25445

Bridge Key Number

1500 E Road over Low Line Canal

Route and Crossing

Buhl HD

Administration Jurisdiction

Geotechnical Report

Report Title

April 17, 2025

Report Date

Greg Fischer, P.E.

Report Prepared by Jacobs

Muhammad Zubery

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Accepted By LHTAC

lhtac t2

Advocate | Support Train

Jacobs

Memorandum

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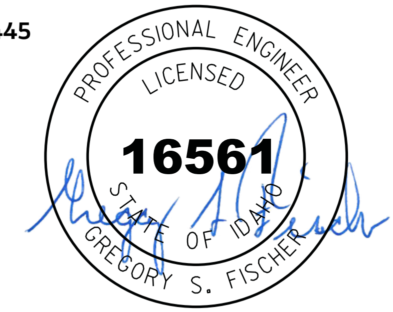
Subject	**Geotechnical Report for 1500 E Road over Low Line Canal, KN25445**
Project Name	Leading Idaho Local Bridge Program
Highway District	Buhl HD
Prepared By:	Ajith Hanagoodu
Reviewed By:	Greg Fischer, P.E.
Date	April 17, 2025



April 17, 2025

1. Introduction

This Geotechnical Engineering Report has been prepared for the Local Highway Technical Assistance Council (LHTAC) and the Buhl Highway District and presents the results of the geotechnical engineering evaluation for the proposed replacement of the 1500 E Road over Low Line Canal bridge (KN25445) located in Twin Falls County, Idaho. The existing bridge, which was originally constructed in 1936 and reconstructed in 1963, is a single span structure with a concrete deck. The bridge is 41 feet long and 26 feet wide (out-to-out) and supports two-way traffic.

Jacobs performed this work for LHTAC under the scope of work outlined in the Leading Idaho Local Bridge Program Work Task Agreement Number G19 dated April 22, 2024. This report references the 2023 ITD Standard Specifications and the 2019 ITD *Quality Assurance Manual*.

1.1 Project Description

The proposed structure will be a single-span, pre-stressed voided slab bridge with abutments supported by shallow spread footings. The proposed bridge will accommodate two 12-foot-wide lanes and 6-foot-wide shoulder at the edge of each lane. The total length of the structure will be 41.41 feet (out-to-out) and will have a width of 40 feet (out-to-out). The grade changes are anticipated to be minimal; however, construction of the proposed structure will require reconstruction of a portion of the existing roadway approaches. Roadway reconstruction will consist of a flexible hot-mix asphalt (HMA) pavement section provided by the local highway district. If approach slabs are not included, geosynthetic reinforced abutment backfill (GRAB) is recommended at the bridge approaches. The proposed structure information is presented in Table 1.

Table 1. Proposed Structure

Bridge Element	Value/Description
Foundation Type	Shallow Spread Footing
Number of Spans	1
Span Length (feet)	41.41
Width (feet)	40
Skew (degrees)	15
Deck Elevation (feet)	3,909.93
Bottom Footing Elevation (feet)	3,900.55
Groundwater Elevation at Time of Exploration (feet)	Not Encountered
Design Highwater Elevation (feet)	3,906.93

1.2 Limitations

This report has been prepared for the exclusive use of LHTAC, their design consultant, and Jacobs for specific application to the project. It has been prepared in accordance with generally accepted geotechnical engineering practice. No other warranty, express or implied, is made.

The analysis and recommendations contained in this report are based on the data obtained from available published literature and on data obtained from subsurface explorations and laboratory testing. Exploration data indicate soil conditions and water levels only at specific locations and times, and only to the depths penetrated. Subsurface conditions and water levels at other locations may differ from conditions occurring at these explored locations. In addition, the passage of time may result in a change in conditions at these locations. Some of the information provided is based on interpretation. The information reflects the opinion of the engineer for the specific evaluation presented herein. Any use of interpreted information for other purposes could lead to erroneous assumptions and faulty conclusions.

Jacobs is not responsible for any claims, damages, or liability associated with interpretation of subsurface data or for reuse of subsurface data without Jacobs' express written authorization.

2. Technical Data

2.1 Field Exploration

Jacobs performed the field exploration in general accordance with the ITD *Materials Manual* (2020), Section 405. Jacobs completed two exploratory borings at the proposed structure location on May 13, 2024. Subsurface exploration was completed using a truck-mounted CME-75 drill rig equipped with an automatic hammer and 8-inch outside-diameter hollow-stem augers and HQ-3 rock core. Soil samples were obtained via a 2-inch outside-diameter split-spoon sampler. Jacobs performed sampling in general accordance with ASTM International (ASTM) D1586. Soils encountered during drilling were logged and visually classified by a field engineer in accordance with the Unified Soil Classification System Visual-Manual method outlined in ASTM D2488. Recovered rock core was evaluated for Rock Quality Designation (RQD) in accordance with ASTM D6032.

The approximate boring locations, surface elevations, exploration depths, and groundwater elevations are summarized in Table 2.

Table 2. Exploratory Boring Information

Boring Designation	North[a]	West[a]	Surface Elevation[b] (feet)	Termination Depth (feet) and [Elevation]	Groundwater Depth (feet) and [Elevation]
KN25445 B-1	42°33’46.59”	114°45’03.75”	3,911.1	20 [3,891.1]	N/E
KN25445 B-2	42°33’47.13”	114°45’03.77”	3,911.6	20 [3,891.6]	N/E

[a] North, west, and elevation obtained from the design team.

N/E = not encountered

At the conclusion of the subsurface investigation, borings were backfilled in accordance with the Idaho Department of Water Resources requirements. Recovered samples were packaged, labeled, and transported to GeoTek in Meridian, Idaho, for laboratory testing.

The locations of exploratory borings are illustrated on the Exploration Plan included in Attachment 1. The exploratory boring logs are presented in Attachment 2.

2.2 Surface and Subsurface Conditions

The roadway surface south of the crossing is generally flat, and the grade decreases in elevation north of the crossing. The overall topography is characterized by flat agricultural fields to the east and west of the crossing.

The subsurface conditions encountered are generally consistent between the two borings drilled at the abutments. The existing road section is approximately 4 to 6.5 inches of asphalt pavement underlain by 12 to 13.5 inches of granular base layer, which is underlain by fill soil comprised of very soft to hard silt extending to a depth of 7.5 feet below ground surface (bgs). In boring KN25445 B-1, the fill layer overlays native very dense well graded sand extending to a depth of 10 feet bgs, which overlays basalt bedrock which was encountered from 10 feet bgs to boring termination depth of 20 feet bgs. In boring KN25445 B-2, the fill layer overlays native hard silt with sand layer to a depth of 10 feet below bgs. The native soil was underlain by basalt bedrock encountered at 10 feet bgs to boring termination depth of 20 feet bgs.

Groundwater was not encountered at the time of drilling, despite the canal being full.

2.3 Laboratory Testing

Representative soil samples collected from the borings were taken to GeoTek in Meridian, Idaho, for laboratory testing. Test procedures were performed in general accordance with the following applicable test procedures. “General accordance” indicates that certain local and common descriptive practices and methodologies have been followed.

- Water (Moisture) Content of Soil and Rock by Mass (ASTM D2216)
- Amount of Material Finer than the No. 200 Sieve in Soils by Washing (ASTM D1140)
- Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis (ASTM D6913)
- Liquid Limit, Plastic Limit, and Plasticity Index of Soils (ASTM D4318)
- Laboratory Compaction Characteristics of Soil Using Standard Effort (Standard Proctor) (ASTMD698)

- Resistance R-Value Test (Idaho T-8)

Based on the laboratory test results, the soil classifications were modified, if necessary, in accordance with ASTM D2487. Laboratory test results are summarized in Attachment 3 and are also included in the boring logs in Attachment 2.

3. Recommendations

Based on the results of the subsurface exploration program, it is Jacobs' opinion that the proposed structure may be supported using shallow spread foundations.

Recommended design capacities, anticipated performance, and construction considerations are presented in the following sections.

3.1 Foundations

Recommendations pertaining to the load and resistance factor design (LRFD) foundation design for the proposed structure are presented in the following sections. The cast-in-place abutments will be founded approximately 10.75 feet below the existing roadway surface.

Table 3 shows the resistance factors recommended for use in the design of spread footings.

Table 3. Resistance Factors for Shallow Foundation Design

Limit State	Bearing Resistance	Base Sliding (cast-in-place/pre-cast on sand)	Passive Earth Pressure Component of Sliding Resistance
Strength I	0.45	0.80/0.90	0.50
Extreme I/Service I	1.00	1.00	1.00

Source: AASHTO 2020; Table 10.5.5.2.2-1

The following inputs were used in the bearing resistance calculations regarding the footing dimensions and ground conditions:

- The bottom of the footing will be at elevation 3,900.55 feet.
- The footing will be founded on basalt bedrock.
- Footing length is 40 feet.
- Effective footing width varies from 4 to 12 feet.
- Design groundwater table is at elevation 3906.93 feet.

The bearing resistance was evaluated in accordance with *LRFD Bridge Design Specifications* (AASHTO 2020) for the effective footing widths listed:

- Extreme Limit State: In accordance with Section 10.5.5.3 and 10.6.4 of the LRFD specifications (AASHTO 2020), the ultimate bearing resistance is used as the Extreme I Limit State Resistance (resistance factor is equal to 1). For the spread foundations, the ultimate bearing resistance ranges from 30.1 to 56.5 kips per square foot (ksf).
- Strength I Limit State: A resistance factor is applied to the net bearing resistance (nominal resistance minus vertical overburden pressure). As listed in Table 3, a resistance factor of 0.45 should be used to calculate the Strength I Limit State bearing resistance. The strength limit state bearing resistance ranges from 13.5 to 25.4 ksf. Figure 1 shows these values plotted for varying footing widths.

- Service I Limit State: The bearing resistance was estimated as the minimum applied footing pressure to limit settlement to a specific value. The settlement analysis was performed using the elastic half space method. For a settlement value of 1 inch, the applied service limit state bearing resistance ranges from 17 to 26 ksf. Figure 1 shows these values plotted for varying footing widths.

Figure 1 presents the results of the bearing resistance evaluation and can be used to size the abutment footings.

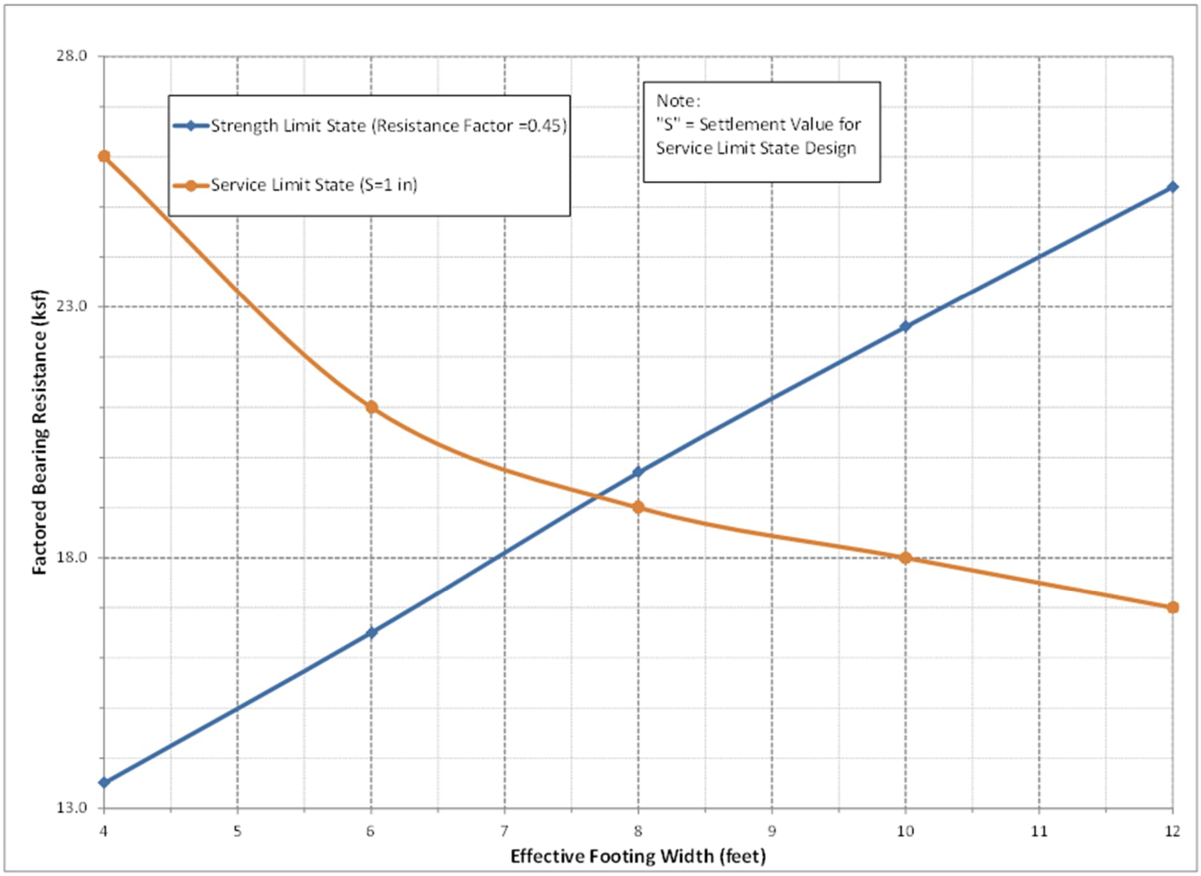


Figure 1. Bearing Resistance versus Effective Footing Width

3.2 Lateral Earth Pressures

Any backfill soil placed behind proposed walls must be free of organics and deleterious materials. In addition, all undocumented fill, debris, and loose soil must be removed before placing any backfill. Jacobs recommends lateral earth pressures for the abutments be estimated using the equivalent fluid densities provided in Table 4; these values were estimated in accordance with Section 3.11.5 of the LRFD specifications (AASHTO 2020). Jacobs recommends designing walls for undrained (hydrostatic pressure) conditions below the design high water elevation of 3,906.93 feet. The equivalent fluid densities are based on geosynthetic reinforced abutment backfill (GRAB) and embankment soil consisting of 3/4-inch aggregate for untreated base, Type B with an internal friction angle of 35 degrees and a moist unit weight of 130 pounds per cubic feet (pcf). If GRAB is not utilized behind the abutment walls, the lateral earth pressures listed in Table 4 must be re-evaluated by Jacobs using a wall backfill material consisting of granular subbase (as specified in Section 301 of the standard specifications).

Table 4. Unfactored Equivalent Fluid Densities

Earth Pressure State	Horizontal Backfill Surface		
	Lateral Earth Coefficient	**Equivalent Fluid Density (pcf) (Above Design Water Elevation)**	**Equivalent Fluid Density (pcf) (Undrained - Below Design Water Elevation)**
Active	$K_a = 0.246$	32	79
At-Rest	$K_o = 0.426$	55	91
Passive	$K_p = 4.05$	526	-

The estimated wall translations for the active and passive earth pressure conditions are 0.001H and 0.05H (where H is the height of the wall), respectively, per Table C3.11.1-1 of the LRFD specifications (AASHTO 2020). The passive pressure resistance should not be considered effective in the upper 30 inches of the subsurface profile or in the scour zone, whichever is deeper. Jacobs recommends using at-rest equivalent earth pressures for walls that can tolerate little or no movement. Active earth pressures may be considered for walls that are unrestrained and able to achieve a minimum 0.001H translation at the top of the wall; otherwise, Jacobs recommends designing the walls for at-rest conditions. If the walls are unable to deflect the 0.05H to fully mobilize the passive resistance, the maximum passive resistance should be reduced by half.

Seismic design for abutment walls must be performed per the LRFD specifications, Subsection 11.6.5 (AASHTO 2020). Static lateral earth pressures should not be added to dynamic lateral earth pressures, because static pressures are already included in the dynamic pressures. Per the LRFD specifications, Figure 11.6.5.1-1 (AASHTO 2020), the dynamic lateral earth force should be applied at H/3 above the wall bottom.

Backfill must be compacted to Class A Compaction criteria in accordance with Section 205 of the 2023 ITD Standard Specifications. Over-compaction must be avoided because increased compactive efforts will result in lateral pressures higher than those provided in this report. Heavy compaction equipment or other construction loads must not be allowed within 3 feet of the abutments unless planned for in the structural design. Hand-operated or lightweight compaction equipment such as vibrating plate compactors and loose lift thicknesses reduced to a maximum of 6 inches must be used within 3 feet of the structure.

Jacobs recommends that the design of the structure account for additional surcharge pressures developed from loads applied at the ground surface. These loads may include surface surcharge loads, point loads, line loads, hydrostatic forces, or strip loads. Vehicular loading must be taken into consideration at both abutment walls. The equivalent height of soil must be calculated per Table 3.11.6.4-1 in the LRFD specifications (AASHTO 2020) for abutment walls, assuming an in-place soil density of 130 pcf. The earth pressures generated by uniform surcharge loads can be calculated by multiplying the uniform loads by the active or at-rest lateral earth pressure coefficients (as appropriate) presented in Table 4.

3.3 Wall Drainage

Surface drainage should be directed away from the abutment walls to avoid saturating prepared subgrade and wall backfill. Weep holes should be included in the abutment and wingwalls to mitigate long-term buildup of hydrostatic pressure in the wall backfill.

3.4 Embankments

Embankment construction, which includes keying widening areas into existing embankment slopes, must conform to the requirements set forth in Section 205 of the 2023 ITD Standard Specifications. Embankments must be constructed using Granular Borrow (Section 205) and be compacted to Class A requirements (Subsection 205.03.G). Embankment slopes must not exceed maximum side slopes of 2H:1V.

3.5 Pavement

Pavement recommendations are not provided in this report. We understand the design team will use a pavement section provided by the local highway district. A nonwoven separation geotextile meeting the requirements of a Type III subgrade separation geotextile in accordance with Section 718.07 of the ITD 2023 Standard Specifications for Highway Construction is recommended between the granular subbase and the native subgrade to prevent fines migration and improve roadway surface performance.

3.6 Seismic Design

Based on the subsurface soil conditions encountered in the exploratory borings, it is Jacobs' opinion that a seismic site class "D" should be used for design. Jacobs recommends the seismic parameters presented in Table 5 be used, based on the project site location and Figures 3.10.2.1-1, 3.10.2.1-2, and 3.10.2.1-3 in the LRFD specifications (AASHTO 2020).

Table 5. Seismic Response Criteria

Period (seconds)	Standard Acceleration Coefficients for Site Class B (g)	Site Factor for Site Class C	Factored Acceleration Coefficients for Design (g)
0.0 (Zero)	PGA = 0.06	F_{PGA} = 1.6	PGA_M = 0.09
0.2 (Short)	S_S = 0.13	F_a = 1.6	S_{DS} = 0.21
1.0 (Long)	S_1 = 0.04	F_v = 2.4	S_{D1} = 0.09

PGA = peak ground acceleration

Based on Jacobs' experience in the area, site soil conditions, and readily available geologic data, it appears there is no evidence of active faults on or immediately adjacent to the project site. The U.S. Geological Survey (USGS) and the Idaho Geological Survey indicate that the Owyhee Mountains Fault (considering the last 1.6 million years) is approximately 7 miles northwest of the project site. Based on the age of the fault and its distance from the project site, the possibility of fault rupture at the site is negligible.

Liquefaction is a phenomenon where soils experience a rapid loss of internal strength because of strong seismic ground shaking. Ground settlement, lateral spreading, or sand boils may result from liquefaction. Structures supported on liquefiable soils could suffer foundation settlement or lateral movement that could be severely damaging. Conditions favorable to liquefaction typically occur in loose to medium dense, clean to moderately silty sand that is below the groundwater level in areas with earthquake accelerations higher than 0.1g. According to Section 10.5.4.2 of the LRFD specifications (AASHTO 2020), a liquefaction assessment must be conducted for foundations in Seismic Zones 3 and 4. Comparing the values in Table 5 of this report with Table 3.10.6-1 of the LRFD specifications (AASHTO 2020), the project area classifies as Zone 1, and a liquefaction analysis is not required.

3.7 Construction Considerations

3.7.1 Excavation and Fill

Before construction, Jacobs recommends any organic or loose surficial soils, and any man-made features including foundations, pavement, subsurface structures, or debris be stripped and removed from the construction area in accordance with Sections 203 and 205 of the 2023 ITD Standard Specifications. Subgrade material should be prepared before construction in accordance with Section 210 of the Standard Specifications. Excavated rock surfaces should be leveled to the plan elevation with 2 inches of Class 15 or higher concrete before constructing structure foundations.

If the design team chooses the use of GRAB placed in accordance with Section 215 of the 2023 ITD Standard Specifications behind the bridge abutments, the Type III subgrade separation geotextile specified in Section 215 is recommended.

No fill or structural elements are to be placed on frosted or frozen ground, nor is frozen material to be placed as fill. Frozen ground must be allowed to thaw or be completely removed before placing fill or structural elements. If earthwork is performed during the winter months when the temperatures fall below freezing, the subgrade must be protected from freezing by using straw or insulating blankets. Before proceeding with fill placement, the insulating blanket or straw must be entirely removed, and any frozen areas allowed to thaw or be completely removed. To avoid soil freezing, reduce the amount of time between excavation and construction.

Fill should not be placed when the atmospheric temperature is below 35 degrees Fahrenheit. When the temperature falls below 35 degrees, all areas of completed work must be protected against detrimental effects of ground freezing. Any areas affected by freezing are to be reconditioned in conformance with the previously stated requirements.

3.7.2 Dewatering

Groundwater was not encountered during exploration. If necessary, dewatering should be performed to facilitate construction in the dry and to keep the water table at least 1 foot below the bottom of the excavation. Because the bridge will be constructed outside of the irrigation season, it is anticipated that dewatering will not be necessary.

3.7.3 Compaction

In accordance with Section 205 of the 2023 ITD Standard Specifications, it is recommended that Class A compaction be required for placing backfill and embankment material. Completed embankment slopes should be well compacted and protected from erosion using methods such as slope tracking and seeding, or with erosion control matting.

4. References

American Association of State Highway and Transportation Officials (AASHTO). 2020. *AASHTO LRFD Bridge Design Specifications*. 9th Edition.

Idaho Transportation Department (ITD). 2019. *Quality Assurance Manual*.

Idaho Transportation Department (ITD). 2020. *Materials Manual*.

Idaho Transportation Department (ITD). 2023. *Standard Specifications for Highway Construction*.

Attachment 1
Exploration Plan

Legend:

Boring Locations

N

0 30 60

Scale in feet

Leading Idaho Local Bridge Program:

KN25445 Buhl 1500 E Rd over Low Line Canal

FIGURE 1
BORING LOCATION MAP

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Attachment 2
Boring Logs

Jacobs

PROJECT NUMBER:	BORING NUMBER:	
W3Y23600	KN25445 B-1	SHEET 1 OF 2

SOIL BORING LOG

PROJECT : Leading Idaho Local Bridge Program | LOCATION : Buhl (42.5629 N, -114.7510 E)

ELEVATION : 3911.1 ft | DRILLING CONTRACTOR : Haztech

DRILLING EQUIPMENT AND METHOD : CME 75, HSA, Split-Spoon Sampler, HQ Rock Core | ORIENTATION : Vertical

WATER LEVELS : Not measured | START : 5/13/2024 | END : 5/13/2024 | LOGGER : A. Hanagoodu

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	SAMPLE RECOVERY (ft)	#TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
3911.1					**ASPHALT** 6.5" of asphalt		
					BASE GRAVEL 13.5" base course		
	2.5 – 4.0	0.8	1-SS	6-8-25 (33)	**SILT (ML)** Brown, moist, hard, trace sand, trace gravel		
5 / 3906.1	5.0 – 6.5	1.5	2-SS	4-2-2 (4)	**SILT (ML)** Brown and dark brown, moist, soft		
	7.5 – 9.0	0.3	3-SS	50/4 (50/4")	**WELL GRADED SAND (SW)** Dark brown and brown, moist, very dense, cemented, basalt fragments in shoe		
10 / 3901.1					Begin Rock Coring at 10.0 ft bgs See the next sheet for the rock core log		
15 / 3896.1							
20							

Jacobs

PROJECT NUMBER:	BORING NUMBER:
W3Y23600	KN25445 B-1 SHEET 2 OF 2

ROCK CORE LOG

PROJECT : Leading Idaho Local Bridge Program LOCATION : Buhl (42.5629 N, -114.7510 E)

ELEVATION : 3911.1 ft DRILLING CONTRACTOR : Haztech

CORING EQUIPMENT AND METHOD : CME 75, HQ Rock Core ORIENTATION : Vertical

WATER LEVELS : Not measured START : 5/13/2024 END : 5/13/2024 LOGGER : A. Hanagoodu

DEPTH AND ELEVATION BELOW SURFACE (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DISCONTINUITIES DESCRIPTION: DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
3901.1	10.0		5	10-15 ft - Moderately fractured, 30-45 deg fractures, smooth to rough, slightly weathered		**BASALT** Gray, hard, slightly weathered, some vesicles	Auger refusal at 10 ft bgs
			1				
	4-HQ 5 ft 93%	58.3	3				
			1				
			2				
15 3896.1	15.0		2	Similar to run HQ-4		**BASALT** Gray, hard, slightly weathered, some vesicles	
			1				
	5-HQ 5 ft 100%	83.3	2				
			2				
			4				
20 3891.1	20.0					Bottom of Boring at 20.0 ft bgs on 5/13/2024	Backfilled boring with bentonite hole plug
25 3886.1							
30							

PROJECT NUMBER: W3Y23600	BORING NUMBER: KN25445 B-2	SHEET 1 OF 2

SOIL BORING LOG

PROJECT : Leading Idaho Local Bridge Program | LOCATION : Buhl (42.5630 N, -114.7510 E)

ELEVATION : 3911.6 ft | DRILLING CONTRACTOR : Haztech

DRILLING EQUIPMENT AND METHOD : CME 75, HSA, Split-Spoon Sampler, HQ Rock Core | ORIENTATION : Vertical

WATER LEVELS : Not measured | START : 5/13/2024 | END : 5/13/2024 | LOGGER : A. Hanagoodu

DEPTH BELOW EXISTING GRADE (ft)	INTERVAL (ft)	SAMPLE RECOVERY (ft)	#TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	COMMENTS: DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
3911.6					**ASPHALT** 4" of asphalt		
					BASE GRAVEL 12" base course		Bulk sample obtained from 1-4' bgs
	2.5 – 4.0	1.5	1-SS	6-7-5 (12)	**SILT (ML)** Brown and dark brown, moist, stiff, low-plasticity to non-plastic, trace sand, trace gravel		
5 / 3906.6	5.0 – 6.5	1.5	2-SS	1-0-1 (1)	**SANDY SILT (ML)** Brown, moist, very soft, non-plastic, fine grained		Laboratory Testing Results: MC = 24.9% PL = NP PI = NP P200 = 56%
	7.5 – 9.0	1.0	3-SS	11-13-50/6 (63/12")	**SILT with Sand (ML)** Brown, moist, hard, low-plasticity to non-plastic, basalt fragments in shoe		
10 / 3901.6					Begin Rock Coring at 10.0 ft bgs See the next sheet for the rock core log		
15 / 3896.6							
20							

Jacobs

PROJECT NUMBER:	BORING NUMBER:
W3Y23600	KN25445 B-2 SHEET 2 OF 2

ROCK CORE LOG

PROJECT : Leading Idaho Local Bridge Program LOCATION : Buhl (42.5630 N, -114.7510 E)

ELEVATION : 3911.6 ft DRILLING CONTRACTOR : Haztech

CORING EQUIPMENT AND METHOD : CME 75, HQ Rock Core ORIENTATION : Vertical

WATER LEVELS : Not measured START : 5/13/2024 END : 5/13/2024 LOGGER : A. Hanagoodu

DEPTH AND ELEVATION BELOW SURFACE (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	DISCONTINUITIES: R Q D (%)	DISCONTINUITIES: FRACTURES PER FOOT	DISCONTINUITIES: DESCRIPTION — DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	LITHOLOGY: ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	COMMENTS: SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
3901.6	10.0		3	10-15 ft - Moderately to slightly fractured, 30-45 deg fractures, smooth to rough, slightly weathered		**BASALT** Gray, hard, fine grained, slightly to moderately weathered, some vesicles	Auger refusal at 10 ft bgs
			1				
	4-HQ 5 ft 97%	75	2				
			2				
15	15.0		1				
3896.6			1	Similar to run HQ-4, slightly fractured		**BASALT** Gray, hard, fine grained, slightly weathered, some vesicles	
			0				
	5-HQ 5 ft 100%	100	1				
			1				
20	20.0		0				
3891.6						Bottom of Boring at 20.0 ft bgs on 5/13/2024	Backfilled boring with bentonite hole plug
25							
3886.6							
30							

Attachment 3
Laboratory Test Results

GeoTek - Boise
320 Corporate Drive, Suite #300
Meridian, ID 83642
Phone: (208) 888-7010
Fax: (208) 888-7924

Report No: PTR:24-00577-S01

Proctor Report

Client: Jacobs
999 W. Main Street, Suite 1200
Boise ID 83702

CC:

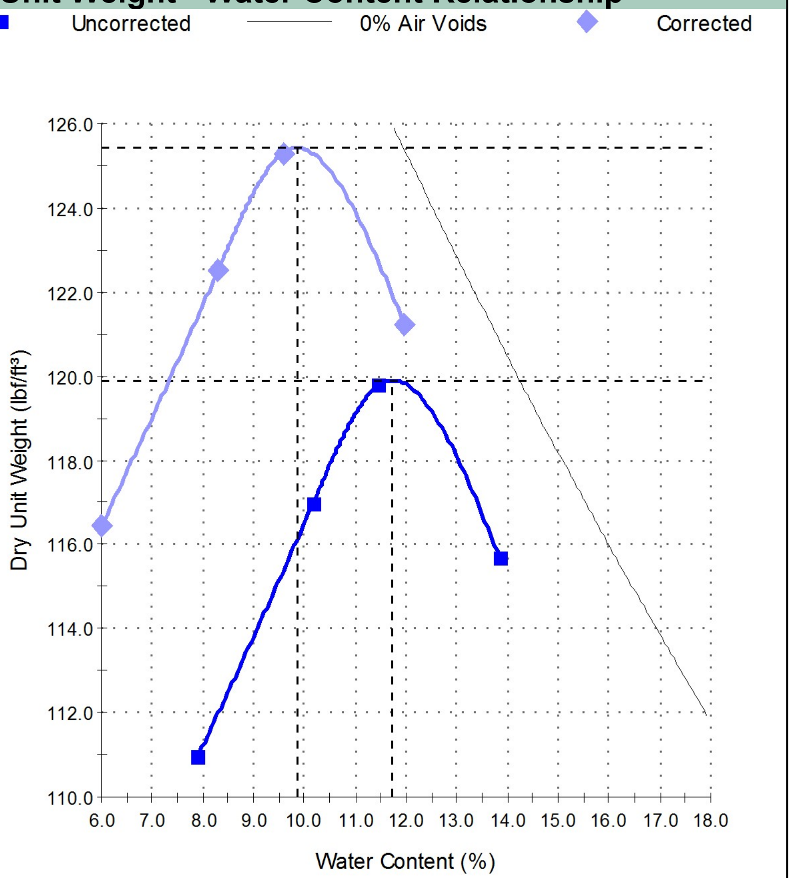
Project: 2106-ID
Jacobs Lab Testing

THIS DOCUMENT SHALL NOT BE REPRODUCED EXCEPT IN FULL

Sample Details

Sample ID: 24-00577-S01
Date Sampled: 6/10/2024
Sampled By:
Location: 25445 B-2, 1-4'

Dry Unit Weight - Water Content Relationship



Test Results

ASTM D 698	
Maximum Dry Unit Weight (lbf/ft³):	**119.9**
Optimum Water Content (%):	**11.7**
Method:	B
Preparation Method:	
Specific Gravity (Fines):	2.65
Retained Sieve 3/8" (9.5mm) (%):	16
Passing Sieve 3/8" (9.5mm) (%):	84
Tested By:	
Date Tested:	
ASTM D 4718	
Corrected Maximum Dry Unit Weight (lbf/ft³):	**125.4**
Corrected Optimum Water Content (%):	**9.9**
Specific Gravity (Oversize):	2.65
Sieve Size (Oversize):	3/8
Oversize Particles (%):	16

Comments

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GeoTek - Boise
320 Corporate Drive, Suite #300
Meridian, ID 83642
Phone: (208) 888-7010
Fax: (208) 888-7924

Report No: RV:24-00577-S01

R Value Report

Client: Jacobs
999 W. Main Street, Suite 1200
Boise ID 83702

CC:

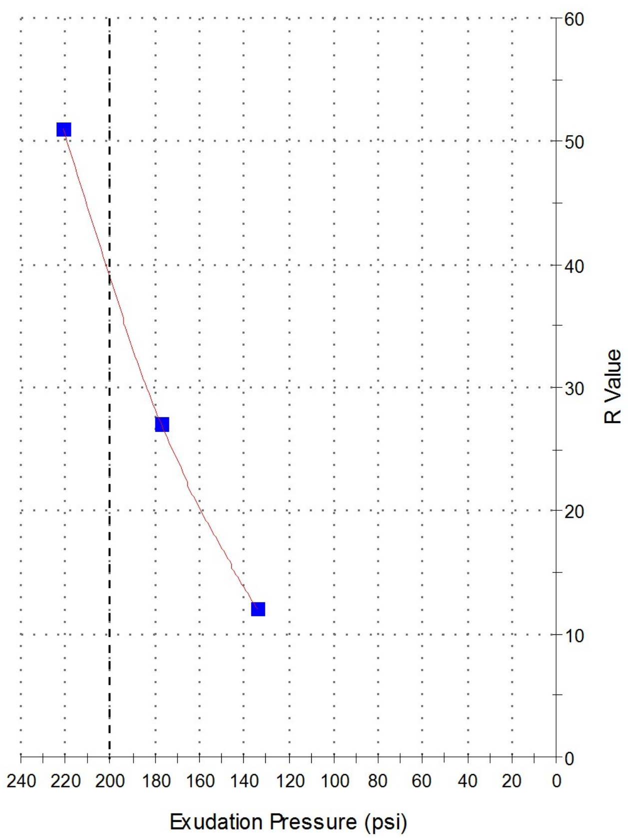
Project: 2106-ID
Jacobs Lab Testing

THIS DOCUMENT SHALL NOT BE REPRODUCED EXCEPT IN FULL

Sample Details

Sample ID: 24-00577-S01
Date Sampled: 6/10/2024
Sampling Method:
Source:
Material:
Specification:
Location: 25445 B-2, 1-4'
Tested By:
Date Tested:

R Value



Test Results

ASTM D 2844

R Value at 200 psi Exudation: 39

Specimen Results

Moisture Content (%)	7.2	7.7	8.0
Dry Density (lb/ft³)	122.3	122.5	122.0
Exudation Pressure (psi)	221	177	134
R Value	51	27	12
Expansion Pressure (psi)			

Comments

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GeoTek - Boise
320 Corporate Drive, Suite #300
Meridian, ID 83642
Phone: (208) 888-7010
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GEOTEK

Report No: MAT:24-00577-S02

Material Test Report

Client: Jacobs
999 W. Main Street, Suite 1200
Boise ID 83702

CC:

Project: 2106-ID
Jacobs Lab Testing

THIS DOCUMENT SHALL NOT BE REPRODUCED EXCEPT IN FULL

Sample Details

Sample ID	24-00577-S02
Location	25445 B-2 SS-2, 5.0-6.5'

Particle Size Distribution

Method: AASHTO T 27, AASHTO T 11

Date Tested:
Tested By:

Sieve Size	% Passing	Limits
Finer No.200 (75µm)	56	

Other Test Results

Description	Method	Result	Limits
Moisture Content (%)	AASHTO T 265	24.9	
Group Symbol	ASTM D 2487	ML	
Group Name		Sandy silt	
Approximate maximum grain size	ASTM D 4318		
Material retained on 425µm (No. 40) (%)			
Method of Removal			
Grooving Tool Type			
Specimen preparation method			
Drying Method			
Special selection process			
Rolling Method for PL		Hand	
As Received Water Content (%)			
Liquid Limit Device Type		Manual	
Liquid Limit		N/A	
Plastic Limit		NP	
Plasticity Index		NP	
Liquid Limit Procedure		Multipoint (A)	

Chart

Comments

NP = Non Plastic

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Material Test Report

Report No: MAT:24-00577-S03

Client: Jacobs
999 W. Main Street, Suite 1200
Boise ID 83702

CC:

Project: 2106-ID
Jacobs Lab Testing

THIS DOCUMENT SHALL NOT BE REPRODUCED EXCEPT IN FULL

Sample Details

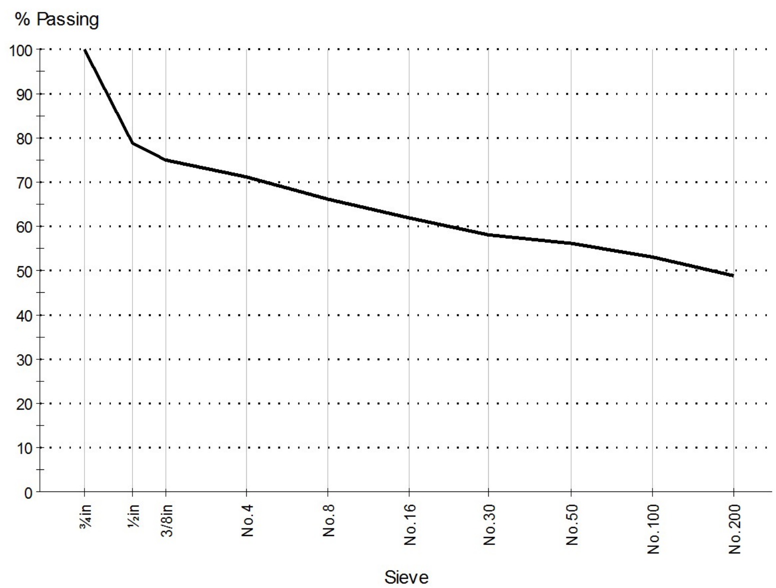
Sample ID	24-00577-S03
Specification	General Sieve Set
Location	25445 BED SAMPLE

Other Test Results

Description	Method	Result	Limits

Particle Size Distribution

ASTM C 136, ASTM C 117



Date Tested:
Tested By:

Sieve Size	% Passing	Limits
¾in	100	
½in	79	
3/8in	75	
No.4	71	
No.8	66	
No.16	62	
No.30	58	
No.50	56	
No.100	53	
No.200	49	

Comments

N/A

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