US Army Corps
of Engineers ®
Portland District

SOLICITATION
W9127N26BA024

Bonneville Lock and Dam
Cascade Locks, Multnomah County, Oregon

Navigation Lock 1 Bridge Replacement

Project Manual

BONNEVILLE LOCK AND DAM NAVIGATION LOCK 1 BRIDGE REPLACEMENT
CASCADE LOCKS, MULTNOMAH COUNTY, OREGON

TABLE OF CONTENTS

00 10 00 SOLICITATION, OFFER, AND AWARD (SF 1442)

00 00 00 PROCUREMENT AND CONTRACTING REQUIREMENTS

00 10 00 SOLICITATION

00 21 00 INSTRUCTIONS

00 21 13 INSTRUCTIONS TO BIDDERS

00 22 00 SUPPLEMENTARY INSTRUCTIONS

00 45 00 REPRESENTATIONS AND CERTIFICATIONS

00 70 00 CONDITIONS OF THE CONTRACT

00 72 00 GENERAL CONDITIONS

00 73 00 SUPPLEMENTARY CONDITIONS

01 00 00 GENERAL REQUIREMENTS

GENERAL AND TECHNICAL REQUIREMENTS: SEE PROJECT TABLE OF CONTENTS

ATTACHMENTS

A1: Submittal Register (ENG Form 4288-R)

A2: Limitations on Subcontracting Form

A3: Construction Project Identification Sign

A4: Spill Emergency Initial Report Form

A5: Bonneville Boat Restricted Zone Policy

A6: Floating Plant Inspection Checklist

BONNEVILLE LOCK AND DAM NAVIGATION LOCK 1 BRIDGE REPLACEMENT
CASCADE LOCKS, MULTNOMAH COUNTY, OREGON

TABLE OF CONTENTS

A7: Lid Verification Report

A8: Bathymetry Files

A9: Incidental Harassment Authorization

A10: Post Review Discovery Plan

A11: Construction and Demolition Cumulative Report

A12: Water Quality Certificate

A13: Conduct of a Dive/ROV Operation (NWPR 385-1-93)

A14: Bonneville Subsurface Investigation Report

A15: Geotechnical Data Report

A16: As-built Drawings

A17: Wage Determinations - Oregon

SOLICITATION, OFFER, AND AWARD

(Construction, Alteration, or Repair)

1. SOLICITATION NUMBER	2. TYPE OF SOLICITATION	3. DATE ISSUED	PAGE	OF	PAGES
W9127N26BA024	[X] SEALED BID (IFB) INVITATION FOR BID [ ] NEGOTIATED (RFP) REQUEST FOR PROPOSAL		1		242

IMPORTANT - The "offer" section on the reverse must be fully completed by offeror.

4. CONTRACT NUMBER	5. REQUISITION/PURCHASE REQUEST NUMBER	6. PROJECT NUMBER
		475034

7. ISSUED BY CODE W9127N

W071 ENDIST PORTLAND
KO CONTRACTING DIVISION, 333 SW FIRST AVE
PORTLAND, OR 97204-3495
UNITED STATES
CHRISTOPHER BURROUGHS, EMAIL: CHRISTOPHER.D.BURROUGHS@USACE.ARMY.MIL TELEPHONE: 503-808-4910

8. ADDRESS OFFER TO

W071 ENDIST PORTLAND
KO CONTRACTING DIVISION, 333 SW FIRST AVE
PORTLAND, OR 97204-3495
UNITED STATES

9. FOR INFORMATION CALL:	a. NAME	b. TELEPHONE NUMBER *(Include area code) (NO COLLECT CALLS)*
	CHRISTOPHER BURROUGHS	503-808-4910

SOLICITATION

NOTE: In sealed bid solicitations "offer" and "offeror" mean "bid and "bidder".

10. THE GOVERNMENT REQUIRES PERFORMANCE OF THE WORK DESCRIBED IN THESE DOCUMENTS *(Title, identifying number, date)*

PROJECT TITLE: BONNEVILLE LOCK AND DAM - NAVIGATION LOCK 1 BRIDGE REPLACEMENT
PROJECT LOCATION: CASCADE LOCKS, MULTNOMAH COUNTY, OREGON

MAGNITUDE OF CONSTRUCTION: BETWEEN $10,000,000.00 AND $25,000,000.00
NAICS: 237310 - HIGHWAY, STREET, AND BRIDGE CONSTRUCTION
SOCIOECONOMIC: TOTAL SMALL BUSINESS SET-ASIDE

11. The contractor shall begin performance within 10 calendar days and complete it within 930 calendar days after receiving [ ] award, [X] notice to proceed. This performance period is [X] mandatory [ ] negotiable. ***(See*** Section 00 73 00 Para. L ***).***

12a. THE CONTRACTOR MUST FURNISH ANY REQUIRED PERFORMANCE AND PAYMENT BONDS? *(If "YES", indicate within how many calendar days after award in Item 12b.)*	12b. CALENDAR DAYS
[X] YES [ ] NO	10

13. ADDITIONAL SOLICITATION REQUIREMENTS:

a. Sealed offers in original and 1 copies to perform the work required are due at the place specified in Item 8 by 03:00 PM ***(hour)*** local time 18 SEP 2026 (date). If this is a sealed bid solicitation, offers will be publicly opened at that time. Sealed envelopes containing offers shall be marked to show the offeror's name and address, the solicitation number, and the date and time offers are due.

b. An offer guarantee [X] is, [ ] is not required.

c. All offers are subject to the (1) work requirements, and (2) other provisions and clauses incorporated in the solicitation in full text or by reference.

d. Offers providing less than 120 calendar days for Government acceptance after the date offers are due will not be considered and will be rejected.

OFFER *(Must be fully completed by offeror)*

14. NAME AND ADDRESS OF OFFEROR *(Include ZIP Code)*

Stellar J Corporation
1363 Down River Drive
Woodland, WA 98674

CODE FACILITY CODE

15. TELEPHONE NUMBER *(Include area code)*

360-225-7996

16. REMITTANCE ADDRESS *(Include only if different than Item 14.)*

17. The offeror agrees to perform the work required at the prices specified below in strict accordance with the terms of this solicitation, if this offer is accepted by the Government in writing within 120 calendar days after the date offers are due. *(Insert any number equal to or greater than the minimum requirement stated in Item 13d. Failure to insert any number means the offeror accepts the minimum in Item 13d.)*

AMOUNTS ▶

18. The offeror agrees to furnish any required performance and payment bonds.

19. ACKNOWLEDGMENT OF AMENDMENTS
(The offeror acknowledges receipt of amendments to the solicitation -- give number and date of each)

AMENDMENT NUMBER										
DATE										

20a. NAME AND TITLE OF PERSON AUTHORIZED TO SIGN OFFER *(Type or print)*

Jeff Carlsen/President

20b. SIGNATURE

20c. OFFER DATE

Sept 18, 2026

AWARD *(To be completed by Government)*

21. ITEMS ACCEPTED:

22. AMOUNT

23. ACCOUNTING AND APPROPRIATION DATA

24. SUBMIT INVOICES TO ADDRESS SHOWN IN *(4 copies unless otherwise specified)* ▶ ITEM

25. OTHER THAN FULL AND OPEN COMPETITION PURSUANT TO THE UNITED STATES CODE AT

☐ 10 U.S.C. 3204(a) ( ) ☐ 41 U.S.C. 3304(a) ( )

26. ADMINISTERED BY

27. PAYMENT WILL BE MADE BY

CONTRACTING OFFICER WILL COMPLETE ITEM 28 OR 29 AS APPLICABLE

☐ 28. NEGOTIATED AGREEMENT *(Contractor is required to sign this document and return _____ copies to issuing office.)* Contractor agrees to furnish and deliver all items or perform all work requirements identified on this form and any continuation sheets for the consideration stated in this contract. The rights and obligations of the parties to this contract shall be governed by (a) this contract award, (b) the solicitation, and (c) the clauses, representations, certifications, and specifications incorporated by reference in or attached to this contract.

☐ 29. AWARD *(Contractor is not required to sign this document.)* Your offer on this solicitation is hereby accepted as to the items listed. This award consummates the contract, which consists of (a) the Government solicitation and your offer, and (b) this contract award. No further contractual document is necessary.

30a. NAME AND TITLE OF CONTRACTOR OR PERSON AUTHORIZED TO SIGN *(Type or print)*

31a. NAME OF CONTRACTING OFFICER *(Type or print)*

30b. SIGNATURE

30c. DATE

31b. UNITED STATES OF AMERICA

BY

31c. DATE

Section 00 00 00 - Procurement and Contracting Requirements

Instrument Name: Bonneville Lock and Dam - Navigation Lock 1 Bridge Replacement

Contract Description: MAGNITUDE OF CONSTRUCTION: Between $10,000,000.00 and $25,000,000.00 NAICS: 237310 - HIGHWAY, STREET, AND BRIDGE CONSTRUCTION SOCIOECONOMIC: Total Small Business Set-Aside

The scope included in this solicitation requires the contractor and/or subcontractor(s) information system to process, store, or transmit Federal Contract Information (FCI) or Controlled Unclassified Information (CUI), and requires the contractor and/or subcontractor(s) to comply with CMMC requirements. The Contractor shall have and maintain for the duration of this contract, order, or agreement a current CMMC status at the following CMMC level, or higher: **CMMC Level 1 (Self)** for all information systems used in performance of the contract, task order, or delivery order that process, store, or transmit FCI or CUI. See DFARS 252.204-7021 "Contractor Compliance With the Cybersecurity Maturity Model Certification Level Requirements", for the definitions, requirements, reporting, and subcontract information for this contract/order/agreement."

*** END OF NARRATIVE ***

Section 00 10 00 - Solicitation, Contract Line Item Number (CLIN) Schedule

Additional Information/Notes

CLIN Totals

Mandatory CLINS:

*** END OF NARRATIVE ***

Item	Supplies/Service	Quantity	Unit	Unit Price	Amount
0001	Mobilization and Demobilization Product Service Code: Y1LB Pricing Arrangement: Firm Fixed Price	1	Job		
0002	Demolition Product Service Code: Y1LB Pricing Arrangement: Firm Fixed Price	1	Job		
0003	Structural Product Service Code: Y1LB Pricing Arrangement: Firm Fixed Price	1	Job		
0004	Civil Product Service Code: Y1LB Pricing Arrangement: Firm Fixed Price	1	Job		

0005	Utilities Product Service Code: Y1LB Pricing Arrangement: Firm Fixed Price	1	Job		
0006	Landscape Product Service Code: Y1LB Pricing Arrangement: Firm Fixed Price	1	Job		

Section 00 21 00 - Instructions

E-VERIFY

Contractors shall comply with the requirements set forth in FAR clause 52.222-54 Employment Eligibility Verification and RFO 22.18 in using the E-Verify Program at (https://www.e-verify.gov/) (website subject to change) to meet the contract employment eligibility requirements. Contractors are encouraged to cooperate with Federal and State agencies responsible for enforcing labor requirements to include eligibility for employment under United States immigration laws in accordance with FAR 22.102-1(i). An initial list of verified/eligible candidates shall be provided to the COR no later than three business days after the initial contract award. When contracts are with individuals, the individuals will be required to complete a Form I-9, Employment Eligibility Verification, and submit it to the Contracting Officer to become part of the official contract file.

SITE VISIT (CONSTRUCTION) (FEB 1995)

a) The conditions, Differing Site Conditions, and Site Investigations and Conditions Affecting the Work, will be included in any contract awarded as a result of this solicitation. Accordingly, offerors or quoters are urged and expected to inspect the site where the work will be performed.

b) an organized site visit has been scheduled for:

10:00 A.M. on August 27, 2026

c) Participants will meet at:

Admin Building Security Desk

Exit 40, I-84 Bonneville Lock and Dam

Cascade Locks, OR 997014

Anyone planning to attend should notify Michael R. Carl via email at michael.r.carl@usace.army.mil at least 2 business days prior to the scheduled site visit.

All participants will be required to possess a Real ID in order to access the site.

52.233-2 Service of Protest. (Deviation) 2026-02

Service of Protest (Feb 2026) (Deviation)

(a) Protests, (as defined in FAR 33.102), that are filed directly with an agency, and copies of any protests that are filed with the Government Accountability Office (GAO), must be served on the Contracting Officer identified in the solicitation by obtaining written and dated acknowledgment of receipt from them.

(b) The copy of any protest must be received in the office designated above within one day of filing a protest with the GAO.

(End of provision)

*** END OF NARRATIVE ***

FAR Provisions Incorporated by Reference

Number	Title	Effective Date	Alternate Deviation	Variation Effective Date
52.214-4	False Statements in Bids.	1984-04		
52.214-6	Explanation to Prospective Bidders.	1984-04		
52.214-34	Submission of Offers in the English Language.	1991-04		
52.214-35	Submission of Offers in U.S. Currency.	1991-04		
52.225-12	Notice of Buy American Requirement-Construction Materials Under Trade Agreements.	2014-05		

FAR Provisions Incorporated by Full Text

Number	Title	Effective Date	Alternate Deviation	Variation Effective Date
52.204-7	System for Award Management-Registration. (Deviation 2026-O0038)	2026-02		

System for Award Management-Registration (Feb 2026) (Deviation 2026-O0038)

The Offeror shall have an active Federal Government contracts registration in the System for Award Management (SAM) when submitting an offer or quotation in response to this solicitation and at the time of award. As part of the SAM registration process, the Government collects information, as described in paragraphs (b) through (d) of this provision, that is necessary to identify the Offeror and for the Offeror to be awarded Federal Government contracts. To register in SAM, go to https://www.sam.gov. Allow for processing time when registering in SAM. If the Offeror is not registered in SAM, it should register immediately after receiving this solicitation.

(a) Definitions. As used in this provision-

Commercial and Government Entity (CAGE) code has the meaning provided in the clause at the Federal Acquisition Regulation (FAR) 52.204-13, System for Award Management-Maintenance, of this solicitation.

Electronic Funds Transfer (EFT) indicator means a bank account identifier to establish additional System for Award Management records for identifying alternative EFT accounts (see part 32) for the same entity.

Highest-level owner means the entity that owns or controls an immediate owner of the offeror, or that owns or controls one or more entities that control an immediate owner of the offeror. No entity owns or exercises control of the highest-level owner.

Immediate owner means an entity, other than the offeror, that has direct control of the offeror. Indicators of control include, but are not limited to, one or more of the following: ownership or interlocking management, identity of interests among family members, shared facilities and equipment, and the common use of employees. There may be more than one immediate owner (e.g., joint ventures).

Predecessor means an entity whose assets were acquired by the offeror or another entity (most often through merger or acquisition) and whose affairs are now carried out by the offeror or the other entity under a new name.

Taxpayer identification number means the number required by the Internal Revenue Service (IRS) to be used by the offeror to report income tax and other returns. It may be either a Social Security Number or an Employer Identification Number.

Unique entity identifier (UEI) has the meaning provided in the clause at FAR 52.204-13, System for Award Management-Maintenance, of this solicitation.

(b) Identifiers. The Offeror shall obtain and provide the following identifying information:

(1) Unique entity identifier (UEI).

(i) The Offeror shall obtain a UEI to register in SAM. The Government will independently validate the existence and uniqueness of the Offeror before assigning a UEI to the Offeror. Go to https://www.sam.gov for instructions on obtaining a UEI.

(ii) The Offeror shall enter, in the block with its name and address on the cover page of its offer, the annotation "Unique Entity Identifier" followed by the UEI that identifies the Offeror's name and address exactly as stated in the offer. The Offeror shall also enter its EFT indicator, if applicable.

(iii) The Contracting Officer will use the UEI to verify that the Offeror has an active Federal Government contracts registration in SAM.

(2) Taxpayer identification number (TIN).

(i) The Offeror shall provide its TIN or related information to comply with debt collection requirements of 31 U.S.C. 7701(c) and 3325(d); reporting requirements of 26 U.S.C. 6041, 6041A, and 6050M; and implementing regulations issued by the IRS. The Offeror shall consent for TIN validation; and

(3) Commercial and Government Entity (CAGE) code.

(i) The Offeror shall provide a CAGE code and legal business name (Do not use a "doing business as" name) for-

(A) Itself;

(B) Its immediate owner(s), if any;

(C) Its highest-level owner, if any; and

(D) Any predecessor(s), or predecessor of an Offeror's predecessor, that held a Federal contract or grant within the last three years.

(ii) If the Offeror is in the United States or its outlying areas and does not already have a CAGE code assigned, the DLA CAGE Branch will assign a CAGE code to the Offeror as a part of the SAM registration process. For information on obtaining a CAGE code go to https://cage.dla.mil/.

(iii) The Offeror shall get from any immediate and/or highest-level owner(s) their respective CAGE code(s) to provide the code(s) as part of the registration (FAR 52.204-7(b)(3)(i)).

(iv) If the Offeror is located outside of the United States or its outlying areas, and does not already have a CAGE code assigned, the Offeror may obtain a CAGE code as indicated in the following table.

If the Offeror is…	Then…
Located in a country that is a member of the North Atlantic Treaty Organization (NATO) or a sponsored nation	Contact the appropriate National Codification Bureau (https://www.nato.int/structur/ac/135/about/contacts)
Located in a country that is not a member of NATO or a sponsored nation	Contact the NATO Support and Procurement Agency (NSPA) (https://eportal.nspa.nato.int/AC135Public/scage/CageList.aspx)

(c) Representations and certifications.

(1) The following FAR solicitation provisions contain entity-level representations and certifications that the Offeror shall submit as part of their Federal Government contracts registration in SAM:

Provision	Title	Date
52.204-5	Women-Owned Business (Other Than Small Business)	Oct 2014
52.209-2	Prohibition on Contracting with Inverted Domestic Corporations-Representation	Nov 2015

52.209-5 Certification Regarding Responsibility Matters Aug 2020

52.209-11 Representation by Corporations Regarding Delinquent Tax Liability or a Felony Conviction under any Federal Law Feb 2016

52.219-1 Small Business Program Representations Feb 2024

52.219-1 Alt I Small Business Program Representations, with its Alternate I Feb 2024

52.219-1 Alt II Small Business Program Representations, with its Alternate II Mar 2023

52.226-2 Historically Black College or University and Minority Institution Representation Oct 2014

(2) By submitting its offer, the Offeror verifies that, as of the date of its offer, its representations and certifications posted electronically in SAM for the provisions listed in paragraph (c)(1) of this provision are current, accurate, and complete. The Offeror's representations and certifications in SAM are hereby incorporated by reference into its offer.

(d) Other information. The Offeror shall provide more information on its business operations and type that is necessary to be considered for award of certain contracts and financial information necessary to receive payment under contracts.

(End of provision)

52.214-3 Amendments to Invitations for Bids. (Deviation 2026-O0038) 2026-02

Amendments to Invitations for Bids (Feb 2026) (Deviation 2026-O0038)

(a) If this solicitation is amended, then all terms and conditions which are not modified remain unchanged.

(b)

(1) Bidders shall acknowledge receipt of any amendment to this solicitation-

(i) By signing and returning the amendment;

(ii) By identifying the amendment number and date in space provided for this purpose on the form for submitting a bid;

(iii) By letter; or

(iv) By email, if email bids are authorized in the solicitation.

(2) The Government shall receive the acknowledgement by the time and at the place specified for receipt of bids.

(End of provision)

52.214-5	Submission of Bids. (Deviation 2026-O0038)	2026-02

Submission of Bids (Feb 2026) (Deviation 2026-O0038)

(a) Bids and bid modifications shall be submitted in sealed envelopes or packages (unless submitted by electronic means) (1) addressed to the office specified in the solicitation, and (2) showing the time and date specified for receipt, the solicitation number, and the name and address of the bidder.

(b) Bidders using commercial carrier services shall ensure that the bid is addressed and marked on the outermost envelope or wrapper as prescribed in subparagraphs (a) (1) and (2) of this provision when delivered to the office specified in the solicitation.

(c) Bids submitted by electronic commerce shall be considered only if the electronic commerce method was specifically stipulated or permitted by the solicitation.

(End of provision)

52.214-7	Late Submissions, Modifications, and Withdrawals of Bids. (Deviation 2026-O0038)	2026-02

Late Submissions, Modifications, and Withdrawals of Bids (Feb 2026) (Deviation 2026-O0038)

(a) Bidders are responsible for submitting bids, and any modifications or withdrawals, so as to reach the Government office designated in the invitation for bids (IFB) by the time specified in the IFB. If no time is specified in the IFB, the time for receipt is 4:30 p.m., local time, for the designated Government office on the date that bids are due.

(b)

(1) Any bid, modification, or withdrawal received at the Government office designated in the IFB after the exact time specified for receipt of bids is "late" and will not be considered unless it is received before award is made, the Contracting Officer determines that accepting the late bid would not unduly delay the acquisition; and-

(i) If it was transmitted through an electronic commerce method authorized by the IFB, it was received at the initial point of entry to the Government infrastructure not later than 5:00 p.m. one working day prior to the date specified for receipt of bids; or

(ii) There is acceptable evidence to establish that it was received at the Government installation designated for receipt of bids and was under the Government's control prior to the time set for receipt of bids.

(2) However, a late modification of an otherwise successful bid that makes its terms more favorable to the Government, will be considered at any time it is received and may be accepted.

(c) Acceptable evidence to establish the time of receipt at the Government installation includes the time/date stamp of that installation on the bid wrapper, other documentary evidence of receipt maintained by the installation, or oral testimony or statements of Government personnel.

(d) If an emergency or unanticipated event interrupts normal Government processes so that bids cannot be received at the Government office designated for receipt of bids by the exact time specified in the IFB and urgent Government requirements preclude amendment of the IFB, the time specified for receipt of bids will be deemed to be extended to the same time of day

specified in the solicitation on the first work day on which normal Government processes resume.

(e) Bids may be withdrawn by written notice received at any time before the exact time set for receipt of bids. A bid may be withdrawn in person by a bidder or its authorized representative if, before the exact time set for receipt of bids, the identity of the person requesting withdrawal is established and the person signs a receipt for the bid.

(End of provision)

52.216-1	Type of Contract. (Deviation 2026-O0038)	2026-02

Type of Contract (Feb 2026) (Deviation 2026-O0038)

The Government contemplates award of a **Firm-Fixed Price** contract resulting from this solicitation.

(End of provision)

52.222-5	Construction Wage Rate Requirements-Secondary Site of the Work. (Deviation 2026-O0038)	2026-02

Construction Wage Rate Requirements-Secondary Site of the Work (Feb 2026) (Deviation 2026-O0038)

(a)

(1) The offeror must notify the Government if the offeror intends to perform work at any secondary site of the work, as defined in paragraph (a)(1)(ii) of the FAR clause at 52.222-6, Construction Wage Rate Requirements, of this solicitation.

(2) If the offeror is unsure if a planned work site satisfies the criteria for a secondary site of the work, the offeror must request a determination from the Contracting Officer.

(b)

(1) If the wage determination provided by the Government for work at the primary site of the work is not applicable to the secondary site of the work, the offeror must request a wage determination from the Contracting Officer.

(2) The due date for receipt of offers will not be extended as a result of an offeror's request for a wage determination for a secondary site of the work.

(End of provision)

52.228-1 Bid Guarantee. 1996-09

Bid Guarantee (Sept 1996)

(a) Failure to furnish a bid guarantee in the proper form and amount, by the time set for opening of bids, may be cause for rejection of the bid.

(b) The bidder shall furnish a bid guarantee in the form of a firm commitment, *e.g.,* bid bond supported by good and sufficient surety or sureties acceptable to the Government, postal money order, certified check, cashier's check, irrevocable letter of credit, or, under Treasury Department regulations, certain bonds or notes of the United States. The Contracting Officer will return bid guarantees, other than bid bonds-

(1) To unsuccessful bidders as soon as practicable after the opening of bids; and

(2) To the successful bidder upon execution of contractual documents and bonds (including any necessary coinsurance or reinsurance agreements), as required by the bid as accepted.

(c) The amount of the bid guarantee shall be **20** percent of the bid price or **$3,000,000.00**, whichever is less.

(d) If the successful bidder, upon acceptance of its bid by the Government within the period specified for acceptance, fails to execute all contractual documents or furnish executed bond(s) within 10 days after receipt of the forms by the bidder, the Contracting Officer may terminate the contract for default.

(e) In the event the contract is terminated for default, the bidder is liable for any cost of acquiring the work that exceeds the amount of its bid, and the bid guarantee is available to offset the difference.

(End of clause)

52.252-1	Solicitation Provisions Incorporated by Reference.	1998-02

Solicitation Provisions Incorporated by Reference (Feb 1998)

This solicitation incorporates one or more solicitation provisions by reference, with the same force and effect as if they were given in full text. Upon request, the Contracting Officer will make their full text available. The offeror is cautioned that the listed provisions may include blocks that must be completed by the offeror and submitted with its quotation or offer. In lieu of submitting the full text of those provisions, the offeror may identify the provision by paragraph identifier and provide the appropriate information with its quotation or offer. Also, the full text of a solicitation provision may be accessed electronically at this/these address(es):

Federal Acquisition Regulation: https://www.acquisition.gov/browse/index/far

Revolutionary FAR Overhaul: https://www.acquisition.gov/sites/default/files /page_file_uploads/RFO.pdf

Defense Federal Acquisition Regulation Supplement: https://www.acquisition.gov/dfars

DFARS Class Deviations: https://www.acq.osd.mil/dpap/dars/class_deviations.html

Army Federal Acquisition Regulation Supplement: https://www.acquisition.gov/afars

(End of provision)

52.252-5	Authorized Deviations in Provisions.	2020-11

Authorized Deviations in Provisions (Nov 2020)

(a) The use in this solicitation of any Federal Acquisition Regulation (**48 CFR Chapter 1**) provision with an authorized deviation is indicated by the addition of "(DEVIATION)" after the date of the provision.

(b) The use in this solicitation of any **Defense Federal Acquisition Regulation Supplement (DFARS) (48 CFR Chapter2)** provision with an authorized deviation is indicated by the addition of "(DEVIATION)" after the name of the regulation.

(End of provision)

DFARS Provisions Incorporated by Full Text

Number	Title	Effective Date	Alternate Deviation	Variation Effective Date
252.204-7024	Notice on the Use of the Supplier Performance Risk System.	2023-03		

NOTICE ON THE USE OF THE SUPPLIER PERFORMANCE RISK SYSTEM (MAR 2023)

(a) Definitions. As used in this provision-

"Item risk" means the probability that a product, based on intended use, will introduce performance risk resulting in safety issues, mission degradation, or monetary loss.

"Price risk" means a measure of whether a proposed price for a product or service is consistent with historical prices paid for that item or service.

"Supplier risk" means the probability that an award may subject the procurement to the risk of unsuccessful performance or to supply chain risk (see Defense Federal Acquisition Regulation Supplement 239.7301).

(b) The Supplier Performance Risk System (SPRS), available at https://piee.eb.mil/, will be used in the evaluation of the Quoter or Offeror's performance. SPRS retrieves item, price, quality, delivery, and contractor information on contracts from Government reporting systems in

order to develop risk assessments.

(c) The Contracting Officer will consider SPRS risk assessments during the evaluation of quotations or offers received in response to this solicitation as follows:

(1) Item risk will be considered to determine whether the procurement represents a high performance risk to the Government.

(2) Price risk will be considered in determining if a proposed price is consistent with historical prices paid for a product or a service or otherwise creates a risk to the Government.

(3) Supplier risk, including but not limited to quality and delivery, will be considered to assess the risk of unsuccessful performance and supply chain risk.

(d) SPRS risk assessments are generated daily. Quoters or Offerors are able to access their risk assessments by following the access instructions in the SPRS user's guide available at https://www.sprs.csd.disa.mil/reference.htm. Quoters and Offerors are granted access to SPRS for their own risk assessment classifications only. SPRS reporting procedures and risk assessment methodology are detailed in the SPRS user's guide. The method to challenge a rating generated by SPRS is also provided in the user's guide. SPRS evaluation criteria are available at https://www.sprs.csd.disa.mil/pdf/SPRS_DataEvaluationCriteria.pdf.

(e) The Contracting Officer may consider any other available and relevant information when evaluating a quotation or an offer.

(End of provision)

252.204-7025	Notice of Cybersecurity Maturity Model Certification Level Requirements.	2025-11

NOTICE OF CYBERSECURITY MATURITY MODEL CERTIFICATION LEVEL REQUIREMENTS (NOV 2025)

(a) *Definitions*. As used in this provision, "controlled unclassified information (CUI)," "current," "Cybersecurity Maturity Model Certification (CMMC) status," "Cybersecurity Maturity Model Certification unique identifier (CMMC UID)," "Federal contract information (FCI)", and

"plan of action and milestones" have the meaning given in the Defense Federal Acquisition Regulation Supplement 252.204-7021, Contractor Compliance With the Cybersecurity Maturity Model Certification Level Requirements, clause of this solicitation.

(b)(1) *Cybersecurity Maturity Model Certification (CMMC) level*. The CMMC level required by this solicitation is: ***CMMC Level 1 (Self)***. This CMMC level, or higher (see 32 CFR part 170), is required prior to award for each contractor information system that will process, store, or transmit Federal contract information (FCI) or controlled unclassified information (CUI) during performance of the contract.

(2) The Offeror will not be eligible for award of a contract, task order, or delivery order resulting from this solicitation if the Offeror does not have, for each of the contractor information systems that will process, store, or transmit FCI or CUI and that will be used in performance of a contract resulting from this solicitation-

(i) The current CMMC status entered in the Supplier Performance Risk System (SPRS) (*https://piee.eb.mil*) at the CMMC level required by paragraph (b)(1) of this provision; and

(ii) A current affirmation of continuous compliance with the security requirements identified at 32 CFR part 170 in SPRS.

(c) *Plan of action and milestones*. If the Offeror has a CMMC Status of Conditional, the Offeror shall successfully close out a valid plan of action and milestones (32 CFR 170.21) to achieve a CMMC Status of Final.

(d) *CMMC unique identifiers*. The Offeror shall provide, in the proposal, the CMMC unique identifier(s) (CMMC UIDs) issued by SPRS for each contractor information system that will process, store, or transmit FCI or CUI during performance of a contract, task order, or delivery order resulting from this solicitation. The Offeror also shall update the list when new CMMC UIDs are generated in SPRS. The CMMC UIDs are provided in SPRS after the Offeror enters the results of self-assessment(s) for each such information system.

(End of provision)

Section 00 21 13 - Instructions to Bidders

BIDDER INQUIRIES

All inquiries regarding this solicitation are to be submitted via ProjNet-Bidsm. Inquiries will not be accepted 10 calendar days or less prior to bid close date. Telephone and email inquiries will not be accepted. ProjNet-Bidsm is a web-based program that allows bidders to post questions regarding the solicitation and to view all questions by other bidders and answers by USACE. ProjNet-Bidsm can be accessed through ProjNetsm at https://www. projnet.org/projnet/. To access the ProjNet-Bidsm website the first time:

1) Click the Bid tab

2) Click Bidder Inquiry. (The Agency is USACE.)

3) Enter the following information for access:

The Bidder Inquiry Key **6KBW6P-RN6ZCI**

Valid business contact information (e.g. Company name, contact person, business address, phone number and email address). (required on first project only)

Establish secret question and answer which will be used as a password. (required on first project only)

4) For subsequent access use your email address, the Bid Inquiry Key and response to the secret question to access the ProjNet-Bidsm Module.

5) Submit questions or review questions and answers. (A bidder who submits a question will receive an automated email notification that their question has been received. When an answer is posted to a question, the question and answer is then available for all other bidders to review.

6) For a specific step-by-step for POSTING YOUR INQUIRIES, is available in the Reference link on the Contract Viewer.

7) For questions about the ProjNet-Bidsm, please contact the Call Center help desk toll free at 1-800-428- HELP, which operates from 8AM to 5PM (Central US time zone). ProjNet-Bidsm questions can also be emailed to the helpdesk at staff@rcesupport.com. No response will be posted to inquiries after the Close of Business on the seventh business day preceding the solicitation due date. All bidders will be held to have reviewed the questions and responses in ProjNet-Bidsm prior to bid submission. Nothing in the solicitation is changed unless an amendment is sent out.

ELECTRONIC SUBMISSION INSTRUCTIONS

HARD COPY SUBMISSIONS WILL NOT BE CONSIDERED.

Bids are due no later than the time and date specified in Block 13 of Standard Form 1442, or SF 30 if applicable. Bids received at the Government Point of Entry after the date and time in block 13. A. of the solicitation will be considered a late bid, and will not be considered for award.

Offeror shall submit its Bid via email to Chris Burroughs at christopher.d.burroughs@usace. army. mil and Justin Figueredo at justin.f.figueredo@usace.army.mil.

Offerors should enter a description for every file submitted. For files over 20 megabytes (MB) the offeror shall break the file into smaller files sent via separate emails, each marked to identify which number the email is relative to the total number of emails submitted (i.e. "one of four").

Once all of the emails submitted have been received, the Government will confirm receipt via return email. If an offeror submits multiple bids, the Government will only consider the last bid submitted prior to the bid due date and time.

The electronic Bid shall be in Portable Document Format, filename extension: ".pdf" and suitable for viewing in Adobe Reader. Offerors shall bookmark and label each electronic PDF to afford easy identification from the Bid table of contents.

Do not assume submission will be instantaneous. File size and number of files submitted shall be considered. Offeror/Teammate/Subcontractors should allow adequate time for submission completion because the entire Bid (i.e. offerors submission and all teammate/subcontractor(s) independent submissions) must be received by the time and date specified in Block 13 of Standard Form 1442, or SF 30 if applicable.

To avoid rejection of an offer, the offeror must make every effort to ensure its electronic submission is virus-free. Bids, or portions thereof, submitted with the presence of a virus or which are otherwise unreadable will be treated as unreadable pursuant to RFO 14.302.

The requirement that an original and copy(ies) be submitted as found in block 13A of the SF1442 is satisfied through the electronic submission. Additionally, electronic submission of the bid guarantee, when a bid guarantee is required, is due with the bid submission (mailing a bid guarantee is not allowed).

BID OPENING

No hard copy documents are allowed to be submitted at the bid opening. Due to the requirement that bids be submitted electronically only, bid opening is scheduled for one hour following the bid due date and time to allow the Contracting Office time to download all bid documents.

The bid opening will be held telephonically at **4:00 pm**, local time, on the date bids are due. Offerors wishing to participate in the telephonic bid opening shall email a list of their participants to both Chris Burroughs at christopher.d.burroughs@usace.army.mil and Justin Figueredo at justin.f. figueredo@usace.army.mil. In the email subject line use title, **"W9127N26BA024 Bonneville**

Lock and Dam - Navigation Lock 1 Bridge Replacement Bid Opening". The telephone number and security passcode for offerors to utilize will be provided via return email to the offerors initial email including the list of its participants. There will be no physical bid opening held at the Portland District, therefore, offerors are advised that they shall not plan to attend a bid opening in person on the day of bid opening.

SPECIAL CONTRACT REQUIREMENTS

1) FAR provision 52.229-11 and FAR clause 52.229-12

FAR provision 52.229-11 and FAR clause 52.229-12 are included in this solicitation. This provision and clause concern the imposition of a 2 percent Federal excise tax withholding on any resultant contract award or payment request. This rule applies to Federal Government contracts for goods or services that are awarded to foreign persons - such as foreign contractors. It implements the Department of the Treasury's final regulations published in the Federal Register at 81 FR 55133 on August 18, 2016, under section 5000C of the Internal Revenue Code relating to the 2 percent tax on payments made by the U.S. Government to foreign persons pursuant to certain contracts.

Pursuant to the FAR 52.229-3 Federal, State, and Local Taxes, taxes imposed under 26 U.S.C. 5000 C may not be included in the contract price or reimbursed.

Exemptions from this excise tax must be claimed by an Offeror when it submits, with its offer, a U. S. Department of Treasury Internal Revenue Service (IRS) Form W-14, Certificate of Foreign Contracting Party Receiving Federal Procurement Payments, available via the internet at www.irs. gov/W14. If not submitted with the offer, exemptions will not be applied to any resulting contract and the Government will withhold a full 2 percent on each contract payment. Failure to submit an IRS Form W-14 with each payment request will also result in an automatic withholding of 2 percent from the payment request.

When filling out the IRS Form W-14 the following information may be used to complete Part I, Lines 6 and 7.

Line 6 Contract/reference number: **W9127N26BA024**

Line 7 "Name and address of the acquiring agency":

USACE Portland District

333 SW First Avenue

Portland, Oregon 97204-3440

503-808-4616

Any exemption claimed and self-certified is subject to audit by the IRS. Any disputes concerning this tax are adjudicated by the IRS because the Section 5000C tax is a tax matter not a contract issue.

Offerors are encouraged to seek guidance from their own tax professionals for advice concerning the provision, clause, and exclusions exclusion /submission of IRS Form W-14. Additional information is also available at:

Notwithstanding the above, the USACE does not have a means of withholding this excise tax at this time. As a result, contractors are expected to comply with the instructions above and to properly complete and return the W-14 at proposal submission, and with each pay application. The amount due for each withholding will be confirmed by USACE, BUT WILL NOT BE WITHHELD. It is the contractor's responsibility to set aside, or remit to the IRS, the amount confirmed by USACE. Whether the contractor sets the money aside for future payment to the IRS, or makes payment to the IRS, is the contractor's discretion, based on its analysis of the regulations regarding the excise tax. In the event that USACE is able to withhold during contract performance, it will notify the contractor and make such a withholding (including any catch up withholdings); no advance notice is required to the contractor prior to the withholding. Under no circumstances is USACE liable for any tax not paid by the contractor. The contractor is liable for the tax, to the extent required by law, regardless of whether USACE makes a withholding.

RFO 29.204 expressly states that, "Agencies merely withhold the tax for the Internal Revenue Service (IRS). All substantive issues regarding the underlying section 5000C tax, such as the imposition of or exemption from the tax, are matters under IRS jurisdiction."

Therefore, we cannot help you determine how the tax law applies to you. We strongly recommend that you contact the IRS and/or a tax professional should you have any questions of this nature. To be clear, this information does not constitute tax advice or a representation of your tax liability. Furnishing this information does not create liability for the USACE for any Federal, state, or local taxes applicable to the above-referenced contract or any other contract.

****

For submission requirements and basis of evaluation:

Executed FAR Provision 52.229-11.

Completed IRS Form W-14, Certificate of Foreign Contracting Party Receiving Federal Procurement Payments, if applicable. If not submitted with the offer, exemptions will not be applied to any resulting contract and the Government will withhold a full 2 percent on each payment.

*** END OF NARRATIVE ***

Section 00 22 00 - Supplementary Instructions

Section 00 22 00 - Supplementary Instructions

In accordance with 52.102(c), the following provisions and clauses, available at www.acquisition.gov, require your review and action:

52.219-28

52.222-5

52.229-11

52.236-13 Alt.1

252.236-7001

*** END OF NARRATIVE ***

Section 00 45 00 - Representations and Certifications

FAR Provisions Incorporated by Reference

Number	Title	Effective Date	Alternate Deviation	Variation Effective Date
52.203-11	Certification and Disclosure Regarding Payments to Influence Certain Federal Transactions.	2024-09		
52.203-18	Prohibition on Contracting with Entities that Require Certain Internal Confidentiality Agreements or Statements-Representation.	2017-01		
52.223-1	Biobased Product Certification. (Deviation 2026-O0038)	2026-02		
52.223-4	Recovered Material Certification.	2008-05		

DFARS Provisions Incorporated by Reference

Number	Title	Effective Date	Alternate Deviation	Variation Effective Date
252.203-7005	Representation Relating to Compensation of Former DoD Officials.	2022-09		
252.204-7008	Compliance with Safeguarding Covered Defense Information Controls.	2016-10		
252.225-7055	Representation Regarding	2022-05		

	Business Operations with the Maduro Regime.	
252.225-7059	Prohibition on Certain Procurements from the Xinjiang Uyghur Autonomous Region-Representation.	2023-06
252.227-7028	Technical Data or Computer Software Previously Delivered to the Government.	1995-06

FAR Provisions Incorporated by Full Text

Number	Title	Effective Date	Alternate Deviation	Variation Effective Date
52.203-2	Certificate of Independent Price Determination.	1985-04		

Certificate of Independent Price Determination (Apr 1985)

(a) The offeror certifies that-

(1) The prices in this offer have been arrived at independently, without, for the purpose of restricting competition, any consultation, communication, or agreement with any other offeror or competitor relating to-

(i) Those prices;

(ii) The intention to submit an offer; or

(iii) The methods or factors used to calculate the prices offered.

(2) The prices in this offer have not been and will not be knowingly disclosed by the offeror,

directly or indirectly, to any other offeror or competitor before bid opening (in the case of a sealed bid solicitation) or contract award (in the case of a negotiated solicitation) unless otherwise required by law; and

(3) No attempt has been made or will be made by the offeror to induce any other concern to submit or not to submit an offer for the purpose of restricting competition.

(b) Each signature on the offer is considered to be a certification by the signatory that the signatory-

(1) Is the person in the offeror's organization responsible for determining the prices being offered in this bid or proposal, and that the signatory has not participated and will not participate in any action contrary to paragraphs (a)(1) through (a)(3) of this provision; or

(2)

(i) Has been authorized, in writing, to act as agent for the following principals in certifying that those principals have not participated, and will not participate in any action contrary to paragraphs (a)(1) through (a)(3) of this provision ____[insert full name of person(s) in the offeror's organization responsible for determining the prices offered in this bid or proposal, and the title of his or her position in the offeror's organization];

(ii) As an authorized agent, does certify that the principals named in subdivision (b)(2)(i) of this provision have not participated, and will not participate, in any action contrary to paragraphs (a)(1) through (a)(3) of this provision; and

(iii) As an agent, has not personally participated, and will not participate, in any action contrary to paragraphs (a)(1) through (a)(3) of this provision.

(c) If the offeror deletes or modifies subparagraph (a)(2) above, the offeror must furnish with its offer a signed statement setting forth in detail the circumstances of the disclosure.

(End of provision)

52.209-2	Prohibition on Contracting With Inverted Domestic Corporations-Representation. (Deviation 2026-O0038)	2026-02

Prohibition on Contracting with Inverted Domestic Corporations-Representation (Feb 2026) (Deviation 2026-O0038)

(a) Definitions. As used in this clause-

Inverted domestic corporation means a foreign incorporated entity that meets the definition of an inverted domestic corporation under 6 U.S.C. 395(b), applied in accordance with the rules and definitions of 6 U.S.C. 395(c).

Subsidiary means an entity in which more than 50 percent of the entity is owned-

(1) Directly by a parent corporation; or

(2) Through another subsidiary of a parent corporation.

(b) Government agencies are not permitted to use appropriated (or otherwise made available) funds for contracts with either an inverted domestic corporation, or a subsidiary of an inverted domestic corporation, unless the exception at 9.108-3(b) applies or the requirement is waived in accordance with the procedures at 9.108-5.

(c) Representation. The Offeror represents that-

(1) It [ ] is, [ ] is not an inverted domestic corporation; and

(2) It [ ] is, [ ] is not a subsidiary of an inverted domestic corporation.

(End of provision)

52.209-5	Certification Regarding Responsibility Matters.	2026-02

(Deviation 2026-O0038)

Certification Regarding Responsibility Matters (Feb 2026) (Deviation 2026-O0038)

(a)

(1) The Offeror certifies, to the best of its knowledge and belief, that-

(i) The Offeror and/or any of its Principals-

(A) Are [ ] are not [ ] presently debarred, suspended, proposed for debarment, or declared ineligible for the award of contracts by any Federal agency;

(B) Have [ ] have not [ ], within a three-year period preceding this offer, been convicted of or had a civil judgment rendered against them for: commission of fraud or a criminal offense in connection with obtaining, attempting to obtain, or performing a public (Federal, State, or local) contract or subcontract; violation of Federal or State antitrust statutes relating to the submission of offers; or commission of embezzlement, theft, forgery, bribery, falsification or destruction of records, making false statements, tax evasion, violating Federal criminal tax laws, or receiving stolen property (if offeror checks "have", the offeror shall also see 52.209-7, if included in this solicitation);

(C) Are [ ] are not [ ] presently indicted for, or otherwise criminally or civilly charged by a governmental entity with, commission of any of the offenses enumerated in paragraph (a)(1)(i)(B) of this provision; and

(D) Have [ ], have not [ ], within a three-year period preceding this offer, been notified of any delinquent Federal taxes in an amount that exceeds the threshold at 9.104-5(a)(2) for which the liability remains unsatisfied. Federal taxes are considered delinquent if both of the following criteria apply:

(1) The tax liability is finally determined. The liability is finally determined if it has been assessed. A liability is not finally determined if a pending administrative or judicial challenge remains. In the case of a judicial challenge to the liability, the liability is not finally determined until all judicial appeal rights have been exhausted.

(2) The taxpayer is delinquent in making payment. A taxpayer is delinquent if the taxpayer has

failed to pay the tax liability when full payment was due and required. A taxpayer is not delinquent in cases where enforced collection action is precluded.

(ii) The Offeror has [ ] has not [ ], within a 3-year period preceding this offer, had one or more contracts terminated for default by any Federal agency.

(2) "Principal," for the purposes of this certification, means an officer, director, owner, partner, or a person having primary management or supervisory responsibilities within a business entity (e. g., general manager; plant manager; head of a division or business segment; and similar positions).

(b) The Offeror shall provide immediate written notice to the Contracting Officer if, at any time prior to contract award, the Offeror learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.

(c) A certification that any of the items in paragraph (a) of this provision exists will not necessarily result in withholding of an award under this solicitation. However, the Government will consider the certification in connection with a determination of the Offeror's responsibility. Failure of the Offeror to furnish a certification or provide such additional information as requested by the Contracting Officer may render the Offeror nonresponsible.

(d) This provision does not require establishment of a system of records in order to render, in good faith, the certification required by paragraph (a). The knowledge and information of an Offeror is not required to exceed that which is normally possessed by a prudent person in the ordinary course of business dealings.

(e) The certification in paragraph (a) of this provision is a material representation of fact upon which reliance was placed when making award. If the Government later determines that the Offeror knowingly rendered an erroneous certification, in addition to other remedies available to the Government, the Contracting Officer may terminate the contract resulting from this solicitation for default.

(End of provision)

52.209-7	Information Regarding Responsibility Matters.	2026-02

(Deviation 2026-O0038)

Information Regarding Responsibility Matters (Feb 2026) (Deviation 2026-O0038)

(a) Definitions. As used in this provision-

Administrative proceeding means a non-judicial process that is adjudicatory in nature in order to make a determination of fault or liability (e.g., Securities and Exchange Commission Administrative Proceedings, Civilian Board of Contract Appeals Proceedings, and Armed Services Board of Contract Appeals Proceedings). This includes administrative proceedings at the Federal and State level but only in connection with performance of a Federal contract or grant. It does not include agency actions such as contract audits, site visits, corrective plans, or inspection of deliverables.

Federal contracts and grants with total value greater than $10,000,000 means-

(1) The total value of all current, active contracts and grants, including all priced options; and

(2) The total value of all current, active orders including all priced options under indefinite-delivery, indefinite-quantity, 8(a), or requirements contracts (including task and delivery and multiple-award Schedules).

Principal means an officer, director, owner, partner, or a person having primary management or supervisory responsibilities within a business entity (e.g., general manager; plant manager; head of a division or business segment; and similar positions).

(b) The offeror [ ] has [ ] does not have current active Federal contracts and grants with total value greater than $10,000,000.

(c) If the offeror checked "has" in paragraph (b) of this provision, the offeror represents, by submission of this offer, that the information it has entered in the Federal Awardee Performance and Integrity Information System (FAPIIS) is current, accurate, and complete as of the date of submission of this offer with regard to the following information:

(1) Whether the offeror, and/or any of its principals, has or has not, within the last five years, in connection with the award to or performance by the offeror of a Federal contract or grant, been the subject of a proceeding, at the Federal or State level that resulted in any of the following

dispositions:

(i) In a criminal proceeding, a conviction.

(ii) In a civil proceeding, a finding of fault and liability that results in the payment of a monetary fine, penalty, reimbursement, restitution, or damages of $5,000 or more.

(iii) In an administrative proceeding, a finding of fault and liability that results in-

(A) The payment of a monetary fine or penalty of $5,000 or more; or

(B) The payment of a reimbursement, restitution, or damages in excess of $100,000.

(iv) In a criminal, civil, or administrative proceeding, a disposition of the matter by consent or compromise with an acknowledgment of fault by the Contractor if the proceeding could have led to any of the outcomes specified in paragraphs (c)(1)(i), (c)(1)(ii), or (c)(1)(iii) of this provision.

(2) If the offeror has been involved in the last five years in any of the occurrences listed in (c)(1) of this provision, whether the offeror has provided the requested information with regard to each occurrence.

(d) The offeror shall post the information in paragraphs (c)(1)(i) through (c)(1)(iv) of this provision in FAPIIS as required through maintaining an active registration in the System for Award Management, which can be accessed via https://www.sam.gov (see 52.204-7).

(End of provision)

52.209-11	Representation by Corporations Regarding Delinquent Tax Liability or a Felony Conviction under any Federal Law. (Deviation 2026-O0038)	2026-02

Representation by Corporations Regarding Delinquent Tax Liability or a Felony Conviction under any Federal Law (Feb 2026) (Deviation 2026-O0038)

(a) The Government will not enter into a contract with any corporation that-

(1) Has any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability, where the awarding agency is aware of the unpaid tax liability, unless an agency has considered suspension or debarment of the corporation and made a determination that suspension or debarment is not necessary to protect the interests of the Government; or

(2) Was convicted of a felony criminal violation under any Federal law within the preceding 24 months, where the awarding agency is aware of the conviction, unless an agency has considered suspension or debarment of the corporation and made a determination that this action is not necessary to protect the interests of the Government.

(b) The Offeror represents that-

(1) It is [ ] is not [ ] a corporation that has any unpaid Federal tax liability that has been assessed, for which all judicial and administrative remedies have been exhausted or have lapsed, and that is not being paid in a timely manner pursuant to an agreement with the authority responsible for collecting the tax liability; and

(2) It is [ ] is not [ ] a corporation that was convicted of a felony criminal violation under a Federal law within the preceding 24 months.

(End of provision)

52.209-13	Violation of Arms Control Treaties or Agreements-Certification. (Deviation 2026-O0038)	2026-02

Violation of Arms Control Treaties or Agreements-Certification (Feb 2026) (Deviation 2026-O0038)

(a) This provision does not apply to acquisitions at or below the simplified acquisition threshold or to acquisitions of commercial products and commercial services as defined in Federal Acquisition Regulation 2.101.

(b) Certification. [Offeror shall check either (1) or (2).]

[ ] (1) The Offeror certifies that-

(i) It does not engage and has not engaged in any activity that contributed to or was a significant factor in the President's or Secretary of State's determination that a foreign country is in violation of its obligations undertaken in any arms control, nonproliferation, or disarmament agreement to which the United States is a party, or is not adhering to its arms control, nonproliferation, or disarmament commitments in which the United States is a participating state. The determinations are described in the most recent unclassified annual report provided to Congress pursuant to section 403 of the Arms Control and Disarmament Act (22 U.S.C. 2593a). The report is available at https://www.state.gov/bureaus-offices/under-secretary-for-arms-control-and-international-security-affairs/bureau-of-arms-control-verification-and-compliance/; and

(ii) No entity owned or controlled by the Offeror has engaged in any activity that contributed to or was a significant factor in the President's or Secretary of State's determination that a foreign country is in violation of its obligations undertaken in any arms control, nonproliferation, or disarmament agreement to which the United States is a party, or is not adhering to its arms control, nonproliferation, or disarmament commitments in which the United States is a participating state. The determinations are described in the most recent unclassified annual report provided to Congress pursuant to section 403 of the Arms Control and Disarmament Act (22 U.S.C. 2593a). The report is available at https://www.state.gov/bureaus-offices/under-secretary-for-arms-control-and-international-security-affairs/bureau-of-arms-control-verification-and-compliance/; or

[ ] (2) The Offeror is providing separate information with its offer in accordance with paragraph (d)(2) of this provision.

(c) Procedures for reviewing the annual unclassified report (see paragraph (b)(1) of this provision). For clarity, references to the report in this section refer to the entirety of the annual unclassified report, including any separate reports that are incorporated by reference into the annual unclassified report.

(1) Check the table of contents of the annual unclassified report and the country section

headings of the reports incorporated by reference to identify the foreign countries listed there. Determine whether the Offeror or any person owned or controlled by the Offeror may have engaged in any activity related to one or more of such foreign countries.

(2) If such activity might have occurred, review all findings in the report associated with those foreign countries to determine whether or not each such foreign country was determined to be in violation of its obligations undertaken in an arms control, nonproliferation, or disarmament agreement to which the United States is a party, or to be not adhering to its arms control, nonproliferation, or disarmament commitments in which the United States is a participating state. For clarity, in the annual report an explicit certification of non-compliance is equivalent to a determination of violation. However, the following statements in the annual report are not equivalent to a determination of violation:

(i) An inability to certify compliance.

(ii) An inability to conclude compliance.

(iii) A statement about compliance concerns.

(3) If so, determine whether the Offeror or any person owned or controlled by the Offeror has engaged in any activity that contributed to or is a significant factor in the determination in the report that one or more of these foreign countries is in violation of its obligations undertaken in an arms control, nonproliferation, or disarmament agreement to which the United States is a party, or is not adhering to its arms control, nonproliferation, or disarmament commitments in which the United States is a participating state. Review the narrative for any such findings reflecting a determination of violation or non-adherence related to those foreign countries in the report, including the finding itself, and to the extent necessary, the conduct giving rise to the compliance or adherence concerns, the analysis of compliance or adherence concerns, and efforts to resolve compliance or adherence concerns.

(4) The Offeror may submit any questions with regard to this report by email to NDAA1290Cert@state.gov. To the extent feasible, the Department of State will respond to such email inquiries within 3 business days.

(d) Do not submit an offer unless-

(1) A certification is provided in paragraph (b)(1) of this provision and submitted with the offer; or

(2) In accordance with paragraph (b)(2) of this provision, the Offeror provides with its offer

information that the President of the United States has

(i) Waived application under 22 U.S.C. 2593e(d) or (e); or

(ii) Determined under 22 U.S.C. 2593e(g)(2) that the entity has ceased all activities for which measures were imposed under 22 U.S.C. 2593e(b).

(e) Remedies. The certification in paragraph (b)(1) of this provision is a material representation of fact upon which reliance was placed when making award. If the Government later determines that the Offeror knowingly submitted a false certification, in addition to other remedies available to the Government, such as suspension or debarment, the Contracting Officer may terminate any contract resulting from the false certification.

(End of provision)

52.219-1	Small Business Program Representations. (Deviation 2026-O0038)	2026-02

Small Business Program Representations (Feb 2026) (Deviation 2026-O0038)

(a) *Definitions*. As used in this provision-

Economically disadvantaged women-owned small business (EDWOSB) concern means a small business concern that is at least 51 percent directly and unconditionally owned by, and the management and daily business operations of which are controlled by, one or more women who are citizens of the United States and who are economically disadvantaged in accordance with 13 CFR part 127, and the concern is certified by SBA or an approved third-party certifier in accordance with 13 CFR 127.300. It automatically qualifies as a women-owned small business concern eligible under the WOSB Program.

HUBZone small business concern means a small business concern that meets the requirements described in 13 CFR 126.200, is certified by the Small Business Administration (SBA) and designated by SBA as a HUBZone small business concern in the Small Business Search (SBS) (13 CFR 126.103).

Service-disabled veteran-owned small business (SDVOSB) concern eligible under the SDVOSB Program means an SDVOSB concern that is designated in the System for Award Management (SAM) as certified by the Small Business Administration (SBA) in accordance with 13 CFR 128.300.

Small business concern-

(1) Means a concern, including its affiliates, that is independently owned and operated, not dominant in its field of operation, and qualified as a small business under the criteria in 13 CFR part 121 and the size standard in paragraph (b) of this provision.

(2) *Affiliates*, as used in this definition, means business concerns, one of whom directly or indirectly controls or has the power to control the others, or a third party or parties control or have the power to control the others. In determining whether affiliation exists, consideration is given to all appropriate factors including common ownership, common management, and contractual relationships. SBA determines affiliation based on the factors set forth at 13 CFR 121.103.

Small disadvantaged business concern means a small business concern that-

(1) Is at least 51 percent unconditionally and directly owned (as defined at 13 CFR 124.105) by one or more socially disadvantaged (as defined at 13 CFR 124.103) and economically disadvantaged (as defined at 13 CFR 124.104) individuals who are citizens of the United States, and

(2) The management and daily business operations of which are controlled (as defined at 13 CFR 124.106) by individuals who meet the criteria in paragraph (1) of this definition.

Women-owned small business (WOSB) concern eligible under the WOSB Program (in accordance with 13 CFR part 127) means a small business concern that is at least 51 percent directly and unconditionally owned by, and the management and daily business operations of which are controlled by, one or more women who are citizens of the United States, and the concern is certified by SBA or an approved third-party certifier in accordance with 13 CFR 127.300.

(b)

(1) The North American Industry Classification System (NAICS) code for this acquisition is **237310 - HIGHWAY, STREET, AND BRIDGE CONSTRUCTION**.

(2) The small business size standard is _$45M_.

(3) The small business size standard for a concern that submits an offer, other than on a construction or service acquisition, but proposes to furnish an end item that it did not itself manufacture, process, or produce (*i.e.*, nonmanufacturer), is 500 employees, or 150 employees for information technology value-added resellers under NAICS code 541519, if the acquisition-

(i) Is set aside for small business and has a value above the simplified acquisition threshold;

(ii) Uses the HUBZone price evaluation preference regardless of dollar value, unless the offeror waives the price evaluation preference; or

(iii) Is an 8(a), HUBZone, service-disabled veteran-owned, economically disadvantaged women-owned, or women-owned small business set-aside or sole-source award regardless of dollar value.

(c) *Representations.*

(1) The offeror represents as part of its offer that-

(i) it is, is not a small business concern; or

(ii) It is, is not a small business joint venture that complies with the requirements of 13 CFR 121.103(h) and 13 CFR 125.8(a) and (b). [_____The offeror shall enter the name and unique entity identifier of each party to the joint venture: __.]

(2) [*Complete only if the offeror represented itself as a small business concern in paragraph (c)(1) of this provision.]* The offeror represents that it is, is not a women-owned small disadvantage business concern.

(3) *Women-owned small business (WOSB) joint venture eligible under the WOSB Program.* The offeror represents as part of its offer that it is, is not a joint venture that complies with the requirements of 13 CFR 127.506(a) through (c). [____The offeror shall enter the name and unique entity identifier of each party to the joint venture: __.]

(4) *Economically disadvantaged women-owned small business (EDWOSB) joint venture.* The offeror represents as part of its offer that it is, is not a joint venture that complies with the requirements of 13 CFR 127.506(a) through (c). [____The offeror shall enter the name and unique entity identifier of each party to the joint venture: __.]

(5) *SDVOSB joint venture eligible under the SDVOSB Program*. [*Complete only if the offeror is certified as a SDVOSB concern*]. The offeror represents as part of its offer that it is, is not a SDVOSB joint venture eligible under the SDVOSB Program that complies with the requirements of 13 CFR 128.402. [____The offeror shall enter the name and unique entity identifier of each party to the joint venture:__.]

(6) *HUBZone joint venture eligible under the HUBZone Program.* [*Complete only if the offeror is a HUBZone small business concern.*] The offeror represents, as part of its offer, that it is, is not a HUBZone joint venture that complies with the requirements of 13 CFR 126.616(a) through (c). [____The offeror shall enter the name and unique entity identifier of each party to the joint venture: __.] Each HUBZone small business concern participating in the HUBZone joint venture must be certified as a HUBZone concern.

(d) *Notice.* Under 15 U.S.C. 645(d), any person who misrepresents a firm's status as a business concern that is small, HUBZone small, small disadvantaged, service-disabled veteran-owned small, economically disadvantaged women-owned small, or women-owned small eligible under the WOSB Program in order to obtain a contract to be awarded under the preference programs established pursuant to section 8, 9, 15, 31, and 36 of the Small Business Act or any other provision of Federal law that specifically references section 8(d) for a definition of program eligibility, will be-

(1) Punished by imposition of fine, imprisonment, or both;

(2) Subject to administrative remedies, including suspension and debarment; and

(3) Ineligible for participation in programs conducted under the authority of the Act.

(End of provision)

52.219-2	Equal Low Bids. (Deviation 2026-O0038)	2026-02

Equal Low Bids (Feb 2026) (Deviation 2026-O0038)

(a) This provision applies to small business concerns only.

(b) The bidder's status as a labor surplus area (LSA) concern may affect entitlement to award in case of tie bids. If the bidder wishes to be considered for this priority, the bidder must identify, in the following space, the LSA in which the costs to be incurred on account of manufacturing or production (by the bidder or the first-tier subcontractors) amount to more than 50 percent of the contract price.

_____ _____

(c) Failure to identify the labor surplus areas as specified in paragraph (b) of this provision will preclude the bidder from receiving priority consideration. If the bidder is awarded a contract as a result of receiving priority consideration under this provision and would not have otherwise received award, the bidder shall perform the contract or cause the contract to be performed in accordance with the obligations of an LSA concern.

(End of provision)

52.229-11	Tax on Certain Foreign Procurements-Notice and Representation.	2026-08

Tax on Certain Foreign Procurements-Notice and Representation (Jun 2020)

(a) *Definitions*. As used in this provision-

Foreign person means any person other than a United States person.

Specified Federal procurement payment means any payment made pursuant to a contract with a foreign contracting party that is for goods, manufactured or produced, or services provided in a foreign country that is not a party to an international procurement agreement with the United States. For purposes of the prior sentence, a foreign country does not include an outlying area of the United States.

United States person as defined in 26 U.S.C. 7701(a)(30) means

(1) A citizen or resident of the United States;

(2) A domestic partnership;

(3) A domestic corporation;

(4) Any estate (other than a foreign estate, within the meaning of 26 U.S.C. 701(a)(31)); and

(5) Any trust if-

(i) A court within the United States is able to exercise primary supervision over the administration of the trust; and

(ii) One or more United States persons have the authority to control all substantial decisions of the trust.

(b) Unless exempted, there is a 2 percent tax of the amount of a specified Federal procurement payment on any foreign person receiving such payment. See 26 U.S.C. 5000C and its implementing regulations at 26 CFR 1.5000C-1 through 1.5000C-7.

(c) Exemptions from withholding under this provision are described at 26 CFR 1.5000C-1(d)(5) through (7). The Offeror may claim an exemption from the withholding by using the Department

of the Treasury Internal Revenue Service (IRS) Form W-14, Certificate of Foreign Contracting Party Receiving Federal Procurement Payments, available at www.irs.gov/w14. Any exemption claimed and self-certified on the IRS Form W-14 is subject to audit by the IRS. Any disputes regarding the imposition and collection of the 26 U.S.C. 5000C tax are adjudicated by the IRS as the 26 U.S.C. 5000C tax is a tax matter, not a contract issue. The IRS Form W-14 is provided to the acquiring agency rather than to the IRS.

(d) For purposes of withholding under 26 U.S.C. 5000C, the Offeror represents that

(1) It is is not a foreign person; and

(2) If the Offeror indicates "is" in paragraph (d)(1) of this provision, then the Offeror represents that-I am claiming on the IRS Form W-14 a full exemption, or partial or no exemption [*Offeror must select one*] from the excise tax.

(e) If the Offeror represents it is a foreign person in paragraph (d)(1) of this provision, then-

(1) The clause at FAR 52.229-12, Tax on Certain Foreign Procurements, will be included in any resulting contract; and

(2) The Offeror shall submit with its offer the IRS Form W-14. If the IRS Form W-14 is not submitted with the offer, exemptions will not be applied to any resulting contract and the Government will withhold a full 2 percent of each payment.

(f) If the Offeror selects "is" in paragraph (d)(1) and "partial or no exemption" in paragraph (d)(2) of this provision, the Offeror will be subject to withholding in accordance with the clause at FAR 52.229-12, Tax on Certain Foreign Procurements, in any resulting contract.

(g) A taxpayer may, for a fee, seek advice from the IRS as to the proper tax treatment of a transaction. This is called a private letter ruling. Also, the IRS may publish a revenue ruling, which is an official interpretation by the IRS of the Internal Revenue Code, related statutes, tax treaties, and regulations. A revenue ruling is the conclusion of the IRS on how the law is applied to a specific set of facts. For questions relating to the interpretation of the IRS regulations go to https://www.irs.gov/help/tax-law-questions.

(End of provision)

52.240-90	Security Prohibitions and Exclusions Representations and Certifications. (Deviation 2026-O0038)	2026-02

Security Prohibitions and Exclusions Representations and Certifications (Feb 2026) (Deviation 2026-O0038)

(a) Definitions. As used in this provision--

Backhaul, covered article, covered telecommunications equipment or services, critical technology, FASCSA order, Intelligence community, interconnection arrangements, national security system, roaming, sensitive compartmented information, sensitive compartmented information system, source, and substantial or essential component have the meanings provided in the clause 52.240-91, Security Prohibitions and Exclusions.

Business operations means engaging in commerce in any form, including by acquiring, developing, maintaining, owning, selling, possessing, leasing, or operating equipment, facilities, personnel, products, services, personal property, real property, or any other apparatus of business or commerce.

Marginalized populations of Sudan means-

(1) Adversely affected groups in regions authorized to receive assistance under section 8(c) of the Darfur Peace and Accountability Act (Pub. L. 109-344) (50 U.S.C. 1701 note); and

(2) Marginalized areas in Northern Sudan described in section 4(9) of such Act.

Restricted business operations means business operations in Sudan that include power production activities, mineral extraction activities, oil-related activities, or the production of military equipment, as those terms are defined in the Sudan Accountability and Divestment Act of 2007 (Pub. L. 110-174). Restricted business operations do not include business operations that the person (as that term is defined in Section 2 of the Sudan Accountability and Divestment Act of 2007) conducting the business can demonstrate-

(1) Are conducted under contract directly and exclusively with the regional government of southern Sudan;

(2) Are conducted under specific authorization from the Office of Foreign Assets Control in the Department of the Treasury, or are expressly exempted under Federal law from the requirement to be conducted under such authorization;

(3) Consist of providing goods or services to marginalized populations of Sudan;

(4) Consist of providing goods or services to an internationally recognized peacekeeping force or humanitarian organization;

(5) Consist of providing goods or services that are used only to promote health or education; or

(6) Have been voluntarily suspended.

Sensitive technology-

(1) Means hardware, software, telecommunications equipment, or any other technology that is to be used specifically-

(i) To restrict the free flow of unbiased information in Iran; or

(ii) To disrupt, monitor, or otherwise restrict speech of the people of Iran; and

(2) Does not include information or informational materials the export of which the President does not have the authority to regulate or prohibit pursuant to section 203(b)(3) of the International Emergency Economic Powers Act (50 U.S.C. 1702(b)(3)).

(b) Procedures.

(1) Covered telecommunications and video surveillance. The Offeror shall review the list of excluded parties in the System for Award Management (SAM) at https://www.sam.gov for entities excluded from receiving federal awards for "covered telecommunications equipment or services."

(2) FASCSA Orders.

(i) The Offeror shall search in SAM for the phrase "FASCSA order" for any covered article, or any products or services produced or provided by a source, if there is an applicable FASCSA order described in paragraph (e) of FAR 52.240-91, Security Prohibitions and Exclusions.

(ii) The Offeror shall review the solicitation for any FASCSA orders that are not in SAM but are effective and apply to the solicitation and resultant contract (see FAR 40.204-1(c)(2)).

(iii) FASCSA orders issued after the date of solicitation do not apply unless added by an

amendment to the solicitation.

(c) Covered telecommunications equipment or services representations. By submission of its offer, the Offeror represents that, after conducting a reasonable inquiry (that looks at any information in the Offeror's possession but does not need to include an internal or third-party audit)-

(1) It will not provide covered telecommunications equipment or services to the Government in the performance of any contract, subcontract or other contractual instrument resulting from this solicitation, except as waived by the solicitation, or as disclosed in paragraph (g); and

(2) It does not use covered telecommunications equipment or services, or use any equipment, system, or service that uses covered telecommunications equipment or services, except as waived by the solicitation, or as disclosed in paragraph (g).

(d) FASCSA Representation. By submission of this offer, the offeror represents that it has conducted a reasonable inquiry, and that the offeror does not propose to provide or use in response to this solicitation any covered article, or any products or services produced or provided by a source, if the covered article or the source is prohibited by an applicable FASCSA order in effect on the date the solicitation was issued, except as waived by the solicitation, or as disclosed in paragraph (g). A reasonable inquiry will look at any information in the offeror's possession but does not need to include an internal or third-party audit.

(e) Sudan certification. By submission of its offer, the offeror certifies, after conducting a reasonable inquiry (that looks at any information in the offeror's possession but does not need to include an internal or third-party audit), that the offeror does not conduct any restricted business operations in Sudan.

(f) Iran Representation and Certifications.

(1) Except as provided in paragraph (f)(2) of this provision or if a waiver has been granted in accordance with FAR 40.203-3, the offeror, after conducting a reasonable inquiry (that looks at any information in the offeror's possession but does not need to include an internal or third-party audit), by submission of its offer-

(i) Represents, to the best of its knowledge and belief, that the offeror does not export any sensitive technology to the government of Iran or any entities or individuals owned or controlled by, or acting on behalf or at the direction of, the government of Iran;

(ii) Certifies that the offeror, or any person (as defined at section 15 of the Iran Sanctions Act of 1996, Pub. L. 104-172, 50 U.S.C. 1701 note) owned or controlled by the offeror, does not engage in any activities for which sanctions may be imposed under section 5 of the Act. These sanctioned activities are in the areas of development of the petroleum resources of Iran, production of refined petroleum products in Iran, sale and provision of refined petroleum products to Iran, and contributing to Iran's ability to acquire or develop certain weapons or technologies; and

(iii) Certifies that the offeror, and any person owned or controlled by the offeror, does not knowingly engage in any transaction that exceeds $15,000 with Iran's Revolutionary Guard Corps or any of its officials, agents, or affiliates, the property and interests in property of which are blocked pursuant to the International Emergency Economic Powers Act (50 U.S.C. 1701 et seq.) (see OFAC's Specially Designated Nationals and Blocked Persons List at https://www.treasury.gov/resource-center/sanctions/SDN-List/Pages/default.aspx)

(2) Exception for trade agreements. The representation and certification requirements of paragraph (f)(1) of this provision do not apply if-

(i) This solicitation includes a trade agreements notice or certification (e.g., 52.225-6, Trade Agreements Certificate); and

(ii) The offeror has certified that all the offered products to be supplied are designated country end products or designated country construction material.

(iii) The offeror shall email questions concerning sensitive technology to the Department of State at CISADA106@state.gov.

(g) Disclosure.

(1) If the Offeror is not able to represent compliance with the prohibitions in paragraphs (c) or (d), then the Offeror shall disclose within 72 hours to the contracting office identified in paragraph (g)(2) the following information for each product or service not compliant:

(i) Contract number and order number, if applicable;

(ii) Identification of whether this disclosure relates to paragraph (c) on covered telecommunication equipment or services, or to paragraph (d) on FASCSA orders;

(iii) A description of the products or services that the Contractor identifies or has reason to

suspect is prohibited (include brand; model number, such as the original equipment manufacturer (OEM) number, manufacturer part number, or wholesaler number; and item description, as applicable);

(iv) The entity that produced the product or service (include entity name, unique entity identifier, Contractor and Government Entity (CAGE) code, facilities responsible for design, fabrication, assembly, packaging, and test of the product, and whether the entity was the OEM or a distributor (provide manufacturer codes and distributor codes used for the product));

(v) Description of the functionality of the product or service and how that functionality impacts the risk to the product or service;

(vi) An explanation of any factors relevant to determining if the product or service should be permitted by an applicable exception, exemption, or waiver (if the offeror would like the Government to consider a waiver);

(vii) Whether alternative products or services are available that would be compliant with the prohibition;

(viii) If the product or service is related to item maintenance, include the following information on the item being maintained:

(A) Brand;

(B) Model number, OEM number, manufacturer part number, or wholesaler number; and

(C) Item description, as applicable.

(ix) Any readily available information about mitigation actions undertaken or recommended.

(2) If a disclosure is required to be submitted to a contracting office, the offeror shall submit the disclosure as follows:

(i) If a Department of Defense contracting office, the offeror shall submit the disclosure to the website at https://dibnet.dod.mil.

(ii) For all other contracting offices, the Offeror shall submit the disclosure to the Contracting Officer.

(3) If the disclosure provided does not contain any of the information required by paragraph (1), and the Offeror later discovers new information that is required by paragraph (1), then the Offeror shall submit a subsequent disclosure within 72 hours of discovering the new information.

(h) Executive agency review of disclosures. The Contracting Officer will review disclosures provided in paragraph (g) to determine if any applicable waiver may be sought. The Contracting Officer may choose not to pursue a waiver and may instead make an award to an Offeror that does not require a waiver.

(End of provision)

DFARS Provisions Incorporated by Full Text

Number	Title	Effective Date	Alternate Deviation	Variation Effective Date
252.204-7017	Prohibition on the Acquisition of Covered Defense Telecommunications Equipment or Services-Representation.	2021-05		

PROHIBITION ON THE ACQUISITION OF COVERED DEFENSE TELECOMMUNICATIONS EQUIPMENT OR SERVICES-REPRESENTATION (MAY 2021)

The Offeror is not required to complete the representation in this provision if the Offeror has represented in the provision at 252.204-7016, Covered Defense Telecommunications Equipment or Services-Representation, that it "does not provide covered defense telecommunications equipment or services as a part of its offered products or services to the Government in the performance of any contract, subcontract, or other contractual instrument."

(a) Definitions. "Covered defense telecommunications equipment or services," "covered mission," "critical technology," and "substantial or essential component," as used in this

provision, have the meanings given in the 252.204-7018 clause, Prohibition on the Acquisition of Covered Defense Telecommunications Equipment or Services, of this solicitation.

(b) Prohibition. Section 1656 of the National Defense Authorization Act for Fiscal Year 2018 (Pub. L. 115-91) prohibits agencies from procuring or obtaining, or extending or renewing a contract to procure or obtain, any equipment, system, or service to carry out covered missions that uses covered defense telecommunications equipment or services as a substantial or essential component of any system, or as critical technology as part of any system.

(c) Procedures. The Offeror shall review the list of excluded parties in the System for Award Management (SAM) at https://www.sam.gov for entities that are excluded when providing any equipment, system, or service to carry out covered missions that uses covered defense telecommunications equipment or services as a substantial or essential component of any system, or as critical technology as part of any system, unless a waiver is granted.

(d) Representation. If in its annual representations and certifications in SAM the Offeror has represented in paragraph (c) of the provision at 252.204-7016, Covered Defense Telecommunications Equipment or Services-Representation, that it "does" provide covered defense telecommunications equipment or services as a part of its offered products or services to the Government in the performance of any contract, subcontract, or other contractual instrument, then the Offeror shall complete the following additional representation:

The Offeror represents that it [ ] will [ ] will not provide covered defense telecommunications equipment or services as a part of its offered products or services to DoD in the performance of any award resulting from this solicitation.

(e) Disclosures. If the Offeror has represented in paragraph (d) of this provision that it "will provide covered defense telecommunications equipment or services," the Offeror shall provide the following information as part of the offer:

(1) A description of all covered defense telecommunications equipment and services offered (include brand or manufacturer; product, such as model number, original equipment manufacturer (OEM) number, manufacturer part number, or wholesaler number; and item description, as applicable).

(2) An explanation of the proposed use of covered defense telecommunications equipment and services and any factors relevant to determining if such use would be permissible under the prohibition referenced in paragraph (b) of this provision.

(3) For services, the entity providing the covered defense telecommunications services (include entity name, unique entity identifier, and Commercial and Government Entity (CAGE) code, if known).

(4) For equipment, the entity that produced or provided the covered defense telecommunications equipment (include entity name, unique entity identifier, CAGE code, and whether the entity was the OEM or a distributor, if known).

(End of provision)

Section 00 70 00 - Conditions of the Contract

252.215-7994 Requirements for Certified Cost or Pricing Data and Data Other Than Certified Cost or Pricing Data. (DEVIATION 2026-O0048)

REQUIREMENTS FOR CERTIFIED COST OR PRICING DATA AND DATA OTHER THAN CERTIFIED COST OR PRICING DATA--BASIC

(JUL 2026) (DEVIATION 2026-O0048)

(a) Definitions. As used in this provision--

Market prices means current prices that are established in the course of ordinary trade between buyers and sellers free to bargain and that can be substantiated through competition or from sources independent of the offerors.

Non-Government sales means sales of the supplies or services to non-Governmental entities for purposes other than governmental purposes.

Relevant sales data means information provided by an offeror on sales of the same or similar items that can be used to establish price reasonableness taking into consideration the age, volume, and nature of the transactions (including any related discounts, refunds, rebates, offsets, or other adjustments).

Sufficient non-Government sales means relevant sales data that reflects market pricing and contains enough information to make adjustments covered by

Federal Acquisition Regulation (FAR) 15.404-1(b)(2)(ii).

Uncertified cost data means the subset of "data other than certified cost or pricing data" (see FAR 2.101) that relates to cost.

(b) Exceptions from certified cost or pricing data.

(1) In lieu of submitting certified cost or pricing data, the Offeror may submit a written request for exception by submitting the information described in paragraphs (b)(1)(i) and (ii) of this provision. The Contracting Officer may require additional supporting information, but only to the extent necessary to determine whether an exception should be granted and whether the price is fair and reasonable.

(i) Exception for prices set by law or regulation - Identification of the law or regulation establishing the prices offered. If the prices are controlled under law by periodic rulings, reviews, or similar actions of a governmental body, attach a copy of the controlling document, unless it was previously submitted to the contracting office.

(ii) Commercial product or commercial service exception. For a commercial product or commercial service exception, the Offeror shall submit, at a minimum, information that is adequate for determining commerciality and evaluating the reasonableness of the price for this acquisition, including prices at which the same product or service or similar products or services have been sold in the commercial market. Such information shall include--

(A) For products or services previously determined to be commercial, the contract number and military department, defense agency, or other DoD component that rendered such determination, and if available, a Government point of contact;

(B) For items priced based on a catalog--

(1) A copy of or identification of the Offeror's current catalog showing the price for that item; and

(2) If the catalog pricing provided with this proposal is not consistent with all relevant sales data, a detailed description of differences or inconsistencies between or among the relevant sales data, the proposed price, and the catalog price (including any related discounts, refunds, rebates, offsets, or other adjustments);

(C) For items priced based on market pricing, a description of the nature of the commercial market, the methodology used to establish a market price, and all relevant sales data. The description shall be adequate to permit DoD to verify the accuracy of the description;

(D) For items included on an active Federal Supply Service Multiple Award Schedule contract, proof that an exception has been granted for the schedule item; or

(E) For items provided by nontraditional defense contractors, a statement that the entity is not currently performing and has not performed, for at least the 1-year period preceding the solicitation of sources by DoD for the procurement or transaction, any contract or subcontract for DoD that is subject to full coverage under the cost accounting standards prescribed pursuant to 41 U.S.C. 1502 and the regulations implementing such section.

(2) The Offeror grants the Contracting Officer or an authorized representative the right to examine, at any time before award, books, records, documents, or other directly pertinent records to verify any request for an exception under this provision, and to determine price reasonableness.

(c) Requirements for certified cost or pricing data. If the Offeror is not granted an exception from the requirement to submit certified cost or pricing data, the following applies:

(1) The Offeror shall prepare and submit certified cost or pricing data and supporting attachments in accordance with the instructions contained in Table 15-1 of FAR 15.408-2, which is incorporated by reference with the same force and effect as though it were inserted here in full text. The instructions in Table 15-1 are incorporated as a mandatory format to be used in any resultant contract, unless the Contracting Officer and the Offeror agree to a different format and change this provision to use Alternate I.

(2) As soon as practicable after agreement on price, but before contract award (except for unpriced actions such as letter contracts), the Offeror shall submit a Certificate of Current Cost or Pricing Data, as prescribed by FAR 15.403-4.

(3) The Offeror is responsible for determining whether a subcontractor qualifies for an exception from the requirement for submission of certified cost or pricing data on the basis of adequate price competition, i.e., two or more responsible offerors, competing independently, submit priced offers that satisfy the Government's expressed requirement in accordance with FAR 15.403-2(c)(1)(i).

(d) Requirements for data other than certified cost or pricing data.

(1) Data other than certified cost or pricing data submitted in accordance with this provision shall include the minimum information necessary to permit a determination that the proposed price is fair and reasonable, to include the requirements in Defense Federal Acquisition Regulation Supplement (DFARS) 215.402-70(a)(1) and 215.404-71.

(2) When uncertified cost data is required, see FAR 15.105-4(b)(2).

(3) The Offeror shall provide information described as follows: [Insert description of the data and the format required, including access to records necessary to permit an adequate evaluation of the proposed price in accordance with 15.403-1].

(4) Within 10 days of a written request from the Contracting Officer for additional information to permit an adequate evaluation of the proposed price in accordance with FAR 15.403-1, the Offeror shall provide either the requested information, or a written explanation for the inability to fully comply.

(5) Subcontract price evaluation.

(i) Offerors shall obtain from subcontractors the minimum information necessary to support a determination of price reasonableness, as described in FAR part 15 and DFARS part 215.

(ii) No cost data may be required from a prospective subcontractor when there are sufficient non-Government sales of the same item to establish price reasonableness.

(iii) If the Offeror relies on relevant sales data for similar items to determine the price is reasonable, the Offeror must obtain only that technical

information necessary--

(A) To support the conclusion that items are technically similar; and

(B) To explain any technical differences that account for variances between the proposed prices and the sales data presented.

(e) Subcontracts. The Offeror shall insert the substance of this provision, including this paragraph (e), in solicitations for subcontracts expected to exceed the simplified acquisition threshold defined

in FAR part 2. The Offeror shall require prospective subcontractors to adhere to the requirements of--

(1) Paragraph (c) of this provision in solicitations for subcontracts expected to exceed the threshold for submission of certified cost or pricing data in 215.403-3(a); and

(2) Paragraph (d) of this provision in solicitations for subcontracts expected to exceed the simplified acquisition threshold defined in FAR part 2.

(End of provision)

*** END OF NARRATIVE ***

FAR Clauses Incorporated by Reference

Number	Title	Effective Date	Alternate Deviation	Variation Effective Date
52.214-27	Price Reduction for Defective Certified Cost or Pricing Data -- Modifications -- Sealed Bidding (DEVIATION 2022-O0001)	2020-06	Deviation 2022-O0001	2021-10
52.222-9	Apprentices and Trainees. (DEVIATION 2025-O0003)	2026-02	Deviation 2025-O0003	2025-03
52.228-11	Pledges of Assets (DEVIATION 2020-O0016)	2021-02	Deviation 2020-O0016	2020-04

DFARS Clauses Incorporated by Reference

Number	Title	Effective Date	Alternate Deviation	Variation Effective

				Date
252.201-7000	Contracting Officer's Representative. (DEVIATION 2026-O0002)	1991-12	Deviation 2026-O0002	2026-08
252.215-7013	Supplies and Services Provided by Nontraditional Defense Contractors. (DEVIATION 2026-O0048)	2023-01	Deviation 2026-O0048	2026-07

FAR Clauses Incorporated by Full Text

Number	Title	Effective Date	Alternate Deviation	Variation Effective Date
52.222-3	Convict Labor. (Deviation 2026-O0038)	2026-02		

Convict Labor (Feb 2026) (Deviation 2026-O0038)

(a) Except as provided in paragraph (b) of this clause, the Contractor must not employ in the performance of this contract any person undergoing a sentence of imprisonment imposed by any court of a State, the District of Columbia, Puerto Rico, the Northern Mariana Islands, American Samoa, Guam, or the U.S. Virgin Islands.

(b) The Contractor is not prohibited from employing persons-

(1) On parole or probation to work at paid employment during the term of their sentence;

(2) Who have been pardoned or who have served their terms; or

(3) Confined for violation of the laws of any of the States, the District of Columbia, Puerto Rico, the Northern Mariana Islands, American Samoa, Guam, or the U.S. Virgin Islands who are authorized to work at paid employment in the community under the laws of such jurisdiction, if-

(i) The worker is paid or is in an approved work training program on a voluntary basis;

(ii) Representatives of local union central bodies or similar labor union organizations have been consulted;

(iii) Such paid employment will not result in the displacement of employed workers, or be applied in skills, crafts, or trades in which there is a surplus of available gainful labor in the locality, or impair existing contracts for services;

(iv) The rates of pay and other conditions of employment will not be less than those paid or provided for work of a similar nature in the locality in which the work is being performed; and

(v) The Attorney General of the United States has certified that the work-release laws or regulations of the jurisdiction involved are in conformity with the requirements of Executive Order11755, as amended by Executive Orders 12608 and 12943.

(End of clause)

52.222-7	Withholding of Funds. (Deviation 2026-O0038)	2026-02

Withholding of Funds (Feb 2026) (Deviation 2026-O0038)

The Contracting Officer must, upon his or her own action or upon written request of an authorized representative of the Department of Labor, withhold or cause to be withheld from the Contractor under this contract or any other Federal contract with the same Prime Contractor, or any other federally assisted contract subject to prevailing wage requirements, which is held by the same Prime Contractor, so much of the accrued payments or advances as may be considered necessary to pay laborers and mechanics, including apprentices, trainees, and helpers, employed by the Contractor or any subcontractor the full amount of wages required by the contract. In the event of failure to pay any laborer or mechanic, including any apprentice, trainee, or helper, employed or working on the site of the work, all or part of the wages required by the contract, the Contracting Officer may, after written notice to the Contractor, take such action as may be necessary to cause the suspension of any further payment, advance, or

guarantee of funds until such violations have ceased.

(End of clause)

52.228-15	Performance and Payment Bonds-Construction (Deviation 2020-O0016)	2020-06	Deviation 2020-O0016	2020-04

PERFORMANCE AND PAYMENT BONDS-CONSTRUCTION (APR 2020) (DEVIATION 2020-O0016)

(a) Definitions. As used in this clause-

Original contract price means the award price of the contract; or, for requirements contracts, the price payable for the estimated total quantity; or, for indefinite-quantity contracts, the price payable for the specified minimum quantity. Original contract price does not include the price of any options, except those options exercised at the time of contract award.

(b) Amount of required bonds. Unless the resulting contract price is $150,000 or less, the successful offeror shall furnish performance and payment bonds to the Contracting Officer as follows:

(1) Performance bonds (Standard Form 25, except that no seal is required). The penal amount of performance bonds at the time of contract award shall be 100 percent of the original contract price.

(2) Payment bonds (Standard Form 25A, except that no seal is required). The penal amount of payment bonds at the time of contract award shall be 100 percent of the original contract price.

(3) Additional bond protection.

(i) The Government may require additional performance and payment bond protection if the contract price is increased. The increase in protection generally will equal 100 percent of the increase in contract price.

(ii) The Government may secure the additional protection by directing the Contractor to increase the penal amount of the existing bond or to obtain an additional bond.

(c) Furnishing executed bonds. The Contractor shall furnish all executed bonds, including any necessary reinsurance agreements, to the Contracting Officer, within the time period specified in the Bid Guarantee provision of the solicitation, or otherwise specified by the Contracting Officer, but in any event, before starting work.

(d) Surety or other security for bonds. The bonds shall be in the form of firm commitment, supported by corporate sureties whose names appear on the list contained in Treasury Department Circular 570, individual sureties, or by other acceptable security such as postal money order, certified check, cashier's check, irrevocable letter of credit, or, in accordance with Treasury Department regulations, certain bonds or notes of the United States. Treasury Circular 570 is published in the Federal Register or may be obtained from the U.S. Department of the Treasury, Financial Management Service, Surety Bond Branch, 3700 East West Highway, Room 6F01, Hyattsville, MD 20782. Or via the internet at http://www.fms.treas.gov/c570/.

(e) Notice of subcontractor waiver of protection (40 U.S.C. 3133(c)). Any waiver of the right to sue on the payment bond is void unless it is in writing, signed by the person whose right is waived, and executed after such person has first furnished labor or material for use in the performance of the contract.

(End of clause)

DFARS Clauses Incorporated by Full Text

Number	Title	Effective Date	Alternate Deviation	Variation Effective Date
252.204-7998	Alternate A, Annual Representations and Certifications. (DEVIATION 2026-O0043)	2026-02	Alternate A Deviation 2026-O0043	2026-02 2026-02

Alternate A, Annual Representations and Certifications (DEVIATION 2026-O0043)(FEB 2026)

Include the following paragraphs (e), (f), and (g) in the provision at FAR 52.204-7:

(e)(1) If the provision at FAR 52.204-7, System for Award Management **-** Registration, is included in this solicitation, paragraph (g) of this provision applies.

(2) If the provision at FAR 52.204-7, System for Award Management - Registration, is not included in this solicitation, and the Offeror has an active registration in the System for Award Management (SAM), the Offeror may choose to use paragraph (g) of this provision instead of completing the corresponding individual representations and certifications in the solicitation. The Offeror shall indicate which option applies by checking one of the following boxes:

(i) Paragraph (g) applies.

(ii) Paragraph (g) does not apply and the Offeror has completed the individual representations and certifications in the solicitation.

(f)(1) The following representations or certifications in the SAM database are applicable to this solicitation as indicated:

(i) 252.204-7016, Covered Defense Telecommunications Equipment or Services--Representation. Applies to all solicitations.

(ii) 252.216-7008, Economic Price Adjustment--Wage Rates or Material Prices Controlled by a Foreign Government. Applies to solicitations for fixed-price supply and service contracts when the contract is to be performed wholly or in part in a foreign country, and a foreign government controls wage rates or material prices and may during contract performance impose a mandatory change in wages or prices of materials.

(iii) 252.225-7042, Authorization to Perform. Applies to all solicitations when performance will be wholly or in part in a foreign country.

(iv) 252.225-7049, Prohibition on Acquisition of Certain Foreign Commercial Satellite Services--Representations. Applies to solicitations for the acquisition of commercial satellite services.

(v) 252.225-7050, Disclosure of Ownership or Control by the Government of a Country that is a State Sponsor of Terrorism. Applies to all solicitations expected to result in contracts of $150,000 or more.

(vi) 252.229-7012, Tax Exemptions (Italy)--Representation. Applies to solicitations when contract performance will be in Italy.

(vii) 252.229-7013, Tax Exemptions (Spain)--Representation. Applies to solicitations when contract performance will be in Spain.

(2) The following representations or certifications in SAM are applicable to this solicitation as indicated by the Contracting Officer: [*Contracting Officer check as appropriate.*]

(i) 252.209-7002, Disclosure of Ownership or Control by a Foreign Government.

(ii) 252.225-7000, Buy American--Balance of Payments Program Certificate.

(iii) 252.225-7020, Trade Agreements Certificate.

Use with Alternate I.

X (iv) 252.225-7031, Secondary Arab Boycott of Israel.

(v) 252.225-7035, Buy American--Free Trade Agreements--Balance of Payments Program Certificate.

Use with Alternate I.

Use with Alternate II.

Use with Alternate III.

Use with Alternate IV.

Use with Alternate V.

(vi) 252.226-7002, Representation for Demonstration Project for Contractors Employing Persons with Disabilities.

(vii) 252.232-7015, Performance-Based Payments--Representation.

(g) The Offeror has completed the annual representations and certifications electronically via the SAM website at *https://www.sam.gov* After reviewing the SAM database information, the Offeror verifies by submission of the offer that the representations and certifications currently posted electronically that apply to this solicitation as indicated in FAR 52.204-7 and paragraph (f) of this provision have been entered or updated within the last 12 months, are current, accurate, complete, and applicable to this solicitation (including the business size standard applicable to the NAICS code referenced for this solicitation), as of the date of this offer, and are incorporated in this offer by reference (see FAR 4.203-1); except for the changes identified below [*Offeror to insert changes, identifying change by provision number, title, date*]. These amended representation(s) and/or certification(s) are also incorporated in this offer and are current, accurate, and complete as of the date of this offer.

FAR/DFARS provision No.	Title	Date	Change
___	___	___	___
___	___	___	___
___	___	___	___
___	___	___	___
___	___	___	___

Any changes provided by the Offeror are applicable to this solicitation only, and do not result in an update to the representations and certifications located in the SAM database.

(End of provision)

252.215-7992	Only One Offer. (DEVIATION 2026-O0048)	2026-03	Deviation 2026-O0048	2026-03

ONLY ONE OFFER (DEVIATION 2026-O0048) (MAR 2026)

(a) Cost or pricing data requirements. After initial submission of offers, if the Contracting Officer notifies the Offeror that only one offer was received, the Offeror agrees to--

(1) Submit any additional cost or pricing data that is required in order to determine whether the price is fair and reasonable (10 U.S.C. 3705) or to comply with the statutory requirement for

certified cost or pricing data (10 U.S.C. 3702); and

(2) Except as provided in paragraph (b) of this provision, if the acquisition exceeds the certified cost or pricing data threshold and an exception to the requirement for certified cost or pricing data at FAR 15.403-2(b)(2) through (5) does not apply, certify all cost or pricing data in accordance with paragraph (c) of DFARS provision 252.215-7994, Requirements for Certified Cost or Pricing Data and Data Other Than Certified Cost or Pricing Data, of this solicitation.

(b) Canadian Commercial Corporation. If the Offeror is the Canadian Commercial Corporation, certified cost or pricing data are not required. If the Contracting Officer notifies the Canadian Commercial Corporation that additional data other than certified cost or pricing data are required in accordance with DFARS 225.870-4(c), the Canadian Commercial Corporation shall obtain and provide the following:

(1) Profit rate or fee (as applicable).

(2) Analysis provided by Public Works and Government Services Canada to the Canadian Commercial Corporation to determine a fair and reasonable price (comparable to the analysis required at 15.404).

(3) Data other than certified cost or pricing data necessary to permit a determination by the U. S. Contracting Officer that the proposed price is fair and reasonable [U.S. Contracting Officer to provide description of the data required in accordance with FAR 15.403-1 with the notification].

____

(4) As specified in FAR 15.403-1(d), an offeror who does not comply with a requirement to submit data that the U.S. Contracting Officer has deemed necessary to determine price reasonableness or cost realism is ineligible for award unless the head of the contracting activity determines that it is in the best interest of the Government to make the award to that offeror.

(c) Subcontracts. Unless the Offeror is the Canadian Commercial Corporation, the Offeror shall insert the substance of this provision, including this paragraph (c), in all subcontracts exceeding the simplified acquisition threshold defined in FAR part 2.

(End of provision)

252.227-7989	Rights in Technical Data, Computer Software, and Computer Software Documentation--Other Than Commercial Products and Commercial Services. (DEVIATION 2026-O0036)	2026-02	Deviation 2026-O0036	2026-02

RIGHTS IN TECHNICAL DATA, COMPUTER SOFTWARE, AND COMPUTER SOFTWARE DOCUMENTATION-- OTHER THAN COMMERCIAL PRODUCTS OR COMMERCIAL SERVICES (DEVIATION 2026-O0036) (FEB 2026)

(a) Definitions. As used in this clause--

"Commercial computer software" means software developed or regularly used for nongovernmental purposes which--

(1) Has been sold, leased, or licensed to the public;

(2) Has been offered for sale, lease, or license to the public;

(3) Has not been offered, sold, leased, or licensed to the public but will be available for commercial sale, lease, or license in time to satisfy the delivery requirements of this contract; or

(4) Satisfies a criterion expressed in paragraph (1), (2), or (3) of this definition and would require only minor modification to meet the requirements of this contract.

"Computer database" means a collection of data recorded in a form capable of being processed by a computer. The term does not include computer software.

"Computer program" means a set of instructions, rules, or routines recorded in a form that is capable of causing a computer to perform a specific operation or series of operations.

"Computer software" means computer programs, source code, source code listings, object code listings, design details, algorithms, processes, flow charts, formulae and related material that would enable the software to be reproduced, recreated, or recompiled. Computer software does not include computer databases or computer software documentation.

"Computer software documentation" means owner's manuals, user's manuals, installation instructions, operating instructions, and other similar items, regardless of storage medium, that explain the capabilities of the computer software or provide instructions for using the software.

"Covered Government support contractor" means a contractor (other than a litigation support contractor covered by 252.204-7014) under a contract, the primary purpose of which is to furnish independent and impartial advice or technical assistance directly to the Government in support of the Government's management and oversight of a program or effort, rather than to directly furnish an end item or service to accomplish a program or effort, provided that the contractor--

(1) Is not affiliated with the prime contractor or a first-tier subcontractor on the program or effort, or with any direct competitor of such prime contractor or any such first-tier subcontractor in furnishing end items or services of the type developed or produced on the program or effort; and

(2) Receives access to technical data or computer software for performance of a Government contract that contains the clause at 252.227-7994, Limitations on the Use or Disclosure of Government-Furnished Information Marked with Restrictive Legends.

"Detailed manufacturing or process data" means technical data that describe the steps, sequences, and conditions of manufacturing, processing or assembly used by the manufacturer to produce an item or component or to perform a process.

"Developed" means--

(1) (Applicable to technical data other than computer software documentation.) An item, component, or process exists and is workable. Thus, the item or component must have been constructed or the process practiced. Workability is generally established when the item, component, or process has been analyzed or tested sufficiently to demonstrate to reasonable people skilled in the applicable art that there is a high probability that it will operate as intended. Whether, how much, and what type of analysis or testing is required to establish workability depends on the nature of the item, component, or process, and the state of the art. To be considered "developed," the item, component, or process need not be at the stage where it could be offered for sale or sold on the commercial market, nor must the item, component, or process be actually reduced to practice within the meaning of Title 35 of the United States Code;

(2) A computer program has been successfully operated in a computer and tested to the extent

sufficient to demonstrate to reasonable persons skilled in the art that the program can reasonably be expected to perform its intended purpose;

(3) Computer software, other than computer programs, has been tested or analyzed to the extent sufficient to demonstrate to reasonable persons skilled in the art that the software can reasonably be expected to perform its intended purpose; or

(4) Computer software documentation the contractor must deliver under a contract has been written, in any medium, in sufficient detail to comply with requirements under that contract.

"Developed exclusively at private expense" means development was accomplished entirely with costs charged to indirect cost pools, costs not allocated to a Government contract, or any combination thereof.

(1) Private expense determinations should be made at the lowest practicable level.

(2) Under fixed-price contracts, when total costs are greater than the firm-fixed-price or ceiling price of the contract, the additional development costs necessary to complete development shall not be considered when determining whether development was at Government, private, or mixed expense.

"Developed exclusively with Government funds" means development was not accomplished exclusively or partially at private expense.

"Developed with mixed funding" means development was accomplished partially with costs charged to indirect cost pools and/or costs not allocated to a government contract, and partially with costs charged directly to a government contract.

"Form, fit, and function data" means technical data that describe the required overall physical, functional, and performance characteristics (along with the qualification requirements, if applicable) of an item, component, or process to the extent necessary to permit identification of physically and functionally interchangeable items.

"Generated" means, with regard to technical data or computer software, first created in the performance of this contract.

"Government purpose" means any activity in which the United States Government is a party, including cooperative agreements with international or multi-national defense organizations, or sales or transfers by the United States Government to foreign governments or international

organizations. Government purposes include competitive procurement, but do not include the rights to use, modify, reproduce, release, perform, display, or disclose technical data, computer software, or computer software documentation for commercial purposes or authorize others to do so.

"Government purpose rights" means the rights to--

(1) Use, modify, reproduce, release, perform, display, or disclose technical data, computer software, or computer software documentation within the Government without restriction; and

(2) Release or disclose technical data, computer software, or computer software documentation outside the Government and authorize persons to whom release or disclosure has been made to use, modify, reproduce, release, perform, display, or disclose that data or software for United States Government purposes.

"Limited rights" means the rights to use, modify, reproduce, release, perform, display, or disclose technical data, in whole or in part, within the Government. The Government may not, without the written permission of the party asserting limited rights, release or disclose the technical data outside the Government, use the technical data for manufacture, or authorize the technical data to be used by another party, except that the Government may reproduce, release, or disclose such data or authorize the use or reproduction of the data by persons outside the Government if--

(1) The reproduction, release, disclosure, or use is--

(i) Necessary for emergency repair and overhaul; or

(ii) A release or disclosure to--

(A) A covered Government support contractor in performance of its covered Government support contract for use, modification, reproduction, performance, display, or release or disclosure to a person authorized to receive limited rights technical data; or

(B) A foreign government, of technical data other than detailed manufacturing or process data, when use of such data by the foreign government is in the interest of the Government and is required for evaluational or informational purposes;

(2) The recipient of the technical data is subject to a prohibition on the further reproduction, release, disclosure, or use of the technical data; and

(3) The contractor or subcontractor asserting the restriction is notified of such reproduction, release, disclosure, or use.

"Minor modification" means a modification that does not significantly alter the nongovernmental function or purpose of the software or is of the type customarily provided in the commercial marketplace.

"Other than commercial computer software" means software that does not qualify as commercial computer software under the definition of "commercial computer software" of this clause.

"Restricted rights" apply only to other than commercial computer software and mean the Government's rights to--

(1) Use a computer program with one computer at one time. The program may not be accessed by more than one terminal or central processing unit or time shared unless otherwise permitted by this contract;

(2) Transfer a computer program to another Government agency without the further permission of the Contractor if the transferor destroys all copies of the program and related computer software documentation in its possession and notifies the licensor of the transfer. Transferred programs remain subject to the provisions of this clause;

(3) Make a reasonable number of copies of the computer software required for the purposes of safekeeping (archive), backup, modification, or other activities authorized in paragraphs (1), (2), (4) and (5) of this definition;

(4) Modify computer software provided that the Government may--

(i) Use the modified software only as provided in paragraphs (1) and (3) of this definition; and

(ii) Not release or disclose the modified software except as provided in paragraphs (2) and (5) of this clause;

(5) Use, modify, reproduce, perform, display, or release or disclose the computer software, and permit contractors, subcontractors, or covered Government support contractors to do so, for purposes set forth in subparagraph (i) of this paragraph, subject to the conditions set forth in subparagraphs (ii) of this paragraph:

(i)(A) In performance of service contracts (see FAR 37.101), to diagnose and correct deficiencies, to modify the software to enable a computer program to be combined with, adapted to, or merged with other computer programs, or when necessary to respond to urgent tactical situations, provided that the Government notifies the party which has granted restricted rights that any such release or disclosure to particular contractors or subcontractors was made;

(B) To perform emergency repairs or overhaul of items or components procured under this or a related contract, when necessary to perform such repairs or overhaul; or

(C) For the management and oversight of a program or effort by a person authorized to receive restricted rights computer software, including in the performance of covered Government support contracts.

(ii)(A) Any contractor, subcontractor, or covered Government support contractor receiving access to the software for the purposes of subparagraphs (i), (ii), or (iii) of this paragraph shall be subject to the use and nondisclosure agreement at 227.7103-7 or be performing a Government contract that contains the clause at 252.227-7994, Limitations on the Use or Disclosure of Government-Furnished Information Marked with Restrictive Legends;

(B) The Government must not permit any recipient of the software under this paragraph to decompile, disassemble, or reverse engineer the software, or use software decompiled, disassembled, or reverse engineered by the Government pursuant to paragraph (4) of this definition, for any other purpose; and

(C) Any use, modification, reproduction, performance, display, release, or disclosure of the computer software under this paragraph remains subject to the limitations in paragraphs (1) through (4) of this definition.

"Small Business Innovation Research/Small Business Technology Transfer (SBIR/STTR) data" means all technical data or computer software developed or generated in the performance of a phase I, II, or III SBIR/STTR contract or subcontract.

"Technical data" means recorded information, regardless of the form or method of the recording, of a scientific or technical nature (including computer software documentation). The term does not include computer software or financial, administrative, cost or pricing, or management information, or information incidental to contract administration.

"Unlimited rights" means rights to use, modify, reproduce, perform, display, release, or disclose

technical data, computer software, or computer software documentation in whole or in part, in any manner, and for any purpose whatsoever, and to have or authorize others to do so.

(b) Applicability. (1) Except as provided in paragraph (b)(2) of this clause--

(i) This clause governs all technical data related to other than commercial products or commercial services or to any portion of a commercial product or commercial service that was developed in any part at Government expense;

(ii) This clause governs all other than commercial computer software or other than commercial computer software documentation; and

(iii) The clause at DFARS 252.227-7990, Technical Data--Commercial Products and Commercial Services, governs the technical data related to any portion of a commercial product or commercial service that was developed exclusively at private expense.

(2) The clause at DFARS 252.227-7993, Rights in Other Than Commercial Technical Data and Computer Software--Small Business Innovation Research Program and Small Business Technology Transfer Program, governs technical data that are SBIR/STTR data.

(c) Rights in technical data and computer software. The Contractor grants or shall obtain for the Government the following royalty free, worldwide, nonexclusive, irrevocable license rights:

(1) Unlimited rights. The Government shall have unlimited rights in technical data, computer software, or computer software documentation that are--

(i) Data related to an item, component, or process which has been or will be developed exclusively with Government funds;

(ii) Studies, analyses, test data, or similar data produced for this contract, when the study, analysis, test, or similar work was specified as an element of performance;

(iii) Technical data created exclusively with Government funds in the performance of a contract that does not require the development, manufacture, construction, or production of items, components, or processes;

(iv) Form, fit, and function data;

(v) Technical data necessary for installation, operation, maintenance, or training purposes

(other than detailed manufacturing or process data);

(vi) Government-furnished corrections or changes to--

(A) Technical data furnished to the Contractor by the Government; or

(B) Computer software or computer software documentation;

(vii) Data, computer software, or computer software documentation that is publicly available or previously released or disclosed by the Contractor or subcontractor without restrictions on further use, release or disclosure, other than a release or disclosure resulting from the sale, transfer, or other assignment of interest in the technical data to another party or the sale or transfer of some or all of a business entity or its assets to another party;

(viii) Data, computer software, or computer software documentation in which the Government has obtained unlimited rights under another Government contract or as a result of negotiations;

(ix) Data furnished to the Government, under this or any other Government contract or subcontract, with--

(A) Government purpose license rights or limited rights and the restrictive condition(s) has/have expired; or

(B) Government purpose rights and the Contractor's exclusive right to use such data for commercial purposes has expired; or

(x) Computer software developed exclusively with Government funds;

(xi) Computer software documentation the contractor must deliver under this contract; or

(xvii) Computer software or computer software documentation furnished to the Government, under this or any other Government contract or subcontract with--

(A) Restricted rights in computer software, limited rights in technical data, or government purpose license rights and the restrictive conditions have expired; or

(B) Government purpose rights and the Contractor's exclusive right to use such software or documentation for commercial purposes has expired.

(2) Government purpose rights. (i) The Government shall have government purpose rights for a 5-year period, or such other period as may be negotiated, in technical data or computer software--

(A) Related to items, components, or processes developed with mixed funding except when the Government is entitled to unlimited rights in such data or software as provided in paragraphs (c)(1)(ii), (c)(1)(iv) through (c)(1)(ix), and (c)(1)(xii) through (c)(1)(x)(v)(i) of this clause; or

(B) Created with mixed funding in the performance of a contract that does not require the development, manufacture, construction, or production of items, components, or processes.

(ii) The 5-year period, or such other period as may have been negotiated, shall begin upon execution of the contract, subcontract, letter contract (or similar contractual instrument), contract modification, or option exercise that required development of the items, components, or processes, development of the computer software, or creation of the data described in paragraph (c)(2)(i)(B) of this clause. Upon expiration of the 5-year or other negotiated period, the Government shall have unlimited rights in the technical data or computer software.

(iii) The Government will not release or disclose technical data or computer software in which it has government purpose rights unless--

(A) Prior to release or disclosure, the intended recipient completes the nondisclosure agreement at DFARS 227.7103-7; or

(B) The recipient is a Government contractor receiving access to the data or software for performance of a Government contract that contains the clause at DFARS 252.227-7994, Limitations on the Use or Disclosure of Government-Furnished Information Marked with Restrictive Legends.

(iv) The Contractor has the exclusive right, including the right to license others, to use technical data or computer software in which the Government has obtained government purpose rights under this contract for any commercial purpose during the time period specified in the government purpose rights legend prescribed in paragraph (g)(3) of this clause.

(3) Limited rights. (i) Except as provided in paragraphs (c)(1)(ii) and (c)(1)(iv) through (c)(1)(ix) of this clause, the Government shall have limited rights in technical data--

(A) Related to items, components, or processes developed exclusively at private expense and marked with the limited rights legend prescribed in paragraph (g) of this clause; or

(B) Created exclusively at private expense in the performance of a contract that does not require the development, manufacture, construction, or production of items, components, or processes.

(ii) The Government will require a recipient of limited rights data for emergency repair or overhaul to destroy the data and all copies in its possession promptly following completion of the emergency repair/overhaul and to notify the Contractor that the data have been destroyed.

(iii) The Contractor, its subcontractors, and suppliers are not required to provide the Government additional rights to use, modify, reproduce, release, perform, display, or disclose technical data furnished to the Government with limited rights. However, if the Government desires to obtain additional rights in technical data in which it has limited rights, the Contractor agrees to promptly enter into negotiations with the Contracting Officer to determine whether there are acceptable terms for transferring such rights. The Contractor shall ensure that any resulting license agreement, made part of the contract, lists or describes all technical data for which the Government has been granted additional rights and specifies those additional rights.

(iv) The Contractor acknowledges that--

(A) The Government is authorized to release or disclose limited rights data to covered Government support contractors;

(B) The Government will notify the contractor of such release or disclosure;

(C) The Contractor or the party asserting restrictions in the limited rights legend may--

(1) Require each covered Government support contractor to enter into a nondisclosure agreement directly with the Contractor or the party asserting restrictions regarding use of the data; or

(2) Waive in writing the requirement for a nondisclosure agreement; and

(D) Any such nondisclosure agreement shall address the restrictions on the covered Government support contractor's use of the limited rights data as set forth in the clause at DFARS 252.227-7994, Limitations on the Use or Disclosure of Government-Furnished Information Marked with Restrictive Legends. The nondisclosure agreement shall not include any additional terms and conditions unless mutually agreed to by the parties to the nondisclosure agreement.

(4) Restricted rights. (i) The Government shall have restricted rights in other than commercial computer software the contractor must deliver, or that is otherwise provided, to the Government under this contract that was developed exclusively at private expense.

(ii) The Contractor, its subcontractors, or suppliers are not required to provide the Government additional rights in other than commercial computer software delivered or otherwise provided to the Government with restricted rights. However, if the Government desires to obtain additional rights in such software, the Contractor agrees to promptly enter into negotiations with the Contracting Officer to determine whether there are acceptable terms for transferring such rights. The Contractor shall ensure that any resulting license agreement, made part of the contract, lists or describes all other than commercial computer software for which the Government has been granted additional rights and specifies those additional rights.

(iii) The Contractor acknowledges that--

(A) The Government is authorized to release or disclose restricted rights computer software to covered Government support contractors;

(B) The Government will notify the Contractor of such release or disclosure;

(C) The Contractor or the party asserting restrictions in the restricted rights legend may--

(1) Require each such covered Government support contractor to enter into a nondisclosure agreement directly with the Contractor or the party asserting restrictions regarding the use of the software; or

(2) Waive in writing the requirement for a nondisclosure agreement; and

(D) Any such nondisclosure agreement shall address the restrictions on the covered Government support contractor's use of the restricted rights software as set forth in the clause at DFARS 252.227-7994, Limitations on the Use or Disclosure of Government-Furnished Information Marked with Restrictive Legends. The nondisclosure agreement shall not include any additional terms and conditions unless mutually agreed to by the parties to the nondisclosure agreement.

(5) Specifically negotiated license rights. The standard license rights granted to the Government under paragraphs (c)(1) through (c)(4) of this clause, including the period during which the Government shall have government purpose rights in technical data or computer

software, may be modified by mutual agreement but shall not provide the Government lesser rights than provided in the definition of "limited rights" or restricted rights" of this clause. Any negotiated rights shall be identified in a license agreement made part of this contract.

(6) Prior government rights. Technical data or computer software that will be delivered, furnished, or otherwise provided to the Government under this contract, in which the Government has previously obtained rights shall be delivered, furnished, or provided with the preexisting rights, unless--

(i) The parties have agreed otherwise; or

(ii) The restrictions on the Government's rights to use, modify, reproduce, release, perform, display, or disclose the data or software have expired or no longer apply.

(7) Release from liability. The Contractor agrees to release the Government from liability for any authorized release or disclosure of technical data or computer software made in accordance with this clause or any negotiated license agreement. This release from liability for the Government also applies to releases or disclosures made by a third party who received the data or software from an authorized recipient. For any unauthorized use or disclosure by such third parties of technical data or computer software marked with restrictive legends, the Contractor agrees to seek relief solely from that party.

(d) Contractor rights in technical data and computer software. The Contractor retains all rights not granted to the Government.

(e) Third party copyrighted data and software. The Contractor shall not, without the written approval of the Contracting Officer, incorporate any copyrighted data or software in the technical data or computer software the contractor must deliver under this contract unless the Contractor is the copyright owner or has obtained license rights for the Government of the appropriate scope set forth in paragraph (c) of this clause, and has affixed a statement of the license or licenses obtained on behalf of the Government and other persons to the data transmittal document.

(f) Identification and delivery of data to be delivered with restrictions on use, release, or disclosure. (1) This paragraph does not apply to restrictions based solely on copyright.

(2) Except as provided in paragraph (f)(3) of this clause, technical data or computer software that the Contractor asserts should be furnished to the Government with restrictions on use, release, or disclosure are identified in an attachment to this contract (the Attachment). The

Contractor shall not deliver any data or software with restrictive markings unless the data are listed on the Attachment.

(3) In addition to the assertions made in the Attachment, the Contractor may identify other assertions after award when based on new information or inadvertent omissions unless the inadvertent omissions would have materially affected the source selection decision. The Contractor shall submit such identification and assertions to the Contracting Officer as soon as practicable prior to the scheduled date for delivery of the data or software, in the following format, and signed by an official authorized to contractually obligate the Contractor:

Identification and Assertion of Restrictions on the Government's Use, Release, or Disclosure of Technical Data or Computer Software

The Contractor asserts for itself, or the persons identified below, that the Government's rights to use, release, or disclose the following technical data or computer software should be restricted--

Technical Data or Computer Software to be Furnished With Restrictions1 (LIST)	Basis for Assertion2 (LIST)	Asserted Rights Category3 (LIST)	Name of Person Asserting Restrictions4 (LIST)
____	____	____	____

1 If the assertion is applicable to items, components or processes developed at private expense, identify both the data and each such item, component, or process.

2 Generally, the development of an item, component, process, or computer software at private expense, either exclusively or partially, is the only basis for asserting restrictions on the Government's rights to use, release, or disclose computer software or technical data related to such items, components, or processes. Indicate whether development was exclusively or partially at private expense. If development was not at private expense, enter the specific reason for asserting that the Government's rights should be restricted.

3 Enter asserted rights category (e.g., rights in SBIR/STTR data generated under another contract, limited rights, restricted rights, or government purpose rights under this or a prior contract, or specifically negotiated licenses).

4 Corporation, individual, or other person, as appropriate.

Date ____

Printed Name and Title ____

Signature ____

(End of identification and assertion)

(4) When requested by the Contracting Officer, the Contractor shall provide sufficient information to enable the Contracting Officer to evaluate the Contractor's assertions. The

Contracting Officer reserves the right to add the Contractor's assertions to the Attachment and validate any listed assertion, at a later date, in accordance with the procedures in the DFARS 252.227-7997, Validation of Asserted Restrictions, clause of this contract.

(g) Marking requirements. The Contractor, and its subcontractors or suppliers, may only assert restrictions on the Government's rights to use, modify, reproduce, release, perform, display, or disclose technical data or computer software the Contractor must deliver under this contract by marking the deliverable data or software subject to restriction. Except as provided in paragraph (g)(7) of this clause, only the following legends are authorized under this contract: the government purpose rights legend at paragraph (g)(3) of this clause; the limited rights legend at paragraph (g)(4) of this clause; the restricted rights legend at paragraph (g)(5) of this clause; the special license rights legend at paragraph (g)(6) of this clause; and a notice of copyright as prescribed under 17 U.S.C. 401 or 402.

(1) General marking instructions. The Contractor, or its subcontractors or suppliers, shall conspicuously and legibly mark the appropriate legend on all technical data or computer software that qualify for such markings. The authorized legends shall be placed on the transmittal document or storage container and, for printed material, each page of the printed material containing technical data or computer software for which restrictions are asserted. When only portions of a page of printed material are subject to the asserted restrictions, such portions shall be identified by circling, underscoring, with a note, or other appropriate identifier. Technical data or computer software transmitted directly from one computer or computer terminal to another shall contain a notice of asserted restrictions. For software that will or might be used in combat or situations that simulate combat conditions, the contractor shall not insert instructions that interfere with or delay the operation of computer software in order to display a restrictive rights legend or other license statement at any time prior to or during use of the computer software, or otherwise cause such interference or delay, unless the Contracting Officer's written permission to deliver such software has been obtained prior to delivery. Reproductions of technical data or computer software or any portions thereof subject to asserted restrictions shall also reproduce the asserted restrictions.

(2) Omitted markings. (i) Technical data or computer software delivered or otherwise provided under this contract without restrictive markings will be presumed to have been delivered with unlimited rights. To the extent practicable, if the Contractor has requested permission (see paragraph (g)(2)(ii) of this clause) to correct an inadvertent omission of markings, the Contracting Officer will not release or disclose the technical data or computer software pending evaluation of the request.

(ii) The Contractor may request permission to have conforming and justified restrictive

markings placed on unmarked technical data or computer software at its expense. The request must be received by the Contracting Officer within 6 months following the furnishing or delivery of such technical data or computer software, or any extension of that time approved by the Contracting Officer. The Contractor shall--

(A) Identify the technical data or computer software that should have been marked;

(B) Demonstrate that the omission of the marking was inadvertent, the proposed marking is justified and conforms with the requirements for the marking of technical data or computer software contained in this clause; and

(C) Acknowledge, in writing, that the Government has no liability with respect to any disclosure, reproduction, or use of the technical data or computer software made prior to the addition of the marking or resulting from the omission of the marking.

(3) Government purpose rights markings. Technical data or computer software delivered or otherwise furnished to the Government with government purpose rights shall be marked as follows:

GOVERNMENT PURPOSE RIGHTS

Contract Number ____
Contractor Name ____
Contractor Address ____
Expiration Date ____

The Government's rights to use, modify, reproduce, release, perform, display, or disclose these technical data or computer software are restricted by the government purpose rights license in the DFARS 252.227-7989, Rights in Technical Data, Computer Software, and Computer Software Documentation--Other Than Commercial Products and Commercial Services, clause contained in the above identified contract. No restrictions apply after the expiration date shown above. Any reproduction of technical data or portions thereof marked with this legend must also reproduce the markings.

(End of legend)

(4) Limited rights markings. Data delivered or otherwise furnished to the Government with limited rights shall be marked as follows:

LIMITED RIGHTS

Contract Number ____
Contractor Name ____
Contractor Address ____

The Government's rights to use, modify, reproduce, release, perform, display, or disclose these technical data are restricted by the limited rights license in the DFARS 252.227-7989, Rights in Technical Data, Computer Software, and Computer Software Documentation--Other Than Commercial Products and Commercial Services, clause contained in the above identified contract. Any reproduction of technical data or portions thereof marked with this legend must also reproduce the markings. Any person, other than the Government, who has been provided access to such data must promptly notify the above named Contractor.

(End of legend)

(5) Restricted rights markings. Software delivered or otherwise furnished to the Government with restricted rights shall be marked as follows:

RESTRICTED RIGHTS

Contract Number ____
Contractor Name ____
Contractor Address ____

The Government's rights to use, modify, reproduce, release, perform, display, or disclose this software are restricted by the restricted rights license in the DFARS 252.227-7014, Rights in Other Than Commercial Computer Software and Other Than Commercial Computer Software Documentation, clause contained in the above identified contract. Any reproduction of computer software or portions thereof marked with this legend must also reproduce the markings. Any person, other than the Government, who has been provided access to such software must promptly notify the above named Contractor.

(End of legend)

(6) Special license rights markings. (i) Technical data or computer software in which the Government's rights stem from a specifically negotiated license shall be marked as follows:

SPECIAL LICENSE RIGHTS

The Government's rights to use, modify, reproduce, release, perform, display, or disclose these data or software are restricted by Contract Number [Insert contract number] ____, License

Number [Insert license identifier] ____. Any reproduction of technical data, computer software, or portions thereof marked with this legend must also reproduce the markings.

(End of legend)

(ii) For purposes of this clause, special licenses do not include government purpose license rights acquired under a prior contract (see paragraph (c)(5) of this clause).

(7) Preexisting data or software markings. If the terms of a prior contract or license permitted the Contractor to restrict the Government's rights to use, modify, reproduce, release, perform, display, or disclose technical data or computer software deliverable under this contract, and those restrictions are still applicable, the Contractor may mark such data or software with the appropriate restrictive legend for which the data or software qualified under the prior contract or license. The Contractor shall follow the marking procedures in paragraph (g)(1) of this clause.

(h) Contractor procedures and records. Throughout performance of this contract, the Contractor and its subcontractors or suppliers that will deliver technical data or computer software with other than unlimited rights, shall--

(1) Have, maintain, and follow written procedures sufficient to assure that restrictive markings are used only when authorized by the terms of this clause; and

(2) Maintain records sufficient to justify the validity of any restrictive markings on technical data or computer software delivered under this contract.

(i) Removal of unjustified and nonconforming markings--(1) Unjustified technical data markings. The rights and obligations of the parties regarding the validation of restrictive markings on technical data or computer software delivered or to be delivered under this contract are contained in the DFARS 252.227-7997, Validation of Asserted Restrictions, clause of this contract. Notwithstanding any provision of this contract concerning inspection and acceptance, the Government may ignore or, at the Contractor's expense, correct or strike a marking if, in accordance with the procedures in the Validation of Asserted Restrictions clause of this contract, a restrictive marking is determined to be unjustified.

(2) Nonconforming technical data or computer software markings. A nonconforming marking is a marking placed on technical data or computer software delivered or otherwise furnished to the Government under this contract that is not in the format authorized by this contract. Correction of nonconforming markings is not subject to the DFARS 252.227-7997, Validation of Asserted Restrictions, clause of this contract. If the Contracting Officer notifies the Contractor of a

nonconforming marking and the Contractor fails to remove or correct such marking within 60 days, the Government may ignore or, at the Contractor's expense, remove or correct any nonconforming marking.

(j) Relation to patents. Nothing contained in this clause shall imply a license to the Government under any patent or be construed as affecting the scope of any license or other right otherwise granted to the Government under any patent.

(k) Limitation on charges for rights in technical data, computer software, or computer software documentation. (1) The Contractor shall not charge to this contract any cost, including, but not limited to, license fees, royalties, or similar charges, for rights in technical data, computer software, or computer software documentation the Contractor must deliver under this contract when--

(i) The Government has acquired, by any means, the same or greater rights in the data or software; or

(ii) The data or software are available to the public without restrictions.

(2) The limitation in paragraph (k)(1) of this clause--

(i) Includes costs charged by a subcontractor or supplier, at any tier, or costs incurred by the Contractor to acquire rights in subcontractor or supplier technical data, computer software, or computer software documentation, if the subcontractor or supplier has been paid for such rights under any other Government contract or under a license conveying the rights to the Government; and

(ii) Does not include the reasonable costs of reproducing, handling, or mailing the documents or other media in which the technical data, computer software, or computer software documentation will be delivered.

(l) Applicability to subcontractors or suppliers. (1) The Contractor shall ensure that the rights afforded its subcontractors and suppliers under 10 U.S.C. 3771-3775, 10 U.S.C. 3781-3786, and the identification, assertion, and delivery processes of paragraph (f) of this clause are recognized and protected.

(2)(i) Except as provided in paragraph (l)(2)(ii) of this clause, the Contractor shall include this clause in any subcontract or contractual instrument under which technical data or computer software will be obtained from a subcontractor or supplier for delivery to the Government. This

requirement applies to technical data or software related to other than commercial products or commercial services, or related to commercial products or commercial services developed in any part with Government funds. The Contractor shall also require its subcontractors and suppliers to include this clause, without alteration except to identify the parties, in any contractual instrument under which technical data or computer software will be obtained from a subcontractor or supplier for delivery to the Government. This clause will govern the technical data related to an other than commercial product or service or to any portion of a commercial product or commercial service that was developed in any part at Government expense, and the clause at 252.227-7990 will govern the technical data related to any portion of a commercial item that was developed exclusively at private expense. No other clause shall be used to expand or reduce the Government's, the Contractor's, or a higher-tier subcontractor's or supplier's rights in a subcontractor's or supplier's technical data, computer software, or computer software documentation.

(ii) The Contractor shall use the clause at DFARS 252.227-7993, Rights in Other Than Commercial Technical Data and Computer Software--Small Business Innovation Research Program and Small Business Technology Transfer Program, to govern technical data, computer software, or computer software documentation that is SBIR/STTR data.

(3) Technical data, computer software, or computer software documentation a subcontractor or supplier must deliver shall normally be delivered to the next higher-tier contractor, subcontractor, or supplier. However, when there is a requirement in the prime contract for data which may be submitted with other than unlimited rights by a subcontractor or supplier, then said subcontractor or supplier may fulfill its requirement by submitting such data or software directly to the Government, rather than through a higher-tier contractor, subcontractor, or supplier.

(4) The Contractor and higher-tier subcontractors or suppliers shall not use the award of a contract as economic leverage to obtain rights in technical data, computer software, or computer software documentation from their subcontractors or suppliers.

(5) In no event shall the Contractor use its obligation to recognize and protect subcontractor or supplier rights in technical data, computer software, or computer software documentation as an excuse for failing to satisfy its contractual obligations to the Government.

(End of clause)

252.227-7991	Rights in Bid or Proposal Information. (DEVIATION 2026-O0036)	2026-02	Deviation 2026-O0036	2026-02

RIGHTS IN BID OR PROPOSAL INFORMATION ((DEVIATION 2026-O0036) (FEB 2026)

(a) Definitions. As used in this clause--

"Computer software" is defined in--

(1) The 252.227-7989, Rights in Technical Data, Computer Software, and Computer Software Documentation--Other Than Commercial Products and Commercial Services, clause of this contract; or

(2) If this is a contract awarded under the Small Business Innovation Research Program or Small Business Technology Transfer Program, the 252.227-7993, Rights in Other Than Commercial Technical Data and Computer Software--Small Business Innovation Research Program and Small Business Technology Transfer Program, clause of this contract.

"Technical data" is defined in--

(1) The 252.227-7989, Rights in Technical Data, Computer Software, and Computer Software Documentation--Other Than Commercial Products and Commercial Services, clause of this contract; or

(2) If this is a contract awarded under the Small Business Innovation Research Program or Small Business Technology Transfer Program, the 252.227-7993, Rights in Other Than Commercial Technical Data and Computer Software--Small Business Innovation Research Program and Small Business Technology Transfer Program, clause of this contract.

(b) Government rights before contract award. By submission of its offer, the Offeror agrees that the Government--

(1) May reproduce the bid or proposal, or any portions thereof, to the extent necessary to evaluate the offer.

(2) Except as provided in paragraph (d) of this clause, will use information contained in the bid

or proposal only for evaluation purposes and will not disclose, directly or indirectly, such information to any person including potential evaluators, unless that person has been authorized by the head of the agency, his or her designee, or the Contracting Officer to receive such information.

(c) Government rights after contract award. The Contractor agrees--

(1) Except as provided in paragraphs (c)(2), (d), and (e) of this clause, the Government has the rights to use, modify, reproduce, release, perform, display, or disclose information contained in the Contractor's bid or proposal within the Government. The Government will not release, perform, display, or disclose such information outside the Government without the Contractor's written permission.

(2) The Government's right to use, modify, reproduce, release, perform, display, or disclose information that is technical data or computer software the Contractor must deliver under this contract are determined by the Defense Federal Acquisition Regulation Supplement (DFARS) 252.227-7989, Rights in Technical Data, Computer Software, and Computer Software Documentation--Other Than Commercial Products and Commercial Services; ; or DFARS 252.227-7993, Rights in Other Than Commercial Technical Data and Computer Software--Small Business Innovation Research Program and Small Business Technology Transfer Program, clause of this contract.

(d) Government-furnished information. The Government's rights with respect to Government-furnished technical data or computer software contained in the Contractor's bid or proposal are subject only to restrictions on use, modification, reproduction, release, performance, display, or disclosure, if any, imposed by the developer or licensor of such data or software.

(e) Information available without restrictions. The Government's rights to use, modify, reproduce, release, perform, display, or, disclose information contained in a bid or proposal, including technical data or computer software, and to permit others to do so, shall not be restricted in any manner if such information has been released or disclosed to the Government or to other persons without restrictions other than a release or disclosure resulting from the sale, transfer, or other assignment of interest in the information to another party or the sale or transfer of some or all of a business entity or its assets to another party.

(f) Flowdown. Contractor shall include this clause in all subcontracts or similar contractual instruments and require its subcontractors or suppliers to do so without alteration, except to identify the parties.

(End of clause)

252.227-7992	Identification and Assertion of Use, Release, or Disclosure Restrictions. (DEVIATION 2026-O0036)	2026-02	Deviation 2026-O0036	2026-02

IDENTIFICATION AND ASSERTION OF USE, RELEASE, OR DISCLOSURE RESTRICTIONS (DEVIATION 2026-O0036) (FEB 2026)

(a) Definitions. As used in this provision--

"Computer software" is defined in--

(1) The 252.227-7989, Rights in Technical Data, Computer Software, and Computer Software Documentation--Other Than Commercial Products and Commercial Services; or

(2) If this solicitation contemplates a contract under the Small Business Innovation Research Program or Small Business Technology Transfer Program, the 252.227-7993, Rights in Other Than Commercial Technical Data and Computer Software--Small Business Innovation Research Program and Small Business Technology Transfer Program, clause of this solicitation.

"SBIR/STTR data" is defined in the 252.227-7993, Rights in Other Than Commercial Technical Data and Computer Software--Small Business Innovation Research Program and Small Business Technology Transfer Program, clause of this solicitation.

"Technical data" is defined in--

(1) The 252.227-7989, Rights in Technical Data, Computer Software, and Computer Software Documentation--Other Than Commercial Products and Commercial Services, clause of this solicitation; or

(2) If this solicitation contemplates a contract under the Small Business Innovation Research Program or Small Business Technology Transfer Program, the 252.227-7993, Rights in Other Than Commercial Technical Data and Computer Software--Small Business Innovation

Research Program and Small Business Technology Transfer Program, clause of this solicitation.

(b) The identification and assertion requirements in this provision apply only to technical data, including computer software documentation, or computer software the Contractor must deliver with other than unlimited rights. For contracts to be awarded under the Small Business Innovation Research (SBIR) Program or Small Business Technology Transfer Program (STTR) Program, these requirements apply to SBIR/STTR data that will be generated under the resulting contract and will be delivered with SBIR/STTR data rights and to any other data that will be delivered with other than unlimited rights. Notification and identification are not required for restrictions based solely on copyright.

(c) Offers submitted in response to this solicitation shall identify, to the extent known at the time an offer is submitted to the Government, the technical data or computer software that the Offeror, its subcontractors or suppliers, or potential subcontractors or suppliers, assert should be furnished to the Government with restrictions on use, release, or disclosure.

(d) The Offeror's assertions, including the assertions of its subcontractors or suppliers or potential subcontractors or suppliers, shall be submitted as an attachment to its offer in the following format, dated and signed by an official authorized to contractually obligate the Offeror:

Identification and Assertion of Restrictions on the Government’s Use, Release, or Disclosure of Technical Data or Computer Software

The Offeror asserts for itself, or the persons identified below, that the Government's rights to use, release, or disclose the following technical data or computer software should be restricted:

Technical data or computer software to be delivered with restrictions1 (LIST)5	Basis for assertion2 (LIST)	Asserted rights category3 (LIST)	Name of person asserting restrictions4 (LIST)
____	____	____	____

1 For technical data (other than computer software documentation) related to items, components, or processes developed at private expense, identify both the deliverable technical data and each such items, component, or process. For computer software or computer software documentation identify the software or documentation.

2 Generally, development at private expense, either exclusively or partially, is the only basis for asserting restrictions. For technical data, other than computer software documentation, development refers to development of the item, component, or process to which the data relate. The Government’s rights in computer software documentation generally may

not be restricted. For computer software, development refers to the software. Indicate whether development was accomplished exclusively or partially at private expense. If development was not accomplished at private expense, or for computer software documentation, enter the specific basis for asserting restrictions.

3 Enter asserted rights category (e.g., government purpose license rights from a prior contract, rights in SBIR/STTR data generated under a contract resulting from this solicitation or under another contract, limited, restricted, or government purpose rights under a contract resulting from this solicitation or under a prior contract, or specially negotiated licenses).

4 Corporation, individual, or other person, as appropriate.

5 Enter “none” when all data or software will be submitted without restrictions.

Date ____

Printed Name and Title ____

Signature ____

(End of identification and assertion)

(e) An offeror's failure to submit, complete, or sign the notification and identification required by paragraph (d) of this provision with its offer may render the offer ineligible for award.

(f) If the Offeror is awarded a contract, the assertions identified in paragraph (d) of this provision shall be listed in an attachment to that contract. Upon request by the Contracting Officer, the Offeror shall provide sufficient information to enable the Contracting Officer to evaluate any listed assertion.

(End of provision)

252.227-7996	Technical Data--Withholding of Payment. (DEVIATION 2026-O0036)	2026-02	Deviation 2026-O0036	2026-02

TECHNICAL DATA--WITHHOLDING OF PAYMENT (DEVIATION 2026-O0036) (FEB 2026)

(a) If technical data the Contractor must deliver under this contract is not delivered within the time specified by this contract or is deficient upon delivery (including having restrictive markings not identified in the list described in the clause at 252.227-7989(f)(2) or 252.227-7993(f)(2) of this contract), the Contracting Officer may until such data is accepted by the Government, withhold payment to the Contractor of ten percent (10%) of the total contract price or amount

unless a lesser withholding is specified in the contract. Payments shall not be withheld nor any other action taken pursuant to this paragraph when the Contractor's failure to make timely delivery or to deliver such data without deficiencies arises out of causes beyond the control and without the fault or negligence of the Contractor.

(b) The withholding of any amount or subsequent payment to the Contractor shall not be construed as a waiver of any rights accruing to the Government under this contract.

(End of clause)

252.227-7997	Validation of Asserted Restrictions. (DEVIATION 2026-O0036)	2026-02	Deviation 2026-O0036	2026-02

VALIDATION OF ASSERTED RESTRICTIONS (DEVIATION 2026-O0036) (FEB 2026)

(a) Definitions. The terms used in this clause are defined in the 252.227-7989, Rights in Technical Data, Computer Software, and Computer Software Documentation--Other Than Commercial Products and Commercial Services, clause of this contract.

(b) Technical data related to commercial products or commercial services--presumption regarding development exclusively at private expense. For technical data related to commercial products or commercial services, the Contracting Officer will presume that the Contractor's or a subcontractor's asserted use or release restrictions with respect to a commercial product or commercial service are justified on the basis that the item was developed exclusively at private expense. The Contracting Officer will not issue a challenge unless there are reasonable grounds to question the validity of the assertion that the commercial item was developed exclusively at private expense.

(c) Justification. The Contractor or subcontractor at any tier is responsible for maintaining records sufficient to justify the validity of its asserted restrictions on the rights of the Government and others to use, duplicate, release, or disclose technical data or computer software delivered, required to be delivered, or otherwise provided to the Government under the contract or subcontract. Except as provided in paragraph (b) of this clause, the Contractor or subcontractor shall be prepared to furnish to the Contracting Officer a written justification for

such asserted restrictions in response to a challenge under paragraph (e) of this clause.

(d) Prechallenge request for information related to asserted restrictions on technical data. (1) The Contracting Officer may request the Contractor or subcontractor to furnish a written explanation for any asserted restriction on the right of the United States or others to use, disclose, or release technical data. If, upon review of the explanation submitted, the Contracting Officer cannot determine the basis of the asserted restriction, the Contracting Officer may further request the Contractor or subcontractor to furnish additional information in the records of, or otherwise in the possession of or reasonably available to, the Contractor or subcontractor to justify the validity of any asserted restriction on technical data delivered, to be delivered, or otherwise provided to the Government under the contract or subcontract (e.g., a statement of facts accompanied with supporting documentation). The Contractor or subcontractor shall submit such written data as requested by the Contracting Officer within the time required or such longer period as may be mutually agreed.

(2) If the Contracting Officer, after reviewing the written data furnished pursuant to paragraph (d)(1) of this clause, or any other available information related to the validity of an asserted restriction, determines that reasonable grounds exist to question the current validity of the asserted restriction and that continued adherence to the asserted restriction would make impracticable the subsequent competitive acquisition of the item or process to which the technical data relates, the Contracting Officer will follow the procedures in paragraph (f) of this clause.

(3) If the Contractor or subcontractor fails to respond to the Contracting Officer's request for information under paragraph (d)(1) of this clause, and the Contracting Officer determines that continued adherence to the asserted restriction would make impracticable the subsequent competitive acquisition of the item or process to which the technical data relates, the Contracting Officer may challenge the validity of the asserted restriction as described in paragraph (f) of this clause.

(e) Prechallenge request for information related to assertion restrictions on computer software. (1) The Contracting Officer may request the Contractor to provide sufficient information to enable the Contracting Officer to evaluate the Contractor's asserted restrictions. Such information shall be based upon the records required by this clause or other information reasonably available to the Contractor.

(2) Based upon the information provided, if the--

(i) Contractor agrees that an asserted restriction is not valid, the Contracting Officer may--

(A) Strike or correct the unjustified marking at the Contractor's expense; or

(B) Return the computer software to the Contractor for correction at the Contractor's expense. If the Contractor fails to correct or strike the unjustified marking and return the corrected software to the Contracting Officer within 60 days following receipt of the software, the Contracting Officer may correct or strike the marking at the Contractor's expense;

(ii) Contracting Officer concludes that the asserted restriction is appropriate for this contract, the Contracting Officer shall so notify the Contractor in writing.

(3) The Contractor's failure to provide a timely response to a Contracting Officer's request for information or failure to provide sufficient information to enable the Contracting Officer to evaluate an asserted restriction shall constitute reasonable grounds for questioning the validity of an asserted restriction.

(f) Challenge. (1) Notwithstanding any provision of this contract concerning inspection and acceptance, if the Contracting Officer determines that a challenge to the asserted restriction is warranted, the Contracting Officer will send a written challenge notice to the Contractor or subcontractor making the asserted restriction. The challenge notice and all related correspondence shall be subject to handling procedures for classified information and controlled unclassified information. Such challenge will--

(i) State the specific grounds for challenging the asserted restriction including, for technical data related to commercial products or commercial services, sufficient information to reasonably demonstrate that the commercial product or commercial service was not developed exclusively at private expense;

(ii) Require a response within 60 days justifying the assertion based upon records kept in accordance with paragraph (c) of this clause and providing sufficient evidence as to the current validity of the asserted restriction;

(iii) State that a Contracting Officer's final decision, issued pursuant to paragraph (h) of this clause, or action of a court of competent jurisdiction or Board of Contract Appeals that sustained the validity of an identical assertion made by the Contractor (or a licensee) sustaining the validity of a prior asserted restriction identical to the current asserted restriction, within the 3-year period preceding the current challenge, shall serve as justification for the current asserted restriction if the prior validated restriction was asserted by the same Contractor or subcontractor (or any licensee of such Contractor or subcontractor) to which such notice is being provided; and

(iv) State that failure to respond to the challenge notice may result in issuance of a final decision pursuant to paragraph (g) of this clause.

(2) The Contracting Officer will extend the time for response as appropriate if the Contractor or subcontractor submits a written request showing the need for additional time to prepare a response.

(3) The Contractor's or subcontractor's written response shall be considered a claim within the meaning of the 41 U.S.C. 7101, Contract Disputes, and shall be certified in the form prescribed at 33.207 of the Federal Acquisition Regulation, regardless of dollar amount.

(4) A Contractor or subcontractor receiving challenges to the same asserted restrictions from more than one Contracting Officer shall notify each Contracting Officer of the existence of more than one challenge. The notice shall also state which Contracting Officer initiated the first in time unanswered challenge. The Contracting Officer initiating the first in time unanswered challenge after consultation with the Contractor or subcontractor and the other Contracting Officers, will formulate and distribute a schedule for responding to each of the challenge notices to all interested parties. The schedule will afford the Contractor or subcontractor a reasonable opportunity to respond to each challenge notice. All parties will be bound by this schedule.

(5) The Contracting Officer may request additional supporting documentation if, in the Contracting Officer's opinion, the Contractor's explanation does not provide sufficient evidence to justify the validity of the asserted restrictions. The Contractor agrees to promptly respond to the Contracting Officer's request for additional supporting documentation.

(6) Notwithstanding challenge by the Contracting Officer, the parties may agree on the disposition of an asserted restriction at any time prior to a Contracting Officer's final decision or, if the Contractor has appealed that decision, filed suit, or provided notice of an intent to file suit, at any time prior to a decision by a court of competent jurisdiction or Board of Contract Appeals.

(g) Final decision when Contractor or subcontractor fails to respond. Upon a failure of a Contractor or subcontractor to submit any response to the challenge notice or a request for additional information (under paragraphs (f)(1) and (f)(5) of this clause), the Contracting Officer will issue a final decision to the Contractor or subcontractor in accordance with the Disputes clause of this contract. In order to sustain the challenge for commercial products or commercial services, the Contracting Officer will provide information demonstrating that the commercial product or commercial service was not developed exclusively at private expense. This final decision will be issued as soon as possible after the expiration of the time period of paragraph (f)

(1)(ii) or (f)(2) of this clause. Following issuance of the final decision, the Contracting Officer will comply with the procedures in paragraphs (h)(2)(ii) through (iv) of this clause.

(h) Final decision when Contractor or subcontractor responds. (1) If the Contracting Officer determines that the Contractor or subcontractor has justified the validity of the asserted restriction, the Contracting Officer will issue a final decision to the Contractor or subcontractor that sustains the validity of the asserted restriction and that states that the Government will continue to be bound by the asserted restriction. The Contracting Officer will issue this final decision within 60 days after receipt of the Contractor's or subcontractor's response to the challenge notice, or within such longer period that the Contracting Officer has notified the Contractor or subcontractor that the Government will require. The Contracting Officer will provide notification of any longer period for issuance of a final decision within 60 days after receipt of the response to the challenge notice.

(2)(i) If the Contracting Officer determines that the validity of the asserted restriction is not justified, the Contracting Officer will issue a final decision to the Contractor or subcontractor in accordance with the Disputes clause of this contract. To sustain the challenge for technical data related to commercial products or commercial services, the Contracting Officer will provide information demonstrating that the commercial product or commercial service was not developed exclusively at private expense. Notwithstanding paragraph (e) of the Disputes clause, the final decision will be issued within 60 days after receipt of the Contractor's or subcontractor's response to the challenge notice, or within such longer period that the Contracting Officer has notified the Contractor or subcontractor that the Government will require. The notification of a longer period for issuance of a final decision will be made within 60 days after receipt of the response to the challenge notice.

(ii) The Government agrees that it will continue to be bound by the asserted restriction for a period of 90 days from the issuance of the Contracting Officer's final decision under paragraph (h)(2)(i) of this clause. The Contractor or subcontractor agrees that, if it intends to file suit in the United States Court of Federal Claims, it will provide a notice of intent to file suit to the Contracting Officer within 90 days from the issuance of the Contracting Officer's final decision under paragraph (h)(2)(i) of this clause. If the Contractor or subcontractor fails to appeal to an agency Board of Contract Appeals, file suit in an appropriate court, or provide a notice of intent to file suit in an appropriate court to the Contracting Officer within the 90-day period, the Government may cancel or ignore the restrictive markings that are based on the asserted restrictions, and the failure of the Contractor or subcontractor to take the required action constitutes agreement with such Government action.

(iii) The Government agrees that it will continue to be bound by the asserted restriction where a

notice of intent to file suit in the United States Court of Federal Claims is provided to the Contracting Officer within 90 days from the issuance of the final decision under paragraph (h)(2)(i) of this clause. The Government will no longer be bound, and the Contractor or subcontractor agrees that the Government may strike or ignore the restrictive marking that is based on the asserted restriction, if the Contractor or subcontractor fails to file its suit within 1 year after issuance of the final decision. Notwithstanding the foregoing, where the head of an agency determines, on a nondelegable basis, that urgent or compelling circumstances will not permit waiting for the filing of a suit in the United States Court of Federal Claims, the Contractor or subcontractor agrees that the agency may, following notice to the Contractor or subcontractor, authorize release or disclosure of the technical data or computer software. The Government agrees not to release or disclose such technical data or computer software unless, prior to release or disclosure, the intended recipient is subject to the use and nondisclosure agreement at Defense Federal Acquisition Regulation Supplement (DFARS) 227.7103-7, or is a Government contractor receiving access to the technical data or computer software for performance of a Government contract that contains the clause at DFARS 252.227-7994, Limitations on the Use or Disclosure of Government-Furnished Information Marked with Restrictive Legends. Such agency determination may be made at any time after issuance of the final decision and will not affect the Contractor's or subcontractor's right to damages against the United States where its asserted restrictions are ultimately upheld or to pursue other relief, if any, as may be provided by law.

(iv) The Government agrees that it will be bound by the asserted restrictions where an appeal or suit is filed pursuant to the Contract Disputes statute until final disposition by an agency Board of Contract Appeals or the United States Court of Federal Claims. Notwithstanding the foregoing, where the head of an agency determines, on a nondelegable basis, following notice to the Contractor that urgent or compelling circumstances will not permit awaiting the decision by such Board of Contract Appeals or the United States Court of Federal Claims, the Contractor or subcontractor agrees that the agency may authorize release or disclosure of the technical data or computer software. The Government agrees not to release or disclose such technical data or computer software unless, prior to release or disclosure, the intended recipient is subject to the use and nondisclosure agreement at Defense Federal Acquisition Regulation Supplement (DFARS) 227.7103-7, or is a Government contractor receiving access to the technical data or computer software for performance of a Government contract that contains the clause at DFARS 252.227-7994, Limitations on the Use or Disclosure of Government-Furnished Information Marked with Restrictive Legends. Such agency determination may be made at any time after issuance of the final decision and will not affect the Contractor's or subcontractor's right to damages against the United States where its asserted restrictions are ultimately upheld or to pursue other relief, if any, as may be provided by law.

(i) Final disposition of appeal or suit. (1) If the Contractor or subcontractor appeals or files suit and if, upon final disposition of the appeal or suit, the Contracting Officer's decision is sustained--

(i) The restrictive marking that is based on the asserted restriction on the technical data or computer software shall be cancelled, corrected or ignored; and

(ii) If the asserted restriction is found not to be substantially justified, the Contractor or subcontractor, as appropriate, shall be liable to the Government for payment of the cost to the Government of reviewing the asserted restriction and the fees and other expenses (as defined in 28 U.S.C. 2412(d)(2)(A)) incurred by the Government in challenging the asserted restriction, unless special circumstances would make such payment unjust.

(2) If the Contractor or subcontractor appeals or files suit and if, upon final disposition of the appeal or suit, the Contracting Officer's decision is not sustained--

(i) The Government will continue to be bound by the restrictive marking; and

(ii) The Government will be liable to the Contractor or subcontractor for payment of fees and other expenses (as defined in 28 U.S.C. 2412(d)(2)(A)) incurred by the Contractor or subcontractor in defending the marking, if the challenge by the Government is found not to have been made in good faith.

(j) Duration of right to challenge. (1) The Government may review the validity of any restriction on technical data or computer software, delivered or that the Contractor must deliver under a contract, asserted by the Contractor or subcontractor. During the period within 6 years of final payment on a contract or within 6 years of delivery of the technical data or computer software to the Government, whichever is later, the Contracting Officer may review and make a written determination to challenge the restriction. The Government may, however, challenge a restriction on the release, disclosure, or use of technical data or computer software at any time if such technical data or computer software--

(i) Are publicly available;

(ii) Have been furnished to the United States without restriction;

(iii) Have been otherwise made available without restriction; or

(iv) Are the subject of a fraudulently asserted use or release restriction.

(2) Only the Contracting Officer's final decision resolving a formal challenge by sustaining the validity of a restrictive marking or actions of an agency Board of Contract Appeals or a court of competent jurisdiction that sustain the validity of an asserted restriction constitute "validation" as addressed in 10 U.S.C. 3785(c).

(k) Decision not to challenge. A decision by the Government, or a determination by the Contracting Officer, to not challenge the restrictive marking or asserted restriction shall not constitute "validation."

(l) Privity of contract. The Contractor or subcontractor agrees that the Contracting Officer may transact matters under this clause directly with subcontractors at any tier that assert restrictions. However, this clause neither creates nor implies privity of contract between the Government and subcontractor.

(m) Flowdown. The Contractor or subcontractor agrees to insert this clause in contractual instruments, including subcontracts and other contractual instruments for commercial products or commercial services, with its subcontractors or suppliers at any tier requiring the delivery of technical data or computer software. The clause may not be altered other than to identify the appropriate parties.

(End of clause)

252.240-7997	NIST SP 800-171 DoD Assessment Requirements. (DEVIATION 2026-O0025)	2026-02	Deviation 2026-O0025	2026-02

NIST SP 800-171 DOD ASSESSMENT REQUIREMENTS (DEVIATION 2026-O0025)(FEB 2026)

(a) Definitions.

Covered contractor information system has the meaning given in the clause 252.204-7012, Safeguarding Covered Defense Information and Cyber Incident Reporting, of this contract.

High Assessment means an assessment that is conducted by Government personnel, trained in accordance with DoD policy and procedures, using NIST SP 800-171A, Assessing Security Requirements for Controlled Unclassified Information that--

(1) Consists of--

(i) A review of a contractor's previous assessment(s), as applicable;

(ii) A thorough document review;

(iii) Verification, examination, and demonstration of a Contractor's system security plan to validate that NIST SP 800-171 security requirements have been implemented as described in the contractor's system security plan; and

(iv) Discussions with the contractor to obtain additional information or clarification, as needed; and

(2) Results in a confidence level of “High” in the resulting score.

Medium Assessment means an assessment conducted by Government personnel, trained in accordance with DoD policy and procedures, using NIST SP 800-171A, Assessing Security Requirements for Controlled Unclassified Information that--

(1) Consists of--

(i) A review of a contractor's previous assessment(s), as applicable;

(ii) A thorough document review; and

(iii) Discussions with the contractor to obtain additional information or clarification, as needed; and

(2) Results in a confidence level of “Medium” in the resulting score.

(b) Applicability. This clause applies to covered contractor information systems that are required to comply with the National Institute of Standards and Technology (NIST) Special Publication (SP) 800-171, in accordance with Defense Federal Acquisition Regulation System (DFARS) clause at 252.204-7012, Safeguarding Covered Defense Information and Cyber Incident Reporting, of this contract.

(c) Requirements. The Contractor shall provide access to its facilities, systems, and personnel necessary for the Government to conduct a Medium or High NIST SP 800-171 DoD Assessment, using the methodology described at 32 CFR 170.24, if necessary. The results of Medium or High NIST SP 800-171 DoD Assessments, when conducted by DCMA, will take precedence over any other assessment, in accordance with 32 CFR 170.16(a)(1)(iv), 32 CFR 170.17(a)(1)(iv), and 32 CFR 170.18(a)(1)(iv).

(d) Procedures. Summary level scores for all assessments will be posted in the Supplier Performance Risk System (SPRS) (https://www.sprs.csd.disa.mil/) to provide DoD Components visibility into the summary level scores of strategic assessments.

Medium and High Assessments. DoD will post the following Medium and/or High Assessment summary level scores to SPRS for each system security plan assessed:

(i) The standard assessed (e.g., NIST SP 800-171 Rev 1).

(ii) Organization conducting the assessment, i.e., DCMA.

(iii) All industry CAGE code(s) associated with the information system(s) addressed by the system security plan.

(iv) Date and level of the assessment, i.e., medium or high.

(v) Summary level score (overall numerical score, not the individual value assigned for each requirement).

(vi) Date that all requirements are expected to be implemented based on information gathered from associated plan(s) of action developed in accordance with NIST SP 800-171.

(e) Rebuttals. (1) DoD will provide Medium and High Assessment summary level scores to the Contractor and offer the opportunity for rebuttal and adjudication of assessment summary level scores prior to posting the summary level scores to SPRS (see SPRS User's Guide https://www.sprs.csd.disa.mil/pdf/SPRS_Awardee.pdf).

(2) Upon completion of each assessment, the contractor has 14 business days to provide additional information to demonstrate that they meet any security requirements not observed by the assessment team or to rebut the findings that may be of question.

(f) Accessibility. (1) Assessment summary level scores posted in SPRS are available to DoD personnel, and are protected, in accordance with the standards set forth in DoD Instruction 5000.79, Defense-wide Sharing and Use of Supplier and Product Performance Information (PI).

(2) Authorized representatives of the Contractor for which the assessment was conducted may access SPRS to view their own summary level scores, in accordance with the SPRS Software User's Guide for Awardees/Contractors available at https://www.sprs.csd.disa.mil/pdf /SPRS_Awardee.pdf.

(3) A High NIST SP 800-171 DoD Assessment may result in documentation in addition to that listed in this clause. DoD will retain and protect any such documentation as “Controlled Unclassified Information (CUI)” and intended for internal DoD use only. The information will be protected against unauthorized use and release, including through the exercise of applicable exemptions under the Freedom of Information Act (e.g., Exemption 4 covers trade secrets and commercial or financial information obtained from a contractor that is privileged or confidential).

(g) Subcontracts. The Contractor shall insert the substance of this clause, including this paragraph (g), in all subcontracts and other contractual instruments, including subcontracts for the acquisition of commercial products or commercial services (excluding commercially available off-the-shelf items).

(End of clause)

252.244-7999	Subcontracts for Commercial Products or Commercial Services. (DEVIATION 2026-O0015)	2026-02	Deviation 2026-O0015	2026-01

SUBCONTRACTS FOR COMMERCIAL PRODUCTS OR COMMERCIAL SERVICES (FEB 2026)(DEVIATION 2026-O0015)

(a) The Contractor shall not include the terms of any Federal Acquisition Regulation (FAR) clause or Defense Federal Acquisition Regulation Supplement (DFARS) clause in subcontracts for commercial products or commercial services at any tier under this contract, unless--

(1) For DFARS clauses, it is so specified in the particular clause; or

(2) For FAR clauses, the clause is listed at FAR 12.205 or it is so specified in paragraph (b) of the clause at FAR 52.244-6, as applicable. (Section 847(b)(1)(B), Pub. L. 114-328)

(b)(1) In accordance with 10 U.S.C. 3457(c), the Contractor shall treat as commercial products any items valued at less than $10,000 per item that were purchased by the Contractor for use in the performance of multiple contracts with the Department of Defense and other parties and are not identifiable to any particular contract when purchased.

(2) The Contractor shall ensure that any items to be used in performance of this contract, that are treated as commercial products pursuant to paragraph (b)(1) of this clause, meet all terms and conditions of this contract that are applicable to commercial products in accordance with the clause at FAR 52.244-6 and paragraph (a) of this clause.

(c) Subcontracts. The Contractor shall include the terms of this clause, including this paragraph (c), in subcontracts awarded under this contract, including subcontracts for the acquisition of commercial products or commercial services.

(End of clause)

Section 00 72 00 - General Conditions

FAR Clauses Incorporated by Reference

Number	Title	Effective Date	Alternate Deviation	Variation Effective Date
52.202-1	Definitions.	2020-06		
52.203-3	Gratuities.	1984-04		
52.203-5	Covenant Against Contingent Fees.	2014-05		
52.203-6	Restrictions on Subcontractor Sales to the Government.	2020-06		
52.203-7	Anti-Kickback Procedures.	2020-06		
52.203-8	Cancellation, Rescission, and Recovery of Funds for Illegal or Improper Activity.	2014-05		
52.203-10	Price or Fee Adjustment for Illegal or Improper Activity.	2014-05		
52.203-12	Limitation on Payments to Influence Certain Federal Transactions.	2020-06		
52.203-13	Contractor Code of Business Ethics and Conduct.	2021-11		
52.203-19	Prohibition on Requiring Certain Internal Confidentiality Agreements or Statements.	2017-01		
52.204-9	Personal Identity Verification of Contractor Personnel.	2011-01		

52.204-19	Incorporation by Reference of Representations and Certifications.	2014-12
52.214-18	Preparation of Bids-Construction.	1984-04
52.214-19	Contract Award-Sealed Bidding-Construction.	1996-08
52.222-12	Contract Termination-Debarment.	2014-05
52.222-13	Compliance with Construction Wage Rate Requirements and Related Regulations.	2014-05
52.222-15	Certification of Eligibility.	2014-05
52.222-90	Addressing DEI Discrimination by Federal Contractors. (Deviation 2026-O0040, Revision 1)	2026-04
52.223-5	Pollution Prevention and Right-to-Know Information.	2024-05
52.226-7	Drug-Free Workplace.	2024-05
52.226-8	Encouraging Contractor Policies to Ban Text Messaging While Driving.	2024-05
52.227-1	Authorization and Consent.	2020-06
52.227-2	Notice and Assistance Regarding Patent and Copyright Infringement.	2020-06
52.228-2	Additional Bond Security.	1997-10
52.228-5	Insurance-Work on a	1997-01

	Government Installation.			
52.228-12	Prospective Subcontractor Requests for Bonds.	2022-12		
52.228-14	Irrevocable Letter of Credit.	2014-11		
52.229-3	Federal, State, and Local Taxes.	2026-08		
52.229-12	Tax on Certain Foreign Procurements.	2026-08		
52.232-15	Progress Payments Not Included.	1984-04		
52.232-17	Interest.	2014-05		
52.232-23	Assignment of Claims. (Alternate I)	2014-05	Alternate I	1984-04
52.232-27	Prompt Payment for Construction Contracts.	2017-01		
52.232-33	Payment by Electronic Funds Transfer-System for Award Management.	2018-10		
52.232-39	Unenforceability of Unauthorized Obligations.	2013-06		
52.232-40	Providing Accelerated Payments to Small Business Subcontractors.	2023-03		
52.236-13	Accident Prevention. (Alternate I)	2026-02	Alternate I	1991-11
52.236-14	Availability and Use of Utility Services. (Deviation 2026-O0038)	2026-02		
52.242-13	Bankruptcy.	1995-07		

52.242-14	Suspension of Work.	1984-04		
52.246-12	Inspection of Construction.	1996-08		
52.246-21	Warranty of Construction.	1994-03		
52.249-2	Termination for Convenience of the Government (Fixed-Price). (Alternate I)	2012-04	Alternate I	1996-09
52.249-10	Default (Fixed-Price Construction).	1984-04		

DFARS Clauses Incorporated by Reference

Number	Title	Effective Date	Alternate Deviation	Variation Effective Date
252.203-7000	Requirements Relating to Compensation of Former DoD Officials.	2011-09		
252.203-7001	Prohibition on Persons Convicted of Fraud or Other Defense-Contract-Related Felonies.	2023-01		
252.203-7002	Requirement to Inform Employees of Whistleblower Rights.	2022-12		
252.203-7003	Agency Office of the Inspector General.	2019-08		
252.203-7004	Display of Hotline Posters.	2023-01		
252.204-7000	Disclosure of Information.	2016-10		

252.204-7003	Control of Government Personnel Work Product.	1992-04
252.204-7004	Antiterrorism Awareness Training for Contractors.	2023-01
252.204-7012	Safeguarding Covered Defense Information and Cyber Incident Reporting.	2024-05
252.204-7018	Prohibition on the Acquisition of Covered Defense Telecommunications Equipment or Services.	2023-01
252.205-7000	Provision of Information to Cooperative Agreement Holders.	2024-10
252.209-7004	Subcontracting with Firms that are Owned or Controlled by the Government of a Country that is a State Sponsor of Terrorism.	2019-05
252.222-7006	Restrictions on the Use of Mandatory Arbitration Agreements.	2023-01
252.223-7008	Prohibition of Hexavalent Chromium.	2023-01
252.225-7012	Preference for Certain Domestic Commodities.	2022-04
252.225-7048	Export-Controlled Items.	2013-06
252.225-7052	Restriction on the Acquisition of Certain Magnets, Tantalum, and Tungsten.	2024-05
252.225-7056	Prohibition Regarding Business	2023-01

	Operations with the Maduro Regime.	
252.225-7060	Prohibition on Certain Procurements from the Xinjiang Uyghur Autonomous Region.	2023-06
252.232-7003	Electronic Submission of Payment Requests and Receiving Reports.	2018-12
252.232-7010	Levies on Contract Payments.	2006-12
252.236-7000	Modification Proposals--Price Breakdown.	1991-12
252.236-7002	Obstruction of Navigable Waterways.	1991-12
252.243-7001	Pricing of Contract Modifications.	1991-12
252.243-7002	Requests for Equitable Adjustment.	2022-12
252.247-7023	Transportation of Supplies by Sea.	2024-10

FAR Clauses Incorporated by Full Text

Number	Title	Effective Date	Alternate Deviation	Variation Effective Date
52.204-10	Reporting Executive Compensation and First-Tier Subcontract Awards. (Deviation 2026-O0038)	2026-02		

Reporting Executive Compensation and First-Tier Subcontract Awards (Feb 2026) (Deviation 2026-O0038)

(a) Definitions. As used in this clause:

Executive means officers, managing partners, or any other employees in management positions.

First-tier subcontract means a subcontract awarded directly by the Contractor to acquire supplies or services (including construction) for performing a prime contract. It does not include the Contractor's supplier agreements with vendors, such as long-term arrangements for materials or supplies that benefit multiple contracts and/or the costs of which are normally applied to a contractor's general and administrative expenses or indirect costs.

Month of award means the month in which the Contracting Officer signs a contract or the month in which the Contractor signs a first-tier subcontract.

Total compensation means the cash and noncash dollar value earned by the executive during the Contractor's preceding fiscal year and includes the information described at 17 CFR 229.402 (c)(2).

(b) Requirement. Section 2(d)(2) of the Federal Funding Accountability and Transparency Act of 2006 (Pub. L. 109-282), as amended by section 6202 of the Government Funding Transparency Act of 2008 (Pub. L. 110-252), requires the Contractor to report information on subcontract awards. The law requires all reported information be made public; therefore, the Contractor is responsible for notifying its subcontractors that the required information will be made public. Nothing in this clause requires disclosing classified information.

(c) Reporting. Unless otherwise directed by the Contracting Officer, or as provided in paragraph (f) of this clause, the Contractor shall report the following in the System for Award Management at https://www.sam.gov as follows:

(1) Executive compensation of the prime contractor. The Contractor shall report the names and total compensation of each of the five most highly compensated executives for its preceding completed fiscal year, if-

(i) In the Contractor's preceding fiscal year, the Contractor received-

(A)80 percent or more of its annual gross revenues from Federal contracts (and subcontracts);

loans, grants (and subgrants); cooperative agreements; and other forms of Federal financial assistance; and

(B)$25,000,000 or more in annual gross revenues from Federal contracts (and subcontracts); loans, grants (and subgrants); cooperative agreements; and other forms of Federal financial assistance; and

(ii) The public does not have access to information about the compensation of the executives through periodic reports filed under section 13(a) or 15(d) of the Securities Exchange Act of 1934 (15 U.S.C. 78m(a), 78o(d)) or section 6104 of the Internal Revenue Code of 1986. (To determine if the public has access to the compensation information, see the U.S. Security and Exchange Commission total compensation filings at http://www.sec.gov/answers/execomp.htm.).

(2) First-tier subcontract information. The Contractor shall report the following information by the end of the month following the month of award of each first-tier subcontract award:

(i) Unique entity identifier for the subcontractor receiving the award and for the subcontractor's ultimate parent company, if the subcontractor has a parent company.

(ii) Name of the subcontractor.

(iii) Amount of the subcontract award.

(iv) Date of the subcontract award.

(v) A description of the products or services (including construction) being provided under the subcontract, including the overall purpose and expected outcomes or results of the subcontract.

(vi) The subcontract number assigned by the Prime Contractor.

(vii) Subcontractor's physical address.

(viii) Subcontractor's primary performance location.

(ix) The prime contract number, and order number if applicable.

(x) Awarding agency name and code.

(xi) Funding agency name and code.

(xii) Government contracting office code.

(xiii) The applicable North American Industry Classification System code.

(3) Executive compensation of the first-tier subcontractor. The Contractor shall report by the end of the month following the month of award of a first-tier subcontract award and annually thereafter (calculated from the prime contract award date) the names and total compensation of each of the five most highly compensated executives for that subcontractor in the subcontractor's preceding completed fiscal year, if-

(i) In the subcontractor's preceding fiscal year, the subcontractor received-

(A)80 percent or more of its annual gross revenues from Federal contracts (and subcontracts); loans, grants (and subgrants); cooperative agreements; and other forms of Federal financial assistance; and

(B)$25,000,000 or more in annual gross revenues from Federal contracts (and subcontracts); loans, grants (and subgrants); cooperative agreements; and other forms of Federal financial assistance; and

(ii) The public does not have access to information about the compensation of the executives through periodic reports filed under section 13(a) or 15(d) of the Securities Exchange Act of 1934 (15 U.S.C. 78m(a), 78o(d)) or section 6104 of the Internal Revenue Code of 1986 (see http://www.sec.gov/answers/execomp.htm).

(d) Restriction. The Contractor shall not split or break down subcontracts to a value below the threshold at the Federal Acquisition Regulation 4.208(e), on the date of subcontract award, to avoid the reporting requirements in paragraph (c) of this clause.

(e) Duration. Continued reporting on first-tier subcontracts is not required unless one of the reported data elements changes during the performance of the subcontract. The Contractor is not required to make further reports after a first-tier subcontract expires.

(f) Exceptions.

(1) If the Contractor in the previous tax year had gross income, from all sources, under $300,000, the Contractor is exempt from the requirement to report subcontractor awards.

(2) If a subcontractor in the previous tax year had gross income from all sources under $300,000, the Contractor does not need to report awards for that subcontractor.

(g) Prepopulated data. The Subcontract Reports in SAM will prepopulate with some information from SAM and the Federal Procurement Data System (FPDS). If the FPDS information is incorrect, the Contractor should notify the Contracting Officer. If the SAM information is incorrect, the Contractor is responsible for correcting this information.

(End of clause)

52.204-13	System for Award Management-Maintenance. (Deviation 2026-O0038)	2026-02

System for Award Management-Maintenance (Feb 2026) (Deviation 2026-O0038)

(a) Definitions. As used in this clause-

Commercial and Government Entity code means-

(1) An identifier assigned to entities located in the United States or its outlying areas by the Defense Logistics Agency (DLA) Commercial and Government Entity (CAGE) Branch to identify a commercial or government entity by unique location (referred to as "CAGE code"); or

(2) An identifier assigned by a member of the North Atlantic Treaty Organization (NATO) or by the NATO Support and Procurement Agency to entities located outside the United States and its outlying areas that the DLA CAGE Branch records and maintains in the CAGE master file (referred to as "NCAGE code").

Unique Entity Identifier (UEI) means an identifier used to identify a specific commercial, nonprofit, or Government entity.

(b) Active registration.

(1) The Contractor shall maintain an active Federal Government contracts registration in the

System for Award Management (SAM) at https://www.sam.gov during contract performance and through final payment under this contract. To maintain an active registration in SAM, the Contractor shall review at least annually its registration in SAM and validate that the information is current, accurate, and complete.

(2) The Contractor is responsible for the currency, accuracy, and completeness of the information provided within SAM, and for any liability resulting from the Government's reliance on inaccurate or incomplete information. Updating SAM does not alter the terms and conditions of this contract and is not a substitute for a properly executed contractual document.

(c) Novation and change-of-name agreements.

(1) If the Contractor has legally changed its business name or "doing business as" name (whichever is shown on the contract), or has transferred the assets used to perform the contract, but has not completed the necessary requirements regarding novation and change-of-name agreements in part 42 of the Federal Acquisition Regulation (FAR), the Contractor shall provide the responsible Contracting Officer a minimum of one business day's written notification of its intention to -

(i) Change the legal business name in SAM;

(ii) Comply with the requirements of FAR part 42; and

(iii) Agree in writing to the timeline and procedures specified by the responsible Contracting Officer. The Contractor shall provide with its written notification sufficient documentation to support the legally changed name.

(2) If the Contractor fails to comply with the requirements of paragraph (c)(1) of this clause, or fails to perform the agreement at paragraph (c)(1)(iii) of this clause, and, in the absence of a properly executed novation or change-of-name agreement, the SAM information that shows the Contractor to be other than the Contractor indicated in the contract will be considered to be incorrect information within the meaning of the "Suspension of Payment" paragraph of the electronic funds transfer (EFT) clause of this contract.

(d) Assignees.

(1) The Contractor shall not change the legal business name or address for EFT payments or manual payments, as appropriate, in the SAM record to reflect an assignee for the purpose of assignment of claims (see FAR part 32). Assignees shall be separately registered in SAM.

(2) Information provided to the Contractor's SAM record that indicates payments, including those made by EFT, to an ultimate recipient other than that Contractor will be incorrect information within the meaning of the "Suspension of Payment" paragraph of the EFT clause of this contract.

(e) Unique entity identifier (UEI). The Contractor shall ensure that its UEI is maintained throughout the life of the contract.

(f) Commercial and Government Entity (CAGE) code. The Contractor shall ensure that the CAGE code is maintained throughout the life of the contract. To update a CAGE code, the Contractor shall initiate the change by updating its SAM registration.

(g) Communicating changes. The Contractor shall communicate any change to its UEI or CAGE code to the Contracting Officer within 30 days after the change, so a modification can be issued to update the UEI or CAGE code on this contract. A change in the UEI does not necessarily require a novation.

(End of clause)

52.209-6	Protecting the Government's Interest When Subcontracting With Contractors Debarred, Suspended, Proposed for Debarment, or Voluntarily Excluded. (Deviation 2026-O0038)	2026-02

Protecting the Government's Interest When Subcontracting With Contractors Debarred, Suspended, Proposed for Debarment, or Voluntarily Excluded (Feb 2026) (Deviation 2026-O0038)

(a) Definition. As used in this clause-

Commercially available off-the-shelf (COTS) item

(1) Means any item of supply (including construction material) that is-

(i) A commercial product (as defined in paragraph (1) of the definition of "commercial product" in Federal Acquisition Regulation (FAR) 2.101);

(ii) Sold in substantial quantities in the commercial marketplace; and

(iii) Offered to the Government, under a contract or subcontract at any tier, without modification, in the same form in which it is sold in the commercial marketplace; and

(2) Does not include bulk cargo, as defined in 46 U.S.C. 40102(4), such as agricultural products and petroleum products.

(b) The Government suspends or debars Contractors to protect the Government's interests. Other than a subcontract for a commercially available off-the-shelf item, the Contractor shall not enter into any subcontract, in excess of the threshold specified in FAR 9.405-2(b) on the date of subcontract award, with a Contractor that is debarred, suspended, or proposed for debarment by any executive agency unless a compelling reason exists to do so.

(c) The Contractor shall require each proposed subcontractor whose subcontract will exceed the threshold specified in FAR 9.405-2(b) on the date of subcontract award, other than a subcontractor providing a commercially available off-the-shelf item, to disclose to the Contractor, in writing, whether as of the time of award of the subcontract, the subcontractor, or its principals, is or is not debarred, suspended, proposed for debarment, or voluntarily excluded by the Federal Government.

(d) A corporate officer or a designee of the Contractor shall notify the Contracting Officer, in writing, before entering into a subcontract with a party (other than a subcontractor providing a commercially available off-the-shelf item) that is debarred, suspended, proposed for debarment, or voluntarily excluded (see FAR 9.404 for information on the System for Award Management (SAM) Exclusions). The notice must include the following:

(1) The name of the subcontractor.

(2) The Contractor's knowledge of the reasons for the subcontractor being listed with an exclusion in SAM.

(3) The compelling reason(s) for doing business with the subcontractor notwithstanding its

being listed with an exclusion in SAM.

(4) The systems and procedures the Contractor has established to ensure that it is fully protecting the Government's interests when dealing with such subcontractor in view of the specific basis for the party's debarment, suspension, proposed debarment, or voluntary exclusion.

(e) Subcontracts. Unless this is a contract for the acquisition of commercial products or commercial services, the Contractor shall include the requirements of this clause, including this paragraph (e) (appropriately modified for the identification of the parties), in each subcontract that-

(1) Exceeds the threshold specified in FAR 9.405-2(b) on the date of subcontract award; and

(2) Is not a subcontract for commercially available off-the-shelf items.

(End of clause)

52.209-9	Updates of Publicly Available Information Regarding Responsibility Matters. (Deviation 2026-O0038)	2026-02

Updates of Publicly Available Information Regarding Responsibility Matters (Feb 2026) (Deviation 2026-O0038)

(a) The Contractor shall update the information in the Federal Awardee Performance and Integrity Information System (FAPIIS) on a semi-annual basis, throughout the life of the contract, by posting the required information in the System for Award Management via https://www.sam.gov.

(b) All information posted in FAPIIS on or after April 15, 2011, except past performance reviews, will be publicly available. FAPIIS consists of two segments-

(1) The non-public segment, into which Government officials and the Contractor post

information, which can only be viewed by-

(i) Government personnel and authorized users performing business on behalf of the Government; or

(ii) The Contractor, when viewing data on itself; and

(2) The publicly-available segment, to which all data in the non-public segment of FAPIIS is automatically transferred after a waiting period of 14 calendar days, except for-

(i) Past performance reviews required by part 42.

(ii) Information that was entered prior to April 15, 2011; or

(iii) Information that is withdrawn during the 14-calendar-day waiting period by the Government official who posted it in accordance with paragraph (c)(1) of this clause.

(c) The Contractor will receive notification when the Government posts new information to the Contractor's record.

(1) If the Contractor asserts in writing within 7 calendar days, to the Government official who posted the information, that some of the information posted to the non-public segment of FAPIIS is covered by a disclosure exemption under the Freedom of Information Act, the Government official who posted the information must within 7 calendar days remove the posting from FAPIIS and resolve the issue in accordance with agency Freedom of Information procedures, prior to reposting the releasable information. The contractor must cite 52.209-9 and request removal within 7 calendar days of the posting to FAPIIS.

(2) The Contractor will also have an opportunity to post comments regarding information that the Government has posted. FAPIIS will retain the comments as long as the associated information is retained, i.e., for a total period of 6 years. Contractor comments will remain a part of the record unless the Contractor revises them.

(3) All information posted in FAPIIS on or after April 15, 2011, except past performance reviews, will be publicly available (section 3010 of Pub. L. 111-212).

(d) The Government will handle public requests for system information posted prior to April 15, 2011, under Freedom of Information Act procedures, including, where appropriate, procedures promulgated under E.O. 12600.

(End of clause)

52.209-10	Prohibition on Contracting With Inverted Domestic Corporations. (Deviation 2026-O0038)	2026-02

Prohibition on Contracting with Inverted Domestic Corporations (Feb 2026) (Deviation 2026-O0038)

(a) Definitions. As used in this clause-

Inverted domestic corporation means a foreign incorporated entity that meets the definition of an inverted domestic corporation under 6 U.S.C. 395(b), applied in accordance with the rules and definitions of 6 U.S.C. 395(c).

Subsidiary means an entity in which more than 50 percent of the entity is owned-

(1) Directly by a parent corporation; or

(2) Through another subsidiary of a parent corporation.

(b) If the contractor reorganizes as an inverted domestic corporation or becomes a subsidiary of an inverted domestic corporation at any time during the period of performance of this contract, applicable law may prohibit the Government from paying for Contractor activities performed after the date when it becomes an inverted domestic corporation or subsidiary. The Government may seek any available remedies in the event the Contractor fails to perform in accordance with the terms and conditions of the contract as a result of Government action under this clause.

(c) Exceptions to this prohibition are located at 9.108-3.

(d) In the event the Contractor becomes either an inverted domestic corporation, or a subsidiary of an inverted domestic corporation during contract performance, the Contractor shall give written notice to the Contracting Officer within five business days from the date of the inversion

event.

(End of clause)

52.210-1	Market Research. (Deviation 2026-O0038)	2026-02

Market Research (Feb 2026) (Deviation 2026-O0038)

(a) Definition. As used in this clause-

Commercial product, commercial service, and nondevelopmental item have the meaning contained in Federal Acquisition Regulation (FAR) 2.101.

(b) Before awarding subcontracts for noncommercial acquisitions, where the subcontracts are over the simplified acquisition threshold, as defined in FAR 2.101 on the date of subcontract award, the Contractor shall conduct market research to determine, in the following order of priority, whether-

(1) A commercial product or commercial service can meet the agency's requirements;

(2) The requirements could be modified so the agency could use an existing commercial product or commercial service;

(3) A commercial product or commercial service could be modified to meet the agency's requirements; or

(4) The requirement can only be satisfied by a nondevelopmental item.

(End of clause)

52.211-12	Liquidated Damages-	2000-09

Construction.

Liquidated Damages-Construction (Sept 2000)

(a) If the Contractor fails to complete the work within the time specified in the contract, the Contractor shall pay liquidated damages to the Government in the amount of **$2,367.00** for each calendar day of delay until the work is completed or accepted.

(b) If the Government terminates the Contractor's right to proceed, liquidated damages will continue to accrue until the work is completed. These liquidated damages are in addition to excess costs of repurchase under the Termination clause.

(End of clause)

52.214-26	Audit and Records-Sealed Bidding. (Deviation 2026-O0038)	2026-02

Audit and Records-Sealed Bidding (Feb 2026) (Deviation 2026-O0038)

(a) As used in this clause, records includes books, documents, accounting procedures and practices, and other data, regardless of type and regardless of whether such items are in written form, in the form of computer data, or in any other form.

(b) Certified cost or pricing data. If the Contractor has been required to submit certified cost or pricing data in connection with the pricing of any modification to this contract, the Contracting Officer, or an authorized representative of the Contracting Officer, in order to evaluate the accuracy, completeness, and currency of the certified cost or pricing data, shall have the right to examine and audit all of the Contractor's records, including computations and projections, related to-

(1) The proposal for the modification;

(2) The discussions conducted on the proposal(s), including those related to negotiating;

(3) Pricing of the modification; or

(4) Performance of the modification.

(c) Comptroller General. In the case of pricing any modification, the Comptroller General of the United States, or an authorized representative, shall have the same rights as specified in paragraph (b) of this clause and also the right to interview any current employee regarding such transactions.

(d) Availability. The Contractor shall make available at its office at all reasonable times the materials described in paragraph (b) of this clause, for examination, audit, or reproduction, until 3 years after final payment under this contract, or for any other period specified in subpart 4.7 of the Federal Acquisition Regulation (FAR). FAR Subpart 4.7, Contractor Records Retention, in effect on the data of this contract, is incorporated by reference in its entirety and made a part of this contract.

(1) If this contract is completely or partially terminated, the records relating to the work terminated shall be made available for 3 years after any resulting final termination settlement.

(2) Records pertaining to appeals under the Disputes clause or to litigation or the settlement of claims arising under or relating to the performance of this contract shall be made available until disposition of such appeals, litigation, or claims.

(e) Subcontracts. The Contractor shall insert a clause containing all the provisions of this clause, including this paragraph (e), in all subcontracts expected to exceed the threshold for submission of certified cost or pricing data in FAR 15.403-4(a)(1) on the date of subcontract award.

(End of clause)

52.214-28	Subcontractor Certified Cost or Pricing Data-Modifications-Sealed Bidding. (Deviation 2026-O0038)	2026-02

Subcontractor Certified Cost or Pricing Data-Modifications-Sealed Bidding (Feb 2026) (Deviation 2026-O0038)

(a) The requirements of paragraphs (b) and (c) of this clause shall-

(1) Become operative only for any modification to this contract involving aggregate increases and/or decreases in costs, plus applicable profits, expected to exceed the threshold for submission of certified cost or pricing data in Federal Acquisition Regulation (FAR) 15.403-4(a)(1) on the date of execution of the modification, and

(2) Be limited to such modifications.

(b) Before awarding any subcontract expected to exceed the threshold for submission of certified cost or pricing data in FAR 15.403-4(a)(1), on the date of agreement on price or the date of award, whichever is later, or before pricing any subcontract modifications involving aggregate increases and/or decreases in costs, plus applicable profits, expected to exceed the threshold for submission of certified cost or pricing data in FAR 15.403-4(a)(1), the Contractor shall require the subcontractor to submit certified cost or pricing data (actually or by specific identification in writing), as part of the subcontractor's proposal in accordance with FAR 15.408, Table 15-2 (to include any information reasonably required to explain the subcontractor's estimating process such as the judgmental factors applied and the mathematical or other methods used in the estimate, including those used in projecting from known data, and the nature and amount of any contingencies included in the price), unless an exception under FAR 15.403-1(b) applies. If the threshold for submission of certified cost or pricing data specified in FAR 15.403-4(a)(1) is adjusted for inflation as set forth in FAR 1.108, then the changed threshold applies throughout the remaining term of the contract, unless there is a subsequent threshold adjustment.

(c) The Contractor shall require the subcontractor to certify in substantially the form prescribed in section 15.406-2 of the Federal Acquisition Regulation that, to the best of its knowledge and belief, the data submitted under paragraph (b) above were accurate, complete, and current as of the date of agreement on the negotiated price of the subcontract or subcontract modification.

(d) The Contractor shall insert the substance of this clause, including this paragraph (d), in each subcontract that, when entered into, exceeds the threshold for submission of certified cost or pricing data in FAR 15.403-4(a)(1).

(End of clause)

52.219-6 Notice of Total Small Business 2026-02

Set-Aside. (Deviation 2026-O0038)

Notice of Total Small Business Set-Aside (Feb 2026) (Deviation 2026-O0038)

(a) Definition. Small business concern, as used in this clause-

(1) Means a concern, including its affiliates, that is independently owned and operated, not dominant in the field of operation in which it is bidding on Government contracts, and qualified as a small business under the size standards in this solicitation.

(2) Affiliates, as used in paragraph (a)(1) of this clause, means business concerns, one of whom directly or indirectly controls or has the power to control the others, or a third party or parties control or have the power to control the others. In determining whether affiliation exists, consideration is given to all appropriate factors including common ownership, common management, and contractual relationships. SBA determines affiliation based on the factors set forth at 13 CFR 121.103.

(b) Applicability. This clause applies only to-

(1) Contracts that have been set aside for small business concerns; and

(2) Orders set aside for small business concerns under multiple-award contracts as described in 8.4 and 16.5.

(c) General.

(1) Offers are solicited only from small business concerns. Offers received from concerns that are not small business concerns shall be considered nonresponsive and will be rejected.

(2) Any award resulting from this solicitation will be made to a small business concern.

(End of clause)

52.219-8 Utilization of Small Business 2026-02

Concerns. (Deviation 2026-O0038)

Utilization of Small Business Concerns (Feb 2026) (Deviation 2026-O0038)

(a) Definitions. As used in this contract-

HUBZone small business concern means a small business concern that meets the requirements described in 13 CFR 126.200, certified by the Small Business Administration (SBA) and designated by SBA as a HUBZone small business concern in the Small Business Search (SBS) and the System for Award Management (SAM).

Service-disabled veteran-owned small business (SDVOSB) concern means an SDVOSB concern that meets the requirements described in 13 CFR 128.300, is certified by SBA, and is designated by SBA as an SDVOSB concern in SBS and SAM.

Small business concern means a concern, including its affiliates, that is independently owned and operated, not dominant in its field of operation and qualified as a small business under the criteria and size standards in 13 CFR part 121, including the size standard that corresponds to the NAICS code assigned to the contract or subcontract.

Small disadvantaged business (SDB) concern means a small business concern under the size standard applicable to the acquisition, that-

(1) Is at least 51 percent unconditionally and directly owned (as defined at 13 CFR 124.105) by-

(i) One or more socially disadvantaged (as defined at 13 CFR 124.103) and economically disadvantaged (as defined at 13 CFR 124.104) individuals who are citizens of the United States; and

(ii) Each individual claiming economic disadvantage has a net worth not exceeding the threshold at 13 CFR 124.104(c)(2) after taking into account the applicable exclusions set forth at 13 CFR 124.104(c)(2); and

(2) The management and daily business operations of which are controlled (as defined at 13. CFR 124.106) by individuals, who meet the criteria in paragraphs (1)(i) and (ii) of this definition.

Veteran-owned small business (VOSB) concern means a small business concern-

(1) Not less than 51 percent of which is owned and controlled by one or more veterans (as defined at 38 U.S.C.101(2)) or, in the case of any publicly owned business, not less than 51 percent of the stock of which is owned by one or more veterans; and

(2) The management and daily business operations of which are controlled by one or more veterans.

Women-owned small business (WOSB) concern means a small business concern-

(1) That is at least 51 percent owned by one or more women, or, in the case of any publicly owned business, at least 51 percent of the stock of which is owned by one or more women;

(2) Whose management and daily business operations are controlled by one or more women; and

(3) That is certified by SBA or an approved third- party certifier in accordance with 13 CFR 127.300 and is designated by SBA as a WOSB concern in SBS and SAM.

(b) It is the policy of the United States that small business concerns, VOSB concerns, SDVOSB concerns, HUBZone small business concerns, SDB concerns, and WOSB concerns shall have the maximum practicable opportunity to participate in performing contracts let by any Federal agency, including contracts and subcontracts for subsystems, assemblies, components, and related services for major systems. It is further the policy of the United States that its prime contractors establish procedures to ensure the timely payment of amounts due pursuant to the terms of their subcontracts with small business concerns, VOSB concerns, SDVOSB concerns, HUBZone small business concerns, SDB concerns, and WOSB concerns.

(c)

(1) A joint venture qualifies as a small business concern if-

(i) Each party to the joint venture qualifies as small under the size standard for the solicitation; or

(ii) The protégé is small under the size standard for the solicitation in a joint venture comprised of a mentor and protégé with an approved mentor-protégé agreement under a SBA mentor-protégé program. (See 13 CFR 125.9(d).)

(2) A joint venture qualifies as a HUBZone small business concern if it complies with the requirements in 13 CFR 126.616(a) through (c).

(d) The Contractor hereby agrees to carry out this policy in the awarding of subcontracts to the fullest extent consistent with efficient contract performance. The Contractor further agrees to cooperate in any studies or surveys as may be conducted by the Small Business Administration or the awarding agency of the as may be necessary to determine the extent of the Contractor's compliance with this clause.

(e)

(1) Unless the Contractor has reason to question the representation, it may accept a subcontractor's written representations of its size and socioeconomic status as a small business or SDB, if the subcontractor represents that the size and socioeconomic status representations with its offer are current, accurate, and complete as of the date of the offer for the subcontract.

(2) Unless the Contractor has reason to question the representation, it may accept a subcontractor's representations of its size and socioeconomic status as a small business or SDB in the System for Award Management (SAM) if the subcontractor-

(i) Is registered in SAM; and

(ii) Represents that the size and socioeconomic status representations made in SAM are current, accurate and complete as of the date of the offer for the subcontract.

(3) The Contractor may not require that the subcontractor register in SAM for the purposes of representing size or socioeconomic status in connection with a subcontract.

(4) A contractor acting in good faith is not liable for misrepresentations made by its subcontractors regarding the subcontractor's size or socioeconomic status.

(5) The Contractor shall confirm that a subcontractor representing itself as a HUBZone small business concern, VOSB, SDVOSB, or WOSB concern is certified by SBA by checking SAM or SBS at https://search.certifications.sba.gov/.

(End of clause)

52.219-14 Limitations on Subcontracting. 2026-02
(Deviation 2026-O0038)

Limitations on Subcontracting (Feb 2026) (Deviation 2026-O0038)

(a) This clause does not apply to the unrestricted portion of a partial set-aside.

(b) *Definition. Similarly situated entity*, as used in this clause, means a first-tier subcontractor, including an independent contractor, that-

(1) Has the same small business program status as that which qualified the prime contractor for the award (*e.g.*, for a small business set-aside contract, any small business concern, without regard to its socioeconomic status); and

(2) Is considered small for the size standard under the North American Industry Classification System (NAICS) code the prime contractor assigned to the subcontract.

(c) *Applicability.* This clause applies only to-

(1) Contracts that have been set aside for any of the small business concerns identified in 19.000(a)(3);

(2) Part or parts of a multiple-award contract that have been set aside for any of the small business concerns identified in 19.000(a)(3);

(3) Contracts that have been awarded on a sole-source basis in accordance with sections 19.105, 19.106, 19.107, and 19.108;

(4) Orders expected to exceed the simplified acquisition threshold and that are set aside for small business concerns under multiple-award contracts, as described in 8.4 and 16.5;

(5) Orders, regardless of dollar value, that are set aside in accordance with sections 19.105, 19.106, 19.107, and 19.108 under multiple-award contracts, as described in 8.4 and 16.5; and

(6) Contracts using the HUBZone price evaluation preference to award to a HUBZone small business concern unless the concern waived the evaluation preference.

(d) *Independent contractors.* An independent contractor shall be considered a subcontractor.

(e) By submission of an offer and execution of a contract, the Contractor agrees that in performance of a contract assigned a North American Industry Classification System (NAICS) code for-

(1) Services (except construction), it will not pay more than 50 percent of the amount paid by the Government for contract performance to subcontractors that are not similarly situated

entities. Any work that a similarly situated entity further subcontracts will count towards the prime contractor's 50 percent subcontract amount that cannot be exceeded. When a contract includes both services and supplies, the 50 percent limitation shall apply only to the service portion of the contract;

(2) Supplies (other than procurement from a nonmanufacturer of such supplies), it will not pay more than 50 percent of the amount paid by the Government for contract performance, excluding the cost of materials, to subcontractors that are not similarly situated entities. Any work that a similarly situated entity further subcontracts will count towards the prime contractor's 50 percent subcontract amount that cannot be exceeded. When a contract includes both supplies and services, the 50 percent limitation shall apply only to the supply portion of the contract;

(3) General construction, it will not pay more than 85 percent of the amount paid by the Government for contract performance, excluding the cost of materials, to subcontractors that are not similarly situated entities. Any work that a similarly situated entity further subcontracts will count towards the prime contractor's 85 percent subcontract amount that cannot be exceeded; or

(4) Construction by special trade contractors, it will not pay more than 75 percent of the amount paid by the Government for contract performance, excluding the cost of materials, to subcontractors that are not similarly situated entities. Any work that a similarly situated entity further subcontracts will count towards the prime contractor's 75 percent subcontract amount that cannot be exceeded.

(f) The Contractor shall comply with the limitations on subcontracting as follows:

(1) For contracts, in accordance with paragraphs (c)(1), (2), (3) and (6) of this clause-

[*Contracting Officer check as appropriate.*]

X By the end of the base term of the contract and then by the end of each subsequent option period; or

By the end of the performance period for each order issued under the contract.

(2) For orders, in accordance with paragraphs (c)(4) and (5) of this clause, by the end of the performance period for the order.

(g) A joint venture agrees that, in the performance of the contract, the applicable percentage specified in paragraph (e) of this clause will be performed by the aggregate of the joint venture participants.

(1) In a joint venture comprised of a small business protege and its mentor approved by the Small Business Administration, the small business protege shall perform at least 40 percent of the work performed by the joint venture. Work performed by the small business protege in the joint venture must be more than administrative functions.

(2) In an 8(a) joint venture, the 8(a) participant(s) shall perform at least 40 percent of the work performed by the joint venture. Work performed by the 8(a) participants in the joint venture must be more than administrative functions.

(End of clause)

52.219-28	Postaward Small Business Program Rerepresentation. (Deviation 2026-O0038)	2026-02

Postaward Small Business Program Rerepresentation (Feb 2026) (Deviation 2026-O0038)

(a) *Definitions*. As used in this clause-

Long-term contract means a contract of more than five years in duration, including options. However, the term does not include contracts that exceed five years in duration because the period of performance has been extended for a cumulative period not to exceed six months under the clause at 52.217-8, Option to Extend Services, or other appropriate authority.

Small business concern-

(1) Means a concern, including its affiliates, that is independently owned and operated, not dominant in its field of operation, and qualified as a small business under the criteria in 13 CFR part 121 and the size standard in paragraph (c) of this clause.

(2) *Affiliates*, as used in this definition, means business concerns, one of whom directly or indirectly controls or has the power to control the others, or a third party or parties control or have the power to control the others. In determining whether affiliation exists, consideration is given to all appropriate factors including common ownership, common management, and contractual relationships. SBA determines affiliation based on the factors set forth at 13 CFR 121.103.

(b) If the Contractor represented that it was a small business concern, a small disadvantaged business concern, or a joint venture that was any of the small business concerns identified in 19.000(a)(3) prior to award of this contract, the Contractor shall rerepresent its size and socioeconomic status according to paragraph (e) of this clause or, if applicable, paragraph (g) of this clause, upon occurrence of any of the following:

(1) Within 30 days after execution of a novation agreement or within 30 days after modification of the contract to include this clause, if the novation agreement was executed prior to inclusion of this clause in the contract.

(2) Within 30 days after a merger or acquisition that does not require a novation or within 30 days after modification of the contract to include this clause, if the merger or acquisition occurred prior to inclusion of this clause in the contract.

(3) For long-term contracts-

(i) Within 60 to 120 days prior to the end of the fifth year of the contract; and

(ii) Within 60 to 120 days prior to the date specified in the contract for exercising any option thereafter.

(c) The Contractor shall rerepresent its size status in accordance with the size standard in effect at the time of this rerepresentation that corresponds to the North American Industry Classification System (NAICS) code(s) assigned to this contract. The small business size standard corresponding to this NAICS code(s) can be found at https://www.sba.gov/document /support--table-size-standards.

(d) The small business size standard for a Contractor providing an end item that it does not manufacture, process, or produce itself, for a contract other than a construction or service contract, is 500 employees, or 150 employees for information technology value-added resellers under NAICS code 541519, if the acquisition-

(1) Was set aside for small business and has a value above the simplified acquisition threshold;

(2) Used the HUBZone price evaluation preference regardless of dollar value, unless the Contractor waived the price evaluation preference; or

(3) Was an 8(a), HUBZone, service-disabled veteran-owned, economically disadvantaged women-owned, or women-owned small business set-aside or sole-source award regardless of dollar value.

(e) Except as provided in paragraph (g) of this clause, the Contractor shall make the representation(s) required by paragraph (b) of this clause by validating or updating all its representations in the Representations and Certifications section of the System for Award Management (SAM) and its other data in SAM, as necessary, to ensure that they reflect the Contractor's current status. The Contractor shall notify the contracting officer in writing within the timeframes specified in paragraph (b) of this clause, that the data have been validated or updated, and provide the date of the validation or update.

(f) If the Contractor represented that it was other than a small business concern prior to award of this contract, the Contractor may, but is not required to, take the actions required by paragraphs (e) or (g) of this clause.

(g) If the Contractor does not have representations and certifications in SAM, or does not have a representation in SAM for the NAICS code applicable to this contract, the Contractor is required to complete the following rerepresentation and submit it to the contracting office, along with the contract number and the date on which the rerepresentation was completed:

(1) The Contractor represents that it is, is not a small business concern under NAICS Code 237310 - HIGHWAY, STREET, AND BRIDGE CONSTRUCTION assigned to ____contract number.

(2) [*Complete only if the Contractor represented itself as a small business concern in paragraph (g)(1) of this clause*.] The Contractor represents that it is, is not, a small disadvantaged business concern as defined in 13 CFR 124.1001.

(3) *Women-owned small business (WOSB) joint venture eligible under the WOSB Program*. The Contractor represents that it is, is not a joint venture that complies with the requirements of 13 CFR 127.506(a) through (c). [____The Contractor shall enter the name and unique entity identifier of each party to the joint venture: __.]

(4) *Economically disadvantaged women-owned small business (EDWOSB) joint venture*. The Contractor represents that it is, is not a joint venture that complies with the requirements of 13 CFR 127.506(a) through (c). [____The Contractor shall enter the name and unique entity identifier of each party to the joint venture: __ .]

(5) *Service-disabled veteran-owned small business (SDVOSB) joint venture eligible under the SDVOSB Program*. The Contractor represents that it is, is not an SDVOSB joint venture eligible under the SDVOSB Program that complies with the requirements of 13 CFR 128.402. [____The Contractor shall enter the name and unique entity identifier of each party to the joint venture: __.]

(6) *HUBZone joint venture eligible under the HUBZone Program.*[*Complete only if the offeror is a HUBZone small business concern.*] The offeror represents, as part of its offer, that It is, is not a HUBZone joint venture that complies with the requirements of 13 CFR 126.616(a) through (c). [____The Contractor shall enter the name and unique entity identifier of each party to the joint venture: .] Each HUBZone small business concern participating in the HUBZone joint venture must be certified as a HUBZone concern. [____Contractor to sign and date and insert authorized signer's name and title.]

(End of clause)

52.222-4	Contract Work Hours and Safety Standards-Overtime Compensation. (Deviation 2026-O0038)	2026-02

Contract Work Hours and Safety Standards-Overtime Compensation (Feb 2026) (Deviation 2026-O0038)

(a) Overtime requirements. No Contractor or subcontractor employing laborers or mechanics (see Federal Acquisition Regulation 22.301-1) must require or permit them to work over 40 hours in any workweek unless they are paid at least 1 and 1/2 times the basic rate of pay for each hour worked over 40 hours.

(b) Violation; liability for unpaid wages; liquidated damages. The responsible Contractor and subcontractor are liable for unpaid wages if they violate the terms in paragraph (a) of this clause. In addition, the Contractor and subcontractor are liable for liquidated damages payable to the Government. The Contracting Officer will assess liquidated damages at the rate specified at 29 CFR 5.5(b)(2) per affected employee for each calendar day on which the employer required or permitted the employee to work in excess of the standard workweek of 40 hours without paying overtime wages required by the Contract Work Hours and Safety Standards statute (found at 40 U.S.C. chapter 37). In accordance with the Federal Civil Penalties Inflation Adjustment Act of 1990 (28 U.S.C. 2461 Note), the Department of Labor adjusts this civil monetary penalty for inflation no later than January 15 each year.

(c) Withholding for unpaid wages and liquidated damages. The Contracting Officer will withhold from payments due under the contract sufficient funds required to satisfy any Contractor or subcontractor liabilities for unpaid wages and liquidated damages. If amounts withheld under the contract are insufficient to satisfy Contractor or subcontractor liabilities, the Contracting Officer will withhold payments from other Federal or federally assisted contracts held by the same Contractor that are subject to the Contract Work Hours and Safety Standards statute.

(d) Payrolls and basic records.

(1) The Contractor and its subcontractors must maintain payrolls and basic payroll records for all laborers and mechanics working on the contract during the contract and must make them available to the Government until 3 years after contract completion. The records must contain the name and address of each employee, social security number, labor classifications, hourly rates of wages paid, daily and weekly number of hours worked, deductions made, and actual wages paid. The records need not duplicate those required for construction work by Department of Labor regulations at 29 CFR 5.5(a)(3) implementing the Construction Wage Rate Requirements statute.

(2) The Contractor and its subcontractors must allow authorized representatives of the Contracting Officer or the Department of Labor to inspect, copy, or transcribe records maintained under paragraph (d)(1) of this clause. The Contractor or subcontractor also must allow authorized representatives of the Contracting Officer or Department of Labor to interview employees in the workplace during working hours.

(e) Subcontracts. The Contractor must insert the provisions set forth in paragraphs (a) through (d) of this clause in subcontracts that may require or involve the employment of laborers and mechanics and require subcontractors to include these provisions in any such lower tier subcontracts. The Contractor must be responsible for compliance by any subcontractor or lower-tier subcontractor with the provisions set forth in paragraphs (a) through (d) of this clause.

(End of clause)

52.222-6	Construction Wage Rate Requirements. (Deviation 2026-O0038)	2026-02

Construction Wage Rate Requirements (Feb 2026) (Deviation 2026-O0038)

(a) Definition.-"Site of the work"-

(1) Means-

(i) The primary site of the work. The physical place or places where the construction called for in the contract will remain when work on it is completed; and

(ii) The secondary site of the work, if any. Any other site where a significant portion of the building or work is constructed, provided that such site is-

(A) Located in the United States; and

(B) Established specifically for the performance of the contract or project;

(2) Except as provided in paragraph (3) of this definition, includes any fabrication plants, mobile

factories, batch plants, borrow pits, job headquarters, tool yards, etc., provided-

(i) They are dedicated exclusively, or nearly so, to performance of the contract or project; and

(ii) They are adjacent or virtually adjacent to the "primary site of the work" as defined in paragraph (a)(1)(i), or the "secondary site of the work" as defined in paragraph (a)(1)(ii) of this definition;

(3) Does not include permanent home offices, branch plant establishments, fabrication plants, or tool yards of a Contractor or subcontractor whose locations and continuance in operation are determined wholly without regard to a particular Federal contract or project. In addition, fabrication plants, batch plants, borrow pits, job headquarters, yards, etc., of a commercial or material supplier which are established by a supplier of materials for the project before opening of bids and not on the Project site, are not included in the "site of the work." Such permanent, previously established facilities are not a part of the "site of the work" even if the operations for a period of time may be dedicated exclusively or nearly so, to the performance of a contract.

(b)

(1) All laborers and mechanics employed or working upon the site of the work will be paid unconditionally and not less often than once a week, and without subsequent deduction or rebate on any account (except such payroll deductions as are permitted by regulations issued by the Secretary of Labor under the Copeland Act (29 CFR Part 3)), the full amount of wages and bona fide fringe benefits (or cash equivalents thereof) due at time of payment computed at rates not less than those contained in the wage determination of the Secretary of Labor which is attached hereto and made a part hereof, or as may be incorporated for a secondary site of the work, regardless of any contractual relationship which may be alleged to exist between the Contractor and such laborers and mechanics. Any wage determination incorporated for a secondary site of the work must be effective from the first day on which work under the contract was performed at that site and must be incorporated without any adjustment in contract price or estimated cost. Laborers employed by the construction Contractor or construction subcontractor that are transporting portions of the building or work between the secondary site of the work and the primary site of the work must be paid in accordance with the wage determination applicable to the primary site of the work.

(2) Contributions made or costs reasonably anticipated for bona fide fringe benefits under section 1(b)(2) of the Construction Wage Rate Requirements statute on behalf of laborers or mechanics are considered wages paid to such laborers or mechanics, subject to the provisions of paragraph (e) of this clause; also, regular contributions made or costs incurred for more than

a weekly period (but not less often than quarterly) under plans, funds, or programs which cover the particular weekly period, are deemed to be constructively made or incurred during such period.

(3) Such laborers and mechanics must be paid not less than the appropriate wage rate and fringe benefits in the wage determination for the classification of work actually performed, without regard to skill, except as provided in the clause entitled Apprentices and Trainees. Laborers or mechanics performing work in more than one classification may be compensated at the rate specified for each classification for the time actually worked therein; provided that the employer's payroll records accurately set forth the time spent in each classification in which work is performed.

(4) The wage determination (including any additional classifications and wage rates conformed under paragraph (c) of this clause) and the Construction Wage Rate Requirements (Davis-Bacon Act) poster (WH-1321) must be posted at all times by the Contractor and its subcontractors at the primary site of the work and the secondary site of the work, if any, in a prominent and accessible place where it can be easily seen by the workers.

(c)

(1) The Contractor must complete and submit to the Contracting Officer the Standard Form (SF) 1444, Request for Authorization of Additional Classification and Rate, if any class of laborers or mechanics that is not listed in the wage determination applicable to the contract is to be employed under the contract. Upon receipt of a complete SF 1444, the Contracting Officer will submit a report to the Administrator, Wage and Hour Division, for approving, modifying, disapproving, or rendering a final determination, of the additional classification and wage rate including any amount designated for fringe benefits.

(2) The wage rate (including fringe benefits, where appropriate) determined pursuant to subparagraph (c) of this clause must be paid to all workers performing work in the classification under this contract from the first day on which work is performed in the classification.

(d) Whenever the minimum wage rate prescribed in the contract for a class of laborers or mechanics includes a fringe benefit which is not expressed as an hourly rate, the Contractor must either pay the benefit as stated in the wage determination or must pay another bona fide fringe benefit or an hourly cash equivalent thereof.

(e) If the Contractor does not make payments to a trustee or other third person, the Contractor may consider as part of the wages of any laborer or mechanic the amount of any costs

reasonably anticipated in providing bona fide fringe benefits under a plan or program; provided, that the Secretary of Labor has found, upon the written request of the Contractor, that the applicable standards of the Construction Wage Rate Requirements statute have been met. The Secretary of Labor may require the Contractor to set aside in a separate account assets for the meeting of obligations under the plan or program.

(End of clause)

52.222-8	Payrolls and Basic Records. (Deviation 2026-O0038)	2026-02

Payrolls and Basic Records (Feb 2026) (Deviation 2026-O0038)

(a) Payrolls and basic records relating thereto must be maintained by the Contractor during the course of the work and preserved for a period of 3 years thereafter for all laborers and mechanics working at the site of the work. Such records must contain the name, address, and social security number of each such worker, his or her correct classification, hourly rates of wages paid (including rates of contributions or costs anticipated for bona fide fringe benefits or cash equivalents thereof of the types described in 40 U.S.C. 3141(2)(B) (Construction Wage Rate Requirement statute)), daily and weekly number of hours worked, deductions made, and actual wages paid. Whenever the Secretary of Labor has found, under paragraph (d) of the clause entitled Construction Wage Rate Requirements, that the wages of any laborer or mechanic include the amount of any costs reasonably anticipated in providing benefits under a plan or program described in 40 U.S.C. 3141(2)(B), the Contractor must maintain records which show that the commitment to provide such benefits is enforceable, that the plan or program is financially responsible, and that the plan or program has been communicated in writing to the laborers or mechanics affected, and records which show the costs anticipated or the actual cost incurred in providing such benefits. Contractors employing apprentices or trainees under approved programs must maintain written evidence of the registration of apprenticeship programs and certification of trainee programs, the registration of the apprentices and trainees, and the ratios and wage rates prescribed in the applicable programs.

(b)

(1) The Contractor must submit weekly for each week in which any contract work is performed a

copy of all payrolls to the Contracting Officer. The payrolls submitted must set out accurately and completely all of the information required to be maintained under paragraph (a) of this clause, except that full social security numbers and home addresses must not be included on weekly transmittals. Instead the payrolls must only need to include an individually identifying number for each employee (e.g., the last four digits of the employee's social security number). The required weekly payroll information may be submitted in any form desired. Optional Form WH-347 is available for this purpose and may be obtained from the U.S. Department of Labor Wage and Hour Division website at https://www.dol.gov/agencies/whd/forms. The Prime Contractor is responsible for the submission of copies of payrolls by all subcontractors. Contractors and subcontractors must maintain the full social security number and current address of each covered worker, and must provide them upon request to the Contracting Officer, the Contractor, or the Wage and Hour Division of the Department of Labor for purposes of an investigation or audit of compliance with prevailing wage requirements. It is not a violation of this section for a Prime Contractor to require a subcontractor to provide addresses and social security numbers to the Prime Contractor for its own records, without weekly submission to the Contracting Officer.

(2) Each payroll submitted must be accompanied by a "Statement of Compliance," signed by the Contractor or subcontractor or his or her agent who pays or supervises the payment of the persons employed under the contract and must certify-

(i) That the payroll for the payroll period contains the information required to be maintained under paragraph (a) of this clause and that such information is correct and complete;

(ii) That each laborer or mechanic (including each helper, apprentice, and trainee) employed on the contract during the payroll period has been paid the full weekly wages earned, without rebate, either directly or indirectly, and that no deductions have been made either directly or indirectly from the full wages earned, other than permissible deductions as set forth in the Regulations, 29 CFR Part 3; and

(iii) That each laborer or mechanic has been paid not less than the applicable wage rates and fringe benefits or cash equivalents for the classification of work performed, as specified in the applicable wage determination incorporated into the contract.

(3) The weekly submission of a properly executed certification set forth on the reverse side of Optional Form WH-347 must satisfy the requirement for submission of the "Statement of Compliance" required by subparagraph (b)(2) of this clause.

(4) The falsification of any of the certifications in this clause may subject the Contractor or

subcontractor to civil or criminal prosecution under Section 1001 of Title 18 and Section 3729 of Title 31 of the United States Code.

(c) The Contractor or subcontractor must make the records required under paragraph (a) of this clause available for inspection, copying, or transcription by the Contracting Officer or authorized representatives of the Contracting Officer or the Department of Labor. The Contractor or subcontractor must permit the Contracting Officer or representatives of the Contracting Officer or the Department of Labor to interview employees during working hours on the job. If the Contractor or subcontractor fails to submit required records or to make them available, the Contracting Officer may, after written notice to the Contractor, take such action as may be necessary to cause the suspension of any further payment. Furthermore, failure to submit the required records upon request or to make such records available may be grounds for debarment action pursuant to 29 CFR 5.12.

(End of clause)

52.222-10	Compliance with Copeland Act Requirements. (Deviation 2026-O0038)	2026-02

Compliance with Copeland Act Requirements (Feb 2026) (Deviation 2026-O0038)

The Contractor must comply with the requirements of 29 CFR Part 3, which are hereby incorporated by reference in this contract.

(End of clause)

52.222-11	Subcontracts (Labor Standards). (Deviation 2026-O0038)	2026-02

Subcontracts (Labor Standards) (Feb 2026) (Deviation 2026-O0038)

(a) Definition. "Construction, alteration or repair," as used in this clause, means all types of work done by laborers and mechanics employed by the construction Contractor or construction subcontractor on a particular building or work at the site thereof, including without limitation-

(1) Altering, remodeling, installation (if appropriate) on the site of the work of items fabricated off-site;

(2) Painting and decorating;

(3) Manufacturing or furnishing of materials, articles, supplies, or equipment on the site of the building or work;

(4) Transportation of materials and supplies between the site of the work within the meaning of paragraphs (a)(1)(i) and (ii) of the "site of the work" as defined in the FAR clause at 52.222-6, Construction Wage Rate Requirements of this contract, and a facility which is dedicated to the construction of the building or work and is deemed part of the site of the work within the meaning of paragraph (2) of the "site of the work" definition; and

(5) Transportation of portions of the building or work between a secondary site where a significant portion of the building or work is constructed, which is part of the "site of the work" definition in paragraph (a)(1)(ii) of the FAR clause at 52.222-6, Construction Wage Rate Requirements, and the physical place or places where the building or work will remain (paragraph (a)(1)(i) of the FAR clause at 52.222-6, in the "site of the work" definition).

(b) The Contractor must insert in any subcontracts for construction, alterations and repairs within the United States the clauses entitled-

(1) Construction Wage Rate Requirements;

(2) Contract Work Hours and Safety Standards-Overtime Compensation (if the clause is included in this contract);

(3) Apprentices and Trainees;

(4) Payrolls and Basic Records;

(5) Compliance with Copeland Act Requirements;

(6) Withholding of Funds;

(7) Subcontracts (Labor Standards);

(8) Contract Termination-Debarment;

(9) Disputes Concerning Labor Standards;

(10) Compliance with Construction Wage Rate Requirements and Related Regulations; and

(11) Certification of Eligibility.

(c) The prime Contractor must be responsible for compliance by any subcontractor or lower tier subcontractor performing construction within the United States with all the contract clauses cited in paragraph (b).

(d)

(1) Within 14 days after award of the contract, the Contractor must deliver to the Contracting Officer a completed Standard Form (SF) 1413, Statement and Acknowledgment, for each subcontract for construction within the United States, including the subcontractor's signed and dated acknowledgment that the clauses set forth in paragraph (b) of this clause have been included in the subcontract.

(2) Within 14 days after the award of any subsequently awarded subcontract the Contractor must deliver to the Contracting Officer an updated completed SF 1413 for such additional subcontract.

(e) The Contractor must insert the substance of this clause, including this paragraph (e) in all subcontracts for construction within the United States.

(End of clause)

52.222-14	Disputes Concerning Labor Standards. (Deviation 2026-O0038)	2026-02

Disputes Concerning Labor Standards (Feb 2026) (Deviation 2026-O0038)

The United States Department of Labor has set forth in 29 CFR parts 5, 6, and 7 procedures for resolving disputes concerning labor standards requirements. Such disputes must be resolved in accordance with those procedures and not the Disputes clause of this contract. Disputes within the meaning of this clause include disputes between the Contractor (or any of its subcontractors) and the contracting agency, the U.S. Department of Labor, or the employees or their representatives.

(End of clause)

52.222-35	Equal Opportunity for Veterans. (Deviation 2026-O0038)	2026-02

Equal Opportunity for Veterans (Feb 2026) (Deviation 2026-O0038)

(a) Definitions. As used in this clause-

"Active duty wartime or campaign badge veteran," "Armed Forces service medal veteran," "disabled veteran," "protected veteran," "qualified disabled veteran," and "recently separated veteran" have the meanings given at Federal Acquisition Regulation (FAR) 22.1301.

(b) Equal opportunity requirements. The Contractor must abide by the requirements of 38 U.S. C. 4212(a)(1) and (2). These requirements prohibit discrimination against qualified protected veterans, and requires affirmative action by the Contractor to employ and advance in employment qualified protected veterans.

(c) Subcontracts. The Contractor must insert the terms of this clause in subcontracts valued at or above the threshold specified in FAR 22.1302-1(a)(2) on the date of subcontract award,

unless exempted by rules, regulations, or orders of the Secretary of Labor. The Contractor must act as specified by the Director, Office of Federal Contract Compliance Programs, to enforce the terms, including action for noncompliance. Such necessary changes in language may be made as shall be appropriate to identify properly the parties and their undertakings.

(End of clause)

52.222-36	Equal Opportunity for Workers with Disabilities. (Deviation 2026-O0038)	2026-02

Equal Opportunity for Workers with Disabilities (Feb 2026) (Deviation 2026-O0038)

(a) Equal opportunity clause. The Contractor must abide by the requirements of the equal opportunity clause at 41 CFR 60-741.5(a), as of March 24, 2014. This clause prohibits discrimination against qualified individuals on the basis of disability, and requires affirmative action by the Contractor to employ and advance in employment qualified individuals with disabilities.

(b) Subcontracts. The Contractor must include the terms of this clause in every subcontract or purchase order in excess of the threshold specified in Federal Acquisition Regulation (FAR) 22.1401-2(a)(1) on the date of subcontract award, unless exempted by rules, regulations, or orders of the Secretary, so that such provisions will be binding upon each subcontractor or vendor. The Contractor must act as specified by the Director, Office of Federal Contract Compliance Programs of the U.S. Department of Labor, to enforce the terms, including action for noncompliance. Such necessary changes in language may be made as shall be appropriate to identify properly the parties and their undertakings.

(End of clause)

52.222-37	Employment Reports on Veterans. (Deviation 2026-	2026-02

O0038)

Employment Reports on Veterans (Feb 2026) (Deviation 2026-O0038)

(a) Definitions. As used in this clause, "active duty wartime or campaign badge veteran," "Armed Forces service medal veteran," "disabled veteran," "protected veteran," and "recently separated veteran," have the meanings given in Federal Acquisition Regulation (FAR) 22.1301.

(b) Unless the Contractor is a State or local government agency, the Contractor must report at least annually, as required by the Secretary of Labor, on-

(1) The total number of employees in the contractor's workforce, by job category and hiring location, who are protected veterans (i.e., active duty wartime or campaign badge veterans, Armed Forces service medal veterans, disabled veterans, and recently separated veterans);

(2) The total number of new employees hired during the period covered by the report, and of the total, the number of protected veterans (i.e., active duty wartime or campaign badge veterans, Armed Forces service medal veterans, disabled veterans, and recently separated veterans); and

(3) The maximum number and minimum number of employees of the Contractor or subcontractor during the period covered by the report.

(c) The Contractor must report the above items by filing the VETS-4212 "Federal Contractor Veterans' Employment Report" (see "VETS-4212 Federal Contractor Reporting" and "Filing Your VETS-4212 Report" at http://www.dol.gov/vets/vets4212.htm).

(d) The Contractor must file VETS-4212 Reports no later than September 30 of each year.

(e) The employment activity report required by paragraphs (b)(2) and (b)(3) of this clause must reflect total new hires, and maximum and minimum number of employees, during the most recent 12-month period preceding the ending date selected for the report.

(f) The number of veterans reported must be based on data known to the contractor when completing the VETS-4212. The contractor's knowledge of veterans status may be obtained in a variety of ways, including an invitation to applicants to self-identify (in accordance with 41 CFR 60-300.42), voluntary self-disclosure by employees, or actual knowledge of veteran status by the contractor. This paragraph does not relieve an employer of liability for discrimination under

38 U.S.C. 4212.

(g) The Contractor must insert the terms of this clause in subcontracts valued at or above the threshold specified in FAR 22.1302-1(b) on the date of subcontract award, unless exempted by rules, regulations, or orders of the Secretary of Labor.

(End of clause)

52.222-40	Notification of Employee Rights Under the National Labor Relations Act. (Deviation 2026-O0038)	2026-02

Notification of Employee Rights Under the National Labor Relations Act (Feb 2026) (Deviation 2026-O0038)

(a) During the term of this contract, the Contractor must post an employee notice, of such size and in such form, and containing such content as prescribed by the Secretary of Labor, in conspicuous places in and about its plants and offices where employees covered by the National Labor Relations Act engage in activities relating to the performance of the contract, including all places where notices to employees are customarily posted both physically and electronically, in the languages employees speak, in accordance with 29 CFR471.2 (d) and (f).

(1) Physical posting of the employee notice must be in conspicuous places in and about the Contractor's plants and offices so that the notice is prominent and readily seen by employees who are covered by the National Labor Relations Act and engage in activities related to the performance of the contract.

(2) If the Contractor customarily posts notices to employees electronically, then the Contractor must also post the required notice electronically by displaying prominently, on any Web site that is maintained by the Contractor and is customarily used for notices to employees about terms and conditions of employment, a link to the Department of Labor's Web site that contains the full text of the poster. The link to the Department's Web site, as referenced in (b)(3) of this section, must read, "Important Notice about Employee Rights to Organize and Bargain Collectively with Their Employers."

(b) This required employee notice, printed by the Department of Labor, may be-

(1) Obtained from the Division of Interpretations and Standards, Office of Labor-Management Standards, U.S. Department of Labor, 200 Constitution Avenue, NW., Room N-5609, Washington, DC 20210, (202) 693-0123, or from any field office of the Office of Labor-Management Standards or Office of Federal Contract Compliance Programs;

(2) Provided by the Federal contracting agency if requested;

(3) Downloaded from the Office of Labor-Management Standards Web site at http://www.dol.gov /olms/regs/compliance/EO13496.htm; or

(4) Reproduced and used as exact duplicate copies of the Department of Labor's official poster.

(c) The required text of the employee notice referred to in this clause is located at Appendix A, Subpart A, 29 CFR Part 471.

(d) The Contractor must comply with all provisions of the employee notice and related rules, regulations, and orders of the Secretary of Labor.

(e) In the event that the Contractor does not comply with the requirements set forth in paragraphs (a) through (d) of this clause, this contract may be terminated or suspended in whole or in part, and the Contractor may be suspended or debarred in accordance with 29 CFR 471.14 and subpart 9.4. Such other sanctions or remedies may be imposed as are provided by 29 CFR part 471, which implements Executive Order 13496 or as otherwise provided by law.

(f) Subcontracts.

(1) The Contractor must include the substance of this clause, including this paragraph (f), in every subcontract that exceeds $10,000 and will be performed wholly or partially in the United States, unless exempted by the rules, regulations, or orders of the Secretary of Labor issued pursuant to section 3 of Executive Order 13496 of January 30, 2009, so that such provisions will be binding upon each subcontractor.

(2) The Contractor must not procure supplies or services in a way designed to avoid the applicability of Executive Order 13496 or this clause.

(3) The Contractor must take such action with respect to any such subcontract as may be

directed by the Secretary of Labor as a means of enforcing such provisions, including the imposition of sanctions for noncompliance.

(4) However, if the Contractor becomes involved in litigation with a subcontractor, or is threatened with such involvement, as a result of such direction, the Contractor may request the United States, through the Secretary of Labor, to enter into such litigation to protect the interests of the United States.

(End of clause)

52.222-50	Combating Trafficking in Persons. (Deviation 2026-O0038)	2026-02

Combating Trafficking in Persons (Feb 2026) (Deviation 2026-O0038)

(a) Definitions. As used in this clause-

Agent means any individual, including a director, an officer, an employee, or an independent contractor, authorized to act on behalf of the organization.

Coercion means-

(1) Threats of serious harm to or physical restraint against any person;

(2) Any scheme, plan, or pattern intended to cause a person to believe that failure to perform an act would result in serious harm to or physical restraint against any person; or

(3) The abuse or threatened abuse of the legal process.

Commercial sex act means any sex act on account of which anything of value is given to or received by any person.

Commercially available off-the-shelf (COTS) item -

(1) Means any item of supply (including construction material) that is-

(i) A commercial product (as defined in paragraph (1) of the definition of "commercial product" at Federal Acquisition Regulation (FAR) 2.101;

(ii) Sold in substantial quantities in the commercial marketplace; and

(iii) Offered to the Government, under a contract or subcontract at any tier, without modification, in the same form in which it is sold in the commercial marketplace; and

(2) Does not include bulk cargo, as defined in 46 U.S.C. 40102(4), such as agricultural products and petroleum products.

Debt bondage means the status or condition of a debtor arising from a pledge by the debtor of his or her personal services or of those of a person under his or her control as a security for debt, if the value of those services as reasonably assessed is not applied toward the liquidation of the debt or the length and nature of those services are not respectively limited and defined.

Employee means an employee of the Contractor directly engaged in the performance of work under the contract who has other than a minimal impact or involvement in contract performance.

Forced Labor means knowingly providing or obtaining the labor or services of a person-

(1) By threats of serious harm to, or physical restraint against, that person or another person;

(2) By means of any scheme, plan, or pattern intended to cause the person to believe that, if the person did not perform such labor or services, that person or another person would suffer serious harm or physical restraint; or

(3) By means of the abuse or threatened abuse of law or the legal process.

Involuntary servitude includes a condition of servitude induced by means of-

(1) Any scheme, plan, or pattern intended to cause a person to believe that, if the person did not enter into or continue in such conditions, that person or another person would suffer serious harm or physical restraint; or

(2) The abuse or threatened abuse of the legal process.

Recruitment fees means fees of any type, including charges, costs, assessments, or other

financial obligations, that are associated with the recruiting process, regardless of the time, manner, or location of imposition or collection of the fee.

(1) Recruitment fees include, but are not limited to, the following fees (when they are associated with the recruiting process) for-

(i) Soliciting, identifying, considering, interviewing, referring, retaining, transferring, selecting, training, providing orientation to, skills testing, recommending, or placing employees or potential employees;

(ii) Advertising;

(iii) Obtaining permanent or temporary labor certification, including any associated fees;

(iv) Processing applications and petitions;

(v) Acquiring visas, including any associated fees;

(vi) Acquiring photographs and identity or immigration documents, such as passports, including any associated fees;

(vii) Accessing the job opportunity, including required medical examinations and immunizations; background, reference, and security clearance checks and examinations; and additional certifications;

(viii) An employer's recruiters, agents or attorneys, or other notary or legal fees;

(ix) Language interpretation or translation, arranging for or accompanying on travel, or providing other advice to employees or potential employees;

(x) Government-mandated fees, such as border crossing fees, levies, or worker welfare funds;

(xi) Transportation and subsistence costs-

(A) While in transit, including, but not limited to, airfare or costs of other modes of transportation, terminal fees, and travel taxes associated with travel from the country of origin to the country of performance and the return journey upon the end of employment; and

(B) From the airport or disembarkation point to the worksite;

(xii) Security deposits, bonds, and insurance; and

(xiii) Equipment charges.

(2) A recruitment fee, as described in the introductory text of this definition, is a recruitment fee, regardless of whether the payment is-

(i) Paid in property or money;

(ii) Deducted from wages;

(iii) Paid back in wage or benefit concessions;

(iv) Paid back as a kickback, bribe, in-kind payment, free labor, tip, or tribute; or

(v) Collected by an employer or a third party, whether licensed or unlicensed, including, but not limited to-

(A) Agents;

(B) Labor brokers;

(C) Recruiters;

(D) Staffing firms (including private employment and placement firms);

(E) Subsidiaries/affiliates of the employer;

(F) Any agent or employee of such entities; and

(G) Subcontractors at all tiers.

Severe forms of trafficking in persons means-

(1) Sex trafficking in which a commercial sex act is induced by force, fraud, or coercion, or in which the person induced to perform such act has not attained 18 years of age; or

(2) The recruitment, harboring, transportation, provision, or obtaining of a person for labor or

services, through the use of force, fraud, or coercion for the purpose of subjection to involuntary servitude, peonage, debt bondage, or slavery.

Sex trafficking means the recruitment, harboring, transportation, provision, or obtaining of a person for the purpose of a commercial sex act.

Subcontract means any contract entered into by a subcontractor to furnish supplies or services for performance of a prime contract or a subcontract.

Subcontractor means any supplier, distributor, vendor, or firm that furnishes supplies or services to or for a prime contractor or another subcontractor.

United States means the 50 States, the District of Columbia, and outlying areas.

(b) Policy. The United States Government has adopted a policy prohibiting trafficking in persons including the trafficking-related activities of this clause. Contractors, contractor employees, and their agents must not-

(1) Engage in severe forms of trafficking in persons during the period of performance of the contract;

(2) Procure commercial sex acts during the period of performance of the contract;

(3) Use forced labor in the performance of the contract;

(4) Destroy, conceal, confiscate, or otherwise deny access by an employee to the employee's identity or immigration documents, such as passports or drivers' licenses, regardless of issuing authority;

(5)

(i) Use misleading or fraudulent practices during the recruitment of employees or offering of employment, such as failing to disclose, in a format and language understood by the employee or potential employee, basic information or making material misrepresentations during the recruitment of employees regarding the key terms and conditions of employment, including wages and fringe benefits, the location of work, the living conditions, housing and associated costs (if employer or agent provided or arranged), any significant costs to be charged to the employee or potential employee, and, if applicable, the hazardous nature of the work;

(ii) Use recruiters that do not comply with local labor laws of the country in which the recruiting takes place;

(6) Charge employees or potential employees recruitment fees;

(7)

(i) Fail to provide return transportation or pay for the cost of return transportation upon the end of employment-

(A) For an employee who is not a national of the country in which the work is taking place and who was brought into that country for the purpose of working on a U.S. Government contract or subcontract (for portions of contracts performed outside the United States); or

(B) For an employee who is not a United States national and who was brought into the United States for the purpose of working on a U.S. Government contract or subcontract, if the payment of such costs is required under existing temporary worker programs or pursuant to a written agreement with the employee (for portions of contracts performed inside the United States); except that-

(ii) The requirements of paragraphs (b)(7)(i) of this clause must not apply to an employee who is-

(A) Legally permitted to remain in the country of employment and who chooses to do so; or

(B) Exempted by an authorized official of the contracting agency from the requirement to provide return transportation or pay for the cost of return transportation;

(iii) The requirements of paragraph (b)(7)(i) of this clause are modified for a victim of trafficking in persons who is seeking victim services or legal redress in the country of employment, or for a witness in an enforcement action related to trafficking in persons. The contractor must provide the return transportation or pay the cost of return transportation in a way that does not obstruct the victim services, legal redress, or witness activity. For example, the contractor must not only offer return transportation to a witness at a time when the witness is still needed to testify. This paragraph does not apply when the exemptions at paragraph (b)(7)(ii) of this clause apply.

(8) Provide or arrange housing that fails to meet the host country housing and safety standards; or

(9) If required by law or contract, fail to provide an employment contract, recruitment

agreement, or other required work document in writing. Such written work document must be in a language the employee understands. If the employee must relocate to perform the work, the work document must be provided to the employee at least five days prior to the employee relocating. The employee's work document must include, but is not limited to, details about work description, wages, prohibition on charging recruitment fees, work location(s), living accommodations and associated costs, time off, roundtrip transportation arrangements, grievance process, and the content of applicable laws and regulations that prohibit trafficking in persons.

(c) Contractor requirements. The Contractor must-

(1) Notify its employees and agents of-

(i) The United States Government's policy prohibiting trafficking in persons, described in paragraph (b) of this clause; and

(ii) The actions that will be taken against employees or agents for violations of this policy. Such actions for employees may include, but are not limited to, removal from the contract, reduction in benefits, or termination of employment; and

(2) Take appropriate action, up to and including termination, against employees, agents, or subcontractors that violate the policy in paragraph (b) of this clause.

(d) Notification.

(1) The Contractor must inform the Contracting Officer and the agency Inspector General immediately of-

(i) Any credible information it receives from any source (including host country law enforcement) that alleges a Contractor employee, subcontractor, subcontractor employee, or their agent has engaged in conduct that violates the policy in paragraph (b) of this clause (see also 18 U.S.C. 1351, Fraud in Foreign Labor Contracting, and 52.203-13(b)(3)(i)(A), if that clause is included in the solicitation or contract, which requires disclosure to the agency Office of the Inspector General when the Contractor has credible evidence of fraud); and

(ii) Any actions taken against a Contractor employee, subcontractor, subcontractor employee, or their agent pursuant to this clause.

(2) If the allegation may be associated with more than one contract, the Contractor must inform

the contracting officer for the contract with the highest dollar value.

(e) Remedies. In addition to other remedies available to the Government, the Contractor's failure to comply with the requirements of paragraphs (c), (d), (g), (h), or (i) of this clause may result in-

(1) Requiring the Contractor to remove a Contractor employee or employees from the performance of the contract;

(2) Requiring the Contractor to terminate a subcontract;

(3) Suspension of contract payments until the Contractor has taken appropriate remedial action;

(4) Loss of award fee, consistent with the award fee plan, for the performance period in which the Government determined Contractor non-compliance;

(5) Declining to exercise available options under the contract;

(6) Termination of the contract for default or cause, in accordance with the termination clause of this contract; or

(7) Suspension or debarment.

(f) Mitigating and aggravating factors. When determining remedies, the Contracting Officer may consider the following:

(1) Mitigating factors. The Contractor had a Trafficking in Persons compliance plan or an awareness program at the time of the violation, was in compliance with the plan, and has taken appropriate remedial actions for the violation, that may include reparation to victims for such violations.

(2) Aggravating factors. The Contractor failed to abate an alleged violation or enforce the requirements of a compliance plan, when directed by the Contracting Officer to do so.

(g) Full cooperation.

(1) The Contractor must, at a minimum-

(i) Disclose to the agency Inspector General information sufficient to identify the nature and

extent of an offense and the individuals responsible for the conduct;

(ii) Provide timely and complete responses to Government auditors' and investigators' requests for documents;

(iii) Cooperate fully in providing reasonable access to its facilities and staff (both inside and outside the U.S.) to allow contracting agencies and other responsible Federal agencies to conduct audits, investigations, or other actions to ascertain compliance with the Trafficking Victims Protection Act of 2000 (22 U.S.C. chapter 78), E.O. 13627, or any other applicable law or regulation establishing restrictions on trafficking in persons, the procurement of commercial sex acts, or the use of forced labor; and

(iv) Protect all employees suspected of being victims of or witnesses to prohibited activities, prior to returning to the country from which the employee was recruited, and must not prevent or hinder the ability of these employees from cooperating fully with Government authorities.

(2) The requirement for full cooperation does not foreclose any Contractor rights arising in law, the FAR, or the terms of the contract. It does not-

(i) Require the Contractor to waive its attorney-client privilege or the protections afforded by the attorney work product doctrine;

(ii) Require any officer, director, owner, employee, or agent of the Contractor, including a sole proprietor, to waive his or her attorney client privilege or Fifth Amendment rights; or

(iii) Restrict the Contractor from-

(A) Conducting an internal investigation; or

(B) Defending a proceeding or dispute arising under the contract or related to a potential or disclosed violation.

(h) Compliance plan.

(1) This paragraph (h) applies to any portion of the contract that-

(i) Is for supplies, other than commercially available off-the-shelf items, acquired outside the United States, or services to be performed outside the United States; and

(ii) Has an estimated value that exceeds $550,000.

(2) The Contractor must maintain a compliance plan during the performance of the contract that is appropriate-

(i) To the size and complexity of the contract; and

(ii) To the nature and scope of the activities to be performed for the Government, including the number of non-United States citizens expected to be employed and the risk that the contract or subcontract will involve services or supplies susceptible to trafficking in persons.

(3) Minimum requirements. The compliance plan must include, at a minimum, the following:

(i) An awareness program to inform contractor employees about the Government's policy prohibiting trafficking-related activities described in paragraph (b) of this clause, the activities prohibited, and the actions that will be taken against the employee for violations. Additional information about Trafficking in Persons and examples of awareness programs can be found at the Web site for the Department of State's Office to Monitor and Combat Trafficking in Persons at http://www.state.gov/j/tip/.

(ii) A process for employees to report, without fear of retaliation, activity inconsistent with the policy prohibiting trafficking in persons, including a means to make available to all employees the hotline phone number of the Global Human Trafficking Hotline at 1-844-888-FREE and its email address at help@befree.org.

(iii) A recruitment and wage plan that only permits the use of recruitment companies with trained employees, prohibits charging recruitment fees to the employee or potential employee, and ensures that wages meet applicable host-country legal requirements or explains any variance.

(iv) A housing plan, if the Contractor or subcontractor intends to provide or arrange housing, that ensures that the housing meets host-country housing and safety standards.

(v) Procedures to prevent agents and subcontractors at any tier and at any dollar value from engaging in trafficking in persons (including activities in paragraph (b) of this clause) and to monitor, detect, and terminate any agents, subcontracts, or subcontractor employees that have engaged in such activities.

(4) Posting.

(i) The Contractor must post the relevant contents of the compliance plan, no later than the initiation of contract performance, at the workplace (unless the work is to be performed in the field or not in a fixed location) and on the Contractor's Web site (if one is maintained). If posting at the workplace or on the Web site is impracticable, the Contractor must provide the relevant contents of the compliance plan to each worker in writing.

(ii) The Contractor must provide the compliance plan to the Contracting Officer upon request.

(5) Certification. Annually after receiving an award, the Contractor must submit a certification to the Contracting Officer that-

(i) It has implemented a compliance plan to prevent any prohibited activities identified at paragraph (b) of this clause and to monitor, detect, and terminate any agent, subcontract or subcontractor employee engaging in prohibited activities; and

(ii) After having conducted due diligence, either-

(A) To the best of the Contractor's knowledge and belief, neither it nor any of its agents, subcontractors, or their agents is engaged in any such activities; or

(B) If abuses relating to any of the prohibited activities identified in paragraph (b) of this clause have been found, the Contractor or subcontractor has taken the appropriate remedial and referral actions.

(i) Subcontracts.

(1) The Contractor must include the substance of this clause, including this paragraph (i), in all subcontracts and in all contracts with agents. The requirements in paragraph (h) of this clause apply only to any portion of the subcontract that-

(i) Is for supplies, other than commercially available off-the-shelf items, acquired outside the United States, or services to be performed outside the United States; and

(ii) Has an estimated value that exceeds $700,000.

(2) If any subcontractor is required by this clause to submit a certification, the Contractor must require submission prior to the award of the subcontract and annually thereafter. The certification must cover the items in paragraph (h)(5) of this clause.

(End of clause)

52.222-54	Employment Eligibility Verification. (Deviation 2026-O0038)	2026-02

Employment Eligibility Verification (Feb 2026) (Deviation 2026-O0038)

(a) Definitions. As used in this clause-

Commercially available off-the-shelf (COTS) item-

(1) Means any item of supply that is-

(i) A commercial product (as defined in paragraph (1) of the definition of "commercial product" at Federal Acquisition Regulation (FAR) 2.101);

(ii) Sold in substantial quantities in the commercial marketplace; and

(iii) Offered to the Government, without modification, in the same form in which it is sold in the commercial marketplace; and

(2) Does not include bulk cargo, as defined in 46 U.S.C. 40102(4), such as agricultural products and petroleum products. Per 46 CFR 525.1 (c)(2), "bulk cargo" means cargo that is loaded and carried in bulk onboard ship without mark or count, in a loose unpackaged form, having homogenous characteristics. Bulk cargo loaded into intermodal equipment, except LASH or Seabee barges, is subject to mark and count and, therefore, ceases to be bulk cargo.

Employee assigned to the contract means an employee who was hired after November 6, 1986 (after November 27, 2009 in the Commonwealth of the Northern Mariana Islands), who is directly performing work, in the United States, under a contract that is required to include the clause prescribed at 22.1802-2. An employee is not considered to be directly performing work under a contract if the employee-

(1) Normally performs support work, such as indirect or overhead functions; and

(2) Does not perform any substantial duties applicable to the contract.

Subcontract means any contract, as defined in 2.101, entered into by a subcontractor to furnish supplies or services for performance of a prime contract or a subcontract. It includes but is not limited to purchase orders, and changes and modifications to purchase orders.

Subcontractor means any supplier, distributor, vendor, or firm that furnishes supplies or services to or for a prime Contractor or another subcontractor.

United States, as defined in 8 U.S.C. 1101(a)(38), means the 50 States, the District of Columbia, Puerto Rico, Guam, the Commonwealth of the Northern Mariana Islands, and the U. S. Virgin Islands.

(b) Enrollment and verification requirements.

(1) If the Contractor is not enrolled as a Federal Contractor in E-Verify at time of contract award, the Contractor must-

(i) Enroll. Enroll as a Federal Contractor in the E-Verify program within 30 calendar days of contract award;

(ii) Verify all new employees. Within 90 calendar days of enrollment in the E-Verify program, begin to use E-Verify to initiate verification of employment eligibility of all new hires of the Contractor, who are working in the United States, whether or not assigned to the contract, within 3 business days after the date of hire (but see paragraph (b)(3) of this section); and

(iii) Verify employees assigned to the contract. For each employee assigned to the contract, initiate verification within 90 calendar days after date of enrollment or within 30 calendar days of the employee's assignment to the contract, whichever date is later (but see paragraph (b)(4) of this section).

(2) If the Contractor is enrolled as a Federal Contractor in E-Verify at time of contract award, the Contractor must use E-Verify to initiate verification of employment eligibility of-

(i) All new employees.

(A) Enrolled 90 calendar days or more. The Contractor must initiate verification of all new hires of the Contractor, who are working in the United States, whether or not assigned to the contract,

within 3 business days after the date of hire (but see paragraph (b)(3) of this section); or

(B) Enrolled less than 90 calendar days. Within 90 calendar days after enrollment as a Federal Contractor in E-Verify, the Contractor must initiate verification of all new hires of the Contractor, who are working in the United States, whether or not assigned to the contract, within 3 business days after the date of hire (but see paragraph (b)(3) of this section); or

(ii) Employees assigned to the contract. For each employee assigned to the contract, the Contractor must initiate verification within 90 calendar days after date of contract award or within 30 days after assignment to the contract, whichever date is later (but see paragraph (b)(4) of this section).

(3) If the Contractor is an institution of higher education (as defined at 20 U.S.C. 1001(a)); a State or local government or the government of a Federally recognized Indian tribe; or a surety performing under a takeover agreement entered into with a Federal agency pursuant to a performance bond, the Contractor may choose to verify only employees assigned to the contract, whether existing employees or new hires. The Contractor must follow the applicable verification requirements at (b)(1) or (b)(2) respectively, except that any requirement for verification of new employees applies only to new employees assigned to the contract.

(4) Option to verify employment eligibility of all employees. The Contractor may elect to verify all existing employees hired after November 6, 1986 (after November 27, 2009, in the Commonwealth of the Northern Mariana Islands), rather than just those employees assigned to the contract. The Contractor must initiate verification for each existing employee working in the United States who was hired after November 6, 1986 (after November 27, 2009, in the Commonwealth of the Northern Mariana Islands), within 180 calendar days of-

(i) Enrollment in the E-Verify program; or

(ii) Notification to E-Verify Operations of the Contractor's decision to exercise this option, using the contact information provided in the E-Verify program Memorandum of Understanding (MOU).

(5) The Contractor must comply, for the period of performance of this contract, with the requirements of the E-Verify program MOU.

(i) The Department of Homeland Security (DHS) or the Social Security Administration (SSA) may terminate the Contractor's MOU and deny access to the E-Verify system in accordance with the terms of the MOU. In such case, the Contractor will be referred to a suspending and debarring official.

(ii) During the period between termination of the MOU and a decision by the suspending and debarring official whether to suspend or debar, the Contractor is excused from its obligations under paragraph (b) of this clause. If the Contractor is not suspended, debarred, or subject to a voluntary exclusion, then the Contractor must reenroll in E-Verify.

(c) Web site. Information on registration for and use of the E-Verify program can be obtained via the Internet at the Department of Homeland Security Web site: https://www.e-Verify.gov.

(d) Individuals previously verified. The Contractor is not required by this clause to perform additional employment verification using E-Verify for any employee-

(1) Whose employment eligibility was previously verified by the Contractor through the E-Verify program;

(2) Who has been granted and holds an active U.S. Government security clearance for access to confidential, secret, or top secret information in accordance with the National Industrial Security Program Operating Manual; or

(3) Who has undergone a completed background investigation and been issued credentials pursuant to Homeland Security Presidential Directive (HSPD)-12, Policy for a Common Identification Standard for Federal Employees and Contractors.

(e) Subcontracts. The Contractor must include the requirements of this clause, including this paragraph (e) (appropriately modified for identification of the parties), in each subcontract that-

(1) Is for-

(i) Services (except for commercial services that are part of the purchase of a COTS item (or an item that would be a COTS item, but for minor modifications), performed by the COTS provider, and are normally provided for that COTS item); or

(ii) Construction;

(2) Has a value of more than $3,500; and

(3) Includes work performed in the United States.

(End of clause)

52.222-55	Minimum Wages for Contractor Workers Under Executive Order 14026. (Deviation 2026-O0038)	2026-02

Minimum Wages for Contractor Workers Under Executive Order 14026 (Feb 2026) (Deviation 2026-O0038)

(a) Definitions. As used in this clause-

United States means the 50 states, the District of Columbia, Puerto Rico, the Northern Mariana Islands, American Samoa, Guam, the U.S. Virgin Islands, Johnston Island, Wake Island, and the outer Continental Shelf as defined in the Outer Continental Shelf Lands Act (43 U.S.C. 1331, et seq.).

Worker-

(1)

(i) Means any person engaged in performing work on, or in connection with, a contract covered by Executive Order 14026, and -

(A) Whose wages under such contract are governed by the Fair Labor Standards Act (29 U.S. C. chapter 8), the Service Contract Labor Standards statute (41 U.S.C. chapter 67), or the Wage Rate Requirements (Construction) statute (40 U.S.C. chapter 31, subchapter IV);

(B) Other than individuals employed in a bona fide executive, administrative, or professional capacity, as those terms are defined in 29 CFR part 541; and

(C) Regardless of the contractual relationship alleged to exist between the individual and the employer.

(ii) Includes workers performing on, or in connection with, the contract whose wages are calculated pursuant to special certificates issued under 29 U.S.C. 214(c).

(iii) Also includes any person working on, or in connection with, the contract and individually registered in a bona fide apprenticeship or training program registered with the Department of Labor's Employment and Training Administration, Office of Apprenticeship, or with a State Apprenticeship Agency recognized by the Office of Apprenticeship.

(2)

(i) A worker performs on a contract if the worker directly performs the specific services called for by the contract; and

(ii) A worker performs in connection with a contract if the worker's work activities are necessary to the performance of a contract but are not the specific services called for by the contract.

(b) Executive Order minimum wage rate.

(1) The Contractor must pay to workers, while performing in the United States, and performing on, or in connection with, this contract, a minimum hourly wage rate of $15.00 per hour beginning January 30, 2022.

(2) The Contractor must adjust the minimum wage paid, if necessary, beginning January 1, 2023, and annually thereafter, to meet the applicable annual E.O. minimum wage. The Administrator of the Department of Labor's Wage and Hour Division (the Administrator) will publish annual determinations in the Federal Register no later than 90 days before the effective date of the new E.O. minimum wage rate. The Administrator will also publish the applicable E. O. minimum wage on https://www.sam.gov (or any successor Web site), and a general notice on all wage determinations issued under the Service Contract Labor Standards statute or the Wage Rate Requirements (Construction) statute, that will provide information on the E.O. minimum wage and how to obtain annual updates. The applicable published E.O. minimum wage is incorporated by reference into this contract.

(3)

(i) The Contractor may request a price adjustment only after the effective date of the new annual E.O. minimum wage determination. Prices will be adjusted only for increased labor costs (including subcontractor labor costs) as a result of an increase in the annual E.O. minimum wage, and for associated labor costs (including those for subcontractors). Associated labor costs must include increases or decreases that result from changes in social security and unemployment taxes and workers' compensation insurance, but will not otherwise include any amount for general and administrative costs, overhead, or profit.

(ii) Subcontractors may be entitled to adjustments due to the new minimum wage, pursuant to paragraph (b)(2). Contractors must consider any subcontractor requests for such price adjustment.

(iii) The Contracting Officer must not adjust the contract price under this clause for any costs other than those identified in paragraph (b)(3)(i) of this clause, and must not provide duplicate price adjustments with any price adjustment under clauses implementing the Service Contract Labor Standards statute or the Wage Rate Requirements (Construction) statute.

(4) The Contractor warrants that the prices in this contract do not include allowance for any contingency to cover increased costs for which adjustment is provided under this clause.

(5) A pay period under this clause may not be longer than semi-monthly, but may be shorter to comply with any applicable law or other requirement under this contract establishing a shorter pay period. Workers must be paid no later than one pay period following the end of the regular pay period in which such wages were earned or accrued.

(6) The Contractor must pay, unconditionally to each worker, all wages due free and clear without subsequent rebate or kickback. The Contractor may make deductions that reduce a worker's wages below the E.O. minimum wage rate only if done in accordance with 29 CFR 23.230, Deductions.

(7) The Contractor must not discharge any part of its minimum wage obligation under this clause by furnishing fringe benefits or, with respect to workers whose wages are governed by the Service Contract Labor Standards statute, the cash equivalent thereof.

(8) Nothing in this clause shall excuse the Contractor from compliance with any applicable Federal or State prevailing wage law or any applicable law or municipal ordinance or any applicable contract establishing a minimum wage higher than the E.O. 14026 minimum wage. However, wage increases under such other laws or municipal ordinances are not subject to price adjustment under this subpart.

(9) The Contractor must pay the E.O. minimum wage rate whenever it is higher than any applicable collective bargaining agreement(s) wage rate.

(10) The Contractor must follow the policies and procedures in 29 CFR 23.240(b) and 23.280 for treatment of workers engaged in an occupation in which they customarily and regularly receive more than $30 a month in tips.

(c)

(1) This clause applies to workers as defined in paragraph (a). As provided in that definition-

(i) Workers are covered regardless of the contractual relationship alleged to exist between the contractor or subcontractor and the worker;

(ii) Workers with disabilities whose wages are calculated pursuant to special certificates issued under 29 U.S.C. 214(c) are covered; and

(iii) Workers who are registered in a bona fide apprenticeship program or training program registered with the Department of Labor's Employment and Training Administration, Office of Apprenticeship, or with a State Apprenticeship Agency recognized by the Office of Apprenticeship, are covered.

(2) This clause does not apply to-

(i) Fair Labor Standards Act (FLSA)-covered individuals performing in connection with contracts covered by the E.O., i.e. those individuals who perform duties necessary to the performance of the contract, but who are not directly engaged in performing the specific work called for by the contract, and who spend less than 20 percent of their hours worked in a particular workweek performing in connection with such contracts;

(ii) Individuals exempted from the minimum wage requirements of the FLSA under 29 U.S.C. 213(a) and 214(a) and (b), unless otherwise covered by the Service Contract Labor Standards statute, or the Wage Rate Requirements (Construction) statute. These individuals include but are not limited to-

(A) Learners, apprentices, or messengers whose wages are calculated pursuant to special certificates issued under 29 U.S.C. 214(a);

(B) Students whose wages are calculated pursuant to special certificates issued under 29 U.S.C. 214(b); and

(C) Those employed in a bona fide executive, administrative, or professional capacity (29 U.S.C. 213(a)(1) and 29 CFR part 541).

(d) Notice. The Contractor must notify all workers performing work on, or in connection with, this

contract of the applicable E.O. minimum wage rate under this clause. With respect to workers covered by the Service Contract Labor Standards statute or the Wage Rate Requirements (Construction) statute, the Contractor may meet this requirement by posting, in a prominent and accessible place at the worksite, the applicable wage determination under those statutes. With respect to workers whose wages are governed by the FLSA, the Contractor must post notice, utilizing the poster provided by the Administrator, which can be obtained at www.dol.gov /agencies/whd/government-contracts, in a prominent and accessible place at the worksite. Contractors that customarily post notices to workers electronically may post the notice electronically provided the electronic posting is displayed prominently on any Web site that is maintained by the contractor, whether external or internal, and customarily used for notices to workers about terms and conditions of employment.

(e) Payroll Records.

(1) The Contractor must make and maintain records, for three years after completion of the work, containing the following information for each worker:

(i) Name, address, and social security number;

(ii) The worker's occupation(s) or classification(s);

(iii) The rate or rates of wages paid;

(iv) The number of daily and weekly hours worked by each worker;

(v) Any deductions made; and

(vi) Total wages paid.

(2) The Contractor must make records pursuant to paragraph (e)(1) of this clause available for inspection and transcription by authorized representatives of the Administrator. The Contractor must also make such records available upon request of the Contracting Officer.

(3) The Contractor must make a copy of the contract available, as applicable, for inspection or transcription by authorized representatives of the Administrator.

(4) Failure to comply with this paragraph (e) shall be a violation of 29 CFR 23.260 and this contract. Upon direction of the Administrator or upon the Contracting Officer's own action, payment must be withheld until such time as the noncompliance is corrected.

(5) Nothing in this clause limits or otherwise modifies the Contractor's payroll and recordkeeping obligations, if any, under the Service Contract Labor Standards statute, the Wage Rate Requirements (Construction) statute, the Fair Labor Standards Act, or any other applicable law.

(f) Access. The Contractor must permit authorized representatives of the Administrator to conduct investigations, including interviewing workers at the worksite during normal working hours.

(g) Withholding. The Contracting Officer, upon his or her own action or upon written request of the Administrator, must withhold funds or cause funds to be withheld, from the Contractor under this or any other Federal contract with the same Contractor, sufficient to pay workers the full amount of wages required by this clause.

(h) Disputes. Department of Labor has set forth in 29 CFR 23.510, Disputes concerning contractor compliance, the procedures for resolving disputes concerning a contractor's compliance with Department of Labor regulations at 29 CFR part 23. Such disputes must be resolved in accordance with those procedures and not the Disputes clause of this contract. These disputes include disputes between the Contractor (or any of its subcontractors) and the contracting agency, the Department of Labor, or the workers or their representatives.

(i) Antiretaliation. The Contractor must not discharge or in any other manner discriminate against any worker because such worker has filed any complaint or instituted or caused to be instituted any proceeding under or related to compliance with the E.O. or this clause, or has testified or is about to testify in any such proceeding.

(j) Subcontractor compliance. The Contractor is responsible for subcontractor compliance with the requirements of this clause and may be held liable for unpaid wages due subcontractor workers.

(k) Subcontracts. The Contractor must include the substance of this clause, including this paragraph (k) in all subcontracts, regardless of dollar value, that are subject to the Service Contract Labor Standards statute or the Wage Rate Requirements (Construction) statute, and are to be performed in whole or in part in the United States.

(End of clause)

52.222-62	Paid Sick Leave Under Executive Order 13706. (Deviation 2026-O0038)	2026-02

Paid Sick Leave Under Executive Order 13706 (Feb 2026) (Deviation 2026-O0038)

(a) Definitions. As used in this clause (in accordance with 29 CFR 13.2)-

Child, "domestic partner", and "domestic violence" have the meaning given in 29 CFR 13.2.

Employee -

(1)

(i) Means any person engaged in performing work on or in connection with a contract covered by Executive Order (E.O.) 13706; and

(A) Whose wages under such contract are governed by the Service Contract Labor Standards statute (41 U.S.C. chapter 67), the Wage Rate Requirements (Construction) statute (40 U.S.C. chapter 31, subchapter IV), or the Fair Labor Standards Act (29 U.S.C. chapter 8);

(B) Including employees who qualify for an exemption from the Fair Labor Standards Act's minimum wage and overtime provisions;

(C) Regardless of the contractual relationship alleged to exist between the individual and the employer; and

(ii) Includes any person performing work on or in connection with the contract and individually registered in a bona fide apprenticeship or training program registered with the Department of Labor's Employment and Training Administration, Office of Apprenticeship, or with a State Apprenticeship Agency recognized by the Office of Apprenticeship.

(2)

(i) An employee performs "on" a contract if the employee directly performs the specific services called for by the contract; and

(ii) An employee performs "in connection with" a contract if the employee's work activities are necessary to the performance of a contract but are not the specific services called for by the contract.

Individual related by blood or affinity whose close association with the employee is the equivalent of a family relationship has the meaning given in 29 CFR 13.2.

Multiemployer plan means a plan to which more than one employer is required to contribute and which is maintained pursuant to one or more collective bargaining agreements between one or more employee organizations and more than one employer.

Paid sick leave means compensated absence from employment that is required by E.O. 13706 and 29 CFR Part 13.

Parent, "sexual assault", "spouse", and "stalking" have the meaning given in 29 CFR 13.2.

United States means the 50 States and the District of Columbia.

(b) Executive Order 13706.

(1) This contract is subject to E.O. 13706 and the regulations issued by the Secretary of Labor in 29 CFR Part 13 pursuant to the E.O.

(2) If this contract is not performed wholly within the United States, this clause only applies with respect to that part of the contract that is performed within the United States.

(c) Paid sick leave. The Contractor must-

(1) Permit each employee engaged in performing work on or in connection with this contract to earn not less than 1 hour of paid sick leave for every 30 hours worked;

(2) Allow accrual and use of paid sick leave as required by E.O. 13706 and 29 CFR Part 13;

(3) Comply with the accrual, use, and other requirements set forth in 29 CFR 13.5 and 13.6, which are incorporated by reference in this contract;

(4) Provide paid sick leave to all employees when due free and clear and without subsequent deduction (except as otherwise provided by 29 CFR 13.24), rebate, or kickback on any account;

(5) Provide pay and benefits for paid sick leave used no later than one pay period following the end of the regular pay period in which the paid sick leave was taken; and

(6) Be responsible for the compliance by any subcontractor with the requirements of E.O. 13706, 29 CFR Part 13, and this clause.

(d) Contractors may fulfill their obligations under E.O. 13706 and 29 CFR Part 13 jointly with other contractors through a multiemployer plan, or may fulfill their obligations through an individual fund, plan, or program (see 29 CFR 13.8).

(e) Withholding. The Contracting Officer must, upon his or her own action or upon written request of an authorized representative of the Department of Labor, withhold or cause to be withheld from the Contractor under this or any other Federal contract with the same Contractor, so much of the accrued payments or advances as may be considered necessary to pay employees the full amount owed to compensate for any violation of the requirements of E.O. 13706, 29 CFR Part 13, or this clause, including-

(1) Any pay and/or benefits denied or lost by reason of the violation;

(2) Other actual monetary losses sustained as a direct result of the violation; and

(3) Liquidated damages.

(f) Payment suspension/contract termination/contractor debarment.

(1) In the event of a failure to comply with E.O. 13706, 29 CFR Part 13, or this clause, the contracting agency may, on its own action or after authorization or by direction of the Department of Labor and written notification to the Contractor take action to cause suspension of any further payment, advance, or guarantee of funds until such violations have ceased.

(2) Any failure to comply with the requirements of this clause may be grounds for termination for default or cause.

(3) A breach of the contract clause may be grounds for debarment as a contractor and subcontractor as provided in 29 CFR 13.52.

(g) The paid sick leave required by E.O. 13706, 29 CFR Part 13, and this clause is in addition to the Contractor's obligations under the Service Contract Labor Standards statute and Wage Rate Requirements (Construction) statute, and the Contractor may not receive credit toward its

prevailing wage or fringe benefit obligations under those Acts for any paid sick leave provided in satisfaction of the requirements of E.O. 13706 and 29 CFR Part 13.

(h) Nothing in E.O. 13706 or 29 CFR Part 13 shall excuse noncompliance with or supersede any applicable Federal or State law, any applicable law or municipal ordinance, or a collective bargaining agreement requiring greater paid sick leave or leave rights than those established under E.O. 13706 and 29 CFR Part 13.

(i) Recordkeeping.

(1) The Contractor must make and maintain, for no less than three (3) years from the completion of the work on the contract, records containing the following information for each employee, which the Contractor must make available upon request for inspection, copying, and transcription by authorized representatives of the Administrator of the Wage and Hour Division of the Department of Labor:

(i) Name, address, and social security number of each employee.

(ii) The employee's occupation(s) or classification(s).

(iii) The rate or rates of wages paid (including all pay and benefits provided).

(iv) The number of daily and weekly hours worked.

(v) Any deductions made.

(vi) The total wages paid (including all pay and benefits provided) each pay period.

(vii) A copy of notifications to employees of the amount of paid sick leave the employee has accrued, as required under 29 CFR 13.5(a)(2).

(viii) A copy of employees' requests to use paid sick leave, if in writing, or, if not in writing, any other records reflecting such employee requests.

(ix) Dates and amounts of paid sick leave taken by employees (unless the Contractor's paid time off policy satisfies the requirements of E.O. 13706 and 29 CFR Part 13 as described in 29 CFR 13.5(f)(5), leave must be designated in records as paid sick leave pursuant to E.O. 13706).

(x) A copy of any written responses to employees' requests to use paid sick leave, including

explanations for any denials of such requests, as required under 29 CFR 13.5(d)(3).

(xi) Any records reflecting the certification and documentation the Contractor may require an employee to provide under 29 CFR 13.5(e), including copies of any certification or documentation provided by an employee.

(xii) Any other records showing any tracking of or calculations related to an employee's accrual or use of paid sick leave.

(xiii) The relevant contract.

(xiv) The regular pay and benefits provided to an employee for each use of paid sick leave.

(xv) Any financial payment made for unused paid sick leave upon a separation from employment intended, pursuant to 29 CFR 13.5(b)(5), to relieve the Contractor from the obligation to reinstate such paid sick leave as otherwise required by 29 CFR 13.5(b)(4).

(2)

(i) If the Contractor wishes to distinguish between an employee's covered and noncovered work, the Contractor must keep records or other proof reflecting such distinctions. Only if the Contractor adequately segregates the employee's time will time spent on noncovered work be excluded from hours worked counted toward the accrual of paid sick leave. Similarly, only if the Contractor adequately segregates the employee's time may the Contractor properly refuse an employee's request to use paid sick leave on the ground that the employee was scheduled to perform noncovered work during the time he or she asked to use paid sick leave.

(ii) If the Contractor estimates covered hours worked by an employee who performs work in connection with contracts covered by the E.O. pursuant to 29 CFR 13.5(a)(1)(i) or (iii), the Contractor must keep records or other proof of the verifiable information on which such estimates are reasonably based. Only if the Contractor relies on an estimate that is reasonable and based on verifiable information will an employee's time spent in connection with noncovered work be excluded from hours worked counted toward the accrual of paid sick leave. If the Contractor estimates the amount of time an employee spends performing in connection with contracts covered by the E.O., the Contractor must permit the employee to use his or her paid sick leave during any work time for the Contractor.

(3) In the event the Contractor is not obligated by the Service Contract Labor Standards statute, the Wage Rate Requirements (Construction) statute, or the Fair Labor Standards Act to keep

records of an employee's hours worked, such as because the employee is exempt from the Fair Labor Standards Act's minimum wage and overtime requirements, and the Contractor chooses to use the assumption permitted by 29 CFR 13.5(a)(1)(iii), the Contractor is excused from the requirement in paragraph (i)(1)(iv) of this clause and 29 CFR 13.25(a)(4) to keep records of the employee's number of daily and weekly hours worked.

(4)

(i) Records relating to medical histories or domestic violence, sexual assault, or stalking, created for purposes of E.O. 13706, whether of an employee or an employee's child, parent, spouse, domestic partner, or other individual related by blood or affinity whose close association with the employee is the equivalent of a family relationship, must be maintained as confidential records in separate files/records from the usual personnel files.

(ii) If the confidentiality requirements of the Genetic Information Nondiscrimination Act of 2008 (GINA), section 503 of the Rehabilitation Act of 1973, and/or the Americans with Disabilities Act (ADA) apply to records or documents created to comply with the recordkeeping requirements in this contract clause, the records and documents must also be maintained in compliance with the confidentiality requirements of the GINA, section 503 of the Rehabilitation Act of 1973, and /or ADA as described in 29 CFR 1635.9, 41 CFR 60-741.23(d), and 29 CFR 1630.14(c)(1), respectively.

(iii) The Contractor must not disclose any documentation used to verify the need to use 3 or more consecutive days of paid sick leave for the purposes listed in 29 CFR 13.5(c)(1)(iv) (as described in 29 CFR 13.5(e)(1)(ii)) and must maintain confidentiality about any domestic abuse, sexual assault, or stalking, unless the employee consents or when disclosure is required by law.

(5) The Contractor must permit authorized representatives of the Wage and Hour Division to conduct interviews with employees at the worksite during normal working hours.

(6) Nothing in this contract clause limits or otherwise modifies the Contractor's recordkeeping obligations, if any, under the Service Contract Labor Standards statute, the Wage Rate Requirements (Construction) statute, the Fair Labor Standards Act, the Family and Medical Leave Act, E.O. 14026, their respective implementing regulations, or any other applicable law.

(j) Interference/discrimination.

(1) The Contractor must not in any manner interfere with an employee's accrual or use of paid sick leave as required by E.O. 13706 or 29 CFR Part 13. Interference includes, but is not limited

to-

(i) Miscalculating the amount of paid sick leave an employee has accrued;

(ii) Denying or unreasonably delaying a response to a proper request to use paid sick leave;

(iii) Discouraging an employee from using paid sick leave;

(iv) Reducing an employee's accrued paid sick leave by more than the amount of such leave used;

(v) Transferring an employee to work on contracts not covered by the E.O. to prevent the accrual or use of paid sick leave;

(vi) Disclosing confidential information contained in certification or other documentation provided to verify the need to use paid sick leave; or

(vii) Making the use of paid sick leave contingent on the employee's finding a replacement worker or the fulfillment of the Contractor's operational needs.

(2) The Contractor must not discharge or in any other manner discriminate against any employee for-

(i) Using, or attempting to use, paid sick leave as provided for under E.O. 13706 and 29 CFR Part 13;

(ii) Filing any complaint, initiating any proceeding, or otherwise asserting any right or claim under E.O. 13706 and 29 CFR Part 13;

(iii) Cooperating in any investigation or testifying in any proceeding under E.O. 13706 and 29 CFR Part 13; or

(iv) Informing any other person about his or her rights under E.O. 13706 and 29 CFR Part 13.

(k) Notice. The Contractor must notify all employees performing work on or in connection with a contract covered by the E.O. of the paid sick leave requirements of E.O. 13706, 29 CFR Part 13, and this clause by posting a notice provided by the Department of Labor in a prominent and accessible place at the worksite so it may be readily seen by employees. Contractors that customarily post notices to employees electronically may post the notice electronically, provided

such electronic posting is displayed prominently on any Web site that is maintained by the Contractor, whether external or internal, and customarily used for notices to employees about terms and conditions of employment.

(l) Disputes concerning labor standards. Disputes related to the application of E.O. 13706 to this contract must not be subject to the general disputes clause of the contract. Such disputes must be resolved in accordance with the procedures of the Department of Labor set forth in 29 CFR Part 13. Disputes within the meaning of this contract clause include disputes between the Contractor (or any of its subcontractors) and the contracting agency, the Department of Labor, or the employees or their representatives.

(m) Subcontracts. The Contractor must insert the substance of this clause, including this paragraph (m), in all subcontracts, regardless of dollar value, that are subject to the Service Contract Labor Standards statute or the Wage Rate Requirements (Construction) statute, and are to be performed in whole or in part in the United States.

(End of clause)

52.223-2	Reporting of Biobased Products Under Service and Construction Contracts. (Deviation 2026-O0038)	2026-02

Reporting of Biobased Products Under Service and Construction Contracts (Feb 2026) (Deviation 2026-O0038)

(a) Definitions. As used in this clause-

Biobased product means a product determined by the U.S. Department of Agriculture (USDA) to be a commercial product or industrial product (other than food or feed) that is composed, in whole or in significant part, of biological products, including renewable domestic agricultural materials and forestry materials, or that is an intermediate ingredient or feedstock. The term includes, with respect to forestry materials, forest products that meet biobased content requirements, notwithstanding the market share the product holds, the age of the product, or whether the market for the product is new or emerging. (7 U.S.C. 8101) (7 CFR 4270.2).

USDA-designated product category a generic grouping of biobased products that are listed by USDA in a procurement guideline (7 CFR part 4270) and for which USDA has provided minimum biobased content standards (see https://www.biopreferred.gov/resources/categories.html).

(b) Requirement. The Contractor shall-

(1) Report to https://www.sam.gov, with a copy to the Contracting Officer, on the product types and dollar value of any biobased products in USDA-designated product categories purchased by the Contractor during the previous Government fiscal year, between October 1 and September 30; and

(2) Submit this report no later than-

(i) October 31 of each year during contract performance; and

(ii) At the end of contract performance.

(End of clause)

52.223-9	Estimate of Percentage of Recovered Material Content for EPA-Designated Items.	2008-05

Estimate of Percentage of Recovered Material Content for EPA-Designated Items (May 2008)

(a) Definitions. As used in this clause-

Postconsumer materialmeans a material or finished product that has served its intended use and has been discarded for disposal or recovery, having completed its life as a consumer item. Postconsumer material is a part of the broader category of "recovered material."

"Recovered material" means waste materials and by-products recovered or diverted from solid waste, but the term does not include those materials and by-products generated from, and

commonly reused within, an original manufacturing process.

(b) The Contractor, on completion of this contract, shall-

(1) Estimate the percentage of the total recovered material content for EPA-designated item(s) delivered and/or used in contract performance, including, if applicable, the percentage of post-consumer material content; and

(2) Submit this estimate to _____[Contracting Officer complete in accordance with agency procedures].

(End of clause)

52.223-23	Sustainable Products. (Deviation 2026-O0038)	2026-02

Sustainable Products (Feb 2026) (Deviation 2026-O0038)

(a) Definitions. As used in this clause-

Sustainable product means-

(1) A product that contains recovered material designated by the EPA under the Comprehensive Procurement Guidelines (42 U.S.C. 6962) (40 CFR part 247) (https://www.epa.gov/smm/comprehensive-procurement-guideline-cpg-program#products).

(2) An energy-efficient product or low standby power device (42 U.S.C. 8259b) (10 CFR part 436, subpart C) (https://www.energy.gov/eere/femp/search-energy-efficient-products, https://www.energystar.gov/products?s=mega, and https://www.energy.gov/femp/low-standby-power-product-list).

(3) A biobased product that meets the content requirements of the USDA under the BioPreferred® program (7 U.S.C. 8102) (7 CFR Part 4270) (https://www.biopreferred.gov/).

(4) A substance identified in the EPA's Significant New Alternatives Policy (SNAP) program as a

safe alternative to an ozone-depleting substance (42 U.S.C. 7671l) (40 CFR part 82, subpart G) (https://www.epa.gov/snap/unacceptable-and-acceptable-substitutes-tables).

(b) Requirements. The Government has identified in the statement of work or elsewhere in the contract the sustainable products that are required during the performance of this contract. The Contractor shall ensure that it provides sustainable products as required by this contract, when the products are-

(1) Delivered to the Government;

(2) Furnished for use by the Government;

(3) Incorporated into the construction of a public building or public work; or

(c) Furnished for use in performing services under this contract, where the cost of the products is a direct cost to this contract.

End of clause

52.225-11	Buy American-Construction Materials under Trade Agreements. (Deviation 2026-O0038)	2026-02

Buy American-Construction Materials under Trade Agreements (Feb 2026) (Deviation 2026-O0038)

(a) Definitions. As used in this clause-

Caribbean Basin country construction material means a construction material that-

(1) Is wholly the growth, product, or manufacture of a Caribbean Basin country; or

(2) In the case of a construction material that consists in whole or in part of materials from another country, has been substantially transformed in a Caribbean Basin country into a new

and different construction material distinct from the materials from which it was transformed.

Commercially available off-the-shelf (COTS) item-

(1) Means any item of supply (including construction material) that is-

(i) A commercial product (as defined in paragraph (1) of the definition of "commercial product" at Federal Acquisition Regulation (FAR) 2.101);

(ii) Sold in substantial quantities in the commercial marketplace; and

(iii) Offered to the Government, under a contract or subcontract at any tier, without modification, in the same form in which it is sold in the commercial marketplace; and

(2) Does not include bulk cargo, as defined in 46 U.S.C. 40102(4), such as agricultural products and petroleum products.

Component means an article, material, or supply incorporated directly into a construction material.

Construction material means an article, material, or supply brought to the construction site by the Contractor or subcontractor for incorporation into the building or work. The term also includes an item brought to the site preassembled from articles, materials, or supplies. However, emergency life safety systems, such as emergency lighting, fire alarm, and audio evacuation systems, that are discrete systems incorporated into a public building or work and that are produced as complete systems, are evaluated as a single and distinct construction material regardless of when or how the individual parts or components of those systems are delivered to the construction site. Materials purchased directly by the Government are supplies, not construction material.

Cost of components means-

(1) For components purchased by the Contractor, the acquisition cost, including transportation costs to the place of incorporation into the construction material (whether or not such costs are paid to a domestic firm), and any applicable duty (whether or not a duty-free entry certificate is issued); or

(2) For components manufactured by the Contractor, all costs associated with the manufacture of the component, including transportation costs as described in paragraph (1) of this definition,

plus allocable overhead costs, but excluding profit. Cost of components does not include any costs associated with the manufacture of the construction material.

Critical component means a component that is mined, produced, or manufactured in the United States and deemed critical to the U.S. supply chain. The list of critical components is at FAR 25.105.

Critical item means a domestic construction material or domestic end product that is deemed critical to U.S. supply chain resiliency. The list of critical items is at FAR 25.105.

Designated country means any of the following countries:

(1) A World Trade Organization Government Procurement Agreement (WTO GPA) country (Armenia, Aruba, Australia, Austria, Belgium, Bulgaria, Canada, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hong Kong, Hungary, Iceland, Ireland, Israel, Italy, Japan, Korea (Republic of), Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Moldova, Montenegro, Netherlands, New Zealand, North Macedonia, Norway, Poland, Portugal, Romania, Singapore, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Taiwan, Ukraine, or United Kingdom);

(2) A Free Trade Agreement (FTA) country (Australia, Bahrain, Chile, Colombia, Costa Rica, Dominican Republic, El Salvador, Guatemala, Honduras, Korea (Republic of), Mexico, Morocco, Nicaragua, Oman, Panama, Peru, or Singapore);

(3) A least developed country (Afghanistan, Angola, Bangladesh, Benin, Bhutan, Burkina Faso, Burundi, Cambodia, Central African Republic, Chad, Comoros, Democratic Republic of Congo, Djibouti, Equatorial Guinea, Eritrea, Ethiopia, Gambia, Guinea, Guinea-Bissau, Haiti, Kiribati, Laos, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mozambique, Nepal, Niger, Rwanda, Samoa, Sao Tome and Principe, Senegal, Sierra Leone, Solomon Islands, Somalia, South Sudan, Tanzania, Timor-Leste, Togo, Tuvalu, Uganda, Vanuatu, Yemen, or Zambia); or

(4) A Caribbean Basin country (Antigua and Barbuda, Aruba, Bahamas, Barbados, Belize, Bonaire, British Virgin Islands, Curacao, Dominica, Grenada, Guyana, Haiti, Jamaica, Montserrat, Saba, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Sint Eustatius, Sint Maarten, or Trinidad and Tobago).

Designated country construction material means a construction material that is a WTO GPA country construction material, an FTA country construction material, a least developed country construction material, or a Caribbean Basin country construction material.

Domestic construction material means-

(1) For construction material that does not consist wholly or predominantly of iron or steel or a combination of both-

(i) An unmanufactured construction material mined or produced in the United States; or

(ii) A construction material manufactured in the United States, if-

(A) The cost of its components mined, produced, or manufactured in the United States exceeds 60 percent of the cost of all its components, except that the percentage will be 65 percent for items delivered in calendar years 2024 through 2028 and 75 percent for items delivered starting in calendar year 2029. Components of foreign origin of the same class or kind for which nonavailability determinations have been made are treated as domestic. Components of unknown origin are treated as foreign; or

(B) The construction material is a COTS item; or

(2) For construction material that consists wholly or predominantly of iron or steel or a combination of both, a construction material manufactured in the United States if the cost of foreign iron and steel constitutes less than 5 percent of the cost of all components used in such construction material. The cost of foreign iron and steel includes but is not limited to the cost of foreign iron or steel mill products (such as bar, billet, slab, wire, plate, or sheet), castings, or forgings utilized in the manufacture of the construction material and a good faith estimate of the cost of all foreign iron or steel components excluding COTS fasteners. Iron or steel components of unknown origin are treated as foreign. If the construction material contains multiple components, the cost of all the materials used in such construction material is calculated in accordance with the definition of "cost of components".

Fastener means a hardware device that mechanically joins or affixes two or more objects together. Examples of fasteners are nuts, bolts, pins, rivets, nails, clips, and screws.

Foreign construction material means a construction material other than a domestic construction material.

Foreign iron and steel means iron or steel products not produced in the United States. Produced in the United States means that all manufacturing processes of the iron or steel must take place in the United States, from the initial melting stage through the application of coatings,

except metallurgical processes involving refinement of steel additives. The origin of the elements of the iron or steel is not relevant to the determination of whether it is domestic or foreign.

Free Trade Agreement country construction material means a construction material that-

(1) Is wholly the growth, product, or manufacture of a Free Trade Agreement (FTA) country; or

(2) In the case of a construction material that consists in whole or in part of materials from another country, has been substantially transformed in a FTA country into a new and different construction material distinct from the materials from which it was transformed.

Least developed country construction material means a construction material that-

(1) Is wholly the growth, product, or manufacture of a least developed country; or

(2) In the case of a construction material that consists in whole or in part of materials from another country, has been substantially transformed in a least developed country into a new and different construction material distinct from the materials from which it was transformed.

Predominantly of iron or steel or a combination of both means that the cost of the iron and steel content exceeds 50 percent of the total cost of all its components. The cost of iron and steel is the cost of the iron or steel mill products (such as bar, billet, slab, wire, plate, or sheet), castings, or forgings utilized in the manufacture of the product and a good faith estimate of the cost of iron or steel components excluding COTS fasteners.

Steel means an alloy that includes at least 50 percent iron, between 0.02 and 2 percent carbon, and may include other elements.

United States means the 50 States, the District of Columbia, and outlying areas.

WTO GPA country construction material means a construction material that-

(1) Is wholly the growth, product, or manufacture of a WTO GPA country; or

(2) In the case of a construction material that consists in whole or in part of materials from another country, has been substantially transformed in a WTO GPA country into a new and different construction material distinct from the materials from which it was transformed.

(b) Construction materials.

(1) This clause implements 41 U.S.C. chapter 83, Buy American, by providing a preference for domestic construction material. In accordance with 41 U.S.C.1907, the domestic content test of the Buy American statute is waived for construction material that is a COTS item, except that for construction material that consists wholly or predominantly of iron or steel or a combination of both, the domestic content test is applied only to the iron and steel content of the construction material, excluding COTS fasteners. In addition, the Contracting Officer has determined that the WTO GPA and Free Trade Agreements (FTAs) apply to this acquisition. Therefore, the Buy American restrictions are waived for designated country construction materials.

(2) The Contractor shall use only domestic or designated country construction material in performing this contract, except as provided in paragraphs (b)(3) and (b)(4) of this clause.

(3) The requirement in paragraph (b)(2) of this clause does not apply to information technology that is a commercial product or to the construction materials or components listed by the Government as follows:

_____[Contracting Officer is to list applicable excepted materials or indicate "none"]

(4) The Contracting Officer may add other foreign construction material to the list in paragraph (b)(3) of this clause if the Government determines that-

(i) The cost of domestic construction material would be unreasonable.

(A) For domestic construction material that is not a critical item or does not contain critical components.

(1) The cost of a particular domestic construction material subject to the restrictions of the Buy American statute is unreasonable when the cost of such material exceeds the cost of foreign material by more than 20 percent;

(2) [Reserved]

(3) [Reserved]

(B) For domestic construction material that is a critical item or contains critical components.

(1) The cost of a particular domestic construction material that is a critical item or contains

critical components, subject to the requirements of the Buy American statute, is unreasonable when the cost of such material exceeds the cost of foreign material by more than 20 percent plus the additional preference factor identified for the critical item or construction material containing critical components listed at FAR 25.105.

(2) [Reserved]

(3) [Reserved]

(ii) The application of the restriction of the Buy American statute to a particular construction material would be impracticable or inconsistent with the public interest; or

(iii) The construction material is not mined, produced, or manufactured in the United States in sufficient and reasonably available commercial quantities of a satisfactory quality.

(c) Request for determination of inapplicability of the Buy American statute.

(1)

(i) Any Contractor request to use foreign construction material in accordance with paragraph (b)(4) of this clause shall include adequate information for Government evaluation of the request, including-

(A) A description of the foreign and domestic construction materials;

(B) Unit of measure;

(C) Quantity;

(D) Price;

(E) Time of delivery or availability;

(F) Location of the construction project;

(G) Name and address of the proposed supplier; and

(H) A detailed justification of the reason for use of foreign construction materials cited in accordance with paragraph (b)(3) of this clause.

(ii) A request based on unreasonable cost shall include a reasonable survey of the market and a completed price comparison table in the format in paragraph (d) of this clause.

(iii) The price of construction material shall include all delivery costs to the construction site and any applicable duty (whether or not a duty-free certificate may be issued).

(iv) Any Contractor request for a determination submitted after contract award shall explain why the Contractor could not reasonably foresee the need for such determination and could not have requested the determination before contract award. If the Contractor does not submit a satisfactory explanation, the Contracting Officer need not make a determination.

(2) If the Government determines after contract award that an exception to the Buy American statute applies and the Contracting Officer and the Contractor negotiate adequate consideration, the Contracting Officer will modify the contract to allow use of the foreign construction material. However, when the basis for the exception is the unreasonable price of a domestic construction material, adequate consideration is not less than the differential established in paragraph (b)(4)(i) of this clause.

(3) Unless the Government determines that an exception to the Buy American statute applies, use of foreign construction material is noncompliant with the Buy American statute.

(d) Data. To permit evaluation of requests under paragraph (c) of this clause based on unreasonable cost, the Contractor shall include the following information and any applicable supporting data based on the survey of suppliers:

Foreign and Domestic Construction Materials Price Comparison

Construction material description	Unit of measure	Quantity	Price (dollars)*
Item 1:			
Foreign construction material.	____	____	____
Domestic construction material.	____	____	____
Item 2:			
Foreign construction material.	____	____	____
Domestic construction material.	____	____	____

[* Include all delivery costs to the construction site and any applicable duty (whether or not a duty-free entry certificate is issued)].

[List name, address, telephone number, and contact for suppliers surveyed. Attach copy of

response; if oral, attach summary.]

[Include other applicable supporting information.]

(End of clause)

52.232-5	Payments under Fixed-Price Construction Contracts.	2014-05

Payments under Fixed-Price Construction Contracts (May 2014)

(a) Payment of price. The Government shall pay the Contractor the contract price as provided in this contract.

(b) Progress payments. The Government shall make progress payments monthly as the work proceeds, or at more frequent intervals as determined by the Contracting Officer, on estimates of work accomplished which meets the standards of quality established under the contract, as approved by the Contracting Officer.

(1) The Contractor's request for progress payments shall include the following substantiation:

(i) An itemization of the amounts requested, related to the various elements of work required by the contract covered by the payment requested.

(ii) A listing of the amount included for work performed by each subcontractor under the contract.

(iii) A listing of the total amount of each subcontract under the contract.

(iv) A listing of the amounts previously paid to each such subcontractor under the contract.

(v) Additional supporting data in a form and detail required by the Contracting Officer.

(2) In the preparation of estimates, the Contracting Officer may authorize material delivered on the site and preparatory work done to be taken into consideration. Material delivered to the Contractor at locations other than the site also may be taken into consideration if-

(i) Consideration is specifically authorized by this contract; and

(ii) The Contractor furnishes satisfactory evidence that it has acquired title to such material and that the material will be used to perform this contract.

(c) Contractor certification. Along with each request for progress payments, the Contractor shall furnish the following certification, or payment shall not be made: (However, if the Contractor elects to delete paragraph (c)(4) from the certification, the certification is still acceptable.)

I hereby certify, to the best of my knowledge and belief, that-

(1) The amounts requested are only for performance in accordance with the specifications, terms, and conditions of the contract;

(2) All payments due to subcontractors and suppliers from previous payments received under the contract have been made, and timely payments will be made from the proceeds of the payment covered by this certification, in accordance with subcontract agreements and the requirements of Chapter 39 of Title 31, United States Code;

(3) This request for progress payments does not include any amounts which the prime contractor intends to withhold or retain from a subcontractor or supplier in accordance with the terms and conditions of the subcontract; and

(4) This certification is not to be construed as final acceptance of a subcontractor's performance.

____ (Name)

____ (Title)

____ (Date)

(d) Refund of unearned amounts. If the Contractor, after making a certified request for progress payments, discovers that a portion or all of such request constitutes a payment for performance by the Contractor that fails to conform to the specifications, terms, and conditions of this contract (hereinafter referred to as the "unearned amount"), the Contractor shall-

(1) Notify the Contracting Officer of such performance deficiency; and

(2) Be obligated to pay the Government an amount (computed by the Contracting Officer in the manner provided in paragraph (j) of this clause) equal to interest on the unearned amount from the 8th day after the date of receipt of the unearned amount until-

(i) The date the Contractor notifies the Contracting Officer that the performance deficiency has been corrected; or

(ii) The date the Contractor reduces the amount of any subsequent certified request for progress payments by an amount equal to the unearned amount.

(e) Retainage. If the Contracting Officer finds that satisfactory progress was achieved during any period for which a progress payment is to be made, the Contracting Officer shall authorize payment to be made in full. However, if satisfactory progress has not been made, the Contracting Officer may retain a maximum of 10 percent of the amount of the payment until satisfactory progress is achieved. When the work is substantially complete, the Contracting Officer may retain from previously withheld funds and future progress payments that amount the Contracting Officer considers adequate for protection of the Government and shall release to the Contractor all the remaining withheld funds. Also, on completion and acceptance of each separate building, public work, or other division of the contract, for which the price is stated separately in the contract, payment shall be made for the completed work without retention of a percentage.

(f) Title, liability, and reservation of rights. All material and work covered by progress payments made shall, at the time of payment, become the sole property of the Government, but this shall not be construed as-

(1) Relieving the Contractor from the sole responsibility for all material and work upon which payments have been made or the restoration of any damaged work; or

(2) Waiving the right of the Government to require the fulfillment of all of the terms of the contract.

(g) Reimbursement for bond premiums. In making these progress payments, the Government shall, upon request, reimburse the Contractor for the amount of premiums paid for performance and payment bonds (including coinsurance and reinsurance agreements, when applicable) after the Contractor has furnished evidence of full payment to the surety. The retainage provisions in paragraph (e) of this clause shall not apply to that portion of progress payments attributable to bond premiums.

(h) Final payment. The Government shall pay the amount due the Contractor under this contract after-

(1) Completion and acceptance of all work;

(2) Presentation of a properly executed voucher; and

(3) Presentation of release of all claims against the Government arising by virtue of this contract, other than claims, in stated amounts, that the Contractor has specifically excepted from the operation of the release. A release may also be required of the assignee if the Contractor's claim to amounts payable under this contract has been assigned under the Assignment of Claims Act of1940 (31 U.S.C.3727 and 41 U.S.C. 6305).

(i) Limitation because of undefinitized work. Notwithstanding any provision of this contract, progress payments shall not exceed 80 percent on work accomplished on undefinitized contract actions. A "contract action" is any action resulting in a contract, as defined in FAR subpart 2.1, including contract modifications for additional supplies or services, but not including contract modifications that are within the scope and under the terms of the contract, such as contract modifications issued pursuant to the Changes clause, or funding and other administrative changes.

(j) Interest computation on unearned amounts. In accordance with 31 U.S.C. 3903(c)(1), the amount payable under paragraph (d)(2) of this clause shall be-

(1) Computed at the rate of average bond equivalent rates of 91-day Treasury bills auctioned at the most recent auction of such bills prior to the date the Contractor receives the unearned amount; and

(2) Deducted from the next available payment to the Contractor.

(End of clause)

52.233-1	Disputes. (Deviation 2026-O0038)	2026-02

Disputes (Feb 2026) (Deviation 2026-O0038)

(a) Definitions. As used in this clause-

Claim means a written demand or written assertion by one of the contracting parties seeking, as a matter of right, the payment of money in a sum certain, the adjustment or interpretation of contract terms, or other relief arising under or relating to this contract. However, a written demand or written assertion by the Contractor seeking the payment of money exceeding $100,000 is not a claim under 41 U.S.C. chapter 71 until certified. A voucher, invoice, or other routine request for payment that is not in dispute when submitted is not a claim under 41 U.S.C. chapter 71. The submission may be converted to a claim under 41 U.S.C. chapter 71, by complying with the submission and certification requirements of this clause, if it is disputed either as to liability or amount or is not acted upon in a reasonable time.

Defective certification means a certification that alters or otherwise deviates from the language in paragraph (d)(2)(iii) of this clause or which is not executed by a person authorized to bind the contractor with respect to the claim. Failure to certify must not be deemed to be a defective certification.

(b) This contract is subject to 41 U.S.C. chapter 71, Contract Disputes.

(c) Except as provided in 41 U.S.C. chapter 71, all disputes arising under or relating to this contract must be resolved under this clause.

(d)

(1) A claim by the Contractor must be made in writing and, unless otherwise stated in this contract, submitted within 6 years after accrual of the claim to the Contracting Officer for a written decision. A claim by the Government against the Contractor must be subject to a written decision by the Contracting Officer.

(2)

(i) The Contractor must provide the certification specified in paragraph (d)(2)(iii) of this clause when submitting any claim exceeding $100,000.

(ii) The certification requirement does not apply to issues in controversy that have not been

submitted as all or part of a claim.

(iii) The certification must state as follows: "I certify that the claim is made in good faith; that the supporting data are accurate and complete to the best of my knowledge and belief; that the amount requested accurately reflects the contract adjustment for which the Contractor believes the Government is liable; and that I am authorized to certify the claim on behalf of the Contractor."

(3) The certification may be executed by any person authorized to bind the Contractor with respect to the claim.

(e) For Contractor claims of $100,000 or less, the Contracting Officer must, if requested in writing by the Contractor, render a decision within 60 days of the request. For Contractor-certified claims over $100,000, the Contracting Officer must, within 60 days, decide the claim or notify the Contractor of the date by which the decision will be made.

(f) The Contracting Officer's decision must be final unless the Contractor appeals or files a suit as provided in 41 U.S.C. chapter 71.

(g) If the claim by the Contractor is submitted to the Contracting Officer or a claim by the Government is presented to the Contractor, the parties, by mutual consent, may agree to use alternative dispute resolution (ADR). If the Contractor refuses an offer for ADR, the Contractor must inform the Contracting Officer, in writing, of the Contractor's specific reasons for rejecting the offer.

(h)

(1) The Government must pay interest on the amount found due and unpaid from the date that-

(i) The Contracting Officer receives the claim (certified, if required); or

(ii) Payment otherwise would be due, if that date is later, until the date of payment.

(2) For claims having defective certifications, interest must be paid from the date that the Contracting Officer initially receives the claim. Simple interest on claims must be paid at the rate, fixed by the Secretary of the Treasury as provided in the Act, which applies to the period during which the Contracting Officer receives the claim and then at the rate that applies for each 6-month period as fixed by the Treasury Secretary while the claim is pending.

(i) The Contractor must proceed diligently with performance of this contract, pending final resolution of any request for relief, claim, appeal, or action arising under the contract. The Contractor must comply with any decision of the Contracting Officer.

(End of clause)

52.233-3	Protest after Award. (Deviation 2026-O0038)	2026-02

Protest after Award (Feb 2026) (Deviation 2026-O0038)

(a) Upon receipt of a stop-work order, the Contractor must immediately comply with its terms and take all reasonable steps to minimize incurring costs allocable to the work covered by the order during the period of work stoppage. After receiving the final decision in the protest, the Contracting Officer must either-

(1) Cancel the stop-work order; or

(2) Terminate the work covered by the order as provided in the Default, or the Termination for Convenience of the Government, clause of this contract.

(b) If a stop-work order issued under this clause is canceled either before or after a final decision in the protest, the Contractor must resume work. The Contracting Officer must make an equitable adjustment in the delivery schedule or contract price, or both, and the contract must be modified, in writing, accordingly, if-

(1) The stop-work order results in an increase in the time required for, or in the Contractor's cost properly allocable to, the performance of any part of this contract; and

(2) The Contractor asserts its right to an adjustment within 30 days after the end of the period of work stoppage; provided, that if the Contracting Officer decides the facts justify the action, the Contracting Officer may receive and act upon a proposal submitted at any time before final payment under this contract.

(c) If a stop-work order is not canceled and the work covered by the order is terminated for the

convenience of the Government, the Contracting Officer must allow reasonable costs resulting from the stop-work order in arriving at the termination settlement.

(d) If a stop-work order is not canceled and the work covered by the order is terminated for default, the Contracting Officer must allow, by equitable adjustment or otherwise, reasonable costs resulting from the stop-work order.

(e) The Government's rights to terminate this contract at any time are not affected by action taken under this clause.

(f) If, as the result of the Contractor's intentional or negligent misstatement, misrepresentation, or miscertification, a protest related to this contract is sustained, and the Government pays costs, the Government may require the Contractor to reimburse the Government the amount of such costs. In addition to any other remedy available, and pursuant to the requirements of subpart 32.6, the Government may collect this debt by offsetting the amount against any payment due the Contractor under any contract between the Contractor and the Government.

(End of clause)

52.233-4	Applicable Law for Breach of Contract Claim. (Deviation 2026-O0038)	2026-02

Applicable Law for Breach of Contract Claim (Feb 2026) (Deviation 2026-O0038)

United States law will apply to resolve any claim of breach of this contract.

(End of clause)

52.236-2	Differing Site Conditions. (Deviation 2026-O0038)	2026-02

Differing Site Conditions (Feb 2026) (Deviation 2026-O0038)

(a) The Contractor shall promptly, and before the conditions are disturbed, give a written notice to the Contracting Officer of

(1) Latent physical conditions or subsurface conditions at the site which differ materially from those indicated in this contract; or

(2) Unknown physical conditions at the site, of an unusual nature, which differ materially from those ordinarily encountered and generally recognized as inherent in work of the character provided for in the contract.

(b)

(1) The Contracting Officer will investigate the site conditions promptly after receiving such a notice.

(2) If the conditions materially so differ and cause an increase or decrease in the Contractor's cost of, or the time required for, performing any part of the work under this contract an equitable adjustment must be made under this clause.

(c) No request for an equitable adjustment to the contract under this clause will be allowed, unless the Contractor has given the written notice required.

(d) No request for an equitable adjustment to the contract for differing site conditions will be allowed if made after final payment under this contract.

(End of clause)

52.236-3	Site Investigation and Conditions Affecting the Work. (Deviation 2026-O0038)	2026-02

Site Investigation and Conditions Affecting the Work (Feb 2026) (Deviation 2026-O0038)

(a) The Contractor acknowledges that it has taken steps reasonably necessary to ascertain the nature and location of the work, and that it has investigated and satisfied itself as to the general and local conditions which can affect the work or its cost, including-

(1) Conditions bearing upon transportation, disposal, handling, and storage of materials;

(2) The availability of labor, water, electric power, and roads;

(3) Uncertainties of weather, river stages, tides, or similar physical conditions at the site;

(4) The conformation and conditions of the ground; and

(5) The character of equipment and facilities needed preliminary to and during work performance.

(b) The Contractor also acknowledges that it has satisfied itself as to the character, quality, and quantity of surface and subsurface materials or obstacles to be encountered insofar as this information is reasonably ascertainable from an inspection of the site, including all exploratory work done by the Government, as well as from the drawings and specifications made a part of this contract. Any failure of the Contractor to take the actions described and acknowledged in this paragraph will not relieve the Contractor from responsibility for estimating properly the difficulty and cost of successfully performing the work, or for proceeding to successfully perform the work without additional expense to the Government.

(c) The Government assumes no responsibility for any conclusions or interpretations made by the Contractor based on the information made available by the Government. Nor does the Government assume responsibility for any understanding reached or representation made concerning conditions which can affect the work by any of its officers or agents before the execution of this contract, unless that understanding or representation is expressly stated in this contract.

(End of clause)

52.236-5	Material and Workmanship. (Deviation 2026-O0038)	2026-02

Material and Workmanship (Feb 2026) (Deviation 2026-O0038)

(a)

(1) Equipment, material, and articles incorporated into the work covered by this contract shall be new and of the most suitable grade for the purpose intended, unless otherwise specifically provided in this contract.

(2) References in the specifications to equipment, material, articles, or patented processes by trade name, make, or catalog number, shall be regarded as establishing a standard of quality and shall not be construed as limiting competition.

(3) The Contractor may, at its option, use any equipment, material, article, or process that, in the judgment of the Contracting Officer, is equal to that named in the specifications, unless otherwise specifically provided in this contract.

(b) The Contractor shall obtain the Contracting Officer's approval of the machinery, mechanical, and other equipment to be incorporated into the work.

(1) When requesting approval, the Contractor shall furnish to the Contracting Officer the name of the manufacturer, the model number, and other information concerning the performance, capacity, nature, and rating of the machinery and mechanical and other equipment.

(2) When required by this contract or by the Contracting Officer, the Contractor shall also obtain the Contracting Officer's approval of the material or articles which the Contractor contemplates incorporating into the work.

(i) When requesting approval, the Contractor shall provide appropriate and required information concerning the material or articles.

(ii) When directed to do so, the Contractor shall submit samples for approval at the Contractor's expense, with shipping charges prepaid. Machinery, equipment, material, and articles that do not have the required approval are installed or used at the risk of subsequent rejection.

(c) Work under this contract shall be performed in a skillful and workmanlike manner. The Contracting Officer may require, in writing, that the Contractor remove from the work any employee the Contracting Officer deems incompetent, careless, or otherwise objectionable.

(End of clause)

52.236-6	Superintendence by the Contractor. (Deviation 2026-O0038)	2026-02

Superintendence by the Contractor (Feb 2026) (Deviation 2026-O0038)

During performance of this contract and until the work is completed and accepted, the Contractor shall directly superintend the work or assign and have on site a competent superintendent who is satisfactory to the Contracting Officer and has authority to act for the Contractor.

(End of clause)

52.236-7	Permits and Responsibilities. (Deviation 2026-O0038)	2026-02

Permits and Responsibilities (Feb 2026) (Deviation 2026-O0038)

(a) The Contractor shall, without additional expense to the Government, be responsible for obtaining any necessary licenses and permits, and for complying with any Federal, State, and municipal laws, codes, and regulations applicable to the performance of the work.

(b) The Contractor shall be responsible for all damages to persons or property that occur as a result of the Contractor's fault or negligence.

(c) The Contractor shall be responsible for all materials delivered and work performed until completion and acceptance of the entire work, except for any completed unit of work which may

have been accepted under the contract.

(End of clause)

52.236-8	Other Contracts. (Deviation 2026-O0038)	2026-02

Other Contracts (Feb 2026) (Deviation 2026-O0038)

(a) The Government may award other contracts for work at or near the site of the work under this contract. The Contractor shall cooperate and coordinate with-

(1) Other contractors; and

(2) Government employees.

(b) The Contractor shall adapt scheduling and performance of the work under this contract to accommodate the performance of other contractors. The Contractor's scheduling and performance shall not delay or interfere with the performance of work by other contractors or Government employees.

(End of clause)

52.236-9	Protection of Existing Vegetation, Structures, Equipment, Utilities, and Improvements. (Deviation 2026-O0038)	2026-02

Protection of Existing Vegetation, Structures, Equipment, Utilities, and Improvements (Feb 2026) (Deviation 2026-O0038)

(a) The Contractor shall preserve and protect structures, equipment, and vegetation (such as trees, shrubs, and grass) on or adjacent to the work site, which are not to be removed, and which do not unreasonably interfere with the work required under this contract. The Contractor shall only remove trees when specifically authorized to do so. If any limbs or branches of trees are broken during contract performance, the Contractor shall trim those limbs or branches with a clean cut and paint the cut with a tree-pruning compound as directed by the Contracting Officer.

(b) The Contractor shall protect from damage and, in the event of damage resulting from non-compliance with this contract or failure to exercise reasonable care in performing the work, shall promptly repair existing improvements and utilities at or near the work site, on adjacent property of a third party, and on or near transportation paths and routes. The Contractor shall repair any damage, including those that are the property of a third party.

(c) If the Contractor fails or refuses to repair the damage promptly, the Contracting Officer may have the necessary work performed and charge the cost to the Contractor.

(End of clause)

52.236-10	Operations and Storage Areas. (Deviation 2026-O0038)	2026-02

Operations and Storage Areas (Feb 2026) (Deviation 2026-O0038)

(a) The Contractor shall confine all activities and operations on site to areas authorized or approved by the Contracting Officer. The Contractor shall hold and save the Government, its officers and agents, free and harmless from liability of any nature occasioned by the Contractor's performance.

(b)

(1) Temporary buildings (e.g., storage sheds, shops, offices) and utilities-

(i) May be erected by the Contractor only with the approval of the Contracting Officer; and

(ii) Shall only be built with labor and materials furnished by the Contractor without additional expense to the Government.

(2) The temporary buildings and utilities are the property of the Contractor and shall be removed by the Contractor at its expense upon completion of the work.

(3) The temporary buildings and utilities may be abandoned and need not be removed, with written consent of the Contracting Officer.

(c) The Contractor shall, as prescribed by the Contracting Officer, use only established roadways, or use temporary roadways constructed by the Contractor when and as authorized by the Contracting Officer. When materials are transported in prosecuting the work, vehicles shall not be loaded beyond the loading capacity recommended by the manufacturer of the vehicle or prescribed by any Federal, State, or local law or regulation.

(End of clause)

52.236-11	Use and Possession Prior to Completion. (Deviation 2026-O0038)	2026-02

Use and Possession Prior to Completion (Feb 2026) (Deviation 2026-O0038)

(a) The Government has the right to take possession of or use any completed or partially completed part of the work.

(1) Before taking possession of or using any work, the Contracting Officer will furnish the Contractor a list of items of work remaining to be performed or corrected on those portions of the work that the Government intends to take possession of or use.

(2) Failure of the Contracting Officer to list any item of work shall not relieve the Contractor of responsibility for complying with the terms of the contract.

(3) The Government's possession or use shall not be deemed an acceptance of any work under

the contract.

(b)

(1) While the Government has such possession or use, the Contractor is relieved of the responsibility for the loss of or damage to the work resulting from the Government's possession or use, notwithstanding the terms of the clause in this contract entitled "Permits and Responsibilities".

(2) If prior possession or use by the Government delays the progress of the work or causes additional expense to the Contractor, an equitable adjustment shall be made in the contract price or the time of completion, and the contract shall be modified in writing accordingly.

(End of clause)

52.236-12	Cleaning Up. (Deviation 2026-O0038)	2026-02

Cleaning Up (Feb 2026) (Deviation 2026-O0038)

(a) The Contractor shall keep the work area, including storage areas, in a clean, neat, orderly condition, and free from accumulations of waste materials.

(b) Before completing the work, the Contractor shall remove from the site any rubbish, tools, scaffolding, equipment, and materials that are not the property of the Government.

(End of clause)

52.236-15	Schedules for Construction Contracts. (Deviation 2026-O0038)	2026-02

Schedules for Construction Contracts (Feb 2026) (Deviation 2026-O0038)

(a)

(1) Within five days after the work commences on the contract or another period of time determined by the Contracting Officer, the Contractor shall prepare and submit to the Contracting Officer for approval a practicable schedule showing the order in which the Contractor proposes to perform the work, and the dates on which the Contractor contemplates starting and completing the work (including acquiring materials, plant, and equipment).

(2) The schedule shall be in the form of a progress chart of suitable scale to indicate appropriately the percentage of work scheduled for completion by any given date during the period.

(3) If the Contractor fails to submit a schedule within the time prescribed, the Contracting Officer may withhold approval of progress payments until the Contractor submits the required schedule.

(b) The Contractor shall continually update the actual progress in the schedule and shall submit it to the Contracting Officer by the means prescribed in the contract for transmittals or as directed by the Contracting Officer.

(c)

(1) If the Contractor falls behind the approved schedule, the Contractor shall take steps necessary to recover lost time and execute in accordance with the approved schedule, without additional cost to the Government.

(2) Such steps may include increasing the number of shifts, overtime operations, days of work, and/or the amount of construction plant.

(3) The Contractor shall submit, for approval, supplementary schedule(s) that demonstrate how the lost time will be recovered.

(d) If the Contractor does not recover the lost time, the Contracting Officer may determine that the Contractor is not prosecuting the work with sufficient diligence to ensure completion within the time specified in the contract. Upon making this determination, the Contracting Officer may terminate the Contractor's right to proceed with the work, or any separable part of it, in accordance with the default terms of this contract.

(End of clause)

52.236-17	Layout of Work. (Deviation 2026-O0038)	2026-02

Layout of Work (Feb 2026) (Deviation 2026-O0038)

(a) The Contractor shall lay out its work from Government-established base lines and benchmarks provided on the drawings.

(b) The Contractor shall be responsible for all measurements in connection with the layout.

(c) The Contractor shall furnish, at its own expense, all stakes, templates, platforms, equipment, tools, materials, and labor required for the layout.

(d) The Contractor shall be responsible for executing the work to the lines and grades that may be established or indicated by the Contracting Officer.

(e)

(1) The Contractor shall be responsible for maintaining and preserving all stakes and other marks established by the Contracting Officer until authorized to remove them.

(2) If such marks are destroyed by the Contractor, the Contracting Officer may replace them and deduct the expense of the replacement from any amounts due or to become due to the Contractor.

(End of clause)

52.236-21	Specifications and Drawings for Construction. (Deviation 2026-	2026-02

O0038)

Specifications and Drawings for Construction (Feb 2026) (Deviation 2026-O0038)

(a) The Contractor shall keep at the site a copy of the drawings and specifications and shall at all times give the Contracting Officer access thereto.

(b) Anything mentioned in the specifications and not shown on the drawings or shown on the drawings and not mentioned in the specifications, shall be of like effect as if shown or mentioned in both.

(1) In case of difference between drawings and specifications, the specifications shall govern.

(2) In case of discrepancy in the figures, in the drawings, or in the specifications, the matter shall be promptly submitted to the Contracting Officer, who shall promptly make a determination in writing.

(3) Any adjustment by the Contractor without such a determination shall be at its own risk and expense.

(c) The Contracting Officer will furnish from time to time such detailed drawings and other information as considered necessary, unless otherwise provided.

(d)

(1) Words, such as, "directed", "required", "ordered", "designated", "prescribed", or words of like import when used, in the specifications or on the drawings are intended to mean the "direction", "requirement", "order", "designation", or "prescription", of the Contracting Officer.

(2) Words, such as, "approved", "acceptable", "satisfactory", or words of like import shall mean "approved by", or 'acceptable to", or "satisfactory to" the Contracting Officer, unless otherwise expressly stated.

(e) Where "as shown", "as indicated", "as detailed", or words of similar import are used, it shall be understood that the reference is made to the drawings accompanying this contract unless stated otherwise. The word "provided" as used herein shall be understood to mean "provide complete in place", that is "furnished and installed".

(f) Shop drawings means drawings, submitted to the Government by the Contractor, subcontractor, or any lower tier subcontractor pursuant to a construction contract, showing in detail (1) the proposed fabrication and assembly of structural elements and (2) the installation (i. e., form, fit, and attachment details) of materials or equipment. It includes drawings, diagrams, layouts, schematics, descriptive literature, illustrations, schedules, performance and test data, and similar materials furnished by the contractor to explain in detail specific portions of the work required by the contract. The Government may duplicate, use, and disclose in any manner and for any purpose shop drawings delivered under this contract.

(g)

(1) If this contract requires shop drawings, the Contractor shall coordinate all such drawings, and review them for accuracy, completeness, and compliance with contract requirements and shall indicate its approval thereon as evidence of such coordination and review.

(2) Shop drawings submitted to the Contracting Officer without evidence of the Contractor's approval may be returned for resubmission.

(h) The Contracting Officer will indicate an approval or disapproval of the shop drawings and if not approved as submitted shall indicate the Government's reasons therefor.

(1) Any work done before such approval shall be at the Contractor's risk.

(2) Approval by the Contracting Officer shall not relieve the Contractor from responsibility for any errors or omissions in such drawings, nor from responsibility for complying with the requirements of this contract, except with respect to variations described and approved in accordance with paragraph (i) of this clause.

(i)

(1) If shop drawings show variations from the contract requirements, the Contractor shall describe such variations in writing, separate from the drawings, at the time of submission.

(2) If the Contracting Officer approves any such variation, the Contracting Officer will issue an appropriate contract modification, except that, if the variation is minor or does not involve a change in price or in time of performance, a modification need not be issued.

(j) The Contractor shall submit to the Contracting Officer for approval four copies (unless

otherwise indicated) of all shop drawings as called for under the various headings of these specifications. Three sets (unless otherwise indicated) of all shop drawings, will be retained by the Contracting Officer and one set will be returned to the Contractor.

(End of clause)

52.240-91	Security Prohibitions and Exclusions. (Deviation 2026-O0038)	2026-02

Security Prohibitions and Exclusions (Feb 2026) (Deviation 2026-O0038)

(a) Definitions. As used in this clause-

American Security Drone Act-covered foreign entity means an entity included on a list that the Federal Acquisition Security Council (FASC) develops and maintains and publishes in the System for Award Management (SAM) at https://www.sam.gov (section 1822 of Pub. L. 118-31, 41 U.S.C. 3901 note prec.).

Backhaul means intermediate links between the core network, or backbone network, and the small subnetworks at the edge of the network (e.g., connecting cell phones/towers to the core telephone network). Backhaul can be wireless (e.g., microwave) or wired (e.g., fiber optic, coaxial cable, Ethernet).

Covered application means the social networking service TikTok or any successor application or service developed or provided by ByteDance Limited or an entity owned by ByteDance Limited.

Covered article, as defined in 41 U.S.C. 4713(k), means:

(1) Information technology, as defined in 40 U.S.C. 11101, including cloud computing services of all types;

(2) Telecommunications equipment or telecommunications service, as those terms are defined in section 3 of the Communications Act of 1934 (47 U.S.C. 153);

(3) The processing of information on a Federal or non-Federal information system, subject to the requirements of the Controlled Unclassified Information program (see 32 CFR part 2002); or

(4) Hardware, systems, devices, software, or services that include embedded or incidental information technology.

Covered foreign country means The People's Republic of China.

Covered telecommunications equipment or services means-

(1) Telecommunications equipment produced by Huawei Technologies Company or ZTE Corporation (or any subsidiary or affiliate of such entities);

(2) For the purpose of public safety, security of Government facilities, physical security surveillance of critical infrastructure, and other national security purposes, video surveillance and telecommunications equipment produced by Hytera Communications Corporation, Hangzhou Hikvision Digital Technology Company, or Dahua Technology Company (or any subsidiary or affiliate of such entities);

(3) Telecommunications or video surveillance services provided by such entities or using such equipment; or

(4) Telecommunications or video surveillance equipment or services produced or provided by an entity that the Secretary of Defense, in consultation with the Director of National Intelligence or the Director of the Federal Bureau of Investigation, reasonably believes to be an entity owned or controlled by, or otherwise connected to, the government of a covered foreign country.

Critical technology means-

(1) Defense articles or defense services included on the United States Munitions List set forth in the International Traffic in Arms Regulations under subchapter M of chapter I of title 22, Code of Federal Regulations;

(2) Items included on the Commerce Control List set forth in Supplement No. 1 to part 774 of the Export Administration Regulations under subchapter C of chapter VII of title 15, Code of Federal Regulations, and controlled-

(i) Pursuant to multilateral regimes, including for reasons relating to national security, chemical

and biological weapons proliferation, nuclear nonproliferation, or missile technology; or

(ii) For reasons relating to regional stability or surreptitious listening;

(3) Specially designed and prepared nuclear equipment, parts and components, materials, software, and technology covered by part 810 of title 10, Code of Federal Regulations (relating to assistance to foreign atomic energy activities);

(4) Nuclear facilities, equipment, and material covered by part 110 of title 10, Code of Federal Regulations (relating to export and import of nuclear equipment and material);

(5) Select agents and toxins covered by part 331 of title 7, Code of Federal Regulations, part 121 of title 9 of such Code, or part 73 of title 42 of such Code; or

(6) Emerging and foundational technologies controlled pursuant to section 1758 of the Export Control Reform Act of 2018 (50 U.S.C. 4817).

FASC-prohibited unmanned aircraft system means an unmanned aircraft system manufactured or assembled by an American Security Drone Act-covered foreign entity.

FASCSA order means any of the following orders issued under the Federal Acquisition Supply Chain Security Act (FASCSA) requiring removing covered articles from executive agency information systems or excluding one or more named sources or named covered articles from executive agency procurement actions, as described in 41 CFR 201-1.303(d) and (e):

(1) The Secretary of Homeland Security may issue FASCSA orders that apply to civilian agencies, to the extent not covered by paragraph (2) or (3) of this definition. This type of FASCSA order may be referred to as a Department of Homeland Security (DHS) FASCSA order.

(2) The Secretary of Defense may issue FASCSA orders that apply to the Department of Defense (DoD) and national security systems other than sensitive compartmented information systems. This type of FASCSA order may be referred to as a DoD FASCSA order.

(3) The Director of National Intelligence (DNI) may issue FASCSA orders that apply to the intelligence community and sensitive compartmented information systems, to the extent not covered by paragraph (2) of this definition. This type of FASCSA order may be referred to as a DNI FASCSA order.

Information technology, as defined in 40 U.S.C. 11101(6)-

(1) Means any equipment or interconnected system or subsystem of equipment, used in the automatic acquisition, storage, analysis, evaluation, manipulation, management, movement, control, display, switching, interchange, transmission, or reception of data or information by the executive agency, if the equipment is used by the executive agency directly or is used by a contractor under a contract with the executive agency that requires the use-

(i) Of that equipment; or

(ii) Of that equipment to a significant extent in the performance of a service or the furnishing of a product;

(2) Includes computers, ancillary equipment (including imaging peripherals, input, output, and storage devices necessary for security and surveillance), peripheral equipment designed to be controlled by the central processing unit of a computer, software, firmware and similar procedures, services (including support services), and related resources; but

(3) Does not include any equipment acquired by a Federal contractor incidental to a Federal contract.

Intelligence community, as defined by 50 U.S.C. 3003(4), means the following-

(1) The Office of the Director of National Intelligence;

(2) The Central Intelligence Agency;

(3) The National Security Agency;

(4) The Defense Intelligence Agency;

(5) The National Geospatial-Intelligence Agency;

(6) The National Reconnaissance Office;

(7) Other offices within the Department of Defense for the collection of specialized national intelligence through reconnaissance programs;

(8) The intelligence elements of the Army, the Navy, the Air Force, the Marine Corps, the Coast

Guard, the Federal Bureau of Investigation, the Drug Enforcement Administration, and the Department of Energy;

(9) The Bureau of Intelligence and Research of the Department of State;

(10) The Office of Intelligence and Analysis of the Department of the Treasury;

(11) The Office of Intelligence and Analysis of the Department of Homeland Security; or

(12) Such other elements of any department or agency as may be designated by the President, or designated jointly by the Director of National Intelligence and the head of the department or agency concerned, as an element of the intelligence community.

Interconnection arrangements means arrangements governing the physical connection of two or more networks to allow the use of another's network to hand off traffic where it is ultimately delivered (e.g., connecting a customer of telephone provider A to a customer of telephone company B) or sharing data and other information resources.

Kaspersky Lab-covered article means any hardware, software, or service that-

(1) Is developed or provided by a Kaspersky Lab-covered entity;

(2) Includes any hardware, software, or service developed or provided in whole or in part by a Kaspersky Lab-covered entity; or

(3) Contains components using any hardware or software developed in whole or in part by a Kaspersky Lab-covered entity.

Kaspersky Lab-covered entity means-

(1) Kaspersky Lab;

(2) Any successor entity to Kaspersky Lab, including any change in name, e.g., "Kaspersky";

(3) Any entity that controls, is controlled by, or is under common control with Kaspersky Lab; or

(4) Any entity of which Kaspersky Lab has a majority ownership.

National security system, as defined in 44 U.S.C. 3552, means any information system

(including any telecommunications system) used or operated by an agency or by a contractor of an agency, or other organization on behalf of an agency-

(1) The function, operation, or use of which involves intelligence activities; involves cryptologic activities related to national security; involves command and control of military forces; involves equipment that is an integral part of a weapon or weapons system; or is critical to the direct fulfillment of military or intelligence missions, but does not include a system that is to be used for routine administrative and business applications (including payroll, finance, logistics, and personnel management applications); or

(2) Is protected at all times by procedures established for information that have been specifically authorized under criteria established by an Executive order or an Act of Congress to be kept classified in the interest of national defense or foreign policy.

Roaming means cellular communications services (e.g., voice, video, data) received from a visited network when unable to connect to the facilities of the home network either because signal coverage is too weak or because traffic is too high.

Sensitive compartmented information means classified information concerning or derived from intelligence sources, methods, or analytical processes, which is required to be handled within formal access control systems established by the Director of National Intelligence.

Sensitive compartmented information system means a national security system authorized to process or store sensitive compartmented information.

Source means a non-Federal supplier, or potential supplier, of products or services, at any tier.

Subsidiary means an entity in which more than 50 percent of the entity is owned directly by a parent corporation or through another subsidiary of a parent corporation.

Substantial or essential component means any component necessary for the proper function or performance of a piece of equipment, system, or service.

Unmanned aircraft means an aircraft that is operated without the possibility of direct human intervention from within or on the aircraft (49 U.S.C. 44801(11)).

Unmanned aircraft system means an unmanned aircraft and associated elements (including communication links and the components that control the unmanned aircraft) that are required for the operator to operate safely and efficiently in the national airspace system (49 U.S.C.

44801(12)).

(b) Prohibitions on providing or using specific products or services in performance of contract. Unless a waiver or exception applies, the Contractor is prohibited from providing any products or services to the Government or using in the performance of the contract any of the following:

(1) A covered application on any information technology owned or managed by the Government, or on any information technology used or provided by the Contractor under this contract, including equipment provided by the Contractor's employees (section 102 of Division R of the Consolidated Appropriations Act, 2023 (Pub. L. 117-328));

(2) A Kaspersky Lab-covered article (Section 1634 of Division A of the National Defense Authorization Act for Fiscal Year 2018 (Pub. L. 115-91));

(3) Covered telecommunications equipment or services used as a substantial or essential component of any system, or as critical technology as part of any system (paragraphs (a)(1)(A) of section 889 of the John S. McCain National Defense Authorization Act for Fiscal Year 2019 (Pub. L. 115-232)). This does not prohibit contractors from providing-

(i) A service that connects to the facilities of a third-party, such as backhaul, roaming, or interconnection arrangements; or

(ii) Telecommunications equipment that cannot route or redirect user data traffic or cannot permit visibility into any user data or packets that such equipment transmits or otherwise handles.

(c) Prohibition on unmanned aircraft systems manufactured or assembled by American Security Drone Act-covered foreign entities.

(1) Prohibition. The Contractor is prohibited from-

(i) Delivering any FASC-prohibited unmanned aircraft system, which includes unmanned aircraft (i.e., drones) and associated elements (sections 1823 and 1826 of American Security Drone Act of 2023, within the National Defense Authorization Act for Fiscal Year 2024, Pub. L. 118-31, Div. A, Title XVIII, Subtitle B, 41 U.S.C. 3901 note prec.);

(ii) On or after December 22, 2025, operating a FASC-prohibited unmanned aircraft system in the performance of the contract (section 1824 of Pub. L. 118-31); and

(iii) On or after December 22, 2025, using Federal funds to procure or operate a FASC-prohibited unmanned aircraft system (section 1825 of Pub. L. 118-31).

(2) Procedures. The Contractor shall search SAM for the FASC-maintained list of American Security Drone Act-covered foreign entities before proposing, or using in performance of the contract, any unmanned aircraft system. Also, the Contractor shall ensure any effort or expenditure associated with a FASC-prohibited unmanned aircraft system is consistent with a corresponding exemption, exception, or waiver determination expressly stated in the contract.

(3) Exemptions, exceptions, and waivers. The prohibitions in paragraph (c) of this clause do not apply where the agency has determined an exemption, exception, or waiver applies, and the contract indicates that such a determination has been made. See sections 1823 through 1825 and 1832 of Public Law 118-31 for statutory requirements pertaining to exemptions, exceptions, and waivers.

(d) Prohibition on using or providing specific products or services or conducting certain transactions regardless of connection to contract.

(1) Certain telecommunications and video surveillance equipment, systems, or services.

(i) Unless an applicable waiver has been issued by the Government, the Contractor cannot use any equipment, systems, or services that uses covered telecommunications equipment or services as a substantial or essential component of any system, or as critical technology as part of any system (paragraph (a)(1)(B) of section 889 of the John S. McCain National Defense Authorization Act for Fiscal Year 2019 (Pub. L. 115-232)).

(ii) This prohibition applies to using covered telecommunications equipment or services, regardless of whether that use is in performance of work under a Federal contract. This does not prohibit the contractor from using-

(A) A service that connects to the facilities of a third party, such as backhaul, roaming, or interconnection arrangements; or

(B) Telecommunications equipment that cannot route or redirect user data traffic or cannot permit visibility into any user data or packets that such equipment transmits or otherwise handles.

(2) Office of Foreign Assets Control Restrictions.

(i) Except as authorized by the Office of Foreign Assets Control (OFAC) in the Department of the Treasury, the Contractor shall not acquire, for use in the performance of this contract, any supplies or services if any proclamation, Executive order, or statute administered by OFAC, or if OFAC's implementing regulations at 31 CFR chapter V, would prohibit such a transaction by a person subject to the jurisdiction of the United States.

(ii) Except as authorized by OFAC, most transactions involving Cuba, Iran, and Sudan are prohibited, as are most imports from Burma or North Korea, into the United States or its outlying areas.

(A) For lists of entities and individuals subject to economic sanctions, see OFAC's List of Specially Designated Nationals and Blocked Persons at https://home.treasury.gov/policy-issues/financial-sanctions/specially-designated-nationals-and-blocked-persons-list-sdn-human-readable-lists.

(B) For more information about these restrictions, as well as updates, see OFAC's regulations at 31 CFR chapter V and at https://home.treasury.gov/policy-issues/office-of-foreign-assets-control-sanctions-programs-and-information.

(C) To conduct electronic screens of potential parties to regulated transactions, see the consolidated screening list at https://www.trade.gov/consolidated-screening-list, which consolidates multiple export screening lists of the Departments of Commerce, State, and the Treasury.

(3) Sudan prohibition. The Contractor is prohibited from conducting any restricted business operations in Sudan in accordance with Accountability and Divestment Act of 2007 (Pub. L. 110-174).

(4) Iran prohibitions.

(i) Unless an exception applies according to paragraph (d)(4)(iii) or the Government grants a waiver, the contractor shall not engage in certain activities or transactions relating to Iran (section 6(b)(1)(A) of Iran Sanctions Act (50 U.S.C. 1701 note).

(ii) Unless an exception applies according to paragraph (d)(4)(iii) or the Government grants a waiver, contractor shall not export certain sensitive technology to Iran, as determined by the President, and has an active exclusion in SAM (22 U.S.C. 8515).

(iii) The prohibition in paragraphs (d)(4)(i) and (d)(4)(ii) do not apply if the acquisition is subject

to trade agreements and the offeror certifies that all the offered products are designated country end products or designated country construction material (see part 25).

(iv) Unless an exception applies or the Government grants a waiver, contractors are prohibited from knowingly engaging in any significant transaction (i.e., over $15,000) with Iran's Revolutionary Guard Corps or any of its officials, agents, or affiliates, the property and interests in property of which are blocked according to the International Emergency Economic Powers Act (section 6(b)(1)(B) of Iran Sanctions Act (50 U.S.C. 1701 note)).

(e) Governmentwide exclusion and removal orders.

(1) Unless the Government has issued an applicable waiver, contractors shall not provide or use as part of the performance of the contract any covered article, or any products or services produced or provided by a source, if the covered article or the source is prohibited by an applicable FASCSA order as follows:

(i) For solicitations and contracts awarded by a Department of Defense contracting office, DoD FASCSA orders apply.

(ii) For all other solicitations and contracts, DHS FASCSA orders apply.

(2) The Contractor shall search for the phrase "FASCSA order" in the System for Award Management (SAM) at https://www.sam.gov to locate applicable FASCSA orders.

(3) The Government may identify in the solicitation other FASCSA orders that are not in SAM, which are effective and apply to the solicitation and resulting contract.

(4) A FASCSA order issued after the date of solicitation applies to this contract only if added by an amendment to the solicitation or modification to the contract (see FAR 40.204-1(c)).

(f) Reasonable inquiry. The contractor shall conduct a reasonable inquiry to determine if there are any prohibited products or services. The inquiry will look at any information in the entity's possession but does not need to include an internal or third-party audit.

(g) Removal of prohibited products and services. For Federal Supply Schedules, Governmentwide acquisition contracts, multi-agency contracts or any other procurement instrument intended for use by multiple agencies, upon notification from the Contracting Officer, during the performance of the contract, the Contractor shall promptly make any necessary changes or modifications to remove any product or service produced or provided by a source

that this clause prohibits.

(h) General report.

(1) If the Contractor identifies or is notified by any source, (including a subcontractor at any tier), that any product or service provided or used (or to be provided or used) during contract performance does not comply with any prohibition in this clause, then the Contractor shall report the following information, or as much information is known, in writing to the contracting office as identified in paragraph (h)(2) within 72 hours:

(i) Contract number and order number, if applicable;

(ii) The specific prohibition the product or service is not complying with;

(iii) A description of the products or services that the Contractor identifies or has reason to suspect is prohibited (include brand; model number, such as the original equipment manufacturer (OEM) number, manufacturer part number, or wholesaler number; and item description, as applicable);

(iv) The entity that produced the product or service (include entity name, unique entity identifier, Contractor and Government Entity (CAGE) code, facilities responsible for design, fabrication, assembly, packaging, and test of the product, and whether the entity was the OEM or a distributor (provide manufacturer codes and distributor codes used for the product));

(v) Description of the functionality of the product or service and how that functionality impacts the risk to the product or service;

(vi) An explanation of any factors relevant to determining if the product or service should be permitted by an applicable exception, exemption, or waiver (if the contractor would like the Government to consider a waiver, and asks for such a waiver);

(vii) Whether alternative products or services are available that would comply with the prohibition;

(viii) If the product or service is related to item maintenance, include the following information on the item being maintained:

(A) Brand;

(B) Model number, OEM number, manufacturer part number, or wholesaler number; and

(C) Item description, as applicable.

(ix) Any readily available information about mitigation actions implemented or recommended.

(2) If a report must be submitted to a contracting office, the Contractor shall submit the report as follows:

(i) If a Department of Defense contracting office, the Contractor shall report to the website at https://dibnet.dod.mil.

(ii) For all other contracting offices, the Contractor shall report to the Contracting Officer.

(iii) For indefinite delivery contracts, the Contractor shall report to both the contracting office for the indefinite delivery contract and the contracting office for any affected order.

(3) If the report provided does not contain any of the information required by paragraph (h)(1) of this clause, and the contractor later discovers new information that is required by paragraph (h)(1) of this clause, then the contractor shall submit a subsequent report within 72 hours of discovering the new information.

(4) The contractor shall also report the information in paragraph (h)(1) if the contractor wishes to ask for a waiver of the requirements of a new FASCSA order being applied through modification.

(i) New FASCSA orders report.

(1) During contract performance, the Contractor shall review SAM at least once every three months, or as advised by the Contracting Officer, to check for covered articles subject to FASCSA order(s), or for products or services produced by a source subject to FASCSA order(s) not currently identified under paragraph (e) of this clause.

(2) If the Contractor identifies a new FASCSA order(s) that could impact their supply chain, then the Contractor shall conduct a reasonable inquiry to identify whether a covered article or product or service produced or provided by a source subject to the FASCSA order(s) was provided to the Government or used during contract performance. The inquiry will look at any information in the entity's possession but does not need to include an internal or third-party audit.

(3) The Contractor shall submit a report to the contracting office identified in paragraph (h)(2) of this clause if the Contractor identifies, including through any notification by a subcontractor at any tier, that a covered article or product or service produced or provided by a source was provided to the Government or used during contract performance and is subject to a FASCSA order(s). For indefinite delivery contracts, the Contractor shall report to both the contracting office for the indefinite delivery contract and the contracting office for any affected order. The Contractor shall report the following information within 72 hours for each covered article or each product or service produced or provided by a source, where the covered article or source is subject to a FASCSA order:

(i) Contract number and order number, if applicable;

(ii) Name of the covered article or source subject to a FASCSA order;

(iii) The specific FASCSA order the product or service does not comply with;

(iv) The elements of (h)(1)(iii) through (ix) of this clause.

(j) Subcontracts. The Contractor shall insert the substance of this clause, including this paragraph (j) but excluding subparagraphs (d)(1) and (i)(1), in all subcontracts and other contractual instruments, including subcontracts for acquiring commercial products or commercial services.

(End of clause)

52.240-93	Basic Safeguarding of Covered Contractor Information Systems. (Deviation 2026-O0038)	2026-02

Basic Safeguarding of Covered Contractor Information Systems (Feb 2026) (Deviation 2026-O0038)

(a) Definitions. As used in this clause-

Covered contractor information system means an information system that is owned or operated

by a contractor that processes, stores, or transmits Federal contract information.

Federal contract information-

(1) Means information, not intended for public release, that is provided by or generated for the Government under a contract to develop or deliver a product or service to the Government; but

(2) Does not include information provided by the Government to the public (such as on public websites) or simple transactional information (such as information necessary to process payments).

Information means any communication or representation of knowledge such as facts, data, or opinions, in any medium or form, including textual, numerical, graphic, cartographic, narrative, or audiovisual (Committee on National Security Systems Instruction (CNSSI) 4009).

Information system means a discrete set of information resources organized for the collection, processing, maintenance, use, sharing, dissemination, or disposition of information (44 U.S.C. 3502).

Safeguarding means measures or controls that are prescribed to protect information systems.

(b) Safeguarding requirements.

(1) Basic requirements. The Contractor shall safeguard its covered contractor information systems by implementing, at minimum, the following security controls:

(i) Limit information system access to authorized users, processes acting on behalf of authorized users, or devices (including other information systems).

(ii) Limit information system access to the types of transactions and functions that authorized users are permitted to execute.

(iii) Verify and control/limit connections to and use of external information systems.

(iv) Control information posted or processed on publicly accessible information systems.

(v) Identify information system users, processes acting on behalf of users, or devices.

(vi) Authenticate (or verify) the identities of those users, processes, or devices, as a prerequisite

to allowing access to organizational information systems.

(vii) Sanitize or destroy information system media containing Federal Contract Information before disposal or release for reuse.

(viii) Limit physical access to organizational information systems, equipment, and the respective operating environments to authorized individuals.

(ix) Escort visitors and monitor visitor activity; maintain audit logs of physical access; and control and manage physical access devices.

(x) Monitor, control, and protect organizational communications (i.e., information transmitted or received by organizational information systems) at the external boundaries and key internal boundaries of the information systems.

(xi) Implement subnetworks for publicly accessible system components that are physically or logically separated from internal networks.

(xii) Identify, report, and correct information and information system flaws in a timely manner.

(xiii) Provide protection from malicious code at appropriate locations within organizational information systems.

(xiv) Update malicious code protection mechanisms when new releases are available.

(xv) Perform periodic scans of the information system and real-time scans of files from external sources as files are downloaded, opened, or executed.

(2) Other requirements. This clause does not relieve the Contractor of any other specific safeguarding requirements specified by Federal departments and agencies relating to covered contractor information systems generally or other Federal safeguarding requirements for controlled unclassified information (CUI) as established by Executive Order 13556.

(c) Subcontracts. The Contractor shall include the substance of this clause, including this paragraph (c), in subcontracts under this contract (including subcontracts for the acquisition of commercial products, other than commercially available off-the-shelf items, or commercial services), in which the subcontractor may have Federal contract information residing in or transiting through its information system.

(End of clause)

52.243-4	Changes. (Deviation 2026-O0038)	2026-02

Changes (Feb 2026) (Deviation 2026-O0038)

(a)

(1) At any time, the Contracting Officer may issue a written order, identified as a change order, to make changes in the work within the scope of the contract, including changes-

(i) In the specifications (including drawings and designs);

(ii) In the method or manner of performance of the work;

(iii) In the Government-furnished property or services; or

(iv) Directing acceleration in the performance of the work.

(2) If there are any sureties, the Contracting Officer does not need to notify them of a written order.

(b) Any other written or oral order (which, as used in this paragraph (b), includes direction, instruction, interpretation, or determination) from the Contracting Officer that causes a change shall be treated as a change order under this clause; provided, that the Contractor gives the Contracting Officer written notice stating-

(1) The date, circumstances, and source of the order; and

(2) That the Contractor regards the order as a change order.

(c) Except as provided in this clause, no order, statement, or conduct of the Contracting Officer shall be treated as a change under this clause or entitle the Contractor to an equitable adjustment.

(d) If any change under this clause causes an increase or decrease in the Contractor's cost of, or the time required for, the performance of any part of the work under this contract, whether or not changed by any such order, the Contracting Officer shall make an equitable adjustment and modify the contract in writing. However, except for an adjustment based on defective specifications, no adjustment for any change under paragraph (b) of this clause shall be made for any costs incurred more than 20 days before the Contractor gives written notice as required. In the case of defective specifications for which the Government is responsible, the equitable adjustment shall include any increased cost reasonably incurred by the Contractor in attempting to comply with the defective specifications.

(e)

(1) The Contractor must assert its right to an adjustment under this clause, by submitting to the Contracting Officer a written statement describing the general nature and amount of proposal within 30 days, unless this period is extended by the Government, after-

(i) Receipt of a written change order under paragraph (a) of this clause; or

(ii) The furnishing of a written notice under paragraph (b) of this clause.

(2) The statement of proposal for adjustment may be included in the notice under paragraph (b) of this clause.

(f) No proposal by the Contractor for an equitable adjustment shall be allowed if asserted after final payment under this contract.

(End of clause)

52.244-6	Subcontracts for Commercial Products and Commercial Services. (Deviation 2026-O0038)	2026-04

Subcontracts for Commercial Products and Commercial Services (Apr 2026) (Deviation 2026-O0038)

(a) Definitions. As used in this clause-

Commercial product, commercial service and nondevelopmental item have the meanings contained in Federal Acquisition Regulation (FAR) 2.101.

Subcontract has the meaning at FAR 44.401

(b) Requirements.

(1) To the maximum extent practicable, the Contractor shall incorporate, and require its subcontractors at all tiers to incorporate, commercial products, commercial services, or non-developmental items as components of items to be supplied under this contract.

(2) If a clause in the following table is included in the contract, the Contractor shall insert the clause in subcontracts for commercial products or commercial services and must flow down the requirements of the clause to subcontracts as indicated in the specific clause:

Number	Title	Date
52.203-13	Contractor Code of Business Ethics and Conduct	NOV 2021
52.203-17	Contractor Employee Whistleblower Rights	NOV 2023
52.203-19	Prohibition on Requiring Certain Internal Confidentiality Agreements or Statements	JAN 2017
52.204-9	Personal Identity Verification of Contractor Personnel	JAN 2011
52.219-8 *	Utilization of Small Business Concerns	JAN 2025
52.222-35	Equal Opportunity for Veterans	JUN 2020
52.222-36	Equal Opportunity for Workers with Disabilities	JUN 2020
52.222-37	Employment Reports on Veterans	JUN 2020
52.222-40	Notification of Employee Rights Under the National Labor Relations Act	DEC 2010
52.222-41	Service Contract Labor Standards	AUG 2018
52.222-50	Combating Trafficking in Persons	NOV 2021
52.222-50 with Alt I	Combating Trafficking in Persons, with its Alternate I	MAR 2015
52.222-51	Exemption from Application of the Service Contract Labor	

Standards to Contracts for Maintenance, Calibration, or Repair of Certain Equipment-Requirements MAY 2014

52.222-53 Exemption from Application of the Service Contract Labor Standards to Contracts for Certain Services-Requirements MAY 2014

52.222-54 Employment Eligibility Verification JAN 2025

52.222-62 Paid Sick Leave Under Executive Order 13706 JAN 2022

52.222-90 Addressing DEI Discrimination by Federal Contractors APR 2026

52.224-3 Privacy Training JAN 2017

52.224-3 with Alt I Privacy Training, with Alternate I JAN 2017

52.225-26 Contractors Performing Private Security Functions Outside the United States OCT 2016

52.232-40 Providing Accelerated Payments to Small Business Subcontractors MAR 2023

52.240-91 Security Prohibitions and Exclusions DATE

52.240-91 with Alt I Security Prohibitions and Exclusions, with its Alternate I DATE

52.240-92 Security Requirements DATE

52.240-92 with Alt II Security Requirements, with its Alternate II DATE

52.247-64 Preference for Privately Owned U.S.-Flag Commercial Vessels NOV 2021

* Include only if the subcontract offers further subcontracting opportunities. If the subcontract (except subcontracts to small business concerns) exceeds the applicable threshold specified in FAR 19.109(a) on the date of subcontract award, the subcontractor must include 52.219-8 in lower tier subcontracts that offer subcontracting opportunities.

(c) Subcontracts. The Contractor shall include the terms of this clause, including this paragraph (c), in subcontracts awarded under this contract.

(End of clause)

52.248-3 Value Engineering-Construction. 2025-10

Value Engineering-Construction (Oct 2025)

(a) General. The Contractor is encouraged to develop, prepare, and submit value engineering change proposals (VECP's) voluntarily. The Contractor shall share in any instant contract savings realized from accepted VECP's, in accordance with paragraph (f) of this clause.

(b) Definitions. "Collateral costs," as used in this clause, means agency costs of operation, maintenance, logistic support, or Government-furnished property.

Collateral savings, as used in this clause, means those measurable net reductions resulting from a VECP in the agency's overall projected collateral costs, exclusive of acquisition savings, whether or not the acquisition cost changes.

Contractor's development and implementation costs, as used in this clause, means those costs the Contractor incurs on a VECP specifically in developing, testing, preparing, and submitting the VECP, as well as those costs the Contractor incurs to make the contractual changes required by Government acceptance of a VECP.

Government costs, as used in this clause, means those agency costs that result directly from developing and implementing the VECP, such as any net increases in the cost of testing, operations, maintenance, and logistic support. The term does not include the normal administrative costs of processing the VECP.

Instant contract savings, as used in this clause, means the estimated reduction in Contractor cost of performance resulting from acceptance of the VECP, minus allowable Contractor's development and implementation costs, including subcontractors' development and implementation costs (see paragraph (h) of this clause).

Value engineering change proposal (VECP) means a proposal that-

(1) Requires a change to this, the instant contract, to implement; and

(2) Results in reducing the contract price or estimated cost without impairing essential functions or characteristics; provided, that it does not involve a change-

(i) In deliverable end item quantities only; or

(ii) To the contract type only.

(c) VECP preparation. As a minimum, the Contractor shall include in each VECP the information described in paragraphs (c)(1) through (7) of this clause. If the proposed change is affected by contractually required configuration management or similar procedures, the instructions in those procedures relating to format, identification, and priority assignment shall govern VECP preparation. The VECP shall include the following:

(1) A description of the difference between the existing contract requirement and that proposed, the comparative advantages and disadvantages of each, a justification when an item's function or characteristics are being altered, and the effect of the change on the end item's performance.

(2) A list and analysis of the contract requirements that must be changed if the VECP is accepted, including any suggested specification revisions.

(3) A separate, detailed cost estimate for (i) the affected portions of the existing contract requirement and (ii) the VECP. The cost reduction associated with the VECP shall take into account the Contractor's allowable development and implementation costs, including any amount attributable to subcontracts under paragraph (h) of this clause.

(4) A description and estimate of costs the Government may incur in implementing the VECP, such as test and evaluation and operating and support costs.

(5) A prediction of any effects the proposed change would have on collateral costs to the agency.

(6) A statement of the time by which a contract modification accepting the VECP must be issued in order to achieve the maximum cost reduction, noting any effect on the contract completion time or delivery schedule.

(7) Identification of any previous submissions of the VECP, including the dates submitted, the agencies and contract numbers involved, and previous Government actions, if known.

(d) Submission. The Contractor shall submit VECP's to the Resident Engineer at the worksite, with a copy to the Contracting Officer.

(e) Government action.

(1) The Contracting Officer will notify the Contractor of the status of the VECP within 45 calendar days after the contracting office receives it. If additional time is required, the Contracting Officer will notify the Contractor within the 45-day period and provide the reason for the delay and the expected date of the decision. The Government will process VECP's expeditiously; however, it will not be liable for any delay in acting upon a VECP.

(2) If the VECP is not accepted, the Contracting Officer will notify the Contractor in writing, explaining the reasons for rejection. The Contractor may withdraw any VECP, in whole or in part, at any time before it is accepted by the Government. The Contracting Officer may require that the Contractor provide written notification before undertaking significant expenditures for VECP effort.

(3) Any VECP may be accepted, in whole or in part, by the Contracting Officer's award of a modification to this contract citing this clause. The Contracting Officer may accept the VECP, even though an agreement on price reduction has not been reached, by issuing the Contractor a notice to proceed with the change. Until a notice to proceed is issued or a contract modification applies a VECP to this contract, the Contractor shall perform in accordance with the existing contract. The decision to accept or reject all or part of any VECP is a unilateral decision made solely at the discretion of the Contracting Officer.

(f) Sharing-

(1) Rates. The Government's share of savings is determined by subtracting Government costs from instant contract savings and multiplying the result by-

(i) 45 percent for fixed-price contracts; or

(ii) 75 percent for cost-reimbursement contracts.

(2) Payment. Payment of any share due the Contractor for use of a VECP on this contract shall be authorized by a modification to this contract to-

(i) Accept the VECP;

(ii) Reduce the contract price or estimated cost by the amount of instant contract savings; and

(iii) Provide the Contractor's share of savings by adding the amount calculated to the contract price or fee.

(g) Collateral savings. If a VECP is accepted, the Contracting Officer will increase the instant contract amount by 20 percent of any projected collateral savings determined to be realized in a typical year of use after subtracting any Government costs not previously offset. However, the Contractor's share of collateral savings will not exceed the contract's firm-fixed-price or estimated cost, at the time the VECP is accepted, or $100,000, whichever is greater. The Contracting Officer is the sole determiner of the amount of collateral savings.

(h) Subcontracts. The Contractor shall include an appropriate value engineering clause in any subcontract of $90,000 or more and may include one in subcontracts of lesser value. In computing any adjustment in this contract's price under paragraph (f) of this clause, the Contractor's allowable development and implementation costs shall include any subcontractor's allowable development and implementation costs clearly resulting from a VECP accepted by the Government under this contract, but shall exclude any value engineering incentive payments to a subcontractor. The Contractor may choose any arrangement for subcontractor value engineering incentive payments; provided, that these payments shall not reduce the Government's share of the savings resulting from the VECP.

(i) Data. The Contractor may restrict the Government's right to use any part of a VECP or the supporting data by marking the following legend on the affected parts:

These data, furnished under the Value Engineering-Construction clause of contract ____, shall not be disclosed outside the Government or duplicated, used, or disclosed, in whole or in part, for any purpose other than to evaluate a value engineering change proposal submitted under the clause. This restriction does not limit the Government's right to use information contained in these data if it has been obtained or is otherwise available from the Contractor or from another source without limitations.

If a VECP is accepted, the Contractor hereby grants the Government unlimited rights in the VECP and supporting data, except that, with respect to data qualifying and submitted as limited rights technical data, the Government shall have the rights specified in the contract modification implementing the VECP and shall appropriately mark the data. (The terms "unlimited rights" and "limited rights" are defined in part 27 of the Federal Acquisition Regulation.)

(End of clause)

52.252-2	Clauses Incorporated by Reference.	1998-02

Clauses Incorporated By Reference (Feb 1998)

This contract incorporates one or more clauses by reference, with the same force and effect as if they were given in full text. Upon request, the Contracting Officer will make their full text available. Also, the full text of a clause may be accessed electronically at this/these address(es):

Army Federal Acquisition Regulation Supplement: https://www.acquisition.gov/afars

DFARS Class Deviations: https://www.acq.osd.mil/dpap/dars/class_deviations.html

Defense Federal Acquisition Regulation Supplement: https://www.acquisition.gov/dfars

Revolutionary FAR Overhaul: https://www.acquisition.gov/sites/default/files /page_file_uploads/RFO.pdf

Federal Acquisition Regulation: https://www.acquisition.gov/browse/index/far

(End of clause)

52.252-6	Authorized Deviations in Clauses.	2020-11

Authorized Deviations in Clauses (Nov 2020)

(a) The use in this solicitation or contract of any Federal Acquisition Regulation (48 CFR Chapter 1) clause with an authorized deviation is indicated by the addition of "(DEVIATION)" after the date of the clause.

(b) The use in this solicitation or contract of any **Defense Federal Acquisition Regulation Supplement (DFARS) (48 CFR 2)** clause with an authorized deviation is indicated by the addition of "(DEVIATION)" after the name of the regulation.

(End of clause)

52.253-1	Computer Generated Forms. (Deviation 2026-O0038)	2026-02

Computer Generated Forms (Feb 2026) (Deviation 2026-O0038)

(a) Any data required to be submitted on a Standard or Optional Form prescribed by the Federal Acquisition Regulation (FAR) may be submitted on a computer generated version of the form, provided there is no change to the name, content, or sequence of the data elements on the form, and provided the form carries the Standard or Optional Form number and edition date.

(b) Unless prohibited by agency regulations, any data required to be submitted on an agency unique form prescribed by an agency supplement to the FAR may be submitted on a computer generated version of the form provided there is no change to the name, content, or sequence of the data elements on the form and provided the form carries the agency form number and edition date.

(c) If the Contractor submits a computer generated version of a form that is different than the required form, then the rights and obligations of the parties will be determined based on the content of the required form.

(End of clause)

DFARS Clauses Incorporated by Full Text

Number	Title	Effective Date	Alternate Deviation	Variation Effective Date
252.204-7021	Contractor Compliance with the Cybersecurity Maturity Model Certification Level Requirements.	2025-11		

CONTRACTOR COMPLIANCE WITH THE CYBERSECURITY MATURITY MODEL CERTIFICATION LEVEL REQUIREMENTS (NOV 2025)

(a) *Definitions*. As used in this clause-

"Controlled unclassified information" means information the Government creates or possesses, or information an entity creates or possesses for or on behalf of the Government, that a law, regulation, or Governmentwide policy requires or permits an agency to handle using safeguarding or dissemination controls (32 CFR 2002.4(h)).

"Current" means-

(1) With regard to Conditional Cybersecurity Maturity Model Certification (CMMC) Status-

(i) Not older than 180 days for Conditional Level 2 (Self) assessments and Conditional Level 2 (certified third-party assessment organization (C3PAO)) assessments, with-

(A) No changes in compliance with the requirements at 32 CFR part 170 since the Conditional CMMC Status date (see 32 CFR 170.16 and 170.17); and

(B) A corresponding affirmation of continuous compliance by an affirming official (see 32 CFR 170.4); and

(ii) Not older than 180 days for Conditional Level 3 (Defense Industrial Base Cybersecurity Assessment Center (DIBCAC)) assessments, with-

(A) No changes in compliance with the requirements at 32 CFR part 170 since the Conditional CMMC Status date (see 32 CFR 170.18); and

(B) A corresponding affirmation of continuous compliance by an affirming official;

(2) With regard to Final CMMC Status-

(i) Not older than 1 year for Final Level 1 (Self), with-

(A) No changes in compliance with the requirements at 32 CFR part 170 since the Final CMMC Status date (see 32 CFR 170.15); and

(B) A corresponding affirmation of continuous compliance, not older than 1 year, by an affirming official;

(ii) Not older than 3 years for Final Level 2 (Self) assessments and Final Level 2 (C3PAO) assessments, with-

(A) No changes in compliance with the requirements at 32 CFR part 170 since the Final CMMC Status date (see 32 CFR 170.16 and 170.17); and

(B) A corresponding affirmation of continuous compliance, not older than 1 year, by an affirming official; and

(iii) Not older than 3 years for Final Level 3 (DIBCAC) assessments, with-

(A) No changes in compliance with the requirements at 32 CFR part 170 since the Final CMMC Status date (see 32 CFR 170.18); and

(B) A corresponding affirmation of continuous compliance, not older than 1 year, by an affirming official; and

(3) With regard to affirmation of continuous compliance (32 CFR 170.22), not older than 1 year with no changes in compliance with the requirements at 32 CFR part 170.

"Cybersecurity Maturity Model Certification (CMMC) status" means the result of meeting or exceeding the minimum required score for the corresponding assessment. The potential statuses are as follows:

(1) Final Level 1 (Self).

(2) Conditional Level 2 (Self).

(3) Final Level 2 (Self).

(4) Conditional Level 2 (C3PAO).

(5) Final Level 2 (C3PAO).

(6) Conditional Level 3 (DIBCAC).

(7) Final Level 3 (DIBCAC).

"Cybersecurity Maturity Model Certification unique identifier (CMMC UID)" means 10 alpha-numeric characters assigned to each CMMC assessment and reflected in the Supplier Performance Risk System (SPRS) for each contractor information system.

"Federal contract information (FCI)" means information, not intended for public release, that is provided by or generated for the Government under a contract to develop or deliver a product or service to the Government. It does not include information provided by the Government to the public, such as on public websites, or simple transactional information, such as information necessary to process payments.

"Plan of action and milestones" means a document that identifies tasks to be accomplished. It details resources required to accomplish the elements of the plan, any milestones in meeting the tasks, and scheduled completion dates for the milestones, as defined in National Institute of Standards and Technology Special Publication 800-115 (32 CFR 170.21).

(b) *Framework*. The Cybersecurity Maturity Model Certification (CMMC) is a framework for assessing a contractor's compliance with applicable information security protections (see 32 CFR part 170).

(c) *Duplication*. The CMMC assessments will not duplicate efforts from any other comparable DoD assessment, except for rare circumstances when a reassessment may be necessary, for example, when there are indications of issues with cybersecurity and/or compliance with CMMC requirements.

(d) *Requirements*. The Contractor shall-

(1)(i) Have and maintain for the duration of the contract a current CMMC status at the following CMMC level, or higher: ***CMMC Level 1 (Self)*** for all information systems used in performance of the contract, task order, or delivery order that process, store, or transmit FCI or CUI; and

(ii) Consult 32 CFR 170.23 related to the flowdown of the CMMC requirements, and flow down the correct CMMC level to subcontracts and other contractual instruments;

(2) Only process, store, or transmit FCI or CUI on contractor information systems that have a CMMC status at the CMMC level required in paragraph (d)(1) of this clause, or higher;

(3) Complete on an annual basis, and maintain as current, an affirmation, by the affirming official (see 32 CFR 170.4), of continuous compliance with the requirements associated with the CMMC level required in paragraph (d)(1) of this clause in the Supplier Performance Risk System (SPRS) (*https://piee.eb.mil*) for each CMMC UID applicable to each of the contractor information systems that process, store, or transmit FCI or CUI and that are used in performance of the contract;

(4) Ensure all subcontractors and suppliers complete prior to subcontract award, and maintain on an annual basis, an affirmation, by the affirming official (see 32 CFR 170.4), of continuous compliance with the requirements associated with the CMMC level required for the subcontract or other contractual instrument for each of the subcontractor information systems that process, store, or transmit FCI or CUI and that are used in performance of the subcontract; and

(5) If the Contractor has a CMMC Status of Conditional, successfully close out a valid plan of action and milestones (32 CFR 170.21) to achieve a CMMC Status of Final.

(e) *Reporting*. The Contractor shall-

(1) Submit to the Contracting Officer-

(i) The CMMC UID(s) issued by SPRS for contractor information systems that will process, store, or transmit FCI or CUI during performance of the contract; and

(ii) Any changes in the CMMC UIDs generated in SPRS throughout the life of the contract, task order, or delivery order, if applicable;

(2) Enter into SPRS the results of a current self-assessment for each CMMC UID, not covered by a C3PAO assessment or DIBCAC assessment, applicable to each of the contractor information systems that process, store, or transmit FCI or CUI and that are used in performance of the contract; and

(3) Complete in SPRS on an annual basis and maintain as current an affirmation of continuous compliance by the affirming official (see 32 CFR 170.4) for each self-assessment, C3PAO assessment, or DIBCAC assessment required under the contract in SPRS.

(f) *Subcontracts*. The Contractor shall-

(1) Insert the substance of this clause, including this paragraph (f) and excluding paragraph (e)(1), in subcontracts and other contractual instruments, including those for the acquisition of commercial products or commercial services, excluding commercially available off-the-shelf items, if the subcontract or other contractual instrument will contain a requirement to process, store, or transmit FCI or CUI; and

(2) Prior to awarding a subcontract or other contractual instrument, ensure that the subcontractor has a current CMMC certificate or current CMMC status at the CMMC level that is appropriate for the information that is being flowed down to the subcontractor based on the requirements at 32 CFR 170.23.

(End of clause)

252.236-7001	Contract Drawings and Specifications.	2000-08

CONTRACT DRAWINGS AND SPECIFICATIONS (AUG 2000)

(a) The Government will provide to the Contractor, without charge, one set of contract drawings and specifications, except publications incorporated into the technical provisions by reference, in electronic or paper media as chosen by the Contracting Officer.

(b) The Contractor shall-

(1) Check all drawings furnished immediately upon receipt;

(2) Compare all drawings and verify the figures before laying out the work;

(3) Promptly notify the Contracting Officer of any discrepancies;

(4) Be responsible for any errors that might have been avoided by complying with this paragraph (b); and

(5) Reproduce and print contract drawings and specifications as needed.

(c) In general--

(1) Large-scale drawings shall govern small-scale drawings; and

(2) The Contractor shall follow figures marked on drawings in preference to scale measurements.

(d) Omissions from the drawings or specifications or the misdescription of details of work that are manifestly necessary to carry out the intent of the drawings and specifications, or that are customarily performed, shall not relieve the Contractor from performing such omitted or misdescribed details of the work. The Contractor shall perform such details as if fully and correctly set forth and described in the drawings and specifications.

(e) The work shall conform to the specifications and the contract drawings identified on the following index of drawings:

"**DRAWING INDEX SHEET**"

(End of clause)

252.236-7004	Payment for Mobilization and Demobilization.	1991-12

PAYMENT FOR MOBILIZATION AND DEMOBILIZATION (DEC 1991)

(a) The Government will pay all costs for the mobilization and demobilization of all of the Contractor's plant and equipment at the contract lump sum price for this item.

(1) **60** percent of the lump sum price upon completion of the contractor's mobilization at the work site.

(2) The remaining **40** percent upon completion of demobilization.

(b) The Contracting Officer may require the Contractor to furnish cost data to justify this portion of the bid if the Contracting Officer believes that the percentages in paragraphs (a)(1) and (2) of this clause do not bear a reasonable relation to the cost of the work in this contract.

(1) Failure to justify such price to the satisfaction of the Contracting Officer will result in payment, as determined by the Contracting Officer, of-

(i) Actual mobilization costs at completion of mobilization;

(ii) Actual demobilization costs at completion of demobilization; and

(iii) The remainder of this item in the final payment under this contract.

(2) The Contracting Officer's determination of the actual costs in paragraph (b)(1)of this clause is not subject to appeal.

(End of clause)

Section 00 73 00 - Supplementary Conditions

CONTRACT ADMINISTRATION

SUPPLEMENTARY CONDITIONS NUMBER DESCRIPTION

A. CONTRACT ADMINISTRATION

B. UNAUTHORIZED INSTRUCTIONS FROM GOVERNMENT OR OTHER PERSONNEL

C. IDENTIFICATION OF EMPLOYEES

D. OTHER WORK

E. SUBMITTING PAY ESTIMATES AND PAYMENTS TO THE CONTRACTOR

F. IMPLEMENTING EQUIPMENT GUARANTEES

G. SAFEGUARDING OF INFORMATION

H. INSURANCE

I. PUBLIC RELEASE OF INFORMATION

J. CONTRACTOR PERFORMANCE EVALUATIONS

K. SPECIAL CONDITIONS

L. COMMENCEMENT, PROSECUTION, AND COMPLETION OF WORK

M. PHYSICAL DATA

A. CONTRACT ADMINISTRATION

This contract will be administered by:

U.S. Army Corps of Engineers, Bonneville Resident Office, PO Box 70, Cascade Locks, OR 97014

The designated Contracting Officer's Representative (COR) is to be determined at award. Name, email address, and telephone number will be provided via an emailed COR Nomination Letter.

B. UNAUTHORIZED INSTRUCTIONS FROMGOVERNMENT OR OTHER PERSONNEL

The Contractor shall not accept instruction issued by any person employed by the U.S. Government or otherwise, other than the Contracting Officer or the authorized representative of the Contracting Officer acting within the limits of his authority.

C. IDENTIFICATION OF EMPLOYEES

The Contractor shall be responsible for furnishing to each employee engaged on the work to display such identification as may be approved and directed by the Contracting Officer. All prescribed identification shall immediately be delivered to the Contracting Officer for cancellation upon the release of any employee. When required by the Contracting Officer, the Contractor shall obtain and submit fingerprints of all persons employed or to be employed on the project.

D. OTHER WORK

The Contractor shall fully cooperate with other Contractors, utility companies, and Government employees engaged in other work on and/or adjacent to the work to be performed under this contract. The Contractor shall coordinate the work herein and the use of haul roads, aggregate sources, and utilities that become a joint responsibility. Any damage resulting from the use of facilities of other Contractors shall immediately be repaired to the satisfaction of, or as directed by the Contracting Officer.

E. SUBMITTING PAY ESTIMATES AND PAYMENTS TO THE CONTRACTOR

The Contractor shall use the Resident Management System-Contractor Module (RMS-CM) to prepare Engineer Form93 (ENG 93), Payment Estimate

- Contract Performance, as request for payment. The Contracting Officer's Representative or Administrative Contracting Officer is responsible for ensuring acceptance and approval for payment.

The Contractor must submit the certification at FAR Clause 52.232-5, paragraph (c) along with each request for progress payments.

F. IMPLEMENTING EQUIPMENT GUARANTEES

When the completed facility or part of a facility is accepted by the Contracting Officer, and the work includes equipment covered by a guarantee which exceeds the warranty of construction period as specified, the Contractor shall furnish the following information to the Contracting Officer:

a. A list of all items with make and model numbers.

b. A copy of manufacturer's or vendor's guarantee documents which extend beyond the warranty of construction period.

c. The date during which the Contractor's guarantee is in effect under the properly identified individual section and paragraph of the Technical Provisions each item of equipment on the list, indicating for each item the date of acceptance for the beginning of the guarantee period, either for

beneficial use or final acceptance, whichever is earlier, and the expiration date of the guarantee period.

d. Name of an authorized representative of the Prime Contractor with complete address and telephone number, and the names, addresses, and telephone numbers of all subcontractors

and/or equipment suppliers or manufacturers specifically designated in writing by the Prime Contractor for direct contact by the United States Army Corps of Engineers for implementing the guarantee after transfer of the equipment.

G. SAFEGUARDING OF INFORMATION

The personnel employed on this contract may, in the performance of their assigned duties, have access to data and information pertaining to location of goods, supplies, parts, equipment, and vehicles. Knowledge of this nature is considered restricted security information. This information shall be protected and safeguarded against disclosure to any unauthorized person or party and shall be furnished or used on an official "need to know" basis only. Safeguarding of information is extended to dependents and guests of employees who may, in any manner, obtain any of the above-specified knowledge.

H. INSURANCE - WORK ON A GOVERNMENT INSTALLATION

a. The Contractor shall, at its own expense, provide and maintain during the entire performance period of this contract, at least the kinds and minimum amounts of insurance required by this Clause as follows:

1) TYPE: Workman's Compensation and Employer's Liability (including Federal Longshoremen and Harbor Worker's Insurance) AMOUNT: As legally required by the State wherein the work is being performed.

2) TYPE: Comprehensive General Liability Insurance

AMOUNT: Personal Injury Liability: $1 million per person / $1 million per occurrence

Property Damage (may be included in general aggregate limits or combined single unit coverage): $1 million per occurrence

3) TYPE: Automobile Liability

AMOUNT: Personal Injury Liability: $1 million per person / $1 million per occurrence

Property Damage (may be included in general aggregate limits or combined single unit coverage): $1 million per occurrence

4) If single general aggregate limits or combined single unit coverage is obtained for General Liability and/or Automobile Liability coverage, minimum amounts shall be the sum of the personal injury and property damage coverage required above. Umbrella Form Excess Liability insurance

coverage shall be added to general liability and automobile liability coverage to determine if minimum insurance limits are met.

b. Before commencing work under this contract, the Contractor shall certify to the Contracting Officer in writing that the required insurance has been obtained. The policies evidencing required insurance shall contain an endorsement to the effect that any cancellation or any material change adversely affecting the Government's interest shall not be effective (1) for such

period as the laws of the State in which this contract is to be performed prescribe, or (2) until 30 days after the insurer or the Contractor gives written notice to the Contracting Officer, whichever period is longer.

c. The Contractor shall insert the substance of this clause, including this paragraph (c), in subcontracts under this contract that require work on a Government installation and shall require subcontractors to provide and maintain the insurance required in the Schedule or elsewhere in the contract. The Contractor shall maintain a copy of all subcontractors' proofs of required insurance, and shall make copies available to the Contracting Officer upon request.

d. "Government Installation" for this clause includes government vessels.

I. PUBLIC RELEASE OF INFORMATION

The contractor shall coordinate with the Portland District of the U.S. Army Corps of Engineers for release of information to the public concerning this contract or any program related to this contract. This clause covers Media Relations and Printed Materials.

a. Media Relations

The contractor is permitted to speak to news media representatives in accordance with his firm's public relations policies and in conjunction with applicable U.S. government or Army Corps of Engineers' guidelines on release of information related to the specific program for which the contract was awarded. The contractor is required to inform the Portland District of significant media contacts. The contractor is encouraged to coordinate directly with Portland District's Public Affairs Officer, as necessary, when the media call is being responded to; however, this shall not preclude the contractor from responding to media requests in a timely manner. The contractor shall

respond to inquiries that directly fall within his domain; he shall not speak for the Army or the Corps.

b. Printed Materials

1) The contractor shall not release to anyone outside the contractor's organization any unclassified information, regardless of medium, pertaining to this contract, unless:

i. The Portland District has given written approval, either by the Public Affairs Officer or by the Contracting Officer;

ii. Or the information is otherwise in the public domain before the date of release.

2) The contractor shall obtain approval from the Portland District prior to the dissemination of any briefings or speeches, news releases, articles, fact sheets, advertisements, or any other informational materials intended for public release that are the result of work performed or to be performed under this contract. This review is intended to insure that public release of material does not violate government policy.

3) Requests for approval shall identify the specific information to be released, the medium to be used, and the purpose for release. This material shall be submitted to the Public Affairs Officer

and to the Contracting Officer at the Portland District. The contractor shall strive to provide five working days for such approvals. Materials to be released within a shorter period of time will require special handling procedures, and the contractor shall request special consideration directly to the Public Affairs Officer or to the Contracting Officer.

4) The Contractor agrees to include a similar requirement in each subcontract under this contract. Subcontractors shall submit requests for authorization to release through the prime contractor to the government (the Public Affairs Officer and the Contracting Officer),assuring the government that the prime contractor is knowledgeable of the action and concurs.

Nothing in the foregoing section on public release of information shall affect compliance with the clause of the contract entitled, "Security Requirements."

J. CONTRACTOR PERFORMANCE EVALUATIONS

In accordance with UAI5142.1502-100 and the Engineering Regulation 415-1-17, Construction Contractor Performance Evaluations, dated 24 January 2012, It is USACE policy that the Procuring Contracting Officer (PCO), or designated representative of the construction office responsible for monitoring contractor performance, will evaluate construction contractor's performance and prepare a performance evaluation report in the Contractor Performance Assessment Reporting System (CPARS). The Contractor shall be briefed of the CPARS process at the time of the Preconstruction Conference.

K. SPECIAL CONDITIONS

Per section 01 10 10, paragraph 1.6 TRAFFIC CONTROL PLAN, access to the Bonneville project must remain open to vehicular traffic throughout the life of the project. See the referenced specification for additional details.

L. COMMENCEMENT, PROSECUTION, AND COMPLETION OF WORK ALTERNATE I (APR 1984)

The Contractor shall be required to (a) commence work under this contract within **10** calendar days after the date the Contractor receives the notice to proceed, (b) prosecute the work diligently, and (c) complete the entire work ready for use not later than **930** calendar days after receipt of Notice to Proceed. The time stated for completion shall include final cleanup of the premises.

M. PHYSICAL DATA (APR 1984)

Data and information furnished or referred to below is for the Contractor's information. The Government shall not be responsible for any interpretation of or conclusion drawn from the data or information by the Contractor.

a) Weather conditions - Weather records and reports may be obtained from the National Weather Service. The following schedule of monthly anticipated adverse weather delays is based on National Oceanic and Atmospheric Administration (NOAA) or similar data for the project (see Table 1).

Table 1. MONTHLY ANTICIPATED ADVERSE WEATHER DELAY WORK DAYS BASED ON (5) DAY WORK WEEK

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
NO. OF DAYS	6	4	4	3	5	6	5	4	3	4	6	7

*** END OF NARRATIVE ***

Overall Contract Inspection/Acceptance Locations

0001	Inspection and Acceptance Location Both Destination Instructions: IAW plans and specifications DoDAAC: 960412

	ARMY CORPS OF ENGINEERS CIVIL WORKS PORTLAND DISTRICT, BONNEVILLE DAM CASCADE LOCKS, OR 97014 UNITED STATES
0003	Inspection and Acceptance Location Both Destination Instructions: IAW plans and specifications DoDAAC: 960412 ARMY CORPS OF ENGINEERS CIVIL WORKS PORTLAND DISTRICT, BONNEVILLE DAM CASCADE LOCKS, OR 97014 UNITED STATES
0004	Inspection and Acceptance Location Both Destination Instructions: IAW plans and specifications DoDAAC: 960412 ARMY CORPS OF ENGINEERS CIVIL WORKS PORTLAND DISTRICT, BONNEVILLE DAM CASCADE LOCKS, OR 97014 UNITED STATES
0005	Inspection and Acceptance Location Both Destination Instructions: IAW plans and specifications DoDAAC: 960412

	ARMY CORPS OF ENGINEERS CIVIL WORKS PORTLAND DISTRICT, BONNEVILLE DAM CASCADE LOCKS, OR 97014 UNITED STATES
0006	Inspection and Acceptance Location Both Destination Instructions: IAW plans and specifications DoDAAC: 960412 ARMY CORPS OF ENGINEERS CIVIL WORKS PORTLAND DISTRICT, BONNEVILLE DAM CASCADE LOCKS, OR 97014 UNITED STATES

Overall Contract Delivery Period

0001	**Delivery Schedule** From date of lead time event to completion of performance 930 Calendar Days Date of Notice to Proceed Receipt **Quantity** 1 Job **Address and POC** Place of Performance DoDAAC: 960412 ARMY CORPS OF ENGINEERS CIVIL WORKS PORTLAND DISTRICT, BONNEVILLE DAM CASCADE LOCKS, OR 97014 UNITED STATES

0002	**Delivery Schedule** From date of lead time event to completion of performance 930 Calendar Days Date of Notice to Proceed Receipt **Quantity** 1 Job **Address and POC** Place of Performance DoDAAC: 960412 ARMY CORPS OF ENGINEERS CIVIL WORKS PORTLAND DISTRICT, BONNEVILLE DAM CASCADE LOCKS, OR 97014 UNITED STATES
0003	**Delivery Schedule** From date of lead time event to completion of performance 930 Calendar Days Date of Notice to Proceed Receipt **Quantity** 1 Job **Address and POC** Place of Performance DoDAAC: 960412 ARMY CORPS OF ENGINEERS CIVIL WORKS PORTLAND DISTRICT, BONNEVILLE DAM CASCADE LOCKS, OR 97014 UNITED STATES
0004	**Delivery Schedule** From date of lead time event to completion of performance 930 Calendar Days

	Date of Notice to Proceed Receipt **Quantity** 1 Job **Address and POC** Place of Performance DoDAAC: 960412 ARMY CORPS OF ENGINEERS CIVIL WORKS PORTLAND DISTRICT, BONNEVILLE DAM CASCADE LOCKS, OR 97014 UNITED STATES
0005	**Delivery Schedule** From date of lead time event to completion of performance 930 Calendar Days Date of Notice to Proceed Receipt **Quantity** 1 Job **Address and POC** Place of Performance DoDAAC: 960412 ARMY CORPS OF ENGINEERS CIVIL WORKS PORTLAND DISTRICT, BONNEVILLE DAM CASCADE LOCKS, OR 97014 UNITED STATES
0006	**Delivery Schedule** From date of lead time event to completion of performance 930 Calendar Days Date of Notice to Proceed Receipt **Quantity** 1 Job **Address and POC** Place of Performance

	DoDAAC: 960412 ARMY CORPS OF ENGINEERS CIVIL WORKS PORTLAND DISTRICT, BONNEVILLE DAM CASCADE LOCKS, OR 97014 UNITED STATES

Section 01 00 00 - General Requirements

Requirements

Partial demolition of the existing Bonneville Old Navigation Lock (NL1) Swing Bridge, located 145 river miles from the Mouth of the Columbia River and approximately 40 miles east of Portland, OR, near Cascade Locks, OR and North Bonneville, WA., and construction of a new fixed bridge on a new alignment.

PROJECT TABLE OF CONTENTS

DIVISION 01 - GENERAL REQUIREMENTS

01 10 00.00 25 CONTRACT ADMINISTRATION DATA
01 10 10.00 25 CONTRACTOR'S OPERATIONS AND REQUIREMENTS
01 11 00.00 25 SUMMARY OF WORK
01 12 00.00 25 SECURITY REQUIREMENTS
01 15 00.01 25 PARTNERING: LEVEL ONE
01 22 00.00 25 MEASUREMENT AND PAYMENT
01 32 01.00 25 PROJECT SCHEDULE
01 33 00 SUBMITTAL PROCEDURES
01 35 26.00 25 GOVERNMENTAL SAFETY REQUIREMENTS
01 35 27.00 25 DIVING
01 42 00 SOURCES FOR REFERENCE PUBLICATIONS
01 45 00.00 25 QUALITY CONTROL
01 45 00.15 25 RESIDENT MANAGEMENT SYSTEM CONTRACTOR MODE (RMS CM)
01 57 19.00 25 TEMPORARY ENVIRONMENTAL CONTROLS
01 74 19.00 25 CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL
01 78 23.00 25 OPERATION AND MAINTENANCE DATA
01 78 39.10 25 AS-BUILT DRAWINGS

DIVISION 02 - EXISTING CONDITIONS

02 41 00.00 99 DEMOLITION AND DECONSTRUCTION
02 81 00.00 99 TRANSPORTATION AND DISPOSAL OF HAZARDOUS MATERIALS
02 82 00.00 25 ASBESTOS REMEDIATION
02 83 00.00 99 LEAD REMEDIATION

DIVISION 03 - CONCRETE

03 30 00.00 99 CAST-IN-PLACE REINFORCED CONCRETE

DIVISION 05 - METALS

05 12 00.00 99 STRUCTURAL BRIDGE STEEL

DIVISION 07 - THERMAL AND MOISTURE PROTECTION

07 10 00.00 99 STRUCTURAL BRIDGE EXPANSION JOINTS

DIVISION 09 - FINISHES

09 90 00.00 99 PAINTS AND COATINGS

DIVISION 10 - SPECIALTIES

10 10 00.00 99 SEISMIC ISOLATION BRIDGE BEARINGS
10 14 53.00 99 TRAFFIC SIGNAGE

DIVISION 26 - ELECTRICAL

26 05 19.00 99 INSULATED WIRE AND CABLE
26 56 00.00 99 EXTERIOR LIGHTING

DIVISION 31 - EARTHWORK

31 00 00.00 99 EARTHWORK
31 05 19.13 99 GEOTEXTILES FOR EARTHWORK

31 11 00.00 99 CLEARING AND GRUBBING
31 52 00.00 25 COFFERDAMS
31 63 29.00 99 DRILLED CONCRETE PIERS AND SHAFTS
31 66 10.00 99 ROCK FOUNDATION PREPARATION
31 68 13.00 99 GROUND ANCHORS
31 73 20.00 99 JET GROUTING

DIVISION 32 - EXTERIOR IMPROVEMENTS

32 01 19.61 99 SEALING OF JOINTS IN RIGID PAVEMENT
32 05 33.00 99 LANDSCAPE ESTABLISHMENT
32 11 20.00 99 BASE COURSE FOR RIGID AND SUBBASE FOR FLEXIBLE PAVING
32 12 16.16 99 ROAD-MIX ASPHALT PAVING
32 13 13.06 99 PORTLAND CEMENT CONCRETE PAVEMENT FOR ROADS AND SITE FACILITIES
32 16 19.00 99 CONCRETE CURBS, GUTTERS AND SIDEWALKS
32 17 23.00 99 PAVEMENT MARKINGS
32 31 13.00 99 CHAIN LINK FENCES AND GATES
32 84 24.00 99 IRRIGATION SPRINKLER SYSTEMS
32 92 19.00 99 SEEDING
32 93 00.00 99 EXTERIOR PLANTS

DIVISION 33 - UTILITIES

33 11 00.00 99 WATER UTILITY DISTRIBUTION PIPING
33 40 00.00 99 STORMWATER UTILITIES
33 46 16.00 99 SUBDRAINAGE PIPING
33 71 02.00 99 UNDERGROUND ELECTRICAL DISTRIBUTION

DIVISION 34 - TRANSPORTATION

34 71 13.16 99 VEHICLE CRASH BARRIERS

-- End of Project Table of Contents --

SECTION TABLE OF CONTENTS

DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01 10 00.00 25

CONTRACT ADMINISTRATION DATA

PART 1 GENERAL

1.1 REFERENCES
1.2 SUBMITTALS
1.3 MEANING OF TERMS
1.4 CONTRACTING OFFICER
1.5 SERIAL LETTER CORRESPONDENCE
1.5.1 Numbering
1.5.2 Subcontractors
1.5.3 Transmittals
1.6 EM 385-1-1 SAFETY AND HEALTH REQUIREMENTS MANUAL
1.7 PROJECT-SPECIFIC MANAGEMENT PLAN
1.8 LETTERS OF AUTHORITY
1.9 LABOR STANDARDS
1.9.1 Coverage
1.9.2 Wages
1.9.3 Overtime
1.9.4 Deductions
1.9.5 Apprentices
1.9.6 Payrolls
1.9.7 Supply and Use of Electronic Software for Processing Wage Rate Requirements
1.9.8 Records
1.9.9 Job Interviews
1.10 VETERANS EMPLOYMENT EMPHASIS FOR U.S. ARMY CORPS OF ENGINEERS CONTRACTS
1.11 FACILITY TURNOVER PLANNING MEETINGS (Red Zone Meetings)
1.11.1 Red Zone Checklist
1.11.2 Meetings
1.12 LIMITATIONS ON SUBCONTRACTING COMPLIANCE
1.13 EQUIPMENT OWNERSHIP AND OPERATING EXPENSE SCHEDULE
1.14 BASIS FOR SETTLEMENT OF PROPOSALS

PART 2 PRODUCTS

PART 3 EXECUTION

-- End of Section Table of Contents --

SECTION 01 10 00.00 25

CONTRACT ADMINISTRATION DATA

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this Specification to the extent referenced. The publications are referred to in the text by basic designation only.

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2024) Safety -- Safety and Occupational Health (SOH) Requirements
EP 1110-1-8	(2021) Engineering and Design -- Construction Equipment Ownership and Operating Expense Schedule

U.S. DEPARTMENT OF LABOR

29 CFR 5.5	Contract Provisions and Related Matters

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-11 Closeout Submittals

Limitations On Subcontracting Compliance

1.3 MEANING OF TERMS

a. Specification Sections of this Contract are generally written in the imperative mood. In sentences using the imperative mood, the subject, "the Contractor," is implied. Also implied in this language are "shall," "shall be," "must," or similar words and phrases. In material specifications, the subject may also be the supplier, fabricator, or manufacturer supplying material, products, or equipment for use on the project.

b. Wherever "directed," "required," "prescribed," or other similar words are used, the "direction," "requirement," or "order" of the Contracting Officer (CO) is intended. Similarly, wherever "approved," "acceptable," "suitable," "satisfactory," or similar words are used, the words mean "approved by," "acceptable to," or "satisfactory to" the CO.

c. The word "will" generally pertains to decisions or actions of the CO.

1.4 CONTRACTING OFFICER

The CO who signed this Contract is the primary CO for the Contract. Nevertheless, any CO assigned to the Portland District and acting within their authority may take formal action on this Contract when a Contract action needs to be taken and the primary CO is unavailable. All correspondence must be through the CO or, upon notification, their authorized Representative (COR).

1.5 SERIAL LETTER CORRESPONDENCE

All letters must be electronically submitted to the Government and must be sent to designated parties via email and exported via the RMS interface. All letters must be signed in accordance with the letters of authority. Send any documents requiring original hardcopy/signatures to:

Bonneville Resident Office
PO Box 70
Cascade Locks, OR 97014-0070

1.5.1 Numbering

All serial letter correspondence must be independently numbered sequentially with no numbers missing or duplicated, commencing with number one. Each letter must show the Contract number, description, and subject matter. Only one subject should be covered in the same letter.

1.5.2 Subcontractors

Subcontractors must not correspond with either the Resident or District offices; the Prime Contractor must handle all correspondence.

1.5.3 Transmittals

Transmittals of signed pay estimates, payrolls, submittals, and other similar correspondence will not require a Serial Letter.

1.6 EM 385-1-1 SAFETY AND HEALTH REQUIREMENTS MANUAL

The latest version in effect on the date of the Solicitation for this Contract (in accordance with EM 385-1-1 Paragraph 4 General, will be contractually binding as part of this Contract. The latest version, including all errata and changes, must be used for this Contract and is obtainable at https://www.publications.usace.army.mil/Portals/76/EM%20385-1-1%20_EFFECTIVE%2015March2024.pdf.

1.7 PROJECT-SPECIFIC MANAGEMENT PLAN

Submit SD-01, Preconstruction Submittals (listed on the submittal register, Attachment A1, and defined in Section 01 33 00, SUBMITTAL PROCEDURES). The listed components of the Project-Specific Management Plan (PSMP) must be submitted separately under the appropriate specifications section. Upon approval, the components must be combined into a single PSMP binder that will be kept onsite. Update the PSMP whenever the plans contained within are updated or amended. The COR will periodically review the onsite copy of the PSMP. If a current version of the PSMP is not available and up to date, site work may be stopped until deficiencies are corrected. Acceptance of the PSMP is required prior to mobilization.

The PSMP must include:

a. Section I - Accident Prevention Program.

(1) Accident Prevention Plan (EM 385-1-1 and Section 01 35 26.00 25, GOVERNMENTAL SAFETY REQUIREMENTS).

(2) Drug-free workplace policy.

(3) Hazard Communication Program (EM 385-1-1).

(4) Activity hazard analysis (EM 385-1-1).

(5) Equipment certification.

b. Section II - Environmental Protection Plan (Section 01 57 19.00 25, TEMPORARY ENVIRONMENTAL CONTROLS).

c. Section III - Construction Quality Control System (Section 01 45 00.00 25, QUALITY CONTROL).

(1) Contractor's quality control (CQC) plan.

(2) CQC Daily Report form.

d. Project Work Plan. The following are examples:

(1) Roadway Access Agreement.

(2) Temporary electrical systems.

(3) Welder qualifications.

(4) Welding procedures.

(5) Bolt pre-tensioning procedure.

e. Construction Waste Management Plan 01 74 19.00 25 CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT

f. Schedule for Construction.

g. Submittal Register.

1.8 LETTERS OF AUTHORITY

a. To authenticate actions required under terms of this Contract, furnish a serial letter of authority to the CO and Resident Engineer that indicates the names of individual or individuals who are authorized to perform the following functions on behalf of the company:

(1) Sign progress payment estimates.

(2) Sign final payment estimate.

(3) Accept Government-furnished property (if applicable).

(4) Sign Contract modifications, supplemental agreements and consent

of surety.

(5) Monitor and report on the environmental protection plan, management plan, quality control plan, and safety plan.

(6) Supervise the field activities.

(7) Sign Release of Claims.

(8) Sign Correspondence.

b. This letter of authority must bear the typewritten names and the signatures of each individual and be signed by the person whose signature appears on the final Contract. If authorities change, submit a revised serial letter.

1.9 LABOR STANDARDS

Submit a serial letter identifying the crafts and wage rates for all Prime and subcontractor employees to whom the Contract's construction wage rate requirements apply. The Government will review for conformance with the wage determination. Comply with the following labor standards, statutes, and regulations: Wage Rate Requirements (Construction); Contract Work Hours and Safety Standards Act; Copeland Act; Secretary of Labor's regulations (Parts 3 and 5, Subtitle A, Title 29, Code of Federal Regulations).

1.9.1 Coverage

Contract provisions relating to wages, overtime, payroll deductions, and other labor standards requirements cover foremen, laborers, and mechanics, including owner-operators of other than hauling equipment and other individual enterprises performing the duties of a laborer or mechanic. Bona fide owner-operators of hauling equipment, such as trucks, who are independent contractors, are not covered, and the certified payrolls, including the names of such owner-operators, need to show hours worked each day but not the rates paid and provide a notation of "owner-operator".

1.9.2 Wages

Wages must be paid at least once a week and be computed at hourly rates not less than those set forth in the Contract wage decision, as set by the Wage Rate Requirements (Construction), for the particular classifications of work performed.

1.9.3 Overtime

Pay overtime for work in excess of 40 hours in any workweek at not less than 1-1/2 times the basic rate of pay. Rates paid for fringe benefits are excluded in the computations of overtime.

1.9.4 Deductions

Deductions from wages earned may be only those that are permitted by the Copeland Act (Anti-Kickback) regulations.

1.9.5 Apprentices

Comply with the requirements of 29 CFR 5.5(a)(4)(i) with respect to apprentices.

1.9.6 Payrolls

Prepare and submit correct Weekly Payrolls, including those of subcontractors. Weekly Payrolls will be submitted via upload to the Resident Management System Contractor Module (RMS CM) Contractor Payroll feature. Incorrect and delinquent payrolls will delay processing of partial payment estimates.

1.9.7 Supply and Use of Electronic Software for Processing Wage Rate Requirements

a. Use of a commercially available electronic system to process and submit certified payrolls electronically to the Government is encouraged. The Wage Rate Requirements statute outlines the requirements for preparing, processing and providing certified labor payrolls.

b. If the Contractor utilizes an electronic payroll processing system, then the Contractor is responsible for obtaining and providing for all access, licenses, and other services required to provide for receipt, processing, certifying, electronically transmitting to the Government, and storing weekly payrolls and other data required to comply with the Wage Rate Requirements statute. The electronic payroll service must be used to prepare, process, and maintain the relevant payrolls and basic records during all work under this contract. The electronic payroll service must be capable of preserving these payrolls and related basic records for the required three years after contract completion. The Contractor must provide access, to include electronic review access by the Government, to the electronic payroll processing system used by the Contractor.

c. Provision and use of an electronic payroll processing system must meet the following basic functional criteria:

(1) commercially available;

(2) compliant with appropriate Wage Rate Requirements statute payroll provisions in the Federal Acquisition Regulation (FAR);

(3) able to accommodate the required numbers of employees for both the prime and all subcontractors planned to be employed under the contract;

(4) capable of producing electronic versions of weekly payroll data and capable of exporting weekly payroll records for uploading into the RMS CM) 3.0;

(5) demonstrated security of data and data entry rights;

(6) ability to identify erroneous entries and track the date/time of all versions of the certified Wage Rate Requirements statute payrolls submitted to the Government over the life of the contract and to make corrections prior to submission to the Government.

d. All costs incurred related to use of an electronic payroll processing service must be included in the price for the overall work under the Contract. The costs for compliance with the Wage Rate Requirements statute by using electronic payroll processing services will not be a separately bid or reimbursed item under this Contract.

1.9.8 Records

Maintain payroll and Employment Records during the course of work and for three years thereafter. They are subject to inspection by the CO and the U.S. Department of Labor.

1.9.9 Job Interviews

A Government representative will interview Contractor and subcontractor employees from time to time during working hours on the job.

1.10 VETERANS EMPLOYMENT EMPHASIS FOR U.S. ARMY CORPS OF ENGINEERS CONTRACTS

In addition to complying with the requirements outlined in FAR Part 22.13, FAR Provision FAR 52.222-35, FAR 52.222-37, DFARS 222.13 and Department of Labor regulations, U.S. Army Corps of Engineers (USACE) Contractors and subcontractors at all tiers are encouraged to promote the training and employment of U.S. veterans while performing under a USACE Contract. While no set-aside, evaluation preference, or incentive applies to the solicitation or performance under the resultant Contract, USACE Contractors are encouraged to seek out highly qualified veterans to perform services under this Contract. The following resources are available to assist USACE Contractors in their outreach efforts:

a. U.S. Department of Labor Veterans employment: www.va.gov/

b. Federal veteran employment information: https://www.opm.gov/fedshirevets/

c. Veterans' Employment and Training Service (VETS): https://www.dol.gov/agencies/vets/

d. Veterans Opportunity to Work (VOW) Program: http://benefits.va.gov/vow/

e. Hiring Our Heroes initiative: www.uschamberfoundation.org/hiring-our-heroes

1.11 FACILITY TURNOVER PLANNING MEETINGS (Red Zone Meetings)

Meet with the Government to identify strategies to ensure the project is carried to expeditious closure and turnover to the Client. Start planning the turnover process at the Pre-Construction Conference meeting with a discussion of the Red Zone process and convene at regularly scheduled Red Zone Meetings beginning at approximately 75 percent of project completion. Include the following in the turnover effort:

1.11.1 Red Zone Checklist

a. CO will provide the Contractor a copy of the Red Zone Checklist template.

b. Prior to 75 percent completion, modify the Red Zone Checklist template by adding or deleting critical activities applicable to the project and assign planned completion dates for each activity. Submit the modified Red Zone Checklist to the CO. The CO may request additional activities be added to the Red Zone Checklist at any time as necessary.

1.11.2 Meetings

a. Conduct regular Red Zone Meetings beginning at approximately 75 percent project completion, or three to six months prior to Beneficial Occupancy Date (BOD), whichever comes first.

b. The Contracting Officer will establish the frequency of the meetings, which is expected to increase as the project completion draws nearer. At the beginning, Red Zone meetings may be every two weeks then increase to weekly towards the final month of the project.

c. Using the Red Zone Checklist as a Plan of Action and Milestones (POAM) and basis for discussion, review upcoming critical activities and strategies to ensure work is completed on time.

d. During the Red Zone Meetings discuss with the CO any upcoming activities that require Government involvement.

e. Maintain the Red Zone Checklist by documenting the actual completion dates as work is completed and update the Red Zone Checklist with revised planned completion dates as necessary to match progress. Distribute copies of the current Red Zone Checklist to attendees at each Red Zone Meeting.

1.12 LIMITATIONS ON SUBCONTRACTING COMPLIANCE

Prior to completion of the on-site construction, and not less than annually if this Contract has a period of performance greater than one year, submit evidence of compliance with FAR 52.219-14 Limitations on Subcontracting. Evidence may be completed utilizing the Limitations on Subcontracting Form. Attachment A2 is provided as an example. This form will be provided upon request in its native Microsoft Excel format from the CO. The submittal item will include self-attestation signed by someone authorized by the company to approve Contract actions that provides, at minimum, the following summary:

a. Contract Number

b. Prime Contractor Name

c. Total Current Contract Price

d. Type of Contract Set-Aside (found on the SF 1442, Block 10, under socio-economic, e.g. Small Business, 8(a) sole source, 8(a) competitive, etc.)

e. Required Participation (specified requirement within FAR 52.219-14 such as XX percent for General Construction)

f. Amount Invoiced by the Prime Contractor (to date)

g. Prime Contractor Material Cost (to date)

h. Invoiced Amount Minus Material Cost

i. Portion of Invoiced Amount for Similarly Situated Subcontractors

j. Portion of Invoiced Amount for Non-Similarly Situated Subcontractors

k. Calculated Limitation on Subcontracting Percentage which equates to "Invoiced Amount Minus Material Cost" minus "Portion of Invoiced Amount for Non-Similarly Situated Subcontractors" with that total then divided by "Total Invoiced Amount Minus Material Cost"

l. Prime Contractor's Corrective Action Plan should the calculated percentage be less then the percentage required by FAR 52.219-14

1.13 EQUIPMENT OWNERSHIP AND OPERATING EXPENSE SCHEDULE

a. This special contract requirement does not apply to terminations. See FAR Part 49.

b. Allowable cost for construction and marine plant and equipment in sound workable condition owned or controlled and furnished by a contractor or subcontractor at any tier must be based on actual cost data for each piece of equipment or groups of similar serial and series for which the Government can determine both ownership and operating costs from the contractor's accounting records. When both ownership and operating costs cannot be determined for any piece of equipment or groups of similar serial or series equipment from the contractor's accounting records, costs for that equipment must be based upon the applicable provisions of EP 1110-1-8, Construction Equipment Ownership and Operating Expense Schedule, Region VIII. Working conditions must be considered to be average for determining equipment rates using the schedule unless specified otherwise by the contracting officer. For equipment not included in the schedule, rates for comparable pieces of equipment may be used or a rate may be developed using the formula provided in the schedule. For forward pricing, the schedule in effect at the time of negotiations must apply. For retroactive pricing, the schedule in effect at the time the work was performed must apply.

c. Equipment rental costs are allowable, subject to the provisions of FAR 31.105(d)(ii) and FAR 31.205-36, Rental Costs. Rates for equipment rented from an organization under common control, lease-purchase arrangements, and sale-leaseback arrangements, will be determined using the schedule, except that actual rates will be used for equipment leased from an organization under common control that has an established practice of leasing the same or similar equipment to unaffiliated lessees.

d. When actual equipment costs are proposed and the total amount of the pricing action exceeds $2,000,000, the Contracting Officer will request the Contractor to submit either certified cost or pricing data, or partial/limited data, as appropriate. The data must be submitted on Standard Form 1411, Contract Pricing Proposal Cover Sheet.

1.14 BASIS FOR SETTLEMENT OF PROPOSALS

a. Actual costs will be used to determine equipment costs for a settlement proposal submitted on the total cost basis.

b. In evaluating a termination settlement proposal using the total cost basis, the following principles will be applied to determine allowable equipment costs:

(1) Actual costs for each piece of equipment, or groups of similar serial or series equipment, need not be available in the contractor's accounting records to determine total actual

equipment costs.

(2) If equipment costs have been allocated to a contract using predetermined rates, those charges will be adjusted to actual costs.

(3) Recorded job costs adjusted for unallowable expenses will be used to determine equipment operating expenses.

(4) Ownership costs (depreciation) will be determined using the contractor's depreciation schedule (subject to the provisions of Federal Acquisition Regulation (FAR) 31.205-11).

(5) License, taxes, storage and insurance costs are normally recovered as an indirect expense and unless the contractor charges these costs directly to contracts, they will be recovered through the indirect expense rate.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01 10 10.00 25

CONTRACTOR'S OPERATIONS AND REQUIREMENTS

PART 1 GENERAL

1.1 DESCRIPTION OF WORK
1.2 REFERENCES
1.3 SUBMITTALS
1.4 PERIOD OF PERFORMANCE
1.5 PRE-CONSTRUCTION CONFERENCE
1.6 IN-WATER WORK
1.6.1 In-Water Work (IWW) Periods
1.6.2 In-Water Work Activities
1.7 WATER QUALITY CERTIFICATION
1.8 BARGE OPERATIONS AND TEMPORARY FACILITIES IN NAVIGATION CHANNEL
1.8.1 SUMMARY
1.8.2 ABANDONED CHANNEL DEPTH
1.8.3 NOTICE OF SEA LION TRAPS
1.8.4 OIL BOOM OPERATION
1.9 FISH SALVAGE AFTER COFFERDAM INSTALLATION
1.10 NOTICE OF SITE ACCESS RESTRICTIONS
1.11 NOTICE OF HIGH VOLTAGE BPA POWERLINE
1.12 NOTICE OF COUNTER WEIGHT DISPOSAL
1.13 INCLEMENT WEATHER CONSTRUCTION
1.14 AIR QUALITY WEATHER DELAYS FOR SMOKE
1.15 UTILITY OUTAGE REQUEST AND UTILITY CONNECTION REQUEST
1.16 WEEKLY COORDINATION MEETINGS
1.17 CONTRACTOR EMPLOYEES
1.18 ACCESS AGREEMENTS AND WORK AREAS
1.18.1 Access Agreements
1.18.2 Work Areas
1.18.3 Employee Access and Parking
1.18.4 Traffic Control Plan
1.19 DECK ACCESS RESTRICTIONS
1.20 CONSTRUCTION PROJECT IDENTIFICATION SIGN
1.21 UTILITIES
1.21.1 Sanitary Facilities
1.21.2 Electrical Power
1.21.2.1 General
1.21.2.2 Temporary Electrical Wiring
1.21.3 Water
1.22 CONTRACTOR'S EQUIPMENT
1.22.1 Contractor's Planned Equipment Methods
1.22.2 Plant and Equipment List
1.22.3 Movement of Equipment by the Contractor
1.23 CONTRACTOR USE OF GOVERNMENT CRANES
1.24 FLOATING PLANT INSPECTION
1.25 EQUIPMENT CERTIFICATION AND INSPECTION
1.26 U.S. COAST GUARD NOTICE TO MARINERS
1.27 EXISTING PIPELINES, STRUCTURES, OR UTILITIES
1.28 NOTIFICATION OF DIVING OPERATIONS

1.29 CONTRACTOR SUPPLIED EQUIPMENT AND ACCOMMODATIONS
1.30 DAMAGED EQUIPMENT OR ABNORMAL CONDITIONS
1.31 USE OF EXPLOSIVES
1.32 DAILY CLEANUP AND DISPOSAL
1.33 DISPOSAL AND SALVAGE OF EQUIPMENT AND MISCELLANEOUS MATERIALS
1.34 PROTECTION OF MATERIAL AND WORK
1.35 PROTECTION OF EXISTING UTILITIES
1.36 PROTECTION AND RESTORATION OF EXISTING FACILITIES
1.37 RESTORATION OF PROJECT ROADS

PART 2 PRODUCTS

PART 3 EXECUTION

-- End of Section Table of Contents --

SECTION 01 10 10.00 25

CONTRACTOR'S OPERATIONS AND REQUIREMENTS

PART 1 GENERAL

1.1 DESCRIPTION OF WORK

This Section covers general requirements applicable to specific Contractor's operations and equipment.

1.2 REFERENCES

The publications listed below form a part of this Specification to the extent referenced. The publications are referred to in the text by basic designation only.

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2024) Safety -- Safety and Occupational Health (SOH) Requirements
EP 310-1-6A	(2006; 2019 Change 2) Project Operation -- Sign Standards Manual, VOL 1

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO LRFD	(9th Edition; 2020 with 2022 Interims) Bridge Design Specifications

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. Submit the following in accordance with Section 01 33 00, SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Utility Outage Request

Utility Connection Request

Access Agreements and Work Areas; G

Temporary Electrical Wiring Plan; G

Contractor's Planned Equipment Methods; G

Plant and Equipment List; G

Loading Diagram; G

Traffic Control Plan; G

1.4 PERIOD OF PERFORMANCE

All on-site work and submitalls must be completed no later then 930 days after Notice To Proceed (NTP).

1.5 PRE-CONSTRUCTION CONFERENCE

A Pre-Construction Conference will be held once Contract award is made. The Pre-Construction Conference will be scheduled by the Government. Key Contractor staff will be required to attend in person. Key personnel include, but are not limited to, Project Manager, Site Superintendent, Project Engineer, Quality Control Manager, and Site Safety Health Officer. The purpose of the Pre-Construction Conference is to establish a mutual understanding of the respective organizations and to establish a team based understanding of the quality and safety expectations for the job. The Government will develop the agenda.

1.6 IN-WATER WORK

1.6.1 In-Water Work (IWW) Periods

The Government has established interim construction date, described as "in-water work periods," coinciding with the annual cycles of fish migration and related allowed maintenance periods. In general, this is a work period that allows for work in the water, on the water, and adjacent to the water where the work might affect fish passage (usually a 50-foot rule from the work site to the water). Work done in the navigation channel does not affect fish passage. The IWW period established for this Contract is: December 1st through the end of February.

1.6.2 In-Water Work Activities

For purposes of this Contract, work items that must be restricted to the IWW period, along with further work restrictions, are described below:

a. All work involving movement of barges, waterborne vessels, or other floating plants.

b. All work in an active streambed. This includes work in the existing navigation channel that is below Ordinary High Water line. Work above the surface water elevation, and that does not touch the water or strembed below OHW, is excluded from the IWW restriction.

c. All work within 50ft of an adult salmon fishway and 100ft of an adult fishway entrance/exit. Non-routine work such as demolition, construction and paving activities within the specified vicinity of the nearby adult fishway is restricted to when it is dewatered in alternate years. For the adult fishway adjacent to the worksite, this includes DEC 2027 - FEB 2028 and DEC 2029 - FEB 2030. Further requests for more access time will be considered upon request at least 60 days in advance, but with no guarantees for Government approval.

1.7 WATER QUALITY CERTIFICATION

All work done below the Ordinary High Water line (OHW) within the navigation channel requires Water Quality Certification. Current water elevations can be found at https://www.nwd-wc.usace.army.mil/nwp/teacup/lcol/.

1.8 BARGE OPERATIONS AND TEMPORARY FACILITIES IN NAVIGATION CHANNEL

1.8.1 SUMMARY

Barging of materials and equipment into the abandoned navigation channel is allowed at contractor risk. The government no longer dredges nor maintains this channel, and will not do so for this project. The Government will not alter operations at the dam to allow for a higher tailrace elevation or change in flows. As allowed per this specification and permits, temporary facilities are allowed in the channel to support construction.

1.8.2 ABANDONED CHANNEL DEPTH

The Government performed a bathymetric survey in 2019 (see Attachment A8 as FIO), and this data can be used by contractors to determine their ability to barge-in materials based on river depth and draft of contractor vessels. Historic tailrace information can be found at the following publicly available websites. Tailrace elevations are shown in NGVD29 datum. Bathymetric elevations are shown in NAV88 datum. Elevation conversion is NAVD88 = NGVD29 + 3.34'.

https://www.nwd-wc.usace.army.mil/dd/common/dataquery/www/

https://waterdata.usgs.gov/monitoring-location/USGS-14128870/#dataTypeId=continuous-00065-0&period=P365D&showFieldMeasurements=true

1.8.3 NOTICE OF SEA LION TRAPS

Sea lion traps exist downstream of the bridge location and physically block access to the navigation channel. If the contractor chooses to bring in supplies, materials, or equipment via the navigation channel as a waterway to assist in the construction of the bridge, coordination with the Government is required before Contractor access is permitted to enter or exit the navigation channel upstream of the traps. Provide the COR a minimum of four-weeks notice before channel access is requested; the Government and Government-related entities will move the traps out of channel to allow for Contractor access. Access is limited to once per week during the IWWW for a four hour window. Further requests for more access time will be considered upon request, but with no guarantees for Government approval.

1.8.4 OIL BOOM OPERATION

Two existing oil booms exist in the navigation channel that create a Boat Restricted Zone (BRZ) for access upstream of the booms. The government will move the booms with 72 hours notice, and will provide Contractors a four hour window for vessel movement before placing the booms back into service. This operation is limited to once per week during the contract duration during IWWW. The Government will consider requests for additional boom operations, but will provide no guarantee as to the acceptance of such requests. More information and the permit to enter the BRZ can be found in Attachment A5.

1.9 FISH SALVAGE AFTER COFFERDAM INSTALLATION

a. If a Contractor proposes use of a cofferdam to assist in the construction of this project, the dewatered area must have fish removed when the area becomes isolated from the river. A cofferdam is considered means and methods and is not a contract requirement. The

Government will perform all direct fish handling activities; the Contractor is responsible for dewatering the space and providing the Government access to the area as it is dewatered. The water level needs to be lowered to between 1 and 2 foot of water depth in order to allow Government personnel to safely enter the area for fish salvage. Notify the COR 72 hours prior to initiating dewatering of the area. Fish salvage shall begin within 72 hours of this area becoming isolated from the river and be fully completed within 96 hours. This process will be repeated if the area is reconnected with the river, i.e., if the cofferdam is removed and reinstalled.

b. All dewatering activities must be done with methods to safely exclude fish entrainment in pump systems via Government approved methods. See National Marine Fisheries Service (NMFS) 2022. NOAA Fisheries West Coast Region Anadromous Salmonid Passage Design Manual, NMFS, WCR, Portland, Oregon for fish detailed screening requirements.

1.10 NOTICE OF SITE ACCESS RESTRICTIONS

The south entrance of Bonneville Dam has a height restriction of 14.5 feet. The north entrance has a weight restriction of 11 tons. Vehicle access is limited by turning radii on project access roads, connection to Interstate 84, and underneath the existing Union Pacific railroad bridge. Contractors must perform due diligence in planning deliveries via I-84 and US-14 to ensure access is possible for their deliveries.

1.11 NOTICE OF HIGH VOLTAGE BPA POWERLINE

There exists a high voltage (carrying 115kV and 230kV lines) BPA transmission tower on Robins Island. It is advised to keep a minimum 50 foot buffer from the tower at all times in order to reduce risk of a flashover event. Refer to EM 385-1-1 for minimum clearing distances to energized overhead electric lines.

1.12 NOTICE OF COUNTER WEIGHT DISPOSAL

There exists a lead counter weight attached to the bridge to be demolished that will have to be properly disposed of.

1.13 INCLEMENT WEATHER CONSTRUCTION

The Contractor's schedule must reflect adverse weather days in all weather dependent activities as defined in Section 00 73 00, PHYSICAL DATA. Protect work areas from inclement weather, wind damage, and precipitation so that no delay in the prosecution of critical work items, or damage to Government property occurs. No time extensions will be authorized for materials, work in place, or equipment damaged due to negligence during periods of inclement weather.

1.14 AIR QUALITY WEATHER DELAYS FOR SMOKE

If the Air Quality Index (AQI) is greater than 200 and the Contractor is performing outdoor work, a weather delay will be granted for a day. The AQI can be found at www.airnow.gov.

1.15 UTILITY OUTAGE REQUEST AND UTILITY CONNECTION REQUEST

a. Perform a utility locate prior to the start of excavation. Notify the CO at least two business days prior to starting excavation work.

Verify and mark all utilities not shown.

b. Verify the elevations of existing piping, utilities, and any type of underground obstruction not indicated or specified to be removed but indicated in locations to be traversed by piping, ducts, and other work to be conducted or installed.

c. Schedule work to hold outages to a minimum.

d. Arrange utility outages and connections required during the prosecution of work that affect existing systems, at the convenience of the Government, and outside of regular working hours or on weekends. Contractor will not be entitled to additional payment for utility outages and connections required to be performed outside the regular work hours.

e. Requests for utility outages and connections must be made in writing to the CO at least 14 calendar days in advance of the time required. Each request must include the system involved, location involved, utilities being affected, approximate duration of outage, and the nature of work involved.

f. During a water outage of more then four hours, provide a temporary water supply to keep all Government facilities operational.

1.16 WEEKLY COORDINATION MEETINGS

Run weekly coordination meetings with the Government. This meeting will be used to discuss Contractor's safety, Quality Control Program, joint risk management, submittals, deficiencies, Contract administration, schedule, actual progress in the last week, and work planned in the upcoming two weeks. Any work requiring Project support or potential impacts to Project operations or maintenance must be noted. The Contractor must provide a two week look ahead, with the previous week progress, 48 hours before each weekly meeting to the Government representative. The responsible party must prepare and distribute, by e-mail, the coordination meeting agenda with a two week look ahead no later than 24 hours before each meeting. A meeting time and place will be mutually agreed upon for the same time each week. Distribute weekly coordination meeting minutes no later than the close of business the next business day.

1.17 CONTRACTOR EMPLOYEES

All employees must be capable of demonstrating adequate knowledge of tools, supplies, equipment, and techniques necessary to competently perform the work. All personnel must be fully qualified in their respective fields to render the services necessary. The Government may require the Contractor to discontinue using any employee in the performance of the work specified in this Contract if the Government determines the performance to be unsatisfactory. Contractor employees will not be permitted to bring guests, family members, or non-employees to the job site at any time.

1.18 ACCESS AGREEMENTS AND WORK AREAS

1.18.1 Access Agreements

a. Submit access procedures to and from the work site after the Contractor, the CO, and the Project's Representative have coordinated

and determined the most advantageous access to, and staging of, the Contractor's assets deployed to the work site.

b. The right-of-way for the work (or delivery site) and access thereto will be furnished as stated in this Paragraph subject to mutual agreement between the Contractor and the Government concerning the specific route the Contractor is to use. Such mutual agreement must be reached prior to initiation, construction, or delivery.

c. The existing access roadway and any associated access roads on the Project, must not be closed as a result of construction or delivery activities associated with this Contract unless previously coordinated and approved by the Government. Traffic delays will only be permitted in accordance with the provisions of this Section.

d. When necessary to operate on or to cross existing highways or roads, all necessary permits must be obtained from the appropriate private or public authority.

e. In accordance with FAR 52.236-13 Alt I, ACCIDENT PREVENTION - ALTERNATE I, and EM 385-1-1, flaggers, signs, lights, and/or other safeguards must be provided to safely control and direct the flow of traffic when necessary for equipment to operate on or to cross access roads, arterial roads, or highways.

f. Spillage on Project roads and state or county roads will not be permitted, and the spillage must be immediately cleaned up at the expense of the Contractor.

g. No cleated or crawler-type equipment can be operated on paved surfaces.

h. Damage to all roads caused by the Contractor's operations must be repaired to pre-existing conditions at the expense of the Contractor.

i. Photograph the existing condition of all staging areas prior to mobilization and submit all photographs in the Access Agreements submittal. Failure to properly document existing conditions will result in a Government determination of necessary repairs.

1.18.2 Work Areas

a. Drawings showing the layout of the area proposed for use must be submitted for review and approval and comply with FAR 52.236-10 OPERATIONS AND STORAGE AREAS. The drawing(s) must show the location of the principal components: offices, access roads, parking, storage facilities and disposal areas, which the Contractor proposes to construct within the designated limits.

b. Only Contractor and subcontractor parts trailers and lunch trailers may be allowed in the Contractor work areas and these must be subject to CO and Project approval. All Contractor and subcontractor trailers are required to be adequately and physically anchored to prevent overturning due to high winds.

c. Should additional working space or lands within the Government right-of-way be required for material yards, job offices, or other purposes obtain prior Government approval in writing. When directed at any time during the progress of the work when space is needed within the right-of-way for other purposes, any part of the grounds that have

been in use must be promptly vacated and cleaned up. However, it is not the intent to require the Contractor's plant or material to be removed from an area while such plant, material, or area is still being actively used.

d. The Project staff will brief the Contractor on security procedures. Any such procedures will not be the basis for claims for additional money or time. The Project areas off limits to Contractor personnel will also be designated.

e. Staging areas/work areas must be surrounded by temporary fencing in a manner that prevents non-contractor personnel from entering

1.18.3 Employee Access and Parking

Contractor's employee private vehicle parking areas must be restricted to the area as agreed upon before construction or delivery. All Contractor vehicles used for prosecuting the work must have a Contractor sign or other permanent identification and must carry the required insurance. Private vehicles not owned by the Contractor must not be used for prosecuting the work. Private vehicles of the Contractor and its employees must enter and leave the project as directed. Keep the parking areas free of litter and debris. An adequate number and size of trash receptacles must be placed in the parking areas and emptied, as necessary to avoid overflowing. Trash receptacles must be adequately secured to provide protection from the wind and animals.

1.18.4 Traffic Control Plan

Maintain uninterrupted, two lane, vehicle access across the navigation channel for the entirety of the project duration. Construct a bypass road before modifications are made to the original project road (Star Route). Provide all necessary traffic controls. 48 hours notice and Government approval of a Traffic Control Plan is required for any full or partial closure of the project road. The plan is to include means and methods of maintaining access across the navigation lock.

1.19 DECK ACCESS RESTRICTIONS

Do not block operational areas of the deck gantry crane at any time. With prior coordination and approval, the deck gantry crane may be blocked for a period no longer than four hours. One lane of traffic must be left open at all times.

1.20 CONSTRUCTION PROJECT IDENTIFICATION SIGN

Fabricate and install one construction project identification sign in accordance with EP 310-1-6A, Attachment A3, within three days of beginning site work.

1.21 UTILITIES

Provide utilities required for the performance of work under this Contract, except Government-furnished electrical power, and water as described below.

1.21.1 Sanitary Facilities

Use of the Project restroom by Contractor personnel will not be permitted. Provide portable, temporary sanitary facilities in accordance with

EM 385-1-1.

1.21.2 Electrical Power

1.21.2.1 General

Use of existing 120V and 480V electrical receptacles is allowed. Take special care not to overload receptacle circuits. Contractor must be responsible for all accessories, such as extension cords, adapters, and raceways for road crossings. Extension cords must not be allowed to cross crane rails.

1.21.2.2 Temporary Electrical Wiring

Submit a Temporary Electrical Wiring Plan for temporary electrical wiring. Install all temporary electrical wiring in accordance with EM 385-1-1 and as approved. All temporary electrical wiring must be removed prior to completion of the Contract. Include load calculations to ensure conduit capacity is not exceeded.

1.21.3 Water

Reasonable amounts of water for domestic use will be made available from existing outlets and supplies. No charge will be made for the water.

1.22 CONTRACTOR'S EQUIPMENT

1.22.1 Contractor's Planned Equipment Methods

Submit proposed methods of transportation and operation of cranes and other heavy equipment for approval prior to commencement of those operations. Submittals must include the type, size, loadings of equipment, placement of outriggers, and the proposed transportation routes and work areas to be used on the project. Operation of heavy equipment adjacent to existing structures must be avoided when possible. Testing requirements and operation of cranes and other heavy equipment must be in accordance with EM 385-1-1. All cranes, rigging, lifts, operators, vehicles, and other necessary means to move equipment or items must be Contractor-furnished as required to pursue and complete the work and must comply with EM 385-1-1.

1.22.2 Plant and Equipment List

Within seven days prior to commencing site operations, provide a complete list of all plant and equipment to be used on the job site, exclusive of shop equipment. Throughout the life of the Contract, submit an up-to-date plant and equipment list with each progress payment request. Include rented equipment as well as lease purchase or sale leaseback equipment on the lists. Initial list and the revised monthly lists must indicate dates equipment is assigned to or removed from the project; deadline dates for repairs and returned for use; dates of the most recent and planned inspections; and adequate identification or description of each item of equipment including manufacturer's name (abbreviated), model number, manufacturer's serial number, year of manufacture, and Contractor's assigned serial or record number.

1.22.3 Movement of Equipment by the Contractor

a. Unless otherwise noted, any vehicle crossing a project bridge is limited to AASHTO LRFD, HL-93 vehicle and load requirements. Submit a

loading diagram for approval showing wheel loads, wheel spacing, and travel speed a minimum of 30 days prior to operating any equipment or vehicles whose loading conditions are in excess of a HL-93 vehicle. Prior coordination and approval for such loads must be obtained before proceeding. No exclusion trucks, multi-axle specialized hauling vehicles (SHV) or mobile cranes will be allowed on a bridge deck without prior review and approval. At a minimum, the loading diagram must include but not be limited to the following information:

(1) A typical section and plan view of the bridge, the position of the wheel loads and wheel spacing of the truck or crane.

(2) The GVW of the vehicle and all axle weights.

(3) For cranes, the location and weight of axles before and after counter weights are installed, all outrigger loads, required crane boom length, weight and location of center of gravity. This should also include the effects of guy lines, upper spreader and jib mast. If using a jib, show the length, weight, and location of the center of gravity.

b. Any SHV's authorized to drive on the bridge deck must have all lift axles lowered and fully engaged while the vehicle has any load. For cranes, all specialized boom trailers must be engaged until a final set up with the outriggers are made and approved.

1.23 CONTRACTOR USE OF GOVERNMENT CRANES

Use of Government cranes for any work or access is not allowed. Use Contractor-furnished equipment to facilitate installation or handling of items and equipment for this Contract.

1.24 FLOATING PLANT INSPECTION

Fill out NPP Form 159 (Rev) "Floating Plant Inspection Checklist" Attachment A6 for any floating plant intended to be utilized. Submit the completed NPP Form 159 (Rev) to the Government one working day prior to the joint equipment inspection. Notify the Government four calendar days prior to the joint equipment inspection. The joint equipment inspection will be held prior to beginning all work. A new inspection will not be held at each new location unless major repairs are performed while transiting to a new location. A Government representative will accompany the designated person during normal daylight working hours to view the plant and equipment intended to be utilized on this project. Any units found to be unsafe or otherwise not in compliance with the Contract clauses, specifications, and EM 385-1-1 will be deadlined and their use prohibited until the unacceptable conditions have been corrected. Mobilization payment will be delayed until the deficiencies have been corrected or replaced in an acceptable manner

1.25 EQUIPMENT CERTIFICATION AND INSPECTION

a. Equipment Certification

The equipment certification must state that the equipment has been tested by a competent person and found to be in safe operating condition and is in compliance with the Contract specifications and EM 385-1-1. Designate a competent person to be responsible for the daily inspection of the plant, machinery, and equipment as called for

in Section 19, of EM 385-1-1 to assure it is kept in safe operating condition. In addition, fill out NPP Form 159 (Rev) "Floating Plant Inspection Checklist" (Attachment A6) for any floating plant intended to be utilized. Submit both the completed NPP Form 159 (Rev) and Equipment Certification to the GQAR one working day prior to the required initial joint walk-through.

b. Joint Equipment Inspection

Notify the Government 96 hours prior to the joint equipment walk-through. The joint equipment walk-through will be held prior to beginning of the work. A Government representative will accompany the designated person during normal daylight working hours to view the plant and equipment intended to be utilized on this project. Any units found to be unsafe or otherwise not in compliance with the Contract clauses, specifications, and EM 385-1-1 will be deadlined and their use prohibited until the unacceptable conditions have been corrected. Mobilization payment will be delayed until the deficiencies have been corrected or replaced in an acceptable manner. The Government may elect to perform a hull inspection of the vessel through the use of a remote operated vehicle (ROV) for the purpose of inspecting for invasive species. The ROV inspection is expected to take up to eight hours and will be done concurrently with the joint equipment inspection. A floating plant inspection may be required at the CO's discretion after returning from a break in work that involves work for others.

c. Daily Equipment Inspection

Designate a competent person to be responsible for the daily inspection, on each shift, to assure that the plant is kept in a safe operating condition. Keep record of these inspections on the plant and available for review by Government personnel.

d. Coast Guard Inspection

All equipment must meet all applicable U.S. Coast Guard regulations. All self-propelled equipment is subject to U.S. Coast Guard Certification.

1.26 U.S. COAST GUARD NOTICE TO MARINERS

a. For each general area of operation, notify the U.S. Coast Guard at least 14 days prior to start of dredging and material placement operations. Provide weekly updates once work has begun. These weekly updates need to be provided before 1600 on each Monday during the life of the Contract. In addition, immediately notify the U.S. Coast Guard of updated and specific dredging dates, once the Government has issued them. These notifications must be certified and a copy attached to the Daily QC report. For work in California, correspondence must be directed to the 11th U.S. Coast Guard District; for work in the Portland District (LCR and MCR) correspondence must be to the 13th U.S. Coast Guard District:

13th Coast Guard District
(206) 220-7280
D13-SMB-D13-LNM@uscg.mil

b. The following information must be included in each notification:

(1) Project designation (USACE Contract number and Contract title), Contractor's address, and Contractor's day time phone number.

(2) Name and type of dredge plant used, including any assist vessels.

(3) Dredging location (reference the navigation project name and dredging area limits by river miles).

(4) Material placement site(s) (site reference number and location).

(5) Estimated beginning and ending dates of dredging and placement operations.

(6) Work schedule (days/hours).

(7) List VHF radio channels that the dredge will monitor.

(8) Point of Contact and 24 hour phone number.

(9) Terminology to be used:

(a) For Cautionary Areas: Mariners are urged to use extreme caution in the area.

(b) For dredging and placement operations: Mariners are urged to transit at their slowest safe speed to minimize wake and proceed with caution after passing arrangements have been made.

(c) Circumstances that warrant specific maritime precautions must be handled on a case-by case basis in coordination with the local U. S. Coast Guard representatives.

(d) The U.S. Coast Guard will subsequently disseminate information provided by the Contractor in this notification to the general maritime community through Local Notice to Mariners publications and marine band broadcasts.

1.27 EXISTING PIPELINES, STRUCTURES, OR UTILITIES

a. Attention is directed to the possible existence of pipelines or public utilities or private improvements, shown or not shown on the drawings, which may be buried within the limits of the work or adjacent thereto. Preserve and protect any such improvements from injury or damage during construction operations.

b. Coordinate with and if necessary assist the U.S. Coast Guard in moving navigation buoys within the defined work area. Obtain approval from U.S. Coast guard prior to moving any navigational aids.

Points of Contact:

Port Orford, Winchester Bay, and Depot Slough: Aids to Navigation Team-Coos Bay Officer in Charge, 541-888-3441

Baker Bay, Astoria Turning Basin, Longview Turning Basin, Port of Longview, Old Mouth Cowlitz, and W-60.9-IW Transfer Site: Astoria Aids to Navigation Team-Astoria Officer in Charge, 503-325-3301

c. Utilities or improvements, whether buried or not, which cannot be determined to exist through visual inspection, if inadvertently damaged, must be promptly repaired or replaced.

d. Assume full responsibility for reimbursing the owners for any damage to their properties, utilities, or improvements, or interference with their services caused through his operations. No relief will be granted from the responsibility set forth in Section 00 72 00, FAR 52.236-3, SITE INVESTIGATION AND CONDITIONS AFFECTING THE WORK, except as provided above.

e. Observe all obstructions depicted in project plan drawings as well as associated NOAA navigational charts.

1.28 NOTIFICATION OF DIVING OPERATIONS

Immediately notify the GQAR of any need to employ diving operations. Conform to the latest version of Engineering Regulation NPPR 385-1-93, Diving Operation by Contract, and the required publications therein as determined by the Portland District Diving Coordinator (DDC). A copy of NPPR 385-1-93 will be provided and used as a reference to prepare the required diving plan and the associated attachments.

1.29 CONTRACTOR SUPPLIED EQUIPMENT AND ACCOMMODATIONS

a. Transportation: Furnish Government personnel transportation to and from the vessels and shore as needed. There will be one GQAR on-board at all times when working at all Contract work areas. Additional GQARs or other Government personnel may also occasionally require transportation to the dredge.

b. The pick-up locations for Government and quality assurance personnel must be a location mutually agreed upon by the COR and the Contractor and must provide a safe location for Government vehicles. Government personnel will be on board during construction operations as part of quality assurance oversight. Anticipate four round trips per day on average for Government personnel to each placement site.

c. VHF Radio: Provide a VHF radio and charger. Provide the GQAR with instructions, procedures, and operating manuals for the operation of the radio. The radio must be for the exclusive use of the GQARs on the vessel, and must be capable of receiving and transmitting on the same channels/frequencies that the crew uses.

d. Four Man Overboard Devices (MOB): Provide MOB's as prescribed in Subpart 1.16 h. of Section 01 35 26.00 82, GOVERNMENT SAFETY REQUIREMENTS.

e. Offices: Furnish Government office space for the exclusive use of the GQAR(s) on board the plant must be properly heated, ventilated and lighted and must have a desk or chart table, a chair, and four or more standard 120-volt electrical outlets. Provide a lockable storage area or locker on the plant for the exclusive use of the GQAR(s). Provide scanning, copying, and color printing (capable of up to 11x17) services, on board the plant. This equipment may be shared between the Contractor and Government personnel. Anticipate a total use of approximately 50 pages/week.

1.30 DAMAGED EQUIPMENT OR ABNORMAL CONDITIONS

Inform the CO immediately upon finding any damaged equipment or other abnormal conditions involving additional work in which the Contractor believes it has no responsibility. The failure or abnormality must not be disturbed until witnessed by the CO. Prior to proceeding further with work, the Contractor and the Government must agree in writing as to the responsibility for the damage or abnormality. Any damage or abnormal conditions not reported as specified above must also be corrected.

1.31 USE OF EXPLOSIVES

Use of explosives will not be permitted.

1.32 DAILY CLEANUP AND DISPOSAL

Keep all work areas reasonably neat on a daily basis. Collect, remove, and dispose of all debris resulting from the work, such as waste metalwork, packing cases, scrap lumber, and other debris off-site at least once per week. Do not use the Government's trash cans, dump boxes, and other containers. Do not dispose of liquid waste in Project drains. All costs of removing debris must be incidental to the work and therefore no separate payment will be made.

1.33 DISPOSAL AND SALVAGE OF EQUIPMENT AND MISCELLANEOUS MATERIALS

Title to all materials and equipment to be disposed of, excepting materials salvaged for the Government, will be vested in the Contractor when beginning disassembly work or when such materials and equipment are designated as scrap. The Government will not be responsible for the condition, loss, or damage to such property after title transfer. The Contractor may retain these items in usable form and take possession of them providing that there is no subsequent cost or inconvenience to the Government. The Government does not guarantee that these items are complete or in working order and the Contractor must assume responsibility for any damages caused by their use immediately upon taking possession of them.

1.34 PROTECTION OF MATERIAL AND WORK

All materials, supplies, tools, equipment and Government property (including all tools, equipment, and special devices supplied by the Contractor and to be turned over to the Government at the end of the Contract) must at all times be protected and preserved in an approved manner. If material, equipment, supplies, and work performed are not adequately protected, such property may be protected by the Government and the cost thereof will be charged to the Contractor or deducted from any payment due.

1.35 PROTECTION OF EXISTING UTILITIES

Protect existing utilities in accordance with FAR 52.236-9, PROTECTION OF EXISTING VEGETATION, STRUCTURES, EQUIPMENT, UTILITIES, AND IMPROVEMENTS. Repairs must be made immediately and at Contractor's expense.

1.36 PROTECTION AND RESTORATION OF EXISTING FACILITIES

Protect all existing facilities whether or not shown on the drawings or referenced in the specifications. Leave all the existing facilities, not

included as a portion of the work, in a condition equal to the original condition prior to the Contract upon completion of work. Costs for repair and restoration of any facilities must be considered to be incidental to the work and included in the Contract price.

1.37 RESTORATION OF PROJECT ROADS

Project roads used for construction access will be evaluated and must be restored to their original condition by the Contractor as required. Repair and restoration must be made at the expense of the Contractor.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01 11 00.00 25

SUMMARY OF WORK

PART 1 GENERAL

1.1 SUMMARY
1.2 WORK COVERED BY CONTRACT DOCUMENTS
1.2.1 Project Description
1.2.2 Location
1.3 CONTRACT DRAWINGS
1.4 OCCUPANCY OF PREMISES
1.5 EXISTING WORK

PART 2 PRODUCTS

PART 3 EXECUTION

-- End of Section Table of Contents --

SECTION 01 11 00.00 25

SUMMARY OF WORK

PART 1 GENERAL

1.1 SUMMARY

This Section provides a summary of the various Contract work elements and their relationship to each other. This summary describes work activities within interim construction completion dates. This Section does not provide the technical detail for particular work activities, but describes the work as a whole, providing overall perspective to the separate tasks and their interrelationships. Use this Section in conjunction with all the Specification Sections and the Drawings to establish the total work requirements.

1.2 WORK COVERED BY CONTRACT DOCUMENTS

1.2.1 Project Description

The work includes bridge construction, demolition, roadway construction, and incidental related work. This effort is to include all associated works required and described within this Contract package.

1.2.2 Location

The work site is located at, and in the vicinity of Navigation Lock 1 at Bonneville Dam. Contractor access to the work site will be from the south project access road off of Interstate 84, or via the navigation channel, pursuant to the requirements of this solicitation.

1.3 CONTRACT DRAWINGS

a. The Drawings that accompany these Specifications are a part thereof.

b. Immediately check furnished drawings, maps, and specifications and notify the Government of any discrepancies.

1.4 OCCUPANCY OF PREMISES

Building(s) will be occupied during performance of work under this Contract. Occupancy notifications will be posted in a prominent location in the work area.

1.5 EXISTING WORK

In addition to FAR 52.236-9, PROTECTION OF EXISTING VEGETATION, STRUCTURES, EQUIPMENT, UTILITIES, AND IMPROVEMENTS:

a. Remove or alter existing work in such a manner as to prevent injury or damage to any portion of the existing work to remain.

b. Upon completion of the work, repair or replace portions of existing work, which have been damaged by Contractor's operations, toPreconstruction conditions at the expense of the Contractor.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01 12 00.00 25

SECURITY REQUIREMENTS

PART 1 GENERAL

1.1 DESCRIPTION OF WORK
1.2 SUBMITTALS
1.3 GENERAL SECURITY REQUIREMENTS AND GUIDANCE (ATOPSEC 1)
1.4 ANTITERRORISM (AT) LEVEL I TRAINING (ATOPSEC 2)
1.5 PHYSICAL SECURITY AND ACCESS CONTROL REQUIREMENTS (ATOPSEC 3)
1.6 SUSPICIOUS ACTIVITY REPORTING TRAINING (ATOPSEC 6)
1.7 PRE-SCREEN CANDIDATES USING E-VERIFY PROGRAM (ATOPSEC 14)
1.8 NON-US CITIZENS

PART 2 PRODUCTS

PART 3 EXECUTION

-- End of Section Table of Contents --

SECTION 01 12 00.00 25

SECURITY REQUIREMENTS

PART 1 GENERAL

1.1 DESCRIPTION OF WORK

This Section covers general requirements applicable to Antiterrorism and Operations Security (ATOPSEC) requirements to the Contract. Costs associated with the following execution of requirements must be at the expense of the Contractor.

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. Submit the following in accordance with Section 01 33 00, SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Antiterrorism (At) Level I Training

Suspicious Activity Reporting Training

Pre-Screen Candidates Using E-Verify Program

Non-Us Citizens

1.3 GENERAL SECURITY REQUIREMENTS AND GUIDANCE (ATOPSEC 1)

a. Complete initial training within 30 days of Notice To Proceed (NTP) or the date new contract personnel begin performance on the Contract. Submit documentation to the Government that includes the names of contract personnel trained and which training they completed within five business days from the completion of training. Maintain training records. Contractor personnel and vehicles are subject to search when entering Federal installations. Comply with Force Protection Condition (FPCON) measures, Random Antiterrorism Measures (commonly referred to as “RAMs”), and Health Protection Condition (HPCON) measures.

b. The Bonneville Project is open to the public during daylight hours. After dusk the outer security gates are locked and unmanned. Several internal gates may be locked, to prevent visitors from entering non-public areas. After passing through any gate that is locked and unattended, all personnel are required to wait for the gate to close before proceeding. Notify the Control Room if the gate fails to close.

c. Arrangement and scheduling of working hours and crews must be coordinated through the CO with the Project Staff. The working hours of the Project Staff are Mondays through Thursdays from 6:30 a.m. until 5:00 p.m. Fridays are non-working days. Working hours that extend past 5:00 p.m. weekdays or on weekends and holidays must be coordinated through the CO. Submit the intended working hours of staff on site and identify any employees working in any capacity in accordance with Subparagraph IDENTIFICATION OF EMPLOYEES.

d. Security of the Contractor's property and items furnished under this Contract, until the Government accepts items, are the Contractor's responsibility.

e. All Contractor personnel, subcontractor personnel, suppliers, etc. must comply with the posted rules.

(1) Access to the Contractor's work areas will be available from the highway gate closest to the work area: I-84 for work at Powerhouse 1 or on the Oregon shore, Washington SR14 via Dam Access Road for work at Powerhouse 2 or on the Washington shore.

(2) The nearest access points to cross the Columbia River are the Bridge of the Gods in Cascade Locks (toll bridge, 4 miles east) and the I-205 bridge in Portland (45 miles west).

(3) For pre-approved deliveries, the Contractor must escort deliveries from the nearest guard gate to the delivery site and back. For all deliveries going to either Powerhouse, the driver must obtain an Escorted Visitor badge, and the escort must be a person who is authorized for unescorted Powerhouse access.

f. Salespersons, personnel seeking employment, and personal visitors are not authorized to enter non-public areas of the Project.

g. Signs may be erected outside the project containing instructions for personnel seeking the Contractor. The content and location of the signs will be approved by the CO prior to erection. Posts or other means of support, if required, must be provided by the Contractor and removed when the Contract is completed. Any open post holes must be suitably backfilled, prior to the end of the shift in which posts are removed, and any other damage must be repaired to preconstruction conditions.

h. Prepare an organizational chart and revise whatever organizational changes occur. Maintain a complete organizational chart of all positions that will be working on the project.

1.4 ANTITERRORISM (AT) LEVEL I TRAINING (ATOPSEC 2)

All contract personnel must complete initial and annual refresher AT Level I awareness training. Online AT Level I awareness training is available at https://jko.jten.mil/ (website subject to change).

1.5 PHYSICAL SECURITY AND ACCESS CONTROL REQUIREMENTS (ATOPSEC 3)

a. All Contract personnel requiring physical access to a Federal facility must comply with the access control procedures of that location. Contract personnel requiring unescorted access to meet contract performance requirements on a Federal facility must provide a seven-year criminal background check. All costs associated with obtaining the criminal background report will be at the expense of the Contractor. The Project Reliability Compliance Coordinator (RCC) or Security Specialist will review the report, and will approve, disapprove, or revoke authorization for unescorted access based on the findings of the report. Base the report on a positive ID match using Social Security Number or fingerprints, and include all of the following:

(1) State and county check for the current residence, regardless of duration, and for each jurisdiction where the subject has lived or worked for six months or longer during the seven years immediately preceding the investigation.

(2) A search of Federal criminal records, a national crime index search of all US states and territories, and (where possible) an Office of Foreign Assets Control (OFAC) search for terrorists, narcotics traffickers, and blocked persons.

(3) For Contracts extending beyond seven years, the seven year criminal background check must be updated at least once every seven years for personnel requiring unescorted access to Powerhouses or other areas subject to NERC CIP regulations.

b. Contract personnel who are not approved for unescorted access to Federal facilities must be escorted. The Government is unable to escort Contractor personnel. One individual working for the prime contractor can request a tier 1 background check from the Government. Once approved, that individual can escort contract personnel.

c. Submit a complete, dated and signed, list of all Contractor and subcontractor personnel and their titles who will be working on the project at the Weekly Coordination Meeting. This listing must be revised and resubmitted when personnel changes occur.

d. Issuance of Government prescribed keys and cards. Each person requiring access for this Contract must obtain Government-prescribed ID/access cards (and keys if applicable) from the Project security office. Submit a Project-approved access request form and all accompanying documents not less than one week prior to the date when access is needed for any employee requiring access. For Contracts requiring access for more than 10 employees starting in the same week, provide all documents not less than two weeks prior to the date when access is required.

e. Return of Government prescribed keys and cards:

(1) Notify the Project security office immediately in the event of a termination for cause, reassignment, or a lost or stolen security item.

(2) Return all Government-prescribed cards/keys to the Project Security Office within 24 hours of personnel changes and within seven days of the final construction physical completion or termination of Contract. Failure to return any Government-prescribed cards or keys will result in a per item charge to the Contractor as defined below and may delay final payment. These fees will be deducted from the Contractor's progress payment.

(a) Physical Key: $5,000

(b) Multi-Dam Physical Key: $25,000

(c) Proximity Card: $200

(3) Contractor personnel who are on site intermittently (less than once per week) must return their security items to the Project security office for safekeeping when offsite.

f. Personnel Identity Verification (PIV) - All personnel, including

visitors, must provide a valid Government-issued photo ID prior to being granted access to non-public areas. Driver licenses that do not comply with the REAL ID Act of 2005 cannot be used as the sole source for identity proofing, and a second form of Government issued photo ID will be required.

g. Personally Identifiable Information (PII) - Encrypt or password protect all transmissions containing PII must be encrypted or the document(s) containing PII must be encrypted or password protected. Send all documents containing PII directly to the Project Reliability Compliance Coordinator (RCC) and/or Security Specialist only. Upon request, DoD Safe links can be sent to the Contractor for the upload of documents.

h. Identification of Contractor Vehicles

(1) Each Contractor vehicle must display a Government-furnished Project parking tag at all times while on the Project. Obtain the parking tags from the Project security office.

(2) Obtaining parking tags for each Contractor vehicle prior to its use on site and requiring each vehicle engaged in the work to display such identification, is the responsibility of the Contractor.

(3) Immediately return all Government-furnished Project parking tags to the Government for cancellation upon permanent removal of any Contractor vehicle from the Project. Failure to return any Government-furnished parking tag will result in a charge of $50 per item to the Contractor and may delay final payment. This fee will be deducted from the Contractor's monthly payment at no additional cost to the Government.

1.6 SUSPICIOUS ACTIVITY REPORTING TRAINING (ATOPSEC 6)

All Contract personnel must complete initial and annual refresher training. The training video is one minute in duration. (Army Video: https://www.dvidshub.net/video/872410/iwatch-army-timely-threat-reporting-59sec or Department of Homeland Security Video: https://www.dhs.gov/medialibrary/assets/video/53369).

1.7 PRE-SCREEN CANDIDATES USING E-VERIFY PROGRAM (ATOPSEC 14)

Comply with the requirements set forth in FAR 52.222-54 Employment Eligibility Verification and FAR Subpart 22.18 in using the E-Verify Program at https://www.e-verify.gov/ to meet the Contract employment eligibility requirements. Contractors are encouraged to cooperate with Federal and State agencies responsible for enforcing labor requirements to include eligibility for employment under United States immigration laws in accordance with FAR 22.102-1(i). Submit an initial list of verified/eligible candidates to the CO no later than 30 business days after NTP.

1.8 NON-US CITIZENS

a. Submit a scanned legible color copy of the Permanent Resident Card (if available) and passport for all personnel who are non-US citizens working on this Contract. (Note: Passports and Permanent Resident Cards both contain PII and must be protected.)

Note: Include Visitors Nationality, Name, Title and Organization or Company name.

b. Contractor personnel who are non-US citizens will not be permitted access to the Projects until the Foreign Visitor Authorization is received from U.S. Army Corps of Engineers Headquarters. Contractor personnel who are non-US citizens will not be permitted on-site until the Foreign Visitor Authorization is approved.

c.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01 15 00.03 25

PARTNERING: LEVEL ONE

PART 1 GENERAL

1.1 SUMMARY
1.2 ADMINISTRATIVE REQUIREMENTS
1.3 REFERENCES

PART 2 PRODUCTS

PART 3 EXECUTION

3.1 PARTNERING KICKOFF MEETING
3.2 PARTNERING PROGRESS MEETINGS

-- End of Section Table of Contents --

SECTION 01 15 00.03 25

PARTNERING: LEVEL ONE

PART 1 GENERAL

1.1 SUMMARY

This section defines the partnering requirements for the Contractor and the Government. The goal of partnering is to build and sustain trust among all stakeholders, improve communication and problem solving, reduce conflicts and disputes, identify and mitigate risk, and deliver the project safely, on schedule, and with quality. More information on the USACE Partnering principles can be found in EP 34-1-1.

1.2 ADMINISTRATIVE REQUIREMENTS

Participation in partnering is mandatory.

1.3 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only. Where conflicts arise, the project specifications will govern.

U.S. ARMY CORPS OF ENGINEERS (USACE)

EP 34-1-1 (2024) Partnering Playbook

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.1 PARTNERING KICKOFF MEETING

a. A Partnering Kickoff Meeting will be held after Contract award. The Partnering Kickoff Meeting will be scheduled by the Government on the same day as the Preconstruction Conference. Key Contractor staff will be required to attend in person. Key personnel include, but are not limited to, Project Manager, Site Superintendent, Project Engineer, Quality Control Manager, and Site Safety Health Officer. The Government may invite other key stakeholders as necessary.

b. The purpose of the Partnering Kickoff Meeting is to initiate the partnering process, develop a partnering charter, establish issue resolution procedures, and develop a shared risk register. The Government will develop a draft agenda and seek input from the Contractor for additional agenda items.

3.2 PARTNERING PROGRESS MEETINGS

a. After the Partnering Kickoff Meeting, ongoing Partnering Progress Meetings must occur yearly, with a three-hour duration. The frequency

of Partnering Progress Meetings may be adjusted throughout the project to accommodate project needs.

b. The Partnering Progress Meetings will be scheduled by the Government. Key Contractor staff will be required to attend in person. Key personnel include, but are not limited to, Project Manager, Site Superintendent, Project Engineer, Quality Control Manager, and Site Safety Health Officer.

c. The purpose of the Partnering Progress Meetings is to update the partnering charter, discuss issue resolution, and update the shared risk register. The Government will develop a draft agenda and seek input from the Contractor for additional agenda items.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01 22 00.00 25

MEASUREMENT AND PAYMENT

PART 1 GENERAL

1.1 GENERAL INFORMATION
1.2 PAYMENT FOR MATERIALS DELIVERED OFF-SITE
1.3 UNIT PRICE PAYMENT ITEMS
1.4 JOB PAYMENT ITEMS
1.5 MEASUREMENT AND PAYMENT
1.5.1 Mobilization and Demobilization, CLIN 0001
1.5.2 Demolition, CLIN 0002
1.5.3 Structural, CLIN 0003
1.5.4 Civil, CLIN 0004
1.5.5 Utilities, CLIN 0005
1.5.6 Landscape, CLIN 0006

PART 2 PRODUCTS

PART 3 EXECUTION

-- End of Section Table of Contents --

SECTION 01 22 00.00 25

MEASUREMENT AND PAYMENT

PART 1 GENERAL

1.1 GENERAL INFORMATION

In each instance, the Contract price for an item will constitute full compensation as herein specified, as shown, or as otherwise approved. The Contract price and payment will also constitute full compensation for all work incidental to completion of the item, unless such work is otherwise specifically mentioned for separate payment under another line item. In the event any work is required by the specifications Sections or by the Drawings and not specifically mentioned in the Paragraphs MEASUREMENT AND PAYMENT, separate or direct payment will not be made and all costs thereof are incidental to the work and included in the Contract prices and payments for all Contract Line Item Numbers (CLIN) listed in the price schedule.

1.2 PAYMENT FOR MATERIALS DELIVERED OFF-SITE

a. Pursuant to Federal Acquisition Regulation 52.232-5, Payments Under Fixed-Price Construction Contracts, materials delivered to the contractor at locations other than the site of the work may be taken into consideration in making payments, if included in the payment estimates and all the conditions of the General Provisions are fulfilled. Payment for items delivered to locations other than the worksite must be limited to:

   (1) Materials required by the technical provisions; or

   (2) Materials that have been fabricated to the point where they are identifiable to an item of work required under this contract; or

   (3) Items specifically listed below in paragraph b.

b. Payment for materials delivered off-site shall be made only after receipt of paid invoices listing the value of material and labor incorporated in the items along with a canceled check showing the prime contractor's title to the items delivered off-site. Payment for materials delivered off-site shall be limited to the following items:

1.3 UNIT PRICE PAYMENT ITEMS

Payment items for the work of this Contract on which the Contract unit price payments will be made are listed in Section 00 10 00, PRICE SCHEDULE, and described below. The unit price and payment made for each item listed will constitute full compensation for furnishing all plant, labor, materials, and equipment; performing all associated Contractor quality control, environmental protection, commissioning, preparation of working as-built drawing redlines, O&M manuals, tests and reports, meeting safety requirements; and for performing all work required for each of the unit price items.

1.4 JOB PAYMENT ITEMS

Payment items for the work of this Contract for which Contract job payments will be made are listed in Section 00 10 00, PRICE SCHEDULE, and described below. All costs for items of work, which are not specifically mentioned to be included in a particular job item, must be included in the listed job item most closely associated with the work involved. The job price and payment made for each item listed will constitute full compensation for furnishing all plant, labor, materials, and equipment; performing all associated Contractor quality control, environmental protection, commissioning, preparation of working as-built drawing redlines, O&M manuals, tests and reports, meeting safety requirements; and for performing all work required for which separate payment is not otherwise provided. Provide a schedule of values for job items prior to the first pay request. Update with each subsequent payment request.

MANDATORY ITEMS

1.5 MEASUREMENT AND PAYMENT

1.5.1 Mobilization and Demobilization, CLIN 0001

a. Measurement: Measurement will be made as a job for mobilizing and demobilizing all plant, equipment, fuel, supplies, materials, and personnel to and from the job site. This Contract Line Item Number (CLIN) applies to the Prime Contractor and all subcontractor mobilization and demobilization.

b. Payment: Payment will be made at the Contract amount under CLIN 0001 as stated in Contract Clause 252.236-7004, PAYMENT FOR MOBILIZATION AND DEMOBILIZATION (Dec 1991). Submit a schedule of mobilization and demobilization costs prior to submitting the first request for payment.

1.5.2 Demolition, CLIN 0002

a. Measurement: Measurement will be made as a job for providing all labor, equipment, materials, parts, and incidentals for the demolition and deconstruction scope as shown on the plans and described in the specifications. Testing and removal of both asbestos and lead, including removal of lead bridge counterweight and lead paint, asbestos brakes, are incidental to this CLIN. As-built drawings included as Attachment A14 are considered Government Furnished Information.

b. Payment: Payment will be made at the Contract amount under CLIN 0002.

1.5.3 Structural, CLIN 0003

a. Measurement: Measurement will be made as a job for providing all labor, equipment, materials, parts, and incidentals for the structural scope described in the S series of drawings and in accordance with project specifications.

b. Payment: Payment will be made at the Contract amount under CLIN 0003.

1.5.4 Civil, CLIN 0004

a. Measurement: Measurement will be made as a job for providing all labor, equipment, materials, parts, and incidentals for the civil scope described in the C series of drawings and in accordance with project

specifications.

b. Payment: Payment will be made at the Contract amount under CLIN 0004.

1.5.5 Utilities, CLIN 0005

a. Measurement: Measurement will be made as a job for providing all labor, equipment, materials, parts, and incidentals for the utilities scope described.

b. Payment: Payment will be made at the Contract amount under CLIN 0005.

1.5.6 Landscape, CLIN 0006

a. Measurement: Measurement will be made as a job for providing all labor, equipment, materials, parts, and incidentals for the landscaping scope described L series of drawings and in accordance with project specifications.

b. Payment: Payment will be made at the Contract amount under CLIN 0006.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01 32 01.00 25

PROJECT SCHEDULE

PART 1 GENERAL

1.1 REFERENCES
1.2 SUBMITTALS
1.3 QUALITY CONTROL
1.4 GENERAL REQUIREMENTS
1.5 BASIS FOR PAYMENT AND COST LOADING
1.6 SOFTWARE REQUIREMENTS
1.6.1 Critical Path Method
1.6.2 Milestones
1.6.3 Level of Detail Required
1.6.3.1 Activity Durations
1.6.3.2 Procurement Activities
1.6.3.3 Government Activities
1.6.3.4 Responsibility
1.6.3.5 Work Areas
1.6.3.6 Contract Line Item Number (CLIN)
1.6.3.7 Phase of Work
1.6.3.8 Category of Work
1.6.3.9 Definable Features of Work
1.6.3.10 Modification or Claim Number
1.6.4 Scheduled Project Completion and Activity Calendars
1.6.4.1 Project Start Date
1.6.4.2 Constraint of Last Activity
1.6.4.3 Early Project Completion
1.6.5 Interim Completion Dates
1.6.5.1 Start Phase
1.6.5.2 End Phase
1.6.5.3 Phase "X" Hammock
1.6.6 Default Progress Data Disallowed
1.6.7 Out-of-Sequence Progress
1.6.8 Negative Lags and Start to Finish Relationships
1.6.9 Calculation Mode
1.7 SUBMISSIONS
1.7.1 Preliminary Schedule
1.7.2 Initial Schedule
1.7.3 Standard Activity Coding Dictionary
1.8 SUBMISSION REQUIREMENTS
1.8.1 Data Submission
1.8.2 Narrative Report
1.8.3 Approved Changes Verification
1.8.4 Schedule Reports
1.8.4.1 Activity Report
1.8.4.2 Logic Report
1.8.4.3 Total Float Report
1.8.4.4 Earnings Report by CLIN

1.8.5 Gantt Chart
1.8.5.1 Continuous Flow
1.8.5.2 Project Milestone Dates
1.8.5.3 Critical Path
1.8.5.4 Banding
1.8.5.5 S-Curves
1.9 PERIODIC PROGRESS MEETINGS
1.9.1 Update Submission Following Progress Meeting
1.9.2 Status of Activities
1.9.2.1 Start and Finish Dates
1.9.2.2 Remaining Duration
1.9.2.3 Cost Completion
1.9.2.4 Percent Complete
1.9.2.5 Logic Changes
1.9.2.6 Other Changes
1.10 REQUESTS FOR TIME EXTENSIONS
1.10.1 Justification of Delay
1.10.2 Extension Submission Requirements
1.10.3 Additional Submission Requirements
1.11 DIRECTED CHANGES
1.12 OWNERSHIP OF FLOAT
1.13 PAYMENT
1.14 TRANSFER OF SCHEDULE DATA INTO RMS CM

PART 2 PRODUCTS

PART 3 EXECUTION

-- End of Section Table of Contents --

SECTION 01 32 01.00 25

PROJECT SCHEDULE

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this Specification to the extent referenced. The publications are referred to within the text by the basic designation only.

U.S. ARMY CORPS OF ENGINEERS (USACE)

ER 1-1-11 (2017) Administration -- Project Schedules

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00, SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Preliminary Schedule; G ECCC

Initial Schedule; G ECCC

Schedule Update

1.3 QUALITY CONTROL

Designate an authorized representative who must be responsible for the preparation of the schedule and all required updating (activity status) and preparation of reports. The authorized representative must have previously developed, created, and maintained at least two electronic schedules for projects similar in nature and complexity to this project and must be experienced in the use of the scheduling software that meets the requirements of this specification.

1.4 GENERAL REQUIREMENTS

a. Prepare for approval a Project Schedule, as described herein, pursuant to FAR 52.236-15, SCHEDULES FOR CONSTRUCTION CONTRACTS. Show in the schedule the sequence in which the Contractor proposes to perform the work and dates on which the Contractor contemplates starting and completing all schedule activities. The scheduling of the entire project is required. Scheduling of construction are the responsibility of the Contractor. Contractor management personnel must actively participate in its development. Coordinate with other Contractor's work at or near the site of the work under this Contract in accordance with FAR 52.236-8, OTHER CONTRACTS.

b. The approved Project Schedule must be used to measure the progress of

the work, to aid in evaluating time extensions, and to provide the basis of all progress payments.

1.5 BASIS FOR PAYMENT AND COST LOADING

Use the schedule as the basis for determining Contract earnings during each update period and therefore the amount of each progress payment. Lack of an approved schedule update, or qualified scheduling personnel, will result in the inability of the Contracting Officer (CO) to evaluate Contractor's progress for the purposes of payment. Failure of the Contractor to provide all required information will result in the disapproval of the preliminary, initial, and subsequent schedule updates. In the event schedule revisions have been directed by the CO and those revisions have not been included in subsequent revisions or updates, the CO may hold retainage up to the maximum allowed by Contract, each payment period, until such revisions to the Project Schedule have been made. Activity cost loading must be reasonable, as determined by the CO. The aggregate value of all activities coded to a Contract Line Item Number (CLIN) must equal the value of the CLIN on the Schedule.

1.6 SOFTWARE REQUIREMENTS

The schedule must be compatible with Primavera P6 Professional v25.

1.6.1 Critical Path Method

Use the Critical Path Method (CPM) of network calculation to generate the Project Schedule. Prepare the Project Schedule using the Precedence Diagram Method (PDM).

1.6.2 Milestones

Include milestone activities for each significant project event including but not limited to: Notice to Proceed (NTP), contractually required work windows, construction complete, and Contract complete.

1.6.3 Level of Detail Required

Include an appropriate level of detail in the Project Schedule. Failure to develop or update the Project Schedule or provide data at the appropriate level of detail, as determined by the CO, will result in its disapproval. The CO will consider, but is not limited to, the following characteristics and requirements to determine the appropriate level of detail:

1.6.3.1 Activity Durations

Submissions must follow the direction of the CO regarding reasonable activity durations. Reasonable durations are those that allow the progress of activities to be accurately determined between payment periods. Procurement activities are defined herein. Less than two percent of all non-procurement activities must have Original Durations (OD) greater than 20 work days or 30 calendar days.

1.6.3.2 Procurement Activities

Include activities associated with the submittal, approval, procurement, fabrication and delivery of long lead materials, equipment, fabricated assemblies, and supplies. Long lead materials and equipment are those materials that have a procurement cycle of over 90 calendar days. A

typical procurement sequence includes the string of activities: submit, approve, procure, fabricate, and deliver.

1.6.3.3 Government Activities

Government and other agency activities that could impact progress must be shown. These activities include, but are not limited to: submittal reviews, approvals, environmental permit approvals, inspections, lockout/tagout procedures, utility tie-in, Government-Furnished Equipment (GFE), and NTP for phasing requirements.

1.6.3.4 Responsibility

Identify all activities in the Project Schedule by the party responsible to perform the work. Responsibility includes, but is not limited to: the subcontractor, the Prime Contractor, or Government agency performing a given task. The responsible party for each activity must be identified by the Responsibility Code. Activities must not have more than one Responsibility Code.

1.6.3.5 Work Areas

Identify all activities in the Project Schedule by the work area in which the activity occurs. Activities must not be allowed to cover more than one work area. Define work areas based on resource constraints or space constraints that would preclude a resource, such as a particular trade or craft work crew, from working in more than one work area at a time due to restraints on resources or space. The work area of each activity must be identified by the Work Area Code and activities must not have more than one Work Area Code.

1.6.3.6 Contract Line Item Number (CLIN)

Code all activities to the CLIN on the Contract Line Item Schedule to which the activity belongs. CLIN Item code all activities, even when an activity is not cost loaded. An activity must not contain more than one CLIN Item Code.

1.6.3.7 Phase of Work

Identify all activities in the Project Schedule by the phase of work in which the activity occurs. Code construction phases proposed by the Contractor to allow filtering and organizing the schedule by construction packages. Activities must not contain work in more than one phase of work. Each activity must be identified with a single project phase and have only one Phase of Work code.

1.6.3.8 Category of Work

Assign a Category of Work Code to all Activities based upon the category of work to which the activity belongs. Category of work refers, but is not limited, to the procurement chain of activities including such items as construction submittals, approvals, procurement, fabrication, delivery, weather sensitive installation, non-weather sensitive installation, start-up, and testing. Assign a Category of Work Code to each activity. Each activity must have only one Category of Work Code.

1.6.3.9 Definable Features of Work

Assign a Definable Feature of Work Code to appropriate activities based on the definable feature of work to which the activity belongs. Definable Feature of Work is defined in Specification Section 01 45 00.00 25, QUALITY CONTROL. An activity must not have more than one Definable Feature of Work Code. Not all activities are required to be Definable Feature of Work Coded.

1.6.3.10 Modification or Claim Number

Assign an Activity code to any activity or sequence of activities added to the schedule as a result of a Contract Modification, when approved by the CO. Any activity that is added or changed by Contract modification or used to justify claimed time must be identified by a Mod or Claim Number that changed the activity. Activities must not belong to more than one modification or claim item. Approval to add these activities does not necessarily mean the Government accepts responsibility and, therefore, liability for such activities and any associated impacts to the schedule, but rather the Government recognizes such activities are appropriately added to the schedule for the purposes of maintaining a realistic and meaningful schedule. Such activities must not be Responsibility Coded to the Government unless approved. Existing activities must not normally be changed to reflect modifications.

1.6.4 Scheduled Project Completion and Activity Calendars

The schedule interval must extend from NTP date to the required final physical completion and Contract end dates. The Contract completion activity (End Project) must finish based on the required Contract duration in the accepted Contract proposal, as adjusted for any approved Contract time extensions. The first scheduled work period must be the day after NTP is received by the Contractor. Schedule activities on a calendar to which the activity logically belongs. Activities may be assigned to a seven-day calendar when the Contract assigns calendar day durations for the activity such as a Government Acceptance activity. If the Contractor intends to perform physical work less than seven days per week, schedule the associated activities on a calendar with non-work periods identified including weekends and holidays. Assign the Category of Work Code - Weather Sensitive Installation to those activities that are weather sensitive. Original durations must account for anticipated normal adverse weather. The Government will interpret all work periods not identified as non-work periods on each calendar as meaning the Contractor intends to perform work during those periods.

1.6.4.1 Project Start Date

Start the schedule no earlier than the date on which the NTP was acknowledged. Include as the first activity in the Project Schedule an activity called "Start Project." The "Start Project" activity must have an early start "ES" constraint date, equal to the date that the NTP was acknowledged, and a zero-day duration.

1.6.4.2 Constraint of Last Activity

Completion of the last physical activity in the schedule must be constrained by final construction physical completion date. Submission and acceptance of the last transmittal in the schedule must be constrained by the Contract end date. Schedule calculations must result in a negative

float when the calculated early finish date of the last activity is later than the Contract end date. Include as the last activity in the Project Schedule an activity called "End Project". The "End Project" activity must have a late finish "LF" constraint date equal to the Contract end date for the project, and a zero-day duration or by using the "project must finish by" date in the scheduling software. The schedule must have no constrained dates other than those specified in the Contract. There must only be two open ended activities: Start Project (or NTP) with no predecessor logic and End Project with no successor logic.

1.6.4.3 Early Project Completion

In the event the Project Schedule shows completion of the project prior to the final construction physical completion and/or Contract end date, identify those activities that it intends to accelerate and/or those activities that are scheduled in parallel to support the Contractor's "early" completion. Specifically address each of the activities noted in the narrative report at every Project Schedule update period to assist the CO in evaluating the Contractor's ability to actually complete prior to the Contract period. The last activity must have a late finish constraint equal to the Contract end date and the schedule must calculate positive float. The Government will not approve an early completion schedule with zero float on the longest path. The Government is under no obligation to accelerate activities for which it is responsible to support a proposed early Contract completion.

1.6.5 Interim Completion Dates

Contractually specified interim construction completion dates must be constrained to show negative float if the early finish date of the last activity in that phase falls after the interim construction completion date.

1.6.5.1 Start Phase

Include as the first activity for a project phase an activity called "Start Phase X" where "X" refers to the phase of work. The "Start Phase X" activity must have an "ES" constraint date equal to the date on which the NTP was acknowledged, and a zero-day duration.

1.6.5.2 End Phase

Include as the last activity in a project phase an activity called "End Phase X" where "X" refers to the phase of work. The "End Phase X" activity must have an "LF" constraint date equal to the date on which the NTP was acknowledged, and a zero-day duration.

1.6.5.3 Phase "X" Hammock

Include a hammock type activity for each project phase called "Phase X" where "X" refers to the phase of work. The "Phase X" activity must be logically tied to the earliest and latest activities in the phase.

1.6.6 Default Progress Data Disallowed

Actual Start and Finish dates must not be automatically updated by default mechanisms that may be included in the scheduling software systems. Actual Start (AS) and Actual Finish (AF) dates assigned during the updating process must match those dates provided from Contractor Quality Control Reports. Failure of the Contractor to document the AS and AF dates on the

Daily Quality Control Report for every in-progress or completed activity, and failure to ensure that the data contained on the Daily Quality Control reports is the sole basis for schedule updating must result in the disapproval of the Contractor's schedule and the inability of the CO to evaluate Contractor progress for payment purposes. Updating of the percent complete and the remaining duration of any activity must be independent functions. Program features which calculate one of these parameters from the other must be disabled.

1.6.7 Out-of-Sequence Progress

Activities that have progressed before all preceding logic has been satisfied (Out-of-Sequence Progress) will be allowed only on a case-by-case basis subject to approval by the CO. Propose logic corrections to eliminate all out of sequence progress or justify not changing the sequencing for approval prior to submitting an updated Project Schedule. Correct out of sequence progress that continues for more than two update cycles by logic revision, as approved by the CO.

1.6.8 Negative Lags and Start to Finish Relationships

Lag durations contained in the Project Schedule must not have a negative value. Do not use Start to Finish (SF) relationships.

1.6.9 Calculation Mode

Schedule calculations must retain the logic between predecessors and successors even when the successor activity starts and the predecessor activity has not finished. Software features that in effect sever the tie between predecessor and successor activities when the successor has started and the predecessor logic is not satisfied ("progress override") will not be allowed.

1.7 SUBMISSIONS

Provide the submissions as described below. The data, reports, and network diagrams required for each submission must be in accordance with Paragraph entitled SUBMISSION REQUIREMENTS.

1.7.1 Preliminary Schedule

Submit the Preliminary Schedule, defining the Contractor's planned operations for the first 90 calendar days, for approval within 15 calendar days after the NTP is acknowledged. The approved preliminary schedule must be used for payment purposes not to exceed 90 calendar days after NTP. Completely cost load the Preliminary Schedule to balance the Contract award CLINs shown on the Price Schedule. Detail it for the first 90 calendar days after NTP. It may be summary in nature for the remaining performance period. It must be early start and late finish constrained and logically tied as previously specified. The Preliminary Schedule forms the basis for the Initial Schedule specified herein and must include all of the required submissions and approvals identified in the Contract (for example, Quality Control Plan, Safety Plan, and Environmental Protection Plan), other construction, and non-construction activities intended to occur within the first 90 calendar days after NTP.

1.7.2 Initial Schedule

a. Submit the Initial Schedule for approval within 30 calendar days after

NTP. Provide a reasonable and realistic sequence of activities which represent all work through the entire Contract performance period. The Initial Schedule must be at a reasonable level of detail as determined by the CO.

b. Periodic Schedule Updates - Based on the result of progress meetings, specified in Paragraph entitled PERIODIC PROGRESS MEETINGS, submit periodic schedule updates. These submissions will enable the CO to assess Contractor's progress. If the Contractor fails or refuses to furnish the information and Project Schedule data, which in the judgment of the CO is necessary for verifying the Contractor's progress, the Contractor must be deemed not to have provided an estimate upon which progress payment may be made.

1.7.3 Standard Activity Coding Dictionary

Use the activity coding structure defined in the Standard Data Exchange Format (SDEF) in ER 1-1-11, Appendix A. This exact structure is mandatory, even if some fields are not used. A template SDEF compatible schedule backup file (sdef.prx) is available on the RMS website: http://rms.usace.army.mil/. The SDEF format is as follows:

SDEF Format			
Field	Activity Code	Length	Description
1	WRKP	3	Workers per Day
2	RESP	4	Responsible Party (e.g. GC, subcontractor, USACE)
3	AREA	4	Area of Work
4	MODF	6	Modification or REA number
5	BIDI	6	Bid Item (CLIN)
6	PHAS	2	Phase of Work
7	CATW	1	Category of Work
8	FOW1	10	Feature of Work (used up to 10 characters in length)
9	FOW2	10	Feature of Work (used up to 20 characters in length)
10	FOW3	10	Feature of Work (used up to 30 characters in length)

1.8 SUBMISSION REQUIREMENTS

Submit the following items for the Preliminary Schedule, Initial Schedule, and every Periodic Schedule update throughout the life of the project:

1.8.1 Data Submission

Provide the Project Schedule via email or file transfer site as required by the COR. Name files indicating the type of schedule: (Preliminary, Initial, or Update), Contract number, and Data Date.

1.8.2 Narrative Report

Provide a Narrative Report with the preliminary, initial, and each update of the Project Schedule, as the basis of the Contractor's progress payment request. Include: a description of activities along the two most critical paths, a description of current and anticipated problem areas or delaying factors and their impact, and an explanation of corrective actions taken or required to be taken. The narrative report is expected to communicate to the Government the Contractor's thorough analysis of the schedule output and its plans to compensate for any problems, either current or potential, which are revealed through that analysis. Identify and explain why any activities that, based on their calculated late dates, should have either started or finished during the update period, but did not.

1.8.3 Approved Changes Verification

Include only those project schedule changes in the schedule submission that have been previously approved by the CO. Specifically reference, on an activity by activity basis, all changes made since the previous period and relate each change to documented, approved schedule changes.

1.8.4 Schedule Reports

The format for each activity for the schedule reports listed below must contain: Activity Numbers, Activity Description, Original Duration, Remaining Duration, Early Start Date, Early Finish Date, Late Start Date, Late Finish Date, Total Float, Actual Start Date, Actual Finish Date, and Percent Complete. The following lists typical reports that will be requested, of which one or more may be requested for each schedule submission:

1.8.4.1 Activity Report

A list of all activities sorted according to activity number.

1.8.4.2 Logic Report

A list of detailed Preceding and Succeeding activities for every activity in ascending order by activity number.

1.8.4.3 Total Float Report

A list of all incomplete activities sorted in ascending order of total float. List activities which have the same amount of total float in ascending order of Early Start Dates. Do not show completed activities on this report.

1.8.4.4 Earnings Report by CLIN

A compilation of the Contractor's Total Earnings on the project from the NTP to the data date. This report must reflect the Earnings of specific activities based on the agreements made in the field and approved between the Contractor and CO at the most recent Monthly Progress Meeting. Provided that the Contractor has provided a complete schedule update, this report must serve as the basis of determining Contractor progress payments. Group activities by CLIN and sorted by activity numbers. This report must: sum all activities coded to a particular CLIN and provide a CLIN item percent earned value, and complete and sum all CLIN items to provide a total project percent complete. Printed report must contain, for

each activity: the Activity Number, Activity Description, Original Budgeted Amount, Total Quantity, Quantity to Date, Percent Complete (based on cost), and Earnings to Date.

1.8.5 Gantt Chart

The gantt chart is required for the Preliminary, Initial, and Periodic Updates. Depict and display the order and interdependence of activities and the sequence in which the work is to be accomplished. The CO will use, but is not limited to, the following conditions to review compliance with this Paragraph:

1.8.5.1 Continuous Flow

Diagrams must show a continuous flow from left to right with no arrows from right to left. Show the activity number, description, duration, and estimated earned value on the diagram.

1.8.5.2 Project Milestone Dates

Show dates on the diagram for start of project, any Contract required interim completion dates, and final construction physical completion and Contract end dates.

1.8.5.3 Critical Path

Clearly show the two critical paths.

1.8.5.4 Banding

Organize activities as directed to assist in the understanding of the activity sequence. Typically, this flow will group activities by category of work, work area, and/or responsibility.

1.8.5.5 S-Curves

Show earnings curves for projected early and late earnings and earnings to date.

1.9 PERIODIC PROGRESS MEETINGS

Progress meetings to discuss payment must include a monthly onsite meeting or other regular intervals as determined by CO. During this meeting describe, on an activity by activity basis, all proposed revisions and adjustments to the Project Schedule required to reflect the current status of the project. The CO will approve activity progress, proposed revisions, and adjustments as appropriate. The Contractor's Project Manager and Authorized Scheduler must attend the meeting with the CO.

1.9.1 Update Submission Following Progress Meeting

If required by the CO, submit a schedule update, not later than four working days after the monthly progress meeting. Include a complete update of the Project Schedule containing all approved progress, revisions, and adjustments, based on the regular progress meeting, reflecting only those changes made during the previous update meeting.

1.9.2 Status of Activities

Update information, including Actual Start (AS) Dates, Actual Finish (AF) Dates, Remaining Durations (RD), and Percent Complete will be subject to the approval of the CO. As a minimum, address the following items on an activity by activity basis during each progress meeting:

1.9.2.1 Start and Finish Dates

Accurately show the status of the Actual Start (AS) and Actual Finish (AF) dates for each activity currently in-progress or completed since the last update. Only assign AS dates when actual progress occurs on an activity.

1.9.2.2 Remaining Duration

Update the estimated Remaining Duration for each activity in-progress. Base time-based progress calculations on Remaining Duration for each activity.

1.9.2.3 Cost Completion

Update the earnings for each activity started. Payment will be based on earnings for each in-progress or completed activity. Payment for individual activities will not be made for work that contains quality defects. A portion of the overall project amount may be retained based on delays of activities.

1.9.2.4 Percent Complete

Update the percent complete for each activity started based on the realistic assessment of earned value. Activities which are complete except for remaining minor punch list work and which do not restrain the initiation of successor activities may be declared 100 percent complete.

1.9.2.5 Logic Changes

Specifically identify and discuss all logic changes pertaining to NTP on change orders, change orders to be incorporated into the schedule, Contractor proposed changes in work sequence, corrections to schedule logic for out-of-sequence progress, lag durations, and other changes that have been made pursuant to Contract provisions. The Government will only approve logic revisions for the purpose of keeping the schedule valid in terms of its usefulness in calculating a realistic completion date, correcting erroneous logic ties, and accurately sequencing the work.

1.9.2.6 Other Changes

Other changes required due to delays in completion of any activity or group of activities include:

a. Delays beyond the Contractor's control, such as strikes and unusual weather.

b. Delays encountered due to submittals, Government Activities, deliveries, or work stoppages which make re-planning the work necessary.

c. Changes required to correct a schedule which does not represent the actual or planned prosecution and progress of the work.

1.10 REQUESTS FOR TIME EXTENSIONS

In the event the Contractor believes it is entitled to an extension of the Contract performance period, final construction physical completion date, Contract end date, or any interim milestone date, furnish the following for a determination by the CO: justification, Project Schedule data, and supporting evidence as the CO may deem necessary. Submission of proof of excusable delay, based on revised activity logic, duration, and costs (updated to the specific date that the delay occurred) is obligatory to any approvals by the Government. In response to each Request For Proposal issued by the Government, submit a schedule impact analysis demonstrating whether or not the change contemplated by the Government impacts the critical path.

1.10.1 Justification of Delay

The Project Schedule must clearly display that the Contractor has used, in full, all the float time available for the work involved with this request. The CO's determination as to the number of allowable days of Contract extension must be based upon the Project Schedule updates in effect for the time period in question, and other factual information. Actual delays that are found to be caused by the Contractor's own actions, which result in a calculated schedule delay, will not be a cause for a time extension to the performance period, final construction physical completion date, Contract end date, or any interim milestone date.

1.10.2 Extension Submission Requirements

a. Submit a justification for each request for a change in the final construction physical completion and Contract end dates of less than two weeks based upon the most recent schedule update at the time of the NTP or constructive direction issued for the change. Such a request must be in accordance with the requirements of other appropriate Contract Clauses and must include, as a minimum:

   (1) A list of affected activities, with their associated Project Schedule activity number.

   (2) A brief explanation of the causes of the change.

   (3) An analysis of the overall impact of the changes proposed.

   (4) A sub-network of the affected area.

b. Identify activities impacted by a unique activity code contained in the required data file.

1.10.3 Additional Submission Requirements

For any requested time extension of over two weeks, the CO may request an interim update with revised activities for a specific change request. Provide this within four days of the CO's request.

1.11 DIRECTED CHANGES

If the NTP is issued for changes prior to settlement of price and/or time, submit proposed schedule revisions within seven calendar days of the NTP being issued. The proposed revisions to the schedule will be approved by the Government prior to inclusion of those changes within the Project

Schedule. If the Contractor fails to submit the proposed revisions, the CO may furnish the Contractor with suggested revisions to the Project Schedule. Include these revisions in the Project Schedule until revisions are submitted and final changes and impacts have been negotiated. If the Contractor has any objections to the revisions furnished by the CO, advise the CO within one week of receipt of the revisions. Regardless of the objections, continue to update the schedule with the CO's revisions until a mutual agreement in the revisions is reached. If the Contractor fails to submit alternative revisions within one week of receipt of the CO's proposed revisions, the Contractor will be deemed to have concurred with the CO's proposed revisions.

1.12 OWNERSHIP OF FLOAT

Float available in the schedule, at any time, must not be considered for the exclusive use of either the Government or the Contractor.

1.13 PAYMENT

Include an updated schedule with each progress payment request submitted. The updated schedule will be used as a basis to evaluate the Contractor's progress for purposes of payment. Lack of an updated schedule will result in an inability of the CO to perform a full evaluation of the Contractor's progress. Failure to provide all information, as specified, must result in the disapproval of the entire Project Schedule submission. The CO may withhold payment until the Contractor's schedule has been approved by the Government. In the case where Project Schedule revisions have been directed by the CO and those revisions have not been included in the Project Schedule, the CO may hold retainage up to the maximum allowed by Contract, each payment period, until revisions to the Project Schedule have been made.

1.14 TRANSFER OF SCHEDULE DATA INTO RMS CM

Download and upload the schedule data into the Resident Management System Contractor MODE (RMS CM), Section 01 45 00.15 25 RESIDENT MANAGEMENT SYSTEM CONTRACTOR MODE (RMS CM), prior to databases being transferred to the Government and is considered to be additional supporting data in a form and detail required by the CO pursuant to FAR 52.232-5, PAYMENTS UNDER FIXED-PRICE CONSTRUCTION CONTRACTS. The receipt of a proper payment request pursuant to FAR 52.232-27, PROMPT PAYMENT FOR CONSTRUCTION CONTRACTS, is contingent upon the Government receiving both acceptable and approvable hard copies and electronic export from RMS CM of the application for progress payment.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01 33 00

SUBMITTAL PROCEDURES

PART 1 GENERAL

1.1 GENERAL INFORMATION
1.2 SUBMITTALS
1.3 DEFINITIONS
1.3.1 Submittal Descriptions (SD)
1.3.2 Approving Authority
1.3.3 Work
1.4 SUBMITTAL DESIGNATION
1.5 SUBMITTAL REGISTER
1.5.1 Maintain Submittal Register
1.5.2 Use of Submittal Register
1.5.3 Government Approved Submittals
1.5.3.1 Quantity of Submittals
1.5.3.2 Processing of "G" Submittals.
1.5.4 Information Only Submittals
1.5.4.1 General
1.5.4.2 Processing of Information Only Submittals
1.6 SUBMITTAL COORDINATION
1.6.1 Submittal Coordination Meeting
1.6.2 Submittal Register ENG Form 4288-R
1.6.3 Submittal Register Updates
1.7 SCHEDULING
1.8 TRANSMITTAL FORM (ENG FORM 4025-R)
1.9 CROSS-REFERENCE (ENG FORM 4288-R/ENG FORM 4025-R)
1.10 SUBMITTAL PROCEDURES
1.10.1 e-Submittals
1.10.2 Approval of Submittals by the Contractor
1.10.3 Drawings
1.10.3.1 Printed Material
1.11 SAMPLES REQUIRING LABORATORY ANALYSIS
1.12 SAMPLES REQUIRING VISUAL INSPECTION
1.13 FIELD TEST REPORTS
1.14 PURCHASE ORDERS
1.15 CERTIFICATES OF COMPLIANCE
1.16 DISAPPROVED SUBMITTALS
1.17 APPROVED SUBMITTALS
1.18 APPROVED SAMPLES
1.19 CONTRACTOR'S FILES
1.20 PAYMENT
1.21 WITHHOLDING OF PAYMENT
1.22 CONTRACTOR APPROVAL STAMP

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

-- End of Section Table of Contents --

SECTION 01 33 00

SUBMITTAL PROCEDURES

PART 1 GENERAL

1.1 GENERAL INFORMATION

a. Make submittals as required by the Specifications. The Contracting Officer (CO) may request submittals in addition to those specified when deemed necessary to adequately describe the work covered in the respective Sections.

b. Use the same units of weights and measures on all submittals as those used in the Contract Drawings.

c. Each submittal must be complete and in sufficient detail to allow ready determination of compliance with Contract requirements.

d. The Contractor's Quality Control (CQC) System Manager must check and approve all items prior to submittal and stamp, sign, and date indicating action taken. Proposed deviations from the Contract requirements must be clearly identified. Submittals must include items such as: Contractor's, manufacturer's, or fabricator's drawings; descriptive literature including (but not limited to) catalog cuts, diagrams, operating charts or curves; test reports; test cylinders; samples; O&M manuals (including parts list); certifications; warranties; and other such required submittals.

e. Submittals requiring Government approval must be scheduled and approved prior to the acquisition of the material or equipment covered thereby.

f. Pick up and dispose of samples not incorporated into the work in accordance with manufacturer's Safety Data Sheets (SDS) and in compliance with existing laws and regulations.

g. Submittals requiring professional licensure, signature, and stamp must comply with all State professional licensing and registration requirements.

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. Submit the following in accordance with this Section:

SD-01 Preconstruction Submittals

Submittal Register; G

SD-07 Certificates

Authorized Shop Drawing Approvers

1.3 DEFINITIONS

1.3.1 Submittal Descriptions (SD)

Submittal requirements are specified in the technical Sections and in the preliminary submittal register (ENG Form 4288-R, Attachment A1). Submittals are identified by Submittal Description (SD) numbers and titles as follows:

SD-01 Preconstruction Submittals

a. Submittals required prior to start of construction work. Includes, but not limited to: schedules, tabular list of data, or tabular list including location, features, or other pertinent information regarding products, materials, equipment, or components to be used in the work.

b. Certificates of insurance.

c. Surety bonds.

d. List of proposed subcontractors.

e. List of proposed products.

f. Construction Progress Schedule.

g. Submittal register.

h. Schedule of prices.

i. Health and safety plans.

j. Work plan.

k. Contractor Quality Control (CQC) plan.

l. Environmental protection plan.

SD-02 Shop Drawings

a. Drawings, diagrams, and schedules specifically prepared to illustrate some portion of the work.

b. Diagrams and instructions from a manufacturer or fabricator for use in producing the product and as aids to the Contractor for integrating the product or system into the project.

c. Drawings prepared by or for the Contractor to show how multiple systems and interdisciplinary work will be coordinated.

SD-03 Product Data

a. Catalog cuts, illustrations, schedules, diagrams, performance charts, instructions and brochures illustrating size, physical appearance, and other characteristics of materials, systems, or equipment for some portion of the work.

b. Warranty language when the Contract requires extended product warranties.

SD-04 Samples

a. Fabricated or unfabricated physical examples of materials, equipment, or workmanship that illustrate functional and aesthetic characteristics of a material or product and establish standards by which the work can be judged.

b. Color samples from the manufacturer's standard line (or custom color samples if specified) to be used in selecting or approving colors for the project.

c. Field samples and mock-ups constructed on the project site establish standards by which the ensuing work can be judged. Includes assemblies or portions of assemblies which are to be incorporated into the project and those which will be removed at conclusion of the work.

SD-05 Design Data

Design calculations, mix designs, analyses, or other data pertaining to a part of work.

SD-06 Test Reports

a. Report signed by authorized official of testing laboratory that a material, product, or system identical to the material, product, or system to be provided has been tested in accordance with specified requirements. (Testing must have been within three years of date of Contract award for the project.)

b. Report which includes findings of a test required to be performed by the Contractor on an actual portion of the work or prototype prepared for the project before shipment to job site.

c. Report which includes finding of a test made at the job site or on sample taken from the job site, on portion of work during or after installation.

d. Investigation reports.

e. Daily logs and checklists.

f. Final acceptance test and operational test procedure.

g. Any reports required by the CO or designated representative to assure successful completion of tasks during the life of the Contract.

SD-07 Certificates

a. Statements printed on the manufacturer's letterhead and signed by responsible officials of manufacturer of product, system, or material attesting that product, system, or material meets specification requirements. Must be dated after award of project Contract and clearly name the project.

b. Document required of Contractor, or of a manufacturer, supplier, installer, or subcontractor through Contractor, the purpose of which is to further quality of orderly progression of a portion of the work by documenting procedures, acceptability of methods or personnel

qualifications.

c. Confined space entry permits.

d. Text of posted operating instructions.

SD-08 Manufacturer's Instructions

Preprinted material describing installation of a product, system, or material, including special notices and SDS concerning impedances, hazards, and safety precautions.

SD-09 Manufacturer's Field Reports

a. Documentation of the testing and verification actions taken by manufacturer's representative at the job site, in the vicinity of the job site, or on a sample taken from the job site, on a portion of the work, during or after installation, to confirm compliance with manufacturer's standards or instructions. The documentation must be signed by an authorized official of a testing laboratory or agency and must state the test results; and indicate whether the material, product, or system has passed or failed the test.

b. Factory test reports.

SD-10 Operation and Maintenance Data

a. Data that is furnished by the manufacturer, or the system provider, to the equipment operating and maintenance personnel, including manufacturer's help and product line documentation necessary to maintain and install equipment. This data is needed by operating and maintenance personnel for the safe and efficient operation, maintenance, and repair of the item.

b. This Data is intended to be incorporated in an operations and maintenance manual or control system.

SD-11 Closeout Submittals

a. Documentation to record compliance with technical or administrative requirements or to establish an administrative mechanism.

b. Special requirements necessary to properly close out a construction Contract. For example, Record Drawings and as-built drawings.

1.3.2 Approving Authority

Office or designated person authorized to approve submittal.

1.3.3 Work

As used in this Section, on- and off-site construction required by Contract documents, including labor necessary to produce submittals (except those SD-01 Pre-Construction Submittals noted above) construction, materials, products, equipment, and systems incorporated or to be incorporated in such construction.

1.4 SUBMITTAL DESIGNATION

Submittals are classified as follows:

a. Government Approved (G). Government approval is required for critical materials, deviations, an "or equal" decision, equipment whose compatibility with the entire system must be checked, and other items as designated by the CO.Within the terms of Section Contract Clause 52.236-21, SPECIFICATIONS AND DRAWINGS FOR CONSTRUCTION, they are considered to be "shop drawings".

b. Information Only. Submittals not requiring Government approval will be for information only. Within the terms of the Contract Clause 52.236-21, SPECIFICATIONS AND DRAWINGS FOR CONSTRUCTION, these submittals are not considered to be "shop drawings".

1.5 SUBMITTAL REGISTER

1.5.1 Maintain Submittal Register

a. Prepare and maintain Submittal Register, ENG Form 4288-R, see Section 01 45 00.15 25, RESIDENT MANAGEMENT SYSTEM CONTRACTOR MODE (RMS CM), as the work progresses. Do not change data which is output in columns (c), (d), (e), and (f) as delivered by Government; retain data which is output in columns (a), (g), (h), and (i) as approved. This list may not be all inclusive and additional submittals may be required. Do not preassign transmittal numbers when preparing the submittal register. The preliminary and then the approved submittal register will become the scheduling documents and will be updated monthly and used to control submittals throughout the life of the Contract.

b. The Government will provide the preliminary submittal register in electronic format with the following fields completed, to the extent that will be required by the Government during subsequent usage.

Column (c): Lists Specification Section in which submittal is required.

Column (d): Lists each submittal description (SD No. and type, e.g. SD-02 Shop Drawings) required in each Specification Section.

Column (e): Lists one principal paragraph in Specification Section where a material or product is specified. This listing is only to facilitate locating submitted requirements. Do not consider entries in column (e) as limiting project requirements.

c. Thereafter, track all submittals by maintaining a complete list, including completion of all data columns, including dates on which submittals are received and returned by the Government.

1.5.2 Use of Submittal Register

Submit submittal register with project schedule and QC plan. Verify that all submittals required for work are listed and add missing submittals. Coordinate, update, and complete the fields on the submitted register in RMS CM with the project schedule and QC plan.

1.5.3 Government Approved Submittals

1.5.3.1 Quantity of Submittals

SD-01, SD-02, SD-03, and SD-05 through SD-11 submittals: Upload submittals with corresponding ENG 4025-R transmittal forms as outlined in Paragraph entitled E-SUBMITTALS. SD-04 submittals: Submit two samples of "G" submittals with two corresponding ENG 4025-R transmittal forms, unless otherwise specified. Upon completion of review, "G" submittal copies will be marked with an action code, dated, electronically signed, and electronically returned to the Contractor as specified below:

1.5.3.2 Processing of "G" Submittals.

a. Submittals will be reviewed and processed as follows:

(1) Approved as Submitted (Action Code "A"): Submittals which can be approved without correction will be stamped "Approved" and returned electronically to the Contractor.

(2) Approved, Except as Noted on Drawings (Action Code "B"): Submittals which have only minor discrepancies will be annotated in red to indicate necessary corrections. Marked material will be stamped "Approved Except as Noted" and returned electronically to the Contractor for correction.

(3) Approved, Except as Noted on Drawings, Resubmission Required (Action Code "C"): Submittals which are incomplete or require more than minor corrections will be annotated in red to indicate necessary corrections. Marked material will be stamped "Approved Except as Noted - Resubmission Required" and returned electronically to the Contractor for correction. Resubmittal of only those items needing correction required.

(4) Will be Returned by Separate Correspondence (Action Code "D"): Submittals will be addressed by Serial Letter and the Contractor must respond according to instructions in the letter.

(5) Disapproved (Action Code "E"): Submittals which are fundamentally in error, cover wrong equipment or construction, or require extensive corrections, will be returned to the Contractor stamped "Disapproved." Submittal will be returned electronically to the Contractor and an explanation will be furnished on the submitted material or on ENG Form 4025-R indicating reason for disapproval. Complete resubmittal required.

(6) Receipt Acknowledged (Action Code "F"): Submittals stamped "Receipt Acknowledged" are complete and returned electronically to the Contractor.

(7) Other (Specify) (Action Code "G"): Submittals requiring other specific action will be stamped "Other (Specify)" and returned with a description in the Remarks section. Submittal will be returned electronically to the Contractor. Resubmittal of only those items needing correction required.

(8) Receipt Acknowledged, Does Not Comply (Action Code "X"): Submittals which have been received but do not comply with Contract requirements. Submittal will be returned electronically

to the Contractor stamped "Receipt Acknowledged, Does Not Comply" and an explanation will be furnished. Corrective action and resubmittal required.

b. Resubmittal will not be required for approved submittals unless subsequent changes are made by Contractor or by Contract modification. For submittals required to be resubmitted, make corrections required, note any changes by dating the revisions to correspond with the change request date, and promptly resubmit the corrected material. Resubmittals must be associated with the "parent" by use of sequential numbers (for example, resubmittal of transmittal 8 will be 8.1, 8.2, etc). Government costs incurred after the first resubmittal may be charged to the Contractor.

1.5.4 Information Only Submittals

1.5.4.1 General

Upload submittal with corresponding ENG 4025 forms as outlined in Paragraph entitled E-SUBMITTALS. Normally information only submittals will not be returned. Government approval is not required on information only submittals. These submittals will be used for information purposes. The Government reserves the right to require the Contractor to resubmit any item found not to comply with the Contract. This does not relieve the Contractor from the obligation to furnish material conforming to the plans and specifications; will not prevent the CO from requiring removal and replacement of nonconforming material incorporated in the work; and does not relieve the Contractor of the requirement to furnish samples for testing by the Government laboratory or for check testing by the Government in those instances where the technical specifications so prescribe.

1.5.4.2 Processing of Information Only Submittals

Submit information only submittals electronically prior to delivery of the material or equipment to the job site. ENG Form 4025-R must be marked with the words "Contractor approved - information copy only" in the REMARKS block of the form. Submittals will be monitored and spot checks made. When such checks indicate noncompliance, the Contractor will be notified by the same method used for Government Approval submittals. Resubmittal of nonconforming information only submittals must be reclassified Government Approval ("G") and re-submitted electronically for approval.

1.6 SUBMITTAL COORDINATION

1.6.1 Submittal Coordination Meeting

Meet with the CO, after the preconstruction conference and before any submittals are sent to the CO, to further develop the preliminary submittal register (ENG Form 4288-R). During the meeting identify and group all required items into the categories as shown in Paragraph entitled SUBMITTAL DESIGNATION.

1.6.2 Submittal Register ENG Form 4288-R

Coordinate the submittal register with the progress schedule and submit within 30 days of Notice to Proceed. In preparing the final document, allow a minimum of 30 days for review and approval, and possible resubmittal of each item on the register.

1.6.3 Submittal Register Updates

The CQC System Manager must review the listing at least every 30 days and take appropriate action to maintain an effective system. Submit copies of updated or corrected listings to the CO at least every 30 days in the quantity specified.

1.7 SCHEDULING

Schedule and submit concurrently submittals covering component items forming a system or items that are interrelated. Adequate time (a minimum of 30 calendar days) must be allowed and shown on the register for Government review and approval. No delay damages or time extensions will be allowed for time lost in late submittals.

a. Coordinate scheduling, sequencing, preparing, and processing of submittals with performance of work so that work will not be delayed by submittal processing. Allow for potential resubmittal of requirements.

b. Submittals called for by the Contract documents must be listed on the register. Approval by the CO does not relieve the Contractor of supplying submittals required by the Contract documents but which have been omitted from the register.

c. Re-submit register and annotate monthly with actual submission and approval dates. When all items on the register have been fully approved, no further re-submittal is required.

d. Carefully control procurement operations to ensure that each individual submittal is made on or before the Contractor scheduled submittal date shown on the approved "Submittal Register".

1.8 TRANSMITTAL FORM (ENG FORM 4025-R)

Use the sample transmittal form (ENG Form 4025-R) for submitting both Government Approval and Information Only submittals in accordance with the instructions on the reverse side of the form. These forms are included in the RMS CM software that the Contractor is required to use for this Contract, per Section 01 45 00.15 25, RESIDENT MANAGEMENT SYSTEM CONTRACTOR MODE (RMS CM). Fill forms in completely prior to submittal. Exercise special care to ensure proper listing of the specification paragraph number(s) and Contract Drawing sheet number(s) pertinent to the data submitted for each item. List each submittal item separately on the form, naming subcontractor, supplier, or manufacturer; applicable specification paragraph number(s); drawing/sheet number; pay item number; and any other information needed to identify the item, define its use, and locate it in the work. One or more ENG 4025-R forms may be used per Specification Section, however, DO NOT include more than one Specification Section per transmittal.

1.9 CROSS-REFERENCE (ENG FORM 4288-R/ENG FORM 4025-R)

To provide a cross-reference between the approved submittal register and transmittal forms, the Contractor must record the "transmittal numbers" assigned when submitting items in column "Transmittal No." of the ENG Form 4288-R. The numbers in column "Transmittal No." of the submittal register must correspond to the column "Item No." on ENG Form 4025-R.

1.10 SUBMITTAL PROCEDURES

Upload submittals in accordance with subparagraphs entitled Government Approved Submittals and Information Only Submittals, unless indicated otherwise in the technical specifications. Submit a complete collated "reviewers copy" with one ENG 4025-R form and attachments (not originals). Submit hard copy and electronic copies of Record (as-built) Drawings and O&M Manuals in accordance with the applicable Specification Sections.

1.10.1 e-Submittals

The intent of electronic submittals is to expedite the construction process by reducing paperwork, improving information flow, and decreasing turnaround time. Transmit all submittals, including either an electronically signed or signed scanned copy of form ENG 4025, to the Government electronic (PDF) format via email or other secure internet accessible service such as ShareFile, ProCore, Submittal Exchange, or a FTP site that utilize 256-bit SSL encryption and hosted as SAS70 Type II compliant data centers. Submittals must be entered and tracked using RMS CM (see Section 01 45 00.15 25, RESIDENT MANAGEMENT SYSTEM CONTRACTOR MODE (RMS CM). At completion of Contract closeout, provide a minimum of two archival discs (DVD-R) that include all documents and tracking logs. Color samples, color charts, or physical material samples shall not be transmitted electronically. E-Submittals will not relieve the Contractor from following all applicable requirements within this and other Specifications Sections and Contract Clauses.

1.10.2 Approval of Submittals by the Contractor

a. Submit names and titles of Contractor Authorized Shop Drawing Approvers to the CO with the ENG Form 4288-R. Supplier or subcontractors certifications are not acceptable as meeting this requirement.

b. Before submittal to the CO, the Contractor's Authorized Shop Drawing Approvers must review and correct shop drawings prepared by subcontractors, suppliers, and itself, for completeness and compliance with Drawings and Specifications. Do not use red markings for correcting material to be submitted. Red markings are reserved for CO's use.

c. Submittals for Government Approval must first be Contractor-approved and stamped, see Paragraph entitled CONTRACTOR APPROVAL STAMP.

d. Submittals not conforming to the requirements of this Section will be returned to the Contractor for correction and resubmittal.

1.10.3 Drawings

Each drawing must be not larger than D size (22 inches high by 34 inches wide), include a title block in lower right hand corner, and a 3- by 4-inch clear area adjacent. The title block must contain vendor's name, Contract number, description of item(s), Contract line item number, and a revision block. Separate drawings are required for each Contract line item. Where drawings are submitted for assemblies of more than one piece of equipment or systems, of components dependent on each other for compatible characteristics, complete information must be submitted on all such related components at the same time. The information must be complete and the sequence of drawing submittal must be such that all information is

available for reviewing each drawing. Drawings for all items and equipment, of special manufacture or fabrication, must consist of complete assembly and detail drawings. All revisions after initial submittal must be shown by number, date, and subject in revision block. Any drawing submitted, that is not of satisfactory quality, will be returned and must be corrected and re-submitted.

1.10.3.1 Printed Material

All requirements for shop drawings apply to catalog cuts, illustrations, printed specifications, or other data submitted, except the 3- by 4-inch clear area adjacent to the title block is not mandatory. Mark out inapplicable portions of the documents. Applicable items such as model numbers, sizes, and accessories must be indicated by arrow or highlighted.

1.11 SAMPLES REQUIRING LABORATORY ANALYSIS

See Section 01 45 00.00 25, QUALITY CONTROL, for procedures and address for samples requiring Government testing.

1.12 SAMPLES REQUIRING VISUAL INSPECTION

Coordinate samples requiring only physical inspection for appearance and suitability with the on-site Government Quality Assurance Representative (GQAR).

1.13 FIELD TEST REPORTS

Deliver routine tests such as soil density, concrete deliveries, and repetitive pressure testing to the GQAR with the daily Quality Control reports. See Section 01 45 00.00 25, QUALITY CONTROL.

1.14 PURCHASE ORDERS

a. Each purchase order issued by the Contractor for materials and equipment to be incorporated into the work must:

(1) Clearly identify the applicable Contract number

(2) Carry an identifying number

(3) Be in sufficient detail to identify the material being purchased

(4) Indicate a definite delivery date.

b. Furnish copies of purchase orders to the CO when the Contractor requests assistance for expediting deliveries of equipment or materials, or when requested by the CO for the purpose of quality assurance review.

1.15 CERTIFICATES OF COMPLIANCE

Submit an electronic copy of certificates required for demonstrating proof of compliance of materials with specification requirements. Each certificate must be signed by an official authorized to certify on behalf of the manufacturing company, contain the name and address of the Contractor, the project name and location, and the quantity and date or dates of shipment or delivery to which the certificates apply. Copies of

laboratory test reports submitted with certificates must contain the name and address of the testing laboratory and the date or dates of the tests to which the report applies. Certification shall not be construed as relieving the Contractor from furnishing satisfactory material if, after tests are performed on selected samples, the material is found not to meet the specific requirements.

1.16 DISAPPROVED SUBMITTALS

a. Make all corrections required by the CO and promptly furnish a corrected submittal in the form specified for the initial submittal. If the Contractor considers any correction or notation on the returned submittals to constitute a change to the Contract drawings or Specifications; notice as required under Contract Clause 52.243-4, CHANGES, is to be given to the CO. The Contractor must be responsible for the dimensions and design of connection details and construction of work. Failure to point out deviations may result in the Government requiring rejection and removal of such work at the Contractor's expense.

b. If changes are necessary to submittals, make such revisions and re-submit the submittals in accordance with the procedures above. No item of work requiring a submittal change is to be accomplished until the changed submittals are approved.

1.17 APPROVED SUBMITTALS

a. The CO's approval or acceptance of submittals shall not be construed as a complete check, and indicates only that the general method of construction, materials, detailing, and other information are satisfactory.

b. Approval or acceptance will not relieve the Contractor of the responsibility for any error which may exist, as the Contractor under the Contractor Quality Control (CQC) requirements of this Contract must be responsible for dimensions, the design of adequate connections and details, and the satisfactory construction of all work.

c. After submittals have been approved by the CO, no resubmittal for the purpose of substituting materials or equipment will be considered unless accompanied by an explanation of why a substitution is necessary.

1.18 APPROVED SAMPLES

a. Approval of a sample is only for the characteristics or use named in such approval and must not be construed to change or modify any Contract requirements. Before submitting samples, ensure that the materials or equipment will be available in quantities required. No change or substitution will be permitted after a sample has been approved.

b. If requested, approved and/or disapproved samples, including those which may be damaged in testing, will be returned at the expense of the Contractor upon completion of the Contract.

c. Failure of any materials to pass the specified tests will be sufficient cause for refusal to consider, under this Contract, any further samples of the same brand or make of that material. Government reserves the right to disapprove any material or equipment which

previously has proved unsatisfactory in service.

d. Samples of various materials or equipment delivered on the site or in place may be taken by the CO for testing. Samples failing to meet Contract requirements will automatically void previous approvals. Contractor must replace such materials or equipment to meet Contract requirements.

e. Approval of the Contractor's samples by the CO does not relieve the Contractor of his/her responsibilities under the Contract.

1.19 CONTRACTOR'S FILES

Maintain "Approved as Accepted" and "Approved, Except as Noted on Drawings" (Action Codes "A" and "B") shop drawing files in fabrication shops and at field sites for Government use.

1.20 PAYMENT

Separate payment will not be made for submittals, and all costs associated therein must be included in the applicable unit prices or job prices contained in the Price Schedule. Payment will not be made for any material or equipment which does not comply with Contract requirements.

1.21 WITHHOLDING OF PAYMENT

Payment for materials incorporated in the work will not be made if required approvals have not been obtained. No payment will be made for any materials incorporated into the work for Information Only submittals found to contain errors.

1.22 CONTRACTOR APPROVAL STAMP

Stamps used by the Contractor on the submittal data to certify that the submittal meets Contract requirements must be similar to the following:

CONTRACTOR

(Firm Name)

_____ Approved

_____ Approved with corrections as noted on submittal data and/or attached sheets(s).

SIGNATURE: _____

TITLE: _____

DATE: _____

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01 35 26.00 25

GOVERNMENTAL SAFETY REQUIREMENTS

PART 1 GENERAL

1.1 REFERENCES
1.2 DEFINITIONS
1.2.1 Site Safety and Health Officer (SSHO)
1.2.1.1 Level One SSHO
1.2.1.2 Level Two SSHO
1.2.1.3 Level Three SSHO
1.2.1.4 Alternate SSHO
1.2.2 Competent Person (CP)
1.2.3 Qualified Person (QP)
1.3 SUBMITTALS
1.4 PUBLIC HEALTH EMERGENCIES
1.5 REFERENCED ENGINEER FORMS (ENG)
1.6 MONTHLY EXPOSURE REPORTS
1.7 REGULATORY REQUIREMENTS
1.8 SITE QUALIFICATIONS, DUTIES, AND MEETINGS
1.8.1 Site Safety and Health Officer (SSHO)
1.8.1.1 Qualifications of SSHO
1.8.1.2 Duties of SSHO
1.8.1.3 Safety Meetings
1.8.2 Roles and Responsibilities of Prime Contractor and SSHO
1.8.3 Dredging Contract Site Safety and Health Officer(s)(SSHOs) Requirements
1.8.3.1 Dredging SSHO Personnel Requirements
1.8.4 Crane Operators
1.8.5 Competent Person for Fall Protection
1.8.6 Competent Person for Confined Space Entry
1.9 ACCIDENT PREVENTION PLAN (APP)
1.9.1 Accident Prevention Plan (APP)
1.9.2 Names and Qualifications
1.9.3 Plans
1.9.3.1 Electrical Safety Plan (ESP)
1.9.3.2 Site-Specific Energy Control Plan (SSECP)
1.9.3.3 Fall Protection and Prevention Plan (FPP)
1.9.3.4 Scaffold Work Plan
1.9.3.5 Hearing Conservation Program (HCP)
1.9.3.6 Respiratory Protection Program (RPP)
1.9.3.7 Lead, Cadmium, and Chromium Compliance Plan
1.9.3.8 Asbestos Hazard Abatement Plan
1.9.3.9 Site Demolition Plan
1.10 ACTIVITY HAZARD ANALYSIS (AHA)
1.10.1 AHA Management
1.10.2 AHA Signature Log
1.11 SITE SAFETY REFERENCE MATERIALS
1.12 EMERGENCY MEDICAL TREATMENT

1.13 NOTIFICATIONS AND REPORTS
1.13.1 Accident Notification
1.13.2 Accident Reports
1.13.3 LHE Inspection Reports
1.13.4 Certificate of Compliance
1.13.5 Third Party Certification of Barge-Mounted Mobile Cranes and Mobile Equipment
1.14 HOT WORK PERMIT
1.14.1 Permit and Personnel Requirements
1.14.2 Work Around Flammable Materials
1.15 CONFINED SPACE ENTRY REQUIREMENTS
1.15.1 Rescue Procedures and Coordination with Local Emergency Responders
1.16 SEVERE WEATHER PLAN FOR MARINE ACTIVITIES (SWPMA)

PART 2 PRODUCTS

PART 3 EXECUTION

3.1 CONSTRUCTION AND OTHER WORK
3.1.1 Worksite Communication
3.1.2 Hazardous Material Exclusions
3.1.3 Unforeseen Hazardous Material
3.2 EQUIPMENT
3.2.1 Use of Explosives
3.2.2 Load Handling Equipment (LHE)
3.2.3 Cranes, Hoists, and Rigging
3.2.4 Standard Lift Plans
3.2.5 Critical Lift Plan
3.2.6 Scaffolding
3.3 ELECTRICAL
3.3.1 Electrical Work
3.3.2 Qualifications
3.3.3 Arc Flash
3.3.4 Grounding
3.3.5 Testing

-- End of Section Table of Contents --

SECTION 01 35 26.00 25

GOVERNMENTAL SAFETY REQUIREMENTS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN BUREAU OF SHIPPING (ABS)

ABS 152	Guide for Certification of Lifting Appliances

AMERICAN PETROLEUM INSTITUTE (API)

API Spec 2C	Offshore Pedestal-mounted Cranes

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI Z244	Control of Hazardous Energy

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

ASME B30.8	Floating Cranes and Floating Derricks
ASME B30-PKG	All Volumes of the Safety Standard

AMERICAN SOCIETY OF SAFETY PROFESSIONALS (ASSP)

ANSI/ASSP A10.34	(2021) Protection of the Public on or Adjacent to Construction Sites

ASTM INTERNATIONAL (ASTM)

ASTM F855	(2025) Standard Specifications for Temporary Protective Grounds to Be Used on De-energized Electric Power Lines and Equipment

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE 1048	(2016) Guide for Protective Grounding of Power Lines
IEEE C2	(2023) National Electrical Safety Code

INTERNATIONAL SAFETY EQUIPMENT ASSOCIATION (ISEA)

ANSI/ISEA Z89.1	(2014; R 2019) American National Standard for Industrial Head Protection

NATIONAL ELECTRICAL CONTRACTORS ASSOCIATION (NECA)

NESC	National Electric Safety Code

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 10	(2026) Standard for Portable Fire Extinguishers
NFPA 51B	(2024) Standard for Fire Prevention During Welding, Cutting, and Other Hot Work
NFPA 70	(2026; TIA 26-1; ERTA 26-1; TIA 26-2; TIA 26-3; TIA 26-4; TIA 26-5; TIA 26-6; TIA 26-7; ERTA 26-2; ERTA 26-3) National Electrical Code
NFPA 70E	(2024) Standard for Electrical Safety in the Workplace
NFPA 241	(2022; ERTA 22-1) Standard for Safeguarding Construction, Alteration, and Demolition Operations
NFPA 306	(2024) Standard for the Control of Gas Hazards on Vessels

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2024) Safety -- Safety and Occupational Health (SOH) Requirements

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910	Occupational Safety and Health Standards
29 CFR 1910.269	Electric Power Generation, Transmission, and Distribution
29 CFR 1915	Confined and Enclosed Spaces and Other Dangerous Atmospheres in Shipyard Employment
29 CFR 1926	Safety and Health Regulations for Construction
29 CFR 1926.950	Occupational Safety and Health Administration
CPL 2.100	(1995) Application of the Permit-Required Confined Spaces (PRCS) Standards, 29 CFR 1910.146

1.2 DEFINITIONS

The following definitions are for the convenience of the reader. If there is a referenced document in the text of this specification section, that is the document that should define terms for that paragraph. If further clarification is needed, contact the Contracting Officer.

1.2.1 Site Safety and Health Officer (SSHO)

A Contractor Employee that is responsible for overseeing and ensuring implementation of the prime Contractor's Safety and Occupational Health (SOH) program according to the Contract, EM 385-1-1, applicable federal, state, and local requirements.

1.2.1.1 Level One SSHO

A designated employee with full-time SOH responsibility that meets the following requirements (reference EM 385-1-1 2-3.b for additional information):

a. Initial SOH Training. OSHA 30-hour general industry or construction safety training.

b. Competency Training Requirements. Maintained competency by taking 24 hours of documented formal classroom or online.

c. Experience Requirements. At least five years of cumulative safety experience, within the last ten years, managing or implementing a SOH program on projects similar in industry type, size, and complexity as the project described in the contract scope of work.

1.2.1.2 Level Two SSHO

A designated employee with collateral duty SOH responsibility that meets the following requirements (reference EM 385-1-1 2-3.b for additional information):

a. Initial SOH Training. OSHA 30-hour general industry or construction safety training.

b. Competency Training Requirements. Maintained competency by taking 24 hours of documented formal classroom or online.

c. Experience Requirements. At least three years of cumulative safety experience, within the last ten years, managing or implementing a SOH program on projects similar in industry type, size, and complexity as the project described in the contract scope of work.

1.2.1.3 Level Three SSHO

A designated Qualified Person (QP) or Competent Person (CP) with SOH responsibility that has experience which enables identification of hazards and implementation of controls for the work being performed. Reference EM 385-1-1 2-3.b for additional information.

1.2.1.4 Alternate SSHO

An employee that meets the definition of the contract-required level SSHO, but is not the primary SSHO.

1.2.2 Competent Person (CP)

The CP is a person designated in writing, who, through training, knowledge and experience, is capable of identifying, evaluating, and addressing existing and predictable hazards in the working environment or working

conditions that are unsanitary, hazardous, or dangerous to personnel, and who has authorization to take prompt corrective measures to eliminate them.

1.2.3 Qualified Person (QP)

The QP is a person designated in writing, who, by possession of a recognized degree, certificate, or professional standing, or extensive knowledge, training, and experience, has successfully demonstrated their ability to solve or resolve problems related to the subject matter, the work, or the project.

1.3 SUBMITTALS

Government Acceptance or Approval does not remove responsibility from the Contractors for their actions or liability.

Government approval is required for submittals with a "G" designation are for information only. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Accident Prevention Plan (APP); G

Crane Operators; G

Electrical Safety Plan (ESP); G

Site-Specific Energy Control Plan (SSECP); G

Scaffold Work Plan

Hearing Conservation Program (HCP); G

Respiratory Protection Program (RPP)

Regulatory Citations, Violations, And Corrective Action

Site Safety And Health Officer (SSHO)

SD-06 Test Reports

Accident Reports; G

LHE Inspection Reports

Monthly Exposure Reports; G

SD-07 Certificates

Activity Hazard Analysis (AHA); G

Certificate of Compliance; G

Hot Work Permit

Critical Lift Plan; G

Third Party Certification Of Barge-Mounted Mobile Cranes And

Mobile Equipment; G

1.4 PUBLIC HEALTH EMERGENCIES

In the event of a declared public health emergency, follow safety precautions as required by the Occupational Safety and Health Administration (OSHA) www.osha.gov, the Centers for Disease Control and Prevention (CDC) www.cdc.gov, and as required by federal, state and local requirements.

1.5 REFERENCED ENGINEER FORMS (ENG)

The Engineer Forms listed within this specification can be found at the following website: https://www.publications.usace.army.mil/USACE-Publications/Engineer-Forms/.

1.6 MONTHLY EXPOSURE REPORTS

Submit a Monthly Exposure Report by the fifth of each month in the Construction Management System. This report is a compilation of employee-hours worked each month for all site workers, both Prime and subcontractor.

1.7 REGULATORY REQUIREMENTS

a. In addition to the detailed requirements included in the provisions of this Contract, comply with the most recent edition of USACE EM 385-1-1, and the following federal, state, and local laws, ordinances, criteria, rules and regulations at the date of the Solicitation for this Contract. Submit regulatory citations, violations, and corrective action, and matters of interpretation of standards to the appropriate administrative agency for resolution before starting work. Where the requirements of this specification, applicable laws, criteria, ordinances, regulations, and referenced documents vary, the most stringent requirements govern.

b. Contact the Contracting Officer (CO) immediately of any OSHA or other regulatory agency inspection or visit, and provide the CO with a copy of each citation, report, and Contractor response. Correct violations and citations promptly and provide written corrective action plan to the CO.

1.8 SITE QUALIFICATIONS, DUTIES, AND MEETINGS

1.8.1 Site Safety and Health Officer (SSHO)

1.8.1.1 Qualifications of SSHO

This Contract requires a Level One SSHO. All SSHOs must demonstrate compliance with the training and experience requirements identified in the EM 385-1-1, Section 2-3 and this Contract.

1.8.1.2 Duties of SSHO

All SSHOs must perform the roles and responsibilities as identified in this Contract and the EM 385-1-1. All SSHOs will be designated on an ENG Form 6282. SSHO are subject to dismissal if their required duties are not being effectively carried out. If the SSHO is dismissed, project work will be stopped and will not be allowed to resume until a suitable replacement is

approved and the above duties are again being effectively carried out.

1.8.1.3 Safety Meetings

Conduct safety meetings to review past activities, plan for new or changed operations, review pertinent aspects of appropriate AHA (by trade), establish safe working procedures for anticipated hazards, and provide pertinent Safety and Occupational Health (SOH) training and motivation. Conduct meetings at least once a month for all supervisors at the project location. The SSHO, supervisors, or foremen must conduct meetings at least once a week for the trade workers. Document meeting minutes to include the date, persons in attendance, subjects discussed, and names of individual(s) who conducted the meeting. Include meeting minutes in the Daily QC Report. Notify the Contracting Officer of all scheduled meetings seven calendar days in advance.

1.8.2 Roles and Responsibilities of Prime Contractor and SSHO

a. The Prime Contractor and SSHO must ensure that the requirements of all applicable OSHA and EM 385-1-1 are met for the project. The Prime Contractor must ensure an SSHO or an equally qualified Alternate SSHO(s) is at the worksite at all times. If the required SSHO has to temporarily (that is, up to 24 hours / one day) leave the site of work due to unforeseen or emergency situations, a Level One, Two, or Three SSHO may be used in the interim and must be on the site of work at all times when work is being performed.

b. If the SSHO must be off-site for a period longer than 24 hours, a qualified alternate that meets the contract requirements must be onsite.

c. Prime contractor must ensure all SSHOs:

(1) Are designated on an ENG Form 6282.

(2) Meet minimum training and experience requirements identified in EM 385-1-1.

(3) Execute roles and responsibilities identified in EM 385-1-1.

1.8.3 Dredging Contract Site Safety and Health Officer(s)(SSHOs) Requirements

1.8.3.1 Dredging SSHO Personnel Requirements

a. Provide a minimum of one primary Level One SSHO assigned for the primary shift.

b. For a project involving multiple work shifts, provide a minimum of a Level Two SSHO for each additional shift.

For dredging projects with multiple sites (dredge, shore operations, etc.) an additional level three SSHO is required where the primary level one SSHO is not located.

Examples of one dredging project with multiple sites are reflected in each of the following:

(1) A mechanical dredge, scow(s), and material placement site; or

(2) A hydraulic pipeline dredge, attendant plant, and material placement site; or,

(3) A hopper dredge (include land-based material placement site if applicable.)

c. Designated SSHOs must be present at the project site, located so that they have full mobility and reasonable access to all major work operations and must be available during their shift for immediate verbal consultation and notification.

d. Designated Level One and Two SSHOs must have direct report authority to a senior project (or corporate) management official.

e. Designated Level Three SSHOs must report potential safety and occupational health hazards, incidents, and concerns to the Level One or Two SSHO on shift.

f. Level One and Level Two SSHOs for dredging must have a minimum of 3 years experience in one of the following areas:

(1) Supervising/managing dredging activities.

(2) Supervising/managing marine construction activities.

(3) Conducting hazard analyses and developing controls in activities or environments with similar hazards.

1.8.4 Crane Operators

Comply with the crane operator's training and medical requirements in EM 385-1-1 Chapter 16; ASME B30-PKG; 29 CFR 1910; and 29 CFR 1926. Submit documentation for all crane operators including certification, qualifications, and designation in writing.

1.8.5 Competent Person for Fall Protection

Provide a CP for Fall Protection who meets the requirements of EM 385-1-1.

1.8.6 Competent Person for Confined Space Entry

a. Provide a CP for Confined Space Entry who meets the requirements of EM 385-1-1 and herein. The CP for Confined Space Entry must supervise the entry into each confined space in accordance with EM 385-1-1.

b. Since this work involves operations that handle combustible or hazardous materials, this person must have the ability to understand and follow through on the air sampling, Personal Protective Equipment (PPE), and instructions of a Marine Chemist, Coast Guard authorized persons, or Certified Industrial Hygienist. Confined space and enclosed space work must comply with NFPA 306, 29 CFR 1915, "Confined and Enclosed Spaces and Other Dangerous Atmospheres in Shipyard Employment," or as applicable in 29 CFR 1910 for general industry, 29 CFR 1926 for construction.

1.9 ACCIDENT PREVENTION PLAN (APP)

1.9.1 Accident Prevention Plan (APP)

a. Submit the APP to the Contracting Officer at least 30 calendar days prior to planned mobilization. Work cannot proceed without an accepted APP.

b. A competent person must prepare the written site-specific APP. Prepare the APP in accordance with the format and requirements of EM 385-1-1, ENG Form 6293 and herein.

c. The APP must be job-specific and address any unusual or unique aspects of the project or activity for which it is written. Once reviewed and accepted by the Contracting Officer, the APP and attachments will be enforced as part of the Contract. Disregarding the provisions of this Contract or the accepted APP is cause for stopping of work, at the discretion of the Contracting Officer, until the matter has been rectified.

d. The Government considers the Prime Contractor to be the "controlling employer" for all worksite safety and health of the subcontractors. Contractors are responsible for informing their subcontractors of the safety provisions under the terms of the Contract and the penalties for noncompliance, coordinating the work to prevent one craft from interfering with or creating hazardous working conditions for other crafts, and inspecting subcontractor operations to ensure that accident prevention responsibilities are being carried out. The SSHO must provide and maintain the APP and a log of signatures by each subcontractor foreman, attesting that they have read and understand the APP, and make the APP and log available on-site to the Contracting Officer. If English is not the foreman's primary language, the Prime Contractor must provide an interpreter.

e. Continuously review and amend the APP, as necessary, throughout the life of the Contract. Changes to the accepted APP must be made with the knowledge and concurrence of the Contracting Officer, Project Superintendent, SSHO and Quality Control Manager. Incorporate unusual or high-hazard activities not identified in the original APP as they are discovered. Should any severe hazard exposure (i.e., imminent danger) become evident, stop work in the area, secure the area, and develop a plan to remove the exposure and control the hazard. Notify the Contracting Officer within 24 hours of discovery. Eliminate and remove the hazard. In the interim, take all necessary action to restore and maintain safe working conditions in order to safeguard onsite personnel, visitors, the public (as defined by ANSI/ASSP A10.34), and the environment.

1.9.2 Names and Qualifications

Provide plans in accordance with the requirements outlined in EM 385-1-1, including the following:

a. Names and qualifications (resumes including education, training, experience and certifications) of site safety and health personnel designated to perform work on this project to include the designated Site Safety and Health Officer and other competent and qualified personnel to be used. Specify the duties of each position.

b. As a minimum, designate and submit qualifications of Competent Persons (CP) for each of the following major areas: excavation; scaffolding; fall protection; hazardous energy; confined space; health hazard recognition, evaluation and control of chemical, physical and biological agents; and personal protective equipment. Designate and submit qualifications for additional CPs as applicable to the work performed under this Contract.

1.9.3 Plans

Provide plans in the APP in accordance with the requirements outlined in EM 385-1-1 and as detailed in ENG Form 6293, including the following:

1.9.3.1 Electrical Safety Plan (ESP)

An Electrical Safety Plan (ESP) is required when personnel perform work that involves exposure to electrical hazards. The ESP must be developed according to NFPA 70E and when work involves exposure to electrical hazards associated with electric power generation, transformation, transmission, and/or distribution lines and equipment, additional requirements according to 29 CFR 1926.950, 29 CFR 1910.269, and the NESC. Reference EM 385-1-1 11-7.a for specific requirements of the ESP.

1.9.3.2 Site-Specific Energy Control Plan (SSECP)

When a Contractor SSECP is required for work on or near any system that produces, uses, or stores hazardous energy, the SSECP must be site-specific and developed according to EM 385-1-1 Figure 12-1 and ANSI Z244, and when electricity is a potential energy source, the plan must also include the required elements of NFPA 70E. The plan must clearly and specifically outline the scope, purpose, authorization, roles and responsibilities, and techniques to be used. Reference EM 385-1-1 12-7.a for specific requirements of the SSECP.

1.9.3.3 Fall Protection and Prevention Plan (FPP)

A Fall Protection and Prevention Plan is required when employees are working at heights or exposed to fall hazards. The plan must be site specific and developed by a CP or QP and updated as conditions change, but at least annually. Reference EM 385-1-1 21.7a for specific requirements of the FPP..

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1.9.3.4 Scaffold Work Plan

A Scaffold Work Plan is required for the following scaffold types: (1) Tube and coupler, regardless of size, (2) Supported scaffolds with a height to base width ratio greater than four to one, (3) Suspended scaffolds, (4) Scaffolds requiring tenting due to weather conditions (5) Engineered scaffold systems. Reference EM 385-1-1 22-7.a for specific requirements of the Scaffold Work Plan.

1.9.3.5 Hearing Conservation Program (HCP)

A Hearing Conservation Program (HCP) is required when employees are exposed to hazardous noise. Reference EM 385-1-1 5-7 for specific requirements of the Hearing Conservation Program.

1.9.3.6 Respiratory Protection Program (RPP)

A Respiratory Protection Program (RPP) is required when employees are required to use respirators. Reference EM 385-1-1 5.7.b for specific requirements of the Respiratory Protection Program.

1.9.3.7 Lead, Cadmium, and Chromium Compliance Plan

Identify the safety and health aspects of work involving lead, cadmium and chromium, and prepare in accordance with Section 02 83 00.00 99 LEAD REMEDIATION.

1.9.3.8 Asbestos Hazard Abatement Plan

Identify the safety and health aspects of asbestos work and prepare in accordance with Section 02 82 00.00 25 ASBESTOS REMEDIATION.

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1.9.3.9 Site Demolition Plan

Identify the safety and health aspects and prepare in accordance with Section 02 41 00.00 99 DEMOLITION AND DECONSTRUCTION and referenced sources.

1.10 ACTIVITY HAZARD ANALYSIS (AHA)

a. Before beginning each activity Definable Feature of Work (DFOW) involving a type of work presenting hazards not experienced in previous project operations, or where a new work crew or subcontractor is to perform the work, the Contractor(s) performing that work activity must prepare an AHA. AHAs must be developed by the Prime Contractor, subcontractor, or supplier performing the work, and provided for Prime Contractor review and approval before submitting to the Contracting Officer. AHAs must be signed by the SSHO, Superintendent, QC Manager and the subcontractor Foreman performing the work. Use non-mandatory form ENG Form 6206 Activity Hazard Analysis or format AHA in accordance with EM 385-1-1. Submit the AHA for review at least 15 working days prior to the start of each DFOW. The Government reserves the right to require the Contractor to revise and resubmit the AHA if it fails to effectively identify the work sequences, specific anticipated hazards, site conditions, equipment, materials, personnel and the control measures to be implemented.

b. AHAs must identify competent persons required for phases involving high risk activities, including confined entry, crane and rigging, excavations, trenching, electrical work, fall protection, and scaffolding.

1.10.1 AHA Management

Review the AHA list periodically (at least monthly) at the Contractor supervisory safety meeting, and update as necessary when procedures, scheduling, or hazards change. Use the AHA during daily inspections by the SSHO to ensure the implementation and effectiveness of the required safety and health controls for that work activity.

1.10.2 AHA Signature Log

Each employee performing work as part of an activity, task or DFOW must

review the AHA for that work and sign a signature log specifically maintained for that AHA prior to starting work on that activity. The SSHO must maintain a signature log on site for every AHA. Provide employees whose primary language is other than English, with an interpreter to ensure a clear understanding of the AHA and its contents.

1.11 SITE SAFETY REFERENCE MATERIALS

Maintain safety-related references applicable to the project, including those listed in paragraph REFERENCES. Maintain applicable equipment manufacturer's manuals.

1.12 EMERGENCY MEDICAL TREATMENT

Contractors must arrange for their own emergency medical treatment in accordance with EM 385-1-1. The Government has no responsibility to provide emergency medical treatment.

1.13 NOTIFICATIONS AND REPORTS

1.13.1 Accident Notification

Notify the Contracting Officer in accordance with the EM 385-1-1 Accident Reporting Timeline.

Table
Accident Reporting Required Timeline

Accident Type	Notify RE and CO	Complete Final Accident Report on ENG 3394 and provide to KO or COR
Fatality, in-patient hospitalization, amputation, eye loss, or property damage over $600,000.	Immediately, no later than (NLT) 8 Hours	Within 7 Days
All other accidents and near misses	Immediately, no later than (NLT) 24 Hours	Within 7 Days

Within notification include Contractor name; Contract title; type of Contract; name of activity, installation or location where accident occurred; date and time of accident; names of personnel injured; extent of property damage, if any; extent of injury, if known, and brief description of accident (for example, type of construction equipment used and PPE used). Preserve the conditions and evidence on the accident site until the Government investigation team arrives on-site and Government investigation is conducted. Assist and cooperate fully with the Government's investigation(s) of any accident or near miss.

1.13.2 Accident Reports

a. Conduct an accident investigation for recordable injuries and illnesses, property damage, and near misses as defined in EM 385-1-1, to establish the root cause(s) of the accident. All accidents are reportable, regardless of whether or not it is recordable. Complete

the applicable USACE Accident Report, ENG Form 3394, and provide the report to the Contracting Officer within seven calendar days of the accident. The Contracting Officer will provide copies of any required or special forms.

b. Near Misses: Report all Near Misses to the CO within 24 hours. For Near Misses involving: Electrical, Working at Heights, Diving, or Load Handling Equipment report on USACE Accident Report ENG Form 3394 and provide the report to the CO within seven calendar days of the Near Miss. Near miss reports are considered positive and proactive Contractor safety management actions.

1.13.3 LHE Inspection Reports

Submit LHE inspection reports required in accordance with EM 385-1-1 and as specified herein with Daily Reports of Inspections.

1.13.4 Certificate of Compliance

Submit Certificate of Compliance (CoC) for each piece of LHE prior to bringing on site. The CoC must state that the LHE and the rigging equipment meets applicable regulations (to include inspections and tests) as required by the manufacturer and requirements of this manual. Use mandatory ENG Form 6209 Certificate of Compliance (CoC) for Load Handling Equipment and Rigging. CoC must be posted on the LHE.

1.13.5 Third Party Certification of Barge-Mounted Mobile Cranes and Mobile Equipment

Barge-mounted mobile cranes must be certified in accordance with the following standards: ASME B30.8, ABS 152, and API Spec 2C. Include Naval Architectural Analysis (NAA) to determine barge stability calculations identifying barge list and trim based on anticipated loading; and load charts based on calculated list and trim. Calculate the amount of list and trim to be within the crane manufacturer's requirements in accordance with EM 385-1-1, Chapter 16.

1.14 HOT WORK PERMIT

1.14.1 Permit and Personnel Requirements

a. Submit and obtain a written permit prior to performing "Hot Work" (i.e. welding or cutting, etc.) or operating other flame-producing/spark producing devices. Submit one copy of each permit attached to each Daily Contractor Quality Control Report (Section 01 45 00.00 25 QUALITY CONTROL.A permit is required from the Explosives Safety Office for work in and around where explosives are processed, stored, or handled. Contractors are required to meet all criteria before a permit is issued. Provide at least two 20 pound 4A:20 BC rated extinguishers for normal "Hot Work". The extinguishers must be current inspection tagged and contain an approved safety pin and tamper resistant seal. It is also mandatory to have a designated FIRE WATCH for any "Hot Work" done at this activity. The Fire Watch must be trained in accordance with NFPA 51B and remain on-site for a minimum of 1 hour after completion of the task or as specified on the hot work permit.

b. When starting work in the facility, require personnel to familiarize themselves with the location of the nearest fire alarm boxes and know the emergency phone number. Report any fire, no matter how small, to

the Fire Department and CO immediately.

1.14.2 Work Around Flammable Materials

a. Obtain permit approval from a NFPA Certified Marine Chemist, or Certified Industrial Hygienist for "Hot Work" within or around flammable materials (such as fuel systems or welding/cutting on fuel pipes) or confined spaces (such as sewer wet wells, manholes, or vaults) that have the potential for flammable or explosive atmospheres.

b. Whenever these materials, except beryllium and chromium (VI), are encountered in indoor operations, local mechanical exhaust ventilation systems that are sufficient to reduce and maintain personal exposures to within acceptable limits must be used and maintained in accordance with manufacturer's instruction and supplemented by exceptions noted in EM 385-1-1.

1.15 CONFINED SPACE ENTRY REQUIREMENTS

Confined space entry must comply with EM 385-1-1, 29 CFR 1926, 29 CFR 1910, and Directive CPL 2.100. Any potential for a hazard in the confined space requires a permit system to be used.

1.15.1 Rescue Procedures and Coordination with Local Emergency Responders

Develop and implement an on-site rescue and recovery plan and procedures. The rescue plan must not rely on local emergency responders for rescue from a confined space.

1.16 SEVERE WEATHER PLAN FOR MARINE ACTIVITIES (SWPMA)

In the event of a severe storm warning, the Contractor must comply with the applicable Storm Plan and:

a. Secure outside equipment and materials and place materials that could be damaged in protected areas.

b. Check surrounding area, including roof, for loose material, equipment, debris, and other objects that could be blown away or against existing facilities.

c. Ensure that temporary erosion controls are adequate.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

3.1 CONSTRUCTION AND OTHER WORK

Comply with EM 385-1-1, NFPA 70, NFPA 70E, NFPA 241, the APP, the AHA, Federal and State OSHA regulations, and other related submittals and activity fire and safety regulations. The most stringent standard prevails.

PPE is governed in all areas by the nature of the work the employee is performing. Use personal hearing protection at all times in designated noise hazardous areas or when performing noise hazardous tasks. Safety glasses must be worn or carried/available on each person. At a minimum

mandatory PPE includes:

a. Head Protection that meets ANSI/ISEA Z89.1

b. Long Pants

c. Appropriate Safety Footwear

3.1.1 Worksite Communication

Employees working alone in a remote location or away from other workers must be provided an effective means of emergency communications (i.e., cellular phone, two-way radios, land-line telephones or other acceptable means). The selected communication must be readily available (easily within the immediate reach) of the employee and must be tested prior to the start of work to verify that it effectively operates in the area/environment. Develop an employee check-in/check-out communication procedure to ensure employee safety.

3.1.2 Hazardous Material Exclusions

Notwithstanding any other hazardous material used in this Contract, radioactive materials or instruments capable of producing ionizing/non-ionizing radiation (with the exception of radioactive material and devices used in accordance with EM 385-1-1 such as nuclear density meters for compaction testing and laboratory equipment with radioactive sources) as well as materials which contain asbestos, mercury or polychlorinated biphenyls, di-isocyanates, lead-based paint, and hexavalent chromium, are prohibited. The Contracting Officer, upon written request by the Contractor, may consider exceptions to the use of any of the above excluded materials. Low mercury lamps used within fluorescent lighting fixtures are allowed as an exception without further Contracting Officer approval. Notify the Radiation Safety Officer (RSO) prior to excepted items of radioactive material and devices being brought on base.

3.1.3 Unforeseen Hazardous Material

If material(s) that may be hazardous to human health upon disturbance are encountered during demolition, repair, renovation, or construction operations. Stop that portion of work and notify the Contracting Officer immediately. Within 14 calendar days the Government will determine if the material is hazardous. If material is not hazardous or poses no danger, the Government will direct the Contractor to proceed without change. If material is hazardous and handling of the material is necessary to accomplish the work, the Government will issue a modification.

3.2 EQUIPMENT

3.2.1 Use of Explosives

a. Explosives must not be used or brought to the project site without prior written approval from the Contracting Officer. Such approval does not relieve the Contractor of responsibility for injury to persons or for damage to property due to blasting operations.

b. Storage of explosives, when permitted on Government property, must be only where directed and in approved storage facilities. These facilities must be kept locked at all times except for inspection, delivery, and withdrawal of explosives.

3.2.2 Load Handling Equipment (LHE)

Load Handling Equipment (LHE) must comply with ASME B30-PKG and the following:

a. Do not modify Load Handling Equipment such as forklifts with work platform attachments for supporting employees unless specifically delineated in the manufacturer's printed operating instructions.

b. The use of hooks on equipment for lifting of material must be in accordance with manufacturer's printed instructions.

c. Operators of forklifts or power industrial trucks must be licensed in accordance with OSHA.

3.2.3 Cranes, Hoists, and Rigging

a. LHE as specified in EM 385-1-1, Chapter 16.

b. Comply with the LHE manufacturer's specifications and limitations for erection and operation of LHE used in support of the work. Perform erection under the supervision of a designated person (as defined in ASME B30-PKG). Perform all testing in accordance with the manufacturer's recommended procedures.

c. Comply with ASME B30-PKG, OSHA and the EM 385-1-1 for all cranes.

d. When operating in the vicinity of overhead transmission lines, operators and riggers be alert to this special hazard and follow the requirements of EM 385-1-1, Chapter 11, and ASME B30-PKG.

e. Do not use personnel work platforms (man-baskets) unless the Contractor proves that using any other access to the work location would provide a greater hazard to the workers or is impossible. Hoisting personnel must be allowed by the LHE Manufacturer. This activity is a critical lift and a critical lift plan is required.

f. Inspect, maintain, and recharge portable fire extinguishers as specified in NFPA 10, Standard for Portable Fire Extinguishers.

g. All employees must keep clear of loads about to be lifted and of suspended loads.

h. Use cribbing when performing lifts on outriggers.

i. Position the LHE hook/block directly over the load. Side loading of LHE is prohibited unless allowed by the manufacturer.

j. Position a physical barricade to prevent personnel from entering the counterweight swing (tail swing) area of the crane.

k. Certification records which include the date of inspection, signature of the person performing the inspection, and make the serial number or other identifier of the LHE that was inspected available onsite at all times.

l. Written reports listing the load test procedures used along with any repairs or alterations performed on the crane must be available onsite.

m. Certify that all LHE operators have been trained in proper use of the equipment they are authorized by type, class and capacity.

n. Certify that all LHE meet the manufactures requirements by completing and submitting the certification of compliance (COC)for in the EM 385-1-1 prior to the start of work.

o. A physical if required by the EM 385-1-1, and must be signed by a Medical Doctor (MD) or Doctor of Osteopathy (DO), for all LHE operators.

3.2.4 Standard Lift Plans

Plan all lifts to avoid situations where the operator cannot maintain safe control of the lift. Prepare a written SLP for every lift or series of lifts (if duty cycle or routine lifts are being performed). The SLP must be developed, reviewed, and accepted by all personnel involved in the lift. Keep a copy of the SLP on the LHE for the specific approved lift(s). Keep a copy of every SLP for a minimum of three months. Use the non-mandatory ENG Form 6203 (Crane Standard Lift Plan) https://www.publications.usace.army.mil/USACE-Publications/Engineer-Forms/ or format in accordance with EM 385-1-1.

3.2.5 Critical Lift Plan

Critical lifts require detailed planning and additional or unusual safety considerations. Before making a critical lift, develop a critical lift plan and submit to GDA for approval. Critical lifts are detailed in EM 385-1-1, Chapter 16. Use non-mandatory Critical Lift Plan Form 6213 (Load-Handling Equipment Crane Operations Critical Lift Plan) or format in accordance with EM 385-1-1.

3.2.6 Scaffolding

Provide employees with a safe means of access to the work area on the scaffold. Climbing of any scaffold braces or supports not specifically designed for access is prohibited. Access to scaffold platforms greater than 20 feet in height must be accessed by use of a scaffold stair system. Do not use vertical ladders commonly provided by scaffold system manufacturers for accessing scaffold platforms greater than 20 feet in height. The use of an adequate gate is required. Ensure that employees are qualified to perform scaffold erection and dismantling. Do not use scaffold without the capability of supporting at least four times the maximum intended load or without appropriate fall protection as delineated in the accepted fall protection and prevention plan. Attach stationary scaffolds to structural building components to safeguard against tipping forward or backward. Special care must be given to ensure scaffold systems are not overloaded. Side brackets used to extend scaffold platforms on self-supported scaffold systems for the storage of material are prohibited. The first tie-in must be at the height equal to four times the width of the smallest dimension of the scaffold base. Place work platforms on mud sills. Scaffold or work platform erectors must have fall protection during the erection and dismantling of scaffolding or work platforms that are more than six feet. Delineate fall protection requirements when working above six feet or above dangerous operations in the Fall Protection and Prevention (FP&P) Plan and Activity Hazard Analysis (AHA) for the phase of work.

3.3 ELECTRICAL

Perform electrical work in accordance with EM 385-1-1.

3.3.1 Electrical Work

a. As described in EM 385-1-1, electrical work is to be conducted in a de-energized state unless there is no alternative method for accomplishing the work. In those cases obtain an energized work permit from the CO. The energized work permit application must be accompanied by the AHA and a summary of why the equipment/circuit needs to be worked energized. Underground electrical spaces must be certified safe for entry before entering to conduct work. Cables that will be cut must be positively identified and de-energized prior to performing each cut. Attach temporary grounds in accordance with ASTM F855 and IEEE 1048. Perform all high voltage cable cutting remotely using hydraulic cutting tool. When racking in or live switching of circuit breakers, no additional person other than the switch operator is allowed in the space during the actual operation. Plan so that work near energized parts is minimized to the fullest extent possible. Use of electrical outages clear of any energized electrical sources is the preferred method.

b. When working in energized substations, only qualified electrical workers are permitted to enter. When work requires work near energized circuits as defined by NFPA 70, high voltage personnel must use personal protective equipment that includes, as a minimum, electrical hard hat, safety footwear, insulating gloves and electrical arc flash protection for personnel as required by NFPA 70E. Insulating blankets, hearing protection, and switching suits may also be required, depending on the specific job and as delineated in the Contractor's AHA. Ensure that each employee is familiar with and complies with these procedures and 29 CFR 1910.

3.3.2 Qualifications

Electrical work must be performed by QP with verifiable credentials who are familiar with applicable code requirements. Verifiable credentials consist of State, National and Local Certifications or Licenses that a Master or Journeyman Electrician may hold, depending on work being performed, and must be identified in the appropriate AHA. Journeyman/Apprentice ratio must be in accordance with State, Local requirements applicable to where work is being performed.

3.3.3 Arc Flash

Conduct a hazard analysis/arc flash hazard analysis whenever work on or near energized parts greater than 50 volts is necessary, in accordance with NFPA 70E.

All personnel entering the identified arc flash protection boundary must be QPs and properly trained in NFPA 70E requirements and procedures. Unless permitted by NFPA 70E, no Unqualified Person is permitted to approach nearer than the Limited Approach Boundary of energized conductors and circuit parts. Training must be administered by an electrically qualified source and documented.

3.3.4 Grounding

Ground electrical circuits, equipment and enclosures in accordance with NFPA 70 and IEEE C2 to provide a permanent, continuous and effective path to ground unless otherwise noted by EM 385-1-1.

3.3.5 Testing

Temporary electrical distribution systems and devices must be inspected, tested and found acceptable for Ground-Fault Circuit Interrupter (GFCI) protection, polarity, ground continuity, and ground resistance before initial use, before use after modification and at least monthly. Monthly inspections and tests must be maintained for each temporary electrical distribution system, and signed by the electrical CP or QP.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01 35 27.00 25

DIVING

PART 1 GENERAL

1.1 GENERAL INFORMATION
1.2 REFERENCES
1.3 SUBMITTALS
1.4 PRE-QUALIFIED DIVE COMPANIES AND DIVE TEAM PERSONNEL
1.5 DIVING ENVIRONMENT
1.6 DIVE PLAN AND GENERAL SCHEDULE
1.7 COMPANY SAFE PRACTICE MANUAL FOR DIVING
1.8 PORTLAND DISTRICT DIVE SAFETY INSPECTOR
1.9 RESOLUTION OF CONFLICT

PART 2 PRODUCTS

PART 3 EXECUTION

3.1 DIVE TEAM COMPOSITION AND DIVE EQUIPMENT
3.2 CONTRACTOR-PROVIDED DIVING SUPPORT EQUIPMENT
3.3 CONTRACTOR-PROVIDED SPECIAL UNDERWATER EQUIPMENT
3.4 SAFE CLEARANCE PROCEDURES
3.5 BOAT RESTRICTED ZONE
3.5.1 General
3.5.2 Permission
3.5.3 Flows and Site Conditions
3.5.4 Safety Requirements

-- End of Section Table of Contents --

SECTION 01 35 27.00 25

DIVING

PART 1 GENERAL

1.1 GENERAL INFORMATION

This Section covers the general requirements for Contract diving operations to be performed if needed by the contractor, and as specified within this Contract. There is no mandatory contract equirement for diving operations as part of this contract; this specification is to be used if the contractor proposes a cofferdam as means and methods for bridge erection. Diving must be performed in accordance with the latest edition of the U.S. Army Corps of Engineers Safety and Health Requirements Manual, EM 385-1-1 referenced in Section 00 72 00 FAR 52.236-13 Alt I, ACCIDENT PREVENTION - ALTERNATE I; the Portland District Diving Regulation, NWPR 385-1-93; the U.S. Navy Diving Manuals, NAVSEA 0994-LP001-0910 and NAVSEA 0994-LP001-0920; 29 CFR 1910, Subpart T; and ADCI Consensus Standards inclusive of all other references listed therein. All diving operations must be considered incidental to the work specified elsewhere herein. No separate payment for diving work will be made.

1.2 REFERENCES

The latest editions of the publications listed below form a part of this Specification to the extent referenced. The publications are referred to in the text by basic designation only.

ASSOCIATION OF DIVING CONTRACTORS INTERNATIONAL (ADCI)

ADCI	(2020) Consensus Standards for Commercial Diving and Underwater Operations, 6th Edition

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2024) Safety -- Safety and Occupational Health (SOH) Requirements

U.S. ARMY CORPS OF ENGINEERS (PORTLAND DISTRICT)

NWPR 385-1-93	(2019) Engineering Regulation, Diving Operation by Contract

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910, Subpart T	Commercial Diving Operations (OSHA)

U.S. NAVAL SEA SYSTEMS COMMAND (NAVSEA)

NAVSEA 0994-LP001-0910	U.S. Navy Diving Manual
NAVSEA 0994-LP001-0920	U.S. Navy Diving Manual

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. The following must be submitted in accordance with Sections 01 33 00, SUBMITTAL PROCEDURES, and 01 35 26.00 25, GOVERNMENTAL SAFETY REQUIREMENTS.

SD-01 Preconstruction Submittals

Dive Team Personnel; G

Dive Plan and General Schedule; G

Equipment Certification; G

Emergency Management Plan; G

Activity Hazard Analysis; G

Company Safe Practice Manual For Diving; G

1.4 PRE-QUALIFIED DIVE COMPANIES AND DIVE TEAM PERSONNEL

a. Any domestic commercial dive Contractor meeting the minimum standards set forth in the most recent edition of the USACE Safety and Health Requirements Manual, EM 385-1-1, and in the Portland District's Dive Safety Regulation, NWPR 385-1-93 (see Appendix A of this Section), will be eligible to compete for routine diving work. The Dive Contractor must have no State or Federal OSHA safety violations within the 12 months preceding the due date of the bid or proposal.

b. Once awarded, Contract performance is contingent upon the Contractor's submission of an acceptable Dive Plan, Activity Hazard Analysis, and Emergency Management Plan for the specific diving operation to be conducted. It is the Contractor's responsibility to ensure that all diver credentials and equipment certifications meet the standards outlined in the most recent edition of EM 385-1-1 and NWPR 385-1-93 (Attachment A13).

1.5 DIVING ENVIRONMENT

a. The estimated maximum working depth must be determined by the contractor depending on their needs for cofferdam installation.

b. The estimated maximum depth (distance from water surface to bottom) the diver(s) will be exposed to must be determined by the contractor depending on their needs for cofferdam installation.

c. Turbidity may limit visibility to 5 feet or less.

d. The current water velocity through the work area is estimated to be less than one knot.

e. Water temperature(s) are estimated to vary between 42 and 60 degrees F.

f. Underwater operations will not require diver(s) to perform work within confined spaces and/or enclosed areas or areas with an overhead.

g. The overall work site is a restricted access area and is not open to

commercial and private vessels.

1.6 DIVE PLAN AND GENERAL SCHEDULE

a. No later than 21 working days prior to the first planned diving operation, the Dive Plan and General Schedule must be submitted to coordinate unit outages at the Project and other concurrent work. The Dive Plan and General Schedule must detail dive locations and must be flexible enough to accommodate conflicts with allowable unit outages. Include personnel and equipment certification in the plan. Include a site specific Emergency Management Plan in the Dive Plan in accordance with NWPR 385-1-93. Prepare a job specific Activity Hazard Analysis (AHA) in accordance with NWPR 385-1-93 and EM 385-1-1, Chapter 30-6, and include in the Dive Plan. Adjustments must be coordinated with the Contracting Officer (CO). Submit dive locations and schedules in accordance with Section 01 33 00 SUBMITTAL PROCEDURES, for approval.

b. Scheduling Individual Dives. The Contractor must notify the COR in writing a minimum of seven calendar days in advance of each scheduled dive. Failure to give the full seven days notice may result in delays to the work if a Dive Safety Inspector (DSI) is not available. The Government is not liable for delays if the Contractor fails to give the required seven days written notice.

c. In the event it becomes necessary to cancel or reschedule a dive, notify the Government at least two working days prior to the first day of the scheduled dive during normal business hours (Monday through Friday excluding holidays). Failure to provide notification will make the Contractor liable for the daily rate for the DSI from the date of the cancellation until the dive commences. The Contactor will not be charged for more than seven days delay for each dive cancellation. However, each time a dive is cancelled or rescheduled, it is treated as a new dive for purposes of scheduling DSI's and determining delay costs. When computing delay costs, a partial day is considered a full day; DSI delay costs will be permanently deducted from the Contractor's pay at the rate of $1,000 per day.

1.7 COMPANY SAFE PRACTICE MANUAL FOR DIVING

Submit a Company Safe Practice Manual for Diving. If this manual is already on file with U.S. Army Corps of Engineers, Portland District, Office of Dive Safety an additional copy is not required.

1.8 PORTLAND DISTRICT DIVE SAFETY INSPECTOR

EM 385-1-1 requires the Portland District Dive Safety Office to provide a DSI to be onsite at all times during diving operations. A DSI will be provided based on the Contractor's submitted Dive Plan and General Schedule. The Dive Plan and General Schedule must include anticipated dive schedules and durations. Any changes to the dive schedule must be provided to the COR with no less than seven calendar days notice.

1.9 RESOLUTION OF CONFLICT

EM 385-1-1 and NWPR 385-1-93, as applied by the U.S. Army Corps of Engineers (USACE) Portland District Office of Dive Safety, or supplemental waiver or applicable Memorandum of Agreement (MOA) must be the controlling authority(s) for implementation of all Contract diving policy.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.1 DIVE TEAM COMPOSITION AND DIVE EQUIPMENT

Minimum dive team staffing must, unless a waiver is approved by the USACE Portland District Office of Dive Safety, be comprised of personnel levels as required by EM 385-1-1 and NWPR 385-1-93: a single diver requires a five-man crew as defined in this reference and for two in-water working divers, a seven-man crew must be required, which includes the addition of one stand-by diver and one tender. For depths exceeding 100 feet, a six-man crew is required. Any use of breathing gas with oxygen content more than 21 percent is considered mixed gas diving. A minimum six-man crew is required for all mixed gas diving. SCUBA Diving is allowable only with prior permission obtained from the USACE Portland District Office of Dive Safety. In addition to the dive team personnel addressed in the above references, minimum required certified chamber crew personnel must be provided as diving operations dictate. If a crane is used, a certified crane operator who must not be included as a dive-team member must be exclusively dedicated to crane operations. Surface-supplied air diving equipment with two-way voice communication must be used by divers and standby divers. An independent reserve air system (bailout bottle) for all divers is required as specified by EM 385-1-1 and NWPR 385-1-93. As a minimum, all diver surface air supply compressors, tanks, helmets, and other related equipment must comply with the requirements of EM 385-1-1. All dive team members must meet the requirements as listed in EM 385-1-1, Chapter 30-3, and NWPR 385-1-93.

3.2 CONTRACTOR-PROVIDED DIVING SUPPORT EQUIPMENT

A dual lock recompression chamber(s) capable of recompression to a minimum of 165 FSW must be provided on-site and available for immediate use for divers working at all depths unless a waiver is granted by the Portland Office of Dive Safety. Sufficient on-site chamber facilities must be provided to service multiple divers working simultaneously on differing recompression schedules. All recompression treatment tables must comply with NAVSEA 0994-LP001-0910 and NAVSEA 0994-LP001-0920. Unless waived by the Portland Office of Dive Safety, diving in water less than 46 degrees F for bottom times exceeding 45 minutes of accumulated bottom time or less than 36 degrees F for bottom times exceeding 20 minutes of accumulated bottom time must require hot water diving systems. Unless waived by the Portland District of Dive Safety, variable-volume dry suits with appropriate thermal protection must be utilized by divers working in waters 60 degrees F, or less. A dive vessel, or a floating or suspended dive platform from which diving operations will be staged, must at all times provide a portable toilet unit and a heated shelter for all dive team members when temperature and/or wind-chill factor is below 60 degrees F. Man-basket(s) must be provided for each working diver as needed. All necessary top-side equipment such as cranes, trucks, personnel vehicles, and appropriately-powered underwater hand and power tools must be furnished by the Contractor to enable accomplishment of all required dive work.

3.3 CONTRACTOR-PROVIDED SPECIAL UNDERWATER EQUIPMENT

Provide all appropriate tools, equipment, and materials needed to accomplish the tasks as stated in Paragraph DIVING WORK DESCRIPTION.

3.4 SAFE CLEARANCE PROCEDURES

A safe clearance Lock-out/Tag-out system is used by USACE Portland District project personnel to insure continuity of service and safety to personnel and equipment in accordance with Section 01 35 26.00 25 GOVERNMENTAL SAFETY REQUIREMENTS. Any work performed which requires taking Project operating equipment out of service must be done only after formal clearance is obtained from the Government. Clearances will be issued only by the Project Control Room and the Chief of Operations. The Government will furnish a checklist of clearance lock-out/tag-out items implemented for each clearance action and the Contractor dive supervisor must accompany Government personnel during the verification of the lock-out/tag-out process. The DSI will keep the Project control room informed of all diving activity underway. Clearances violated by Contractor personnel will be cause to immediately and permanently ban the person(s) from the project site. See NWPR 385-1-93, Appendix E of Appendix A, for Procedures for Corrective Actions.

3.5 BOAT RESTRICTED ZONE

3.5.1 General

Any work on or over water near the dam structures will be planned and coordinated with Project Operations personnel before approaching the dam. Work on or over water must conform to the requirements set forth in Bonneville Project Boat Restricted Zone Entry Procedure, See Attachment A5.

3.5.2 Permission

a. The applicant wishing to enter the Boat Restricted Zone (BRZ) is required to make a written request for access to the OPM two weeks in advance of the anticipated work date(s). The request must include a schedule and written work plan. The schedule and work plan will be approved by the OPM prior to any "work from the water" or "entry in the BRZ." Coordination with the OPM must include the CO, theOPM or their representative.

b. The applicant wishing to enter the BRZ must include a written job and activity hazard analysis. These analyses will be reviewed and approved by the OPM prior to any in-water work.

c. A pre-work safety meeting must be held at the Project prior to the anticipated work dates. The safety meeting must be attended by the Task/Work Leader or Supervisor of the work crew. In addition, evidence must be provided to the OPM that the applicant seeking access has all of the requirements listed on the attached boating safety equipment memorandum.

d. Immediately prior to engaging in the work within the BRZ boundaries, the applicant must call in and acquire Project Control Room approval to enter the BRZ. This will enable any real time event information to be passed to the BRZ entrants. The applicant must call and advise the Project when leaving the BRZ.

3.5.3 Flows and Site Conditions

a. Should the applicant wish to enter within 600 feet of the Powerhouse or spillway, Project equipment will be positioned so that flows are

eliminated or reduced to acceptable levels for the boats being used in the BRZ and for the safety of personnel should they fall overboard. This equipment will be placed under the appropriate clearance so that it cannot be operated while boats are in the inner BRZ. No boat must enter the area until the clearances are issued and approval has been granted from the Project control room.

b. Permission to enter the BRZ may be withdrawn due to operational concerns at a moments notice by the Project Manager or their representative.

3.5.4 Safety Requirements

The following safety items must be met prior to entry into the BRZ:

a. The requirements of EM 385-1-1.

b. As a minimum, each vessel must meet Coast Guard safety standards for boat day and night operation. Included are fire extinguishing capability, personal safety devices, running and anchor lights and audible warning device capable of being heard anywhere within the BRZ. In addition, each boat wishing to enter the BRZ must display a current State inspection sticker on the boat demonstrating the equipment meets current state safety standards.

c. A marine band radio capable of communication with the control room on channel 14 must be available to the boat operator. Failure to maintain communication with the control room during the period boats are operating within the BRZ is cause for removal from the BRZ and for future BRZ access denial.

d. The boat operator must remain at the boat controls and have no other duties while inside the BRZ.

e. A rescue line must be available in a throw bag. The rescue line length must be of sufficient length to reach personnel which have gone overboard. A minimum length of 75 feet is recommended. Line which is constructed of a buoyant material is also recommended.

f. A spotlight which can be easily operated by the boat operator must be available.

g. A second boat of sufficient size, capable of safely removing "ALL" personnel from the work zone, must be standing by for rescue purposes. Both boats must remain in radio contact with each other and the Project control room. The rescue boat is not to perform any work. It is to be manned by a boat operator and at least one rescue individual.

h. Both boats must be powered by engines capable of motoring upstream at twice the speed of the quickest flow that will be encountered inside the BRZ while fully loaded and operational.

i. Each boat must have two motors and be of sufficient size to safely remove ALL personnel from the work zone.

j. Each motor must have a separate fuel system to isolate any fuel contamination problems.

k. Each boat must have an adequate size tow line capable of towing a

disabled boat to safety.

l. If diving, a one-meter square Code Alpha Flag as well as a "Diver Down" flag must be flown a minimum of five feet above the vessel's highest point.

m. All boat operators must present their credentials prior to initiation of work. This must include all licenses, certifications, and a resume of appropriate experience. Each operator must be approved by the Operations Project Manager (or their Representative) prior to beginning work.

n. Boat operators must have and review latest river charts in the BRZ area.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01 42 00

SOURCES FOR REFERENCE PUBLICATIONS

PART 1 GENERAL

1.1 REFERENCES
1.2 ORDERING INFORMATION

PART 2 PRODUCTS

PART 3 EXECUTION

-- End of Section Table of Contents --

SECTION 01 42 00

SOURCES FOR REFERENCE PUBLICATIONS

PART 1 GENERAL

1.1 REFERENCES

Various publications are referenced in other sections of the specifications to establish requirements for the work. These references are identified in each section by document number, date and title. The document number used in the citation is the number assigned by the standards producing organization (e.g., ASTM B564 Standard Specification for Nickel Alloy Forgings). However, when the standards producing organization has not assigned a number to a document, an identifying number has been assigned for reference purposes.

1.2 ORDERING INFORMATION

The addresses of the standards publishing organizations whose documents are referenced in other sections of these specifications are listed below, and if the source of the publications is different from the address of the sponsoring organization, that information is also provided.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)
555 12th Street NW, Suite 1000
Washington, DC 20004
Ph: 202-624-5800
Fax: 202-624-5806
E-Mail: info@aashto.org
Internet: https://www.transportation.org/

AMERICAN BUREAU OF SHIPPING (ABS)
ABS Plaza
1701 City Plaza Drive
Spring, TX 77389 United States
Ph: 281-877-6000
Fax: 281-877-5976
E-Mail: ABS-WorldHQ@eagle.org
Internet: https://ww2.eagle.org/

AMERICAN CONCRETE INSTITUTE (ACI)
38800 Country Club Drive
Farmington Hills, MI 48331-3439
Ph: 248-848-3800
Fax: 248-848-3701
Internet: https://www.concrete.org/

AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS (ACGIH)
3640 Park 42 Drive
Cincinnati, OH 45241
Ph: 513-742-2020
Fax: 513-742-3355
Email: customerservice@acgih.org
Internet: https://www.acgih.org/

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)
130 East Randolph, Suite 2000
Chicago, IL 60601
Ph: 312-670-2400
Fax: 312-670-5403
Steel Solutions Center: 866-275-2472
E-mail: solutions@aisc.org
Internet: https://www.aisc.org/

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)
1899 L Street, NW,11th Floor
Washington, DC 20036
Ph: 202-293-8020
Fax: 202-293-9287
E-mail: info@ansi.org
Internet: https://www.ansi.org/

AMERICAN PETROLEUM INSTITUTE (API)
200 Massachusetts Avenue NW Suite 1100
Washington, DC 20001-5571
Ph: 202-682-8000
Internet: https://www.api.org/

AMERICAN SOCIETY FOR NONDESTRUCTIVE TESTING (ASNT)
1201 Dublin Road Suite G04

Columbus, OH 43215-1045
Ph: 800-222-2768 or 614-274-6003

E-mail: customersupport@asnt.org
Internet: https://www.asnt.org/

AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE)
1801 Alexander Bell Drive
Reston, VA 20191
Ph: 800-548-2723; 703-295-6300
Email: customercare@asce.org
Internet: https://www.asce.org/

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)
Two Park Avenue
New York, NY 10016-5990
Ph: 800-843-2763
Fax: 973-882-1717
E-mail: customercare@asme.org
Internet: https://www.asme.org/

AMERICAN SOCIETY OF SAFETY PROFESSIONALS (ASSP)
520 N. Northwest Highway
Park Ridge, IL 60068
Ph: 847-699-2929
E-mail: customerservice@assp.org
Internet: https://www.assp.org/

AMERICAN WATER WORKS ASSOCIATION (AWWA)
6666 W. Quincy Avenue
Denver, CO 80235 USA
Ph: 303-794-7711 or 800-926-7337

Fax: 303-347-0804
Internet: https://www.awwa.org/

AMERICAN WELDING SOCIETY (AWS)
8669 NW 36 Street, #130
Miami, FL 33166-6672
Ph: 800-443-9353
Email: customercare@aws.org
Internet: https://www.aws.org/

AmericanHort (AH)
2130 Stella Court
Columbus, OH 43215
Ph: 614-487-1117 OH
Ph: 202-789-2900 DC
Internet: https://www.americanhort.org/

ASTM INTERNATIONAL (ASTM)
100 Barr Harbor Drive, P.O. Box C700
West Conshohocken, PA 19428-2959
Ph: 610-832-9500
Fax: 610-832-9555
E-mail: service@astm.org
Internet: https://www.astm.org/

CENTERS FOR DISEASE CONTROL AND PREVENTION (CDC)
1600 Clifton Road
Atlanta, GA 30329-4027
Ph: 800-232-4636
TTY: 888-232-6348
Internet: https://www.cdc.gov

COMPRESSED GAS ASSOCIATION (CGA)
8484 Westpark Drive Suite 220
McLean, Virginia 22102
Ph: 703-788-2700
Fax: 703-961-1831
E-mail: cga@cganet.com
Internet: https://www.cganet.com/

CONCRETE REINFORCING STEEL INSTITUTE (CRSI)
933 North Plum Grove Road
Schaumburg, IL 60173-4758
Ph: 847-517-1200
Email: crsi@crsi.org
Fax: 847-517-1206
Internet: http://www.crsi.org/

EUROPEAN UNION (EU)
European Commission
Rue de la Loi 200
1000 Bruxelle
Belgium
Ph: +32 2 299 96 96
Internet: https://commission.europa.eu/index en

ILLUMINATING ENGINEERING SOCIETY (IES)
120 Wall Street, Floor 17

New York, NY 10005-4001
Ph: 212-248-5000
Fax: 212-248-5018
E-mail: membership@ies.org
Internet: https://www.ies.org/

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)
445 and 501 Hoes Lane
Piscataway, NJ 08854-4141
Ph: 732-981-0060 or 800-701-4333
Fax: 732-981-9667
E-mail: onlinesupport@ieee.org
Internet: https://www.ieee.org/

INSULATED CABLE ENGINEERS ASSOCIATION (ICEA)
P.O. Box 493
Miamitown, OH 45041-9998
E-mail: info@icea.net
Internet: https://www.icea.net/

INTERNATIONAL AIR TRANSPORT ASSOCIATION (IATA)
800 Place Victoria
PO Box 113
Montréal, Quebec, H4Z 1M1
Ph: 514-390-6726 or 800-716-6326
Fax: 514-874-9659
E-mail: custserv@iata.org
Internet: https://www.iata.org/

INTERNATIONAL CODE COUNCIL (ICC)
200 Massachusetts Ave, NW Suite 250
Washington, DC 20001
Ph: 800-786-4452 or 888-422-7233
Fax: 202-783-2348
E-mail: order@iccsafe.org
Internet: https://www.iccsafe.org/

INTERNATIONAL CONCRETE REPAIR INSTITUTE (ICRI)
1601 Utica Avenue South, Suite 213
Minneapolis MN 55416
Ph: 651-366-6095
Fax: 651-290-2266
E-mail: info@icri.org
Internet: https://www.icri.org/

INTERNATIONAL ELECTRICAL TESTING ASSOCIATION (NETA)
3050 Old Centre Ave. Suite 101
Portage, MI 49024
Ph: 269-488-6382 or 1-888-300-6382
Fax: 269-488-6383
Internet: https://www.netaworld.org/

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO)
ISO Central Secretariat
BIBC II
Chemin de Blandonnet 8
CP 401 - 1214 Vernier, Geneva
Switzerland
Ph: 41-22-749-01-11

E-mail: central@iso.ch
Internet: https://www.iso.org

INTERNATIONAL SAFETY EQUIPMENT ASSOCIATION (ISEA)
1101 Wilson Blvd, Suite 1425
Arlington, VA 22209-1762
Ph: 703-525-1695
Fax: 703-528-2148
Internet: https://safetyequipment.org/

L.H. BAILEY HORTORIUM (LHBH)
Plant Biology Units
The L.H. Bailey Hortorium and Herbarium
440 Mann Library Building
Ithaca, NY 14853
Ph: 607-255-1052
Fax: 607-254-5407
Internet:
https://cals.cornell.edu/school-integrative-plant-science/school-sections/plant-

MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS INDUSTRY (MSS)
127 Park Street, NE
Vienna, VA 22180-4602
Ph: 703-281-6613
E-mail: info@msshq.org
Internet: http://msshq.org

MASTER PAINTERS INSTITUTE (MPI)
2800 Ingleton Avenue
Burnaby, BC CANADA V5C 6G7
Ph: 1-888-674-8937
Fax: 1-888-211-8708
E-mail: info@paintinfo.com or techservices@mpi.net
Internet: http://www.mpi.net/

NATIONAL ELECTRICAL CONTRACTORS ASSOCIATION (NECA)
1201 Pennsylvania Ave. NW, Suite 1200
Washington, DC 20004
Ph: 202-991-6300
Fax: 202-217-4171
Internet: https://www.necanet.org/

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)
1300 North 17th Street, Suite 900
Arlington, VA 22209
Ph: 703-841-3200
Email: communications@nema.org
Internet: https://www.nema.org

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)
1 Batterymarch Park
Quincy, MA 02169-7471
Ph: 800-344-3555
Fax: 800-593-6372
Internet: https://www.nfpa.org

NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH (NIOSH)
Patriots Plaza 1

395 E Street, SW, Suite 9200
Washington, DC 20201
Ph: 800-232-4636
Fax: 513-533-8347
Internet: https://www.cdc.gov/niosh/

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST)
100 Bureau Drive
Gaithersburg, MD 20899
Ph: 301-975-2000
Internet: https://www.nist.gov/

NATIONAL READY MIXED CONCRETE ASSOCIATION (NRMCA)
Manager, Customer Service
66 Canal Center Plaza, Suite 250
Alexandria, VA 22314
Ph: 703-706-4800
Fax: 703-706-4809
E-mail: jjenkins@nrmca.org (Jacques Jenkins)
Internet: https://www.nrmca.org/

NSF INTERNATIONAL (NSF)
789 North Dixboro Road
P.O. Box 130140
Ann Arbor, MI 48105
Ph: 734-769-8010 or 800-NSF-MARK
Fax: 734-769-0109
E-mail: info@nsf.org
Internet: http://www.nsf.org

POST-TENSIONING INSTITUTE (PTI)
38800 Country Club Drive
Farmington Hills, MI 48331
Ph: 248-848-3180
Bookstore: 248-848-3182
E-mail: technical.inquiries@post-tensioning.org
Internet: https://www.post-tensioning.org/

SOCIETY FOR PROTECTIVE COATINGS (SSPC)
800 Trumbull Drive
Pittsburgh, PA 15205
Ph: 877-281-7772 or 412-281-2331
Fax: 412-444-3591
E-mail: customerservice@sspc.org
Internet: http://www.sspc.org

TELECOMMUNICATIONS INDUSTRY ASSOCIATION (TIA)
1320 North Courthouse Rosd, Suite 200
Arlington, VA 22201
Ph: 703-907-7700
Fax: 703-907-7727
E-mail: marketing@tiaonline.org
Internet: https://www.tiaonline.org/

TREE CARE INDUSTRY ASSOCIATION (TCIA)
136 Harvey Road, Suite 101
Londonderry, NH 03053
Ph: 603-314-5380 or 800-733-2622

Fax: 603-314-5386
Email: memberservices@tcia.org
Internet: https://tcia.org/

U.S. ARMY CORPS OF ENGINEERS (USACE)
CRD-C DOCUMENTS available on Internet: https://www.wbdg.org/army
THE CAD/BIM TECHNOLOGY CENTER FOR FACILITIES, INFRASTRUCTURE, AND ENVIRONMENT (USACE)on Internet:
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https://www.hnc.usace.army.mil/Missions/Engineering-Directorate/TECHINFO/

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E-mail: PA@usda.gov
Internet: https://www.ams.usda.gov/
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Rural Utilities Service
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1400 Independence Avenue SW
Washington, DC 20250-1510
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Internet:
https://www.rd.usda.gov/about-rd/agencies/rural-utilities-service

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Internet: https://www.ntis.gov/
Obtain Military Specifications, Standards and Related Publications from:
Acquisition Streamlining and Standardization Information System (ASSIST)
Department of Defense Single Stock Point (DODSSP)
Document Automation and Production Service (DAPS)
Building 4/D
700 Robbins Avenue
Philadelphia, PA 19111-5094
Ph: 215-697-6396 - for account/password issues
Internet: https://assist.dla.mil/online/start/; account registration required
Obtain Unified Facilities Criteria (UFC) from:
Whole Building Design Guide (WBDG)
National Institute of Building Sciences (NIBS)

1090 Vermont Avenue NW, Suite 700
Washington, DC 20005
Ph: 202-289-7800
Fax: 202-289-1092
Internet:
https://www.wbdg.org/ffc/dod/unified-facilities-criteria-ufc

U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT (HUD)
HUD User
P.O. Box 23268
Washington, DC 20026-3268
Ph: 800-245-2691 or 202-708-3178
TDD: 800-927-7589
Fax: 202-708-9981
E-mail: helpdesk@huduser.gov
Internet: https://www.huduser.gov

U.S. DEPARTMENT OF TRANSPORTATION (DOT)
1200 New Jersey Ave., SE
Washington, DC 20590
Ph: 202-366-4000
Internet: https://www.transportation.gov/

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)
1200 Pennsylvania Avenue, N.W.
Washington, DC 20004
Ph: 202-564-4700
Internet: https://www.epa.gov
--- Some EPA documents are available only from:
National Technical Information Service (NTIS)
5301 Shawnee Road
Alexandria, VA 22312
Ph: 703-605-6060 or 1-800-363-2068
Fax: 703-605-6880
TDD: 703-487-4639
E-mail: info@ntis.gov
Internet: https://www.ntis.gov/

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Washington, DC 20591
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Washington, DC 20590
Ph: 202-366-4000

E-mail: ExecSecretariat.FHWA@dot.gov
Internet: https://highways.dot.gov/
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Internet: https://www.gpo.gov/

U.S. GENERAL SERVICES ADMINISTRATION (GSA)
General Services Administration
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Washington, DC 20405
Ph: 1-844-472-4111
Internet: https://www.gsaelibrary.gsa.gov/ElibMain/home.do
Obtain documents from:
Acquisition Streamlining and Standardization Information System (ASSIST)
Internet: https://assist.dla.mil/online/start/; account registration required

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)
8601 Adelphi Road
College Park, MD 20740-6001
Ph: 866-272-6272
Internet: https://www.archives.gov/
Order documents from:
Superintendent of Documents
U.S. Government Publishing Office (GPO)
732 N. Capitol Street, NW
Washington, DC 20401
Ph: 202-512-1800 or 866-512-1800
Bookstore: 202-512-0132
Internet: https://www.gpo.gov/

U.S. NAVAL FACILITIES ENGINEERING SYSTEMS COMMAND (NAVFAC)
1322 Patterson Ave. SE, Suite 1000
Washington Navy Yard, DC 20374-5065
Ph: 202-685-9387
Internet: http://www.navfac.navy.mil

U.S. NAVAL SEA SYSTEMS COMMAND (NAVSEA)
Commander Naval Sea Systems Command
1333 Isaac Hull Ave., SE
Washington Navy Yard, DC 20376
Ph: 202-781-0000
Internet: https://www.navsea.navy.mil/

UL SOLUTIONS (UL)
333 Pfingsten Road
Northbrook, IL 60062
Ph: 877-854-3577 or 360-817-5500
E-mail: CustomerExperienceCenter@ul.com
Internet: https://www.ul.com/
UL Directories available through IHS at https://accuristech.com/

PART 2 PRODUCTS

Not used

PART 3 EXECUTION

Not used

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01 45 00.00 25

QUALITY CONTROL

PART 1 GENERAL

1.1 REFERENCES
1.2 SUBMITTALS
1.3 LABORATORY VALIDATION
1.4 PAYMENT

PART 2 PRODUCTS

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS
3.1.1 Quality Control System
3.1.2 Project Superintendent
3.2 CONTRACTOR QUALITY CONTROL PLAN
3.2.1 Content of the CQC Plan
3.2.2 Acceptance of CQC Plan
3.2.3 Notification of Changes
3.3 COORDINATION MEETING
3.4 QUALITY CONTROL ORGANIZATION
3.4.1 Personnel Requirements
3.4.2 CQC System Manager Qualifications
3.4.3 CQC Specialized Personnel
3.4.4 Construction Quality Management for Contractors
3.4.5 Organizational Changes
3.5 FAILURE TO COMPLETE PERSONNEL DUTIES
3.6 SUBMITTALS AND DELIVERABLES
3.7 QUALITY CONTROL
3.7.1 Preparatory Phase
3.7.2 Initial Phase
3.7.3 Follow-up Phase
3.7.4 Additional Preparatory and Initial Phases
3.8 TESTS
3.8.1 Testing Procedure
3.8.2 Testing Laboratories
3.8.3 Onsite Laboratory
3.8.4 Furnishing or Transportation of Samples for Testing
3.9 COMPLETION INSPECTION
3.9.1 Punch-Out Inspection
3.9.2 Pre-Final Inspection
3.9.3 Final Acceptance Inspection
3.10 DOCUMENTATION
3.11 NOTIFICATION OF NONCOMPLIANCE

-- End of Section Table of Contents --

SECTION 01 45 00.00 25

QUALITY CONTROL

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this Specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM C1077	(2024) Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation
ASTM C1093	(2022) Standard Practice for Accreditation of Testing Agencies for Masonry
ASTM D3666	(2016) Standard Specification for Minimum Requirements for Agencies Testing and Inspecting Road and Paving Materials
ASTM D3740	(2019) Minimum Requirements for Agencies Engaged in the Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction
ASTM E329	(2023) Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following must be submitted in accordance with Section 01 33 00, SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Contractor Quality Control Plan; G

Construction Quality Management for Contractors

1.3 LABORATORY VALIDATION

For tests performed under this Contract, use a testing laboratory validated by the Corps of Engineers Material Testing Center (MTC). See Paragraph entitled TESTS.

1.4 PAYMENT

Separate payment will not be made for providing and maintaining an effective Quality Control system, and all associated costs will be included in the applicable unit prices or lump-sum prices contained in the Price Schedule.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

3.1.1 Quality Control System

Establish and maintain an effective quality control (QC) system in compliance with Contract Clause 52.246-12, INSPECTION OF CONSTRUCTION. The quality control system must consist of plans, procedures, and organization necessary to produce an end product which complies with the Contract requirements. The QC system must cover all construction operations, both onsite and offsite, and be keyed to the proposed construction sequence.

3.1.2 Project Superintendent

Identify an individual, within the onsite work organization, as Project Superintendent. The Project Superintendent must be a Journeyman with a minimum of five years experience in a verifiable Project Superintendent role on jobs similar to this Contract. The designated Project Superintendent must be acceptable to the Contracting Officer (CO). The Project Superintendent must be held responsible for the quality of work on the job and is subject to removal by the CO for non-compliance with the quality requirements specified in the Contract. In this context the highest level manager responsible for the overall construction activities at the site, including quality and production is the Project Superintendent. The Project Superintendent must maintain a physical presence at the site at all times, except as otherwise acceptable to the CO, and must be responsible for all construction and construction related activities at the site. The Project Superintendent must have no other duties; they may not perform the duties of an equipment operator, flagger, laborer, or any other position. Identify an alternate for the Project Superintendent to serve in the event of the Project Superintendent's absence or to cover work performed on additional shift. The requirements for the alternate are the same as the designated Project Superintendent.

3.2 CONTRACTOR QUALITY CONTROL PLAN

Submit no later than 30 days after receipt of Notice to Proceed, the Contractor Quality Control (CQC) Plan proposed to implement the requirements of Contract Clause 52.246-12, INSPECTION OF CONSTRUCTION. The Government will consider an interim plan for the first 10 days of operation. Construction will be permitted to begin only after acceptance of the CQC Plan or acceptance of an interim plan applicable to the particular feature of work to be started. Work outside of the features of work included in an accepted interim plan will not be permitted to begin until acceptance of a CQC Plan or another interim plan containing the additional features of work.

3.2.1 Content of the CQC Plan

Include, as a minimum, the following to cover all construction operations, both onsite and offsite, including work by subcontractors, fabricators, suppliers, purchasing agents:

a. A description of the quality control organization, including a chart showing lines of authority and acknowledgment that the CQC staff must implement the three phase control system for all aspects of the work specified. Include in the staff a CQC System Manager.

b. The name, qualifications (in resume format), duties, responsibilities, and authorities of each person assigned a CQC function; see Paragraph entitled QUALITY CONTROL ORGANIZATION.

c. A copy of the letter to the CQC System Manager signed by an authorized official of the firm which describes the responsibilities and delegates sufficient authorities to adequately perform the functions of the CQC System Manager, including authority to stop work which is not in compliance with the Contract. Letters of direction to all other various quality control representatives outlining duties, authorities, and responsibilities must be issued by the CQC System Manager. Copies of these letters must be furnished to the Government.

d. Procedures for scheduling, reviewing, certifying, and managing submittals, including those of subcontractors, offsite fabricators, suppliers, and purchasing agents. These procedures must be in accordance with Section 01 33 00 SUBMITTAL PROCEDURES.

e. Control, verification, and acceptance testing procedures for each specific test to include the test name, specification paragraph requiring test, feature of work to be tested, test frequency, and person responsible for each test. (Use laboratory facilities approved by the CO.)

f. Procedures for tracking preparatory, initial, and follow-up control phases and control, verification, and acceptance tests including documentation.

g. Procedures for tracking construction deficiencies from identification through acceptable corrective action. Establish verification procedures that identified deficiencies have been corrected.

h. Reporting procedures, including proposed reporting formats.

i. A list of the definable features of work. A definable feature of work is a task which is separate and distinct from other tasks, has separate control requirements, and may be identified by different trades or disciplines, or it may be work by the same trade in a different environment. Although each Section of the specifications may generally be considered as a definable feature of work, there are frequently more than one definable features under a particular Section. This list will be agreed upon during the coordination meeting.

3.2.2 Acceptance of CQC Plan

Acceptance of the CQC plan is required prior to the start of construction.

Acceptance is conditional and will be predicated on satisfactory performance during the construction. The Government reserves the right to require the Contractor to make changes in the CQC Plan and operations including removal of personnel, as necessary, to obtain the quality specified.

3.2.3 Notification of Changes

After acceptance of the CQC Plan, notify the CO in writing of any proposed change. Proposed changes are subject to acceptance by the CO.

3.3 COORDINATION MEETING

After the Preconstruction Conference, before start of construction and prior to acceptance by the Government of the CQC Plan, the Contractor must meet with the CO and discuss the Contractor's quality control system. Submit the CQC Plan for review a minimum of 10 calendar days prior to the Coordination Meeting. During the meeting, a mutual understanding of the system details must be developed, including the forms for recording the CQC operations, control activities, testing, administration of the system for both onsite and offsite work, and the interrelationship of Contractor's Management, and control with the Government's Quality Assurance. Minutes of the meeting will be prepared by the Government and signed by both the Contractor and the CO and will become a part of the Contract file. There may be occasions when subsequent conferences will be called by either party to reconfirm mutual understandings or address deficiencies in the CQC system or procedures which may require corrective action by the Contractor.

3.4 QUALITY CONTROL ORGANIZATION

3.4.1 Personnel Requirements

The requirements for the CQC organization are a CQC System Manager and sufficient number of additional qualified personnel to ensure Contract compliance. Personnel identified in the technical provisions as requiring specialized skills to assure the required work is being performed properly must be included as part of the CQC organization. The Contractor's CQC staff must maintain a presence at the site at all times during progress of the work and have complete authority and responsibility to take any action necessary to ensure Contract compliance. All CQC staff members must be subject to acceptance by the CO. Promptly complete and furnish all letters, material submittals, shop drawing submittals, schedules, and all other project documentation to the CQC organization. The CQC organization must maintain these documents and records at the site at all times, except as otherwise acceptable to the CO.

3.4.2 CQC System Manager Qualifications

Identify an individual, within the onsite work organization, as CQC System Manager who must be responsible for writing and executing a complete CQC plan, overall management of CQC, and have the authority to act in all CQC matters for the Contractor. The CQC System Manager must have a minimum of ten years of experience in a verifiable CQC role on jobs similar to this Contract. This CQC System Manager must be on the site at all times during construction and be employed by the Prime Contractor. The CQC System Manager must be assigned no other duties. Identify in the plan an alternate for the CQC System Manager to serve in the event of the CQC System Manager's absence or to cover work performed on additional shifts. The requirements for the alternate are the same as the designated CQC System

Manager.

3.4.3 CQC Specialized Personnel

In addition to CQC personnel specified elsewhere in the Contract, provide as part of the CQC organization specialized personnel to assist the CQC System Manager for the following areas: electrical, mechanical, civil, structural, if the CQC manager is not qualified to cover these areas at the discretion of the CO. These individuals may be employees of the Prime or subcontractor; must be responsible to the CQC System Manager; be physically present at the construction site during work on their areas of responsibility; must have five years of experience in a verifiable CQC role on jobs similar to this Contract; and must be a graduate engineer, journeyman, or licensed in their own discipline. These individuals may perform other duties but must be allowed sufficient time to perform their assigned quality control duties as described in the Quality Control Plan.

3.4.4 Construction Quality Management for Contractors

The CQC System Manager and Alternate CQC System Manager must have successfully completed the course entitled "Construction Quality Management For Contractors." This course is periodically offered by the Associated Builders and Constructors, Inc., or Associated General Contractor, Inc. and must be retaken every five years. The course has been coordinated with the Navy and certificates from the Navy will be accepted. For further information regarding courses in the Portland area contact: Associated General Contractors, Oregon-Columbia Chapter at (503) 682-3363 or https://www.agc-oregon.org/training/professional-development/. Furnish documentation that the Contractor Quality Control System Manager has completed the course.

3.4.5 Organizational Changes

Maintain the CQC staff at full strength at all times. When it is necessary to make changes to the CQC staff, revise the CQC Plan to reflect the changes and submit the changes to the CO for acceptance.

3.5 FAILURE TO COMPLETE PERSONNEL DUTIES

Superintendent and QC Manager are subject to dismissal if the above duties are not being effectively carried out. If the Superintendent and QC Manager are dismissed project work will be stopped and will not be allowed to resume until a suitable replacement is approved and the above duties are again being effectively carried out.

3.6 SUBMITTALS AND DELIVERABLES

Submittals, if needed, must comply with the requirements in Section 01 33 00 SUBMITTAL PROCEDURES. The CQC organization must be responsible for certifying that all submittals and deliverables are in compliance with Contract requirements.

3.7 QUALITY CONTROL

Contractor Quality Control is the means by which the Contractor ensures that the construction, to include that of subcontractors and suppliers, complies with the requirements of the Contract. At least three phases (Preparatory, Initial, and Follow-up) of control must be conducted by the CQC System Manager for each definable feature of the construction work as

follows:

3.7.1 Preparatory Phase

This phase must be performed prior to beginning work on each definable feature of work, after all required plans/documents/materials are approved/accepted, and after copies are at the work site. This phase includes:

a. Review each paragraph of applicable specifications, reference codes, and standards. Make available during the preparatory inspection a copy of those Sections of referenced codes and standards applicable to that portion of the work to be accomplished in the field. Maintain and make available in the field for use by Government personnel until final acceptance of the work.

b. Review of the Contract drawings.

c. Check to assure that all materials or equipment have been tested, submitted, and approved.

d. Review of provisions that have been made to provide required control inspection and testing.

e. Examination of the work area to assure that all required preliminary work has been completed and is in compliance with the Contract.

f. Physical examination of required materials, equipment, and sample work to assure that they are on hand, conform to approved shop drawings or submitted data, and are properly stored.

g. Review of the appropriate activity hazard analysis to assure safety requirements are met.

h. Discussion of procedures for controlling quality of the work including repetitive deficiencies. Document construction tolerances and workmanship standards for that feature of work.

i. Check to ensure that the portion of the plan for the work to be performed has been accepted by the CO.

j. Discussion of the initial control phase.

k. Notify the Government at least 24 hours in advance of beginning the preparatory control phase. Include a meeting conducted by the CQC System Manager and attended by the superintendent, other CQC personnel (as applicable), and the foreman responsible for the definable feature. The CQC System Manager must prepare and document the results of the preparatory phase actions by separate minutes, and attach to the daily CQC report. Instruct applicable workers as to the acceptable level of workmanship required in order to meet Contract specifications.

3.7.2 Initial Phase

This phase must be accomplished at the beginning of a definable feature of work. Accomplish the following:

a. Check work to ensure that it is in full compliance with Contract requirements. Review minutes of the preparatory meeting.

b. Verify adequacy of controls to ensure full Contract compliance. Verify required control inspection and testing.

c. Establish level of workmanship and verify that it meets minimum acceptable workmanship standards. Compare with required sample panels as appropriate.

d. Resolve all differences.

e. Check safety to include compliance with and upgrading of the safety plan and activity hazard analysis. Review the activity analysis with each worker.

f. Notify the Government at least 24 hours in advance of beginning the initial phase. Document separate minutes of this phase, prepared by the CQC System Manager, and attach to the daily CQC report. Indicate exact location of initial phase for future reference and comparison with follow-up phases.

g. Repeat the initial phase for each new crew to work onsite, or any time acceptable specified quality standards are not being met.

3.7.3 Follow-up Phase

Perform daily checks to assure control activities, including control testing, are providing continued compliance with Contract requirements, until completion of the particular feature of work. Record the daily checks in the CQC documentation. Conduct final follow-up checks and correct all deficiencies prior to the start of additional features of work which may be affected by the deficient work. Do not build upon nor conceal non-conforming work.

3.7.4 Additional Preparatory and Initial Phases

Conduct additional preparatory and initial phases on the same definable features of work if: the quality of on-going work is unacceptable; if there are changes in the applicable CQC staff, onsite production supervision, or work crew; if work on a definable feature is resumed after a substantial period of inactivity; or if other problems develop.

3.8 TESTS

3.8.1 Testing Procedure

Perform specified or required tests to verify that control measures are adequate to provide a product that conforms to Contract requirements. Report all test results using industry standard forms at the frequency specified in the Contract. Upon request, furnish to the Government duplicate samples of test specimens for QA verification testing by the Government. Procure the services of a Corps of Engineers approved testing laboratory, as described in Subparagraph entitled TESTING LABORATORIES, or establish an approved testing laboratory at the project site. Perform the following activities and record and provide the following data:

a. Verify that testing procedures comply with Contract requirements.

b. Verify that facilities and testing equipment are available and comply with testing standards.

c. Check test instrument calibration data against certified standards.

d. Verify that recording forms and test identification control number system, including all of the test documentation requirements, have been prepared.

e. Record results of all tests taken, both passing and failing, on the CQC report for the date taken. Include Specification paragraph reference, location where tests were taken, and the sequential control number identifying the test. If approved by the CO, actual test reports may be submitted later with a reference to the test number and date taken. Provide an information copy of tests performed by an offsite or commercial test facility directly to the CO. Failure to submit timely test reports as stated may result in nonpayment for related work performed and disapproval of the test facility for this Contract.

3.8.2 Testing Laboratories

The Government reserves the right to check laboratory equipment in the proposed laboratory for compliance with the standards set forth in the Contract specifications and to check the laboratory technician's testing procedures and techniques.

a. Validation. The validation of a testing laboratory is site-specific and cannot be transferred to a facility at a different location. Costs for validation by the Corps of Engineers MTC must be borne by the laboratory or the Contractor. Validation is granted only for the specific testing procedures requested to be validated. The laboratory may select the testing procedures to be validated, except for the Quality Assurance requirements of the applicable ASTM standards listed in this Paragraph.

b. Validation Procedures. Validation of a testing laboratory consists of either an inspection or audit, as defined below:

(1) Inspection must be performed by the MTC to verify compliance with the applicable provisions of ASTM C1077, ASTM C1093, ASTM D3666, ASTM D3740, and ASTM E329.

(2) An audit would be performed by the MTC in lieu of an inspection for laboratories holding a current AASHTO accreditation. Inspection by the MTC may be required after auditing if critical testing procedures required in the Contract were not included in the applicable CCRL or AMRL inspections.

c. Validation Schedule. For aggregate, concrete, bituminous materials, soil, rock, riprap, and metal components, the frequency of validation inspections or audits is once every two years. For water quality and sediment testing the validation schedule is every 18 months. When conditions change substantially from the time of the last validation, laboratories must be re-validated.

d. Validation Process. For information on the validation process and costs contact the MTC at (601) 634-2496. Procedures for validation, including forms requesting validation may be obtained from the MTC web site at: https://mtc.erdc.dren.mil/. The Contractor is cautioned that the validation process is lengthy and that it requires immediate

action. Keep the CO informed about the validation process as it proceeds in a timely manner.

3.8.3 Onsite Laboratory

The Government reserves the right to utilize the Contractor's control testing laboratory and equipment to make assurance tests, and to check the Contractor's testing procedures, techniques, and test results at no additional cost to the Government.

3.8.4 Furnishing or Transportation of Samples for Testing

Costs incidental to the transportation of samples or materials must be borne by the Contractor. Samples of materials for test verification and acceptance testing by the Government must be delivered to the Portland District Contract commercial Laboratory in the District area. Coordination for each specific test, exact delivery location, and dates must be made through the Portland District Resident Office.

3.9 COMPLETION INSPECTION

3.9.1 Punch-Out Inspection

The CQC Manager must conduct an inspection of the work near the end of the work, or any increment of the work established by a time stated in the specifications, or the Contract Clause 52.211-10, COMMENCEMENT, PROSECUTION, AND COMPLETION OF WORK. As required by Paragraph DOCUMENTATION, prepare and include in the CQC documentation a punch list of items which do not conform to the approved drawings and specifications. Include within the list of deficiencies the estimated date by which the deficiencies will be corrected. The CQC System Manager or staff must make a second inspection to ascertain that all deficiencies have been corrected. Once this is accomplished, notify the Government that the facility is ready for the Government Pre-Final inspection.

3.9.2 Pre-Final Inspection

The Government will perform the pre-final inspection to verify that the work is complete. A Government Pre-Final Punch List may be developed as a result of this inspection. The Contractor's CQC System Manager must ensure that all items on this list have been corrected before notifying the Government, so that a Final inspection with the customer can be scheduled. Correct any items noted on the Pre-Final inspection in a timely manner. These inspections and any deficiency corrections required by this Paragraph must be accomplished within the time slated for completion of the entire work or any particular increment of the work if the project is divided into increments by separate completion dates.

3.9.3 Final Acceptance Inspection

The Contractor's Quality Control Inspection personnel, plus the superintendent or other primary management person, and the CO must be in attendance at the final acceptance inspection. Additional Government personnel including, but not limited to, those from Base/Post Civil Facility Engineer user groups and major commands may also be in attendance. The final acceptance inspection will be formally scheduled by the CO based upon results of the Pre-Final inspection. Notify the CO at least 14 days prior to the final acceptance inspection and include the Contractor's assurance that all specific items previously identified to the

Contractor as being unacceptable, along with all remaining work performed under the Contract, will be complete and acceptable by the date scheduled for the final acceptance inspection. Failure of the Contractor to have all Contract work acceptably complete for this inspection will be cause for the CO to bill the Contractor for the Government's additional inspection cost in accordance with Contract Clause 52.246-12, INSPECTION OF CONSTRUCTION.

3.10 DOCUMENTATION

Daily CQC Report:

a. Maintain current records providing factual evidence that required quality control activities and tests have been performed. Include in these records the work of subcontractors and suppliers on an acceptable form that includes, as a minimum, the following information:

(1) Contractor/subcontractor and their area of responsibility.

(2) Operating plant and equipment with hours worked, idle, or down for repair.

(3) Work performed each day, giving location, description, and by whom. When Network Analysis (NAS) is used, identify each phase of work performed each day by NAS activity number.

(4) Test and control activities performed with results and references to specifications and drawings requirements. Identify the control phase (Preparatory, Initial, or Follow-up). List of deficiencies noted, along with corrective action.

(5) Quantity of materials received at the site with statement as to acceptability, storage, and reference to specifications and drawings requirements.

(6) Submittals and deliverables reviewed, with Contract reference, by whom, and action taken.

(7) Offsite surveillance activities, including actions taken.

(8) Job safety evaluations stating what was checked, results, and instructions or corrective actions.

(9) Instructions given or received and conflicts in plans and specifications.

(10) Contractor's verification statement.

(11) Deficiency Tracking System. Maintain a cumulative list of deficiencies identified for the duration of the project. Deficiencies to be listed include those failures, Government oral observations, and Notifications of Noncompliance. Maintain the list at the project site. Submit copies of updated listings to the Government at least every 30 days.

b. Indicate a description of trades working on the project; the number of personnel working; weather conditions encountered; and any delays encountered. Cover both conforming and deficient features and include a statement that equipment and materials incorporated in the work and workmanship comply with the Contract. Electronically submit daily

reports and a signed, printed copy of these records to the Government within 24 hours after the date covered by the report, except that reports need not be submitted for days on which no work is performed. As a minimum, prepare and submit one report for every seven days of no work and on the last day of a no work period. All calendar days must be accounted for throughout the life of the Contract. The first report following a day of no work must be for that day only. Reports must be signed and dated by the CQC System Manager. Include copies of test reports and copies of reports prepared by all subordinate quality control personnel within the Daily CQC Report.

3.11 NOTIFICATION OF NONCOMPLIANCE

The CO will notify the Contractor of any detected noncompliance with the foregoing requirements. Take immediate corrective action after receipt of such notice. Such notice, when delivered to the Contractor at the work site, must be deemed sufficient for the purpose of notification. If the Contractor fails or refuses to comply promptly, the CO may issue an order stopping all or part of the work until satisfactory corrective action has been taken. The Contractor must make no part of the time lost due to such stop orders the subject of claim for extension of time or for excess costs or damages.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01 45 00.15 25

RESIDENT MANAGEMENT SYSTEM CONTRACTOR MODE (RMS CM)

PART 1 GENERAL

1.1 REFERENCES
1.2 CONTRACT ADMINISTRATION
1.2.1 Correspondence and Electronic Communications
1.2.2 Other Factors
1.3 RMS SOFTWARE
1.4 CONTRACT DATABASE - GOVERNMENT
1.5 CONTRACT DATABASE - CONTRACTOR
1.5.1 Administration
1.5.1.1 Contractor Information
1.5.1.2 Subcontractor Information
1.5.1.3 Correspondence
1.5.1.4 Equipment
1.5.1.5 Reports
1.5.1.6 Request For Information (RFI)
1.5.2 Finances
1.5.2.1 Pay Activity Data
1.5.2.2 Payment Requests
1.5.3 Quality Control (QC)
1.5.3.1 Quality Control (QC) Reports
1.5.3.2 Deficiency Tracking
1.5.3.3 Three-Phase Control Meetings
1.5.3.4 Labor and Equipment Hours
1.5.3.5 Accident/Safety Reporting
1.5.3.6 Definable Features of Work
1.5.3.7 Activity Hazard Analysis
1.5.4 Submittal Management
1.5.5 Schedule
1.5.6 Closeout
1.6 IMPLEMENTATION
1.7 NOTIFICATION OF NONCOMPLIANCE

PART 2 PRODUCTS

PART 3 EXECUTION

-- End of Section Table of Contents --

SECTION 01 45 00.15 25

RESIDENT MANAGEMENT SYSTEM CONTRACTOR MODE (RMS CM)

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this section to the extent referenced. The publications are referred to within the text by the basic designation only.

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2024) Safety -- Safety and Occupational Health (SOH) Requirements

1.2 CONTRACT ADMINISTRATION

a. The Government will use the Resident Management System (RMS) to assist in its monitoring and administration of this Contract. The Government accesses the system using the Government Mode of RMS (RMS GM) and the Contractor accesses the system using the Contractor Mode (RMS CM). The term RMS will be used in the remainder of this Section for both RMS GM and RMS CM. The joint Government-Contractor use of RMS facilitates electronic exchange of information and overall management of the Contract. The Contractor accesses RMS to record, maintain, input, track, and electronically share information with the Government throughout the contract period in the following areas:

(1) Administration

(2) Finances

(3) Quality Control

(4) Submittal Monitoring

(5) Scheduling

(6) Closeout

(7) Import/Export of Data

b. Be prepared to transition from the Resident Management System (RMS) to the new Construction Management Platform (CMP) at any time during the period of performance of this Contract, once the USACE enterprise implements this change. The Contractor's obligation to transition from RMS to the CMP system is a requirement of this Contract. Therefore, additional time or cost increase to complete this transition will not be considered. In the event of the transition, RMS project information will be migrated to CMP by the Government and available in the CMP system. After the transition, utilize the CMP system to perform all Contract administration functions previously required in RMS, including all areas listed above. After the transition, “RMS” and “CMP” will be synonymous for all “Resident Management System” and “RMS” references in

this Contract's specification. To facilitate the transition from RMS to CMP, online training for the CMP system will be made available to the Contractor with enough time to train staff, prior to the transition occurring.

1.2.1 Correspondence and Electronic Communications

For ease and speed of communications, exchange correspondence and other documents in electronic format to the maximum extent feasible.

1.2.2 Other Factors

Other portions of this document have a direct relationship to the reporting accomplished through RMS. Particular attention is directed to FAR 52.236-15 Schedules for Construction Contracts; FAR 52.232-27 Prompt Payment for Construction Contracts; FAR 52.232-5 Payments Under Fixed-Priced Construction Contracts; Section 01 32 01.00 25 PROJECT SCHEDULE; Section 01 33 00 SUBMITTAL PROCEDURES; Section 01 35 26.00 25 GOVERNMENTAL SAFETY REQUIREMENTS; and Section 01 45 00.00 25 QUALITY CONTROL.

1.3 RMS SOFTWARE

RMS is a web based application. Download, install and be able to utilize the latest version of RMS within seven calendar days of receipt of the Notice to Proceed. RMS software, user manuals, access and installation instructions, program updates and training information are available from the RMS website (https://rms.usace.army.mil). The Government and the Contractor will have different access authorities to the same Contract database through RMS. The common database will be updated automatically each time a user finalizes an entry or change.

1.4 CONTRACT DATABASE - GOVERNMENT

The Government will enter the basic Contract award data in RMS prior to granting the Contractor access. The Government entries into RMS will generally be related to submittal reviews, correspondence status, and Quality Assurance(QA)comments, as well as other miscellaneous administrative information.

1.5 CONTRACT DATABASE - CONTRACTOR

Contractor entries into RMS establish, maintain, and update data throughout the duration of the Contract. Contractor entries generally include prime and subcontractor information, daily reports, submittals, RFI's, schedule updates and payment requests. RMS includes the ability to import attachments and export reports in many of the modules, including submittals. The Contractor responsibilities for entries in RMS typically include the following items:

1.5.1 Administration

1.5.1.1 Contractor Information

Enter all current Contractor administrative data and information into RMS within seven calendar days of receiving access to the contract in RMS. This includes, but is not limited to, Contractor's name, address, telephone numbers, management staff, and other required items.

1.5.1.2 Subcontractor Information

Enter all missing subcontractor administrative data and information into RMS CM within seven calendar days of receiving access to the Contract in RMS or within seven calendar days of the signing of the subcontractor agreement for agreements signed at a later date. This includes name, trade, address, phone numbers, and other required information for all subcontractors. A subcontractor is listed separately for each trade to be performed.

1.5.1.3 Correspondence

Identify all Contractor correspondence to the Government with a serial number. Prefix correspondence initiated by the Contractor's site office with "S". Prefix letters initiated by the Contractor's home (main) office with "H". Letters are numbered starting from 0001. (e.g., H-0001 or S-0001). The Government's letters to the Contractor will be prefixed with "C" or "RFP".

1.5.1.4 Equipment

Enter and maintain a current list of equipment planned for use or being used on the jobsite, including the most recent and planned equipment inspection dates in accordance with Section 01 45 00.00 25 QUALITY CONTROL.

1.5.1.5 Reports

Track the status of the project using the reports available in RMS. The value of these reports reflects the quality of the data input. These reports include but are not limited to the Progress Payment Request worksheet, Quality Control (QC) comments, Deficiency Tracking Log, Submittal Register Status, and Three-Phase Control worksheets in accordance with Sections 01 22 00.00 25 MEASUREMENT AND PAYMENT, Section 01 32 01.00 25 PROJECT SCHEDULE, 01 33 00 SUBMITTAL PROCEDURES, and 01 45 00.00 25 QUALITY CONTROL.

1.5.1.6 Request For Information (RFI)

Create and track all Requests For Information (RFI) in the RMS Administration Module for Government review and response. Provide status at weekly progress meeting in accordance with Section 01 32 01.00 25 PROJECT SCHEDULE.

1.5.2 Finances

1.5.2.1 Pay Activity Data

Develop and enter a list of pay activities in conjunction with the project schedule in accordance with Section 01 32 01.00 25 PROJECT SCHEDULE. The sum of pay activities equals the total Contract amount, including modifications. Each pay activity must be assigned to a Contract Line Item Number (CLIN). The sum of the activities assigned to a CLIN equals the amount of each CLIN.

1.5.2.2 Payment Requests

Prepare all progress payment requests using RMS. Update the work completed under the Contract at least monthly, measured as percent or as specific quantities. After the update, generate a payment request and prompt

payment certification using RMS. Submit the signed prompt payment certification and payment request as well as supporting data, either electronically or by hard copy.

1.5.3 Quality Control (QC)

Enter and track implementation of the 3-phase QC Control System, QC testing, transferred and installed property and warranties in RMS. Link each deficiency and QC test to a pay activity. Prepare daily reports, identify and track deficiencies, document progress of work, and support other Contractor QC requirements in RMS. Maintain all data on a daily basis. Ensure that RMS reflects all quality control methods, tests and actions contained within the Contractor Quality Control (CQC) Plan and Government review comments. Provide within seven calendar days of Government acceptance of the CQC Plan.

1.5.3.1 Quality Control (QC) Reports

The Contractor's Quality Control (QC) Daily Report in RMS is the official report. The Contractor can use other supplemental formats to record QC data, but information from any supplemental formats are to be consolidated and entered into the RMS QC Daily Report. Any supplemental information may be entered into RMS as an attachment to the report. QC Daily Reports must be finalized and signed in RMS within 24 hours after the date covered by the report.

1.5.3.2 Deficiency Tracking

Use the QC Daily Report Module to enter and track deficiencies. Deficiencies identified and entered into RMS by the Contractor or the Government will be sequentially numbered with a QC or QA prefix for tracking purposes. Enter each deficiency into RMS the same day that the deficiency is identified. Monitor, track and resolve all QC and QA entered deficiencies. A deficiency is not considered to be corrected until the Government indicates concurrence in RMS.

1.5.3.3 Three-Phase Control Meetings

Maintain scheduled and actual dates and times of preparatory and initial control meetings in RMS, and upload meeting minutes of the meetings. Worksheets for the three-phase control meetings are generated within RMS.

1.5.3.4 Labor and Equipment Hours

Enter labor and equipment exposure hours on a daily basis. Roll up the labor and equipment exposure data into a monthly exposure report.

1.5.3.5 Accident/Safety Reporting

Both the Contractor and the Government enter safety related comments in RMS as a deficiency. Monitor, track and show resolution for safety issues in the QC Daily Report area of the RMS QC Module. In addition, follow all reporting requirements for accidents and incidents as required in EM 385-1-1, Section 01 35 26.00 25 GOVERNMENTAL SAFETY REQUIREMENTS and as required by any other applicable Federal, State or local agencies.

1.5.3.6 Definable Features of Work

Enter each feature of work, as defined in the approved CQC Plan, into the

RMS QC Module. A feature of work may be associated with a single or multiple pay activities, however a pay activity is only to be linked to a single feature of work.

1.5.3.7 Activity Hazard Analysis

Import activity hazard analysis electronic document files into the RMS QC Module utilizing the document package manager. Prepare activity hazard analysis in accordance with Section 01 35 26.00 25 GOVERNMENT SAFETY REQUIREMENTS.

1.5.4 Submittal Management

a. Enter all current submittal register data and information into RMS within seven calendar days of receiving access to the Contract in RMS.Entering Activity Numbers for each submittal item corresponding to their Schedule. Group electronic submittal documents into transmittal packages to send to the Government, except very large electronic files, samples, spare parts, mock ups, color boards, or where hard copies are specifically required. Track transmittals and update the submittal register in RMS on a daily basis throughout the duration of the Contract.

b. Enter all submittals as listed in the approved design's submittal register within 14 calendar days of design approval for construction.

c. Contractor may request submittals to be added to RMS throughout the lifecycle of the project. Approval/disapproval of Contractor requests is at the discretion of the Contracting Officer (CO). Submittals entry into RMS must be updated daily or as practical for performance of the Contract, as approved by the CO.

1.5.5 Schedule

Enter and update the Contract project schedule in RMS by either manually entering all schedule data or by importing the Standard Data Exchange Format (SDEF) file, based on the requirements in Section 01 32 01.00 25 PROJECT SCHEDULE.

1.5.6 Closeout

Closeout documents, processes and forms are managed and tracked in RMS by both the Contractor and the Government. Ensure that all closeout documents are entered, completed and documented within RMS.

1.6 IMPLEMENTATION

Use of RMS as described in the preceding paragraphs is mandatory. Ensure that sufficient resources are available to maintain Contract data within the RMS system. RMS is an integral part of the Contractor's required management of quality control.

1.7 NOTIFICATION OF NONCOMPLIANCE

Take corrective action within seven calendar days after receipt of notice of RMS non-compliance by the CO.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01 57 19.00 25

TEMPORARY ENVIRONMENTAL CONTROLS

PART 1 GENERAL

1.1 GENERAL INFORMATION
1.2 REFERENCES
1.3 DEFINITIONS
1.3.1 Contractor-Generated Hazardous Waste
1.3.2 Electronics Waste
1.3.3 Environmental Pollution and Damage
1.3.4 Environmental Protection
1.3.5 Hazardous Debris
1.3.6 Hazardous Materials
1.3.7 Hazardous Waste
1.3.8 Land Application
1.3.9 National Pollutant Discharge Elimination System (NPDES)
1.3.10 Oily Waste
1.3.11 Petroleum, Oils, and Lubricants (POLs)
1.3.12 Regulated Waste
1.3.13 Sediment
1.3.14 Solid Waste
1.3.14.1 Construction Debris
1.3.14.2 Non-Hazardous Waste
1.3.14.3 Recyclables
1.3.14.4 Surplus Soil
1.3.14.5 Scrap Metal
1.3.15 Surface Discharge
1.3.16 Stormwater
1.3.17 Wastewater
1.3.18 Waters of the United States
1.3.19 Wetlands
1.3.20 Universal Waste
1.4 SUBMITTALS
1.5 GENERAL ENVIRONMENTAL PROTECTION REQUIREMENTS
1.6 ENVIRONMENTAL PERMITS AND COMMITMENTS
1.7 In-Water Work Definition
1.8 QUALITY CONTROL
1.8.1 Environmental Preconstruction Survey
1.8.2 Environmental Coordination Meeting
1.8.3 Non-Compliance Notifications
1.9 ENVIRONMENTAL PROTECTION PLAN
1.9.1 General Overview and Purpose
1.9.1.1 Procedures
1.9.1.2 Communications
1.9.2 Environmental Manager Qualifications
1.9.3 Regulatory Notification and Permits
1.9.4 General Site Information
1.9.4.1 Drawings

1.9.4.2 Work Area
1.9.5 Documentation of Environmental Conditions
1.9.6 Protection of the Environment from Waste Derived from Contractor Operations
1.9.7 Spill Prevention and Control Plan
1.9.8 Clean Air Act Compliance
1.9.8.1 Dirt and Dust Control Plan
1.9.8.2 Pollution Generating Equipment
1.9.8.3 Refrigerants
1.9.8.4 Air Pollution-Generating Processes
1.9.8.5 Compliant Materials
1.9.8.6 Safety Data Sheets (SDS)
1.10 ENVIRONMENTAL RECORDS BINDER
1.10.1 Employee Training Records

PART 2 PRODUCTS

PART 3 EXECUTION

3.1 PROTECTION OF NATURAL RESOURCES
3.1.1 Marine Mammals
3.1.2 Pile (including Sheet Piles) Installation Requirements
3.1.3 Fish
3.1.4 Streams
3.1.5 Wetlands and Other Sensitive Areas
3.1.6 Vegetation
3.1.7 Nesting Birds
3.2 OREGON STORMWATER POLLUTION PREVENTION
3.2.1 Erosion and Sediment Control Plan
3.2.2 Construction Stormwater General Permit
3.2.2.1 Stormwater Permit Application for Construction Activities
3.2.2.2 Inspections and Reports
3.2.2.3 Stormwater Notice of Termination for Construction Activities
3.2.3 BMP Monitoring and Maintenance
3.2.4 Erosion and Sediment Control Measures
3.2.4.1 Erosion Control Practices
3.2.4.2 Sediment Control Practices
3.2.5 Contractor Facilities and Work Areas
3.3 SURFACE AND GROUNDWATER
3.3.1 Cofferdams, Diversions, and Dewatering
3.3.2 Waters of the United States
3.3.3 Invasive Species Prevention Measures for Boat Operations
3.4 CULTURAL RESOURCES
3.4.1 Archaeological Resources
3.4.2 Human Remains and Cultural Items
3.4.3 Professional Archaeological Monitor
3.4.4 SOI Professional Qualifications Standards
3.5 AIR RESOURCES
3.5.1 Burning
3.5.2 Dust and Particulate Control
3.5.3 Odors
3.6 WASTE MINIMIZATION
3.6.1 Salvage, Reuse and Recycle
3.7 WASTE MANAGEMENT AND DISPOSAL
3.7.1 Waste Determination Documentation
3.7.2 Solid Waste Management
3.7.2.1 Solid Waste Management Report
3.7.2.2 Control and Management of Solid Wastes

3.7.3 Control and Management of Hazardous Waste
3.7.3.1 Hazardous Waste/Debris Management
3.7.3.2 Hazardous Waste Disposal
3.7.3.3 Universal Waste Management
3.7.3.4 Electronics End-of-Life Management
3.7.4 Releases/Spills of Oil and Hazardous Substances
3.7.5 Mercury Materials
3.7.6 Wastewater
3.7.6.1 Treatment
3.7.6.2 Sanitary Sewer Discharge
3.7.6.3 Surface Discharge
3.7.6.4 Land Application
3.8 HAZARDOUS MATERIAL MANAGEMENT
3.8.1 Lead-Based Paint (LBP)
3.9 PREVIOUSLY USED EQUIPMENT
3.10 PETROLEUM, OILS, AND LUBRICANTS (POLs) STORAGE AND FUELING
3.10.1 Used Oil Management
3.10.2 Oil Storage Including Fuel Tanks
3.11 INADVERTENT DISCOVERY OF PETROLEUM-CONTAMINATED SOIL OR HAZARDOUS WASTES
3.12 NOISE CONTROL
3.12.1 General
3.12.2 Noise Limitations
3.13 POST CONSTRUCTION CLEANUP

-- End of Section Table of Contents --

SECTION 01 57 19.00 25

TEMPORARY ENVIRONMENTAL CONTROLS

PART 1 GENERAL

1.1 GENERAL INFORMATION

This section includes requirements for preventing and controlling environmental pollution and minimizing environmental impacts to the site and surroundings during the work. The control of environmental pollution requires consideration of sound levels, air, water, and land resources; the proper management and use of petroleum products and hazardous materials; and the disposal of solid and hazardous wastes. Sections 02 82 00.00 25 ASBESTOS REMEDIATION and 02 83 00.00 99 LEAD REMEDIATION contains specific requirements for construction activities impacting asbestos containing materials and lead-based paint. Those specific requirements are in addition to or modify the requirements in this section. The project site lies within the State of Oregon. Conform to all applicable state regulations.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2024) Safety -- Safety and Occupational Health (SOH) Requirements

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA 800-R-11-002	(2011) Environmentally Acceptable Lubricants

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910.120	Hazardous Waste Operations and Emergency Response
29 CFR 1926.52	Occupational Noise Exposure
29 CFR 1926.62	Lead
29 CFR 1926.101	Hearing Protection
36 CFR Part 61	Procedures For State, Tribal, And Local Government Historic Preservation Programs
40 CFR 50	National Primary and Secondary Ambient Air Quality Standards
40 CFR 61	National Emission Standards for Hazardous Air Pollutants

40 CFR 112	Oil Pollution Prevention
40 CFR 122.26	Storm Water Discharges (Applicable to State NPDES Programs, see section 123.25)
40 CFR 260	Hazardous Waste Management System: General
40 CFR 261	Identification and Listing of Hazardous Waste
40 CFR 261.7	Residues of Hazardous Waste in Empty Containers
40 CFR 262	Standards Applicable to Generators of Hazardous Waste
40 CFR 268	Land Disposal Restrictions
40 CFR 273	Standards for Universal Waste Management
40 CFR 279	Standards for the Management of Used Oil
40 CFR 300	National Oil and Hazardous Substances Pollution Contingency Plan
40 CFR 302	Designation, Reportable Quantities, and Notification
49 CFR 171	General Information, Regulations, and Definitions
49 CFR 172	Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements
49 CFR 173	Shippers - General Requirements for Shipments and Packagings

1.3 DEFINITIONS

1.3.1 Contractor-Generated Hazardous Waste

Contractor-generated hazardous waste is material that, if abandoned or disposed of, may meet the definition of a hazardous waste. These waste streams typically consist of material brought on site by the Contractor to execute work, but are not fully consumed during the course of construction. Examples include, but are not limited to, excess paint thinners (i.e. methyl ethyl ketone, toluene), waste thinners, excess paints, excess solvents, waste solvents, excess pesticides, and contaminated pesticide equipment rinse water. The cleanup of Contractor spills of hazardous materials or petroleum products may also result in the generation of Contractor-generated hazardous waste.

1.3.2 Electronics Waste

Electronics waste is discarded electronic devices intended for salvage, recycling, or disposal.

1.3.3 Environmental Pollution and Damage

Environmental pollution and damage is the presence of chemical, physical, or biological elements or agents that adversely affect human health or welfare; unfavorably alter ecological balances of importance to human life; affect other species of importance to humankind; or degrade the environment aesthetically, culturally or historically.

1.3.4 Environmental Protection

Environmental protection is the prevention/control of pollution and habitat disruption that may occur during construction. The control of environmental pollution and damage requires consideration of land, water, and air; biological and cultural resources; and includes management of visual aesthetics; noise; solid, chemical, gaseous, and liquid waste; radiant energy and radioactive material as well as other pollutants.

1.3.5 Hazardous Debris

Hazardous debris is debris that contains listed hazardous waste (either on the debris surface, or in its interstices, such as pore structure) in accordance with 40 CFR 261. Hazardous debris also includes debris that exhibits a characteristic of hazardous waste in accordance with 40 CFR 261.

1.3.6 Hazardous Materials

a. Hazardous materials as defined in 49 CFR 171 and listed in 49 CFR 172.

b. Hazardous material is any material that: Is regulated as a hazardous material in accordance with 49 CFR 173; or requires a Safety Data Sheet (SDS) in accordance with 29 CFR 1910.120; or during end use, treatment, handling, packaging, storage, transportation, or disposal meets or has components that meet or have potential to meet the definition of a hazardous waste as defined by 40 CFR 261 Subparts A, B, C, or D. Designation of a material by this definition, when separately regulated or controlled by other sections or directives, does not eliminate the need for adherence to that hazard-specific guidance which takes precedence over this section for "control" purposes. Such material includes ammunition, weapons, explosive actuated devices, propellants, pyrotechnics, chemical and biological warfare materials, medical and pharmaceutical supplies, medical waste and infectious materials, bulk fuels, radioactive materials, and other materials such as asbestos, mercury, and polychlorinated biphenyls (PCBs).

1.3.7 Hazardous Waste

Hazardous Waste is any material that meets the definition of a solid waste and exhibits a hazardous characteristic (ignitability, corrosivity, reactivity, or toxicity) as specified in 40 CFR 261, Subpart C, is listed in 40 CFR 261, Subpart D, or is a mixture of a solid waste and one or more hazardous wastes listed in 40 CFR 261, Subpart D.

1.3.8 Land Application

Land Application means spreading or spraying discharge water at a rate that allows the water to percolate into the soil.

1.3.9 National Pollutant Discharge Elimination System (NPDES)

The NPDES permit program controls water pollution by regulating point sources, including stormwater discharges from construction sites, that discharge pollutants into waters of the United States. In the state of Oregon, the Department of Environmental Quality (ODEQ) has the delegated authority to administer the NPDES permit program and issue permits, including the construction stormwater general permit.

1.3.10 Oily Waste

a. Oily wastes are materials that are, or were, mixed with Petroleum, Oils, and Lubricants (POLs) and have become separated from the POLs. Oily wastes also refers to materials, including wastewaters, centrifuge solids, filter residues or sludges, bottom sediments, tank bottoms, and sorbents which have come into contact with and have been contaminated by POLs.

b. This definition includes materials such as oily rags, "kitty litter" sorbent clay and organic sorbent material. These materials may be land filled provided that: It is not prohibited in other state regulations or local ordinances; the amount generated is "de minimis" (a small amount); it is the result of minor leaks or spills resulting from normal process operations; and free-flowing oil has been removed to the practicable extent possible. Large quantities of this material, generated as a result of a major spill or in lieu of proper maintenance of the processing equipment, are a solid waste. As a solid waste, perform a hazardous waste determination prior to disposal. As this can be an expensive process, it is recommended that this type of waste be minimized through good housekeeping practices and employee education.

1.3.11 Petroleum, Oils, and Lubricants (POLs)

POL products include flammable or combustible liquids, such as gasoline, diesel, lubricating oil, used engine oil, hydraulic oil, mineral oil, and cooking oil.

1.3.12 Regulated Waste

Regulated wastes are solid wastes that have specific additional federal, state, or local requirements for handling, storage, or disposal.

1.3.13 Sediment

Sediment is soil or other debris that has eroded and has been transported by runoff water or wind.

1.3.14 Solid Waste

Solid waste is a solid, liquid, semi-solid or contained gaseous waste. A solid waste can be a hazardous waste, non-hazardous waste, or non-Resource Conservation and Recovery Act (RCRA) regulated waste. Types of solid waste typically generated at construction sites may include:

1.3.14.1 Construction Debris

Construction debris is non-hazardous solid material generated during the construction, demolition, or renovation of a structure that exceeds 2.5-inch particle size that is: a manufactured object; plant or animal matter; or

natural geologic material (e.g., cobbles and boulders), broken or removed concrete, masonry, rebar, and rock asphalt paving; ceramics; roofing paper and shingles. A mixture of debris and other material is also subject to regulation as debris if the mixture is comprised primarily of debris by volume, based on visual inspection.

1.3.14.2 Non-Hazardous Waste

Non-hazardous waste is waste that is excluded from, or does not meet, hazardous waste criteria in accordance with 40 CFR 262.

1.3.14.3 Recyclables

Recyclables are materials, equipment, and assemblies such as metal parts, wiring, insulated/non-insulated copper wire cable, wire rope, and structural components that are recovered and sold as recyclable. It also includes clean polyethylene terephthalate bottles, cooking oil, used fuel oil, high-grade paper products and corrugated cardboard, stackable pallets in good condition, clean crating material, and clean rubber/vehicle tires. Metal containing lead or lead-based paint may be included as recyclable if sold to a scrap metal company with full disclosure of the presence of lead or other metal contaminants. Paint cans that meet the definition of empty containers in accordance with 40 CFR 261.7 may be included as recyclable if sold to a scrap metal company.

1.3.14.4 Surplus Soil

Surplus soil is existing soil that is in excess of what is required for this work, including aggregates intended, but not used, for on-site mixing of concrete, mortars, and paving. Contaminated soil meeting the definition of hazardous material or hazardous waste is not included and must be managed in accordance with Paragraph HAZARDOUS WASTE/DEBRIS MANAGEMENT.

1.3.14.5 Scrap Metal

This includes scrap and excess ferrous and non-ferrous metals such as reinforcing steel, structural shapes, pipe, and wire that are recovered or collected and managed as scrap. Scrap metal meeting the definition of hazardous material or hazardous waste is not included.

1.3.15 Surface Discharge

Surface discharge means discharge of water into drainage ditches, storm sewers, creeks or "waters of the United States". Surface discharges are discrete, identifiable sources and require a permit from the governing agency. Comply with federal, state, and local laws and regulations.

1.3.16 Stormwater

Stormwater is any portion of precipitation that does not naturally percolate into the ground or evaporate, but flows via overland flow, interflow, pipes, or other features of a stormwater drainage system into a defined surface waterbody, or a constructed stormwater management facility.

1.3.17 Wastewater

Wastewater is any water used or generated during construction, including groundwater, that contains contaminants, pollutants, or hazardous substances and that must be managed to prevent discharge to waters of the

United States or waters of the State.

1.3.18 Waters of the United States

Waters of the United States means federal jurisdictional waters, including wetlands, that are subject to regulation under Section 404 of the Clean Water Act or navigable waters, as defined under the Rivers and Harbors Act.

1.3.19 Wetlands

Wetlands are areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.

1.3.20 Universal Waste

The universal waste regulations streamline collection requirements for certain hazardous wastes in the following categories: batteries, pesticides, mercury-containing equipment (e.g., thermostats), lamps (e.g., fluorescent bulbs) and aerosol cans. The rule is designed to reduce hazardous waste in the municipal solid waste (MSW) stream by making it easier for universal waste handlers to collect these items and send them for recycling or proper disposal. These regulations can be found at 40 CFR 273.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Environmental Preconstruction Survey

Environmental Protection Plan; G

Erosion and Sediment Control Plan (ESCP); G ECDG

Resume And Qualifications

Marine Mammal Observation Sheet

Application For NPDES Permit

SD-06 Test Reports

ESCP Modifications; G ECDG

Inspections and Reports; G

Monitoring Report

SD-11 Closeout Submittals

Environmental Records Binder; G

Stormwater Notice Of Termination

1.5 GENERAL ENVIRONMENTAL PROTECTION REQUIREMENTS

Comply with federal, state, and local regulations pertaining to the environment, including water, air, solid waste, hazardous waste and substances, oily substances, and noise pollution. Tests and procedures assessing whether construction operations comply with applicable environmental laws must be performed by qualified laboratories, and where required by law, the laboratories must be certified.

1.6 ENVIRONMENTAL PERMITS AND COMMITMENTS

Obtain all permits and licenses required for this project as stated in this Section and in accordance with FAR 52.236-7 Permits and Responsibilities. Provide an electronic copy of each permit or license obtained by the Contractor to the Government. Comply with all environmental permits and commitments required by federal, state, regional, and local environmental laws and regulations. Comply with the requirements listed in the Water Quality Certificate (Attachment A12), including turbidity restrictions and standard monitoring requirements. Permit requirements take precedent over specification requirements in this Section.

1.7 In-Water Work Definition

Construction activities must not occur within 100 feet of any active fishway entrance or exit and 50 feet of an active fishway, during the in-water work period.

1.8 QUALITY CONTROL

1.8.1 Environmental Preconstruction Survey

a. Prior to the start of any onsite construction activities, perform an Environmental Preconstruction Survey of the project site with the Contracting Officer (CO), and take photographs showing existing environmental conditions in and adjacent to the site as described in Paragraph titled Documentation of Environmental Conditions. Submit a report for the record. Include in the report a plan describing the features requiring protection under the provisions of the Contract Clauses, which are not specifically identified on the drawings as environmental features requiring protection along with the condition of trees, shrubs and grassed areas immediately adjacent to the site of work and adjacent to the Contractor's assigned storage area and access route(s), as applicable. The Contractor and the CO will sign this survey report upon mutual agreement regarding its accuracy and completeness. Protect those environmental features included in the survey report and any indicated on the drawings, regardless of interference that their preservation may cause to the work under the Contract.

b. Provide photographs of all typical vegetation at sites planned for disturbance (i.e. grassland, wetland, forest). These photographs will be used as reference for sites planned for revegetation. Photographs must adequately reflect "foliar densities" at pre-construction conditions.

1.8.2 Environmental Coordination Meeting

a. Prior to initiating any work on site, meet with the CO to discuss the proposed Environmental Protection Plan (EPP). Submit the EPP 14 calendar days before the Environmental Coordination meeting. Develop a mutual understanding relative to the details of environmental protection, including measures for protecting natural and cultural resources, required reports, required permits, permit requirements (such as mitigation measures), and other measures to be taken.

b. Provide the following information for the meeting agenda: types, quantities, and use of hazardous materials that will be brought onto the project site; and types and quantities of wastes/wastewater that may be generated during the Contract. Discuss the results of the Environmental Preconstruction Survey at this time.

1.8.3 Non-Compliance Notifications

The CO will notify the Contractor in writing of any observed noncompliance with federal, state or local environmental laws or regulations, permits, and other elements of the Contractor's EPP. After receipt of such notice, inform the CO of the proposed corrective action and take such action when approved by the CO. The CO may issue an order stopping all or part of the work until satisfactory corrective action has been taken. No time extensions will be granted nor equitable adjustments allowed for any such suspensions. This is in addition to any other actions the CO may take under the Contract, or in accordance with the Federal Acquisition Regulation or federal law.

1.9 ENVIRONMENTAL PROTECTION PLAN

a. The purpose of the EPP is to present an overview of known or potential environmental issues that must be considered and addressed during construction. Revise the EPP throughout the project to include any reporting requirements, changes in site conditions, or Contract modifications that change the project scope of work in a way that may have an environmental impact. No requirement in this section will relieve the Contractor of any applicable federal, state, and local environmental protection laws or regulations. During Construction, identify, implement, and submit for approval any additional Environmental Protection Plan requirements to be included in the EPP. Maintain the current version onsite.

b. The EPP must include the following elements:

1.9.1 General Overview and Purpose

A brief description of each specific plan required by applicable environmental permit or elsewhere in this Contract such as the Erosion and Sediment Control Plan, Stormwater Pollution Prevention Plan, Spill Prevention and Control Plan, and Solid Waste Management Plan.

1.9.1.1 Procedures

A copy of any standard or project-specific operating procedures that will be used to effectively manage and protect the environment on the project site.

1.9.1.2 Communications

Communication and training procedures that will be used to convey environmental management requirements to Contractor employees and subcontractors.

1.9.2 Environmental Manager Qualifications

Include in the EPP a letter signed by an officer of the firm appointing the Environmental Manager and stating that person is responsible for managing and implementing the Environmental Program as described in this Contract. Include in this letter the Environmental Manager's authority to direct the removal and replacement of non-conforming work and emergency contact information (office phone number, cell phone number, and e-mail address). The Environmental Manager is directly responsible for coordinating contractor compliance with federal, state, and local requirements. The Environmental Manager may have other duties on the jobsite; however, the person in this position must be trained to adequately accomplish the following duties:

a. Ensure compliance with Hazardous Waste Program requirements (including hazardous waste handling, storage, manifesting, and disposal).

b. Implement the EPP and ensure its compliance.

c. Ensure environmental permits are obtained, maintained, and closed out.

d. Ensure compliance with Stormwater Program requirements.

e. Ensure compliance with Hazardous Materials (storage, handling, and reporting) requirements; and coordinate any remediation of regulated substances (lead, asbestos, PCBs).

f. Be responsible for spill prevention and cleanup and training personnel on spill response procedures.

g. Be responsible for manifesting hazardous waste to be removed from the site (if applicable).

h. Be responsible for training the Contractor's environmental protection personnel.

i. Designate the person performing any inspections of Best Management Practices (BMPs) and erosion and sediment control measures.

j. Ensure waste segregation and storage compatibility requirements are met.

k. Ensure only authorized personnel add wastes to containers.

l. Ensure Contractor personnel are trained in 40 CFR requirements in accordance with their position requirements.

m. Coordinate removal of waste containers.

n. Maintain the Environmental Records Binder and required documentation, including environmental permits compliance and close-out.

o. Ensure compliance with the Water Quality Certification Attachment A12.
p. Be responsible for the project revegetation and restoration process.

q. Be responsible for the implementation of protective measures for marine mammals during construction.

1.9.3 Regulatory Notification and Permits

List all notifications and permit applications that must be made by the Contractor as required by this section, if any. Demonstrate that those permits have been obtained or applied for by including copies of applicable environmental permits. The EPP will not be approved until the permits have been obtained.

1.9.4 General Site Information

1.9.4.1 Drawings

Drawings showing locations of proposed temporary excavations or embankments for haul roads, stream crossings, jurisdictional wetlands and proposed wetland protection measures, material storage areas, Contractor staging areas, structures, sanitary facilities, storm drains and conveyances, and stockpiles of excess soil.

1.9.4.2 Work Area

Include in the EPP a Work Area Plan showing the proposed activity in each portion of the area and identify the areas of limited use or nonuse. Include measures for marking the limits of use areas, including methods for protection of features to be preserved within authorized work areas and methods to control runoff and to contain materials on site, and a traffic control plan.

1.9.5 Documentation of Environmental Conditions

Describe existing conditions and identify procedures to be implemented to ensure protection of existing environmental conditions for the following categories as applicable:

a. Protection of Natural Resources

b. Stormwater

c. Surface and Groundwater

d. Cultural Resources

e. Air Resources

f. Waste Minimization

g. Waste Management and Disposal

h. Hazardous Material Management

i. Petroleum, Oils, and Lubricants (POLs) Storage and Fueling

1.9.6 Protection of the Environment from Waste Derived from Contractor Operations

If hazardous wastes are anticipated to be generated by the Contractor,

identify and describe the procedures to be implemented for the management and disposal of hazardous waste and debris. As a minimum, include the following:

a. List of the types of hazardous wastes expected to be generated

b. Procedures to ensure a written waste determination is made for appropriate wastes that are to be generated

c. Sampling/analysis plan, including laboratory method(s) that will be used for waste determinations and copies of relevant laboratory certifications

d. Methods and proposed locations for hazardous waste accumulation/storage (that is, in tanks, drums, or other containers)

e. Management procedures for storage, labeling, transportation, and disposal of waste (treatment of waste is not allowed unless specifically noted)

f. Management procedures and regulatory documentation ensuring disposal of hazardous waste complies with Land Disposal Restrictions (40 CFR 268)

g. Management procedures for recyclable hazardous materials such as lead-acid batteries, used oil, and similar

h. Used oil management procedures in accordance with 40 CFR 279

i. Hazardous waste minimization procedures

j. Plans for the disposal of hazardous waste at permitted facilities

1.9.7 Spill Prevention and Control Plan

Include in the Spill Prevention and Control Plan the procedures, instructions, and reports to be used in the event of an unforeseen spill of a substance regulated by 40 CFR 112, 40 CFR 302, and/or regulated under state or local laws and regulations. The Spill Prevention and Control Plan supplements the requirements of EM 385-1-1. This plan must include as a minimum:

a. Measures to be implemented to prevent spills of petroleum products and hazardous substances to the environment.

b. Name of the individual who reports any spills or hazardous substance releases and follows up with complete documentation. This individual must immediately notify the CO and Facility Response Personnel in addition to the legally required federal, state, and local reporting channels (including the National Response Center (NRC) 1-800-424-8802) if a reportable quantity is released to the environment.

(1) The plan must contain a list of the required reporting channels and telephone numbers.

(2) The 24-hour spill notification telephone numbers including NRC, County, and local police and/or Emergency Response organization as appropriate and required. The plan must include 24-hour emergency number for the Government Quality Assurance Representative (GQAR), Project Engineer, and Resident Engineer. The Oregon Emergency

Response System (OERS) must also be notified.

c. Name(s) and qualifications of the individual(s) responsible for implementing and supervising the containment and cleanup.

d. Training requirements for Contractor's personnel and methods of accomplishing the training.

e. List of materials and equipment to be immediately available at the job site, tailored to cleanup work of the potential hazard(s) identified. For all work in or adjacent to water, a 200-foot-long minimum containment boom, skimming equipment, and a cleanup kit must be available at the job-site. To determine the number of required floating plants, consider the logistics, time required to begin containment and cleanup of a spill, accessibility, number of remote work areas, and number and location of floating plants on the river. Materials and equipment for other cleanup work must be tailored to the potential hazards involved.

f. Names and locations of suppliers of containment materials and locations of additional fuel oil recovery, cleanup restoration, and material-placement equipment available in case of an unforeseen spill emergency.

g. Methods and procedures to be used for expeditious contaminant cleanup.

h. Include a hazardous material Spill Emergency Initial Report Form, similar to Attachment A4. Ensure that all of the elements shown on the sample form are provided and submitted within 24 hours of a spill.

1.9.8 Clean Air Act Compliance

1.9.8.1 Dirt and Dust Control Plan

Include a Dirt and Dust Control Plan in the EPP showing proposed activities and identify measures to minimize dust. Include truck and material haul routes along with measures for controlling dirt, debris, and dust. As a minimum, identify in the plan any equipment for cleaning along the haul route and measures to reduce dirt, dust, and debris from roadways.

1.9.8.2 Pollution Generating Equipment

Identify air pollution generating equipment or processes that may require federal, state, or local permits under the Clean Air Act.

1.9.8.3 Refrigerants

Identify management practices to ensure that heating, ventilation, and air conditioning (HVAC) work involving refrigerants complies with state and federal requirements. Technicians must be certified, maintain copies of certification on site, use certified equipment and log work that requires the addition or removal of refrigerant. Any refrigerant reclaimed is the property of the Government. Coordinate with the USACE Environmental Compliance Coordinator to determine the appropriate turn in location.

1.9.8.4 Air Pollution-Generating Processes

Identify planned air pollution-generating processes and management control measures (including, but not limited to, spray painting, abrasive blasting,

demolition, material handling, fugitive dust, and fugitive emissions).

1.9.8.5 Compliant Materials

Materials must be compliant with all Clean Air Act regulations for emissions including solvent and volatile organic compound contents, and applicable National Emission Standards for Hazardous Air Pollutants requirements of 40 CFR 61.

1.9.8.6 Safety Data Sheets (SDS)

Include in the EPP an SDS and estimated quantity to be used for each hazardous material brought onto the site. State how the hazardous material will be used and why it is required for the performance of this Contract.

1.10 ENVIRONMENTAL RECORDS BINDER

a. Create and maintain a three-ring binder of documents that demonstrate compliance with the environmental permits in this Contract. The binder must include, but is not limited to, the following items:

(1) Final ESCP: Include a copy of the final ESCP including modifications, inspection reports and related corrective action records, copies of correspondence with the State of Oregon, and a copy of the permit Notice of Termination in the binder. Records must indicate when the ESCP was reviewed and updated to meet changing onsite conditions.

(2) Employee Training records

(3) Relevant environmental permits

(4) Waste Determination Documentation

(5) Solid Waste Management Report

(6) Hazardous Waste/Debris Management Report

(7) Archaeological Letter Report

b. Maintain the binder on-site and submit an electronic copy of the binder to the CO at the completion of the project. The binder must be available for review at all times.

1.10.1 Employee Training Records

a. Prepare and maintain Employee Training Records throughout the term of the Contract meeting applicable 40 CFR requirements. Keep Employee Training Records in the Environmental Records Binder.

b. Train personnel to meet regulatory requirements for environmental, biological and cultural resources and provide an attendance roster documenting the names of personnel trained and the dates training occurred. Conduct environmental protection/pollution control meetings for personnel prior to commencing construction activities. Conduct additional meetings for new personnel and when site conditions change. Include in the training and meeting agenda the following:

(1) the methods of detecting and avoiding pollution;

(2) familiarization with statutory and contractual pollution standards;

(3) installation and care of devices, vegetative covers, and instruments required for monitoring purposes to ensure adequate and continuous environmental protection/pollution control;

(4) anticipated hazardous or toxic chemicals or wastes, and other regulated contaminants;

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.1 PROTECTION OF NATURAL RESOURCES

a. Protect the natural resources at and near the project site. Prevent disturbance and damage to fish, wildlife, and plants, including their habitats. The protection of rare, threatened, and endangered animal and plant species identified, including their habitats, is the Contractor's responsibility.

b. Prior to commencing construction activities, mark (or fence) the limits of disturbance noted on the plans. If no limit is indicated, mark the limits of the work indicated and specified. Mark isolated areas within the limits of disturbance that are not to be disturbed. Markers must be highly visible. Personnel must be knowledgeable of the purpose for marking and protecting particular objects. Confine all construction activities within the marked limits of disturbance.

3.1.1 Marine Mammals

The Government has obtained the Incidental Harassment Authorization (IHA) from National Marine Fisheries Service (NMFS) (Attachment A9). A copy of the IHA must be in possession of Contractor and Protected Species Observers operating under the authority of the IHA. Implement mitigation measures, as well as monitoring and reporting requirements, as stated in the IHA.

3.1.2 Pile (including Sheet Piles) Installation Requirements

a. Conduct pile and/or sheet pile driving only during daylight hours from sunrise to sunset when it is possible to visually monitor marine mammals.

b. If the shutdown zone is obscured by fog or poor lighting conditions, pile driving must not be initiated until the entire shutdown zone is visible.

c. Piles will be installed vibratory method until refusal. Impact hammer may be used to meet final depth.

d. Piles must be steel, untreated wood, or other approved material.

e. Noise dampeners, also called pile cushions or caps, will be used during all pile installations with an impact hammer

f. Piles may be installed between 1-Nov and 28-Feb.

g. For all pile driving, a shutdown and disturbance zone must be monitored.

(1) Monitoring must take place from 30 minutes prior to initiation through 30 minutes post-completion of pile driving.

(2) The shutdown zone for all species must be as specified in Table 2 of the IHA (Attachemnt A9).

(3) Monitor the entirety of the underwater disturbance zone observable by binoculars as required in attached IHA (Attachment A9).

h. If a marine mammal is entering or is observed within an established shutdown zone, pile driving must be halted or delayed. Pile driving must not commence or resume until either the animal has voluntarily left and been visually confirmed beyond the shutdown zone; 15 minutes have passed without subsequent detections of small cetaceans and pinnipeds; or 30 minutes have passed without subsequent detections of large cetaceans.

i. For in-water heavy machinery work other than pile driving (e.g., standard barges, tug boats, barge-mounted excavators, or clamshell equipment used to place or remove material), if a marine mammal comes within distance as specified in the Incidental Harassment Authorization (IHA) (Attachment A9), operations must cease and vessels must reduce speed to the minimum level required to maintain steerage and safe working conditions. This type of work could include the following activities:

(1) movement of the barge to the pile location or

(2) positioning of the pile on the substrate via a crane (i.e., stabbing the pile).

j. When a marine mammal is observed in the Level B Zone of Influence (ZOI), but not approaching or entering the shutdown zone, a "take" must be recorded and work may proceed without cessation. Marine mammal behavior must be monitored and documented on the marine mammal observation sheet.

k. Marine Mammal Harassment is limited to the species and limits specified in the attached IHA (Attachment A9). Take is not authorized for any marine mammal species that are not listed in the Incidental Harassment Authorization (IHA) (Attachment A9). If any marine mammal species that is not explicitly listed in the IHA is encountered within the ZOI, then the Contractor must stop pile driving activities, a shore-based protected species observer (PSO) should record the species, numbers, and other pertinent information in the marine mammal monitoring log, and pile driving must not resume until the marine mammal(s) have moved beyond the ZOI. If the number of individuals exposed to Level A or Level B harassment is likely to exceed the allowable take numbers in the IHA, then the Contractor must stop pile driving activities and notify the Corps immediately.

l. Install pile caps to prevent birds from perching on piles. Install caps in the same season as the pile install.

m. In the unanticipated event that the specified activity clearly causes the take of a marine mammal in a manner prohibited by the IH, such as

an injury (Level A harassment), serious injury or mortality (e.g., ship-strike, gear interaction, and/or entanglement), immediately cease the specified activities and immediately report the incident to the CO. Include the information indicated in the reporting form and listed in the IHA. The Contractor must not resume their activities until notified by the CO. If level A or B take is exceeded, or if a species without allowable take enters the level A or B take zone for that species, all pile driving work must cease and Contractor must notify the CO.

n. In the event that there is a discovery of an injured or dead marine mammal, and the lead PSO determines that the cause of the injury or death is unknown and the death is relatively recent (i.e., in less than a moderate state of decomposition as described in Paragraph DUTIES, Item h.), immediately notify the CO. The report must include the same information identified in the paragraph above. Activities may continue while NMFS reviews the circumstances of the incident. The CO will notify the Contractor if modifications in activities are needed as a result of the NMFS review.

o. Mammals encountered during pile driving actions that are not listed in the IHA/LOA must be documented. If the PSO recognizes the mammal encountered is a listed endangered species, shut down operations and follow procedures described in Paragraph PILE INSTALLATION REQUIREMENTS, Item h.

3.1.3 Fish

Work in the water, on the water, and adjacent to the water where the work might affect fish passage is restricted to the In-Water Work (IWW) period. The IWW period is provided in Section 01 10 10.00 25 CONTRACTOR'S OPERATIONS AND REQUIREMENTS.

3.1.4 Streams

a. Do not alter water flows or otherwise significantly disturb the native habitat adjacent to the project and critical to the survival of fish and wildlife, except as specified and permitted.

b. Stream crossings must allow movement of materials or equipment without violating water pollution control standards of the federal, state, and local governments.

c. The CO's approval and appropriate permits are required before any equipment will be permitted to ford live streams. In areas where frequent crossings are required, install temporary culverts or bridges. Obtain CO's approval prior to installation. Remove temporary culverts or bridges upon completion of work, and repair the area to its original condition unless otherwise required by the CO.

3.1.5 Wetlands and Other Sensitive Areas

Provide BMPs to protect wetlands and other sensitive areas. Locate BMPs to provide a minimum 50-feet buffer between the sensitive area and construction activity, unless noted otherwise on the plans.

3.1.6 Vegetation

Except in areas designated to be cleared, do not remove, cut, deface,

injure, or destroy trees, shrubs, or other vegetation. Unless otherwise noted in the plans and specifications, protect trees larger than 6 inches in diameter with a minimum 5 foot high fence around the dripline of the trees to protect the tree's root zone from damage. Tree diameter is measured at 4.5 feet above the highest point of ground at the tree's base. Do not fasten or attach ropes, cables, or guys to existing nearby trees for anchorages unless authorized by the CO. Where such use of attached ropes, cables, or guys is authorized, the Contractor is responsible for any resultant damage.

3.1.7 Nesting Birds

Avoid all active migratory bird nests. The nesting activity period extends from 15 March through 15 August. Discovered nests must be flagged and an exclusion zone must surround the nest a minimum of 50 feet. Work must not proceed within the fenced buffer area until the young have fledged or the nests have become inactive. Notify the CO immediately upon discovery of an active nest. Do not begin clearing activities until approved by the CO. Approval will not be granted without a negative finding of biological avian surveys conducted by the Government.

3.2 OREGON STORMWATER POLLUTION PREVENTION

Erosion and sediment control, including stormwater pollution prevention measures, must be provided for the work site regardless of the ground disturbance area. The total acreage of ground disturbance from construction activities is estimated to be 1 acre or more, and as such, the Contractor must prepare and submit an Erosion and Sediment Control Plan (ESCP) and apply for a Construction Stormwater General Permit 1200-C from the Oregon Department of Environmental Quality (ODEQ). However, if the Contractor can demonstrate that the total ground disturbance area from their activities is less than 1 acre, then the Contractor is only required to prepare and implement an ESCP.

3.2.1 Erosion and Sediment Control Plan

Prepare and submit a draft Erosion and Sediment Control Plan (ESCP) to the Contracting Officer for review at least 30 days prior to the commencement of work and implement the approved plan. The ESCP must describe the types and locations of best management practices (BMPs) to be implemented during all construction activities to minimize soil erosion and prevent sediment from entering streams or water bodies. The BMPs must be consistent with ODEQ guidance listed below.

a. The ESCP must meet the requirements of 40 CFR 122.26 and the ODEQ Construction Stormwater General Permit (1200-C) for stormwater discharges from construction sites. Include the following:

   (1) Comply with terms of the state general permit for stormwater discharges from construction activities. Use state guidance to develop the Erosion and Sediment Control Plan located at http://www.oregon.gov/deq/FilterPermitsDocs/ErosionSedimentControl.pdf

   (2) Select applicable BMPs from state guide located at http://www.oregon.gov/deq/FilterPermitsDocs/BMPManual.pdf or in accordance with applicable local requirements.

b. The ESCP must include practices to minimize erosion and sedimentation associated with all aspects of the project (e.g., staging areas, stockpiles, grading; to prevent construction debris from dropping or

otherwise entering any stream or waterbody; and to prevent and control hazardous material spills.

c. Include in the ESCP an inspection program that includes a list of the BMPs to be inspected, frequency of inspections, and corrective actions to be taken if BMPs are deficient.

d. Update or modify the ESCP as needed to represent actual BMPs being used on the site and include the type and location of the erosion and sediment controls being used. Submit the ESCP Modifications to the CO for review and approval.

e. Maintain an approved copy of the ESCP at the onsite construction office in the Environmental Records Binder, and continually update as regulations require and reflecting current site conditions and actual BMPs being used.

3.2.2 Construction Stormwater General Permit

3.2.2.1 Stormwater Permit Application for Construction Activities

a. Prepare and submit as the primary permittee, a draft new Application for NPDES Permit (Construction Stormwater General Permit 1200-C) for stormwater discharges to the Contracting Officer for review and approval. Submit the approved draft application, supporting information, and appropriate fees to the ODEQ. No land disturbing activities may commence without permit coverage.

b. Retain a copy of the permit, permit coverage letter from ODEQ, and the ESCP on the site for inspection by the Contracting Officer. Keep copies of all monitoring and inspections reports required by the permit in the Environmental Records Binder and make these reports available upon request by the Contracting Officer for review.

3.2.2.2 Inspections and Reports

a. Conduct monitoring and inspections and prepare Inspection Reports in accordance with ODEQ 1200-C Discharge Permit and the ESCP. Include inspection reports with the daily CQC report. If, by regular inspection or observations, the Contractor determines that the BMPs are ineffective in eliminating or minimizing pollutants in stormwater discharges from the project site, the Contractor must evaluate and implement more effective BMPs, and review and update their ESCP accordingly.

b. If, by periodic inspection or observations, the Contracting Officer or Resident Engineer determine that the BMPs are ineffective in eliminating or minimizing pollutants in stormwater discharges from the project site, the Contractor must evaluate and implement more effective BMPs, and review and update their ESCP accordingly.

3.2.2.3 Stormwater Notice of Termination for Construction Activities

Submit a Notice of Termination to the Contracting Officer for approval once construction is complete and final stabilization has been achieved on all portions of the site for which the permittee is responsible. Once approved, submit the Notice of Termination to the ODEQ.

3.2.3 BMP Monitoring and Maintenance

a. During construction, erosion controls, streams, and adjacent water bodies must be monitored and BMPs maintained daily during the rainy season and weekly during the dry season as necessary to ensure controls are properly functioning.

b. If monitoring shows that the erosion controls are ineffective at preventing visible sediment discharge, the project must stop to evaluate erosion control measures. Repairs, replacements or the installation of additional erosion control measures must be completed before the project resumes.

c. Proper maintenance includes removal of sediment and debris from erosion controls such as silt fences or wattles once it has reached one-third of the exposed height of the control.

3.2.4 Erosion and Sediment Control Measures

Provide erosion and sediment control measures in accordance with state and local laws and regulations. Preserve vegetation to the maximum extent practicable.

3.2.4.1 Erosion Control Practices

a. Prevent erosion by the use of mulching, compost blankets, geotextiles, temporary slope drains, or other BMPs described in the ESCP.

b. Stabilize slopes by seeding or other approved methods necessary for effective erosion control. Use of hay bales is prohibited.

3.2.4.2 Sediment Control Practices

Implement sediment control practices to divert flows from exposed soils, temporarily store flows, or otherwise limit runoff and the discharge of pollutants from exposed areas of the site. Implement sediment control practices prior to soil disturbance and prior to creating areas with concentrated flow, during the construction process to minimize erosion and sediment-laden runoff. Include the following devices: silt fence, temporary diversion dikes, or other BMPs described in the ESCP.

3.2.5 Contractor Facilities and Work Areas

Place field offices, staging areas, stockpile storage, and temporary buildings within the work areas shown on the drawings. Move or relocate the Contractor facilities only when approved by the Government. Provide erosion and sediment controls for onsite borrow and spoil areas to prevent sediment from entering nearby waters. Control temporary excavation and embankments for work areas to protect adjacent areas.

3.3 SURFACE AND GROUNDWATER

3.3.1 Cofferdams, Diversions, and Dewatering

a. Construction operations for dewatering and removal of cofferdams must be constantly controlled to maintain compliance with existing state water quality standards and designated uses of the surface water body. Comply with state water quality standards and anti-degradation provisions. Do not discharge excavation ground water to the sanitary

sewer, storm drains, or to surface waters without prior specific authorization in writing from the CO. Discharge of hazardous substances will not be permitted under any circumstances. Use sediment control BMPs to prevent construction site runoff from directly entering any storm drain or surface waters.

b. If the construction dewatering is noted or suspected of being contaminated, it must not be released to the storm drain system or surface water unless specifically permitted. Obtain authorization for any contaminated groundwater release in advance from the federal or state authority, as applicable.

3.3.2 Waters of the United States

Do not enter, disturb, destroy, or allow discharge of contaminants into waters of the United States unless otherwise noted on specifications.

3.3.3 Invasive Species Prevention Measures for Boat Operations

Prevent contaminating the waters of the United States with invasive species, particularly zebra mussels. Zebra mussels can be transported by boats, trailers, outboard motors and other equipment such as tractors, bulldozers, water pumps, ropes and nets that are used in areas that zebra mussels inhabit. Zebra mussels have been found in several lakes and river systems. If equipment is not properly inspected and treated to prevent the spread of zebra mussels and other aquatic nuisance species, they can be introduced into areas not currently infested. To assist in preventing the introduction and spread of aquatic nuisance species, the following precautions must be taken:

a. Prior to transporting to site, visually inspect all equipment for zebra mussels and other aquatic nuisance species. Remove all trash, mud, vegetation, suspected zebra mussels, place in plastic bags, and properly dispose of in land-based receptacles.

b. All construction equipment and supplies intended for use in water that has been exposed to other lake or stream water must be thoroughly washed with a power washed or be allowed to dry an appropriate length of time in accordance with state guidance. Water being used for power washing must be at least 160 degrees F when leaving the spray nozzle and 140 degrees F when contacting the equipment being decontaminated. All contaminated runoff must be adequately contained and disposed of properly.

c. Treat pumps, equipment, and supplies that cannot be thoroughly drained, cleaned, and dried with a 200 ppm bleach solution for 20 minutes, deactivate with sodium thiosulfate, and rinse according to Table 1 below.

d. Conduct an onsite inspection of all vessels, equipment, pumps, and supplies to be used in or around the water before work begins. Coordinate the date and time of this onsite inspection with the CO seven days in advance of inspection.

e. Inspect vessels and equipment upon removal from any body of water. Clean hulls, anchors, moorings, trailers, etc. of all mud, vegetation, and any noticeable attached zebra mussels before leaving the site. Remove any suspected zebra mussels, report to the CO, and contain them for verification.

f. Wash or appropriately dry all vessels and construction equipment removed from waters currently infested with zebra mussels or other aquatic invasive species as described above.

Table 1:

Disinfectant Amounts to Make Needed Concentrations					
Disinfectant	1 gallon	2 gallons	5 gallons	20 gallons	100 gallons
200 ppm Chlorine (household bleach, 5.25% Chlorine)	0.5 ounce (15 ml)	1.0 ounce (30 ml)	2.5 ounces (75 ml)	11.0 ounces (300 ml)	6 1/3 cups (1.5 L)
800 ppm Sodium Thiosulfate	0.1 ounce (3 g)	0.2 ounce (6 g)	0.5 ounce (15 g)	2.1 ounces (60 g)	10.6 ounces (300 g)

Notes:

(1) Zebra mussel juveniles, called veligers, are microscopic and invisible to the naked eye.

(2) Air drying and hot water are most effective when used in conjunction with each other because their effectiveness is highly dependent upon ambient temperatures and contact times.

(3) Household bleach (5.25 percent chlorine) and vinegar can be purchased from grocery or convenience stores. Sodium Thiosulfate can be purchased at pool supply stores or chemical companies.

(4) All bilges and hidden areas under boat decks must be thoroughly treated as described above.

(5) For instructions on cleaning and decontaminating specific types of equipment use the following link to access the Inspection and Cleaning Manual for Equipment and Vehicles to Prevent the Spread of Invasive Species: http://www.usbr.gov/mussels/prevention/docs/EquipmentInspectionandCleaningManual2010.pdf

3.4 CULTURAL RESOURCES

3.4.1 Archaeological Resources

An archaeologist must be present on site to monitor during construction and be qualified in accordance with the National Historic Preservation Act (NHPA) Secretary of the Interior’s Standards for an Archaeologist. Provide a copy of the Archaeological Letter Report in the Environmental Records Binder. If, during excavation or other construction activities, previously unidentified or unanticipated historical, archaeological, or cultural resources are discovered, immediately suspend activities in the vicinity of the discovery that could damage or alter such resources and notify the Contracting Officer (CO). Secure the area and prevent employees or other persons from trespassing on, removing, or otherwise disturbing such resources. The Government retains ownership and control over archaeological resources. Resources covered by this paragraph include, but are not limited to: artifacts; shell, midden, bone, charcoal, or other deposits; rock or

coral alignments, pavings, walls, or other constructed features; and any indication of agricultural or other human activities.

3.4.2 Human Remains and Cultural Items

If human remains or cultural items are discovered during excavation or other construction activities, immediately suspend all project activities within 100 feet of the discovery and implement the project's Plan of Action. Notify the CO immediately so that appropriate authorities may be contacted. Resources covered by this subparagraph include, but are not limited to: human burials, human bone, hair, funerary objects, sacred objects, or objects of cultural patrimony as identified through Native American traditional knowledge of a lineal descendant or Indian Tribe. Secure the area and prevent employees or other persons from trespassing on, removing, or otherwise disturbing such remains or cultural items. Cover the remains or cultural items with a clean tarp. Do not photograph the remains or cultural items.

3.4.3 Professional Archaeological Monitor

a. A professional archaeological monitor to be present during all ground disturbance associated with this project. Use qualified personnel familiar with the methods and techniques for site recordation and monitoring according to current Oregon State Historic Preservation Office (SHPO) and Secretary of Interior's (SOI) Standards and Guidelines. Following the completion of all ground disturbing activities and within 60 days, the Contractor's professional archaeologist must submit a monitoring report to the Government, summarizing the completed sampling, sampling locations, and monitoring activities. Maps and photographs must be included. The archaeological monitor and all individuals associated with the project will follow the Post-Review Discovery Plan (Attachment A10) if any cultural materials are encountered during ground disturbing activities.

b. Tribal monitors may be present during ground disturbing activities, however tribal monitors will not replace the requirement for a professional archaeological monitor with SHPO and SOI qualifications.

3.4.4 SOI Professional Qualifications Standards

a. The following requirements are those used by the National Park Service, and have been previously published in the Code of Federal Regulations, 36 CFR Part 61. The qualifications define minimum education and experience required to perform identification, evaluation, registration, and treatment activities. In some cases, additional areas or levels of expertise may be needed, depending on the complexity of the task and the nature of the historic properties involved. In the following definitions, a year of full-time professional experience need not consist of a continuous year of fulltime work but may be made up of discontinuous periods of full-time or part-time work significance within specific historic contexts, adding up to the equivalent of a year of full-time experience. Submit the resume and qualifications of the Professional Archeological Monitor.

b. The minimum professional qualifications in archeology are a graduate degree in archeology, anthropology, or closely related field plus:

(1) At least one year of full-time professional experience or equivalent specialized training in archeological research,

administration or management;

(2) At least four months of supervised field and analytic experience in general North American archeology; and

(3) Demonstrated ability to carry research to completion. In addition to these minimum qualifications, a professional in prehistoric archeology must have at least one year of full-time professional experience at a supervisory level in the study of archeological resources of the prehistoric period. A professional in historic archeology must have at least one year of full-time professional experience at a supervisory level in the study of archeological resources of the historic period.

3.5 AIR RESOURCES

Equipment operation, activities, or processes must be in accordance with applicable federal and state air emission and performance laws and standards. To reduce air emissions, equipment must not remain idle for longer than 15 minutes.

3.5.1 Burning

Burning is prohibited on the Government premises.

3.5.2 Dust and Particulate Control

Control dust at all times, including during non-working periods. Dust particles, aerosols and gaseous by-products from construction activities, and processing and preparation of materials (such as from asphaltic batch plants) must be controlled at all times, including weekends, holidays, and hours when work is not in progress. Maintain excavations, stockpiles, haul roads, permanent and temporary access roads, plant sites, spoil areas, borrow areas, and other work areas within or outside the project boundaries free from particulates that would exceed 40 CFR 50, state, and local air pollution standards or that would cause a hazard. Sprinkling or other methods will be permitted to control particulates in the work area. Sprinkling, to be effective, must be repeated to keep the disturbed area damp. Perform particulate control as the work proceeds and whenever a particulate hazard occurs. Comply with state and local visibility regulations.

3.5.3 Odors

Control odors from construction activities. The odors must be in compliance with state regulations and local ordinances and may not constitute a health hazard.

3.6 WASTE MINIMIZATION

Minimize the use of hazardous materials and the generation of waste. Include procedures for pollution prevention/hazardous waste minimization in the Hazardous Waste Management Section of the EPP. Describe the anticipated types of the hazardous materials to be used during construction.

3.6.1 Salvage, Reuse and Recycle

a. Identify anticipated materials and waste for salvage, reuse, and recycling. Describe actions to promote material reuse, resale or

recycling. To the extent practicable, all scrap metal must be sent for reuse or recycling and will not be disposed of in a landfill.

b. Include the name, physical address, and telephone number of the hauler, if transported by a franchised solid waste hauler. Include the destination and, unless exempted, provide a copy of the state or local permit (cover) or license for recycling.

3.7 WASTE MANAGEMENT AND DISPOSAL

3.7.1 Waste Determination Documentation

Complete a Waste Determination form for all anticipated Contractor-derived solid and hazardous wastes to be generated. All potentially hazardous waste streams that are not subject to a specific exclusion or exemption from the hazardous waste regulations (e.g. scrap metal) or subject to special rules, (lead-acid batteries and precious metals) must be characterized in accordance with the requirements of 40 CFR 261 or corresponding applicable state or local regulations. Base the waste determination on user knowledge of the processes and materials used, and analytical data when necessary. Attach support documentation to the Waste Determination form. At a minimum, provide a Waste Determination form for the following wastes (this listing is not inclusive): oil- and latex- based painting and caulking products, solvents, adhesives, aerosols, petroleum products, and containers of the original materials. Include Waste Determination Documentation in the Environmental Records Binder.

3.7.2 Solid Waste Management

3.7.2.1 Solid Waste Management Report

Prepare a Solid Waste Management Report following completion of construction and include the report in the Environmental Records Binder. For each waste, the report must state the classification (using the definitions provided), amount in cubic yards, pounds or tons, location, and name of the business receiving the solid waste. Provide copies of the waste handling facilities' weight tickets, receipts, and bills of sale and other sales documentation. In lieu of sales documentation, a statement indicating the disposal location for the solid waste that is signed by an employee authorized to legally obligate or bind the firm may be submitted. The sales documentation must include the receiver's tax identification number and business, EPA or state registration number, along with the receiver's delivery and business addresses and telephone numbers. For each solid waste retained for the Contractor's own use, submit the information previously described in this paragraph on the solid waste management report. Prices paid or received do not have to be reported to the CO unless required by other provisions or specifications of this Contract or public law.

3.7.2.2 Control and Management of Solid Wastes

a. Prevent contamination of the site or other areas when handling and disposing of wastes. Employ segregation measures so that no hazardous or toxic waste will become co-mingled with non-hazardous solid waste. Transport solid waste off Government property and dispose of it in compliance with 40 CFR 260, state, and local requirements for solid waste disposal. A Subtitle D RCRA permitted landfill is the minimum acceptable offsite solid waste disposal option. Verify that the selected transporters and disposal facilities have the necessary

permits and licenses to operate. Solid waste disposal offsite must comply with most stringent local, state, and federal requirements.

b. Manage hazardous material used in construction, including but not limited to, aerosol cans, waste paint, cleaning solvents, contaminated brushes, and used rags, in accordance with 49 CFR 173.

3.7.3 Control and Management of Hazardous Waste

Do not dispose of hazardous waste on Government property. Do not discharge any waste to a sanitary sewer, storm drain, or to surface waters or conduct waste treatment or disposal on Government property without written approval of the CO. Provide the documentation required in this subsection in the Hazardous Waste/Debris Management Report of the Environmental Records Binder.

3.7.3.1 Hazardous Waste/Debris Management

a. Prepare a Hazardous Waste/Debris Management Report that identifies the hazardous waste or debris, and the quantities of each, that were generated by construction activities. Include a documented waste determination for resultant waste streams. Identify, label, handle, store, and dispose of hazardous waste or debris in accordance with federal, state, and local regulations, including 40 CFR 261, 40 CFR 262, and 40 CFR 268. Include the Hazardous Waste/Debris Management Report in the Environmental Records Binder.

b. Manage hazardous waste in accordance with the approved EPP. Store hazardous wastes in approved containers in accordance with 49 CFR 173. Hazardous waste generated within the confines of Government facilities is identified as being generated by the Government. Do not bring hazardous waste onto Government property.

3.7.3.2 Hazardous Waste Disposal

The following applies to disposal of any hazardous waste:

a. Use, or propose for use, materials which may be considered environmentally friendly in that waste from such materials is not regulated as a hazardous waste or is not considered harmful to the environment.

b. Documentation for analysis, sampling, transportation, and disposal of all hazardous waste generated during this Contract must be in accordance with 40 CFR 260-262.

c. Remove all Contractor-generated hazardous wastes from the project for proper disposal within 90 days of waste generation or at the completion of on-site work. Package, label, and mark all hazardous waste in accordance with 49 CFR 172 and 40 CFR 262. Store all hazardous waste in accordance with 40 CFR 262.

d. Transportation of Contractor hazardous material must be in accordance with 49 CFR 171, 49 CFR 172, and 49 CFR 173.

e. Use the Contractor's Environmental Protection Agency (EPA) identification number to dispose of all hazardous waste generated by the Contractor and its subcontractors under this Contract. This is construed to mean all hazardous waste the Contractor or subcontractors

generate from materials brought on the site for the purpose of performing work under the terms of the Contract.

f. The Government will dispose of all hazardous waste generated from Government-owned facilities on the project. This is construed to mean hazardous wastes generated from the repair, demolition, or removal of any existing materials and buildings from the Government facilities and is not intended to include any wastes generated by the Contractor in the performance of its work.

g. The GQAR will notify the project Environmental Compliance Coordinator (ECC) when Government owned wastes are generated. The project ECC will ensure that the wastes are labeled correctly. The GQAR will notify the project ECC when waste containers are full. The project ECC will then arrange for movement of the waste to a designated Government waste collection area.

h. It is the responsibility of the Contractor to prepare hazardous waste manifests for Contractor-generated hazardous waste. The Government will review the Contractor's hazardous waste manifest to ensure the use of the Contractor's own EPA identification number. Include copies of the Hazardous Waste Manifests for all Contractor-generated hazardous wastes disposed off-site in the Environmental Records Binder.

i. Recycle Contractor-generated hazardous or dangerous waste to the maximum extent possible. Placing hazardous or dangerous waste in a permitted hazardous waste landfill must be the last resort.

j. Follow state and local hazardous waste requirements.

3.7.3.3 Universal Waste Management

a. Manage universal waste in accordance with 40 CFR 273 and federal, state, and local requirements.

b. Mercury is prohibited in the construction of this facility, unless specified otherwise, and with the exception of mercury vapor lamps and fluorescent lamps. Dumping of mercury-containing materials and devices such as mercury vapor lamps, fluorescent lamps, or mercury switches in rubbish containers is prohibited. Remove without breaking, pack to prevent breakage, and transport out of the activity in an unbroken condition for disposal as directed.

3.7.3.4 Electronics End-of-Life Management

Recycle or dispose of electronics waste, including, but not limited to, used electronic devices such computers, monitors, hard-copy devices, televisions, mobile devices, in accordance with 40 CFR 260-262, state, and local requirements.

3.7.4 Releases/Spills of Oil and Hazardous Substances

Exercise due diligence to prevent, contain, and respond to spills of hazardous material, hazardous substances, hazardous waste, sewage, regulated gas, petroleum, lubrication oil, and other substances regulated in accordance with 40 CFR 300. Maintain spill cleanup equipment and materials at the work site. In the event of a spill, take prompt, effective action to stop, contain, curtail, or otherwise limit the amount, duration, and severity of the spill/release.

3.7.5 Mercury Materials

a. Immediately report to the Environmental Compliance Coordinator and the CO instances of breakage or mercury spillage. Clean mercury spill area to the satisfaction of the CO.

b. Do not recycle a mercury spill cleanup; manage it as a hazardous waste for disposal.

3.7.6 Wastewater

3.7.6.1 Treatment

Do not allow wastewater from construction activities, such as onsite material processing, concrete curing, foundation and concrete clean-up, water used in concrete trucks, and forms to enter waterways or to be discharged prior to being treated to remove pollutants. Dispose of the construction-related waste water by collecting and placing it in a drum or tank where suspended material can be settled out or the water can evaporate to separate pollutants from the water. The site for the drum or tank must be coordinated and approved with the CO. The residue left in the drum or tank, prior to completion of the project must be removed, tested, and disposed of off Government property in accordance with federal, state, and local laws and regulations.

3.7.6.2 Sanitary Sewer Discharge

Discharges to sanitary sewers are not allowed unless the Contractor has obtained all applicable permits for those discharges.

3.7.6.3 Surface Discharge

Surface discharge of wastewater to land or waterways is not permitted unless the Contractor has obtained all applicable NPDES permits for that discharge.

3.7.6.4 Land Application

Do not allow sheeting action, soil erosion, discharge into storm sewers, discharge into defined drainage areas, or discharge into the "waters of the United States". Comply with federal, state, and local laws and regulations.

3.8 HAZARDOUS MATERIAL MANAGEMENT

Include hazardous material control procedures in the Safety Plan, in accordance with Section 01 35 26.00 25 GOVERNMENTAL SAFETY REQUIREMENTS. Address procedures and proper handling of hazardous materials, including the appropriate transportation requirements. Do not bring hazardous material onto Government property that does not directly relate to requirements for the performance of this Contract. Typical materials requiring SDS and quantity reporting include, but are not limited to, oil and latex based painting and caulking products, solvents, adhesives, aerosol, and petroleum products. Use hazardous materials in a manner that minimizes the amount of hazardous waste generated. Containers of hazardous materials must have National Fire Protection Association labels or their equivalent. Certify that hazardous materials removed from the site do not meet the definition of hazardous waste, in accordance with 40 CFR 261.

3.8.1 Lead-Based Paint (LBP)

a. Lead-based paint is suspected to be present. Such surfaces must be handled as if LBP is present. However, the Contractor may decide, at no additional cost to the Government, to conduct testing to demonstrate that LBP is not present. No drilling, cutting, or other abrasive action will be used on or to remove LBP in a manner that could create dust or an uncontrolled release of lead or other heavy metals. The removal of LBP should be avoided whenever possible. If removing LBP cannot be avoided, select a lead removal process that achieves all of the following:

   (1) Prevents contamination of work areas outside the control area with lead-contaminated dust, debris, or waste.

   (2) Ensures that unprotected personnel in the vicinity are not exposed to hazardous concentrations of lead.

   (3) Does not release LBP, including dust or chips originating from LBP, into the environment, including the air, water, or ground.

   (4) Meets the standards of applicable federal and state regulations.

b. Any paint removed must be completed with a chemical paint stripping compound according to manufacturer's instructions and contained for proper disposal. Chemical paint strippers must not contain methylene chloride, and the compound must be approved by the onsite Environmental Compliance Coordinator before use. Minimize the amount of hazardous waste generated. Only remove lead-based paint from local areas subject to drilling, cutting, or other disturbance. Paint strippers are not allowed to be used below the water surface or come in contact with water. Rags used to remove paint may be disposed of with the Project's hazardous waste stream. Place generated waste into approved DOT drums (1A1/1A2). Notify the Project Environmental Compliance Coordinator when drums are full and ready for disposal. Follow all EPA and OSHA standards, EM 385-1-1, 29 CFR 1926.62, and all state and local ordinances pertaining to the proper removal, handling, and disposal of hazardous waste. Removal, handling, and disposal of LBP is considered incidental to the work. Therefore, no separate payment will be made.

c. The dry sanding or grinding of surfaces that contain LBP is prohibited. LBP must be removed with a minimum clearance of 4 inches in all directions from the cut line or point of disturbance if a flame torch or abrasive actions are used on the material cleared of LBP. Do not allow heat, abrasion, or any other process to impact LBP left in place.

d. Off-site disposal of equipment or material with LBP must be transported in a manner that will not allow loose paint chips, paint dust, or any substance that contains heavy metals to be released into the environment. The Contractor must disclose that the equipment or material has LBP to the receiving disposal or recycling facility. The disposal or recycling facility must be certified (as indicated in the facility's solid waste management permit) to accept waste material that contains lead or other heavy metals.

3.9 PREVIOUSLY USED EQUIPMENT

Clean previously used construction equipment prior to bringing it onto the project site. Equipment must be free from soil residuals, egg deposits from plant pests, noxious weeds, and plant seeds. Consult with the U.S. Department of Agriculture jurisdictional office for additional cleaning requirements.

3.10 PETROLEUM, OILS, AND LUBRICANTS (POLs) STORAGE AND FUELING

Utilize environmentally acceptable lubricants including hydraulic fluid as in accordance with EPA 800-R-11-002 when operating equipment below Ordinary High Water and work over water. Store POL products in a manner that affords the maximum protection against spills into the environment. Fuel equipment and motor vehicles in a manner that affords the maximum protection against spills into the environment. Use secondary containments, dikes, curbs, and other barriers, to prevent POL products from spilling and entering the ground, storm or sewer drains, stormwater ditches or canals, or navigable waters of the United States. Describe in the EPP (see Paragraph ENVIRONMENTAL PROTECTION PLAN) how POL tanks and containers must be stored, managed, and inspected and what protections must be provided.

a. Inspect all equipment, vehicles, and power tools for fluid leaks before they arrive onto the project site.

b. Before operation within 150 feet of any body of water, and as often as necessary during operation, thoroughly clean all equipment, vehicles, and power tools to keep them free of external fluids and grease and to prevent leaks and spills from entering the water.

c. Maintain and protect generators, cranes, or other stationary heavy equipment operated within 150 feet of any waterbody as necessary to prevent leaks and spills from entering the water.

3.10.1 Used Oil Management

Manage used oil generated on site in accordance with 40 CFR 279. Determine if any used oil generated while onsite exhibits a characteristic of hazardous waste. Used oil containing 1,000 parts per million of solvents is considered a hazardous waste and disposed of at the Contractor's expense. Used oil mixed with a hazardous waste is also considered a hazardous waste. Dispose in accordance with Paragraph HAZARDOUS WASTE DISPOSAL.

3.10.2 Oil Storage Including Fuel Tanks

a. Provide secondary containment and overfill protection for POL storage tanks and refueling onsite. Use drip pans during oil transfer operations. Cover tanks and drip pans during inclement weather. Provide procedures and equipment to prevent overfilling of tanks.

b. Monitor and remove any rainwater that accumulates in open containment pans, dikes, or berms. Inspect the accumulated rainwater prior to draining from a containment dike to the environment, to determine there is no oil sheen present. If oil sheen is present, treat and dispose of accumulated rainwater in an environmentally-protective manner approved by the CO.

3.11 INADVERTENT DISCOVERY OF PETROLEUM-CONTAMINATED SOIL OR HAZARDOUS WASTES

If petroleum-contaminated soil, or suspected hazardous waste is found during construction that was not identified in the Contract documents, immediately notify the CO. Do not disturb this material until authorized by the CO.

3.12 NOISE CONTROL

3.12.1 General

Keep construction activities under surveillance and control to minimize environmental damage by noise. Noise control and noise levels must conform to requirements set forth in the appropriate regulations, including EM 385-1-1 Section 05.C, 29 CFR 1926.52, and 29 CFR 1926.101. The most conservative requirement will govern.

3.12.2 Noise Limitations

Follow local noise requirements. In the absence of local requirements, the noise levels, as measured from the nearest dwelling, must not exceed 50 decibels during the hours from 2200 hours to 0700 hours.

3.13 POST CONSTRUCTION CLEANUP

Clean up areas used for construction. Unless otherwise instructed in writing by the CO, remove traces of temporary construction facilities such as haul roads, work area, structures, foundations of temporary structures, stockpiles of excess or waste materials, and other vestiges of construction prior to final acceptance of the work. Grade parking area and similar temporarily used areas to conform with surrounding contours.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01 74 19.00 25

CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 GENERAL

1.1 DEFINITIONS
1.1.1 Co-mingle
1.1.2 Construction Waste
1.1.3 Demolition Debris/Waste
1.1.4 Disposal
1.1.5 Diversion
1.1.6 Final Construction Waste Diversion Report
1.1.7 Recycling
1.1.8 Reuse
1.1.9 Salvage
1.1.10 Source Separation
1.2 CONSTRUCTION WASTE (INCLUDES DEMOLITION DEBRIS/WASTE)
1.3 CONSTRUCTION WASTE MANAGEMENT
1.3.1 Implementation of Construction Waste Management Program
1.3.2 Oversight
1.3.3 Special Instructions
1.3.4 Waste Streams
1.4 SUBMITTALS
1.5 MEETINGS
1.6 CONSTRUCTION WASTE MANAGEMENT PLAN (CWMP)
1.7 RECORDS (DOCUMENTATION)
1.7.1 General
1.7.2 Accumulated
1.8 REPORTS
1.8.1 General
1.8.2 Quarterly Reporting
1.8.3 Annual Reporting
1.9 FINAL CONSTRUCTION WASTE DIVERSION REPORT
1.10 COLLECTION
1.10.1 Source Separation Method
1.10.2 Co-Mingled Method
1.10.3 Other Methods
1.11 DISPOSAL
1.11.1 Reuse
1.11.2 Recycle
1.11.3 Compost
1.11.4 Waste

PART 2 PRODUCTS

PART 3 EXECUTION

-- End of Section Table of Contents --

SECTION 01 74 19.00 25

CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 GENERAL

1.1 DEFINITIONS

1.1.1 Co-mingle

The practice of placing unrelated materials together in a single container, usually for benefits of convenience and speed.

1.1.2 Construction Waste

Waste generated by construction activities, such as scrap materials, damaged or spoiled materials, temporary and expendable construction materials, and other waste generated by the workforce during construction activities.

1.1.3 Demolition Debris/Waste

Waste generated from demolition activities, including minor incidental demolition waste materials generated as a result of intentional dismantling of all or portions of a building, to include clearing of building contents that have been destroyed or damaged.

1.1.4 Disposal

Depositing waste in a solid waste disposal facility, usually a managed landfill or incinerator, regulated in the US under the Resource Conservation and Recovery Act (RCRA).

1.1.5 Diversion

The practice of diverting waste from disposal in a landfill or incinerator, by means of eliminating or minimizing waste, or reuse of materials.

1.1.6 Final Construction Waste Diversion Report

A written assertion by a material recovery facility operator identifying constituent materials diverted from disposal, usually including summary tabulations of materials, weight in short-ton.

1.1.7 Recycling

The series of activities, including collection, separation, and processing, by which products or other materials are diverted from the solid waste stream for use in the form of raw materials in the manufacture of new products sold or distributed in commerce, or the reuse of such materials as substitutes for goods made of virgin materials, other than fuel.

1.1.8 Reuse

The use of a product or materials again for the same purpose, in its original form or with little enhancement or change.

1.1.9 Salvage

Usable, salable items derived from buildings undergoing demolition or deconstruction, parts from vehicles, machinery, other equipment, or other components.

1.1.10 Source Separation

The practice of administering and implementing a management strategy to identify and segregate unrelated waste at the first opportunity.

1.2 CONSTRUCTION WASTE (INCLUDES DEMOLITION DEBRIS/WASTE)

Divert a minimum of 60 percent by weight of the project construction waste and demolition debris/waste from the landfill or incinerator. Follow applicable industry standards in the management of waste. Apply sound environmental principles in the management of waste.

a. Practice efficient waste management when sizing, cutting, and installing products and materials and

b. Use all reasonable means to divert construction waste and demolition debris/waste from landfills and incinerators and to facilitate the recycling or reuse of excess construction materials.

1.3 CONSTRUCTION WASTE MANAGEMENT

Implement a Construction Waste Management Program for the project. Establish a process for clear tracking, and documentation of construction waste and demolition debris/waste.

1.3.1 Implementation of Construction Waste Management Program

Develop and document how the Construction Waste Management Program will be implemented in a Construction Waste Management Plan. Submit a Construction Waste Management Plan to the Contracting Officer (CO) for approval. Construction waste and demolition debris/waste materials include un-used construction materials not incorporated in the final work, as well as demolition debris/waste materials from demolition activities or deconstruction activities. In the management of waste, consider the availability of viable markets, the condition of materials, the ability to provide material in suitable condition and in a quantity acceptable to available markets, and time constraints imposed by internal project completion mandates.

1.3.2 Oversight

The Quality Control Manager, as specified in Section 01 45 00.00 25 QUALITY CONTROL, is responsible for overseeing and documenting results from executing the Construction Waste Management Plan for the project.

1.3.3 Special Instructions

Provide on-site instruction of appropriate separation, handling, recycling, salvage, reuse, and return methods to be used by all parties at the appropriate stages of the projects. Designation of single source separating or commingling will be clearly marked on the containers.

1.3.4 Waste Streams

Delineate waste streams and characterization, including estimated material types and quantities of waste, in the Construction Waste Management Plan. Manage all waste streams associated with the project. Typical waste streams are listed below. Include additional waste steams not listed:

a. Land Clearing Debris

b. Asphalt

c. Masonry and CMU

d. Concrete

e. Metals (Includes, but is not limited to, banding, stud trim, ductwork, piping, rebar, roofing, other trim, steel, iron, galvanized, stainless steel, aluminum, copper, zinc, bronze.)

f. Wood (nails and staples allowed)

g. Glass

h. Paper

i. Plastics (PET, HDPE,PVC,LDPE,PP,PS, Other)

j. Gypsum

k. Non-hazardous paint and paint cans

l. Carpet

m. Ceiling Tiles

n. Insulation

o. Beverage Containers

1.4 SUBMITTALS

Government approval is required for submittals with a "G". Submittals not having a "G" classification are for information only. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Construction Waste Management Plan; G

SD-06 Test Reports

Quarterly Reports

Annual Report

SD-11 Closeout Submittals

Final Construction Waste Diversion Report; G

1.5 MEETINGS

a. Conduct Construction Waste Management meetings. After award of the Contract and prior to commencement of work, schedule and conduct a meeting with the CO to discuss the proposed Construction Waste Management Plan and to develop a mutual understanding relative to the management of the Construction Waste Management Program and how waste diversion requirements will be met.

b. At a minimum, discuss and document waste management goals at following meetings:

(1) Preconstruction meeting.

(2) Preparatory meetings.

(3) Regular coordination meetings.

(4) Safety Meetings.

1.6 CONSTRUCTION WASTE MANAGEMENT PLAN (CWMP)

a. Submit Construction Waste Management Plan as part of the PSMP. Approval of the CWMP is required prior to the start of on-site work. Manage demolition debris/waste or deconstruction materials in accordance with the approved construction waste management plan.

b. An approved CWMP will not relieve the Contractor of responsibility for compliance with applicable environmental regulations or meeting project cumulative waste diversion requirement. Ensure all subcontractors receive a copy of the approved Construction Waste Management Plan. The plan demonstrates how to meet the project waste diversion requirement. Also, include the following in the plan:

(1) Identify the names of individuals responsible for waste management and waste management tracking, along with roles and responsibilities on the project.

(2) Actions that will be taken to reduce solid waste generation, including coordination with subcontractors to ensure awareness and participation.

(3) Description of the regular meetings to be held to address waste management.

(4) Description of the specific approaches to be used in recycling/reuse of the various materials generated, including the areas on site and equipment to be used for processing, sorting, and temporary storage of materials.

(5) Name of landfill and incinerator to be used.

(6) Identification of local and regional re-use programs, including non-profit organizations such as schools, local housing agencies, and organization that accept used materials such as material exchange networks and resale stores. Include the name, location, phone number for each re-use facility identified, and provide a copy of the permit or license for each facility.

(7) List of specific materials, by type and quantity, that will be salvaged for resale, salvaged and reused on the current project, salvaged and stored for reuse on a future project, or recycled. Identify the recycling facilities by name, address, and phone number.

(8) Identification of materials that cannot be recycled or reused with an explanation or justification, to be approved by the CO.

(9) Description of the means by which materials identified in item (g) above will be protected from contamination.

(10) Description of the means of transportation of the recyclable materials (whether materials will be site-separated and self-hauled to designated centers, or whether mixed materials will be collected by a waste hauler and removed from the site).

(11) Copy of training plan for subcontractors and other services to prevent contamination by co-mingling materials identified for diversion and waste materials.

1.7 RECORDS (DOCUMENTATION)

1.7.1 General

Maintain records to document the types and quantities of waste generated and diverted though re-use, recycling and sale to third parties; through disposal to a landfill or incinerator facility. Provide explanations for materials not recycled, reused or sold. Collect and retain manifests, weight tickets, sales receipts, and invoices specifically identifying diverted project waste materials or disposed materials.

1.7.2 Accumulated

Maintain a running record of materials generated and diverted from landfill disposal, including accumulated diversion rates for the project. Make records available to the CO during construction or incidental demolition activities. Provide a copy of the diversion records to the CO upon completion of the construction, incidental demolitions or minor deconstruction activities.

1.8 REPORTS

1.8.1 General

Maintain current construction waste diversion information on site for periodic inspection by the CO. Include in the quarterly reports, annual reports and final reports: the project name, Contract information, information for waste generated, diverted and disposed of for the current reporting period and show cumulative totals for the project. Reports must identify quantifies of waste by type and disposal method. Also include in each report, supporting documentation to include manifests, weigh tickets, receipts, and invoices specifically identifying the project and waste material type and weighted sum.

1.8.2 Quarterly Reporting

Provide cumulative reports at the end of each quarter (December, March, June, and September, corresponding with the federal fiscal year for

reporting purposes). Submit quarterly reports not later than 15 calendar days after the preceding quarter has ended. See Attachment A11 for an example report.

1.8.3 Annual Reporting

Provide a cumulative construction waste diversion report annually. Submit annual report not later than 30 calendar days after the preceding fourth quarter has ended.

1.9 FINAL CONSTRUCTION WASTE DIVERSION REPORT

A Final Construction Waste Diversion Report is required at the end of the project. Provide Final Construction Waste Diversion Report within 90 calendar days of final Construction physical completion.

1.10 COLLECTION

a. Collect, store, protect, and handle reusable and recyclable materials at the site in a manner which prevents contamination, and provides protection from the elements to preserve their usefulness and monetary value. Provide receptacles and storage areas designated specifically for recyclable and reusable materials and label them clearly and appropriately to prevent contamination from other waste materials. Keep receptacles or storage areas neat and clean.

b. Separate materials by one of the following methods described herein:

1.10.1 Source Separation Method

Separate waste products and materials that are recyclable from trash and sort as described below into appropriately marked separate containers and then transport to the respective recycling facility for further processing. Deliver materials in accordance with recycling or reuse facility requirements (e.g., free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process). Separate materials into the category types as defined in the Construction Waste Management Plan.

1.10.2 Co-Mingled Method

Place waste products and recyclable materials into a single container and then transport to an authorized recycling facility, which meets all applicable requirements to accept and dispose of recyclable materials in accordance with all applicable local, state and federal regulations. The Co-mingled materials must be sorted and processed in accordance with the approved Construction Waste Management Plan.

1.10.3 Other Methods

Other methods proposed by the Contractor may be used when approved by the CO.

1.11 DISPOSAL

Control accumulation of waste materials and trash. Recycle or dispose of collected materials off-site at intervals approved by the CO and in compliance with waste management procedures as described in the waste management plan. Except as otherwise specified in other sections of the

specifications, dispose of in accordance with the following:

1.11.1 Reuse

Give first consideration to reusing construction and demolition materials as a disposition strategy. Recover for reuse materials, products, and components as described in the approved Construction Waste Management Plan. Coordinate with the CO to identify onsite reuse opportunities or material sales or donation available through Government resale or donation programs. Sale of recovered materials is not allowed on Government property or at the Construction site, unless approved by the CO. Consider the use of surplus industrial supply broker services, who match entities with reusable or repurpose industrial materials with entities with need of such materials.

1.11.2 Recycle

Recycle non-hazardous construction and demolition/debris materials that are not suitable for reuse. Track rejection of contaminated recyclable materials by the recycling facility. Rejected recyclables materials will not be counted as a percentage of diversion calculation. Recycle all fluorescent lamps, HID lamps, mercury (Hg) -containing thermostats and ampoules, and PCBs-containing ballasts and electrical components as directed by the CO. Do not crush lamps on site as this creates a hazardous waste stream with additional handling requirements.

1.11.3 Compost

Consider composting off site if a reasonable amount of compostable materials will be available and a utilization of compostable material can be determined and appropriately planned for. Compostable materials include plant materials, sawdust and certain food scraps. Composting as a strategy must be explicitly addressed in the Construction Waste Management Plan submitted for approval to ensure it is feasible.

1.11.4 Waste

Dispose by landfill or incineration only those waste materials with no practical use, economic benefit, or recycling opportunity.

PART 2 PRODUCTS

Not used.

PART 3 EXECUTION

Not used.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01 78 23.00 25

OPERATION AND MAINTENANCE DATA

PART 1 GENERAL

1.1 SUBMITTALS
1.2 O&M MANUAL EXECUTION PLAN
1.2.1 General Requirements
1.2.2 Project Schedule
1.3 SUBMISSION OF OPERATION AND MAINTENANCE MANUAL DATA
1.3.1 Binder Requirements
1.3.1.1 General
1.3.1.2 Labeling of Binders
1.3.2 Package Quality
1.3.2.1 Drawings
1.3.2.2 Manufacturer's Data
1.3.3 Electronic O&M Manual
1.3.4 Package Content
1.3.5 Changes to Submittals
1.3.6 O&M Database
1.4 TYPES OF INFORMATION REQUIRED IN O&M DATA PACKAGES
1.4.1 Operating Instructions
1.4.1.1 Safety Precautions
1.4.1.2 Operator Prestart
1.4.1.3 Startup, Shutdown, and Post-Shutdown Procedures
1.4.1.4 Normal Operations
1.4.1.5 Emergency Operations
1.4.1.6 Operator Service Requirements
1.4.1.7 Environmental Conditions
1.4.1.8 Manufacturer's Data and Parts Catalogs
1.4.2 Preventive Maintenance
1.4.2.1 Lubrication Data
1.4.2.2 Preventive Maintenance Plan and Schedule
1.4.3 Corrective Maintenance (Repair)
1.4.3.1 Troubleshooting Guides and Diagnostic Techniques
1.4.3.2 Wiring Diagrams and Control Diagrams
1.4.3.3 Maintenance and Repair Procedures
1.4.3.4 Removal and Replacement Instructions
1.4.3.5 Spare Parts and Supply Lists
1.4.4 Corrective Maintenance Work-Hours
1.4.5 Appendices
1.4.5.1 Product Submittal Data
1.4.5.2 Manufacturer's Instructions
1.4.5.3 O&M Submittal Data
1.4.5.4 Parts Identification
1.4.5.5 Warranty Information
1.4.5.6 Personnel Training Requirements
1.4.5.7 Testing Equipment and Special Tool Information
1.4.5.8 Testing and Performance Data

1.4.5.9 Contractor Information
1.5 SCHEDULE OF OPERATION AND MAINTENANCE DATA PACKAGES
1.5.1 Data Package 4
1.6 FAILURE TO SUBMIT OPERATIONS AND MAINTENANCE DATA
1.7 PAYMENT

PART 2 PRODUCTS

PART 3 EXECUTION

-- End of Section Table of Contents --

SECTION 01 78 23.00 25

OPERATION AND MAINTENANCE DATA

PART 1 GENERAL

1.1 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only or as otherwise designated. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with this Section and Section 01 33 00, SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

O&M Manual Execution Plan; G

SD-10 Operation and Maintenance Data

Operation and Maintenance Manual; G

1.2 O&M MANUAL EXECUTION PLAN

1.2.1 General Requirements

Submit for approval a discussion detailing how the Contract requirements for Operation and Maintenance (O&M) Manuals, as set forth in this Section, will be met. Identify Contractor personnel who must be responsible for meeting the O&M submittal requirements in this Section and the Technical Sections of this Contract.

1.2.2 Project Schedule

Time required to accomplish the requirements of this Section must be included in the Project Schedule in accordance with Section 01 32 01.00 25 PROJECT SCHEDULE.

1.3 SUBMISSION OF OPERATION AND MAINTENANCE MANUAL DATA

a. Submit Operation and Maintenance (O&M) Data specifically applicable to this Contract and a complete and concise depiction of the provided equipment, product, or system, stressing and enhancing the importance of system interactions, troubleshooting, and long-term preventative maintenance and operation. The subcontractors must compile and prepare data and deliver to the Contractor prior to the training of Government personnel. The Contractor must compile and prepare aggregate O&M data including clarifying and updating the original sequences of operation to as-built conditions. Organize and present information in sufficient detail to clearly explain O&M requirements at the system, equipment, component, and subassembly level. Include troubleshooting data with error indications and the possible cause. Include an index preceding each submittal. Submit in accordance with this Section and Section 01 33 00 SUBMITTAL PROCEDURES.

b. Each system or piece of equipment must be covered in a single manual regardless of the number of suppliers or subcontractors involved. Data submitted for the manual is in addition to that furnished as shop drawings. At least 30 days prior to scheduled testing and training, submit three copies of above data for each electrical, mechanical, and electromechanical system or equipment.

c. Mark draft copies as "Draft". The Government will return one copy if "Approved" or "Returned for Correction" (Action Codes A or C). If "Returned for Correction" resubmit the corrected manual with two sets of additional data, for the manuals retained by the Government, within 30 days of the date the prior submittal was returned. Within 30 days of approval, submit five additional, complete copies identical to the "Approved" copy (for a total of eight copies) and two electronic copies, in accordance with paragraph entitled Electronic O&M Manual.

1.3.1 Binder Requirements

1.3.1.1 General

Assemble O&M Manuals in a binder for 8 1/2- by 11-inch sheets with slide binding, swing hinge, or steel screwpost fastening. Binder dimensions must not exceed three inches in width or 11.75 inches in height, and must not have any protruding clasps, hooks, or other hardware. Loose-leaf ring binders and spiral bound manuals are not acceptable.

1.3.1.2 Labeling of Binders

a. Label each binder on the cover and spine with the Contract name, Contract number, location of project, and the system or piece of equipment covered by the manual.

b. Where multiple volumes are required, number sequentially on both the cover and spine. Include a brief description of the contents in the volume designation (i.e. Vol. 1 Mechanical, Vol. 2 Electrical, Vol. 3 HVAC).

1.3.2 Package Quality

Provide data for equipment in hard copy and electronic format. Documents must be fully legible and all pages of the original material must be included. Poor quality copies and material with hole punches obliterating the text or drawings will not be accepted.

1.3.2.1 Drawings

Shop assembly or special drawings for manuals and parts catalogs must be of a size that requires folding only in left to right coordinate. Furnish a permanent reproducible conforming to Section 01 33 00, SUBMITTAL PROCEDURES, for all drawings in addition to the five copies specified herein. Number each sheet and provide an index.

1.3.2.2 Manufacturer's Data

One master hard copy of the approved O&M manual(s) must contain all original documents including, but not limited to: standard catalog cuts, manufacturer's data, parts sheets, and illustrations. Non-permanent copies will not be accepted. Mark out all non-applicable data, such as description of other models and optional equipment not included. If

reference is made to other drawings or data they must be included. List equipment covered; the manufacturer; and name, address, and telephone number of the local representative.

1.3.3 Electronic O&M Manual

Subsequent to approval of the hard copy O&M Manual(s), submit files electronically. Assemble the electronic information in a single PDF file with data organized identically to the approved master hard copy.

1.3.4 Package Content

Data package content must include, but not be limited to, the requirements as shown in paragraph entitled SCHEDULE OF OPERATION AND MAINTENANCE DATA PACKAGES. Comply with the data package requirements specified in the individual Technical Sections, including the content of the packages and addressing each product, component, and system designated for data package submission. Commissioned items without a specified data package requirement in the individual technical Sections must use Data Package 4.

1.3.5 Changes to Submittals

Submit changes, additions, or revisions required by the Contracting Officer (CO) for final acceptance of submitted data within 30 calendar days of the notification of this change requirement. Furnish manufacturer-originated changes or revisions to submitted data if a component of an item is so affected subsequent to acceptance of the O&M Data.

1.3.6 O&M Database

Develop a database from the O&M manuals that contains the information required to start a preventative maintenance program.

1.4 TYPES OF INFORMATION REQUIRED IN O&M DATA PACKAGES

1.4.1 Operating Instructions

Include specific instructions, procedures, and illustrations for the following phases of operation for the installed model and features of each system:

1.4.1.1 Safety Precautions

List personnel hazards and equipment or product safety precautions for all operating conditions.

1.4.1.2 Operator Prestart

Include procedures required to install, set up, and prepare each system for use.

1.4.1.3 Startup, Shutdown, and Post-Shutdown Procedures

Provide narrative description for Startup, Shutdown, and Post-shutdown operating procedures including the control sequence for each procedure.

1.4.1.4 Normal Operations

Provide narrative description of Normal Operating Procedures. Include

Control Diagrams with data to explain operation and control of systems and specific equipment.

1.4.1.5 Emergency Operations

Include Emergency Procedures for equipment malfunctions to permit a short period of continued operation or to shut down the equipment to prevent further damage to systems and equipment. Include Emergency Shutdown Instructions for fire, explosion, spills, or other foreseeable contingencies. Provide guidance and procedures for emergency operation of all utility systems including required valve positions, valve locations, and zones or portions of systems controlled.

1.4.1.6 Operator Service Requirements

Include instructions for services to be performed by the operator such as lubrication, adjustment, inspection, and recording gage readings.

1.4.1.7 Environmental Conditions

Include a list of Environmental Conditions (temperature, humidity, and other relevant data) that are best suited for the operation of each product, component, or system. Describe conditions under which the item equipment should not be allowed to run.

1.4.1.8 Manufacturer's Data and Parts Catalogs

Include all original standard catalog cuts, manufacturer's data, parts sheets, or illustrations. Parts catalogs must include identification, nomenclature, part numbers, required parts, recommended spare parts stocked, and spare parts supplied. Data must match equipment furnished. Standard catalog data will not be acceptable unless irrelevant parts are marked out and relevant parts are clearly identified.

1.4.2 Preventive Maintenance

Include the following information for preventive and scheduled maintenance to minimize corrective maintenance and repair for the installed model and features of each system. Include potential environmental and indoor air quality impacts of recommended maintenance procedures and materials.

1.4.2.1 Lubrication Data

Include preventative maintenance lubrication data, in addition to instructions for lubrication provided under paragraph entitled Operator Service Requirements:

a. A table showing recommended lubricants for specific temperature ranges and applications.

b. Charts with a schematic diagram of the equipment showing lubrication points, recommended types and grades of lubricants, and capacities.

c. A Lubrication Schedule showing service interval frequency.

1.4.2.2 Preventive Maintenance Plan and Schedule

Include manufacturer's schedule for routine preventive maintenance, inspections, tests, and adjustments required to ensure proper and

economical operation and to minimize corrective maintenance. Provide manufacturer's projection of preventive maintenance work-hours on a daily, weekly, monthly, and annual basis including craft requirements by type of craft. For periodic calibrations, provide manufacturer's specified frequency and procedures for each separate operation.

1.4.3 Corrective Maintenance (Repair)

Include manufacturer's recommended procedures and instructions for correcting problems and making repairs.

1.4.3.1 Troubleshooting Guides and Diagnostic Techniques

Include step-by-step procedures to promptly isolate the cause of typical malfunctions. Describe clearly why the checkout is performed and what conditions are to be sought. Identify tests or inspections and test equipment required to determine whether parts and equipment may be reused or require replacement.

1.4.3.2 Wiring Diagrams and Control Diagrams

Wiring diagrams and control diagrams must be point-to-point drawings of wiring and control circuits including factory-field interfaces. Provide a complete and accurate depiction of the actual job specific wiring and control work. On diagrams, number electrical and electronic wiring and pneumatic control tubing and the terminals for each type, identically to actual installation configuration and numbering.

1.4.3.3 Maintenance and Repair Procedures

Include instructions and a list of tools required to repair or restore the product or equipment to proper condition or operating standards.

1.4.3.4 Removal and Replacement Instructions

Include step-by-step procedures and lists of required tools and supplies for removal, replacement, disassembly, and assembly of components, assemblies, subassemblies, accessories, and attachments. Provide tolerances, dimensions, settings, and adjustments required. Instructions must include a combination of text and illustrations.

1.4.3.5 Spare Parts and Supply Lists

Include lists of spare parts and supplies required for maintenance and repair to ensure continued service or operation without unreasonable delays. Special consideration is required for facilities at remote locations. Identify spare parts and supplies that have a long lead-time to obtain.

1.4.4 Corrective Maintenance Work-Hours

Include manufacturer's projection of corrective maintenance work-hours including requirements by type of craft. Separately identify and tabulate corrective maintenance that requires participation of or completion by the equipment manufacturer.

1.4.5 Appendices

Provide information required below and information not specified in the

preceding paragraphs but pertinent to the maintenance or operation of the product or equipment. Include the following:

1.4.5.1 Product Submittal Data

Provide a copy of all SD-03 Product Data submittals required in the applicable Technical Sections.

1.4.5.2 Manufacturer's Instructions

Provide a copy of all SD-08 Manufacturer's Instructions submittals required in the applicable Technical Sections.

1.4.5.3 O&M Submittal Data

Provide a copy of all SD-10 Operation and Maintenance Data submittals required in the applicable Technical Sections.

1.4.5.4 Parts Identification

Provide identification and coverage for all parts of each component, assembly, subassembly, and accessory of the end items subject to replacement. Include special hardware requirements, such as requirement to use high-strength bolts and nuts. Identify parts by make, model, serial number, and source of supply to allow reordering without further identification. Provide clear and legible illustrations, drawings, and exploded views to enable easy identification of the items. When illustrations omit the part numbers and description, both the illustrations and separate listing must show the index, reference, or key number that will cross-reference the illustrated part to the listed part. Group parts by components, assemblies, and subassemblies in accordance with the manufacturer's standard practice. Parts data may cover more than one model or series of equipment, components, assemblies, subassemblies, attachments, or accessories, such as typically shown in a master parts catalog.

1.4.5.5 Warranty Information

List and explain the various warranties and clearly identify the servicing and technical precautions prescribed by the manufacturers or Contract documents in order to keep warranties in force. Include warranty information for primary components such as the compressor of air conditioning system.

1.4.5.6 Personnel Training Requirements

Provide information, classroom, and field instructions available from the manufacturers that are needed for use in training Government personnel to properly operate and maintain the equipment and systems. These services must be directed by the Contractor, using the manufacturer's factory-trained personnel or qualified representatives. Give CO seven calendar days written notice of scheduled instructional services. Submit all instructional materials such as lists, static exhibits, video of training session on DVD-R, and visual aids with the O&M Manuals.

1.4.5.7 Testing Equipment and Special Tool Information

Include information on test equipment required to perform specified tests and on special tools needed for the operation, maintenance, and repair of components.

1.4.5.8 Testing and Performance Data

Include completed prefunctional checklists, functional performance test forms, and monitoring reports. Include recommended schedule for retesting and blank test forms.

1.4.5.9 Contractor Information

Provide a list that includes the name, address, and telephone number of the General Contractor and each subcontractor who installed the product or equipment, or system. For each item, provide the name, address, and telephone number of the manufacturer's representative and service organization that can provide replacements most convenient to the project site. Provide the name, address, and telephone number of the product, equipment, and system manufacturers.

1.5 SCHEDULE OF OPERATION AND MAINTENANCE DATA PACKAGES

Furnish the O&M data packages specified in individual Technical Sections. The required information for each O&M data package must include, but not be limited to, the following:

1.5.1 Data Package 4

a. Safety precautions

b. Operator prestart

c. Startup, shutdown, and post-shutdown procedures

d. Normal operations

e. Emergency operations

f. Operator service requirements

g. Environmental conditions

h. Lubrication data

i. Preventive maintenance plan and schedule

j. Cleaning recommendations

k. Troubleshooting guides and diagnostic techniques

l. Wiring diagrams and control diagrams

m. Maintenance and repair procedures

n. Removal and replacement instructions

o. Spare parts and supply list

p. Corrective maintenance man-hours

q. Product submittal data

r. O&M submittal data

s. Parts identification

t. Warranty information

u. Government personnel training requirements

v. Testing equipment and special tool information

w. Testing and performance data

x. Contractor information.

1.6 FAILURE TO SUBMIT OPERATIONS AND MAINTENANCE DATA

Failure to furnish O&M Manual data as required is justification to hold or adjust the retained percentage in accordance with Contract Clause 52.232-5, PAYMENTS UNDER FIXED-PRICE CONSTRUCTION CONTRACTS. Moreover, failure to furnish O&M Manual data as required may result in a final unsatisfactory overall performance rating, despite the nature of all other ratings.

1.7 PAYMENT

No partial payment will be made for compliance with this Section. All costs for hard copy and electronic O&M Manuals must be included in the Contract prices of the various items. The O&M Data will be jointly inspected for accuracy and completeness by the Government and a responsible representative of the Contractor prior to submission. Final payment will not be made until all eight, complete hard copies and two electronic copies of the O&M manuals have been accepted.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 01 - GENERAL REQUIREMENTS

SECTION 01 78 39.10 25

AS-BUILT DRAWINGS

PART 1 GENERAL

1.1 GENERAL INFORMATION
1.2 REFERENCES
1.3 SUBMITTALS
1.4 AS-BUILT DRAWINGS EXECUTION PLAN
1.4.1 General Requirements
1.4.2 Project Schedule
1.5 WORKING AS-BUILT REDLINE DRAWINGS
1.5.1 General
1.5.2 Weekly Redline Verification
1.5.3 Monthly Meeting
1.6 DIGITAL IMAGES
1.7 FINAL WORKING AS-BUILT REDLINE DRAWINGS
1.8 FINAL CONTRACTOR-PREPARED CAD DRAWINGS
1.8.1 CAD STANDARDS
1.9 PAYMENT

PART 2 PRODUCTS

PART 3 EXECUTION

-- End of Section Table of Contents --

SECTION 01 78 39.10 25

AS-BUILT DRAWINGS

PART 1 GENERAL

1.1 GENERAL INFORMATION

This Section covers as-built drawings complete, as a requirement of the Contract. As-built drawings are redlined Contract drawings and Contractor prepared drawings showing as-built conditions. As-built drawings showing final as-built conditions of the work are defined, but not limited to:

a. Contract Drawings - Drawings created by the Government specifically for this Contract and provided to the Contractor upon Award. As-built redline drawings are copies of Contract drawings that are revised to show additions and changes occurring during construction, eventually becoming final record drawings.

b. Contractor-Prepared Drawings - Drawings created by the Contractor during execution of this Contract. Drawings must include shop drawings, diagrammatic, and design information provided by the Contractor and the Contractor's subcontractors, vendors, or suppliers.

1.2 REFERENCES

The publications listed below form a part of this Specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN CONCRETE INSTITUTE (ACI)

ACI SP-66	(2004) ACI Detailing Manual

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

AISC 326	(2009) Detailing for Steel Construction

U.S. ARMY CORPS OF ENGINEERS (USACE)

ERDC/ITL TR-19-7	(2019) A/E/C CAD Standard - Release 6.1

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. The following must be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

As-Built Drawings Execution Plan; G

Working As-Built Redline Drawings

SD-11 Closeout Submittals

Final Working As-Built Redline Drawings; G

Final Contractor-prepared CAD Drawings; G

Digital Images; G

1.4 AS-BUILT DRAWINGS EXECUTION PLAN

1.4.1 General Requirements

Submit for approval a discussion detailing how the Contract requirements for As-built Drawings, as set forth in this Section, will be met. Identify Contractor personnel who must be responsible for maintaining marked up as-built conditions during the prosecution of the work and identify an authorized Contractor representative who will certify the monthly review in conjunction with periodic progress payments. Identify Contractor personnel who must be responsible for meeting the Final Working As-Built Redline Drawings submittal requirements at the time of Final Inspection(s), and describe the process of how these requirements will be met.

1.4.2 Project Schedule

Time required to accomplish the requirements of this Section must be included in the Project Schedule in accordance with Section 01 32 01.00 25 PROJECT SCHEDULE.

1.5 WORKING AS-BUILT REDLINE DRAWINGS

1.5.1 General

a. During the execution of the work, mark up an electronic set of Contract, and Contractor-prepared Drawings in accordance with this Section to show the current as-constructed conditions. Working as-built redline drawings must be accessible to the Government at all times through a secure internet accessible service. Submittals must include digital images identified below for verification of redlines. Keep working as-built redline drawings current on a continuous basis and available on the job site at all times. By means of details and notes, accurately and neatly record changes, as they occur, from the Contract drawings that are made in the work and additional information uncovered in the course of construction. Mark up the electronic copy of the working as-built redline drawings, including details and notes, in accordance with the U.S. Army Corps of Engineers (USACE), Portland District As-built CAD standards. Clearly identify changes related to RFIs and Contract modifications.

b. Working as-built redline drawings are part of the permanent records of this Contract and will be retained by the Government upon approval. As-built drawings must include, but not be limited to:

(1) Contract Drawings - Use working as-built redline Contract drawings, and additional drawings or sketches which may be required to thoroughly describe deviations or additions to the Contract drawings, to provide the required redlined Contract drawings. Mark out Contract drawings and/or portions of Contract drawings superseded by Contractor-prepared drawings and provide reference(s) on superseded Contract Drawings to applicable

Contractor-prepared drawing(s). Additional Contractor sketches must be provided if sufficient space is not available on the Contract Drawings. See Contract drawing index Sheet G-001 for Project Record Action Codes.

(2) Contractor-prepared Drawings - Incorporate working as-built redline Contractor-prepared drawings reflecting field conditions into the Final Contractor Prepared CAD Drawings to ensure the ability to cross-reference between Contract, and Contractor-prepared Drawings. Contractor must complete all CAD updates to Contractor-prepared drawings. See Contract drawing index sheet G-001 for Project Record Action Codes. Contractor-generated drawings are Action Code 2.

1.5.2 Weekly Redline Verification

Add redline review and status update to the weekly construction coordination meeting agenda. At a minimum discuss the following:

a. Redlines are present and accurate on an electronic set of drawings.

b. Changes originating from requests for information or Contract modifications are included in the redlines.

c. Adequate construction photographing is being completed prior to embedment, cover, or other actions that will preclude future access for verification.

1.5.3 Monthly Meeting

Coordinate and schedule a monthly meeting with the Contracting Officer (CO) to review the current working as-built redline drawings for accuracy and completeness.

1.6 DIGITAL IMAGES

Provide digital images in JPEG Format with a minimum of 300 pixels per inch (PPI) documenting the as-constructed state of the completed project for verification of redlines. Provide images for buried or concealed work that can not otherwise be verified, and all electrical panels (to include all wire labels). Images must be provided for each plan, section, elevation, and detail drawing (including all Contractor-prepared Drawings). Organize images into folders by feature.

1.7 FINAL WORKING AS-BUILT REDLINE DRAWINGS

Submit a complete electronic set of as-built redlines drawings marked "Draft" (including digital images). Allow 30 calendar days for Government review and approval. The CO will review the draft final working as-built redline drawings for accuracy and completeness and return them to the Contractor for required corrections, changes, additions, and deletions. If changes are required, make such revisions within 15 calendar days, and re-submit a complete set to the Government for review and approval. Final inspection cannot proceed until the Government has completed reviewing final working as-built drawings and determined they are acceptable.

1.8 FINAL CONTRACTOR-PREPARED CAD DRAWINGS

Within 15 calendar days of final construction physical completion submit a

complete set of as-built Contractor-prepared CAD drawings including electronic PDF and CAD files marked "Draft" (including Digital Images). Allow 30 calendar days for Government review and approval. The CO will review final CAD drawings for accuracy and completeness and return them to the Contractor for required corrections, changes, additions, and deletions. If changes are required, make such revisions within 15 calendar days, and resubmit to the Government for review and approval. Once approved, submit a complete set of electronic PDF and CAD files.

1.8.1 CAD STANDARDS

a. The CAD standard mandated by US Army Corps of Engineers and this Contract is ERDC/ITL TR-19-7. In addition to ERDC/ITL TR-19-7, structural drawings must be in accordance with ACI SP-66 and AISC 326. ERDC/ITL TR-19-7 is available, under the District CADD Standards, at the following web link: http://www.nwp.usace.army.mil/About/Standards.aspx. The web link contains the guides, libraries, and templates that must be utilized by the Contractor to produce CAD files that are compliant with the CAD standards required in this Contract. The digital support files in this web link are in DGN format (MicroStation).

b. Computer-Aided Design (CAD) work for this Contract must be accomplished with personnel that are knowledgeable and experienced with ERDC/ITL TR-19-7. Employ proficient personnel for the creation of CAD files.

1.9 PAYMENT

a. Working as-built redline drawings will be jointly inspected for accuracy and completeness by the CO and an authorized representative of the Contractor prior to submission of the monthly pay estimate. Failure to keep working as-built redline drawings maintained on a current basis, in accordance with Paragraph WORKING AS-BUILT REDLINE DRAWINGS, will be sufficient justification to withhold up to ten percent of the monthly pay estimate.

b. Separate payment will not be made for compliance with this Section for the preparation of the working as-built Contract and/or Shop Drawing redline drawings. All costs associated with the working as-built drawing requirements of this Section are considered incidental to the work.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

Not Used.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 02 - EXISTING CONDITIONS

SECTION 02 41 00.00 99

DEMOLITION AND DECONSTRUCTION

PART 1 GENERAL

1.1 REFERENCES
1.2 PROJECT DESCRIPTION
1.2.1 Definitions
1.2.1.1 Demolition
1.2.1.2 Deconstruction
1.2.1.3 Demolition and Deconstruction Plan
1.2.1.4 Pre-Deconstruction Walkthrough
1.2.2 Demolition/Deconstruction Plan
1.2.3 General Requirements
1.3 ITEMS TO REMAIN IN PLACE
1.3.1 Existing Construction Limits and Protection
1.3.2 Weather Protection
1.3.3 Trees
1.3.4 Utility Service
1.3.5 Facilities
1.3.6 Protection of Waters of the U.S. or State
1.3.6.1 Identifying Waters of the U.S. or State, Including Wetlands
1.3.6.2 Disturbing Waters of the U.S or State, Including Wetlands
1.4 BURNING
1.5 AVAILABILITY OF WORK AREAS
1.6 SUBMITTALS
1.7 QUALITY ASSURANCE
1.7.1 Dust and Debris Control
1.8 PROTECTION
1.8.1 Traffic Control Signs
1.8.2 Protection of Personnel
1.8.3 Protection of Fish and Fish Habitat
1.8.3.1 Regulated Work Areas
1.8.3.2 Prohibited Operations
1.8.4 Protection of Wildlife and Wildlife Habitat
1.8.4.1 Migratory Birds
1.8.4.2 Bats
1.9 RELOCATIONS
1.10 EXISTING CONDITIONS

PART 2 PRODUCTS

2.1 FILL MATERIAL

PART 3 EXECUTION

3.1 EXISTING FACILITIES TO BE REMOVED
3.1.1 Structures
3.1.2 Utilities and Related Equipment

3.1.2.1 General Requirements
3.1.2.2 Disconnecting Existing Utilities
3.1.3 Chain Link Fencing
3.1.4 Paving and Slabs
3.1.5 Masonry
3.1.6 Concrete
3.1.7 Structural Steel
3.1.8 Miscellaneous Metal
3.1.9 Carpentry
3.1.10 Mechanical Equipment and Fixtures
3.1.10.1 Preparation for Storage
3.1.10.2 Piping
3.1.10.3 Fixtures, Motors and Machines
3.1.11 Electrical Equipment and Fixtures
3.1.11.1 Fixtures
3.1.11.2 Electrical Devices
3.1.11.3 Wiring Ducts or Troughs
3.1.11.4 Conduit and Miscellaneous Items
3.2 CONCURRENT EARTH-MOVING OPERATIONS
3.3 DISPOSITION OF MATERIAL
3.3.1 Title to Materials
3.3.2 Reuse of Materials and Equipment
3.3.3 Salvaged Materials and Equipment
3.3.4 Disposal of Ozone Depleting Substance (ODS)
3.3.4.1 Fire Suppression
3.3.5 Unsalvageable and Non-Recyclable Material
3.4 CLEANUP
3.5 DISPOSAL OF REMOVED MATERIALS
3.5.1 Regulation of Removed Materials
3.5.2 Burning on Government Property
3.5.3 Removal to Spoil Areas on Government Property
3.5.4 Removal from Government Property
3.6 REUSE OF SALVAGED ITEMS

-- End of Section Table of Contents --

SECTION 02 41 00.00 99

DEMOLITION AND DECONSTRUCTION

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO M 145	(1991; R 2012) Standard Specification for Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes
AASHTO T 180	(2023) Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop

AMERICAN SOCIETY OF SAFETY PROFESSIONALS (ASSP)

ASSP A10.6	(2006) Safety & Health Program Requirements for Demolition Operations - American National Standard for Construction and Demolition Operations

ASTM INTERNATIONAL (ASTM)

ASTM D2487	(2017; E 2020) Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)

OREGON ADMINISTRATIVE RULES (OAR)

OAR 340-208-0210	(2019) Requirements for Fugitive Emissions

OREGON REVISED STATUTES (ORS)

ORS 196.800-990	(2024)Oregon Removal-Fill Law
ORS 390.805-925	(2024) Oregon Removal and Filling in Scenic Waterways Law

OREGON DEPARTMENT OF TRANSPORTATION (ODOT)

ODOT SSC	(2024) Oregon Standard Specifications for Construction

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2024) Safety -- Safety and Occupational Health (SOH) Requirements

U.S. FEDERAL AVIATION ADMINISTRATION (FAA)

FAA AC 70/7460-1	(2016; Rev L; Change 2) Obstruction Marking and Lighting

U.S. FISH & WILDLIFE SERVICE

16 USC 703-712	Migratory Bird Treaty Act
33 USC 403	Federal Rivers and Harbors Act of 1899, Section 10
33 USC 1344	Clean Water Act Section 404

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

40 CFR 61	National Emission Standards for Hazardous Air Pollutants

1.2 PROJECT DESCRIPTION

1.2.1 Definitions

1.2.1.1 Demolition

Demolition is the process of tearing apart and removing any feature of a facility together with any related handling and disposal operations.

1.2.1.2 Deconstruction

Deconstruction is the process of taking apart a facility with the primary goal of preserving the value of all useful building materials.

1.2.1.3 Demolition and Deconstruction Plan

Demolition and Deconstruction Plan is the planned steps and processes for managing demolition and deconstruction activities and identifying the required sequencing activities, disposal and recycling mechanisms.

1.2.1.4 Pre-Deconstruction Walkthrough

Pre-Deconstruction Walkthrough is an on-site meeting between the Contractor and the Engineer with the purpose of identifying and reviewing the components to be removed and those to remain.

1.2.2 Demolition/Deconstruction Plan

Prepare a Demolition and Deconstruction Plan and submit proposed demolition, deconstruction, and removal procedures for approval before work is started. Include in the plan procedures for careful removal and disposition of materials, coordination with other work in progress, a disconnection schedule of utility services, a detailed description of methods and equipment to be used for each operation and of the sequence of operations. Perform a Pre-Deconstruction Walkthrough in conjunction with

the preparation of the Demolition and Deconstruction Plan. Provide procedures for safe conduct of the work in accordance with EM 385-1-1. Plan must be approved by Contracting Officer (CO) prior to work beginning. Non friable asbestos is expected to be encountered at the project site and is to be removed. Lead based paint is expected to be encountered at the project site and is to be handled in accordance with Section 02 83 00.00 99 LEAD REMEDIATION.

1.2.3 General Requirements

Do not begin demolition or deconstruction until authorization is received from the CO. Remove rubbish and debris from the project site; do not allow accumulations. The work includes demolition and deconstruction, and removal of resulting rubbish and debris. Store materials that cannot be removed daily in areas specified by the CO. In the interest of occupational safety and health, perform the work in accordance with EM 385-1-1, Section 23, Demolition, and other applicable Sections.

1.3 ITEMS TO REMAIN IN PLACE

Comply with FAR 52.236-9 to protect existing vegetation, structures, equipment, utilities, and improvements. Coordinate the work of this section with all other work indicated. Construct and maintain shoring, bracing, and supports as required. Ensure that structural elements are not overloaded. Increase structural supports or add new supports as may be required as a result of any cutting, removal, deconstruction, or demolition work performed under this Contract. Do not overload structural elements or pavements to remain. Provide new supports and reinforcement for existing construction weakened by demolition, deconstruction, or removal work. Repairs, reinforcement, or structural replacement require approval by the CO prior to performing such work. The existing Rack is to remain in place for historical purposes. The Contractor will confirm items to remain prior to commencing work with the CO.

1.3.1 Existing Construction Limits and Protection

Do not disturb existing construction beyond the extent indicated or necessary for installation of new construction. Provide temporary shoring and bracing for support of building components to prevent settlement or other movement. Provide protective measures to control accumulation and migration of dust and dirt in all work areas. Remove snow, dust, dirt, and debris from work areas daily.

1.3.2 Weather Protection

For portions of the roadway to remain, protect exposed materials and equipment from the weather at all times.

1.3.3 Trees

Protect trees within the project site which might be damaged during demolition or deconstruction, and which are indicated to be left in place, by a 6 foot high fence. Erect and secure fence a minimum of 5 feet from the trunk of individual trees or follow the outer perimeter of branches or clumps of trees. Replace any tree designated to remain that is damaged during the work under this Contract with like-kind or as approved by the CO.

1.3.4 Utility Service

Maintain existing utilities indicated to stay in service and protect against damage during demolition and deconstruction operations. The water line on the old bridge will need to remain operational until the new bridge's utility lines are ready to be switched on. The utility provider will disconnect and seal utilities serving each area of alteration or removal upon written request from the Contractor.

1.3.5 Facilities

Protect electrical and mechanical services and utilities. Where removal of existing utilities and pavement is specified or indicated, provide approved barricades, temporary covering of exposed areas, and temporary services or connections for electrical and mechanical utilities. Walls, columns, pilasters, and other structural components that are designed and constructed to stand without lateral support or shoring, and are determined to be in stable condition, must remain standing without additional bracing, shoring, or lateral support until demolished or deconstructed, unless directed otherwise by the CO. Ensure that no elements determined to be unstable are left unsupported and place and secure bracing, shoring, or lateral supports as may be required as a result of any cutting, removal, deconstruction, or demolition work performed under this Contract.

1.3.6 Protection of Waters of the U.S. or State

a. Comply with and require that all the Contractor's employees, agents, and Subcontractors on the Project Site comply with the following:

(1) Clean Water Act Section 404 (33 USC 1344); Federal Rivers and Harbors Act of 1899, Section 10 (33 USC 403 et seq.).

(2) ORS 196.800-990 (Oregon Removal-Fill law).

(3) ORS 390.805-925 (Oregon Removal and Filling in Scenic Waterways law).

(4) All other applicable Laws governing preservation of Wetland resources.

(5) Water from the existing DW Pipe to be demolished cannot be drained back into the river. The water must be drained into the Stormwater Swale.

b. Willful violation of permit conditions and applicable laws exposes the offending Contractor and other violators to criminal and civil sanctions. Civil sanctions include, but are not limited to, the offender's sole liability for all costs associated with site restoration, maintenance and additional mitigation Work required by federal or State authorities.

1.3.6.1 Identifying Waters of the U.S. or State, Including Wetlands

Wetlands known to be on the Project Site will be shown and identified either as "permanently filled or excavated" or as "temporarily impacted". Wetlands to be protected will be shown as "no work zones".

1.3.6.2 Disturbing Waters of the U.S or State, Including Wetlands

a. If Wetlands are shown, meet with the Agency Wetland Specialist, the Engineer, and Inspector on-site prior to moving Equipment onto the site or beginning any Work, to ensure that all parties understand the locations of Wetlands and the measures that must be taken to protect them.

b. Ensure protection of no work zones as follows:

(1) Fence off no work zones using work zone fencing from section 00221.13 of the QPL.

(2) Except as authorized by the Engineer for the purpose of installing or maintaining approved Wetland protective measures, keep all persons, Equipment and materials off no work zones.

(3) The Engineer has the authority to bar from the Project any person entering a protected site other than for the purpose of installing or maintaining protective measures.

c. Install all site protection for Wetlands required by the Plans and Special Provisions prior to staging Equipment or starting Work near the sites.

d. The Engineer may suspend Work until the Contractor, Engineer, Agency Wetland Specialist, and other required federal and State personnel, if any, meet to determine damage to the site and the nature and scope of necessary site restoration and maintenance. The Engineer may require the Contractor to submit a written plan for protection of other sites for the duration of the Project before Work resumes.

1.4 BURNING

The use of burning at the project site for the disposal of refuse and debris will not be permitted.

1.5 AVAILABILITY OF WORK AREAS

Areas in which the work is to be accomplished will be available at Contract award.

1.6 SUBMITTALS

Government approval is required for submittals with a "G" classification. Submittals not having a "G" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Demolition and Deconstruction Plan; G

Existing Conditions; G

Items To Remain In Place; G

SD-07 Certificates

Notification Of Demolition; G

1.7 QUALITY ASSURANCE

Submit timely notification of demolition and deconstruction projects to Federal, State, regional, and local authorities in accordance with 40 CFR 61, Subpart M. Notify the Regional Office of the United States Environmental Protection Agency (USEPA), the State's environmental protection agency, as necessary, and the CO in writing 10 working days prior to the commencement of work in accordance with 40 CFR 61, Subpart M. Comply with federal, state, and local hauling and disposal regulations. In addition to the requirements of the "Contract Clauses," conform to the safety requirements contained in ASSP A10.6. Comply with the Environmental Protection Agency requirements specified. Use of explosives will not be permitted.

1.7.1 Dust and Debris Control

Prevent the spread of dust and debris and avoid the creation of a nuisance or hazard in the surrounding area. Do not use water if it results in hazardous or objectionable conditions such as, but not limited to, ice, flooding, or pollution. Comply with Oregon Administrative Rules OAR 340-208-0210 pertaining to the control of fugitive dust.

1.8 PROTECTION

1.8.1 Traffic Control Signs

a. Where pedestrian and driver safety is endangered in the area of removal work, use traffic barricades with flashing lights. Anchor barricades in a manner to prevent displacement by wind. Notify the CO prior to beginning such work.

b. Provide a minimum of 2 FAA type L-810 steady burning red obstruction lights on temporary structures (including cranes) over 100 feet, but less than 200 ft, above ground level. The use of LED based obstruction lights are not permitted. For temporary structures (including cranes) over 200 ft above ground level provide obstruction lighting in accordance with FAA AC 70/7460-1. Perform light construction and installation in compliance with FAA AC 70/7460-1. Lights must be operational during periods of reduced visibility, darkness, and as directed by the CO. Maintain the temporary services during the period of construction and remove only after permanent services have been installed and tested and are in operation.

c. Provide in accordance with ODOT SSC Sections 00221 and 00222.

1.8.2 Protection of Personnel

Before, during and after the demolition and deconstruction work continuously evaluate the condition of the bridge being demolished and deconstructed and take immediate action to protect all personnel working in and around the project site. No area, section, or component of the bridge will be allowed to be left standing without sufficient bracing, shoring, or lateral support to prevent collapse or failure while workmen remove debris or perform other work in the immediate area.

1.8.3 Protection of Fish and Fish Habitat

Comply with the Laws of the Oregon Department of Fish and Wildlife, National Marine Fisheries Service, and U.S. Fish and Wildlife Service, and the rules and practices developed through the Oregon Plan for Salmon and Watersheds. Conduct operations to avoid any hazards to the safety and propagation of fish and shellfish in waters of the State and U.S.

1.8.3.1 Regulated Work Areas

Perform Work within regulated work areas only within the regulated in-water work periods. Do not allow Equipment to enter any waters of the State or U.S. or the regulated work area except as allowed in permits issued for the Project. The regulated work area, if any, will be identified in the Special Provisions.

1.8.3.2 Prohibited Operations

Except where allowed by the Contract or by permit, do not:

a. Blast underwater

b. Use water jetting

c. Release petroleum products or chemicals in the water

d. Disturb spawning beds

e. Obstruct stream channels

f. Cause silting or sedimentation of waters of the State or waters of the U.S

g. Use treated timbers within the regulated work area

h. Impede adult and juvenile fish passage, including intermittent streams

i. Allow equipment, debris, and contaminants to enter the waterway. Contraminants includes, but are not limited to; fluids, tools, parts, and materials to be disposed of

1.8.4 Protection of Wildlife and Wildlife Habitat

Comply with the Laws of the Oregon Department of Fish and Wildlife and U.S. Fish and Wildlife Service. Conduct operations to avoid any hazards to the safety and propagation of wildlife.

1.8.4.1 Migratory Birds

a. Comply with the Migratory Bird Treaty Act (16 USC 703-712) which protects most species of birds in Oregon and prohibits the removal of nests containing eggs or dependent young (i.e., active nest) without a permit. Migratory birds include most birds in Oregon; the few exceptions include rock pigeons, house sparrows, and European starlings.

b. Except where allowed by the Contract and by permit, do not disturb an active migratory bird nest, do not inhibit the ability of adult birds to care for eggs or dependent young, and do not impact the

supporting structure on which an active nest is built.

c. If active migratory bird nests are encountered stop all actions that may disrupt the nest and its occupants (including visual and auditory impacts) and contact the Engineer. Do not resume Work that may disrupt nesting until approved by the Engineer.

1.8.4.2 Bats

a. If bats are encountered, stop all actions in the area and contact the Engineer. Do not disturb bat colonies. In the event that a bat colony is encountered during construction, the Engineer may suspend Work. Do not resume Work until approved by the Engineer.

b. Protect bats by doing the following:

(1) Prevent destruction of bat colonies as shown.

(2) If bats gain access to excluded areas, stop actions in the area and contact the Engineer. Do not resume Work until approved by the Engineer.

1.9 RELOCATIONS

Perform the removal and reinstallation of relocated items as indicated with workmen skilled in the trades involved. Repair or replace items to be relocated which are damaged by the Contractor with new undamaged items as approved by the CO.

1.10 EXISTING CONDITIONS

Before beginning any demolition or deconstruction work, survey the site and examine the drawings and specifications to determine the extent of the work. Record existing conditions in the presence of the CO or the Contracting Officer's Representative showing the condition of structures and other facilities adjacent to areas of alteration or removal. Photographs or electronic images with a minimum resolution of 3072 x 2304 pixels, capable of a print resolution of 300 dpi, will be acceptable as a record of existing conditions. Include in the record the elevation of the top of foundation walls, finish roadway elevations, possible conflicting electrical conduits, plumbing lines, alarms systems, the location and extent of existing cracks and other damage and description of surface conditions that exist prior to starting work. It is the Contractor's responsibility to verify and document all required outages which will be required during the course of work, and to note these outages on the record document. Submit survey results to the CO or the Contracting Officer's Representative.

PART 2 PRODUCTS

2.1 FILL MATERIAL

a. Comply with excavating, backfilling, and compacting procedures for soils used as backfill material to fill basements, voids, depressions or excavations resulting from demolition or deconstruction of structures.

b. Provide fill material conforming to the definition of satisfactory soil material as defined in ASTM D2487 and AASHTO M 145, Soil

Classification Groups A-1, A-2-4, A-2-5 and A-3. In addition, fill material must be free from roots and other organic matter, trash, debris, frozen materials, and stones larger than 2 inches in any dimension.

c. Proposed fill material must be sampled and tested by an approved soil testing laboratory, as follows:

Soil classification	AASHTO M 145
Moisture-density relations	AASHTO T 180, Method B or D

PART 3 EXECUTION

3.1 EXISTING FACILITIES TO BE REMOVED

Inspect and evaluate existing structures onsite for reuse. Disassemble existing construction scheduled to be removed for reuse. Dismantled and removed materials are to be separated, set aside, and prepared as specified, and stored or delivered to a collection point for reuse, remanufacture, recycling, or other disposal, as specified. Designate materials for reuse onsite whenever possible. No demolition or decontamination will begin until after the new bridge has been installed and all the necessary utilities have been reconnected and are functional across the new bridge.

3.1.1 Structures

a. Remove existing structures indicated to be removed. Remove sidewalks, curbs, gutters and street light bases as indicated.

b. Demolish and deconstruct structures in a systematic manner from the top of the structure to the ground. Complete demolition work above each tier or floor before the supporting members on the lower level are disturbed. Demolish concrete and masonry walls in small sections. Remove structural framing members and lower to ground by means of derricks, platforms hoists, or other suitable methods as approved by the CO.

c. Locate demolition and deconstruction equipment throughout the structure and remove materials so as to not impose excessive loads to supporting walls, floors, or framing.

3.1.2 Utilities and Related Equipment

3.1.2.1 General Requirements

Do not interrupt existing utilities serving occupied or used facilities, except when authorized in writing by the CO. Do not interrupt existing utilities serving facilities occupied and used by the Government except when approved in writing and then only after temporary utility services have been approved and provided. Do not begin demolition or deconstruction work until all utility disconnections have been made. Shut off and cap utilities for future use, as indicated.

3.1.2.2 Disconnecting Existing Utilities

Remove existing utilities, as indicated and terminate in a manner

conforming to the nationally recognized code covering the specific utility and approved by the CO. When utility lines are encountered but are not indicated on the drawings, notify the CO prior to further work in that area. Remove meters and related equipment and deliver to a location in accordance with instructions of the CO.

3.1.3 Chain Link Fencing

Remove chain link fencing, gates and other related items scheduled for removal and transport to designated areas. Remove gates as whole units. Cut chain link fabric to 25 foot lengths and store in rolls off the ground.

3.1.4 Paving and Slabs

Remove sawcut concrete and asphaltic concrete paving and slabs including aggregate base as indicated. Provide neat sawcuts at limits of pavement removal as indicated. Move, grind and store pavement and slabs designated to be recycled and utilized in this project as directed by the CO. Remove pavement and slabs not to be used in this project from the project site at Contractor's expense.

3.1.5 Masonry

Sawcut and remove masonry so as to prevent damage to surfaces to remain. Where new masonry adjoins existing, abut or tie the new work into the existing construction as indicated. Provide square, straight edges and corners where existing masonry adjoins new work and other locations. Masonry removed in pieces can be crushed and used as aggregate if it does not contain regulated materials (i.e. asbestos).

3.1.6 Concrete

Saw concrete along straight lines to a depth of a minimum 2 inch. Make each cut in walls perpendicular to the face and in alignment with the cut in the opposite face. Break out the remainder of the concrete provided that the broken area is concealed in the finished work, and the remaining concrete is sound. At locations where the broken face cannot be concealed, grind smooth or saw cut entirely through the concrete. Sawcuts in existing concrete pads must be at the nearest existing expansion joint or weakened plane joint and at full depth.

3.1.7 Structural Steel

Dismantle structural steel at field connections and in a manner that will prevent bending or damage. Salvage for recycle structural steel, steel joists, girders, angles, plates, columns and shapes. Do not use flame-cutting torches unless paints have been removed from the affected steel to be cut following Section 02 83 00.00 99 LEAD REMEDIATION. Transport steel joists and girders as whole units and not dismantled. Transport structural steel shapes to a designated recycling facility, stacked according to size, type of member and length, and stored off the ground, protected from the weather.

3.1.8 Miscellaneous Metal

Salvage shop-fabricated items such as access doors and frames, steel gratings, metal ladders, wire mesh partitions, metal railings, metal windows and similar items as whole units. Salvage light-gage and cold-formed metal framing, such as steel studs, steel trusses, metal

gutters, roofing and siding, metal toilet partitions, toilet accessories and similar items. Scrap metal is the Contractor's property. Recycle scrap metal as part of demolition and deconstruction operations. Provide separate containers to collect scrap metal and transport to a scrap metal collection or recycling facility, in accordance with the Waste Management Plan.

3.1.9 Carpentry

Salvage for recycle lumber, millwork items, and finished boards, and sort by type and size.

3.1.10 Mechanical Equipment and Fixtures

Disconnect mechanical equipment and fixtures at fittings. Remove service valves attached to the unit. Salvage each item of equipment and fixtures as a whole unit; listed, indexed, tagged, and stored. Salvage each unit with its normal operating auxiliary equipment. Transport salvaged equipment and fixtures, including motors and machines, to a designated storage area as directed by the CO. Do not remove equipment until approved. Do not offer low-efficiency equipment for reuse; provide to recycling service for disassembly and recycling of parts.

3.1.10.1 Preparation for Storage

Remove water, dirt, dust, and foreign matter from units; drain tanks, piping and fixtures; if previously used to store flammable, explosive, or other dangerous liquids, steam clean interiors. Seal openings with caps, plates, or plugs. Secure motors attached by flexible connections to the unit.

3.1.10.2 Piping

Disconnect piping at unions, flanges and valves, and fittings as required to reduce the pipe into straight lengths for practical storage and minimize potential contaminants created over the waterway. Store salvaged piping according to size and type. If the piping that remains can become pressurized due to upstream valve failure, attach end caps, blind flanges, or other types of plugs or fittings with a pressure gage and bleed valve to the open end of the pipe to ensure positive leak control. Carefully dismantle piping that previously contained gas, gasoline, oil, or other dangerous fluids, with precautions taken to prevent injury to persons and property. Store piping outdoors until all fumes and residues are removed. Box prefabricated supports, hangers, plates, valves, and specialty items according to size and type. Classify piping not designated for salvage, or not reusable, as scrap metal.

3.1.10.3 Fixtures, Motors and Machines

Remove and salvage fixtures, motors and machines associated with plumbing, heating, air conditioning, refrigeration, and other mechanical system installations. Salvage, box and store auxiliary units and accessories with the main motor and machines. Tag salvaged items for identification, storage, and protection from damage. Classify broken, damaged, or otherwise unserviceable units and not caused to be broken, damaged, or otherwise unserviceable as debris to be disposed of by the Contractor.

3.1.11 Electrical Equipment and Fixtures

Salvage motors, motor controllers, and operating and control equipment that are attached to the driven equipment. Salvage wiring systems and components. Box loose items and tag for identification. Disconnect primary, secondary, control, communication, and signal circuits at the point of attachment to their distribution system.

3.1.11.1 Fixtures

Remove and salvage electrical fixtures. Salvage unprotected glassware from the fixture and salvage separately. Salvage incandescent, mercury-vapor, and fluorescent lamps and fluorescent ballasts manufactured prior to 1978, boxed and tagged for identification, and protected from breakage.

3.1.11.2 Electrical Devices

Remove and salvage switches, switchgear, transformers, conductors including wire and nonmetallic sheathed and flexible armored cable, regulators, meters, instruments, plates, circuit breakers, panelboards, outlet boxes, and similar items. Box and tag these items for identification according to type and size.

3.1.11.3 Wiring Ducts or Troughs

Remove and salvage wiring ducts or troughs. Dismantle plug-in ducts and wiring troughs into unit lengths. Remove plug-in or disconnecting devices from the busway and store separately.

3.1.11.4 Conduit and Miscellaneous Items

Salvage conduit except where embedded in concrete or masonry. Consider corroded, bent, or damaged conduit as scrap metal. Sort straight and undamaged lengths of conduit according to size and type. Classify supports, knobs, tubes, cleats, and straps as debris to be removed and disposed.

3.2 CONCURRENT EARTH-MOVING OPERATIONS

Do not begin excavation, filling, and other earth-moving operations that are sequential to demolition or deconstruction work in areas occupied by structures to be demolished or deconstructed until all demolition and deconstruction in the area has been completed and debris removed. Fill holes, open basements and other hazardous openings.

3.3 DISPOSITION OF MATERIAL

3.3.1 Title to Materials

Except for salvaged items specified in related Sections, and for materials or equipment scheduled for salvage, all materials and equipment removed and not reused or salvaged, become the property of the Contractor and must be removed from Government property. Materials approved for storage by the CO must be removed before completion of the Contract. Title to materials resulting from demolition and deconstruction, and materials and equipment to be removed, is vested in the Contractor upon approval by the CO. The Government will not be responsible for the condition or loss of, or damage to, such property after Contract award. Showing for sale or selling materials and equipment on site is prohibited.

3.3.2 Reuse of Materials and Equipment

Remove and store materials and equipment listed in the Demolition and Deconstruction Plan to be reused or relocated to prevent damage, and reinstall as the work progresses. Capture re-use of materials in the diversion calculations for the project.

3.3.3 Salvaged Materials and Equipment

Remove materials and equipment that are listed in the Demolition and Deconstruction Plan and specified to be removed by the Contractor and that are to remain the property of the Government, and deliver to a storage site.

a. Salvage items and material to the maximum extent possible.

b. Store all materials salvaged for the Contractor as approved by the CO and remove from Government property before completion of the Contract. Capture salvaged materials in the diversion calculations for the project.

c. Remove salvaged items to remain the property of the Government in a manner to prevent damage, and packed or crated to protect the items from damage while in storage or during shipment. Items damaged during removal or storage must be repaired or replaced to match existing items. Properly identify the contents of containers.

d. Remove historical items in a manner to prevent damage. Deliver the following historical items to the Government for disposition: Corner stones, contents of corner stones, and document boxes wherever located on the site.

3.3.4 Disposal of Ozone Depleting Substance (ODS)

3.3.4.1 Fire Suppression

Protect existing fire hydrants as indicated.

3.3.5 Unsalvageable and Non-Recyclable Material

Dispose of unsalvageable and non-recyclable noncombustible material at an approved landfill or waste disposal facility following applicable rules an regulations. Refer to Sections 01 57 19.00 25 TEMPORARY ENVIRONMENTAL CONTROLS and 02 81 00.00 99 TRANSPORTATION AND DISPOSAL OF HAZARDOUS MATERIALS.

3.4 CLEANUP

Remove debris and rubbish from project site and similar excavations. Remove and transport the debris in a manner that prevents spillage on streets or adjacent areas. Apply local regulations regarding hauling and disposal.

3.5 DISPOSAL OF REMOVED MATERIALS

3.5.1 Regulation of Removed Materials

Dispose of debris, rubbish, scrap, and other nonsalvageable materials resulting from removal operations with all applicable federal, state and

local regulations as contractually specified in the Waste Management Plan.

3.5.2 Burning on Government Property

Burning of materials removed from demolished and deconstructed structures will not be permitted on Government property.

3.5.3 Removal to Spoil Areas on Government Property

Transport noncombustible materials removed from demolition and deconstruction structures to designated spoil areas on Government property.

3.5.4 Removal from Government Property

Transport waste materials removed from demolished and deconstructed structures, except waste soil, from Government property for legal disposal. Dispose of waste soil per Section 01 57 19.00 25TEMPORARY ENVIRONMENTAL CONTROLS.

3.6 REUSE OF SALVAGED ITEMS

Recondition salvaged materials and equipment designated for reuse before installation. Replace items damaged during removal and salvage operations or restore them as necessary to usable condition.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 02 - EXISTING CONDITIONS

SECTION 02 81 00.00 99

TRANSPORTATION AND DISPOSAL OF HAZARDOUS MATERIALS

PART 1 GENERAL

1.1 REFERENCES
1.2 DEFINITIONS
1.2.1 Hazardous Material
1.2.2 Hazardous Waste
1.3 SUBMITTALS
1.4 QUALITY ASSURANCE
1.4.1 Transportation and Disposal Coordinator
1.4.2 Training
1.4.3 Certification
1.4.4 Laws and Regulations Requirements

PART 2 PRODUCTS

2.1 MATERIALS
2.1.1 Packagings
2.1.2 Markings
2.1.3 Labeling
2.1.4 Placards
2.1.5 Spill Response Materials
2.2 EQUIPMENT AND TOOLS

PART 3 EXECUTION

3.1 HAZARDOUS WASTE MANAGEMENT PLAN
3.2 ONSITE HAZARDOUS WASTE MANAGEMENT
3.2.1 Hazardous Waste Classification
3.3 OFFSITE HAZARDOUS WASTE MANAGEMENT
3.3.1 Treatment, Storage, and Disposal Facility and Transporter
3.3.2 Facility Status Information
3.3.3 Shipping Documents and Packagings Certification
3.3.4 Transportation
3.3.5 Treatment and Disposal of Hazardous Wastes
3.4 RADIOACTIVE MATERIALS MANAGEMENT
3.4.1 Identification of Proper Shipping Names
3.4.2 Packaging, Labeling, and Marking
3.4.3 Shipping Documents
3.4.3.1 PCB Waste Shipment Documents
3.4.3.2 Other Hazardous Material Shipment Documents
3.5 WASTE MINIMIZATION
3.6 RECORDKEEPING
3.7 SPILL RESPONSE
3.8 EMERGENCY CONTACTS

-- End of Section Table of Contents --

SECTION 02 81 00.00 99

TRANSPORTATION AND DISPOSAL OF HAZARDOUS MATERIALS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

INTERNATIONAL AIR TRANSPORT ASSOCIATION (IATA)

IATA DGR	(2018) Dangerous Goods Regulations

U.S. ARMY CORPS OF ENGINEERS (USACE)

EP 415-1-266	(2000) Construction -- Resident Engineer Management Guide (REMG) for Hazardous, Toxic, and Radioactive Waste (HTRW) Projects

U.S. DEPARTMENT OF TRANSPORTATION (DOT)

DOT 4500.9R	Defense Transportation Regulation, Part 2, Cargo Movement, Chapter 204, Hazardous Material

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

40 CFR 261	Identification and Listing of Hazardous Waste
40 CFR 262	Standards Applicable to Generators of Hazardous Waste
40 CFR 263	Standards Applicable to Transporters of Hazardous Waste
40 CFR 264	Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 265	Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 266	Standards for the Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities
40 CFR 268	Land Disposal Restrictions
40 CFR 270	EPA Administered Permit Programs: The Hazardous Waste Permit Program

40 CFR 279	Standards for the Management of Used Oil
40 CFR 300	National Oil and Hazardous Substances Pollution Contingency Plan
40 CFR 302	Designation, Reportable Quantities, and Notification
40 CFR 761	Polychlorinated Biphenyls (PCBs) Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions
49 CFR 107	Hazardous Materials Program Procedures
49 CFR 172	Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements
49 CFR 173	Shippers - General Requirements for Shipments and Packagings
49 CFR 178	Specifications for Packagings

1.2 DEFINITIONS

1.2.1 Hazardous Material

A substance or material which has been determined by the Secretary of Transportation to be capable of posing an unreasonable risk to health, safety, and property when transported in commerce, and which has been so designated pursuant to the Hazardous Materials Transportation Act, 49 U.S.C. Appendix Section 1801 et seq. The term includes materials designated as hazardous materials under the provisions of 49 CFR 172, Sections .101 and .102 and materials which meet the defining criteria for hazard classes and divisions in 49 CFR 173. EPA designated hazardous wastes are also hazardous materials.

1.2.2 Hazardous Waste

A waste which meets criteria established in RCRA or specified by the EPA in 40 CFR 261 or which has been designated as hazardous by a RCRA authorized state program.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" classification. Submittals not having a "G" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Packaging Notifications

Hazardous Waste Management Plan; G

Onsite Hazardous Waste Management; G

Notices of Non-Compliance and Notices of Violation

SD-06 Test Reports

Recordkeeping; G

Exception Report; G

Spill Response

SD-07 Certificates

Transportation and Disposal Coordinator; G

Training; G

Certification

Shipping Documents and Packagings Certification; G

Security Plan

Certificates of Disposal

Waste Minimization

1.4 QUALITY ASSURANCE

1.4.1 Transportation and Disposal Coordinator

Designate, by position and title, one person to act as the Transportation and Disposal Coordinator (TDC) for this Contract. The TDC must serve as the single point of contact for all environmental regulatory matters and have overall responsibility for total environmental compliance at the site including, but not limited to, accurate identification and classification of hazardous waste and hazardous materials; determination of proper shipping names; identification of marking, labeling, packaging and placarding requirements; completion of waste profiles, hazardous waste manifests, PCB manifests, bill of ladings, exception and discrepancy reports; and all other environmental documentation. The TDC must have, at a minimum, one year of specialized experience in the management and transportation of hazardous waste and have been Department of Transportation certified under 49 CFR 172, Subpart H.

1.4.2 Training

Hazardous materials employees must be trained, tested, and certified to safely and effectively carry out their assigned duties. Employees transporting hazardous materials or preparing hazardous materials for transportation, including samples, must be trained, tested, and certified in accordance with 49 CFR 172, Subpart H, including security awareness and any applicable security plans. Hazardous material employees must also be trained in accordance with IATA DGR when shipping hazardous materials by air. Employees must be trained, tested, and certified in accordance with 49 CFR 172, Subpart H to determine that shipments do not constitute DOT regulated hazardous materials.

1.4.3 Certification

The hazardous materials transporter must possess a current certificate of registration issued by the Research and Special Programs Administration (RSPA), U.S. Department of Transportation, when required by 49 CFR 107, Subpart G. Submit copies of the certificates or written statements certifying exemption from these requirements.

1.4.4 Laws and Regulations Requirements

Comply with Federal, state, and local laws and regulations which are applicable. These requirements are amended frequently and compliance with amendments is required as they become effective. Notify the Contracting Officer (CO) immediately if compliance exceeds the scope of work or conflicts with specific requirements of the Contract.

PART 2 PRODUCTS

2.1 MATERIALS

Provide all the materials required for the packaging, labeling, marking, placarding and transportation of hazardous wastes and hazardous materials in conformance with Department of Transportation standards IATA DGR, and EP 415-1-266. Details in this specification must not be construed as establishing the limits of the Contractor's responsibility.

2.1.1 Packagings

Provide bulk and non-bulk containers for packaging hazardous materials/wastes consistent with the authorizations referenced in the Hazardous Materials Table in 49 CFR 172, Section.101, Column 8. Bulk and non-bulk packaging must meet the corresponding specifications in 49 CFR 173 referenced in the Hazardous Materials Table, 49 CFR 172, Section .101. Packaging must conform to the general packaging requirements of Subpart B of 49 CFR 173, to the requirements of 49 CFR 178 at the specified packing group performance level, to the requirements of special provisions of column 7 of the Hazardous Materials Table in 49 CFR 172, Section .101, and be compatible with the material to be packaged as required by 40 CFR 262. Also provide other packaging related materials such as materials used to cushion or fill voids in overpacked containers. The hazardous materials being packaged must not react dangerously with, decompose or ignite the sorbent packaging materials. Additionally, sorbents used to treat free liquids to be disposed of in landfills must be non-biodegradable as specified in 40 CFR 264, Section .314. In addition, packaging notifications will be provided to the Government in accordance with 49 CFR 172, Section .178.2(c) regarding type and dimensions of closures, including gaskets, needed to satisfy performance test requirements.

2.1.2 Markings

Provide markings for each hazardous material/waste package, freight container, and transport vehicle consistent with the requirements of 49 CFR 172, Subpart D, 40 CFR 262, Section .32 (for hazardous waste), 40 CFR 761, Section .45 (for PCBs), and EP 415-1-266 (for FUSRAP radionuclides). Markings must withstands 180 day exposure to conditions reasonably expected to be encountered during container storage and transportation, without deterioration or substantial color change.

2.1.3 Labeling

Provide primary and subsidiary labels for hazardous materials/wastes consistent with the requirements in the Hazardous Materials Table in 49 CFR 172, Section .101, Column 6. Labels must meet design specifications required by 49 CFR 172, Subpart E including size, shape, color, printing, and symbol requirements. Labels must be durable weather resistant and withstanding a 180 day exposure to conditions reasonably expected to be encountered during container storage and transportation, without deterioration or substantial color change.

2.1.4 Placards

For each offsite shipment of hazardous material/waste, provide primary and subsidiary placards consistent with the requirements of 49 CFR 172, Subpart F. Provide placards for each side and each end of bulk packaging, freight containers, transport vehicles, and rail cars requiring such placarding. Placards may be plastic, metal, or other material capable of withstanding, without deterioration, a 30 day exposure to open weather conditions and must meet design requirements specified in 49 CFR 172, Subpart F.

2.1.5 Spill Response Materials

Provide spill response materials including, but not limited to, containers, adsorbent, shovels, and personal protective equipment. Spill response materials must be available at all times when hazardous materials/wastes are being handled or transported. Spill response materials must be compatible with the type of material being handled.

2.2 EQUIPMENT AND TOOLS

Provide miscellaneous equipment and tools necessary to handle hazardous materials and hazardous wastes in a safe and environmentally sound manner.

PART 3 EXECUTION

3.1 HAZARDOUS WASTE MANAGEMENT PLAN

Prepare a Hazardous Waste Management Plan detailing the manner in which hazardous wastes will be managed and describing the types and volumes of hazardous wastes anticipated to be managed. The plan must address both onsite and offsite hazardous waste management. Describe the methods to be used to ensure accurate piece counts or weights of shipments; describe waste minimization methods; identify and describe facilities to be used for treatment, storage, and disposal (TSD); identify areas onsite where hazardous wastes are to be handled; and identify whether transfer facilities are to be used; and if so, how the wastes will be tracked to ultimate disposal. Submit the plan to the CO for approval prior to start of work. Submit written documentation of weekly hazardous waste inspections on a monthly basis.

3.2 ONSITE HAZARDOUS WASTE MANAGEMENT

Coordinate the onsite management of all hazardous materials and waste with the project environmental function and the CO. These paragraphs apply to Government owned waste only. The Contractor is responsible for ensuring compliance with Federal, State, and local hazardous waste laws and regulations and verifying those requirements when preparing reports, waste shipment records, hazardous waste manifests, or other documents. Identify

hazardous wastes using criteria set forth in 40 CFR 261 or applicable state and local laws, regulations, and ordinances. Comply with generator requirements in 40 CFR 262 and applicable State or local law or regulations when accumulating hazardous waste onsite. Onsite accumulation times must be restricted to applicable time frames referenced in 40 CFR 262, Section .34 and applicable state or local law or regulation. Accumulation start dates commence when waste container is transferred into a 90 day accumulation site or permitted storage facility. Only use containers in good condition and compatible with the waste to be stored. Ensure containers are closed except when adding or removing waste, and immediately mark all hazardous waste containers with the words "hazardous waste" and other information required by 40 CFR 262, Section .32 and applicable state or local law or regulation as soon as the waste is containerized. An additional marking must be placed on containers of "unknowns" designating the date sampled, and the suspected hazard. Inspect containers for signs of deterioration and for responding to any spills or leaks. Inspect all hazardous waste areas weekly and provide written documentation of the inspection. Include date and time of inspection, name of individual conducting the inspection, problems noted, and corrective actions taken on the inspection logs.

3.2.1 Hazardous Waste Classification

Identify, in consultation with the CO, all waste codes applicable to each hazardous waste stream based on requirements in 40 CFR 261 or applicable state or local law or regulation. Also identify applicable treatment standards in 40 CFR 268 and state land disposal restrictions and make a determination as to whether or not the waste meets or exceeds the standards. Submit waste profiles, analyses, classification and treatment standards information to CO for review and approval.

3.3 OFFSITE HAZARDOUS WASTE MANAGEMENT

Coordinate the off site transfer of all hazardous materials and waste with the project environmental function and the CO. Use RCRA Subtitle C permitted facilities which meet the requirements of 40 CFR 264 or facilities operating under interim status which meet the requirements of 40 CFR 265. Do not use offsite treatment, storage, and disposal facilities with significant RCRA violations or compliance problems (such as facilities known to be releasing hazardous constituents into ground water, surface water, soil, or air). Submit Notices of Non-Compliance and Notices of Violation by a Federal, state, or local regulatory agency issued to the Contractor in relation to any work performed under this Contract. Immediately provide copies of such notices to the CO. Also furnish relevant documents regarding the incident and any information requested by the CO, and coordinate its response to the notice with the CO or the designated representative prior to submission to the notifying authority. Also furnish a copy to the CO of all documents submitted to the regulatory authority, including the final reply to the notice, and all other materials, until the matter is resolved.

3.3.1 Treatment, Storage, and Disposal Facility and Transporter

Provide the CO with EPA ID numbers, names, locations, and telephone numbers of TSD facilities and transporters. This information must be contained in the Hazardous Waste Management Plan and be approved by the CO prior to waste disposal.

3.3.2 Facility Status Information

Facilities receiving hazardous waste must be permitted in accordance with 40 CFR 270 or operating under interim status in accordance with 40 CFR 265 requirements, or permitted by a state authorized by the Environmental Protection Agency to administer the RCRA permit program. Additionally, prior to using a TSD Facility, contact the EPA Regional Offsite Coordinator specified in 40 CFR 300, Section .440, to determine the facility's status, and document all information necessary to satisfy the requirements of the EPA Offsite policy and submit this information to the CO in the Hazardous Waste Management Plan.

3.3.3 Shipping Documents and Packagings Certification

Prior to shipment of any hazardous material offsite and a minimum of 14 days prior to anticipated pickup, provide for review written certification to the CO that hazardous materials have been properly packaged, labeled, and marked in accordance with Department of Transportation and EPA requirements. Furnish designated disposal facility packaging assurances not later than 35 days after acceptance of the shipment. The Contractor's TDC must also provide written certification regarding waste minimization efforts documenting that efforts have been taken to reduce the volume and toxicity of waste to the degree economically practicable and that the method of treatment, storage, or disposal selected minimizes threats to human health and the environment.

3.3.4 Transportation

Prior to conducting hazardous materials activities, the Contractor responsible for pre-transportation activities must either certify to the Government that a Security Plan is in place which meets the requirements of 49 CFR 172, Subpart I or in the event that the types or amounts of hazardous materials are excluded from the security planning requirements, a written statement to that effect detailing the basis for the exception. Use manifests for transporting hazardous wastes as required by 40 CFR 263 orapplicable state or local law or regulation. Transportation must comply with all requirements in the Department of Transportation referenced regulations in the 49 CFR series. Prepare hazardous waste manifests for each shipment of hazardous waste shipped offsite. Complete manifests using instructions in 40 CFR 262, Subpart B and applicable state or local law or regulation. Submit manifests and waste profiles to CO for review and approval. Prepare land disposal restriction notifications as required by 40 CFR 268 or applicable state or local law or regulation for each shipment of hazardous waste. Submit notifications with the manifest to the CO for review and approval. In accordance with DOT 4500.9R, inspect motor vehicles used to transport hazardous materials in accordance the 49 CFR and DOT safety regulations and complete DD Form 626, Motor Vehicle Inspection.

3.3.5 Treatment and Disposal of Hazardous Wastes

Coordinate any off site shipments of hazardous materials or hazardous wastes with the project environmental function. Initial, or satellite hazardous waste accumulation is limited to 55 gallons (or 1 quart of acutely hazardous waste). Once a waste stream exceeds 55 gallons, it must be transferred to an on-site 90 day (180 day small quantity generator) accumulation area, or a permitted hazardous waste treatment, storage or disposal facility within three days. Ship hazardous wastes only to facilities which are properly permitted to accept the hazardous waste or operating under interim status. Ensure wastes are treated to meet land

disposal treatment standards in 40 CFR 268 prior to land disposal. Propose TSD facilities via submission of the Hazardous Waste Management Plan, subject to the approval of the CO. Submit Certificates of Disposal documenting the ultimate disposal, destruction or placement of hazardous wastes, CERCLA remediation waste, and polychlorinated biphenyls (PCBs), within 180 days of initial shipment. Receipt of these certificates will be required for final payment.

3.4 RADIOACTIVE MATERIALS MANAGEMENT

Consult with the CO, to evaluate, prior to shipment of any material offsite, whether the material is regulated as a hazardous waste in addition to being regulated as a radioactive material. Perform the evaluation to determine proper shipping descriptions, marking requirements, and other criteria, as described below.

3.4.1 Identification of Proper Shipping Names

Use 49 CFR 172, Section .101 to identify proper shipping names for each hazardous material (including hazardous wastes) to be shipped offsite. Submit proper shipping names to the CO in the form of draft shipping documents for review and approval.

3.4.2 Packaging, Labeling, and Marking

Package, label, and mark hazardous materials/wastes using the specified materials and in accordance with the referenced authorizations. Mark each container of hazardous waste of 110 gallons or less with the following:

> "HAZARDOUS WASTE - Federal Law Prohibits Improper Disposal. If found, contact the nearest police or public safety authority or the U.S. Environmental Protection Agency.
> Generator's name _____
> Manifest Document Number _____"

3.4.3 Shipping Documents

Ensure that each shipment of hazardous material sent offsite is accompanied by properly completed shipping documents. This includes shipments of samples that may potentially meet the definition of a Department of Transportation regulated hazardous material.

3.4.3.1 PCB Waste Shipment Documents

Prepare hazardous waste manifests for each shipment of PCB waste shipped offsite. Complete manifests using instructions in 40 CFR 761, Sections .207 and .208 and other applicable requirements. Submit documents to CO for review and approval.

3.4.3.2 Other Hazardous Material Shipment Documents

Prepare a bill of lading for each shipment of hazardous material which is not accompanied by a hazardous waste manifest which fulfills the shipping paper requirements. The bill of lading must satisfy the requirements of 49 CFR 172, Subpart C, and 40 CFR 279 if shipping used oil and applicable state or local law or regulation, and must be submitted to the CO for review and approval. For laboratory samples and treatability study samples, prepare bills of lading and other documentation as necessary to satisfy conditions of the sample exclusions in 40 CFR 261, Section .4(d)

and (e) and any applicable state or local law or regulation. Bill of ladings requiring shipper's certifications must be signed by the Contractor.

3.5 WASTE MINIMIZATION

Minimize the generation of hazardous waste to the maximum extent practicable and take all necessary precautions to avoid mixing clean and contaminated wastes. Identify and evaluate recycling and reclamation options as alternatives to land disposal. Requirements of 40 CFR 266 apply to: hazardous wastes recycled in a manner constituting disposal; hazardous waste burned for energy recovery; lead-acid battery recycling; and hazardous wastes with economically recoverable precious metals. Submit written certification that waste minimization efforts have been undertaken to reduce the volume and toxicity of waste to the degree economically practicable and that the method of treatment, storage, or disposal selected minimizes threats to human health and the environment.

3.6 RECORDKEEPING

Maintain adequate records to support information provided to the CO regarding exception reports, annual reports, and biennial reports; and maintain bill of ladings for a minimum of 375 days from the date of shipment or longer period required by applicable law or regulation or other provision of this Contract. Submit information necessary to file state annual or EPA biennial reports for hazardous waste transported, treated, stored, or disposed of under this Contract. Do not forward these data directly to the regulatory agency but to the CO at the specified time. Submit the information necessary for filing of the formal reports in the form and format required by the governing Federal or state regulatory agency. A cover letter must accompany the data to include the Contract number, Contractor name, and project location. In the events that a manifest copy documenting receipt of hazardous waste at the treatment storage and disposal facility is not received within 35 days of shipment initiation, or that a manifest copy documenting receipt of PCB waste at the designated facility is not received within 35 days of shipment initiation, prepare and submit an exception report to the CO within 37 days of shipment initiation.

3.7 SPILL RESPONSE

In the event of a spill or release of a hazardous substance (as designated in 40 CFR 302), or pollutant or contaminant, or oil (as governed by the Oil Pollution Act (OPA), 33 U.S.C. 2701 et seq.), notify the CO immediately. Direction from the CO concerning a spill or release is not considered a change under the Contract. If the spill exceeds a reporting threshold, follow the pre-established procedures for immediate reporting to the CO. Comply with applicable requirements of Federal, state, or local laws or regulations regarding any spill incident.

3.8 EMERGENCY CONTACTS

Comply with the emergency contact provisions in 49 CFR 172, Section .604. Whenever the Contractor ships hazardous materials, provide a 24 hr emergency response contact and phone number of a person knowledgeable about the hazardous materials being shipped and who has comprehensive emergency response and incident mitigation information for that material, or has immediate access to a person who possesses such knowledge and information. Monitor the phone on a 24 hour basis at all times when the hazardous materials are in transportation, including during storage incidental to

transportation. Ensure that information regarding this emergency contact and phone number are placed on all hazardous material shipping documents. Designate an emergency coordinator and post the following information at areas in which hazardous wastes are managed:

a. The name of the emergency coordinator.

b. Phone number through which the emergency coordinator can be contacted on a 24 hour basis.

c. The telephone number of the local fire department.

d. The location of fire extinguishers and spill control materials.

Attachment A SAMPLE OFF-SITE POLICY CERTIFICATION MEMO	
Project/Contract #:	
Waste Stream:	
Primary TSD Facility, EPA ID # and Location:	
Alter. TSD Facility, EPA ID # and Location:	
EPA Region	Contact
I	888-372-7341
II	212-673-4040
III	800-438-2474 or 215-814-5000
IV	800-241-1754 or 404-562-9900
V	312-353-2000
VI	800-887-6063 or 214-665-2210
VII	800-223-0425
VIII	800-424-8802
IX	415-947-8713
X	800-424-4372 or 206-553-4973
EPA representative contacted:	
EPA representative phone number:	
Date contacted:	
Comment:	
The above EPA representative was contacted on _____. As of that date the above sites were considered acceptable in accordance with the Off-Site Policy in 40 CFR 300.440.	
Date:	Signature:

Attachment A SAMPLE OFF-SITE POLICY CERTIFICATION MEMO
Phone number:

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 02 - EXISTING CONDITIONS

SECTION 02 82 00.00 25

ASBESTOS REMEDIATION

PART 1 GENERAL

1.1 REFERENCES
1.2 DEFINITIONS
1.2.1 Amended Water
1.2.2 Area Sampling
1.2.3 Asbestos
1.2.4 Asbestos Containing Material (ACM)
1.2.5 Asbestos Control Area
1.2.6 Asbestos Fibers
1.2.7 Asbestos Permissible Exposure Limit
1.2.8 Authorized Person
1.2.9 Background
1.2.10 Competent Person (CP)
1.2.11 Contractor
1.2.12 Disposal Bag
1.2.13 Disturbance
1.2.14 Encapsulation
1.2.15 Encapsulants
1.2.16 Friable Asbestos Material
1.2.17 Glovebag Technique
1.2.18 HEPA Filter Equipment
1.2.19 Model Accreditation Plan (MAP)
1.2.20 Negative Pressure Enclosure (NPE)
1.2.21 NESHAP
1.2.22 Nonfriable Asbestos Material
1.2.23 Permissible Exposure Limits (PELs)
1.2.23.1 PEL-Time Weighted Average(TWA)
1.2.23.2 PEL-Excursion Limit
1.2.24 Personal Sampling
1.2.25 Presumed ACM
1.2.26 Private Qualified Person (PQP)
1.2.27 TEM
1.2.28 Thermal System Insulation
1.2.29 Time Weighted Average (TWA)
1.2.30 Transite
1.2.31 Wetting Agent
1.2.32 Worker
1.3 REQUIREMENTS
1.3.1 Description of Work
1.3.2 Unexpected Discovery of Asbestos
1.3.3 Medical Requirements
1.3.3.1 Medical Examinations
1.3.3.2 Medical Records
1.3.4 Employee Training
1.3.5 Permits, Licenses, and Notifications

1.3.6 Environment, Safety and Health Compliance
1.3.7 Respiratory Protection Program
1.3.7.1 Respirator Program Records
1.3.7.2 Respirator Fit Testing
1.3.7.3 Respirator Selection and Use Requirements
1.3.8 Asbestos Hazard Control Supervisor
1.3.9 Hazard Communication
1.3.10 Asbestos Hazard Abatement Plan
1.3.11 Testing Laboratory
1.3.12 Landfill Approval
1.3.13 Transporter Certification
1.3.14 Medical Certification
1.4 SUBMITTALS
1.5 QUALITY ASSURANCE
1.5.1 Private Qualified Person Documentation
1.5.2 Designated Competent Person Documentation
1.5.3 Worker's License
1.5.4 Contractor's License
1.5.5 Air Sampling Results
1.5.6 Federal, State or Local Citations on Previous Projects
1.5.7 Preconstruction Conference
1.6 SECURITY
1.7 EQUIPMENT
1.7.1 Rental Equipment

PART 2 PRODUCTS

2.1 ENCAPSULANTS
2.1.1 Removal Encapsulants
2.1.2 Bridging Encapsulant
2.1.3 Penetrating Encapsulant
2.1.4 Lock-down Encapsulant
2.2 DUCT TAPE
2.3 DISPOSAL CONTAINERS
2.4 SHEET PLASTIC
2.4.1 Flame Resistant
2.4.2 Reinforced
2.5 MASTIC REMOVING SOLVENT
2.6 LEAK-TIGHT WRAPPING
2.7 VIEWING INSPECTION WINDOW
2.8 WETTING AGENTS

PART 3 EXECUTION

3.1 EQUIPMENT
3.1.1 Air Monitoring Equipment
3.1.2 Respirators
3.1.2.1 Respirators for Handling Asbestos
3.1.3 Exterior Whole Body Protection
3.1.3.1 Outer Protective Clothing
3.1.3.2 Work Clothing
3.1.3.3 Personal Decontamination Unit
3.1.3.4 Eye Protection
3.1.4 Regulated Areas
3.1.5 Load-out Unit
3.1.6 Warning Signs and Labels
3.1.6.1 Warning Sign
3.1.6.2 Warning Labels
3.1.7 Tools

3.1.8 Rental Equipment
3.1.9 Glovebags
3.1.10 Single Stage Decontamination Area
3.1.11 Decontamination Area Exit Procedures
3.2 WORK PROCEDURE
3.2.1 Building Ventilation System and Critical Barriers
3.2.2 Protection of Existing Work to Remain
3.2.3 Asbestos Control Area Requirements
3.2.3.1 Glovebag
3.2.3.2 Regulated Area for Class II Removal
3.2.4 Removal Procedures
3.2.4.1 Exposed Pipe Insulation Edges
3.2.4.2 Presumed ACM
3.2.5 Methods of Compliance
3.2.5.1 Mandated Practices
3.2.5.2 Control Methods
3.2.5.3 Unacceptable Practices
3.2.6 Class II Work Procedures
3.2.7 Air Sampling
3.2.7.1 Sampling Prior to Asbestos Work
3.2.7.2 Sampling During Asbestos Work
3.2.7.3 Final Clearance Requirements, NIOSH PCM Method
3.2.7.4 Final Clearance Requirements, EPA TEM Method
3.2.7.5 Sampling After Final Clean-Up (Clearance Sampling)
3.2.7.6 Air Clearance Failure
3.2.8 Lock-Down
3.2.9 Site Inspection
3.3 CLEAN-UP AND DISPOSAL
3.3.1 Housekeeping
3.3.2 Title to Materials
3.3.3 Disposal of Asbestos
3.3.3.1 Procedure for Disposal
3.3.3.2 Asbestos Disposal Quantity Report

-- End of Section Table of Contents --

SECTION 02 82 00.00 25

ASBESTOS REMEDIATION

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN SOCIETY OF SAFETY PROFESSIONALS (ASSP)

ASSP Z9.2	(2018) Fundamentals Governing the Design and Operation of Local Exhaust Ventilation Systems

ASTM INTERNATIONAL (ASTM)

ASTM D522/D522M	(2017; R 2021) Mandrel Bend Test of Attached Organic Coatings
ASTM D2794	(1993; R 2024) Standard Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact)
ASTM D4397	(2016; R 2023) Standard Specification for Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications
ASTM E84	(2024) Standard Test Method for Surface Burning Characteristics of Building Materials
ASTM E96/E96M	(2024a) Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials
ASTM E119	(2024) Standard Test Methods for Fire Tests of Building Construction and Materials
ASTM E736/E736M	(2019) Standard Test Method for Cohesion/Adhesion of Sprayed Fire-Resistive Materials Applied to Structural Members
ASTM E1368	(2023) Standard Practice for Visual Inspection of Asbestos Abatement Projects

COMPRESSED GAS ASSOCIATION (CGA)

CGA G-7	(2019) Standard for Compressed Air for Human Respiration; 6th Edition

INTERNATIONAL SAFETY EQUIPMENT ASSOCIATION (ISEA)

ANSI/ISEA Z87.1	(2020) Occupational and Educational Personal Eye and Face Protection Devices

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 701	(2023; ERTA 1 2023) Standard Methods of Fire Tests for Flame Propagation of Textiles and Films

NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH (NIOSH)

NIOSH NMAM	(2020; 5th Ed) NIOSH Manual of Analytical Methods

OREGON ADMINISTRATIVE RULES (OAR)

OAR 340-248	Asbestos Requirements
OAR 340-248-0260	Emission Standards and Procedural Requirements: Asbestos Abatement Notification Requirements

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2024) Safety -- Safety and Occupational Health (SOH) Requirements

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA 340/1-90-018	(1990) Asbestos/NESHAP Regulated Asbestos Containing Materials Guidance

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910.147	The Control of Hazardous Energy (Lock Out/Tag Out)
29 CFR 1926.51	Sanitation
29 CFR 1926.59	Hazard Communication
29 CFR 1926.103	Respiratory Protection
29 CFR 1926.200	Accident Prevention Signs and Tags
29 CFR 1926.1101	Asbestos
40 CFR 61-SUBPART A	General Provisions
40 CFR 61-SUBPART M	National Emission Standard for Asbestos
40 CFR 763	Asbestos
42 CFR 84	Approval of Respiratory Protective Devices
49 CFR 107	Hazardous Materials Program Procedures

49 CFR 171	General Information, Regulations, and Definitions
49 CFR 172	Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements
49 CFR 173	Shippers - General Requirements for Shipments and Packagings

U.S. NAVAL FACILITIES ENGINEERING SYSTEMS COMMAND (NAVFAC)

ND OPNAV M-5100.23	(2020; Rev G) Navy Safety and Occupational Health Manual

UL SOLUTIONS (UL)

UL 586	(2009; Reprint Sep 2022) UL Standard for Safety High-Efficiency Particulate, Air Filter Units

1.2 DEFINITIONS

1.2.1 Amended Water

Water containing a wetting agent or surfactant with a maximum surface tension of 0.00042 psi.

1.2.2 Area Sampling

Sampling of asbestos fiber concentrations which approximates the concentrations of asbestos in the theoretical breathing zone but is not actually collected in the breathing zone of an employee.

1.2.3 Asbestos

The term asbestos includes chrysotile, amosite, crocidolite, tremolite, anthophyllite, and actinolite and any of these minerals that have been chemically treated or altered.

1.2.4 Asbestos Containing Material (ACM)

Any material which contains greater than 1 percent asbestos.

1.2.5 Asbestos Control Area

That area where asbestos removal operations are performed which is isolated by physical boundaries which assist in the prevention of the uncontrolled release of asbestos dust, fibers, or debris.

1.2.6 Asbestos Fibers

Those fibers having an aspect ratio of at least 3:1 and longer than 5 micrometers as determined by National Institute for Occupational Safety and Health (NIOSH) Method 7400.

1.2.7 Asbestos Permissible Exposure Limit

0.1 fibers per cubic centimeter of air as an 8-hour time weighted average measured in the breathing zone as defined by 29 CFR 1926.1101 or other Federal legislation having legal jurisdiction for the protection of workers health.

1.2.8 Authorized Person

Any person authorized by the Contractor and required by work duties to be present in the regulated areas.

1.2.9 Background

The ambient airborne asbestos concentration in an uncontaminated area as measured prior to any asbestos hazard abatement efforts. Background concentrations for other (contaminated) areas are measured in similar but asbestos free locations.

1.2.10 Competent Person (CP)

A person meeting the requirements for competent person as specified in 29 CFR 1926.1101 including a person capable of identifying existing asbestos hazards in the workplace and selecting the appropriate control strategy for asbestos exposure, who has the authority to take prompt corrective measures to eliminate them, and is specifically trained in a training course which meet the criteria of EPA's Model Accreditation Plan (40 CFR 763) for project designer or supervisor, or its equivalent. The competent person must have a current State of Oregon asbestos contractors or supervisors license.

1.2.11 Contractor

The Contractor is that individual, or entity under contract to perform the herein listed work.

1.2.12 Disposal Bag

A 6 mil thick, leak-tight plastic bag, pre-labeled in accordance with 29 CFR 1926.1101, used for transporting asbestos waste from containment to disposal site.

1.2.13 Disturbance

Activities that disrupt the matrix of ACM, crumble or pulverize ACM, or generate visible debris from ACM. Disturbance includes cutting away small amounts of ACM, no greater than the amount which can be contained in one standard sized glovebag or waste bag, not larger than 60 inches in length and width or as required by state or local regulations in order to access a building component.

1.2.14 Encapsulation

The abatement of an asbestos hazard through the appropriate use of a physical barrier or chemical encapsulants.

1.2.15 Encapsulants

Specific materials in various forms used to chemically or physically entrap

asbestos fibers in various configurations to prevent these fibers from becoming airborne. There are four types of encapsulants as follows which must comply with performance requirements as specified herein.

a. Removal Encapsulant (can be used as a wetting agent)

b. Bridging Encapsulant (used to provide a tough, durable surface coating to asbestos containing material)

c. Penetrating Encapsulant (used to penetrate the asbestos containing material encapsulating all asbestos fibers and preventing fiber release due to routine mechanical damage)

d. Lock-Down Encapsulant (used to seal off or "lock-down" minute asbestos fibers left on surfaces from which asbestos containing material has been removed).

1.2.16 Friable Asbestos Material

A term defined in 40 CFR 61-SUBPART M and EPA 340/1-90-018 meaning any material which contains more than 1 percent asbestos, as determined using the method specified in 40 CFR 763, Polarized Light Microscopy (PLM), that when dry, can be crumbled, pulverized, or reduced to powder by hand pressure.

1.2.17 Glovebag Technique

Those asbestos removal and control techniques put forth in 29 CFR 1926.1101.

1.2.18 HEPA Filter Equipment

High efficiency particulate air (HEPA) filtered vacuum and exhaust ventilation equipment with a filter system capable of collecting and retaining asbestos fibers. Filters must retain 99.97 percent of particles 0.3 microns or larger as indicated in UL 586.

1.2.19 Model Accreditation Plan (MAP)

USEPA training accreditation requirements for persons who work with asbestos as specified in 40 CFR 763.

1.2.20 Negative Pressure Enclosure (NPE)

That engineering control technique described as a negative pressure enclosure in 29 CFR 1926.1101 or applicable state regulations.

1.2.21 NESHAP

National Emission Standards for Hazardous Air Pollutants. The USEPA NESHAP regulation for asbestos is at 40 CFR 61-SUBPART M. Requirements associated with demolition and renovation activities are found in Section 61.145 of the NESHAP while requirements associated with waste disposal are found in Section 61.150.

1.2.22 Nonfriable Asbestos Material

Material that contains asbestos in which the fibers have been immobilized by a bonding agent, coating, binder, or other material so that the asbestos fibers are not normally released during appropriate use, handling, storage

or transportation. It is understood that asbestos fibers may be released under other conditions such as demolition, removal, or mishap.

1.2.23 Permissible Exposure Limits (PELs)

1.2.23.1 PEL-Time Weighted Average(TWA)

Concentration of asbestos not in excess of 0.1 fibers per cubic centimeter of air (f/cc) as an 8-hour time weighted average (TWA).

1.2.23.2 PEL-Excursion Limit

An airborne concentration of asbestos not in excess of 1.0 f/cc of air as averaged over a sampling period of 30 minutes.

1.2.24 Personal Sampling

Air sampling which is performed to determine asbestos fiber concentrations within the breathing zone of a specific employee, as performed in accordance with 29 CFR 1926.1101.

1.2.25 Presumed ACM

Any material which cannot be sampled at the time of the initial inspection due to inaccessibility, structural or safety concerns (such as charged electrical components), or could void active warranties (such as roofing materials). Presumed ACM must be managed as ACM unless proven to not be ACM through testing by a qualified and certified asbestos professional.

1.2.26 Private Qualified Person (PQP)

A Registered Architect, Professional Engineer, Certified Industrial Hygienist, consultant or other qualified person who has successfully completed training and is therefore accredited under a legitimate State Model Accreditation Plan as described in 40 CFR 763 as a Building Inspector, Contractor/Supervisor Abatement Worker, and Asbestos Project Designer. The PQP that collects samples and elects to analyze samples on site must successfully complete the National Institute of Occupational Safety and Health (NIOSH) 582 course "Sampling and Evaluating Airborne Asbestos Dust" or equivalent, and must participate in the American Industrial Hygiene Association (AIHA) Asbestos Analysis Registry (AAR). The PQP must be appropriately licensed in the State of Oregon.

1.2.27 TEM

Refers to Transmission Electron Microscopy.

1.2.28 Thermal System Insulation

Thermal system insulation (TSIACM applied to pipes, fittings, boilers, breeching, tanks, ducts or other structural components to prevent heat loss or gain.

1.2.29 Time Weighted Average (TWA)

The TWA is an 8-hour time weighted average airborne concentration of asbestos fibers.

1.2.30 Transite

A generic name for asbestos cement wallboard and pipe.

1.2.31 Wetting Agent

A chemical added to water to reduce the water's surface tension thereby increasing the water's ability to soak into the material to which it is applied. An equivalent wetting agent must have a surface tension of at most 0.00042 psi.

1.2.32 Worker

Individual (not designated as the Competent Person or a supervisor) who performs asbestos work and has completed asbestos worker training required by 29 CFR 1926.1101, to include EPA Model Accreditation Plan (MAP) "Worker" training; accreditation, if required by the OSHA Class of work to be performed or by the state where the work is to be performed.The worker must be appropriately licensed in the State of Oregon.

1.3 REQUIREMENTS

1.3.1 Description of Work

The work covered by this section includes the handling and control of asbestos containing materials and describes some of the resultant procedures and equipment required to protect workers, the environment and occupants of the building or area, or both, from contact with airborne asbestos fibers. The work also includes the disposal of any asbestos containing materials generated by the work. More specific operational procedures must be outlined in the Asbestos Hazard Abatement Plan called for elsewhere in this specification. Insulation on the existing water line is believed to be non-asbestos. Sample and characterize the water line insulation for asbestos content prior to water line work or demolition. Brakes on the existing bridge to be demolished are assumed to be asbestos containing. Electrical components that may be worked on or disturbed during utility work have not been characterized for asbestos content, and for purposes of bidding assume that the electrical components are asbestos containing. The asbestos work includes the demolition and removalof brakes located on the existing bridge as shown in as-built drawings, which is governed by 40 CFR 763. Under normal conditions non-friable or chemically bound materials containing asbestos would not be considered hazardous; however, this material may release airborne asbestos fibers during demolition and removal and therefore must be handled in accordance with the removal and disposal procedures as specified herein. Provide asbestos control techniques as outlined in this specification. The work area must be evacuated during the asbestos abatement work. A competent person must supervise asbestos removal work as specified herein.

1.3.2 Unexpected Discovery of Asbestos

Notify the Contracting Officer if any previously untested building components suspected to contain asbestos are impacted by the work.

1.3.3 Medical Requirements

Provide medical requirements including but not limited to medical surveillance and medical record keeping as listed in 29 CFR 1926.1101.

1.3.3.1 Medical Examinations

Contractor must submit documentation of workers who perform activities potentially impactedACM including the name of each employee, type of exam received, and date of the exam. The documentation must also include a signed statement that the medical examination was reviewed by the contractor's Safety Manager stating that the listed personnel have received the required medical examination in accordance with 29 CFR 1926.1101 and the exam results are saved. This requirement must have been satisfied within the 12 months prior to the start of work on this contract. The same medical examination must be given on an annual basis to employees engaged in an occupation involving asbestos and within 30 calendar days before or after the termination of employment in such occupation. Specifically identify x-ray films of asbestos workers to the consulting radiologist and mark medical record jackets with the word "ASBESTOS."

1.3.3.2 Medical Records

Maintain complete and accurate records of employees' medical examinations, medical records, and exposure data for a period of indefinite time after termination of employment and make records of the required medical examinations and exposure data available for inspection and copying to: The Assistant Secretary of Labor for Occupational Safety and Health (OSHA), or authorized representatives of them, and an employee's physician upon the request of the employee or former employee.

1.3.4 Employee Training

Submit certificates, prior to the start of work but after the main abatement submittal, signed by each employee indicating that the employee has received training in the proper handling of materials and wastes that contain asbestos in accordance with 40 CFR 763; understands the health implications and risks involved, including the illnesses possible from exposure to airborne asbestos fibers; understands the use and limits of the respiratory equipment to be used; and understands the results of monitoring of airborne quantities of asbestos as related to health and respiratory equipment as indicated in 29 CFR 1926.1101 on an initial and annual basis. Organize certificates by individual worker, not grouped by type of certification. Make training requirement records readily available in accordance with 40 CFR 763. Train personnel involved in the asbestos control work in accordance with United States Environmental Protection Agency (USEPA) Asbestos Hazard Emergency Response Act (AHERA) training criteria or State training criteria whichever is more stringent. Document the training by providing: dates of training, training entity, course outline, names of instructors, and qualifications of instructors upon request by the Contracting Officer. Furnish each employee with respirator training and fit testing administered by the PQP as required by 29 CFR 1926.1101 and 29 CFR 1926.103. Fully cover engineering and other hazard control techniques and procedures. Asbestos workers must have a current State of Oregon asbestos worker's license.

1.3.5 Permits, Licenses, and Notifications

Prior to the start of work, obtain necessary permits and licenses in conjunction with asbestos removal, encapsulation, hauling, and disposition, and furnish notification of such actions required by Federal, State, regional, and local authorities. Notify the State's environmental protection agency and the Contracting Officer in writing 10 working days prior to commencement of work in accordance with 40 CFR 61-SUBPART M and

OAR 340-248-0260. Notify the Contracting Officer and other appropriate Government agencies in writing 20 working days prior to the start of asbestos work as indicated in applicable laws, ordinances, criteria, rules, and regulations. Submit copies of all Notifications to the Contracting Officer.

1.3.6 Environment, Safety and Health Compliance

In addition to detailed requirements of this specification, comply with those applicable laws, ordinances, criteria, rules, and regulations of Federal, State, regional, and local authorities regarding handling, storing, transporting, and disposing of asbestos waste materials. Comply with the applicable requirements of the current issue of EM 385-1-1, 29 CFR 1926.1101, 40 CFR 61-SUBPART A, 40 CFR 61-SUBPART M, 40 CFR 763 and ND OPNAV M-5100.23. Submit matters of interpretation of standards to the appropriate administrative agency for resolution before starting the work. Where the requirements of this specification, applicable laws, rules, criteria, ordinances, regulations, and referenced documents vary, the most stringent requirement as defined by the Government apply. The following laws, ordinances, criteria, rules and regulations regarding removal, handling, storing, transporting and disposing of asbestos materials apply:

a. OAR 340-248 Asbestos Requirements

b. OAR 340-248-0260 Emission Standards and Procedural Requirements: Asbestos Abatement Notification Requirements

1.3.7 Respiratory Protection Program

Establish and implement a respirator program as required by 29 CFR 1926.1101, and 29 CFR 1926.103 and applicable state and local regulations. Submit a written description of the program to the Contracting Officer. Submit a written program manual or operating procedure including methods of compliance with regulatory statutes.

1.3.7.1 Respirator Program Records

Submit records of the respirator program as required by 29 CFR 1926.103, and 29 CFR 1926.1101.

1.3.7.2 Respirator Fit Testing

The Contractor's PQP must conduct a qualitative or quantitative fit test conforming to 29 CFR 1926.103 for each worker required to wear a respirator, and any authorized visitors who enter a regulated area where respirators are required to be worn. A respirator fit test must be performed prior to initially wearing a respirator and every 12 months thereafter. If physical changes develop that affects the fit, a new fit test must be performed. Functional fit checks must be performed each time a respirator is put on and in accordance with the manufacturer's recommendation.

1.3.7.3 Respirator Selection and Use Requirements

Provide respirators, and ensure that they are used as required by 29 CFR 1926.1101 and in accordance with CGA G-7 and the manufacturer's recommendations. Respirators must be approved by the National Institute for Occupational Safety and Health NIOSH, under the provisions of 42 CFR 84,

for use in environments containing airborne asbestos fibers. For air-purifying respirators, the particulate filter must be high-efficiency particulate air (HEPA)/(N-,R-,P-100). The initial respirator selection and the decisions regarding the upgrading or downgrading of respirator type must be made by the Contractor's Designated IH based on the measured or anticipated airborne asbestos fiber concentrations to be encountered.

1.3.8 Asbestos Hazard Control Supervisor

The Contractor must be represented on site by a supervisor, trained using the model Contractor accreditation plan as indicated in the Federal statutes for all portions of the herein listed work.

1.3.9 Hazard Communication

Adhere to all parts of 29 CFR 1926.59 and provide the Contracting Officer with a copy of the Safety Data Sheets (SDS) for all materials brought to the site.

1.3.10 Asbestos Hazard Abatement Plan

Submit a detailed plan of the safety precautions such as lockout, tagout, tryout, fall protection, and confined space entry procedures and equipment and work procedures to be used in the removal of materials containing asbestos. The plan, not to be combined with other hazard abatement plans, must be prepared, signed, and sealed by the PQP. Provide a Table of Contents for each abatement submittal, which follows the sequence of requirements in the contract. The plan must include but not be limited to the precise personal protective equipment to be used including, but not limited to, respiratory protection, type of whole-body protection, the location of asbestos control areas including clean and dirty areas, buffer zones, showers, storage areas, change rooms, removal method, interface of trades involved in the construction, sequencing of asbestos related work, disposal plan, type of wetting agent and asbestos sealer to be used, locations of local exhaust equipment, planned air monitoring strategies, and a detailed description of the method to be employed in order to control environmental pollution. The plan must also include (both fire and medical emergency) response plans and an Activity Hazard Analyses (AHAs) in accordance with EM 385-1-1. The Asbestos Hazard Abatement Plan must be approved in writing prior to starting any asbestos work. The Contractor, Asbestos Hazard Control Supervisor, CP and PQP must meet with the Contracting Officer prior to beginning work, to discuss in detail the Asbestos Hazard Abatement Plan, including work procedures and safety precautions. Once approved by the Contracting Officer, the plan will be enforced as if an addition to the specification. Any changes required in the specification as a result of the plan must be identified specifically in the plan to allow for free discussion and approval by the Contracting Officer prior to starting work.

1.3.11 Testing Laboratory

Submit the name, address, telephone number, and appliable laboratory certification(s) of each testing laboratory selected for the sampling, analysis, and reporting of airborne concentrations of asbestos fibers along with evidence that each laboratory selected holds the appropriate State license and permits and certification that each laboratory is American Industrial Hygiene Association (AIHA) accredited and that persons counting the samples have been judged proficient by current inclusion on the AIHA Asbestos Analysis Registry (AAR) and successful participation of the

laboratory in the Proficiency Analytical Testing (PAT) Program. Where analysis to determine asbestos content in bulk materials or transmission electron microscopy is required, submit evidence that the laboratory is accredited by the National Institute of Science and Technology (NIST) under National Voluntary Laboratory Accreditation Program (NVLAP) for asbestos analysis. The testing laboratory firm must be independent of the asbestos contractor and must have no employee or employer relationship which could constitute a conflict of interest.

1.3.12 Landfill Approval

Submit written evidence that the landfill is approved for asbestos disposal by the U.S. Environmental Protection Agency, Region 10, local regulatory agencies. Within three working days after delivery, submit detailed delivery tickets, prepared, signed, and dated by an agent of the landfill, certifying the amount of asbestos materials delivered to the landfill. Submit a copy of the waste shipment records within one day of the shipment leaving the project site.

1.3.13 Transporter Certification

Submit written evidence that the transporter is approved to transport asbestos waste in accordance with the DOT requirements of 49 CFR 171, 49 CFR 172, 49 CFR 173, as well as registration requirements of 49 CFR 107 and all other State and local regulatory agency requirements.

1.3.14 Medical Certification

Provide a written certification for each worker and supervisor, signed by a licensed physician indicating that the worker and supervisor has met or exceeded all of the medical prerequisites listed herein and in 29 CFR 1926.1101 and 29 CFR 1926.103 as prescribed by law. Submit certificates prior to the start of work but after the main abatement submittal.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Amended Water; G

Safety Data Sheets (SDS) for All Materials; G

Encapsulants; G

Respirators; G

Vacuums; G

Glovebags; G

SD-06 Test Reports

Air Sampling Results; G

Clearance Sampling; G

Asbestos Disposal Quantity Report; G

SD-07 Certificates

Employee Training; G

Notifications; G

Respiratory Protection Program; G

Asbestos Hazard Abatement Plan; G

Testing Laboratory; G

Landfill Approval; G

Delivery Tickets; G

Waste Shipment Records; G

Transporter Certification; G

Medical Certification; G

Private Qualified Person Documentation; G

Designated Competent Person; G

Worker's License; G

Contractor's License; G

Federal, State or Local Citations on Previous Projects; G

Encapsulants; G

Equipment Used to Contain Airborne Asbestos Fibers; G

Water Filtration Equipment; G

Vacuums; G

Ventilation Systems; G

SD-11 Closeout Submittals

Permits and Licenses; G

Notifications; G

Respirator Program Records; G

Rental Equipment; G

1.5 QUALITY ASSURANCE

1.5.1 Private Qualified Person Documentation

Submit the name, address, and telephone number of the PQP selected to prepare the Asbestos Hazard Abatement Plan, direct monitoring and training, and documented evidence that the PQP has successfully completed training in and is accredited and where required is certified as, a Building Inspector, Contractor/Supervisor Abatement Worker, and Asbestos Project Designer as described by 40 CFR 763 and has successfully completed the National Institute of Occupational Safety and Health (NIOSH) 582 course "Sampling and Evaluating Airborne Asbestos Dust" or equivalent. The PQP and the asbestos contractor must not have an employee/employer relationship or financial relationship which could constitute a conflict of interest. The PQP must be a first tier subcontractor.

1.5.2 Designated Competent Person Documentation

The Designated Competent Person must be experienced in the administration and supervision of asbestos abatement projects including exposure assessment and monitoring, work practices, abatement methods, protective measures for personnel, setting up and inspecting asbestos abatement work areas, evaluating the integrity of containment barriers, placement and operation of local exhaust systems, ACM generated waste containment and disposal procedures, decontamination units installation and maintenance requirements, site safety and health requirements, and notification of other employees onsite. The Designated Competent Person must be on-site at all times when asbestos abatement activities are underway.Submit training certification and a current State of Oregon Asbestos Contractor's and Supervisor's License. Submit evidence that the Designated Competent Person has a minimum of 2 years of on-the-job asbestos abatement experience relevant to OSHA designated competent person requirements. The Designated Competent Person must be a first tier subcontractor.

1.5.3 Worker's License

Submit documentation that workers meet the requirements of 29 CFR 1926.1101, 40 CFR 61-SUBPART M and have a current State of Oregon Asbestos Workers License.

1.5.4 Contractor's License

Submit a copy of the asbestos contractor's license issued by the State of Oregon. Submit the following certification along with the license: "I certify that the personnel I am responsible for during the course of this project fully understand the contents of 29 CFR 1926.1101, 40 CFR 61-SUBPART MEM 385-1-1, and the Federal, State and local requirements for those asbestos abatement activities that they will be involved in." This certification statement must be signed by the Company's President or Chief Executive.

1.5.5 Air Sampling Results

Complete fiber counting and provide results to the PQP for review within 16 hours of the "time off" of the sample pump. Notify the Contracting Officer immediately of any airborne levels of asbestos fibers in excess of the acceptable limits. Submit sampling results to the Contracting Officer and the affected Contractor employees where required by law within three working days, signed by the testing laboratory employee performing air

sampling, the employee that analyzed the sample, and the PQP. Notify the Contractor and the Contracting Officer immediately of any variance in the pressure differential which could cause adjacent unsealed areas to have asbestos fiber concentrations in excess of 0.01 fibers per cubic centimeter or background whichever is higher. In no circumstance must levels exceed 0.1 fibers per cubic centimeter.

1.5.6 Federal, State or Local Citations on Previous Projects

Submit a statement, signed by an officer of the company, containing a record of any citations issued by Federal, State or local regulatory agencies relating to asbestos activities within the last 5 years (including projects, dates, and resolutions); a list of penalties incurred through non-compliance with asbestos project specifications, including liquidated damages, overruns in scheduled time limitations and resolutions; and situations in which an asbestos-related contract has been terminated (including projects, dates, and reasons for terminations). If there are none, a negative declaration signed by an officer of the company must be provided.

1.5.7 Preconstruction Conference

Conduct a safety preconstruction conference to discuss the details of the Asbestos Hazard Abatement Plan, Accident Prevention Plan (APP) including the AHAs required in specification Section 01 35 26.00 25 GOVERNMENTAL SAFETY REQUIREMENTS. The safety preconstruction conference must include the Contractor and their Designated Competent Person, Designated IH and Project Supervisor and the Contracting Officer. Deficiencies in the APP must be discussed. Onsite work must not begin until the APP has been accepted.

1.6 SECURITY

A log book must be kept documenting entry into and out of the regulated area. Entry into regulated areas must only be by personnel authorized by the Contractor and the Contracting Officer. Personnel authorized to enter regulated areas must be trained, medically evaluated, and wear the required personal protective equipment.

1.7 EQUIPMENT

1.7.1 Rental Equipment

Provide a copy of the written notification to the rental company concerning the intended use of the equipment and the possibility of asbestos contamination of the equipment.

PART 2 PRODUCTS

2.1 ENCAPSULANTS

Encapsulants must conform to current USEPA requirements, contain no toxic or hazardous substances as defined in 29 CFR 1926.59, and conform to the following performance requirements.

2.1.1 Removal Encapsulants

Requirement	Test Standard
Flame Spread - 25, Smoke Emission - 50	ASTM E84
Life Expectancy - 20 years	Warranted by the manufacturer to perform for at least 20 years as a durable barrier in the environment and conditions similar to the planned application
Permeability - Minimum 0.4 perms	ASTM E96/E96M
Fire Resistance - Negligible affect on fire resistance rating over 3 hour test (Classified by UL for use over fibrous and cementitious sprayed fireproofing)	ASTM E119
Impact Resistance - Minimum 43 in/lb	ASTM D2794 Gardner Impact Test
Flexibility - no rupture or cracking	ASTM D522/D522M Mandrel Bend Test

2.1.2 Bridging Encapsulant

Requirement	Test Standard
Flame Spread - 25, Smoke Emission - 50	ASTM E84
Life Expectancy - 20 years	Warranted by the manufacturer to perform for at least 20 years as a durable barrier in the environment and conditions similar to the planned application
Permeability - Minimum 0.4 perms	ASTM E96/E96M
Fire Resistance - Negligible affect on fire resistance rating over 3-hour test (Classified by UL for use over fibrous and cementitious sprayed fireproofing)	ASTM E119
Impact Resistance - Minimum 43 in/lb	ASTM D2794 Gardner Impact Test
Flexibility - no rupture or cracking	ASTM D522/D522M Mandrel Bend Test

2.1.3 Penetrating Encapsulant

Requirement	Test Standard
Flame Spread - 25, Smoke Emission - 50	ASTM E84
Life Expectancy - 20 years	Warranted by the manufacturer to perform for at least 20 years as a durable barrier in the environment and conditions similar to the planned application
Permeability - Minimum 0.4 perms	ASTM E96/E96M
Cohesion/Adhesion Test - 50 pounds of force/foot	ASTM E119
Fire Resistance - Negligible affect on fire resistance rating over 3-hour test (Classified by UL for use over fibrous and cementitious sprayed fireproofing)	ASTM E119
Impact Resistance - Minimum 43 in/lb	ASTM D2794 Gardner Impact Test
Flexibility - no rupture or cracking	ASTM D522/D522M Mandrel Bend Test

2.1.4 Lock-down Encapsulant

Requirement	Test Standard
Flame Spread - 25, Smoke Emission - 50	ASTM E84
Life Expectancy - 20 years	Warranted by the manufacturer to perform for at least 20 years as a durable barrier in the environment and conditions similar to the planned application
Permeability - Minimum 0.4 perms	ASTM E96/E96M
Fire Resistance - Negligible affect on fire resistance rating over 3-hour test (Tested with fireproofing over encapsulant applied directly to steel member)	ASTM E119

Requirement	Test Standard
Bond Strength: 100 pounds of force/foot	ASTM E736/E736M
(Tests compatibility with cementitious and fibrous fireproofing)	

2.2 DUCT TAPE

Industrial grade duct tape of appropriate widths suitable for bonding sheet plastic and disposal container.

2.3 DISPOSAL CONTAINERS

Leak-tight (defined as solids, liquids, or dust that cannot escape or spill out) disposal containers must be provided for ACM wastes, and presumed ACM wastes, as required by 29 CFR 1926.1101 and state and local regulatory requirements. Disposal containers can be in the form of:

a. Disposal Bags

b. Fiberboard Drums

c. Cardboard Boxes

2.4 SHEET PLASTIC

Sheet plastic must be polyethylene of 6 mil minimum thickness and must be provided in the largest sheet size necessary to minimize seams. Film must conform to ASTM D4397, except as specified below.

2.4.1 Flame Resistant

Where a potential for fire exists, flame-resistant sheets must be provided. Film must conform to the requirements of NFPA 701.

2.4.2 Reinforced

Reinforced sheets must be provided where high skin strength is required, such as where it constitutes the only barrier between the regulated area and the outdoor environment. The sheet stock must consist of translucent, nylon-reinforced or woven-polyethylene thread laminated between two layers of polyethylene film. Film must meet flame resistant standards of NFPA 701.

2.5 MASTIC REMOVING SOLVENT

Mastic removing solvent must be nonflammable and must not contain methylene chloride, glycol ether, or halogenated hydrocarbons. Solvents used onsite must have a flash point greater than 140 degrees F.

Prior to approving the use of mastic removing solvent for renovation projects where a new material is placed on the treated surface, the treated surface with mastic removing solvent must be completely removed. Remaining mastic removing solvent may react with glues and mastic of the new product.

2.6 LEAK-TIGHT WRAPPING

Two layers of 6 mil minimum thick polyethylene sheet stock must be used for the containment of removed asbestos-containing components or materials such as large tanks, boilers, insulated pipe segments and other materials. Upon placement of the ACM component or material, each layer must be individually leak-tight sealed with duct tape.

2.7 VIEWING INSPECTION WINDOW

Where feasible, a minimum of one clear, 1/8 inch thick, acrylic sheet, 18 by 24 inches, must be installed as a viewing inspection window at eye level on a wall in each containment enclosure. The windows must be sealed leak-tight with industrial grade duct tape.

2.8 WETTING AGENTS

Removal encapsulant (a penetrating encapsulant) must be provided when conducting removal abatement activities that require a longer removal time or are subject to rapid evaporation of amended water. The removal encapsulant must be capable of wetting the ACM and retarding fiber release during disturbance of the ACM greater than or equal to that provided by amended water. Performance requirements for penetrating encapsulants are specified in paragraph ENCAPSULANTS above.

PART 3 EXECUTION

3.1 EQUIPMENT

Provide the Contracting Officer or the Contracting Officer's Representative, with at least two complete sets of personal protective equipment including reusable coveralls with an outer disposable full body cover as required for entry to and inspection of the asbestos control area. Provide equivalent training to the Contracting Officer or a designated representative as provided to Contractor employees in the use of the required personal protective equipment. Provide manufacturer's certificate of compliance for all equipment used to contain airborne asbestos fibers.

3.1.1 Air Monitoring Equipment

The Contractor's PQP must approve air monitoring equipment. The equipment must include, but must not be limited to:

a. High-volume sampling pumps that can be calibrated and operated at a constant airflow up to 16 liters per minute.

b. Low-volume, battery powered, body-attachable, portable personal pumps that can be calibrated to a constant airflow up to approximately 3.5 liters per minute, and a self-contained rechargeable power pack capable of sustaining the calibrated flow rate for a minimum of 10 hours. The pumps must also be equipped with an automatic flow control unit which must maintain a constant flow, even as filter resistance increases due to accumulation of fiber and debris on the filter surface.

c. Single use standard 25 mm diameter cassette, open face, 0.8 micron pore size, mixed cellulose ester membrane filters and cassettes with 50 mm electrically conductive extension cowl, and shrink bands for personal air sampling.

d. Single use standard 25 mm diameter cassette, open face, 0.45 micron pore size, mixed cellulose ester membrane filters and cassettes with 50 mm electrically conductive cowl, and shrink bands when conducting environmental area sampling using NIOSH NMAM Methods 7400 and 7402, (and the transmission electric microscopy method specified at 40 CFR 763 if required).

e. A flow calibrator capable of calibration to within plus or minus 2 percent of reading over a temperature range of minus 4 to plus 140 degrees F and traceable to a NIST primary standard.

3.1.2 Respirators

Select respirators from those approved by the National Institute for Occupational Safety and Health (NIOSH), Department of Health and Human Services.

3.1.2.1 Respirators for Handling Asbestos

Provide personnel engaged in pre-cleaning, cleanup, handling, removal of asbestos materials with respiratory protection as indicated in 29 CFR 1926.1101 and 29 CFR 1926.103. Breathing air must comply with CGA G-7.

3.1.3 Exterior Whole Body Protection

3.1.3.1 Outer Protective Clothing

Provide personnel exposed to asbestos with disposable "non-breathable," whole body outer protective clothing, head coverings, gloves, and foot coverings. Provide disposable plastic or rubber gloves to protect hands. Cloth gloves may be worn inside the plastic or rubber gloves for comfort, but must not be used alone. Make sleeves secure at the wrists, make foot coverings secure at the ankles, and make clothing secure at the neck by the use of tape.

3.1.3.2 Work Clothing

Provide cloth work clothes for wear under the outer protective clothing and foot coverings and either dispose of or properly decontaminate them as recommended by the PQP after each use.

3.1.3.3 Personal Decontamination Unit

Provide a temporary, negative pressure unit with a separate decontamination locker room and clean locker room with a shower that complies with 29 CFR 1926.51(f)(4)(ii) through (V) in between for personnel required to wear whole body protective clothing. Provide two separate lockers for each asbestos worker, one in each locker room. Keep street clothing and street shoes in the clean locker. HEPA vacuum and remove asbestos contaminated disposable protective clothing while still wearing respirators at the boundary of the asbestos work area and seal in impermeable bags or containers for disposal. Do not wear work clothing between home and work. Locate showers between the decontamination locker room and the clean locker room and require that all employees shower before changing into street clothes. Collect used shower water and filter with approved water filtration equipment to remove asbestos contamination. Wastewater filters must be installed in series with the first stage pore size 20 microns and

the second stage pore size of 5 microns. Dispose of filters and residue as asbestos waste. Discharge clean water to the sanitary system. Dispose of asbestos contaminated work clothing as asbestos contaminated waste. Keep the floor of the decontamination unit's clean room dry and clean at all times. Proper housekeeping and hygiene requirements must be maintained. Provide soap and towels for showering, washing and drying. Cloth towels provided must be disposed of as ACM waste. Physically attach the decontamination units to the asbestos control area. Construct both a personnel decontamination unit and an equipment decontamination unit onto and integral with each asbestos control area.

3.1.3.4 Eye Protection

Provide eye protection that complies with ANSI/ISEA Z87.1 when operations present a potential eye injury hazard. Provide goggles to personnel engaged in asbestos abatement operations when the use of a full face respirator is not required.

3.1.4 Regulated Areas

All Class I, II, and III asbestos work must be conducted within regulated areas. The regulated area must be demarcated to minimize the number of persons within the area and to protect persons outside the area from exposure to airborne asbestos. Control access to regulated areas, ensure that only authorized personnel enter, and verify that Contractor required medical surveillance, training and respiratory protection program requirements are met prior to allowing entrance.

3.1.5 Load-out Unit

Provide a temporary load-out unit that is adjacent and connected to the regulated area and access tunnel. Attach the load-out unit in a leak-tight manner to each regulated area.

3.1.6 Warning Signs and Labels

Provide warning signs in English and in languages understood by the asbestos workers at all approaches to asbestos control areas. Locate signs at such a distance that personnel may read the sign and take the necessary protective steps required before entering the area. Provide labels and affix to all asbestos materials, scrap, waste, debris, and other products contaminated with asbestos. Containers with preprinted warning labels conforming to the requirements are acceptable.

3.1.6.1 Warning Sign

Provide vertical format conforming to 29 CFR 1926.200, and 29 CFR 1926.1101 minimum 20 by 14 inches displaying the following legend in the lower panel:

Legend	Notation
DANGER	one inch Sans Serif Gothic or Block
ASBESTOS	one inch Sans Serif Gothic or Block

Legend	Notation
MAY CAUSE CANCER	one inch Sans Serif Gothic or Block
CAUSES DAMAGE TO LUNGS	1/4 inch Sans Serif Gothic or Block
AUTHORIZED PERSONNEL ONLY	1/4 inch Sans Serif Gothic or Block
WEAR RESPIRATORY PROTECTION AND PROTECTIVE CLOTHING IN THIS AREA	1/4 inch Sans Serif Gothic or Block

Spacing between lines must be at least equal to the height of the upper of any two lines.

3.1.6.2 Warning Labels

Provide labels conforming to 29 CFR 1926.1101 of sufficient size to be clearly legible, displaying the following legend:

DANGER
CONTAINS ASBESTOS FIBERS
MAY CAUSE CANCER
CAUSES DAMAGE TO LUNGS
DO NOT BREATHE DUST AVOID CREATING DUST

3.1.7 Tools

Vacuums must be leak proof to the filter and equipped with HEPA filters. Filters on vacuums must conform to ASSP Z9.2 and UL 586. Do not use power tools to remove asbestos containing materials unless the tool is equipped with effective, integral HEPA filtered exhaust ventilation systems. Remove all residual asbestos from reusable tools prior to storage or reuse. Reusable tools must be thoroughly decontaminated prior to being removed from the regulated areas.

3.1.8 Rental Equipment

If rental equipment is to be used, furnish written notification to the rental agency concerning the intended use of the equipment and the possibility of asbestos contamination of the equipment.

3.1.9 Glovebags

Submit written manufacturers proof that glovebags do not break down under expected temperatures and conditions.

3.1.10 Single Stage Decontamination Area

A decontamination area (equipment room/area) must be provided for Class I work involving less than 25 feet or 10 square feet of TSI or surfacing ACM, and for Class II and Class III asbestos work operations where exposures exceed the PELs or where there is no negative exposure assessment. The equipment room or area must be adjacent to the regulated area for the decontamination of employees, material, and their equipment which could be contaminated with asbestos. The area must be covered by an impermeable drop cloth on the floor or horizontal working surface. The area must be of sufficient size to accommodate cleaning of equipment and removing personal protective equipment without spreading contamination beyond the area.

3.1.11 Decontamination Area Exit Procedures

Ensure that the following procedures are followed:

a. Before leaving the regulated area, remove all gross contamination and debris from work clothing using a HEPA vacuum.

b. Employees must remove their protective clothing in the equipment room and deposit the clothing in labeled impermeable bags or containers for disposal.

c. Employees must not remove their respirators until showering.

d. Employees must shower prior to entering the clean room. If a shower has not been located between the equipment room and the clean room or the work is performed outdoors, ensure that employees engaged in Class I asbestos jobs: a) Remove asbestos contamination from their work suits in the equipment room or decontamination area using a HEPA vacuum before proceeding to a shower that is not adjacent to the work area; or b) Remove their contaminated work suits in the equipment room, without cleaning worksuits, and proceed to a shower that is not adjacent to the work area.

3.2 WORK PROCEDURE

Perform asbestos related work in accordance with 29 CFR 1926.1101, 40 CFR 61-SUBPART M, and as specified herein. Use wet or if given prior EPA approval, dry removal procedures. Wear and utilize protective clothing and equipment as specified herein. No eating, smoking, drinking, chewing gum, tobacco, or applying cosmetics is permitted in the asbestos work or control areas. Personnel of other trades not engaged in the removal and demolition of asbestos containing material must not be exposed at any time to airborne concentrations of asbestos unless all the personnel protection and training provisions of this specification are complied with by the trade personnel. Shut down the building heating, ventilating, and air conditioning system, cap the openings to the system, prior to the commencement of asbestos work. Power to the regulated area must be locked-out and tagged in accordance with 29 CFR 1910.147. Disconnect electrical service when wet removal is performed and provide temporary electrical service with verifiable ground fault circuit interrupter (GFCI) protection prior to the use of any water. All electrical work must be performed by a licensed electrician. Stop abatement work in the regulated area immediately when the airborne total fiber concentration: (1) equals or exceeds 0.01 f/cc, or the pre-abatement concentration, whichever is greater, outside the regulated area; or (2) equals or exceeds 1.0 f/cc inside the regulated area. Correct the condition to the satisfaction of

the Contracting Officer, including visual inspection and air sampling. Work must resume only upon notification by the Contracting Officer. Corrective actions must be documented. If an asbestos fiber release or spill occurs, stop work immediately, correct the condition to the satisfaction of the Contracting Officer including clearance sampling, prior to resumption of work.

3.2.1 Building Ventilation System and Critical Barriers

Building ventilation system supply and return air ducts in a regulated area must be isolated by airtight seals to prevent the spread of contamination throughout the system. The airtight seals must consist of two layers of polyethylene. Edges to wall, ceiling and floor surfaces must be sealed with industrial grade duct tape.

a. A Competent Person must supervise the work.

b. For indoor work, critical barriers must be placed over all openings to the regulated area.

c. Impermeable dropcloths must be placed on surfaces beneath all removal activity.

3.2.2 Protection of Existing Work to Remain

Perform work without damage or contamination of adjacent work. Where such work is damaged or contaminated as verified by the Contracting Officer using visual inspection or sample analysis, it must be restored to its original condition or decontaminated by the Contractor as deemed appropriate by the Contracting Officer. This includes inadvertent spill of dirt, dust, or debris in which it is reasonable to conclude that asbestos may exist. When these spills occur, stop work immediately. Then clean up the spill. When satisfactory visual inspection and air sampling results are obtained from the PQP work may proceed at the discretion of the Contracting Officer.

3.2.3 Asbestos Control Area Requirements

3.2.3.1 Glovebag

Use alternate techniques as indicated in 29 CFR 1926.1101. Establish designated limits for the asbestos regulated area with the use of rope or other continuous barriers, and maintain all other requirements for asbestos control areas. The PQP must conduct personal samples of each worker engaged in asbestos handling (removal, disposal, transport and other associated work) throughout the duration of the project. If the quantity of airborne asbestos fibers monitored at the breathing zone of the workers at any time exceeds background or 0.01 fibers per cubic centimeter whichever is greater, stop work, evacuate personnel in adjacent areas or provide personnel with approved protective equipment at the discretion of the Contracting Officer. This sampling may be duplicated by the Government at the discretion of the Contracting Officer. If the air sampling results obtained by the Government differ from those obtained by the Contractor, the Government will determine which results predominate. If adjacent areas are contaminated as determined by the Contracting Officer, clean the contaminated areas, monitor, and visually inspect the area as specified herein.

3.2.3.2 Regulated Area for Class II Removal

Removal of brakes and electrical components are Class II removal activities. Establish designated limits for the asbestos regulated work area with the use of red barrier tape; install critical barriers, splash guards and signs, and maintain all other requirements for asbestos control area except local exhaust. Place impermeable dropcloths on surfaces beneath removal activity extending out 3 feet in all directions. A detached decontamination system may be used. Conduct area monitoring of airborne fibers during the work shift at the designated limits of the asbestos work area and conduct personal samples of each worker engaged in the work. If the airborne fiber concentration of the workers or designated limits at any time exceeds background or 0.01 fibers per cubic centimeter, whichever is greater, stop work immediately and correct the situation.

3.2.4 Removal Procedures

Wet asbestos material with a fine spray of amended water or a specific wetting agent such as light oil during removal, cutting, or other handling so as to reduce the emission of airborne fibers. Remove material and immediately place in 6 mil plastic disposal bags. Remove asbestos containing material in a gradual manner, with continuous application of the amended water or wetting agent in such a manner that no asbestos material is disturbed prior to being adequately wetted. Where unusual circumstances prohibit the use of 6 mil plastic bags, submit an alternate proposal for containment of asbestos fibers to the Contracting Officer for approval. For example, in the case where both piping and insulation are to be removed, the Contractor may elect to wet the insulation, wrap the pipes and insulation in plastic and remove the pipe by sections. Containerize asbestos containing material while wet. Do not allow asbestos material to accumulate or become dry. Lower and otherwise handle asbestos containing material as indicated in 40 CFR 61-SUBPART M.

3.2.4.1 Exposed Pipe Insulation Edges

Contain edges of asbestos insulation to remain that are exposed by a removal operation. Wet and cut the rough ends true and square with sharp tools and then encapsulate the edges with a 1/4 inch thick layer of non-asbestos containing insulating cement troweled to a smooth hard finish. When cement is dry, lag the end with a layer of non-asbestos lagging cloth, overlapping the existing ends by at least 4 inches. When insulating cement and cloth is an impractical method of sealing a raw edge of asbestos, take appropriate steps to seal the raw edges as approved by the Contracting Officer.

3.2.4.2 Presumed ACM

Presumed ACM must be treated as ACM throughout the abatement and disposal process. Testing can be performed by a trained and certified asbestos professional following applicable local, state, and federal regulations to either confirm the material is ACM or non-ACM. If testing proves asbestos is not present, the material can be managed as non-ACM.

3.2.5 Methods of Compliance

3.2.5.1 Mandated Practices

The specific abatement techniques and items identified must be detailed in the Contractor's Asbestos Hazard Abatement Plan (AHAP). Use the following

engineering controls and work practices in all operations, regardless of the levels of exposure:

a. Vacuum cleaners equipped with HEPA filters.

b. Wet methods or wetting agents except where it can be demonstrated that the use of wet methods is unfeasible due to the creation of electrical hazards, equipment malfunction, and in roofing.

c. Prompt clean-up and disposal.

d. Inspection and repair of polyethylene.

e. Cleaning of equipment and surfaces of containers prior to removing them from the equipment room or area.

3.2.5.2 Control Methods

Use the following control methods:

a. Local exhaust ventilation equipped with HEPA filter;

b. Enclosure or isolation of processes producing asbestos dust;

c. Where the feasible engineering and work practice controls are not sufficient to reduce employee exposure to or below the PELs, use them to reduce employee exposure to the lowest levels attainable and must supplement them by the use of respiratory protection.

3.2.5.3 Unacceptable Practices

The following work practices must not be used:

a. High-speed abrasive disc saws that are not equipped with point of cut ventilator or enclosures with HEPA filtered exhaust air.

b. Compressed air used to remove asbestos containing materials, unless the compressed air is used in conjunction with an enclosed ventilation system designed to capture the dust cloud created by the compressed air.

c. Dry sweeping, shoveling, or other dry clean up.

d. Employee rotation as a means of reducing employee exposure to asbestos.

3.2.6 Class II Work Procedures

In addition to the requirements of paragraphs MANDATED PRACTICES and CONTROL METHODS, the following engineering controls and work practices must be used:

a. A Competent Person must supervise the work.

b. For indoor work, critical barriers must be placed over all openings to the regulated area.

c. Impermeable dropcloths must be placed on surfaces beneath all removal activity.

3.2.7 Air Sampling

Perform sampling of airborne concentrations of asbestos fibers in accordance with 29 CFR 1926.1101, the Contractor's air monitoring plan, applicable local, state and federal regulations, and as specified herein. Sampling performed in accordance with 29 CFR 1926.1101 must be performed by the PQP. Sampling performed for environmental and quality control reasons must be performed by the PQP. Unless otherwise specified, use NIOSH Method 7400 for sampling and analysis. Monitoring may be duplicated by the Government at the discretion of the Contracting Officer. If the air sampling results obtained by the Government differ from those results obtained by the Contractor, the Government will determine which results predominate. Results of breathing zone samples must be made available to the tested employees and Contracting Officer.. Submit all documentation regarding initial exposure assessments, negative exposure assessments, and air-monitoring results.

3.2.7.1 Sampling Prior to Asbestos Work

Provide area air sampling and establish the baseline one day prior to the masking and sealing operations for each removal site. Establish the background by performing area sampling in similar but uncontaminated sites in the building.

3.2.7.2 Sampling During Asbestos Work

The PQP must provide personal and area sampling as indicated in 29 CFR 1926.1101 and governing environmental regulations. Breathing zone samples must be taken for at least 25 percent of the workers in each shift, or a minimum of two, whichever is greater. Air sample fiber counting must be completed and results provided within 24-hours (breathing zone samples), and 24 hours (environmental/clearance monitoring) after completion of a sampling period. In addition, provided the same type of work is being performed, provide area sampling at least once every work shift close to the work inside the enclosure, outside the clean room entrance to the enclosure, and at the exhaust opening of the local exhaust system. If sampling outside the enclosure shows airborne levels have exceeded background or 0.01 fibers per cubic centimeter, whichever is greater, stop all work, correct the condition(s) causing the increase, and notify the Contracting Officer immediately. Where alternate methods are used, perform personal and area air sampling at locations and frequencies that accurately characterize the evolving airborne asbestos levels. The written results must be signed by testing laboratory analyst, testing laboratory principal and the Contractor's PQP. The air sampling results must be documented on a Contractor's daily air monitoring log.

The PQP must provide personal sampling as indicated in 29 CFR 1926.1101. Breathing zone samples must be taken for at least 25 percent of the workers in each shift, or a minimum of two, whichever is greater. Breathing zone samples must be taken for at least 25 percent of the workers in each shift, or a minimum of two, whichever is greater. Air sample fiber counting must be completed and results provided within 24-hours (breathing zone samples), and 24 hours (environmental/clearance monitoring) after completion of a sampling period. At the same time the PQP must provide area sampling close to the work inside the enclosure, outside the clean room entrance to the enclosure, and at the exhaust opening of the local exhaust system. In addition, provided the same type of work is being performed, the PQP must provide area sampling once every work shift close to the work inside the enclosure, outside the clean room entrance to the enclosure, and at the

exhaust opening of the local exhaust system. If sampling outside the enclosure shows airborne levels have exceeded background or 0.01 fibers per cubic centimeter, whichever is greater, stop all work, correct the condition(s) causing the increase, and notify the Contracting Officer immediately. Where alternate methods are used, perform personal and area air sampling at locations and frequencies that accurately characterize the evolving airborne asbestos levels. The written results must be signed by testing laboratory analyst, testing laboratory principal and the Contractor's PQP. The air sampling results must be documented on a Contractor's daily air monitoring log.

3.2.7.3 Final Clearance Requirements, NIOSH PCM Method

For PCM sampling and analysis using NIOSH NMAM Method 7400, the fiber concentration inside the abated regulated area, for each airborne sample, must be less than 0.01 f/cc. The abatement inside the regulated area is considered complete when every PCM final clearance sample is below the clearance limit. If any sample result is greater than 0.01 total f/cc, the asbestos fiber concentration (asbestos f/cc) must be confirmed from that same filter using NIOSH NMAM Method 7402 (TEM) at no additional cost to the Government. If any confirmation sample result is greater than 0.01 asbestos f/cc, abatement is incomplete and cleaning must be repeated at no additional cost to the Government. Upon completion of any required recleaning, resampling with results to meet the above clearance criteria must be done at no additional cost to the Government.

3.2.7.4 Final Clearance Requirements, EPA TEM Method

For EPA TEM sampling and analysis, using the EPA Method specified in 40 CFR 763, abatement inside the regulated area is considered complete when the arithmetic mean asbestos concentration of the five inside samples is less than or equal to 70 structures per square millimeter (70 S/mm). When the arithmetic mean is greater than 70 S/mm, the three blank samples must be analyzed. If the three blank samples are greater than 70 S/mm, resampling must be done. If less than 70 S/mm, the five outside samples must be analyzed and a Z-test analysis performed. When the Z-test results are less than 1.65, the decontamination must be considered complete. If the Z-test results are more than 1.65, the abatement is incomplete and cleaning must be repeated. Upon completion of any required recleaning, resampling with results to meet the above clearance criteria must be done at no additional cost to the Government.

3.2.7.5 Sampling After Final Clean-Up (Clearance Sampling)

Provide area sampling of asbestos fibers and establish an airborne asbestos concentration of less than 0.01 fibers per cubic centimeter after final clean-up but before removal of the enclosure or the asbestos work control area. After final cleanup and the asbestos control area is dry but prior to clearance sampling, the PQP must perform a visual inspection in accordance with ASTM E1368 to ensure that the asbestos control and work area is free of any accumulations of dirt, dust, or debris. The asbestos fiber counts from these samples must be less than 0.01 fibers per cubic centimeter or be not greater than the background, whichever is greater. If any of the final samples indicate a higher value take appropriate actions to re-clean the area and repeat the sampling and analysis at no additional cost to the Government.

3.2.7.6 Air Clearance Failure

If clearance sampling results fail to meet the final clearance requirements, pay all costs associated with the required recleaning, resampling, and analysis, until final clearance requirements are met.

3.2.8 Lock-Down

Prior to removal of plastic barriers and after pre-clearance clean up of gross contamination, the PQP must conduct a visual inspection of all areas affected by the removal in accordance with ASTM E1368. Inspect for any visible fibers

3.2.9 Site Inspection

While performing asbestos engineering control work, the Contractor must be subject to on-site inspection by the Contracting Officer who may be assisted by or represented by safety or industrial hygiene personnel. If the work is found to be in violation of this specification, the Contracting Officer or his representative will issue a stop work order to be in effect immediately and until the violation is resolved. All related costs including standby time required to resolve the violation must be at no additional cost to the Government.

3.3 CLEAN-UP AND DISPOSAL

3.3.1 Housekeeping

Essential parts of asbestos dust control are housekeeping and clean-up procedures. Maintain surfaces of the asbestos control area free of accumulations of asbestos fibers. Give meticulous attention to restricting the spread of dust and debris; keep waste from being distributed over the general area. Use HEPA filtered vacuum cleaners. DO NOT BLOW DOWN THE SPACE WITH COMPRESSED AIR. When asbestos removal is complete, all asbestos waste is removed from the work-site, and final clean-up is completed, the Contracting Officer will attest that the area is safe before the signs can be removed. After final clean-up and acceptable airborne concentrations are attained but before the HEPA unit is turned off and the enclosure removed, remove all pre-filters on the building HVAC system and provide new pre-filters. Dispose of filters as asbestos contaminated materials. Reestablish HVAC mechanical, and electrical systems in proper working order. The Contracting Officer will visually inspect all surfaces within the enclosure for residual material or accumulated dust or debris. The Contractor must re-clean all areas showing dust or residual materials. If re-cleaning is required, air sample and establish an acceptable asbestos airborne concentration after re-cleaning. The Contracting Officer must agree that the area is safe in writing before unrestricted entry is permitted. The Government must have the option to perform monitoring to determine if the areas are safe before entry is permitted.

3.3.2 Title to Materials

All waste materials, except as specified otherwise, become the property of the Contractor and must be disposed of as specified in applicable local, State, and Federal regulations and herein.

3.3.3 Disposal of Asbestos

3.3.3.1 Procedure for Disposal

Coordinate all waste disposal manifests with the Contracting Officer and host installation environmental function. Collect asbestos waste, contaminated waste water filters, asbestos contaminated water, scrap, debris, bags, containers, equipment, and asbestos contaminated clothing which may produce airborne concentrations of asbestos fibers and place in sealed fiber-proof, waterproof, non-returnable containers (e.g. double plastic bags 6 mils thick, cartons, drums or cans). Wastes within the containers must be adequately wet in accordance with 40 CFR 61-SUBPART M. Affix a warning and Department of Transportation (DOT) label to each container including the bags or use at least 6 mils thick bags with the approved warnings and DOT labeling preprinted on the bag. Clearly indicate on the outside of each container the name of the waste generator and the location at which the waste was generated. Prevent contamination of the transport vehicle (especially if the transport vehicle is a rented truck likely to be used in the future for non-asbestos purposes). These precautions include lining the vehicle cargo area with plastic sheeting (similar to work area enclosure) and thorough cleaning of the cargo area after transport and unloading of asbestos debris is complete. Dispose of waste asbestos material at an Environmental Protection Agency (EPA) or State-approved asbestos landfill off Government property. For temporary storage, store sealed impermeable bags in asbestos waste drums or skids. An area for interim storage of asbestos waste-containing drums or skids must be assigned by the Contracting Officer or his authorized representative. Comply with 40 CFR 61-SUBPART M, State, regional, and local standards for hauling and disposal. Sealed plastic bags may be dumped from drums into the burial site unless the bags have been broken or damaged. Damaged bags must remain in the drum and the entire contaminated drum must be buried. Uncontaminated drums may be recycled. All persons handling containers with asbestos containing wastes must comply with applicable federal, state, and local regulations.

3.3.3.2 Asbestos Disposal Quantity Report

Direct the PQP to record and report, to the Contracting Officer, the amount of asbestos containing material removed and released for disposal. Deliver the report for the previous day at the beginning of each day shift with amounts of material removed during the previous day reported in linear feet or square feet as described initially in this specification and in cubic feet for the amount of asbestos containing material released for disposal.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 02 - EXISTING CONDITIONS

SECTION 02 83 00.00 99

LEAD REMEDIATION

PART 1 GENERAL

1.1 REFERENCES
1.2 DEFINITIONS
1.2.1 Action Level
1.2.2 Area Sampling
1.2.3 Certified Industrial Hygienist (CIH)
1.2.4 Competent Person (CP)
1.2.5 Contaminated Room
1.2.6 Decontamination Shower Facility
1.2.7 Deleading
1.2.8 Eight Hour Time Weighted Average (TWA)
1.2.9 High Efficiency Particulate Air (HEPA) Filter Equipment
1.2.10 Lead
1.2.11 Lead-Based Paint (LBP)
1.2.12 Lead Control Area
1.2.13 Lead Permissible Exposure Limit (PEL)
1.2.14 Material Containing Lead/Paint with Lead (MCL/PWL)
1.2.15 Personal Sampling
1.2.16 Physical Boundary
1.3 DESCRIPTION
1.3.1 Protection of Existing Areas To Remain
1.3.2 Coordination with Other Work
1.4 SUBMITTALS
1.5 QUALITY ASSURANCE
1.5.1 Qualifications
1.5.1.1 Competent Person Qualifications (CP)
1.5.1.2 Training Certification
1.5.1.3 Testing Laboratory
1.5.2 Requirements
1.5.2.1 Competent Person (CP) Responsibilities
1.5.2.2 Lead Compliance Plan
1.5.2.3 Occupational and Environmental Assessment Data Report
1.5.2.4 Medical Examinations
1.5.2.5 Training
1.5.2.6 Respiratory Protection Program
1.5.2.7 Hazard Communication Program
1.5.2.8 Lead Waste Management
1.5.2.9 Environmental, Safety and Health Compliance
1.5.3 Pre-Construction Conference
1.6 EQUIPMENT
1.6.1 Respirators
1.6.2 Special Protective Clothing
1.6.3 Rental Equipment Notification
1.6.4 Vacuum Filters
1.6.5 Equipment for Government Personnel

1.6.6 Abrasive Removal Equipment
1.6.7 Vacuum Systems
1.6.8 Heat Blower Guns
1.7 PROJECT/SITE CONDITIONS
1.7.1 Protection of Existing Work to Remain

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT
2.1.1 Expendable Supplies
2.1.1.1 Polyethylene Bags
2.1.1.2 Polyethylene Leak-tight Wrapping
2.1.1.3 Polyethylene Sheeting
2.1.1.4 Tape and Adhesive Spray
2.1.1.5 Containers
2.1.1.6 Chemical Paint Strippers
2.1.1.7 Chemical Paint Stripper Neutralizer
2.1.1.8 Detergents and Cleaners

PART 3 EXECUTION

3.1 PREPARATION
3.1.1 Protection
3.1.1.1 Notification
3.1.1.2 Lead Control Area
3.1.1.3 Decontamination Shower Facility
3.1.1.4 Eye Wash Station
3.1.1.5 Mechanical Ventilation System
3.1.1.6 Personnel Protection
3.2 ERECTION
3.2.1 Lead Control Area Requirements
3.3 APPLICATION
3.3.1 Lead Work
3.3.2 Paint with Lead or Material Containing Lead Removal
3.3.2.1 Paint with Lead or Material Containing Lead - Outdoor Removal
3.3.3 Personnel Exiting Procedures
3.4 FIELD QUALITY CONTROL
3.4.1 Tests
3.4.1.1 Air and Wipe Sampling
3.4.1.2 Testing of Material Containing Lead Residue
3.5 CLEANING AND DISPOSAL
3.5.1 Cleanup
3.5.2 Disposal
3.5.2.1 Disposal Documentation
3.5.2.2 Payment for Hazardous Waste

-- End of Section Table of Contents --

SECTION 02 83 00.00 99

LEAD REMEDIATION

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 701	(2023; ERTA 1 2023) Standard Methods of Fire Tests for Flame Propagation of Textiles and Films

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2024) Safety -- Safety and Occupational Health (SOH) Requirements

U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT (HUD)

HUD 6780	(1995; Errata Aug 1996;Rev Ch. 7 - 1997) Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1926.21	Safety Training and Education
29 CFR 1926.33	Access to Employee Exposure and Medical Records
29 CFR 1926.55	Gases, Vapors, Fumes, Dusts, and Mists
29 CFR 1926.59	Hazard Communication
29 CFR 1926.62	Lead
29 CFR 1926.65	Hazardous Waste Operations and Emergency Response
29 CFR 1926.103	Respiratory Protection
40 CFR 260	Hazardous Waste Management System: General
40 CFR 261	Identification and Listing of Hazardous Waste
40 CFR 262	Standards Applicable to Generators of Hazardous Waste
40 CFR 263	Standards Applicable to Transporters of

	Hazardous Waste
40 CFR 264	Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 265	Interim Status Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
40 CFR 268	Land Disposal Restrictions
49 CFR 172	Hazardous Materials Table, Special Provisions, Hazardous Materials Communications, Emergency Response Information, and Training Requirements
49 CFR 178	Specifications for Packagings

UNDERWRITERS LABORATORIES (UL)

UL 586	(2009; Reprint Sep 2022) UL Standard for Safety High-Efficiency Particulate, Air Filter Units

1.2 DEFINITIONS

1.2.1 Action Level

Employee exposure, without regard to use of respirators, to an airborne concentration of lead of 30 micrograms per cubic meter of air averaged over an eight hour period.

1.2.2 Area Sampling

Sampling of lead concentrations within the lead control area and inside the physical boundaries which is representative of the airborne lead concentrations but is not collected in the breathing zone of personnel (approximately 5 to 6 feet above the floor).

1.2.3 Certified Industrial Hygienist (CIH)

As used in this Section refers to a person retained by the Contractor who is certified as an industrial hygienist and who is trained in the recognition and control of lead hazards in accordance with current Federal, State, and local regulations. CIH must be certified for comprehensive practice by the American Board of Industrial Hygiene. The Certified Industrial Hygienist must be independent of the Contractor and must have no employee or employer relationship which could constitute a conflict of interest.

1.2.4 Competent Person (CP)

As used in this Section, refers to a person employed by the Contractor who is trained in the recognition and control of lead hazards in accordance with current Federal, State, and local regulations and has the authority to take prompt corrective actions to control the lead hazard. The Contractor may provide more than one CP as required to supervise and monitor the work. The CP must be a Certified Industrial Hygienist (CIH) certified by

the American Board of Industrial Hygiene or a Certified Safety Professional (CSP) certified by the Board of Certified Safety Professionals or a licensed lead-based paint abatement Supervisor/Project Designer in the State of Oregon.

1.2.5 Contaminated Room

Refers to a room for removal of contaminated personal protective equipment (PPE).

1.2.6 Decontamination Shower Facility

That facility that encompasses a clean clothing storage room, and a contaminated clothing storage and disposal rooms, with a shower facility in between.

1.2.7 Deleading

Activities conducted by a person who offers to eliminate lead-based paint or lead-based paint hazards or to plan such activities in commercial buildings, bridges or other structures.

1.2.8 Eight Hour Time Weighted Average (TWA)

Airborne concentration of lead to which an employee is exposed, averaged over an eight hour workday as indicated in 29 CFR 1926.62.

1.2.9 High Efficiency Particulate Air (HEPA) Filter Equipment

HEPA filtered vacuuming equipment with a UL 586 filter system capable of collecting and retaining lead contaminated particulate. A high efficiency particulate filter demonstrates at least 99.97 percent efficiency against 0.3 micron or larger size particles.

1.2.10 Lead

Metallic lead, inorganic lead compounds, and organic lead soaps. Excludes other forms of organic lead compounds. The use of the term Lead in this Section also refers to paints which contain detectable concentrations of Cadmium and Chromium. For the purposes of the Section lead-based paint (LBP) and paint with lead (PWL) also contains cadmium and chromium.

1.2.11 Lead-Based Paint (LBP)

Paint or other surface coating that contains lead in excess of 1.0 milligrams per centimeter squared or 0.5 percent by weight.

1.2.12 Lead Control Area

A system of control methods to prevent the spread of lead dust, paint chips or debris to adjacent areas that may include temporary containment, floor or ground cover protection, physical boundaries, and warning signs to prevent unauthorized entry of personnel. HEPA filtered local exhaust equipment may be used as engineering controls to further reduce personnel exposures or building/outdoor environmental contamination.

1.2.13 Lead Permissible Exposure Limit (PEL)

50 micrograms per cubic meter of air as an eight hour time weighted average

as determined by 29 CFR 1926.62. If an employee is exposed for more than eight hours in a work day, determine the PEL by the following formula:

PEL (micrograms/cubic meter of air) = 400/No. hrs worked per day

1.2.14 Material Containing Lead/Paint with Lead (MCL/PWL)

Any material, including paint, which contains lead as determined by the testing laboratory using a valid test method. The requirements of this Section does not apply if no detectable levels of lead are found using a quantitative method for analyzing paint or MCL using laboratory instruments with specified limits of detection (usually 0.01 percent). An X-Ray Fluorescence (XRF) instrument is not considered a valid test method.

1.2.15 Personal Sampling

Sampling of airborne lead concentrations within the breathing zone of an employee to determine the eight hour time weighted average concentration in accordance with 29 CFR 1926.62. Samples must be representative of the employees' work tasks. Breathing zone must be considered an area within a hemisphere, forward of the shoulders, with a radius of 6 to 9 inches and centered at the nose or mouth of an employee.

1.2.16 Physical Boundary

Area physically roped or partitioned off around lead control area to limit unauthorized entry of personnel.

1.3 DESCRIPTION

Construction activities impacting PWL or material containing lead which are covered by this specification include the demolition or removal of material containing lead and as indicated on the drawings. Paint on the existing bridge and appurtenances to be demolished is assumed to be LBP. The counterweight of the existing bridge to be demolished contains 140,000 pounds of metallic lead. The work covered by this Section includes work tasks and the precautions specified in this Section for the protection of facility workers and the environment during and after the performance of the hazard abatement activities.

1.3.1 Protection of Existing Areas To Remain

Project work including, but not limited to, lead hazard abatement work, storage, transportation, and disposal must be performed without damaging or contaminating adjacent work and areas. Where such work or areas are damaged or contaminated, restore work and areas to the original condition.

1.3.2 Coordination with Other Work

Coordinate with work being performed in adjacent areas to ensure there are no exposure issues. Explain coordination procedures in the Lead Compliance Plan and describe how the Contractor will prevent lead exposure to other Contractors and Government personnel performing work unrelated to lead activities.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" classification. Submittals not having a "G" classification are for information only. When

used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Competent Person Qualifications; G

Training Certification; G

Occupational and Environmental Assessment Data Report; G

Medical Examinations; G

Lead Waste Management Plan; G

Lead Compliance Plan; G

Written Evidence of TSD Approval; G

SD-03 Product Data

Respirators; G

Vacuum Filters; G

Materials and Equipment; G

Expendable Supplies; G

SD-06 Test Reports

Sampling Results; G

SD-07 Certificates

Testing Laboratory; G

SD-11 Closeout Submittals

Hazardous Waste Manifest; G

Turn-In Documents or Weight Tickets; G

1.5 QUALITY ASSURANCE

1.5.1 Qualifications

1.5.1.1 Competent Person Qualifications (CP)

Submit name, address, and telephone number of the CP selected to perform responsibilities specified in paragraph COMPETENT PERSON (CP) RESPONSIBILITIES. Provide documented construction project-related experience with implementation of OSHA's Lead in Construction standard

(29 CFR 1926.62) which shows ability to assess occupational and environmental exposure to lead; experience with the use of respirators, personal protective equipment and other exposure reduction methods to protect employee health. Demonstrate a minimum of three years experience implementing OSHA's Lead in Construction standard (29 CFR 1926.62). Submit proper documentation that the CP is trained and certified in accordance with Federal, State and local laws. The competent person must be a licensed lead-based paint abatement Supervisor/Project Designer in the State of Oregon.

1.5.1.2 Training Certification

Submit a certificate for each worker and supervisor, signed and dated by the accredited training provider, stating that the employee has received the required lead training specified in 29 CFR 1926.62.

1.5.1.3 Testing Laboratory

Submit the name, address, and telephone number of the testing laboratory selected to perform the air soil and wipe analysis, testing, and reporting of airborne concentrations of lead. Use a laboratory participating in the EPA National Lead Laboratory Accreditation Program (NLLAP) by being accredited by either the American Association for Laboratory Accreditation (A2LA) or the American Industrial Hygiene Association (AIHA) and that is successfully participating in the Environmental Lead Proficiency Analytical Testing (ELPAT) program to perform sample analysis. Laboratories selected to perform blood lead analysis must be OSHA approved.

1.5.2 Requirements

1.5.2.1 Competent Person (CP) Responsibilities

a. Verify training meets all Federal, State, and local requirements.

b. Review and approve Lead Compliance Plan for conformance to the applicable referenced standards.

c. Continuously inspect LBP/PWL or MCL work for conformance with the approved plan.

d. Perform (or oversee performance of) air sampling. Recommend upgrades or downgrades (whichever is appropriate based on exposure) on the use of PPE (respirators included) and engineering controls.

e. Ensure work is performed in strict accordance with specifications at all times.

f. Control work to prevent hazardous exposure to human beings and to the environment at all times.

g. Supervise final cleaning of the lead control area, take clearance wipe samples if necessary; review clearance sample results and make recommendations for further cleaning.

h. Certify the conditions of the work as called for elsewhere in this specification.

1.5.2.2 Lead Compliance Plan

Submit a detailed job-specific plan of the work procedures to be used in the disturbance of lead, LBP/PWL or MCL. Include in the plan a sketch showing the location, size, and details of lead control areas, critical barriers, physical boundaries, location and details of decontamination facilities, viewing ports, and mechanical ventilation system. Include a description of equipment and materials, work practices, controls and job responsibilities for each activity from which lead is emitted. Include in the plan, eating, drinking, smoking, hygiene facilities and sanitary procedures, interface of trades, sequencing of lead related work, collected waste water and dust containing lead and debris, air sampling, respirators, personal protective equipment, and a detailed description of the method of containment of the operation to ensure that lead is not released outside of the lead control area. Include site preparation, cleanup and clearance procedures. Include occupational and environmental sampling, training and strategy, sampling and analysis strategy and methodology, frequency of sampling, duration of sampling, and qualifications of sampling personnel in the air sampling portion of the plan. Include a description of arrangements made among Contractors on multicontractor worksites to inform affected employees and to clarify responsibilities to control exposures.

1.5.2.3 Occupational and Environmental Assessment Data Report

a. If initial monitoring is necessary, submit occupational and environmental sampling results to the CO within three working days of collection, signed by the testing laboratory employee performing the analysis, the employee that performed the sampling, and the CP.

b. In order to reduce the full implementation of 29 CFR 1926.62 the Contractor must provide documentation. Submit a report that supports the determination to reduce full implementation of the requirements of 29 CFR 1926.62 and supporting the Lead Compliance Plan.

(1) The initial monitoring must represent each job classification, or if working conditions are similar to previous jobs by the same employer, provide previously collected exposure data that can be used to estimate worker exposures per 29 CFR 1926.62. The data must represent the worker's regular daily exposure to lead for stated work.

(2) Submit worker exposure data gathered during the task based trigger operations of 29 CFR 1926.62 with a complete process description. This includes manual demolition, manual scraping, manual sanding, heat gun, power tool cleaning, rivet busting, cleanup of dry expendable abrasives, abrasive blast enclosure removal, abrasive blasting, welding, cutting and torch burning where lead containing coatings are present.

(3) The initial assessment must determine the requirement for further monitoring and the need to fully implement the control and protective requirements including the lead compliance plan per 29 CFR 1926.62.

1.5.2.4 Medical Examinations

Submit pre-work blood lead levels and post-work blood lead levels for all workers performing lead activities during the execution of the work. Initial medical surveillance as required by 29 CFR 1926.62 must be made

available to all employees exposed to lead at any time (one day) above the action level. Full medical surveillance must be made available to all employees on an annual basis who are or may be exposed to lead in excess of the action level for more than 30 days a year or as required by 29 CFR 1926.62. Adequate records must show that employees meet the medical surveillance requirements of 29 CFR 1926.33, 29 CFR 1926.62 and 29 CFR 1926.103. Provide medical surveillance to all personnel exposed to lead as indicated in 29 CFR 1926.62. Maintain complete and accurate medical records of employees for the duration of employment plus 30 years.

1.5.2.5 Training

Train each employee performing work that disturbs lead, who performs LBP/MCL/PWL disposal, and air sampling operations prior to the time of initial job assignment and annually thereafter, in accordance with 29 CFR 1926.21, 29 CFR 1926.62, and State of Oregon and local regulations where appropriate.

1.5.2.6 Respiratory Protection Program

a. Provide each employee required to wear a respirator a respirator fit test at the time of initial fitting and at least annually thereafter as required by 29 CFR 1926.62.

b. Establish and implement a respiratory protection program as required by 29 CFR 1926.103, 29 CFR 1926.62, and 29 CFR 1926.55.

1.5.2.7 Hazard Communication Program

Establish and implement a Hazard Communication Program as required by 29 CFR 1926.59.

1.5.2.8 Lead Waste Management

The Lead Waste Management Plan must comply with applicable requirements of Federal, State, and local hazardous waste regulations and address:

a. Identification and classification of wastes associated with the work.

b. Estimated quantities of wastes to be generated and disposed of.

c. Names and qualifications of each Contractor that will be transporting, storing, treating, and disposing of the wastes. Include the facility location and operator and a 24 hour point of contact. Provide USEPA Identification numbers for each transporter and disposal facility.

d. Names and qualifications (experience and training) of personnel who will be working on-site with hazardous wastes.

e. List of waste handling equipment to be used in performing the work, to include cleaning, volume reduction, and transport equipment.

f. Spill prevention, containment, and cleanup contingency measures including a health and safety plan to be implemented in accordance with 29 CFR 1926.65.

g. Work plan and schedule for waste containment, removal and disposal. Proper containment of the waste includes using acceptable waste

containers (e.g., 55 gallon drums) as well as proper marking/labeling of the containers. Clean up and containerize wastes daily.

h. Include any process that may alter or treat waste rendering a hazardous waste non hazardous.

i. Unit cost for hazardous waste disposal according to this plan.

1.5.2.9 Environmental, Safety and Health Compliance

a. In addition to the detailed requirements of this specification, comply with laws, ordinances, rules, and regulations of Federal, State, and local authorities regarding lead. Comply with the applicable requirements of the current issue of 29 CFR 1926.62 and EM 385-1-1. Submit matters regarding interpretation of standards to the CO for resolution before starting work. Where specification requirements and the referenced documents vary, the most stringent requirements apply.

b. Licensing and certification in the State of Oregon is required.

1.5.3 Pre-Construction Conference

Along with the CP, meet with the CO to discuss in detail the Lead Waste Management Plan and the Lead Compliance Plan, including procedures and precautions for the work.

1.6 EQUIPMENT

1.6.1 Respirators

Furnish appropriate respirators approved by the National Institute for Occupational Safety and Health (NIOSH), Department of Health and Human Services, for use in atmospheres containing lead dust, fume and mist. Respirators must comply with the requirements of 29 CFR 1926.62.

1.6.2 Special Protective Clothing

Personnel exposed to lead contaminated dust must wear proper disposable protective whole body clothing, head covering, gloves, eye, and foot coverings as required by 29 CFR 1926.62. Furnish proper disposable plastic or rubber gloves to protect hands. Reduce the level of protection only after obtaining approval from the CP.

1.6.3 Rental Equipment Notification

If rental equipment is to be used during PWL or MCL handling and disposal, notify the rental agency in writing concerning the intended use of the equipment.

1.6.4 Vacuum Filters

UL 586 labeled HEPA filters.

1.6.5 Equipment for Government Personnel

Furnish the CO with two complete sets of personal protective equipment (PPE) daily, as required herein, for entry into and inspection of the lead removal work within the lead controlled area. Personal protective equipment must include disposable whole body covering, including appropriate foot,

head, eye, and hand protection. PPE remains the property of the Contractor. The Government will provide respiratory protection for the CO.

1.6.6 Abrasive Removal Equipment

The use of powered machine for vibrating, sanding, grinding, or abrasive blasting is prohibited unless equipped with local exhaust ventilation systems equipped with high efficiency particulate air (HEPA) filters.

1.6.7 Vacuum Systems

Vacuum systems must be suitably sized for the project, and filters must be capable of trapping and retaining all mono-disperse particles as small as 0.3 micrometers (mean aerodynamic diameter) at a minimum efficiency of 99.97 percent. Properly dispose of used filters that are being replaced.

1.6.8 Heat Blower Guns

Heat blower guns must be flameless, electrical, paint-softener type with controls to limit temperature to 1,100 degrees F. Heat blower must be (grounded) 120 volts ac, and must be equipped with cone, fan, glass protector and spoon reflector nozzles.

1.7 PROJECT/SITE CONDITIONS

1.7.1 Protection of Existing Work to Remain

Perform work without damage or contamination of adjacent areas. Where existing work is damaged or contaminated, restore work to its original condition or better as determined by the CO.

PART 2 PRODUCTS

2.1 MATERIALS AND EQUIPMENT

Keep materials and equipment needed to complete the project available and on the site. Submit a description of the materials and equipment required; including Safety Data Sheets (SDSs) for material brought onsite to perform the work.

2.1.1 Expendable Supplies

Submit a description of the expendable supplies required.

2.1.1.1 Polyethylene Bags

Disposable bags must be polyethylene plastic and be a minimum of 6 mils thick (4 mils thick if double bags are used) or any other thick plastic material shown to demonstrate at least equivalent performance; and capable of being made leak-tight. Leak-tight means that solids, liquids or dust cannot escape or spill out.

2.1.1.2 Polyethylene Leak-tight Wrapping

Wrapping used to wrap lead contaminated debris must be polyethylene plastic that is a minimum of 6 mils thick or any other thick plastic material shown to demonstrate at least equivalent performance.

2.1.1.3 Polyethylene Sheeting

Sheeting must be polyethylene plastic with a minimum thickness of 6 mil, or any other thick plastic material shown to demonstrate at least equivalent performance; and be provided in the largest sheet size reasonably accommodated by the project to minimize the number of seams. Where the project location constitutes an out of the ordinary potential for fire, or where unusual fire hazards cannot be eliminated, provide flame-resistant polyethylene sheets which conform to the requirements of NFPA 701.

2.1.1.4 Tape and Adhesive Spray

Tape and adhesive must be capable of sealing joints between polyethylene sheets and for attachment of polyethylene sheets to adjacent surfaces. After dry application, tape or adhesive must retain adhesion when exposed to wet conditions, including amended water. Tape must be minimum 2 inches wide, industrial strength.

2.1.1.5 Containers

When used, containers must be leak-tight and be labeled in accordance with EPA, DOT and OSHA standards.

2.1.1.6 Chemical Paint Strippers

Chemical paint strippers must not contain methylene chloride and be formulated to prevent stain, discoloration, or raising of the substrate materials.

2.1.1.7 Chemical Paint Stripper Neutralizer

Neutralizers for paint strippers must be compatible with the substrate and suitable for use with the chemical stripper that has been applied to the surface.

2.1.1.8 Detergents and Cleaners

Detergents or cleaning agents must not contain trisodium phosphate and have demonstrated effectiveness in lead control work using cleaning techniques specified by HUD 6780 guidelines.

PART 3 EXECUTION

3.1 PREPARATION

3.1.1 Protection

3.1.1.1 Notification

Notify the CO 20 days prior to the start of any lead, cadmium and chromium work.

3.1.1.2 Lead Control Area

a. Physical Boundary - Provide physical boundaries around the lead control area by roping off the area designated in the work plan or providing curtains, portable partitions or other enclosures to ensure that lead will not escape outside of the lead control area. Prohibit the general public from accessing the lead control areas.

b. Warning Signs - Provide warning signs at approaches to lead control areas. Locate signs at such a distance that personnel may read the sign and take the necessary precautions before entering the area. Signs must comply with the requirements of 29 CFR 1926.62.

3.1.1.3 Decontamination Shower Facility

Provide clean and contaminated change rooms and shower facilities in accordance with this specification and 29 CFR 1926.62.

3.1.1.4 Eye Wash Station

Provide suitable facilities within the work area for quick drenching or flushing of the eyes where eyes may be exposed to injurious corrosive materials.

3.1.1.5 Mechanical Ventilation System

a. Use adequate ventilation to control personnel exposure to lead in accordance with 29 CFR 1926.62. To the extent feasible, use local exhaust ventilation or other collection systems, approved by the CP. Evaluate and maintain local exhaust ventilation systems in accordance with 29 CFR 1926.62.

b. Vent local exhaust outside the building and away from building ventilation intakes or ensure system is connected to HEPA filters.

c. Use locally exhausted, power actuated tools or manual hand tools.

3.1.1.6 Personnel Protection

Personnel must wear and use protective clothing and equipment as specified herein. Eating, smoking, or drinking or application of cosmetics is not permitted in the lead control area. No one will be permitted in the lead control area unless they have been appropriately trained and provided with protective equipment.

3.2 ERECTION

3.2.1 Lead Control Area Requirements

a. Establish a lead control area by completely establishing barriers and physical boundaries around the area or structure where PWL or MCL removal operations will be performed.

3.3 APPLICATION

3.3.1 Lead Work

Perform lead work in accordance with approved Lead Compliance Plan. Use procedures and equipment required to limit occupational exposure and environmental contamination with lead when the work is performed in accordance with 29 CFR 1926.62, and as specified herein. Dispose of all PWL or MCL and associated waste in compliance with Federal, State, and local requirements.

3.3.2 Paint with Lead or Material Containing Lead Removal

a. Manual or power sanding or grinding of lead surfaces or materials is not permitted unless tools are equipped with HEPA attachments or wet methods. The dry sanding or grinding of surfaces that contain lead is prohibited. Provide methodology for removing lead in the Lead Compliance Plan. Select lead removal processes to minimize contamination of work areas outside the control area with lead contaminated dust or other lead contaminated debris or waste and to ensure that unprotected personnel are not exposed to hazardous concentrations of lead. Describe this removal process in the Lead Compliance Plan.

b. Provide methodology for lead, LBP/PWL removal and processes to minimize contamination of work areas outside the control area with lead contaminated dust or other lead contaminated debris/waste and to ensure that unprotected personnel are not exposed to hazardous concentrations of lead. Describe this lead, LBP/PWL removal/control process in the Lead Compliance Plan.

3.3.2.1 Paint with Lead or Material Containing Lead - Outdoor Removal

Perform outdoor removal as indicated in Federal, State, and local regulations and in the Lead Compliance Plan. The worksite preparation (barriers or containments) must be job dependent and presented in the Lead Compliance Plan.

3.3.3 Personnel Exiting Procedures

Whenever personnel exit the lead controlled area, they must perform the following procedures and must not leave the work place wearing any clothing or equipment worn in the control area:

a. Vacuum all clothing before entering the contaminated change room.

b. Remove protective clothing in the contaminated change room, and place them in an approved impermeable disposal bag.

c. Shower.

d. Wash hands and face at the site, don appropriate disposable clothing, move to an appropriate shower facility, shower.

e. Change to clean clothes prior to leaving the clean clothes storage area.

3.4 FIELD QUALITY CONTROL

3.4.1 Tests

3.4.1.1 Air and Wipe Sampling

Conduct sampling for lead in accordance with 29 CFR 1926.62 and as specified herein. Air and wipe sampling must be directed or performed by the CP.

a. The CP must be on the job site directing the air and wipe sampling and inspecting the PWL or MCL removal work to ensure that the

requirements of the Contract have been satisfied during the entire PWL or MCL operation.

b. Collect personal air samples on employees who are anticipated to have the greatest risk of exposure as determined by the CP. In addition, collect air samples on at least twenty-five percent of the work crew or a minimum of two employees, whichever is greater, during each work shift.

c. Submit results of air samples, signed by the CP, within 72 hours after the air samples are taken.

d. Conduct area air sampling daily, on each shift in which lead and lead-based paint removal operations are performed, in areas immediately adjacent to the lead control area. Conduct sufficient area monitoring to ensure unprotected personnel are not exposed at or above 30 micrograms of lead per cubic meter of air. If 30 micrograms of lead per cubic meter of air is reached or exceeded, stop work, correct the conditions(s) causing the increased levels. Notify the CO immediately. Determine if condition(s) require any further change in work methods. Resume removal work only after the CP and the CO give approval.

3.4.1.2 Testing of Material Containing Lead Residue

Test residue in accordance with 40 CFR 261 for hazardous waste.

3.5 CLEANING AND DISPOSAL

3.5.1 Cleanup

Maintain surfaces of the lead control area free of accumulations of dust and debris. Restrict the spread of dust and debris; keep waste from being distributed over the work area. Do not dry sweep or use pressurized air to clean up the area. At the end of each shift and when the lead operation has been completed, clean the controlled area of all visible contamination by vacuuming with a HEPA filtered vacuum cleaner, wet mopping the area and wet wiping the area as indicated by the Lead Compliance Plan. Reclean areas showing dust or debris. After visible dust and debris is removed, wet wipe and HEPA vacuum all surfaces in the controlled area. If adjacent areas become contaminated at any time during the work, clean, visually inspect, and then wipe sample all contaminated areas. The CP must then certify in writing that the area has been cleaned of lead contamination before clearance testing.

3.5.2 Disposal

a. Disposal of metallic lead by landfilling is prohibited. Dispose of metallic lead by salvage and reuse or by recycling. Dispose of material, whether hazardous or non-hazardous in accordance with all laws and provisions and all Federal, State or local regulations. Ensure all waste is properly characterized. The result of each waste characterization (TCLP for RCRA materials) will dictate disposal requirements.

b. Contractor is responsible for segregation of waste. Collect lead contaminated waste, scrap, debris, bags, containers, equipment, and lead contaminated clothing that may produce airborne concentrations of lead particles. Label the containers in accordance with 29 CFR 1926.62, 40 CFR 261, 40 CFR 262 and corresponding state regulations.

c. Dispose of lead contaminated material classified as hazardous waste at an EPA approved hazardous waste treatment, storage, or disposal facility off Government property.

d. Accumulate waste materials in U.S. Department of Transportation (49 CFR 178) approved 55 gallon drums or appropriately sized container for smaller volumes. Properly label each drum to identify the type of hazardous material (49 CFR 172). For hazardous waste, the collection container requires marking/labeling in accordance with 40 CFR 262 and corresponding state regulations during the accumulation/collection timeframe. The CO or an authorized representative will assign an area for accumulation of waste containers. Coordinate authorized accumulation volumes and time limits with the host installation environmental function.

e. Handle, store, transport, and dispose lead or lead contaminated waste in accordance with 40 CFR 260, 40 CFR 261, 40 CFR 262, 40 CFR 263, 40 CFR 264, and 40 CFR 265. Comply with land disposal restriction notification requirements as required by 40 CFR 268.

f. All lead waste generation, management,and disposal will be coordinated with the Bonneville Project Environmental Protection Specialist.

3.5.2.1 Disposal Documentation

Coordinate all disposal or off-site shipments of lead waste with the host installation environmental function. Submit written evidence of TSD approval to demonstrate the hazardous waste treatment, storage, or disposal facility (TSD) is approved for lead disposal by the EPA, State or local regulatory agencies. Submit one copy of the completed hazardous waste manifest, signed and dated by the initial transporter in accordance with 40 CFR 262. Provide a certificate that the waste was accepted by the disposal facility. Provide turn-in documents or weight tickets for non-hazardous waste disposal.

3.5.2.2 Payment for Hazardous Waste

Payment for disposal of hazardous and non-hazardous waste will not be made until a signed copy of the manifest from the treatment or disposal facility is received and approved by the CO. The manifest must detail and certify the amount of lead containing materials or non-hazardous waste delivered to the treatment or disposal facility.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 03 - CONCRETE

SECTION 03 30 00.00 99

CAST-IN-PLACE REINFORCED CONCRETE

PART 1 GENERAL

1.1 REFERENCES
1.2 DEFINITIONS
1.3 SUBMITTALS
1.4 MODIFICATION OF REFERENCES
1.5 DELIVERY, STORAGE, AND HANDLING
1.5.1 Reinforcement
1.5.1.1 Epoxy Coated Reinforcing Steel
1.6 QUALITY ASSURANCE
1.6.1 Design Data
1.6.1.1 Formwork Calculations
1.6.1.2 Concrete Mix Design
1.6.1.3 Mass Concrete Design
1.6.2 Shop Drawings
1.6.2.1 Formwork
1.6.2.2 Reinforcing Steel
1.6.3 Control Submittals
1.6.3.1 Concrete Curing Plan
1.6.3.2 Pumping Concrete
1.6.3.3 Silica Fume Manufacturer's Representative
1.6.3.4 Finishing Plan
1.6.3.5 Safety Data Sheets
1.6.4 Test Reports
1.6.4.1 Fly Ash and Pozzolan
1.6.4.2 Slag Cement
1.6.4.3 Aggregates
1.6.4.4 Fiber-Reinforced Concrete
1.6.5 Field Samples
1.6.5.1 Slab Finish Sample
1.6.5.2 Surface Finish Samples
1.6.6 Quality Control Plan
1.6.7 Concrete Deck Pre-Placement Conference
1.6.8 Quality Control Personnel Certifications
1.6.8.1 Quality Manager Qualifications
1.6.8.2 Field Testing Technician and Testing Agency
1.6.8.3 ADA Sidewalk Certification
1.6.9 Laboratory Qualifications for Concrete Qualification Testing
1.6.10 Laboratory Accreditation
1.7 ENVIRONMENTAL REQUIREMENTS
1.7.1 Submittals for Environmental Performance
1.8 SUSTAINABLE DESIGN REQUIREMENTS
1.8.1 Local/Regional Materials
1.9 QUALIFICATIONS FOR WELDING WORK

PART 2 PRODUCTS

2.1 STRUCTURAL CONCRETE
2.2 FORMWORK MATERIALS
2.2.1 Wood Forms
2.2.1.1 Concrete Form Plywood (Standard Rough)
2.2.1.2 Overlaid Concrete Form Plywood (Standard Smooth)
2.2.2 Plastic Forms
2.2.3 Carton Forms
2.2.4 Steel Forms
2.3 FORMWORK ACCESSORIES
2.3.1 Form Ties
2.3.2 Waterstops
2.3.2.1 PVC Waterstop
2.3.2.2 Rubber Waterstop
2.3.2.3 Thermoplastic Elastomeric Rubber Waterstop
2.3.2.4 Hydrophilic Waterstop
2.3.3 Biodegradable Form Release Agent
2.3.4 Chamfer Materials
2.3.5 Construction Joints
2.4 CONCRETE MATERIALS
2.4.1 Cementitious Materials
2.4.1.1 Portland Cement
2.4.1.2 Blended Cements
2.4.1.3 Fly Ash
2.4.1.4 Slag Cement
2.4.1.5 Silica Fume
2.4.1.6 Other Supplementary Cementitious Materials
2.4.2 Water
2.4.3 Aggregate
2.4.3.1 Normal-Weight Aggregate
2.4.4 Admixtures
2.5 MISCELLANEOUS MATERIALS
2.5.1 Concrete Curing Materials
2.5.2 Nonshrink Grout
2.5.3 Surface Finish Materials
2.5.3.1 Deck Roadway Finish
2.5.3.2 Deck Sidewalk and Curb Finish
2.5.3.3 Bridge Approach Slab Finish
2.5.3.4 Other Surface Finish
2.5.4 Joint Filler
2.5.5 Joint Sealants
2.6 CONCRETE MIX DESIGN
2.6.1 Properties and Requirements
2.6.2 Durability
2.6.2.1 Alkali-Aggregate Reaction
2.6.2.2 Concrete Temperature
2.6.2.3 Concrete permeability
2.6.3 Trial Sampling and Testing
2.6.4 Ready-Mix Concrete
2.7 REINFORCEMENT
2.7.1 Reinforcing Bars
2.7.1.1 Epoxy-Coated Reinforcing Bars
2.7.1.2 Headed Shear Stud Reinforcement
2.7.2 Welded Wire Reinforcement
2.7.3 Welding

PART 3 EXECUTION

3.1 EXAMINATION

3.2 CONSTRUCTION METHODS
3.3 FORMS
3.4 PLACING REINFORCEMENT AND MISCELLANEOUS MATERIALS
3.4.1 General
3.4.2 Reinforcement Supports
3.4.3 Epoxy Coated Reinforcing
3.4.3.1 Epoxy Coated Reinforcing Steel Placement and Coating Repair
3.4.4 Splicing
3.4.5 Future Bonding
3.4.6 Setting Miscellaneous Material
3.4.7 Fabrication
3.4.8 Placing Reinforcement
3.4.9 Spacing of Reinforcing Bars
3.4.10 Concrete Protection for Reinforcement
3.4.11 Welding
3.5 BATCHING, MEASURING, MIXING, AND TRANSPORTING CONCRETE
3.5.1 Measuring
3.5.2 Mixing
3.5.3 Transporting
3.6 PLACING CONCRETE
3.6.1 Footing Placement
3.6.2 Approach Slab Placement
3.6.3 Bridge Rail Placement
3.6.4 Mass Concrete Placement
3.6.5 Pumping
3.6.6 Cold Weather
3.6.7 Hot Weather
3.6.8 Preparation of Surfaces to Receive Grout, Mortar, or Concrete
3.7 WASTE MANAGEMENT
3.7.1 Mixing Equipment
3.7.2 Hardened, Cured Waste Concrete
3.7.3 Reinforcing Steel
3.7.4 Other Waste
3.8 SURFACE FINISHES EXCEPT FLOOR, SLAB, AND PAVEMENT FINISHES
3.8.1 Defects
3.8.2 Formed Surfaces
3.8.2.1 Tolerances
3.8.2.2 Deck Finishing Machine
3.8.2.3 Surface Finish
3.9 CONCRETE SLAB AND MISCELLANEOUS CONSTRUCTION
3.9.1 Deck Roadway Texturing
3.10 TOLERANCES
3.10.1 Tolerance Report
3.11 JOINTS
3.11.1 Construction Joints
3.11.2 Contraction Joints in Slabs on Ground
3.11.3 Sealing Joints in Slabs on Ground
3.12 CURING AND PROTECTION
3.12.1 Curing Periods
3.12.2 Curing Formed Surfaces
3.12.3 Curing Unformed Surfaces
3.12.4 Temperature of Concrete During Curing
3.12.5 Protection from Mechanical Injury
3.12.6 Protection After Curing
3.13 FIELD QUALITY CONTROL
3.13.1 Aggregate Testing
3.13.2 Concrete Sampling
3.13.3 Concrete Testing
3.13.3.1 Slump Tests

3.13.3.2 Temperature Tests
3.13.3.3 Compressive Strength Tests
3.13.3.4 Air Content
3.13.3.5 Strength of Concrete Structure
3.13.3.6 Non-Conforming Materials
3.13.3.7 Testing Concrete Structure for Strength
3.14 REPAIR, REHABILITATION AND REMOVAL
3.14.1 Crack Repair
3.14.2 Repair of Weak Surfaces
3.14.3 Failure of Quality Assurance Test Results

-- End of Section Table of Contents --

SECTION 03 30 00.00 99

CAST-IN-PLACE REINFORCED CONCRETE

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO LRFD	(9th Edition; 2020 with 2022 Interims) Bridge Design Specifications
AASHTO M 240/M 240M	(2023) Standard Specification for Blended Hydraulic Cement

AMERICAN CONCRETE INSTITUTE (ACI)

ACI 117	(2010; R 2015) Specifications for Tolerances for Concrete Construction and Materials and Commentary
ACI 121R	(2008) Guide for Concrete Construction Quality Systems in Conformance with ISO 9001
ACI 301	(2020) Specifications for Structural Concrete
ACI 304R	(2000; R 2009) Guide for Measuring, Mixing, Transporting, and Placing Concrete
ACI 308.1	(2023) Specification for Curing Concrete
ACI 347R	(2014; Errata 1 2017) Guide to Formwork for Concrete
ACI SP-2	(2007; Abstract: 10th Edition) ACI Manual of Concrete Inspection
ACI SP-15	(2011) Field Reference Manual: Standard Specifications for Structural Concrete ACI 301-05 with Selected ACI References

AMERICAN HARDBOARD ASSOCIATION (AHA)

AHA A135.4	(1995; R 2004) Basic Hardboard

AMERICAN WELDING SOCIETY (AWS)

AWS D1.4/D1.4M	(2018) Structural Welding Code -

	Reinforcing Steel
AWS D1.5M/D1.5	(2020; Errata 1 2022) Bridge Welding Code

ASTM INTERNATIONAL (ASTM)

ASTM A615/A615M	(2022) Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM A706/A706M	(2022a) Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement
ASTM A775/A775M	(2022) Standard Specification for Epoxy-Coated Steel Reinforcing Bars
ASTM A780/A780M	(2020) Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
ASTM A884/A884M	(2019; Errata 1) Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Reinforcement
ASTM A934/A934M	(2022) Standard Specification for Epoxy-Coated Prefabricated Steel Reinforcing Bars
ASTM A1022/A1022M	(2016b) Standard Specification for Deformed and Plain Stainless Steel Wire and Welded Wire for Concrete Reinforcement
ASTM A1044/A1044M	(2016a; Errata 1) Standard Specification for Steel Stud Assemblies for Shear Reinforcement of Concrete
ASTM A1060/A1060M	(2016b) Standard Specification for Zinc-Coated (Galvanized) Steel Welded Wire Reinforcement, Plain and Deformed, for Concrete
ASTM A1064/A1064M	(2024) Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
ASTM C31/C31M	(2024b) Standard Practice for Making and Curing Concrete Test Specimens in the Field
ASTM C33/C33M	(2023) Standard Specification for Concrete Aggregates
ASTM C42/C42M	(2020) Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
ASTM C78/C78M	(2022) Standard Test Method for Flexural Strength of Concrete (Using Simple Beam

	with Third-Point Loading)
ASTM C94/C94M	(2024a) Standard Specification for Ready-Mixed Concrete
ASTM C150/C150M	(2022) Standard Specification for Portland Cement
ASTM C260/C260M	(2010a; R 2016) Standard Specification for Air-Entraining Admixtures for Concrete
ASTM C330/C330M	(2017a) Standard Specification for Lightweight Aggregates for Structural Concrete
ASTM C494/C494M	(2019; E 2022) Standard Specification for Chemical Admixtures for Concrete
ASTM C595/C595M	(2023) Standard Specification for Blended Hydraulic Cements
ASTM C618	(2023; E 2023) Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
ASTM C989/C989M	(2024) Standard Specification for Slag Cement for Use in Concrete and Mortars
ASTM C1017/C1017M	(2013; E 2015) Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete
ASTM C1074	(2019; E 2021) Standard Practice for Estimating Concrete Strength by the Maturity Method
ASTM C1077	(2024) Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation
ASTM C1107/C1107M	(2020) Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
ASTM C1116/C1116M	(2023) Standard Specification for Fiber-Reinforced Concrete
ASTM C1240	(2020) Standard Specification for Silica Fume Used in Cementitious Mixtures
ASTM C1260	(2023) Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)
ASTM C1293	(2008; R 2015) Standard Test Method for Determination of Length Change of Concrete Due to Alkali-Silica Reaction
ASTM C1567	(2023) Standard Test Method for Potential

	Alkali-Silica Reactivity of Combinations of Cementitious Materials and Aggregate (Accelerated Mortar-Bar Method)
ASTM C1602/C1602M	(2022) Standard Specification for Mixing Water Used in Production of Hydraulic Cement Concrete
ASTM D412	(2016; R 2021) Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers - Tension
ASTM D471	(2016a) Standard Test Method for Rubber Property - Effect of Liquids
ASTM E329	(2023) Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection

CONCRETE REINFORCING STEEL INSTITUTE (CRSI)

CRSI 10MSP	(2023) Manual of Standard Practice
CRSI RB4.1	(2016) Supports for Reinforcement Used in Concrete

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST)

NIST PS 1	(2009) DOC Voluntary Product Standard PS 1-07, Structural Plywood

OREGON DEPARTMENT OF TRANSPORTATION (ODOT)

ODOT SSC	(2024) Oregon Standard Specifications for Construction

U.S. ARMY CORPS OF ENGINEERS (USACE)

COE CRD-C 513	(1974) Corps of Engineers Specifications for Rubber Waterstops
COE CRD-C 572	(1974) Corps of Engineers Specifications for Polyvinylchloride Waterstops

1.2 DEFINITIONS

a. "Cementitious material" as used herein must include all portland cement, pozzolan, fly ash, slag cement, and silica fume.

b. "Exposed to public view" means situated so that it can be seen from eye level from a public location after completion of the building. A public location is accessible to persons not responsible for operation or maintenance of the building.

c. "Chemical admixtures" are materials in the form of powder or fluids that are added to the concrete to give it certain characteristics not obtainable with plain concrete mixes.

d. "Supplementary cementing materials" (SCM) include coal fly ash,

silica fume, slag cement, natural or calcined pozzolans, and ultra-fine coal ash when used in such proportions to replace the portland cement that result in improvement to sustainability and durability and reduced cost.

e. "Design strength" (f'c) is the specified compressive strength of concrete at time(s) specified in this Section to meet structural design criteria.

f. "Mass Concrete" is any concrete system that approaches a maximum temperature of 158 degrees F within the first 72 hours of placement. In addition, it includes all concrete elements with a Section thickness of 3 feet or more regardless of temperature.

g. "Mixture proportioning" is the process of designing concrete mixture proportions to enable it to meet the strength, service life and constructability requirements of the project while minimizing the initial and life-cycle cost.

h. "Mixture proportions" are the masses or volumes of individual ingredients used to make a unit measure (cubic meter or cubic yard) of concrete.

i. "Pozzolan" is a siliceous or siliceous and aluminous material, which in itself possesses little or no cementitious value but will, in finely divided form and in the presence of moisture, chemically react with calcium hydroxide at ordinary temperatures to form compounds possessing cementitious properties.

j. "Workability (or consistence)" is the ability of a fresh (plastic) concrete mix to fill the form/mould properly with the desired work (vibration) and without reducing the concrete's quality. Workability depends on water content, chemical admixtures, aggregate (shape and size distribution), cementitious content and age (level of hydration).

k. For additional definitions not shown see ODOT SSC.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" classification. Submittals not having a "G" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Concrete Curing Plan

Quality Control Plan; G

Quality Control Personnel Certifications; G

Quality Control Organizational Chart

Laboratory Accreditation; G

Form Removal Schedule; G

Concrete Deck Pre-Placement Conferences; G

SD-02 Shop Drawings

Formwork

Reinforcing Steel; G

SD-03 Product Data

Joint Sealants

Joint Filler

Formwork Materials

Cementitious Materials

Concrete Curing Materials

Reinforcement

Admixtures

Waterstops

Local/Regional Materials

Biodegradable Form Release Agent

Pumping Concrete

Finishing Plan

Nonshrink Grout

SD-04 Samples

Slab Finish Sample

Surface Finish Samples

SD-05 Design Data

Concrete Mix Design; G

Formwork Calculations

SD-06 Test Reports

Concrete Mix Design; G

Fly Ash

Pozzolan

Slag Cement

Aggregates

Fiber-Reinforced Concrete; G

Compressive Strength Tests; G

Air Content

Slump Tests

Water

SD-07 Certificates

Reinforcing Bars

Welder Qualifications

Silica Fume Manufacturer's Representative

Safety Data Sheets

Field Testing Technician and Testing Agency

ADA Certification

SD-08 Manufacturer's Instructions

Joint Sealants

Curing Compound

1.4 MODIFICATION OF REFERENCES

Accomplish work in accordance with ACI publications and ODOT SSC except as modified herein. Consider the advisory or recommended provisions to be mandatory. Interpret reference to the "Building Official," the "Structural Engineer," and the "Architect/Engineer" to mean the Contracting Officer (CO). Provide concrete in accordance with AASHTO LRFD.

1.5 DELIVERY, STORAGE, AND HANDLING

Follow ACI 301, ACI 304R and ASTM A934/A934M requirements and recommendations. Do not deliver concrete until forms, reinforcement, embedded items, and chamfer strips are in place and ready for concrete placement. Do not store concrete curing compounds or sealers with materials that have a high capacity to adsorb volatile organic compound (VOC) emissions. Do not store concrete curing compounds or sealers in occupied spaces. Deliver concrete mix materials per ODOT SSC Section 00540.47. Provide handling and placement of concrete per ODOT SSC Section 00540.48. Storage of concrete will not be permitted without approval from the Government.

1.5.1 Reinforcement

Store reinforcement of different sizes and shapes in separate piles or racks raised above the ground to avoid excessive rusting. Protect from contaminants such as grease, oil, and dirt. Ensure bar sizes can be accurately identified after bundles are broken and tags removed. Protect concrete reinforcement steel per ODOT SSC Section 00530.40.

1.5.1.1 Epoxy Coated Reinforcing Steel

Record coating lot on each shipping notice and carefully identify and re-tag bar bundles from bending plant. Provide systems for handling coated bars which have padded contact areas such as, nylon slings, all free of dirt and grit. Lift bundled coated bars with strong back, multiple supports, or platform bridge to prevent sagging and abrasion. Pad bundling bands where in contact with bars. Do not drop or drag bars or bundles. Store coated bars both in shop and in field, aboveground, on wooden or padded cribbing. Space the dunnage close enough to prevent excessive sags. Stack large quantities of straight bars with adequate protective blocking between layers. Schedule deliveries of epoxy coated bars to the job site to avoid the need for long term storage. Protect from direct sunlight and weather. Cover bars to be stored longer than 12 hours at the job site with opaque polyethylene sheeting or other suitable equivalent protective material. Protect concrete epoxy coated reinforcement steel per ODOT SSC Section 00530.40. Handle epoxy coated reinforcement steel per ODOT SSC Section 02510.11.

1.6 QUALITY ASSURANCE

1.6.1 Design Data

1.6.1.1 Formwork Calculations

ACI 347R. Include design calculations indicating arrangement of forms, sizes and grades of supports (lumber), panels, and related components. Furnish drawings and calculations of shoring and re-shoring methods proposed for slabs, beams, and walls. Calculations must indicate concrete pressure with both live and dead loads, along with material types. Provide formwork/falsework design calculations, including temporary bracing of concrete forms on steel structures per ODOT SSC Sections 00540.41 and 00150.35.

1.6.1.2 Concrete Mix Design

60 days minimum prior to concrete placement, submit a mix design for each strength and type of concrete. Submit a complete list of materials including type; brand; source and amount of cement, supplementary cementitious materials, fibers, and admixtures; and applicable reference specifications. Submit mill test and all other test for cement, supplementary cementitious materials, aggregates, and admixtures. Provide documentation of maximum nominal aggregate size, gradation analysis, percentage retained and passing sieve, and a graph of percentage retained verses sieve size. Provide mix proportion data using at least three different water-cementitious material ratios for each type of mixture, which produce a range of strength encompassing those required for each type of concrete required. If source material changes, resubmit mix proportion data using revised source material. Provide only materials that have been proven by trial mix studies to meet the requirements of this specification, unless otherwise approved in writing by the CO. Indicate clearly in the submittal where each mix design is used when more than one mix design is submitted. Resubmit data on concrete components if the qualities or source of components changes. Required average strength can be documented by field experience if field strength test data are available and represent a single group of at least 10 consecutive strength tests for one mixture, using materials and conditions similar to those expected for work, and encompassing a period of not less than 45 days. The average of field

strength tests must equal or exceed fcr'. Changes in materials, conditions, and proportions within the test record must not have been more closely restricted than those for the proposed work. Test records must not be more than 24 months old. Obtain mix design approval from the CO prior to concrete placement. Ensure concrete mix designs meet ODOT SSC Section 02001.15.

1.6.1.3 Mass Concrete Design

Concrete placements with the least dimension greater than 6 feet must be considered mass concrete. Concrete placement with the least dimension greater than 3 feet, but less than or equal than 6 feet, must require the approval of the Engineer for the use of accelerating admixtures. Shafts must not be considered mass concrete. Chloride based accelerating admixtures must not be used.

1.6.2 Shop Drawings

1.6.2.1 Formwork

a. Drawings showing details of formwork including, but not limited to; joints, supports, studding and shoring, and sequence of form and shoring removal. Indicate placement schedule, construction, location and method of forming control joints. Include locations of inserts, conduit, sleeves and other embedded items. Reproductions of Contract drawings are unacceptable. Submit form removal schedule indicating element and minimum length of time for form removal.

b. Design, fabricate, erect, support, brace, and maintain formwork so that it is able to support, without failure, all vertical and lateral loads that may reasonably be anticipated to be applied to the formwork. Provide formwork/falsework design plans, including temporary bracing of concrete forms on steel structures per ODOT SSC Sections 00540.41 and 00150.35.

1.6.2.2 Reinforcing Steel

Indicate bending diagrams, assembly diagrams, splicing and laps of bars, shapes, dimensions, and details of bar reinforcing, accessories, and concrete cover. Do not scale dimensions from structural drawings to determine lengths of reinforcing bars. Reproductions of Contract drawings are unacceptable. Provide QA for reinforcing steel per ODOT SSC Section 00530.

1.6.3 Control Submittals

1.6.3.1 Concrete Curing Plan

Submit proposed materials, methods and duration for curing concrete elements in accordance with ACI 308.1 and ODOT SSC Section 00540.51.

1.6.3.2 Pumping Concrete

Submit proposed materials and methods for pumping concrete. Submittal must include mix designs, pumping equipment including type of pump and size and material for pipe, and maximum length and height concrete is to be pumped.Submit pumping concrete in accordance with ODOT SSC Sections 00540.48 and 00540.22.

1.6.3.3 Silica Fume Manufacturer's Representative

The manufacturer's representative must be present at mix plant to ensure proper mix, including high range water reducer, and batching methods during the first three days of concrete mix preparation and placement. After which the manufacturer's representative must designate a representative at the concrete producer's plant to ensure the concrete mix procedures meet the silica fume manufacturer's recommendations. Representative to attend and advise at finishing of sample slab. Perform silica fume work in accordance with ODOT SSC Sections 02001 and 02030.

1.6.3.4 Finishing Plan

Perform bridge deck roadway and sidewalk finish per ODOT SSC Section 00540.50, approach slabs per ODOT SSC Section 00545.42, and for all other surface finish provide in accordance with ODOT SSC Section 00540.53.

1.6.3.5 Safety Data Sheets

Submit Safety Data Sheets (SDS) for all materials that are regulated for hazardous health effects. SDS must be readily accessible during each work shift to employees when they are at the construction site.

1.6.4 Test Reports

1.6.4.1 Fly Ash and Pozzolan

Submit test results in accordance with ASTM C618 for fly ash and pozzolan. Submit test results performed within six months of submittal date. Perform fly ash and pozzolan work in accordance with ODOT SSC Sections 02001 and 02030.

1.6.4.2 Slag Cement

Submit test results in accordance with ASTM C989/C989M for slag cement. Submit test results performed within six months of submittal date. Perform slag cement work in accordance with ODOT SSC Sections 02001, 02010 and 02030.

1.6.4.3 Aggregates

Submit test results in accordance with ASTM C33/C33M, or ASTM C330/C330M for lightweight aggregate, and ASTM C1293 or ASTM C1567 as required in the Paragraph titled ALKALI-AGGREGATE REACTION. Concrete aggregate quality and acceptance performed in accordance with ODOT SSC Sections 02690 and 00540.

1.6.4.4 Fiber-Reinforced Concrete

Test to determine flexural toughness index I5 in accordance with ASTM C1116/C1116M and ODOT SSC Section 02045.

1.6.5 Field Samples

1.6.5.1 Slab Finish Sample

Install minimum of 10 foot by 10 foot slab. Slab finish sample must not be part of the final project. Finish as required by specification. Silica fume manufacturer's representative must attend and advise. Allow structural concrete sampling and quality control per ODOT SSC Sections

00540 and 00165.

1.6.5.2 Surface Finish Samples

Provide a minimum of three sample concrete panels for each finish for each mix design, 3 feet by 3 feet, 3 inches thick. Use the approved concrete mix design(s). Provide sample panels on-site at locations directed. Once approved, each set of panels must be representative of each of the finishes specified and of the workmanship and finish(es) required. Do not remove or destroy samples until directed by the CO. Provide concrete surface finish per ODOT SSC Section 00540.

1.6.6 Quality Control Plan

Develop and submit for approval a concrete quality control program in accordance with the guidelines of ACI 121R and as specified herein. The plan must include approved laboratories. Provide direct oversight for the concrete qualification program inclusive of associated sampling and testing. All quality control reports must be provided to the CO, Quality Manager and Concrete Supplier. Maintain a copy of ACI SP-15 and CRSI 10MSP at project site. Ensure quality control plan meets ODOT SSC Sections 00165 and 02001.

1.6.7 Concrete Deck Pre-Placement Conference

Concrete deck pre-placement conferences per ODOT SSC Section 00540.02.

1.6.8 Quality Control Personnel Certifications

a. The Contractor must submit for approval the responsibilities of the various quality control personnel, including the names and qualifications of the individuals in those positions and a quality control organizational chart defining the quality control hierarchy and the responsibility of the various positions. Quality control personnel must be employed by the Contractor.

b. Submit American Concrete Institute certification for the following:

(1) CQC personnel responsible for inspection of concrete operations.

(2) Lead Foreman or Journeyman of the Concrete Placing, Finishing, and Curing Crews.

(3) Field Testing Technicians: ACI Concrete Field Testing Technician, Grade I.

c. Quality Control Personnel Certifications must be in accordance with ODOT SSC Section 02001.

1.6.8.1 Quality Manager Qualifications

The quality manager must hold a current license as a professional engineer in a U.S. state or territory with experience on at least five similar projects. Evidence of extraordinary proven experience may be considered by the CO as sufficient to act as the Quality Manager.

1.6.8.2 Field Testing Technician and Testing Agency

a. Submit data on qualifications of proposed testing agency and technicians for approval by the CO prior to performing testing on concrete.

(1) Work on concrete under this Contract must be performed by an ACI Concrete Field Testing Technician Grade 1 qualified in accordance with ACI SP-2 or equivalent. Equivalent certification programs must include requirements for written and performance examinations as stipulated in ACI SP-2.

(2) Testing agencies that perform testing services on reinforcing steel must meet the requirements of ASTM E329.

(3) Testing agencies that perform testing services on concrete materials must meet the requirements of ASTM C1077.

b. Ensure field testing performed in accordance with ODOT SSC Section 00165.

1.6.8.3 ADA Sidewalk Certification

Concrete deck sidewalk and curb ramps ADA certification for Contractors and working drawings for curb ramp work per ODOT SSC Section 00540.03.

1.6.9 Laboratory Qualifications for Concrete Qualification Testing

The concrete testing laboratory must have the necessary equipment and experience to accomplish required testing. The laboratory must meet the requirements of ASTM C1077 and be Cement and Concrete Reference Laboratory (CCRL) inspected. Testing will be accordance with ODOT SSC Section 00165.

1.6.10 Laboratory Accreditation

Laboratory and testing facilities must be provided by and at the expense of the Contractor. The laboratories performing the tests must be accredited in accordance with ASTM C1077, including ASTM C78/C78M and ASTM C1260. The accreditation must be current and must include the required test methods, as specified. Furthermore, the testing must comply with the following requirements:

a. Aggregate Testing and Mix Proportioning: Aggregate testing and mixture proportioning studies must be performed by an accredited laboratory and under the direction of a registered professional engineer in a U.S. state or territory competent in concrete materials who is competent in concrete materials and must sign all reports and designs.

b. Acceptance Testing: Furnish all materials, labor, and facilities required for molding, curing, testing, and protecting test specimens at the site and in the laboratory. Furnish and maintain boxes or other facilities suitable for storing and curing the specimens at the site while in the mold within the temperature range stipulated by ASTM C31/C31M.

c. Contractor Quality Control: All sampling and testing must be performed by an approved, onsite, independent, accredited laboratory.

d. Laboratory will be accordance with ODOT SSC Section 00165.

1.7 ENVIRONMENTAL REQUIREMENTS

Provide space ventilation according to material manufacturer recommendations, at a minimum, during and following installation of concrete curing compound and sealer. Maintain one of the following ventilation conditions during the curing period or for 72 hours after installation:

a. Supply 100 percent outside air 24 hours a day.

b. Supply airflow at a rate of six air changes per hour, when outside temperatures are between 55 degrees F and 84 degrees F and humidity is between 30 percent and 60 percent.

c. Supply airflow at a rate of one and a half air changes per hour, when outside air conditions are not within the range stipulated above.

d. Perform additional environmental requirements per ODOT SSC Section 00290.

1.7.1 Submittals for Environmental Performance

a. Provide data indication the percentage of post-industrial pozzolan (fly ash, slag cement) cement substitution as a percentage of the full product composite by weight.

b. Provide data indicating the percentage of post-industrial and post-consumer recycled content aggregate.

c. Provide product data indicating the percentage of post-consumer recycled steel content in each type of steel reinforcement as a percentage of the full product composite by weight.

d. Provide product data stating the location where all products were manufactured

e. For projects using FSC certified formwork, provide chain-of-custody documentation for all certified wood products.

f. For projects using reusable formwork, provide data showing how formwork is reused.

g. Provide SDS product information data showing that form release agents meet any environmental performance goals such as using vegetable and soy based products.

h. Provide SDS product information data showing that concrete adhesives meet any environmental performance goals including low emitting, low volatile organic compound products.

i. Provide additional environmental submittals per ODOT SSC Section 00290.

1.8 SUSTAINABLE DESIGN REQUIREMENTS

1.8.1 Local/Regional Materials

Use materials or products extracted, harvested, or recovered, as well as manufactured, within a 500 mile radius from the project site, if available from a minimum of three sources. Submit documentation indicating distance between manufacturing facility and the project site. Indicate distance of raw material origin from the project site. Indicate relative dollar value of local and regional materials to total dollar value of products included in project.

1.9 QUALIFICATIONS FOR WELDING WORK

a. Welding procedures must be in accordance with AWS D1.4/D1.4M.

b. Verify that Welder qualifications are in accordance with AWS D1.4/D1.4M for welding of reinforcement or under an equivalent qualification test approved in advance. Welders are permitted to do only the type of welding for which each is specifically qualified.

PART 2 PRODUCTS

2.1 STRUCTURAL CONCRETE

a. The concrete mix design and material requirements for cast-in-place structural concrete, including but not limited to aggregates, chemical admixtures, and cementitious materials, will be in accordance with ODOT SSC Sections 00540, 02001, and 02010. All cast-in-place reinforced concrete will be per the specified class on the Contract plans with the minimum compressive strength achieved at 28 days.

b. Provide reinforced concrete bridge approach slabs per ODOT SSC Section 00545.

2.2 FORMWORK MATERIALS

Provide formwork/falsework in accordance with ODOT SSC Section 00540.

a. Form-facing material in contact with concrete must be lumber, plywood, tempered concrete-form-grade hardboard, metal, plastic, or treated paper that creates specified appearance and texture of concrete surface. Submit product information on proposed form-facing materials if different from that specified herein. Permanent stay-in-place bridge deck forms are not allowed, use removable concrete forms on all steel structures. Do not weld or permanently attach any part of the form to any steel girder.

b. Design formwork, shores, reshores, and backshores to support loads transmitted to them and to comply with applicable building code requirements.

c. Design formwork and shoring for load redistribution resulting from stressing of post-tensioned reinforcement. Ensure that formwork allows movement resulting from application of prestressing force.

d. Design formwork to withstand pressure resulting from placement and vibration of concrete and to maintain specified tolerances.

e. Design formwork to accommodate waterstop materials in joints at locations indicated in Contract documents.

f. Provide temporary openings in formwork if needed to facilitate cleaning and inspection.

g. Design formwork joints to inhibit leakage of mortar.

h. Limit deflection of facing materials for concrete surfaces exposed to view to 1/240 of center-to-center spacing of facing supports.

i. Do not use earth cuts as forms for vertical or sloping surfaces.

j. Submit product information on proposed form-facing materials if different from that specified herein.

k. Submit shop drawings for formwork, shoring, reshoring, and backshoring. Shop drawings must be signed and sealed by a licensed design engineer.

l. Submit design calculations for formwork, shoring, reshoring, and backshoring. Design calculations must be signed and sealed by a licensed design engineer.

m. Submit procedure for reshoring and backshoring, including drawings signed and sealed by a licensed design engineer. Include on shop drawings the formwork removal procedure and magnitude of construction loads used for design of reshoring or backshoring system. Indicate in procedure the magnitude of live and dead loads assumed for required capacity of the structure at time of reshoring or backshoring.

n. Submit manufacturer's product data on form liner proposed for use with each formed surface.

2.2.1 Wood Forms

Use lumber as follows. Provide lumber that is square edged or tongue-and-groove boards, free of raised grain, knotholes, or other surface defects. Provide plywood that complies with NIST PS 1, B-B concrete form panels or better or AHA A135.4, hardboard for smooth form lining.

2.2.1.1 Concrete Form Plywood (Standard Rough)

Provide plywood that conforms to NIST PS 1, B-B, concrete form, not less than 5/8-inch thick.

2.2.1.2 Overlaid Concrete Form Plywood (Standard Smooth)

Provide plywood that conforms to NIST PS 1, B-B, high density form overlay, not less than 5/8-inch thick.

2.2.2 Plastic Forms

Plastic lumber as allowed by ODOT SSC Section 00540 must be approved by the Government. Provide plastic forms that contain a minimum of 50 percent post-consumer recycled content, or a minimum of 50 percent post-industrial recycled content.

2.2.3 Carton Forms

Moisture resistant treated paper faces, biodegradable, structurally sufficient to support weight of wet concrete until initial set. Provide carton forms that contain a minimum of five percent post-consumer recycled content, or a minimum of 20 percent post-industrial recycled content.

2.2.4 Steel Forms

Provide temporary steel form surfaces that do not contain irregularities, dents, or sags.

2.3 FORMWORK ACCESSORIES

a. Use commercially manufactured formwork accessories, including ties and hangers.

b. Form ties and accessories must not reduce the effective cover of the reinforcement.

2.3.1 Form Ties

a. Use form ties with ends or end fasteners that can be removed without damage to concrete.

b. Where indicated in Contract documents, use form ties with integral water barrier plates or other acceptable positive water barriers in walls.

c. The breakback distance for ferrous ties must be at least 2 in. for Surface Finish-2.0 or Surface Finish-3.0, as defined in ACI 301.

d. If the breakback distance is less than 3/4 in., use coated or corrosion-resistant ties.

e. Submit manufacturer's data sheet on form ties.

2.3.2 Waterstops

Provide waterstops per ODOT SSC Section 02440. Submit manufacturer's data sheet on waterstop materials and splices.

2.3.2.1 PVC Waterstop

Polyvinylchloride waterstops must conform to COE CRD-C 572.

2.3.2.2 Rubber Waterstop

Rubber waterstops must conform to COE CRD-C 513.

2.3.2.3 Thermoplastic Elastomeric Rubber Waterstop

Thermoplastic elastomeric rubber waterstops must conform to ASTM D471.

2.3.2.4 Hydrophilic Waterstop

Swellable strip type compound of polymer modified chloroprene rubber that swells upon contact with water must conform to the following requirements when tested in accordance to ASTM D412: Tensile strength 420 psi minimum;

ultimate elongation 600 percent minimum. Hardness must be 50 minimum on the type A durometer and the volumetric expansion ratio in distilled water at 70 degrees F must be 3 to 1 minimum.

2.3.3 Biodegradable Form Release Agent

a. Provide form release agent that is colorless, biodegradable, and either rapeseed oil-based, or soy oil-based, or water-based, with a low (maximum of 55 grams/liter (g/l)) or zero VOC content. A minimum of 85 percent of the total product must be biobased material.

b. Provide product that does not bond with, stain, or adversely affect concrete surfaces and does not impair subsequent treatments of concrete surfaces.

c. Provide form release agent that reduces formwork moisture absorption, and does not contain diesel fuel, petroleum-based lubricating oils, waxes, or kerosene. Submit documentation indicating type of biobased material in product and biobased content. Indicate relative dollar value of biobased content products to total dollar value of products included in project.

d. Submit manufacturer's product data on formwork release agent for use on each form-facing material.

2.3.4 Chamfer Materials

Use lumber materials with dimensions of 3/4 by 3/4 in. Provide chamfers in accordance with ODOT SSC Section 00540.

2.3.5 Construction Joints

Provide construction joints as shown on Contract plans and in accordance with ODOT SSC Section 00540.

2.4 CONCRETE MATERIALS

2.4.1 Cementitious Materials

Cementitious Materials submittals of mix design will be performed in accordance with ODOT SSC Sections 02001 and 02023.

2.4.1.1 Portland Cement

a. Portland Cement for concrete mixes will be in accordance with ODOT SSC Section 02010.

b. Unless otherwise specified, provide cement that conforms to ASTM C150/C150M Type I, II, or III.

c. Use one brand and type of cement for formed concrete having exposed-to-view finished surfaces.

d. Submit information along with evidence demonstrating compliance with referenced standards. Submittals must include types of cementitious materials, manufacturing locations, shipping locations, and certificates showing compliance.

e. Cementitious materials must be stored and kept dry and free from

contaminants.

2.4.1.2 Blended Cements

a. Blended cements must conform to ASTM C595/C595M and AASHTO M 240/M 240M, Type IP, IS, IL or IT per ODOT SSC Section 02010.20.

b. Slag cement added to the Type IS blend must meet ASTM C989/C989M.

c. The pozzolan added to the Type IS blend must meet ASTM C618 Class F or Class C, and must be interground with the cement clinker. The manufacturer must state in writing that the amount of pozzolan in the finished cement will not vary more than plus or minus five mass percent of the finished cement from lot-to-lot or within a lot. The percentage and type of pozzolan used in the blend must not change from that submitted for the aggregate evaluation and mixture proportioning.

2.4.1.3 Fly Ash

If fly ash is used for concrete mixtures, it must be done in accordance with ODOT SSC Sections 02001 and 02030.

2.4.1.4 Slag Cement

If slag cement is used for concrete mixes, it must be done in accordance with ODOT SSC Sections 02001 and 02035.

2.4.1.5 Silica Fume

a. If silica fume is used for concrete mixes, it must be done in accordance with ODOT SSC Sections 02001 and 02035.

b. Silica fume must conform to ASTM C1240, including the optional limits on reactivity with cement alkalis. Silica fume may be furnished as a dry, densified material or as slurry. Proper mixing is essential to accomplish proper distribution of the silica fume and avoid agglomerated silica fume which can react with the alkali in the cement resulting in premature and extensive concrete damage. Supervision at the batch plant, finishing, and curing is essential. Provide at the Contractor's expense the services of a manufacturer's technical representative, experienced in mixing, proportioning, placement procedures, and curing of concrete containing silica fume. This representative must be present on the project prior to and during at least the first four days of concrete production and placement using silica fume. A High Range Water Reducing admixture (HRWRA) must be used with silica fume.

2.4.1.6 Other Supplementary Cementitious Materials

Supplementary cementitious materials for concrete mixtures must be done in accordance with ODOT SSC Sections 02001 and 02035.

2.4.2 Water

a. Water or ice must comply with the requirements of ASTM C1602/C1602M.

b. Minimize the amount of water in the mix. Improve workability by adjusting the grading of the aggregate and using admixture rather than

by adding water.

c. Water must be potable; free from injurious amounts of oils, acids, alkalis, salts, organic materials, or other substances deleterious to concrete.

d. Protect mixing water and ice from contamination during storage and delivery.

e. Submit test report showing water complies with ASTM C1602/C1602M.

f. When nonpotable source is proposed for use, submit documentation on effects of water on strength and setting time in compliance with ASTM C1602/C1602M.

g. Must conform to ODOT SSC Section 02020.

2.4.3 Aggregate

2.4.3.1 Normal-Weight Aggregate

a. Aggregates must conform to ASTM C33/C33M and ODOT SSC Sections 02001 and 02690.

b. Aggregates used in concrete must be obtained from the same sources and have the same size range as aggregates used in concrete represented by submitted field test records or used in trial mixtures.

c. Store and handle aggregate in a manner that will avoid segregation and prevents contamination by other materials or other sizes of aggregates. Store aggregates in locations that will permit them to drain freely. Do not use aggregates that contain frozen lumps.

d. Submit types, pit or quarry locations, producers' names, aggregate supplier statement of compliance with ASTM C33/C33M, and ASTM C1293 expansion data not more than 18 months old.

2.4.4 Admixtures

a. Chemical admixtures must conform to ASTM C494/C494M and ODOT SSC Section 02040.

b. Air-entraining admixtures must conform to ASTM C260/C260M and ODOT SSC Section 02040.

c. Chemical admixtures for use in producing flowing concrete must conform to ASTM C1017/C1017M.

d. Do not use calcium chloride admixtures.

e. Admixtures used in concrete must be the same as those used in the concrete represented by submitted field test records or used in trial mixtures.

f. Protect stored admixtures against contamination, evaporation, or damage.

g. To ensure uniform distribution of constituents, provide agitating equipment for admixtures used in the form of suspensions or unstable

solutions. Protect liquid admixtures from freezing and from temperature changes that would adversely affect their characteristics.

h. Submit types, brand names, producers' names, manufacturer's technical data sheets, and certificates showing compliance with standards required herein.

i. Accelerating admixtures used in accordance with the manufacturer’s recommendations may be used in cast-in-place reinforced concrete, except as required here. Accelerating admixtures must not be used in bridge deck slabs, all concrete superstructures, mass concrete, and approach slabs and expansion joints.

2.5 MISCELLANEOUS MATERIALS

2.5.1 Concrete Curing Materials

Provide concrete curing material in accordance with ACI 301 Section 5 and ACI 308.1 Section 2, and ODOT SSC Section 02050. Submit product data for concrete curing compounds. Submit manufactures instructions for placement of curing compound. Provide concrete curing materials per ODOT SSC Section 02050. Provide concrete sealers per ODOT SSC Section 02060.

2.5.2 Nonshrink Grout

Nonshrink grout in accordance with ASTM C1107/C1107M and ODOT SSC Sections 02080 and 02440.

2.5.3 Surface Finish Materials

2.5.3.1 Deck Roadway Finish

After the deck roadway has been screeded with a finishing machine per ODOT SSC Section 00540.24, provide deck surface finish and the associated materials per ODOT SSC Section 00540.

2.5.3.2 Deck Sidewalk and Curb Finish

Provide sidewalk surface finish and the associated materials per ODOT SSC Sections 00540 and 00759.50.

2.5.3.3 Bridge Approach Slab Finish

Provide bridge approach slab surface finish and the associated materials per ODOT SSC Sections 00545.

2.5.3.4 Other Surface Finish

All other concrete exposed surfaces must be surface finished with materials and techniques per ODOT SSC Section 00540.53.

2.5.4 Joint Filler

Provide preformed joint fillers for concrete per ODOT SSC Section 02440.

2.5.5 Joint Sealants

Provide poured joint sealant for concrete per ODOT SSC Section 02440.

2.6 CONCRETE MIX DESIGN

2.6.1 Properties and Requirements

Provide concrete mix properties and requirements per ODOT SSC Section 00540, 02001, and 02010.

2.6.2 Durability

For High Performance Concrete (HPC) in the bridge deck, sidewalk, and approach panels ensure durability requirements in ODOT SSC Section 02001.20 are met.

2.6.2.1 Alkali-Aggregate Reaction

a. Do not use any aggregate susceptible to alkali-carbonate reaction (ACR).

b. For each aggregate used in concrete, the expansion result determined in accordance with ASTM C1293 must not exceed 0.04 percent at one year.

2.6.2.2 Concrete Temperature

Follow concrete temperature requirements per ODOT SSC Sections 00540 and 02001.

2.6.2.3 Concrete permeability

a. Provide concrete meeting the requirements of ODOT SSC Section 02001.

b. Submit documentation verifying compliance with specified requirements.

2.6.3 Trial Sampling and Testing

Trial sampling and testing must be in accordance to ODOT SSC Sections 00540 and 02001.

2.6.4 Ready-Mix Concrete

If ready-mixed concrete is utilized it must be done so in accordance with ODOT SSC Section 02001.

2.7 REINFORCEMENT

a. Bend reinforcement cold. Fabricate reinforcement in accordance with fabricating tolerances of ACI 117 and ODOT SSC Sections 00530 and 02510.

b. Submit manufacturer's certified test report for reinforcement.

c. Submit placing drawings showing fabrication dimensions and placement locations of reinforcement and reinforcement supports. Placing drawings must indicate locations of splices, lengths of lap splices, and details of mechanical and welded splices.

d. Submit request with locations and details of splices not indicated in Contract documents.

2.7.1 Reinforcing Bars

a. Reinforcing bars must be deformed, except spirals, load-transfer dowels, and welded wire reinforcement, which may be plain.

b. ASTM A615/A615M with the bars marked S, Grade 60; or ASTM A706/A706M with bars marked W, Grade 60 and 80. All reinforcement bars that need to be welded must be ASTM A706/A706M. Provide dowels for the approach slab conforming to ASTM A615/A615M where appropriate per ODOT Standard Drawing BR165.

c. Submit mill certificates for reinforcing bars.

d. Ensure all requirements of ODOT SSC 00530 and 02510 are met for steel reinforcement.

2.7.1.1 Epoxy-Coated Reinforcing Bars

a. Provide epoxy-coated reinforcing bars that conform to ASTM A775/A775M, Grade 60.

b. Coatings must be applied in plants that are certified in accordance with Concrete Reinforcing Steel Institute (CRSI) Epoxy Coating Plant Certification Program or an equivalent program acceptable to the CO.

c. Coating damage incurred during shipment, storage, handling, and placing of epoxy-coated reinforcing bars must be repaired. Repair damaged coating areas with patching material conforming to ASTM A775/A775M as applicable and in accordance with material manufacturer's written recommendations. Damaged coating area must not exceed two percent of surface area in each linear foot of each bar or bar must not be used. The two percent limit on damaged coating area must include repaired areas damaged before shipment as required by ASTM A775/A775M as applicable. Fading of coating color will not be cause for rejection of epoxy-coated reinforcing bars.

d. Submit concrete Reinforcing Steel Institute (CRSI) Epoxy Coating Plant Certification inspection and quality-control program of plant applying epoxy coating if proposed plant is not certified in accordance with CRSI Epoxy Coating Plant Certification Program.

e. Epoxy coated reinforcing bars must be handled and stored in accordance with ASTM A775/A775M. If the manufacturer stores bars outdoors for more than 2 months, cover coated reinforcement with opaque protective material.

f. Ensure that epoxy-coated reinforcement steel is done in accordance with ODOT SSC Sections 00530 and 02510.

2.7.1.2 Headed Shear Stud Reinforcement

Headed studs and headed stud assemblies must conform to ASTM A1044/A1044M. Fabricate shear connector studs with material, welding, and inspection according to AWS D1.5M/D1.5 and AWS D1.4/D1.4M.

2.7.2 Welded Wire Reinforcement

a. Use welded wire reinforcement specified in Contract documents and conforming to one or more of the specifications given herein.

b. Plain welded wire reinforcement must conform to ASTM A1064/A1064M with welded intersections spaced no greater than 12 inch apart in direction of principal reinforcement.

c. Deformed welded wire reinforcement must conform to ASTM A1064/A1064M, with welded intersections spaced no greater than 16 inch apart in direction of principal reinforcement.

d. Epoxy-coated welded wire reinforcement must conform to ASTM A884/A884M. Coating damage incurred during shipment, storage, handling, and placing of epoxy-coated welded wire reinforcement must be repaired in accordance with ASTM A884/A884M. Repair damaged coating areas with patching material in accordance with material manufacturer's written recommendations. If damaged area exceeds two percent of surface area in each linear foot of each wire or welded wire reinforcement, the sheet containing the damaged area must not be used. The two percent limit on damaged coating area must include repaired areas damaged before shipment as required by ASTM A884/A884M. Fading of coating color must not be cause for rejection of epoxy-coated welded wire reinforcement.

e. Stainless steel welded wire reinforcement must conform to ASTM A1022/A1022M.

f. Zinc-coated (galvanized) welded wire reinforcement must conform to ASTM A1060/A1060M. Coating damage incurred during shipment, storage, handling, and placing of zinc-coated (galvanized) welded wire reinforcement must be repaired in accordance with ASTM A780/A780M. If damaged area exceeds two percent of surface area in each linear foot of each wire or welded wire reinforcement, the sheet containing the damaged area must not be used. The two percent limit on damaged coating area must include repaired areas damaged before shipment as required by ASTM A1060/A1060M.

2.7.3 Welding

a. Provide weldable reinforcing bars that conform to ASTM A706/A706M, Grade 60 and 80, except that the maximum carbon content must be 0.55 percent.

b. Comply with AWS D1.4/D1.4M unless otherwise specified. Do not tack weld reinforcing bars.

c. Welded assemblies of steel reinforcement produced under factory conditions, such as welded wire reinforcement, bar mats, and deformed bar anchors, are allowed.

d. After completing welds on zinc-coated (galvanized), epoxy-coated, or zinc and epoxy dual-coated reinforcement, coat welds and repair coating damage in accordance with Paragraphs REINFORCING BARS AND WELDED WIRE REINFORCEMENT.

PART 3 EXECUTION

3.1 EXAMINATION

a. Do not begin installation until substrates have been properly constructed; verify that substrates are level.

b. If substrate preparation is the responsibility of another installer, notify CO of unsatisfactory preparation before processing.

c. Check field dimensions before beginning installation. If dimensions vary too much from design dimensions for proper installation, notify CO and wait for instructions before beginning installation.

d. Provide examination requirements per ODOT SSC Sections 00540, 02001, and 02010. Before any cast-in-place reinforced concrete construction activities begin, the qualifications for all required Contractor Quality Control personnel must be submitted to and approved by the engineer.

3.2 CONSTRUCTION METHODS

Construction methods pertaining to structural concrete including all portions of the bridge project must be in accordance with the ODOT SSC Section 00540.

3.3 FORMS

a. All construction use of temporary formwork/falsework for structural concrete must be utilized and removed in accordance with the ODOT SSC Section 00540.

b. Concrete maturity method in accordance with ASTM C1074 and ODOT SSC. Submit maturity method data using project materials and concrete mix proportions used on the project to demonstrate the correlation between maturity and compressive strength of laboratory cured test specimens to the CO.

3.4 PLACING REINFORCEMENT AND MISCELLANEOUS MATERIALS

a. Unless otherwise specified, placing reinforcement and miscellaneous materials must be in accordance to the ODOT SSC Section 00530. Provide bars, welded wire reinforcement, and other devices necessary to install and secure reinforcement. Provide alternating reinforcement bar splices where possible.

b. Reinforcement must not have rust, scale, oil, grease, clay, or foreign substances that would reduce the bond. Rusting of reinforcement is a basis of rejection if the effective cross-sectional area or the nominal weight per unit length has been reduced. Remove loose rust prior to placing steel. Tack welding is prohibited.

c. Structural concrete members must have concrete cover for reinforcement given in the Contract documents.

3.4.1 General

Provide details of reinforcement that are in accordance with the Contract documents and CRSI 10MSP.

3.4.2 Reinforcement Supports

Provide reinforcement support in accordance with CRSI RB4.1 and ACI 301 Section 3 requirements. Ensure requirements are met for ODOT SSC Section 00530 as well. Supports for coated or galvanized bars must also be coated

with electrically compatible material for a distance of at least 2 inches beyond the point of contact with the bars.

3.4.3 Epoxy Coated Reinforcing

Epoxy Coated Reinforcing must meet the requirements of ASTM A934/A934M including Appendix X2, "Guidelines for Job Site Practices" except as otherwise specified herein. Epoxy Coated Reinforcement must adhere to ODOT SSC Sections 00530 and 02510 requirements. Epoxy Coated Reinforcement must be provided in the bridge deck, bridge approach slabs, sidewalk, and bridge rails.

3.4.3.1 Epoxy Coated Reinforcing Steel Placement and Coating Repair

Carefully handle and install bars to minimize job site patching. Use the same precautions as described in the Paragraph titled EPOXY-COATED REINFORCING BARS. Do not drag bars over other bars or over abrasive surfaces. Keep bar free of dirt and grit. When possible, assemble reinforcement as tied cages prior to final placement into the forms. Support assembled cages on padded supports. It is not expected that coated bars, when in final position ready for concrete placement, are completely free of damaged areas; however, excessive nicks and scrapes which expose steel is cause for rejection. Criteria for defects which require repair and for those that do not require repair are as indicated. Inspect for defects and provide required repairs prior to assembly. After assembly, reinspect and provide final repairs.

a. Immediately prior to application of the patching material, manually remove any rust and debonded coating from the reinforcement by suitable techniques employing devices such as wire brushes and emery paper. Exercise cars during this surface preparation so that the damaged areas are not enlarged more than necessary to accomplish the repair. Clean damaged areas of dirt, debris, oil, and similar materials prior to application of the patching material.

b. Do repair and patching in accordance with the patching material manufacturer's recommendations and ODOT SSC Section 00530. These recommendations, including cure times, must be available at the job site at all times.

c. Allow adequate time for the patching materials to cure in accordance with the manufacturer's recommendation prior to concrete placement.

d. Rinse placed reinforcing bars with fresh water to remove chloride contamination prior to placing concrete.

3.4.4 Splicing

Provide steel reinforcement splicing as indicated in the Contract documents. For splices not indicated follow ODOT SSC Section 00530. Do not splice at points of maximum stress. Overlap welded wire reinforcement the spacing of the cross wires, plus 2 inches. Approve welded splices prior to use and per AWS D1.4/D1.4M.

3.4.5 Future Bonding

Plug exposed, threaded, mechanical reinforcement bar connectors with a greased bolt. Provide bolt threads that match the connector. Countersink the connector in the concrete. Caulk the depression after the bolt is

installed.

3.4.6 Setting Miscellaneous Material

Place and secure anchors and bolts, pipe sleeves, conduits, and other such items in position before concrete placement and support against displacement. Plumb anchor bolts and check location and elevation. Temporarily fill voids in sleeves with readily removable material to prevent the entry of concrete.

3.4.7 Fabrication

a. Shop fabricate reinforcing bars to conform to shapes and dimensions indicated for reinforcement, and as follows:

(1) Provide fabrication tolerances that are in accordance with ACI 117.

(2) Provide hooks and bends that are in accordance with the Contract documents.

b. Reinforcement must be bent cold to shapes as indicated. Bending must be done in the shop. Rebending of a reinforcing bar that has been bent incorrectly is not be permitted. Bending must be in accordance with standard approved practice and by approved machine methods.

c. Deliver reinforcing bars bundled, tagged, and marked. Tags must be metal with bar size, length, mark, and other information pressed in by machine. Marks must correspond with those used on the placing drawings.

d. Do not use reinforcement that has any of the following defects:

(1) Bar lengths, depths, and bends beyond specified fabrication tolerances

(2) Bends or kinks not indicated on drawings or approved shop drawings

(3) Bars with reduced cross-section due to rusting or other cause

e. Replace defective reinforcement with new reinforcement having required shape, form, and cross-section area.

3.4.8 Placing Reinforcement

a. Place reinforcement in accordance with ACI 301 and ODOT SSC Section 00530.

b. For slabs on grade (over earth or over capillary water barrier) and for footing reinforcement, support bars or welded wire reinforcement on precast concrete blocks, spaced at intervals required by size of reinforcement, to keep reinforcement the minimum height specified above the underside of slab or footing.

c. Provide reinforcement that is supported and secured together to prevent displacement by construction loads or by placing of wet concrete, and as follows:

(1) Provide supports for reinforcing bars that are sufficient in

number and have sufficient strength to carry the reinforcement they support, and in accordance with ACI 301, CRSI 10MSP and ODOT SSC Section 00530. Do not use supports to support runways for concrete conveying equipment and similar construction loads.

(2) Equip supports on ground and similar surfaces with sand-plates.

(3) Support welded wire reinforcement as required for reinforcing bars.

(4) Secure reinforcements to supports by means of tie wire. Wire must be black, soft iron wire, not less than 16 gage.

(5) Reinforcement must be accurately placed, securely tied at intersections, and held in position during placing of concrete by spacers, chairs, or other approved supports. Point wire-tie ends away from the form. Unless otherwise indicated, numbers, type, and spacing of supports must conform to the Contract documents.

(6) Bending of reinforcing bars partially embedded in concrete is permitted only as specified in the Contract documents.

3.4.9 Spacing of Reinforcing Bars

a. Spacing must be as indicated in the Contract documents.

b. Reinforcing bars may be relocated to avoid interference with other reinforcement, or with conduit, pipe, or other embedded items. If any reinforcing bar is moved a distance exceeding one bar diameter or specified placing tolerance, resulting rearrangement of reinforcement is subject to preapproval by the CO.

3.4.10 Concrete Protection for Reinforcement

Additional concrete protection must be in accordance with the Contract documents and ODOT SSC Section 00540.

3.4.11 Welding

Welding must be in accordance with AWS D1.4/D1.4M.

3.5 BATCHING, MEASURING, MIXING, AND TRANSPORTING CONCRETE

All batching, measuring, mixing, and transporting of concrete must be in accordance with ODOT SSC Sections 00540, 02001, and 02010.

3.5.1 Measuring

Make measurements at intervals as specified in ODOT SSC Sections 00165 and 02001.

3.5.2 Mixing

a. Mix concrete in accordance with ODOT SSC Section 00540, ASTM C94/C94M, ACI 301 and ACI 304R.

b. Machine mix concrete. Begin mixing within 30 minutes after the cement has been added to the aggregates. Place concrete within 90 minutes of either addition of mixing water to cement and aggregates or

addition of cement to aggregates if the concrete temperature is less than 84 degrees F.

c. Place concrete within 60 minutes if the concrete temperature is greater than 84 degrees F except as follows: if set retarding admixture is used and slump requirements can be met, limit for placing concrete may remain at 90 minutes. Additional water may be added, provided that both the specified maximum slump and submitted water-cementitious material ratio are not exceeded and the required concrete strength is still met. When additional water is added, an additional 30 revolutions of the mixer at mixing speed is required.

d. If the entrained air content falls below the specified limit, add a sufficient quantity of admixture, within the manufacturer's recommended dosage, to bring the entrained air content within the specified limits. Dissolve admixtures in the mixing water and mix in the drum to uniformly distribute the admixture throughout the batch. Do not reconstitute concrete that has begun to solidify.

3.5.3 Transporting

Transport concrete from the mixer to the forms as rapidly as practicable and deliver per ODOT SSC Section 00540. Prevent segregation or loss of ingredients. Clean transporting equipment thoroughly before each batch. Do not use aluminum pipe or chutes. Remove concrete which has segregated in transporting and dispose of as directed.

3.6 PLACING CONCRETE

Place concrete in accordance with ODOT SSC Section 00540.

3.6.1 Footing Placement

Concrete for footings may be placed in excavations without forms upon inspection and approval by the CO. Excavation width must be a minimum of 4 inches greater than indicated.

3.6.2 Approach Slab Placement

Construct bridge approach slabs per ODOT SSC Section 00545.

3.6.3 Bridge Rail Placement

Refer to the Contract plans and ODOT Standard Drawings BR216 and BR220. Place concrete for bridge rails per ODOT SSC Section 00545 and Section 00587. Refer to Section 05 12 00.00 99 STRUCTURAL BRIDGE STEEL for metal railing, posts, and fixture coordination concrete bridge rail interface. Provide accommodations for concrete rails on approach slabs with roadway elements such as guardrails at approach slab ends.

3.6.4 Mass Concrete Placement

a. Produce a mass concrete placement free of cracks caused or worsened by concrete heat of hydration. Accomplish this through appropriate concrete mix design and control of concrete temperatures and temperature differences. Use of concrete pre-cooling, concrete post-cooling, application of insulation or external heat, and or selection of reduced heat of hydration concrete mix may be appropriate for this purpose.

b. Compliance with this specification may result in long durations of temperature control which could impact the sequence and schedule of planned work. The Contractor must implement procedures to control concrete temperatures that are compatible with the work plan and project schedule.

c. Provide a thermal control plan signed and stamped by licensed engineer. Unless otherwise specified, the following temperature limits apply:

(1) Maximum temperature in concrete after placement cannot exceed 160 degrees F.

(2) Maximum temperature difference between center and any surface of placement, and with ambient temperature, must not exceed 35 degrees F.

(a) The surface is 2 to 6 inches internal to the outer dimension of the placement and can include the upper surface and the sides.

(b) The center is the vertical centerline horizontally centered with the element where mass concrete is being placed.

d. Submit a thermal control plan for each mass concrete placement that includes:

(1) Concrete materials, mixture proportions, and ranges of chemical admixture dosages using ODOT SSC.

(2) Permissible changes to concrete materials and mixture proportions that do not require the thermal control plan to be updated.

(3) Calculated and measured adiabatic temperature rise of concrete.

(4) Upper limit for concrete temperature at time of placement.

(5) Description of specific measures and equipment that will be used to ensure maximum temperature in placement will not exceed the specified maximum temperature.

(6) Calculated maximum temperature difference in placement based on expected conditions at time of placement and use of proposed measures to control temperature differences.

(7) Description of equipment and procedures that will be used to monitor and log temperatures and temperature differences.

(8) Drawings of locations for temperature sensors in placement.

(9) Description of format and frequency of reporting temperature data.

(10) Description of measures to address and reduces excessive temperatures and temperature differences if they occur.

(11) Description of curing procedures, including materials and

methods, and curing duration.

(12) Description of formwork removal procedures to ensure temperature difference at temporarily exposed surface will not exceed temperature difference limit, and how curing will be maintained.

e. Update thermal control plan if changes in concrete materials or mixture proportions affect compliance with temperature limits. Unless otherwise specified, preserve moisture by maintaining forms in place. For surfaces not in contact with forms either apply water-retention sheeting material without holes or gaps, or apply membrane-forming curing compound. Control concrete temperature and temperature difference within the concrete from the time concrete is placed until internal temperature has cooled from its maximum so that the difference between average daily ambient temperature and internal temperatures at time of protection removal is less than the specified temperature difference limit. Do not use ice in the concrete mix. Place two temperature sensors (one redundant backup) at the center of the largest portion of placement, two temperature sensors (one redundant backup) at a depth 2 to 3 inches from the edge of exterior surface that is nearest to the vertical center of the placement, and two temperature sensors (one redundant backup) at a depth 3 to 4 inches from the upper surface nearest the horizontal center of the placement. In addition, place two temperature sensors (one redundant backup) in a shaded location for monitoring ambient onsite temperature. Monitor temperatures hourly using electronic sensors capable of measuring temperatures from 0 to 212 degrees F to an accuracy of 2 degrees F. Ensure temperature sensors are operational before placing concrete. Provide temperature monitoring data daily to the Engineer until the internal temperature has cooled from maximum so that the difference between the average daily ambient temperature and the internal temperature at the time of protection removal is less than 35 degrees F. Do no place fresh concrete between hardened concrete placed within the previous four weeks. If unavoidable, obtain approval from the Engineer. If temperatures are nearing the maximum temperature or maximum difference in temperature, take immediate action as described in the thermal control plan. Do not place additional concrete until the cause of excessive temperatures or temperature difference has been identified and corrections are accepted. Care must be taken to avoid construction joints where they are not specified. If unavoidable, obtain approval from the Engineer. If the temperature difference limit is exceeded, the Engineer may require additional testing at no cost to the Department to determine if a pay deduction or removal of material is required. If there is no apparent damage with the concrete, the material may remain in place. If the maximum temperature limit is exceeded, strengths may be reduced and internal expansion and cracking of concrete may not be apparent for several years after the placement; therefore, the material must be removed and replaced at the discretion of the Engineer.

3.6.5 Pumping

Pump structural concrete in accordance with ODOT SSC Section 00540. Pumping must not result in separation or loss of materials nor cause interruptions sufficient to permit loss of plasticity between successive increments. Loss of slump in pumping equipment must not exceed 2 inches at discharge/placement. Do not convey concrete through pipe made of aluminum or aluminum alloy. Avoid rapid changes in pipe sizes. Limit maximum size

of course aggregate to 33 percent of the diameter of the pipe. Limit maximum size of well-rounded aggregate to 40 percent of the pipe diameter. Take samples for testing at both the point of delivery to the pump and at the discharge end.

3.6.6 Cold Weather

Cold weather concrete must meet the requirements of ODOT SSC Section 00540 and ACI 301 unless otherwise specified. Do not allow concrete temperature to decrease below 50 degrees F. Obtain approval prior to placing concrete when the ambient temperature is below 40 degrees F or when concrete is likely to be subjected to freezing temperatures within 24 hours. Cover concrete and provide sufficient heat to maintain 50 degrees F minimum adjacent to both the formwork and the structure while curing. Limit the rate of cooling to 37 degrees F in any one hour and 50 degrees F per 24 hours after heat application.

3.6.7 Hot Weather

Hot weather concrete must meet the requirements of ODOT SSC Section 00540 and ACI 301 unless otherwise specified. Maintain required concrete temperature using ODOT SSC to prevent the evaporation rate from exceeding 0.2 pound of water per square foot of exposed concrete per hour. Cool ingredients before mixing or use other suitable means to control concrete temperature and prevent rapid drying of newly placed concrete. Shade the fresh concrete as soon as possible after placing. Start curing when the surface of the fresh concrete is sufficiently hard to permit curing without damage. Provide water hoses, pipes, spraying equipment, and water hauling equipment, where job site is remote to water source, to maintain a moist concrete surface throughout the curing period. Provide burlap cover or other suitable, permeable material with fog spray or continuous wetting of the concrete when weather conditions prevent the use of either liquid membrane curing compound or impervious sheets. For vertical surfaces, protect forms from direct sunlight and add water to top of structure once concrete is set.

3.6.8 Preparation of Surfaces to Receive Grout, Mortar, or Concrete

Surfaces of set concrete at joints, must be roughened and cleaned of laitance, coatings, loose particles, and foreign matter. Provide unformed surfaces that will subsequently receive grout, mortar, or concrete must be roughened to approximately 1/4 inch in amplitude to maximize the bonding strength between underlying concrete and grout/mortar/concrete interfaces. These recommended practices may include roughening, water jet blasting, scrubbing, wire brushing, and application of bonding agents, as applicable. See ODOT SSC Section 00540 for additional requirements.

3.7 WASTE MANAGEMENT

Provide as specified in the Waste Management Plan and as follows.

3.7.1 Mixing Equipment

Before concrete pours, designate Contractor-owned site meeting environmental standards for cleaning out concrete mixing trucks. Minimize water used to wash equipment.

3.7.2 Hardened, Cured Waste Concrete

Use hardened, cured waste concrete as aggregate in concrete mix if approved by CO.

3.7.3 Reinforcing Steel

Collect reinforcing steel and place in designated area for recycling.

3.7.4 Other Waste

Identify concrete manufacturer's or supplier's policy for collection or return of construction waste, unused material, deconstruction waste, and packaging material. Return excess cement to supplier or seek local recyclers to reclaim the materials if manufacturer does not accept return.

3.8 SURFACE FINISHES EXCEPT FLOOR, SLAB, AND PAVEMENT FINISHES

3.8.1 Defects

Repair surface defects in accordance with ACI 301 Section 5 and ODOT SSC Section 02015.

3.8.2 Formed Surfaces

3.8.2.1 Tolerances

Tolerances in accordance with ODOT SSC Sections 00540 and 02001.

3.8.2.2 Deck Finishing Machine

Provide a deck finishing machine that can screed the concrete bridge deck in accordance with ODOT SSC Section 00540.

3.8.2.3 Surface Finish

Provide for exposed surface finish per Contract documents and ODOT SSC Section 00540.

3.9 CONCRETE SLAB AND MISCELLANEOUS CONSTRUCTION

3.9.1 Deck Roadway Texturing

Provide saw cut texturing per ODOT SSC Section 00540.

3.10 TOLERANCES

3.10.1 Tolerance Report

Provide Tolerance Report showing that all structural concrete components including the top of bearing elevations for the girders are within the tolerances outlined in ODOT SSC Section 00540.

3.11 JOINTS

3.11.1 Construction Joints

Make and locate joints not indicated so as not to impair strength and appearance of the structure, as approved. Joints must be perpendicular to

main reinforcement. Reinforcement must be continued and developed across construction joints. Locate permissible construction joints per Contract documents and ODOT SSC Section 00540.

3.11.2 Contraction Joints in Slabs on Ground

a. Provide joints to form panels as indicated.

b. Under and on exact line of each control joint, cut 50 percent of welded wire reinforcement before placing concrete.

c. Sawcut contraction joints into slab on ground in accordance with ACI 301 Section 5 and ODOT SSC Section 00540.

3.11.3 Sealing Joints in Slabs on Ground

a. Contraction and control joints which are to receive finish flooring material must be sealed with joint sealing compound after concrete curing period. Slightly underfill groove with joint sealing compound to prevent extrusion of compound. Remove excess material as soon after sealing as possible.

b. Sealed groove must be left ready to receive filling material that is provided as part of finish floor covering work.

3.12 CURING AND PROTECTION

Curing and protection in accordance with ODOT SSC Section 00540.

3.12.1 Curing Periods

Conduct concrete curing periods in accordance with ODOT SSC Section 00540. Begin curing immediately after placement. Protect concrete from premature drying, excessively hot temperatures, and mechanical injury; and maintain minimal moisture loss at a relatively constant temperature for the period necessary for hydration of the cement and hardening of the concrete. The materials and methods of curing are subject to approval by the CO.

3.12.2 Curing Formed Surfaces

Accomplish curing of formed surfaces per ODOT SSC Section 00540, including undersurfaces of girders, beams, supported slabs, and other similar surfaces by moist curing with forms in place for full curing period or until forms are removed. If forms are removed before end of curing period, accomplish final curing of formed surfaces by any of the curing methods specified above, as applicable.

3.12.3 Curing Unformed Surfaces

Accomplish curing of unformed surfaces such as footings and slabs on grade according to ODOT SSC Section 00540.

3.12.4 Temperature of Concrete During Curing

Concrete must comply with temperature requirements under weather conditions per ODOT SSC Section 00540.

3.12.5 Protection from Mechanical Injury

During curing period, protect concrete from damaging mechanical disturbances, particularly load stresses, heavy shock, and excessive vibration and from damage caused by rain or running water.

3.12.6 Protection After Curing

Protect finished concrete surfaces from damage by construction operations.

3.13 FIELD QUALITY CONTROL

3.13.1 Aggregate Testing

Provide aggregate testing in accordance with ODOT SSC Section 02690.

3.13.2 Concrete Sampling

Collect samples of fresh concrete to perform tests per ODOT SSC Sections 00165 and 02001.

3.13.3 Concrete Testing

3.13.3.1 Slump Tests

Provide slump tests in accordance with ODOT SSC Sections 00540 and 02001.

3.13.3.2 Temperature Tests

Provide temperature tests in accordance with ODOT SSC Sections 00540 and 02001.

3.13.3.3 Compressive Strength Tests

Provide concrete compressive strength tests in accordance with ODOT SSC Sections 00540 and 02001.

3.13.3.4 Air Content

Provide air content in accordance with ODOT SSC Sections 00165 and 02001.

3.13.3.5 Strength of Concrete Structure

a. The strength of the concrete structure will be considered to be deficient if any of the following conditions are identified:

(1) Failure to meet compressive strength tests as evaluated.

(2) Reinforcement not conforming to requirements specified.

(3) Concrete which differs from required dimensions or location in such a manner as to reduce strength.

(4) Concrete curing and protection of concrete against extremes of temperature during curing, not conforming to requirements specified.

(5) Concrete subjected to damaging mechanical disturbances, particularly load stresses, heavy shock, and excessive vibration.

(6) Poor workmanship likely to result in deficient strength.

b. Where the strength of the concrete structure is considered deficient submit a mitigation or remediation plan for review and approval by the CO.

3.13.3.6 Non-Conforming Materials

a. Factors that indicate that there are non-conforming materials include (but not limited to) excessive compressive strength, inadequate compressive strength, excessive slump, excessive voids and honeycombing, concrete delivery records that indicate excessive time between mixing and placement, or excessive water was added to the mixture during delivery and placement. Any of these indicators alone are sufficient reason for the CO to request additional sampling and testing.

b. Investigations into non-conforming materials must be conducted at the Contractor's expense. The Contractor must be responsible for the investigation and must make written recommendations to adequately mitigate or remediate the non-conforming material. The CO may accept, accept with reduced payment, require mitigation, or require removal and replacement of non-conforming material at no additional cost to the Government.

3.13.3.7 Testing Concrete Structure for Strength

a. When there is evidence that strength of concrete structure in place does not meet specification requirements or there are non-conforming materials, make cores drilled from hardened concrete for compressive strength determination in accordance with ASTM C42/C42M, and as follows:

(1) Take at least three representative cores from each member or area of concrete-in-place that is considered potentially deficient. Location of cores will be determined by the CO.

(2) Test cores after moisture conditioning in accordance with ASTM C42/C42M if concrete they represent is more than superficially wet under service.

(3) Air dry cores, (60 to 80 degrees F with relative humidity less than 60 percent) for seven days before test and test dry if concrete they represent is dry under service conditions.

(4) Strength of cores from each member or area are considered satisfactory if their average is equal to or greater than 85 percent of the 28-day design compressive strength of the class of concrete.

b. Fill core holes solid with patching mortar and finished to match adjacent concrete surfaces.

c. Correct concrete work that is found inadequate by core tests in a manner approved by the CO.

3.14 REPAIR, REHABILITATION AND REMOVAL

Before the CO accepts the structure the Contractor must inspect the

structure for cracks, damage and substandard concrete placements that may adversely affect the service life of the structure. A report documenting these defects must be prepared which includes recommendations for repair, removal or remediation must be submitted to the CO for approval before any corrective work is accomplished.

3.14.1 Crack Repair

Prior to final acceptance, all cracks in excess of 0.02 inches wide must be documented and repaired. The proposed method and materials to repair the cracks must be submitted to the CO for approval. The proposal must address the amount of movement expected in the crack due to temperature changes and loading.

3.14.2 Repair of Weak Surfaces

Weak surfaces are defined as mortar-rich, rain-damaged, uncured, or containing exposed voids or deleterious materials. Concrete surfaces with weak surfaces less than 1/4 inch thick must be diamond ground to remove the weak surface. Surfaces containing weak surfaces greater than 1/4 inch thick must be removed and replaced or mitigated in a manner acceptable to the CO.

3.14.3 Failure of Quality Assurance Test Results

Proposed mitigation efforts by the Contractor must be approved by the CO prior to proceeding.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 05 - METALS

SECTION 05 12 00.00 99

STRUCTURAL BRIDGE STEEL

PART 1 GENERAL

1.1 REFERENCES
1.2 SYSTEM DESCRIPTION
1.2.1 Weld Tracking Log Template
1.2.2 Weld Tracking Log
1.2.3 Welding Procedure Specifications (WPS)
1.2.4 Repairs During Fabrication & Erection
1.3 SUBMITTALS
1.4 AISC QUALITY CERTIFICATION
1.5 QUALITY ASSURANCE (QA)
1.5.1 Qualification of Welders and Welding Operators
1.5.2 Inspector Qualifications
1.5.3 Testing by the Government
1.5.4 Preconstruction Submittals
1.5.4.1 Prefabrication Conference and Notice of Work
1.5.4.2 Fabrication Shop Inspection and Testing
1.5.5 Working/Shop Drawings
1.5.6 Erection Plan
1.6 TRANSPORTATION, HANDLING, AND STORAGE AT FABRICATION SHOP PLAN
1.7 FIELD MEASUREMENTS

PART 2 PRODUCTS

2.1 FABRICATION
2.1.1 Bridge Framing System
2.1.1.1 Dimensional Tolerances for Structural Work
2.1.1.2 Structural Steel Fabrication
2.1.2 Assembly
2.1.3 Materials Disposition Record
2.1.4 Welded Connections
2.1.4.1 Welding Procedure
2.1.4.2 Welder Performance Qualification of Welders and Welding Operators
2.1.4.3 Welding Process
2.1.4.4 Welding Technique
2.1.4.4.1 Filler Metal
2.1.4.4.2 Preheat and Interpass Temperature
2.1.4.5 Workmanship
2.1.4.5.1 Preparation of Base Metal
2.1.4.5.2 Tack and Temporary Welds
2.1.4.5.3 Weld Backing Removal
2.1.5 Bolted Connections
2.1.5.1 Nuts
2.1.5.2 Washers
2.1.5.3 Bolt Holes

2.1.5.4 Rotational Capacity Tests
2.1.5.5 Anchor Bolts
2.1.6 Miscellaneous Provisions
2.1.6.1 Weldments
2.1.6.2 Seal Welds
2.1.7 Camber
2.1.8 Shop Assembly
2.2 STEEL
2.2.1 Structural Steel
2.2.2 Combination Bridge Rail Steel Tubing, Posts, and Connections
2.2.3 Welded Shear Stud Connectors
2.3 CERTIFIED TEST REPORTS
2.3.1 General
2.3.2 Nondestructive Testing
2.3.3 Inspection of Structural Steel Welding
2.3.3.1 Visual Examination
2.3.3.2 Nondestructive Examination
2.3.3.2.1 Testing Agency
2.3.3.2.2 Examination Procedure and Extent
2.3.3.2.3 Acceptability of Welds
2.3.3.2.4 Examination Procedures
2.3.3.2.4.1 Ultrasonic Testing (UT)
2.3.3.2.4.2 Radiographic Testing (RT)
2.3.3.2.4.3 Magnetic Particle Inspection (MT)
2.3.3.2.4.4 Dye Penetrant Inspection (PT)
2.3.4 Welds to be Subject to Nondestructive Examination
2.3.4.1 Structural Steel Non-Fracture Critical Members
2.3.4.2 Structural Steel Non-Fracture Critical Member Fillet Welds and Partial Penetration Groove Welds
2.3.5 Test Coupons
2.3.6 Supplemental Examination
2.3.7 Structural Steel Welding Repairs
2.3.8 Control Dimensions
2.3.9 ODOT REQUIREMENTS
2.4 STRUCTURAL STEEL ACCESSORIES
2.4.1 Welding Electrodes and Rods
2.4.2 Non-Shrink Grout
2.5 SURFACE PREPARATIONS
2.5.1 Uncoated Weathering Steel Cleaning
2.5.2 Hot-Dipped Galvanized Steel Cleaning
2.5.3 Painted Girder Ends
2.5.4 Surface Finishes

PART 3 EXECUTION

3.1 ERECTION
3.1.1 STORAGE
3.2 FIELD CONNECTIONS
3.2.1 High-Strength Anchor Bolts and High-Strength Bolts
3.3 FIELD WELDING
3.4 COATING REPAIR
3.5 CONSTRUCTION
3.5.1 Members Work
3.5.2 Camber
3.5.3 Erecting
3.6 FIELD QUALITY CONTROL

-- End of Section Table of Contents --

SECTION 05 12 00.00 99

STRUCTURAL BRIDGE STEEL

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO LRFD	(9th Edition; 2020 with 2022 Interims) Bridge Design Specifications
AASHTO LRFDCONS	(4th Edition; with 2022 Interims) Bridge Construction Specifications
AASHTO SBFS	(1st Edition, 2023) LRFD Steel Bridge Fabrication Specifications

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

AISC 207	(2020) Certification Standard for Steel Fabrication and Erection, and Manufacturing of Metal Components

AMERICAN SOCIETY FOR NONDESTRUCTIVE TESTING (ASNT)

ANSI/ASNT CP-189	(2020) ASNT Standard for Qualification and Certification of Nondestructive Testing Personnel

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1/D1.1M	(2020; Errata 1 2021) Structural Welding Code - Steel
AWS D1.5M/D1.5	(2020; Errata 1 2022) Bridge Welding Code

ASTM INTERNATIONAL (ASTM)

ASTM A36/A36M	(2019) Standard Specification for Carbon Structural Steel
ASTM A108	(2024) Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished
ASTM A143/A143M	(2007; R 2020) Standard Practice for Safeguarding Against Embrittlement of Hot-Dip Galvanized Structural Steel Products and Procedure for Detecting Embrittlement

ASTM A500/A500M	(2023) Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes
ASTM A501/A501M	(2021) Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing
ASTM A563	(2021; E 2022a) Standard Specification for Carbon and Alloy Steel Nuts
ASTM A618/A618M	(2021) Standard Specification for Hot-Formed Welded and Seamless High-Strength Low-Alloy Structural Tubing
ASTM A709/A709M	(2021) Standard Specification for Structural Steel for Bridges
ASTM C827/C827M	(2023) Standard Test Method for Change in Height at Early Ages of Cylindrical Specimens of Cementitious Mixtures
ASTM C1107/C1107M	(2020) Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
ASTM E165/E165M	(2023) Standard Practice for Liquid Penetrant Examination for General Industry
ASTM E709	(2021) Standard Guide for Magnetic Particle Testing
ASTM F436	(2011) Hardened Steel Washers
ASTM F1554	(2020) Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength
ASTM F3125/F3125M	(2023) Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength

OREGON DEPARTMENT OF TRANSPORTATION (ODOT)

ODOT SSC	(2024) Oregon Standard Specifications for Construction
ODOT QPL	(2024) Qualified Product List

SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC SP 6/NACE No.3	(2007) Commercial Blast Cleaning

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2024) Safety -- Safety and Occupational Health (SOH) Requirements

U.S. DEPARTMENT OF DEFENSE (DOD)

UFC 3-301-01	(2023; with Change 1, 2023) Structural Engineering

1.2 SYSTEM DESCRIPTION

Submit a detailed work plan for fabrication, including descriptions of shop facilities, equipment, number of personnel, and related information prior to the Prefabrication Conference, and procedures for safe conduct of the work, careful removal and disposition of materials, protection of property that is to remain undisturbed, and coordination with other work in progress. Include in the procedures a detailed description of the methods and equipment to be used for each operation, and the sequence of operations in accordance with EM 385-1-1 for all work that occurs on federal property. Include the recommended measuring system for ensuring dimensional tolerances in the Work Plan. Perform the fabrication of the new Bonneville BN1 Old NL1 Replacement Bridge under this Contract in accordance to this Section of the specifications including but not limited to the steel girder webs/flanges, field splices, steel cross-frames, steel diaphragms, steel top flange lateral bracing, connection plates, anchor bolts, shear stud connectors, and other temporary works.

a. Material with welds will not be accepted unless the welding is specified or indicated on the drawings or otherwise approved. Do not begin welding until welding procedures, inspectors, nondestructive testing personnel, welders, welding operators, and tackers have been qualified and approved. Each Contractor performing welding must maintain records of the test results obtained in welding procedure, and welder, welding operator, and tacker performance qualifications.

b. As it is used in these specifications, "The Engineer" refers to the Portland District or the engineer of record. The AWS D1.5M/D1.5 definition of "The Engineer" as specified in AWS D1.5M/D1.5 Application Clause refers to the Portland District or the engineer of record in lieu of the state bridge engineer as specified in the Application Clause of AWS D1.5M/D1.5.

c. Schedule a Prefabrication Conference as soon as possible after Notice to Proceed and prior to any fabrication. Include the Prime Contractor, Fabricator, the Fabricator's primary QC representative, the Contracting Officer, and the Engineer of Record for the structure or structures being fabricated in the Prefabrication Conference, at a minimum. Hold the Prefabrication Conference at either the Fabrication Facilities or a similar location as deemed appropriate.

1.2.1 Weld Tracking Log Template

Submit for approval a weld tracking log template, a minimum of 30 days prior to commencement of fabrication, to identify all necessary components to be addressed in the tracking of all welds for the structures in question. A weld tracking log will be developed and maintained as described in the following paragraphs.

1.2.2 Weld Tracking Log

Submit a log capable of individually identifying and tracking every weld on the project. Member identification must follow the numbering scheme shown on the shop drawings. Include in the log the member to be welded, member type, type of weld including temporary and tack welds, welding position, applicable WPS reference, AWS joint preparation designation, name or stamping designation of welder, welding operator or tacker, date and time of completion of welding or tacking, name and date of CWI visual inspection, NDT testing performed, including the type of inspection, date(s) of inspection, inspector name, and the acceptance criteria used, description of defects found and reason for non-compliance, corrective action taken, or whether the weld is acceptable. Weld identification on the shop drawing must match weld tracking log identification. Bind together a completed log for each structure and submit two copies to the Contracting Officer immediately upon completion of the fabrication of each structure. Furnish draft copies of NDT testing to the Contracting Officer upon request and have a copy available on the shop floor during any inspection.

1.2.3 Welding Procedure Specifications (WPS)

Submit all Welding Procedure Specifications (WPS), with supporting Procedure Qualification Records and supporting test documentation on forms similar or equivalent to the sample forms in AWS D1.5M/D1.5 for each weld, including prequalified welds, in accordance with paragraph Welded Connections approved before fabrication is commenced. Individually identify each Welding Procedure Specification and reference it on the working/shop drawings.

1.2.4 Repairs During Fabrication & Erection

Perform all repair welds in accordance with AWS D1.5M/D1.5, repair procedures must be qualified and approved and subject to the same QA/QC inspection requirements as other welds. Perform all other repairs including but not limited to gouges, thermal cut edges, laminations, and discontinuities in accordance with AASHTO SBFS.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" classification. Submittals not having a "G" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Work Plan; G

Inspector Qualifications; G

Prefabrication Conference; G

Notice Of Work; G

Fabrication Shop Inspection and Testing; G

Welding Procedure Specifications (WPS); G

Procedure Qualification Records (PQR); G

Performance Qualification Records; G

Welding Repair Plans; G

Schedule Of Random Testing; G

Weld Tracking Log Template; G

Weld Tracking Log; G

Qualification Of Welders And Welding Operators; G

NDT Inspector Certification; G

SD-02 Shop Drawings

Working/Shop Drawings; G

Transportation, Handling, And Storage At Fabrication Shop Plan; G

Assembly Drawings; G

SD-03 Product Data

Welding Electrodes and Rods

Non-Shrink Grout

Recycled Content for Structural Steel; S

Material Records

Proposed Repair Work; G

SD-05 Design Data

Erection Plan; G

SD-06 Test Reports

Class B Coating

Bolts, Nuts, and Washers

Weld Inspection Reports

Bolt Testing Reports

Field Bolt Testing Reports

Embrittlement Test Reports

Certified Manufacturer's Mill Reports

Manufacturer Certified Test Reports; G

Distributor Certified Test Reports; G

Repair Of Mislocated Or Misdrilled Holes; G

Certified Test Reports; G

Witness Points; G

SD-07 Certificates

Steel

Bolts, Nuts, and Washers

AISC Bridge Fabricator Quality Certification

AISC Bridge Erector Quality Certification

Welding Electrodes and Rods

AWS Certified Welding Inspector (CWI)

NDT Technicians

Welding Procedure Specifications (WPS)

1.4 AISC QUALITY CERTIFICATION

a. Work must be fabricated by an AISC Certified Bridge Fabricator - Intermediate (IBR) and Advanced (ABR), in accordance with AISC 207. Submit AISC Bridge Fabricator quality certification.

b. Work must be erected by an AISC Structural Steel Certified Erector, in accordance with AISC 207. Submit AISC Bridge erector quality certification.

c. Work must be in accordance with ODOT SSC Sections 00560, 02530, and 02560.

1.5 QUALITY ASSURANCE (QA)

Establish witness points for the initial QA inspection, intermediate QA inspections, and final inspection as follows and submit a record of all witness points. Start the initial QA Inspection after the Government has determined that there is substantial completion of components that comprise a reasonable sampling of each significant FCM and non-FCM details. Determine the extent of completion and details and the date of the initial QA inspection by the Government at the prefabrication conference after discussion with the Contractor. At that time, produce a detailed schedule showing the progression of work and completion of components. This schedule will be updated weekly and provided by e-mail to the Contracting Officer. Give the Contracting Officer two weeks notice prior to the predetermined date for the initial QA inspection, including adjustments for changes in schedule. Intermediate QA inspections will be conducted on an as needed basis and at the discretion of the Government. All QA inspections will follow AWS D1.5M/D1.5, except for the combination bridge railing assembly fabrication which may utilize AWS D1.1/D1.1M. Provide unpainted components for each QA NDT and visual inspection. At these stages of construction, give the Contracting Officer three working days to

inspect the structure. Do not begin the QA inspection period until a minimum period of 72 hours after any welding. After the Contracting Officer and the Engineer of Record has inspected the structure, make any changes required to the structure as directed by the Contracting Officer before proceeding with any additional welding. Proceed with the construction until the next witness point is reached, unless it is waived in writing by the Contracting Officer. Each structure fabricated is subject to a final fabrication inspection prior to painting. Conduct a final fabrication inspection after the first structure is completed. Schedule and coordinate with the Contracting Officer and the Engineer of Record final fabrication inspections of additional structures. Give the Contracting Officer a minimum notice of two weeks prior to the final fabrication inspection.

1.5.1 Qualification of Welders and Welding Operators

Submit welder, welding operator and tacker qualification certification for each welder, welding operator or tack welder for approval before fabrication is commenced in accordance with Paragraph WELDED CONNECTIONS. An AWS Certified Welding Inspector (CWI) meeting the specified qualifications must approve all welder qualifications. Limit welders, welding operators, and tack welders to welding procedures for which they are certified. Prepare, weld, and test welds in accordance with the requirements of AWS D1.5M/D1.5. Before assigning any welder, welding operator, or tacker to work under this Contract, submit the names and certification that each individual is qualified as specified. State the type of welding and positions for which the welder, welding operator, or tacker is qualified, the code and procedure under which the individual is qualified, the date qualified, and the name of the firm and person certifying the qualification tests on the certification. Keep the certification current for the duration of the Contract. Submit welder and welding operator qualification test records on forms similar or equivalent to the sample forms in AWS D1.5M/D1.5. All welders must be qualified in accordance with the Qualification Clause of AWS D1.5M/D1.5. Verify all qualifications are current prior to commencing any work. Submit a log for each welder showing that he/she is current in the process and procedures being proposed for this work.

1.5.2 Inspector Qualifications

All inspectors, performing structural steel visual inspection in accordance with these specifications, must be qualified and certified in conformance with AWS QC1. Provide an AWS Certified Welding Inspector (CWI) as the primary point of contact for quality control of welding. Designate one individual as having primary responsibility for all quality control in accordance with AWS D1.5M/D1.5 inspection clause when several CWI and NDT technicians are working. Do not use non-certified inspectors and certified associate weld inspectors (CAWI) for inspection under these specifications. All personnel who perform NDT must be qualified in accordance with: ANSI/ASNT CP-189 NDT Level II or III. Submit copies of certificates showing evidence of qualifications or certifications for welding inspectors and NDT personnel, including NDT Technicians and AWS CWI.

1.5.3 Testing by the Government

Material component parts may be subjected to any form of nondestructive testing, as directed by the Contracting Officer. This may include any test that will thoroughly investigate the part in question. The cost of such investigation will be borne by the Government. Replace and retest all

defects that are cause for rejection and rejected materials or parts at the Contractor's expense. The Government reserves the right to perform quality assurance at any point during fabrication.

1.5.4 Preconstruction Submittals

1.5.4.1 Prefabrication Conference and Notice of Work

Hold a prefabrication conference per ODOT SSC Section 00560 with the Government and discuss Work Plan for all phases of steel fabrication for the project. Provide the Government with Notice of Work per ODOT SSC Section 00560.

1.5.4.2 Fabrication Shop Inspection and Testing

Provide fabrication shop inspection and testing per ODOT SSC Sections 00560.23 and 00165, including weld inspection reports.

1.5.5 Working/Shop Drawings

Prepare all working/shop drawings in accordance with these specifications and ODOT SSC Sections 00560 and 00150.35. Submit working/shop drawings for review per ODOT SSC Section 00560.03. Return elements of fabricated items inadvertently omitted on Contract drawings to the Engineer of Record for detailing unless they are to be detailed by the fabricator and so indicated on the working/shop drawings. Cloud any and all details developed by the fabricator on the working/shop drawings for separate approval by the Engineer of Record. Any items designed by the Contractor must be prepared and sealed by a Registered Professional Engineer. All splices must be approved by the Engineer of Record. Make all splices with complete joint penetration groove welds. Identify all field welds on the working/shop drawings. Provide a unique identifier to permit tracking on the weld tracking log for each weld, both shop and field welds. Prior to performing any fabrication of the bridge structure, submit complete, detailed working drawings/shop drawings for approval. Show complete details of materials, tolerances, connections, and proposed welding sequences on the working/shop drawings. Include catalog cuts, templates, fabrication and assembly details, and type, grade, and class of materials, as appropriate in the working/shop drawings. Identify each member following the numbering scheme shown on the drawings. Provide a table containing a list of all members and a reference to each material certificate and test report that applies to that member. Identify weld procedures and NDE required for each weld on working/shop drawings. Cloud any and all splices in the working/shop drawings for engineer approval.

1.5.6 Erection Plan

Submit stamped erection plans showing complete information necessary for the erection of each component part of the bridge per ODOT SSC Sections 00560.04 and 00150.35. Include the following additional information:

a. Dimensions for alignment and elevations of each member.

b. Location of members and attachments by match-marking of piece numbers.

c. Type and location of each field connection.

d. Detail of each field connection or typical connection.

e. Anchor bolts and setting plans.

1.6 TRANSPORTATION, HANDLING, AND STORAGE AT FABRICATION SHOP PLAN

Provide transportation, handling, and storage at fabrication shop plan to the Government per these specifications and ODOT SSC Sections 00560.24. The plan must indicate stability during shipping loading/unloading including any temporary bracing required during operations. Transportation options are traditional freight hauling or barging by ship. Notify the Contracting Officer at least 28 days in advance of delivery of the structures. Shipping of the structures are at the Contractor's expense. Deliver all structures to the Bonneville Dam Navlock Bridge 1 Maintenance Yard near Cascade Locks, OR. Coordinate all deliveries through the Portland District Contracting Officer. Arrange the structures on the delivery vehicles such that no damage occurs during shipping. Direct all sling lifting lugs up. Submit a Delivery/Shipping Plan showing orientation and locations of structures on the delivery vehicles prior to shipment for Government approval. Submit drawings providing descriptions of methods of delivering the completed structural units, including details for support during shipment to prevent distortion or other damages, and orientation and location of the structure on transport equipment. Protect structural steel members and packaged materials from corrosion and deterioration. Store material in a dry area. Support materials stored outdoors above ground surfaces on wood runners and protect with acceptable effective and durable covers.

1.7 FIELD MEASUREMENTS

Consider all field conditions that affect the details and tolerances of the bridge. Contractor is responsible for accuracy and layout of work and must make necessary field measurements prior to preparation of working/shop drawings for the bridge.

PART 2 PRODUCTS

2.1 FABRICATION

2.1.1 Bridge Framing System

Provide the structural steel bridge framing system, including approved 3-coat paint system at girder ends, complete and ready for use. Provide structural steel bridge including design, materials, installation, workmanship, fabrication, assembly, erection, inspection, quality control, and testing in accordance with these specifications, ODOT SSC Section 00560, AASHTO LRFDCONS, AASHTO SBFS, AWS D1.5M/D1.5, and UFC 3-301-01 except as modified in this Contract. All steel bridge fabrication must be performed in accordance with ODOT SSC Section 00560 and these specifications. Material must be straight before being laid off or worked. Perform steel fabrication methods that will not impair the metal per AASHTO LRFDCONS and AASHTO SBFS. Material will be rejected for sharp kinks or bends. Material with welds will not be accepted except where welding is definitely specified, indicated or otherwise approved. Use approved dies, press brakes or bending rolls to make bends. Take precautions to avoid overheating the metal where heating is required and allow it to cool in a manner that will not impair the original properties of the metal. Obtain approval prior to flame cutting material, other than structural steel, indicated on detail drawings. Accurately shear material and neatly finish all portions of the work. Provide square and true

corners unless otherwise shown. Fillet re-entrant cuts to a minimum radius of 1 inch in accordance with AWS D1.5M/D1.5 Workmanship Clause unless otherwise indicated or approved. Provide finished members free of twists, bends and open joints.

2.1.1.1 Dimensional Tolerances for Structural Work

a. Measure dimensions by an approved measuring system. Submit the measuring system for approval with the work plan (i.e. calibrated steel tape of approximately the same temperature as the material being measured). The overall dimensions of an assembled structural unit must be within the tolerances indicated on the drawings or as specified for the item of work. Where tolerances are not specified in other sections of these specifications or shown, a variation of 1/32 inch is permissible in the overall length of component members with both ends milled and component members without milled ends must not deviate from the dimensions shown by not more than 1/16 inch for members 30 feet or less in length and by not more than 1/8 inch for members over 30 feet in length.

b. Structure dimensions indicated are based on a structure temperature of 47 degrees F. Perform dimensional adjustments to compensate for actual temperature variations during construction. Dimensional tolerances must be in accordance with ODOT SSC, AASHTO LRFDCONS, and AWS D1.5M/D1.5.

2.1.1.2 Structural Steel Fabrication

Structural steel may be cut by mechanically guided or hand-guided torches, provided an accurate profile with a surface that is smooth and free from cracks and notches is obtained. Prepare surfaces and edges in accordance with AWS D1.5M/D1.5, Workmanship Clause. Hand-guided cuts must be chipped, ground or machined to sound metal.

2.1.2 Assembly

Submit Assembly Drawings indicating the sequence of fabrication and assembly and provide details for connecting the adjoining fabricated components in the shop. Identify assembly details in the required order of assembly and details of witness points as described in these specifications.

2.1.3 Materials Disposition Record

Submit three copies of all purchase and mill orders, shop orders for materials and work orders, including all new orders placed by Contractors and old orders extended for each supplier. Furnish, at the time of submittal of shop drawings, a list designating the material to be used for each item. Where mill tests are required, purchase orders must contain the test site address and the name of the testing agency. Furnish a shipping bill or memorandum of each shipment of finished pieces or members to the project site, giving the designation mark and weight of each piece, the number of pieces, the total weight, and if shipped by rail in carload lots, the car initial and number. Submit material records before the beginning of fabrication. Additional requirements for this submittal are listed below.

2.1.4 Welded Connections

2.1.4.1 Welding Procedure

a. Perform all bridge welding in accordance with the applicable provisions of AWS D1.5M/D1.5 and ODOT SSC, except for the combination bridge railing that must be per AWS D1.1/D1.1M. Prior to the start of production welding, submit a complete schedule of welding procedures for a typical structure that conforms to the requirements specified in the provisions of AWS D1.5M/D1.5. Provide detailed procedure specifications and tables or diagrams showing the procedures to be used for each required joint in the schedule.

b. Submit a Welding Procedure Specifications (WPS) for each weld to be made. Submit Welding Procedure Specifications (WPS) and Procedure Qualification Records (PQR) for approval before fabrication is commenced. Submit for approval copies of the Welding Procedure Specification (WPS) and the results of the procedure qualification test for each type of welding which requires procedure qualification. Submit the WPS and PQR with the shop drawings. Prepare and qualify each WPS in accordance with the applicable provisions of AWS D1.5M/D1.5. Show types and locations of welds designated or specified to receive nondestructive examination and identify the weld as FCM when applicable in the welding procedure. A WPS is always required, even if the procedure is considered prequalified in accordance with AWS D1.5M/D1.5. Clearly identify each procedure as being either prequalified or qualified by tests. If a PQR is developed, a representative of the Government must witness the test plate welding and the specimen testing. Approval of any procedure, however, will not relieve the Contractor of the responsibility for producing a finished structure meeting all requirements of these specifications. Make copies of the WPS available for reference to the welders, welding operators and tack welders. An AWS CWI meeting the specified qualifications or welding engineer must approve all WPS's and PQR's.

2.1.4.2 Welder Performance Qualification of Welders and Welding Operators

Qualify and requalify welding operators, welders, and tack welders if necessary for the particular type of work to be done. Perform qualification in accordance with AWS D1.5M/D1.5. Before assigning any welder, welding operator, or tacker to work under this Contract, submit the names and certification that each individual is qualified as specified. State the type of welding and positions for which the welder, welding operator, or tacker is qualified, the code and procedure under which the individual is qualified, and the date qualified on the certification. The company employing the welder must certify by signature that the welder has passed all code required testing and meets the requirements for certification. Submit copies of the Performance Qualification records for approval before fabrication is commenced. The welder and welding operators may have to repeat the qualifying tests when, in the opinion of the Contracting Officer, the work indicates a reasonable doubt as to proficiency. In such cases, the welder must be recertified, as above, after successfully passing the retest; otherwise, he/she must be disqualified until successfully passing a retest. The period of effectiveness for all welder and welding operator performance qualifications must be in accordance with AWS D1.5M/D1.5. All welders performing the work must keep the certification current for the duration of the Contract. All expenses are borne by the Contractor in connection with qualification and requalification.

2.1.4.3 Welding Process

Perform welding of structural steel in accordance with applicable provisions of AWS D1.5M/D1.5 by an electric arc welding process using a method which excludes the atmosphere from the molten metal for all welds. Minimize residual stresses, distortion and shrinkage during welding.

2.1.4.4 Welding Technique

2.1.4.4.1 Filler Metal

The electrode, electrode-flux combination and grade of weld metal must conform to the appropriate AWS specification for the base metal and welding process being used or must be as shown where a specific choice of AWS specification allowable is required. Follow the requirements of AWS D1.5M/D1.5 for matching filler metal. Include the AWS designation of the electrodes to be used in the schedule of welding procedures. Use only low hydrogen electrodes for manual shielded metal-arc welding regardless of the thickness of the steel. Do not combine filler metals and processes in the same joint or weld.

2.1.4.4.2 Preheat and Interpass Temperature

Perform preheating as required by the applicable provisions of AWS D1.5M/D1.5 for all welds except that the temperature of the base metal must be at least 70 degrees F. Slowly and uniformly heat the weldments that are required to be preheated by approved means to the prescribed temperature, hold at that temperature until the welding is completed, and then permit the weldments to cool slowly as required and in accordance with the approved WPS in order to prevent cracking or distortion.

2.1.4.5 Workmanship

Perform welding in accordance with AWS D1.5M/D1.5, Workmanship Clause for all welds and other applicable requirements of these specifications. Ensure requirements of ODOT SSC are met as well. Provide NTD Procedures used for the project formally submitted to the Government for review and comment.

2.1.4.5.1 Preparation of Base Metal

Prior to welding, inspect surfaces to be welded to assure compliance with the applicable Clauses of AWS D1.5M/D1.5.

2.1.4.5.2 Tack and Temporary Welds

Make tack and temporary welds required for fabrication and erection in accordance with AWS D1.5M/D1.5 under the controlled conditions prescribed herein for permanent work. Tack welds that are to be incorporated into the permanent work are subject to the same quality requirements as the permanent welds. Clean and fuse such tack welds thoroughly with the permanent welds. Multiple-pass tack welds must have cascaded ends. Remove defective tack welds before permanent welding. Make all welds using low-hydrogen welding electrodes and with welders qualified for permanent work as specified elsewhere in these specifications. Preheat as required by AWS D1.5M/D1.5 for permanent tack welds except that the minimum temperature must be 70 degrees F in any case, regardless of electrode used. All tack welds which will be incorporated into the final weldment

must be a maximum of 1/8 inch with a minimum length of 1.0 inch long spaced at a maximum of 6 inch on center. In making temporary welds, arc strikes must not be struck in other than the weld joints. Remove each temporary weld as required by AWS D1.5M/D1.5, Workmanship Clause. Grind out and fill all arc strikes struck outside the weld zone, and inspect in accordance with AWS D1.5M/D1.5.

2.1.4.5.3 Weld Backing Removal

Unless otherwise indicated, remove all steel weld backing material from welded joints prior to testing.

2.1.5 Bolted Connections

High Strength Bolts must be ASTM F3125/F3125M Grade A325 Type 3 (weathering steel grade) Bolts per Contract plans, these specifications, and ODOT SSC Sections 00560 and 02560. Install all high strength connections in aligned holes to a tension given in ODOT SSC Table 00560-1. Use turn-of-nut method for tightening per AASHTO LRFDCONS & RCSC A348 for installation, inspection, and testing per ODOT SSC. Tighten all connections to the snug-tight condition per ODOT SSC Section 00560.29. The snug-tight condition is defined as the tightness attained by either a few impacts of an impact wrench or the full effort of a worker with an ordinary spud wrench that brings the plies into firm contact. Perform snugging in a systematic manner starting at the most rigid part of the joint and working to the outside of the connection or the free edges. Install all bolts in a connection to a snug tight condition prior to pretensioning. Perform pretensioning in the same order as snug-tightening per ODOT SSC Section 00560.29. Submit the certified manufacturer's mill reports which clearly show the applicable ASTM mechanical and chemical requirements together with the actual test results for the supplied fasteners. High strength bolts and nuts must be shipped together in the same shipping container. The supplier can supply bolts that have been lubricated and tested with the supplied bolts. Provide bolts, nuts, and washers mill certificates to the Government when first available. Provide bolt testing reports to the Government when first available.

2.1.5.1 Nuts

All nuts used for high strength bolts must be heavy hex ASTM A563, Grade C3 or DH3 per ODOT SSC Sections 00560 and 02560.20 and ASTM F3125/F3125M for Grade A325 Type 3 bolts.

2.1.5.2 Washers

All washers for high strength bolts must be ASTM F436 Type 3 for compatibility with Grade A325 type 3 bolts. Use hardened washers per ODOT SSC Sections 00560 and 02560 and ASTM F3125/F3125M.

2.1.5.3 Bolt Holes

All bolt holes must be standard sized per AASHTO LRFD Table 6.13.2.4.2-1 and shown on the Contract plans, oversized holes are not allowed and will be rejected at no cost to the Government. All bolt holes must be fabricated and installed per ODOT SSC Section 00560.27 and AASHTO LRFDCONS Section 11.4.8. Accurately locate bolt holes so that they are smooth, perpendicular to the member and cylindrical.

a. For main load-carrying girder members including flanges, webs, and

field splice connections bolt holes must not be punched full size. Drill or subdrill and ream holes as necessary for bolts not more than 1/16 inch larger than the diameter of the bolt. Cross-frames, and lateral bracing connections that are not at the top flanges of girders can be punched full sized.

b. Match-ream or drill holes for high strength fitted bolts. Remove burrs resulting from reaming. The threads of bolts must be excluded from the shear plane. Provide the body diameter of holes and bolts with the tolerances specified in AASHTO LRFDCONS and ODOT SSC.

c. The provisions of AWS D1.5M/D1.5 Workmanship Clause allowing misdrilled holes do not apply. Repair all misdrilled holes as directed by the Engineer. Submit repair of mislocated or misdrilled holes to the Government for approval.

2.1.5.4 Rotational Capacity Tests

The manufacturer or distributor must perform rotational-capacity tests in accordance with ASTM F3125/F3125M and on all bolt, nut, and washer assemblies prior to shipping. The Contractor is responsible for assuring the rotational-capacity testing is performed by either the manufacturer or distributor prior to shipping. Submit manufacturer certified test reports and distributor certified test reports and conduct work in accordance with ODOT SSC Sections 00560 and 02560.

2.1.5.5 Anchor Bolts

Anchor bolts must be in accordance with ASTM F1554 Grade 105 per ODOT SSC.

2.1.6 Miscellaneous Provisions

2.1.6.1 Weldments

Sequence the work and perform post weld heat treatment in accordance with the qualified WPS to alleviate residual stress as necessary such that final machining achieves stable specified dimensions and tolerances for fabrication.

2.1.6.2 Seal Welds

Seal welds maintain water tightness. Show and make all seal welds as indicated on the shop drawings. Make seal welds, when called for on the drawings, the minimum size fillet weld as required in AWS D1.5M/D1.5. Seal welds should be performed per AWS D1.5M/D1.5 to prevent wrapping all around reentrant corners and conducted in accordance with FHWA WRM.

2.1.7 Camber

Provide girder camber per ODOT SSC Section 00560.42.

2.1.8 Shop Assembly

Perform fabrication and assembly in an indoor, climate-controlled shop. Closely check each item to ensure that all necessary clearances have been provided and that binding does not occur in any moving part. All shop testing for assembly must be witnessed by the Government Representative. Immediately remedy disclosed errors or defects without cost to the Government. Provide shop assembly in accordance with ODOT SSC Section

00560.43.

2.2 STEEL

2.2.1 Structural Steel

All structural steel plate and shape material must meet ASTM A709/A709M Grade 50W material specifications. Impact test requirements for Charpy V-Notch (CVN) Toughness must meet Temperature Zone 2 for Non-fracture critical tension components (T) per ODOT SSC and noted on the Contract plans. For structural steel shapes for the project, similar specifications can be substituted for ASTM A709/A709M provided they are approved by the Government and show the same strength properties, minimum toughness requirements, and are of a similar weathering steel metallurgical chemistry composition is provided. Provide structural steel containing a minimum of 80 percent recycled content. Submit data identifying percentage of recycled content for structural steel.

2.2.2 Combination Bridge Rail Steel Tubing, Posts, and Connections

Provide structural steel tubing for the combination handrail on top of the concrete bridge barrier conforming to ASTM A500/A500M, Grade B, ASTM A501/A501M or ASTM A618/A618M. Provide steel posts and plates conforming to ASTM A36/A36M unless otherwise noted. Provide High Strength anchor bolts (Grade 105) according to ODOT SSC Section 02560.30 (b). Hot-dip galvanize structural steel including fasteners after fabrication. Provide Galvanize-Control Silicon posts and horizontal rail steel tubing according to ODOT SSC Section 02530.70. Tap nuts and inserts 0.021 inch oversize after galvanizing in accordance with ASTM A563. All welding on structural steel combination railing system only must be AWS D1.1/D1.1M. All other welding for the project must be AWS D1.5M/D1.5.

2.2.3 Welded Shear Stud Connectors

Provide welded shear studs in accordance with AWS D1.5M/D1.5 and ODOT SSC, with ASTM A108, Grades 10100 through 10200, inclusive, either semi-killed or killed deoxidation. Shear studs must be stud welded in the erected state of the girders and per AWS D1.5M/D1.5.

2.3 CERTIFIED TEST REPORTS

Submit reports of tests, inspections, and verifications of all materials used under this Contract approved by the Government before incorporation into the structure. All testing must conform to minimum requirements of ODOT SSC.

2.3.1 General

Have required material tests and analyses performed at the Contractor's expense, to demonstrate that materials are in conformity with the specifications. Tests, inspections, and verifications must conform to the requirements of the particular sections of these specifications for the respective items of work unless otherwise specified or authorized. Conduct tests in the presence of the Contracting Officer. Furnish specimens and samples for additional independent tests and analyses upon request by the Contracting Officer.

2.3.2 Nondestructive Testing

When doubt exists as to the soundness of any material part, such part may be subjected to any form of nondestructive testing determined by the Contracting Officer. The cost of such investigation will be borne by the Government. Any defects will be cause for rejection and rejected parts must be replaced and retested by the same test method that located the defect at the Contractor's expense.

2.3.3 Inspection of Structural Steel Welding

Maintain an approved inspection system and perform required inspections. Inspect welding to determine conformance with the requirements of AWS D1.5M/D1.5 and the approved welding procedures and provisions stated in other sections of these specifications. Clean and carefully visually examine all completed welds for insufficient leg sizes, cracks, undercutting, overlap, excessive convexity or reinforcement and other surface defects to ensure compliance with the requirements of AWS D1.5M/D1.5, Inspection Clause. In addition, the Government may choose to hire a third party inspector to perform verification of this work. The Government's third party inspection will occur at various times throughout the duration of fabrication. The Contractor will be advised that third party inspection must be coordinated with the Contracting Officer, and the Contractor for all verification inspections selected by the Government.

2.3.3.1 Visual Examination

Prior to any welding, a certified weld inspector (CWI) supplied by the Contractor must visually inspect and document on the weld tracking log the preparation of material for welding at each weld or joint in order to assure compliance with AWS D1.5M/D1.5 and approved WPS. The AWS CWI must also perform visual inspection on all completed welds throughout the welding process to assure compliance with AWS D1.5M/D1.5 and approved WPS. Clean all completed welds free of oxide, flux, scale, paint spatter, or other foreign matter before inspection. Document all non-destructive testing on the weld tracking log.

2.3.3.2 Nondestructive Examination

Perform the nondestructive examination of welds as specified or described on the drawings or as listed in the following paragraphs. Document all non-destructive testing on the weld tracking log.

2.3.3.2.1 Testing Agency

Perform the nondestructive examination of welds and the evaluation of examination tests as to the acceptability of the welds by a testing agency adequately equipped and competent to perform such services or by the Contractor using suitable equipment and qualified personnel. In either case written approval of the examination procedures is required and the examination tests must be made in the presence of the Contracting Officer. The evaluation of examination tests are subject to the approval of, and all records become the property of, the Government. Qualify and certify Certified Weld Inspectors (CWI) in accordance with the provisions of AWS QC1 and the CWI must be familiar with AWS D1.5M/D1.5. The laboratory and all personnel performing nondestructive testing must be qualified as specified. Only individuals qualified for NDT Level II or Level III may perform nondestructive testing. The Level III NDT inspector who supervises all NDT must possess a currently valid American Society for Nondestructive

Testing (ASNT) Level III certificate for each of the processes for which they are qualified. Include copies of the NDT inspector certification, including the ASNT certificate of Level III NDT Technician that certified the Level II Technicians in the submittals.

2.3.3.2.2 Examination Procedure and Extent

Perform all nondestructive testing in accordance with AWS D1.5M/D1.5, Inspection Clause. Perform testing as defined in the following Paragraph.

2.3.3.2.3 Acceptability of Welds

Welds will be unacceptable if shown to have defects prohibited by AWS D1.5M/D1.5.

2.3.3.2.4 Examination Procedures

Perform examination procedures to the following requirements:

2.3.3.2.4.1 Ultrasonic Testing (UT)

Phased-array UT (PAUT) in accordance with AWS D1.5M/D1.5 Annex J may be substituted for conventional UT. Perform ultrasonic testing of welds in accordance with the provisions of AWS D1.5M/D1.5. Make a record of each weld tested. Variations in ultrasonic testing procedures, equipment, and acceptance standards not included in Clause 8 of AWS D1.5M/D1.5 may be used with the approval of the Engineer. Such variations include curved scanning surfaces, other thicknesses, weld geometries, transducer sizes, frequencies, couplant, painted surfaces, testing techniques, etc. Record all approved variations in the inspection records. Perform all UT in conformance with a ultrasonic written procedure which contains a minimum of the following information regarding the UT method and examination techniques:

a. The types of weld joint configurations to be examined.

b. Acceptance criteria for the types of weld joints to be examined.

c. Type of UT equipment (manufacturer, model number, serial number).

d. Type of transducer, including frequency, size, shape, angle and type of wedge.

e. Scanning surface preparation and couplant requirements.

f. Type of calibration test block(s) with the appropriate reference reflectors.

g. Method of calibration and calibration interval.

h. Method for examining for laminations prior to weld evaluation.

i. Weld root index marking and other preliminary weld marking methods.

j. Scanning pattern and sensitivity requirements.

k. Methods for determining discontinuity location height, length and amplitude level.

l. Method of verifying the accuracy of the completed examination. This verification may be by re-UT by others (audits), other NDE methods, macroetch specimen, gouging or other visual techniques as may be approved by the Engineer.

m. Documentation requirements for examinations, including any verifications performed.

n. Documentation retention requirements.

2.3.3.2.4.2 Radiographic Testing (RT)

Perform, evaluate and report radiographic testing in accordance with the applicable requirements of AWS D1.5M/D1.5.

2.3.3.2.4.3 Magnetic Particle Inspection (MT)

Perform magnetic particle inspection of welds in accordance with the provisions of ASTM E709 and AWS D1.5M/D1.5, Inspection Clause. MT by the prod method is prohibited.

2.3.3.2.4.4 Dye Penetrant Inspection (PT)

Perform dye penetrant inspection(PT) of welds in accordance with the applicable provisions of ASTM E165/E165M.

2.3.4 Welds to be Subject to Nondestructive Examination

2.3.4.1 Structural Steel Non-Fracture Critical Members

Complete joint penetration groove welds. Inspect welds in conformance with AWS D1.5M/D1.5, inspection clause. Perform testing with a representative sample of welds and weld types from all welders and each of the processes each welder used. Spread testing throughout the project. Test 50 percent of all Complete joint penetration groove welds on non-fracture critical members.

2.3.4.2 Structural Steel Non-Fracture Critical Member Fillet Welds and Partial Penetration Groove Welds

Randomly select a minimum of 25 percent of all fillet welds and partial penetration welds for examination by magnetic particle and or dye penetrant testing procedures described previously. The random testing includes a representative sample of welds and weld types from all welders and each of the processes each welder used. Spread the random testing throughout the project. Develop and submit a schedule of random testing for approval prior to fabrication.

2.3.5 Test Coupons

The Government reserves the right to require the Contractor to remove coupons from completed work when doubt as to soundness cannot be resolved by nondestructive examination. Repair all replaced members with complete joint penetration groove welds. Submit proposed repair work for approval before commencing work. Develop a plan to reduce residual stress in all repaired weldments. The expense for removing and testing coupons, repairing cut members and the nondestructive examination of repairs will be borne by the Government. If the coupons fail testing, repair costs as well as sampling costs, will be borne by the Contractor.

2.3.6 Supplemental Examination

When the soundness of any weld is suspected of being deficient, due to faulty welding or stresses that might occur during shipment or erection, the Government reserves the right to perform nondestructive supplemental examinations before final acceptance. The cost of such inspection will be borne by the Government. If welds are found to be defective, repair of the defective work and cost of the reinspection will be borne by the Contractor.

2.3.7 Structural Steel Welding Repairs

Defective welds in the structural steel should be defined as critical repairs or non-critical repairs and must be repaired in accordance with AWS D1.5M/D1.5, Workmanship Clause for non-FCM and AASHTO/AWS. Make separate submittals for Welding Repairs for each process performed. Submit welding repair plans for steel approval prior to making repairs. Address weld repairs within the weld as well as weld repairs for base metal defects in the welding repair plan. Weld repairs to mill defects in the base metal, repair of cracks, or a revised design to compensate for deficiencies require approval from the Government. The Contractor may prepare procedures and specifications for the repair of anticipated routine problems and submit them for approval before fabrication begins. Remove defective weld metal to sound metal by use of air carbon-arc gouging or by mechanical methods. Oxygen gouging for purposes of weld repair is not permitted. Thoroughly clean metal surfaces before welding. Inadequate removal of welds that damages the base metal are subject to replacement of the base metal, or compensation for the deficiency in a manner approved by the Contracting Officer. Retest repaired welds by the same methods used in the original inspection. Except for the repair of members cut to remove test coupons and found to have acceptable welds, costs of repairs and retesting are borne by the Contractor.

2.3.8 Control Dimensions

After fabrication of each structure, but prior to painting, record and submit on the "control dimensions" chart provided, the actual dimensions indicated on Contract plans. Verify control dimensions prior to witness points defined under the schedule of witness points so that they may be verified during inspection and prior to either final assembly, painting, or installation of the structure. Verify and document all control dimensions prior to shipping the structure are within tolerance per ODOT SSC, AASHTO LRFDCONS, and AWS D1.5M/D1.5.

2.3.9 ODOT REQUIREMENTS

Provide all fabrication shop procedures, internal inspection, third-party inspection. and testing in accordance with ODOT SSC 00560.

2.4 STRUCTURAL STEEL ACCESSORIES

2.4.1 Welding Electrodes and Rods

AWS D1.5M/D1.5. Submit product data for welding electrodes and rods.

2.4.2 Non-Shrink Grout

ASTM C1107/C1107M, with no ASTM C827/C827M shrinkage. Grout must be nonmetallic. Submit product data for non-shrink grout. Provide non-shrink

grout in accordance with ODOT QPL and ODOT SSC Section 02080.

2.5 SURFACE PREPARATIONS

2.5.1 Uncoated Weathering Steel Cleaning

a. Remove mill scale and foreign material from exterior surfaces of exterior girders of unpainted weathering steel by blast cleaning according to SSPC SP 6/NACE No.3, Commercial Blast Cleaning, ASTM A709/A709M Grade 50W. Then dry the surface and apply at least three uniform applications of water mist at 24 hour intervals to ensure uniform weathering. Thoroughly clean all parts to be installed. Remove packing compounds, rust, dirt, grit and other foreign matter. Clean holes and grooves for lubrication. Examine enclosed chambers or passages to make sure that they are free from damaging materials. Where units or items are shipped as assemblies they will be inspected prior to installation. Disassembly, cleaning and lubrication will not be required except where necessary to place the assembly in a clean and properly lubricated condition. Do not use pipe wrenches, cold chisels or other tools likely to cause damage to the surfaces of rods, nuts or other parts for assembling and tightening parts.

b. SSPC SP 6/NACE No.3. Maintain steel surfaces free from rust, dirt, oil, grease, and other contaminants through final assembly. Provide in accordance with ODOT SSC Section 00560.70.

2.5.2 Hot-Dipped Galvanized Steel Cleaning

Provide the same surface cleaning as uncoated weathering steel cleaning, except the water mist and drying applications may be omitted.

2.5.3 Painted Girder Ends

Refer to Section 09 90 00.00 99 PAINTS AND COATINGS and Contract plans for extents and application of 3-coat paint system from ODOT QPL that is applied to ends of girders. Grind all edges of plate prior to coating. Perform grinding of plate edges before paint preparation in order to remove hardness as a result of flame cutting. Brake and grind all square edges and holes other than bolt holes to a 1/16 inch radius prior to painting. Provide Class B Coating at faying surfaces.

2.5.4 Surface Finishes

Provide maximum surface roughness per ODOT SSC and AASHTO LRFDCONS.

PART 3 EXECUTION

3.1 ERECTION

Pre-Erection coordination meeting must be scheduled and conducted with the Government per ODOT SSC Section 00560. Submit a stamped Erection Plan per ODOT SSC Sections 00560.04 and 00150.35.

3.1.1 STORAGE

Store the material out of contact with the ground in such manner and location as to minimize deterioration.

3.2 FIELD CONNECTIONS

All field connections must be executed in accordance with ODOT SSC and AASHTO LRFDCONS unless otherwise specified.

3.2.1 High-Strength Anchor Bolts and High-Strength Bolts

Install high-strength bolt assemblies and anchor bolt assemblies in the field per ODOT SSC Sections 00560 and 02560. Inspect and Test connections per ODOT SSC. Provide field bolt testing reports to the Government as tightening procedures commence.

3.3 FIELD WELDING

All field welding will need to be approved by the Government. Shop welding is required for this project. Any field welding performed must be in accordance with AWS D1.5M/D1.5 and ODOT SSC.

3.4 COATING REPAIR

All coatings must be provided in accordance with 09 90 00.00 99 PAINTS AND COATINGS, provide touch up coating repair in the field as necessary per ODOT SSC. In accordance with ASTM A143/A143M for steel products hot-dip galvanized after fabrication, submit embrittlement test reports to the Government.

3.5 CONSTRUCTION

3.5.1 Members Work

Provide all structural steel bridge member work in accordance with ODOT SSC Section 00560.40.

3.5.2 Camber

Ensure final girder camber and associated girder elevations for top of bearing elevations prior to deck placement. Provide final screed deck elevations for the finished grade in accordance with ODOT SSC and the project plans.

3.5.3 Erecting

Provide steel bridge girder erection per ODOT SSC requirements. The Contractor is responsible for ensuring the safety and stability of all temporary works prior to the bridge opening to traffic and the general public. No temporary works welds or bolts to permanent members will be permitted. Construction work platforms with deck overhang brackets have been considered for design in the noncomposite steel girder condition including dead load, screed machine loading, live load, and wind load applied to the top flange lateral bracing prior to the deck being poured and cured in the composite condition. Listed design assumptions are on the Contract plans for construction loading. In the erection plan provide written communication if the construction loading is greater than these assumptions along with stamped temporary bracing calculations showing satisfactory girder stress and stability of the noncomposite bridge system per AASHTO LRFD and ODOT SSC requirements.

3.6 FIELD QUALITY CONTROL

Perform field tests, and provide labor, equipment, and incidentals required for testing. Notify the Contracting Officer in writing of defective work within seven working days of the date of the inspection.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 07 - THERMAL AND MOISTURE PROTECTION

SECTION 07 10 00.00 99

STRUCTURAL BRIDGE EXPANSION JOINTS

PART 1 GENERAL

1.1 REFERENCES
1.2 SUBMITTALS
1.3 QUALITY CONTROL
1.4 DELIVERY, STORAGE, AND HANDLING

PART 2 PRODUCTS

2.1 MATERIALS
2.1.1 Strip Seal Expansion Joint Assemblies
2.1.2 Preformed Joint Filler

PART 3 EXECUTION

3.1 EXAMINATION
3.2 INSTALLATION

-- End of Section Table of Contents --

SECTION 07 10 00.00 99

STRUCTURAL BRIDGE EXPANSION JOINTS

PART 1 GENERAL

This specification include the strip seal expansion joint assemblies for steel bridge superstructures, and preformed joint filler shown on Contract plans.

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO LRFD	(9th Edition; 2020 with 2022 Interims) Bridge Design Specifications

AMERICAN CONCRETE INSTITUTE (ACI)

ACI 318	(2019; R 2022) Building Code Requirements for Structural Concrete (ACI 318-19) and Commentary (ACI 318R-19)

AMERICAN WELDING SOCIETY (AWS)

AWS D1.5M/D1.5	(2020; Errata 1 2022) Bridge Welding Code

ASTM INTERNATIONAL (ASTM)

ASTM A36/A36M	(2019) Standard Specification for Carbon Structural Steel
ASTM A108	(2024) Standard Specification for Steel Bar, Carbon and Alloy, Cold-Finished
ASTM A706/A706M	(2022a) Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement

OREGON DEPARTMENT OF TRANSPORTATION (ODOT)

ODOT SSC	(2024) Oregon Standard Specifications for Construction
ODOT QPL	(2024) Qualified Product List

1.2 SUBMITTALS

Government approval is required for submittals with a "G" classification. Submittals not having a "G" classification are for information only. When used, a code following the "G" classification identifies the office that

will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Strip Seal Expansion Joint Assemblies; G

Working/Shop Drawings; G

SD-03 Product Data

Product Data; G

SD-07 Certificates

Personnel Qualifications; G

Material Mill Certificates; G

SD-08 Manufacturer's Instructions

Manufacturer's Instructions; G

1.3 QUALITY CONTROL

Fabricator and installer experienced in the installation of strip seal expansion joints in steel bridge superstructures with previous work experience required. Provide detailed working/shop drawings of strip seal expansion joint assemblies for approval to the Government prior to performing working. Working/shop drawings of strip seal expansion Joint Assemblies must be in accordance with ODOT SSC Sections 00585 and Section 02440. Preformed joint filler must conform to requirements of ODOT SSC Section 02440. Both preformed joint filler and strip seal expansion joints must be approved on the ODOT QPL. Working/shop drawings of strip seal expansion joint assemblies must conform to ODOT Standard Drawing BR145. Submit personnel qualifications to the Government in accordance with ODOT SSC Section 00585.

1.4 DELIVERY, STORAGE, AND HANDLING

Deliver materials to the site in manufacturer's original, unopened containers with seals intact per ODOT SSC.

PART 2 PRODUCTS

2.1 MATERIALS

Submit all product data to the government for approval. Provide material mill certificates to the Government when available.

2.1.1 Strip Seal Expansion Joint Assemblies

Strip Seal Expansion Joint Assembly must comply with ACI 318, AASHTO LRFD, ODOT SSC, and contract documents. Use reinforcing steel per ASTM A706/A706M. Use structural steel shapes and plates conforming to ASTM A36/A36M. Use welded shear stud connectors conforming to ASTM A108. All welding must conform to AWS D1.5M/D1.5. See ODOT Standard Drawing BR145 and contract documents for further detail. Provide the Government material mill certificates during fabrication.

2.1.2 Preformed Joint Filler

Provide a preformed expansion strip seal meeting the requirements of ODOT SSC and using qualified products from the ODOT QPL.

PART 3 EXECUTION

3.1 EXAMINATION

Verify that conditions are acceptable for installation per ODOT SSC. Notify the Engineer of any discrepancies.

3.2 INSTALLATION

Install strip seal expansion joint assemblies in accordance with manufacturer's instructions, AASHTO LRFD, and ODOT SSC. Ensure proper alignment and secure fastening of steel plates and parts.

Install premolded joint filler according to approved shop drawings and ODOT SSC.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 09 - FINISHES

SECTION 09 90 00.00 99

PAINTS AND COATINGS

PART 1 GENERAL

1.1 REFERENCES
1.2 SUBMITTALS
1.3 RELATED REQUIREMENTS
1.3.1 Painting Included
1.3.1.1 Steel Bridge Girder Three-Coat Paint System
1.3.2 Painting Excluded
1.3.3 Mechanical and Electrical Coatings
1.3.4 Exterior Painting of Site Work Items
1.4 DEFINITIONS
1.4.1 Qualification Testing
1.4.2 Batch Quality Conformance Testing
1.4.3 Coating
1.4.4 DFT or dft
1.4.5 DSD
1.4.6 EXT
1.4.7 Loose Paint
1.4.8 mil / mils
1.4.9 MPI Gloss Levels
1.4.10 MPI System Number
1.4.11 Paint
1.5 QUALITY ASSURANCE
1.5.1 Regulatory Requirements
1.5.1.1 Environmental Protection
1.5.1.2 Lead Content
1.5.1.3 Chromate Content
1.5.1.4 Asbestos Content
1.5.1.5 Mercury Content
1.5.1.6 Silica
1.5.1.7 Human Carcinogens
1.5.1.8 Carbon Based Fibers / Tubes
1.5.2 Coating Contractor's Qualification
1.5.3 SSPC QP 1 Certification
1.5.4 Approved Products List
1.5.5 Hot-Dipped Galvanizing
1.5.6 Field Samples and Tests
1.5.6.1 Sampling Procedure
1.5.6.2 Testing Procedure
1.6 SAFETY AND HEALTH
1.6.1 Toxic Materials
1.7 ENVIRONMENTAL REQUIREMENTS
1.7.1 Coatings

PART 2 PRODUCTS

2.1 MATERIALS
2.2 COLOR SELECTION OF TOP COAT
2.3 HOT-DIPPED GALVANIZING

PART 3 EXECUTION

3.1 APPLICATION OF COATINGS
3.2 SURFACE PREPARATION
3.3 PREPARATION OF METAL SURFACES
3.3.1 Existing and New Ferrous Surfaces
3.3.2 Final Ferrous Surface Condition:
3.3.2.1 Abrasive Blast Cleaned Surfaces
3.3.3 Hot-Dipped Galvanized Surfaces
3.4 APPLICATION
3.4.1 Coating Application
3.4.2 Mixing and Thinning of Paints
3.4.3 Coating Systems
3.5 COATING SYSTEMS FOR METAL
3.6 PIPING IDENTIFICATION
3.7 INSPECTION AND ACCEPTANCE
3.8 WASTE MANAGEMENT
3.9 PAINT TABLES
3.9.1 Exterior Paint Tables
3.9.1.1 MPI Division 5: Exterior Metal, Ferrous Paint Table

-- End of Section Table of Contents --

SECTION 09 90 00.00 99

PAINTS AND COATINGS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS (ACGIH)

ACGIH 0100	(2017; Suppl 2020) Documentation of the Threshold Limit Values and Biological Exposure Indices

ASTM INTERNATIONAL (ASTM)

ASTM A123/A123M	(2017) Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A153/A153M	(2023) Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM D523	(2014; R 2018) Standard Test Method for Specular Gloss
ASTM D6386	(2022) Standard Practice for Preparation of Zinc (Hot-Dip Galvanized) Coated Iron and Steel Product and Hardware Surfaces for Painting

CENTERS FOR DISEASE CONTROL AND PREVENTION (CDC)

Intelligence Bulletin 65	(2013) Occupational Exposure to Carbon Nanotubes and Nanofibers

MASTER PAINTERS INSTITUTE (MPI)

MPI 9	(2016) Alkyd, Exterior Gloss (MPI Gloss Level 6)
MPI 72	(2016) Polyurethane, Two-Component, Pigmented, Gloss (MPI Gloss Level 6-7)
MPI 79	(2016) Primer, Alkyd, Anti-Corrosive for Metal
MPI 94	(2016) Alkyd, Exterior, Semi-Gloss (MPI Gloss Level 5)
MPI 101	(2016) Primer, Epoxy, Anti-Corrosive, for

	Metal
MPI 107	(2016) Primer, Rust-Inhibitive, Water Based
MPI ASM	(2019) Architectural Painting Specification Manual
MPI GPS-1-14	(2014) Green Performance Standard GPS-1-14
MPI MRM	(2015) Maintenance Repainting Manual

OREGON DEPARTMENT OF TRANSPORTATION (ODOT)

ODOT SSC	(2024) Oregon Standard Specifications for Construction
ODOT QPL	(2024) Qualified Product List

SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC Glossary	(2011) SSPC Protective Coatings Glossary
SSPC PA 1	(2016) Shop, Field, and Maintenance Coating of Metals
SSPC QP 1	(2019) Standard Procedure for Evaluating the Qualifications of Industrial/Marine Painting Contractors (Field Application to Complex Industrial Steel Structures and Other Metal Components)
SSPC SP 1	(2015) Solvent Cleaning
SSPC SP 6/NACE No.3	(2007) Commercial Blast Cleaning
SSPC VIS 1	(2002; E 2004) Guide and Reference Photographs for Steel Surfaces Prepared by Dry Abrasive Blast Cleaning

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2024) Safety -- Safety and Occupational Health (SOH) Requirements

U.S. DEPARTMENT OF DEFENSE (DOD)

MIL-STD-101	(2014; Rev C) Color Code for Pipelines and for Compressed Gas Cylinders

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA Method 24	(2000) Determination of Volatile Matter Content, Water Content, Density, Volume Solids, and Weight Solids of Surface Coatings

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FED-STD-313	(2018) Material Safety Data,

Transportation Data and Disposal Data for Hazardous Materials Furnished to Government Activities

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910.1000 Air Contaminants

1.2 SUBMITTALS

Government approval is required for submittals with a "G" classification. Submittals not having a "G" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

Samples of specified materials may be taken and tested for compliance with specification requirements.

SD-02 Shop Drawings

Piping Identification

SD-03 Product Data

Coating; G

Product Data Sheets

SD-04 Samples

Color; G

SD-07 Certificates

Qualification Testing laboratory for coatings; G

SD-08 Manufacturer's Instructions

Mixing

Manufacturer's Safety Data Sheets

SD-10 Operation and Maintenance Data

Coatings; G

1.3 RELATED REQUIREMENTS

1.3.1 Painting Included

Where a space or surface is indicated to be painted, include the following unless indicated otherwise.

a. Surfaces behind portable objects and surface mounted articles readily detachable by removal of fasteners, such as screws and bolts.

b. New factory finished surfaces that require identification or color coding and factory finished surfaces that are damaged during

performance of the work.

c. Existing coated surfaces that are damaged during performance of the work.

1.3.1.1 Steel Bridge Girder Three-Coat Paint System

Includes new steel surfaces at girder ends as shown on Contract documents.

1.3.2 Painting Excluded

Do not paint the following unless indicated otherwise.

a. Surfaces concealed and made inaccessible by panelboards, fixed ductwork, machinery, and equipment fixed in place.

b. Surfaces in concealed spaces. Concealed spaces are defined as enclosed spaces above suspended ceilings, furred spaces, attic spaces, crawl spaces, elevator shafts and chases.

c. Steel to be embedded in concrete.

d. Copper, stainless steel, aluminum, anodized aluminum, brass, and lead except existing coated surfaces.

e. Hardware, fittings, and other factory finished items.

1.3.3 Mechanical and Electrical Coatings

Includes field coating of exterior new and existing surfaces.

a. Where a space or surface is indicated to be painted, include the following items unless indicated otherwise:

(1) Exposed piping, conduit, and ductwork;

(2) Supports, hangers, air grilles, and registers;

(3) Miscellaneous metalwork and insulation coverings.

b. Do not paint the following, unless indicated otherwise:

(1) New zinc-coated, aluminum, and copper surfaces under insulation;

(2) New aluminum jacket on piping;

(3) New interior ferrous piping under insulation.

1.3.4 Exterior Painting of Site Work Items

All coatings to be applied in a controlled fabrication shop facility per Contract documents and ODOT SSC unless approved by the Government.

1.4 DEFINITIONS

1.4.1 Qualification Testing

Qualification testing is the performance of all test requirements listed in

the product specification. This testing is accomplished by MPI to qualify each product for the MPI Approved Product List, and may also be accomplished by Contractor's third-party testing lab if an alternative to Batch Quality Conformance Testing by MPI is desired. Provide a three-ccoat system for painted girders as shown on Contract plans and in accordance with ODOT SSC and ODOT QPL.

1.4.2 Batch Quality Conformance Testing

Batch quality conformance testing determines that the product provided is the same as the product qualified to the appropriate product specification. This testing must be accomplished by an MPI testing lab.

1.4.3 Coating

SSPC Glossary: A liquid, liquefiable, or mastic composition that is converted to a solid protective, decorative, or functional adherent film after application as a thin layer; Generic term for paint, lacquer, enamel.

1.4.4 DFT or dft

Dry film thickness, the film thickness of the fully cured, dry paint or coating.

1.4.5 DSD

Degree of Surface Degradation, the MPI system of defining degree of surface degradation. Five levels are generically defined under the Assessment sections in the MPI MRM, MPI Maintenance Repainting Manual.

1.4.6 EXT

MPI short term designation for an exterior coating system.

1.4.7 Loose Paint

Paint or coating that can be removed with a dull putty knife.

1.4.8 mil / mils

The English measurement for 0.001 in or one one-thousandth of an inch.

1.4.9 MPI Gloss Levels

a. MPI system of defining gloss. Seven gloss levels (G1 to G7) are generically defined under the Evaluation sections of the MPI Manuals. Traditionally, Flat refers to G1/G2, Eggshell refers to G3, Semigloss refers to G5, and Gloss refers to G6.

b. Gloss levels are defined by MPI as follows:

Gloss Level	Description	Units at 60 degree angle	Units at 80 degree angle
G1	Matte or Flat	0 to 5	10 max
G2	Velvet	0 to 10	10 to 35

Gloss Level	Description	Units at 60 degree angle	Units at 80 degree angle
G3	Eggshell	10 to 25	10 to 35
G4	Satin	20 to 35	35 min
G5	Semi-Gloss	35 to 70	
G6	Gloss	70 to 85	
G7	High Gloss		

c. Gloss is tested in accordance with ASTM D523. Historically, the Government has used Flat (G1 / G2), Eggshell (G3), Semi-Gloss (G5), and Gloss (G6).

1.4.10 MPI System Number

The MPI coating system number in each MPI Division found in either the MPI Architectural Painting Specification Manual or the Maintenance Repainting Manual and defined as an exterior (EXT/REX) or interior system (INT/RIN).

1.4.11 Paint

SSPC Glossary; Any pigmented liquid, liquefiable, or mastic composition designed for application to a substrate in a thin layer that is converted to an opaque solid film after application. Used for protection, decoration, identification, or to serve some other functional purposes; Application of a coating material.

1.5 QUALITY ASSURANCE

1.5.1 Regulatory Requirements

1.5.1.1 Environmental Protection

In addition to requirements specified elsewhere for environmental protection, provide coating materials that conform to the restrictions of the local Air Pollution Control District and regional jurisdiction. Notify Contracting Officer of any paint specified herein which fails to conform.

1.5.1.2 Lead Content

Do not use coatings having a lead content over 0.06 percent by weight of nonvolatile content.

1.5.1.3 Chromate Content

Do not use coatings containing zinc-chromate or strontium-chromate.

1.5.1.4 Asbestos Content

Provide asbestos-free materials.

1.5.1.5 Mercury Content

Provide materials free of mercury or mercury compounds.

1.5.1.6 Silica

Provide abrasive blast media containing no free crystalline silica.

1.5.1.7 Human Carcinogens

Provide materials that do not contain ACGIH 0100 confirmed human carcinogens (A1) or suspected human carcinogens (A2).

1.5.1.8 Carbon Based Fibers / Tubes

Materials must not contain carbon based fibers such as carbon nanotubes or carbon nanofibers. Intelligence Bulletin 65 ranks toxicity of carbon nanotubes on a par with asbestos.

1.5.2 Coating Contractor's Qualification

Submit the name, address, telephone number, and e-mail address of the Contractor that will be performing all surface preparation and coating application. Submit evidence that key personnel have successfully performed surface preparation and application of coatings on structural steel bridges on a minimum of three similar projects within the past three years. List information by individual and include the following:

a. Name of individual and proposed position for this work.

b. Information about each previous assignment including:

(1) Position or responsibility

(2) Employer (if other than the Contractor)

(3) Name of facility owner

(4) Mailing address and telephone number of facility owner

(5) Name of individual in facility owner's organization who can be contacted as a reference

(6) Location, size and description of structure

(7) Dates work was carried out

(8) Description of work carried out on structure

1.5.3 SSPC QP 1 Certification

Contractors that perform surface preparation or coating application on steel substrates must be certified by the Society for Protective Coatings (formerly Steel Structures Painting Council) (SSPC) to the requirements of SSPC QP 1 prior to Contract award, and must remain certified while accomplishing any surface preparation or coating application. If a Contractor's certification expires, the firm will not be allowed to perform any work until the certification is reissued. Requests for extension of time for any delay to the completion of the project due to an inactive certification will not be considered. Notify the Contracting Officer of any change in Contractor certification status. Notify the Contracting Officer of all scheduled and unannounced on-site audits from SSPC and

furnish a copy of all audit reports.

1.5.4 Approved Products List

The current MPI, "Approved Product List" which lists paint by brand, label, product name and product code as of the date of Contract award, will be used to determine compliance with the submittal requirements of this specification. The Contractor may choose to use a subsequent MPI "Approved Product List", however, only one list may be used for the entire Contract and each coating system is to be from a single manufacturer. Provide all coats on a particular substrate from a single manufacturer. No variation from the MPI Approved Products List is acceptable. Ensure steel girders are painted at each end in accordance with ODOT SSC Section 00594 and the ODOT QPL for a 3 Coat System.

1.5.5 Hot-Dipped Galvanizing

Provide hot-dipped galvanizing in accordance with ASTM A123/A123M and ODOT SSC. This includes but is not limited to bearing plates, masonry plates, pedestrian railing/posts and fixtures, Schedule 40 steel pipe and steel shield/craddle for the domestic waterline as shown on Contract documents. Provide hot-dipped galvanizing of anchor bolts and other fasteners on the project in accordance with ASTM A153/A153M.

1.5.6 Field Samples and Tests

a. The Contracting Officer may choose up to two coatings that have been delivered to the site to be tested at no cost to the Government. Take samples of each chosen product as specified in the Paragraph SAMPLING PROCEDURE. Test each chosen product as specified in the Paragraph TESTING PROCEDURE. Remove products from the job site which do not conform, and replace with new products that conform to the referenced specification. Test replacement products that failed initial testing as specified in the Paragraph TESTING PROCEDURE at no cost to the Government.

b. Another required testing is Batch Quality Conformance Testing to prove conformance of the manufacturer's paint to the specified MPI standard. This testing is accomplished before the materials are delivered to the job site. Provide testing for steel girder paint products. Test paint products as specified in the Paragraph TESTING PROCEDURE.

1.5.6.1 Sampling Procedure

Select paint at random from the products that have been delivered to the job site for sample testing. The Contractor must provide one quart samples of the selected paint materials. Take samples in the presence of the Contracting Officer, and label, and identify each sample. Provide labels in accordance with the Paragraph PACKAGING, LABELING, AND STORAGE.

1.5.6.2 Testing Procedure

a. Provide Batch Quality Conformance Testing for specified products, as defined by and performed by MPI. As an alternative to Batch Quality Conformance Testing, the Contractor may provide Qualification Testing laboratory for coatings for specified products above to the appropriate MPI product specification, using the third-party laboratory approved under the Paragraph QUALIFICATION TESTING laboratory for coatings.

Include the backup data and summary of the test results within the qualification testing lab report. Provide a summary listing of all the reference specification requirements and the result of each test. Clearly indicate in the summary whether the tested paint meets each test requirement. Note that Qualification Testing may take four to six weeks to perform, due to the extent of testing required.

b. Submit name, address, telephone number, FAX number, and e-mail address of the independent third party laboratory selected to perform testing of coating samples for compliance with specification requirements. Submit documentation that laboratory is regularly engaged in testing of paint samples for conformance with specifications, and that employees performing testing are qualified. If MPI is chosen to perform the Batch Quality Conformance testing, the above submittal information is not required, only a letter is required from the Contractor stating that MPI will perform the testing.

1.6 SAFETY AND HEALTH

Comply with applicable Federal, State, and local laws and regulations, and with the ACCIDENT PREVENTION PLAN, including the Activity Hazard Analysis as specified in Section 01 35 26.00 25 GOVERNMENTAL SAFETY REQUIREMENTS and in Appendix A of EM 385-1-1. Include in the Activity Hazard Analysis the potential impact of painting operations on painting personnel and on others involved in and adjacent to the work zone.

1.6.1 Toxic Materials

a. To protect personnel from overexposure to toxic materials, conform to the most stringent guidance of:

(1) The applicable manufacturer's Safety Data Sheets (SDS) or local regulation.

(2) 29 CFR 1910.1000.

(3) ACGIH 0100, threshold limit values.

b. Submit manufacturer's Safety Data Sheets for coatings, solvents, and other potentially hazardous materials, as defined in FED-STD-313.

1.7 ENVIRONMENTAL REQUIREMENTS

Comply, at minimum, with manufacturer recommendations for space ventilation during and after installation.

1.7.1 Coatings

Do not apply coating when air or substrate conditions are:

a. Less than 5 degrees F above dew point;

b. Below 50 degrees F or over 95 degrees F, unless specifically pre-approved by the Contracting Officer and the product manufacturer. Do not, under any circumstances, violate the manufacturer's application recommendations.

PART 2 PRODUCTS

2.1 MATERIALS

Conform to the coating specifications and standards referenced in PART 3. Submit Product Data Sheets for specified coatings and solvents. Provide preprinted cleaning and maintenance instructions for all coating systems. Submit Manufacturer's Instructions on Mixing: Detailed mixing instructions, minimum and maximum application temperature and humidity, pot life, and curing and drying times between coats. Follow the Application Instructions of approved three-Coat Paint System per the Manufacturer's Instructions and these specifications.

2.2 COLOR SELECTION OF TOP COAT

a. Provide colors of finish coats as indicated or specified. Allow Contracting Officer to select colors not indicated or specified. Manufacturers' names and color identification are used for the purpose of color identification only. Named products are acceptable for use only if they conform to specified requirements. Products of other manufacturers are acceptable if the colors are approximately the colors indicated and the product conforms to specified requirements.

b. Provide top coat of three-coat paint system for steel girder ends that will be of similar color to the final weathering steel patina of a dark purplish brown in accordance with ODOT SSC and ODOT QPL.

2.3 HOT-DIPPED GALVANIZING

Provide Hot-Dipped Galvanizing in accordance with ASTM A123/A123M, ASTM A153/A153M, and ODOT SSC.

PART 3 EXECUTION

3.1 APPLICATION OF COATINGS

All coatings must be applied in a controlled and covered facility where all curing times must be adhered to per manufacturer recommended practices. Damaged coatings may be touched up and fixed in the field per manufacturer and ASTM A123/A123M and ASTM A153/A153M requirements.

3.2 SURFACE PREPARATION

Remove dirt, splinters, loose particles, grease, oil, and other foreign matter and substances deleterious to coating performance as specified for each substrate before application of paint or surface treatments. Remove oil and grease prior to mechanical cleaning. Schedule cleaning so that dust and other contaminants will not fall on wet, newly painted surfaces. Spot-prime exposed ferrous metals such as nail heads on or in contact with surfaces to be painted with water-thinned paints, with a suitable corrosion-inhibitive primer capable of preventing flash rusting and compatible with the coating specified for the adjacent areas. Refer to MPI ASM and MPI MRM for additional more specific substrate preparation requirements.

3.3 PREPARATION OF METAL SURFACES

3.3.1 Existing and New Ferrous Surfaces

a. Ferrous Surfaces including Shop-coated Surfaces and Small Areas That Contain Rust, Mill Scale and Other Foreign Substances: Where shop coat is missing or damaged, clean according to SSPC SP 6/NACE No.3.

b. Surfaces With More Than 20 Percent Rust, Mill Scale, and Other Foreign Substances: Clean entire surface in accordance with SSPC SP 6/NACE No.3.

3.3.2 Final Ferrous Surface Condition:

3.3.2.1 Abrasive Blast Cleaned Surfaces

Comply with SSPC SP 6/NACE No.3 and ODOT SSC. Use as a visual reference, photographs in SSPC VIS 1 for the appearance of cleaned surfaces.

3.3.3 Hot-Dipped Galvanized Surfaces

New Galvanized Surfaces With Only Dirt and Zinc Oxidation Products: Clean with solvent, in accordance with SSPC SP 1. Completely remove coating by brush-off abrasive blast if the galvanized metal has been passivated or stabilized. Do not "passivate" or "stabilize" new galvanized steel to be coated. If the absence of hexavalent stain inhibitors is not documented, test as described in ASTM D6386, Appendix X2, and remove by one of the methods described therein. Perform work in accordance with ODOT SSC, ASTM A123/A123M, and ASTM A153/A153M.

3.4 APPLICATION

3.4.1 Coating Application

a. Comply with applicable Federal, State and local laws enacted to ensure compliance with Federal Clean Air Standards. Apply coating materials in accordance with SSPC PA 1. SSPC PA 1 methods are applicable to all substrates, except as modified herein.

b. At the time of application, paint must show no signs of deterioration. Maintain uniform suspension of pigments during application.

c. Unless otherwise specified or recommended by the paint manufacturer, paint may be applied by brush, roller, or spray. Use trigger operated spray nozzles for water hoses. Use rollers for applying paints and enamels of a type designed for the coating to be applied and the surface to be coated. Wear protective clothing and respirators when applying oil-based paints or using spray equipment with any paints.

d. Only apply paints, except water-thinned types, to surfaces that are completely free of moisture as determined by sight or touch.

e. Thoroughly work coating materials into joints, crevices, and open spaces. Pay special attention to ensure that all edges, corners, crevices, welds, and rivets receive a film thickness equal to that of adjacent painted surfaces.

f. Apply each coat of paint so that dry film is of uniform thickness

and free from runs, drops, ridges, waves, pinholes or other voids, laps, brush marks, and variations in color, texture, and finish. Completely hide all blemishes.

g. Touch up damaged coatings before applying subsequent coats. Broom clean and clear dust from steel girders before and during the application of coating material.

h. Piping in Unfinished Areas: Provide primed surfaces with one coat of red alkyd gloss enamel (MPI 9) applied to a minimum dry film thickness of 1.0 mil in attic spaces, spaces above suspended ceilings, crawl spaces, pipe chases, mechanical equipment room, and spaces where walls or ceiling are not painted or not constructed of a prefinished material.

i. Piping in Finished Areas: Provide primed surfaces with two coats of paint to match adjacent surfaces, except provide valves and operating accessories with one coat of red alkyd gloss enamel (MPI 9) applied to a minimum dry film thickness of 1.0 mil or two component gloss polyurethane (MPI 72) in exterior applications.

j. Provide labeling on the surfaces of all feed and cross mains to show the pipe function such as "Sprinkler System", "Fire Department Connection", "Standpipe". For pipe sizes 4 inch and larger provide white painted stenciled letters and arrows, a minimum of 2 in in height and visible from at least two sides when viewed from the floor. For pipe sizes less than 4-inch, provide white painted stenciled letters and arrows, a minimum of 0.75 in in height and visible from the floor.

k. Drying Time: Allow time between coats, as recommended by the coating manufacturer, to permit thorough drying, but not to present topcoat adhesion problems. Provide each coat in specified condition to receive next coat.

l. Primers, and Intermediate Coats: Do not allow primers or intermediate coats to dry more than 30 days, or longer than recommended by manufacturer, before applying subsequent coats. Follow manufacturer's recommendations for surface preparation if primers or intermediate coats are allowed to dry longer than recommended by manufacturers of subsequent coatings. Cover each preceding coat or surface completely by ensuring visually perceptible difference in shades of successive coats.

m. Finished Surfaces: Provide finished surfaces free from runs, drops, ridges, waves, laps, brush marks, and variations in colors.

n. Thermosetting Paints: Apply topcoats over thermosetting paints (epoxies and urethanes) within the overcoat window recommended by the manufacturer.

3.4.2 Mixing and Thinning of Paints

a. Reduce paints to proper consistency by adding fresh paint, except when thinning is mandatory to suit surface, temperature, weather conditions, application methods, or for the type of paint being used. Obtain written permission from the Contracting Officer to use thinners. Verify that the written permission includes quantities and types of thinners to use.

b. When thinning is allowed, thin paints immediately prior to application with not more than one pint of suitable thinner per gallon. The use of thinner does not relieve the Contractor from obtaining complete hiding, full film thickness, or required gloss. Thinning cannot cause the paint to exceed limits on volatile organic compounds. Do not mix paints of different manufacturers.

3.4.3 Coating Systems

Systems by Substrates: Apply coatings that conform to the respective specifications listed in the following Tables:

Table for Exterior Applications	
MPI Division 5	Exterior Metal, Ferrous Paint Table

3.5 COATING SYSTEMS FOR METAL

Apply coatings of Tables in MPI Division 5 for Structural Bridge Steel per Application Instructions of three-Coat Paint System approved per ODOT QPL.

a. Apply specified ferrous metal primer to steel surfaces on the same day that surface is cleaned, to surfaces that meet all specified surface preparation requirements at time of application.

b. Inaccessible Surfaces: Prior to erection, use one coat of specified primer on metal surfaces that will be inaccessible after erection.

c. Shop-primed Surfaces: Touch up exposed substrates and damaged coatings to protect from rusting prior to applying field primer.

d. Surface Previously Coated with Epoxy or Urethane: Apply MPI 101, 1.5 mils DFT immediately prior to application of epoxy or urethane coatings.

e. Pipes and Tubing: The semitransparent film applied to some pipes and tubing at the mill is not to be considered a shop coat. Overcoat these items with the specified ferrous-metal primer prior to application of finish coats.

f. Exposed Nails, Screws, Fasteners, and Miscellaneous Ferrous Surfaces. On surfaces to be coated with water thinned coatings, spot prime exposed nails and other ferrous metal with latex primer MPI 107.

3.6 PIPING IDENTIFICATION

Piping Identification, Including Surfaces In Concealed Spaces: Provide in accordance with MIL-STD-101. Place stenciling in clearly visible locations. On piping not covered by MIL-STD-101, stencil approved names or code letters, in letters a minimum of 1/2 inch high for piping and a minimum of 2 inches high elsewhere. Stencil arrow-shaped markings on piping to indicate direction of flow using black stencil paint.

3.7 INSPECTION AND ACCEPTANCE

In addition to meeting previously specified requirements, demonstrate mobility of moving components, including swinging and sliding doors, cabinets, and windows with operable sash, for inspection by the Contracting

Officer. Perform this demonstration after appropriate curing and drying times of coatings have elapsed and prior to invoicing for final payment.

3.8 WASTE MANAGEMENT

As specified in the Waste Management Plan and as follows. Do not use kerosene or any such organic solvents to clean up water based paints. Properly dispose of paints or solvents in designated containers. Close and seal partially used containers of paint to maintain quality as necessary for reuse. Store in protected, well-ventilated, fire-safe area at moderate temperature. Place materials defined as hazardous or toxic waste in designated containers. Coordinate with manufacturer for take-back program. Set aside scrap to be returned to manufacturer for recycling into new product. When such a service is not available, contact local recyclers to reclaim the materials. Where local options exist for leftover paint recycling, collect all waste paint by type and provide for delivery to recycling or collection facility for reuse by local organizations.

3.9 PAINT TABLES

All DFT's are minimum values. Use only materials with a MPI GPS-1-14 green check mark having a minimum MPI "Environmentally Friendly" E1 rating based on VOC (EPA Method 24) content levels. Acceptable products are listed in the MPI Green Approved Products List, available at http://www.specifygreen.com/APL/ProductIdxByMPInum.asp.

3.9.1 Exterior Paint Tables

3.9.1.1 MPI Division 5: Exterior Metal, Ferrous Paint Table

Steel/Ferrous Surfaces:

New Steel that has been blast-cleaned to SSPC SP 6/NACE No.3

Alkyd					
New	Existing, uncoated	Primer	Intermediate	Topcoat	System DFT
MPI EXT 5.1D-G5 (Semigloss)	MPI REX 5.1D-G5 (Semigloss)	MPI 79	MPI 94	MPI 94	5.25 mils
MPI EXT 5.1D-G6 (Gloss)	MPI REX 5.1D-G6 (Gloss)	MPI 79	MPI 9	MPI 9	5.25 mils
Topcoat: Coating to match adjacent surfaces.					

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 10 - SPECIALTIES

SECTION 10 10 00.00 99

SEISMIC ISOLATION BRIDGE BEARINGS

PART 1 GENERAL

1.1 REFERENCES
1.2 SUBMITTALS
1.3 QUALITY CONTROL
1.3.1 Qualifications
1.3.1.1 Manufacturer Qualifications
1.4 DELIVERY, STORAGE, AND HANDLING

PART 2 PRODUCTS

2.1 MATERIALS
2.2 DESIGN AND TESTING

PART 3 EXECUTION

3.1 EXAMINATION
3.2 INSTALLATION
3.3 FIELD QUALITY CONTROL
3.3.1 Tests

-- End of Section Table of Contents --

SECTION 10 10 00.00 99

SEISMIC ISOLATION BRIDGE BEARINGS

PART 1 GENERAL

This specification include the seismic isolation bridge bearings that secure the steel girder superstructure to the concrete subsstructure and are utilized to isolate and dampen the earthquake inertia forces in the superstructure and transmitted to the substructure foundation elements. This Work consists of furnishing and installing seismic isolation bridge bearings as shown, specified, or directed. Seismic Isolation Bridge Bearings consist of the isolator assembly including upper and lower bearing plates. Additional items, such as the bevel plates, sole plates, masonry plates, and lower bearing plate and bolts are considered part of the isolation bearing assembly.

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO GSID	(4th Edition, 2014; Interim Amendment 1, 2023) Guide Specifications for Seismic Isolation Design
AASHTO LRFD	(9th Edition; 2020 with 2022 Interims) Bridge Design Specifications

OREGON DEPARTMENT OF TRANSPORTATION (ODOT)

ODOT SSC	(2024) Oregon Standard Specifications for Construction

1.2 SUBMITTALS

Government approval is required for submittals with a "G" classification. Submittals not having a "G" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Prefabrication Coordination Meeting

SD-02 Shop Drawings

Working/Shop Drawings; G

SD-03 Product Data

Product Data; G

Manufacturer's Specifications; G

Quality Control Tests; G

SD-05 Design Data

Seismic Isolation Design Calculations

SD-06 Test Reports

Prototype Test Results; G

Manufacturer’s Test Results; G

SD-07 Certificates

Manufacturer Qualifications; G

Material Certificates; G

SD-08 Manufacturer's Instructions

Manufacturer's Instructions; G

1.3 QUALITY CONTROL

a. Isolator dimensions shown on the plans are based on one possible isolator configuration, for the purpose of determining beam seat elevations and connection details shown. Final isolator configurations may vary from that shown, and make any necessary adjustments in bridge elevations and connection details to accommodate final isolator dimensions. Provide isolators meeting the limiting dimensions shown on the plans. The Contractor is responsible for making any necessary adjustments in bridge elevations to accommodate final isolator dimensions. Provide isolators meeting the limiting dimensions shown on the plans.

b. The structure has been analyzed and designed in accordance with the AASHTO GSID using a lead core elastomeric isolation system. Suppliers of lead core elastomeric isolation systems are not required to perform additional analyses. Suppliers of alternate isolation systems are required to perform an analysis in accordance with the AASHTO GSID incorporating their proposed isolation system properties. Provide Working/Shop Drawings for review and approval to the Government prior to beginning fabrication. During this process schedule a prefabrication coordination meeting with the Government to ensure working direction is satisfactory. As required in Paragraph DESIGN AND TESTING, provide manufacturer seismic isolation design calculations that verify the proposed isolation system included in the Working/Shop Drawings meets the requirements of the Contract; submit design calculations with Working/Shop Drawings.

1.3.1 Qualifications

1.3.1.1 Manufacturer Qualifications

The manufacturer must have a minimum of five years of experience in the design and production of seismic isolation bridge bearings.

1.4 DELIVERY, STORAGE, AND HANDLING

Deliver materials to the site in manufacturer's original, unopened containers with seals intact. Provide storage that is covered from the elements and above the ground.

PART 2 PRODUCTS

2.1 MATERIALS

Bearings must be designed and manufactured to accommodate the Contract documents forces, deflections, and rotations of the project. Comply with AASHTO LRFD and AASHTO GSID requirements. The manufacturer is responsible for testing bearings. The manufacturer is also responsible for certifying that the completed bearings and their components meet the requirements of the following tests, provide the Government with the Manufacturer's Certificates adhering to the requirements of the Contract documents. Submit the manufacturer’s test results to the Government. Provide bearing plates, beveled plates, sole plates, and masonry plates in accordance with Contract plans and ODOT SSC Section 00582. Provide product data, material certificates, and manufacturer's specifications to the Government.

2.2 DESIGN AND TESTING

a. Provide prototype test results to the Government. Isolation system suppliers who have submitted characterization test results by means of the evaluation findings of the Highway Innovative Technology Evaluation Center (HITEC) must perform prototype tests in accordance with Section 13.2 and evaluation of the results per Section 13.3 of the AASHTO GSID. Suppliers without HITEX results must perform prototype tests in accordance with AASHTO GSID Section 13 in its entirety.

b. Provide the quality control tests to the Government. All isolators must be tested in accordance with the requirements of the AASHTO GSID, Section 15.2. Any bearing that fails to satisfy the requirements must be rejected. Alternative suppliers of lead core elastomeric isolators, if approved, must satisfy these testing requirements.

c. Alternative systems, if approved, must perform and evaluate all tests in accordance with AASHTO GSID, Section 15.2 or 17.2. Substitution of other standards or requirements, including the use of sampling methods rather than testing each isolator, is not permitted. Provide manufacturer seismic isolation design calculations for the isolation system that is included in the Working/Shop Drawings. Provide base materials that are durable, corrosion-resistant, and suitable for the project's environmental conditions.

PART 3 EXECUTION

3.1 EXAMINATION

Verify that conditions are acceptable for installation. Notify the Engineer of any discrepancies. Contractor is responsible for achieving final top of grout pad dimensions at the seismic isolation bridge bearings to fit geometrically achieving final top of deck screed elevations. Grout pads may be adjusted to a maximum height of 6 inches above the top shaft cap/stem wall.

3.2 INSTALLATION

Install bridge bearings in accordance with ODOT SSC. Additionally install seismic isolation bridge bearings in accordance with manufacturer's instructions and AASHTO LRFD and AASHTO GSID. Ensure proper alignment and secure fastening of the bearings to the structure.

3.3 FIELD QUALITY CONTROL

3.3.1 Tests

Perform testing and inspection of seismic isolation bearings as per the requirements outlined in Contract documents and ODOT SSC.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 10 - SPECIALTIES

SECTION 10 14 53.00 99

TRAFFIC SIGNAGE

PART 1 GENERAL

1.1 REFERENCES
1.2 GENERAL
1.3 SUBMITTALS

PART 2 PRODUCTS

2.1 TRAFFIC SIGN POSTS
2.1.1 Steel Flanged Channel Section (U-Shape)
2.1.2 Perforated Steel Tube
2.1.3 Steel Tube
2.1.4 Structural Steel H Section
2.1.4.1 Slip Base, Fuse Plate and Splice Plate
2.1.4.2 High-Strength Bolts, Nuts and Washers
2.1.5 Wood
2.2 FLAT ALUMINUM SIGN PANELS
2.3 EXTRUDED ALUMINUM SIGN PANELS
2.4 TRAFFIC SIGN RETROREFLECTIVE SHEETING
2.4.1 Legend and Border
2.4.2 Screen Printed Transparent Colored Areas
2.4.3 Adhesive Performance
2.5 LETTERS, NUMERALS, ARROWS, SYMBOLS, AND BORDERS
2.6 DELINEATOR POSTS
2.6.1 Steel Posts
2.6.2 Flexible Posts
2.7 DELINEATOR RETROREFLECTORS
2.7.1 Circular Prismatic Reflectors
2.7.2 Retroreflective Sheeting
2.8 HARDWARE
2.9 CONCRETE

PART 3 EXECUTION

3.1 SIGN POSTS
3.1.1 Perforated Square Steel Tube
3.1.2 Structural Steel H Section Posts
3.1.3 Wood
3.2 SIGN PANELS
3.3 DELINEATORS
3.4 LOCATION AND POSITION OF SIGNS

-- End of Section Table of Contents --

SECTION 10 14 53.00 99

TRAFFIC SIGNAGE

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM D4956	(2013) Standard Specification for Retroreflective Sheeting for Traffic Control

OREGON DEPARTMENT OF TRANSPORTATION (ODOT)

ODOT SSC	(2024) Oregon Standard Specifications for Construction

U.S. FEDERAL HIGHWAY ADMINISTRATION (FHWA)

FHWA SHS	(2004; Supplement 2012) Standard Highway Signs
MUTCD	(2009; Rev 2012) Manual on Uniform Traffic Control Devices

1.2 GENERAL

All signs must be in accordance with the MUTCD. Any signs not detailed on the drawings must be in accordance with the FHWA SHS.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" classification. Submittals not having a "G" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Traffic Sign Posts

Traffic Sign Retroreflective Sheeting

SD-04 Samples

Flexible Posts

PART 2 PRODUCTS

2.1 TRAFFIC SIGN POSTS

2.1.1 Steel Flanged Channel Section (U-Shape)

Refer to ODOT SSC Sections 02530.20 and 02530.70.

2.1.2 Perforated Steel Tube

Refer to ODOT SSC Sections 02530.20 and 02530.70.

2.1.3 Steel Tube

Refer to ODOT SSC Section 00930.

2.1.4 Structural Steel H Section

Refer to ODOT SSC Sections 02530.20 and 02530.70.

2.1.4.1 Slip Base, Fuse Plate and Splice Plate

Refer to ODOT SSC Section 00930.

2.1.4.2 High-Strength Bolts, Nuts and Washers

Refer to ODOT SSC Sections 02560.10 and 02560.20.

2.1.5 Wood

Refer to ODOT SSC Section 02110.30.

2.2 FLAT ALUMINUM SIGN PANELS

Refer to ODOT SSC Section 02910.10.

2.3 EXTRUDED ALUMINUM SIGN PANELS

Refer to ODOT SSC Section 02910.10.

2.4 TRAFFIC SIGN RETROREFLECTIVE SHEETING

Refer to ODOT SSC Section 02910.20.

2.4.1 Legend and Border

Refer to ODOT SSC Section 02910.33.

2.4.2 Screen Printed Transparent Colored Areas

Refer to ODOT SSC Section 02910.60.

2.4.3 Adhesive Performance

Adhesive performance for retroreflective sheeting must be in accordance with ASTM D4956. The sheeting surface must be in condition to be readily screen processed and compatible with transparent overlay films, plus recommended transparent and opaque screen process colors. Furnish manufacturer's information as to the type of solvent or solvents that may

be used to clean the surface of the sheeting without detrimental loss of performance and durability.

2.5 LETTERS, NUMERALS, ARROWS, SYMBOLS, AND BORDERS

Refer to ODOT SSC Section 02910.33.

2.6 DELINEATOR POSTS

2.6.1 Steel Posts

Refer to ODOT SSC Sections 02530.20 and 02530.70.

2.6.2 Flexible Posts

Provide one-piece driveable or two-piece with driveable steel anchor flexible posts. Posts must be impact-resistant, integrally colored UV stabilized polymer or polycarbonate extrusion or fiberglass reinforced composite material. Other materials are subject to approval by the Contracting Officer's Representative. Include a retroreflective sheeting plate with each post as indicated.

2.7 DELINEATOR RETROREFLECTORS

2.7.1 Circular Prismatic Reflectors

Retroreflectors attached to steel posts must be a 3 inch minimum diameter acrylic plastic lens with prismatic optical elements and a smooth, clear, transparent face. Fabricate the back from similar material and fuse to the lens around the entire perimeter to form a homogeneous unit. Permanently seal the units against the intrusion of dust, water, or air. Mount the retroreflector unit in a housing fabricated from 0.063 inch aluminum alloy or similar, or from cold-rolled, hot dip, galvanized steel, having a thickness of 0.064 inches. Provide the indicated color.

2.7.2 Retroreflective Sheeting

For Delineator Reflective Sheeting (Type III and Type IV) see the requirements from the QPL.

2.8 HARDWARE

Refer to ODOT SSC Section 02910.40.

2.9 CONCRETE

Refer to ODOT SSC Section 00920.41.

PART 3 EXECUTION

3.1 SIGN POSTS

3.1.1 Perforated Square Steel Tube

Refer to ODOT SSC Section 00930.40.

3.1.2 Structural Steel H Section Posts

Refer to ODOT SSC Section 00930.40.

3.1.3 Wood

Refer to ODOT SSC Section 00940.42(b)(1).

3.2 SIGN PANELS

Refer to ODOT SSC Section 00940.42.

3.3 DELINEATORS

Refer to ODOT SSC Section 00840.41.

3.4 LOCATION AND POSITION OF SIGNS

Refer to ODOT SSC Section 00940.47.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 26 - ELECTRICAL

SECTION 26 05 19.00 99

INSULATED WIRE AND CABLE

PART 1 GENERAL

1.1 REFERENCES
1.2 SUBMITTALS
1.3 DELIVERY, STORAGE, AND HANDLING

PART 2 PRODUCTS

2.1 MATERIALS
2.1.1 Wire Table
2.1.2 Rated Circuit Voltages
2.1.3 Conductors
2.1.3.1 Material for Conductors
2.1.3.2 Size
2.1.3.3 Stranding
2.1.4 Insulation
2.1.4.1 Insulation Material
2.1.4.2 Insulation Thickness
2.1.5 Jackets
2.1.5.1 Jacket Material
2.1.5.1.1 General Use
2.1.5.1.2 Accessible Use Only, 2,000 Volts or Less
2.1.5.2 Jacket Thickness
2.1.5.2.1 Single-Conductor Cables
2.2 CABLE IDENTIFICATION
2.2.1 Color-Coding
2.2.2 Cabling
2.2.3 Dimensional Tolerance

PART 3 EXECUTION

3.1 INSTALLATION INSTRUCTIONS
3.2 CABLE INSTALLATION PLAN
3.3 TEST REPORT(S), INSPECTION REPORT(S), AND VERIFICATION REPORT(S)
3.3.1 Cable Data
3.3.2 Inspection and Tests

-- End of Section Table of Contents --

SECTION 26 05 19.00 99

INSULATED WIRE AND CABLE

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

INSULATED CABLE ENGINEERS ASSOCIATION (ICEA)

ICEA S-58-679	(2014) Control, Instrumentation and Thermocouple Extension Conductor Identification

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

ANSI/NEMA WC 71/ICEA S-96-659	(2014; R 2022) Standard for Nonshielded Cables Rated 2001-5000 Volts for use in the Distribution of Electric Energy
NEMA WC 57	(2014) Standard for Control, Thermocouple Extension, and Instrumentation Cables
NEMA WC 70	(2021) Power Cable Rated 2000 Volts or Less for the Distribution of Electrical Energy
NEMA WC 74/ICEA S-93-639	(2022) 5-46 kV Shielded Power Cable for Use in the Transmission and Distribution of Electric Energy

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2026; TIA 26-1; ERTA 26-1; TIA 26-2; TIA 26-3; TIA 26-4; TIA 26-5; TIA 26-6; TIA 26-7; ERTA 26-2; ERTA 26-3) National Electrical Code

UNDERWRITERS LABORATORIES (UL)

UL 44	(2018; Reprint May 2021) UL Standard for Safety Thermoset-Insulated Wires and Cables

1.2 SUBMITTALS

Government approval is required for submittals with a "G" classification. Submittals not having a "G" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Cable Installation Plan; G

SD-03 Product Data

Wire and Cable; G

Conductors; G

Cable Manufacturing Data

SD-06 Test Reports

Test Report(s), Inspection Report(s), and Verification Report(s); G

1.3 DELIVERY, STORAGE, AND HANDLING

Furnish cables on reels or coils. Each cable and the outside of each reel or coil, must be plainly marked or tagged to indicate the cable length, voltage rating, conductor size, and manufacturer's lot number and reel number. Each coil or reel of cable must contain only one continuous cable without splices. Reels must remain the property of the Government.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Wire Table

Furnish wire and cable in accordance with the requirements of the wire table below, conforming to the detailed requirements specified herein.

2.1.2 Rated Circuit Voltages

All power wire and cable must have minimum rated circuit voltages in accordance with NEMA WC 70, ANSI/NEMA WC 71/ICEA S-96-659, or NEMA WC 74/ICEA S-93-639 as applicable. Power wire and cable for circuit voltages rated 0-600 volts must be rated not less than 600 volts. Control wire and cable must have minimum rated circuit voltages in accordance with NEMA WC 57, but must be rated 600 volts if routed in raceway with other conductors that are rated 600 volts.

2.1.3 Conductors

2.1.3.1 Material for Conductors

Conductors must conform to all the applicable requirements of NEMA WC 57, NEMA WC 70, ANSI/NEMA WC 71/ICEA S-96-659, or NEMA WC 74/ICEA S-93-639 as applicable. Copper conductors must be annealed copper material and they may be bare, or tin- or lead-alloy-coated, if required by the type of insulation used."

2.1.3.2 Size

Minimum wire size must be as listed below:

No. 8 AWG for power and lighting circuits

2.1.3.3 Stranding

Conductor stranding classes cited herein must be as defined for control conductors in NEMA WC 57 or as defined for 0-2,000 volts power conductors in NEMA WC 70, as applicable. Lighting conductors No. 10 AWG and smaller must be solid or have Class B stranding. Any conductors used between stationary and moving devices, such as hinged doors or panels, must have Class H or K stranding. All other conductors must have Class B or C stranding, except that conductors as shown, or in the schedule, as No. 12 AWG may be 19 strands of No. 25 AWG, and conductors shown as No. 10 AWG may be 19 strands of No. 22 AWG. Conductor stranding classes for circuit voltages 2,001 volts and above must be as defined in ANSI/NEMA WC 71/ICEA S-96-659 and NEMA WC 74/ICEA S-93-639, as applicable.

2.1.4 Insulation

2.1.4.1 Insulation Material

Unless specified otherwise or required by NFPA 70, wires in conduit, other than service entrance, must be 600-volt, Type XHHW or RHW conforming to UL 44. Insulation for control wire and cable must meet the requirements of NEMA WC 57. Insulation requirements for wire and cable rated less than 2,000 volts must meet the requirements of NEMA WC 70.

2.1.4.2 Insulation Thickness

The insulation thickness for each conductor must be based on its rated circuit voltage.

2.1.5 Jackets

All cables must have jackets meeting the requirements of NEMA WC 57, NEMA WC 70, ANSI/NEMA WC 71/ICEA S-96-659, and NEMA WC 74/ICEA S-93-639, as applicable, and as specified herein. Individual conductors of multiple-conductor cables must be required to have jackets only if they are necessary for the conductor to meet other specifications herein. Jackets of single-conductor cables and of individual conductors of multiple-conductor cables, except for shielded cables, must be in direct contact and adhere or be vulcanized to the conductor insulation. Multiple-conductor cables and shielded single-conductor cables must be provided with a common overall jacket, which must be tightly and concentrically formed around the core. Repaired jacket defects found and corrected during manufacturing are permitted if the cable, including jacket, afterward fully meets these specifications and the requirements of the applicable standards.

2.1.5.1 Jacket Material

The jacket must be one of the materials listed below. Variations from the materials required below will be permitted only if approved for each specific use, upon submittal of sufficient data to prove that they exceed all specified requirements for the particular application.

2.1.5.1.1 General Use

Heavy-duty black neoprene	NEMA WC 70, ANSI/NEMA WC 71/ICEA S-96-659, or NEMA WC 74/ICEA S-93-639
Heavy-duty chlorosulfonated polyethylene	NEMA WC 57, NEMA WC 70, ANSI/NEMA WC 71/ICEA S-96-659, or NEMA WC 74/ICEA S-93-639
Heavy-duty cross-linked (thermoset) chlorinated polyethylene	NEMA WC 70, ANSI/NEMA WC 71/ICEA S-96-659, or NEMA WC 74/ICEA S-93-639

2.1.5.1.2 Accessible Use Only, 2,000 Volts or Less

Cables installed where they are entirely accessible, such as cable trays and raceways with removable covers, or where they pass through less than 10 feet of exposed conduit only, must have jackets of one of the materials in item "a. General Use" or one of the following:

General-purpose neoprene	NEMA WC 70, ANSI/NEMA WC 71/ICEA S-96-659, or NEMA WC 74/ICEA S-93-639
Black polyethylene (MDPE)	NEMA WC 57, NEMA WC 70, ANSI/NEMA WC 71/ICEA S-96-659, or NEMA WC 74/ICEA S-93-639
Thermoplastic chlorinated polyethylene	NEMA WC 70, ANSI/NEMA WC 71/ICEA S-96-659, or NEMA WC 74/ICEA S-93-639

2.1.5.2 Jacket Thickness

The minimum thickness of the jackets must be not less than 80 percent of the respective nominal thicknesses specified below.

2.1.5.2.1 Single-Conductor Cables

Single-conductor cables must have a jacket thickness as specified in NEMA WC 57, NEMA WC 70, ANSI/NEMA WC 71/ICEA S-96-659, or NEMA WC 74/ICEA S-93-639 as applicable.

2.2 CABLE IDENTIFICATION

2.2.1 Color-Coding

Insulation of individual conductors of multiple-conductor cables must be color-coded in accordance with ICEA S-58-679, except that colored braids will not be permitted. Only one color-code method must be used for each cable construction type. Power cable color-coding must be as follows:

a. 208/120 volt, three-phase

(1) Phase A - black

(2) Phase B - red

(3) Phase C - blue

(4) Grounded neutral - white

(5) Insulated grounding conductor - green

b. 480/277 volt, three-phase

(1) Phase A - brown

(2) Phase B - orange

(3) Phase C - yellow

c. 240/120 volt, single phase: Black and red

2.2.2 Cabling

Individual conductors of multiple-conductor cables must be assembled with flame-and moisture-resistant fillers, binders, and a lay conforming to NEMA WC 57, NEMA WC 70, ANSI/NEMA WC 71/ICEA S-96-659, or NEMA WC 74/ICEA S-93-639. Flat twin cables are prohibited. Fillers must be used in the interstices of multiple-conductor round cables with a common covering where necessary to give the completed cable a substantially circular cross section. Fillers must be non-hygroscopic material, compatible with the cable insulation, jacket, and other components of the cable. The rubber-filled or other approved type of binding tape must consist of a material that is compatible with the other components of the cable and must be lapped at least 10 percent of its width.

2.2.3 Dimensional Tolerance

The outside diameters of single-conductor cables and of multiple-conductor cables must not vary more than 5 percent and 10 percent, respectively, from the manufacturer's published catalog data.

PART 3 EXECUTION

3.1 INSTALLATION INSTRUCTIONS

Submit cable manufacturing data as requested. The following information must be provided by the cable manufacturer for each size, conductor quantity, and type of cable furnished:

a. Minimum bending radius, in inches - For multiple-conductor cables, this information must be provided for both the individual conductors and the multiple-conductor cable.

b. Pulling tension and sidewall pressure limits, in pounds.

c. Instructions for stripping semiconducting insulation shields, if furnished, with minimum effort without damaging the insulation.

d. Upon request, compatibility of cable materials and construction with specific materials and hardware manufactured by others must be stated. Also, if requested, recommendations must be provided for various cable operations, including installing, splicing, terminating, etc.

3.2 CABLE INSTALLATION PLAN

Provide a cable installation plan which includes the following for each raceway. Exclude raceways with less than 45 degrees of total bending or shorter than 20 feet.

a. Raceway name

b. Circuit names with wire sizes and quantities

c. Maximum tolerable pulling tension

d. Maximum tolerable sidewall pressure

e. Estimated maximum pulling tension

f. Estimated maximum sidewall pressure

g. Jam ratio

h. Lubricant and coefficient of friction

i. Pulling device(s)

j. Direction of pull

3.3 TEST REPORT(S), INSPECTION REPORT(S), AND VERIFICATION REPORT(S)

3.3.1 Cable Data

Do not begin any wire and cable fabrication until materials are submitted and approved by the Contracting Officer. Submit cable data for approval including, but not limited to, dimensioned sketches showing cable construction and sufficient additional data to show that wire and cable meet the requirements of this Section.

3.3.2 Inspection and Tests

Inspection and tests of wire and cable furnished under these specifications must be made by and at the plant of the manufacturer. The Government may require or perform further tests before or after installation. Testing in general must comply with NEMA WC 57, NEMA WC 70, ANSI/NEMA WC 71/ICEA S-96-659, or NEMA WC 74/ICEA S-93-639 as applicable. Specific tests required for particular materials, components, and completed cables must be as specified in the sections of the above standards applicable to those materials, components, and cable types. Tests must also be performed in accordance with the additional requirements specified below. Submit four certified copies of test reports.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 26 - ELECTRICAL

SECTION 26 56 00.00 99

EXTERIOR LIGHTING

PART 1 GENERAL

1.1 REFERENCES
1.2 SUBMITTALS
1.3 RELATED REQUIREMENTS
1.4 DEFINITIONS
1.5 QUALITY ASSURANCE
1.5.1 Drawing Requirements
1.5.1.1 Luminaire Drawings
1.5.1.2 Pole Drawings
1.5.2 Luminaire Design Data
1.5.3 ANSI/IES LM-79 Test Report
1.5.4 ANSI/IES LM-80 Test Report
1.5.5 ANSI/IES TM-21 Test Report
1.5.6 Photometric Plan
1.5.7 Test Laboratories
1.5.8 Regulatory Requirements
1.5.9 Standard Products
1.5.9.1 Alternative Qualifications
1.5.9.2 Material and Equipment Manufacturing Date
1.6 DELIVERY, STORAGE, AND HANDLING OF POLES
1.6.1 Aluminum Poles
1.7 WARRANTY
1.7.1 Luminaire Warranty
1.7.2 Pole Warranty
1.8 OPERATION AND MAINTENANCE MANUALS
1.8.1 Lighting System, Data Package 5

PART 2 PRODUCTS

2.1 PRODUCT COORDINATION
2.2 LUMINAIRES
2.2.1 Luminaires
2.3 LIGHT SOURCES
2.3.1 LED Light Sources
2.4 LED DRIVERS
2.5 POLES
2.5.1 Aluminum Poles
2.5.2 Pole Foundations
2.6 EQUIPMENT IDENTIFICATION
2.6.1 Manufacturer's Nameplate
2.6.2 Labels
2.7 FACTORY APPLIED FINISH

PART 3 EXECUTION

3.1 INSTALLATION
3.1.1 Luminaires
3.1.2 LED Drivers
3.1.3 Aluminum and Steel Poles
3.1.4 Grounding
3.2 FIELD QUALITY CONTROL
3.2.1 Tests
3.2.1.1 Lighting Control Verification Test
3.3 CLOSEOUT ACTIVITIES
3.3.1 Training
3.3.1.1 Maintenance Staff Training
3.3.1.2 End-User Training

-- End of Section Table of Contents --

SECTION 26 56 00.00 99

EXTERIOR LIGHTING

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO LTS	(2013; Errata 2013) Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals

AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE)

ASCE 7-16	(2017; Errata 2018; Supp 1 2018) Minimum Design Loads and Associated Criteria for Buildings and Other Structures

ASTM INTERNATIONAL (ASTM)

ASTM A153/A153M	(2023) Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM B108/B108M	(2019) Standard Specification for Aluminum-Alloy Permanent Mold Castings
ASTM B117	(2019) Standard Practice for Operating Salt Spray (Fog) Apparatus

EUROPEAN UNION (EU)

Directive 2011/65/EU	(2011) Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment

ILLUMINATING ENGINEERING SOCIETY (IES)

ANSI/IES LM-79	(2019) Approved Method: Electrical and Photometric Measurements of Solid State Lighting Products
ANSI/IES LM-80	(2020) Approved Method: Measuring Luminous Flux and Color Maintenance of LED Packages, Arrays and Modules
ANSI/IES LS-1	(2020) Lighting Science: Nomenclature and Definitions for Illuminating Engineering

ANSI/IES RP-8	(2018; Addenda 1 2020; Errata 1-2 2021) Recommended Practice for Design and Maintenance of Roadway and Parking Facility Lighting
ANSI/IES TM-15	(2020) Technical Memorandum: Luminaire Classification System for Outdoor Luminaires
ANSI/IES TM-21	(2021) Technical Memorandum: Projecting Long-TermLuminous, Photon, and Radiant Flux Maintenance of LED Light Sources
IES Lighting Library	IES Lighting Library

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE 100	(2000; Archived) The Authoritative Dictionary of IEEE Standards Terms
IEEE C62.41.2	(2002) Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and Less) AC Power Circuits

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

ANSI C136.3	(2020) Roadway and Area Lighting Equipment - Luminaire Attachments
NEMA 250	(2020) Enclosures for Electrical Equipment (1000 Volts Maximum)
NEMA ANSLG C78.377	(2017) Electric Lamps— Specifications for the Chromaticity of Solid State Lighting Products
NEMA C82.77-10	(2020) Harmonic Emission Limits - Related Power Quality Requirements
NEMA C136.31	(2023) Roadway and Area Lighting Equipment - Luminaire Vibration
NEMA IEC 60529	(2004) Degrees of Protection Provided by Enclosures (IP Code)
NEMA SSL 1	(2016) Electronic Drivers for LED Devices, Arrays, or Systems
NEMA SSL 3	(2011) High-Power White LED Binning for General Illumination

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2026; TIA 26-1; ERTA 26-1; TIA 26-2; TIA 26-3; TIA 26-4; TIA 26-5; TIA 26-6; TIA 26-7; ERTA 26-2; ERTA 26-3) National Electrical Code

UNDERWRITERS LABORATORIES (UL)

UL 1310	(2018; Reprint Jun 2022) UL Standard for Safety Class 2 Power Units
UL 1598	(2021; Reprint Jan 2024) UL Standard for Safety Luminaires
UL 8750	(2020; Reprint Jul 2024) UL Standard for Safety Light Emitting Diode (LED) Equipment for Use in Lighting Products

1.2 SUBMITTALS

Government approval is required for submittals with a "G" classification. Submittals not having a "G" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Luminaire Drawings; G

Pole Drawings; G

SD-03 Product Data

Luminaires; G

Light Sources; G

LED Drivers; G

Luminaire Warranty; G

Pole Warranty; G

Poles; G

SD-05 Design Data

Luminaire Design Data

Photometric Plan

SD-06 Test Reports

ANSI/IES LM-79 Test Report; G

ANSI/IES LM-80 Test Report; G

ANSI/IES TM-21 Test Report; G

SD-08 Manufacturer's Instructions

Poles

SD-10 Operation and Maintenance Data

Lighting System, Data Package 5; G

Maintenance Staff Training Plan; G

End-User Training Plan; G

1.3 RELATED REQUIREMENTS

Materials not considered to be luminaires, luminaire accessories, or lighting equipment are specified in Section 33 71 02.00 99 UNDERGROUND ELECTRICAL DISTRIBUTION.

1.4 DEFINITIONS

a. Unless otherwise specified or indicated, electrical and electronics terms used in these specifications and on the drawings must be as defined in IEEE 100 and ANSI/IES LS-1.

b. For LED luminaire light sources, "Useful Life" is the operating hours before reaching 70 percent of the initial rated lumen output (L70) with no catastrophic failures under normal operating conditions. This is also known as 70 percent "Rated Lumen Maintenance Life" as defined in ANSI/IES LM-80.

c. For LED luminaires, "Luminaire Efficacy" (LE) is the appropriate measure of energy efficiency, measured in lumens/watt. This is gathered from LM-79 data for the luminaire, in which absolute photometry is used to measure the lumen output of the luminaire as one entity, not the source separately and then the source and housing together.

d. Total Harmonic Distortion (THD) is the Root Mean Square (RMS) of all the harmonic components divided by the total fundamental current.

1.5 QUALITY ASSURANCE

Data, drawings, and reports must employ the terminology, classifications and methods prescribed by the IES Lighting Library as applicable, for the lighting system specified.

1.5.1 Drawing Requirements

1.5.1.1 Luminaire Drawings

Include dimensions, effective projected area (EPA), weight, accessories, and installation and construction details. Photometric data, including CRI, CCT, TM-15-11 BUG rating, LED driver type, zonal lumen data, and candlepower distribution data per LM-79 must accompany shop drawings. Submit design data to verify the Luminaire Drawings meet the requirements of Paragraph LUMINAIRE DESIGN DATA and Paragraph PHOTOMETRIC PLAN. Submit Drawings together with Design Data.

1.5.1.2 Pole Drawings

Include dimensions, wind load determined in accordance with AASHTO LTS, ASCE 7-16, pole deflection, pole class, and other applicable information.

1.5.2 Luminaire Design Data

a. Provide distribution data according to IES classification type as defined in IES Lighting Library and ANSI/IES RP-8.

b. B.U.G. rating for the installed position as defined by ANSI/IES TM-15 and shielding as defined by ANSI/IES RP-8.

c. Provide safety certification and file number for the luminaire family. Include listing, labeling and identification in accordance with NFPA 70 (NEC). Applicable testing bodies are determined by the US Occupational Safety Health Administration (OSHA) as Nationally Recognized Testing Laboratories (NRTL) and include: CSA (Canadian Standards Association), ETL (Edison Testing Laboratory), and UL (Underwriters Laboratories).

d. Provide long term lumen maintenance projections for each LED luminaire in accordance with ANSI/IES TM-21. Data used for projections must be obtained from testing in accordance with ANSI/IES LM-80.

e. Provide wind loading calculations for luminaires mounted on poles. Weight and effective projected area (EPA) of luminaires and mounting brackets must not exceed maximum rating of pole as installed in particular wind zone area.

1.5.3 ANSI/IES LM-79 Test Report

Submit test report on manufacturer's standard production model of specified luminaire. Testing must be performed at the same operating drive current as specified luminaire. Include all applicable and required data as outlined under "14.0 Test Report" in ANSI/IES LM-79.

1.5.4 ANSI/IES LM-80 Test Report

Submit report on manufacturer's standard production LED light source (package, array, or module) of specified luminaire. Testing must be performed at the same operating drive current as specified luminaire. Include all applicable and required data as outlined under "8.0 Test Report" in ANSI/IES LM-80.

1.5.5 ANSI/IES TM-21 Test Report

Submit test report on manufacturer's standard production LED light source (package, array or module) of specified luminaire. Testing must be performed at the same operating drive current as specified luminaire. Include all applicable and required data, as well as required interpolation information as outlined under "7.0 Report" in ANSI/IES TM-21.

1.5.6 Photometric Plan

For roadways include computer-generated photometric analysis of the "designed to" values in accordance with ANSI/IES RP-8 for the "end of useful life" of the luminaire installation using a light loss factor of 0.81. Provide photometric plans that meet criteria in the Basis of Design in the project plans. Include the following in the submittal:

a. Horizontal illuminance measurements at finished grade, taken at a maximum grid size of 10 feet by 10 feet.

b. Vertical illuminance measurements at 5 feet above finished grade at all sidewalks and crosswalks, taken at a maximum of 10 feet.

c. Minimum and maximum footcandle levels.

d. Average maintained footcandle level.

e. Maximum to minimum ratio for horizontal illuminance only.

1.5.7 Test Laboratories

Test laboratories for the ANSI/IES LM-79 and ANSI/IES LM-80 test reports must be one of the following:

a. National Voluntary Laboratory Accreditation Program (NVLAP) accredited for solid-state lighting testing as part of the Energy-Efficient Lighting Products laboratory accreditation program.

b. One of the qualified labs listed on the Department of Energy - Energy Efficiency & Renewable Energy, Solid-State Lighting web site.

c. One of the EPA-Recognized Laboratories listed at for LM-80 testing.

1.5.8 Regulatory Requirements

Equipment, materials, installation, and workmanship must be in accordance with the mandatory provisions of NFPA 70 unless more stringent requirements are specified or indicated. Provide luminaires and assembled components that are approved by and bear the label of UL for the applicable location and conditions unless otherwise specified.

1.5.9 Standard Products

Provide materials and equipment that are products of manufacturers regularly engaged in the production of such products which are of equal material, design and workmanship. Products must have been in satisfactory commercial or industrial use for six months prior to bid opening. The six-month period must include applications of equipment and materials under similar circumstances and of similar size. The product must have been on sale on the commercial market through advertisements, manufacturers' catalogs, or brochures during the six-month period. Where two or more items of the same class of equipment are required, these items must be products of a single manufacturer; however, the component parts of the item need not be the products of the same manufacturer unless stated in this Section.

1.5.9.1 Alternative Qualifications

Products having less than a six-month field service record will be acceptable if a certified record of satisfactory field operation for not less than 6000 hours, exclusive of the manufacturers' factory or laboratory tests, is furnished.

1.5.9.2 Material and Equipment Manufacturing Date

Do not use products manufactured more than six months prior to date of delivery to site, unless specified otherwise.

1.6 DELIVERY, STORAGE, AND HANDLING OF POLES

1.6.1 Aluminum Poles

Do not store poles on ground. Support poles so they are at least one foot above ground level and growing vegetation. Do not remove factory-applied pole wrappings until just before installing pole.

1.7 WARRANTY

Support all equipment items by service organizations which are reasonably convenient to the equipment installation in order to render satisfactory service to the equipment on a regular and emergency basis during the warranty period of the Contract.

1.7.1 Luminaire Warranty

Provide and transfer to the Government the original LED luminaire manufacturers standard commercial warranty for each different luminaire manufacturer used in the project.

a. Provide a written five year minimum replacement warranty for material, luminaire finish, and workmanship. Provide written warranty document that contains all warranty processing information needed, including customer service point of contact, whether or not a return authorization number is required, return shipping information, and closest return location to the luminaire location.

(1) Finish warranty must include failure and substantial deterioration such as blistering, cracking, peeling, chalking, or fading.

(2) Material warranty must include:

(a) All LED drivers and integral control equipment.

(b) Replacement when more than 15 percent of LED sources in any lightbar or subassembly(s) are defective, non-starting, or operating below 70 percent of specified lumen output.

b. Warranty period must begin in accordance with the manufacturer's standard warranty starting date.

c. Provide replacements that are promptly shipped, without charge, to the using Government facility point of contact and that are identical to or an improvement upon the original equipment. All replacements must include testing of new components and installation.

1.7.2 Pole Warranty

Provide and transfer to the Government the original pole manufacturers standard commercial warranty for each different pole manufacturer used in the project. Warranty coverage must begin from date of final system commissioning or three months from date of delivery, whichever is the earliest. Provide a written three year minimum replacement warranty for material, luminaire finish, and workmanship. Warranty service must be performed by a factory-trained engineer or technician.

1.8 OPERATION AND MAINTENANCE MANUALS

1.8.1 Lighting System, Data Package 5

Provide operation and maintenance manuals for the lighting system that provide basic data relating to the design, operation, and maintenance of the lighting system. Include the following:

a. Manufacturers' operating and maintenance manuals.

b. Luminaire shop drawings for modified and custom luminaires.

c. Luminaire Manufacturers' standard commercial warranty information as specified in Paragraph LUMINAIRE WARRANTY.

PART 2 PRODUCTS

2.1 PRODUCT COORDINATION

2.2 LUMINAIRES

UL 1598, NEMA C82.77-10. Provide luminaires as indicated in the luminaire schedule and XL plates or details on project plans, complete with light source, wattage, and lumen output indicated. All luminaires of the same type must be provided by the same manufacturer. Luminaires must be specifically designed for use with the LED driver and light source provided.

2.2.1 Luminaires

UL 8750, ANSI/IES LM-79, ANSI/IES LM-80. For all luminaires, provide:

a. Complete system with LED drivers and light sources.

b. Housing constructed of non-corrosive materials. All new aluminum housings must be anodized or powder-coated. All new steel housings must be treated to be corrosion resistant.

c. ANSI/IES TM-21, ANSI/IES LM-80. Minimum L70 lumen maintenance value of 50,000 hours unless otherwise indicated in the luminaire schedule. Luminaire drive current value must be identical to that provided by test data for luminaire in question.

d. Minimum efficacy as specified in the luminaire schedule. Theoretical models of initial lamp lumens per watt are not acceptable. If efficacy values are not listed in the luminaire schedule, provide luminaires that meet the following minimum values:

Luminaire Style	Minimum Luminaire Efficacy
Area and Roadway (pole mounted)	109 LPW
Pedestrian Post-Top (pole mounted)	109 LPW

e. Product rated for operation within an ambient temperature range of minus 22 degrees F to 104 degrees F.

f. UL listed for wet locations. Optical compartment for LED luminaires must be sealed and rated a minimum of IP65 per NEMA IEC 60529.

g. IES Lighting Library. Light distribution and NEMA field angle classifications as indicated in luminaire schedule on project plans.

h. Housing finish that is baked-on enamel, anodized, or baked-on powder coat paint. Finish must be capable of surviving ASTM B117 salt fog environment testing for 2500 hours minimum without blistering or peeling.

i. LED driver and light source package, array, or module are accessible for service or replacement without removal or destruction of luminaire.

j. ANSI/IES TM-15. Does not exceed the BUG ratings as listed in the luminaire schedule. If BUG ratings are not listed in the luminaire schedule, provide luminaires that meet the following minimum values for each application and mounting conditions:

Lighting Application	Mounting Conditions	BUG Rating
Area and Roadway	All	B2-U4-G3
Pedestrian Post-Top	All	B2-U4-G3

k. Fully assembled and electrically tested prior to shipment from factory.

l. Finish color is as indicated in the luminaire schedule or detail on the project plans.

m. Lenses constructed of clear polycarbonate vandal-resistant lenses.

n. All factory electrical connections are made using crimp, locking, or latching style connectors. Twist-style wire nuts are not acceptable.

o. NEMA C136.31. Comply with 3G vibration testing.

p. Luminaire arm bolts constructed from 304 stainless steel or zinc-plated steel.

q. Wiring compartment on pole-mounted, street and area luminaires is accessible without the use of hand tools to manipulate small screws, bolts, or hardware.

r. Incorporate modular electrical connections, and construct luminaires to allow replacement of all or any part of the optics, heat sinks, LED drivers, surge suppressors and other electrical components using only a simple tool, such as a manual or cordless electric screwdriver.

s. ANSI C136.3. For all roadway and area luminaires, provide products with an integral tilt adjustment of plus or minus 5 degrees to allow the unit to be leveled.

2.3 LIGHT SOURCES

NEMA ANSLG C78.377, NEMA SSL 3. Provide type, lumen rating, and wattage as indicated in luminaire schedule on project plans.

2.3.1 LED Light Sources

Provide LED light sources that meet the following requirements:

a. NEMA ANSLG C78.377. Emit white light and have a nominal Correlated Color Temperature (CCT) of 2700 Kelvin.

b. Minimum Color Rendering Index (CRI) of 70.

c. Directive 2011/65/EU. Restriction of Hazardous Substances (RoHS) compliant.

d. Light source color consistency by utilizing a binning tolerance within a 4-step McAdam ellipse.

2.4 LED DRIVERS

NEMA SSL 1, UL 1310. Provide LED Drivers that are electronic, UL Class 1 or Class 2, constant-current type and meet the following requirements:

a. The combined LED driver and LED light source system is greater than or equal to the minimum luminaire efficacy values as listed in the luminaire schedule provided.

b. Operate at a voltage of 240 volts at 50/60 hertz, with input voltage fluctuations of plus or minus 10 percent.

c. Power Factor (PF) greater than or equal to 0.90 at full input power and across specified dimming range.

d. Maximum Total Harmonic Distortion (THD) less than or equal to 20 percent at full input power and across specified dimming range.

e. Operates for at least 50,000 hours at maximum case temperature and 90 percent non-condensing relative humidity.

f. Meets the "Elevated" (10kV/10kA) requirements per IEEE C62.41.2 -2002. Manufacturer must indicate whether failure of the electrical immunity system can possibly result in disconnect of power to luminaire. Provide surge protection that is integral to the LED driver.

g. Contains integral thermal protection that reduces the output power to protect the driver and light source from damage if the case temperature approaches or exceeds the driver's maximum operating temperature.

h. Complies with the requirements of the Federal Communications Commission (FCC) rules and regulations, Title 47 CFR part 15, Non-Consumer (Class A) for EMI/RFI (conducted and radiated).

i. Class A sound rating for all drivers mounted under a covered structure, such as a canopy, or where otherwise appropriate.

j. Directive 2011/65/EU. Restriction of Hazardous Substances (RoHS) compliant.

k. UL listed for wet locations typical of exterior installations.

l. Dimmable, and compatible with a standard dimming control circuit of zero - 10V.

m. Rated to operate between ambient temperatures of minus 22 degrees F and 104 degrees F.

2.5 POLES

AASHTO LTS and ASCE 7-16. Provide round tapered poles designed for wind loading of 120 miles per hour while supporting luminaires and all other appurtenances indicated. The effective projected areas (EPA) of luminaires and appurtenances used in calculations must be specific for the actual products provided on each pole. Provide poles that are anchor-base type designed for use with underground supply conductors. Poles must have oval-shaped hand hole having a minimum clear opening of 3 by 5 inches. Secure hand hole covers by stainless steel captive screws. Provide metal poles with an internal grounding connection accessible from the hand hole near the bottom of each pole. Install a means of wire disconnection accessible from the hand hole. Do not install square poles. Provide poles from a Manufacturer with a standard provision for protecting the finish during shipment and installation. Do not install scratched, stained, chipped, or dented poles.

2.5.1 Aluminum Poles

Provide aluminum poles with uniform satin finish unless otherwise noted in luminaire schedule on project plans. Do not paint aluminum poles. Provide poles that meet the following requirements:

a. AASHTO LTS. Manufactured of corrosion resistant aluminum alloys for Alloy 6063-T6 or Alloy 6005-T5 for wrought alloys and Alloy 356-T4 (3,5) for cast alloys.

b. Seamless extruded or spun seamless-type with minimum 0.125 inch wall thickness.

c. ASTM B108/B108M. Pole base is mounted by anchor bolts, made of cast 356-T6 aluminum alloy. Base must be machined to receive the lower end of shaft.

d. Joint between shaft and base is welded.

e. ASTM B108/B108M. Base cover is cast 356-T6 aluminum alloy.

f. All hardware other than anchor bolts are either 2024-T4 anodized aluminum alloy or stainless steel.

g. Grounding connection is designed to prevent electrolysis when used with copper ground wire.

2.5.2 Pole Foundations

Provide anchor bolts consisting of a steel rod with a minimum yield strength of 50,000 psi; the top 12 inches of the rod must be galvanized in accordance with ASTM A153/A153M. Concrete must be as specified in Section 03 30 00.00 99 CAST-IN-PLACE CONCRETE and Section 33 71 02.00 99 UNDERGROUND ELECTRICAL DISTRIBUTION.

2.6 EQUIPMENT IDENTIFICATION

2.6.1 Manufacturer's Nameplate

Each item of equipment must have a nameplate bearing the manufacturer's name, address, model number, and serial number securely affixed in a conspicuous place; the nameplate of the distributing agent will not be acceptable.

2.6.2 Labels

UL 1598. Luminaires must be clearly marked for operation of specific light sources and drivers according to proper light source type.

Correlated color temperature (CCT) and color rendering index (CRI) for all luminaires.

2.7 FACTORY APPLIED FINISH

NEMA 250. Provide all luminaires and lighting equipment with factory-applied painting system that as a minimum meets requirements of corrosion-resistance testing.

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 Luminaires

Install all luminaires in accordance with the luminaire manufacturer's written instructions. Install all luminaires at locations and heights as indicated on the project plans. Level all luminaires in accordance to manufacturer's written instructions.

3.1.2 LED Drivers

Provide LED drivers integral to luminaire as constructed by the manufacturer.

3.1.3 Aluminum and Steel Poles

Provide pole foundations with galvanized steel anchor bolts, threaded at the top end and bent 90 degrees at the bottom end. Provide ornamental covers to match pole and galvanized nuts and washers for anchor bolts. Concrete for anchor bases, polyvinyl chloride (PVC) conduit bells, and ground rods must be as specified in Section 03 30 00.00 99 CAST-IN-PLACE CONCRETE and Section 33 71 02.00 99 UNDERGROUND ELECTRICAL DISTRIBUTION. Thoroughly compact backfill with compacting arranged to prevent pressure between conductor, jacket, or sheath and the end of conduit ell. Adjust poles as necessary to provide a permanent vertical position for luminaire location. Install according to pole manufacturer's instructions. Alterations to poles after fabrication will void manufacturer's warranty and is not allowed.

3.1.4 Grounding

Ground noncurrent-carrying parts of equipment including metal poles, luminaires, mounting arms, brackets, and metallic enclosures as specified in Section 33 71 02.00 99 UNDERGROUND ELECTRICAL DISTRIBUTION. Where

copper grounding conductor is connected to a metal other than copper, provide specially treated or lined connectors suitable for this purpose.

3.2 FIELD QUALITY CONTROL

3.2.1 Tests

Upon completion of installation, verify that equipment is properly installed, connected, and adjusted. Perform initial operational test, consisting of the entire system energized for 72 consecutive hours without any failures of any kind occurring in the system. All circuits must test clear of faults, grounds, and open circuits.

3.2.1.1 Lighting Control Verification Test

Verify lighting control system and devices operate according to approved sequence of operations. Verification tests are to be completed after commissioning.

3.3 CLOSEOUT ACTIVITIES

3.3.1 Training

Provide on-site training to the Owner's personnel in the operation and maintenance of lighting and lighting control system. Provide training that includes calibration, adjustment, troubleshooting, maintenance, repair, and replacement.

3.3.1.1 Maintenance Staff Training

Submit a Maintenance Staff Training Plan at least 30 calendar days prior to training session that describes training procedures for Owner's personnel in the operation and maintenance of lighting and lighting control system. Provide on-site training which demonstrate full system functionality, assigning schedules, calibration adjustments for light levels and sensor sensitivity, integration procedures for connecting to third-party devices, and manual override including information on appropriate use. Provide protocols for troubleshooting, maintenance, repair, and replacement, and literature on available system updates and process for implementing updates.

3.3.1.2 End-User Training

Submit a End-User Training Plan at least 30 calendar days prior to training session that describes training procedures for end-users on the lighting control system. Provide demonstration for each type of user interface. Provide users with the curfew schedule as currently commissioned, including conditional programming based on astronomic time clock functionality. Provide users with the correct contact information for maintenance personnel who will be available to address any lighting control issues.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 31 - EARTHWORK

SECTION 31 00 00.00 99

EARTHWORK

PART 1 GENERAL

1.1 REFERENCES
1.2 DEFINITIONS
1.2.1 Selected General Backfill
1.2.2 Selected Granular Backfill
1.2.3 Granular Wall Backfill
1.2.4 Granular Structure Backfill
1.2.5 Selected Topsoil
1.2.6 Riprap
1.2.7 Granular Drain Backfill
1.2.8 Trench Backfill
1.2.9 Pipe Bedding
1.2.10 Flowable Fill
1.2.11 Satisfactory Materials
1.2.12 Unsatisfactory Materials
1.2.13 Cohesionless Materials
1.2.14 Cohesive Materials
1.2.15 Hard/Unyielding Materials
1.2.16 Unstable Material
1.2.17 Expansive Soils
1.2.18 Rock
1.2.19 Capillary Water Barrier
1.2.20 Degree of Compaction (Proctor)
1.2.21 Degree of Compaction (Relative Density)
1.2.22 Borrow
1.2.23 Subgrade
1.3 SUBSURFACE DATA
1.4 SUBMITTALS
1.5 QUALITY CONTROL
1.5.1 Geotechnical Engineer
1.5.2 Qualified Technician
1.5.3 Lab Validation
1.5.4 Preconstruction Meeting

PART 2 PRODUCTS

2.1 SOIL MATERIALS
2.1.1 Selected General Backfill
2.1.2 Selected Granular Backfill
2.1.3 Granular Wall Backfill
2.1.4 Granular Structure Backfill
2.1.5 Selected Topsoil
2.1.6 Riprap
2.1.7 Granular Drain Backfill
2.1.8 Trench Backfill

2.1.9 Pipe Bedding
2.2 FLOWABLE FILL
2.3 BURIED WARNING AND IDENTIFICATION MARKERS
2.3.1 Warning Tape for Metallic Piping
2.3.2 Detectable Warning Tape for Non-Metallic Piping
2.3.3 Detection Wire for Non-Metallic Piping
2.4 BORROW
2.5 GEOTEXTILE

PART 3 EXECUTION

3.1 PROTECTION
3.1.1 Underground Utilities
3.1.2 Drainage and Dewatering
3.1.2.1 Drainage
3.1.2.2 Dewatering
3.1.3 Shoring and Sheeting
3.1.4 Protection of Graded Surfaces
3.2 BORROW
3.2.1 Government Furnished Borrow Area(s)
3.2.2 Contractor Furnished Borrow Area(s)
3.2.3 Environmental Requirements for Off-Site Soil
3.3 SURFACE PREPARATION
3.3.1 Clearing and Grubbing
3.3.2 Stripping
3.3.3 Proof Rolling
3.3.4 Stockpiling Operations
3.4 EXCAVATION
3.4.1 Ditches, Gutters, and Channel Changes
3.4.2 Trench Excavation Requirements
3.4.3 Underground Utilities
3.4.4 Structural Excavation
3.4.5 Rock Excavation
3.5 SUBGRADE PREPARATION
3.5.1 General Requirements
3.5.2 Subgrade for Structures, Spread Footings, and Concrete Slabs
3.5.3 Subgrade for Pavements
3.5.4 Subgrade for Shoulders
3.5.5 Subgrade Filter Fabric
3.6 FILLING AND COMPACTION
3.6.1 Trench Backfill
3.6.1.1 Trench Foundation
3.6.1.2 Bedding
3.6.1.3 Buried Tape And Detection Wire
3.6.1.3.1 Buried Warning and Identification Tape
3.6.1.3.2 Buried Detection Wire
3.6.2 Fill and Backfill
3.6.3 Flowable Fill
3.6.4 Compaction
3.7 EMBANKMENTS
3.8 RIP-RAP CONSTRUCTION
3.9 FINISHING/FINISH OPERATIONS
3.9.1 Existing Navigation Lock Slope Armoring
3.10 DISPOSITION OF SURPLUS MATERIAL
3.11 TESTING
3.12 ABANDONMENT OF MONITORING WELLS AND GEOTECHNICAL HOLES

-- End of Section Table of Contents --

SECTION 31 00 00.00 99

EARTHWORK

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO T 180	(2023) Standard Method of Test for Moisture-Density Relations of Soils Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop

ASTM INTERNATIONAL (ASTM)

ASTM C117	(2023) Standard Test Method for Materials Finer than 75-um (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C136/C136M	(2019) Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM D1140	(2017) Standard Test Methods for Determining the Amount of Material Finer than 75-µm (No. 200) Sieve in Soils by Washing
ASTM D1557	(2012; E 2015) Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3) (2700 kN-m/m3)
ASTM D2487	(2017; E 2020) Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)
ASTM D4253	(2016; E 2019) Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table
ASTM D4254	(2016) Standard Test Methods for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density
ASTM D4318	(2017; E 2018) Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

ASTM D4829	(2021) Standard Test Method for Expansion Index of Soils

OREGON DEPARTMENT OF TRANSPORTATION (ODOT)

ODOT SSC	(2024) Oregon Standard Specifications for Construction
ODOT MFTP	(2023) Manual of Field Test Procedures

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2024) Safety -- Safety and Occupational Health (SOH) Requirements

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA 600/4-79/020	(1983) Methods for Chemical Analysis of Water and Wastes
EPA SW-846.3-3	(1999, Third Edition, Update III-A) Test Methods for Evaluating Solid Waste: Physical/Chemical Methods

1.2 DEFINITIONS

1.2.1 Selected General Backfill

Per ODOT SSC Section 00330.13.

1.2.2 Selected Granular Backfill

Per ODOT SSC Section 00330.14.

1.2.3 Granular Wall Backfill

Per ODOT SSC Sections 00510.12 and 02630.11.

1.2.4 Granular Structure Backfill

Per ODOT SSC Sections 00510.13 and 02630.10 with the amount of materials passing the No. 200 sieve not to exceed 5 percent by weight.

1.2.5 Selected Topsoil

Per ODOT SSC Section 00330.11.

1.2.6 Riprap

Per ODOT SSC Section 00390.

1.2.7 Granular Drain Backfill

Per ODOT SSC Section 00430.11.

1.2.8 Trench Backfill

Per ODOT SSC Section 00405 Part MATERIALS.

1.2.9 Pipe Bedding

Per ODOT SSC Section 00405 Part MATERIALS.

1.2.10 Flowable Fill

Per ODOT SSC Section 00442.

1.2.11 Satisfactory Materials

Satisfactory materials consisting of Selected Materials as defined in ODOT SSC Section 00330.

1.2.12 Unsatisfactory Materials

Materials which do not comply with the requirements for satisfactory materials are unsatisfactory. Unsatisfactory materials also include man-made fills; trash; refuse; backfills from previous construction; roots and other organic matter or frozen material. Notify the Contracting Officer (CO) when encountering any contaminated materials.

1.2.13 Cohesionless Materials

Cohesionless materials include materials classified in ASTM D2487 as GW, GP, SW, and SP. Materials classified as GM and SM will be identified as cohesionless only when the fines are nonplastic. Perform testing, required for classifying materials, in accordance with ASTM D4318, ASTM C117, ASTM C136/C136M and ASTM D1140.

1.2.14 Cohesive Materials

Cohesive materials include materials classified as GC, SC, ML, CL, MH, and CH. Materials classified as GM and SM will be identified as cohesive only when the fines are plastic. Perform testing, required for classifying materials, in accordance with ASTM D4318, ASTM C117, ASTM C136/C136M and ASTM D1140.

1.2.15 Hard/Unyielding Materials

Hard/Unyielding materials comprise weathered rock, dense consolidated deposits, or conglomerate materials which are not included in the definition of "rock" with stones greater than 3 inch in any dimension or as defined by the pipe manufacturer, whichever is smaller. These materials usually require the use of heavy excavation equipment, ripper teeth, or jack hammers for removal.

1.2.16 Unstable Material

Unstable materials are too weak to adequately support the utility pipe, conduit, equipment, or appurtenant structure. Satisfactory material may become unstable due to ineffective drainage, dewatering, becoming frozen, excessive loading.

1.2.17 Expansive Soils

Expansive soils are defined as soils that have an expansion index greater than 20 when tested in accordance with ASTM D4829.

1.2.18 Rock

Solid homogeneous interlocking crystalline material with firmly cemented, laminated, or foliated masses or conglomerate deposits, neither of which can be removed without systematic drilling and the use of expansion jacks or feather wedges, or the use of backhoe-mounted pneumatic hole punchers or rock breakers; also large boulders, buried masonry, or concrete other than pavement which can only be removed by the methods described for rock. Basalt, as referred to in these documents, is a fine-grained intrusive, igneous rock with columnar jointing such as basalt and diabase.

1.2.19 Capillary Water Barrier

A layer of clean, poorly graded crushed rock, stone, or natural sand or gravel having a high porosity which is placed beneath a building slab with or without a vapor barrier to cut off the capillary flow of pore water to the area immediately below a slab.

1.2.20 Degree of Compaction (Proctor)

Degree of compaction required, except as noted in the second sentence, is expressed as a percentage of the maximum density obtained by the test procedure presented in ASTM D1557 abbreviated as a percent of laboratory maximum density. Since ASTM D1557 applies only to soils that have 30 percent or less by weight of their particles retained on the 3/4 inch sieve, express the degree of compaction for material having more than 30 percent by weight of their particles retained on the 3/4 inch sieve as a percentage of the maximum density in accordance with AASHTO T 180-21 paragraph 1.5, Note 1.

1.2.21 Degree of Compaction (Relative Density)

Degree of compaction required for soils with less than 5 percent passing the No. 200 sieve, is expressed as a relative percentage of the maximum index density/dry unit weight and minimum index density/dry unit weight, obtained by the test procedures in accordance with ASTM D4253 and ASTM D4254, respectively, abbreviated as a percent of laboratory relative density.

1.2.22 Borrow

Soil brought to the project site from an external location for the purposes of project construction.

1.2.23 Subgrade

Earth materials directly below foundations and directly below granular base materials in building slab and pavement areas including shoulders.

1.3 SUBSURFACE DATA

Available subsurface information developed by the Owner or by the Owner's duly authorized representative (engineer) includes the following items:

a. Bonneville Lock and Dam Subsurface Investigation and Liquefaction Analysis: Subsurface Investigation Report. Prepared by INCA/Anderson Perry Joint Venture, dated April 2017 (Attachment A14).

b. Geotechnical Data Report: Bonneville BN1 Old Bridge Geotechnical Explorations, Multnomah County. Prepared by Shannon & Wilson, dated

January 2021 (Attachment A15).

1.4 SUBMITTALS

Government approval is required for submittals with a "G" classification. Submittals not having a "G" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Excavation and Trenching Plan; G

Borrow Plan; G

Rock Excavation Plan; G

Disposition of Surplus Materials; G

Preconstruction Meeting; G

SD-06 Test Reports

Material Test Report; G

Borrow Site Testing; G

SD-07 Certificates

Qualifications Of Engineer; G

Qualified Technician; G

1.5 QUALITY CONTROL

1.5.1 Geotechnical Engineer

Provide a Professional Geotechnical Engineer to provide inspection of excavations and soil/groundwater conditions throughout construction.

Provide engineering services by an authorized engineer currently licensed in the State of Oregon; having a minimum of four years experience. Submit certificates substantiating the Qualifications of Engineer. The Geotechnical Engineer is responsible for performing pre-construction and periodic site visits throughout construction to assess site conditions. The Geotechnical Engineer is responsible for preparing and updating the Excavation and Trenching Plan and Dewatering Work Plan as construction progresses to reflect changing conditions and submit an updated plan if necessary. The Contractor is responsible for arranging meetings with the Geotechnical Engineer and CO throughout the Contract duration.

1.5.2 Qualified Technician

Provide a Qualified Technician to inspect, monitor, sample, and performing field testing. The technician qualifications need to be one of the following: a current National Institute for Certification in Engineering Technologies (NICET) Level II minimum certification in Construction Materials Testing Soils; a Geologist-in-Training with minimum one-year experience; an Engineer-in-Training with minimum one-year experience; a

Registered Geologist; or a Professional Engineer.

1.5.3 Lab Validation

Perform testing by a Government validated commercial testing laboratory or Contractor established testing laboratory meeting the requirements of Section 01 45 00.00 10 (or similar number) entitled QUALITY CONTROL and approved by the CO. Submit testing laboratory validation for the testing to be performed. Do not permit work requiring testing until testing facilities have been inspected, Corps validated and approved by the CO.

1.5.4 Preconstruction Meeting

a. Conduct a preconstruction meeting at the jobsite at least five business days prior to the start of earthwork operations on the project. The preconstruction meeting is to be arranged by the Contractor and is to follow the written agenda submitted prior to the meeting. The purpose of this meeting is to review the requirements of this specification and the associated plans. The following individuals must be in attendance at this meeting: Contractor's Project Manager and Project Superintendent, earthwork subcontractor's Project Manager and Site Foreman, Contractor's Geotechnical Engineer and Testing Agency, Government Geotechnical Engineer and Civil Engineer, and Government Construction Manager and Engineering Technician.

b. The minutes of this meeting are to be recorded by the Contractor and published via email within 48 hours to all attendees. The minutes must be re-published within 48 hours via email pending any subsequent comments from the attendees.

PART 2 PRODUCTS

2.1 SOIL MATERIALS

2.1.1 Selected General Backfill

Per ODOT SSC Section 00330.13.

2.1.2 Selected Granular Backfill

Per ODOT SSC Section 00330.14.

2.1.3 Granular Wall Backfill

Per ODOT SSC Sections 00510.12 and 02630.11.

2.1.4 Granular Structure Backfill

Per ODOT SSC Sections 00510.13 and 02630.10 with the amount of materials passing the No. 200 sieve not to exceed 5 percent by weight.

2.1.5 Selected Topsoil

Per ODOT SSC Section 00330.11.

2.1.6 Riprap

Per ODOT SSC Section 00390.

2.1.7 Granular Drain Backfill

Per ODOT SSC Section 00430.11.

2.1.8 Trench Backfill

Per ODOT SSC Section 00405 Part MATERIALS.

2.1.9 Pipe Bedding

Per ODOT SSC Section 00405 Part MATERIALS.

2.2 FLOWABLE FILL

Per ODOT SSC Section 00442.

2.3 BURIED WARNING AND IDENTIFICATION MARKERS

Provide polyethylene plastic and metallic core or metallic-faced, acid- and alkali-resistant, polyethylene plastic warning tape manufactured specifically for warning and identification of buried utility lines. Provide tape on rolls, 3 inches minimum width, color coded as specified below for the intended utility with warning and identification imprinted in bold black letters continuously over the entire tape length. Warning and identification to read, "CAUTION, BURIED (intended service) LINE BELOW" or similar wording. Provide permanent color and printing, unaffected by moisture or soil.

Warning Tape Color Codes	
Red	Electric
Yellow	Gas, Oil; Dangerous Materials
Orange	Telephone and Other Communications
Blue	Water Systems
Green	Sewer Systems
White	Steam Systems
Gray	Compressed Air

2.3.1 Warning Tape for Metallic Piping

Provide acid and alkali-resistant polyethylene plastic tape conforming to the width, color, and printing requirements specified above, with a minimum thickness of 0.003 inch and a minimum strength of 1500 psi lengthwise, and 1250 psi crosswise, with a maximum 350 percent elongation.

2.3.2 Detectable Warning Tape for Non-Metallic Piping

Provide polyethylene plastic tape conforming to the width, color, and printing requirements specified above, with a minimum thickness of 0.004 inch, and a minimum strength of 1500 psi lengthwise and 1250 psi crosswise. Manufacture tape with integral wires, foil backing, or other means of enabling detection by a metal detector when tape is buried up to 3

feet deep. Encase metallic element of the tape in a protective jacket or provide with other means of corrosion protection.

2.3.3 Detection Wire for Non-Metallic Piping

Insulate a single strand, solid copper detection wire with a minimum of 12 AWG.

2.4 BORROW

Per ODOT SSC Section 00330.04.

2.5 GEOTEXTILE

Per ODOT SSC Section 02320.

PART 3 EXECUTION

3.1 PROTECTION

a. Perform all work specified in accordance with applicable requirements of the Corps of Engineers publication EM 385-1-1 Safety and Health Requirements Manual.

b. Use equipment of type and size appropriate for the site conditions (soil character and moisture content). Maintenance of exposed subgrades and fills is the responsibility of the Contractor. The Contractor is required to prevent damage by ineffective drainage, dewatering, and heavy loads and equipment by implementing precautionary measures. Repair or replace any defects or damage.

3.1.1 Underground Utilities

Location of the existing utilities indicated is approximate. Physically verify the location and elevation of the existing utilities indicated prior to starting construction. The Contractor is responsible for protecting utilities from damage during construction.

3.1.2 Drainage and Dewatering

Provide for the collection and disposal of surface and subsurface water encountered during construction.

3.1.2.1 Drainage

Provide for the collection and disposal of surface and subsurface water encountered during construction. Construct storm drainage features (ponds/basins) at the earliest stages of site development, and throughout construction grade the construction area to provide positive surface water runoff away from the construction activity and provide temporary ditches, swales, and other drainage features and equipment as required to keep soils from becoming unstable, prevent erosion, or undermining of foundations. Remove unstable material from working platforms for equipment operation and soil support for subsequent construction features and provide new material as specified herein. It is the responsibility of the Contractor to assess the site conditions to employ necessary measures to permit construction to proceed.

3.1.2.2 Dewatering

Control groundwater flowing toward or into excavations to prevent sloughing of excavation slopes and walls, boils, uplift and heave in the excavation and to eliminate interference with orderly progress of construction. French drains, sumps, ditches or trenches are not allowed within 3 feet of the foundation of any structure, except with specific written approval, and after specific contractual provisions for restoration of the foundation area have been made. Perform control measures by the time the excavation reaches the water level in order to maintain the integrity of the in-situ material. While the excavation is open, maintain the water level continuously, at least one feet below the working level.

3.1.3 Shoring and Sheeting

Submit an Excavation and Trenching Plan in accordance with ODOT SSC Section 00510.04 to stabilize features, prevent undermining or unintended horizontal and vertical movement of adjacent structures, and prevent slippage or movement in banks or slopes adjacent to the excavation. Submit drawings and calculations, certified by a registered professional engineer, describing the methods for shoring and sheeting of excavations. Drawings to include material sizes and types, arrangement of members, and the sequence and method of installation and removal. Calculations are to include data and references used.

3.1.4 Protection of Graded Surfaces

Protect newly backfilled, graded, and topsoiled areas from traffic, erosion, and settlements that may occur. Repair or reestablish damaged grades, elevations, or slopes.

3.2 BORROW

Select borrow material to meet the requirements ODOT SSC Section 00330.12. Submit a borrow plan that includes materials to be excavated, stockpile locations, proposed slopes, drainage, and closure. Unless otherwise provided in the Contract, the Contractor is responsible for obtaining the right to procure material, pay royalties and other charges involved, and bear the expense of developing the sources, including rights-of-way for hauling from the owners. Unless specifically provided, do not obtain borrow within the limits of the project site without prior written approval.

3.2.1 Government Furnished Borrow Area(s)

Per ODOT SSC Section 00330.

3.2.2 Contractor Furnished Borrow Area(s)

Per ODOT SSC Section 00330.

3.2.3 Environmental Requirements for Off-Site Soil

Test offsite soils brought in for use as backfill for Total Petroleum Hydrocarbons (TPH), Benzene, Toluene, Ethyl Benzene, and Xylene (BTEX) and full Toxicity Characteristic Leaching Procedure (TCLP) including ignitability, corrosivity and reactivity. Backfill may not contain concentrations above appropriate State and EPA criteria, and for hazardous waste characteristics. Determine TPH concentrations by using EPA 600/4-79/020 Method 418.1. Determine BTEX concentrations by using

EPA SW-846.3-3 Method 5030/8020/8260B. Perform TCLP in accordance with EPA SW-846.3-3 Method 1311. Perform hazardous waste characteristic tests for ignitability, corrosivity, and reactivity in accordance with accepted standard methods. Perform PCB testing in accordance with accepted standard methods for sampling and analysis of bulk solid samples. Provide borrow site testing for petroleum hydrocarbons and BTEX from a grab sample of material from the area most likely to be contaminated at the borrow site (as indicated by visual or olfactory evidence), with at least one test from each borrow site. Provide borrow site testing for hazardous waste characteristics (TPH, BTEX and TCLP) from a composite sample of material, collected in accordance with standard soil sampling techniques. Do not bring borrow material to project site until Borrow Plan containing environmental test results has been received and approved by the CO.

3.3 SURFACE PREPARATION

3.3.1 Clearing and Grubbing

Clear and grub as specified in Section 31 11 00.00 99 CLEARING AND GRUBBING.

3.3.2 Stripping

a. Strip site where indicated on the plans. All stripped materials not suitable for reuse as topsoil will be wasted in specified disposal area. Screen all stripped soils to remove roots and organic materials prior disposal.

b. Strip suitable soil from the site where excavation or grading is indicated and stockpile separately from other excavated material. Protect topsoil and keep in segregated piles until needed.

3.3.3 Proof Rolling

a. Perform proof rolling on exposed subgrade that is unfrozen and free of surface water (wet conditions resulting from rainfall). Perform proof rolling in the presence of the CO.

b. After stripping, excavating, and rough grading to the planned elevation, proof roll the existing subgrade of all pavement and embankment locations with six passes of a loaded tandem axle dump truck. Operate the truck in a systematic manner to ensure the number of passes over all areas, and at speeds between 2.5 to 3.5 miles per hour. Subgrade materials that exhibit excessive deflection and rutting during proof rolling need to be scarified, aerated, and re-compacted to specified density at plus or minus two percent of optimum moisture content prior to being considered for remedial action by the CO.

3.3.4 Stockpiling Operations

Place and grade stockpiles of satisfactory and unsatisfactory as specified. Keep stockpiles in a neat and well drained condition, giving due consideration to drainage at all times. Clear, grub, and seal by rubber-tired equipment, the ground surface at stockpile locations; separately stockpile excavated satisfactory and unsatisfactory materials. Protect stockpiles of satisfactory materials from contamination which may destroy the quality and fitness of the stockpiled material. Do not create stockpiles that could obstruct the flow of any stream, endanger a partly finished structure, impair the efficiency or appearance of any structure, or be detrimental to the completed work in any way. If the Contractor

fails to protect the stockpiles, and any material becomes unsatisfactory, remove and replace such material with satisfactory material from approved sources.

3.4 EXCAVATION

a. Per ODOT SSC Section 00330.41 of the 2024 OSSC. Excavate to contours, elevation, and dimensions indicated. Excavate soil disturbed or weakened by Contractor's operations, and soils softened or made unstable for subsequent construction due to exposure to weather. Use material removed from excavations meeting the specified requirements in the construction of fills, embankments, subgrades, shoulders, bedding (as backfill), and for similar purposes to minimize surplus material and to minimize additional material to brought on site. Do not excavate below indicated depths except to remove unstable material as determined by the Geotechnical Engineer and confirmed by the CO. Remove and replace excavations below the grades shown with appropriate materials as directed by the CO.

b. If at any time during excavation, including excavation from borrow areas, the Contractor encounters material that may be classified as rock or as hard/unyielding material, uncover such material, and notify the CO. Do not proceed with the excavation of this material until the CO has classified the materials as common excavation or rock excavation. Failure on the part of the Contractor to uncover such material, notify the CO, and allow sufficient time for classification and delineation of the undisturbed surface of such material will cause the forfeiture of the Contractor's right of claim to any classification or volume of material to be paid for other than that allowed by the CO for the areas of work in which such deposits occur.

3.4.1 Ditches, Gutters, and Channel Changes

Finish excavation of ditches, gutters, and channel changes by cutting accurately to the cross sections, grades, and elevations shown. Do not excavate below grades shown. Backfill excessive excavation as directed by the CO, with satisfactory, compacted, material or with suitable stone or cobble to grades shown. Dispose excavated material as shown or as directed. Do not allow material to be deposited within 4 feet from edge of a ditch. Maintain excavations free from detrimental quantities of leaves, brush, sticks, trash, and other debris until final acceptance of the work.

3.4.2 Trench Excavation Requirements

Per ODOT SSC Section 00405.

3.4.3 Underground Utilities

Perform work adjacent to utilities in accordance with procedures outlined by utility owner. Report damage to utility lines or subsurface construction immediately to the CO.

3.4.4 Structural Excavation

a. Per ODOT SSC Section 00400.

b. Make excavations to the lines, grades, and elevations shown, or as directed. Provide trenches and foundation pits of sufficient size to permit the placement and removal of forms for the full length and width

of structure footings and foundations as shown. Clean rock or other hard foundation material of loose debris and cut to a firm, level, stepped, or serrated surface. Remove loose disintegrated rock and thin strata.

c. Concrete placement is not allowed until footing subgrades have been inspected and approved by the CO.

3.4.5 Rock Excavation

Excavate rock encountered in the cut section to a depth shown or 6 inches below finished grade and replace with satisfactory material. Submit a Rock Excavation Plan, prepared and sealed by a registered professional engineer. Blasting will not be permitted.

3.5 SUBGRADE PREPARATION

3.5.1 General Requirements

Shape subgrade to line, grade, and cross section as indicated. Remove unsatisfactory and unstable material in surfaces to receive fill or in excavated areas, as determined by proof rolling, and replaced with satisfactory materials. Do not place material on surfaces that are muddy, frozen, contain frost, or otherwise containing unstable material. Scarify the surface to a depth of 4 inches prior to placing fill. Step or bench sloped surfaces steeper than one vertical to 4 horizontal prior to scarifying. Place 4 inches of loose fill and blend with scarified material. When subgrade is part fill and part excavation or natural ground, scarify to a depth of 8 inches.

3.5.2 Subgrade for Structures, Spread Footings, and Concrete Slabs

Do not excavate below depth shown for structures, spread footings, and concrete slabs. If over excavation occurs, notify the CO and remove, replace, and compact as directed. After final rolling, the surface of the subgrade for buildings and pavements must not show deviations greater than 0.05 foot when tested with a 12 foot straightedge applied both parallel and at right angles to the centerline of the area.

3.5.3 Subgrade for Pavements

Compact top 12 inches of subgrade for pavements to at least 95 percent of ASTM D1557. After final rolling, the surface of the subgrade for pavements must not show deviations greater than 0.05 foot when tested with a 12 foot straightedge applied both parallel and at right angles to the centerline of the area.

3.5.4 Subgrade for Shoulders

Compact the upper 6 inches of subgrade for shoulders to at least 95 percent of ASTM D1557 for the depth below the surface of shoulder shown.

3.5.5 Subgrade Filter Fabric

Place filter fabric as indicated directly on prepared subgrade free of vegetation, stumps, rocks larger than 2 inch diameter and other debris which may puncture or otherwise damage the fabric. Repair damaged fabric by placing an additional layer of fabric to cover the damaged area a minimum of 3 feet overlap in all directions. Overlap fabric at joints a

minimum of 3 feet. Obtain approval of filter fabric installation before placing fill or backfill. Place fill or backfill on fabric in the direction of overlaps and compact as specified herein. Follow manufacturer's recommended installation procedures.

3.6 FILLING AND COMPACTION

Prepare ground surface on which backfill is to be placed and provide compaction requirements for backfill materials in conformance with the applicable portions of Paragraphs for SUBGRADE PREPARATION. Do not place material on surfaces that are muddy, frozen, or contain frost. Finish compaction by sheepsfoot rollers, pneumatic-tired rollers, steel-wheeled rollers, or other approved equipment well suited to the soil being compacted. Moisten material as necessary to plus or minus two percent of optimum moisture. Fill and backfill to contours, elevations, and dimensions indicated. Compact and test each lift before placing overlaying lift.

3.6.1 Trench Backfill

Per ODOT SSC Section 00405.46.

3.6.1.1 Trench Foundation

Per ODOT SSC Section 00405.44.

3.6.1.2 Bedding

Per ODOT SSC Section 00405.45.

3.6.1.3 Buried Tape And Detection Wire

3.6.1.3.1 Buried Warning and Identification Tape

Provide buried utility lines with utility identification tape. Bury tape 12 inches below finished grade; under pavements and slabs, bury tape 6 inches below top of subgrade.

3.6.1.3.2 Buried Detection Wire

Bury detection wire directly above non-metallic piping at a distance not to exceed 12 inches above the top of pipe. Extend the wire continuously and unbroken, from manhole to manhole. Terminate the ends of the wire inside the manholes at each end of the pipe, with a minimum of 3 feet of wire, coiled, remaining accessible in each manhole. Furnish insulated wire over its entire length. Install wires at manholes between the top of the corbel and the frame, and extend up through the chimney seal between the frame and the chimney seal. For force mains, terminate the wire in the valve pit at the pump station end of the pipe.

3.6.2 Fill and Backfill

Per ODOT SSC Section 00330.42.

3.6.3 Flowable Fill

Place fill in a manner to completely fill voids in the location indicated. Do not place when atmospheric temperatures are expected to be below 33 degrees F at any time during the three day period following placement.

3.6.4 Compaction

Per ODOT SSC Section 00330.43.

3.7 EMBANKMENTS

Per ODOT SSC Section 00330.42.

3.8 RIP-RAP CONSTRUCTION

Per ODOT SSC Section 00390.44.

3.9 FINISHING/FINISH OPERATIONS

Per ODOT SSC Sections 00330 and 00370.

3.9.1 Existing Navigation Lock Slope Armoring

During construction of abutments at Bents 1 and 2, if existing riprap size armoring present on Navigation Lock slopes is disturbed or removed, replace slope armoring material to lines and grades as it exists prior to construction.

3.10 DISPOSITION OF SURPLUS MATERIAL

Remove from Government property all surplus or other soil material not required or not suitable for filling or backfilling, along with brush, refuse, stumps, roots, and timber. Properly disposed of in accordance with all applicable laws and regulations. Prepare plan for Disposition of Surplus Materials to include permissions document to dispose of nonsalable products.

3.11 TESTING

Perform testing as specified by ODOT MFTP. Submit material test report within seven days of tests being completed.

3.12 ABANDONMENT OF MONITORING WELLS AND GEOTECHNICAL HOLES

Abandonment of existing monitoring wells or geotechnical holes must be performed by a well drilling contractor licensed in the State of Oregon. Monitoring well and geotechnical hole abandonment must be performed in accordance with Oregon Administrative Rules (OAR) 690-240-0510.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 31 - EARTHWORK

SECTION 31 05 19.13 99

GEOTEXTILES FOR EARTHWORK

PART 1 GENERAL

1.1 REFERENCES
1.2 SUBMITTALS
1.3 DELIVERY, STORAGE, AND HANDLING

PART 2 PRODUCTS

2.1 MATERIALS
2.1.1 General
2.1.2 Geotextile Fiber
2.1.3 Seams
2.1.4 Securing Pins
2.2 INSPECTIONS, VERIFICATIONS, AND TESTING
2.2.1 Manufacturing and Sampling
2.2.1.1 Conformance Testing
2.2.1.2 Factory Sampling
2.2.1.3 Needle Punched Geotextile
2.2.1.4 Manufacturer Certification

PART 3 EXECUTION

3.1 SURFACE PREPARATION
3.2 INSTALLATION OF THE GEOTEXTILE
3.2.1 General
3.2.2 Placement
3.3 PROTECTION
3.4 OVERLAPPING AND SEAMING

-- End of Section Table of Contents --

SECTION 31 05 19.13 99

GEOTEXTILES FOR EARTHWORK

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM D123	(2023) Standard Terminology Relating to Textiles
ASTM D4354	(2012; R 2020) Sampling of Geosynthetics for Testing
ASTM D4873/D4873M	(2017) Standard Guide for Identification, Storage, and Handling of Geosynthetic Rolls and Samples
ASTM D4884/D4884M	(2014a) Strength of Sewn or Thermally Bonded Seams of Geotextiles

OREGON DEPARTMENT OF TRANSPORTATION (ODOT)

ODOT SSC	(2024) Oregon Standard Specifications for Construction

1.2 SUBMITTALS

Government approval is required for submittals with a "G" classification. Submittals not having a "G" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-06 Test Reports

Geotextiles

SD-07 Certificates

Geotextiles

Needle Punched Geotextile

1.3 DELIVERY, STORAGE, AND HANDLING

Label, ship, store, and handle all geotextile in accordance with ASTM D4873/D4873M. Do not use hooks, tongs, or other sharp instruments for handling geotextile.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 General

Provide geotextile that is a woven or non-woven pervious sheet of plastic yarn as defined by ASTM D123 matching or exceeding the minimum average roll values listed in ODOT SSC Tables 02320-1 through 02320-6.

2.1.2 Geotextile Fiber

Use fibers consisting of a long-chain synthetic polymer composed of at least 85 percent by weight of polyolefins, polyesters, or polyamides. Add stabilizers or inhibitors to the base polymer, if necessary to make the filaments resistant to deterioration caused by ultraviolet light and heat exposure. Do not add reclaimed or recycled fibers or polymer to the formulation. Form geotextile into a network such that the filaments or yarns retain dimensional stability relative to each other, including the edges. Finish the edges of the geotextile to prevent the outer fiber from pulling away from the geotextile.

2.1.3 Seams

Sew the seams of the geotextile with thread of a material meeting the chemical requirements given above for geotextile yarn or bond the seams by cementing or by heat. Seam testing and acceptance in accordance with ODOT SSC Section 02320.11.

2.1.4 Securing Pins

Secure the geotextile to the embankment or foundation soil by pins to prevent movement prior to placement of revetment materials. Other appropriate means to prevent movement such as staples, sand bags, and stone could also be used. Insert securing pins through both strips of overlapped geotextile along the line passing through midpoints of the overlap. Remove securing pins as placement of revetment materials are placed to prevent tearing of geotextile or enlarging holes. Maximum spacing between securing pins depends on the steepness of the embankment slope. Provide maximum pins spacing equal to or less than the values listed in TABLE 1. When windy conditions prevail at the construction site, increase the number of pins upon the demand of the Contracting Officer. Anchor terminal ends of the geotextile with key trench or apron at crest, toe of the slope and upstream and downstream limits of installation.

TABLE 1
MAXIMUM SPACING FOR SECURING PINS

EMBANKMENT	SPACING, feet
STEEPER THAN 1V ON 3H	2
1V ON 3H TO 1V ON 4H	3
FLATTER THAN 1V ON 4H	5

2.2 INSPECTIONS, VERIFICATIONS, AND TESTING

2.2.1 Manufacturing and Sampling

Provide geotextiles and factory seams meeting the requirements specified in ODOT SSC Tables 02320-1 through 02320-6.

2.2.1.1 Conformance Testing

Perform conformance testing in accordance with the manufacturers approved quality control manual. Submit manufacturer's quality control conformance test results.

2.2.1.2 Factory Sampling

Randomly sample geotextiles in accordance with ASTM D4354 (Procedure Method A). Sample factory seams at the frequency specified in ASTM D4884/D4884M. Provide all samples from the same production lot as will be supplied for the Contract, of the full manufactured width of the geotextile by at least 10 feet long, except that samples for seam strength may be a full width sample folded over and the edges stitched for a length of at least 5 feet. Identify samples submitted for testing by manufacturers lot designation.

2.2.1.3 Needle Punched Geotextile

For needle punched geotextile, provide manufacturer certification that the geotextile has been inspected using permanent on-line metal detectors and does not contain any needles.

2.2.1.4 Manufacturer Certification

Upon delivery of the geotextile, submit duplicate copies of the written certificate of compliance signed by a legally authorized official of the manufacturer. State that the geotextile shipped to the site meets the chemical requirements and exceeds the minimum average roll value listed in ODOT SSC Tables 02320-1 through 02320-6.

PART 3 EXECUTION

3.1 SURFACE PREPARATION

Prepare surface, on which the geotextile will be placed, to a relatively smooth surface condition in accordance with the applicable portion of this specification and must be free from obstruction, debris, depressions, erosion feature, or vegetation. Remove any irregularities so as to ensure continuous, intimate contact of the geotextile with all the surface. Remove loose material, soft or low density pockets of material; grade erosion features such as rills and gullies out of the surface before geotextile placement.

3.2 INSTALLATION OF THE GEOTEXTILE

3.2.1 General

Place the geotextile in the manner and at the locations shown. At the time of installation, reject the geotextile if it has defects, rips, holes, flaws, deterioration or damage incurred during manufacture, transportation or storage.

3.2.2 Placement

Refer to ODOT SSC Sections 00350.41 and 00350.42.

3.3 PROTECTION

Refer to ODOT SSC Sections 00350.41 and 00350.42.

3.4 OVERLAPPING AND SEAMING

Refer to ODOT SSC Sections 00350.41 and 00350.42.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 31 - EARTHWORK

SECTION 31 11 00.00 99

CLEARING AND GRUBBING

PART 1 GENERAL

1.1 REFERENCES
1.2 SUBMITTALS
1.3 QUALITY CONTROL
1.3.1 Regulatory Requirements
1.3.2 Qualifications
1.4 DELIVERY, STORAGE, AND HANDLING
1.4.1 Storage
1.4.2 Handling

PART 2 PRODUCTS

2.1 MATERIALS
2.1.1 Tree Wound Paint
2.1.2 Herbicide

PART 3 EXECUTION

3.1 PREPARATION
3.1.1 Herbicide Application Plan
3.1.2 Protection
3.1.2.1 Roads and Walks
3.1.2.2 Trees, Shrubs, and Existing Facilities
3.1.2.3 Utility Lines
3.2 APPLICATION
3.2.1 Herbicide Application
3.2.1.1 Clean Up, Disposal, And Protection
3.2.1.1.1 Disposal of Herbicide
3.3 CLEARING
3.3.1 Tree Removal
3.3.2 Pruning
3.3.3 Grubbing
3.4 DISPOSAL OF MATERIALS
3.5 CLOSEOUT ACTIVITIES
3.5.1 Herbicides

-- End of Section Table of Contents --

SECTION 31 11 00.00 99

CLEARING AND GRUBBING

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

OREGON DEPARTMENT OF TRANSPORTATION (ODOT)

ODOT SSC	(2024) Oregon Standard Specifications for Construction

U.S. DEPARTMENT OF DEFENSE (DOD)

DODI 4150.07	(2019) DOD Pest Management Program

1.2 SUBMITTALS

Government approval is required for submittals with a "G" classification. Submittals not having a "G" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Herbicide Application Plan

SD-03 Product Data

Tree Wound Paint

Herbicides; G

SD-07 Certificates

Qualifications; G

SD-11 Closeout Submittals

Pest Management Report

1.3 QUALITY CONTROL

1.3.1 Regulatory Requirements

Comply with DODI 4150.07 for requirements on Contractor's licensing, certification, and record keeping. Maintain daily records using the Pest Management Maintenance Record, DD Form 1532-1, or a computer generated equivalent. These forms may be obtained from the main web site: https://www.esd.whs.mil/Directives/forms/dd1500_1999/DD1532/.

1.3.2 Qualifications

For the application of herbicides, use the services of an applicator who is commercially certified in the state where the work is to be performed as required by DODI 4150.07. Submit a copy of the pesticide applicator certificates.

1.4 DELIVERY, STORAGE, AND HANDLING

Deliver materials to the site, and handle in a manner which will maintain the materials in their original manufactured or fabricated condition until ready for use.

1.4.1 Storage

Storage of herbicides on the installation will not be permitted unless it is written into the Contract.

1.4.2 Handling

Handle herbicides in accordance with the manufacturer's label and Safety Data Sheet (SDS), preventing contamination by dirt, water, and organic material. Protect herbicides from weather elements as recommended by the manufacturer's label and SDS. Spill kits must be maintained on herbicide control vehicles. Mixing of herbicides on the installation will not be permitted unless it is written into the Contract.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Tree Wound Paint

Use bituminous based paint from standard manufacture specially formulated for tree wounds.

2.1.2 Herbicide

Provide herbicides currently registered by the EPA or approved for such use by the appropriate agency of the host county and approved by the Contracting Officer. Select a herbicide that is suitable for the climatic conditions at the project site. Submit manufacturer's label and SDS for herbicides proposed for use.

PART 3 EXECUTION

3.1 PREPARATION

3.1.1 Herbicide Application Plan

Prior to commencing application of herbicide, submit a herbicide application plan with proposed sequence of treatment work including dates and times of application. Include the herbicide trade name, EPA registration number, chemical composition, formulation, application rate of active ingredients, method of application, area or volume treated, and amount applied. Include a copy of the pesticide applicator certificates.

3.1.2 Protection

3.1.2.1 Roads and Walks

Keep roads and walks free of dirt and debris at all times.

3.1.2.2 Trees, Shrubs, and Existing Facilities

Provide protection in accordance with Section 01 57 19.00 25 TEMPORARY ENVIRONMENTAL CONTROLS. Protect trees and vegetation to be left standing from damage incident to clearing, grubbing, and construction operations by the erection of barriers or by such other means as the circumstances require.

3.1.2.3 Utility Lines

Protect existing utility lines that are indicated to remain from damage. Notify the Contracting Officer immediately of damage to or an encounter with an unknown existing utility line. The Contractor is responsible for the repair of damage to existing utility lines that are indicated or made known to the Contractor prior to start of clearing and grubbing operations. When utility lines which are to be removed are encountered within the area of operations, notify the Contracting Officer in ample time to minimize interruption of the service. Refer to Section 01 57 19.00 25 TEMPORARY ENVIRONMENTAL CONTROLS for additional utility protection.

3.2 APPLICATION

3.2.1 Herbicide Application

Adhere to safety precautions as recommended by the manufacturer concerning handling and application of the herbicide.

3.2.1.1 Clean Up, Disposal, And Protection

Once application has been completed, proceed with clean up and protection of the site without delay. Clean the site of all material associated with the treatment measures, according to label instructions, and as indicated. Remove and dispose of excess and waste material off Government property.

3.2.1.1.1 Disposal of Herbicide

Dispose of residual herbicides and containers off Government property, and in accordance with the approved disposal plan, label instructions and EPA requirements.

3.3 CLEARING

a. Clearing must be in accordance with ODOT SSC Section 00320.

b. Clearing consists of the felling, trimming, and cutting of trees into sections and the satisfactory disposal of the trees and other vegetation designated for removal, including downed timber, snags, brush, and rubbish occurring within the areas to be cleared. Clearing also includes the removal and disposal of structures that obtrude, encroach upon, or otherwise obstruct the work. Cut off flush with or below the original ground surface trees, stumps, roots, brush, and other vegetation in areas to be cleared, except such trees and vegetation as may be indicated or directed to be left standing. Trim

dead branches 1-1/2 inches or more in diameter on trees designated to be left standing within the cleared areas and trim all branches to the heights indicated or directed. Neatly cut close to the bole of the tree or main branches, limbs and branches to be trimmed. Paint, with an approved tree-wound paint, cuts more than 1-1/2 inches in diameter. Apply herbicide in accordance with the manufacturer's label to the top surface of stumps designated not to be removed.

3.3.1 Tree Removal

Where indicated or directed, remove trees and stumps that are designated as trees from areas outside those areas designated for clearing and grubbing. This work includes the felling of such trees and the removal of their stumps and roots as specified in Paragraph GRUBBING. Dispose of trees as specified in Paragraph DISPOSAL OF MATERIALS.

3.3.2 Pruning

Prune trees designated to be left standing within the cleared areas of dead branches 1-1/2 inches or more in diameter; and trim branches to heights and in a manner as indicated. Neatly cut limbs and branches to be trimmed close to the bole of the tree or main branches. Paint cuts more than 1-1/4 inches in diameter with an approved tree wound paint.

3.3.3 Grubbing

Grubbing consists of the removal and disposal of stumps, roots larger than 3 inches in diameter, and matted roots from the designated grubbing areas. Remove material to be grubbed, together with logs and other organic or metallic debris not suitable for foundation purposes, to a depth of not less than 18 inches below the original surface level of the ground in areas indicated to be grubbed and in areas indicated as construction areas under this Contract, such as areas for buildings, and areas to be paved. Fill depressions made by grubbing with suitable material and compact to make the surface conform with the original adjacent surface of the ground.

3.4 DISPOSAL OF MATERIALS

a. Dispose of excess materials in accordance with the approved solid waste management permit and include those materials in the solid waste management report.

b. All wood or wood like materials, except for salable timber, remaining from clearing, pruning or grubbing such as limbs, tree tops, roots, stumps, logs, rotten wood, and other similar materials is the property of the Contractor and dispose of as specified. All non-saleable timber and wood or wood like materials remaining from timber harvesting such as limbs, tree tops, roots, stumps, logs, rotten wood, and other similar materials is the property of the Contractor and dispose of as specified.

3.5 CLOSEOUT ACTIVITIES

3.5.1 Herbicides

Upon completion of this work, submit the Pest Management Report DD Form 1532, or an equivalent computer product, to the Integrated Pest Management Coordinator. This form identifies the type of operation, brand name and manufacturer of herbicide, formulation, concentration or rate of

application used.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 31 - EARTHWORK

SECTION 31 52 00.00 25

COFFERDAMS

PART 1 GENERAL

1.1 PUBLICATIONS
1.1.1 Referenced Publications
1.2 SUBMITTALS
1.3 GENERAL INFORMATION
1.3.1 General
1.3.2 Duration Time
1.3.3 In-Water Work Defined
1.3.4 Basic Criteria

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 DESIGN OF TEMPORARY COFFERDAM
3.2 COFFERDAM CONSTRUCTION
3.3 TIMING FOR CONSTRUCTION
3.4 DEWATERING ACTIVITIES
3.5 IMPACTS TO WILDLIFE AND FISH
3.6 REMOVAL OF COFFERDAM AND DEWATERING SYSTEM AND RESTORATION OF RIVER CONDITION

-- End of Section Table of Contents --

SECTION 31 52 00.00 25

COFFERDAMS

PART 1 GENERAL

1.1 PUBLICATIONS

1.1.1 Referenced Publications

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

U.S. DEPARTMENT OF DEFENSE (DOD)

UFC 3-220-05	(2004) Dewatering and Groundwater Control

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

AISC 325	(2023) Steel Construction Manual

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2024) Safety -- Safety and Occupational Health (SOH) Requirements
EM 1110-2-2503	(1989, E 1990) Design of Sheet Pile Cellular Structures, Cofferdams and Retaining Structures
EM 1110-2-2504	(1994) Design of Sheet Pile Walls

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

33 CFR 320	General Regulatory Policies, Corps of Engineers
33 CFR 321	Permits for Dams and Dikes in Navigable Waters of the United States
33 CFR 322	permits for Structures or Work in or Affecting Navigable Waters of the United States
33 CFR 323	Permits for Discharges of Dredged or Fill Material Into Waters of the United States
33 CFR 324	Permits for Ocean Dumping of Dredged Material
33 CFR 325	Processing of Department of the Army Permits
33 CFR 326	Enforcement

33 CFR 327	Public Hearings
33 CFR 328	Definition of Waters of the United States
33 CFR 329	Definition of Navigable Waters of the United States
33 CFR 330	Nationwide Permit Program
33 CFR 331	Administrative Appeal Process
33 CFR 332	Compensatory Mitigation for Losses of Aquatic Resources
33 CFR 334	Danger Zone and Restricted Area Regulations
33 CFR 335	Operation And Maintenance of Army Corps of Engineers Civil Works Projects Involving the Discharge of Dredged or Fill Material Into Waters of the U.S. or Ocean Waters
33 CFR 336	Factors to be Considered in the Evaluation of Army Corps of Engineers Dredging Projects Involving the Discharge of Dredged Material Into Waters of the U.S. and Ocean Waters
33 CFR 337	Practice and Procedure
33 CFR 338	Other Corps Activities Involving the Discharge of Dredged Material or Fill Into Waters of the U.S.
40 CFR 110	Discharge of Oil
40 CFR 111	Protection of the Environment
40 CFR 112	Oil Pollution Prevention
40 CFR 113	Liability Limits for Small Onshore Storage Facilities
40 CFR 116	Designation of Hazardous Substances
40 CFR 117	Determination of Reportable Quantities for Hazardous Substances
40 CFR 121	State Certification of Activities Requiring a Federal License or Permit
40 CFR 122	EPA Administered Permit Programs: The National Pollutant Discharge Elimination System
40 CFR 123	State Program Requirements
40 CFR 124	Procedures for Decisionmaking
40 CFR 125	Criteria and Standards for the National

	Pollutant Discharge Elimination System
40 CFR 127	NPDES Electronic Reporting
40 CFR 129	Toxic Pollutant Effluent Standards
40 CFR 130	Water Quality Planning and Management
40 CFR 131	Water Quality Standards

1.2 SUBMITTALS

Submitt the following in accordance with Section 01 33 00, SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Evacuation Plan; G

Contractor's Work Plan; G

The Proposed Plan for the cofferdam and dewatering systems including narration regarding construction, usage and removal of the cofferdam and dewatering systems. If diving activities are to be used for doing the In-Water work then a complete plan of how the work is to be accomplished using divers shall be submitted. See also the submittal requirements of Section 01 35 27.00 25, DIVING.

SD-02 Shop Drawings

Drawings; G

All drawings needed to show cofferdam and dewatering systems and location.

SD-05 Design Data

Data Calculations; G

All design criteria and calculations actually used for design of the cofferdam and dewatering systems. The calculations shall include sketches and layout drawings as needed to show how the systems work.

1.3 GENERAL INFORMATION

1.3.1 General

This Section covers any temporary cofferdam system used for completion of the In-Water portion of this work in this Contract. The temporary cofferdam system shall be designed, fabricated and/or constructed by the Contractor. The Contractor must also provide a dewatering system for this cofferdam system as needed that is designed, fabricated and/or constructed by the Contractor subject to the approval of the Contracting Officer (CO). Refer to paragraph, DEWATERING ACTIVITIES, for information regarding water flows. Diving may be used to do the in-water work upon approval. See Section 01 35 27.00 25, DIVING, for diving requirements. Location of the cofferdam system shall be in the vicinity of the Outfall Structure and

shall be submitted for approval.

1.3.2 Duration Time

All in-water work activities conducted, shall be performed during the in-water work (IWW) period defined in Section 01 10 10.00 25, CONTRACTOR'S OPERATIONS AND REQUIREMENTS. Activities related to placing, operating, and removing the cofferdam and dewatering systems shall be completed during the IWW. When removal activities start, not more than two days shall pass before the cofferdam is completely removed such that the grade and cross sectional area of the stream that existed prior to the placement of the cofferdam has been restored.

1.3.3 In-Water Work Defined

In-water work shall be as defined in Section 01 10 10.00 25, CONTRACTOR'S OPERATIONS AND REQUIREMENTS.

1.3.4 Basic Criteria

Cofferdam activities shall be in compliance with paragraph, BIOLOGICAL RESOURCES, Section 01 57 19.00 25, TEMPORARY ENVIRONMENTAL CONTROLS. The following criteria shall be incorporated within the design of the cofferdam and dewatering systems:

a. Background information: Flows from Bonneville Dam will not be adjusted for the convenience of cofferdam construction.

e. The Contractor must prepare and submit an Evacuation Plan prior to any cofferdam activities taking place in the river. The evacuation plan shall include a phone tree that includes, but is not limited to: key Contractor personnel, the Corps reservoir regulation office, Bonneville Dam operators, the GQAR, and the CO. Regular communication between the Contractor and the reservoir regulation office shall be required the entire duration that the cofferdams are in the river. The Contractor must include the individuals listed above in the weekly coordination meetings with the Government.

f. The abandoned channel does not see water flow except as from tidal forces. Contractor to use tailrace elevation data publcily available, ordinary high water elevations, and expected wave heights in determining proper design loads for cofferdam design.

g. Minimum design wind speed for this site shall be 95 mph. This wind speed shall be considered for design of the cofferdam including wind-generated waves and for forces on the exposed cofferdam structures. The Contractor must determine and utilize wave height as part of the design process.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.1 DESIGN OF TEMPORARY COFFERDAM

a. The design of the temporary cofferdam and dewatering systems shall be designed and stamped by a Oregon Licensed Professional Civil Engineer and shall meet the requirements of the publications listed in paragraph entitled Referenced Publications.

b. The design of the temporary cofferdam shall limit disturbance to the channel and channel riprap.

3.2 COFFERDAM CONSTRUCTION

a. The Contractor must construct temporary cofferdams and accompanying dewatering systems.

b. Construction of the cofferdam and dewatering systems shall not begin until the Government has approved the Contractor's Work Plan and all the required submittals, Data Calculations, and design in writing. The data calculations shall include sketches and layout drawings as needed to show how the systems work. Approval given by the CO shall not relieve the Contractor of the responsibility to satisfactorily complete the work. The cofferdam and dewatering systems shall remain in-place and functional throughout the duration of the required work.

c. The use of in-stream silt fences or turbidity curtains shall not substitute for cofferdams. However, they may be used during cofferdam construction to control turbidity generated during the cofferdam construction process.

3.3 TIMING FOR CONSTRUCTION

The Contractor must promptly install the cofferdam and dewatering systems after the Government has given written permission to proceed with the cofferdam construction work. The Contractor must be prepared to start construction within 48 hours of written notice to proceed with the cofferdam construction.

3.4 DEWATERING ACTIVITIES

The Contractor must design, install, and maintain the cofferdam and dewatering systems during the duration of the cofferdam placement. Treat all water pumped from behind the cofferdam to remove sediment before discharge, and to control turbidity per Section 01 57 19.00 25, TEMPORARY ENVIRONMENT CONTROLS. The Contractor shall ensure that visible sediment plumes do not occur at discharge location.

3.5 IMPACTS TO WILDLIFE AND FISH

a. Fishery protection shall meet all of the Terms and Conditions of the Biological Opinion (BiOp) received from National Marine Fisheries Service (NMFS). The Contractor is required to comply with the Terms and Conditions of NMFS' BiOp found in Chapter 11, paragraph 11.2.1, Incidental Take Statement. The Terms and Conditions listed must be carried out and are non-discretionary.

b. The Contractor must comply with all environmental laws, regulations, and permits related to protections for wildlife and fish as they apply to the execution of this Contract. During dewatering of any areas of the project (i.e. cofferdam, fish ladder) the Contractor must coordinate with the CO to arrange for a fish salvage operation to be performed by the Government, or designated alternate. During construction operations, the Contractor must report any wildlife and fish, either deceased or displaying signs of distress, to the COR immediately. Document the date, time, quantity, and species by retrieving (if deceased and safe to do so) or photographing the

impacted wildlife or fish. If the Government determines that the distress may be caused by Contractor operations, the Contractor may be required to stop all related work until the cause can be determined and a corrective action can be implemented. The Contractor must not dispose of any fish or wildlife carcasses unless directed to do so by the COR.

3.6 REMOVAL OF COFFERDAM AND DEWATERING SYSTEM AND RESTORATION OF RIVER CONDITION

a. When the In-Water features have been completed the cofferdam and dewatering systems shall be removed. The CO shall approve the timing and methods of cofferdam removal.

b. Following removal of the cofferdam and dewatering system, the channel shall be repaired to original design conditions.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 31 - EARTHWORK

SECTION 31 63 29.00 99

DRILLED CONCRETE PIERS AND SHAFTS

PART 1 GENERAL

1.1 REFERENCES
1.2 SUBMITTALS
1.3 QUALITY CONTROL
1.3.1 General
1.3.2 Sequencing and Scheduling
1.3.3 Inspection Criteria
1.3.4 Qualification of Excavation Contractor
1.3.5 Qualification of Professional Engineer
1.3.6 Welding Qualifications
1.3.7 Pre-Construction Conference
1.3.8 Drilled Shaft Installation Plan
1.3.9 Drilled Shaft Repair Plan
1.3.10 Drilled Shaft Inspection Report
1.3.11 Concrete Placement Log and Volume Curve
1.4 PROJECT CONDITIONS
1.4.1 Available Information
1.4.2 Existing Conditions
1.4.3 Interruption of Existing Utilities
1.4.4 Weather Limitations

PART 2 PRODUCTS

2.1 DESIGN REQUIREMENTS
2.1.1 Assembly
2.2 EQUIPMENT
2.2.1 Drilling and Excavation Equipment
2.3 MATERIALS
2.3.1 Steel Reinforcement
2.3.1.1 Deformed Steel Bars
2.3.2 Concrete
2.3.3 Crosshole Sonic Log Access Tubes
2.3.4 Crosshole Sonic Log Cement Grout
2.3.5 Drilled Shaft Casing

PART 3 EXECUTION

3.1 PREPARATION
3.2 INSTALLATION
3.2.1 Construction Criteria
3.2.2 Excavation
3.2.3 Cleanout
3.2.4 Drilling Slurry
3.2.5 Crosshole Sonic Log Access Tubes and Cement Grout
3.2.6 Steel Reinforcement

3.2.7 Concrete Placement
3.2.8 Crosshole Sonic Log Access Tubes
3.3 FIELD QUALITY CONTROL
3.3.1 Test Reports
3.4 DRILLED SHAFT TESTING AND ACCEPTANCE

-- End of Section Table of Contents --

SECTION 31 63 29.00 99

DRILLED CONCRETE PIERS AND SHAFTS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN CONCRETE INSTITUTE (ACI)

ACI 305R	(2020) Guide to Hot Weather Concreting
ACI 306.1	(1990; R 2002) Standard Specification for Cold Weather Concreting
ACI 318	(2019; R 2022) Building Code Requirements for Structural Concrete (ACI 318-19) and Commentary (ACI 318R-19)
ACI 336.1	(2001) Specification for the Construction of Drilled Piers
ACI SP-66	(2004) ACI Detailing Manual

AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE)

ASCE 7-16	(2017; Errata 2018; Supp 1 2018) Minimum Design Loads and Associated Criteria for Buildings and Other Structures

AMERICAN WELDING SOCIETY (AWS)

AWS D1.4/D1.4M	(2018) Structural Welding Code - Reinforcing Steel

ASTM INTERNATIONAL (ASTM)

ASTM A706/A706M	(2022a) Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement
ASTM C31/C31M	(2024b) Standard Practice for Making and Curing Concrete Test Specimens in the Field
ASTM C39/C39M	(2024) Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
ASTM C94/C94M	(2024a) Standard Specification for Ready-Mixed Concrete
ASTM C143/C143M	(2020) Standard Test Method for Slump of

	Hydraulic-Cement Concrete
ASTM C172	(2010) Standard Practice for Sampling Freshly Mixed Concrete

CONCRETE REINFORCING STEEL INSTITUTE (CRSI)

CRSI 10MSP	(2023) Manual of Standard Practice

OREGON DEPARTMENT OF TRANSPORTATION (ODOT)

ODOT SSC	(2024) Oregon Standard Specifications for Construction

U.S. FEDERAL HIGHWAY ADMINISTRATION (FHWA)

FHWA NHI-10-016	(2010) Drilled Shafts: Construction Procedures and LRFD Design Methods
FHWA NHI-18-024	(2018) Drilled Shafts: Construction Procedures and LRFD Design Methods

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1926.651	Specific Excavation Requirements

1.2 SUBMITTALS

Government approval is required for submittals with a "G" classification. Submittals not having a "G" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Installation Plan; G

Drilled Shaft Repair Plan

SD-02 Shop Drawings

Drilled Shaft Diameters; G

Top and Bottom of Shaft Elevations; G

Steel Reinforcement; G

Accessories; G

Crosshole Sonic Log Access Tubes; G

SD-05 Design Data

Mix Design Data; G

SD-06 Test Reports

Soils Report; G

Ground Water Conditions

Slump

Concrete; G

Compressive Strength; G

Drilled Shaft Inspection Report; G

Concrete Placement Log And Volume Curve; G

Crosshole Sonic Log; G

Downhole Camera Recording Of Bottom Surface

SD-07 Certificates

Bill of Lading for Ready-Mix Concrete Deliveries

Steel Reinforcement; G

Welding Certificates; G

Excavation and Drilling Equipment

Qualifications of Excavator; G

Qualifications of Engineer; G

1.3 QUALITY CONTROL

1.3.1 General

Install drilled shaft foundations in accordance with applicable requirements as described by ACI 336.1, FHWA NHI-18-024, and in accordance with ODOT SSC Section 00512.

1.3.2 Sequencing and Scheduling

Submit a detailed installation plan describing the schedule for drilling and excavation, installation of steel reinforcement and concrete placement with anticipated site conditions so that each excavated shaft is poured the same day that the drilling is performed.

1.3.3 Inspection Criteria

Design inspection activities to minimize delays while insuring the intent of the Industry Standard Specifications.

1.3.4 Qualification of Excavation Contractor

In accordance with ODOT SSC Section 00512.30. Submit certificates substantiating the Qualifications of Excavator.

1.3.5 Qualification of Professional Engineer

Provide engineering services by an authorized engineer currently licensed

in the State of Oregon; having a minimum of four years experience as an engineer knowledgeable in drilled shaft foundation design analysis, protocols and procedures for the ACI 336.1, FHWA NHI-10-016, ASCE 7-16, and ODOT SSC. Submit certificates substantiating the Qualifications of Engineer.

1.3.6 Welding Qualifications

Provide and maintain qualified procedures and personnel according to AWS D1.4/D1.4M. Submit Welding Certificates to the Contracting Officer.

1.3.7 Pre-Construction Conference

After submittals are received and approved but before drilled shaft excavation and foundation work, including associated work, is performed, the Contracting Officer will hold a pre-construction conference to review the following:

a. The drawings, specifications and the geotechnical report.

b. Finalize construction schedule and verify availability of materials, Excavator's personnel, equipment, and facilities needed to make progress and avoid delays.

c. Methods and procedures related to drilled shaft foundation installation, including engineer's written instructions.

d. Support conditions for compliance with requirements, including alignment between foundation system and erection of structural members.

e. Governing regulations and requirements for, certificates, insurance, tests and inspections if applicable.

f. Temporary protection requirements for foundation assembly during and after installation.

1.3.8 Drilled Shaft Installation Plan

In accordance with ODOT SSC Section 00512.40 Part (a).

1.3.9 Drilled Shaft Repair Plan

In accordance with ODOT SSC Section 00512.40 Part (b).

1.3.10 Drilled Shaft Inspection Report

In accordance with ODOT SSC Section 00512.40 Part (c).

1.3.11 Concrete Placement Log and Volume Curve

In accordance with ODOT SSC Section 00512.40 Part (d).

1.4 PROJECT CONDITIONS

1.4.1 Available Information

Available information developed by the Owner or by the Owner's duly authorized representative (engineer) includes the following items:

Bonneville Lock and Dam Subsurface Investigation and Liquefaction

Analysis: Subsurface Investigation Report. Prepared by INCA/Anderson Perry Joint Venture, dated April 2017 (Attachment A14).

1.4.2 Existing Conditions

Locate existing underground utilities before excavating drilled shaft foundations. If existing utilities are to remain in place, provide protection during drilled shaft operations.

1.4.3 Interruption of Existing Utilities

Do not interrupt any utility to occupied facilities unless directed in writing by the Contracting Officer.

1.4.4 Weather Limitations

Proceed with installation preparation only when existing and forecasted weather conditions permit work to proceed without water entering into the area of excavation.

PART 2 PRODUCTS

2.1 DESIGN REQUIREMENTS

Submit design data for the following:

Mix design data in accordance with Paragraph READY-MIX CONCRETE accompanied by the Bill of Lading for Ready Mix Concrete deliveries.

2.1.1 Assembly

Installation drawings are to include, but not limited to, the following items indicating a completely dimensioned layout and location of drilled shafts and concrete placement for foundation system. Submit detailed shop drawings for the following:

a. Drilled shaft diameters

b. Top and bottom of shaft elevations

c. Steel reinforcement

d. Accessories

e. Crosshole Sonic Log Access Tubes

2.2 EQUIPMENT

2.2.1 Drilling and Excavation Equipment

a. Drilling and excavation equipment must consist of casing oscillator/rotator drilled shaft equipment.

b. Provide drilling and excavation equipment having adequate capacity, including but not limited to, power, torque and down thrust to excavate a hole of diameter and depth indicated. Also provide excavation and over-reaming tools of adequate design, size and strength to perform the work indicated.

c. Provide special drilling equipment including, but not limited to, rock core barrels, rock tools, air tools and other equipment as necessary to construct the shaft excavation to the size and depth indicated when materials encountered can not be drilled using earth augers and over-reaming tools.

d. Submit certificates substantiating appropriate selection of excavation and drilling equipment.

2.3 MATERIALS

2.3.1 Steel Reinforcement

2.3.1.1 Deformed Steel Bars

Steel bars conforming to ASTM A706/A706M, Grade 60 ksi and 80 ksi as indicated on Contract plans. Provide drilled shaft reinforcement bars per ODOT SSC Sections 00512, 00530, and 0210.

2.3.2 Concrete

Provide Class 4000 psi concrete in accordance with Contract documents and ODOT SSC Sections 00512 and 02001.

Portland cements must conform to ODOT SSC Sections 00512 and 02010.

Potable water conforming to ASTM C94/C94M.

Measure, batch, mix and deliver concrete according to ASTM C94/C94M, ODOT SSC Section 00512, and furnish batch ticket information.

2.3.3 Crosshole Sonic Log Access Tubes

Provide crosshole sonic log access tubes in accordance with ODOT SSC Section 00512.

2.3.4 Crosshole Sonic Log Cement Grout

Provide grout for filling crosshole sonic log access tubes in accordance with ODOT SSC Sections 00512 & 02010.

2.3.5 Drilled Shaft Casing

Provide drilled shaft casing in accordance with ODOT SSC Section 00512.

PART 3 EXECUTION

3.1 PREPARATION

a. Protect existing structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, vibration, and other hazards created by drilled shaft foundation operations in accordance with ODOT SSC Section 00512.43.

b. Provide Fall Protection as required by Section 01 35 26.00 25 GOVERNMENTAL SAFETY REQUIREMENTS and 29 CFR 1926.651.

3.2 INSTALLATION

3.2.1 Construction Criteria

a. Provide equipment for checking the dimensions and alignment of each shaft excavation. Determine dimensions and alignment jointly with the Contractor and engineer. Measure final shaft depths with appropriate weighted tape measure or other approved method after cleaning.

b. Provide and install monolithically cast-in-place concrete drilled shaft foundation to the sizes indicated.

c. Provide and install straight cylindrical shaft foundation of the type indicated.

d. Tolerances:

Drilled Shaft construction tolerances in accordance with ODOT SSC Section 00512.42.

3.2.2 Excavation

a. Excavation in accordance with ODOT SSC Section 00512.43.

b. Accomplish excavation of shaft foundations by casing oscillator/rotator methods using drilling equipment of adequate size, power, torque and down thrust necessary for the work.

c. Perform excavation through whatever materials that are encountered to the dimensions, depths and applicable ACI 336.1 tolerances.

d. Protect excavated walls with temporary watertight steel casings of sufficient length to prevent water intrusion, cave-ins, displacement of surrounding earth, and injury to personnel and damage to construction operations.

e. Excavate shafts for drilled foundations to indicated elevations. Remove loose debris, materials and muck to make bottom surfaces level within ACI 336.1 tolerances.

3.2.3 Cleanout

In accordance with ODOT SSC Section 00512.43(h). Cleanout and condition of bottom surface must be verified with downhole camera system.

3.2.4 Drilling Slurry

Drilling slurry in accordance with ODOT SSC Section 00512.14.

3.2.5 Crosshole Sonic Log Access Tubes and Cement Grout

Crosshole sonic log access tubes and cement grout in accordance with Sections 00512.15 and 00512.18.

3.2.6 Steel Reinforcement

a. Steel reinforcement must be in accordance with ODOT SSC Section 00512.43.

b. Comply with recommendations in the CRSI "Manual of Standard Practice" CRSI 10MSP for fabricating, placing and supporting reinforcement. Shop fabricate steel reinforcement in accordance with ACI SP-66.

c. When practicable, deliver the reinforcement cage assembly to the jobsite as a complete unit ready for installation. Should it be necessary to make any additional connections and splices, provide as indicated on the approved shop drawings, at-grade level prior to lowering the complete assembly into the hole.

d. Clean reinforcement of loose rust, mill scale, earth and other foreign materials. Do not tack weld crossing reinforcing bars. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

e. Lower reinforcement steel into the hole in such a manner as to prevent damage to the walls of the excavation. Place, tie and clip cage symmetrically about the axis of the shaft. Use centering devices securely attached to the cage to clear the shaft walls and maintain the cage in place throughout the concrete placement operations.

f. Cooperate with other trades in setting of other embedded items. Where conflicts occur between reinforcing and embedded items, notify the Contracting Officer in order to reconcile conflicts before concrete placement. Position and support anchors and embedded items with appropriate accessories.

g. Use templates to set anchor bolts, leveling plates and other accessories required for structure erection. Provide blocking or holding devices to maintain required anchoring positions during final concrete placement.

3.2.7 Concrete Placement

a. Keep all equipment, including but not limited to, mixers, pumps, hoses, tools and screeds clean and free of set concrete throughout the placement operation.

b. Convey concrete from the mixer to place of deposit by best industry methods that prevents segregation and loss of material. Size and design the equipment for conveying concrete to ensure uniform, continuous placement of concrete.

c. Place concrete in accordance with ACI 318 and ODOT SSC Section 00512.47.

d. Place concrete in a continuous operation and without segregation into dry excavations whenever possible after inspection and written approval by the Contracting Officer. Use all practicable means to obtain a dry excavation before and during concrete placement.

e. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. When hot weather conditions exist that would impair quality and strength of placed concrete, comply with ACI 305R. Comply with ACI 306.1 for cold-weather protection.

f. A minimum of 50 percent of the base for each shaft is to be less than 1/2 inch of sediment at the time of concrete placement. Maximum depth

of sediment or debris at any place on the base of the shaft is not to exceed 1-1/2 inches. Shaft cleanliness is to be determined by the engineer by visual inspection.

3.2.8 Crosshole Sonic Log Access Tubes

Construction of crosshole sonic log access tubes must be in accordance with ODOT SSC Section 00512.46.

3.3 FIELD QUALITY CONTROL

3.3.1 Test Reports

a. As a minimum, submit the following test reports and data.

(1) Soils Report

(2) Ground Water conditions

(3) Slump

(4) Concrete

(5) Compressive Strength

(6) Crosshole Sonic Log

(7) Downhole camera recording of bottom surface

b. Sample and test concrete for quality control during placement.

c. Sample freshly placed concrete for testing in accordance with ASTM C172.

d. Make concrete test specimens for compressive strength at seven and 28 days for each design mix conforming to ASTM C31/C31M. Compression test concrete in accordance with ASTM C39/C39M.

e. Test Slump at plant for each design mix in accordance with ASTM C143/C143M.

f. Crosshole Sonic Log Testing and Reporting in accordance with with ODOT SSC Section 00512.48 Parts (a) and (b).

3.4 DRILLED SHAFT TESTING AND ACCEPTANCE

Acceptance of drilled shafts in accordance with ODOT SSC Section 00512.48.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 31 - EARTHWORK

SECTION 31 66 10.00 99

ROCK FOUNDATION PREPARATION

PART 1 GENERAL

1.1 REFERENCES
1.2 DEFINITIONS
1.2.1 Foundations
1.2.2 Rock Joints
1.3 AVAILABLE INFORMATION
1.4 SUBMITTALS

PART 2 PRODUCTS

2.1 MATERIALS
2.1.1 Concrete
2.1.2 Grout
2.1.3 Welded Wire Fabric

PART 3 EXECUTION

3.1 EXAMINATION
3.2 PREPARATION
3.2.1 Equipment
3.2.1.1 Tools
3.2.1.2 Air Jet
3.3 PRELIMINARY CLEANUP
3.4 FINAL CLEANUP AND FOUNDATION PREPARATION
3.5 TREATMENT
3.5.1 Concrete
3.5.2 Grout
3.6 FOUNDATION INSPECTION AND GEOLOGIC MAPPING

-- End of Section Table of Contents --

SECTION 31 66 10.00 99

ROCK FOUNDATION PREPARATION

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM A1064/A1064M	(2024) Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete

OREGON DEPARTMENT OF TRANSPORTATION (ODOT)

ODOT SSC	(2024) Oregon Standard Specifications for Construction

1.2 DEFINITIONS

1.2.1 Foundations

The rock foundation is comprised of the rock surfaces upon which embankment and concrete structures are placed. Vertical surfaces, where permitted or required by these specifications, are included.

1.2.2 Rock Joints

Rock joints are all planar or curvilinear fractures, including cracks, crevices, and seams which separate a rock mass into individual rock blocks of various sizes. They may be open or closed and may be filled with material other than rock material.

1.3 AVAILABLE INFORMATION

Available information at Bent 2 developed by the Owner or by Owner's duly authorized representative (engineer) includes the following items:

Geotechnical Data Report: Bonneville BN1 Old NL Bridge Geotechnical Explorations. Prepared by Shannon & Wilson, dated January 2021 (Attachment A15).

1.4 SUBMITTALS

Government approval is required for submittals with a "G" classification. Submittals not having a "G" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Tools; G

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Concrete

Provide dental concrete conforming to the requirements of ODOT SSC Class 4000.

2.1.2 Grout

Provide grout conforming with structural grout per ODOT SSC Section 2080.60.

2.1.3 Welded Wire Fabric

Use welded wire fabric 6 by 6 inches - W3 x W3, conforming to ASTM A1064/A1064M.

PART 3 EXECUTION

3.1 EXAMINATION

The limits of the proposed foundations for the various parts of the work are approximately as indicated. The Contracting Officer reserves the right to change the depth to, or the width of, the foundations if, conditions exposed in the foundation excavations, or as determined by exploratory drilling, warrant such modifications.

3.2 PREPARATION

3.2.1 Equipment

3.2.1.1 Tools

Submit for approval tabular list of pavement breakers, rippers, backhoes, and other rock excavation equipment including hand tools, prior to their use on the job site. Hand tools, where required or permitted by these specifications include, but are not limited to shovels, bars, picks, wedges, and brooms.

3.2.1.2 Air Jet

Furnish an air jet consisting of a 1-1/2 inch nozzle with a supply hose connected to a suitable source of compressed air. Provide compressed air with a pressure between 90 and 110 psi. Control compressed air at the nozzle.

3.3 PRELIMINARY CLEANUP

When the excavation has reached the approximate limits shown or when the Contracting Officer determines that a satisfactory foundation may have been reached, the Contracting Officer may direct that a preliminary cleanup be performed on all or any part of the rock foundation surface. Remove all debris, loose rock, sand, silt, and other objectionable material by hand tools followed by air jets or any combination of additional methods

approved or directed. The Contracting Officer may require that the excavation be continued and the preliminary cleanup procedure repeated until a satisfactory foundation surface is reached.

3.4 FINAL CLEANUP AND FOUNDATION PREPARATION

a. Unless otherwise directed, perform final cleanup and foundation preparation. This work consists of removing loose and weather rock and pockets of fines, sand, rock rubble or gravel and other objectionable material from the in place rock surface including areas of depression, large crevices, and open rock joints. Picking, barring, and hand excavation may be necessary to obtain a foundation surface free from loose, drummy, or shattered materials. Thoroughly clean the final rock surface using air jets or other approved method and maintain in a clean condition until the placement of concrete thereon.

b. In general accordance with ODOT SSC Section 00510.46 Part (d).

3.5 TREATMENT

Provide treatment consisting of excavation, if necessary, of the material in joints, cavities, depressions, and overhangs and the placement of concrete or mortar such that the final surface is satisfactory for the subsequent placement of concrete.

3.5.1 Concrete

Use concrete to fill joints, cavities, depressions, and overhangs except where the use of grout is required or permitted to provide level working surface for bent cap. Prior to placement, the surfaces of the joint, cavity, depression, or overhang will be thoroughly cleaned using air jets. Provide maximum aggregate size of as directed. Furnish concrete conforming with Paragraph MATERIALS.

3.5.2 Grout

Use grout to fill joints, cavities, depressions, and at other areas as directed or approved to provide level working surface for bent cap. Minimize the absorption of water from the grout mix in the surface moisture of the rock. However, no standing water will be allowed. Provide grout conforming with Paragraph MATERIALS.

3.6 FOUNDATION INSPECTION AND GEOLOGIC MAPPING

Inspections to determine adequacy of the foundations will be performed by the Contracting Officer in all foundation areas between completion of excavation and placement of concrete. The Contractor will cooperate to the extent necessary to assist in inspection and mapping activities which may require additional survey control points and access. Coordinate the schedule for foundation excavation and preliminary cleanup with the Contracting Officer to ensure that the cleanup, inspection, and mapping proceed in an orderly manner.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 31 - EARTHWORK

SECTION 31 68 13.00 99

GROUND ANCHORS

PART 1 GENERAL

1.1 SYSTEM DESCRIPTION
1.1.1 Scope of Work
1.2 REFERENCES
1.3 DEFINITIONS
1.3.1 Admixture
1.3.2 Alignment Load (AL)
1.3.3 Anchor
1.3.4 Anchor Grout
1.3.5 Anchor Head
1.3.6 Anchor Nut
1.3.7 Anchorage
1.3.8 Anchorage Cover
1.3.9 Apparent Free Tendon Length
1.3.10 Bearing Plate
1.3.11 Bond Length
1.3.12 Bond Breaker
1.3.13 Centralizer
1.3.14 Coarse-Grained Soils
1.3.15 Cohesive Soils
1.3.16 Consolidation Grout
1.3.17 Construction Quality Assurance (CQA) Inspector
1.3.18 Contract Drawings
1.3.19 Corrosion Inhibiting Compound
1.3.20 Creep Movement
1.3.21 Creep Test
1.3.22 Factored Design Load (FDL)
1.3.23 Elastic Movement
1.3.24 Encapsulation
1.3.25 Fine Grained Soils
1.3.26 Free Stressing (Unbonded) Length
1.3.27 Fully Bonded Anchor
1.3.28 Lift-Off
1.3.29 Lock-Off Load
1.3.30 Non-Cohesive Soils
1.3.31 Performance Test
1.3.32 Primary Grout
1.3.33 Proof Test
1.3.34 Pulling Head
1.3.35 Relaxation
1.3.36 Residual Movement
1.3.37 Restressable Anchor Head
1.3.38 Rock
1.3.39 Safety Factor
1.3.40 Sheath

1.3.41 Shop Drawings
1.3.42 Spacer
1.3.43 Stressing Anchorage
1.3.44 Subcontractor
1.3.45 Supplier
1.3.46 Tendon
1.3.47 Test Load (TL)
1.3.48 Unbonded Anchor
1.3.49 Working Load
1.4 SUBMITTALS
1.5 QUALITY ASSURANCE
1.5.1 Construction Quality Assurance
1.5.2 Qualifications
1.5.2.1 Project Experience
1.5.2.2 Personnel Experience
1.5.2.3 Ground Anchor Contractor Qualifications
1.5.3 Certificates of Compliance
1.5.4 Mill Test Reports
1.5.5 Calibration Data
1.6 WORKING DRAWINGS
1.6.1 Ground Anchor Schedule
1.6.2 Ground Anchor Details
1.7 PROJECT CLOSEOUT
1.8 SITE CONDITIONS

PART 2 PRODUCTS

2.1 ADMIXTURES
2.2 ANCHORAGE DEVICES
2.2.1 Bearing Plate
2.2.2 Anchorage Covers
2.3 BONDBREAKER
2.4 CEMENT GROUT
2.5 CENTRALIZERS
2.6 CORROSION INHIBITING COMPOUND
2.7 GROUT TUBES
2.8 HEAT SHRINKABLE SLEEVES
2.9 PRESTRESSING STEEL
2.10 SHEATH
2.11 SPACERS
2.12 TENDON BOND LENGTH ENCAPSULATIONS
2.13 WATER

PART 3 EXECUTION

3.1 PERFORMANCE CRITERIA
3.2 CORROSION PROTECTION
3.2.1 Anchorage Protection
3.2.2 Unbonded Length Protection
3.3 UNBONDED LENGTH/BOND LENGTH TRANSITION
3.4 TENDON BOND LENGTH PROTECTION FOR GROUT PROTECTED TENDONS (CLASS II)
3.5 TENDON BOND LENGTH PROTECTION FOR ENCAPSULATED TENDONS (CLASS I)
3.6 EPOXY (CLASS I)
3.7 TENDON STORAGE AND HANDLING
3.8 ANCHOR FABRICATION
3.9 DRILLING
3.10 TENDON INSERTION
3.11 GROUTING
3.12 ANCHORAGE INSTALLATION

3.13 STRESSING, LOAD TESTING, AND ACCEPTANCE
3.13.1 Stressing Equipment
3.13.2 Testing Equipment
3.13.3 Load Testing Setup
3.13.4 Performance Tests
3.13.5 Proof Tests
3.13.6 Ground Anchor Acceptance Criteria
3.13.7 Procedures for Anchors Failing Acceptance Criteria
3.13.8 Anchor Lock-Off
3.13.9 Anchor Lift-Off Test

-- End of Section Table of Contents --

SECTION 31 68 13.00 99

GROUND ANCHORS

PART 1 GENERAL

1.1 SYSTEM DESCRIPTION

1.1.1 Scope of Work

a. Furnish all labor, materials, tools, supervision, transportation, installation equipment, and incidentals necessary to complete the work specified herein and shown on the Contract drawings. The work must include but not be limited to mobilization, surveying, drilling, inserting, grouting, stressing, load testing, and lock-off of ground anchors at the appropriate locations.

b. Unless otherwise directed, the Contractor must select the ground anchor type, drilling method, grouting method, grouting pressures, and, subject to the minimum values in the contract documents, determine the bond length, free-stressing (unbonded) length, and anchor diameter. The Contractor must be responsible for installing ground anchors that will develop the load-carrying capacity indicated on the Contract Drawings in accordance with the testing subsection of this Specification.

c. The anchor tendon must be protected from corrosion as shown on the Contract drawings and in accordance with the requirements of this Specification.

1.2 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO M 252	(2009; R 2017) Standard Specification for Corrugated Polyethylene Drainage Pipe

ASTM INTERNATIONAL (ASTM)

ASTM A53/A53M	(2024) Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A192/A192M	(2002; R 2012) Standard Specification for Seamless Carbon Steel Boiler Tubes for High-Pressure Service
ASTM A500/A500M	(2023) Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes

ASTM A709/A709M	(2021) Standard Specification for Structural Steel for Bridges
ASTM A775/A775M	(2022) Standard Specification for Epoxy-Coated Steel Reinforcing Bars
ASTM C109/C109M	(2023) Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or (50-mm) Cube Specimens)
ASTM D1248	(2016) Standard Specification for Polyethylene Plastics Extrusion Materials for Wire and Cable
ASTM D1784	(2020) Standard Specification for Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds
ASTM D4101	(2017) Standard Classification System and Basis for Specification for Polypropylene Injection and Extrusion Materials

POST-TENSIONING INSTITUTE (PTI)

PTI DC35.1	(2014) Recommendations for Prestressed Rock and Soil Anchors

1.3 DEFINITIONS

The following definitions are in addition to those given in PTI DC35.1, Section 2.0:

1.3.1 Admixture

Substance added to the grout to either control bleed or shrinkage, improve flowability, reduce water content, or retard setting time.

1.3.2 Alignment Load (AL)

A nominal minimal load applied to an anchor during testing to keep the testing equipment correctly positioned.

1.3.3 Anchor

A system, used to transfer tensile loads to the ground (soil or rock), which includes the prestressing steel, anchorage, corrosion protection, sheathings, spacers, centralizers, and grout.

1.3.4 Anchor Grout

See Primary Grout.

1.3.5 Anchor Head

A system, used to transfer tensile loads to the ground (soil or rock), which includes the prestressing steel, anchorage, corrosion protection,

sheathings, spacers, centralizers, and grout.

1.3.6 Anchor Nut

The threaded device that transfers the prestressing force in a bar to a bearing plate.

1.3.7 Anchorage

The combined system of anchor head, bearing plate, trumpet, and corrosion protection that is capable of transmitting the prestressing force from the prestressing steel to the surface of the ground or the supported structure.

1.3.8 Anchorage Cover

A cover to protect the anchorage from corrosion and physical damage.

1.3.9 Apparent Free Tendon Length

The length of tendon which is apparently not bonded to the surrounding grout or ground, as calculated from the elastic load extension data during testing.

1.3.10 Bearing Plate

A steel plate under the anchor head that distributes the prestressing force to the anchored structure.

1.3.11 Bond Length

The length of the tendon that is bonded to the primary grout and capable of transmitting the applied tensile load to the surrounding soil or rock.

1.3.12 Bond Breaker

A sleeve placed over the anchor tendon in the free stressing length to ensure unobstructed elongation of the tendon during stressing.

1.3.13 Centralizer

A device to support and position the tendon in the drill hole so that a minimum grout cover is provided.

1.3.14 Coarse-Grained Soils

Soils with more than 50 percent, by weight of material larger than the No. 200 sieve size.

1.3.15 Cohesive Soils

Soils that exhibit plasticity. Atterberg limits are commonly used to determine plasticity and better define a soil as cohesive or non-cohesive.

1.3.16 Consolidation Grout

Portland cement grout that is injected into the hole prior to inserting the tendon to either reduce the permeability of the rock surrounding the hole or improve the ground conditions.

1.3.17 Construction Quality Assurance (CQA) Inspector

The person or firm responsible for construction quality assurance (CQA) testing, monitoring, and other duties related to assuring the quality of construction and adherence to the Contract drawings and specifications.

1.3.18 Contract Drawings

The approved plans, profiles, typical cross sections, working drawings, and supplemental drawings which show the location, dimensions, and details of the work to be done.

1.3.19 Corrosion Inhibiting Compound

Material used to protect against corrosion and lubricate the prestressing steel.

1.3.20 Creep Movement

The movement that occurs during the creep test of an anchor under a constant load.

1.3.21 Creep Test

A test to determine the movement of the ground anchor at a constant load.

1.3.22 Factored Design Load (FDL)

Anticipated final maximum factored load in the anchor after allowance for time- dependent losses or gains. The factored design load includes appropriate load factors to ensure that the overall structure has adequate capacity for its intended use.

1.3.23 Elastic Movement

The recoverable movement measured during an anchor test.

1.3.24 Encapsulation

A corrugated or deformed tube protecting the prestressing steel against corrosion in the tendon bond length.

1.3.25 Fine Grained Soils

Soils with at least 50 percent, by weight of material smaller than the No. 200 sieve size.

1.3.26 Free Stressing (Unbonded) Length

The designed length of the tendon that is not bonded to the surrounding ground or grout during stressing.

1.3.27 Fully Bonded Anchor

Anchor in which the free stressing length without bondbreaker is grouted after stressing and so bonded to the surrounding structure or ground.

1.3.28 Lift-Off

The load (lift-off load) in the tendon which can be checked at any specified time with the use of a hydraulic jack, by lifting the anchor head off the bearing plate.

1.3.29 Lock-Off Load

The prestressing force in an anchor immediately after transferring the load from the jack to the stressing anchorage.

1.3.30 Non-Cohesive Soils

Material that is generally nonplastic.

1.3.31 Performance Test

Incremental cyclic test loading of a prestressed anchor in which the total movement of the anchor is recorded at each increment.

1.3.32 Primary Grout

Portland cement grout that is injected into the anchor hole prior to or after the installation of the anchor tendon to provide for the force transfer to the surrounding ground along the bond length of the tendon. Primary grout is also known as anchor grout.

1.3.33 Proof Test

Incremental loading of a prestressed anchor recording the total movement of the anchor at each increment.

1.3.34 Pulling Head

Temporary anchoring device behind the hydraulic jack during stressing.

1.3.35 Relaxation

The decrease of stress or load with time while the tendon is held under constant strain.

1.3.36 Residual Movement

The non-elastic (i.e., non-recoverable) movement of an anchor measured during load testing.

1.3.37 Restressable Anchor Head

An anchor head that permits the anchor load, throughout the life of the structure, to be measured by lift-off checking and adjusted by shimming, unshimming or thread- turning.

1.3.38 Rock

Solid homogeneous interlocking crystalline material with firmly cemented, laminated, or foliated masses or conglomerate deposits. Basalt, as referred to in these documents, is a fine-grained intrusive, igneous rock with columnar jointing such as basalt and diabase.

1.3.39 Safety Factor

The ratio of the ultimate capacity to the working load used for the design of any component or interface.

1.3.40 Sheath

A smooth or corrugated pipe or tube protecting the prestressing steel in the free stressing length against corrosion.

1.3.41 Shop Drawings

All drawings, diagrams, illustrations, schedules, performance charts, brochures, and other data which are prepared for or by the Contractor or any subcontractor, manufacturer, supplier, or distributor and which illustrate the equipment, material, or any other matter relating to the work.

1.3.42 Spacer

A device to separate elements of a multiple-element tendon to ensure full bond development of each prestressing steel element.

1.3.43 Stressing Anchorage

See Anchorage.

1.3.44 Subcontractor

The Subcontractor is a person or firm who has a direct or indirect Contract relationship with the Contractor to perform any of the work.

1.3.45 Supplier

Any person or firm who supplies materials or equipment for the work, including fabricated to a special design, and may also be a Subcontractor.

1.3.46 Tendon

The complete anchor assembly (excluding grout) consisting of prestressing steel, corrosion protection, sheathings, and coating when required, as well as spacers and centralizers.

1.3.47 Test Load (TL)

The maximum load to which the anchor is subjected during testing.

1.3.48 Unbonded Anchor

Anchor in which the free stressing length remains permanently unbonded.

1.3.49 Working Load

Equivalent term for Design Load.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" classification. Submittals not having a "G" classification are for information only. When

used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Contractor's Qualifications; G

SD-02 Shop Drawings

Working Drawings; G

SD-03 Product Data

Calibration Data; G

SD-06 Test Reports

Mill Test Reports; G

SD-07 Certificates

Certificates Of Compliance; G

SD-11 Closeout Submittals

Grouting Records; G

Ground Anchor Test Results; G

As-Built Drawings; G

1.5 QUALITY ASSURANCE

1.5.1 Construction Quality Assurance

The Construction Quality Assurance (CQA) Inspector will monitor all aspects of anchored wall construction. The CQA Inspector will perform material conformance testing as required. The Contractor must be aware of the activities required by the CQA Inspector and must account for these activities in the construction schedule. Correct all deficiencies and nonconformities identified by the CQA Inspector at no additional cost to the Owner.

1.5.2 Qualifications

Due to the specialized nature of the ground anchor portion of the work, the ground anchor Contractor must be pre-qualified before bidding on this work. Contractors must meet the experience criteria listed below. The Engineer will approve or reject the Contractor's qualifications within 15 calendar days after receipt of a complete qualifications submission. Additional time required due to incomplete or unacceptable submittals will not be cause for time extension or impact or delay claims. All costs associated with incomplete or unacceptable submittals must be borne by the Contractor.

1.5.2.1 Project Experience

The ground anchor Contractor performing the work described in this

Specification must have installed permanent ground anchors for a minimum of three years.

1.5.2.2 Personnel Experience

Assign an engineer to supervise the work with at least three years of experience in the design and construction of permanent anchored structures.The Contractor may not use consultants or manufacturer's representatives in order to meet the requirements of this section. Drill operators and on-site supervisors must have a minimum of one year experience installing permanent ground anchors with the Contractor's organization.

1.5.2.3 Ground Anchor Contractor Qualifications

The following must be submitted to the Owner's Representative by the ground anchor Contractor four weeks prior to the start of the work:

a. A list containing at least five projects completed within the last five years. For each project, include with this submittal, at a minimum:

(1) name of client contact, address, and telephone number;

(2) location of project;

(3) Contract value; and

(4) scheduled completion date and actual completion date for the project.

b. Resumes of the Contractor's staff. Only those individuals designated as meeting the qualification requirements must be used for the project. The Contractor cannot substitute for any of these individuals without written approval of the Owner or Owner's Engineer (Engineer).

1.5.3 Certificates of Compliance

Certificates of Compliance for the following materials, if used. The certificate must state that the material or assemblies to be provided will fully comply with the requirements of the contract.

a. Prestressing steel, strand or bar

b. Portland cement

c. Prestressing hardware

d. Bearing plates

e. Corrosion protection system

1.5.4 Mill Test Reports

Mill test reports for the prestressing steel and bearing plate steel.

1.5.5 Calibration Data

Calibration data for each test jack, load cell, primary pressure gauge and reference pressure gauge to be used.

1.6 WORKING DRAWINGS

Prepare and submit to the Engineer for review and approval Working Drawings and a design submission describing the ground anchor system or systems intended for use. The Working Drawings and design submission must be submitted 30 working days prior to the commencement of the ground anchor work. The Working Drawings and design submission must include the following:

1.6.1 Ground Anchor Schedule

A ground anchor schedule including the following:

a. Ground anchor number

b. Ground anchor design load

c. Type and size of tendon

d. Minimum total anchor length

e. Minimum bond length

f. Minimum tendon bond length

g. Minimum unbonded length

1.6.2 Ground Anchor Details

Ground anchor tendon and the corrosion protection system including the following:

a. Ground anchor number

b. Ground anchor design load

c. Type and size of tendon

d. Minimum total anchor length

e. Minimum bond length

f. Minimum tendon bond length

g. Minimum unbonded length

1.7 PROJECT CLOSEOUT

Submit to the Engineer within 20 calendar days after completion of the ground anchor work a report containing the following:

a. Prestressing steel manufacturer's mill test reports for the tendons incorporated in the installation.

b. Grouting records indicating the cement type, quantity injected, and the grout pressures.

c. Ground anchor test results and graphs.

d. As-built drawings showing the location and orientation of each ground anchor, anchor capacity, tendon type, total anchor length, bond length, unbonded length, and tendon bond length as installed.

1.8 SITE CONDITIONS

A foundation investigation has been conducted at the site by the Government and is summarized in Geotechnical Data Report: Bonneville BN1 Old NL Bridge Geotechnical Explorations (Attachment A15). Prepared by Shannon and Wilson, dated January 2021. Data from the investigation is presented in the foundation data sheet drawings. While foundation information is representative of subsurface conditions at respective locations, local variations in the characteristics of the subsurface materials may be anticipated. Local variations which may be encountered include, but are not limited to, classification and thickness of rock strata, fractures, and other discontinuities in the rock structure, and variation in the soil classifications. Such variations will not be considered differing materially within the purview of the contract clauses, paragraph differing site conditions. The Contractor is responsible for verifying the location of all utilities that may be affected by construction or the installation of the anchors.

PART 2 PRODUCTS

a. The Contractor must not deliver materials to the site until the Engineer has approved the submittals outlined in Paragraph SUBMITTALS.

b. The designated storage location or locations must be protected by the Contractor from theft, vandalism, passage of vehicles, and other potential sources of damage to materials delivered to the site.

c. Protect the materials from the elements by appropriate means. Prestressing steel strands and bars must be stored and handled in accordance with the manufacturer's recommendations and in such a manner that no damage to the component parts occurs. All steel components must be protected from the elements at all times. Cement and additives for grout must be stored under cover and protected against moisture.

2.1 ADMIXTURES

Admixtures which control bleed, improve flowability, reduce water content, and retard set may be used in the grout subject to the approval of the Engineer. Admixtures, if used, must be compatible with the prestressing steels and mixed in accordance with the manufacturer's recommendations. Expansive admixtures may only be added to the grout used for filling sealed encapsulations, trumpets, and anchorage covers. Accelerators must not be permitted.

2.2 ANCHORAGE DEVICES

Stressing anchorages must be a combination of either a steel bearing plate with wedge plate and wedges, or a steel bearing plate with a threaded anchor nut. The steel bearing and wedge plate may also be combined into a single element. Anchorage devices must be capable of developing 95 percent

of the specified minimum ultimate tensile strength (SMTS) of the prestressing steel tendon. The anchorage devices must conform to the static strength requirements of Section 3.1.6 (1) and Section 3.1.8 (1) and (2) of the PTI "Guide Specification for Post-Tensioning Materials."

2.2.1 Bearing Plate

The bearing plate must be fabricated from steel conforming to ASTM A709/A709M Grade 50 or 50W specifications.

2.2.2 Anchorage Covers

Anchorage covers must be fabricated from steel or plastic with a minimum thickness of 0.1 inch. The joint between the cover and the bearing plate must be watertight.

2.3 BONDBREAKER

The bondbreaker must be fabricated from a smooth plastic tube or pipe having the following properties:

a. resistant to chemical attack from aggressive environments, grout, or corrosion inhibiting compound;

b. resistant to aging by ultra-violet light;

c. fabricated from material nondetrimental to the tendon;

d. capable of withstanding abrasion, impact, and bending during handling and installation;

e. enable the tendon to elongate during testing and stressing; and

f. allow the tendon to remain unbonded after lock-off.

2.4 CEMENT GROUT

Type I, II, III, or V Portland cement conforming to AASHTO M85 must be used for grout. The grout must be a pumpable neat mixture of cement and water and must be stable (bleed less than 2 percent), fluid, and provide a minimum 28 day compressive strength of at least 4,000 psi measured in accordance with ASTM C109/C109M at time of stressing.

2.5 CENTRALIZERS

a. Centralizers must be fabricated from plastic, steel or material which is nondetrimental to the prestressing steel. Wood must not be used. The centralizer must be able to support the tendon in the drill hole and position the tendon so a minimum of 0.5 inch of grout cover is provided and must permit grout to freely flow around the tendon and up the drill hole.

b. Centralizers are not required on pressure injected anchors installed in coarse grained soils when the grouting pressure exceeds 150 psi, nor on hollow stem-augered anchors when they are grouted through the auger with grout having a slump of 9 inches or less.

2.6 CORROSION INHIBITING COMPOUND

The corrosion inhibiting compound placed in either the free length or the trumpet area must be an organic compound (i.e., grease or wax) with appropriate polar moisture displacing, corrosion inhibiting additives and self-healing properties. The compound must permanently stay viscous and be chemically stable and nonreactive with the prestressing steel, the sheathing material, and the anchor grout.

2.7 GROUT TUBES

Grout tubes must have an adequate inside diameter to enable the grout to be pumped to the bottom of the drill hole. Grout tubes must be strong enough to withstand a minimum grouting pressure of 150 psi. Postgrout tubes must be strong enough to withstand postgrouting pressures.

2.8 HEAT SHRINKABLE SLEEVES

Heat shrinkable sleeves must be fabricated from a radiation crosslinked polyolefin tube internally coated with an adhesive sealant. Prior to shrinking, the tube must have a nominal wall thickness of 0.6 mm. The adhesive sealant inside the heat shrinkable tube must have a nominal thickness of 0.5 mm.

2.9 PRESTRESSING STEEL

Ground anchor tendons must consist of epoxy coated reinforcing steel bars conforming to ASTM A775/A775M and be fabricated from single elements.

2.10 SHEATH

A sheath must be used as part of the corrosion protection system for the unbonded length portion of the tendon. The sheath must be fabricated from one of the following:

a. A polyethylene tube pulled or pushed over the prestressing steel. The polyethylene must be Type II, III or IV as defined by ASTM D1248 (or approved equal). The tubing must have a minimum wall thickness of 1.5 mm.

b. A hot-melt extruded polypropylene tube. The polypropylene must be cell classification B55542-11 as defined by ASTM D4101 (or approved equal). The tubing must have a minimum wall thickness of 1.5 mm.

c. A hot-melt extruded polyethylene tube. The polyethylene must be high density Type III as defined by ASTM D1248 (or approved equal). The tubing must have a minimum wall thickness of 1.5 mm.

d. Steel tubing conforming to ASTM A500/A500M. The tubing must have a minimum wall thickness of 5 mm.

e. Steel pipe conforming to ASTM A53/A53M. The pipe must have a minimum wall thickness of 5 mm.

f. Plastic pipe or tube of PVC conforming to ASTM D1784 Class 13464-B. The pipe or tube must be Schedule 40 at a minimum.

g. A corrugated tube conforming to the requirement of the tendon bond length encapsulation.

2.11 SPACERS

Spacers must be used to separate elements of a multi-element tendon and must permit grout to freely flow around the tendon and up the drill hole. Spacers must be fabricated from plastic, steel or material which is nondetrimental to the prestressing steel. Wood must not be used. A combination centralizer-spacer may be used.

2.12 TENDON BOND LENGTH ENCAPSULATIONS

When the Contract drawings require the tendon bond length to be encapsulated to provide additional corrosion protection, the encapsulation must be fabricated from one of the following:

a. High density corrugated polyethylene tubing conforming to the requirements of AASHTO M 252 and having a minimum wall thickness of 1.5 mm except pregrouted tendons which may have a minimum wall thickness of 1.0 mm.

b. Deformed steel tubing or pipes conforming to ASTM A192/A192M or ASTM A500/A500M with a minimum wall thickness of 5 mm.

c. Corrugated, polyvinyl chloride tubes manufactured from rigid PVC compounds conforming to ASTM D1784, Class 13464-B.

d. Fusion-bonded epoxy conforming to the requirements of ASTM A775/A775M.

2.13 WATER

Water for mixing grout must be potable, clean, and free of injurious quantities of substances known to be harmful to Portland cement or prestressing steel.

PART 3 EXECUTION

3.1 PERFORMANCE CRITERIA

a. The tendon must be sized so the design load does not exceed 60 percent of the specified minimum tensile strength (SMTS) of the prestressing steel. The lock-off load for the tendon must be chosen based on anticipated time or activity dependent load changes, but must not exceed 70 percent of the SMTS of the prestressing steel. The prestressing steel must be sized so the maximum test load does not exceed 80 percent of the SMTS of the prestressing steel.

b. The Contractor must be responsible for determining the bond length necessary to develop the design load indicated on the Contract Drawings or the approved Working Drawings. The minimum bond length must be 15 feet for strand tendons in rock and 10 feet for bar tendons in rock. The minimum bond length must 15 feet for strand and bar tendons in soil. The minimum tendon bond length must be 10 feet.

c. The free stressing length (unbonded length) for rock and soil anchors must not be less than 10 feet for bar tendons and 10 feet for strand tendons.

3.2 CORROSION PROTECTION

Corrosion protection requirements must be determined by the Owner and must be shown on the Contract drawings. The corrosion protection systems must be designed and constructed to provide reliable ground anchors for temporary and permanent structures.

3.2.1 Anchorage Protection

All stressing anchorages permanently exposed to the atmosphere must be grout-filled cover, except, for restressable anchorages, a corrosion inhibiting compound must be used. Stressing anchorages encased in concrete at least 2 inches thick do not require a cover.

3.2.2 Unbonded Length Protection

a. Corrosion protection of the unbonded length must be provided by a combination of sheaths, sheath filled with a corrosion inhibiting compound or grout, or a heat shrinkable tube internally coated with a mastic compound, depending on the tendon class. The corrosion inhibiting compound must completely coat the tendon elements and fill the void between them and the sheath. Provisions must be made to retain the compound within the sheath.

b. The corrosion protective sheath surrounding the unbonded length must not come into contact with the stressing anchorage during testing. Any excessive protection length must be trimmed off.

c. For pregrouted encapsulations and all Class I tendons, a separate bondbreaker or common sheath must be provided for supplemental corrosion protection or to prevent the tendon from bonding to the grout surrounding the unbonded length.

3.3 UNBONDED LENGTH/BOND LENGTH TRANSITION

The transition between the corrosion protection for the bonded and unbonded lengths must be designed and fabricated to ensure continuous protection from corrosive attack.

3.4 TENDON BOND LENGTH PROTECTION FOR GROUT PROTECTED TENDONS (CLASS II)

Cement grout can be used to protect the tendon bond length in non-aggressive ground when the installation methods ensure that the grout will remain fully around the tendon. The grout must overlap the sheathing of the unbonded length by at least 1 inch. Centralizers or grouting techniques must ensure a minimum of 0.5 inch of grout cover over the tendon bond length.

3.5 TENDON BOND LENGTH PROTECTION FOR ENCAPSULATED TENDONS (CLASS I)

A grout-filled, corrugated plastic encapsulation or a grout-filled, deformed steel tube must be used. The prestressing steel can be grouted inside the encapsulation prior to inserting the tendon into the drill hole or after the tendon has been placed. Centralizers or grouting techniques must ensure a minimum of 0.5 inch of grout cover over the encapsulation.

3.6 EPOXY (CLASS I)

Fusion-bonded epoxy may be used to provide a layer of protection for the

steel tendon in addition to the cement grout.

3.7 TENDON STORAGE AND HANDLING

a. Tendons must be handled and stored in such a manner as to avoid damage or corrosion. Damage to the prestressing steel, the corrosion protection, or the epoxy coating as a result of abrasions, cuts, nicks, welds and weld splatter will be cause for rejection by the Engineer. The prestressing steel must be protected if welding is to be performed in the vicinity. Grounding of welding leads to the prestressing steel is forbidden. Prestressing steel must be protected from dirt, rust, or deleterious substances. A light coating of rust on the steel is acceptable. If heavy corrosion or pitting is noted, the Engineer must reject the affected tendons.

b. Use care in handling and storing the tendons at the site. Prior to inserting a tendon in the drill hole, the Contractor and the CQA Inspector must examine the tendon for damage to the encapsulation and the sheathing. If, in the opinion of the CQA Inspector, the encapsulation is damaged, repair the encapsulation in accordance with the tendon supplier's recommendations. If, in the opinion of the CQA Inspector, the smooth sheathing has been damaged, repair it with ultra high molecular weight polyethylene tape. The tape should be spiral wound around the tendon to completely seal the damaged area. The pitch of the spiral must ensure a double thickness at all points

c. Banding for fabricated tendons must be padded to avoid damage to the tendon corrosion protection. Upon delivery, the fabricated anchors or the prestressing steel for fabrication of the tendons on site and all hardware must be stored and handled in such a manner to avoid mechanical damage, corrosion, and contamination with dirt or deleterious substances. Lifting of the pre-grouted tendons must not cause excessive bending, which can debond the prestressing steel from the surrounding grout. Prestressing steel must not be exposed to excessive heat (i.e., more than 230 degrees C).

3.8 ANCHOR FABRICATION

Anchors must be either shop or field fabricated from materials conforming to Part 2 of this specification and as shown in the approved Working Drawings. Prestressing steel must be cut with an abrasive saw or, with the approval of the prestressing steel supplier, an oxyacetylene torch. All of the tendon bond length, especially for strand, must be free of dirt, manufacturers' lubricants, corrosion-inhibitive coatings, or other deleterious substances that may significantly affect the grout-to-tendon bond or the service life of the tendon. Pregrouting of encapsulated tendons must be done on an inclined, rigid frame or bed by injecting the grout from the low end of the tendon.

3.9 DRILLING

a. Drilling methods must be left to the discretion of the Contractor, whenever possible. The Contractor must be responsible for using a drilling method to establish a stable hole of adequate dimensions, within the tolerances specified. Drilling methods may involve, amongst others, rock coring, rotary, percussion, rotary/percussive or auger drilling; or percussive or vibratory driven casing.

b. Holes for anchors must be drilled at the locations and to the

length, inclination and diameter shown on the Contract Drawings or the approved Working Drawings. The drill bit or casing crown must not be more than 0.1 inch smaller than the specified hole diameter. At the ground surface the drill hole must be located within 6 inches of the location shown on the Contract Drawings or the approved Working Drawings. The drill hole must be located so the longitudinal axis of the drill hole and the longitudinal axis of the tendon are parallel. In particular, the ground anchor hole must not be drilled in a location that requires the tendon to be bent in order to enable the bearing plate to be connected to the supported structure. At the point of entry the ground anchor must be installed within plus/minus 3 degrees of vertical.

3.10 TENDON INSERTION

a. Tendons must be placed in accordance with the Contract Drawings and details and the recommendations of the tendon manufacturer or specialist anchor contractor. The tendon must be inserted into the drill hole to the desired depth without difficulty. When the tendon cannot be completely inserted, the Contractor must remove the tendon from the drill hole and clean or redrill the hole to permit insertion. Partially inserted tendons must not be driven or forced into the hole.

b. Each anchor tendon must be inspected by field personnel during installation into the drill hole or casing. Damage to the corrosion protection system must be repaired, or the tendon replaced if not repairable. Loose spacers or centralizers must be reconnected to prevent shifting during insertion. Damaged fusion-bonded epoxy coatings must be repaired in accordance with the manufacturer's recommendations. If the patch is not allowed to cure prior to inserting the tendon in the drill hole, the patched area must be protected by tape or other suitable means.

c. The rate of placement of the tendon into the hole must be controlled such that the sheathing, coating, and grout tubes are not damaged during installation of the tendon. Anchor tendons must not be subjected to sharp bends. The bottom end of the tendon may be fitted with a cap or bullnose to aid its insertion into the hole, casing, or sheathing.

3.11 GROUTING

a. Use a neat cement grout or a sand-cement grout. The cement must not contain lumps or other indications of hydration. Admixtures, if used, must be mixed in accordance with the manufacturer's recommendations. The grouting equipment must produce a grout free of lumps and undispersed cement. A positive displacement grout pump must be used. The pump must be equipped with a pressure gauge to monitor grout pressures. The pressure gauge must be capable of measuring pressures of at least 150 psi or twice the actual grout pressures used by the Contractor, whichever is greater. The grouting equipment must be sized to enable the grout to be pumped in one continuous operation. The mixer should be capable of continuously agitating the grout. The grout must be injected from the lowest point of the drill hole. The grout may be pumped through grout tubes, casing, hollow-stem-augers, or drill rods. The grout can be placed before or after insertion of the tendon. The quantity of the grout and the grout pressures must be recorded. The grout pressures and grout takes must be controlled to prevent excessive heave or fracturing.

b. After the tendon is installed, the drill hole may be filled in one continuous grouting operation except that pressure grouting must not be used in the free length zone. If grout protected tendons are used for ground anchors anchored in rock, then pressure grouting techniques must be utilized. Pressure grouting requires that the drill hole be sealed and that the grout be injected until a minimum 50 psi grout pressure (measured at the top of the drill hole) can be maintained on the grout for at least five minutes. The grout tube may remain in the hole on completion of grouting if the tube is filled with grout. After grouting, the tendon must not be loaded for a minimum of three days.

3.12 ANCHORAGE INSTALLATION

The anchor bearing plate and the anchor head or nut must be installed perpendicular to the tendon, within plus/minus three degrees and centered on the bearing plate, without bending or kinking of the prestressing steel elements. Wedge holes and wedges must be free of rust, grout, and dirt. The stressing tail must be cleaned and protected from damage until final testing and lock-off. After the anchor has been accepted by the Engineer, the stress tail must be cut to its final length according to the tendon manufacturer's recommendations. The corrosion protection surrounding the unbonded length of the tendon must not contact the bearing plate or the anchor head during testing and stressing. If the protection is too long, the Contractor must trim the corrosion protection to prevent contact.

3.13 STRESSING, LOAD TESTING, AND ACCEPTANCE

Each ground anchor must be tested. No load greater than 10 percent of the design load can be applied to the ground anchor prior to testing. The maximum test load must be no less than the factored design load and must not exceed 80 percent of the specified minimum ultimate tensile strength (SMTS) of the prestressing steel of the tendon. The test load must be simultaneously applied to the entire tendon. Stressing of single elements of multi-element tendons must not be permitted.

3.13.1 Stressing Equipment

The stressing equipment, the sequence of stressing and the procedure to be used for each stressing operation must be determined at the planning stage of the project. The equipment must be used strictly in accordance with the manufacturer's operating instructions. Stressing equipment must preferably be capable of stressing the whole tendon in one stroke to the specified Test Load and the equipment must be capable of stressing the tendon to the maximum specified Test Load within 75 percent of the rated capacity. The pump must be capable of applying each load increment in less than 60 seconds. The equipment must permit the tendon to be stressed in increments so that the load in the tendon can be raised or lowered in accordance with the test specifications, and allow the anchor to be lift-off tested to confirm the lock-off load. Stressing equipment must be recently calibrated within an accuracy of plus or minus 2 percent prior to use. The calibration certificate and graph must be available on site at all times. The calibration must be traceable to the National Institute of Standards and Technology (NIST).

3.13.2 Testing Equipment

The testing equipment must consist of:

a. A dial gauge or vernier scale capable of measuring to the nearest 0.001 inch must be used to measure the ground anchor movement. The movement-measuring device must have a minimum travel equal to the theoretical elastic elongation of the total anchor length at the maximum test load and it must have adequate travel so the ground anchor movement can be measured without resetting the device at an interim point.

b. A hydraulic jack and pump must be used to apply the test load. The jack and a calibrated primary pressure gauge must be used to measure the applied load. The jack and primary pressure gauge must be calibrated by an independent firm as a unit. The calibration must have been performed within 45 working days of the date when the calibration submittals are provided to the Engineer. Testing cannot commence until the Engineer has approved the calibration. The primary pressure gauge must be graduated in 100 psi increments or less. The ram travel must be at least 6 inches and preferably not be less than the theoretical elongation of the tendon at the maximum test load. If elongations greater than 6 inches are required, restroking can be allowed.

c. A calibrated reference pressure gauge must also be kept at the site to periodically check the production (i.e., primary pressure) gauge. The reference gauge must be calibrated with the test jack and primary pressure gauge. The reference pressure gauge must be stored indoors and not subjected to rough treatment.

d. Provide an electrical resistance load cell and readout to be used when performing an extended creep test.

e. The stressing equipment must be placed over the ground anchor tendon in such a manner that the jack, bearing plates, load cells and stressing anchorage are axially aligned with the tendon and the tendon is centered within the equipment.

3.13.3 Load Testing Setup

Dial gauges must bear on the pulling head of the jack and their stems must be coaxial with the tendon direction. The gauges must be supported on an independent, fixed frame, such as a tripod, which will not move as a result of stressing or other construction activities during the operation. Prior to setting the dial gauges, the Alignment Load (AL) must be accurately placed on the tendon. The magnitude of AL depends on the type and length of the tendon. Regripping of strands, which would cause overlapping wedge bites, or wedge bites on the tendon below the anchor head, must be avoided. Stressing and testing of multiple element tendons with single element jacks is not permitted. Stressing must not begin before the grout has reached adequate strength.

3.13.4 Performance Tests

a. One performance test must be performed on a sacrificial ground anchor that is not located at a permanent ground anchor location and in accordance with the procedures described below. Sacrificial ground anchor for performance testing must be located within the excavation limits for Bent 2 and within prepared rock foundation surface. Sacrificial ground anchor for performance testing must be located a minimum distance of 5 feet from any permanent ground anchor location. All permanent ground anchors must be tested in accordance with the proof test procedures.

b. The performance test must be made by incrementally loading and unloading the ground anchor in accordance with the schedule provided. The load must be raised from one increment to another immediately after recording the ground anchor movement. The ground anchor movement must be measured and recorded to the nearest 0.001 inch with respect to an independent fixed reference point at the alignment load and at each increment of load. The load must be monitored with the primary pressure gauge. The reference pressure gauge must be placed in series with the primary pressure gauge during each performance test. If the load determined by the reference pressure gauge and the load determined by the primary pressure gauge differ by more than 10 percent, the jack, primary pressure gauge and reference pressure gauge must be recalibrated at no expense to the Owner. At load increments other than the maximum test load, the load must be held just long enough to obtain the movement reading.

c. The maximum test load in a performance test must be held for 10 minutes. A load cell must be used to monitor small changes in load during constant load-hold periods.

d. The jack must be adjusted as necessary in order to maintain a constant load. The load-hold period must start as soon as the maximum test load is applied and the ground anchor movement, with respect to a fixed reference, must be measured and recorded at one minute, two, three, four, five, six and 10 minutes. If the ground anchor movement between one minute and 10 minutes exceeds one mm, the maximum test load must be held for an additional 50 minutes. If the load hold is extended, the ground anchor movement must be recorded at 15 minutes, 20, 30, 40, 50 and 60 minutes.

STEPS FOR THE PERFORMANCE TEST					
Step	Loading	Applied Load	Record and Plot Total Movement (1)	Record and Plot Residual Movement (2)	Calculate Elastic Movement (3)
1	Apply alignment load (AL)				
2	Cycle 1	0.2FDL		N/A	
		AL	N/A		
3	Cycle 2	0.2FDL		N/A	
		0.4FDL		N/A	
		AL	N/A		
4	Cycle 3	0.2FDL		N/A	
		0.4FDL		N/A	
		0.6FDL		N/A	
		AL	N/A		

STEPS FOR THE PERFORMANCE TEST					
5	Cycle 4	0.2FDL		N/A	
		0.4FDL		N/A	
		0.6FDL		N/A	
		0.8FDL		N/A	
		AL			
6	Cycle 5	0.2FDL		N/A	
		0.4FDL		N/A	
		0.6FDL		N/A	
		0.8FDL		N/A	
		1.0FDL		N/A	
		AL	N/A		
7	Hold load for 10 minutes while recording movement at specified times. If the total movement measured during the load hold exceeds the specified maximum value then the load hold should be extended to a total of 60 minutes.				
8	Cycle 5 cont'd.	AL			

Notes: AL: Alignment Load
FDL: Factored Design Load
(1): Record and plot total movement for each Cycle at each applied load (0.2FDL, 0.4FDL, etc.). After final applied load during Cycle 5 (1.0FDL) zero total movement reading for creep test.
(2): Record and plot residual movement for each Cycle after unloading to AL.
(3): Elastic movement equal to total movement recorded at final applied load minus residual movement recorded at AL.

3.13.5 Proof Tests

a. The proof test must be performed by incrementally loading the ground anchor in accordance with the following schedule. The load must be raised from one increment to another immediately after recording the ground anchor movement. The ground anchor movement must be measured and recorded to the nearest 0.001 inch with respect to an independent fixed reference point at the alignment load and at each increment of load. The load must be monitored with the primary pressure gauge. At load increments other than the maximum test load, the load must be held just long enough to obtain the movement reading.

PROOF TEST SCHEDULE	
Step	**Load**
1	AL
2	0.2FDL
3	0.4FDL
4	0.6FDL
5	0.8FDL
6	1.0FDL
7	Reduce to lock-off load
8	AL (optional)
9	Adjust to lock-off load

b. The maximum test load in a proof test must be held for 10 minutes. The jack must be adjusted as necessary in order to maintain a constant load. The load-hold period must start as soon as the maximum test load is applied and the ground anchor movement with respect to a fixed reference must be measured and recorded at one minute, two, three, four, five, six, and 10 minutes. If the ground anchor movement between one minute and 10 minutes exceeds one mm, the maximum test load must be held for an additional 50 minutes. If the load hold is extended, the ground anchor movements must be recorded at 15 minutes, 20, 30, 40, 50 and 60 minutes.

3.13.6 Ground Anchor Acceptance Criteria

a. A performance-tested or proof-tested ground anchor with a 10 minute load hold must be acceptable if the:

(1) ground anchor resists the maximum test load with less than one mm of movement between one minute and 10 minutes; and

(2) total elastic movement at the maximum test load exceeds 80 percent of the theoretical elastic elongation of the unbonded length.

b. A performance-tested or proof-tested ground anchor with a 60 minute load hold must be acceptable if the:

(1) ground anchor resists the maximum test load with a creep rate that does not exceed 0.1 inch in the last log cycle of time; and

(2) total elastic movement at the maximum test load exceeds 80 percent of the theoretical elastic elongation of the unbonded length.

c. The initial lift-off reading must be within plus or minus 5 percent of the designed lock-off Load. If this criterion is not met, then the

tendon load must be adjusted accordingly and the initial lift-off reading repeated.

3.13.7 Procedures for Anchors Failing Acceptance Criteria

a. Anchors that do not satisfy the minimum apparent free length criteria must be either rejected and replaced at no additional cost to the Owner or locked off at not more than 50 percent of the maximum acceptable load attained. In this event, no further acceptance criteria are applied.

b. Regroutable anchors which satisfy the minimum apparent free length criteria but which fail the extended creep test at the test load may be postgrouted and subjected to an enhanced creep criterion. This enhanced criterion requires a creep movement of not more than one mm between one and 60 minutes at test load. Anchors which satisfy the enhanced creep criterion must be locked off at the design lock-off load. Anchors which cannot be postgrouted or regroutable anchors that do not satisfy the enhanced creep criterion must be either rejected or locked off at 50 percent of the maximum acceptable test load attained. In this event, no further acceptance criteria are applied. The maximum acceptable test load with respect to creep must correspond to that where acceptable creep movements are measured over the final log cycle of time.

3.13.8 Anchor Lock-Off

After testing has been completed, the load in the tendon must be such that after seating losses (i.e., wedge seating), the specified lock-off load has been applied to the anchor tendon. The magnitude of the lock-off load must be specified by the Engineer, and must not exceed 70 percent Fpu. The wedges must be seated at a minimum load of 50 percent Fpu. If the lock-off load is less than 50 percent Fpu, shims must be used under the wedge plate and the wedges seated at 50 percent Fpu. The shims must then be removed to reduce the load in the tendon to the desired lock-off load. Bar tendons may be locked off at any load less than 70 percent Fpu.

3.13.9 Anchor Lift-Off Test

After transferring the load to the anchorage, and prior to removing the jack, a lift-off test must be conducted to confirm the magnitude of the load in the anchor tendon. This load is determined by reapplying load to the tendon to lift off the wedge plate (or anchor nut) without unseating the wedges (or turning the anchor nut). This moment represents zero time for any long time monitoring.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 31 - EARTHWORK

SECTION 31 73 20.00 99

JET GROUTING

PART 1 GENERAL

1.1 SCOPE
1.2 PROJECT OBJECTIVES
1.3 REFERENCES
1.4 DEFINITIONS
1.4.1 Jet Grouting
1.4.2 Single Fluid Jet Grouting
1.4.3 Double Fluid Jet Grouting
1.4.4 Triple Fluid Jet Grouting
1.4.5 Monitor (adjusted for single, double, and triple systems)
1.4.6 Jet-Grouting Supervisor
1.4.7 Binder
1.4.8 Soil-Cement
1.4.9 Soil-Cement Element
1.4.10 Jet-Grouting Parameters
1.4.11 Jet-Grouting String
1.4.12 Prejetting, Precutting or Prewashing
1.4.13 Fresh-in-Fresh Sequence
1.4.14 Primary-secondary Sequence
1.4.15 Spoil Return
1.4.16 UCS
1.5 AVAILABLE INFORMATION
1.6 SUBMITTALS
1.7 QUALITY CONTROL
1.7.1 Qualifications
1.7.1.1 Project Experience
1.7.1.2 Personnel Experience
1.7.1.3 Supervisor Experience
1.7.1.4 Jet Grouting Contractor Qualifications
1.8 PROJECT/SITE CONDITIONS
1.8.1 Existing Conditions

PART 2 PRODUCTS

2.1 EQUIPMENT
2.1.1 Drilling Equipment
2.1.2 Drill Bit and Drill String
2.1.3 Grout Mixing and Injection Equipment
2.1.4 Jet Grouting Pump
2.1.5 Compressor (for Double and Triple Jet Grouting)
2.1.6 Filling Grout Pump (for Triple Jet Grouting)
2.1.7 Jet Grout Tools
2.1.8 Equipment Instrumentation
2.2 TESTS, INSPECTIONS, AND VERIFICATIONS
2.2.1 Bench-Scale Testing

2.2.1.1 Bench-Scale Testing Criteria
2.2.2 Test Program
2.2.2.1 Test Program Criteria
2.2.3 Jet Grouting Procedure

PART 3 EXECUTION

3.1 FIELD QUALITY CONTROL
3.1.1 Quality Control/Quality Assurance
3.1.2 Daily Reports
3.1.3 Acceptance Criteria
3.1.3.1 Uniformity Acceptance Criteria
3.1.3.2 Strength Acceptance Criteria
3.1.3.3 Geometric Acceptance Criteria
3.1.4 Nonconformance
3.2 CONSTRUCTION SEQUENCE
3.3 PRODUCTION WORK
3.4 CLOSEOUT ACTIVITIES
3.4.1 As-Built Field Measurement Data

-- End of Section Table of Contents --

SECTION 31 73 20.00 99

JET GROUTING

PART 1 GENERAL

1.1 SCOPE

a. This Section specifies requirements for furnishing all labor, equipment, materials, and supplies necessary for soil stabilization by jet grouting and associated testing, monitoring, sampling, and recording as required to reduce potential for lateral spreading, and seismic slope instability.

b. The work consist of installation, monitoring, sampling and testing of jet grouting within the limits indicated on drawings.

c. In connection with the jet grouting program, as shown on drawings, the Contractor must provide all labor, materials and equipment to accomplish the following items of work:

(1) Mobilization and Demobilization.

(2) Test program.

(3) Drilling.

(4) Jet Grouting.

(5) Quality Assurance/Quality Control and verification.

(6) Spoil containment, collection, and disposal.

d. The Contractor is responsible for selection of jet-grouting parameters, equipment, and construction of the jet-grout columns to meet the design intent.

1.2 PROJECT OBJECTIVES

Construction of soil cement enclosed cells consisting of overlapping jet grout columns in multiple rows, with the following characteristics:

a. Ground Improvement Limits: As shown on drawings.

b. Minimum Jet-Grout Column Diameter: 4 feet.

c. Minimum Overlap Thickness: 1/8 of the column diameter or 6 inches, whichever is greater.

d. Minimum 28 day Unconfined Compressive Strength (UCS): 400 pounds per square inch (psi).

e. Top Elevation of Jet-Grout Columns: As shown on drawings.

f. Bottom Elevation of Jet-Grout Columns: The jet-grout columns must extend to the top of Pre-Slide Alluvium, where the top of the layer

will be determined by the Owner's Representative in the field. Top of Pre-Slide Alluvium estimated to be at elevation -45 feet.

1.3 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM C192/C192M	(2019) Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory
ASTM D422	(1963; R 2007; E 2014; E 2014) Particle-Size Analysis of Soils
ASTM D1140	(2017) Standard Test Methods for Determining the Amount of Material Finer than 75-µm (No. 200) Sieve in Soils by Washing
ASTM D2166	(2000; R 2017) Standard Test Method for Unconfined Compressive Strength of Cohesive Soil
ASTM D4318	(2017; E 2018) Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

1.4 DEFINITIONS

1.4.1 Jet Grouting

An in situ injection technique employed with specialized equipment that includes grout pump(s), grout mixer, drill rig, drill rods, and injection monitor with horizontal radial nozzles delivering high velocity fluids to erode, mix, and stabilize in situ soils using an engineered grout slurry.

1.4.2 Single Fluid Jet Grouting

The jet-grouting technique where a single fluid, typically neat cement grout, is injected at high velocity through horizontal radial nozzle(s) to directly erode, and mix with, the in situ soil.

1.4.3 Double Fluid Jet Grouting

The jet-grouting technique where one fluid, typically neat cement grout, is injected at high velocity through horizontal radial nozzle(s) and is assisted by a second fluid, typically air, delivered through a coaxial nozzle(s), to directly erode and mix with the in situ soil.

1.4.4 Triple Fluid Jet Grouting

The jet-grouting technique where one fluid, typically water, is injected at high velocity through horizontal radial nozzle(s) and is assisted by a second fluid, typically air delivered through a coaxial nozzle(s), to erode the in situ soil, while a separate nozzle placed lower on the monitor

delivers a third fluid, typically neat cement grout, at lower velocity to simultaneously fill the soil zone eroded by the cutting fluids (air and water).

1.4.5 Monitor (adjusted for single, double, and triple systems)

A single, double, or triple fluid drill pipe attached to the end of a drilling string and designed to deliver one to three elements of the jet-grouting process, typically air, water, and grout. The monitor has one or more injection points (nozzles).

1.4.6 Jet-Grouting Supervisor

The individual on site who is in responsible charge for the jet-grouting work.

1.4.7 Binder

Chemically reactive material (i.e., lime, cement, gypsum, blast furnace slag, fly ash, or other hardening reagents) that can be used for mixing with in situ soils to strengthen the soils and form jet grout columns. Also referred to as stabilizer or reagent. Binder slurry is frequently referred to as grout or slurry.

1.4.8 Soil-Cement

Mixture of grout slurry and in situ soils formed by the jet-grouting process.

1.4.9 Soil-Cement Element

A column, or panel (planar shape), of soil-cement formed by jet grouting, used as a component of a soil-cement structure.

1.4.10 Jet-Grouting Parameters

Pressure of the fluid(s) within the jet-grouting string; flow rate of the fluid(s); grout composition; rotational speed of the jet grouting string; and rate of withdrawal or insertion of the jet grouting string.

1.4.11 Jet-Grouting String

Jointed rods with simple, double or triple inner conduit that conveys the jet-grouting fluid(s) to the monitor.

1.4.12 Prejetting, Precutting or Prewashing

The method in which the jet grouting of an element is facilitated by a preliminary disaggregation phase consisting of jetting with water and other fluids.

1.4.13 Fresh-in-Fresh Sequence

Method that involves jet-grouting elements successively without waiting for the grout to harden in the overlapping elements.

1.4.14 Primary-secondary Sequence

Method in which installation of an overlapping element cannot commence

before a specified hardening time or achievement of predetermined strength of the adjacent previously constructed elements(s).

1.4.15 Spoil Return

All materials including, but not limited to liquids, semi-solids, and solids, which are discharged above ground surface during, or as a result of jet grouting.

1.4.16 UCS

Unconfined Compressive Strength at 28 days.

1.5 AVAILABLE INFORMATION

Available information developed by the Owner or by the Owner's duly authorized representative (engineer) includes the following items:

Bonneville Lock and Dam Subsurface Investigation and Liquefaction Analysis: Subsurface Investigation Report. Prepared by INCA/Anderson Perry Joint Venture, dated April 2017 (Attachment A14).

1.6 SUBMITTALS

Government approval is required for submittals with a "G" classification. Submittals not having a "G" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Contractor Qualifications; G

Field Demonstration Test Program; G

Installation Details; G

Work Procedures Plan; G

Jet Grout Spoil Return Management Plan; G

Containment, Treatment, And Disposal Plan; G

Quality Assurance, Quality Control And Verification Procedures; G

SD-03 Product Data

Equipment Data; G

Field Data Collection Forms; G

Tabular And Graphical Data Presentations; G

SD-06 Test Reports

Bench-Scale Testing Report; G

SD-09 Manufacturer's Field Reports

Daily Reports

SD-11 Closeout Submittals

As-Built Field Measurement Data; G

1.7 QUALITY CONTROL

1.7.1 Qualifications

Due to the specialized nature of the jet grouting portion of the work, the Jet Grouting Contractor must be pre-qualified before bidding on this work. Contractors must meet the experience criteria listed below. The Engineer will approve or reject the Contractor's qualifications within 15 calendar days after receipt of a complete qualification's submission. Additional time required due to incomplete or unacceptable submittals will not be cause for time extension or impact or delay claims. All costs associated with incomplete or unacceptable submittals must be borne by the Contractor.

1.7.1.1 Project Experience

The Jet Grouting Contractor must have at least three years' jet grouting experience; and must have completed at least five jet-grouting projects with at least 15,000 cubic yards of total treatment volume in Jet Grouting construction with at least two projects where a minimum of 5,000 cubic yards of Jet Grouting columns in a gridded treatment pattern was completed (Contractor to provide the number of years/projects, project description(s), volume of Jet Grout treatment, and reference list for each of at least five representative projects).

1.7.1.2 Personnel Experience

The Jet Grouting Contractor's personnel assigned to this Project to design and manage the work (specifically this Project), must have at least five years' jet grouting experience over the last 10 years; and have completed at least five jet-grouting projects, with at least two projects having objectives and jet-grouting system (single, double or triple) similar to those of this Project and in the same type of soil.

1.7.1.3 Supervisor Experience

The Contractor's Jet Grouting Supervisor must have at least five years' on site experience managing jet grouting field operations of similar size and scope, and must have supervised at least two projects within the past three years employing the jet grouting technique proposed for this project. The supervisor must have experience and knowledge of all aspects of jet grouting as required for the project and must be present at the work site at all times during jet-grouting operations.

1.7.1.4 Jet Grouting Contractor Qualifications

The following must be submitted to the Owner's Representative by the Jet Grouting Contractor four weeks prior to the start of the work:

a. A list of at least five previously completed projects for review by the Owner's Representative. The list must include a description of the project, project location, scope or work, total jet grouting performed in cubic yards, depths of jet grouting, size of jet grout columns, and

contact person with phone number.

b. A list of at least two previously completed projects of similar scope and purpose for review by the Owner's Representative. The list must include a description of the project, relative size, and contact person with phone number.

c. Resumes of the management, supervisory, and key personnel, for approval by the Owner's representative, in accordance Paragraph QUALIFICATIONS.

1.8 PROJECT/SITE CONDITIONS

1.8.1 Existing Conditions

a. Prior to submitting a bid price for the jet grouting, conduct a site inspection to assess the site geometry, equipment access conditions, staging area location and conditions, location of existing structures, and above-ground utilities and facilities; and review available subsurface information (including all geotechnical engineering and data reports).

b. The Contractor will be responsible for making arrangements to have below ground utilities field located.

c. Field locate and verify the locations of all utilities prior to starting work. Maintain uninterrupted service for those utilities designated to remain in service throughout the work. Notify the Owner's Representative of any utility locations different from those shown on drawings that may require relocation of jet-grout columns or structure design modification. Subject to the Owner's Representative's approval, the Contractor will be compensated for additional costs of column relocation and structure design modifications resulting from utility locations different from those shown on drawings.

PART 2 PRODUCTS

2.1 EQUIPMENT

a. Submit equipment data to the Owner's Representative four weeks prior to the start of the work. Equipment data submitted must include catalog cuts, details of grout mixers, pumps, drill rigs, and a plan view of the jet-grouting equipment arrangement, noting any equipment that has been modified or is of unique construction. Submit copies of field data collection forms, including a sample copy of daily field report as described in Paragraph DAILY REPORTS.

b. All equipment used for drilling boreholes; lowering, raising and rotating jet monitors; mixing grout; supplying pressurized grout and air-water to jet monitors; and jet monitors must have proven performance records for use in jet grouting work, as demonstrated by the information to be submitted under Paragraph DEFINITIONS.

c. Spare parts and equipment must be available on site to maintain jet grouting equipment in satisfactory operational condition at all times during execution of the jet grouting work.

2.1.1 Drilling Equipment

Use drilling equipment of a type and capacity suitable for drilling required hole diameters and depths, and lowering, raising, and rotating jet grout monitors to the depths and at the rates required to perform the work as shown on the Contract drawings and as specified herein. The drill rig must be equipped with automated controls to regulate and maintain consistent rod retraction rate, and rod RPM and have pressure gauges for all fluids injected.

2.1.2 Drill Bit and Drill String

Use drill bits and tooling appropriate for the given conditions so as to reach the design depths shown on drawings and specified.

2.1.3 Grout Mixing and Injection Equipment

Use grout mixers and holding tanks, water tanks, air compressors, and pumps of sufficient capacity to ensure adequate supply of grout, air, and water at required pressure to the jet grouting monitors during a full work shift to produce jet grout elements of the quality and dimensions necessary.

2.1.4 Jet Grouting Pump

Must be capable, with the nozzles proposed, of providing the required velocity and a delivery rate adequate for the execution of the work.

2.1.5 Compressor (for Double and Triple Jet Grouting)

Must be capable of producing the pressure and to deliver the flow rate values proposed by the Contractor depending on the parameters chosen.

2.1.6 Filling Grout Pump (for Triple Jet Grouting)

Must be capable of producing the pressure and to deliver the flow rate values proposed by the Contractor depending on the parameter chosen.

2.1.7 Jet Grout Tools

Use jet grouting monitors with appropriate nozzles with the capacity suitable for producing jet-grout elements in the soil types identified during Subsurface Explorations performed at the site, and of the size and depth shown on drawings and as specified herein. The drill hole diameter must be sufficiently large to be a clear path for continuous spoil return during all jetting operations.

2.1.8 Equipment Instrumentation

Provide instrumentation that allows continuous monitoring and automatic recording of data throughout the jet-grouting operations. As a minimum, the following must be provided versus depth:

a. Pressure gauges/devices at the drilling rig to automatically record pressures of cement grout, water, and air during the grouting process.

b. Flow meter(s) to monitor and record the rate and total volume of grouting fluids through the grouting monitor at every element.

c. Devices that automatically monitor and record the rate of monitor

rotation and withdrawal.

2.2 TESTS, INSPECTIONS, AND VERIFICATIONS

2.2.1 Bench-Scale Testing

Submit a bench-scale testing report of the results from bench-scale tests conducted a minimum of four weeks prior to the start of the work. The report must provide all data collected, including, at a minimum, descriptions of sampling techniques used, boring logs, classifications of all major soil strata to be mixed, site groundwater conditions, binder materials used, mixed design proportions, laboratory mixing techniques used, and curing curves for unconfined compressive strength versus time for each major soil type. Discussion of tests results must be provided, including proposed mix designs for use in the field. If the Contractor intends to deviate from the equipment defined in Paragraph EQUIPMENT, submit evidence of satisfactory use of the proposed material from past projects with similar soil conditions.

2.2.1.1 Bench-Scale Testing Criteria

Laboratory bench-scale testing must be used to identify initial mix designs for use in the test program. Bulk soil samples from the site, and representative of site soil condition must be obtained by the Contractor. A set of three different mix designs is required for each major soil stratum encountered to the expected termination depth of the jet grout elements. Record the location and depth of the soil collected for the bench-scale testing. For each bulk sample collected complete and provide results for minimum of two particle size analyses of soil in accordance with ASTM D422, amount of material finer than No. 200 sieve in accordance with ASTM D1140, and Atterberg limits tests in accordance with ASTM D4318.

2.2.2 Test Program

a. Prior to production work, a test program must be conducted by the Contractor in accordance with the accepted work plan. The test program must be used to optimize the various parameters, including type of jet grouting (single, double or triple), necessity of prejetting with water, grout mix composition, fluid(s) flows and pressures, rotational speed, retraction rate, grout, and number and size of nozzles; and confirm that resultant in situ soil-cement properties meet required design criteria.

b. The test program and its results will be observed, reviewed and approved by the Engineer. The test program must be installed in areas near the planned production work at a location agreed upon between the Owner's Representative and Jet Grouting Contractor and in representative soils and depths anticipated to be found during production work.

c. Submit details of proposed field demonstration test program for jet grouting, as specified herein to the Owner's Representative four weeks prior to the start of the work. This must include location of test columns, layout of test pattern, jet-grouting parameters to be used and variables to be tested during test program, and details of proposed quality control/quality assurance testing to meet acceptance criteria specified in Paragraph ACCEPTANCE CRITERIA.

d. Following performance of the field demonstration test program and

prior to beginning production jet-grouting operations, submit installation details regarding drilling and installation of test columns, jet grouting parameters, quality control/quality assurance test results, and recommended changes to jet grouting parameters based on test program, if any.

e. If the Contractor begins construction of production jet grout elements prior to obtaining QA/QC test results, the work will be considered to be at risk to the Contractor and any re-work or additional work required because of the nonconformance to acceptance criteria must be at the Contractor's sole expense.

2.2.2.1 Test Program Criteria

a. The test section must consist of a minimum of three jet-grouted columns. Install each test column along the border of the limits of ground improvement as shown in the drawings. One test column at both the southwest and southeast corners of the ground improvement limits and one test column along the southern boundary of the ground improvement limits near the center of the area of the limits. Test columns must extend to the top of the Pre-Slide Alluvium, where the top of the Pre-Slide Alluvium is determined by the Owner's Representative in the field.

b. Collect minimum of one wet grab sample per test column at location and depth determined by the Owner's Representative. Collect the sample by inserting a downhole in situ sampler within a fresh jet grout column to retrieve the wet grab sample of in-place soilcrete.

c. The Contractor must obtain full-depth continuous core samples from the test columns in accordance with the QC/QA requirements outlined in Paragraph QUALITY CONTROL/QUALITY ASSURANCE.

d. Three acceptable/representative core specimens from each test column selected by the Engineer must be sent to an independent Laboratory for the tests required to satisfy the criteria specified in Paragraph ACCEPTANCE CRITERIA.

e. The top of all test elements must be exposed by excavation and measured for geometric properties. A minimum of 6 feet of the top of each test column must be exposed. The Contractor must provide access for the Engineer to inspect the columns. The columns must be backfilled after inspection is complete.

f. Subject to the results of the test program, the Contractor will present parameters selected to achieve the specified acceptance criteria for review of the Engineer. The Contractor, at their expense, may be required to repeat the construction of a test section if selected parameters fall outside test requirements. The test program must confirm that the resultant soil-cement properties met the required design criteria prior to the Contractor proceeding with production work.

2.2.3 Jet Grouting Procedure

The following must be submitted to the Owner's Representative by the Contractor four weeks prior to the start of the work:

a. Submit a general Work Procedures Plan outlining the spacing, location, depth and general sequence to achieve the specified criteria

detailed in this specification. Grout hole locations must be dimensionally referenced to the Contract drawings and shown on layout plans of suitable scale to effectively indicate the details of the layout. The layout must provide a unique number for each planned jet grout column for the purpose of inspection and installation documentation.

b. Submit a general jet grout spoil return management plan outlining waste containment methods during jet grouting and treatment and removal plans for jet grout spoil return. Jet grout spoil return management plan must include methods preventing migration of grout materials into Navigation Lock 1 and the Columbia River.

c. Submit a general containment, treatment, and disposal plan outlining description and details of means and methods for containment, treatment, and disposal of ground improvement spoil material, cement grout, and water coming in contact with cement grout during the mixing process or as part of the containment process.

PART 3 EXECUTION

3.1 FIELD QUALITY CONTROL

Submit quality assurance, quality control and verification procedures to be used for the field test and production work. This must include details of the procedures to obtain soil-cement samples; and catalog cuts or shop fabrication drawings of the soil-cement sampling device and curing boxes. Submit proposed details and formats of all required tabular and graphical data presentations that will be submitted to the Engineer during the course of the Work. This will include submittal of a copy of the reports used for data monitoring and recording, as described herein.

3.1.1 Quality Control/Quality Assurance

a. All Jet Grouting must be performed in the presence of the Owner's QC/QA Representative. Owner's QC/QA Representative must be notified prior to initiating jet-grouting. Monitoring and logging of jet-grouting operations for both test areas and production work must be performed by the Contractor.

b. The Contractor's equipment must be configured to record and continuously show all fluid flows and pressures, rotational speed, depth and rod retraction rates. The rod retraction rate and rod RPM must be set by the driller then automatically controlled by the drill rig during the entire jet-grouting process and recorded on the jet-grout installation log.

c. All the data monitored and recorded, as described above, must be made available to the Engineer in a format previously agreed on prior to the work. Supply the Engineer with the software used for this task. The software must be capable of processing the data recorded and graphic in a satisfactory manner. Proposal of the software to be used must be described in advance to the Engineer.

d. Grout mix proportions must be measured and documented by the Contractor per the submittal requirements in Paragraph SUBMITTALS. Appropriate records must be kept by the Contractor and submitted to the Engineer to verify that grout mixture(s) are as accepted.

e. Throughout the jet-grouting operations, perform continuous coring to full depth on five percent of production jet grout columns to obtain drill cores of the jet grout soil. The drill core will be evaluated for compliance with specific acceptance criteria defined in Paragraph ACCEPTANCE CRITERIA herein. The Contractor will be notified immediately if the soil-cement samples do not meet the acceptance criteria outlined herein.

(1) Perform all coring operations in the presence of the Engineer. Notify the Engineer at least one business day in advance of beginning sampling operations.

(2) Determine the time interval between element installation and coring except that the interval must be no longer than required to conduct 28 day strength testing.

(3) The full-depth samples must be obtained along a vertical alignment located in the outer half of the column diameter.

(4) Core samples must be retrieved using standard triple-tube or equivalent continuous coring techniques.

(5) Samples must have a diameter of at least 3 inches, and each core run must be at least 3 feet in length.

(6) The cores must be drilled at locations defined by the Engineer.

(7) Photograph each core run.

(8) Upon retrieval, provide the cores to the Engineer for logging and test specimen selection.

(9) Following logging, the Engineer will select at least five specimens from each full-depth continuous core for strength testing. Each test specimen must have a length-to-diameter ratio of two or greater.

(10) Immediately following logging and test specimen selection by the Engineer, seal the entire full-depth sample, including the designated test specimens, in plastic wrap to prevent drying and transport the sealed sample to the laboratory. The samples must be protected against drying and mechanical damage prior to and during transport.

(11) The samples must be stored in a moist room in accordance with ASTM C192/C192M until the test date.

(12) Samples must not be submerged in water during curing unless they are sealed in a water-tight plastic bag with as much air removed as possible prior to sealing to void swelling.

(13) Retain portions of the samples that are not tested until completion and acceptance of all jet grouting work for possible future inspection and confirmation testing by the Engineer. If a large volume of samples cannot be reasonably stored on the job site, cores from columns deemed satisfactory may be disposed of prior to project completion if approved by the Engineer.

(14) All core holes must be filled with cement grout that will

obtain a 28 day unconfined compressive strength equal to or greater than the 28 day unconfined compressive strength of the grouted material.

f. Wet Grab Samples: Collect minimum of one wet grab sample per day during production work at location and depth determined by the Owner's QC/QA Representative. Collect the sample by inserting a downhole in situ sampler within a fresh jet grout column to retrieve the wet grab sample of in-place soilcrete.

g. Strength Testing:

(1) Strength testing must be conducted by an independent testing laboratory retained by the Contractor and approved by the Engineer.

(2) Testing for unconfined compressive strength must be conducted in accordance with ASTM D2166, except that loading will continue on all specimens until the cylinders break sufficiently to examine the interior of the specimen.

(3) The broken specimen must be photographed so that the Engineer may document any apparent segregation, lenses, and pockets in the specimen.

(4) For test program, unconfined compressive strength testing must be performed on specimens from wet grab samples three, seven, 28, and 56 days or more after mixing.

(5) For full production work, unconfined compressive strength testing must be performed on specimens from wet grab samples at seven days and 28 days after mixing.

(6) For specimens obtained by coring, unconfined compressive strength testing must be performed 28 days after mixing.

h. Uniformity Evaluation: Provide the continuous core samples to the Engineer for logging and assessing uniformity in accordance with the acceptance criteria outlined in Paragraph ACCEPTANCE CRITERIA.

i. Both the Contractor's testing and the Owner's testing (if performed) must demonstrate that the required strengths are met prior to accepting the work. Conduct additional coring and testing required to demonstrate the acceptability of the jet grouting product due to non-conformance at no additional cost to the Owner.

3.1.2 Daily Reports

Within one business day of a work shift, submit summary daily reports during test and production jet grouting that provide the information listed below. A sample of the report form proposed for use must be submitted to the Engineer for approval prior to the start of work.

a. Project name.

b. Jet-grout element number.

c. Time and date (day, month, year) of beginning and completion of each grout element, including interruptions to the jetting process or material supply.

d. Grout mix data, including mix proportions and unit weight density measurements.

e. Injection pressure of all fluids used to construct each grout element.

f. Flow rates of all fluids used to construct each grout element.

g. Rates of rotation and withdrawal of jet rods for each grout element.

h. Total grout quantity used for each element.

i. Top and bottom elevations of the jet-grout element.

j. Continuous flow of spoils return.

k. Name of field superintendent in charge of the work for the Contractor.

l. Notes and description of obstructions, interruptions of binder injections, or other difficulties during installation and their resolution.

m. Other pertinent observations including but not limited to binder escapes, ground settlement or heave, collapses of the treatment zone, and any unusual behavior of any equipment during the jet-grouting process.

n. For both wet grab samples and coring, provide collection date, time, plan location, elevation, and identification numbers of all samples, including unsuccessful attempts to retrieve samples.

o. For coring operations, provide the coring method, equipment, and personnel; recovery percentage and percent treatment (percent of run length that is treated) for each core run; sample collection, handling, and storage details; and name of person responsible for logging and collecting cores and samples to be tested.

p. Quantities of all binder materials delivered to the site plus a reconciliation showing the amount actually injected.

q. Summary of any down time or other unproductive time including time, duration, and reason.

r. Detailed results of all testing.

s. Continuous recording of jet-grouting parameters must be provided for each production column to verify consistency with the approved test program results.

3.1.3 Acceptance Criteria

a. Installation records from Paragraph QUALITY CONTROL/QUALITY ASSURANCE and daily reports from Paragraph DAILY REPORTS documenting that the approved parameters from the test program were accurately repeated for the production work.

b. The Engineer will make the sole determination as to whether the test

results satisfy the following acceptance criteria.

3.1.3.1 Uniformity Acceptance Criteria

a. Full-depth continuous core samples retrieved by the Contractor from the jet-grout element will be used to evaluate uniformity.

b. Core recovery (expressed as a percentage) will be reported for each run and is equal to the total length of recovered core divided by the total core run length. Length of recovered core includes lengths of treated and untreated soil.

c. Percent treatment is calculated as the total length of recovered core minus the sum of the lengths of unmixed or poorly mixed soil regions or lumps that extend across the entire diameter of the core divided by the total core run length expressed as a percentage. Percent treatment must be at least 80 percent for every 5 feet core run. If 80 percent treatment cannot be confirmed by coring in coarse sandy or gravelly soil, optical televiewer logs can be used to confirm uniformity.

d. If the Contractor uses core runs shorter than 5 feet (e.g., 3 feet), then the recovery and percent treatment can be calculated taking into equal amounts of core run length on either side of the short core run length to make up a total 5 feet run length for calculation purposes. At least 80 percent of all jet-grout samples tested must have a minimum 28 day unconfined compressive strength of 400 psi.

e. The use of pH color indicator, such as phenolphthalein, will not be considered in determining percent treatment of test program or production cores.

3.1.3.2 Strength Acceptance Criteria

a. The specified unconfined compressive strength of the jet grout material as determined by ASTM D2166 at 28 days curing time is 400 psi.

b. 80 percent of unconfined compressive strength test results as determined by ASTM D2166 from each tested jet grout column must equal or exceed the specified strength. If a strength specimen falls below the specified strength due to an obviously unrepresentative lump of unmixed soil in the specimen, the Engineer has the option to select another specimen from the same core run and allow the Contractor's laboratory to test the replacement specimen and substitute the strength from the replacement specimen for the strength from the unrepresentative specimen that failed to satisfy the strength requirement. Only one such retest will be allowed per core run.

3.1.3.3 Geometric Acceptance Criteria

a. Minimum Overlap Thickness: Adjacent grout columns must have a minimum overlap greater than 1/8 of the column diameter or 6 inches, whichever is greater.

b. Verticality and Horizontal Tolerances: vertical alignment must be maintained within one percent of plumb. Centerline of the elements must not be more than 3 inches from the indicated plan location.

c. The top of the jet grout element must extend upward to the

designated elevation or higher.

d. The bottom of the jet grout element must extend to the top of the Pre-Slide Alluvium layer, where the top of the layer must be determined by the Owner's Representative in the field.

3.1.4 Nonconformance

a. The Contractor is responsible for correcting the location or alignment of misplaced elements that will adversely affect the project quality. The Contractor must correct misaligned elements that interfere with the Project in a manner acceptable to the Owner.

b. If the strength and uniformity acceptance criteria are not achieved for production elements, the Contractor must submit a proposed plan for investigating and repairing failed sections for review and approval by the Engineer.

c. To prove acceptability of the failed element, the Contractor may core elements on both sides of the failed element. If those two cores meet the criteria, then the element will be accepted. If the additional cores fail, then the Contractor can propose additional investigations and remedial measures, which the Engineer will review and has the option to accept or reject depending on whether the proposed remedial measures meet the design intent. Examples of such investigations and remedial measures include the following:

(1) In the case that the treated soil meets the uniformity criteria but fails to meet the strength criteria, the elements or zone could be assigned a lower strength level. The Contractor could propose installing additional elements to compensate the strength required by the design intent. If the treated soil fails to meet the uniformity criteria, the elements need to be replaced.

(2) If the treated soil that failed to pass cannot be isolated in a specific zone, the Contractor must provide remedial measures for all elements constructed during all rig shifts that occurred between passing elements.

(3) Remedial measures are subject to coring and application of the specification acceptance criteria.

3.2 CONSTRUCTION SEQUENCE

The sequence of installing the jet grout columns must start along the edge nearest Navigation Lock 1 and progress away from the channel. Install the entire row of columns along the Navigation Lock 1 edge prior to installing columns further from the channel.

3.3 PRODUCTION WORK

a. Jet grout columns should be laid out so that they form enclosed cells by overlapping of columns creating multiple rows within the limits of ground improvement as shown on the drawings. All jet grout columns must be laid out and installed so that no part of any column is located within 4 feet of the theoretical edge of any drilled shaft to be installed for the foundations at Bent 1.

b. Before beginning installation, the Contractor must provide

sufficient survey control points to allow Owner's Representative to verify accurate locations of ground improvement elements and stake each end of ground improvement grid lines shown on drawings using a licensed surveyor. The Contractor must provide an adequate method for locating elements and to allow the Owner's Representative to verify the as-built location of the elements during construction. The Contractor will not be compensated for elements that are located outside of the tolerances specified in Paragraph QUALITY CONTROL/QUALITY ASSURANCE. The Owner will review the location of misaligned elements to determine if the elements interfere with the proposed construction. If the Owner determines that misaligned elements will interfere with construction, the Contractor must correct the alignment. The method of correction must be submitted by the Contractor to the Engineer for review and approval.

c. If an obstruction is encountered that prevents drilling advancement, the Contractor must immediately notify the Owner's Representative and investigate the location and extent of the obstruction using methods approved by the Engineer. The Contractor must propose remedial measures to clear the obstruction for approval by the Engineer. The Contractor will be compensated for removal or clearing of obstructions with prior approval from the Owner. If the element cannot be installed at the design location due to obstructions, the element will be relocated as directed by the Engineer.

d. Execute production jet grouting using the same jet-grout tooling, materials, and procedures as demonstrated from the satisfactory set of test elements.

e. Install jet-grout elements, such that continuous spoil return up the borehole annulus is achieved during all work.

f. Centerline of the elements must not be more than 3 inches from the indicated plan location.

g. The sequence of the jet grouting, primary and secondary, fresh on fresh, pre-jetting with water is the responsibility of the Contractor and must be based on the results of the successful test program.

h. Maintain a clean site and dispose of all spoil debris, water, and spilled material during jet-grouting operations.

i. Equipment for mixing, holding, and pumping grout must be in a secure location and must be operated to minimize spillage of material. No material will be allowed to enter storm drains or other drainage courses.

j. Monitor nearby grade, structures and utilities during all jetting work.

k. If jet grouting is interrupted during the execution of a column, the re-start of the jetting must be undertaken so the nozzles are at least 6 inches below the previous stopping point.

l. Site access must be provided to Owner's Representatives for observation of the work.

m. Control of Spoils:

(1) Control and dispose of all waste materials produced as a result of the grouting operation in accordance with the project requirements. The spoils must be contained and processed within the limits of ground improvement as shown on drawings. The spoils must be contained onsite for at least six hours prior to loading and transport to an offsite disposal area to allow excess water to drain from the spoil material.

(2) Collect and treat bleed water originating from spoil material prior to discharging water in accordance with 1200-C and other applicable permits or disposing of water offsite.

3.4 CLOSEOUT ACTIVITIES

3.4.1 As-Built Field Measurement Data

After completion of the Project, submit as-built field measurement data indicating surveyed as-built plan locations of each jet grout element, including the element center (per site specific coordinates), the element dimension, the column verticality, and the top and bottom elevations of each element to the accuracy required by the Project specifications.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 32 - EXTERIOR IMPROVEMENTS

SECTION 32 01 19.61 99

SEALING OF JOINTS IN RIGID PAVEMENT

PART 1 GENERAL

1.1 REFERENCES
1.2 SUBMITTALS
1.3 QUALITY ASSURANCE
1.3.1 Test Requirements
1.3.2 Trial Joint Sealant Installation
1.4 DELIVERY, STORAGE, AND HANDLING
1.5 ENVIRONMENTAL REQUIREMENTS
1.6 TRAFFIC CONTROL

PART 2 PRODUCTS

2.1 SEALANTS
2.2 PRIMERS
2.3 BOND BREAKERS
2.3.1 Blocking Media/Backup Materials
2.3.2 Bond Breaking Tapes

PART 3 EXECUTION

3.1 EXECUTING EQUIPMENT
3.1.1 Joint Cleaning Equipment
3.1.1.1 Tractor-Mounted Routing and Plowing Tool
3.1.1.2 Concrete Saw
3.1.1.3 Sandblasting Equipment
3.1.1.4 Air Compressor
3.1.1.5 Vacuum Sweeper
3.1.1.6 Hand Tools
3.1.2 Sealing Equipment
3.1.2.1 Hot-Poured Sealing Equipment
3.1.2.2 Cold-Applied, Single-Component Sealing Equipment
3.2 SAFETY
3.3 PREPARATION OF JOINTS
3.3.1 Sawing
3.3.1.1 Facing of Joints
3.3.1.2 Refacing of Random Cracks
3.3.2 Final Cleaning of Joints
3.3.2.1 Sandblasting
3.3.3 Bond Breaker
3.3.3.1 Blocking Media (Backer Rod) (Except for Expansion Joints)
3.3.3.2 Bond Breaking Tape
3.3.4 Rate of Progress of Joint Preparation
3.3.5 Disposal of Debris
3.4 PREPARATION OF SEALANT
3.4.1 Hot-Poured Sealants

3.4.2 Single-Component, Cold-Applied Sealants
3.5 INSTALLATION OF SEALANT
3.5.1 Time of Application
3.5.2 Sealing Joints
3.6 INSPECTION/FIELD QUALITY CONTROL
3.6.1 Joint Cleaning
3.6.2 Sampling Sealant
3.6.3 Sealant Application Equipment
3.6.4 Joint Sealant
3.7 ACCEPTANCE
3.8 CLEAN-UP

-- End of Section Table of Contents --

SECTION 32 01 19.61 99

SEALING OF JOINTS IN RIGID PAVEMENT

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM C1016	(2014; R 2022) Standard Test Method for Determination of Water Absorption of Sealant Backing (Joint Filler) Material
ASTM D789	(2015) Determination of Relative Viscosity and Moisture Content of Polyamide (PA)
ASTM D5249	(2010; R 2016) Standard Specification for Backer Material for Use with Cold-and Hot-Applied Joint Sealants in Portland-Cement Concrete and Asphalt Joints
ASTM D5329	(2016) Standard Test Methods for Sealants and Fillers, Hot-Applied, for Joints and Cracks in Asphalt Pavements and Portland Cement Concrete Pavements
ASTM D5893/D5893M	(2016) Standard Specification for Cold Applied, Single Component, Chemically Curing Silicone Joint Sealant for Portland Cement Concrete Pavements
ASTM D6690	(2021) Standard Specification for Joint and Crack Sealants, Hot Applied, for Concrete and Asphalt Pavements

U.S. ARMY CORPS OF ENGINEERS (USACE)

COE CRD-C 525	(1989) Corps of Engineers Test Method for Evaluation of Hot-Applied Joint Sealants for Bubbling Due to Heating

1.2 SUBMITTALS

Government approval is required for submittals with a "G" classification. Submittals not having a "G" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Sealants

Manufacturer's Recommendations

SD-04 Samples

Sealants

Blocking Media/Backup Materials

Backer Rod

Bond Breaking Tapes

SD-06 Test Reports

Sealants

SD-07 Certificates

Equipment List

SD-08 Manufacturer's Instructions

Sealants

1.3 QUALITY ASSURANCE

1.3.1 Test Requirements

The materials will be tested by the Government. Do not use material at the project prior to receipt of written notice that the materials meet the laboratory requirements. The cost of the first test of samples will be borne by the Government. If the samples fail to meet specification requirements, replace the materials represented by the sample and test the new materials at the Contractor's expense. Conformance with the requirements of the laboratory tests specified does not constitute final acceptance of the materials. Base final acceptance on the performance of the in-place materials. Submit samples of the materials (sealant, primer if required, and backup material), in sufficient quantity for testing and approval 45 days prior to the beginning of work. Do not use material until it has been approved.

1.3.2 Trial Joint Sealant Installation

Prior to cleaning and sealing the joints for the entire project, prepare a test section at least 50 ft long using the specified materials and approved equipment, so as to demonstrate the proposed joint preparation and sealing of the types of joints in the project. Following the completion of the test section and before any other joint is sealed, inspect the test section to determine that the materials and installation meet the requirements specified. Inspect joint seal test section. Provide written notice of deficiencies and required corrections or adjustments in the joint seal installation procedures. Correct deficiencies and obtain approval of test section prior to installing joint seals. If it is determined that the materials or installation do not meet the requirements, remove the materials, and reclean and reseal the joints at no cost to the Government. Permit the test section meeting the requirements to be incorporated into the permanent work and paid for at the Contract unit price per linear foot

for sealing items scheduled. Prepare and seal other joints in the manner approved for sealing the test section. Notify the Contracting Officer upon completion of the test section.

1.4 DELIVERY, STORAGE, AND HANDLING

Inspect materials delivered to the site for visible damage, and unload and store with a minimum of handling. Deliver joint materials in original sealed containers and protect from freezing or overheating. Provide jobsite storage facilities capable of maintaining temperature ranges within manufacturers recommendations.

1.5 ENVIRONMENTAL REQUIREMENTS

Do not proceed with work when weather conditions detrimentally affect the quality of cleaning joints or applying sealants. Proceed with joint preparation and sealing only when weather conditions are in accordance with manufacturer's instructions. Install joint sealant to dry surfaces and protect sealant and bond breakers from moisture.

1.6 TRAFFIC CONTROL

Do not permit vehicular or heavy equipment traffic on the pavement in the area of the joints being sealed during the protection and curing period of the sealant. Permit traffic on the pavement at the end of the curing period.

PART 2 PRODUCTS

2.1 SEALANTS

a. Submit catalog cuts, specifications, Safety Data Sheets and other information documenting conformance to Contract requirements.

b. Provide for testing a five gallon sample of each sealant with associated primer to the Contracting Officer a minimum of 60 days prior to its use on the job. Provide factory-sealed containers with a factory applied label showing the following information:

(1) Name of sealant

(2) Identification of component, or primer

(3) Specification number and type

(4) Manufacturer's name

(5) Manufacturer's lot and batch number

(6) Date of Manufacture (month and year)

(7) Shelf life retest date (month and year)

(8) List of hazardous components

(9) Quantity of material in container (volume)

(10) Storage instructions

(11) Instructions for use

c. Provide instructions that include, but not limited to: storage requirements, ambient temperature and humidity ranges, and moisture condition of joints for successful installation; requirements for preparation of joints; safe heating temperature; mixing instructions; installation equipment and procedures; application and disposal requirements; compatibility of sealant with filler material; curing requirements; and restrictions to be adhered to in order to reduce hazards to personnel or to the environment. Submit instructions at least 30 days prior to use.

d. Use materials for sealing cracks in accordance with ASTM D6690 and ASTM D5893/D5893M based on the type of area as follows:

Area	Sealing Material
5,050 square feet of concrete roadway	ASTM D6690, Type III and ASTM D5329 /COE CRD-C 525

2.2 PRIMERS

Use primers in accordance with the recommendation of the manufacturer.

2.3 BOND BREAKERS

2.3.1 Blocking Media/Backup Materials

Provide backup (joint filler) material that is a compressible, nonshrinking, nonstaining, nonabsorbing, nonreactive material with the sealant. Use backup material compliant with ASTM D5249. Use material with a melting point at least 5 degrees F greater than the pouring temperature of the sealant being used when tested in accordance with ASTM D789. Use material with a water absorption of not more than five percent of the sample weight when tested in accordance with ASTM C1016. Use backup (joint filler) material that is 25 plus or minus five percent larger in diameter than the nominal width of the crack. Use blocking media consistent with the sealant manufacturer's installation instructions.

2.3.2 Bond Breaking Tapes

Provide a bond breaking tape or separating material that is a flexible, nonshrinkable, nonabsorbing, nonstaining, and nonreacting adhesive-backed tape. Use material with a melting point at least 5 degrees F greater than the pouring temperature of the sealant being used when tested in accordance with ASTM D789. Use bond breaker tape approximately 1/8 in wider than the nominal width of the joint and that does not bond to the sealant. Use bond breaking tape consistent with the sealant manufacturer's installation instructions.

PART 3 EXECUTION

3.1 EXECUTING EQUIPMENT

Submit equipment list and description of the equipment to be used and a statement from the supplier of the sealant that the proposed equipment is acceptable for installing the specified sealant. Use equipment for heating, mixing, and installing seals in accordance with the instructions

provided by the sealant manufacturer. Provide equipment, tools, and accessories necessary to clean existing joints and install liquid joint sealants. Maintain machines, tools, and other equipment in proper working condition. Submit a list of proposed equipment to be used in performance of construction work including descriptive data, 45 days prior to use on the project.

3.1.1 Joint Cleaning Equipment

3.1.1.1 Tractor-Mounted Routing and Plowing Tool

Use routing tools for removing old sealant from the joints, of such shape and dimensions and so mounted on the tractor that do not damage the sides of the joints. Use tools designed to be adjusted to remove the old material to varying depths and widths as required. Use equipment capable of maintaining accurate cutting depth and width control. Use a joint plow equipped with a spring or hydraulic mechanism to release pressure on the tool prior to spalling the concrete. Do not permit the use of V-shaped tools or rotary impact routing devices. Permit the use of hand-operated spindle routing devices to clean and enlarge random cracks.

3.1.1.2 Concrete Saw

Provide a self-propelled power saw, with water-cooled diamond or abrasive saw blades, for cutting joints to the depths and widths specified, for refacing joints, cleaning sawed joints where sandblasting does not provide a clean joint, widening, or deepening existing joints as specified without damaging the sides, bottom, or top edge of joints. Permit single or gang type blades with one or more blades mounted in tandem for fast cutting. Select saw adequately powered and sized to cut specified opening with not more than two passes of the saw through the joint.

3.1.1.3 Sandblasting Equipment

Include with the sandblasting equipment an air compressor, hose, and long-wearing venturi-type nozzle of proper size, shape and opening. Do not permit the maximum nozzle opening to exceed 1/4 in. Use a portable air compressor capable of providing not less than 150 cfm and maintaining a line pressure of not less than 90 psi at the nozzle while in use. Demonstrate compressor capability, under job conditions, before approval. Use a compressor equipped with traps that maintain the compressed air free of oil and water. Use a nozzle with an adjustable guide that holds the nozzle aligned with the joint approximately one in above the pavement surface. Adjust the height, angle of inclination and the size of the nozzle to secure satisfactory results.

3.1.1.4 Air Compressor

Use a portable air compressor capable of operating the sandblasting equipment and capable of blowing out sand, water, dust adhering to sidewalls of concrete, and other objectionable materials from the joints. Use a compressor that provides air at a pressure not less than 90 psi and a minimum rate of 150 cubic ft of air per minute at the nozzles and free of oil.

3.1.1.5 Vacuum Sweeper

Use a self-propelled, vacuum pickup sweeper capable of completely removing loose sand, water, joint material, and debris from pavement surface.

3.1.1.6 Hand Tools

Permit the use of hand tools, such as brooms and chisels, when approved, for removing defective sealant from a crack and repairing or cleaning the crack faces.

3.1.2 Sealing Equipment

Use joint sealing equipment of a type required by the sealant manufacturer's installation instructions. Use equipment capable of installing sealant to the depths, widths and tolerances indicated. Do not proceed with joint sealing when malfunctions are noted until the malfunctions are corrected.

3.1.2.1 Hot-Poured Sealing Equipment

Use mobile unit applicators equipped with a double-boiler, agitator-type kettle with an oil medium in the outer space for heat transfer for heating and installing ASTM D6690 joint sealant materials; a direct-connected pressure-type extruding device with a nozzle shaped for inserting in the joint to be filled; positive temperature devices for controlling the temperature of the transfer oil and sealant; and a recording thermometer for indicating the temperature of the sealant. Use an applicator unit designed so that the sealant circulates through the delivery hose and returns to the inner kettle when not in use.

3.1.2.2 Cold-Applied, Single-Component Sealing Equipment

Use equipment for installing ASTM D5893/D5893M single component joint sealants that consists of an extrusion pump, air compressor, following plate, hoses, and nozzle for transferring the sealant from the storage container into the joint opening. Use a nozzle with dimensions that allows the tip of the nozzle to extend into the joint to allow sealing from the bottom of the joint to the top. Maintain the initially approved equipment in good working condition, serviced in accordance with the supplier's instructions, and unaltered in any way without obtaining prior approval. Use lined hoses and seals to prevent moisture penetration and withstand pumping pressures. Use equipment free of contamination from previously used or other type sealant. Permit use of small hand-held air-powered equipment (i.e., caulking guns) for small applications.

3.2 SAFETY

a. Do not place sealant within 25 ft of LOX equipment, LOX storage, or LOX piping. Clean joints in this area and leave them unsealed.

b. In accordance with the provisions of the Contract respecting "Accident Prevention," take appropriate measures to control worker exposure to toxic substances during the work. Provide personnel protective equipment as required. Make Material Safety Data Sheets (Department of Labor Form OSHA-20 or comparable form) available on the site.

c. Perform sandblasting operations in accordance to Paragraph entitled ABRASIVE BLASTING of Section 01 57 19.00 25 TEMPORARY ENVIRONMENTAL CONTROLS.

3.3 PREPARATION OF JOINTS

Unless otherwise indicated, remove existing material, saw, clean and reseal joints. Do not proceed with final cleaning operations by more than one working day in advance of sealant. Clean joints by removing existing joint sealing compound, bond-breakers, dirt, laitance, curing compound, filler, and protrusions of hardened concrete from the sides and upper edges of the joint space to be sealed and other foreign material with the equipment. Do not permit cleaning procedures that damage joints or previously repaired patches by chipping or spalling. Remove existing sealant to the required depth. Precise shape and size of existing joints vary, and conditions of joint walls and edges vary and include but are not limited to rounding, square edges, sloping, chips, voids, depressions, and projections.

3.3.1 Sawing

3.3.1.1 Facing of Joints

Accomplish facing of joints using a concrete saw as specified in Paragraph EQUIPMENT to saw through sawed and filler-type joints to loosen and remove material until the joint is clean and open to the full specified width and depth. Provide exposure of newly clean concrete through removal. Remove burrs and irregularities from sides of joint faces. Stiffen the blade with a sufficient number of dummy (used) blades or washers. Clean, immediately following the sawing operation, the joint opening using a water jet to remove saw cuttings and debris and adjacent concrete surface. Protect adjacent previously cleaned joint spaces from receiving water and debris during the cleaning operation.

Joint Widening (Except Expansion Joints): Saw joints having grooves less than 3/8 in wide and less than one in deep to a minimum width of 1/2 in and to the minimum depth, of one in.

3.3.1.2 Refacing of Random Cracks

Accomplish sawing of the cracks using a power-driven concrete saw as specified in Paragraph EQUIPMENT. Use a saw blade 6 in or less in diameter to enable the saw to follow the trace of the crack. Stiffen the blade with dummy (or used) blades or washers. Immediately following the sawing operation, clean the crack opening using a water jet to remove saw cuttings and debris.

3.3.2 Final Cleaning of Joints

3.3.2.1 Sandblasting

Following removal of existing sealant, and sawing, and immediately before resealing, clean newly exposed concrete joint faces and pavement surface extending to a mimimum of 1/2 in up to 2 in from each joint edge by sandblasting until concrete surfaces in the joint space are free of sealants, dust, dirt, water and other foreign materials that prevent bonding of new sealants to the concrete. Use sand particles of the proper size and quality for the work. Perform sandblasting with specified nozzles, air compressor, and other appurtenant equipment. Position nozzles to clean the joint faces. Make at least two passes; one for each joint face. Make as many passes as required for proper cleaning. Immediately prior to sealing the joint, blow out the joint spaces with compressed air until completely free of sand, water, and dust. Install joint sealants to dry joints. Replace expansion joint filler material damaged in performing

the work with new materials of the same type and dimensions as the existing material, or with appropriate blocking media.

3.3.3 Bond Breaker

At the time the joints receive the final cleaning and are dry, install bond breaker material as indicated with a steel wheel or other approved device.

3.3.3.1 Blocking Media (Backer Rod) (Except for Expansion Joints)

When the joint opening is of a greater depth than indicated for the sealant depth, plug or seal off the lower portion of the joint opening using a blocking media/back-up material to prevent the entrance of the sealant below the specified depth. Take care to ensure that the blocking media/backup material is placed at the specified depth and is not stretched or twisted during installation.

3.3.3.2 Bond Breaking Tape

Where inserts or filler materials contain bitumen, or the depth of the joint opening does not allow for the use of a backup material, insert a bond breaker separating tape to prevent incompatibility with the filler materials and three-sided adhesion of the sealant. Bond the tape to the bottom of the joint opening to prevent it from floating up into the new sealant.

3.3.4 Rate of Progress of Joint Preparation

Limit the stages of joint preparation, including sandblasting, air pressure cleaning and placing of the back-up material to only that lineal footage that can be sealed during the same day.

3.3.5 Disposal of Debris

Sweep pavement surface to remove excess joint material, dirt, water, sand, and other debris by vacuum sweepers or hand brooms. Remove the debris immediately to a designated area.

3.4 PREPARATION OF SEALANT

3.4.1 Hot-Poured Sealants

Heat hot-poured sealing materials in accordance with ASTM D6690 and with safe heating temperature ranges recommended by the manufacturer. Withdraw and waste sealant that has been overheated or subjected to heating for over three hours or that remain in the applicator at the end of the day's operation. Heat sealant in specified equipment.

3.4.2 Single-Component, Cold-Applied Sealants

Inspect the ASTM D5893/D5893M sealant and containers prior to use. Reject materials that contain water, hard caking of any separated constituents, nonreversible jell, or materials that are otherwise unsatisfactory. Do not reject sealants that exhibit settlement of constituents in a soft mass that can be readily and uniformly remixed in the field with simple tools.

3.5 INSTALLATION OF SEALANT

3.5.1 Time of Application

After approval of the test section, seal joints immediately following final cleaning and placing of bond breakers. Commence sealing joints when walls are dust free and dry, and when weather conditions meet sealant manufacturer's instructions. If the above conditions cannot be met, or when rain interrupts sealing operations, reclean and permit the joints to dry prior to installing the sealant.

3.5.2 Sealing Joints

Do not install joint sealant until joints to be sealed have been inspected and approved. Install bond breaker just prior to pouring sealant. Fill the joints with sealant from bottom up until joints are uniformly filled solid from bottom to top using the specified equipment for the type of sealant required. Fill joints to 1/4 in plus or minus 1/16 in below top of pavement, and without formation of voids or entrapped air. Do not permit gravity methods or pouring pots to be used to install the sealant material. Except as otherwise permitted, tool the sealant immediately after application to provide firm contact with the joint walls and to form the indicated sealant profile below the pavement surface. Remove excess sealant that has been inadvertently spilled on the pavement surface. Do not permit traffic over newly sealed pavement until authorized. When a primer is recommended by the manufacturer, apply it evenly to the joint faces in accordance with the manufacturer's recommendations. Check sealed joints frequently to ensure that newly installed sealant is cured to a tack-free condition within the specified time. Protect new sealant from rain during curing period.

3.6 INSPECTION/FIELD QUALITY CONTROL

3.6.1 Joint Cleaning

Inspect joints during the cleaning process to correct improper equipment and cleaning techniques that damage the concrete pavement in any manner. Approve cleaned joints prior to installation of the separating or back-up material and joint sealant.

3.6.2 Sampling Sealant

Obtain a one gal sample of each type of sealant on the project from material used for each 10,000 linear ft or less of joints sealed. Store samples according to sealant manufacturer's instructions. Retain samples until final acceptance of the work.

3.6.3 Sealant Application Equipment

Inspect the application equipment to ensure conformance to temperature requirements, proper proportioning and mixing (if two-component sealant) and proper installation. Suspend operations if there is evidences of bubbling, improper installation, or failure to cure or set until causes of the deficiencies are determined and corrected.

3.6.4 Joint Sealant

Inspect the joint sealant for proper rate of cure and set, bonding to the joint walls, cohesive separation within the sealant, reversion to liquid,

entrapped air and voids. Remove sealants exhibiting these deficiencies prior to the final acceptance of the project from the joint, wasted, and replace at no additional cost to the Government. Obtain approval for each joint seal installation.

3.7 ACCEPTANCE

Reject sealer that fails to cure properly, or fails to bond to joint walls, or reverts to the uncured state, or fails in cohesion, or shows excessive air voids, blisters, surface defects, swelling, or other deficiencies, or is not properly recessed within indicated tolerances. Remove rejected sealer and reclean and reseal joints. Perform removal and reseal work promptly by and at the expense of the Contractor.

3.8 CLEAN-UP

Upon completion of the project, remove unused materials from the site and leave the pavement in a clean condition.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 32 - EXTERIOR IMPROVEMENTS

SECTION 32 05 33.00 99

LANDSCAPE ESTABLISHMENT

PART 1 GENERAL

1.1 REFERENCES
1.2 DEFINITIONS
1.2.1 Pesticide
1.2.2 Stand of Turf
1.2.3 Planter Beds
1.3 RELATED REQUIREMENTS
1.4 SUBMITTALS
1.5 DELIVERY, STORAGE AND HANDLING
1.5.1 Delivery
1.5.2 Storage
1.5.2.1 Fertilizer, Lime, Iron, and Mulch Storage
1.5.2.2 Antidesiccant's Storage
1.5.3 Handling

PART 2 PRODUCTS

2.1 POST-PLANT FERTILIZER
2.1.1 Granular Fertilizer
2.2 WATER
2.3 MULCHES TOPDRESSING
2.3.1 Organic Mulch Materials
2.4 PESTICIDES

PART 3 EXECUTION

3.1 EXTENT OF WORK
3.1.1 Policing
3.1.2 Drainage System Maintenance
3.2 IRRIGATION ESTABLISHMENT PERIOD
3.2.1 Maintenance During the Irrigation Establishment Period
3.2.2 Water Restrictions
3.2.3 Fire Hydrants
3.2.4 Final Acceptance
3.2.5 Controller Charts
3.3 GROUNDCOVER ESTABLISHMENT PERIOD
3.3.1 Frequency of Maintenance
3.3.2 Promotion of Growth
3.3.3 Mowing
3.3.3.1 Turf
3.3.4 Turf Edging and Trimming
3.3.5 Post-Fertilizer Application
3.3.6 Turf Watering
3.3.7 Turf Clearance Area
3.3.8 Replanting

3.3.9 Final Inspection and Acceptance
3.4 EXTERIOR PLANT ESTABLISHMENT PERIOD
3.4.1 Frequency of Maintenance
3.4.2 Promotion of Plant Growth and Vigor
3.4.3 Planter Bed Maintenance
3.4.3.1 Shrub Selective Maintenance
3.4.4 Slope Erosion Control Maintenance
3.4.5 Removal of Dying or Dead Plants
3.4.6 Tracking of Unhealthy Plants
3.4.7 Final Inspection
3.4.7.1 Total Plants on Site
3.4.7.2 Mulching and Weeding
3.4.7.3 Remedial Work
3.5 FIELD QUALITY CONTROL
3.5.1 Maintenance Inspection Report
3.5.2 Plant Quantities

-- End of Section Table of Contents --

SECTION 32 05 33.00 99

LANDSCAPE ESTABLISHMENT

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM D2103	(2015) Standard Specification for Polyethylene Film and Sheeting

1.2 DEFINITIONS

1.2.1 Pesticide

Any substance or mixture of substances, including biological control agents, that may prevent, destroy, repel, or mitigate pests and are specifically labeled for use by the U.S. Environmental Protection Agency (EPA). Also, any substance used as a plant regulator, defoliant, disinfectant, or biocide. Examples of pesticides include fumigants, herbicides, insecticides, fungicides, nematicides, molluscicides and rodenticides.

1.2.2 Stand of Turf

100 percent ground cover of the established species.

1.2.3 Planter Beds

A planter bed is defined as an area containing one or a combination of the following plant types: shrubs, vines, wildflowers, annuals, perennials, ground cover, and a mulch topdressing excluding turf. Trees may also be found in planter beds.

1.3 RELATED REQUIREMENTS

a. Section 32 84 24.00 99 IRRIGATION SPRINKLER SYSTEM applies to this section for installation of irrigation equipment requirements, with additions and modifications herein.

b. Section 32 92 19.00 99 SEEDING applies to this section for installation of seed requirements, with additions and modifications herein.

c. Section 32 93 00.00 99 EXTERIOR PLANTS applies to this section for installation of shrubs and ground cover with additions and modifications herein.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" classification. Submittals not having a "G" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Integrated Pest Management Plan; G

SD-03 Product Data

Fertilizer; G

Mulches Topdressing

Organic Mulch Materials

SD-07 Certificates

Maintenance Inspection Report

Plant Quantities; G

1.5 DELIVERY, STORAGE AND HANDLING

1.5.1 Delivery

Deliver fertilizer, gypsum, and iron to the site in original containers bearing manufacturer's chemical analysis, name, trade name, or trademark, and indication of conformance to state and federal laws. Instead of containers, fertilizer, gypsum may be furnished in bulk with a certificate indicating the above information.

1.5.2 Storage

1.5.2.1 Fertilizer, Lime, Iron, and Mulch Storage

Store material in designated areas. Store lime and fertilizer in cool, dry locations away from contaminants.

1.5.2.2 Antidesiccant's Storage

Do not store with fertilizers or other landscape maintenance materials.

1.5.3 Handling

Do not drop or dump materials from vehicles.

PART 2 PRODUCTS

2.1 POST-PLANT FERTILIZER

2.1.1 Granular Fertilizer

Organic, granular controlled release fertilizer containing the following minimum percentages, by weight, of plant food nutrients:

a. 22 percent available nitrogen

b. 16 percent available phosphorus

c. eight percent available potassium

d. two percent sulfur

2.2 WATER

Source of water must be approved by the Contracting Officer and be of suitable quality for irrigation.

2.3 MULCHES TOPDRESSING

Free from noxious weeds, mold, or other deleterious materials.

2.3.1 Organic Mulch Materials

Furnish plant bed mulch Materials free of Noxious Weed seeds or plants and which contain no substance detrimental to plant life. Mulches are subject to inspection at any time and place at the discretion of the Contracting Officer. Provide Bark Mulch that is ground, shredded or broken particles from the bark of fir or hemlock trees which is free of non-bark debris, harmful bacteria, disease spores, pests and substances toxic to plant growth. Provide mulch that is the standard trade size known as "medium fine mulch".

2.4 PESTICIDES

Use black sheet polyethylene conforming to ASTM D2103, minimum thickness 5/32 inch. Submit an Integrated Pest Management Plan, including weed and pest management strategies. Use biological pest controls as approved in the Plan.

PART 3 EXECUTION

3.1 EXTENT OF WORK

Provide landscape construction maintenance to include irrigation equipment cleaning and adjustments, mowing, edging, overseeding, aeration, fertilizing, watering, weeding, and pruning, unless indicated otherwise, and at all areas inside or outside the limits of the construction that are disturbed by the Contractor's operations.

3.1.1 Policing

Police all landscaped areas. Policing includes removal of leaves, branches and limbs regardless of length or diameter, dead vegetation, paper, trash, cigarette butts, garbage, rocks or other debris. Policing must extend to both sides of fencing or walls. Collected debris must be promptly removed and disposed of at an approved disposal site.

3.1.2 Drainage System Maintenance

Remove all obstructions from surface and subsurface drain lines to allow water to flow unrestricted in swales, gutters, catch basins, storm drain curb inlets, and yard drains. Remove grates and clear debris in catch

basins. Open drainage channels are to be maintained free of all debris and vegetation at all times. Edges of these channels must be clear of any encroachment by vegetation.

3.2 IRRIGATION ESTABLISHMENT PERIOD

The irrigation establishment period will commence on the date that inspection by the Contracting Officer shows that the new and repaired irrigation equipment furnished under this Contract have been satisfactorily installed and is functional and must continue for a period of 365 days.

3.2.1 Maintenance During the Irrigation Establishment Period

Begin maintenance immediately after irrigation equipment has been installed and is functional. Inspect irrigation equipment at least once a week during the installation and establishment period and perform needed maintenance promptly. Irrigation controllers must be inspected and reprogrammed after power outages. Contractor must be responsible for winterization and startup. Sprinkler heads must direct water away from buildings and hard surfaced areas.

3.2.2 Water Restrictions

Abide by State, local or other water conservation regulations in force during the establishment period. Automatic controller must be adjusted to comply with the water conservation regulations schedule.

3.2.3 Fire Hydrants

To use a fire hydrant for irrigation, obtain prior clearance from the Contracting Officer and provide the tools and connections approved for use on fire hydrants. If a fire hydrant is used, Provide a reduced pressure backflow preventer for each connection between hose and fire hydrant. Backflow preventer used must be tested once per month by a certified backflow preventer tester.

3.2.4 Final Acceptance

Operation and coverage test is acceptable if system operates through at least one complete cycle for areas to be irrigated and all leaks or repairs have been completed.

3.2.5 Controller Charts

Indicate in chart area controlled by the automatic controller new zones added to the existing controller. The chart is a reduction of the actual plan that will fit the maximum dimensions inside the controller housing. Use a black line print for the chart and a different pastel or transparent color to indicate each station zone of coverage. After chart is completed and approved for final acceptance, seal chart between two 20 mil pieces of clear plastic.

3.3 GROUNDCOVER ESTABLISHMENT PERIOD

Groundcover establishment period will commence on the date that inspection by the Contracting Officer shows that the new and renovated turf furnished under this Contract has been satisfactorily installed to a 95 percent stand of coverage. The establishment period must continue for a period of 365 days.

3.3.1 Frequency of Maintenance

Begin maintenance immediately after turf has been installed and fully renovated. Inspect areas once a week during the installation and establishment period and perform needed maintenance promptly.

3.3.2 Promotion of Growth

Maintain groundcover in a manner that promotes proper health, growth, natural color. Turf must have a neat uniform manicured appearance, free of bare areas, ruts, holes, weeds, pests, dead vegetation, debris, and unwanted vegetation that present an unsightly appearance. Mow, remove excess clippings, eradicate weeds, water, fertilize, overseed, aerate, topdress and perform other operations necessary to promote growth, as approved by Contracting Officer and consistent with approved Integrated Pest Management Plan. Remove noxious weeds common to the area from planting areas by mechanical means.

3.3.3 Mowing

3.3.3.1 Turf

Mow turf at a uniform finished height. Mow turfed areas to a minimum average height of 3 inches when average height of grass becomes 5 inches for spring/summer maintenance and to a minimum average height of 3 inches when the average height of grass reaches 5 inches for fall winter maintenance. The height of turf is measured from the soil. Perform mowing of turf in a manner that prevents scalping, rutting, bruising, uneven and rough cutting. Prior to mowing, all rubbish, debris, trash, leaves, rocks, paper, and limbs or branches on a turf area must be picked up and disposed. Adjacent paved areas must be swept/vacuumed clean.

3.3.4 Turf Edging and Trimming

a. Perimeter of planter bed edges, sidewalks, driveways, curbs, and other paved surfaces must be edged. Uniformly edge these areas to prevent encroachment of vegetation onto paved surfaces and to provide a clear cut division line between planter beds, turf, and ground cover. Edging is to be accomplished in a manner that prevents scalping, rutting, bruising, uneven and rough cutting. Perform edging on the same day that turf is mowed. Use of string line trimmers is permitted in "soft" areas such as an edge between turfgrass and a planter bed. Exercise care to avoid damage to any plant materials, structures, and other landscape features.

b. Trimming around existing trees, fences, poles, walls, irrigation valve boxes and other similar objects is to be accomplished to match the height and appearance of surrounding mowed turf growth. Trimming must be performed on the same day the turf's mowed. Care must be exercised to avoid "Girdling" existing trees located in turf areas. The use of protective tree collars on trees in turf areas may be utilized as a temporary means to avoid injury to tree trunks. At the end of the plant establishment period, the Contractor will be responsible for removing all protective tree collars.

3.3.5 Post-Fertilizer Application

Apply turf fertilizer in a manner that promotes health, growth, vigor,

color and appearance of cultivated turf areas. The method of application, fertilizer type and frequencies must be determined by the laboratory soil analysis results the requirements of the particular turf species. Organic fertilizer must be used. In the event that organic fertilizer is not producing the desired effect, the Contractor must contact the Contracting Officer for approval prior to the use of a synthetic type of fertilizer. Apply fertilizer by approved methods in accordance with the manufacturer's recommendations.

3.3.6 Turf Watering

Perform irrigation in a manner that promotes the health, growth, color and appearance of cultivated vegetation and that complies with all Federal, State, and local water agencies and authorities directives. The Contractor must be responsible to prevent over watering, water run-off, erosion, and ponding due to excessive quantities or rate of application. Abide by state, local or other water conservation regulations or restrictions in force during the establishment period. Adjust irrigation controllers to comply with the water conservation regulations schedule.

3.3.7 Turf Clearance Area

Trees located in turf areas must be maintained with a growth free clearance of 18 inches from the tree trunk base. The use of mechanical weed whips to accomplish the turf growth free bed area is prohibited.

3.3.8 Replanting

Replant in accordance with Section 32 92 19.00 99 SEEDING and within specified planting dates areas which do not have a satisfactory stand of turf.

3.3.9 Final Inspection and Acceptance

Final inspection will be made upon written request from the Contractor at least 10 days prior to the last day of the turf establishment period. Final turf acceptance will be based upon a satisfactory stand of turf.

3.4 EXTERIOR PLANT ESTABLISHMENT PERIOD

The exterior plant establishment period will commence on the date that inspection by the Contracting Officer shows that the new plants furnished under this Contract have been satisfactorily installed and must continue for a period of 365 days.

3.4.1 Frequency of Maintenance

Begin maintenance immediately after plants have been installed. Inspect exterior plants at least once a week during the installation and establishment period and perform needed maintenance promptly.

3.4.2 Promotion of Plant Growth and Vigor

Water, prune, fertilize, mulch, eradicate weeds, and perform other operations necessary to promote plant growth, and vigor.

3.4.3 Planter Bed Maintenance

Planter beds must be weeded, fertilized, irrigated, kept pest free, turf

free, pruned, and mulch levels maintained. Planter beds will not be allowed to encroach into turf areas. A definite break must be maintained between turf areas and planter beds.

3.4.3.1 Shrub Selective Maintenance

In addition to the above requirements, shrubs must be selectively pruned, and shaped for health and safety when the following conditions exist: Remove growth in front of windows, over entrance ways or walks, and any growth which will obstruct vision at street intersections or of security personnel; Remove dead, damaged or diseased branches or limbs; where shrub growth obstructs pedestrian walkways; where shrub growth is found growing against or over structures; where shrub growth permits concealment of unauthorized persons. Dispose of all pruning debris in a proper manner.

3.4.4 Slope Erosion Control Maintenance

Provide slope erosion control maintenance to prevent undermining of all slopes in newly landscaped and natural growth areas. Maintenance tasks include immediate repairs to weak spots in sloped areas, and maintaining clean, clear culverts, and graded berms, and terraces to intercept and direct water flow to prevent development of large gullies and slope erosion and during periods of extended rainfall, irrigation systems must be secured. Eroded areas must be filled with amended topsoil and replanted with the same plant species. Erosion control blankets damaged due to slope erosion must be reinstalled.

3.4.5 Removal of Dying or Dead Plants

Remove dead and dying plants and provide new plants immediately upon commencement of the specified planting season, and replace, mulch and eroded earth mound water basins. Provide an additional 90 day establishment period for replacement plants beyond the original warranty period. A shrub or ground cover must be considered dying or dead when a minimum of 20 percent of the plant has died. This condition must be determined by scraping on a branch an area 1/16 inch square, maximum, to determine the cause for dying plant material and must provide recommendations for replacement. The Contractor must determine the cause for dying plant material and provide recommendations for replacement.

3.4.6 Tracking of Unhealthy Plants

Note plants not in healthy growing condition, as determined by the Contracting Officer, and as soon as seasonal conditions permit, remove and replace with plants of the same species and sizes as originally specified. Install replacement plantings in accordance with Section 32 93 00.00 99 EXTERIOR PLANTS.

3.4.7 Final Inspection

Final inspection will be made upon written request from the Contractor at least 10 days prior to the last day of the establishment period. Final inspection will be based upon satisfactory health and growth of plants and on the following:

3.4.7.1 Total Plants on Site

Plants have been accepted and required number of replacements have been installed.

3.4.7.2 Mulching and Weeding

Planter beds and earth mound water basins are properly mulched and free of weeds.

3.4.7.3 Remedial Work

Remedial measures directed by the Contracting Officer to ensure plant material survival and promote healthy growth have been completed.

3.5 FIELD QUALITY CONTROL

3.5.1 Maintenance Inspection Report

Provide maintenance inspection report to assure that landscape maintenance is being performed in accordance with the specifications and in the best interest of plant growth and survivability. Site observations must be documented at the start of the establishment period, then quarterly following the start, and at the end of establishment period. Submit results of site observation visits to the Contracting Officer within seven calendar days of each site observation visit.

3.5.2 Plant Quantities

Provide Contracting Officer with the number of plant quantities. In addition, provide total exterior area of hardscape and landscaping such as turf and total number of shrubs.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 32 - EXTERIOR IMPROVEMENTS

SECTION 32 11 20.00 99

BASE COURSE FOR RIGID AND SUBBASE FOR FLEXIBLE PAVING

PART 1 GENERAL

1.1 REFERENCES
1.2 DEGREE OF COMPACTION
1.3 SUBMITTALS
1.4 QUALITY ASSURANCE
1.4.1 Sampling
1.4.2 Tests
1.4.2.1 Gradation
1.4.2.2 Liquid Limit and Plasticity Index
1.4.2.3 Moisture-Density Determinations
1.4.2.4 Field Density Tests
1.4.2.5 Wear Test
1.4.2.6 Weight of Slag
1.5 ENVIRONMENTAL REQUIREMENTS
1.6 ACCEPTANCE
1.6.1 Tolerances

PART 2 PRODUCTS

2.1 MATERIALS
2.1.1 Subbase Course
2.1.2 Rigid Pavement Base Course
2.2 TESTS, INSPECTIONS, AND VERIFICATIONS
2.2.1 Initial Tests
2.2.2 Approval of Material
2.3 EQUIPMENT, TOOLS, AND MACHINES

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS
3.2 OPERATION OF AGGREGATE SOURCES
3.3 STOCKPILING MATERIAL
3.4 PREPARATION OF UNDERLYING COURSE OR SUBGRADE
3.5 GRADE CONTROL
3.6 MIXING AND PLACING MATERIALS
3.7 LAYER THICKNESS
3.8 COMPACTION
3.9 EDGES OF SUBBASE AND RIGID PAVEMENT BASE COURSE
3.10 FINISHING
3.11 SMOOTHNESS TEST
3.12 FIELD QUALITY CONTROL
3.12.1 In-Place Tests
3.12.2 Approval of Material
3.13 TRAFFIC
3.14 MAINTENANCE

3.15 DISPOSAL OF UNSATISFACTORY MATERIALS

-- End of Section Table of Contents --

SECTION 32 11 20.00 99

BASE COURSE FOR RIGID AND SUBBASE FOR FLEXIBLE PAVING

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM C29/C29M	(2023) Standard Test Method for Bulk Density ("Unit Weight") and Voids in Aggregate
ASTM C117	(2023) Standard Test Method for Materials Finer than 75-um (No. 200) Sieve in Mineral Aggregates by Washing
ASTM C131/C131M	(2020) Standard Test Method for Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine
ASTM C136/C136M	(2019) Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates
ASTM D1556/D1556M	(2015; E 2016) Standard Test Method for Density and Unit Weight of Soil in Place by Sand-Cone Method
ASTM D1557	(2012; E 2015) Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft3) (2700 kN-m/m3)
ASTM D3665	(2012; R 2017) Standard Practice for Random Sampling of Construction Materials
ASTM D4318	(2017; E 2018) Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM D4718/D4718M	(2015) Standard Practice for Correction of Unit Weight and Water Content for Soils Containing Oversize Particles
ASTM D6938	(2017a) Standard Test Method for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)
ASTM D7928	(2017) Standard Test Method for

	Particle-Size Distribution (Gradation) of Fine-Grained Soils Using the Sedimentation (Hydrometer) Analysis
ASTM E11	(2024) Standard Specification for Woven Wire Test Sieve Cloth and Test Sieves

OREGON DEPARTMENT OF TRANSPORTATION (ODOT)

ODOT SSC	(2024) Oregon Standard Specifications for Construction

1.2 DEGREE OF COMPACTION

Degree of compaction required, except as noted in the second sentence, is expressed as a percentage of the maximum laboratory dry density obtained by the test procedure presented in ASTM D1557 abbreviated as a percent of laboratory maximum dry density. Since ASTM D1557 applies only to soils that have 30 percent or less by weight of their particles retained on the 3/4 inch sieve, express the degree of compaction for material having more than 30 percent by weight of their particles retained on the 3/4 inch sieve as a percentage of the laboratory maximum dry density in accordance with ASTM D1557 Method C and corrected with ASTM D4718/D4718M.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" classification. Submittals not having a "G" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Plant, Equipment, and Tools; G

SD-06 Test Reports

Initial Tests; G

In-Place Tests; G

1.4 QUALITY ASSURANCE

Refer to ODOT SSC Section 00165 - Quality of Materials.

1.4.1 Sampling

Refer to ODOT SSC Section 00641.16 (b) - Aggregate Base and Shoulder Mixture and Section 00641.16 (c) Aggregate Subbase.

1.4.2 Tests

1.4.2.1 Gradation

Perform gradation in conformance with ASTM C117 and ASTM C136/C136M using sieves conforming to ASTM E11. Perform particle-size analysis of the soils in conformance with ASTM D7928.

1.4.2.2 Liquid Limit and Plasticity Index

Determine liquid limit and plasticity index in accordance with ASTM D4318.

1.4.2.3 Moisture-Density Determinations

Determine the laboratory maximum dry density and optimum moisture in accordance with Paragraph DEGREE OF COMPACTION.

1.4.2.4 Field Density Tests

Measure field density in accordance with ASTM D1556/D1556M, or ASTM D6938. For the method presented in ASTM D1556/D1556M, use the base plate, as shown in the drawing. For the method presented in ASTM D6938, check the calibration curves and adjust them, if necessary, using only the sand cone method as described in Annex A2, of the ASTM publication. Use ASTM D6938 to determine the moisture content of the soil. Check the calibration curves furnished with the moisture gauges along with density calibration checks as described in ASTM D6938. Make the calibration checks of both the density and moisture gauges using the prepared containers of material method, as described in Annex A2, in ASTM D6938, on each different type of material to be tested at the beginning of a job and at intervals as directed. Submit calibration curves and related test results prior to using the device or equipment being calibrated.

1.4.2.5 Wear Test

Perform wear tests on rigid pavement base course material in conformance with ASTM C131/C131M.

1.4.2.6 Weight of Slag

Determine weight per cubic foot of slag in accordance with ASTM C29/C29M.

1.5 ENVIRONMENTAL REQUIREMENTS

Perform construction when the atmospheric temperature is above 35 degrees F. When the temperature falls below 35 degrees F, protect all completed areas by approved methods against detrimental effects of freezing. Correct completed areas damaged by freezing, rainfall, or other weather conditions to meet specified requirements.

1.6 ACCEPTANCE

1.6.1 Tolerances

Refer to ODOT SSC Section 00165 - Quality of Materials.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Subbase Course

Refer to ODOT SSC Section 00641.10 (b) Subbase Aggregate.

2.1.2 Rigid Pavement Base Course

Provide aggregates conforming to ODOT SSC Section 02630.10 Dense-Graded

Aggregate.

2.2 TESTS, INSPECTIONS, AND VERIFICATIONS

2.2.1 Initial Tests

a. Perform one of each of the following Initial Tests on the proposed material prior to commencing construction to demonstrate that the proposed material meets all specified requirements prior to installation. Complete this testing for each source if materials from more than one source are proposed.

(1) Gradation including 0.02 mm size material.

(2) Liquid limit and plasticity index.

(3) Moisture-density relationship.

(4) Wear.

(5) Weight per cubic foot of Slag.

b. Submit certified copies of test results for approval not less than 30 days before material is required for the work.

2.2.2 Approval of Material

Tentative approval of material will be based on initial test results.

2.3 EQUIPMENT, TOOLS, AND MACHINES

All plant, equipment, and tools used in the performance of the work are subject to approval by the Government before the work is started. Maintain all plant, equipment, and tools in satisfactory working condition at all times. Submit a list of proposed equipment, including descriptive data. Use equipment capable of minimizing segregation, producing the required compaction, meeting grade controls, thickness control, and smoothness requirements as set forth herein.

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

Provide adequate drainage during the entire period of construction to prevent water from collecting or standing on the working area.

3.2 OPERATION OF AGGREGATE SOURCES

Refer to ODOT SSC Section 00641.15 (b) Preproduced Aggregate.

3.3 STOCKPILING MATERIAL

Refer to ODOT SSC Section 00641.11 Stockpiling.

3.4 PREPARATION OF UNDERLYING COURSE OR SUBGRADE

Refer to ODOT SSC Section 00641.40 Preparation of Foundation.

3.5 GRADE CONTROL

Provide a finished and completed subbase and rigid pavement base courses conforming to the lines, grades, and cross sections shown. Place line and grade stakes as necessary for control.

3.6 MIXING AND PLACING MATERIALS

Refer to ODOT SSC Section 00641.41 Mixing, Hauling, and Placing.

3.7 LAYER THICKNESS

Refer to ODOT SSC Section 00641.43 (a) Aggregate Base Courses and Section 00641.43 (b) Aggregate Subbase Courses.

3.8 COMPACTION

Refer to ODOT SSC Section 00641.44 (a) Aggregate Base Courses and Section 00641.44 (b) Aggregate Subbase and Shoulder Courses.

3.9 EDGES OF SUBBASE AND RIGID PAVEMENT BASE COURSE

Refer to ODOT SSC 00641.43 (c) Shoulder Courses.

3.10 FINISHING

Refer to ODOT SSC 00641.45 Surface Tolerance.

3.11 SMOOTHNESS TEST

Refer to ODOT SSC 00641.45 Surface Tolerance.

3.12 FIELD QUALITY CONTROL

3.12.1 In-Place Tests

Perform one of each of the following In-Place Tests on samples taken from the placed and compacted rigid pavement base course. Determine sample locations using random sampling in accordance with ASTM D3665. Take samples and test at the rates indicated.

a. Perform density tests on every lift of material placed and at a frequency of one set of tests for every 500 square yards, or portion thereof, of completed area.

b. Perform gradation including 0.02 mm size material on every lift of material placed and at a frequency of one gradation for every 1,000 square yards, or portion thereof, of material placed.

c. Perform liquid limit and plasticity index tests at the same frequency as the gradation.

d. Measure the thickness of each course at intervals providing at least one measurement for each 500 square yards or part thereof. Measure the thickness using test holes, at least 3 inches in diameter through the course.

3.12.2 Approval of Material

Final approval of the materials will be based on tests for gradation, liquid limit, and plasticity index performed on samples taken from the completed and fully compacted course(s).

3.13 TRAFFIC

Completed portions of the rigid pavement base course can be opened to limited traffic, provided there is no marring or distorting of the surface by the traffic. Do not allow heavy equipment on the completed rigid pavement base course except when necessary for construction. When it is necessary for heavy equipment to travel on the completed rigid pavement base course, protect the area against marring or damage to the completed work. Repair damage to meet these specifications.

3.14 MAINTENANCE

Refer to ODOT SSC 00641.60 - Care of the Work.

3.15 DISPOSAL OF UNSATISFACTORY MATERIALS

Refer to ODOT SSC 00165.50 (4) c. Remove and Replace.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 32 - EXTERIOR IMPROVEMENTS

SECTION 32 12 16.16 99

ROAD-MIX ASPHALT PAVING

PART 1 GENERAL

1.1 REFERENCES
1.2 SUBMITTALS

PART 2 PRODUCTS

2.1 ASPHALT
2.2 AGGREGATE BASE
2.3 TACK AND PRIME COATS
2.4 CRACK SEALANT
2.5 ADDITIVES

PART 3 EXECUTION

3.1 CONTRACTOR QUALITY CONTROL
3.1.1 General
3.1.2 QC Monitoring
3.1.3 Sampling
3.1.4 Design Grade
3.2 PREPARATION OF THE UNDERLYING SURFACE
3.2.1 Removal of Existing Asphalt
3.2.2 Underlying Existing Asphalt
3.2.3 Underlying Base Course
3.3 APPLICATION OF PRIME AND TACK COATS
3.4 PREPARATION, TRANSPORT, PLACEMENT, JOINTS, AND COMPACTION

-- End of Section Table of Contents --

SECTION 32 12 16.16 99

ROAD-MIX ASPHALT PAVING

PART 1 GENERAL

Work must be in accordance with the contract documents and the 2024 Oregon Department of Transportation Standard Specifications for Construction and subsequently issued special provisions. The Contractor is advised to review all sections of the 2024 OREGON STANDARD SPECIFICATIONS for changes made by errata/special provisions.

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM D2041/D2041M	(2011) Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures

OREGON DEPARTMENT OF TRANSPORTATION (ODOT)

ODOT SSC	(2024) Oregon Standard Specifications for Construction

1.2 SUBMITTALS

Government approval is required for submittals with a "G" classification. Submittals not having a "G" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Asphalt; G

Aggregate Base; G

Tack And Prime Coats; G

Crack Sealant; G

SD-06 Test Reports

Contractor Quality Control; G

PART 2 PRODUCTS

2.1 ASPHALT

Provide asphalt conforming to ODOT SSC Section 00744 - Asphalt Concrete

Pavement. Hot (or warm) mix asphalt concrete must be Level 2, 1/2 inch gradation mix. The mix design must be made by the asphalt manufacturer's Certified Mixture Design Technician (CMDT) and submitted to the Contracting Officer a minimum of 14 days prior to scheduled placement of asphalt.

2.2 AGGREGATE BASE

Provide aggregate subbase, base, and shoulders in accordance with ODOT SSC Section 00641.

2.3 TACK AND PRIME COATS

Prime and Tack Coat will be per ODOT SSC Sections 00705, 00730, and 00744.

2.4 CRACK SEALANT

Sealing material for sealing cracks will be per ODOT SSC Section 00746.

2.5 ADDITIVES

Comply with ODOT SSC Section 00744.11 for additives. If additives recommended by the supplier of warm mix asphalt do not meet the requirements of ODOT SSC Section 00744.11, describe why the additives are equal or better in the product data submittal.

PART 3 EXECUTION

3.1 CONTRACTOR QUALITY CONTROL

3.1.1 General

The Contractor must perform all Contractor Quality Control Tests as specified in ODOT SSC Section 00700 - WEARING SURFACES and as set forth in the Contractor's Quality Control Program. The testing program must include, but not be limited to tests for the control of:

a. Temperature (air, surface, asphalt).

b. In-place density.

c. Grade.

d. Smoothness.

3.1.2 QC Monitoring

Submit all QC test results to the Contracting Officer on a daily basis as the tests are performed. The Contracting Officer reserves the right to monitor any of the Contractor's quality control testing and to perform duplicate testing as a check to the Contractor's quality control testing. Notify Contracting Officer 48 hours before scheduled testing.

3.1.3 Sampling

When directed by the CO, the Contractor must sample and test any material which appears inconsistent with similar material being produced, unless such material is voluntarily removed and replaced or deficiencies corrected by the Contractor. All sampling must be in accordance with ODOT SSC procedures.

3.1.4 Design Grade

Pavement elevations must not vary more than 0.1 feet from the plan grade established and approved at site of work. Any deviation from the plan elevation will not be permitted in areas required for the proper functioning of drainage or limiting vehicle access. Using topographic survey equipment, measure pavement grades along the centerline and transverse road edges at intervals of 25 feet or less longitudinally. Skin patching for correcting low areas will not be permitted. High spots can be diamond ground up to 0.05 feet as an alternative to remove and replace in order to meet plan grade requirements at individual locations.

3.2 PREPARATION OF THE UNDERLYING SURFACE

3.2.1 Removal of Existing Asphalt

In areas where repair of existing pavement is required, the existing pavement must be removed to prepare a foundation for placing new surfacing. Sawcut pavement and tack coat existing pavement edges per ODOT Detail RD302. Prepare subgrade per Section 31 00 00.00 99, EARTHWORK.

3.2.2 Underlying Existing Asphalt

When preparing underlying existing asphalt, skin patch depressions less than 1 1/2 inches deep and remove pavement and repair subgrade for depressions more than 1 1/2 inches deep or where alligator cracking is larger than 4 square feet. At edges with existing and proposed structures (i.e. pavement, curbs, buildings, manholes), reshape existing paving a minimum of 5 feet from structure so that overlay pavement connects smoothly to established grades. Immediately before placing the asphalt, clean the underlying existing pavement of dust and debris. Apply a prime coat or tack coat in accordance with ODOT SSC requirements.

3.2.3 Underlying Base Course

Immediately before placing the hot-mix asphalt, the underlying base course must be cleaned of loose and foreign matter and inspected for adequate compaction, smoothness, grade, and cross section. If portions are found to not meet the accuracies specified, such portions must be corrected.

3.3 APPLICATION OF PRIME AND TACK COATS

Apply prime and tack coats per ODOT SSC Section 00730 and Section 00744.

3.4 PREPARATION, TRANSPORT, PLACEMENT, JOINTS, AND COMPACTION

The preparation, transport, placing, joints, and compaction of asphalt must meet the requirements of ODOT SSC Section 00700 - WEARING COURSES. Compact the mixture to a minimum of 91 percent maximum density in accordance with ASTM D2041/D2041M for lower lifts and compact the final (surface) lift to a minimum of 92 percent maximum density in accordance with ASTM D2041/D2041M. Compaction must be completed before the mix temperature falls below 180 degrees F. An asphalt thermometer must be furnished at the paver for the Government's use.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 32 - EXTERIOR IMPROVEMENTS

SECTION 32 13 13.06 99

PORTLAND CEMENT CONCRETE PAVEMENT FOR ROADS AND SITE FACILITIES

PART 1 GENERAL

1.1 REFERENCES
1.2 SUBMITTALS
1.3 QUALITY CONTROL
1.3.1 NRMCA Certificate of Conformance
1.3.2 Qualifications
1.3.2.1 Laboratory Accreditation
1.3.2.2 Field Technicians
1.3.3 Batch Tickets
1.4 DELIVERY, STORAGE, AND HANDLING
1.5 ACCEPTANCE
1.5.1 Tolerances
1.5.2 Test Section

PART 2 PRODUCTS

2.1 MATERIALS
2.1.1 Cementitious Materials
2.1.1.1 Portland Cement
2.1.1.2 Blended Cement
2.1.1.3 Fly Ash and Pozzolan
2.1.1.4 Ultra Fine Fly Ash and Ultra Fine Pozzolan
2.1.1.5 Slag
2.1.2 Water
2.1.3 Aggregate
2.1.3.1 Durability
2.1.3.2 Alkali Reactivity Test
2.1.3.3 Fine Aggregates
2.1.3.4 Coarse Aggregates
2.1.4 Chemical Admixtures
2.1.4.1 Water Reducing Admixtures
2.1.4.2 Air Entraining Admixture
2.1.5 Reinforcement
2.1.5.1 Dowel Bars
2.1.5.2 Tie Bars
2.1.5.3 Reinforcement
2.1.6 Curing Materials
2.1.6.1 White-Burlap-Polyethylene Sheet
2.1.6.2 Liquid Membrane-Forming Compound
2.1.6.3 Liquid Chemical Sealer-Hardener Compound
2.1.7 Joint Fillers and Sealants
2.1.8 Biodegradable Form Release Agent
2.1.9 Epoxy Resin
2.1.10 Joint Materials
2.1.10.1 Expansion Joint Materials

2.1.10.2 Slip Joint Material
2.2 MIX DESIGN
2.2.1 Specified Concrete Properties
2.2.1.1 Flexural Strength
2.2.1.2 Air Entrainment
2.2.1.3 Slump
2.2.1.4 Water/Cementitious Materials Ratio
2.2.2 Mix Design Report
2.2.3 Mix Verification
2.3 EQUIPMENT
2.3.1 Batching and Mixing
2.3.2 Transporting Equipment
2.3.3 Delivery Equipment
2.3.4 Paver-Finisher
2.3.4.1 Paver-Finisher with Fixed Forms
2.3.5 Texturing Equipment
2.3.5.1 Deep Texturing Equipment
2.3.6 Curing Equipment
2.3.7 Sawing Equipment
2.3.8 Straightedge

PART 3 EXECUTION

3.1 PREPARATION FOR PAVING
3.1.1 Weather Limitations
3.1.1.1 Inclement Weather
3.1.1.2 Hot Weather
3.1.1.3 Prevention of Plastic Shrinkage Cracking
3.1.1.4 Cold Weather
3.1.2 Conditioning of Underlying Material
3.1.3 Forms
3.1.4 Reinforcement
3.1.4.1 Dowel Bars
3.1.4.2 Tie Bars
3.2 MEASURING, MIXING, CONVEYING, AND PLACING CONCRETE
3.2.1 Measuring
3.2.2 Mixing
3.2.3 Conveying
3.2.4 Placing
3.3 PAVING
3.3.1 Paving Plan
3.3.2 Required Results
3.3.3 Operation
3.3.4 Consolidation
3.3.5 Fixed Form Paving
3.4 JOINTS
3.4.1 Construction Joints - Fixed Form Paving
3.4.2 Dowels Installed In Hardened Concrete
3.5 FINISHING CONCRETE
3.5.1 Machine Finishing
3.5.1.1 Equipment Operation
3.5.1.2 Joint Finish
3.5.1.3 Hand Finishing
3.5.2 Texturing
3.5.2.1 Wire-Comb Texturing
3.5.3 Edging
3.6 CURING AND PROTECTION
3.6.1 Moist Curing
3.6.2 White-Burlap-Polyethylene Sheet

3.6.3 Liquid Membrane-Forming Compound Curing
3.6.4 Protection of Treated Surfaces
3.7 FIELD QUALITY CONTROL
3.7.1 Sampling
3.7.2 Consistency Tests
3.7.3 Flexural Strength Tests
3.7.4 Air Content Tests
3.7.5 Surface Testing
3.7.5.1 Straightedge Testing Method
3.7.5.2 "Bumps" (Must Grind Areas)
3.7.5.3 Diamond Grinding
3.7.6 Plan Grade Testing and Conformance
3.7.7 Edge Slump
3.7.8 Test for Pavement Thickness
3.7.9 Dowels

-- End of Section Table of Contents --

SECTION 32 13 13.06 99

PORTLAND CEMENT CONCRETE PAVEMENT FOR ROADS AND SITE FACILITIES

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN CONCRETE INSTITUTE (ACI)

ACI 211.1	(1991; R 2009) Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete
ACI 305R	(2020) Guide to Hot Weather Concreting
ACI 306R	(2016) Guide to Cold Weather Concreting

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO M 227/M 227M	(2019) Standard Specifications for Steel Bars, Carbon, Merchant Quality, Mechanical Properties
AASHTO R 39	(2019) Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory
AASHTO T 23	(2020) Standard Method Test for Making and Curing Concrete Test Specimens in the Field
AASHTO T 24/T 24M	(2015) Standard Method of Test for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
AASHTO T 97	)2018) Standard Method of Test for Flexural Strength of Concrete (Using Simple Beam with Third- Point Loading)
AASHTO T 148	(2022) Standard Method of Test for Measuring Length of Drilled Concrete Cores
AASHTO T 152	(2019) Standard Method of Test for Air Content of Freshly Mixed Concrete by the Pressure Method

ASTM INTERNATIONAL (ASTM)

ASTM A615/A615M	(2022) Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement

ASTM A706/A706M	(2022a) Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement
ASTM A775/A775M	(2022) Standard Specification for Epoxy-Coated Steel Reinforcing Bars
ASTM A966/A966M	(2024) Standard Practice for Magnetic Particle Examination of Steel Forgings Using Alternating Current
ASTM A1035/A1035M	(2023a) Standard Specification for Deformed and Plain, Low-carbon, Chromium, Steel Bars for Concrete Reinforcement
ASTM C33/C33M	(2023) Standard Specification for Concrete Aggregates
ASTM C88	(2018) Standard Test Method for Soundness of Aggregates by Use of Sodium Sulfate or Magnesium Sulfate
ASTM C94/C94M	(2024a) Standard Specification for Ready-Mixed Concrete
ASTM C143/C143M	(2020) Standard Test Method for Slump of Hydraulic-Cement Concrete
ASTM C150/C150M	(2022) Standard Specification for Portland Cement
ASTM C171	(2020) Standard Specification for Sheet Materials for Curing Concrete
ASTM C260/C260M	(2010a; R 2016) Standard Specification for Air-Entraining Admixtures for Concrete
ASTM C309	(2019) Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C494/C494M	(2019; E 2022) Standard Specification for Chemical Admixtures for Concrete
ASTM C595/C595M	(2023) Standard Specification for Blended Hydraulic Cements
ASTM C618	(2023; E 2023) Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
ASTM C881/C881M	(2020a) Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete
ASTM C989/C989M	(2024) Standard Specification for Slag Cement for Use in Concrete and Mortars

ASTM C1017/C1017M	(2013; E 2015) Standard Specification for Chemical Admixtures for Use in Producing Flowing Concrete
ASTM C1077	(2024) Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation
ASTM C1260	(2023) Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method)
ASTM C1567	(2023) Standard Test Method for Potential Alkali-Silica Reactivity of Combinations of Cementitious Materials and Aggregate (Accelerated Mortar-Bar Method)
ASTM C1602/C1602M	(2022) Standard Specification for Mixing Water Used in Production of Hydraulic Cement Concrete
ASTM D1751	(2018) Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
ASTM D1752	(2018) Standard Specification for Preformed Sponge Rubber, Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction
ASTM D2995	(2023) Determining Application Rate of Bituminous Distributors

NATIONAL READY MIXED CONCRETE ASSOCIATION (NRMCA)

NRMCA QC 3	(2015) Quality Control Manual: Section 3, Plant Certifications Checklist: Certification of Ready Mixed Concrete Production Facilities

OREGON DEPARTMENT OF TRANSPORTATION (ODOT)

ODOT SSC	(2024) Oregon Standard Specifications for Construction

WESTERN ALLIANCE QUALITY TRANSPORTATION CONSTRUCTION (WAQTC)

WAQTC TM 2	(2015) Sampling Freshly Mixed Concrete

1.2 SUBMITTALS

Government approval is required for submittals with a "G" classification. Submittals not having a "G" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Paving Plan

SD-03 Product Data

Curing Materials; G

Reinforcement; G

Epoxy Resin; G

Cementitious Materials; G

Dowel Bars; G

Expansion Joint Filler; G

SD-04 Samples

Test Section; G

SD-05 Design Data

Mix Design Report; G

SD-06 Test Reports

Concrete Slump Tests

Concrete Uniformity

Flexural Strength

Air Content

SD-07 Certificates

Batch Tickets

NRMCA Certificate Of Conformance

SD-08 Manufacturer's Instructions

Diamond Grinding Plan

1.3 QUALITY CONTROL

1.3.1 NRMCA Certificate of Conformance

Provide a batching and mixing plant consisting of a stationary-type central mix plant, including permanent installations and portable or relocatable plants installed on stable foundations. Provide a plant designed and operated to produce concrete within the specified tolerances, with a minimum capacity of 50 cubic yards per hour. Submit NRMCA Certificate of Conformance that conforms to the requirements of NRMCA QC 3 including provisions addressing:

a. Material Storage and Handling

b. Batching Equipment

c. Central Mixer

d. Ticketing System

e. Delivery System

1.3.2 Qualifications

1.3.2.1 Laboratory Accreditation

Perform sampling and testing using an approved commercial testing laboratory or on-site facilities that are accredited in accordance with ASTM C1077. Do not start work requiring testing until the facilities have been inspected and approved. The Government will inspect all laboratories requiring validation for equipment and test procedures prior to the start of any concreting operations for conformance to ASTM C1077. Schedule and provide payment for laboratory inspections. Additional payment or a time extension due to failure to acquire the required laboratory validation is not allowed. Maintain this certification for the duration of the project.

1.3.2.2 Field Technicians

Provide field technicians meeting one of the following criteria:

a. Have at least one National Ready Mixed Concrete Association (NRMCA) certified concrete craftsman and at least one American Concrete Institute (ACI) Flatwork Finisher Certified craftsman on site, overseeing each placement crew during all concrete placement.

b. Have no less than three NRMCA certified concrete installers and at least two American Concrete Institute (ACI) Flatwork Finisher Certified installers on site working as members of each placement crew during all concrete placement.

1.3.3 Batch Tickets

Submit batch tickets for each load of ready-mixed concrete in accordance with ASTM C94/C94M.

1.4 DELIVERY, STORAGE, AND HANDLING

Deliver concrete paving in accordance with ASTM C94/C94M.

1.5 ACCEPTANCE

1.5.1 Tolerances

Acceptance of Portland cement concrete pavement is based on compliance with the tolerances presented in Table 1. Remove and replace concrete pavement represented by the failing tests or submit repair plan for approval.

Table 1	
Measurement	Tolerance
PLASTIC CONCRETE	
Slump	plus 0, minus 1.5 inches
Air Content	plus/minus 1.5 percent
Flexural Strength	No individual specimen less than 100 psi below specified strength.
HARDENED CONCRETE	
Grade	plus/minus 0.05 feet from plan
Smoothness	No abrupt change exceeding 1/8 inch
Straightedge	Not more than 1/8 in for roads. Not more than 1/4 in for open storage areas.
Profilograph	Not more than 9 inches/mile
Thickness	minus 1/2 inch for pavement less than 8 inches thick.
Edge Slump	85 percent less than 1/4 inch and 100 percent less than 3/8 inch.

1.5.2 Test Section

a. Construct a minimum 400 square feet test section to demonstrate typical joints, surface finish, texture, color, thickness, and standard of workmanship using the mixture proportions, materials, and equipment as proposed for the project. Test in accordance with requirements in FIELD QUALITY CONTROL.

b. When a test section does not meet one or more of the tolerances in Table 1, remove and reconstruct the test section. If the test section is acceptable, it may be incorporated into the project.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Cementitious Materials

Provide cementitious materials in concrete mix with 20 to 50 percent non-portland cement pozzolanic materials or slag by weight, that meets ODOT SSC Section 02001.

2.1.1.1 Portland Cement

Conforming to ASTM C150/C150M, Type I or II III, for high early concrete.

2.1.1.2 Blended Cement

Provide blended cement conforming to ASTM C595/C595M, Type IP or IS, including the optional requirement for mortar expansion and sulfate

soundness. Provide pozzolan added to the Type IP blend consisting of ASTM C618 Class F or Class N and that is interground with the cement clinker. Include in written statement from the manufacturer that the amount of pozzolan in the finished cement does not vary more than plus or minus five mass percent of the finished cement from lot to lot or within a lot. The percentage and type of mineral admixture used in the blend are not allowed to change from that submitted for the aggregate evaluation and mixture proportioning. The requirements of Paragraph SUPPLEMENTARY CEMENTITIOUS MATERIALS (SCM) Content do not apply to the SCM content of blended cement.

2.1.1.3 Fly Ash and Pozzolan

Conforming to ASTM C618, Type F, or N, with a loss on ignition not exceeding six percent. Include test results in accordance with ASTM C618.

2.1.1.4 Ultra Fine Fly Ash and Ultra Fine Pozzolan

Ultra Fine Fly Ash (UFFA) and Ultra Fine Pozzolan (UFP) conforming to ASTM C618, Class F or N, and the following additional requirements:

a. The strength activity index at 28 days of age at least 95 percent of the control specimens.

b. The average particle size not exceeding six microns.

c. Loss on ignition not exceeding six percent.

2.1.1.5 Slag

Conforming to ASTM C989/C989M, Slag Cement (formerly Ground Granulated Blast Furnace Slag) Grade 100 or 120. Include test results in accordance with ASTM C989/C989M.

2.1.2 Water

Water conforming to ASTM C1602/C1602M.

2.1.3 Aggregate

2.1.3.1 Durability

Evaluate and test all fine and coarse aggregates to be used in all concrete for durability in accordance with ASTM C88 and ODOT SSC Section 00755. Provide fine and coarse aggregates with a maximum of 18 percent loss when subjected to five cycles using Magnesium Sulfate or a maximum of 12 percent loss when subjected to five cycles of Sodium Sulfate.

2.1.3.2 Alkali Reactivity Test

Evaluate and test fine and coarse aggregates to be used in all concrete for alkali-aggregate reactivity in accordance with ODOT SSC Section 00755. Test all size groups and sources proposed for use.

a. Evaluate the fine and coarse aggregates separately, using ASTM C1260. Reject individual aggregates with test results that indicate an expansion of greater than 0.08 percent after 28 days of immersion in 1N NaOH solution, or perform additional testing as follows: utilize the proposed low alkali portland cement, blended cement, or SCM in

combination with each individual aggregate. Test in accordance with ASTM C1567. Determine the quantity that meets all the requirements of these specifications and that lowers the expansion equal to or less than 0.08 percent after 28 days of immersion in a 1N NaOH solution. Base the mixture proportioning on the highest percentage of SCM required to mitigate ASR-reactivity.

b. If any of the above options does not lower the expansion to less than 0.08 percent after 28 days of immersion in a 1N NaOH solution, reject the aggregate(s) and submit new aggregate sources for retesting. Submit the results of testing for evaluation and acceptance.

2.1.3.3 Fine Aggregates

Conforming to the quality and gradation of ASTM C33/C33M.

2.1.3.4 Coarse Aggregates

Coarse aggregate consisting of crushed or uncrushed gravel, crushed stone, or a combination thereof. Provide aggregates, as delivered to the mixers, consisting of clean, hard, uncoated particles. Wash coarse aggregate sufficient to remove dust and other coatings. Provide fine aggregate consisting of natural sand, manufactured sand, or a combination of the two, and composed of clean, hard, durable particles. Provide both coarse and fine aggregates meeting the requirements of ASTM C33/C33M.

a. Gradation: Provide coarse aggregate with a nominal maximum size of 1.5 inches. Grade and provide the individual aggregates in two or more size groups meeting the individual grading requirements of ASTM C33/C33M, Size No. 4 (1.5 to 0.75 inch) and Size No. 67 (0.75 inch to No. 4).

b. Quality: Conforming to ASTM C33/C33M, Class 4S.

2.1.4 Chemical Admixtures

2.1.4.1 Water Reducing Admixtures

Provide admixture conforming to ASTM C494/C494M: Type A, water reducing; Type B, retarding; Type C, accelerating; Type D, water-reducing and retarding; and Type E, water-reducing and accelerating admixture. Do not use calcium chloride admixtures. ASTM C494/C494M Type S specific performance admixtures and ASTM C1017/C1017M flowable admixtures are not allowed.

2.1.4.2 Air Entraining Admixture

Conforming to ASTM C260/C260M: Air-entraining.

2.1.5 Reinforcement

2.1.5.1 Dowel Bars

Dowel bars conforming to ASTM A615/A615M, Grade 40 and Grade 60, or AASHTO M 227/M 227M for Grades 70, 75, and 80 for plain billet-steel bars of the size and length indicated. Remove all burrs and projections from the bars. Epoxy coat in accordance with ASTM A775/A775M.

2.1.5.2 Tie Bars

Billet or axle steel deformed bars conforming to ASTM A615/A615M or ASTM A966/A966M Grade 40 and Grade 60. Epoxy coat in accordance with ASTM A775/A775M.

2.1.5.3 Reinforcement

Furnish deformed bar reinforcement form the QPL and conforming to the requirements of ASTM A706/A706M, ASTM A615/A615M, or ASTM A1035/A1035M, Grade 60. Epoxy coat in accordance with ASTM A775/A775M.

2.1.6 Curing Materials

Provide curing materials consisting of:

2.1.6.1 White-Burlap-Polyethylene Sheet

Conforming to ASTM C171, 0.004 inch thick white opaque polyethylene bonded to 10 oz/linear yard (40 inch) wide burlap.

2.1.6.2 Liquid Membrane-Forming Compound

Conforming to ASTM C309, white pigmented, Type 2, Class B, free of paraffin or petroleum in accordance with ODOT SSC Section 00755.

2.1.6.3 Liquid Chemical Sealer-Hardener Compound

Compound consisting of magnesium fluosilicate which when mixed with water seals and hardens the surface of the concrete. Do not use on exterior slabs exposed to freezing conditions.

2.1.7 Joint Fillers and Sealants

Provide as specified in Section 32 01 19.61 99 SEALING OF JOINTS IN RIGID PAVEMENT. Match new joints with existing alignment.

2.1.8 Biodegradable Form Release Agent

Provide form release agent that is colorless and biodegradable. Provide product that does not bond with, stain, or adversely affect concrete surfaces and does not impair subsequent treatments of concrete surfaces. Provide form release agent with a minimum of 87 percent biobased material and does not contain diesel fuel, petroleum-based lubricating oils, waxes, or kerosene.

2.1.9 Epoxy Resin

Provide epoxy-resin materials that consist of two-component materials conforming to the requirements of ASTM C881/C881M, Class as appropriate for each application temperature to be encountered, except that in addition, the materials meet the following requirements:

a. Type IV, Grade 3, for use for embedding dowels and anchor bolts.

b. Type III, Grade as approved, for use as patching materials for complete filling of spalls and other voids and for use in preparing epoxy resin mortar.

c. Type IV, Grade 1, for use for injecting cracks.

d. Type V, Grade as approved, for bonding freshly mixed portland cement concrete or mortar or freshly mixed epoxy resin concrete or mortar to hardened concrete.

2.1.10 Joint Materials

2.1.10.1 Expansion Joint Materials

Provide preformed expansion joint filler material conforming to ASTM D1751 or ASTM D1752 Type II or III. Provide expansion joint filler that is 3/4 inch thick, unless otherwise indicated, and provided in a single full depth piece.

2.1.10.2 Slip Joint Material

Provide slip joint material that is 1/4 inch thick expansion joint filler, unless otherwise indicated, conforming to Paragraph EXPANSION JOINT MATERIAL.

2.2 MIX DESIGN

Proportion concrete mix in accordance with ACI 211.1 except as modified herein.

2.2.1 Specified Concrete Properties

2.2.1.1 Flexural Strength

Provide concrete with a minimum flexural strength of 650 psi at 28 days of age in accordance with ODOT SSC Section 02001.

2.2.1.2 Air Entrainment

Provide an entrained air content of five and a half percent in accordance with ODOT SSC Section 02001.

2.2.1.3 Slump

For fixed form and hand placement, provide a maximum slump of 3 inches in accordance with ODOT SSC Section 02001.

2.2.1.4 Water/Cementitious Materials Ratio

Maximum allowable water-cementitious material ratio is 0.45. The water-cementitious material ratio is based on absolute volume equivalency, where the ratio is determined using the weight of cement for a cement only mix, or using the total volume of cement plus pozzolan converted to an equivalent weight of cement by the absolute volume equivalency method described in ACI 211.1.

2.2.2 Mix Design Report

Perform trial design batches, mixture proportioning studies, testing, and include test results demonstrating that the proposed mixture proportions produce concrete of the qualities indicated in accordance with ODOT SSC Section 02001. An existing mix design may be submitted if developed within the previous 12 months. Submit test results in a mix design report to

include:

a. Coarse and fine aggregate gradations and plots.

b. Coarse and fine aggregate quality test results, include deleterious materials and ASR testing.

c. Mill certificates for cement and supplemental cementitious materials.

d. Certified test results for all proposed admixtures.

e. Specified flexural strength, slump, and air content.

f. Recommended proportions and volumes for proposed mixture and each of three trial water-cementitious materials ratios.

g. Individual beam breaks.

h. Flexural strength summaries and plots.

i. Historical record of test results, documenting production standard deviation (if available).

j. Narrative discussing methodology on how the mix design was developed.

2.2.3 Mix Verification

Mix verification tests may be performed by the Government. Provide quantities of cementitious materials, aggregates and admixtures as requested in accordance with ODOT SSC Section 02001.

2.3 EQUIPMENT

2.3.1 Batching and Mixing

Provide batching and mixings conforming to ODOT SSC Section 02001. Provide truck mixers. Provide a batch plant conforming to ASTM C94/C94M and as specified. Do not weigh water or measure cumulatively with another ingredient. Batch all concrete materials in accordance with ASTM C94/C94M requirements. Verify batching, mixers, mixing time, permitted reduction of mixing time, and concrete uniformity in accordance with the requirements of ASTM C94/C94M, and document in the initial weekly QC Report. Do not use truck mixers for mixing slipformed concrete. Provide only truck mixers designed for mixing or transporting paving concrete with extra large blading and rear opening specifically for low-slump paving concrete and conforming to the requirements of ASTM C94/C94M.

2.3.2 Transporting Equipment

Provide transporting equipment in conformance with ASTM C94/C94M and as specified herein. Transport concrete to the paving site in rear-dump trucks, in truck mixers designed with extra large blading and rear opening specifically for low slump concrete, or in agitators. Do not permit bottom-dump trucks for delivery of concrete.

2.3.3 Delivery Equipment

Deliver concrete conforming to ODOT SSC Section 02001. When concrete transport equipment cannot operate on the paving lane, provide

side-delivery transport equipment consisting of self-propelled moving conveyors to deliver concrete from the transport equipment and discharge it in front of the paver. Do not permit front-end loaders, dozers, or similar equipment to distribute the concrete.

2.3.4 Paver-Finisher

Provide a heavy-duty, self-propelled paver-finisher machine designed specifically for paving and finishing high quality pavement and capable of spreading, consolidating, and shaping the plastic concrete to the desired cross section in one pass. Provide a paver-finisher weighing at least 2200 lb/foot of lane width, and powered by an engine having at least 6.0 horsepower/foot of lane width. Equip the paver-finisher with a full width "knock-down" auger, capable of operating in both directions, which will evenly spread the fresh concrete in front of the screed or extrusion plate. Gang-mount immersion vibrators at the front of the paver on a frame equipped with suitable controls so that all vibrators can be operated at any desired depth within the slab or completely withdrawn from the concrete. Automatically control the vibrators so they will be immediately stopped as forward motion of the paver ceases. Space the immersion vibrators across the paving lane as necessary to properly consolidate the concrete, but limit the clear distance between vibrators not to exceed 30 inches, and the outside vibrators not to exceed 12 inches from the edge of the lane. Vibrators may be pneumatic, gas driven, or electric, and operated at frequencies within the concrete between 6,000 and 7,000 vibrations per minute, with an amplitude of vibration such that noticeable vibrations occur at 1.5 foot radius when the vibrator is inserted in the concrete to the depth specified. Equip the paver-finisher with a transversely oscillating screed or an extrusion plate to shape, compact, and smooth the surface.

2.3.4.1 Paver-Finisher with Fixed Forms

Equip the paver-finisher with wheels designed to ride the forms, keep it aligned with the forms, and to prevent deformation of the forms.

2.3.5 Texturing Equipment

Provide texturing equipment as specified below.

2.3.5.1 Deep Texturing Equipment

Provide texturing equipment consisting of a comb with steel-tine tool which will produce true, even grooves, and in accordance with ODOT SSC Section 00755. Mount this drag in a wheeled frame spanning the paving lane and constructed to mechanically pull the drag in a straight line across the paving lane perpendicular to the centerline.

2.3.6 Curing Equipment

Provide coring equipment conforming to ODOT SSC Section 02001. Provide equipment for applying membrane-forming curing compound mounted on a self-propelled frame that spans the paving lane. Constantly agitate the curing compound reservoir mechanically (not air) during operation and provide a means for completely draining the reservoir. Provide a spraying system that consists of a mechanically powered pump which maintains constant pressure during operation, an operable pressure gauge, and either a series of spray nozzles evenly spaced across the lane to provide uniformly overlapping coverage or a single spray nozzle which is mounted on

a carriage which automatically traverses the lane width at a speed correlated with the forward movement of the overall frame. Protect all spray nozzles with wind screens. Calibrate the spraying system in accordance with ASTM D2995, Method A, for the rate of application required in subpart CURING AND PROTECTION. Provide hand-operated sprayers powered by compressed air supplied by a mechanical air compressor. Immediately replace curing equipment if it fails to apply an even coating of compound at the specified rate.

2.3.7 Sawing Equipment

Provide equipment for sawing joints and for other similar sawing of concrete consisting of standard diamond-type concrete saws mounted on a wheeled chassis which can be easily guided to follow the required alignment. Provide diamond tipped blades. If demonstrated to operate properly, abrasive blades may be used. Provide spares as required to maintain the required sawing rate. Early-entry saws may be used, subject to demonstration and approval. No change to the initial sawcut depth is permitted.

2.3.8 Straightedge

Furnish one 12 foot straightedge constructed of aluminum or magnesium alloy, having blades of box or box-girder cross section with flat bottom, adequately reinforced to insure rigidity and accuracy. Provide handles for operation on the pavement.

PART 3 EXECUTION

3.1 PREPARATION FOR PAVING

3.1.1 Weather Limitations

When windy conditions during paving appear probable, have equipment and material at the paving site to provide windbreaks, shading, fogging, or other action to prevent plastic shrinkage cracking or other damaging drying of the concrete. Comply with weather limitations per ODOT SSC Section 00755.

3.1.1.1 Inclement Weather

Do not commence placing operations when heavy rain or other damaging weather conditions appear imminent. At all times when placing concrete, maintain on-site sufficient waterproof cover and means to rapidly place it over all unhardened concrete or concrete that might be damaged by rain. Suspend placement of concrete whenever rain, high winds, or other damaging weather commences to damage the surface or texture of the placed unhardened concrete, washes cement out of the concrete, or changes the water content of the surface concrete. Immediately cover and protect all unhardened concrete from the rain or other damaging weather. Completely remove and replace any slab damaged by rain or other weather full depth, by full slab width, to the nearest original joint.

3.1.1.2 Hot Weather

Maintain required concrete temperature in accordance with ACI 305R to prevent evaporation rate from exceeding 0.2 pound of water per square foot of exposed concrete per hour. Cool ingredients before mixing, place concrete during cooler night time hours, or use other suitable means to

control concrete temperature and prevent rapid drying of newly placed concrete. Water is not allowed to be added after the initial introduction of mixing water except, when on arrival at the job site, the slump is less than specified and the water-cement ratio is less than that given as a maximum in the approved mixture. Additional water may be added to bring the slump within the specified range provided the approved water-cement ratio is not exceeded. Inject water into the head of the mixer (end opposite the discharge opening) drum under pressure, and turn the drum or blades a minimum of 30 additional revolutions at mixing speed. The addition of water to the batch at any later time is not allowed. After placement, use fog spray, apply monomolecular film, or use other suitable means to reduce the evaporation rate. Start curing when surface of fresh concrete is sufficiently hard to permit curing without damage. Cool underlying material by sprinkling lightly with water before placing concrete. Follow practices found in ACI 305R.

3.1.1.3 Prevention of Plastic Shrinkage Cracking

During weather with low humidity, and particularly with high temperature and appreciable wind, develop and institute measures to prevent plastic shrinkage cracks from developing. If plastic shrinkage cracking occurs, halt further placement of concrete until protective measures are in place to prevent further cracking. Periods of high potential for plastic shrinkage cracking can be anticipated by use of ACI 305R. In addition to the protective measures specified in the previous paragraph, the concrete placement may be further protected by erecting shades and windbreaks and by applying fog sprays of water, the addition of monomolecular films, or wet covering. Apply monomolecular films after finishing is complete, do not use in the finishing process. Immediately commence curing procedures when such water treatment is stopped.

3.1.1.4 Cold Weather

Do not place concrete when ambient temperature is below 40 degrees F or when concrete is likely to be subjected to freezing temperatures within 24 hours. When authorized, when concrete is likely to be subjected to freezing within 24 hours after placing, heat concrete materials so that temperature of concrete when deposited is between 65 and 80 degrees F. Methods of heating materials are subject to approval. Do not heat mixing water above 165 degrees F. Remove lumps of frozen material and ice from aggregates before placing aggregates in mixer. Follow practices found in ACI 306R.

3.1.2 Conditioning of Underlying Material

Verify the underlying material, upon which concrete is to be placed is clean, damp, and free from debris, waste concrete or cement, frost, ice, and standing or running water. Prior to setting forms or placement of concrete, verify the underlying material is well drained and has been satisfactorily graded by string-line controlled, automated, trimming machine and uniformly compacted in accordance with the applicable Section of these specifications. Test the surface of the underlying material to crown, elevation, and density in advance of setting forms or of concrete placement using slip-form techniques. Trim high areas to proper elevation. Fill and compact low areas to a condition similar to that of surrounding grade, or fill with concrete monolithically with the pavement. Low areas filled with concrete are not to be cored for thickness to avoid biasing the average thickness used for evaluation and payment adjustment. Rework and compact any underlying material disturbed by construction

operations to specified density immediately in front of the paver. If a slipform paver is used, continue the same underlying material under the paving lane beyond the edge of the lane a sufficient distance that is thoroughly compacted and true to grade to provide a suitable trackline for the slipform paver and firm support for the edge of the paving lane.

3.1.3 Forms

Use steel forms, except that wood forms may be used for curves having a radius of 150 feet or less, and for fillets. Forms may be built up with metal or wood, added only to the base, to provide an increase in depth of not more than 25 percent. Provide forms with the base width not less than eight-tenths of the vertical height of the form, except that for forms 8 inches or less in vertical height, provide forms with a base width not less than the vertical height of the form. Provide wood forms adequate in strength and rigidly braced for curves and fillets. Set forms on firm material cut true to grade so that each form section when placed will be firmly in contact with the underlying layer for its entire base. Do not set forms on blocks or on built-up spots of underlying material. Before placing the concrete, coat the contact surfaces of forms with a non-staining mineral oil, non-staining form coating compound, biodegradable form release agent, or two coats of nitro-cellulose lacquer. When using existing pavement as a form, clean existing concrete and then coat with asphalt emulsion bondbreaker before concrete is placed. Check and correct grade elevations and alignment of the forms immediately before placing concrete.

3.1.4 Reinforcement

3.1.4.1 Dowel Bars

Install dowels with horizontal and vertical alignment plus or minus 1 inch. Except as otherwise specified, maintain location of dowels within a skew alignment of 1/4 inch over 1 foot length. Reject coatings which are perforated, cracked or otherwise damaged. While handling avoid scuffing or gouging of the coatings. Omit Dowels when the center of the dowel is located within a horizontal distance from an intersecting joint equal to or less than one-fourth of the slab thickness. Maintain dowels in position during concrete placement and curing. Before concrete placement, thoroughly grease the entire length of each dowel secured in a dowel basket or fixed form.

3.1.4.2 Tie Bars

Install bars, accurately aligned horizontally and vertically, and to the tolerances shown on the drawings, at indicated locations.

3.2 MEASURING, MIXING, CONVEYING, AND PLACING CONCRETE

3.2.1 Measuring

Conform to ASTM C94/C94M.

3.2.2 Mixing

Comply with mixing concrete per ODOT SSC Section 00755 and Section 02001. Conform to ASTM C94/C94M, except as modified herein. Begin mixing within 30 minutes after cement has been added to aggregates. When the air temperature is greater than 85 degrees F, place concrete within 60

minutes. With approval, a hydration stabilizer admixture meeting the requirements of ASTM C494/C494M Type D, may be used to extend the placement time to 90 minutes. Additional water may be added to bring slump within required limits as specified in ASTM C94/C94M, provided that the specified water-cement ratio is not exceeded.

3.2.3 Conveying

Conform to ASTM C94/C94M.

3.2.4 Placing

Comply with placing concrete per ODOT SSC Section 00755. Do not exceed a free vertical drop of 5 feet from the point of discharge. Deposit concrete either directly from the transporting equipment or by conveyor on to the pre-wetted subgrade or subbase, unless otherwise specified. Deposit the concrete between the forms to an approximately uniform height. Place concrete continuously at a uniform rate, without damage to the grade and without unscheduled stops except for equipment failure or other emergencies. If an unscheduled stop occurs within 10 feet of a previously placed expansion joint, remove concrete back to joint, repair any damage to grade, install a construction joint and continue placing concrete only after cause of the stop has been corrected.

3.3 PAVING

Construct pavement with paving and finishing equipment utilizing fixed forms, with the exception of curved roads where paving equipment isn't practical, where finishing by hand would be utilized.

3.3.1 Paving Plan

Submit for approval a paving plan identifying the following items:

a. A description of the placing and protection methods proposed when concrete is to be placed in or exposed to hot, cold, or rainy weather conditions.

b. A detailed paving sequence plan and proposed paving pattern showing all planned construction joints.

c. Plan and equipment proposed to control alignment of formed or sawn joints within the specified tolerances.

3.3.2 Required Results

Operate the paver-finisher to produce a thoroughly consolidated slab throughout, true to line and grade within specified tolerances. Adjust the paver-finishing operation to produce a surface finish free of irregularities, tears, voids of any kind, and other discontinuities, with only a minimum of paste at the surface. Do not permit multiple passes of the paver-finisher. Produce a finished surface requiring no hand finishing, other than the use of cutting straightedges, except in very infrequent instances. Do not apply water, other than true fog sprays (mist), to the concrete surface during paving and finishing.

3.3.3 Operation

When the paver is operated between or adjacent to previously constructed

pavement (fill-in lanes), make provisions to prevent damage to the previously constructed pavement, including keeping the existing pavement surface free of debris, and placing rubber mats beneath the paver tracks. Operate transversely oscillating screeds and extrusion plates to overlap the existing pavement the minimum possible, but in no case more than 8 inches.

3.3.4 Consolidation

Immediately after spreading concrete, consolidate full depth with internal type vibrating equipment along the boundaries of all slabs regardless of slab thickness, and interior of all concrete slabs. For pavements less than 10 inches thick, operate vibrators at mid-depth parallel with or at a slight angle to the base course. For thicker pavements, angle vibrators toward the vertical, with vibrator tip preferably about 2 inches above the base course, and top of vibrator a few inches below pavement surface. Automatically control the vibrators or tamping units in front of the paver so that they stop immediately as forward motion ceases. Limit duration of vibration to that necessary to produce consolidation of concrete. Do not permit excessive vibration. Vibrate concrete in small, odd-shaped slabs or in locations inaccessible to the paver mounted vibration equipment with a hand-operated immersion vibrator operated from a bridge spanning the area. Do not operate vibrators at one location for more than 15 seconds. Do not use vibrators to transport or spread the concrete.

3.3.5 Fixed Form Paving

Spread and strike off concrete with with the paver. Shape the concrete to the specified and indicated cross section in one pass, and finish the surface and edges so that only a very minimum amount of hand finishing is required. Use single spud hand vibrators to consolidate the concrete adjacent to fixed forms as required to achieve a void-free formed edge. Do not allow vibrators to contact reinforcement, forms, or the grade during vibration.

3.4 JOINTS

3.4.1 Construction Joints - Fixed Form Paving

Install dowels by the bonded-in-place method, supported by means of devices fastened to the forms. Do not permit installation by removing and replacing in preformed holes.

3.4.2 Dowels Installed In Hardened Concrete

Install by bonding the dowels into holes drilled into the hardened concrete. Drill holes into the hardened concrete approximately 1/8 inch greater in diameter than the dowels. Bond the dowels in the drilled holes using epoxy resin injected at the back of the hole before installing the dowel and extruded to the collar during insertion of the dowel so as to completely fill the void around the dowel. Application by buttering the dowel is not permitted. Hold the dowels in alignment at the collar of the hole, after insertion and before the epoxy resin hardens, by means of a suitable metal or plastic collar fitted around the dowel. Check the vertical alignment of the dowels by placing the straightedge on the surface of the pavement over the top of the dowel and measuring the vertical distance between the straightedge and the beginning and ending point of the exposed part of the dowel.

3.5 FINISHING CONCRETE

Start finishing operations immediately after placement of concrete. Use finishing machine, except hand finishing may be used in emergencies and for concrete slabs in inaccessible locations or of such shapes or sizes that machine finishing is impracticable. Immediately halt any operations which produce more than 1/8 inch of mortar-rich surface (defined as deficient in plus U.S. No. 4 sieve size aggregate) and modify the equipment, mixture, or procedures. Finish pavement surface on both sides of a joint to the same grade. Finish formed joints from a securely supported transverse bridge. Provide hand finishing equipment for use at all times.

3.5.1 Machine Finishing

Strike off and screed concrete to the required crown and cross-section by a power-driven transverse finishing machine. A transverse rotating tube or pipe is not permitted. Maintain elevation of concrete such that, when consolidated and finished, pavement surface will be adequately consolidated and at the required grade. Equip finishing machine with a screed which is readily and accurately adjustable for changes in pavement crown and compensation for wear and other causes. Do not permit excessive operation over an area, which will result in an excess of mortar and water being brought to the surface.

3.5.1.1 Equipment Operation

Maintain the travel of machine on the forms without lifting, wobbling, or other variation of the machine which tend to affect the precision of concrete finish. Keep the tops of the forms clean by a device attached to the machine. Maintain a uniform ridge of concrete ahead of the front screed for its entire length.

3.5.1.2 Joint Finish

Before concrete is hardened, correct edge slump of pavement, exclusive of edge rounding, in excess of 0.25 inches. Finish concrete surface on each side of construction joints to the same plane, and correct deviations before newly placed concrete has hardened.

3.5.1.3 Hand Finishing

Strike-off and screed surface of concrete to elevations slightly above finish grade so that when concrete is consolidated and finished, the pavement surface is at the indicated elevation. Vibrate entire surface until required compaction and reduction of surface voids is secured with a strike-off template. After initial finishing, further smooth and consolidate concrete by means of hand-operated longitudinal floats.

3.5.2 Texturing

Before the surface sheen has disappeared and before the concrete hardens, provide a texture to the surface of the pavement as described herein. After curing is complete, thoroughly broom all textured surfaces to remove all debris. Finish the concrete in areas of recesses for lighting fixtures, and other outlets in the pavement to provide a surface of the same texture as the surrounding area.

3.5.2.1 Wire-Comb Texturing

Comply with ODOT SSC Section 00755 for textured finish. Apply surface texture transverse to the pavement center line using a mechanical steel-tine tool comb drag capable of traversing the full width of the pavement in a single pass at a uniform speed and with a uniform pressure. Avoid overlap successive passes of the comb the minimum necessary to obtain a continuous and uniformly textured surface, with scores 1/8 to 3/16 inch deep, 1/8 inch wide, and spaced 3/4 inch apart.

3.5.3 Edging

Comply with ODOT SSC Section 00755 edge tooling and filling. At the time the concrete has attained a degree of hardness suitable for edging, carefully finish slab edges, including edges at formed joints, with an edge having a maximum radius of 1/8 inch. Clean by removing loose fragments and soupy mortar from corners or edges of slabs which have crumbled and areas which lack sufficient mortar for proper finishing. Refill voids solidly with a mixture of suitable proportions and consistency and refinish. Remove unnecessary tool marks and edges. Smooth remaining edges true to line.

3.6 CURING AND PROTECTION

Protect concrete adequately from injurious action by sun, rain, flowing water, frost, mechanical injury, tire marks and oil stains, and do not allow it to dry out from the time it is placed until the expiration of the minimum curing periods specified herein. Do not use membrane-forming compound on surfaces where its appearance would be objectionable, on surfaces to be painted, where coverings are to be bonded to concrete, or on concrete to which other concrete is to be bonded.

3.6.1 Moist Curing

Comply with ODOT SSC Section 00755 curing concrete. Maintain concrete to be moist-cured continuously wet for the entire curing period, or until curing compound is applied, commencing immediately after finishing. If forms are removed before the end of the curing period, provide curing on unformed surfaces, using suitable materials. Cure surfaces by ponding, by continuous sprinkling, by continuously saturated burlap or cotton mats, or by continuously saturated plastic coated burlap. Provide burlap and mats that are clean and free from any contamination and completely saturated before being placed on the concrete. Lap sheets to provide full coverage. Provide an approved work system to ensure that moist curing is continuous 24 hours per day and that the entire surface is wet.

3.6.2 White-Burlap-Polyethylene Sheet

Wet entire exposed surface thoroughly with a fine spray of water, saturate burlap but do not have excessive water dripping off the burlap and then cover concrete with White-Burlap-Polyethylene Sheet, burlap side down. Lay sheets directly on concrete surface and overlap 12 inches. Make sheeting not less than 18 inches wider than concrete surface to be cured, and weight down on the edges and over the transverse laps to form closed joints. Repair or replace sheets when damaged during curing. Check daily to assure burlap has not lost all moisture. If moisture evaporates, resaturate burlap and re-place on pavement (limit re-saturation and re-placing to less than 10 minutes per sheet). Leave sheeting on concrete surface to be cured for at least seven days.

3.6.3 Liquid Membrane-Forming Compound Curing

Comply with ODOT SSC Section 00755 liquid membrane-forming compounds. Apply compound immediately after surface loses its water sheen and has a dull appearance and before joints are sawed. Agitate curing compound thoroughly by mechanical means during use and apply uniformly in a two-coat continuous operation by suitable power-spraying equipment. Apply a total coverage for the two coats at least one gallon of undiluted compound per 150 square feet to produce a uniform, continuous, coherent film that will not check, crack, or peel and free from pinholes or other imperfections. The application of curing compound by hand-operated, mechanical powered pressure sprayers is permitted only on odd widths or shapes of slabs and on concrete surfaces exposed by the removal of forms. When the application is made by hand-operated sprayers, apply a second coat in a direction approximately at right angles to the direction of the first coat. Apply an additional coat of compound immediately to areas where film is defective. Respray concrete surfaces that are subject to heavy rainfall within three hours after curing compound has been applied in the same manner.

3.6.4 Protection of Treated Surfaces

Comply with ODOT SSC Section 00755 protection of concrete. After the initial saw cut is complete and the slurry has been removed, respray the area with curing compound or restore the white burlap polyethylene sheet to maintain a continuous curing environment in the area of the sawn joints. Keep concrete surfaces to which liquid membrane-forming compounds have been applied free from vehicular traffic and other sources of abrasion for not less than 72 hours. Foot traffic is allowed after 24 hours for inspection purposes. Maintain continuity of coating for entire curing period and repair damage to coating immediately.

3.7 FIELD QUALITY CONTROL

3.7.1 Sampling

Collect samples of fresh concrete in accordance with WAQTC TM 2 during each working day as required to perform tests specified herein. Make test specimens in accordance with AASHTO T 23 or AASHTO R 39.

3.7.2 Consistency Tests

Comply with ODOT SSC Section 02001 consistency tests. Perform concrete slump tests in accordance with ASTM C143/C143M. Take samples for slump determination from concrete during placement. Perform tests at the beginning of a concrete placement operation and for each batch (minimum) or every 20 cubic yards (maximum) of concrete to ensure that specification requirements are met. In addition, perform tests each time test beams are made.

3.7.3 Flexural Strength Tests

Comply with ODOT SSC Section 02001 flexural strength tests. Test for flexural strength in accordance with AASHTO T 97. Fabricate and cure four test specimens in accordance with AASHTO T 23 or AASHTO R 39 for each set of tests. Test two specimens at seven days, and the other two at 28 days. Concrete strength will be considered satisfactory when the minimum of the 28-day test results equals or exceeds the specified 28-day flexural strength, and no individual strength test is less than the tolerance

indicated on Table 1. If the ratio of the 7-day strength test to the specified 28-day strength is less than 65 percent, make necessary adjustments for conformance. Fabricate, cure and test a minimum of one set of four beams for each shift of concrete placement. Remove concrete which is determined to be defective, based on the strength acceptance criteria therein, and replace with acceptable concrete.

3.7.4 Air Content Tests

Comply with ODOT SSC Section 02001 air content tests. Test air-entrained concrete for air content at the same frequency as specified for slump tests. Determine percentage of air in accordance with AASHTO T 152 on samples taken during placement of concrete in forms.

3.7.5 Surface Testing

Use the profilograph method for all longitudinal testing, except for paving lanes less than 200 feet in length. Use the straightedge method for transverse testing, for longitudinal testing where the length of each pavement lane is less than 200 feet, and at the ends of the paving limits for the project. Smoothness requirements do not apply over crowns, drainage structures, or similar penetrations. Maintain detailed notes of the testing results and submit a copy to the Government after each day's testing.

3.7.5.1 Straightedge Testing Method

Test the surface of the pavement with the straightedge to identify all surface irregularities exceeding the tolerances specified in Table 1. Test the entire area of the pavement in both a longitudinal and a transverse direction on parallel lines approximately 15 feet apart. Hold the straightedge in contact with the surface and move ahead one-half the length of the straightedge for each successive measurement. Determine the amount of surface irregularity by placing the straightedge on the pavement surface and allowing it to rest upon the two highest spots covered by its length and measuring the maximum gap between the straightedge and the pavement surface, in the area between these two high points.

3.7.5.2 "Bumps" (Must Grind Areas)

Reduce any bumps ("must grind" areas) shown on the profilograph trace which exceed 0.4 inch in height by diamond grinding in accordance with Subparagraph DIAMOND GRINDING until they do not exceed 0.3 inch when retested. Taper such diamond grinding in all directions to provide smooth transitions to areas not requiring diamond grinding.

3.7.5.3 Diamond Grinding

Comply with ODOT SSC Section 00755 grind. Those performing diamond grinding are required to have a minimum of three years experience in diamond grinding of rigid concrete pavements. In areas not meeting the specified limits for surface smoothness and plan grade, reduce high areas to attain the required smoothness and grade, except as depth is limited below. Reduce high areas by diamond grinding the hardened concrete with an approved equipment after the concrete is at a minimum age of 14 days. Perform diamond grinding by sawing with an industrial diamond abrasive which is impregnated in the saw blades. Assemble the saw blades in a cutting head mounted on a machine designed specifically for diamond grinding that produces the required texture and smoothness level without

damage to the concrete pavement or joint faces. Provide diamond grinding equipment with saw blades that are 1/8 inch wide, a minimum of 60 blades per 12 inches of cutting head width, and capable of cutting a path a minimum of 3 ft wide. Diamond grinding equipment that causes ravels, aggregate fractures, spalls or disturbance to the joints is not permitted. The maximum area corrected by diamond grinding the surface of the hardened concrete is 10 percent of the total area of a day's production. The maximum depth of diamond grinding is 0.3 inch. Provide diamond grinding machine equipped to flush and vacuum the pavement surface. Dispose of all debris from diamond grinding operations off Government property. Prior to diamond grinding, submit a Diamond Grinding Plan for review and approval. At a minimum, include the daily reports for the deficient areas, the location and extent of deficiencies, corrective actions, and equipment. Remove and replace all pavement areas requiring plan grade or surface smoothness corrections in excess of the limits specified in Table 1. Retexture pavement areas given a wire comb or tined texture, areas exceeding 25 square feet that have been corrected by diamond grinding by transverse grooving using an approved grooving machine of standard manufacture. Provide grooves that match any existing grooves in the adjacent pavement. All areas in which diamond grinding has been performed are subject to the thickness tolerances specified in Table 1.

3.7.6 Plan Grade Testing and Conformance

Within five days after each day's paving, test the finished surface of the pavement area by running lines of levels at intervals corresponding with every longitudinal and transverse joint to determine the elevation at each joint intersection. Record the results of this survey and submit a copy to the Government at the completion of the survey.

3.7.7 Edge Slump

Comply with ODOT SSC Section 00755 edge slump. Test the pavement surface to determine edge slump immediately after the concrete has hardened sufficiently to permit walking thereon. Perform testing with a minimum 12 foot straightedge to reveal irregularities exceeding the edge slump tolerance specified in Table 1. Determine the vertical edge slump at each free edge of each slipformed paving lane constructed. Place the straightedge transverse to the direction of paving and the end of the straightedge located at the edge of the paving lane. Record measurements at 5 to 10 foot spacings, as directed, commencing at the header where paving was started. Initially record measurements at 5 foot intervals in each lane. When no deficiencies are present after 5 measurements, the interval may be increased. The maximum interval is 10 feet. When any deficiencies exist, return the interval to 5 feet. In addition to the transverse edge slump determination above, at the same time, record the longitudinal surface smoothness of the joint on a continuous line 1 inch back from the joint line using the minimum 12 foot straightedge advanced one-half its length for each reading. Perform other tests of the exposed joint face to ensure that a uniform, true vertical joint face is attained. Properly reference all recorded measurements in accordance with paving lane identification and stationing, and submit a report within 24 hours after measurement is made. Correct any edge slump of the concrete in excess of 1/4 inch before the concrete hardens.

3.7.8 Test for Pavement Thickness

Comply with ODOT SSC Section 00755 pavement thickness. Take full depth cores of 4 inch diameter of concrete pavement as requested by the Engineer

in accordance with AASHTO T 24/T 24M. Measure thickness in accordance with AASHTO T 148. Record and submit testing, inspection, and evaluation of each core for surface paste, uniformity of aggregate distribution, segregation, voids, cracks, and depth of reinforcement or dowel (if present). Moisten the core with water to visibly expose the aggregate and take a minimum of three photographs of the sides of the core, rotating the core approximately 120 degrees between photographs. Include a ruler for scale in the photographs. Submit plan view of location for each core.

3.7.9 Dowels

Inspect dowel placement prior to placing concrete to verify that dowels are of the size indicated, and are spaced, aligned and painted and oiled as specified. Do not permit dowels to exceed the tolerances shown in Paragraph DOWEL BARS.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 32 - EXTERIOR IMPROVEMENTS

SECTION 32 16 19.00 99

CONCRETE CURBS, GUTTERS AND SIDEWALKS

PART 1 GENERAL

1.1 REFERENCES
1.2 SUBMITTALS
1.3 EQUIPMENT, TOOLS, AND MACHINES
1.3.1 General Requirements
1.3.2 Slip Form Equipment
1.4 ENVIRONMENTAL REQUIREMENTS
1.4.1 Placing During Cold Weather
1.4.2 Placing During Warm Weather

PART 2 PRODUCTS

2.1 CONCRETE
2.1.1 Air Content
2.1.2 Slump
2.1.3 Reinforcement Steel
2.2 CONCRETE CURING MATERIALS
2.2.1 Impervious Sheet Materials
2.2.2 Burlap
2.2.3 White Pigmented Membrane-Forming Curing Compound
2.3 CONCRETE PROTECTION MATERIALS
2.4 JOINT FILLER STRIPS
2.4.1 Contraction Joint Filler for Curb and Gutter
2.4.2 Expansion Joint Filler, Premolded
2.5 JOINT SEALANTS
2.6 FORM WORK
2.6.1 Wood Forms
2.6.2 Steel Forms
2.6.3 Sidewalk Forms
2.6.4 Curb and Gutter Forms
2.6.5 Biodegradable Form Release Agent
2.7 DETECTABLE WARNING SYSTEM

PART 3 EXECUTION

3.1 SUBGRADE PREPARATION
3.1.1 Sidewalk Subgrade
3.1.2 Curb and Gutter Subgrade
3.1.3 Maintenance of Subgrade
3.2 FORM SETTING
3.2.1 Sidewalks
3.2.2 Curbs and Gutters
3.3 SIDEWALK CONCRETE PLACEMENT AND FINISHING
3.3.1 Formed Sidewalks
3.3.2 Concrete Finishing

3.3.3 Edge and Joint Finishing
3.3.4 Surface and Thickness Tolerances
3.4 CURB AND GUTTER CONCRETE PLACEMENT AND FINISHING
3.4.1 Formed Curb and Gutter
3.4.2 Curb and Gutter Finishing
3.4.3 Concrete Finishing
3.4.4 Joint Finishing
3.4.5 Surface and Thickness Tolerances
3.5 SIDEWALK JOINTS
3.5.1 Sidewalk Contraction Joints
3.5.2 Sidewalk Expansion Joints
3.5.3 Reinforcement Steel Placement
3.6 CURB AND GUTTER JOINTS
3.6.1 Contraction Joints
3.6.2 Expansion Joints
3.7 CURING AND PROTECTION
3.7.1 General Requirements
3.7.1.1 Mat Method
3.7.1.2 Impervious Sheeting Method
3.7.1.3 Membrane Curing Method
3.7.2 Backfilling
3.7.3 Protection
3.7.4 Protective Coating
3.7.4.1 Application
3.7.4.2 Precautions
3.8 FIELD QUALITY CONTROL
3.8.1 General Requirements
3.8.2 Concrete Testing
3.8.2.1 Strength Testing
3.8.2.2 Air Content
3.8.2.3 Slump Test
3.8.3 Thickness Evaluation
3.8.4 Surface Evaluation
3.9 SURFACE DEFICIENCIES AND CORRECTIONS
3.9.1 Thickness Deficiency
3.9.2 High Areas
3.9.3 Appearance
3.10 DETECTABLE WARNING SYSTEM

-- End of Section Table of Contents --

SECTION 32 16 19.00 99

CONCRETE CURBS, GUTTERS AND SIDEWALKS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO M 182	(2005; R 2021) Standard Specification for Burlap Cloth Made from Jute or Kenaf and Cotton Mats

ASTM INTERNATIONAL (ASTM)

ASTM A615/A615M	(2022) Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
ASTM A1064/A1064M	(2024) Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
ASTM C31/C31M	(2024b) Standard Practice for Making and Curing Concrete Test Specimens in the Field
ASTM C143/C143M	(2020) Standard Test Method for Slump of Hydraulic-Cement Concrete
ASTM C171	(2020) Standard Specification for Sheet Materials for Curing Concrete
ASTM C172/C172M	(2017) Standard Practice for Sampling Freshly Mixed Concrete
ASTM C173/C173M	(2024) Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method
ASTM C231/C231M	(2024) Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method
ASTM C309	(2019) Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete
ASTM C920	(2018) Standard Specification for Elastomeric Joint Sealants

ASTM D1751	(2018) Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)
ASTM D1752	(2018) Standard Specification for Preformed Sponge Rubber, Cork and Recycled PVC Expansion Joint Fillers for Concrete Paving and Structural Construction
ASTM D5893/D5893M	(2016) Standard Specification for Cold Applied, Single Component, Chemically Curing Silicone Joint Sealant for Portland Cement Concrete Pavements

INTERNATIONAL CODE COUNCIL (ICC)

ICC A117.1	(2017) Standard And Commentary Accessible and Usable Buildings and Facilities

1.2 SUBMITTALS

Government approval is required for submittals with a "G" classification. Submittals not having a "G" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Concrete; G

Biodegradable Form Release Agent; G

SD-06 Test Reports

Field Quality Control

1.3 EQUIPMENT, TOOLS, AND MACHINES

1.3.1 General Requirements

Plant, equipment, machines, and tools used in the work will be subject to approval and must be maintained in a satisfactory working condition at all times. Use equipment capable of producing the required product, meeting grade controls, thickness control and smoothness requirements as specified. Discontinue using equipment that produces unsatisfactory results. Allow the Contracting Officer access at all times to the plant and equipment to ensure proper operation and compliance with specifications.

1.3.2 Slip Form Equipment

Slip form paver or curb forming machines, will be approved based on trial use on the job and must be self-propelled, automatically controlled, crawler mounted, and capable of spreading, consolidating, and shaping the plastic concrete to the desired cross section in one pass.

1.4 ENVIRONMENTAL REQUIREMENTS

1.4.1 Placing During Cold Weather

Do not place concrete when the air temperature reaches 40 degrees F and is falling, or is already below that point. Placement may begin when the air temperature reaches 35 degrees F and is rising, or is already above 40 degrees F. Make provisions to protect the concrete from freezing during the specified curing period. If necessary to place concrete when the temperature of the air, aggregates, or water is below 35 degrees F, placement and protection must be approved in writing. Approval will be contingent upon full conformance with the following provisions. Prepare and protect the underlying material so that it is entirely free of frost when the concrete is deposited. Heat mixing water and aggregates as necessary to result in the temperature of the in-place concrete being between 50 and 85 degrees F. Methods and equipment for heating must be approved. Use only aggregates that are free of ice, snow, and frozen lumps before entering the mixer. Provide covering or other means as needed to maintain the concrete at a temperature of at least 50 degrees F for not less than 72 hours after placing, and at a temperature above freezing for the remainder of the curing period.

1.4.2 Placing During Warm Weather

The temperature of the concrete as placed must not exceed 85 degrees F except where an approved retarder is used. Cool the mixing water and aggregates as necessary to maintain a satisfactory placing temperature. The placing temperature must not exceed 95 degrees F at any time.

PART 2 PRODUCTS

2.1 CONCRETE

Provide concrete conforming to the applicable requirements of Section 03 30 00.00 99 CAST-IN-PLACE CONCRETE except as otherwise specified. Concrete must have a minimum compressive strength of 3500 psi at 28 days. Size of aggregate must not exceed 1-1/2 inches. Submit copies of certified delivery tickets for all concrete used in the construction.

2.1.1 Air Content

Use concrete mixtures that have an air content by volume of concrete of five to seven percent, based on measurements made immediately after discharge from the mixer.

2.1.2 Slump

Use concrete with a slump of 3 inches plus or minus one inch for hand placed concrete or one inch plus or minus 1/2 inch for slipformed concrete as determined in accordance with ASTM C143/C143M.

2.1.3 Reinforcement Steel

Use reinforcement bars conforming to ASTM A615/A615M. Use wire mesh reinforcement conforming to ASTM A1064/A1064M.

2.2 CONCRETE CURING MATERIALS

2.2.1 Impervious Sheet Materials

Use impervious sheet materials conforming to ASTM C171, type optional, except that polyethylene film, if used, must be white opaque.

2.2.2 Burlap

Use burlap conforming to AASHTO M 182.

2.2.3 White Pigmented Membrane-Forming Curing Compound

Use white pigmented membrane-forming curing compound conforming to ASTM C309, Type 2.

2.3 CONCRETE PROTECTION MATERIALS

Use concrete protection materials consisting of a linseed oil mixture of equal parts, by volume, of linseed oil and either mineral spirits, naphtha, or turpentine. At the option of the Contractor, commercially prepared linseed oil mixtures, formulated specifically for application to concrete to provide protection against the action of deicing chemicals may be used, except that emulsified mixtures are not acceptable.

2.4 JOINT FILLER STRIPS

2.4.1 Contraction Joint Filler for Curb and Gutter

Use hard-pressed fiberboard contraction joint filler for curb and gutter.

2.4.2 Expansion Joint Filler, Premolded

Onless otherwise indicated, use 1/2 inch thick premolded expansion joint filler conforming to ASTM D1751 or ASTM D1752.

2.5 JOINT SEALANTS

Use cold-applied joint sealant conforming to ASTM C920 or ASTM D5893/D5893M.

2.6 FORM WORK

Design and construct form work to ensure that the finished concrete will conform accurately to the indicated dimensions, lines, and elevations, and within the tolerances specified. Use wood or steel forms that are straight and of sufficient strength to resist springing during depositing and consolidating concrete.

2.6.1 Wood Forms

Use forms that are surfaced plank, 2 inches nominal thickness, straight and free from warp, twist, loose knots, splits or other defects. Use forms with a nominal length of 10 feet. Radius bends may be formed with 3/4 inch boards, laminated to the required thickness.

2.6.2 Steel Forms

Use channel-formed sections with a flat top surface and welded braces at each end and at not less than two intermediate points. Use forms with

interlocking and self-aligning ends. Provide flexible forms for radius forming, corner forms, form spreaders, and fillers as needed. Use forms with a nominal length of 10 feet and that have a minimum of three welded stake pockets per form. Use stake pins consisting of solid steel rods with chamfered heads and pointed tips designed for use with steel forms.

2.6.3 Sidewalk Forms

Use sidewalk forms that are of a height equal to the full depth of the finished sidewalk.

2.6.4 Curb and Gutter Forms

Use curb and gutter outside forms that have a height equal to the full depth of the curb or gutter. Use rigid forms for curb returns, except that benders or thin plank forms may be used for curb or curb returns with a radius of 10 feet or more, where grade changes occur in the return, or where the central angle is such that a rigid form with a central angle of 90 degrees cannot be used. Back forms for curb returns may be made of 1-1/2 inch benders, for the full height of the curb, cleated together. In lieu of inside forms for curbs, a curb "mule" may be used for forming and finishing this surface, provided the results are approved.

2.6.5 Biodegradable Form Release Agent

Use form release agent that is colorless and biodegradable and that is composed of at least 87 percent biobased material. Provide product that does not bond with, stain, or adversely affect concrete surfaces and does not impair subsequent treatments of concrete surfaces. Provide form release agent that does not contain diesel fuel, petroleum-based lubricating oils, waxes, or kerosene.

2.7 DETECTABLE WARNING SYSTEM

Detectable Warning Systems shown on the Contract plans are to meet requirements of ICC A117.1 - Section 705.

PART 3 EXECUTION

3.1 SUBGRADE PREPARATION

Construct subgrade to the specified grade and cross section prior to concrete placement.

3.1.1 Sidewalk Subgrade

Place and compact the subgrade in accordance with Section 31 00 00.00 99 EARTHWORK. Test the subgrade for grade and cross section with a template extending the full width of the sidewalk and supported between side forms.

3.1.2 Curb and Gutter Subgrade

Place and compact the subgrade in accordance with Section 31 00 00.00 99 EARTHWORK. Test the subgrade for grade and cross section by means of a template extending the full width of the curb and gutter. Use subgrade materials equal in bearing quality to the subgrade under the adjacent pavement.

3.1.3 Maintenance of Subgrade

Maintain subgrade in a smooth, compacted condition in conformity with the required section and established grade until the concrete is placed. The subgrade must be in a moist condition when concrete is placed. Prepare and protect subgrade so that it is free from frost when the concrete is deposited.

3.2 FORM SETTING

Set forms to the indicated alignment, grade and dimensions. Hold forms rigidly in place by a minimum of three stakes per form placed at intervals not to exceed 4 feet. Use additional stakes and braces at corners, deep sections, and radius bends, as required. Use clamps, spreaders, and braces where required to ensure rigidity in the forms. Remove forms in a manner that will not injure the concrete. Do not use bars or heavy tools against the concrete when removing the forms. Promptly and satisfactorily repair concrete found to be defective after form removal. Clean forms and coat with form oil or biodegradable form release agent each time before concrete is placed. Wood forms may, instead, be thoroughly wetted with water before concrete is placed, except that with probable freezing temperatures, oiling is mandatory.

3.2.1 Sidewalks

Set forms for sidewalks with the upper edge true to line and grade with an allowable tolerance of 1/8 inch in any 10 foot long section. After forms are set, grade and alignment must be checked with a 10 foot straightedge. Sidewalks must have a transverse slope unless otherwise indicated, construct sidewalks that are located adjacent to curbs with the low side adjacent to the curb. Do not remove side forms less than 12 hours after finishing has been completed.

3.2.2 Curbs and Gutters

Remove forms used along the front of the curb not less than two hours nor more than six hours after the concrete has been placed. Do not remove forms used along the back of curb until the face and top of the curb have been finished, as specified for concrete finishing. Do not remove gutter forms while the concrete is sufficiently plastic to slump in any direction.

3.3 SIDEWALK CONCRETE PLACEMENT AND FINISHING

3.3.1 Formed Sidewalks

Place concrete in the forms in one layer. When consolidated and finished, the sidewalks must be of the thickness indicated. Use a strike-off guided by side forms after concrete has been placed in the forms to bring the surface to proper section to be compacted. Consolidate concrete by tamping and spading or with an approved vibrator. Finish the surface to grade with a strike off.

3.3.2 Concrete Finishing

After straightedging, when most of the water sheen has disappeared, and just before the concrete hardens, finish the surface with a wood or magnesium float or darby to a smooth and uniformly fine granular or sandy texture free of waves, irregularities, or tool marks. Produce a scored surface by brooming with a fiber-bristle brush in a direction transverse to

that of the traffic, followed by edging.

3.3.3 Edge and Joint Finishing

Finish all slab edges, including those at formed joints, with an edger having a radius of 1/8 inch. Edge transverse joints before brooming. Eliminate the flat surface left by the surface face of the edger with brooming. Clean and solidly fill corners and edges which have crumbled and areas which lack sufficient mortar for proper finishing with a properly proportioned mortar mixture and then finish.

3.3.4 Surface and Thickness Tolerances

Finished surfaces must not vary more than 5/16 inch from the testing edge of a 10-foot straightedge. Permissible deficiency in section thickness will be up to 1/4 inch.

3.4 CURB AND GUTTER CONCRETE PLACEMENT AND FINISHING

3.4.1 Formed Curb and Gutter

Place concrete to the required section in a single lift. Consolidate concrete using approved mechanical vibrators. Curve shaped gutters must be finished with a standard curb "mule".

3.4.2 Curb and Gutter Finishing

Approved slipformed curb and gutter machines may be used in lieu of hand placement.

3.4.3 Concrete Finishing

Float and finish exposed surfaces with a smooth wood float until true to grade and section and uniform in texture. Brush floated surfaces with a fine-hair brush using longitudinal strokes. Round the edges of the gutter and top of the curb with an edging tool to a radius of 1/2 inch. Immediately after removing the front curb form, rub the face of the curb with a wood or concrete rubbing block and water until blemishes, form marks, and tool marks have been removed. Brush the front curb surface, while still wet, in the same manner as the gutter and curb top. Finish the top surface of gutter and entrance to grade with a wood float.

3.4.4 Joint Finishing

Finish curb edges at formed joints as indicated.

3.4.5 Surface and Thickness Tolerances

Finished surfaces must not vary more than 1/4 inch from the testing edge of a 10 foot straightedge. Permissible deficiency in section thickness will be up to 1/4 inch.

3.5 SIDEWALK JOINTS

Construct sidewalk joints to divide the surface into rectangular areas. Space transverse contraction joints at a distance equal to the sidewalk width or 5 feet on centers, whichever is less, and continuous across the slab. Construct longitudinal contraction joints along the centerline of all sidewalks 10 feet or more in width. Construct transverse expansion

joints at sidewalk returns and opposite expansion joints in adjoining curbs. Where the sidewalk is not in contact with the curb, install transverse expansion joints as indicated. Form expansion joints around structures and features which project through or into the sidewalk pavement, using joint filler of the type, thickness, and width indicated. Expansion joints are not required between sidewalks and curb that abut the sidewalk longitudinally.

3.5.1 Sidewalk Contraction Joints

Form contraction joints in the fresh concrete by cutting a groove in the top portion of the slab to a depth of at least one-fourth of the sidewalk slab thickness. Unless otherwise approved or indicated, either use a jointer to cut the groove or saw a groove in the hardened concrete with a power-driven saw. Construct sawed joints by sawing a groove in the concrete with a 1/8 inch blade. Provide an ample supply of saw blades on the jobsite before concrete placement is started. Provide at least one standby sawing unit in good working order at the jobsite at all times during the sawing operations.

3.5.2 Sidewalk Expansion Joints

Form expansion joints using 1/2 inch joint filler strips. Joint filler in expansion joints surrounding structures and features within the sidewalk may consist of preformed filler material conforming to ASTM D1752 or building paper. Hold joint filler in place with steel pins or other devices to prevent warping of the filler during floating and finishing. Immediately after finishing operations are completed, round joint edges using an edging tool having a radius of 1/8 inch. Remove any concrete over the joint filler. At the end of the curing period, clean the top of expansion joints and fill with cold-applied joint sealant. Use joint sealant that is gray or stone in color. Thoroughly clean the joint opening before the sealing material is placed. Do not spill sealing material on exposed surfaces of the concrete. Apply joint sealing material only when the concrete at the joint is surface dry and atmospheric and concrete temperatures are above 50 degrees F. Immediately remove any excess material on exposed surfaces of the concrete and clean the concrete surfaces.

3.5.3 Reinforcement Steel Placement

Accurately and securely fasten reinforcement steel in place with suitable supports and ties before the concrete is placed.

3.6 CURB AND GUTTER JOINTS

Construct curb and gutter joints at right angles to the line of curb and gutter.

3.6.1 Contraction Joints

Construct contraction joints directly opposite contraction joints in abutting Portland cement concrete pavements and spaced so that monolithic sections between curb returns will not be less than 5 feet nor greater than 15 feet in length.

a. Construct contraction joints (except for slip forming) by means of 1/8 inch thick separators and of a section conforming to the cross section of the curb and gutter. Remove separators as soon as

practicable after concrete has set sufficiently to preserve the width and shape of the joint and prior to finishing.

b. When slip forming is used, cut the contraction joints in the top portion of the gutter/curb hardened concrete in a continuous cut across the curb and gutter, using a power-driven saw. Cut the contraction joint to a depth of at least one-fourth of the gutter/curb depth using a 1/8 inch saw blade.

3.6.2 Expansion Joints

Form expansion joints by means of preformed expansion joint filler material cut and shaped to the cross section of curb and gutter. Construct expansion joints in curb and gutter directly opposite expansion joints of abutting portland cement concrete pavement using the same type and thickness of joints as joints in the pavement. Where curb and gutter do not abut portland cement concrete pavement, provide expansion joints at least 1/2 inch in width at intervals not less than 30 feet nor greater than 120 feet. Seal expansion joints immediately following curing of the concrete or as soon thereafter as weather conditions permit. Seal expansion joints and the top 1 inch depth of curb and gutter contraction-joints with joint sealant. Thoroughly clean the joint opening before the sealing material is placed. Do not spill sealing material on exposed surfaces of the concrete. Concrete at the joint must be surface dry and atmospheric and concrete temperatures must be above 50 degrees F at the time of application of joint sealing material. Immediately remove excess material on exposed surfaces of the concrete and clean concrete surfaces.

3.7 CURING AND PROTECTION

3.7.1 General Requirements

Protect concrete against loss of moisture and rapid temperature changes for at least seven days from the beginning of the curing operation. Protect unhardened concrete from rain and flowing water. All equipment needed for adequate curing and protection of the concrete must be on hand and ready for use before actual concrete placement begins. Protect concrete as necessary to prevent cracking of the pavement due to temperature changes during the curing period.

3.7.1.1 Mat Method

Cover the entire exposed surface with two or more layers of burlap. Overlap mats at least 6 inches. Thoroughly wet the mat with water prior to placing on concrete surface and keep the mat continuously in a saturated condition and in intimate contact with concrete for not less than seven days.

3.7.1.2 Impervious Sheeting Method

Wet the entire exposed surface with a fine spray of water and then cover with impervious sheeting material. Lay sheets directly on the concrete surface with the light-colored side up and overlapped 12 inches when a continuous sheet is not used. Use sheeting that is not less than 18 inches wider than the concrete surface to be cured. Secure sheeting using heavy wood planks or a bank of moist earth placed along edges and laps in the sheets. Satisfactorily repair or replace sheets that are torn or otherwise damaged during curing. Sheeting must remain on the concrete surface to be

cured for not less than seven days.

3.7.1.3 Membrane Curing Method

Apply a uniform coating of white-pigmented membrane-curing compound to the entire exposed surface of the concrete as soon after finishing as the free water has disappeared from the finished surface. Coat formed surfaces immediately after the forms are removed and in no case longer than one hour after the removal of forms. Do not allow concrete surface to dry before application of the membrane. If drying has occurred, moisten the surface of the concrete with a fine spray of water and apply the curing compound as soon as the free water disappears. Apply curing compound in two coats by hand-operated pressure sprayers at a coverage of approximately 200 square feet/gallon for the total of both coats. Apply the second coat in a direction approximately at right angles to the direction of application of the first coat. The compound must form a uniform, continuous, coherent film that will not check, crack, or peel and must be free from pinholes or other imperfections. If pinholes, abrasion, or other discontinuities exist, apply an additional coat to the affected areas within 30 minutes. Respray concrete surfaces that are subjected to heavy rainfall within three hours after the curing compound has been applied by the method and at the coverage specified above. Respray areas where the curing compound is damaged by subsequent construction operations within the curing period. Take precautions necessary to ensure that the concrete is properly cured at sawed joints, and that no curing compound enters the joints. Tightly seal the top of the joint opening and the joint groove at exposed edges before the concrete in the region of the joint is resprayed with curing compound. Use a method used for sealing the joint groove that prevents loss of moisture from the joint during the entire specified curing period. Provide approved standby facilities for curing concrete pavement at a location accessible to the jobsite for use in the event of mechanical failure of the spraying equipment or other conditions that might prevent correct application of the membrane-curing compound at the proper time. Adequately protect concrete surfaces to which membrane-curing compounds have been applied during the entire curing period from pedestrian and vehicular traffic, except as required for joint-sawing operations and surface tests, and from other possible damage to the continuity of the membrane.

3.7.2 Backfilling

After curing, remove debris and backfill, grade, and compact the area adjoining the concrete to conform to the surrounding area in accordance with lines and grades indicated.

3.7.3 Protection

Protect completed concrete from damage until accepted. Repair damaged concrete and clean concrete discolored during construction. Remove and reconstruct concrete that is damaged for the entire length between regularly scheduled joints. Refinishing the damaged portion will not be acceptable. Dispose of removed material as directed.

3.7.4 Protective Coating

Apply a protective coating of linseed oil mixture to the exposed-to-view concrete surface after the curing period, if concrete will be exposed to de-icing chemicals within 6 weeks after placement. Moist cure concrete to receive a protective coating.

3.7.4.1 Application

Complete curing and backfilling operation prior to applying two coats of protective coating. Concrete must be surface dry and clean before each application. Spray apply at a rate of not more than 50 square yards/gallon for first application and not more than 70 square yards/gallon for second application, except that the number of applications and coverage for each application for commercially prepared mixture must be in accordance with the manufacturer's instructions. Protect coated surfaces from vehicular and pedestrian traffic until dry.

3.7.4.2 Precautions

Do not heat protective coating by direct application of flame or electrical heaters and protect the coating from exposure to open flame, sparks, and fire adjacent to open containers or applicators. Do not apply material at ambient or material temperatures lower than 50 degrees F.

3.8 FIELD QUALITY CONTROL

Submit copies of all test reports within 24 hours of completion of the test.

3.8.1 General Requirements

Perform the inspection and tests described and meet the specified requirements for inspection details and frequency of testing. Based upon the results of these inspections and tests, take the action and submit reports as required below, and additional tests to ensure that the requirements of these specifications are met.

3.8.2 Concrete Testing

3.8.2.1 Strength Testing

Take concrete samples in accordance with ASTM C172/C172M not less than once a day nor less than once for every 250 cubic yards of concrete placed. Mold cylinders in accordance with ASTM C31/C31M for strength testing by an approved laboratory. Each strength test result must be the average of two test cylinders from the same concrete sample tested at 28 days, unless otherwise specified or approved. Concrete specified on the basis of compressive strength will be considered satisfactory if the averages of all sets of three consecutive strength test results equal or exceed the specified strength, and no individual strength test result falls below the specified strength by more than 500 psi.

3.8.2.2 Air Content

Determine air content in accordance with ASTM C173/C173M or ASTM C231/C231M. Use ASTM C231/C231M with concretes and mortars made with relatively dense natural aggregates. Make two tests for air content on randomly selected batches of each class of concrete placed during each shift. Make additional tests when excessive variation in concrete workability is reported by the placing foreman or the Government inspector. Notify the placing foreman if results are out of tolerance. The placing foreman must take appropriate action to have the air content corrected at the plant. Additional tests for air content will be performed on each truckload of material until such time as the air content is within the tolerance specified.

3.8.2.3 Slump Test

Perform two slump tests on randomly selected batches of each class of concrete for every 250 cubic yards, or fraction thereof, of concrete placed during each shift. Perform additional tests when excessive variation in the workability of the concrete is noted or when excessive crumbling or slumping is noted along the edges of slip-formed concrete.

3.8.3 Thickness Evaluation

Determine the anticipated thickness of the concrete prior to placement by passing a template through the formed section or by measuring the depth of opening of the extrusion template of the curb forming machine. If a slip form paver is used for sidewalk placement, construct the subgrade true to grade prior to concrete placement. The thickness will be determined by measuring each edge of the completed slab.

3.8.4 Surface Evaluation

Provide finished surfaces for each category of the completed work that are uniform in color and free of blemishes and form or tool marks.

3.9 SURFACE DEFICIENCIES AND CORRECTIONS

3.9.1 Thickness Deficiency

When measurements indicate that the completed concrete section is deficient in thickness by more than 1/4 inch the deficient section will be removed, between regularly scheduled joints, and replaced.

3.9.2 High Areas

In areas not meeting surface smoothness and plan grade requirements, reduce high areas either by rubbing the freshly finished concrete with carborundum brick and water when the concrete is less than 36 hours old or by grinding the hardened concrete with an approved surface grinding machine after the concrete is 36 hours old or more. The area corrected by grinding the surface of the hardened concrete must not exceed five percent of the area of any integral slab, and the depth of grinding must not exceed 1/4 inch. Remove and replace pavement areas requiring grade or surface smoothness corrections in excess of the limits specified.

3.9.3 Appearance

Exposed surfaces of the finished work will be inspected by the Contracting Officer and deficiencies in appearance will be identified. Remove and replace areas which exhibit excessive cracking, discoloration, form marks, or tool marks or which are otherwise inconsistent with the overall appearances of the work.

3.10 DETECTABLE WARNING SYSTEM

Install Detectable Warning Systems required by Contract plans in accordance with ICC A117.1, Section 705, and by manufacturers' installation instructions.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 32 - EXTERIOR IMPROVEMENTS

SECTION 32 17 23.00 99

PAVEMENT MARKINGS

PART 1 GENERAL

1.1 REFERENCES
1.2 SUBMITTALS
1.3 QUALITY ASSURANCE
1.3.1 Regulatory Requirements
1.3.2 Qualifications
1.4 DELIVERY AND STORAGE
1.5 PROJECT/SITE CONDITIONS
1.5.1 Environmental Requirements
1.5.1.1 Weather Limitations for Application
1.5.1.2 Weather Limitations for Removal of Pavement Markings on Roads and Automotive Parking Areas
1.5.2 Traffic Controls
1.5.3 Lighting

PART 2 PRODUCTS

2.1 EQUIPMENT
2.1.1 Surface Preparation and Paint Removal
2.1.1.1 Surface Preparation Equipment for Roads and Automotive Parking Areas
2.1.1.1.1 Waterblasting Equipment
2.1.1.1.2 Grinding or Scarifying Equipment
2.1.2 Application Equipment
2.1.2.1 Paint Application Equipment
2.1.2.1.1 Road Marking
2.1.2.1.1.1 Hand Application
2.1.2.2 Reflective Media Dispenser
2.1.2.3 Preformed Tape Application Equipment
2.2 MATERIALS
2.2.1 Waterborne Paint
2.2.2 Reflective Media
2.2.2.1 Reflective Media for Roads

PART 3 EXECUTION

3.1 EXAMINATION
3.1.1 Testing for Moisture
3.1.2 Surface Preparation Demonstration
3.1.3 Test Stripe Demonstration
3.1.4 Application Rate Demonstration
3.1.5 Retroreflective Value Demonstration
3.1.6 Level of Performance Demonstration
3.2 EXTERIOR SURFACE PREPARATION
3.2.1 Early Painting of Rigid Pavements

3.2.2 Early Painting of Asphalt Pavements
3.3 APPLICATION
3.3.1 Paint
3.3.1.1 Waterborne Paint
3.3.1.1.1 Roads
3.3.2 Preformed Tape
3.3.3 Cleanup and Waste Disposal
3.4 FIELD QUALITY CONTROL
3.4.1 Sampling and Testing
3.4.2 Material Inspection
3.4.3 Dimensional Tolerances
3.4.4 Bond Failure Verification
3.4.5 Reflective Media and Coating Application Verification
3.4.6 Retroreflective Markings

-- End of Section Table of Contents --

SECTION 32 17 23.00 99

PAVEMENT MARKINGS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM D4061	(2013) Standard Test Method for Retroreflectance of Horizontal Coatings
ASTM D6628	(2003; R 2015) Standard Specification for Color of Pavement Marking Materials
ASTM E1710	(2011) Standard Test Method for Measurement of Retroreflective Pavement Marking Materials with CEN-Prescribed Geometry Using a Portable Retroreflectometer
ASTM E2177	(2011) Standard Test Method for Measuring the Coefficient of Retroreflected Luminance (RL) of Pavement Markings in a Standard Condition of Wetness
ASTM E2302	(2003; R 2016) Standard Test Method for Measurement of the Luminance Coefficient Under Diffuse Illumination of Pavement Marking Materials Using a Portable Reflectometer

INTERNATIONAL CONCRETE REPAIR INSTITUTE (ICRI)

ICRI 03732	(1997) Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays

U.S. FEDERAL HIGHWAY ADMINISTRATION (FHWA)

MUTCD	(2009; Rev 2012) Manual on Uniform Traffic Control Devices

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FS TT-P-1952	(2015; Rev F; Notice 1) Paint, Traffic and Airfield Markings, Waterborne

OREGON DEPARTMENT OF TRANSPORTATION (ODOT)

ODOT SSC	(2024) Oregon Standard Specifications for

1.2 SUBMITTALS

Government approval is required for submittals with a "G" classification. Submittals not having a "G" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Surface Preparation Equipment List; G

Application Equipment List; G

Exterior Surface Preparation

Safety Data Sheets; G

Reflective media for roads; G

Waterborne Paint; G

SD-06 Test Reports

Reflective Media for Roads; G

Waterborne Paint; G

Test Reports

SD-07 Certificates

Qualifications; G

Reflective Media for Roads

Waterborne Paint

Volatile Organic Compound; G

SD-08 Manufacturer's Instructions

Waterborne Paint; G

1.3 QUALITY ASSURANCE

1.3.1 Regulatory Requirements

Submit certificate stating that the proposed pavement marking paint meets the Volatile Organic Compound, (VOC) regulations of the local Air Pollution Control District having jurisdiction over the geographical area in which the project is located. Submit Safety Data Sheets for each product.

1.3.2 Qualifications

Submit documentation certifying that pertinent personnel are qualified for equipment operation and handling of applicable chemicals. The

documentation should include experience on five projects of similar size and scope with references for all personnel.

1.4 DELIVERY AND STORAGE

a. Deliver paint materials, thermoplastic compound materials, and reflective media in original sealed containers that plainly show the designated name, specification number, batch number, color, date of manufacture, manufacturer's directions, and name of manufacturer.

b. Provide storage facilities at the job site for maintaining materials at temperatures recommended by the manufacturer. Make available paint stored at the project site or segregated at the source for sampling not less than 30 days prior to date of required approval for use to allow sufficient time for testing. Notify the Contracting Officer when paint is available for sampling.

1.5 PROJECT/SITE CONDITIONS

1.5.1 Environmental Requirements

1.5.1.1 Weather Limitations for Application

Apply pavement markings to clean, dry surfaces, and unless otherwise approved, only when the air and pavement surface temperature is at least 5 degrees F above the dew point and the air and pavement temperatures are within the limits recommended by the pavement marking manufacturer. Allow pavement surfaces to dry after water has been used for cleaning or rainfall has occurred prior to striping or marking. Test the pavement surface for moisture before beginning work each day and after cleaning. Do not commence marking until the pavement is sufficiently dry and the pavement condition has been approved by the Contracting Officer. Employ the "plastic wrap method" to test the pavement for moisture as specified in Paragraph TESTING FOR MOISTURE.

1.5.1.2 Weather Limitations for Removal of Pavement Markings on Roads and Automotive Parking Areas

Pavement surface must be free of snow, ice, or slush; with a surface temperature of at least 40 degrees F and rising at the beginning of operations, except those involving shot or sand blasting or grinding. Cease operation during thunderstorms, or during rainfall, except for waterblasting and removal of previously applied chemicals. Cease waterblasting where surface water accumulation alters the effectiveness of material removal.

1.5.2 Traffic Controls

a. Place warning signs conforming to MUTCD near the beginning of the worksite and well ahead of the worksite for alerting approaching traffic from both directions. Place small markers along newly painted lines or freshly placed raised markers to control traffic and prevent damage to newly painted surfaces or displacement of raised pavement markers. Mark painting equipment with large warning signs indicating slow-moving painting equipment in operation.

b. When traffic must be rerouted or controlled to accomplish the work, provide necessary warning signs, flag persons, and related equipment for the safe passage of vehicles.

1.5.3 Lighting

When night operations are necessary, provide all necessary lighting and equipment. The Government reserves the right to accept or reject night work on the day following night activities by the Contractor.

PART 2 PRODUCTS

2.1 EQUIPMENT

2.1.1 Surface Preparation and Paint Removal

2.1.1.1 Surface Preparation Equipment for Roads and Automotive Parking Areas

Submit a surface preparation equipment list by serial number, type, model, and manufacturer. Include descriptive data indicating area of coverage per pass, pressure adjustment range, tank and flow capacities, and safety precautions required for the equipment operation. Mobile equipment must allow for removal of markings without damaging the pavement surface or joint sealant. Maintain machines, tools, and equipment used in the performance of the work in satisfactory operating condition.

2.1.1.1.1 Waterblasting Equipment

Use mobile waterblasting equipment capable of producing a pressurized stream of water that effectively removes paint from the pavement surface without significantly damaging the pavement. Provide equipment, tools, and machinery which are safe and in good working order at all times.

2.1.1.1.2 Grinding or Scarifying Equipment

Use equipment capable of removing surface contaminates, paint build-up, or extraneous markings from the pavement surface without leaving any residue. Clean the surface by hydro blast to remove surface contaminates and ash after a weed torch is used to remove paint.

2.1.2 Application Equipment

Submit application equipment list appropriate for the material(s) to be used. Include manufacturer's descriptive data and certification for the planned use that indicates area of coverage per pass, pressure adjustment range, tank and flow capacities, and all safety precautions required for operating and maintaining the equipment. Provide and maintain machines, tools, and equipment used in the performance of the work in satisfactory operating condition, or remove them from the work site. Provide mobile and maneuverable application equipment to the extent that straight lines can be followed and normal curves can be made in a true arc.

2.1.2.1 Paint Application Equipment

2.1.2.1.1 Road Marking

Provide equipment used for Longitudinal Lines, Pavement Legends and Bars according to ODOT SSC Section 00850.

2.1.2.1.1.1 Hand Application

Provide spray guns for hand application of paint in areas where the mobile

paint applicator cannot be used.

2.1.2.2 Reflective Media Dispenser

Attach the dispenser for applying the reflective media to the paint and thermoplastic dispenser and designed to operate automatically and simultaneously with the applicator through the same control mechanism. The bead applicator must be capable of adjustment and designed to provide uniform flow of reflective media over the full length and width of the stripe at the rate of coverage specified in Paragraph APPLICATION.

2.1.2.3 Preformed Tape Application Equipment

Provide and use mechanical application equipment for the placement of preformed marking tape which is a mobile pavement marking machine specifically designed for use in applying pressure-sensitive pavement marking tape of varying widths. Equip the applicator with rollers, or other suitable compaction device to provide initial adhesion of the material with the pavement surface. Use additional tools and devices as needed to properly seat the applied material as recommended by the manufacturer.

2.2 MATERIALS

Use waterborne paint for roads. Use non-reflectorized waterborne paint for automotive parking areas. The maximum allowable VOC content of pavement markings is 150 grams per liter. Color of markings are indicated on the drawings and must conform to ASTM D6628 for roads. Provide materials conforming to the requirements specified herein.

2.2.1 Waterborne Paint

FS TT-P-1952, Type I or II III.

2.2.2 Reflective Media

2.2.2.1 Reflective Media for Roads

Type I, Gradation B, fine - low-index glass beads for premixed paint are intended for marking highways.

PART 3 EXECUTION

3.1 EXAMINATION

3.1.1 Testing for Moisture

a. Test the pavement surface for moisture before beginning pavement marking after each period of rainfall, fog, high humidity, or cleaning, or when the ambient temperature has fallen below the dew point. Do not commence marking until the pavement is sufficiently dry and the pavement condition has been approved by the Contracting Officer or authorized representative.

b. Employ the "plastic wrap method" to test the pavement for moisture as follows: Cover the pavement with a 12 inch by 12 inch section of clear plastic wrap and seal the edges with tape. After 15 minutes, examine the plastic wrap for any visible moisture accumulation inside the plastic. Do not begin marking operations until the test can be

performed with no visible moisture accumulation inside the plastic wrap. Re-test surfaces when work has been stopped due to rain.

3.1.2 Surface Preparation Demonstration

Prior to surface preparation, demonstrate the proposed procedures and equipment. Prepare areas large enough to determine cleanliness, adhesion of remaining coating and rate of cleaning. Perform a demonstration removal of pavement marking in an area designated by the Contracting Officer. Approved demonstration area establishes the standard for the remainder of the work.

3.1.3 Test Stripe Demonstration

Prior to paint application, demonstrate test stripe application within the work area using the proposed materials and equipment. Apply separate test stripes in each of the line widths and configurations required herein using the proposed equipment. Make the test stripes long enough to determine the proper speed and operating pressures for the vehicle(s) and machinery, but not less than 50 feet long.

3.1.4 Application Rate Demonstration

During the Test Stripe Demonstration, demonstrate compliance with the application rates specified herein. Document the equipment speed and operating pressures required to meet the specified rates in each configuration of the equipment and provide a copy of the documentation to the Contracting Officer prior to proceeding with the work.

3.1.5 Retroreflective Value Demonstration

After the test stripes have cured to a "no-track" condition, demonstrate compliance with the average retroreflective values specified herein. Take a minimum of ten readings on each test stripe with a Retroreflectometer with a direct readout in millicandelas per square meter per lux (mcd/m2/lx). Perform testing in accordance with ASTM D4061, ASTM E1710, ASTM E2177, and ASTM E2302.

3.1.6 Level of Performance Demonstration

The Contracting Officer will be present at the application demonstrations to observe the results obtained and to validate the operating parameters of the vehicle(s) and equipment. If accepted by the Contracting Officer, the test stripe is the measure of performance required for this project. Do not proceed with the work until the demonstration results are satisfactory to the Contracting Officer.

3.2 EXTERIOR SURFACE PREPARATION

Allow new pavement surfaces to cure for a period of not less than 30 days before application of marking materials. Thoroughly clean surfaces to be marked before application of the paint. Remove dust, dirt, and other granular surface deposits by sweeping, blowing with compressed air, rinsing with water, or a combination of these methods as required. Remove rubber deposits, existing paint markings, residual curing compounds, and other coatings adhering to the pavement by methods conforming to ODOT SSC 00225.45 - Pavement Marking Removal.

For Portland Cement Concrete pavement, grinding, light shot blasting,

or light scarification, to a resulting profile equal to ICRI 03732 CSP 2, CSP 3, and CSP 4, respectively, can be used in addition to water blasting on most pavements, to either remove existing coatings, or for surface preparation.

3.2.1 Early Painting of Rigid Pavements

Pretreat rigid pavements that require early painting with an aqueous solution containing 3 percent phosphoric acid and two percent zinc chloride. Apply the solution to the areas to be marked.

3.2.2 Early Painting of Asphalt Pavements

For asphalt pavement systems requiring painting application at less than 30 days, apply the paint and beads at half the normal application rate, followed by a second application at the normal rate after 30 days.

3.3 APPLICATION

Apply pavement markings to dry pavements only.

3.3.1 Paint

Apply paint with approved equipment at rate of coverage specified herein. Provide guidelines and templates as necessary to control paint application. Take special precautions in marking numbers, letters, and symbols. Manually paint numbers, letters, and symbols. Sharply outline all edges of markings. The maximum drying time requirements of the paint specifications will be strictly enforced, to prevent undue softening of bitumen, and pickup, displacement, or discoloration by tires of traffic. If there is a deficiency in drying of the markings, painting operations must cease until the cause of the slow drying is determined and corrected.

3.3.1.1 Waterborne Paint

3.3.1.1.1 Roads

Apply paint and reflective elements per ODOT SSC Section 00860.

3.3.2 Preformed Tape

The pavement surface and ambient air temperature must be a minimum of 60 degrees F and rising. Place the preformed markings in accordance with the manufacturer's written instructions.

3.3.3 Cleanup and Waste Disposal

Keep the worksite clean and free of debris and waste from the removal and application operations. Dispose of debris at approved sites.

3.4 FIELD QUALITY CONTROL

3.4.1 Sampling and Testing

a. As soon as the paint and reflective media are available for sampling, obtain by random selection from the sealed containers, four quart samples of each batch in the presence of the Contracting Officer. Two quarts will be for sampling and testing by the Contractor and two quarts will be for retention by the Government. Accomplish

adequate mixing prior to sampling to ensure a uniform, representative sample. A batch is defined as that quantity of material processed by the manufacturer at one time and identified by number on the label. Clearly identify samples by designated name, specification number, batch number, project contract number, intended use, and quantity involved.

b. Test samples by an approved laboratory. If a sample fails to meet specification, replace the material in the area represented by the samples and retest the replacement material as specified above. Submit certified copies of the test reports, prior to the use of the materials at the jobsite. Include in the report of test results a listing of any specification requirements not verified by the test laboratory. At the discretion of the Contracting Officer, samples provided may be tested by the Government for verification.

3.4.2 Material Inspection

Examine material at the job site to determine that it is the material referenced in the report of test results or certificate of compliance. Provide test results substantiating conformance to the specified requirements with each certificate of compliance.

3.4.3 Dimensional Tolerances

Apply all markings in the standard dimensions provide in the drawings. New markings may deviate a maximum of 10 percent larger than the standard dimension. The maximum deviation allowed when painting over an old marking is up to 20 percent larger than the standard dimensions.

3.4.4 Bond Failure Verification

Inspect newly applied markings for signs of bond failure based on visual inspection and comparison to results from TEST STRIPE DEMONSTRATION Paragraph.

3.4.5 Reflective Media and Coating Application Verification

Use a wet film thickness gauge to measure the application of wet paint. Use a microscope or magnifying glass to evaluate the embedment of glass beads in the paint. Verify the glass bead embedment with approximately 50 percent of the individual bead spheres embedded and 50 percent of the individual bead spheres exposed.

3.4.6 Retroreflective Markings

Collect and record readings for white and yellow retroreflective markings at the rate of one reading per 1000 linear feet. The minimum acceptable average for white markings is 200 millicandelas per square meter per lux (mcd/m2/lx) (measured with Retroreflectometer). The minimum acceptable average for yellow markings is 175 millicandelas per square meter per lux (mcd/m2/lx). Compute readings by averaging a minimum of 10 readings taken within the area at random locations. Re-mark areas not meeting the retroreflective requirements stated above.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 32 - EXTERIOR IMPROVEMENTS

SECTION 32 31 13.00 99

CHAIN LINK FENCES AND GATES

PART 1 GENERAL

1.1 REFERENCES
1.2 SUBMITTALS
1.3 QUALITY CONTROL
1.3.1 Certificates of Compliance
1.4 DELIVERY, STORAGE, AND HANDLING

PART 2 PRODUCTS

2.1 SYSTEM DESCRIPTION
2.2 FENCES
2.2.1 Fabric
2.2.2 Posts
2.2.2.1 Metal
2.2.2.1.1 Line Posts
2.2.2.1.2 End, Corner and Pull Posts
2.2.2.2 Post Tops
2.2.3 Braces and Rails
2.2.3.1 Top Rail
2.2.3.2 Center Rails Between Line Posts
2.2.3.3 Post-Brace Assembly
2.2.4 Wire Ties
2.2.5 Stretcher Bars
2.2.6 Stretcher Bar Bands
2.2.7 Tension Wire
2.2.8 Miscellaneous Hardware
2.3 GATES
2.3.1 Gate Posts
2.3.2 Gate Fabric
2.3.3 Gate Frame
2.3.4 Gate Bracing
2.3.5 Padlocks
2.3.6 Gate Hardware and Accessories
2.4 MATERIALS
2.4.1 Zinc Coating
2.4.2 Concrete
2.4.3 Grout

PART 3 EXECUTION

3.1 PREPARATION
3.1.1 Clearing and Grading
3.2 INSTALLATION
3.2.1 Security
3.2.2 Fence Installation

3.2.2.1 Post Spacing
3.2.2.2 Top and Bottom Tension Wire
3.2.3 Excavation
3.2.4 Setting Posts
3.2.4.1 Bracing
3.2.4.2 Tolerances
3.2.5 Concrete Strength
3.2.6 Top Rails
3.2.7 Center Rails
3.2.8 Brace Assembly
3.2.9 Tension Wire Installation
3.2.10 Fabric Installation
3.2.11 Stretcher Bar Installation
3.2.12 Gate Installation
3.2.13 Tie Wires
3.2.14 Fasteners
3.2.15 Zinc-Coating Repair
3.2.16 Accessories Installation
3.2.16.1 Post Caps
3.2.16.2 Padlocks
3.2.17 Grounding
3.3 CLOSEOUT ACTIVITIES

-- End of Section Table of Contents --

SECTION 32 31 13.00 99

CHAIN LINK FENCES AND GATES

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO M 181	(2010) Standard Specification for Chain-Link Fence

ASTM INTERNATIONAL (ASTM)

ASTM A153/A153M	(2023) Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A780/A780M	(2020) Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
ASTM A824	(2001; R 2022) Standard Specification for Metallic-Coated Steel Marcelled Tension Wire for Use With Chain Link Fence
ASTM C94/C94M	(2024a) Standard Specification for Ready-Mixed Concrete
ASTM F567	(2023) Standard Practice for Installation of Chain Link Fence
ASTM F626	(2014; R 2023) Standard Specification for Fence Fittings
ASTM F883	(2013; R 2022) Standard Performance Specification for Padlocks

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FS RR-F-191/1	(Rev F) Fencing, Wire and Post, Metal (Chain-Link Fence Fabric)
FS RR-F-191/2	(Rev E) Fencing, Wire and Post, Metal (Chain-Link Fence Gates)
FS RR-F-191/3	(2023; Rev F) Fencing, Wire and Post, Metal (Chain-Link Fence Posts, Top Rails and Braces)

FS RR-F-191/4	(Rev F) Fencing, Wire and Post, Metal (Chain-Link Fence Accessories)

OREGON DEPARTMENT OF TRANSPORTATION (ODOT)

ODOT SSC	(2024) Oregon Standard Specifications for Construction

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Fence Assembly; G

Location of Gate, Corner, End, and Pull Posts; G

Gate Assembly; G

Gate Hardware and Accessories; G

Erection/Installation Drawings; G

SD-03 Product Data

Fence Assembly; G

Gate Assembly; G

Gate Hardware and Accessories; G

Zinc Coating; G

Stretcher Bars; G

Concrete; G

SD-04 Samples

Fabric; G

Posts; G

Braces; G

Line Posts; G

Top Rail; G

Tension Wire; G

Stretcher Bars; G

Gate Posts; G

Gate Hardware and Accessories; G

Padlocks; G

Wire Ties; G

SD-07 Certificates

Certificates of Compliance

SD-08 Manufacturer's Instructions

Fence Assembly

Gate Assembly

Hardware Assembly

Accessories

SD-11 Closeout Submittals

Recycled Material Content

1.3 QUALITY CONTROL

1.3.1 Certificates of Compliance

Submit certificates of compliance in accordance with the applicable reference standards and descriptions of this section for the following:

a. Zinc coating

b. Stretcher bars

c. Gate hardware and accessories

d. Concrete

1.4 DELIVERY, STORAGE, AND HANDLING

Deliver materials to site in an undamaged condition. Store materials off the ground to provide protection against oxidation caused by ground contact.

PART 2 PRODUCTS

2.1 SYSTEM DESCRIPTION

a. Submit reports of listing chain-link fencing and accessories regarding weight in ounces for zinc coating.

b. Submit manufacturer's catalog data for complete fence assembly, gate assembly, hardware assembly and accessories.

2.2 FENCES

2.2.1 Fabric

a. Provide fabric conforming to ODOT SSC Section 03010 - Chain Link Fabric. FS RR-F-191/1; Type I, zinc-coated steel, Class D coating requirement, aluminum alloy, 9 gauge conforming to AASHTO M 181, with 2.0 ounces per square foot of coated surface. Provide selvage knuckled at one selvage and twisted and barbed at the other. Height of fabric as indicated.

b. Provide fabric consisting of wires woven into a 2 inch diamond mesh. Provide one-piece fabric widths for fence heights up to 6 feet.

2.2.2 Posts

2.2.2.1 Metal

2.2.2.1.1 Line Posts

Provide line posts complying with FS RR-F-191/3. Provide Class 1, steel pipe, Grade A Regular Strength, minimum sizes listed in FS RR-F-191/3 for each class and grade.

2.2.2.1.2 End, Corner and Pull Posts

Provide end, corner, and pull posts in minimum sizes listed in FS RR-F-191/3 for each class and grade. Provide Class 1, steel pipe, Grade A Regular Strength.

2.2.2.2 Post Tops

Provide steel tops and designed as a weathertight closure cap. Post top to have finish and coating matching rails and posts. Steel type to be pressed steel galvanized after fabrication having a minimum zinc coating of 1.20 ounces per square foot. Provide one cap for each post, unless equal protection is provided by a combination post-cap and wire supporting arm. Provide caps with an opening to permit through passage of the top rail.

2.2.3 Braces and Rails

Class 1, steel pipe, Grade A Regular Strength, in minimum sizes listed in FS RR-F-191/3 for each class and grade.

2.2.3.1 Top Rail

Provide top rail conforming to minimum sizes specified in FS RR-F-191/3 for each class and grade unless members are to be oversized. Provide expansion couplings 6 inches long at each joint in top rails.

2.2.3.2 Center Rails Between Line Posts

Provide center rail conforming to minimum sizes specified in FS RR-F-191/3 for each class and grade unless members are to be oversized.

2.2.3.3 Post-Brace Assembly

Provide bracing conforming to minimum sizes specified in FS RR-F-191/3 for each class and grade, and 3/8 inch adjustable truss rods and turnbuckles.

2.2.4 Wire Ties

a. Provide 9-gauge wire for tying fabric to line posts,spaced 12 inches on center. For tying fabric to rails and braces, space wire ties 24 inches on center. For tying fabric to tension wire, space 0.105 inch hog rings 24 inches on center. Manufacturer's standard procedure will be accepted if of equal strength and durability.

b. FS RR-F-191/4. Provide wire ties constructed of the same material and coating as the fencing fabric.

2.2.5 Stretcher Bars

Provide bars that have one-piece lengths equal to the full height of the fabric with a minimum cross section of 3/16 by 3/4 inch, in accordance with ASTM F626.

2.2.6 Stretcher Bar Bands

Provide bar bands for securing stretcher bars to posts that are steel, wrought iron, or malleable iron spaced not over 15 inches on center. Bands may also be used in conjunction with special fittings for securing rails to posts. Provide bands with projecting edges chamfered or eased.

2.2.7 Tension Wire

Provide metallic coated steel marcelled tension wire,(No. 7-gauge) complying with ASTM A824. Provide zinc-coated steel wire with zinc coating that weighs not less than 2.0 ounces per square foot.

2.2.8 Miscellaneous Hardware

All fence and gate hardware must conform to the requirements of AASHTO M 181, except that the thickness of galvanizing must be according to ASTM A153/A153M.

2.3 GATES

FS RR-F-191/2; Type II, double swing. Shape and size of gate frame, as indicated. Framing and bracing members, round of steel alloy. Steel member finish, zinc-coated. Provide gate frames and braces of minimum sizes listed in FS RR-F-191/3 for each Class and Grade, except that steel pipe frames are a minimum of 1.90 inches o.d., 0.120 inches minimum wall thickness. Provide intermediate members as necessary for gate leaves more than 8 feet wide, to provide rigid construction, free from sag or twist.

2.3.1 Gate Posts

Provide gate posts for supporting each gate leaf in minimum sizes listed in FS RR-F-191/3 for each material class and grade. Gate post material class, grade and finish to match other fence posts.

2.3.2 Gate Fabric

Gate fabric, is as specified for fencing fabric. Attach gate fabric to gate frame in accordance with manufacturer's standards, except that welding is not permitted.

2.3.3 Gate Frame

Provide gate frame assembly that is welded or assembled with special malleable or pressed-steel fittings and rivets to provide rigid connections. Install fabric with stretcher bars at vertical edges; stretcher bars may also be used at top and bottom edges. Attach stretcher bars and fabric to gate frames on all sides at intervals not exceeding 15 inches. Attach hardware with rivets or by other means which provides equal security against breakage or removal.

2.3.4 Gate Bracing

Provide diagonal cross-bracing, consisting of 3/8 inch diameter adjustable-length truss rods on welded gate frames, where necessary to obtain frame rigidity without sag or twist. Provide nonwelded gate frames with diagonal bracing.

2.3.5 Padlocks

Provide padlocks conforming to ASTM F883, with chain.

2.3.6 Gate Hardware and Accessories

Provide gate hardware and accessories that conforms to AASHTO M 181 and ASTM F626, and as specified. Coating for steel latches, stops, hinges, keepers, and accessories, is galvanized

a. Provide forged steel hinges to suit gate size, non-lift-off type, offset to permit 180-degree opening. Provide hinge with stainless steel pin.

b. Provide latch that permits accessibility and operation from either side of the gate regardless of the latching arrangement, and with a padlock eye provided as an integral part of the latch. Provide fork type gate latches.

c. Provide stops and holders of malleable iron for vehicular gates. Provide stops that automatically engage the gate and hold it in the open position until manually released.

d. Provide double gates with a cane bolt and ground-set keeper, with latch or locking device and padlock eye designed as an integral part.

2.4 MATERIALS

2.4.1 Zinc Coating

a. Provide zinc-coated ferrous metal components and accessories that are factory coated after fabrication, except as otherwise specified.

b. For galvanizing field repairs, provide material that is cold-applied zinc-rich coating conforming to ASTM A780/A780M.

2.4.2 Concrete

Provide concrete conforming to ASTM C94/C94M, and obtaining a minimum 28 day compressive strength of 3,000 psi.

2.4.3 Grout

Provide grout of proportions one part portland cement to three parts clean, well-graded sand and a minimum amount of water to produce a workable mix.

PART 3 EXECUTION

a. Submit manufacturer's erection/installation drawings and instructions that detail proper assembly and materials in the design for fence, gate, hardware and accessories.

b. Provide complete installation conforming to ASTM F567.

3.1 PREPARATION

Ensure final grading and established elevations are complete prior to commencing fence installation.

3.1.1 Clearing and Grading

Clear fence line of trees, brush, and other obstacles to install fencing for a distance of 5 feet inside; and 5 feet outside the fence. Establish a graded, compacted fence line prior to fencing installation.

3.2 INSTALLATION

3.2.1 Security

Install new chain link fencing, remove existing fencing, and perform related work to provide continuous security for facility. Schedule and fully coordinate work with Contracting Officer and cognizant Security Officer.

3.2.2 Fence Installation

Install fence on prepared surfaces to line and grade indicated. Install fence in accordance with fence manufacturer's written installation instructions except as modified herein.

3.2.2.1 Post Spacing

Provide line posts spaced equidistantly apart, not exceeding 10 feet on center. Provide gate posts spaced as necessary for size of gate openings. Do not exceed 500 feet on straight runs between braced posts. Provide corner or pull posts, with bracing in both directions, for changes in direction of 15 degrees or more, or for abrupt changes in grade. Submit drawings showing location of gate, corner, end, and pull posts.

3.2.2.2 Top and Bottom Tension Wire

Install bottom tension wires before installing chain-link fabric, and pull wires taut. Place bottom tension wires within 8 inches of respective fabric line.

3.2.3 Excavation

a. Provide excavations for post footings which are drilled holes in virgin or compacted soil, of minimum sizes as indicated. Space footings for line posts 10 feet on center maximum and at closer

intervals when indicated, with bottoms of the holes approximately 3 inches below the bottoms of the posts. Set bottom of each post not less than 36 inches below finished grade when in firm, undisturbed soil. Set posts deeper, as required, in soft and problem soils and for heavy, lateral loads. Uniformly spread soil from excavations adjacent to the fence line or on areas of Government property, as directed.

b. When solid rock is encountered near the surface, drill into the rock at least 12 inches for line posts and at least 18 inches for end, pull, corner, and gate posts. Drill holes at least one inch greater in diameter than the largest dimension of the placed post. If solid rock is below the soil overburden, drill to the full depth required except that penetration into rock need not exceed the minimum depths specified above.

3.2.4 Setting Posts

a. Remove loose and foreign materials from holes and moisten the soil prior to placing concrete. Provide tops of footings that are trowel finished and sloped or domed to shed water away from posts. Set hold-open devices, sleeves, and other accessories in concrete.

b. Keep exposed concrete moist for at least seven calendar days after placement or cured with a membrane curing material, as approved. Maintain vertical alignment of posts in concrete construction until concrete has set.

3.2.4.1 Bracing

Brace gate, corner, end, and pull posts to nearest post with a horizontal brace used as a compression member, placed at least 12 inches below top of fence, and a diagonal tension rod.

3.2.4.2 Tolerances

Provide posts that are straight and plumb within a vertical tolerance of 1/4 inch after the fabric has been stretched. Provide fencing and gates that are true to line with no more than 1/2 inch deviation from the established centerline between line posts. Repair defects as directed.

3.2.5 Concrete Strength

Provide concrete that has attained at least 75 percent of its minimum 28 day compressive strength, but in no case sooner than seven calendar days after placement, before rails, tension wire, or fabric are installed. Do not stretch fabric and wires or hang gates until the concrete has attained its full design strength.

3.2.6 Top Rails

Provide top rails that run continuously through post caps or extension arms, bending to radius for curved runs. Provide expansion couplings as recommended by the fencing manufacturer.

3.2.7 Center Rails

Provide single piece center rails between posts set flush with posts on the fabric side, using special offset fittings where necessary.

3.2.8 Brace Assembly

a. Provide bracing assemblies at end and gate posts and at both sides of corner and pull posts, with the horizontal brace located at midheight of the fabric.

b. Install brace assemblies so posts are plumb when the diagonal rod is under proper tension. Provide two complete brace assemblies at corner and pull posts where required for stiffness and as indicated.

3.2.9 Tension Wire Installation

Install tension wire by weaving them through the fabric and tying them to each post with not less than 7-gauge galvanized wire or by securing the wire to the fabric with 10-gauge ties or clips spaced 24 inches on center.

3.2.10 Fabric Installation

a. Provide fabric in single lengths between stretch bars with bottom barbs placed approximately 1-1/2 inches above the ground line. Pull fabric taut and tied to posts, rails, and tension wire with wire ties and bands.

b. Install fabric on the security side of fence, unless otherwise directed. Ensure fabric remains under tension after the pulling force is released.

3.2.11 Stretcher Bar Installation

Thread stretcher bars through or clamped to fabric 4 inches on center and secured to posts with metal bands spaced 15 inches on center.

3.2.12 Gate Installation

Install gates plumb, level, and secure, with full opening without interference. Install ground set items in concrete for anchorage as recommended by the fence manufacturer. Adjust hardware for smooth operation and lubricated where necessary.

3.2.13 Tie Wires

Provide tie wires that are U-shaped to the pipe diameters to which attached. Twist ends of tie wires not less than two full turns and bent so as not to present a hazard.

3.2.14 Fasteners

Install nuts for tension bands and hardware on the side of the fence opposite the fabric side. Peen ends of bolts to prevent removal of nuts.

3.2.15 Zinc-Coating Repair

Clean and repair galvanized surfaces damaged by welding or abrasion, and cut ends of fabric, or other cut sections with specified galvanizing repair material applied in strict conformance with the manufacturer's printed instructions.

3.2.16 Accessories Installation

3.2.16.1 Post Caps

Design post caps to accommodate top rail. Install post caps as recommended by the manufacturer.

3.2.16.2 Padlocks

Provide padlocks for gate openings and provide chains that are securely attached to gate or gate posts. Provide padlocks keyed alike, and provide two keys for each padlock.

3.2.17 Grounding

a. Ground fencing as indicated on drawings and specified.

b. Ground all fences crossed by overhead power lines in excess of 600 volts, and all electrical equipment attached to the fence. Ground fences on each side of all gates, at each corner, at the closest approach to each building located within 50 feet of the fence, and where the fence alignment changes more than 15 degrees. Grounding locations can not exceed 650 feet. Bond each gate panel with a flexible bond strap to its gate post. Ground fences crossed by power lines of 600 volts or more at or near the point of crossing and at distances not exceeding 150 feet on each side of crossing. Provide ground conductor consisting of No. 6 AWG solid copper wire. Provide copper-clad steel rod grounding electrodes 3/4 inch by 10 foot long. Drive electrodes into the earth so that the top of the electrode is at least 6 inches below the grade. Where driving is impracticable, bury electrodes a minimum of 12 inches deep and radially from the fence, with top of the electrode not less than 2 feet or more than 8 feet from the fence. Clamp ground conductor to the fence and electrodes with bronze grounding clamps to create electrical continuity between fence posts, fence fabric, and ground rods. Total resistance of the fence to ground cannot exceed 25 ohms.

3.3 CLOSEOUT ACTIVITIES

a. Remove waste fencing materials and other debris from the work site.

b. Submit manufacturer's data indicating percentage of recycled material content in protective fence materials, including chain link fence, fabric, and gates to verify affirmative procurement compliance.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 32 - EXTERIOR IMPROVEMENTS

SECTION 32 84 24.00 99

IRRIGATION SPRINKLER SYSTEMS

PART 1 GENERAL

1.1 REFERENCES
1.2 SYSTEM DESCRIPTION
1.3 SUBMITTALS
1.4 DELIVERY, STORAGE, AND HANDLING
1.4.1 Delivery
1.4.2 Storage
1.4.3 Handling
1.5 EXTRA STOCK
1.6 QUALITY ASSURANCE
1.6.1 Required Test

PART 2 PRODUCTS

2.1 PIPING MATERIALS, TUBING AND FITTINGS
2.1.1 Polyvinyl Chloride (PVC) Pipe, Fittings and Solvent Cement
2.1.1.1 Pipe
2.1.1.2 Fittings
2.1.1.3 Solvent Cement
2.1.2 Polyethylene (PE) Plastic Piping
2.1.2.1 Pipe
2.1.2.2 Fittings
2.1.3 Pipe Sleeving
2.2 IRRIGATION AND DRIP SPRINKLER HEADS
2.2.1 Pop-Up Irrigation Head
2.2.1.1 Stream Rotor Irrigation Head, Full or Part Circle
2.3 VALVES AND ACCESSORIES
2.3.1 Isolation Valve
2.3.1.1 Ball Valves, Less than 3 inches
2.3.1.2 Gate Valves, 3 inches and Larger
2.3.2 Control Valves
2.3.2.1 Remote Control Valve, Electrical
2.3.3 Quick Coupling Valves
2.3.4 Drain Valves
2.3.4.1 Manual
2.4 ACCESSORIES AND APPURTENANCES
2.4.1 Valve Boxes
2.5 ELECTRICAL CIRCUITS
2.5.1 Control Wiring for Electrically Operated Valves
2.5.2 Conduit

PART 3 EXECUTION

3.1 INSTALLATION
3.1.1 Trenching

3.1.2 Piping System
3.1.2.1 Clearances
3.1.2.2 Minimum Pitch
3.1.2.3 Minimum Backfill Cover
3.1.2.4 Restoration
3.1.3 Piping Installation
3.1.3.1 Polyvinyl Chloride (PVC) Pipe
3.1.4 Irrigation Heads
3.1.4.1 Pop-Up Irrigation Head
3.1.5 Valves
3.1.5.1 Isolation Valves
3.1.5.2 Control Valves
3.1.5.3 Quick Coupling Valves
3.1.5.4 Drain Valves
3.1.6 Accessories
3.1.6.1 Valve Boxes and Lids
3.1.7 Electrical Circuits
3.1.7.1 Loops
3.1.7.2 Expansion and Contraction
3.1.7.3 Splices
3.1.8 Flushing
3.1.9 Adjustment
3.1.10 Sterilization
3.2 FIELD QUALITY CONTROL
3.2.1 Pressure Test
3.2.1.1 Duration
3.2.1.2 Leaks
3.2.1.3 Retest
3.2.2 Operation Test
3.2.2.1 Submittal Instructions
3.2.2.2 Accessories
3.2.2.3 Acceptance

-- End of Section Table of Contents --

SECTION 32 84 24.00 99

IRRIGATION SPRINKLER SYSTEMS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN PETROLEUM INSTITUTE (API)

API Std 598	(2023) Valve Inspecting and Testing

AMERICAN WATER WORKS ASSOCIATION (AWWA)

AWWA C500	(2019) Metal-Seated Gate Valves for Water Supply Service
AWWA C651	(2023) Standard for Disinfecting Water Mains
AWWA C901	(2020) Polyethylene (PE) Pressure Pipe and Tubing, 3/4 In. (19mm) Through 3 In. (76 mm), for Water Service

ASTM INTERNATIONAL (ASTM)

ASTM D1785	(2021) Standard Specification for Poly(Vinyl Chloride) (PVC), Plastic Pipe, Schedules 40, 80, and 120
ASTM D2241	(2020) Standard Specification for Poly(Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series)
ASTM D2464	(2015) Standard Specification for Threaded Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80
ASTM D2466	(2023) Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40
ASTM D2564	(2020) Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems
ASTM D2774	(2021a) Standard Practice for Underground Installation of Thermoplastic Pressure Piping
ASTM D2855	(2020) Standard Practice for the Two-Step (Primer and Solvent Cement) Method of

	Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets
ASTM D3261	(2016) Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic Pipe and Tubing

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2026; TIA 26-1; ERTA 26-1; TIA 26-2; TIA 26-3; TIA 26-4; TIA 26-5; TIA 26-6; TIA 26-7; ERTA 26-2; ERTA 26-3) National Electrical Code

NSF INTERNATIONAL (NSF)

NSF/ANSI 14	(2023) Plastics Piping System Components and Related Materials

OREGON DEPARTMENT OF TRANSPORTATION (ODOT)

ODOT SSC	(2024) Oregon Standard Specifications for Construction

UNDERWRITERS LABORATORIES (UL)

UL 651	(2011; Reprint May 2022) UL Standard for Safety Schedule 40, 80, Type EB and A Rigid PVC Conduit and Fittings

1.2 SYSTEM DESCRIPTION

a. Includes repair of existing irrigation system and new irrigation zones added to the existing irrigation system.

b. New zones added to the existing system are designed with a water pressure minimum of 40 pounds per square inch (psi) maximum of 120 psi at connection to main and 30 psi at the last head in each zone. If pressure falls above or below indicated values, Contractor must notify Contracting Officer.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" classification. Submittals not having a "G" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Piping Materials, Tubing, and Fittings

Valves and Accessories

Sprinkler Heads

Solvent Cement

Control Wiring

Valve Boxes and Lids

SD-06 Test Reports

Pressure Test

Operation Test

Tests

SD-08 Manufacturer's Instructions

Sprinkler Heads

Piping Materials, Tubing and Fittings

Solvent Cement

Control Wiring

1.4 DELIVERY, STORAGE, AND HANDLING

1.4.1 Delivery

Deliver materials in original rolls, packages, cartons, and containers with the name of manufacturer, brand, and model. Inspect materials delivered to the site for damage.

1.4.2 Storage

Store materials on site in enclosures or under protective covering. Store plastic piping and rubber gaskets under cover out of direct sunlight. Do not store materials directly on ground. Keep inside of pipes and fittings free from dirt and debris.

1.4.3 Handling

Handle and carry pipe, fittings, valves, and accessories in such a manner as to ensure delivery to trench in sound undamaged condition. Do not drag pipe.

1.5 EXTRA STOCK

a. two additional sprinkler heads (nozzles, bodies, screens, pressure compensating devices) of each size and type.

b. two valve keys for operating manual valves.

c. two wrenches for removing and installing each type of head.

d. two quick coupler keys and hose swivels.

1.6 QUALITY ASSURANCE

1.6.1 Required Test

Submit tests signed by an authorized official of a testing laboratory of sprinkler head and valve.

PART 2 PRODUCTS

2.1 PIPING MATERIALS, TUBING AND FITTINGS

2.1.1 Polyvinyl Chloride (PVC) Pipe, Fittings and Solvent Cement

NSF/ANSI 14, seal of approval for potable water.

2.1.1.1 Pipe

ASTM D1785, PVC 1120 Schedule 40; or ASTM D2241, PVC 1120 SDR 21, Class 200.

2.1.1.2 Fittings

a. Solvent Welded Socket Type: ASTM D2466, Schedule 40.

b. Threaded Type: ASTM D2464, Schedule 80.

2.1.1.3 Solvent Cement

ASTM D2564.

2.1.2 Polyethylene (PE) Plastic Piping

2.1.2.1 Pipe

AWWA C901, outside diameter (od) base with dimension ratio (DR) of 9.3 to provide 150 psi minimum pressure rating.

2.1.2.2 Fittings

ASTM D3261, DR of 9.3.

2.1.3 Pipe Sleeving

a. Provide PVC piping two times the diameter of main or lateral piping.

b. Provide gray PVC electrical conduit sized according to number of control wires. Minimum 2 inch size.

2.2 IRRIGATION AND DRIP SPRINKLER HEADS

2.2.1 Pop-Up Irrigation Head

2.2.1.1 Stream Rotor Irrigation Head, Full or Part Circle

Sprinkler body, nozzle, and screen constructed of heavy-duty, ultra-violet resistant plastic. Heavy duty, stainless steel internal construction with plastic body. Pop-up height of 4 inches in lawn areas and 12 inches in shrub beds as measured from top of cap at normal installation to middle of nozzle orifice. Provide check valve in head.

2.3 VALVES AND ACCESSORIES

2.3.1 Isolation Valve

2.3.1.1 Ball Valves, Less than 3 inches

API Std 598, brass body, threaded ends.

2.3.1.2 Gate Valves, 3 inches and Larger

AWWA C500, bottom wedging double discs, parallel seats, non-rising stems, open by counterclockwise turning. Provide flanged end connections. Provide bronze interior construction of valves including stem containing a maximum two percent aluminum and maximum 16 percent zinc.

2.3.2 Control Valves

2.3.2.1 Remote Control Valve, Electrical

Furnish automatic control valves per ODOT SSC Section 01220.17 (h).

2.3.3 Quick Coupling Valves

Two piece unit consisting of a coupler water seal valve assembly and a removable upper body to allow spring and key track to be serviced without shutout of main. Provide brass parts. Provide yellow lockable lids with springs for positive closure on key removal.

2.3.4 Drain Valves

2.3.4.1 Manual

Furnish drain valves per ODOT SSC Section 01120.17(b).

2.4 ACCESSORIES AND APPURTENANCES

2.4.1 Valve Boxes

Plastic valve box for each isolation valve, control valve, quick coupling valve and drain valve. Provide box sizes that are suitable and adjustable for valve used.

2.5 ELECTRICAL CIRCUITS

2.5.1 Control Wiring for Electrically Operated Valves

NFPA 70, copper conductor 14 gage wire, Type UF.

2.5.2 Conduit

UL 651, rigid polyvinyl chloride conduit, Schedule 40.

PART 3 EXECUTION

3.1 INSTALLATION

Install sprinkler system after site grading has been completed.

3.1.1 Trenching

Hand trench around roots to pipe grade when roots of 2 inches diameter or greater are encountered. Make width of trench 4 inches minimum or 1 1/2 times diameter of pipe, whichever is wider. Backfill and hand tamp over excavation. When rock is encountered, excavate 4 inches deeper and backfill with silty sand (SM) or well-graded sand (SW) to pipe grade. Keep trenches free of obstructions and debris that would damage pipe. Do not mix subsoil with topsoil. Bore under existing concrete walks, drives and other obstacles at a depth conforming to bottom of adjacent trenches. Install pipe sleeve, two pipe diameters larger than sprinkler pipe, to fill bore. Rock will be encountered. Excavate 4 inches deeper and backfill with silty sand (SM) or well graded sand (SW) to pipe grade. Prior to backfilling of trench, Contracting Officer must verify and approve location of all irrigation heads.

3.1.2 Piping System

3.1.2.1 Clearances

a. Minimum horizontal clearances between lines: 4 inches for 2 inch pipe and less; 12 inches for 2 inch pipe and more.

b. Minimum vertical clearances between lines: one inch.

3.1.2.2 Minimum Pitch

Down 6 inches per 100 feet in direction of drain valves.

3.1.2.3 Minimum Backfill Cover

a. 18 inches for pressure mainline pipe and valve control wire.

b. 12 inches for non-pressure lateral pipe.

c. 24 inches for all piping under paved or non-paved pedestrian paths.

d. 36 inches for all piping under traffic loads.

e. Install pipe sleeves at depths indicated in "c" and "d".

Rock will be encountered. Provide minimum 4 inches of silty sand (SM) or well graded sand (SW) cover on top of all piping. Fill remainder of trench or pipe cover to within 3 inches of top with excavated soil, and compact soil with plate hand-held compactors to same density as undisturbed adjacent soil.

3.1.2.4 Restoration

Fill top 3 inches with topsoil and compact with same density as surrounding soil. Restore turf and plants according to Section 32 92 19.00 99 SEEDING, and Section 32 93 00.00 99 EXTERIOR PLANTS.

3.1.3 Piping Installation

3.1.3.1 Polyvinyl Chloride (PVC) Pipe

a. Solvent-Cemented Joints: ASTM D2855.

b. Threaded Joints: full cut with a maximum of three threads remain exposed on pipe and nipples. Make threaded joints tight without recourse to wicks or fillers, other than polytetrafluoroethylene thread tape.

c. Piping: ASTM D2774 or ASTM D2855, and pipe manufacturer's instructions. Install pipe in a serpentine (snaked) manner to allow for expansion and contraction in trench before backfilling. Install pipes at temperatures over 40 degrees F.

3.1.4 Irrigation Heads

Install plumb and level with terrain. Irrigation heads must not spray directly on or within 3 feet of building.

3.1.4.1 Pop-Up Irrigation Head

Install plumb and level with terrain. Provide swing joint assembly attachment between lateral line and pop-up body. Top of irrigation head must be flush wit surrounding finish grade.

3.1.5 Valves

3.1.5.1 Isolation Valves

Install in a valve box extending from grade to below valve body, with a minimum of 4 inches cover measured from finish grade to top of valve stem.

3.1.5.2 Control Valves

Plumb valve in a valve box extending from grade to below valve body, with minimum of 4 inch cover measured from grade to top of valve. Install automatic valves beside sprinkler heads with a valve box.

3.1.5.3 Quick Coupling Valves

Install in a valve box extending from grade to below valve body, with a minimum of 4 inches cover measured from finish grade to top of valve stem.Install 2 inches above finish grade in planter bed, level with finish grade in turf areas.

3.1.5.4 Drain Valves

Entire system must be manually or automatically drainable. Equip low point of each underground line with drain valve draining into an excavation containing gravel. Cover gravel with building paper. Backfill with excavated material and 6 inches of topsoil.

3.1.6 Accessories

3.1.6.1 Valve Boxes and Lids

a. Install with one cu ft pea gravel sump below valve.

b. Support valve box with brick or concrete block.

c. For turf areas, install flush with finish grade.

d. For planter beds, install 2 inches above finish grade.

e. For sloped conditions, install valve box level with terrain.

3.1.7 Electrical Circuits

Bury wires beside mainline pipe in same trench. Provide gray electrical conduit where wires run under paved or non-paved pedestrian paths and vehicular roads. Tag wires at controller and control valve location with plastic tie wrapped tags. Provide one control wire to each control valve location and one common wire looped from controller to each control valve. Provide one separate control valve wire of a different color from controller to each control valve cluster.

3.1.7.1 Loops

Provide a 12 inch loop of wire at each valve where controls are connected.

3.1.7.2 Expansion and Contraction

Bundle multiple tubes or wires and tape together at 10 foot intervals with 12 inch loop for expansion and contraction.

3.1.7.3 Splices

Make electrical splices waterproof. Locate all field electrical splices in valve boxes.

3.1.8 Flushing

After piping, risers, and valves are in place and connected, but prior to installation of sprinkler heads and valves, flush piping system under a full head of water. Maintain flushing for three minutes.

3.1.9 Adjustment

After grading, plant installation, and rolling of planted areas, adjust sprinkler heads flush with finished grade. Make adjustments by providing new nipples of proper length or by use of heads having an approved device, integral with head, which will permit adjustment in height of head without changing piping.

3.1.10 Sterilization

Sprinkler system fed from a potable water system must be sterilized upstream of backflow preventer in accordance with AWWA C651. Sterilize new waterlines for a minimum of 24-hours, to meet local, state, federal, health test requirements before placing in service. Minimum retention period must be three hours.

3.2 FIELD QUALITY CONTROL

The Contractor will conduct and the Contracting Officer and the QC representative will witness field inspections and field tests specified in this Section. Perform field tests, and provide labor, equipment, and incidentals required for testing.

3.2.1 Pressure Test

3.2.1.1 Duration

During pressure test, maintain a hydrostatic pressure of 150 psi without pumping for a period of one hour with an allowable pressure drop of 5 psi before backfilling system.

3.2.1.2 Leaks

Correct leaks. Make necessary corrections to stop leakage.

3.2.1.3 Retest

Retest system twice until pressure can be maintained for duration of test.

3.2.2 Operation Test

3.2.2.1 Submittal Instructions

Submit record of pressure tests conducted on recording gage, including verification of sprinkler head layout.

3.2.2.2 Accessories

At conclusion of pressure test, install irrigation heads, quick coupling assemblies, and test entire system for operation under normal operating pressure. Make necessary corrections or adjustments to raise or lower pressure for each system if tests results do not match pressure requirements.

3.2.2.3 Acceptance

Operation test is acceptable if system operates through at least one complete cycle for areas to be irrigated.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 32 - EXTERIOR IMPROVEMENTS

SECTION 32 92 19.00 99

SEEDING

PART 1 GENERAL

1.1 REFERENCES
1.2 DEFINITIONS
1.2.1 Stand of Turf
1.3 RELATED REQUIREMENTS
1.4 SUBMITTALS
1.5 DELIVERY, STORAGE, AND HANDLING
1.5.1 Delivery
1.5.1.1 Seed Protection
1.5.1.2 Fertilizer Gypsum Sulfur Iron and Lime Delivery
1.5.2 Storage
1.5.2.1 Seed, Fertilizer Gypsum Sulfur Iron and Lime Storage
1.5.2.2 Topsoil
1.5.2.3 Handling
1.6 TIME RESTRICTIONS AND PLANTING CONDITIONS
1.6.1 Restrictions
1.7 TIME LIMITATIONS
1.7.1 Seed

PART 2 PRODUCTS

2.1 SEED
2.1.1 Classification
2.1.2 Lawn Seed Mixture by Weight
2.2 TOPSOIL
2.2.1 Topsoil
2.2.2 On-Site Topsoil
2.2.3 Off-Site Topsoil
2.3 SOIL AMENDMENTS
2.3.1 Lime
2.3.2 Aluminum Sulfate
2.3.3 Sulfur
2.3.4 Iron
2.3.5 Peat
2.3.6 Sand
2.3.7 Perlite
2.3.8 Soil Conditioners
2.3.8.1 Particle Size
2.3.8.2 Nitrogen Content
2.3.9 Gypsum
2.3.10 Calcined Clay
2.4 FERTILIZER
2.5 MULCH
2.5.1 Straw
2.5.2 Hay

2.5.3 Wood Cellulose Fiber Mulch
2.6 WATER
2.7 EROSION CONTROL MATERIALS
2.7.1 Tackifier

PART 3 EXECUTION

3.1 PREPARATION
3.1.1 EXTENT OF WORK
3.1.1.1 Topsoil
3.1.1.2 Soil Amendment Application Rates
3.2 SEEDING
3.2.1 Seed Application Seasons and Conditions
3.2.2 Seed Application Method
3.2.2.1 Broadcast and Drop Seeding
3.2.2.2 Hydroseeding
3.2.3 Mulching
3.2.3.1 Hay or Straw Mulch
3.2.3.2 Asphalt Adhesive Tackifier
3.2.3.3 Non-Asphaltic Tackifier
3.2.3.4 Asphalt Adhesive Coated Mulch
3.2.4 Rolling
3.2.5 Watering
3.3 PROTECTION OF TURF AREAS
3.4 RENOVATION OF EXISTING TURF AREA
3.4.1 Aeration
3.4.2 Vertical Mowing
3.4.3 Dethatching
3.4.4 Overseeding
3.5 RESTORATION

-- End of Section Table of Contents --

SECTION 32 92 19.00 99

SEEDING

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM C602	(2023) Agricultural Liming Materials
ASTM D4427	(2018) Standard Classification of Peat Samples by Laboratory Testing

OREGON DEPARTMENT OF TRANSPORTATION (ODOT)

ODOT SSC	(2024) Oregon Standard Specifications for Construction

U.S. DEPARTMENT OF AGRICULTURE (USDA)

AMS Seed Act	(1940; R 1988; R 1998) Federal Seed Act

1.2 DEFINITIONS

1.2.1 Stand of Turf

95 percent ground cover of the established species.

1.3 RELATED REQUIREMENTS

Section 31 00 00.00 99 EARTHWORK, Section 32 84 24.00 99 IRRIGATION SPRINKLER SYSTEMS, Section 32 93 00.00 99 EXTERIOR PLANTS, and Section 32 05 33.00 99 LANDSCAPE ESTABLISHMENT applies to this section for pesticide use and plant establishment requirements, with additions and modifications herein.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" classification. Submittals not having a "G" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Wood Cellulose Fiber Mulch

Fertilizer

SD-06 Test Reports

Soil Testing; G, A/E

SD-07 Certificates

Seed

1.5 DELIVERY, STORAGE, AND HANDLING

1.5.1 Delivery

1.5.1.1 Seed Protection

Protect from drying out and from contamination during delivery, on-site storage, and handling.

1.5.1.2 Fertilizer Gypsum Sulfur Iron and Lime Delivery

Deliver to the site in original, unopened containers bearing manufacturer's chemical analysis, name, trade name, trademark, and indication of conformance to state and federal laws. Instead of containers, fertilizer gypsum sulphur iron and lime may be furnished in bulk with certificate indicating the above information.

1.5.2 Storage

1.5.2.1 Seed, Fertilizer Gypsum Sulfur Iron and Lime Storage

Store in cool, dry locations away from contaminants.

1.5.2.2 Topsoil

Prior to stockpiling topsoil, treat growing vegetation with application of appropriate specified non-selective herbicide. Clear and grub existing vegetation three to four weeks prior to stockpiling topsoil.

1.5.2.3 Handling

Do not drop or dump materials from vehicles.

1.6 TIME RESTRICTIONS AND PLANTING CONDITIONS

1.6.1 Restrictions

Do not plant when the ground is frozen, snow covered, muddy, or when air temperature exceeds 90 degrees Fahrenheit. Perform seeding during time periods allowed per ODOT SSC Section 1030.43.

1.7 TIME LIMITATIONS

1.7.1 Seed

Apply seed within 24 hours after seed bed preparation.

PART 2 PRODUCTS

2.1 SEED

2.1.1 Classification

Provide State-certified seed of the latest season's crop delivered in original sealed packages, bearing producer's guaranteed analysis for percentages of mixtures, purity, germination, weed seed content, and inert material. Submit State Certification and Approval for seed. Label in conformance with AMS Seed Act and applicable state seed laws. Wet, moldy, or otherwise damaged seed will be rejected. Field mixes will be acceptable when field mix is performed on site in the presence of the Contracting Officer.

2.1.2 Lawn Seed Mixture by Weight

Botanical Name	Common Name	Minimum Percent Pure Live Seed
Lolimum perenne var Blazer 4	Blazer 4 Perennial Rye	30
Lolimum perenne var Express II	Express II Perennial Rye	30
Festuca rubra spp. fallax var Windward	Windward Chewings Fescue	20
Festuca rubra var. Garnet	Garnet Creeping Red Fescue	20

Proportion seed mixtures by weight.

2.2 TOPSOIL

2.2.1 Topsoil

Furnish topsoil per ODOT SSC Section 01040.14. Submit soil testing per ODOT SSC Section 01040.13 Soil Testing.

2.2.2 On-Site Topsoil

Surface soil stripped and stockpiled on site and modified as necessary to meet the requirements for topsoil specified in Paragraph TOPSOIL. When available topsoil must be existing surface soil stripped and stockpiled on-site in accordance with Section 31 00 00.00 99 EARTHWORK.

2.2.3 Off-Site Topsoil

Conform to requirements specified in Paragraph TOPSOIL. Additional topsoil must be furnished by the Contractor when on-site topsoil is not sufficient.

2.3 SOIL AMENDMENTS

Add amendments to topsoil as required to bring into compliance with standard for topsoil as specified herein.

2.3.1 Lime

Commercial grade hydrate limestone containing a calcium carbonate equivalent (C.C.E.) as specified in ASTM C602 of not less than 110 percent.

2.3.2 Aluminum Sulfate

Commercial grade.

2.3.3 Sulfur

100 percent elemental

2.3.4 Iron

100 percent elemental

2.3.5 Peat

Natural product of peat moss derived from a freshwater site and conforming to ASTM D4427. Shred and granulate peat to pass a 1/2 inch mesh screen and condition in storage pile for minimum 6 months after excavation.

2.3.6 Sand

Clean and free of materials harmful to plants.

2.3.7 Perlite

Horticultural grade.

2.3.8 Soil Conditioners

Provide soil conditioner per ODOT SSC Section 01040.15 Soil Conditioners.

2.3.8.1 Particle Size

Minimum percent by weight passing:

No. 4 mesh screen	95
No. 8 mesh screen	80

2.3.8.2 Nitrogen Content

Minimum percent based on dry weight:

Fir Sawdust	0.7
Fir or Pine Bark	1.0

2.3.9 Gypsum

Coarsely ground gypsum comprised of calcium sulfate dihydrate 80 percent, calcium 18 percent, sulfur 14 percent; minimum 96 percent passing through 20 mesh screen, 100 percent passing thru 16 mesh screen.

2.3.10 Calcined Clay

Calcined clay must be granular particles produced from montmorillonite clay calcined to a minimum temperature of 1200 degrees F. Gradation: A minimum 90 percent must pass a No. 8 sieve; a minimum 99 percent must be retained on a No. 60 sieve; and material passing a No. 100 sieve must not exceed 2 percent. Bulk density: A maximum 40 pounds per cubic foot.

2.4 FERTILIZER

Provide Fertilizer per ODOT SSC Section 01030.14 Fertilizer. Include physical characteristics, and recommendations.

2.5 MULCH

Mulch must be free from noxious weeds, mold, and other deleterious materials.

2.5.1 Straw

Stalks from oats, wheat, rye, barley, or rice. Furnish in air-dry condition and of proper consistency for placing with commercial mulch blowing equipment. Straw must contain no fertile seed.

2.5.2 Hay

Air-dry condition and of proper consistency for placing with commercial mulch blowing equipment. Hay must be sterile, containing no fertile seed.

2.5.3 Wood Cellulose Fiber Mulch

Cellulose fiber produced from virgin wood, straw, or paper fiber product. Furnish wood or straw mulch processed so the fibers remain uniformly suspended under agitation in water and the fibers have moisture-absorption and percolation properties. Ship hydromulch in packages of uniform weight, ± five percent, and labeled with the manufacturer's name and air-dry weight. Include enough green dye tracer so applied mulch is easily visible. Processed to contain no growth or germination-inhibiting factors. Composition on air-dry weight basis: nine to 15 percent moisture, pH range from 5.5 to 8.2. Use with hydraulic application of grass seed and fertilizer.

2.6 WATER

Source of water must be approved by Contracting Officer and of suitable quality for irrigation, containing no elements toxic to plant life.

2.7 EROSION CONTROL MATERIALS

Erosion control material must conform to the following:

2.7.1 Tackifier

Furnish a commercial quality tackifier containing no agent toxic to plant life. Furnish tackifier of either a liquid stabilizing emulsion or a dry powder tackifier meeting the following requirements:

a. Liquid Stabilizer Emulsion - Tackifier with a base material of liquid, polyvinyl acetate polymers, using emulsion resins and containing not less than 55 percent total solids by weight. Furnish tackifier containing no polyacrylates or polyvinyl acrylics. The emulsion must, when diluted with water and upon drying, allow exchange of air and moisture to the seeds and have an effective life of one year or more.

b. Dry Powder Tackifier - Tackifier base consisting of one or more active hydrocolloids from natural plant sources, which hydrates in

water and blends with other slurry materials, and upon application and drying tacks the slurry particles to the Soil surface, and exhibits no growth or germination inhibiting factors. Provide stabilizing emulsion in a dry powder form that may be re-emulsifiable, and consisting of a processed organic adhesive derivative of one of the following:

(1) Gumbinder derived from guar (Cyamopsis tetragonoloba).

(2) Gumbinder derived from plantain (Plantago insularis).

PART 3 EXECUTION

3.1 PREPARATION

3.1.1 EXTENT OF WORK

Provide soil preparation prior to planting (including soil amendments as required), fertilizing, seeding, and surface topdressing of all newly graded finished earth surfaces, unless indicated otherwise, and at all areas inside or outside the limits of construction that are disturbed by the Contractor's operations. Prepare subgrade per ODOT SSC Section 01040.43 Topsoil and 01040.48(c) Method "C" (Sod Lawn and Seeded Lawn Areas).

3.1.1.1 Topsoil

Provide 6 inches of off-site topsoil or on-site topsoil to meet indicated finish grade for turf seeding areas only. After areas have been brought to indicated finish grade, incorporate fertilizer, pH adjusters, and soil amendments into soil a minimum depth of 4 inches by disking, harrowing, tilling or other method approved by the Contracting Officer. Remove debris and stones larger than 3/4 inch in any dimension remaining on the surface after finish grading. Correct irregularities in finish surfaces to eliminate depressions. Protect finished topsoil areas from damage by vehicular or pedestrian traffic.

3.1.1.2 Soil Amendment Application Rates

Apply soil amendments at rates as determined by laboratory soil analysis of the soils at the job site or as follows:

Material	**Rate (per 100 square yards)**
Soil Conditioner	1/2 cubic yard
Fertilizer	10 pounds
Lime	40 pounds

3.2 SEEDING

3.2.1 Seed Application Seasons and Conditions

Immediately before seeding, restore soil to proper grade. Do not seed when ground is muddy frozen, snow covered or in an unsatisfactory condition for seeding. If special conditions exist that may warrant a variance in the above seeding dates or conditions, submit a written request to the Contracting Officer stating the special conditions and proposed variance.

Apply seed within twenty four hours after seedbed preparation. Sow seed by approved sowing equipment. Sow one-half the seed in one direction, and sow remainder at right angles to the first sowing.

3.2.2 Seed Application Method

Seeding method must be broadcasted and drop seeding or hydroseeding.

3.2.2.1 Broadcast and Drop Seeding

Seed must be uniformly broadcast at the rate of 7.0 PLS pounds per 1000 square feet. Use broadcast or drop seeders. Sow one-half the seed in one direction, and sow remainder at right angles to the first sowing. Cover seed uniformly to a maximum depth of 1/4 inch in clay soils and 1/2 inch in sandy soils by means of spike-tooth harrow, cultipacker, raking or other approved devices.

3.2.2.2 Hydroseeding

First, mix water and fiber. Wood cellulose fiber, paper fiber, or recycled paper must be applied as part of the hydroseeding operation. Fiber must be added at 1,000 pounds, dry weight, per acre. Then add and mix seed and fertilizer to produce a homogeneous slurry. Seed must be mixed to ensure broadcasting at the rate of 7.0 PLS pounds per 1000 square feet. When hydraulically sprayed on the ground, material must form a blotter like cover impregnated uniformly with grass seed. Spread with one application with no second application of mulch.

3.2.3 Mulching

3.2.3.1 Hay or Straw Mulch

Hay or straw mulch must be spread uniformly at the rate of 2 tons per acre. Mulch must be spread by hand, blower-type mulch spreader, or other approved method. Mulching must be started on the windward side of relatively flat areas or on the upper part of steep slopes, and continued uniformly until the area is covered. The mulch must not be bunched or clumped. Sunlight must not be completely excluded from penetrating to the ground surface. All areas installed with seed must be mulched on the same day as the seeding. Mulch must be anchored immediately following spreading.

3.2.3.2 Asphalt Adhesive Tackifier

Asphalt adhesive tackifier must be sprayed at a rate between 10 to 13 gallons per 1000 square feet. Sunlight must not be completely excluded from penetrating to the ground surface.

3.2.3.3 Non-Asphaltic Tackifier

Hydrophilic colloid must be applied at the rate recommended by the manufacturer, using hydraulic equipment suitable for thoroughly mixing with water. A uniform mixture must be applied over the area.

3.2.3.4 Asphalt Adhesive Coated Mulch

Hay or straw mulch may be spread simultaneously with asphalt adhesive applied at a rate between 10 to 13 gallons per 1000 square feet, using power mulch equipment which must be equipped with suitable asphalt pump and nozzle. The adhesive-coated mulch must be applied evenly over the

surface. Sunlight must not be completely excluded from penetrating to the ground surface.

3.2.4 Rolling

Immediately after seeding, firm entire area except for slopes in excess of three to one with a roller not exceeding 90 pounds for each foot of roller width. If seeding is performed by hydroseeding, rolling may be eliminated.

3.2.5 Watering

Start watering areas seeded as required by temperature and wind conditions. Apply water at a rate sufficient to insure thorough wetting of soil to a depth of 2 inches without run off. During the germination process, seed is to be kept actively growing and not allowed to dry out.

3.3 PROTECTION OF TURF AREAS

Immediately after turfing, protect area against traffic and other use.

3.4 RENOVATION OF EXISTING TURF AREA

3.4.1 Aeration

a. Upon completion of weed eradication operations and Contracting Officer's approval to proceed, aerate turf areas indicated, by approved device. Core, by pulling soil plugs, to a minimum depth of 3 inches. Leave all soil plugs, that are produced, in the turf area. Remove all debris generated during this operation off site. After aeration operations are complete, topdress entire area 1/4 inch depth with the following mixture:

(1) 70 percent sand

(2) 30 percent humus

b. Blend all parts of topdressing mixture to a uniform consistency throughout. Keep clean at all times at least one paved pedestrian access route and one paved vehicular access route to each building. Clean all soil plugs off of other paving when work is complete. Apply fertilizer according to Paragraph FERTILIZER APPLICATION RATES.

3.4.2 Vertical Mowing

Upon completion of aerating operation and Contracting Officer's approval to proceed, vertical mow turf areas indicated, by approved device, to a depth of 1/2 inch above existing soil level, to reduce thatch build-up, grain, and surface compaction. Clean other paving when work is complete. Remove all debris generated during this operation off site.

3.4.3 Dethatching

Upon completion of aerating operation and Contracting Officer's approval to proceed, dethatch turf areas indicated, by approved device, to a depth of 1/4 inch below existing soil level, to reduce thatch build-up, grain, and surface compaction. Keep clean at all times at least one paved pedestrian access route and one paved vehicular access route to each building. Clean other paving when work is complete. Remove all debris generated during this operation off site.

3.4.4 Overseeding

Apply seed in accordance with and at rates indicated in applicable portions of Paragraph SEED APPLICATION METHOD.

3.5 RESTORATION

Restore to original condition existing turf areas which have been damaged during turf installation operations at the Contractor's expense. Clean other paving when work in adjacent areas is complete.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 32 - EXTERIOR IMPROVEMENTS

SECTION 32 93 00.00 99

EXTERIOR PLANTS

PART 1 GENERAL

1.1 REFERENCES
1.2 RELATED REQUIREMENTS
1.3 SUBMITTALS
1.4 QUALITY ASSURANCE
1.4.1 Nursery Certifications
1.4.2 State Landscape Contractor's License
1.4.3 Plant Material Photographs
1.5 DELIVERY, STORAGE, AND HANDLING
1.5.1 Delivery
1.5.1.1 Branched Plant Delivery
1.5.1.2 Soil Amendment Delivery
1.5.1.3 Plant Labels
1.5.2 Storage
1.5.2.1 Plant Storage and Protection
1.5.2.2 Fertilizer, Gypsum, pH Adjusters and Mulch Storage
1.5.3 Handling
1.5.4 TIME LIMITATION
1.6 TIME RESTRICTIONS AND PLANTING CONDITIONS
1.6.1 Planting Dates
1.6.2 Restrictions
1.7 GUARANTEE

PART 2 PRODUCTS

2.1 PLANTS
2.1.1 Regulations and Varieties
2.1.2 Shape and Condition
2.1.2.1 Deciduous Shrubs
2.1.2.2 Evergreen Shrubs
2.1.2.3 Ground Covers
2.1.3 Plant Size
2.1.4 Root Ball Size
2.1.4.1 Mycorrhizal fungi inoculum
2.1.5 Growth of Trunk and Crown
2.1.5.1 Deciduous Shrubs
2.1.5.2 Coniferous Evergreen Plant Material
2.1.5.3 Broadleaf Evergreen Plant Material
2.2 BLENDED SOIL
2.3 MULCH
2.3.1 Organic Mulch Materials
2.4 ANTIDESICCANTS
2.5 WATER
2.6 MYCORRHIZAL FUNGI INOCULUM
2.7 SOURCE QUALITY CONTROL

PART 3 EXECUTION

3.1 EXTENT OF WORK
3.2 PREPARATION
3.2.1 Layout
3.2.2 Subgrade Preparation
3.2.3 Blended Soil Preparation
3.3 RAIN GARDEN PLANT BED PREPARATION
3.4 PLANT INSTALLATION
3.4.1 Individual Plant Pit Excavation
3.4.2 Plant Beds with Multiple Plants
3.4.3 Handling and Setting
3.4.3.1 Balled and Burlapped Stock
3.4.3.2 Container Grown Stock
3.4.4 Mulch Topdressing
3.4.5 Watering
3.4.6 Pruning
3.4.6.1 Shrubs
3.5 RESTORATION AND CLEAN UP
3.5.1 Restoration
3.5.2 Clean Up

-- End of Section Table of Contents --

SECTION 32 93 00.00 99

EXTERIOR PLANTS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICANHORT (AH)

ANSI/ANLA Z60.1	(2004) American Standard for Nursery Stock

CITY OF PORTLAND (COP)

COP SCS	(2021) Standard Construction Specifications

L.H. BAILEY HORTORIUM (LHBH)

LHBH	(1976) Hortus Third

TREE CARE INDUSTRY ASSOCIATION (TCIA)

TCIA A300P1	(2017) ANSI A300 Part1: Tree Care Operations - Trees, Shrubs and Other Woody Plant Maintenance Standard Practices - Pruning
TCIA Z133	(2017) American National Standard for Arboricultural Operations - Pruning, Repairing, Maintaining, and Removing Trees, and Cutting Brush - Safety Requirements

1.2 RELATED REQUIREMENTS

Section 31 00 00.00 99 EARTHWORK, Section 32 84 24.00 99 IRRIGATION SPRINKLER SYSTEMS, Section 32 92 19.00 99 SEEDING, and Section 32 05 33.00 99 LANDSCAPE ESTABLISHMENT applies to this section for pesticide use and plant establishment requirements, with additions and modifications herein.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" classification. Submittals not having a "G" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

State Landscape Contractor's License

Time Restrictions and Planting Conditions

SD-03 Product Data

Organic Mulch Materials

Mulch; G, A/E

Antidesiccants

Photographs; G, A/E

SD-07 Certificates

Nursery Certifications; G, A/E

1.4 QUALITY ASSURANCE

1.4.1 Nursery Certifications

a. Indicate on nursery letterhead the name of plants in accordance with the LHBH, including botanical common names, quality, and size.

b. Inspection certificate.

c. Mycorrhizal fungi inoculum for plant material treated

1.4.2 State Landscape Contractor's License

Construction company must hold a landscape contractors license in the state where the work is performed and have a minimum of five years landscape construction experience. Submit copy of license and three references for similar work completed in the last five years.

1.4.3 Plant Material Photographs

Submit nursery photographs, for Government approval prior to ordering, for each tree larger than 24 inch box/ 2 inch caliper size.

1.5 DELIVERY, STORAGE, AND HANDLING

1.5.1 Delivery

1.5.1.1 Branched Plant Delivery

Deliver with branches tied and exposed branches covered with material which allows air circulation. Prevent damage to branches, trunks, root systems, and root balls and desiccation of leaves.

1.5.1.2 Soil Amendment Delivery

Deliver to the site in original, unopened containers bearing manufacturer's chemical analysis, name, trade name, or trademark, and indication of conformance to state and federal laws. Instead of containers, fertilizer, gypsum, sulfur, iron, and lime may be furnished in bulk with a certificate indicating the above information. Store in dry locations away from contaminates.

1.5.1.3 Plant Labels

Deliver plants with durable waterproof labels in weather-resistant ink. Provide labels stating the correct botanical and common plant name and variety as applicable and size as specified in the list of required plants. Attach to plants, bundles, and containers of plants. Groups of plants may be labeled by tagging one plant. Labels must be legible for a minimum of 60 days after delivery to the planting site.

1.5.2 Storage

1.5.2.1 Plant Storage and Protection

Store and protect plants not planted on the day of arrival at the site as follows:

a. Shade and protect plants in outside storage areas from the wind and direct sunlight until planted.

b. Protect balled and burlapped plants from freezing or drying out by covering the balls or roots with moist burlap, sawdust, wood chips, shredded bark, peat moss, or other approved material. Provide covering which allows air circulation.

c. Keep plants in a moist condition until planted by watering with a fine mist spray.

d. Do not store plant material directly on concrete or bituminous surfaces.

1.5.2.2 Fertilizer, Gypsum, pH Adjusters and Mulch Storage

Store in dry locations away from contaminants.

1.5.3 Handling

Do not drop or dump plants from vehicles. Avoid damaging plants being moved from nursery or storage area to planting site. Handle balled and burlapped and container plants carefully to avoid damaging or breaking the earth ball or root structure. Do not handle plants by the trunk or stem. Remove damaged plants from the site.

1.5.4 TIME LIMITATION

Except for container-grown plant material, the time limitation from digging to installing plant material must be a maximum of 90 days. The time limitation between installing the plant material and placing the mulch must be a maximum of 24 hours.

1.6 TIME RESTRICTIONS AND PLANTING CONDITIONS

1.6.1 Planting Dates

Plant all plants from September 1 to March 15. Indicate anticipated dates and locations for each type of planting.

1.6.2 Restrictions

Do not plant under the following conditions, unless otherwise approved:

When ground is frozen, snow covered, muddy, wind velocity exceed 25 mph or when air temperature is expected below 32 degrees Fahrenheit or exceeds 88 degrees Fahrenheit. Do not plant when ground reaches saturation, except as approved when planting wetland plants.

1.7 GUARANTEE

a. Guarantee plants installed during fall planting season until the following December 1; guarantee plants installed during spring planting season until the following May 15.

b. Remove and replace dead planting materials immediately unless required to plant in the succeeding planting season. At end of warranty period, replace planting materials that die or have 25 percent or more of their branches that die during the construction operations or the guarantee period.

PART 2 PRODUCTS

2.1 PLANTS

2.1.1 Regulations and Varieties

Furnish nursery stock in accordance with ANSI/ANLA Z60.1, except as otherwise specified or indicated. Each plant or group of planting must have a "key" number indicated on the nursery certifications of the plant schedule. Furnish plants grown under climatic conditions similar to those in the locality of the project. Spray plants budding into leaf or having soft growth with an antidesiccant before digging. Plants of the same specified size must be of uniform size and character of growth. All plants must comply with all Federal and State Laws requiring inspection for plant diseases and infestation.

2.1.2 Shape and Condition

Well-branched, well-formed, sound, vigorous, healthy planting stock free from disease, sunscald, windburn, abrasion, and harmful insects or insect eggs and having a healthy, normal, and undamaged root system.

2.1.2.1 Deciduous Shrubs

Symmetrically developed and of uniform habit of growth, with straight boles or stems, and free from objectionable disfigurements.

2.1.2.2 Evergreen Shrubs

Well developed symmetrical tops with typical spread of branches for each particular species or variety.

2.1.2.3 Ground Covers

Number and length of runners and clump sizes indicated, and of the proper age for the grade of plants indicated, furnished in removable containers, integral containers, or formed homogeneous soil section.

2.1.3 Plant Size

Minimum sizes measured after pruning and with branches in normal position, must conform to measurements indicated, based on the average width or

height of the plant for the species as specified in ANSI/ANLA Z60.1. Plants larger in size than specified may be provided with approval of the Contracting Officer. When larger plants are provided, increase the ball of earth or spread of roots in accordance with ANSI/ANLA Z60.1.

2.1.4 Root Ball Size

All balled and burlapped and container grown root balls must conform to ANSI/ANLA Z60.1. All wrappings and ties must be biodegradable. Root growth in container grown plants must be sufficient to hold earth intact when removed from containers. Root bound plants will not be accepted.

2.1.4.1 Mycorrhizal fungi inoculum

Before shipment, root systems must contain mycorrhizal fungi inoculum.

2.1.5 Growth of Trunk and Crown

2.1.5.1 Deciduous Shrubs

Deciduous shrubs must have the height and number of primary stems recommended by ANSI/ANLA Z60.1. Acceptable plant material must be well shaped, with sufficient well-spaced side branches, and recognized by the trade as typical for the species grown in the region of the project.

2.1.5.2 Coniferous Evergreen Plant Material

Coniferous Evergreen plant material must have the height-to-spread ratio recommended by ANSI/ANLA Z60.1. The coniferous evergreen trees must not be "poled" or the leader removed. Acceptable plant material must be exceptionally heavy, well shaped and trimmed to form a symmetrical and tightly knit plant. The form of growth desired must be as indicated.

2.1.5.3 Broadleaf Evergreen Plant Material

Broadleaf evergreen plant material must have the height-to-spread ratio recommended by ANSI/ANLA Z60.1. Acceptable plant material must be well shaped and recognized by the trade as typical for the variety grown in the region of the project.

2.2 BLENDED SOIL

Provide Blended Soil for planting in rain garden facility per COP SCS Section 01040.14(d) Stormwater Facility Blended Soil. The City of Portland Bureau of Environmental Services (BES) maintains an online list of vendors and their products that have successfully demonstrated compliance with BES' standard specification for Blended Soil for vegetated stormwater systems.

2.3 MULCH

Free from noxious weeds, mold, pesticides, or other deleterious materials.

2.3.1 Organic Mulch Materials

Furnish plant bed mulch Materials free of Noxious Weed seeds or plants and which contain no substance detrimental to plant life. Mulches are subject to inspection at any time and place at the discretion of the Contracting Officer. Provide Bark Mulch that is ground, shredded or broken particles from the bark of fir or hemlock trees which is free of non-bark debris,

harmful bacteria, disease spores, pests and substances toxic to plant growth. Provide mulch that is the standard trade size known as "medium fine mulch".

2.4 ANTIDESICCANTS

Sprayable, water insoluble vinyl-vinledine complex which produce a moisture retarding barrier not removable by rain or snow. Film must form at temperatures commonly encountered out of doors during planting season and have a moisture vapor transmission rate (MVT) of the resultant film of maximum 10 grams per 24 hours at 70 percent humidity.

2.5 WATER

Source of water to be approved by Contracting Officer and suitable quality for irrigation and must not contain elements toxic to plant life.

2.6 MYCORRHIZAL FUNGI INOCULUM

Mycorrhizal fungi inoculum must be composed of multiple-fungus inoculum as recommended by the manufacturer for the plant material specified.

2.7 SOURCE QUALITY CONTROL

The Contracting Officer and Landscape Architect of Record will inspect plant materials at the project site and approve them. Tag plant materials for size and quality.

PART 3 EXECUTION

3.1 EXTENT OF WORK

Provide soil preparation, including soil conditioners and soil amendments prior to planting. Provide shrubs, groundcover, seed, post-planting fertilizer, erosion control material, and mulch topdressing of all newly graded finished earth surfaces, unless indicated otherwise, and at all areas inside or outside the limits of construction that are disturbed by the Contractor's operations.

3.2 PREPARATION

3.2.1 Layout

Stake out approved plant material locations and planter bed outlines on the project site before digging plant pits or beds. The Contracting Officer reserves the right to adjust plant material locations to meet field conditions. Do not plant closer than 36 inches to a pavement edge, fence or wall edge and other similar structures.

3.2.2 Subgrade Preparation

Areas to receive Blended Soil: Scarify or till subsoil that is not loose and friable to a depth of 6 inches and obtain approval from Contracting Officer.

3.2.3 Blended Soil Preparation

Place blended soil per COP SCS Section 1040.43 Topsoil and Stormwater Facility Blended Soil. Place to depth indicated on drawings.

3.3 RAIN GARDEN PLANT BED PREPARATION

Protect existing adjacent turf before excavations are made. Measure depth of plant pits from finished grade. Depth of plant pit excavation must be as indicated and provide proper relation between top of root ball and finished grade. Install plant material as specified in Paragraph PLANT INSTALLATION.

3.4 PLANT INSTALLATION

3.4.1 Individual Plant Pit Excavation

Excavate pits at least twice as large in diameter as the size of ball or container to depth shown.

3.4.2 Plant Beds with Multiple Plants

Excavate plant beds continuously throughout entire bed as outlined to depth shown.

3.4.3 Handling and Setting

a. Move plant materials only by supporting the root ball or container. Set plants on hand compacted layer of the blended soil mixture a minimum of 6 inches thick and hold plumb in the center of the pit until blended soil has been tamped firmly around root ball. Set plant materials, in relation to surrounding finish grade, depth at which they were grown in the nursery, collecting field or container. Replace plant material whose root balls are cracked or damaged either before or during the planting process.

b. Plant material must be set in plant beds according to the drawings. Backfill soil mixture must be placed on previously scarified subsoil to completely surround the root balls, and must be brought to a smooth and even surface, blending to existing areas.

3.4.3.1 Balled and Burlapped Stock

Backfill with blended soil mixture to approximately half the depth of ball and then tamp and water. Carefully remove or fold back excess burlap and tying materials from the top a minimum 1/3 depth from the top of the rootball. Tamp and complete backfill, place mulch topdressing, and water. Remove wires and non-biodegradable materials from plant pit prior to backfill operations.

3.4.3.2 Container Grown Stock

Remove from container and prevent damage to plant or root system.

3.4.4 Mulch Topdressing

After completion of plant installation and before watering, place mulch topdressing to a depth of 3 inches to planting areas located above the high water line elevation of the Rain Garden. Refer to Drainage Drawings for location of the high water line elevation. No mulch placement below high water elevation. Keep mulch out of the crowns of shrubs. Place mulch a minimum 2 to 3 inches away from trunk of shrub or tree.

3.4.5 Watering

Start watering areas planted as required by temperature and wind conditions. Apply water at a rate sufficient to ensure thorough wetting of soil to a depth of 12 inches without run off.

3.4.6 Pruning

Prune in accordance with safety requirement of TCIA Z133.

3.4.6.1 Shrubs

Remove dead and broken branches. Prune to correct structural defects only. Retain typical growth shape of individual plants with as much height and spread as practical. Make cuts with sharp instruments. Collars must remain in place. Pruning must be accomplished by trained and experienced personnel and must be accordance with TCIA A300P1.

3.5 RESTORATION AND CLEAN UP

3.5.1 Restoration

Turf areas, pavements and facilities that have been damaged from the planting operation must be restored to original condition at the Contractor's expense.

3.5.2 Clean Up

Excess and waste material must be removed from the installed area and must be disposed offsite at an approved landfill, recycling center, or composting center. Separate and recycle or reuse the following landscape waste materials: nylon straps, wire, ball wrap, burlap, and wood stakes. Adjacent paved areas must be cleared.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 33 - UTILITIES

SECTION 33 11 00.00 99

WATER UTILITY DISTRIBUTION PIPING

PART 1 GENERAL

1.1 REFERENCES
1.2 DEFINITIONS
1.2.1 Water Mains
1.2.2 Additional Definitions
1.3 SUBMITTALS
1.4 QUALITY CONTROL
1.4.1 Regulatory Requirements
1.5 QUALITY ASSURANCE
1.5.1 Pipe Insulation Installer Qualification
1.5.2 Electric Heat Tracing System
1.5.2.1 Manufacturer Qualifications
1.5.2.2 Product Requirements
1.5.2.3 Electrical Components, Devices, and Accessories
1.6 DELIVERY, STORAGE, AND HANDLING
1.6.1 Delivery and Storage
1.6.2 Handling

PART 2 PRODUCTS

2.1 MATERIALS
2.1.1 Pipe, Fittings, Joints And Couplings
2.1.1.1 Ductile-Iron Piping
2.1.1.1.1 Pipe and Fittings
2.1.1.1.2 Joints and Jointing Material
2.1.1.2 Steel Piping
2.1.1.2.1 Pipe and Fittings
2.1.1.2.2 Wall Thickness for Pipe and Fittings
2.1.1.2.3 Joints and Jointing Material
2.1.1.2.4 Lining
2.1.2 Valves
2.1.2.1 Gate Valves 3 Inch Size and Larger on Buried Piping
2.1.2.2 Air Release, Air/Vacuum, and Combination Air Valves
2.1.2.3 Valve Boxes
2.1.3 Fire Hydrants
2.1.3.1 Fire Hydrants
2.1.3.1.1 Dry-Barrel Type Fire Hydrants
2.1.4 Disinfection
2.2 PIPE ACCESSORIES
2.2.1 Pipe Restraint
2.2.1.1 Thrust Blocks
2.2.2 Sleeve-Type Mechanical Couplings
2.2.3 Bonded Joints
2.3 PIPE INSULATION
2.3.1 Aluminum Jackets and Pipe Cradle

2.3.2 Vapor Retarder Required
2.3.2.1 White Vapor Retarder All Service Jacket (ASJ)
2.3.2.2 Vapor Retarder/Vapor Barrier Mastic Coatings
2.3.2.2.1 Vapor Barrier
2.3.2.2.2 Vapor Retarder
2.3.2.2.3 Polyvinylidene Chloride (PVDC) Film Vapor Retarder
2.3.2.2.4 Polyvinylidene Chloride Vapor Retarder Adhesive Tape
2.3.2.2.5 Vapor Barrier/Weather Barrier
2.3.3 Wire
2.3.4 Insulation Bands
2.3.5 Sealants
2.3.6 Pipe Insulation Systems
2.3.6.1 Aboveground Cold Pipeline (-30 to 60 deg. F)
2.3.6.1.1 Cellular Glass
2.4 SELF-REGULATING PARALLEL RESISTANCE HEATING CABLES
2.4.1 Heating Cables
2.4.2 Wire Connectors and Terminations
2.5 CONTROLS
2.6 HEATING CABLES ACCESSORIES

PART 3 EXECUTION

3.1 PREPARATION
3.1.1 Connections to Existing System
3.1.2 Operation of Existing Valves
3.1.3 Earthwork
3.2 INSTALLATION
3.2.1 Piping
3.2.1.1 General Requirements
3.2.1.1.1 Termination of Water Lines
3.2.1.1.2 Pipe Laying and Jointing
3.2.1.1.3 Tracer Wire
3.2.1.1.4 Connections to Existing Water Lines
3.2.1.1.5 Sewer Manholes
3.2.1.1.6 Water Piping Parallel With Sewer Piping
3.2.1.1.7 Water Piping Crossing Sewer Piping
3.2.1.1.8 Penetrations
3.2.1.2 Ductile-Iron Piping
3.2.1.3 Steel Piping
3.2.2 Disinfection
3.2.3 Flushing
3.2.4 Pipe Restraint
3.2.4.1 Concrete Thrust Blocks
3.2.5 Valves
3.2.5.1 Gate Valves
3.2.5.2 Air Release, Air/Vacuum, and Combination Air Valves
3.2.6 Fire Hydrants
3.2.7 Pipe Insulation Systems Installation
3.2.7.1 Pipe Insulation
3.2.7.1.1 General
3.2.7.1.2 Pipes Passing Through Exterior Walls
3.2.7.1.3 Pipes Passing Through Pipe Straps
3.2.7.1.3.1 Horizontal Pipes Larger Than 2 Inches and Below 60 Degrees F
3.2.7.1.3.2 Vertical Pipes
3.2.7.1.3.3 Inserts
3.2.7.2 Aboveground Cold Pipelines
3.2.7.2.1 Factory or Field applied Jacket
3.2.7.2.2 Installing Insulation for Cold Pipe Straight Runs

3.2.7.2.3 Longitudinal Laps of the Jacket Material
3.2.7.2.4 Laps and Butt Strips
3.2.7.2.5 Factory Self-Selling Lap Systems
3.2.7.2.6 Breaks and Punctures in the Jacket Material
3.2.7.2.7 Penetrations Such as Thermometers
3.2.7.2.8 Insulation for Fittings and Accessories
3.2.7.3 Piping Exposed to Weather
3.2.7.3.1 Aluminum Jacket and Pipe Cradle
3.2.7.3.2 Insulation of Fittings
3.2.8 Heating Cable Installation
3.2.8.1 General
3.2.8.2 Installation
3.3 FIELD QUALITY CONTROL
3.3.1 Tests
3.3.1.1 Hydrostatic Test
3.3.1.2 Leakage Test
3.3.1.3 Bacteriological Testing
3.3.1.4 Special Testing Requirements for Fire Service
3.3.1.5 Tracer Wire Continuity Test
3.3.1.6 Heating Cable Electrical Tests
3.4 SYSTEM STARTUP
3.5 DEMONSTRATION AND TRAINING
3.6 CLEANUP

-- End of Section Table of Contents --

SECTION 33 11 00.00 99

WATER UTILITY DISTRIBUTION PIPING

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

ASME B18.2.2	(2022) Nuts for General Applications: Machine Screw Nuts, and Hex, Square, Hex Flange, and Coupling Nuts (Inch Series)
ASME B18.5.2.1M	(2006; R 2011) Metric Round Head Short Square Neck Bolts
ASME B18.5.2.2M	(1982; R 2010) Metric Round Head Square Neck Bolts

AMERICAN WATER WORKS ASSOCIATION (AWWA)

AWWA B300	(2018) Hypochlorites
AWWA B301	(2018) Liquid Chlorine
AWWA C104/A21.4	(2022) Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water
AWWA C110/A21.10	(2021) Ductile-Iron and Gray-Iron Fittings
AWWA C111/A21.11	(2023) Rubber-Gasket Joints for Ductile-Iron Pressure Pipe and Fittings
AWWA C116/A21.16	(2015) Protective Fusion-Bonded Coatings for the Interior and Exterior Surfaces of Ductile-Iron and Gray Iron Fittings
AWWA C151/A21.51	(2023) Ductile-Iron Pipe, Centrifugally Cast
AWWA C153/A21.53	(2019) Ductile-Iron Compact Fittings for Water Service
AWWA C200	(2023) Steel Water Pipe - 6 In. (150 mm) and Larger
AWWA C205	(2018) Cement-Mortar Protective Lining and Coating for Steel Water Pipe - 4 In. (100 mm) and Larger - Shop Applied
AWWA C208	(2022) Dimensions for Fabricated Steel

	Water Pipe Fittings
AWWA C213	(2022) Fusion-Bonded Epoxy Coatings and Linings for Steel Water Pipe and Fittings
AWWA C219	(2023) Bolted Sleeve-Type Couplings for Plain-End Pipe
AWWA C500	(2019) Metal-Seated Gate Valves for Water Supply Service
AWWA C502	(2018) Dry-Barrel Fire Hydrants
AWWA C509	(2023) Resilient-Seated Gate Valves for Water Supply Service
AWWA C512	(2015) Air-Release, Air/Vacuum, and Combination Air Valves for Water and Wastewater Service
AWWA C515	(2020) Reduced-Wall, Resilient-Seated Gate Valves for Water Supply Service
AWWA C550	(2017) Protective Interior Coatings for Valves and Hydrants
AWWA C600	(2023) Installation of Ductile-Iron Mains and Their Appurtenances
AWWA C602	(2023) Cement-Mortar Lining of Water Pipelines in Place—4 In. (100 mm) and Larger
AWWA C606	(2022) Grooved and Shouldered Joints
AWWA C651	(2023) Standard for Disinfecting Water Mains
AWWA C655	(2018) Field Dechlorination
AWWA C800	(2021) Underground Service Line Valves and Fittings
AWWA M11	(2017; Errata 2018, Addendum 2019) Steel Pipe: A Guide for Design and Installation
AWWA M41	(2009; 3rd Ed) Ductile-Iron Pipe and Fittings

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1/D1.1M	(2020; Errata 1 2021) Structural Welding Code - Steel

ASTM INTERNATIONAL (ASTM)

ASTM A48/A48M	(2022) Standard Specification for Gray Iron Castings

ASTM A307	(2021) Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength
ASTM A536	(1984; R 2019; E 2019) Standard Specification for Ductile Iron Castings
ASTM A563	(2021; E 2022a) Standard Specification for Carbon and Alloy Steel Nuts
ASTM A580/A580M	(2023) Standard Specification for Stainless Steel Wire
ASTM B209/B209M	(2021a) Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
ASTM C94/C94M	(2024a) Standard Specification for Ready-Mixed Concrete
ASTM C552	(2022) Standard Specification for Cellular Glass Thermal Insulation
ASTM C647	(2008; R 2013) Properties and Tests of Mastics and Coating Finishes for Thermal Insulation
ASTM C755	(2019b) Standard Practice for Selection of Water Vapor Retarders for Thermal Insulation
ASTM C921	(2010; R 2015) Standard Practice for Determining the Properties of Jacketing Materials for Thermal Insulation
ASTM C1136	(2023) Standard Specification for Flexible, Low Permeance Vapor Retarders for Thermal Insulation
ASTM C1433	(2020) Standard Specification for Precast Reinforced Concrete Monolithic Box Sections for Culverts, Storm Drains, and Sewers
ASTM D822	(2013; R 2018) Filtered Open-Flame Carbon-Arc Exposures of Paint and Related Coatings
ASTM D2863	(2019) Standard Test Method for Measuring the Minimum Oxygen Concentration to Support Candle-Like Combustion of Plastics (Oxygen Index)
ASTM D5590	(2017; R 2021) Standard Test Method for Determining the Resistance of Paint Films and Related Coatings to Fungal Defacement by Accelerated Four-Week Agar Plate Assay
ASTM E84	(2024) Standard Test Method for Surface Burning Characteristics of Building

	Materials
ASTM E96/E96M	(2024a) Standard Test Methods for Gravimetric Determination of Water Vapor Transmission Rate of Materials

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE 515	(2017) Standard for the Testing, Design, Installation, and Maintenance of Electrical Resistance Heat Tracing for Industrial Applications

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO)

ISO 2758	(2014) Paper - Determination of Bursting Strength

MANUFACTURERS STANDARDIZATION SOCIETY OF THE VALVE AND FITTINGS INDUSTRY (MSS)

MSS SP-58	(2018) Pipe Hangers and Supports - Materials, Design and Manufacture, Selection, Application, and Installation

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

ANSI/NEMA WC 71/ICEA S-96-659	(2014; R 2022) Standard for Nonshielded Cables Rated 2001-5000 Volts for use in the Distribution of Electric Energy
NEMA WC 57	(2014) Standard for Control, Thermocouple Extension, and Instrumentation Cables
NEMA WC 70	(2021) Power Cable Rated 2000 Volts or Less for the Distribution of Electrical Energy
NEMA WC 74/ICEA S-93-639	(2022) 5-46 kV Shielded Power Cable for Use in the Transmission and Distribution of Electric Energy

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 24	(2025) Standard for the Installation of Private Fire Service Mains and Their Appurtenances
NFPA 70	(2026; TIA 26-1; ERTA 26-1; TIA 26-2; TIA 26-3; TIA 26-4; TIA 26-5; TIA 26-6; TIA 26-7; ERTA 26-2; ERTA 26-3) National Electrical Code

NSF INTERNATIONAL (NSF)

NSF/ANSI 14	(2023) Plastics Piping System Components and Related Materials
NSF/ANSI 61	(2022) Drinking Water System Components -

Health Effects

U.S. DEPARTMENT OF DEFENSE (DOD)

UFC 3-600-01	(2016; with Change 6, 2021) Fire Protection Engineering for Facilities

UNDERWRITERS LABORATORIES (UL)

UL 246	(2011; Reprint Jul 2020) UL Standard for Safety Hydrants for Fire-Protection Service
UL 262	(2004; Reprint Jul 2023) Gate Valves for Fire-Protection Service
UL 723	(2020) UL Standard for Safety Test for Surface Burning Characteristics of Building Materials

1.2 DEFINITIONS

1.2.1 Water Mains

Water mains include water piping having diameters 4 through 14 inch, specific materials, methods of joining and any appurtenances deemed necessary for a satisfactory system.

1.2.2 Additional Definitions

For additional definitions refer to the definitions in the applicable referenced standard.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" classification. Submittals not having a "G" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

Submit the three SD types, SD-02 Shop Drawings, SD-03 Product Data, and SD-08 Manufacturer's Instructions at the same time for the pipe insulation systems.

SD-01 Preconstruction Submittals

Connections; G

SD-02 Shop Drawings

MICA Plates; G

SD-03 Product Data

Pipe, Fittings, Joints and Couplings; G

Valves; G

Valve Boxes; G

Fire Hydrants; G

Pipe Restraint; G

Disinfection Procedures; G

Pipe Insulation Systems; G

SD-06 Test Reports

Bacteriological Samples; G

Leakage Test

Hydrostatic Test

SD-07 Certificates

Pipe, Fittings, Joints and Couplings

Lining

Valves

Fire Hydrants

SD-08 Manufacturer's Instructions

Ductile-Iron Piping

Pipe Insulation Systems; G

1.4 QUALITY CONTROL

1.4.1 Regulatory Requirements

a. Use NSF/ANSI 61 or NSF/ANSI 14 materials for potable water systems to comply with lead free content requirements as defined by the U.S. Safe Drinking Water Act effective January 2014.

b. Comply with NFPA 24 for materials, installation, and testing of fire main piping and components.

1.5 QUALITY ASSURANCE

1.5.1 Pipe Insulation Installer Qualification

Qualified pipe insulation installers will have successfully completed three or more similar type jobs within the last five years.

1.5.2 Electric Heat Tracing System

1.5.2.1 Manufacturer Qualifications

10 years' experience in design, engineering, manufacture and support of specified system and components.

1.5.2.2 Product Requirements

Pipe or tank tracing cable assembly must be factory assembled, immersed in water for a minimum of 12 hours, and then tested for insulation resistance, high potential breakdown and continuity before leaving the factory. Factory mutual approved heating cable that has the same wattage per lineal foot (power output), throughout its entire length. UL Listed, thermostat, contactor panel, and control/monitor panel.

1.5.2.3 Electrical Components, Devices, and Accessories

Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.6 DELIVERY, STORAGE, AND HANDLING

1.6.1 Delivery and Storage

Inspect pipematerials delivered to site for required pipe markings and damage. Unload and store with minimum handling and in accordance with manufacturer's instructions to prevent cuts, scratches and other damage. Store materials on site in enclosures or under protective covering. Store plastic piping, jointing materials and rubber gaskets under cover out of direct sunlight. Do not store materials directly on the ground. Keep inside of pipes, fittings, valves, fire hydrants, and other accessories free of dirt and debris or other contaminates. Deliver pipe insulation materials in the manufacturer's unopened containers. Protect materials delivered and placed in storage from weather, humidity, dirt, dust and other contaminants. The Contracting Officer may reject insulation material and supplies that become dirty, dusty, wet, or contaminated by some other means. Attach manufacturer's stamp or label giving the name of the manufacturer and brand, and a description of the material, date codes, and approximate shelf life (if applicable) to packages or standard containers of insulation, jacket material, cements, adhesives, and coatings delivered for use, and samples required for approval. Insulation packages and containers must be asbestos free.

1.6.2 Handling

a. Handle pipe, fittings, valves, fire hydrants, and other accessories in accordance with applicable AWWA standard, manufacturer's instructions and in a manner to ensure delivery to the trench in sound undamaged condition. Avoid injury to coatings and linings on pipe and fittings; make repairs if coatings or linings are damaged. Do not place other material, hooks, or pipe inside a pipe or fitting after the coating has been applied. Inspect the pipe for defects before installation. Carry, do not drag pipe to the trench. Use of pinch bars and tongs for aligning or turning pipe will be permitted only on the bare ends of the pipe. Clean the interior of pipe and accessories of foreign matter before being lowered into the trench and keep them clean during laying operations by plugging. Replace defective material without additional expense to the Government. Store rubber gaskets, not immediately installed, under cover or out of direct sunlight.

b. Handle ductile iron pipe, fittings, and accessories in accordance with AWWA C600 and AWWA M41.

PART 2 PRODUCTS

2.1 MATERIALS

a. All materials are intended for potable water use unless otherwise indicated. Comply with NSF/ANSI 61 or NSF/ANSI 14 for all potable water pipe, fittings and other applicable materials. Provide pipe, fittings and other applicable materials bearing NSF/ANSI 61 or NSF/ANSI 14 markings for potable water service.

b. Provide all materials in accordance with AWWA C800 and as indicated herein. Provide valves and fittings with pressure ratings equivalent to the pressure ratings of the pipe.

2.1.1 Pipe, Fittings, Joints And Couplings

Submit manufacturer's standard drawings or catalog cuts, except submit both drawings and cuts for push-on joints. Include information concerning gaskets with submittal for joints and couplings.

2.1.1.1 Ductile-Iron Piping

2.1.1.1.1 Pipe and Fittings

Pipe, except flanged pipe, AWWA C151/A21.51, Pressure Class 350. Fittings, AWWA C110/A21.10 or AWWA C153/A21.53; fittings with push-on joint ends are to meet the same requirements as fittings with mechanical-joint ends, except for the factory modified bell design. Provide fittings with pressure ratings equivalent to that of the pipe. Provide compatible pipe ends and fittings for the specified joints. Provide cement-mortar lining, AWWA C104/A21.4, standard thickness on pipe and fittings.

2.1.1.1.2 Joints and Jointing Material

Provide push-on joints or mechanical joints for pipe and fittings unless otherwise indicated. Sleeve-type mechanical couplings in lieu of push-on joints are acceptable, subject to the limitations specified in the Paragraph SLEEVE-TYPE MECHANICAL COUPLINGS.

a. Push-On Joints: Shape of pipe ends and fitting ends, gaskets, and lubricant for joint assembly as recommended in AWWA C111/A21.11.

b. Mechanical Joints: Dimensional and material requirements for pipe ends, glands, bolts and nuts, and gaskets as recommended in AWWA C111/A21.11.

c. Flexible Expansion Joints: Material requirements for flexible expansion joints as recommended in ASTM A536 and AWWA C153/A21.53. Each flexible expansion joint must be pressure tested prior to shipment against its own restraint to a minimum of 350 psi. Each flexible expansion joint must consist of an expansion joint designed and cast as an integral part of a ball and socket type flexible joint, having a minimum ball deflection of 20 degree. The flexible expansion fitting must not expand or exert an axial imparting thrust under internal water pressure and must not increase or decrease the internal water volume as the unit expands or contracts. The minimum total linear travel distance must be 8 inches. All internal surfaces (wetted parts) must be lined with a minimum of 15 mils of fusion bonded epoxy conforming to the applicable requirements of AWWA C213. Sealing gaskets must be

constructed of EPDM rubber. Exterior surfaces must be coated with a minimum of 6 mils of fusion bonded epoxy conforming to the applicable requirements of AWWA C116/A21.16.

d. Sleeve-Type Mechanical Coupled Joints: As specified in the Paragraph SLEEVE-TYPE MECHANICAL COUPLINGS.

e. Grooved and Shouldered Type Joints: Grooved and shouldered pipe ends and couplings, AWWA C606. Joint dimension as specified in AWWA C606 for rigid joints, joint dimensions as specified in AWWA C606 for flexible joints.

2.1.1.2 Steel Piping

2.1.1.2.1 Pipe and Fittings

Schedule 40 hot-dip galvanized pipe, AWWA C200. Fittings, AWWA C208 and AWWA C200, with reference to the requirements specified therein for "Special Sections." Provide cement-mortar lining on pipe and fittings for aboveground lines. Utilize pipe ends and fittings compatible for the joints and jointing materials used.

a. Utilize welded or seamless pipe with plain, or shouldered and grooved ends in accordance with AWWA C606 for use with mechanical couplings.

b. Provide fittings and specials made of the same material as the pipe. Use specials and fittings made of standard steel tube turns or segmentally welded sections, with ends to accommodate the type of couplings or joints specified for the pipe. Match the thickness rating of pipe fittings and specials to the thickness specified and the pressure rating calculated for the pipe with which they are used. Provide identical protective materials for fittings and specials as specified for the pipe. Hand wrap, line, or coat specials and fittings that cannot be mechanically wrapped, lined, or coated using the same material used for the pipe with the same number of applications of each material, smoothly applied.

2.1.1.2.2 Wall Thickness for Pipe and Fittings

a. The minimum metal thickness for steel pipe wall is 0.28 inches, based on steel having a minimum yield strength of 30,000 psi. Pipe has been designed for the following minimum conditions:

Pressure rating	200 psi
Water hammer	40 percent of pressure rating

b. Ensure that the wall thickness of fittings is equal to or greater than that required for the pipe. Reinforce fittings in accordance with methods given in AWWA M11, Chapter 13, "Supplementary Design Data and Details" when necessary to meet the pressure test requirements.

2.1.1.2.3 Joints and Jointing Material

Provide shop fabricated welded joints, or the mechanically coupled type using a sleeve-type mechanical coupling, unless otherwise specified. Provide grooved or shouldered type where indicated.

a. Rubber-Gasketed Bell-and-Spigot Joints: Provide joints and pipe ends in accordance with the pipe manufacturer's standard for this type of joint, except that the joint is to also meet the requirements specified for rubber-gasketed joints and rubber gaskets in AWWA C200.

b. Welded Joints: Provide electrodes of the quality specified in AWS D1.1/D1.1M.

c. Sleeve-Type Mechanical Coupled Joints: As specified in Paragraph SLEEVE-TYPE MECHANICAL COUPLINGS.

d. Grooved and Shouldered Type Joints: Provide pipe ends grooved by roll grooving or with welded-on adapters and cut grooves. Provide grooves made by roll grooving with dimensions as recommended by the coupling manufacturer. Match dimensions for cut grooves in adapters to AWWA C606. Couplings and shouldered pipe ends, AWWA C606. Match the joint dimensions as specified in AWWA C606 for rigid joint, joint dimensions as specified in AWWA C606 for flexible joints.

2.1.1.2.4 Lining

Cement-Mortar Lining: AWWA C205, shop-applied. Materials for cement mortar lining in place as specified in AWWA C602.

2.1.2 Valves

Provide a protective interior coating in accordance with AWWA C550.

2.1.2.1 Gate Valves 3 Inch Size and Larger on Buried Piping

a. AWWA C500, AWWA C509, AWWA C515, or UL 262 and:

(1) AWWA C500: nonrising stem type with double-disc gate and mechanical-joint ends or push-on joint ends compatible for the adjoining pipe.

(2) AWWA C509 or AWWA C515: nonrising stem type with mechanical-joint ends or resilient-seated gate valves 3 to 12 inches in size.

(3) UL 262: inside-screw type with operating nut, double-disc or split-wedge type gate, designed for a hydraulic working pressure of 175 psi, and have mechanical-joint ends or push-on joint ends as appropriate for the pipe to which it is joined.

b. Match materials for UL 262 gate valves to the reference standards specified in AWWA C500. Gate valves open by counterclockwise rotation of the valve stem. Stuffing boxes have 0-ring stem seals, except for those valves for which gearing is specified, in which case use conventional packing in place of 0-ring seal. Stuffing boxes are bolted and constructed so as to permit easy removal of parts for repair. Use gate valves with special ends for connection to sleeve-type mechanical coupling in lieu of mechanical-joint ends and push-on joint ends. Provide valve ends and gaskets for connection to sleeve-type mechanical couplings that conform to the requirements specified respectively for the joint or coupling.Gate valves have ends compatible with joining to the pipe used; push-on joint ends or

mechanical-joint ends for joining to ductile-iron pipe; with AWWA C111/A21.11 gaskets and pipe ends. Provide all valves from one manufacturer.

2.1.2.2 Air Release, Air/Vacuum, and Combination Air Valves

Provide AWWA C512 air release and combination air valves that release air and prevent the formation of a vacuum. Provide valves with an iron body, lead-free bronze trim and stainless steel float that automatically releases air when the lines are being filled with water and admits air into the line when water is being withdrawn in excess of the inflow.

2.1.2.3 Valve Boxes

Provide a valve box for each gate valve on buried piping. Construct adjustable valve boxes manufactured from cast iron or precast concrete of a size compatible for the valve on which it is used. Provide cast iron valve boxes with a minimum cover and wall thickness of 3/16 inch and conforming to ASTM A48/A48M, Class 35B. Coat the cast-iron box with a heavy coat of bituminous paint. Provide a round head. Cast the word "WATER" on the lid. The minimum diameter of the shaft of the box is 5 1/4 inches. Provide ASTM C1433 precast concrete valve box.

2.1.3 Fire Hydrants

2.1.3.1 Fire Hydrants

Provide fire hydrants where indicated. Paint fire hydrants with at least one coat of primer and two coats of enamel paint. Paint barrel and bonnet colors in accordance with UFC 3-600-01. Stencil fire hydrant number and main size on the fire hydrant barrel using black stencil paint.

2.1.3.1.1 Dry-Barrel Type Fire Hydrants

a. Provide Dry-barrel type fire hydrants, AWWA C502 or UL 246, "Base Valve" with 6 inch inlet, 5 1/4 inch valve opening, one 4 1/2 inch pumper connection, and two 2 1/2 inch hose connections.

b. Provide mechanical-joint or push-on joint end inlet, except where flanged end is indicated; with end matching requirements as specified in AWWA C502 or UL 246 for size and shape of operating nut, cap nuts, and threads on hose and pumper connections. Provide fire hydrants with frangible sections as mentioned in AWWA C502. Provide fire hydrant with special couplings joining upper and lower sections of fire hydrant barrel that break from a force imposed by a moving vehicle.

2.1.4 Disinfection

Chlorinating materials are to conform to: Chlorine, Liquid: AWWA B301; Hypochlorite, Calcium and Sodium: AWWA B300.

2.2 PIPE ACCESSORIES

2.2.1 Pipe Restraint

2.2.1.1 Thrust Blocks

Use ASTM C94/C94M concrete having a minimum compressive strength of 2,500 psi at 28 days or use concrete of a mix not leaner than one part cement,

two and one half parts sand, and five parts gravel, having the same minimum compressive strength.

2.2.2 Sleeve-Type Mechanical Couplings

Use AWWA C219 couplings to join plain-end piping by compression of a ring gasket at each end of the adjoining pipe sections. The coupling consists of one middle ring flared or beveled at each end to provide a gasket seat; two follower rings; two resilient tapered rubber gaskets; and bolts and nuts to draw the follower rings toward each other to compress the gaskets. Provide true circular middle ring and the follower rings sections free from irregularities, flat spots, and surface defects; provide for confinement and compression of the gaskets. For ductile iron pipe, use ASTM A536 ductile iron. Use gaskets for resistance to set after installation and to meet the requirements specified for gaskets for mechanical joint in AWWA C111/A21.11. Provide track-head type bolts ASTM A307, Grade A, with ASTM A563, Grade A nuts or round-head square-neck type ASME B18.5.2.2M or ASME B18.5.2.1M bolts with ASME B18.2.2 hex nuts. Provide 5/8 inch diameter bolts. Shape bolt holes in follower rings to hold fast to the necks of the bolts used. Do not use mechanically coupled joints using a sleeve-type mechanical coupling as an optional method of jointing except where pipeline is adequately anchored to resist tension pull across the joint. Provide a tight flexible joint with mechanical couplings under reasonable conditions, such as pipe movements caused by expansion, contraction, slight settling or shifting in the ground, minor variations in trench gradients, and traffic vibrations. Match coupling strength to that of the adjoining pipeline.

2.2.3 Bonded Joints

For all ferrous pipe, provide a metallic bond at each joint, including joints made with flexible couplings, caulking, or rubber gaskets, of ferrous metallic piping to effect continuous conductivity. Provide Size 1/0 copper conductor thermal weld type bond wire designed for direct burial and shaped to stand clear of the joint.

2.3 PIPE INSULATION

2.3.1 Aluminum Jackets and Pipe Cradle

Provide aluminum jackets consisting of corrugated, embossed or smooth sheet, 0.016 inch nominal thickness; ASTM B209/B209M, Temper H14, Temper H16, Alloy 3003, 5005, or 3105. Do not use corrugated aluminum jacket outdoors. Aluminum jacket securing bands must be Type 304 stainless steel, 0.015 inch thick, 1/2 inch wide for pipe under 12 inch diameter and 3/4 inch wide for pipe over 12 inches and larger diameter. Aluminum jacket circumferential seam bands must be 2 by 0.016 inch aluminum matching jacket material. Ensure bands for insulation below ground are 3/4 by 0.020 inch thick stainless steel, or fiberglass reinforced tape. The jacket may, at the option of the Contractor, be provided with a factory fabricated Pittsburgh or "Z" type longitudinal joint. When the "Z" joint is used, use bands at the circumferential joints that are designed by the manufacturer to seal the joints and hold the jacket in place. Provide 18 gauge rolled hot-dip galvanized sheet metal cradles 6 inches minimum length with diameter sufficient to support insulated steel pipe at bridge deck soffit u-bolt anchors.

2.3.2 Vapor Retarder Required

ASTM C921, Type I, minimum puncture resistance 50 Beach units on all surfaces. Minimum tensile strength, 35 pounds/inch width. Use jackets on insulation exposed in finished areas that have white finish suitable for painting without sizing.

2.3.2.1 White Vapor Retarder All Service Jacket (ASJ)

ASJ is for use on aboveground steel pipelines if covered by a suitable protective jacket. Provide product which meets all physical property and performance requirements of ASTM C1136, Type I, except a minimum burst strength of 85 psi. ASTM D2863, Limited Oxygen Index (LOI) is a minimum of 31. In addition, do not use paper or other moisture-sensitive material for the outer exposed surface or the inner-most surface contacting the insulation. Ensure the outer exposed surface is white and has an emittance no less than 0.80. Ensure the outer exposed surface is paintable.

2.3.2.2 Vapor Retarder/Vapor Barrier Mastic Coatings

2.3.2.2.1 Vapor Barrier

The vapor barrier must be self adhesive (minimum 2 mils adhesive, 3 mils embossed) greater than 3 plies standard grade, silver, white, black and embossed white jacket for use on hot/cold pipes. Ensure permeability is less than 0.02 when tested in accordance with ASTM E96/E96M. Provide products meeting UL 723 or ASTM E84 flame and smoke requirements and that are UV resistant.

2.3.2.2.2 Vapor Retarder

Provide fire and water resistant vapor retarder coating selected for outdoor service. Color must be white. Ensure the water vapor permeance of the compound is in accordance with ASTM C755, Section 7.2.2, Table 2, for insulation type and service conditions. Provide nonflammable, fire resistant coating. To resist mold/mildew, provide coating meeting ASTM D5590 with zero growth rating. Determine all other application and service properties pursuant to ASTM C647.

2.3.2.2.3 Polyvinylidene Chloride (PVDC) Film Vapor Retarder

Provide PVDC film vapor retarder with a maximum moisture vapor transmission of 0.02 perms, minimum puncture resistance of 150 Beach units, a minimum tensile strength in any direction of 30 pounds/inch when tested in accordance with ASTM D822, and a maximum flame spread index of 25 and a maximum smoke developed index of 50 when tested in accordance with ASTM E84.

2.3.2.2.4 Polyvinylidene Chloride Vapor Retarder Adhesive Tape

Requirements must meet the same as specified for Laminated Film Vapor Retarder above.

2.3.2.2.5 Vapor Barrier/Weather Barrier

Ensure the vapor barrier is greater than 3 ply self adhesive laminate -white vapor barrier jacket- superior performance (less than 0.0000 permeability when tested in accordance with ASTM E96/E96M). Provide vapor barrier meeting UL 723 or ASTM E84 25 flame and 50 smoke requirements; and UV resistant. Minimum burst strength 185 psi in accordance with ISO 2758.

Tensile strength 68 pounds/inch width (PSTC-1000). Provide tape as specified for laminated film vapor barrier above.

2.3.3 Wire

Soft annealed ASTM A580/A580M Type 302, 304 or 316 stainless steel, 16 or 18 gauge.

2.3.4 Insulation Bands

Provide 1/2 inch wide; 26 gauge stainless steel insulation bands.

2.3.5 Sealants

Choose sealants from the butyl polymer type, the styrene-butadiene rubber type, or the butyl type of sealants. Provide sealants with a maximum permeance of 0.02 perms based on Procedure B for ASTM E96/E96M, and a maximum flame spread index of 25 and a maximum smoke developed index of 50 when tested in accordance with ASTM E84.

2.3.6 Pipe Insulation Systems

2.3.6.1 Aboveground Cold Pipeline (-30 to 60 deg. F)

Provide insulation for outdoor, exposed applications, as follows:

2.3.6.1.1 Cellular Glass

ASTM C552, Type II, Class 2 with a 1.5 inch insulation thickness. Supply the insulation from the fabricator with (Paragraph WHITE VAPOR RETARDER ALL SERVICE JACKET (ASJ)) ASJ vapor retarder and installed with all longitudinal overlaps sealed and all circumferential joints ASJ taped or supply the insulation unfaced from the fabricator and install with all longitudinal and circumferential joints sealed with vapor barrier mastic.

2.4 SELF-REGULATING PARALLEL RESISTANCE HEATING CABLES

2.4.1 Heating Cables

a. Self-regulating parallel resistance heating cables must comply with IEEE 515.

b. The heating element must be a pair of parallel No. 16 AWG tinned stranded copper bus wires embedded in cross linked conductive polymer core, which varies heat output in response to temperature along its length. Cables must be terminated with waterproof, factory assembled non heating leads with connects at one and seal the opposite end watertight. The cable must be capable of crossing over itself without overheating.

c. The electrical insulating jacket must be flame-retardant polyolefin.

d. The cable cover must be tinned copper braid and polyolefin outer jacket with UV inhibitor.

e. Grounding conductor(s) conforming to NEMA WC 57, NEMA WC 70, ANSI/NEMA WC 71/ICEA S-96-659, or NEMA WC 74/ICEA S-93-639 as applicable must be furnished for each multiple-conductor cable.

f. The maximum power on operating temperature must be 150 degrees F.

g. The maximum power off exposure temperature must be 185 degrees F.

h. The capacities and characteristics must be:

(1) Maximum heat output 5.0 W/foot.

(Voltage: 240VAC.

(2) Pipe Diameter: 6 inch.

(3) Number of parallel cables: one.

(4) Spiral wrap pitch: Not applicable.

(5) See electrical drawings for electrical characteristics.

2.4.2 Wire Connectors and Terminations

a. Mechanical type of high conductivity and corrosion-resistant material, listed for use with copper and aluminum conductors.

b. Long barrel compression type of high conductivity and corrosion-resistant material, with minimum of two compression indents per wire, listed for use with copper and aluminum conductors.

c. All bolts, nuts, and washers used to connect connections and terminations to bus bars or other termination points must be zinc-plated steel.

2.5 CONTROLS

a. Pipe mounting thermostats for Freeze protection must have be a remote bulb unit with adjustable temperature range from 34 to 50 degrees F. The thermostat must be snap action, open-on-rise, single pole switch with minimum current rating adequate for the connected cable. The thermostat must be remote bulb on capillary, resistance temperature device, or thermistor for direct sensing of pipe wall temperature. The control enclosure must be corrosion resistant and waterproof.

b. The enclosure must be the NEMA 4X Type 316 SST.

c. A minimum 30 amp contactor (four Pole) must be provided to energize cable or close other contactors. Provide relay with contacts to indicate operational status, on/off, and for interface with central energy management and control system.

2.6 HEATING CABLES ACCESSORIES

a. Cable Installation Accessories: Fiberglass tape, heat-conductive putty, cable ties, silicone end seals and splice kits, and installation clips all furnished by manufacturer, or as recommended in writing by manufacturer.

b. Warning Labels must comply with NFPA 70.

c. Warning Tape: Continuously printed "Electrical Tracing"; vinyl, at

least 3 mils thick, and with pressure-sensitive, permanent, waterproof, self-adhesive back.

(1) Width for warning tape on pipes with outside dimension, including insulation, less than 6 inches: 3/4 inch minimum.

(2) Width for warning tape on pipes with outside dimension, including insulation, 6 inches or greater: 1 1/2 inches minimum.

PART 3 EXECUTION

3.1 PREPARATION

3.1.1 Connections to Existing System

Perform all connections to the existing water system in the presence of the Contracting Officer.

3.1.2 Operation of Existing Valves

Do not operate valves within or directly connected to the existing water system unless expressly directed to do so by the Contracting Officer.

3.1.3 Earthwork

Perform earthwork operations in accordance with Section 31 00 00.00 99 EARTHWORK.

3.2 INSTALLATION

Install all materials in accordance with the applicable reference standard, manufacturers' instructions and as indicated herein. Domestic water line must be Schedule 40 steel pipe installed above grade, and all below grade piping must be ductile iron.

3.2.1 Piping

3.2.1.1 General Requirements

Install pipe, fittings, joints and couplings in accordance with the applicable referenced standard, the manufacturer's instructions and as specified herein.

3.2.1.1.1 Termination of Water Lines

Do not lay water lines in the same trench with gas lines, fuel lines, electric wiring, or any other utility. Where nonferrous metallic pipe (i.e., copper tubing) crosses any ferrous piping, provide a minimum vertical separation of 12 inches between pipes.

3.2.1.1.2 Pipe Laying and Jointing

Remove fins and burrs from pipe and fittings. Before placing in position, clean pipe, fittings, valves, and accessories, and maintain in a clean condition. Provide proper facilities for lowering sections of pipe into trenches. Under no circumstances is it permissible to drop or dump pipe, fittings, valves, or other water line material into trenches. Cut pipe cleanly, squarely, and accurately to the length established at the site and work into place without springing or forcing. Replace a pipe or fitting

that does not allow sufficient space for installation of jointing material. Blocking or wedging between bells and spigots is not permitted. Lay bell-and-spigot pipe with the bell end pointing in the direction of laying. Grade the pipeline in straight lines; avoid the formation of dips and low points. Support pipe at the design elevation and grade. Secure firm, uniform support. Support blocking is not permitted. Lay pipe so that the full length of each section of pipe and each fitting rests solidly on the pipe bedding; excavate recesses to accommodate bells, joints, and couplings. Provide anchors and supports for fastening work into place. Make provision for expansion and contraction of pipelines. Keep trenches free of water until joints have been assembled. At the end of each work day, close open ends of pipe temporarily with blocking or bulkheads. Do not lay pipe when conditions of trench or weather prevent installation. Provide a minimum of 2 1/2 feet depth of cover over top of pipe.

3.2.1.1.3 Tracer Wire

Install a continuous length of tracer wire for the full length of each run of nonmetallic pipe. Attach wire to top of pipe in such manner that it will not be displaced during construction operations.

3.2.1.1.4 Connections to Existing Water Lines

Make connections to existing water lines after coordination with the facility and with a minimum interruption of service on the existing line. Make connections to existing lines under pressure in accordance with the recommended procedures of the manufacturer of the pipe being tapped and as indicated.

3.2.1.1.5 Sewer Manholes

No water piping is to pass through or come in contact with any part of a sewer manhole.

3.2.1.1.6 Water Piping Parallel With Sewer Piping

Where the location of the water line is not clearly defined by dimensions on the drawings, do not lay water line closer than 10 feet, horizontally, from any sewer line.

3.2.1.1.7 Water Piping Crossing Sewer Piping

Provide at least 18 inches above the top (crown) of the sewer piping and the bottom (invert) of the water piping whenever possible. Measure the distance edge-to-edge. Where water lines cross under gravity sewer lines, construct sewer line of AWWA compliant ductile iron water piping with rubber-gasketed joints and no joint located within 10 feet, horizontally, of the crossing.

3.2.1.1.8 Penetrations

Provide ductile-iron or Schedule 40 steel wall sleeves for pipe passing through walls of valve pits and structures. Fill annular space between walls and sleeves with rich cement mortar. Fill annular space between pipe and sleeves with mastic.

3.2.1.2 Ductile-Iron Piping

Unless otherwise specified, install pipe and fittings in accordance with

the Paragraph GENERAL REQUIREMENTS and with the requirements of AWWA C600 for pipe installation, joint assembly, valve-and-fitting installation, and thrust restraint.

a. Jointing: Make push-on joints with the gaskets and lubricant specified for this type joint; assemble in accordance with the applicable requirements of AWWA C600 and AWWA M41 for joint assembly. Make mechanical joints with the gaskets, glands, bolts, and nuts specified for this type joint; assemble in accordance with the applicable requirements of AWWA C600 and AWWA M41 for joint assembly and the recommendations of Appendix A to AWWA C111/A21.11. Assemble joints made with sleeve-type mechanical couplings in accordance with the recommendations of the coupling manufacturer. Make grooved and shouldered type joints with the couplings previously specified for this type joint connecting pipe with the grooved or shouldered ends specified for this type joint; assemble in accordance with the recommendations of the coupling manufacturer. Groove pipe in the field only with groove cutting equipment designed especially for the purpose and produced by a manufacturer of grooved joint couplings; secure approval for field-cut grooves before assembling the joint.

b. Allowable Deflection: Follow AWWA C600 and AWWA M41 for the maximum allowable deflection. If the alignment requires deflection in excess of the above limitations, provide special bends or a sufficient number of shorter lengths of pipe to achieve angular deflections within the limit set forth.

3.2.1.3 Steel Piping

Unless otherwise specified, install pipe and fittings in accordance with AWWA M11, Chapter 12, "Transportation, Installation, and Testing." Apply protective coating for aboveground piping as specified in Section 09 90 00.00 99 PAINTS AND COATINGS.

a. Jointing: Welded joints must be shop fabricated made in accordance with AWS D1.1/D1.1M and with the recommendations given for installation of pipe in AWWA M11, Chapter 12, "Transportation, Installation, and Testing." Assemble joints made with sleeve-type mechanical couplings in accordance with the recommendations of the coupling manufacturer. Make grooved type joints with the couplings specified for this type joint connecting pipe with roll-grooved ends or pipe with welded-on cut-grooved adapters, each with dimensions as previously specified for this type joint. Groove pipe ends in the field only with manufacturer recommended groove rolling equipment and manufacturer recommended groove adapters in the field only with manufacturer recommended groove cutting equipment; use groove rolling and groove cutting equipment especially for the purpose and produced by a manufacturer of grooved joint couplings. Obtain approval for field-cut grooves before assembling the joint. Make shouldered type joints with the couplings specified for this type joint connecting pipe with the shouldered ends specified for this type joint. Assemble grooved and shouldered type joints in accordance with the recommendations of the coupling manufacturer. Finish joints on piping with cement-mortar lining and on piping with cement-mortar coating as specified in Appendix on Field Joints in AWWA C205.

b. Cement Mortar Lining: AWWA C205, shop applied.

3.2.2 Disinfection

Prior to disinfection, provide disinfection procedures, proposed neutralization and disposal methods of waste water from disinfection as part of the disinfection submittal. Disinfect new water piping and existing water piping affected by Contractor's operations in accordance with AWWA C651. Disinfect new water piping using the AWWA C651 continuous-feed method of chlorination. Ensure a free chlorine residual of not less than 10 parts per million after 24 hour holding period and prior to performing bacteriological tests.

3.2.3 Flushing

Perform bacteriological tests prior to flushing. Flush solution from the systems with domestic water until maximum residual chlorine content is within the range of 0.2 to 0.5 parts per million, the residual chlorine content of the distribution system, or acceptable for domestic use. Use AWWA C655 neutralizing chemicals.

3.2.4 Pipe Restraint

3.2.4.1 Concrete Thrust Blocks

Install concrete thrust blocks where indicated.

3.2.5 Valves

3.2.5.1 Gate Valves

Install gate valves, AWWA C500 and UL 262, in accordance with the requirements of AWWA C600 for valve-and-fitting installation and with the recommendations of the Appendix ("Installation, Operation, and Maintenance of Gate Valves") to AWWA C500. Install gate valves, AWWA C509 or AWWA C515, in accordance with the requirements of AWWA C600 for valve-and-fitting installation and with the recommendations of the Appendix ("Installation, Operation, and Maintenance of Gate Valves") to AWWA C509 or AWWA C515. Make and assemble joints to gate valves as specified for making and assembling the same type joints between pipe and fittings.

3.2.5.2 Air Release, Air/Vacuum, and Combination Air Valves

Install pressure vacuum assemblies of type, size, and capacity indicated. Include valves and test cocks. Install according to the requirements of plumbing and health department and authorities having jurisdiction. Do not install pressure vacuum breaker assemblies in vault or other space subject to flooding.

3.2.6 Fire Hydrants

Install fire hydrants in accordance with AWWA C600 for fire hydrant installation and as indicated. Make and assemble joints as specified for making and assembling the same type joints between pipe and fittings. Install fire hydrants with the 4 1/2 inch connections facing the adjacent paved surface. If there are two paved adjacent surfaces, install fire hydrants with the 4 1/2 inch connection facing the paved surface where the connecting main is located.

3.2.7 Pipe Insulation Systems Installation

Install pipe insulation systems in accordance with the approved MICA Insulation Stds plates as supplemented by the manufacturer's published installation instructions.

3.2.7.1 Pipe Insulation

3.2.7.1.1 General

Install pipe insulation on aboveground cold pipeline systems as specified below to form a continuous thermal retarder/barrier, including straight runs, fittings and appurtenances unless specified otherwise. Install full length units of insulation using a single cut piece to complete a run. Do not use cut pieces or scraps abutting each other.

3.2.7.1.2 Pipes Passing Through Exterior Walls

Provide continuous pipe insulation through the sleeve. Provide an aluminum jacket over the insulation wherever penetrations require sealing. Continue the aluminum jacket required for pipe exposed to weather through the sleeve to a point 2 inches beyond the interior surface of the wall.

3.2.7.1.3 Pipes Passing Through Pipe Straps

Ensure insulation is continuous through pipe straps.

3.2.7.1.3.1 Horizontal Pipes Larger Than 2 Inches and Below 60 Degrees F

Supported on pipe straps with the addition of a Type 40 protection shield in accordance with MSS SP-58. Install an insulation insert of cellular glass, prefabricated insulation pipe hangers, or perlite above 80 degrees F above each shield. Ensure insert covers no less than the bottom 180 degree arc of the pipe. Provide inserts that are the same thickness as the insulation, and extend 2 inches on each end beyond the protection shield. Ensure the insulation jacket is continuous over the dowel, block, or insulation insert.

3.2.7.1.3.2 Vertical Pipes

Supported with either Type 8 or Type 42 riser clamps with the addition of two Type 40 protection shields in accordance with MSS SP-58 covering the 360 degree arc of the insulation. Install an insulation insert of cellular glass between each shield and the pipe. Ensure the insert covers the 360 degree arc of the pipe. Provide inserts that are the same thickness as the insulation, and extend 2 inches on each end beyond the protection shield. Ensure the insulation jacket is continuous over the dowel, block, or insulation insert. Support the vertical weight of the pipe with pipe straps located in a horizontal section of the pipe. When the pipe riser is longer than 30 feet, support the weight of the pipe additionally with pipe straps in the vertical run of the pipe that are directly clamped to the pipe, penetrating the pipe insulation. Use insulated hangers and seal the insulation jacket as indicated herein for anchors in a similar service.

3.2.7.1.3.3 Inserts

Covered with a jacket material of the same appearance and quality as the adjoining pipe insulation jacket, overlap the adjoining pipe jacket 1 1/2 inches, and seal as required for the pipe jacket.

3.2.7.2 Aboveground Cold Pipelines

Insulate the aboveground cold pipelines for minus 30 to plus 60 degrees F.

3.2.7.2.1 Factory or Field applied Jacket

Install the aluminum jacket as specified for piping exposed to weather, except sealing of the laps of the aluminum jacket is not required.

3.2.7.2.2 Installing Insulation for Cold Pipe Straight Runs

Apply insulation to the pipe with tight butt joints. Seal all butted joints and ends with joint sealant and seal with a vapor retarder coating, greater than 3 ply laminate jacket - less than 0.0000 perm adhesive tape or PVDC adhesive tape.

3.2.7.2.3 Longitudinal Laps of the Jacket Material

Overlap not less than 1 1/2 inches. Provide butt strips 3 inches wide for circumferential joints.

3.2.7.2.4 Laps and Butt Strips

Secure with adhesive 4 inch centers if not factory self-sealing.

3.2.7.2.5 Factory Self-Selling Lap Systems

May be used when the ambient temperature is between 40 and 120 degrees F during installation. Install the lap system in accordance with manufacturer's recommendations.

3.2.7.2.6 Breaks and Punctures in the Jacket Material

Patch by wrapping a strip of jacket material around the pipe and secure it with adhesive, staple, and coat with vapor retarder coating or PVDC adhesive tape or greater than 3 ply laminate jacket - less than 0.0000 perm adhesive tape. Extend the patch not less than 1 1/2 inches past the break.

3.2.7.2.7 Penetrations Such as Thermometers

Fill the voids in the insulation and seal with vapor retarder coating or PVDC adhesive tape or greater than 3 ply laminate jacket - less than 0.0000 perm adhesive tape.

3.2.7.2.8 Insulation for Fittings and Accessories

a. Butt pipe insulation tightly to the insulation of the fittings and accessories. Seal the butted joints and ends with joint sealant and seal with a vapor retarder coating or PVDC adhesive tape or greater than 3 ply laminate jacket - less than 0.0000 perm adhesive tape.

b. Place precut or preformed insulation around all fittings and accessories and conform to MICA plates except as modified herein: five for anchors; 10, 11, and 13 for fittings. Insulation must be the same insulation as the pipe insulation, including same density, thickness, and thermal conductivity. Where precut/preformed is unavailable, rigid preformed pipe insulation sections may be segmented into the shape required. Use insulation of the same thickness and conductivity as the

adjoining pipe insulation. If nesting size insulation is used, overlap the insulation 2 inches or one pipe diameter. Elbows insulated using segments must conform to MICA Tables 12.20 "Mitered Insulation Elbow'. Submit a booklet containing completed MICA Insulation Stds plates detailing each insulating system for the pipe insulating system, after approval of materials and prior to applying insulation.

(1) Ensure MICA plates detail the materials to be installed and the specific insulation application. Submit all MICA plates required showing the entire insulating system, including plates required to show insulation penetrations, vessel bottom and top heads, legs, and skirt insulation as applicable. Present all variations of insulation systems including locations, materials, vaporproofing, jackets and insulation accessories.

(2) If the Contractor elects to submit detailed drawings instead of edited MICA Plates, ensure the detail drawings are technically equivalent to the edited MICA Plate submittal.

c. Upon completion of insulation installation on unions, anchors, fittings and accessories, terminations, seams, joints and insulation not protected by factory vapor retarder jackets must be protected with PVDC or greater than 3 ply laminate jacket - less than 0.0000 perm adhesive tape or two coats of vapor retarder coating with a minimum total thickness of 1/16 inch, applied with glass tape embedded between coats. Overlap tap seams one inch. Extend the coating out onto the adjoining pipe insulation 2 inches. Protect fabricated insulation with a factory vapor retarder jacket with either greater than 3 ply laminate jacket - less than 0.0000 perm adhesive tape, standard grade, silver, white, black and embossed or PVDC adhesive tape or two coats of vapor retarder coating with a minimum thickness of 1/16 inch and with a 2 inch wide glass tape embedded between coats. Where fitting insulation butts to pipe insulation, seal the joints with a vapor retarder coating and a 4 inch wide ASJ tape which matches the jacket of the pipe insulation.

d. Insulate anchors attached directly to the pipe for a sufficient distance to prevent condensation but no less than 6 inches from the insulation surface.

e. Mark insulation to show the location of unions.

3.2.7.3 Piping Exposed to Weather

3.2.7.3.1 Aluminum Jacket and Pipe Cradle

Overlap the jacket no less than 2 inches at longitudinal and circumferential joints and secure with bands at no more than 12 inch centers. Overlap longitudinal joints down to shed water and locate at 4 or 8 o'clock positions. Seal joints on piping 60 degrees F and below with metal jacketing/flashing sealant while overlapping to prevent moisture penetration. Where jacketing on piping 60 degrees F and below abuts an un-insulated surface, caulk joints to prevent moisture penetration. Seal joints on piping above 60 degrees F with a moisture retarder. Weld sheet metal pipe cradles to bridge deck soffit u-bolt anchors to support insulated pipe.

3.2.7.3.2 Insulation of Fittings

Insulate and finish unions, fittings, and accessories as specified for the applicable service. Apply two coats of breather emulsion type weatherproof mastic (impermeable to water, permeable to air) recommended by the insulation manufacturer with glass tape embedded between coats. Overlap tap no less than 1 inch and the adjoining aluminum jacket no less than 2 inches. Factory preformed aluminum jackets may be used in lieu of the above.

3.2.8 Heating Cable Installation

3.2.8.1 General

Inspect surfaces and substrates of electric heating cables for compliance with requirements of this specification. Ensure surfaces and pipes in contact with electric heating cables are free of burrs and sharp protrusions. Notify COR if the existing substrate conditions are unsuitable for application of heating cables in accordance with manufacturer's recommendations. If the installation of the heat tracing is unsatisfactory, then the Contractor must correct the installation at no additional cost or time to the Government.

3.2.8.2 Installation

a. Electric heating cable must be installed for freeze protection of aboveground cold piping: Self-regulating parallel-resistance heating cable.

b. Electric heating cable must be installed across expansion, construction, and control joints according to the manufacturer's recommendations using cable protection conduit and slack cable to allow for movement without damage to cable.

c. Electric heating cable for pipe freeze protection must be installed according to the following:

(1) Electric heating cables must be installed after piping has been mechanically tested (i.e., hydrostatic testing/purging) and before insulation is installed.

(2) Electric heat cables must be installed according to IEEE 515.

(3) Insulation must be installed or applied over piping with electric cables. Refer to PIPE INSULATION SYSTEMS INSTALLATION.

(4) Warning tape must be installed on pipe insulation where piping is equipped with electric heating cables.

(5) Provide current transducer to monitor power in heating tape and monitor and alarm from BAS.

d. Heating cables including leads must be protected from damage.

e. Equipment must be grounded according to SELF-REGULATING PARALLEL RESISTANCE HEATING CABLES.

f. Installation must be in accordance with the NEC, as shown on the drawings, and manufacturer's instructions.

g. Splice conductors only in outlet boxes, junction boxes, pullboxes, manholes, or handholes.

h. In panelboards, cabinets, wireways, switches, enclosures, and equipment assemblies, neatly form, train, and tie the conductors with non-metallic "zip" ties.

i. When stripping stranded conductors, use a tool that does not damage the conductor or remove conductor strands.

3.3 FIELD QUALITY CONTROL

3.3.1 Tests

Notify the Contracting Officer a minimum of five days in advance of hydrostatic testing. Coordinate the proposed method for disposal of waste water from hydrostatic testing. Perform field tests, and provide labor, equipment, and incidentals required for testing. Provide documentation that all items of work have been constructed in accordance with the Contract documents.

3.3.1.1 Hydrostatic Test

Test the water system in accordance with the applicable AWWA standard specified below. Where water mains provide fire service, test in accordance with the special testing requirements given in the Paragraph SPECIAL TESTING REQUIREMENTS FOR FIRE SERVICE. Test ductile-iron water mains in accordance with the requirements of AWWA C600 for hydrostatic testing. The amount of leakage on ductile-iron pipelines with mechanical-joints or push-on joints is not to exceed the amounts given in AWWA C600; no leakage will be allowed at joints made by any other methods. Test steel water mains in accordance with applicable requirements of AWWA C600 for hydrostatic testing. The amount of leakage on steel pipelines with rubber-gasketed bell-and-spigot joints is not to exceed 20 gallons per 24 hours per inch of pipe diameter per mile of pipeline; no leakage will be allowed at joints made by any other method. To stop leakage, repair welded joints only by welding. Do not backfill utility trench or begin testing on any section of a pipeline where concrete thrust blocks have been provided until at least seven days after placing of the concrete.

3.3.1.2 Leakage Test

For leakage test, use a hydrostatic pressure not less than the maximum working pressure of the system. Leakage test may be performed at the same time and at the same test pressure as the pressure test.

3.3.1.3 Bacteriological Testing

Perform bacteriological tests in accordance with AWWA C651 Option A. For new water mains use Option A and obtain two sets of samples for coliform analysis, each sample being collected at least 16 hours apart. Take samples every 1,200 ft plus one set from the end of the line and at least one from each branch greater than one pipe length. Analyze samples by a certified laboratory and submit the results of the bacteriological samples.

3.3.1.4 Special Testing Requirements for Fire Service

Test water mains and water service lines providing fire service or water and fire service in accordance with NFPA 24. The additional water added to the system must not exceed the limits given in NFPA 24

3.3.1.5 Tracer Wire Continuity Test

Test tracer wire for continuity after service connections have been completed and prior to final pavement or restoration. Verify that tracer wire is locatable with electronic utility locating equipment. Repair breaks or separations and re-test for continuity.

3.3.1.6 Heating Cable Electrical Tests

a. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect components, assemblies, and equipment installations, including connections.

b. Perform in accordance with the manufacturer's recommendations and with the assistance of a factory-authorized service representative:

(1) Visual Inspection and Tests: Inspect physical condition.

(2) Electrical tests:

(a) Test heating cable for electrical continuity integrity before energizing.

(b) After installation but before application of coverings such as insulation and connection to utilization device, test conductors phase-to-phase and phase-to-ground resistance with an insulation resistance tester.

(c) Applied voltages must be 500 V DC, 1000 V DC, and 2500V DC during the insulation resistance (Megger) test for the heating cable. Apply test for one minute or until reading is constant for 15 seconds, whichever is longer. All minimum insulation resistance values for the applied voltages must be greater than 1000 megohms in the heating cable.

(d) Test cables to verify rating and power input. Energize and measure voltage and current simultaneously.

(3) Repeat tests for continuity, insulation resistance, and input power after applying thermal insulation on pipe-mounted cables.

(4) If deficiency is found, Contractor must correct all deficiencies at no addition cost or time to the Government.

(5) Prepare test and inspection reports.

3.4 SYSTEM STARTUP

Water mains and appurtenances must be completely installed, disinfected, flushed, and satisfactory bacteriological sample results received prior to permanent connections being made to the active distribution system. Obtain approval by the Contracting Officer prior to the new water piping being placed into service.

3.5 DEMONSTRATION AND TRAINING

Provide services of manufacturer's technical representative for four hours to instruct Government personnel responsible in operation and maintenance of the heating trace cable.

3.6 CLEANUP

Upon completion of the installation of water lines and appurtenances, remove all debris and surplus materials resulting from the work.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 33 - UTILITIES

SECTION 33 40 00.00 99

STORMWATER UTILITIES

PART 1 GENERAL

1.1 REFERENCES
1.2 SUBMITTALS
1.3 DELIVERY, STORAGE, AND HANDLING
1.3.1 Delivery and Storage
1.3.2 Handling

PART 2 PRODUCTS

2.1 PIPE FOR CULVERTS AND STORM DRAINS
2.1.1 Concrete Pipe
2.1.1.1 Nonreinforced Culvert and Storm Drain Pipe
2.1.2 Ductile Iron Pipe
2.1.3 Poly Vinyl Chloride (PVC) Pipe
2.1.3.1 Type PSM PVC Pipe
2.2 PIPE JOINTS
2.2.1 Concrete Pipe
2.2.1.1 Rubber Gasket Joints
2.2.1.2 Preformed Flexible Sealant Joints
2.2.2 Ductile Iron Pipe
2.2.3 PVC Plastic Pipe
2.3 MISCELLANEOUS MATERIALS
2.3.1 Mortar
2.3.2 Precast Reinforced Concrete Manholes
2.3.3 Frame and Cover or Gratings
2.3.4 Resilient Connectors
2.3.5 Flared End Sections
2.3.5.1 Concrete Flared End Sections
2.4 TESTS, INSPECTIONS, AND VERIFICATIONS
2.4.1 Hydrostatic Test on Watertight Joints
2.4.1.1 Concrete and PVC
2.4.1.2 Corrugated Steel and Aluminum Pipe
2.5 RAIN GARDEN

PART 3 EXECUTION

3.1 EXCAVATION FOR PIPE CULVERTS, STORM DRAINS, AND DRAINAGE STRUCTURES
3.1.1 Trenching
3.1.2 Removal of Rock
3.1.3 Removal of Unstable Material
3.2 BEDDING AND INITIAL BACKFILL
3.2.1 Concrete Pipe
3.2.1.1 Trenches
3.2.1.2 Fill Sections
3.2.2 Ductile Iron Pipe

3.2.3 Plastic Pipe
3.3 PLACING PIPE
3.3.1 Concrete, Clay, PVC, Ribbed PVC, Ductile Iron Pipe
3.4 JOINTING
3.4.1 Concrete and Clay Pipe
3.4.1.1 Plastic Sealing Compound Joints for Tongue-and-Grooved Pipe
3.4.1.2 Flexible Watertight Joints
3.5 DRAINAGE STRUCTURES
3.5.1 Manholes and Inlets
3.6 INSTALLATION OF TRACER WIRE AND WARNING TAPE
3.7 FINAL BACKFILL
3.8 FIELD QUALITY CONTROL
3.8.1 Tests
3.8.1.1 Leakage Test
3.8.1.1.1 Individual Pipe Joint Testing
3.8.1.2 Deflection Testing
3.8.1.2.1 Laser Profiler
3.8.1.3 Tracer Wire Continuity
3.8.2 Inspection
3.8.2.1 Post-Installation Inspection
3.8.2.1.1 Concrete Pipe
3.8.2.1.2 Flexible Pipe
3.8.2.1.3 Post-Installation Inspection Report
3.8.2.2 Low Impact Development Inspection
3.8.3 Repair of Defects
3.8.3.1 Leakage Test
3.8.3.2 Deflection Testing
3.8.3.3 Inspection
3.8.3.3.1 Concrete Pipe
3.8.3.3.2 Flexible Pipe
3.9 PROTECTION
3.10 WARRANTY PERIOD

ATTACHMENTS:

LID Verification Report

-- End of Section Table of Contents --

SECTION 33 40 00.00 99

STORMWATER UTILITIES

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO HB-17	(2002; Errata 2003; Errata 2005, 17th Edition) Standard Specifications for Highway Bridges

AMERICAN WATER WORKS ASSOCIATION (AWWA)

AWWA C151/A21.51	(2023) Ductile-Iron Pipe, Centrifugally Cast

ASTM INTERNATIONAL (ASTM)

ASTM A123/A123M	(2017) Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A760/A760M	(2015, R 2020) Standard Specification for Corrugated Steel Pipe, Metallic-Coated for Sewers and Drains
ASTM C14	(2020) Standard Specification for Nonreinforced Concrete Sewer, Storm Drain, and Culvert Pipe
ASTM C270	(2019a; E 2019) Standard Specification for Mortar for Unit Masonry
ASTM C443	(2021) Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets
ASTM C443M	(2021) Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets (Metric)
ASTM C923/C923M	(2020) Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals
ASTM C990	(2009; R 2019) Standard Specification for Joints for Concrete Pipe, Manholes, and

	Precast Box Sections Using Preformed Flexible Joint Sealants
ASTM C990M	(2009; R 2019) Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants (Metric)
ASTM C1103	(2022) Standard Practice for Joint Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines
ASTM C1103M	(2019) Standard Practice for Joint Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines (Metric)
ASTM D2321	(2020) Standard Practice for Underground Installation of Thermoplastic Pipe for Sewers and Other Gravity-Flow Applications
ASTM D2564	(2020) Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems
ASTM D3034	(2016) Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings
ASTM D3212	(2020) Standard Specification for Joints for Drain and Sewer Plastic Pipes Using Flexible Elastomeric Seals
ASTM F477	(2014; R 2021) Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe

OREGON DEPARTMENT OF TRANSPORTATION (ODOT)

ODOT SSC	(2024) Oregon Standard Specifications for Construction

1.2 SUBMITTALS

Government approval is required for submittals with a "G" classification. Submittals not having a "G" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-06 Test Reports

Leakage Test; G, DO

SD-07 Certificates

Hydrostatic Test on Watertight Joints; G, DO

SD-08 Manufacturer's Instructions

Placing Pipe; G, DO

SD-11 Closeout Submittals

Post-Installation Inspection Report; G, DO

LID Verification Report; G, DO

1.3 DELIVERY, STORAGE, AND HANDLING

1.3.1 Delivery and Storage

Inspect materials delivered to site for damage and unload and store materials with minimal handling. Do not store materials directly on the ground. Keep the inside of pipes and fittings free of dirt and debris. Before, during, and after installation, protect plastic pipe and fittings from any environment that would result in damage or deterioration to the material. Keep a copy of the manufacturer's instructions available at the construction site at all times and follow these instructions unless directed otherwise by the Contracting Officer. Store solvents, solvent compounds, lubricants, elastomeric gaskets, and any similar materials required to install plastic pipe in accordance with the manufacturer's recommendations and discard if the storage period exceeds the recommended shelf life. Discard solvents in use when the recommended pot life is exceeded.

1.3.2 Handling

Handle materials in a manner that ensures delivery to the trench in sound, undamaged condition. Carry pipe to the trench.

PART 2 PRODUCTS

2.1 PIPE FOR CULVERTS AND STORM DRAINS

Refer to ODOT SSC Section 00445 - Sanitary, Storm, Culvert, Siphon and Irrigation Pipe for acceptable Work including complete construction for all storm drains shown on drawings.

Pipe sizes for culverts and storm drains are indicated on the drawings.

2.1.1 Concrete Pipe

2.1.1.1 Nonreinforced Culvert and Storm Drain Pipe

Refer to ODOT SSC Setion 02410.10 for pipe conformance requirements, which require manufacturing in accordance with and conforming to ASTM C14, Class 3.

2.1.2 Ductile Iron Pipe

For ductile iron pipe for stormwater applications, use AWWA C151/A21.51 pressure class 150 with hot-dipped galvanized coating in accordance with ASTM A123/A123M.

2.1.3 Poly Vinyl Chloride (PVC) Pipe

Refer to ODOT SSC Section 02415.50 for all PVC pipe conformance requirements.

2.1.3.1 Type PSM PVC Pipe

ASTM D3034, maximum SDR 35.

2.2 PIPE JOINTS

Refer to ODOT SSC Section 02440.00 for joint conformance requirements.

2.2.1 Concrete Pipe

2.2.1.1 Rubber Gasket Joints

Provide rubber gasket joints of a design and physical requirements conforming to ASTM C443.

2.2.1.2 Preformed Flexible Sealant Joints

Provide joints made with preformed flexible joint sealant conforming to ASTM C990.

2.2.2 Ductile Iron Pipe

Provide push-on type joints with rubber gaskets.

2.2.3 PVC Plastic Pipe

Provide solvent cement or elastomeric gasket type joints in accordance with the specification for the pipe and as recommended by the pipe manufacturer. Use solvent cement conforming to ASTM D2564. Provide gaskets for elastomeric joints conforming to ASTM F477.

2.3 MISCELLANEOUS MATERIALS

2.3.1 Mortar

Mortar is not allowed for pipe joints. Provide mortar for pipe connections to drainage structures conforming to ASTM C270, Type M, except that the maximum placement time will be one hour. Provide a sufficient quantity of water in the mixture to produce a stiff workable mortar but in no case may the quantity exceed five gallons of water per sack of cement. Use water that is clean and free of harmful acids, alkalis, and organic impurities. Use the mortar within 30 minutes after the ingredients are mixed with water.

2.3.2 Precast Reinforced Concrete Manholes

Refer to ODOT SSC Section 02450.10 for Precast Concrete Manhole Section requirements.

2.3.3 Frame and Cover or Gratings

Refer to ODOT SSC Section 02450.30 for Metal Frames, Covers, Grates, and Steps requirement within the "All Other Projects" ASTM designations.

2.3.4 Resilient Connectors

Provide flexible, watertight connectors conforming to ASTM C923/C923M for connecting pipe to manholes and inlets.

2.3.5 Flared End Sections

2.3.5.1 Concrete Flared End Sections

Provide sections of a standard design fabricated with reinforced concrete.

2.4 TESTS, INSPECTIONS, AND VERIFICATIONS

2.4.1 Hydrostatic Test on Watertight Joints

Perform a hydrostatic test on the watertight joint types as proposed. This test will be conducted at the plant or by an independent laboratory. Only one sample joint of each type needs testing; however, if the sample joint fails because of faulty design or workmanship, an additional sample joint may be tested.

2.4.1.1 Concrete and PVC

Provide joints in reinforced and nonreinforced concrete pipe meeting the performance requirements in ASTM C990M ASTM C990 or ASTM C443M ASTM C443. Provide joints in PVC plastic pipe meeting the test requirements in ASTM D3212.

2.4.1.2 Corrugated Steel and Aluminum Pipe

Perform a hydrostatic pressure test on the proposed joining system in accordance with ASTM A760/A760M. The joining system must not leak when subjected to an internal hydrostatic pressure of 10 psi for a 10 minute period

2.5 RAIN GARDEN

Rain garden must be in accordance with the plans and blended soil per Section 32 93 00.00 99 PLANTINGS and excavation per Section 31 00 00.00 99 EARTHWORK. Refer to Section 33 46 16.00 99 SUBDRAINAGE PIPING for perforated pipe, and drain rock within the rain garden.

PART 3 EXECUTION

3.1 EXCAVATION FOR PIPE CULVERTS, STORM DRAINS, AND DRAINAGE STRUCTURES

Excavate trenches, excavate for appurtenances and backfill for culverts and storm drains, in accordance with ODOT SSC Section 00405 and applicable portions of Section 31 00 00.00 99 EARTHWORK and the requirements specified below.

3.1.1 Trenching

Excavate trenches to the width indicated on the drawings but no less than 24 inches, or minimum 12 inches from structure surface to sides of excavation. Trench width should permit satisfactory jointing and thorough tamping of the bedding material under and around the pipe. Place sheeting and bracing, where required, within the trench width as specified, without any overexcavation.

3.1.2 Removal of Rock

Replace rock in either ledge or boulder formation with suitable materials to provide a compacted earth cushion. Provide a compacted earth cushion

between unremoved rock and the pipe with a thickness of at least 8 inches or 1/2 inch for each foot of fill over the top of the pipe, whichever is greater, but not more than three-fourths the nominal diameter of the pipe. Maintain the cushion under the bell as well as under the straight portion of the pipe where bell-and-spigot pipe is used. Excavate rock as specified and defined in Section 31 00 00.00 99 EARTHWORK.

3.1.3 Removal of Unstable Material

Where wet or otherwise unstable soil incapable of properly supporting the pipe, as determined by the Contracting Officer, is unexpectedly encountered in the bottom of a trench, remove such material to the depth required and replace with select granular material to the proper grade. Compact select granular material as specified in Paragraph FINAL BACKFILL. When removal of unstable material is due to the fault or neglect of the Contractor while performing shoring and sheeting, water removal, or other specified requirements, perform such removal and replacement at no additional cost to the Government.

3.2 BEDDING AND INITIAL BACKFILL

Provide a firm bedding foundation of uniform density throughout the entire length of the pipe.

3.2.1 Concrete Pipe

Use select granular material conforming to Section 31 00 00.00 99 EARTHWORK for haunch and bedding material. Compact haunch and outer bedding to at least 90 percent laboratory maximum density and place in layers not exceeding 6 inch loose thickness for compaction by hand-operated compactors and 200 mm 8 inches for other than hand-operated machines. Loosely place middle bedding and do not compact. After the pipe has been properly bedded, place haunch material, at a moisture content that will facilitate compaction, evenly along both sides of the pipe and thoroughly compact each layer with mechanical tampers or rammers to the springline of the pipe. Thoroughly compact the haunch material under the haunches of the pipe. For bell and spigot pipe, form a depression in bedding material for bells so entire barrel of pipe is uniformly supported. Minimize the length, depth, and width of bell depressions to that required for properly making the particular type of joint.

3.2.1.1 Trenches

After the pipe has been properly bedded and haunch material placed to the midpoint (springline) of the pipe, backfill and compact the remainder of the trench by spreading and rolling or compacting by mechanical rammers or tampers in layers not exceeding 6 inches. Refer to ODOT SSC Section 00405.44 for trench foundation. Test for density as necessary to ensure conformance to the compaction requirements specified below. Where it is necessary, in the opinion of the Contracting Officer, that sheeting or portions of bracing used be left in place, the Contract will be adjusted accordingly. Leave untreated sheeting in place beneath structures or pavements.

3.2.1.2 Fill Sections

For pipe placed in fill sections, uniformly spread fill material longitudinally on both sides of the pipe in layers not exceeding 6 inches in compacted depth, and compact by rolling parallel with pipe or by

mechanical tamping or ramming. Prior to commencing normal filling operations, the crown width of the fill at a height of 12 inches above the top of the pipe must extend a distance of not less than twice the outside pipe diameter on each side of the pipe or 12 feet, whichever is less. After the backfill has reached at least 12 inches above the top of the pipe, place and thoroughly compact the remainder of the fill in layers not exceeding 8 inches.

3.2.2 Ductile Iron Pipe

Provide bedding comprised of the following:

a. one inch - zero or 3/4 inch - zero base aggregate conforming to ODOT SSC02630.10, or

b. Commercially available one inch - zero or 3/4 inch - zero aggregate.

3.2.3 Plastic Pipe

Provide bedding for PVC, PE, SRPE and PP pipe meeting the requirements of ASTM D2321. Use Class IB or II material for PVC, PE, pipe bedding, haunching, and initial backfill. Use Class I, II, or III material for PP pipe bedding, haunching and initial backfill.

3.3 PLACING PIPE

Thoroughly examine each section of pipe before being laid; do not use defective or damaged pipe. Protect plastic pipe, excluding SRPE pipe, from exposure to direct sunlight prior to laying, if necessary to maintain adequate pipe stiffness and meet installation deflection requirements. Lay pipelines to the grades and alignment indicated. Provide proper facilities for lowering sections of pipe into trenches. Do not lay pipe in water or when trench conditions or weather are unsuitable for such work. Divert drainage or dewater trenches during construction as necessary. Deflection of installed flexible pipe must not exceed the following limits:

TYPE OF PIPE	MAXIMUM ALLOWABLE DEFLECTION (percent)
Corrugated Steel and Aluminum	5
Ductile Iron Culvert	3
Plastic (PVC)	5

3.3.1 Concrete, Clay, PVC, Ribbed PVC, Ductile Iron Pipe

Lay pipe proceeding upgrade with spigot ends of bell-and-spigot pipe and tongue ends of tongue-and-groove pipe pointing in the direction of the flow.

3.4 JOINTING

3.4.1 Concrete and Clay Pipe

3.4.1.1 Plastic Sealing Compound Joints for Tongue-and-Grooved Pipe

Follow the recommendation of the particular manufacturer in regard to sealing compound special installation requirements. When lubricants, primers, or adhesives are used, only apply on surfaces that are dry and

clean. Affix sealing compounds to the pipe not more than three hours prior to installation of the pipe. Protect sealing compounds from the sun, blowing dust, and other deleterious agents at all times. Inspect sealing compounds before installation of the pipe and remove and replace any loose or improperly affixed sealing compound. Align the pipe with the previously installed pipe and pull the joint together.

3.4.1.2 Flexible Watertight Joints

Use lubricants, cements, adhesives, and other special installation requirements for gaskets and jointing materials as recommended by the manufacturer. When lubricants, cements, or adhesives are used, only apply on surfaces that are clean and dry. Affix gaskets and jointing materials to the pipe not more than 24 hours prior to the installation of the pipe, and protect from the sun, blowing dust, and other deleterious agents at all times. Inspect gaskets and jointing materials before installing the pipe; remove and replace any loose or improperly affixed gaskets and jointing materials. Align the pipe with the previously installed pipe, and push the joint home. If the gasket becomes visibly dislocated when joining sections of pipe, remove the pipe and remake the joint.

3.5 DRAINAGE STRUCTURES

3.5.1 Manholes and Inlets

Refer to ODOT SSC Section 00470 for construction methods for manholes, catch basins, inlets, and other similar structures.

3.6 INSTALLATION OF TRACER WIRE AND WARNING TAPE

Install warning tape above all storm drain pipe in accordance with Section 31 00 00.00 99 EARTHWORK.

3.7 FINAL BACKFILL

Backfill trenches with satisfactory material deposited in layers of a maximum of 8 inches loose thickness and compacted to 90 percent of maximum density for cohesive soils and 95 percent of maximum density for cohesionless soils in accordance with Section 31 00 00.00 99 EARTHWORK. Testing is the responsibility of the Contractor and will be performed at no additional cost to the Government. Unless otherwise specified, determine field in-place density of final backfill at a frequency of one test per 50 linear feet, or fraction thereof, of each lift of backfill. Submit test results in accordance with Section 31 00 00.00 99 EARTHWORK. Do not displace or damage pipe or box when compacting final backfill by rolling or operating heavy equipment parallel with the pipe or box. Movement of construction machinery over a culvert or storm drain at any stage of construction will be at the Contractor's risk. Repair or replace any damaged pipe. Protect concrete pipes with a minimum of 3 feet of cover prior to permitting heavy construction equipment to pass over them during construction. Provide the minimum cover for construction loads over corrugated steel pipes as specified in Section 26, Division II of AASHTO HB-17. Provide minimum cover for construction loads over plastic pipes as specified in ASTM D2321.

3.8 FIELD QUALITY CONTROL

Provide quality control according to ODOT SSC Section 00165 in addition to requirements below.

3.8.1 Tests

Testing is the responsibility of the Contractor. Perform all testing and retesting at no additional cost to the Government.

3.8.1.1 Leakage Test

Test pipe lines for leakage prior to completing backfill by performing either an exfiltration test, low pressure air pipeline test or by individual pipe joint testing. Submit leakage test results to the Contracting Officer.

3.8.1.1.1 Individual Pipe Joint Testing

Testing of individual joints for leakage by low pressure air or water must conform to ASTM C1103M ASTM C1103.

3.8.1.2 Deflection Testing

Conduct deflection test no sooner than 30 days after completion of final backfill and compaction testing. Clean or flush all lines prior to testing. Perform a deflection test on entire length of installed flexible pipeline upon completion of work adjacent to and over the pipeline, including backfilling, placement of fill, grading, paving, placement of concrete, and any other superimposed loads. Deflection of pipe in the installed pipeline under external loads must not exceed the limits in paragraph PLACING PIPE above as percent of the average inside diameter of pipe. Use a laser profiler to determine if allowable deflection has been exceeded.

3.8.1.2.1 Laser Profiler

Perform Laser Profiler with equipment in accordance with ODOT SSC Section 00415.22.

3.8.1.3 Tracer Wire Continuity

Test tracer wire for continuity after initial and final backfilling of pipes. Verify that tracer wire is locatable with electronic utility location equipment. Repair breaks or separations and re-test for continuity.

3.8.2 Inspection

3.8.2.1 Post-Installation Inspection

Perform video pipe inspection in accordance with ODOT SSC Section 00415.

3.8.2.1.1 Concrete Pipe

An engineer must evaluate all pipes with cracks with a width greater than 0.25 mm 0.01 inches, but less than 0.10 inches to determine if any remediation or repair is required.

3.8.2.1.2 Flexible Pipe

Check each flexible pipe (PE, PVC, PP, corrugated steel and aluminum) for rips, tears, joint separations, soil migration throughout the joint,

cracks, localized buckling, bulges, settlement and alignment.

3.8.2.1.3 Post-Installation Inspection Report

Provide inspection or deflection report in accordance with ODOT SSC Section 00415.70 with the following information included.

3.8.2.2 Low Impact Development Inspection

Inspect Low Impact Development (LID) features indicated on the design portion of the LID Verification Report such as the Rain Garden. Certify LID features were constructed according to plans and specifications or by submitting as-built drawings in accordance with Section 01 78 39.10 25 AS-BUILT DRAWINGS. When as-built drawings show deviations to the LID features, document the deviations on the LID Verification Report.

3.8.3 Repair of Defects

3.8.3.1 Leakage Test

When leakage exceeds the maximum amount specified, correct source of excess leakage by replacing damaged pipe and gaskets and retest.

3.8.3.2 Deflection Testing

When deflection readings are in excess of the allowable deflection of average inside diameter of pipe are obtained, remove pipe which has excessive deflection and replace with new pipe. Retest 30 days after completing backfill, leakage testing and compaction testing.

3.8.3.3 Inspection

Replace pipe or repair defects indicated in the Post-Installation Inspection Report.

3.8.3.3.1 Concrete Pipe

Replace pipes having cracks with a width greater than 0.1 inches.

3.8.3.3.2 Flexible Pipe

Replace pipes having cracks or splits.

3.9 PROTECTION

Protect storm drainage piping and adjacent areas from superimposed and external loads during construction.

3.10 WARRANTY PERIOD

Pipe segments found to have defects during the warranty period must be replaced with new pipe and retested.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 33 - UTILITIES

SECTION 33 46 16.00 99

SUBDRAINAGE PIPING

PART 1 GENERAL

1.1 REFERENCES
1.2 SUBMITTALS
1.3 DELIVERY, STORAGE, AND HANDLING
1.3.1 Delivery and Storage
1.3.2 Handling

PART 2 PRODUCTS

2.1 PIPE FOR SUBDRAINS
2.1.1 Plastic
2.1.1.1 Polyvinyl Chloride (PVC) and Fittings
2.1.1.2 Corrugated Polyethylene (PE) and Fittings
2.1.1.3 Pipe Perforations
2.1.1.3.1 Slotted Perforations in Plastic Pipe
2.2 DRAIN ROCK MATERIAL

PART 3 EXECUTION

3.1 EXCAVATION AND BEDDING FOR SUBDRAIN SYSTEMS
3.2 MANHOLES AND FLUSHING AND OBSERVATION RISERS
3.2.1 Flushing and Observation Risers
3.3 INSTALLATION OF PIPE FOR SUBDRAINS
3.3.1 Installation of Pipe for Subdrains
3.3.1.1 Pipelaying
3.4 INSTALLATION OF DRAINAGE ROCK MATERIAL AND BACKFILLING FOR PERFORATED SUBDRAINS

-- End of Section Table of Contents --

SECTION 33 46 16.00 99

SUBDRAINAGE PIPING

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO M 252	(2009; R 2017) Standard Specification for Corrugated Polyethylene Drainage Pipe

ASTM INTERNATIONAL (ASTM)

ASTM D3034	(2016) Standard Specification for Type PSM Poly(Vinyl Chloride) (PVC) Sewer Pipe and Fittings
ASTM F758	(2014; R 2023) Smooth-Wall Poly(Vinyl Chloride) (PVC) Plastic Underdrain Systems for Highway, Airport, and Similar Drainage
ASTM F949	(2020) Standard Specification for Poly(Vinyl Chloride) (PVC) Corrugated Sewer Pipe with a Smooth Interior and Fittings

1.2 SUBMITTALS

Government approval is required for submittals with a "G" classification. Submittals not having a "G" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-07 Certificates

Pipe and Pipe Fittings

Drain Rock Material

1.3 DELIVERY, STORAGE, AND HANDLING

1.3.1 Delivery and Storage

Inspect materials delivered to site for damage; unload, and store with minimum handling. Do not store materials directly on the ground. Keep the inside of pipes and fittings free of dirt and debris. Keep, during shipment and storage, geotextile wrapped in burlap or similar heavy duty protective covering. Protect the geotextile from mud, soil, dust, and

debris. Do not store geotextile materials in direct sunlight. Install plastic pipe within six months from the date of manufacture unless otherwise approved.

1.3.2 Handling

Handle materials in such a manner as to ensure delivery to the trench in sound undamaged condition. Carry pipe to the trench.

PART 2 PRODUCTS

2.1 PIPE FOR SUBDRAINS

Submit samples of pipe and pipe fittings, before starting the work. Provide type and sizes of subdrain pipe indicated. Submit certifications from the manufacturers attesting that materials meet specification requirements. Certificates are required for drain pipe and fittings.

2.1.1 Plastic

2.1.1.1 Polyvinyl Chloride (PVC) and Fittings

ASTM D3034, ASTM F949 or ASTM F758, Type PS 46.

2.1.1.2 Corrugated Polyethylene (PE) and Fittings

AASHTO M 252, Type S or SP as indicated.

2.1.1.3 Pipe Perforations

Provide pipe perforations with a minimum water inlet area of 0.5 square inch per linear foot and as specified below.

2.1.1.3.1 Slotted Perforations in Plastic Pipe

Cleanly cut circumferential slots so as not to restrict the inflow of water and uniformly spaced along the length and circumference of the pipe. Provide pipe with slots not exceeding 1/8 inch nor less than 1/32 inch in width. Provide pipe with individual slot lengths not exceeding 10 percent of the pipe inside nominal circumference on 6 to 8 inch diameter pipe, and 2-1/2 inches on 10 inch diameter pipe. Symmetrically space rows of slots so that they are fully contained in two quadrants of the pipe. Center slots in the valleys of the corrugations of profile wall pipe.

2.2 DRAIN ROCK MATERIAL

Provide drain rock consisting of 1/4 inch - No. 10 Washed Angular aggregate. Submit certificate from manufacturers attesting that material meets specification.

PART 3 EXECUTION

3.1 EXCAVATION AND BEDDING FOR SUBDRAIN SYSTEMS

Excavate trenches, including the removal of rock and unstable material, in accordance with Section 31 00 00.00 99 EARTHWORK. Place bedding material in the trench as indicated or as required as replacement materials used in those areas where unstable materials were removed. Compact bedding material as specified for cohesionless material in Section 31 00 00.00 99 EARTHWORK.

3.2 MANHOLES AND FLUSHING AND OBSERVATION RISERS

3.2.1 Flushing and Observation Risers

Install flushing and observation riser pipes with frames and covers at the locations indicated. Construct risers of non-perforated plastic pipe. Join riser pipes to the subdrain system as indicated.

3.3 INSTALLATION OF PIPE FOR SUBDRAINS

3.3.1 Installation of Pipe for Subdrains

3.3.1.1 Pipelaying

Install pipe in accordance with the manufacturer's recommendations. Thoroughly examine each section of pipe before being laid; do not use defective or damaged pipe. Do not lay pipe when the trench conditions or weather is unsuitable for such work. Remove water from trenches by sump pumping or other approved methods. Lay the pipe to the grades and alignment as indicated. Bed the pipe to the established gradeline. Center perforations on the bottom of the pipe. Lay bell-and-spigot type with the bell ends upstream. Approval of all in-place pipes by the Contracting Officer is required prior to backfilling.

3.4 INSTALLATION OF DRAINAGE ROCK MATERIAL AND BACKFILLING FOR PERFORATED SUBDRAINS

After perforated pipe for subdrains has been laid, inspected, and approved, place drainage rock material around and over the pipe to the depth indicated. Place the drainage rock material in layers not to exceed 8 inches thick. Thoroughly compact each layer using mechanical tampers or rammers.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 33 - UTILITIES

SECTION 33 71 02.00 99

UNDERGROUND ELECTRICAL DISTRIBUTION

PART 1 GENERAL

1.1 REFERENCES
1.2 SYSTEM DESCRIPTION
1.3 DEFINITIONS
1.4 SUBMITTALS
1.5 QUALITY ASSURANCE
1.5.1 Precast Underground Structures
1.5.2 Regulatory Requirements
1.5.3 Standard Products
1.5.3.1 Alternative Qualifications
1.5.3.2 Material and Equipment Manufacturing Date

PART 2 PRODUCTS

2.1 CONDUIT, DUCTS, AND FITTINGS
2.1.1 Rigid Metal Conduit
2.1.1.1 Rigid Metallic Conduit, PVC Coated
2.1.2 Plastic Conduit for Direct Burial and Riser Applications
2.1.3 Plastic Duct for Concrete Encasement
2.1.4 Duct Sealant
2.1.5 Fittings
2.1.5.1 Metal Fittings
2.1.5.2 PVC Conduit Fittings
2.1.5.3 PVC Duct Fittings
2.2 PULL ROPE
2.3 GROUNDING AND BONDING
2.3.1 Driven Ground Rods
2.3.2 Grounding Conductors
2.4 CAST-IN-PLACE CONCRETE
2.5 UNDERGROUND STRUCTURES
2.5.1 Precast Concrete Structures, Risers and Tops
2.5.1.1 General
2.5.1.2 Design for Precast Structures
2.5.1.3 Construction
2.5.1.4 Joints
2.5.2 Handhole Frames and Covers

PART 3 EXECUTION

3.1 INSTALLATION
3.2 UNDERGROUND STRUCTURE CONSTRUCTION
3.2.1 Precast Concrete Construction
3.2.2 Field Painting
3.3 UNDERGROUND CONDUIT AND DUCT SYSTEMS
3.3.1 Requirements

3.3.2 Treatment
3.3.3 Conduit Cleaning
3.3.4 Jacking and Drilling Under Roads and Structures
3.3.5 Galvanized Conduit Concrete Penetrations
3.3.6 Multiple Conduits
3.3.7 Conduit Plugs and Pull Rope
3.3.8 Conduit and Duct Without Concrete Encasement
3.3.8.1 Encasement Under Roads and Structures
3.3.9 Duct Encased in Concrete
3.3.9.1 Removal of Ducts
3.3.10 Duct Sealing
3.4 CABLE PULLING
3.4.1 Cable Lubricants
3.5 CABLES IN UNDERGROUND STRUCTURES
3.5.1 Cable Tag Installation
3.6 LOW VOLTAGE CABLE SPLICING AND TERMINATING
3.7 GROUNDING SYSTEMS
3.7.1 Grounding Electrodes
3.7.2 Grounding Connections
3.7.3 Grounding Conductors
3.7.4 Ground Cable Crossing Expansion Joints
3.8 EXCAVATING, BACKFILLING, AND COMPACTING
3.8.1 Reconditioning of Surfaces
3.8.1.1 Unpaved Surfaces
3.9 FIELD QUALITY CONTROL
3.9.1 Performance of Field Acceptance Checks and Tests
3.9.1.1 Low Voltage Cables, 600-Volt
3.9.1.2 Grounding System
3.9.2 Follow-Up Verification

-- End of Section Table of Contents --

SECTION 33 71 02.00 99

UNDERGROUND ELECTRICAL DISTRIBUTION

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO HB-17	(2002; Errata 2003; Errata 2005, 17th Edition) Standard Specifications for Highway Bridges

AMERICAN CONCRETE INSTITUTE (ACI)

ACI 318M	(2019; Errata 2022) Building Code Requirements for Structural Concrete & Commentary
ACI SP-66	(2004) ACI Detailing Manual

ASTM INTERNATIONAL (ASTM)

ASTM B1	(2013) Standard Specification for Hard-Drawn Copper Wire
ASTM B8	(2023) Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft
ASTM C478	(2018) Standard Specification for Circular Precast Reinforced Concrete Manhole Sections
ASTM C857	(2016) Standard Practice for Minimum Structural Design Loading for Underground Precast Concrete Utility Structures
ASTM C990	(2009; R 2019) Standard Specification for Joints for Concrete Pipe, Manholes, and Precast Box Sections Using Preformed Flexible Joint Sealants

INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

IEEE 81	(2012) Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Ground System
IEEE C2	(2023) National Electrical Safety Code

IEEE Stds Dictionary	(2009) IEEE Standards Dictionary: Glossary of Terms & Definitions

INTERNATIONAL ELECTRICAL TESTING ASSOCIATION (NETA)

NETA ATS	(2021) Standard for Acceptance Testing Specifications for Electrical Power Equipment and Systems

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA RN 1	(2005; R 2013) Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit
NEMA TC 2	(2020) Standard for Electrical Polyvinyl Chloride (PVC) Conduit
NEMA TC 3	(2021) Polyvinyl Chloride (PVC) Fittings for Use With Rigid PVC Conduit and Tubing
NEMA TC 9	(2020) Standard for Fittings for Polyvinyl Chloride (PVC) Plastic Utilities Duct for Underground Installation

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2026; TIA 26-1; ERTA 26-1; TIA 26-2; TIA 26-3; TIA 26-4; TIA 26-5; TIA 26-6; TIA 26-7; ERTA 26-2; ERTA 26-3) National Electrical Code

TELECOMMUNICATIONS INDUSTRY ASSOCIATION (TIA)

TIA-758	(2012b) Customer-Owned Outside Plant Telecommunications Infrastructure Standard

U.S. DEPARTMENT OF AGRICULTURE (USDA)

RUS Bull 1751F-644	(2002) Underground Plant Construction

UNDERWRITERS LABORATORIES (UL)

UL 6	(2022) UL Standard for Safety Electrical Rigid Metal Conduit-Steel
UL 94	(2023; Reprint Jan 2024) UL Standard for Safety Tests for Flammability of Plastic Materials for Parts in Devices and Appliances
UL 467	(2022) UL Standard for Safety Grounding and Bonding Equipment
UL 514B	(2012; Reprint Mar 2024) UL Standard for Safety Conduit, Tubing and Cable Fittings
UL 651	(2011; Reprint May 2022) UL Standard for

1.2 SYSTEM DESCRIPTION

Items provided under this Section must be specifically suitable for the following service conditions. Seismic details must conform to UFC 3-301-01, "Structural Engineering".

a. Altitude: 500 feet

b. Ambient Temperature: 104 degrees F

c. Frequency: 60 Hz

d. Ventilation: Non-ventilated

e. Seismic Parameters: Per Specifications

f. Corrosive Areas: Wet non-corrosive

1.3 DEFINITIONS

a. Unless otherwise specified or indicated, electrical and electronics terms used in these specifications, and on the drawings, are as defined in IEEE Stds Dictionary.

b. In the text of this section, the words conduit and duct are used interchangeably and have the same meaning.

c. In the text of this section, "medium voltage cable splices," and "medium voltage cable joints" are used interchangeably and have the same meaning.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" classification. Submittals not having a "G" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Precast Underground Structures; G

SD-03 Product Data

Precast Concrete Structures; G

Sealing Material

Handhole Frames and Covers; G

1.5 QUALITY ASSURANCE

1.5.1 Precast Underground Structures

Submittal required for each type used. Provide calculations and drawings

for precast manholes and handholes bearing the seal of a registered professional engineer including:

a. Material description (i.e., f'c and Fy)

b. Manufacturer's printed assembly and installation instructions

c. Design calculations

d. Reinforcing shop drawings in accordance with ACI SP-66

e. Plans and elevations showing opening and pulling-in iron locations and details

1.5.2 Regulatory Requirements

In each of the publications referred to herein, consider the advisory provisions to be mandatory, as though the word, "must" had been substituted for "should" wherever it appears. Interpret references in these publications to the "authority having jurisdiction," or words of similar meaning, to mean the Contracting Officer. Equipment, materials, installation, and workmanship must be in accordance with the mandatory and advisory provisions of IEEE C2 and NFPA 70 unless more stringent requirements are specified or indicated.

1.5.3 Standard Products

Provide materials and equipment that are products of manufacturers regularly engaged in the production of such products which are of equal material, design and workmanship. Products must have been in satisfactory commercial or industrial use for two years prior to bid opening. The two year period must include applications of equipment and materials under similar circumstances and of similar size. The product must have been for sale on the commercial market through advertisements, manufacturers' catalogs, or brochures during the two year period. Where two or more items of the same class of equipment are required, these items must be products of a single manufacturer; however, the component parts of the item need not be the products of the same manufacturer unless stated in this Section.

1.5.3.1 Alternative Qualifications

Products having less than a 2-year field service record will be acceptable if a certified record of satisfactory field operation for not less than 6000 hours, exclusive of the manufacturers' factory or laboratory tests, is furnished.

1.5.3.2 Material and Equipment Manufacturing Date

Products manufactured more than three years prior to date of delivery to site are not acceptable, unless specified otherwise.

PART 2 PRODUCTS

2.1 CONDUIT, DUCTS, AND FITTINGS

2.1.1 Rigid Metal Conduit

UL 6.

2.1.1.1 Rigid Metallic Conduit, PVC Coated

NEMA RN 1, Type A40, except that hardness must be nominal 85 Shore A durometer, dielectric strength must be minimum 400 volts per mil at 60 Hz, and tensile strength must be minimum 3500 psi.

2.1.2 Plastic Conduit for Direct Burial and Riser Applications

UL 651 and NEMA TC 2, EPC-40 or EPC-80 as indicated.

2.1.3 Plastic Duct for Concrete Encasement

Provide Type EPC-40 per UL 651 and NEMA TC 2.

2.1.4 Duct Sealant

UL 94, Class HBF. Provide high-expansion urethane foam duct sealant that expands and hardens to form a closed, chemically and water resistant, rigid structure. Sealant must be compatible with common cable and wire jackets and capable of adhering to metals, plastics and concrete. Sealant must be capable of curing in temperature ranges of 35 degrees F to 95 degrees F. Cured sealant must withstand temperature ranges of -20 degrees F to 200 degrees F without loss of function.

2.1.5 Fittings

2.1.5.1 Metal Fittings

UL 514B.

2.1.5.2 PVC Conduit Fittings

UL 514B, UL 651, and NEMA TC 3.

2.1.5.3 PVC Duct Fittings

NEMA TC 9.

2.2 PULL ROPE

Plastic or flat pull line (bull line) having a minimum tensile strength of 200 pounds.

2.3 GROUNDING AND BONDING

2.3.1 Driven Ground Rods

Provide copper-clad steel ground rods conforming to UL 467 not less than 3/4 inch in diameter by 10 feet in length. Sectional type rods may be used for rods 20 feet or longer.

2.3.2 Grounding Conductors

Stranded-bare copper conductors must conform to ASTM B8, Class B, soft-drawn unless otherwise indicated. Solid-bare copper conductors must conform to ASTM B1 for sizes No. 8 and smaller. Insulated conductors must be of the same material as phase conductors and green color-coded, except that conductors must be rated no more than 600 volts. Aluminum is not acceptable.

2.4 CAST-IN-PLACE CONCRETE

Provide concrete in accordance with Section 03 30 00.00 99 CAST-IN-PLACE CONCRETE. In addition, provide concrete for encasement of underground ducts with 3000 psi minimum 28 day compressive strength. Concrete associated with electrical work for other than encasement of underground ducts must be 4000 psi minimum 28 day compressive strength unless specified otherwise.

2.5 UNDERGROUND STRUCTURES

Provide precast concrete underground structures or standard type cast-in-place manhole types as indicated, conforming to ASTM C857 and ASTM C478. Top, walls, and bottom must consist of reinforced concrete. Walls and bottom must be of monolithic concrete construction. Locate duct entrances and windows near the corners of structures to facilitate cable racking. Covers must fit the frames without undue play. Form steel and iron to shape and size with sharp lines and angles. Castings must be free from warp and blow holes that may impair strength or appearance. Exposed metal must have a smooth finish and sharp lines and arises. Provide necessary lugs, rabbets, and brackets. Set pulling-in irons and other built-in items in place before depositing concrete. Install a pulling-in iron in the wall opposite each duct line entrance. Cable racks, including rack arms and insulators, must be adequate to accommodate the cable.

2.5.1 Precast Concrete Structures, Risers and Tops

Precast concrete underground structures may be provided in lieu of cast-in-place subject to the requirements specified below. Precast units must be the product of a manufacturer regularly engaged in the manufacture of precast concrete products, including precast manholes.

2.5.1.1 General

Precast concrete structures must have the same accessories and facilities as required for cast-in-place structures. Likewise, precast structures must have plan area and clear heights not less than those of cast-in-place structures. Concrete materials and methods of construction must be the same as for cast-in-place concrete construction, as modified herein. Slope in floor may be omitted provided precast sections are poured in reinforced steel forms. Concrete for precast work must have a 28 day compressive strength of not less than 4000 psi. Structures may be precast to the design and details indicated for cast-in-place construction, precast monolithically and placed as a unit, or structures may be assembled sections, designed and produced by the manufacturer in accordance with the requirements specified. Structures must be identified with the manufacturer's name embedded in or otherwise permanently attached to an interior wall face.

2.5.1.2 Design for Precast Structures

ACI 318M. In the absence of detailed on-site soil information, design for the following soil parameters/site conditions:

a. Angle of Internal Friction (phi) = 30 degrees

b. Unit Weight of Soil (Dry) = 110 pcf, (Saturated) = 130 pcf

c. Coefficient of Lateral Earth Pressure (Ka) = 0.33

d. Ground Water Level = 3 feet below ground elevation

e. Vertical design loads must include full dead, superimposed dead, and live loads including a 30 percent magnification factor for impact. Live loads must consider all types and magnitudes of vehicular (automotive, industrial, or aircraft) traffic to be encountered. The minimum design vertical load must be for H20 highway loading per AASHTO HB-17.

f. Horizontal design loads must include full geostatic and hydrostatic pressures for the soil parameters, water table, and depth of installation to be encountered. Also, horizontal loads imposed by adjacent structure foundations, and horizontal load components of vertical design loads, including impact, must be considered, along with a pulling-in iron design load of 6000 pounds.

g. Each structural component must be designed for the load combination and positioning resulting in the maximum shear and moment for that particular component.

h. Design must also consider the live loads induced in the handling, installation, and backfilling of the manholes. Provide lifting devices to ensure structural integrity during handling and installation.

2.5.1.3 Construction

Provide a uniform thickness for structure top, bottom, and wall not less than 6 inches. Thin-walled knock-out panels for designed or future duct bank entrances are not permitted. Provide quantity, size, and location of duct bank entrance windows as directed, and cast completely open by the precaster. Size of windows must exceed the nominal duct bank envelope dimensions by at least 12 inches vertically and horizontally to preclude in-field window modifications made necessary by duct bank misalignment. However, the sides of precast windows must be a minimum of 6 inches from the inside surface of adjacent walls, floors, or ceilings. Form the perimeter of precast window openings to have a keyed or inward flared surface to provide a positive interlock with the mating duct bank envelope. Provide welded wire fabric reinforcing through window openings for in-field cutting and flaring into duct bank envelopes. Provide additional reinforcing steel comprised of at least two No. 4 bars around window openings. Provide drain sumps a minimum of 12 inches in diameter and 4 inches deep for precast structures.

2.5.1.4 Joints

Provide tongue-and-groove joints on mating edges of precast components. Shiplap joints are not allowed. Design joints to firmly interlock adjoining components and to provide waterproof junctions and adequate shear transfer. Seal joints watertight using preformed plastic strip conforming to ASTM C990. Install sealing material in strict accordance with the sealant manufacturer's printed instructions. Provide waterproofing at conduit/duct entrances into structures, and where access frame meets the top slab, provide continuous grout seal.

2.5.2 Handhole Frames and Covers

Frames and covers of steel must be welded by qualified welders in

accordance with standard commercial practice. Provide rolled-steel floor plate covers having an approved antislip surface. Hinges must be of stainless steel with bronze hinge pin, 5 by 5 inches by approximately 3/16 inch thick, without screw holes, and must be for full surface application by fillet welding. Hinges must have nonremovable pins and five knuckles. The surfaces of plates under hinges must be true after the removal of raised antislip surface, by grinding or other approved method.

PART 3 EXECUTION

3.1 INSTALLATION

Install equipment and devices in accordance with the manufacturer's published instructions and with the requirements and recommendations of NFPA 70 and IEEE C2 as applicable. In addition to these requirements, install telecommunications in accordance with TIA-758 and RUS Bull 1751F-644.

3.2 UNDERGROUND STRUCTURE CONSTRUCTION

3.2.1 Precast Concrete Construction

Set commercial precast structures on 6 inches of level, 90 percent compacted granular fill, 3/4 inch to one inch size, extending 12 inches beyond the structure on each side. Compact granular fill by a minimum of four passes with a plate type vibrator. Installation must additionally conform to the manufacturer's instructions.

3.2.2 Field Painting

Clean cast-iron frames and covers not buried in concrete or masonry of mortar, rust, grease, dirt and other deleterious materials, and coat with bituminous paint.

3.3 UNDERGROUND CONDUIT AND DUCT SYSTEMS

3.3.1 Requirements

a. Run conduit in straight lines except where a change of direction is necessary. Provide numbers and sizes of ducts as indicated. Ducts must have a continuous slope downward toward underground structures and away from buildings, laid with a minimum slope of 4 inches per 100 feet. Depending on the contour of the finished grade, the high-point may be at a terminal, a handhole, or between handholes. Terminate all PVC conduit end points in handholes and buildings with end bells. The bell end of the conduits that enter handholes must be flush with the wall.

b. Perform changes in ductbank direction as follows:

(1) Short-radius manufactured 90-degree duct bends may be used only for pole or equipment risers, unless specifically indicated as acceptable.

(2) The minimum manufactured bend radius must be 18 inches for ducts of less than 3 inch diameter, and 36 inches for ducts 3 inches or greater in diameter.

(3) As an exception to the bend radius required above, provide field manufactured longsweep bends having a minimum radius of 25 feet for a change of direction of more than five degrees, either

horizontally or vertically, using a combination of curved and straight sections. Maximum manufactured curved sections allowed for use in field manufactured longsweep bend: 30 degrees.

3.3.2 Treatment

Keep ducts clean of concrete, dirt, or foreign substances during construction. Make field cuts requiring tapers with proper tools and match factory tapers. Use a coupling recommended by the duct manufacturer whenever an existing duct is connected to a duct of different material or shape. Store ducts to avoid warping and deterioration with ends sufficiently plugged to prevent entry of any water or solid substances. Thoroughly clean ducts before being laid. Store plastic ducts on a flat surface and protected from the direct rays of the sun.

3.3.3 Conduit Cleaning

As each conduit run is completed, for conduit sizes 3 inches and larger, draw a flexible testing mandrel approximately 12 inches long with a diameter less than the inside diameter of the conduit through the conduit. After which, draw a stiff bristle brush through until conduit is clear of particles of earth, sand and gravel; then immediately install conduit plugs. For conduit sizes less than 3 inches, draw a stiff bristle brush through until conduit is clear of particles of earth, sand and gravel; then immediately install conduit plugs.

3.3.4 Jacking and Drilling Under Roads and Structures

Conduits to be installed under existing paved areas which are not to be disturbed, and under roads and railroad tracks, must be zinc-coated, rigid steel, jacked into place. Where ducts are jacked under existing pavement, install rigid steel conduit because of its strength. To protect the corrosion-resistant conduit coating, predrilling or installing conduit inside a larger iron pipe sleeve (jack-and-sleeve) is required. For crossings of existing railroads and airfield pavements greater than 50 feet in length, the predrilling method or the jack-and-sleeve method will be used. Separators or spacing blocks must be made of steel, concrete, plastic, or a combination of these materials placed not farther apart than 4 feet on centers. Hydraulic jet method must not be used.

3.3.5 Galvanized Conduit Concrete Penetrations

Galvanized conduits which penetrate concrete (slabs, pavement, and walls) in wet locations must be PVC coated and extend from at least 2 inches within the concrete to the first coupling or fitting outside the concrete (minimum of 6 inches from penetration).

3.3.6 Multiple Conduits

Separate multiple conduits by a minimum distance of 3 inches. Stagger the joints of the conduits by rows (horizontally) and layers (vertically) to strengthen the conduit assembly. Provide plastic duct spacers that interlock vertically and horizontally. Spacer assembly must consist of base spacers, intermediate spacers, ties, and locking device on top to provide a completely enclosed and locked-in conduit assembly. Install spacers per manufacturer's instructions, but provide a minimum of two spacer assemblies per 10 feet of conduit assembly.

3.3.7 Conduit Plugs and Pull Rope

Provide new conduit indicated as being unused or empty with plugs on each end. Plugs must contain a weephole or screen to allow water drainage. Provide a plastic pull rope having 3 feet of slack at each end of unused or empty conduits.

3.3.8 Conduit and Duct Without Concrete Encasement

Depths to top of the conduit must be not less than 24 inches below finished grade. Provide not less than 3 inches clearance from the conduit to each side of the trench. Grade bottom of trench smooth; where rock, soft spots, or sharp-edged materials are encountered, excavate the bottom for an additional 3 inches, fill and tamp level with original bottom with sand or earth free from particles, that would be retained on a 1/4 inch sieve. The first 6 inch layer of backfill cover must be sand compacted as previously specified. The rest of the excavation must be backfilled and compacted in 3 to 6 inch layers. Provide color, type and depth of warning tape as specified in Section 31 00 00.00 99 EARTHWORK.

3.3.8.1 Encasement Under Roads and Structures

Under roads, paved areas, and railroad tracks, install conduits in concrete encasement of rectangular cross-section providing a minimum of 3 inch concrete cover around ducts. Extend concrete encasement at least 5 feet beyond the edges of paved areas and roads, and 12 feet beyond the rails on each side of railroad tracks. Depths to top of the concrete envelope must be not less than 24 inches below finished grade.

3.3.9 Duct Encased in Concrete

3.3.9.1 Removal of Ducts

Where duct lines are removed from existing underground structures, close the openings to waterproof the structure. Chip out the wall opening to provide a key for the new section of wall.

3.3.10 Duct Sealing

Seal all electrical penetrations for radon mitigation, maintaining integrity of the vapor barrier, and to prevent infiltration of air, insects, and vermin.

3.4 CABLE PULLING

Test existing duct lines with a mandrel and thoroughly swab out to remove foreign material before pulling cables. Pull cables down grade with the feed-in point at the manhole or buildings of the highest elevation. Use flexible cable feeds to convey cables through manhole opening and into duct runs. Do not exceed the specified cable bending radii when installing cable under any conditions, including turnups into other enclosures. If basket-grip type cable-pulling devices are used to pull cable in place, cut off the section of cable under the grip before splicing and terminating.

3.4.1 Cable Lubricants

Use lubricants that are specifically recommended by the cable manufacturer for assisting in pulling jacketed cables.

3.5 CABLES IN UNDERGROUND STRUCTURES

Do not install cables utilizing the shortest path between penetrations, but route along those walls providing the longest route and the maximum spare cable lengths. Form cables to closely parallel walls, not to interfere with duct entrances, and support on brackets and cable insulators. Support cable splices in underground structures by racks on each side of the splice. Locate splices to prevent cyclic bending in the spliced sheath. Install cables at middle and bottom of cable racks, leaving top space open for future cables, except as otherwise indicated for existing installations. Provide one spare three-insulator rack arm for each cable rack in each underground structure.

3.5.1 Cable Tag Installation

Install cable tags in each manhole as specified, including each splice. Tag wire and cable provided by this Contract. Install cable tags over the fireproofing, if any, and locate the tags so that they are clearly visible without disturbing any cabling or wiring in the manholes.

3.6 LOW VOLTAGE CABLE SPLICING AND TERMINATING

Make terminations and splices with materials and methods as indicated or specified herein and as designated by the written instructions of the manufacturer. Do not allow the cables to be moved until after the splicing material has completely set. Make splices in underground distribution systems only in accessible locations such as manholes, handholes, or aboveground termination pedestals.

3.7 GROUNDING SYSTEMS

NFPA 70 and IEEE C2, except provide grounding systems with a resistance to solid earth ground not exceeding 25 ohms.

3.7.1 Grounding Electrodes

Provide cone pointed driven ground rods driven full depth plus 6 inches, installed to provide an earth ground of the appropriate value for the particular equipment being grounded. If the specified ground resistance is not met, provide an additional ground rod in accordance with the requirements of NFPA 70 (placed not less than 6 feet from the first rod). Should the resultant (combined) resistance exceed the specified resistance, measured not less than 48 hours after rainfall, notify the Contracting Officer immediately.

3.7.2 Grounding Connections

Make grounding connections which are buried or otherwise normally inaccessible, by exothermic weld or compression connector.

a. Make exothermic welds strictly in accordance with the weld manufacturer's written recommendations. Welds which are "puffed up" or which show convex surfaces indicating improper cleaning are not acceptable. Mechanical connectors are not required at exothermic welds.

b. Make compression connections using a hydraulic compression tool to provide the correct circumferential pressure. Tools and dies must be as recommended by the manufacturer. An embossing die code or other standard method must provide visible indication that a connector has

been adequately compressed on the ground wire.

3.7.3 Grounding Conductors

Provide bare grounding conductors, except where installed in conduit with associated phase conductors. Ground cable sheaths, cable shields, conduit, and equipment with No. 6 AWG. Ground other noncurrent-carrying metal parts and equipment frames of metal-enclosed equipment. Ground metallic frames and covers of handholes and pull boxes with a braided, copper ground strap with equivalent ampacity of No. 6 AWG.

3.7.4 Ground Cable Crossing Expansion Joints

Protect ground cables crossing expansion joints or similar separations in structures and pavements by use of approved devices or methods of installation which provide the necessary slack in the cable across the joint to permit movement. Use stranded or other approved flexible copper cable across such separations.

3.8 EXCAVATING, BACKFILLING, AND COMPACTING

Provide in accordance with NFPA 70 and Section 31 00 00.00 99 EARTHWORK.

3.8.1 Reconditioning of Surfaces

3.8.1.1 Unpaved Surfaces

Restore to their original elevation and condition unpaved surfaces disturbed during installation of duct. Preserve sod and topsoil removed during excavation and reinstall after backfilling is completed. Replace sod that is damaged by sod of quality equal to that removed. When the surface is disturbed in a newly seeded area, re-seed the restored surface with the same quantity and formula of seed as that used in the original seeding, and provide topsoiling, fertilizing, liming, seeding, sodding, sprigging, or mulching. Provide work in accordance with Section 32 92 19.00 99 SEEDING and Section 32 93 00.00 99 EXTERIOR PLANTS.

3.9 FIELD QUALITY CONTROL

3.9.1 Performance of Field Acceptance Checks and Tests

Perform in accordance with the manufacturer's recommendations, and include the following visual and mechanical inspections and electrical tests, performed in accordance with NETA ATS.

3.9.1.1 Low Voltage Cables, 600-Volt

Perform tests after installation of cable, splices and terminations and before terminating to equipment or splicing to existing circuits.

a. Visual and Mechanical Inspection

(1) Inspect exposed cable sections for physical damage.

(2) Verify that cable is supplied and connected in accordance with Contract plans and specifications.

(3) Verify tightness of accessible bolted electrical connections.

(4) Inspect compression-applied connectors for correct cable match and indentation.

(5) Visually inspect jacket and insulation condition.

(6) Inspect for proper phase identification and arrangement.

b. Electrical Tests

(1) Perform insulation resistance tests on wiring No. 6 AWG and larger diameter using instrument which applies voltage of approximately 1000 volts dc for one minute.

(2) Perform continuity tests to insure correct cable connection.

3.9.1.2 Grounding System

a. Visual and mechanical inspection

Inspect ground system for compliance with Contract plans and specifications.

b. Electrical tests

Perform ground-impedance measurements utilizing the fall-of-potential method in accordance with IEEE 81. On systems consisting of interconnected ground rods, perform tests after interconnections are complete. On systems consisting of a single ground rod perform tests before any wire is connected. Take measurements in normally dry weather, not less than 48 hours after rainfall. Use a portable ground resistance tester in accordance with manufacturer's instructions to test each ground or group of grounds. The instrument must be equipped with a meter reading directly in ohms or fractions thereof to indicate the ground value of the ground rod or grounding systems under test. Provide site diagram indicating location of test probes with associated distances, and provide a plot of resistance vs. distance.

3.9.2 Follow-Up Verification

Upon completion of acceptance checks and tests, show by demonstration in service that circuits and devices are in good operating condition and properly performing the intended function. As an exception to requirements stated elsewhere in the Contract, the Contracting Officer must be given five working days advance notice of the dates and times of checking and testing.

-- End of Section --

SECTION TABLE OF CONTENTS

DIVISION 34 - TRANSPORTATION

SECTION 34 71 13.16 99

VEHICLE CRASH BARRIERS

PART 1 GENERAL

1.1 REFERENCES
1.2 SUBMITTALS

PART 2 PRODUCTS

2.1 GUARDRAIL POSTS
2.1.1 Sawn Wood Posts and Offset Blocks
2.1.2 Steel Posts
2.2 W-BEAM GUARDRAIL
2.3 W-BEAM END SECTION
2.4 GUARDRAIL HARDWARE
2.5 TERMINAL FOR W-BEAM GUARDRAIL
2.6 CABLE BARRIER
2.6.1 Cable Splices, Ends, Fittings
2.6.2 Compensating Device
2.6.3 Hook Bolts
2.6.4 Steel Posts
2.6.4.1 Structural Steel Posts
2.6.4.2 Flanged Channel Posts
2.6.5 Anchor Assembly
2.6.6 Concrete
2.7 CRASH CUSHION
2.8 RETROREFLECTIVE SHEETING

PART 3 EXECUTION

3.1 POSTS
3.2 GUARDRAIL BEAM ELEMENTS
3.3 GUARDRAIL DELINEATOR REFLECTOR TABS
3.4 GUARDRAIL END ANCHORAGE
3.5 THREE CABLE GUARDRAIL
3.5.1 Posts
3.5.2 Cable Splices, Compensating Devices and Turnbuckle Cable End Assemblies
3.5.3 Pretension of Cable
3.6 CRASH CUSHION

-- End of Section Table of Contents --

SECTION 34 71 13.16 99

VEHICLE CRASH BARRIERS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO)

AASHTO MASH	(2016) Manual for Assessing Safety Hardware - Second Edition

ASTM INTERNATIONAL (ASTM)

ASTM A1	(2000; R 2018) Standard Specification for Carbon Steel Tee Rails
ASTM A36/A36M	(2019) Standard Specification for Carbon Structural Steel
ASTM A123/A123M	(2017) Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A153/A153M	(2023) Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A307	(2021) Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength
ASTM A499	(2015, R 2020) Standard Specification for Steel Bars and Shapes, Carbon Rolled from "T" Rails
ASTM A563	(2021; E 2022a) Standard Specification for Carbon and Alloy Steel Nuts
ASTM B695	(2021) Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel
ASTM F3125/F3125M	(2023) Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength

OREGON DEPARTMENT OF TRANSPORTATION (ODOT)

ODOT SSC	(2024) Oregon Standard Specifications for Construction

U.S. FEDERAL HIGHWAY ADMINISTRATION (FHWA)

NCHRP 350	(1993) Recommended Procedures for the Safety Performance Evaluation of Highway Features

1.2 SUBMITTALS

Government approval is required for submittals with a "G" classification. Submittals not having a "G" classification are for information only. When used, a code following the "G" classification identifies the office that will review the submittal for the Government. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

FHWA Acceptance Letter

SD-08 Manufacturer's Instructions

End Anchorage

PART 2 PRODUCTS

2.1 GUARDRAIL POSTS

Refer to ODOT SSC Section 00810.11 - Posts.

2.1.1 Sawn Wood Posts and Offset Blocks

Refer to ODOT SSC Section 02110.10 - Guardrail Posts and Section 02110.20 - Guardrail Blocks.

2.1.2 Steel Posts

Refer to ODOT SSC Section 02820.20 - Metal Guardrail and Median Barrier Posts and Section 02820.30 - Guardrail Hardware.

2.2 W-BEAM GUARDRAIL

Refer to ODOT SSC 02820.10 - Metal Beam Rail.

2.3 W-BEAM END SECTION

Provide W-beam end sections of the same or greater thickness of metal and the same type as the beam to which it is attached.

2.4 GUARDRAIL HARDWARE

Refer to ODOT SSC Section 02820.30 - Guardrail Hardware and Section 02820.40 - Guardrail Anchor Hardware.

2.5 TERMINAL FOR W-BEAM GUARDRAIL

Refer to ODOT SSC 02820.30 - Guardrail Hardware and Section 02820.40 - Guardrail Anchor Hardware.

2.6 CABLE BARRIER

2.6.1 Cable Splices, Ends, Fittings

Refer to ODOT SSC Section 02820.30 - Guardrail Hardware and Section - 02820.40 Guardrail Anchor Hardware.

2.6.2 Compensating Device

Provide compensating devices with a spring rate of 450 lbs plus or minus 50 lbs per inch and a minimum total available travel of 6 inches. Galvanize all parts in accordance with ASTM A153/A153M.

2.6.3 Hook Bolts

Provide hook bolts conforming to ASTM A307 Grade A with a tensile strength of 60 ksi and a yield strength of 36 ksi. Provide corrosion-resistant bolts manufactured from ASTM F3125/F3125M Type 3 material, with a tensile strength of 120 ksi and a yield strength of 92 ksi. Hook bolts must develop an ultimate pull open strength, applied in a direction normal to the longitudinal axis of the post, from 500 to 1000 pounds. Use galvanized nuts conforming to ASTM A563 Grade A. Use corrosion-resistant nuts conforming to ASTM A563 Grade C3. Finish galvanized bolts and nuts according to ASTM A153/A153M for Class C or ASTM B695 for Class 50. If galvanized, overlap the threads as specified in ASTM A563.

2.6.4 Steel Posts

2.6.4.1 Structural Steel Posts

Provide structural steel posts and anchor plates conforming to ASTM A36/A36M. Galvanize in accordance with ASTM A123/A123M.

2.6.4.2 Flanged Channel Posts

Fabricate flanged channel posts from rerolled rail steel bars conforming to ASTM A499, Grade 60 except that the minimum yield strength must be. The post must meet the chemical properties of ASTM A1 for rails 30 pounds per foot and heavier.

2.6.5 Anchor Assembly

Refer to ODOT SSC Section 02820.40 - Guardrail Anchor Hardware.

2.6.6 Concrete

Refer to ODOT SSC Section 0040 - Commercial Grade Concrete.

2.7 CRASH CUSHION

Provide redirective, non-gating, bi-directional type crash cushion as indicated. Crash cushion must be certified by the Federal Highway Administration (FHWA) to meet the requirements for Test Level 2 of NCHRP 350 or AASHTO MASH. Submit a copy of the FHWA Acceptance Letter.

2.8 RETROREFLECTIVE SHEETING

Refer to ODOT SSC Section 02910.20 - Retroreflective Sheeting.

PART 3 EXECUTION

3.1 POSTS

Refer to ODOT SSC Section 00810.42 - Installation of Posts and Anchors.

3.2 GUARDRAIL BEAM ELEMENTS

Place and fasten the beam elements, fittings, and other parts of the guardrail as indicated. Erect the elements to produce a smooth, even rail, closely conforming to a line and grade parallel to the pavement. Bolt the beam elements to each post, and make splices by lapping in the direction of traffic. Splice only at posts. Where the rail is on a curve, the beams at the splice must make contact throughout the area of the splice, forming a continuous beam before erection. On curves of 150 foot radius or less, install shop bent beam elements, bent to the radius indicated. Tighten all bolts in the finished rail.

3.3 GUARDRAIL DELINEATOR REFLECTOR TABS

Clean, degrease and etch the face of metal tabs using methods recommended by the retroreflective sheeting manufacturer. After cleaning and degreasing, apply retroreflective sheeting material to the metal tabs as recommended by the manufacturer. Perform shearing, cutting and punching prior to preparing the blanks for application of reflective material.

3.4 GUARDRAIL END ANCHORAGE

Install flared and non-flared end anchorages in accordance with the manufacturer's instructions. Submit a copy of the manufacturer's end anchorage installation instructions prior to installation. Submit at least 14 days prior to installation.

3.5 THREE CABLE GUARDRAIL

3.5.1 Posts

Set all posts plumb and firm and spaced as indicated. Posts may be power driven or set by hand. Protect the top of steel posts by a suitable driving cap if power driven.

3.5.2 Cable Splices, Compensating Devices and Turnbuckle Cable End Assemblies

Stagger cable splices. Provide a minimum of 20 feet between any pair. Provide a minimum of 100 feet between cable splices on the same cable. For length of cable runs up to 1000 feet, use a compensating device on one end and a turnbuckle on the other end of each individual cable. For length of cable runs from 1000 feet to 2000 feet, use a compensating device on the ends of each individual cable. For length of cable runs over 2000 feet, start a new stretch by interlacing at the last parallel post.

3.5.3 Pretension of Cable

Install and tension the cable barrier as follows:

a. Properly seat the spring in the compensator device and permanently mark the unloaded spring position on the compensator rod.

b. Install spring end assemblies at one end of the barrier and secure to the anchor.

c. With cable strung through the hook bolts, introduce tension into the cable at the opposite end of the barrier to compress the installed springs approximately 3.5 inches.

d. Clamp this tension in the cable while the end assemblies are installed at the second anchor.

e. Remove the slack between the clamp point and the second anchor by taking up the turnbuckle. If springs are also used at this end, compress them approximately 3.5 inches.

f. After two weeks at this setting, reset the spring compression as indicated based on the temperature at the time of adjustment.

3.6 CRASH CUSHION

Refer ODOT SSC Section 00830 - Impact Attenuators.

-- End of Section --

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
Bonneville Powerhouse I Navigation Lock Bridge Replacement

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY					MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
							SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION		
(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		01 10 00.00 25	SD-11 Closeout Submittals															
			Limitations On Subcontracting	1.12														
			Compliance															
		01 10 10.00 25	SD-01 Preconstruction Submittals															
			Utility Outage Request	1.15														
			Utility Connection Request	1.15														
			Access Agreements and Work	1.18	G													
			Areas															
			Temporary Electrical Wiring Plan	1.21.2.2	G													
			Contractor's Planned Equipment	1.22.1	G													
			Methods															
			Plant and Equipment List	1.22.2	G													
			Loading Diagram	1.22.3	G													
			Traffic Control Plan	1.18.4	G													
		01 12 00.00 25	SD-01 Preconstruction Submittals															
			Antiterrorism (At) Level I Training	1.4														
			Suspicious Activity Reporting	1.6														
			Training															
			Pre-Screen Candidates Using	1.7														
			E-Verify Program															
			Non-Us Citizens	1.8														
		01 32 01.00 25	SD-01 Preconstruction Submittals															
			Preliminary Schedule	1.7.1	GECCC													
			Initial Schedule	1.7.2	GECCC													
			Schedule Update	1.9.1														
		01 33 00	SD-01 Preconstruction Submittals															

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
Bonneville Powerhouse I Navigation Lock Bridge Replacement

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY					
							SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION	MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		01 33 00	Submittal Register	1.5	G													
			SD-07 Certificates															
			Authorized Shop Drawing	1.10.2														
			Approvers															
		01 35 26.00 25	SD-01 Preconstruction Submittals															
			Accident Prevention Plan (APP)	1.9	G													
			Crane Operators	1.8.4	G													
			Electrical Safety Plan (ESP)	1.9.3.1	G													
			Site-Specific Energy Control Plan	1.9.3.2	G													
			(SSECP)															
			Scaffold Work Plan	1.9.3.4														
			Hearing Conservation Program	1.9.3.5	G													
			(HCP)															
			Respiratory Protection Program	1.9.3.6														
			(RPP)															
			Regulatory Citations, Violations,	1.7														
			And Corrective Action															
			Site Safety And Health Officer	1.8.1														
			(SSHO)															
			SD-06 Test Reports															
			Accident Reports	1.13.2	G													
			LHE Inspection Reports	1.13.3														
			Monthly Exposure Reports	1.6	G													
			SD-07 Certificates															
			Activity Hazard Analysis (AHA)	1.10	G													
			Certificate of Compliance	1.13.4	G													

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
Bonneville Powerhouse I Navigation Lock Bridge Replacement

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY					
							SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION	MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
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		01 35 26.00 25	Hot Work Permit	1.14														
			Critical Lift Plan	3.2.5	G													
			Third Party Certification Of	1.13.5	G													
			Barge-Mounted Mobile Cranes															
			And Mobile Equipment															
		01 35 27.00 25	SD-01 Preconstruction Submittals															
			Dive Team Personnel	1.4	G													
			Dive Plan and General Schedule	1.6	G													
			Equipment Certification	1.6	G													
			Emergency Management Plan	1.6	G													
			Activity Hazard Analysis	1.6	G													
			Company Safe Practice Manual	1.7	G													
			For Diving															
		01 45 00.00 25	SD-01 Preconstruction Submittals															
			Contractor Quality Control Plan	3.2	G													
			Construction Quality	3.4.4														
			Management for Contractors															
		01 57 19.00 25	SD-01 Preconstruction Submittals															
			Environmental Preconstruction	1.8.1														
			Survey															
			Environmental Protection Plan	1.9	G													
			Erosion and Sediment Control	3.2	GECDG													
			Plan (ESCP)															
			Resume And Qualifications	3.4.4														
			Marine Mammal Observation	3.1.2														
			Sheet															

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
Bonneville Powerhouse I Navigation Lock Bridge Replacement

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY					
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		01 57 19.00 25	Application For NPDES Permit	3.2.2.1														
			SD-06 Test Reports															
			ESCP Modifications	3.2.1	GECDG													
			Inspections and Reports	3.2.2.2	G													
			Monitoring Report	3.4.3														
			SD-11 Closeout Submittals															
			Environmental Records Binder	1.10	G													
			Stormwater Notice Of	3.2.2.3														
			Termination															
		01 74 19.00 25	SD-01 Preconstruction Submittals															
			Construction Waste Management	1.6	G													
			Plan															
			SD-06 Test Reports															
			Quarterly Reports	1.8.2														
			Annual Report	1.8.3														
			SD-11 Closeout Submittals															
			Final Construction Waste	1.9	G													
			Diversion Report															
		01 78 23.00 25	SD-01 Preconstruction Submittals															
			O&M Manual Execution Plan	1.2	G													
			SD-10 Operation and Maintenance															
			Data															
			Operation and Maintenance	1.3	G													
			Manual															
		01 78 39.10 25	SD-01 Preconstruction Submittals															
			As-Built Drawings Execution Plan	1.4	G													

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
Bonneville Powerhouse I Navigation Lock Bridge Replacement

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY					
							SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION	MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		01 78 39.10 25	Working As-Built Redline	1.5														
			Drawings															
			SD-11 Closeout Submittals															
			Final Working As-Built Redline	1.7	G													
			Drawings															
			Final Contractor-prepared CAD	1.8	G													
			Drawings															
			Digital Images	1.6	G													
		02 41 00.00 99	SD-01 Preconstruction Submittals															
			Demolition and Deconstruction	1.2.2	G													
			Plan															
			Existing Conditions	1.10	G													
			Items To Remain In Place	1.3	G													
			SD-07 Certificates															
			Notification Of Demolition	1.7	G													
		02 81 00.00 99	SD-03 Product Data															
			Packaging Notifications	2.1.1														
			Hazardous Waste Management	3.1	G													
			Plan															
			Onsite Hazardous Waste	3.2	G													
			Management															
			Notices of Non-Compliance and	3.3														
			Notices of Violation															
			SD-06 Test Reports															
			Recordkeeping	3.6	G													
			Exception Report	3.6	G													

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
Bonneville Powerhouse I Navigation Lock Bridge Replacement

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY					
							SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION	MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		02 81 00.00 99	Spill Response	3.7														
			SD-07 Certificates															
			Transportation and Disposal	1.4.1	G													
			Coordinator															
			Training	1.4.2	G													
			Certification	1.4.3														
			Shipping Documents and	3.3.3	G													
			Packagings Certification															
			Security Plan	3.3.4														
			Certificates of Disposal	3.3.5														
			Waste Minimization	3.5														
		02 82 00.00 25	SD-03 Product Data															
			Amended Water	1.2.1	G													
			Safety Data Sheets (SDS) for All	1.3.9	G													
			Materials															
			Encapsulants	2.1	G													
			Respirators	3.1.2.1	G													
			Vacuums	3.1.7	G													
			Glovebags	3.1.9	G													
			SD-06 Test Reports															
			Air Sampling Results	1.5.5	G													
			Clearance Sampling	3.2.7.5	G													
			Asbestos Disposal Quantity	3.3.3.2	G													
			Report															
			SD-07 Certificates															
			Employee Training	1.3.4	G													

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
Bonneville Powerhouse I Navigation Lock Bridge Replacement

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY					
							SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION	MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		02 82 00.00 25	Notifications	1.3.5	G													
			Respiratory Protection Program	1.3.7	G													
			Asbestos Hazard Abatement	1.3.10	G													
			Plan															
			Testing Laboratory	1.3.11	G													
			Landfill Approval	1.3.12	G													
			Delivery Tickets	1.3.12	G													
			Waste Shipment Records	1.3.12	G													
			Transporter Certification	1.3.13	G													
			Medical Certification	1.3.14	G													
			Private Qualified Person	1.5.1	G													
			Documentation															
			Designated Competent Person	1.5.2	G													
			Worker's License	1.5.3	G													
			Contractor's License	1.5.4	G													
			Federal, State or Local Citations	1.5.6	G													
			on Previous Projects															
			Encapsulants	2.1	G													
			Equipment Used to Contain	3.1	G													
			Airborne Asbestos Fibers															
			Water Filtration Equipment	3.1.3.3	G													
			Vacuums	3.1.7	G													
			Ventilation Systems	3.1.7	G													
			SD-11 Closeout Submittals															
			Permits and Licenses	1.3.5	G													
			Notifications	1.3.5	G													

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
Bonneville Powerhouse I Navigation Lock Bridge Replacement

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY					
							SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION	MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
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		02 82 00.00 25	Respirator Program Records	1.3.7.1	G													
			Rental Equipment	1.7.1	G													
		02 83 00.00 99	SD-01 Preconstruction Submittals															
			Competent Person Qualifications	1.5.1.1	G													
			Training Certification	1.5.1.2	G													
			Occupational and Environmental	1.5.2.3	G													
			Assessment Data Report															
			Medical Examinations	1.5.2.4	G													
			Lead Waste Management Plan	1.5.2.8	G													
			Lead Compliance Plan	1.5.2.2	G													
			Written Evidence of TSD	3.5.2.1	G													
			Approval															
			SD-03 Product Data															
			Respirators	1.6.1	G													
			Vacuum Filters	1.6.4	G													
			Materials and Equipment	2.1	G													
			Expendable Supplies	2.1.1	G													
			SD-06 Test Reports															
			Sampling Results	1.5.2.3	G													
			SD-07 Certificates															
			Testing Laboratory	1.5.1.3	G													
			SD-11 Closeout Submittals															
			Hazardous Waste Manifest	3.5.2.1	G													
			Turn-In Documents or Weight	3.5.2.1	G													
			Tickets															
		03 30 00.00 99	SD-01 Preconstruction Submittals															

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
Bonneville Powerhouse I Navigation Lock Bridge Replacement

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY					
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		03 30 00.00 99	Concrete Curing Plan	1.6.3.1														
			Quality Control Plan	1.6.6	G													
			Quality Control Personnel	1.6.8	G													
			Certifications															
			Quality Control Organizational	1.6.8														
			Chart															
			Laboratory Accreditation	1.6.10	G													
			Form Removal Schedule	1.6.2.1	G													
			Concrete Deck Pre-Placement	1.6.7	G													
			Conferences															
			SD-02 Shop Drawings															
			Formwork	1.6.2.1														
			Reinforcing Steel	1.6.2.2	G													
			SD-03 Product Data															
			Joint Sealants	2.5.5														
			Joint Filler	2.5.4														
			Formwork Materials	2.2														
			Cementitious Materials	2.4.1														
			Concrete Curing Materials	2.5.1														
			Reinforcement	2.7														
			Admixtures	2.4.4														
			Waterstops	2.3.2														
			Local/Regional Materials	1.8.1														
			Biodegradable Form Release	2.3.3														
			Agent															
			Pumping Concrete	1.6.3.2														

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
Bonneville Powerhouse I Navigation Lock Bridge Replacement

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY					MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
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		03 30 00.00 99	Finishing Plan	1.6.3.4														
			Nonshrink Grout	2.5.2														
			SD-04 Samples															
			Slab Finish Sample	1.6.5.1														
			Surface Finish Samples	1.6.5.2														
			SD-05 Design Data															
			Concrete Mix Design	1.6.1.2	G													
			Formwork Calculations	1.6.1.1														
			SD-06 Test Reports															
			Concrete Mix Design	1.6.1.2	G													
			Fly Ash	1.6.4.1														
			Pozzolan	1.6.4.1														
			Slag Cement	1.6.4.2														
			Aggregates	1.6.4.3														
			Fiber-Reinforced Concrete	1.6.4.4	G													
			Compressive Strength Tests	3.13.3.3	G													
			Air Content	3.13.3.4														
			Slump Tests	3.13.3.1														
			Water	2.4.2														
			SD-07 Certificates															
			Reinforcing Bars	2.7.1														
			Welder Qualifications	1.9														
			Silica Fume Manufacturer's	1.6.3.3														
			Representative															
			Safety Data Sheets	1.6.3.5														

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
Bonneville Powerhouse I Navigation Lock Bridge Replacement

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY					
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		03 30 00.00 99	Field Testing Technician and	1.6.8.2														
			Testing Agency															
			ADA Certification	1.6.8.3														
			SD-08 Manufacturer's Instructions															
			Joint Sealants	2.5.5														
			Curing Compound	2.5.1														
		05 12 00.00 99	SD-01 Preconstruction Submittals															
			Work Plan	1.2	G													
			Inspector Qualifications	1.5.2	G													
			Prefabrication Conference	1.5.4.1	G													
			Notice Of Work	1.5.4.1	G													
			Fabrication Shop Inspection and	1.5.4.2	G													
			Testing															
			Welding Procedure Specifications	2.1.4.1	G													
			(WPS)															
			Procedure Qualification Records	2.1.4.1	G													
			(PQR)															
			Performance Qualification	2.1.4.2	G													
			Records															
			Welding Repair Plans	2.3.7	G													
			Schedule Of Random Testing	2.3.4.2	G													
			Weld Tracking Log Template	1.2.1	G													
			Weld Tracking Log	1.2.2	G													
			Qualification Of Welders And	1.5.1	G													
			Welding Operators															
			NDT Inspector Certification	2.3.3.2.1	G													

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
Bonneville Powerhouse I Navigation Lock Bridge Replacement

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY					MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
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		05 12 00.00 99	SD-02 Shop Drawings															
			Working/Shop Drawings	1.5.5	G													
			Transportation, Handling, And	1.6	G													
			Storage At Fabrication Shop Plan															
			Assembly Drawings	2.1.2	G													
			SD-03 Product Data															
			Welding Electrodes and Rods	2.4.1														
			Non-Shrink Grout	2.4.2														
			Recycled Content for Structural	2.2.1	S													
			Steel															
			Material Records	2.1.3														
			Proposed Repair Work	2.3.5	G													
			SD-05 Design Data															
			Erection Plan	1.5.6	G													
			Erection Plan	3.1	G													
			SD-06 Test Reports															
			Class B Coating	2.5.3														
			Bolts, Nuts, and Washers	2.1.5														
			Weld Inspection Reports	1.5.4.2														
			Bolt Testing Reports	2.1.5														
			Field Bolt Testing Reports	3.2.1														
			Embrittlement Test Reports	3.4														
			Certified Manufacturer's Mill	2.1.5														
			Reports															
			Manufacturer Certified Test	2.1.5.4	G													
			Reports															

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
Bonneville Powerhouse I Navigation Lock Bridge Replacement

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY					
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		05 12 00.00 99	Distributor Certified Test Reports	2.1.5.4	G													
			Repair Of Mislocated Or	2.1.5.3	G													
			Misdrilled Holes															
			Certified Test Reports	2.3	G													
			Witness Points	1.5	G													
			SD-07 Certificates															
			Steel	2.2														
			Bolts, Nuts, and Washers	2.1.5														
			AISC Bridge Fabricator Quality	1.4														
			Certification															
			AISC Bridge Erector Quality	1.4														
			Certification															
			Welding Electrodes and Rods	2.4.1														
			AWS Certified Welding Inspector	1.5.1														
			(CWI)															
			AWS Certified Welding Inspector	1.5.2														
			(CWI)															
			NDT Technicians	1.5.2														
			Welding Procedure Specifications	2.1.4.1														
			(WPS)															
		07 10 00.00 99	SD-02 Shop Drawings															
			Strip Seal Expansion Joint	2.1.1	G													
			Assemblies															
			Working/Shop Drawings	1.3	G													
			SD-03 Product Data															
			Product Data	2.1	G													

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
Bonneville Powerhouse I Navigation Lock Bridge Replacement

CONTRACTOR

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		07 10 00.00 99	SD-07 Certificates															
			Personnel Qualifications	1.3	G													
			Material Mill Certificates	2.1	G													
			SD-08 Manufacturer’s Instructions															
			Manufacturer's Instructions	3.2	G													
		09 90 00.00 99	SD-02 Shop Drawings															
			Piping Identification	3.6														
			SD-03 Product Data															
			Coating	2.1	G													
			Product Data Sheets	2.1														
			SD-04 Samples															
			Color	2.2	G													
			SD-07 Certificates															
			Qualification Testing laboratory	1.5.6.2	G													
			for coatings															
			SD-08 Manufacturer’s Instructions															
			Mixing	2.1														
			Manufacturer's Safety Data	1.6.1														
			Sheets															
			SD-10 Operation and Maintenance															
			Data															
			Coatings	2.1	G													
		10 10 00.00 99	SD-01 Preconstruction Submittals															
			Prefabrication Coordination	1.3														
			Meeting															
			SD-02 Shop Drawings															

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
Bonneville Powerhouse I Navigation Lock Bridge Replacement

CONTRACTOR

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		10 10 00.00 99	Working/Shop Drawings	1.3	G													
			SD-03 Product Data															
			Product Data	2.1	G													
			Manufacturer's Specifications	2.1	G													
			Quality Control Tests	2.2	G													
			SD-05 Design Data															
			Seismic Isolation Design	2.2														
			Calculations															
			SD-06 Test Reports															
			Prototype Test Results	2.2	G													
			Manufacturer’s Test Results	2.1	G													
			SD-07 Certificates															
			Manufacturer Qualifications	1.3.1.1	G													
			Material Certificates	2.1	G													
			SD-08 Manufacturer’s Instructions															
			Manufacturer's Instructions	3.2	G													
		10 14 53.00 99	SD-03 Product Data															
			Traffic Sign Posts	2.1														
			Traffic Sign Retroreflective	2.4														
			Sheeting															
			SD-04 Samples															
			Flexible Posts	2.6.2														
		26 05 19.00 99	SD-01 Preconstruction Submittals															
			Cable Installation Plan	3.2	G													
			SD-03 Product Data															
			Wire and Cable	2.1.1	G													

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
Bonneville Powerhouse I Navigation Lock Bridge Replacement

CONTRACTOR

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		26 05 19.00 99	Conductors	2.1.3.1	G													
			Cable Manufacturing Data	3.1														
			SD-06 Test Reports															
			Test Report(s), Inspection	3.3	G													
			Report(s), and Verification															
			Report(s)															
		26 56 00.00 99	SD-02 Shop Drawings															
			Luminaire Drawings	1.5.1.1	G													
			Pole Drawings	1.5.1.2	G													
			SD-03 Product Data															
			Luminaires	2.2	G													
			Light Sources	2.3	G													
			LED Drivers	2.4	G													
			Luminaire Warranty	1.7.1	G													
			Pole Warranty	1.7.2	G													
			Poles	2.5	G													
			SD-05 Design Data															
			Luminaire Design Data	1.5.2														
			Photometric Plan	1.5.6														
			SD-06 Test Reports															
			ANSI/IES LM-79 Test Report	1.5.3	G													
			ANSI/IES LM-80 Test Report	1.5.4	G													
			ANSI/IES TM-21 Test Report	1.5.5	G													
			SD-08 Manufacturer's Instructions															
			Poles	2.5														

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
Bonneville Powerhouse I Navigation Lock Bridge Replacement

CONTRACTOR

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		26 56 00.00 99	SD-10 Operation and Maintenance															
			Data															
			Lighting System, Data Package 5	1.8.1	G													
			Maintenance Staff Training Plan	3.3.1.1	G													
			End-User Training Plan	3.3.1.2	G													
		31 00 00.00 99	SD-01 Preconstruction Submittals															
			Excavation and Trenching Plan	3.1.3	G													
			Borrow Plan	3.2	G													
			Rock Excavation Plan	3.4.5	G													
			Disposition of Surplus Materials	3.10	G													
			Preconstruction Meeting	1.5.4	G													
			SD-06 Test Reports															
			Material Test Report	3.11	G													
			Borrow Site Testing	3.2.3	G													
			SD-07 Certificates															
			Qualifications Of Engineer	1.5.1	G													
			Qualified Technician	1.5.2	G													
		31 05 19.13 99	SD-06 Test Reports															
			Geotextiles	2.2.1														
			SD-07 Certificates															
			Geotextiles	2.2.1														
			Needle Punched Geotextile	2.2.1.3														
		31 11 00.00 99	SD-01 Preconstruction Submittals															
			Herbicide Application Plan	3.1.1														
			SD-03 Product Data															
			Tree Wound Paint	2.1.1														

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
Bonneville Powerhouse I Navigation Lock Bridge Replacement

CONTRACTOR

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		31 11 00.00 99	Herbicides	1.3.2	G													
			SD-07 Certificates															
			Qualifications	1.3.2	G													
			SD-11 Closeout Submittals															
			Pest Management Report	3.5.1														
		31 52 00.00 25	SD-01 Preconstruction Submittals															
			Evacuation Plan	1.3.4	G													
			Contractor's Work Plan	3.2	G													
			SD-02 Shop Drawings															
			Drawings	3.2	G													
			SD-05 Design Data															
			Data Calculations	3.2	G													
		31 63 29.00 99	SD-01 Preconstruction Submittals															
			Installation Plan	1.3.2	G													
			Drilled Shaft Repair Plan	1.3.9														
			SD-02 Shop Drawings															
			Drilled Shaft Diameters	2.1.1	G													
			Top and Bottom of Shaft	2.1.1	G													
			Elevations															
			Steel Reinforcement	2.1.1	G													
			Accessories	2.1.1	G													
			Crosshole Sonic Log Access	2.1.1	G													
			Tubes															
			Crosshole Sonic Log Access	3.2.8	G													
			Tubes															
			SD-05 Design Data															

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
Bonneville Powerhouse I Navigation Lock Bridge Replacement

CONTRACTOR

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		31 63 29.00 99	Mix Design Data	2.1	G													
			SD-06 Test Reports															
			Soils Report	3.3.1	G													
			Ground Water Conditions	3.3.1														
			Slump	3.3.1														
			Concrete	3.3.1	G													
			Compressive Strength	3.3.1	G													
			Drilled Shaft Inspection Report	1.3.10	G													
			Concrete Placement Log And	1.3.11	G													
			Volume Curve															
			Crosshole Sonic Log	3.3.1	G													
			Downhole Camera Recording Of	3.3.1														
			Bottom Surface															
			SD-07 Certificates															
			Bill of Lading for Ready-Mix	2.1														
			Concrete Deliveries															
			Steel Reinforcement	2.1.1	G													
			Welding Certificates	1.3.6	G													
			Excavation and Drilling	2.2.1														
			Equipment															
			Qualifications of Excavator	1.3.4	G													
			Qualifications of Engineer	1.3.5	G													
		31 66 10.00 99	SD-03 Product Data															
			Tools	3.2.1.1	G													
		31 68 13.00 99	SD-01 Preconstruction Submittals															
			Contractor's Qualifications	1.5.2	G													

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
Bonneville Powerhouse I Navigation Lock Bridge Replacement

CONTRACTOR

ACTIVITY NO	TRANSMITTAL NO	SPEC SECT	DESCRIPTION ITEM SUBMITTED	PARAGRAPH #	CLASSIFICATION	GOVT OR A/E REVWR	CONTRACTOR: SCHEDULE DATES			CONTRACTOR ACTION			APPROVING AUTHORITY					
							SUBMIT	APPROVAL NEEDED BY	MATERIAL NEEDED BY	ACTION CODE	DATE OF ACTION	DATE FWD TO APPR AUTH/ DATE RCD FROM CONTR	DATE FWD TO OTHER REVIEWER	DATE RCD FROM OTH REVIEWER	ACTION CODE	DATE OF ACTION	MAILED TO CONTR/ DATE RCD FRM APPR AUTH	REMARKS
(a)	(b)	(c)	(d)	(e)	(f)		(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
		31 68 13.00 99	SD-02 Shop Drawings															
			Working Drawings	1.6	G													
			SD-03 Product Data															
			Calibration Data	1.5.5	G													
			SD-06 Test Reports															
			Mill Test Reports	1.5.4	G													
			SD-07 Certificates															
			Certificates Of Compliance	1.5.3	G													
			SD-11 Closeout Submittals															
			Grouting Records	1.7	G													
			Ground Anchor Test Results	1.7	G													
			As-Built Drawings	1.7	G													
		31 73 20.00 99	SD-01 Preconstruction Submittals															
			Contractor Qualifications	1.7.1.4	G													
			Field Demonstration Test	2.2.2	G													
			Program															
			Installation Details	2.2.2	G													
			Work Procedures Plan	2.2.3	G													
			Jet Grout Spoil Return	2.2.3	G													
			Management Plan															
			Containment, Treatment, And	2.2.3	G													
			Disposal Plan															
			Quality Assurance, Quality	3.1	G													
			Control And Verification															
			Procedures															
			SD-03 Product Data															

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
Bonneville Powerhouse I Navigation Lock Bridge Replacement

CONTRACTOR

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		31 73 20.00 99	Equipment Data	2.1	G													
			Field Data Collection Forms	2.1	G													
			Tabular And Graphical Data	3.1	G													
			Presentations															
			SD-06 Test Reports															
			Bench-Scale Testing Report	2.2.1	G													
			SD-09 Manufacturer’s Field															
			Reports															
			Daily Reports	3.1.2														
			SD-11 Closeout Submittals															
			As-Built Field Measurement Data	3.4.1	G													
		32 01 19.61 99	SD-03 Product Data															
			Sealants	2.1														
			Manufacturer's	3.5.2														
			Recommendations															
			SD-04 Samples															
			Sealants	2.1														
			Blocking Media/Backup Materials	2.3.1														
			Backer Rod	3.3.3.1														
			Bond Breaking Tapes	2.3.2														
			SD-06 Test Reports															
			Sealants	2.1														
			SD-07 Certificates															
			Equipment List	3.1														
			SD-08 Manufacturer’s Instructions															
			Sealants	2.1														

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
Bonneville Powerhouse I Navigation Lock Bridge Replacement

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		32 05 33.00 99	SD-01 Preconstruction Submittals															
			Integrated Pest Management	2.4	G													
			Plan															
			SD-03 Product Data															
			Fertilizer	2.1	G													
			Mulches Topdressing	2.3														
			Organic Mulch Materials	2.3.1														
			SD-07 Certificates															
			Maintenance Inspection Report	3.5.1														
			Plant Quantities	3.5.2	G													
		32 11 20.00 99	SD-03 Product Data															
			Plant, Equipment, and Tools	2.3	G													
			SD-06 Test Reports															
			Initial Tests	2.2.1	G													
			In-Place Tests	3.12.1	G													
		32 12 16.16 99	SD-03 Product Data															
			Asphalt	2.1	G													
			Aggregate Base	2.2	G													
			Tack And Prime Coats	2.3	G													
			Crack Sealant	2.4	G													
			SD-06 Test Reports															
			Contractor Quality Control	3.1	G													
		32 13 13.06 99	SD-01 Preconstruction Submittals															
			Paving Plan	3.3.1														
			SD-03 Product Data															
			Curing Materials	2.1.6	G													

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
Bonneville Powerhouse I Navigation Lock Bridge Replacement

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		32 13 13.06 99	Reinforcement	2.1.5.3	G													
			Epoxy Resin	2.1.9	G													
			Cementitious Materials	2.1.1	G													
			Dowel Bars	2.1.5.1	G													
			Expansion Joint Filler	2.1.10.1	G													
			SD-04 Samples															
			Test Section	1.5.2	G													
			SD-05 Design Data															
			Mix Design Report	2.2.2	G													
			SD-06 Test Reports															
			Concrete Slump Tests	3.7.2														
			Concrete Uniformity	2.3.1														
			Flexural Strength	3.7.3														
			Air Content	3.7.4														
			SD-07 Certificates															
			Batch Tickets	1.3.3														
			NRMCA Certificate Of	1.3.1														
			Conformance															
			SD-08 Manufacturer’s Instructions															
			Diamond Grinding Plan	3.7.5.3														
		32 16 19.00 99	SD-03 Product Data															
			Concrete	2.1	G													
			Biodegradable Form Release	2.6.5	G													
			Agent															
			SD-06 Test Reports															
			Field Quality Control	3.8														

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
Bonneville Powerhouse I Navigation Lock Bridge Replacement

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		32 17 23.00 99	SD-03 Product Data															
			Surface Preparation Equipment	2.1.1.1	G													
			List															
			Application Equipment List	2.1.2	G													
			Exterior Surface Preparation	3.2														
			Safety Data Sheets	1.3.1	G													
			Reflective media for roads	2.2.2.1	G													
			Waterborne Paint	2.2.1	G													
			SD-06 Test Reports															
			Reflective Media for Roads	2.2.2.1	G													
			Waterborne Paint	2.2.1	G													
			Test Reports	3.4.1														
			SD-07 Certificates															
			Qualifications	1.3.2	G													
			Reflective Media for Roads	2.2.2.1														
			Waterborne Paint	2.2.1														
			Volatile Organic Compound	1.3.1	G													
			SD-08 Manufacturer’s Instructions															
			Waterborne Paint	2.2.1	G													
		32 31 13.00 99	SD-02 Shop Drawings															
			Fence Assembly	2.1	G													
			Location of Gate, Corner, End,	3.2.2.1	G													
			and Pull Posts															
			Gate Assembly	2.1	G													
			Gate Hardware and Accessories	2.3.6	G													
			Erection/Installation Drawings	Part 3	G													

SUBMITTAL REGISTER

CONTRACT NO.

TITLE AND LOCATION
Bonneville Powerhouse I Navigation Lock Bridge Replacement

CONTRACTOR

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		32 31 13.00 99	SD-03 Product Data															
			Fence Assembly	2.1	G													
			Gate Assembly	2.1	G													
			Gate Hardware and Accessories	2.3.6	G													
			Zinc Coating	2.4.1	G													
			Stretcher Bars	2.2.5	G													
			Concrete	2.4.2	G													
			SD-04 Samples															
			Fabric	2.2.1	G													
			Posts	2.2.2	G													
			Braces	2.2.3	G													
			Line Posts	2.2.2.1.1	G													
			Top Rail	2.2.3.1	G													
			Tension Wire	2.2.7	G													
			Stretcher Bars	2.2.5	G													
			Gate Posts	2.3.1	G													
			Gate Hardware and Accessories	2.3.6	G													
			Padlocks	2.3.5	G													
			Wire Ties	2.2.4	G													
			SD-07 Certificates															
			Certificates of Compliance	1.3.1														
			SD-08 Manufacturer's Instructions															
			Fence Assembly	2.1														
			Gate Assembly	2.1														
			Hardware Assembly	2.1														
			Accessories	2.1														

SUBMITTAL REGISTER

CONTRACT NO.

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		32 31 13.00 99	SD-11 Closeout Submittals															
			Recycled Material Content	3.3														
		32 84 24.00 99	SD-03 Product Data															
			Piping Materials, Tubing, and	2.1														
			Fittings															
			Valves and Accessories	2.3														
			Sprinkler Heads	2.2														
			Solvent Cement	2.1.1														
			Control Wiring	2.5.1														
			Valve Boxes and Lids	3.1.6.1														
			SD-06 Test Reports															
			Pressure Test	3.2.1														
			Operation Test	3.2.2														
			Tests	1.6.1														
			SD-08 Manufacturer's Instructions															
			Sprinkler Heads	2.2														
			Piping Materials, Tubing and	2.1														
			Fittings															
			Solvent Cement	2.1.1														
			Control Wiring	2.5.1														
		32 92 19.00 99	SD-03 Product Data															
			Wood Cellulose Fiber Mulch	2.5.3														
			Fertilizer	2.4														
			SD-06 Test Reports															
			Soil Testing	2.2.1	G	A/E												
			SD-07 Certificates															

SUBMITTAL REGISTER

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		32 92 19.00 99	Seed	2.1														
		32 93 00.00 99	SD-01 Preconstruction Submittals															
			State Landscape Contractor's	1.4.2														
			License															
			Time Restrictions and Planting	1.6														
			Conditions															
			SD-03 Product Data															
			Organic Mulch Materials	2.3.1														
			Mulch	2.3	G	A/E												
			Antidesiccants	2.4														
			Photographs	1.4.3	G	A/E												
			SD-07 Certificates															
			Nursery Certifications	2.1.1	G	A/E												
		33 11 00.00 99	SD-01 Preconstruction Submittals															
			Connections	3.1.1	G													
			SD-02 Shop Drawings															
			MICA Plates	3.2.7.2.8	G													
			SD-03 Product Data															
			Pipe, Fittings, Joints and	2.1.1	G													
			Couplings															
			Valves	2.1.2	G													
			Valve Boxes	2.1.2.3	G													
			Fire Hydrants	2.1.3.1	G													
			Pipe Restraint	2.2.1	G													
			Disinfection Procedures	3.2.2	G													
			Pipe Insulation Systems	2.3.6	G													

SUBMITTAL REGISTER

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		33 11 00.00 99	SD-06 Test Reports															
			Bacteriological Samples	3.3.1.3	G													
			Leakage Test	3.3.1.2														
			Hydrostatic Test	3.3.1.1														
			SD-07 Certificates															
			Pipe, Fittings, Joints and	2.1.1														
			Couplings															
			Lining	2.1.1.2.4														
			Valves	2.1.2														
			Fire Hydrants	2.1.3.1														
			SD-08 Manufacturer’s Instructions															
			Ductile-Iron Piping	2.1.1.1														
			Pipe Insulation Systems	2.3.6	G													
		33 40 00.00 99	SD-06 Test Reports															
			Leakage Test	3.8.1.1	G DO													
			SD-07 Certificates															
			Hydrostatic Test on Watertight	2.4.1	G DO													
			Joints															
			SD-08 Manufacturer’s Instructions															
			Placing Pipe	3.3	G DO													
			SD-11 Closeout Submittals															
			Post-Installation Inspection	3.8.2.1.3	G DO													
			Report															
			LID Verification Report	3.8.2.2	G DO													
		33 46 16.00 99	SD-07 Certificates															
			Pipe and Pipe Fittings	2.1														

SUBMITTAL REGISTER

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Bonneville Powerhouse I Navigation Lock Bridge Replacement

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		33 46 16.00 99	Drain Rock Material	2.2														
		33 71 02.00 99	SD-02 Shop Drawings															
			Precast Underground Structures	1.5.1	G													
			SD-03 Product Data															
			Precast Concrete Structures	2.5.1.1	G													
			Sealing Material	2.5.1.4														
			Handhole Frames and Covers	2.5.2	G													
		34 71 13.16 99	SD-03 Product Data															
			FHWA Acceptance Letter	2.7														
			SD-08 Manufacturer's Instructions															
			End Anchorage	3.4														

Limitations on Subcontracting Attachment

U.S. Army Corps of Engineers, Portland District
Version Date: 14 March 2026

FAR Clause 52.219-14 included in this contract requires the Contractor to comply with specific limitations on subcontracting. Reference the clause for the report submission deadline of the this form.

Contract Number:	W9127N26CA000
Prime Contractor Name:	Construction & Associates
Total Current Contract Price:	$550,390.50
Type of Set-Aside:	8(a) sole source
Required Participation:	[Put an X in the applicable box below per contract clause 52.219-14]
	1) Services (except construction). The Contractor will not pay more than **50 percent** of the amount paid by the Government for contract performance to Subcontractors that are not similarly situated entities. Any work that a similarly situated entity further subcontracts will count towards the Prime Contractor's 50 percent subcontract amount that cannot be exceeded.
	2) Supplies (other than procurement from a nonmanufacturer of such supplies). The Contractor will not pay more than 50 percent of the amount paid by the Government for contract performance, excluding the cost of materials, to Subcontractors that are not similarly situated entities. Any work that a similarly situated entity further subcontracts will count towards the Prime Contractor's 50 percent subcontract amount that cannot be exceeded.
X	3) General construction. The Contractor will not pay more than 85 percent of the amount paid by the Government for contract performance, excluding the cost of materials, to Subcontractors that are not similarly situated entities. Any work that a similarly situated entity further subcontracts will count towards the Prime Contractor's 85 percent subcontract amount that cannot be exceeded.
	4) Construction by special trade Contractors. The Contractor will not pay more than 75 percent of the amount paid by the Government for contract performance, excluding the cost of materials, to Subcontractors that are not similarly situated entities. Any work that a similarly situated entity further subcontracts will count towards the Prime Contractor's 75 percent subcontract amount that cannot be exceeded.
Joint Ventures: The percentage specified in paragraph (e) of Clause 52.219-14 will be performed by the aggregate of the joint venture participants. If joint venture is comprised of a small business protégé and its mentor, or comprised of 8(a) participants, refer to the Clause for	
	Blue Fields are calculated field. Do not overwrite.

Participation Calculation as of the Reporting Period		
Amounts shown below shall include amounts from all previous invoices and the current invoice.		
1) Amount Invoiced by the Prime Contractor (as of date of submission, if multi-reporting contract):		$ 550,390.50
2) Cost of Materials (Supply and Construction only)		$ 80,000.00
3) Amount Invoiced Minus Material		$ 470,390.50
4) Portion of Amount Invoiced for Similarly Situated Subcontractors (SSS)*		$ 260,000.00
5) Portion of Amount Invoiced for Non-Similarly Situated Subcontractors (NSS)		$ 100,000.00
6) Prime Contractor's %	**79%**	

Limitation on Subcontracting = $\frac{\text{(Total amount invoiced by the Prime Contractor - Cost of Materials - Portion of total amount for NSS)}}{\text{(Total amount invoiced by the Prime Contractor - Cost of Materials)}}$

* Similarly Situated Subcontractor (SSS): A small business Subcontractor that is a participant of the same Small Business Administration (SBA) program as that which qualified the Prime Contractor for the award (e.g., for a small business set-aside contract, any small business concern, without regard to its socioeconomic status); and Is considered small for the size standard under the North American Industry Classification System (NAICS) code the Prime Contractor assigned to the subcontract.

Corrective Action Plan

If the Prime Contractor's Participation % noted in line 6 above is not in compliance with the % required by contract clause 52.219-14 then the Prime Contractor shall provide a written corrective action plan below:

Contractor Certification

I certify that to the best of my knowledge and belief, the information provided herein is accurate, complete, and current.

Name and Title: Signature Date

THIS ATTACHMENT IS AN EXAMPLE. This form will be provided upon request in its native Microsoft Excel format from the CO.

Below are two samples of the Construction Project Identification sign showing how this panel is adaptable for use to identify either military (top) or civil works projects (bottom). The graphic format for this 4'x 6' sign panel follows the legend guidelines and layout as specified below. The large 4'x 4' section of the panel on the right is to be white with black legend. The 2'x 4' section of the sign on the left with the full Corps Signature (reverse version) is to be screen-printed Communication Red on the white background The designation of a sponsor in the area indicated is optional with Military or Civil Works construction signs. Signs may list one sponsoring entity. If agreement on a sponsor designation cannot be achieved, the area should be left blank.

This sign is to be placed with the Safety Performance sign shown on the following page. Mounting and fabrication details are provided on page 16-4.

Special applications or situations not covered in these guidelines should be referred to the district Sign Program Manager.

Legend Group 1: One- to two-line description of Corps relationship to project.
Color: White
Typeface: 1.25" Helvetica Regular
Maximum line length: 19"

Legend Group 2: Division or District Name (optional). Placed below 10.5" reverse Signature (6" Castle).
Color: White
Typeface: 1.25" Helvetica Regular

Legend Group 2a: Army Star logo. Placed below Corps Signature and Division or District Name.
Size: 10.5" x 7.875"

Legend Group 3: One- to three-line project title legend describes the work being done under this contract.
Color: Black
Typeface: 3" Helvetica Bold
Maximum line length: 42"

Legend Group 4: One- to two-line identification of project or facility (civil works) or name of sponsoring department (military).
Color: Black
Typeface: 1.5" Helvetica Regular
Maximum line length: 42"

Cross-align the first line of Legend Group 4 with the first line of the Corps Signature (US Army Corps) as shown.

Legend Groups 5a-b: One- to five-line identification of prime contractors including: type (architect, general contractor, etc.), corporate or firm name, city, state. Use of Legend Group 5 is optional.
Color: Black
Typeface: 1.25" Helvetica Regular
Maximum line length: 21"

All typography is flush left and rag right, upper and lower case with initial capitals only as shown. Letter- and word-spacing to follow Corps standards as specified in Appendix D.

Sign Type	Legend Size (A)	Panel Size	Post Size	Specification Code	Mounting Height	Color Bkg/Lgd
CID-01	various	4'x6'	4"x4"	HDO-3	48"	WH-RD/BK

BACKCHECK

SPILL EMERGENCY - INITIAL REPORT FORM

1. **Reporting Name: _____ Responsible Party: _____**
2. **Location of Spill (include County, Nearest Town, County, Township, Range, Rivermile)**

_____

_____

3. **Spill Description (time & date spilled, material involved, quantity)**

_____

_____

_____

4. **Environmental Impacts: Air? Surface Water? Groundwater? Fish? Wildlife?**

_____

_____

5. **Reporting** **Tracking No.** **Date/Time** **POC**

National Response Center: _____

Oregon Emergency Response System: _____

Washington Emergency Management: _____

6. **Incident Action Plan: Strategic Goals (what to do) and Tactical Objectives (who & how)**

Strategic Goals	***Tactical Objectives***
a. Perform Hazard Assessment	_____
b. Establish Site Security	_____
c. Establish Incident Command	_____
d. Evacuate Injured or Exposed	_____
e. Contain the Spill	_____
f. Control the Spill	_____
g. Initiate Cleanup	_____

Table of Contents **30 June 2015**

1.0 Purpose
2.0 Applicability
3.0 References
4.0 Related Procedures
5.0 Definitions
6.0 Responsibilities
7.0 Procedures
8.0 Records & Measurements
Attachments

Forward

This document, Bonneville Project Boat Restricted Zone Entry Procedure, provides a working tool that outlines procedures for entry into the Boat Restricted Zones (BRZs) at Bonneville Project.

The proponent office for this document is the Bonneville Project Operations division staff. Any questions or comments should be directed to this office at:

CENWP-OD-B
PO Box 150
Cascade Locks, OR 97014
Phone: (541) 374-8442

Review. This document will be reviewed at a minimum of annually or if conditions change.

History. This is a revision of an existing policy for this titled subject.

No changes to this document shall be made without concurrence of management. Any change must be approved by the Operations Project Manager.

Record of Review and Changes				
No.	Section:	Statement of Review or Change	Date	Approval
1	All	New	01 Jan 2007	David Smith
2	All	Updated format	30 Jun 2015	Ray Guajardo

1.0 Purpose. The Boat Restricted Zone Entry Procedure prescribes policies, best practices, and procedures for safe access and entry into the BRZ at Bonneville Project. This procedure has been established to ensure that personnel who enter the BRZ are fully aware of the hazards associated with the structures and operating conditions in Bonneville's BRZs and are properly equipped to safely deal with them.

2.0 Applicability. This procedure is applicable to all Bonneville BRZs (as identified in Attachment A) and all personnel and vessels desiring entry into the Bonneville BRZ.

3.0 References. None

4.0 Related Procedures. None

5.0 Definitions. None.

6.0 Responsibilities

6.1 Operations Project Manager (OPM): The OPM is the Bonneville Project senior staff employee responsible for Bonneville Project and personnel. The OPM sets policies, approves or endorses operations plans and procedures, and is in charge of ensuring compliance with Portland District policies. The OPM keeps senior district leadership informed of project conditions.

6.2 Chief of Operations: The Chief of Operations is responsible for the planning and supervision of all Operations activities of the powerhouse, NAVLOCK, fish passage facilities, and other project features which are necessary and consistent with the needs of navigation, river control, fish passage and power system demand at Bonneville Project.

6.3 Chief Power Plant Operator: During an assigned shift, the Chief Operator is in direct charge and serves as the senior hydro station operator responsible for the operation of the Bonneville Project powerhouse, NAVLOCK, fish facilities, and spillway. During nightshifts and weekends/holidays, the Chief Operator is the senior employee at the Project and serves as the OPM's representative. The Chief Operator performs tasks in accordance with current work practices as established and assumes responsibilities for their completion in a manner which will ensure safety of self, others, and equipment at Bonneville Project.

6.4 Project Representative: The Project point of contact (POC) for entities desiring access to the Bonneville BRZ. Prepares and requests a BRZ Permit on behalf of interested entities.

6.5 Entrant: Entity desiring entry into Bonneville BRZs for any purpose. Must have an approved BRZ Permit in their possession. Must request permission before entering any Bonneville BRZ from the Bonneville Control Room and must notify the Control Room upon exiting the BRZ.

7.0 Procedures.

7.1 Precautions.

7.1.1 The waters immediately surrounding the structures and channels at Bonneville Project present fixed and dynamic hazards to vessels and their occupants while performing work in their proximity.

7.1.2 Wires and/or cable lines span the channels both upstream and downstream of the Powerhouses and Spillway structures. These lines may be above or below the water level and changing pool elevations cause a varying clearance between the water and these lines. The lines can be difficult to see in daylight and nearly impossible to see during the hours of darkness.

7.1.3 Bonneville structures have open and unprotected water inlets and outlets which are capable of ingesting, capsizing, or swamping smaller vessels. Many of these features have both remote and automatic operating capabilities.

7.1.4 Water velocities exceeding 8 feet per second (fps) are present and are continuously changing direction, making navigation in the BRZ difficult and dangerous. Water velocities, at and below the surface, are constantly changing due to the normal operation of the turbines and spillway gates as many of these operations are performed remotely or by automatic controls.

7.1.5 Automatic protective relay actions can cause considerable and sudden water elevation variations with a sudden increase in water velocities. These sudden elevation changes are sufficient in magnitude and duration to capsize a vessel or pitch them into structures or lines when in close proximity. Personnel on board are at great risk of being cast overboard during sudden elevation changes resulting from protective relay events.

7.1.6 Surface and submerged debris pose a danger and are capable of damaging or breaking vessel propulsion or steering mechanisms.

7.1.7 The Powerhouse 2 Corner Collector (B2CC) discharge at the western tip of Cascades Island is an extremely hazardous area and must be avoided. Maintain a minimum of **150 ft.** away from the B2CC discharge, even if there is no discharge present as the B2CC may be operated remotely.

7.1.8 No work or activity will be permitted within **150 ft.** of any operating fishway entrance or exit, or within 100 ft. of any operating fish passage structure. Additional requirements, as outlined in the current Fish Passage Plan must be observed (as applicable).

7.2 Entrant and Vessel Requirements.

7.2.1 No vessel may enter the Bonneville BRZ without proper coordination with the Operations Project Manager, or their representative.

7.2.2 All personnel must wear Coast Guard approved Personal Flotation Devices (PFDs) while in the Bonneville BRZ.

7.2.3 All vessels entering the Bonneville BRZ will have either a current Coast Guard certification or state inspection tag on the boat demonstrating the equipment meets current Coast Guard safety standards for day and night operations. Included are fire extinguishing capabilities, running and anchor lights, and an audible warning device capable of being heard anywhere within the BRZ.

7.2.4 Primary and Safety Boats will be equipped **with two engines**, each capable of propelling the boat and any anticipated load against a current of 8 fps.

7.2.4.1 While acting in the capacity of a Safety Boat, occupants of the boat will have **no other duties** other than observing the Primary Boat inside the BRZ and will be positioned at a safe distance for this purpose.

7.2.5 All vessel or boat operators shall have a current vessel or boating license and shall be current on their Boater Safety Training.

7.2.6 A Marine Band radio capable of communication with the Bonneville Project Control Room on Marine Channel 14 must be available to the boat operator. Failure to maintain communication with the Control Room when operating within the Bonneville BRZ is cause for removal from the BRZ and denial of future access.

7.2.7 A rescue line shall be available in a throw bag or other Coast Guard approved device of sufficient length to reach personnel that have gone overboard. A minimum length of 50 ft. is required and the line should be constructed of a buoyant material.

7.2.8 A spotlight that can be easily accessed and operated by the boat operator must be available.

7.3 Bonneville Boat Restricted Zones. The Project has six distinctive Boat Restricted Zones which present varying degrees of risk and, therefore, have different entry requirements. Requirements in the Entrant and Vessel Requirements Section (Section 7.2) apply to all zones.

7.3.1 Inner BRZ Upstream of Powerhouse 1 and Powerhouse 2. Operations in the upstream BRZ at Powerhouse 1 and 2 pose the additional risk of vessels being pulled into structures, lines, and open channel sluiceways. It is preferred that the Project close and apply a Safe Clearance to the sluiceways or the B2CC during boating activity in the upstream BRZ at either Powerhouse. If these surface flows can be closed and equipment secured, the use of a Safety Boat may not be necessary, but must be approved by the Chief of Operations or representative. If the work inside the BRZ requires a sluiceway or the B2CC to be in the open position, then a Safety Boat will be utilized.

7.3.1.1 For activities that require a barge to be tied off or parked at the face of the Powerhouse: all units and surface flow in the immediate vicinity will be secured when vessels/barge approach the Powerhouse and until the barge is resting on the Powerhouse. Once the barge is positioned as desired and secured, flow in the area can be established.

7.3.1.2 Consideration must be given to shutting down units immediately beneath or adjacent to the barge when performing large or heavy picking operations.

7.3.2 Inner BRZ Downstream of Powerhouse 1 and Powerhouse 2: The use of a Safety Boat may or may not be required depending on the work to be performed and with the approval of the Chief of Operations. All vessels will maintain a minimum of **150 ft.** distance from the B2CC discharge.

7.3.2.1 For activities that require a barge to be tied off or parked at the face of the Powerhouse: when approaching the Powerhouse all units and surface flow in the immediate vicinity will be secured until the barge is resting on the Powerhouse. Once the barge is positioned as desired and secured, flow in the area can be established.

7.3.2.2 Consideration must be given to shutting down units immediately beneath or adjacent to the barge when performing large or heavy picking operations.

7.3.3 Inner BRZ at the Spillway, Upstream and Downstream: The Spillway is remotely operated and is used to pass river flow in excess of turbine capacity or for fish passage requirements. The Spillway may be used during emergencies to pass water when turbine capacity has been suddenly reduced. Water conditions in the Spillway channel are swift, violent, and unpredictable during spilling operations. For these reasons, access to the Inner Spillway BRZs upstream and downstream will only be granted after the Spillway gates are on seal and a Safe Clearance applied to the power feeds, disabling their operation. Under these conditions, authorized BRZ entrants will not require a Safety Boat as a condition of BRZ

entry.

7.3.3.1 Exceptions to this requirement could be Bays 1 and 18 open to 0.5 ft., with a Safe Clearance applied.

7.3.3.2 If the Spillway must remain in operation, the Spillway will be taken off Automatic control (all gates in Local). A Safety Boat and a Safety Observer monitoring operations from the Spillway structure itself are required.

7.3.3.3 No access to the Inner Spillway BRZ will be permitted with spillway flows greater than 150Kcfs.

7.3.4 **Outer BRZs for All Structures:** Vessels may be permitted to enter any outer BRZ area up to the Inner BRZ zones under the following circumstances:

7.3.4.1 Proper coordination as outlined in this procedure.

7.3.4.2 A Safety Boat will not be required as long as the entering vessel is equipped with a second motor capable of propelling the vessel with a water velocity of 8 fps.

7.3.4.3 All vessels will maintain a minimum of **150 ft.** distance from the B2CC discharge.

7.4 Bonneville BRZ Permit Request.

7.4.1 Applicants desiring entry into the Bonneville BRZ must submit a written Activity Hazard Analysis (AHA) to their Project representative. This document must be available to anyone for review.

7.4.2 Any work or activity requiring access to the Bonneville BRZ must be coordinated with the respective Project representative and submitted to the Chief of Operations at least two weeks in advance of the anticipated work start date.

7.4.2.1 The Project representative coordinating access will draft a BRZ Entry Permit (Attachment 2) for review and approval using the requirements of this procedure.

7.4.2.2 All BRZ Entry Permits will be sequentially numbered starting with the current calendar year (2015-XXX).

7.4.2.3 Requests must include a schedule and written work plan with a complete description of the work

being performed, the location(s) of the work, and any known Project operating requirements or conditions necessary.

7.4.2.4 Once approved, the BRZ Entry Permit will be provided to the Control Room by the Chief of Operations or representative.

7.4.2.5 Requests that require Project support must be made a minimum of 30 days prior to the anticipated need.

7.5 Bonneville BRZ Access.

7.5.1 A pre-work safety meeting will be held at the Project prior to the start of work. The safety meeting must be attended by the Work Leader or supervision of the applying work crew and all affected Project work groups.

7.5.2 Entrants must have a copy of the approved BRZ Entry Permit on their vessel prior to seeking permission from the Bonneville Control Room to enter the BRZ.

7.5.2.1 Just prior to entering the Bonneville BRZ, the entrants will contact the Control Room using Marine Band Channel 14 and request permission to enter the BRZ.

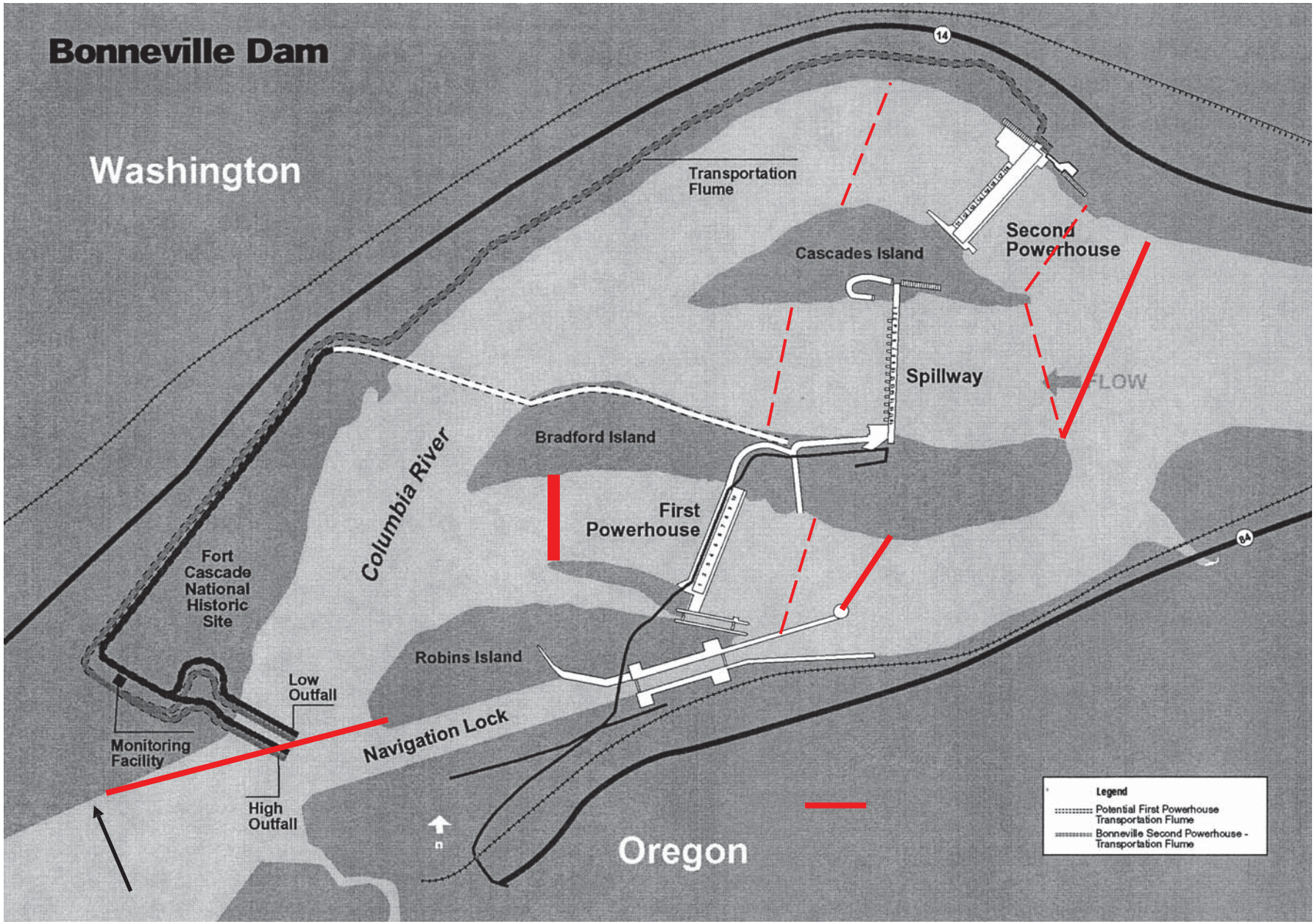
7.5.2.2 Entrants must identify themselves, the BRZ to be entered, and provide the BRZ Entry Permit number. This will allow the Control Room the opportunity to relay any pertinent real time conditions concerning the BRZ prior to granting entry approval.

7.5.2.3 BRZ entrants must contact the Control Room when they exit the Bonneville BRZ.

8.0 Records & Measurements. None

//ORIGINAL SIGNED//
Ray Guajardo
Chief of Operations

ATTACHMENTS:
Attachment A – Bonneville Project BRZ Map
Attachment B – Bonneville Project BRZ Permit



A5 – 9

Printed copies are for information only. The controlled version can be found on the CENWP-OD-B Operations SharePoint portal.

US Army Corps of Engineers ® Bonneville Project	**BONNEVILLE PROJECT** **Boat Restricted Zone Entry Permit**	Portland District

Number: Date Requested:

Title:

BRZ to be entered:

Dive associated with work (Yes/No):

Project Point of Contact (name, radio, and phone)

Requested By (Company and Name):

Requester Contact information (phone/cell number):

Scope of Work:

Special Requirements:

Schedule:

Map (yes/no):

Boat Operators:

Job Hazardous Analysis (yes/no):

Activity Hazardous Analysis (yes/no):

Radio Frequency: Marine Band 14

Pre Work Safety Meeting (yes/no):

Printed copies are for information only. The controlled version can be found on the CENWP-OD-B Operations SharePoint portal.

FLOATING PLANT INSPECTION CHECKLIST
CLAMSHELL DREDGE

NOTE: This is a checklist only and does not include ALL pertinent safety requirements. For detailed requirements, refer to EM 385-1-1, 30 November 2014

Contract No.:
Vessel Name:
Contractor's Representative/Title:

Government Representative/Title:

United States Coast Guard Certificate of Inspection - Expiration Date:

Stability Letter - Date Issued:

Date of QC Inspection:

Each employer shall furnish to each of its employees, employment, and place of employment, which are free from hazards (PL 91-596).

Note: Paragraph references in this table refers to paragraphs in EM 385-1-1 (30 November 2014).

Items	Reference	Meets 385 1-1	Remarks
(Brief description)	**(Section)**	**(Yes/No)**	**(If not applicable, or answer is contrary to requirement, explain in detail)**
Emergency notification and emergency medical numbers posted?	01.A.07		
At least 2 members of the crew on each watch qualified to administer first aid & CPR? (no more than 2 years old)	03.A.02		
First aid kits available (min. 1/25 workers), of proper type and well stocked?	03.A.03		
First aid/CPR persons in the Bloodborne Pathogen Program, trained and provided protective equipment (gloves, breathing barriers, resuscitation equipment, etc.)?	03.A.05/03.B		
Required personal protective and safety equipment based on AHA/PHA? Training in use, care and storage of PPE?(Attach training records)	05.A/05.B		
Crew using proper eye, foot, head, hand protection?	05.B., 05.D, 05.E, 05.H		
All wearable PFDs shall be of an international orange (or orange/red) or ANSI 107 yellow-green color	05.J.03		
Each PFD shall be equipped with a USCG-approved automatically activated light, unless projects performed exclusively during daylight hours	05.J.04		
Noise surveys performed on all equipment, all "noisy areas"? Signs posted indicated hearing protection required and type (or noise level)?	05.C		
Ring buoys, lifelines, water lights provided, properly located, in good condition?	05.J.05/06		
Properly equipped life-saving skiff provided? Lifesaving drills being performed (initially, at least monthly afterwards)?	05.K		
Lighting requirements reviewed in AHA? Proper lighting supplied in all work areas, sites, vessels, etc. (Provide light meter/survey if unknown/questionable). Marine lighting IAW ABS.	07.A./07.B		
Night operations lighting plan developed and on board?	07.B.06		
Hot work performed? Fire watch? Hot work permit used? Min. 10 lb. fire extinguisher?	09.A.04		
All sources of ignition prohibited within 50 feet of operations with potential fire hazard?	09.A.06		
Flammable materials stored properly?	09.B		

Items	Reference	Meets 385 1-1	Remarks
(Brief description)	(Section)	(Yes/No)	(If not applicable, or answer is contrary to requirement, explain in detail)
Storage areas/tanks shall be surrounded by a curb, earthen dike or other equivalent means of containment of at least 6 in (0.15 m) in height	09.B.18		
Proper number, type of fire extinguishers provided as required? Fully charged, operable, accessible? Inspected monthly, documented?	09.F.		
Structural welding on critical items performed by Certified Welders? Inspected by Certified Inspector?	10.A.07		
Ventilation provided if welding/cutting performed in confined space?	10.C.03		
Oxy-Fuel gas systems using cylinder-regulator-hose-torch have a reverse-flow check valve AND a flash arrestor on each hose, at torch unless manufacturer states otherwise?	10.E.07		
Batteries stored in enclosures with outside vents or in a well-ventilated room and arranged to prevent the escape of fumes, gases or electrolyte spray into other areas?	11.G.01		
Lockout/tagout used when systems are de-energized? Both locks and tags used? Procedures in place? Personnel assigned roles and documentation of all?	Section 12		
All hand and power tools in good condition with required guards in place?	13.A.		
Are safety lashings and safety clips installed on all pneumatic tools and hoses?	13.D		
Housekeeping (attach most recent daily inspection report)	14.D		
Rigging Inspections performed by QR/CP each shift before use? Annually by QR or CP and documented?	15.A.01		
Are positive latching devices used to secure loads?	15.A.04		
Custom designed beams, clamp, etc., tested and marked?	15.A.05		
Qualified Rigger(s) identified, designated in writing along with rigging tasks? Only QRs perform rigging?	15.B		
All slings manufactured, used, inspected and maintained according to ASME B30.9? Tagged/marked with manufacturer, WLL, #legs if more than 1?	15.D		
Only alloy chain Grade 80 or higher used for rigging loads?	15.D.02		
Rigging hardware, per ASME B30.26? Inspected each shift, at least annually?	15.E		
Contractor has submitted, accepted Certificate of Compliance for all LHE on site? (Attach copy)	16.A.02		
Standard Lift Plans being prepared for every lift/series of lifts?	16.A.03		
Work area control in accessible areas where equipment is rotating next to fixed structure, min 24 in clearance, to allow passage of workers without harm? Barricade swing radius to prevent worker from being struck?	16.A.13/16.G.13		
Running lines within 6 ft-6 in of ground or working level guarded/restricted by physical barriers to preclude injury?	16.A.14		
Maintenance/repairs of LHE per manufacturer, documented and available for length of contract? (Attach recent records of maintenance and repairs)	16.A.15		
LHE operators certified, qualified and designated by employer in writing, including specific LHE on site. (attach proof of qualifications and designation prior to start of work)	16.B		
Crane Operators certified by option 2? Attach records of last audit, letter from QP saying program meets 16.B.03.b	16.B.03.b		
LHE Operator physical examination clearance (only clearance statement, no data), signed by MD or DO? Attach written/ signed documentation saying exam meets EM 385-1-1, 16.B.04 and ASME B30 for acceptance prior to operating LHE.	16.B.04		
Inspection Criteria for LHE being performed? Attach last Monthly and Annual inspection results.	16.D		
Safety Devices and Operational Aids required on all Cranes and Derricks in place, functioning?	16.E.03		
Operational Testing IAW 16.F.02?	16.F.02		

Items	Reference	Meets 385 1-1	Remarks
(Brief description)	(Section)	(Yes/No)	(If not applicable, or answer is contrary to requirement, explain in detail)
Load Testing performed IAW 16.F.03?	16.F.03		
All LHE has proper documents in cab?	16.G.01		
Proper clearances are maintained at all times, during operation AND travel?	16.G.09-12		
Accessible areas within the swing radius of the rear of the LHE's rotating superstructure, either permanently or temporarily mounted, shall be barricaded to prevent an employee from being struck or crushed	16.G.13 (b)		
All critical lifts identified and planned properly? Critical lift plans submitted for acceptance prior to lift?	16.H		
Project has adequate means for monitoring local weather conditions, including a wind-indicating device?	16.I.01		
Using/Have Floating Cranes/ Derricks, Crane Barges, and Auxiliary shipboard mounted Cranes? Attach Navel Architectural Analysis, floating service load chart.	16.L		
Additional inspection requirements for barges, pontoons, vessel or other means of flotation used to support a land crane/Derrick	16.L.18		
Crane -Supported personnel platforms: work platform and suspension system shall be designed and certified by a registered professional engineer	16.T		
Machinery/mechanized equipment inspected/tested IAW manufacturer's recommendations/EM requirements? Certified in writing (Attach documents)?	18.G.02		
All floating plant regulated by the USCG has required, current USCG documentation? Attach documents.	19.A.01		
All licensed officers and crew have current documentation?	19.A.02		
Operators of Uninspected Towing Vessels and Master and Pilots on radar-equipped vessels 26' or more have USCG Radar Observers endorsement on license?	19.A.02		
Are all reciprocating, rotating and moving parts of winch gears and other equipment properly guarded.	19.A.05		
Shutoff valve installed at the engine end of the fuel line? (Unless the length of the supply pipe is < 6 feet).	19.A.06		
Fuel transfer procedures on board?	19.A.06		
Shutoff valve installed at the fuel tank connections, can be operated from outside a compartment, outside the engine room, and outside the house bulkheads?	19.A.06		
Stumbling and tripping hazards painted yellow? Uncovered deck plate openings (e.g., around generators and main engines) outlined with yellow paint?	19.A.07		
Are non-slip surfaces provided on working decks, stair treads, ship ladders, platforms, catwalks, and walkways?	19.B.		
Safe access provided to and from vessels? Gangways and ramps secured at one end by at least one point on each side with lines or chains to prevent overturning?	19.B.02		
Proper Marine Railings Types provided and in-place?	19.E.		
Pressurized equipment and systems inspected and tested? Attach inspection and Test logs.	20.A		
Oxygen and gas cylinders in storage separated by firewall or by distance of 20 feet? Appropriately placarded?	20.D/20.D.03		
Compressed gas cylinders separated from flammable or combustible material by at least 40 ft.?	20.D.03		

Items	Reference	Meets 385 1-1	Remarks
(Brief description)	**(Section)**	**(Yes/No)**	**(If not applicable, or answer is contrary to requirement, explain in detail)**
Protective caps installed on oxygen/fuel gas cylinder when stored, in transit, or the regulator is not in place?	20.D.07		
All compressed gas cylinders stored upright at all times? Secured against falling?	20.D.10		
Personal Fall protection Systems used at any time? Attach Competent Person for FP certification (and QP for FP if applicable).	21.C		
Rescue plan and procedures developed?	21.M		
All ladders inspected for defects? Any welding on ladders performed by certified welder?	24.B.09		
Oil spill response supplies on board and in adequate quantities?	28.A.01		
Inventory of confined spaces (both Permit-Required (PRCS) and Non-Permit-Required (NPRC))? Attach.	34.A.04		
PRCS and Potential PRCS have been Identified, labeled?	34.A.05 (a)		
Competent Person for Confined spaces has been identified? Attach qualifications.	34.A/34.B		
CSE Procedures have been developed for each space? Personnel have been trained?	34.A/34.B		
Air monitoring equipment is on board? Who is qualified to use? History of air monitoring documented?	34.A/34.B		

NAVFAC LOW IMPACT DEVELOPMENT (LID) Verification Report

DESIGN

eProjects WON: _____

Designer of Record: Indicate the LID features listed below that require Contractor post construction analysis.

LID Features: **select all that apply**	**Shown on Sheet:**
☐ Bioretention	_____
☐ Cisterns	_____
☐ Dry Wells	_____
☐ Grass Buffers	_____
☐ Grass Swales	_____
☐ Tree Preservation	_____
☐ Infiltration Trenches	_____
☐ Permeable Pavers	_____
☐ Porous Concrete	_____
☐ Rain Barrels	_____
☒ Rain Gardens	CU-101, CU-104
☐ Re-vegetation	_____
☐ Roof Leader Disconnection	_____
☐ Tree Box Filters	_____
☐ Tree Preservation	_____
☐ Other_____	_____
☐ Other_____	_____
☐ Other_____	_____

CONSTRUCTION

☐ I certify that the LID features indicated above were constructed in accordance with the plans and specifications and that there have been no deviations.

☐ I certify that as-built drawings have been submitted in accordance with UFGS 01 78 00 Closeout Submittals for the following deviations.

(Explain deviations here):

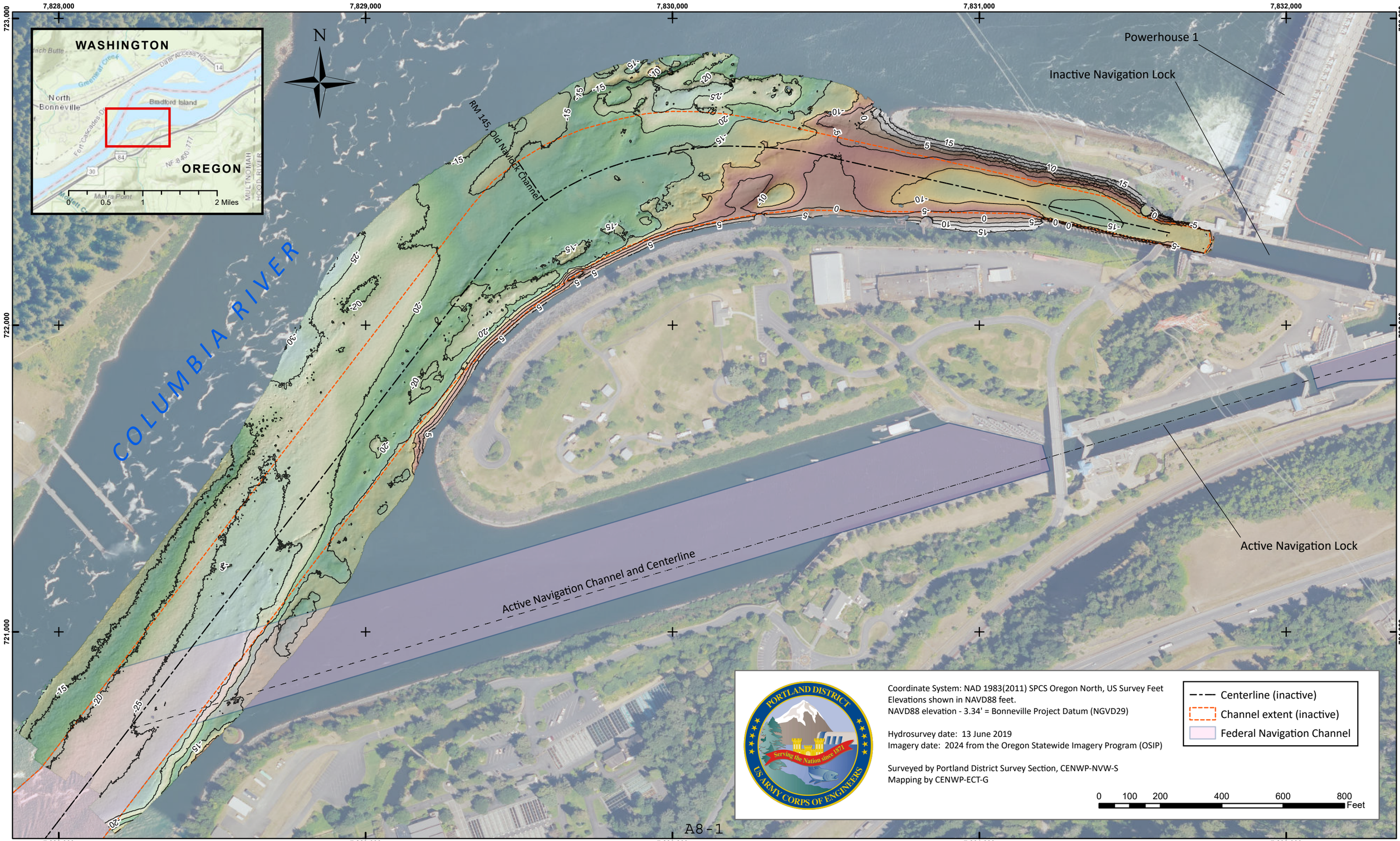
Contractor (Print Name): _____

Contractor (Signature): _____ Date: _____

January 2017 Version 1.0

US Army Corps of Engineers
Portland District

Bonneville Dam - Old Navlock Channel Bathymetry, 2019



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CENWP-ECT-G

Date Saved: 2026-May-11

US Army Corps of Engineers
Portland District

Bonneville Dam - Old Navlock Channel Bathymetry, 2019 Detail

Document Path: C:\Users\G2ENCJAK\OneDrive - US Army Corps of Engineers\Desktop\WORK_UPDATE\APRX\BONNEVILLE\BD_OldNavLockBridge_2019_UPDATE\BD_OldNavLockBridge_2019_UPDATE_2026.aprx

CENWP-ECT-G

Date Saved: 2026-May-11

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
1315 East-West Highway
Silver Spring, Maryland 20910

INCIDENTAL HARASSMENT AUTHORIZATION

The U.S. Army Corps of Engineers (USACE) and its designees are hereby authorized under section 101(a)(5)(D) of the Marine Mammal Protection Act (MMPA; 16 U.S.C. 1371(a)(5)(D)) to incidentally harass marine mammals, under the following conditions:

1. This incidental harassment authorization (IHA) is effective from December 1, 2027 through November 30, 2028.

2. This IHA authorizes take incidental to Construction Activities, as specified in the USACE's IHA application, associated with the Bonneville Lock 1 Bridge Replacement Project. Hereafter (unless otherwise specified), the term "pile driving" is used to refer to both pile installation and pile removal.

3. <u>General Conditions</u>

   (a) A copy of this IHA must be in the possession of the Holder of the Authorization (Holder), supervisory construction personnel, lead protected species observers (PSOs), and any other relevant designees of the Holder operating under the authority of this IHA at all times that activities subject to this IHA are being conducted.

   (b) The species and/or stocks authorized for taking are harbor seals, California sea lions, and Steller sea lions. Authorized take, by Level A and Level B harassment only, is limited to the species and numbers listed in Table 1.

   (c) The taking by serious injury or death of any of the species listed in Table 1 or any taking of any other species of marine mammal is prohibited and may result in the modification, suspension, or revocation of this IHA. Any taking exceeding the authorized amounts listed in Table 1 is prohibited and may result in the modification, suspension, or revocation of this IHA.

   (d) The Holder must ensure that construction supervisors and crews, the monitoring team, and relevant USACE staff are trained prior to the start of activities subject to this IHA, so that responsibilities, communication procedures, monitoring protocols, and operational procedures are clearly understood. New personnel joining during the project must be trained prior to commencing work.

4. Mitigation Requirements

(a) The Holder must employ PSOs and establish monitoring locations as described in section 5 of this IHA. The Holder must monitor the project area to the maximum extent possible based on the required number of PSOs, required monitoring locations, and environmental conditions.

(b) Monitoring must take place from 30 minutes prior to initiation of pile driving activity (i.e., pre-start clearance monitoring) through 30 minutes post-completion of pile driving activity.

(c) Pre-start clearance monitoring must be conducted during periods of visibility sufficient for the lead PSO to determine that the shutdown zones indicated in Table 2 are clear of marine mammals. Pile driving may commence following 30 minutes of observation when the determination is made that the shutdown zones are clear of marine mammals.

(d) If a marine mammal is observed entering or within the shutdown zones indicated in Table 2, pile driving activity must be delayed or halted. Pile driving must be commenced or resumed as described in condition 4(e) of this IHA.

(e) If pile driving is delayed or halted due to the presence of a marine mammal, the activity may not commence or resume until either the animal has voluntarily exited and been visually confirmed beyond the shutdown zone indicated in Table 2 or 15 minutes have passed without re-detection of the animal.

(f) The Holder must use soft start techniques when impact pile driving. Soft start requires contractors to provide an initial set of three strikes at reduced energy, followed by a 30-second waiting period, then two subsequent sets of reduced energy strikes. A soft start must be implemented at the start of each day's impact pile driving and at any time following cessation of impact pile driving for a period of 30 minutes or longer.

(g) Pile driving activity must be halted (as described in condition 4(d) of this IHA) upon observation of either a species for which incidental take is not authorized or a species for which incidental take has been authorized but the authorized number of takes has been met, entering or within the harassment zone (as shown in Table 2).

(h) The Holder, construction supervisors and crews, PSOs, and relevant USACE staff must avoid direct physical interaction with marine mammals during construction activity. If a marine mammal comes within 10 meters of such activity, operations must cease, and vessels must reduce speed to the minimum level required to maintain steerage and safe working conditions, as necessary to avoid direct physical interaction.

5. Monitoring Requirements

(a) Marine mammal monitoring must be conducted in accordance with NMFS-approved marine mammal monitoring plan. The monitoring plan must be submitted to NMFS no later than 30 days prior to the start of in-water construction.

(b) Monitoring must be conducted by qualified, NMFS-approved PSOs, in accordance with the following conditions:

(i) PSOs must be independent of the activity contractor (for example, employed by a subcontractor) and have no other assigned tasks during monitoring periods.

(ii) At least one PSO must have prior experience performing the duties of a PSO during construction activity pursuant to a NMFS-issued incidental take authorization or Letter of Concurrence (LOC).

(iii) Other PSOs may substitute other relevant experience, education (degree in biological science or related field), or training for prior experience performing the duties of a PSO during construction activity pursuant to a NMFS-issued incidental take authorization or LOC.

(iv) Where a team of three or more PSOs is required, a lead observer or monitoring coordinator must be designated. The lead observer must have prior experience performing the duties of a PSO during construction activity pursuant to a NMFS-issued incidental take authorization or LOC.

(v) PSOs must be approved by NMFS prior to beginning any activity subject to this IHA.

(c) The Holder must establish monitoring locations. For all pile-driving activities, a minimum of two PSOs must be assigned to each active pile-driving location to

monitor the shutdown zones. One PSO would be positioned on the construction barge and at least one PSO would monitor from a nearby beach or shoreline to ensure the best possible visual coverage of the Level B harassment zone.

(d) PSOs must record all observations of marine mammals, regardless of distance from the pile being driven, as well as the additional data indicated in section 6 of this IHA.

6. Reporting

(a) The Holder must submit its draft report(s) on all monitoring conducted under this IHA within 90 calendar days of the completion of monitoring or 60 calendar days prior to the requested issuance of any subsequent IHA for construction activity at the same location, whichever comes first. A final report must be prepared and submitted within 30 calendar days following receipt of any NMFS comments on the draft report. If no comments are received from NMFS within 30 calendar days of receipt of the draft report, the report shall be considered final.

(b) All draft and final monitoring reports must be submitted to *PR.ITP.MonitoringReports@noaa.gov* and *ITP.Demarest@noaa.gov*.

(c) The marine mammal report, at a minimum, must include:

(i) Dates and times (begin and end) of all marine mammal monitoring;

(ii) Construction activities occurring during each daily observation period, including:

A. The number and type of piles that were driven and the method (e.g., impact, vibratory, down-the-hole); and

B. Total duration of driving time for each pile (vibratory driving) and number of strikes for each pile (impact driving).

(iii) PSO locations during marine mammal monitoring;

(iv) Environmental conditions during monitoring periods (at the beginning and end of PSO shift and whenever conditions change significantly), including Beaufort sea state and any other relevant weather conditions, including cloud cover, fog, sun glare, and overall visibility to the horizon, and estimated observable distance;

(v) Upon observation of a marine mammal, the following information:

A. Name of PSO who sighted the animal(s) and PSO location and activity at time of sighting;

B. Time of sighting;

C. Identification of the animal(s) (e.g., genus/species, lowest possible taxonomic level, or unidentified), PSO confidence in identification, and the composition of the group if there is a mix of species;

D. Distance and location of each observed marine mammal relative to the pile being driven for each sighting;

E. Estimated number of animals (min/max/best estimate);

F. Estimated number of animals by cohort (adults, juveniles, neonates, group composition, etc.);

G. Animal's closest point of approach and estimated time spent within the harassment zone;

H. Description of any marine mammal behavioral observations (e.g., observed behaviors such as feeding or traveling), including an assessment of behavioral responses thought to have resulted from the activity (e.g., no response or changes in behavioral state such as ceasing feeding, changing direction, flushing, or breaching); and

I. Description of any actions implemented in response to the sighting (e.g., delays, shutdown) and time and location of the action.

(vi) Number of marine mammals detected within the harassment zones, by species; and

(vii) Summary information about implementation of any mitigation (e.g., shutdowns and delays), a description of specific actions that ensued, and resulting changes in behavior of the animal(s), if any.

(d) The Holder must submit all PSO data electronically in a format that can be queried, such as a spreadsheet or database (*i.e.,* digital images of data sheets are not sufficient).

(e) Reporting injured or dead marine mammals:

In the event that personnel involved in the construction activities discover an injured or dead marine mammal, the Holder must report the incident to the Office of Protected Resources (OPR), NMFS (*PR.ITP.MonitoringReports@noaa.gov* and *ITP.Demarest@noaa.gov*), and to the West Coast regional stranding network (866-767-6114) as soon as feasible. If the death or injury was clearly caused by the specified activity, the Holder must immediately cease the activities until NMFS OPR is able to review the circumstances of the incident and determine what, if any, additional measures are appropriate to ensure compliance with the terms of this IHA. The Holder must not resume their activities until notified by NMFS.

The report must include the following information:

(i) Time, date, and location (latitude/longitude) of the first discovery (and updated location information if known and applicable);

(ii) Species identification (if known) or description of the animal(s) involved;

(iii) Condition of the animal(s) (including carcass condition if the animal is dead);

(iv) Observed behaviors of the animal(s), if alive;

(v) If available, photographs or video footage of the animal(s); and

(vi) General circumstances under which the animal was discovered.

7. This Authorization may be modified, suspended or revoked if the Holder fails to abide by the conditions prescribed herein (including, but not limited to, failure to comply with monitoring or reporting requirements), or if NMFS determines: (1) the authorized taking is likely to have or is having more than a negligible impact on the species or stocks of affected marine mammals or (3) the prescribed measures are likely not or are not effecting the least practicable adverse impact on the affected species or stocks and their habitat.

8. <u>Renewals</u>

On a case-by-case basis, NMFS may issue a one-time, one-year renewal IHA following notice to the public providing an additional 15 days for public comments when (1) up to another year of identical, or nearly identical, activities (or a subset of those activities) are planned or (2) the specified activities will not be completed by the time the IHA expires and a renewal would allow for completion of the activities, provided all of the following conditions are met:

(a) A request for renewal is received no later than 60 days prior to the needed renewal IHA effective date.

(b) The request for renewal must include the following:

(i) An explanation that the activities to be conducted under the requested renewal IHA are identical to the activities analyzed for this IHA, are a subset of the activities, or include changes so minor (e.g., reduction in pile size) that the changes do not affect the previous analyses, mitigation and monitoring requirements, or take estimates.

(ii) A preliminary monitoring report showing the results of the required monitoring to date and an explanation showing that the monitoring results do not indicate impacts of a scale or nature not previously analyzed or authorized.

(c) Upon review of the request for renewal, the status of the affected species or stocks, and any other pertinent information, NMFS determines that there are no more than minor changes in the activities, the mitigation and monitoring measures will remain the same and appropriate, and the findings made in support of this IHA remain valid.

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Kimberly Damon-Randall,
Director, Office of Protected Resources
National Marine Fisheries Service

Table 1. Authorized Incidental Take.

Common name	Scientific name	Stock	Level A harassment	Level B harassment
California sea lion	*Zalophus californianus*	U.S.	1	7
Steller sea lion	*Eumetopias jubatus*	Eastern	19	45
Harbor seal	*Phoca vitulina richardii*	Oregon/Washington Coast	8	0

Table 2. Shutdown and Harassment Zones.

Pile size, type, and method	Minimum shutdown zone (m)		Level B harassment zone (m) (all hearing groups)
	Phocid	Otariid	
14-inch, Steel Pipe Pile, Vibratory Installation	10		1,848
24-inch, Steel Pipe Pile, Vibratory Installation			2,929
24-inch, Steel Sheet Pile, Vibratory Installation			7,356
14-inch, Steel Pipe Pile, Impact Installation	50		464
24-inch, Steel Pipe Pile, Impact Installation			1000
24-inch, Steel Sheet Pile, Impact Installation			858

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
1315 East-West Highway
Silver Spring, Maryland 20910

INCIDENTAL HARASSMENT AUTHORIZATION

The U.S. Army Corps of Engineers (USACE) and its designees are hereby authorized under section 101(a)(5)(D) of the Marine Mammal Protection Act (MMPA; 16 U.S.C. 1371(a)(5)(D)) to incidentally harass marine mammals, under the following conditions:

1. This incidental harassment authorization (IHA) is effective for 1 year upon written notification from the Holder of the Authorization ("Holder") to NMFS, but not beginning later than 1 year from the date of expiration of the Year 1 IHA issued for the Bonneville Dam Lock 1 Bridge Replacement Project.

2. This IHA authorizes take incidental to Construction Activities, as specified in the USACE's IHA application, associated with the Bonneville Lock 1 Bridge Replacement Project. Hereafter (unless otherwise specified), the term "pile driving" is used to refer to both pile installation and pile removal.

3. <u>General Conditions</u>

   (a) A copy of this IHA must be in the possession of the Holder of the Authorization (Holder), supervisory construction personnel, lead protected species observers (PSOs), and any other relevant designees of the Holder operating under the authority of this IHA at all times that activities subject to this IHA are being conducted.

   (b) The species and/or stocks authorized for taking are harbor seals, California sea lions, and Steller sea lions. Authorized take, by Level A and Level B harassment only, is limited to the species and numbers listed in Table 1.

   (c) The taking by serious injury or death of any of the species listed in Table 1 or any taking of any other species of marine mammal is prohibited and may result in the modification, suspension, or revocation of this IHA. Any taking exceeding the authorized amounts listed in Table 1 is prohibited and may result in the modification, suspension, or revocation of this IHA.

   (d) The Holder must ensure that construction supervisors and crews, the monitoring team, and relevant USACE staff are trained prior to the start of activities subject to this IHA, so that responsibilities, communication procedures, monitoring protocols, and operational procedures are clearly understood. New personnel joining during the project must be trained prior to commencing work.

4. Mitigation Requirements

(a) The Holder must employ PSOs and establish monitoring locations as described in section 5 of this IHA. The Holder must monitor the project area to the maximum extent possible based on the required number of PSOs, required monitoring locations, and environmental conditions.

(b) Monitoring must take place from 30 minutes prior to initiation of pile driving activity (i.e., pre-start clearance monitoring) through 30 minutes post-completion of pile driving activity.

(c) Pre-start clearance monitoring must be conducted during periods of visibility sufficient for the lead PSO to determine that the shutdown zones indicated in Table 2 are clear of marine mammals. Pile driving may commence following 30 minutes of observation when the determination is made that the shutdown zones are clear of marine mammals.

(d) If a marine mammal is observed entering or within the shutdown zones indicated in Table 2, pile driving activity must be delayed or halted. Pile driving must be commenced or resumed as described in condition 4(e) of this IHA.

(e) If pile driving is delayed or halted due to the presence of a marine mammal, the activity may not commence or resume until either the animal has voluntarily exited and been visually confirmed beyond the shutdown zone indicated in Table 2 or 15 minutes have passed without re-detection of the animal.

(f) The Holder must use soft start techniques when impact pile driving. Soft start requires contractors to provide an initial set of three strikes at reduced energy, followed by a 30-second waiting period, then two subsequent sets of reduced energy strikes. A soft start must be implemented at the start of each day's impact pile driving and at any time following cessation of impact pile driving for a period of 30 minutes or longer.

(g) Pile driving activity must be halted (as described in condition 4(d) of this IHA) upon observation of either a species for which incidental take is not authorized or a species for which incidental take has been authorized but the authorized number of takes has been met, entering or within the harassment zone (as shown in Table 2).

(h) The Holder, construction supervisors and crews, PSOs, and relevant USACE staff must avoid direct physical interaction with marine mammals during construction activity. If a marine mammal comes within 10 meters of such activity, operations must cease, and vessels must reduce speed to the minimum level required to maintain steerage and safe working conditions, as necessary to avoid direct physical interaction.

5. Monitoring Requirements

(a) Marine mammal monitoring must be conducted in accordance with NMFS-approved marine mammal monitoring plan. The monitoring plan must be submitted to NMFS no later than 30 days prior to the start of in-water construction.

(b) Monitoring must be conducted by qualified, NMFS-approved PSOs, in accordance with the following conditions:

(i) PSOs must be independent of the activity contractor (for example, employed by a subcontractor) and have no other assigned tasks during monitoring periods.

(ii) At least one PSO must have prior experience performing the duties of a PSO during construction activity pursuant to a NMFS-issued incidental take authorization or Letter of Concurrence (LOC).

(iii) Other PSOs may substitute other relevant experience, education (degree in biological science or related field), or training for prior experience performing the duties of a PSO during construction activity pursuant to a NMFS-issued incidental take authorization or LOC.

(iv) Where a team of three or more PSOs is required, a lead observer or monitoring coordinator must be designated. The lead observer must have prior experience performing the duties of a PSO during construction activity pursuant to a NMFS-issued incidental take authorization or LOC.

(v) PSOs must be approved by NMFS prior to beginning any activity subject to this IHA.

(c) The Holder must establish monitoring locations. For all pile-driving activities, a minimum of two PSOs must be assigned to each active pile-driving location to

monitor the shutdown zones. One PSO would be positioned on the construction barge and at least one PSO would monitor from a nearby beach or shoreline to ensure the best possible visual coverage of the Level B harassment zone.

(d) PSOs must record all observations of marine mammals, regardless of distance from the pile being driven, as well as the additional data indicated in section 6 of this IHA.

6. Reporting

(a) The Holder must submit its draft report(s) on all monitoring conducted under this IHA within 90 calendar days of the completion of monitoring or 60 calendar days prior to the requested issuance of any subsequent IHA for construction activity at the same location, whichever comes first. A final report must be prepared and submitted within 30 calendar days following receipt of any NMFS comments on the draft report. If no comments are received from NMFS within 30 calendar days of receipt of the draft report, the report shall be considered final.

(b) All draft and final monitoring reports must be submitted to *PR.ITP.MonitoringReports@noaa.gov* and *ITP.Demarest@noaa.gov*.

(c) The marine mammal report, at a minimum, must include:

(i) Dates and times (begin and end) of all marine mammal monitoring;

(ii) Construction activities occurring during each daily observation period, including:

A. The number and type of piles that were driven and the method (e.g., impact, vibratory, down-the-hole); and

B. Total duration of driving time for each pile (vibratory driving) and number of strikes for each pile (impact driving).

(iii) PSO locations during marine mammal monitoring;

(iv) Environmental conditions during monitoring periods (at the beginning and end of PSO shift and whenever conditions change significantly), including Beaufort sea state and any other relevant weather conditions, including cloud cover, fog, sun glare, and overall visibility to the horizon, and estimated observable distance;

(v) Upon observation of a marine mammal, the following information:

A. Name of PSO who sighted the animal(s) and PSO location and activity at time of sighting;

B. Time of sighting;

C. Identification of the animal(s) (e.g., genus/species, lowest possible taxonomic level, or unidentified), PSO confidence in identification, and the composition of the group if there is a mix of species;

D. Distance and location of each observed marine mammal relative to the pile being driven for each sighting;

E. Estimated number of animals (min/max/best estimate);

F. Estimated number of animals by cohort (adults, juveniles, neonates, group composition, etc.);

G. Animal's closest point of approach and estimated time spent within the harassment zone;

H. Description of any marine mammal behavioral observations (e.g., observed behaviors such as feeding or traveling), including an assessment of behavioral responses thought to have resulted from the activity (e.g., no response or changes in behavioral state such as ceasing feeding, changing direction, flushing, or breaching); and

I. Description of any actions implemented in response to the sighting (e.g., delays, shutdown) and time and location of the action.

(vi) Number of marine mammals detected within the harassment zones, by species; and

(vii) Summary information about implementation of any mitigation (e.g., shutdowns and delays), a description of specific actions that ensued, and resulting changes in behavior of the animal(s), if any.

(d) The Holder must submit all PSO data electronically in a format that can be queried, such as a spreadsheet or database (*i.e.,* digital images of data sheets are not sufficient).

(e) Reporting injured or dead marine mammals:

In the event that personnel involved in the construction activities discover an injured or dead marine mammal, the Holder must report the incident to the Office of Protected Resources (OPR), NMFS (*PR.ITP.MonitoringReports@noaa.gov* and *ITP.Demarest@noaa.gov*), and to the West Coast regional stranding network (866-767-6114) as soon as feasible. If the death or injury was clearly caused by the specified activity, the Holder must immediately cease the activities until NMFS OPR is able to review the circumstances of the incident and determine what, if any, additional measures are appropriate to ensure compliance with the terms of this IHA. The Holder must not resume their activities until notified by NMFS.

The report must include the following information:

(i) Time, date, and location (latitude/longitude) of the first discovery (and updated location information if known and applicable);

(ii) Species identification (if known) or description of the animal(s) involved;

(iii) Condition of the animal(s) (including carcass condition if the animal is dead);

(iv) Observed behaviors of the animal(s), if alive;

(v) If available, photographs or video footage of the animal(s); and

(vi) General circumstances under which the animal was discovered.

7. This Authorization may be modified, suspended or revoked if the Holder fails to abide by the conditions prescribed herein (including, but not limited to, failure to comply with monitoring or reporting requirements), or if NMFS determines: (1) the authorized taking is likely to have or is having more than a negligible impact on the species or stocks of affected marine mammals or (3) the prescribed measures are likely not or are not effecting the least practicable adverse impact on the affected species or stocks and their habitat.

8. <u>Renewals</u>

On a case-by-case basis, NMFS may issue a one-time, one-year renewal IHA following notice to the public providing an additional 15 days for public comments when (1) up to another year of identical, or nearly identical, activities (or a subset of those activities) are planned or (2) the specified activities will not be completed by the time the IHA expires and a renewal would allow for completion of the activities, provided all of the following conditions are met:

(a) A request for renewal is received no later than 60 days prior to the needed renewal IHA effective date.

(b) The request for renewal must include the following:

(i) An explanation that the activities to be conducted under the requested renewal IHA are identical to the activities analyzed for this IHA, are a subset of the activities, or include changes so minor (e.g., reduction in pile size) that the changes do not affect the previous analyses, mitigation and monitoring requirements, or take estimates.

(ii) A preliminary monitoring report showing the results of the required monitoring to date and an explanation showing that the monitoring results do not indicate impacts of a scale or nature not previously analyzed or authorized.

(c) Upon review of the request for renewal, the status of the affected species or stocks, and any other pertinent information, NMFS determines that there are no more than minor changes in the activities, the mitigation and monitoring measures will remain the same and appropriate, and the findings made in support of this IHA remain valid.

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Kimberly Damon-Randall,
Director, Office of Protected Resources
National Marine Fisheries Service

Table 1. Authorized Incidental Take.

Common name	Scientific name	Stock	Level A harassment	Level B harassment
California sea lion	*Zalophus californianus*	U.S.	0	8
Steller sea lion	*Eumetopias jubatus*	Eastern	0	64
Harbor seal	*Phoca vitulina richardii*	Oregon/Washington Coast	0	8

Table 2. Shutdown and Harassment Zones.

Pile size, type, and method	Minimum shutdown zone (m)		Level B harassment zone (m) (all hearing groups)
	Phocid	Otariid	
14-inch, Steel Pipe Pile, Vibratory Removal	10		1,848
24-inch, Steel Pipe Pile, Vibratory Removal			2,929
24-inch, Steel Sheet Pile, Vibratory Removal			7,356

Post-Review Discovery Plan

This Post Review Discovery Plan (PRDP) has been prepared pursuant to 36 CFR § 800.13 and provides guidance on how to manage a discovery of historic properties if they are encountered during a project. However, USACE may encounter resources that may be protected by other cultural resource laws, regulations, or policies. This PRDP describes basic procedures that are necessary to initially protect all cultural resources.

It is the policy of USACE to work effectively with Native American Tribes, landowners, resource agencies, historic preservation organizations, stakeholders, applicants, and the public to comply with the National Historic Preservation Act (NHPA), Native American Graves Protection and Repatriation Act (NAGPRA), and other applicable laws and regulations, Executive Orders, memoranda, and policies. Violators may be subject to civil and criminal penalties. Respectful and meaningful coordination and consultations between the USACE, Native American Tribes, and Oregon SHPO are conducted in furtherance of USACE's historic preservation responsibilities.

Post Review Discovery of Historic Properties

If a contractor, subcontractor, landowner, USACE staff, archaeological monitor, or anyone else involved in project implementation sees evidence of an identifiable or suspected historic property, they are to follow the below process.

1. Stop ALL work in the vicinity of the discovery.
2. Secure and protect area of discovery with 30-meter/100-foot buffer—work may continue outside of this buffer.
3. Notify USACE Cultural Section Chief (Tara Gauthier 503-915-3551 or tara.r.gauthier@usace.army.mil), USACE Project Manager, and USACE Contracting Officer, as applicable.
    - Provide the following information: project name, location, and what was discovered.
4. USACE Cultural Resource Specialist will assess the post-review discovery to determine if it is a historic property[1], per 36 CFR §800.4.
    - If the discovery is determined to not be a historic property by the USACE Cultural Resource Specialist, and subject to compliance with other applicable laws or regulations[2], project implementation may continue.
5. USACE will comply with 36 CFR § 800.13, or other laws as applicable[3].

The person(s) may be in violation of state and federal cultural resource protection laws if they fail to stop work immediately. They must wait until the USACE Cultural Resources Specialist and other USACE staff can comply with applicable federal and state requirements before resuming work. Violators may be subject to civil or criminal penalties.

When to Resume Project Implementation

The contractor, subcontractor, landowner, USACE staff, archaeological monitor, or anyone else involved in project implementation may resume work only after the USACE Cultural Resource Specialist has confirmed compliance with all applicable laws, and USACE personnel has notified those implementing the project that compliance is done.

[1] If a cultural resource is discovered post-review, it will be treated as potentially eligible for listing on the National Register of Historic Places (NRHP) until an evaluation proves otherwise, per 36 CFR §800.13(c).

[2] For cultural resources on non-Federal land see ORS Chapter 358. The "Advisory Council on Historic Preservation Policy Statement on Burial Sites, Human Remains, and Funerary Objects, March 1, 2023" and "Policy Statement Regarding Burial Sites, Human Remains, and Funerary Objects: Explanations and Discussion" will inform USACE's response to the discovery of human remains. Discovery of Native American human remains and associated funerary objects on Federal or tribal lands will follow the process identified in the Native American Graves Protection and Repatriation Act (25 USC Chapter 32). In cases where human remains are not historic properties, USACE will follow 36 CFR Part 800. In cases where human remains are discovered on non-Federal lands, USACE will support the processes identified in relevant state laws (e.g. Oregon Revised Statutes (ORS) Chapter 97).

[3] See note 2 for other laws that may be applicable.

Treatment of Human Remains

DO NOT PHOTOGRAPH OR FILM HUMAN REMAINS
DO NOT SPEAK TO THE MEDIA

If the contractor, subcontractor, landowner, USACE staff, archaeological monitor, or anyone else involved in project implementation discovers human burials and/or human remains, the person(s) will treat the remains with sensitivity and respect. Human remains may include complete or fragmented bones.

The Post Review Discovery of Historic Properties described above will be followed.

All work within 100-feet/30-meters of the human remains shall stop and the USACE Cultural Resource Specialist shall be contacted immediately. The USACE Cultural Resource Specialist, or other appropriate personnel, shall contact the State Police, Oregon SHPO, and others as applicable[4]. The human remains shall be covered from view and to protect them from damage or exposure, preferably with a clean tarp, provided the cover will not damage the human remains. Discuss with the USACE Cultural Resource Specialist about covers if there is a question about appropriate covers and if damage would occur by covering the human remains.

All unauthorized personnel shall vacate the site location and reasonable efforts shall be made to secure the site location. The person(s) who identified the discovery will make every reasonable effort to ensure the remains are not physically handled or examined by unauthorized personnel until the USACE Cultural Resources Specialist, or other applicable authorized personnel, takes responsibility for protection of the remains.

Confidentiality

To protect fragile, vulnerable, or threatened sites, the NHPA, and Oregon state laws require that the location of archaeological sites, both on land and underwater, shall be confidential.

USACE will make every effort to preserve the confidentiality of any discovery. The media, or any third-party member or members of the public are not to be contacted or have information regarding the discovery.

Points of Contact

USACE

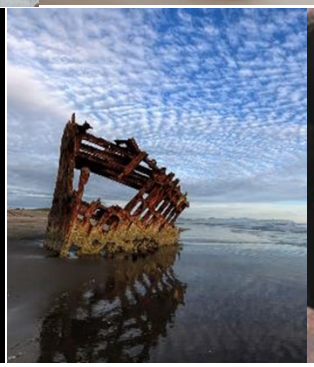
- Tara Gauthier, Chief, Cultural Resources Section
  Tara.R.Gauthier@usace.army.mil, 503-808-4754 (office), 503-915-3551 (mobile)
- Amy Gibbons, Chief, Environmental Resources Branch
  Amy.C.Gibbons@usace.army.mil, 503-808-4708 (office), 503-875-4085 (mobile)

[4] See 36 CFR §800.13, Native American Graves Protection and Repatriation Act (25 USC Chapter 32; Oregon Revised Statutes (ORS) Chapter 97, as applicable.

You Discovered Cultural Resources: Now What?

Stop	• Stop ALL work in vicinity of discovery
Buffer	•Create 100-foot buffer around discovery •If you see human remains, cover with a clean tarp. DO NOT PHOTOGRAPH, FILM, OR SPEAK TO MEDIA. •Work can continue outside buffer
Notify	• Immediately notify USACE Cultural Resource Specialist, Project Manager, and Contracting Officer
Assess	• USACE Cultural Resource Specialist will assess the discovery for further action
Resume Work	• Resume work in the buffered area ONLY after USACE says it is OK

Cultural Resource Examples



Construction and Demolition (C&D) Diversion - Disposal Cumulative Report

Project Information

1. Calendar Year Being Reported	2. Contract Number	3. Task Order Number (if any)

4. Project Name/Site Location

5. Contractor Signature	Date	6. PE/COR Signature	Date

C&D Report by Quarter

	Enter data for each destination IN TONS. Attach additional sheets if more room is required. All reports must include landfill tons or provide justification for not supplying data. Likewise, submission of blank forms must be justified (e.g., "no activity for qtr").		Recycled (Note 3)	Composted (Note 4)	Converted (Note 5)	Landfilled (Note 6)	Total Cost (Note 7)
1st QTR (Note 2)	7. Destination						
	8. Destination						
	9. Destination						
		Subtotals	0	0	0	0	$ -
2nd QTR (Note 2)	10. Destination						
	12. Destination						
	13. Destination						
		Subtotals	0	0	0	0	$ -
3rd QTR (Note 2)	15. Destination						
	16. Destination						
	17. Destination						
		Subtotals	0	0	0	0	$ -
4th QTR (Note 2)	19. Destination						
	20. Destination						
	21. Destination						
		Subtotals	0	0	0	0	$ -

Contractors: Submit completed form and supporting information to the COR or Government Project Engineer via RMS Submittal.

PE/COR: Submit to CRAFT POC for data entry.

Notes:

1. C&D materials are those generated by construction, renovation, repair, and demolition activities.
2. Destination is the name of the facility to which C&D materials were transported.
3. Recycled includes materials sent to a recycling facility.
4. Composted includes any vegetational material sent to a recycling/composting facility.
5. Converted includes waste that was converted into an energy use (e.g. waste converted to heat, electricity, or fuel).
6. Landfilled includes any C&D waste that is landfilled or incinerated at a landfill facility.
7. Total costs of all disposal methods.

Oregon
Tina Kotek, Governor

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May 29, 2025

Amy Gibbons
333 SW First Ave
Portland, OR 97204-3440

RE: 401 Water Quality Certification Approval for 2024-USACE-5, Bonneville Dam Navigation Lock 1 Bridge Replacement

The US Army Corps of Engineers (USACE) has determined that your project will be authorized under Nationwide Permit (NWP) category #14. As described in the application package received and reviewed by the Oregon Department of Environmental Quality (DEQ), the project qualifies for the expedited 401 Water Quality Certification (WQC), subject to the conditions outlined below. If you cannot meet all conditions of this 401 WQC, you may apply for a standard individual certification. A standard individual certification will require additional information, a public notice, and a higher review fee.

Certification Decision: Based on information provided by the USACE and the Applicant, DEQ has determined that implementation eligible activities under the proposed NWP will be consistent with water quality requirements including applicable provisions of Sections 301, 302, 303, 306, and 307 of the federal Clean Water Act, state water quality standards set forth in Oregon Administrative Rules Chapter 340 Division 41, and other appropriate requirements of state law, provided the following conditions are incorporated into the federal permit and strictly adhered to by the Applicant.

Duration of Certificate: This 401 WQC for impacts to waters, including dredge and fill activities, is valid for the duration of the USACE Section 404 permit. A new 401 WQC must be requested with any modification of the USACE 404 permit.

In addition to all USACE national and regional permit conditions, the following 401 WQC conditions apply to all NWP categories that qualify for the Nationwide 401 WQC.

401 GENERAL CERTIFICATION CONDITIONS

1) **Responsible parties:** This 401 WQC applies to the Applicant. The Applicant is responsible for the work of its contractors and sub-contractors, as well as any other entity that performs work related to this WQC.
Rule: *40 CFR 121, OAR 340-048-0015*
Justification: *DEQ must be aware of responsible parties to ensure compliance.*

2) **Work Authorized:** Work authorized by this 401 WQC is limited to the work described in the Permit Application and additional application materials (hereafter “the permit application materials”), unless otherwise authorized by DEQ. If the project is operated in a manner not

consistent with the project description contained in the permit application materials, the Applicant is not in compliance with this 401 WQC and may be subject to enforcement.
Rule: *OAR 340-048-0015*
Justification: *To ensure the project will comply with water quality standards, DEQ must understand all work involved in the construction and operation of the project.*

3) **401 WQC on Site:** A copy of this 401 WQC must be kept on the job site and readily available for reference by the Applicant and its contractors and subcontractors, as well as by DEQ, USACE, National Marine Fisheries Service (NMFS), Oregon Department of Fish and Wildlife (ODFW), and other state and local government inspectors.
Rule: *OAR 340-012*
Justification: *All parties must be aware of and comply with the 401 WQC, including on-site contractors.*

4) **Project Changes:** DEQ may modify or revoke this 401 WQC, in accordance with OAR 340-048-0050, if the project changes or project activities are having an adverse impact on state water quality or beneficial uses, or if the Applicant is otherwise in violation of the conditions of this certification.
Rule: *OAR 340-048-0050*
Justification: *To ensure the project will comply with water quality standards, DEQ must understand all work involved in the construction and operation of the project.*

5) **Land Use Compatibility Statement:** In accordance with OAR 340-048-0020(2) (i), each Applicant must submit findings prepared by the local land use jurisdiction that demonstrates the activity's compliance with the local comprehensive plan. Such findings can be submitted using Section 11 of the Joint Permit Application, signed by the appropriate local official and indicating:

   a. "This project is consistent with the comprehensive plan and land use regulations;" or,

   b. "This project will be consistent with the comprehensive plan and land use regulations when the following local approvals are obtained," accompanied by the obtained local approvals.

   c. Rarely, such as for federal projects on federal land, "this project is not regulated by the comprehensive plan" will be acceptable.

   In lieu of submitting the appropriate section of the USACE & Department of State Lands (DSL) Joint Permit Application, the Applicant may use DEQ's Land Use Compatibility Statement form found at: http://www.oregon.gov/deq/FilterDocs/lucs.pdf
   Rule: *OAR 340-048-0020(2) (i), OAR 340-018*
   Justification: *DEQ must ensure compliance with water quality land use laws at the local level.*

6) **Access:** The Applicant and its contractors must allow DEQ access to the project site with or without prior notice, including staging areas, and mitigation sites to monitor compliance with these 401 WQC conditions, including:

   a. Access to any records, logs, and reports that must be kept under the conditions of this 401 WQC;

   b. To inspect best management practices (BMPs), monitoring or equipment or methods; and

   c. To collect samples or monitor any discharge of pollutants.

Rule: *OAR 340-012*
Justification: *DEQ must inspect facilities for compliance with all state rules and laws.*

7) Failure of any person or entity to comply with this Order may result in the issuance of civil penalties or other actions, whether administrative or judicial, to enforce its terms.
Rule: *OAR 340-012*
Justification: *If the project is not being constructed or operated as proposed, it may not be consistent with water quality requirements.*

FOR PROJECTS THAT PROPOSE CONSTRUCTION, THE FOLLOWING GENERAL CONDITIONS APPLY

8) **Erosion and Sediment Control**: During construction, erosion control measures must be implemented to prevent or control movement of soil into waters of the state. The Applicant is required to develop and implement an effective erosion and sediment control plan. A project that disturbs more than one acre may be required to obtain a National Pollutant Discharge Elimination System (NPDES) 1200-C construction stormwater general permit. Contact the DEQ Stormwater Program for more information at: https://www.oregon.gov/deq/wq/wqpermits/Pages/Stormwater-Construction.aspx

In addition, the Applicant must:

a. Maintain an adequate supply of materials necessary to control erosion at the project construction site.

b. Prohibit erosion of stockpiles. Deploy compost berms, impervious materials, or other effective methods during rain events or when stockpiles are not moved or reshaped for more than 48 hours.

c. Inspect erosion control measures daily and maintain erosion control measures as often necessary to ensure the continued effectiveness of measures. Erosion control measures must remain in place until all exposed soil is stabilized;

i. If monitoring or inspection shows that the erosion and sediment controls are ineffective, Applicant must mobilize immediately to make repairs, install replacements, or install additional controls as necessary.

ii. If sediment has reached 1/3 of the exposed height of a sediment or erosion control, Applicant must remove the sediment to its original contour.

d. Use removable pads or mats to prevent soil compaction at all construction access points through, and staging areas in, riparian or wetland areas to prevent soil compaction, unless otherwise authorized by DEQ.

e. Flag or fence off wetlands not specifically authorized to be impacted to protect from disturbance and/or erosion.

f. Place dredged or other excavated material on upland areas with stable slopes to prevent materials from eroding back into waterways or wetlands.

g. Place clean aggregate at all construction entrances, and utilize other BMPs, including, but not limited to as truck or wheel washes, when earth moving equipment is leaving the site and traveling on paved surfaces. The tracking of sediment off site by vehicles is prohibited.

Rule: *OAR 340-041-0007(8), ORS 468B.050, CWA Section 402, OAR 340-045*
Justification: *DEQ must ensure that pollution does not enter waterways.*

9) **Deleterious Waste Materials:** The Applicant is prohibited from placing biologically harmful materials and construction debris where they could enter waters of the state, including wetlands (wetlands are waters of the state). This includes, but is not limited to: petroleum products; chemicals; cement cured less than 24 hours; welding slag and grindings; concrete saw cutting by-products; sandblasted materials; chipped paint; tires; wire; steel posts; asphalt; and waste concrete.

The following specific requirements apply:

a. Cure concrete, cement, or grout for at least 24 hours before any contact with flowing waters;

b. Use only clean fill, free of waste and polluted substances;

c. Employ all practicable controls to prevent discharges of spills of harmful materials to surface or groundwater;

d. Maintain at the project construction site, and deploy as necessary, an adequate supply of materials needed to contain deleterious materials during a weather event;

e. Remove all foreign materials, refuse, and waste from the project area

Rule: *OAR 340-041-0007(8), ORS 468B.050, CWA Section 402*
Justification: *DEQ must ensure that pollution does not enter waterways.*

10) **Spill Prevention:** The Applicant must fuel, operate, maintain and store vehicles, and must store construction materials, in areas that will not disturb habitat directly or result in potential discharges.

Rule: *ORS 468B.025(1)(a)*
Justification: *DEQ must ensure that pollution does not enter waterways.*

11) **Spill & Incident Reporting:**

a. In the event that deleterious materials are discharged into state waters, or onto land with a potential to enter state waters, the discharge must be promptly reported to the Oregon Emergency Response Service (OERS, 1-800-452-0311) within 24 hours. Containment and cleanup must begin immediately and be completed as soon as possible.

b. If the project operations cause a water quality problem that results in distressed or dying fish, the operator must immediately: cease operations; take appropriate corrective measures to prevent further environmental damage; collect fish specimens and water samples; and notify DEQ, ODFW, NMFS, and US Fish and Wildlife Service (USFW).

Rule: *ORS 466.645(1); OAR 340-142-0030(1)(b)(B), OAR 340-041*
Justification: *DEQ must ensure that pollution does not enter waterways and must be protective of beneficial uses, including fish.*

12) **Vegetation Protection and Site Restoration:**

a. The Applicant must protect riparian, wetland, and shoreline vegetation in the authorized project area from disturbance through one or more of the following:

i. Minimization of project and impact footprint;

ii. Designation of staging areas and access points in open, upland areas;

iii. Fencing and other barriers demarking construction areas; and

iv. Use of alternative equipment (e.g., spider hoe or crane).

b. If authorized work results in vegetative disturbance and the disturbance has not been accounted for in planned mitigation actions, the Applicant must successfully reestablish vegetation to a degree of function equivalent or better than before the disturbance.

c. Pesticides (including herbicides) and fertilizers must be applied per manufacturer's instructions by a professionally licensed applicator. If chemical treatment is necessary, the Applicant is responsible for ensuring that pesticide application laws, including with the NPDES System 2300-A general permit, are met. Please review the information on the following website for more information: https://www.oregon.gov/deq/wq/wqpermits/Pages/Pesticide.aspx

i. For pesticide application within stormwater treatment facilities or within 150 feet of waters of the state, the Applicant must adopt an Integrated Pest Management (IPM) plan that describes pest prevention, monitoring and control techniques with a focus on prevention of inputs to waters of the state, or coverage under an NPDES permit, if required.

ii. Pesticide application should be applied during the dry season and avoid direct water application;

iii. Unless otherwise approved in writing by DEQ, applying surface fertilizer within stormwater treatment facilities or within 50 feet of any stream channel is prohibited.

Rule: *OAR 340-041, OAR 340-012, OAR 340-041-0033*
Justification: *Riparian, wetland, and shoreline vegetation help ensure excess sediment does not enter a waterway, and helps offset potential temperature impacts. DEQ must ensure that pollution does not enter waterways.*

13) **Buffers:** The Applicant shall avoid and protect from harm, all wetlands and provide a 50 foot buffer to waters of the state, unless proposed, necessary, and approved as part of the project. If a local jurisdiction has a more stringent buffer requirement, that requirement will take the place of this certification requirement.
Rule: *OAR 340-041, OAR 340-012*
Justification: *Riparian, wetland, and shoreline buffers help ensure excess sediment does not enter a waterway, and helps offset potential temperature impacts. DEQ must ensure that pollution does not enter waterways.*

14) **Previously Contaminated Soil and Groundwater:** If any contaminated soil or groundwater is encountered, it must be handled and disposed of in accordance with the soil and groundwater management plan for the site, as well as local, state and federal regulations. The Applicant must notify the Environmental Cleanup Section of DEQ at 1-800-452-4011.
Rule: *OAR 340-041, OAR 340-012, OAR 340-122, OAR 340-040*
Justification: *DEQ must ensure that pollution does not enter waterways. As sediments are disturbed, pollutants could become redistributed.*

FOR PROJECTS THAT PROPOSE IN-STREAM WORK IN JURISDICTIONAL WATERS

15) **Fish protection/ Oregon Department of Fish and Wildlife timing:** The Applicant must perform in-water work only within the ODFW preferred time window as specified in the *Oregon Guidelines for Timing of In-Water Work to Protect Fish and Wildlife Resources*, or as authorized otherwise under a USACE permit and/or DSL removal/fill permit. Exceptions to the timing window must be recommended by ODFW, NMFS and/or the USFW as appropriate, and approved by DSL when applicable.
Rule: *OAR 340-041-0011*
Justification: *DEQ must be protective of all water quality standards, including beneficial uses such as fish.*

16) **Aquatic life movements:** Any activity that may disrupt the movement of aquatic life living in the water body, including those species that normally migrate through the area, is prohibited. The Applicant must provide unobstructed fish passage at all times during any authorized activity, unless otherwise approved in the approved application.
Rule: *OAR 340-041-0016; OAR 340-041-0028*
Justification: *DEQ must be protective of all water quality standards, including beneficial uses such as fish.*

17) **Isolation of in-water work areas:** The Applicant must isolate in-water work areas from the active flowing stream, unless otherwise authorized as part of the approved application, or authorized by DEQ.
Rule: *OAR 340-041, OAR 340-012, OAR 340-045*
Justification: *DEQ must ensure that pollution does not enter waterways.*

18) **Cessation of Work:** The Applicant must cease project operations under high-flow conditions that will result in inundation of the project area. Only efforts to avoid or minimize turbidity or other resource damage as a result of inundation of the exposed project area are allowed during high-flow conditions.
Rule: *OAR 340-041, OAR 340-012*
Justification: *DEQ must ensure that pollution does not enter waterways.*

19) **Turbidity**: The Applicant must implement BMPs to minimize turbidity during in-water work. Any activity that causes turbidity to exceed 10% above natural stream turbidities is prohibited except as specifically provided below:

a. **Monitoring**: Turbidity monitoring must be conducted and recorded as described below. Monitoring must occur at two-hour intervals each day when in-water work is being conducted. A properly calibrated turbidimeter is required **unless another monitoring method is proposed and authorized by DEQ**.

i. **Representative Background Point**: The Applicant must take and record a turbidity measurement every two hours during in-water work at an undisturbed area. A background location shall be established at a representative location approximately 100 feet up-current of the in water activity unless otherwise authorized by DEQ. The background turbidity, location, date, tidal stage (if applicable) and time must be recorded immediately prior to monitoring down-current at the compliance point described below.

ii. **Compliance Point:** The Applicant must monitor every two hours. A compliance location shall be established at a representative location approximately 100 feet down-current from the disturbance at approximately mid-depth of the waterbody and within any visible plume. The turbidity, location, date, tidal stage (if applicable) and time must be recorded for each measurement.

b. **Compliance**: The Applicant must compare turbidity monitoring results from the compliance points to the representative background levels taken during each two – hour monitoring interval. Pursuant to OAR 340-041-0036, short term exceedances are allowed as followed:

MONITORING WITH A TURBIDIMETER *EVERY 2 HOURS*	
TURBIDITY LEVEL	***Restrictions to Duration of Activity***
0 to 4 NTU above background	No Restrictions
5 to 29 NTU above background	Work may continue maximum of 4 hours. If turbidity remains 5-29 NTU above background, stop work and modify BMPs. Work may resume when NTU is 0-4 above background.
30 to 49 NTU above background	Work may continue maximum of 2 hours. If turbidity remains 30-49 NTU above background, stop work and modify BMPs. Work may resume when NTU is 0-4 above background.
50 NTU or more above background	Stop work immediately and inform DEQ

c. **Reporting**:

i. Record all turbidity monitoring required by subsections (a) and (b) above in daily logs which must include: calibration documentation; background NTUs; compliance point NTUs; comparison of the points in NTUs; and location; date; time; and tidal stage (if applicable) for each reading.

ii. A narrative must be prepared discussing all exceedances with subsequent monitoring, actions taken, and the effectiveness of the actions. Applicant must make available copies of daily logs for turbidity monitoring to regulatory agencies including DEQ, USACE, NMFS, USFWS, and ODFW upon request.

iii. Keep records on file for the duration of the permit cycle.

d. **BMPs to Minimize In-stream Turbidity:** The Applicant must implement the following BMPs, unless accepted in writing by DEQ:

i. Sequence/Phasing of work – The Applicant must schedule work activities so as to minimize in-water disturbance and duration of in-water disturbances.

ii. Bucket control - All in-stream digging passes by excavation machinery and placement of fill in-stream using a bucket must be completed so as to minimize turbidity. All practicable techniques such as employing an experienced equipment operator, not dumping partial or full buckets of material back into the wetted stream, adjusting the volume, speed, or both of the load, or using a closed-lipped environmental bucket must be implemented;

iii. The Applicant must limit the number and location of stream-crossing events. Establish temporary crossing sites as necessary at the least sensitive areas

and amend these crossing sites with clean gravel or other temporary methods as appropriate;

iv. Machinery may not be driven into the flowing channel, unless authorized in writing by DEQ; and

v. Excavated material must be placed so that it is isolated from the water edge or wetlands, and not placed where it could re-enter waters of the state uncontrolled.

vi. Containment measures such as silt curtains, geotextile fabric, and silt fences must be in place and properly maintained in order to minimize in-stream sediment suspension and resulting turbidity.

Rule: *OAR 340-041-0036, OAR 340-041*
Justification: *DEQ must ensure that pollution does not enter waterways.*

SPECIFIC CONDITIONS FOR POST-CONSTRUCTION STORMWATER MANAGEMENT

20) **Post Construction Stormwater Management:** For projects which propose new impervious surfaces or the redevelopment of existing surfaces, the Applicant must submit a post-construction stormwater management plan to DEQ. The plan must be reviewed and approved prior to construction to ensure compliance with water quality standards. The Applicant must implement BMPs as proposed in the stormwater management plan, including construction, operation, and maintenance. If proposed stormwater facilities change due to site conditions, the Applicant must notify DEQ in writing.

In lieu of a complete stormwater management plan, the Applicant may submit documentation of acceptance of the stormwater into a DEQ permitted NPDES Phase I Municipal Separate Storm Sewer System (MS4).
Rule: *ORS 468B.050, OAR 340-045, OAR 340-041*
Justification: *DEQ must ensure that pollution does not enter waterways.*

21) **Stormwater Management & System Maintenance:** The Applicant is required to implement effective operation and maintenance practices for the lifetime of the proposed facility. Long-term operation and maintenance of stormwater treatment facilities will be the responsibility of the applicant or the entity listed in the approved post-construction stormwater management plan.

Maintenance of stormwater treatment facilities subject to an MS4 permit is regulated by the permit.
Rule: *OAR 340-041, OAR 340-012, OAR 340-045*
Justification: *DEQ must ensure that pollution does not enter waterways.*

22) **Corrective Action May Be Required:** DEQ retains the authority to require corrective action in the event the stormwater management facilities are not built or performing as described in the plan.
Rule: *OAR 340-041, OAR 340-012*
Justification: *DEQ must ensure that pollution does not enter waterways.*

CATEGORY SPECIFIC CONDITIONS

In addition to all national and regional conditions of the USACE permit and the 401 Water Quality Certification general conditions above, the following conditions apply to the noted specific categories of authorized activities.

NWP 7 – Outfall Structures and Associated Intake Structures:

7.1) The following actions are denied certification:

a. Discharge outfalls that are not subject to an NPDES permit; and

b. Outfalls that discharge stormwater without pollutant removal demonstrated to meet water-quality standards prior to discharge to waters of the state.

Rule: *OAR 340-041, OAR 340-012, OAR 340-048, OAR 340-045*
Justification: *DEQ must ensure that pollution does not enter waterways. Untreated stormwater is considered pollution.*

7.2) If an Applicant cannot obtain an NPDES permit or submit an approvable stormwater management plan per DEQ's Guidelines found at: http://www.oregon.gov/deq/FilterDocs/401wqcertPostCon.pdf the Applicant must submit complete project information and water quality impacts analysis directly to DEQ in order to undergo individual 401 WQC evaluation and fulfill public participation requirements.
Rule: *OAR 340-041, OAR 340-012, OAR 340-048, OAR 340-045*
Justification: *DEQ must ensure that pollution does not enter waterways. Untreated stormwater is considered pollution.*

NWP 13 – Bank Stabilization:

13.1) Projects that do not include bioengineering are denied certification, unless a registered professional engineer provides a written statement that non-bioengineered solutions are the only means of protection.
Rule: *OAR 340-041, OAR 340-012, OAR 340-048*
Justification: *DEQ must ensure that pollution does not enter waterways. Hard armoring can increase erosion upstream and downstream of the structure.*

13.2) Projects that propose permanent fill in adjacent wetlands are denied certification.
Rule: *OAR 340-041, OAR 340-012, OAR 340-048*
Justification: *DEQ must ensure that pollution does not enter waterways. Water adjacent wetlands provide water quality benefits.*

13.3) To apply for certification for a project without bioengineering, the Applicant must submit complete project information and water quality impacts analysis directly to DEQ in order to undergo individual 401 WQC evaluation and fulfill public participation requirements.
Rule: *OAR 340-041-0059*
Justification: *DEQ must ensure that pollution does not enter waterways. Hard armoring can increase erosion upstream and downstream of the structure.*

NWP 14 – Linear Transportation:

14.1) For projects that include bank stabilization, bioengineering must be a component of the project, unless a registered professional engineer provides a written statement that non-bioengineered solutions are the only means of protection.
Rule: *OAR 340-041, OAR 340-012, OAR 340-048*
Justification: *DEQ must ensure that pollution does not enter waterways. Hard armoring can increase erosion upstream and downstream of the structure.*

14.2) To apply for certification for a project without bioengineering, the Applicant must submit complete project information and water quality impacts analysis directly to DEQ in order to undergo individual 401 WQC evaluation and fulfill public participation requirements.
Rule: *OAR 340-041-0059*
Justification: *DEQ must ensure that pollution does not enter waterways. Hard armoring can increase erosion upstream and downstream of the structure.*

NWP 16 - Return Water from Contained Upland Disposal Areas: Water-quality criteria and guidance values for toxics, per OAR 340-041-0033, are available in Tables 30, 31, and 40 at: https://secure.sos.state.or.us/oard/viewSingleRule.action?ruleVrsnRsn=68746.

16.1) Discharge of return water from contaminated dredged material that exceeds a chronic or acute toxicity water quality standard is prohibited.
Rule: *OAR 340-041-0053(b)(A), OAR 340-041*
Justification: *DEQ must ensure that pollution does not enter waterways.*

16.2) Water removed with contaminated dredged material that could or does exceed chronic water-quality criteria must be contained and disposed of at an appropriately sized and sealed upland facility by evaporation or infiltration.
Rule: *OAR 340-041-0053(b)(A), OAR 340-041*
Justification: *DEQ must ensure that pollution does not enter waterways.*

16.3) If a Modified Elutriate Test (MET) is performed for the known contaminants of concern (CoCs) and CoC concentrations are below DEQ chronic water-quality criteria, return water discharge is not limited.

a. The MET must be performed before dredging.
a. DEQ must approve the list of CoCs and analytical method prior to the Applicant performing the MET.
b. DEQ must review the results and provide approval of discharge from return water, in writing, prior to dredging.

Rule: *OAR 340-041, OAR 340-012, OAR 340-048*
Justification: *DEQ must ensure that pollution does not enter waterways.*

NWP 20 – Response Operations for Oil and Hazardous Waste:

20.1) Coordination with DEQ's Emergency Response program is required. See: http://www.oregon.gov/deq/Hazards-and-Cleanup/env-cleanup/Pages/Emergency-Response.aspx.
Rule: *OAR 340-142-0130(3), OAR 340-041*
Justification: *DEQ must ensure that pollution does not enter waterways.*

NWP 22 – Removal of Vessels:

22.1) Coordination with DEQ's Emergency Response program is required. See:

http://www.oregon.gov/deq/Hazards-and-Cleanup/env-cleanup/Pages/Emergency-Response.aspx.
Rule: *OAR 340-041, OAR 340-012, OAR 340-048*
Justification: *DEQ must ensure that pollution does not enter waterways. Vessels may contain various fuels, lubricants, and other possible sources of pollution.*

NWP 31 – Maintenance of Existing Flood Control Facilities:

31.1) Projects in streams with temperature TMDLs which result in a net reduction of riparian shade are prohibited.
Rule: *OAR 340-041-0028, OAR 340-041*
Justification: *DEQ must ensure that pollution does not enter waterways.*

NWP 38 – Cleanup of Hazardous and Toxic Waste:

38.1) For removal of contaminated material from waters, dredging method is limited to diver assisted hydraulic suction, hydraulic suction, closed-lipped environmental bucket, or excavation in the dry, unless otherwise authorized by DEQ.

a. For in-water isolation measures, the Applicant is referred to Appendix D of DEQ's Oregon Erosion and Sediment Control Manual, April 2005 (or most current version), at: DEQ Erosion and Sediment Control Manual
Rule: *OAR 340-041, OAR 340-012, OAR 340-048*
Justification: *DEQ must ensure that pollution does not enter waterways.*

38.2) Discharge to waters of the state resulting from dewatering during dredging or release of return water from an upland facility is prohibited except as provided below.

a. All water removed with sediment must be contained and disposed of at an appropriately sized and sealed upland facility by evaporation or infiltration; or,

b. A Modified Elutriate Test (MET) may be performed for the known Contaminants of Concern (CoCs) and if CoC concentrations are below DEQ chronic water-quality criteria; return water discharge is not limited.

i. The MET must be performed before dredging.
ii. DEQ must approve the list of CoCs and analytical method prior to the Applicant performing the MET.
iii. DEQ must review the results and provide approval of discharge from dewatering and return water in writing prior to dredging.

Rule: *OAR 340-041, OAR 340-012, OAR 340-048*
Justification: *DEQ must ensure that pollution does not enter waterways.*

38.3) Dredged material must be disposed of in compliance with DEQ Rules governing Hazardous Waste (see: http://www.oregon.gov/deq/Hazards-and-Cleanup/hw/Pages/default.aspx) or Solid Waste (see: http://www.oregon.gov/deq/mm/swpermits/Pages/Solid-Waste-Disposal-Sites-and-Landfill.aspx).
Rule: *OAR 340-041, OAR 340-012, OAR 340-048*
Justification: *DEQ must ensure that pollution does not enter waterways.*

38.4) The new in-water surface must be managed to prevent exposure or mobilization of contaminants.

Rule: *OAR 340-041, OAR 340-012, OAR 340-048*
Justification: *DEQ must ensure that pollution does not enter waterways.*

NWP 41 - Reshaping Existing Drainage Ditches:

41.1) To the extent practicable, the Applicant must work from only one bank in order to minimize disturbance to existing vegetation, preferably the bank with the least existing vegetation;
Rule: *OAR 340-041, OAR 340-012, OAR 340-048*
Justification: *DEQ must ensure that pollution does not enter waterways.*

41.2) Following authorized work, the Applicant must establish in-stream and riparian vegetation on reshaped channels and side-channels using native plant species wherever practicable. Plantings must be targeted to address water-quality improvement (e.g., provide shade to water to reduce temperature or provide bank stability through root systems to limit sediment inputs). Planting options may include clustering or vegetating only one side of a channel, preferably the side which provides maximum shade.
Rule: *OAR 340-041-0004(5)(a)*
Justification: *Riparian, wetland, and shoreline buffers help ensure excess sediment does not enter a waterway and helps offset potential temperature impacts. DEQ must ensure that pollution does not enter waterways.*

NWP 42 – Recreational Facilities:

42.1) For facilities that include turf maintenance actions, the permittee must develop and implement an Integrated Pest Management Plan (IPM) that describes pest prevention, monitoring and control techniques with a focus on prevention of chemical and nutrient inputs to waters of the state, including maintenance of adequate buffers for pesticide application near salmonid streams, or coverage under an NPDES permit, if required (information is available at: http://www.oregon.gov/deq/wq/wqpermits/Pages/Pesticide.aspx).
Rule: *OAR 340-041-0033, OAR 340-041*
Justification: *DEQ must ensure that pollution does not enter waterways, including excess pesticides and fertilizers.*

NWP 43 – Stormwater Management Facilities:

43.1) Projects that propose the following elements are denied expedited certification:
a. In-stream stormwater facilities;
b. Discharge outfalls not subject to an MS4 NPDES permit; and,
c. Proposals that do not demonstrate pollutant removal to meet water quality standards prior to discharge to waters of the state.
Rule: *OAR 340-041, OAR 340-012, OAR 340-048*
Justification: *DEQ must ensure that pollution does not enter waterways; stormwater is considered a pollutant.*

43.2) To apply for certification for a project with in-stream stormwater facilities, without an NPDES permit, or without submittal of an approvable stormwater management plan per DEQ's Guidelines (at: http://www.oregon.gov/deq/FilterDocs/401wqcertPostCon.pdf), the Applicant must submit complete project information and water quality impacts analysis directly to DEQ in order to undergo individual 401 WQC evaluation and fulfill public participation requirements.
Rule: *OAR 340-041-0059*
Justification: *DEQ must ensure that pollution does not enter waterways; stormwater is considered a pollutant.*

NWP 44 – Mining Activities:

44.1) Projects that do not obtain an NPDES 700-PM or Individual permit are denied expedited certification.
Rule: *OAR 340-045-0033, OAR 340-041*
Justification: *DEQ must ensure that pollution does not enter waterways. Excess turbidity can be considered pollution.*

44.2) To apply for certification for a project without an NPDES permit, the Applicant must submit complete project information and water quality impacts analysis directly to DEQ in order to undergo individual 401 WQC evaluation and fulfill public participation requirements.
Rule: *OAR 340-041-0059*
Justification: *DEQ must ensure that pollution does not enter waterways.*

44.3) The State of Oregon requires an In-Water Blasting Permit be obtained per OAR, 635-425-0000. Permittee is advised to contact the nearest ODFW office for further information at: https://www.dfw.state.or.us/lands/inwater/
Rule: *OAR 340-041-0011*
Justification: *DEQ must be protective of all water quality standards, including beneficial uses such as fish.*

NWP 51 – Land-Based Renewable Energy Generation Facilities:

51.1) For associated utility lines with directionally-bored stream or wetland crossings proposed, condition D.1 must be applied.
Rule: *OAR 340-041, OAR 340-012, OAR 340-048*
Justification: *DEQ must ensure that pollution does not enter waterways*

NWP 53 – Removal of Low-Head Dams:

53.1) Projects that do *not* go through a PSET review if sediments are being dispersed are denied certification.
Rule: *OAR 340-041, OAR 340-012, OAR 340-048*
Justification: *DEQ must ensure that pollution does not enter waterways. Sediments can be a carrier of contaminants.*

53.2) To apply for certification for a project without a PSET, the Applicant must submit complete project information and water quality impacts analysis directly to DEQ in order to undergo individual 401 WQC evaluation and fulfill public participation requirements.
Rule: *OAR 340-041-0059*
Justification: *DEQ must ensure that pollution does not enter waterways. Sediments can be a carrier of contaminants.*

NWP 54 – Living Shorelines:

54.1) Projects that do not include bioengineering are denied certification, unless a registered professional engineer provides a written statement that non-bioengineered solutions are the only means of protection.
Rule: *OAR 340-041, OAR 340-012, OAR 340-048*
Justification: *DEQ must ensure that pollution does not enter waterways. Hard armoring can increase erosion in the system.*

NWP 58 – Utility Lines:

58.1) For proposals that include directionally-bored stream or wetland crossings:

a. All drilling equipment, drill recovery and recycling pits, and any waste or spoil produced, must be completely isolated, recovered, then recycled or disposed of to prevent entry into waters of the state. Recycling using a tank instead of drill recovery/recycling pits is preferable;

b. In the event that drilling fluids enter a water of the state, the equipment operator must stop work, immediately initiate containment measures and report the spill to the Oregon Emergency Response System (OERS) at 1-800-452-0311.

c. An adequate supply of materials needed to control erosion and to contain drilling fluids must be maintained at the project construction site and deployed as necessary.

d. The Applicant must have a contingency plan in place prior to construction for the inadvertent return of drilling lubricant.

Rule: *OAR 340-142-0030, OAR 340-142-0040(1)*
Justification: *Drilling equipment and fluids that enter a waterbody would likely cause contamination of that waterbody.*

58.2) For proposals that include utility lines through wetlands, include anti-seep collars or equivalent technology to prevent draining the wetlands.

Rule: *OAR 340-041, OAR 340-012, OAR 340-048*
Justification: *DEQ must ensure that pollution does not enter waterways*

If the Applicant is dissatisfied with the conditions contained in this certification, a hearing may be requested. Such request must be made in writing to DEQ's Office of Compliance and Enforcement at 700 NE Multnomah St, Suite 600, Portland Oregon 97232, within 20 days of the mailing of this certification.

The DEQ hereby certifies that this project complies with the Clean Water Act and state rules, with the above conditions. If you have any questions, please contact Delia Negru, at 503-593-2493, by email at delia.negru@deq.oregon.gov, or at the address on this letterhead.

Sincerely,

Christine SVETKOVACH

Theresa Burcsu,
Water Quality Manager
Northwest Region

ec: Tessa Rough, USACE

State of Oregon
DEQ Department of Environmental Quality

401 Water Quality Certification Turbidity Monitoring Report

Project Name:	USACE Project #	DSL Project #

Name of Inspector(s):	Turbidimeter Model:	Calibration Standard Type (Circle One) Formazin Solution or Gelex	Calibration Standard Expiration Date:

Sampling Date:	Calibration Values:	*Upstream (Background) Point Location:	*Downstream (Compliance) Point Location:
	_____NTU (Standard) = _____NTU (Reading) _____NTU (Standard) = _____NTU (Reading) _____NTU (Standard) = _____NTU (Reading)	Latitude: Longitude:	Latitude: Longitude:

In-Water Work Start Time:	In-Water Work End Time:	Description of In-Water Work:

Upstream Sample		Downstream Sample		Change in Turbidity (NTU)	Observation of waterbody		NOTES (Describe any modifications made to BMPs)
Time	Turbidity (NTU)	Time	Turbidity (NTU)		Tidal Stage	Note any plume, sheen, floatables, color	

** Include a figure with the turbidity sampling forms showing the sampling locations.*

Turbidity: The Applicant must implement appropriate Best Management Practices (BMPs) to minimize turbidity during in-water work. Any activity that causes turbidity to exceed 10% above natural stream turbidity is prohibited except as specifically provided below:

Monitoring: Turbidity monitoring must be conducted and recorded as described below. Monitoring must occur at two hour intervals each day during daylight hours when in-water work is being conducted, including while dewatering or work area isolation measures are in place. A properly calibrated turbidimeter is required unless another monitoring method is proposed and authorized by DEQ.

Representative Background Point: The Applicant must take and record a turbidity measurement every two hours during in-water work at an undisturbed area. A background location shall be established at a representative location approximately 100 feet upcurrent of the in water activity unless otherwise authorized by DEQ. The background turbidity, location, date, tidal stage (if applicable) and time must be recorded immediately prior to monitoring downcurrent at the compliance point described below.

Compliance Point: The must monitor every two hours. A compliance location shall be established at a representative location approximately 100 feet downcurrent from the disturbance at approximately mid-depth of the waterbody and within any visible plume. The turbidity, location, date, tidal stage (if applicable) and time must be recorded for each measurement.

MONITORING WITH A TURBIDIMETER *EVERY 2 HOURS*	
TURBIDITY LEVEL	***Restrictions to Duration of Activity***
0 to 4 NTU above background	No Restrictions
5 to 29 NTU above background	Work may continue maximum of 4 hours. If turbidity remains 5-29 NTU above background, stop work and modify BMPs. Work may resume when NTU is 0-4 above background.
30 to 49 NTU above background	Work may continue maximum of 2 hours. If turbidity remains 30-49 NTU above background, stop work and modify BMPs. Work may resume when NTU is 0-4 above background.
50 NTU or more above background	Stop work immediately and inform DEQ

Compliance: The Applicant must compare turbidity monitoring results from the compliance points to the representative background levels taken during each two – hour monitoring interval. Pursuant to OAR 340-041-0036, short term exceedances of the turbidity water quality standard are allowed as shown in the monitoring table shown here.

Reporting: The Applicant must record all turbidity monitoring required by subsections (a) and (b) above in daily logs, kept on file for the duration of the permit cycle. The daily logs must include calibration documentation; background NTUs; compliance point NTUs; comparison of the points in NTUs; location; date; time; and tidal stage (if applicable) for each reading. Additionally, a narrative must be prepared discussing all exceedances with subsequent monitoring, actions taken, and the effectiveness of the actions. Applicant must make available copies of daily logs for turbidity monitoring to DEQ, USACE, NMFS, USFWS, and ODFW upon request.

BMPs to Minimize In-stream Turbidity: The Applicant must implement the following BMPs, unless otherwise accepted by DEQ:

i. Sequence/Phasing of Work – The Applicant must schedule work activities so as to minimize in-water disturbance and duration of in-water disturbances;
ii. Bucket control - All in-stream digging passes by excavation machinery and placement of fill in-stream using a bucket must be completed so as to minimize turbidity. All practicable techniques such as employing an experienced equipment operator, not dumping partial or full buckets of material back into the wetted stream, adjusting the volume, speed, or both of the load, or using a closed-lipped environmental bucket must be implemented;
iii. The Applicant must limit the number and location of stream-crossing events. Establish temporary crossing sites as necessary in the least sensitive areas and amend these crossing sites with clean gravel or other temporary methods as appropriate;
iv. Machinery may not be driven into the flowing channel, unless authorized by DEQ; and
v. Excavated material must be placed so that it is isolated from the water edge or wetlands, and not placed where it could re-enter waters of the state uncontrolled.

APPENDIX A

CONDUCT OF A DIVE / ROV OPERATION

The following is a brief description of events which constitute the planning and execution of a typical USACE Portland District project dive or ROV operation. It may be modified, with the concurrence of the District Dive Coordinator, to suit the particular requirements of a specific mission. Each aspect of the sequence should, however, be considered.

Dive Planning Sequence:

1. A condition is identified by project personnel where an underwater operation may be required. This may be, but not limited to, inspection / maintenance / construction, dredge fleet support, or fisheries mission.

2. The need for an underwater operation is determined by the Project Manager and / or Resident Engineer or Biologist in conjunction with the District Dive Coordinator. A written dive request is submitted to the Office of Dive Safety. Excluding emergencies, this request shall be made no fewer than 20 working days prior to the anticipated dive dates.

3. If required by the DDC, a joint review to address technical and safety concerns is held with members of the operational / technical team staff and the Office of Dive Safety. Excluding emergencies, this review should be held 10 working days prior to commencement of a dive operation.

4. Operational mode is selected; Diver or Remotely Operated Vehicle (ROV).

5. Mission dates are selected.

6. A qualified on-site USACE Dive-Project Point of Contact and / or Clearance Holder are selected by the OPM or their designee. If available, a qualified USACE Dive Safety Inspector is selected by the Office of Dive Safety from project personnel.

7. Appropriate departmental funding requests are made at least 20 working days prior to mission.

8. Once the operation has been defined, a request for underwater operation and corresponding Scope Of Work (SOW) is written by the Project Point of Contact specifying dive objectives, type of dive, equipment and personnel requirements. Project Manager, Dive-Project Point of Contract, and Office of Dive Safety collaborate to determine required clearances.

9. The Office of Dive Safety prepares a review of and edits the Scope of Work (SOW) document.

10. Scope of Work, Dive Specifications, and request for a USACE Dive Team, MDU, or CDC and, if needed, qualified USACE / Contract Dive Safety Inspector, is submitted to the appropriate District Division by the Office of Dive Safety for funding.

11. Project Manager, Dive-Project Point of Contact, and Office of Dive Safety determine required clearances, permits, and permissions.

12. A USACE Dive Team, MDU, or CDU is selected by appropriate District Division.

13. A USACE Dive Team, MDU, or CDC prepares and submits to the Office of Dive Safety for review and acceptance by the DDC, a job-specific Dive Plan Package consisting of Dive Plan including dive-team personnel and required certifications, site–specific Emergency Management Plan and Activity Hazard Analysis, Accident Prevention Plan, Spill Plan, MOA/MOU, and requests for support equipment and funding, if applicable.

14. Immediately prior to dive operations commencing, a pre-dive conference is conducted by the Dive Safety Inspector with Project Personnel, Dive Team members and others as deemed appropriate by the Office of Dive Safety. At a minimum, the pre-dive conference will cover:

- **a.** Objectives and scope of dive operation;
- **b.** Dive site conditions, hazards, environmental, and site-specific considerations;
- **c.** Simulated job-site specific dive accident, dive causality management exercise plan if directed by the USACE Portland Office of Dive Safety and DDC or assignee;
- **d.** Review techniques and equipment to be used;
- **e.** Review dive team and dive station equipment certifications;
- **f.** Determine dive-support equipment placement;
- **g.** Placement of Government and Dive-Team personnel;
- **h.** Detailed review of dive plan, safety protocols, emergency management plan, activity hazard analysis, and accident prevention plan;
- **i.** Review site-specific clearances, permits, and permissions.
- **j.** Questions;
- **k.** Final acceptance from Dive Team Supervisor of dive plan package by DSI.

NOTE: Once accepted, no changes shall be made to the dive plan, including change of personnel, without the specific and expressed permission of the Office of Dive Safety.

NOTE: **ALL DIVE PLANS MUST INCLUDE THIS STATEMENT:**

1) "This Dive/Work plan and related dive and/or other underwater operations will strictly conform to all regulations set forth in NWPR 385-1-93 (Current Revision) and EM 385-1-1 (Current Revision). Failure to do so may result in the immediate termination of the dive operation, cancellation of the dive contract and / or loss of work eligibility status by the USACE Portland District Office of Dive Safety and / or other sanctions as deemed appropriate by the USACE Portland District.

2) "If for any reason the dive plan is altered in mission, depth, personnel, or equipment, the DDC shall be contacted in order to review and accept the alteration prior to actual operation."

15. Physical walk-through inspections of all clearances are made and lock-out / tag-out (LOTO) cards are signed by each member of the inspection party prior to commencing any dive operation or upon any changes to lock-outs / tag-outs. Lock-outs / tag-outs will be reviewed as requested by the Office of Dive Safety, the Project Clearance Holder, the Dive Safety Inspector and/or Dive Team Supervisor.

NOTE: A dive operation shall not commence unless clearances are inspected and signed by the Dive Safety Inspector, Project Clearance Holder, Dive Team Dive Supervisor, and other personnel as deemed necessary.

16. Final review of diver and dive-support equipment by dive team and Dive Safety Inspector. A check of all required surface communications is performed.

17. Perform dive operation.

NOTE: Except during an emergency, diver in-water shifts shall not exceed four (4) hours per calendar day. No member of the dive team shall work in excess of 12 hours per calendar day.

18. A post-dive review shall be facilitated at the conclusion of each dive day by the Dive Safety Inspector and the Dive Team Supervisor. Divers are advised of the nearest recompression chamber's location and on limitations to their post-dive activities.

NOTE: Any post-dive adjustments to the dive plan must have the specific and expressed approval of the Office of Dive Safety.

APPENDIX B

DESCRIPTIONS OF DUTIES / QUALIFICATIONS

<u>USACE: Portland District: Office of Dive Safety</u>

District Dive Coordinator: Todd Manny
Alt. District Dive Coordinator: Jared Butler

1. Manages USACE Portland District Dive Safety Program, serves as Portland District subject-matter expert(s) for all underwater activities that involve diving and diving alternatives.

2. Maintains and enforces USACE and Portland District dive policies.

3. Reviews requests for dive operations and sanctions the necessity of proposed dives in the Portland District.

4. Consults with Operations Division Chief or designee to determine emergency dive circumstances.

5. Maintains records and other documentation for USACE, MDU, and CDC and dive personnel. Standardizes processes and procedures for supporting documentation evaluation.

6. Establishes minimum eligibility and qualification requirements and standards for CDC, MDU, and all dive team personnel. Reviews submittals and eligibility documentation.

7. Coordinates dive-related training programs.

8. Serves as an on-site Dive Safety Inspector as needed.

9. Serves as USACE Portland District Engineer's (Commander's) representative and liaison to the government, military, and commercial dive communities.

10. Resolves conflicts in field interpretations of regulations and requirements. Proposes and submits MOAs/MOUs for acceptance.

11. Reviews for acceptance Dive Plans, Emergency Management Plans, Safe Practices Manuals, Activity Hazard Analysis, Dive Equipment and Dive Personnel submittals.

12. Coordinates dive teams under contract to the USACE Portland District in an annual simulated work-site specific dive accident, dive causality management exercise.

13. Alt. District Dive Coordinator serves as District Dive Coordinator as determined by DDC and/or Operations Chief.

14. Qualifications of District Dive Coordinator:

- **a.** Must be a certified dive master possessing 5-10 years of commercial and/or military dive experience. Instructor level preferred;
- **b.** Must successfully complete a HQUSACE approved or equivalent, Diving Coordinator / Dive Safety Administrator / Dive Supervisor Training Course and Working Diver Course;
- **c.** Must successfully complete specialized hyperbaric chamber training;
- **d.** Must successfully complete NITROX and / or mixed gas dive training;
- **e.** Must possess valid CPR, 1st Aid, and Dive Emergency Oxygen Administration training. Instructor level preferred. EMT with dive accident management (DMT and / or EDAM) certification preferred;
- **f.** Must be HazMat certified;
- **g.** Must be OSHA 30 Certified.

15. Qualifications of Alt. District Dive Coordinator:

- **a.** Must be a certified diver possessing 3-5 years of dive experience. Dive master level preferred;
- **b.** Must successfully complete a HQUSACE approved or equivalent, Diving Coordinator / Dive Safety Administrator / Dive Supervisor Training Course and Working Diver Course;
- **c.** Must successfully complete specialized hyperbaric chamber training;
- **d.** Must successfully complete NITROX and / or mixed gas dive training;
- **e.** Must possess valid CPR, 1st Aid, and Dive Emergency Oxygen Administration training. EMT with dive accident management (DMT and/or EDAM) certification preferred;
- **f.** Must be HazMat certified;
- **g.** Must be OSHA 30 Certified.

Contract / Military Dive Safety Inspector:
USACE Staff Dive Safety Inspector; DSIs:

1. Serves as the Office of Dive Safety on-site representative and liaison between Office of Dive Safety and all dive operation and project personnel;
2. Facilitates the on-site conduct of all diving operations as assigned by the District Diving Coordinator occurring within the USACE Portland District;
3. Insures that all diving complies with pertinent OSHA and USACE regulations and policies governing dive operations;
4. Reports all safety concerns to the Office of Dive Safety. On authority of the Office of Dive Safety, will halt diving operations if necessary;
5. With the aid and assistance of the commercial contractor or military Dive Supervisor shall participate in a lock-out/tag-out review and inspection and facilitate a pre-dive safety briefing before onset of any diving operations;
6. Participates annually in a simulated work-site specific dive accident, dive causality management exercise as coordinated by the Office of Dive Safety;
7. Acts as the dive-site point of contact with Project Control Room Operators or Ship's Master. Informs Control Room and / or Ship's Bridge of diver in-water/out-of-water status. Acts as primary point of contact in case of emergency;
8. Reports to the Office of Dive Safety at the start and conclusion of all diving operations. Evaluates in writing performance of dive contractors and their personnel. Secures video recording and dive logs to be forwarded to the Office of Dive Safety. Makes recommendations to improve performance of dive operation and affiliated personnel;

NOTE: Except with the expressed authority of the District Dive Coordinator, the Dive Safety Inspector will not approve nor accept modification(s) to the Dive Plan or Scope of Work by the dive team.

9. Qualifications of USACE Dive Safety Inspector:

    a. Should be a certified diver possessing 1-3 years of dive-related experience. Advanced certification preferred;
    b. Must successfully complete a HQUSACE approved or equivalent, Diving Coordinator / Dive Safety Administrator / Dive Supervisor Training Course. Working Diver certification desired;
    c. Must successfully complete a specialized hyperbaric chamber training if inspecting a dive operation where a hyperbaric chamber is utilized;
    d. Must successfully complete NITROX and / or mixed gas dive training if inspecting NITROX or Mixed Gas dive operation;
    e. Must possess valid CPR, 1st Aid, and Dive Emergency Oxygen Administration training. BLS or EMT with dive accident management endorsements (DMT and/or EDAM) preferred;

f. HazMat certification preferred;

g. Shall have, at a minimum, completed the 30-hour OSHA / USACE Construction Safety Class or an equivalent course applicable to the work to be performed and given by qualified instructors. Such training shall have been within the last three (3) years;

h. USACE DSI staff must assist a senior Dive Safety Inspector with three (3) dive operations after initial HQUSACE training. Contract DSI shall be observed working as a DSI at a USACE dive operation by a senior USACE DSI at least once as part of their qualification process;

i. Serve as a Dive Safety Inspector for a minimum of three (3) USACE dive operations during each calendar year.

NOTE: In addition, CDC and MDU Safety Inspectors shall comply with all items listed in Addendum 1 to Appendix B, Contract Specifications for Contract Dive Safety Inspectors.

District Safety Office Representative:

1. The District Commander shall appoint a Dive Safety Representative (DSR) from the District Safety Office to provide collateral review when needed of operational dive plan packages. The DSR also provides a secondary review of non-diving project safety concerns within these operational dive plan packages.

Contract / Military Dive Team Personnel:

1. Dive Supervisor:

a. Must meet or exceed all qualifications listed in the most recent revision of EM 385-1-1, Section 30 and NWPR 385-1-93. All training documentation shall be in compliance with 29 CFR 1910.410;

b. Must be sponsored by a Commercial Dive Company, Military Dive Unit, or USACE Dive Team;

c. Must have five (5) years' experience and/or 500 hours accumulated bottom time as a commercial and/or military diver contiguous with application for dive supervisor;

d. Must have supervised a diversity of dive operations, minimum of three (3) USACE and/or other commercial projects within the previous 12 months;

e. As a dive-team member, must have at least two (2) years' experience working USACE Portland District or similar USACE projects; minimum of three (3) per year or an aggregate of six (6);

f. Must have documented training in and experience supervising specialty dive operations. Examples include but are not limited to: NITROX/Mixed Gas, Surface Decompression with Oxygen (Sur-D-O2); Altitude Diving, Deep Diving, etc.;

g. Must have documented training and current certification in the operation of and experience as primary operator of required (dual-lock, multi-place) recompression chamber(s) and associated equipment;

h. Must possess valid and current CPR, 1st Aid, and Dive Emergency Oxygen Administration provider training, BLS or EMT with dive accident management endorsements. DMT and/or EDAM preferred;

i. Shall be familiar with the current edition of the U.S. Army Corps of Engineers Safety & Occupational Health Manual: EM 385-1-1 (Current Revision), and NWPR 385-1-93 (Current Revision);

j. Shall have knowledge of USACE Portland District document submittal requirements and procedures for diving operations; including but not limited to Dive Plans, Emergency Management Plans, and Activity Hazard Analysis;

k. Participate annually in a simulated work-site specific dive accident, dive causality management exercise as coordinated by the Office of Dive Safety;

l. Must have a Letter of Recommendation from current employer affirming and requesting designation as a Dive Supervisor;

m. Shall not have any USACE, NWP Office of Dive Safety citations and / or supervised dive site issues with a Federal and / or State OSHA violation within the previous 5 years prior to application;

n. Qualification as a Dive Supervisor and acceptance to supervise a USACE Portland District dive project is at the sole discretion of the Office of Dive Safety.

2. Diver:

a. Must meet or exceed all qualifications listed in: EM 385-1-1 (Current Revision), and NWPR 385-1-93 (Current Revision);

b. All training documentation shall be in compliance with 29 CFR 1910.410;

c. Must be sponsored by a CDC, MDU, or USACE Dive Team;

d. Must have completed an accredited college, commercial, US military or other government-sponsored dive school;

e. With less than five (5) years of documented dive-team experience, must submit dive school transcripts;

f. Must have at least one (1) year of experience working as a tender on USACE Portland District dive operations working a minimum of three (3) projects; or must have at least one (1) year of experience working as a diver and/or tender on other USACE or commercial dive operations working a minimum of six (6) projects;

g. Must possess valid CPR, 1st Aid, and Dive Emergency Oxygen Administration training, BLS or EMT with dive accident management endorsements. DMT and/or EDAM preferred;

h. Must have documented training in and a minimum of one (1) year of experience diving according to protocols required by a specialty dive operation. Examples include but are not limited to: Mixed Gas, Surface Decompression with Oxygen (Sur-D-O2); Altitude Diving, Deep Diving, etc.;

i. Should participate annually in a simulated work-site specific dive accident, dive causality management exercise as coordinated by the Office of Dive Safety.

j. Must not have any documented USACE, NWP Office of Dive Safety citations and / or been a subject of Federal and / or State OSHA violations within the last 5 years;

k. Qualification as a Diver and acceptance to work on a USACE Portland District dive project is at the sole discretion of the Office of Dive Safety.

3. Tender:

a. Must meet or exceed all qualifications listed in: EM 385-1-1 (Current Revision), and NWPR 385-1-93 (Current Revision). All training documentation shall be in compliance with 29 CFR 1910.410;

b. Must be sponsored by a Commercial Dive Company, Military Dive Unit, or USACE Dive Team;

c. Must have attended an accredited college, commercial, US military or other government-sponsored dive school;

d. With less than five (5) years of documented diving-team experience, must submit school transcripts;

e. Must possess valid CPR, 1st Aid, and Dive Emergency Oxygen Administration training, BLS or EMT with dive accident management endorsements. DMT and / or EDAM preferred;

f. Should participate annually in a simulated work-site specific dive accident, dive causality management exercise as coordinated by the Office of Dive Safety;

g. Must not have any documented USACE, NWP Office of Dive Safety citations and / or been a subject of Federal and / or State OSHA violations within the last 5 years;

h. Qualification as a Tender and acceptance to work on a USACE Portland District dive project is at the sole discretion of the Office of Dive Safety.

NOTE: As per EM 385-1-1, Section 1, 01.A.17 – "The contractor shall employ a competent person at each project (is) to function as the Site Safety and Health Officer (SSHO)" … who, as a minimum, "must have completed the 30-hour OSHA Construction Safety Class within the previous three years to beginning the dive project." This assignment may be collateral to duties previously listed above exclusive of the in-water diver or standby diver.

NOTE:

a. **CPR certification training, with AED endorsement, *must include a hands-on component in accordance with OSHA requirements*, successfully completed bi-annually and comply with the most current Emergency Cardiac Care Conference (ECCC) guidelines;**

b. **Dive-Accident Oxygen 1st Aid certification training must be successfully completed bi-annually. Curriculum must include demand inhalator, non-rebreather, and pocket mark application. *Training must be dive specific and include hands on. On-Line training is not accepted*;**

c. **First Aid certification training may be successfully completed every two or three years depending on training agency requirements. First Aid curriculum must include in-line stabilization, back-boarding, neck collaring, five (5)-minute field neurological examination, and drowning intervention.**

d. **All Dive Team members shall be Basic Life Support (BLS) certified from a nationally accredited certification agency.**

APPENDIX B-1

CONTRACT SPECIFICATIONS FOR CONTRACT DIVE SAFETY INSPECTOR (CDSI)

Scope of Work: The Contract (CDSI), Military, or Federal Agency Dive Safety Inspector (FADSI) on loan shall furnish management, supervision, personnel, and materials, supplies, equipment, transportation and vehicles as requested except as otherwise provided, and are required to perform the following duties;

The CDSI / FADSI shall:

a. Control the conduct of all diving operations as assigned by the District Diving Coordinator (DDC) occurring within the U.S. Army Corps of Engineers Portland District jurisdiction to insure that all diving operations comply with pertinent OSHA and USACE regulations and policies governing contract, military and/or USACE diving operations. The CDSI / FADSI are required to inform the Office of Dive Safety of any safety concerns observed. On authority of the DDC, all diving operations will be halted immediately if there is any reason to believe that the operation cannot be accomplished safely. (See Deficiency Documentation as listed below.)

b. With the aid and assistance of the Dive Supervisor, the CDSI / FADSI shall facilitate a pre-dive safety briefing before onset of any diving operations. This meeting shall at a minimum address all safety concerns and remedies outlined in the Activity Hazard Analysis and review the Dive Plan as submitted by the Dive Contractor, Military Dive Unit, or USACE Dive Team and accepted by the Office of Dive Safety.

c. Insure that all diving operations are video recorded according to the pertinent contract requirements and submit the recording(s) in DVD format to the Office of Dive Safety upon completion of the work.

d. Maintain dive logs for each dive operation. Insure that all dives follow applicable standards established by the latest revisions of EM 385-1-1, NWPR 385-1-93, U.S. Navy Dive Manual and the Consensus Standards of the Association of Diving Contractors. Submit daily dive summary reports to the Office of Dive Safety.

e. Act as a Dive Safety liaison between the Portland District Safety Office, Office of Dive Safety, Dive Supervisor, Prime Contractor, and USACE project personnel.

f. When dive operations occur at a USACE facility or off a USACE vessel, act as primary point of contact with Project Control Room Operators or Ship's Master through government provided radio or cell phone. Inform Control Room or Ship's Bridge as to status of the dive during course of operations. Inform Control Room Operator and Ship's Master when diver enters and exits water. Acts as primary point of contact in case of emergency coordinating with Control Room or Ship's Bridge to provide emergency services as needed.

g. Report to the Office of Dive Safety immediately before commencement of and immediately after termination of all diving operations. Evaluates in writing the performance of dive contractors, military dive units, and/or USACE dive teams and their personnel. Makes recommendations for dive operation improvements.

h. Shall upon the request of the USACE Portland District, District Dive Coordinator be required to annually participate and / or facilitate a simulated work-site specific dive accident, dive causality management exercise as coordinated by the Office of Dive Safety.

NOTE: At no time will the Contract Dive Safety Inspector (CDSI), Military, or Federal Agency (FADSI) Dive Safety Inspector approve, direct, or accept responsibility for modifying the Scope of Work or accepted Dive Plan. In no case shall the CDSI / FADSI allow any activity not within the approved Scope of Work or accepted Dive Plan without the express approval of the Office of Dive Safety prior to commencement of the dive operation.

Background: All activities required by this contract will occur within the Portland District, U.S. Army Corps of Engineers. Primary sites where diving activities occur include, but are not limited to, Bonneville Lock and Dam, Cascade Locks Oregon; The Dalles Lock and Dam, The Dalles, Oregon; Willamette Falls Locks, Oregon City, Oregon; John Day Dam, Rufus, Oregon; U.S. Government Moorings, Portland Oregon; Willamette Valley Project (13 multi-purpose dam sites with headquarters in Eugene, Oregon); Rogue River Basin Project, Trail, Oregon. Dive activities may also occur at various coastal locations or on the lower Columbia River in support of the USACE dredge fleet.

Working Hours: Unless otherwise specified, normal working hours except as specified below shall be 0700 to 1700 hours, Monday through Friday, federal holidays excluded. Emergency working hours are as declared.

Certifications & Training: The CDSI / FADSI shall at their own expense obtain any certifications or training required to perform a contract and maintain certification currency. At a minimum, one USACE-sponsored Dive Safety class must be successfully completed.

Identification of Contract Employees and Vehicles: The contractor shall obtain government-provided personal identification badges and vehicle identification tags as required at each Project. Badges and tags must be returned upon request or at completion of contract.

Safety And Security Requirements: The CDSI / FADSI shall comply with all standards of the most current revisions of the USACE Safety and Health Requirement (EM-385-1-1), Portland District Diving Regulation (NWPR 385-1-93); the provisions of the Occupational Safety and Health Act (OSHA- Part 1910, Subpart T- Commercial Diving Standards) governing diving operations and/or U.S. Coast Guard Commercial Diving Standards, as applicable. All diving operations shall use the U.S. Navy Diving Manual air diving tables or other specialty (Mixed Gas, etc.) U.S. Navy dive table as applicable.

NOTE: ALL CDSI-ONLY BID SUBMITTALS AND CONTRACTS MUST INCLUDE THE FOLLOWING STATEMENT:

"The CDSI will ensure the Dive / Work plan and related dive and/or other underwater operations will strictly conform to all regulations set forth in NWPR 385-1-93 (Current Revision) and EM 385-1-1 (Current Revision) and other applicable regulations. Failure to do so may result in the immediate termination of the CDSI contract in force and may incur chargeback's related to the delay of the dive contract and / or loss of work eligibility status by the USACE Portland District Office of Dive Safety and / or other sanctions as deemed appropriate by the USACE Portland District.

Site Access: The CDSI / FADSI shall be provided keys and / or keycards required for performing this contract. These items shall remain the property of the government and be returned to the issuing office upon completion of the work. None of these items may be duplicated or loaned without the express approval of the Facility Operations Manager. The loss of any of these items will result in a deduction of $10.00 per lost or damaged key or key card from the payment due the contractor.

Accident Reporting: All serious accidents (those resulting in death or injury requiring medical attention) by either the contractor or any person of the contract, military, or USACE dive team shall be reported to the Office of Dive Safety, the facility Control Room Operator and the District Safety Office immediately, followed by a "Preliminary Accident Report" (PAN). The contractor shall submit a written report to the Office of Dive Safety within 24 hours of the accident and submit an ENG 3394 within 12 days of the PAN. The Office of Dive Safety will immediately be notified of all accidents occurring at the dive station.

Damage Reports: In all instances where Government property and / or equipment are damaged by the contractor, a full report of the incident and extent of damage shall be submitted to the Office of Dive Safety within one (1) work day.

CDSI / FADSI Employees: All CDSI / FADSI employees shall conduct themselves in a professional manner consistent with safe diving practices at all times. No alcoholic or intoxicating beverages, illegal drugs or controlled substances not prescribed by a physician shall be possessed or consumed while on duty. Prescription and / or over-the-counter medications causing impairment shall not be taken 24-hours prior to a dive operation.

Conflict Of Interest: The CDSI / FADSI either individually or as a business, or member of their immediate family shall not be employed by the dive contractor, a subsidiary, or a regional competitor. A CDSI / FADSI shall not be related to any member of the working dive team they are contracted to inspect. The CDSI / FADSI or any member of their immediate family shall not have a financial interest or other affiliation with any dive company they inspect. The CDSI / FADSI may not be related to any member of the contract, military, or USACE dive team.

Quality Assurance: The Office of Dive Safety will monitor the CDSI / FADSI's performance though on-site visits, review of submitted records and meetings. If the CDSI fails to perform according to the requirements of this regulation or awarded CDSI contract, a Notice of Contract Deficiency will be issued. The contractor shall explain, in writing, why performance was not satisfactory and how reoccurrence of the problem will be prevented in the future. If a second Notice of Deficiency is issued, the offending CDSI will be disqualified from working USACE Portland District dive operations for a period of one (1) year.

Deficiency Documentation: In case of dive team or dive contractors regulatory non-compliance, the CDSI will submit to the Office of Dive Safety within 24 hours written and / or photographic documentation of the dive team's and dive contractor's deficiency.

Government Provided Communications: The contractor shall be provided government owned radios and/or cell phones when required to perform their contract. These items will be the responsibility of the contractor and shall be returned in the same condition as issued.

Contractor Provided Items: The contractor shall provide all safety equipment as required by the Portland District Project, Portland District or as stated in the USACE Safety and Health Requirements Manual. These items include, but are not limited to, Personal Flotation Devices (PFD), hardhats, safety boots, and safety glasses.

Qualifications of a Contract Dive Safety Inspector:

Each person performing duties as a Contract Dive Safety Inspector shall at a minimum have the following qualifications:

a. Successful completion of and current certification from a recognized commercial, government-sponsored, military, or USACE dive training program.

b. Five (5) years of commercial, government or military dive experience including three (3) years supervising divers in underwater inspection and construction activities.

c. Have documented training, a minimum of one (1) year of experience, and be certified in recompression chamber operations. Be trained and / or certified in Sur-D-O2 operations.

d. Be familiar with the most current edition and / or revision of USACE Safety and Health Requirements Manual, EM 385-1-1 and USACE Portland District Dive Regulations NWPR 385-1-93.

e. Have knowledge of USACE document submittal requirements for diving operations, including Dive Plans, Emergency Management Plans, and Activity Hazard Analysis.

f. Have prior documented supervisory experience as a dive safety inspector, diver support crew member or diver at shipyards, navigation locks, hydroelectric and / or dam facilities.

g. Have current First Aid / CPR / AED and Dive Emergency Oxygen Administration provider certification. BLS or EMT with dive accident management endorsements (DMT) or Emergency Dive Accident Management (EDAM) certification preferred.

h. Have, at a minimum, completed the 30-hour OSHA Construction Safety Class or equivalent applicable to the work to be performed. Such training shall have been within the last three (3) years. OSHA HazMat and Confined Space training desired.

i. Have dive-specific specialty certifications, including but not limited to, decompression, high-altitude diving, NITROX and / or Mixed Gas, if medium is scheduled to accomplish dive.

j. Have, at a minimum, certified training and at least five (5) years of crane operations and rigging experience

k. Possess a valid U.S. driver's license and be current on all required certifications.

l. Upon application in writing to the USACE District Dive Coordinator, qualification waivers may be granted.

Contractor Requirements: The contractor shall have the following required items.

1. Insurance:

a. Workman's Compensation and Employer's Liability Insurance as legally required by the State wherein the work is being performed.

b. Comprehensive, bodily injury and property damage liability; minimum amounts of $1,000,000 for injury to or death of any person, and $100,000 for each accident or occurrence for property damage liability.

c. Automobile bodily injury or property damage liability; minimum limits of $1,000,000 for injury or death of any person and $1,000,000 for each accident or occurrence for bodily injury liability; and $100,000 for each accident or occurrence for property damage.

d. Other necessary coverage required by Federal Contracting regulations, and / or the Longshoreman and Harbor Worker's Compensation Act or Jones Act.

e. When utilizing a dive contractor's working platform, i.e. boat, barge, etc. the Contract Dive Safety Inspector shall provide the vessel owner with a "Certificate of Insurance" listing the vessel's owner(s) as an "Additional Insured" for the duration of the dive operation if requested.

Payments: The CDSI shall be paid only for work accomplished and performed in accordance with these specifications and the requirements of the task orders. The contractor's administrative time to accomplish work including time spent traveling to the work site, will not be considered as work for payment. Invoices shall be submitted within two (2) weeks of the accomplished work, or bi-weekly for project assignments four weeks in length or longer to USAED, Portland, C/O USACE Finance Center, CEFC-AO-P, 5720 Integrity Drive, Millington, TN 38054-5005, with a copy sent to the District Diving Coordinator, Office of Dive Safety, USACE Portland District, P.O. Box 2946, Portland, OR 97208-2946.

NOTE: A Contract Dive Safety Inspector on loan from a federal agency via MIPR shall follow all related USACE guidelines and policies.

APPENDIX C

DIVE PLAN PACKAGE

1. Dive Plans: An operational Dive Plan shall be developed by the contractor for each diving operation. A separate Dive Plan will be developed for all separate dive operations even if performed by the same dive team on the same day. Project-specific information needed to write the Dive Plan may be obtained from the USACE Portland District Office of Dive Safety. This Dive Plan must be accepted by the Office of Dive Safety prior to the commencement of any dive operations. A copy of the accepted Dive Plan Package must be at the dive site at all times and be available to the government representative upon request. The Dive Plan will be reviewed in detail at the pre-dive conference. No part of the Dive Plan shall be altered, revised or changed in any part without the expressed consent of the District Dive Coordinator or Alternate. All Dive Plans become a part of the contract file.

At a minimum, the Dive Plan shall meet all elements required by the most current revision of the EM 385-1-1 and NWPR 385 1-93 to include:

- **a.** Purpose of dive;
- **b.** Nature of work to be performed;
- **c.** Names of all dive team members with each dive team member's assignment clearly defined;
- **d.** Updated and / or amended diver or dive-team credentials;
- **e.** Date, time, and location of dive;
- **f.** Diving method to be utilized, SCUBA, SSA, Mix Gas, or NITROX;
- **g.** Type of dive; No-decompression, Decompression, High Altitude, etc.;
- **h.** Recompression schedule and method if required. Planned safety stops;
- **i.** Diving platform: boat, man basket, land;
- **j.** Anticipated dive environment, to include but no be limited to, expected surface and bottom conditions, visibility, temperature, currents, etc.;
- **k.** Planned rotation of divers and dive-team members;
- **l.** Type of hand tools being utilized if any;
- **m.** Post-dive procedures, including dive log completion and diver observation.

NOTE: ALL DIVE PLANS MUST INCLUDE THE FOLLOWING STATEMENT:

"This Dive/Work plan and related dive and/or other underwater operations will strictly conform to all regulations set forth in the most current revision of the NWPR 385-1-93 and EM 385-1-1. Failure to do so may result in the immediate termination of the dive operation, cancellation of the dive contract and / or loss of work eligibility status by the USACE Portland District Office of Dive Safety and / or other sanctions as deemed appropriate by the USACE Portland District.

2. Emergency Management Plan: A site-specific Emergency Management Plan shall be prepared in accordance to EM 385-1-1, Section 30.A.18 by the contractor for each dive and submitted to the Office of Dive Safety for acceptance with the Dive Plan. At a minimum, content of the Emergency Management Plan shall include, but not be limited to:

- **a.** Location, distance from dive site, and telephone number of nearest operational (dual-lock, multi-place) recompression chamber in compliance with EM 385-1-1 if not located at the dive site;
- **b.** Location and telephone number(s) of nearest hospital(s);
- **c.** Method of available transportation (air or land) to nearest hospitals, including distance from dive site, approximate time to dive site, telephone numbers;
- **d.** Emergency access to dive site;
- **e.** Procedures, including telephone numbers or alternate methods of communications, to activate emergency management services at facility where dive operation is being performed;
- **f.** Site-specific protocols for extricating an entrapped or fouled diver;
- **g.** Actions to overcome loss of life-support or mission-support equipment;
- **h.** Actions to overcome interruption of life-support or mission-support equipment;
- **i.** Actions to locate / recover a lost-diver;
- **j.** Actions to extricate an injured diver or dive support personnel;
- **k.** Actions to extinguish a fire.

NOTE: All dive teams under contract to the USACE Portland District are required upon request of the District Dive Coordinator to annually participate and/or facilitate a simulated work-site specific dive accident, dive causality management exercise as coordinated by the Office of Dive Safety.

3. Activity Hazard Analysis: The AHA shall define the activities being performed and identify the sequences of work, the specific hazards anticipated, site conditions, equipment, materials, and control measures to be implemented to best eliminate and/or reduce each hazard. An Activity Hazard Analysis (AHA) represents the dive team's best effort to anticipate and mitigate or prevent the adverse effects of equipment failure, weather, or other unexpected events. Each AHA will be job and site specific. The AHA will be reviewed in detail at the pre-dive safety conference. Copies of applicable tag-out/lock-out clearances obtained from the dive site will be attached to the AHA. The AHA shall be prepared in accordance with the US Army Corps of Engineers Safety and Health Requirements Manual, EM 385-1-1, Section 1, paragraph 01, A.14.

4. Required Supporting Documentations

a. Accident Prevention Plan;
b. Spill Prevention Plan;
c. Dive Team Certifications and qualification documents:
a. Recent Dive Logs (previous six (6) months);
b. Company Endorsement and Letter of Instatement;
c. Current BLS, CPR, First Aid, O2;
d. Current "Physician-signed," (MD or DO) Medical Approval to Dive;
e. Other Specialty Endorsements, including but not limited to:
    - OSHA 30 Hour Safety Course;
    - OSHA 40-hour Hazardous Materials Course;
    - NITROX, Mix Gas; Saturation;
    - DMT / EDAM (for Recompression Chamber Operators);
    - Dive School Diploma and Course Transcripts;
d. Dive Station Equipment Certifications:
    - Certificates of Air Quality;
    - Gauge Calibrations (Pneumatic and or Pressure);
    - Dive Hose / Umbilical Hydrostatic Test Results;
    - Recompression Chamber and volume tanks;

APPENDIX D

USACE PORTLAND DISTRICT OFFICE OF DIVE SAFETY REQUIREMENTS EXCEEDING EM 385-1-1 MINIMUMS

Due to local dive environments and site-specific hazards, the following list exceeding minimum standards published by the USACE Safety and Health Requirements Manual, EM 385-1-1 (Current Revision) has been established by the Portland District Office of Dive Safety and incorporated in NWPR 385-1-93 (Current Revision). Adherence to these enhanced standards is mandatory for all USACE Portland District dive operations unless waived by agreement or governed by a Memorandum of Agreement (MOA) on file in the USACE Portland District Office of Dive Safety. **This Appendix D may be amended without notice to include additional requirements as determined by the Office of Dive Safety.**

Diver Equipment:

1. When utilizing Surface Supplied Air, bailout bottles must be pressurized to a minimum of 3,000 PSI plus or minus 10-percent and hold at least 50 cubic feet of air.

2. All bailout systems must utilize a diver worn standard submersible pressure gauge (SPG) viewable in-water by the diver and attached to the first stage by a minimum 36-inch high pressure hose.

3. Diving in water 38-degrees-F or less, or when diving in contaminated water, first stage regulators attached to bailout bottles as part of a bailout system shall be environmentally sealed and / or cold-water rated by USN list of approved equipment.

4. All dive equipment must be worn, utilized, and maintained according to manufacturer standards.

5. Divers diving in water less than 46-degree-F for accumulated bottom times exceeding 45 minutes or less than 36 degrees-F for accumulated bottom times exceeding 20 minutes shall require hot water diving systems. Unless waived by the Portland District of Dive Safety, variable-volume dry suits with appropriate thermal protection shall be utilized by divers working in waters 60 degrees or less. **Utilizing a quick-disconnect inflator hose is mandatory for all dry suit diving.**

6. Appropriate thermal protection (undergarment made of Polartec, Thinsulate, or equivalent material) shall be worn by the diver(s) when utilizing a dry suit system in water colder than 60-degrees-F. Exposure shall be limited to 180 minutes (three (3) hours) with a minimum of one (1) hour surface rest in a dive-site's sheltered and heated environment.

7. A sheltered and heated environment must be provided to the standby diver at the dive site in weather where the air temperature with or without wind chill is 50-degrees-F or less.

8. Hot water suit systems shall have at least a non-adjustable high temperature limit switch (125-degree maximum), in combination with at least one of the following safety devices to prevent diver scalding; expansion tank, boiler shutdown water flow switch, pressure relief valve on volume tank and/or boiler, locking control box.

9. Diver umbilical lines shall be secured to at least one attachment point on the diver's harness. Lines are required to be secured at a minimum of one (1) attachment point.

10. SCUBA Diving is allowable only with prior permission obtained from the USACE Portland District Office of Dive Safety.

Diver-Support Equipment:

1. A minimum of 60 minutes of portable oxygen (Jumbo-D or M-9 type cylinder) with appropriate delivery system (demand inhalator, demand resuscitator, non-re-breather or pocket mask with O2 inlet) shall be immediately available at all dive sites.

2. A backboard, Miller Board or stokes litter with flotation, head & neck immobilizer, and a minimum of four color-coded straps with quick-release buckles shall be immediately available at all dive sites.

Dive-Team Qualifications:

1. Minimum dive team staffing shall, unless a waiver is approved by the Portland District Office of Dive Safety, be comprised of personnel levels as required by EM 385-1-1 and NWPR-1-93: a single diver requires a five (5)-man crew as defined in this reference and for two in-water working divers, a seven (7)-man crew shall be required, which includes the addition of one (1) stand-by diver and one (1) tender. For depths exceeding 100 ft. a six (6)-man crew is required. Any use of breathing gas with oxygen content more than 21 percent is considered mixed gas diving. A minimum six (6)-person crew is required for all mixed gas diving.

2. In addition to the dive team personnel addressed in the above paragraph, minimum required certified chamber crew personnel shall be provided as diving operations dictate.

3. All on-site dive team surface-support members shall be certified in Basic Life Support (BLS) with emergency dive accident management endorsements. At least one non-diving member of the dive team shall be certified as a Diving Medical Technician (DMT / EDAM); Emergency Medical Technician (EMT-B) with emergency dive-accident management endorsements preferred. Certifications must be documented, current and on file with the USACE Portland District's Office of Dive Safety.

4. CPR certification training, with AED endorsement, must be successfully completed bi-annually and comply with the most current Emergency Cardiac Care Conference (ECCC) guidelines; Dive-Accident Oxygen 1st Aid certification training must be successfully completed bi-annually. Curriculum must include hands on training of the demand inhalator, non-rebreather, and pocket mask application. **On-Line training is not accepted**;

5. Diver-team members with less than five (5) years' experience must submit an official dive-school transcript as part of their application package.

6. To maintain USACE work eligibility, divers, dive team members, and dive contractors are required to have worked on an Army Corps of Engineers or similar project / dive operation (preferably on a Portland District project) within the previous 12 months.

7. Dive physicals should be performed and / or supervised by a physician familiar with hyperbaric medicine. All dive physicals must utilize a standardized industry dive medical form and be signed and stamped by the examining physician and should have the physician's DEA number affixed. Dive physicals given by a physician assistant, nurse, or other medical practitioner will not be accepted.

8. Each diver shall undergo a re-examination to receive medical clearance to dive after experiencing any pressure-related diving injury requiring medical attention including, but not limited to, ruptured tympanic membrane, pneumothorax, decompression sickness, etc., or other non-diving illness or injury requiring emergency intervention or hospitalization.

Miscellaneous:

1. A prime dive contractor or diving sub-contractor or any company subsidiary shall not have received a Serious, Willful, or Repeat State or Federal dive-related OSHA safety violation within the 12 months preceding the contract scheduled start date.

2. Video recordings of dive operations shall be in DVD format.

3. All vessels utilized to facilitate a dive operation in a Boat Restricted Zone (BRZ) shall have an appropriate secondary, independent means of motorized power.

4. Subcontractors of a dive operation shall provide a "Certificate of Insurance" to owner(s) of any vessel jointly utilized during said dive operation.

5. Subcontractors of a dive operation shall name owner(s) of any vessel jointly utilized as an "Additionally Insured" for the duration of said dive operation.

6. All dive teams under contract to the USACE Portland District are required upon request of the District Dive Coordinator to annually participate and / or facilitate a simulated work-site specific dive accident, dive causality management exercise as coordinated by the Office of Dive Safety.

7. The maximum allowable daily in-water work period for divers is four (4) hours per calendar day. The maximum allowable daily work shift for all dive-team members is 12 hours per calendar day.

8. Upon written application to the USACE District Dive Coordinator, waivers to the listed requirements in NWPR 1-93 may be granted by the Office of Dive Safety for cause.

9. **ALL DIVE PLANS SHALL INCLUDE THIS STATEMENT:**

"This Dive/Work plan and related dive and/or other underwater operations will strictly conform to all regulations set forth in the current revision of the NWPR 385-1-93 and EM 385-1-1. Failure to do so may result in the immediate termination of the dive operation, cancellation of the dive contract and / or loss of work eligibility status by the USACE Portland District Office of Dive Safety and / or other sanctions as deemed appropriate by the USACE Portland District."

APPENDIX E

PROCEDURE FOR CORRECTIVE ACTION

1. Policy Statement: The United States Army Corps of Engineers Portland District's Office of Dive Safety provides a progressive system of Corrective Action to notify dive contractors, divers, and other dive team members, and contract dive safety inspectors when unsatisfactory and / or unsafe conduct, communication, or performance occurs at or during an USACE annual re-qualification audit or dive operation as determined by the Office of Dive Safety. Although this policy outlines a three-step process, it is within the discretion of the Office of Dive Safety to elect any step within the policy up to and including immediate withdrawal of work eligibility status and removal from the dive site.

NOTE: Corrective action taken against a dive contractor, dive-team member, or contract dive safety inspector by the Portland District Office of Dive Safety may be grounds for disqualification to work at other USACE dive projects in other USACE Districts.

2. Purpose: The purpose of this policy as applied by the Portland District Office of Dive Safety is to establish and outline the process for identifying, documenting, analyzing, and implementing corrective and preventative actions. The intent of this policy is to provide remediation and guidance to correct violations of the EM 385 1-1, NWPR 385-1-93 (current revisions), and / or other referenced material applicable to dive operations in the USACE's Portland District as well as punitive sanctions if necessary.

3. Process: Dependent on the seriousness of deficiency and / or number of violations, a Notice of Deficiency, a Notice of Unsatisfactory Performance, or a Notice of Action will be written by the Office of Dive Safety and delivered to the offending party by registered mail within five (5) working days of infraction(s).

NOTE: Any federal and / or state OSHA dive-related safety violation is cause for immediate exclusion from working in the USACE Portland District for a period of one year from the initial violation citation date, exclusive of the policy procedures contained within NWPR-1-93 (current revision).

STEP ONE:

Notice of Deficiency: This is a proactive process intended to prevent reoccurrences of safety concerns and / or regulatory violations as observed and interpreted by the Office of Dive Safety or its representative. A written response outlying corrective action addressing the infraction(s) and / or cause of the Notice of Deficiency as well as long-term preventative solutions are required to be submitted to the Office of Dive Safety within 10 working days of receipt.

STEP TWO:

Notice of Unsatisfactory Performance: This is a reactive process initiated when a response and / or corrections required by the Notice of Deficiency are not initiated. A Notice of Unsatisfactory Performance may also be written for concerns, including but not limited to, inability to perform according to contract or multiple and/or egregious violations of safety and regulatory policy as observed and interpreted by the Office of Dive Safety or its representative. A written response outlying corrective action addressing the infraction(s) and/or cause of the Notice of Unsatisfactory Performance as well as long-term preventative solutions are required to be submitted to the Office of Dive Safety within five (5) working days of receipt.

STEP THREE:

Notice of Action: This is the penalty phase when corrective actions and penalties are proposed by the Office of Dive Safety. This action may include, but not be limited to, contracting charge backs, work eligibility status audit, sanction, and / or permanent disqualification from working on USACE Portland District projects.

INTERNAL RIGHT OF APPPEAL: Recipients of a Notice of Deficiency or Notice of Unsatisfactory Performance may appeal to the Office of Dive Safety.

US Army Corps
of Engineers

Portland District

BONNEVILLE LOCK AND DAM SUBSURFACE INVESTIGATION AND LIQUEFACTION ANALYSIS

SUBSURFACE INVESTIGATION REPORT

CONTRACT NO.: W912EF-11-D-0002
TASK ORDER: DT06

PREPARED BY:
INCA/ANDERSON PERRY JOINT VENTURE

IN ASSOCIATION WITH SHANNON & WILSON, INC. AND BRIDGE DIAGNOSTICS INC.

APRIL 2017

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FINAL REPORT

BONNEVILLE LOCK AND DAM

SUBSURFACE INVESTIGATION AND LIQUEFACTION ANALYSIS

CASCADE LOCKS, OR

PREPARED FOR USACE, PORTLAND DISTRICT

PREPARED BY INCA/ANDERSON PERRY JOINT VENTURE

PROJECT NUMBER: 100-RCE-10-079Y

APRIL 2017

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CERTIFICATE OF ENGINEER

The work contained herein was prepared under the supervision and direction of the undersigned.

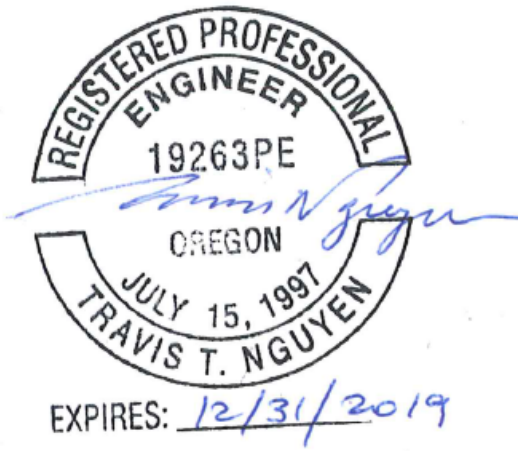

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TABLE OF CONTENTS

EXECUTIVE SUMMARY ..... **v**
1.0 INTRODUCTION **1-1**
1.1 PROJECT BACKGROUND 1-1
1.2 SCOPE OF WORK 1-1
2.0 SUBSURFACE EXPLORATION **2-1**
2.1 GENERAL 2-1
2.2 REGIONAL GEOLOGY AND SEISMIC SETTING 2-1
2.2.1 REGIONAL GEOLOGY 2-1
2.2.2 SEISMIC SETTING 2-2
2.3 GEOTECHNICAL SUBSURFACE EXPLORATIONS 2-4
2.3.1 DRILLING 2-4
2.3.2 MATERIAL DESCRIPTIONS 2-5
2.3.3 BORING LOGS 2-5
2.3.4 BOREHOLE DEVIATION SURVEYS 2-5
2.4 LABORATORY TESTING 2-6
2.4.1 MOISTURE (NATURAL WATER) CONTENT 2-6
2.4.2 ATTERBERG LIMITS 2-6
2.4.3 PARTICLE SIZE ANALYSIS 2-6
2.5 SUBSURFACE CONDITIONS 2-8
2.5.1 GEOTECHNICAL UNITS 2-8
2.5.2 GROUNDWATER 2-10
2.6 REFERENCES 2-10
3.0 GEOPHYSICAL TESTING **3-1**
3.1 GENERAL 3-1
3.2 INTERPRETATION OF DATA 3-2
3.3 SITE GEOLOGY 3-2
3.4 REFERENCES 3-3

APPENDICES

A. Geotechnical Subsurface Explorations
B. Laboratory Test Results
C. Crosshole Sonic Logging Results
D. Parallel Seismic Results

TABLES

TABLE 2-1 USGS CLASS A FAULTS WITHIN AN APPROXIMATE 30-MILE RADIUS OF THE PROJECT 2-3
TABLE 2-2 LABORATORY TESTING SUMMARY BY GEOTECHNICAL UNIT 2-7
TABLE 3-1 AVERAGE WAVE VELOCITY AS A FUNCTION OF DEPTH 3-3

FIGURES

FIGURE D-1 RESULTS OF PARALLEL SEISMIC TESTING – SIDE IMPACT D-1
FIGURE D-2 RESULTS OF PARALLEL SEISMIC TESTING – TOP IMPACT D-1

Acronyms and Abbreviations

Bpf	Blows per foot
CRBG	Columbia River Basalt Group
CSL	Crosshole Sonic Logging
CSZ	Cascadia Subduction Zone
LL	Liquid Limit
NDT	Nondestructive Testing
PI	Plasticity Index
PL	Plastic Limit
PS	Parallel Seismic
SPT	Standard Penetration Test
USACE	United States Army Corps of Engineers
USGS	United States Geological Survey

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EXECUTIVE SUMMARY

The majority of the work for this project was performed by Shannon & Wilson (Geotechnical) and Bridge Diagnostics, Inc. (Geophysical).

Geotechnical Subsurface Exploration

The drilling program included two geotechnical borings (GT/GP-1 and GT-2), which were sampled continuously, and three geophysical borings (GP-1, GP-2, and PS-1), which were not sampled or logged. Boring depths ranged from 100 to 110 feet. The laboratory-testing program included moisture content analyses, Atterberg limits testing, and particle size analyses. The encountered subsurface conditions generally consisted of 20 to 28 feet of predominantly gravel and cobble fill material over stratified alluvial deposits, which included layers of gravel, sand, silt, and clay. An older, weakly to moderately cemented alluvial gravel unit was encountered near the bottoms of the geotechnical borings, below depths of 108 feet in GT/GP-1 and 91 feet in GT-2.

Geophysical Subsurface Exploration

The Crosshole Sonic Logging (CSL) testing was performed between borings GP-1 and GP-2 with an objective of determining the shear and compression wave velocities of the material as a function of depth. The PS testing was performed to determine the depth of the timber piles underneath Pier 5.

Shear wave velocities varied with a minimum of 640 ft/sec., maximum of 2,405 ft/sec., average of 1,526 ft/sec., and standard deviation of 367 ft/sec. Compression wave velocities varied with a minimum of 2,263 ft/sec., maximum of 4,855 ft/sec., average of 3,122 ft/sec., and a standard deviation of 560 ft/sec. The fill layer had average shear and compression wave velocities of 1,566 ft/sec. and 3,483 ft/sec., respectively; the gravel alluvium layer had average shear and compression wave velocities of 1,522 ft/sec. and 2,995 ft/sec, respectively; the sand and silt alluvium layer had average shear and compression wave velocities of 1,790 ft/sec. and 3,041 ft/sec, respectively; and pre-slide gravel alluvium layer had average shear and compression wave velocities of 1,878 ft/sec. and 3,808 ft/sec, respectively. The PS testing and analysis indicates that the pile depths continue past the depth of the boring.

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1.0 INTRODUCTION

1.1 PROJECT BACKGROUND

Bonneville Lock and Dam is located 145 river miles from the mouth of the Columbia River and about 40 miles east of Portland, OR near Cascade Locks, OR and North Bonneville, WA. The U.S. Army Corps of Engineers (USACE), Portland District plans to conduct geotechnical subsurface explorations and geophysical subsurface testing for the Navlock 1 Swing Bridge, which crosses the original navigation lock at the Bonneville Dam site. This bridge carries essential plant personnel to the site as well as visitors to the Visitor Center.

1.2 SCOPE OF WORK

The scope of the geotechnical subsurface work was to determine the type, nature, characteristics, and properties of the subsurface materials, and the extent and conditions of the various materials, as they exist at the Navlock 1 Swing Bridge. The scope of the geophysical subsurface testing was to determine geometric properties (length, diameter, taper) of the timber piles currently supporting Pier 5 of the existing swing bridge. These determinations were accomplished by means of subsurface drive sample borings; subsurface cross-hole geophysical measuring; and geophysical testing (NDT) of select bridge piers, utilizing the Parallel Seismic (PS) method.

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2.0 SUBSURFACE EXPLORATION

2.1 GENERAL

This chapter presents a discussion of the regional geology and seismic setting, followed by details of the field exploration and laboratory testing programs and a summary of the subsurface conditions encountered.

2.2 REGIONAL GEOLOGY AND SEISMIC SETTING

2.2.1 REGIONAL GEOLOGY

Bonneville Dam is located in the Columbia River Gorge, approximately 145 miles upstream from the mouth of the Columbia River. Geologic mapping of the area, compiled by Korosec (1987), shows three primary bedrock units in the vicinity of the project site. The oldest near-surface unit is the early Miocene (about 23- to 17-million-year-old) Eagle Creek Formation, which consists of stream-deposited sandstone, conglomerate, and semi-consolidated debris flows and tuff breccias derived from scattered volcanic centers in the Cascade Range (Beaulieu, 1977). The Eagle Creek Formation is exposed in the core of the Cascade Range along the Columbia River. The formation is locally overlain by the middle to late Miocene Columbia River Basalt Group (CRBG). The CRBG is a series of basaltic lava flows that originated near the Oregon-Idaho border and inundated the project area between about 17 and 6 million years ago. Rocks of the CRBG make up most of the steep basaltic cliffs visible throughout the Columbia River Gorge. The third bedrock unit in the project area is a basaltic intrusion, also of Miocene age, that crosscuts the Eagle Creek Formation and may or may not be younger than the CRBG (Korosec, 1987). The intrusive basalt makes up the pronounced, rocky, topographic high that is roughly 150 to 200 feet southeast of the project site.

After emplacement of the CRBG lava flows, the Columbia River began to cut down through the basalt. Throughout the Pleistocene and Holocene, within the last 2.6 million years, the Columbia River Gorge was intermittently plugged by local lava flows and landslides. Significant landslides in the vicinity of the project area likely began to occur when down cutting of the Columbia River exposed the Eagle Creek Formation and underlying sedimentary rock units. During the late stages of the last great ice age, between about 18,000 and 15,000 years ago, a series of glacial outburst floods that originated in western Montana repeatedly washed across the Idaho panhandle, through eastern Washington's scablands, and through the Columbia River Gorge (Allen and others, 2009). These repeated floods are collectively referred to as the Missoula Floods and likely accelerated widening of the Gorge and steepening of its walls. The resulting steep canyon walls resulted in numerous, large-scale landslides, where the Eagle Creek Formation failed under the overlying CRBG (Beaulieu, 1977). In the Bonneville area, the surface of the Eagle Creek Formation dips gently to the south. However, the Gorge wall geometry and properties of the Eagle Creek Formation were such that landslides initiated on both the north and south sides of the river.

The last major episode of sliding near the modern-day Bonneville Dam site occurred around 700 years ago. The slides dammed the river such that water was still impounded behind them at the time of the Lewis and Clark expedition in the early 1800s. Based on available mapping (Korosec, 1987), existing geotechnical reports containing logs of other boreholes near the site (Squier, 1990), and discussions with the USACE, it has been determined that landslide deposits are not present beneath the project site, on the north side of Robbins Island. The nearest mapped landslide deposits, according to Korosec (1987), are south and east of the topographic high created by the basaltic intrusion.

At the project site, at the southern abutment of the Navlock 1 Swing Bridge, subsurface geology within the upper 110 feet is dominated by alluvial deposits from the Columbia River and fill material placed during development of the site. Grain size distributions of the alluvial sediments at the site were heavily influenced by the presence of the basaltic intrusion and likely by upstream landslides, with deposits ranging from clays and sands to cobble-rich gravels.

2.2.2 SEISMIC SETTING

Earthquakes in the Pacific Northwest occur largely as a result of the region's close proximity to an active convergent plate boundary. At this boundary, dense oceanic crust is subducting beneath less dense continental crust. At this subduction plate boundary, known as the Cascadia Subduction Zone (CSZ), the Explorer, Juan de Fuca, and Gorda Oceanic Plates are subducting beneath the overriding, westward-moving North American Plate. Oblique convergence of these plates not only results in east-west compressive strain, but also results in dextral (right lateral) shear, clockwise rotation, and north-south compression of accreted crustal blocks that form the leading edge of the North American Plate (Wells and others, 1998). The CSZ extends about 750 miles from northern California to southern British Columbia and lies approximately 170 miles west of the project site. Within the present understanding of the regional tectonic framework and historical seismicity, three broad seismogenic sources have been identified. These include the following:

- A mega-thrust source at the interface between the North American and Juan de Fuca plates in the CSZ;
- A deep intraslab source in the subducted Juan de Fuca Plate, within the CSZ; and
- A shallow crustal source within the North American Plate.

The following sections briefly describe the location, characteristics, and seismicity of each of the sources.

2.2.2.1 Cascadia Subduction Zone: Mega-Thrust Interface Source

CSZ mega-thrust earthquakes originate along the interface between the subducting oceanic plates and the North American plate. Because of the significant uncertainty of the landward extent of a potential rupture surface, estimates of the closest distance between the project and potential rupture surface range from about 100 to 170 horizontal miles. Focal depths for mega-thrust earthquakes are commonly on the order of about 15 to 25 miles. Rupture of the interface could result in earthquakes with moment magnitudes on the order of 8.5 to over 9.0, with strong shaking that lasts for several minutes. No large earthquakes have occurred in this zone during historic times (the last 170 years). However, geologic evidence suggests that coastal estuaries have experienced rapid subsidence at various times within the last 2,000 years (e.g., Atwater, 1987; Atwater and Hemphill-Haley, 1997) as a result of tectonic movement associated with mega-thrust earthquakes on the CSZ. It appears that ruptures of this zone have occurred at irregular intervals that span from about 100 to more than 1,200 years, with an average recurrence interval of about 300 to 500 years (Atwater and Hemphill-Haley, 1997). Based on historical tsunami records in Japan (Satake and others, 1996) the most recent interplate event on the CSZ was a moment magnitude (M_w) 9 event on January 26, 1700.

2.2.2.2 Cascadia Subduction Zone: Intraslab Source

CSZ intraslab earthquakes originate from within the subducting oceanic plates as a result of down-dip tensional forces and bending caused by mineralogical and density changes in the plates at depth. These earthquakes typically occur 28 to 37 miles beneath the surface. Ludwin and others (1991) estimate that the maximum M_w from this source zone would be about 7.5. Ground shaking produced by intraplate earthquakes would generally be less intense and less prolonged in the project area than ground motions generated by large subduction zone interface earthquake events. Historic seismicity from this source zone includes the 1949 M_w 6.7 Olympia earthquake, the 1965 M_w 6.7 earthquake between Tacoma and

Seattle, and the 2001 M_w 6.8 Nisqually earthquake. While intraslab events have occurred frequently in the Puget Sound area, they are historically rare in Oregon.

2.2.2.3 Shallow Crustal Source

Shallow crustal earthquakes within the North American Plate have historically occurred in a diffuse pattern within Pacific Northwest, typically within the upper 4 to 19 miles of the continental crust. The largest known crustal earthquake in the Pacific Northwest is the 1872 North Cascades earthquake at approximate M_w 6.5 to 7.0. Other examples include the 1993 M_w 5.6 Scotts Mill earthquake and the 1993 M_w 6.0 Klamath Falls earthquake.

Shallow crustal faults and folds throughout Oregon and Washington have been located and characterized by the United States Geological Survey (USGS). The USGS provides approximate fault locations and a detailed summary of available fault information in the USGS Quaternary Fault and Fold Database. The database defines four categories of faults, Class A through D, based on evidence of tectonic movement known or presumed to be associated with large earthquakes during Quaternary time (within the last 2.6 million years). For Class A faults, geologic evidence demonstrates that a tectonic fault exists and that it has likely been active within the Quaternary period. For Class B faults, there is equivocal geologic evidence of Quaternary tectonic deformation, or the fault may not extend deep enough to be considered a source of significant earthquakes. Class C and D faults lack convincing geologic evidence of Quaternary tectonic deformation, or have been studied carefully enough to determine that they are not likely to generate significant earthquakes.

According to the USGS Quaternary Fault and Fold database (USGS, 2017), there are five Class A features within approximately 30 miles of the project site. Their names, general locations relative to the site, and the time since their most recent deformation are summarized in Table 2-1. The CSZ itself is approximately 170 miles west of the project site, with an average slip rate of approximately 40 millimeters (1.5 inches) per year and the most recent deformation occurring about 300 years ago (Personius and Nelson, 2006).

Table 2-1 USGS Class A Faults within an Approximate 30-mile Radius of the Project

Fault Name	USGS Fault Number	Approximate Length	Approximate Distance and Direction from Project Site[a]	Slip Rate Category[b]	Time Since Last Deformation[c]
Faults near The Dalles	580	42.9 miles	14.7 miles NE	< 0.2 mm/yr	< 1.6 Ma
Hood River Fault Zone	866	27.3 miles	16.1 miles E-SE	< 0.2 mm/yr	< 1.6 Ma
Lacamas Lake Fault	880	14.9 miles	18.9 miles W-SW	< 0.2 mm/yr	< 750 ka
Damascus-Tickle Creek Fault	879	9.9 miles	23.3 miles SW	< 0.2 mm/yr	< 750 ka
Grant Butte Fault	878	6.2 miles	25.3 miles SW	< 0.2 mm/yr	< 750 ka

Notes:

a. Approximate distance between project site and nearest extent of fault mapped at the ground surface.
b. mm = millimeters; yr = year.
c. Ma = "Mega-annum" or million years ago; ka = "Kilo-annum" or one thousand years ago.

2.3 GEOTECHNICAL SUBSURFACE EXPLORATIONS

The field exploration program included two geotechnical borings, which were designated GT/GP-1 and GT-2. These borings were logged and sampled continuously. Three additional borings, designated GP-1, GP-2, and PS-1, were drilled for geophysical testing, and were not logged or sampled. Borehole locations were determined through coordination with USACE. Completed borehole locations were measured in the field relative to existing site features using a tape measure, and coordinates were also recorded using a hand-held GPS unit. Approximate borehole locations are shown graphically on the Site and Exploration Plan, Figure A-1, in Appendix A. Approximate borehole coordinates (OR83-NIF) and elevations (NAVD88) are shown in the Field Exploration Summary, Table A-1, and on the boring logs for the geotechnical holes, both of which are presented in Appendix A.

2.3.1 DRILLING

The geotechnical borings (GT/GP-1 and GT-2) were drilled between February 27 and March 8, 2017. The geophysical borings (GP-1, GP-2, and PS-1) were drilled between March 9 and 21, 2017. All borings were drilled using a truck-mounted CME 75 drill rig that was provided and operated by a driller licensed in the State of Oregon. The borings were drilled to depths ranging from 100 to 110 feet using mud rotary drilling techniques. A field representative for the geotechnical engineer was on site full-time during the geotechnical borings to observe drilling, collect samples, and maintain logs of the materials encountered. The geotechnical engineer managed drilling of the geophysical holes and associated casing installations remotely and with intermittent site visits.

2.3.1.1 Disturbed Sampling

Disturbed samples were collected continuously in the geotechnical borings (GT/GP-1 and GT-2) using a standard 24-inch-long, 2-inch-outside-diameter split spoon sampler in conjunction with Standard Penetration Testing. In a Standard Penetration Test (SPT), ASTM D1586, the sampler is driven 18 or 24 inches into the soil using a 140-pound hammer dropped 30 inches. The number of blows required to drive the sampler through the interval from 6 to 18 inches is defined as the standard penetration resistance, or N-value. The SPT N-value provides a measure of in situ relative density of cohesionless soils (silt, sand, and gravel), and the consistency of cohesive soils (silt and clay). All disturbed samples were visually identified and described in the field, sealed to retain moisture, and returned to our laboratory for additional examination and testing.

SPT N-values can be significantly affected by several factors including the efficiency of the hammer, depth of the borehole, diameter of the borehole, type of sampler, type of sampling rod, and the length of rod between the hammer and the sampler. All field N-values were normalized to $(N_1)_{60}$-values using the standard method from ASTM D6066. ASTM D6066 corrects for hammer energy and effective overburden stress, and does not consider sampler type, borehole diameter or rod length. One automatic hammer system was used in both geotechnical borings. The average energy transfer efficiency of the hammer was measured at 74 percent in February 2017 (Miner, 2017). To calculate the stress correction factor, CN, a stress exponent, n, of 0.5 was used. Per Section 13.3.1 of the ASTM standard, a factor of 0.75 was applied to blow counts obtained from depths of less than 10 feet. Per Section 13.4.2, CN was limited to 1.6.. Both field N-values and $(N_1)_{60}$-values are presented on the boring longs in Appendix A. All other discussions of N-values in this report, including density/consistency terms used in soil descriptions, are based on the $(N_1)_{60}$-values.

An SPT was considered to have met refusal where more than 50 blows were required to drive the sampler through any 6-inch interval. If refusal was encountered in the first 6-inch interval (for example, 50 for 1.5 inches), the count is reported as 50/1st 1.5 inches. If refusal was encountered in the second 6-inch interval (for example, 48, 50 for 1.5 inches), the count is reported as 50/1.5 inches. If refusal

was encountered in the third 6-inch interval (for example, 39, 48, 50 for 1.5 inches), the count is reported as 98/7.5 inches.

2.3.1.2 Borehole Installations and Abandonment

Boring GT/GP-1 was intended to receive a casing installation for use in geophysical testing. However, a casing was installed (grouted into place) which had an inside diameter that was 0.13 inches narrower than that required for the geophysical testing (3 inches). The GT/GP-1 casing was abandoned by cutting it off below the ground surface and filling its interior with a bentonite-cement grout. The intended GT/GP-1 casing installation was replaced by an installation in a separate boring, designated GP-1. Boring GT-2 was not intended to receive any installation and was likewise backfilled with bentonite-cement grout, in accordance with Oregon Water Resource Department regulations. A 4-inch-inside-diameter, thread-coupled, polyvinyl chloride (PVC) casing was installed to the full depth of each of the three geophysical borings (GP-1, GP-2, and PS-1). These holes were first tremie-grouted with a bentonite-cement grout. The PVC casing sections were then filled with water and inserted into the grouted holes as they were assembled. The bottom of each casing was capped, so that the water-filled casing would displace the grout in the hole, leaving an open casing and grouted annulus. The PVC casings are protected at the ground surface with steel, flush-mount monuments set in concrete. Boring GT-2 was not intended to receive any installation and was backfilled with bentonite-cement grout in accordance with Oregon Water Resource Department regulations.

2.3.2 Material Descriptions

Soil samples were described and identified visually in the field, in general accordance with ASTM D2488, Standard Practice for Description and Identification of Soils (Visual-Manual Procedure). The specific terminology used is defined in the Soil Description and Log Key, Figure A-2 in Appendix A. Consistency, color, relative moisture, degree of plasticity, peculiar odors, and other distinguishing characteristics of the samples were noted. Once transported to the laboratory, the samples were re-examined, various classification tests were performed, and the field descriptions and identifications were modified where necessary. Visual-manual soil descriptions were refined and identifications based on the results of the laboratory tests, using elements of the Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System), ASTM D2487. However, ASTM D2487 was not followed in full because it requires that a suite of tests be performed to fully classify a single sample.

2.3.3 Boring Logs

Summary logs of the geotechnical borings (GT/GP-1 and GT-2) are presented in Appendix A, Figures A-3 and A-4. Material descriptions and interfaces on the logs are interpretive, and actual changes may be gradual. The left-hand portion of the boring logs provides description, identification, and geotechnical unit designation for the materials encountered in the boring. The right-hand portion of the boring logs shows a graphic log, sample locations and designations, and a graphical representation of N-values, sample recovery, natural water contents, Atterberg limits, and fines content.

2.3.4 Borehole Deviation Surveys

During mud rotary drilling, particularly where cobbles and boulders are present, it is not uncommon for boreholes to deviate from their initial verticality. In some cases, the horizontal distance between the top and bottom of a borehole may be several feet. Since accurate geophysical measurements of compressional and shear wave velocity depend on knowing the distance between the energy source and receiver, it is important to measure borehole deviation so the actual distance between source and receiver is known throughout the tested depths. Borehole deviation surveys were performed in the PVC casings installed in geophysical borings GP-1, GP-2, and PS-1. The surveys were performed using a

QL40 DEV Borehole Deviation Probe, MGX winch, and MATRIX ALT logger, all manufactured by Mount Sopris Instruments. Two data sets were collected in each casing: one collected at approximately 1-foot intervals during a pass down the casing, and one collected at approximately 1-foot intervals during a pass back up the casing. Plots of the deviation data with depth are presented in Appendix A, Figures A-5 through A-7. The data are also presented in tabular format in Appendix A, Tables A-2 through A-4.

2.4 LABORATORY TESTING

The samples obtained from the geotechnical borings were transported to the testing laboratory for further examination. Selected representative samples were then sent for a suite of laboratory tests. In some cases, due to limited sample recovery, we combined two or more adjacent samples were combined for testing. The soil-testing program included moisture content analyses, Atterberg limits tests, and particle-size analyses. All testing was performed in accordance with applicable ASTM International (ASTM) standards. The following sections provide brief descriptions of the tests performed.

2.4.1 MOISTURE (NATURAL WATER) CONTENT

Natural moisture content analyses were performed on selected samples in accordance with ASTM D2216. The natural moisture content is a measure of the amount of moisture in the soil at the time the explorations are performed, and is defined as the ratio of water weight to dry soil weight, expressed as a percentage. Results of the moisture content analyses are presented graphically on the boring logs in Appendix A and in tabular format in the Laboratory Testing Summary, Table B-1 in Appendix B. Results are also included in the Technical Report prepared by Northwest Testing, Inc. (NTI), dated March 27, 2017, which is attached to the end of Appendix B. Results for each geotechnical unit are shown below in Table 2-2.

2.4.2 ATTERBERG LIMITS

Atterberg limits were determined on selected samples in accordance with ASTM D4318. This analysis yields index parameters of the soil that are useful in soil identification, as well as in several engineering analyses, including liquefaction analysis. An Atterberg limits test determines a soil's liquid limit (LL) and plastic limit (PL). These are the maximum and minimum moisture contents at which the soil exhibits plastic behavior. A soil's plasticity index (PI) can be determined by subtracting PL from LL. The LL, PL, and PI of the tested samples are presented in Appendix B on Figure B-1, Atterberg Limits Results. Results are also shown graphically on the boring logs in Appendix A, in tabular format in the Laboratory Testing Summary, Table B-1, and the Technical Report prepared by NTI, dated March 27, 2017, both included in Appendix B. Results for each geotechnical unit are shown below in Table 2-2. For the purposes of soil description, the term nonplastic was used to refer to soils with a PI less than 4, low plasticity for soils with a PI range of 4 to 10, medium plasticity for soils with a PI range of 10 to 20, high plasticity for soils with a PI greater than 20.

2.4.3 PARTICLE SIZE ANALYSIS

Particle-size analyses were conducted on selected samples to determine their grain-size distributions. Sieve and hydrometer analyses were conducted in accordance with ASTM D422. A wet sieve analysis was performed to determine a percentage (by weight) of the sample passing the No. 200 (0.075 mm) sieve. The material retained on the No. 200 sieve was shaken through a series of sieves to determine the distribution of the plus No. 200 fraction. A hydrometer analysis was then performed to determine the size distribution of the material passing the No. 200 sieve. Results of the particle-size analyses are presented in Appendix B on Figure B-2, Grain Size Distribution. Results are summarized in the Laboratory Testing Summary, Table B-1 in Appendix B, and the percentage of material passing the No. 200 sieve is shown graphically on the boring logs in Appendix A. Complete results, including

tabular sieve data, are included in the Technical Report prepared by NTI, dated March 27, 2017, which is attached to the end of Appendix B. Results for each geotechnical unit are shown below in Table 2-2. Note that results of the particle-size analyses may not be representative of the in-situ material in all cases, due to the size limitations of the sampling equipment used. For example, while observed drill action indicated the presence of cobbles in some areas beneath the site, results of the particle-size analyses do not reflect this because cobbles do not fit inside a standard SPT sampler and were not recovered for testing.

Table 2-2 Laboratory Testing Summary by Geotechnical Unit

Geotechnical Unit	Boring	Sample Number	Top Depth of Sample (feet)	Natural Moisture Content (%)	Gravel (%)	Sand (%)	Fines (%)	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)
Fill	GT/GP-1	S-4 to S-6	6.0	15	44	34	22			
	GT/GP-1	S-10 to S-11	18.0	13	59	28	13			
	GT-2	S-2 to S-3	2.0	16	60	24	16			
	GT-2	S-7 to S-8	12.0	17	56	33	11			
Gravel Alluvium	GT-2	S-14	26.0					49	23	26
	GT/GP-1	S-16	30.0	24	57	29	14			
	GT-2	S-15	28.0	30	42	30	28			
	GT-2	S-25 to S-26	48.0	21	64	22	14			
	GT/GP-1	S-43 to S-44	84.0	12	48	37	15			
	GT-2	S-28 to S-29	54.0	18	56	28	16			
	GT/GP-1	S-17 to S-18	32.0	14	65	25	10			
	GT/GP-1	S-25 to S-27	48.0	10	72	20	8			
	GT-2	S-34 to S-35	66.0	13	55	34	11			
	GT/GP-1	S-33 to S-35	64.0	10	75	20	5			
	GT-2	S-17	32.0					63	34	29
	GT-2	S-37B	72.7					38	30	8
	GT-2	S-12	22.0	24	13	63	24			
Sand and Silt Alluvium	GT/GP-1	S-37B	72.7		0	2	98	66	43	23
	GT/GP-1	S-39A	76.0					43	35	8
	GT/GP-1	S-41A	80.0					44	31	13
	GT/GP-1	S-50	98.0					NP	NP	NP
	GT/GP-1	S-52	102.0					32	25	7
	GT-2	S-40	78.0	29	0	41	59			
	GT-2	S-45	88.0					27	23	4
	GT-2	S-46A	90.0	31	0	25	75			
	GT/GP-1	S-36	70.0	45	2	58	40			
	GT/GP-1	S-39B	76.8	48	0	64	36			
	GT/GP-1	S-48	94.0	28	0	87	13			
	GT/GP-1	S-54	106.0	28	1	75	24			
	GT-2	S-43	84.0	27	1	65	34			
	GT/GP-1	S-37A	72.0	65						
	GT/GP-1	S-53	104.0	25						
Pre-Slide Alluvium	GT-2	S-49 to S-50	96.0	15	46	40	14			

Notes: NP = nonplastic

2.5 SUBSURFACE CONDITIONS

2.5.1 GEOTECHNICAL UNITS

Materials encountered in the field explorations were grouped into four geotechnical units. Interpretation of the subsurface conditions is based on the explorations and regional geologic information from published sources. The geotechnical units are as follows:

- **Fill:** very loose to very dense Poorly Graded Gravel with Silt and Sand to Silty Gravel with Sand, with Cobbles (GP-GM to GM); possible boulders and wood debris;
- **Gravel Alluvium:** loose to very dense Poorly Graded Gravel with Silt and Sand to Silty Gravel with Sand (GP-GM to GM); some zones include cobbles; unit includes lesser amounts of Well Graded Gravel with Silt (GW-GM), Clayey Gravel with Sand (GC), Gravelly Lean Clay with Sand (CL), Gravelly Elastic Silt with Sand (MH), and Silty Sand with Gravel (SM), and trace interbeds of Silt to Silt with Sand (ML); boulders may be present;
- **Sand and Silt Alluvium:** very loose to medium dense Silty Sand (SM) and very loose to medium dense/soft to very stiff Silt to Sandy Silt (ML); trace to few organics;
- **Pre-Slide Alluvium:** dense to very dense Poorly Graded Gravel with Silt and Sand to Silty Gravel with Sand, with Cobbles (GP-GM to GM); weakly to moderately cemented.

These geotechnical units were grouped based on their engineering properties, geologic origins, and distribution in the subsurface. Contacts between the units may be more gradational than shown in boring logs, and subsurface conditions may vary significantly between the explorations. SPT N-values presented on the boring logs and discussed below have been normalized to $(N_1)_{60}$, in accordance with ASTM D6066. The following sections describe the geotechnical unit characteristics in greater detail.

2.5.1.1 Fill

The Fill consists of material placed at the site by humans during the course of development. Fill was encountered from the ground surface to depths of approximately 28 feet in boring GT/GP-1 and 20 feet in boring GT-2. In general, the Fill included very loose to very dense, gray and brown, Poorly Graded Gravel with Silt and Sand to Silty Gravel with Sand, with Cobbles (GP-GM to GM). The gravel and sand constituents generally ranged from fine to coarse and gravel clasts were angular to subrounded. Fines in the unit generally ranged from nonplastic to low plasticity. Mud loss and borehole instability were noted in the unit during drilling. Also, while drilling additional borings for geophysical testing, the drillers reported encountering some wood debris and boulders up to 2 feet in diameter. Three out of 24 SPTs attempted in the unit met refusal. Non-refusal SPT $(N_1)_{60}$-values ranged from 4 to 68 blows per foot (bpf) and averaged 33 bpf. Natural moisture content analyses in the unit ranged from 13 to 17 percent and averaged 15 percent. Sieve analyses indicated fines contents that ranged from 11 to 22 percent and averaged 16 percent by dry weight. Bridge Diagnostics, Inc. reported that geophysical testing in the Fill indicated average shear and compression wave velocities of 1,566 ft/sec and 3,483 ft/sec, respectively.

2.5.1.2 Gravel Alluvium

The Gravel Alluvium consists of predominantly coarse-grained sediment deposited by the Columbia River. The unit was encountered below the Fill in both borings. In boring GT/GP-1, it extended from the bottom of the Fill to a depth of 69.7 feet and was also encountered as 2-to-10-foot-thick interbeds within the underlying Sand and Silt Alluvium. In boring GT-2, the Gravel Alluvium extended from the bottom of the Fill to a depth of about 78 feet. The Gravel Alluvium generally included loose to very dense, gray and brown, Poorly Graded Gravel with Silt and Sand to Silty Gravel with Sand (GP-GM to

GM) and lesser amounts of Well Graded Gravel with Silt (GW-GM), Clayey Gravel with Sand (GC), Gravelly Lean Clay with Sand (CL), Gravelly Elastic Silt with Sand (MH), and Silty Sand with Gravel (SM). Some zones included cobbles. Trace interbeds of Silt-to-Silt with Sand (ML) were also observed. In boring GT-2, the unit generally included more fine-grained layers and fewer cobbles, as compared to GT/GP-1. Gravel and sand constituents in the unit generally ranged from fine to coarse and gravel clasts were subangular to subrounded. Fines in the unit ranged from nonplastic to high plasticity. While not encountered in the unit during drilling, based on the nature of the deposit, boulders may be present. Mud loss was noted in portions of the unit during drilling.

Six out of 56 SPTs attempted in the unit met refusal. Non-refusal SPT (N1)60-values ranged from 7 to 49 bpf and averaged 22 bpf. Natural moisture content analyses in the unit ranged from 10 to 30 percent and averaged 17 percent. Atterberg limits tests on specimens from fine-grained layers in the unit indicated plasticity indices that ranged from 8 to 29 percent, and USCS designations of ML, CL, and MH. Sieve analyses indicated fines contents that ranged from 5 to 28 percent and averaged 15 percent by dry weight. Bridge Diagnostics, Inc. reported that geophysical testing in the Gravel Alluvium indicated average shear and compression wave velocities of 1,522 ft/sec and 2,995 ft/sec, respectively.

2.5.1.3 Sand and Silt Alluvium

The Sand and Silt Alluvium consists of predominantly sand and fine-grained sediment, deposited by the Columbia River, likely along a bar that developed in a protected area downstream of the prominent igneous intrusion just southeast of the site. The unit was encountered between depths of 69 feet and 108 feet in GT/GP-1, with approximately 2- to 10-foot-thick interbeds of Gravel Alluvium near the middle of the unit. The Sand and Silt Alluvium was encountered between depths of approximately 78 feet and 91 feet in GT-2. In general, the unit included very loose to medium dense, brown to gray and blue-gray, Silty Sand (SM) and very loose to medium dense/soft to very stiff, brown to blue-gray and red-brown, Silt to Sandy Silt (ML). Fines in the soil generally ranged from nonplastic to low plasticity, with the exception of trace interbeds of medium plasticity Silt (ML) and high plasticity Elastic Silt (MH). The sand constituent, where present, was typically fine- to medium-grained. Trace to few organics were observed in some samples, and some samples were micaceous.

SPT $(N_1)_{60}$-values ranged from 1 to 21 bpf and averaged 10 bpf. Natural moisture content analyses in the predominantly sandy portions of the unit ranged from 27 to 48 percent and averaged 35 percent. Natural moisture content analyses in the predominantly fine-grained portions of the unit ranged from 29 to 65 percent and averaged 37 percent. Atterberg limits tests on specimens from fine-grained layers in the unit indicated plasticity indices that ranged from 0 to 23 percent and averaged 9 percent, with USCS designations of ML and MH. Sieve analyses of specimens from the predominantly sandy portions of the unit indicated fines contents that ranged from 13 to 40 percent and averaged 29 percent by dry weight. Sieve analyses of specimens from the predominantly fine-grained portions of the unit indicated fines contents that ranged from 59 to 98 percent and averaged 77 percent by dry weight. Bridge Diagnostics, Inc. reported that geophysical testing in the Sand and Silt Alluvium indicated average shear and compression wave velocities of 1,790 ft/sec and 3,041 ft/sec, respectively.

2.5.1.4 Pre-Slide Alluvium

The Pre-Slide Alluvium consists of older Columbia River alluvium, likely deposited prior to the onset of large-scale landslide activity near the Bonneville Dam site. The Pre-Slide Alluvium was encountered in boring GT/GP-1 below a depth of 108 feet, and in boring GT-2 below a depth of 91.2 feet. Both borings were terminated in the unit and both borings encountered it directly underneath the Sand and Silt Alluvium. In general, the unit included dense to very dense, gray, brown, and red-brown, Poorly Graded Gravel with Silt and Sand to Silty Gravel with Sand, with Cobbles (GP-GM to GM). Gravel and sand constituents in the unit generally ranged from fine to coarse and gravel clasts were subangular to subrounded. Fines in the unit were typically nonplastic. Based on drill action and limited sample

recovery, the unit appears to be weakly to moderately cemented. Six out of seven SPTs attempted in the unit met refusal. The only non-refusal SPT $(N_1)_{60}$-value was 34 bpf. The natural moisture content of one specimen was 15 percent. Sieve analysis of one specimen indicated a fines content of 14 percent by dry weight. Bridge Diagnostics, Inc., reported that geophysical testing in the Pre-Slide Alluvium indicated average shear and compression wave velocities of 1,878 ft/sec and 3,808 ft/sec, respectively.

2.5.2 GROUNDWATER

Borings GT/GP-1 and GT-2 were drilled using mud rotary drilling techniques, which make it difficult to discern the depth to groundwater, particularly in gravelly soils. Based on the materials encountered in the borings, we anticipate that groundwater levels at the site correspond closely to the elevation of the adjacent waters of the Columbia River. Groundwater levels should be expected to vary with changes in river levels.

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3.0 GEOPHYSICAL TESTING

3.1 GENERAL

The purpose of the geophysical subsurface testing was to determine the subsurface geophysical properties and the length of the timber piles currently supporting Pier 5 of the existing swing bridge. The methods used to determine these characteristics were the CSL method and the PS method, respectively.

The CSL method is a geophysical subsurface exploration technique that characterizes soil shear and compression wave velocity profiles. The test layout consists of two adjacent boreholes where the source and receiver located within different boreholes. Testing occurs as a seismic wave source propagates waves from one cased borehole to a receiver in another borehole. Analysis is performed to identify the presence of first wave arrivals at the receiver. The wave velocity and subsequent stiffness of the material is determined by dividing the time interval by the measured spacing between the two boreholes (ASTM D 4428/D 4428M-07).

The PS method was originally developed for unknown foundations and has since become one of the most common NDT techniques to determine the length of bridge foundations. The test consists of measuring the arrival times of wave energy that is imparted to the foundation from a hammer blow at the side or top of the bridge substructure. The main difference between PS and surface NDT techniques is that the receiver (hydrophone or geophone) is lowered in a cased borehole alongside the foundation. Data is typically acquired at approximately 1 - 2 foot intervals using a digital signal analyzer. The foundation bottom is identified by a sudden break in the slope of the first wave arrival times versus depth (i.e. the waves travel more slowly in the soil beneath the bottom of the foundation). To identify the bottom of the foundation, the borehole must be a minimum of 10 feet below the foundation depth so that the change in slope can be identified (Hertlein, 2006). The length of the piles supporting Pier 5 was determined utilizing the Parallel Seismic method (PS).

CSL was performed on March 20th – 22nd and 30th – 31st, 2017 in accordance with ASTM D 4428/D 4428M-07 between GP-1 and GP-2, which were positioned approximately 20 feet apart. The testing utilized a Ballard borehole wave generation source with a Geometrics Geode Seismograph and a GeoStuff BHG-3 geophone receiver. Prior to testing, the deviation from the top of each borehole was determined so that the source and receiver and seismic source were positioned at the same elevation prior to the collection of data at each interval. The BHG-3 geophone receiver contained an internal compass so that the receivers were aligned with the source prior to each test. This enabled the collection of shear and compression wave types to be measured in a single pass of the probe through the borehole. The source was activated five (5) times per interval in each direction and each result was collected and stacked. Separate source activation and data acquisition was conducted for Vs and Vp measurements at each interval. Testing was performed at 2-foot intervals to the full depth of each borehole. Although the boreholes were designed to be drilled to 110 feet, the geophone and source were not able to be lowered beyond 100 feet in either hole. It was unclear whether the borehole terminated early or if its integrity had been compromised after drilling, but the weight of the geophone and source were found not able to go any deeper. Confirmatory measurements were collected as the source and receiver were retracted at intervals of 20 feet. The entire logging procedure was repeated from the opposite direction across the borehole pairs.

The PS method was performed on March 23rd – 24th, 2017 utilizing the PS-1 borehole utilizing a National Instruments USB-4431 sound and vibration measurement device, a Teledyne TC4013 hydrophone, and a PCB 086D20 instrument hammer to record the moment of impact. Testing was performed as the hydrophone was lowered into the borehole in 2-foot intervals. Multiple impacts were made for each interval to ensure repeatable results. The testing was performed to full depth of PS-1 utilizing impacts on the side and top of Pier 5.

3.2 INTERPRETATION OF DATA

All data from CSL and PS testing was downloaded from the respective data acquisition devices and analyzed in Matlab utilizing methods described in ASTM D4428/D4428M-07 and standard methodologies for PS testing analysis.

For each stacked CSL data set, shear and compression wave velocities were calculated by dividing the measured arrival time of each wave type and the measured spacing between the two boreholes. The results of the deviation survey were used to calculate the actual distances (to the nearest 0.01 foot) between the casings over their entire length. This analysis method was used to determine the shear and compression wave velocities as a function of depth for the soils between boreholes GP-1 and GP-2. Boring GP-1 and GP-2 deviated by 7.44 feet and 2.06 feet respectively at the bottom of the boring. GP-1 was filled with water to approximately 20 feet below the surface while GP-2 was filled with water to the surface. Results are presented in Appendix C.

Shear wave velocities varied with a minimum of 640 ft/sec., maximum of 2,405 ft/sec., average of 1,526 ft/sec., and standard deviation of 367 ft/sec. Compression wave velocities varied with a minimum of 2,263 ft/sec., maximum of 4,855 ft/sec., average of 3,122 ft/sec., and a standard deviation of 560 ft/sec. Generally, the wave velocity changes were consistent with each other. However, at stiffness interfaces verified by the geotechnical exploration, there are distinct differences. Compression waves propagate with longitudinal particle motion away from the source and shear waves propagate with lateral particle motion away from the source. Thus, at stiffness interfaces, the change in velocity between the two wave types can differ in polarity.

All PS data sets for both top and side impacts were plotted as a function of depth. As the receiver was lowered into the borehole, the travel time increased linearly, as was anticipated. This indicated good wave propagation from the pile cap, down through the piles, and across to the receiver. Good wave propagation continued through the full depth of the boring, however, the change in travel time also continued to be linear. This indicates that the pile depths continue past the depth of the boring. Results are presented in Appendix D. The great depth of penetration of these piles is common for construction of bridge crossing the Columbia River in the Northwest region during this era (Engineering Record, 1986).

3.3 SITE GEOLOGY

Average wave velocities were calculated per layer in accordance with the boring logs. Results are presented in Table 3-1, below:

Table 3-1 Average Wave Velocity as a Function of Depth

Layer	Average Shear Wave Velocity (ft/sec.)	Average Compression Wave Velocity (ft/sec.)
Fill	1,566	3,483
Gravel Alluvium	1,522	2,995
Sand and Silt Alluvium	1,790	3,041
Pre-Slide Gravel Alluvium	1,878	3,808

3.4 REFERENCES

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APPENDIX A GEOTECHNICAL SUBSURFACE EXPLORATIONS

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0 25 50 100

Scale in Feet

LEGEND

GP-1 Designation and Location of Geophysical Exploration with 4-inch Casing Installation

GT-2 Designation and Location of Geotechnical Exploration

Bonneville Lock and Dam Subsurface Investigation and Liquefaction Analysis
Multnomah County, Oregon

SITE AND EXPLORATION PLAN

March 2017 24-1-04114-001

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. A-1

Filename: T:\Projects\24-1\4114_Bonneville Subs\Avmxd\SitePlan.mxd Date: 3/29/2017 Login: aah

Shannon & Wilson, Inc. (S&W), uses a soil identification system modified from the Unified Soil Classification System (USCS). Elements of the USCS and other definitions are provided on this and the following pages. Soil descriptions are based on visual-manual procedures (ASTM D2488) and laboratory testing procedures (ASTM D2487), if performed.

S&W INORGANIC SOIL CONSTITUENT DEFINITIONS

CONSTITUENT[2]	FINE-GRAINED SOILS (50% or more fines)[1]	COARSE-GRAINED SOILS (less than 50% fines)[1]
Major	***Silt, Lean Clay, Elastic Silt,*** or ***Fat Clay***[3]	***Sand*** or ***Gravel***[4]
Modifying (Secondary) Precedes major constituent	30% or more coarse-grained: ***Sandy*** or ***Gravelly***[4]	More than 12% fine-grained: ***Silty*** or ***Clayey***[3]
Minor Follows major constituent	15% to 30% coarse-grained: ***with Sand*** or ***with Gravel***[4]	5% to 12% fine-grained: ***with Silt*** or ***with Clay***[3]
	30% or more total coarse-grained *and* lesser coarse-grained constituent is 15% or more: ***with Sand*** or ***with Gravel***[5]	15% or more of a second coarse-grained constituent: ***with Sand*** or ***with Gravel***[5]

[1]All percentages are by weight of total specimen passing a 3-inch sieve.
[2]The order of terms is: *Modifying Major with Minor*.
[3]Determined based on behavior.
[4]Determined based on which constituent comprises a larger percentage.
[5]Whichever is the lesser constituent.

MOISTURE CONTENT TERMS

Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water, from below water table

STANDARD PENETRATION TEST (SPT) SPECIFICATIONS

Hammer:	140 pounds with a 30-inch free fall. Rope on 6- to 10-inch-diam. cathead 2-1/4 rope turns, > 100 rpm
Sampler:	10 to 30 inches long Shoe I.D. = 1.375 inches Barrel I.D. = 1.5 inches Barrel O.D. = 2 inches
N-Value:	Sum blow counts for second and third 6-inch increments. Refusal: 50 blows for 6 inches or less; 10 blows for 0 inches.

NOTE: Penetration resistances (N-values) shown on boring logs are as recorded in the field and have not been corrected for hammer efficiency, overburden, or other factors.

PARTICLE SIZE DEFINITIONS

DESCRIPTION	SIEVE NUMBER AND/OR APPROXIMATE SIZE
FINES	< #200 (0.075 mm = 0.003 in.)
SAND Fine Medium Coarse	 #200 to #40 (0.075 to 0.4 mm; 0.003 to 0.02 in.) #40 to #10 (0.4 to 2 mm; 0.02 to 0.08 in.) #10 to #4 (2 to 4.75 mm; 0.08 to 0.187 in.)
GRAVEL Fine Coarse	 #4 to 3/4 in. (4.75 to 19 mm; 0.187 to 0.75 in.) 3/4 to 3 in. (19 to 76 mm)
COBBLES	3 to 12 in. (76 to 305 mm)
BOULDERS	> 12 in. (305 mm)

RELATIVE DENSITY / CONSISTENCY

COHESIONLESS SOILS		COHESIVE SOILS	
N, SPT, BLOWS/FT.	RELATIVE DENSITY	N, SPT, BLOWS/FT.	RELATIVE CONSISTENCY
< 4	Very loose	< 2	Very soft
4 - 10	Loose	2 - 4	Soft
10 - 30	Medium dense	4 - 8	Medium stiff
30 - 50	Dense	8 - 15	Stiff
> 50	Very dense	15 - 30	Very stiff
		> 30	Hard

WELL AND BACKFILL SYMBOLS

Bentonite Cement Grout	Surface Cement Seal
Bentonite Grout	Asphalt or Cap
Bentonite Chips	Slough
Silica Sand	Inclinometer or Non-perforated Casing
Gravel	Vibrating Wire Piezometer
Perforated or Screened Casing	

PERCENTAGES TERMS [1, 2]

Trace	< 5%
Few	5 to 10%
Little	15 to 25%
Some	30 to 45%
Mostly	50 to 100%

[1]Gravel, sand, and fines estimated by mass. Other constituents, such as organics, cobbles, and boulders, estimated by volume.

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Bonneville Lock and Dam Subsurface Investigation and Liquefaction Analysis
Multnomah County, Oregon

SOIL DESCRIPTION AND LOG KEY

March 2017 24-1-04114-001

SHANNON & WILSON, INC.
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FIG. A-2
Sheet 1 of 3

2013_BORING_CLASS1 24-1-04114_BONNEVILLE-TRY3.GPJ SW2013LIBRARYPDX.GLB SWNEW.GDT 3/29/17

UNIFIED SOIL CLASSIFICATION SYSTEM (USCS)
(Modified From USACE Tech Memo 3-357, ASTM D2487, and ASTM D2488)

MAJOR DIVISIONS			GROUP/GRAPHIC SYMBOL		TYPICAL IDENTIFICATIONS
COARSE-GRAINED SOILS *(more than 50% retained on No. 200 sieve)*	Gravels *(more than 50% of coarse fraction retained on No. 4 sieve)*	Gravel *(less than 5% fines)*	GW		Well-Graded Gravel; Well-Graded Gravel with Sand
			GP		Poorly Graded Gravel; Poorly Graded Gravel with Sand
		Silty or Clayey Gravel *(more than 12% fines)*	GM		Silty Gravel; Silty Gravel with Sand
			GC		Clayey Gravel; Clayey Gravel with Sand
	Sands *(50% or more of coarse fraction passes the No. 4 sieve)*	Sand *(less than 5% fines)*	SW		Well-Graded Sand; Well-Graded Sand with Gravel
			SP		Poorly Graded Sand; Poorly Graded Sand with Gravel
		Silty or Clayey Sand *(more than 12% fines)*	SM		Silty Sand; Silty Sand with Gravel
			SC		Clayey Sand; Clayey Sand with Gravel
FINE-GRAINED SOILS *(50% or more passes the No. 200 sieve)*	Silts and Clays *(liquid limit less than 50)*	Inorganic	ML		Silt; Silt with Sand or Gravel; Sandy or Gravelly Silt
			CL		Lean Clay; Lean Clay with Sand or Gravel; Sandy or Gravelly Lean Clay
		Organic	OL		Organic Silt or Clay; Organic Silt or Clay with Sand or Gravel; Sandy or Gravelly Organic Silt or Clay
	Silts and Clays *(liquid limit 50 or more)*	Inorganic	MH		Elastic Silt; Elastic Silt with Sand or Gravel; Sandy or Gravelly Elastic Silt
			CH		Fat Clay; Fat Clay with Sand or Gravel; Sandy or Gravelly Fat Clay
		Organic	OH		Organic Silt or Clay; Organic Silt or Clay with Sand or Gravel; Sandy or Gravelly Organic Silt or Clay
HIGHLY-ORGANIC SOILS	Primarily organic matter, dark in color, and organic odor		PT		Peat or other highly organic soils (see ASTM D4427)
FILL	Placed by humans, both engineered and nonengineered. May include various soil materials and debris.				The Fill graphic symbol is combined with the soil graphic that best represents the observed material

NOTE: No. 4 size = 4.75 mm = 0.187 in.; No. 200 size = 0.075 mm = 0.003 in.

NOTES

1. Dual symbols *(symbols separated by a hyphen, i.e., SP-SM, Sand with Silt)* are used for soils with between 5% and 12% fines or when the liquid limit and plasticity index values plot in the *CL-ML* area of the plasticity chart.
2. Borderline symbols *(symbols separated by a slash, i.e., CL/ML, Lean Clay to Silt; SP-SM/SM, Sand with Silt to Silty Sand)* indicate that the soil properties are close to the defining boundary between two groups.
3. The soil graphics above represent the various USCS identifications (i.e., *GP*, *SM*, etc.) and may be augmented with additional symbology to represent differences within USCS designations. *Sandy Silt (ML)*, for example, may be accompanied by the *ML* soil graphic with sand grains added. Non-USCS materials may be represented by other graphic symbols; see log for descriptions.

Bonneville Lock and Dam Subsurface Investigation and Liquefaction Analysis
Multnomah County, Oregon

SOIL DESCRIPTION AND LOG KEY

March 2017 | 24-1-04114-001

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A-2
Sheet 2 of 3

2013_BORING_CLASS2 24-1-04114_BONNEVILLE-TRY3.GPJ SW2013LIBRARYPDX.GLB SWNEW.GDT 3/29/17

GRADATION TERMS

Poorly Graded	Narrow range of grain sizes present or, within the range of grain sizes present, one or more sizes are missing (Gap Graded). Meets criteria in ASTM D2487, if tested.
Well-Graded	Full range and even distribution of grain sizes present. Meets criteria in ASTM D2487, if tested.

CEMENTATION TERMS[1]

Weak	Crumbles or breaks with handling or slight finger pressure
Moderate	Crumbles or breaks with considerable finger pressure
Strong	Will not crumble or break with finger pressure

PLASTICITY[2]

DESCRIPTION	VISUAL-MANUAL CRITERIA	APPROX. PLASITICTY INDEX RANGE
Nonplastic	A 1/8-in. thread cannot be rolled at any water content.	< 4%
Low	A thread can barely be rolled and a lump cannot be formed when drier than the plastic limit.	4 to 10%
Medium	A thread is easy to roll and not much time is required to reach the plastic limit. The thread cannot be rerolled after reaching the plastic limit. A lump crumbles when drier than the plastic limit.	10 to 20%
High	It take considerable time rolling and kneading to reach the plastic limit. A thread can be rerolled several times after reaching the plastic limit. A lump can be formed without crumbling when drier than the plastic limit.	> 20%

ADDITIONAL TERMS

Mottled	Irregular patches of different colors.
Bioturbated	Soil disturbance or mixing by plants or animals.
Diamict	Nonsorted sediment; sand and gravel in silt and/or clay matrix.
Cuttings	Material brought to surface by drilling.
Slough	Material that caved from sides of borehole.
Sheared	Disturbed texture, mix of strengths.

PARTICLE ANGULARITY AND SHAPE TERMS[1]

Angular	Sharp edges and unpolished planar surfaces.
Subangular	Similar to angular, but with rounded edges.
Subrounded	Nearly planar sides with well-rounded edges.
Rounded	Smoothly curved sides with no edges.
Flat	Width/thickness ratio > 3.
Elongated	Length/width ratio > 3.

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ACRONYMS AND ABBREVIATIONS

ATD	At Time of Drilling
approx.	Approximate/Approximately
Diam.	Diameter
Elev.	Elevation
ft.	Feet
FeO	Iron Oxide
gal.	Gallons
Horiz.	Horizontal
HSA	Hollow Stem Auger
I.D.	Inside Diameter
in.	Inches
lbs.	Pounds
MgO	Magnesium Oxide
mm	Millimeter
MnO	Manganese Oxide
NA	Not Applicable or Not Available
NP	Nonplastic
O.D.	Outside Diameter
OW	Observation Well
pcf	Pounds per Cubic Foot
PID	Photo-Ionization Detector
PMT	Pressuremeter Test
ppm	Parts per Million
psi	Pounds per Square Inch
PVC	Polyvinyl Chloride
rpm	Rotations per Minute
SPT	Standard Penetration Test
USCS	Unified Soil Classification System
q_u	Unconfined Compressive Strength
VWP	Vibrating Wire Piezometer
Vert.	Vertical
WOH	Weight of Hammer
WOR	Weight of Rods
Wt.	Weight

STRUCTURE TERMS[1]

Interbedded	Alternating layers of varying material or color with layers at least 1/4-inch thick; singular: bed.
Laminated	Alternating layers of varying material or color with layers less than 1/4-inch thick; singular: lamination.
Fissured	Breaks along definite planes or fractures with little resistance.
Slickensided	Fracture planes appear polished or glossy; sometimes striated.
Blocky	Cohesive soil that can be broken down into small angular lumps that resist further breakdown.
Lensed	Inclusion of small pockets of different soils, such as small lenses of sand scattered through a mass of clay.
Homogeneous	Same color and appearance throughout.

Bonneville Lock and Dam Subsurface Investigation and Liquefaction Analysis
Multnomah County, Oregon

SOIL DESCRIPTION AND LOG KEY

March 2017 24-1-04114-001

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

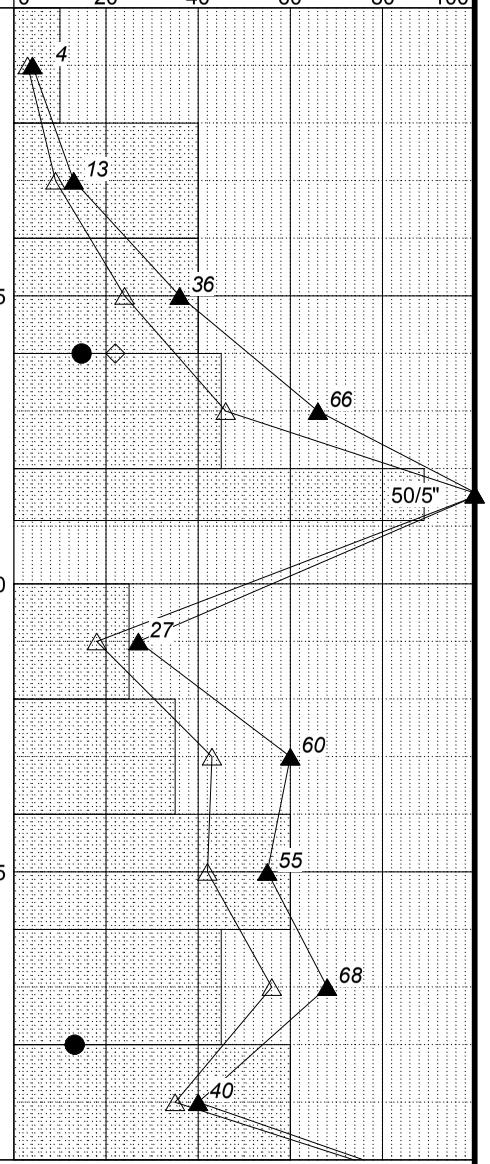
FIG. A-2
Sheet 3 of 3

2013_BORING_CLASS3 24-1-04114_BONNEVILLE-TRY3.GPJ SW2013LIBRARYPDX.GLB SWNEW.GDT 3/29/17

Total Depth:	110.25 ft.	Northing:	~ 722,180 ft.	Drilling Method:	Mud Rotary	Hole Diam.:	6 in. / 5 in.
Top Elevation:	58	Easting:	~ 7,831,432 ft.	Drilling Company:	Cascade Drilling	Rod Type:	NWJ
Vert. Datum:	NAVD88	Station:	~	Drill Rig Equipment:	CME-75 (Rig # 02-44263)	Hammer Type:	Automatic
Horiz. Datum:	OR83-NIF	Offset:	~	Other Comments:	Hammer Efficiency = 74%		

SOIL DESCRIPTION	Elev. Depth (ft.)
Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between soil types, and the transitions may be gradual.	
Very loose to loose, brown, *Silty Gravel to Silty Gravel with Sand (GM)*; moist; fine to coarse, angular to subangular gravel; fine to coarse sand; low plasticity fines.	56.0 / 2.0
Medium dense to very dense, dark gray and brown, *Silty Gravel with Sand, with Cobbles (GM)*; moist; fine to coarse, angular to subangular gravel; fine to coarse sand; nonplastic to low plasticity fines. *Approx. 500 psi drill pressure at 4 ft.* *Samples S-4 to S-6 combined for testing.* **FILL** *Lost more than 280 gallons of drilling mud between 8 and 28 ft.*	42.0 / 16.0
Dense to very dense, dark gray and brown, *Poorly Graded Gravel with Silt and Sand to Silty Gravel with Sand, with Cobbles (GP-GM to GM)*; moist; fine to coarse, angular to subangular gravel; fine to coarse sand; nonplastic to low plasticity fines. *Samples S-10 and S-11 combined for testing.*	

Symbol | Samples: S-1, S-2, S-3, S-4, S-5, S-6, S-7, S-8, S-9, S-10 | Ground Water | Depth, ft.



CONTINUED NEXT SHEET

LEGEND

* Sample Not Recovered

Standard Penetration Test

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. Group symbol is based on visual-manual identification and selected lab testing.
4. The hole location and elevation should be considered approximate.
5. Normalization performed per ASTM D6066. Normalized blow counts are not provided for tests with partial penetration or non-standard samplers.
6. Relative density / consistency terms are based on normalized blow counts.

Bonneville Lock and Dam Subsurface Investigation and Liquefaction Analysis
Multnomah County, Oregon

LOG OF BORING GT/GP-1

March 2017 | 24-1-04114-001

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A-3
Sheet 1 of 6

REV 3

COMPARE_LOG_N_(N1)60 24-1-04114_BONNEVILLE-TRY3.GPJ SW2013LIBRARYPDX.GLB SHAN_WIL.GDT 3/29/17 Log: SCS Rev: AAJH Typ: JJW

Total Depth:	110.25 ft.	Northing:	~ 722,180 ft.	Drilling Method:	Mud Rotary	Hole Diam.:	6 in. / 5 in.
Top Elevation:	58	Easting:	~ 7,831,432 ft.	Drilling Company:	Cascade Drilling	Rod Type:	NWJ
Vert. Datum:	NAVD88	Station:	~	Drill Rig Equipment:	CME-75 (Rig # 02-44263)	Hammer Type:	Automatic
Horiz. Datum:	OR83-NIF	Offset:	~	Other Comments:	Hammer Efficiency = 74%		

SOIL DESCRIPTION

Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between soil types, and the transitions may be gradual.

Elev. Depth (ft.) | Symbol | Samples | Ground Water | Depth, ft.

PENETRATION RESISTANCE, N (blows/ft.)

▲ Normalized Blow Count [5], $(N_1)_{60}$

△ Raw Field Blow Count, N

Continued:

Medium dense to very dense, dark gray and brown, *Poorly Graded Gravel with Silt and Sand to Silty Gravel with Sand, with Cobbles (GP-GM to GM)*; moist; fine to coarse, angular to subangular gravel; fine to coarse sand; nonplastic to low plasticity fines.

Switched from 6-inch to 5-inch bit at 22 ft.

FILL

30.0 / 28.0

Loose to medium dense, brown to gray, *Clayey Gravel with Sand (GC)*; moist; fine to coarse, angular to subangular gravel; fine to coarse sand; medium to high plasticity fines; trace 2- to 6-inch-thick interbeds of *Lean Clay (CL)*.

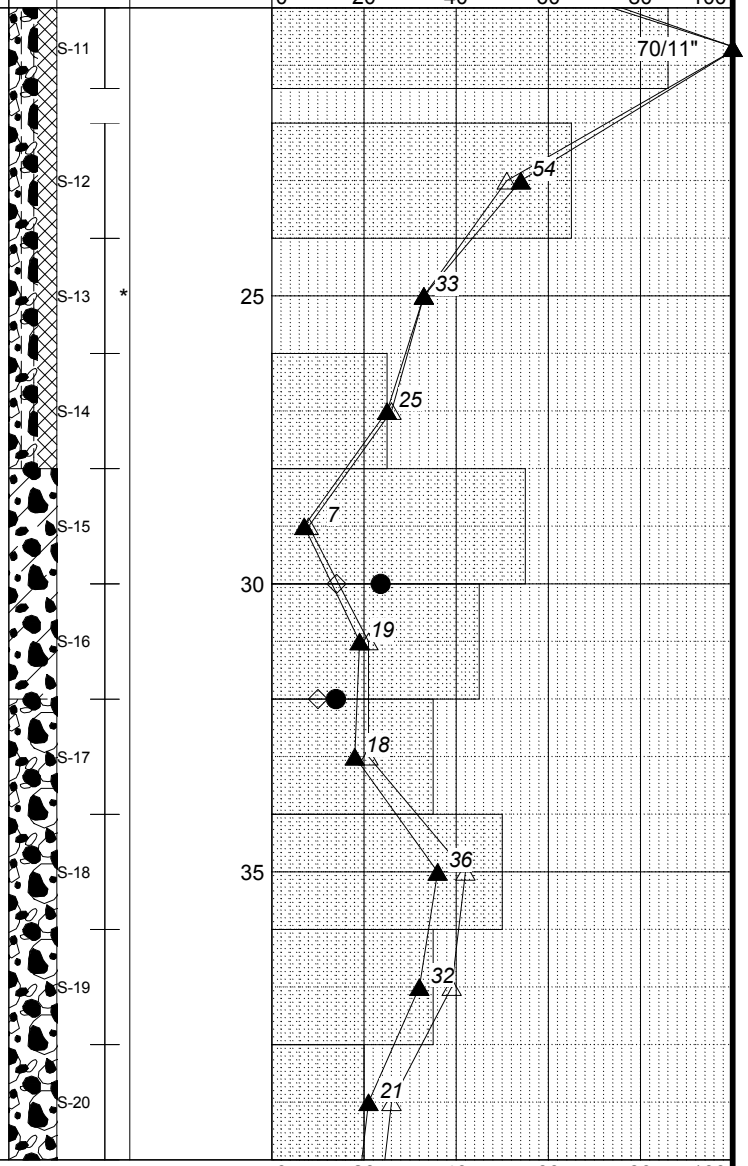
GRAVEL ALLUVIUM

26.0 / 32.0

Medium dense to dense, brown to gray, *Poorly Graded Gravel with Silt and Sand, with Cobbles (GP-GM)*; wet; fine to coarse, angular to subrounded gravel; fine to coarse sand; nonplastic to low plasticity fines.

Grades to 200 to 300 psi drill pressure at 32 ft.

Samples S-17 and S-18 combined for testing.



CONTINUED NEXT SHEET

LEGEND

* Sample Not Recovered

Standard Penetration Test

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. Group symbol is based on visual-manual identification and selected lab testing.
4. The hole location and elevation should be considered approximate.
5. Normalization performed per ASTM D6066. Normalized blow counts are not provided for tests with partial penetration or non-standard samplers.
6. Relative density / consistency terms are based on normalized blow counts.

Bonneville Lock and Dam Subsurface Investigation and Liquefaction Analysis
Multnomah County, Oregon

LOG OF BORING GT/GP-1

March 2017 | 24-1-04114-001

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A-3
Sheet 2 of 6

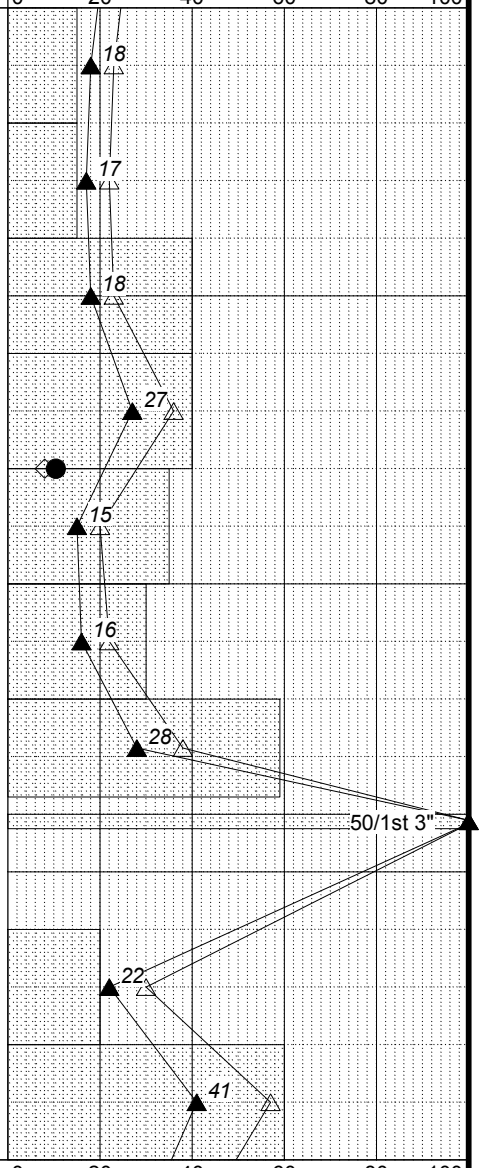
REV 3

COMPARE_LOG_N_(N1)60 24-1-04114_BONNEVILLE-TRY3.GPJ SW2013LIBRARYPDX.GLB SHAN_WIL.GDT 3/29/17 Log: SCS Rev: AAJH Typ: JJW

Total Depth:	110.25 ft.	Northing:	~ 722,180 ft.	Drilling Method:	Mud Rotary	Hole Diam.:	6 in. / 5 in.
Top Elevation:	58	Easting:	~ 7,831,432 ft.	Drilling Company:	Cascade Drilling	Rod Type:	NWJ
Vert. Datum:	NAVD88	Station:	~	Drill Rig Equipment:	CME-75 (Rig # 02-44263)	Hammer Type:	Automatic
Horiz. Datum:	OR83-NIF	Offset:	~	Other Comments:	Hammer Efficiency = 74%		

SOIL DESCRIPTION	Elev. Depth (ft.)	Symbol	Samples	Ground Water	Depth, ft.
Continued: Medium dense, brown to gray, *Poorly Graded Gravel with Silt and Sand, with Cobbles (GP-GM)*; wet; fine to coarse, angular to subrounded gravel; fine to coarse sand; nonplastic to low plasticity fines.			S-21, S-22		
GRAVEL ALLUVIUM			S-23		45
Grades to 400 to 500 psi drill pressure at 46 ft.			S-24		
			S-25		50
Samples S-25 to S-27 combined for testing.			S-26, S-27		
Grades to medium dense to very dense at 54 ft.			S-28		55
Lost approx. 20 gallons of drilling mud around 51 ft. and approx. 70 gallons around 56 ft.			S-29		
Medium dense to dense, gray to brown, *Poorly Graded Gravel with Silt and Sand to Silty Gravel with Sand, with Cobbles (GP-GM to*	0.0 / 58.0		S-30		

CONTINUED NEXT SHEET



LEGEND

* Sample Not Recovered

Standard Penetration Test

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. Group symbol is based on visual-manual identification and selected lab testing.
4. The hole location and elevation should be considered approximate.
5. Normalization performed per ASTM D6066. Normalized blow counts are not provided for tests with partial penetration or non-standard samplers.
6. Relative density / consistency terms are based on normalized blow counts.

Bonneville Lock and Dam Subsurface Investigation and Liquefaction Analysis
Multnomah County, Oregon

LOG OF BORING GT/GP-1

March 2017 24-1-04114-001

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A-3
Sheet 3 of 6

REV 3

COMPARE_LOG_N_(N1)60 24-1-04114_BONNEVILLE-TRY3.GPJ SW2013LIBRARYPDX.GLB SHAN_WIL.GDT 3/29/17 Log: SCS Rev: AAJH Typ: JJW

Total Depth:	110.25 ft.	Northing:	~ 722,180 ft.	Drilling Method:	Mud Rotary	Hole Diam.:	6 in. / 5 in.
Top Elevation:	58	Easting:	~ 7,831,432 ft.	Drilling Company:	Cascade Drilling	Rod Type:	NWJ
Vert. Datum:	NAVD88	Station:	~	Drill Rig Equipment:	CME-75 (Rig # 02-44263)	Hammer Type:	Automatic
Horiz. Datum:	OR83-NIF	Offset:	~	Other Comments:	Hammer Efficiency = 74%		

SOIL DESCRIPTION

Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between soil types, and the transitions may be gradual.

GM); wet; fine to coarse, angular to subrounded gravel; fine to coarse sand; nonplastic to low plasticity fines; stratified from 58 to 60 feet with 6-inch-thick interbeds of *Silt with Sand (ML)*.

GRAVEL ALLUVIUM

-6.0 / 64.0

Medium dense to dense, gray to brown, *Well Graded Gravel with Silt and Sand, with Cobbles (GW-GM)*; wet; fine to coarse, angular to subrounded gravel; fine to coarse sand; nonplastic to low plasticity fines.

Lost approx. 70 gallons of drilling mud at 65 ft. and had little to no circulation from 65 to 85 ft.

Samples S-33 to S-35 combined for testing.

-11.7 / 69.7

Very loose, dark gray, *Silty Sand (SM)*; wet; fine to medium sand; nonplastic fines; trace organics.

SAND AND SILT ALLUVIUM

-14.0 / 72.0

Very loose to loose / very soft to medium stiff, dark gray, *Silt to Silt with Sand (ML)*; wet; fine sand; nonplastic to low plasticity fines; trace to few organics; trace 16-inch-thick interbeds of high plasticity *Elastic Silt (MH)*.

-18.8 / 76.8

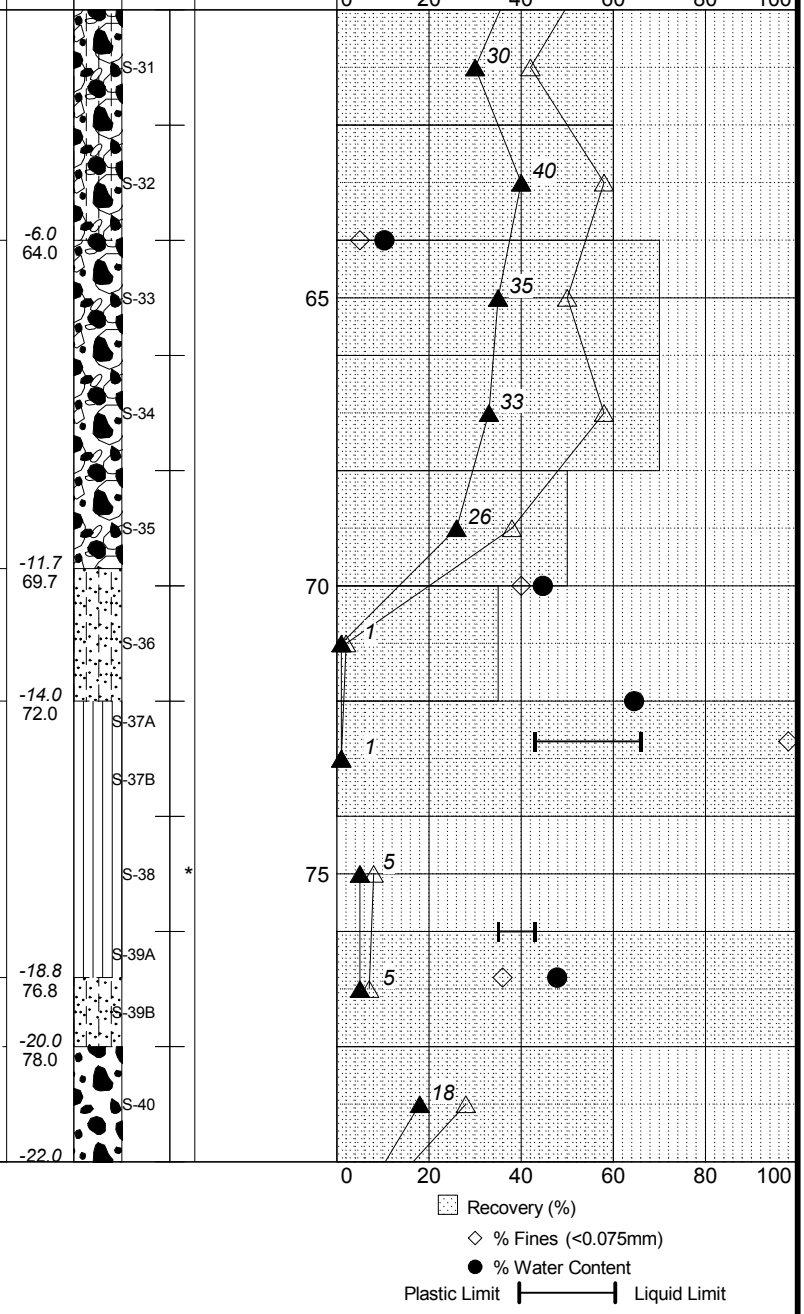
Loose, gray to brown, *Silty Sand (SM)*; wet; fine to medium sand; nonplastic fines; trace organics.

-20.0 / 78.0

Medium dense, red-brown, *Poorly Graded Gravel with Sand (GP)*; wet; fine to coarse gravel; fine to coarse sand.

-22.0

CONTINUED NEXT SHEET



LEGEND

* Sample Not Recovered

Standard Penetration Test

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. Group symbol is based on visual-manual identification and selected lab testing.
4. The hole location and elevation should be considered approximate.
5. Normalization performed per ASTM D6066. Normalized blow counts are not provided for tests with partial penetration or non-standard samplers.
6. Relative density / consistency terms are based on normalized blow counts.

Bonneville Lock and Dam Subsurface Investigation and Liquefaction Analysis
Multnomah County, Oregon

LOG OF BORING GT/GP-1

March 2017 | 24-1-04114-001

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A-3
Sheet 4 of 6

REV 3

COMPARE_LOG_N_(N1)60 24-1-04114_BONNEVILLE-TRY3.GPJ SW2013LIBRARYPDX.GLB SHAN_WIL.GDT 3/29/17 Log: SCS Rev: AAJH Typ: JJW

Total Depth:	110.25 ft.	Northing:	~ 722,180 ft.	Drilling Method:	Mud Rotary	Hole Diam.:	6 in. / 5 in.
Top Elevation:	58	Easting:	~ 7,831,432 ft.	Drilling Company:	Cascade Drilling	Rod Type:	NWJ
Vert. Datum:	NAVD88	Station:	~	Drill Rig Equipment:	CME-75 (Rig # 02-44263)	Hammer Type:	Automatic
Horiz. Datum:	OR83-NIF	Offset:	~	Other Comments:	Hammer Efficiency = 74%		

SOIL DESCRIPTION

Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between soil types, and the transitions may be gradual.

Elev. Depth (ft.) | Symbol | Samples | Ground Water | Depth, ft.

PENETRATION RESISTANCE, N (blows/ft.)

▲ Normalized Blow Count [5], $(N_1)_{60}$

△ Raw Field Blow Count, N

Soft, blue-gray to red-brown, *Silt to Silt with Sand (ML)*; wet; fine sand; medium plasticity.

SAND AND SILT ALLUVIUM

80.0 / -24.0

Dense to very dense, brown to gray, *Silty Gravel with Sand, with Cobbles (GM)*; wet; fine to coarse subangular to rounded gravel; fine to coarse sand; nonplastic fines; trace zones of weak cementation.

Samples S-43 and S-44 combined for testing.

GRAVEL ALLUVIUM

Grades to medium dense at 90 ft.

82.0 / -34.5

Medium dense, brown, *Poorly Graded Sand with Silt to Silty Sand (SP-SM to SM)*; wet; fine to medium sand; nonplastic fines.

SAND AND SILT ALLUVIUM

92.5 / -40.0

Loose, light brown to gray-blue, *Silt to Silt with Sand (ML)*; wet; fine sand; nonplastic.

98.0

S-41A, S-41B, S-42, S-43, S-44, S-45, S-46, S-47A, S-47B, S-48, S-49, S-50

Depth, ft.: 85, 90, 95

Blow counts: 3, 47, 49, 50/5", 50/1st 3", 21, 19, 13, 19, 7

0 20 40 60 80 100

CONTINUED NEXT SHEET

LEGEND

* Sample Not Recovered

Standard Penetration Test

Recovery (%)

◇ % Fines (<0.075mm)

● % Water Content

Plastic Limit — Liquid Limit

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. Group symbol is based on visual-manual identification and selected lab testing.
4. The hole location and elevation should be considered approximate.
5. Normalization performed per ASTM D6066. Normalized blow counts are not provided for tests with partial penetration or non-standard samplers.
6. Relative density / consistency terms are based on normalized blow counts.

Bonneville Lock and Dam Subsurface Investigation and Liquefaction Analysis
Multnomah County, Oregon

LOG OF BORING GT/GP-1

March 2017 | 24-1-04114-001

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A-3
Sheet 5 of 6

REV 3

COMPARE_LOG_N_(N1)60 24-1-04114_BONNEVILLE-TRY3.GPJ SW2013LIBRARYPDX.GLB SHAN_WIL.GDT 3/29/17 Log: SCS Rev: AAJH Typ: JJW

Total Depth:	110.25 ft.	Northing:	~ 722,180 ft.	Drilling Method:	Mud Rotary	Hole Diam.:	6 in. / 5 in.
Top Elevation:	58	Easting:	~ 7,831,432 ft.	Drilling Company:	Cascade Drilling	Rod Type:	NWJ
Vert. Datum:	NAVD88	Station:	~	Drill Rig Equipment:	CME-75 (Rig # 02-44263)	Hammer Type:	Automatic
Horiz. Datum:	OR83-NIF	Offset:	~	Other Comments:	Hammer Efficiency = 74%		

SOIL DESCRIPTION

Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between soil types, and the transitions may be gradual.

Continued:

Loose to medium dense / stiff, light brown to gray-blue, *Silt to Silt with Sand (ML)*; wet; fine sand; nonplastic to low plasticity; stratified in layers with variable sand content.

SAND AND SILT ALLUVIUM

-48.0 / 106.0

Medium dense, blue-gray to brown, *Silty Sand (SM)*; moist to wet; fine to medium sand; nonplastic fines; micaceous.

-50.0 / 108.0

Very dense, brown to gray, *Poorly Graded Gravel with Silt and Sand to Silty Gravel with Sand, with Cobbles (GP-GM to GM)*; moist to wet; fine to coarse, subangular to round gravel; fine to coarse sand; nonplastic fines; weakly to moderately cemented.

-52.3 / 110.3

PRE-SLIDE ALLUVIUM

Approx. 600 to 700 psi drill pressure below 108 ft.; Lost approx. 70 gallons of drilling mud at 108.5 ft.

Completed: March 2, 2017

Elev. Depth (ft.) | Symbol | Samples | Ground Water | Depth, ft.

S-51 *
S-52
S-53
S-54
S-55
S-56 *

105
110
115

PENETRATION RESISTANCE, N (blows/ft.)

▲ Normalized Blow Count [5], $(N_1)_{60}$

△ Raw Field Blow Count, N

0 20 40 60 80 100

9
11
14
21
50/1st 2"
50/1st 3"

0 20 40 60 80 100

Recovery (%)

◇ % Fines (<0.075mm)

● % Water Content

Plastic Limit ├──┤ Liquid Limit

LEGEND

* Sample Not Recovered

Standard Penetration Test

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. Group symbol is based on visual-manual identification and selected lab testing.
4. The hole location and elevation should be considered approximate.
5. Normalization performed per ASTM D6066. Normalized blow counts are not provided for tests with partial penetration or non-standard samplers.
6. Relative density / consistency terms are based on normalized blow counts.

Bonneville Lock and Dam Subsurface Investigation and Liquefaction Analysis
Multnomah County, Oregon

LOG OF BORING GT/GP-1

March 2017 | 24-1-04114-001

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A-3
Sheet 6 of 6

REV 3

COMPARE_LOG_N_(N1)60 24-1-04114_BONNEVILLE-TRY3.GPJ SW2013LIBRARYPDX.GLB SHAN_WIL.GDT 3/29/17 Log: SCS Rev: AAJH Typ: JJW

Total Depth:	100.3 ft.	Northing:	~ 722,158 ft.	Drilling Method:	Mud Rotary	Hole Diam.:	5 in. / 6 in.
Top Elevation:	58	Easting:	~ 7,831,543 ft.	Drilling Company:	Cascade Drilling	Rod Type:	NWJ
Vert. Datum:	NAVD88	Station:	~	Drill Rig Equipment:	CME-75 (Rig # 02-44263)	Hammer Type:	Automatic
Horiz. Datum:	OR83-NIF	Offset:	~	Other Comments:	Hammer Efficiency = 74%		

SOIL DESCRIPTION

Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between soil types, and the transitions may be gradual.

Very loose to loose, brown, *Silty Gravel with Sand, with Cobbles (GM)*; moist; fine to coarse, subangular to subrounded gravel; fine to coarse sand; nonplastic fines.

56.0 2.0

FILL

Loose to dense, brown, *Silty Gravel with Sand, with Cobbles (GM)*; moist; fine to coarse, subangular to subrounded gravel; fine to coarse sand; nonplastic fines.

Samples S-2 and S-3 combined for testing.

50.0 8.0

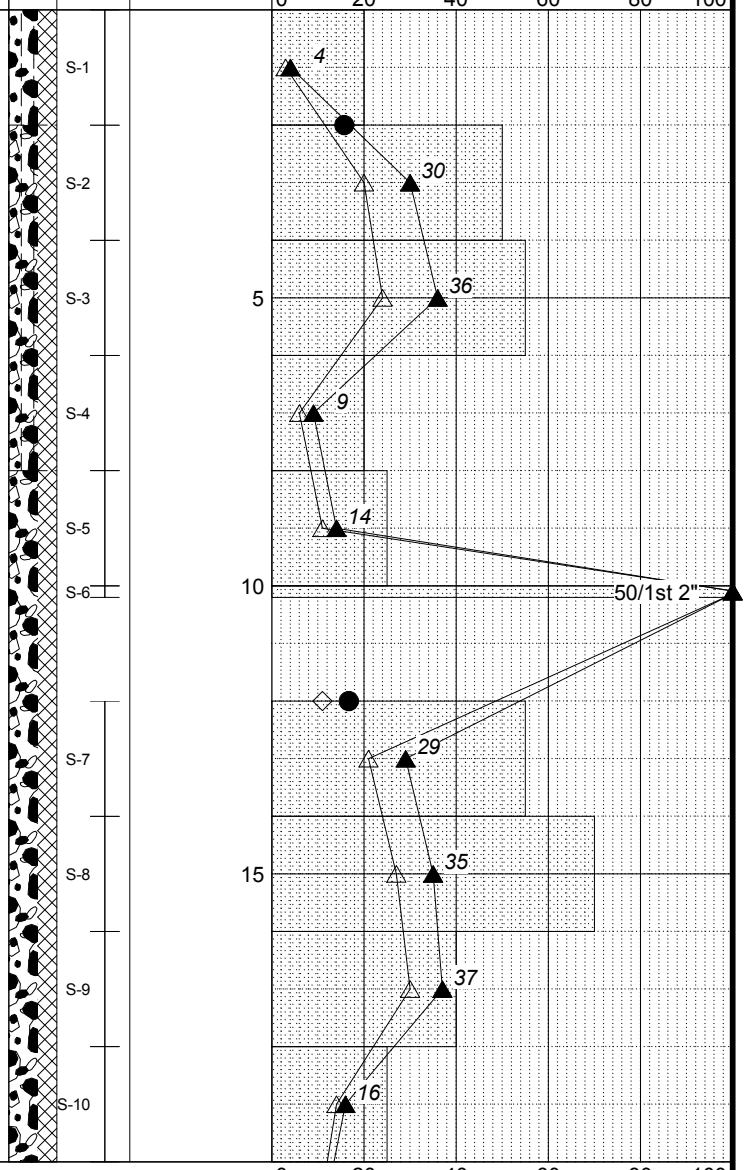
Medium dense to very dense, brown to gray, *Poorly Graded Gravel with Silt and Sand, with Cobbles (GP-GM)*; moist; fine to coarse, subangular to subrounded gravel; fine to coarse sand; nonplastic fines.

5-inch bit used from 0 to 10 ft.; 6-inch bit used from 10 to 20 ft.; 5-inch bit used below 20 ft. Poor circulation and extensive drilling mud loss from 8 to 20 ft.

Samples S-7 and S-8 combined for testing.

38.0

Elev. Depth (ft.) | Symbol | Samples | Ground Water | Depth, ft.



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LEGEND

⊥ Standard Penetration Test

Recovery (%)

◇ % Fines (<0.075mm)

● % Water Content

Plastic Limit ├──┤ Liquid Limit

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. Group symbol is based on visual-manual identification and selected lab testing.
4. The hole location and elevation should be considered approximate.
5. Normalization performed per ASTM D6066. Normalized blow counts are not provided for tests with partial penetration or non-standard samplers.
6. Relative density / consistency terms are based on normalized blow counts.

Bonneville Lock and Dam Subsurface Investigation and Liquefaction Analysis
Multnomah County, Oregon

LOG OF BORING GT-2

March 2017 | 24-1-04114-001

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A-4
Sheet 1 of 6

REV 3

COMPARE_LOG_N_(N1)60 24-1-04114_BONNEVILLE-TRY3.GPJ SW2013LIBRARYPDX.GLB SHAN_WIL.GDT 3/29/17 Log: SCS Rev: AAJH Typ: SCS

Total Depth:	100.3 ft.	Northing:	~ 722,158 ft.	Drilling Method:	Mud Rotary	Hole Diam.:	5 in. / 6 in.
Top Elevation:	58	Easting:	~ 7,831,543 ft.	Drilling Company:	Cascade Drilling	Rod Type:	NWJ
Vert. Datum:	NAVD88	Station:	~	Drill Rig Equipment:	CME-75 (Rig # 02-44263)	Hammer Type:	Automatic
Horiz. Datum:	OR83-NIF	Offset:	~	Other Comments:	Hammer Efficiency = 74%		

SOIL DESCRIPTION

Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between soil types, and the transitions may be gradual.

Loose to medium dense, brown, *Silty Sand (SM)*; moist; trace to little, fine to coarse, subrounded gravel; fine to coarse sand; nonplastic fines.

GRAVEL ALLUVIUM

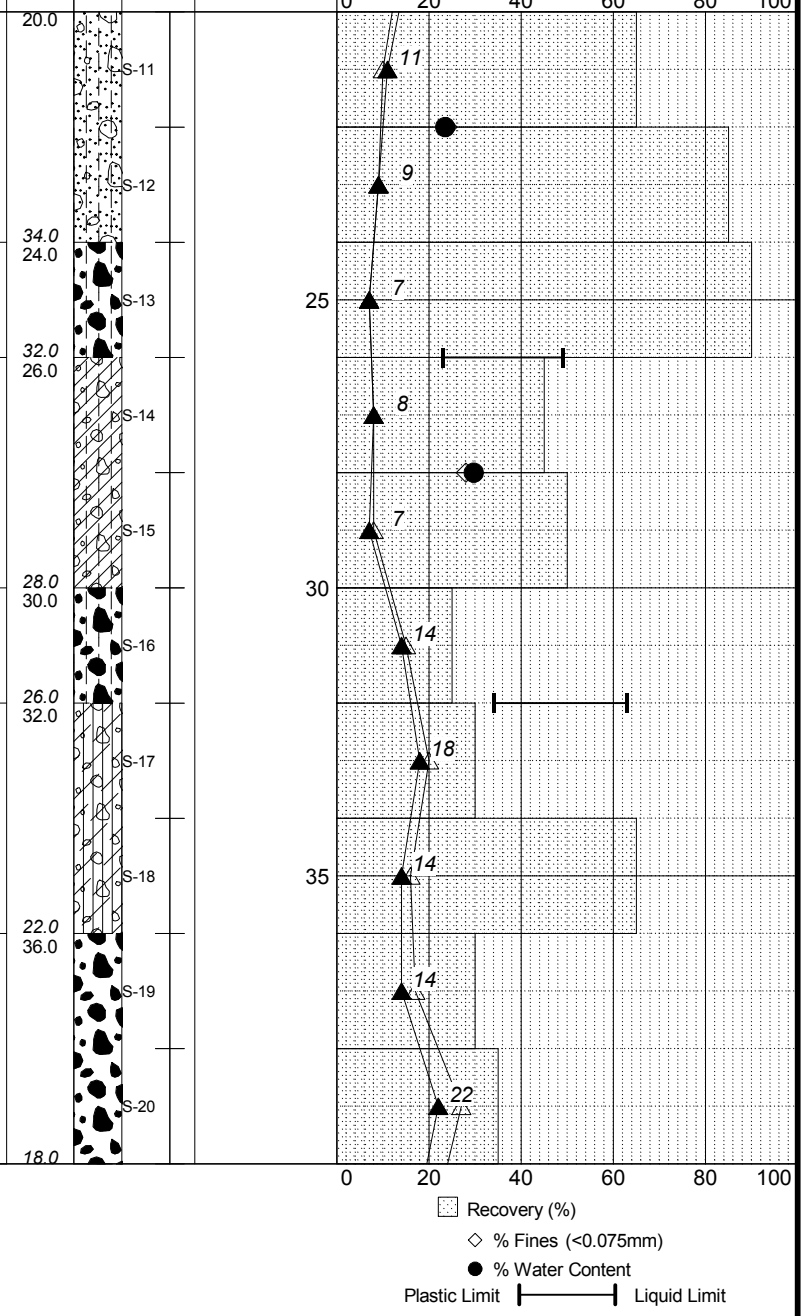
Loose, dark brown, *Silty Gravel with Sand (GM)*; moist; fine to coarse, subrounded to rounded gravel; fine to coarse sand; low plasticity fines.

Medium stiff to stiff, gray and brown mottled, *Clayey Gravel with Sand to Gravelly Lean Clay with Sand (GC to CL)*; moist to wet; fine to coarse, subangular to subrounded gravel; fine to coarse sand; high plasticity fines.

Medium dense, brown mottled, *Silty Gravel with Sand (GM)*; moist; fine to coarse, subangular to subrounded gravel; fine to coarse sand; nonplastic to low plasticity fines.

Stiff to very stiff, blue-gray, *Gravelly Elastic Silt with Sand (MH)*; moist; fine to coarse, subangular gravel; fine to coarse sand; high plasticity.

Medium dense, brown, *Poorly Graded Gravel with Silt and Sand (GP-GM)*; moist; fine to coarse, subrounded gravel; fine to coarse sand; low plasticity fines; stratified with 3- to 5-inch-thick interbeds of *Silt (ML)*.



CONTINUED NEXT SHEET

LEGEND

Standard Penetration Test

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. Group symbol is based on visual-manual identification and selected lab testing.
4. The hole location and elevation should be considered approximate.
5. Normalization performed per ASTM D6066. Normalized blow counts are not provided for tests with partial penetration or non-standard samplers.
6. Relative density / consistency terms are based on normalized blow counts.

Bonneville Lock and Dam Subsurface Investigation and Liquefaction Analysis
Multnomah County, Oregon

LOG OF BORING GT-2

March 2017 | 24-1-04114-001

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A-4
Sheet 2 of 6

COMPARE_LOG_N_(N1)60 24-1-04114_BONNEVILLE-TRY3.GPJ SW2013LIBRARYPDX.GLB SHAN_WIL.GDT 3/29/17 Log: SCS Rev: AAJH Typ: SCS

REV 3

Total Depth:	100.3 ft.	Northing:	~ 722,158 ft.	Drilling Method:	Mud Rotary	Hole Diam.:	5 in. / 6 in.
Top Elevation:	58	Easting:	~ 7,831,543 ft.	Drilling Company:	Cascade Drilling	Rod Type:	NWJ
Vert. Datum:	NAVD88	Station:	~	Drill Rig Equipment:	CME-75 (Rig # 02-44263)	Hammer Type:	Automatic
Horiz. Datum:	OR83-NIF	Offset:	~	Other Comments:	Hammer Efficiency = 74%		

SOIL DESCRIPTION

Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between soil types, and the transitions may be gradual.

Elev. Depth (ft.)	Soil Description
40.0	Medium dense, brown, *Poorly Graded Gravel (GP)*; moist; fine to coarse, subangular to subrounded gravel; trace fine to coarse sand; trace low plasticity fines.
	GRAVEL ALLUVIUM
10.0 / 48.0	Medium dense, brown to gray, *Clayey Gravel with Sand (GC)*; moist; fine to coarse, subangular to subrounded gravel; fine to coarse sand; medium plasticity fines.
	Samples S-25 and S-26 combined for testing.
6.0 / 52.0	Medium dense, brown to gray, *Silty Gravel with Sand (GM)*; moist; fine to coarse, subangular to subrounded gravel; fine to coarse sand; nonplastic to low plasticity fines.
	Samples S-28 and S-29 combined for testing.
0.0 / 58.0	Medium dense, brown to gray, *Poorly Graded Gravel with Silt and Sand (GP-GM)*.

Samples: S-21, S-22, S-23, S-24, S-25, S-26, S-27, S-28, S-29, S-30

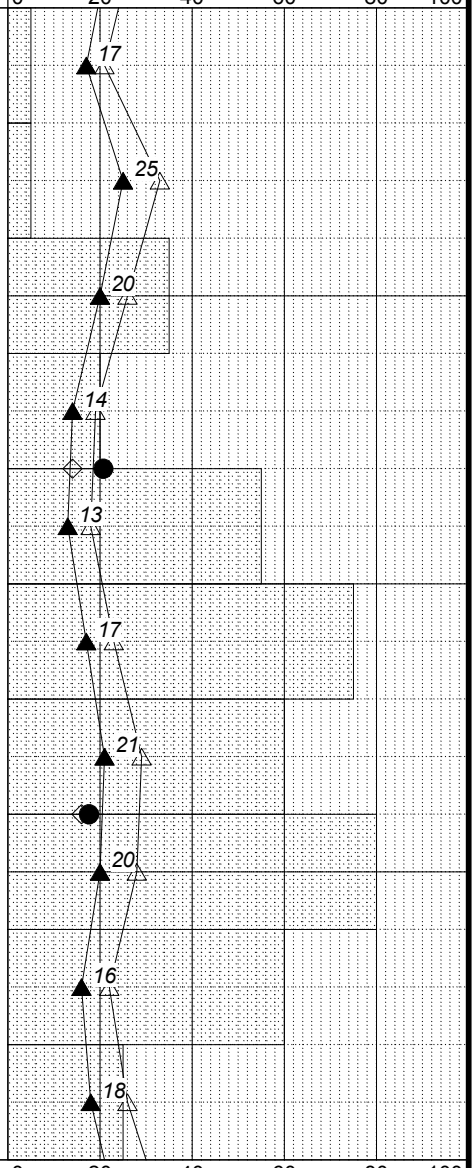
Ground Water

Depth, ft.: 45, 50, 55

PENETRATION RESISTANCE, N (blows/ft.)

▲ Normalized Blow Count [5], $(N_1)_{60}$

△ Raw Field Blow Count, N



CONTINUED NEXT SHEET

LEGEND

Standard Penetration Test

Recovery (%)

◇ % Fines (<0.075mm)

● % Water Content

Plastic Limit ├──┤ Liquid Limit

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. Group symbol is based on visual-manual identification and selected lab testing.
4. The hole location and elevation should be considered approximate.
5. Normalization performed per ASTM D6066. Normalized blow counts are not provided for tests with partial penetration or non-standard samplers.
6. Relative density / consistency terms are based on normalized blow counts.

Bonneville Lock and Dam Subsurface Investigation and Liquefaction Analysis
Multnomah County, Oregon

LOG OF BORING GT-2

March 2017 | 24-1-04114-001

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FIG. A-4
Sheet 3 of 6

REV 3

COMPARE_LOG_N_(N1)60 24-1-04114_BONNEVILLE-TRY3.GPJ SW2013LIBRARYPDX.GLB SHAN_WIL.GDT 3/29/17 Log: SCS Rev: AAJH Typ: SCS

Total Depth:	100.3 ft.	Northing:	~ 722,158 ft.	Drilling Method:	Mud Rotary	Hole Diam.:	5 in. / 6 in.
Top Elevation:	58	Easting:	~ 7,831,543 ft.	Drilling Company:	Cascade Drilling	Rod Type:	NWJ
Vert. Datum:	NAVD88	Station:	~	Drill Rig Equipment:	CME-75 (Rig # 02-44263)	Hammer Type:	Automatic
Horiz. Datum:	OR83-NIF	Offset:	~	Other Comments:	Hammer Efficiency = 74%		

SOIL DESCRIPTION

Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between soil types, and the transitions may be gradual.

Continued:

Medium dense, brown to gray, *Poorly Graded Gravel with Silt and Sand (GP-GM)*; moist; fine to coarse, subangular to subrounded gravel; fine to coarse sand; nonplastic fines.

GRAVEL ALLUVIUM

Grades to dense at 66 ft.

Samples S-34 and S-35 combined for testing.

Very dense, brown to gray, *Poorly Graded Gravel with Silt and Sand to Silty Gravel with Sand, with Cobbles (GP-GM to GM)*; moist; fine to coarse, subangular to subrounded gravel; fine to coarse sand; nonplastic to low plasticity fines.

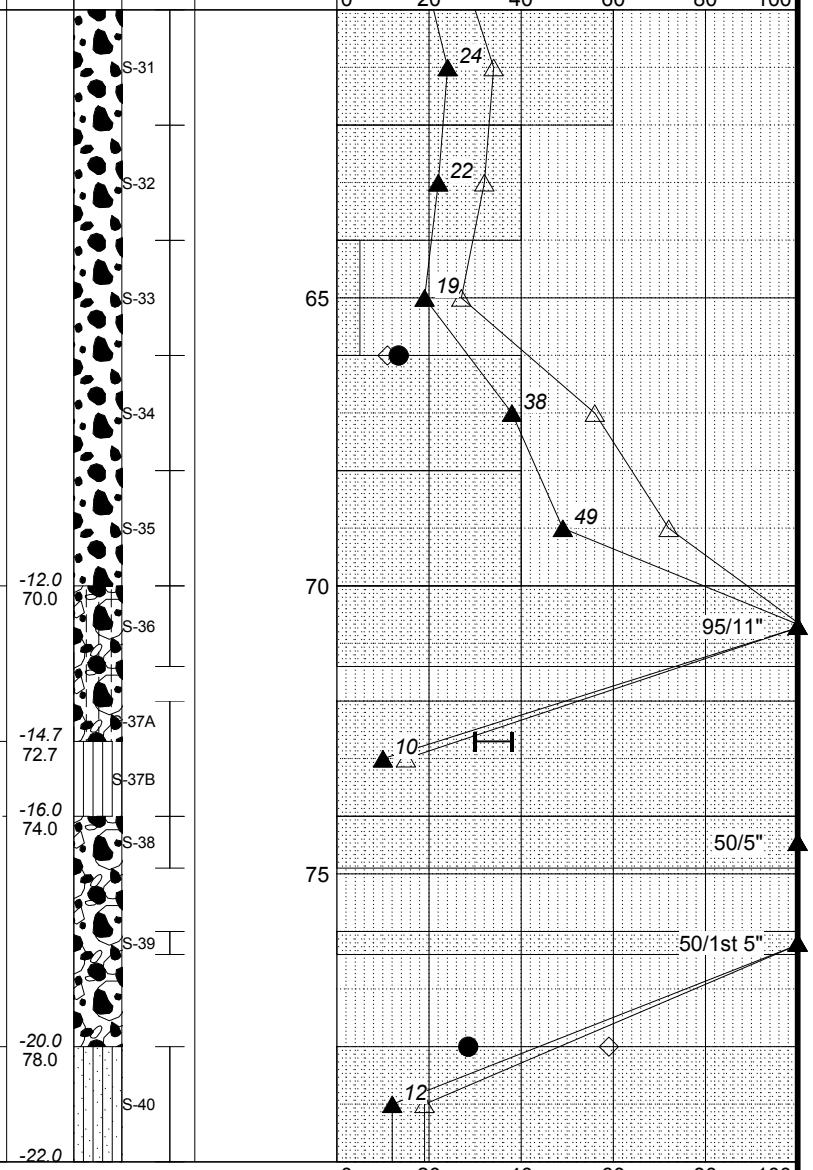
Lost approx. 20 gallons of drilling mud at 70 ft.

Stiff, blue-gray, *Silt to Silt with Sand (ML)*; moist; fine sand; low plasticity; micaceous.

Very dense, gray, *Poorly Graded Gravel with Sand and Cobbles (GP)*; wet; fine to coarse, angular to subrounded gravel; fine to coarse sand; trace nonplastic fines.

Medium dense, brown, *Sandy Silt (ML)*; wet; fine to medium sand; nonplastic fines; micaceous.

CONTINUED NEXT SHEET



LEGEND

Standard Penetration Test

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. Group symbol is based on visual-manual identification and selected lab testing.
4. The hole location and elevation should be considered approximate.
5. Normalization performed per ASTM D6066. Normalized blow counts are not provided for tests with partial penetration or non-standard samplers.
6. Relative density / consistency terms are based on normalized blow counts.

Bonneville Lock and Dam Subsurface Investigation and Liquefaction Analysis
Multnomah County, Oregon

LOG OF BORING GT-2

March 2017 | 24-1-04114-001

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A-4
Sheet 4 of 6

REV 3

COMPARE_LOG_N_(N1)60 24-1-04114_BONNEVILLE-TRY3.GPJ SW2013LIBRARYPDX.GLB SHAN_WIL.GDT 3/29/17 Log: SCS Rev: AAJH Typ: SCS

Total Depth:	100.3 ft.	Northing:	~ 722,158 ft.	Drilling Method:	Mud Rotary	Hole Diam.:	5 in. / 6 in.
Top Elevation:	58	Easting:	~ 7,831,543 ft.	Drilling Company:	Cascade Drilling	Rod Type:	NWJ
Vert. Datum:	NAVD88	Station:	~	Drill Rig Equipment:	CME-75 (Rig # 02-44263)	Hammer Type:	Automatic
Horiz. Datum:	OR83-NIF	Offset:	~	Other Comments:	Hammer Efficiency = 74%		

SOIL DESCRIPTION

Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between soil types, and the transitions may be gradual.

Elev. Depth (ft.) | Symbol | Samples | Ground Water | Depth, ft.

PENETRATION RESISTANCE, N (blows/ft.)

▲ Normalized Blow Count [5], $(N_1)_{60}$

△ Raw Field Blow Count, N

0 20 40 60 80 100

Loose to medium dense, brown, *Silty Sand (SM)*; wet; fine to medium sand; nonplastic fines; micaceous.

SAND AND SILT ALLUVIUM

80.0

S-41, S-42, S-43, S-44A

85

12, 14, 11, 10

-29.3 / 87.3

Loose / medium stiff, light brown, *Silt (ML)*; wet; trace to little fine sand; nonplastic to low plasticity; micaceous.

S-44B, S-45

6, 17

-32.0 / 90.0

Medium dense, light brown, *Silt with Sand (ML)*; wet; fine sand; nonplastic fines.

S-46A

90

-33.2 / 91.2

Dense to very dense, red-brown, *Poorly Graded Gravel with Silt and Sand to Silty Gravel with Sand, with Cobbles (GP-GM to GM)*; moist to wet; fine to coarse, angular to subrounded gravel; fine to coarse sand; nonplastic fines; weakly to moderately cemented.

PRE-SLIDE ALLUVIUM

Samples S-49 and S-50 combined for testing.

S-46B, S-47, S-48, S-49, S-50

50/1st 3"

50/1st 4"

95

82/11"

34

CONTINUED NEXT SHEET

LEGEND

Standard Penetration Test

Recovery (%)

◇ % Fines (<0.075mm)

● % Water Content

Plastic Limit ├──┤ Liquid Limit

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. Group symbol is based on visual-manual identification and selected lab testing.
4. The hole location and elevation should be considered approximate.
5. Normalization performed per ASTM D6066. Normalized blow counts are not provided for tests with partial penetration or non-standard samplers.
6. Relative density / consistency terms are based on normalized blow counts.

Bonneville Lock and Dam Subsurface Investigation and Liquefaction Analysis
Multnomah County, Oregon

LOG OF BORING GT-2

March 2017 | 24-1-04114-001

SHANNON & WILSON, INC.
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FIG. A-4
Sheet 5 of 6

REV 3

COMPARE_LOG_N_(N1)60 24-1-04114_BONNEVILLE-TRY3.GPJ SW2013LIBRARYPDX.GLB SHAN_WIL.GDT 3/29/17 Log: SCS Rev: AAJH Typ: SCS

Total Depth:	100.3 ft.	Northing:	~ 722,158 ft.	Drilling Method:	Mud Rotary	Hole Diam.:	5 in. / 6 in.
Top Elevation:	58	Easting:	~ 7,831,543 ft.	Drilling Company:	Cascade Drilling	Rod Type:	NWJ
Vert. Datum:	NAVD88	Station:	~	Drill Rig Equipment:	CME-75 (Rig # 02-44263)	Hammer Type:	Automatic
Horiz. Datum:	OR83-NIF	Offset:	~	Other Comments:	Hammer Efficiency = 74%		

SOIL DESCRIPTION	Elev. Depth (ft.)	Symbol	Samples	Ground Water	Depth, ft.	PENETRATION RESISTANCE, N (blows/ft.)
Continued: **PRE-SLIDE ALLUVIUM** Completed: March 8, 2017	-42.3 100.3		S-51		105, 110, 115	50/1st 4"

Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between soil types, and the transitions may be gradual.

▲ Normalized Blow Count [5], $(N_1)_{60}$
△ Raw Field Blow Count, N

0 20 40 60 80 100

LEGEND
Standard Penetration Test

Recovery (%)
◇ % Fines (<0.075mm)
● % Water Content
Plastic Limit — Liquid Limit

1. Refer to KEY for explanation of symbols, codes, abbreviations and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. Group symbol is based on visual-manual identification and selected lab testing.
4. The hole location and elevation should be considered approximate.
5. Normalization performed per ASTM D6066. Normalized blow counts are not provided for tests with partial penetration or non-standard samplers.
6. Relative density / consistency terms are based on normalized blow counts.

Bonneville Lock and Dam Subsurface Investigation and Liquefaction Analysis
Multnomah County, Oregon

LOG OF BORING GT-2

March 2017 24-1-04114-001

SHANNON & WILSON, INC.
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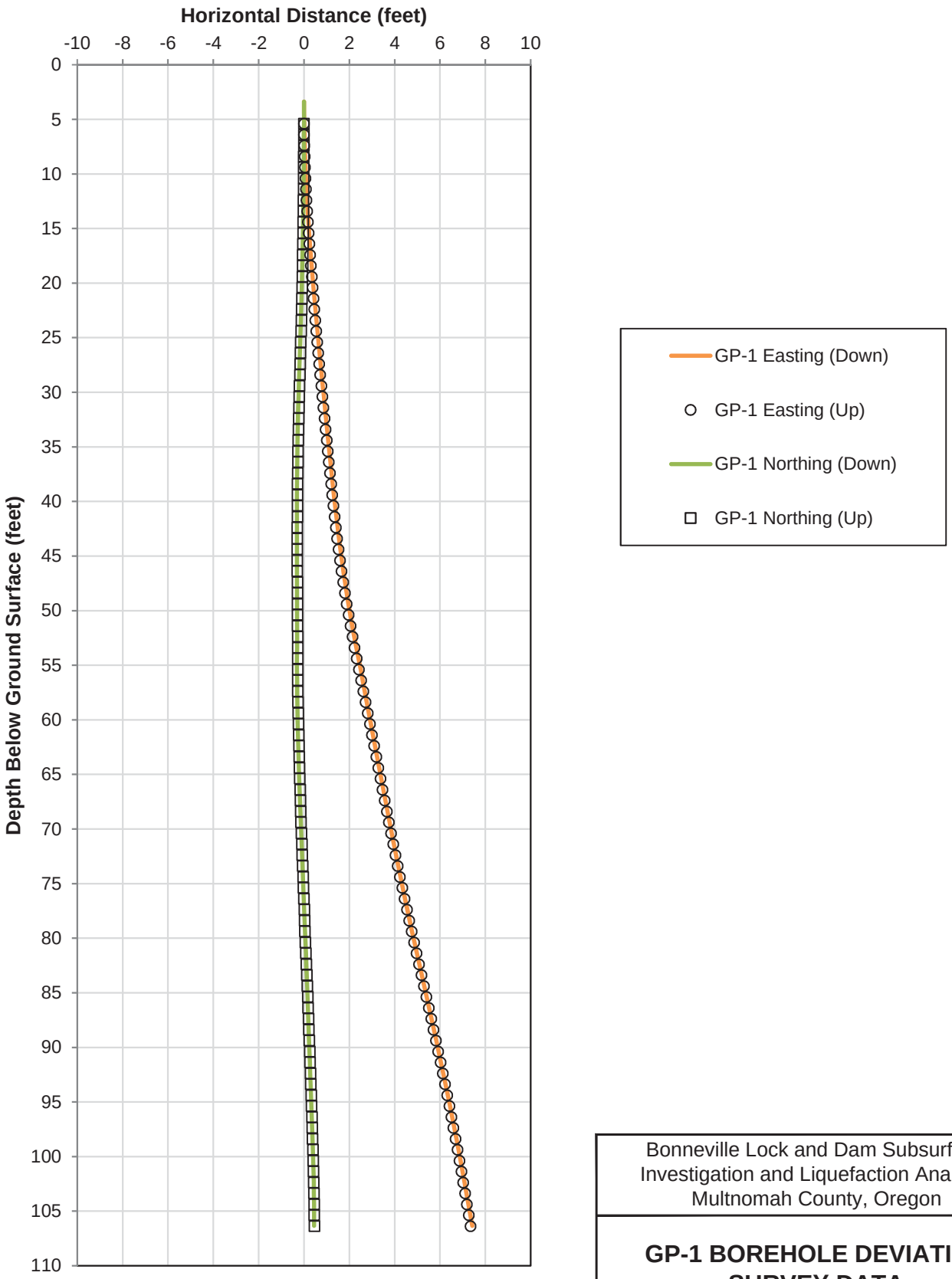
FIG. A-4
Sheet 6 of 6

REV 3

COMPARE_LOG_N_(N1)60 24-1-04114_BONNEVILLE-TRY3.GPJ SW2013LIBRARYPDX.GLB SHAN_WIL.GDT 3/29/17 Log: SCS Rev: AAJH Typ: SCS



Bonneville Lock and Dam Subsurface Investigation and Liquefaction Analysis
Multnomah County, Oregon

GP-1 BOREHOLE DEVIATION SURVEY DATA

March 2017 24-1-04114-001

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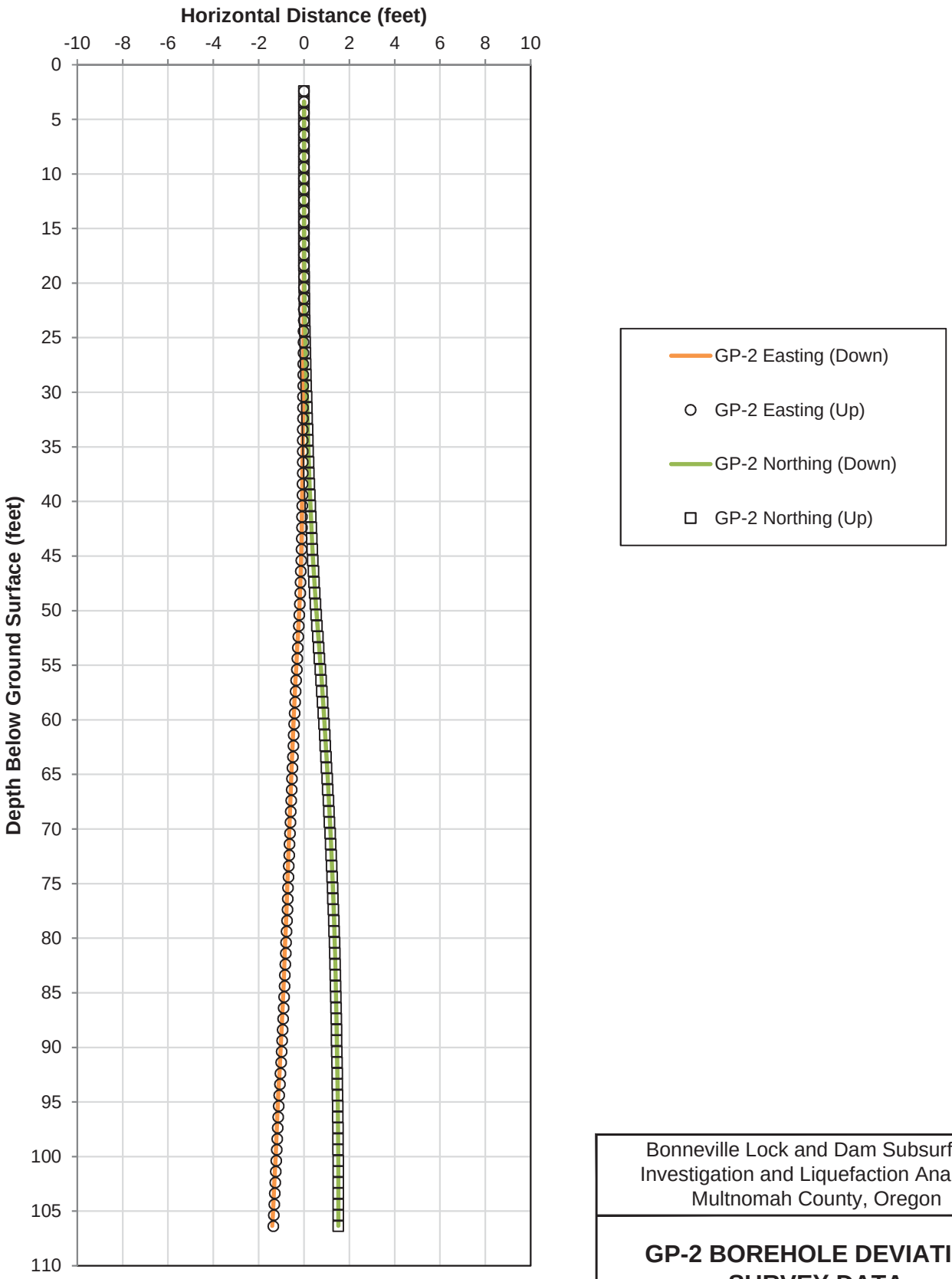
FIG. A-5

File: I:\EF\24-1 PDX\04100s\04114 Bonneville Subs\DRAFTING\Borehole Deviation.dwg Date: 03-29-2017 Author: aah



Bonneville Lock and Dam Subsurface Investigation and Liquefaction Analysis
Multnomah County, Oregon

GP-2 BOREHOLE DEVIATION SURVEY DATA

March 2017 24-1-04114-001

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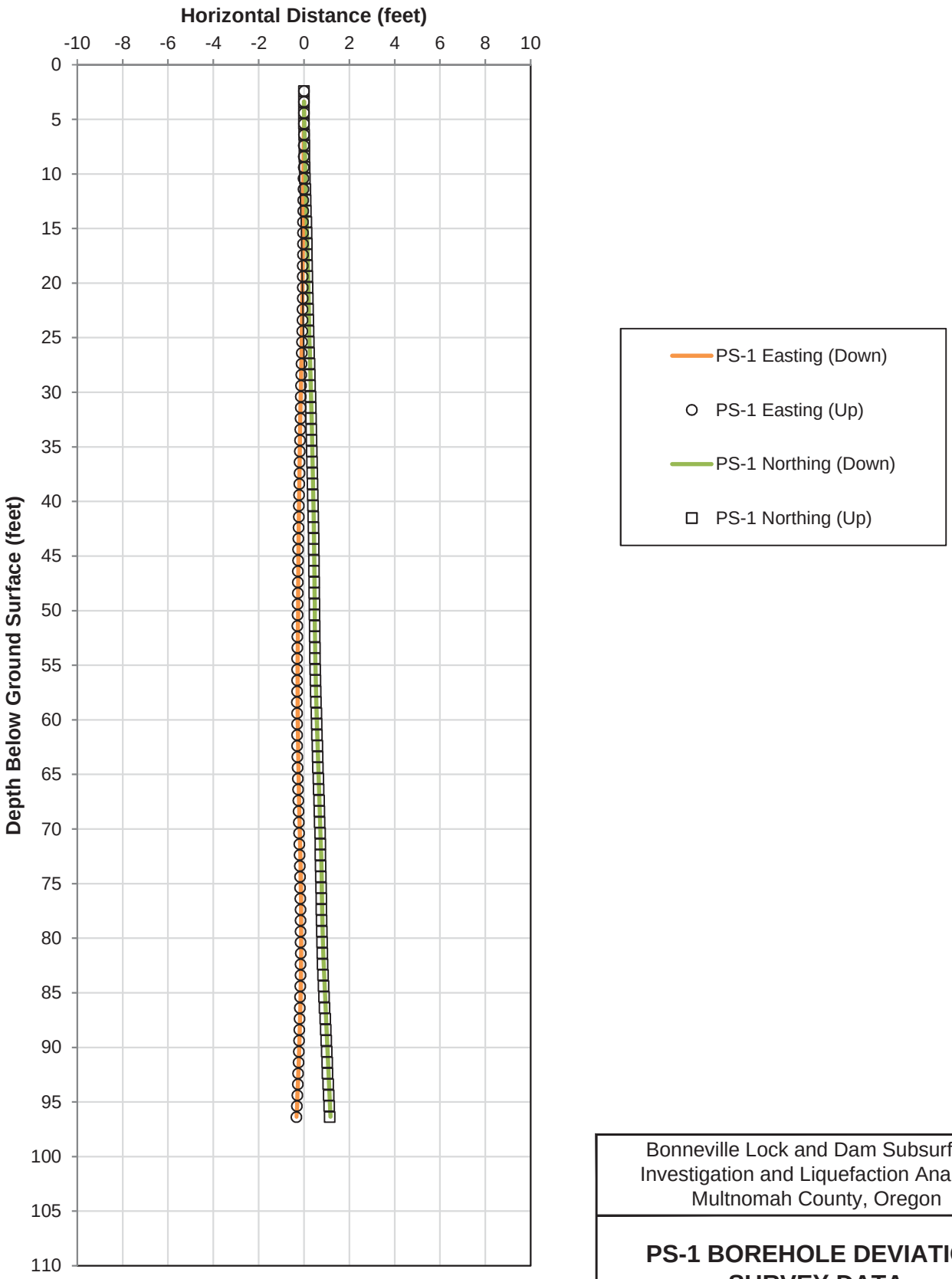
FIG. A-6

File: I:\EF\24-1 PDX\04100s\04114 Bonneville Subs\DRAFTING\Borehole Deviation.dwg Date: 03-29-2017 Author: aah



Bonneville Lock and Dam Subsurface Investigation and Liquefaction Analysis
Multnomah County, Oregon

PS-1 BOREHOLE DEVIATION SURVEY DATA

March 2017 24-1-04114-001

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FIG. A-7

File: I:\EF\24-1 PDX\04100s\04114 Bonneville Subs\DRAFTING\Borehole Deviation.dwg Date: 03-29-2017 Author: aah

TABLE A-1: FIELD EXPLORATION SUMMARY

Boring Designation	Date Started	Date Completed	Total Depth (feet)	Approximate Collar Elevation (feet)	Approximate Northing (feet)	Approximate Easting (feet)	Geotechnical Sampling	Installation / Abandonment
GT/GP-1	2/27/2017	3/2/2017	110.3	58	722180	7831432	continuous	Abandoned
GT-2	3/6/2017	3/8/2017	100.3	58	722158	7831543	continuous	Abandoned
GP-1	3/9/2017	3/13/2017	110.0	58	722179	7831447	none	4-inch ID PVC casing
GP-2	3/14/2017	3/16/2017	110.0	58	722180	7831467	none	4-inch ID PVC casing
PS-1	3/16/2017	3/21/2017	100.0	58	722177	7831520	none	4-inch ID PVC casing

Horizontal Datum = OR83-NIF
Vertical Datum = NAVD88

TABLE A-2: GP-1 BOREHOLE DEVIATION SURVEY DATA

GP-1 Down		
Depth (ft)	Easting (ft)	Northing (ft)
3.38	0.00	0.00
4.38	0.00	0.00
5.38	0.01	0.00
6.38	0.02	0.00
7.38	0.03	-0.01
8.38	0.05	-0.01
9.38	0.06	-0.02
10.38	0.08	-0.02
11.38	0.11	-0.02
12.38	0.13	-0.03
13.38	0.16	-0.03
14.38	0.19	-0.04
15.38	0.22	-0.04
16.38	0.26	-0.05
17.38	0.30	-0.06
18.37	0.33	-0.07
19.37	0.37	-0.08
20.37	0.42	-0.09
21.37	0.46	-0.11
22.37	0.50	-0.12
23.37	0.55	-0.14
24.37	0.59	-0.15
25.37	0.64	-0.17
26.37	0.68	-0.19
27.37	0.73	-0.20
28.37	0.78	-0.21
29.37	0.83	-0.23
30.37	0.87	-0.24
31.37	0.92	-0.25
32.37	0.97	-0.27
33.37	1.02	-0.28
34.37	1.07	-0.28
35.37	1.12	-0.29
36.37	1.17	-0.30
37.37	1.22	-0.30
38.37	1.26	-0.31
39.37	1.31	-0.31
40.37	1.36	-0.31
41.37	1.42	-0.31
42.37	1.47	-0.31
43.37	1.53	-0.32
44.37	1.60	-0.31
45.37	1.66	-0.31
46.36	1.73	-0.31
47.36	1.81	-0.31
48.36	1.88	-0.31
49.36	1.96	-0.31
50.36	2.04	-0.31

GP-1 Up		
Depth (ft)	Easting (ft)	Northing (ft)
5.42	0.00	0.00
6.42	0.01	0.00
7.41	0.02	0.00
8.41	0.03	0.00
9.41	0.05	-0.01
10.41	0.07	-0.01
11.41	0.09	-0.01
12.41	0.11	-0.02
13.41	0.14	-0.03
14.41	0.17	-0.03
15.41	0.21	-0.04
16.41	0.24	-0.04
17.41	0.27	-0.05
18.41	0.31	-0.06
19.41	0.35	-0.06
20.41	0.38	-0.07
21.41	0.42	-0.08
22.41	0.46	-0.10
23.41	0.50	-0.11
24.41	0.54	-0.12
25.41	0.59	-0.14
26.41	0.63	-0.15
27.41	0.68	-0.16
28.41	0.72	-0.18
29.41	0.77	-0.19
30.41	0.81	-0.20
31.41	0.86	-0.21
32.41	0.91	-0.22
33.41	0.96	-0.23
34.41	1.01	-0.24
35.41	1.05	-0.25
36.40	1.10	-0.26
37.40	1.15	-0.27
38.40	1.20	-0.28
39.40	1.25	-0.28
40.40	1.30	-0.28
41.40	1.35	-0.29
42.40	1.40	-0.29
43.40	1.46	-0.29
44.40	1.52	-0.29
45.40	1.59	-0.29
46.40	1.66	-0.29
47.40	1.73	-0.28
48.40	1.81	-0.28
49.40	1.88	-0.28
50.40	1.97	-0.28
51.40	2.05	-0.28
52.40	2.14	-0.27

TABLE A-2: GP-1 BOREHOLE DEVIATION SURVEY DATA

GP-1 Down		
Depth (ft)	Easting (ft)	Northing (ft)
51.36	2.13	-0.30
52.36	2.22	-0.30
53.36	2.31	-0.30
54.36	2.40	-0.31
55.36	2.50	-0.31
56.36	2.59	-0.31
57.36	2.67	-0.30
58.36	2.77	-0.30
59.36	2.86	-0.29
60.36	2.95	-0.28
61.36	3.04	-0.27
62.36	3.13	-0.26
63.36	3.22	-0.24
64.36	3.31	-0.23
65.36	3.40	-0.21
66.36	3.49	-0.20
67.36	3.58	-0.18
68.36	3.68	-0.16
69.36	3.77	-0.14
70.36	3.86	-0.12
71.36	3.96	-0.10
72.36	4.06	-0.09
73.36	4.15	-0.07
74.36	4.25	-0.05
75.35	4.35	-0.03
76.35	4.46	-0.01
77.35	4.56	0.01
78.35	4.66	0.03
79.35	4.77	0.05
80.35	4.87	0.07
81.35	4.98	0.08
82.35	5.09	0.10
83.35	5.19	0.12
84.35	5.30	0.14
85.35	5.41	0.16
86.35	5.51	0.17
87.35	5.62	0.19
88.35	5.73	0.21
89.35	5.83	0.22
90.35	5.94	0.24
91.35	6.04	0.26
92.35	6.14	0.27
93.35	6.24	0.29
94.35	6.34	0.31
95.35	6.44	0.32
96.35	6.54	0.34
97.35	6.63	0.36
98.35	6.72	0.38

GP-1 Up		
Depth (ft)	Easting (ft)	Northing (ft)
53.40	2.23	-0.27
54.40	2.33	-0.27
55.40	2.43	-0.27
56.40	2.53	-0.27
57.40	2.62	-0.27
58.40	2.72	-0.26
59.40	2.82	-0.25
60.40	2.91	-0.24
61.40	3.00	-0.23
62.40	3.09	-0.22
63.40	3.19	-0.21
64.39	3.28	-0.20
65.39	3.38	-0.18
66.39	3.47	-0.17
67.39	3.56	-0.15
68.39	3.65	-0.14
69.39	3.75	-0.12
70.39	3.84	-0.11
71.39	3.94	-0.09
72.39	4.04	-0.07
73.39	4.14	-0.05
74.39	4.24	-0.03
75.39	4.34	-0.02
76.39	4.44	0.00
77.39	4.54	0.02
78.39	4.65	0.03
79.39	4.75	0.05
80.39	4.86	0.07
81.39	4.97	0.09
82.39	5.08	0.11
83.39	5.19	0.13
84.39	5.29	0.15
85.39	5.40	0.17
86.39	5.51	0.19
87.39	5.61	0.20
88.39	5.72	0.22
89.39	5.82	0.24
90.39	5.92	0.26
91.39	6.03	0.27
92.39	6.12	0.29
93.38	6.22	0.31
94.38	6.32	0.32
95.38	6.41	0.34
96.38	6.50	0.35
97.38	6.59	0.37
98.38	6.68	0.38
99.38	6.77	0.40
100.38	6.86	0.41

TABLE A-2: GP-1 BOREHOLE DEVIATION SURVEY DATA

GP-1 Down		
Depth (ft)	**Easting (ft)**	**Northing (ft)**
99.35	6.81	0.39
100.35	6.90	0.41
101.35	6.99	0.42
102.35	7.08	0.43
103.35	7.16	0.44
104.35	7.25	0.44
105.34	7.34	0.45
106.34	7.43	0.44

GP-1 Up		
Depth (ft)	**Easting (ft)**	**Northing (ft)**
101.38	6.94	0.43
102.38	7.02	0.44
103.38	7.11	0.45
104.38	7.19	0.45
105.38	7.27	0.46
106.38	7.35	0.46

(Depth is below ground surface.)

TABLE A-3: GP-2 BOREHOLE DEVIATION SURVEY DATA

GP-2 Down		
Depth (ft)	Easting (ft)	Northing (ft)
3.38	0.00	0.00
4.38	0.00	0.00
5.38	0.00	0.00
6.38	0.00	0.00
7.38	0.00	0.00
8.38	0.00	0.00
9.38	0.00	0.00
10.38	0.00	0.00
11.38	0.00	0.00
12.38	0.00	0.00
13.38	0.00	0.00
14.38	0.00	0.00
15.38	0.00	0.00
16.38	0.00	0.00
17.38	0.00	0.00
18.37	0.00	0.00
19.37	0.00	0.01
20.37	-0.01	0.02
21.37	-0.01	0.02
22.37	-0.01	0.03
23.37	-0.02	0.04
24.37	-0.02	0.05
25.37	-0.02	0.06
26.37	-0.03	0.07
27.37	-0.03	0.09
28.37	-0.03	0.10
29.37	-0.04	0.11
30.37	-0.04	0.13
31.37	-0.04	0.14
32.37	-0.05	0.16
33.37	-0.05	0.17
34.37	-0.05	0.19
35.37	-0.06	0.20
36.37	-0.06	0.21
37.37	-0.06	0.23
38.37	-0.07	0.24
39.37	-0.08	0.26
40.37	-0.08	0.29
41.37	-0.09	0.31
42.37	-0.10	0.33
43.37	-0.11	0.35
44.37	-0.12	0.37
45.37	-0.13	0.40
46.36	-0.14	0.43
47.36	-0.16	0.46
48.36	-0.18	0.49
49.36	-0.20	0.53
50.36	-0.22	0.56

GP-2 Up		
Depth (ft)	Easting (ft)	Northing (ft)
2.42	0.00	0.00
3.42	0.00	0.00
4.42	0.00	0.00
5.42	0.00	0.00
6.42	0.00	0.00
7.42	0.00	0.00
8.41	0.00	0.00
9.41	0.00	0.00
10.41	0.00	0.00
11.41	0.00	0.00
12.41	0.00	0.00
13.41	0.00	0.00
14.41	0.00	0.00
15.41	0.00	0.00
16.41	0.00	0.00
17.41	0.00	0.00
18.41	0.00	0.01
19.41	0.00	0.01
20.41	0.00	0.01
21.41	-0.01	0.02
22.41	-0.01	0.03
23.41	-0.01	0.03
24.41	-0.02	0.04
25.41	-0.02	0.05
26.41	-0.02	0.07
27.41	-0.03	0.08
28.41	-0.03	0.09
29.41	-0.03	0.10
30.41	-0.04	0.12
31.41	-0.04	0.13
32.41	-0.04	0.15
33.41	-0.05	0.16
34.41	-0.05	0.18
35.41	-0.05	0.19
36.41	-0.05	0.20
37.40	-0.05	0.22
38.40	-0.06	0.24
39.40	-0.07	0.26
40.40	-0.07	0.28
41.40	-0.08	0.30
42.40	-0.09	0.32
43.40	-0.10	0.34
44.40	-0.11	0.37
45.40	-0.12	0.39
46.40	-0.13	0.42
47.40	-0.15	0.45
48.40	-0.16	0.48
49.40	-0.18	0.51

TABLE A-3: GP-2 BOREHOLE DEVIATION SURVEY DATA

GP-2 Down		
Depth (ft)	Easting (ft)	Northing (ft)
51.36	-0.24	0.60
52.36	-0.27	0.64
53.36	-0.30	0.67
54.36	-0.32	0.71
55.36	-0.35	0.74
56.36	-0.37	0.78
57.36	-0.40	0.81
58.36	-0.42	0.84
59.36	-0.44	0.87
60.36	-0.46	0.90
61.36	-0.48	0.93
62.36	-0.50	0.96
63.36	-0.52	0.99
64.36	-0.54	1.02
65.36	-0.56	1.05
66.36	-0.58	1.07
67.36	-0.60	1.10
68.36	-0.62	1.12
69.36	-0.64	1.15
70.36	-0.65	1.17
71.36	-0.67	1.19
72.36	-0.69	1.21
73.36	-0.70	1.23
74.36	-0.72	1.25
75.35	-0.74	1.27
76.35	-0.75	1.29
77.35	-0.77	1.31
78.35	-0.79	1.33
79.35	-0.81	1.34
80.35	-0.83	1.36
81.35	-0.85	1.37
82.35	-0.87	1.39
83.35	-0.89	1.40
84.35	-0.91	1.41
85.35	-0.92	1.42
86.35	-0.94	1.42
87.35	-0.97	1.43
88.35	-0.99	1.44
89.35	-1.01	1.45
90.35	-1.04	1.46
91.35	-1.06	1.47
92.35	-1.08	1.47
93.35	-1.11	1.48
94.35	-1.13	1.49
95.35	-1.16	1.49
96.35	-1.18	1.50
97.35	-1.20	1.50
98.35	-1.22	1.51

GP-2 Up		
Depth (ft)	Easting (ft)	Northing (ft)
50.40	-0.20	0.54
51.40	-0.22	0.58
52.40	-0.24	0.62
53.40	-0.26	0.65
54.40	-0.29	0.69
55.40	-0.32	0.72
56.40	-0.34	0.76
57.40	-0.36	0.79
58.40	-0.39	0.82
59.40	-0.41	0.86
60.40	-0.43	0.89
61.40	-0.45	0.92
62.40	-0.47	0.94
63.40	-0.49	0.97
64.40	-0.51	1.00
65.39	-0.52	1.03
66.39	-0.54	1.05
67.39	-0.56	1.08
68.39	-0.58	1.11
69.39	-0.60	1.13
70.39	-0.62	1.15
71.39	-0.63	1.18
72.39	-0.65	1.20
73.39	-0.67	1.22
74.39	-0.68	1.24
75.39	-0.70	1.26
76.39	-0.71	1.28
77.39	-0.73	1.30
78.39	-0.75	1.32
79.39	-0.77	1.34
80.39	-0.78	1.35
81.39	-0.80	1.36
82.39	-0.82	1.38
83.39	-0.84	1.39
84.39	-0.86	1.40
85.39	-0.88	1.41
86.39	-0.90	1.42
87.39	-0.92	1.43
88.39	-0.94	1.44
89.39	-0.96	1.45
90.39	-0.99	1.45
91.39	-1.01	1.46
92.39	-1.03	1.47
93.39	-1.06	1.48
94.38	-1.09	1.48
95.38	-1.11	1.49
96.38	-1.14	1.50
97.38	-1.16	1.50

TABLE A-3: GP-2 BOREHOLE DEVIATION SURVEY DATA

GP-2 Down		
Depth (ft)	**Easting (ft)**	**Northing (ft)**
99.35	-1.24	1.51
100.35	-1.26	1.52
101.35	-1.28	1.52
102.35	-1.30	1.52
103.34	-1.33	1.52
104.34	-1.35	1.52
105.34	-1.37	1.52
106.34	-1.40	1.51

GP-2 Up		
Depth (ft)	**Easting (ft)**	**Northing (ft)**
98.38	-1.18	1.51
99.38	-1.20	1.51
100.38	-1.22	1.51
101.38	-1.24	1.52
102.38	-1.26	1.52
103.38	-1.28	1.52
104.38	-1.31	1.52
105.38	-1.33	1.52
106.38	-1.35	1.51

(Depth is below ground surface.)

TABLE A-4: PS-1 BOREHOLE DEVIATION SURVEY DATA

PS-1 Down		
Depth (ft)	Easting (ft)	Northing (ft)
3.38	0.00	0.00
4.38	0.00	0.01
5.38	0.00	0.01
6.38	-0.01	0.02
7.38	-0.01	0.03
8.38	-0.01	0.04
9.38	-0.02	0.06
10.38	-0.02	0.07
11.38	-0.03	0.08
12.38	-0.03	0.10
13.38	-0.04	0.11
14.38	-0.05	0.12
15.38	-0.05	0.14
16.38	-0.06	0.15
17.38	-0.06	0.16
18.37	-0.06	0.17
19.37	-0.06	0.18
20.37	-0.07	0.19
21.37	-0.07	0.20
22.37	-0.07	0.21
23.37	-0.08	0.22
24.37	-0.09	0.23
25.37	-0.10	0.24
26.37	-0.11	0.26
27.37	-0.12	0.27
28.37	-0.13	0.28
29.37	-0.13	0.30
30.37	-0.14	0.31
31.37	-0.16	0.32
32.37	-0.16	0.34
33.37	-0.17	0.35
34.37	-0.18	0.36
35.37	-0.19	0.37
36.37	-0.19	0.38
37.37	-0.20	0.39
38.37	-0.21	0.40
39.37	-0.22	0.41
40.37	-0.22	0.42
41.37	-0.23	0.43
42.37	-0.23	0.44
43.37	-0.24	0.44
44.37	-0.24	0.45
45.37	-0.25	0.45
46.36	-0.25	0.46
47.36	-0.25	0.46
48.36	-0.26	0.47
49.36	-0.26	0.47
50.36	-0.26	0.48

PS-1 Up		
Depth (ft)	Easting (ft)	Northing (ft)
2.41	0.00	0.00
3.41	0.00	0.00
4.41	0.00	0.00
5.41	0.00	0.00
6.41	0.00	0.01
7.41	-0.01	0.02
8.41	-0.01	0.03
9.41	-0.01	0.04
10.41	-0.02	0.05
11.41	-0.02	0.06
12.41	-0.03	0.08
13.41	-0.04	0.09
14.41	-0.04	0.10
15.41	-0.04	0.12
16.41	-0.04	0.13
17.41	-0.05	0.14
18.41	-0.05	0.14
19.41	-0.05	0.15
20.41	-0.05	0.16
21.41	-0.06	0.17
22.41	-0.06	0.18
23.41	-0.07	0.19
24.41	-0.08	0.21
25.40	-0.09	0.22
26.40	-0.10	0.23
27.40	-0.11	0.25
28.40	-0.12	0.26
29.40	-0.13	0.28
30.40	-0.14	0.29
31.40	-0.14	0.30
32.40	-0.15	0.31
33.40	-0.16	0.33
34.40	-0.17	0.34
35.40	-0.18	0.35
36.40	-0.19	0.36
37.40	-0.20	0.37
38.40	-0.21	0.38
39.40	-0.22	0.40
40.40	-0.22	0.40
41.40	-0.23	0.41
42.40	-0.24	0.42
43.40	-0.25	0.43
44.40	-0.25	0.44
45.40	-0.26	0.44
46.40	-0.26	0.45
47.40	-0.27	0.45
48.40	-0.27	0.46
49.40	-0.28	0.46

TABLE A-4: PS-1 BOREHOLE DEVIATION SURVEY DATA

PS-1 Down		
Depth (ft)	Easting (ft)	Northing (ft)
51.36	-0.27	0.48
52.36	-0.27	0.49
53.36	-0.27	0.49
54.36	-0.28	0.50
55.36	-0.28	0.51
56.36	-0.28	0.52
57.36	-0.28	0.53
58.36	-0.28	0.54
59.36	-0.28	0.56
60.36	-0.28	0.57
61.36	-0.27	0.58
62.36	-0.27	0.60
63.36	-0.26	0.62
64.36	-0.25	0.63
65.36	-0.24	0.65
66.36	-0.23	0.66
67.36	-0.22	0.68
68.36	-0.21	0.70
69.36	-0.19	0.71
70.36	-0.18	0.73
71.36	-0.17	0.74
72.36	-0.16	0.75
73.36	-0.15	0.77
74.36	-0.14	0.78
75.35	-0.14	0.79
76.35	-0.13	0.80
77.35	-0.13	0.80
78.35	-0.12	0.81
79.35	-0.12	0.82
80.35	-0.12	0.83
81.35	-0.13	0.85
82.35	-0.13	0.87
83.35	-0.14	0.89
84.35	-0.14	0.91
85.35	-0.15	0.93
86.35	-0.16	0.95
87.35	-0.17	0.97
88.35	-0.19	1.00
89.35	-0.20	1.02
90.35	-0.21	1.04
91.35	-0.23	1.06
92.35	-0.25	1.08
93.35	-0.27	1.10
94.35	-0.29	1.12
95.35	-0.31	1.15
96.35	-0.33	1.17

PS-1 Up		
Depth (ft)	Easting (ft)	Northing (ft)
50.40	-0.28	0.47
51.40	-0.29	0.47
52.40	-0.29	0.48
53.40	-0.29	0.48
54.39	-0.30	0.49
55.39	-0.30	0.50
56.39	-0.30	0.51
57.39	-0.31	0.52
58.39	-0.31	0.54
59.39	-0.31	0.55
60.39	-0.30	0.56
61.39	-0.30	0.58
62.39	-0.30	0.59
63.39	-0.29	0.61
64.39	-0.28	0.62
65.39	-0.27	0.64
66.39	-0.26	0.65
67.39	-0.25	0.67
68.39	-0.24	0.68
69.39	-0.23	0.70
70.39	-0.22	0.71
71.39	-0.20	0.72
72.39	-0.19	0.73
73.39	-0.18	0.74
74.39	-0.18	0.75
75.39	-0.17	0.76
76.39	-0.16	0.77
77.39	-0.15	0.77
78.39	-0.15	0.78
79.39	-0.15	0.79
80.39	-0.14	0.80
81.39	-0.14	0.81
82.38	-0.15	0.83
83.38	-0.15	0.84
84.38	-0.16	0.87
85.38	-0.17	0.89
86.38	-0.18	0.91
87.38	-0.19	0.94
88.38	-0.20	0.96
89.38	-0.21	0.98
90.38	-0.23	1.00
91.38	-0.24	1.02
92.38	-0.26	1.05
93.38	-0.27	1.07
94.38	-0.29	1.09
95.38	-0.31	1.11
96.38	-0.33	1.13

(Depth is below ground surface.)

APPENDIX B LABORATORY TEST RESULTS

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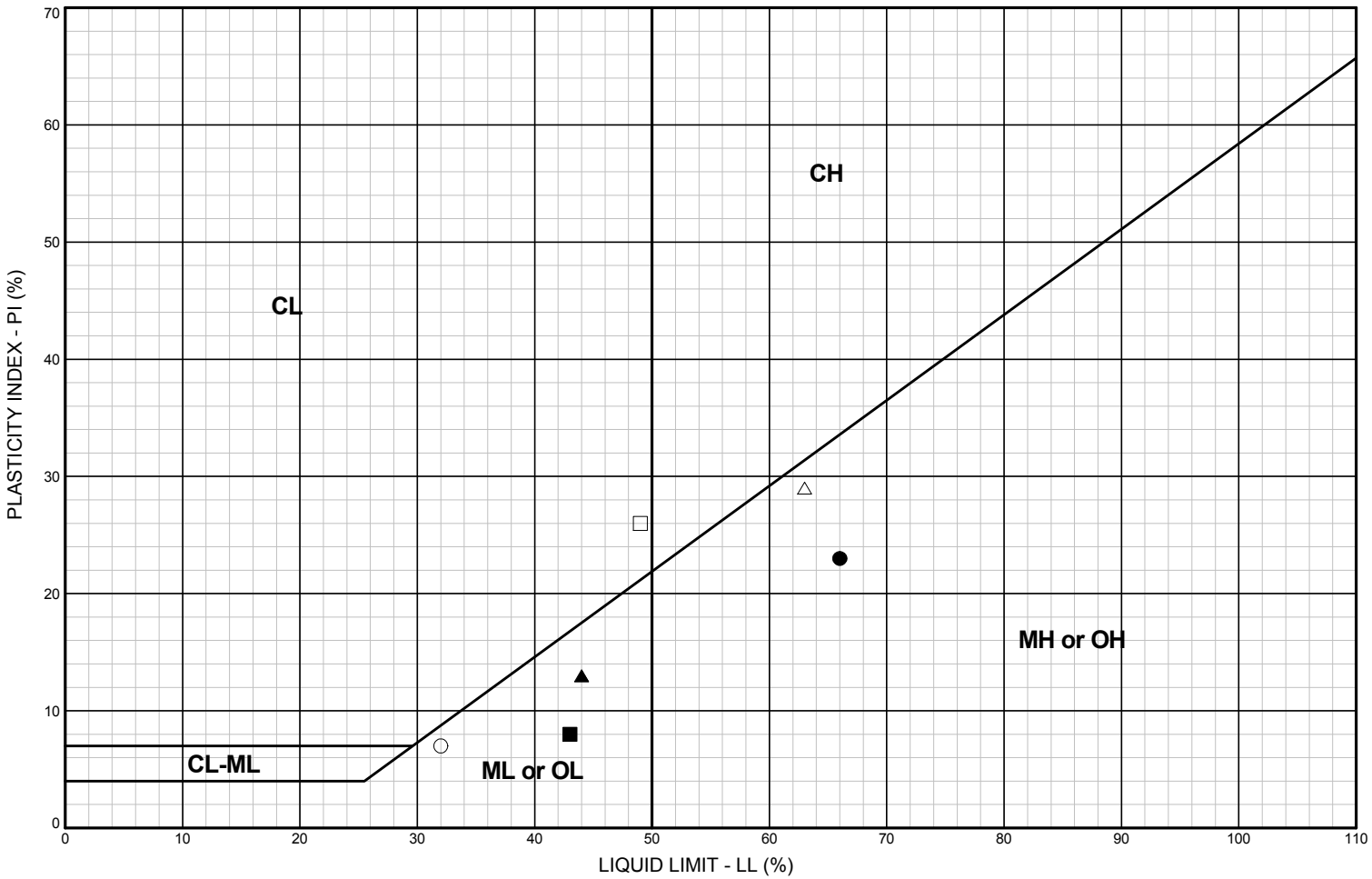

NOTES

1) Atterberg limits tests were performed in general accordance with ASTM D4318 unless otherwise noted in the report.

2) Group Name and Group Symbol are in accordance with ASTM D2488 and are refined in accordance with ASTM D2487 where appropriate laboratory tests are performed.

3) Plasticity adjectives used in sample descriptions correspond to plasticity index as follows:
- Nonplastic (NP) (< 4%)
- Low Plasticity (4 to 10%)
- Medium Plasticity (10 to 20%)
- High Plasticity (> 20%)

BORING AND SAMPLE NO.	DEPTH (feet)	GROUP SYMBOL[2]	GROUP NAME[2]	LL %	PL %	PI %[3]	NAT. W.C. %	FINES %
● GT/GP-1, S-37B	72.7	*MH*	*Elastic Silt*	66	43	23		98
■ GT/GP-1, S-39A	76.0	*ML*	*Silt to Silt with Sand*	43	35	8		
▲ GT/GP-1, S-41A	80.0	*ML*	*Silt to Silt with Sand*	44	31	13		
GT/GP-1, S-50	98.0	*ML*	*Silt to Silt with Sand*	NP	NP	NP		
○ GT/GP-1, S-52	102.0	*ML*	*Silt to Silt with Sand*	32	25	7		
□ GT-2, S-14	26.0	*CL*	*Gravelly Lean Clay with Sand*	49	23	26		
△ GT-2, S-17	32.0	*MH*	*Gravelly Elastic Silt with Sand*	63	34	29		

Bonneville Lock and Dam Subsurface Investigation and Liquefaction Analysis
Multnomah County, Oregon

ATTERBERG LIMITS RESULTS

March 2017 24-1-04114-001

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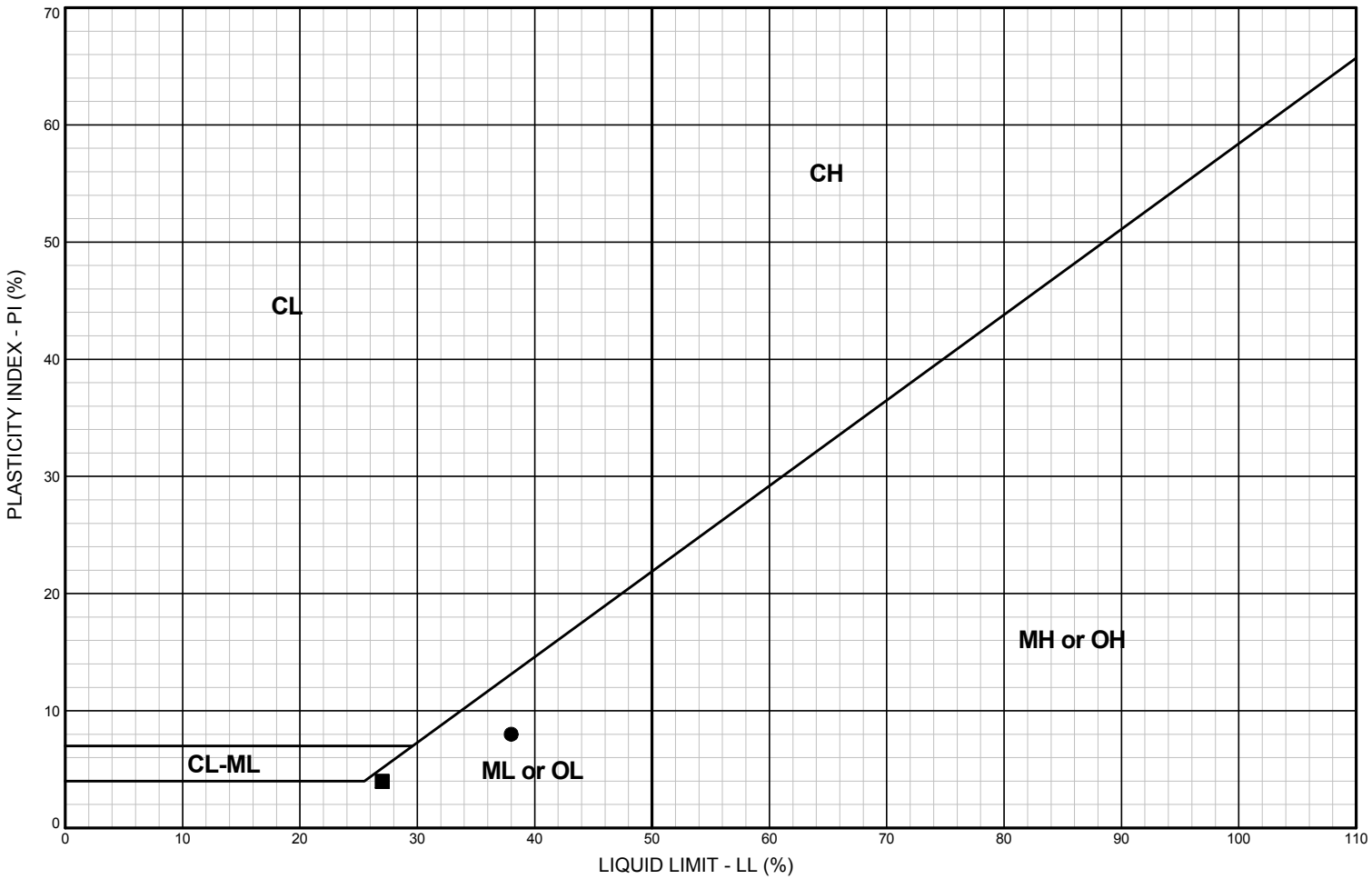
FIG. B-1
Sheet 1 of 2

FIG. B-1

ATT_MAIN 24-1-04114_BONNEVILLE-TRY3.GPJ SHAN WIL.GDT 3/29/17



NOTES

1) Atterberg limits tests were performed in general accordance with ASTM D4318 unless otherwise noted in the report.

2) Group Name and Group Symbol are in accordance with ASTM D2488 and are refined in accordance with ASTM D2487 where appropriate laboratory tests are performed.

3) Plasticity adjectives used in sample descriptions correspond to plasticity index as follows:
- Nonplastic (NP) (< 4%)
- Low Plasticity (4 to 10%)
- Medium Plasticity (10 to 20%)
- High Plasticity (> 20%)

BORING AND SAMPLE NO.	DEPTH (feet)	GROUP SYMBOL[2]	GROUP NAME[2]	LL %	PL %	PI %[3]	NAT. W.C. %	FINES %
● GT-2, S-37B	72.7	*ML*	*Silt to Silt with Sand*	38	30	8		
■ GT-2, S-45	88.0	*ML*	*Silt*	27	23	4		

Bonneville Lock and Dam Subsurface Investigation and Liquefaction Analysis
Multnomah County, Oregon

ATTERBERG LIMITS RESULTS

March 2017 24-1-04114-001

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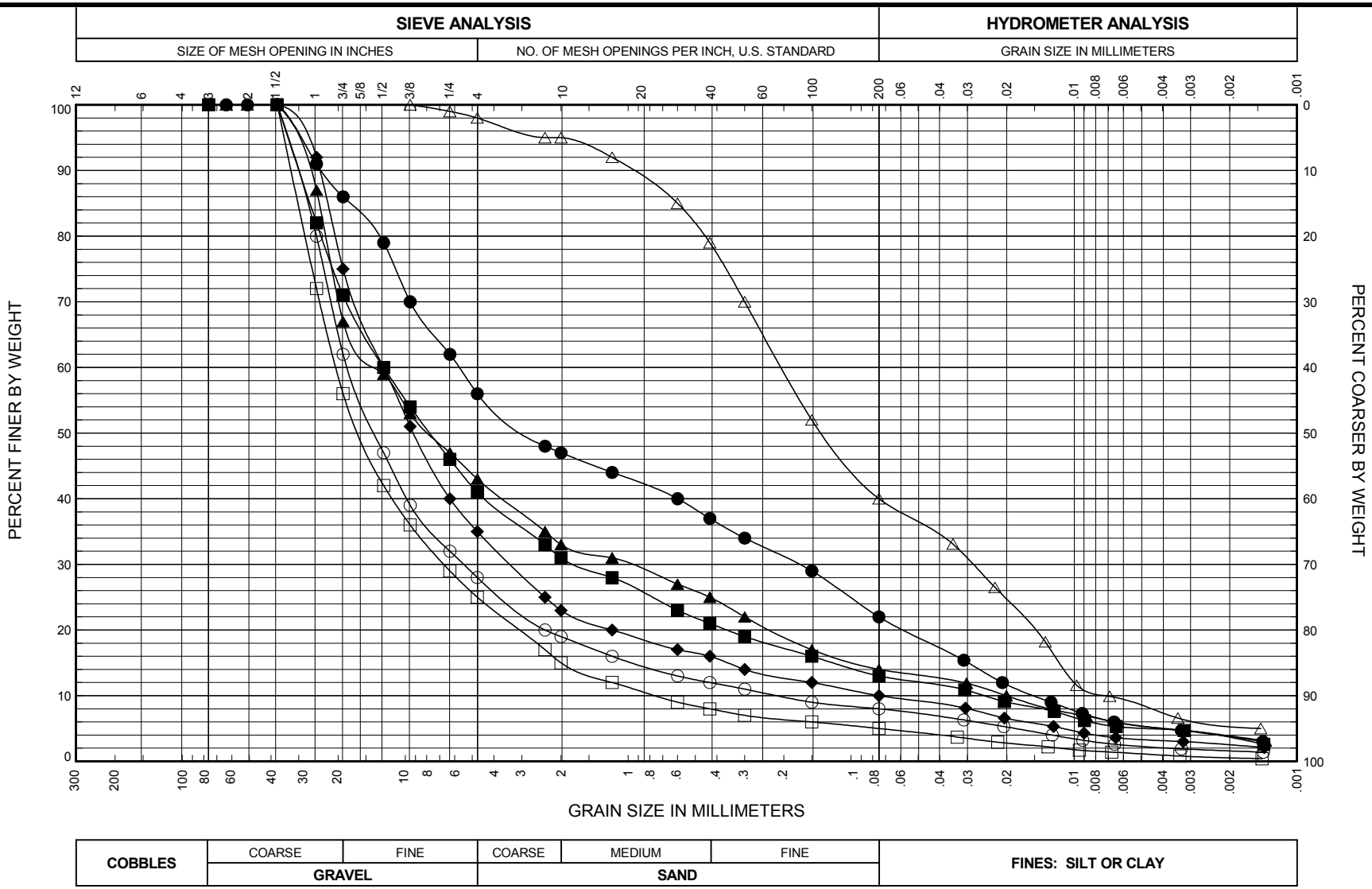
FIG. B-1
Sheet 2 of 2

FIG. B-1

ATT_MAIN 24-1-04114_BONNEVILLE-TRY3.GPJ SHAN WIL.GDT 3/29/17

NOTES:
1) Sieve analyses were performed in general accordance with ASTM D6913, sieve with hydrometer analyses were performed in general accordance with ASTM D422, and amount finer than #200 sieve analyses were performed in general accordance with ASTM D1140 unless otherwise noted in the report.
2) Group Name and Group Symbol are in accordance with ASTM D2488 and are refined in accordance with ASTM D2487 where appropriate laboratory tests are performed.



BORING AND SAMPLE NO.	DEPTH (feet)	GROUP SYMBOL[2]	GROUP NAME[2]	GRAVEL %	SAND %	FINES %	NAT. W.C. %	DRY DENSITY PCF
● GT/GP-1, S-4	6.0	*GM*	*Silty Gravel with Sand* (Combined with S-5 and S-6)	44	34	22	15	
■ GT/GP-1, S-10	18.0	*GM*	*Silty Gravel with Sand* (Combined with S-11)	59	28	13	13	
▲ GT/GP-1, S-16	30.0	*GC*	*Clayey Gravel with Sand*	57	29	14	24	
◆ GT/GP-1, S-17	32.0	*GP-GM*	*Poorly Graded Gravel with Silt and Sand* (Combined with S-18)	65	25	10	14	
○ GT/GP-1, S-25	48.0	*GP-GM*	*Poorly Graded Gravel with Silt and Sand* (Combined with S-26 and S-27)	72	20	8	10	
□ GT/GP-1, S-33	64.0	*GW-GM*	*Well Graded Gravel with Silt and Sand* (Combined with S-34 and S-35)	75	20	5	10	
△ GT/GP-1, S-36	70.0	*SM*	*Silty Sand*	2	58	40	45	

Bonneville Lock and Dam Subsurface Investigation and Liquefaction Analysis
Multnomah County, Oregon

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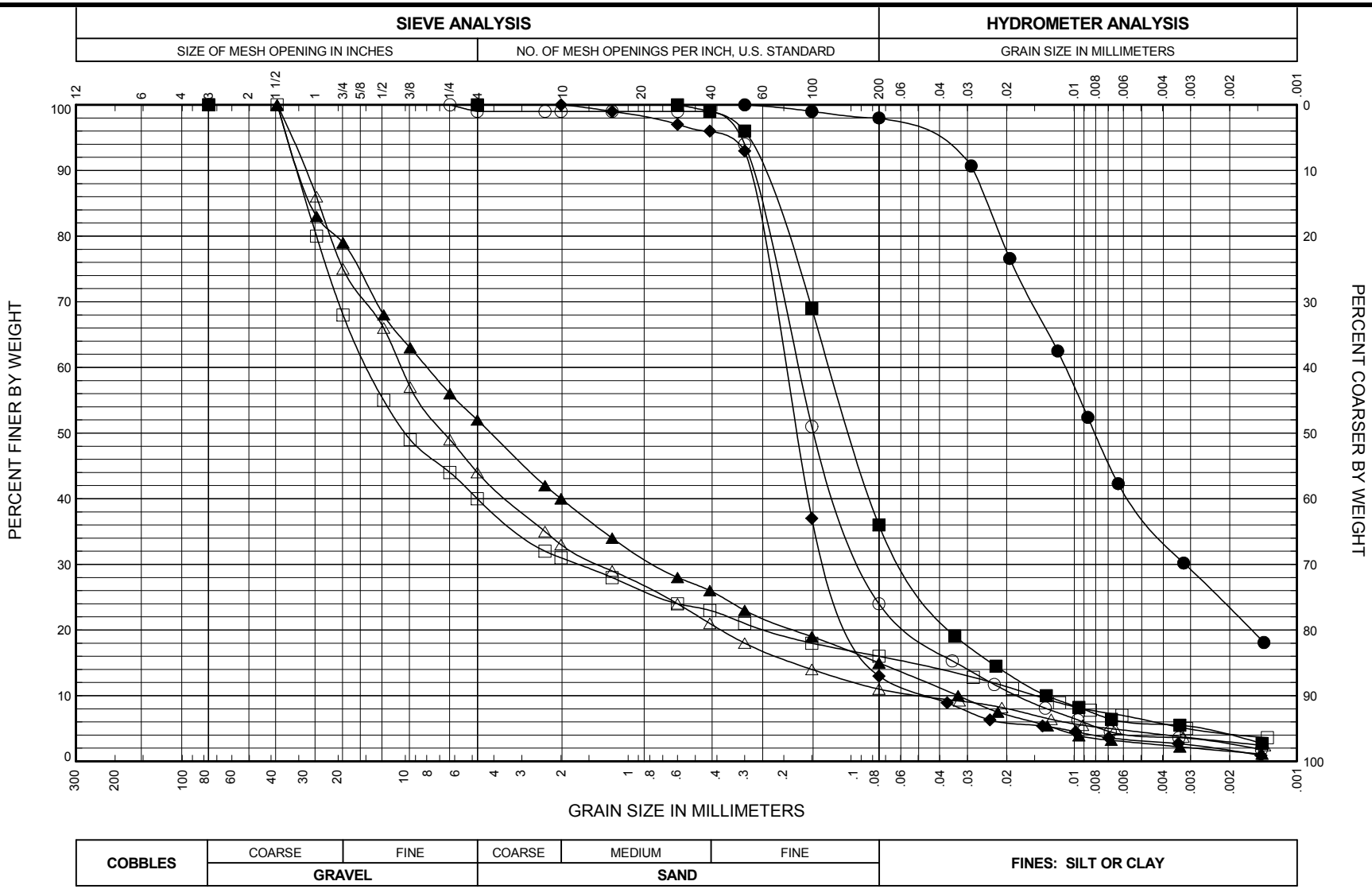
FIG. B-2
Sheet 1 of 4

FIG. B-2

NOTES:
1) Sieve analyses were performed in general accordance with ASTM D6913, sieve with hydrometer analyses were performed in general accordance with ASTM D422, and amount finer than #200 sieve analyses were performed in general accordance with ASTM D1140 unless otherwise noted in the report.
2) Group Name and Group Symbol are in accordance with ASTM D2488 and are refined in accordance with ASTM D2487 where appropriate laboratory tests are performed.



BORING AND SAMPLE NO.	DEPTH (feet)	GROUP SYMBOL[2]	GROUP NAME[2]	GRAVEL %	SAND %	FINES %	NAT. W.C. %	DRY DENSITY PCF
● GT/GP-1, S-37B	72.7	*MH*	*Elastic Silt*	0	2	98		
■ GT/GP-1, S-39B	76.8	*SM*	*Silty Sand*	0	64	36	48	
▲ GT/GP-1, S-43	84.0	*GM*	*Silty Gravel with Sand* (Combined with S-44)	48	37	15	12	
◆ GT/GP-1, S-48	94.0	*SM*	*Silty Sand*	0	87	13	28	
○ GT/GP-1, S-54	106.0	*SM*	*Silty Sand*	1	75	24	28	
□ GT-2, S-2	2.0	*GM*	*Silty Gravel with Sand* (Combined with S-3)	60	24	16	16	
△ GT-2, S-7	12.0	*GP-GM*	*Poorly Graded Gravel with Silt and Sand* (Combined with S-8)	56	33	11	17	

Bonneville Lock and Dam Subsurface Investigation and Liquefaction Analysis
Multnomah County, Oregon

GRAIN SIZE DISTRIBUTION

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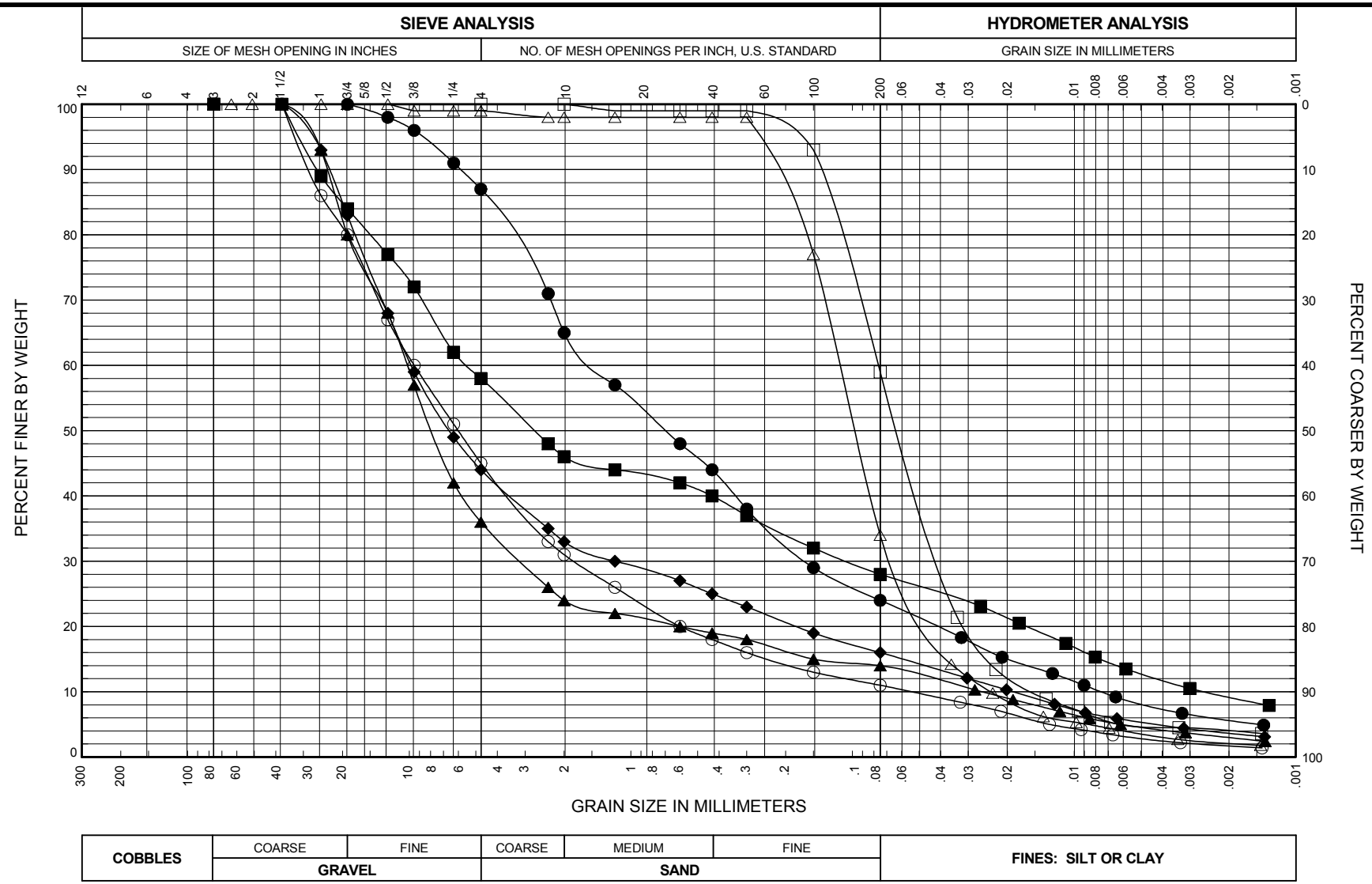
FIG. B-2
Sheet 2 of 4

FIG. B-2

NOTES:
1) Sieve analyses were performed in general accordance with ASTM D6913, sieve with hydrometer analyses were performed in general accordance with ASTM D422, and amount finer than #200 sieve analyses were performed in general accordance with ASTM D1140 unless otherwise noted in the report.
2) Group Name and Group Symbol are in accordance with ASTM D2488 and are refined in accordance with ASTM D2487 where appropriate laboratory tests are performed.



BORING AND SAMPLE NO.	DEPTH (feet)	GROUP SYMBOL[2]	GROUP NAME[2]	GRAVEL %	SAND %	FINES %	NAT. W.C. %	DRY DENSITY PCF
● GT-2, S-12	22.0	*SM*	*Silty Sand*	13	63	24	24	
■ GT-2, S-15	28.0	*GC*	*Clayey Gravel with Sand*	42	30	28	30	
▲ GT-2, S-25	48.0	*GC*	*Clayey Gravel with Sand* (Combined with S-26)	64	22	14	21	
◆ GT-2, S-28	54.0	*GM*	*Silty Gravel with Sand* (Combined with S-29)	56	28	16	18	
○ GT-2, S-34	66.0	*GP-GM*	*Poorly Graded Gravel with Silt and Sand* (Combined with S-35)	55	34	11	13	
□ GT-2, S-40	78.0	*ML*	*Sandy Silt*	0	41	59	29	
△ GT-2, S-43	84.0	*SM*	*Silty Sand*	1	65	34	27	

Bonneville Lock and Dam Subsurface Investigation and Liquefaction Analysis
Multnomah County, Oregon

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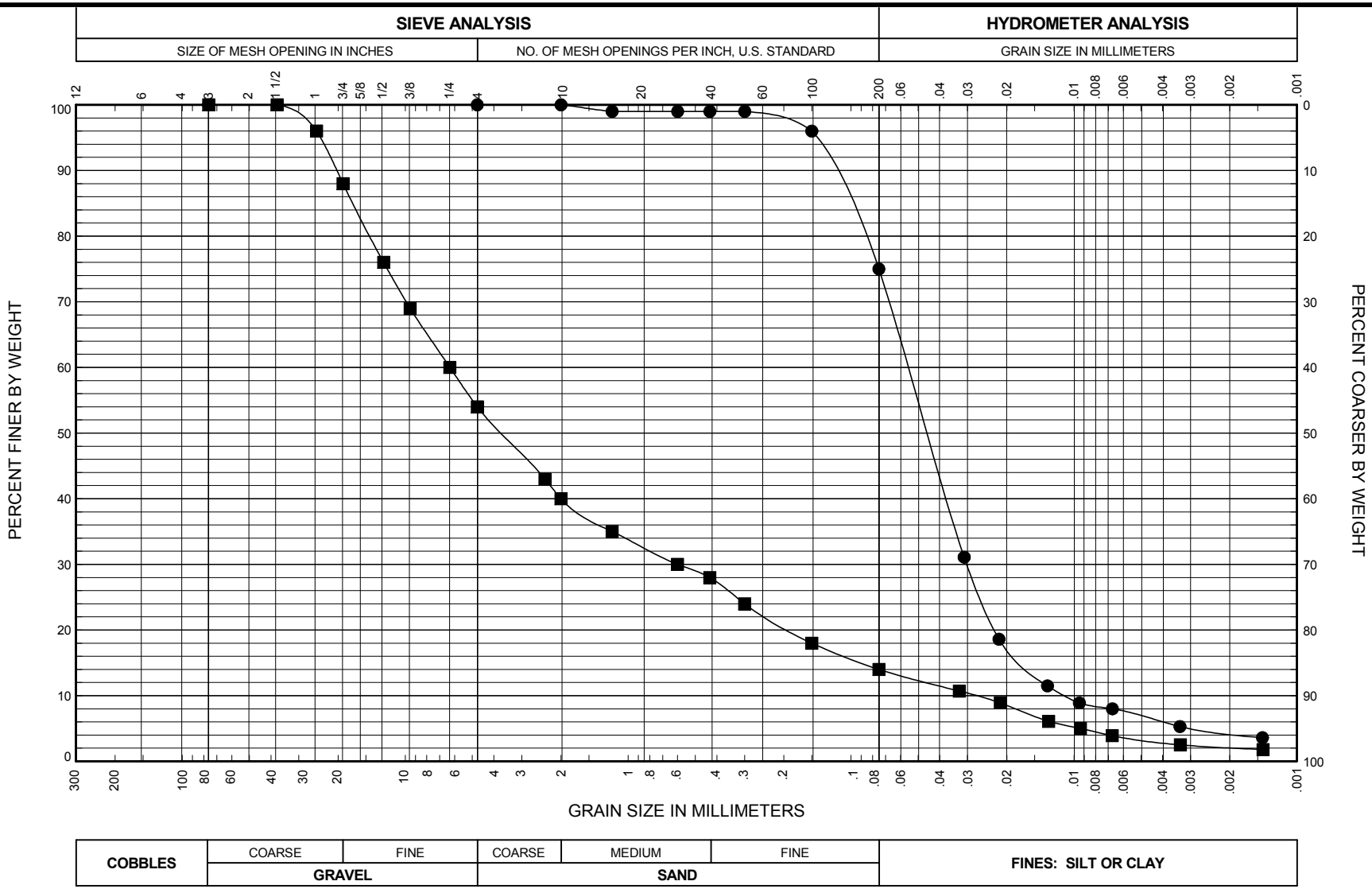
FIG. B-2
Sheet 3 of 4

FIG. B-2

NOTES:
1) Sieve analyses were performed in general accordance with ASTM D6913, sieve with hydrometer analyses were performed in general accordance with ASTM D422, and amount finer than #200 sieve analyses were performed in general accordance with ASTM D1140 unless otherwise noted in the report.
2) Group Name and Group Symbol are in accordance with ASTM D2488 and are refined in accordance with ASTM D2487 where appropriate laboratory tests are performed.



BORING AND SAMPLE NO.	DEPTH (feet)	GROUP SYMBOL[2]	GROUP NAME[2]	GRAVEL %	SAND %	FINES %	NAT. W.C. %	DRY DENSITY PCF
● GT-2, S-46A	90.0	*ML*	*Silt with Sand*	0	25	75	31	
■ GT-2, S-49	96.0	*GM*	*Silty Gravel with Sand* (Combined with S-50)	46	40	14	15	

Bonneville Lock and Dam Subsurface Investigation and Liquefaction Analysis
Multnomah County, Oregon

GRAIN SIZE DISTRIBUTION

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FIG. B-2
Sheet 4 of 4

FIG. B-2

TABLE B-1: LABORATORY TESTING SUMMARY

Boring	Sample Number	Top Depth of Sample (feet)	Sample Type	Field N-Value	$(N_1)_{60}$-Value	Geologic Unit	USCS Designation	Natural Moisture Content (%)	% Gravel	% Sand	% Fines	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Remarks
GT/GP-1	S-1	0.0	SPT	3	4	Fill									
GT/GP-1	S-2	2.0	SPT	9	13	Fill									
GT/GP-1	S-3	4.0	SPT	24	36	Fill									
GT/GP-1	S-4	6.0	SPT	46	66	Fill	GM	14.7	44	34	22				Combined S-4 through S-6
GT/GP-1	S-5	8.0	SPT	50/5"	50/5"	Fill									
GT/GP-1	S-6	10.0	SPT	18	27	Fill									
GT/GP-1	S-7	12.0	SPT	43	60	Fill									
GT/GP-1	S-8	14.0	SPT	42	55	Fill									
GT/GP-1	S-9	16.0	SPT	56	68	Fill									
GT/GP-1	S-10	18.0	SPT	35	40	Fill	GM	13.2	59	28	13				Combined S-10 and S-11
GT/GP-1	S-11	20.0	SPT	70/11"	70/11"	Fill									
GT/GP-1	S-12	22.0	SPT	51	54	Fill									
GT/GP-1	S-13	24.0	SPT	33	33	Fill									
GT/GP-1	S-14	26.0	SPT	26	25	Fill									
GT/GP-1	S-15	28.0	SPT	8	7	Gravel Alluvium									
GT/GP-1	S-16	30.0	SPT	21	19	Gravel Alluvium	GC	23.6	57	29	14				
GT/GP-1	S-17	32.0	SPT	21	18	Gravel Alluvium	GP-GM	13.9	65	25	10				Combined S-17 and S-18
GT/GP-1	S-18	34.0	SPT	42	36	Gravel Alluvium									
GT/GP-1	S-19	36.0	SPT	39	32	Gravel Alluvium									
GT/GP-1	S-20	38.0	SPT	26	21	Gravel Alluvium									
GT/GP-1	S-21	40.0	SPT	23	18	Gravel Alluvium									
GT/GP-1	S-22	42.0	SPT	22	17	Gravel Alluvium									
GT/GP-1	S-23	44.0	SPT	23	18	Gravel Alluvium									
GT/GP-1	S-24	46.0	SPT	36	27	Gravel Alluvium									
GT/GP-1	S-25	48.0	SPT	20	15	Gravel Alluvium	GP-GM	10.4	72	20	8				Combined S-25 through S-27
GT/GP-1	S-26	50.0	SPT	22	16	Gravel Alluvium									
GT/GP-1	S-27	52.0	SPT	38	28	Gravel Alluvium									
GT/GP-1	S-28	54.0	SPT	50/1st 3"	50/1st 3"	Gravel Alluvium									
GT/GP-1	S-29	56.0	SPT	30	22	Gravel Alluvium									
GT/GP-1	S-30	58.0	SPT	57	41	Gravel Alluvium									
GT/GP-1	S-31	60.0	SPT	42	30	Gravel Alluvium									
GT/GP-1	S-32	62.0	SPT	58	40	Gravel Alluvium									
GT/GP-1	S-33	64.0	SPT	50	35	Gravel Alluvium	GW-GM	10.3	75	20	5				Combined S-33 through S-35
GT/GP-1	S-34	66.0	SPT	58	33	Gravel Alluvium									
GT/GP-1	S-35	68.0	SPT	38	26	Gravel Alluvium									
GT/GP-1	S-36	70.0	SPT	2	1	Sand and Silt Alluvium	SM	44.7	2	58	40				
GT/GP-1	S-37A	72.0	SPT	1	1	Sand and Silt Alluvium		64.5							
GT/GP-1	S-37B	72.7	SPT	1	1	Sand and Silt Alluvium	MH		0	2	98	66	43	23	
GT/GP-1	S-38	74.0	SPT	8	5	Sand and Silt Alluvium									

TABLE B-1: LABORATORY TESTING SUMMARY

Boring	Sample Number	Top Depth of Sample (feet)	Sample Type	Field N-Value	$(N_1)_{60}$-Value	Geologic Unit	USCS Designation	Natural Moisture Content (%)	% Gravel	% Sand	% Fines	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Remarks
GT/GP-1	S-39A	76.0	SPT	7	5	Sand and Silt Alluvium	ML					43	35	8	
GT/GP-1	S-39B	76.8	SPT	7	5	Sand and Silt Alluvium	SM	47.8	0	64	36				
GT/GP-1	S-40	78.0	SPT	28	18	Sand and Silt Alluvium									
GT/GP-1	S-41A	80.0	SPT	5	3	Sand and Silt Alluvium	ML					44	31	13	
GT/GP-1	S-41B	81.3	SPT	5	3	Sand and Silt Alluvium									
GT/GP-1	S-42	82.0	SPT	74	47	Gravel Alluvium									
GT/GP-1	S-43	84.0	SPT	77	49	Gravel Alluvium	GM	11.6	48	37	15				Combined S-43 and S-44
GT/GP-1	S-44	86.0	SPT	50/5"	50/5"	Gravel Alluvium									
GT/GP-1	S-45	88.0	SPT	50/1st 3"	50/1st 3"	Gravel Alluvium									
GT/GP-1	S-46	90.0	SPT	34	21	Gravel Alluvium									
GT/GP-1	S-47A	92.0	SPT	30	19	Gravel Alluvium									
GT/GP-1	S-47B	92.5	SPT	30	19	Sand and Silt Alluvium									
GT/GP-1	S-48	94.0	SPT	22	13	Sand and Silt Alluvium	SM	28.1	0	87	13				
GT/GP-1	S-49	96.0	SPT	32	19	Sand and Silt Alluvium									
GT/GP-1	S-50	98.0	SPT	12	7	Sand and Silt Alluvium	ML					NP	NP	NP	
GT/GP-1	S-51	100.0	SPT	15	9	Sand and Silt Alluvium									
GT/GP-1	S-52	102.0	SPT	19	11	Sand and Silt Alluvium	ML					32	25	7	
GT/GP-1	S-53	104.0	SPT	23	14	Sand and Silt Alluvium		25.2							
GT/GP-1	S-54	106.0	SPT	36	21	Sand and Silt Alluvium	SM	27.8	1	75	24				
GT/GP-1	S-55	108.0	SPT	50/1st 2"	50/1st 2"	Pre-Slide Alluvium									
GT/GP-1	S-56	110.0	SPT	50/1st 3"	50/1st 3"	Pre-Slide Alluvium									
GT-2	S-1	0.0	SPT	3	4	Fill									
GT-2	S-2	2.0	SPT	20	30	Fill	GM	15.7	60	24	16				Combined S-2 and S-3
GT-2	S-3	4.0	SPT	24	36	Fill									
GT-2	S-4	6.0	SPT	6	9	Fill									
GT-2	S-5	8.0	SPT	11	14	Fill									
GT-2	S-6	10.0	SPT	50/1st 2"	50/1st 2"	Fill									
GT-2	S-7	12.0	SPT	21	29	Fill	GP-GM	16.7	56	33	11				Combined S-7 and S-8
GT-2	S-8	14.0	SPT	27	35	Fill									
GT-2	S-9	16.0	SPT	30	37	Fill									
GT-2	S-10	18.0	SPT	14	16	Fill									
GT-2	S-11	20.0	SPT	10	11	Gravel Alluvium									
GT-2	S-12	22.0	SPT	9	9	Gravel Alluvium	SM	23.5	13	63	24				
GT-2	S-13	24.0	SPT	7	7	Gravel Alluvium									
GT-2	S-14	26.0	SPT	8	8	Gravel Alluvium	CL					49	23	26	
GT-2	S-15	28.0	SPT	8	7	Gravel Alluvium	GC	29.7	42	30	28				
GT-2	S-16	30.0	SPT	15	14	Gravel Alluvium									
GT-2	S-17	32.0	SPT	20	18	Gravel Alluvium	MH					63	34	29	
GT-2	S-18	34.0	SPT	16	14	Gravel Alluvium									

TABLE B-1: LABORATORY TESTING SUMMARY

Boring	Sample Number	Top Depth of Sample (feet)	Sample Type	Field N-Value	$(N_1)_{60}$-Value	Geologic Unit	USCS Designation	Natural Moisture Content (%)	% Gravel	% Sand	% Fines	Liquid Limit (%)	Plastic Limit (%)	Plasticity Index (%)	Remarks
GT-2	S-19	36.0	SPT	17	14	Gravel Alluvium									
GT-2	S-20	38.0	SPT	27	22	Gravel Alluvium									
GT-2	S-21	40.0	SPT	21	17	Gravel Alluvium									
GT-2	S-22	42.0	SPT	33	25	Gravel Alluvium									
GT-2	S-23	44.0	SPT	26	20	Gravel Alluvium									
GT-2	S-24	46.0	SPT	19	14	Gravel Alluvium									
GT-2	S-25	48.0	SPT	18	13	Gravel Alluvium	GC	20.7	64	22	14				Combined S-25 and S-26
GT-2	S-26	50.0	SPT	23	17	Gravel Alluvium									
GT-2	S-27	52.0	SPT	29	21	Gravel Alluvium									
GT-2	S-28	54.0	SPT	28	20	Gravel Alluvium	GM	17.6	56	28	16				Combined S-28 and S-29
GT-2	S-29	56.0	SPT	22	16	Gravel Alluvium									
GT-2	S-30	58.0	SPT	26	18	Gravel Alluvium									
GT-2	S-31	60.0	SPT	34	24	Gravel Alluvium									
GT-2	S-32	62.0	SPT	32	22	Gravel Alluvium									
GT-2	S-33	64.0	SPT	27	19	Gravel Alluvium									
GT-2	S-34	66.0	SPT	56	38	Gravel Alluvium	GP-GM	13.4	55	34	11				Combined S-34 and S-35
GT-2	S-35	68.0	SPT	72	49	Gravel Alluvium									
GT-2	S-36	70.0	SPT	95/11"	95/11"	Gravel Alluvium									
GT-2	S-37A	72.0	SPT	15	10	Gravel Alluvium									
GT-2	S-37B	72.7	SPT	15	10	Gravel Alluvium	ML					38	30	8	
GT-2	S-38	74.0	SPT	50/5"	50/5"	Gravel Alluvium									
GT-2	S-39	76.0	SPT	50/1st 5"	50/1st 5"	Gravel Alluvium									
GT-2	S-40	78.0	SPT	19	12	Sand and Silt Alluvium	ML	28.5	0	41	59				
GT-2	S-41	80.0	SPT	19	12	Sand and Silt Alluvium									
GT-2	S-42	82.0	SPT	22	14	Sand and Silt Alluvium									
GT-2	S-43	84.0	SPT	18	11	Sand and Silt Alluvium	SM	26.6	1	65	34				
GT-2	S-44A	86.0	SPT	16	10	Sand and Silt Alluvium									
GT-2	S-44B	87.3	SPT	16	10	Sand and Silt Alluvium									
GT-2	S-45	88.0	SPT	9	6	Sand and Silt Alluvium	ML					27	23	4	
GT-2	S-46A	90.0	SPT	28	17	Sand and Silt Alluvium	ML	30.7	0	25	75				
GT-2	S-46B	91.2	SPT	28	17	Pre-Slide Alluvium									
GT-2	S-47	92.0	SPT	50/1st 3"	50/1st 3"	Pre-Slide Alluvium									
GT-2	S-48	94.0	SPT	50/1st 4"	50/1st 4"	Pre-Slide Alluvium									
GT-2	S-49	96.0	SPT	82/11"	82/11"	Pre-Slide Alluvium	GM	15.2	46	40	14				Combined S-49 and S-50
GT-2	S-50	98.0	SPT	57	34	Pre-Slide Alluvium									
GT-2	S-51	100.0	SPT	50/1st 4"	50/1st 4"	Pre-Slide Alluvium									

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9120 SW Pioneer Court, Suite B, Wilsonville, Oregon 97070 | ph: 503.682.1880 fax: 503.682.2753 | www.nwgeotech.com

TECHNICAL REPORT

Report To:	Ms. Aimee Holmes, P.E., C.E.G. Shannon & Wilson, Inc. 3990 S.W. Collins Way, Suite 203 Lake Oswego, Oregon 97035	**Date:** **Lab No.:**	3/27/17 17-043
Project:	Laboratory Testing – 24-1-04114	**Project No.:**	2966.1.1

Report of: Atterberg limits, moisture content, and hydrometer sieve analysis

Sample Identification

NTI completed Atterberg limits, moisture content and hydrometer sieve analysis testing on samples delivered to our laboratory on March 16, 2017. Testing was performed in accordance with the standards indicated. Our laboratory test results are summarized on the following table and attached pages.

Laboratory Testing

Atterberg Limits (ASTM D4318)			
Sample ID	**Liquid Limit**	**Plastic Limit**	**Plasticity Index**
GT/GP-1 S-37B @ 72.7 – 74 ft.	66	43	23
GT/GP S-39A @ 76 – 76.8 ft.	43	35	8
GT/GP-1 S-41A @ 80 – 81.3 ft.	44	31	13
GT/GP-1 S-50 @ 98 – 100 ft.	NP	NP	NP
GT/GP-1 S-52 @ 102 – 104 ft.	32	25	7
GT-2 S-14 @ 26 – 28 ft.	49	23	26
GT-2 S-17 @ 32 – 34 ft.	63	34	29
GT-2 S-37B @ 72.7 – 74 ft.	38	30	8
GT-2 S-45 @ 88 – 90 ft.	27	23	4

Attachments: Laboratory Test Results
Gradation Test Results

Copies: Addressee

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TECHNICAL REPORT

Report To: Ms. Aimee Holmes, P.E., C.E.G.
Shannon & Wilson, Inc.
3990 S.W. Collins Way, Suite 203
Lake Oswego, Oregon 97035

Date: 3/27/17

Lab No.: 17-043

Project: Laboratory Testing – 24-1-04114

Project No.: 2966.1.1

Laboratory Testing

Moisture Content of Soil (ASTM D 2216)			
Sample ID	**Moisture Content (Percent)**	**Sample ID**	**Moisture Content (Percent)**
GT/GP-1 S-4 @ 6 – 8 ft. S-5 @ 8 – 8.9 ft. S-6 @ 10 – 12 ft.	14.7	GT/GP-1 S-54 @ 106 – 108 ft.	27.8
GT/GP-1 S-10 @ 18 – 20 ft. S-11 @ 20 – 21.4 ft.	13.2	GT-2 S-2 @ 2 – 4 ft. S-3 @ 4 – 6 ft.	15.7
GT/GP-1 S-16 @ 30 – 32 ft.	23.6	GT-2 S-7 @ 12 – 14 ft. S-8 @ 14 – 16 ft.	16.7
GT/GP-1 S-17 @ 32 – 34 ft. S-18 @ 34 – 36 ft.	13.9	GT-2 S-12 @ 22 – 24 ft.	23.5
GT/GP-1 S-25 @ 48 – 50 ft. S-26 @ 50 – 52 ft. S-27 @ 52 – 53.7 ft.	10.4	GT-2 S-15 @ 28 – 30 ft.	29.7
GT/GP-1 S-33 @ 64 – 66 ft. S-34 @ 66 – 68 ft. S-35 @ 69 – 70 ft.	10.3	GT-2 S-25 @ 48 – 50 ft. S-26 @ 50 – 52 ft.	20.7
GT/GP-1 S-36 @ 70 - 72 ft.	44.7	GT-2 S-28 @ 54 – 56 ft. S-29 @ 56 – 58 ft.	17.6
GT/GP-1 S-37A @ 72 – 72.7 ft.	64.5	GT-2 S-34 @ 66 – 68 ft. S-35 @ 68 – 70 ft.	13.4
GT/GP-1 S-39B @ 76.8 – 78 ft.	47.8	GT-2 S-40 @ 78 – 80 ft.	28.5
GT/GP-1 S-43 @ 84 – 86 ft. S-44 @ 86 – 86.9 ft.	11.6	GT-2 S-43 @ 84 – 86 ft.	26.6
GT/GP-1 S-48 @ 94 – 96 ft.	28.1	GT-2 S-46A @ 90 – 91.8 ft.	30.7
GT/GP-1 S-53 @ 104 – 106 ft.	25.2	GT-2 S-49 @ 96 – 97.4 ft. S-50 @ 98 – 100 ft.	15.2

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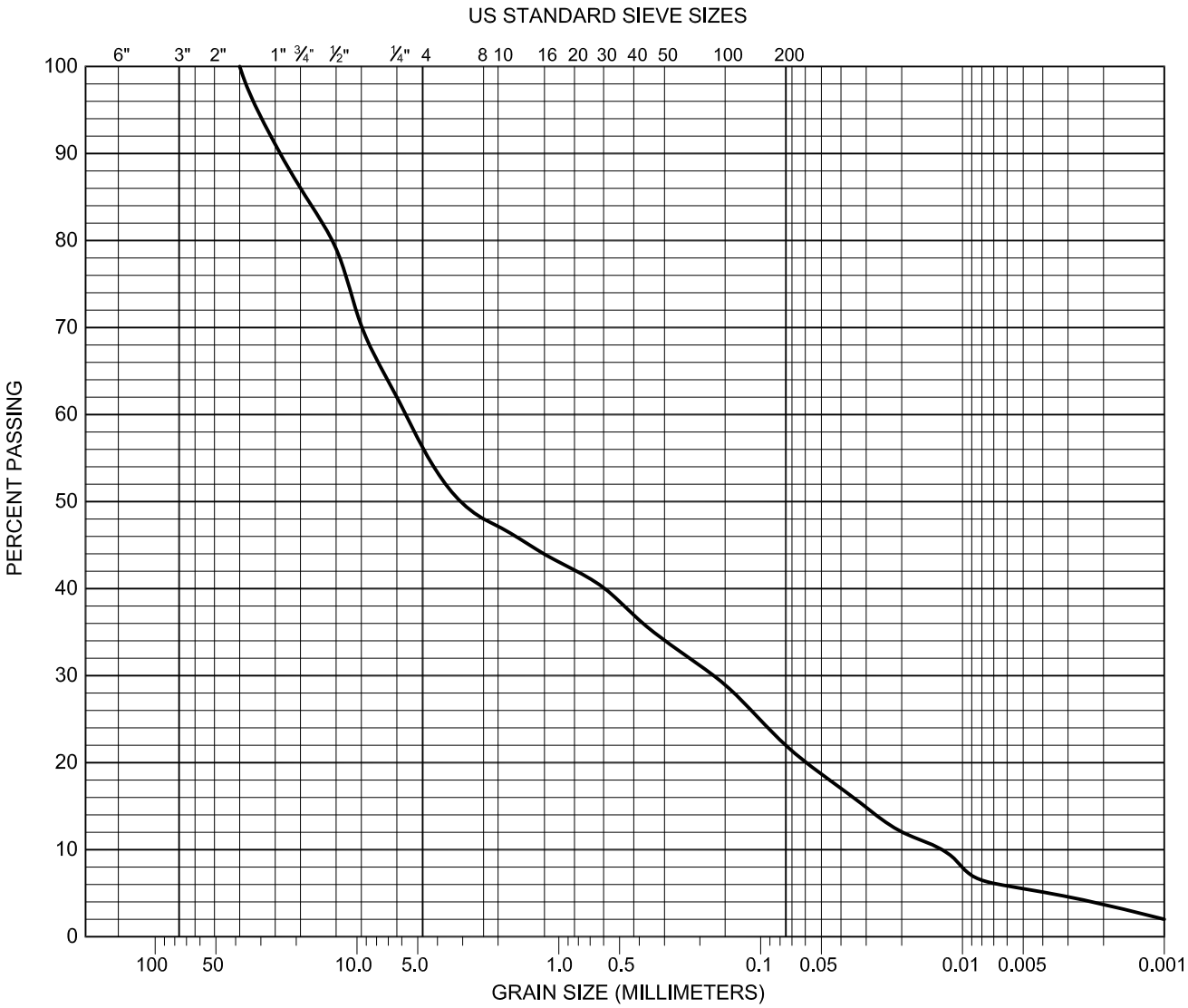

COBBLES	GRAVEL		SAND			SILT AND CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SYMBOL	SAMPLE LOCATION	FIELD MOISTURE (%)	% PASSING NO. 200 SIEVE	% PASSING 2 μ	UNIFIED SOIL CLASSIFICATION
———	GT/GP-1 S-4 @ 6 - 8 FT. GT/GP-1 S-5 @ 8 - 8.9 FT. GT/GP-1 S-6 @ 10 - 12 FT.	–	22	4	--

GRADATION TEST RESULTS - ASTM D422

PROJECT NO. 2966.1.1	SHANNON & WILSON, INC. LABORATORY TESTING 24-1-04114-001	LAB NO. 17-043

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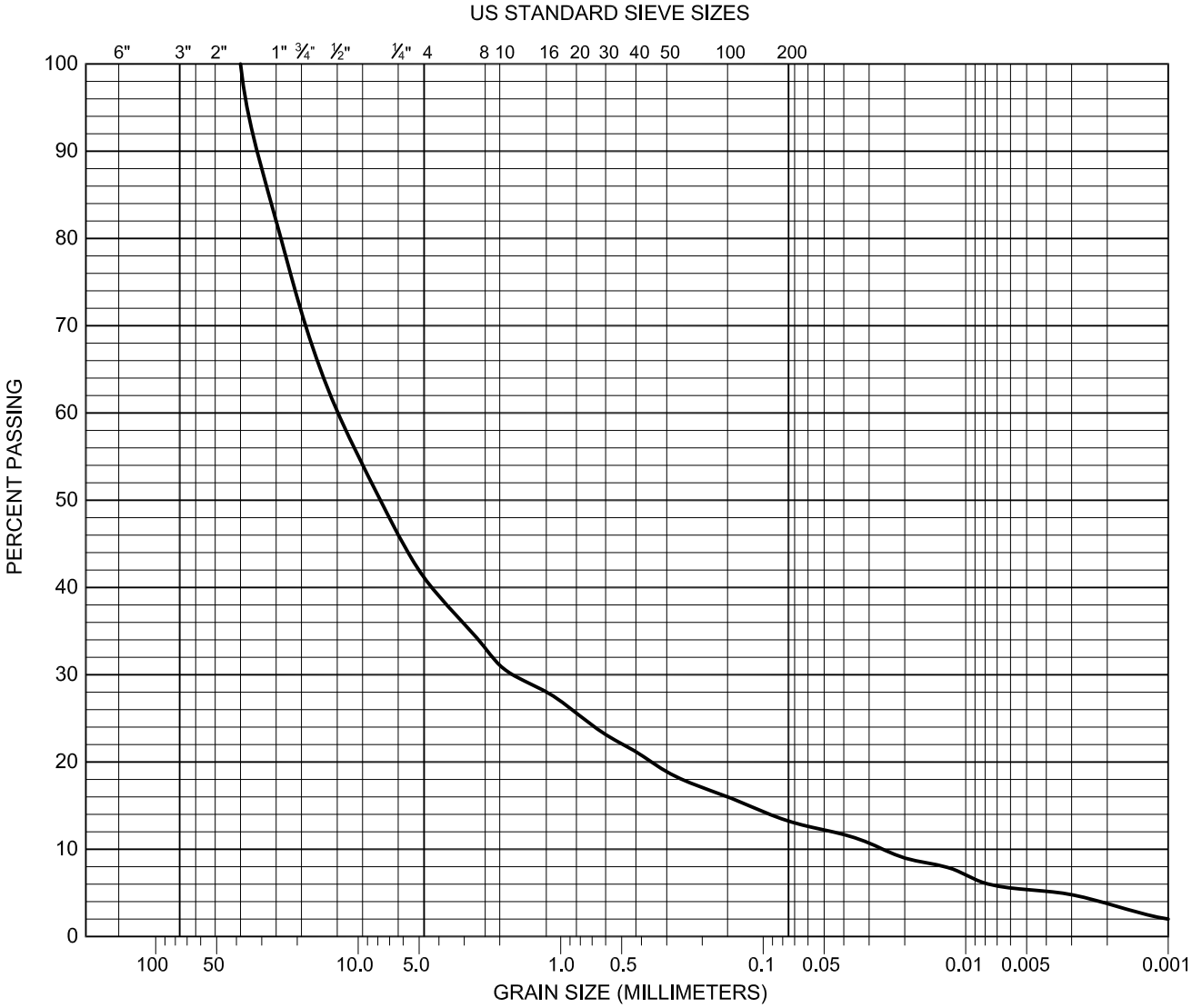

COBBLES	GRAVEL		SAND			SILT AND CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SYMBOL	SAMPLE LOCATION	FIELD MOISTURE (%)	% PASSING NO. 200 SIEVE	% PASSING 2 μ	UNIFIED SOIL CLASSIFICATION
———	GT/GP-1 S-10 @ 18 - 20 FT. GT/GP-1 S-11 @ 20 - 21.4 FT.	–	13	4	--

GRADATION TEST RESULTS - ASTM D422

PROJECT NO. 2966.1.1	SHANNON & WILSON, INC. LABORATORY TESTING 24-1-04114-001	LAB NO. 17-043

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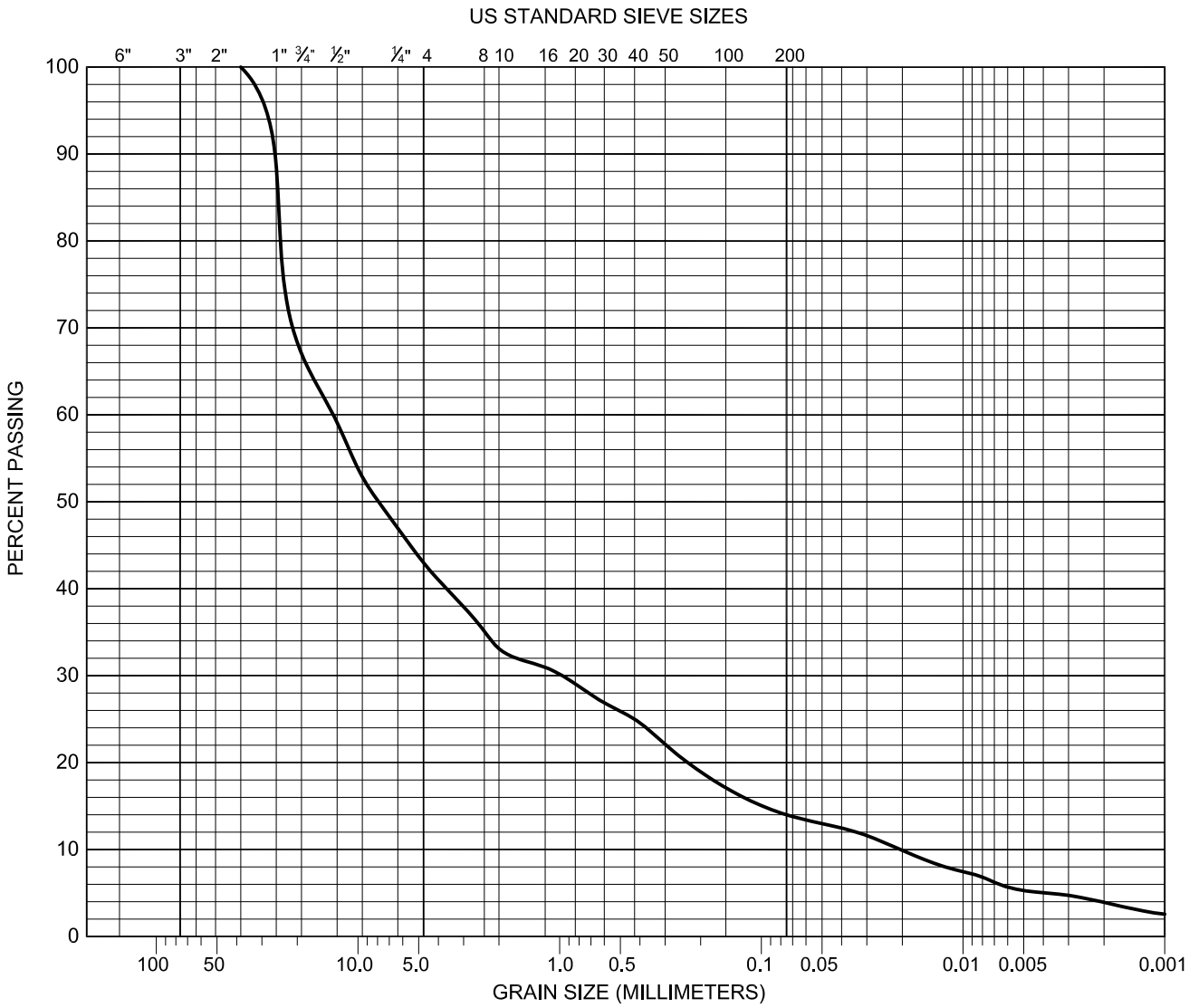

COBBLES	GRAVEL		SAND			SILT AND CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SYMBOL	SAMPLE LOCATION	FIELD MOISTURE (%)	% PASSING NO. 200 SIEVE	% PASSING 2 μ	UNIFIED SOIL CLASSIFICATION
———	GT/GP-1 S-16 @ 30 - 32 FT.	--	14	4	–

GRADATION TEST RESULTS - ASTM D422

PROJECT NO. 2966.1.1	SHANNON & WILSON, INC. LABORATORY TESTING 24-1-04114-001	LAB NO. 17-043

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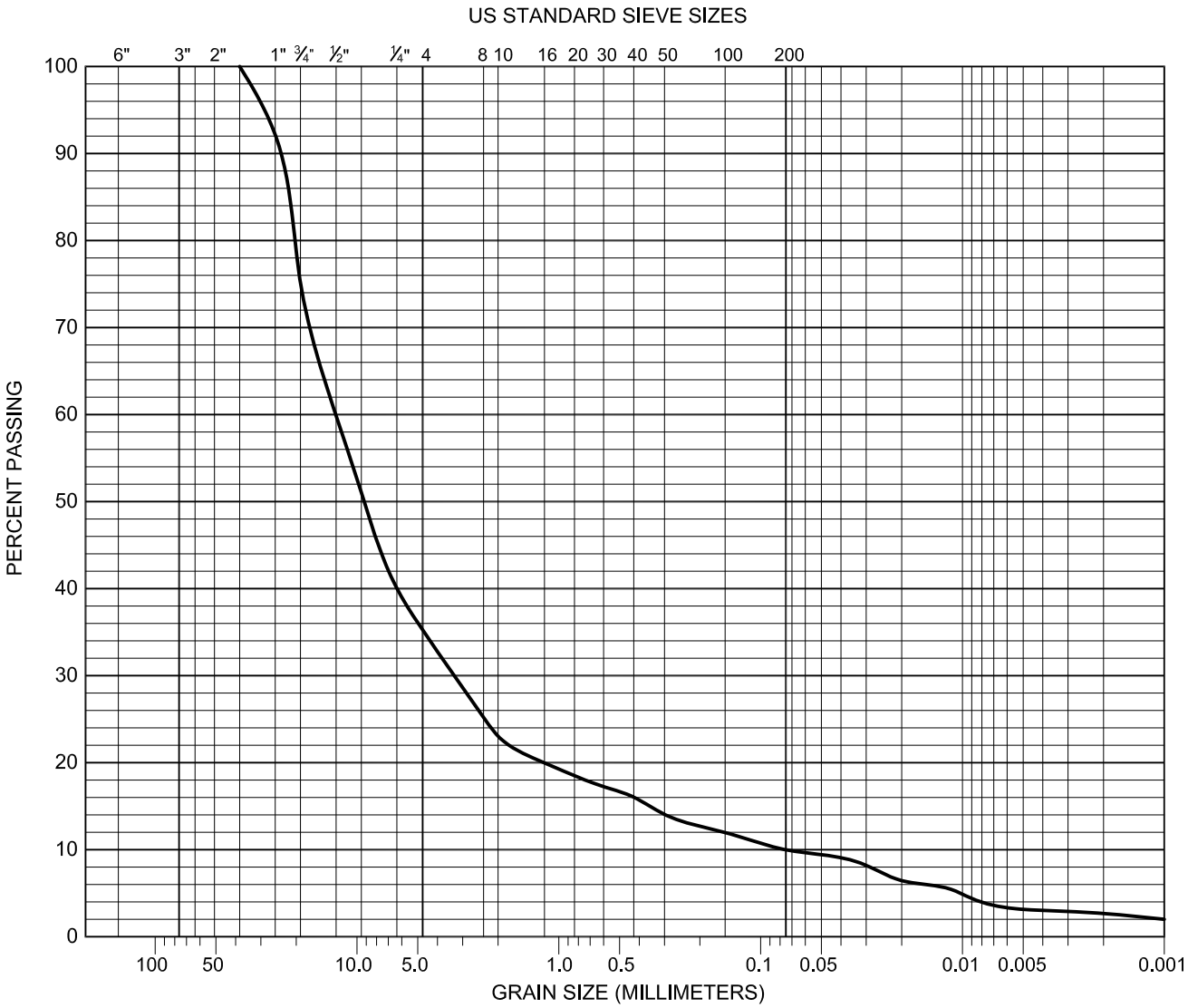

COBBLES	GRAVEL		SAND			SILT AND CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SYMBOL	SAMPLE LOCATION	FIELD MOISTURE (%)	% PASSING NO. 200 SIEVE	% PASSING 2 μ	UNIFIED SOIL CLASSIFICATION
———	GT/GP-1 S-17 @ 32 - 34 FT. GT/GP-1 S-18 @ 34 - 36 FT.	–	10	3	--

GRADATION TEST RESULTS - ASTM D422

PROJECT NO. 2966.1.1	SHANNON & WILSON, INC. LABORATORY TESTING 24-1-04114-001	LAB NO. 17-043

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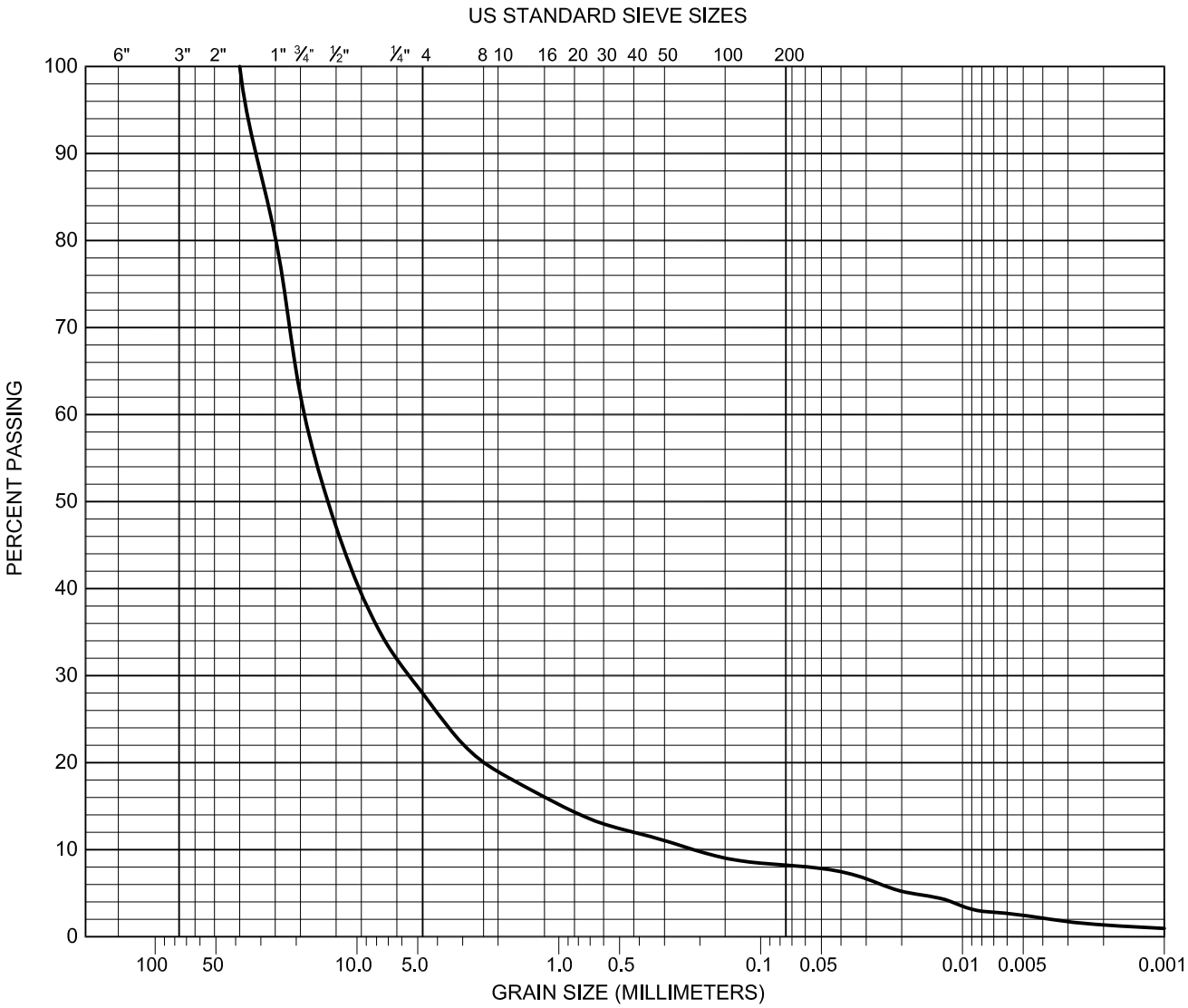


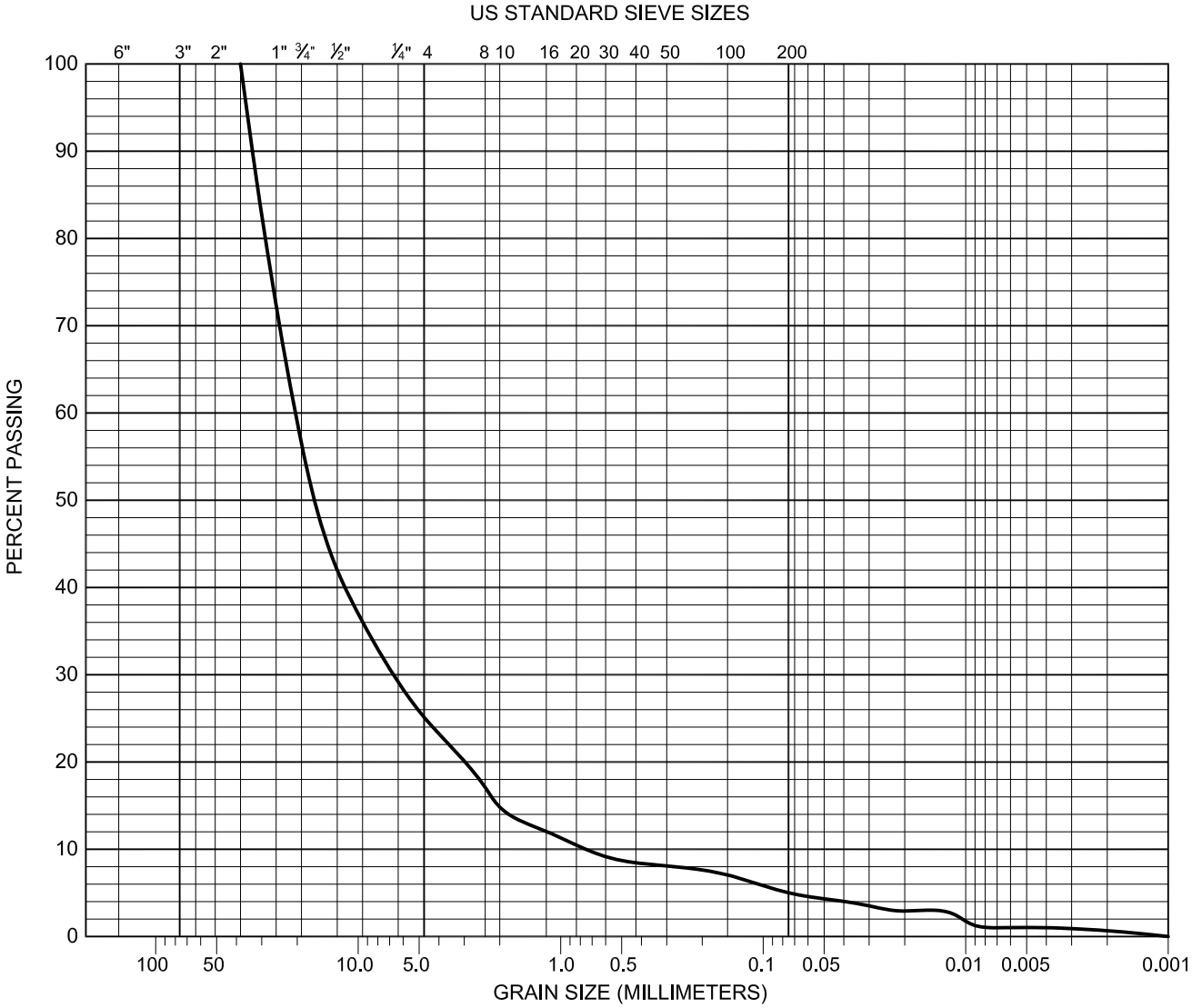
COBBLES	GRAVEL		SAND			SILT AND CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SYMBOL	SAMPLE LOCATION	FIELD MOISTURE (%)	% PASSING NO. 200 SIEVE	% PASSING 2 μ	UNIFIED SOIL CLASSIFICATION
———	GT/GP-1 S-25 @ 48 - 50 FT. GT/GP-1 S-26 @ 50 - 52 FT. GT/GP-1 S-27 @ 52 - 53.7 FT.	–	8	1.5	--

GRADATION TEST RESULTS - ASTM D422

PROJECT NO. 2966.1.1	SHANNON & WILSON, INC. LABORATORY TESTING 24-1-04114-001	LAB NO. 17-043

Northwest Testing, Inc.
A Division of Northwest Geotech, Inc.



COBBLES	GRAVEL		SAND			SILT AND CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SYMBOL	SAMPLE LOCATION	FIELD MOISTURE (%)	% PASSING NO. 200 SIEVE	% PASSING 2 μ	UNIFIED SOIL CLASSIFICATION
———	GT/GP-1 S-33 @ 64 - 66 FT. GT/GP-1 S-34 @ 66 - 68 FT. GT/GP-1 S-35 @ 68 - 70 FT.	–	5	1	--

GRADATION TEST RESULTS - ASTM D422

PROJECT NO. 2966.1.1	SHANNON & WILSON, INC. LABORATORY TESTING 24-1-04114-001	LAB NO. 17-043

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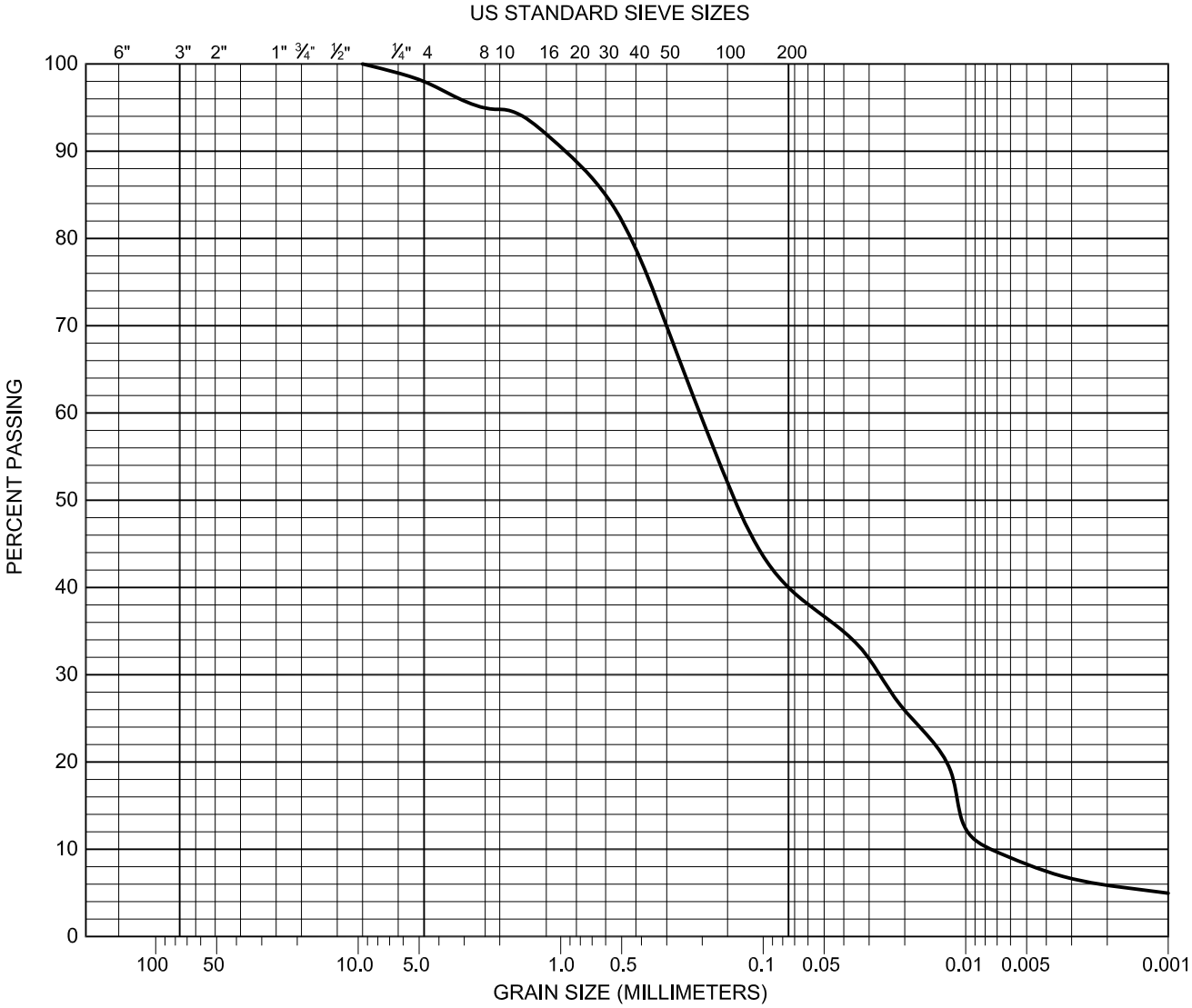

COBBLES	GRAVEL		SAND			SILT AND CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SYMBOL	SAMPLE LOCATION	FIELD MOISTURE (%)	% PASSING NO. 200 SIEVE	% PASSING 2 μ	UNIFIED SOIL CLASSIFICATION
———	GT/GP-1 S-36 @ 70 - 72 FT.	–	40	6	--

GRADATION TEST RESULTS - ASTM D422

PROJECT NO. 2966.1.1	SHANNON & WILSON, INC. LABORATORY TESTING 24-1-04114-001	LAB NO. 17-043

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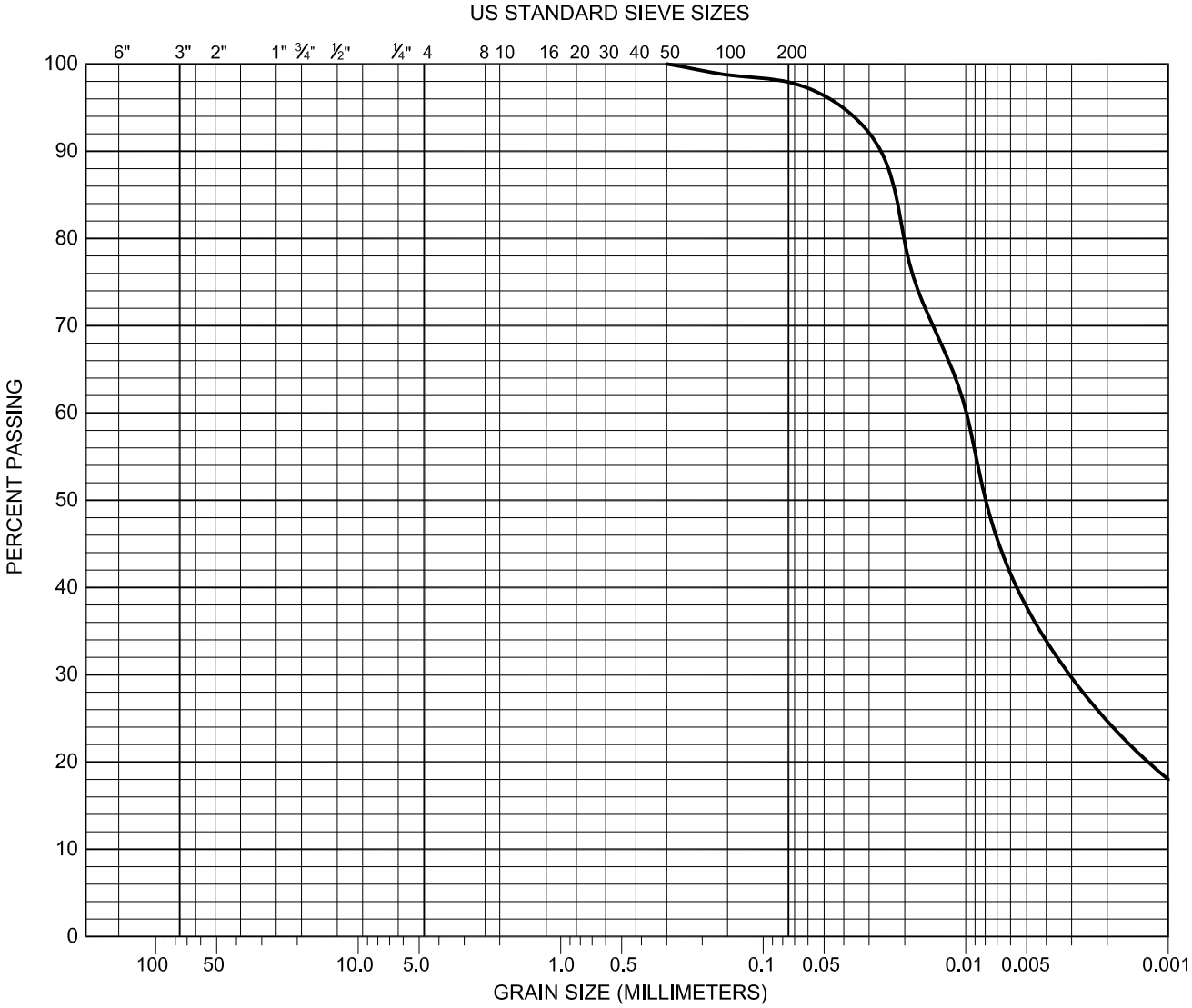

COBBLES	GRAVEL		SAND			SILT AND CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SYMBOL	SAMPLE LOCATION	FIELD MOISTURE (%)	% PASSING NO. 200 SIEVE	% PASSING 2 μ	UNIFIED SOIL CLASSIFICATION
———	GT/GP-1 S-37B @ 72.7 - 74 FT.	–	98	24.5	--

GRADATION TEST RESULTS - ASTM D422

PROJECT NO. 2966.1.1	SHANNON & WILSON, INC. LABORATORY TESTING 24-1-04114-001	LAB NO. 17-043

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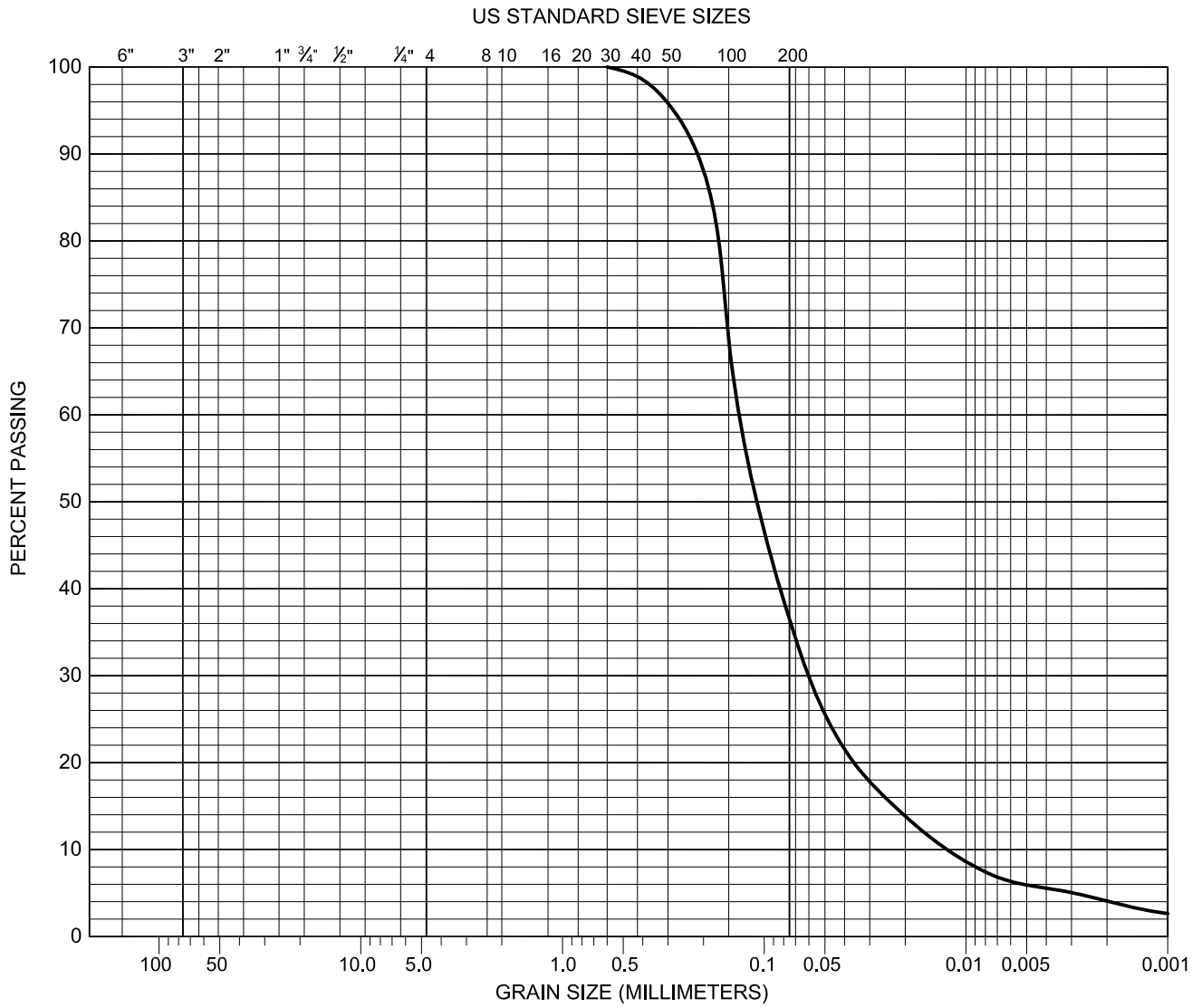

COBBLES	GRAVEL		SAND			SILT AND CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SYMBOL	SAMPLE LOCATION	FIELD MOISTURE (%)	% PASSING NO. 200 SIEVE	% PASSING 2 μ	UNIFIED SOIL CLASSIFICATION
———	GT/GP-1 S-39B @ 76.8 - 78 FT.	--	36	4	–

GRADATION TEST RESULTS - ASTM D422

PROJECT NO. 2966.1.1	SHANNON & WILSON, INC. LABORATORY TESTING 24-1-04114-001	LAB NO. 17-043

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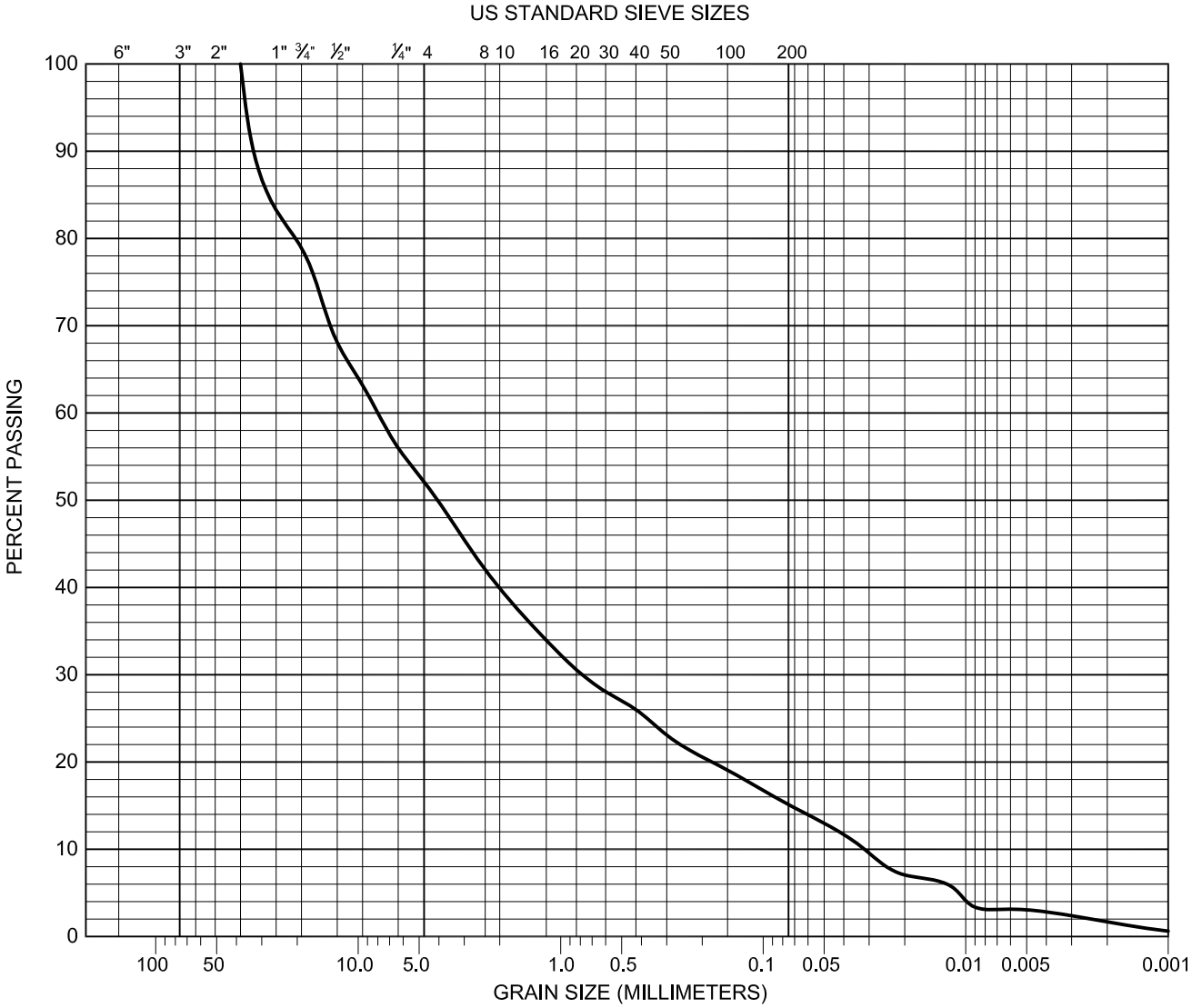

COBBLES	GRAVEL		SAND			SILT AND CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SYMBOL	SAMPLE LOCATION	FIELD MOISTURE (%)	% PASSING NO. 200 SIEVE	% PASSING 2 μ	UNIFIED SOIL CLASSIFICATION
———	GT/GP-1 S-43 @ 84 - 86 FT. GT/GP-1 S-44 @ 86 - 86.9 FT.	–	15	2	--

GRADATION TEST RESULTS - ASTM D422

PROJECT NO. 2966.1.1	SHANNON & WILSON, INC. LABORATORY TESTING 24-1-04114-001	LAB NO. 17-043

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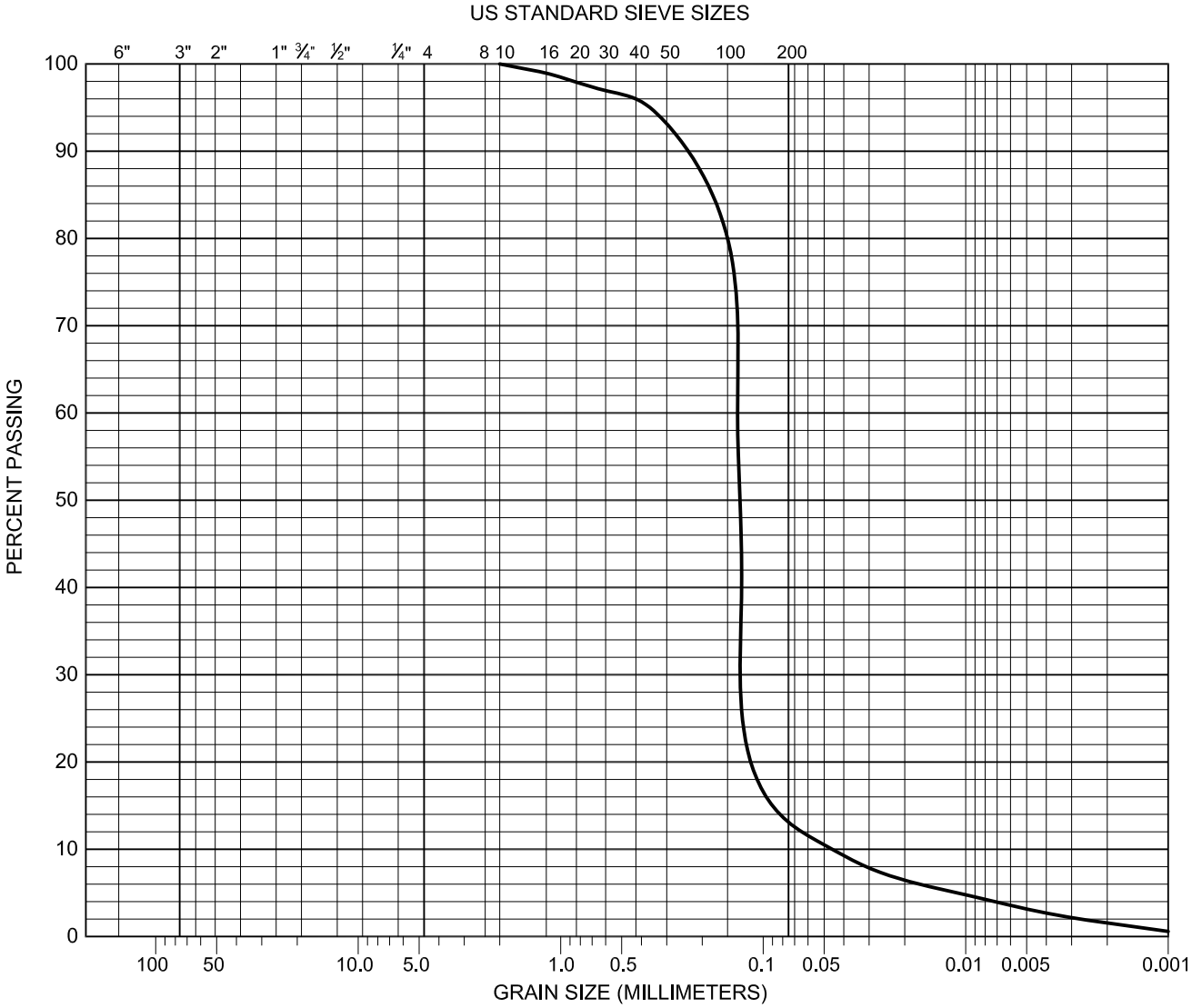

COBBLES	GRAVEL		SAND			SILT AND CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SYMBOL	SAMPLE LOCATION	FIELD MOISTURE (%)	% PASSING NO. 200 SIEVE	% PASSING 2 μ	UNIFIED SOIL CLASSIFICATION
———	GT/GP-1 S-48 @ 94 - 96 FT.	–	13	1.5	--

GRADATION TEST RESULTS - ASTM D422

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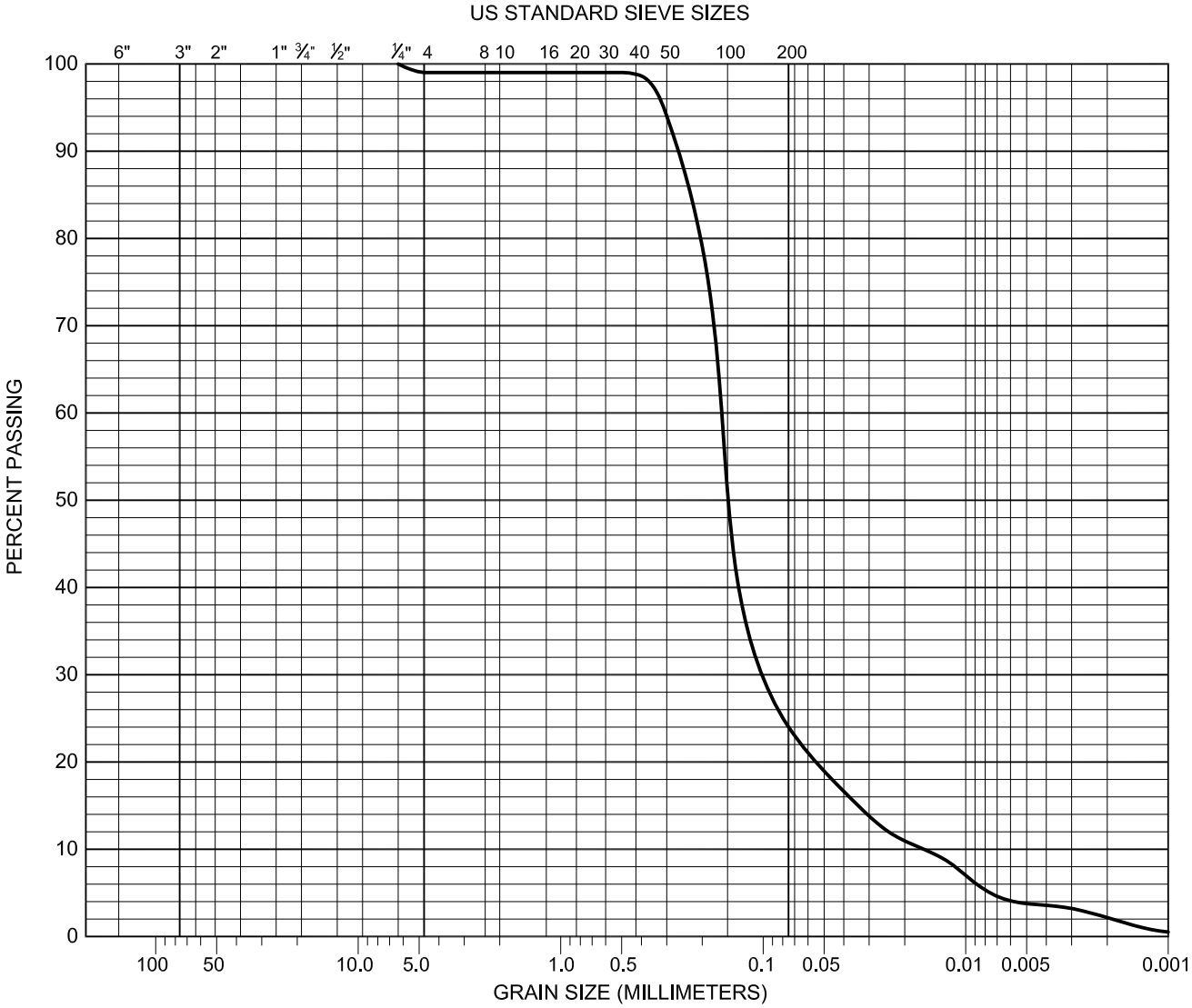

COBBLES	GRAVEL		SAND			SILT AND CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SYMBOL	SAMPLE LOCATION	FIELD MOISTURE (%)	% PASSING NO. 200 SIEVE	% PASSING 2 μ	UNIFIED SOIL CLASSIFICATION
———	GT/GP-1 S-54 @ 106 - 108 FT.	–	24	2	--

GRADATION TEST RESULTS - ASTM D422

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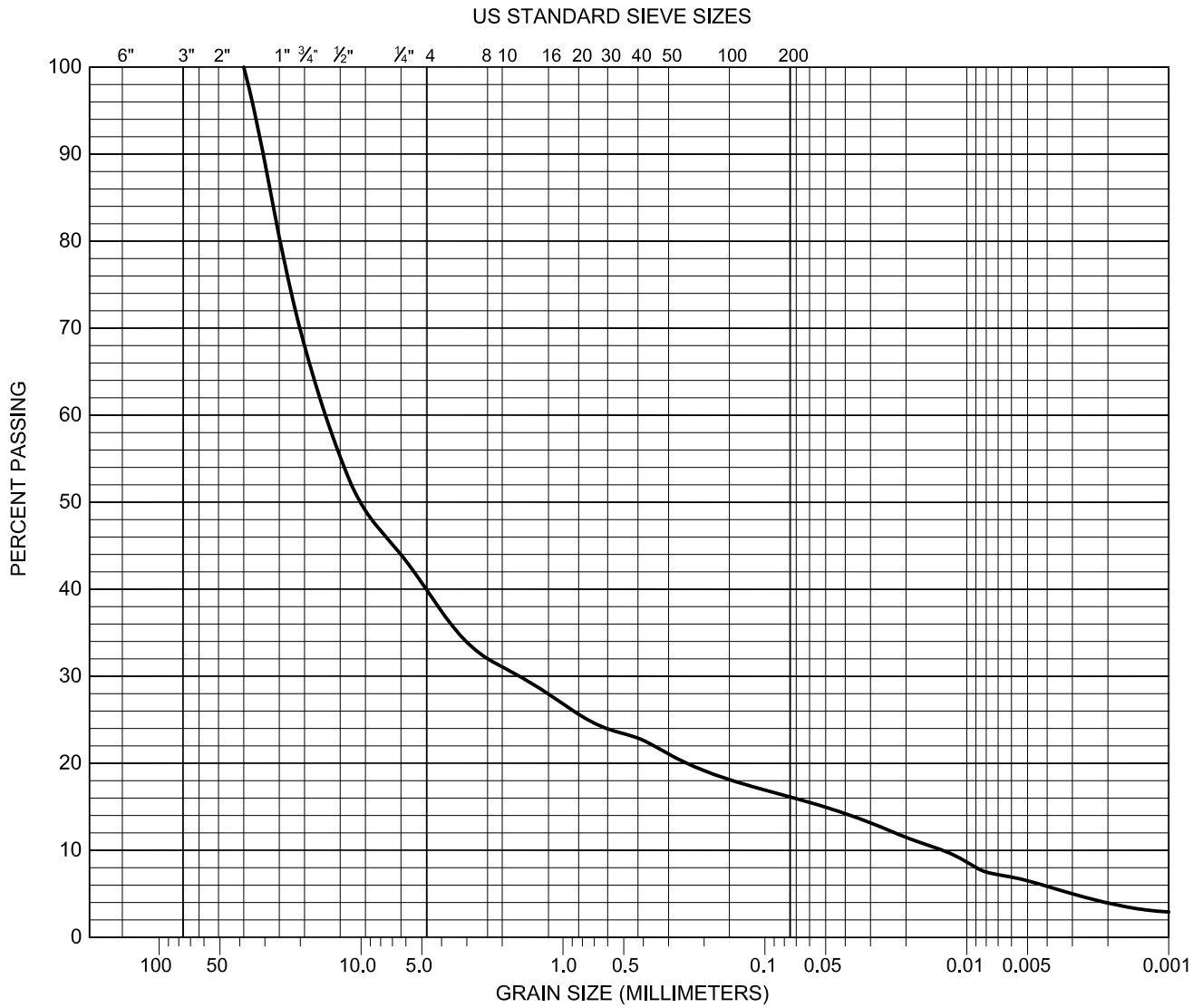

COBBLES	GRAVEL		SAND			SILT AND CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SYMBOL	SAMPLE LOCATION	FIELD MOISTURE (%)	% PASSING NO. 200 SIEVE	% PASSING 2 μ	UNIFIED SOIL CLASSIFICATION
———	GT-2 S-2 @ 2 - 4 FT. GT-2 S-3 @ 4 - 6 FT.	--	16	4	–

GRADATION TEST RESULTS - ASTM D422

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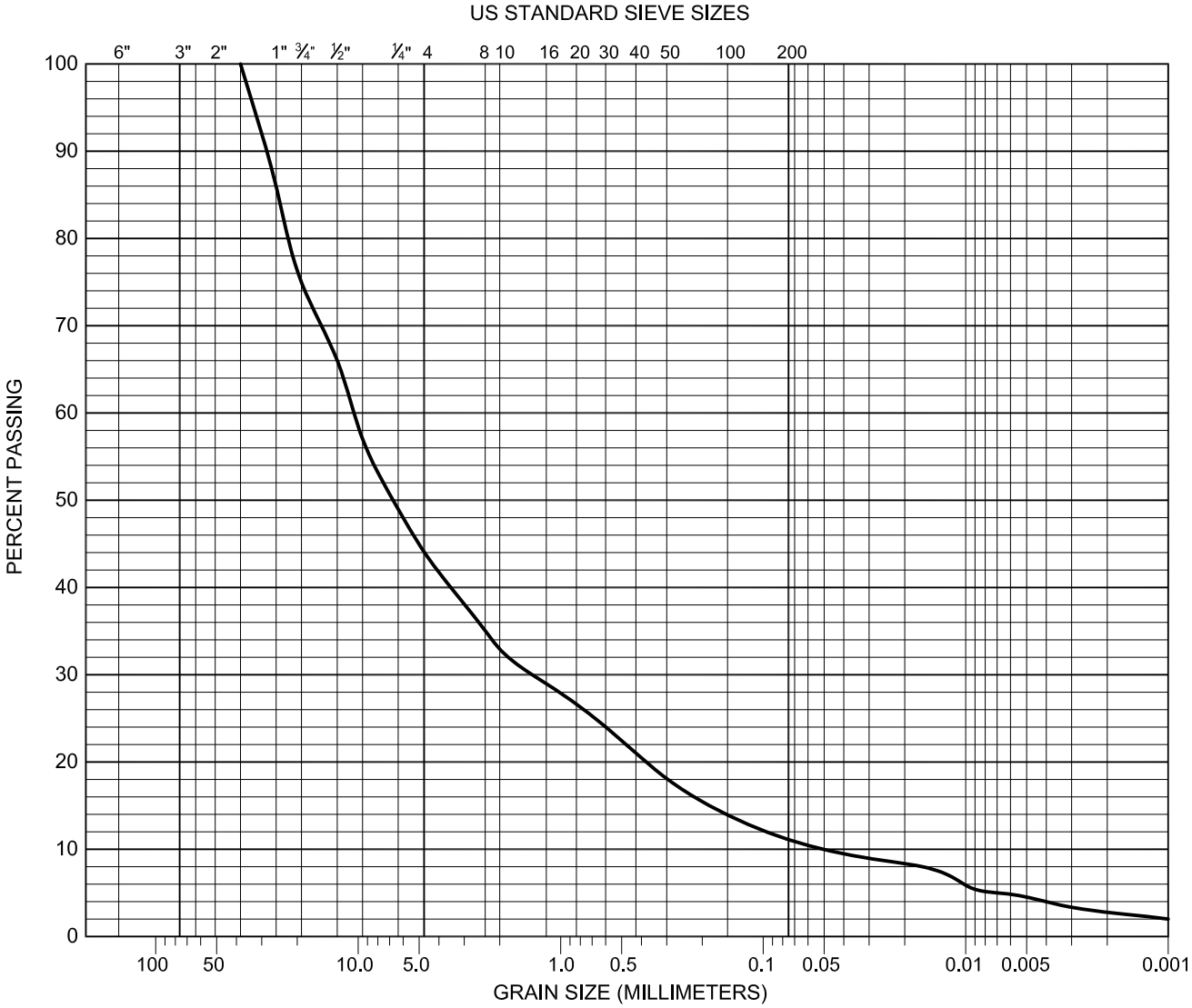

COBBLES	GRAVEL		SAND			SILT AND CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SYMBOL	SAMPLE LOCATION	FIELD MOISTURE (%)	% PASSING NO. 200 SIEVE	% PASSING 2 μ	UNIFIED SOIL CLASSIFICATION
———	GT-2 S-7 @ 12 - 14 FT. GT-2 S-8 @ 14 - 16 FT.	–	11	3	--

GRADATION TEST RESULTS - ASTM D422

PROJECT NO. 2966.1.1	SHANNON & WILSON, INC. LABORATORY TESTING 24-1-04114-001	LAB NO. 17-043

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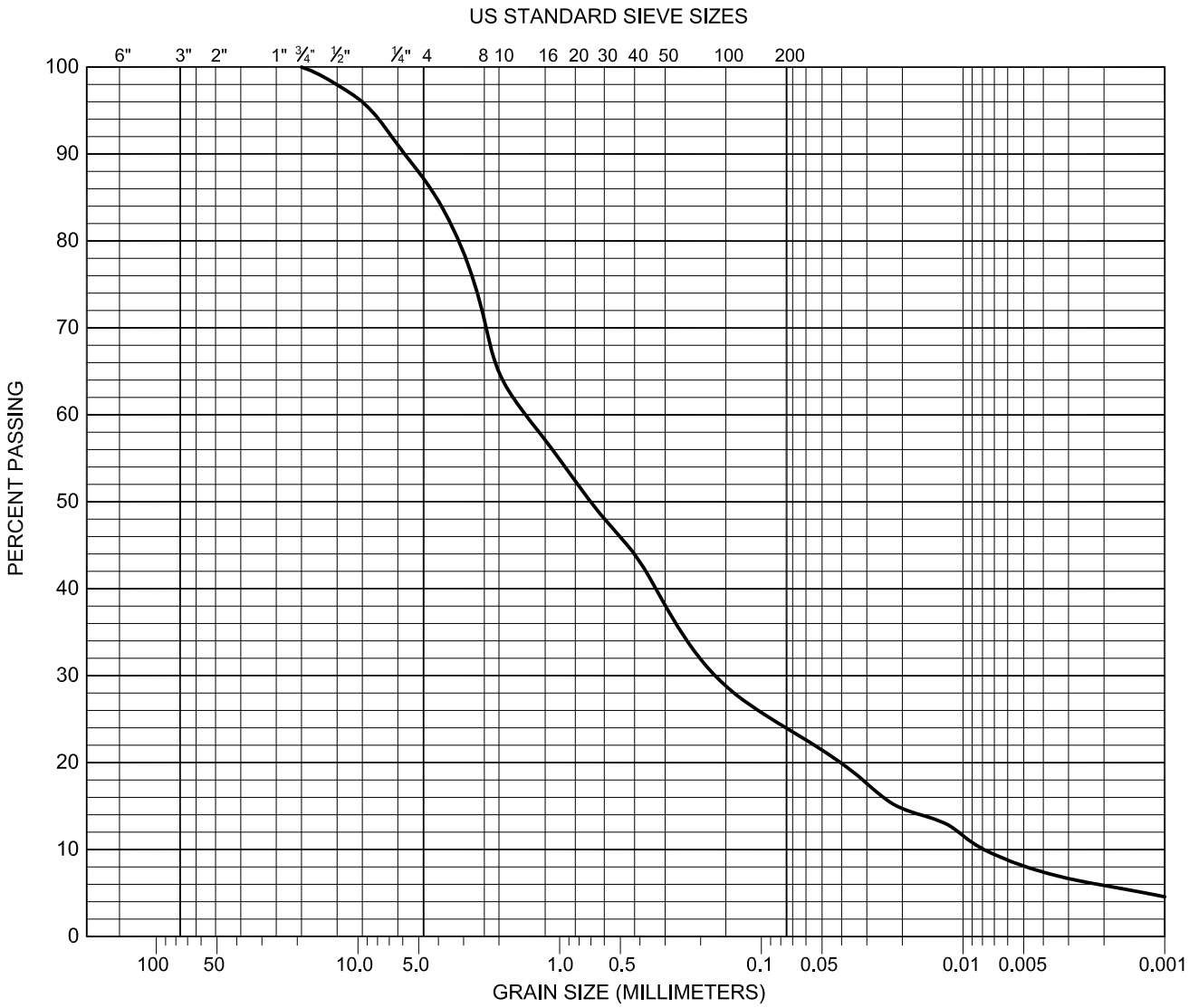

COBBLES	GRAVEL		SAND			SILT AND CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SYMBOL	SAMPLE LOCATION	FIELD MOISTURE (%)	% PASSING NO. 200 SIEVE	% PASSING 2 μ	UNIFIED SOIL CLASSIFICATION
———	GT-2 S-12 @ 22 - 24 FT.	--	24	6	–

GRADATION TEST RESULTS - ASTM D422

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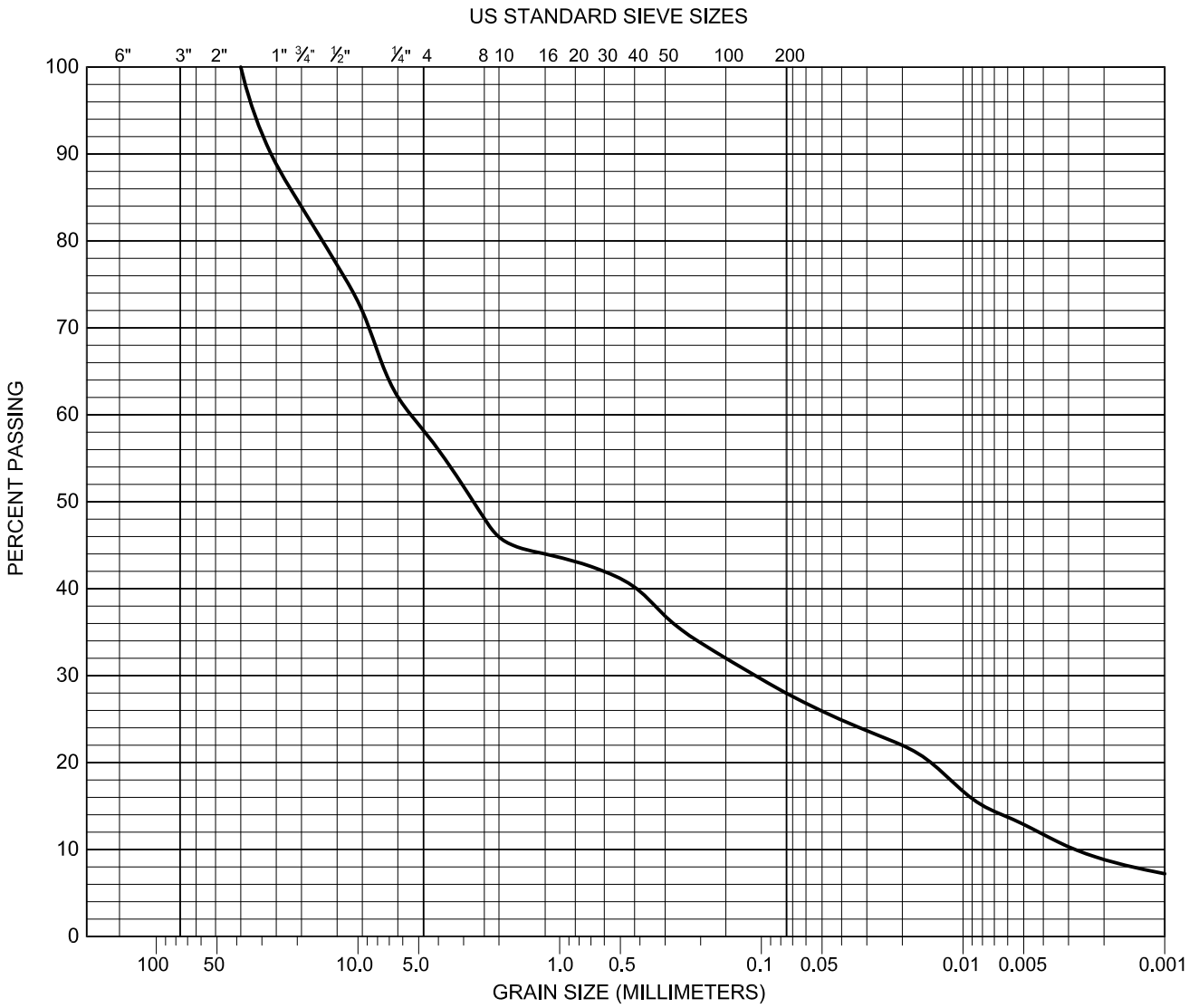

COBBLES	GRAVEL		SAND			SILT AND CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SYMBOL	SAMPLE LOCATION	FIELD MOISTURE (%)	% PASSING NO. 200 SIEVE	% PASSING 2 μ	UNIFIED SOIL CLASSIFICATION
———	GT-2 S-15 @ 28 - 30 FT.	--	28	9	–

GRADATION TEST RESULTS - ASTM D422

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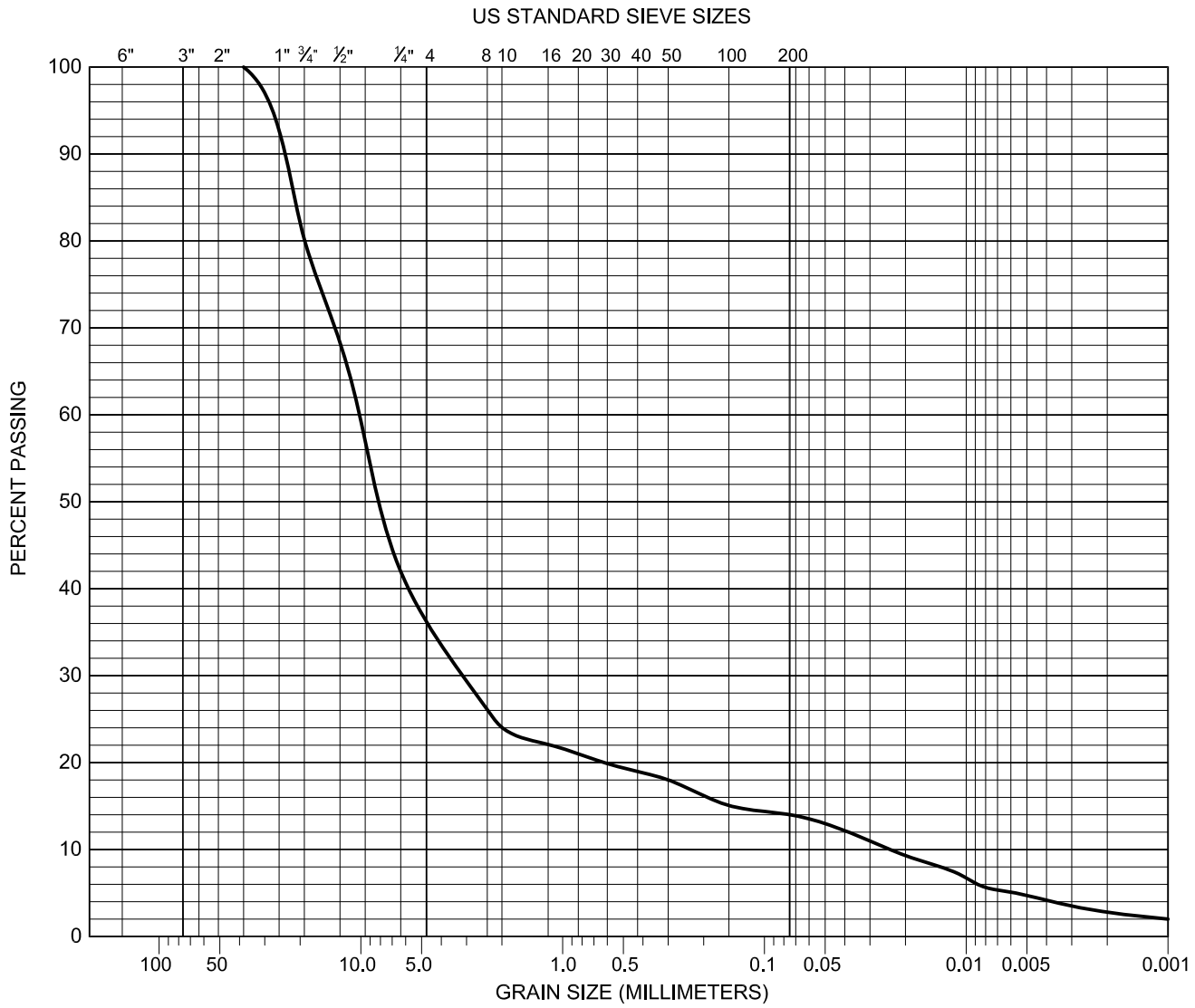

COBBLES	GRAVEL		SAND			SILT AND CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SYMBOL	SAMPLE LOCATION	FIELD MOISTURE (%)	% PASSING NO. 200 SIEVE	% PASSING 2 μ	UNIFIED SOIL CLASSIFICATION
———	GT-2 S-25 @ 48 - 50 FT. GT-2 S-26 @ 50 - 52 FT.	--	14	3	–

GRADATION TEST RESULTS - ASTM D422

PROJECT NO. 2966.1.1	SHANNON & WILSON, INC. LABORATORY TESTING 24-1-04114-001	LAB NO. 17-043

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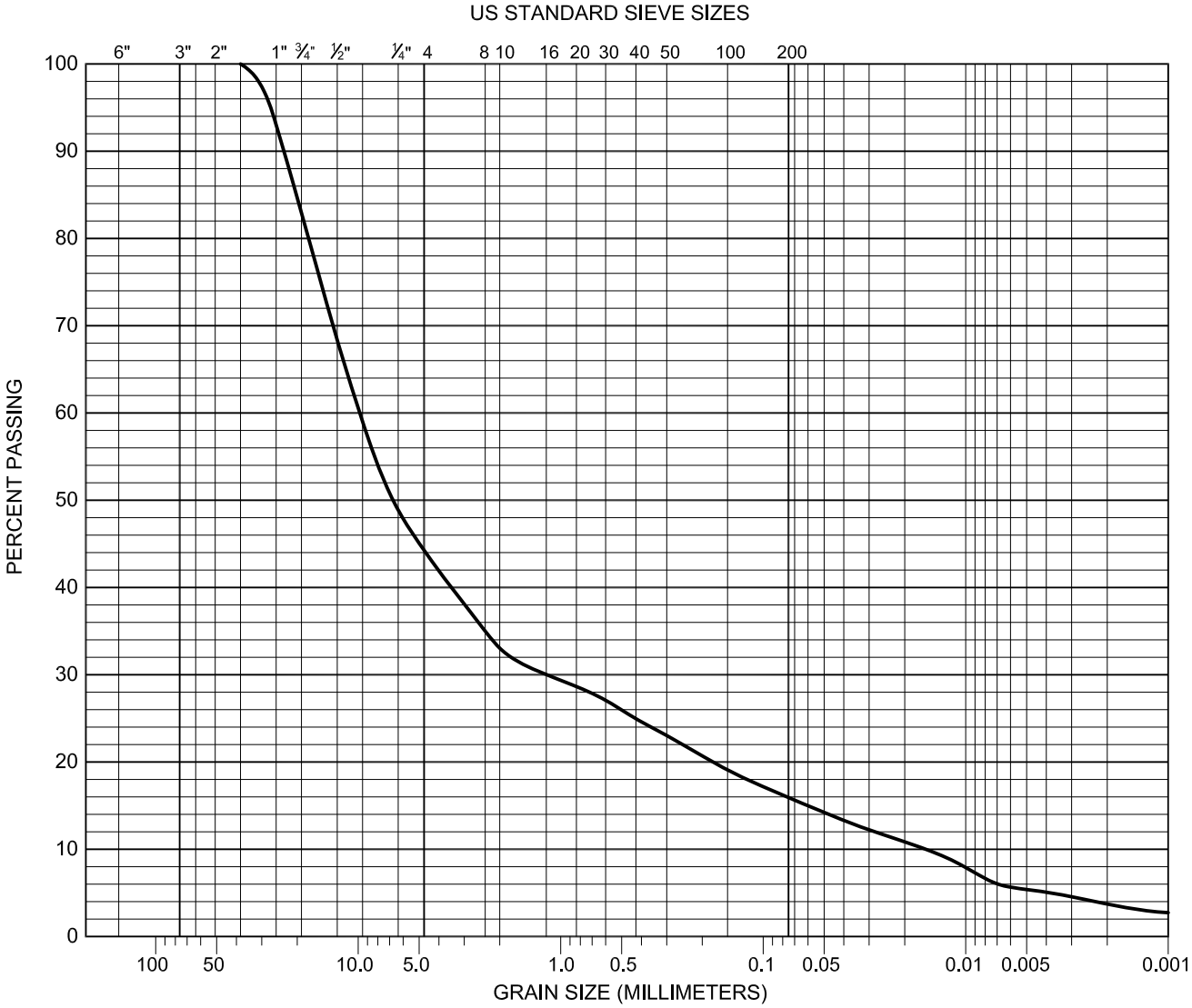

COBBLES	GRAVEL		SAND			SILT AND CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SYMBOL	SAMPLE LOCATION	FIELD MOISTURE (%)	% PASSING NO. 200 SIEVE	% PASSING 2 μ	UNIFIED SOIL CLASSIFICATION
———	GT-2 S-28 @ 54 - 56 FT. GT-2 S-29 @ 56 - 58 FT.	–	16	3.5	--

GRADATION TEST RESULTS - ASTM D422

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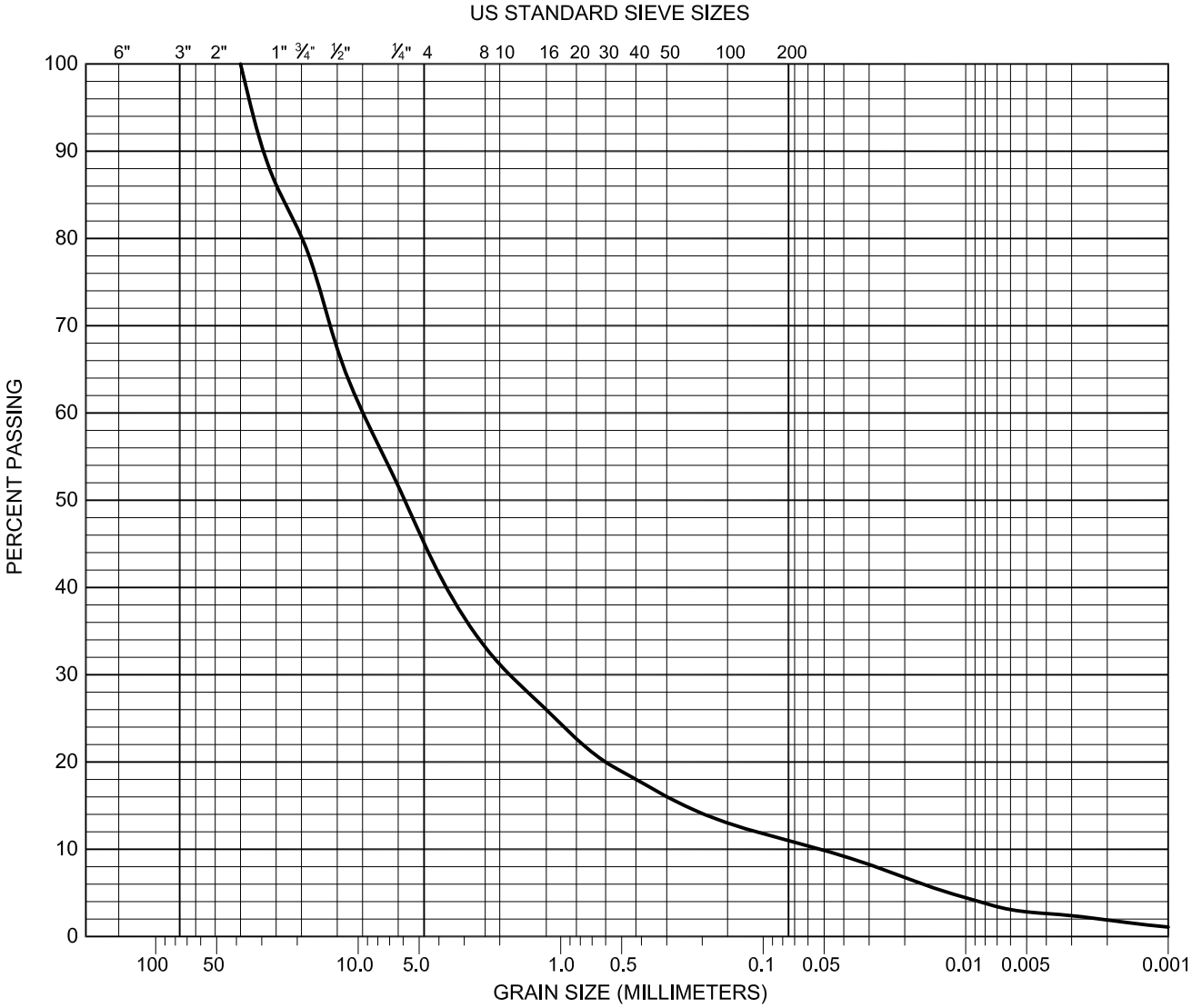

COBBLES	GRAVEL		SAND			SILT AND CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SYMBOL	SAMPLE LOCATION	FIELD MOISTURE (%)	% PASSING NO. 200 SIEVE	% PASSING 2 μ	UNIFIED SOIL CLASSIFICATION
———	GT-2 S-34 @ 66 - 68 FT. GT-2 S-35 @ 68 - 70 FT.	–	11	2	--

GRADATION TEST RESULTS - ASTM D422

PROJECT NO. 2966.1.1	SHANNON & WILSON, INC. LABORATORY TESTING 24-1-04114-001	LAB NO. 17-043

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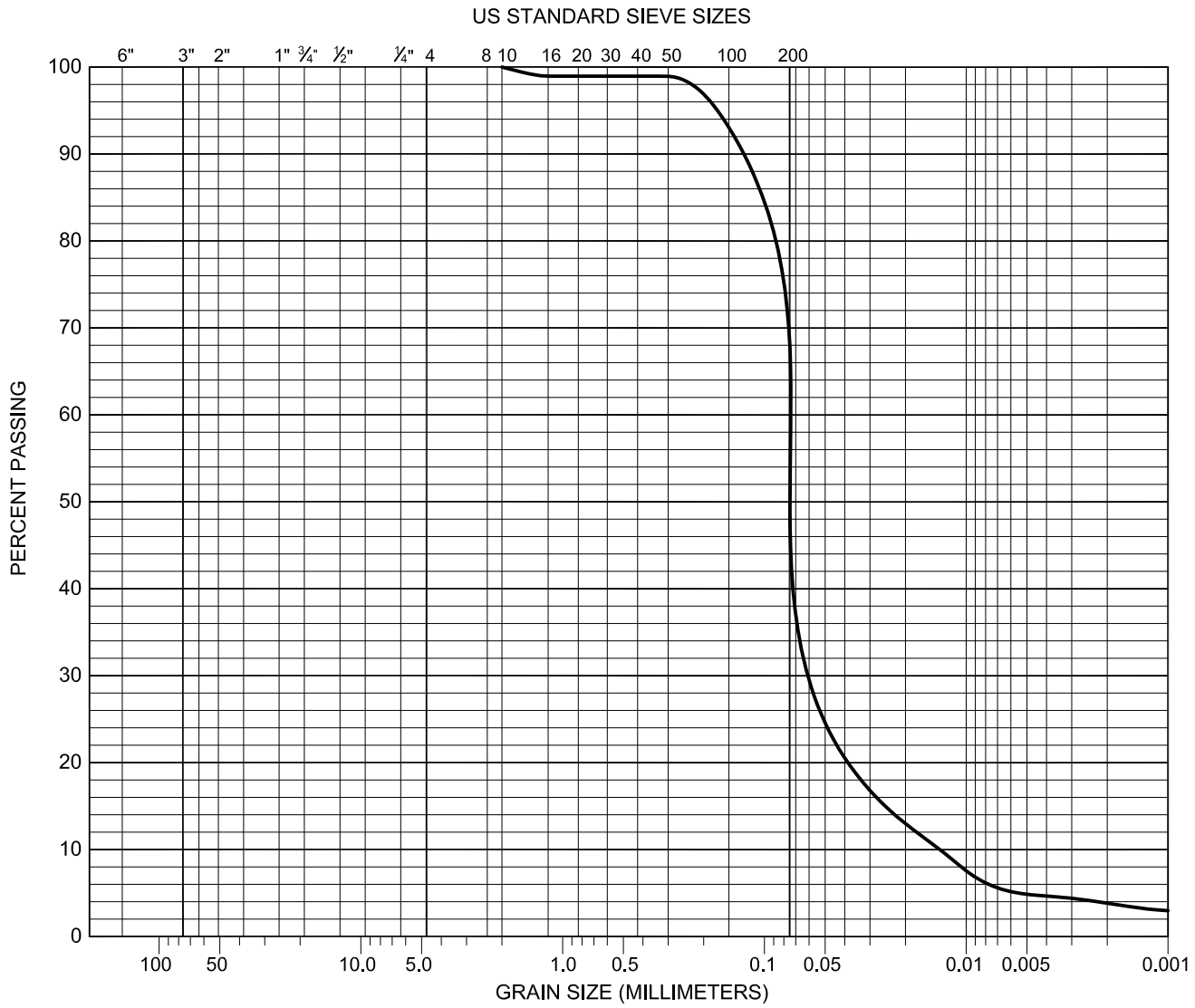

COBBLES	GRAVEL		SAND			SILT AND CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SYMBOL	SAMPLE LOCATION	FIELD MOISTURE (%)	% PASSING NO. 200 SIEVE	% PASSING 2 μ	UNIFIED SOIL CLASSIFICATION
———	GT-2 S-40 @ 78 - 80 FT.	--	59	4	–

GRADATION TEST RESULTS - ASTM D422

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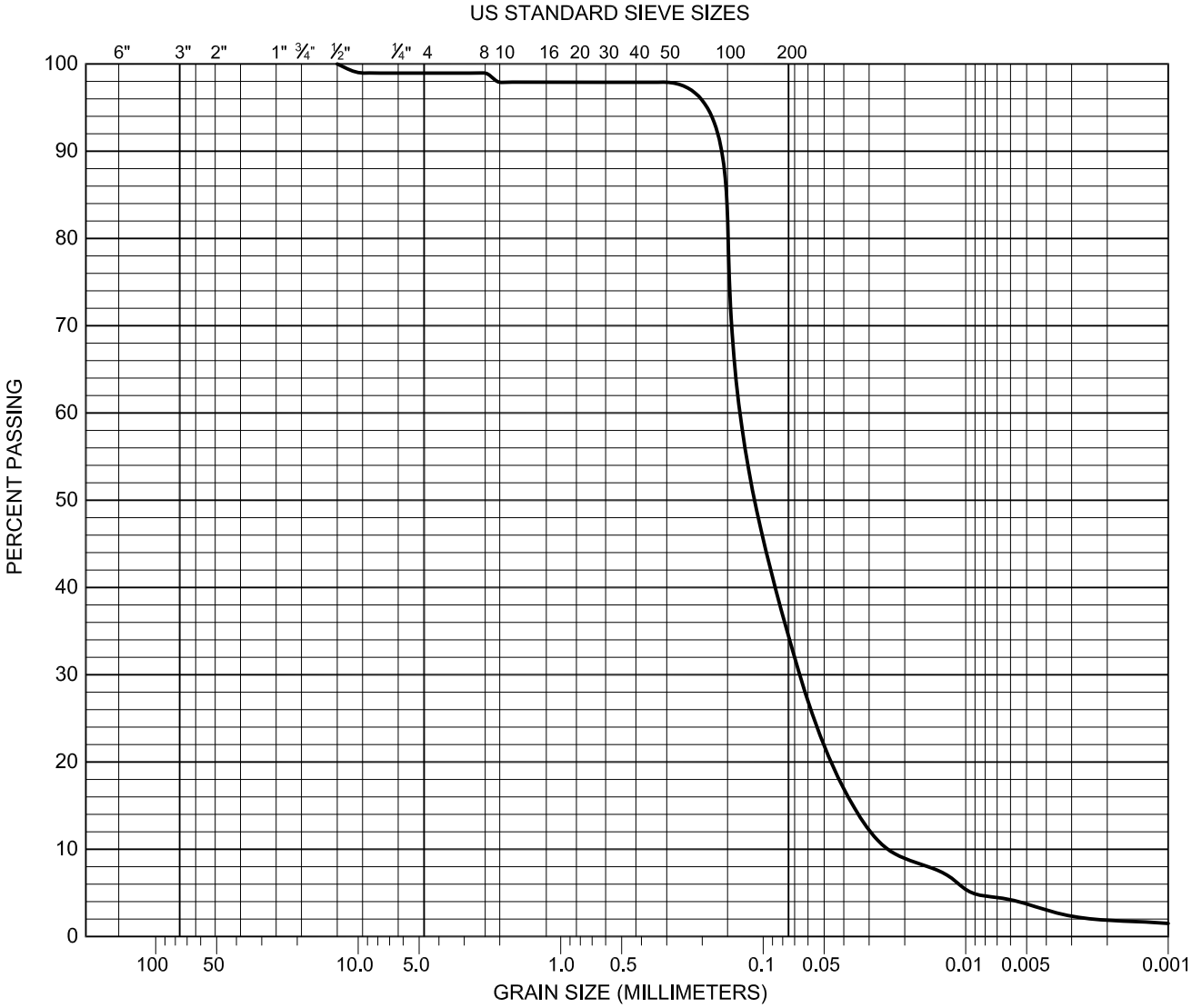

COBBLES	GRAVEL		SAND			SILT AND CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SYMBOL	SAMPLE LOCATION	FIELD MOISTURE (%)	% PASSING NO. 200 SIEVE	% PASSING 2 μ	UNIFIED SOIL CLASSIFICATION
———	GT-2 S-43 @ 84 - 86 FT.	–	34	2	--

GRADATION TEST RESULTS - ASTM D422

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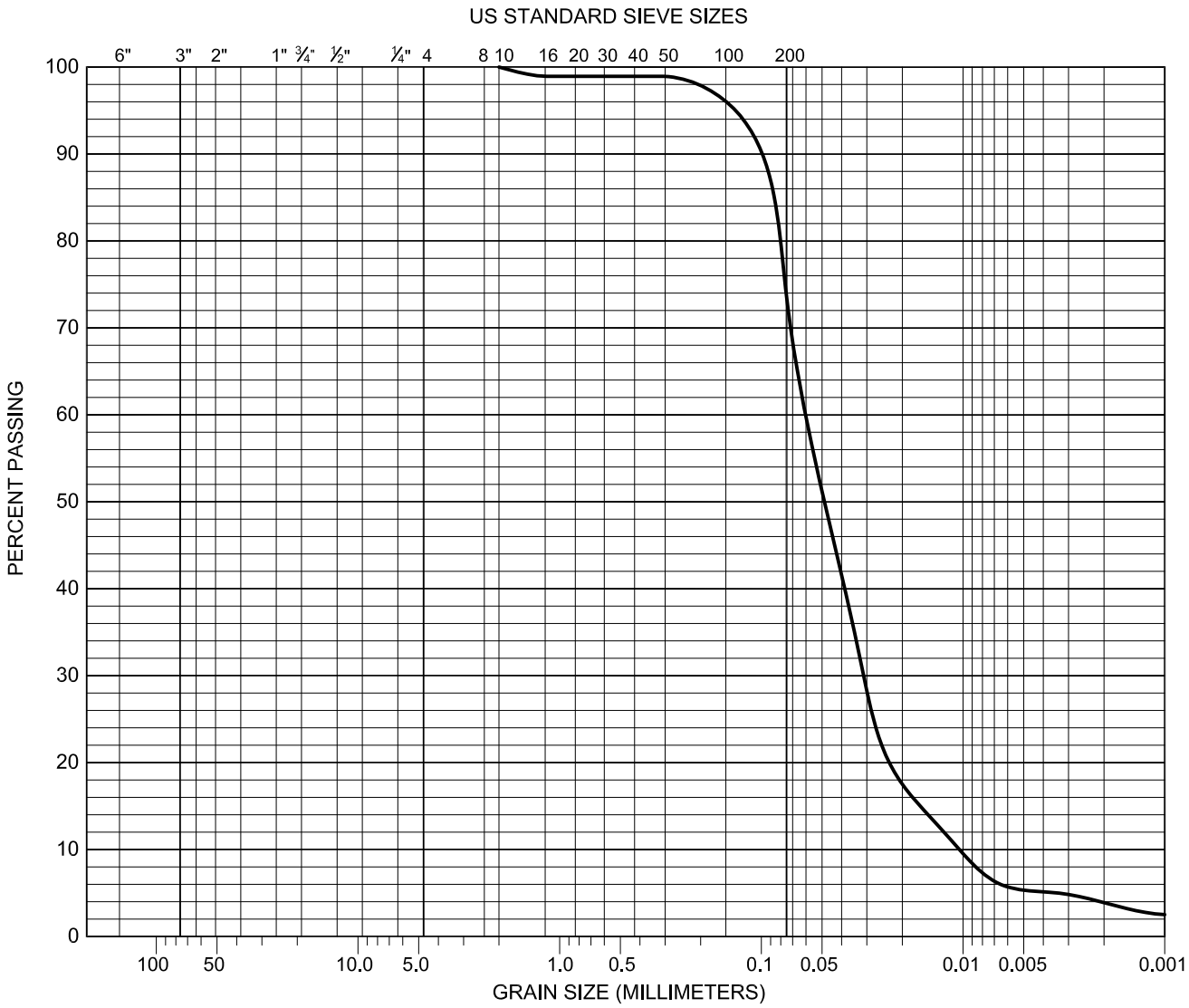

COBBLES	GRAVEL		SAND			SILT AND CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SYMBOL	SAMPLE LOCATION	FIELD MOISTURE (%)	% PASSING NO. 200 SIEVE	% PASSING 2 μ	UNIFIED SOIL CLASSIFICATION
———	GT-2 S-46A @ 90 - 91.8 FT.	--	75	4	–

GRADATION TEST RESULTS - ASTM D422

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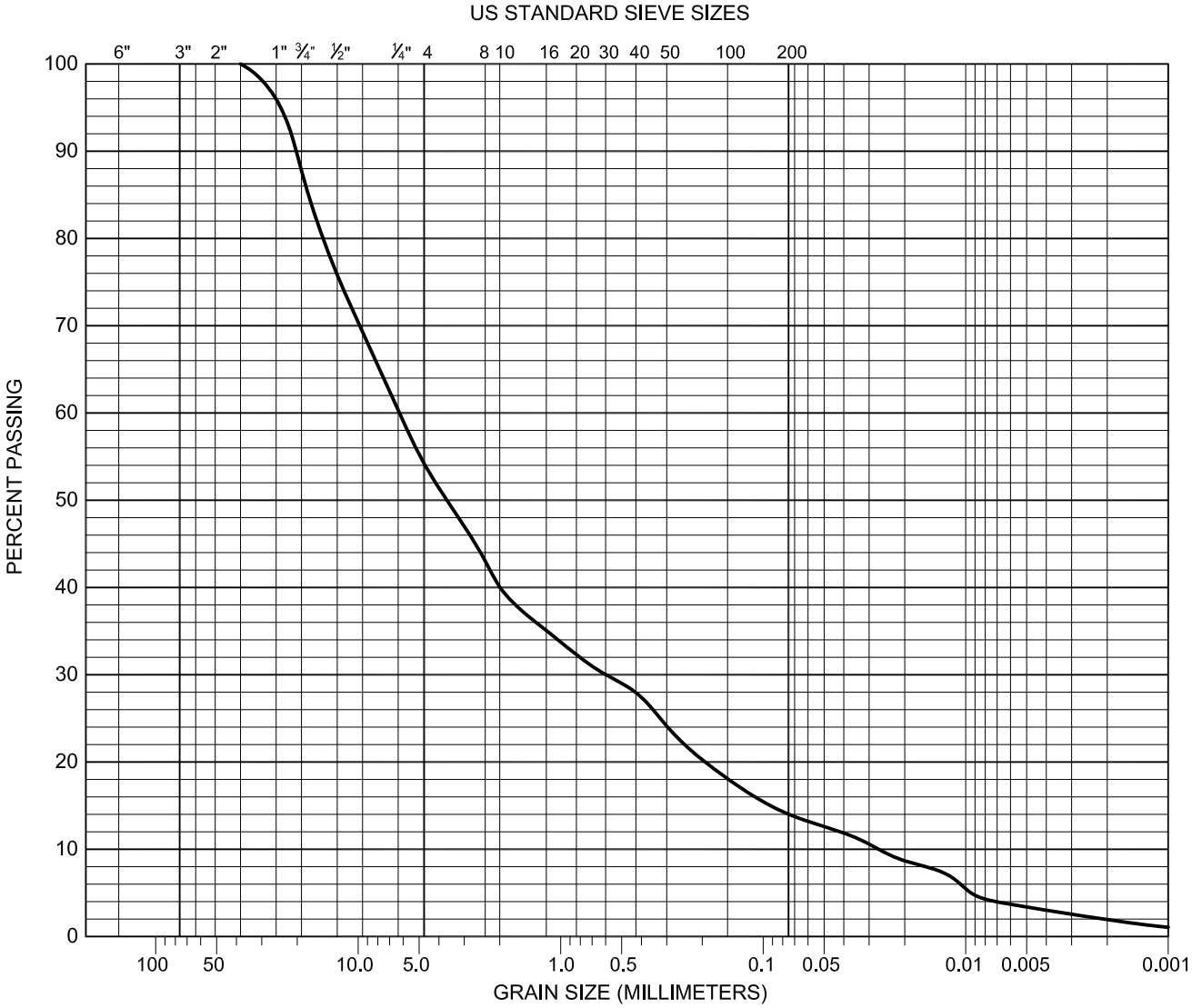

COBBLES	GRAVEL		SAND			SILT AND CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SYMBOL	SAMPLE LOCATION	FIELD MOISTURE (%)	% PASSING NO. 200 SIEVE	% PASSING 2 μ	UNIFIED SOIL CLASSIFICATION
———	GT-2 S-49 @ 96 - 97.4 FT. GT-2 S-50 @ 98 - 100 FT.	–	14	2	--

GRADATION TEST RESULTS - ASTM D422

PROJECT NO. 2966.1.1	SHANNON & WILSON, INC. LABORATORY TESTING 24-1-04114-001	LAB NO. 17-043

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9120 SW Pioneer Court, Suite B, Wilsonville, Oregon 97070 | ph: 503.682.1880 fax: 503.682.2753 | www.nwgeotech.com

TECHNICAL REPORT-RAW DATA

Report To: Ms. Aimee Holmes, P.E., C.E.G.
Shannon & Wilson, Inc.
3990 S.W. Collins Way, Suite 203
Lake Oswego, Oregon 97035

Date: 3/27/17

Lab No.: 17-043

Project: Laboratory Testing – 24-1-04114

Project No.: 2966.1.1

GT/GP-1 S-4 @ 6 – 8 ft., S-5 @ 8 – 8.9 ft., & S-6 @ 10 – 12 ft.

Sieve Analysis of Fine Aggregate			
Sieve Size	**Soil Diameter (mm)**	**Percent Retained**	**Total Percent Passed**
2 1/2"	63.5	0.00	100
2"	51	0.00	100
1 1/2"	37.5	0.00	100
1"	25	8.74	91
3/4"	19	13.71	86
1/2"	12.5	20.85	79
3/8"	9.5	30.11	70
1/4"	6.3	38.44	62
#4	4.75	43.71	56
#8	2.36	51.83	48
#10	2.00	53.29	47
#16	1.18	2.70	44
#30	0.60	7.13	40
#40	0.43	9.35	37
#50	0.30	12.25	34
#100	0.15	18.03	29
#200	0.075	24.36	22

Diameter of Soil Particle D(mm)	Soil in Suspension, P (%Soil Finer)
0.031204	15.4
0.020944	12.0
0.012671	9.0
0.009186	7.3
0.006613	6.0
0.003296	4.7
0.001421	3.0

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TECHNICAL REPORT-RAW DATA

Report To:	Ms. Aimee Holmes, P.E., C.E.G. Shannon & Wilson, Inc. 3990 S.W. Collins Way, Suite 203 Lake Oswego, Oregon 97035	**Date:**	3/27/17
		Lab No.:	17-043
Project:	Laboratory Testing – 24-1-04114	**Project No.:**	2966.1.1

GT/GP-1, S-10 @ 18 – 20 ft., S-11 @ 20 – 21.4 ft.

Sieve Analysis of Fine Aggregate			
Sieve Size	**Soil Diameter (mm)**	**Percent Retained**	**Total Percent Passed**
1 1/2"	**37.5**	**0.00**	**100**
1"	25	17.72	82
3/4"	19	29.14	71
1/2"	12.5	39.85	60
3/8"	9.5	45.87	54
1/4"	6.3	53.87	46
#4	4.75	58.72	41
#8	2.36	67.19	33
#10	2.00	68.88	31
#16	1.18	3.25	28
#30	0.60	7.92	23
#40	0.43	9.89	21
#50	0.30	12.06	19
#100	0.15	15.55	16
#200	0.075	18.30	13

Diameter of Soil Particle D(mm)	Soil in Suspension, P (%Soil Finer)
0.030957	10.9
0.020499	9.1
0.012260	7.6
0.008960	6.2
0.006456	5.3
0.003201	4.7
0.001406	2.6

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Report To:	Ms. Aimee Holmes, P.E., C.E.G. Shannon & Wilson, Inc. 3990 S.W. Collins Way, Suite 203 Lake Oswego, Oregon 97035	**Date:**	3/27/17
		Lab No.:	17-043
Project:	Laboratory Testing – 24-1-04114	**Project No.:**	2966.1.1

GT/GP-1 S-16 @ 30 – 32 ft.

Sieve Analysis of Fine Aggregate

Sieve Size	Soil Diameter (mm)	Percent Retained	Total Percent Passed
2 1/2"	63.5	0.00	100
2"	51	0.00	100
1 1/2"	37.5	0.00	100
1"	25	12.98	87
3/4"	19	32.55	67
1/2"	12.5	41.20	59
3/8"	9.5	47.22	53
1/4"	6.3	53.15	47
#4	4.75	57.15	43
#8	2.36	65.23	35
#10	2.00	66.79	33
#16	1.18	2.70	31
#30	0.60	6.71	27
#40	0.43	8.56	25
#50	0.30	11.27	22
#100	0.15	15.84	17
#200	0.075	18.79	14

Diameter of Soil Particle D(mm)	Soil in Suspension, P (%Soil Finer)
0.030349	11.9
0.020111	10.0
0.012200	7.8
0.008799	6.9
0.006341	5.9
0.003183	4.7
0.001381	3.1

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Report To:	Ms. Aimee Holmes, P.E., C.E.G. Shannon & Wilson, Inc. 3990 S.W. Collins Way, Suite 203 Lake Oswego, Oregon 97035	**Date:**	3/27/17
		Lab No.:	17-043
Project:	Laboratory Testing – 24-1-04114	**Project No.:**	2966.1.1

GT/GP-1, S-17 @ 32 – 34 ft., S-18 @ 34 – 36 ft.

Sieve Analysis of Fine Aggregate			
Sieve Size	**Soil Diameter (mm)**	**Percent Retained**	**Total Percent Passed**
1 1/2"	37.5	0.00	100
1"	25	7.81	92
3/4"	19	25.14	75
1/2"	12.5	40.45	60
3/8"	9.5	48.67	51
1/4"	6.3	59.88	40
#4	4.75	64.86	35
#8	2.36	75.23	25
#10	2.00	77.16	23
#16	1.18	2.84	20
#30	0.60	6.04	17
#40	0.43	7.26	16
#50	0.30	8.82	14
#100	0.15	11.21	12
#200	0.075	13.03	10
pan		13.24	10

Diameter of Soil Particle D(mm)	Soil in Suspension, P (%Soil Finer)
0.030708	8.1
0.020499	6.6
0.012344	5.3
0.009017	4.3
0.006495	3.6
0.003240	3.0
0.001398	2.1

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TECHNICAL REPORT-RAW DATA

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Shannon & Wilson, Inc.
3990 S.W. Collins Way, Suite 203
Lake Oswego, Oregon 97035

Date: 3/27/17

Lab No.: 17-043

Project: Laboratory Testing – 24-1-04114

Project No.: 2966.1.1

GT/GP-1 S-25 @ 48 – 50 ft., S-26 @ 50 – 52 ft. , S-27 @ 52 – 53.7 ft.

Sieve Analysis of Fine Aggregate			
Sieve Size	**Soil Diameter (mm)**	**Percent Retained**	**Total Percent Passed**
1 1/2"	37.5	0.00	100
1"	25	20.09	80
3/4"	19	37.99	62
1/2"	12.5	52.78	47
3/8"	9.5	60.51	39
1/4"	6.3	67.61	32
#4	4.75	72.29	28
#8	2.36	79.69	20
#10	2.00	81.05	19
#16	1.18	2.83	16
#30	0.60	5.68	13
#40	0.43	6.63	12
#50	0.30	7.78	11
#100	0.15	9.54	9
#200	0.075	10.93	8

Diameter of Soil Particle D(mm)	Soil in Suspension, P (%Soil Finer)
0.031204	6.3
0.020649	5.3
0.012509	4.0
0.009130	3.2
0.006574	2.6
0.003296	1.9
0.001414	1.4

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		Lab No.:	17-043
Project:	Laboratory Testing – 24-1-04114	**Project No.:**	2966.1.1

GT/GP-1 S-33 @ 64 – 66 ft., S-34 @ 66 – 68 ft., S-35 @ 69 – 70 ft.

Sieve Analysis of Fine Aggregate			
Sieve Size	**Soil Diameter (mm)**	**Percent Retained**	**Total Percent Passed**
1 1/2"	37.5	0.00	100
1"	25	27.58	72
3/4"	19	44.29	56
1/2"	12.5	57.89	42
3/8"	9.5	64.48	36
1/4"	6.3	71.15	29
#4	4.75	75.29	25
#8	2.36	83.14	17
#10	2.00	84.60	15
#16	1.18	3.19	12
#30	0.60	6.12	9
#40	0.43	7.14	8
#50	0.30	8.15	7
#100	0.15	9.56	6
#200	0.075	10.62	5

Diameter of Soil Particle D(mm)	Soil in Suspension, P (%Soil Finer)
0.033347	3.7
0.021948	2.9
0.013069	2.2
0.009461	1.7
0.006766	1.4
0.003348	0.8
0.001434	0.4

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		Lab No.:	17-043
Project:	Laboratory Testing – 24-1-04114	**Project No.:**	2966.1.1

GT/GP-1 S-36 @ 70 - 72 ft.

Sieve Analysis of Fine Aggregate			
Sieve Size	**Soil Diameter (mm)**	**Percent Retained**	**Total Percent Passed**
3/8"	9.5	0.00	100
1/4"	6.3	1.10	99
#4	4.75	1.93	98
#8	2.36	4.73	95
#10	2.00	5.41	95
#16	1.18	2.79	92
#30	0.60	10.02	85
#40	0.43	15.47	79
#50	0.30	24.61	70
#100	0.15	42.95	52
#200	0.075	54.73	40

Diameter of Soil Particle D(mm)	Soil in Suspension, P (%Soil Finer)
0.034923	33.1
0.022637	26.5
0.013456	18.2
0.009728	11.6
0.006916	9.9
0.003424	6.6
0.001452	5.0

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		Lab No.:	17-043
Project:	Laboratory Testing – 24-1-04114	**Project No.:**	2966.1.1

GT/GP-1 S-37A @ 72 – 72.7 ft.

Sieve Analysis of Fine Aggregate			
Sieve Size	**Soil Diameter (mm)**	**Percent Retained**	**Total Percent Passed**
#50	0.30	0.40	100
#100	0.15	0.84	99
#200	0.075	2.47	98

Diameter of Soil Particle D(mm)	Soil in Suspension, P (%Soil Finer)
0.028903	90.7
0.019421	76.6
0.011835	62.5
0.008669	52.4
0.006336	42.3
0.003220	30.2
0.001406	18.1

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Project:	Laboratory Testing – 24-1-04114	**Project No.:**	2966.1.1

GT/GP-1 S-39B @ 76.8 – 78 ft.

Sieve Analysis of Fine Aggregate			
Sieve Size	**Soil Diameter (mm)**	**Percent Retained**	**Total Percent Passed**
#30	0.60	0.27	100
#40	0.43	0.68	99
#50	0.30	3.57	96
#100	0.15	30.40	69
#200	0.075	64.07	36

Diameter of Soil Particle D(mm)	Soil in Suspension, P (%Soil Finer)
0.034297	19.1
0.022372	14.5
0.013298	10.0
0.009509	8.2
0.006798	6.4
0.003348	5.5
0.001434	2.7

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Project No.: 2966.1.1

GT/GP-1 S-43 @ 84 – 86 ft., S-44 @ 86 – 86.9 ft.

Sieve Analysis of Fine Aggregate			
Sieve Size	**Soil Diameter (mm)**	**Percent Retained**	**Total Percent Passed**
1 1/2"	37.5	0.00	100
1"	25	16.56	83
3/4"	19	21.36	79
1/2"	12.5	32.29	68
3/8"	9.5	37.32	63
1/4"	6.3	44.14	56
#4	4.75	48.44	52
#8	2.36	58.19	42
#10	2.00	60.50	40
#16	1.18	5.28	34
#30	0.60	11.54	28
#40	0.43	13.74	26
#50	0.30	16.17	23
#100	0.15	20.54	19
#200	0.075	24.90	15

Diameter of Soil Particle D(mm)	Soil in Suspension, P (%Soil Finer)
0.033116	10.0
0.021948	7.5
0.013148	5.4
0.009515	3.9
0.006804	3.2
0.003348	2.2
0.001434	1.1

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Project:	Laboratory Testing – 24-1-04114	**Project No.:**	2966.1.1

GT/GP-1 S-48 @ 94 – 96 ft.

Sieve Analysis of Fine Aggregate

Sieve Size	Soil Diameter (mm)	Percent Retained	Total Percent Passed
#10	2.00	0.45	100
#16	1.18	0.59	99
#30	0.60	2.34	97
#40	0.43	3.48	96
#50	0.30	6.76	93
#100	0.15	62.54	37
#200	0.075	86.51	13

Diameter of Soil Particle D(mm)	Soil in Suspension, P (%Soil Finer)
0.037058	8.9
0.023828	6.3
0.013831	5.4
0.009832	4.5
0.006989	3.6
0.003402	2.7
0.001449	0.9

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Project No.: 2966.1.1

GT/GP-1 S-54 @ 106 – 108 ft.

Sieve Analysis of Fine Aggregate			
Sieve Size	**Soil Diameter (mm)**	**Percent Retained**	**Total Percent Passed**
1/4"	6.3	0.43	100
#4	4.75	0.53	99
#8	2.36	0.75	99
#10	2.00	0.78	99
#16	1.18	0.16	99
#30	0.60	0.34	99
#40	0.43	0.70	99
#50	0.30	5.15	94
#100	0.15	48.42	51
#200	0.075	75.65	24

Diameter of Soil Particle D(mm)	Soil in Suspension, P (%Soil Finer)
0.035161	15.3
0.022771	11.7
0.013448	8.1
0.009614	6.3
0.006871	4.5
0.003384	3.6
0.001442	1.8

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		Lab No.:	17-043
Project:	Laboratory Testing – 24-1-04114	**Project No.:**	2966.1.1

GT-2 S-2 @ 2 – 4 ft., S-3 @ 4 – 6 ft.

Sieve Analysis of Fine Aggregate			
Sieve Size	**Soil Diameter (mm)**	**Percent Retained**	**Total Percent Passed**
1 1/2"	37.5	0.00	100
1"	25	19.88	80
3/4"	19	31.97	68
1/2"	12.5	44.73	55
3/8"	9.5	50.59	49
1/4"	6.3	56.20	44
#4	4.75	59.91	40
#8	2.36	67.67	32
#10	2.00	69.43	31
#16	1.18	2.84	28
#30	0.60	6.31	24
#40	0.43	7.69	23
#50	0.30	9.56	21
#100	0.15	12.33	18
#200	0.075	14.33	16

Diameter of Soil Particle D(mm)	Soil in Suspension, P (%Soil Finer)
0.028302	12.8
0.018879	11.1
0.011611	8.9
0.008451	7.8
0.006100	7.0
0.003126	5.0
0.001358	3.6

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Lab No.: 17-043

Project: Laboratory Testing – 24-1-04114

Project No.: 2966.1.1

GT-2 S-7 @ 12 – 14 ft., S-8 @ 14 – 16 ft.

Sieve Analysis of Fine Aggregate			
Sieve Size	**Soil Diameter (mm)**	**Percent Retained**	**Total Percent Passed**
1 1/2"	37.5	0.00	100
1"	25	13.50	86
3/4"	19	25.35	75
1/2"	12.5	33.69	66
3/8"	9.5	43.15	57
1/4"	6.3	50.91	49
#4	4.75	55.67	44
#8	2.36	65.30	35
#10	2.00	67.40	33
#16	1.18	3.39	29
#30	0.60	8.93	24
#40	0.43	11.52	21
#50	0.30	14.57	18
#100	0.15	18.76	14
#200	0.075	21.33	11

Diameter of Soil Particle D(mm)	Soil in Suspension, P (%Soil Finer)
0.032649	9.2
0.021091	8.2
0.012671	6.4
0.009130	5.5
0.006535	4.9
0.003239	3.7
0.001396	2.4

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		Lab No.:	17-043
Project:	Laboratory Testing – 24-1-04114	**Project No.:**	2966.1.1

GT-2 S-12 @ 22 – 24 ft.

Sieve Analysis of Fine Aggregate			
Sieve Size	**Soil Diameter (mm)**	**Percent Retained**	**Total Percent Passed**
3/4"	19	0.00	100
1/2"	12.5	2.33	98
3/8"	9.5	4.29	96
1/4"	6.3	8.67	91
#4	4.75	12.86	87
#8	2.36	29.46	71
#10	2.00	34.84	65
#16	1.18	8.07	57
#30	0.60	17.43	48
#40	0.43	21.30	44
#50	0.30	27.01	38
#100	0.15	36.10	29
#200	0.075	41.28	24

Diameter of Soil Particle D(mm)	Soil in Suspension, P (%Soil Finer)
0.032267	18.3
0.021130	15.3
0.012523	12.8
0.009023	11.0
0.006497	9.2
0.003257	6.7
0.001396	4.9

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Lab No.: 17-043

Project: Laboratory Testing – 24-1-04114

Project No.: 2966.1.1

GT-2 S-15 @ 28 – 30 ft.

Sieve Analysis of Fine Aggregate			
Sieve Size	**Soil Diameter (mm)**	**Percent Retained**	**Total Percent Passed**
1 1/2"	37.5	0.00	100
1"	25	10.90	89
3/4"	19	16.07	84
1/2"	12.5	23.28	77
3/8"	9.5	28.49	72
1/4"	6.3	37.93	62
#4	4.75	42.13	58
#8	2.36	51.97	48
#10	2.00	53.94	46
#16	1.18	1.74	44
#30	0.60	4.36	42
#40	0.43	6.13	40
#50	0.30	8.94	37
#100	0.15	14.08	32
#200	0.075	18.31	28

Diameter of Soil Particle D(mm)	Soil in Suspension, P (%Soil Finer)
0.026380	23.1
0.017731	20.5
0.010900	17.4
0.008025	15.3
0.005848	13.5
0.003008	10.5
0.001318	7.9

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Project:	Laboratory Testing – 24-1-04114	**Project No.:**	2966.1.1

GT-2 S-25 @ 48 – 50 ft., S-26 @ 50 – 52 ft.

Sieve Analysis of Fine Aggregate			
Sieve Size	**Soil Diameter (mm)**	**Percent Retained**	**Total Percent Passed**
1 1/2"	37.5	0.00	100
1"	25	7.44	93
3/4"	19	19.64	80
1/2"	12.5	32.25	68
3/8"	9.5	42.51	57
1/4"	6.3	57.60	42
#4	4.75	63.95	36
#8	2.36	73.99	26
#10	2.00	75.87	24
#16	1.18	1.90	22
#30	0.60	4.22	20
#40	0.43	5.15	19
#50	0.30	6.49	18
#100	0.15	8.70	15
#200	0.075	10.52	14

Diameter of Soil Particle D(mm)	Soil in Suspension, P (%Soil Finer)
0.028035	10.3
0.018879	8.8
0.011611	7.0
0.008510	5.9
0.006181	5.0
0.003145	3.7
0.001373	2.4

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3990 S.W. Collins Way, Suite 203
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Lab No.: 17-043

Project: Laboratory Testing – 24-1-04114

Project No.: 2966.1.1

GT-2 S-28 @ 54 – 56 ft., S-29 @ 56 – 58 ft.

Sieve Analysis of Fine Aggregate			
Sieve Size	**Soil Diameter (mm)**	**Percent Retained**	**Total Percent Passed**
1 1/2"	37.5	0.00	100
1"	25	6.89	93
3/4"	19	16.66	83
1/2"	12.5	31.74	68
3/8"	9.5	40.69	59
1/4"	6.3	50.53	49
#4	4.75	55.77	44
#8	2.36	64.78	35
#10	2.00	66.56	33
#16	1.18	3.49	30
#30	0.60	6.89	27
#40	0.43	8.25	25
#50	0.30	10.29	23
#100	0.15	14.07	19
#200	0.075	17.32	16

Diameter of Soil Particle D(mm)	Soil in Suspension, P (%Soil Finer)
0.030457	12.1
0.020197	10.3
0.012260	8.1
0.008903	6.8
0.006416	5.9
0.003202	4.4
0.001381	3.1

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Project: Laboratory Testing – 24-1-04114

Project No.: 2966.1.1

GT-2 S-34 @ 66 – 68 ft., S-35 @ 68 – 70 ft.

Sieve Analysis of Fine Aggregate			
Sieve Size	**Soil Diameter (mm)**	**Percent Retained**	**Total Percent Passed**
1 1/2"	37.5	0.00	100
1"	25	13.65	86
3/4"	19	20.16	80
1/2"	12.5	33.17	67
3/8"	9.5	40.32	60
1/4"	6.3	48.70	51
#4	4.75	54.67	45
#8	2.36	66.67	33
#10	2.00	69.06	31
#16	1.18	5.42	26
#30	0.60	11.25	20
#40	0.43	13.17	18
#50	0.30	15.14	16
#100	0.15	17.94	13
#200	0.075	20.14	11

Diameter of Soil Particle D(mm)	Soil in Suspension, P (%Soil Finer)
0.032649	8.4
0.021380	7.0
0.012912	5.0
0.009297	4.2
0.006690	3.4
0.003312	2.2
0.001419	1.4

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A Division of Northwest Geotech, Inc.
9120 SW Pioneer Court, Suite B, Wilsonville, Oregon 97070 | ph: 503.682.1880 fax: 503.682.2753 | www.nwgeotech.com

TECHNICAL REPORT-RAW DATA

Report To: Ms. Aimee Holmes, P.E., C.E.G.
Shannon & Wilson, Inc.
3990 S.W. Collins Way, Suite 203
Lake Oswego, Oregon 97035

Date: 3/27/17

Lab No.: 17-043

Project: Laboratory Testing – 24-1-04114

Project No.: 2966.1.1

GT-2 S-40 @ 78 – 80 ft.

Sieve Analysis of Fine Aggregate			
Sieve Size	**Soil Diameter (mm)**	**Percent Retained**	**Total Percent Passed**
#10	2.00	0.16	100
#16	1.18	0.48	99
#30	0.60	0.81	99
#40	0.43	0.89	99
#50	0.30	1.01	99
#100	0.15	6.95	93
#200	0.075	41.27	59

Diameter of Soil Particle D(mm)	Soil in Suspension, P (%Soil Finer)
0.033634	21.4
0.022506	13.4
0.013373	8.9
0.009562	7.1
0.006835	5.3
0.003366	4.5
0.001427	3.6

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Date: 3/27/17

Lab No.: 17-043

Project: Laboratory Testing – 24-1-04114

Project No.: 2966.1.1

GT-2 S-43 @ 84 – 86 ft.

Sieve Analysis of Fine Aggregate			
Sieve Size	**Soil Diameter (mm)**	**Percent Retained**	**Total Percent Passed**
2 1/2"	63.5	0.00	100
2"	51	0.00	100
1 1/2"	37.5	0.00	100
1"	25	0.00	100
3/4"	19	0.00	100
1/2"	12.5	0.00	100
3/8"	9.5	1.41	99
1/4"	6.3	1.41	99
#4	4.75	1.41	99
#8	2.36	1.61	98
#10	2.00	1.71	98
#16	1.18	0.31	98
#30	0.60	0.56	98
#40	0.43	0.63	98
#50	0.30	0.73	98
#100	0.15	20.86	77
#200	0.075	64.32	34

Diameter of Soil Particle D(mm)	Soil in Suspension, P (%Soil Finer)
0.035792	14.2
0.023306	9.8
0.013757	6.2
0.009780	5.3
0.006953	4.4
0.003402	2.7
0.001442	1.8

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TECHNICAL REPORT-RAW DATA

Report To:	Ms. Aimee Holmes, P.E., C.E.G. Shannon & Wilson, Inc. 3990 S.W. Collins Way, Suite 203 Lake Oswego, Oregon 97035	**Date:**	3/27/17
		Lab No.:	17-043
Project:	Laboratory Testing – 24-1-04114	**Project No.:**	2966.1.1

GT-2 S-46A @ 90 – 91.8 ft.

Sieve Analysis of Fine Aggregate			
Sieve Size	**Soil Diameter (mm)**	**Percent Retained**	**Total Percent Passed**
#10	2.00	0.40	100
#16	1.18	0.25	99
#30	0.60	0.47	99
#40	0.43	0.55	99
#50	0.30	0.79	99
#100	0.15	3.59	96
#200	0.075	24.29	75

Diameter of Soil Particle D(mm)	Soil in Suspension, P (%Soil Finer)
0.031082	31.1
0.021691	18.6
0.013147	11.5
0.009456	8.9
0.006724	8.0
0.003348	5.3
0.001427	3.6

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Lake Oswego, Oregon 97035

Date: 3/27/17

Lab No.: 17-043

Project: Laboratory Testing – 24-1-04114

Project No.: 2966.1.1

GT-2 S-49 @ 96 – 97.4 ft., S-50 @ 98 – 100 ft.

Sieve Analysis of Fine Aggregate			
Sieve Size	**Soil Diameter (mm)**	**Percent Retained**	**Total Percent Passed**
1 1/2"	37.5	0.00	100
1"	25	4.23	96
3/4"	19	12.06	88
1/2"	12.5	24.38	76
3/8"	9.5	30.87	69
1/4"	6.3	40.30	60
#4	4.75	45.53	54
#8	2.36	57.39	43
#10	2.00	59.82	40
#16	1.18	4.99	35
#30	0.60	10.27	30
#40	0.43	12.28	28
#50	0.30	15.68	24
#100	0.15	21.99	18
#200	0.075	25.96	14

Diameter of Soil Particle D(mm)	Soil in Suspension, P (%Soil Finer)
0.032649	10.7
0.021380	8.9
0.012991	6.1
0.009352	5.0
0.006728	3.9
0.003330	2.5
0.001419	1.8

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APPENDIX C CROSSHOLE SONIC LOGGING RESULTS

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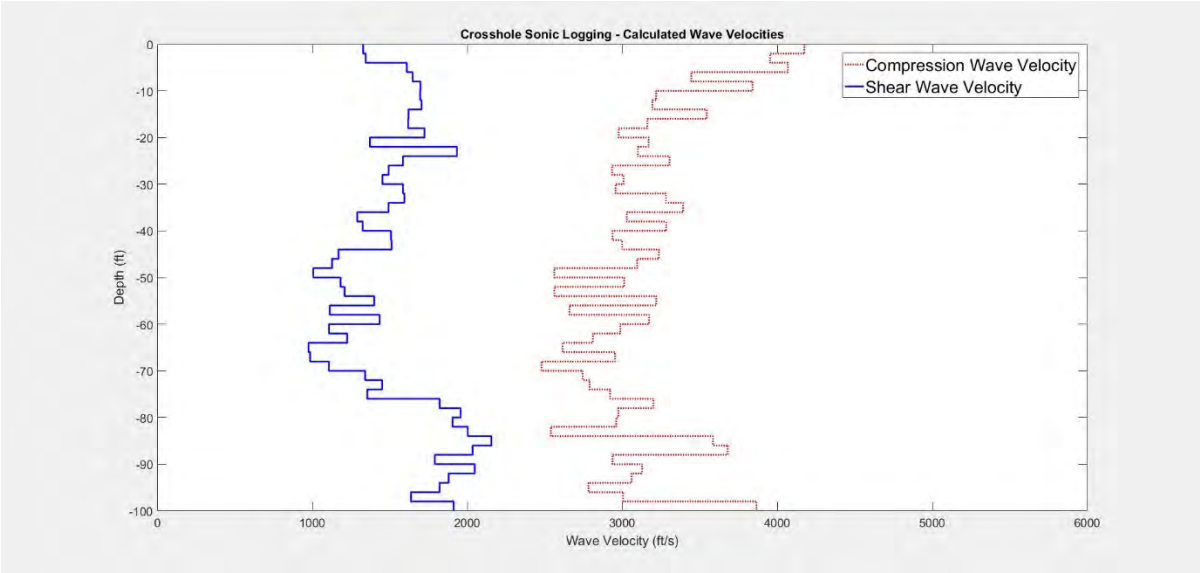
Depth (ft.)	Average Compression Wave Velocity (ft/sec.)	Average Shear Wave Velocity (ft./sec.)
2	4,175	1,329
4	3,954	1,345
6	4,068	1,610
8	3,445	1,647
10	3,840	1,698
12	3,219	1,696
14	3,195	1,705
16	3,544	1,621
18	3,162	1,618
20	2,976	1,724
22	3,170	1,372
24	3,101	1,933
26	3,305	1,586
28	2,935	1,493
30	3,009	1,453
32	2,957	1,586
34	3,282	1,595
36	3,393	1,492
38	3,029	1,290
40	3,283	1,325
42	2,938	1,508
44	2,999	1,512
46	3,237	1,170
48	3,096	1,128
50	2,562	1,006

Depth (ft.)	Average Compression Wave Velocity (ft/sec.)	Average Shear Wave Velocity (ft./sec.)
52	3,012	1,183
54	2,563	1,208
56	3,220	1,400
58	2,659	1,113
60	3,173	1,435
62	2,988	1,108
64	2,812	1,225
66	2,615	976
68	2,953	986
70	2,479	1,107
72	2,744	1,342
74	2,789	1,450
76	2,977	1,644
78	2,950	2,180
80	3,475	2,134
82	3,190	1,872
84	2,815	1,986
86	3,238	2,176
88	2,883	2,187
90	2,828	1,466
92	3,378	1,690
94	3,205	1,808
96	2,507	1,839
98	3,144	1,755
100	4,052	1,586


Crosshole Sonic Logging - Calculated Wave Velocities
Compression Wave Velocity
Shear Wave Velocity
Depth (ft)
Wave Velocity (ft/s)
0
-10
-20
-30
-40
-50
-60
-70
-80
-90
-100
0
1000
2000
3000
4000
5000
6000

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APPENDIX D PARALLEL SEISMIC RESULTS

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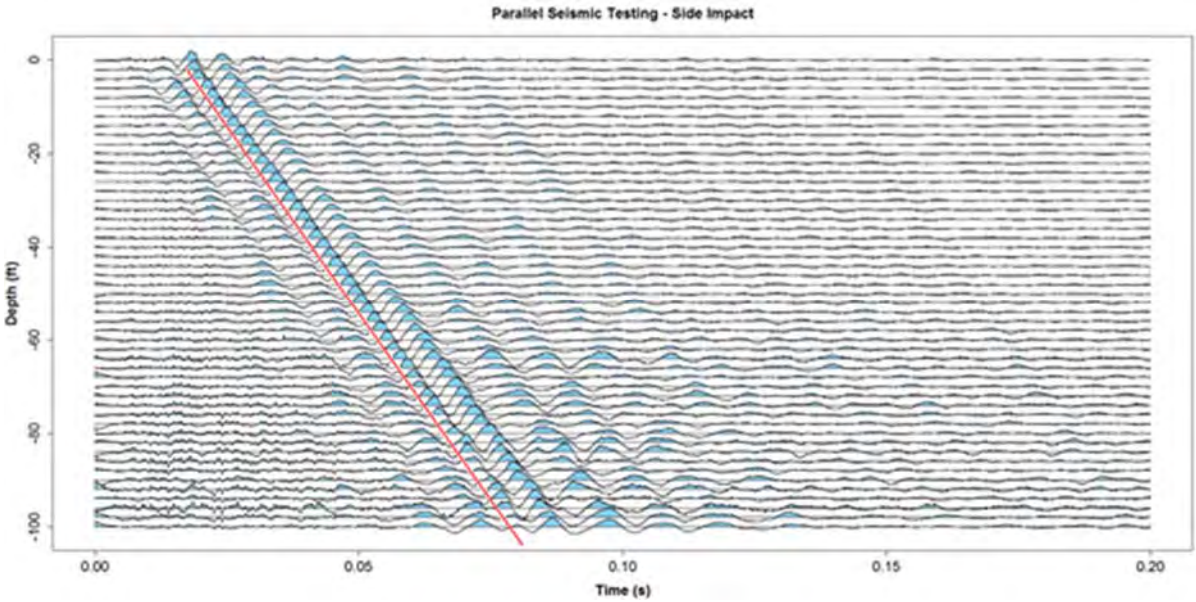

Figure D-1 Results of Parallel Seismic Testing – Side Impact

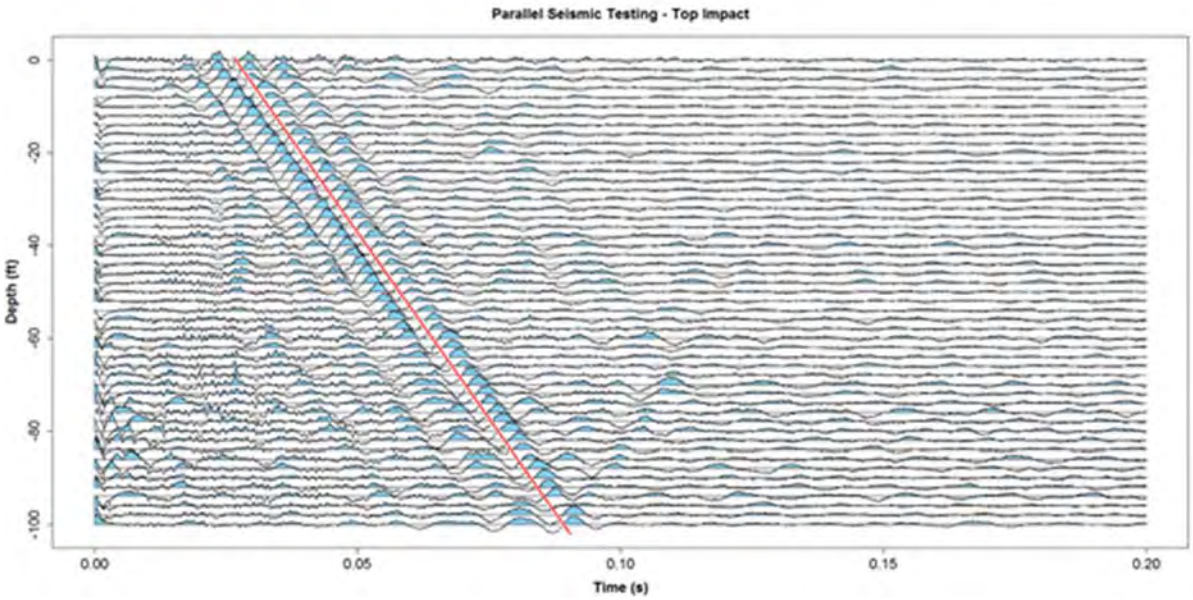

Figure D-2 Results of Parallel Seismic Testing – Top Impact

Figures D-1 and D-2 present the vibration data gathered during Parallel Seismic (PS) Testing with the individual signals being stacked for analysis. The signals are plotted at the depth at which they were gathered during the incremental lowering of the hydrophone down the borehole during data collection. Figure D-1 presents data gathered when the bridge foundation was struck from the side, while Figure D-2 presents data gathered when the bridge foundation was struck from the top. The shaded blue peaks indicate regions of significant amplitude at a given time when the vibration energy generated by the impact at the foundation arrived at the hydrophone in the parallel borehole. Typical PS results will yield

a sharp change in the slope of these arrival peaks at the depth at which the hydrophone has passed the pile tip. As illustrated in Figures D-1 and D-2 by the red line, only a single linear slope was identified in the data, leading to the conclusion that the hydrophone did not pass the pile tip before reaching the bottom of the provided borehole.

SUBMITTED TO:
United States Department of
The Army Corps of Engineers,
Portland District
333 SW First Avenue
Portland, OR 97204

BY:
Shannon & Wilson, Inc.
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GEOTECHNICAL DATA REPORT

Bonneville BN1 Old NL Bridge Geotechnical Explorations

MULTNOMAH COUNTY, OREGON

January 2021

Shannon & Wilson No: 105960

SHANNON & WILSON

A15-1

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Submitted To: United States Department of The Army Corps of Engineers, Portland District
333 SW First Avenue
Portland, OR 97204
Attn: Mr. Michael Karl

Subject: GEOTECHNICAL DATA REPORT, BONNEVILLE BN1 OLD NL BRIDGE GEOTECHNICAL EXPLORATIONS, MULTNOMAH COUNTY, OREGON

Shannon & Wilson prepared this report and participated in this project as a subconsultant to United States Department of The Army Corps of Engineers (USACE), Portland District. Our scope of services was specified in Task Order Number W9127N20F0080 under IDIQ contract W9127EF18D0001 with the USACE, dated September 28, 2020. This report presents the results of our geotechnical field explorations and was prepared by the undersigned.

We appreciate the opportunity to be of service to you on this project. If you have questions concerning this report, or we may be of further service, please contact us.

Sincerely,

SHANNON & WILSON, INC.

REGISTERED PROFESSIONAL ENGINEER
19263PE
OREGON
JULY 15, 1997
TRAVIS T. NGUYEN
EXPIRES: 12/31/2022

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TTN:HLE:RPP/aeh:srs

EXECUTIVE SUMMARY

This Geotechnical Data Report (GDR) presents the results of our field explorations, laboratory testing, and geophysical surveys for the proposed north abutment of the swing bridge at the original navigation lock (Navlock 1) at the Bonneville Lock and Dam facilities.

The subsurface explorations consisted of four (4) mandatory geotechnical borings, two (2) optional geotechnical borings, geophysical surveys, and two (2) infiltration tests. The mandatory geotechnical borings were designated by USACE as DH-20-1 through DH-20-4 and optional borings were designated as DH-20-3(A), and DH-20-4(A). The mandatory borings were planned to encounter the top of bedrock or a maximum depth of approximately 30 feet below ground surface (bgs). The borings were advanced to depths ranging between 6.5 and 20.6 feet below ground surface (bgs). Hollow stem auger drilling refusal was encountered in borings DH-20-1 at 20.5 feet, in DH-20-2 at 18.5 feet, in DH-20-3 at 5 feet, and in DH-20-4 at 10 feet. The optional borings, designated HD-20-3(A) and HD-20-4(A), encountered hollow stem drilling refusal at 7.5 and 19.8 feet bgs, respectively. A Standard Penetration Test (SPT) was performed at hollow stem auger drilling refusal in each boring. A summary of completed borings is shown in Exhibit A.

Exhibit A: Summary of Completed Borings

Boring Designation	Explored Depth[1] (ft.)
HD-20-1	20.6
HD-20-2	18.6
HD-20-3	6.5
HD-20-3(A)	9.0
HD-20-4	11.5
HD-20-4(A)	19.9

NOTE:
[1] Hollow stem auger refusal was at or near the explored depth.

Resistivity surveys were performed on November 4, 2020. The survey comprised two multiple electrode arrays. The arrays were 200 and 150 feet long for Line 1 and Line 2, respectively. Seismic refraction surveys were performed on November 5, 2020. This method was implemented in conjunction with resistivity to aid in subsurface interpretation and comprised two refraction arrays that are superimposed with the resistivity arrays. The arrays were 170 and 150 feet long for Line 1 and Line 2, respectively. Global Geophysics LLC, out of Redmond, Washington, performed the resistivity and seismic refraction surveys.

Infiltration test DI-20-1 was performed at an approximate depth of 3 feet bgs on November 16, 2020. Infiltration test DI-20-3 was performed at an approximate depth of 4 feet bgs on November 17, 2020. Hollow stem auger drilling refusal was encountered at several locations in the vicinity of the planned DI-20-2 at an approximate depth of 1 foot bgs due to an obstruction of a concrete slab or debris. USACE Portland District approved not to perform an infiltration test at DI-20-2.

Two particle size analyses with hydrometer tests were performed on combined samples from borings DH-20-3 and DH-20-3(A), and DH-20-4 and DH-20-4(A).

CONTENTS

1 Introduction 1
1.1 Project Description and Location 1
1.2 Project Background 1
1.3 Scope of Services 2
2 Regional Geology and Seismic Setting 2
2.1 Regional Geology 2
2.2 Seismic Setting 4
2.2.1 Cascadia Subduction Zone: Mega-Thrust Interface Source 4
2.2.2 Cascadia Subduction Zone: Intraslab Source 5
2.2.3 Shallow Crustal Source 5
2.2.4 Local Quaternary Faults and Folds 5
3 Subsurface Explorations and Laboratory Testing 6
3.1 Borings 6
3.2 Electrical Resistivity Tomography 7
3.3 Seismic Refraction 8
3.4 In-Situ Infiltration Testing 8
3.5 Laboratory Testing 9
4 Subsurface Conditions 9
4.1 Subsurface Conditions 9
4.2 Groundwater 10
5 Limitations 10
6 References 11

Exhibits

Exhibit A: Summary of Completed Borings ii
Exhibit 2-1: USGS Class A Faults Within an Approximate 30-mile Radius of Project Site 6
Exhibit 3-1: Summary of Completed Borings 7

Figures

Figure 1: Vicinity Map
Figure 2: Site and Exploration Plan
Figure 3: Subsurface Profile A-A′

CONTENTS

Appendices

Appendix A: Subsurface Explorations
Appendix B: Laboratory Testing Results
Appendix C: Geophysical Surveys
Important Information

ACRONYMS

Acronyms

ASTM	American Society for Testing and Materials
SPT	Standard Penetration Test
GDR	Geotechnical Data Report
USACE	U.S. Army Corps of Engineers

1 INTRODUCTION

1.1 Project Description and Location

This Geotechnical Data Report (GDR) presents the results of our field explorations, laboratory testing, and geophysical surveys for the proposed north abutment of the swing bridge at the original navigation lock (Navlock 1) at the Bonneville Lock and Dam facilities. The Bonneville Lock and Dam is a large multipurpose federal dam on the Columbia River at Columbia River Mile 146.1, located in Multnomah County, Oregon, and Skamania County, Washington. The location of the project site is shown on the Vicinity Map, Figure 1.

USACE, Portland District plans to replace the existing swing bridge at Navlock 1. The project area is located on the north side and downstream of the original navigation lock (Navlock 1) as shown on Site and Exploration Plan, Figure 2.

1.2 Project Background

Bonneville Lock and Dam (L&D) is located 145 river miles from the mouth of the Columbia River, and about 40 miles east of Portland, Oregon, near the town of Cascade Locks, Oregon. Bonneville L&D is a run-of-river project, consisting of a gated spillway, two powerhouses, and two navigation locks. The original navigation lock (Navlock 1) was constructed in 1935, but has not been in use since the commissioning of the newer second navigation lock (Navlock 2). The Navlock 1 bridge currently has one main span that was designed to swing and three fixed approach spans with a total length of approximately 248 feet. The Navlock 1 swing bridge remained in operation until the new Navlock 2 was put into service in 1993. Although it no longer functions as a swing bridge, the Navlock 1 bridge connects the north and south of Navlock 1 channel, provides access for workers to Powerhouse 1 (PH1), and provides public access to the visitor center. The bridge was reevaluated as part of a Major Maintenance Report and found to be seismically deficient. A subsequent Alternatives Analysis Report further recommended the bridge be completely replaced to ensure that the substructure and superstructure are designed to current seismic standards rather than partially rehabilitated. Portland District is currently finalizing a Design Documentation Report (DDR) for a replacement bridge that meets current State and Federal seismic standards. A previous geotechnical exploration program completed by Shannon & Wilson in 2017 characterized the foundation materials at the proposed new bridge's south abutment.

The purpose of the current field explorations is to characterize the subsurface at the proposed bridge's north abutment and to assist with foundation design for the proposed

new Navlock 1 channel bridge. The current geotechnical exploration program was developed to confirm subsurface rock contours, and the extent and conditions of the various materials that exist, as well as characterize the permeability of the existing fill to inform stormwater design. The north abutment area is known to consist of relatively shallow, massive, intrusive igneous rock (dacite) overlain by man-made fill.

1.3 Scope of Services

The scope of our services was in general accordance with Contract No. W912EF18D0001, Task Order W9127N20F0080, dated September 28, 2020. The following scope of services describes the required tasks to complete the field explorations and lab testing for the Bonneville BN1 Old NL Bridge Subsurface Explorations project:

- Review pertinent, available, and existing information provided by the USACE regarding the project area;
- Perform a site visit to assist in developing a plan to perform the exploration drilling and instrumentation;
- Prepare a Field Exploration and Safety Plan and submit to the USACE for approval;
- Plan and coordinate field explorations with the USACE;
- Perform geotechnical soil borings and geophysical surveys;
- Complete geotechnical laboratory testing;
- Summarize the results of the field and laboratory investigations in a draft Geotechnical Data Report and submit to the USACE for review and comment;
- Address comments by the USACE and submit a final Geotechnical Data Report.

2 REGIONAL GEOLOGY AND SEISMIC SETTING

2.1 Regional Geology

Bonneville Dam is located in the Columbia River Gorge, approximately 145 miles upstream from the mouth of the Columbia River. Geologic mapping of the area, compiled by Korosec (1987), show three primary bedrock units in the vicinity of the project site. The oldest near-surface unit is the early Miocene (about 23- to 17-million-year-old) Eagle Creek Formation, which consists of stream-deposited sandstone, conglomerate, and semi-consolidated debris flows and tuff breccias derived from scattered volcanic centers in the Cascade Range (Beaulieu, 1977). The Eagle Creek Formation is exposed in the core of the Cascade Range along the Columbia River. The formation is locally overlain by the middle to late Miocene Columbia River Basalt Group (CRBG). The CRBG is a series of basaltic lava flows that

originated near the Oregon-Idaho border and inundated the project area between about 17 and 6 million years ago. Rocks of the CRBG make up most of the steep basaltic cliffs visible throughout the Columbia River Gorge. The third bedrock unit in the project area is a basaltic intrusion, also of Miocene age, that crosscuts the Eagle Creek Formation and may or may not be younger than the CRBG (Korosec, 1987). The intrusive basalt makes up the pronounced, rocky, topographic high that is roughly 150 to 200 feet southeast of the project site.

After emplacement of the CRBG lava flows, the Columbia River began to cut down through the basalt. Throughout the Pleistocene and Holocene, within the last 2.6 million years, the Columbia River Gorge was intermittently plugged by local lava flows and landslides. Significant landslides in the vicinity of the project area likely began to occur when down-cutting of the Columbia River exposed the Eagle Creek Formation and underlying sedimentary rock units. During the late stages of the last great ice age, between about 18,000 and 15,000 years ago, a series of glacial outburst floods that originated in western Montana repeatedly washed across the Idaho panhandle, through eastern Washington's scablands, and through the Columbia River Gorge (Allen and others, 2009). These repeated floods are collectively referred to as the Missoula Floods and likely accelerated widening of the Gorge and steepening of its walls. The steepening of the canyon walls resulted in numerous, large-scale landslides, where the Eagle Creek Formation failed under the overlying CRBG (Beaulieu, 1977). In the Bonneville area, the surface of the Eagle Creek Formation dips gently to the south. However, the Gorge wall geometry and properties of the Eagle Creek Formation were such that landslides initiated on both the north and south sides of the river.

The last major episode of sliding near the modern-day Bonneville Dam site occurred around 700 years ago. The slides dammed the river such that water was still impounded behind them at the time of the Lewis and Clark expedition in the early 1800s. Based on available mapping (Korosec, 1987), previous borings on site, and discussions with the USACE, it has been determined that landslide deposits are not present beneath the project site, on the north side of Robbins Island. The nearest mapped landslide deposits, according to Korosec (1987), are south and east of the topographic high created by the basaltic intrusion.

Geologic mapping of the project site indicates the upper 110 feet is dominated by alluvial deposits from the Columbia River and fill material placed during development of the site. Grain size distributions of the alluvial sediments at the site were heavily influenced by the presence of the basaltic intrusion and likely by upstream landslides, with deposits ranging from clays and sands to cobble-rich gravels.

2.2 Seismic Setting

Earthquakes in the Pacific Northwest occur largely as a result of the region's close proximity to an active convergent plate boundary. At this boundary, dense oceanic crust is subducting beneath less dense continental crust. At this subduction plate boundary, known as the Cascadia Subduction Zone (CSZ), the Explorer, Juan de Fuca, and Gorda Oceanic Plates are subducting beneath the overriding, westward-moving North American Plate. Oblique convergence of these plates not only results in east-west compressive strain, but also results in dextral (right lateral) shear, clockwise rotation, and north-south compression of accreted crustal blocks that form the leading edge of the North American Plate (Wells and others, 1998). The CSZ extends about 750 miles from northern California to southern British Columbia and lies approximately 170 miles west of the project site. Within the present understanding of the regional tectonic framework and historical seismicity, three broad seismogenic sources have been identified. These include the following:

- A mega-thrust source at the interface between the North American and Juan de Fuca plates in the CSZ;
- A deep intraslab source in the subducted Juan de Fuca Plate, within the CSZ; and
- A shallow crustal source within the North American Plate.

The following sections briefly describe the location, characteristics, and seismicity of each of the sources.

2.2.1 Cascadia Subduction Zone: Mega-Thrust Interface Source

CSZ mega-thrust earthquakes originate along the interface between the subducting oceanic plates and the North American plate. Because of the significant uncertainty of the landward extent of a potential rupture surface, estimates of the closest distance between the project and potential rupture surface range from about 100 to 170 horizontal miles. Focal depths for mega-thrust earthquakes are commonly on the order of about 15 to 25 miles. Rupture of the interface could result in earthquakes with moment magnitudes on the order of 8.5 to over 9.0, with strong shaking that lasts for several minutes. No large earthquakes have occurred in this zone during historic times (the last 170 years). However, geologic evidence suggests that coastal estuaries have experienced rapid subsidence at various times within the last 2,000 years (e.g., Atwater, 1987; Atwater and Hemphill-Haley, 1997) as a result of tectonic movement associated with mega-thrust earthquakes on the CSZ. It appears that ruptures of this zone have occurred at irregular intervals that span from about 100 to more than 1,200 years, with an average recurrence interval of about 300 to 500 years (Atwater and Hemphill-Haley, 1997). Based on historical tsunami records in Japan (Satake and others, 1996) the most recent interplate event on the CSZ was a moment magnitude (M_w) 9 event on January 26, 1700.

2.2.2 Cascadia Subduction Zone: Intraslab Source

CSZ intraslab earthquakes originate from within the subducting oceanic plates as a result of down-dip tensional forces and bending caused by mineralogical and density changes in the plates at depth. These earthquakes typically occur 28 to 37 miles beneath the surface. Ludwin and others (1991) estimate that the maximum M_w from this source zone would be about 7.5. Ground shaking produced by intraplate earthquakes would generally be less intense and less prolonged in the project area than ground motions generated by large subduction zone interface earthquake events. Historic seismicity from this source zone includes the 1949 M_w 6.7 Olympia earthquake, the 1965 M_w 6.7 earthquake between Tacoma and Seattle, and the 2001 M_w 6.8 Nisqually earthquake. While intraslab events have occurred frequently in the Puget Sound area, they are historically rare in Oregon.

2.2.3 Shallow Crustal Source

Shallow crustal earthquakes within the North American Plate have historically occurred in a diffuse pattern within Pacific Northwest, typically within the upper 4 to 19 miles of the continental crust. The largest known crustal earthquake in the Pacific Northwest is the 1872 North Cascades earthquake at approximate M_w 6.5 to 7.0. Other examples include the 1993 M_w 5.6 Scotts Mill earthquake and the 1993 M_w 6.0 Klamath Falls earthquake.

2.2.4 Local Quaternary Faults and Folds

Quaternary faults and folds throughout Oregon and Washington have been located and characterized by the United States Geological Survey (USGS). The USGS provides approximate fault locations and a detailed summary of available fault information in the USGS Quaternary Fault and Fold Database. The database defines four categories of faults, Class A through D, based on evidence of tectonic movement known or presumed to be associated with large earthquakes during Quaternary time (within the last 2.6 million years). For Class A faults, geologic evidence indicates that a tectonic fault exists and that it has likely been active within the Quaternary period. For Class B faults, there is equivocal geologic evidence of Quaternary tectonic deformation, or the fault may not extend deep enough to be considered a source of significant earthquakes. Class C and D faults lack convincing geologic evidence of Quaternary tectonic deformation or have been studied carefully enough to determine that they are not likely to generate significant earthquakes.

According to the USGS Quaternary Fault and Fold database (USGS, 2020), there are five Class A features within approximately 30 miles of the project site. Their names, general locations relative to the site, and the time since their most recent deformation are summarized in Exhibit 2-1. The CSZ itself is approximately 170 miles west of the project site, with an average slip rate of approximately 40 millimeters (1.5 inches) per year and the most recent deformation occurring about 300 years ago (Personius and Nelson, 2006).

Exhibit 2-1: USGS Class A Faults Within an Approximate 30-mile Radius of Project Site

Fault Name	USGS Fault Number	Approximate Fault Length	Approximate Distance and Direction from Project Site	Slip Rate[2]	Time Since Last Deformation[2]
Faults near The Dalles	583	42.9 miles	14.7 miles NE	<0.2 mm/yr	<1.6 Ma
Hood River Fault Zone	866	27.3 miles	16.1 miles, E-SE	<0.2 mm/yr	<1.6 Ma
Lacamas Lake Fault	850	14.9 miles	18.9 miles, W-SW	<0.2 mm/yr	<750 ka
Damascus-Tickle Creek Fault	879	9.9 miles	23.3 miles, SW	<0.2 mm/yr	<750 ka
Grant Butte Fault	878	6.2 miles	25.3 miles, SW	<0.2 mm/yr	<750 ka

NOTES:

[1] Approximate distance from site center to nearest extent of fault mapped at the ground surface.

[2] mm = millimeters; yr = year; Ma = "Mega-annum" or million years ago; ka = "Kilo-annum" or one thousand years ago.

3 SUBSURFACE EXPLORATIONS AND LABORATORY TESTING

The subsurface explorations for the north side of the new Navlock 1 channel bridge consisted of four mandatory geotechnical borings, two optional geotechnical borings, geophysical surveys, and two infiltration tests.

3.1 Borings

The mandatory geotechnical borings were designated by USACE Portland District as DH-20-1 through DH-20-4 and optional borings were designated as DH-20-3(A), and DH-20-4(A). The mandatory borings were planned to encounter the top of bedrock or a maximum depth of approximately 30 feet below ground surface (bgs). The borings were advanced to depths ranging between 6.5 and 20.6 feet below ground surface (bgs). As described previously, hollow stem auger drilling refusal was encountered in all borings at depths ranging from 5 to 20.5 feet. After hollow stem auger drilling met refusal, a Standard Penetration Test (SPT) was performed. The completed boring locations were surveyed by USACE Portland District. A summary of completed borings is shown in Exhibit 3-1. Boring locations are shown on the Site and Exploration Plan, Figure 2.

Exhibit 3-1: Summary of Completed Borings

Boring Designation	Explored Depth[1] (ft.)
HD-20-1	20.6
HD-20-2	18.6
HD-20-3	6.5
HD-20-3 (A)	9.0
HD-20-4	11.5
HD-20-4 (A)	19.9

NOTE:
[1] Hollow stem auger refusal was at or near the explored depth.

The borings were drilled on November 12 and 13, 2020. The drilling was performed by Holt, Inc., of Vancouver, Washington, using one CME-75 truck-mounted drill rig. Hollow stem auger drilling techniques were used to advance the boreholes. Disturbed bulk samples were collected within the top 10 feet below the ground surface in each boring when cuttings were available. Upon hollow stem auger refusal, sampling followed the ASTM D1586 procedures for the Standard Penetration Test (SPT), which yields an in situ driving resistance index value (N-value), measured in blows per foot (bpf). The SPTs were performed to indicate if refusal was the result of encountering the bedrock or large fill debris.

Shannon & Wilson geology staff were on site during drilling to locate the borings, observe drilling, collect samples, and maintain logs of the materials encountered. Details of the exploration program, including descriptions of the techniques used to advance and sample the borings, logs of the materials encountered, and backfill details, are presented in Appendix A, Field Explorations.

3.2 Electrical Resistivity Tomography

Global Geophysics LLC, out of Redmond, Washington conducted a resistivity survey on November 4, 2020. The objective of the geophysical survey was to identify the top of bedrock and degree of bedrock slope and variation underlying the mantle of overburden. The survey comprised two multiple electrode arrays. The arrays were 200 and 150 feet for Line 1 and Line 2, respectively. Data were acquired with an AGI SuperSting R8 system using up to 56 electrodes spaced at 5-foot intervals. Once each electrode array was installed in the ground, multiple soundings were automatically carried out by the control unit. The data were downloaded on site into a computer and processed using specialized inversion software to determine if all the objectives have been met. Array locations and the resulting two-dimensional resistivity profiles are presented in Appendix C as a color-contoured cross-section that highlights stratigraphic features. The locations of the resistivity survey lines

were measured from existing structures and should be considered approximate. Approximate locations of resistivity lines are shown on the Site and Exploration Plan, Figure 2 and in the Global Geophysics Report in Appendix C.

3.3 Seismic Refraction

Global Geophysics LLC, out of Redmond, Washington conducted a seismic refraction survey on November 5, 2020. This method was implemented in conjunction with resistivity to aid in subsurface interpretation and comprised two refraction arrays that are superimposed with the resistivity arrays. The arrays were about 170 and 150 feet for Line 1 and Line 2, respectively. The refraction survey used a Geometrics Geode 24-channel digital seismograph. The sensors used were Mark Products 4.5-Hz vertical geophones and the seismic energy source was a 20-pound. sledgehammer. The field procedure consisted of laying out the cables and planting the geophones at 5-foot intervals. The hammer was pounded on the ground at seven locations along the geophone array. Data were collected and saved in digital format and a field record was produced on the computer screen to check the data quality in real time. Array locations and the resulting two-dimensional compressional (p-wave) velocity profile can be found in Appendix C as a color-contoured cross-section that highlights stratigraphic features. The locations of the seismic refraction survey lines were measured from existing structures and should be considered approximate. Approximate locations of seismic refraction lines are shown on the Site and Exploration Plan, Figure 2 and in the Global Geophysics Report in Appendix C.

3.4 In-Situ Infiltration Testing

The infiltration test hole DI-20-1 was advanced on November 12, 2020. The infiltration test holes DI-20-2 and DI-20-3 were advanced on November 13. Infiltration test holes DI-20-1 and DI-20-2 were advanced with a CME 75 truck-mounted rotary drill rig using the hollow stem auger drilling technique, provided and operated by Holt Services, Inc., out of Vancouver, Washington. Infiltration test hole DI-20-03 was advanced using a hand auger with an approximate 6.5-inch diameter auger bit. Hollow stem auger drilling refusal was encountered at several locations in the vicinity of DI-20-2 at approximate depth of 1 foot bgs due to an obstruction of a concrete slab or debris. USACE Portland District approved not to perform infiltration test at DI-20-2. The infiltration locations were surveyed by USACE Portland District. Infiltration locations are shown on the Site and Exploration Plan, Figure 2.

Infiltration testing was performed using the Open Pit Falling Head Test method to estimate the infiltration rate of the in-place soils for potential use in stormwater management. The infiltration tests were performed in accordance with the 2016 City of Portland Stormwater Management Manual. Water used for infiltration testing was acquired from a potable water

source at the Shannon & Wilson office in Lake Oswego, Oregon. Infiltration test DI-20-1 was performed at approximate depth of 3 feet bgs on November 16, 2020. Infiltration test DI-20-3 was performed at approximate depth of 4 feet bgs on November 17, 2020. A 6-inch-diameter PVC casing was installed into the hole to prevent hole caving. Due to the presence of gravelly soils at both locations, the PVC was not embedded, but instead lifted 6 inches off the bottom and wedged in place to hold it off the bottom of the hole yet still support the hole sides to prevent caving. After testing, the abandoned test holes were backfilled with bentonite chips. The final infiltration field rate results for each test location can be found in Appendix A, Field Explorations.

3.5 Laboratory Testing

Two particle size analyses with hydrometer tests were performed on combined samples from borings DH-20-3 and DH-20-3(A), and DH-20-4 and DH-20-4(A). Particle size analysis with hydrometer tests were performed in accordance with ASTM D7928. The results of the laboratory tests and brief descriptions of the test procedures are presented in Appendix B.

4 SUBSURFACE CONDITIONS

4.1 Subsurface Conditions

We grouped the materials encountered in our subsurface explorations into two geotechnical units, as described below. Our interpretation of the subsurface conditions is based on our explorations and regional geologic information from published sources. Detailed descriptions of these units are presented in the Logs of Borings in Appendix A. Typical descriptions of the geotechnical units identified in the borings are as follows:

- **Fill:** medium dense, Poorly Graded Gravel with Silt, Sand, Cobbles and Boulders (GP-GM); and Silt with varying amounts of Sand and Gravel (ML); and
- **Columbia River Basalt:** gray, fresh to slightly weathered basalt.

These geotechnical units were grouped based on their engineering properties, geologic origins, and their distribution in the subsurface. A Subsurface Profile A-A' is shown on Figure 3. The location of the profile and cross section is shown on Figure 2. Contacts between the units may be more gradational than shown in the profiles, cross sections, and drill logs in Appendix A. The SPT N-values presented in the figures and discussed below are as counted in the field (uncorrected).

4.2 Groundwater

Groundwater instrumentation such as vibrating wire piezometers and open pipe monitoring wells were not installed in borings for this project. Hollow stem auger drilling generally allows for groundwater measurements, if it is encountered. Groundwater was not encountered during the drilling of the borings.

5 LIMITATIONS

This report was prepared for the exclusive use by USACE Portland District and their design team for the Bonneville BN1 Old NL Bridge Subsurface Explorations Project. The data contained in this report are based upon the explorations performed and site conditions as they existed at the time that this report was prepared. Subsurface conditions may vary between and away from the locations of the borings and our surface observations. Within the limitations of the scope, schedule, and budget, the data presented in this report were collected and presented in accordance with generally accepted professional geotechnical practice in this area at the time that this report was prepared. No warranty, express or implied, is made.

This report provides the geologic and geotechnical data collected through our explorations. No design recommendations are provided. This report is not a warranty of subsurface conditions. Unanticipated soil or rock conditions are commonly encountered during construction and cannot fully be disclosed by information from the explorations described in this report. Unexpected ground conditions should be anticipated, and geotechnical construction plans and specifications would be prepared to address that possible variability.

If there is substantial lapse of time between the submission of this report and completion of the final design and the start of work at the site, or if conditions have changed because of natural or manmade forces, we recommend that this report be reviewed with respect to the changed conditions or the time lapse.

Our scope of services did not include environmental site assessments or evaluations regarding the presence or absence of hazardous or toxic materials in the soil, surface water, groundwater, or air, on or below the site, or for evaluation or disposal of contaminated soils or groundwater, should any be encountered.

Shannon & Wilson, Inc., has prepared and included the attached, “Important Information About Your Geotechnical/Environmental Report,” to assist you and others in understanding the use and limitations of our reports.

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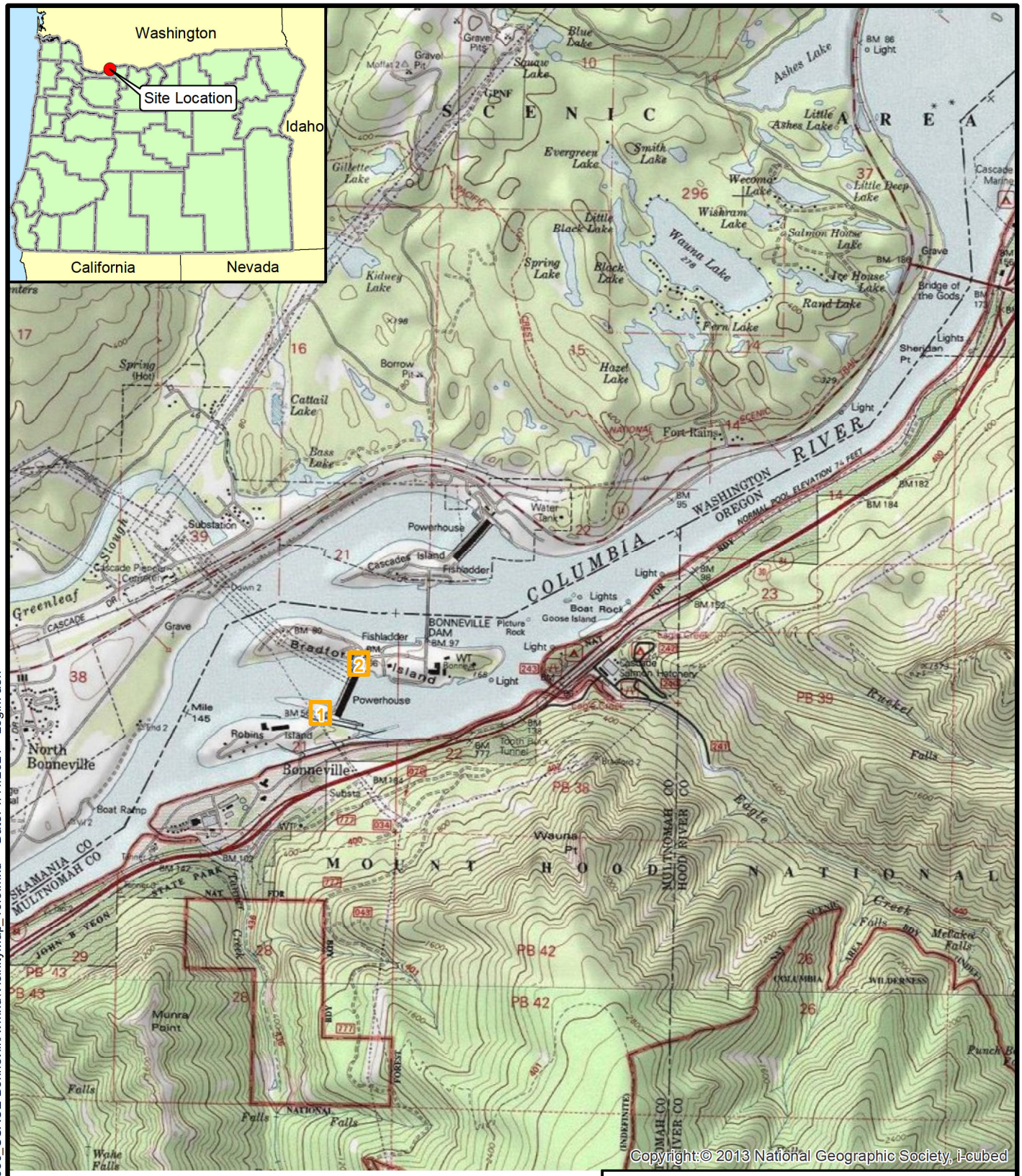

0 0.25 0.5 1

Scale in Miles

N

LEGEND

Figure 2 Sheet

Bonneville BN1 Old NL Bridge
Bonneville, Oregon

VICINITY MAP

January 2021 105960

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FIG. 1

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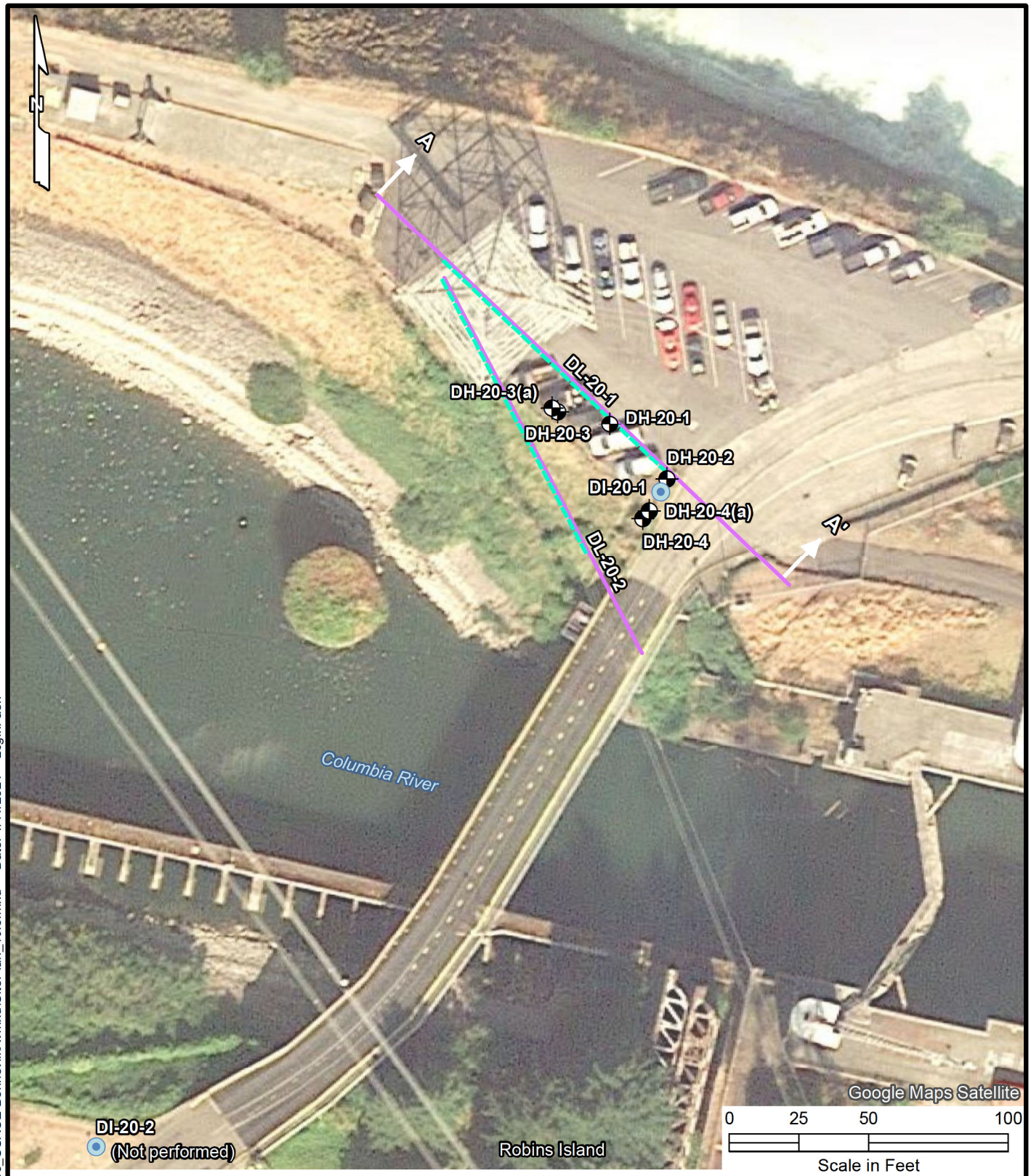

LEGEND

DH-20-1 Designation and Location of Boring

DI-20-1 Designation and Approximate Location of Infiltration Test

DL-20-1 Designation and Approximate Location of Multiple Electrode Resistivity (MER) Survey

Approximate Location of Seismic Refraction Survey

A A' Location and Designation of Subsurface Profile

Bonneville BN1 Old NL Bridge
Multnomah County, Oregon

SITE AND EXPLORATION PLAN

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FIG. 2
Sheet 1 of 2

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LEGEND

DH-20-1 Designation and Location of Boring

DI-20-1 Designation and Approximate Location of Infiltration Test

DL-20-1 Designation and Approximate Location of Multiple Electrode Resistivity (MER) Survey

Approximate Location of Seismic Refraction Survey

A A' Location and Designation of Subsurface Profile

Bonneville BN1 Old NL Bridge
Multnomah County, Oregon

SITE AND EXPLORATION PLAN

January 2021 105960

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FIG. 2
Sheet 2 of 2

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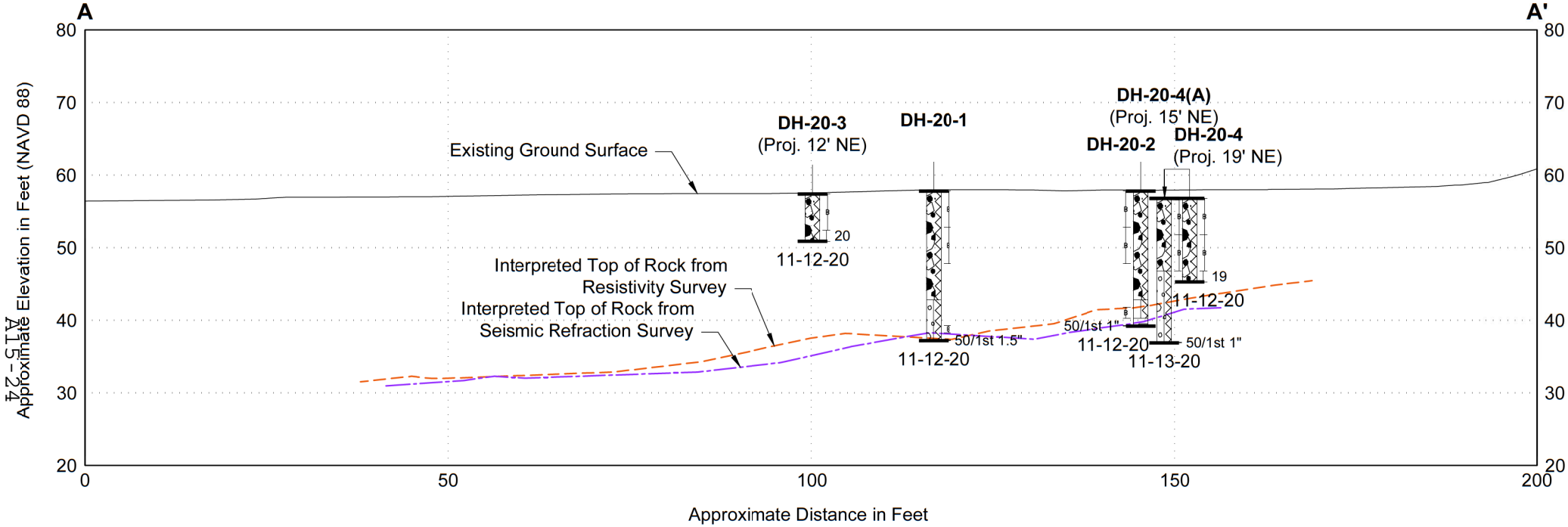

LEGEND

Designation and Projection of Boring to Profile Line

Grab Sample

Material Type Symbol

SPT Sample and Penetration Resistance in Blows/Foot or Blows/Inches Driven

0 20 40

Scale in Feet

No Vertical Exaggeration

NOTES

1. The ground surface was derived from 2010 LiDAR data and may not reflect current existing grade at all locations.
2. Variations may exist between profile and actual conditions. See Appendix A for complete boring logs and

APPENDIX A: SUBSURFACE EXPLORATIONS

Appendix A

Subsurface Explorations

CONTENTS

A.1 General A-1
A.2 Drilling A-1
A.3 Disturbed Sampling A-2
A.3.1 Bulk Sampling A-2
A.3.2 Standard Penetration Test A-2
A.4 Borehole Abandonment A-3
A.5 Material Descriptions A-3
A.6 Logs of Borings A-3
A.7 In-Situ InfIltration Testing A-3

Figures

Figure A1: Soil Description and Log Key
Figures A2-A7: Logs of Borings
Figures A8-A9 Infiltration Test Results

APPENDIX A: SUBSURFACE EXPLORATIONS

A.1 GENERAL

Shannon & Wilson explored the subsurface conditions at the project site with six (6) geotechnical borings and two (2) infiltration tests. The mandatory geotechnical borings were designated by USACE Portland District as DH-20-1 through DH-20-4, the optional geotechnical borings were designated DH-20-3(A), and DH-20-4(A). Three (3) infiltration test locations were designated by USACE Portland District as DI-20-1 through DI-20-3. However, during drilling of the hole for DI-20-2, a thick concrete slab or large concrete debris was encountered which prohibited the advancement of the infiltration test hole. The USACE Portland District was notified and approved to not perform the infiltration test at the location of DI-20-2. The geotechnical borings were advanced to depths ranging between 6.5 and 20.6 feet below ground surface (bgs). The infiltration tests were advanced and tested at depth ranging between 3 and 4 feet bgs. The completed boring and infiltration locations were surveyed by USACE Portland District. The boring and infiltration locations are shown on the Site and Exploration Plan, Figure 2.

This appendix describes the techniques used to advance and sample the borings and presents logs of the materials encountered during drilling. In-situ infiltration methods are also described, and the results are presented at the end of this appendix.

A.2 DRILLING

The borings were drilled on November 12 and 13, 2020 with a CME 75 truck-mounted rotary drill rig using hollow stem auger drilling techniques. The drill rig was provided and operated by Holt Services, Inc., out of Vancouver, Washington. During hollow stem auger drilling, the boring is advanced by sections, or flights, of augers that are rotated into the ground. A cutting head is attached to the first flight and the cuttings, or spoils, are rotated to the surface as the borehole is advanced. A pilot or center bit can be held at the base of the first flight with drill rods to prevent cuttings from entering the center of the auger. When the bit is removed, samples can be obtained through the hollow portion of the auger. In general, the introduction of drilling fluids is not required. The hollow stem auger also acts as a casing while the boring is being advanced, preventing the side walls from collapsing into the boring. A 6.25-inch outside diameter auger, which generally creates a 7- to 8-inch hole, was used for all borings.

A Shannon & Wilson representative was present during the drilling to locate the borings, log materials encountered in the borings, and collect soil samples for laboratory testing.

A.3 DISTURBED SAMPLING

A.3.1 Bulk Sampling

Disturbed bulk samples were collected within the top 10 feet below ground surface in each boring. The disturbed bulk soil samples, consisting of drill cuttings returned to the surface while advancing the hollow-stem augers, were collected at the surface from the outside of the hollow-stem augers. The samples were immediately sealed in plastic bags and returned to Shannon & Wilson's in-house laboratory for additional examination and testing.

A.3.2 Standard Penetration Test

Disturbed samples were collected in the borings when auger refusal was encountered, using a standard 2-inch outside diameter (O.D.) split spoon sampler in conjunction with Standard Penetration Testing. In a Standard Penetration Test (SPT), ASTM D1586, the sampler is driven 18 inches into the soil using a 140-pound hammer dropped 30 inches. The number of blows required to drive the sampler the last 12 inches is defined as the standard penetration resistance, or "N-value". The SPT N-value provides a measure of in situ relative density of cohesionless soils (silt, sand, and gravel) and the consistency of cohesive soils (silt and clay). All disturbed samples were visually identified and described in the field, sealed to retain moisture, and returned to our laboratory for additional observation.

SPT N-values can be significantly affected by several factors, including the efficiency of the hammer used. Automatic hammers generally have higher energy transfer efficiencies than cathead (manual) hammers. Holt Services provided the energy efficiency value for the automatic hammer used on site, 87 percent, which is also presented on the Logs of Borings in this appendix. For comparison, a standard cathead hammer is typically assumed to have an energy efficiency of 60 percent. All N-values presented in this report are in blows per foot, as counted in the field. No corrections of any kind have been applied.

An SPT was considered to have met "refusal" when 50 blows were required to drive the sampler 6-inches or less. If refusal was encountered in the first 6-inch interval (for example, 50 for 1.5"), the count is reported as 50/1st 1.5". If refusal was encountered in the second 6-inch interval (for examples, 48, 50 for 1.5"), the count is reported as 50/1.5". If refusal was encountered in the last 6-inch interval (for example, 39, 48, 50 for 1.5"), the count is reported as 98/7.5".

A.4 BOREHOLE ABANDONMENT

Borings were backfilled in accordance with Oregon state regulations, using bentonite chips and matching surface material. Drilled locations not performed in asphalt were marked with a stake and white flagging for surveying.

A.5 MATERIAL DESCRIPTIONS

In the field, soil samples were described and identified visually in general accordance with ASTM D2488, the Standard Practice for Description and Identification of Soils (Visual-Manual Procedure), which is in accordance with EM 1110-1-1804. Consistency, color, relative moisture, degree of plasticity, peculiar odors, and other distinguishing characteristics of the samples were noted. Once returned to the laboratory, the soil samples were re-examined. The field descriptions and identifications were modified as necessary based on further review of the samples. The specific terminology used in our soil descriptions and identifications is defined in the Soil Description and Log Key, Figure A1.

A.6 LOGS OF BORINGS

Summaries of logs of borings are presented in Figures A2 through A7. Summary material descriptions and interfaces on the logs are interpretive, and actual changes may be gradual. The left-hand portion of the boring logs provides a description, identification, and geotechnical unit designation for the materials encountered. The right-hand portion shows a graphic log, sample locations and designations, a graphical representation of N-values, and sample recovery.

A.7 IN-SITU INFILTRATION TESTING

The infiltration test hole DI-20-1 was advanced on November 12, 2020. The infiltration test holes for DI-20-2 and DI-20-3 were advanced on November 13, 2020. Infiltration tests DH-20-1 and DH-20-2 were advanced with a CME 75 truck-mounted rotary drill rig using hollow stem auger drilling techniques. Infiltration test DI-20-03 was advanced using a hand auger with 6-5/8-inch diameter auger bit. Hollow stem auger drilling refusal was encountered at several locations in the vicinity of the planned DI-20-2 at an approximate depth of 1 foot bgs due to obstruction of a concrete slab or debris and, as described previously, the infiltration test was terminated by the USACE Portland District.

Infiltration test DI-20-1 was performed at an approximate depth of 3 feet bgs on November 16, 2020. Infiltration test DI-20-3 was performed at an approximate depth of 4 feet bgs on

November 17, 2020. The infiltration tests were performed in general accordance with the procedures described in the *Portland Stormwater Management Manual, 2016*. The general procedures are to excavate a hole into soil to the elevation of the proposed facility bottom, for this project approximately 3 to 4 feet bgs. An encased test is normally performed whereby a 6-inch diameter PVC casing is embedded 6-inches into the soil at the base of the hole. Due to the presence of gravelly soils and conditions in which a good seal with the casing could not be established, the Open Pit Falling Head Test method was used. The excavated hole was filled with clean water a minimum of 12 inches deep, and this depth is maintained for at least 4 hours to presoak the material. After the pre-saturation period, the hole is refilled with water to 12 inches and the draw down time is measured. Measurements are made every 10 minutes for 1 hour in faster draining soils, or 20 minutes for 2 hours for slower draining soils. The process of refilling the hole and taking measurements or trials is repeated until the change in measured infiltration rate between two successive trials is no more than 10 percent. At least three trials were conducted at each test location, with the water depth replenished to 12 inches at the beginning of each trial. The field infiltration test results for infiltration tests DI-20-1 and DI-20-3 are presented in Figures A8 and A9.

Shannon & Wilson, Inc. (S&W), uses a soil identification system modified from the Unified Soil Classification System (USCS). Elements of the USCS and other definitions are provided on this and the following pages. Soil descriptions are based on visual-manual procedures (ASTM D2488) and laboratory testing procedures (ASTM D2487), if performed.

S&W INORGANIC SOIL CONSTITUENT DEFINITIONS

CONSTITUENT[2]	FINE-GRAINED SOILS (50% or more fines)[1]	COARSE-GRAINED SOILS (less than 50% fines)[1]
Major	***Silt, Lean Clay, Elastic Silt,*** or ***Fat Clay***[3]	***Sand*** or ***Gravel***[4]
Modifying (Secondary) Precedes major constituent	30% or more coarse-grained: ***Sandy*** or ***Gravelly***[4]	More than 12% fine-grained: ***Silty*** or ***Clayey***[3]
Minor Follows major constituent	15% to 30% coarse-grained: ***with Sand*** or ***with Gravel***[4]	5% to 12% fine-grained: ***with Silt*** or ***with Clay***[3]
	30% or more total coarse-grained *and* lesser coarse-grained constituent is 15% or more: ***with Sand*** or ***with Gravel***[5]	15% or more of a second coarse-grained constituent: ***with Sand*** or ***with Gravel***[5]

[1]All percentages are by weight of total specimen passing a 3-inch sieve.
[2]The order of terms is: *Modifying Major with Minor*.
[3]Determined based on behavior.
[4]Determined based on which constituent comprises a larger percentage.
[5]Whichever is the lesser constituent.

MOISTURE CONTENT TERMS

Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water, from below water table

STANDARD PENETRATION TEST (SPT) SPECIFICATIONS

Hammer:	140 pounds with a 30-inch free fall. Rope on 6- to 10-inch-diam. cathead 2-1/4 rope turns, > 100 rpm
Sampler:	10 to 30 inches long Shoe I.D. = 1.375 inches Barrel I.D. = 1.5 inches Barrel O.D. = 2 inches
N-Value:	Sum blow counts for second and third 6-inch increments. Refusal: 50 blows for 6 inches or less; 10 blows for 0 inches.

NOTE: Penetration resistances (N-values) shown on boring logs are as recorded in the field and have not been corrected for hammer efficiency, overburden, or other factors.

PARTICLE SIZE DEFINITIONS

DESCRIPTION	SIEVE NUMBER AND/OR APPROXIMATE SIZE
FINES	< #200 (0.075 mm = 0.003 in.)
SAND Fine Medium Coarse	 #200 to #40 (0.075 to 0.4 mm; 0.003 to 0.02 in.) #40 to #10 (0.4 to 2 mm; 0.02 to 0.08 in.) #10 to #4 (2 to 4.75 mm; 0.08 to 0.187 in.)
GRAVEL Fine Coarse	 #4 to 3/4 in. (4.75 to 19 mm; 0.187 to 0.75 in.) 3/4 to 3 in. (19 to 76 mm)
COBBLES	3 to 12 in. (76 to 305 mm)
BOULDERS	> 12 in. (305 mm)

RELATIVE DENSITY / CONSISTENCY

COHESIONLESS SOILS		COHESIVE SOILS	
N, SPT, BLOWS/FT.	RELATIVE DENSITY	N, SPT, BLOWS/FT.	RELATIVE CONSISTENCY
< 4	Very loose	< 2	Very soft
4 - 10	Loose	2 - 4	Soft
10 - 30	Medium dense	4 - 8	Medium stiff
30 - 50	Dense	8 - 15	Stiff
> 50	Very dense	15 - 30	Very stiff
		> 30	Hard

WELL AND BACKFILL SYMBOLS

Bentonite Cement Grout	Surface Cement Seal
Bentonite Grout	Asphalt or Cap
Bentonite Chips	Slough
Silica Sand	Inclinometer or Non-perforated Casing
Gravel	Vibrating Wire Piezometer
Perforated or Screened Casing	

PERCENTAGES TERMS [1, 2]

Trace	< 5%
Few	5 to 10%
Little	15 to 25%
Some	30 to 45%
Mostly	50 to 100%

[1]Gravel, sand, and fines estimated by mass. Other constituents, such as organics, cobbles, and boulders, estimated by volume.

[2]Reprinted, with permission, from ASTM D2488 - 09a Standard Practice for Description and Identification of Soils (Visual-Manual Procedure), copyright ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428. A copy of the complete standard may be obtained from ASTM International, www.astm.org.

Bonneville BN1 Old NL Bridge
Multnomah County, Oregon

SOIL DESCRIPTION AND LOG KEY

December 2020 105960

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A1
Sheet 1 of 3

2013 BORING CLASS1 105960.GPJ SW2013LIBRARYPDX.GLB SWNEW.GDT 12/17/20

UNIFIED SOIL CLASSIFICATION SYSTEM (USCS)
(Modified From USACE Tech Memo 3-357, ASTM D2487, and ASTM D2488)

MAJOR DIVISIONS			GROUP/GRAPHIC SYMBOL		TYPICAL IDENTIFICATIONS
COARSE-GRAINED SOILS *(more than 50% retained on No. 200 sieve)*	Gravels *(more than 50% of coarse fraction retained on No. 4 sieve)*	Gravel *(less than 5% fines)*	GW		Well-Graded Gravel; Well-Graded Gravel with Sand
			GP		Poorly Graded Gravel; Poorly Graded Gravel with Sand
		Silty or Clayey Gravel *(more than 12% fines)*	GM		Silty Gravel; Silty Gravel with Sand
			GC		Clayey Gravel; Clayey Gravel with Sand
	Sands *(50% or more of coarse fraction passes the No. 4 sieve)*	Sand *(less than 5% fines)*	SW		Well-Graded Sand; Well-Graded Sand with Gravel
			SP		Poorly Graded Sand; Poorly Graded Sand with Gravel
		Silty or Clayey Sand *(more than 12% fines)*	SM		Silty Sand; Silty Sand with Gravel
			SC		Clayey Sand; Clayey Sand with Gravel
FINE-GRAINED SOILS *(50% or more passes the No. 200 sieve)*	Silts and Clays *(liquid limit less than 50)*	Inorganic	ML		Silt; Silt with Sand or Gravel; Sandy or Gravelly Silt
			CL		Lean Clay; Lean Clay with Sand or Gravel; Sandy or Gravelly Lean Clay
		Organic	OL		Organic Silt or Clay; Organic Silt or Clay with Sand or Gravel; Sandy or Gravelly Organic Silt or Clay
	Silts and Clays *(liquid limit 50 or more)*	Inorganic	MH		Elastic Silt; Elastic Silt with Sand or Gravel; Sandy or Gravelly Elastic Silt
			CH		Fat Clay; Fat Clay with Sand or Gravel; Sandy or Gravelly Fat Clay
		Organic	OH		Organic Silt or Clay; Organic Silt or Clay with Sand or Gravel; Sandy or Gravelly Organic Silt or Clay
HIGHLY-ORGANIC SOILS	Primarily organic matter, dark in color, and organic odor		PT		Peat or other highly organic soils (see ASTM D4427)
FILL	Placed by humans, both engineered and nonengineered. May include various soil materials and debris.				The Fill graphic symbol is combined with the soil graphic that best represents the observed material

NOTE: No. 4 size = 4.75 mm = 0.187 in.; No. 200 size = 0.075 mm = 0.003 in.

NOTES

1. Dual symbols *(symbols separated by a hyphen, i.e., SP-SM, Sand with Silt)* are used for soils with between 5% and 12% fines or when the liquid limit and plasticity index values plot in the *CL-ML* area of the plasticity chart.
2. Borderline symbols *(symbols separated by a slash, i.e., CL/ML, Lean Clay to Silt; SP-SM/SM, Sand with Silt to Silty Sand)* indicate that the soil properties are close to the defining boundary between two groups.
3. The soil graphics above represent the various USCS identifications (i.e., *GP*, *SM*, etc.) and may be augmented with additional symbology to represent differences within USCS designations. *Sandy Silt (ML)*, for example, may be accompanied by the *ML* soil graphic with sand grains added. Non-USCS materials may be represented by other graphic symbols; see log for descriptions.

Bonneville BN1 Old NL Bridge
Multnomah County, Oregon

SOIL DESCRIPTION AND LOG KEY

December 2020 105960

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A1
Sheet 2 of 3

2013 BORING CLASS2 105960.GPJ SW2013LIBRARYPDX.GLB SWNEW.GDT 12/17/20

GRADATION TERMS

Poorly Graded	Narrow range of grain sizes present or, within the range of grain sizes present, one or more sizes are missing (Gap Graded). Meets criteria in ASTM D2487, if tested.
Well-Graded	Full range and even distribution of grain sizes present. Meets criteria in ASTM D2487, if tested.

CEMENTATION TERMS[1]

Weak	Crumbles or breaks with handling or slight finger pressure
Moderate	Crumbles or breaks with considerable finger pressure
Strong	Will not crumble or break with finger pressure

PLASTICITY[2]

DESCRIPTION	VISUAL-MANUAL CRITERIA	APPROX. PLASITICTY INDEX RANGE
Nonplastic	A 1/8-in. thread cannot be rolled at any water content.	< 4%
Low	A thread can barely be rolled and a lump cannot be formed when drier than the plastic limit.	4 to 10%
Medium	A thread is easy to roll and not much time is required to reach the plastic limit. The thread cannot be rerolled after reaching the plastic limit. A lump crumbles when drier than the plastic limit.	10 to 20%
High	It take considerable time rolling and kneading to reach the plastic limit. A thread can be rerolled several times after reaching the plastic limit. A lump can be formed without crumbling when drier than the plastic limit.	> 20%

ADDITIONAL TERMS

Mottled	Irregular patches of different colors.
Bioturbated	Soil disturbance or mixing by plants or animals.
Diamict	Nonsorted sediment; sand and gravel in silt and/or clay matrix.
Cuttings	Material brought to surface by drilling.
Slough	Material that caved from sides of borehole.
Sheared	Disturbed texture, mix of strengths.

PARTICLE ANGULARITY AND SHAPE TERMS[1]

Angular	Sharp edges and unpolished planar surfaces.
Subangular	Similar to angular, but with rounded edges.
Subrounded	Nearly planar sides with well-rounded edges.
Rounded	Smoothly curved sides with no edges.
Flat	Width/thickness ratio > 3.
Elongated	Length/width ratio > 3.

[1]Reprinted, with permission, from ASTM D2488 - 09a Standard Practice for Description and Identification of Soils (Visual-Manual Procedure), copyright ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428. A copy of the complete standard may be obtained from ASTM International, www.astm.org.
[2]Adapted, with permission, from ASTM D2488 - 09a Standard Practice for Description and Identification of Soils (Visual-Manual Procedure), copyright ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428. A copy of the complete standard may be obtained from ASTM International, www.astm.org.

ACRONYMS AND ABBREVIATIONS

ATD	At Time of Drilling
approx.	Approximate/Approximately
Diam.	Diameter
Elev.	Elevation
ft.	Feet
FeO	Iron Oxide
gal.	Gallons
Horiz.	Horizontal
HSA	Hollow Stem Auger
I.D.	Inside Diameter
in.	Inches
lbs.	Pounds
MgO	Magnesium Oxide
mm	Millimeter
MnO	Manganese Oxide
NA	Not Applicable or Not Available
NP	Nonplastic
O.D.	Outside Diameter
OW	Observation Well
pcf	Pounds per Cubic Foot
PID	Photo-Ionization Detector
PMT	Pressuremeter Test
ppm	Parts per Million
psi	Pounds per Square Inch
PVC	Polyvinyl Chloride
rpm	Rotations per Minute
SPT	Standard Penetration Test
USCS	Unified Soil Classification System
q_u	Unconfined Compressive Strength
VWP	Vibrating Wire Piezometer
Vert.	Vertical
WOH	Weight of Hammer
WOR	Weight of Rods
Wt.	Weight

STRUCTURE TERMS[1]

Interbedded	Alternating layers of varying material or color with layers at least 1/4-inch thick; singular: bed.
Laminated	Alternating layers of varying material or color with layers less than 1/4-inch thick; singular: lamination.
Fissured	Breaks along definite planes or fractures with little resistance.
Slickensided	Fracture planes appear polished or glossy; sometimes striated.
Blocky	Cohesive soil that can be broken down into small angular lumps that resist further breakdown.
Lensed	Inclusion of small pockets of different soils, such as small lenses of sand scattered through a mass of clay.
Homogeneous	Same color and appearance throughout.

Bonneville BN1 Old NL Bridge
Multnomah County, Oregon

SOIL DESCRIPTION AND LOG KEY

December 2020 105960

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A1
Sheet 3 of 3

2013 BORING CLASS3 105960.GPJ SW2013LIBRARYPDX.GLB SWNEW.GDT 12/17/20

Total Depth:	20.6 ft.	Northing:	722,439.3 ft.	Drilling Method:	Hollow Stem Auger	Hole Diam.:	8 in.
Top Elevation:	57.8 ft.	Easting:	7,831,638.0 ft.	Drilling Company:	Holt Services, Inc.	Rod Type:	NWJ
Vert. Datum:	NAVD88	Station:		Drill Rig Equipment:	CME-75 Truck Rig	Hammer Type:	Automatic
Horiz. Datum:	OR83-NF	Offset:		Other Comments:	Hammer Efficiency = 87%		

SOIL DESCRIPTION

Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between soil types, and the transitions may be gradual.

Elev. Depth (ft.) | Symbol | Samples | Ground Water | Depth, ft.

PENETRATION RESISTANCE, N (blows/ft.)

▲ Hammer Wt. & Drop: *140 lbs / 30 inches*

0 20 40 60 80 100

Brown with gray clasts, *Poorly Graded Gravel with Silt, Sand and Cobbles (GP-GM)*; dry to moist; 3-inch subrounded cobbles; fine to coarse, subangular to subrounded gravel; fine to medium sand; nonplastic fines.

FILL

S-1

S-2

5

10

15

42.8
15.0

Gray, *Silt with Gravel (ML)*; moist; fine to coarse, subangular to subrounded gravel; few to little fine sand; low to medium plasticity fines; micaceous; inferred from drill action and cuttings.

S-3

20

Auger refusal at 20.5 feet.

37.3
20.5
37.2
20.6

S-4

50/1st 1.5"

BASALT: Gray, fresh to slightly weathered, inferred from drill action and SPT N-value.

COLUMBIA RIVER BASALT

Completed: November 12, 2020

0 20 40 60 80 100

Recovery (%)

LEGEND

Bag Sample

Standard Penetration Test

● % Water Content

Plastic Limit ├──┤ Liquid Limit

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations, and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. Group symbol is based on visual-manual identification and selected lab testing.

Bonneville BN1 Old NL Bridge
Multnomah County, Oregon

LOG OF BORING DH-20-1

December 2020 105960

SHANNON & WILSON, INC.
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FIG. A2

REV 2

MASTER LOG E 105960.GPJ SW2013LIBRARYPDX.GLB SHANWIL PDX.GDT 12/18/20 Log: KJC Rev: CKS Typ: KJC

Total Depth:	18.6 ft.	Northing:	722,419.5 ft.	Drilling Method:	Hollow Stem Auger	Hole Diam.:	8 in.
Top Elevation:	57.8 ft.	Easting:	7,831,658.7 ft.	Drilling Company:	Holt Services, Inc.	Rod Type:	NWJ
Vert. Datum:	NAVD88	Station:		Drill Rig Equipment:	CME-75 Truck Rig	Hammer Type:	Automatic
Horiz. Datum:	OR83-NF	Offset:		Other Comments:	Hammer Efficiency = 87%		

SOIL DESCRIPTION

Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between soil types, and the transitions may be gradual.

Brown and gray, *Poorly Graded Gravel with Silt, Sand and Cobbles (GP-GM)*; dry to moist; 3-inch subrounded cobbles; fine to coarse, subangular to rounded gravel; fine to medium sand; nonplastic fines.

FILL

42.8 / 15.0

Gray, *Silt (ML)*; wet; trace fine sand; nonplastic to low plasticity fines.

40.3 / 17.5

BASALT: Gray, fresh to slightly weathered, inferred from drill action and SPT N-value.

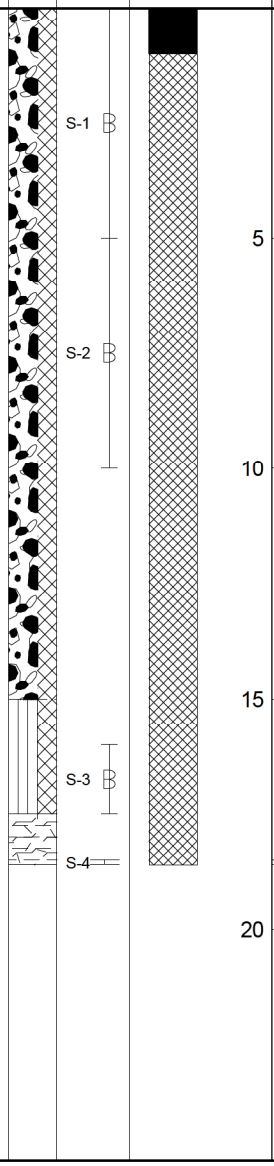
39.2 / 18.6

Auger refusal at 18.5 feet.

COLUMBIA RIVER BASALT

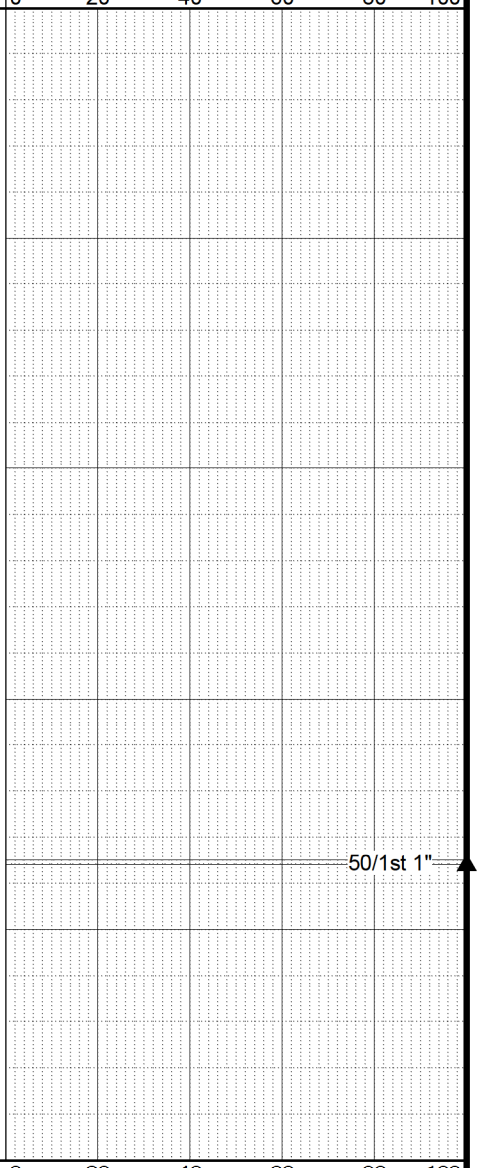
Completed: November 12, 2020

Elev. Depth (ft.) | Symbol | Samples | Ground Water | Depth, ft.



PENETRATION RESISTANCE, N (blows/ft.)

▲ Hammer Wt. & Drop: *140 lbs / 30 inches*



Recovery (%)

● % Water Content

Plastic Limit ├──┤ Liquid Limit

LEGEND

Bag Sample

Standard Penetration Test

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations, and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. Group symbol is based on visual-manual identification and selected lab testing.

Bonneville BN1 Old NL Bridge
Multnomah County, Oregon

LOG OF BORING DH-20-2

December 2020 | 105960

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A3

REV 2

MASTER LOG E 105960.GPJ SW2013LIBRARYPDX.GLB SHANWIL PDX.GDT 12/18/20 Log: KJC Rev: CKS Typ: KJC

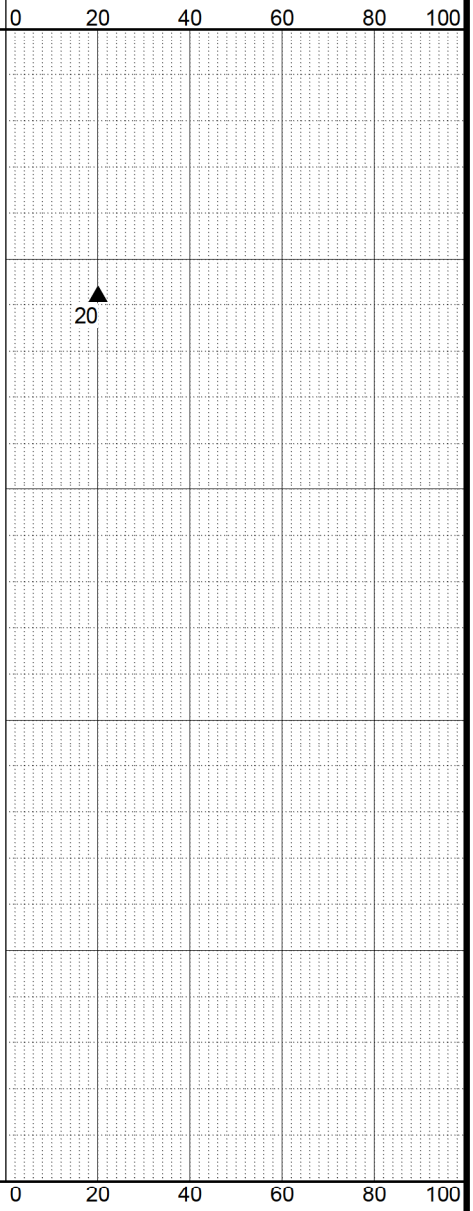
Total Depth:	6.5 ft.	Northing:	722,443.8 ft.	Drilling Method:	Hollow Stem Auger	Hole Diam.:	8 in.
Top Elevation:	57.4 ft.	Easting:	7,831,619.4 ft.	Drilling Company:	Holt Services, Inc.	Rod Type:	NWJ
Vert. Datum:	NAVD88	Station:		Drill Rig Equipment:	CME-75 Truck Rig	Hammer Type:	Automatic
Horiz. Datum:	OR83-NF	Offset:		Other Comments:	Hammer Efficiency = 87%		

SOIL DESCRIPTION	Elev. Depth (ft.)	Symbol	Samples	Ground Water	Depth, ft.
Medium dense, Brown and gray, *Poorly Graded Gravel with Silt, Sand, Cobbles and Boulders (GP-GM)*; moist; 3-inch subrounded cobbles; boulders inferred from driller and drill action; fine to coarse, subangular to rounded gravel; fine to medium sand; nonplastic fines.			S-1		
FILL *Auger refusal at 5 feet.*			S-2 *		5
Completed: November 12, 2020	50.9 6.5				
					10
					15
					20

Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between soil types, and the transitions may be gradual.

PENETRATION RESISTANCE, N (blows/ft.)

▲ Hammer Wt. & Drop: *140 lbs / 30 inches*



LEGEND

* Sample Not Recovered

Bag Sample

Standard Penetration Test

Plastic Limit ├──┤ Liquid Limit

Natural Water Content

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations, and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. Group symbol is based on visual-manual identification and selected lab testing.

Bonneville BN1 Old NL Bridge
Multnomah County, Oregon

LOG OF BORING DH-20-3

December 2020 105960

SHANNON & WILSON, INC.
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FIG. A4

REV 2

MASTER LOG E 105960.GPJ SW2013LIBRARYPDX.GLB SHANWIL PDX.GDT 12/18/20 Log: KJC Rev: CKS Typ: KJC

Total Depth:	9 ft.	Northing:	722,445.1 ft.	Drilling Method:	Hollow Stem Auger	Hole Diam.:	8 in.
Top Elevation:	57.0 ft.	Easting:	7,831,617.5 ft.	Drilling Company:	Holt Services, Inc.	Rod Type:	NWJ
Vert. Datum:	NAVD88	Station:		Drill Rig Equipment:	CME-75 Truck Rig	Hammer Type:	Automatic
Horiz. Datum:	OR83-NF	Offset:		Other Comments:	Hammer Efficiency = 87%		

SOIL DESCRIPTION	Elev. Depth (ft.)	Symbol	Samples	Ground Water	Depth, ft.	PENETRATION RESISTANCE, N (blows/ft.) ▲ Hammer Wt. & Drop: 140 lbs / 30 inches
Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between soil types, and the transitions may be gradual.						0 20 40 60 80 100
Medium dense, Brown and Gray, *Poorly Graded Gravel with Silt, Sand, Cobbles and Boulders (GP-GM)*; dry to moist; 3-inch subrounded cobbles; boulders inferred from driller and drill action; fine to coarse, subangular to rounded gravel; fine to medium sand; nonplastic fines; numerous basalt fragments.			S-1		5	
FILL			S-2			
Auger refusal at 7.5 feet.			S-3			▲ 18
Completed: November 12, 2020	48.0 9.0				10 15 20	

0 20 40 60 80 100

Recovery (%)

LEGEND

Bag Sample

Standard Penetration Test

● % Water Content

Plastic Limit ├──┤ Liquid Limit

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations, and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. Group symbol is based on visual-manual identification and selected lab testing.

Bonneville BN1 Old NL Bridge
Multnomah County, Oregon

LOG OF BORING DH-20-3(A)

December 2020 105960

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FIG. A5

REV 2

MASTER LOG E 105960.GPJ SW2013LIBRARYPDX.GLB SHANWIL PDX.GDT 12/18/20 Log: KJC Rev: CKS Typ: KJC

Total Depth:	11.5 ft.	Northing:	722,405.5 ft.	Drilling Method:	Hollow Stem Auger	Hole Diam.:	8 in.
Top Elevation:	56.8 ft.	Easting:	7,831,649.9 ft.	Drilling Company:	Holt Services, Inc.	Rod Type:	NWJ
Vert. Datum:	NAVD88	Station:		Drill Rig Equipment:	CME-75 Truck Rig	Hammer Type:	Automatic
Horiz. Datum:	OR83-NF	Offset:		Other Comments:	Hammer Efficiency = 87%		

SOIL DESCRIPTION	Elev. Depth (ft.)	Symbol	Samples	Ground Water	Depth, ft.	PENETRATION RESISTANCE, N (blows/ft.) ▲ Hammer Wt. & Drop: 140 lbs / 30 inches
Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between soil types, and the transitions may be gradual.						0 20 40 60 80 100
Medium dense, Brown and gray, *Poorly Graded Gravel with Silt, Sand, Cobbles and Boulders (GP-GM)*; moist; 3-inch subrounded cobbles; boulders inferred from driller and drill action; fine to coarse, subangular to rounded gravel; fine to medium sand; nonplastic fines.			S-1			
					5	
FILL			S-2			
Auger refusal at 10 feet.			S-3		10	▲ 19
Completed: November 12, 2020	45.3 11.5					
					15	
					20	

0 20 40 60 80 100
Recovery (%)

LEGEND

Bag Sample

Standard Penetration Test

● % Water Content

Plastic Limit ├──┤ Liquid Limit

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations, and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. Group symbol is based on visual-manual identification and selected lab testing.

Bonneville BN1 Old NL Bridge
Multnomah County, Oregon

LOG OF BORING DH-20-4

December 2020 105960

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A6

REV 2

MASTER LOG E 105960.GPJ SW2013LIBRARYPDX.GLB SHANWIL PDX.GDT 12/18/20 Log: KJC Rev: CKS Typ: KJC

Total Depth:	19.9 ft.	Northing:	722,408.2 ft.	Drilling Method:	Hollow Stem Auger	Hole Diam.:	8 in.
Top Elevation:	56.8 ft.	Easting:	7,831,652.3 ft.	Drilling Company:	Holt Services, Inc.	Rod Type:	NWJ
Vert. Datum:	NAVD88	Station:		Drill Rig Equipment:	CME-75 Truck Rig	Hammer Type:	Automatic
Horiz. Datum:	OR83-NF	Offset:		Other Comments:	Hammer Efficiency = 87%		

SOIL DESCRIPTION

Refer to the report text for a proper understanding of the subsurface materials and drilling methods. The stratification lines indicated below represent the approximate boundaries between soil types, and the transitions may be gradual.

Soil Description	Elev. Depth (ft.)
Brown and gray, *Poorly Graded Gravel with Silt, Sand and Cobbles (GP-GM)*; dry to moist; 3-inch subrounded cobbles; fine to coarse, subangular to rounded gravel; fine to medium sand; nonplastic fines.	
FILL	
Gray, *Gravelly Silt (ML)*; moist; fine to coarse, subangular to rounded gravel; few fine to coarse sand; low plasticity fines.	46.8 / 10.0
Auger refusal at 19.8 feet.	37.0 / 19.8
BASALT: Gray, fresh to slightly weathered, inferred from drill action and SPT N-value. **COLUMBIA RIVER BASALT**	36.9 / 19.9

Completed: November 13, 2020

Samples: S-1 B*, S-2 B*, S-3

Ground Water

Depth, ft.: 5, 10, 15, 20

PENETRATION RESISTANCE, N (blows/ft.)

▲ Hammer Wt. & Drop: *140 lbs / 30 inches*

0 20 40 60 80 100

50/1st 1" ▲

0 20 40 60 80 100

Recovery (%)

● % Water Content

Plastic Limit ├──┤ Liquid Limit

LEGEND

* Sample Not Recovered

Bag Sample

Standard Penetration Test

NOTES

1. Refer to KEY for explanation of symbols, codes, abbreviations, and definitions.
2. Groundwater level, if indicated above, is for the date specified and may vary.
3. Group symbol is based on visual-manual identification and selected lab testing.

Bonneville BN1 Old NL Bridge
Multnomah County, Oregon

LOG OF BORING DH-20-4(A)

December 2020 105960

SHANNON & WILSON, INC.
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FIG. A7

REV 2

MASTER LOG E 105960.GPJ SW2013LIBRARYPDX.GLB SHANWIL PDX.GDT 12/18/20 Log: KJC Rev: CKS Typ: KJC

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

Location: Bonneville Dam	**Date:** 11/16/20	**Infiltration Test Number:** DI-20-1
Depth to bottom of hole: 3 ft	**Dimension of hole:** 8-inch dia.	**Test Method:** Open Pit F.H.

Tester's Name: Kevin Cowell
Tester's Company: Shannon & Wilson, Inc

Depth (feet):	Soil Texture:
0-3.0	*Poorly Graded Gravel with Sand*
	Presoak Period: 08:30 11/16/20 - 13:00 11/16/20

Time	Time Interval (minutes)	Measurement (feet)	Head (feet)	Drop in Water Level (feet)	Infiltration rate (inches per hour)	Remarks
13:00	--	2.82	1.01	--	--	Avg. Infiltration Rate= 48.48 in/hr
13:02	2	2.90	0.93	0.08	28.80	
13:04	2	2.97	0.86	0.07	25.20	
13:06	2	3.07	0.76	0.10	36.00	
13:08	2	3.24	0.59	0.17	61.20	
13:10	2	3.38	0.45	0.14	50.40	
13:12	2	3.60	0.23	0.22	79.20	
13:14	2	3.75	0.08	0.15	54.00	
13:15	1	3.83	Dry	0.08	57.60	
13:23	--	2.83	1.00	--	--	Avg. Infiltration Rate= 42.35 in/hr
13:25	2	2.90	0.93	0.07	25.20	
13:27	2	2.97	0.86	0.07	25.20	
13:29	2	3.06	0.77	0.09	32.40	
13:31	2	3.14	0.69	0.08	28.80	
13:33	2	3.32	0.51	0.18	64.80	
13:35	2	3.48	0.35	0.16	57.60	
13:37	2	3.61	0.22	0.13	46.80	
13:39	2	3.76	0.07	0.15	54.00	
13:40	1	3.83	Dry	0.07	50.40	
13:50	--	2.74	1.09	--	--	Avg. Infiltration Rate= 46.16 in/hr
13:52	2	2.84	0.99	0.10	36.00	
13:54	2	2.95	0.88	0.11	39.60	
13:56	2	3.02	0.81	0.07	25.20	
13:58	2	3.10	0.73	0.08	28.80	
14:00	2	3.30	0.53	0.20	72.00	
14:02	2	3.46	0.37	0.16	57.60	
14:04	2	3.60	0.23	0.14	50.40	
14:06	2	3.74	0.09	0.14	50.40	
14:07	1	3.83	0.00	0.09	64.80	

Bonneville BN1 Old NL Bridge
Multnomah County, Oregon

INFILTRATION TEST RESULTS DI-20-1

December 2020 105960

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A8

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

Location: Bonneville Dam	**Date:** 11/17/20	**Infiltration Test Number:** DI-20-3
Depth to bottom of hole: 4.0 ft	**Dimension of hole:** 6-inch dia.	**Test Method:** Open Pit F.H.

Tester's Name: Kevin Cowell
Tester's Company: Shannon & Wilson, Inc

Depth (feet):	Soil Texture:
0-4	*Silty Gravel with Sand*
	Presoak Period: 15:30 11/16/20 - 09:30 11/17/20

Time	Time Interval (minutes)	Measurement (feet)	Head (feet)	Drop in Water Level (feet)	Infiltration rate (inches per hour)	Remarks
9:30	--	3.82	1.18	--	--	Avg. Infiltration Rate= 5.58 in/hr
9:40	10	4.02	0.98	0.20	14.40	
9:50	10	4.23	0.77	0.21	15.12	
10:00	10	4.35	0.65	0.12	8.64	
10:10	10	4.44	0.56	0.09	6.48	
10:20	10	4.52	0.48	0.08	5.76	
10:30	10	4.60	0.40	0.08	5.76	
10:40	10	4.63	0.37	0.03	2.16	
10:50	10	4.67	0.33	0.04	2.88	
11:00	10	4.71	0.29	0.04	2.88	
11:10	10	4.71	0.29	0.00	0.00	
11:20	10	4.74	0.26	0.03	2.16	
11:30	10	4.75	0.25	0.01	0.72	
11:38	--	3.99	1.01	--	--	Avg. Infiltration Rate= 4.44 in/hr
11:48	10	4.18	0.82	0.19	13.68	
11:58	10	4.31	0.69	0.13	9.36	
12:08	10	4.42	0.58	0.11	7.92	
12:18	10	4.49	0.51	0.07	5.04	
12:28	10	4.52	0.48	0.03	2.16	
12:38	10	4.55	0.45	0.03	2.16	
12:48	10	4.59	0.41	0.04	2.88	
12:58	10	4.63	0.37	0.04	2.88	
13:08	10	4.68	0.32	0.05	3.60	
13:18	10	4.69	0.31	0.01	0.72	
13:28	10	4.71	0.29	0.02	1.44	
13:38	10	4.73	0.27	0.02	1.44	
13:48	--	3.94	1.06	--	--	Avg. Infiltration Rate= 4.56
13:58	10	4.09	0.91	0.15	10.80	
14:08	10	4.23	0.77	0.14	10.08	
14:18	10	4.33	0.67	0.10	7.20	
14:28	10	4.39	0.61	0.06	4.32	
14:38	10	4.44	0.56	0.05	3.60	
14:48	10	4.48	0.52	0.04	2.88	
14:58	10	4.53	0.47	0.05	3.60	
15:08	10	4.56	0.44	0.03	2.16	
15:18	10	4.60	0.40	0.04	2.88	
15:28	10	4.61	0.39	0.01	0.72	
15:38	10	4.67	0.33	0.06	4.32	
15:48	10	4.70	0.30	0.03	2.16	

Bonneville BN1 Old NL Bridge
Multnomah County, Oregon

INFILTRATION TEST RESULTS DI-20-3

December 2020 105960

SHANNON & WILSON, INC.
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FIG. A9

APPENDIX B: LABORATORY TEST RESULTS

Appendix B

Laboratory Test Results

CONTENTS

B.1 General B-1

B.2 Particle-Size Analysis B-1

Figure

Figure B1: Grain Size Distribution

APPENDIX B: LABORATORY TEST RESULTS

B.1 GENERAL

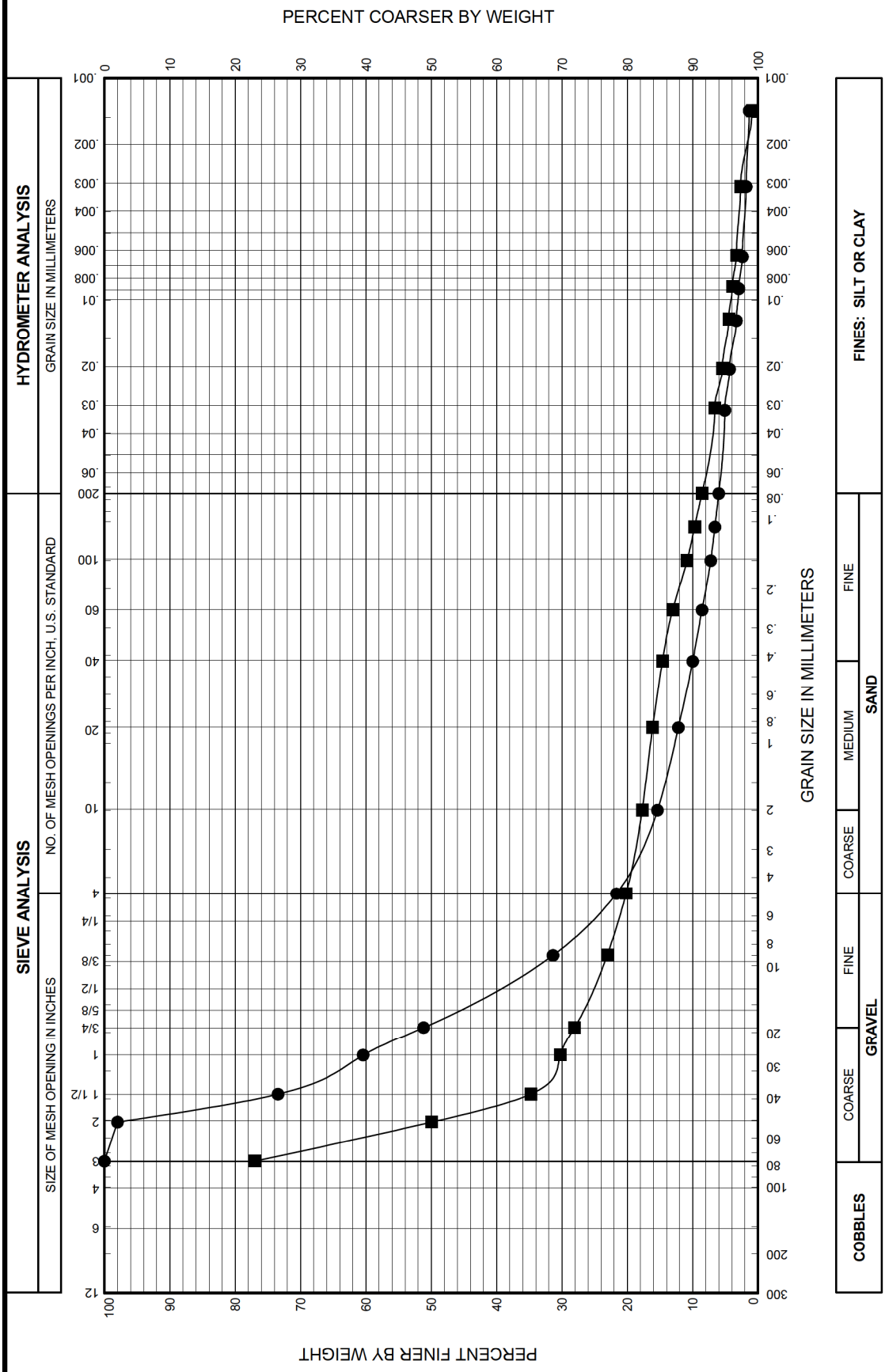
The soil samples obtained during the subsurface explorations were identified in the field in general accordance with the Standard Practice for Description and Identification of Soils (Visual-Manual Procedure), ASTM D2488. The specific terminology used is presented on Appendix A, Figure A1. The samples were then reviewed in the laboratory. The physical characteristics of the samples were noted, and the field identifications were modified where necessary in accordance with terminology presented on Figure A1. Representative samples were selected for various laboratory tests. We refined our visual-manual soil identifications based on the results of the laboratory tests, using elements of the Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System), ASTM D2487. The refined identifications were then incorporated into the Logs of Borings, presented in Appendix A. Note that ASTM D2487 was not followed in full, because it requires that a suite of tests be performed to classify a single sample.

The testing program include two (2) sieve with hydrometer analyses. Laboratory testing was performed by Shannon & Wilson in Lake Oswego, Oregon. The testing procedures from the laboratory program are summarized in the following paragraphs. Unless noted otherwise, all test procedures were in accordance with applicable ASTM International (ASTM) standards.

B.2 PARTICLE-SIZE ANALYSIS

Particle-size analyses were conducted on two composite samples to determine their grain-size distributions. Particle size analysis with hydrometer tests were conducted in accordance with ASTM D7928. The material is air-dried and split over the No. 10 sieve. The material retained on the No. 10 sieve was washed, air-dried, oven dried and shaken through a series of sieves to determine the distribution of the plus No. 10 fraction. The material passing the No. 10 sieve undergoes a hydrometer (sedimentation) analysis which yields the grain-size distribution of the sample fraction finer than the No. 200 sieve. After hydrometer analysis, the tested hydrometer material is washed over a No. 200 sieve, dried and shaken through a series of sieves to determine the distribution of the plus No. 200 and minus No. 10 fraction. Results of the particle-size analyses are presented on Figure B1, Grain Size Distribution.

NOTES:
1) Sieve analyses were performed in general accordance with ASTM D6913, sieve with hydrometer analyses were performed in general accordance with ASTM D422, and amount finer than #200 sieve analyses were performed in general accordance with ASTM D1140 unless otherwise noted in the report.
2) Group Name and Group Symbol are in accordance with ASTM D2488 and are refined in accordance with ASTM D2487 where appropriate laboratory tests are performed.



BORING AND SAMPLE NO.	DEPTH (feet)	GROUP SYMBOL[2]	GROUP NAME[2]	GRAVEL %	SAND %	FINES %	NAT. W.C. %	DRY DENSITY PCF
● DH-20-3 & DH-20-3(A), S-1 Composite	0.0	*GP-GM*	*Poorly Graded Gravel with Silt and Sand*	78	16	6	5	
■ DH-20-4 & DH-20-4(A), S-1 Composite	0.0	*GP-GM*	*Poorly Graded Gravel with Silt, Sand and Cobbles*	57	12	9	7	

Bonneville BN1 Old NL Bridge
Multnomah County, Oregon

GRAIN SIZE DISTRIBUTION

December 2020

105960

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FIG. B1

FIG. B1

APPENDIX C: GEOPHYSICAL SURVEYS

Appendix C

Geophysical Surveys

CONTENTS

- Report on Geophysical Surveys at Bonneville Dam, Oregon, dated November 23, 2020, Prepared by Global Geophysics, LLC.

Global Geophysics

P. O. Box 2229
Redmond, WA, 98073-2229
Tel: 425-890-4321

November 23, 2020 Our Ref.: 110-0825.000

Shannon & Wilson, Inc.
3990 Collins Way, Suite 100,
Lake Oswego, OR 97035

Attention: Mr. Travis Nguyen

RE: REPORT ON THE GEOPHYSICAL SURVEYS AT BONNEVILLE DAM, OREGON

Dear Mr. Nguyen:

Global Geophysics conducted electrical resistivity tomography (ERT) and seismic refraction, surveys for Bonneville Swing Bridge, Bonneville Dam, Oregon. The proposed objectives of the geophysical investigation is to assist in studying subsurface conditions.

METHODOLOGY AND INSTRUMENTATION

Electrical resistivity tomography, seismic refraction, and overwater reflection methods were used for this study. The following paragraphs describe the methods and field procedures.

Electrical Resistivity Tomography (ERT)

The electrical resistivity tomography technique maps differences in the electrical properties of geologic materials. These differences can result from variations in lithology, water content, and pore-water chemistry. The method involves transmitting an electric current into the ground between two electrodes and measuring the voltage between two other electrodes. The direct measurement is an apparent resistivity of the area beneath the electrodes that includes deeper layers as the electrode spacing is increased. Recent advances in technology permit rapid collection of multiple soundings, using up to 56 electrodes for each spread. The data are modeled to create a 2-D geo-electric cross-section that is useful for mapping both vertical and horizontal variations of the subsurface strata.

The data were acquired with an AGI SuperSting R8 using up to 56 electrodes spaced at a 5 – foot interval. Once the electrode array was installed in the ground, multiple soundings were automatically carried out by the control unit. Downloading and routine modeling of the data was done on-site to provide preliminary analysis and QA/QC of the data. These results were displayed on a color monitor as cross-section that highlight changes in resistivity with depths along the transects.

Seismic Refraction

Seismic refraction is the traditional method for determining the rock velocity for rock rippability using a controlled energy source (hammer, blank shotgun shells, or chemical explosives) to generate a seismic signal. The seismic signals are received by a series of geophones (24, for example) that are connected to a seismic cable laid on the surface in a linear manner. The geophones, evenly spaced along the geophone cable, are placed on the ground surface. The seismic energy source (explosive) is discharged at several places along the array and off both ends.

The seismic wavelets travel through the earth to the geophones that convert the acoustic energy in the ground to an electric signal in the geophone cable. The seismograph detects the arriving electric signals with respect to time and stores the records for future data processing. The seismic data is processed to determine the seismic velocity of the earth material through which the energy has traveled and to model the subsurface geology. This geophysical model depicts the earth in cross-section showing the velocity and thickness of the subsurface layers below the seismic line.

The seismic refraction survey was conducted using a Geometrics Geode 24-channel digital seismograph. The sensors used were Mark Products 4.5-Hz vertical geophones and the seismic energy source was a 20 lb. sledgehammer. The typical field procedure consisted of laying out the cables and planting the geophones at 5 ft intervals. The shots were set off at seven locations along the geophone array. Data was collected and saved in digital format and a field record was produced on the computer screen to check the data quality in real time.

ANALYSIS AND RESULTS

The approximate line locations are shown in Figure 1. The inverted resistivity profiles are presented in Figure 2. The electrical resistivity tomography measures the soil and rock resistivity. The resistivity profiles indicate two layers of soil above the bedrock: gravel (resistive) and silt (less resistive). Based on the borehole logs, the top of the bedrock is interpreted as the resistivity starts to increase below the silt.

The interpreted velocity profiles are presented in Figure 3. The velocities of overburden on Line 1 is 1100 ft/s, and 650 ft/s and 1100 ft/s on Line 2. The interpreted bedrock velocity is 8070 ft/s.

LIMITATIONS OF THE GEOPHYSICAL METHOD

Global geophysics services are conducted in a manner consistent with the level of care and skill ordinarily exercised by other members of the geophysical community currently practicing under similar conditions subject to the time limits and financial and physical constraints applicable to the services. ERT and seismic refraction are remote sensing geophysical methods that may not detect all subsurface conditions due to the limitations of the methods, soil conditions, size of the features and their depths.

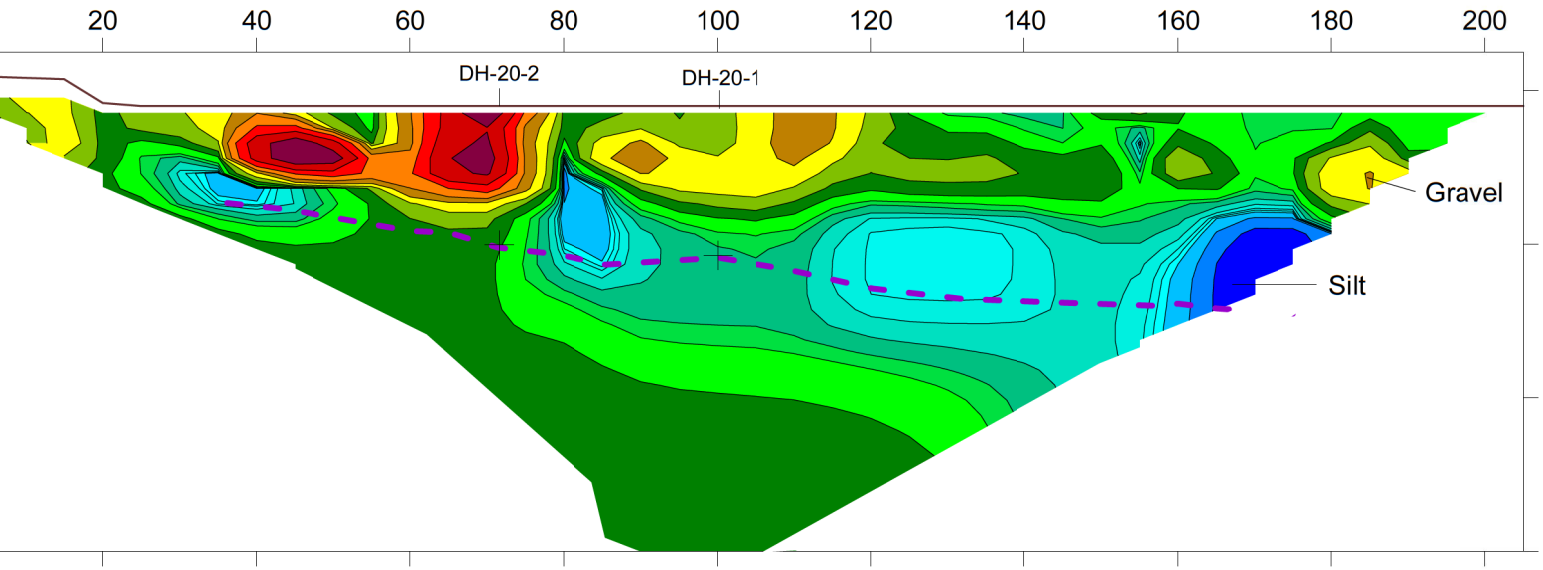
Sincerely,

Global Geophysics

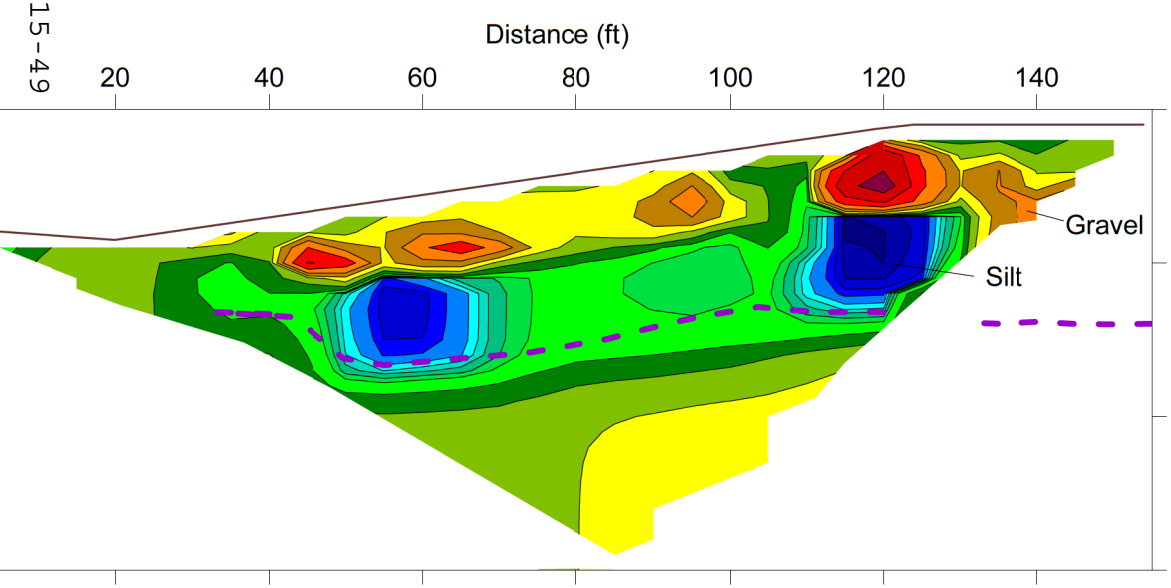
John Liu, Ph.D., R.G.
Principal Geophysicist

DH-20-1
DH-20-2
DH-20-4 (B)
0
0
Line 1
0
Line 2
0
Star Route
Columbia River
Leg
PROJECT
Geop
TITLE

A15-48



A15-49

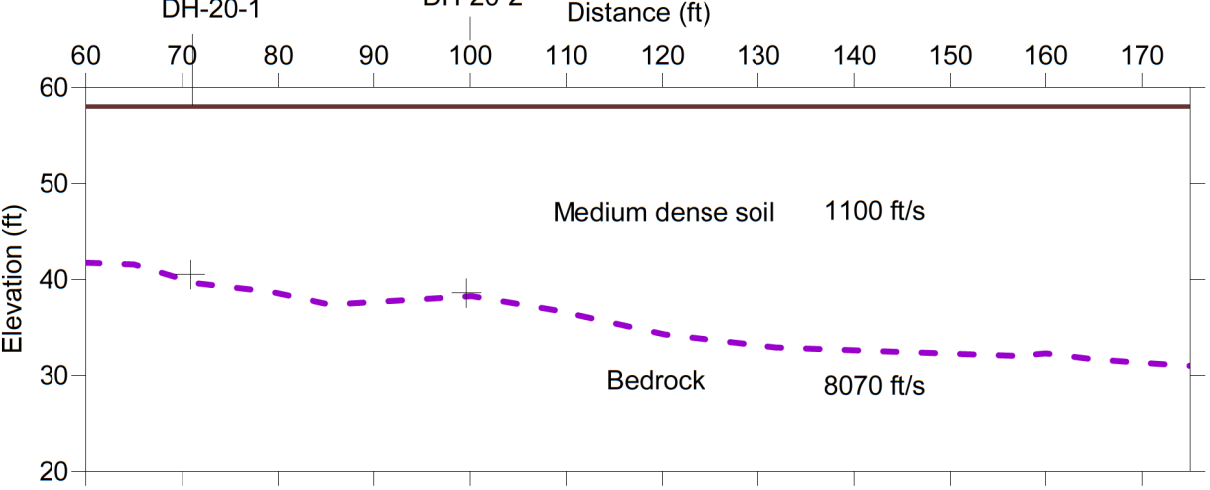


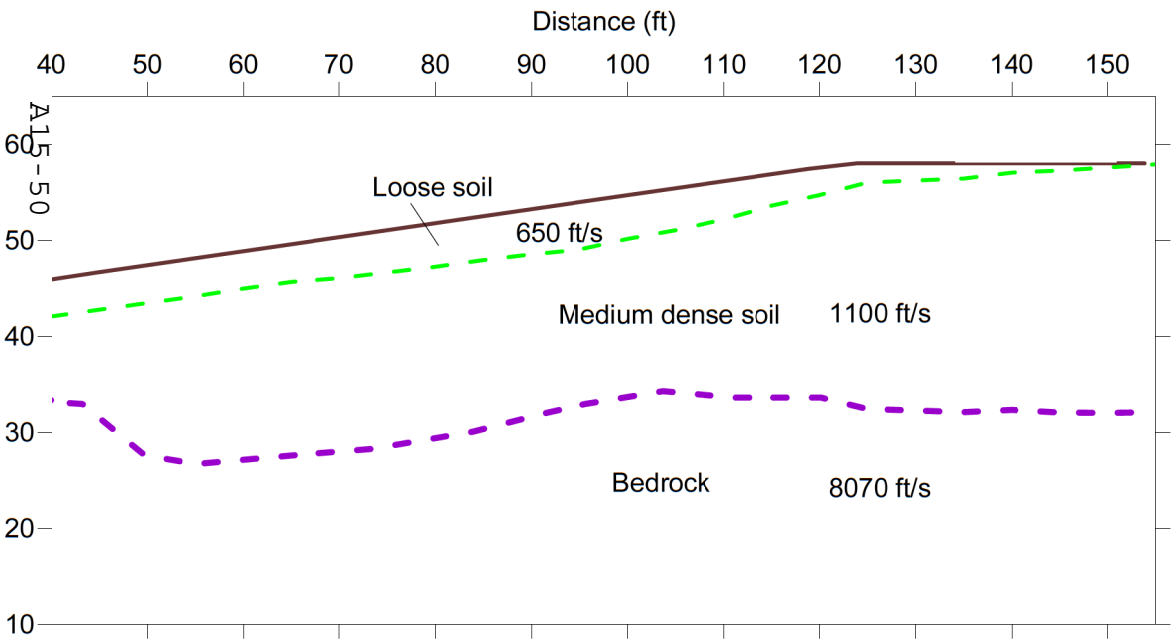
0 ft

Legend:

PROJECT
Geop

TITLE





Legend:

PROJECT
Geop

TITLE

IMPORTANT INFORMATION

Important Information

About Your Geotechnical/Environmental Report

IMPORTANT INFORMATION

CONSULTING SERVICES ARE PERFORMED FOR SPECIFIC PURPOSES AND FOR SPECIFIC CLIENTS.

Consultants prepare reports to meet the specific needs of specific individuals. A report prepared for a civil engineer may not be adequate for a construction contractor or even another civil engineer. Unless indicated otherwise, your consultant prepared your report expressly for you and expressly for the purposes you indicated. No one other than you should apply this report for its intended purpose without first conferring with the consultant. No party should apply this report for any purpose other than that originally contemplated without first conferring with the consultant.

THE CONSULTANT'S REPORT IS BASED ON PROJECT-SPECIFIC FACTORS.

A geotechnical/environmental report is based on a subsurface exploration plan designed to consider a unique set of project-specific factors. Depending on the project, these may include the general nature of the structure and property involved; its size and configuration; its historical use and practice; the location of the structure on the site and its orientation; other improvements such as access roads, parking lots, and underground utilities; and the additional risk created by scope-of-service limitations imposed by the client. To help avoid costly problems, ask the consultant to evaluate how any factors that change subsequent to the date of the report may affect the recommendations. Unless your consultant indicates otherwise, your report should not be used (1) when the nature of the proposed project is changed (for example, if an office building will be erected instead of a parking garage, or if a refrigerated warehouse will be built instead of an unrefrigerated one, or chemicals are discovered on or near the site); (2) when the size, elevation, or configuration of the proposed project is altered; (3) when the location or orientation of the proposed project is modified; (4) when there is a change of ownership; or (5) for application to an adjacent site. Consultants cannot accept responsibility for problems that may occur if they are not consulted after factors that were considered in the development of the report have changed.

SUBSURFACE CONDITIONS CAN CHANGE.

Subsurface conditions may be affected as a result of natural processes or human activity. Because a geotechnical/environmental report is based on conditions that existed at the time of subsurface exploration, construction decisions should not be based on a report whose adequacy may have been affected by time. Ask the consultant to advise if additional tests are desirable before construction starts; for example, groundwater conditions commonly vary seasonally.

Construction operations at or adjacent to the site and natural events such as floods, earthquakes, or groundwater fluctuations may also affect subsurface conditions and, thus, the continuing adequacy of a geotechnical/environmental report. The consultant should be kept apprised of any such events and should be consulted to determine if additional tests are necessary.

IMPORTANT INFORMATION

MOST RECOMMENDATIONS ARE PROFESSIONAL JUDGMENTS.

Site exploration and testing identifies actual surface and subsurface conditions only at those points where samples are taken. The data were extrapolated by your consultant, who then applied judgment to render an opinion about overall subsurface conditions. The actual interface between materials may be far more gradual or abrupt than your report indicates. Actual conditions in areas not sampled may differ from those predicted in your report. While nothing can be done to prevent such situations, you and your consultant can work together to help reduce their impacts. Retaining your consultant to observe subsurface construction operations can be particularly beneficial in this respect.

A REPORT'S CONCLUSIONS ARE PRELIMINARY.

The conclusions contained in your consultant's report are preliminary, because they must be based on the assumption that conditions revealed through selective exploratory sampling are indicative of actual conditions throughout a site. Actual subsurface conditions can be discerned only during earthwork; therefore, you should retain your consultant to observe actual conditions and to provide conclusions. Only the consultant who prepared the report is fully familiar with the background information needed to determine whether or not the report's recommendations based on those conclusions are valid and whether or not the contractor is abiding by applicable recommendations. The consultant who developed your report cannot assume responsibility or liability for the adequacy of the report's recommendations if another party is retained to observe construction.

THE CONSULTANT'S REPORT IS SUBJECT TO MISINTERPRETATION.

Costly problems can occur when other design professionals develop their plans based on misinterpretation of a geotechnical/environmental report. To help avoid these problems, the consultant should be retained to work with other project design professionals to explain relevant geotechnical, geological, hydrogeological, and environmental findings, and to review the adequacy of their plans and specifications relative to these issues.

BORING LOGS AND/OR MONITORING WELL DATA SHOULD NOT BE SEPARATED FROM THE REPORT.

Final boring logs developed by the consultant are based upon interpretation of field logs (assembled by site personnel), field test results, and laboratory and/or office evaluation of field samples and data. Only final boring logs and data are customarily included in geotechnical/environmental reports. These final logs should not, under any circumstances, be redrawn for inclusion in architectural or other design drawings, because drafters may commit errors or omissions in the transfer process.
To reduce the likelihood of boring log or monitoring well misinterpretation, contractors should be given ready access to the complete geotechnical engineering/environmental report prepared or authorized for their use. If access is provided only to the report

IMPORTANT INFORMATION

prepared for you, you should advise contractors of the report's limitations, assuming that a contractor was not one of the specific persons for whom the report was prepared, and that developing construction cost estimates was not one of the specific purposes for which it was prepared. While a contractor may gain important knowledge from a report prepared for another party, the contractor should discuss the report with your consultant and perform the additional or alternative work believed necessary to obtain the data specifically appropriate for construction cost estimating purposes. Some clients hold the mistaken impression that simply disclaiming responsibility for the accuracy of subsurface information always insulates them from attendant liability. Providing the best available information to contractors helps prevent costly construction problems and the adversarial attitudes that aggravate them to a disproportionate scale.

READ RESPONSIBILITY CLAUSES CLOSELY.

Because geotechnical/environmental engineering is based extensively on judgment and opinion, it is far less exact than other design disciplines. This situation has resulted in wholly unwarranted claims being lodged against consultants. To help prevent this problem, consultants have developed a number of clauses for use in their contracts, reports, and other documents. These responsibility clauses are not exculpatory clauses designed to transfer the consultant's liabilities to other parties; rather, they are definitive clauses that identify where the consultant's responsibilities begin and end. Their use helps all parties involved recognize their individual responsibilities and take appropriate action. Some of these definitive clauses are likely to appear in your report, and you are encouraged to read them closely. Your consultant will be pleased to give full and frank answers to your questions.

The preceding paragraphs are based on information provided by the ASFE/Association of Engineering Firms Practicing in the Geosciences, Silver Spring, Maryland

DWG. NO.	TITLE
	SPILLWAY
M-6-1 SHT 1	SPILLWAY DAM-SHOWING SCOUR AS OF JAN. 1939
2	SPILLWAY DAM-BAY 9 - SHOWING SCOUR AS OF JAN. 1939
3	SPILLWAY DAM-BAY 15- SHWOING SCOUR AS OF JAN. 1939
4	SPILLWAY DAM-SHOWING SCOUR AS OF NOV. 1939
5	SPILLWAY DAM-SHOWING SCOUR AS OF NOV. 1939
M-6-1 SHT 6	SPILLWAY DAM-SHOWING SCOUR AS OF NOV. 1939
7	BOTTOM CONTOURS-D/S OF APRON - PIERS 1-5
8	BOTTOM CONTOURS-D/S OF APRON - PIERS 5-9
9	BOTTOM CONTOURS-D/S OF APRON - PIERS 9-13
10	BOTTOM CONTOURS-D/S OF APPON - PIERS 13-7
M-6-1 SHT 11	SPILLWAY DAM-BAY 5 - SHOWING SCOUR AS OF NOV. 1941
12	SPILLWAY DAM-BAY 9 - SHOWING SCOUR AS OF NOV. 1941
13	SPILLWAY DAM-BAY 13 - SHOWING SCOUR AS OF NOV. 1941
14	SPILLWAY DAM-BAY 15 - SHOWING SCOUR AS OF NOV. 1941
15	DOWNSTREAM APRON - SURVEY OF OCTOBER 1943
M-6-1 SHT 16A	DOWNSTREAM APRON SOUNDING PROFILES STA. 14+70 TO STA. 11+80
16B	DOWNSTREAM APRON SOUNDING PROFILES STA. 11+50 TO STA. 8+50
16C	DOWNSTREAM APPON SOUNDING PROFILES STA. 8+20 TO STA. 5+30
17	SKETCH SHOWING CONDITION OF BAFFLE DECK RESTORED IN DEC. 1940 AS OF SEPT. 1943
18	SPILLWAY DAM-BAY 5 - SHWOING SCOUR AS OF NOV 41 & 46
M-6-1 SHT 19	SPILLWAY DAM-BAY 9 - SHOWING SCOUR AS OF NOV 41 & 46
20	SPILLWAY DAM-BAY 13- SHOWING SCOUR AS OF NOV 41 & 46
21	SPILLWAY DAM-BAY 15- SHOWING SCOUR AS OF NOV 41 & 46
22	SPILLWAY DAM-BAY 16- SHOWING SCOUR AS OF NOV 41 & 46
23	SPILLWAY DAM-BAY 17- SHOWING SCOUP AS OF NOV 41 & 46
M-6-1 SHT 24	SPILLWAY DAM-DIVING SURVEY-BAFFLE DECK BAYS 5, 9 & 13 - NOV. 1948
25	SPLWY DAM-DIVING SUPVEY-BAFFLE DECK BAYS 15, 16 & 17 - NOV. 1948
26	SPILLWAY DAM-DIVING SURVEY-BAFFLE DECK BAYS 5, 9 & 13 - OCT. 1949
27	SPILLWAY DAM-DIVING SUPVEY-BAYS 15, 16 & 17- OCT 49
28A	SPILLWAY DAM- BAY 5 - NOV 1950
M-6-1 SHT 28B	SPILLWAY DAM-BAFFLE DECK CHANGES IN BAY 9-DEC. 1950
29	SPILLWAY DAM-BAY 16 - SHOWING SCOUR AS OF NOV. 1951
30	SPILLWAY DAM-BAY 13 - SHOWING SCOUR AS OF NOV. 1951
31	SPILLWAY DAM-BAY 9 - SHOWING SCOUR AS OF NOV. 1951
32	SPILLWAY DAM-BAY 5 - SHOWING SCOUR AS OF NOV. 1951
M-6-1 SHT 33	SPILLWAY DAM-BAY 16- SHOWING SCOUR AS OF NOV. 1952
34	SPILLWAY DAM-BAY 13- SHOWING SCOUR AS OF NOV. 1952
35	SPILLWAY DAM-BAY 9 - SHOWING SCOUR AS OF NOV. 1952
36	SPILLWAY DAM-BAY 5 - SHOWING SCOUR AS OF NOV. 1952
37	SPILLWAY DAM-BAY 16- SHOWING SCOUR AS OF NOV. 1954
M-6-1 SHT 38	SPILLWAY DAM-BAY 8 - SHOWING SCOUR AS OF JAN. 1955
39	SPILLWAY DAM-BAY 7 - SHOWING SCOUR AS OF JAN. 1955
40	SPILLWAY DAM-BAY 6 - SHOWING SCOUR AS OF JAN. 1955
41	SPILLWAY DAM-BAY 5 - SHOWING SCOUR AS OF JAN. 1955
42	SPILLWAY DAM-BAY 4 - SHOWING SCOUR AS OF JAN. 1955
M-6-1 SHT 43	SPILLWAY DAM-BAY 3 - SHOWING SCOUR AS OF JAN. 1955
44	SPILLWAY DAM-BAY 2 - SHOWING SCOUR AS OF JAN. 1955
45	SPILLWAY DAM-BAY 16- SHOWING SCOUR AS OF OCT. 1958
46	SPILLWAY DAM-BAY 15- SHOWING SCOUR AS OF OCT. 1958
47	SPILLWAY DAM-BAY 14- SHOWING SCOUR AS OF OCT. 1958
M-6-1 SHT 48	SPILLWAY DAM-BAY 13- SHOWING SCOUR AS OF OCT. 1958
49	SPILLWAY DAM-BAY 12- SHOWING SCOUR AS OF OCT. 1958
50	SPILLWAY DAM-BAY 11- SHOWING SCOUR AS OF OCT. 1958
51	SPILLWAY DAM-BAY 10- SHOWING SCOUR AS OF OCT. 1958
52	SPILLWAY DAM-BAY 9 - SHOWING SCOUR AS OF OCT. 1958
M-6-1 SHT 53	SPILLWAY DAM-BAY 8 SHOWING SCOUR AS OF OCT. 1958
54	SPILLWAY DAM-BAY 7 SHOWING SCOUR AS OF OCT. 1958
55	SPILLWAY DAM-BAY 6 SHOWING SCOUR AS OF OCT. 1958
56	SPILLWAY DAM-BAY 5 SHOWING SCOUR AS OF OCT. 1958
57	SPILLWAY DAM-BAY 4 SHOWING SCOUR AS OF OCT. 1958
M-6-2 SHT 1	REPAIR METHODS FOR SPILLWAY BAFFLES
2	REMOVABLE STEEL FORMS FOR BAFFLE REPAIR
3	PIER AND OGEE REPAIR PLATES
4	PIER AND OGEE SECTION ARMOR PLATE REPAIR
5	STEEL FORM FOR SPILLWAY DAM
	SPILLWAY DAM APRON & BAFFLE DAMAGE
3/1	SITE MAP
2	LOCATION MAP
3	BAY 10 SHOWING SCOUR AS OF NOV. 1954
4	BAY 11 SHOWING SCOUR AS OF NOV. 1954
5	BAY 12 SHOWING SCOUR AS OF NOV. 1954
6	BAY 13 SHOWING SCOUR AS OF NOV. 1954
	BAY 14 SHOWING SCOUR AS OF NOV. 1954
	BAY 15 SHOWING SCOUR AS OF NOV. 1954
	BAY 16 SHOWING SCOUR AS OF NOV. 1954
	BAY 17 SHOWING SCOUR AS OF NOV. 1954
MC-5-20-1	NORTH APPROACH TO DAM - POUR LINE DRAWINGS
2	NORTH APPROACH TO DAM - POUR LINE DRAWINGS
3	NORTH APPROACH TO DAM - POUR LINE DRAWINGS
4	NORTH APPROACH TO DAM - POUR LINE DRAWINGS
5	NORTH APPROACH TO DAM - POUR LINE DRAWINGS
MC-5-20-6	NORTH APPROACH TO DAM - POUR LINE DRAWINGS
7	NORTH APPROACH TO DAM - POUR LINE DRAWINGS
8	NORTH APPROACH TO DAM - POUR LINE DRAWINGS
9	NORTH APPROACH TO DAM - POUR LINE DRAWINGS
10	NORTH APPROACH TO DAM - POUR LINE DRAWINGS

DWG. NO.	TITLE
	SPILLWAY DAM APRON & BAFFLE DAMAGE
MC-5-23-1	WASH. ENTRANCE BAY CONSTR DET & JOINTS COUNTER. 1 & 2
2	CONSTR. JOINTS COUNTERFORT #3 & RETAINING WALL
3	CONSTR. JOINTS - CENTER WALL
4	CONSTR. JOINTS - A-1 TRAINING WALL
5	CONSTR. JOINTS - PIERS A-4 TO A-11 INCL.
MC-5-23-6	CONSTR. JOINTS - POURS NOS. 5, 6, 7 & 8
7	CONSTR. JOINTS - POURS NOS. 9, 10, 11 & 12
8	CONSTR. JOINTS - POURS NOS. 13 TO 18 INCL.
8	ABUTMENT NO. 1 & FISH LOCKS ERECTION DETS.-POUR 11
9	ABUT. NO. 1 & FISH LOCKS ERECTION DETS. POURS 12 & 13
MC-5-23-10	ABUT. NO. 1 & FISH LOCKS ERECTION DETS.-POUR 14
11	ABUT. NO. 1 & FISH LOCKS ERECTION DETS.-POUR 15
12	ABUT. NO. 1 & FISH LOCKS ERECTION DETS.-POUR 16
13	ABUT. NO. 1 & FISH LOCKS ERECTION DETS.-POUR 17
14	ABUT. NO. 1 & FISH LOCKS ERECTION DETS.-POUR 18
MC-5-23-15	ABUT. NO. 1 & FISH LOCKS ERECTION DETS.-POUR 19
16	ABUT. NO. 1 & FISH LOCKS ERECTION DETS.-POUR 20
17	ABUT. NO. 1 & FISH LOCKS ERECTION DETS.-POUR 21
	WASHINGTON SHORE FISH LADDER SEC. 15
MC-5-24 SHT 1	CONSTRUCTION DETAILS GENERAL PLAN AND INDEX
2	NORTH AND SOUTH WALLS
3	COUNTERFORTS NO 4 TO NO 10, INCL.
4	WATER SLOTS & KEYWAYS
5	CONSTRUCTION DETAILS DIFFUSION CHAMBER
MC-5-24 SHT 6	TYPICAL FORMING SECTIONS.
	ABUTMENT NO. 1 & FISH LOCK ERECTION DETAILS
MC-5-25 SHT 1	KEY TO POURS
2	POURS 1 - 4
3	POUR 5
4	POUR 6
5	POUR 7
MC-5-25 SHT 6	POUR 8 & 9
7	POUR 10
8	POUR 11
9	POUR 12 & 13
10	POUR 14
MC-5-25 SHT 11	POUR 15
12	POUR 16
13	POUR 17
14	POUR 18
15	POUR 19
MC-5-25 SHT 16	POUR 20
17	POUR 21
	SPILLWAY DAM
MD-2-46	CRIB STABILITY ANALYSIS SECOND STEP COFFERDAM
MD-3-5 SHT 1	STABILITY ANALYSIS SPILLWAY DAM FIRST STEP CONSTRUCTION
2	STABILITY ANALYSIS SPILLWAY DAM SECOND STEP CONSTRUCTION
MD-3-46	SPILLWAY GATES ASSEMBLY OF LIFTING AND LATCHING MECHANISM
MD-3-57	LINNTON HYDRAULIC LABORATORY BACKWATER EXPERIMENTS 1:100 RIVER MODEL COMPARISON OF ADJUSTED WATER SURFACE ELEVATIONS AT THE HEAD OF CASCADE RAPIDS
57B	SPILLWAY DAM LOCATION ORIGINAL RIVER CHANNEL AND COMPARATIVE SPILLWAY CREVTS
MD-3-58-B	HYDRAULIC LABORATORY BACKWATER EXPERIMENTS OF CHANNEL IMPROVEMENTS AT SHERIDAN POINT
MD-3-59-A	BONNEVILLE HYDRAULIC LABORATORY BACKWATER EXPERIMENTS AND NAVIGATION RUNS SHOWING CHANNEL IMPROVEMENTS AT CASCADE LOCKS CANAL FOR EXP. B39
60-A	BONNEVILLE HYDRAULIC LABORATORY BACKWATER EXPERIMENTS OF CHANNEL IMPROVEMENTS AT LOWER CASCADE RAPIDS
61-A	BONNEVILLE HYDRAULIC LABORATORY BACKWATER EXPERIMENTS SUMMARY OF BENEFITS DUE TO CHANNEL IMPROVEMENTS
62-A	BONNEVILLE HYDRAULIC LABORATORY BACKWATER EXPERIMENTS COMPARISON OF RIVER PROFILES FOR EXPERIMENTS B2 & B39
	BRADFORD ISLAND FISH LADDER SECTION 27
MC-5-8 SHT 1	DESIGN ASSUMPTIONS
MD-5-9 SHT 1	BRADFORD ISLAND WINGWALL COUNTERFORTS NO 2-5 INCL. DESIGN ASSUMPTIONS
MD-5-12 SHT 1	PIERS DESIGN DATA
2	CRANE RUNWAY GIRDERS-DESIGN DATA
3	CRANE DECK CENTER GIRDERS DESIGN
4	ORIGINAL DESIGN LAYOUT WITH TWO PIERS RIGID WITH OPERATING BRIDGE DESIGN DATA
MD-5-16 SHT 1	ABUTMENT NO 2 & FISH LOCKS ASSUMED LOADINGS FOR DESIGN
MD-5-24 SHT 1	WASHINGTON SHORE FISH LADDER-SECTION 15 DESIGN ASSUMPTIONS
	SPILLWAY - DOWNSTREAM
MP-1-59/1	REVETMENT RESTORATION - PLAN (21 FEB 47)
2	REVETMENT RESTORATION - SECTION

DWG. NO.	TITLE
	CONCRETE POWERHOUSE SUBSTRUCTURE & NAVIGATION LOCK
	CONTRACT W694 ENG. 45TH SPILLWAY DAM GANTRY CRANES
MISC. NOS.	
472371	STRESS ANALYSIS
472381	STRESS ANALYSIS
472391	STRESS ANALYSIS
472401	STRESS ANALYSIS
472621	BRIDGE ERECTION DIAGRAM 350 TON GANTRY CRANE-15 TON AUX. HOIST
472671	FRAME FOR 15 TON GRAPPLE TROLLEY 34'0" SPAN
472681	CANTILEVER FOR 15 TON GRAPPLE TROLLEY
473241	TROLLEY FRAME 15 TON BUCKET
473251	TROLLEY FRAME 15 TON BUCKET
487271	GENERAL DRAWING OF 350 TON GANTRY CRANE
N-1-3	LOCK EXCAVATION-5TH CONTRACT
	SUPSD BY
N-1-4 SHT 1	GENERAL DRAWING — N-1-11 SERIES
2	LOCK DESIGN DATA — N-1-11 SERIES
3	LOCK MASONRY PLAN & CROSS SECTIONS — N-1-11 SERIES
4	LOCK WALLS LONGITUDINAL ELEVATIONS — N-1-11 SERIES
5	CULVERT DETAILS — N-1-11 SERIES
N-1-4 SHT 6	LOCK GUIDE WALLS & BRIDGE PIERS — N-1-11 SERIES
7	LOCK EMBEDDED STEEL EMERGENCY DAM, FISHWAY GATES & MISC. — N-1-11 SERIES
8	LOCK TAINTER VALVE PIT — N-1-11 SERIES
9	LOCK MITER GATE ANCHOR FRAMES — N-1-11 SERIES
10	LOCK MANHOLES & MISC. EMBEDDED STEEL — N-1-11 SERIES
N-1-10	PRELIMINARY PLAN FOR CONVERSION OF SINGLE-LIFT BARGE LOCK INTO DOUBLE-LIFT SHIP LOCK 76 FT. x 500 FT. x 26 FT. DRAFT
N-1-11 SHT 1	GENERAL DRAWING
2	DESIGN DATA
3	MASONRY PLAN & CROSS SECTIONS
4	WALLS & LONGITUDINAL ELEVATIONS
5	CULVERT DETAILS
N-1-11 SHT 6	LOWER GUIDE WALL DETAILS GENERAL PLAN & RETAINING WALL
7	UPPER GUIDE WALL DETAILS
8	SWING BRIDGE - PIER DETAILS
9	DETAILS OF MONOLITHS 18-19-20
10	TAINTER VALVE PIT
N-1-11 SHT 11	TAINTER VALVE PIT
12	LOWER MITER GATE ANCHOR FRAMES
13	UPPER MITER GATE ANCHOR FRAMES
14	CURBING & MISC. EMBEDDED STEEL
15	CONTROL STATIONS & MANHOLE DETL'S MANHOLES 1, 10, 11, 12, 13, 14.
N-1-13	EXCAVATION FOR SWING BRIDGE PIERS NO's 1 & 2
N-1-14 SHT 1	EXCAVATION DETAILS
2	EXCAVATION DETAILS
3	EXCAVATION DETAILS
4	UPSTREAM GUIDE WALL EXCAVATION
N-1-16 SHT 1	MASONRY DETAILS MONOLITHS NOS. 11 THRU 17
2	MASONRY DETAILS MONOLITHS NOS. 11 THRU 17
3	MASONRY DETAILS MONOLITHS NOS. 11 THRU 17
4	MASONRY DETAILS MONOLITHS NOS. 11 THRU 17
5	MASONRY DETAILS MONOLITHS NOS. 11 THRU 17
N-1-16 SHT 6	MASONRY DETAILS MONOLITHS NOS. 11 THRU 17
N-1-17 SHT 1	ELECTRICAL DETAILS CONDUIT & PIPING PLAN
2	ELECTRICAL DETAILS- MANHOLES 2 TO 9 INCL.
3	ELECTRICAL DETAILS LOWER GUIDE WALL & BRIDGE PIERS NOS. 1, 2, & 3
4	ELECTRICAL DETAILS WALL LIGHTING & MACH'Y PITS MONOLITHS 11, 12, 16 & 17
5	ELECTRICAL DETAILS COND'T ENTRANCES, CABLE SUPPORTS & LTG. STD. DTL'S
N-1-17 SHT 6	ELECTRICAL DETAILS MACHINERY PITS IN MONOLITHS 26 & 27
7	ELECTRICAL DETAILS STOP LOG PLATFORM, UPPER GUIDE WALL & MISC. DET'LS
8	ELECTRICAL DETAILS LIGHTING & RECEPTABLE OUTLETS, & LIGHT ST'D DET'L MONOLITHS 19 TO 25 INCL.
9	WATER MAIN LAYOUT
N-1-17 SHT 11	ELECTRICAL DETAILS CONTROL STATIONS
12	ELECTRICAL DETAILS MONOLITHS 1 & 2 SOUTH LOCK WALL LIGHT STANDARDS
13	DRAINAGE SYSTEM FOR MANHOLES & PITS
N-1-18 SHT 1	LOWER GUIDE WALL DETAILS
2	LOWER GUIDE WALL DETAILS
N-1-19	LOWER EMERGENCY DAM RECESS-EMBEDDED STEEL
N-1-22 SHT 1	MASONRY DETAILS MONOLITH NO. 27
2	MASONRY DETAILS MONOLITH NO. 27
3	MASONRY DETAILS MONOLITH NO. 27
4	MASONRY DETAILS MONOLITH [illegible]

DWG. NO.	TITLE
	CONCRETE POWERHOUSE SUBSTRUCTURE & NAVIGATION LOCK
	CONTRACT W694 ENG. 45TH SPILLWAY DAM GANTRY CRANES
N-1-23	BORROW PIT AREA "A" 21ST CONTRACT
N-1-24 SHT 1	DETAILS OF MONOLITH NO. 26 INTAKE OF NORTH WALL
2	DETAILS OF MONOLITH NO. 26 INTAKE OF NORTH WALL
3	DETAILS OF MONOLITH NO. 26 INTAKE OF NORTH WALL
N-1-25	WALL DRAINAGE SYSTEM
26	PLAN FOR TEMPORARY 150 FOOT TRUSS FOR O.W.R. & N. COMPANY AT EAST END OF SHIP LOCK
N-1-28 SHT 1	CULVERT DETAILS
2	CULVERT DETAILS
3	CULVERT DETAILS
4	CULVERT DETAILS
5	CULVERT DETAILS
N-1-28 SHT 6	CULVERT DETAILS
N-1-29	EMBEDDED STEEL FOR MACHINERY PITS, ECT.
30	MASONRY DETAILS-MITER GATE PINTLE BASES
N-1-32 SHT 1	EMBEDDED BOLTS PIER NO. 2
2	EMBEDDED BOLTS PIER NO. 1 & 3
3	EMBEDDED BOLTS PIER NO. 4 & 5
N-1-33 SHT 1	DETAILS OF MONLITHS 18-19-20
N-1-34 SHT 1	MASONRY DETAILS MONOLITHS NOS. 21 THRU 25
2	MASONRY DETAILS MONOLITHS NOS. 21 THRU 25
3	MASONRY DETAILS MONOLITHS NOS. 21 THRU 25
4	MASONRY DETAILS MONOLITHS NOS. 21 THRU 25
5	MASONRY DETAILS MONOLITHS NOS. 21 THRU 25
N-1-35 SHT 1	MASONRY DETAIL - MONOLITHS NOS 1 TO 10 INC. & NO 28
2	MASONRY DETAILS- MONOLITHS NOS 1 TO 10 INC. & NO 28
3	MASONRY DETAILS- MONOLITHS NOS 1 TO 10 INC. & NO 28
N-1-37	TAINTER VALVE TRASH RACKS & QUOIN POST ADJUSTMENT BEAMS
N-1-38 SHT 1	UPPER GUIDE WALL DETAILS
2	UPPER GUIDE WALL DETAILS
3	UPPER GUIDE WALL DETAILS
4	UPPER GUIDE WALL DETAILS
5	UPPER GUIDE WALL DETAILS
N-1-38 SHT 6	UPPER GUIDE WALL DETAILS
N-1-39	BACK FILL FOR SHIP LOCK DEC 4, 1934
N-1-40 SHT 1	CONTROL HOUSES ARCHITECTURAL DETAILS
2	CONTROL HOUSES ARCHITECTURAL DETAILS
3	CONTROL HOUSES ARCHITECTURAL DETAILS
N-1-42	MONOLITH NO. 26 CONSTRUCTION JOINTS
N-1-45	FLOATING MOORING BIT RECESSES CONCRETE OUTLINE & EMBEDDED STEEL
46	LOWER ANCHOR FRAME EXCAVATION NORTH WALL
47	RECESS FOR R.R. TRACK
N-1-48 SHT 1	HAND RAILING PLAN & ELEVATIONS
2	HAND RAILING ELEVATIONS & WALKWAYS
3	MISCELLANEOUS DETAILS
4	PLAN & ELEVATIONS
	SHIP LOCK SWING BRIDGE
N-1-49	CORRECTIONS TO PIER NO 3
50	ALTERATIONS TO PIER NO 1
51	PIER DETAILS WING WALL ADDITION TO PIER NO. 1
N-1-52 SHT 1	GENERAL SITE MAP
2	EQUIPMENT LOCATION AND GEOMETRY OF MITER GATES
N-1-56	TIMBER BUMPER MONLITH 16
57	EXCAVATION REQUIRED FOR WALL DRAINS (SOUTH WALL ONLY)
N-1-59 SHT 1	DETAILS OF CORNER PROTECTION ANGLES
2	DETAILS OF CORNER PROTECTION ANGLES
3	DETAILS OF CORNER PROTECTION ANGLES
4	DETAILS OF CORNER PROTECTION ANGLES
	CONTROL HOUSES
N-1-60 SHT 1	PLANS, ELEVATIONS AND GENERAL SECTIONS
2	DOOR & PROJECTED WINDOW DETAILS
3	CIRCULAR WINDOW, WALL SECTION & CONDUIT LAYOUT
4	MOUNTING BLOCKS AND CEILING LIGHT DETAILS

REVISION	DATE	DESCRIPTION	BY
	4/18/80	INDEX UPDATED	VLS

U. S. ARMY ENGINEER DISTRICT, PORTLAND
CORPS OF ENGINEERS

DESIGNED BY
DRAWN BY
TRACED BY
CHECKED BY
REVIEWED:
SUPERVISED: MKV
NAME AND TITLE: CHIEF O & M MANUAL WRITING SECTI
SUBMITTED:
RECOMMENDED:

BONNEVILLE DAM
COLUMBIA RIVER OREGO

NAVIGATION LO

THIS PRINT REDUCED
ONE-HALF SCALE

DWG. NO.	TITLE
	SHIP LOCK - EMERGENCY DAM BULKHEAD
N-1-62	BRIDGE PIERS, ANCHOR BOLT PLAN, GENERAL LAYOUT & DETAILS
N-1-64	CHANGES IN MONOLITH NO. 17 & ROCK BACKING
N-1-68	VALVE CHAMBER GATES EMBEDDED STEEL
N-1-70	DRAINAGE PIPES FOR NON'LTH. 25
71	COUNTERWEIGHT PROPOSED ARRANGEMENT
N-1-73	EMBEDDED STEEL-MACHINERY PITS
N-1-75	RELOCATION OF QUOIN POST ADJUSTMENT BEAM
N-1-76 SHT 1	LOWER GUIDE WALL - NORTH SIDE
2	LOWER GUIDE WALL - NORTH SIDE
	BRIDGE ACROSS NAVIGATION CHANNEL
N-1-77	BRIDGE & PIER PROTECTION-NORTH SIDE-
77A	SWING BRIDGE REST & FENDER DETAILS
77B	SWING BRIDGE FENDER CELL
77C	RECONSTRUCTION OF SWING BRIDGE FENDER CELL
	SHIP LOCK HAND RAILING DETAILS
N-1-79 SHT 1	SOUTH-WEST END OF LOCK
2	
3	NORTH WALL OF LOCKS
4	NORTH WALL OF LOCKS
5	FOR WALKWAYS AT EL. +25 & +65 IN MONOLITHS 20 TO 25 INCL.
	SHIP LOCK
N-1-80 SHT 1	CONDUIT SYSTEM BETWEEN SHIP LOCK & BRIDGE
2	ELECTRICAL DETAILS PULL BOX AT SWING BRIDGE PIER NO. 1
N-1-82	BRIDGE ACROSS NAVIGATION CANAL DRAINS FOR PIER 2
83	CONDUIT & PIPING CONNECTIONS SOUTH OF MONOLITH 11
N-1-84	FLOOR DETAILS FOR CONTROL HOUSES
85	EXTENSION OF 14" TYPE "C" LADDER
86	LOWER CONTROL HOUS ADDITION PLUMBING
N-1-88	TAINTER VALVE PIT ALTERATIONS
N-1-90 SHT 1	TAINTER VALVES MACHINERY PIT ALTERATIONS
2	TAINTER VALVES MACHINERY PIT ALTERATIONS
N-1-91	RAILINGS ADDITIONAL PLAN
92	HAND RAILING DETAILS
	COFFERDAMS, EXCAVATION AND ROADWAY FOR POWERHOUSE & LOCK
N-2-10 SHT 1	GENERAL PLAN - 5TH CONTRACT
2	POWER HOUSE EXCAVATION - 5TH CONTRACT
3	LOCK EXCAVATION COFFERDAM & ROADWAY DETAILS - 5TH CONTRACT
N-2-26	GENERAL PLAN OF NAVIGATION
29	TAINTER VALVES - GENERAL ARRANGEMENT
N-2-31	TAINTER VALVES - TRUNNION BEARING ANCHORAGE
32	TAINTER VALVES - GENERAL ARRANGEMENT & WATER SEALS
33	TAINTER VALVES - SCOUPING PLATE & WATER SEALS
N-2-41	SHIP LOCK MITER GATES QUOIN & MITER ENDS ASSEMBLY
42	CONCRETE RECESS FOR MITER GATE ANCHOR LINKAGE
	BRIDGE ACROSS NAVIGATION CANAL — 28TH CONTRACT
N-2-43 SHT 1	GENERAL SITE MAP
2	GENERAL LAYOUT
3	GENERAL ARRANGEMENT OF MACHINERY
4	ELECTRICAL DETAILS AND CONDUIT DIAGRAMS
	SWING BRIDGE
N-2-43A SHT 1	GENERAL PLAN
2	SWING SPAN (SPAN NO. 1)
N-2-43A SHT 3	FIXED SPANS (SPANS 2, 3,& 4)

DWG. NO.	TITLE
N-2-43A SHT 4	RECONSTRUCTION ABUTMENT, PIER ALTERATION & SECTIONS
5	RECONSTRUCTION BEAM SEATS
6	RECONSTRUCTION MISCELLANEOUS DETAILS
N-2-43A1	RECONSTRUCTION GRATING REPAIR
B	MODIFICATION TO FIXED SPAN BEARING AT PIER 3
	SHIP LOCK
N-2-44 SHT 1	UPPER ADJUSTING BEAMS FOR SETTING WALL QUOINS
2	UPPER ADJUSTING BEAMS FOR SETTING WALL QUOINS
	SHIP LOCK — EMERGENCY DAM
N-2-48 SHT 1	VALVE CHAMBER GATES ASSEMBLY & STRUCTURAL DETAILS
2	VALVE CHAMBER GATES SEAL DETAILS
3	VALVE CHAMBER GATES SKIN PLATE & GUIDE ROLLERS
4	VALVE CHAMBER GATES HOIST, LATCH PAWL & MISCL.
N-2-48 SHT 6	VALVE CHAMBER GATE ALTERATIONS FOR NEW TOP HORIZONTAL SEAL
7	EMERGENCY VALVE CHAMBERS - STOPLOG DETAILS
8	EMERGENCY VALVE CHAMBERS - STOPLOG DETAILS
9	EMERGENCY VALVE CHAMBERS - STOPLOG ROLLER GUIDE DETAILS
	NAVIGATION LOCK VALVE CHAMBER STOPLOG
N-2-48/10	DETAILS I
11	DETAILS II
12	DETAILS III
	SHIP LOCK EMERGENCY DAM
N-2-60 SHT 1	GENERAL SITE PLAN
2	BULKHEADS GENERAL PLAN AND STRESS SHEET
3	BULKHEADS NO 1 TO 3 INCL. PLAN & ELEVATIONS
4	BULKHEADS NO 1 TO 3 INCL. SECTIONS & END DETAILS
5	BULKHEADS NO 1 TO 3-END SHOES & MISCELLANEOUS DETAILS
N-2-60 SHT 6	BULKHEADS NO 1 TO 13 INCL. PICK-UP DETAILS
7	BULKHEADS NO 4 TO 13 INCL. PLAN AND ELEVATIONS
8	BULKHEADS NO 4 TO 13 INCL.-SE_TIONS & END DETAILS
N-2-60 SHT 9	BULKHEADS NO. 4 TO 13 INCL. END ROLLERS-ASSEMBLY & DETAILS
10	BULKHEADS NO 4 TO 13 INCL. END ROLLERS-DETAILS
11	LIFTING BEAM PLAN AND ELEVATION
12	LIFTING BEAM ROLLERS AND DETAILS
13	LIFTING BEAM HOOK ASSEMBLY AND DETAILS
N-2-60 SHT 14	LIFTING BEAM HOOK - DETAILS
15	DERRICKS GENERAL ARRANGEMENT & DATA
	BRIDGE ACROSS NAVIGATION CANAL
N-2-61 SHT 1	SWING SPAN COUNTERWEIGHT END
2	SWING SPAN SWING END
3	SWING SPAN DETAILS
4	SWING SPAN DETAILS
5	FIXED SPANS DETAILS
N-2-61 SHT 6	TIE PLAN AND DETAILS
7	SWING SPAN TURNING MACHINERY
8	SWING SPAN CENTER WEDGE MACHINERY
9	SWING SPAN END JACKS MECHANISM
10	SWING SPAN LATCH MECHANISM
N-2-61 SHT 10A	SWING SPAN CENTERING LATCH MECHANISM REVISIONS TO SHEET 10 - N-2-61
11	BRIDGE PIERS ANCHOR BOLTS PLAN
12	ELECTRICAL DETAILS SWING SPAN
13	ELECTRICAL DETAILS FIXED SPAN
	SHIP LOCK
N-2-62	TIMBER MITER SILLS - EMERGENCY DAM
N-2-63 SHT 4	TIMBER MITER GATES PINTLE CASTINGS & MISCL. DETAILS
N-2-63 SHT 6	TIMBER MITER GATES WICKET GATES-ASSEMBLY AND DETAILS
7	TIMBER MITER GATES GEOMETRY AND PLAN
	BRIDGE ACROSS NAVIGATION CANAL
N-2-69	COUNTERWEIGHT PROPOSED ARRANGEMENT
70	SWING SPAN HAND OPERATING MECHANISM PROPOSED CHANGE IN BRACKET S-4789
71	COUNTERWEIGHT PROPOSED ARRANGEMENT

DWG. NO.	TITLE	
	TIMBER MITER GATES	
N-2-72 SHT 1	DESIGN DATA	
2	GENERAL ASSEMBLY & POST DETAILS	
3	WALL ANCHORAGE & QUOIN POST CASTINGS	
4	PINTLE CASTINGS & MISCEL. DETAILS	
5	TEMPORARY MITER GATES OPERATING MACHINERY	
N-2-72 SHT 6	TEMPORARY MITER GATES OPERATING SPAR	
7	GEOMETRY AND PLAN	
	BRIDGE ACROSS NAVIGATION CANAL	
N-2-73	SWING SPAN ALTERATIONS FOR CENTERING LATCH CLEARANCE	
74 SHT 1	TEMPORARY TRESTLE TO MONOLITH NO. 12	
75	CONDUIT DETAILS PIER NO. 3	
N-2-77	SWING SPAN CORRECTIONS TO TURNING MACHINERY CLUTCH YOKE MOUNTING	
78	FIXED SPAN NO 2 CORRECTIONS TO NORTH ENDS OF GIRDERS	
79	ARRANGEMENT SKETCH TO SHOW LOCATION OF SPEED REDUCER SWING SPAN END JACKS MECHANISM	
80	SWING SPAN ALTERATIONS CHANGE IN BRACKET TO CLEAR S-4684	
	36TH CONTRACT LOCK OPERATING EQUIPMENT LOWER MITER GATE	
N-2-81 SHT 1	DESIGN DATA	SUPSD BY N-2-114
2	GENERAL ASSEMBLY	SUPSD BY N-2-114
3	QUOIN & MITER CASTINGS	SUPSD BY N-2-114
4	EMBEDDED QUOIN POST ELEVATIONS	SUPSD BY N-2-114
5	EMBEDDED QUOIN POST, SECTIONS AND DETAILS	SUPSD BY N-2-114
N-2-81 SHT 6	PINTLE CASTINGS ASSEMBLY & DETAILS	SUPSD BY N-2-114
7	LOWER SEALS ARRANGEMENT AND DETAILS	SUPSD BY N-2-114
8	AIR CHAMBER GIRDERS, 15 TO 20, AND CONNECTIONS	SUPSD BY N-2-114
9	TOP GIRDER, ANCHORAGE AND STRUT CONNECTIONS	SUPSD BY N-2-114
N-2-81 SHT 10	ADJUSTMENT FACILITIES FOR EMBEDDED QUOIN POSTS	SUPSD BY N-2-114
	LOCK OPERATING EQUIPMENT - UPPER MITER GATE	
N-2-82 SHT 1	DESIGN DATA	SUPSD BY N-2-115
2	GENERAL ASSEMBLY	SUPSD BY N-2-115
3	QUOIN & MITER CASTINGS	SUPSD BY N-2-115
4	EMBEDDED QUOIN POST, ELEVATIONS	SUPSD BY N-2-115
5	WATER CHAMBER GIRDERS 2 TO 6, AND CONNECTIONS	SUPSD BY N-2-115
	LOCK OPERATING EQUIPMENT - MITER GATE MACHINERY	
N-2-83 SHT 1	DESIGN DATA	SUPSD BY N-2-116
1A	COMPUTATION CURVES FOR MITER GATES OPERATING MACHINERY	SUPSD BY N-2-116
2	GENERAL ASSEMBLY	SUPSD BY N-2-116
3	OPERATING STRUT ARRANGEMENT DETAILS OF SECTOR AND ARM	SUPSD BY N-2-116
	LOCK OPERATING EQUIPMENT - TAINTER VALVES	
N-2-84 SHT 1	DESIGN DATA	
2	GENERAL ASSEMBLY	
3	SEALS & SEAL CASTINNGS	
4	TUNNION & GUIDE ROLLER DETAILS	
	LOCK OPERATING EQUIPMENT - TAINTER VALVE MACHINERY	
N-2-85 SHT 1	GENERAL ASSEMBLY	
2	HOIST ASSEMBLY	
3	GEARS PINIONS AND SHEAVES	
4	BEARING DETAILS	
5	SHAFTS, BUSHINGS, SPROCKET, ETC.	
N-2-85 SHT 6	HOIST & COUNTERWEIGHT SHEAVE FRAMES	
7	CHAIN SHEAVE DETAILS	
8	RADIUS FRAME, STRUT'S & YOKES	
9	COUNTERWEIGHT AND DETAILS	
10	HOIST FRAME GRATINGS & LOWER PLATFORM	
N-2-85 SHT 11	DETAILS OF CHAIN, UPPER STRUT, AND CABLE CONNECTIONS	

DWG. NO.	TITLE	
N-2-85 SHT 12	GEAR GUARDS	
13	OVERLOAD CLUTCH DETAILS.	
14	COVERS FOR PITS AND FLOATING MOORING BITT RECESSES	
15	GREASING LAYOUT & PARTS LIST	
16	ELECTRICAL DETAILS	
	LOCK OPERATING EQUIPMENT - FLOATING MOORING BITT	
N-2-86 SHT 1	GENERAL ARRANGEMENT AND DETAILS	SUPSD BY N-2-102
2	PONTOON DETAILS	
3	DETAILS OF YOKE, BITT STOCK SPINDLE & ROLLER	SUPSD BY N-2-102
	33RD CONTRACT	
N-2-87	LIFTING BAR FOR VALVE GATES	
	BRIDGE ACROSS NAVIGATION CANAL	
N-2-89	SWING SPAN CHANGES	
90	SWING BRIDGE CHANGES IN LOWER FLANGE GIRDER	
91	SWING SPAN INDICATOR SUPPORT	
92	SWING SPAN COUNTERWEIGHT	
93	SWING SPAN - SOUTH END LUBRICATION PLATFORM	
	SHIP LOCK — EMERGENCY DAM	
N-2-94	DERRICK OPERATOR'S CAB	
95 SHT 1	33RD CONTRACT PROPOSED CHANGES IN BULKHEADS ETC.	
N-2-97	LIFTING BEAM CENTER OF GRAVITY ADJUSTMENT	
98	CENTER OF GRAVITY ADJUSTMENT FOR LIFTING BEAM	
99 SHT 1	PROVISIONS FOR TEMPORARY LIFT GATES	
100 SHT 1	PROVISIONS FOR TEMPORARY LIFT GATES BULKHEADS NO. 4 TO 8 INCLUSIVE PLAN & ELEVATIONS	
2	PROVISIONS FOR TEMPORARY LIFT GATES BULKHEADS NO. 4 TO 8 INCLUSIVE SECTIONS & END DETAILS	
	BRIDGE ACROSS NAVIGATION CANAL LOCK	
N-2-101	COUNTERWEIGHT FOR CENTERING LATCH MECHANISM	
N-2-102 SHT 1	FLOATING MOORING BITT GENERAL ARRANGEMENT	
2	FLOATING MOORING BITT DETAILS OF PONTOON & BITT STOCK	
3	DETAILS OF YOKE	
4	FLOATING MOORING BITT BEARING DETAILS	
N-2-104	SHIP LOCK EMERGENCY DAM SUGGESTED CORRECTIONS TO ROLLER HOUSING ER-1-ER	
105	SHIP LOCK EMERGENCY DAM ARRANGEMENT OF LIFTING BEAM SHEAVES	
106	BRIDGE ACROSS NAVIGATION CANAL SWING SPAN MAIN PINION BRACKET (CHANGES)	
107	BRIDGE ACROSS NAVIGATION CANAL SWING SPAN PINION SHAFT BEARING (CHANGES)	
108	BRIDGE ACROSS NAVIGATION CANAL SWING SPAN INDICATOR BRACKET CHANGES	
N-2-109/1	TAINTER VALVE OPERATOR PLANS, SECTIONS AND HYDRAULIC SYSTEM	
2	TAINTER VALVE OPERATOR DETAILS	
N-2-111 SHT 1	TAINTER VALVES - COUNTERWEIGHT PIT INSPECTION DOOR	
2	TAINTER VALVES - COUNTERWEIGHT PIT INSPECTION DOOR	
N-2-112	DERRICK BOOM POINT STUDY	
113	FLOATING MOORING BITT RECESS MEASURING TEMPLATE	

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CORPS OF ENGINEERS

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BONNEVILLE DAM PROJECT
COLUMBIA RIVER OREGON-WASHINGTON

LOCK EMERGENCY DAM BULKHEAD EQUIPMENT INDEX

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A16-2

LOCK OPERATING EQUIPMENT

N-2-114 SHT 1	LOWER MITER GATE DESIGN DATA
2	LOWER MITER GATE MATERIALS AND DESIGN SPECIFICATIONS
3	LOWER MITER GATE GENERAL ARRANGEMENT
4	LOWER MITER GATE GIRDERS 2 TO 6 AND CONNECTIONS
5	LOWER MITER GATE GIRDERS 7 & 8 AND CONNECTIONS
N-2-114 SHT 6	LOWER MITER GATE GIRDER 9-10 & 11 AND CONNECTIONS
7	LOWER MITER GATE GIRDERS 12 TO 14 INCLUSIVE
8	LOWER MITER GATE AIR CHAMBER GIRDERS 15 TO 19, AND CONNECTIONS
9	LOWER MITER GATE GIRDERS 20 TO 22 INCLUSIVE AND CONNECTIONS
10	LOWER MITER GATE END REACTION DIAPHRAGM AND END VERTICAL FRAME
N-2-114 SHT 11	LOWER MITER GATE DIAGONAL BRACING
12	LOWER MITER GATE QUOIN & MITER POST PLATES
13	LOWER MITER GATE QUOIN AND MITER CASTINGS
14	LOWER MITER GATE EMBEDDED QUOIN POST
15	LOWER MITER GATE GATE FENDERS AND RECESS BUMPERS
N-2-114 SHT 16	LOWER MITER GATES ROLLING PLAN & JACKING DATA
N-2-115 SHT 1	UPPER MITER GATE DESIGN DATA
2	UPPER MITER GATE MATERIALS AND DESIGN SPECIFICATIONS
3	UPPER MITER GATE GENERAL ARRANGEMENT
4	UPPER MITER GATE GIRDER NO 1
5	UPPER MITER GATE ANCHOR STRUT AND GUARD BRACKETS ON GIRDER NO 1
N-2-115 SHT 6	UPPER MITER GATE GIRDERS 2 TO 7 AND CONNECTIONS
7	UPPER MITER GATE GIRDERS-8 TO 10 AND CONNECTIONS
8	UPPER MITER GATE DIAGONAL BRACING-END VERTICAL FRAME AND END REACTION DIAPHRAGM
9	UPPER MITER GATE QUOIN & MITER POST PLATES
10	MITER GATES-TOP WATER SEAL
N-2-115 SHT 11	UPPER MITER GATE WALKWAY AND HAND RAIL
12	UPPER MITER GATE QUOIN & MITER CASTINGS
13	UPPER MITER GATE SPECIAL QUOIN AND MITER END CASTINGS
14	UPPER MITER GATE PINTLE CASTINGS ASSEMBLY & DETAILS
15	UPPER MITER GATE MITER GUARD, ASSEMBLY AND DETAILS
N-2-115 SHT 16	UPPER MITER GATE LOWER SEALS & SILLS ARRANGEMENT AND DETAILS
17	UPPER MITER GATE GATE FENDERS AND RECESS BUMPERS
18	UPPER MITER GATE EMBEDDED QUOIN POST, ELEVATIONS
19	UPPER MITER GATE ADJUSTMENT FACILITIES FOR EMBEDDED QUOIN POSTS
20	UPPER MITER GATE ANCHOR ADJUSTMENT SYSTEM
N-2-115 SHT 21	UPPER MITER GATE LUBRICATION DETAILS
22	LOWER MITER GATES - SEAL ALTERATIONS
N-2-116 SHT 1	MITER GATE MACHINERY DESIGN DATA
2	MITER GATE MACHINERY GENERAL ASSEMBLY
3	MITER GATE MACHINERY-ANCHOR BOLT SETTING ANCHOR BOLTS, SLEEVES & MISC. PARTS
4	MITER GATE MACHINERY OPERATING STRUT ARRANGEMENT DETAILS OF SECTOR AND ARM
4A	REPAIRS TO SECTOR ARM - MECHANICAL DETAILS
N-2-116 SHT 4B	SPARE SECTOR ARM - FABRICATION
5	MITER GATE MACHINERY OPERATING STRUT DETAILS
6	MITER GATE MACHINERY OPERATING STRUT DETAILS
7	MITER GATE MACHINERY GEARS, SHAFTS, KEYS AND WASHERS
8	MITER GATE MACHINERY BEARINGS & CAPS
N-2-116 SHT 9	MITER GATE MACHINERY MACHINERY BASE, STUFFING BOX DETAILS AND LIMIT SWITCH GEARS
10	MITER GATE MACHERY PIT AND RECESS COVERS
11	MITER GATE MACHINERY AUTOMATIC AUXILIARY BRAKE
12	MITER GATE MACHINERY ELECTRICAL DETAILS
N-2-118	BRIDGE SPAN - RELATION BETWEEN SWING SPAN ROLLERS & END ROLLER TRACK
N-2-119	TAINTER VALVE - SECTION THRU SIDE SEAL

PROVISIONS FOR TEMPERARY LIFT GATE

N-2-121 SHT 1	BULKHEAD STORAGE
2	CULVERT DISCHARGE BOX
3	BULKHEADS NO 7 AND 8 TIMBER ATTACHMENTS
4	MISC.-ADJUSTMENTS & SEALS

POWERHOUSE & SUBSTRUCTURE (MISC.)

N-2-122	TEMPORARY MITER GATES OPERATING SCHEME
123	NAVIGATION LOCKS CHAIN FENDERS PROPOSED PLAN
124	TAINTER VALVE PITS - GUIDE ROLLER TRACK ALIGNMENT
125	TAINTER VALVE MACHINERY
126	SHIP LOCK EMERGENCY DAM-DERRICK STRESS DIAGRAM
N-2-127	TAINTER VALVE-PROFILES OF SPROCKET TOOTH FORMS
128	EMERGENCY UNWATERING GATES - TESTING FACILITIES
129	TAINTER VALVE MACHINERY ARRANGEMENT OF RAILS & BARS IN COUNTERWEIGHT POCKETS
130	EMERGENCY DAMS AND DERRICKS BALLAST FOR VALVE CHAMBER GATES
N-2-131 SHT 1	EMERGENCY UNWATERING GATES - ALIGNMENT PROFILES OF EMBEDDED STEEL
N-2-134 SHT 1	TRASH RACKS-CULVERTS INTAKE-MON. #26
2	TRASH RACKS DETAILS FOR LIFTING BEAM
N-2-136	VALVE CHAMBER GATES-SEAL ALTERATION TO TOP SEAL CASTING

SHIP LOCK EQUIPMENT VALVE CHAMBER GATES

N-2-137 SHT 1	LOCK OPERATING EQUIPMENT LOWER MITER GATE STUDY OF SPLICES END POST & DOUBLING PLATES
N-2-138 SHT 1	GUIDE ROLLERS & LIFTING BAR
2	STRUCTURAL DETAILS
3	SEAL DETAILS
4	HAND HOIST - ASSEMBLY
N-2-138 SHT 6	HAND HOIST - SHEAVES
7	HAND HOIST - DRUM & BRAKE
8	HAND HOIST REVISED AUTOMATIC BRAKE ASSEMBLY

EMERGENCY DAM & DERRICKS

N-2-139	MAST AND BOOM LINE HANGERS
N-2-142 SHT 1	MAST REINFORCEMENTS
2	ALTERATIONS TO BOOM & BULL GEAR
3	LOAD HANGER & BLOCKS AND DETAILS
4	STRESS DIAGRAM
N-2-142 SHT 5	GENERAL ARRANGEMENT SHOWING ALTERATIONS

LOCK OPERATING EQUIPMENT

N-2-143	MITER GATE PINTLE BASE FOUNDATION
143A	PUMP SHAFT EXTENSION - MECHANICAL DETAILS

LOCK OPERATING EQUIPMENT AND MISC.

N-2-145	TAINTER VALVE MACHY.-PLATFORMS AT ELE +64 & ELE +23 -HINGED GRATINGS AND LADDER EXTENSIONS
N-2-147	UNWATERING PUMP FOR ELECTRICAL MANHOLES
N-2-149 SHT 1	SWING BRIDGE TURNING MACHINERY ALTERATIONS
2	SWING BRIDGE TURNING MACHINERY ALTERATIONS
N-2-150 SHT 1	ELECTRICAL SYSTEM-CONDUIT LOCATION DIAGRAM FOR SHIP LOCK
2	ELECTRICAL SYSTEM-CONDUIT LOCATION DIAGRAMS FOR SHIP LOCK & GUIDE WALLS

SHIP LOCK EMERGENCY DAM - VALVE GATE CHAMBERS

N-2-151 SHT 1	HAND HOIST ALTERATIONS
2	HAND HOIST ALTERATIONS
N-2-151 SHT 5	MOTOR DRIVE ASSEMBLY
6	MOTOR DRIVE DETAILS

NAVIGATION LOCKS

N-2-152	UPSTREAM GUIDE WALL EXTENSION GENERAL LAYOUT
153	UPSTREAM GUIDE WALL EXTENSION DETAILS
N-2-156	UPSTREAM GUIDE WALL EXTENSION LIGHTING SYSTEM
157	UPSTREAM NORTH GUARD WALL PROPOSED CONC. WALL ON TIMBER PILES PLAN AND DETAILS
158	UPSTREAM NORTH GUARD WALL PROPOSED FLOATING CONCRETE WALL LAYOUT & DESIGN DETAILS
159	UPSTREAM NORTH GUARD WALL ROCK FILL CRIBS LAYOUT & STABILITY ANALYSIS
160	SOUNDINGS AT PROPOSED GUIDE WALL
N-2-161	DOWNSTREAM MOORING FACILITIES FLOATING TYPE
162	DOWNSTREAM MOORING FACILITIES CONCRETE WALL ON PILES
163	DOWNSTREAM MOORING FACILITIES TIMBER WALL
164	UPSTREAM SOUTH GUIDE WALL CONCRETE WALL ON PILES
165	UPSTREAM NORTH GUARD WALL PROPOSED FLOATING STEEL WALL TYPICAL DETAILS
N-2-166	UPSTREAM GUIDE WALL EXTENSION GENERAL PLAN
167	UPSTREAM GUIDE WALL EXTENSION STRUCTURAL DETAILS
N-2-169	UPSTREAM NAVIGATION LOCK GUIDE WALL FENDER DOLPHIN

SHIP LOCK AND SWING BRIDGE EQUIPMENT

N-2-400 SHT 2	ELECTRICAL SYSTEM INDEX OF EQUIPMENT
3	ELECTRICAL SYSTEM SINGLE LINE DIAGRAMS (SUPSD BY BDM-9-6-0B19/1)
4	ELECTRICAL SYSTEM ELEMENTARY WIRING DIAGRAM 120-240 V. SYSTEM & 480 V. LIGHT CONTROL
5	ELECTRICAL SYSTEM ELEMENTARY WIRING DIAGRAM DIAGRAM SWING BRIDGE (SUPSD BY BDM-9-61B19/B1)
6	ELECTRICAL SYSTEM ELEMENTARY WIRING DIAGRAM MITER GATES 1, 2, 3 & 4
N-2-400 SHT 7	ELECTRICAL SYSTEM ELEMENTARY WIRING DIAGRAM TAINTER VALVES 1, 2, 3 & 4
8	ELECTRICAL SYSTEM ELEMENTARY WIRING DIAGRAM CHAIN FENDERS 1 & 2

TEMPORARY LOCK OPERATING EQUIPMENT

N-2-401 SHT 1	ELECTRICAL DETAILS ONE LINE WIRING DIAGRAM
2	ELECTRICAL DETAILS ELEMENTARY WIRING DIAGRAM
3	ELECTRICAL DETAILS CONTROL AND CONTACTOR PANEL DETAILS
4	ELECTRICAL DETAILS BRIDGE CONTROL HOUSE LAYOUT
5	ELECTRICAL DETAILS BRIDGE WIRING DIAGRAM
N-2-401 SHT 6	ELECTRICAL DETAILS VALVE WIRING DIAGRAM
N-2-401 SHT 7	ELECTRICAL DETAILS WIRING DEVICES AND LOCATIONS
8	ELECTRICAL DETAILS DETAILS OF NAVIGATION LIGHTS
9	ELECTRICAL DETAILS AIR WHISTLE AND TRAFFIC STOP SIGNS
10	TAINTER VALVE MACHINERY ELECTRICAL TESTING EQUIPMENT
11	ELECTRICAL DETAILS PULL BOX & MANHOLE COVER GASKETS & MISCELLANEOUS DETAILS
N-2-401 SHT 12	TEMPORARY NAVIGATION TOPOGRAPHY & CANAL LOCATION
13	LOCK OPERATION AND SEQUENCE TABLE
N-2-402 SHT 2	ELECTRICAL DETAILS - BRIDGE ACROSS NAV. CANANL - BRIDGE CABLE LOOP

SHIP LOCK & SWING BRIDGE EQUIPMENT

N-2-403 SHT 1	ELECTRICAL SYSTEM CONTROL EQUIPMENT CONTROL DESKS IN LOCK CONTROL HOUSES
2	ELECTRICAL SYSTEM CONTROL EQUIPMENT CUBICLES IN CONTROL HOUSES 1 & 2
3	ELECTRICAL SYSTEM CONTROL EQUIPMENT CUBICLES IN CONTROL HOUSE 3
4	ELECTRICAL SYSTEM CONTROL EQUIPMENT CONTROL SWITCH DETAILS
5	ELECTRICAL SYSTEM CONTROL EQUIPMENT CONTROL DESK IN BRIDGE CONTROL HOUSE

SHIP LOCK AND SWING BRIDGE EQUIPMENT

N-2-404 SHT 1	ELECTRICAL SYSTEM WIRING DIAGRAMS FOR CH-1 & CH-3 CONTROL DESKS FOR GATES 1 & 2, ALL VALVES & BRIDGE (SUPSD BY BDM-9-6-0B9/OD1, OD2, & BDM-9-6-1B/19, BDM-9-6-G1-4, V1-V4,)
2	ELECTRICAL SYSTEM WIRING DIAGRAM OF CH-2 CONTROL DESK FOR GATES 3, 4 VALVES AND FENDERS (SUPSD BY BDM-9-6 -0B9/ OD3 & OD 4)
3	ELECTRICAL SYSTEM WIRING DIAGRAM FOR GATE 1, VALVE 1 AND LIGHTING PANELS IN CH-1
4	ELECTRICAL SYSTEM WIRING DIAGRAM FOR GATE 3, VALVE 3, VALVE 4, & LIGHTING PANELS IN CH-2
5	ELECTRICAL SYSTEM WIRING DIAGRAM FOR GATE 2 AND VALVE 2 PANELS AND GATES 1 & 2 MACHINERY
N-2-404 SHT 6	ELECTRICAL SYSTEM WIRING DIAGRAM FOR GATE 4 PANEL, GATE 3 & 4, AND VALVE 3 AND 4 MACHINERY
N-2-404 SHT 7	ELECTRICAL SYSTEM WIRING DIAGRAM FOR BRIDGE PANELS, BRIDGE MACHINERY AND GUARD GATES
8	ELECTRICAL SYSTEM WIRING DIAGRAM FOR LOCK LIGHTING AND RECEPTACLES
N-2-405 SHT 3	ELECTRICAL DETAILS 3 WIRE, 3 POLE, 30A, 440 V, PLUG RECEPTACLE DETAILS
N-2-406 SHT 1	CONTROL HOUSES HEATING AND VENTILATING SYSTEM
N-2-407 SHT 1	ELECTRICAL SYSTEM CABLE LOCATIONS ARRANGEMENT FOR TEMPORARY CONNECTIONS
2	ELECTRICAL SYSTEM CABLE LOCATIONS LOCATION OF CABLES FOR TEMPORARY CONNECTIONS
N-2-408 SHT 1	ELECTRICAL SYSTEM CABLE LOCATION DIAGRAM LOWER LOCK AND BRIDGE
2	ELECTRICAL SYSTEM CABLE LOCATION DIAGRAM UPPER LOCK AND FENDER

DERRICK

N-2-409 SHT 1	MAST STEP & COLLECTOR ASSEMBLY
2	STEP BEARING DETAILS
3	NAVIGATION LOCK-EMERGENCY DAM-TRANSFER CAR

OPERATING EQUIPMENT

N-2-410 SHT 1	ELECTRICAL SYSTEM CABLE ROUTING IN MANHOLE 7
2	ELECTRICAL SYSTEM CABLE ROUTING IN MANHOLE NO. 5
3	ELECTRICAL SYSTEM CABLE ROUTING IN MANHOLES NO 5, NO 15 AND NO 19
4	ELECTRICAL SYSTEM CABLE ROUTING IN MACHINERY PITS AND MISCELLANEOUS DETAILS
5	ELECTRICAL SYSTEM CABLE ROUTING IN MANHOLE 3
N-2-410 SHT 6	ELECTRICAL SYSTEM CABLE ROUTING IN MANHOLES 2 AND 4
7	ELECTRICAL SYSTEM CABLE ROUTING IN MANHOLES NOS 8 AND 9
8	ELECTRICAL SYSTEM CABLE ROUTING IN MANHOLE 10-11
9	ELECTRICAL SYSTEM CABLE ROUTING IN MANHOLE NO. 12
10	ELECTRICAL SYSTEM CABLE ROUTING IN MANHOLES 1, 17 & 18
N-2-410 SHT 11	ELECTRICAL SYSTEM CABLE ROUTING IN MH-14 & PULL BOXES

OPERATING EQUIPMENT

N-2-411 SHT 1	CABLE SCHEDULE - POWER CIRCUITS
2	CABLE SCHEDULE - POWER, CONTROL AND MISCELLANEOUS
3	CABLE SCHEDULE - LIGHTING CIRCUITS
4	CABLE SCHEDULE - LIGHTING CIRCUITS
5	CABLE SCHEDULE - GROUNDING SYSTEM
N-2-412 SHT 1	ELECTRICAL SYSTEM CABLE INSTALLATION DETAILS CONDUIT DETAILS FOR CH-1, GQ-2, GQ-4, VQ-2
2	ELECTRICAL SYSTEM CABLE INSTALLATION DETAILS CONDUIT DETAILS FOR CH-2, FQ-1 & FQ-2
3	ELECTRICAL DETAILS CABLE INSTALLATION DETAILS INSULATOR SUPPLIES
4	ELECTRICAL DETAILS CABLE INSTALLATION DETAILS INSULATOR SUPPORTS
5	ELECTRICAL DETAILS CABLE-INSTALLATION DETAILS - INSULATOR SUPPORTS
N-2-412 SHT 6	ELECTRICAL DETAILS CABLE INSTALLATION DETAILS - SHELF SUPPORTS
7	ELECTRICAL DETAILS CABLE INSTALLATION DETAILS BILL OF MATERIAL FOR SHTS. 3, 4, 5, 6
N-2-413	ELECTRICAL DETAILS CABLE BOXES
N-2-414/1	NAVIGATION SIGNAL - LOCK AND DETAILS
2	NAVIGATION SIGNAL - WIRING & SCHEMATIC DIAGRAM
N-2-417 SHT 1	ELECTRICAL SYSTEM-SWING BRIDGE CONTROL HOUSE (CH 3) DETAILS
2	ELECTRICAL SYSTEM SWING BRIDGE CONTROL HOUSE (CH 3) DETAILS

NAVIGATION LOCK - ELECTRICAL & MECHANICAL

N-2-418/1	50 TON POST DERRICK CONTROL MODIFICATIONS PLAN AND SECTIONS
2	50 TON POST DERRICK CONTROL MODIFICATIONS RISER DIAGRAM & PAWL POSITION INDICATORS
3	50 TON POST DERRICK CONTROL MODIFICATIONS HYDRAULIC CONTROLS GENERAL ARRANGEMENT
4	50 TON POST DERRICK CONTROL MODIFICATIONS HYDRAULIC CONTROLS DETAILS
5	50 TON POST DERRICK CONTROL MODIFICATIONS CONTROL STAND

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U. S. ARMY ENGINEER DISTRICT, PORTLAND
CORPS OF ENGINEERS

BONNEVILLE DAM PROJECT
COLUMBIA RIVER OREGON-WASHINGTON

LOCK AND OPERATING EQUIPMENT INDEX

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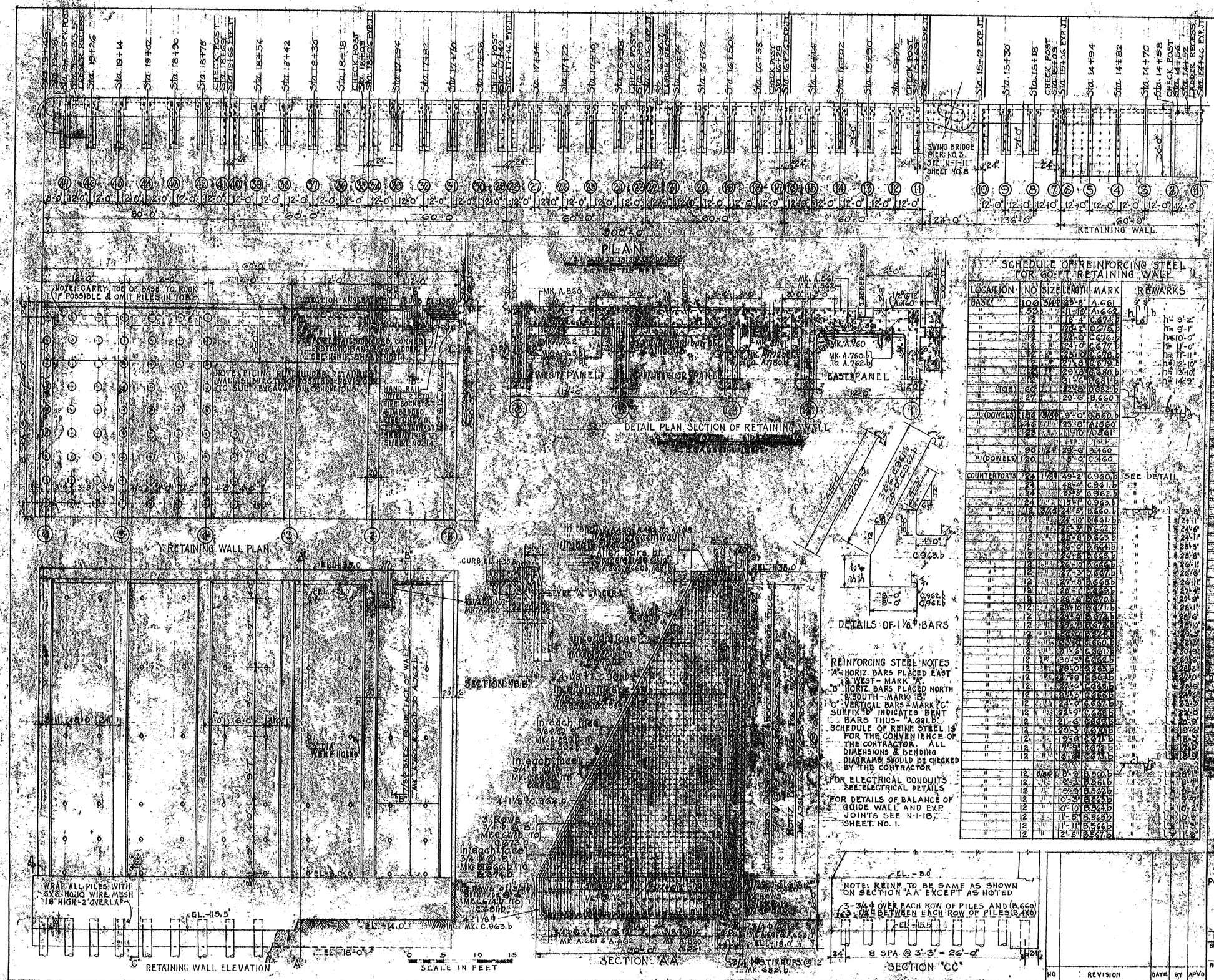


REINFORCING STEEL NOTES

"A" HORIZ. BARS PLACED EAST & WEST - MARK "A"

"B" HORIZ. BARS PLACED NORTH & SOUTH - MARK "B"

"C" VERTICAL BARS = MARK "C"

SUFFIX "b" INDICATES BENT BARS THUS - "A.921.b"

SCHEDULE OF REINF. STEEL IS FOR THE CONVENIENCE OF THE CONTRACTOR. ALL DIMENSIONS & BENDING DIAGRAMS SHOULD BE CHECKED BY THE CONTRACTOR

FOR ELECTRICAL CONDUITS SEE ELECTRICAL DETAILS

FOR DETAILS OF BALANCE OF GUIDE WALL AND EXP. JOINTS SEE N-1-18, SHEET NO. 1.

SCHEDULE OF REINFORCING STEEL FOR 60-FT RETAINING WALL

LOCATION	NO.	SIZE	LENGTH	MARK	REMARKS
BASE	100	3/4ϕ	23'-8"	A.661	
"	52	"	11'-10"	A.662	
"	12	"	18'-4"	C.674.b	
"	12	"	20'-2"	C.675.b	
"	12	"	22'-0"	C.676.b	
"	12	"	24'-0"	C.677.b	
"	12	"	25'-10"	C.678.b	
"	12	"	27'-8"	C.679.b	
"	12	"	29'-8"	C.680.b	
"	12	"	31'-6"	C.681.b	
(TOE)	60	"	22'-8"	C.682.b	
"	27	"	20'-8"	B.660	
(DOWELS)	184	7/8ϕ	9'-0"	C.560.b	
"	46	"	23'-8"	A.1560	
"	23	"	11'-10"	A.1561	
"	98	1/2ϕ	12'-8"	C.460	
" (DOWELS)	120	"	8'-0"	C.460	
COUNTERFORTS	24	1/8ϕ	49'-8"	C.980.b	SEE DETAIL
"	24	"	48'-4"	C.961.b	
"	24	"	47'-8"	C.962.b	
"	24	"	46'-4"	C.963.b	
"	12	3/4ϕ	24'-8"	B.660.b	
"	12	"	24'-10"	B.661.b	
"	12	"	25'-3"	B.662.b	
"	12	"	25'-8"	B.663.b	
"	12	"	26'-0"	B.664.b	
"	12	"	26'-3"	B.665.b	
"	12	"	26'-10"	B.666.b	
"	12	"	27'-3"	B.667.b	
"	12	"	27'-8"	B.668.b	
"	12	"	28'-1"	B.669.b	
"	12	"	28'-8"	B.670.b	
"	12	"	28'-10"	B.671.b	
"	12	"	29'-3"	B.672.b	
"	12	"	29'-8"	B.673.b	
"	12	"	30'-0"	B.674.b	
"	12	"	30'-3"	B.675.b	
"	12	"	30'-10"	B.676.b	
"	12	"	31'-3"	B.677.b	
"	12	"	31'-8"	B.678.b	
"	12	"	32'-1"	B.679.b	
"	12	"	32'-8"	B.680.b	
"	12	"	33'-3"	B.681.b	
"	12	"	33'-10"	B.682.b	
"	12	"	34'-3"	B.683.b	
"	12	"	34'-8"	B.684.b	
"	12	"	35'-3"	B.685.b	
"	12	"	35'-8"	B.686.b	
"	12	"	36'-3"	B.687.b	
"	12	"	36'-8"	B.688.b	
"	12	"	37'-3"	B.689.b	
"	12	"	37'-8"	B.690.b	
"	12	"	38'-3"	B.691.b	
"	12	"	38'-8"	B.692.b	
"	12	"	39'-3"	B.693.b	
"	12	"	39'-8"	B.694.b	
"	12	"	40'-3"	B.695.b	
"	12	"	40'-8"	B.696.b	
"	12	"	41'-3"	B.697.b	
"	12	"	41'-8"	B.698.b	
"	12	"	42'-3"	B.699.b	
"	12	"	42'-8"	B.700.b	
"	12	"	43'-3"	B.701.b	
"	12	"	43'-8"	B.702.b	
"	12	"	44'-3"	B.703.b	
"	12	"	44'-8"	B.704.b	
"	12	"	45'-3"	B.705.b	
"	12	"	45'-8"	B.706.b	
"	12	"	46'-3"	B.707.b	
"	12	"	46'-8"	B.708.b	
"	12	"	47'-3"	B.709.b	
"	12	"	47'-8"	B.710.b	
"	12	"	48'-3"	B.711.b	
"	12	"	48'-8"	B.712.b	
"	12	"	49'-3"	B.713.b	
"	12	3/4ϕ	8'-3"	B.560.b	
"	12	"	9'-3"	B.561.b	
"	12	"	9'-9"	B.562.b	
"	12	"	10'-3"	B.563.b	
"	12	"	10'-10"	B.564.b	
"	12	"	11'-5"	B.565.b	
"	12	"	11'-11"	B.566.b	
"	12	"	12'-5"	B.567.b	
COUNTERFORTS	12	1/8ϕ	49'-8"	C.980	
"	12	"	48'-4"	C.961	
"	12	"	47'-8"	C.962	
"	12	"	46'-4"	C.963	
"	12	3/4ϕ	24'-8"	B.660	
"	12	"	24'-10"	B.661	
"	12	"	25'-3"	B.662	
"	12	"	25'-8"	B.663	
"	12	"	26'-0"	B.664	
"	12	"	26'-3"	B.665	
"	12	"	26'-10"	B.666	
"	12	"	27'-3"	B.667	
"	12	"	27'-8"	B.668	
"	12	"	28'-1"	B.669	
"	12	"	28'-8"	B.670	
"	12	"	28'-10"	B.671	
"	12	"	29'-3"	B.672	
"	12	"	29'-8"	B.673	
"	12	"	30'-0"	B.674	
"	12	"	30'-3"	B.675	
"	12	"	30'-10"	B.676	
"	12	"	31'-3"	B.677	
"	12	"	31'-8"	B.678	
"	12	"	32'-1"	B.679	
"	12	"	32'-8"	B.680	
"	12	"	33'-3"	B.681	
"	12	"	33'-10"	B.682	
"	12	"	34'-3"	B.683	
"	12	"	34'-8"	B.684	
"	12	"	35'-3"	B.685	
"	12	"	35'-8"	B.686	
"	12	"	36'-3"	B.687	
"	12	"	36'-8"	B.688	
"	12	"	37'-3"	B.689	
"	12	"	37'-8"	B.690	
"	12	"	38'-3"	B.691	
"	12	"	38'-8"	B.692	
"	12	"	39'-3"	B.693	
"	12	"	39'-8"	B.694	
"	12	"	40'-3"	B.695	
"	12	"	40'-8"	B.696	
"	12	"	41'-3"	B.697	
"	12	"	41'-8"	B.698	
"	12	"	42'-3"	B.699	
"	12	"	42'-8"	B.700	
"	12	"	43'-3"	B.701	
"	12	"	43'-8"	B.702	
"	12	"	44'-3"	B.703	
"	12	"	44'-8"	B.704	
"	12	"	45'-3"	B.705	
"	12	"	45'-8"	B.706	
"	12	"	46'-3"	B.707	
"	12	"	46'-8"	B.708	
"	12	"	47'-3"	B.709	
"	12	"	47'-8"	B.710	
"	12	"	48'-3"	B.711	
"	12	"	48'-8"	B.712	
"	12	"	49'-3"	B.713	
"	12	3/4ϕ	8'-3"	B.560	
"	12	"	9'-3"	B.561	
"	12	"	9'-9"	B.562	
"	12	"	10'-3"	B.563	
"	12	"	10'-10"	B.564	
"	12	"	11'-5"	B.565	
"	12	"	11'-11"	B.566	
"	12	"	12'-5"	B.567	

LOCATION	NO.	SIZE	LENGTH	MARK	REMARKS
COUNTERFORTS	2	3/8ϕ	3'-1"	B.660.b	
"	2	"	2'-7"	B.669.b	
"	2	"	1'-11"	B.670.b	
"	2	"	4'-8"	B.671.b	
"	2	"	5'-2"	B.672.b	
"	2	"	5'-8"	B.673.b	
"	2	"	6'-3"	B.674.b	
"	2	"	6'-9"	B.675.b	
"	2	"	7'-3"	B.676.b	
"	2	"	7'-10"	B.677.b	
"	2	"	8'-4"	B.678.b	
"	2	"	8'-10"	B.679.b	
"	2	"	9'-3"	B.680.b	
"	2	"	9'-9"	B.681.b	
"	2	"	20'-1"	B.682.b	
"	2	"	20'-8"	B.683.b	
"	2	"	20'-10"	B.684.b	
"	2	"	21'-3"	B.685.b	
"	2	"	21'-8"	B.686.b	
"	2	"	22'-0"	B.687.b	
"	2	"	22'-8"	B.688.b	
"	2	"	23'-10"	B.689.b	
"	2	"	24'-3"	B.690.b	
"	2	"	24'-8"	B.691.b	
"	2	"	25'-3"	B.692.b	
"	2	"	25'-8"	B.693.b	
"	2	"	26'-3"	B.694.b	
"	2	"	26'-10"	B.695.b	
"	2	"	27'-3"	B.696.b	
"	2	"	27'-8"	B.697.b	
"	2	"	28'-1"	B.698.b	
"	2	"	28'-8"	B.699.b	
"	2	"	29'-3"	B.700.b	
"	2	"	29'-10"	B.701.b	
"	2	"	30'-3"	B.702.b	
"	2	"	30'-8"	B.703.b	
"	2	"	31'-3"	B.704.b	
"	2	"	31'-8"	B.705.b	
"	2	"	32'-3"	B.706.b	
"	2	"	32'-8"	B.707.b	
"	2	"	33'-3"	B.708.b	
"	2	"	33'-8"	B.709.b	
"	2	"	34'-3"	B.710.b	
"	2	"	34'-8"	B.711.b	
"	2	"	35'-3"	B.712.b	
"	2	"	35'-8"	B.713.b	
"	2	"	36'-3"	B.714.b	
"	2	"	36'-8"	B.715.b	
"	2	"	37'-3"	B.716.b	
"	2	"	37'-8"	B.717.b	
"	2	"	38'-3"	B.718.b	
"	2	"	38'-8"	B.719.b	
"	2	"	39'-3"	B.720.b	
"	2	"	39'-8"	B.721.b	
"	2	"	40'-3"	B.722.b	
"	2	"	40'-8"	B.723.b	
"	2	"	41'-3"	B.724.b	
"	2	"	41'-8"	B.725.b	
"	2	"	42'-3"	B.726.b	
"	2	"	42'-8"	B.727.b	
"	2	"	43'-3"	B.728.b	
"	2	"	43'-8"	B.729.b	
"	2	"	44'-3"	B.730.b	
"	2	"	44'-8"	B.731.b	
"	2	"	45'-3"	B.732.b	
"	2	"	45'-8"	B.733.b	
"	2	"	46'-3"	B.734.b	
"	2	"	46'-8"	B.735.b	
"	2	"	47'-3"	B.736.b	
"	2	"	47'-8"	B.737.b	
"	2	"	48'-3"	B.738.b	
"	2	"	48'-8"	B.739.b	
"	2	"	49'-3"	B.740.b	
KEYWAYS	4	5/8ϕ	12'-6"	C.569	
"	86	1/2ϕ	3'-10"	A.467	
WALLS ①	64	7/8ϕ	11'-10"	A.760	
" ②④	76	"	22'-1"	A.761	
" ④-⑥	4	"	23'-8"	A.762	
" ⑥-⑧	3	"	16'-7"	A.760.b	
"	3	"	6'-4"	A.761.b	
"	3	"	6'-7"	A.762.b	
" ⑥④	3	"	7'-1"	A.763.b	
"	3	"	7'-4"	A.764.b	
"	3	"	7'-7"	A.765.b	
"	3	"	7'-10"	A.766.b	
"	3	"	7'-10"	A.767.b	
"	3	"	7'-10"	A.768.b	
"	3	"	8'-1"	A.769.b	
"	3	"	8'-4"	A.770.b	
"	3	"	8'-7"	A.771.b	
" ②④	3	"	20'-0"	A.772.b	
"	3	"	9'-10"	A.773.b	
"	3	"	9'-10"	A.774.b	
"	3	"	9'-8"	A.775.b	
"	3	"	9'-6"	A.776.b	
"	3	"	9'-6"	A.777.b	
"	3	"	9'-4"	A.778.b	
"	3	"	9'-2"	A.779.b	
"	3	"	9'-0"	A.780.b	
"	49	5/8ϕ	23'-8"	A.560	
"	49	"	28'-10"	A.562	
" ②④	49	"	11'-10"	A.561	
"	129	1/2ϕ	22'-2"	C.461	
BTO ②	34	"	4'-10"	A.460	
BTO ③	10	"	8'-0"	A.468	
DECK SLAB (N)	70	3/4ϕ	11'-10"	A.662	
COUNTERFORTS	15	"	22'-2"	A.660	
"	15	"	18'-8"	A.661	
" TOP	20	1/2ϕ	7'-0"	C.461	
"	2	"	6'-9"	A.462	
"	2	"	2'-6"	A.463	
"	2	"	3'-7"	A.464	
"	2	"	1'-3"	A.465	
"	2	"	4'-10"	A.460	
" BOTTOM	20	"	7'-8"	B.462	

NO.	DETAILS COMPLETED	DATE	BY	APVD

NO.	REVISION	DATE	BY	APVD

BONNEVILLE POWER NAVIGATION PROJECT

13TH CONTRACT — CONCRETE

POWER HOUSE SUBSTRUCTURE & NAVIGATION LOCK

SHIP LOCK

LOWER GUIDE WALL DETAILS

GENERAL PLAN & RETAINING WALL

SCALES AS SHOWN

U. S. ENGINEER OFFICE, PORTLAND, OREGON DISTRICT

SUBMITTED: R. L. Mackenzie, ENGINEER — APPROVED: MAJOR, CORPS OF ENGINEERS

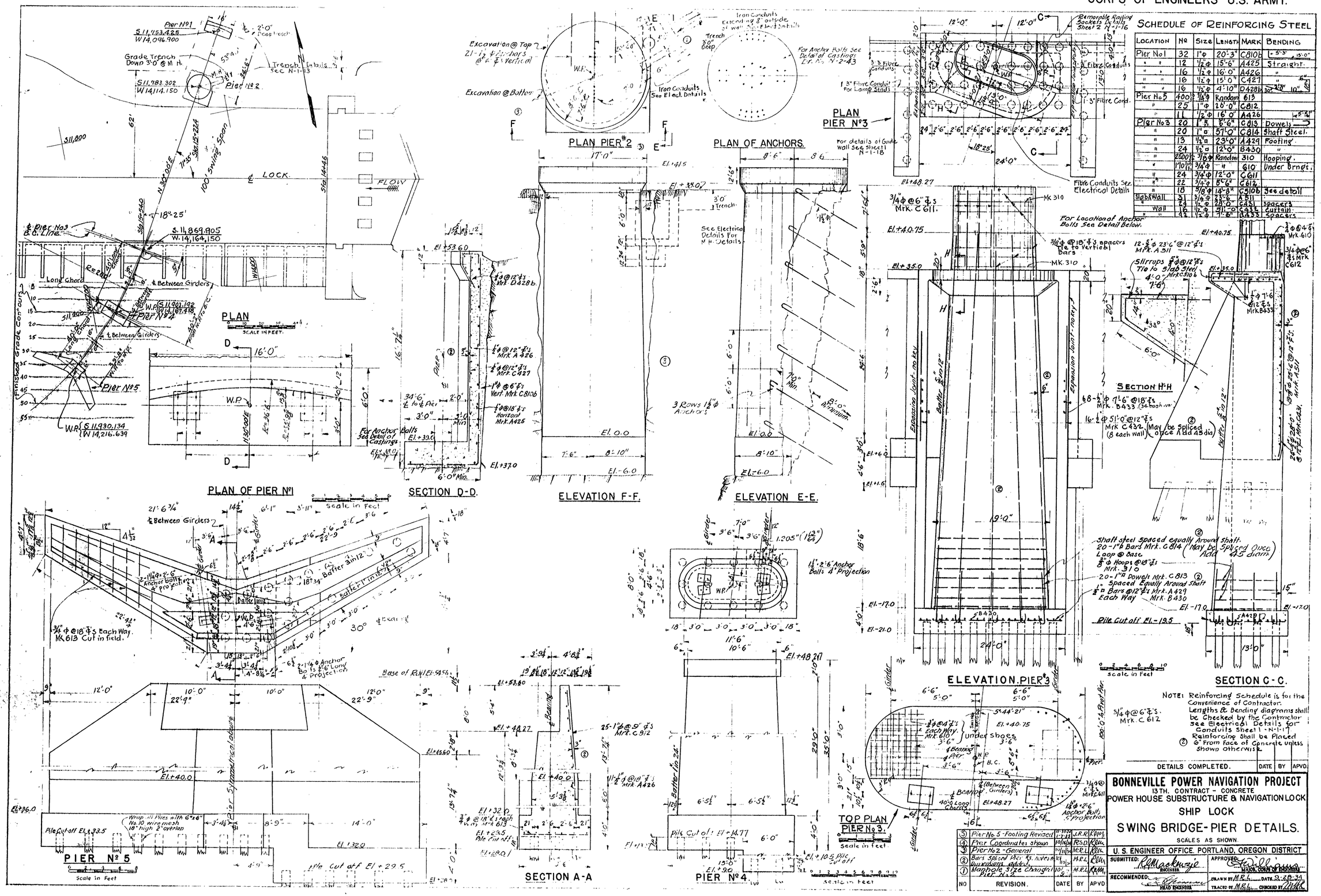
RECOMMENDED: HEAD ENGINEER

DRAWN BY L. D. H. DATE 9-28-34 — TRACED BY L. D. H. CHECKED BY M. K. G.

SHEET 6 OF 15 N-1-11

WAR DEPARTMENT

CORPS OF ENGINEERS U.S. ARMY.



SCHEDULE OF REINFORCING STEEL

LOCATION	Nº	SIZE	LENGTH	MARK	BENDING
Pier No 1	32	1"φ	20'-3"	C810b	5'-3" 15'-0"
" "	12	1/2"φ	15'-6"	A425	Straight.
" "	16	1/2"φ	16'-0"	A426	"
" "	16	1/2"φ	15'-0"	C427	" 6"
" "	16	1/2"φ	4'-10"	D428b	30" 2'-10" 10"
Pier No 5	400	3/4"φ	Random	613	
"	25	1"φ	20'-0"	C812	
"	11	1/2"φ	16'-0"	A426	5'-3"
Pier No 3	20	1"□	8'-6"	C813	Dowels
"	20	1"□	57'-0"	C814	Shaft Steel.
"	13	1/2"□	23'-0"	A429	Footing.
"	24	1/2"□	12'-0"	B430	"
"	2600	3/8"φ	Random	310	Hooping.
"	170	3/4"φ	"	610	Under Brngs.
"	24	3/4"φ	12'-0"	C611	
"	22	3/4"φ	8'-6"	C612	
"	18	3/8"φ	14'-8"	C510b	See detail
Slab & Wall	51	3/4"φ	23'-6"	A511	
"	74	1/2"φ	28'-0"	C431	Spacers
Wall	16	1/2"φ	51'-0"	C432	Curtain.
"	42	1/2"φ	7'-6"	B433	Spacers

NOTE: Reinforcing Schedule is for the Convenience of Contractor. Lengths & Bending diagrams shall be Checked by the Contractor. See Electrical Details for Conduits Sheet 1-N-1-11. Reinforcing Shall be Placed ② 6" From Face of Concrete unless Shown Otherwise.

DETAILS COMPLETED.	DATE	BY	APVD.

NO	REVISION.	DATE	BY	APVD
⑤	Pier No. 5 - Footing Revised	11-19-34	J.R.R.	RAM
④	Pier Coordinates shown	10/16/34	R.S.D.	RAM
③	Pier No. 2 - General	10/11/34	M.R.L.	RAM
②	Bars Spliced Pier #3, notes & quantities added.	10/1-2-34	M.R.L.	RAM
①	Manhole Size Changed Pier #3	10/1-2-34	M.R.L.	RAM

BONNEVILLE POWER NAVIGATION PROJECT

13TH. CONTRACT - CONCRETE

POWER HOUSE SUBSTRUCTURE & NAVIGATION LOCK

SHIP LOCK

SWING BRIDGE-PIER DETAILS.

SCALES AS SHOWN.

U. S. ENGINEER OFFICE. PORTLAND, OREGON DISTRICT

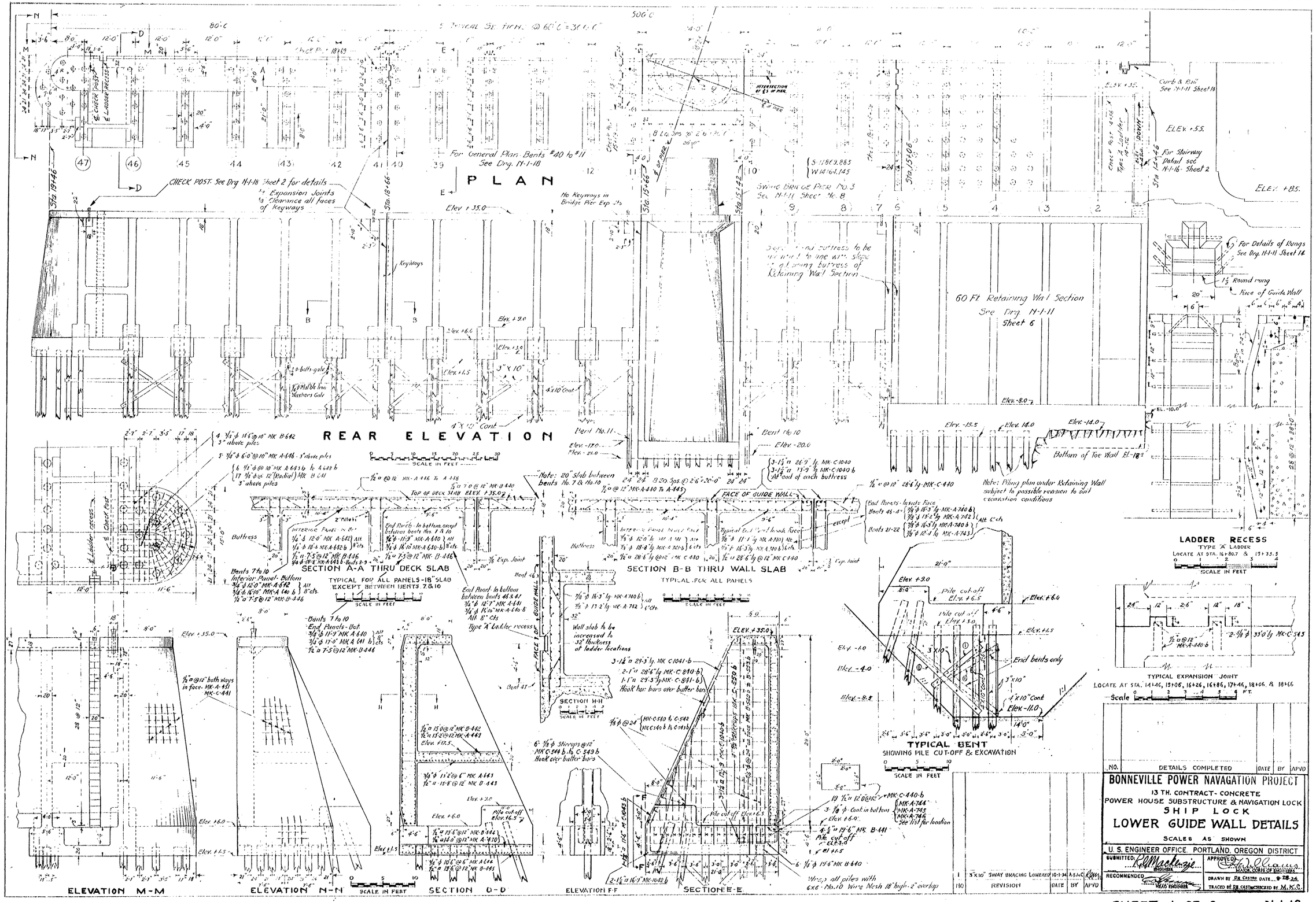
SUBMITTED: R.A. Mackenzie ENGINEER — APPROVED: [illegible] MAJOR, CORPS OF ENGINEERS

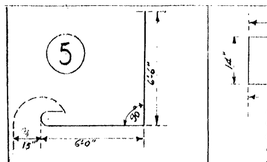
RECOMMENDED: [illegible] HEAD ENGINEER — DRAWN BY M.R.L. DATE 9-28-34 — TRACED BY M.R.L. CHECKED BY [illegible]

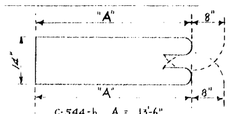
SHEET 8 OF 15 N-1-11.

WAR DEPARTMENT

CORPS OF ENGINEERS U.S. ARMY

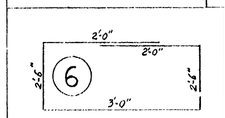


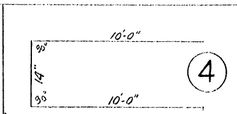


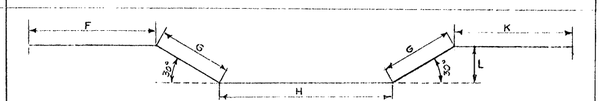


TYPE No. 1 BAR

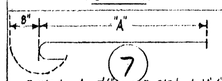
MARK	A	B	C	D	E	F
A-740-b	10"	1'-4"	2'-4"	5'-8"	3'-9"	14"
A-640-b	9"	1'-10"	2'-0"	6'-0"	4'-3"	12"
A-641-b	9"	1'-7"	2'-4"	6'-0"	4'-0"	14"





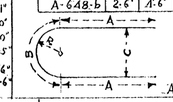


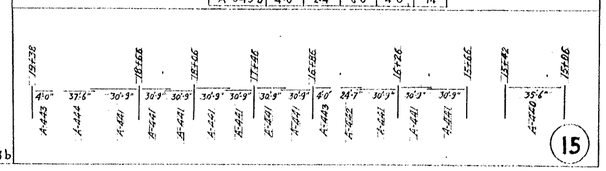
MARK	F	G	H	K	L
A-741-b	4'-0"	2'-4"	6'-0"	4'-0"	14"
A-642-b	4'-3"	2'-0"	6'-0"	4'-3"	12"
A-643-b	4'-0"	2'-4"	6'-0"	4'-0"	14"

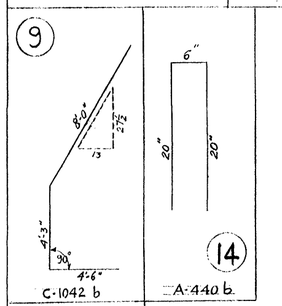


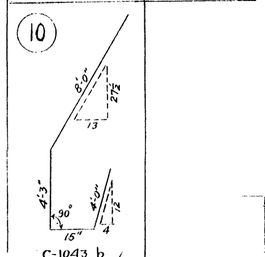
B-540-b	A = 7'-6"	B-547-b	A = 14'-4"
B-541-b	A = 8'-6"	B-548-b	A = 15'-3"
B-542-b	A = 9'-6"	B-549-b	A = 16'-2"
B-543-b	A = 10'-6"	B-550-b	A = 17'-1"
B-544-b	A = 11'-6"	B-551-b	A = 18'-0"
B-545-b	A = 12'-6"	B-552-b	A = 19'-0"
B-546-b	A = 13'-5"	B-553-b	A = 19'-3"
C-540-b	A = 5'-1"	C-542-b	A = 17'-6"
C-541-b	A = 20'-0"	C-543-b	A = 12'-6"

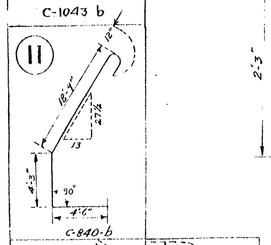
MARK	R	A	B	C
A-643-b	6'-8"	4'-6"	20'-11"	13'-4"
A-644-b	5'-10"	4'-6"	18'-3"	11'-8"
A-645-b	5'-0"	4'-6"	15'-9"	10'-0"
A-646-b	4'-2"	4'-6"	13'-1"	8'-4"
A-647-b	3'-4"	4'-6"	10'-5"	6'-8"
A-648-b	2'-6"	4'-6"	7'-10"	5'-0"

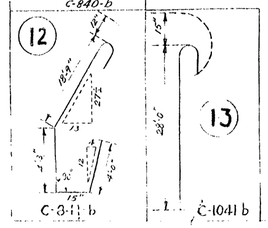


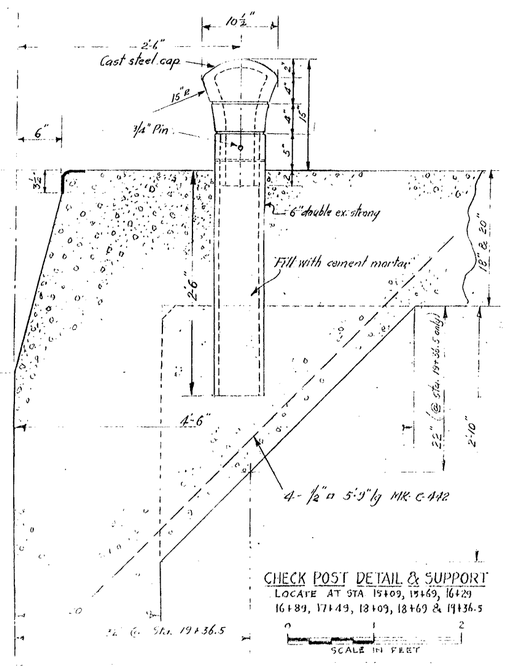






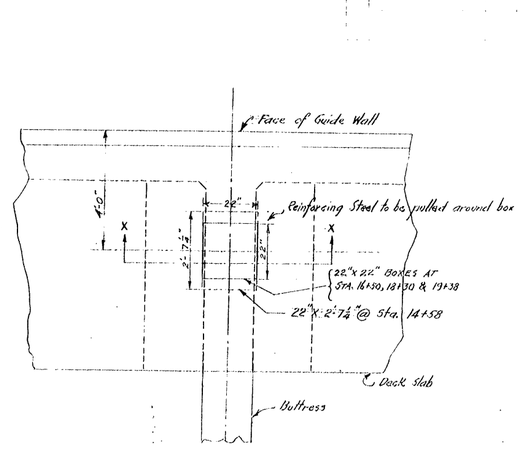


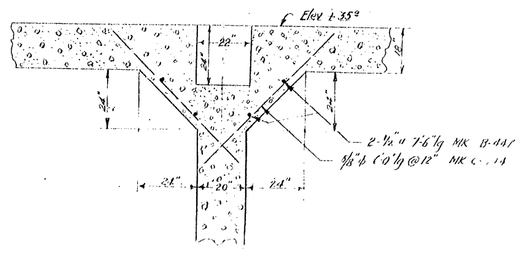




CHECK POST DETAIL & SUPPORT
LOCATE AT STA 15+09, 13+69, 16+29
16+89, 17+49, 18+09, 18+69 & 19+36.5

NOTE —
For details of check post at sta. 14+56 see Dwg. No. N-1-11 Sheet 6





SECTION X-X
DETAIL OF CONSTRUCTION AT PULL BOXES

NOTE —
For details of pull box see Dwg. No. N-1-11 Sheet 6

SCALE IN FEET

SCHEDULE OF REINFORCING STEEL (CONTINUED)

	LOCATION	NO	SIZE	LENGTH UNBENT	MARK	BENDING	
	COUNTERFORTS	164	7/8"ø	21'-2"	C-550-b	See Detail No. 4	★
	"	164	1/2"□	19'-6"	B-441		★
	"	779	1/2"□	12'-0"	C-440-b	See Detail No. 6	★
ADDITIONAL SLABS BET. BENTS 46 & 47	Top of Slab - El. 117.5 Between Bents 46 & 47	10	1/2"□	15'-0"	B-442		
		15	1/2"□	13'-2"	A-449		
	Bottom of Slab - El. 117.5 Between Bents 46 & 47	28	3/4"ø	13'-2"	A-643		
		10	1/2"□	15'-8"	B-443		
	Top of Slab - El. 115 Between Bents 46 & 47	11	1/2"□	19'-6"	B-444		★
		21	1/2"□	14'-0"	A-450		★
	Bottom of Slab El. 115 Between Bents 46 & 47	21	3/4"ø	10'-6"	A-644		★
		11	1/2"□	19'-6"	B-445		★
MONOLITH 19+49 TO STA. 19+38	OVER PILES	1	3/4"ø	29'-11"	A-643-b	See Detail No. 8	★
	" "	1	3/4"ø	27'-3"	A-644-b	" " No. 8	★
	" "	1	3/4"ø	24'-9"	A-645-b	" " No. 8	★
	" "	1	3/4"ø	22'-1"	A-646-b	" " No. 8	★
	" "	1	3/4"ø	19'-5"	A-647-b	" " No. 8	★
	" "	1	3/4"ø	16'-10"	A-648-b	" " No. 8	★
	" "	17	3/4"ø	6'-0"	B-641		★
	" "	5	3/4"ø	6'-0"	A-646		★
	" "	4	3/4"ø	14'-6"	B-642		★
STA. 19+38	IN FACE	8	1/2"□	9'-5"	A-451	(PORTION = ★)	
	" "	8	1/2"□	8'-6"	C-441	(PORTION = ★)	

CHECK POST SUPPORTS	32	1/2"□	5'-9"	C-442	
EXPANSION JOINTS	24	5/8"ø	35'-0"	C-543	
EXPANSION JOINTS	408	1/2"□	3'-10"	A-440-b	See Detail No. 14
PULL BOX SUPPORTS	12	1"□	7'-6"	B-447	
" " "	36	5/8"ø	6'-0"	C-544	

Reinforcing Steel Notes —
"A" Horiz. bars placed East & West MARK "A"
"B" Horiz. bars placed North & South MARK "B"
"C" Vertical bars Mark "C"
Suffix "b" indicates bent bars, thus A-621-b

Bars to be installed before pouring base marked ★

SCHEDULE OF REINFORCING STEEL — STA. 15+06 TO STA 19+49 (EXCLUSIVE OF BRIDGE PIER BAY)

	LOCATION	NO.	SIZE	LENGTH UNBENT	MARK	BENDING	
SLAB	End Panels	351	7/8"ø	16'-3"	A-740-b	See Detail No. 1	
	Interior Panels	567	7/8"ø	18'-8"	A-741-b	" " No. 2	
	End Panel - Bents 46 to 47	54	7/8"ø	13'-2"	A-742		
WALL SLAB INSIDE	End Panel - Bents 21 to 22	54	7/8"ø	12'-4"	A-743		
	Remaining End Panels	324	7/8"ø	11'-9"	A-740		
	Interior Panels	540	7/8"ø	12'-0"	A-741		
WALL SLAB OUTSIDE	End of each buttress	123	1¼"□	26'-9"	C-1040		
		123	1¼"□	15'-9"	C-1040-b	See Detail No. 5	
	Sta. 15+06 To Sta. 15+42	27	1/2"□	35'-6"	A-440		
	Typical Sections Sta. 15+66 to Sta. 16+26, Sta. 16+86 to Sta. 18+66	216	1/2"□	30'-9"	A-441		For location see Detail No. 15
		27	1/2"□	30'-9"	A-441		
	Sta. 16+26 To Sta. 16+86	27	1/2"□	24'-7"	A-442		
		27	1/2"□	4'-0"	A-443		
	Sta. 18+66 To Sta. 19+38	27	1/2"□	30'-9"	A-441		
		27	1/2"□	37'-6"	A-444		
		27	1/2"□	4'-0"	A-443		
	Wall Slab - Both Faces	759	1/2"□	28'-6"	C-440		
BOTTOM OF SLAB	Sta. 15+06 To Sta. 15+42	3	7/8"ø	35'-6"	A-744		
	Sta. 15+66 To Sta. 18+66	15	7/8"ø	37'-3"	A-745		
		15	7/8"ø	25'-3"	A-746		
	Sta. 18+66 To Sta. 19+38	6	7/8"ø	37'-3"	A-745		
SLAB DECK	Interior Panel Between Bents 8 & 9	6	3/4"ø	18'-8"	A-643-b	See Detail No. 2	
	End Panels - Bottom Except Bet. Bents 7 & 10	66	3/4"ø	16'-10"	A-640-b	See Detail No. 1	
	End Panel - Bottom Between Bents 7 & 10	12	3/4"ø	17'-0"	A-641-b	" " No. 1	
	End Panels - Bottom Except Bet. Bents 45-47	72	3/4"ø	11'-9"	A-640		
	End Panels - Bottom Between Bents 46 & 47	6	3/4"ø	12'-7"	A-641		
	Interior Panels - Bottom	120	3/4"ø	18'-6	A-642-b	See Detail No. 2	
	" " "	126	3/4"ø	12'-0"	A-642		
	Interior & End Panels Top & Bottom	408	1/2"□	7'-0"	B-446		
		408	1/2"□	5'-0"	B-446		
	Sta. 15+06 To Sta. 15+42	8	1/2"□	35'-6"	A-446		Top of Slab
	Sta. 15+66 To Sta. 18+66	80	1/2"□	31'-3"	A-447		
	Sta. 18+66 To Sta. 19+38	16	1/2"□	37'-9"	A-448		
COUNTERFORTS	COUNTERFORTS	123	1¼"□	25'-5"	C-1041-b	See Detail No. 13	
	"	82	1¼"□	16'-9"	C-1042-b	" " No. 9	★
	"	41	1¼"□	17'-6"	C-1043-b	" " No. 10	★
	"	82	1"□	28'-6"	C-840-b	" " No. 11	★
	"	41	1"□	29'-3"	C-841-b	" " No. 12	★
	"	110	5/8"ø	3'-9"	C-540-b	" " No. 7	★
	"	246	7/8"ø	28'-8"	C-540		
	"	82	5/8"ø	26'-0"	C-541		
	"	82	7/8"ø	21'-6"	C-542		
	"	82	7/8"ø	20'-8"	C-541-b	see Detail No. 7	★
	"	82	5/8"ø	18'-2"	C-542-b	" " No. 7	★
	"	82	5/8"ø	13'-2"	C-543-b	" " No. 7	★
	"	82	5/8"ø	8'-2"	B-540-b	" " No. 7	
	"	82	5/8"ø	9'-2"	B-541-b	" " No. 7	
	"	82	5/8"ø	10'-2"	B-542-b	" " No. 7	
	"	82	5/8"ø	11'-2"	B-543-b	" " No. 7	
	"	82	5/8"ø	12'-2"	B-544-b	" " No. 7	
	"	82	5/8"ø	13'-2"	B-545-b	" " No. 7	
	"	82	5/8"ø	14'-1"	B-546-b	" " No. 7	
	"	82	5/8"ø	15'-0"	B-547-b	" " No. 7	
	"	82	5/8"ø	15'-11"	B-548-b	" " No. 7	
	"	82	5/8"ø	16'-8"	B-549-b	" " No. 7	
	"	82	5/8"ø	17'-9"	B-550-b	" " No. 7	
	"	82	5/8"ø	18'-8"	B-551-b	" " No. 7	
	"	82	5/8"ø	19'-8"	B-552-b	" " No. 7	★
	"	82	5/8"ø	20'-8"	B-553-b	" " No. 7	★
	STIRRUPS	41	5/8"ø	29'-6"	C-544-b	" " No. 3	★
	"	41	5/8"ø	25'-6"	C-545-b	" " No. 3	★
	"	41	5/8"ø	21'-6"	C-546-b	" " No. 3	★
	"	41	5/8"ø	17'-2"	C-547-b	" " No. 3	★
	"	41	5/8"ø	13'-2"	C-548-b	" " No. 3	★
	"	41	5/8"ø	9'-2"	C-549-b	" " No. 3	★

NOTE —
Steel List is for convenience of Contractor. All bending diagrams and dimensions should be checked by Contractor.

NO	DETAILS COMPLETED	DATE	BY	APVD

NO	REVISION	DATE	BY	APVD

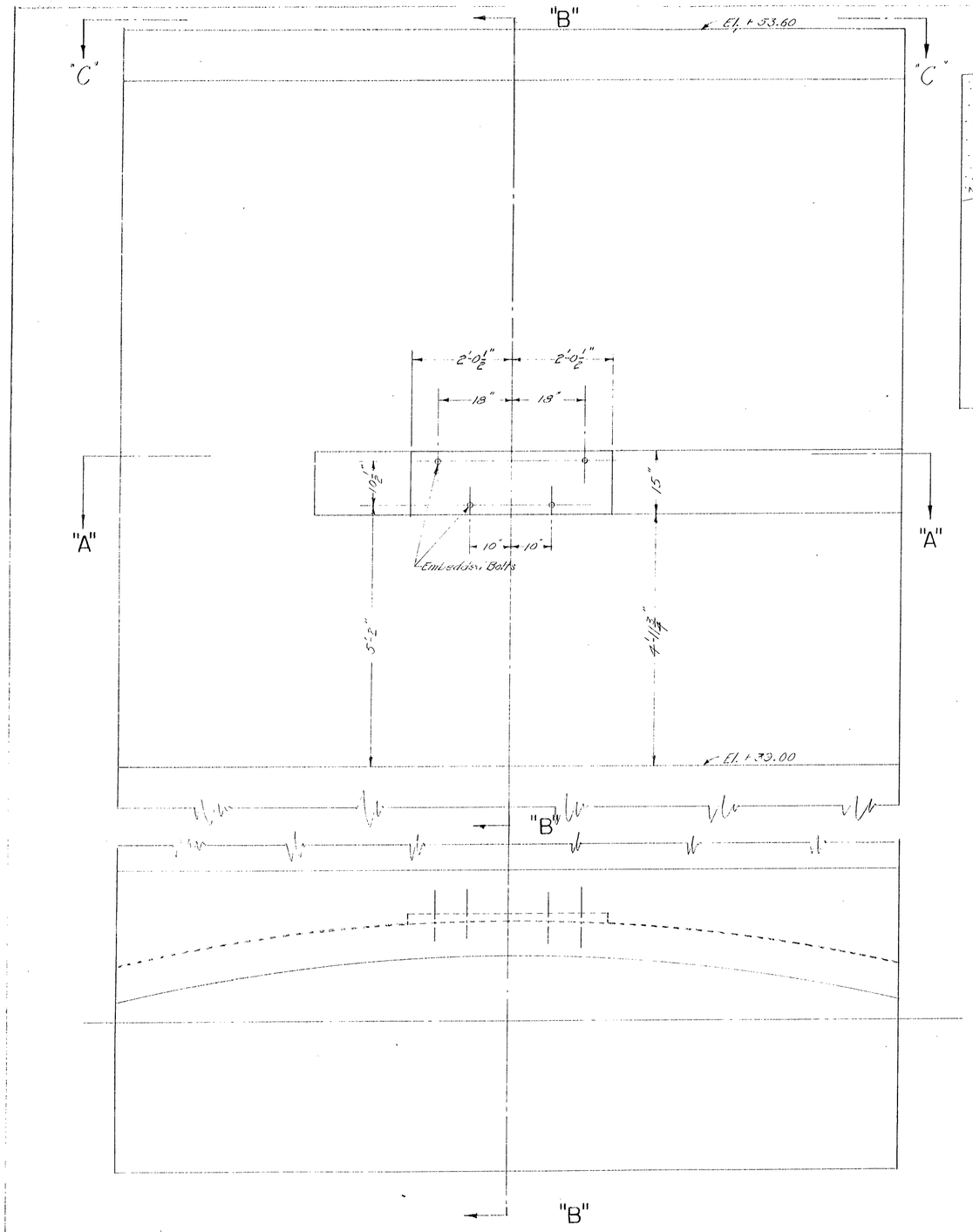
BONNEVILLE POWER NAVIGATION PROJECT
13TH CONTRACT — CONCRETE
POWER HOUSE SUBSTRUCTURE & NAVIGATION LOCK
SHIP LOCK
LOWER GUIDE WALL DETAILS
SCALES AS SHOWN
U S ENGINEER OFFICE PORTLAND, OREGON DISTRICT

SUBMITTED: R.H. Mackenzie, ENGINEER
APPROVED: MAJOR, CORPS OF ENGINEERS
RECOMMENDED: HEAD ENGINEER
DRAWN BY: DE CASTRO DATE: 9-28-34
TRACED BY: DE CASTRO CHECKED BY: M.K.G.

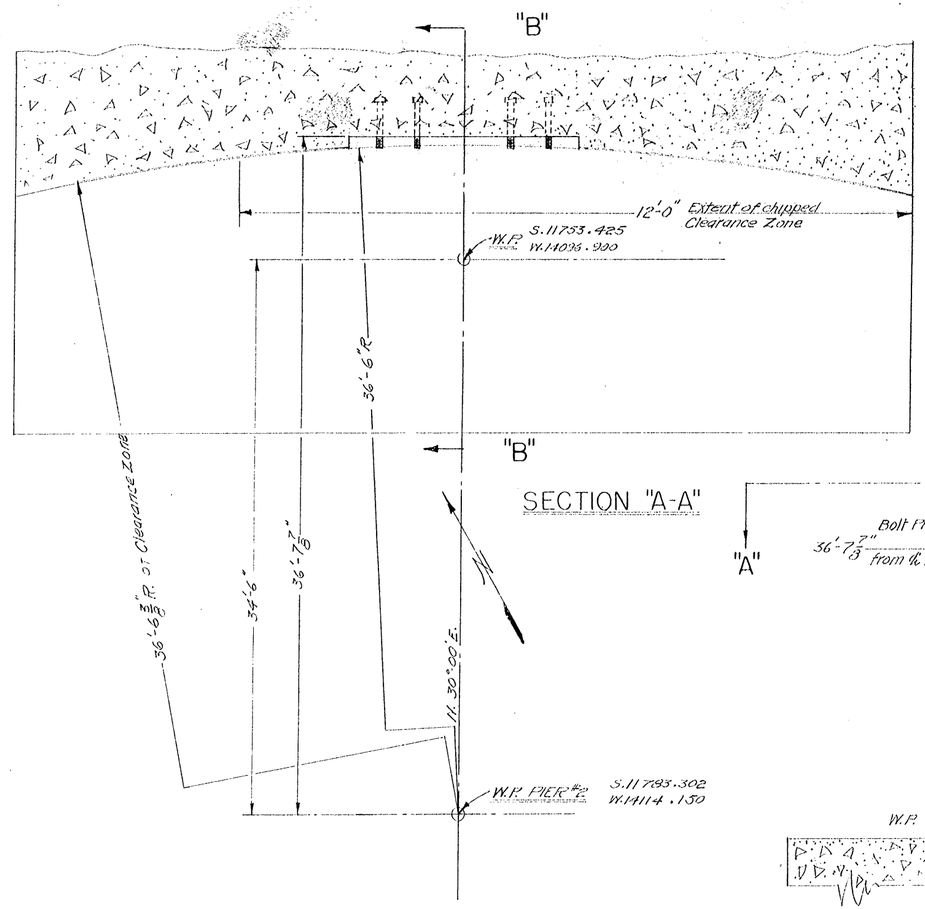
SHEET 2 OF 2 N-1-18

WAR DEPARTMENT

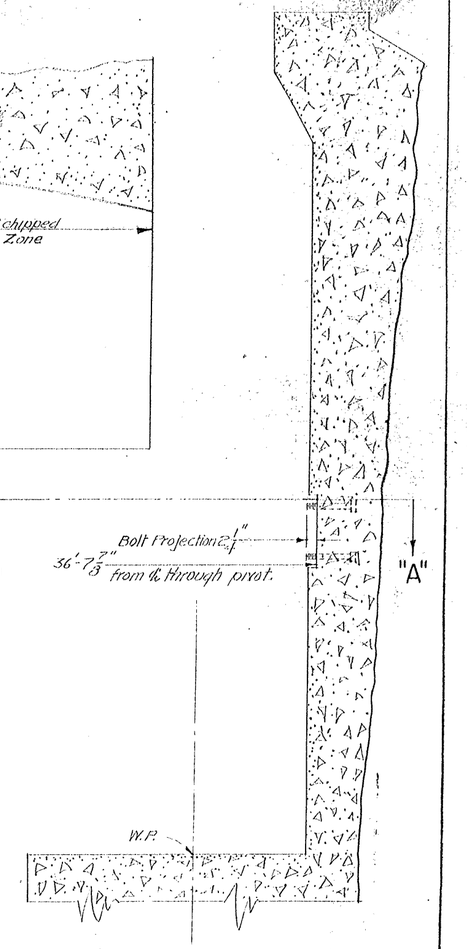
CORPS OF ENGINEERS U.S. ARMY



PLAN VIEW "C-C"



SECTION "A-A"



SECTION "B-B"

General Notes:

To accommodate changes that have been made in the swing span structure of the bridge across the navigation channel, it is required that the latch casting saddle, to be attached to the concave southerly face of Pier #1, be set into a pocket provided in the pier face by chipping, as indicated.

A clearance zone 15" wide, and having a radius of 36'-6⅜" about the axis of rotation of the swing span, is required as shown. Any concrete encroaching upon this zone is to be removed by chipping.

Chipped surfaces are to be grouted for finish.

The embedded bolts affected are to be shortened to the dimensions given herewith, and the fully threaded portion of each of the altered bolts is to be at least 1½" long.

References:

For basic dimensions and co-ordinates of Working Points, see Dwgs. N-1-11 Sheet 8, and N-2-51 Sheet 11.

BONNEVILLE POWER NAVIGATION PROJECT

13TH CONTRACT – CONCRETE

POWER HOUSE SUBSTRUCTURE & NAVIGATION LOCK

SHIP LOCK – SWING BRIDGE

ALTERATIONS TO PIER No. 1

SCALE ¾" = 1'-0"

U. S. ENGINEER OFFICE, PORTLAND, OREGON DISTRICT

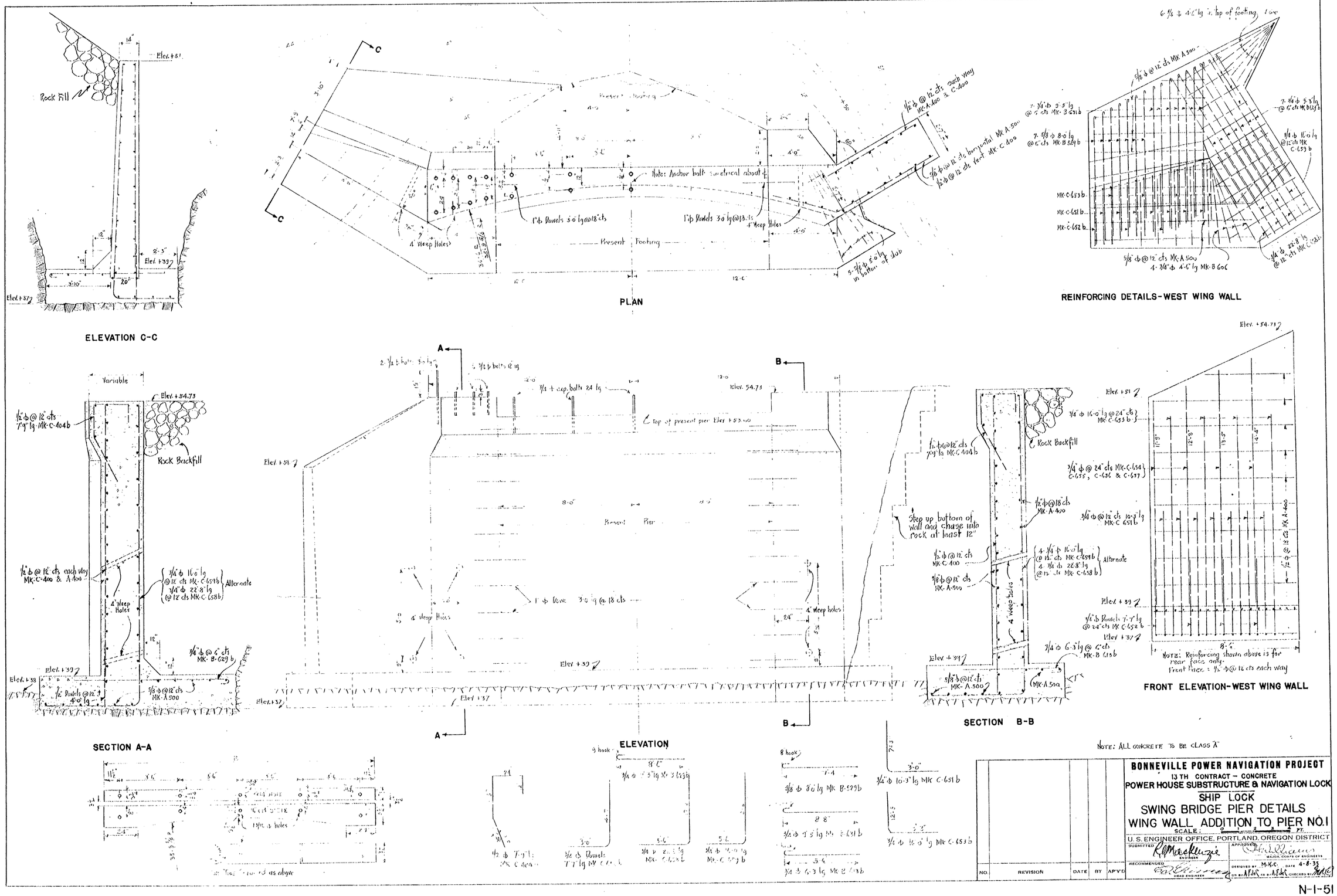
SUBMITTED: R.R. Mackenzie, ENGINEER — APPROVED: H. L. Williams, MAJOR, CORPS OF ENGINEERS

RECOMMENDED: [illegible], HEAD ENGINEER — DRAWN BY: H.G.L. DATE 4-5-35 — TRACED BY ..... CHECKED BY [illegible]

N-1-50

WAR DEPARTMENT

CORPS OF ENGINEERS U. S. ARMY



BONNEVILLE POWER NAVIGATION PROJECT

13 TH CONTRACT – CONCRETE

POWER HOUSE SUBSTRUCTURE & NAVIGATION LOCK

SHIP LOCK

SWING BRIDGE PIER DETAILS

WING WALL ADDITION TO PIER NO. 1

SCALE: 0 1 2 3 4 FT.

U. S. ENGINEER OFFICE, PORTLAND, OREGON DISTRICT

SUBMITTED: R. P. Mackenzie, ENGINEER

APPROVED: C. E. Williams, MAJOR, CORPS OF ENGINEERS

RECOMMENDED: C. E. Williams, HEAD ENGINEER

DESIGNED BY: M.K.C. DATE: 4-8-33

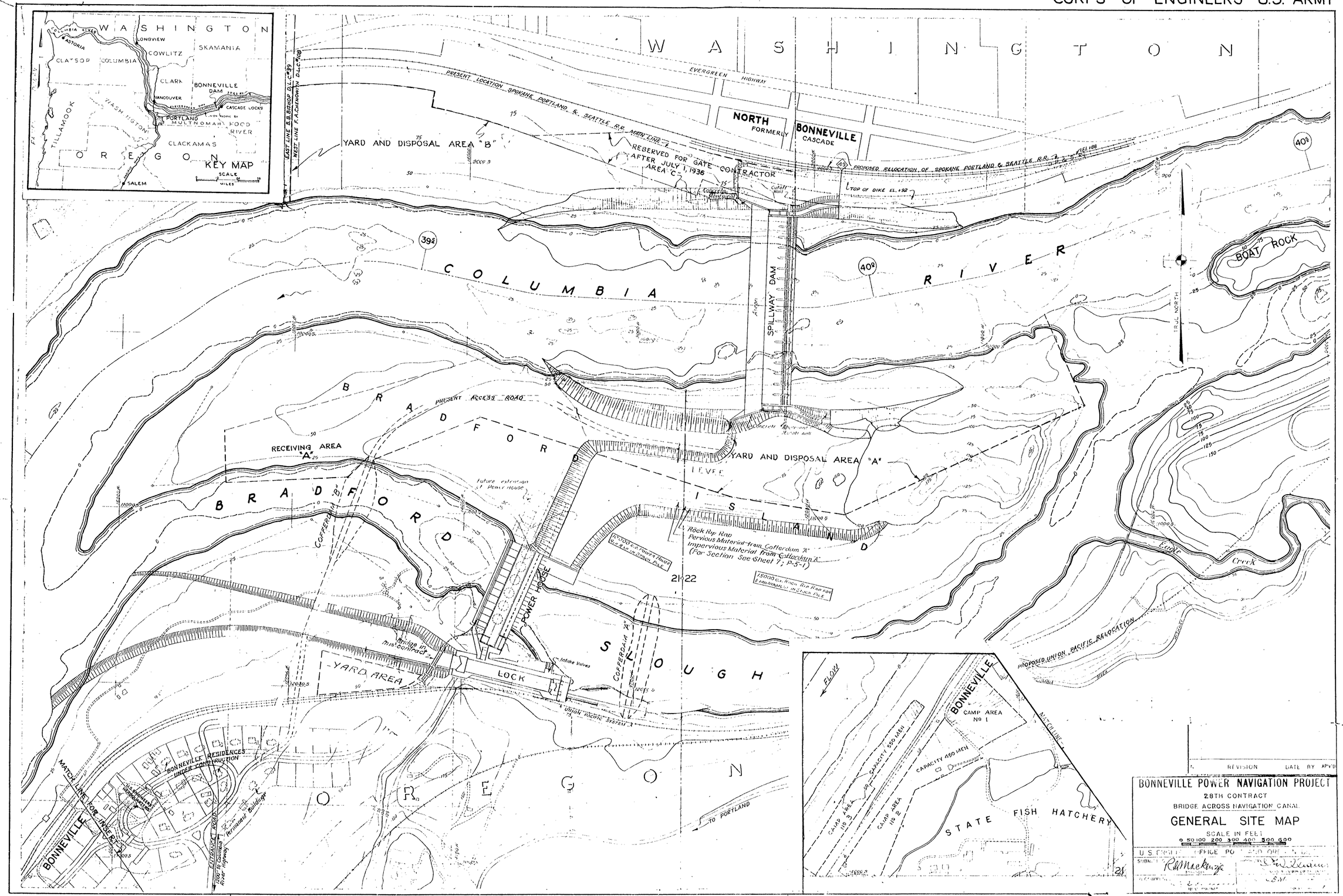
DR. BY: A.F.S.K. CH. BY: A.F.S.K. CHECKED BY: M.K.C.

NO.	REVISION	DATE	BY	APV'D

N-1-51

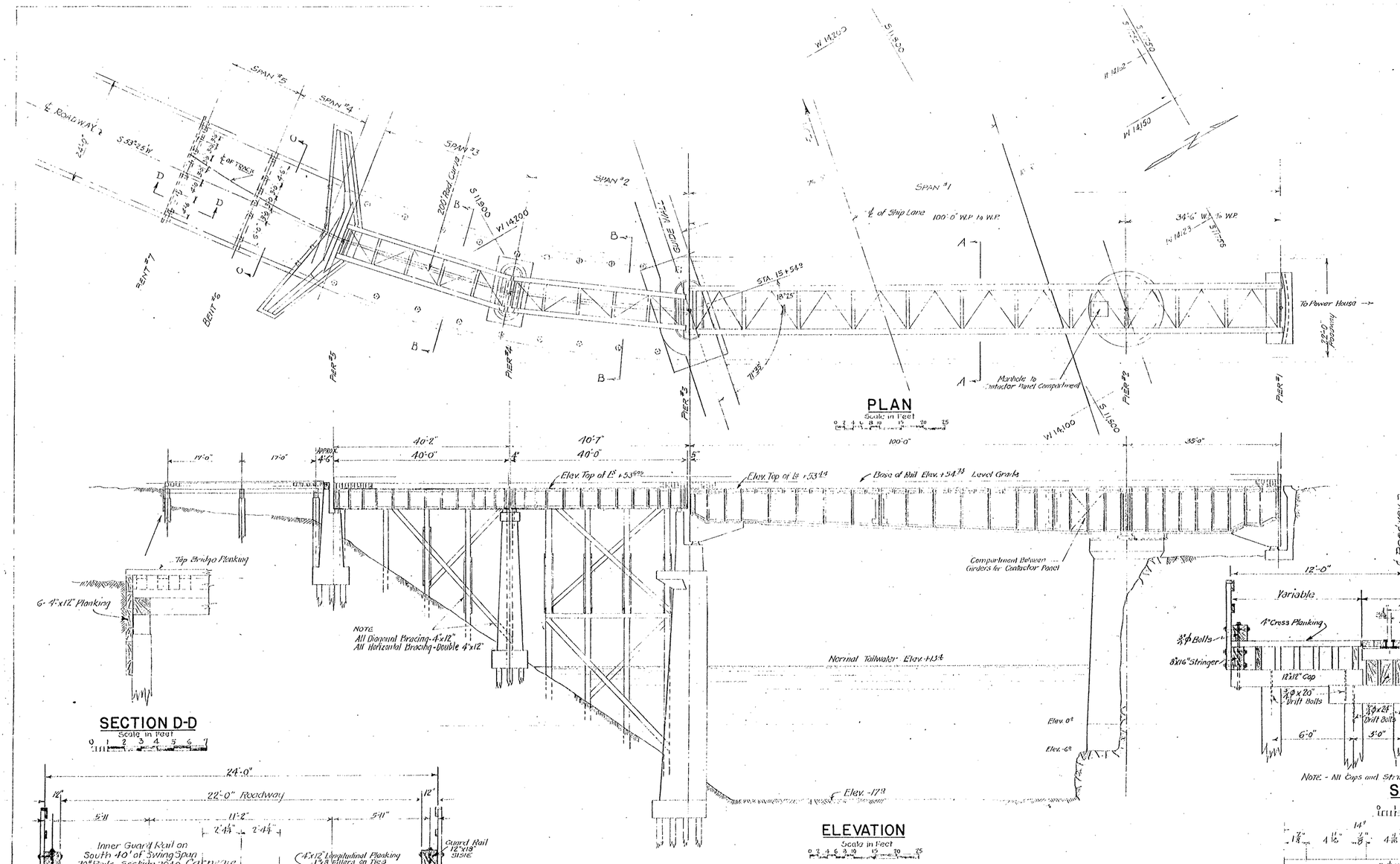
WAR DEPARTMENT

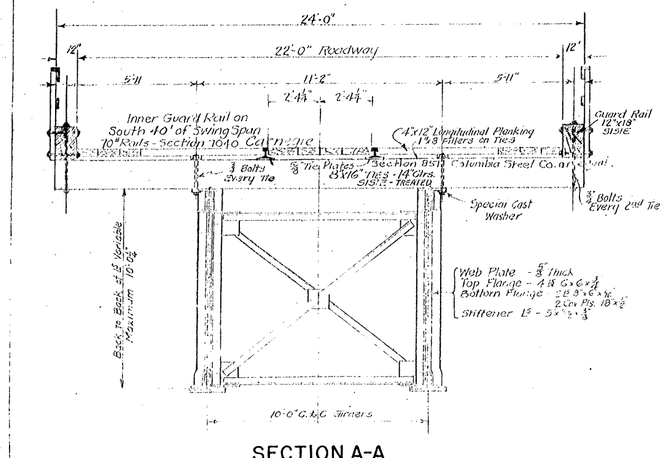
CORPS OF ENGINEERS U.S. ARMY

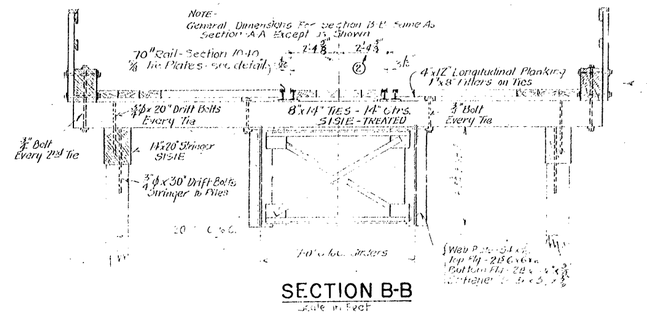


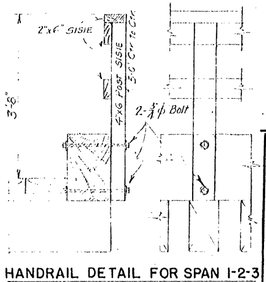
A16-10

SHEET 1 OF 4 N-2-43









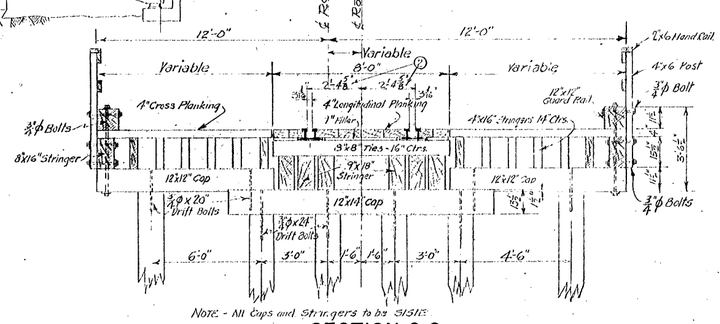
GENERAL NOTES

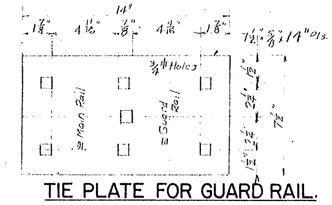
LOADING - 3000# per foot of girder plus 40% Impact

RIVETING - Rivets 7/8" dia. except in Cross Frames and Laterals where 3/4" dia. are to be used. All rivet holes for field rivets to be sub-punched and reamed while assembled in shop. All other holes may be punched or drilled full size.

DRIFT BOLTS - Drift bolts for timber not to have heads or points. Holes for drift bolts to be bored 1/16" less in diameter than nominal diameter of bolts.

TIMBER WORK - 9"x18" Stringers to be drift bolted at each end with one 3/4"ϕ x 28" long drift bolt. 4"x16" Stringers to be toe nailed each side at each cap with 60d nails. 2" fills on track ties to be spiked with 20d nails. 4" deck planking to be spiked with one 1/4"ϕ x 8" long wire spike at each intermediate stringer and 2 spikes at the ends. Spikes in intermediate stringers to be staggered opposite sides of planks. All bracing to be fastened at ends with 3/4"ϕ machine bolts and at intermediate piles with 3-3/8"ϕ x 8" long square head boat spikes. 2"x6" Rails to be securely fastened with 30d nails.





NO.	REVISION	DATE	BY	APV'D
2	Change [illegible] on curve	1-16-35	JMG	RWM
1	Sp. "6" [illegible]	[illegible]	[illegible]	[illegible]
1	Note and tie plates	[illegible]	[illegible]	[illegible]
1	Section [illegible]	[illegible]	[illegible]	[illegible]
1	Section [illegible]	[illegible]	[illegible]	[illegible]
1	Roadway [illegible]	[illegible]	[illegible]	[illegible]

BONNEVILLE POWER NAVIGATION PROJECT

28TH CONTRACT

BRIDGE ACROSS NAVIGATION CANAL

GENERAL LAYOUT

SCALES AS SHOWN

U. S. ENGINEER OFFICE, PORTLAND, OREGON DISTR.

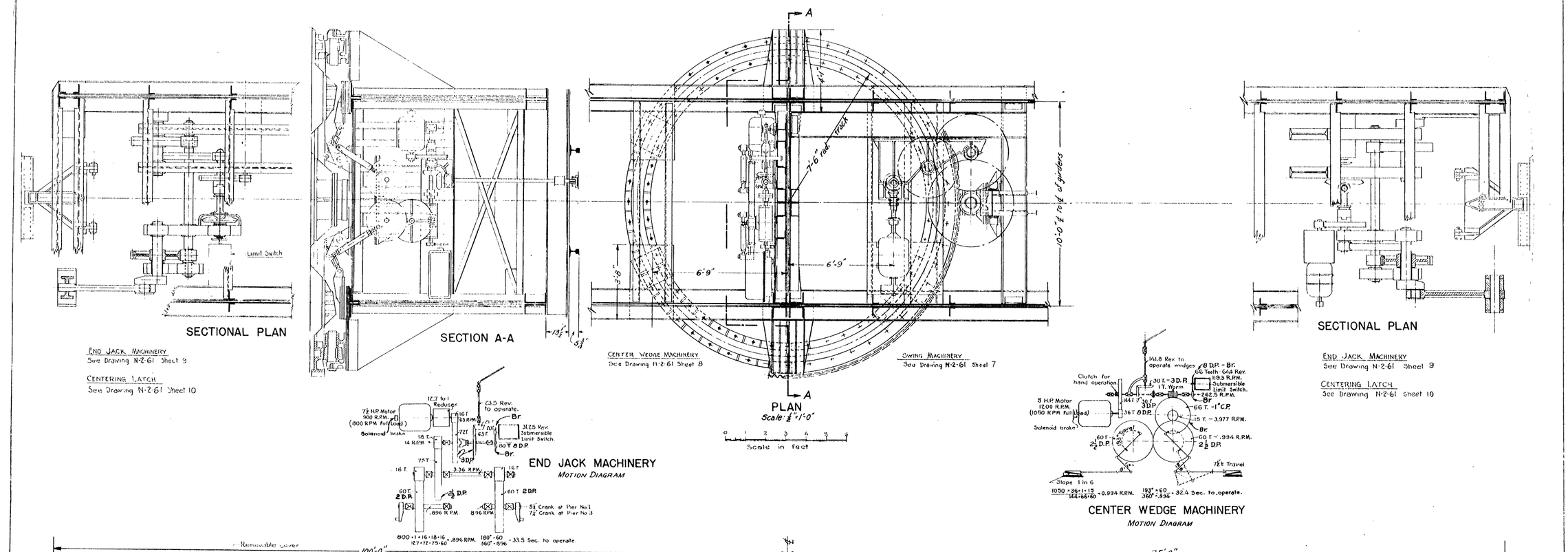
SUBMITTED: R. W. Mackenzie, ENGINEER

APPROVED: Geo. Williams, MAJOR, CORPS OF ENGINEERS

RECOMMENDED: [illegible], HEAD ENGINEER

DRAWN BY: H. D. Pridmore DATE 12-10-34

TRACED BY: H.D.P. CHECKED BY: [illegible]



NO	REVISION	DATE	BY	APP'D

BONNEVILLE POWER NAVIGATION PROJECT
28TH CONTRACT
BRIDGE ACROSS NAVIGATION CANAL
GENERAL ARRANGEMENT OF MACHINERY
SCALE 1/2" = 1 FOOT
U. S. ENGINEER OFFICE PORTLAND, OREGON DISTRICT
SUBMITTED: R. P. Mackenzie, ENGINEER
APPROVED: C. E. Williams, MAJOR, CORPS OF ENGINEERS
RECOMMENDED: [illegible], HEAD ENGINEER
DRAWN BY: D. Kerr
TRACED BY: D. Dill
DATE: 18/10/36
CHECKED BY: [illegible]

SHEET 3 OF 4 N-2-43

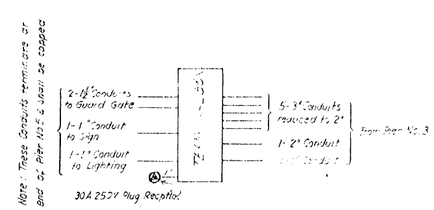
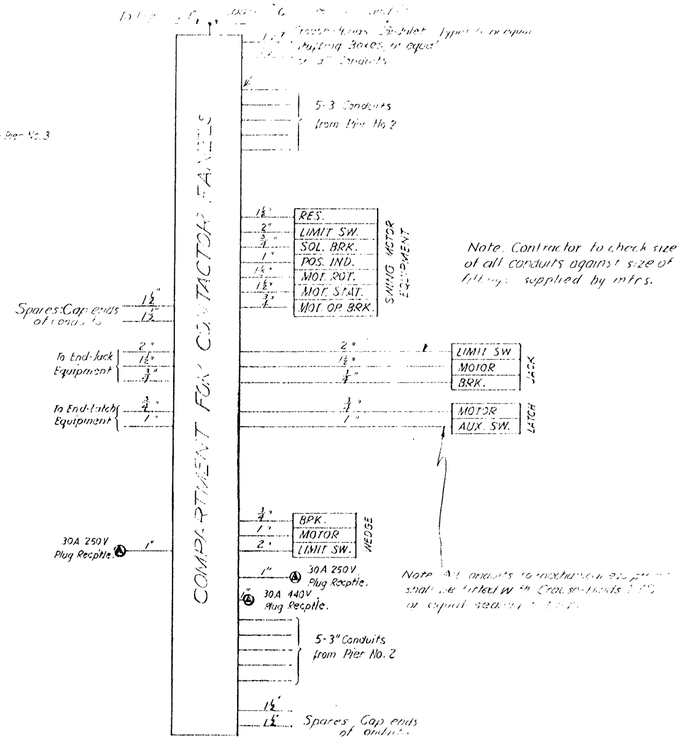


DIAGRAM OF CONDUITS FROM PIER No. 3

NO SCALE

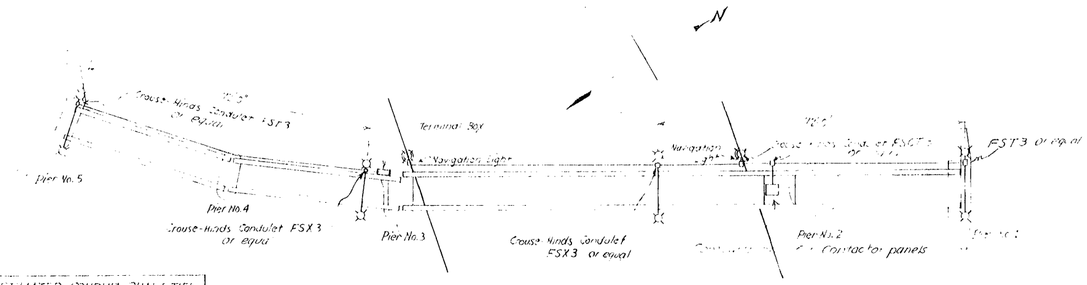


Note: Contractor to check size of all conduits against size of fittings supplied by mfrs.

ESTIMATED CONDUIT QUANTITIES	
SIZE	TOTAL LENGTH
¾"	900'
1"	660'
1½"	500'
2"	200'
3"	120'

DIAGRAM OF CONDUITS FROM PIER No. 2

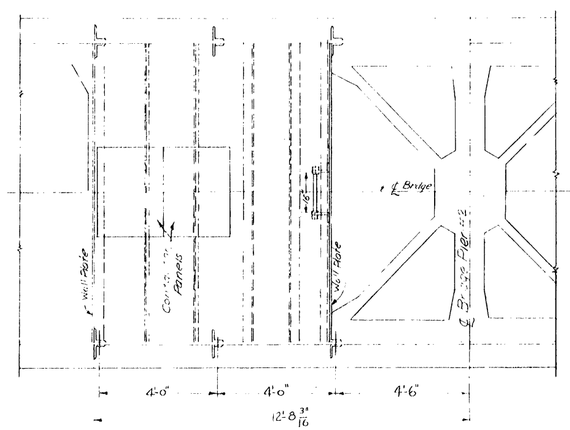
NO SCALE



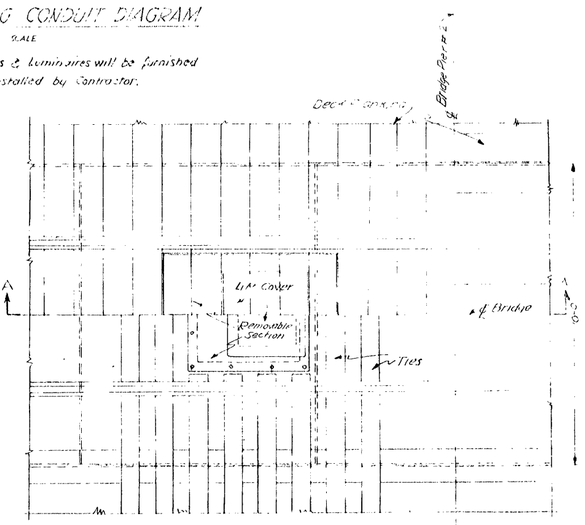
BRIDGE LIGHTING CONDUIT DIAGRAM

NO SCALE

Note: All Light Standards & Luminaires will be furnished by U.S. Government & installed by Contractor.



SECTION B-B



PLAN OF MANHOLE

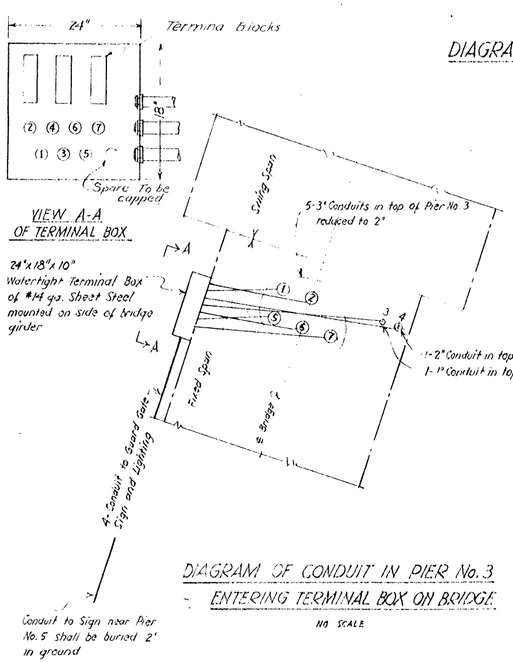
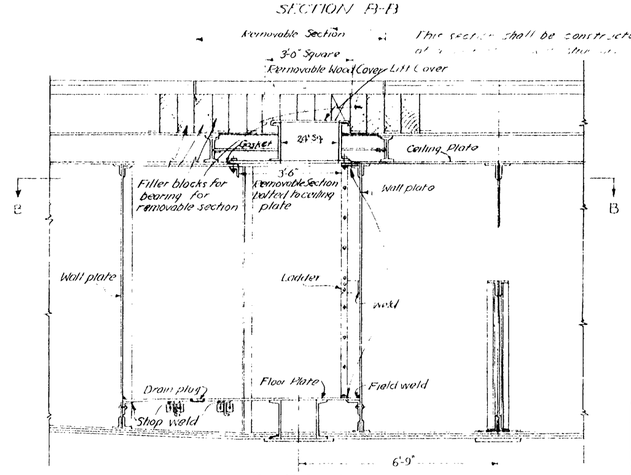


DIAGRAM OF CONDUIT IN PIER No. 3 ENTERING TERMINAL BOX ON BRIDGE

NO SCALE

DRAIN DETAIL

NO SCALE



SECTION A-A

COMPARTMENT FOR CONTACTOR PANELS

SCALE IN FEET

NO.	REVISION	DATE	BY	APV'D

BONNEVILLE POWER NAVIGATION PROJECT
28TH CONTRACT
BRIDGE ACROSS NAVIGATION CANAL
ELECTRICAL DETAILS & CONDUIT DIAGRAMS

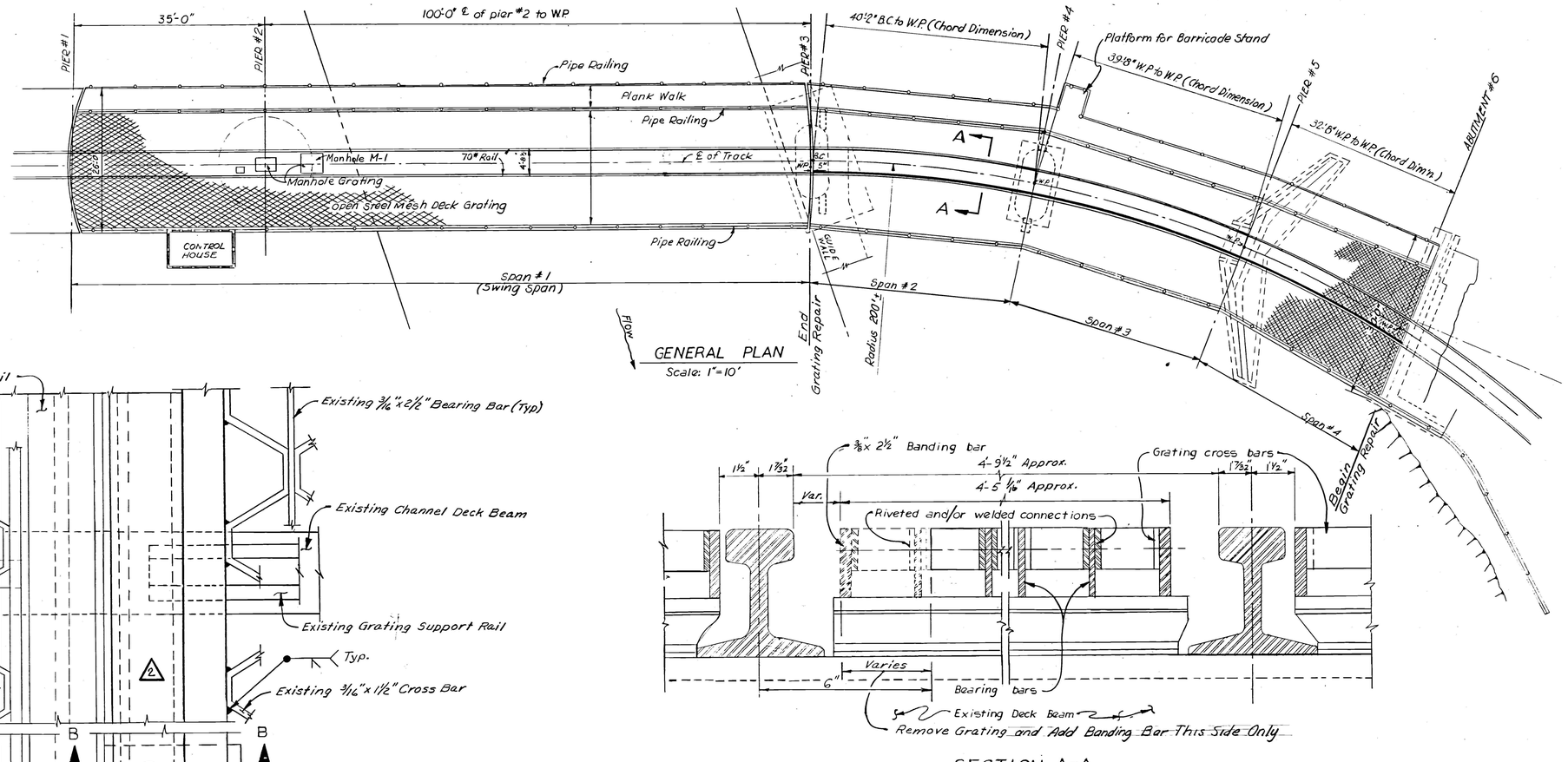
SCALES AS SHOWN

U. S. ENGINEER OFFICE, PORTLAND, OREGON DISTRICT

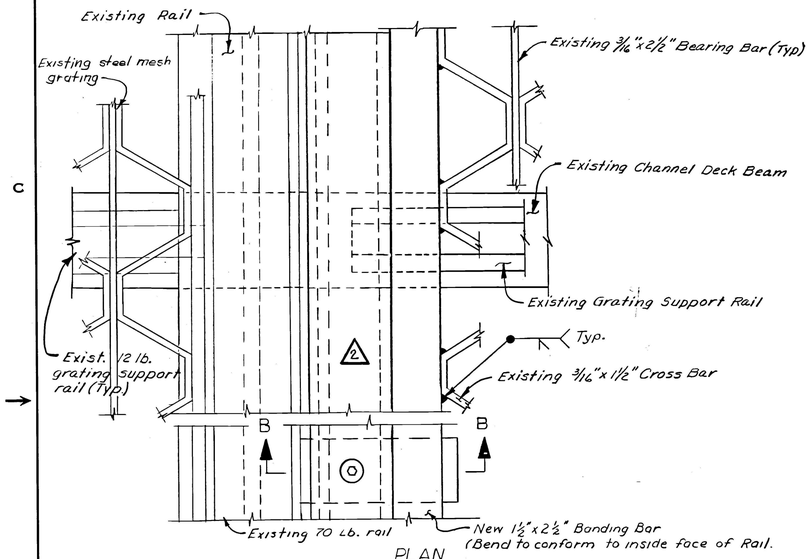
SUBMITTED: R.L. Mackenzie, ENGINEER — APPROVED: H. Williams, MAJOR, CORPS OF ENGINEERS

RECOMMENDED: HEAD ENGINEER — DRAWN BY: DATE — TRACED BY: J.P.G. CHECKED BY

SHEET 4 OF 4 N-2-43

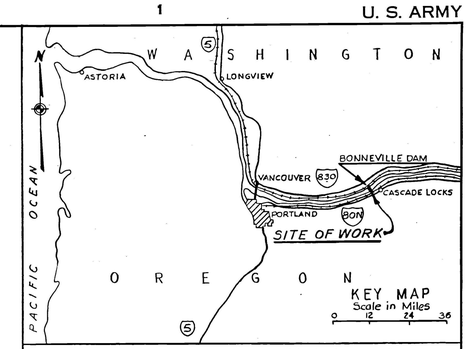


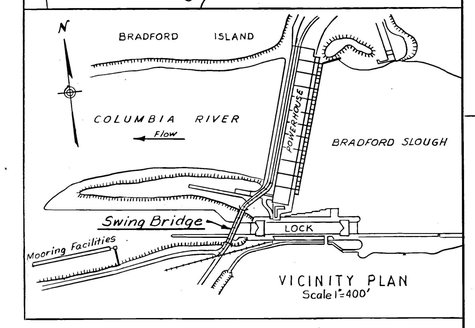
GENERAL PLAN
Scale: 1"=10'

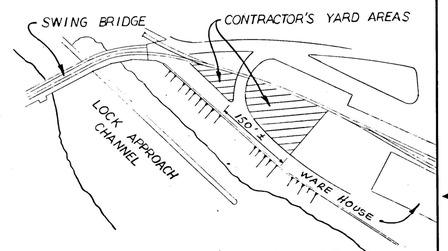


PLAN
Scale 6"=1'-0"

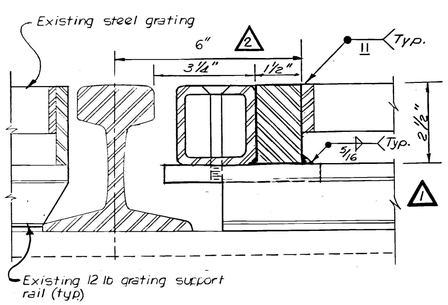
SECTION A-A
EXISTING STEEL GRATING & RAILS
Scale: 6"=1'-0"



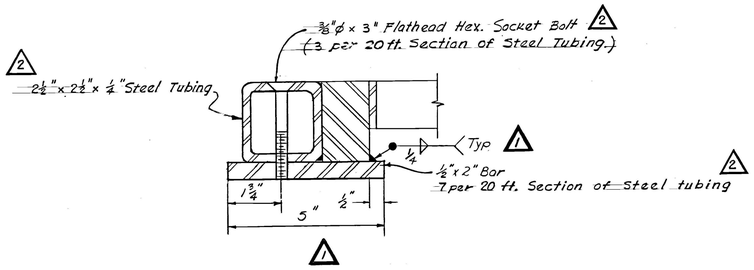




CONTRACTOR'S YARD AREAS
NOT TO SCALE



TYPICAL SECTION
Scale 6"=1'-0"



SECTION B-B
Scale: 6"=1'-0"

NOTES:

1. Open joints in new bonding bar shall be ⅜-inch at piers #4 and #5. Butt joints near mid-span shall be seal welded.
2. Steel Tubing in flangeway shall be installed and removed for each use of railroad track.

AS CONSTRUCTED
~~CONTRACT No.~~ HIRED LABOR
~~CONTRACTOR~~
~~DATE OF RECEIPT OF NOTICE TO PROCEED~~
~~DATE OF COMPLETION OF CONTRACT~~
~~DATE OF ACCEPTANCE~~

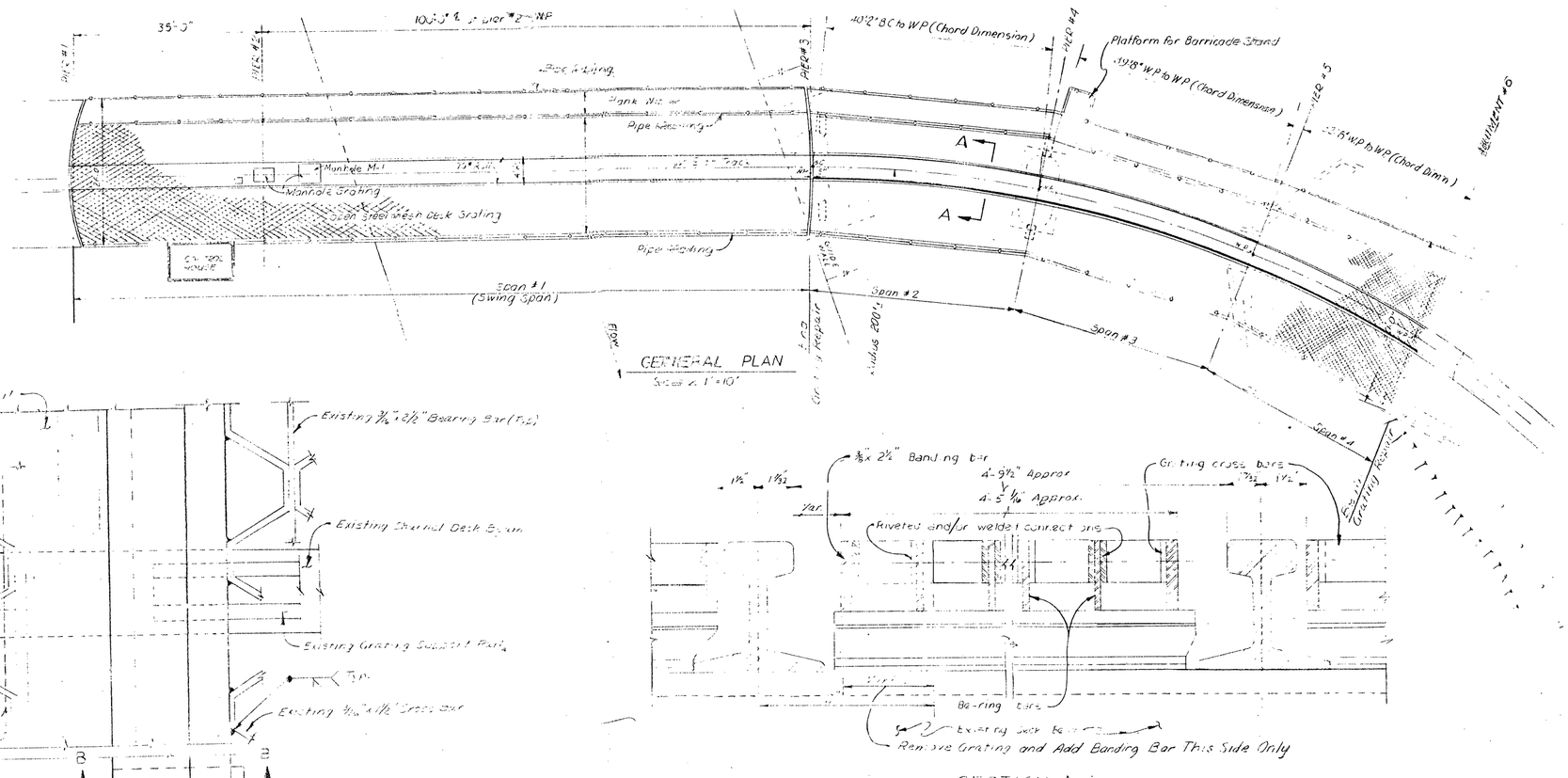
REVISION	DATE	DESCRIPTION	BY
2		As Constructed	
1	70 Oct 12	Revised weld size, corrected dimension.	NeSC

U. S. ARMY ENGINEER DISTRICT, PORTLAND

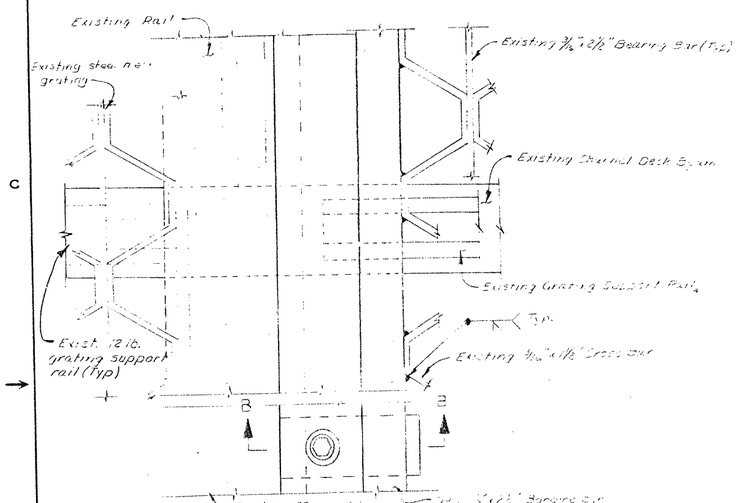
DESIGNED: S.K.H.
DRAWN: WPP-DAC
CHECKED: WRG
PREPARED: W.R. Graybill

BONNEVILLE DAM PROJECT
COLUMBIA RIVER OREGON-WASHINGTON
SWING BRIDGE RECONSTRUCTION
GRATING REPAIR

SUPERVISED: Ralph K. Millison, CHIEF, STRUCTURES SECTION
SUBMITTED: Harold A. Kirby, CHIEF, DESIGN BRANCH
RECOMMENDED: CHIEF, ENGINEERING DIVISION
APPROVED: Paul D. Trim, COLONEL, C. E., DISTRICT ENGINEER
DATE 70 OCT 08
SCALE AS SHOWN
SPEC. NO.
SHEET 1 OF 1
N-2-43A1

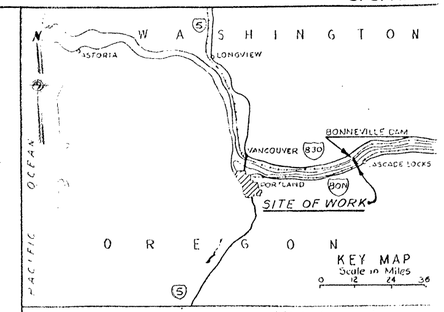


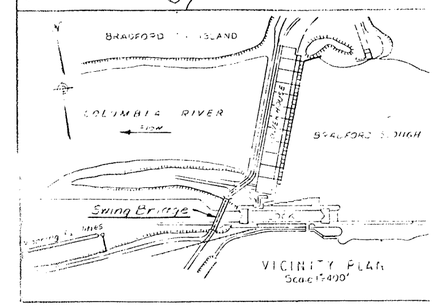
GENERAL PLAN
Scale: 1" = 10'

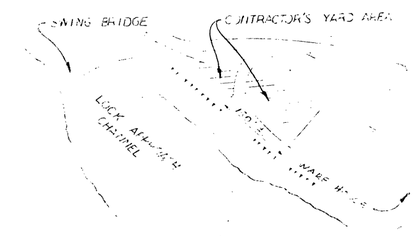


PLAN
Scale: 6" = 1'-0"

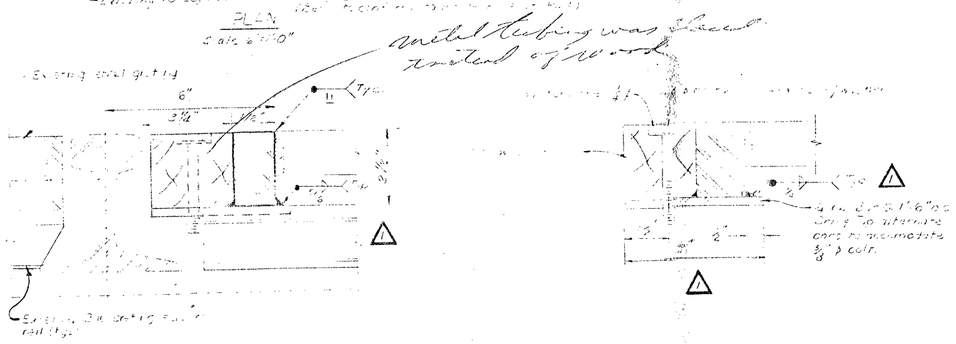
SECTION A-A
EXISTING STEEL GRATING & RAILS
Scale: 6" = 1'-0"

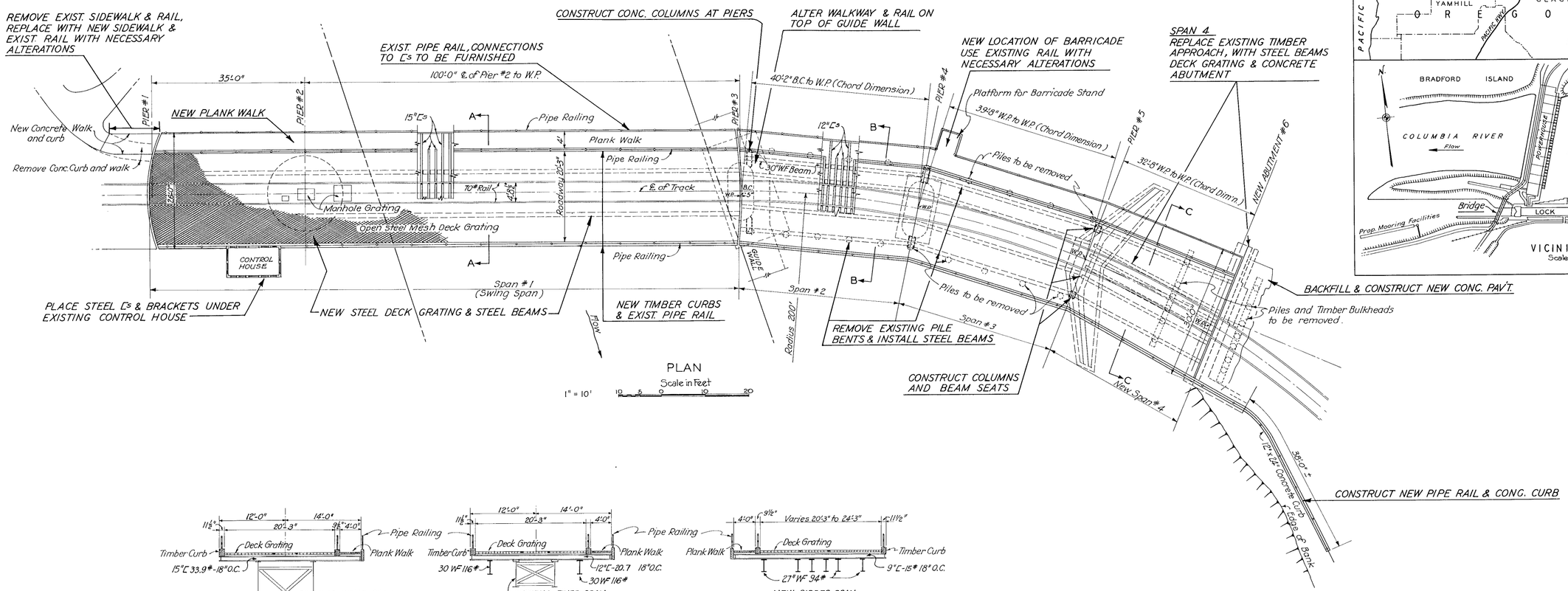


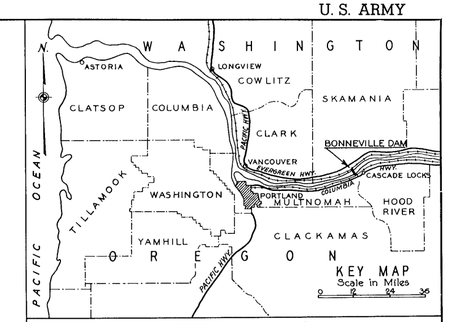


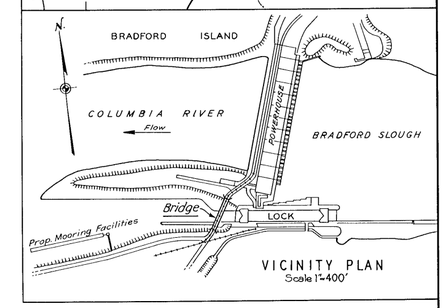


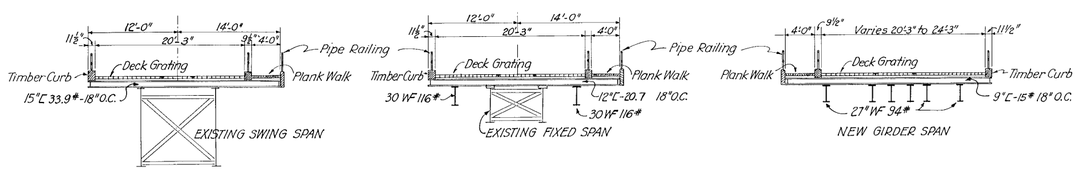
CONTRACTOR'S YARD AREA
NOT TO SCALE


Existing steel grating
6"
3 3/4"
Existing 3x6 grating support rail (Typ.)
Metal tubing was used instead of wood
Typ.
Typ.
Typ.







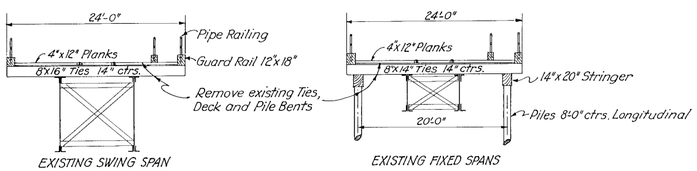


SECTION A-A

SECTION B-B

SECTION C-C

TYPICAL SECTIONS OF PROPOSED CONSTRUCTION



TYPICAL SECTIONS OF BRIDGE DECK
ORIGINAL CONSTRUCTION

Scale in Feet

1/8" = 1'-0"

FOR INFORMATION ONLY

NOTE:
For original construction refer to reference Dwgs. Sheet 2 of N-2-43 and Sheet 8 of N-1-11. Since construction, minor changes have been made during maintenance. The extent of these changes are to be determined in the field by the contractor.

THIS PRINT REDUCED TO ONE-HALF SCALE

REVISION	DATE	DESCRIPTION	BY

CORPS OF ENGINEERS, U. S. ARMY
OFFICE OF THE DISTRICT ENGINEER, PORTLAND, OREGON

DRAWN BY R.M.H.
TRACED BY C.A.S.
CHECKED BY D.W.S.
PREPARED: HEAD, STRUCTURE DESIGN SECTION

BONNEVILLE DAM PROJECT
COLUMBIA RIVER — OREGON - WASHINGTON

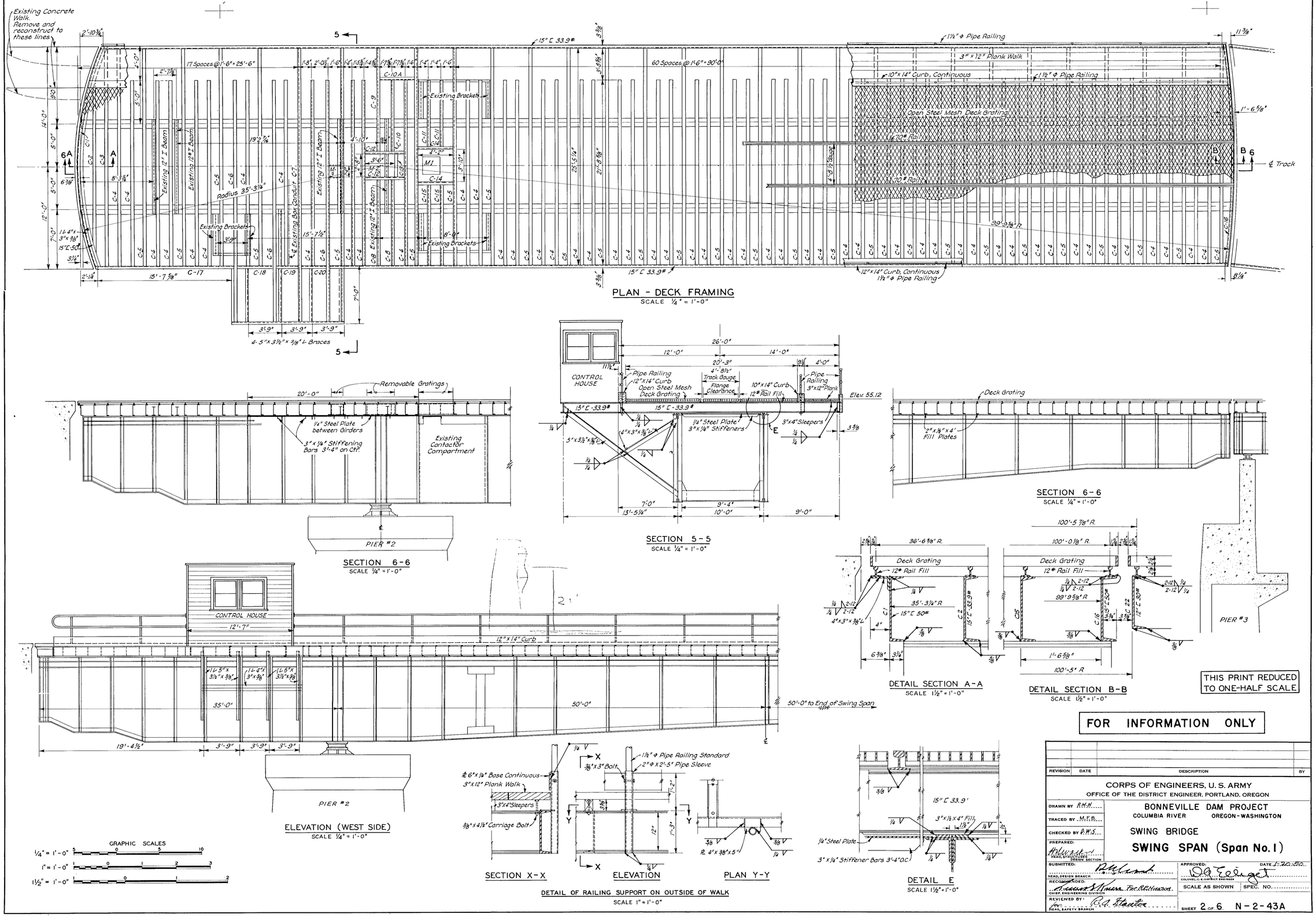
SWING BRIDGE

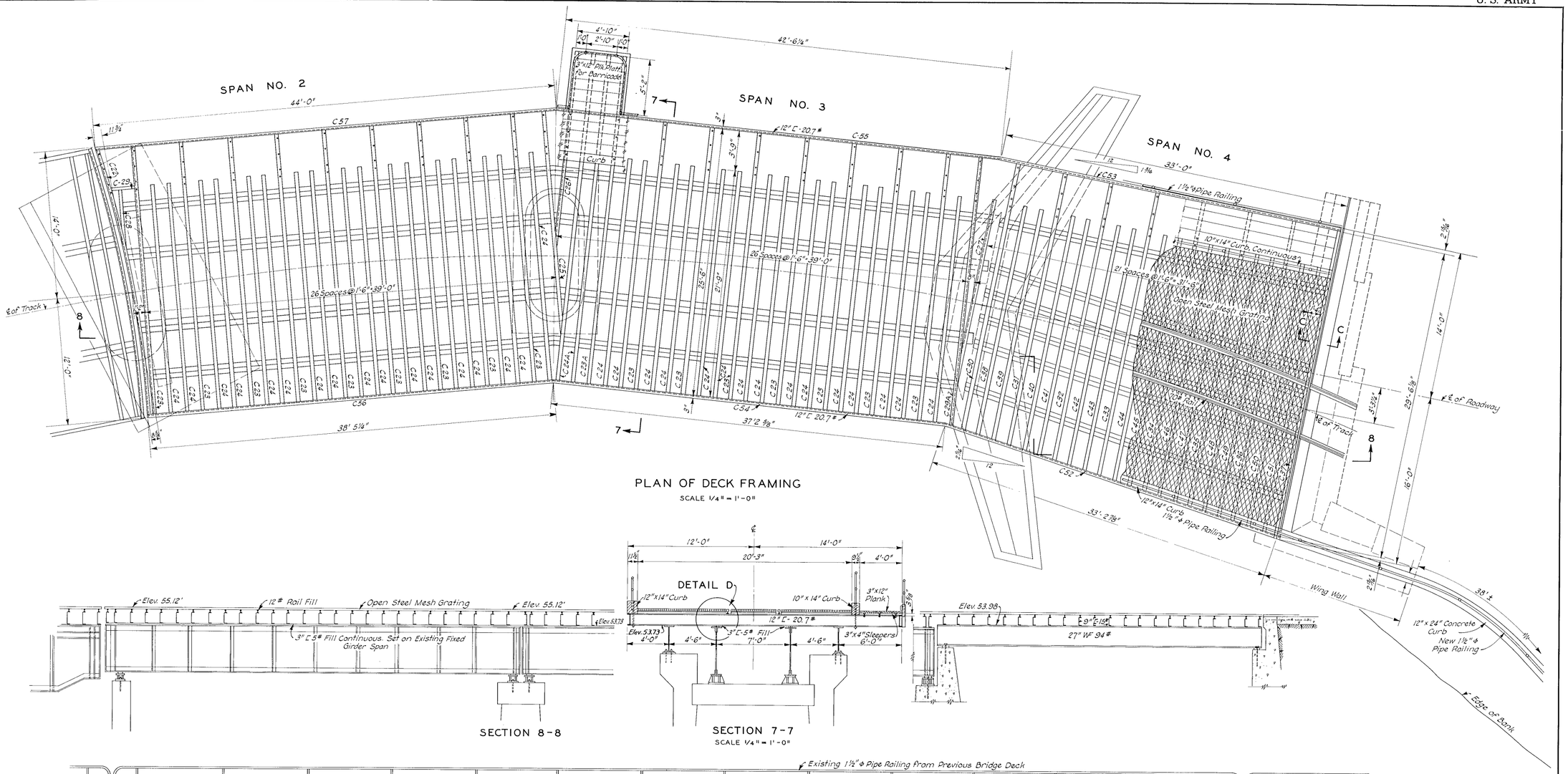
GENERAL PLAN

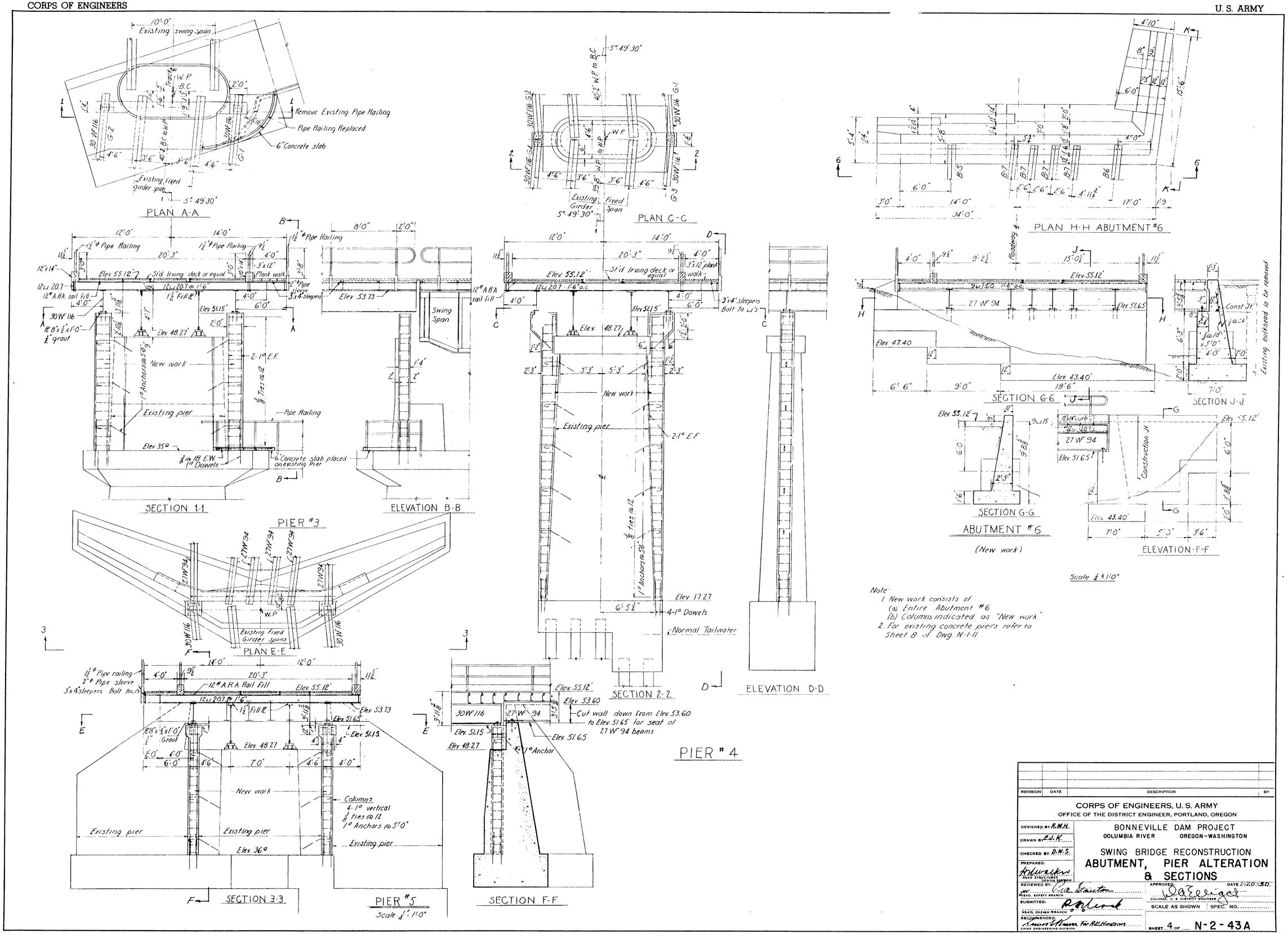
SUBMITTED: HEAD, OREGON BRANCH
RECOMMENDED: For R.F. Hickson, CHIEF, ENGINEERING DIVISION
REVIEWED BY: For HEAD, SAFETY BRANCH
APPROVED: COLONEL, C.E. DISTRICT ENGINEER
DATE 1-26-59

SCALE AS SHOWN
SPEC. NO.
SHEET 1 OF 6 N-2-43A

Paint Nav Lock Swing Bridge Bid No. 76-B-0031
E-0966


PLAN - DECK FRAMING
SCALE 1/4" = 1'-0"
SECTION 6-6
SECTION 5-5
SECTION 6-6
SECTION 6-6
ELEVATION (WEST SIDE)
SECTION X-X
ELEVATION
PLAN Y-Y
DETAIL OF RAILING SUPPORT ON OUTSIDE OF WALK
DETAIL SECTION A-A
DETAIL SECTION B-B
DETAIL E
THIS PRINT REDUCED TO ONE-HALF SCALE
FOR INFORMATION ONLY
CORPS OF ENGINEERS, U. S. ARMY
OFFICE OF THE DISTRICT ENGINEER, PORTLAND, OREGON
BONNEVILLE DAM PROJECT
COLUMBIA RIVER OREGON-WASHINGTON
SWING BRIDGE
SWING SPAN (Span No. 1)
SHEET 2 OF 6 N-2-43A


SPAN NO. 2
SPAN NO. 3
SPAN NO. 4
44'-0"
42'-6¼"
33'-0"
38'-5¼"
37'-2⅝"
33'-2⅞"
26 Spaces @ 1'-6" = 39'-0"
21 Spaces @ 1'-6" = 31'-6"
3"x12" Pile Bents for Barricades
Curb
12" C-20.7#
1½" ϕ Pipe Railing
10"x14" Curb Continuous
Open Steel Mesh Grating
12"x14" Curb
1½" ϕ Pipe Railing
Wing Wall
12"x24" Concrete Curb
New 1½" ϕ Pipe Railing
Edge of Bank
℄ of Track
℄ of Roadway
38'-4"
29'-6⅛"
16'-0"
14'-0"
12'-0"
PLAN OF DECK FRAMING
SCALE 1/4" = 1'-0"
Elev. 55.12'
12# Rail Fill
Open Steel Mesh Grating
3" C-5# Fill Continuous. Set on Existing Fixed Girder Span
Elev. 53.73
SECTION 8-8
DETAIL D
12"x14" Curb
10"x14" Curb
3"x12" Plank
3" C-5# Fill
3"x4" Sleepers
Elev. 53.98
27" WF 94#
SECTION 7-7
SCALE 1/4" = 1'-0"
Existing 1½" ϕ Pipe Railing From Previous Bridge Deck
12"x14" Curb
30" WF 116#
27" WF 94#
Existing Fixed Girder Span
PIER #3
PIER #4
PIER #5
ABUTMENT #6
ELEVATION (WEST SIDE)
SCALE 1/4" = 1'-0"
Deck Grating
70# Rail
12# Rail
12" C-20.7#
3" C-5# Fill Continuous
Elev. 53.61
Elev. 53.73
Top of Girder Span
DETAIL D
SCALE 1½" = 1'-0"
Deck Grating
12# Rail
9" C-15#
Elev. 53.98
27" WF 94#
Elev. 55.12
Elev. 51.65'
6"x½"x10" Plate
½" Cement Grout
2-7/8" ϕ x 15" Anchor Bolt
DETAIL SECTION C-C
SCALE 1½" = 1'-0"
THIS PRINT REDUCED TO ONE-HALF SCALE
GRAPHIC SCALES
1/4" = 1'-0"
1 1/2" = 1'-0"
FOR INFORMATION ONLY
REVISION DATE DESCRIPTION BY
CORPS OF ENGINEERS, U. S. ARMY
OFFICE OF THE DISTRICT ENGINEER, PORTLAND, OREGON
DRAWN BY R.N.H.
TRACED BY M.F.B.
CHECKED BY D.W.S.
PREPARED:
HEAD, STRUCTURES DESIGN SECTION
SUBMITTED:
HEAD, DESIGN BRANCH
RECOMMENDED:
CHIEF, ENGINEERING DIVISION
REVIEWED BY:
HEAD, SAFETY BRANCH
BONNEVILLE DAM PROJECT
COLUMBIA RIVER OREGON - WASHINGTON
SWING BRIDGE
FIXED SPANS (Spans 2, 3 & 4)
APPROVED:
COLONEL, C.E. DISTRICT ENGINEER
DATE
SCALE AS SHOWN
SPEC. NO.
SHEET 3 OF 6
N-2-43A



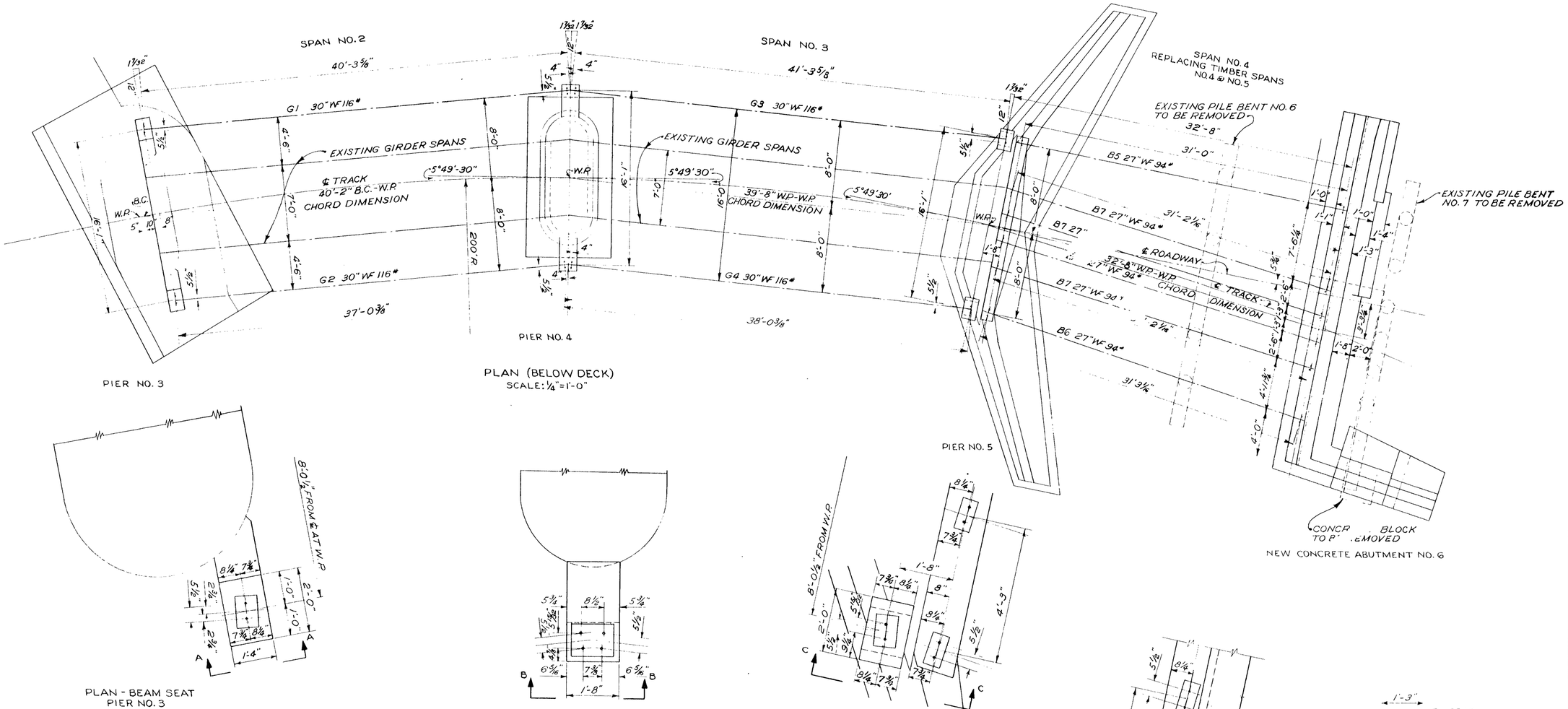
REVISION	DATE	DESCRIPTION	BY

CORPS OF ENGINEERS, U. S. ARMY
OFFICE OF THE DISTRICT ENGINEER, PORTLAND, OREGON

BONNEVILLE DAM PROJECT
COLUMBIA RIVER OREGON-WASHINGTON

SWING BRIDGE RECONSTRUCTION
ABUTMENT, PIER ALTERATION & SECTIONS

DESIGNED BY R.M.H.
DRAWN BY E.J.K.
CHECKED BY D.W.S.
PREPARED: HEAD STRUCTURES DESIGN SECTION
REVIEWED BY: for HEAD, SAFETY BRANCH
SUBMITTED: HEAD, DESIGN BRANCH
RECOMMENDED: for CHIEF, ENGINEERING DIVISION
APPROVED: COLONEL, C. E. DISTRICT ENGINEER
DATE 1-20-50
SCALE AS SHOWN
SPEC. NO.
SHEET 4 OF N-2-43A

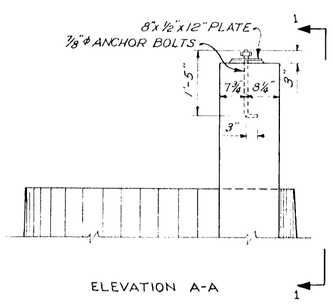


PLAN (BELOW DECK)
SCALE: 1/4" = 1'-0"

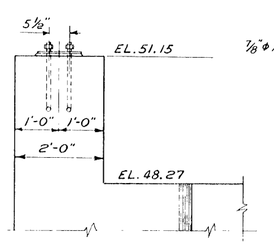
PLAN - BEAM SEAT
PIER NO. 3

PLAN - BEAM SEAT
PIER NO. 4

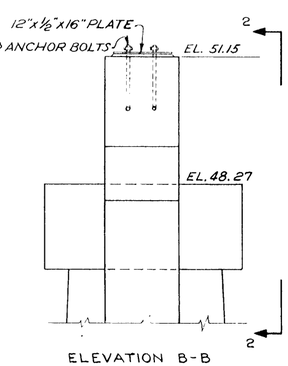
PLAN - BEAM SEAT
PIER NO. 5



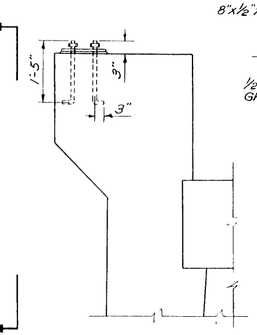
ELEVATION A-A



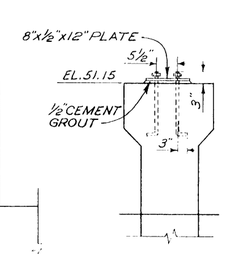
ELEVATION 1-1



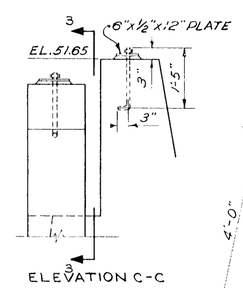
ELEVATION B-B



ELEVATION 2-2

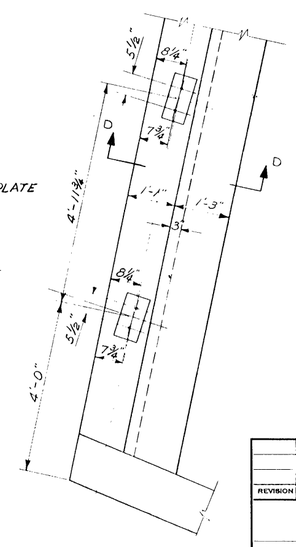


ELEVATION 3-3

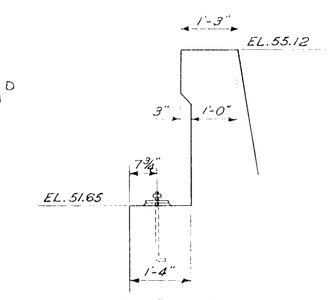


ELEVATION C-C

DETAILS - TOP OF P[illegible]
SCALE: 3/4" = 1'-0"



PLAN - BEAM SEATS
ABUTMENT NO. 6



SECTION D-D

GRAPHIC SCALES
1/4" = 1'-0" 5 0 5 10
3/4" = 1'-0" 1 0 1 2 3 4

REVISION	DATE	DESCRIPTION	BY

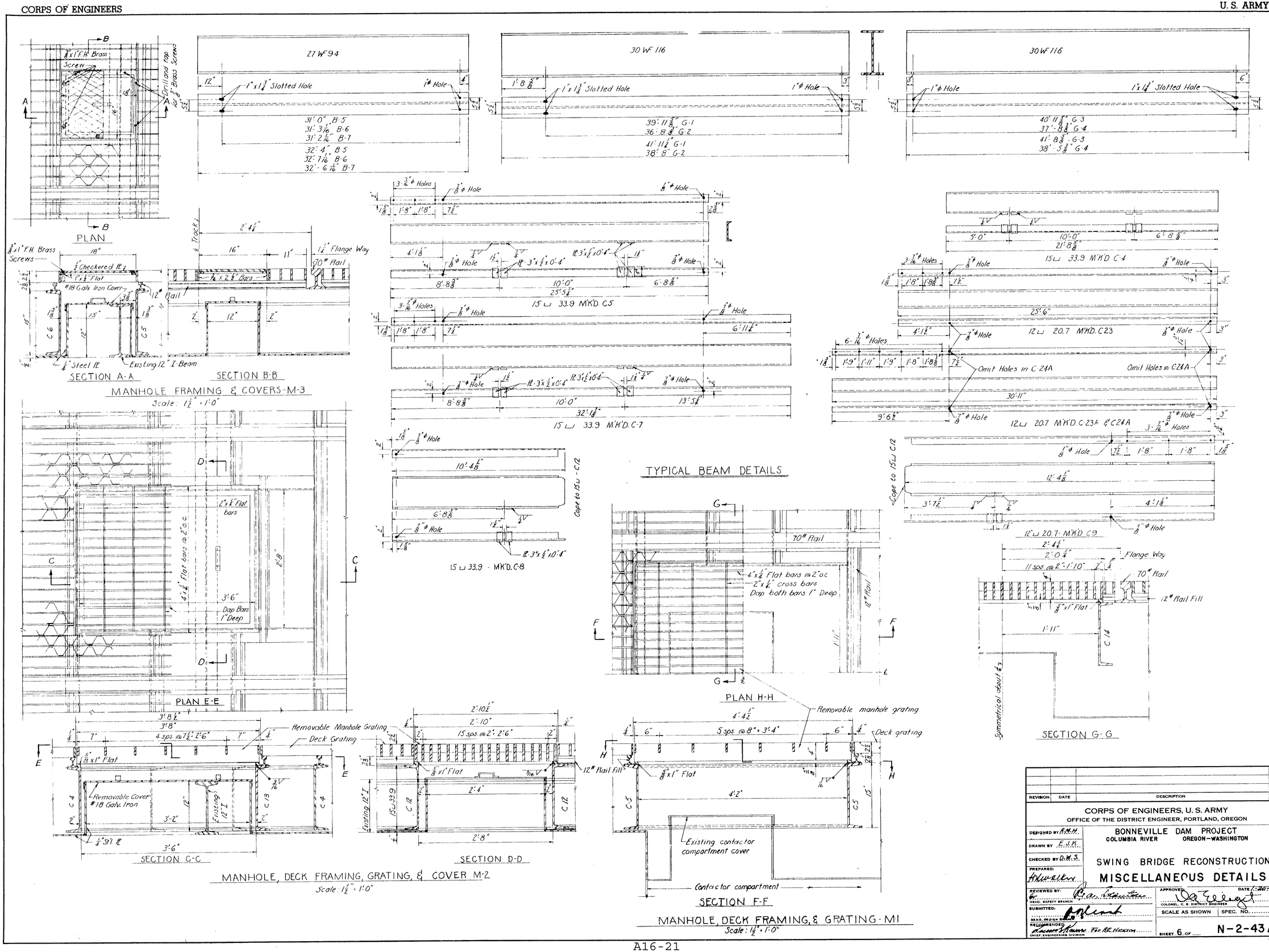
CORPS OF ENGINEERS, U. S. ARMY
OFFICE OF THE DISTRICT ENGINEER, PORTLAND, OREGON

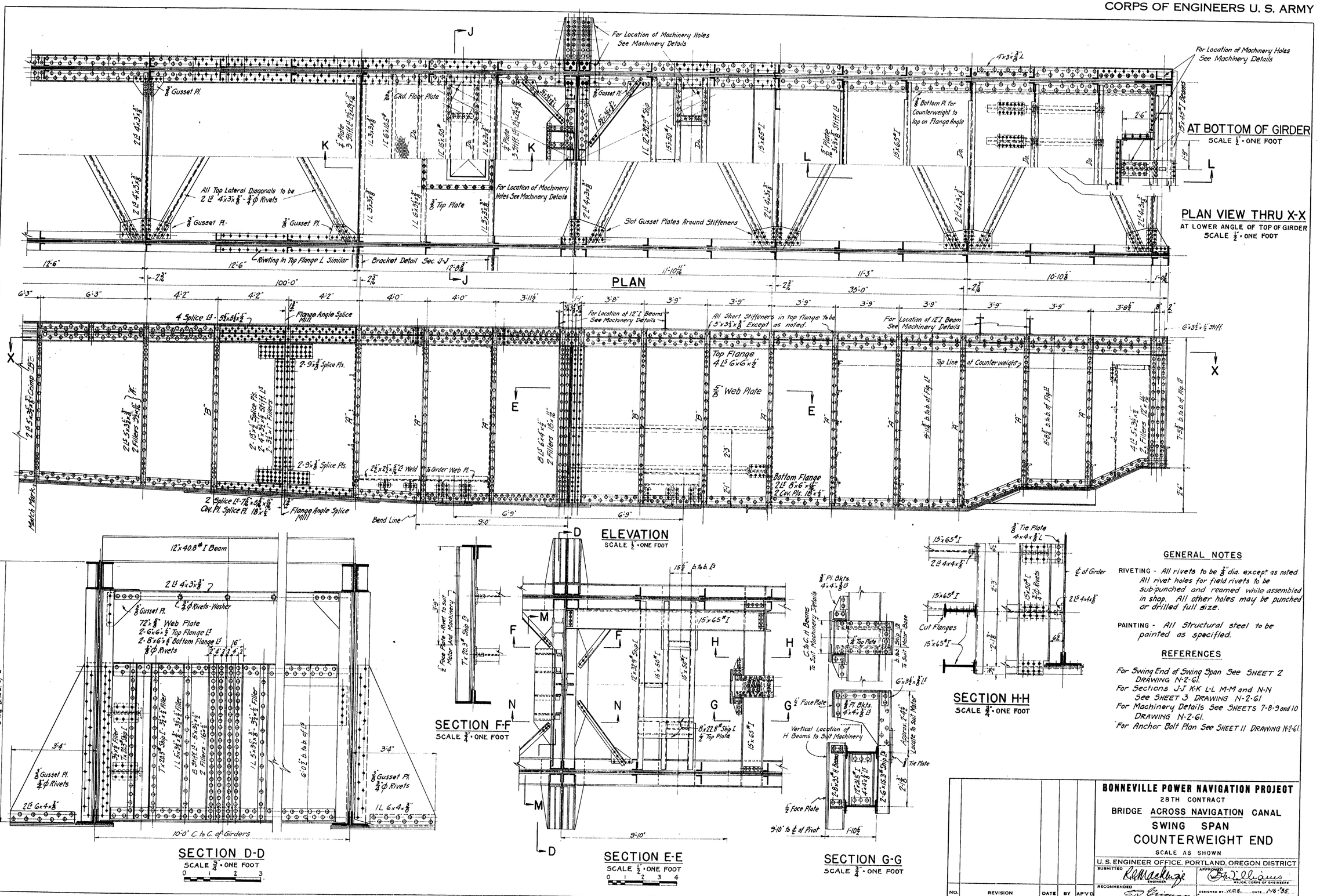
BONNEVILLE DAM PROJECT
COLUMBIA RIVER OREGON-WASHINGTON

SWING BRIDGE RECONSTRUCTION

BEAM SEATS

DESIGNED BY R.M.H.
DRAWN BY H.E.B.
CHECKED BY D.W.S.
PREPARED: H. L. Walker, HEAD, STRUCTURAL DESIGN SECTION
SUBMITTED: R. L. Ford, HEAD, DESIGN BRANCH
RECOMMENDED: R. E. Nelson For R. E. Nelson, CHIEF, ENGINEERING DIVISION
REVIEWED BY: W. J. Stratton, HEAD, SAFETY BRANCH
APPROVED: Wm. E. Wright, COLONEL, C.E. DISTRICT ENGINEER
DATE 1-20-50
SCALE AS SHOWN
SPEC. NO.
SHEET 5
N-2-43A


PLAN
SECTION A-A
SECTION B-B
MANHOLE FRAMING & COVERS-M-3
Scale: 1½" = 1'-0"
27 WF 94
30 WF 116
30 WF 116
15 ⊔ 33.9 M'K'D. C5
15 ⊔ 33.9 M'K'D. C-7
15 ⊔ 33.9 - M'K'D. C-8
15 ⊔ 33.9 M'K'D. C-4
12 ⊔ 20.7 M'K'D. C23
12 ⊔ 20.7 M'K'D. C-23A & C24A
12 ⊔ 20.7 - M'K'D C9
Omit Holes in C-24A
Cope to 15 ⊔ C12
TYPICAL BEAM DETAILS
PLAN E-E
PLAN H-H
SECTION G-G
SECTION C-C
SECTION D-D
SECTION F-F
MANHOLE, DECK FRAMING, GRATING, & COVER M-2
Scale: 1½" = 1'-0"
MANHOLE, DECK FRAMING, & GRATING - M1
Scale: 1½" = 1'-0"
Removable Manhole Grating
Deck Grating
Removable manhole grating
Deck grating
Existing contactor compartment cover
Contactor compartment
Flange Way
70# Rail
12# Rail Fill
Symmetrical about ℄
REVISION DATE DESCRIPTION BY
CORPS OF ENGINEERS, U. S. ARMY
OFFICE OF THE DISTRICT ENGINEER, PORTLAND, OREGON
BONNEVILLE DAM PROJECT
COLUMBIA RIVER OREGON—WASHINGTON
SWING BRIDGE RECONSTRUCTION
MISCELLANEOUS DETAILS
DESIGNED BY R.M.H.
DRAWN BY E.J.K.
CHECKED BY O.W.S.
PREPARED:
REVIEWED BY:
HEAD, SAFETY BRANCH
SUBMITTED:
HEAD, DESIGN BRANCH
RECOMMENDED:
For AR Hickson
CHIEF, ENGINEERING DIVISION
APPROVED:
COLONEL, C. E. DISTRICT ENGINEER
SCALE AS SHOWN
SPEC. NO.
SHEET 6 OF
N-2-43A



GENERAL NOTES

RIVETING - All rivets to be ⅞" dia. except as noted. All rivet holes for field rivets to be sub-punched and reamed while assembled in shop. All other holes may be punched or drilled full size.

PAINTING - All structural steel to be painted as specified.

REFERENCES

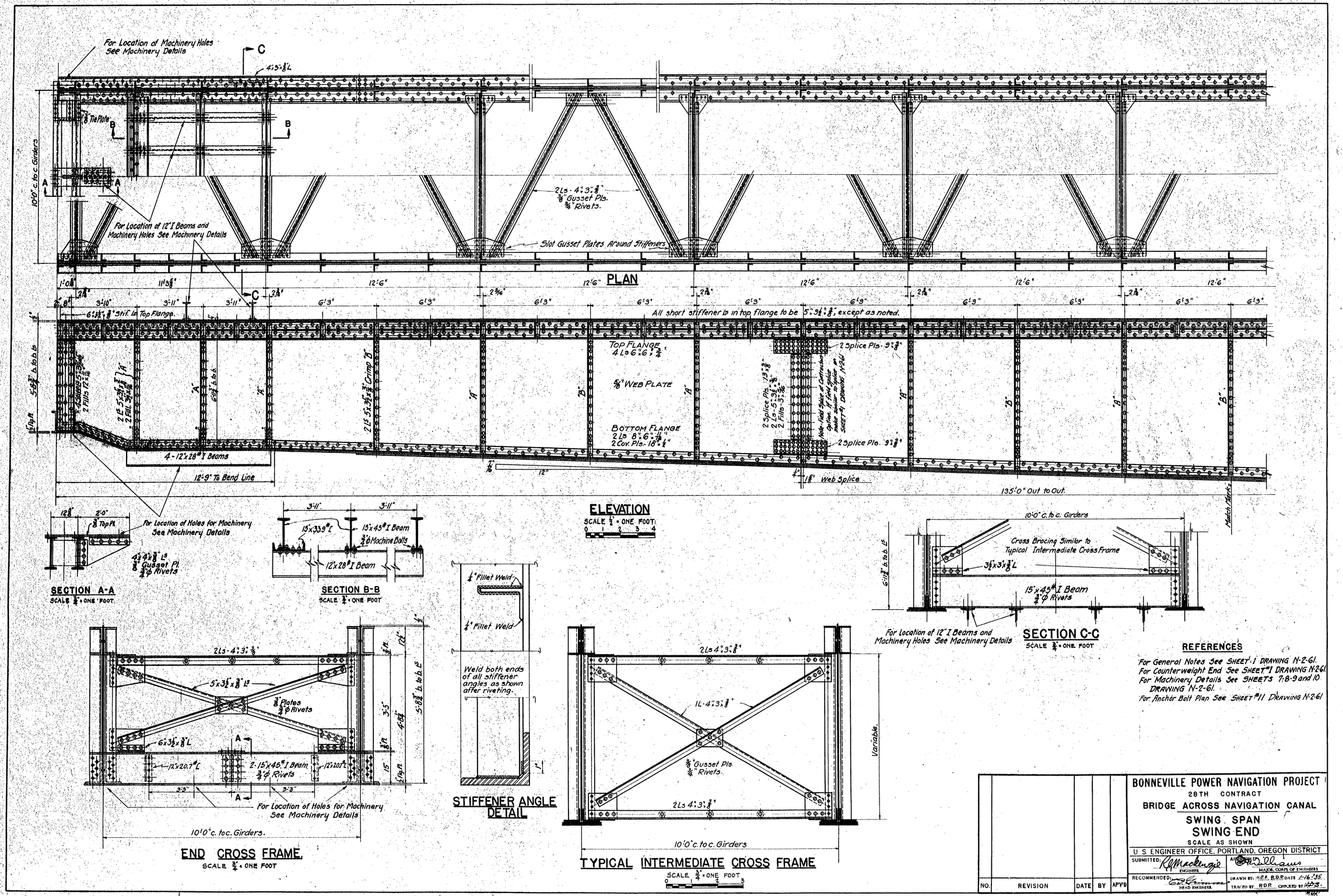
For Swing End of Swing Span See SHEET 2 DRAWING N-2-61.
For Sections J-J K-K L-L M-M and N-N See SHEET 3 DRAWING N-2-61
For Machinery Details See SHEETS 7-8-9 and 10 DRAWING N-2-61.
For Anchor Bolt Plan See SHEET 11 DRAWING N-2-61.

NO.	REVISION	DATE	BY	APV'D

BONNEVILLE POWER NAVIGATION PROJECT
28TH CONTRACT
BRIDGE ACROSS NAVIGATION CANAL
SWING SPAN
COUNTERWEIGHT END
SCALE AS SHOWN
U. S. ENGINEER OFFICE, PORTLAND, OREGON DISTRICT

SUBMITTED R. H. MacMunze, ENGINEER — APPROVED D. W. Williams, MAJOR, CORPS OF ENGINEERS
RECOMMENDED S. D. Crimson, HEAD ENGINEER
DESIGNED BY V.P.S. DATE 1-16-35
DR. BY R.D.P. TR. BY R.D.P. CHECKED BY

SHEET 1 OF 13 N-2-61



REFERENCES

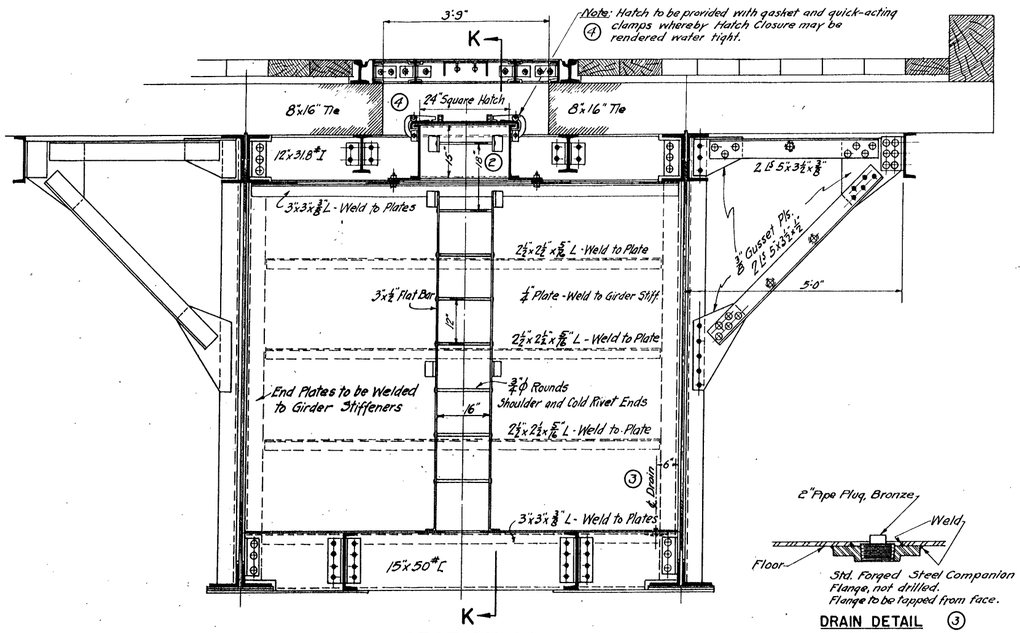
For General Notes See SHEET 1 DRAWING N-2-61.
For Counterweight End See SHEET #1 DRAWING N-2-61.
For Machinery Details See SHEETS 7, 8, 9 and 10 DRAWING N-2-61.
For Anchor Bolt Plan See SHEET #11 DRAWING N-2-61

NO.	REVISION	DATE	BY	APV'D

BONNEVILLE POWER NAVIGATION PROJECT
28TH CONTRACT
BRIDGE ACROSS NAVIGATION CANAL
SWING SPAN
SWING END
SCALE AS SHOWN
U. S. ENGINEER OFFICE, PORTLAND, OREGON DISTRICT

SUBMITTED: R. A. Mackenzie, ENGINEER — APPROVED: D. L. Evans, MAJOR, CORPS OF ENGINEERS
RECOMMENDED: HEAD ENGINEER
DRAWN BY: H.D.F. R.D.P. DATE 1-16-35
TRACED BY R.D.P. CHECKED BY H.D.S.

SHEET 2 OF 13 N-2-61

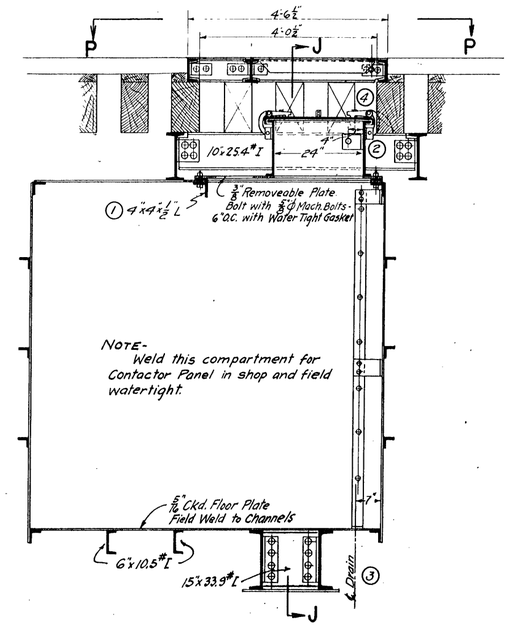


SECTION J-J

SCALE ¾" = ONE FOOT

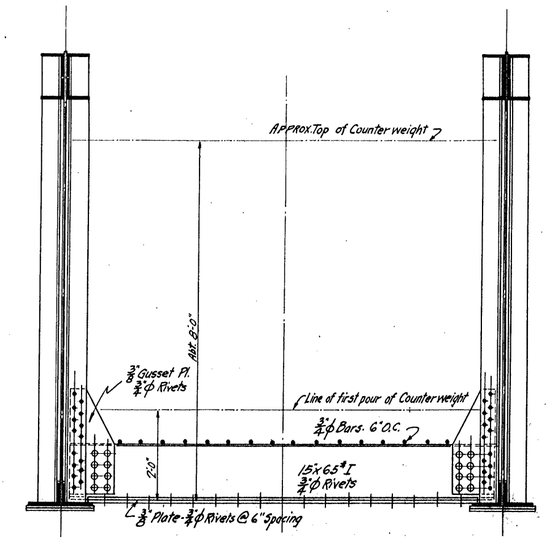
DRAIN DETAIL ③

No Scale



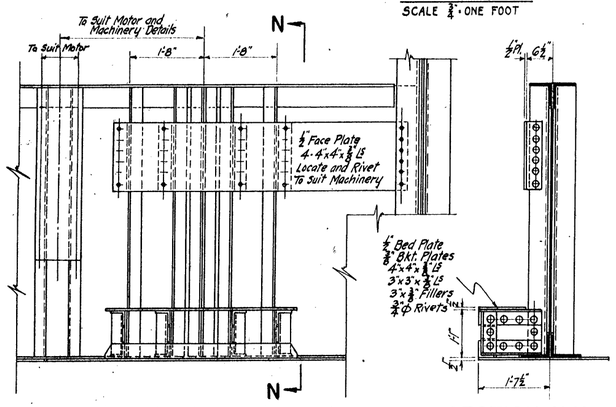
SECTION K-K

SCALE ¾" = ONE FOOT



TYPICAL SECTION THRU COUNTERWEIGHT

SCALE ¾" = ONE FOOT

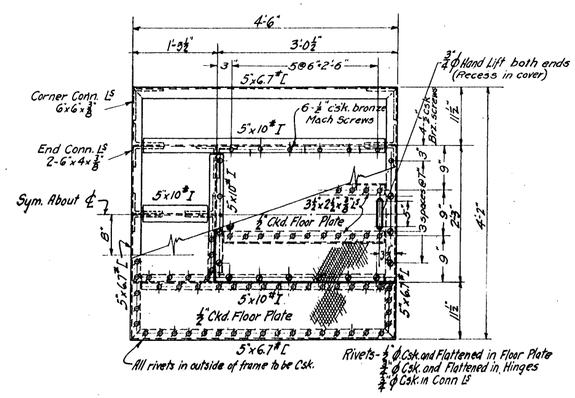


SECTION M-M

SCALE ¾" = ONE FOOT

SECTION N-N

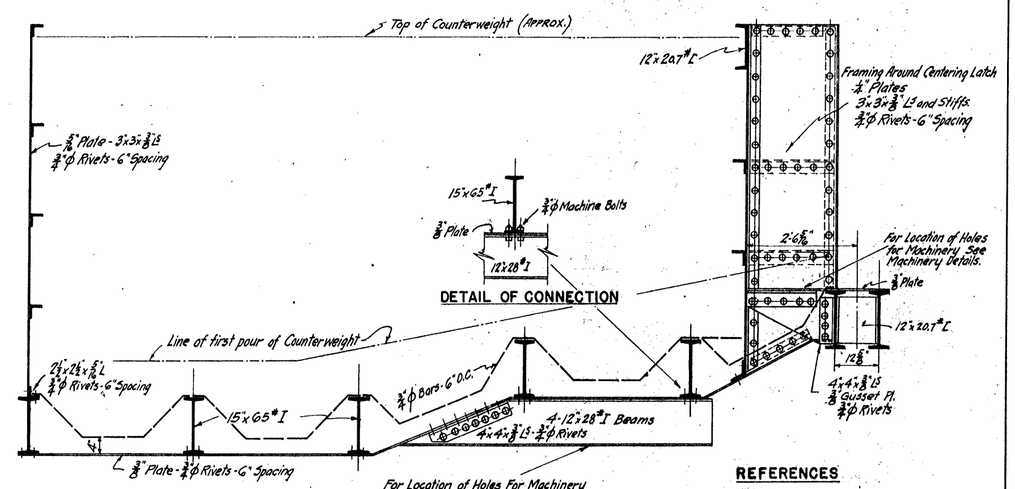
SCALE ¾" = ONE FOOT



PLAN VIEW AT P-P

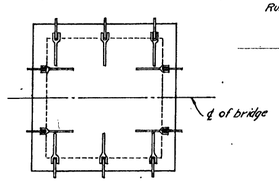
DETAIL CONTACTOR COMPARTMENT COVER

SCALE ~ 1" = ONE FOOT



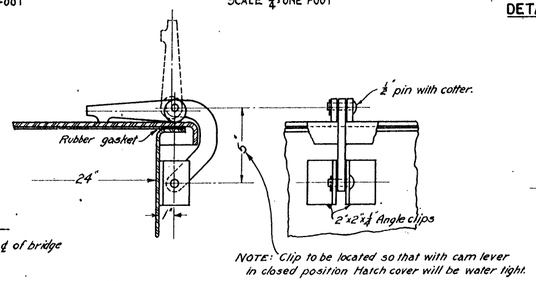
SECTION L-L

SCALE ¾" = ONE FOOT



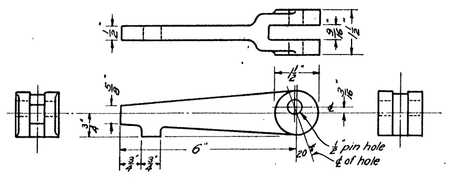
④ LAYOUT OF HATCH CLAMPS PLAN

SCALE: 1" = 1'-0"



④ ASSEMBLY OF HATCH COVER CLAMP

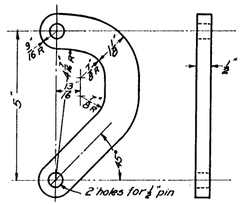
SCALE: 3" = 1'-0"



④ HATCH CLAMP LEVER

STEEL CASTING MAKE 10

SCALE HALF SIZE



④ HATCH CLAMP HOOK

STEEL FORGING MAKE 10

SCALE HALF SIZE

REFERENCES

For General Notes See SHEET 1 DRAWING N-2-61
For Counterweight End of Swing Span See SHEET 1 DRAWING N-2-61
For Swing End of Swing Span See SHEET 2 DRAWING N-2-61
For Machinery Details See SHEETS 7-8-9 and 10 DRAWING N-2-61
For Anchor Bolt Plan See SHEET 11 DRAWING N-2-61

NO.	REVISION	DATE	BY	APV'D
4	Hatch cover tightening details added.	1-31-35	H.G.L.	RJM
3	Drain added.	1-31-35	H.G.L.	RJM
2	Ladder Rung added.	1-31-35	H.G.L.	RJM
1	Angle was 5"x3½"x⅜".	1-31-35	H.G.L.	RJM

BONNEVILLE POWER NAVIGATION PROJECT

28TH CONTRACT

BRIDGE ACROSS NAVIGATION CANAL

SWING SPAN

DETAILS

SCALE AS SHOWN

U. S. ENGINEER OFFICE, PORTLAND, OREGON DISTRICT

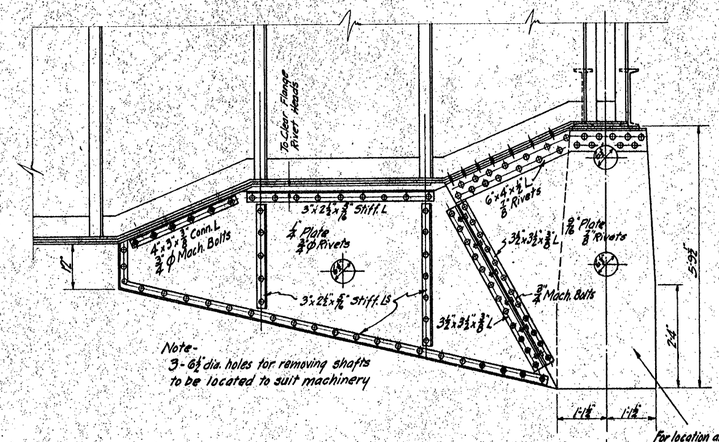
SUBMITTED R. J. Mackenzie, ENGINEER — APPROVED C. E. Williams, MAJOR, CORPS OF ENGINEERS

RECOMMENDED E. O. Sherwood, HEAD ENGINEER

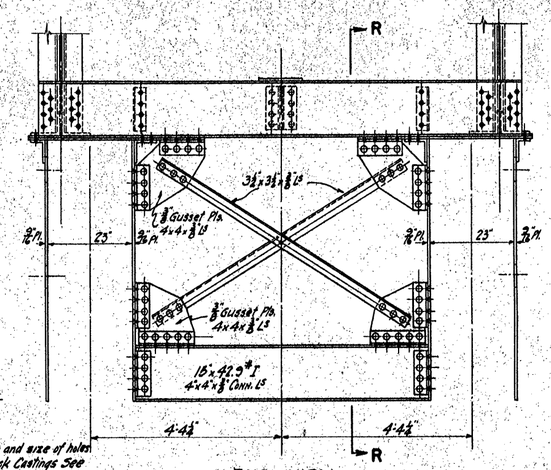
DESIGNED BY W.D.S. DATE 1-16-35

DR. BY R.D.P. TR. BY R.D.P. CHECKED BY W.D.S.

SHEET 3 OF 13 N-2-61

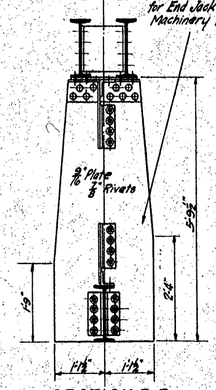


ELEVATION



END VIEW

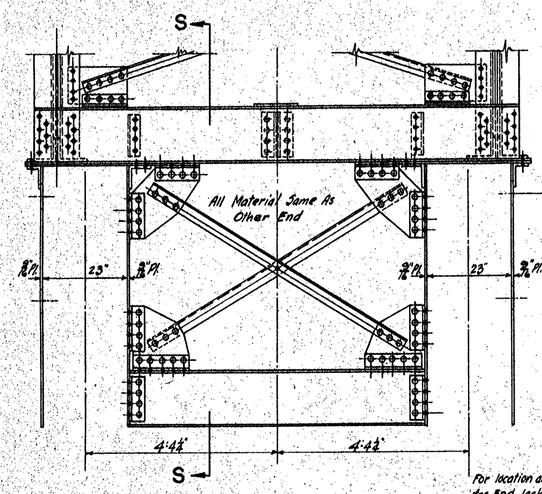
For location and size of holes for End Jack Castings See Machinery Details.



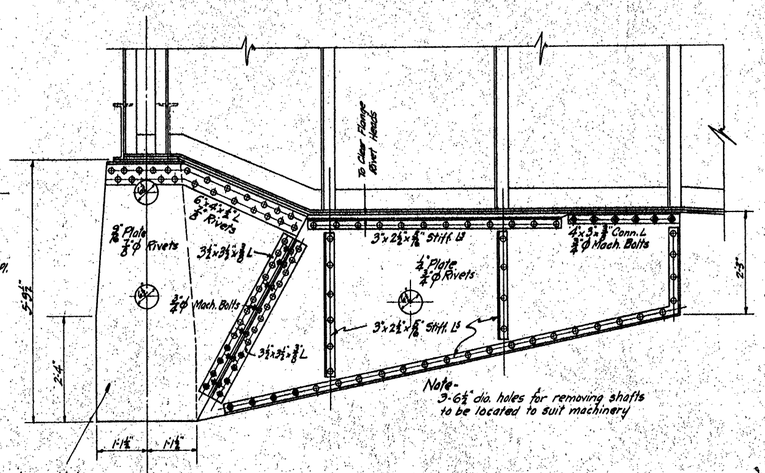
SECTION R-R

END JACK PLATES-COUNTERWEIGHT END

SCALE- 3/4" = ONE FOOT

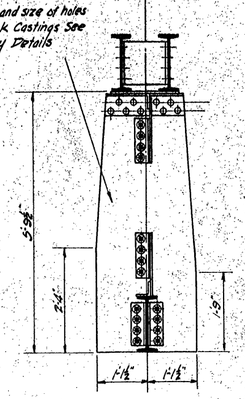


END VIEW



ELEVATION

For location and size of holes for End Jack Castings See Machinery Details



SECTION S-S

END JACK PLATES- SWING END

SCALE 3/4" = ONE FOOT

0 1 2 3

REFERENCES

For General Notes See SHEET 1 DRAWING N-2-61
For Counterweight End See SHEET 1 DRAWING N-2-61
For Swing End See SHEET 2 DRAWING N-2-61
For Machinery Details See SHEET 7,8,9 and 10 DRAWING N-2-61

NO.	REVISION	DATE	BY	APV'D

BONNEVILLE POWER NAVIGATION PROJECT
28TH CONTRACT

BRIDGE ACROSS NAVIGATION CANAL
SWING SPAN
DETAILS

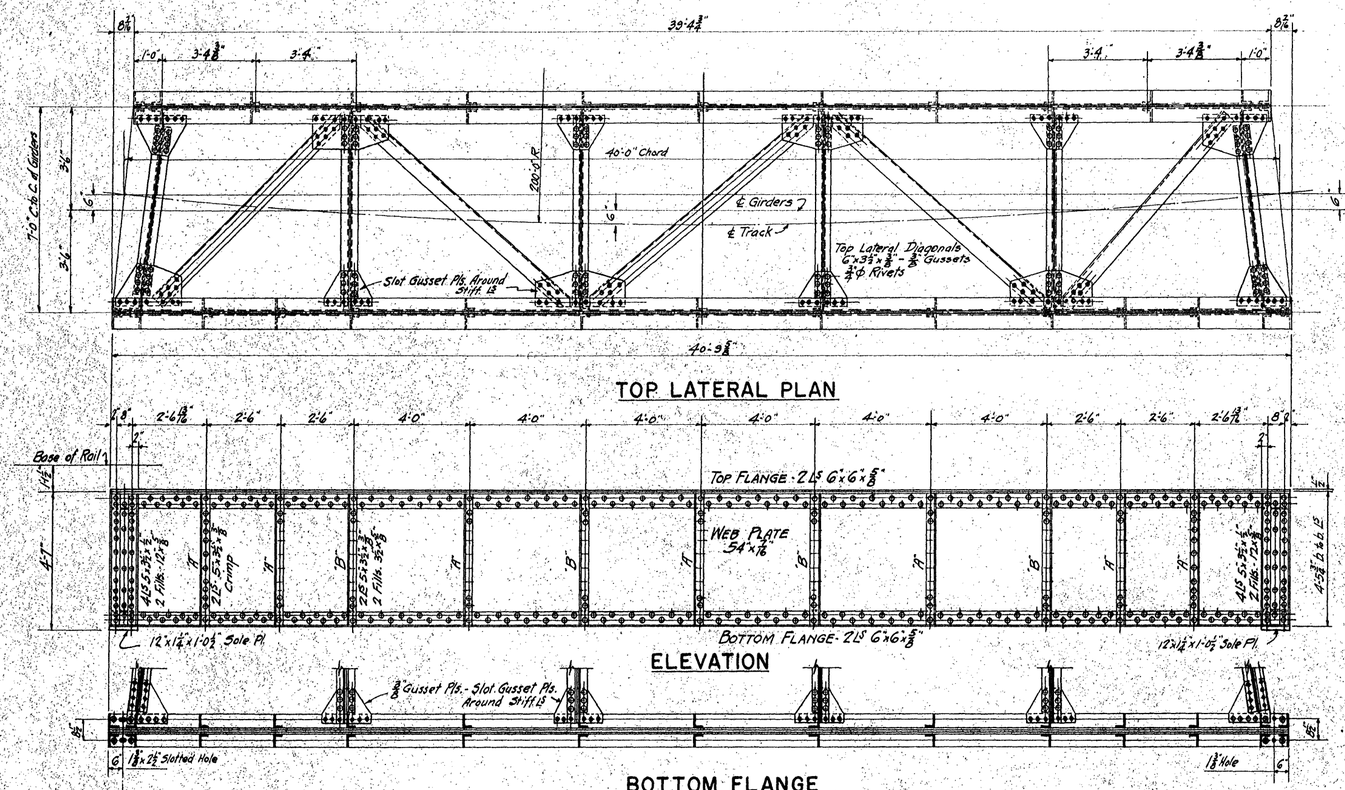
SCALE AS SHOWN

U.S. ENGINEER OFFICE, PORTLAND, OREGON DISTRICT

SUBMITTED R.F. Mackenzie ENGINEER — APPROVED H. Williams MAJOR, CORPS OF ENGINEERS

RECOMMENDED HEAD ENGINEER — DESIGNED BY H.D. Smith DATE 1-16-35 — DR. BY Palmer TR. BY R.D.P. CHECKED BY H.D.S. MAR

SHEET 4 OF 13 N-2-61



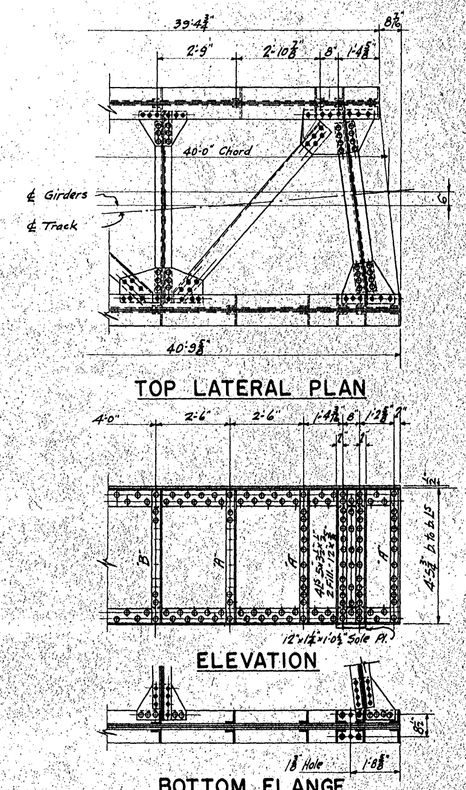
TOP LATERAL PLAN

ELEVATION

BOTTOM FLANGE

MAKE 1 SPAN AS SHOWN FOR SPAN #3

SCALE 1/2" = ONE FOOT



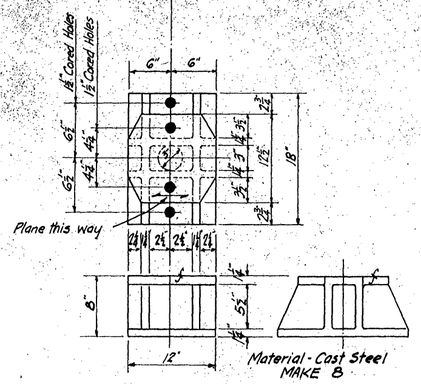
TOP LATERAL PLAN

ELEVATION

BOTTOM FLANGE

MAKE 1 SPAN SIMILAR TO SPAN #3 EXCEPT AS SHOWN FOR SPAN #2

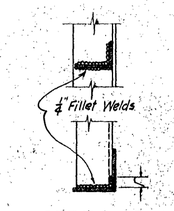
SCALE 1/2" = ONE FOOT



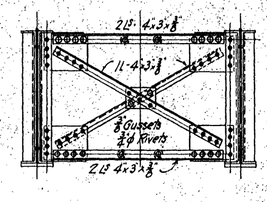
BASE PLATE

SCALE 1 1/2" = ONE FOOT

SCALE IN INCHES

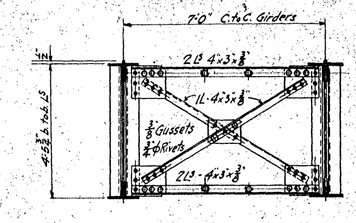


DETAIL OF STIFFENER WELDS



END CROSS FRAME

SCALE 1/2" = ONE FOOT



INTERMEDIATE CROSS FRAME

SCALE 1/2" = ONE FOOT

REFERENCES

For General Notes See SHEET 1, DRAWING N-2-61
For Anchor Bolt Plan See SHEET 11 DRAWING N-2-61

NOTE:
FIELD RIVETING OF CROSS FRAMES & DIAGONALS OPTIONAL.

NO.	REVISION	DATE	BY	APV'D

BONNEVILLE POWER NAVIGATION PROJECT
28TH CONTRACT
BRIDGE ACROSS NAVIGATION CANAL

FIXED SPANS
DETAILS
SCALE AS SHOWN

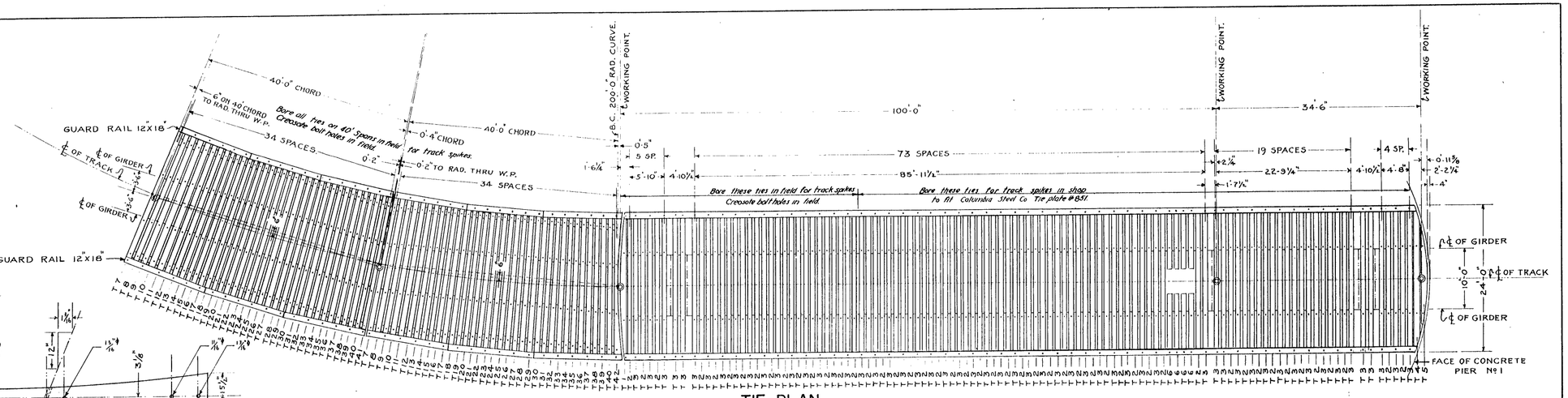
U. S. ENGINEER OFFICE, PORTLAND, OREGON DISTRICT

SUBMITTED R. R. Mackenzie, ENGINEER — APPROVED H. L. Williams, MAJOR, CORPS OF ENGINEERS

RECOMMENDED E. E. Fox, HEAD ENGINEER — DESIGNED BY W.O.S. DATE 1-16-35

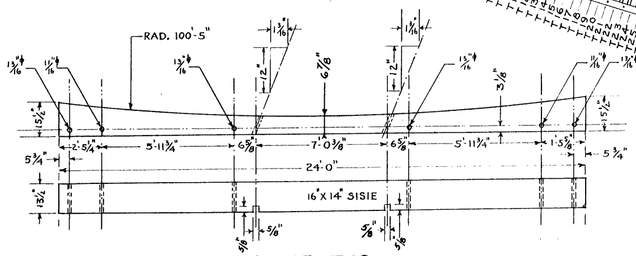
DR. BY R.A.P. TR. BY R.A.P. CHECKED BY W.O.S. MAK

SHEET 5 OF 13 N-2-61



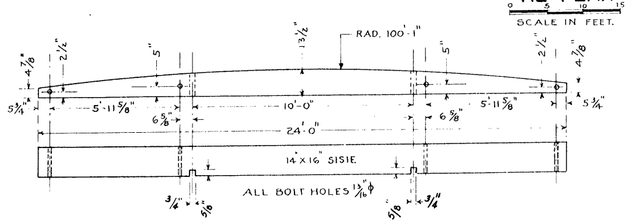
TIE PLAN

SCALE IN FEET.



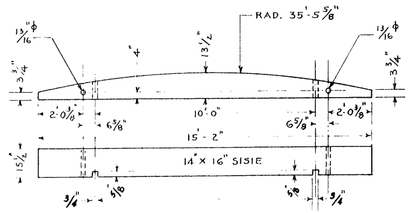
TIE T42

1-REQ.



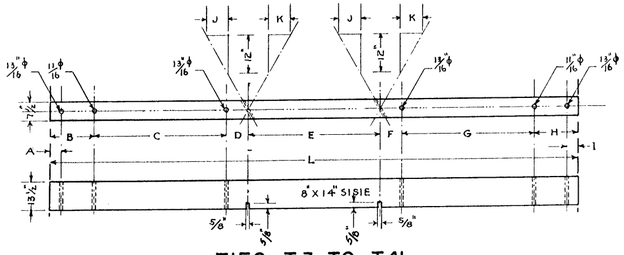
TIE T1

1 REQ.

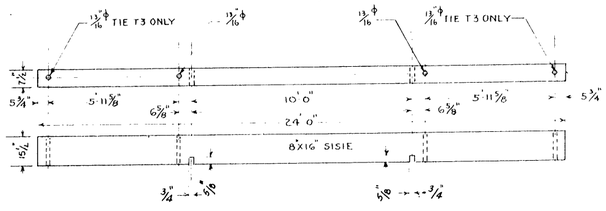


TIE T5

1 REQ.

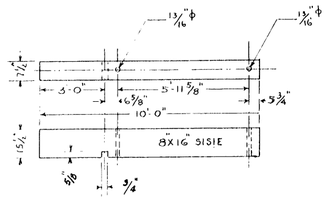


TIES T7 TO T41



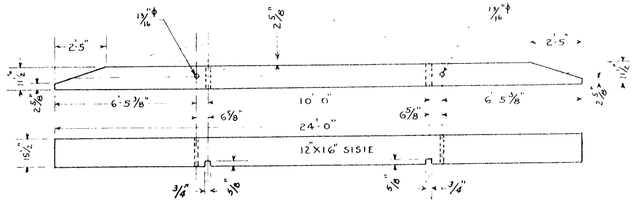
TIE T2 & T3

49 - T2 REQ. 56 - T3 REQ.



TIE T6

8 REQ.



TIE T4

1 REQ.

SCALE IN FEET.

SCHEDULE OF TIE MEASUREMENTS

Nº	Nº REQ	L	A	B	C	D	E	F	G	H	I	J	K
T 7	2	24'-0"	5¾"	2'-5¼"	5'-11¾"	6⅝"	7'-0⅛"	6⅝"	5'-11¾"	1'-5⅝"	5¾"	1 3/16"	
T 8	2	24'-0"		2'-4½"	5'-11⅞"	6⅝"	7'-0⅛"	6⅝"	5'-11⅝"	1'-6⅝"		1⅛"	
T 9	2	24'-0"	5¾"	2'-3½"	5'-11⅝"	6⅝"	7'-0¼"	6⅝"	5'-11⅝"	1'-7¾"	5¾"	1 1/16"	
T 10	2	24'-0"		2'-2⅝"	5'-11⅝"	6⅝"	7'-0¼"	6⅝"	5'-11⅝"	1'-8⅝"		1"	
T 11	2	24'-0"	5¾"	2'-1⅝"	5'-11⅝"	6⅝"	7'-0¼"	6⅝"	5'-11⅝"	1'-9⅝"	5¾"	0⅞"	
T 12	2	24'-0"		2'-0⅞"	5'-11½"	6⅝"	7'-0¼"	6⅝"	5'-11½"	1'-10⅝"		0 11/16"	
T 13	2	24'-0"	5¾"	2'-0"	5'-11½"	6⅝"	7'-0¼"	6⅝"	5'-11½"	1'-11½"	5¾"	0¾"	
T 14	2	24'-0"		1'-11"	5'-11½"	6⅝"	7'-0¼"	6⅝"	5'-11½"	2'-0½"		0 9/16"	
T 15	2	24'-0"	5¾"	1'-10¼"	5'-11½"	6⅝"	7'-0⅛"	6⅝"	5'-11½"	2'-1⅛"	5¾"	0⅜"	
T 16	2	24'-0"		1'-9¼"	5'-11½"	6⅝"	7'-0"	6⅝"	5'-11½"	2'-2½"		0 3/16"	
T 17	2	24'-0"	5¾"	1'-8⅞"	5'-11⅞"	6⅝"	7'-0"	6⅝"	5'-11⅞"	2'-3⅝"	5¾"	0½"	
T 18	2	24'-0"		1'-7½"	5'-11⅞"	6⅝"	7'-0"	6⅝"	5'-11⅞"	2'-4½"		0 7/16"	
T 19	2	24'-0"	5¼"	1'-7⅜"	5'-11⅞"	6⅝"	7'-0"	6⅝"	5'-11⅞"	2'-4⅝"	5¾"	0⅜"	
T 20	2	24'-0"		1'-7⅜"	5'-11⅞"	6⅝"	7'-0"	6⅝"	5'-11⅞"	2'-4⅝"		0¼"	
T 21	2	24'-0"	5¾"	1'-7⅜"	5'-11⅞"	6⅝"	7'-0"	6⅝"	5'-11⅞"	2'-4⅝"	5¾"	0 3/16"	
T 22	2	24'-0"		1'-7⅜"	5'-11⅞"	6⅝"	7'-0"	6⅝"	5'-11⅞"	2'-4⅝"		0⅛"	
T 23	2	24'-0"	5¾"	1'-7⅜"	5'-11⅞"	6⅝"	7'-0"	6⅝"	5'-11⅞"	2'-4⅝"	5¾"	0 1/16"	
T 24	2	24'-0"		1'-7⅜"	5'-11⅞"	6⅝"	7'-0"	6⅝"	5'-11⅞"	2'-4⅝"		0	0
T 25	2	24'-0"	5¾"	1'-7⅜"	5'-11⅞"	6⅝"	7'-0"	6⅝"	5'-11⅞"	2'-4⅝"	5¾"		0 1/16"
T 26	2	24'-0"		1'-7⅜"	5'-11⅞"	6⅝"	7'-0"	6⅝"	5'-11⅞"	2'-4⅝"			0⅛"
T 27	2	24'-0"	5¾"	1'-7⅜"	5'-11⅞"	6⅝"	7'-0"	6⅝"	5'-11⅞"	2'-4⅝"	5¾"		0 3/16"
T 28	2	24'-0"		1'-7⅜"	5'-11⅞"	6⅝"	7'-0"	6⅝"	5'-11⅞"	2'-4⅝"			0¼"
T 29	2	24'-0"	5¾"	1'-7⅜"	5'-11⅞"	6⅝"	7'-0"	6⅝"	5'-11⅞"	2'-4⅝"	5¾"		0⅜"
T 30	2	24'-0"		1'-7½"	5'-11⅞"	6⅝"	7'-0"	6⅝"	5'-11⅞"	2'-4½"			0 7/16"
T 31	2	24'-0"	5¾"	1'-8⅞"	5'-11⅞"	6⅝"	7'-0"	6⅝"	5'-11⅞"	2'-3⅝"	5¾"		0½"
T 32	2	24'-0"		1'-9¼"	5'-11½"	6⅝"	7'-0"	6⅝"	5'-11½"	2'-2½"			0 9/16"
T 33	2	24'-0"	5¾"	1'-10¼"	5'-11½"	6⅝"	7'-0⅛"	6⅝"	5'-11½"	2'-1⅛"	5¾"		0⅜"
T 34	2	24'-0"		1'-11"	5'-11½"	6⅝"	7'-0¼"	6⅝"	5'-11½"	2'-0½"			0 5/16"
T 35	2	24'-0"	5¾"	2'-0"	5'-11½"	6⅝"	7'-0¼"	6⅝"	5'-11½"	1'-11½"	5¾"		0¾"
T 36	2	24'-0"		2'-0⅞"	5'-11½"	6⅝"	7'-0¼"	6⅝"	5'-11½"	1'-10⅝"			0 13/16"
T 37	2	24'-0"	5¼"	2'-1⅝"	5'-11⅝"	6⅝"	7'-0¼"	6⅝"	5'-11⅝"	1'-9⅝"	5¾"		0⅞"
T 38	2	24'-0"		2'-2⅝"	5'-11⅝"	6⅝"	7'-0¼"	6⅝"	5'-11⅝"	1'-8⅝"			1"
T 39	2	24'-0"	5¾"	2'-3½"	5'-11⅝"	6⅝"	7'-0¼"	6⅝"	5'-11⅝"	1'-7¾"	5¾"		1 1/16"
T 40	2	24'-0"		2'-4½"	5'-11⅝"	6⅝"	7'-0⅜"	6⅝"	5'-11⅝"	1'-6⅝"			1⅛"
T 41	1	24'-0"	5¾"	2-5¼"	5'-11¾"	6⅝"	7'-0⅛"	6⅝"	5'-11¾"	1'-5⅝"	5¾"		1 3/16"

NOTES.

For Grade of Timber and Treatment see General Specifications.

Guard Rails to be framed in the field and not treated.

NO.	REVISION	DATE	BY	AP'V'D

BONNEVILLE POWER NAVIGATION PROJECT

28TH CONTRACT

BRIDGE ACROSS NAVIGATION CANAL

TIE PLAN AND DETAILS

SCALE AS SHOWN

U. S. ENGINEER OFFICE, PORTLAND, OREGON DISTRICT

SUBMITTED: R. B. Mackenzie, ENGINEER

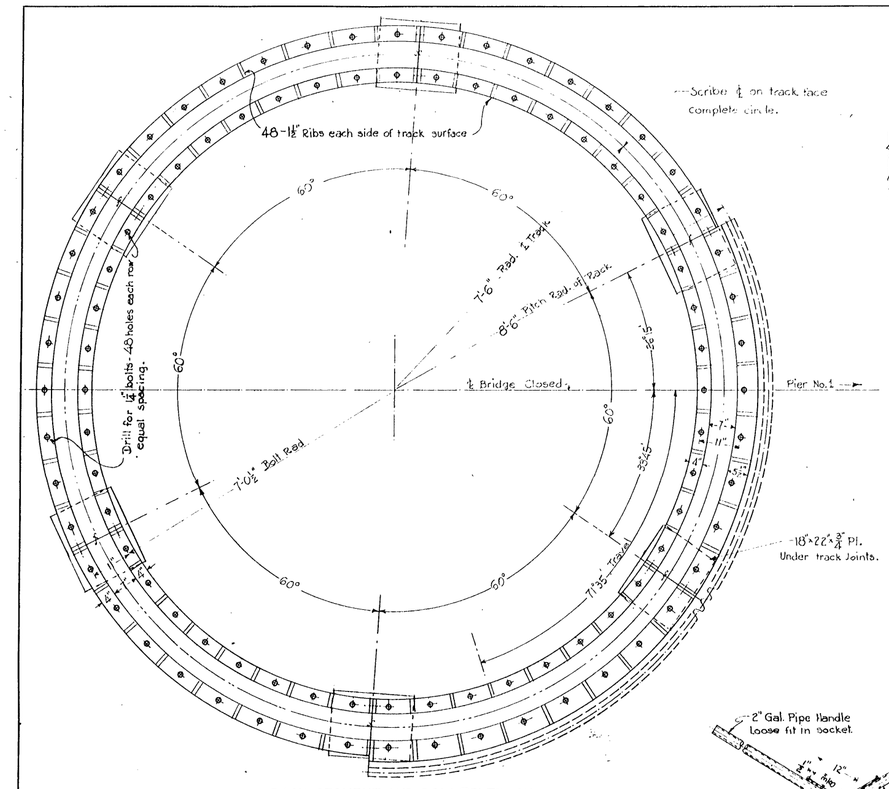
APPROVED: MAJOR, CORPS OF ENGINEERS

RECOMMENDED: E. O. Wilsmann, HEAD ENGINEER

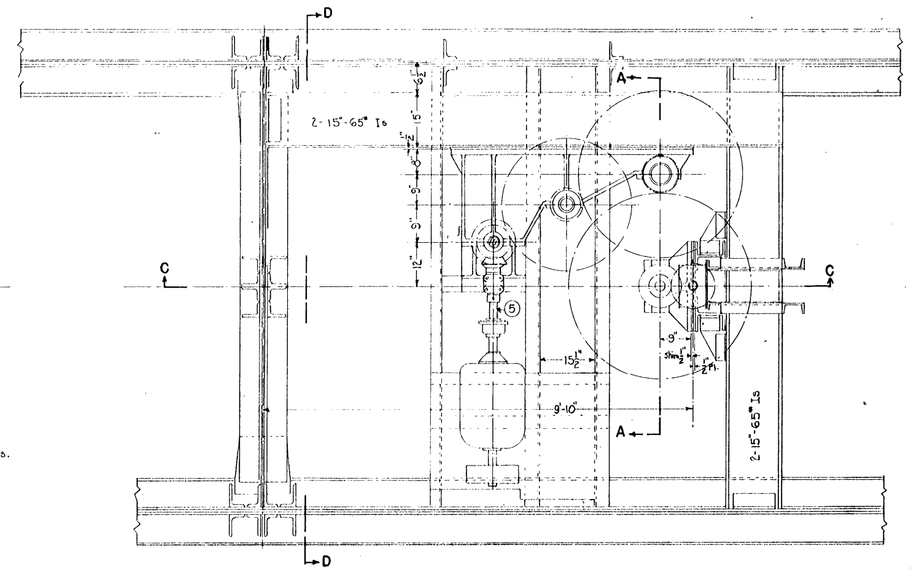
DESIGNED BY W.O.S. DATE Feb 6: 1935.

DR. BY W.C.T. TR. BY W.C.T. CHECKED BY W.O.S.

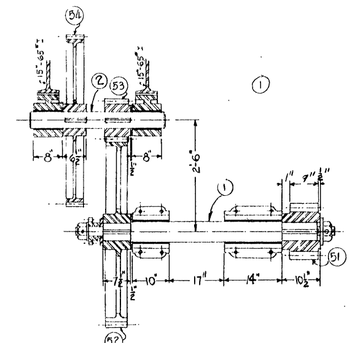
SHEET 6 OF 13 N-2-61



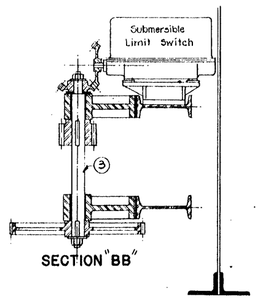
RACK SEGMENT AND ROLLER TRACK



SECTIONAL PLAN "EE"



SECTION "AA"



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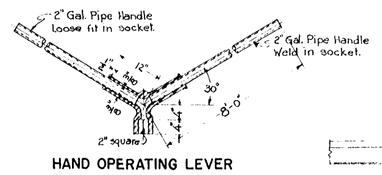
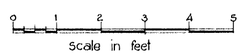
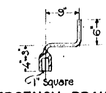
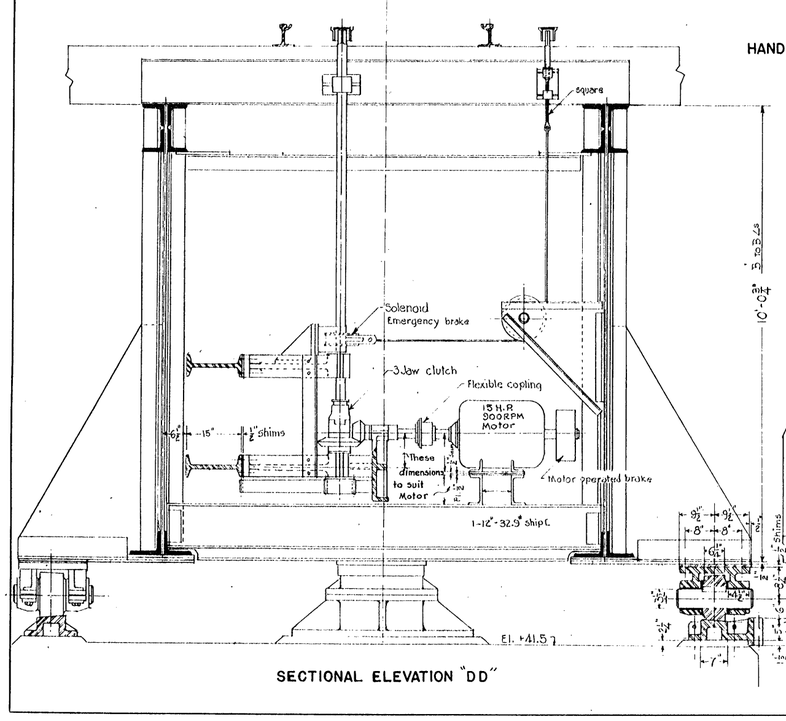


HAND OPERATING LEVER

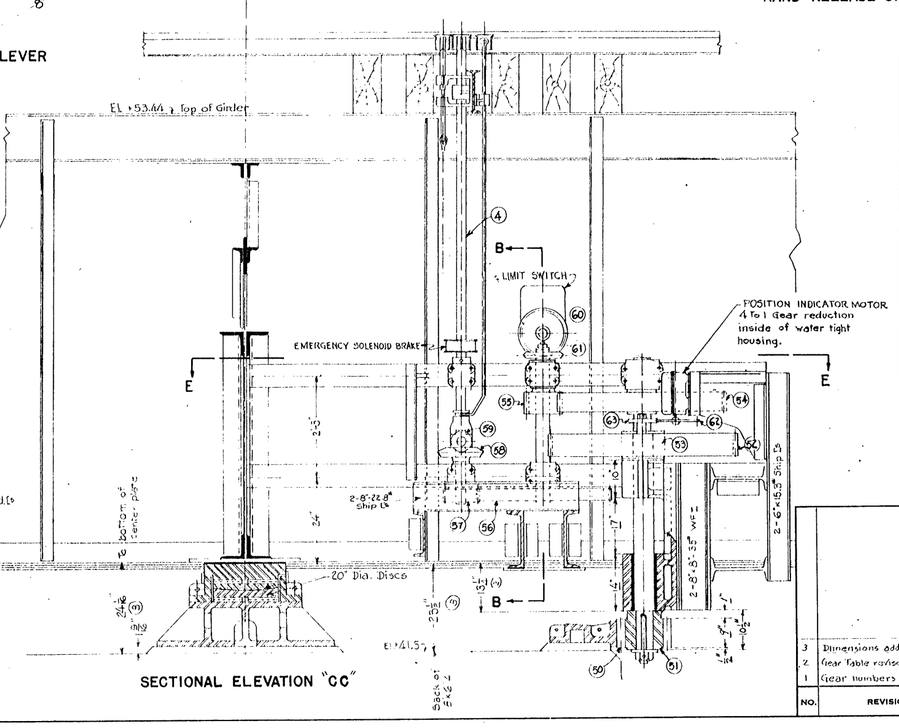




EMERGENCY BRAKE HAND RELEASE CRANK



SECTIONAL ELEVATION "DD"



SECTIONAL ELEVATION "CC"

GEAR TABLE – TURNING MACHINERY

All Gears to be Involute Cut Teeth.

Kind	Mark	Amount	Type	Material	Ratio	Pres. Angle	No. Teeth	Pitch	Pitch Dia.	Face	Bore	Hub Dia.	Hub Length	Remarks
Rack Seg	50	2	Spur	C.S.	19.7	20°	34	1	17'-0"	8"	-	-	-	
Pinion	51	1	"	F.S.	1	20°	13	1	13"	9"	6"	10½"	10½"	
Gear	52	1	"	C.S.	5	20°	75	1½	50"	6"	6"	7½"	7½"	
Pinion	53	1	"	F.S.	1	20°	15	1½	10"	6½"	4½"	8¾"	7½"	
Gear	54	1	"	C.S.	5	20°	90	2	45"	5"	4½"	8¾"	6½"	
Pinion	55	1	"	F.S.	1	20°	18	2	9"	5½"	3½"	6½"	6½"	
Gear	56	1	"	C.S.	4	20°	108	3	36"	3"	3½"	6½"	4"	
Pinion	57	1	"	F.S.	1	20°	27	3	9"	3½"	2½"	4½"	4"	
Gear	58	1	Bevel	C.S.	2	20°	48	4	12"	2½"	2½"	4½"		Jaw clutch.
Pinion	59	1	"	C.S.	1	20°	24	4	6"	2½"	2"	3½"	3½"	
Gear	60	1	"	BR2	1.2	14½°	96	8	12"	1"	1½"	2½"	1½"	Limit Switch.
Pinion	61	1	"	"	1	14½°	80	8	10"	1"	2½"	4½"	2½"	
Gear	62	1	Spur	"	2	14½°	144	12	12"	⅝"	To suit Pos. indicator Motor.			
Pinion	63	1	"	"	1	14½°	72	12	6"	1"	2½"	4½"	3"	

SHAFTING

Mark	Amount	Material	Diameter	Approx. Length	No. Keyways	Remarks
1	1	Forged st	6½"	6'-0"	3	Reduced both ends – With nuts.
2	1	Hot rolled st	4½"	3'-0"	2	
3	1	" "	3½"	3'-11"	3	Reduced both ends – With nuts.
4	1	Cold rolled st	2½"	10'-0"	4	2 Splines for jaw clutch - 1 End squared
5	1	" "	2"	1'-8"	2	

BONNEVILLE POWER NAVIGATION PROJECT

28TH CONTRACT

BRIDGE ACROSS NAVIGATION CANAL

SWING SPAN

TURNING MACHINERY

SCALE 3/4" = 1 FOOT

U. S. ENGINEER OFFICE, PORTLAND, OREGON DISTRICT

SUBMITTED: R. L. Mackenzie, ENGINEER

APPROVED: H. Williams, MAJOR, CORPS OF ENGINEERS

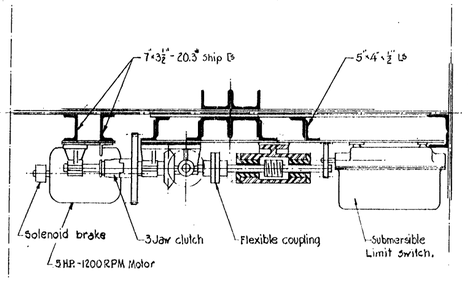
RECOMMENDED: C. W. Wilkinson, HEAD ENGINEER

DESIGNED BY C.W.B. DATE 1-16-35

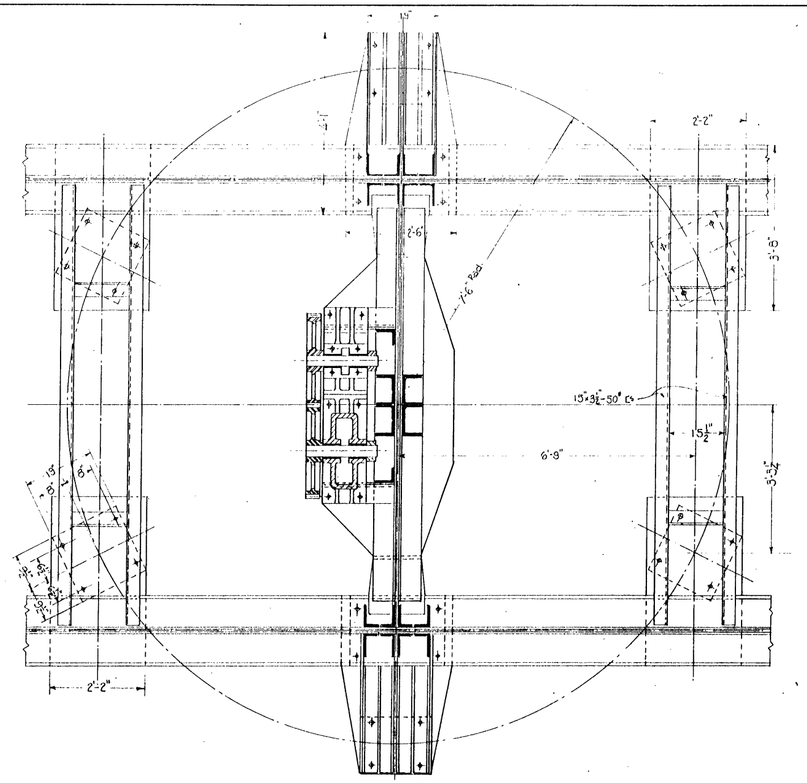
DR. BY C.W.B. TR. BY A.G.D. CHECKED BY R.L.M.

NO.	REVISION	DATE	BY	AP'V'D
3	Dimensions added or changed	3/4-35	A.G.D	
2	Gear Table revised	3/6-35	"	
1	Gear numbers added	3/1-35	A.G.D	

SHEET 7 OF 13 N-2-61



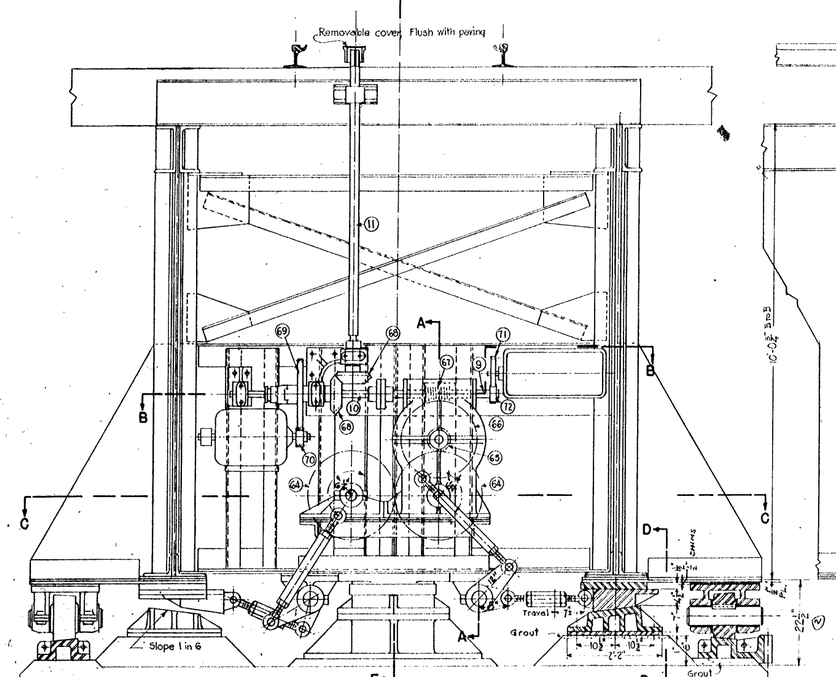
SECTIONAL PLAN "B B"



SECTIONAL PLAN "CC"

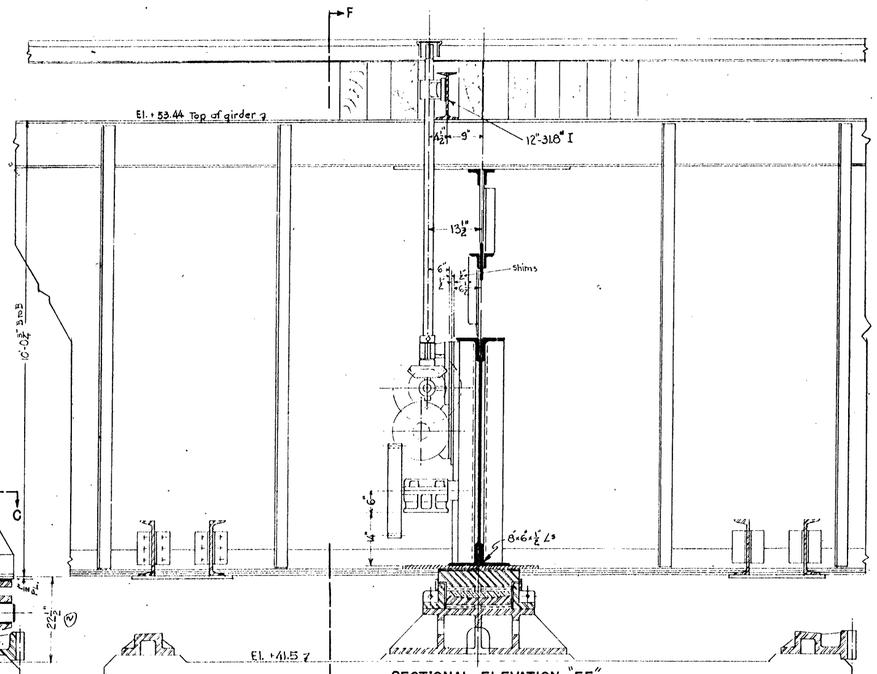
GEAR TABLE - CENTER WEDGE MACHINERY															
All Gears to be Involute Cut Teeth															
KIND	MARK	AMOUNT	TYPE	MATERIAL	RATIO	PRES. ANGLE	NO. TEETH	PITCH	PITCH DIA.	FACE	BORE	HUB DIA.	HUB LGTH.	REMARKS	
Gear	64	2	Spur	C.S.	4	20°	60	2½	24"	5"	4"	7½	5½		①
Pinion	65	1	"	F.S.	1	20°	15	2½	6"	5½	3½	5"	5½		①
Gear	66	1	Worm	BRZ	66	14½°	66	1"	21"	3½	3½	4½	4"		
Worm	67	1	"	F.S.	1	14½°	1	1"	3½	4½	O	2½	5"	Integral with shaft. 9	
Gear	68	2	Bevel	C.S.	1/1	20°	30	3	10"	2½	2"	3½	3½		
Gear	69	1	Spur	C.S.	4	20°	144	8	18"	2"	2"			Jaw Clutch.	
Pinion	70	1	"	F.S.	1	20°	36	8	4½	2½				To Suit Motor.	
Gear	71	1	"	BRZ	2.2	14½°	66	8	8½	1½				Limit Switch.	
Pinion	72	1	"	BRZ	1	14½°	30	8	3½	1½	2"				

SHAFTING - CENTER WEDGE MACHINERY						
MARK	AMOUNT	MATERIAL	DIAMETER	APPROX. LENGTH	NO. KEYWAY	REMARKS
6	2	Hot rolled steel	4½	3'-0"	2	
7	2	" " "	4"	1'-8"	1	
8	1	" " "	3½	1'-6"	2	
9	1	Forged steel	2	2'-8"	2	Integral with worm 67.
10	1	Cold rolled steel	2"	3'-5"	3	2 Splines for jaw clutch.
11	1	" " "	2½	7'-0"	1	One end reduced-One end squared.

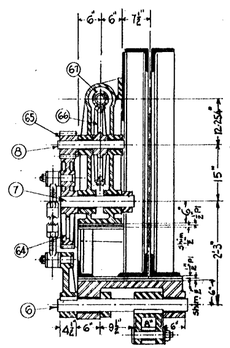


SECTIONAL ELEVATION "F F"

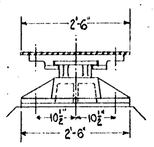
Note:- Position of wedges shown is to illustrate travel of toggles. In operation wedges act in unison.



SECTIONAL ELEVATION "EE"



SECTION "AA"



VIEW "DD"

NO.	REVISION	DATE	BY	APV'D
1	Gear Table revised	1/1-35	A.C.D.	Rev.

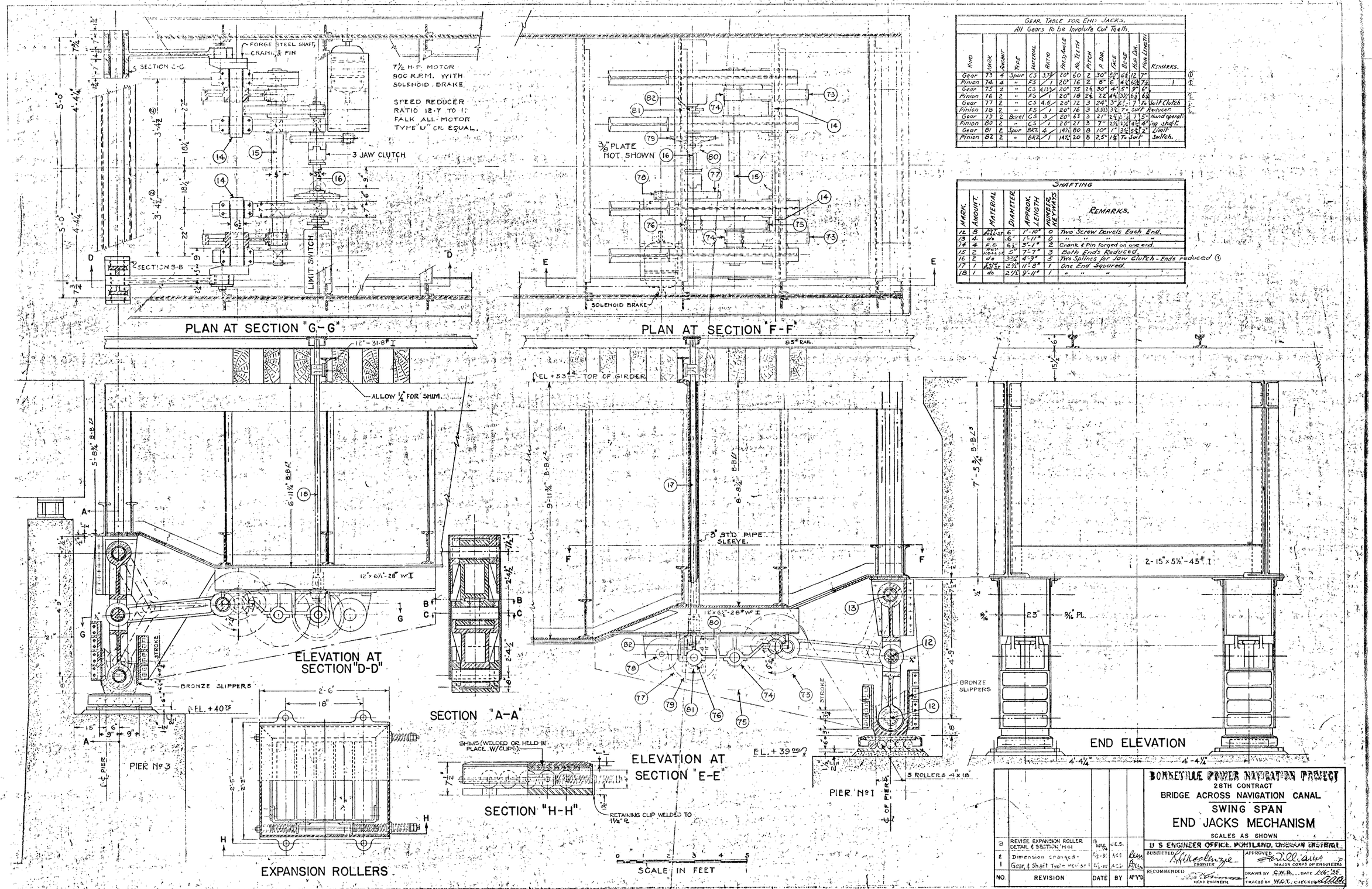
BONNEVILLE POWER NAVIGATION PROJECT
28 TH. CONTRACT
BRIDGE ACROSS NAVIGATION CANAL
SWING SPAN
CENTER WEDGE MACHINERY
SCALE 3/4" = 1 FOOT.

U. S. ENGINEER OFFICE, PORTLAND, OREGON DISTRICT

SUBMITTED L. L. MacKenzie ENGINEER — APPROVED [illegible] MAJOR, CORPS OF ENGINEERS

RECOMMENDED [illegible] HEAD ENGINEER

DESIGNED BY C.W.B. DATE 1-16-35
DR. BY C.W.B. TR. BY A.C.D. CHECKED [illegible]



GEAR TABLE FOR END JACKS.
All Gears To be Involute Cut Teeth.

KIND	MARK	AMOUNT	TYPE	MATERIAL	RATIO	PRES. ANGLE	NO. TEETH	PITCH	P. DIA.	FACE	BORE	HUB DIA.	HUB LENGTH	REMARKS.
Gear	73	4	Spur	CS	3.75	20°	60	2	30"	5¾	6¼	12	7"	
Pinion	74	4	"	FS	1	20°	16	2	8"	6	4¾	6¾	7¼	
Gear	75	2	"	CS	4.13	20°	75	2½	30"	4	5"	9	6"	
Pinion	76	2	"	FS	1	20°	18	2½	7.2	4½	3¾	6¾	6¾	
Gear	77	2	"	CS	4.6	20°	72	3	24"	3"	2	7	To Suit Clutch	
Pinion	78	2	"	FS	1	20°	16	3	5.333	3¼	7"	Suit	Reducer.	
Gear	79	2	Bevel	CS	3	20°	63	3	21"	2½	3	7	5"	Hand operat.
Pinion	80	2	"	CS	1	20°	21	3	7"	2¼	2¼	4½	4"	op. shaft.
Gear	81	2	Spur	BRZ	4	14½°	80	8	10"	1"	3¼	5¾	2"	Limit
Pinion	82	2	"	BRZ	1	14½°	20	8	2.5"	1¼	To Suit			Switch.

SHAFTING

MARK.	AMOUNT.	MATERIAL	DIAMETER	APPROX. LENGTH	NUMBER KEYWAYS	REMARKS.
12	8	Hot Rol. St.	6"	1'-10"	0	Two Screw Dowels Each End.
13	4	do	6"	1'-11"	0	" " " "
14	4	F.S.	6¾"	3'-1"	2	Crank & Pin forged on one end.
15	2	Hot Rol. St.	5"	7'-7"	3	Both Ends Reduced.
16	2	do	3¾"	4'-9"	5	Two Splines for Jaw Clutch - Ends reduced ①
17	1	Hot Rol. St.	2¼"	11'-8"	1	One End Squared.
18	1	do	2¼"	9'-11"	1	" " "

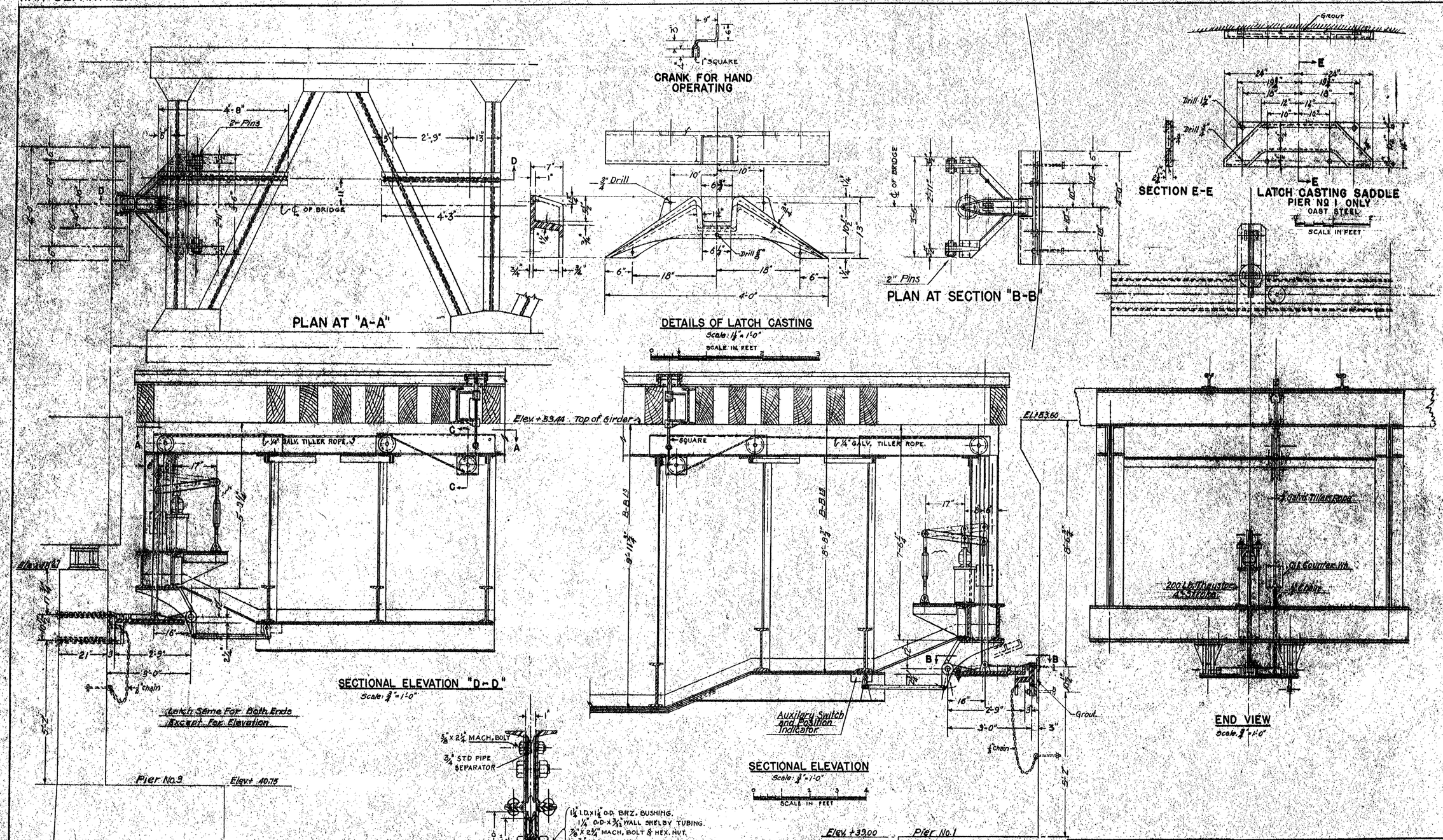
BONNEVILLE POWER NAVIGATION PROJECT
28TH CONTRACT
BRIDGE ACROSS NAVIGATION CANAL
SWING SPAN
END JACKS MECHANISM
SCALES AS SHOWN
U S ENGINEER OFFICE, PORTLAND, OREGON, INSTRUM.

NO	REVISION	DATE	BY	APV'D
3	REVISE EXPANSION ROLLER DETAIL & SECTION "H-H"	13 MAR 36	J.E.S.	
2	Dimension changed.	5-2-35	ACS	
1	Gear & Shaft Table revised	5-2-35	ACS	

SUBMITTED: R. Mackenzie, ENGINEER
APPROVED: F. Williams, MAJOR CORPS OF ENGINEERS
RECOMMENDED: HEAD ENGINEER
DRAWN BY C.W.B. DATE 1-6-36
TRACED BY W.C.T. CHECKED

WAR DEPARTMENT

CORPS OF ENGINEERS U.S. ARMY



NO.	REVISION	DATE	BY	APV'D

BONNEVILLE POWER NAVIGATION PROJECT
28TH CONTRACT
BRIDGE ACROSS NAVIGATION CANAL
SWING SPAN
CENTERING LATCH MECHANISM
SCALES AS SHOWN

U S ENGINEER OFFICE, PORTLAND, OREGON DISTRICT

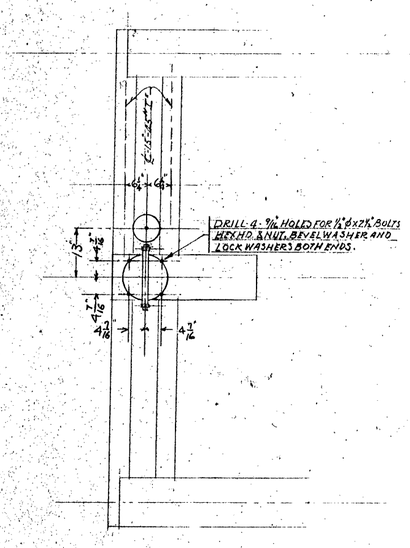
SUBMITTED K. Mueller Jr. ENGINEER — APPROVED G. Williams MAJOR, CORPS OF ENGINEERS

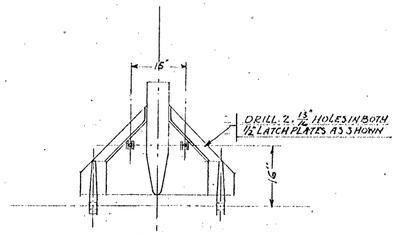
RECOMMENDED [illegible] HEAD ENGINEER — DRAWN BY: C.W.B. DATE 1-16-38 — TRACED BY W.C.T. CHECKED [illegible]

SHEET 10 OF 13 N-2-61

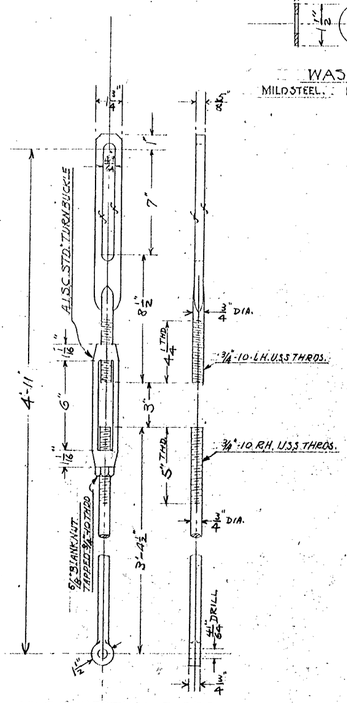
WAR DEPARTMENT.

CORPS OF ENGINEERS U.S. ARMY.



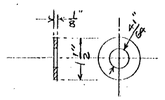


SECTION C-C



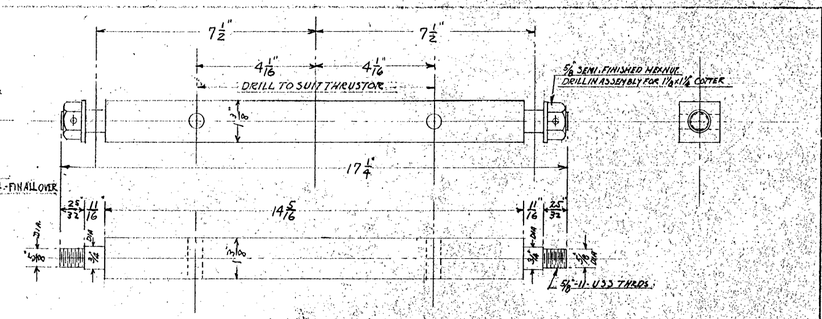
CONNECTING RODS.

MILD STEEL. MAKE 4. SMOOTH FORGE



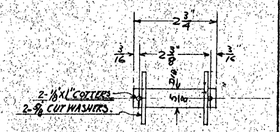
WASHER

MILD STEEL. MAKE 4 - FIN ALL OVER



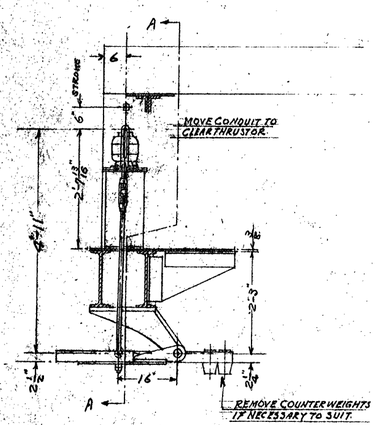
CROSS HEAD

MILD STEEL MAKE 2. FIN. ALL OVER



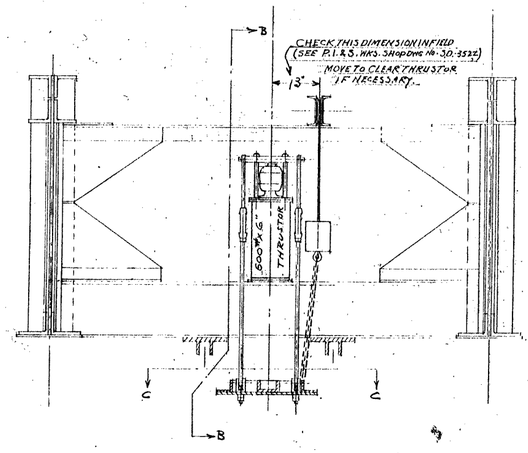
PINS

COLD ROLLED STEEL. MAKE 4

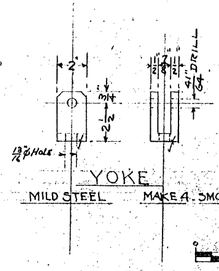


SECTION B-B

SWING END

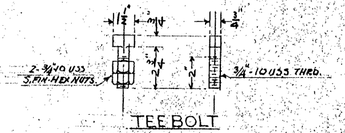


SECTION A-A



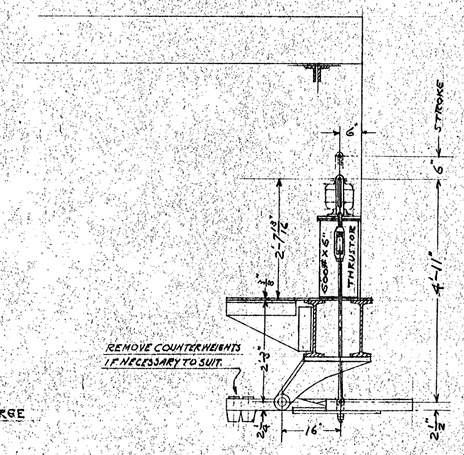
YOKE

MILD STEEL MAKE 4. SMOOTH FORGE



TEE BOLT

MILD STEEL MAKE 4. SMOOTH FORGE



COUNTERWEIGHT END

SCALE 3/4 IN = 1 FOOT

SCALE 3 IN. = 1 FOOT

NOTES

IN ADDITION TO THE DETAILED PARTS SHOWN THERE WILL BE FURNISHED TWO 500 LB. BY 6" STROKE GENERAL ELECTRIC CO., OR EQUAL, THRUSTORS, LOCATED AS SHOWN TO REPLACE THE 200 LB. BY 4" STROKE G.E. THRUSTORS NOW IN PLACE.

PAINT. ALL SURFACES, EXCEPT FINISHED WORKING PARTS, TWO SHOP COATS OF RED LEAD PAINT, AFTER AUTHORIZATION BY THE INSPECTOR. FINISHED SURFACES TO BE GIVEN A PROTECTING COAT OF WHITE LEAD AND TALLOW APPLIED HOT.

NO.	REVISION	DATE	BY	APP'D

BONNEVILLE PROJECT

BRIDGE ACROSS NAVIGATION CANAL

SWING SPAN

CENTERING LATCH MECHANISM

REVISIONS TO SHEET 10 - N2-61

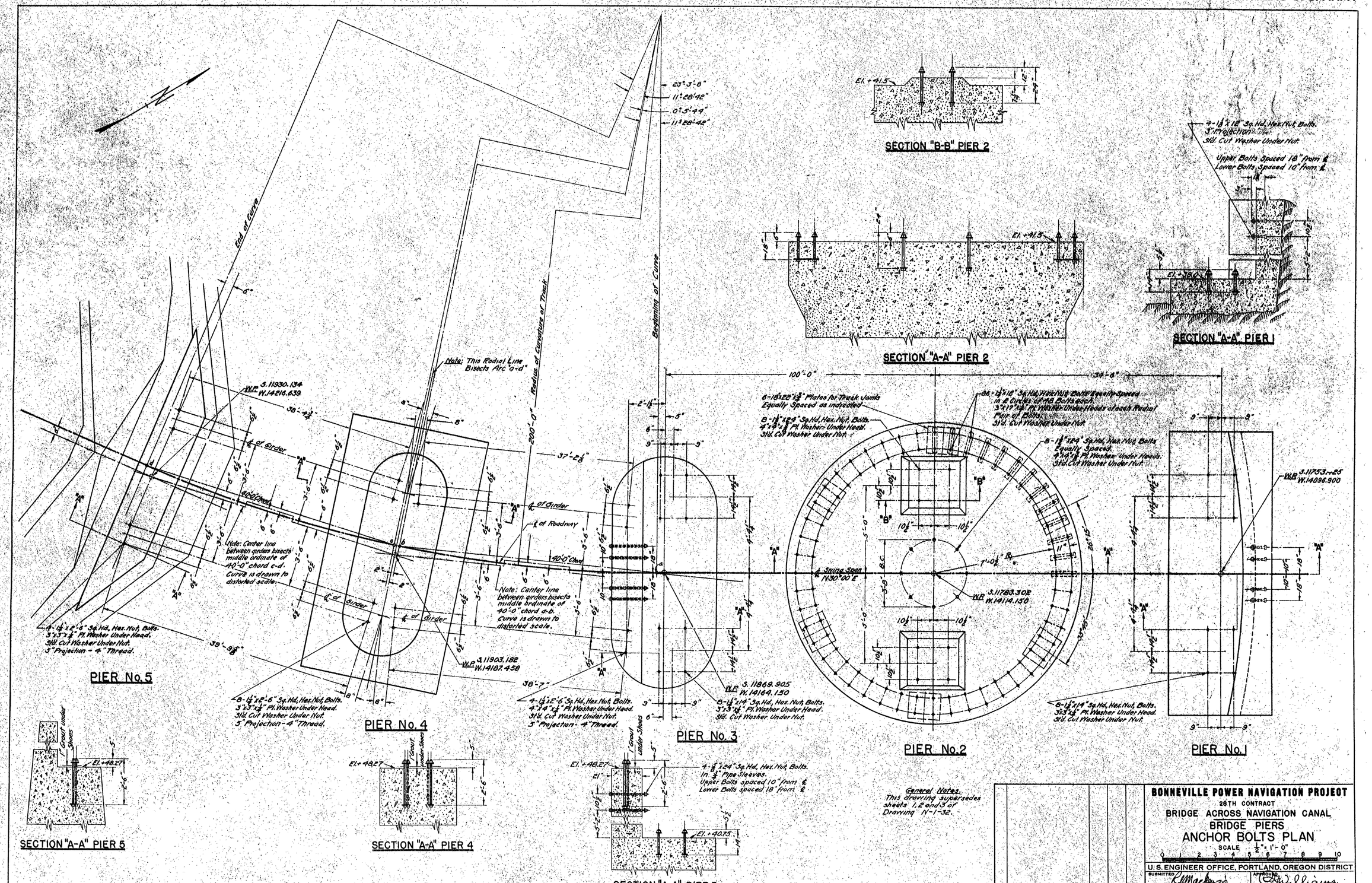
SCALE AS SHOWN

U. S. ENGINEER OFFICE, SECOND PORTLAND DISTRICT (OREGON)

SUBMITTED: M. H. Gehrke, ENGINEER — APPROVED: H. J. Williams, LT. COL. CORPS OF ENGINEERS

RECOMMENDED: Geo. W. Emmons, PRINCIPAL ENGINEER — DESIGNED BY BALE DATE 4-10-36 DR. BY C.H.B. TRACED BY CHECKED BY G.S.D.

SHEET 10A. N-2-61



General Notes.
This drawing supersedes sheets 1, 2 and 3 of Drawing N-1-32.

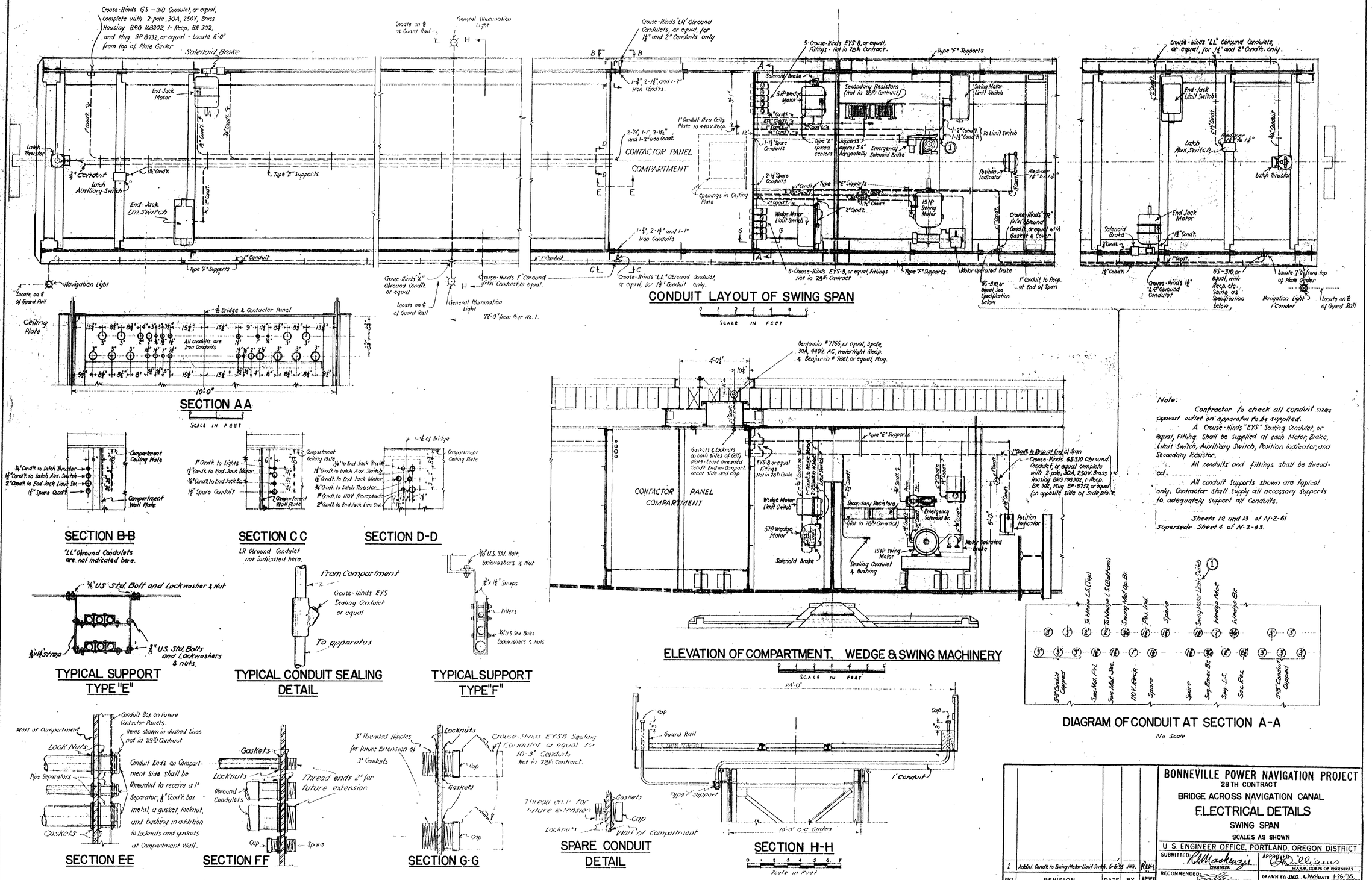
NO.	REVISION	DATE	BY	AP'V'D

BONNEVILLE POWER NAVIGATION PROJECT
26TH CONTRACT
BRIDGE ACROSS NAVIGATION CANAL
BRIDGE PIERS
ANCHOR BOLTS PLAN
SCALE ½" = 1'-0"

U. S. ENGINEER OFFICE, PORTLAND, OREGON DISTRICT

SUBMITTED: R. L. Mackenzie, ENGINEER
APPROVED: C. E. Williams, MAJOR, CORPS OF ENGINEERS
RECOMMENDED: C. E. Ellis, HEAD ENGINEER
DESIGNED BY H. D. Smith DATE 1-16-35
DR. BY C.V.B. TR. BY H.G.L. CHECKED BY C.V.B.

SHEET 11 OF 13 N-2-61



CONDUIT LAYOUT OF SWING SPAN

SECTION AA

SECTION B-B

"LL" Obround Conduiets are not indicated here.

SECTION C C

LR Obround Conduiet not indicated here.

SECTION D-D

ELEVATION OF COMPARTMENT, WEDGE & SWING MACHINERY

DIAGRAM OF CONDUIT AT SECTION A-A

No Scale

TYPICAL SUPPORT TYPE "E"

TYPICAL CONDUIT SEALING DETAIL

TYPICAL SUPPORT TYPE "F"

SECTION E-E

SECTION F F

SECTION G-G

SPARE CONDUIT DETAIL

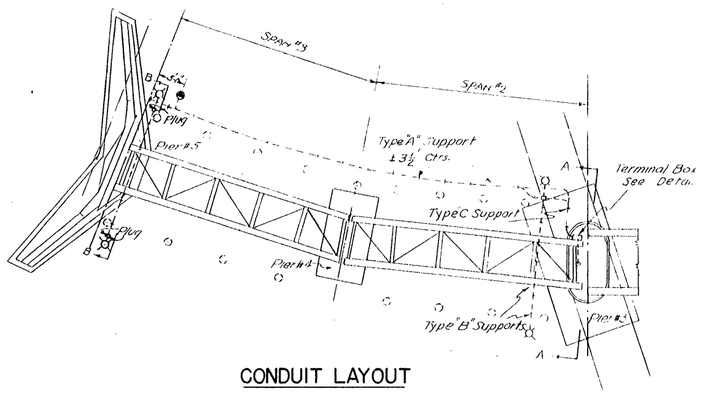
SECTION H-H

NO.	REVISION	DATE	BY	APV'D
1	Addtl. Condt. to Swing Motor Limit Switch.	5-6-35	JWK	RWM

BONNEVILLE POWER NAVIGATION PROJECT
28TH CONTRACT
BRIDGE ACROSS NAVIGATION CANAL
ELECTRICAL DETAILS
SWING SPAN
SCALES AS SHOWN
U. S. ENGINEER OFFICE, PORTLAND, OREGON DISTRICT

SUBMITTED: R.W. Mackenzie, ENGINEER
APPROVED: C. D. Williams, MAJOR, CORPS OF ENGINEERS
RECOMMENDED: HEAD ENGINEER
DRAWN BY: JMG & JWK DATE 1-26-35.
TRACED BY: JMG & JWK CHECKED BY: A.P.D.

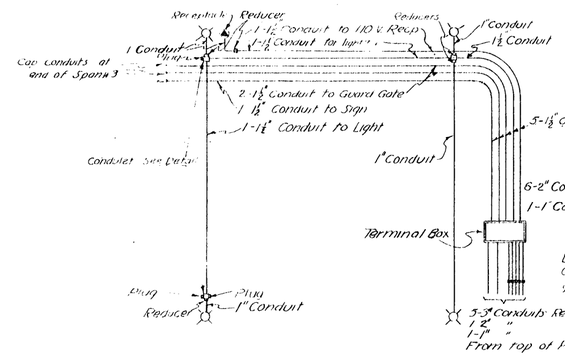
SHEET 12 OF 13 N-2-61



CONDUIT LAYOUT

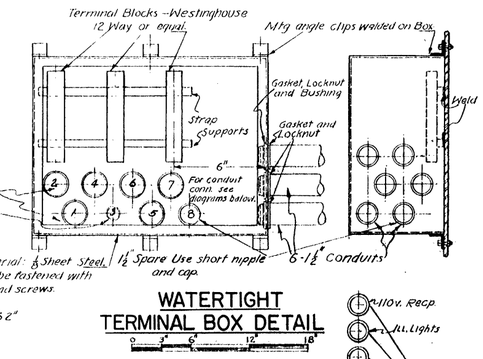
Scale in Feet

Legend:
Jct. Light
Receptacle



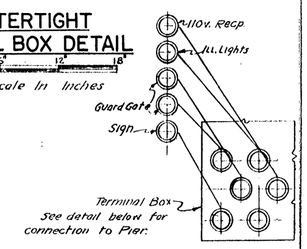
CONDUIT DIAGRAM

No Scale



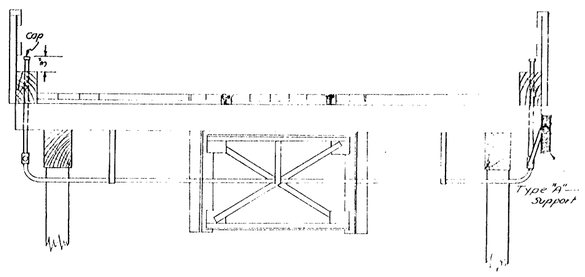
WATERTIGHT TERMINAL BOX DETAIL

Scale In Inches



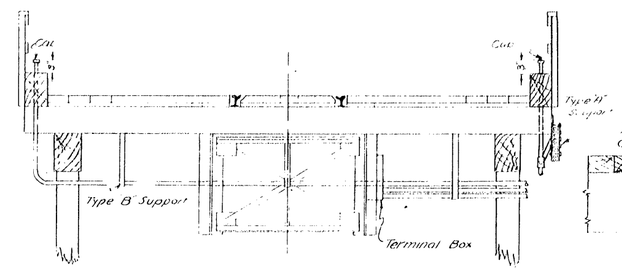
Note: All conduits and fittings to be threaded

All conduit supports are typical only. Contractor shall supply all necessary supports to adequately support all conduit.

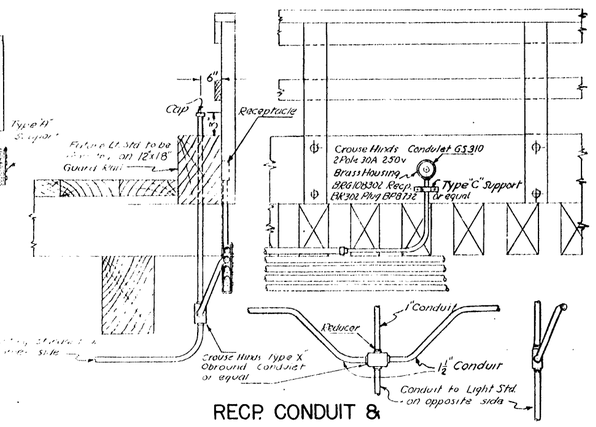


SECTION B-B

Scale in Feet

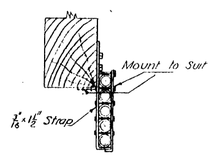


SECTION A-A

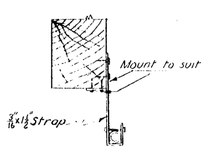


RECP. CONDUIT & LIGHT STANDARD CONDUIT DETAILS

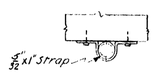
Scale in Feet



TYPICAL SUPPORT TYPE "A"



TYPICAL SUPPORT TYPE "B"



TYPICAL SUPPORT TYPE "C"

Note: Sheet 12 of N-2-6 supersede Sheet 4 of N-2-49

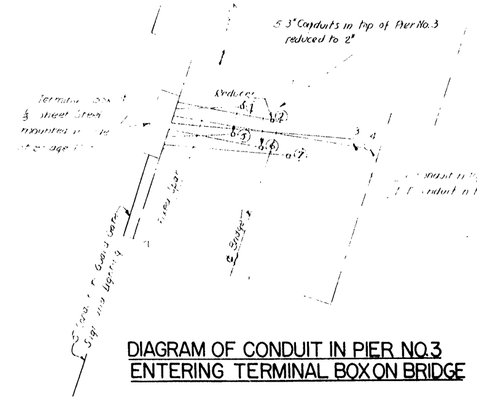


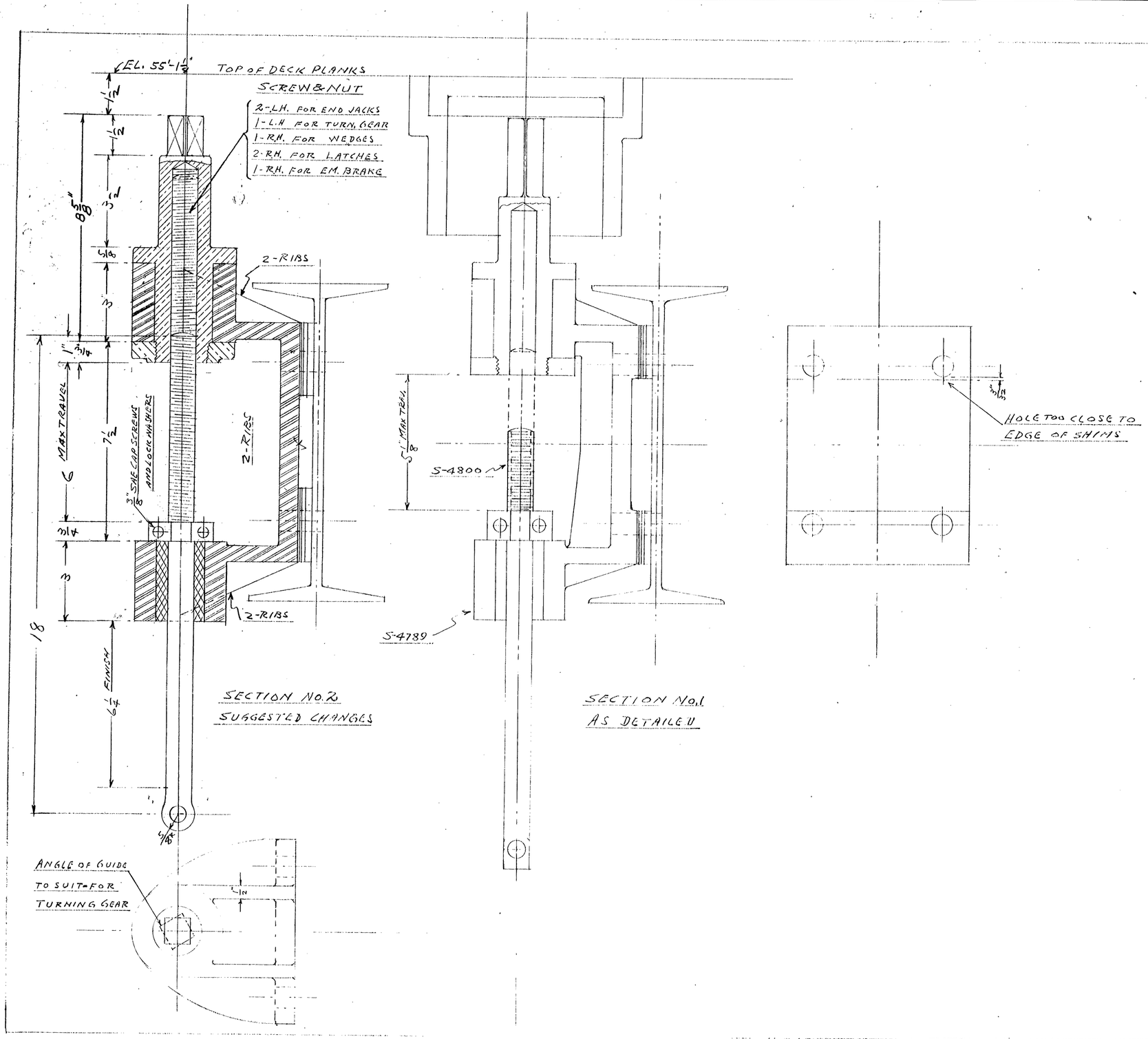
DIAGRAM OF CONDUIT IN PIER NO. 3 ENTERING TERMINAL BOX ON BRIDGE

BONNEVILLE POWER NAVIGATION PROJECT
28TH CONTRACT
BRIDGE ACROSS NAVIGATION CANAL
ELECTRICAL DETAILS
FIXED SPANS
SCALES AS SHOWN

U.S. ENGINEER OFFICE PORTLAND OREGON DISTRICT

SUBMITTED R.H. Mackenzie
RECOMMENDED
DIST. ENGINEER
APPROVED
MAJ. CORPS OF ENGINEERS
DRAWN BY JMG
TRACED BY JMG
DATE 1-26-33
CHECKED BY A.P.D.

SHEET 13 OF 13 N-2-61

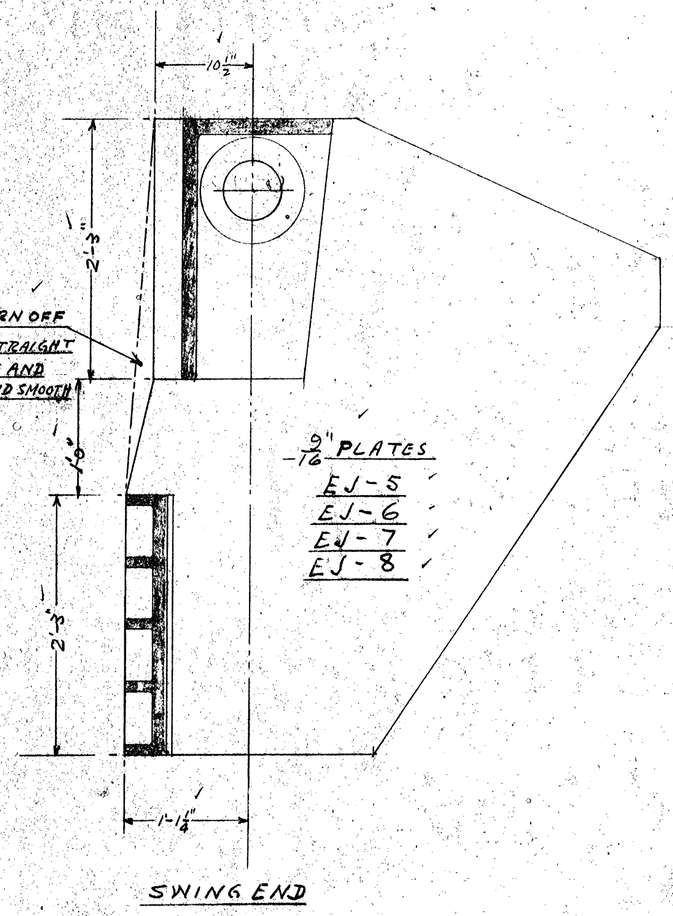


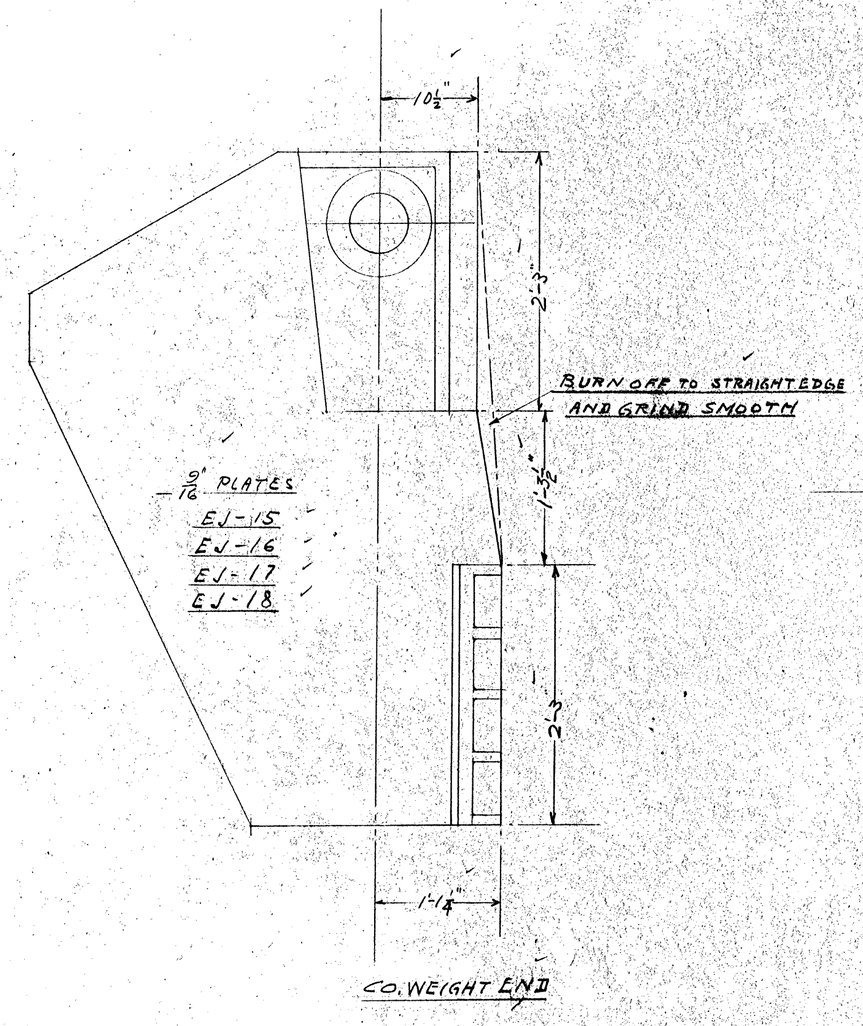
BONNEVILLE POWER NAVIGATION PROJECT
BRIDGE ACROSS NAVIGATION CANAL
SWING SPAN
HAND OPERATING MECHANISM
PROPOSED CHANGE IN BRACKET S-4789

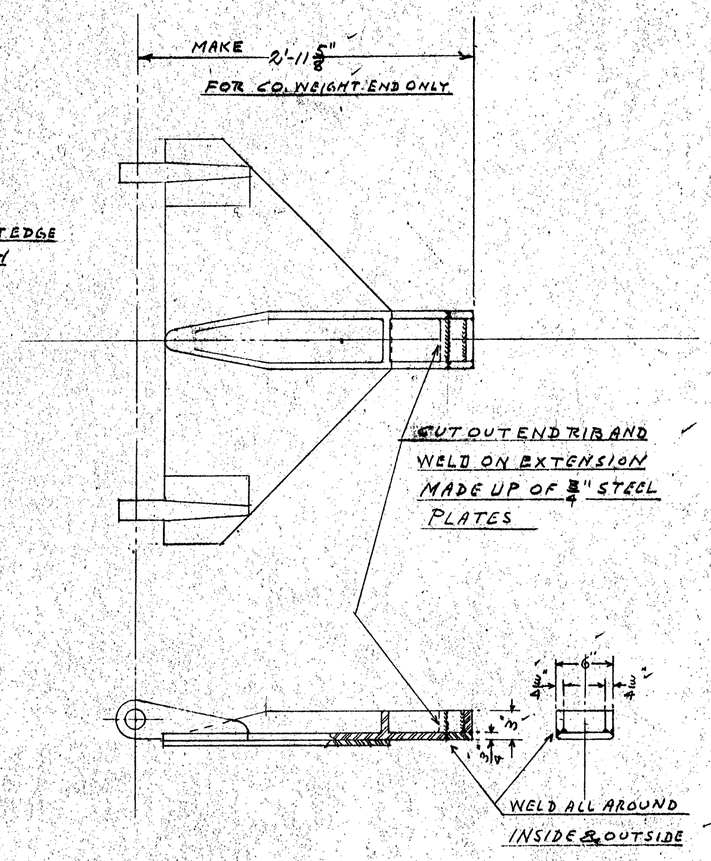
U S ENGINEER OFFICE, PORTLAND, OREGON DISTRICT

SUBMITTED: ENGINEER	APPROVED: MAJOR, CORPS OF ENGINEERS
RECOMMENDED: HEAD ENGINEER	DRAWN BY: C.W.B. DATE MAR. 28 '55 TRACED BY ..... CHECKED BY .....

N-2-70







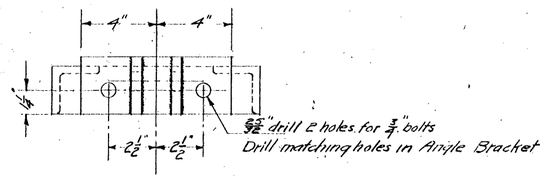
Note: This drawing No. changed from N-2-72 to N-2-73

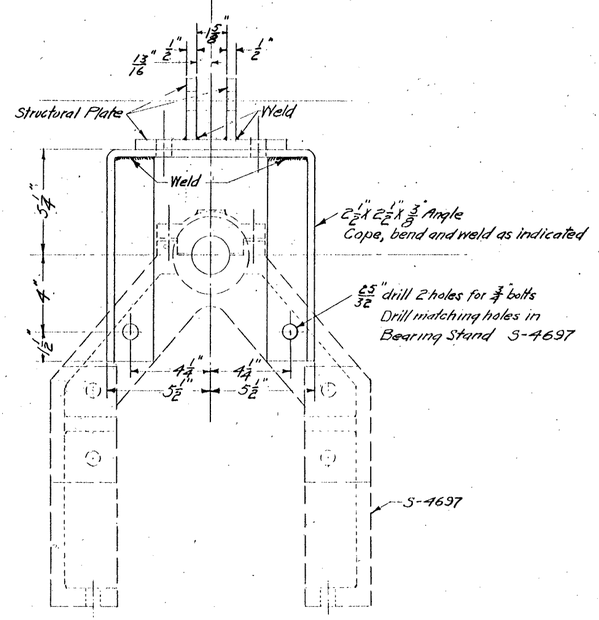
BONNEVILLE POWER NAVIGATION PROJECT
28TH CONTRACT
BRIDGE ACROSS NAVIGATION CANAL
SWING SPAN
ALTERATIONS
FOR CENTERING LATCH CLEARANCE

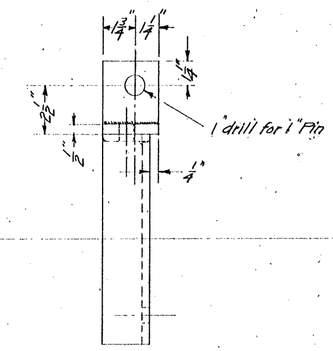
U. S. ENGINEER OFFICE, PORTLAND, OREGON DISTRICT

SUBMITTED: R.H. Mackenzie, ENGINEER	APPROVED: G. F. Williams, MAJOR, CORPS OF ENGINEERS
RECOMMENDED: HEAD ENGINEER	DRAWN BY: E.W.B. DATE 4-3-35 TRACED BY ..... CHECKED BY

N-2-73







General Notes:

The clutch yoke mounting on the turning machinery for the swing span, as constructed encroaches upon the bridge track rail location and also entails an undesireably wide spacing of the contiguous ties.

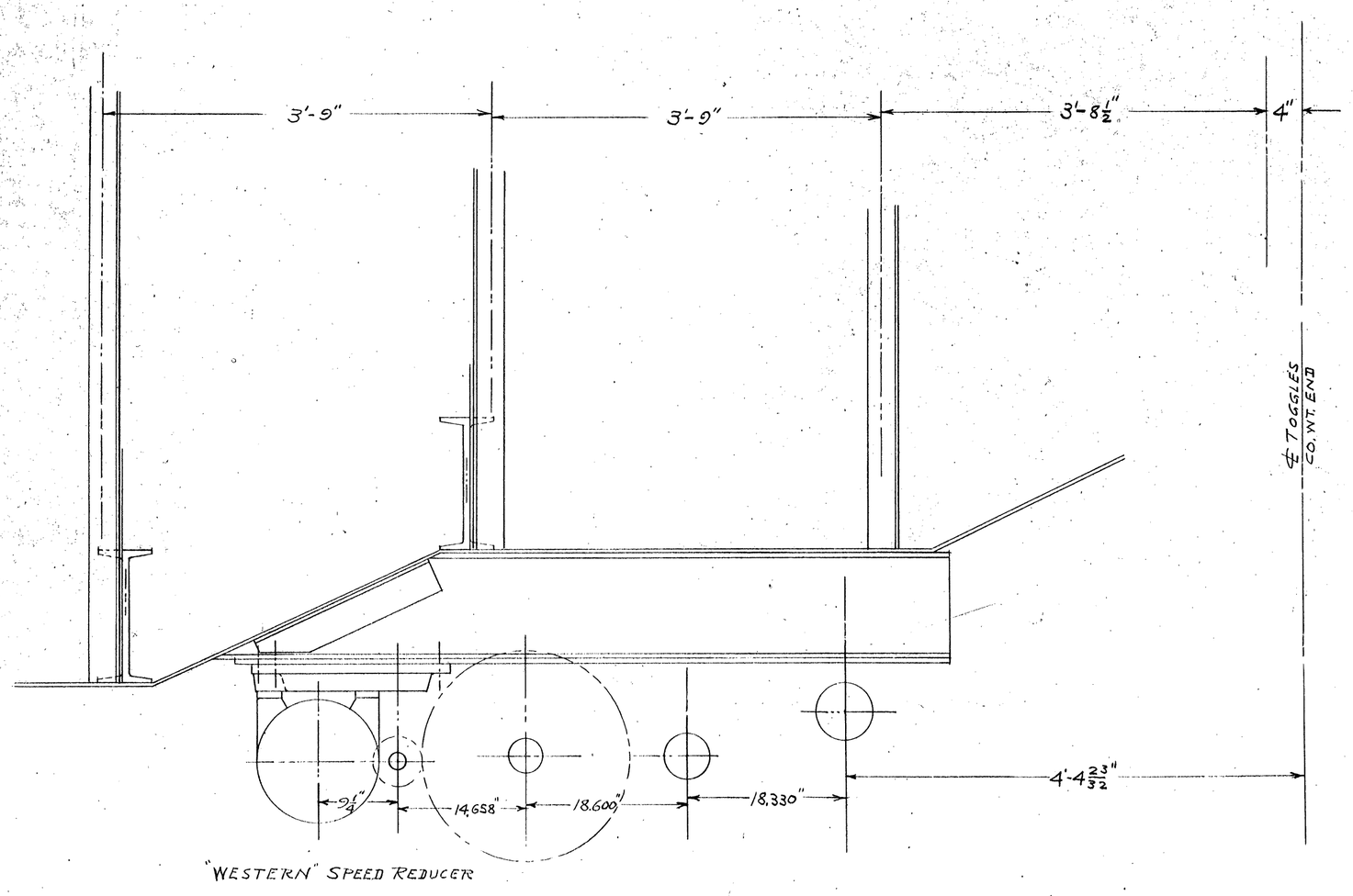
It is required that these conditions be corrected. The clutch yoke mounting submitted herewith is suggested as acceptable.

BONNEVILLE POWER NAVIGATION PROJECT
28TH CONTRACT
BRIDGE ACROSS NAVIGATION CANAL
SWING SPAN
CORRECTIONS TO TURNING MACHINERY
CLUTCH YOKE MOUNTING

U S ENGINEER OFFICE, PORTLAND, OREGON DISTRICT

SUBMITTED: ENGINEER	APPROVED: MAJOR, CORPS OF ENGINEERS
RECOMMENDED: HEAD ENGINEER	DRAWN BY: H.G.L. DATE 4-10-35 TRACED BY ..... CHECKED BY .....

N-2-77



BONNEVILLE POWER NAVIGATION PROJECT

ARRANGEMENT SKETCH

TO SHOW LOCATION OF SPEED REDUCER

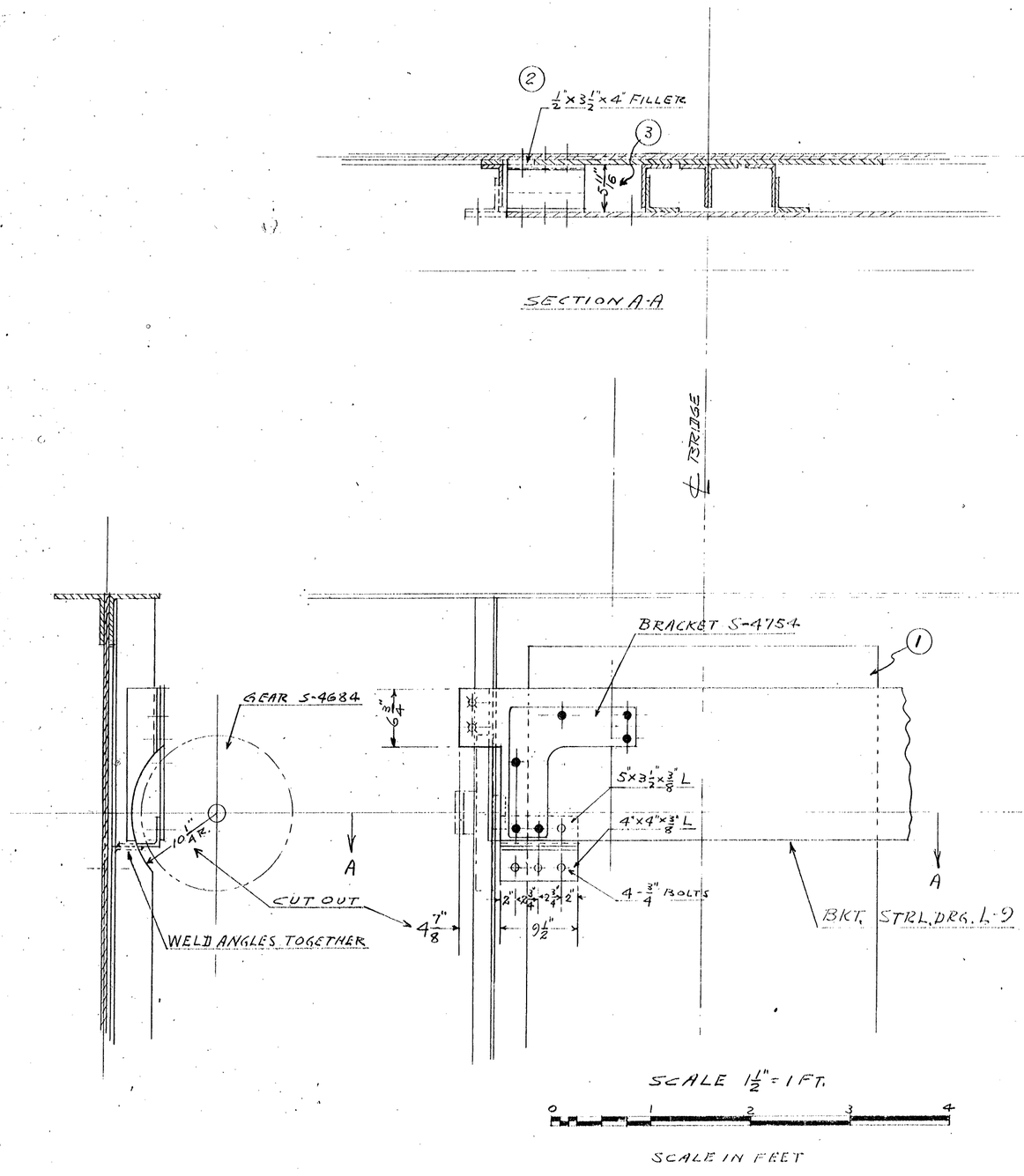
SWING SPAN

END JACKS MECHANISM.

U. S. ENGINEER OFFICE, PORTLAND, OREGON DISTRICT

SUBMITTED: ENGINEER	APPROVED: MAJOR, CORPS OF ENGINEERS
RECOMMENDED: HEAD ENGINEER	DRAWN BY: CWB DATE 2-28-35
	TRACED BY ..... CHECKED BY .....

N-2-79



NO.	REVISION	DATE	BY	APVD
3	DIM. 6 1/2" CHANGED TO 5 1/16"	6-25-35	C.W.B.	[illegible]
2	7/8" x 3 1/2" x 4" FILL. PL. ADDED	6-25-35	C.W.B.	[illegible]
1	FILL. PL. ADDED TO SUIT N-2-89	6-25-35	C.W.B.	[illegible]

BONNEVILLE POWER NAVIGATION PROJECT

28TH CONTRACT

BRIDGE ACROSS NAVIGATION CANAL

SWING SPAN

ALTERATIONS

CHANGE IN BRACKET TO CLEAR GEAR S-4684

U S ENGINEER OFFICE, PORTLAND, OREGON DISTRICT

SUBMITTED: [illegible] ENGINEER

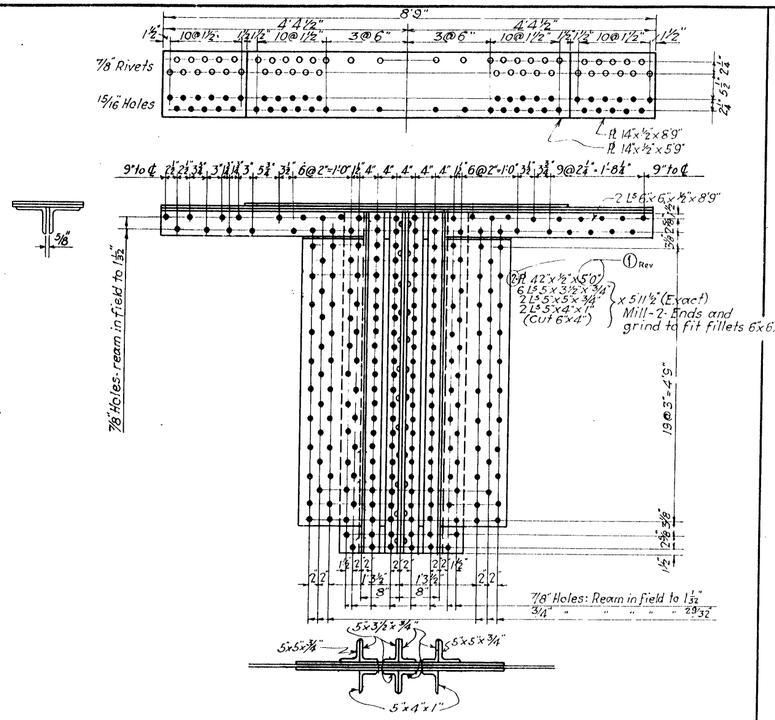
APPROVED: [illegible] MAJOR, CORPS OF ENGINEERS

RECOMMENDED: [illegible] HEAD ENGINEER

DRAWN BY: C.W.B. DATE: 5-8-35

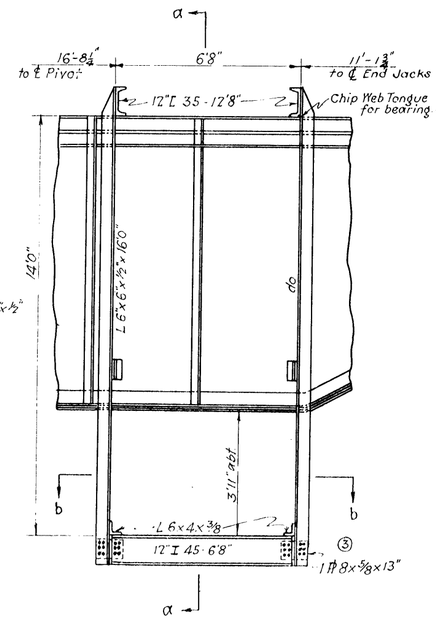
TRACED BY: ..... CHECKED BY: [illegible]

N-2-80

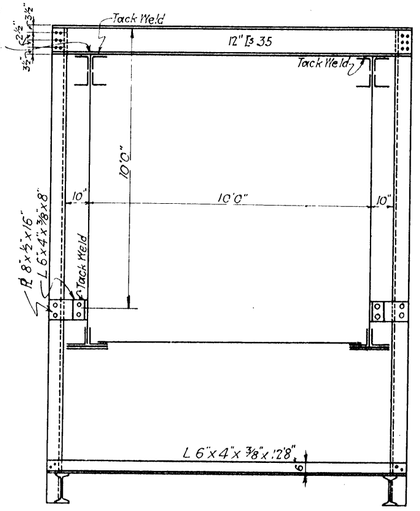


CROSS GIRDER (G-4)

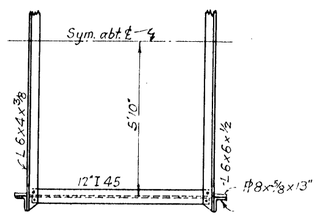
SCALE:- 3/4" = 1'-0"



SECTION bb



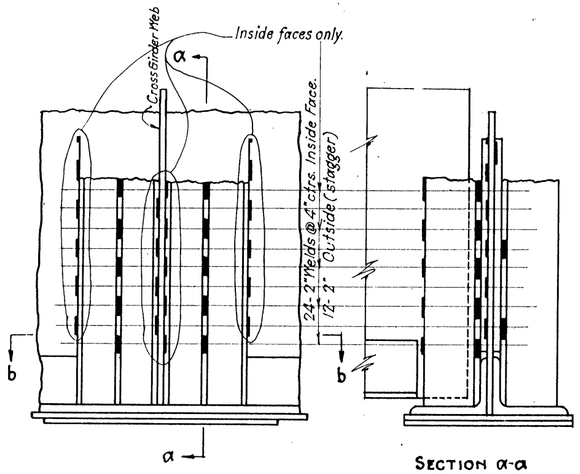
SECTION aa



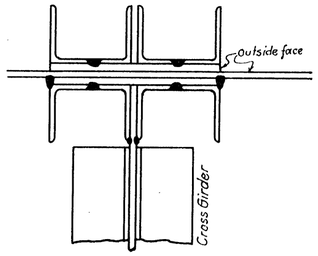
Note: Holes 13/16"ϕ
Rivets, 3/4"ϕ
Provide 3/4"ϕ Turned Bolts, H.H.&N. for all open hole connections.
Paint all shop coat as specified.

CRADLE FOR TEMPORARY CONSTRUCTION COUNTERWEIGHT

Scale: 3/8" = 1'0"



SECTION a-a



SECTION b-b

~ WELDING SPECIFICATIONS:-
All welding rod to be "G.E.-W.20", bare rod or approved equal.
Beads to be 3/8" minimum. Linear welds occuring opposite each other shall be staggered so that no plate metal will be fused on two sides at the same place.
On continuous linear welds metal within a radius of 10" shall be allowed to cool for one hour before further welding is done therein in order to reduce to a minimum any tendency for metal to distort.

Where the vertical leg of bottom chord angles has been sheared and welded at bends, weld top of angle leg to web (outside only) by 6-2" welds, 4" ctrs. each side of cut; spacings may be adjusted to miss stiffeners (See diagram below for location)

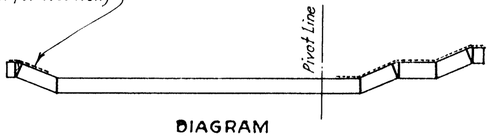


DIAGRAM
NOT TO SCALE

Specification.

Contractor will furnish materials shown and fabricate in accordance with A.R.E.A. specifications, except as noted in the Contract, Specs. and special instructions following:-

The purpose of the operation is to strengthen the cross girder in order to develope additional carrying capacity, and as the change involves connecting to an existing structure already in place, precision of workmanship is of the first importance. The contractor will verify all dimensions in the field.

New materials shall be, as far as practicable, fitted up and reamed at the shop, but units to be riveted to existing holes shall be shipped sub-punched as noted.

After shop inspection and acceptance paint all materials one shop coat of red lead and linseed oil. Surfaces in contact to receive coat of paint before assembly.

Before cutting into the existing girders all external loads causing stress in the girder shall be removed, in so far as is practicable. This will be accomplished mainly by jacking the main girders directly from the pier on both sides of the cross girder. Only slight strain is necessary to accomplish this, but it must be balanced with precision to the satisfaction of the District Engineer. The contractor will be held solely responsible for the safety and protection from damage of all members.

All machinery, and such brackets, lugs, etc., as necessary to provide adequate clearances for workmanlike accomplishment shall be removed.

The existing top chord angles shall be removed first by taking out all rivets affected and the new chord fitted and riveted 75 ofo. Following this, the ten (10) bearing stiffeners and fillers shall be removed and replaced by the new material.

Rivets shall be backed out from the driven side. Driven heads shall be chipped clean and shanks drilled 3/8"ϕ to 1/2 depth before they are backed out.

All rivets replacing those backed out shall be 1/8" larger in diameter. All holes shall be reamed after assembly to 1/32" greater diameter than the rivet. (In new work 1/16")

Rivets shall be driven cherry red (not hotter) and holes filled and inspected before heads are rolled. Where practicable, they shall be air-bucked, or double gunned, otherwise they shall be bucked with a 100# dolly fitted with a rivet snap of proper size.

Stiffener angles must be a driving fit, with backs ground to fit fillets of chord angles. They shall have full bearing and shall be checked with feelers on both sides to insure against bearing at high spots only. They shall not be drifted.

Intermediate stiffeners and brackets shall be replaced in a workmanlike manner.

Counterweight Cradle approved June 15, 1935.
Welding System approved June 8 1935
Cross Girder approved June 3, 1935.

NO	REVISION	DATE	BY	APV'D
3	Plate to cradle I beams	7/9/35	A.H.R.	
2	Location of Cradle	7-3-35	T.M.O.	
1	C.G. Gusset plate to 2@5'0"	6/5/35	A.H.R.	

BONNEVILLE POWER, NAVIGATION PROJECT.
BRIDGE ACROSS NAVIGATION CANAL

SWING SPAN CHANGES

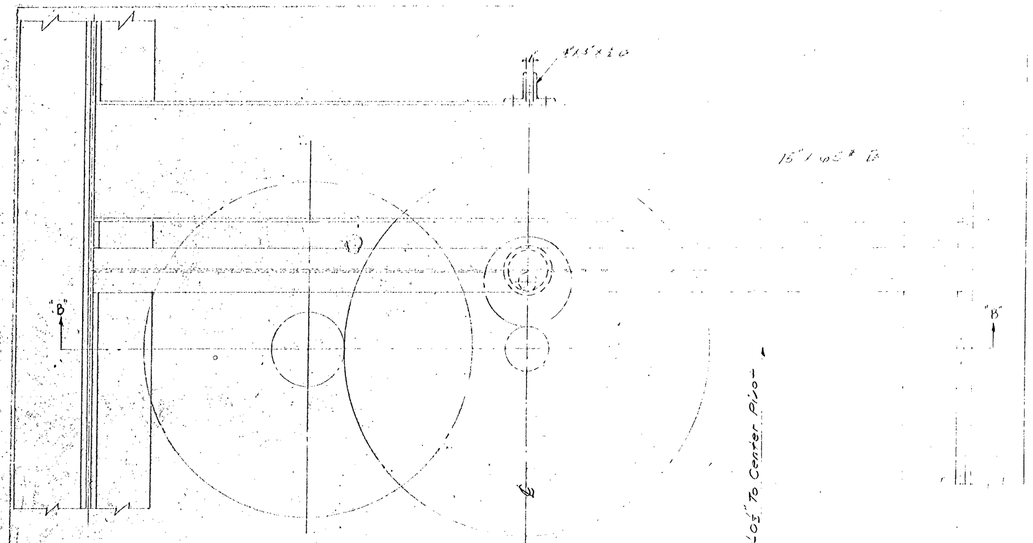
U.S. ENGINEERS OFFICE, 2ND. PORTLAND, DISTRICT (OREGON)

SUBMITTED R.B. Mackenzie, ENGINEER
APPROVED H. Williams, MAJOR, CORPS OF ENGINEERS
RECOMMENDED S. Grimm, HEAD ENGINEER
DRAWN BY
TRACED BY T.H.W. CHECKED BY A.H.R.

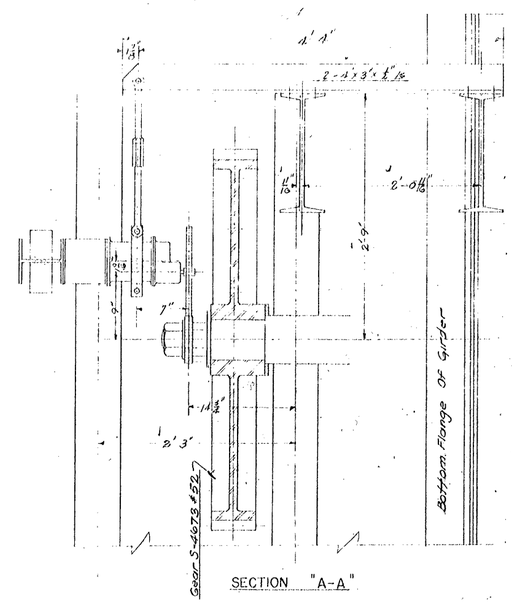
N-2-89

WAR DEPARTMENT

CORPS OF ENGINEERS U.S. ARMY



PLAN



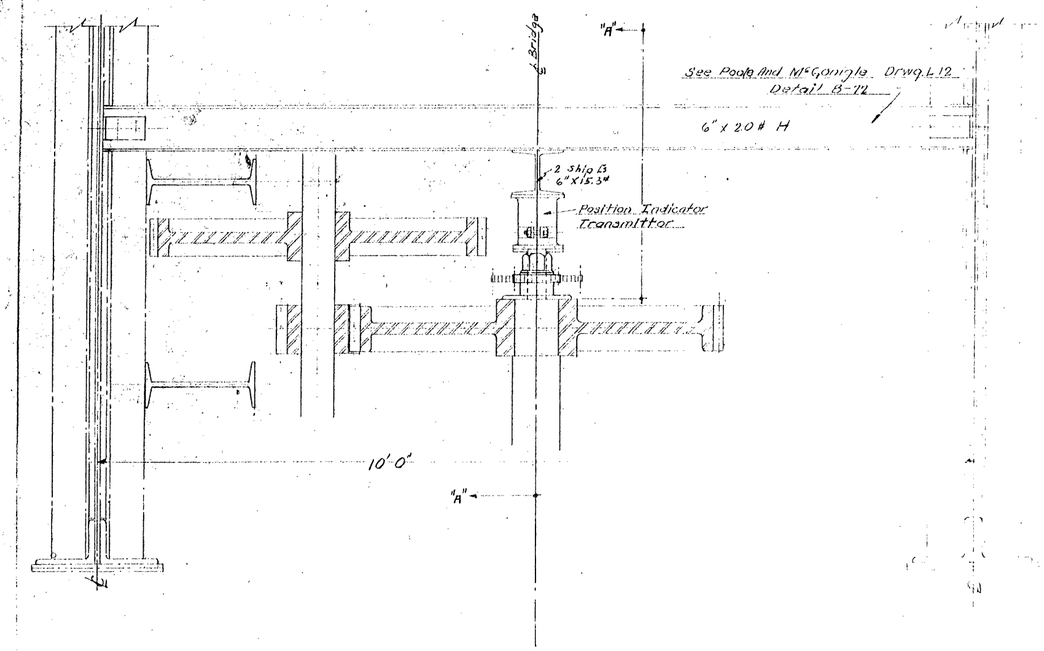
SECTION "A-A"

SCALE 1/2" = 1'-0"

0 1 2

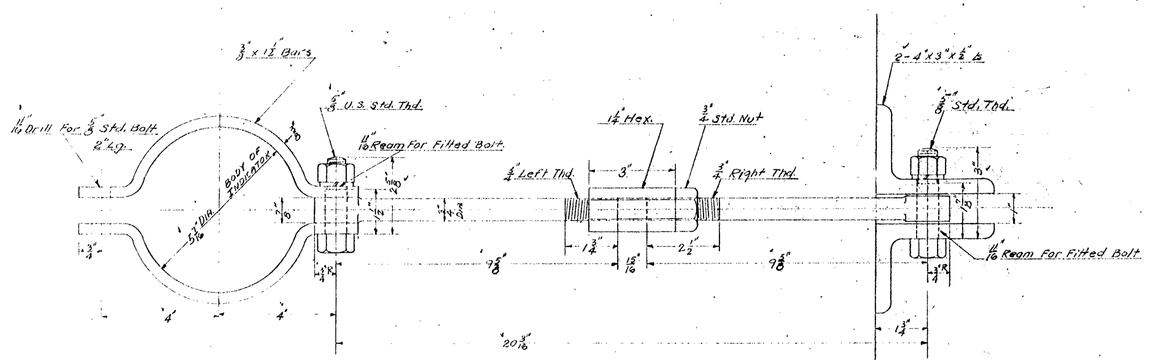
SCALE IN FEET

MATERIAL		Total Wts.
2 Ls 4"x3"x 5/16" x 4'-4" Lg.	Str. St.	96.20 Lbs.
2 Bars 3/8"x1 1/2" x 11 13/16" Lg.	Hot Rolled St.	3.67 "
1-1 1/2" Hex. Bar Stock 3" Lg.	C.R. St.	.78 "
2-3/4" Eye Bolts 9 3/8" Lg.	H.R. St.	2.92 "
1-3/8"x3" Lg. Std. Bolt - Hex. Head	"	.40 "
1-11/16" Fitted Bolt - 2 3/8" Lg.	"	.52 "
1-11/16" " " - 3" Lg.	"	.56 "
1-3/8" Std. Hex. Nut	"	.19 "
3-3/8" Std. Hex. Nuts	"	.42 "
3-3/8" Lock Washers	(Spring St.)	.23 "
8-3/8" Rivets - 2 3/8" Lg.	Str. St.	5.84 "



SECTION "B-B"

View Looking North



DETAILS OF INDICATOR SUPPORT

SCALE 6" = 1'-0"

0 1 2 3 4

SCALE IN INCHES

GENERAL NOTES

REFERENCES

For Bridge Turning Machinery See Drwg. N-2-61 Sheet 7, And Pacific Iron And Steel Works Drwg. S.D. 3506.
For Details Of Indicator Support Beam See Poole & McGonigle Drwg. L12-B12.

NO.	REVISION	DATE	BY	APV'D

APPROVED FOR CONSTRUCTION — Maj. Major, C. of E. — 7-18-35

BONNEVILLE POWER NAVIGATION PROJECT

28-TH CONTRACT

BRIDGE ACROSS NAVIGATION CANAL

SWING SPAN

INDICATOR SUPPORT

SCALE AS SHOWN

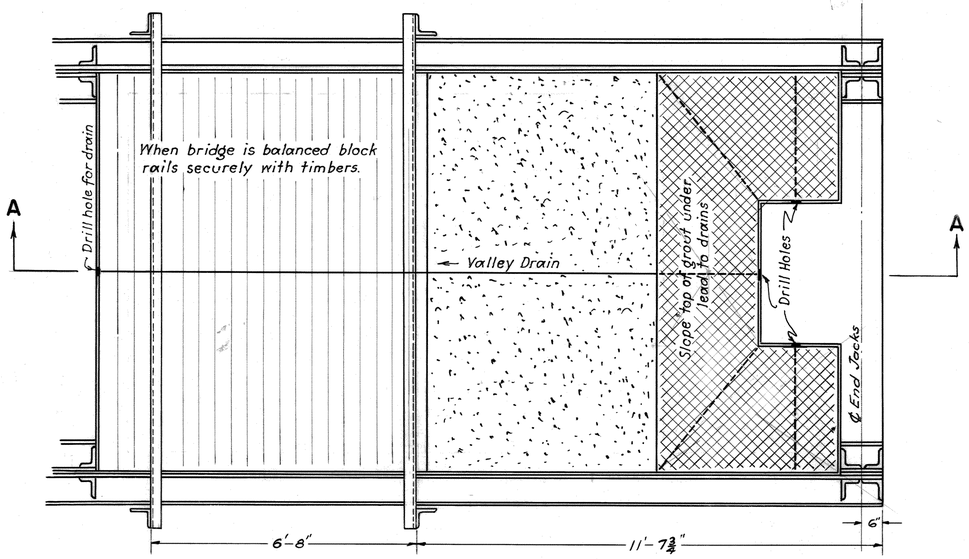
U. S. ENGINEER OFFICE, SECOND PORTLAND DISTRICT (OREGON)

SUBMITTED: ENGINEER — APPROVED: MAJOR, CORPS OF ENGINEERS

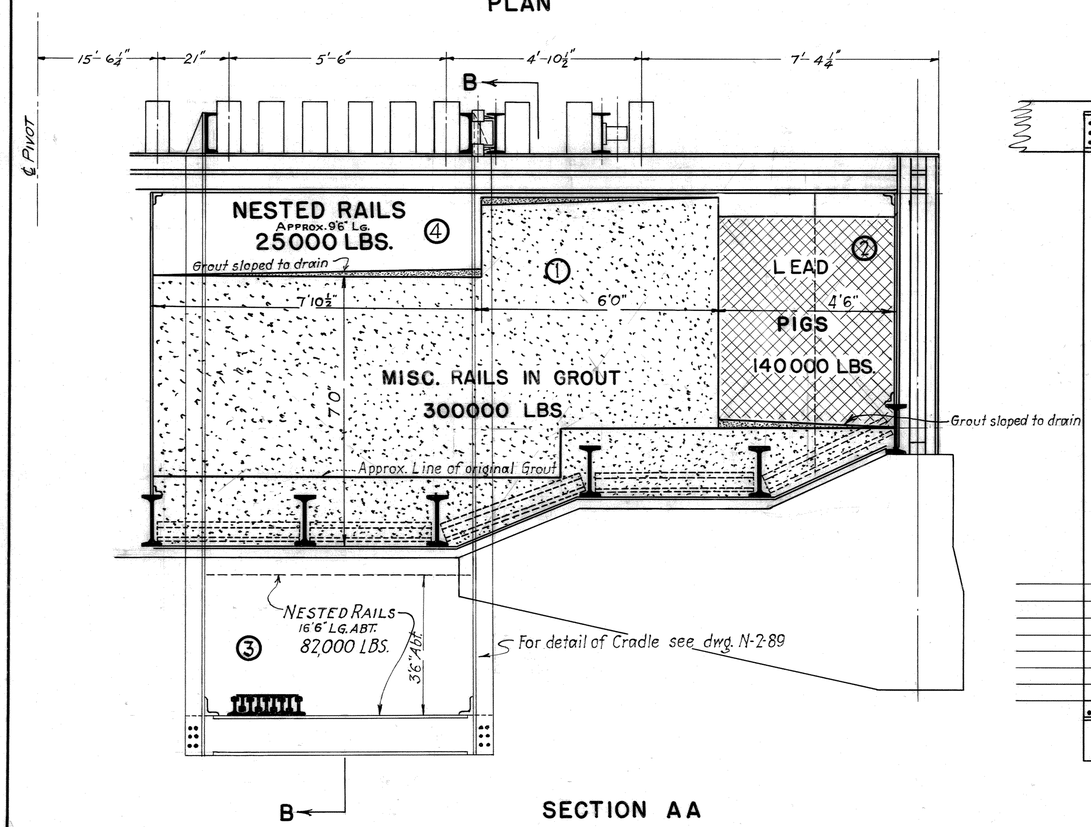
RECOMMENDED: HEAD ENGINEER

DRAWN BY M.O. & T.M.P. DATE 6-29-35 CHK'D BY ... TRACED BY ... CHECKED BY ...

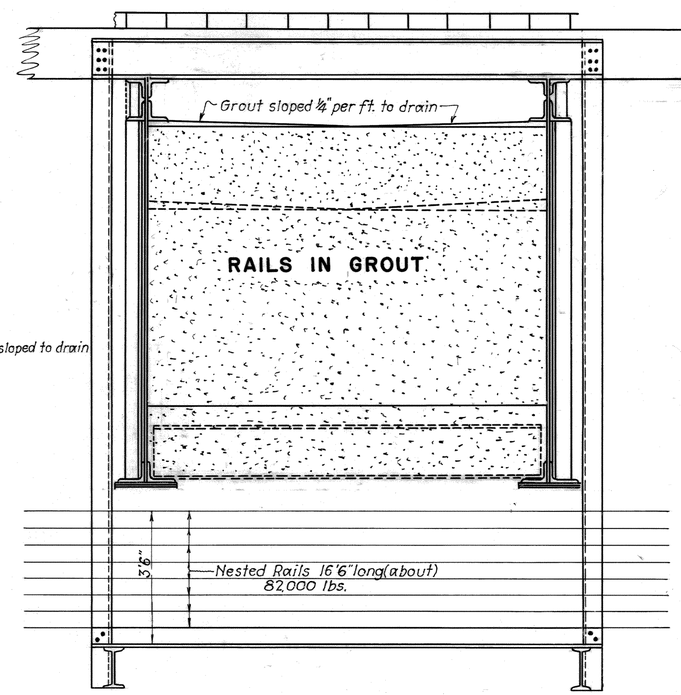
N-2-91



PLAN



SECTION AA



SECTION BB

The counterweight is designed to compensate dead load of bridge only.
Snow and ice are not provided for.

Counterweight Moment	13,500,000 Ft. lbs.*
Bob-tail Dead Load Moment	2,700,000 " "
Total Cantilever Moment	16,200,000 " "

* Includes 5% for adjustment.
For reduction of roadway width and to provide two sidewalks drop rail 3 only.
" " " " " " " " single sidewalk " " 3 and 4

NO.	REVISION	DATE	BY	AP'V'D.
2	Cradle & Tie Changes	7-3-35	T.M.O.	RLM
1	General notes added	6-20-35	A.H.R.	RLM

BONNEVILLE POWER, NAVIGATION PROJECT
BRIDGE ACROSS NAVIGATION CANAL
SWING SPAN
COUNTERWEIGHT

SCALE: 1/2" = 1'0"

U.S. ENGINEERS OFFICE, 2ND. PORTLAND DISTRICT (OREGON)

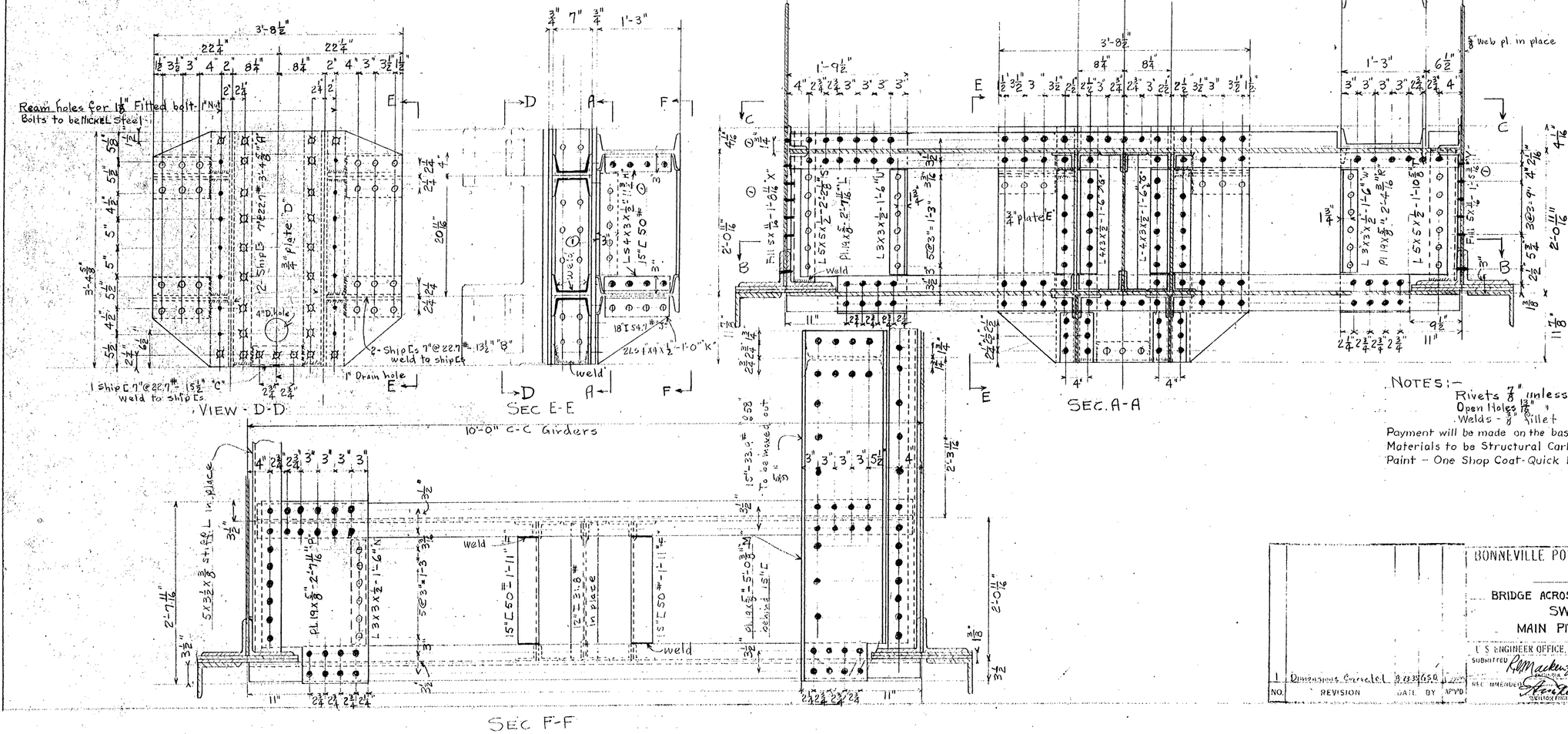
SUBMITTED: R.L. Mackenzie, ENGINEER
APPROVED: MAJOR, CORPS OF ENGRS.
RECOMMENDED: G.E. Sherman, HEAD ENGINEER
DRAWN: June 19, 1935.
TRACED: T.H.W. CHECKED: E.G.H.

APPROVED FOR CONSTRUCTION — 7/10/35 — Major, C.o.E.

N-2-92

MATERIAL LIST- Reqd.

Mark	Description	No. Reqd	Length	Wt/Ft	Total Wt	Remarks
"A"	7" Ship E-22.7#	4	3'-4⅜"	22.7	312	
"B"	"	8	13½"	"	205	
"C"	"	1	15½"	"	29	
"D"+"E"	Pl. ⅜"x44½"	2	3'-4⅜"	113.5	713	cut corners 170-5# 57-4#
"F"	15" L-50#	2	1'-11"	50.	192	
"G"	L-4x3x½	2	1'-6"	11.1	33	
"H"	L "	8	11⅜" ①	"	89	
"J"	18" I-54.7#	2	1'-0"	54.7	55	Cut from one
"K"	L 4x4x½	4	1'-0"	12.8	52	
"L"	Pl. ⅜x19"	1	2'-7 11/16"	40.4	99	cut corners 107-8#
"M"	Pl. " "	1	5'-0⅜"	"	1.95	" " 203-8#
"N"	L 3x3x½	1	1'-6"	9.4	14	
"P"	Pl. ⅜x19"	1	2'-7 11/16"	40.4	99	cut corners 107-8#
"R"	Pl ⅜x19	1	2'-4 7/16"	"	89	" " 95-8#
"S"	L 5x5x½	1	2'-2⅜"	16.7	35	
"T"	L "	1	1'-10⅜"	"	31	
"U"	L 3x3x½	1	1'-6"	9.4	14	
"W"	L "	1	1'-6" ②	"	14	
"X"	Pl 11/16"x5"	1	1'-8 11/16"	11.5	19	
"Y"	Pl "	1	1'-5 7/16" ②	"	16	
					2305# total	



NOTES:-
Rivets ⅞" unless noted
Open Holes 13/16" " " ream to 15/16"
Welds - ⅜" fillet
Payment will be made on the basis of scale weights
Materials to be Structural Carbon Steel A.S.T.M. A-7-33
Paint - One Shop Coat-Quick Drying Red Lead and Oil.

NO.	REVISION	DATE	BY	APV'D
1	Dimensions Corrected	8-23-1950		

BONNEVILLE POWER NAVIGATION PROJECT

BRIDGE ACROSS NAVIGATION CANAL
SWING SPAN
MAIN PINION BRACKET (CHANGES)

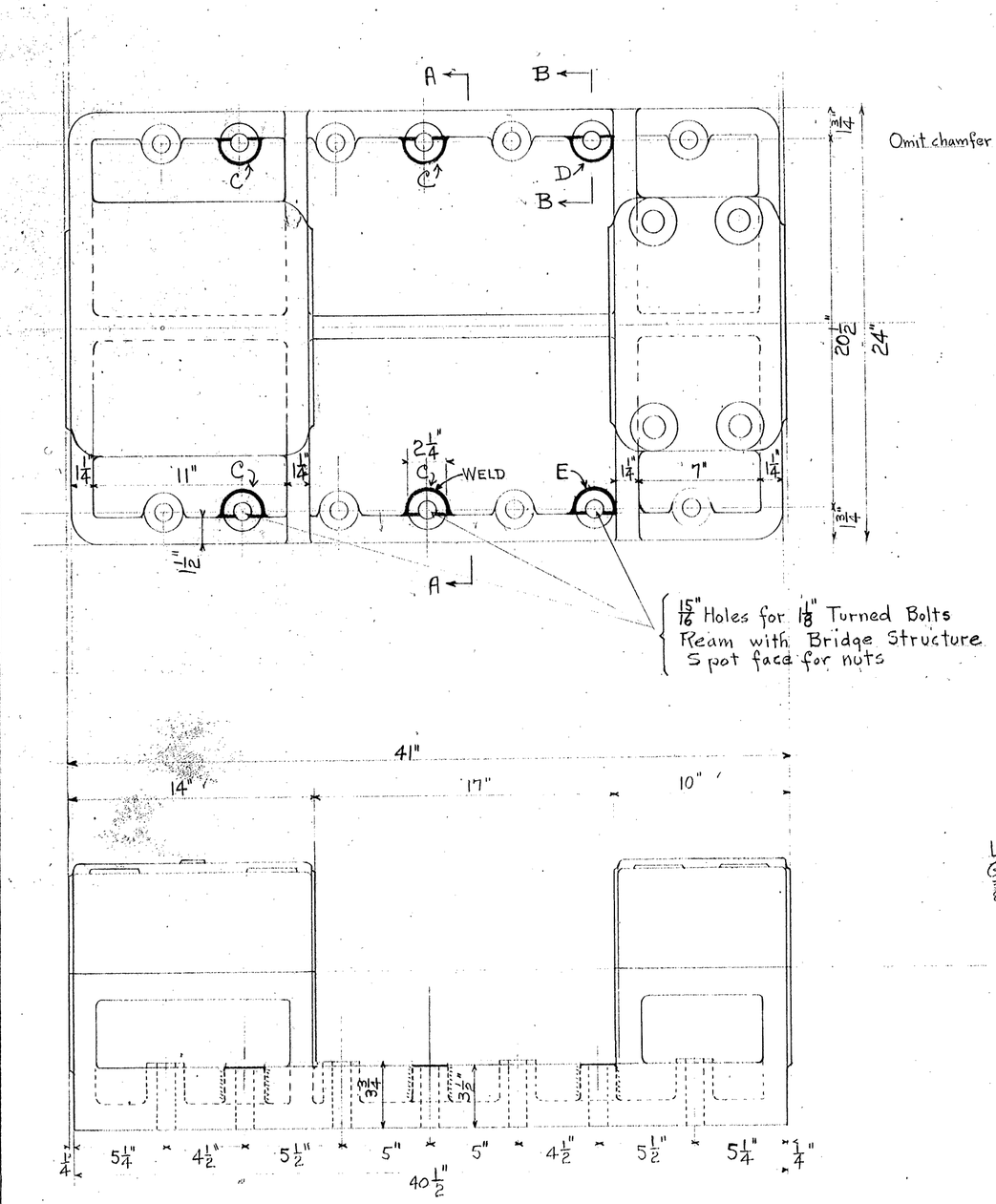
U.S. ENGINEER OFFICE, SECOND PORTLAND DISTRICT, OREGON

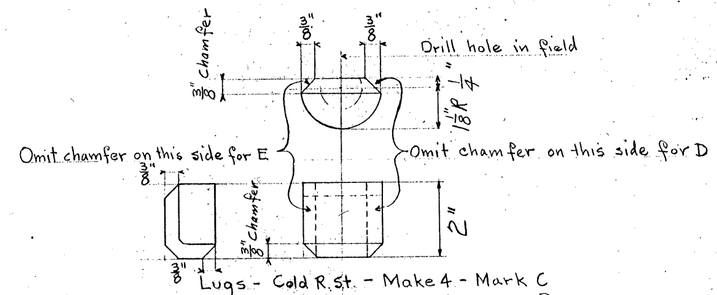
SUBMITTED R.M. Mackenzie ENGINEER — APPROVED G.E. Williams DIST. ENGINEER

REC. AMENDED Stockbridge DESIGN ENGINEER — DRAWN BY G.S.D. DATE 8-11-35

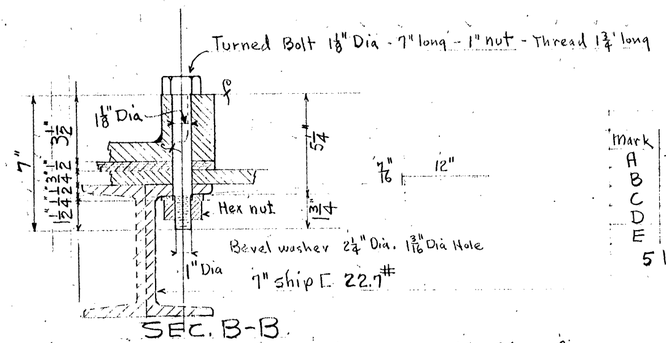
TRACED BY — CHECKED BY C.H.R.

N-2-106





Lugs - Cold R. St. - Make 4 - Mark C
Lug - " " " - Make 1 - " D
Lug - " " " - Make 1 - " E



SEC. B-B

Turned bolts - Nickel Steel — MAKE 14 MARK A
Bevel washers - Machine steel — MAKE 14 " B

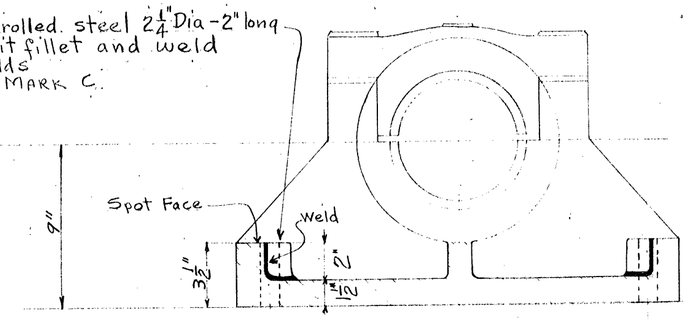
Bill of Material

Mark	Description	Number Required	Material	Weight
A	Turned bolts	14	Ni. Steel	45#
B	Bevel washers	14	Machine "	3#
C	Lugs	4	Cold R St.	7#
D	"	1	" "	
E	"	1	" "	

5 lin. ft. of $\frac{3}{8}$" fillet weld

NOTES:-
For Detail of Bearing See Pac. I & S. Works Dwg. No. S.D. 3504

Lugs - Cold rolled steel $2\frac{1}{4}$" Dia - 2" long
Grind to fit fillet and weld
$\frac{3}{8}$" fillet welds
MAKE 6 MARK C.



SEC. A-A

NO.		DATE	BY	APP'D
1	Detail of lugs added	8-26-35	G.S.D.	RGM

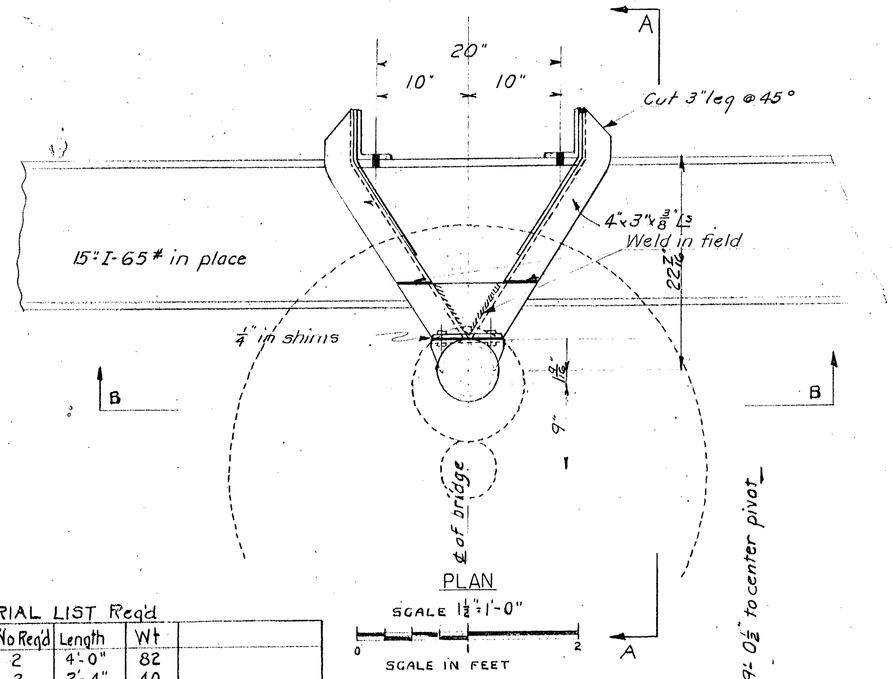
BONNEVILLE POWER NAVIGATION PROJECT

BRIDGE ACROSS NAVIGATION CANAL
SWING SPAN
PIVOT SHAFT BEARING (CHANGES)

U. S. ENGINEER OFFICE, SECOND PORTLAND DISTRICT (OREGON)

SUBMITTED: R.G. Mackenzie — ENGINEER
APPROVED — MAJOR, CORPS OF ENGINEERS
RECOMMENDED — SECTION ENGINEER
DRAWN BY G.S.D. DATE 8-22-35
TRACED BY — CHECKED BY C.H.R.

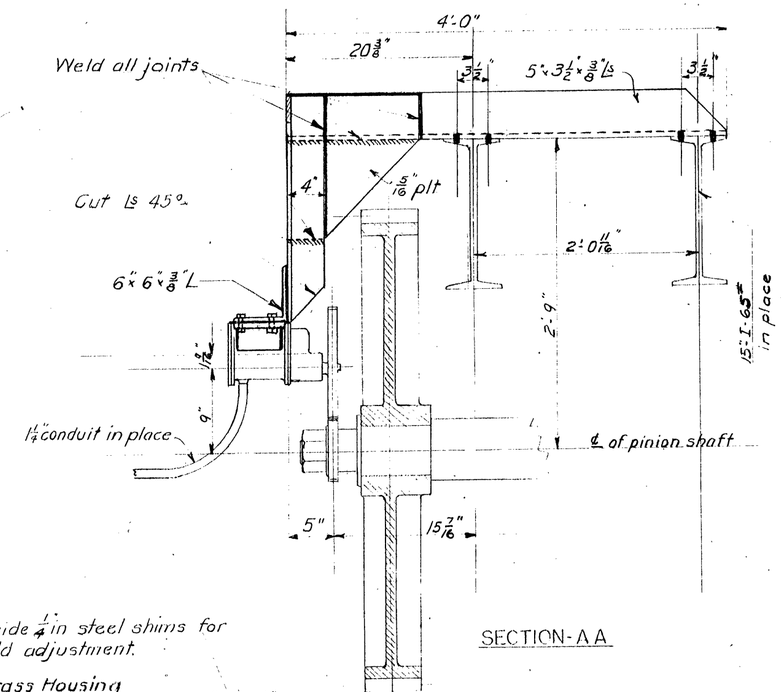
N-2-107



PLAN

SCALE 1 1/2" = 1'-0"

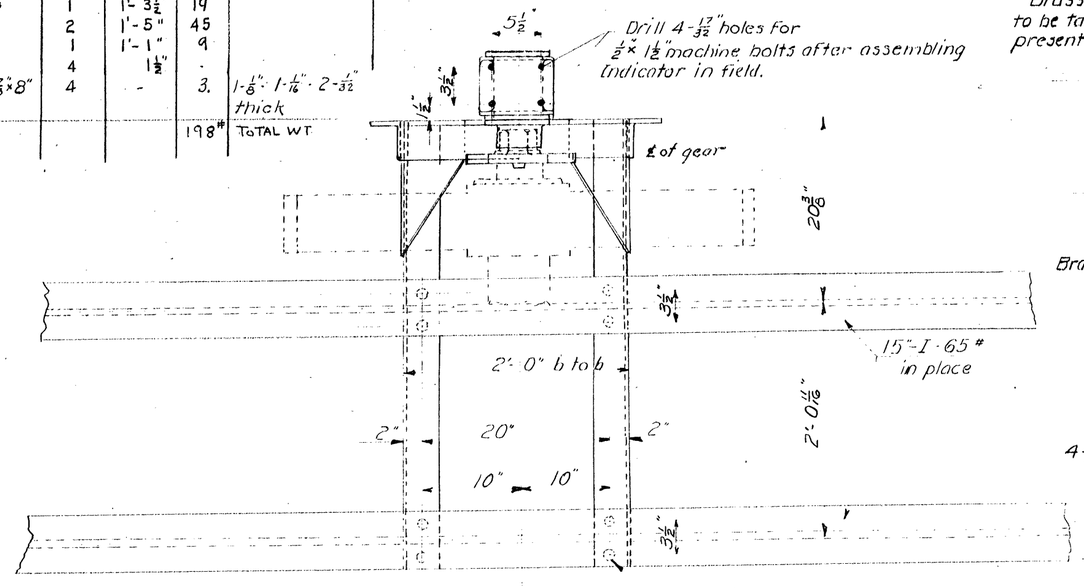
SCALE IN FEET



SECTION-A A

MATERIAL LIST Req'd

Description	No Req'd	Length	Wt	
5x3 1/2x3/8" Ls	2	4'-0"	82	
4"x3"x3/8" Ls	2	2'-4"	40	
6"x6"x3/8" Ls	1	1'-3 1/2"	19	
14"x5/16" plt	2	1'-5"	45	
8"x5/16" plt	1	1'-1"	9	
1/2" bolts	4	1 1/2"	-	
Shims. 5 7/8x8"	4	-	3.	1-1/8"-1-1/16"-2-1/32" thick
			198#	TOTAL WT

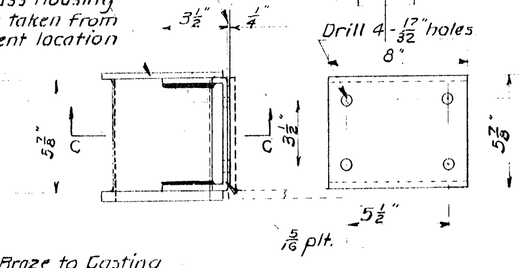


SECTION-B B

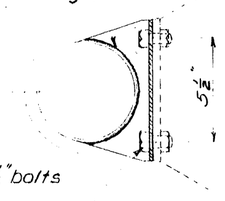
(View looking North)

Provide 1/4" in steel shims for field adjustment.

Brass Housing to be taken from present location



Braze to Casting



Section-C C

DETAIL OF BASE

Scale 3" = 1'-0"

NOTES

Payments will be made on basis of scale weights.

Material to be Structural Carbon Steel A.S.T.M. A-7-33.

Paint - One shop coat of Quick Drying Red Lead and Oil.

REFERENCES

For Present Location see N-2-91.
For Cross beams " N-2-106.
For Assembly of Turning Machinery see sheet 7 N-2-61.

NO	REVISION	DATE	BY	APV'D
2	Shims added.	8/24	C.H.R.	RWM
1	Dimension changed.	8/23	C.H.R.	RWM

BONNEVILLE POWER NAVIGATION PROJECT

BRIDGE ACROSS NAVIGATION CANAL

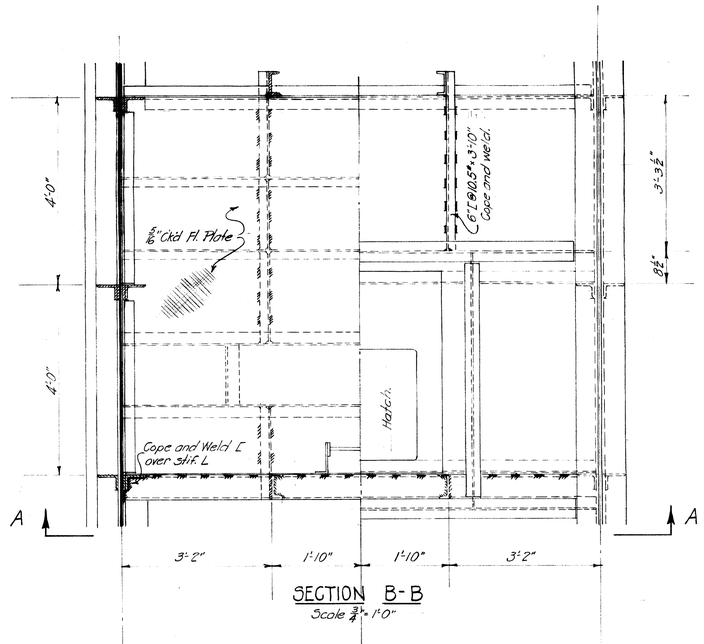
SWING SPAN

INDICATOR BRACKET CHANGES

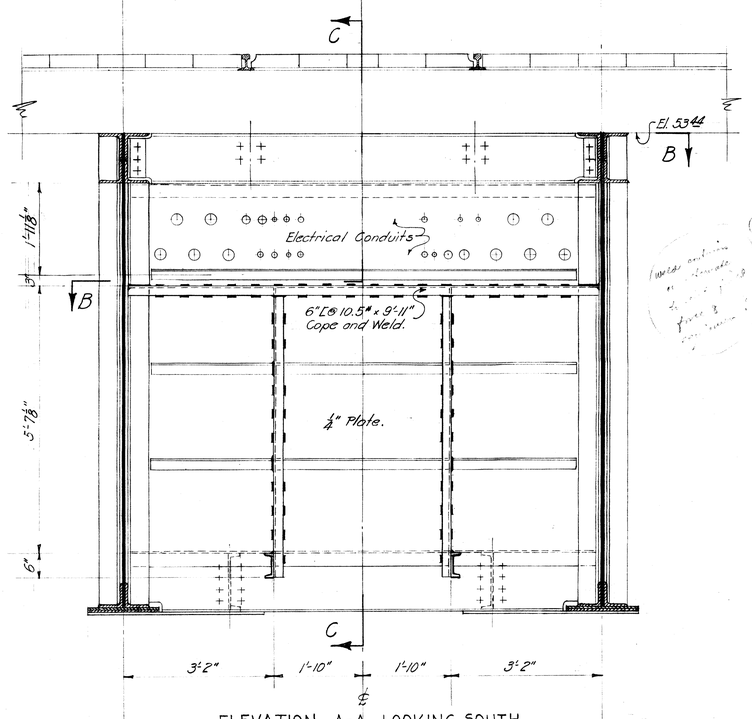
DESIGNED R.G. Mackenzie DRAWN H. Williams

CHECKED C.H.C. DATE 8-20-35

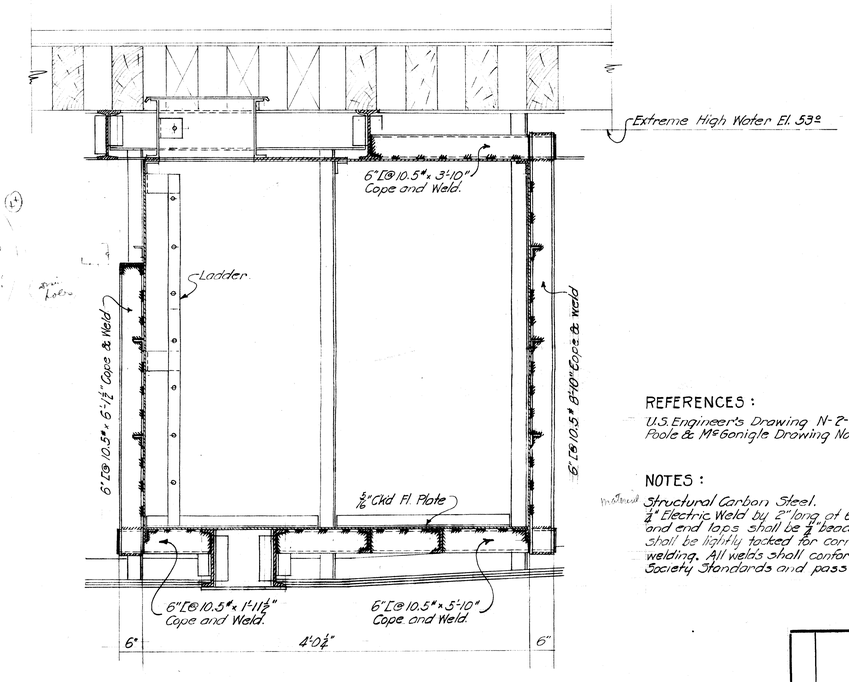
N-2-108



SECTION B-B
Scale ¾" = 1'-0"



ELEVATION A-A LOOKING SOUTH
Scale ¾" = 1'-0"



SECTION C-C
Scale ¾" = 1'-0"

REFERENCES:

U.S. Engineer's Drawing N-2-61 Sheet #3.
Poole & McGonigle Drawing No. F3604 Sheet #10

NOTES:

Structural Carbon Steel.
¼" Electric Weld by 2" long at 6" spaces except copes and end laps shall be ¼" bead continuous. All members shall be lightly tacked for correct alignment before welding. All welds shall conform to American Welding Society Standards and pass Government Inspection.

MATERIAL REQUIRED			
1	6"[@10.5#	9'-11"	105#
2	" "	6'-1⅛"	128
2	" "	1'-11½"	41
2	" "	5'-10"	123
2	" "	8'-10"	185
2	" "	3'-10"	81
	Total Weight		662#

NO.	REVISION	DATE	BY	AP'V'D

008-018

BONNEVILLE POWER NAVIGATION PROJECT

BRIDGE ACROSS NAVIGATION CANAL

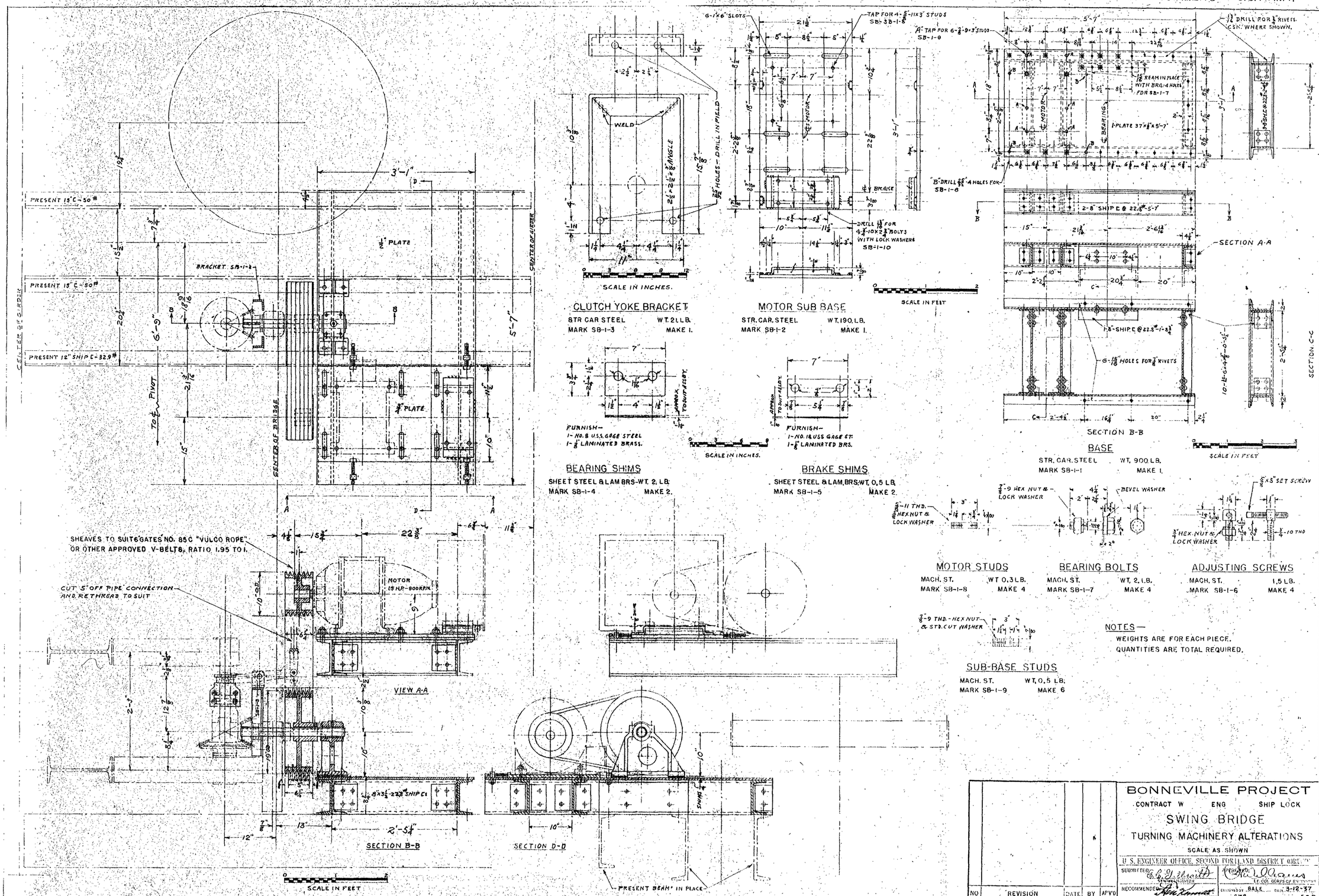
SWING SPAN
CONTACTOR COMPARTMENT
REINFORCING DETAILS
SCALE AS SHOWN

U. S. ENGINEER OFFICE, SECOND PORTLAND DISTRICT (OREGON)

SUBMITTED: ASSOCIATE ENGINEER
RECOMMENDED: PRINCIPAL ENGINEER
APPROVED: LT. COL. CORPS OF ENGINEERS
DESIGNED BY ..... DATE .....
DR. BY V.C.H. TR. BY ..... CHECKED BY .....

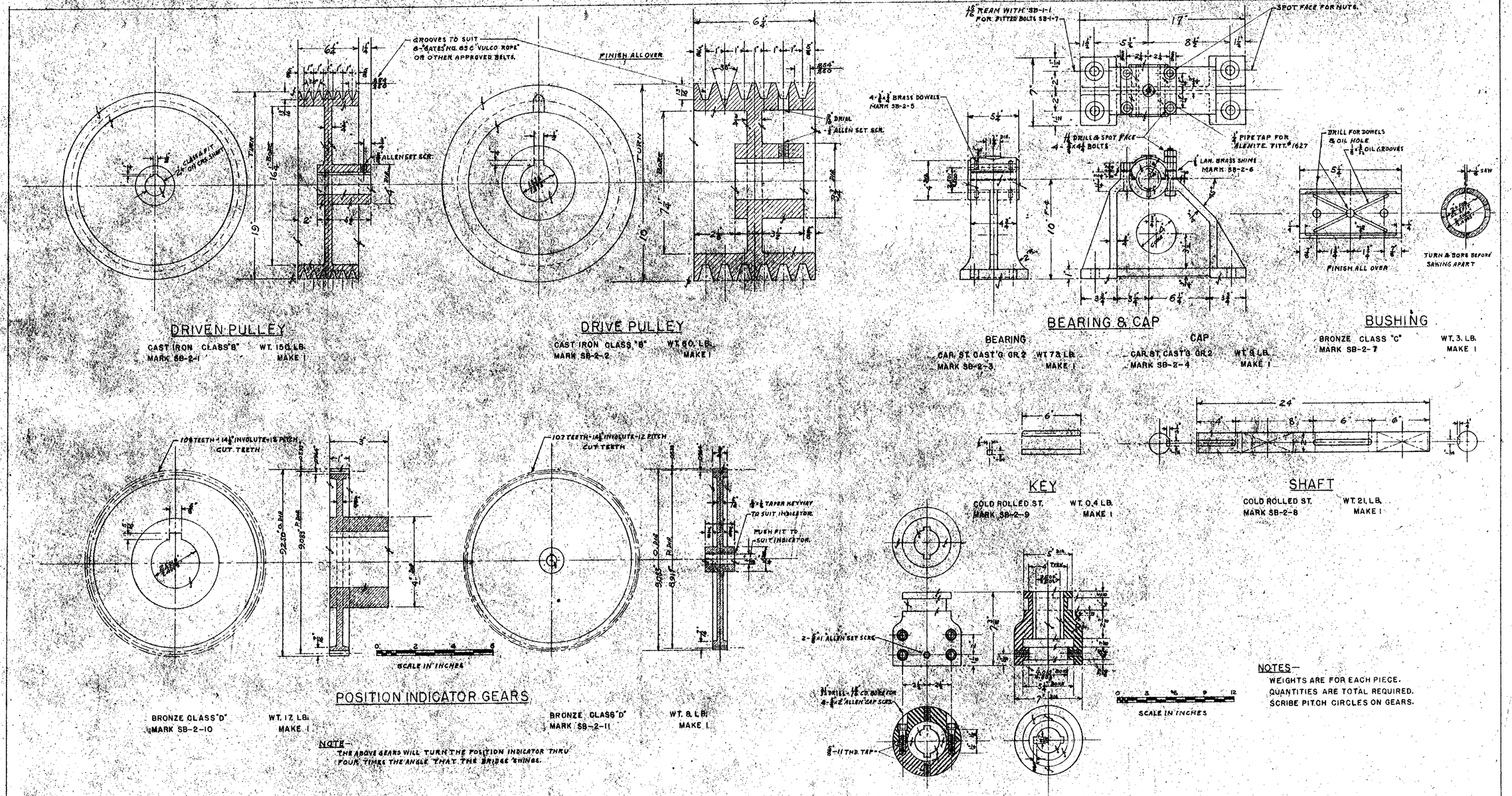
N-2-117

WAR DEPARTMENT CORPS OF ENGINEERS U.S. ARMY.



WAR DEPARTMENT

CORPS OF ENGINEERS U.S. ARMY.



NOTES—
WEIGHTS ARE FOR EACH PIECE.
QUANTITIES ARE TOTAL REQUIRED.
SCRIBE PITCH CIRCLES ON GEARS.

NO.	REVISION	DATE	BY	APV'D

BONNEVILLE PROJECT

CONTRACT W ENG SHIP LOCK

SWING BRIDGE

TURNING MACHINERY ALTERATIONS

SCALE AS SHOWN

U. S. ENGINEER OFFICE, SECOND PORTLAND DISTRICT (OREGON)

SUBMITTED: E. E. Gallwitz SENIOR ENGINEER

APPROVED: C. E. Williams LT. COL. CORPS OF ENGINEERS

RECOMMENDED: John Bonnett PRINCIPAL ENGINEER

DESIGNED BY BALE DATE 3-12-37.

DR. BY C.W.B. TR. BY..... CHECKED BY G.S.D.

SHEET 2 N-2-149

"General Decision Number: OR20260001 07/30/2026

State: Oregon

Construction Types: Highway

Counties: Oregon Counties of
Baker, Benton, Clackamas, Clatsop,
Columbia, Coos, Crook, Curry, Deschutes,
Douglas, Gilliam, Grant, Harney, Hood
River, Jackson, Jefferson, Josephine,
Klamath, Lake, Lane, Lincoln, Linn,
Malheur, Marion, Morrow, Multnomah,
Polk, Sherman, Tillamook, Umatilla,
Union, Wallowa, Wasco, Washington,
Wheeler and Yamhill

Modification Number	Publication Date
1	01/23/2026
2	05/18/2026
3	07/30/2026

BROR0001-031 06/01/2025

	Rates	Fringes
BRICKLAYER	$ 49.60	25.15

CARP0096-005 06/01/2025

	Rates	Fringes
MILLWRIGHT	$ 59.35	22.38

CARP0196-003 01/01/2025

	Rates	Fringes
PILEDRIVER	$ 55.79	15.81

CARP0503-020 06/01/2025

	Rates	Fringes
CARPENTERS: EMPLOYEES MAY BE REQUIRED TO PERFORM ANY COMBINATION OF WORK WITHIN THE DIVING TEAM/CREW, (EXCEPT FOR DIVE SUPERVISOR) PROVIDED THEY ARE PAID AT THE HIGHEST RATE OF PAY THAT THEY RECEIVED DURING THEIR SHIFT	$ 53.94	16.81

ELEC0048-006 01/01/2025

	Rates	Fringes
CABLE SPLICER (CLACKAMAS, CLATSOP, COLUMBIA, HOOD RIVER, MULTNOMAH, TILLAMOOK, WASCO, WASHINGTON, SHERMAN AND YAMHILL (NORTH) COUNTIES) HOURLY ZONE PAY: HOURLY ZONE PAY SHALL BE PAID ON JOBS LOCATED OUTSIDE OF THE FREE ZONE COMPUTED FROM THE CITY CENTER OF THE FOLLOWING LISTED CITIES: PORTLAND, THE DALLES, HOOD RIVER, TILLAMOOK, SEASIDE AND ASTORIA ZONE PAY: ZONE 1: 31-50 MILES $1.50/HOUR ZONE 2: 51-70 MILES $3.50/HOUR ZONE 3: 71-90 MILES $5.50/HOUR ZONE 4: BEYOND 90 MILES $9.00/HOUR *THESE ARE NOT MILES DRIVEN. ZONES ARE BASED ON DELORRNE STREET ATLAS USA 2006 PLUS	$ 69.85	30.44
ELECTRICIAN (CLACKAMAS, CLATSOP, COLUMBIA, HOOD RIVER, MULTNOMAH, TILLAMOOK, WASCO, WASHINGTON, SHERMAN AND YAMHILL (NORTH) COUNTIES) HOURLY ZONE PAY: HOURLY ZONE PAY SHALL BE PAID ON JOBS LOCATED OUTSIDE OF THE FREE ZONE COMPUTED FROM THE CITY CENTER OF THE FOLLOWING LISTED CITIES: PORTLAND, THE DALLES, HOOD RIVER, TILLAMOOK, SEASIDE AND ASTORIA ZONE PAY: ZONE 1: 31-50 MILES $1.50/HOUR ZONE 2: 51-70 MILES $3.50/HOUR ZONE 3: 71-90 MILES $5.50/HOUR ZONE 4: BEYOND 90 MILES $9.00/HOUR *THESE ARE NOT MILES DRIVEN. ZONES ARE BASED ON DELORRNE STREET ATLAS USA 2006 PLUS	$ 63.50	29.73

ELEC0112-001 06/01/2025

	Rates	Fringes
CABLE SPLICER (BAKER, GILLIAM, GRANT, MORROW, UMATILLA, UNION, WALLOWA, AND WHEELER COUNTIES)	$ 63.00	27.87
ELECTRICIAN (BAKER, GILLIAM, GRANT, MORROW, UMATILLA, UNION, WALLOWA, AND WHEELER COUNTIES)	$ 60.00	27.78

ELEC0280-003 01/01/2025

	Rates	Fringes
CABLE SPLICER (BENTON, CROOK, DESCHUTES, JEFFERSON,		

LANE (EAST OF A LINE RUNNING NORTH AND SOUTH FROM
THE NORTHEAST CORNER OF COOS COUNTY TO THE
SOUTHEAST CORNER OF LINCOLN COUNTY), LINN, MARION,
POLK AND YAMHILL (SOUTHERN HALF) COUNTIES).....$ 60.80 22.24
ELECTRICIAN (BENTON, CROOK, DESCHUTES, JEFFERSON,
LANE (EAST OF A LINE RUNNING NORTH AND SOUTH FROM
THE NORTHEAST CORNER OF COOS COUNTY TO THE
SOUTHEAST CORNER OF LINCOLN COUNTY), LINN, MARION,
POLK AND YAMHILL (SOUTHERN HALF) COUNTIES).....$ 56.46 23.05

ELEC0291-006 12/01/2024

	Rates	Fringes
CABLE SPLICER (MALHEUR COUNTY).....	$ 46.81	19.86
ELECTRICIAN (MALHEUR COUNTY).....	$ 42.55	19.86

ELEC0659-004 01/01/2026

	Rates	Fringes
CABLE SPLICER (DOUGLAS (EAST OF A LINE RUNNING NORTH AND SOUTH FROM THE NE CORNER OF COOS COUNTY TO THE SE CORNER OF LINCOLN COUNTY), HARNEY, JACKSON, JOSEPHINE, KLAMATH AND LAKE COUNTIES) ZONE PAY: BASE POINTS ARE FROM THE DOWNTOWN POST OFFICE IN GRANTS PASS, KLAMATH FALLS, ROSEBURG AND MEDFORD. ZONE 1: 0-20 MILES $0.00 PER HOUR ZONE 2: > 20-30 MILES $1.50 PER HOUR ZONE 3: >30-40 MILES $3.30 PER HOUR ZONE 4: >40-50 MILES $5.00 PER HOUR ZONE 5: >50-60 MILES $6.80 PER HOUR ZONE 6: >60 MILES $9.50 PER HOUR *THESE ARE NOT MILES DRIVEN. ZONES ARE BASED ON DELORNE STREET ATLAS USA 5.0.....	$ 64.58	23.31
ELECTRICIAN (DOUGLAS (EAST OF A LINE RUNNING NORTH AND SOUTH FROM THE NE CORNER OF COOS COUNTY TO THE SE CORNER OF LINCOLN COUNTY), HARNEY, JACKSON, JOSEPHINE, KLAMATH AND LAKE COUNTIES) ZONE PAY: BASE POINTS ARE FROM THE DOWNTOWN POST OFFICE IN GRANTS PASS, KLAMATH FALLS, ROSEBURG AND MEDFORD. ZONE 1: 0-20 MILES $0.00 PER HOUR ZONE 2: > 20-30 MILES $1.50 PER HOUR ZONE 3: >30-40 MILES $3.30 PER HOUR ZONE 4: >40-50 MILES $5.00 PER HOUR ZONE 5: >50-60 MILES $6.80 PER HOUR ZONE 6: >60 MILES $9.50 PER HOUR *THESE ARE NOT MILES DRIVEN. ZONES ARE BASED ON DELORNE STREET ATLAS USA 5.0.....	$ 47.04	21.84

ELEC0932-004 01/01/2024

	Rates	Fringes
ELECTRICIAN (COOS, CURRY, LINCOLN, DOUGLAS AND LANE COUNTIES (AREA LYING WEST OF A LINE NORTH AND SOUTH FROM THE N.E. CORNER OF COOS COUNTY TO THE S.E. CORNER OF LINCOLN COUNTY)).....	$ 50.03	24.00

ENGI0701-005 01/01/2024

	Rates	Fringes
POWER EQUIPMENT OPERATOR: GROUP 1- CONCRETE BATCH PLANT OR WET MIX 3 UNITS OR MORE; CRANE, FLOATING 150 TON BUT LESS THAN 250 TON; CRANE, 200 THROUGH 299 TON WITH 200' BOOM OR LESS (INCLUDING JIB, INSERTS AND/OR ATTACHMENTS); CRANE, 90 TON THROUGH 199 TON WITH OVER 200' BOOM (INCLUDING JIB, INSERTS, AND/OR ATTACHMENTS); CRANE, TOWER CRANE WITH 175' TOWER OR LESS AND WITH LESS THAN 200' JIB; CRANE, WHIRLEY 90 TON AND OVER; HELICOPTER WHEN USED IN ERECTING WORK; TUNNEL BORING MACHINE; TUNNEL, MICRO BORING TUNNEL MACHINE. (ZONE 1: BASE RATE. ZONE 2: $3.00. ZONE 3: $6.00. FOR THE FOLLOWING COUNTIES: MULTNOMAH; CLACKAMAS; MARION; WASHINGTON; YAMHILL; COLUMBIA, CLARK, COWLITZ, AND WASHINGTON WITH MODIFICATIONS AS INDICATED: ALL JOBS OR PROJECTS LOCATED IN MULTNOMAH, CLACKAMAS, AND MARION COUNTIES, WEST OF THE WESTERN BOUNDARY OF MT. HOOD NATIONAL FOREST AND WEST OF MILE POST 30 ON INTERSTATE 85 AND WEST OF MILE POST 30 ON STATE HIGHWAY 26 AND EST OF MILE POST 30 ON HIGHWAY 22 AND ALL JOBS OR PROJECTS LOCATED IN YAMHILL COUNTY, WASHINGTON COUNTY, AND COLUMBIA COUNTY AND ALL JOBS OR PROJECTS LOCATED IN CLARK & COWLITZ COUNTY, WASHINGTON EXCEPT THAT PORTION OF COWLITZ COUNTY IN THE MT. ST. HELENS ""BLAST ZONE"" SHALL RECEIVE ZONE 1 PAY FOR ALL CLASSIFICATIONS. ALL JOBS OR PROJECTS LOCATED IN THE AREA OUTSIDE THE IDENTIFIED BOUNDARY ABOVE, BUT LESS THAN 50 MILES FROM THE PORTLAND CITY HALL SHALL RECEIVE ZONE 2 PAY FOR ALL CLASSIFICATIONS. ALL JOBS OR POJRECTS LOCATED MORE THAN 50 MILES FROM THE PORTLAND CITY HALL, BUT OUTSIDE THE IDENTIFIED BORDER ABOVE, SHALL RECEIVE ZONE 3 PAY FOR ALL CLASSIFICATIONS. FOR THE FOLLOWING CITIES: ALBANY, BEND, COOS BAY, EUGENE, GRANTS PASS, KLAMATH FALLS, MEDFORD, ROSEBURG: ALL JOBS OR PROJECTS LOCATED WITHIN 30 MILES OF THE RESPECTIVE CITY HALL OF THE ABOVE		

MENTIONED CITIES SHALL RECEIVE ZONE 1 PAY FOR ALL
CLASSIFICATIONS. ALL JOBS OR PROJECTS LOCATED MORE
THAN 30 MILES AND LESS THAN 50 MILES FROM THE
RESPECTIVE CITY HALL OF THE ABOVE MENTIONED CITIES
SHALL RECEIVE ZONE 2 PAY FOR ALL CLASSIFICATIONS.
ALL JOBS OR PROJECTS LOCATED MORE THAN 50 MILES
FROM THE RESPECTIVE CITY HALL OF THE ABOVE
MENTIONED CITIES SHALL RECEIVE ZONE 3 PAY FOR ALL
CLASSIFICATIONS) (FOOTNOTE C: PERSONNEL WORKING
INSIDE A DESIGNATED HAZARDOUS WASTE PERIMETER SHALL
BE ELIGIBLE FOR COMPENSATION IN ACCORDANCE WITH THE
FOLLOWING GROUP SCHEDULE RELATIVE TO THE LEVEL OF
HAZARDOUS WASTE AS OUTLINED IN THE SPECIFIC
HAZARDOUS WASTE PROJECT SITE SAFTEY PLAN: H-1: BASE
WAGE RATE (I.E. RESPECTIVE CLASSIFICATION/GROUP)
WHEN ON A HAZARDOUS WASTE SITE WHEN NOT OUTFITTED
WITH PROTECTIVE CLOTHING. H-2: CLASS ""C"" SUIT-
APPLICABLE SCALE PLUS $1.00 PER HOUR, FRINGES PLUS
$0.15. H-3: CLASS ""B"" SUIT- APPLICABLE SCALE PLUS
$1.50 PER HOUR, FRINGES PLUS $0.15. H-4: CLASS ""A""
SUIT- APPLICABLE SCALE PLUS $2.00 PER HOUR, FRINGES
PLUS $0.15.).....$ 56.66 16.90
POWER EQUIPMENT OPERATOR GROUP 1A- CRANE, FLOATING
250 TON AND OVER; CRANE, 200 TON THROUGH 299 TON,
WITH 200' BOOM (INCLUDING JIB, INSERTS, AND/OR
ATTACHMENTS); CRANE, 300 TON THROUGH 399 TON;
CRANE, TOWER CRANE WITH OVER 175' TOWER OR OVER
200' JIB; CRANE, TOWER CRANE ON RAIL SYSTEM OR 2ND
TOWER OR MORE IN WORK RADIUS. (ZONE 1: BASE RATE.
ZONE 2: $3.00. ZONE 3: $6.00. FOR THE FOLLOWING
COUNTIES: MULTNOMAH; CLACKAMAS; MARION; WASHINGTON;
YAMHILL; COLUMBIA, CLARK, COWLITZ, AND WASHINGTON
WITH MODIFICATIONS AS INDICATED: ALL JOBS OR
PROJECTS LOCATED IN MULTNOMAH, CLACKAMAS, AND
MARION COUNTIES, WEST OF THE WESTERN BOUNDARY OF
MT. HOOD NATIONAL FOREST AND WEST OF MILE POST 30
ON INTERSTATE 85 AND WEST OF MILE POST 30 ON STATE
HIGHWAY 26 AND EST OF MILE POST 30 ON HIGHWAY 22
AND ALL JOBS OR PROJECTS LOCATED IN YAMHILL COUNTY,
WASHINGTON COUNTY, AND COLUMBIA COUNTY AND ALL JOBS
OR PROJECTS LOCATED IN CLARK & COWLITZ COUNTY,
WASHINGTON EXCEPT THAT PORTION OF COWLITZ COUNTY IN
THE MT. ST. HELENS ""BLAST ZONE"" SHALL RECEIVE ZONE
1 PAY FOR ALL CLASSIFICATIONS. ALL JOBS OR PROJECTS
LOCATED IN THE AREA OUTSIDE THE IDENTIFIED BOUNDARY
ABOVE, BUT LESS THAN 50 MILES FROM THE PORTLAND
CITY HALL SHALL RECEIVE ZONE 2 PAY FOR ALL
CLASSIFICATIONS. ALL JOBS OR POJRECTS LOCATED MORE
THAN 50 MILES FROM THE PORTLAND CITY HALL, BUT
OUTSIDE THE IDENTIFIED BORDER ABOVE, SHALL RECEIVE
ZONE 3 PAY FOR ALL CLASSIFICATIONS. FOR THE
FOLLOWING CITIES: ALBANY, BEND, COOS BAY, EUGENE,
GRANTS PASS, KLAMATH FALLS, MEDFORD, ROSEBURG: ALL
JOBS OR PROJECTS LOCATED WITHIN 30 MILES OF THE
RESPECTIVE CITY HALL OF THE ABOVE MENTIONED CITIES
SHALL RECEIVE ZONE 1 PAY FOR ALL CLASSIFICATIONS.
ALL JOBS OR PROJECTS LOCATED MORE THAN 30 MILES AND
LESS THAN 50 MILES FROM THE RESPECTIVE CITY HALL OF
THE ABOVE MENTIONED CITIES SHALL RECEIVE ZONE 2 PAY
FOR ALL CLASSIFICATIONS. ALL JOBS OR PROJECTS
LOCATED MORE THAN 50 MILES FROM THE RESPECTIVE CITY
HALL OF THE ABOVE MENTIONED CITIES SHALL RECEIVE
ZONE 3 PAY FOR ALL CLASSIFICATIONS) (FOOTNOTE C:
PERSONNEL WORKING INSIDE A DESIGNATED HAZARDOUS
WASTE PERIMETER SHALL BE ELIGIBLE FOR COMPENSATION
IN ACCORDANCE WITH THE FOLLOWING GROUP SCHEDULE
RELATIVE TO THE LEVEL OF HAZARDOUS WASTE AS
OUTLINED IN THE SPECIFIC HAZARDOUS WASTE PROJECT
SITE SAFTEY PLAN: H-1: BASE WAGE RATE (I.E.
RESPECTIVE CLASSIFICATION/GROUP) WHEN ON A
HAZARDOUS WASTE SITE WHEN NOT OUTFITTED WITH
PROTECTIVE CLOTHING. H-2: CLASS ""C"" SUIT-
APPLICABLE SCALE PLUS $1.00 PER HOUR, FRINGES PLUS
$0.15. H-3: CLASS ""B"" SUIT- APPLICABLE SCALE PLUS
$1.50 PER HOUR, FRINGES PLUS $0.15. H-4: CLASS ""A""
SUIT- APPLICABLE SCALE PLUS $2.00 PER HOUR, FRINGES
PLUS $0.15.).....$ 58.82 16.90
POWER EQUIPMENT OPERATOR GROUP 1B- CRANE, 300 TON
THROU 399 TON, WITH OVER 200' BOOM (INCLUDING JIB,
INSERTS, AND/OR ATTACHMENTS); FLOATING CRANE, 350
TON AND OVER; CRANE, 400 TON AND OVER. (ZONE 1:
BASE RATE. ZONE 2: $3.00. ZONE 3: $6.00. FOR THE
FOLLOWING COUNTIES: MULTNOMAH; CLACKAMAS; MARION;
WASHINGTON; YAMHILL; COLUMBIA, CLARK, COWLITZ, AND
WASHINGTON WITH MODIFICATIONS AS INDICATED: ALL
JOBS OR PROJECTS LOCATED IN MULTNOMAH, CLACKAMAS,
AND MARION COUNTIES, WEST OF THE WESTERN BOUNDARY
OF MT. HOOD NATIONAL FOREST AND WEST OF MILE POST
30 ON INTERSTATE 85 AND WEST OF MILE POST 30 ON
STATE HIGHWAY 26 AND EST OF MILE POST 30 ON HIGHWAY
22 AND ALL JOBS OR PROJECTS LOCATED IN YAMHILL
COUNTY, WASHINGTON COUNTY, AND COLUMBIA COUNTY AND
ALL JOBS OR PROJECTS LOCATED IN CLARK & COWLITZ
COUNTY, WASHINGTON EXCEPT THAT PORTION OF COWLITZ
COUNTY IN THE MT. ST. HELENS ""BLAST ZONE"" SHALL
RECEIVE ZONE 1 PAY FOR ALL CLASSIFICATIONS. ALL
JOBS OR PROJECTS LOCATED IN THE AREA OUTSIDE THE
IDENTIFIED BOUNDARY ABOVE, BUT LESS THAN 50 MILES

FROM THE PORTLAND CITY HALL SHALL RECEIVE ZONE 2
PAY FOR ALL CLASSIFICATIONS. ALL JOBS OR POJRECTS
LOCATED MORE THAN 50 MILES FROM THE PORTLAND CITY
HALL, BUT OUTSIDE THE IDENTIFIED BORDER ABOVE,
SHALL RECEIVE ZONE 3 PAY FOR ALL CLASSIFICATIONS.
FOR THE FOLLOWING CITIES: ALBANY, BEND, COOS BAY,
EUGENE, GRANTS PASS, KLAMATH FALLS, MEDFORD,
ROSEBURG: ALL JOBS OR PROJECTS LOCATED WITHIN 30
MILES OF THE RESPECTIVE CITY HALL OF THE ABOVE
MENTIONED CITIES SHALL RECEIVE ZONE 1 PAY FOR ALL
CLASSIFICATIONS. ALL JOBS OR PROJECTS LOCATED MORE
THAN 30 MILES AND LESS THAN 50 MILES FROM THE
RESPECTIVE CITY HALL OF THE ABOVE MENTIONED CITIES
SHALL RECEIVE ZONE 2 PAY FOR ALL CLASSIFICATIONS.
ALL JOBS OR PROJECTS LOCATED MORE THAN 50 MILES
FROM THE RESPECTIVE CITY HALL OF THE ABOVE
MENTIONED CITIES SHALL RECEIVE ZONE 3 PAY FOR ALL
CLASSIFICATIONS) (FOOTNOTE C: PERSONNEL WORKING
INSIDE A DESIGNATED HAZARDOUS WASTE PERIMETER SHALL
BE ELIGIBLE FOR COMPENSATION IN ACCORDANCE WITH THE
FOLLOWING GROUP SCHEDULE RELATIVE TO THE LEVEL OF
HAZARDOUS WASTE AS OUTLINED IN THE SPECIFIC
HAZARDOUS WASTE PROJECT SITE SAFTEY PLAN: H-1: BASE
WAGE RATE (I.E. RESPECTIVE CLASSIFICATION/GROUP)
WHEN ON A HAZARDOUS WASTE SITE WHEN NOT OUTFITTED
WITH PROTECTIVE CLOTHING. H-2: CLASS ""C"" SUIT-
APPLICABLE SCALE PLUS $1.00 PER HOUR, FRINGES PLUS
$0.15. H-3: CLASS ""B"" SUIT- APPLICABLE SCALE PLUS
$1.50 PER HOUR, FRINGES PLUS $0.15. H-4: CLASS ""A""
SUIT- APPLICABLE SCALE PLUS $2.00 PER HOUR, FRINGES
PLUS $0.15.).....$ 60.98 16.90
POWER EQUIPMENT OPERATOR GROUP 2- ASPHALT PLANT
(ANY TYPE); ASPHALT ROTO-ILL, PAVEMENT PROFILER 8'
LATERAL CUT AND OVER; AUTO GRADER OR TRIMMER;
BLADE, ROBOTIC; BULLDOZER, ROBOTIC EQUIPMENT (ANY
TYPE); BULLDOZER, OVER 120,000 LBS. AND ABOVE;
CANAL TRIMMER; CONCRETE BATCH PLANT AND/OR WET MIX
1 AND 2 DRUM; CONCRETE CANAL LINER OPERATOR;
CONCRETE DIAMOND HEAD PROFILER; CONCRETE, AUTOMATIC
SLIP FORM PAVER; CRANE, BOOM TRUCK 50 TON AN DWITH
OVER 150' BOOM AND OVER; CRANE, FLOATING (DERRICK
BARGE) 30 TON BUT LESS THAN 150 TON; CRANE,
CABLEWAY 25 TON AND OVER; CRANE, FLOATING CLAMSHELL
3 CU. YDS. AND OVER; CRANE, 90 TON THROUGH 199 TON
UP TO AND INCLUDING 200' BOOM (INCLUDING JIB
INSERTS AND/OR ATTACHMENTS); CRANE, 50 TON THROUGH
89 TON WITH OVER 150' BOOM (INCLUDING JIB INSERTS
AND/OR ATTACHMENTS); CRANE, WHIRLEY UNDER 90 TON;
CRUSHER PLANT; DRONE; EXCAVATOR OVER 130,000 LBS.;
HEAVY EQUIPMENT ROBOTICS OPERATOR OR MECHANIC;
LOADER 120,000 LBS. AND ABOVE; MASTER ENVIRONMENTAL
MAINTENANCE MECHANIC; REMOTE CONTROLLED EARTH
MOVING EQUIPMENT; SHOVEL, DRAGLINE, CLAMSHELL, 5
CU. YDS. AND OVER; UNDERWATER EQUIPMENT REMOTE OR
OTHERWISE, WHEN USED IN CONSTRUCTION WORK; WHEEL
EXCAVATOR ANY SIZE. (ZONE 1: BASE RATE. ZONE 2:
$3.00. ZONE 3: $6.00. FOR THE FOLLOWING COUNTIES:
MULTNOMAH; CLACKAMAS; MARION; WASHINGTON; YAMHILL;
COLUMBIA, CLARK, COWLITZ, AND WASHINGTON WITH
MODIFICATIONS AS INDICATED: ALL JOBS OR PROJECTS
LOCATED IN MULTNOMAH, CLACKAMAS, AND MARION
COUNTIES, WEST OF THE WESTERN BOUNDARY OF MT. HOOD
NATIONAL FOREST AND WEST OF MILE POST 30 ON
INTERSTATE 85 AND WEST OF MILE POST 30 ON STATE
HIGHWAY 26 AND EST OF MILE POST 30 ON HIGHWAY 22
AND ALL JOBS OR PROJECTS LOCATED IN YAMHILL COUNTY,
WASHINGTON COUNTY, AND COLUMBIA COUNTY AND ALL JOBS
OR PROJECTS LOCATED IN CLARK & COWLITZ COUNTY,
WASHINGTON EXCEPT THAT PORTION OF COWLITZ COUNTY IN
THE MT. ST. HELENS ""BLAST ZONE"" SHALL RECEIVE ZONE
1 PAY FOR ALL CLASSIFICATIONS. ALL JOBS OR PROJECTS
LOCATED IN THE AREA OUTSIDE THE IDENTIFIED BOUNDARY
ABOVE, BUT LESS THAN 50 MILES FROM THE PORTLAND
CITY HALL SHALL RECEIVE ZONE 2 PAY FOR ALL
CLASSIFICATIONS. ALL JOBS OR POJRECTS LOCATED MORE
THAN 50 MILES FROM THE PORTLAND CITY HALL, BUT
OUTSIDE THE IDENTIFIED BORDER ABOVE, SHALL RECEIVE
ZONE 3 PAY FOR ALL CLASSIFICATIONS. FOR THE
FOLLOWING CITIES: ALBANY, BEND, COOS BAY, EUGENE,
GRANTS PASS, KLAMATH FALLS, MEDFORD, ROSEBURG: ALL
JOBS OR PROJECTS LOCATED WITHIN 30 MILES OF THE
RESPECTIVE CITY HALL OF THE ABOVE MENTIONED CITIES
SHALL RECEIVE ZONE 1 PAY FOR ALL CLASSIFICATIONS.
ALL JOBS OR PROJECTS LOCATED MORE THAN 30 MILES AND
LESS THAN 50 MILES FROM THE RESPECTIVE CITY HALL OF
THE ABOVE MENTIONED CITIES SHALL RECEIVE ZONE 2 PAY
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LOCATED MORE THAN 50 MILES FROM THE RESPECTIVE CITY
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PERSONNEL WORKING INSIDE A DESIGNATED HAZARDOUS
WASTE PERIMETER SHALL BE ELIGIBLE FOR COMPENSATION
IN ACCORDANCE WITH THE FOLLOWING GROUP SCHEDULE
RELATIVE TO THE LEVEL OF HAZARDOUS WASTE AS
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SITE SAFTEY PLAN: H-1: BASE WAGE RATE (I.E.
RESPECTIVE CLASSIFICATION/GROUP) WHEN ON A
HAZARDOUS WASTE SITE WHEN NOT OUTFITTED WITH

PROTECTIVE CLOTHING. H-2: CLASS ""C"" SUIT-
APPLICABLE SCALE PLUS $1.00 PER HOUR, FRINGES PLUS
$0.15. H-3: CLASS ""B"" SUIT- APPLICABLE SCALE PLUS
$1.50 PER HOUR, FRINGES PLUS $0.15. H-4: CLASS ""A""
SUIT- APPLICABLE SCALE PLUS $2.00 PER HOUR, FRINGES
PLUS $0.15.).....$ 54.75 16.90
POWER EQUIPMENT OPERATOR GROUP 3- BULLDOZER, OVER
70,000 LBS. UP TO AN INCLUDING 120,000 LBS.; CRANE,
BOOM TRUCK 50 TON AND OVER WITH LESS THAN 150'
BOOM; CRANE, 50 TON THROUGH 89 TON WITH 150' BOOM
OR LESS (INCLUDING JIB AND ATTACHMENTS); CRANE,
SHOVEL, DRAGLINE OR CLAMSHELL 3 CU. YDS. BUT LESS
THAN 5 CU. YDS.; EXCAVATOR OVER 85,000 LBS. THROUGH
130,000 LBS.; LOADER 60,000 LBS. AND LESS THAN
120,000 LBS. (ZONE 1: BASE RATE. ZONE 2: $3.00.
ZONE 3: $6.00. FOR THE FOLLOWING COUNTIES:
MULTNOMAH; CLACKAMAS; MARION; WASHINGTON; YAMHILL;
COLUMBIA, CLARK, COWLITZ, AND WASHINGTON WITH
MODIFICATIONS AS INDICATED: ALL JOBS OR PROJECTS
LOCATED IN MULTNOMAH, CLACKAMAS, AND MARION
COUNTIES, WEST OF THE WESTERN BOUNDARY OF MT. HOOD
NATIONAL FOREST AND WEST OF MILE POST 30 ON
INTERSTATE 85 AND WEST OF MILE POST 30 ON STATE
HIGHWAY 26 AND EST OF MILE POST 30 ON HIGHWAY 22
AND ALL JOBS OR PROJECTS LOCATED IN YAMHILL COUNTY,
WASHINGTON COUNTY, AND COLUMBIA COUNTY AND ALL JOBS
OR PROJECTS LOCATED IN CLARK & COWLITZ COUNTY,
WASHINGTON EXCEPT THAT PORTION OF COWLITZ COUNTY IN
THE MT. ST. HELENS ""BLAST ZONE"" SHALL RECEIVE ZONE
1 PAY FOR ALL CLASSIFICATIONS. ALL JOBS OR PROJECTS
LOCATED IN THE AREA OUTSIDE THE IDENTIFIED BOUNDARY
ABOVE, BUT LESS THAN 50 MILES FROM THE PORTLAND
CITY HALL SHALL RECEIVE ZONE 2 PAY FOR ALL
CLASSIFICATIONS. ALL JOBS OR POJRECTS LOCATED MORE
THAN 50 MILES FROM THE PORTLAND CITY HALL, BUT
OUTSIDE THE IDENTIFIED BORDER ABOVE, SHALL RECEIVE
ZONE 3 PAY FOR ALL CLASSIFICATIONS. FOR THE
FOLLOWING CITIES: ALBANY, BEND, COOS BAY, EUGENE,
GRANTS PASS, KLAMATH FALLS, MEDFORD, ROSEBURG: ALL
JOBS OR PROJECTS LOCATED WITHIN 30 MILES OF THE
RESPECTIVE CITY HALL OF THE ABOVE MENTIONED CITIES
SHALL RECEIVE ZONE 1 PAY FOR ALL CLASSIFICATIONS.
ALL JOBS OR PROJECTS LOCATED MORE THAN 30 MILES AND
LESS THAN 50 MILES FROM THE RESPECTIVE CITY HALL OF
THE ABOVE MENTIONED CITIES SHALL RECEIVE ZONE 2 PAY
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LOCATED MORE THAN 50 MILES FROM THE RESPECTIVE CITY
HALL OF THE ABOVE MENTIONED CITIES SHALL RECEIVE
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PERSONNEL WORKING INSIDE A DESIGNATED HAZARDOUS
WASTE PERIMETER SHALL BE ELIGIBLE FOR COMPENSATION
IN ACCORDANCE WITH THE FOLLOWING GROUP SCHEDULE
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OUTLINED IN THE SPECIFIC HAZARDOUS WASTE PROJECT
SITE SAFTEY PLAN: H-1: BASE WAGE RATE (I.E.
RESPECTIVE CLASSIFICATION/GROUP) WHEN ON A
HAZARDOUS WASTE SITE WHEN NOT OUTFITTED WITH
PROTECTIVE CLOTHING. H-2: CLASS ""C"" SUIT-
APPLICABLE SCALE PLUS $1.00 PER HOUR, FRINGES PLUS
$0.15. H-3: CLASS ""B"" SUIT- APPLICABLE SCALE PLUS
$1.50 PER HOUR, FRINGES PLUS $0.15. H-4: CLASS ""A""
SUIT- APPLICABLE SCALE PLUS $2.00 PER HOUR, FRINGES
PLUS $0.15.).....$ 53.60 16.90
POWER EQUIPMENT OPERATOR GROUP 4 (SEE GROUP
INFORMATION IN FOOTER).....$ 50.27 16.90
POWER EQUIPMENT OPERATOR GROUP 5 (SEE GROUP
INFORMATION IN FOOTER).....$ 49.03 16.90
POWER EQUIPMENT OPERATOR GROUP 6- AIR FILTRATION
EQUIPMENT; ASPHALT, PUGMILL (ANY TYPE); ASPHALT,
RAKER; ASPHALT, TRUCK MOUNTED ASPHALT SPREADER,
WITH SCREED; ASSISTANT TO THE OPERATOR; AUGER
OILER; BELL MAN (ANY TYPE OF COMMUNICATION);
BOATMAN; BOBCAT, SKID STEER (LESS THAN 1 YARD);
BROOM, SELF-PROPELLED, CONSTRUCTION JOB SITE;
COMPRESSOR OPERATOR (ANY POWER) UNDER 1,250 CU. FT.
TOTAL CAPACITY; CONCRETE CURING MACHINE (RIDING
TYPE); CONCRETE SAW; CONVEYOR OPERATOR OR
ASSISTANT; CRANE, TUGGER; CRUSHER FEEDERMAN;
CRUSHER OILER; DECKHAND; DRILL ASSISTANT; DRILL,
DIRECTIONAL LOCATOR; FORKLIFT; GRADE CHECKER;
GUARDRAIL PUNCH OILER; HEAVY DUTY REPAIRMAN
ASSITANT; HELICOPTER RADIOMAN (GROUND); HYDRAULIC
PIPE PRESS; HYDROGRAPHIC SEEDER MACHINE, STRAW,
PULP, OR SEED; HYDROSTATIC PUMP OPERATOR; MATERIAL
HANDLER; MIXER BOX (CTB, DRY BATCH, ETC.); OILER;
PARTS MAN (TOOL ROOM); PLANT OILER; PUMP (ANY
POWER); RAIL, BRAKEMAN, SWITCHMAN, MOTORMAN; RAIL,
TAMPING MACHINE, MECHANICAL, SELF-PROPELLED;
RIGGER; ROLLER GRADING (NOT ASPHALT); TRUCK, CRANE
OILER-DRIVER UNDER 100 TONS; TRUCK, OFF-ROAD
TRUCKS, ARTICULATED AND NON-ARTICULATED TRUCKS 40
TON AND UNDER; TRUCKS, OVER HIGHWAY, EXAMPLES:
MATERIAL AND EQUIPMENT; WELDER'S ASSISTANT; WELDING
MACHINE; WIRE MAT OR BROOMING MACHINE. (ZONE 1:
BASE RATE. ZONE 2: $3.00. ZONE 3: $6.00. FOR THE
FOLLOWING COUNTIES: MULTNOMAH; CLACKAMAS; MARION;
WASHINGTON; YAMHILL; COLUMBIA, CLARK, COWLITZ, AND
WASHINGTON WITH MODIFICATIONS AS INDICATED: ALL

JOBS OR PROJECTS LOCATED IN MULTNOMAH, CLACKAMAS, AND MARION COUNTIES, WEST OF THE WESTERN BOUNDARY OF MT. HOOD NATIONAL FOREST AND WEST OF MILE POST 30 ON INTERSTATE 85 AND WEST OF MILE POST 30 ON STATE HIGHWAY 26 AND EST OF MILE POST 30 ON HIGHWAY 22 AND ALL JOBS OR PROJECTS LOCATED IN YAMHILL COUNTY, WASHINGTON COUNTY, AND COLUMBIA COUNTY AND ALL JOBS OR PROJECTS LOCATED IN CLARK & COWLITZ COUNTY, WASHINGTON EXCEPT THAT PORTION OF COWLITZ COUNTY IN THE MT. ST. HELENS ""BLAST ZONE"" SHALL RECEIVE ZONE 1 PAY FOR ALL CLASSIFICATIONS. ALL JOBS OR PROJECTS LOCATED IN THE AREA OUTSIDE THE IDENTIFIED BOUNDARY ABOVE, BUT LESS THAN 50 MILES FROM THE PORTLAND CITY HALL SHALL RECEIVE ZONE 2 PAY FOR ALL CLASSIFICATIONS. ALL JOBS OR POJRECTS LOCATED MORE THAN 50 MILES FROM THE PORTLAND CITY HALL, BUT OUTSIDE THE IDENTIFIED BORDER ABOVE, SHALL RECEIVE ZONE 3 PAY FOR ALL CLASSIFICATIONS. FOR THE FOLLOWING CITIES: ALBANY, BEND, COOS BAY, EUGENE, GRANTS PASS, KLAMATH FALLS, MEDFORD, ROSEBURG: ALL JOBS OR PROJECTS LOCATED WITHIN 30 MILES OF THE RESPECTIVE CITY HALL OF THE ABOVE MENTIONED CITIES SHALL RECEIVE ZONE 1 PAY FOR ALL CLASSIFICATIONS. ALL JOBS OR PROJECTS LOCATED MORE THAN 30 MILES AND LESS THAN 50 MILES FROM THE RESPECTIVE CITY HALL OF THE ABOVE MENTIONED CITIES SHALL RECEIVE ZONE 2 PAY FOR ALL CLASSIFICATIONS. ALL JOBS OR PROJECTS LOCATED MORE THAN 50 MILES FROM THE RESPECTIVE CITY HALL OF THE ABOVE MENTIONED CITIES SHALL RECEIVE ZONE 3 PAY FOR ALL CLASSIFICATIONS) (FOOTNOTE C: PERSONNEL WORKING INSIDE A DESIGNATED HAZARDOUS WASTE PERIMETER SHALL BE ELIGIBLE FOR COMPENSATION IN ACCORDANCE WITH THE FOLLOWING GROUP SCHEDULE RELATIVE TO THE LEVEL OF HAZARDOUS WASTE AS OUTLINED IN THE SPECIFIC HAZARDOUS WASTE PROJECT SITE SAFTEY PLAN: H-1: BASE WAGE RATE (I.E. RESPECTIVE CLASSIFICATION/GROUP) WHEN ON A HAZARDOUS WASTE SITE WHEN NOT OUTFITTED WITH PROTECTIVE CLOTHING. H-2: CLASS ""C"" SUIT- APPLICABLE SCALE PLUS $1.00 PER HOUR, FRINGES PLUS $0.15. H-3: CLASS ""B"" SUIT- APPLICABLE SCALE PLUS $1.50 PER HOUR, FRINGES PLUS $0.15. H-4: CLASS ""A"" SUIT- APPLICABLE SCALE PLUS $2.00 PER HOUR, FRINGES PLUS $0.15.).....$ 45.81 16.90

IRON0029-004 07/07/2025

	Rates	Fringes
IRONWORKER	$ 48.31	34.52

LABO0737-001 06/01/2024

	Rates	Fringes
MASON TENDER/HOD CARRIER (TENDERS TO BRICKLAYERS, TILE SETTERS, MARBLE SETTERS AND TERRAZZO WORKERS, TOPPING FOR CEMENT FINISHERS AND MORTAR MIXERS)	$ 43.79	17.05

LABO0737-008 06/01/2024

	Rates	Fringes
LABORERS: GROUP 1- APPLICATOR (INCLUDING POT TENDER FOR SAME) APPLYING PROTECTIVE MATERIAL BY HAND OR NOZZLE ON UTILITY LINES OR STORAGE TANKS ON PROJECT; ASPHALT PLANT; ASPHALT SPREADER; BATCH WEIGHMAN; BROOMERS; BRUSH BURNERS AND CUTTERS; CHOKER SETTER; CHOKER SPLICER; CLARY POWER SPREADER; CLEAN-UP LABORER; CLEAN UP NOZZLEMAN (CONCRETE, ROCK, ETC.); CONCRETE LABORER; CRUSHER FEEDER; CURING, CONCRETE; DEMOLITION, WRECKING, AND MOVING; DOPPING AND WRAPPING PIPE; DUMPMAN (FOR GRADING CREW); EROSION CONTROL SPECIALIST; FINE GRADERS; FENCE BUILDERS; FORM STRIPPERS; GUARD RAIL, MEDIAN RAIL, BARRIERS, REFERENCE POST, GUIDE POST, RIGHT OF WAY MARKER; REMOTE CONTROL (DRY PACK MACHINE, JACKHAMMER, CHIPPING GUNS, COMPACTION, PAVING BREAKERS, HAND HELD CONCRETE SAW, DEMO SAW, CORE DRILL); PRECAST CONCRETE SETTER; PRESSURE WASHER; RAILROAD TRACK LABORER; RIBBON SETTER; RIP RAP MAP; SAND BLASTING (WET); SCAFFOLD TENDER; SELF PROPELLED CONCRETE BUGGY; SEWER LABORER; SIGN ERECTOR; SIGNALMAN; SCISSOR AND MANLIFT; SKIPMAN; SLOPERS; SPRAYMAN; STAKE CHASER; STAKE SETTER; TAMPER; TIMBER FALLER AND BUCKER; TOOL OPERATORS (HAND HELD, WALK BEHIND). (ZONE DIFFERENTIAL: ZONE 1- PUBLISHED RATE. ZONE 2- $0.85. ZONE 3- $2.00. ZONE 4- $3.00. ZONE 5- $5.00. ZONE 1-ALL JOBS OR PROJECTS LOCATED WITHIN 30 MILES OF THE RESPECTIVE CITY HALL. ZONE 2- MORE THAN 30 MILES AND LESS THAN 40 MILES FROM THE RESPECTIVE CITY HALL. ZONE 3- MORE THAN 40 MILES AND LESS THAN 50 MILES FROM THE RESPECTIVE CITY HALL. ZONE 4- MORE THAN 50 MILES AND LESS THAN 80 MILES FROM THE RESPECTIVE CITY HALL. ZONE 5- MORE THAN 80 MILES FROM THE RESPECTIVE CITY HALL. BASEPOINTS: ALBANY, ASTORIA, BAKER CITY, BEND, BURNS, COOS BAY, EUGENE, GRANTS PASS, HERMISTON, KLAMATH FALLS, MEDFORD, PENDLETON, PORTLAND, ROSEBURG, SALEM, THE DALLES) (FOOTNOTE C: HANDLING OF HAZARDOUS WASTE MATERIALS- PERSONNEL IN		

ALL CRAFT CLASSIFICATIONS SUBJECT TO WORKING INSIDE
A FEDERALLY DESIGNATED HAZARDOUS WASTE PERIMETER
SHALL BE ELIGIBLE FOR COMPENSATION IN ACCORDANCE
WITH THE FOLLOWING GROUP SCHEDULE RELATIVE TO THE
LEVEL OF HAZARDOUS WASTE AS OUTLINED IN THE
SPECIFIC HAZARDOUS WASTE PROJECT SITE SAFTEY PLAN.
H-1: BASE WAGE RATE WHEN ON A HAZARDOUS WASTE SITE
WHEN NOT OUTFITTED WITH PROTECTIVE CLOTHING. H-2:
CLASS ""C"" SUIT- BASIC HOURLY WAGE RATE PLUS $1.00
PER HOUR, FRINGES PLUS $0.15. H-3: CLASS ""B"" SUIT-
BASIC HOURLY WAGE RATE PLUS $1.50 PER HOUR, FRINGES
PLUS $0.15. H-4: CLASS ""A"" SUIT- BASIC HOURLY WAGE
RATE PLUS $2.00 PER HOUR, FRINGES PLUS $0.15.) .....$ 39.00 17.30
LABORERS: GROUP 2- ASBESTOS REMOVAL; ASPHALT
RAKERS, BIT GRINDER, CONCRETE CORE DRILLL, CONCRETE
PUMP NOZZLEMAN, CONCRET SAW OPERATOR (WALK BEHIND,
WALK SAW, RAIL MOUNTED, WIRE); DRILL OPERATOR;
GRADE CHECKER; GUNITE NOZZLEMAN; HAZARDOUS WASTE
LABORER; HIGH SCALERS; LASER BEAN (PIPE LAYING);
LOOP INSTALLATION; MANHOLE BUILDER; MOLD
REMEDIATION LABORER; NIPPERS AND TIMBERMAN;
PIPELAYER; POWDERMAN; POWER SAW OPERATORS (BUCKING
AND FALLING); PUMPCRETE NOZZLEMAN; SAND BLASTING
(DRY); SEWER TIMBERMAN; TUGGER OPERATOR; VIBRATORS;
WATER BLASTER. (ZONE DIFFERENTIAL: ZONE 1-
PUBLISHED RATE. ZONE 2- $0.85. ZONE 3- $2.00. ZONE
4- $3.00. ZONE 5- $5.00. ZONE 1-ALL JOBS OR
PROJECTS LOCATED WITHIN 30 MILES OF THE RESPECTIVE
CITY HALL. ZONE 2- MORE THAN 30 MILES AND LESS THAN
40 MILES FROM THE RESPECTIVE CITY HALL. ZONE 3-
MORE THAN 40 MILES AND LESS THAN 50 MILES FROM THE
RESPECTIVE CITY HALL. ZONE 4- MORE THAN 50 MILES
AND LESS THAN 80 MILES FROM THE RESPECTIVE CITY
HALL. ZONE 5- MORE THAN 80 MILES FROM THE
RESPECTIVE CITY HALL. BASEPOINTS: ALBANY, ASTORIA,
BAKER CITY, BEND, BURNS, COOS BAY, EUGENE, GRANTS
PASS, HERMISTON, KLAMATH FALLS, MEDFORD, PENDLETON,
PORTLAND, ROSEBURG, SALEM, THE DALLES) (FOOTNOTE C:
HANDLING OF HAZARDOUS WASTE MATERIALS- PERSONNEL IN
ALL CRAFT CLASSIFICATIONS SUBJECT TO WORKING INSIDE
A FEDERALLY DESIGNATED HAZARDOUS WASTE PERIMETER
SHALL BE ELIGIBLE FOR COMPENSATION IN ACCORDANCE
WITH THE FOLLOWING GROUP SCHEDULE RELATIVE TO THE
LEVEL OF HAZARDOUS WASTE AS OUTLINED IN THE
SPECIFIC HAZARDOUS WASTE PROJECT SITE SAFTEY PLAN.
H-1: BASE WAGE RATE WHEN ON A HAZARDOUS WASTE SITE
WHEN NOT OUTFITTED WITH PROTECTIVE CLOTHING. H-2:
CLASS ""C"" SUIT- BASIC HOURLY WAGE RATE PLUS $1.00
PER HOUR, FRINGES PLUS $0.15. H-3: CLASS ""B"" SUIT-
BASIC HOURLY WAGE RATE PLUS $1.50 PER HOUR, FRINGES
PLUS $0.15. H-4: CLASS ""A"" SUIT- BASIC HOURLY WAGE
RATE PLUS $2.00 PER HOUR, FRINGES PLUS $0.15.) .....$ 40.41 17.30
LABORERS: GROUP 3- FINAL CLEAN-UP (DETAILED
CLEAN-UP, LIMITED TO CLEANING UP FLOORS, CEILINGS,
WALLS, WINDOWS-PRIOR TO ACCEPTANCE BY THE OWNER);
FIRE WATCH; LANDSCAPER; TRAFFIC FLAGGER. (ZONE
DIFFERENTIAL: ZONE 1- PUBLISHED RATE. ZONE 2-
$0.85. ZONE 3- $2.00. ZONE 4- $3.00. ZONE 5- $5.00.
ZONE 1-ALL JOBS OR PROJECTS LOCATED WITHIN 30 MILES
OF THE RESPECTIVE CITY HALL. ZONE 2- MORE THAN 30
MILES AND LESS THAN 40 MILES FROM THE RESPECTIVE
CITY HALL. ZONE 3- MORE THAN 40 MILES AND LESS THAN
50 MILES FROM THE RESPECTIVE CITY HALL. ZONE 4-
MORE THAN 50 MILES AND LESS THAN 80 MILES FROM THE
RESPECTIVE CITY HALL. ZONE 5- MORE THAN 80 MILES
FROM THE RESPECTIVE CITY HALL. BASEPOINTS: ALBANY,
ASTORIA, BAKER CITY, BEND, BURNS, COOS BAY, EUGENE,
GRANTS PASS, HERMISTON, KLAMATH FALLS, MEDFORD,
PENDLETON, PORTLAND, ROSEBURG, SALEM, THE DALLES)
(FOOTNOTE C: HANDLING OF HAZARDOUS WASTE MATERIALS-
PERSONNEL IN ALL CRAFT CLASSIFICATIONS SUBJECT TO
WORKING INSIDE A FEDERALLY DESIGNATED HAZARDOUS
WASTE PERIMETER SHALL BE ELIGIBLE FOR COMPENSATION
IN ACCORDANCE WITH THE FOLLOWING GROUP SCHEDULE
RELATIVE TO THE LEVEL OF HAZARDOUS WASTE AS
OUTLINED IN THE SPECIFIC HAZARDOUS WASTE PROJECT
SITE SAFTEY PLAN. H-1: BASE WAGE RATE WHEN ON A
HAZARDOUS WASTE SITE WHEN NOT OUTFITTED WITH
PROTECTIVE CLOTHING. H-2: CLASS ""C"" SUIT- BASIC
HOURLY WAGE RATE PLUS $1.00 PER HOUR, FRINGES PLUS
$0.15. H-3: CLASS ""B"" SUIT- BASIC HOURLY WAGE RATE
PLUS $1.50 PER HOUR, FRINGES PLUS $0.15. H-4: CLASS
""A"" SUIT- BASIC HOURLY WAGE RATE PLUS $2.00 PER
HOUR, FRINGES PLUS $0.15.) .....$ 34.39 17.30

PAIN0010-005 07/01/2025

	Rates	Fringes
PAINTER: HIGHWAY & PARKING LOT STRIPER	$ 41.19	17.09

PAIN0010-008 01/01/2025

	Rates	Fringes
PAINTER	$ 40.25	16.67

PLAS0555-001 06/01/2025

	Rates	Fringes

CEMENT MASON (ZONE DIFFERENTIAL FOR CEMENT MASON - ADD TO BASIC HOURLY RATE FOR THE FOLLOWING CITIES: (REFERENCE CITY) BEND, PORTLAND, PENDLETON, MEDFORD, CORVALLIS, SALEM, EUGENE, THE DALLES, VANCOUVER. WHEN A CONTRACTOR TAKES CURRENT EMPLOYEES TO A PROJECT THAT IS LOCATED MORE THAN 59 MILES FROM THE CITY HALL OF THE REFERENCE CITY THAT IS CLOSEST TO THE CONTRACTOR'S PLACE OF BUSINESS, ZONE PAY IS TO BE PAID FOR THE DISTANCE BETWEEN THE CITY HALL OF THE IDENTIFIED REFERENCE CITY AND THE PROJECT SITE, PER THE FOLLOWING: ZONE A - 60-79 MILES - ADDITIONAL $3.00 HOURLY PREMIUM ABOVE THE BASE RATE OF ALL CLASSIFICATION AS LISTED IN SCHEDULE ""A"". ZONE B - 80-99 MILES - ADDITIONAL $5.00 HOURLY PREMIUM ABOVE THE BASE RATE OF ALL CLASSIFICATIONS AS LISTED IN SCHEDULE ""A"" ZONE C -100 OR MORE MILES - ADDITIONAL $10.00 HOURLY PREMIUM ABOVE THE BASE RATE OF ALL CLASSIFICATIONS AS LISTED IN SCHEDULE ""A"").....$ 46.13 20.31

CEMENT MASONS: DOING BOTH COMPOSITION/POWER MACHINERY AND SUSPENDED/HANGING SCAFFOLD. (ZONE DIFFERENTIAL FOR CEMENT MASON - ADD TO BASIC HOURLY RATE FOR THE FOLLOWING CITIES: (REFERENCE CITY) BEND, PORTLAND, PENDLETON, MEDFORD, CORVALLIS, SALEM, EUGENE, THE DALLES, VANCOUVER. WHEN A CONTRACTOR TAKES CURRENT EMPLOYEES TO A PROJECT THAT IS LOCATED MORE THAN 59 MILES FROM THE CITY HALL OF THE REFERENCE CITY THAT IS CLOSEST TO THE CONTRACTOR'S PLACE OF BUSINESS, ZONE PAY IS TO BE PAID FOR THE DISTANCE BETWEEN THE CITY HALL OF THE IDENTIFIED REFERENCE CITY AND THE PROJECT SITE, PER THE FOLLOWING: ZONE A - 60-79 MILES - ADDITIONAL $3.00 HOURLY PREMIUM ABOVE THE BASE RATE OF ALL CLASSIFICATION AS LISTED IN SCHEDULE ""A"". ZONE B - 80-99 MILES - ADDITIONAL $5.00 HOURLY PREMIUM ABOVE THE BASE RATE OF ALL CLASSIFICATIONS AS LISTED IN SCHEDULE ""A"" ZONE C -100 OR MORE MILES - ADDITIONAL $10.00 HOURLY PREMIUM ABOVE THE BASE RATE OF ALL CLASSIFICATIONS AS LISTED IN SCHEDULE ""A"").....$ 48.05 20.31

CEMENT MASONS: ON SUSPENDED, SWINGING AND/OR HANGING SCAFFOLD. (ZONE DIFFERENTIAL FOR CEMENT MASON - ADD TO BASIC HOURLY RATE FOR THE FOLLOWING CITIES: (REFERENCE CITY) BEND, PORTLAND, PENDLETON, MEDFORD, CORVALLIS, SALEM, EUGENE, THE DALLES, VANCOUVER. WHEN A CONTRACTOR TAKES CURRENT EMPLOYEES TO A PROJECT THAT IS LOCATED MORE THAN 59 MILES FROM THE CITY HALL OF THE REFERENCE CITY THAT IS CLOSEST TO THE CONTRACTOR'S PLACE OF BUSINESS, ZONE PAY IS TO BE PAID FOR THE DISTANCE BETWEEN THE CITY HALL OF THE IDENTIFIED REFERENCE CITY AND THE PROJECT SITE, PER THE FOLLOWING: ZONE A - 60-79 MILES - ADDITIONAL $3.00 HOURLY PREMIUM ABOVE THE BASE RATE OF ALL CLASSIFICATION AS LISTED IN SCHEDULE ""A"". ZONE B - 80-99 MILES - ADDITIONAL $5.00 HOURLY PREMIUM ABOVE THE BASE RATE OF ALL CLASSIFICATIONS AS LISTED IN SCHEDULE ""A"" ZONE C -100 OR MORE MILES - ADDITIONAL $10.00 HOURLY PREMIUM ABOVE THE BASE RATE OF ALL CLASSIFICATIONS AS LISTED IN SCHEDULE ""A"").....$ 47.09 20.31

CEMENT MASONS: COMPOSITION WORKERS AND POWER MACHINERY OPERATORS. (ZONE DIFFERENTIAL FOR CEMENT MASON - ADD TO BASIC HOURLY RATE FOR THE FOLLOWING CITIES: (REFERENCE CITY) BEND, PORTLAND, PENDLETON, MEDFORD, CORVALLIS, SALEM, EUGENE, THE DALLES, VANCOUVER. WHEN A CONTRACTOR TAKES CURRENT EMPLOYEES TO A PROJECT THAT IS LOCATED MORE THAN 59 MILES FROM THE CITY HALL OF THE REFERENCE CITY THAT IS CLOSEST TO THE CONTRACTOR'S PLACE OF BUSINESS, ZONE PAY IS TO BE PAID FOR THE DISTANCE BETWEEN THE CITY HALL OF THE IDENTIFIED REFERENCE CITY AND THE PROJECT SITE, PER THE FOLLOWING: ZONE A - 60-79 MILES - ADDITIONAL $3.00 HOURLY PREMIUM ABOVE THE BASE RATE OF ALL CLASSIFICATION AS LISTED IN SCHEDULE ""A"". ZONE B - 80-99 MILES - ADDITIONAL $5.00 HOURLY PREMIUM ABOVE THE BASE RATE OF ALL CLASSIFICATIONS AS LISTED IN SCHEDULE ""A"" ZONE C -100 OR MORE MILES - ADDITIONAL $10.00 HOURLY PREMIUM ABOVE THE BASE RATE OF ALL CLASSIFICATIONS AS LISTED IN SCHEDULE ""A"").....$ 47.09 20.31

SUOR1991-003 04/01/1991

	Rates	Fringes
TIMBER SALES ROADS: (LABORERS)	$ 8.35	4.30
TIMBER SALES ROADS: (OPERATING ENGINEERS)	$ 10.37	4.15
TIMBER SALES ROADS: (POWER SAW, DRILLER, POWDERMAN)	$ 9.12	4.30
TIMBER SALES ROADS: (TEAMSTERS)	$ 9.74	3.74

TEAM0037-004 06/01/2025

	Rates	Fringes
TRUCK DRIVERS: GROUP 1- A-FRAME OR HYDRA-LIFT TRUCK W/LOAD BEARING SURFACE; ARTICULATED DUMP TRUCK; BATTERY REBUILDERS; BUS OR MANHAUL DRIVER; CONCRETE BUGGIES (POWER OPERATE); CONCRETE PUMP TRUCK; DUMP TRUCKS, SIDE, END, AND BOTTOM DUMPS, INCLUDING SEMI-TRUCKS AND TRAINS OR COMBINATIONS THEROF: UP		

TO AND INCLUDING 10 CU. YDS.; LIFT JITNEYS, FORK
LIFTS (ALL SIZES IN LOADING, UNLOADING AND
TRANSPORTING MATERIALS ON JOB SITE); LOADER AND/OR
LEVERMAN ON CONCRETE DRY BATCH PLANT (MANUALLY
OPERATED); LUBRICATION MAN, FUEL TRUCK DRIVER,
TIREMAN, WASH RACK, STEAM CLEANER, OR COMBINATION;
PILOT CAR; PICKUP TRUCK; SLURRY TRUCK DRIVER OR
LEVERMAN; SOLO FLAT BED AND MISC. BODY TRUCK, 0-10
TONS; TEAM DRIVERS; TIREMAN; TRANSIT MIX AND WET OR
DRY MIX TRUCKS: 5 CU. YDS. AND UNDER; WATER WAGONS
(RATED CAPACITY) UP TO 3,000 GALLONS. (ZONE
DIFFERENTIAL: ZONE 1- PUBLISHED RATE. ZONE 2-
$0.65. ZONE 3- $1.15. ZONE 4- $1.70. ZONE 5- $2.75.
ZONE 1- ALL JOBS OR PROJECTS LOCATED WITHIN 30
MILES OF THE RESPECTIVE CITY HALL. ZONE 2- MORE
THAN 30 MILES AND LESS THAN 40 MILES FORM THE
RESPECTIVE CITY HALL. ZONE 3-MORE THAN 40 MILES AND
LESS THAN 50 MILES FROM THE RESPECTIVE CITY HALL.
ZONE 4- MORE THAN 50 MILES AND LESS THAN 80 MILES
FROM THE RESPECTIVE CITY HALL. ZONE 5- MORE THAN 80
MILES FROM THE RESPECTIVE CITY HALL. BASEPOINTS:
ALBANY, ASTORIA, BAKER, BEND, BINGEN, BROOKINGS,
BURNS, COOS BAY, CORVALLIS, EUGENE, GOLDENDALE,
GRANTS PASS, HERMISTON, HOOD RIVER, KLAMATH FALLS,
LAGRANDE, LAKEVIEW, LONGVIEW, MADRAS, MEDFORD,
MCMINNVILLE, OREGON CITY, NEWPORT, ONTARIO,
PENDLETON, PORTLAND, PORT ORFORD, REEDSPORT,
ROSEBURG, SALEM, THE DALLES, TILLAMOOK, VANCOUVER.)
(FOOTNOTE C: HANDLING OF HAZARDOUS WASTE
MATERIALS: PERSONNEL IN ALL CRAFT CLASSIFICATIONS
SUBJECT TO WORKING INSIDE A FEDERALLY DESIGNATED
HAZARDOUS WASTE PERMIETER SHALL BE ELIGIBLE FOR
COMPENSATION IN ACCORDANCE WITH THE FOLLOWING GROUP
SCHEDULE RELATIVE TO THE LEVEL OF HAZARDOUS WASTE
AS OUTLINED IN THE SPECIFIC HAZARDOUS WASTE PROJECT
SITE SAFETY PLAN. H-1: BASE WAGE RATE WHEN ON A
HAZARDOUS WASTE SITE WHEN NOT OUTFITTED WITH
PROTECTIVE CLOTHING. H-2: CLASS ""C"" SUIT- BASIC
HOURLY WAGE RATE PLUS $1.00 PER HOUR, FRINGES PLUS
$0.15. H-3: CLASS ""B"" SUIT- BASIC HOURLY WAGE RATE
PLUS $1.50 PER HOUR, FRINGES PLUS $0.15. H-4: CLASS
""A"" SUIT- BASIC HOURLY WAGE RATE PLUS $2.00 PER
HOUR, FRINGES PLUS $0.15.).....$ 35.41 18.30
TRUCK DRIVERS: GROUP 2- BOOM TRUCK/HYDRA-LIFT OR
RETRACTING CRANE; CHALLENGER; DUMPSTERS OR SIMILAR
EQUIPMENT-ALL SIZES; DUMP TRUCKS/ARTICULATED DUMPS
6 CU TO 10 CU.; FLAHERTY SPREADER DRIVER OR
LEERMAN; LOW BED EQUIPMENT, FLAT BED SEMI-TRUCK AND
TRAILER OR DOUBLES TRANSPORTING EQUIPMENT OR WET OR
DRY MATERIALS; LUMBER CARRIER, DRIVER-STRADDLE
CARRIER (USED IN LOADING, UNLOADING AND
TRANSPORTING OR MATERIALS ON JOB SITE); OIL
DISTRIBUTOR DRIVER OR LEVERMAN; TRANSIT MIX AND WET
OR DRY MIX TRUCKS: OVER 5 CU. YDS. AND INCLUDING 7
CU. YDS.; VACUUM TRUCKS; WATER WAGONS (RATED
CAPACITY) OVER 3,000 TO 5,000 GALLONS. (ZONE
DIFFERENTIAL: ZONE 1- PUBLISHED RATE. ZONE 2-
$0.65. ZONE 3- $1.15. ZONE 4- $1.70. ZONE 5- $2.75.
ZONE 1- ALL JOBS OR PROJECTS LOCATED WITHIN 30
MILES OF THE RESPECTIVE CITY HALL. ZONE 2- MORE
THAN 30 MILES AND LESS THAN 40 MILES FORM THE
RESPECTIVE CITY HALL. ZONE 3-MORE THAN 40 MILES AND
LESS THAN 50 MILES FROM THE RESPECTIVE CITY HALL.
ZONE 4- MORE THAN 50 MILES AND LESS THAN 80 MILES
FROM THE RESPECTIVE CITY HALL. ZONE 5- MORE THAN 80
MILES FROM THE RESPECTIVE CITY HALL. BASEPOINTS:
ALBANY, ASTORIA, BAKER, BEND, BINGEN, BROOKINGS,
BURNS, COOS BAY, CORVALLIS, EUGENE, GOLDENDALE,
GRANTS PASS, HERMISTON, HOOD RIVER, KLAMATH FALLS,
LAGRANDE, LAKEVIEW, LONGVIEW, MADRAS, MEDFORD,
MCMINNVILLE, OREGON CITY, NEWPORT, ONTARIO,
PENDLETON, PORTLAND, PORT ORFORD, REEDSPORT,
ROSEBURG, SALEM, THE DALLES, TILLAMOOK, VANCOUVER.)
(FOOTNOTE C: HANDLING OF HAZARDOUS WASTE
MATERIALS: PERSONNEL IN ALL CRAFT CLASSIFICATIONS
SUBJECT TO WORKING INSIDE A FEDERALLY DESIGNATED
HAZARDOUS WASTE PERMIETER SHALL BE ELIGIBLE FOR
COMPENSATION IN ACCORDANCE WITH THE FOLLOWING GROUP
SCHEDULE RELATIVE TO THE LEVEL OF HAZARDOUS WASTE
AS OUTLINED IN THE SPECIFIC HAZARDOUS WASTE PROJECT
SITE SAFETY PLAN. H-1: BASE WAGE RATE WHEN ON A
HAZARDOUS WASTE SITE WHEN NOT OUTFITTED WITH
PROTECTIVE CLOTHING. H-2: CLASS ""C"" SUIT- BASIC
HOURLY WAGE RATE PLUS $1.00 PER HOUR, FRINGES PLUS
$0.15. H-3: CLASS ""B"" SUIT- BASIC HOURLY WAGE RATE
PLUS $1.50 PER HOUR, FRINGES PLUS $0.15. H-4: CLASS
""A"" SUIT- BASIC HOURLY WAGE RATE PLUS $2.00 PER
HOUR, FRINGES PLUS $0.15.).....$ 35.57 18.30
TRUCK DRIVERS: GROUP 3- AMMONIA NITRATE DISTRIBUTOR
DRIVER; DUMP TRUCKS, SIDE, END, AND BOTTOM DUMPS,
INCLUDING SEMI-TRUCKS AND TRAINS OR COMBINATIONS
THEREOF: OVER 10 CU. YDS. AND INCLUDING 30 CU. YDS.
AND INCLUDING 11 CU. YDS.; TRUCK
MECHANIC-WELDER-BODY REPAIRMAN; UTILITY AND
CLEAN-UP TRUCK; WATER WAGONS (RATED CAPACITY) 5,000
TO 10,000 GALLONS. (ZONE DIFFERENTIAL: ZONE 1-
PUBLISHED RATE. ZONE 2- $0.65. ZONE 3- $1.15. ZONE
4- $1.70. ZONE 5- $2.75. ZONE 1- ALL JOBS OR

PROJECTS LOCATED WITHIN 30 MILES OF THE RESPECTIVE CITY HALL. ZONE 2- MORE THAN 30 MILES AND LESS THAN 40 MILES FORM THE RESPECTIVE CITY HALL. ZONE 3-MORE THAN 40 MILES AND LESS THAN 50 MILES FROM THE RESPECTIVE CITY HALL. ZONE 4- MORE THAN 50 MILES AND LESS THAN 80 MILES FROM THE RESPECTIVE CITY HALL. ZONE 5- MORE THAN 80 MILES FROM THE RESPECTIVE CITY HALL. BASEPOINTS: ALBANY, ASTORIA, BAKER, BEND, BINGEN, BROOKINGS, BURNS, COOS BAY, CORVALLIS, EUGENE, GOLDENDALE, GRANTS PASS, HERMISTON, HOOD RIVER, KLAMATH FALLS, LAGRANDE, LAKEVIEW, LONGVIEW, MADRAS, MEDFORD, MCMINNVILLE, OREGON CITY, NEWPORT, ONTARIO, PENDLETON, PORTLAND, PORT ORFORD, REEDSPORT, ROSEBURG, SALEM, THE DALLES, TILLAMOOK, VANCOUVER.) (FOOTNOTE C: HANDLING OF HAZARDOUS WASTE MATERIALS: PERSONNEL IN ALL CRAFT CLASSIFICATIONS SUBJECT TO WORKING INSIDE A FEDERALLY DESIGNATED HAZARDOUS WASTE PERMIETER SHALL BE ELIGIBLE FOR COMPENSATION IN ACCORDANCE WITH THE FOLLOWING GROUP SCHEDULE RELATIVE TO THE LEVEL OF HAZARDOUS WASTE AS OUTLINED IN THE SPECIFIC HAZARDOUS WASTE PROJECT SITE SAFETY PLAN. H-1: BASE WAGE RATE WHEN ON A HAZARDOUS WASTE SITE WHEN NOT OUTFITTED WITH PROTECTIVE CLOTHING. H-2: CLASS ""C"" SUIT- BASIC HOURLY WAGE RATE PLUS $1.00 PER HOUR, FRINGES PLUS $0.15. H-3: CLASS ""B"" SUIT- BASIC HOURLY WAGE RATE PLUS $1.50 PER HOUR, FRINGES PLUS $0.15. H-4: CLASS ""A"" SUIT- BASIC HOURLY WAGE RATE PLUS $2.00 PER HOUR, FRINGES PLUS $0.15.).....$ 35.74 18.30

TRUCK DRIVERS: GROUP 4- ASPHALT BURNER; DUMP TRUCKS, SIDE, END, AND BOTTOM DUMPS, INCLUDING SEMI-TRUCKS AND TRAINS OR COMBINATIONS THEREOF: OVER 30 CU. YDS. AND INCLUDING 50 CU. YDS. INCLUDES ARTICULATED DUMP TRUCKS; FIRE GUARD; TRANSIT MIX AND WET OR DRY MIX TRUCKS, OVER 11 CU. YDS. AND INCLUDING 15 CU. YDS.; WATER WAGON (RATED CAPACITY) OVER 10,000 GALLONS TO 15,000 GALLONS. (ZONE DIFFERENTIAL: ZONE 1- PUBLISHED RATE. ZONE 2- $0.65. ZONE 3- $1.15. ZONE 4- $1.70. ZONE 5- $2.75. ZONE 1- ALL JOBS OR PROJECTS LOCATED WITHIN 30 MILES OF THE RESPECTIVE CITY HALL. ZONE 2- MORE THAN 30 MILES AND LESS THAN 40 MILES FORM THE RESPECTIVE CITY HALL. ZONE 3-MORE THAN 40 MILES AND LESS THAN 50 MILES FROM THE RESPECTIVE CITY HALL. ZONE 4- MORE THAN 50 MILES AND LESS THAN 80 MILES FROM THE RESPECTIVE CITY HALL. ZONE 5- MORE THAN 80 MILES FROM THE RESPECTIVE CITY HALL. BASEPOINTS: ALBANY, ASTORIA, BAKER, BEND, BINGEN, BROOKINGS, BURNS, COOS BAY, CORVALLIS, EUGENE, GOLDENDALE, GRANTS PASS, HERMISTON, HOOD RIVER, KLAMATH FALLS, LAGRANDE, LAKEVIEW, LONGVIEW, MADRAS, MEDFORD, MCMINNVILLE, OREGON CITY, NEWPORT, ONTARIO, PENDLETON, PORTLAND, PORT ORFORD, REEDSPORT, ROSEBURG, SALEM, THE DALLES, TILLAMOOK, VANCOUVER.) (FOOTNOTE C: HANDLING OF HAZARDOUS WASTE MATERIALS: PERSONNEL IN ALL CRAFT CLASSIFICATIONS SUBJECT TO WORKING INSIDE A FEDERALLY DESIGNATED HAZARDOUS WASTE PERMIETER SHALL BE ELIGIBLE FOR COMPENSATION IN ACCORDANCE WITH THE FOLLOWING GROUP SCHEDULE RELATIVE TO THE LEVEL OF HAZARDOUS WASTE AS OUTLINED IN THE SPECIFIC HAZARDOUS WASTE PROJECT SITE SAFETY PLAN. H-1: BASE WAGE RATE WHEN ON A HAZARDOUS WASTE SITE WHEN NOT OUTFITTED WITH PROTECTIVE CLOTHING. H-2: CLASS ""C"" SUIT- BASIC HOURLY WAGE RATE PLUS $1.00 PER HOUR, FRINGES PLUS $0.15. H-3: CLASS ""B"" SUIT- BASIC HOURLY WAGE RATE PLUS $1.50 PER HOUR, FRINGES PLUS $0.15. H-4: CLASS ""A"" SUIT- BASIC HOURLY WAGE RATE PLUS $2.00 PER HOUR, FRINGES PLUS $0.15.).....$ 36.08 18.30

TRUCK DRIVERS: GROUP 5- COMPOSITE CREWMAN; DUMP TRUCKS, SIDE, END, AND BOTTOM DUMPS, INCLUDING SEMI-TRUCKS AND TRAINS OR COMBINATIONS THEREOF: OVER 50 CU. YDS. AND INCLUDING 60 CU. YDS., INCLUDING ARTICUALTED DUMP TRUCKS. (ZONE DIFFERENTIAL: ZONE 1- PUBLISHED RATE. ZONE 2- $0.65. ZONE 3- $1.15. ZONE 4- $1.70. ZONE 5- $2.75. ZONE 1- ALL JOBS OR PROJECTS LOCATED WITHIN 30 MILES OF THE RESPECTIVE CITY HALL. ZONE 2- MORE THAN 30 MILES AND LESS THAN 40 MILES FORM THE RESPECTIVE CITY HALL. ZONE 3-MORE THAN 40 MILES AND LESS THAN 50 MILES FROM THE RESPECTIVE CITY HALL. ZONE 4- MORE THAN 50 MILES AND LESS THAN 80 MILES FROM THE RESPECTIVE CITY HALL. ZONE 5- MORE THAN 80 MILES FROM THE RESPECTIVE CITY HALL. BASEPOINTS: ALBANY, ASTORIA, BAKER, BEND, BINGEN, BROOKINGS, BURNS, COOS BAY, CORVALLIS, EUGENE, GOLDENDALE, GRANTS PASS, HERMISTON, HOOD RIVER, KLAMATH FALLS, LAGRANDE, LAKEVIEW, LONGVIEW, MADRAS, MEDFORD, MCMINNVILLE, OREGON CITY, NEWPORT, ONTARIO, PENDLETON, PORTLAND, PORT ORFORD, REEDSPORT, ROSEBURG, SALEM, THE DALLES, TILLAMOOK, VANCOUVER.) (FOOTNOTE C: HANDLING OF HAZARDOUS WASTE MATERIALS: PERSONNEL IN ALL CRAFT CLASSIFICATIONS SUBJECT TO WORKING INSIDE A FEDERALLY DESIGNATED HAZARDOUS WASTE PERMIETER SHALL BE ELIGIBLE FOR COMPENSATION IN ACCORDANCE WITH THE FOLLOWING GROUP SCHEDULE RELATIVE TO THE LEVEL OF HAZARDOUS WASTE AS OUTLINED IN THE SPECIFIC HAZARDOUS WASTE PROJECT

SITE SAFETY PLAN. H-1: BASE WAGE RATE WHEN ON A
HAZARDOUS WASTE SITE WHEN NOT OUTFITTED WITH
PROTECTIVE CLOTHING. H-2: CLASS ""C"" SUIT- BASIC
HOURLY WAGE RATE PLUS $1.00 PER HOUR, FRINGES PLUS
$0.15. H-3: CLASS ""B"" SUIT- BASIC HOURLY WAGE RATE
PLUS $1.50 PER HOUR, FRINGES PLUS $0.15. H-4: CLASS
""A"" SUIT- BASIC HOURLY WAGE RATE PLUS $2.00 PER
HOUR, FRINGES PLUS $0.15.).....$ 36.35 18.30
TRUCK DRIVERS: GROUP 6- BULK CEMENT SPREADER W/O
AUGER; DRY PRE-BATCH CONCRETE MIX TRUCKS; DUMP
TRUCKS, SIDE, END, AND BOTTOM DUMPS, INCLUDING
SEMI-TRUCKS AND TRAINS OF COMBINATIONS THEREOF:
OVER 60 CU. YDS. AND INCLUDING 80 CU. YDS. AND
INCLUDES ARTICULATD DUMP TRUCKS; SKID TRUCK. (ZONE
DIFFERENTIAL: ZONE 1- PUBLISHED RATE. ZONE 2-
$0.65. ZONE 3- $1.15. ZONE 4- $1.70. ZONE 5- $2.75.
ZONE 1- ALL JOBS OR PROJECTS LOCATED WITHIN 30
MILES OF THE RESPECTIVE CITY HALL. ZONE 2- MORE
THAN 30 MILES AND LESS THAN 40 MILES FORM THE
RESPECTIVE CITY HALL. ZONE 3-MORE THAN 40 MILES AND
LESS THAN 50 MILES FROM THE RESPECTIVE CITY HALL.
ZONE 4- MORE THAN 50 MILES AND LESS THAN 80 MILES
FROM THE RESPECTIVE CITY HALL. ZONE 5- MORE THAN 80
MILES FROM THE RESPECTIVE CITY HALL. BASEPOINTS:
ALBANY, ASTORIA, BAKER, BEND, BINGEN, BROOKINGS,
BURNS, COOS BAY, CORVALLIS, EUGENE, GOLDENDALE,
GRANTS PASS, HERMISTON, HOOD RIVER, KLAMATH FALLS,
LAGRANDE, LAKEVIEW, LONGVIEW, MADRAS, MEDFORD,
MCMINNVILLE, OREGON CITY, NEWPORT, ONTARIO,
PENDLETON, PORTLAND, PORT ORFORD, REEDSPORT,
ROSEBURG, SALEM, THE DALLES, TILLAMOOK, VANCOUVER.)
(FOOTNOTE C: HANDLING OF HAZARDOUS WASTE
MATERIALS: PERSONNEL IN ALL CRAFT CLASSIFICATIONS
SUBJECT TO WORKING INSIDE A FEDERALLY DESIGNATED
HAZARDOUS WASTE PERMIETER SHALL BE ELIGIBLE FOR
COMPENSATION IN ACCORDANCE WITH THE FOLLOWING GROUP
SCHEDULE RELATIVE TO THE LEVEL OF HAZARDOUS WASTE
AS OUTLINED IN THE SPECIFIC HAZARDOUS WASTE PROJECT
SITE SAFETY PLAN. H-1: BASE WAGE RATE WHEN ON A
HAZARDOUS WASTE SITE WHEN NOT OUTFITTED WITH
PROTECTIVE CLOTHING. H-2: CLASS ""C"" SUIT- BASIC
HOURLY WAGE RATE PLUS $1.00 PER HOUR, FRINGES PLUS
$0.15. H-3: CLASS ""B"" SUIT- BASIC HOURLY WAGE RATE
PLUS $1.50 PER HOUR, FRINGES PLUS $0.15. H-4: CLASS
""A"" SUIT- BASIC HOURLY WAGE RATE PLUS $2.00 PER
HOUR, FRINGES PLUS $0.15.).....$ 36.57 18.30
TRUCK DRIVERS: GROUP 7- DUMP TRUCKS, SIDE, END, AND
BOTTOM DUMPS, INCLUDING SEMI-TRUCKS AND TRAINS OR
COMBINATIONS THEREOF: OVER 80 CU. YDS. AND
INCLUDING 100 CU. YDS. INCLUDES ARTICULATED DUMP
TRUCKS; INDUSTRIAL LIFT TRUCK (MECHANICAL
TAILGATE). (ZONE DIFFERENTIAL: ZONE 1- PUBLISHED
RATE. ZONE 2- $0.65. ZONE 3- $1.15. ZONE 4- $1.70.
ZONE 5- $2.75. ZONE 1- ALL JOBS OR PROJECTS LOCATED
WITHIN 30 MILES OF THE RESPECTIVE CITY HALL. ZONE
2- MORE THAN 30 MILES AND LESS THAN 40 MILES FORM
THE RESPECTIVE CITY HALL. ZONE 3-MORE THAN 40 MILES
AND LESS THAN 50 MILES FROM THE RESPECTIVE CITY
HALL. ZONE 4- MORE THAN 50 MILES AND LESS THAN 80
MILES FROM THE RESPECTIVE CITY HALL. ZONE 5- MORE
THAN 80 MILES FROM THE RESPECTIVE CITY HALL.
BASEPOINTS: ALBANY, ASTORIA, BAKER, BEND, BINGEN,
BROOKINGS, BURNS, COOS BAY, CORVALLIS, EUGENE,
GOLDENDALE, GRANTS PASS, HERMISTON, HOOD RIVER,
KLAMATH FALLS, LAGRANDE, LAKEVIEW, LONGVIEW,
MADRAS, MEDFORD, MCMINNVILLE, OREGON CITY, NEWPORT,
ONTARIO, PENDLETON, PORTLAND, PORT ORFORD,
REEDSPORT, ROSEBURG, SALEM, THE DALLES, TILLAMOOK,
VANCOUVER.) (FOOTNOTE C: HANDLING OF HAZARDOUS
WASTE MATERIALS: PERSONNEL IN ALL CRAFT
CLASSIFICATIONS SUBJECT TO WORKING INSIDE A
FEDERALLY DESIGNATED HAZARDOUS WASTE PERMIETER
SHALL BE ELIGIBLE FOR COMPENSATION IN ACCORDANCE
WITH THE FOLLOWING GROUP SCHEDULE RELATIVE TO THE
LEVEL OF HAZARDOUS WASTE AS OUTLINED IN THE
SPECIFIC HAZARDOUS WASTE PROJECT SITE SAFETY PLAN.
H-1: BASE WAGE RATE WHEN ON A HAZARDOUS WASTE SITE
WHEN NOT OUTFITTED WITH PROTECTIVE CLOTHING. H-2:
CLASS ""C"" SUIT- BASIC HOURLY WAGE RATE PLUS $1.00
PER HOUR, FRINGES PLUS $0.15. H-3: CLASS ""B"" SUIT-
BASIC HOURLY WAGE RATE PLUS $1.50 PER HOUR, FRINGES
PLUS $0.15. H-4: CLASS ""A"" SUIT- BASIC HOURLY WAGE
RATE PLUS $2.00 PER HOUR, FRINGES PLUS $0.15.).....$ 36.82 18.30

POWER EQUIPMENT OPERATOR GROUP 4 - ASPHALT SCREED; ASPHALT PAVER, ASPHALT ROTO-MILL, PAVEMENT PROFILER, UNDER 8' LATERAL CUT; ASPHALT, RECYCLE MACHINE, ASF

POWER EQUIPMENT OPERATOR GROUP 5 - ASPHALT, EXTRUSION MACHINE; ASHPALT, ROLLER (ANY ASPHALT MIX); ASPHALT, ROTO-MILL PAVEMENT PROFILER GROUND MAN; BULLDOZE

WELDERS - Receive rate prescribed for craft performing
operation to which welding is incidental.
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Note: Executive Order (EO) 13706, Establishing Paid Sick Leave
for Federal Contractors applies to all contracts subject to the
Davis-Bacon Act for which the contract is awarded (and any
solicitation was issued) on or after January 1, 2017. If this
contract is covered by the EO, the contractor must provide

employees with 1 hour of paid sick leave for every 30 hours they work, up to 56 hours of paid sick leave each year. Employees must be permitted to use paid sick leave for their own illness, injury or other health-related needs, including preventive care; to assist a family member (or person who is like family to the employee) who is ill, injured, or has other health-related needs, including preventive care; or for reasons resulting from, or to assist a family member (or person who is like family to the employee) who is a victim of, domestic violence, sexual assault, or stalking. Additional information on contractor requirements and worker protections under the EO is available at https://www.dol.gov/agencies/whd/government-contracts.

Note: Executive Order 13658 generally applies to contracts subject to the Davis-Bacon Act that were awarded on or between January 1, 2015 and January 29, 2022, and that have not been renewed or extended on or after January 30, 2022. Executive Order 13658 does not apply to contracts subject only to the Davis-Bacon Related Acts regardless of when they were awarded. If a contract is subject to Executive Order 13658, the contractor must pay all covered workers at least $13.65 per hour (or the applicable wage rate listed on this wage determination, if it is higher) for all hours spent performing on the contract from May 11, 2026, through December 31, 2026. The applicable Executive Order minimum wage rate will be adjusted annually. Additional information on contractor requirements and worker protections under Executive Order 13658 is available at www.dol.gov/whd/govcontracts.

Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (iii)).

The body of each wage determination lists the classifications and wage rates that have been found to be prevailing for the type(s) of construction and geographic area covered by the wage determination. The classifications are listed in alphabetical order under rate identifiers indicating whether the particular rate is a union rate (current union negotiated rate), a survey rate, a weighted union average rate, a state adopted rate, or a supplemental classification rate.

Union Rate Identifiers

A four-letter identifier beginning with characters other than ⿰SU⿰, ⿰UAVG⿰, ⿰SA⿰, or ⿰SC⿰ denotes that a union rate was prevailing for that classification in the survey. Example: PLUM0198-005 07/01/2024. PLUM is an identifier of the union whose collectively bargained rate prevailed in the survey for this classification, which in this example would be Plumbers. 0198 indicates the local union number or district council number where applicable, i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. The date, 07/01/2024 in the example, is the effective date of the most current negotiated rate.

Union prevailing wage rates are updated to reflect all changes over time that are reported to WHD in the rates in the collective bargaining agreement (CBA) governing the classification.

Union Average Rate Identifiers

The UAVG identifier indicates that no single rate prevailed for those classifications, but that 100% of the data reported for the classifications reflected union rates. EXAMPLE: UAVG-OH-0010 01/01/2024. UAVG indicates that the rate is a weighted union average rate. OH indicates the State of Ohio. The next number, 0010 in the example, is an internal number used in producing the wage determination. The date, 01/01/2024 in the example, indicates the date the wage determination was updated to reflect the most current union average rate.

A UAVG rate will be updated once a year, usually in January, to reflect a weighted average of the current rates in the collective bargaining agreements on which the rate is based.

Survey Rate Identifiers

The ""SU"" identifier indicates that either a single non-union rate prevailed (as defined in 29 CFR 1.2) for this classification in the survey or that the rate was derived by computing a weighted average rate based on all the rates reported in the survey for that classification. As a weighted average rate includes all rates reported in the survey, it may include both union and non-union rates. Example: SUFL2022-007 6/27/2024. SU indicates the rate is a single non-union prevailing rate or a weighted average of survey data for that classification. FL indicates the State of Florida. 2022 is the year of the survey on which these classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. The date, 6/27/2024 in the example, indicates the survey completion date for the classifications and rates under that identifier.

""SU"" wage rates typically remain in effect until a new survey

is conducted. However, the Wage and Hour Division (WHD) has the discretion to update such rates under 29 CFR 1.6(c)(1).

State Adopted Rate Identifiers

The ""SA"" identifier indicates that the classifications and prevailing wage rates set by a state (or local) government were adopted under 29 C.F.R 1.3(g)-(h). Example: SAME2023-007 01/03/2024. SA reflects that the rates are state adopted. ME refers to the State of Maine. 2023 is the year during which the state completed the survey on which the listed classifications and rates are based. The next number, 007 in the example, is an internal number used in producing the wage determination. The date, 01/03/2024 in the example, reflects the date on which the classifications and rates under the ""SA"" identifier took effect under state law in the state from which the rates were adopted.

WAGE DETERMINATION APPEALS PROCESS

1) Has there been an initial decision in the matter? This can be:

a) a survey underlying a wage determination
b) an existing published wage determination
c) an initial WHD letter setting forth a position on a wage determination matter
d) an initial conformance (additional classification and rate) determination

On survey related matters, initial contact, including requests for summaries of surveys, should be directed to the WHD Branch of Wage Surveys. Requests can be submitted via email to davisbaconinfo@dol.gov or by mail to:

Branch of Wage Surveys
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

Regarding any other wage determination matter such as conformance decisions, requests for initial decisions should be directed to the WHD Branch of Construction Wage Determinations. Requests can be submitted via email to BCWD-Office@dol.gov or by mail to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2) If an initial decision has been issued, then any interested party (those affected by the action) that disagrees with the decision can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Requests for review and reconsideration can be submitted via email to dba.reconsideration@dol.gov or by mail to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210.

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END OF GENERAL DECISION"