4/20/2016

Geotechnical Report

The U.S. Department of Veterans Affairs in Buhl, Idaho

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

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Introduction

EHM Engineers, Inc. has performed a geotechnical investigation on the subject property located south of E. Elm Street and west of N. 1600 East, for the U.S. Department of Veterans Affairs. Refer to Figure 1 for the site vicinity map and Figure 2 for the location of the subject property in regards to the City of Buhl. The property consists of approximately six acres with access primarily from E. Elm Street. The site has historically been used for agricultural related activities.

EHM Engineers, Inc. understands that the proposed construction will consist of the establishment of pre-placed crypt gravesites, columbarium wall structures, US and POW flagpoles, and a memorial monument area.

This report will include the following:

1) Description of the existing subsurface materials and conditions.
2) Recommendations for:
    a. Foundation design
    b. Structural fill
    c. Sub-grade preparation beneath slabs on grade and pavements
    d. Cut slope limitations and excavations

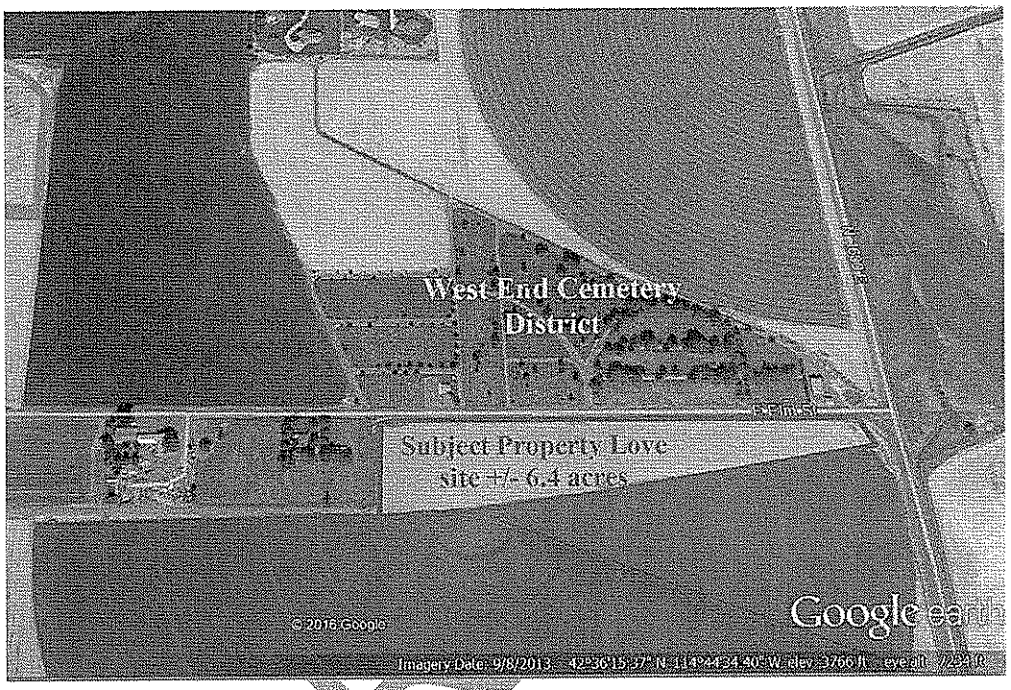

Figure 1: Site Vicinity Map

Figure 2: Subject property in regards to the City of Buhl

Site Description

This site is located directly south of the West End Cemetery District in Buhl, Idaho. Figure 1 shows the site locations.

Nine test pits were dug and soil samples were taken at depths of three (3') feet and when appropriate at five to six and half feet (5'-6.5'). The test holes were generally located throughout the entire subject property, varying north and south to get diverse samples. No buildings or permanent structures have been constructed on the site. There were two underground pipes on the west side of the subject property that limited where we dug the test holes.

The subject property is related to agricultural activities in a rural setting east of the City of Buhl, Idaho. The sites naturally drain due to the Portneuf Silt Loam and Sluka Silt Loam that is present, refer to Figure 3. This site contains an average of 2.72% of organic matter, with high contents of nitrates and potassium; refer to Table 1 for a summary of soil fertility. Sample A was taken by test hole #1 and Sample B was taken by test hole #6. The pH of soil is approximately 8.15 on an average. There are no seep tiles or tunnels present and mild sloping of 0-2% and 1-4% respectively across the site, meaning the majority of storm water is absorbed on site. Depth to groundwater is described to be more than 80 inches below the ground surface (National Resource Conservation Service). No groundwater was encountered as part of the investigation.

Table 1: Soil Fertility Summary

	Sample A (near TH1)	Sample B (near TH6)	Range	Interpretation
Organic Content	2.89%	2.54%	N/A	Medium
Nitrates-ppm	37	28	10 – 35 ppm	High / Medium
Ammonium-ppm	4	4	+ 5 ppm	Low
Phosphorus-ppm	35	40	25 – 40 ppm	Optimum
Potassium-ppm	611	420	300 + ppm	High / Optimum
pH	8.2	8.1	N/A	Moderately Basic

Refer to Appendix C for full results of soil fertility, nutrients, and recommendations.

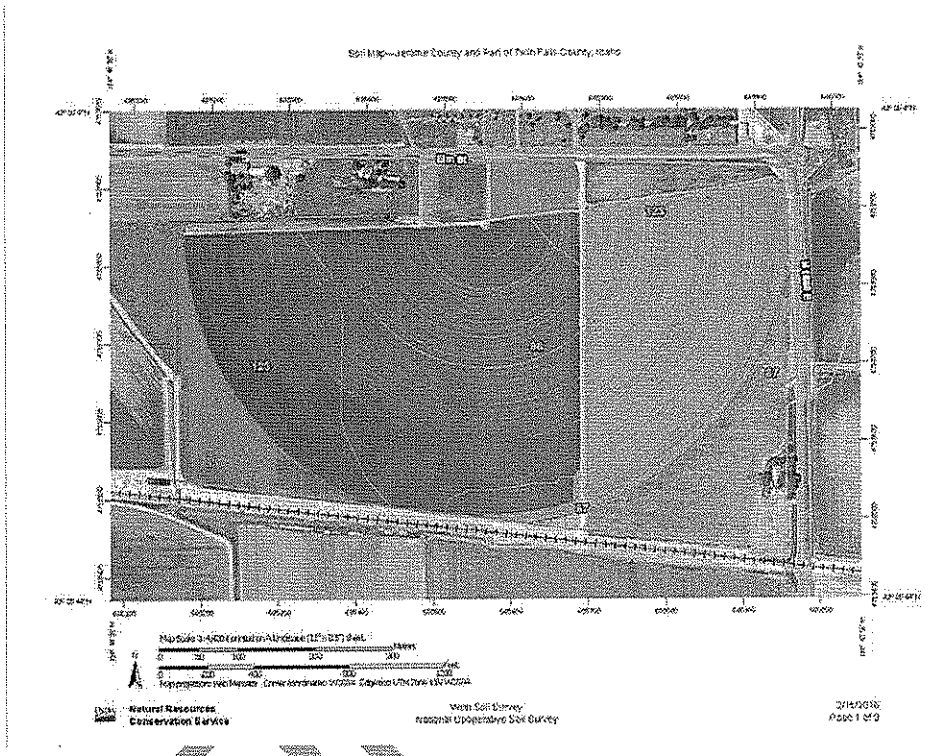

Figure 3: Soil Map of the Subject Property

Area Geology

The City of Buhl, Idaho 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 local and adjacent features Rock Creek Canyon and Snake River Canyon. 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.

The subject property is located in the central portion of the Snake River Plain of Southern Idaho. The Snake River Plain is underlain by thousands of feet of volcanic deposits interbedded with relatively thin layers of sediment. The basalt layers are overlain in the Buhl area with a thin layer of loess/eolain (windblown) deposits of silt and sand (Eloian deposits over bedrock derived from volcanic rock). These superficial sediments generally vary between 3-15 feet in depth within the subject property. Topographic conditions appeared to range from 0% to 4% with increasing grades to the southwest.

Site Investigation

Nine (9) test pits were excavated and soil samples were completed for each test hole at 3.0' and when appropriate 5'-6.5' on April 6, 2016. The approximate locations of the test holes as specified by EHM Engineers, Inc. and approved by Mr. Nathan Van Arsdale with Public Properties, are shown in Figure 4 and fully described in Table 2.

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 site investigation results are described in Table 2 and the laboratory test results are included in Appendix C.

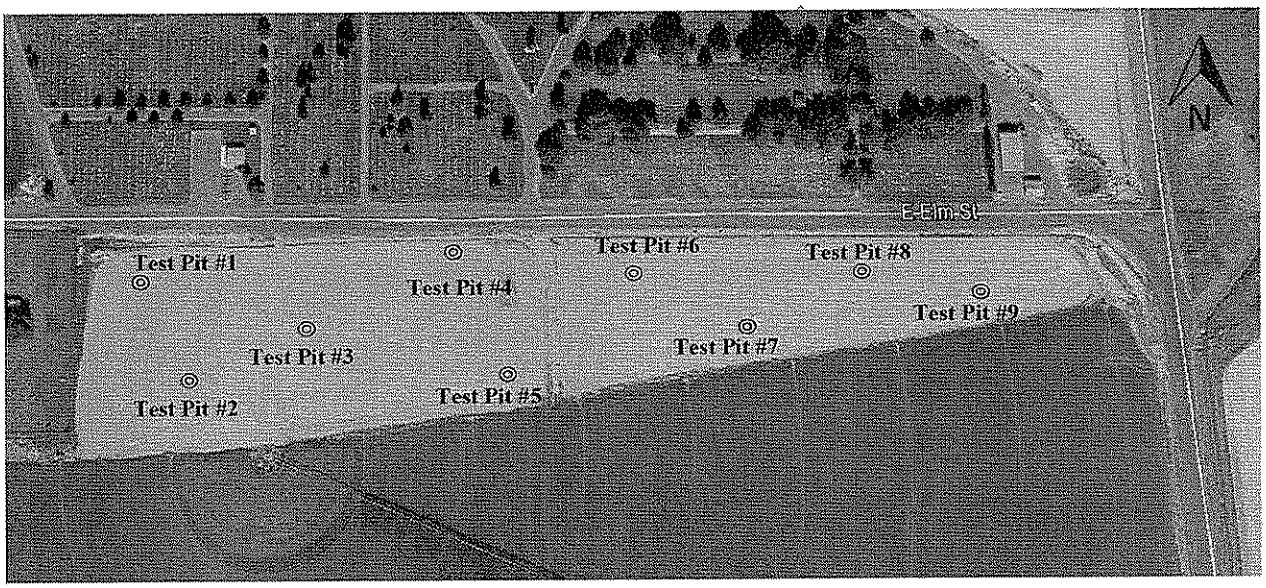

Figure 4: Test Hole Locations

Table 2: Site Investigation Results

Test Pit	Ground Elevation	Depth to Rock	Sample Depth	USCS	Soil Description
#1	±3793	7.0'	3.0'	ML	**Sandy silt**, light brown, dry, moderately dense, stiff
			5.0'-6.5'	Rock	**Asphalt & Sand (Fill)**-Vesicular basalt – black, very dense with caliche silt layers
#2	±3797	6.0'	3.0'	ML	**Silt with sand**, light brown, dry, moderately dense, stiff with thin caliche layers
#3	±3797	NA	3.0'	ML	**Sandy silt**, light brown, dry, moderately dense, stiff with caliche layer @ 4.0'
			10.0'-11.5'	SM	**Silty sand**, light brown, dense with caliche layer @4.0'
#4	±3796	4.0'	3.0'	SP	**Poorly graded sand**, light brown, dry, dense with caliche layer @ 4.0'
#5	±3798	4.0'	3.0'	SP	**Poorly graded sand**, light brown, dry, dense with caliche layer @ 4.0'
#6	±3796	5.0'	3.0'	SP	**Poorly graded sand**, light brown, dry, dense with caliche layer @ 4.0'
#7	±3795	7.0'	3.0'	SP	**Poorly graded sand**, light brown, dry, dense with caliche layer @ 4.0'
#8	±3789	5.0'	3.0'	SM	**Silty sand with gravel**, light brown, dry, dense with caliche layer @ 5.5'
#9	±3786	8.5'	3.0'	SP	**Poorly graded sand**, light brown, dry, dense
			5.0'-6.5'	SP	**Poorly graded sand**, light brown, dry, dense

Conclusions and Recommendations

Foundation Design

The ML and SP soils located at the site are suitable for construction of spread footing foundations with adherence to the following provisions:

1) All organic top soils must be removed from the footing areas. Soils containing vegetation, organic matter, debris, wastes, or frozen materials are not suitable for use as structural fills or beneath footings.
2) Any pavements or gravels encountered should be removed from footing areas which are in conflict.
3) The bottom of the footing shall be located a minimum of 30-inches below the finished grade for frost protection.
4) 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. If this cannot be accomplished, a perimeter drainage system at or above the foundation elevation should be installed. Roof drainage systems must also divert water away from the building(s) and not discharge onto the ground near exterior walls.
5) For an allowable bearing pressure of 2,000 psf, it is recommended that the site be proof rolled and tested to ensure 98% compaction prior to placement of footings.

The foundation shall be cast against undisturbed and/or properly compacted soils that have been approved by a geotechnical engineer. The estimated total settlement is not expected to be greater than one-half inch. The estimated differential settlement is not expected to be greater than one-half inch.

Groundwater was not encountered during any site investigations.

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., 2009)

Lateral Earth Pressure

For the ML and SP 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:

At Rest: 47.81 psf
Active: 30.95 psf
Passive: 356.17 psf

(Geotechdata.info, 2011).

Structural Fill

The ML and SP silts are classified as fine and course grained soils respectively. The general engineering characteristics include (Yun Zhou, 2006):

- Generally very good foundation material for supporting structures and roads.
- Generally very good embankment materials
- Generally the best backfill material for retaining walls.
- Might settle under vibratory loads or blasts
- Dewatering may be difficult in open-graded gravels due to high permeability.
- Generally not frost susceptible.

To achieve an allowable bearing pressure of 2,000 psf, it is recommended that the site be compacted, proof rolled, and tested to ensure 98% compaction prior to placement of footings. Test results shall be approved by a geotechnical engineer prior to footing placement.

Should additional structural fill material be necessary, the 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.

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 imported fill placed on site shall be placed in 8 inch maximum lifts and compacted to a minimum of 95 percent of maximum density as determined by ASTM D 698 at optimum moisture.

Slabs on Grade

All organic topsoil must be removed to a depth of 6"-12" from all areas in which slabs are to be placed. Slabs on grade should be placed over a minimum of 6-inches of compacted granular structural fill (native or imported structural fill as described above) compacted to 98% 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.

Pavement Sections

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 a minimum of 8 inches of pit run, 2 inches of crushed ¾" gravel, and 2.5 inches of asphalt plant mix be provided.

To provide for heavy duty traffic loadings, it is recommended that a minimum of 12 inches of pit run, 3 inches of crushed ¾" gravel, and 3 inches of asphalt plant mix be provided.

The road base gravel should conform to the following gradation:

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

Site Grading

Site grading should be designed to direct surface run-off away from buildings, other structures, and roadways.

Cut slopes should be excavated at 3:1 slopes, horizontal to vertical. Final cut slopes should be 3:1 or flatter.

Storm Water Retention

The City of Buhl requires that every new development capture, retain, and release their storm water within the boundaries of the subject property. This can be accomplished through several different methods including but not limited to swales, ponds, and dry wells. For this site, it is recommended that a combination of swales and basin be used.

The City of Buhl uses a storm water intensity of 1.6 inches for the 25 year – 24 hour storm event. Based on the intensity and below information, the storm water retention basin can be appropriately sized.

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)
GW	2.5×10^{-2}
GP	5×10^{-2}
GM	$>5 \times 10^{-7}$
GC	$>5 \times 10^{-8}$
SW	$>5 \times 10^{-4}$
SP	$>5 \times 10^{-4}$
SM	$>2.5 \times 10^{-5}$
SM-SC	$>10^{-6}$
SC	$>2.5 \times 10^{-7}$
ML	$>5 \times 10^{-6}$
ML-CL	$>2.5 \times 10^{-7}$
CL	$>5 \times 10^{-8}$
OL	---
MH	$>2.5 \times 10^{-7}$
CH	$>5 \times 10^{-8}$
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.

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. Test holes located under any portion of the proposed structures, improvements, or developments should be re-excavated and backfilled with structural fill and properly compacted.

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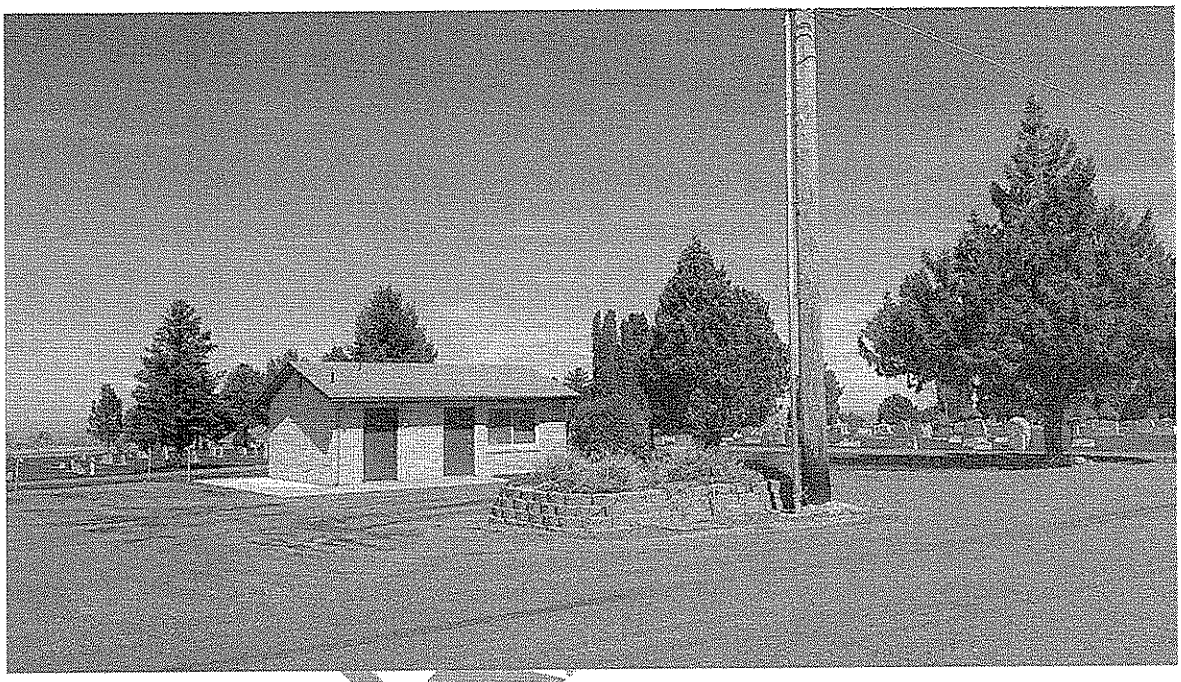
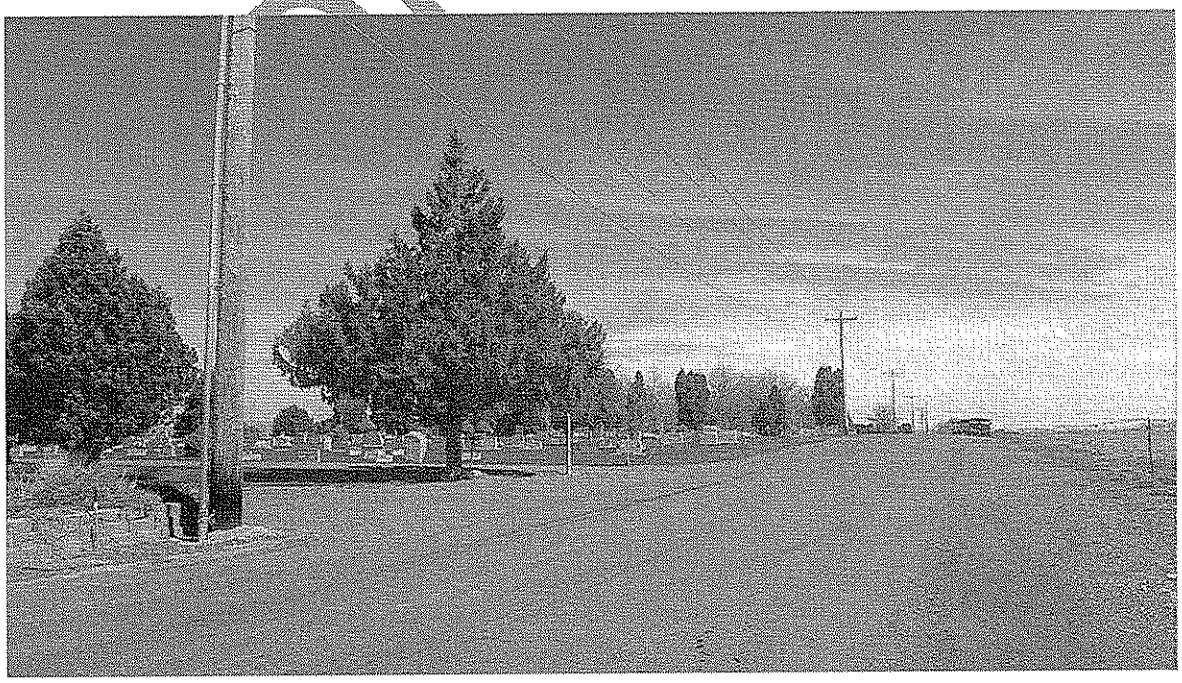
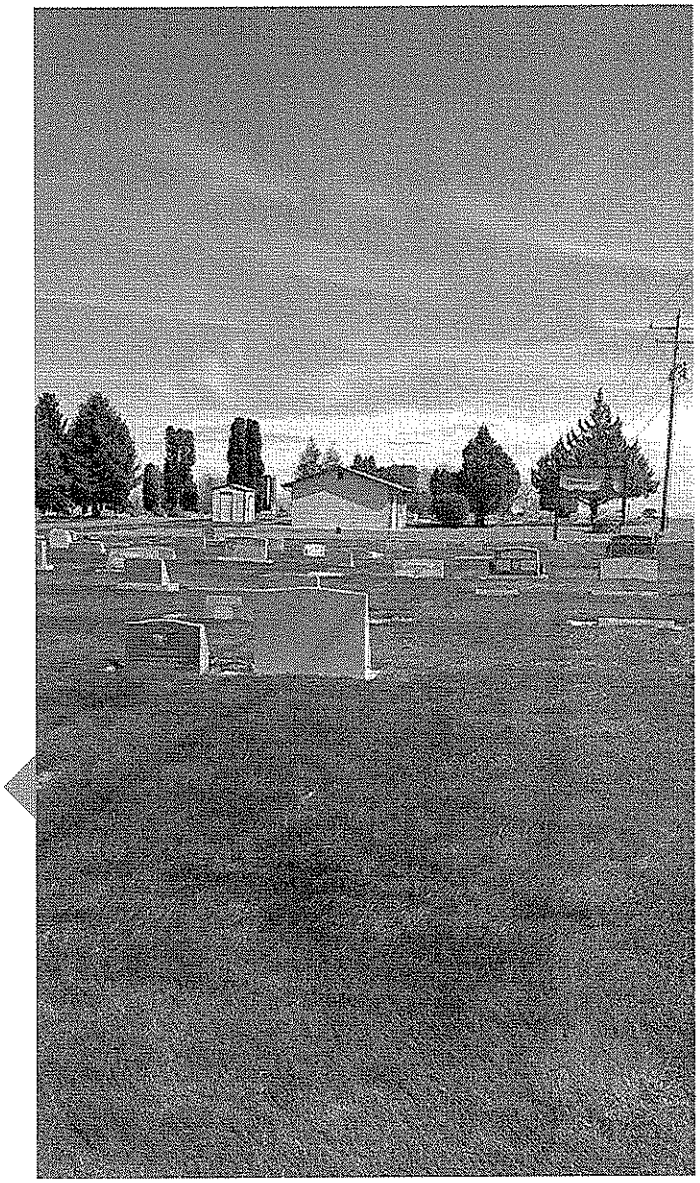
Appendix A Photographs of Adjacent Properties







Appendix B Test Pit Logs

EHM Engineers, Inc.
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Geotechnical Test Pit Log

Test Pit No. 1

Project: Shirley Love's Property – Buhl, Idaho

Location: Northwest Corner of Site

Depth	Description	No. of Blow Counts	Sampled
0.0' – 1.0'	Top soil, brown, dry, Roots to 6.0"-12.0"	None	None
1.0' – 5.0'	(ML) Sandy silt, light brown, dry, moderately dense	None	Yes at 3'
5.0' – 6.5'	Broken up rock with calcified silt	18/20/11	Yes
6.5' – 8.0'	Hit rock at 7' Bottom of hole at 8'	None	None

Observed, logged and sampled by: J. Skeen & S. Kaster
Excavation Equipment used: Hollow Stem Logger
Samples taken at 3.0 feet
Ground Water Encountered: No

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Geotechnical Test Pit Log

Test Pit No.2

Project: Shirley Love's Property – Buhl, Idaho

Location: Southwest corner of Site

Depth	Description	No. of Blow Counts	Sampled
0.0' – 1.0'	Top soil, brown, soft, Roots to 6.0"-12.0"	None	None
1.0' – 5.0'	(ML) Silt with sand, calcified gravel, caliche layers, light brown, dry, moderately dense	None	Yes at 3'
5.0' – 6.5'	Restrictive layer at 6.5' Bottom of hole 6.5'	4/6/21	None

Observed, logged and sampled by: J. Skeen & S. Kaster
Excavation Equipment used: Hollow Stem Logger
Samples taken at 3.0 feet
Ground Water Encountered: No

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Geotechnical Test Pit Log

Test Pit No.3

Project: Shirley Love's Property – Buhl, Idaho

Location: Slightly, northwest of the site property

Depth	Description	No. of Blow Counts	Sampled
0.0' – 1.0'	Top soil, brown, soft, Roots to 6.0"-12.0"	None	None
1.0' – 5.0'	(ML) Sandy silt, light brown, dry, moderately dense with caliche layer at 4.0'	None	Yes at 3'
5.0' – 6.5'	Broken up rock with calcified silt	5/5/4	None
6.5' – 10.0'	Hit rock at 7'	None	None
10.0' – 11.5'	Used spoon (SM) silty sand, light brow, dry, dense Bottom of hole at 11.5'	16/21/50 blow for 5"	Yes

Observed, logged and sampled by: J. Skeen & S. Kaster
Excavation Equipment used: Hollow Stem Logger
Samples taken at 3.0 feet
Ground Water Encountered: No

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Geotechnical Test Pit Log

Test Pit No.4

Project: Shirley Love's Property – Buhl, Idaho

Location: Centrally located on the northwest area of the site property

Depth	Description	No. of Blow Counts	Sampled
0.0' – 1.0'	Top soil, brown, soft, Roots to 6.0"-12.0"	None	None
1.0' – 4.0'	(SP) Poorly graded sand, light brown, dry, dense with caliche layer at 4.0' Bottom of hole at 4.0'	None	Yes at 3'

Observed, logged and sampled by: J. Skeen & S. Kaster
Excavation Equipment used: Hollow Stem Logger
Samples taken at 3.0 feet
Ground Water Encountered: No

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Geotechnical Test Pit Log

Test Pit No.5

Project: Shirley Love's Property – Buhl, Idaho

Location: Centrally located on the southwest area of the site property

Depth	Description	No. of Blow Counts	Sampled
0.0' – 1.0'	Top soil, dark brown, soft, Roots to 6.0"-12.0"	None	None
1.0' – 5.0'	(SP) Poorly graded sand, light brown, dry, dense with caliche layer at 4.0'	None	Yes at 3'
5.0' – 5.5'	Restrictive layer at 5.5'	35 for 6.0" 30 for 0.25"	None

Observed, logged and sampled by: J. Skeen & S. Kaster
Excavation Equipment used: Hollow Stem Logger
Samples taken at 3.0 feet
Ground Water Encountered: No

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Geotechnical Test Pit Log

Test Pit No.6

Project: Shirley Love's Property – Buhl, Idaho

Location: Centrally located on the northeast area of the site property

Depth	Description	No. of Blow Counts	Sampled
0.0' – 1.0'	Top soil, dark brown, soft, Roots to 6.0"-12.0"	None	None
1.0' – 5.0'	(SP) Poorly graded sand, light brown, dry, dense with caliche layer at 4.0'	None	Yes at 3'
5.0' – 5.5'	Restrictive layer at 5.5' Broken up rock with calcified silt Bottom of hole at 5.5'	50 blows for 5.5"	None

Observed, logged and sampled by: J. Skeen & S. Kaster
Excavation Equipment used: Hollow Stem Logger
Samples taken at 3.0 feet
Ground Water Encountered: No

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Geotechnical Test Pit Log

Test Pit No. 7

Project: Shirley Love's Property – Buhl, Idaho

Location: Southeast of the site property

Depth	Description	No. of Blow Counts	Sampled
0.0' – 1.0'	Top soil, dark brown, soft, Roots to 6.0"-12.0"	None	None
1.0' – 5.0'	(SP) Poorly graded sand, light brown, dry, dense with caliche layer at 4.0'	None	Yes at 3'
5.0' – 6.5'	(SP) Poorly graded sand, light brown, dry, dense with caliche layers	8/8/13	None
6.5' – 8.5'	Rock at 7' Total depth 8.5'	None	None

Observed, logged and sampled by: J. Skeen & S. Kaster
Excavation Equipment used: Hollow Stem Logger
Samples taken at 3.0 feet
Ground Water Encountered: No

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Geotechnical Test Pit Log

Test Pit No.8

Project: Shirley Love's Property – Buhl, Idaho

Location: Northeast area of the site property

Depth	Description	No. of Blow Counts	Sampled
0.0' – 1.0'	Top soil, dark brown, soft, Roots to 6.0"-12.0"	None	None
1.0' – 5.0'	(SM) Silty sand with gravel, light brown, dry, dense with caliche layer at 5.5'	None	Yes at 3'
5.0' – 5.5'	(SM) Silty sand with gravel, light brown, dry, dense with caliche layer Restrictive layer at 5.5'	27 for 6" 50 for 1"	None

Observed, logged and sampled by: J. Skeen & S. Kaster
Excavation Equipment used: Hollow Stem Logger
Samples taken at 3.0 feet
Ground Water Encountered: No

EHM Engineers, Inc.
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Geotechnical Test Pit Log

Test Pit No.9

Project: Shirley Love's Property – Buhl, Idaho

Location: East corner of site property

Depth	Description	No. of Blow Counts	Sampled
0.0' – 1.0'	Top soil, dark brown, soft, Roots to 6.0"-12.0"	None	None
1.0' – 5.0'	(SP) Poorly graded sand, light brown, dry, dense	None	Yes at 3'
5.0' – 6.5'	(SP) Poorly graded sand, light brown, dry, dense	11/17/21	Yes
6.5' – 9.0'	(SP) Poorly graded sand, light brown, dry, dense Restrictive layer at 8.5' Bottom of hole 9'	None	None

Observed, logged and sampled by: J. Skeen & S. Kaster
Excavation Equipment used: Hollow Stem Logger
Samples taken at 3.0 feet
Ground Water Encountered: No

Appendix C Sieve Analysis and Soil Classification

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SIEVE ANALYSIS

ASTM C136 & C117

SOIL CLASSIFICATION

ASTM D2487

Project: Twin Falls Idaho - VA

Sample Description:: Test Hole 1,3 - 3'

Sample	Total Wt
Sample/Tare	480.7
Tare /Ratio	0
Sample Wt.	480.7

Date Sampled: 04/06/16 **EHM Job #** 052-16

Sampled By: S. Kaster **Tested By:** B. Kruger

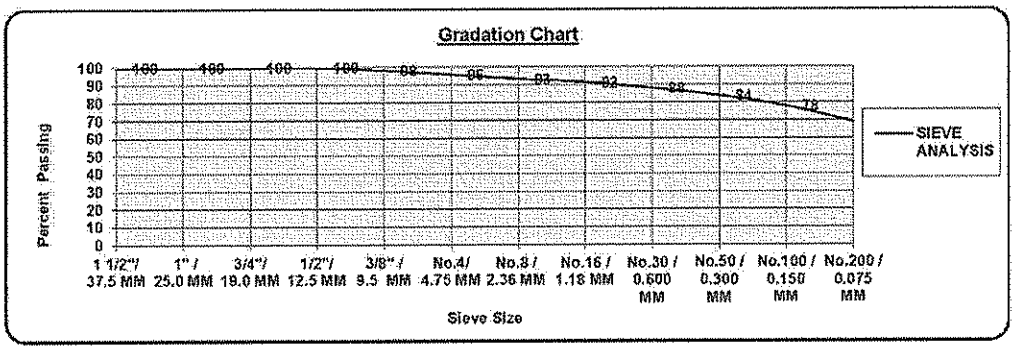
Sieve Analysis

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	8.5	1.8	98
No.4/ 4.75 MM	19.8	4.1	96
No.8 / 2.36 MM	31.7	6.6	93
No.16 / 1.18 MM	40.8	8.5	92
No.30 / 0.600 MM	56.8	11.8	88
No.50 / 0.300 MM	77.4	16.1	84
No.100 / 0.150 MM	105.9	22.0	78
No.200 / 0.075 MM	148.9	31.0	69

Atterburg Limits

ASTM D4318

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



Classification (UCS)

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

Reviewed By:_____

W.J. Nenno C.E.T.

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

SIEVE ANALYSIS

ASTM C136 & C117

SOIL CLASSIFICATION

ASTM D2487

Project: Twin Falls Idaho - VA

Sample Description:: Test Hole 1 - 5'-6.5'

Sample	Total Wt
Sample/Tare	544.9
Tare /Ratio	0
Sample Wt.	544.9

Date Sampled: 04/06/16 **EHM Job #** 052-16

Sampled By: S. Kaster **Tested By:** B. Kruger

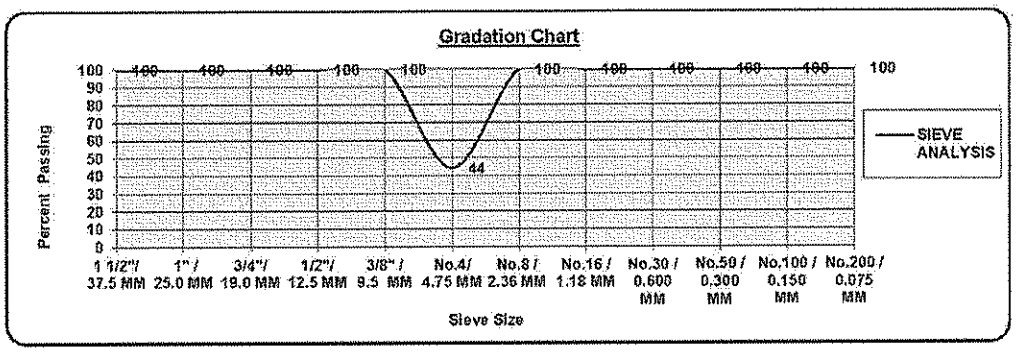
Sieve Analysis

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		303.6	55.7	44
No.8 / 2.36 MM		0.0	0.0	100
No.16 / 1.18 MM		0.0	0.0	100
No.30 / 0.600 MM		0.0	0.0	100
No.50 / 0.300 MM		0.0	0.0	100
lo.100 / 0.150 MM		0.0	0.0	100
lo.200 / 0.075 MM		0.0	0.0	100

Atterburg Limits

ASTM D4318

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



Classification (UCS)

ASTM D2487 Group Name: ASPHALT & SAND (FILL) Group Symbol: -

Reviewed By:_____

W.J. Nenno C.E.T.

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

SIEVE ANALYSIS

ASTM C136 & C117

SOIL CLASSIFICATION

ASTM D2487

Project: Twin Falls Idaho - VA

Sample Description:: Test Hole 2 - 3'

Sample	Total Wt
Sample/Tare	473.3
Tare /Ratio	0
Sample Wt.	473.3

Date Sampled: 04/06/16 **EHM Job #** 052-16

Sampled By: S. Kaster **Tested By:** B. Kruger

Sieve Analysis

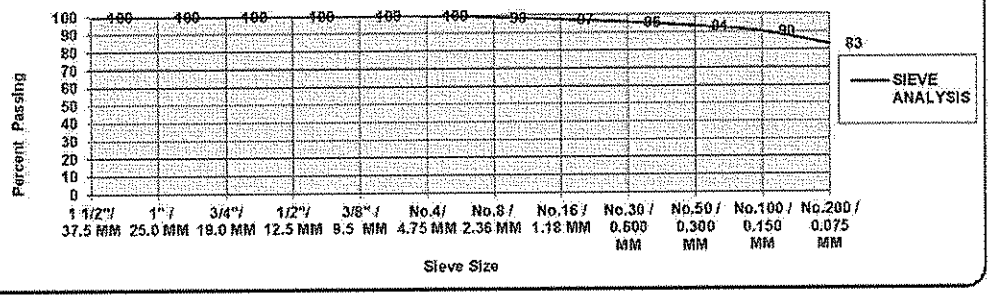
ASTM C136 -C117		Accum. Wt.	% Retained	% Passing
1 1/2"/ 37.5 MM		0.0	0.0	100
1" / 25.0 MM		0.0	0.0	100
3/4"/ 19.0 MM		0.0	0.0	100
1/2"/ 12.5 MM		0.0	0.0	100
3/8" / 9.5 MM		0.0	0.0	100
No.4/ 4.75 MM		0.0	0.0	100
No.8 / 2.36 MM		5.0	1.1	99
No.16 / 1.18 MM		11.9	2.5	97
No.30 / 0.600 MM		19.4	4.1	96
No.50 / 0.300 MM		30.5	6.4	94
No.100 / 0.150 MM		45.3	9.6	90
No.200 / 0.075 MM		79.5	16.8	83

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.

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

SIEVE ANALYSIS

ASTM C136 & C117

SOIL CLASSIFICATION

ASTM D2487

Project: Twin Falls Idaho - VA

Sample Description:: Test Hole 3 - 10' - 11.5'

Sample	Total Wt
Sample/Tare	460.4
Tare /Ratio	0
Sample Wt.	460.4

Date Sampled: 04/06/16 **EHM Job #** 052-16

Sampled By: S. Kaster **Tested By:** B. Kruger

Sieve Analysis

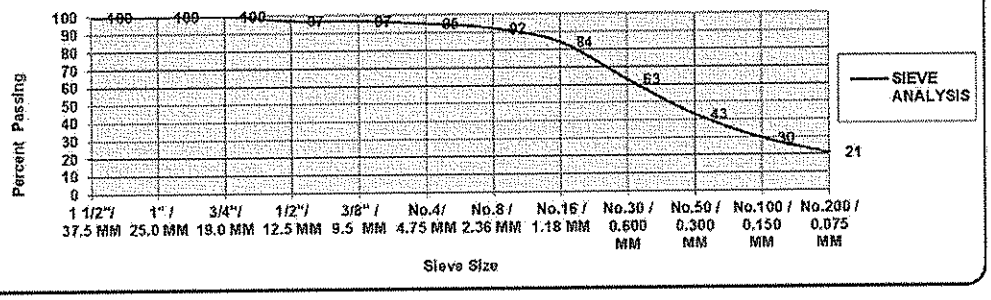
ASTM C136 -C117		Accum. Wt.	% Retained	% Passing
1 1/2"/ 37.5 MM		0.0	0.0	100
1" / 25.0 MM		0.0	0.0	100
3/4"/ 19.0 MM		0.0	0.0	100
1/2"/ 12.5 MM		13.2	2.9	97
3/8" / 9.5 MM		14.6	3.2	97
No.4/ 4.75 MM		22.5	4.9	95
No.8 / 2.36 MM		35.4	7.7	92
No.16 / 1.18 MM		72.3	15.7	84
No.30 / 0.600 MM		170.7	37.1	63
No.50 / 0.300 MM		262.3	57.0	43
No.100 / 0.150 MM		324.4	70.5	30
No.200 / 0.075 MM		365.1	79.3	21

Atterburg Limits

ASTM D4318

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

Gradation Chart



Classification (UCS)

ASTM D2487 Group Name: **Silty Sand** Group Symbol: **SM**

Reviewed By:_____

W.J. Nenno C.E.T.

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

SIEVE ANALYSIS

ASTM C136 & C117

SOIL CLASSIFICATION

ASTM D2487

Project: Twin Falls Idaho - VA

Sample Description:: Test Hole 4,5,6,7,9 - 3'

Sample	Total Wt
Sample/Tare	343.9
Tare /Ratio	0
Sample Wt.	343.9

Date Sampled: 04/06/16 **EHM Job #** 052-16

Sampled By: S. Kaster **Tested By:** B. Kruger

Sieve Analysis

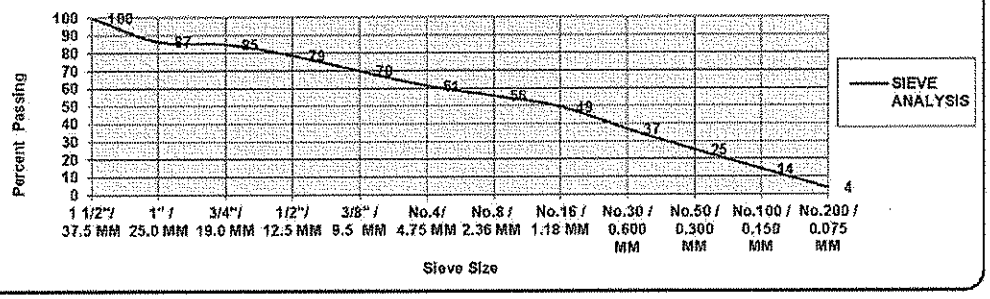
ASTM C136 -C117	Accum. Wt.	% Retained	% Passing
1 1/2"/ 37.5 MM	0.0	0.0	100
1" / 25.0 MM	46.3	13.5	87
3/4"/ 19.0 MM	51.8	15.1	85
1/2"/ 12.5 MM	73.8	21.5	79
3/8" / 9.5 MM	103.9	30.2	70
No.4/ 4.75 MM	132.5	38.5	61
No.8 / 2.36 MM	152.2	44.3	56
No.16 / 1.18 MM	173.9	50.6	49
No.30 / 0.600 MM	217.3	63.2	37
No.50 / 0.300 MM	257.3	74.8	25
No.100 / 0.150 MM	294.8	85.7	14
No.200 / 0.075 MM	331.7	96.5	4

Atterburg Limits

ASTM D4318

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

Gradation Chart



Classification (UCS)

ASTM D2487 Group Name: **Poorly Graded Sand** Group Symbol: **SP**

Reviewed By:_____

W.J. Nenno C.E.T.

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

SIEVE ANALYSIS

ASTM C136 & C117

SOIL CLASSIFICATION

ASTM D2487

Project: Twin Falls Idaho - VA

Sample Description:: Test Hole 8 - 3'

Sample	Total Wt
Sample/Tare	637.1
Tare /Ratio	0
Sample Wt.	637.1

Date Sampled: 04/06/16 **EHM Job #** 052-16

Sampled By: S. Kaster **Tested By:** B. Kruger

Sieve Analysis

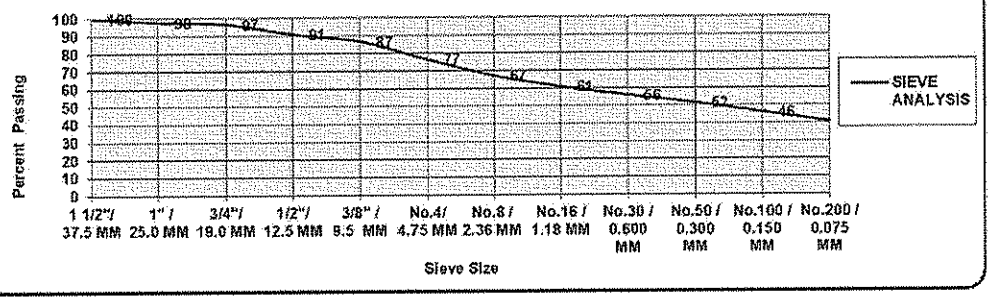
ASTM C136 -C117		Accum. Wt.	% Retained	% Passing
1 1/2"/ 37.5 MM		0.0	0.0	100
1" / 25.0 MM		14.2	2.2	98
3/4"/ 19.0 MM		21.5	3.4	97
1/2"/ 12.5 MM		57.9	9.1	91
3/8" / 9.5 MM		84.1	13.2	87
No.4/ 4.75 MM		149.6	23.5	77
No.8 / 2.36 MM		209.1	32.8	67
No.16 / 1.18 MM		249.2	39.1	61
No.30 / 0.600 MM		279.9	43.9	56
No.50 / 0.300 MM		308.4	48.4	52
No.100 / 0.150 MM		342.5	53.8	46
No.200 / 0.075 MM		377.6	59.3	41

Atterburg Limits

ASTM D4318

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

Gradation Chart



Classification (UCS)

ASTM D2487 Group Name: **Silty Sand with Gravel** Group Symbol: **SM**

Reviewed By:_____

W.J. Nenno C.E.T.

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

SIEVE ANALYSIS

ASTM C136 & C117

SOIL CLASSIFICATION

ASTM D2487

Project: Twin Falls Idaho - VA

Sample Description:: Test Hole 9 - 5 - 6.5'

Sample	Total Wt
Sample/Tare	349.3
Tare /Ratio	0
Sample Wt.	349.3

Date Sampled: 04/06/16 **EHM Job #** 052-16

Sampled By: S. Kaster **Tested By:** B. Kruger

Sieve Analysis

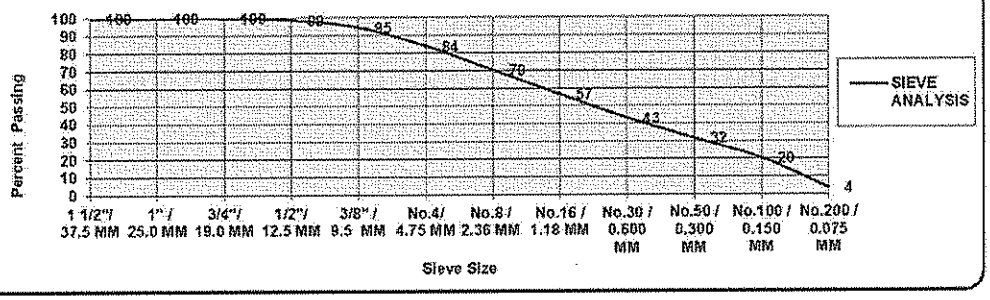
ASTM C136 -C117		Accum. Wt.	% Retained	% Passing
1 1/2"/ 37.5 MM		0.0	0.0	100
1" / 25.0 MM		0.0	0.0	100
3/4"/ 19.0 MM		0.0	0.0	100
1/2"/ 12.5 MM		4.1	1.2	99
3/8" / 9.5 MM		18.8	5.4	95
No.4/ 4.75 MM		55.3	15.8	84
No.8 / 2.36 MM		103.5	29.6	70
No.16 / 1.18 MM		151.4	43.3	57
No.30 / 0.600 MM		198.4	56.8	43
No.50 / 0.300 MM		238.6	68.3	32
No.100 / 0.150 MM		278.1	79.6	20
No.200 / 0.075 MM		336.8	96.4	4

Atterburg Limits

ASTM D4318

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

Gradation Chart



Classification (UCS)

ASTM D2487 Group Name: **Poorly Graded Sand** Group Symbol: **SP**

Reviewed By:_____

W.J. Nenno C.E.T.

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

MAGIC VALLEY LABS
210 Addison Ave / PO Box 1867
Twin Falls ID 83303-1867
Phone: (208) 733-4250
Fax: (208) 734-2539

EHM ENGINEERS

621 N COLLEGE ROAD #100
TWIN FALLS ID 83301

Collection Date	4/12/2016	Received Date	4/12/2016	Location	
Collection Time	12:15 PM	Received Time	1:14 PM	052-16-TH1	

Sample #	Test / Method Code	Results in mg/L	Date Analyzed	Analyst
1581651				

Signature

Report Date: Wednesday, April 20, 2016

Western Laboratories.com
211 Highway 95 • P.O. Box 1020 • Parma, ID 83660
800-658-3858 • FAX 208-722-6550
http://www.westernlaboratories.com
Methods: www.westernlaboratories.com/methods.

Dealer: 17-27 L Smith
Reported: 4-15-2016
Test #: 1
Grower: Magic Valley Labs
Field ID: 1581651

Lab #:
31564

AGRICULTURAL SOIL REPORT

ELEMENT	ANSWER	INTERP	SHOULD BE	ELEMENT	ANSWER	INTERP	SHOULD BE
pH-Soil	8.2	Moderately Basic		Sulfur-ppm	32	Optimum	20 +
pH-SMP				Calcium-ppm	5096	High	1,800 +
Soluble Salts	0.39	Optimum	< 1.5	Magnesium-ppm	496	High	250 +
% Lime	M	3.1 to 5.5 % lime		Sodium-ppm	143	Optimum	< 225
% Organic Matter	2.89	Medium		Zinc-ppm	1.0	Low	1.0 - 3.0
Nitrates-ppm	37	High	10 - 35	Copper-ppm	0.9	Optimum	0.8 - 2.5
Ammonium-ppm	4	Low	5 +	Manganese-ppm	2	Very Low	6 - 30
Phosphorus-ppm	35	Optimum	25 - 40	Iron-ppm	7	Very Low	7 +
Phos-ppm-Bray			50 - 100	Boron-ppm	0.2	Very Low	0.7 - 1.5
Potassium-ppm	611	High	300 +	TBS%	48		

Texture	Silt Loam	Water Holding Capacity/foot	2.29	Bulk Density	1.35

Cation Exchange Capacity - CEC		21	P Index		
Percent Base Saturation		148			
BASES	IDEAL	YOURS		NO3 ppm	NH4 ppm
Calcium-% of CEC	65-80	119	1 Ft	37	4
Magnesium-% of CEC	10-20	19	2 Ft		
Potassium-% of CEC	2-6	7	3 Ft		
Sodium-% of CEC (ESP)	< 5	3	Total N PPM		41
Hydrogen-% of CEC	< 15		Lbs N / Acre		123

Ratio	Ideal	Yours	Evaluation	Recommendations
Ca:Mg	6-20:1	10 :1	OK	
Ca:K pH >7	15:1	8 :1	OK	
Ca:K pH <7	10:1	:1		
Ca:P pH >7	100:1	146:1	High	Watch P
Ca:P pH <7	40:1	:1		
P:Zn	15:1	35 :1	High	Watch Zn
P:Mn	4:1	18:1	High	Watch Mn
P:Cu	25:1	39 :1	High	Watch Cu
Zn:Cu	3:1	1 :1	OK	
Mn:Zn	3:1	2 :1	OK	
Mn:Cu	7:1	2 :1	OK	
K:B	200:1	3055 :1	High	Watch B
Mg:K	2:1	1 :1	Low	Watch Mg

Fertilizer Suggestions in Pounds per Acre for the whole season

Crop		
Yield Goal		
Past Crop		
Acres		
Nitrogen		
Phosphate		
Add Phos for P INDEX		
Potash		
P.F. Sulfur		
Elemental Sulfur	350	
Gypsum		
Lime		
Dolomite		
Magnesium		
Zinc		
Manganese		
Copper		
Boron		

Split apply Nitrogen. Nitrogen, sulfur and boron recs are made for this year. All other nutrient recs can be split over a two-year program. Tissue and soil test in-season gives the best results.

P.F. Sulfur = Plant Food Sulfu Elemental Sulfur = Reclamation Sulfu

"Always practice the laws of Agronomy"
John P. Taberna, Soil Scientist

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

MAGIC VALLEY LABS
210 Addison Ave / PO Box 1867
Twin Falls ID 83303-1867
Phone: (208) 733-4250
Fax: (208) 734-2539

EHM ENGINEERS

621 N COLLEGE ROAD #100
TWIN FALLS ID 83301

Collection Date	4/12/2016	Received Date	4/12/2016	Location	
Collection Time	12:30 PM	Received Time	1:14 PM	052-16-TH6	

Sample #	Test / Method Code	Results in mg/L	Date Analyzed	Analyst
1581661				

Signature

Report Date: Wednesday, April 20, 2016

Western Laboratories.com
211 Highway 95 • P.O. Box 1020 • Parma, ID 83660
800-658-3868 • FAX 208-722-5550
http://www.westernlaboratories.com
Methods: www.westernlaboratories.com/methods.

Dealer: 17-27 L Smith
Reported: 4-15-2016
Test #: 1
Grower: Magic Valley Labs
Field ID: 1581661

Lab #:
31565

AGRICULTURAL SOIL REPORT

ELEMENT	ANSWER	INTERP	SHOULD BE	ELEMENT	ANSWER	INTERP	SHOULD BE
pH-Soil	8.1	Moderately Basic		Sulfur-ppm	32	Optimum	20 +
pH-SMP				Calcium-ppm	4538	High	1,800 +
Soluble Salts	0.47	Optimum	< 1.5	Magnesium-ppm	613	High	250 +
% Lime	M	3.1 to 5.5 % lime		Sodium-ppm	170	Optimum	< 225
% Organic Matter	2.54	Medium		Zinc-ppm	1.5	Optimum	1.0 - 3.0
Nitrates-ppm	28	Optimum	10 - 35	Copper-ppm	1.1	Optimum	0.8 - 2.5
Ammonium-ppm	4	Low	5 +	Manganese-ppm	4	Low	6 - 30
Phosphorus-ppm	40	Optimum	25 - 40	Iron-ppm	31	High	7 +
Phos-ppm-Bray			50 - 100	Boron-ppm	1.1	Optimum	0.7 - 1.5
Potassium-ppm	420	Optimum	300 +	TBS%	94		

Texture	Loam	Water Holding Capacity/foot	2.08	Bulk Density	1.4

Cation Exchange Capacity - CEC	15	P Index	
Percent Base Saturation	194		

BASES	IDEAL	YOURS		NO3 ppm	NH4 ppm
Calcium-% of CEC	65-80	149	1 Ft	28	4
Magnesium-% of CEC	10-20	33	2 Ft		
Potassium-% of CEC	2-6	7	3 Ft		
Sodium-% of CEC (ESP)	< 5	5	Total N PPM		32
Hydrogen-% of CEC	< 15		Lbs N / Acre		96

Ratio	Ideal	Yours	Evaluation	Recommendations
Ca:Mg	6-20:1	7 :1	OK	
Ca:K pH >7	15:1	11 :1	OK	
Ca:K pH <7	10:1	:1		
Ca:P pH >7	100:1	113 :1	High	Watch P
Ca:P pH <7	40:1	:1		
P:Zn	15:1	27 :1	High	Watch Zn
P:Mn	4:1	10:1	High	Watch Mn
P:Cu	25:1	36 :1	High	Watch Cu
Zn:Cu	3:1	1 :1	OK	
Mn:Zn	3:1	3 :1	OK	
Mn:Cu	7:1	4 :1	OK	
K:B	200:1	382 :1	High	Watch B
Mg:K	2:1	1 :1	Low	Watch Mg

Fertilizer Suggestions in Pounds per Acre for the whole season		
Crop		
Yield Goal		
Past Crop		
Acres		
Nitrogen		
Phosphate		
Add Phos for P INDEX		
Potash		
P.F. Sulfur		
Elemental Sulfur	294	
Gypsum		
Lime		
Dolomite		
Magnesium		
Zinc		
Manganese		
Copper		
Boron		

Split apply Nitrogen. Nitrogen, sulfur and boron recs are made for this year. All other nutrient recs can be split over a two-year program. Tissue and soil test in-season gives the best results.

P.F. Sulfur = Plant Food Sulfur Elemental Sulfur = Reclamation Sulfur

"Always practice the laws of Agronomy"
John P. Taburna, Soil Scientist

Lateral Earth Pressure Calculation
U.S. Department of Veterans Affairs

Assumptions	ML/SP Soil Type
Ko	0.45
Φ	33°
γ_{soil}	105 pcf

Ko = 1-sinΦ
Ka = (1-sinΦ) / (1+sinΦ)
Kp = (1+sinΦ) / (1-sinΦ)

Verticle Principle Stress

σ_v=105 pcf/ft

Horizontal Principle Stress

$\sigma_h = \sigma_v * Ko$

At Rest

$Po = \sigma_h = \sigma_v * Ko$

$Po = \sigma_h$=47.31 psf

Active

$Pa = \sigma_v * \tan^2 (45-\Phi/2)$

Pa=30.95 psf

Passive

$Pp = \sigma_v * \tan^2 (45+\Phi/2)$

Pp=356.17 psf

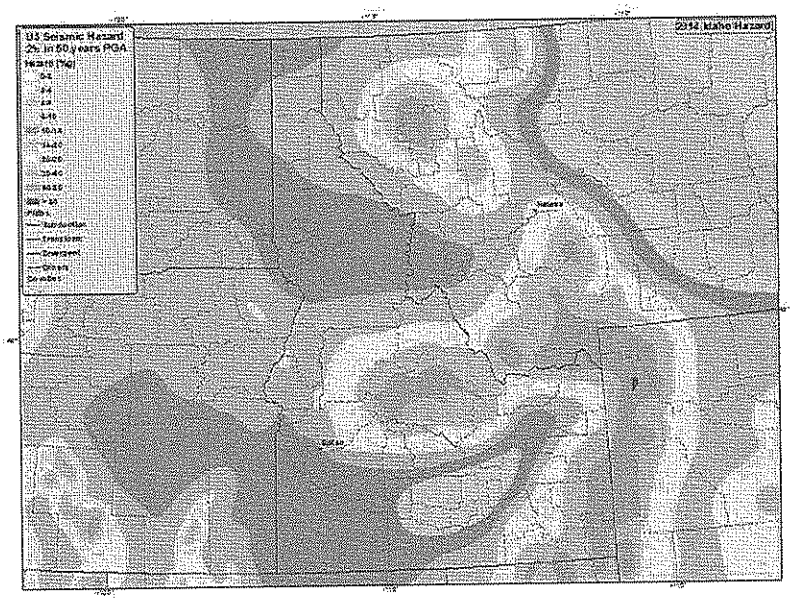
Appendix D Records Search

USGS
science for a changing world

Earthquake Hazards Program

Idaho

2014 Seismic Hazard Map



USGS National Seismic Hazard Maps

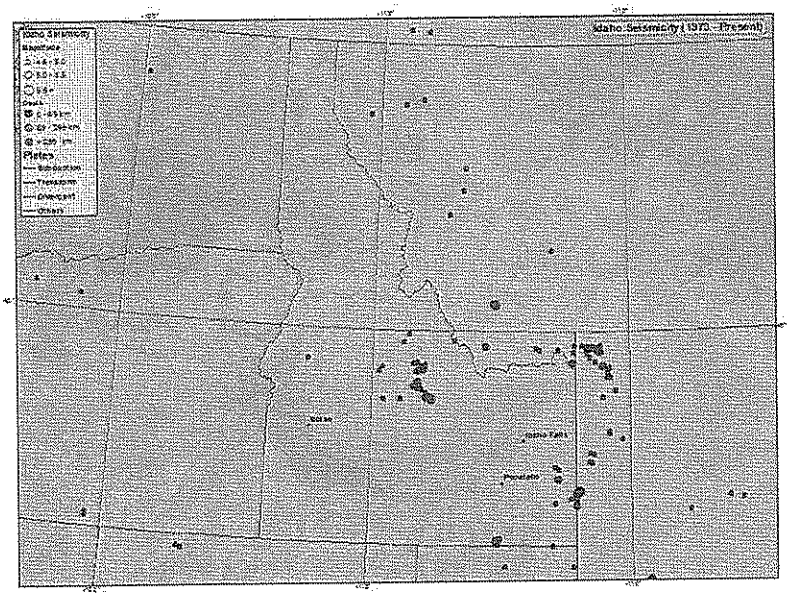
Share this page: Facebook Twitter Google Email

USGS
science for a changing world

Earthquake Hazards Program

Idaho

Seismicity Map - 1973 to March 2012



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Form 238-7
1/78

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES

USE TYPEWRITER OR BALLPOINT PEN

WELL DRILLER'S REPORT

State law requires that this report be filed with the Director, Department of Water Resources within 30 days after the completion or abandonment of the well.

1. WELL OWNER

Name: Bull Cemetary
Address: Bull, Idaho 83316
Owner's Permit No.:

2. NATURE OF WORK

☒ New well ☐ Deepened ☐ Replacement
☐ Abandoned (describe method of abandoning)

3. PROPOSED USE

☒ Domestic ☐ Irrigation ☐ Test ☐ Municipal
☐ Industrial ☐ Stock ☐ Waste Disposal or Injection
☐ Other (specify type)

4. METHOD DRILLED

☐ Rotary ☐ Air ☐ Hydraulic ☐ Reverse rotary
☒ Cable ☐ Dug ☐ Other

5. WELL CONSTRUCTION

Casing schedule: ☒ Steel ☐ Concrete ☐ Other

Thickness	Diameter	From	To
.250 inches	6 inches +	1 feet	20 feet
inches	inches	feet	feet
inches	inches	feet	feet
inches	inches	feet	feet

Was casing drive shoe used? ☐ Yes ☒ No
Was a packer or seal used? ☐ Yes ☒ No
Perforated? ☐ Yes ☒ No
How perforated? ☐ Factory ☐ Knife ☐ Torch
Size of perforation inches by inches

Number	From	To
perforations	feet	feet
perforations	feet	feet
perforations	feet	feet

Well screen installed? ☐ Yes ☒ No
Manufacturer's name
Type Model No.
Diameter Slot size Set from feet to feet
Diameter Slot size Set from feet to feet
Gravel packed? ☐ Yes ☒ No ☐ Size of gravel
Placed from feet to feet
Surface seal depth 19 Material used in seal: ☒ Cement grout ☐ Puddling clay ☒ Well cuttings
Sealing procedure used: ☐ Slurry pit ☒ Temp. surface casing ☒ Overbore to seal depth
Method of joining casing: ☐ Threaded ☐ Welded ☐ Solvent Weld ☐ Cemented between strata
Describe access port 1¼ Plug In well Cap

6. LOCATION OF WELL

Sketch map location must agree with written location.

Subdivision Name
Lot No. Block No.
County
SW ¼ NE ¼ Sec. 31, T. 9 N. (S) R. 15 (E) W.

7. WATER LEVEL

Static water level 105 feet below land surface.
Flowing? ☐ Yes ☒ No G.P.M. flow
Artesian closed-in pressure p.s.i.
Controlled by: ☐ Valve ☐ Cap ☐ Plug
Temperature 57°F. Quality

8. WELL TEST DATA

☐ Pump ☒ Bailer ☐ Air ☐ Other

Discharge G.P.M.	Pumping Level	Hours Pumped

9. LITHOLOGIC LOG 73627

Hole Diam.	Depth From	Depth To	Material	Water Yes	Water No
	0	1	Top Soil		
	1	3	Red pan		
	3	12	Lava		
	12	15	Boulders		
	15	26	Lava		
	26	57	Lava Stripsa Cynders		
	57	73	Redish Brown Rylite		
	73	80	Cynders		
	80	84	Brown Rylite		
	84	90	Cynders		
	90	121	Brown with Red Rylite	✓	
	121	126	Lava Stripa Cynders	✓	
	126	135	Cynders		
					✓

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MAR 12 1982
Department of Water Resources

RECEIVED
MAR 8 1982
Department of Water Resources
Southern District Office

10. Work started 9-2-81 finished 9-10-81

11. DRILLERS CERTIFICATION

I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Firm Name B+B Drilling Firm No. 171
Address Rt 1 Hagerman Date 2/10/82
Signed by (Firm Official) Ron Bixby
and
(Operator) Leon Burkhart

USE ADDITIONAL SHEETS IF NECESSARY — FORWARD THE WHITE COPY TO THE DEPARTMENT

Basin 47 App 85063 Per 789675 JD360690 9874

-8-7

IDAHO DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT

CA

Office Use Only
Well ID No: ____
Inspected by ____
Twp ____ Rge ____ Sec ____
____ 1/4 ____ 1/4 ____ 1/4
Lat: : : Long: : :

1. WELL TAG NO. D 0023490
DRILLING PERMIT NO. 789675
Water Right or Injection Well No. ____

2. OWNER:
Name Homestead Investments, Inc.
Address 2151-A East 3950 North
City Filer State ID Zip 83328

3. LOCATION OF WELL by legal description:
You must provide address or Lot, Blk, Sub. or Directions to well.
Twp. 9 North ☐ or South ☒
Rge. 15 East ☒ or West ☐
Sec. 31 ____ 1/4 ____ 1/4 NE 1/4 NE 1/4
Gov't Lot ____ County Twin Falls
Lat: : : Long: : :
Address of Well Site ____
Mt Buhl Cemetery City Buhl
(Give at least name of road + distance to road or landmark)
Lt. 1 Blk. ____ Sub. Name ____
Easy Living Estates

4. USE:
☒ Domestic ☐ Municipal ☐ Monitor ☐ Irrigation
☐ Thermal ☐ Injection ☐ Other ____

5. TYPE OF WORK check all that apply (Replacement etc.)
☒ New Well ☐ Modify ☐ Abandonment ☐ Other ____

6. DRILL METHOD:
☒ Air Rotary ☐ Cable ☐ Mud Rotary ☐ Other ____

7. SEALING PROCEDURES

Seal Material	From	To	Weight / Volume	Seal Placement Method
Bentonite	5	18	3 S	Poured

Was drive shoe used? ☐Y ☒N Shoe Depth(s) ____
Was drive shoe seal tested? ☐Y ☒N How? ____

8. CASING/LINER:

Diameter	From	To	Gauge	Material	Casing	Liner	Welded	Threaded
6"	+2	18	250	Steel	☒	☐	☐	☐
					☐	☐	☐	☐
					☐	☐	☐	☐

Length of Headpipe ____ Length of Tailpipe ____
Packer ☐Y ☐N Type ____

9. PERFORATIONS/SCREENS PACKER TYPE
Perforation Method ____
Screen Type & Method of Installation ____

From	To	Slot Size	Number	Diameter	Material	Casing	Liner
						☐	☐
						☐	☐
						☐	☐

10. FILTER PACK

Filter Material	From	To	Weight / Volume	Placement Method

11. STATIC WATER LEVEL OR ARTESIAN PRESSURE:
124 ft. below ground Artesian pressure ____ lb.
Depth flow encountered ____ ft. Describe access port or control devices: ____

12. WELL TESTS:
☐ Pump ☐ Bailer ☐ Air ☐ Flowing Artesian

Yield gal./min.	Drawdown	Pumping Level	Time

Water Temp. ____ Bottom hole temp. ____
Water Quality test or comments: ____
Depth first Water Encountered ____

13. LITHOLOGIC LOG: (Describe repairs or abandonment)

Bore Dia.	From	To	Remarks: Lithology, Water Quality & Temperature	Water Y	Water N
8"	0	9	Topsoil		X
	9	18	Gray basalt		X
6"	18	64	Gray basalt		X
	64	80	Fractured gray basalt		X
	80	85	Ash & cinders		X
	85	133	Fractured gray basalt	X	
	133	144	Brown basalt	X	
	144	200	Fractured gray basalt	X	
			5-12-03 Deepen		
	200	248	Fractured gray basalt	X	
	248	252	Brown cinders	X	
	252	280	Fractured gray basalt	X	

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MAY 15 2003
Department of Water Resources
Southern Region

Completed Depth 280 ft. (ft/measurable)
Date: Started 4-16-03 Completed 4-16-03

14. DRILLER'S CERTIFICATION
I/We certify that all minimum well construction standards were complied with at the time the rig was removed.
Company Name Elsing Drilling Firm No. 31
Principal Driller [signature] Date 4-18-03
and
Driller or Operator II [signature] Date 4-18-03
Operator I [signature] Date 4-18-03
Principal Driller and Rig Operator *Required.*
Operator I must have signature of Driller/Operator II.

FORWARD WHITE COPY TO WATER RESOURCES

Form 238-7
1/78

STATE OF IDAHO
DEPARTMENT OF WATER RESOURCES

WELL DRILLER'S REPORT

State law requires that this report be filed with the Director, Department of Water Resources within 30 days after the completion or abandonment of the well.

USE TYPEWRITER OR BALLPOINT PEN

RECEIVED DEC 18 1985

Identification of Water Diversions
Department of Water Resources

1. WELL OWNER

Name West End Cemetery
Address Rt # Buhl, Idaho
Owner's Permit No. 47-7439

2. NATURE OF WORK

☒ New well ☐ Deepened ☐ Replacement
☐ Abandoned (describe method of abandoning)

3. PROPOSED USE

☐ Domestic ☒ Irrigation ☐ Test ☐ Municipal
☐ Industrial ☐ Stock ☐ Waste Disposal or Injection
☐ Other (specify type)

4. METHOD DRILLED

☐ Rotary ☐ Air ☐ Hydraulic ☐ Reverse rotary
☒ Cable ☐ Dug ☐ Other

5. WELL CONSTRUCTION

Casing schedule: ☐ Steel ☐ Concrete ☐ Other

Thickness	Diameter	From	To
.250 inches	8" inches +	1 feet	20 feet
inches	inches	feet	feet
inches	inches	feet	feet
inches	inches	feet	feet

Was casing drive shoe used? ☐ Yes ☒ No
Was a packer or seal used? ☐ Yes ☒ No
Perforated? ☐ Yes ☒ No
How perforated? ☐ Factory ☐ Knife ☐ Torch
Size of perforation inches by inches

Number	From	To
perforations	feet	feet
perforations	feet	feet
perforations	feet	feet

Well screen installed? ☐ Yes ☒ No
Manufacturer's name
Type Model No.
Diameter Slot size Set from feet to feet
Diameter Slot size Set from feet to feet
Gravel packed? ☐ Yes ☒ No ☐ Size of gravel
Placed from feet to feet
Surface seal depth 19 Material used in seal: ☒ Cement grout ☐ Puddling clay ☒ Well cuttings
Sealing procedure used: ☐ Slurry pit ☒ Temp. surface casing ☒ Overbore to seal depth
Method of joining casing: ☐ Threaded ☒ Welded ☐ Solvent Weld ☐ Cemented between strata
Describe access port WC-11 Set 1

6. LOCATION OF WELL

Sketch map location must agree with written location.

N / W / E / S

Subdivision Name
Lot No. Block No.
County
SW ¼ NE ¼ Sec. 31, T. 9 N. R. 15 E.

7. WATER LEVEL

Static water level 105 feet below land surface
Flowing? ☐ Yes ☒ No G.P.M. flow
Artesian closed-in pressure p.s.i.
Controlled by: ☐ Valve ☐ Cap ☐ Plug
Temperature 57°F. Quality

8. WELL TEST DATA

☒ Pump ☒ Bailer ☐ Air ☐ Other

Discharge G.P.M.	Pumping Level	Hours Pumped
110	168	24

88339

9. LITHOLOGIC LOG

Hole Diam.	Depth From	Depth To	Material	Water Yes	Water No
8"	0	1	Top Soil		
	1	4	Scaled Hard Pan		
	4	31	Grey Ryolite		
	31	60	Black Ryolite		
	60	67	Ash		
	67	85	Brownish Red Ryolite		
	85	96	Brown Ryolite		
	96	110	Brownish Red Ryolite		
	110	137	Red Ryolite Slag/Gravel		
	137	164	Grey Ryolite Hard		
	164	186	Black Ryolite Rough		
	186	191	Red Ryolite		
	191	236	Black Ryolite		
	236	251	Red Ryolite		
	251	284	Black Ryolite		
6"	284	307	" "		
	307	332	Brown Ryolite		
	332	409	Brownish Red Ryolite		
	409	425	Red Clay		
	425	428	Gravel	✓	

RECEIVED
JAN 3 1986
Department of Water Resources

MICROFILMED

10. Work started 10-10-84 finished 4-11-85

11. DRILLERS CERTIFICATION

I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Firm Name B+B Drilling Firm No. 171
Address Rt 1 Hagerman Date 11/15/85
Signed by (Firm Official) Ron Bishop
and
(Operator) [illegible]

USE ADDITIONAL SHEETS IF NECESSARY — FORWARD THE WHITE COPY TO THE DEPARTMENT

Form 238-7
6/07

IDAHO DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT

AD

1. WELL TAG NO. D 0051100
Drilling Permit No. 859059
Water right or injection well #

2. OWNER:
Name Galan Giesbrecht
Address 4125 N 1600 E
City Buhl State ID Zip 83316

3. WELL LOCATION:
Twp. 9 North ☐ or South ☒ Rge. 15 East ☒ or West ☐
Sec. 31 NE 1/4 SE 1/4
Gov't Lot County Twin Falls
Lat. 42 ° 35.814 (Deg. and Decimal minutes)
Long. 114 ° 44.007 (Deg. and Decimal minutes)
Address of Well Site 4125 N 1600 E
City Buhl
Lot Blk. Sub. Name

4. USE:
☒ Domestic ☐ Municipal ☐ Monitor ☐ Irrigation ☐ Thermal ☐ Injection
☐ Other

5. TYPE OF WORK:
☐ New well ☐ Replacement well ☒ Modify existing well
☐ Abandonment ☐ Other deepening

6. DRILL METHOD:
☒ Air Rotary ☐ Mud Rotary ☐ Cable ☐ Other

7. SEALING PROCEDURES:

Seal material	From (ft)	To (ft)	Quantity (lbs or ft³)	Placement method/procedure

8. CASING/LINER:

Diameter (nominal)	From (ft)	To (ft)	Gauge/ Schedule	Material	Casing	Liner	Threaded	Welded
					☐	☐	☐	☐
					☐	☐	☐	☐
					☐	☐	☐	☐
					☐	☐	☐	☐

Was drive shoe used? ☐ Y ☐ N Shoe Depth(s)

9. PERFORATIONS/SCREENS:
Perforations ☐ Y ☐ N Method
Manufactured screen ☐ Y ☐ N Type
Method of installation

From (ft)	To (ft)	Slot size	Number/ft	Diameter (nominal)	Material	Gauge or Schedule

Length of Headpipe Length of Tailpipe
Packer ☐ Y ☐ N Type

10. FILTER PACK:

Filter Material	From (ft)	To (ft)	Quantity (lbs or ft³)	Placement method

11. FLOWING ARTESIAN:
Flowing Artesian? ☐ Y ☐ N Artesian Pressure (PSIG)
Describe control device

12. STATIC WATER LEVEL and WELL TESTS:
Depth first water encountered (ft) 150 Static water level (ft) 150
Water temp. (°F) <85 Bottom hole temp. (°F) <85
Describe access port well cap

Well test:

Drawdown (feet)	Discharge or yield (gpm)	Test duration (minutes)
no returns		

Test method: Pump ☐ Bailer ☐ Air ☐ Flowing artesian ☐

Water quality test or comments:

13. LITHOLOGIC LOG and/or repairs or abandonment:

Bore Dia. (in)	From (ft)	To (ft)	Remarks, lithology or description of repairs or abandonment, water temp.	Water Y	Water N
5	166	170	cleaned hole	X	
5	170	175	medium soft breaks & talc	X	
5	175	185	medium lava		
5	185	190	soft lava, breaks & talc	X	
5	190	197	soft lava & breaks	X	
5	197	237	hard lava		
5	237	245	medium soft lava		
5	245	250	soft lava & breaks	X	
5	250	260	medium soft lava & small breaks	X	

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JUL 26 2010
DEPT. OF WATER RESOURCES
SOUTHERN REGION

Completed Depth (Measurable) 260
Date Started 05/26/2010 Date Completed 05/26/2010

14. DRILLER'S CERTIFICATION:
I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Company Name Eaton Drilling & Pump Ser. Co. No. 26
*Principal Driller Date 6-4-2010
*Driller Date 6-4-2010
*Operator II Date 6-4-2010
Operator I Date

* Signature of Principal Driller and rig operator are required.

Form 238-7
1/94

C

IDAHO DEPARTMENT OF WATER RESOURCES
WELL DRILLER'S REPORT

Use Typewriter or Ball Point Pen

AUG 29 1994 56535
Department of Water Resource
Southern Region Off.

1. DRILLING PERMIT NO. 47-94-5-0124-000
Other IDWR No.

2. OWNER:
Name Nick Ring
Address 610 ELM AVE EAST
City State Zip

3. LOCATION OF WELL by legal description:
Sketch map location must agree with written location.

N / W / E / S

Twp. 9 S North ☐ or South ☒
Rge. 13 East ☒ or West ☐
Sec. 31 1/4 NW 1/4 SE 1/4 (10 acres / 40 acres / 160 acres)
Gov't Lot County

Address of Well Site 610 ELM AVE E.
City BUHL
(Give at least name of road + Distance to Road or Landmark)

Lt. Blk. Sub. Name

4. PROPOSED USE:
☒ Domestic ☐ Municipal ☐ Monitor ☐ Irrigation
☐ Thermal ☐ Injection ☐ Other

5. TYPE OF WORK
☒ New Well ☐ Modify or Repair ☐ Replacement ☐ Abandonment

6. DRILL METHOD
☐ Mud Rotary ☒ Air Rotary ☐ Cable ☐ Other

7. SEALING PROCEDURES

SEAL/FILTER PACK Material	From	To	AMOUNT Sacks or Pounds	METHOD
Bentonite	1	17	1 sack	mix & pour

Was drive shoe used? Y☐ N☒
Was drive shoe seal tested? Y☐ N☐ How?

8. CASING/LINER:

Diameter	From	To	Gauge	Material	Casing	Liner	Welded	Threaded
6	+1	19	250		☐	☐	☐	☐
					☐	☐	☐	☐
					☐	☐	☐	☐

Length of Headpipe Length of Tailpipe

9. PERFORATIONS/SCREENS
☐ Perforations Method
☐ Screens Screen Type

From	To	Slot Size	Number	Diameter	Material	Casing	Liner
						☐	☐
						☐	☐
						☐	☐

10. STATIC WATER LEVEL OR ARTESIAN PRESSURE:
100 ft. below ground Artesian pressure lb.
Depth flow encountered ft. Describe access port or control devices:

11. WELL TESTS:
☐ Pump ☐ Bailer ☒ Air ☐ Flowing Artesian

Yield gal./min.	Drawdown	Pumping Level	Time
~~25~~ 25			

Water Temp. ~85 Bottom hole temp.
Water Quality test or comments:

12. LITHOLOGIC LOG: (Describe repairs or abandonment)

Bore Dia.	From	To	Remarks: Lithology, Water Quality & Temperature	Water Y	Water N
8	0	2	Topsoil		
	2	5	white shale		
8/6	5	28	Lava		
6	28	35	Lava w/water rock		
6	35	60	Soft Lava		
6	60	79	Lava w/water rock		
6	79	130	Soft Lava		
6	130	140	Red Clay		
6	140	177	Soft Lava (177 to water)	X	
6	177	220	Soft Lava	X	

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SEP 23 1994
Department of Water Resources

MAY 06 1995

Completed Depth 220 (Measurable)
Date: Started 8/15/94 Completed 8/18/94

13. DRILLER'S CERTIFICATION
I/We certify that all minimum well construction standards were complied with at the time the rig was removed.

Firm Name Rm Bishop DRILLING Firm No. 540
Firm Official Rm Bishop Date 08/21/94
and
Supervisor or Operator Date
(Sign once if Firm Official is Operator)

FORWARD WHITE COPY TO WATER RESOURCES