PROJECT MANUAL

NEW JEROME ELEMENTARY SCHOOL

for

Jerome School District

Bid Set

Jerome, Idaho
February 11, 2022

VOLUME FOUR

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7/21/2021

Geotechnical Report

Glen Eagle – Jerome School District

EHM No. 326-21

Prepared by: Matt Ahrens, EIT

EHM Engineers, Inc.
BUILDING THE FUTURE ON A FOUNDATION OF EXCELLENCE

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Introduction

The purpose of this report is to present the results of a geotechnical investigation for the Jerome School District to construct a new elementary school north of the Glen Eagle Subdivision. The site is accessed Glen Eagle Drive. The legal description for the project location is described as follows:

Located in the SE^4NE^4 portion of Section 19, Township 8 South, Range 17 East, Boise Meridian.

Refer to Figure 1 for subject property location.

The area of interest is currently an undeveloped property that was likely utilized for agricultural crop production in the past but isn't being used as such for the current growing season. EHM Engineers, Inc. understands the scope of work for this report to be limited to a geotechnical investigation for a new proposed elementary school building pad site. This includes the related site development plans for parking, access, and site layout. The proposed construction is understood to be a single-story structure.

This report will include the following scope:

1) Description of the existing subsurface materials and conditions.
2) Conclusions and recommendations for:
    a. Foundation design
    b. Settlement estimation
    c. Seismic design
    d. Pavement sections
    e. Lateral earth pressures
    f. Structural fill
    g. Sub-grade preparation beneath slabs on grade and roadways
    h. Cut slope limitations and excavations
    i. Storm water retention

Figure 1: Project Vicinity Map

Site Description

The subject area is accessed from Glen Eagle Drive and lies directly north of Glen Eagle Subdivision found one half of a mile south of the Jerome High School. There are no improved surfaces on the premises, and little or no utilities are present. Some buried power may be located near the northeast corner of the property.

Single-family residences are located to the west and south, while agricultural crop land is found to the north and east. Refer to Figure 1 and Figure 2 for more information.

Nineteen (19) test hole locations were identified and seventeen (17) were drilled. Drilling was performed by a truck mounted drill rig. Soil samples were obtained from a split spoon sampler at various depths between two and half, five, and ten feet deep. Refer to Site Investigation for detailed sampling information. Silt with Sand and Sandy Silt soils were identified. Refer to Figure 2 for test hole locations.

Figure 2: Test Hole Location Map

The site appears to naturally drain to the southwest from natural topography. According to the National Resource Conservation Service (NRCS), the native soil type in the area is classified as follows:

- Shano Silt Loam: a well-drained soil with a moderately high to high ability to transmit water

Depth to groundwater is described to be more than 80 inches below the ground surface (NRCS).

Area Geology

The Magic Valley is at the center of the Great Rift, a 635-square mile geologic phenomenon, a series of fissures, spatter cones and lava tubes created by 60 different lava flows and over 25 volcanic eruptions. These geologic events helped create the well-known Snake River. There are two predominant types of volcanic rocks that make up the Snake River Canyon near the project site: Rhyolite is from the explosive volcanic eruptions, dating back to when Magic Valley was located over the Yellowstone volcano, and basalt from the slower-moving lava. The rhyolite is 8-10 million years old and the basalt is less than 1 million years old. The canyon formed prior to the Bonneville Flood, 14,500 years ago. The canyon was much shallower and only became deepened with the high flows and extreme velocities of the water due to the flood.

Locally, the geology can be described as deposits of silt, sand, and similar loess deposits. These deposits range in depth from a few feet to tens of feet in thickness. Underlying basalt rock can be identified from the Pleistocene and Pliocene eras that are relatively dense (Idaho Geological Survey).

Site Investigation

Site investigation began and finished on July 9, 2021. Nineteen (19) exploratory test holes, numbering #1 through #19, were drilled. Test holes #15 and #17 were not drilled due to their respective markers not being present. All tests were drilled with a truck mounted drill rig that utilized a hollow stem auger. Soil samples were obtained from each test hole at approximately two and half (2.5), five (5), and ten (10) foot depths. Investigation went to a depth of fifteen (15) feet or until rock, whichever was encountered first. Standard Penetration Tests (SPT) were completed at each interval described above with the use of a two (2) inch diameter by eighteen inch long split spoon sampler with a 140 pound automatic drive weight. Blow counts were recorded for the last twelve inches of the eighteen inch sample. The approximate location of the test holes were specified by Tim Vawser of EHM Engineers, Inc. It is noteworthy to mention that groundwater was not encountered in any of the test holes during excavation. Refer to Table 1: Site Investigation Results for more data.

The soils were collected by EHM Engineers, Inc. and analyzed at their materials testing laboratory. The soils were laboratory tested and classified according to the Unified Soil Classification System (ASTM D-2487). The test pit locations are shown on Figure 2 and fully described in Table 1. The bore logs can be found in Appendix A, the USGS soil classification in Appendix B, the lateral earth pressure calculations in Appendix C, and the laboratory results in Appendix D. Note that a proctor test was not done on these samples.

Table 1: Site Investigation Results

Test Hole	Ground Elevation	Depth to Rock	Stratum	Blow Count (N_{60})	USCS	Soil Description
#1	±3827	7'	0'-2.5'			Topsoil, brown
			2.5'-4'	9-11-10	ML	Silt, Light Brown
			4'-5'			
			5'-6.5'	8-12-31	ML	Calcified Silt, Light Brown
			6.5'-7'			
			7'-			Basalt Rock
#2	±3827	3'	0'-2.5'			Topsoil, brown
			2.5'-3'	15-50 (2")	ML	Calcified Silt, Light Brown
			3'-			Basalt Rock
#3	±3829	6.5'	0'-2.5'			Topsoil, brown
			2.5'-4'	10-11-15	ML	Silt, Light Brown
			4'-5'			
			5'-5.5'	13-50 (4")	ML	Silt, Light Brown
			5.5'-			Basalt Rock
#4	±3830	8'	0'-2.5'			Topsoil, brown
			2.5'-4'	5-5-8	ML	Silt, Light Brown
			4'-5'			
			5'-6.5'	12-12-9	ML	Calcified Silt, Light Brown
			6.5'-8'			
			8'-			Rock
#5	±3826	6.5'	0'-2.5'			Topsoil, brown
			2.5'-4'	12-10-8	ML	Silt, Light Brown
			4'-5'			
			5'-6.5'	15-38-18	ML	Calcified Silt, Light Brown
			6.5'-			Basalt Rock
#6	±3826	2'	0'-2'			Topsoil, brown
			2'-			Silty sand

Test Hole	Ground Elevation	Depth to Rock	Stratum	Blow Count (N_{60})	USCS	Soil Description
#7	±3825	6.5'	0'-2.5'			Topsoil, brown
			2.5'-4'	6-9-10	ML	Silt, Light Brown
			4'-5'			
			5'-6.5'	5-7-10	ML	Calcified Silt, Light Brown
			6.5'-			Basalt Rock
#8	±3824	5.5'	0'-2.5'			Topsoil, brown
			2.5'-4'	3-4-4	ML	Silt, Light Brown
			4'-5'			
			5'-5.5'	11-50 (5")	ML	Silt, Light Brown
			5.5'-			Basalt Rock
#9	±3822	6'	0'-2.5'			Topsoil, brown
			2.5'-4'	6-4-5	ML	Silt, Light Brown
			4'-5'			
			5'-6'	9-9-50 (3")	ML	Calcified Silt, Light Brown
			6'-			Basalt Rock
#10	±3824	6'	0'-2.5'			Topsoil, brown
			2.5'-4'	8-3-2	ML	Silt, Light Brown
			4'-5'			
			5'-6'	4-5-50 (5")	ML	Calcified Silt, Light Brown
			6'-			Basalt Rock
#11	±3823	7.5'	0'-2.5'			Topsoil, brown
			2.5'-4'	3-6-5	ML	Silt, Light Brown
			4'-5'			
			5'-6.5'	9-22-36	ML	Calcified Silt, Light Brown
			6.5'-8'			
			8'-			Rock

Test Hole	Ground Elevation	Depth to Rock	Stratum	Blow Count (N_{60})	USCS	Soil Description
#12	±3825	4'	0'-2.5'			Topsoil, brown
			2.5'-4'	4-7-50 (4")	ML	Calcified Silt, Light Brown
			4'-			Basalt Rock
#13	±3821	10'	0'-2.5'			Topsoil, brown
			2.5'-4'	4-6-12	ML	Silt, Light Brown
			4'-5'			
			5'-6.5'	3-5-6	ML	Silt, Light Brown
			6.5'-10'			
			10'-	50 (1")		Basalt Rock
#14	±3823	6.5'	0'-2.5'			Topsoil, brown
			2.5'-4'	6-8-15	ML	Silt, Light Brown
			4'-5'			
			5'-6.5'	11-17-24	ML	Silt, Light Brown
			6.5'-			Basalt Rock
#15	±3819	-	-			N/A
#16	±3820	16'	0'-2.5'			Topsoil, brown
			2.5'-4'	7-7-7	ML	Silt, Light Brown
			4'-5'			
			5'-6.5'	4-5-6	ML	Silt, Light Brown
			6.5'-10'			
			10'-11.5'	26-50-44	ML	Calcified Silt, Light Brown
			11.5'-15'			
			15'-16'	9-15-50 (4")	ML	Calcified Silt, Light Brown
			16'-			Basalt Rock

Test Hole	Ground Elevation	Depth to Rock	Stratum	Blow Count (N_{60})	USCS	Soil Description
#17	±3813	-	-			N/A
#18	±3816	14'	0'-2.5'			Topsoil, brown
			2.5'-4'	3-7-11	ML	Silt, Light Brown
			4'-5'			
			5'-6.5'	10-9-11	ML	Silt, Light Brown
			6.5'-10'			
			10'-11.5'	6-11-15	ML	Calcified Silt, Light Brown
			11.5'-14'			
			14'-			Basalt Rock
#19	±3816	6'	0'-2.5'			Topsoil, brown
			2.5'-4'	5-9-12	ML	Silt, Light Brown
			4'-5'			
			5'-6'	11-17-50 (2")	ML	Silt, Light Brown
			6'-			Basalt Rock

Conclusions and Recommendations

Foundation Design

The subsurface exploration drilled nineteen (19) test holes that contain native ML soil classifications. The soils located at the site are suitable for construction of spread footings foundations supporting a large-footprint single-story structure with adherence to the following provisions:

1) All structural footings, slabs, or slabs on grade should be placed on approved subgrade, verified by qualified personnel, or structural fill.
2) All structural footings and bearing components shall bear entirely upon rock or entirely upon native soils. Where rock is encountered within the footing zones, the rock shall be over-excavated a minimum of six (6) inches and a sand cushion provided to ensure bearing upon native soils or sand cushion fill in accordance with the recommendations above.
3) All organic top soils must be removed from the footing areas. Soils containing vegetation, calcified or cementitious materials, organic matter, debris, wastes, disturbed or frozen materials are not suitable for use as structural fills or beneath footings and/or bearing areas.
4) Any pavements, gravels, or previously placed controlled fill encountered should be removed from footing areas which are in conflict.
5) All demolished building materials and debris not suitable for use beneath footings or slabs on grade must be properly removed in care of the proposed structure.
6) The bottom of the footings shall be located a minimum of 24-inches below the finished grade for frost protection.
7) Silt soils have a moderate to high collapse potential when they become saturated under load. Therefore, site grading must be designed to direct water away from the building(s) in all directions, regardless of soil type. If this cannot be accomplished, a perimeter drainage system should be installed below the bottom of the foundation elevation. Roof drainage systems must also divert water away from the structure(s) and not discharge onto the ground near exterior walls, footings, or foundations.
8) When the ML soils are properly compacted, they may achieve 1,500 psf bearing capacity.
    a. A subgrade evaluation should be performed by a soils engineer or qualified technician prior to placement of foundation or slab.
    b. Compaction tests shall be taken every 100 square feet of all footing impact area (footing plus 36 inches either side of the footing or slab).

For an allowable bearing capacity of 2,500 psf the site shall be over excavated laterally and vertically no less than 12 inches in either direction from the bottom and sides of any footing location and any interior supporting slabs. Then, the exposed native subgrade shall be proof rolled to 98% maximum density as determined by ASTM D-698 at optimum moisture. Structural fill shall replace the excavated material with approved structural fill placed in eight (8) inch maximum lifts compacted to 98% maximum density as determined by ASTM D-698 at optimum moisture.

Overall, a minimum of 12" of structural fill will be required to provide an allowable bearing capacity of 2,500 psf at all footing locations or where structural support is required. All structural fill shall adhere to compaction testing for every 100 square feet of structural support area as described in Item 8 above.

The estimated settlement is not expected to be greater than one (1) inch total and one-half (1/2) inch differential. Soil conditions should be verified between test pits, prior to foundation, utilities or other constructed improvements are completed. The rock surface should be inspected and verified for competence prior to forming or placing concrete footings. Any differing soil conditions should be immediately called to the attention of the responsible charge or a licensed professional engineer experienced in geotechnical engineering.

Seismic Design

The upper-most 100-feet of strata at the project site is predominantly basalt rock (N>50). Therefore, the site may be classified as Site Class C for seismic design (International Code Council, Inc., 2015).

Pavement Sections

Pavement sections are anticipated to be developed within the subject property. It is recommended that all materials used in the construction of Asphaltic Concrete Pavements meet the requirements of the State of Idaho Department of Transportation Standard Specification for Highway Construction.

The sub-grade upon which any pavement sections are to be constructed should be properly cleared and stripped to a minimum of 12 inches of depth and then compacted to 95% of maximum density as determined by ASTM D 698 at optimum moisture.

To provide for standard traffic loadings, it is recommended that the below section is used:

Typical Paving Section
Approved sub-grade compacted to 95% maximum density
8" road base of 1-1/2" crushed aggregate per ISPWC (compacted to 95% density)
4" leveling course of ¾" crushed aggregate per ISPWC (compacted to 95% density)
2-1/2" of plant mix pavement

(1-1/2" aggregates maybe substituted with ¾" aggregate meeting ISPWC specification, based on availability)

To provide for heavy traffic loadings, it is recommended that the below section is used:

Heavy-Duty Paving Section
Approved sub-grade compacted to 95% maximum density
12" road base of 1-1/2" crushed aggregate per ISPWC (compacted to 95% density)
4" leveling course of ¾" crushed aggregate per ISPWC (compacted to 95% density)
4" of plant mix pavement

(1-1/2" aggregates may be substituted with ¾" aggregate meeting ISPWC specification, based on availability)
The ¾" road base gravel should conform to the following gradation:

Table 2: ¾" Road Base Gradation

Sieve Size	% Passing
¾"	100
½"	90-100
#4	45-70
#8	30-55
#200	2-8

Lateral Earth Pressure

For the ML soils native to the site, the following lateral earth pressures may be used assuming a typical angle of shearing resistance (ϕ) of 33° and unit weight of 105 pcf (Geotechdata.info, 2011):

At Rest:	50 psf
Active:	30 psf
Passive:	350 psf

Structural Fill

The ML soil is classified as a fine-grained soil. The general engineering characteristics include (Yun Zhou, 2006):

- Relatively low shear strength.
- High capillarity and frost susceptibility.
- Relatively low permeability.
- Frost heaving susceptibility.
- Difficult to compact.

In areas where structural fill is required, the following recommendations apply:

Structural fill material shall have at least 90% passing a 1½ inch (38mm) sieve and no more than 8 percent passing a No. 200 (0.075mm) sieve. The material shall be uniformly graded and shall be uniform in consistency. These materials shall be free of rock or gravel larger than 3 inches (75mm) in any dimension, debris waste, frozen materials, vegetation, and/or other deleterious material. Also, Structural fill should be placed in 8" lifts and compacted to 98% of maximum density as determined by ASTM D 698.

All areas of structural fill shall be tested for compaction at a recommended frequency of one test for every 250 square feet beneath paving and landscaped areas on the site, and one test for every 100 square feet, at each lift, beneath all structural bearing zones.

Satisfactory soils (ASTM D 2487) are GW, GP, GM, SW, SP and SM, or a combination of these group symbols. These materials shall be free of rock or gravel larger than 3 inches (75mm) in any dimension, debris waste, frozen materials, vegetation, and/or other deleterious material.

Any and all imported fill placed on site shall be placed in 8" inch maximum lifts and compacted to a minimum of 98% of maximum density as determined by ASTM D 698 at optimum moisture.

Slabs on Grade

All organic topsoil, clay or unsuitable soils, must be removed from all areas in which slabs are to be placed. Slabs on grade should be placed over a minimum of 5-inches of compacted structural engineered fill (native or imported structural fill as described above) compacted to 95% of maximum density as determined by ASTM D 698 at optimum moisture. Reinforced concrete, designed by a professional engineer, may then be constructed above the ballast. Due to the potential for problematic soils, verification of the native top soil characteristics should be completed, prior to any work completed.

Site Grading

Site grading should be designed to direct surface run-off away from buildings, other structures, and roadways. Soil permeability was not conducted in field and is approximated from experience of common soil types. Silts may offer little to no permeability or at very slow saturation rates. Therefore, infiltration facilities should be extended into the most appropriate geological stratum as determined by the local authority.

Cut slope recommendations are based upon the native ML soils discovered onsite. Construction activities should excavate areas to reveal these anticipated soil types. Cut slopes should be excavated at 3:1 slopes, horizontal to vertical. Final cut slopes should be 4:1 or flatter. If alternate soil conditions are suspected, structural fill material should replace the deleterious material as described above.

Storm Water Retention

Common engineering practice includes mitigation of storm water as determined by the local authority. This can be accomplished through several different methods including but not limited to swales, ponds, and dry wells on the subject property. For this site, it is recommended that a combination of swales and dry wells be used in conformance with the City of Jerome and all other local governing authorities. The City of Jerome currently requires that designs consider the 25-year storm for a 24-hour interval with an intensity of 1.6 in/year.

Table 3: Recommended Runoff Coefficients

Description of Runoff Area	Runoff Coefficients "C"
Business	
Central business areas	0.70-0.95
District and local areas	0.50-0.70
Residential	
Single-family	0.35-0.45
Multi-family, detached	0.40-0.60
Multi-family, attached	0.60-0.75
Residential 0.5 acre lots of larger	0.25-0.40
Industrial and Commercial	
Light areas	0.50-0.80
Heavy areas	0.75-0.95
Parks, Cemeteries	0.10-0.25
Playgrounds	0.20-0.35
Unimproved Areas	0.10-0.30
Landscaped Areas	0.20
Streets (Asphalt, Concrete), Drives and Walks, Roofs	0.90-0.95

(IDEQ, Water Quality Division, September 2005)

Table 4: Typical Soil Permeability

Group Symbol	Coefficient of Permeability, K (cm/s)	Group Symbol	Coefficient of Permeability, K (cm/s)
GW	2.5×10^{-2}	SC	$>2.5 \times 10^{-7}$
GP	5×10^{-2}	ML	$>5 \times 10^{-6}$
GM	$>5 \times 10^{-7}$	ML-CL	$>2.5 \times 10^{-7}$
GC	$>5 \times 10^{-8}$	CL	$>5 \times 10^{-8}$
SW	$>5 \times 10^{-4}$	OL	---
SP	$>5 \times 10^{-4}$	MH	$>2.5 \times 10^{-7}$
SM	$>2.5 \times 10^{-5}$	CH	$>5 \times 10^{-8}$
SM-SC	$>10^{-6}$	OH	---

(Michael R. Lindeburg, 2011)

Notes

The recommendations contained in this report are based upon EHM Engineers, Inc. understanding of the proposed development of the site and its evaluation of the conditions observed in the test holes. Soils conditions may vary between test holes. Variations will not appear until construction, and may require changes in the design and construction of the proposed improvements and/or developments. If any variations or undesirable conditions are encountered during construction, or if the proposed construction differs from conventional practices, a soils engineer should be notified to describe necessary supplemental recommendations. Undesirable conditions include construction debris, buried waste, fill material and any soil condition or geology deviating from exploratory tests holes as described in this report, should be called to the attention of a licensed engineer.

All and any fill placed onsite of different origin must be evaluated by a soils engineer. Fills placed without compaction records, or fills containing construction debris, demolition wastes, organic materials, etc. must be over-excavated and replaced with a properly compacted structural fill. Potentially hazardous material within a discovered fill is beyond the scope of this report.

This report is issued with the understanding that it is the responsibility of the owner or the representatives of the owner to ensure that the information and recommendations contained herein are called to the attention of all project Architects and Engineers, incorporated into the plans, and that the necessary steps are taken to assure that all Contractors and Sub-Contractors carry out such recommendations in the field.

This report has been prepared in accordance with generally accepted soils and foundation practices. No other warranty either expressed or implied as to professional advice provided under the terms of this agreement and included in this report is made.

Soils in the test holes are in a loose condition and are prone to settlement. All test holes should be re-excavated and backfilled with structural fill and properly compacted.

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Appendix A Exploratory Test Pit Logs

LOG OF BORING NO. 1

PROJECT: JEROME SCHOOL DISTRICT - GEOTECH
JOB NO: 326-21
LOCATION: See Attached Map
TYPE: Hollow Stem Auger
DATE: 7/9/2021
WATER ENCOUNTERED: ☐ YES ■ NO
DEPTH: N/A
LOGGED BY: M. Ahrens

DEPTH (ft.)	SYMBOL	STANDARD PENETRATION (blows/6")	STRATUM DESCRIPTION
2.5'		9	TOP SOIL
4'		11 10	TOP SOIL
5'		8	
6.5'		12 31	TOP SOIL
7'			
7'–			ROCK

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LOG OF BORING NO. 2

PROJECT: JEROME SCHOOL DISTRICT - GEOTECH
JOB NO: 326-21
LOCATION: See Attached Map
TYPE: Hollow Stem Auger
DATE: 7/9/2021
WATER ENCOUNTERED: ☐ YES ■ NO
DEPTH: N/A
LOGGED BY: M. Ahrens

DEPTH (ft.)	SYMBOL	STANDARD PENETRATION (blows/6")	STRATUM DESCRIPTION
2'		50 (2")	TOP SOIL
2'–			ROCK

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LOG OF BORING NO. 3

PROJECT: JEROME SCHOOL DISTRICT - GEOTECH
JOB NO: 326-21
LOCATION: See Attached Map
TYPE: Hollow Stem Auger
DATE: 7/9/2021
WATER ENCOUNTERED: ☐ YES ■ NO
DEPTH: N/A
LOGGED BY: M. Ahrens

DEPTH (ft.)	SYMBOL	STANDARD PENETRATION (blows/6")	STRATUM DESCRIPTION
2.5'		10	TOP SOIL
4'		11 15	TOP SOIL
5'		13	
5.5'		50 (4")	
5.5'–			ROCK

EHM Engineers, Inc.

LOG OF BORING NO. 4

PROJECT: JEROME SCHOOL DISTRICT - GEOTECH
JOB NO: 326-21
LOCATION: See Attached Map
TYPE: Hollow Stem Auger
DATE: 7/9/2021
WATER ENCOUNTERED: ☐ YES ■ NO
DEPTH: N/A
LOGGED BY: M. Ahrens

DEPTH (ft.)	SYMBOL	STANDARD PENETRATION (blows/6")	STRATUM DESCRIPTION
2.5'		5	TOP SOIL
4'		5 8	TOP SOIL
5'		12	
6.5'		12 9	TOP SOIL
8'			
8'–			ROCK

EHM Engineers, Inc.

LOG OF BORING NO. 5

PROJECT: JEROME SCHOOL DISTRICT - GEOTECH
JOB NO: 326-21
LOCATION: See Attached Map
TYPE: Hollow Stem Auger
DATE: 7/9/2021
WATER ENCOUNTERED: ☐ YES ■ NO
DEPTH: N/A
LOGGED BY: M. Ahrens

DEPTH (ft.)	SYMBOL	STANDARD PENETRATION (blows/6")	STRATUM DESCRIPTION
2.5'		12	TOP SOIL
4'		10 8	TOP SOIL
5'		15	
6.5'		38 18	TOP SOIL
6.5'–			ROCK

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LOG OF BORING NO. 6

PROJECT: JEROME SCHOOL DISTRICT - GEOTECH
JOB NO: 326-21
LOCATION: See Attached Map
TYPE: Hollow Stem Auger
DATE: 7/9/2021
WATER ENCOUNTERED: ☐ YES ■ NO
DEPTH: N/A
LOGGED BY: M. Ahrens

DEPTH (ft.)	SYMBOL	STANDARD PENETRATION (blows/6")	STRATUM DESCRIPTION
2'			TOP SOIL
2'–			ROCK

EHM Engineers, Inc.
BUILDING THE FUTURE ON A FOUNDATION OF EXCELLENCE

LOG OF BORING NO. 7

PROJECT: JEROME SCHOOL DISTRICT - GEOTECH
JOB NO: 326-21
LOCATION: See Attached Map
TYPE: Hollow Stem Auger
DATE: 7/9/2021
WATER ENCOUNTERED: ☐ YES ■ NO
DEPTH: N/A
LOGGED BY: M. Ahrens

DEPTH (ft.)	SYMBOL	STANDARD PENETRATION (blows/6")	STRATUM DESCRIPTION
2.5'		6	TOP SOIL
4'		9 10	TOP SOIL
5'		5	
6.5'		7 10	TOP SOIL
6.5'–			ROCK

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LOG OF BORING NO. 8

PROJECT: JEROME SCHOOL DISTRICT - GEOTECH
JOB NO: 326-21
LOCATION: See Attached Map
TYPE: Hollow Stem Auger
DATE: 7/9/2021
WATER ENCOUNTERED: ☐ YES ■ NO
DEPTH: N/A
LOGGED BY: M. Ahrens

DEPTH (ft.)	SYMBOL	STANDARD PENETRATION (blows/6")	STRATUM DESCRIPTION
2.5'		3	TOP SOIL
4'		4 4	TOP SOIL
5'		11	
5.5'		50 (5")	TOP SOIL
5.5' –			ROCK

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LOG OF BORING NO. 9

PROJECT: JEROME SCHOOL DISTRICT - GEOTECH
LOCATION: See Attached Map
WATER ENCOUNTERED: ☐ YES ■ NO

TYPE: Hollow Stem Auger
DEPTH: N/A

JOB NO: 326-21
DATE: 7/9/2021
LOGGED BY: M. Ahrens

DEPTH (ft.)	SYMBOL	STANDARD PENETRATION (blows/6")	STRATUM DESCRIPTION
2.5'		6	TOP SOIL
4'		4 5	TOP SOIL
5'		9	
6'		9 50 (3")	TOP SOIL
6'–			ROCK

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LOG OF BORING NO. 10

PROJECT: JEROME SCHOOL DISTRICT - GEOTECH
JOB NO: 326-21
LOCATION: See Attached Map
TYPE: Hollow Stem Auger
DATE: 7/9/2021
WATER ENCOUNTERED: ☐ YES ■ NO
DEPTH: N/A
LOGGED BY: M. Ahrens

DEPTH (ft.)	SYMBOL	STANDARD PENETRATION (blows/6")	STRATUM DESCRIPTION
2.5'		8	TOP SOIL
4'		3 2	TOP SOIL
5'		4	
6'		5 50 (5")	TOP SOIL
6'–			ROCK

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LOG OF BORING NO. 11

PROJECT: JEROME SCHOOL DISTRICT - GEOTECH
JOB NO: 326-21
LOCATION: See Attached Map
TYPE: Hollow Stem Auger
DATE: 7/9/2021
WATER ENCOUNTERED: ☐ YES ■ NO
DEPTH: N/A
LOGGED BY: M. Ahrens

DEPTH (ft.)	SYMBOL	STANDARD PENETRATION (blows/6")	STRATUM DESCRIPTION
2.5'		3	TOP SOIL
4'		6 5	TOP SOIL
5'		9	
6.5'		22 36	TOP SOIL
7.5'			
7.5'–			ROCK

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LOG OF BORING NO. 12

PROJECT: JEROME SCHOOL DISTRICT - GEOTECH
JOB NO: 326-21
LOCATION: See Attached Map
TYPE: Hollow Stem Auger
DATE: 7/9/2021
WATER ENCOUNTERED: ☐ YES ■ NO
DEPTH: N/A
LOGGED BY: M. Ahrens

DEPTH (ft.)	SYMBOL	STANDARD PENETRATION (blows/6")	STRATUM DESCRIPTION
2.5'		4	TOP SOIL
4'		7 50 (4")	TOP SOIL
4'–			ROCK

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LOG OF BORING NO. 13

PROJECT: JEROME SCHOOL DISTRICT - GEOTECH
JOB NO: 326-21
LOCATION: See Attached Map
TYPE: Hollow Stem Auger
DATE: 7/9/2021
WATER ENCOUNTERED: ☐ YES ■ NO
DEPTH: N/A
LOGGED BY: M. Ahrens

DEPTH (ft.)	SYMBOL	STANDARD PENETRATION (blows/6")	STRATUM DESCRIPTION
2.5'		4	TOP SOIL
4'		6 12	TOP SOIL
5'		3	
6.5'		5 6	TOP SOIL
10'		50 (1")	
10'–			ROCK

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LOG OF BORING NO. 14

PROJECT: JEROME SCHOOL DISTRICT - GEOTECH
JOB NO: 326-21
LOCATION: See Attached Map
TYPE: Hollow Stem Auger
DATE: 7/9/2021
WATER ENCOUNTERED: ☐ YES ■ NO
DEPTH: N/A
LOGGED BY: M. Ahrens

DEPTH (ft.)	SYMBOL	STANDARD PENETRATION (blows/6")	STRATUM DESCRIPTION
2.5'		6	TOP SOIL
4'		8 15	TOP SOIL
5'		11	
6.5'		17 24	TOP SOIL
6.5'–			ROCK

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LOG OF BORING NO. 16

PROJECT: JEROME SCHOOL DISTRICT - GEOTECH
JOB NO: 326-21
LOCATION: See Attached Map
TYPE: Hollow Stem Auger
DATE: 7/9/2021
WATER ENCOUNTERED: ☐ YES ■ NO
DEPTH: N/A
LOGGED BY: M. Ahrens

DEPTH (ft.)	SYMBOL	STANDARD PENETRATION (blows/6")	STRATUM DESCRIPTION
2.5'		7	TOP SOIL
4'		7 7	TOP SOIL
5'		4	
6.5'		5 6	TOP SOIL
10'		26	
11.5'		50 44	TOP SOIL
		9	
16'		15 50 (4")	TOP SOIL
16'–			ROCK

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LOG OF BORING NO. 18

PROJECT: JEROME SCHOOL DISTRICT - GEOTECH
JOB NO: 326-21
LOCATION: See Attached Map
TYPE: Hollow Stem Auger
DATE: 7/9/2021
WATER ENCOUNTERED: ☐ YES ■ NO
DEPTH: N/A
LOGGED BY: M. Ahrens

DEPTH (ft.)	SYMBOL	STANDARD PENETRATION (blows/6")	STRATUM DESCRIPTION
2.5'		3	TOP SOIL
4'		7 11	TOP SOIL
5'		10	
6.5'		9 11	TOP SOIL
10'		6	
11.5'		11 15	TOP SOIL
14'			
14'–			ROCK

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LOG OF BORING NO. 1

PROJECT: JEROME SCHOOL DISTRICT - GEOTECH — JOB NO: 326-21
LOCATION: See Attached Map — TYPE: Hollow Stem Auger — DATE: 7/9/2021
WATER ENCOUNTERED: ☐ YES ■ NO — DEPTH: N/A — LOGGED BY: M. Ahrens

DEPTH (ft.)	SYMBOL	STANDARD PENETRATION (blows/6")	STRATUM DESCRIPTION
2.5'		5	TOP SOIL
4'		9 12	TOP SOIL
5'		11	
6'		17 50 (2")	TOP SOIL
6'–			ROCK
14'–			ROCK

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Appendix B USGS Soil Classification


Soil Map—Jerome County and Part of Twin Falls County, Idaho
7/15/2021
Page 1 of 3
S 100 E
E Avenue D
122
Soil Map may not be valid at this scale.
Map Scale: 1:2,920 if printed on A landscape (11" x 8.5") sheet.
Meters
Feet
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84
Web Soil Survey
National Cooperative Soil Survey
Natural Resources
Conservation Service

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other

Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Jerome County and Part of Twin Falls County, Idaho
Survey Area Data: Version 14, Jun 4, 2020

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Aug 14, 2012—Nov 8, 2016

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
122	Shano silt loam, 1 to 4 percent slopes	41.5	100.0%
Totals for Area of Interest		**41.5**	**100.0%**

Appendix C Lateral Earth Pressure Calculations

Lateral Earth Pressures - ML Soil

Job Name: Jerome School District **Job Number:** 326-21
By: Matt Ahrens **Date:** 7/20/2021

σ_v = 105 pcf
φ = 33 ° (Assumed)

$K_o = 1 - \sin\varphi =$ 0.46

At Rest:

$\sigma_H = \sigma_v \times K_o$

P_H = 47.8 pcf/ft

Active:

$\sigma_H = \sigma_v \times \tan^2\left(45 - \frac{\varphi}{2}\right)$

P_a = 31.0 pcf/ft

Passive:

$\sigma_H = \sigma_v \times \tan^2\left(45 + \frac{\varphi}{2}\right)$

P_p = 356 pcf/ft

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Appendix D Field Notes & Geologic Information

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SIEVE ANALYSIS

ASTM C136 & C117

SOIL CLASSIFICATION

ASTM D2487

Project: Jerome School District **Sample Locations:** TH 4,6 -5'

Sample	Total Wt
Sample/Tare	614.1
Tare /Ratio	0
Sample Wt.	614.1

Date Sampled: 04-16-20 **EHM Job #** 434-19

Sampled By: EHM **Tested By:** B. Kruger

Sieve Analysis

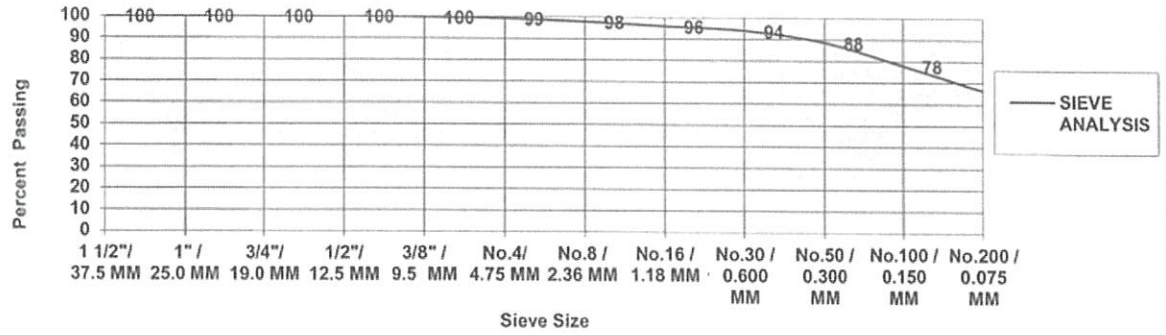
ASTM C136 -C117		Accum. Wt.	% Retained	% Passing
1 1/2"/ 37.5 MM		0.0	0.0	100
1" / 25.0 MM		0.0	0.0	100
3/4"/ 19.0 MM		0.0	0.0	100
1/2"/ 12.5 MM		0.0	0.0	100
3/8" / 9.5 MM		2.0	0.3	100
No.4/ 4.75 MM		5.3	0.9	99
No.8 / 2.36 MM		14.1	2.3	98
No.16 / 1.18 MM		26.2	4.3	96
No.30 / 0.600 MM		38.5	6.3	94
No.50 / 0.300 MM		71.4	11.6	88
No.100 / 0.150 MM		136.7	22.3	78
No.200 / 0.075 MM		206.9	33.7	66

Atterburg Limits

ASTM D4318

Liquid Limit: **NP**
Plastic Limit: **NP**
Plasticity Index: **NP**

Gradation Chart



Classification (UCS)

ASTM D2487 Group Name: **Sandy SILT** Group Symbol: **ML**

Reviewed By:_____

W.J. Nenno C.E.T.

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SIEVE ANALYSIS

ASTM C136 & C117

SOIL CLASSIFICATION

ASTM D2487

Project: Jerome School District **Sample Locations:** TH 2,4,6,8 -2.5' TH 1,11,15,16 -5'

Sample	Total Wt
Sample/Tare	684.4
Tare /Ratio	0
Sample Wt.	684.4

Date Sampled: 04-16-20 **EHM Job #** 434-19

Sampled By: EHM **Tested By:** B. Kruger

Sieve Analysis

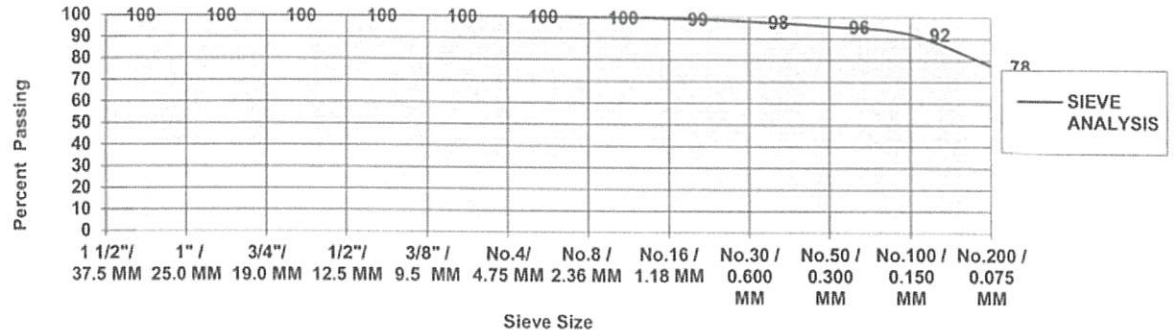
ASTM C136 -C117		Accum. Wt.	% Retained	% Passing
1 1/2"/ 37.5 MM		0.0	0.0	100
1" / 25.0 MM		0.0	0.0	100
3/4"/ 19.0 MM		0.0	0.0	100
1/2"/ 12.5 MM		0.0	0.0	100
3/8" / 9.5 MM		0.0	0.0	100
No.4/ 4.75 MM		0.0	0.0	100
No.8 / 2.36 MM		2.5	0.4	100
No.16 / 1.18 MM		5.6	0.8	99
No.30 / 0.600 MM		14.5	2.1	98
No.50 / 0.300 MM		29.9	4.4	96
No.100 / 0.150 MM		54.3	7.9	92
No.200 / 0.075 MM		152.9	22.3	78

Atterburg Limits

ASTM D4318

Liquid Limit: **NP**
Plastic Limit: **NP**
Plasticity Index: **NP**

Gradation Chart



Classification (UCS)

ASTM D2487 Group Name: **SILT with Sand** Group Symbol: **ML**

Reviewed By: _____

W.J. Nenno C.E.T.