

August 12, 2025

Parametrix, Inc.
7761 West Riverside Drive, Suite 201
Boise, Idaho 83714

Attention: Kenny Dodd

Subject: Report
Geotechnical Engineering Evaluation for Containment Wall
Northside Boulevard and Karcher Road Intersection Improvements
ITD Project No. A023(731); Key No. 23731
Nampa, Idaho
File No. 9468-021-00

Introduction and Project Understanding

The purpose of this report is to provide geotechnical engineering design recommendations for the proposed containment wall to be constructed as part of the Northside and Karcher Roundabout Intersection Improvements project in Nampa, Idaho.

There is an existing Amalgamated Sugar Company tank farm located to the northeast of the existing Northside and Karcher intersection. The tank farm consists of multiple storage tanks that are used to store beet juice, a sugary liquid derived from sugar beets. The tank farm is currently surrounded by an earthen containment berm that provides spill protection in the event of tank rupture. As part of the planned intersection improvements, the existing berm will be replaced with a containment wall. The purpose of the containment wall is to replace the existing berm impacted by the intersection improvements, as well as to maintain a similar containment volume. Modifications to the berm alignment were necessary to accommodate both the proposed intersection improvements/realignment and to maintain similar containment volume. We understand the proposed wall will be constructed following the Idaho Transportation Department (ITD) Standard Specifications for Highway Construction.

GeoEngineers, Inc. (GeoEngineers) was provided preliminary drawings and typical sections of the proposed containment wall. We understand the alignment of the containment wall will cross into the existing pavement area and unpaved shoulder of Karcher Road, the existing containment berm, and exposed earth. The approximate containment wall alignment is shown in the Site Plan, Figure A-1. We understand the wall will generally be a free-standing wall and that the wall will retain a maximum of about 1 foot of soil on the outside of the containment wall.

GeoEngineers drilled three borings near the proposed wall alignment. A Laboratory summary table is in Table A-1. The boring locations can be found in the site plan, with the approximate containment wall alignment, in Figure A-1. The log of borings are provided in Figures A-2 through A-5; laboratory test results are presented in Figures A-6 and A-7; and a bearing resistance plot is in Figure A-8 in Appendix A.

Containment Wall Conclusions and Recommendations

SITE PREPARATION AND EARTHWORK

Site and Subgrade Preparation

Prior to construction, the subgrade along the wall alignment should be prepared as described in Section 200 of the ITD Standard Specifications. This should include clearing and stripping of existing fill, including the existing containment berm, as well as removing the existing pavement section and existing fence along the containment wall alignment. All topsoil, vegetation, undocumented fill, utilities that will be abandoned, and other deleterious materials should be removed from below the containment wall.

Fill soils were encountered in borings drilled at the site. Undocumented fill soils are not suitable for support of the proposed structure and should be completely removed from the proposed alignment.

Grading and Excavation

We understand that proposed site grades will generally match existing grades, and that site grading will be minimal. We anticipate that excavations to establish subgrade along the containment wall will be less than about 4 feet in depth. In our opinion, site soils can be excavated using conventional excavating equipment and procedures.

Exposed native soils near the ground surface are moisture sensitive and will be more difficult to work during or following periods of wet weather when the moisture content of the site soil is greater or less than the optimum moisture content by about 2 to 4 percentage points. In addition, drying soil that is above the optimum moisture content likely will not be feasible under such conditions. Accordingly, earthwork during wet weather should be avoided, if possible.

Alternatively, if construction activities begin in, or extend into, the winter or spring months, we recommend the project include a contingency budget to replace soil over the optimum moisture content with imported structural fill. If earthwork activities cause excessive subgrade disturbance after initial site preparation, removal of the disturbed soil and replacement with structural fill might be necessary. Disturbance to a greater depth should be expected if site preparation work is conducted during or following periods of wet weather.

Temporary and Permanent Slopes

Excavations in the soil conditions encountered at the site may be susceptible to sloughing and caving. Utility excavations deeper than 4 feet should be shored or sloped at stable inclinations if workers are required to enter such excavations. Shoring for utility excavations must conform to provisions of applicable Occupational Safety and Health Administration (OSHA) regulations.

In our opinion, site soil classifies as Soil Type C as described in the Code of Federal Regulations 29, Part 1926, Subpart P, Appendix A, for excavations more than 4 feet deep. Temporary slopes in Type C soil may be inclined at 1½H:1V (horizontal to vertical). This maximum slope inclination assumes that all surface loads are kept a minimum distance of at least one-half the depth of the cut away from the top of the slope and that the slopes are free from groundwater seepage. Flatter slopes will be necessary if surface loads are imposed above the cuts a distance equal to or less than one-half the depth of the cut.

Regardless of the soil type encountered in the excavation, shoring, trench boxes or sloped sidewalls will be required under OSHA, as applicable. While this report describes certain approaches to excavation, the contract documents should specify that the contractor is responsible for selecting excavation methods, monitoring the excavations for safety, reducing temporary slope inclinations to improve stability, and providing shoring, as required, to protect personnel.

Permanent slopes, if required, should be sloped at inclinations no steeper than 3H:1V. Permanent slopes should be seeded or sodded as soon as practicable to provide long-term erosion protection. Some sloughing and raveling of permanent slopes should be anticipated until vegetation is established.

STRUCTURAL FILL

Use of On-Site Soil

The on-site soils should not be reused as structural fill beneath the proposed wall. The on-site sand, silt and lean clay may be used as borrow in non-structural areas provided they are free of topsoil, vegetation, debris and other deleterious materials. Fat clay should not be reused on the project and should be disposed of offsite. The on-site soils will be moisture sensitive and will be difficult to compact when wet. As a result, the on-site soils should only be placed and compacted during extended periods of warm and dry weather. See the Weather Considerations section of this report for more information regarding the on-site soils.

The existing base layers underlying the asphalt pavement can be used as structural fill at the site, provided it is carefully segregated and stockpiled from the native soils. If base layers are contaminated with native soils during exaction or storage, they should not be used as structural fill and should be limited to non-structural areas.

Imported Structural Fill

Structural fill used beneath the proposed wall should consist of soil meeting the requirements of Aggregate for Granular Subbase as described in Section 703.11 of the ITD Standard Specifications, or ¾-inch (Type B) Aggregate for Untreated Base as described in Section 703.04 of the ITD Standard Specifications.

Fill Placement and Compaction Criteria

Fill placement and compaction should be in accordance with Section 205 and 210 of the ITD Standard Specifications, as applicable. Compaction should meet the requirements for Class A compaction.

Soil conditions should be evaluated by in-place density tests, visual evaluation, probing and/or proof-rolling of the structural fill and recompacted native soil as it is prepared to check for compliance with the contract documents and recommendations in this report.

WEATHER CONSIDERATIONS

The native surficial soils encountered in our explorations have a high amount of fine-grained particles and are moisture sensitive and easily disturbed, especially if earthwork is completed during periods of wet weather. If the moisture content is more than a few percent above optimum, the material is likely to become soft and unstable. Operation of equipment in these conditions can be difficult and the required compaction criteria will be difficult to achieve. If wet weather earthwork is unavoidable, we recommend the following:

- Measures are to be taken by the Contractor to prevent surface water from collecting in the work areas, and to remove water should it collect within these areas.
- Earthwork activities are not to take place during periods of heavy precipitation.
- The site soils should not be left uncompacted and exposed to moisture. Sealing the surficial soil by rolling with a smooth-drum roller prior to periods of precipitation should reduce the extent to which the soil becomes wet or unstable.
- Subgrades that are prepared before inclement weather are to be re-inspected to identify areas requiring repair. Any such areas are to be repaired at the direction of the geotechnical engineer.
- Frozen soils should not be used as fill materials, and fill should not be placed on frozen soils.

Construction activities should be scheduled so that the length of time that soil is exposed to moisture during wet weather is reduced to the extent practical. During dry weather, the soils will: (1) be less susceptible to disturbance; (2) provide better support for construction equipment; and (3) be more likely to meet the required compaction criteria.

FOUNDATION SUPPORT

Foundation excavation, subgrade preparation, and backfill should be in accordance with Section 210 of the ITD Standard Specifications. Foundations should be supported on undisturbed native soil or on structural fill extending to native soils. If fat clay is exposed in the foundation excavation, the fat clay should be overexcavated and replaced with compacted structural fill. We understand that foundation depth will be 2½ feet below ground surface which is deeper than the minimum design frost embedment depth of 2 feet.

Soil Design Parameters

Estimated soil parameters for the proposed containment wall are presented in Table 1 below. Soil parameters were determined based on the results of our field exploration program and correlations to field and laboratory data.

TABLE 1. ESTIMATED SOIL PARAMETERS FOR DESIGN

SOIL PARAMETERS	NATIVE UPPER CLAY AND SILT	NATIVE INTERBEDDED SILT AND SAND
Total Unit Weight (pcf)	115 (moist) 120 (saturated)	125 (moist) 130 (saturated)
Friction Angle, ϕ (degrees)	30	32
Cohesion, c (psf)	0	0

Note:

pcf = pounds per cubic foot; psf = pounds per square foot

Bearing Capacity and Settlement

Bearing capacities for shallow foundations supporting the proposed containment wall were computed using the Munfakh, et al., 2001 method from Section 10.6.3 of the American Association of State Highway and Transportation Officials (AASHTO) load-and-resistance factor design (LRFD) Bridge Design Specifications. The settlement bearing resistance values (Service Limit State) were computed using the Hough method from Section 10.6.2.4.2 of the AASHTO LRFD Bridge Design Specifications. The factored shallow foundation bearing resistance recommendations for the containment wall are presented in Figure A-8.

The service limit bearing capacity corresponding to a service limit deflection of 1 inch is presented in Figure A-8. We anticipate that the settlement will mainly occur as the loads are applied and long-term settlement is expected to be relatively small, provided the foundations are supported as recommended in this report.

Foundation Resistance to Lateral Loads

Lateral loads may be resisted by friction at the base of the foundations in accordance with Section 10.6.3.4 of the AASHTO LRFD Bridge Design Specifications. For foundations supported as recommended above, the nominal (ultimate) sliding resistance between soil and foundation may be computed using a coefficient of 1.0 (cast-in-place concrete) or 0.8 (pre-cast concrete) applied to the total vertical force and the tangent of the internal friction angle of drained soil (30 degrees) as defined in Equation 10.6.3.4-2 of the AASHTO LRFD Bridge Design Specifications.

It also may be possible to utilize passive resistance against the footing edges; however, we recommend passive resistance not be used unless lateral displacement sufficient to mobilize passive resistance can be tolerated. If used, the nominal (ultimate) passive resistance is presented in the Lateral Earth Pressures section of this document.

Resistance Factors

We recommend the resistance factors presented in Table 2 be used for the design of shallow foundations. The bearing resistance charts presented on Figure A-8 incorporate the recommended resistance factors.

TABLE 2. RESISTANCE FACTORS - SHALLOW FOUNDATIONS

LIMIT STATE	RESISTANCE FACTOR		
	BEARING RESISTANCE	SLIDING RESISTANCE	PASSIVE RESISTANCE
Strength	0.45	0.85 for precast footings 0.80 for cast-in-place footings	0.5
Service	1.0	1.0	1.0
Extreme	1.0	1.0	1.0

LATERAL EARTH PRESSURES

Wall backfill material used in conjunction with this project should be free from organic and deleterious materials and can consist of native soil (excluding fat clay) or imported structural fill that should conform to the Aggregate for Granular Subbase as described in Section 703.11 of the ITD Standard Specifications or ¾-inch (Type B) Aggregate for Untreated Base as described in Section 703.04 of the ITD Standard

Specifications. The recommended lateral earth pressure values for native and fill material are summarized in Table 3.

TABLE 3. RECOMMENDED LATERAL EARTH PRESSURES

EARTH PRESSURE CONDITION	SLOPE ABOVE WALL	PRESSURE COEFFICIENT	EQUIVALENT FLUID DENSITY ¹ (PCF)	
			FULLY DRAINED	UNDRAINED ²
Aggregate for Granular Subbase				
(Based on moist and saturated unit weight of 125 and 130 pcf, respectively, and an angle of internal friction of 34 degrees)				
Active	Horizontal	0.28	35	81
At-rest	Horizontal	0.44	55	92
Passive	Horizontal	3.54	442	239
Native Upper Clay and Silt				
(Based on moist and saturated unit weight of 115 and 120 pcf, respectively, and an angle of internal friction of 30 degrees)				
At-rest	Horizontal	0.50	58	91
Passive	Horizontal	3.00	345	173

Note:

¹ All values are nominal (unfactored) and should be used with appropriate load and resistance factors.

² For the active and at-rest earth pressures, the values presented for the undrained condition include water pressure. The passive earth pressure for the undrained condition does not include water pressure.

Rigid structures should be designed using at-rest earth pressures. Active earth pressure coefficients should be used for walls that are free to rotate or translate. If wall movement will be less than about 0.001H (where H is the height of the abutment wall) under static conditions, then at-rest static earth pressures should be used.

The lateral earth pressures for the drained condition assume the backfill soils are properly drained and do not include hydrostatic pressures. The lateral earth pressures for the undrained condition assume the backfill soils are saturated and include hydrostatic forces that can develop if an Amalgamated Sugar Storage Tank failure occurs, or surface water accumulates behind the retaining structures.

Backfill material for the structure should be placed and compacted in accordance with Section 210 of the ITD Standard Specifications. Over-compaction of buried structures or retaining walls adjacent to structures should be avoided because increased compactive effort will result in lateral pressures higher than those provided in this report.

SEISMIC DESIGN

Fault Rupture

We reviewed the United States Geological Survey (USGS) (2014) online Quaternary Faults database, Idaho Geological Survey's (IGS) Miocene-Quaternary Fault Map database and published maps available from IGS relative to seismic history and faulting in the project vicinity. A summary of faults mapped within

about 30 miles of the proposed containment wall as part of the Northside and Karcher Roundabout Intersection Improvements are summarized in Table 4.

TABLE 4. SUMMARY OF NEARBY MAPPED FAULTS

FAULT NAME	APPROXIMATE DISTANCE TO SITE	AGE	PROBABILITY OF ACTIVITY
Western Snake River Plain Fault System	< 1 mile south	Lesser Quaternary (<130 thousand years)	Low
Squaw Creek Fault	25 miles northeast	Major Holocene (<10,000 years)	Moderate
Bristol Creek Fault	30 miles northeast	Lesser Quaternary (<130 thousand years)	Low

Based on our observations and the site location with respect to the nearest known faults, it is our opinion that the probability of damaging fault rupture on the site is low and does not warrant fault trenching or specific design considerations.

Seismic Design Parameters

ITD *Materials Manual* Section 630.04 presents maps providing design acceleration coefficients, which have been adapted from the Seismic Hazard Maps presented in the AASHTO LRFD Bridge Design Specifications. The acceleration coefficients for design are based on the expected ground motion at the project site that has a 7 percent probability of exceedance in a 75-year period (approximate 1,000-year return period). The recommended seismic design parameters are presented in Table 5.

TABLE 5. AASHTO SEISMIC PARAMETERS

AASHTO SEISMIC PARAMETERS	RECOMMENDED VALUE
Site Class	D
Peak Ground Acceleration (PGA), bedrock Site Class B	0.077
Spectral Response Acceleration at 0.2-Second Period (S_s), bedrock Site Class B	0.18
Spectral Response Acceleration at 1-Second Period (S_1), bedrock Site Class B	0.065
Zero-period Site Factor, F_{pga}	1.6
Short Period Site Factor, F_a	1.6
Long-period Site Factor, F_v	2.4
Free-field Acceleration Coefficient (A_s), Amplified for Site Class D	0.124
Design Spectral Acceleration Coefficient at 0.2-Second Period (S_{DS}), Amplified for Site Class D	0.288
Design Spectral Acceleration Coefficient at 1.0-second Period (S_{D1}), Amplified for Site Class D	0.156

Note:

Mapped values derived from the 2009 USGS online tool using the coordinates 43.60524°, -116.57165°

Liquefaction Potential

Liquefaction is a phenomenon where soils experience a rapid loss of internal strength as pore water pressures increase in response to strong ground shaking. The increased pore water pressure may temporarily meet or exceed soil overburden pressures to produce conditions that allow soil and water to

flow, deform, or erupt from the ground surface. Ground settlement, lateral spreading and/or sand boils may result from soil liquefaction. Structures supported on or within liquefied soils may suffer foundation settlement or lateral movement that can be damaging to the structure.

Based on the subsurface conditions encountered in the borings, our review of the geologic literature and our analysis, it is our opinion the risk of liquefaction is low at the site within the depths explored by the borings.

Report Considerations

We have prepared this report for Parametrix, Inc. (Parametrix) to support the City of Nampa and other members of the design and construction team for the Northside and Karcher Roundabout Intersection Improvements project in Nampa, Idaho. This report is not intended for use by others and the information contained herein is not applicable to other sites. Our report, conclusions and interpretations should not be construed as a warranty of the subsurface conditions.

If project conditions change from those assumed in this report, we recommend that we be retained to review our design, conclusions and recommendations and to determine whether they are still appropriate, or to provide supplemental information, as appropriate. When the design has been finalized, we recommend that the project design and specifications be reviewed by our firm to verify that our recommendations have been interpreted and implemented as intended.

The scope of our services does not include services related to construction safety precautions and our recommendations are not intended to direct the contractor's methods, techniques, sequences, or procedures, except as specifically described in our report for consideration in design.

Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted practices in the field of geotechnical engineering in this area at the time this report was prepared. No warranty or other conditions, express or implied, should be understood.

References

AASHTO. 2020. Load and Resistance Factor Design Bridge Design Specifications. 9th Edition.

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

USGS, Quaternary Faults Database. Accessed January 13, 2025. U.S. Quaternary Faults (usgs.maps.arcgis.com).

USGS, Unified Hazard Tool. Available online at <https://earthquake.usgs.gov/hazards/interactive/> Accessed January 2, 2025.

USGS, U.S. Seismic Design Maps Online Tool. Available online at <https://earthquake.usgs.gov/ws/designmaps/> Accessed January 2, 2025.

Closing

We trust this letter serves your current needs. Please call if you have any questions or require additional information.

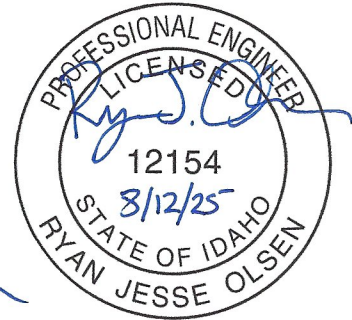
Sincerely,
GeoEngineers, Inc.

Kevin A. Russ, P.E.

Kevin Russ, PE
Geotechnical Engineer

Ryan J. Olsen

Ryan J. Olsen, PE
Principal Geotechnical Engineer



KAR:RJO:nld:mce

Attachments

Appendix A. Figures, Field Explorations and Laboratory Test Results

Table A-1 – Laboratory Test Summary

Figure A-1 – Site Plan

Figure A-2 – Key to Exploration Logs

Figures A-3 through A-5 – Log of Borings

Figure A-6 – Sieve Analysis Results

Figure A-7 – Atterberg Limits Test Results

Figure A-8 – Bearing Resistance Graph

One electronic copy submitted

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Appendix A

Figures, Field Explorations and Laboratory Test Results

Table A-1

Laboratory Test Summary

Northside and Karcher Roundabout Intersection Improvements

Project No. A023(731); KN23731

Nampa, Idaho

Sample Information				Water Content (%)	Soil Index Testing							Soil Corrosivity				Soil Description (USCS)
					Atterberg Limits (%)			Sieve Analysis				Resistivity (ohms-cm)	Soil pH	Soluble Chloride (mg/kg)	Soluble Sulfate (mg/kg)	
Boring Designation	Sample Number	Sample Depth (feet)	Sample Type		Liquid Limit	Plastic Limit	Plastic Index	Percent Gravel	Percent Sand	Percent Fines						
GEI-B4-24	BULK	1 - 3	BULK	18	52	23	29	5	25	70	19					Sandy fat clay (CH)
GEI-B4-24	2	2.5 - 4	SPT	22						82						Silt with sand (ML)
GEI-B5-24	2	2.5 - 4	SPT	28				3	43	54						Sandy silt (ML)
GEI-B5-24	3	5 - 6.5	SPT	21						33						Silty fine to medium sand (SM)
GEI-B5-24	7	15 - 16.5	SPT	39	NP	NP	NP			99						Silt (ML)
GEI-B6-24	1	0 - 1.5	SPT									3,120	8.2	5	27	Sandy silt (ML)
GEI-B6-24	2	2.5 - 4	SPT	31						58						Sandy silt (ML)
GEI-B6-24	3	5 - 6.5	SPT	25				2	62	36						Silty fine to medium sand (SM)

Notes:

SPT = standard penetration test sample

NP = non-plastic

mg/kg = milligrams per kilogram; pcf = pounds per cubic foot

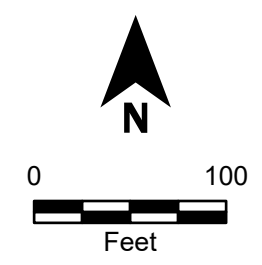


Legend

-  Boring by GeoEngineers, 2024
-  Containment Wall

Source(s):
• ESRI Street Map Premium
• ESRI Clarity
Coordinate System: NAD 1983 StatePlane Idaho West FIPS 1103 Feet

Disclaimer: This figure was created for a specific purpose and project. Any use of this figure for any other project or purpose shall be at the user's sole risk and without liability to GeoEngineers. The locations of features shown may be approximate. GeoEngineers makes no warranty or representation as to the accuracy, completeness, or suitability of the figure, or data contained therein. The file containing this figure is a copy of a master document, the original of which is retained by GeoEngineers and is the official document of record.



Site Plan	
Northside Boulevard and Karcher Road Intersection Improvements - Project No. A023(731); KN23731 Nampa, Idaho	
	Figure A-1

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS
			GRAPH	LETTER	
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES
		(LITTLE OR NO FINES)		GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES
		GRAVELS WITH FINES		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
		(APPRECIABLE AMOUNT OF FINES)		GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS	CLEAN SANDS		SW	WELL-GRADED SANDS, GRAVELLY SANDS
		(LITTLE OR NO FINES)		SP	POORLY-GRADED SANDS, GRAVELLY SAND
SANDS WITH FINES			SM	SILTY SANDS, SAND - SILT MIXTURES	
(APPRECIABLE AMOUNT OF FINES)			SC	CLAYEY SANDS, SAND - CLAY MIXTURES	
FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS, ROCK FLOUR, CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS AND SILTS OF MEDIUM TO HIGH PLASTICITY
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: Multiple symbols are used to indicate borderline or dual soil classifications

Sampler Symbol Descriptions

	Modified California Sampler (6-inch sleeve) or Dames & Moore
	Standard Penetration Test (SPT)
	Shelby tube
	Piston
	Direct-Push
	Bulk or grab
	Continuous Coring

Blowcount is recorded for driven samplers as the number of blows required to advance sampler 12 inches (or distance noted). See exploration log for hammer weight and drop.

"P" indicates sampler pushed using the weight of the drill rig.

"WOH" indicates sampler pushed using the weight of the hammer.

NOTE: The reader must refer to the discussion in the report text and the logs of explorations for a proper understanding of subsurface conditions. Descriptions on the logs apply only at the specific exploration locations and at the time the explorations were made; they are not warranted to be representative of subsurface conditions at other locations or times.

ADDITIONAL MATERIAL SYMBOLS

SYMBOLS		TYPICAL DESCRIPTIONS
GRAPH	LETTER	
	AC	Asphalt Concrete
	CC	Cement Concrete
	CR	Crushed Rock/Quarry Spalls
	SOD	Sod/Forest Duff
	TS	Topsoil

Groundwater Contact



Measured groundwater level in exploration, well, or piezometer



Measured free product in well or piezometer

Graphic Log Contact



Distinct contact between soil strata



Approximate contact between soil strata

Material Description Contact



Contact between geologic units



Contact between soil of the same geologic unit

Laboratory / Field Tests

%F	Percent fines
%G	Percent gravel
AL	Atterberg limits
CA	Chemical analysis
CP	Laboratory compaction test
CS	Consolidation test
DD	Dry density
DS	Direct shear
HA	Hydrometer analysis
MC	Moisture content
MD	Moisture content and dry density
Mohs	Mohs hardness scale
OC	Organic content
PM	Permeability or hydraulic conductivity
PI	Plasticity index
PL	Point load test
PP	Pocket penetrometer
SA	Sieve analysis
TX	Triaxial compression
UC	Unconfined compression
UU	Unconsolidated undrained triaxial compression
VS	Vane shear

Sheen Classification

NS	No Visible Sheen
SS	Slight Sheen
MS	Moderate Sheen
HS	Heavy Sheen

Key to Exploration Logs



Figure A-2

Start Drilled	11/14/2024	End 11/14/2024	Total Depth (ft)	11.5	Logged By Checked By	DSD KAR	Driller	HazTech Drilling, Inc.	Drilling Method	Hollow-stem Auger
Surface Elevation (ft) Vertical Datum	2473.3 NAVD88		Hammer Data		Autohammer 140 (lbs) / 30 (in) Drop		Drilling Equipment		CME 75	
Easting (X) Northing (Y)	2407018 707991		System Datum		CF = 1.00014955836 Project Coordinate System (feet)		Groundwater not observed at time of exploration			
Notes: Hammer efficiency 85.4%; Preformed DCP testing from 9.5 to 44.4 inches below ground surface										

Elevation (feet)	FIELD DATA				Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	Interval Depth (feet)	Recovered (in)	Blows/foot	Collected Sample Sample Name Testing					
2470	0				AC	Approximately 7 inches of asphalt concrete			
	16	18		1	SW-SM	Approximately 4 inches of brown fine to coarse sand with silt and gravel (medium dense, moist) (base course)	18	70	Collected bulk sample from 1 to 3 feet Idaho R-value = 19; AL (LL = 52; PI = 29) Pocket penetrometer = 3.5 tsf
	13	21		2	CH	Dark brown sandy fat clay (very stiff, moist) (native)			
				%F	ML	Dark brown silt with sand (very stiff, moist)	22	82	Pocket penetrometer = 1.5 tsf
2465	5	17	29	3	SM	Brown silty fine sand (medium dense, moist)			
	16	55		4					Weak cementation
	10	17	8	5	SPSM	Light brown fine to coarse sand with silt (loose, moist)			

Note: See Figure A-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on Survey by Ardurra. Vertical approximated based on Survey by Ardurra.

Log of Boring GEI-B4-24



Project: KN23731 Northside and Karcher Roundabout
Project Location: Nampa, Idaho
Project Number: 9468-021-00

Figure A-3
Sheet 1 of 1

Date: 1/24/25 Path: P:\9 9468021\GINT\9468021\00.GPJ DBLibrary\Library\GEOENGINEERS_DF_STD_US_JUNE_2017\GLB\GEI\GEOTECH_STANDARD_D_SF_NO_GW

Start Drilled 11/14/2024	End 11/14/2024	Total Depth (ft) 21	Logged By Checked By DSD KAR	Driller HazTech Drilling, Inc.	Drilling Method Hollow-stem Auger
Surface Elevation (ft) Vertical Datum	2473.5 NAVD88	Hammer Data	Autohammer 140 (lbs) / 30 (in) Drop	Drilling Equipment	CME 75
Easting (X) Northing (Y)	2407404 707652	System Datum	CF = 1.00014955836 Project Coordinate System (feet)	See "Remarks" section for groundwater observed	
Notes: Hammer efficiency 85.4%					

Elevation (feet)	FIELD DATA					MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS
	Depth (feet)	Interval Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Graphic Log			
2470	0	13	13		1		SM	Brown silty fine sand (medium dense, moist) (fill)	Weak cementation Groundwater observed at approximately 13¼ feet AL (Non-plastic) 600 to >4,000 psi pressure to push Shelby tube
							CL	Dark brown sandy clay (stiff, moist) (native)	
		18	37		2		ML	Brown sandy silt (hard, moist)	
2465	5	14	26		3		SM	Brown silty fine to medium sand (medium dense, moist)	
					4				
	10	16	16		5				
2460		14	17		4				
					6		ML	Brown silt with sand (medium stiff, wet)	
	15	18	5		7		ML	Brown silt (medium stiff, wet)	
2455		24			8		SW	Brown fine to coarse sand (loose, wet)	
					9		ML	Brown silt with occasional sand (stiff, wet)	
	20	18	10						

Note: See Figure A-1 for explanation of symbols.
Coordinates Data Source: Horizontal approximated based on Survey by Ardurra. Vertical approximated based on Survey by Ardurra.

Log of Boring GEI-B5-24



Project: KN23731 Northside and Karcher Roundabout
Project Location: Nampa, Idaho
Project Number: 9468-021-00

Figure A-4
Sheet 1 of 1

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Start Drilled 11/15/2024	End 11/15/2024	Total Depth (ft) 21.5	Logged By Checked By DSD KAR	Driller HazTech Drilling, Inc.	Drilling Method Hollow-stem Auger
Surface Elevation (ft) Vertical Datum	2472.5 NAVD88	Hammer Data	Autohammer 140 (lbs) / 30 (in) Drop	Drilling Equipment	CME 75
Easting (X) Northing (Y)	2407067 707766	System Datum	CF = 1.00014955836 Project Coordinate System (feet)	See "Remarks" section for groundwater observed	
Notes: Hammer efficiency 85.4%					

Elevation (feet)	FIELD DATA				Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Fines Content (%)	REMARKS	
	Interval	Recovered (in)	Blows/foot	Collected Sample Sample Name Testing							
2470	0	14	8	1 pH; Resist; CA		SM	Brown silty fine to coarse sand with gravel (loose, moist) (fill)	31	58	pH = 8.2; Resistivity = 3,120 ohms-cm; soluble sulfate = 27 ppm; soluble chloride = 5 ppm	
						CL	Dark brown sandy clay (stiff, moist) (native)				
		17	17	2 %F		ML	Brown sandy silt (very stiff, moist)	25	36	Groundwater observed at approximately 12 feet	
2465	5	16	32	3 SA		SM	Brown silty fine to medium sand (dense, moist)				
		18	29	4			Becomes medium dense				
2460	10	16	28	5		SP	Light brown fine to coarse sand (medium dense, moist)				
						SM	Brown silty fine sand (medium dense, moist)				
		18	13	6		ML	Brown silt with occasional sand (stiff, wet)				
2455	15	18	17	7			Becomes very stiff				
		17	18	8		SM	Brown silty fine to medium sand (medium dense, wet)				
						ML	Brown silt with sand (very stiff, wet)				
20		18	37	9		SP-SM	Brown fine to coarse sand with silt and occasional gravel (dense, wet)				
						SM	Brown silty fine sand (dense, wet)				

Note: See Figure A-1 for explanation of symbols.

Coordinates Data Source: Horizontal approximated based on Survey by Ardurra. Vertical approximated based on Survey by Ardurra.

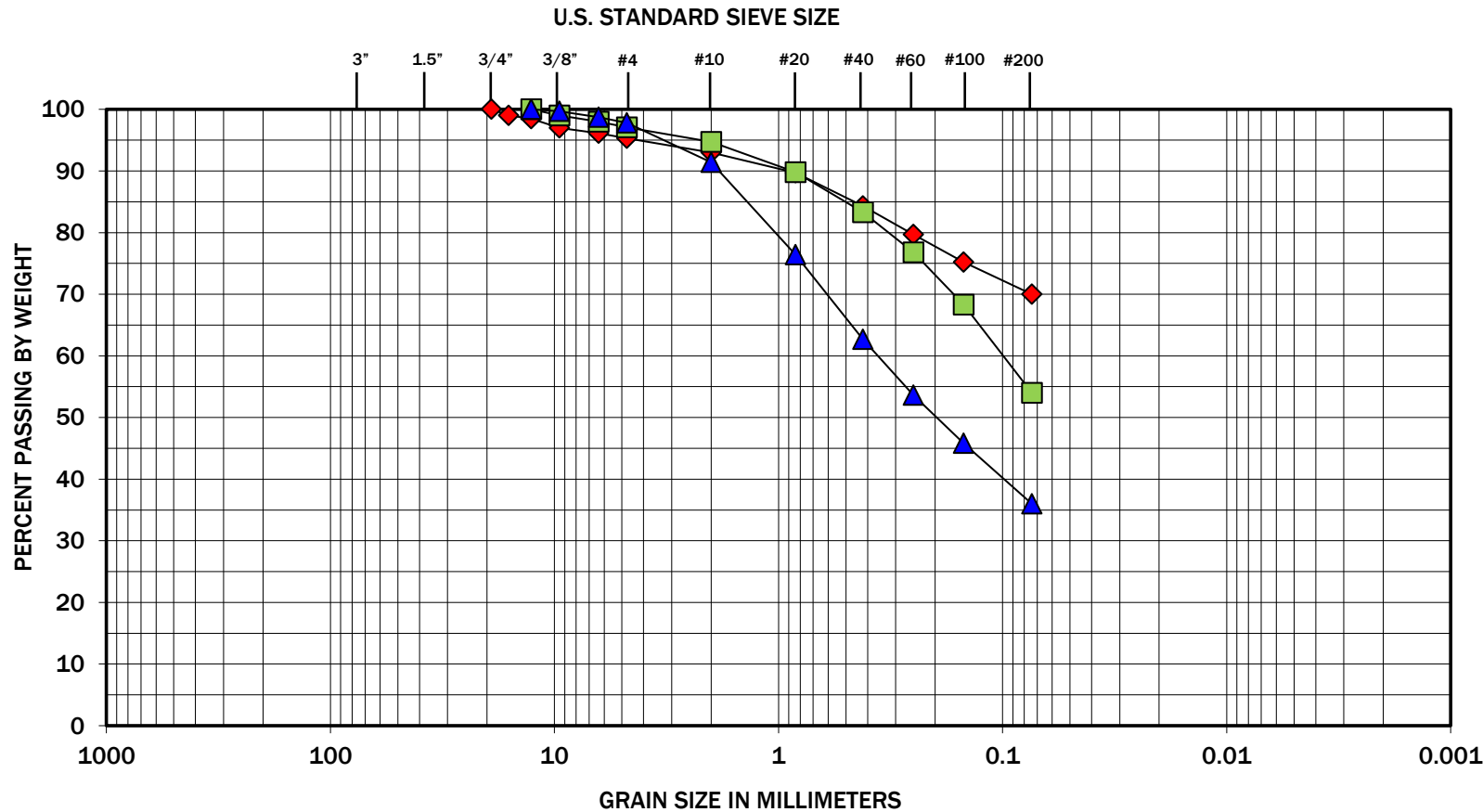
Log of Boring GEI-B6-24



Project: KN23731 Northside and Karcher Roundabout
Project Location: Nampa, Idaho
Project Number: 9468-021-00

Figure A-5
Sheet 1 of 1

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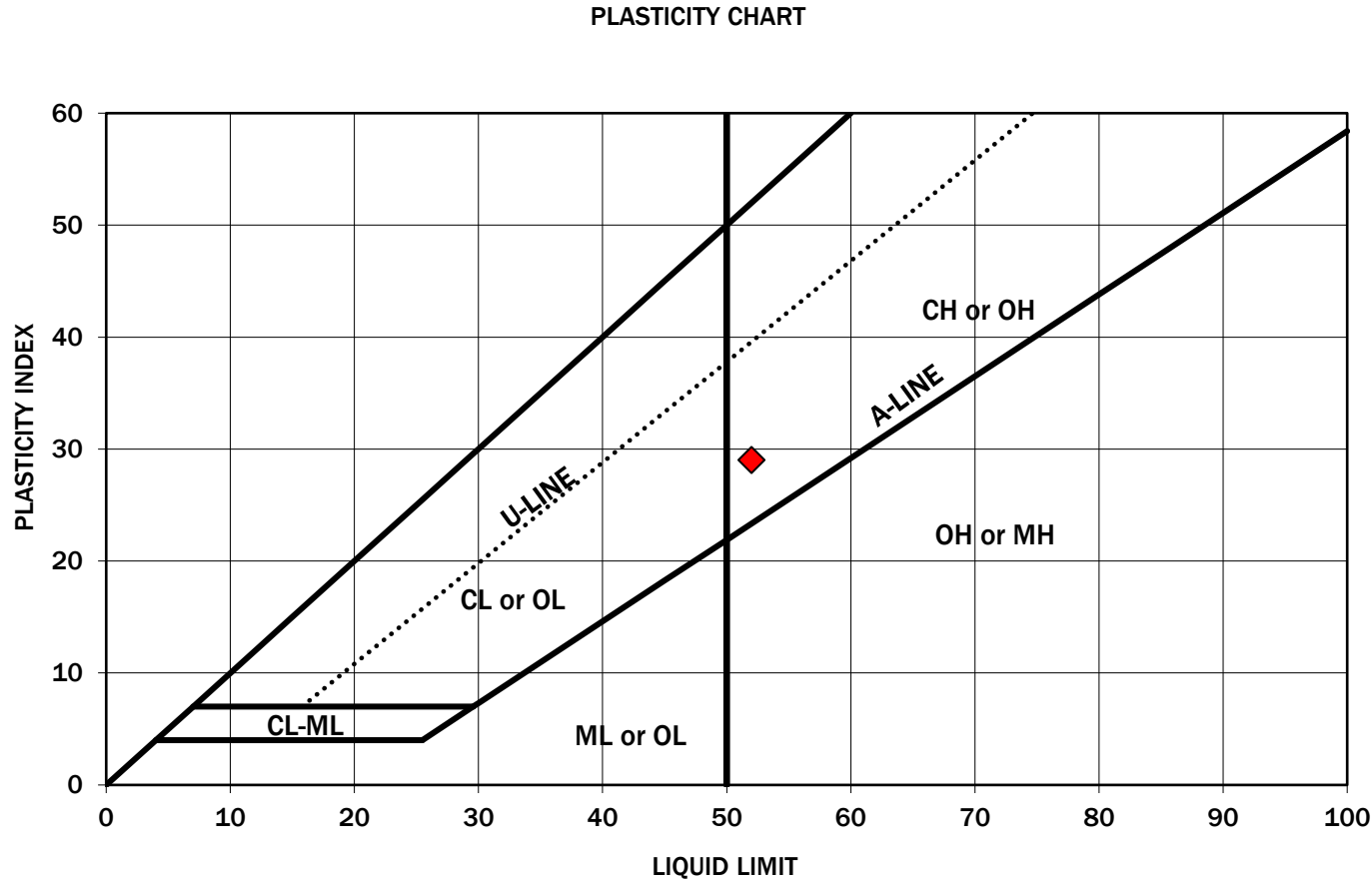


COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Symbol	Boring Number	Depth (feet)	Moisture (%)	Soil Description
◆	GEI-B4-24	Bulk, 1 - 3	18	Sandy fat clay (CH)
■	GEI-B5-24	2.5 - 4	28	Sandy silt (ML)
▲	GEI-B6-24	5 - 6.5	25	Silty fine to medium sand (SM)

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The grain size analysis results were obtained in general accordance with ASTM D 6913.

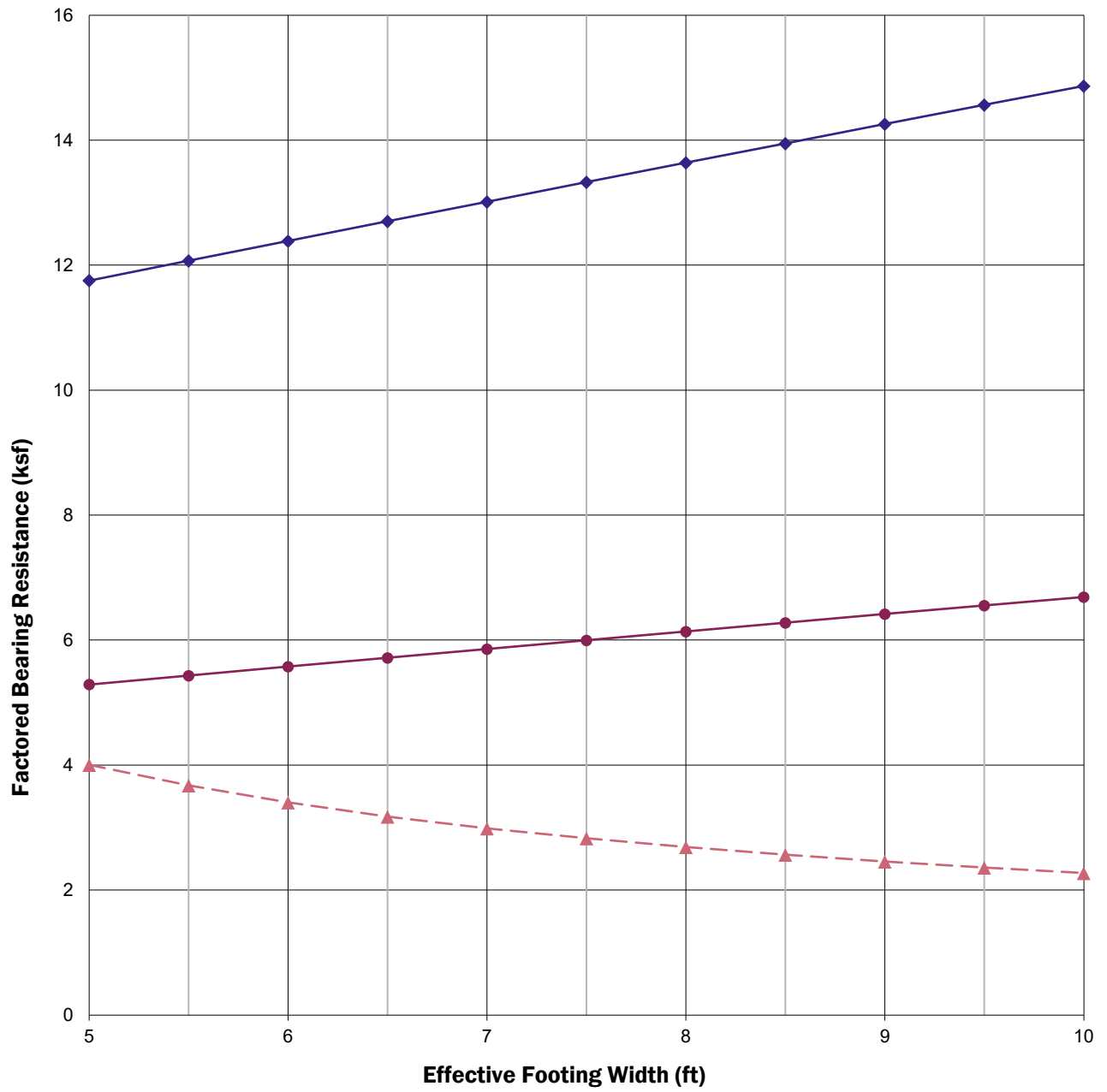


Symbol	Boring Number	Depth (feet)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Soil Description
◆	GEI-B4-24	Bulk; 1-3	18	52	29	Sandy fat clay (CH)

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The liquid limit and plasticity index were obtained in general accordance with ASTM D 4318.

Atterberg Limits Test Results	
Northside and Karcher Roundabout Intersection Improvements; Project No. A023(731); KN23731 Nampa, Idaho	
	Figure A-7



Bearing Resistance Northside Boulevard and Karcher Road Intersection Improvements Project No. A023(731); KN23731 Nampa, Idaho	
GEOENGINEERS 	Figure A-8