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August 21, 2016

Elizabeth Lizberg, Executive Director
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Boise, Idaho 83702
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RE: GEOTEHNIICAL REPORT
Proposed Camp Rainbow Gold
Tax Lot 7995
708 East Fork Road
Blaine County, Idaho

Dear Elizabeth,

I have completed the authorized geotechnical investigation and report and for the proposed Camp Rainbow Gold located on Tax Lot 7995 in Blaine County, Idaho. You authorized the work with the signed proposal dated July 8, 2016.

This report summarizes the results of my field and laboratory testing and presents my geotechnical engineering opinions and recommendations. **It is my opinion that the site is suitable for the proposed multi-structure camp supported by continuous and spread footings and slab-on-grade foundations constructed on either an approved native subgrade or structural fill building pads.** I am providing the recommendations in this report for the foundation design, preparation of the subgrade, foundation drainage system, structural fill building pad, surface grading and drainage and general radon venting concepts.

I recommend that this office be retained to provide construction observations for the foundation building pad, foundation drainage system and any other recommendations presented in this report that are incorporated into the project design. This work will be performed on a time and material basis and is not included in this scope of services. A copy of this soil and foundation report should be incorporated into the construction documents.

I appreciate this opportunity of working with you on this project. Please call me if you have any questions or comments.

Sincerely,

Steve Butler, P.E.



GEOTECHNICAL REPORT

Proposed Camp Rainbow Gold
Tax Lot 7995
708 East Fork Road
Blaine County, Idaho

Butler Associates, Inc.
P.O. Box 1034
Ketchum, Idaho 83340
August 21, 2016

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INTRODUCTION

This report represents the results of the soil and foundation engineering evaluation for the proposed Camp Rainbow Gold located on Tax Lot 7995 in Blaine County, Idaho. The *Vicinity Map* shows the general location of the proposed project site.

The purpose of this evaluation was to assess the surface and subsurface soil and water conditions to prepare geotechnical engineering opinions and recommendations for the construction of the proposed camp. Before the subsurface investigation I reviewed the geotechnical report for Tax Lot 6928 & 7994 located north of the site and geologic data pertinent to the site and general area. I performed a subsurface investigation by excavating fourteen test pits at the site using a track mounted excavator. The soils encountered in the test pits were visually identified and logged by a geotechnical engineer according to the Unified Soil Classification System and USDA and analyzed to prepare this final report.

PROPOSED PROJECT

I understand that the proposed project will consist of over fifteen structures to house and support guests and staff. The structures will probably be single-story, concrete, steel and wood structures supported by continuous and spread footings and slab-on-grade construction. The structures will incorporate a crawlspace and or slab-on-grade construction with no basement or mechanical rooms located below the main finish floor. Access to the site will be from East Fork Road to the west.

The primary views from the site are Pioneer Mountains to the north and east, Mind Bender ridge to the south and Pioneer Mountain foothills and East Fork River drainage to the west.

The property is approximately 259.6 acres in size. BLM property borders the lot to the north, Tax Lot 8366 to the east, Lot 4, Cove Creek Ranch Subdivision and BLM property to the south and Triumph Ranch LLC and BLM property to the west.

FIELD EXPLORATION

Fourteen test pits were excavated and observed at the site on July 20, 2016 using a track-mounted excavator. The test pits were excavated up to 9.4 feet below existing grade. The *Test Pit Site Plan* shows the property lines, existing contours and test pit locations.

The soils in each test pit were evaluated and the soil profiles logged in the field by a geotechnical engineer in accordance with the Unified Soil Classification System (*USCS*) and USDA in order to design the septic drainfield. The *Test Pit Site Plan*, *Test Pit Site Plan Photos* and *Test Pit Logs* are presented on pages 10, 11-12 and 13-26, respectively. The *USCS* chart on page 27 should be used to interpret the terms on the test pit logs in this report. Test Pit #14 is shown on the *Test Pit Site Plan* but was not excavated to avoid crossing the East Fork River with

an excavator.

At the conclusion of the subsurface evaluation, the test pits were loosely backfilled to match the existing ground surface. Any of the test pits located beneath areas proposed for foundations, terraces, walkways or driveways will need to be excavated and backfilled with structural fill in accordance with the *Site Preparation* section of this report.

SUBSURFACE CONDITIONS

The general soil profile encountered in Test Pits #1-#3 located on a slope on the north side of East Fork Road revealed up to 9.0 feet of native, fine sand with little-some silt, little clay and roots overlying sand and gravel up to 9.4 feet below existing grade with no groundwater encountered. Test Pits #4-#15 revealed up to 4.0 feet of sand with little-some silt, little clay and roots overlying sand, gravel and cobble, with occasional boulders and trace-little silt and clay up to 8.5 feet below existing grade. Groundwater was encountered in most of the test pits between 3.0 and 7.2 feet below existing grade. The test pits were terminated due to the caving of the saturated sand and gravel soils and consistency of the soil between the test pits and after reaching several feet below the proposed footings.

The geology of this area is mapped on the "Geologic Map of the Hailey Quadrangle" as alluvium consisting of sand, gravel, and silt and clay soils deposited by the East Fork of the Big Wood River. The surficial fine grain soils are classified as colluvium that was created as the overlying bedrock slopes eroded with the resultant soil being gravity deposited downslope onto the valley floor.

OPINIONS AND RECOMMENDATIONS

General

It is the opinion of this office that the site is suitable from a geotechnical standpoint for the proposed development of the camp supported by approved, compacted native soils and/or a free-draining structural fill foundation building pad constructed on an approved native subgrade underlying the existing topsoil. Groundwater was encountered in most of the test pits in the valley floor that could impact the preparation of the foundation subgrade soils and require importing free-draining gravel to construct foundation building pads. The time of year that construction commences could dictate construction requirements.

All structural fill to be placed for the foundation building pad, exterior terraces, walkways and driveways should be approved native or imported sand and gravel soils. Native silty fine sand soils should be stockpiled to use as non-structural landscape areas. All structural fill should be placed as outlined in the *Subgrade Preparation* section of this report. The recommendations contained in this report reflect my understanding of the existing surface and below grade

conditions and reflect a straight-line interpolation and extrapolation of the subsurface conditions between and beyond test pit locations. However, the soil conditions may vary at the proposed site. The various soil conditions will not be known until excavation for the structure is complete and may cause changes to construction plans and/or costs.

Subgrade Preparation

Following are site preparation recommendations to be completed prior to approving the subgrade for footings or construction of the free-draining structural fill foundation building pads:

1. All test pits should be accurately located in the field prior to commencing with the excavation. Any test pit that is located beneath a proposed footing, slab-on-grade, terrace or walkway adjacent to the structure should be excavated and backfilled with structural fill in accordance with this report. This procedure should help reduce local settlement. The test pit locations are shown on the *Test Pit Site Plan*.
2. The building footprints and exterior terraces and walkways should be stripped of the dark brown topsoil and organics. The silty fine sand topsoil could be used for non-structural landscaping but should be reviewed by your landscape contractor to determine if it is suitable for landscaping.
3. The building footprint, terraces and walkways should then be excavated to bottom of footing or structural section for proposed hardscapes and to remove all uncontrolled fill and organics to expose a native, undisturbed, silty fine sand soils.
4. The exposed subgrade should be watered and compacted with multiple passes of a 5-ton smooth drum roller. The native silty fine sand is sensitive to moisture and groundwater could be close to the bottom of footing elevation so I recommend that the excavation contractor contact this office at the commencement of the excavation to determine the best method to prepare the subgrade since over-watering and/or rubber-tired equipment driving on the moist soils could compromise the integrity of the material.
5. This office should observe and proof-roll the subgrade to determine if the exposed soils is a competent foundation subgrade free of unsuitable soils and organics.
6. Any soft areas encountered once the subgrade is compacted should be over-excavated to expose a competent subgrade and backfilled with structural fill as outlined in this section.
7. Rubber-tired construction traffic, i.e. front loaders during periods of rain and snow should not be allowed to drive on the compacted subgrade to minimize compromising the foundation subgrade soils. Compromised silt soils should be excavated and replaced with approved structural fill.

8. If the excavation commences during inclement weather and freezing temperatures I recommend over-excavating an additional 6" below bottom of footing and placing imported 1" fractured washed gravel to create a free-draining structural fill building pad. The washed gravel will minimize the moisture sensitive silt subgrade from being compromised from precipitation, create a mud-free job-site and improve the foundation drainage system. A layer of 4.0 oz. non-woven filter fabric might be required as a separation layer if the subgrade is moist to prevent the native soils from migrating into the washed gravel.
9. Once the exposed footing subgrade or subgrade for the imported washed gravel structural fill building pad has been observed by this office it will be approved for footings.
10. Groundwater will be higher during the spring snowmelt runoff so excavation to bottom of footing could expose saturated soils and require the import of a free-draining structural fill to construct a foundation building pad.

Structural fill for the foundation building pads, exterior terraces and the driveways should be imported, washed fractured gravel, crushed sand and gravel (roadmix) or pitrun sand and gravel (GW, GM, GP, SW, SM, or SP) as described in the Unified Soil Classification System chart presented after the test pit logs. The washed gravel specified in the foundation drainage system should be imported, washed, 1"-2" fractured or rounded gravel. Granular structural fill should have no more than 10% passing the No. 200 sieve and a cobble size of no larger than 8 inches. Structural fill should be placed to the footing subgrade elevation in uniform, maximum 10-inch deep, loose lifts and compacted to a minimum of 95% of the maximum dry density of the soil, as determined by ASTM D 698 (Standard Proctor). This assumes that heavy compaction equipment such as smooth-drum, vibratory rollers with a minimum drum weight of 5 tons is used. The maximum loose lift thickness should be reduced to 6 inches where smaller and/or lighter compaction equipment is used (i.e. WACKER jumping jack). A vibrating plate tamper can be used to compact 6" lifts of washed rock but should not be used to compact pitrun sand & gravel.

Foundation Drainage System

Due to the native low permeability fine grain subgrade soils overlying the native sand and gravels I recommend that footing drains are installed at the bottom of footing and terminated in drywells. See the *Crawlspace Foundation Wall Drainage Profile* and *Landscape Drywell Profile* for details. This office can work with the landscape architect to locate and size the drywells. If a washed gravel structural fill building pad is constructed the footing drain can be omitted since surface runoff will pass through the perforated pipe and into gravel.

Foundations

The approved compacted foundation subgrade and/or washed gravel structural fill foundation building pad constructed on an approved subgrade will support continuous footings, spread footings and slab-on-grade construction based on the following parameters:

1. The allowable bearing pressure of an approved compacted native silty fine sand or sand, gravel subgrade and/or a washed fractured gravel structural fill foundation building pad constructed on an approved native subgrade is 3,000 pounds per square foot (psf).
2. Exterior footings should be at least 36 inches below finish grade to minimize the potential for frost heave.
3. Total and differential settlement is estimated to be less than one inch and $\frac{3}{4}$ ", respectively, for the structural fill building pad on an approved silty sand subgrade or imported washed gravel structural fill building pad.
4. The recommended friction factor is 0.35 for the native silty sand and 0.5 for the imported washed gravel foundation building pad and/or underlying sand and gravel soils.
5. The floor joists and sub-floor should be in-place prior to backfilling against the foundation walls unless directed otherwise by the structural engineer.
6. All footings should be constructed so that a line drawn from the edge of footings at a slope of 0.5 foot horizontal to 1.0 foot vertical to the undisturbed subgrade soil is not intercepted by non-structural fill or an open slope. See *Structural Fill Building Pad Drainage System* detail.

Soil Classification for Septic Design

Due to high groundwater on the valley floor the septic drainfield will probably be located on the slope north of East Fork Road and east of the existing pond. This office will complete a pressurized septic system design to collect effluent from the structures on the valley floor and pump it under East Fork Road to the drainfield. At the request from the South Central Health District (SCHD) soil samples from Test Pits #2 and #8 were sent to a laboratory to confirm the field classification in order to size the septic drainfield. The following soil profile was encountered in Test Pit #2 located in the area for the proposed drainfield:

0.0' up to 9.0'	B-1 (topsoil) with an application rate of 0.60 gal/s.f./day
9.0' up to 9.4'	A-2a (native) with an application rate of 1.0 gal/s/f/day

No groundwater was encountered and a piezometer was installed to monitor groundwater during the spring snowmelt. The SCHD indicated that the camp septic system should be sized based on 50 gallons/day per person (guests and staff) The following fixtures should also be

reviewed before the drainfield design is completed:

Livable s.f.

Bathrooms

Laundry rooms

Regular and high flow showers (provide flow rates of high flow shower heads)

Utility sinks

Dishwashers

Kitchen sinks

The soil in Test Pit #8 was also classified by the laboratory in case individual pressurized sand mound systems are constructed on the valley floor.

Surface Grading and Drainage

This office did not complete a grading and drainage and landscape plan so the following are general grading and drainage concepts based on the soils encountered in the test pits.

1. I recommend that the surface adjacent to the proposed structure be sloped away from the foundation at least 2% to prevent ponding and to direct surface water runoff away from building foundations, concrete slabs and the edge of pavements and walkways.
2. All roof down spouts, foundation drains, landscape catch basins and surface runoff should be directed to the drywells located downslope of the structure.
3. Roof down spouts should **not** be allowed to drain adjacent to foundation. A 4" solid pipe could be installed in top of the footing with stub-outs for connecting the downspouts to and terminated in the drywells located downslope of the structure. See the *Crawlspace Foundation Wall Drainage Profile* and *Landscape Drywell Profile* for concepts.
4. All drain lines should be covered with at least 36" of soil to minimize freezing.
5. All drywells should be located at least 10 feet from the foundations.
6. The native silty soils have a low permeability so drywells should be terminated several feet into the underlying sand and gravel soils. See the *Landscape Drywell Profile* for details.
7. I can complete a grading and drainage plan or review the landscape at your request.

Driveway, Terraces and Walkways

I recommend the following section for asphalt driveways, terraces and walkways of either pavers or exterior concrete slabs in order to minimize frost action and settlement. The driveway section is designed to allow for an exposed gravel driving surface during construction before the final asphalt driving surface is installed:

1. The alignments should be cut to subgrade elevation and/or to remove all roots, organics, uncontrolled fill or disturbed native soils. The underlying native soils should be proof rolled with a 5-ton smooth drum roller to locate any soft areas. Any soft areas should be excavated to a competent subgrade and replaced with compacted structural fill as outlined in the *Site Preparation* section.
2. All parking areas, terraces and walkways should be constructed so that a line drawn from the edge of walkways or driveways at a slope of 0.5 foot horizontal to 1.0 foot vertical to the undisturbed subgrade soil is not intercepted by non-structural fill or an open slope. See the *Structural Fill-Foundation Subgrade Concepts Profile*.
3. 6 inches of 2" minus, crushed sand and gravel roadmix compacted to at least 95% of the maximum dry density of the soil as determined by ASTM Test D-698 (Standard Proctor).
4. 4 inches of ¾" minus, crushed sand and gravel roadmix compacted to at least 95% of the maximum dry density of the soil as determined by ASTM Test D-698 (Standard Proctor).
5. Pavers, asphalt or concrete. If pavers, asphalt or concrete is not installed as a driving surface then the depth of the ¾" minus roadmix should be increased to 6" to allow for material being lost to snow plowing and to bridge over poor subgrade soils.
6. Driveway runoff should not be allowed to drain onto East Fork Road. I recommend that a drywell with a cast iron ring and grate be installed near the end of the driveway. A drywell installed in the driveway will allow access to it in the winter months to keep it clear of snow and ice but it could also be located on either side of a crowned driveway. See the *Storm Water Drywell Profile* for details.

A minimum of 4 inches of ¾", well graded, crushed sand and gravel (road mix) base course should be placed between the pit-run sub-base and the finish walking surface. This will provide a leveling course and distribute point loads. If the fill for the driveway, terraces, and walkways are completed before the finish surface is constructed any structural fill should be compacted if the surfaces are exposed over a winter since the material will experience frost heave and reach a loose state.

The ¾" minus roadmix should be installed just prior to placing the finish asphalt surface so it does not become contaminated during construction of the residence.

Seismicity

The general subsurface soil conditions are consistent with 2012 International Building Code for Seismic Design Category C. The latitude and longitude of the project site are 43.64°N and 114.22° W, respectively.

Site Soil Classification: Class C

Risk Category: I/II/III

S_s = 0.5460 g

S₁ = 0.165 g

S_{ms} = 0.662 g

S_{m1} = 0.269 g

Radon Venting

This office is not qualified to complete a radon venting system design so the following venting concepts are guidelines. The radon system should be reviewed with a radon venting contractor.

Blaine County has a history of radon gas collecting in crawlspaces and under slab-on-grades. Radon gas is a byproduct of the natural breakdown of uranium that accumulates in improperly sealed basements and crawl spaces. These radon levels can exceed safety standards as set by the EPA. According to the State Radon Contact the most accurate testing results are gathered in the structure after construction. A 4-inch dia. perforated pipe placed in the leveling gravel beneath slab-on-grade construction can be connected to venting fans to reduce radon levels. It is important to create an airtight seal between all concrete slabs and adjacent walls. Consulting an experienced contractor or radon-venting specialist can ensure a fairly inexpensive system is installed during construction compared to potentially expensive remedial measures. See *Slab-On-Grade Drainage and Radon System Concepts Plan* for general design suggestions. I recommend installing sleeves in interior footings to allow the perforated pipe to be directed through the footings to the mechanical room for eventual venting through the roof.

CONSTRUCTION OBSERVATION AND MONITORING

This report provides opinions and recommendations that are generally accepted geotechnical engineering principle and practices. I recommend that this office provide construction monitoring and observation services in order to ensure that the recommendations outlined in this report are followed and that the foundation drainage system and grading and drainage details are constructed properly. If this office is not retained to perform the recommended services, I cannot be responsible for soil engineering construction errors or omissions. The costs for the recommended services are not included with this report and would be incurred on a time and expense basis.

EXPLORATORY TEST PIT #1

Proposed Camp Rainbow Gold
Tax Lot 7995
708 East Fork Road
Blaine County, Idaho

<u>DEPTH (Feet)</u>	<u>USCS SOIL CLASS</u>	<u>USDA SOIL CLASS</u>	<u>SOIL DESCRIPTION</u>
0.0-1.0	SM	B-1	SAND, little-some Silt, little Clay & Roots (NATIVE) Dark brown, loose-compact, dry.
1.0-6.0	SM	B-1	SAND, little-some Silt, little Clay & Roots (NATIVE) Brown-tan, compact, dry.
6.0-8.5	SW/GW	A-2a	SAND & GRAVEL, trace-little Cobble, Silt & Clay (NATIVE) Tan, compact-dense, damp.

Test pit excavated on July 13, 2016.

See *Test Pit Site Plan* for test pit location.

Approximate test pit surface elevation is approximately 6245.3 feet based on the topographic survey by Orion Surveying, PLLC.

No groundwater encountered.

Test pit terminated at 8.5 feet below existing grade due to the consistency of soil between the test pits and loosely backfilled with test pit spoils.

Piezometer installed to monitor groundwater during the spring snowmelt runoff.

No soil sample retrieved.

Piezometer installed to observe groundwater.

Poor stability of test pit walls in native silty sand & gravel soils.

Excavation equipment: DEERE 50D track-mounted excavator.



EXPLORATORY TEST PIT #2

Proposed Camp Rainbow Gold
Tax Lot 7995
708 East Fork Road
Blaine County, Idaho

<u>DEPTH (Feet)</u>	<u>USCS SOIL CLASS</u>	<u>USDA SOIL CLASS</u>	<u>SOIL DESCRIPTION</u>
0.0-1.1	SM	B-1	SAND, little-some Silt, little Clay & Roots (NATIVE) Dark brown, loose-compact, dry.
1.1-9.0	SM	B-1	SAND, little-some Silt, little Clay & Roots (NATIVE) Brown-tan, compact, dry.
9.0-9.4	SW/GW	A-2a	SAND & GRAVEL, trace Cobble (NATIVE) Tan, compact-dense, damp.

Test pit excavated on July 13, 2016.

See *Test Pit Site Plan* for test pit location.

Approximate test pit surface elevation is approximately 6267.0 feet based on the topographic survey by Orion Surveying, PLLC.

No groundwater encountered.

Test pit terminated at 9.4 feet below existing grade due to the consistency of soil between the test pits and loosely backfilled with test pit spoils.

No soil sample retrieved.

Poor stability of test pit walls in native silty sand & gravel soils.

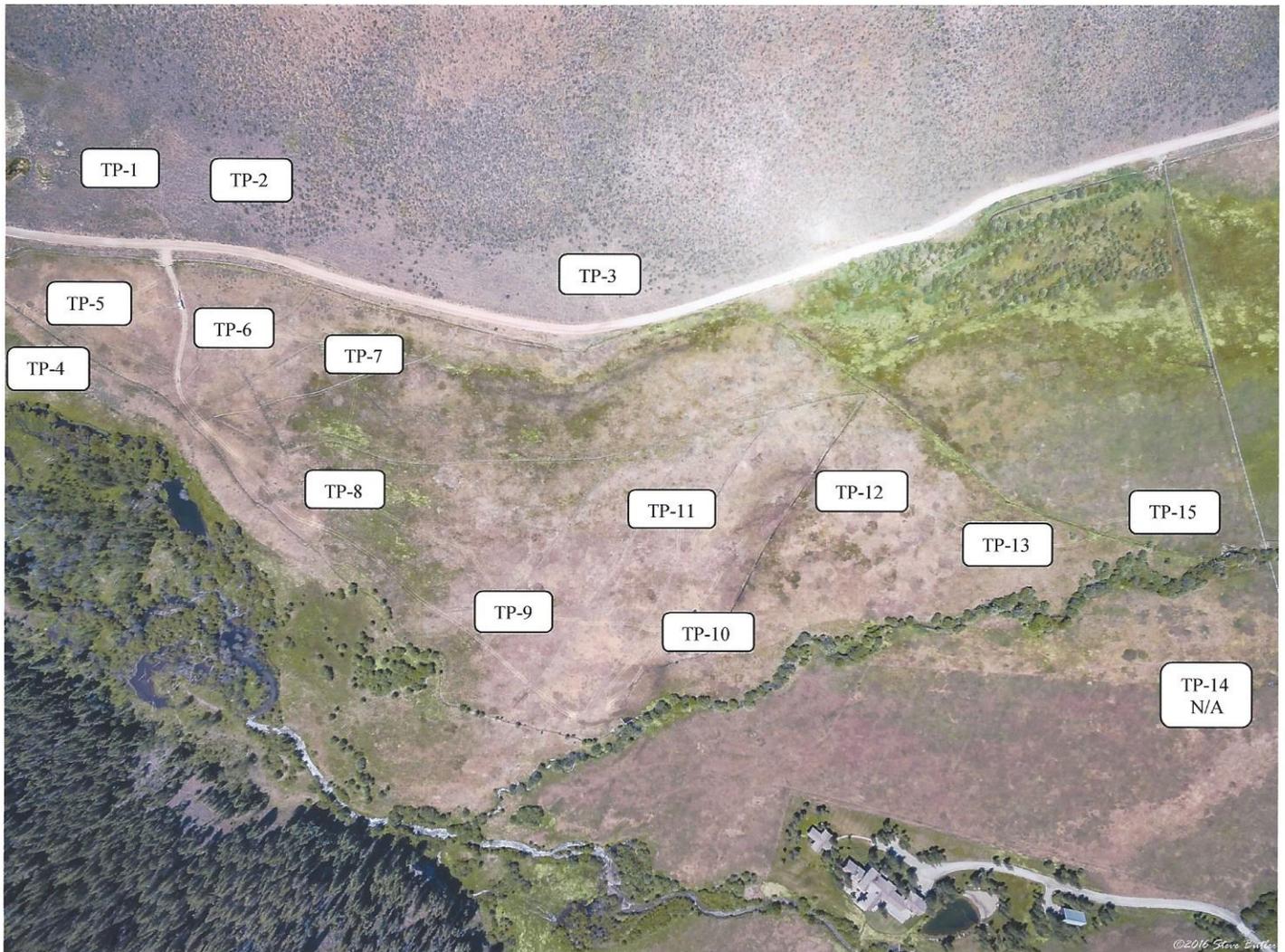
Excavation equipment: DEERE 50D track-mounted excavator.





VICINITY MAP

Proposed Camp Rainbow Gold
Tax Lot 7995
708 East Fork Road
Blaine County, Idaho
43°38'35" N, 114°13'13" W



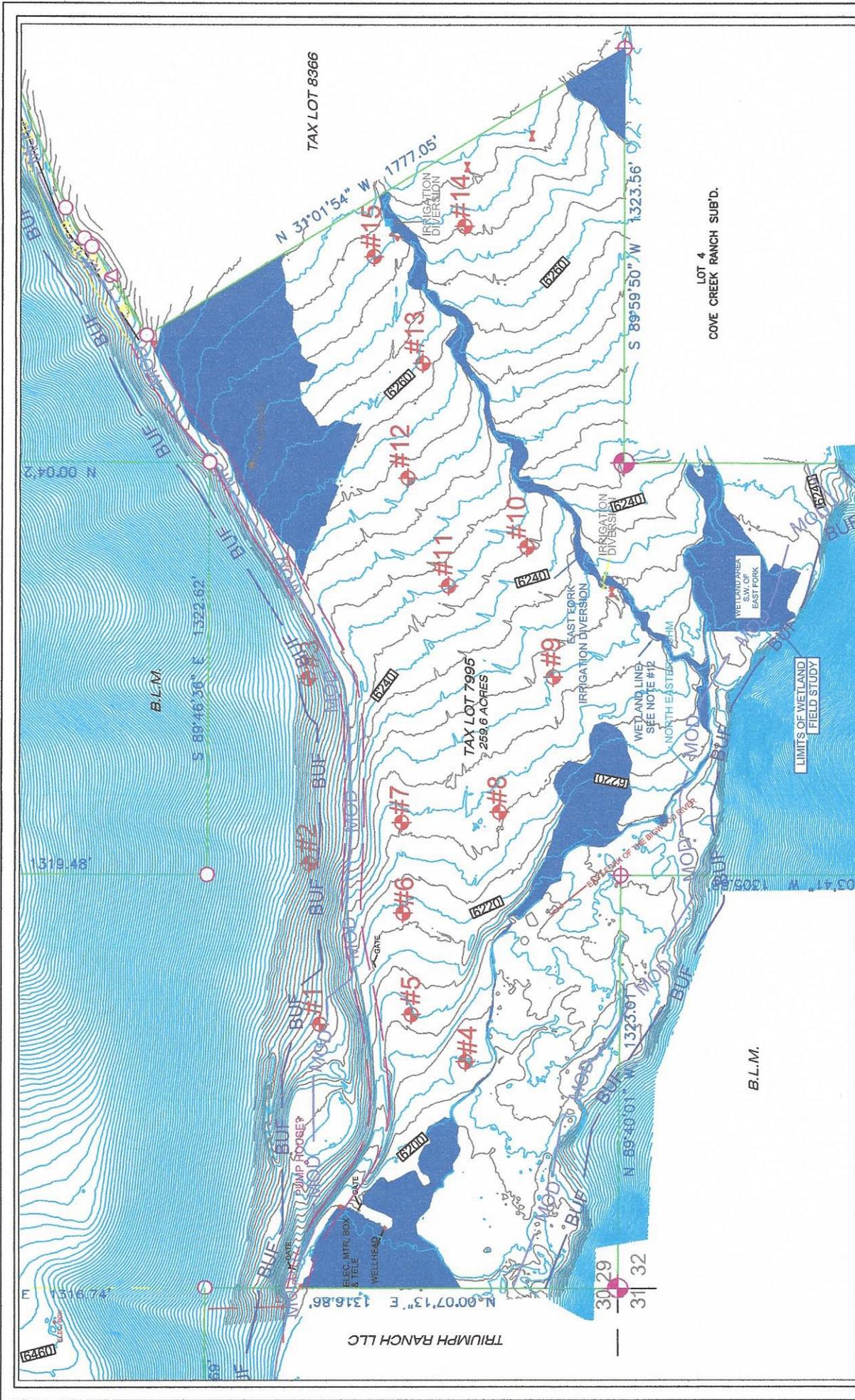
TEST PIT SITE PLAN PHOTO 1

Proposed Camp Rainbow Gold
Tax Lot 7995
708 East Fork Road
Blaine County, Idaho
Test pits excavated on July 13, 2016



TEST PIT SITE PLAN PHOTO 2

Proposed Camp Rainbow Gold
Tax Lot 7995
708 East Fork Road
Blaine County, Idaho
Test pits excavated on July 13, 2016



TEST PIT SITE PLAN

Camp Rainbow Gold
 Tax Lot 7995
 Blaine County, Idaho

Butler Associates, Inc.
 Test pits excavated
 on July 20, 2016

August 2016
 Not to scale

EXPLORATORY TEST PIT #1

Proposed Camp Rainbow Gold
Tax Lot 7995
708 East Fork Road
Blaine County, Idaho

<u>DEPTH (Feet)</u>	<u>USCS SOIL CLASS</u>	<u>USDA SOIL CLASS</u>	<u>SOIL DESCRIPTION</u>
0.0-1.0	SM	B-1	SAND, little-some Silt, little Clay & Roots (NATIVE) Dark brown, loose-compact, dry.
1.0-6.0	SM	B-1	SAND, little-some Silt, little Clay & Roots (NATIVE) Brown-tan, compact, dry.
6.0-8.5	SW/GW	A-2a	SAND & GRAVEL, trace-little Cobble, Silt & Clay (NATIVE) Tan, compact-dense, damp.

Test pit excavated on July 13, 2016.

See *Test Pit Site Plan* for test pit location.

Approximate test pit surface elevation is approximately 6245.3 feet based on the topographic survey by Orion Surveying, PLLC.

No groundwater encountered.

Test pit terminated at 8.5 feet below existing grade due to the consistency of soil between the test pits and loosely backfilled with test pit spoils.

Piezometer installed to monitor groundwater during the spring snowmelt runoff.

No soil sample retrieved.

Piezometer installed to observe groundwater.

Poor stability of test pit walls in native silty sand & gravel soils.

Excavation equipment: DEERE 50D track-mounted excavator.



EXPLORATORY TEST PIT #2

Proposed Camp Rainbow Gold
Tax Lot 7995
708 East Fork Road
Blaine County, Idaho

<u>DEPTH (Feet)</u>	<u>USCS SOIL CLASS</u>	<u>USDA SOIL CLASS</u>	<u>SOIL DESCRIPTION</u>
0.0-1.1	SM	B-1	SAND, little-some Silt, little Clay & Roots (NATIVE) Dark brown, loose-compact, dry.
1.1-9.0	SM	B-1	SAND, little-some Silt, little Clay & Roots (NATIVE) Brown-tan, compact, dry.
9.0-9.4	SW/GW	A-2a	SAND & GRAVEL, trace Cobble (NATIVE) Tan, compact-dense, damp.

Test pit excavated on July 13, 2016.

See *Test Pit Site Plan* for test pit location.

Approximate test pit surface elevation is approximately 6267.0 feet based on the topographic survey by Orion Surveying, PLLC.

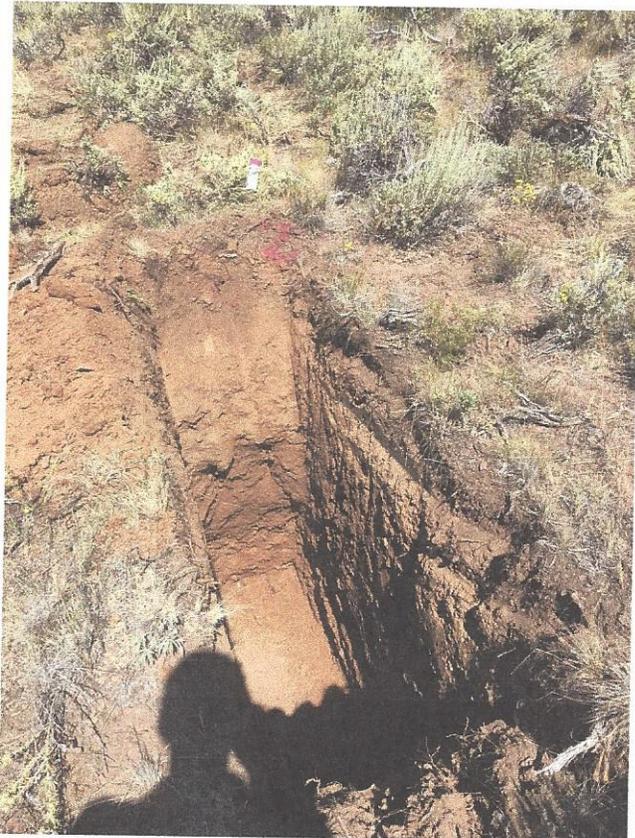
No groundwater encountered.

Test pit terminated at 9.4 feet below existing grade due to the consistency of soil between the test pits and loosely backfilled with test pit spoils.

No soil sample retrieved.

Poor stability of test pit walls in native silty sand & gravel soils.

Excavation equipment: DEERE 50D track-mounted excavator.



EXPLORATORY TEST PIT #3

Proposed Camp Rainbow Gold
Tax Lot 7995
708 East Fork Road
Blaine County, Idaho

<u>DEPTH (Feet)</u>	<u>USCS SOIL CLASS</u>	<u>USDA SOIL CLASS</u>	<u>SOIL DESCRIPTION</u>
0.0-2.0	SM	B-1	SAND, little-some Silt, little Clay & Roots (NATIVE) Dark brown, loose-compact, dry.
2.0-8.8	SM	B-1	SAND, little-some Silt, little Clay & Roots (NATIVE) Brown-tan, compact, dry.

Test pit excavated on July 13, 2016.

See *Test Pit Site Plan* for test pit location.

Approximate test pit surface elevation is approximately 6275.1 feet based on the topographic survey by Orion Surveying, PLLC.

No groundwater encountered.

Test pit terminated at 8.8 feet below existing grade due to the consistency of soil between the test pits and loosely backfilled with test pit spoils.

No soil sample retrieved.

Poor stability of test pit walls in native silty sand & gravel soils.

Excavation equipment: DEERE 50D track-mounted excavator.



EXPLORATORY TEST PIT #4

Proposed Camp Rainbow Gold
Tax Lot 7995
708 East Fork Road
Blaine County, Idaho

<u>DEPTH (Feet)</u>	<u>USCS SOIL CLASS</u>	<u>USDA SOIL CLASS</u>	<u>SOIL DESCRIPTION</u>
0.0-3.0	SM	B-1	SAND, little-some Silt, little Clay & Roots (NATIVE) Dark brown, loose-compact, dry.
3.0-6.5	GW	A-2a	SAND, GRAVEL, COBBLE & Occasional Boulder trace-little Silt & Clay (NATIVE) Brown, compact- dense, damp-saturated.

Test pit excavated on July 13, 2016.

See *Test Pit Site Plan* for test pit location.

Approximate test pit surface elevation is approximately 6203.8 feet based on the topographic survey by Orion Surveying, PLLC.

Groundwater encountered at 3.0 feet below existing grade.

Test pit terminated at 6.5 feet below existing grade due to the consistency of soil between the test pits and loosely backfilled with test pit spoils.

No soil sample retrieved.

Piezoemeter installed to monitor groundwater during the spring snowmelt runoff.

Poor stability of test pit walls in native silty sand & gravel soils.

Excavation equipment: DEERE 50D track-mounted excavator.



EXPLORATORY TEST PIT #5

Proposed Camp Rainbow Gold
Tax Lot 7995
708 East Fork Road
Blaine County, Idaho

<u>DEPTH (Feet)</u>	<u>USCS SOIL CLASS</u>	<u>USDA SOIL CLASS</u>	<u>SOIL DESCRIPTION</u>
0.0-1.4	SM	B-1	SAND, little-some Silt, little Clay & Roots (NATIVE) Dark brown, loose-compact, dry.
1.4-8.4	GW	A-2a	SAND, GRAVEL, COBBLE & Occasional Boulder trace-little Silt & Clay (NATIVE) Brown, compact- dense, damp.

Test pit excavated on July 13, 2016.

See *Test Pit Site Plan* for test pit location.

Approximate test pit surface elevation is approximately 6211.5 feet based on the topographic survey by Orion Surveying, PLLC.

No groundwater encountered.

Test pit terminated at 8.4 feet below existing grade due to the consistency of soil between the test pits and loosely backfilled with test pit spoils.

No soil sample retrieved.

Piezoemeter installed to monitor groundwater during the spring snowmelt runoff.

Poor stability of test pit walls in native silty sand & gravel soils.

Excavation equipment: DEERE 50D track-mounted excavator.



EXPLORATORY TEST PIT #6

Proposed Camp Rainbow Gold
Tax Lot 7995
708 East Fork Road
Blaine County, Idaho

<u>DEPTH (Feet)</u>	<u>USCS SOIL CLASS</u>	<u>USDA SOIL CLASS</u>	<u>SOIL DESCRIPTION</u>
0.0-1.5	SM	B-1	SAND, little-some Silt, little Clay & Roots (NATIVE) Dark brown, loose-compact, dry.
1.5-7.5	GW	A-2a	SAND, GRAVEL, COBBLE & Occasional Boulder trace-little Silt & Clay (NATIVE) Brown, compact- dense, damp..

Test pit excavated on July 13, 2016.

See *Test Pit Site Plan* for test pit location.

Approximate test pit surface elevation is approximately 6219.2 feet based on the topographic survey by Orion Surveying, PLLC.

No groundwater encountered.

Test pit terminated at 7.5 feet below existing grade due to the consistency of soil between the test pits and loosely backfilled with test pit spoils.

No soil sample retrieved.

Poor stability of test pit walls in native silty sand & gravel soils.

Excavation equipment: DEERE 50D track-mounted excavator.



EXPLORATORY TEST PIT #7

Proposed Camp Rainbow Gold
Tax Lot 7995
708 East Fork Road
Blaine County, Idaho

<u>DEPTH (Feet)</u>	<u>USCS SOIL CLASS</u>	<u>USDA SOIL CLASS</u>	<u>SOIL DESCRIPTION</u>
0.0-3.0	SM	B-1	SAND, little-some Silt, little Clay & Roots (NATIVE) Dark brown, loose-compact, dry.
3.0-7.0	GM	A-2a	SAND, GRAVEL, COBBLE & BOULDER, trace-little Silt, & Clay, trace Roots (NATIVE) Brown, compact- dense-damp-saturated.

Test pit excavated on July 13, 2016.

See *Test Pit Site Plan* for test pit location.

Approximate test pit surface elevation is approximately 6226.8 feet based on the topographic survey by Orion Surveying, PLLC.

Groundwater encountered at 5.5 feet below existing grade.

Test pit terminated at 7.0 feet below existing grade due to the consistency of soil between the test pits and loosely backfilled with test pit spoils.

No soil sample retrieved.

Poor stability of test pit walls in native silty sand & gravel soils.

Excavation equipment: DEERE 50D track-mounted excavator.



EXPLORATORY TEST PIT #8

Proposed Camp Rainbow Gold
Tax Lot 7995
708 East Fork Road
Blaine County, Idaho

DEPTH (Feet)	USCS SOIL CLASS	USDA SOIL CLASS	SOIL DESCRIPTION
0.0-2.1	SM	B-1	SAND, little-some Silt, little Clay & Roots (NATIVE) Dark brown, loose-compact, dry.
2.1-7.2	GM	A-2a	SAND, GRAVEL, COBBLE & BOULDER, trace-little Silt, & Clay, trace Roots (NATIVE) Brown, compact- dense-damp-saturated.

Test pit excavated on July 13, 2016.

See *Test Pit Site Plan* for test pit location.

Approximate test pit surface elevation is approximately 6226.4 feet based on the topographic survey by Orion Surveying, PLLC.

Groundwater encountered at 6.0 feet below existing grade.

Test pit terminated at 7.2 feet below existing grade due to the consistency of soil between the test pits and loosely backfilled with test pit spoils.

No soil sample retrieved.

Poor stability of test pit walls in native silty sand & gravel soils.

Excavation equipment: DEERE 50D track-mounted excavator.



EXPLORATORY TEST PIT #9

Proposed Camp Rainbow Gold
Tax Lot 7995
708 East Fork Road
Blaine County, Idaho

<u>DEPTH (Feet)</u>	<u>USCS SOIL CLASS</u>	<u>USDA SOIL CLASS</u>	<u>SOIL DESCRIPTION</u>
0.0-3.0	SM	B-1	SAND, little-some Silt, little Clay & Roots (NATIVE) Dark brown, loose-compact, dry.
3.0-6.8	GM	A-2a	SAND, GRAVEL, COBBLE & BOULDER, trace-little Silt, & Clay, trace Roots (NATIVE) Brown, compact- dense-damp-saturated.

Test pit excavated on July 13, 2016.

See *Test Pit Site Plan* for test pit location.

Approximate test pit surface elevation is approximately 6231.3 feet based on the topographic survey by Orion Surveying, PLLC.

Groundwater encountered at 6.0 feet below existing grade.

Test pit terminated at 6.8 feet below existing grade due to the consistency of soil between the test pits and loosely backfilled with test pit spoils.

No soil sample retrieved.

Poor stability of test pit walls in native silty sand & gravel soils.

Excavation equipment: DEERE 50D track-mounted excavator.



EXPLORATORY TEST PIT #10

Proposed Camp Rainbow Gold
Tax Lot 7995
708 East Fork Road
Blaine County, Idaho

<u>DEPTH (Feet)</u>	<u>USCS SOIL CLASS</u>	<u>USDA SOIL CLASS</u>	<u>SOIL DESCRIPTION</u>
0.0-1.8	SM	B-1	SAND, little-some Silt, little Clay & Roots (NATIVE) Dark brown, loose-compact, dry.
1.8-7.1	GM	A-2a	SAND, GRAVEL, COBBLE & BOULDER, trace-little Silt, & Clay, trace Roots (NATIVE) Brown, compact- dense-damp-saturated.

Test pit excavated on July 13, 2016.

See *Test Pit Site Plan* for test pit location.

Approximate test pit surface elevation is approximately 6242.2 feet based on the topographic survey by Orion Surveying, PLLC.

Groundwater encountered at 4.0 feet below existing grade.

Test pit terminated at 7.1 feet below existing grade due to the consistency of soil between the test pits and loosely backfilled with test pit spoils.

No soil sample retrieved.

Poor stability of test pit walls in native silty sand & gravel soils.

Excavation equipment: DEERE 50D track-mounted excavator.



EXPLORATORY TEST PIT #11

Proposed Camp Rainbow Gold
Tax Lot 7995
708 East Fork Road
Blaine County, Idaho

<u>DEPTH (Feet)</u>	<u>USCS SOIL CLASS</u>	<u>USDA SOIL CLASS</u>	<u>SOIL DESCRIPTION</u>
0.0-2.1	SM	B-1	SAND, little-some Silt, little Clay & Roots (NATIVE) Dark brown, loose-compact, dry.
2.1-8.0	GM	A-2a	SAND, GRAVEL, COBBLE & BOULDER, trace-little Silt, & Clay, trace Roots (NATIVE) Brown, compact- dense-damp-saturated.

Test pit excavated on July 13, 2016.

See *Test Pit Site Plan* for test pit location.

Approximate test pit surface elevation is approximately 6243.9 feet based on the topographic survey by Orion Surveying, PLLC.

Groundwater encountered at 6.0 feet below existing grade.

Test pit terminated at 8.0 feet below existing grade due to the consistency of soil between the test pits and loosely backfilled with test pit spoils.

No soil sample retrieved.

Piezometer installed to monitor groundwater during the spring snowmelt runoff.

Poor stability of test pit walls in native silty sand & gravel soils.

Excavation equipment: DEERE 50D track-mounted excavator.



EXPLORATORY TEST PIT #12

Proposed Camp Rainbow Gold
Tax Lot 7995
708 East Fork Road
Blaine County, Idaho

<u>DEPTH (Feet)</u>	<u>USCS SOIL CLASS</u>	<u>USDA SOIL CLASS</u>	<u>SOIL DESCRIPTION</u>
0.0-3.0	SM	B-1	SAND, little-some Silt, little Clay & Roots (NATIVE) Dark brown, loose-compact, dry.
3.0-8.2	GM	A-2a	SAND, GRAVEL, COBBLE & BOULDER, trace-little Silt, & Clay, trace Roots (NATIVE) Brown, compact- dense-damp-saturated.

Test pit excavated on July 13, 2016.

See *Test Pit Site Plan* for test pit location.

Approximate test pit surface elevation is approximately 6252.2 feet based on the topographic survey by Orion Surveying, PLLC.

Groundwater encountered at 6.2 feet below existing grade.

Test pit terminated at 8.2 feet below existing grade due to the consistency of soil between the test pits and loosely backfilled with test pit spoils.

No soil sample retrieved.

Poor stability of test pit walls in native silty sand & gravel soils.

Excavation equipment: DEERE 50D track-mounted excavator.



EXPLORATORY TEST PIT #13

Proposed Camp Rainbow Gold
Tax Lot 7995
708 East Fork Road
Blaine County, Idaho

<u>DEPTH (Feet)</u>	<u>USCS SOIL CLASS</u>	<u>USDA SOIL CLASS</u>	<u>SOIL DESCRIPTION</u>
0.0-4.0	SM	B-2	Silty fine SAND, trace-little Gravel & Roots (NATIVE) Dark brown, loose, dry-damp.
4.0-8.5	GM	A-2a	SAND, GRAVEL, COBBLE & BOULDER, trace-little Silt, & Clay, trace Roots (NATIVE) Brown, compact-dense-damp-saturated.

Test pit excavated on July 13, 2016.

See *Test Pit Site Plan* for test pit location.

Approximate test pit surface elevation is approximately 6259.3 feet based on the topographic survey by Orion Surveying, PLLC.

Groundwater encountered at 7.0 feet below existing grade.

Test pit terminated at 8.5 feet below existing grade due to the consistency of soil between the test pits and loosely backfilled with test pit spoils.

No soil sample retrieved.

Poor stability of test pit walls in native silty sand & gravel soils.

Excavation equipment: DEERE 50D track-mounted excavator.



EXPLORATORY TEST PIT #14

Test pit not excavated due to stream crossing

EXPLORATORY TEST PIT #15

Proposed Camp Rainbow Gold
Tax Lot 7995
708 East Fork Road
Blaine County, Idaho

<u>DEPTH (Feet)</u>	<u>USCS SOIL CLASS</u>	<u>USDA SOIL CLASS</u>	<u>SOIL DESCRIPTION</u>
0.0-3.0	SM	B-1	SAND, little-some Silt, little Clay & Roots (NATIVE) Dark brown, loose-compact, dry.
3.0-8.2	GM	A-2a	SAND, GRAVEL, COBBLE & BOULDER, trace-little Silt, & Clay, trace Roots (NATIVE) Brown, compact- dense-damp-saturated.

Test pit excavated on July 13, 2016.

See *Test Pit Site Plan* for test pit location.

Approximate test pit surface elevation is approximately 6267.9 feet based on the topographic survey by Orion Surveying, PLLC.

Groundwater encountered at 6.4 feet below existing grade.

Test pit terminated at 8.2 feet below existing grade due to the consistency of soil between the test pits and loosely backfilled with test pit spoils.

No soil sample retrieved.

Piezometer installed to monitor groundwater during the spring snowmelt runoff.

Poor stability of test pit walls in native silty sand & gravel soils.

Excavation equipment: DEERE 50D track-mounted excavator.



SOILS CLASSIFICATION / LEGEND

RELATIVE DENSITY OR CONSISTENCY UTILIZING STANDARD PENETRATION TEST VALUES

COHESIONLESS SOILS (a)			COHESIVE SOILS (b)		
Density (c)	N. blows/ft. (e)	Relative Density (%)	Consistency	N. blows/ft. (c)	Undrained (d) Shear Strength (psf)
Very loose	0 to 4	0 - 15	very soft	0 to 2	<250
Loose	4 to 10	15 - 35	soft	2 to 4	250-500
Compact	10 to 30	35 - 65	firm	4 to 8	500-1000
Dense	30 to 50	65 - 85	stiff	8 to 15	1000-2000
Very Dense	over 50	>85	very stiff Hard	15 to 30 over 30	2000-4000 >4000

- (a) Soils consisting of gravel, sand, and silt, either separately or in combination, possessing no characteristics of plasticity and exhibiting drained behavior.
- (b) Soils possessing the characteristics of plasticity and exhibiting undrained behavior.
- (c) Refer to text of ASTM D 1586-84 for a definition of N; in normally consolidated cohesionless soils Relative Density terms are based on N_v values corrected for overburden pressures.
- (d) Undrained shear strength = 1/2 unconfined compression strength.

COMPONENT DEFINITIONS BY GRADATION

COMPONENT	SIZE RANGE
Boulders	Above 12 inches
Cobbles	3 inches to 12 inches
Gravel	3 inches to No. 4 (4.75 mm)
Coarse gravel	3 inches to 3/4 inch
Fine gravel	3/4 inch to No. 4 (4.75mm)
Sand	No. 4 (4.75mm) to No. 200 (0.074mm)
Coarse sand	No. 4 (4.75) to No. 10. (2.0mm)
Medium sand	No. 10 (2.0mm) to No. 40 (0.42mm)
Fine sand	No. 40 (0.42) to No. 200 (0.074mm)
Silt & Clay	Smaller than No. 200 (0.074mm)

SILT & CLAY DESCRIPTIONS

DESCRIPTIONS	TYPICAL UNIFIED DESIGNATION
Silt	ML (non-plastic)
Clayey Silt	CL-ML (low plasticity)
Silty Clay	CL
Clay	CH
Plastic Silt	MH
Organic Soils	OL, OH, Pt

LABORATORY TESTS

TEST	DESIGNATION
Moisture	(1)
Density	D
Grain Size	G
Hydrometer	H
Atterberg Limits	(1)
Consolidation	C
Unconfined	U
UU Triax	UU
CU Triax	CU
CD Triax	CD
Permeability	P

- (1) Moisture & Atterberg Limits

SAMPLES

SS	SPT Samplers
HD	Heavy Duty Split Spoons
SH	Shelby Tube
P	Pitcher Sampler
B	Bulk
C	Core

Unless otherwise noted, drive samples advanced with 140 lb. Hammer with 30 inch drop.

COMPONENT PROPORTIONS

DESCRIPTIONS	RANGE OF PROPORTION
Trace	0 - 5%
Little	5 - 12%
Some or Adjective (a)	12 - 30%
And	30 - 50%

- (a) Use @Gravelly, Sandy or Silty as appropriate.

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS		SYMBOL	TYPICAL NAMES
COARSE GRAINED SOILS	GRAVELS	CLEAN GRAVELS	GW Well-Graded gravel
		GRAVELS WITH FINES	GP Poorly-graded gravels
	SANDS	CLEAN SANDS	GM Gravel and Silt Mixtures
			GC Gravel and Clay Mixtures
		SANDS WITH FINES more than 12% fines	SW Well-graded Sands
			SP Poorly-graded Sands
FINE GRAINED SOILS	SILTS & CLAYS	INORGANIC	CL Low-plasticity Clays
		ORGANIC	ML Non-plastic and Low-plasticity Silts
	SILTS & CLAYS	INORGANIC	OL Organic Silt and Clay of Low plasticity.
			CH High Plasticity Clays
		ORGANIC	MH High Plasticity Silts
			OH High-plasticity-Organic Clays High-plasticity-Organic Silts
HIGHLY ORGANIC SOILS		PT	Peat, Muck and Other Highly Organic Soils



Project: Camp Rainbow Gold - Blaine County, Idaho
Client: Butler Associates, Inc.

Date: 8/1/2016
Project No: BO14290A

Material Source: Native Material
Date sampled: N/A
Sampled by: Client

TEST RESULTS

Test Method: ASTM D422

Soil Classification for USDA (based on 100% passing the #10 Screen, 2mm)

Sample Location: TP-2 @ 4 ft BEG
Lab Number: BO1600708

USDA Classification

Sand, %: 73
Silt, %: 20
Clay, %: 6

Soil Textural Class.: Sandy Loam
Subgroup: B-1
Retained on #10: 0%
Modifier:

Design Soil Subgroup: B-1

15% - 35% Rock Volume (Gravelly)

* 35% - 60% Rock Volume (Very Gravelly), Lower One Design Soil Subgroup

**60% - 95% Rock Volume (Extremely Gravelly), Lower Two Design Soil Subgroups

Reference CDH Technical Guidance Manual.

Note: Classifications based on samples as received.

Reviewed By: _____



Project: Camp Rainbow Gold - Blaine County, Idaho
Client: Butler Associates, Inc.

Date: 8/1/2016
Project No: BO14290A

Material Source: Native Material
Date sampled: N/A
Sampled by: Client

TEST RESULTS

Test Method: ASTM D422

Soil Classification for USDA (based on 100% passing the #10 Screen, 2mm)

Sample Location: TP-8 @ 4 ft BEG
Lab Number: BO1600708

USDA Classification

Sand, %: 55
Silt, %: 34
Clay, %: 11

Soil Textural Class.: Sandy Loam
Subgroup: B-1
Retained on #10: 0%
Modifier:

Design Soil Subgroup: B-1

15% - 35% Rock Volume (Gravelly)
* 35% - 60% Rock Volume (Very Gravelly), Lower One Design Soil Subgroup
**60% - 95% Rock Volume (Extremely Gravelly), Lower Two Design Soil Subgroups
Reference CDH Technical Guidance Manual.

Note: Classifications based on samples as received.

Reviewed By: _____

USGS Design Maps Summary Report

User-Specified Input

Report Title Camp Rainbow Gold
Sun August 21, 2016 21:59:13 UTC

Building Code Reference Document 2012/2015 International Building Code
(which utilizes USGS hazard data available in 2008)

Site Coordinates 43.64°N, 114.22°W

Site Soil Classification Site Class C – “Very Dense Soil and Soft Rock”

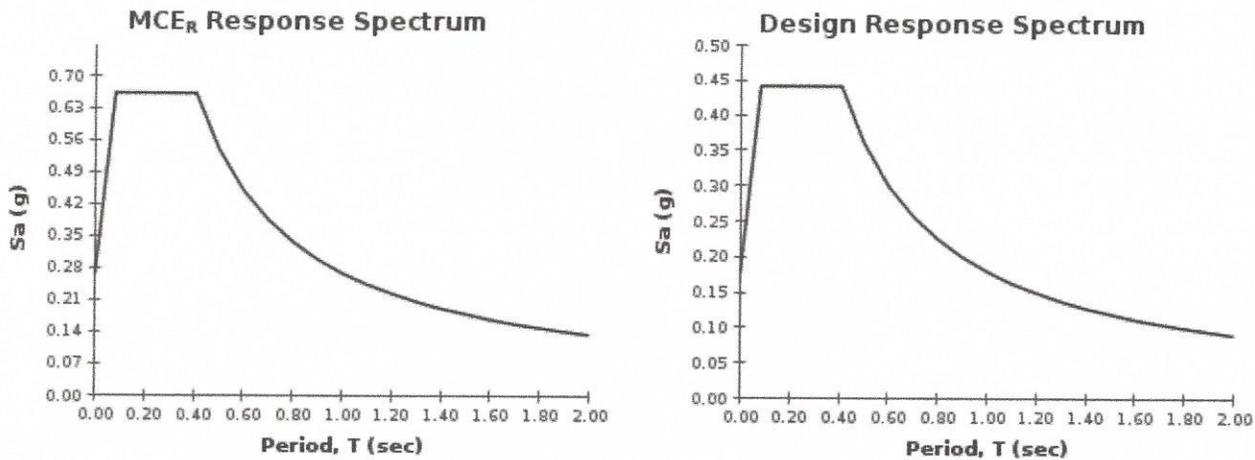
Risk Category I/II/III



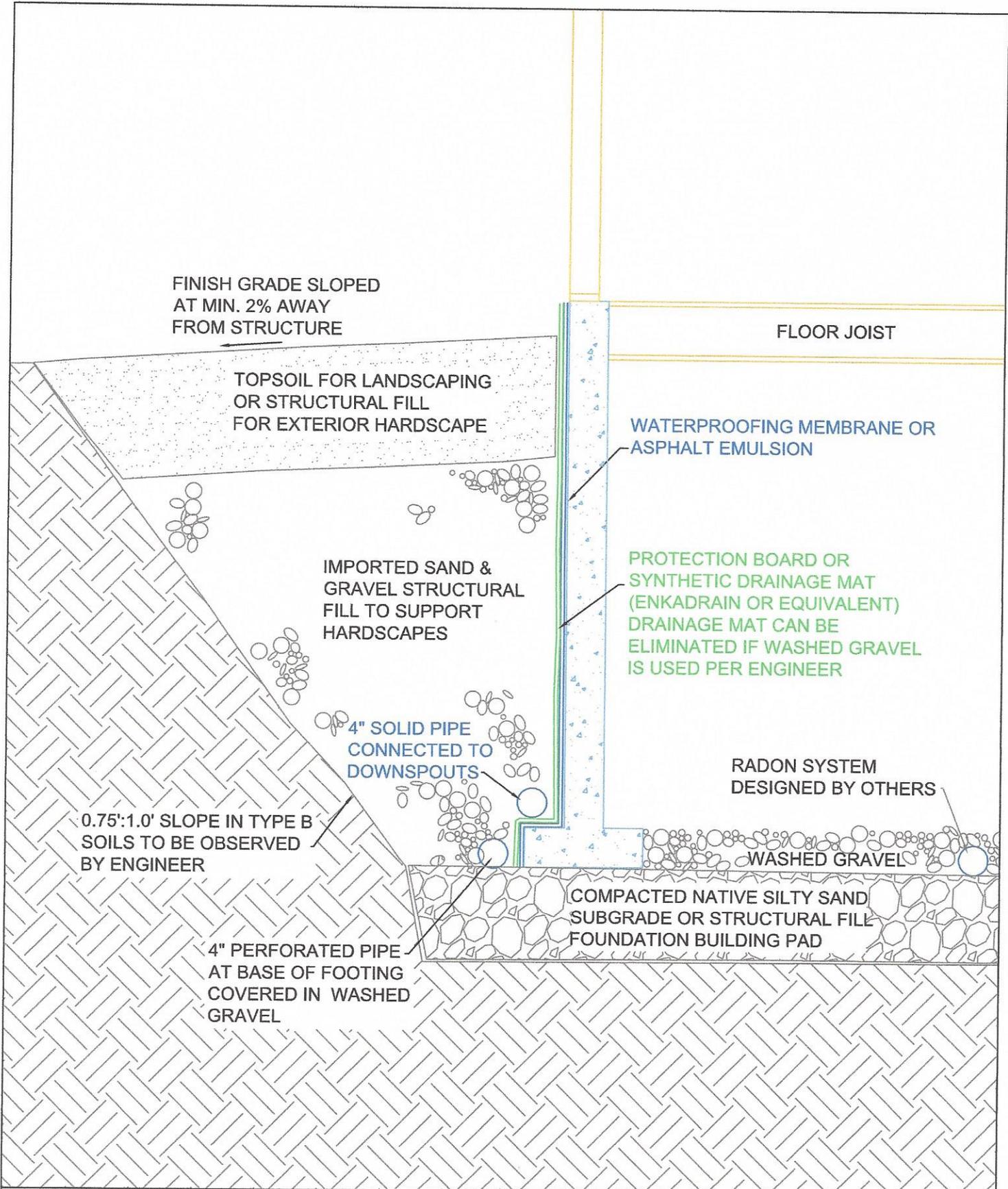
USGS-Provided Output

$S_s = 0.564 \text{ g}$	$S_{MS} = 0.662 \text{ g}$	$S_{DS} = 0.441 \text{ g}$
$S_1 = 0.165 \text{ g}$	$S_{M1} = 0.269 \text{ g}$	$S_{D1} = 0.180 \text{ g}$

For information on how the S_s and S_1 values above have been calculated from probabilistic (risk-targeted) and deterministic ground motions in the direction of maximum horizontal response, please return to the application and select the “2009 NEHRP” building code reference document.



Although this information is a product of the U.S. Geological Survey, we provide no warranty, expressed or implied, as to the accuracy of the data contained therein. This tool is not a substitute for technical subject-matter knowledge.

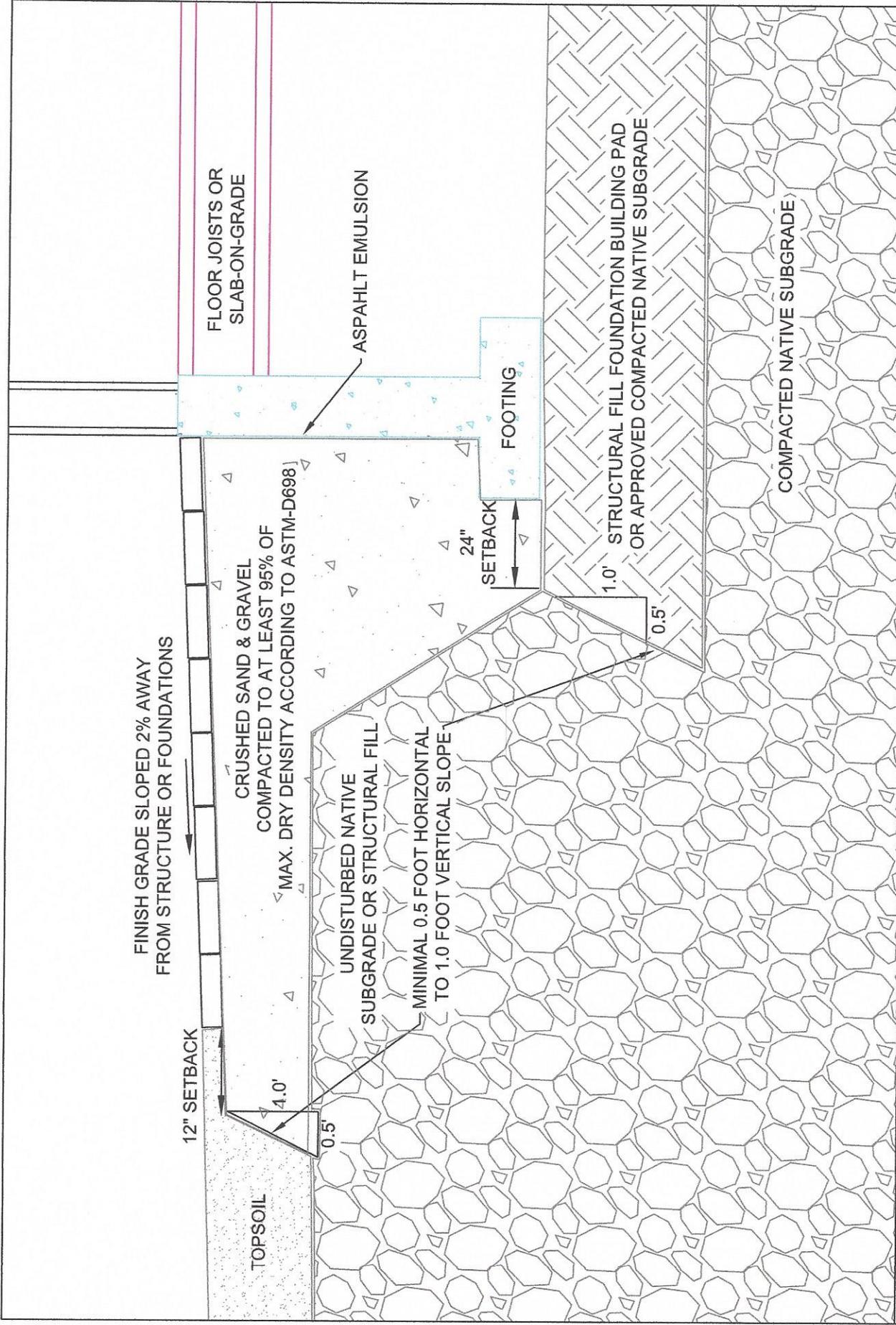


CRAWLSPACE FOUNDATION WALL DRAINAGE PROFILE

Proposed Camp Rainbow Gold
 Tax Lot 7995
 Blaine County, Idaho

Butler Associates, Inc.
 P.O.B. 1034
 Ketchum, ID 83340
 208.720.6432
 svgeotech@gmail.com

8-21-16
Not To Scale



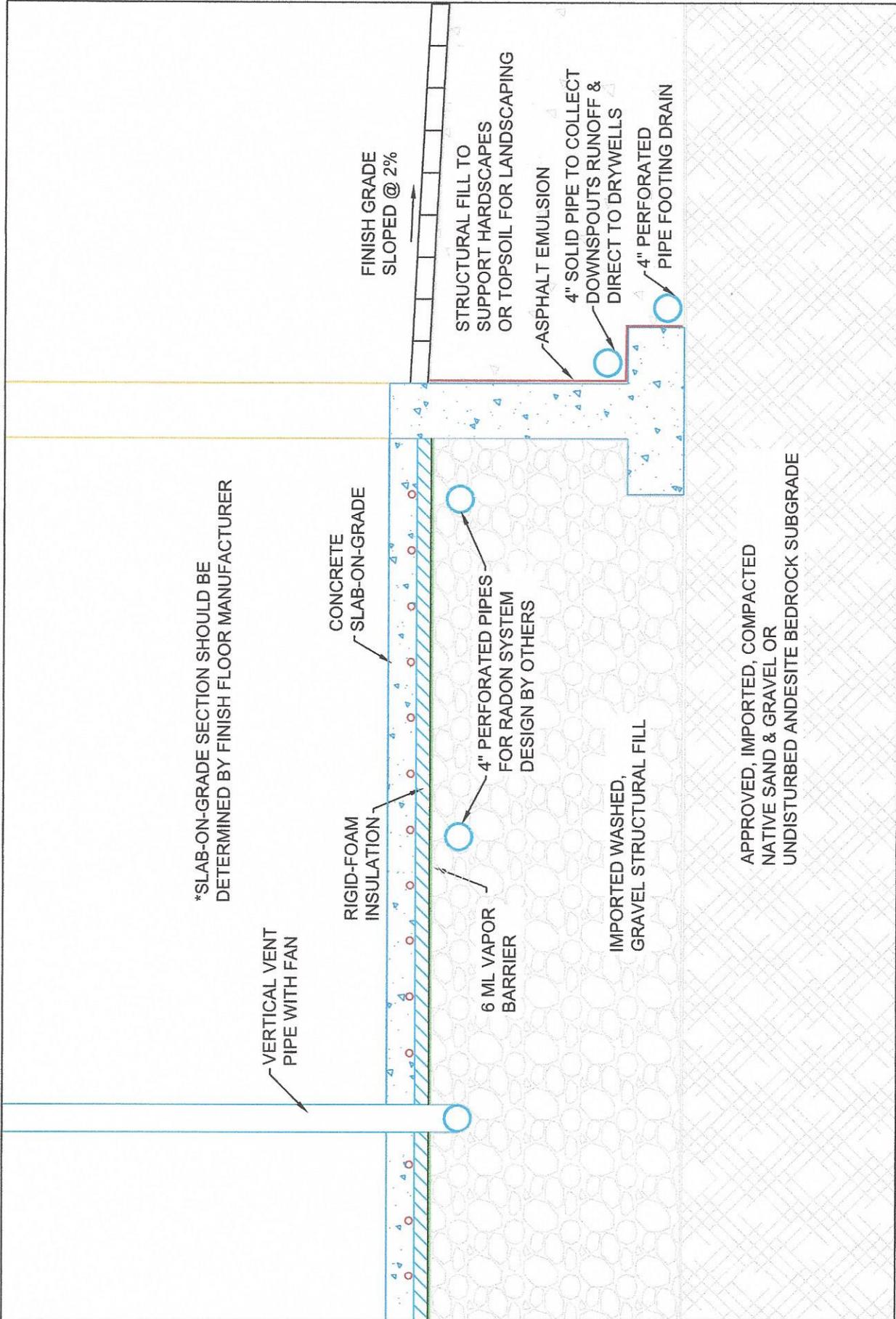
STRUCTURAL FILL / FOUNDATION SUBGRADE CONCEPTS PROFILE

Butler Associates, Inc.
P.O.B. 1034
Ketchum, ID 83340
208.720.6432
sygeotech@gmail.com

Proposed Camp Rainbow Gold
Tax Lot 7995
Blaine County, Idaho

8-21-16

Not To Scale



*SLAB-ON-GRADE SECTION SHOULD BE DETERMINED BY FINISH FLOOR MANUFACTURER

VERTICAL VENT PIPE WITH FAN

RIGID-FOAM INSULATION

CONCRETE SLAB-ON-GRADE

6 ML VAPOR BARRIER

4" PERFORATED PIPES FOR RADON SYSTEM DESIGN BY OTHERS

IMPORTED WASHED, GRAVEL STRUCTURAL FILL

APPROVED, IMPORTED, COMPACTED NATIVE SAND & GRAVEL OR UNDISTURBED ANDESITE BEDROCK SUBGRADE

FINISH GRADE SLOPED @ 2%

STRUCTURAL FILL TO SUPPORT HARDSCAPES OR TOPSOIL FOR LANDSCAPING

ASPHALT EMULSION

4" SOLID PIPE TO COLLECT DOWNSPOUTS RUNOFF & DIRECT TO DRYWELLS

4" PERFORATED PIPE FOOTING DRAIN

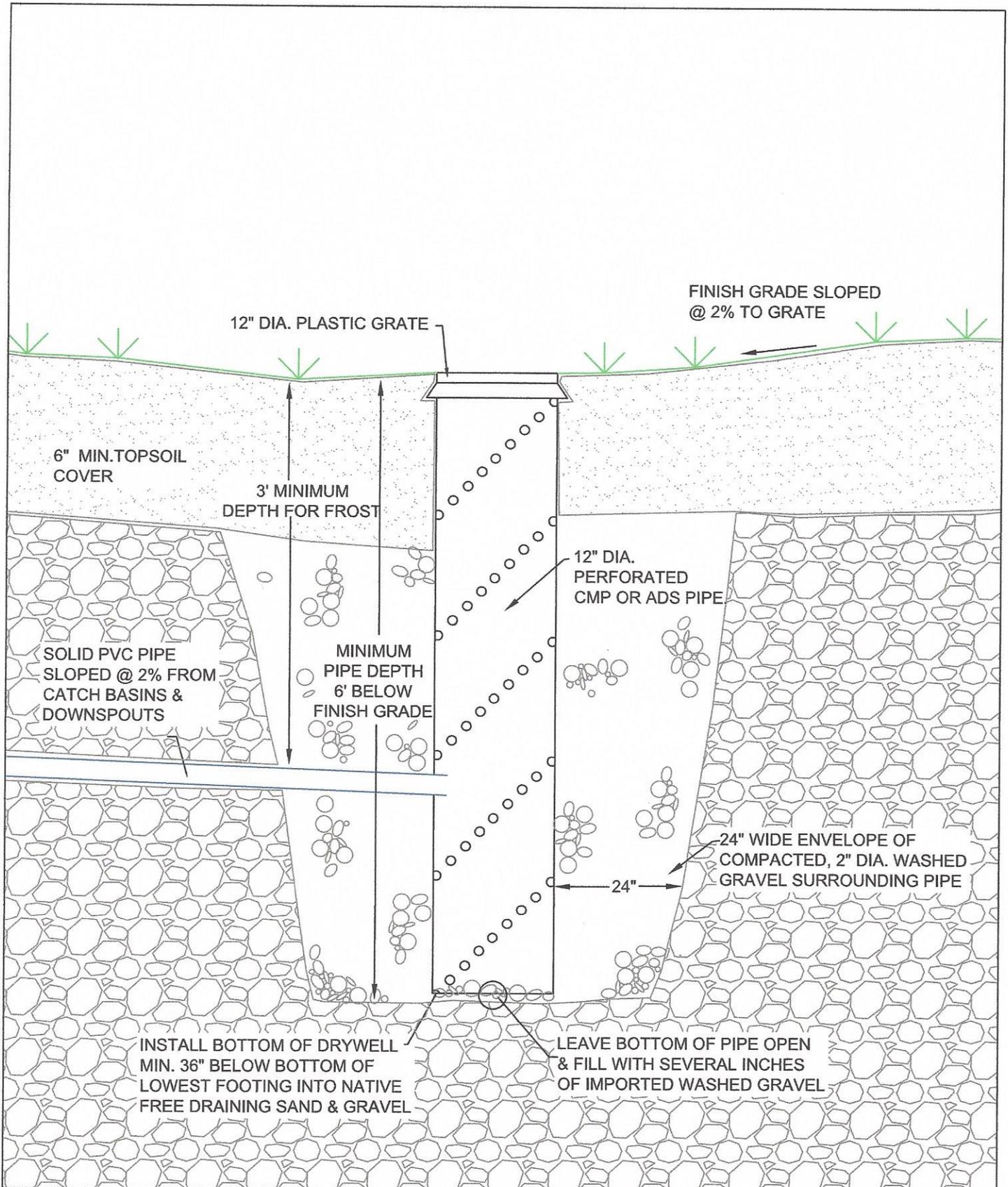
SLAB-ON-GRADE & FOUNDATION DRAINAGE SYSTEM CONCEPTS PROFILE

Proposed Camp Rainbow Gold
Tax Lot 7995
Blaine County, Idaho

Butler Associates, Inc.
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8-21-16

Not To Scale



LANDSCAPE DRYWELL PROFILE

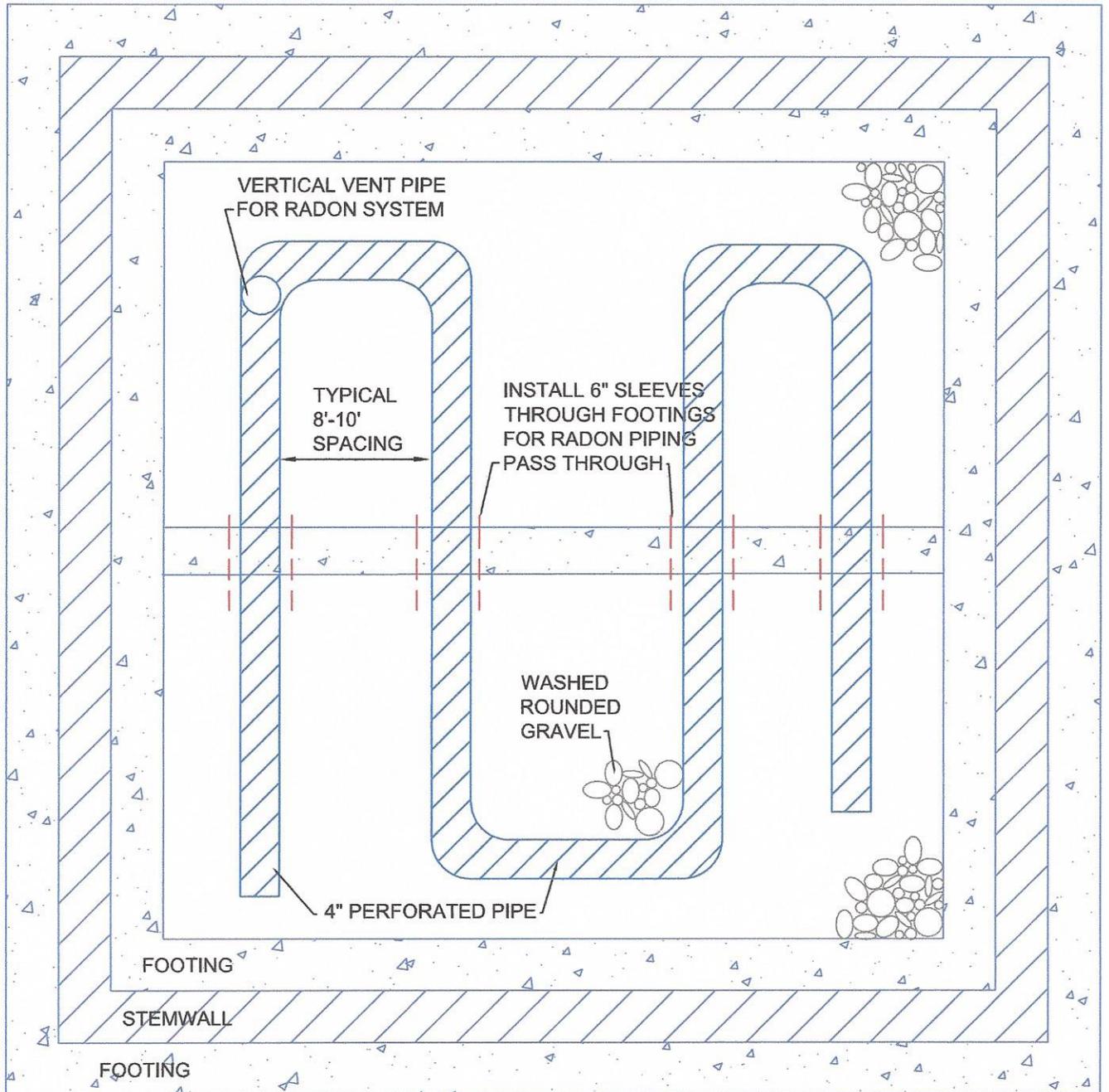
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 Blaine County, Idaho

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 svgeotech@gmail.com

8-21-16

Not To Scale

VAPOR BARRIER PLACED OVER PERFORATED PIPE
& COVERED WITH ROUNDED, WASHED GRAVEL



****RADON SYSTEM DESIGNED BY OTHERS**

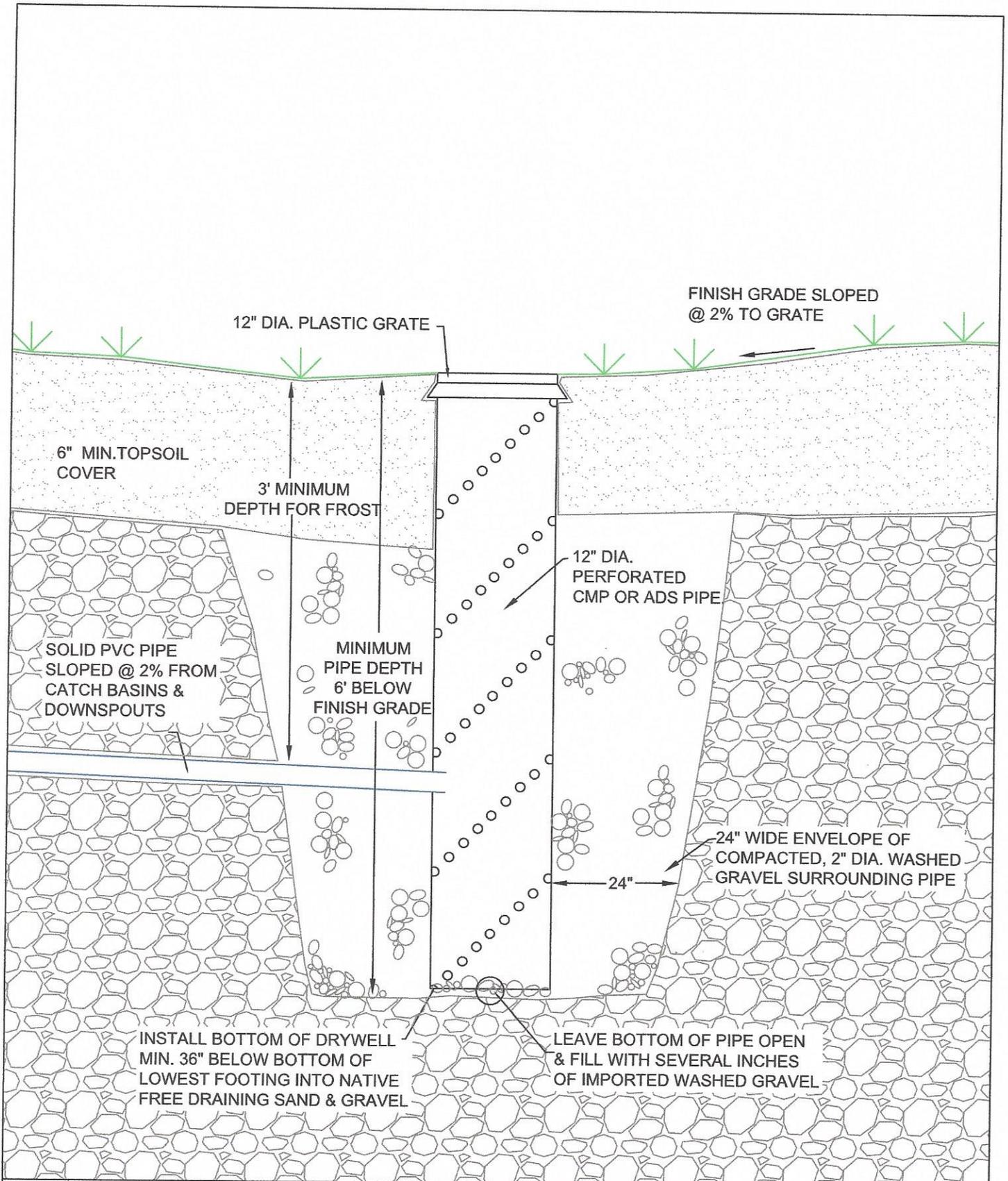
RADON SYSTEM CONCEPTS PLAN

Proposed Camp Rainbow Gold
Tax Lot 7995
Blaine County, Idaho

Butler Associates, Inc.
P.O.B. 1034
Ketchum, ID 83340
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8-21-16

Not To Scale



LANDSCAPE DRYWELL PROFILE

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8-21-16

Not To Scale