GEOTECHNICAL INVESTIGATION

TWIN FALLS FIRE STATION #2

North College Road
Twin Falls, ID

PREPARED FOR:

Ms. Mandi Thompson
City of Twin Falls
PO Box 1907
Twin Falls, ID 83303

PREPARED BY:

Atlas Technical Consultants, LLC
2283 Wright Avenue, Suite A
Twin Falls, ID 83301

June 24, 2021
T211194g

ATLAS

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June 24, 2021

Atlas No. T211194g

Ms. Mandi Thompson
City of Twin Falls
PO Box 1907
Twin Falls, ID 83303

Subject: Geotechnical Investigation
Twin Falls Fire Station #2
North College Road
Twin Falls, ID

Dear Ms. Thompson:

In compliance with your instructions, Atlas has conducted a soils exploration and foundation evaluation for the above referenced development. Fieldwork for this investigation was conducted on May 3, 2021. Data have been analyzed to evaluate pertinent geotechnical conditions. Results of this investigation, together with our recommendations, are to be found in the following report. We have provided a PDF copy for your review and distribution.

Often, questions arise concerning soil conditions because of design and construction details that occur on a project. Atlas would be pleased to continue our role as geotechnical engineers during project implementation.

If you have any questions, please call us at (208) 733-5323.

Respectfully submitted,

PROFESSIONAL ENGINEER
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1. INTRODUCTION

This report presents results of a geotechnical investigation and analysis in support of data utilized in design of structures as defined in the 2018 International Building Code (IBC). Information in support of groundwater and stormwater issues pertinent to the practice of Civil Engineering is included. Observations and recommendations relevant to the earthwork phase of the project are also presented. Revisions in plans or drawings for the proposed development from those enumerated in this report should be brought to the attention of the soils engineer to determine whether changes in the provided recommendations are required. Deviations from noted subsurface conditions, if encountered during construction, should also be brought to the attention of the soils engineer.

1.1 Project Description

The proposed development is in the northwestern portion of the City of Twin Falls, Twin Falls County, ID, and occupies a portion of the SW¼NW¼ of Section 4, Township 10 South, Range 17 East, Boise Meridian. This project will consist of a single-story fire station to be developed on approximately 2.0 acres. Total settlements are limited to 1 inch. As provided by KPFF, loads of up to 5,000 pounds per lineal foot for wall footings, and column loads of up to 20,000 pounds were used for settlement calculations. Atlas was provided with typical truck traffic for Twin Falls Fire Stations. Information was provided by Richard Carlos of Pivot North Architecture. However, Atlas has also made assumptions for traffic loading variables based on the character of the proposed construction. Retaining walls are not anticipated as part of the project. Atlas has not been informed of the proposed grading plan.

1.2 Authorization

Authorization to perform this exploration and analysis was given in the form of a written authorization to proceed from Ms. Mandi Thompson of City of Twin Falls to Ethan Salove of Atlas Technical Consultants (Atlas), on April 22, 2021. Said authorization is subject to terms, conditions, and limitations described in the Professional Services Contract entered into between City of Twin Falls and Atlas. Our scope of services for the proposed development has been provided in our proposal dated April 14, 2021 and repeated below.

1.3 Scope of Investigation

The scope of this investigation included review of geologic literature and existing available geotechnical studies of the area, visual site reconnaissance of the immediate site, subsurface exploration of the site, field and laboratory testing of materials collected, and engineering analysis and evaluation of foundation materials.

2. SITE DESCRIPTION

2.1 Site Access

Access to the site may be gained via Interstate 84 to the Highway 93/Twin Falls exit. Proceed south on Highway 93 approximately 3.6 miles to its intersection with Pole Line Road. From this intersection, proceed west on Pole Line Road 1.0 mile to Washington Street North. Continue south on Washington Street North for 0.2 mile to its intersection with Cheney Drive. Proceed east on N College Road approximately 720 feet and the site occupies the area to the south of this point. The location is depicted on site maps included in the **Appendix**.

2.2 Regional Geology

The subject site is located within the central portion of the Snake River Plain. The Snake River Plain consists of a topographic low which trends in the shape of a concave northward zone across the entire southern half of the state of Idaho. The Owyhee Plateau can be thought of as genetically related to the Snake River Plain, yet it now sits as a highland. The Western Snake River Plain sits in a normal-fault bounded graben, and the Eastern Snake River Plain has subsided due to the collapse of rhyolite calderas. The central portion of the plain exhibits features that indicate an area of transition from graben to subsidence. The area is underlain by a thick sequence of volcanic flows that erupted during the past 12 million years onto pre-Cenozoic rocks. The final phase of the volcanism was dominated by basalts that you see in the walls of the river canyon north of the site. Regionally basalts can be covered by up to 10 feet of soils consisting of alluvial and fluvial deposits in addition to wind deposited loess. Locally, surficial soils almost entirely consist of air transported silt loess and its derivatives.

2.3 General Site Characteristics

The site to be developed is approximately 2.0 acres in size. The site consists of agricultural farm land. Bordering the northern edge of the property, North College Road travels east and west. To the east, south, and west, agricultural land is present.

At the time of the investigation, minor vegetation on the site was noted. This vegetation consists primarily of bunchgrass and other native weeds and grasses. The site is relatively flat and level. Regional drainage is north toward the Snake River. Stormwater drainage for the site is achieved by percolation through surficial soils. The site is situated so that it is unlikely that it will receive any drainage from off-site sources. Stormwater drainage collection and retention systems are not in place on the project site, but currently exist within the adjacent roadways as curb/gutter and drop inlets.

2.4 Regional Site Climatology and Geochemistry

According to the Western Regional Climate Center, the average precipitation for the Twin Falls area is on the order of 9 to 10 inches per year. The monthly mean daily temperatures range from 22°F to 91°F, with daily extremes ranging from -8°F to 107°F. Winds are generally from the southeast with an annual average wind speed of approximately 11 miles per hour (mph) and a maximum of 84 mph. Soils and sediments in the area are primarily derived from siliceous materials and exhibit low electro-chemical potential for corrosion of metals or concretes. Local aggregates are generally appropriate for Portland cement and lime cement mixtures. Surface water, groundwater, and soils in the region typically have pH levels ranging from 7 to 9.

3. SEISMIC SITE EVALUATION

3.1 Geoseismic Setting

Soils on site are classed as Site Class C in accordance with Chapter 20 of the American Society of Civil Engineers (ASCE) publication ASCE/SEI 7-16. Structures constructed on this site should be designed per IBC requirements for such a seismic classification. Our investigation did not reveal hazards resulting from potential earthquake motions including: slope instability, liquefaction, and surface rupture caused by faulting or lateral spreading. Incidence and anticipated acceleration of seismic activity in the area is low.

3.2 Seismic Design Parameter Values

The United States Geological Survey National Seismic Hazard Maps (2008), includes a peak ground acceleration map. The map for 2% probability of exceedance in 50 years in the Western United States in standard gravity (g) indicates that a peak ground acceleration of 0.107 is appropriate for the project site based on a Site Class C.

The following section provides an assessment of the earthquake-induced earthquake loads for the site based on the Risk-Targeted Maximum Considered Earthquake (MCE_R). The MCE_R spectral response acceleration for short periods, S_{MS}, and at 1-second period, S_{M1}, are adjusted for site class effects as required by the 2018 IBC. Design spectral response acceleration parameters as presented in the 2018 IBC are defined as a 5% damped design spectral response acceleration at short periods, S_{DS}, and at 1-second period, S_{D1}.

The USGS National Seismic Hazards Mapping Project includes a program that provides values for ground motion at a selected site based on the same data that were used to prepare the USGS ground motion maps. The maps were developed using attenuation relationships for soft rock sites; the source model, assumptions, and empirical relationships used in preparation of the maps are described in Petersen and others (1996).

Table 1 – Seismic Design Values

Seismic Design Parameter	Design Value
Site Class	C "Very Dense Soil and Soft Rock"
S_s	0.187 (g)
S_1	0.081 (g)
F_a	1.300
F_v	1.500
S_{MS}	0.243
S_{M1}	0.122
S_{DS}	0.162
S_{D1}	0.081

4. SOILS EXPLORATION

4.1 Exploration and Sampling Procedures

Field exploration conducted to determine engineering characteristics of subsurface materials included a reconnaissance of the project site and investigation by test pit. Test pit sites were located in the field by means of a Global Positioning System (GPS) device and are reportedly accurate to within fifteen feet. Upon completion of investigation, each test pit was backfilled with loose excavated materials. Re-excavation and compaction of these test pit areas are required prior to construction of overlying structures.

In addition, samples were obtained from representative soil strata encountered. Samples obtained have been visually classified in the field by professional staff, identified according to test pit number and depth, placed in sealed containers, and transported to our laboratory for additional testing. Subsurface materials have been described in detail on logs provided in the **Appendix**. Results of field and laboratory tests are also presented in the **Appendix**. Atlas recommends that these logs **not** be used to estimate fill material quantities.

4.2 Laboratory Testing Program

Along with our field investigation, a supplemental laboratory testing program was conducted to determine additional pertinent engineering characteristics of subsurface materials necessary in an analysis of anticipated behavior of the proposed structures. Laboratory tests were conducted in accordance with current applicable American Society for Testing and Materials (ASTM) specifications, and results of these tests are to be found in the **Appendix**. The laboratory testing program for this report included: Atterberg Limits Testing – ASTM D4318 and Grain Size Analysis – ASTM C117/C136.

4.3 Soil and Sediment Profile

The profile below represents a generalized interpretation for the project site. Note that on site soils strata, encountered between test pit locations, may vary from the individual soil profiles presented in the logs, which can be found in the **Appendix**.

Silt soils were encountered at ground surface. These soils varied from light brown to brown and were found to be slightly moist to dry. Silts were noted to be stiff to hard. Disturbed materials as a result of plowing activities, usually reach a depth of roughly 1.5 feet. Silt with sand soils were encountered below silt soils within test pits 1 and 4. These soils were found to be light brown to brown, dry to slightly moist, very stiff to hard, with fine-grained sand. Sandy silt soils were encountered below surficial silt soils within test pits 2 and 3, and below silt with sand soils within test pit 4. Sandy silt soils were commonly light brown, dry, hard with fine to coarse-grained sand. Below silt with sand in test pit 1, borderline sandy silt/silty sand soils were encountered. These soils were found to be light brown to brown, dry to slightly moist, hard, with fine to coarse-grained sand. Many of these firmer soil horizons contained some degree of calcium carbonate cementation (hardpan).

At depth, within test pits 1 and 3, basalt bedrock was exposed. Basalt bedrock was classified as dark gray, slightly weathered, widely fractured, strong, with minor vesicles throughout.

During excavation, test pit sidewalls were generally stable. However, moisture contents will affect wall competency with saturated soils having a tendency to readily slough when under load and unsupported.

4.4 Volatile Organic Scan

No environmental concerns were identified prior to commencement of the investigation. Therefore, soils obtained during on-site activities were not assessed for volatile organic compounds by portable photoionization detector. Samples obtained during our exploration activities exhibited no odors or discoloration typically associated with this type of contamination. No groundwater was encountered.

5. SITE HYDROLOGY

Existing surface drainage conditions are defined in the **General Site Characteristics** section. Information provided in this section is limited to observations made at the time of the investigation. Either regional or local ordinances may require information beyond the scope of this report.

5.1 Groundwater

During this field investigation, groundwater was not encountered in test pits advanced to a maximum depth of 10.7 feet bgs. Soil moistures in the test pits were generally dry to slightly moist throughout. In the vicinity of the project site, groundwater levels are controlled in large part by residential and commercial irrigation activity and leakage from nearby canals. Maximum groundwater elevations likely occur during the later portion of the irrigation season.

Atlas has previously performed 6 geotechnical investigations within 0.35 mile of the project site. Information from these investigations has been provided in the table below.

Table 2 – Groundwater Data

Date	Approximate Distance from Site (mile)	Direction from Site	Groundwater Depth (feet bgs)
November 2006	0.33	Southwest	Not Encountered to 11.6
November 2009	0.31	Northwest	Not Encountered to 11.7
October 2013	0.32	North	Not Encountered to 13.0
June 2015	0.17	West	Not Encountered to 11.7
July 2015	0.29	North	Not Encountered to 6.5
May 2018	0.30	North	Not Encountered to 10.0

Furthermore, according to United States Geological Survey (USGS) monitoring well data within approximately ½-mile of the project site, groundwater was measured at depths ranging between 11 and 19 feet bgs, which equates to groundwater elevations of 3,619 to 3,649 feet above mean sea level (msl). Additionally, according to Idaho Department of Water Resources (IDWR) well data within approximately ½-mile of the project site, groundwater was measured at depths ranging between 14 and 16 feet bgs.

Based on evidence of this investigation and background knowledge of the area, Atlas estimates groundwater depths to remain greater than approximately 10 feet bgs or below the basalt bedrock surface throughout the year.

5.2 Soil Infiltration Rates

Soil permeability, which is a measure of the ability of a soil to transmit a fluid, was not tested in the field. Given the absence of direct measurements, for this report an estimation of infiltration is presented using generally recognized values for each soil type and gradation. Of soils comprising the generalized soil profile for this study, silt soils generally offer little permeability, with typical hydraulic infiltration rates of less than 2 inches per hour. Sandy silt soils will commonly exhibit infiltration rates from 2 to 4 inches per hour. Silty sand sediments usually display rates of 4 to 8 inches per hour. However, calcium carbonate cementation within the silty soils may reduce these values to near zero. Infiltration rates through basalt rock can be highly variable, ranging from nearly zero to greater than 6 inches per hour in some cases. Movement of water through the basalt may be more characteristic of fracture flow. Infiltration testing is required to determine site-specific infiltration rates for drainage design once proposed locations of infiltration facilities are determined.

6. FOUNDATION AND SLAB DISCUSSION AND RECOMMENDATIONS

Various foundation types have been considered for support of the proposed structure. Two requirements must be met in the design of foundations. First, the applied bearing stress must be less than the ultimate bearing capacity of foundation soils to maintain stability. Second, total and differential settlement must not exceed an amount that will produce an adverse behavior of the superstructure. Allowable settlement is usually exceeded before bearing capacity considerations become important; thus, allowable bearing pressure is normally controlled by settlement considerations.

Considering subsurface conditions and the proposed construction, it is recommended that the structure be founded upon conventional spread footings and continuous wall footings. Total settlements should not exceed 1 inch if the following design and construction recommendations are observed.

6.1 Foundation Design Recommendations

Based on data obtained from the site and test results from various laboratory tests performed, Atlas recommends the following guidelines for the net allowable soil bearing capacity:

Table 3 – Soil Bearing Capacity

Footing Depth	ASTM D1557 Subgrade Compaction	Net Allowable Soil Bearing Capacity
Footings must bear on competent, undisturbed, native silt, silt with sand, or compacted structural fill. Existing plow zones and organics must be completely removed from below foundation elements.[1] Excavation depths of roughly 1.5 feet bgs should be anticipated to expose proper bearing soils.[2]	Not Required for Native Soil 95% for Structural Fill	2,000 lbs/ft^2

[1]It will be required for Atlas personnel to verify the bearing soil suitability for each structure at the time of construction.
[2]Depending on the time of year construction takes place, the subgrade soils may be unstable because of high moisture contents. If unstable conditions are encountered, over-excavation and replacement with granular structural fill and/or use of geotextiles may be required.

The following sliding frictional coefficient values should be used: 1) 0.35 for footings bearing on native silt soils and 2) 0.45 for footings bearing on granular structural fill. A passive lateral earth pressure of 312 pounds per square foot per foot (psf/ft) should be used for silt soils. For compacted sandy gravel fill, a passive lateral earth pressure of 496 psf/ft should be used.

Footings should be proportioned to meet either the stated soil bearing capacity or the 2018 IBC minimum requirements. Total settlement should be limited to approximately 1 inch, and differential settlement should be limited to approximately ½ inch. Objectionable soil types encountered at the bottom of footing excavations should be removed and replaced with structural fill. Excessively loose or soft areas that are encountered in the footings subgrade will require over-excavation and backfilling with structural fill. To minimize the effects of slight differential movement that may occur because of variations in the character of supporting soils and seasonal moisture content, Atlas recommends continuous footings be suitably reinforced to make them as rigid as possible. For frost protection, the bottom of external footings should be 30 inches below finished grade.

6.2 Floor Slab-on-Grade

For raft or mat slabs bearing on native silt soils, a modulus of subgrade reaction, *k* value, of 120 pounds per cubic inch (pci) may be used for the slab design based on correlation to values typically resulting from a 1 foot by 1 foot plate load test. Additionally, for raft or mat slabs bearing on at least 12 inches of compacted structural fill material, a *k* value of 200 pci may be used. However, depending on how the slab load is applied, the value will need to be geometrically modified. The values should be adjusted for larger areas using the following expression:

Modulus of Subgrade Reaction for Square Mat Slabs: $k_s = k\left(\frac{B+1}{2B}\right)^2$

where: k_s = coefficient of vertical subgrade reaction for loaded area,

k = coefficient of vertical subgrade reaction for a 1 square foot area, and

B = effective width of area loaded, in feet.

Modulus of Subgrade Reaction for Rectangular Mat Slabs: $k' = \frac{k_s(1+0.5\left(\frac{B}{L}\right))}{1.5}$

where: k' = coefficient of vertical subgrade reaction for the loaded rectangular area,

k_s = coefficient of vertical subgrade reaction for loaded square area,

B = effective width of area loaded, in feet,

L = effective length of area loaded, in feet.

Plow zones with organic materials were encountered in portions of the site. Atlas recommends that the organic materials and plow zones be removed. Atlas personnel must be present during excavation to identify these materials.

Organic, loose, or obviously compressive materials must be removed prior to placement of concrete floors or floor-supporting fill. In addition, the remaining subgrade should be treated in accordance with guidelines presented in the **Earthwork** section. Areas of excessive yielding should be excavated and backfilled with structural fill. Fill used to increase the elevation of the floor slab should meet requirements detailed in the **Structural Fill** section. Fill materials must be compacted to a minimum 95 percent of the maximum dry density as determined by ASTM D1557.

A free-draining granular mat should be provided below slabs-on-grade to provide drainage and a uniform and stable bearing surface. This should be a minimum of 4 inches in thickness and properly compacted. The mat should consist of a sand and gravel mixture, complying with Idaho Standards for Public Works Construction (ISPWC) specifications for ¾-inch (Type 1) crushed aggregate. The granular mat should be compacted to no less than 95 percent of the maximum dry density as determined by ASTM D1557. A moisture-retarder should be placed beneath floor slabs to minimize potential ground moisture effects on moisture-sensitive floor coverings. The moisture-retarder should be at least 15-mil in thickness and have a permeance of less than 0.01 US perms as determined by ASTM E96. Placement of the moisture-retarder will require special consideration with regard to effects on the slab-on-grade and should adhere to recommendations outlined in the ACI 302.1R and ASTM E1745 publications. Upon request, Atlas can provide further consultation regarding installation.

7. PAVEMENT DISCUSSION AND RECOMMENDATIONS

Atlas was provided with typical truck traffic for Twin Falls Fire Stations. Information was provided by Richard Carlos of Pivot North Architecture. However, Atlas has also made assumptions for traffic loading variables based on the character of the proposed construction. The Client shall review and understand these assumptions to make sure they reflect intended use and loading of pavements both now and in the future. Based on experience with soils in the region, a subgrade California Bearing Ratio (CBR) value of 4 has been assumed for near-surface silt soils on site. The following are minimum thickness requirements for assured pavement function. Depending on site conditions, additional work, e.g. soil preparation, may be required to support construction equipment. These have been listed within the **Soft Subgrade Soils** section.

7.1 Flexible Pavement Sections

The American Association of State Highway and Transportation Officials (AASHTO) design method has been used to calculate the following pavement sections. Calculation sheets provided in the **Appendix** indicate the soils constant, traffic loading, traffic projections, and material constants used to calculate the pavement sections. Atlas recommends that materials used in the construction of asphaltic concrete pavements meet requirements of the ISPWC Standard Specification for Highway Construction. Construction of the pavement section should be in accordance with these specifications and should adhere to guidelines recommended in the section on **Construction Considerations**.

Table 4 – AASHTO Flexible Pavement Specifications

Pavement Section Component	Driveways and Parking Light Duty	Driveways and Parking Heavy Duty
Asphaltic Concrete	2.5 Inches	3.0 Inches
Crushed Aggregate Base	4.0 Inches	6.0 Inches
Structural Subbase	10.0 Inches	14.0 Inches
Compacted Subgrade	See **Pavement Subgrade Preparation** Section	See **Pavement Subgrade Preparation** Section

[1]It will be required for Atlas personnel to verify subgrade competency at the time of construction.

- Asphaltic Concrete: Asphalt mix design shall meet the requirements of ISPWC, Section 810 Class III plant mix. Materials shall be placed in accordance with ISPWC Standard Specifications for Highway Construction.
- Aggregate Base: Material complying with ISPWC Standards for Crushed Aggregate Materials.
- Structural Subbase: Granular structural fill material complying with the requirements detailed in the **Structural Fill** section of this report except that the maximum material diameter is no more than $^2/_3$ the component thickness. Gradation and suitability requirements shall be per ISPWC Section 801, Table 1.

7.2 Rigid Pavement Sections

The AASHTO pavement design method was used to develop the following rigid concrete pavement sections. Traffic loading and subgrade values indicated in the flexible pavement design were used in developing the rigid sections. This design method assumes the use of dowels at transverse joints. Concrete pavement shall be batched and constructed in accordance with the most current American Concrete Institute Standards and in accordance with Idaho Transportation Department Standard Drawings 411-1 and 409-1. Native subgrade soils on the site are frost susceptible, and therefore, require joint sealers or under-drains.

Table 5 – AASHTO Rigid Pavement Specifications

Pavement Section Component	Driveways and Parking Heavy Duty
Portland Cement Concrete	6.0 Inches
Crushed Aggregate Base	6.0 Inches
Structural Subbase	Not Required
Compacted Subgrade	See **Pavement Subgrade Preparation** Section

- Portland Cement Concrete: 4,000 psi concrete with a modulus of rupture greater than 650 psi generally complying with ITD requirement for Urban Concrete.
- Aggregate Base: Material complying with ITD Standard Specifications for Highway Construction Sections 303 and 703 for aggregates.
- Structural Subbase: Granular structural fill material complying with the requirements detailed in the **Structural Fill** section of this report except that the maximum material diameter is no more than $^{2}/_{3}$ the component thickness. Gradation and suitability requirements shall be per ISPWC Section 801, Table 1.

7.3 Pavement Subgrade Preparation

Plow zones were encountered throughout the site. Atlas recommends that the organic materials and plow zones be removed. Atlas personnel must be present during excavation to identify these materials.

7.4 Common Pavement Section Construction Issues

The subgrade upon which above pavement sections are to be constructed must be properly stripped, inspected, and proof-rolled. Proof rolling of subgrade soils should be accomplished using a heavy rubber-tired, fully loaded, tandem-axle dump truck or equivalent. Verification of subgrade competence by Atlas personnel at the time of construction is required. Fill materials on the site must demonstrate the indicated compaction prior to placing material in support of the pavement section. Atlas anticipated that pavement areas will be subjected to moderate traffic. Subgrade silty soils near and above optimum moisture contents may pump during compaction. Pumping or soft areas must be removed and replaced with structural fill.

Fill material and aggregates in support of the pavement section must be compacted to no less than 95 percent of the maximum dry density as determined by ASTM D698 for flexible pavements and by ASTM D1557 for rigid pavements. If a material placed as a pavement section component cannot be tested by usual compaction testing methods, then compaction of that material must be approved by observed proof rolling. Minor deflections from proof rolling for flexible pavements are allowable. Deflections from proof rolling of rigid pavement support courses should not be visually detectable.

Atlas recommends that rigid concrete pavement be provided for heavy garbage receptacles. This will eliminate damage caused by the considerable loading transferred through the small steel wheels onto asphaltic concrete. Rigid concrete pavement should consist of Portland Cement Concrete Pavement (PCCP) generally adhering to ITD specifications for Urban Concrete. PCCP should be 6 inches thick on a 4-inch drainage fill course (see **Floor Slab-on-Grade** section), and should be reinforced with welded wire fabric. Control joints must be on 12-foot centers or less.

8. CONSTRUCTION CONSIDERATIONS

Recommendations in this report are based upon structural elements of the project being founded on competent, native silt soils or compacted structural fill. Structural areas should be stripped to an elevation that exposes these soil types.

8.1 Earthwork

Excessively organic soils, deleterious materials, or disturbed soils generally undergo high volume changes when subjected to loads, which is detrimental to subgrade behavior in the area of pavements, floor slabs, structural fills, and foundations. It is recommended that organic or disturbed soils, if encountered, be removed to depths of 1 foot (minimum), and wasted or stockpiled for later use. Stripping depths should be adjusted in the field to assure that the entire root zone or disturbed zone (plow depths) or topsoil are removed prior to placement and compaction of structural fill materials. Exact removal depths should be determined during grading operations by Atlas personnel, and should be based upon subgrade soil type, composition, and firmness or soil stability. If underground storage tanks, underground utilities, wells, or septic systems are discovered during construction activities, they must be decommissioned then removed or abandoned in accordance with governing Federal, State, and local agencies. Excavations developed as the result of such removal must be backfilled with structural fill materials as defined in the **Structural Fill** section.

Atlas should oversee subgrade conditions (i.e., moisture content) as well as placement and compaction of new fill (if required) after native soils are excavated to design grade. Recommendations for structural fill presented in this report can be used to minimize volume changes and differential settlements that are detrimental to the behavior of footings, pavements, and floor slabs. Sufficient density tests should be performed to properly monitor compaction. For structural fill beneath building structures, one in-place density test per lift for every 5,000 square feet is recommended. In parking and driveway areas, this can be decreased to one test per lift for every 10,000 square feet.

8.2 Dry Weather

If construction is to be conducted during dry seasonal conditions, many problems associated with soft soils may be avoided. However, some rutting of subgrade soils may be induced by shallow groundwater conditions related to springtime runoff or irrigation activities during late summer through early fall. Solutions to problems associated with soft subgrade soils are outlined in the **Soft Subgrade Soils** section. Problems may also arise because of lack of moisture in native and fill soils at time of placement. This will require the addition of water to achieve near-optimum moisture levels. Low-cohesion soils exposed in excavations may become friable, increasing chances of sloughing or caving. Measures to control excessive dust should be considered as part of the overall health and safety management plan.

8.3 Wet Weather

If construction is to be conducted during wet seasonal conditions (commonly from mid-November through May), problems associated with soft soils must be considered as part of the construction plan. During this time of year, fine-grained soils such as silts and clays will become unstable with increased moisture content, and eventually deform or rut. Additionally, constant low temperatures reduce the possibility of drying soils to near optimum conditions.

8.4 Soft Subgrade Soils

Shallow fine-grained subgrade soils that are high in moisture content should be expected to pump and rut under construction traffic. During periods of wet weather, construction may become very difficult if not impossible. The following recommendations and options have been included for dealing with soft subgrade conditions:

- Track-mounted vehicles should be used to strip the subgrade of root matter and other deleterious debris. Heavy rubber-tired equipment should be prohibited from operating directly on the native subgrade and areas in which structural fill materials have been placed. Construction traffic should be restricted to designated roadways that do not cross, or cross on a limited basis, proposed roadway or parking areas.
- Soft areas can be over-excavated and replaced with granular structural fill.
- Construction roadways on soft subgrade soils should consist of a minimum 2-foot thickness of large cobbles of 4 to 6 inches in diameter with sufficient sand and fines to fill voids. Construction entrances should consist of a 6-inch thickness of clean, 2-inch minimum, angular drain-rock and must be a minimum of 10 feet wide and 30 to 50 feet long. During the construction process, top dressing of the entrance may be required for maintenance.
- Scarification and aeration of subgrade soils can be employed to reduce the moisture content of wet subgrade soils. After stripping is complete, the exposed subgrade should be ripped or disked to a depth of 1½ feet and allowed to air dry for 2 to 4 weeks. Further disking should be performed on a weekly basis to aid the aeration process.
- Alternative soil stabilization methods include use of geotextiles, lime, and cement stabilization. Atlas is available to provide recommendations and guidelines at your request.

8.5 Frozen Subgrade Soils

Prior to placement of structural fill materials or foundation elements, frozen subgrade soils must either be allowed to thaw or be stripped to depths that expose non-frozen soils and wasted or stockpiled for later use. Stockpiled materials must be allowed to thaw and return to near-optimal conditions prior to use as structural fill.

The onsite, shallow silty soils are susceptible to frost heave during freezing temperatures. For exterior flatwork and other structural elements, adequate drainage away from subgrades is critical. Compaction and use of structural fill will also help to mitigate the potential for frost heave. Complete removal of frost susceptible soils for the full frost depth, followed by replacement with a non-frost susceptible structural fill, can also be used to mitigate the potential for frost heave. Atlas is available to provide further guidance/assistance upon request.

8.6 Structural Fill

Soils recommended for use as structural fill are those classified as GW, GP, SW, and SP in accordance with the Unified Soil Classification System (USCS) (ASTM D2487). Use of silty soils (USCS designation of GM, SM, and ML) as structural fill may be acceptable. However, use of silty soils (GM, SM, and ML) as structural fill below footings is prohibited. These materials require very high moisture contents for compaction and require a long time to dry out if natural moisture contents are too high and may also be susceptible to frost heave under certain conditions. Therefore, these materials can be quite difficult to work with as moisture content, lift thickness, and compactive effort becomes difficult to control. If silty soil is used for structural fill, lift thicknesses should not exceed 6 inches (loose), and fill material moisture must be closely monitored at both the working elevation and the elevations of materials already placed. Following placement, silty soils must be protected from degradation resulting from construction traffic or subsequent construction.

Recommended granular structural fill materials, those classified as GW, GP, SW, and SP, should consist of a 6-inch minus select, clean, granular soil with no more than 50 percent oversize (greater than ¾-inch) material and no more than 12 percent fines (passing No. 200 sieve). These fill materials should be placed in layers not to exceed 12 inches in loose thickness. Prior to placement of structural fill materials, surfaces must be prepared as outlined in the **Construction Considerations** section. Structural fill material should be moisture-conditioned to achieve optimum moisture content prior to compaction. For structural fill below footings, areas of compacted backfill must extend outside the perimeter of the footings for a distance equal to the thickness of fill between the bottom of foundation and underlying soils, or 5 feet, whichever is less. All fill materials must be monitored during placement and tested to confirm compaction requirements, outlined below, have been achieved.

Each layer of structural fill must be compacted, as outlined below:

- Below Structures and Rigid Pavements: A minimum of 95 percent of the maximum dry density as determined by ASTM D1557.
- Below Flexible Pavements: A minimum of 92 percent of the maximum dry density as determined by ASTM D1557 or 95 percent of the maximum dry density as determined by ASTM D698.

The ASTM D1557 test method must be used for samples containing up to 40 percent oversize (greater than ¾-inch) particles. If material contains more than 40 percent but less than 50 percent oversize particles, compaction of fill must be confirmed by proof rolling each lift with a 10-ton vibratory roller (or equivalent) until the maximum density has been achieved. Density testing must be performed after each proof rolling pass until the in-place density test results indicate a drop (or no increase) in the dry density, defined as maximum density or "break over" point. The number of required passes should be used as the requirements on the remainder of fill placement. Material should contain sufficient fines to fill void spaces, and must not contain more than 50 percent oversize particles.

8.7 Backfill of Walls

Backfill materials must conform to the requirements of structural fill, as defined in this report. For wall heights greater than 2.5 feet, the maximum material size should not exceed 4 inches in diameter. Placing oversized material against rigid surfaces interferes with proper compaction, and can induce excessive point loads on walls. Backfill shall not commence until the wall has gained sufficient strength to resist placement and compaction forces. Further, retaining walls above 2.5 feet in height shall be backfilled in a manner that will limit the potential for damage from compaction methods and/or equipment. It is recommended that only small hand-operated compaction equipment be used for compaction of backfill within a horizontal distance equal to the height of the wall, measured from the back face of the wall.

Backfill should be compacted in accordance with the specifications for structural fill, except in those areas where it is determined that future settlement is not a concern, such as planter areas. In nonstructural areas, backfill must be compacted to a firm and unyielding condition.

8.8 Excavations

Shallow excavations that do not exceed 4 feet in depth may be constructed with side slopes approaching vertical. Below this depth, it is recommended that slopes be constructed in accordance with Occupational Safety and Health Administration (OSHA) regulations, Section 1926, Subpart P. Based on these regulations, on-site soils are classified as type "B" soil, and as such, excavations within these soils should be constructed at a maximum slope of 1 foot horizontal to 1 foot vertical (1:1) for excavations up to 20 feet in height. Excavations in excess of 20 feet will require additional analysis. Note that these slope angles are considered stable for short-term conditions only, and will not be stable for long-term conditions.

During the subsurface exploration, test pit sidewalls generally exhibited little indication of collapse. For deep excavations, native soils cannot be expected to remain in position. Care must be taken to ensure that excavations are properly backfilled in accordance with procedures outlined in this report.

Shallow soil cementation (caliche) was observed throughout much of the site and may cause difficulties during foundation development and utility placement. Cemented soils should be anticipated throughout the site at depths of 2 to 10 feet bgs.

8.9 Groundwater Control

Groundwater was not encountered during the investigation and is anticipated to be below the depth of most construction. Should the scope of the proposed project change, Atlas should be contacted to provide more detailed groundwater control measures.

Special precautions may be required for control of surface runoff and subsurface seepage. It is recommended that runoff be directed away from open excavations. Silty soils may become soft and pump if subjected to excessive traffic during time of surface runoff. Ponded water in construction areas should be drained through methods such as trenching, sloping, crowning grades, nightly smooth drum rolling, or installing a French drain system. Additionally, temporary or permanent driveway sections should be constructed if extended wet weather is forecasted.

9. GENERAL COMMENTS

Based on the subsurface conditions encountered during this investigation and available information regarding the proposed development, the site is adequate for the planned construction. When plans and specifications are complete, and if significant changes are made in the character or location of the proposed structure, consultation with Atlas must be arranged as supplementary recommendations may be required. Suitability of subgrade soils and compaction of structural fill materials must be verified by Atlas personnel prior to placement of structural elements. Additionally, monitoring and testing should be performed to verify that suitable materials are used for structural fill and that proper placement and compaction techniques are utilized.

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Appendix I WARRANTY AND LIMITING CONDITIONS

Atlas warrants that findings and conclusions contained herein have been formulated in accordance with generally accepted professional engineering practice in the fields of foundation engineering, soil mechanics, and engineering geology only for the site and project described in this report. These engineering methods have been developed to provide the client with information regarding apparent or potential engineering conditions relating to the site within the scope cited above and are necessarily limited to conditions observed at the time of the site visit and research. Field observations and research reported herein are considered sufficient in detail and scope to form a reasonable basis for the purposes cited above.

Exclusive Use

This report was prepared for exclusive use of the property owner(s), at the time of the report, and their retained design consultants ("Client"). Conclusions and recommendations presented in this report are based on the agreed-upon scope of work outlined in this report together with the Contract for Professional Services between the Client and Materials Testing and Inspection ("Consultant"). Use or misuse of this report, or reliance upon findings hereof, by parties other than the Client is at their own risk. Neither Client nor Consultant make representation of warranty to such other parties as to accuracy or completeness of this report or suitability of its use by such other parties for purposes whatsoever, known or unknown, to Client or Consultant. Neither Client nor Consultant shall have liability to indemnify or hold harmless third parties for losses incurred by actual or purported use or misuse of this report. No other warranties are implied or expressed.

Report Recommendations are Limited and Subject to Misinterpretation

There is a distinct possibility that conditions may exist that could not be identified within the scope of the investigation or that were not apparent during our site investigation. Findings of this report are limited to data collected from noted explorations advanced and do not account for unidentified fill zones, unsuitable soil types or conditions, and variability in soil moisture and groundwater conditions. To avoid possible misinterpretations of findings, conclusions, and implications of this report, Atlas should be retained to explain the report contents to other design professionals as well as construction professionals.

Since actual subsurface conditions on the site can only be verified by earthwork, note that construction recommendations are based on general assumptions from selective observations and selective field exploratory sampling. Upon commencement of construction, such conditions may be identified that require corrective actions, and these required corrective actions may impact the project budget. Therefore, construction recommendations in this report should be considered preliminary, and Atlas should be retained to observe actual subsurface conditions during earthwork construction activities to provide additional construction recommendations as needed.

Since geotechnical reports are subject to misinterpretation, **do not** separate the soil logs from the report. Rather, provide a copy of, or authorize for their use, the complete report to other design professionals or contractors. Locations of exploratory sites referenced within this report should be considered approximate locations only. For more accurate locations, services of a professional land surveyor are recommended.

This report is also limited to information available at the time it was prepared. In the event additional information is provided to Atlas following publication of our report, it will be forwarded to the client for evaluation in the form received.

Environmental Concerns

Comments in this report concerning either onsite conditions or observations, including soil appearances and odors, are provided as general information. These comments are not intended to describe, quantify, or evaluate environmental concerns or situations. Since personnel, skills, procedures, standards, and equipment differ, a geotechnical investigation report is not intended to substitute for a geoenvironmental investigation or a Phase II/III Environmental Site Assessment. If environmental services are needed, Atlas can provide, via a separate contract, those personnel who are trained to investigate and delineate soil and water contamination.

Vicinity Map

Figure 1

MAP NOTES:

- Delorme Street Atlas
- Not to Scale

LEGEND

Approximate Site Location ●

Twin Falls Fire Station #2

North College Road
Twin Falls, ID

Modified from DeLorme by: CCW
May 4, 2021
Drawing: T211194g

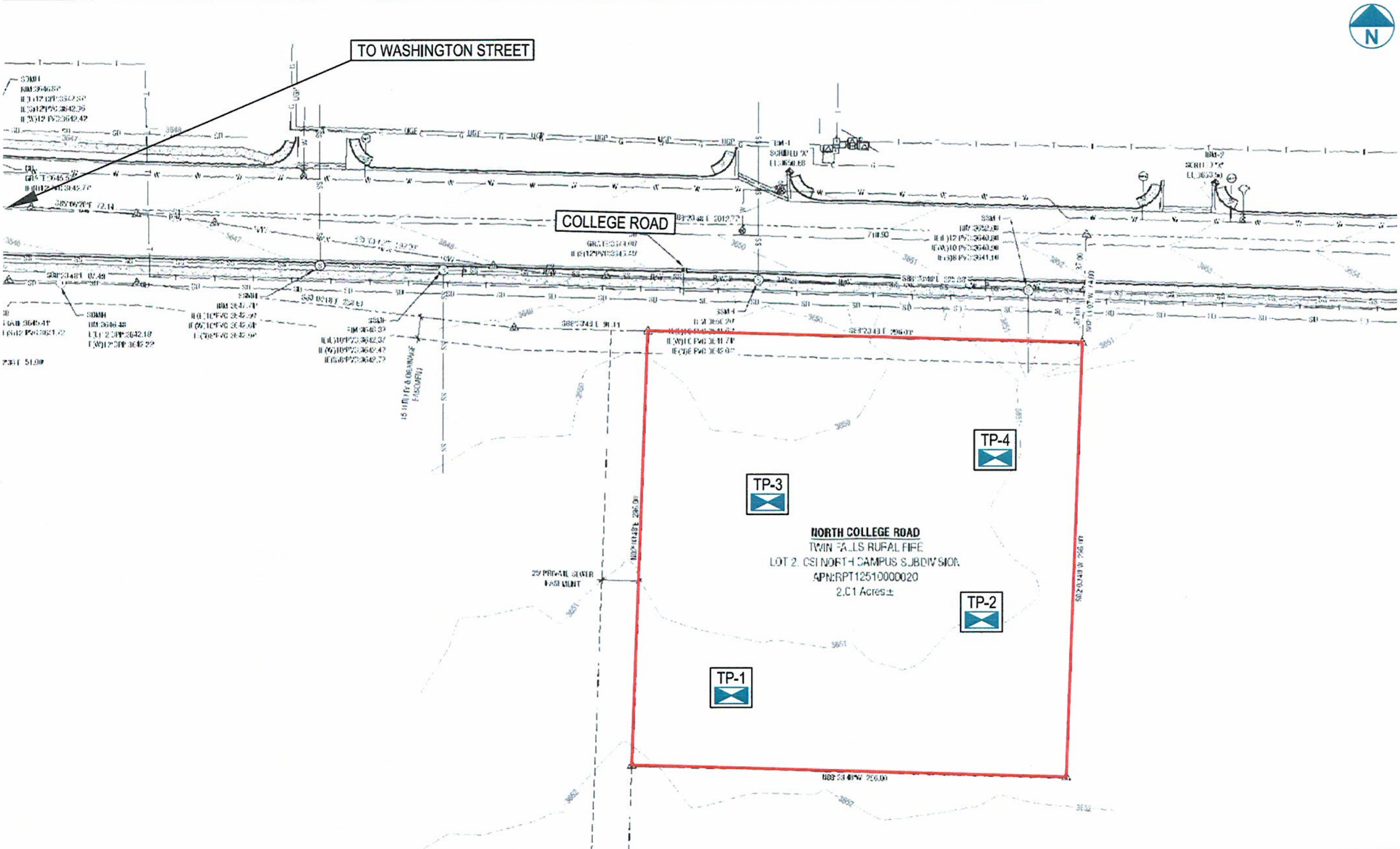
ATLAS

2283 Wright Ave, Suite A
Twin Falls, ID 83301

Phone: (208) 733-5323
Fax: (208) 733-0564
Web: oneatlas.com

Site Map

Figure 2



NOTES:

- Not to Scale

LEGEND

Approximate Site Boundary

Approximate Atlas Test Pit Location

Twin Falls Fire Station #2
North College Road
Twin Falls, ID

Modified by: CCW
May 4, 2021
Drawing: T211194g

ATLAS
2283 Wright Ave, Suite A
Twin Falls, ID 83301
Phone: (208) 733-5323
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ATLAS

Appendix IV GEOTECHNICAL INVESTIGATION TEST PIT LOG

Test Pit Log #: TP-1
Date Advanced: May 3, 2021
Excavated by: Crandall Excavation
Logged by: Ethan Salove, PE

Latitude: 42.587542
Longitude: -114.477381
Depth to Water Table: Not Encountered
Total Depth: 10.7 feet bgs

Depth (feet bgs)	Field Description and USCS Soil and Sediment Classification	Sample Type	Sample Depth (feet bgs)	Qp	Lab Test ID
0.0-4.0	Silt (ML): Light brown to brown, slightly moist, very stiff to hard. --Plow zone encountered to a depth of 1.5 feet bgs.	GS	2.8-3.5	3.5-4.5+	A
4.0-6.8	Silt with Sand (ML): Light brown to brown, dry to slightly moist, very stiff to hard, with fine-grained sand. --Intermittent weak to moderate calcium carbonate cementation throughout.				
6.8-10.7	Borderline Sandy Silt/Silty Sand (ML/SM): Light brown to brown, dry to slightly moist, hard, with fine to coarse-grained sand. --Moderate to strong calcium carbonate cementation throughout. --Intermittent basalt cobbles encountered throughout.				
Below 10.7	Basalt: Dark gray, slightly weathered, widely fractured, strong, with minor vesicles throughout.				

Notes: See Site Map for test pit location.

Lab Test ID	Moisture (%)	LL	PI	Sieve Analysis (% Passing)				
				#4	#10	#40	#100	#200
A	10.4	NP	NP	100	100	98	96	91.6

GEOTECHNICAL INVESTIGATION TEST PIT LOG

Test Pit Log #: TP-2
Date Advanced: May 3, 2021
Excavated by: Crandall Excavation
Logged by: Ethan Salove, PE

Latitude: 42.587719
Longitude: -114.476705
Depth to Water Table: Not Encountered
Total Depth: 7.9 feet bgs

Depth (feet bgs)	Field Description and USCS Soil and Sediment Classification	Sample Type	Sample Depth (feet bgs)	Qp	Lab Test ID
0.0-6.1	Silt (ML): Light brown to brown, slightly moist to dry, very stiff to hard. --Plow zone encountered to a depth of 1.5 feet bgs.			3.0-4.5+	
6.1-7.9	Sandy Silt (ML): Light brown, dry, hard, with fine to coarse-grained sand. --Moderate to strong calcium carbonate cementation throughout, resulting in refusal. --Intermittent basalt cobbles encountered throughout.				

Notes: See Site Map for test pit location.

GEOTECHNICAL INVESTIGATION TEST PIT LOG

Test Pit Log #: TP-3
Date Advanced: May 3, 2021
Excavated by: Crandall Excavation
Logged by: Ethan Salove, PE

Latitude: 42.587926
Longitude: -114.477253
Depth to Water Table: Not Encountered
Total Depth: 9.9 feet bgs

Depth (feet bgs)	Field Description and USCS Soil and Sediment Classification	Sample Type	Sample Depth (feet bgs)	Qp	Lab Test ID
0.0-5.8	Silt (ML): Light brown to brown, slightly moist, stiff to hard. --Plow zone encountered to a depth of 1.3 feet bgs.			2.0-4.5+	
5.8-9.9	Sandy Silt (ML): Light brown, dry, hard, with fine to coarse-grained sand. --Moderate to strong calcium carbonate cementation throughout, resulting in refusal. --Intermittent basalt cobbles encountered from 8.5 to 9.9 feet bgs.				
Below 9.9	Basalt: Dark gray, slightly weathered, widely fractured, strong, with minor vesicles throughout.				

Notes: See Site Map for test pit location.

GEOTECHNICAL INVESTIGATION TEST PIT LOG

Test Pit Log #: TP-4
Date Advanced: May 3, 2021
Excavated by: Crandall Excavation
Logged by: Ethan Salove, PE

Latitude: 42.588036
Longitude: -114.476663
Depth to Water Table: Not Encountered
Total Depth: 7.5 feet bgs

Depth (feet bgs)	Field Description and USCS Soil and Sediment Classification	Sample Type	Sample Depth (feet bgs)	Qp	Lab Test ID
0.0-1.3	Silt (ML): Light brown to brown, slightly moist, very stiff. --Plow zone encountered to a depth of 1.1 feet bgs.			3.0	
1.3-4.8	Silt with Sand (ML): Light brown, dry, hard, with fine-grained sand. --Intermittent weak calcium carbonate cementation throughout.			4.5+	
4.8-7.5	Sandy Silt (ML): Light brown, dry, hard, with fine to coarse-grained sand. --Moderate to strong calcium carbonate cementation throughout, resulting in refusal. --Intermittent basalt cobbles encountered throughout.				

Notes: See Site Map for test pit location.

Appendix V GEOTECHNICAL GENERAL NOTES

Unified Soil Classification System			
Major Divisions		**Symbol**	**Soil Descriptions**
Coarse-Grained Soils < 50% passes No.200 sieve	Gravel & Gravelly Soils < 50% coarse	GW	Well-graded gravels; gravel/sand mixtures with little or no fines
		GP	Poorly-graded gravels; gravel/sand mixtures with little or no fines
		GM	Silty gravels; poorly-graded gravel/sand/silt mixtures
		GC	Clayey gravels; poorly-graded gravel/sand/clay mixtures
	Sand & Sandy Soils > 50% coarse fraction	SW	Well-graded sands; gravelly sands with little or no fines
		SP	Poorly-graded sands; gravelly sands with little or no fines
		SM	Silty sands; poorly-graded sand/gravel/silt mixtures
		SC	Clayey sands; poorly-graded sand/gravel/clay mixtures
Fine-Grained Soils > 50% passes No.200 sieve	Silts & Clays LL < 50	ML	Inorganic silts; sandy, gravelly or clayey silts
		CL	Lean clays; inorganic, gravelly, sandy, or silty, low to medium-plasticity clays
		OL	Organic, low-plasticity clays and silts
	Silts & Clays LL > 50	MH	Inorganic, elastic silts; sandy, gravelly or clayey elastic silts
		CH	Fat clays; high-plasticity, inorganic clays
		OH	Organic, medium to high-plasticity clays and silts
Highly Organic Soils		PT	Peat, humus, hydric soils with high organic content

Relative Density and Consistency Classification	
Coarse-Grained Soils	**SPT Blow Counts (N)**
Very Loose:	< 4
Loose:	4-10
Medium Dense:	10-30
Dense:	30-50
Very Dense:	> 50
Fine-Grained Soils	**SPT Blow Counts (N)**
Very Soft:	< 2
Soft:	2-4
Medium Stiff:	4-8
Stiff:	8-15
Very Stiff:	15-30
Hard:	> 30

Moisture Content and Cementation Classification	
Description	**Field Test**
Dry	Absence of moisture, dry to touch
Slightly Moist	Damp, but no visible moisture
Moist	Visible moisture
Wet	Visible free water
Saturated	Soil is usually below water table
Description	**Field Test**
Weak	Crumbles or breaks with handling or slight finger pressure
Moderate	Crumbles or breaks with considerable finger pressure
Strong	Will not crumble or break with finger pressure

Particle Size	
Boulders:	> 12 in.
Cobbles:	12 to 3 in.
Gravel:	3 in. to 5 mm
Coarse-Grained Sand:	5 to 0.6 mm
Medium-Grained Sand:	0.6 to 0.2 mm
Fine-Grained Sand:	0.2 to 0.075 mm
Silts:	0.075 to 0.005 mm
Clays:	< 0.005 mm

Acronym List	
GS	grab sample
LL	Liquid Limit
M	moisture content
NP	non-plastic
PI	Plasticity Index
Q_p	penetrometer value, unconfined compressive strength, tsf
V	vane value, ultimate shearing strength, tsf

Appendix VI ROCK CLASSIFICATION SYSTEM

Weathering	
Weathering	**Field Test**
Fresh	No sign of decomposition or discoloration. Rings under hammer impact.
Slightly Weathered	Slight discoloration inwards from open fractures, otherwise similar to Fresh.
Moderately Weathered	Discoloration throughout. Weaker minerals such as feldspar decomposed. Strength somewhat less than fresh rock but cores cannot be broken by hand or scraped with a knife. Texture preserved.
Highly Weathered	Most minerals somewhat decomposed. Specimens can be broken by hand with effort or shaved with knife. Core stones present in rock mass. Texture becoming indistinct but fabric preserved.
Completely Weathered	Minerals decomposed to soil but fabric and structure preserved. Specimens easily crumbled or penetrated.

Fracturing	
Spacing	**Description**
6 ft.	Very widely
2 to 6 ft.	Widely
8 to 24 in.	Moderately
2 ½ to 8 in.	Closely
¾ to 2 ½ in.	Very Closely

Rock Quality Designation (RQD)	
RQD (%)	**Rock Quality**
90 – 100	Excellent
75 to 90	Good
50 to 75	Fair
25 to 50	Poor
0 to 25	Very Poor

Competency			
Strength	**Class**	**Field Test**	**Approximate Range of Unconfined Compressive Strength (tsf)**
Extremely Strong	I	Many blows with geologic hammer required to break intact specimen.	> 2000
Very Strong	II	Hand-held specimen breaks with pick end of hammer under more than one blow.	2000 - 1000
Strong	III	Cannot be scraped or peeled with knife, hand-held specimen can be broken with single moderate blow with pick end of hammer.	1000 - 500
Moderately Strong	IV	Can just be scraped or peeled with knife. Indentations 1 mm to 3 mm show in specimen with moderate blow with pick end of hammer.	500 - 250
Weak	V	Material crumbles under moderate blow with pick end of hammer and can be peeled with a knife, but is hard to hand-trim for tri-axial test specimen.	250 - 10
Friable	VI	Material crumbles in hand.	N/A

Appendix VII AASHTO PAVEMENT DESIGN

Pavement Section Design Location: Twin Falls Fire Station #2, Light Duty

Average Daily Traffic Count:	100	All Lanes & Both Directions		
Design Life:	20	Years		
Percent of Traffic in Design Lane:	50%			
Terminal Seviceability Index (Pt):	2.5			
Level of Reliability:	95			
Subgrade CBR Value:	4		**Subgrade Mr:**	6,000

Calculation of Design-18 kip ESALs

	Daily Traffic	Growth Rate	Load Factors	Design ESALs
Passenger Cars:	27	2.0%	0.0008	192
Buses:	0	2.0%	0.6806	0
Panel & Pickup Trucks:	17	2.0%	0.0122	1,839
2-Axle, 6-Tire Trucks:	5	2.0%	0.1890	8,381
Emergency Vehicles:	1.0	2.0%	4.4800	39,731
Dump Trucks:	0	2.0%	3.6300	0
Tractor Semi Trailer Trucks:	0	2.0%	2.3719	0
Double Trailer Trucks	0	2.0%	2.3187	0
Heavy Tractor Trailer Combo Trucks:	0	2.0%	2.9760	0
Average Daily Traffic in Design Lane:	50			

Total Design Life 18-kip ESALs:	50,143
Actual Log (ESALs):	4.700
Trial SN:	2.50
Trial Log (ESALs):	4.749
Pavement Section Design SN:	2.61

	Design Depth Inches	**Structural Coefficient**	**Drainage Coefficient**
Asphaltic Concrete:	2.50	0.42	n/a
Asphalt-Treated Base:	0.00	0.25	n/a
Cement-Treated Base:	0.00	0.17	n/a
Crushed Aggregate Base:	4.00	0.14	1.0
Subbase:	10.00	0.10	1.0
Special Aggregate Subgrade:	0.00	0.09	0.9

AASHTO PAVEMENT DESIGN

Pavement Section Design Location: Twin Falls Fire Station #2, Heavy Duty

Average Daily Traffic Count:	100	All Lanes & Both Directions		
Design Life:	20	Years		
Percent of Traffic in Design Lane:	50%			
Terminal Seviceability Index (Pt):	2.5			
Level of Reliability:	95			
Subgrade CBR Value:	4		**Subgrade Mr:**	6,000

Calculation of Design-18 kip ESALs

	Daily Traffic	Growth Rate	Load Factors	Design ESALs
Passenger Cars:	19	2.0%	0.0008	135
Buses:	0	2.0%	0.6806	0
Panel & Pickup Trucks:	19	2.0%	0.0122	2,056
2-Axle, 6-Tire Trucks:	5	2.0%	0.1890	8,381
Emergency Vehicles:	6	2.0%	4.4800	238,386
Water Trucks:	1	2.0%	3.6300	32,193
Tractor Semi Trailer Trucks:	0	2.0%	2.3719	0
Double Trailer Trucks	0	2.0%	2.3187	0
Heavy Tractor Trailer Combo Trucks:	0	2.0%	2.9760	0
Average Daily Traffic in Design Lane:	50			

Total Design Life 18-kip ESALs:	281,150
Actual Log (ESALs):	5.449
Trial SN:	3.30
Trial Log (ESALs):	5.476
Pavement Section Design SN:	3.50

	Design Depth Inches	**Structural Coefficient**	**Drainage Coefficient**
Asphaltic Concrete:	3.00	0.42	n/a
Asphalt-Treated Base:	0.00	0.25	n/a
Cement-Treated Base:	0.00	0.17	n/a
Crushed Aggregate Base:	6.00	0.14	1.0
Subbase:	14.00	0.10	1.0
Special Aggregate Subgrade:	0.00	0.09	0.9

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Appendix VIII AASHTO RIGID PAVEMENT DESIGN

Pavement Section Design Location: Twin Falls Fire Station #2, Heavy Duty

Average Daily Traffic Count:	100	All Lanes & Both Directions		
Design Life:	20	Years		
% of Traffic in Design Lane:	50%			
Terminal Seviceability Index, Pt:	2			
Level of Reliability, R:	95		**R-Value:**	9
Subgrade CBR Value:	4		**Subgrade Mr:**	6,000
Native Modulus of Subgrade Reaction, K:	120			
Effective Modulus of Subgrade Reaction, K:	180			
Concrete Elastic Modulus, Ec:	4200000			
Modulus of Rupture, S'c:	650			
Load Transfer Coefficient, J:	2.9			
Drainage Coefficient, Cd:	1			
Standard Deviation, So:	0.34			
Design Serviceability Loss, Delta PSI:	2.5			

Calculation of Design 18 kip ESALs

	Daily Traffic	Growth Rate	Load Factors	Design ESAL's
Passenger Cars:	19	2.0%	0.0008	135
Buses:	0	2.0%	0.6806	0
Panel & Pickup Trucks:	19	2.0%	0.0122	2,056
2 Axle, 6 Tire Trucks:	5	2.0%	0.1890	8,381
Emergency Vehicles:	6	2.0%	4.4800	238,386
Water Trucks:	1	2.0%	3.6300	32,193
Tractor Semi Trailer Trucks:	0	2.0%	2.3719	0
Double Trailer Trucks	0	2.0%	2.3187	0
Heavy Tractor Trailer Combo Trucks:	0	2.0%	2.9760	0
Average Daily Traffic in Design Lane:	50			

Total Design Life 18 kip ESAL's: 281,150 Traffic Index equivalent= 7.7

Actual Log (ESAL's): 5.449

Trial Pavement Design Thickness, inches: 6.00

Trial Log (ESAL's): 5.837

Pavement Design Thickness, Inches:	**6.0**
Road Mix Section Thickness, Inches:	**6.0**

Important Information about This

Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, you can benefit from a lowered exposure to problems associated with subsurface conditions at project sites and development of them that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed herein, contact your GBA-member geotechnical engineer. Active engagement in GBA exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.

Understand the Geotechnical-Engineering Services Provided for this Report

Geotechnical-engineering services typically include the planning, collection, interpretation, and analysis of exploratory data from widely spaced borings and/or test pits. Field data are combined with results from laboratory tests of soil and rock samples obtained from field exploration (if applicable), observations made during site reconnaissance, and historical information to form one or more models of the expected subsurface conditions beneath the site. Local geology and alterations of the site surface and subsurface by previous and proposed construction are also important considerations. Geotechnical engineers apply their engineering training, experience, and judgment to adapt the requirements of the prospective project to the subsurface model(s). Estimates are made of the subsurface conditions that will likely be exposed during construction as well as the expected performance of foundations and other structures being planned and/or affected by construction activities.

The culmination of these geotechnical-engineering services is typically a geotechnical-engineering report providing the data obtained, a discussion of the subsurface model(s), the engineering and geologic engineering assessments and analyses made, and the recommendations developed to satisfy the given requirements of the project. These reports may be titled investigations, explorations, studies, assessments, or evaluations. Regardless of the title used, the geotechnical-engineering report is an engineering interpretation of the subsurface conditions within the context of the project and does not represent a close examination, systematic inquiry, or thorough investigation of all site and subsurface conditions.

Geotechnical-Engineering Services are Performed for Specific Purposes, Persons, and Projects, and At Specific Times

Geotechnical engineers structure their services to meet the specific needs, goals, and risk management preferences of their clients. A geotechnical-engineering study conducted for a given civil engineer will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client.

Likewise, geotechnical-engineering services are performed for a specific project and purpose. For example, it is unlikely that a geotechnical-engineering study for a refrigerated warehouse will be the same as one prepared for a parking garage; and a few borings drilled during a preliminary study to evaluate site feasibility will not be adequate to develop geotechnical design recommendations for the project.

Do not rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project or purpose;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, the reliability of a geotechnical-engineering report can be affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If you are the least bit uncertain* about the continued reliability of this report, contact your geotechnical engineer before applying the recommendations in it. A minor amount of additional testing or analysis after the passage of time – if any is required at all – could prevent major problems.

Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read the report in its entirety. Do not rely on an executive summary. Do not read selective elements only. *Read and refer to the report in full.*

You Need to Inform Your Geotechnical Engineer About Change

Your geotechnical engineer considered unique, project-specific factors when developing the scope of study behind this report and developing the confirmation-dependent recommendations the report conveys. Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the elevation, configuration, location, orientation, function or weight of the proposed structure and the desired performance criteria;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project or site changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept* *responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.*

Most of the "Findings" Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site's subsurface using various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing is performed.* The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgement to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team through project completion to obtain informed guidance quickly, whenever needed.

This Report's Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, they are not final, because the geotechnical engineer who developed them relied heavily on judgement and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* exposed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

This Report Could Be Misinterpreted

Other design professionals' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a continuing member of the design team, to:

- confer with other design-team members;
- help develop specifications;
- review pertinent elements of other design professionals' plans and specifications; and
- be available whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction-phase observations.

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note conspicuously that you've included the material for information purposes only.* To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. This happens in part because soil and rock on project sites are typically heterogeneous and not manufactured materials with well-defined engineering properties like steel and concrete. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually provide environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures.* If you have not obtained your own environmental information about the project site, ask your geotechnical consultant for a recommendation on how to find environmental risk-management guidance.

Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, the engineer's services were not designed, conducted, or intended to prevent migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, ***proper implementation of the geotechnical engineer's recommendations will not of itself be sufficient to prevent moisture infiltration. Confront the risk of moisture infiltration*** by including building-envelope or mold specialists on the design team. ***Geotechnical engineers are not building-envelope or mold specialists.***

GBA GEOPROFESSIONAL BUSINESS ASSOCIATION

Telephone: 301/565-2733
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ATLAS

September 23, 2021

Atlas No. T211194g

Ms. Mandi Thompson
City of Twin Falls
PO Box 1907
Twin Falls, ID 83303

Subject: Addendum #1 – Infiltration Testing
Twin Falls Fire Station #2
North College Road
Twin Falls, ID

Dear Ms. Thompson:

This addendum report presents test results not requested at the time of the previously issued Atlas Geotechnical Engineering Report (T211194g). Descriptions of general site characteristics and the proposed project are available in the previous report. Unless otherwise noted in this addendum, all initial recommendations, limitations, and warranties expressed in the previous report must be adhered to.

INFILTRATION TESTING

Infiltration testing was conducted using an open test pit method. Test pit areas will need to be re-excavated and compacted prior to construction of structures that will be sensitive to settlement. Test locations were presoaked prior to testing. Pre-soaking increases soil moistures, which allows the tested soils to reach a saturated condition more readily during testing. Saturation of the tested soils is desirable in order to isolate the vertical component of infiltration by inhibiting horizontal seepage during testing.

Testing was conducted on September 14, 2021. Details and results of testing are as follows:

Table 1 – Infiltration Test Results

Test Location	Test Depth (feet bgs)	Soil Type	Stabilized Infiltration Rate (inches/hour)	Design Infiltration Rate (inches per hour)
TP-1	9.5	Basalt Rock	2.4	1.2
TP-2	7.8	Basalt Rock	1.6	0.8
TP-3	7.3	Basalt Rock	1.4	0.7
TP-5	10.4	Basalt Rock	1.0	0.5

Appropriate factors of safety have been applied to the stabilized infiltration rates achieved during testing to obtain the design infiltration rates listed above. The reason for the decreased infiltration rate is to account for long term saturation of the soils and the potential for less permeable soils to settle into the bottom of the infiltration facilities. Atlas recommends that all infiltration facilities be constructed in accordance with the local municipality requirements.

If you have any questions, please call us at (208) 733-5323.

Respectfully submitted,

PROFESSIONAL ENGINEER LICENSED 18739 9/23/2021 STATE OF IDAHO ETHAN SALOVE

Ethan Salove, PE
Geotechnical Engineer

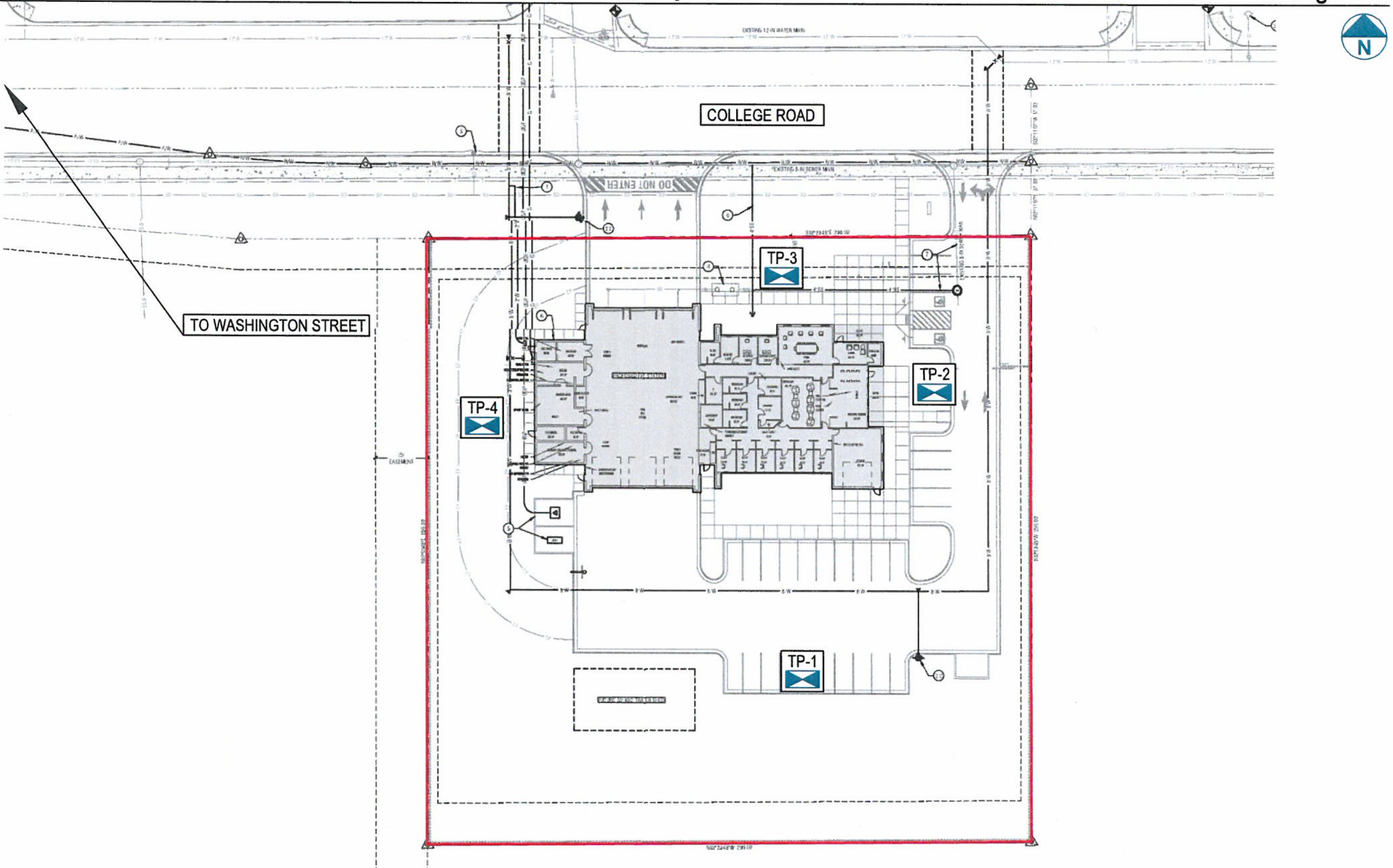
Elizabeth Brown, PE
Geotechnical Services Manager

Attachments: Site Map
Geotechnical Investigation Test Pit Logs
Geotechnical General Notes
Rock Classification System

Distribution: Eric Cronin, The Land Group (PDF Copy)

Site Map

Figure 1



NOTES:
- Not to Scale

LEGEND

Approximate Site Boundary

Approximate Atlas Test Pit Location

Twin Falls Fire Station #2
North College Road
Twin Falls, ID

Modified by: CCW
September 16, 2021
Drawing: T211194g

ATLAS
2283 Wright Ave, Suite A
Twin Falls, ID 83301
Phone: (208) 733-5323
Fax: (208) 733-0564
Web: oneatlas.com

GEOTECHNICAL INVESTIGATION TEST PIT LOG

Test Pit Log #: TP-1
Date Advanced: September 13, 2021
Excavated by: Crandall Excavation
Logged by: Ethan Salove, PE

Latitude: 42.587549
Longitude: -114.476878
Depth to Water Table: Not Encountered
Total Depth: 9.5 feet bgs

Depth (feet bgs)	Field Description and USCS Soil and Sediment Classification	Sample Type	Sample Depth (feet bgs)	Qp	Lab Test ID
0.0-5.6	Silt (ML): Light brown to brown, slightly moist to moist, very stiff to hard. --Plow zone encountered to a depth of 1.1 feet bgs.			3.5-4.5+	
5.6-9.5	Sandy Silt (ML): Light brown, slightly moist, very stiff to hard, with fine-grained sand. --Weak to moderate calcium carbonate cementation encountered from 5.6 to 6.9 feet bgs. --Intermittent basalt cobbles encountered from 6.9 to 9.5 feet bgs.				
Below 9.5	Basalt: Dark gray, slightly weathered, moderately to widely fractured, strong, with minor vesicles throughout.				

Notes: See Site Map for test pit location.
Infiltration testing conducted at a depth of 9.5 feet bgs.

GEOTECHNICAL INVESTIGATION TEST PIT LOG

Test Pit Log #: TP-2
Date Advanced: September 13, 2021
Excavated by: Crandall Excavation
Logged by: Ethan Salove, PE

Latitude: 42.587976
Longitude: -114.476634
Depth to Water Table: Not Encountered
Total Depth: 7.8 feet bgs

Depth (feet bgs)	Field Description and USCS Soil and Sediment Classification	Sample Type	Sample Depth (feet bgs)	Qp	Lab Test ID
0.0-5.1	Silt (ML): Light brown to brown, dry to slightly moist, very stiff to hard. --Plow zone encountered to a depth of 1.3 feet bgs.			3.0-4.5+	
5.1-7.8	Sandy Silt (ML): Light brown, dry to slightly moist, very stiff to hard, with fine-grained sand. --Weak to moderate calcium carbonate cementation encountered from 6.0 to 7.8 feet bgs.				
Below 7.8	Basalt: Dark gray, slightly weathered, widely fractured, strong, with minor vesicles throughout.				

Notes: See Site Map for test pit location.
Infiltration testing conducted at a depth of 7.8 feet bgs.

GEOTECHNICAL INVESTIGATION TEST PIT LOG

Test Pit Log #: TP-3
Date Advanced: September 13, 2021
Excavated by: Crandall Excavation
Logged by: Ethan Salove, PE

Latitude: 42.588160
Longitude: -114.476913
Depth to Water Table: Not Encountered
Total Depth: 7.3 feet bgs

Depth (feet bgs)	Field Description and USCS Soil and Sediment Classification	Sample Type	Sample Depth (feet bgs)	Qp	Lab Test ID
0.0-3.6	Silt (ML): Light brown to brown, dry to slightly moist, very stiff. --Plow zone encountered to a depth of 1.3 feet bgs.			3.0-4.0	
3.6-7.3	Sandy Silt (ML): Light brown, dry, very stiff to hard, with fine-grained sand. --Intermittent weak calcium carbonate cementation encountered throughout.			3.0-4.5+	
Below 7.3	Basalt: Dark gray, slightly weathered, widely fractured, strong, with minor vesicles throughout.				

Notes: See Site Map for test pit location.
Infiltration testing conducted at a depth of 7.3 feet bgs.

GEOTECHNICAL INVESTIGATION TEST PIT LOG

Test Pit Log #: TP-4
Date Advanced: September 13, 2021
Excavated by: Crandall Excavation
Logged by: Ethan Salove, PE

Latitude: 42.587936
Longitude: -114.477458
Depth to Water Table: Not Encountered
Total Depth: 10.4 feet bgs

Depth (feet bgs)	Field Description and USCS Soil and Sediment Classification	Sample Type	Sample Depth (feet bgs)	Qp	Lab Test ID
0.0-5.9	Silt (ML): Light brown to brown, dry to slightly moist, very stiff to hard. --Plow zone encountered to a depth of 1.2 feet bgs.			3.0-4.5	
5.9-10.4	Sandy Silt (ML): Light brown, dry, very stiff to hard, with fine-grained sand. --Intermittent basalt cobbles throughout.			3.0-4.5+	
Below 10.4	Basalt: Dark gray, slightly weathered, moderately to widely fractured, strong, with minor vesicles throughout.				

Notes: See Site Map for test pit location.
Infiltration testing conducted at a depth of 10.4 feet bgs.

GEOTECHNICAL GENERAL NOTES

Unified Soil Classification System			
Major Divisions		**Symbol**	**Soil Descriptions**
Coarse-Grained Soils < 50% passes No.200 sieve	Gravel & Gravelly Soils < 50% coarse	GW	Well-graded gravels; gravel/sand mixtures with little or no fines
		GP	Poorly-graded gravels; gravel/sand mixtures with little or no fines
		GM	Silty gravels; poorly-graded gravel/sand/silt mixtures
		GC	Clayey gravels; poorly-graded gravel/sand/clay mixtures
	Sand & Sandy Soils > 50% coarse fraction	SW	Well-graded sands; gravelly sands with little or no fines
		SP	Poorly-graded sands; gravelly sands with little or no fines
		SM	Silty sands; poorly-graded sand/gravel/silt mixtures
		SC	Clayey sands; poorly-graded sand/gravel/clay mixtures
Fine-Grained Soils > 50% passes No.200 sieve	Silts & Clays LL < 50	ML	Inorganic silts; sandy, gravelly or clayey silts
		CL	Lean clays; inorganic, gravelly, sandy, or silty, low to medium-plasticity clays
		OL	Organic, low-plasticity clays and silts
	Silts & Clays LL > 50	MH	Inorganic, elastic silts; sandy, gravelly or clayey elastic silts
		CH	Fat clays; high-plasticity, inorganic clays
		OH	Organic, medium to high-plasticity clays and silts
Highly Organic Soils		PT	Peat, humus, hydric soils with high organic content

Relative Density and Consistency Classification	
Coarse-Grained Soils	**SPT Blow Counts (N)**
Very Loose:	< 4
Loose:	4-10
Medium Dense:	10-30
Dense:	30-50
Very Dense:	> 50
Fine-Grained Soils	**SPT Blow Counts (N)**
Very Soft:	< 2
Soft:	2-4
Medium Stiff:	4-8
Stiff:	8-15
Very Stiff:	15-30
Hard:	> 30

Moisture Content and Cementation Classification	
Description	**Field Test**
Dry	Absence of moisture, dry to touch
Slightly Moist	Damp, but no visible moisture
Moist	Visible moisture
Wet	Visible free water
Saturated	Soil is usually below water table
Description	**Field Test**
Weak	Crumbles or breaks with handling or slight finger pressure
Moderate	Crumbles or breaks with considerable finger pressure
Strong	Will not crumble or break with finger pressure

Particle Size	
Boulders:	> 12 in.
Cobbles:	12 to 3 in.
Gravel:	3 in. to 5 mm
Coarse-Grained Sand:	5 to 0.6 mm
Medium-Grained Sand:	0.6 to 0.2 mm
Fine-Grained Sand:	0.2 to 0.075 mm
Silts:	0.075 to 0.005 mm
Clays:	< 0.005 mm

Acronym List	
GS	grab sample
LL	Liquid Limit
M	moisture content
NP	non-plastic
PI	Plasticity Index
Q_p	penetrometer value, unconfined compressive strength, tsf
V	vane value, ultimate shearing strength, tsf

ATLAS

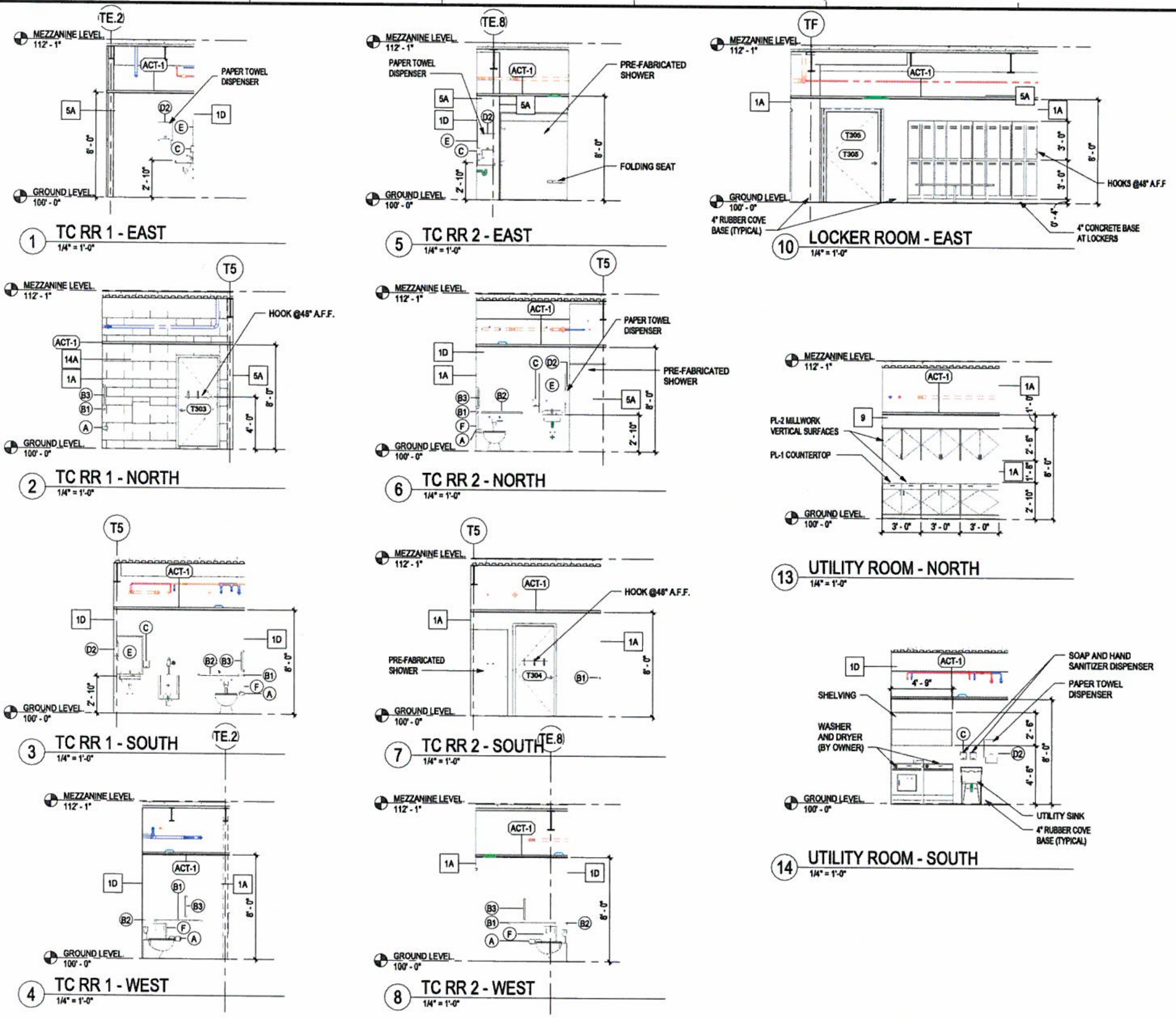
ROCK CLASSIFICATION SYSTEM

Weathering	
Weathering	**Field Test**
Fresh	No sign of decomposition or discoloration. Rings under hammer impact.
Slightly Weathered	Slight discoloration inwards from open fractures, otherwise similar to Fresh.
Moderately Weathered	Discoloration throughout. Weaker minerals such as feldspar decomposed. Strength somewhat less than fresh rock but cores cannot be broken by hand or scraped with a knife. Texture preserved.
Highly Weathered	Most minerals somewhat decomposed. Specimens can be broken by hand with effort or shaved with knife. Core stones present in rock mass. Texture becoming indistinct but fabric preserved.
Completely Weathered	Minerals decomposed to soil but fabric and structure preserved. Specimens easily crumbled or penetrated.

Fracturing	
Spacing	**Description**
6 ft.	Very widely
2 to 6 ft.	Widely
8 to 24 in.	Moderately
2 ½ to 8 in.	Closely
¾ to 2 ½ in.	Very Closely

Rock Quality Designation (RQD)	
RQD (%)	**Rock Quality**
90 – 100	Excellent
75 to 90	Good
50 to 75	Fair
25 to 50	Poor
0 to 25	Very Poor

Competency			
Strength	**Class**	**Field Test**	**Approximate Range of Unconfined Compressive Strength (tsf)**
Extremely Strong	I	Many blows with geologic hammer required to break intact specimen.	> 2000
Very Strong	II	Hand-held specimen breaks with pick end of hammer under more than one blow.	2000 - 1000
Strong	III	Cannot be scraped or peeled with knife, hand-held specimen can be broken with single moderate blow with pick end of hammer.	1000 - 500
Moderately Strong	IV	Can just be scraped or peeled with knife. Indentations 1 mm to 3 mm show in specimen with moderate blow with pick end of hammer.	500 - 250
Weak	V	Material crumbles under moderate blow with pick end of hammer and can be peeled with a knife, but is hard to hand-trim for tri-axial test specimen.	250 - 10
Friable	VI	Material crumbles in hand.	N/A

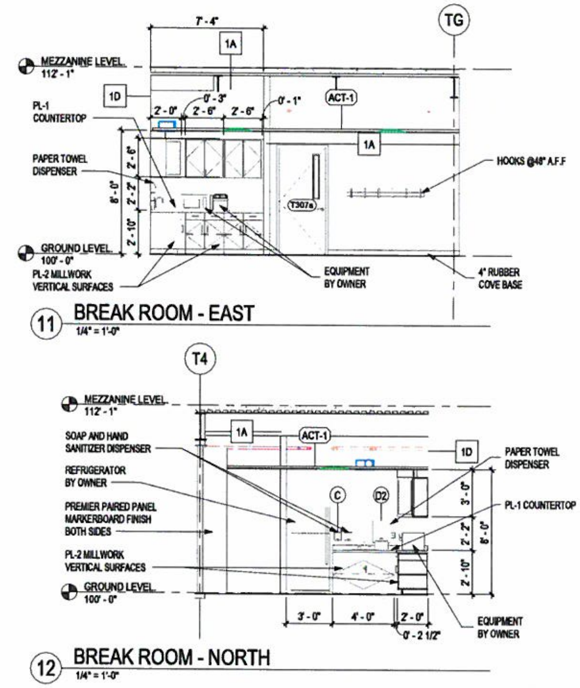


TOILET ACCESSORY SCHEDULE

TOILET ACCESSORIES			
MARK	QTY.	DESCRIPTION	COMMENTS
A	3	TOILET TISSUE DISPENSER (DOUBLE ROLL)	TO BE PROVIDED BY OWNER
B1	3	42" ADA GRAB BAR	
B2	3	36" ADA GRAB BAR	
B3	2	18" VERTICAL GRAB BAR	
C	8	SOAP DISPENSER	TO BE PROVIDED BY OWNER
D2	6	SEMI-RECESSED PAPER TOWEL DISPENSER	
E	3	16" X 36" MIRROR	
F	3	SANITARY NAPKIN DISPOSAL -PARTITION MOUNTED	

NOTE:

1. FURNITURE SYSTEMS PROVIDED BY OWNER. VERIFY WITH OWNER CONCERNING MAKE, MODEL AND QUANTITY.
2. ALL TOILET ACCESSORIES TO BE ADA DESIGNED, MOUNTED AND PROVIDE CLEARANCES AS DEFINED BY SHEET G-520.



GRAPHIC SCALE 0' 2' 4' 8'

ASKELL ARCHITECTS and ENGINEERS, P.A.
IDAHO - Engineering # 2293

HASKELL
The Haskell Company
111 Riverside Avenue
Jacksonville, Florida 32202
Phone # (904) 791-4500

REV.	DATE	MODIFIED BY	PROJECT NUMBER	DESCRIPTION

Drawn: Author
Date: 01/12/2022
Last Saved: 01/12/2022
Approved: Approver
Coordinated: CA
Design: Designer

Chobani
Project: CHOBANI WRRF UPGRADES
Company: HASKELL
Sheet: of
Scale:

Location: TWIN FALLS, IDAHO
Area Number: 75 Area: WRRF
Level:
Project Number: P.200197
SAP Part Number:
Issue: TC - PI Size: 34"X22"

Title: ENLARGED PLANS AND INTERIOR ELEVATIONS - TREATMENT CENTER

Drawing Number: 75-A-412