REPORT
GEOTECHNICAL STUDY
PROPOSED DAVENPORT CROSSING DEVELOPMENT
4792 WEST SR-112
GRANTSVILLE, UTAH

Submitted To:

Wise Management, LLC
PO Box 190
Grantsville, Utah 84029

Submitted By:

GSH Geotechnical, Inc.
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April 15, 2019

Job No. 2164-002-19

April 16, 2019
Job No. 2164-002-19

Mr. Todd Castango
Wise Management, LLC
PO Box 190
Grantsville, Utah 84029

Mr. Castango:

Re: Report
Geotechnical Study
Proposed Davenport Crossing Development
4792 West SR-112
Grantsville, Utah

1. INTRODUCTION

1.1 GENERAL

This report presents the results of our geotechnical study performed at the site of the proposed Davenport Crossing Development to be located at approximately 4792 West SR-112 in Grantsville, Utah. The general location of the site with respect to existing roadways, as of 2019, is presented on Figure 1, Vicinity Map. A more detailed layout of the site showing proposed facilities, existing roadways, and the borings drilled and test pits excavated in conjunction with this study is presented on Figure 2, Site Plan.

1.2 OBJECTIVES AND SCOPE

The objectives and scope of the study were planned in discussions between Mr. Todd Castango of Wise Management, LLC and Mr. Alan Spilker of GSH Geotechnical, Inc. (GSH).

In general, the objectives of this study were to:

1. Define and evaluate the subsurface soil and groundwater conditions across the site.

2. Provide appropriate foundation, earthwork, pavement, and geoseismic recommendations to be utilized in the design and construction of the proposed facilities.

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In accomplishing these objectives, our scope has included the following:

1. A field program consisting of the exploration, logging, and sampling of 24 borings and 11 test pits.

2. A laboratory testing program.

3. An office program consisting of the correlation of available data, engineering analysis, and the preparation of this summary report.

1.3 AUTHORIZATION

Authorization was provided by returning a signed copy of the Professional Services Agreement No. 18-0812.rev1 dated March 1, 2019.

1.4 PROFESSIONAL STATEMENTS

Supporting data upon which our recommendations are based are presented in subsequent sections of this report. Recommendations presented herein are governed by the physical properties of the soils encountered in the exploration borings and test pits, projected groundwater conditions, and the layout and design data discussed in Section 2, Proposed Construction. If subsurface conditions other than those described in this report are encountered and/or if design and layout changes are implemented, GSH must be informed so that our recommendations can be reviewed and amended, if necessary.

Our professional services have been performed, our findings developed, and our recommendations prepared in accordance with generally accepted engineering principles and practices in this area at this time.

2. PROPOSED CONSTRUCTION

The approximately 89-acre parcel is proposed to be developed with single- and multi-family residential structures and commercial structures. The single- and multi-family residential structures are anticipated to be up to 3 stories above ground, of wood-framed construction, with full- or partial-depth basements over conventional spread and continuous wall footings. The commercial structures are anticipated to be up to 2 stories above grade of wood-framed or masonry block construction and placed slab on grade supported over conventional spread and continuous wall footings.

Maximum real column and wall loads for the single- and multi-family residential structures are anticipated to be on the order of up to 40 kips and up to 3 kips per lineal foot, respectively. Maximum real column and wall loads for the commercial structures are anticipated to be on the order of up to 120 kips and 7 kips per lineal foot, respectively. Real loads are defined as the total of all dead plus frequently applied (reduced) live loads.

Paved parking areas and drive lanes are anticipated to service the development. Projected traffic in the parking areas is anticipated to consist of a light volume of automobiles and light trucks, occasional medium-weight trucks, and no heavy-weight trucks. Projected traffic in the parking areas is anticipated to consist of a moderate volume of automobiles and light trucks, a light volume medium-weight trucks, and occasional heavy-weight trucks.

Site development will require some earthwork in the form of minor cutting and filling. At this time, we anticipate that maximum site grading cuts and fills, excluding utilities, will be on the order of 1 to 3 feet.

3. SITE INVESTIGATIONS

3.1 GENERAL

Subsurface conditions in unexplored locations or at other times may vary from those encountered at specific boring and test pit locations. If such variations are noted during construction or if project development plans are changed, GSH must review the changes and amend our recommendations, if necessary.

Boring and test pit locations were established by estimating distances and angles from site landmarks. If increased accuracy is desired by the client, we recommend that the boring and test pit locations and elevations be surveyed.

3.2 FIELD PROGRAM

To define and evaluate the subsurface soil and groundwater conditions across the site, 24 borings and 11 test pits were completed within the accessible areas. The borings and test pits were completed to depths ranging from 10 to 16 feet with a truck-mounted drill rig equipped with hollow-stem augers and a moderate-sized rubber tire-mounted backhoe. The approximate locations of the borings and test pits are presented on Figure 2.

The field portion of our study was under the direct control and continual supervision of an experienced member of our geotechnical staff. During the course of the drilling operations, a continuous log of the subsurface conditions encountered was maintained. In addition, samples of the typical soils encountered were obtained for subsequent laboratory testing and examination. The soils were classified in the field based upon visual and textural examination. These classifications were supplemented by subsequent inspection and testing in our laboratory. Graphical representation of the subsurface conditions encountered is presented on Figures 3A through 3X, Boring Logs and Figures 4A through 4K, Test Pit Logs. Soils were classified in accordance with the nomenclature described on Figure 5, Key to Boring Log, and Figure 6, Key to Test Pit Log (USCS).

A 3.25- and 3.0-inch outside diameter, 2.42-inch inside diameter (Dames & Moore), a 2.0-inch outside diameter, 1.38-inch inside diameter drive sampler (SPT), and a 2.42-inch inside diameter

thin-wall drive sampler were utilized at select locations and depths within the borings and test pits to collect soil samples for further examination and laboratory testing. The blow counts recorded on the boring logs were those required to drive the sampler 12 inches with a 140-pound hammer dropping 30 inches.

Following completion of exploration operations, 1.25-inch diameter slotted PVC pipe was installed in each of the borings and test pits to provide a means of monitoring the groundwater fluctuations. The borings and test pits were then backfilled. Although an effort was made to compact the backfill, it was not placed in uniform lifts and compacted to a specific density. Consequently, settlement of the backfill with time is likely to occur.

3.3 LABORATORY TESTING

3.3.1 General

To provide data necessary for our engineering analysis, a laboratory testing program was performed. This program included moisture, density, partial gradation, swell/consolidation, and chemical tests. The following paragraphs describe the tests and summarize the test data.

3.3.2 Moisture and Density Tests

To provide index parameters and to correlate other test data, moisture and density tests were performed on selected samples. The results of these tests are presented on the boring logs, Figures 3A through 3X, and test pit logs, Figures 4A through 4K.

3.3.3 Partial Gradation Tests

To aid in classifying the granular soils, partial gradation tests were performed. Results of the tests are tabulated below and presented on the boring logs, Figures 3A through 3X.

Boring	Depth (feet)	Percent Passing No. 200 Sieve	Moisture Content Percent	Soil Classification
B-5	15.0	38.4	7.8	SM

3.3.4 Swell/Consolidation Tests

To provide data necessary for our settlement analyses, swell/consolidation tests were performed on each of 3 representative samples of the potentially expansive soils. The swell portion of the overall test was performed in accordance with the following procedure:

1. Load sample at in situ moisture content to specific axial pressure.

2. Measure and record axial deflection.

3. Saturate sample.

4. Measure and record resulting swell.

Upon completion of the swell portion of the tests, standard consolidation test loading was applied. The results of these tests indicate that the soils tested are primarily expansive and are anticipated to exhibit relatively high pre-consolidation pressures, relatively high strength, and relatively low compressibility characteristics under the anticipated loading.

Detailed results of these tests are maintained within our files and can be transmitted to you, upon your request.

3.3.5 Chemical Tests

To determine if the site soils will react detrimentally with concrete, chemical tests were performed on a representative sample of the near-surface soil encountered at the site. The results of the chemical tests are tabulated below:

Boring	Depth (feet)	Soil Classification	pH	Total Water Soluble Sulfate (mg/kg-dry)
B-24	2.5	CL	8.27	1,860

4. SITE CONDITIONS

4.1 SURFACE

The site is located at approximately 4792 West SR-112 in Grantsville, Utah. The site is currently vacant/undeveloped land used for agricultural purposes. The topography of the site is relatively flat, grading gently down toward the northwest with an overall relief of approximately 30 feet. Site vegetation consists of agricultural grass fields throughout the site.

The site is bounded to the north by similar vacant/undeveloped agricultural land with single-family residential structures beyond; to the east by vacant/undeveloped brush land; to the south by SR-112 followed by similar vacant/undeveloped agricultural land and a single-family residential structure; and to the west by similar vacant/undeveloped agricultural land and a single-family residential structure.

4.2 SUBSURFACE SOIL

The following paragraphs provide generalized descriptions of the subsurface profiles and soil conditions encountered within the borings and test pits conducted during this study. As previously noted, soil conditions may vary in unexplored locations.

The borings and test pits were completed to depths ranging from 10 to 16 feet. The soil conditions encountered in each of the borings and test pits, to the depths completed, were generally similar across the boring and test pit locations.

- Up to 8 inches of topsoil was encountered in each of the borings and test pits. Topsoil thickness is frequently erratic and thicker zones of topsoil should be anticipated.

- Natural soils were encountered below the ground surface in each of the borings and test pits. The natural soils consisted primarily of clay with varying silt, sand, and gravel content and sand with varying silt and clay content.

- Potentially expansive clay soils were encountered at the site to depths of up to 5 feet below the existing ground surface. These potentially expansive soils are likely to exist to greater depths throughout the site.

The natural clay soils were stiff to hard, dry to slightly moist, and varied in color (light brown, light gray, light grayish-brown, and grayish-brown). The potentially expansive natural clay soils encountered to depths of up to 5 feet are anticipated to exhibit relatively high pre-consolidation pressures, relatively high strength, and relatively low compressibility characteristics under the anticipated loading. The non-expansive natural clay soils are anticipated to exhibit moderate strength and compressibility characteristics under the anticipated loading.

The natural sand soils were very dense, moist, and varied in color (light brown, light gray, and gray). The natural sand soils are anticipated to exhibit moderately high strength and moderately low compressibility characteristics under the anticipated load range.

For a more descriptive interpretation of subsurface conditions, please refer to Figures 3A through 3X, Boring Logs, and Figures 4A through 4K, Test Pit Logs. The lines designating the interface between soil types on the boring logs and test pit logs generally represent approximate boundaries. In situ, the transition between soil types may be gradual.

4.3 GROUNDWATER

Groundwater was not encountered to the depths explored in the borings competed at the site.

5. DISCUSSIONS AND RECOMMENDATIONS

5.1 SUMMARY OF FINDINGS

The proposed structures may be supported upon conventional spread and continuous wall foundations supported upon suitable natural soils and/or structural fill extending to suitable natural soils.

The most significant geotechnical aspects at the site are:

1. The potentially expansive clay soils encountered at the site to depths of up to 5 feet and likely present to greater depths throughout the site.

2. The potential to encounter non-engineered fill at the site.

Due to the presence of near-surface expansive soils, surface water and moisture control is critical for the project. The surface surrounding the structures must grade away from the proposed structures a minimum of 2 percent. All roof drains/gutters must be extended away from the adjacent foundation a minimum of 15 feet and potentially further, depending on site grades. Additionally, a concrete apron with a minimum width of 10 feet must be installed around the perimeter of all structures.

Residential structures constructed with full-depth basements are anticipated to extend past potentially expansive soils. If residential structures extend past the potentially expansive soils, structural fill will not be required below footings. Residential structures constructed slab on grade or with partial-depth basements are likely to encounter potentially expansive soils. Commercial/office structures are anticipated to be constructed slab on grade and are likely to encounter potentially expansive soils.

For areas where expansive soils are below the structure footprint, a 1-foot over-excavation from the bottom of the footings and floor slab is required. The replacement structural fill must consist of a mixture of sand and gravel containing at least 20 percent fines (silt or clay particles). The purpose of the relatively high percentage of fines is to render the compacted material less permeable; thus, reducing the possibility of deep infiltration of surface water into the underlying expansive soil sequence. All backfill surrounding the footings and stem walls must consist of this material and be compacted to the requirements of structural fill.

A minimum of 1 foot of structural fill is required below footings where the potentially expansive soils are within 1 foot of the bottom of footing elevation. Basement excavations for residential structures will likely extend past the potentially expansive soils. All floor slabs to must be directly underlain by 4 inches of free-draining gravel, which will act a capillary break for moisture protection. This capillary break layer may be considered part of any required over-excavation mentioned above. Additionally, to allow potentially trapped ground moisture to escape, moisture barriers and other impermeable membranes must not be used within the structure footprint, under exterior flat work, or in landscaped areas.

Potentially expansive clay soils may remain below flexible pavements if properly prepared. Proper preparation is to consist of the removal of the upper 1-foot of expansive soils and replaced with structural site grading fill.

Unless the potentially expansive clay soils are completely removed below structures, floor slabs, flatwork areas, and pavement heave may occur.

Prior to proceeding with construction, removal of the existing surface vegetation, root systems, topsoil, non-engineered fill (if encountered), and any deleterious materials from beneath an area extending out at least 5 feet from the perimeter of the proposed structure footprint and 3 feet beyond rigid pavements and exterior flatwork areas will be required. All existing utility locations should be reviewed to assess their impact on the proposed construction and abandoned and/or relocated as appropriate.

Due to the past agricultural use of this site and the developed nature of the surrounding area, non-engineered fills may exist in unexplored areas of the site. Based on our experience, non-engineered fills are frequently erratic in composition and consistency. All surficial loose/disturbed soils and non-engineered fills must be removed below all footings, floor slabs, and pavements.

To reduce disturbance of the natural soils during excavation, it is recommended that low-impact, track-mounted equipment with smooth edge buckets/blades be utilized.

Detailed discussions pertaining to earthwork, foundations, pavements, and the geoseismic setting of the site are presented in the following sections.

5.2 EARTHWORK

5.2.1 Site Preparation

Initial site preparation will consist of the removal of existing non-engineered fills (if encountered), surface vegetation, root systems, topsoil, and any deleterious materials from beneath an area extending out at least 5 feet from the perimeter of the proposed structure footprint and 3 feet beyond pavements and exterior flatwork areas. All existing utility locations should be reviewed to assess their impact on the proposed construction and abandoned and/or relocated as appropriate.

For areas where expansive soils are to be left in place below the structure footprint, a 1-foot over-excavation from the bottom of the floor slab is required. The replacement structural fill must consist of a mixture of sand and gravel containing at least 20 percent fines (silt or clay particles). Structural fills shall be compacted to 90 percent of the maximum dry density as determined by the AASHTO T-180 (ASTM D1557) method of compaction. The purpose of the relatively high percentage of fines is to render the compacted material less permeable; thus, reducing the possibility of deep infiltration of surface water into the underlying expansive soil sequence. All backfill surrounding the footings and stem walls must consist of this material and be compacted to the requirements of structural fill. As an alternative, a 3-inch geofoam mat may be utilized below the floor slab with a weight of 1 to 3 pounds per cubic foot.

If the expansive soils are replaced within the structure footprint, the floor slab must be directly underlain by 4 inches of free-draining gravel, which will act as a capillary break for moisture protection. This capillary break layer may be considered part of any required over-excavation mentioned above. Additionally, to allow potentially trapped ground moisture to escape, moisture

barriers and other impermeable membranes must not be used within the structure footprint, under exterior flat work, or in landscaped areas.

Potentially expansive clay soils may remain below flexible pavements if properly prepared. Proper preparation is to consist of the removal of the upper 1-foot of expansive soils and replaced with structural site grading fill.

Unless the potentially expansive clay soils are completely removed below structures, floor slabs, flatwork areas, and pavement heave may occur.

It must be noted that from a handling and compaction standpoint, soils containing high amounts of fines (silts and clays) are inherently more difficult to rework and are very sensitive to changes in moisture content, requiring very close moisture control during placement and compaction. This will be very difficult, if not impossible, during wet and cold periods of the year. Additionally, the on-site soils are likely above optimum moisture content for compacting at present and would require some drying prior to re-compacting.

Subsequent to stripping and prior to the placement of floor slabs, foundations, structural site grading fills, exterior flatwork, and pavements, the exposed subgrade must be proof rolled by passing moderate-weight rubber tire-mounted construction equipment over the surface at least twice. If excessively soft or otherwise unsuitable soils are encountered beneath footings, they must be completely removed. If removal depth required is greater than 2 feet below footings, GSH must be notified to provide further recommendations. In pavement, floor slab, and outside flatwork areas, unsuitable natural soils should be removed to a maximum depth of 2 feet and replaced with compacted granular structural fill.

Subgrade preparation as described must be completed prior to placing overlying structural site grading fills.

GSH must be notified prior to the placement of structural site grading fills, floor slabs, footings, and pavements to verify that all potentially expansive soils, loose/disturbed soils and non-engineered fills (if encountered) have been completely removed and/or properly prepared.

5.2.2 Temporary Excavations

Temporary excavations up to 8 feet deep in fine-grained cohesive soils, above or below the water table, may be constructed with sideslopes no steeper than one-half horizontal to one vertical (0.5H:1.0V). Excavations deeper than 8 feet are not anticipated at the site.

For granular (cohesionless) soils, construction excavations above the water table, not exceeding 4 feet, should be no steeper than one-half horizontal to one vertical (0.5H:1.0V). For excavations up to 8 feet, in granular soils and above the water table, the slopes should be no steeper than one horizontal to one vertical (1H:1V). Excavations encountering saturated cohesionless soils will be very difficult and will require very flat sideslopes and/or shoring, bracing, and dewatering.

To reduce disturbance of the natural soils during excavation, it is recommended that low-impact, track-mounted equipment with smooth edge buckets/blades be utilized.

All excavations must be inspected periodically by qualified personnel. If any signs of instability or excessive sloughing are noted, immediate remedial action must be initiated.

5.2.3 Structural Fill

Structural fill is defined as all fill which will ultimately be subjected to structural loadings, such as imposed by footings, floor slabs, pavements, etc. Structural fill will be required as backfill over foundations and utilities, as site grading fill, and as replacement fill below footings. All structural fill must be free of surface vegetation, root systems, rubbish, topsoil, frozen soil, and other deleterious materials.

Structural site grading fill is defined as structural fill placed over relatively large open areas to raise the overall grade. For structural site grading fill, the maximum particle size shall not exceed 4 inches; although, occasional larger particles, not exceeding 8 inches in diameter, may be incorporated if placed randomly in a manner such that "honeycombing" does not occur and the desired degree of compaction can be achieved. The maximum particle size within structural fill placed within confined areas shall be restricted to 2 inches.

On-site soils may be re-utilized as structural site grading fill if they do not contain construction debris or deleterious material and meet the requirements of structural fill. Fine-grained soils will require very close moisture control and may be very difficult, if not impossible, to properly place and compact during wet and cold periods of the year.

Imported structural fill below floor slabs must consist of a mixture of sand and gravel containing at least 20 percent fines (silt or clay particles). Structural fills shall be compacted to 90 percent of the maximum dry density as determined by the AASHTO T-180 (ASTM D1557) method of compaction. The purpose of the relatively high percentage of fines is to render the compacted material less permeable; thus, reducing the possibility of deep infiltration of surface water into the underlying expansive soil sequence. All backfill surrounding the footings and stem walls must consist of this material and be compacted to the requirements of structural fill.

To stabilize soft subgrade conditions (if encountered) or where structural fill is required to be placed closer than 2.0 feet above the water table at the time of construction, a mixture of coarse angular gravels and cobbles and/or 1.5- to 2.0-inch gravel (stabilizing fill) should be utilized. It may also help to utilize a stabilization fabric, such as Mirafi 600X or equivalent, placed on the natural ground if 1.5- to 2.0-inch gravel is used as stabilizing fill.

5.2.4 Fill Placement and Compaction

All structural fill shall be placed in lifts not exceeding 8 inches in loose thickness. Structural fills shall be compacted in accordance with the percent of the maximum dry density as determined by the AASHTO[1] T180 (ASTM[2] D1557) compaction criteria in accordance with the following table:

Location	Total Fill Thickness (feet)	Minimum Percentage of Maximum Dry Density
Beneath an area extending at least 5 feet beyond the perimeter of the structure	0 to 10	95
Site grading fills outside area defined above	0 to 5	90
Site grading fills outside area defined above	5 to 10	95
Utility trenches within structural areas	--	96
Road base	--	96

Structural fills greater than 10 feet thick are not anticipated at the site.

Subsequent to stripping and prior to the placement of structural site grading fill, the subgrade shall be prepared as discussed in Section 5.2.1, Site Preparation, of this report. In confined areas, subgrade preparation should consist of the removal of all loose or disturbed soils.

Coarse angular gravel and cobble mixtures (stabilizing fill), if utilized, shall be end dumped, spread to a maximum loose lift thickness of 15 inches, and compacted by dropping a backhoe bucket onto the surface continuously at least twice. As an alternative, the stabilizing fill may be compacted by passing moderately heavy construction equipment or large self-propelled compaction equipment at least twice. Subsequent fill material placed over the coarse gravels and cobbles shall be adequately compacted so that the "fines" are "worked into" the voids in the underlying coarser gravels and cobbles. Where soil fill materials are to be placed directly over more than about 18 inches of clean gravel, a separation geofabric, such as Mirafi 140N or equivalent, is recommended to be placed between the gravel and subsequent soil fills.

Non-structural fill may be placed in lifts not exceeding 12 inches in loose thickness and compacted by passing construction, spreading, or hauling equipment over the surface at least twice.

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1 American Association of State Highway and Transportation Officials
2 American Society for Testing and Materials

5.2.5 Utility Trenches

All utility trench backfill material below structurally loaded facilities (footings, floor slabs, flatwork, pavements, etc.) shall be placed at the same density requirements established for structural fill. If the surface of the backfill becomes disturbed during the course of construction, the backfill shall be proof rolled and/or properly compacted prior to the construction of any exterior flatwork over a backfilled trench. Proof rolling shall be performed by passing moderately loaded rubber tire-mounted construction equipment uniformly over the surface at least twice. If excessively loose or soft areas are encountered during proof rolling, they shall be removed to a maximum depth of 2 feet below design finish grade and replaced with structural fill.

Many utility companies and City-County governments are now requiring that Type A-1a or A-1b (AASHTO Designation – basically granular soils with limited fines) soils be used as backfill over utilities. However, due to the potentially expansive nature of the site soils, structural backfill for utility trenches must contain at least 20 percent fine material. These organizations are also requiring that in public roadways, the backfill over major utilities be compacted over the full depth of fill to at least 96 percent of the maximum dry density as determined by the AASHTO T180 (ASTM D1557) method of compaction. GSH recommends that as the major utilities continue onto the site that these compaction specifications are followed.

Fine-grained soils, such as silts and clays, are not recommended for utility trench backfill in structural areas.

To reduce disturbance of the natural soils during excavation, it is recommended that low-impact, track-mounted equipment with smooth edge buckets/blades be utilized.

5.3 GROUNDWATER RECOMMENDATIONS

Groundwater was not encountered to the depths explored in the borings competed at the site.

The groundwater measurements presented are conditions at the time of the field exploration and may not be representative of other times or locations. Groundwater levels may vary seasonally and with precipitation, as well as other factors including irrigation. Evaluation of these factors is beyond the scope of this study. Groundwater levels may, therefore, be at shallower or deeper depths than those measured during this study, including during construction and over the life of the structure.

The extent and nature of any dewatering required during construction will be dependent on the actual groundwater conditions prevalent at the time of construction and the effectiveness of construction drainage to prevent run-off into open excavations.

5.4 SPREAD AND CONTINUOUS WALL FOUNDATIONS

5.4.1 Design Data

The results of our analysis indicate that the proposed structures may be supported upon conventional spread and continuous wall foundations established upon suitable natural soils and/or structural fill extending to suitable natural soils. Under no circumstances shall foundations be established over non-engineered fills, potentially expansive soils, loose or disturbed soils, topsoil, surface vegetation, root systems, rubbish, construction debris, other deleterious materials, frozen soils, or within ponded water. Due to the anticipated construction depth for the basements of the residential structures, the excavations are anticipated to extend past the potentially expansive soils. For design, the following parameters are provided:

Single- and Multi-Family Residential Structures
With Basements

Minimum Recommended Depth of Embedment for Frost Protection	- 30 inches
Minimum Recommended Depth of Embedment for Non-frost Conditions	- 15 inches
Recommended Minimum Width for Continuous Wall Footings	- 18 inches
Minimum Recommended Width for Isolated Spread Footings	- 24 inches
Recommended Net Bearing Capacity for Real Load Conditions	- 2,000 pounds per square foot
Bearing Capacity Increase for Seismic Loading	- 50 percent

Commercial Structures

Minimum Recommended Depth of Embedment for Frost Protection	- 30 inches
Minimum Recommended Depth of Embedment for Non-frost Conditions	- 15 inches

Recommended Minimum Width for Continuous Wall Footings	-	18 inches
Minimum Recommended Width for Isolated Spread Footings	-	24 inches
Recommended Net Bearing Capacity for Real Load Conditions	-	3,000 pounds per square foot
Bearing Capacity Increase for Seismic Loading	-	50 percent

The term "net bearing capacity" refers to the allowable pressure imposed by the portion of the structure located above lowest adjacent final grade. Therefore, the weight of the footing and backfill to lowest adjacent final grade need not be considered. Real loads are defined as the total of all dead plus frequently applied live loads. Total load includes all dead and live loads, including seismic and wind.

5.4.2 Installation

Under no circumstances shall the footings be installed upon non-engineered fills, loose or disturbed soils, topsoil, surface vegetation, root systems, rubbish, construction debris, or other deleterious materials. If unsuitable soils are encountered, they must be removed and replaced with compacted granular fill. If granular soils become loose or disturbed, they must be recompacted prior to pouring the concrete.

Residential structures constructed with full-depth basements are anticipated to extend past potentially expansive soils. If residential structures extend past the potentially expansive soils, structural fill will not be required below footings. Residential structures constructed slab on grade or with partial-depth basements are likely to encounter potentially expansive soils and will require a minimum of 1 foot of structural fill below footings.

Commercial structures are anticipated to be constructed slab on grade and are likely to encounter potentially expansive soils. Therefore, a higher bearing capacity must be achieved. A minimum of one foot of structural fill is required below footings where the potentially expansive soils are below the footing.

The width of structural replacement fill below footings should be equal to the width of the footing plus one foot for each foot of fill thickness.

GSH must be notified prior to the placement of footings to verify that all potentially expansive soils, loose/disturbed soils, and non-engineered fills (if encountered) have been completely removed and/or properly prepared.

5.4.3 Settlements

Based on column loadings, soil bearing capacities, and the foundation recommendations as discussed above, we expect primary total settlement beneath individual foundations to be less than one inch.

The amount of differential settlement is difficult to predict because the subsurface and foundation loading conditions can vary considerably across the site. However, we anticipate differential settlement between adjacent foundations could vary from 0.5 to 0.75 inch. The final deflected shape of the structure will be dependent on actual foundation locations and loading.

5.5 LATERAL RESISTANCE

Lateral loads imposed upon foundations due to wind or seismic forces may be resisted by the development of passive earth pressures and friction between the base of the footings and the supporting soils. In determining frictional resistance, a coefficient of friction of 0.30 may be utilized for the footing interface with in situ natural clay soils and 0.40 for footing interface with natural granular soils or granular structural fill. Passive resistance provided by properly placed and compacted granular structural fill above the water table may be considered equivalent to a fluid with a density of 300 pounds per cubic foot. Below the water table, this granular soil should be considered equivalent to a fluid with a density of 150 pounds per cubic foot.

A combination of passive earth resistance and friction may be utilized provided that the friction component of the total is divided by 1.5.

5.6 FLOOR SLABS

Floor slabs may be established upon suitable natural subgrade soils or structural fill extending to suitable natural soils. Under no circumstances shall floor slabs be established directly over non-engineered fills, loose or disturbed soils, sod, rubbish, construction debris, other deleterious materials, frozen soils, or within ponded water.

For areas where expansive soils are below the structure footprint, a 1-foot over-excavation from the bottom of the floor slab is required. The replacement structural fill must consist of a mixture of sand and gravel containing at least 20 percent fines (silt or clay particles). Structural fills shall be compacted to 90 percent of the maximum dry density as determined by the AASHTO T-180 (ASTM D1557) method of compaction. The purpose of the relatively high percentage of fines is to render the compacted material less permeable; thus, reducing the possibility of deep infiltration of surface water into the underlying expansive soil sequence. All backfill surrounding the footings and stem walls must consist of this material and be compacted to the requirements of structural fill. As an alternative, a 3-inch geofoam mat may be utilized below the floor slab with a weight of 1 to 3 pounds per cubic foot.

To facilitate curing of the concrete and to provide a capillary moisture break, it is recommended that floor slabs be directly underlain by at least 4 inches of "free-draining" fill, such as "pea" gravel or three-quarters to one-inch minus clean gap-graded gravel. Additionally, moisture barriers and other impermeable membranes must not be used within the structure footprint, under exterior flat work, or in landscaped areas.

Settlement of lightly loaded floor slabs designed according to previous recommendations (average uniform pressure of 200 pounds per square foot or less) is anticipated to be less than one-quarter of an inch.

5.7 PAVEMENTS

The natural clay soils that are identified as potentially expansive soils will exhibit poor pavement support characteristics when saturated or nearly saturated. All pavement areas must be prepared as previously discussed (see Section 5.2.1, Site Preparation). Under no circumstances shall pavements be established over unprepared non-engineered fills, potentially expansive soils, loose or disturbed soils, topsoil, surface vegetation, root systems, rubbish, construction debris, other deleterious materials, frozen soils, or within ponded water. With the subgrade soils and the projected traffic as discussed in Section 2, Proposed Construction, the following pavement sections are recommended:

Parking Areas

(Light Volume of Automobiles and Light Trucks,
Occasional Medium-Weight Trucks,
and No Heavyweight Trucks)
[1-3 equivalent 18-kip axle loads per day]

Flexible Pavements:
(Asphalt Concrete)

3.0 inches	Asphalt concrete
8.0 inches	Aggregate base
Over	Properly prepared and stabilized expansive soils, fills, natural subgrade soils, and/or structural site grading fill extending to properly prepared and stabilized expansive soils, fills, natural subgrade soils

Rigid Pavements:
(Non-reinforced Concrete)

5.0 inches	Portland cement concrete (non-reinforced)
5.0 inches	Aggregate base
Over	Properly prepared and stabilized natural subgrade soils and/or structural site grading fill extending to properly prepared natural subgrade soils

Drive Lanes

(Moderate Volume of Automobiles and Light Trucks,
Light Volume of Medium-Weight Trucks,
and Occasional Heavyweight Trucks)
[6 equivalent 18-kip axle loads per day]

Flexible Pavements:
(Asphalt Concrete)

3.0 inches	Asphalt concrete
9.0 inches	Aggregate base
Over	Properly prepared and stabilized expansive soils, fills, natural subgrade soils, and/or structural site grading fill extending to properly prepared and stabilized expansive soils, fills, natural subgrade soils

Rigid Pavements:
(Non-reinforced Concrete)

5.0 inches	Portland cement concrete (non-reinforced)
5.0 inches	Aggregate base
Over	Properly prepared and stabilized natural subgrade soils and/or structural site grading fill extending to properly prepared natural subgrade soils

For dumpster pads (if utilized), we recommend a pavement section consisting of 6.5 inches of Portland cement concrete, 5.0 inches of aggregate base, over properly prepared natural subgrade or site grading structural fills. Dumpster pads should not be constructed overlying non-engineered fills under any circumstances.

These above rigid pavement sections are for non-reinforced Portland cement concrete. Concrete should be designed in accordance with the American Concrete Institute (ACI) and joint details should conform to the Portland Cement Association (PCA) guidelines. The concrete should have a minimum 28-day unconfined compressive strength of 4,000 pounds per square inch and contain 6 percent ±1 percent air-entrainment.

The crushed stone should conform to applicable sections of the current Utah Department of Transportation (UDOT) Standard Specifications. All asphalt material and paving operations should meet applicable specifications of the Asphalt Institute and UDOT. A GSH technician shall observe placement and perform density testing of the base course material and asphalt.

Please note that the recommended pavement section is based on estimated post-construction traffic loading. If the pavement is to be constructed and utilized by construction traffic, the above pavement section may prove insufficient for heavy truck traffic, such as concrete trucks or tractor-trailers used for construction delivery. Unexpected distress, reduced pavement life, and/or premature failure of the pavement section could result if subjected to heavy construction traffic and the owner should be made aware of this risk. If the estimated traffic loading stated herein is not correct, GSH must review actual pavement loading conditions to determine if revisions to these recommendations are warranted.

5.8 CEMENT TYPES

The laboratory tests indicate that the natural clay soils tested contain a moderate amount of water soluble sulfates. Based on our test results, concrete in contact with the on-site soil will have a moderate potential for sulfate reaction (ACI 318, Table 4.3.1). To achieve the required protection against sulfate-related corrosion, we recommend a maximum water-to-cement ratio of 0.5 (by weight, normal weight aggregate concrete) and using Type II cement in concrete to obtain a minimum compressive strength of 4,000 pounds per square inch (psi). Details can be found in the above ACI reference and in the Portland Cement Association publication, “Design and Control of Concrete Admixtures.”

5.9 GEOSEISMIC SETTING

5.9.1 General

Utah municipalities have adopted the International Building Code (IBC) 2015. The IBC 2015 code determines the seismic hazard for a site based upon 2008 mapping of bedrock accelerations prepared by the United States Geologic Survey (USGS) and the soil site class. The USGS values

are presented on maps incorporated into the IBC code and are also available based on latitude and longitude coordinates (grid points).

5.9.2 Faulting

Based on our review of available literature, no active faults pass through or immediately adjacent to the site. The nearest active mapped fault consists of the Oquirrh Fault, located about 8.4 miles to the east of the site.

5.9.3 Soil Class

For dynamic structural analysis, the Site Class D - Stiff Soil Profile as defined in Chapter 20 of ASCE 7 (per Section 1613.3.2, Site Class Definitions, of IBC 2015) can be utilized.

5.9.4 Ground Motions

The IBC 2015 code is based on 2008 USGS mapping, which provides values of short and long period accelerations for the Site Class B boundary for the Maximum Considered Earthquake (MCE). This Site Class B boundary represents average bedrock values for the Western United States and must be corrected for local soil conditions. The table below summarizes the peak ground and short and long period accelerations for the MCE event and incorporates the appropriate soil amplification factor for a Site Class D soil profile. Based on the site latitude and longitude (40.5905 degrees north and 111.4153 degrees west, respectively), the values for this site are tabulated on the following table:

Spectral Acceleration Value, T	Site Class B Boundary [mapped values] (% g)	Site Coefficient	Site Class D [adjusted for site class effects] (% g)	Design Values (% g)
Peak Ground Acceleration	24.2	F_a = 1.315	31.9	21.3
0.2 Seconds (Short Period Acceleration)	S_S = 60.6	F_a = 1.315	S_{MS} = 79.7	S_{DS} = 53.1
1.0 Second (Long Period Acceleration)	S_1 = 20.1	F_v = 1.998	S_{M1} = 40.2	S_{D1} = 26.8

5.9.5 Liquefaction

The site is located in an area that has been identified by the Utah Geological Survey (UGS) as being a “low” liquefaction potential zone. Liquefaction is defined as the condition when saturated, loose, granular soils lose their support capabilities because of excessive pore water pressure, which

develops during a seismic event. Clayey soils, even if saturated, will generally not liquefy during a major seismic event.

The soils encountered to the depths explored at the site will not likely liquefy during the design seismic event due tot the lack of a shallow groundwater table.

5.10 SITE VISITS

GSH must verify that all topsoil/disturbed soils and any other unsuitable soils have been removed, that non-engineered fills (if encountered), and potentially expansive soils have been removed and/or properly prepared, and that suitable soils have been encountered prior to placing site grading fills, footings, slabs, and pavements. Additionally, GSH must observe fill placement and verify in-place moisture content and density of fill materials placed at the site.

5.11 CLOSURE

If you have any questions or would like to discuss these items further, please feel free to contact us at (801) 685-9190.

Respectfully submitted,

GSH Geotechnical, Inc.

Kylie S. Bailey, E.I.T.
Staff Engineer

Reviewed by:

Alan D. Spilker, P.E.
State of Utah No. 334228
President/Senior Geotechnical Engineer

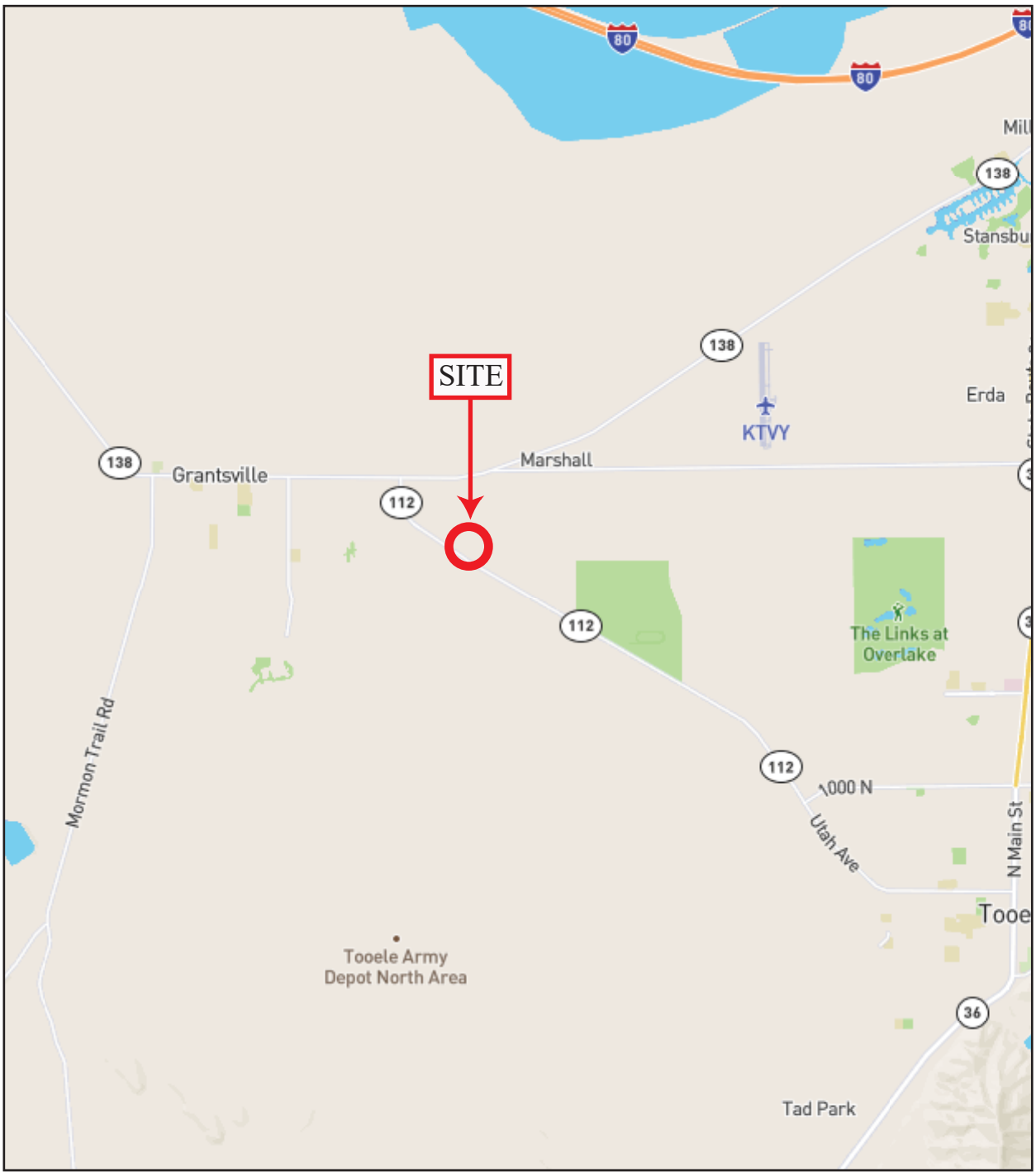
REGISTERED PROFESSIONAL ENGINEER
No. 334228
ALAN D. SPILKER
STATE OF UTAH

KSB/ADS:jlh

Encl. Figure 1, Vicinity Map
Figure 2, Site Plan
Figures 3A through 3X, Log of Borings
Figures 4A through 4K, Log of Test Pits
Figure 5, Key to Boring Log (USCS)
Figure 6, Key to Test Pit Log (USCS)

Addressee (email)

WISE MANAGEMENT, LLC
JOB NO. 2164-002-19



2 0 2 4 6 8 KM 10

2 0 2 MI 4

FIGURE 1
VICINITY MAP

REFERENCE:
ALL TRAILS - NATIONAL GEOGRAPHIC TERRAIN
DATED 2019

GSH

WISE MANAGEMENT, LLC
JOB NO. 2164-002-19

REFERENCE:
ADAPTED FROM DRAWING ENTITLED
"OQUIRRH ESTATES OVERALL CONCEPT, C-100"
BY ENSIGN, DATED 1/5/17

FIGURE 2
SITE PLAN

GSH

BORING LOG

Page: 1 of 1

BORING: B-1

CLIENT: Wise Management, LLC | PROJECT NUMBER: 2164-002-19

PROJECT: Proposed Davenport Crossing Development | DATE STARTED: 3/7/19 | DATE FINISHED: 3/7/19

LOCATION: 4792 West SR-112, Grantsville, Utah | GSH FIELD REP.: AV

DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger | HAMMER: Automatic | WEIGHT: 140 lbs | DROP: 30"

GROUNDWATER DEPTH: Not Encountered (3/7/19) | ELEVATION: ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								
	CL	SILTY CLAY with trace fine sand; major roots (topsoil) to 6"; light brown with oxidation									dry slightly moist
				31		10.7	86				very stiff
			5	34							
		grades with occasional layers of silty fine sand up to 1/2" thick									
			10								
		grades grayish-brown									
	GP/GC	FINE TO COARSE SANDY FINE AND COARSE GRAVEL with some clay; light gray with oxidation	15	50/4"							moist very dense
		End of Exploration at 16.0'. No groundwater encountered at time of drilling. Installed 1.25" diameter slotted PVC pipe to 16.0'.	20								
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3A

GSH

BORING LOG

Page: 1 of 1

BORING: B-2

CLIENT: Wise Management, LLC | PROJECT NUMBER: 2164-002-19

PROJECT: Proposed Davenport Crossing Development | DATE STARTED: 3/7/19 | DATE FINISHED: 3/7/19

LOCATION: 4792 West SR-112, Grantsville, Utah | GSH FIELD REP.: AV

DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger | HAMMER: Automatic | WEIGHT: 140 lbs | DROP: 30"

GROUNDWATER DEPTH: Not Encountered (3/7/19) | ELEVATION: ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								
	CL	SILTY CLAY with trace fine sand; major roots (topsoil) to 8"; light brown with oxidation									slightly moist
			5	23		12.0	75				very stiff
			10	21							
		End of Exploration at 11.0'. No groundwater encountered at time of drilling. Installed 1.25" diameter slotted PVC pipe to 11.0'.	15								
			20								
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3B

BORING LOG

Page: 1 of 1

BORING: B-3

CLIENT: Wise Management, LLC | PROJECT NUMBER: 2164-002-19

PROJECT: Proposed Davenport Crossing Development | DATE STARTED: 3/7/19 | DATE FINISHED: 3/7/19

LOCATION: 4792 West SR-112, Grantsville, Utah | GSH FIELD REP.: AV

DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger | HAMMER: Automatic | WEIGHT: 140 lbs | DROP: 30"

GROUNDWATER DEPTH: Not Encountered (3/7/19) | ELEVATION: ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								
	CL	SILTY CLAY with trace fine sand; major roots (topsoil) to 6"; light brown with oxidation									dry
				30	X	10.0	82				very stiff
			5								slightly moist
		grades light grayish-brown	10	37	X						
		grades with trace fine and coarse gravel; light gray									
	GP/GC	FINE TO COARSE SANDY FINE AND COARSE GRAVEL with some clay and cobbles; gray	15	50/5"	X						moist very dense
		End of Exploration at 16.0'. No groundwater encountered at time of drilling. Installed 1.25" diameter slotted PVC pipe to 16.0'.	20								
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3C

BORING LOG

Page: 1 of 1

BORING: B-4

CLIENT: Wise Management, LLC | PROJECT NUMBER: 2164-002-19

PROJECT: Proposed Davenport Crossing Development | DATE STARTED: 3/7/19 | DATE FINISHED: 3/7/19

LOCATION: 4792 West SR-112, Grantsville, Utah | GSH FIELD REP.: AV

DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger | HAMMER: Automatic | WEIGHT: 140 lbs | DROP: 30"

GROUNDWATER DEPTH: Not Encountered (3/7/19) | ELEVATION: ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								
	CL	SILTY CLAY with trace fine sand; major roots (topsoil) to 6"; light grayish-brown with oxidation									slightly moist
			5	25							very stiff
			10	28		22.8	101				
		End of Exploration at 11.0'. No groundwater encountered at time of drilling. Installed 1.25" diameter slotted PVC pipe to 11.0'.	15								
			20								
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3D

BORING LOG

Page: 1 of 1

BORING: B-5

CLIENT: Wise Management, LLC | PROJECT NUMBER: 2164-002-19

PROJECT: Proposed Davenport Crossing Development | DATE STARTED: 3/7/19 | DATE FINISHED: 3/7/19

LOCATION: 4792 West SR-112, Grantsville, Utah | GSH FIELD REP.: AV

DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger | HAMMER: Automatic | WEIGHT: 140 lbs | DROP: 30"

GROUNDWATER DEPTH: Not Encountered (3/7/19) | ELEVATION: ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								
	CL	SILTY CLAY with trace fine sand; major roots (topsoil) to 8"; light brown with oxidation									slightly moist
				28	X						very stiff
			5	25	X	18.8	112				
		grades with occasional layers of silty fine sand up to 1/2" thick; light grayish-brown	10								
	SM	SILTY FINE TO MEDIUM SAND light brown									slightly moist
			15	50/5"	X	7.8		38.4			very dense
		End of Exploration at 16.0'. No groundwater encountered at time of drilling. Installed 1.25" diameter slotted PVC pipe to 16.0'.	20								
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3E

BORING LOG

Page: 1 of 1

BORING: B-6

CLIENT: Wise Management, LLC | PROJECT NUMBER: 2164-002-19

PROJECT: Proposed Davenport Crossing Development | DATE STARTED: 3/7/19 | DATE FINISHED: 3/7/19

LOCATION: 4792 West SR-112, Grantsville, Utah | GSH FIELD REP.: AV

DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger | HAMMER: Automatic | WEIGHT: 140 lbs | DROP: 30"

GROUNDWATER DEPTH: Not Encountered (3/7/19) | ELEVATION: ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								
	CL	SILTY CLAY with trace fine sand; major roots (topsoil) to 8"; light brown with oxidation									slightly moist
				32							very stiff
			5								
			10	25							
		End of Exploration at 11.0'. No groundwater encountered at time of drilling. Installed 1.25" diameter slotted PVC pipe to 11.0'.									
			15								
			20								
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3F

BORING LOG

Page: 1 of 1

BORING: B-7

CLIENT: Wise Management, LLC | PROJECT NUMBER: 2164-002-19

PROJECT: Proposed Davenport Crossing Development | DATE STARTED: 3/7/19 | DATE FINISHED: 3/7/19

LOCATION: 4792 West SR-112, Grantsville, Utah | GSH FIELD REP.: AV

DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger | HAMMER: Automatic | WEIGHT: 140 lbs | DROP: 30"

GROUNDWATER DEPTH: Not Encountered (3/7/19) | ELEVATION: ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								
	CL	SILTY CLAY with trace fine sand; major roots (topsoil) to 8"; light brown with oxidation									slightly moist
			5	25		12.5	110				very stiff
		grades with occasional layers of silty fine sand up to 1/2" thick; light grayish-brown with oxidation	10	40							
		grades with some silt	15	40							
		End of Exploration at 16.0'. No groundwater encountered at time of drilling. Installed 1.25" diameter slotted PVC pipe to 16.0'.	20								
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3G

BORING LOG

Page: 1 of 1

BORING: B-8

CLIENT: Wise Management, LLC | PROJECT NUMBER: 2164-002-19

PROJECT: Proposed Davenport Crossing Development | DATE STARTED: 3/7/19 | DATE FINISHED: 3/7/19

LOCATION: 4792 West SR-112, Grantsville, Utah | GSH FIELD REP.: AV

DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger | HAMMER: Automatic | WEIGHT: 140 lbs | DROP: 30"

GROUNDWATER DEPTH: Not Encountered (3/7/19) | ELEVATION: ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								
	CL	SILTY CLAY with trace fine sand; major roots (topsoil) to 6"; light brown with oxidation									slightly moist
				24							very stiff
			5								
		grades with some fine sand	10	44							hard
		End of Exploration at 11.0'. No groundwater encountered at time of drilling. Installed 1.25" diameter slotted PVC pipe to 11.0'.	15								
			20								
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3H

BORING LOG

Page: 1 of 1

BORING: B-9

CLIENT: Wise Management, LLC | PROJECT NUMBER: 2164-002-19

PROJECT: Proposed Davenport Crossing Development | DATE STARTED: 3/8/19 | DATE FINISHED: 3/8/19

LOCATION: 4792 West SR-112, Grantsville, Utah | GSH FIELD REP.: AV

DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger | HAMMER: Automatic | WEIGHT: 140 lbs | DROP: 30"

GROUNDWATER DEPTH: Not Encountered (3/8/19) | ELEVATION: ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								
	CL	SILTY CLAY with trace fine sand; major roots (topsoil) to 6"; light brown with oxidation									slightly moist
			5	18							very stiff
		grades light grayish-brown	10	31							
		End of Exploration at 11.0'. No groundwater encountered at time of drilling. Installed 1.25" diameter slotted PVC pipe to 11.0'.	15								
			20								
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3I

BORING LOG

Page: 1 of 1

BORING: B-10

CLIENT: Wise Management, LLC | PROJECT NUMBER: 2164-002-19

PROJECT: Proposed Davenport Crossing Development | DATE STARTED: 3/8/19 | DATE FINISHED: 3/8/19

LOCATION: 4792 West SR-112, Grantsville, Utah | GSH FIELD REP.: AV

DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger | HAMMER: Automatic | WEIGHT: 140 lbs | DROP: 30"

GROUNDWATER DEPTH: Not Encountered (3/8/19) | ELEVATION: ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								
	CL	SILTY CLAY with trace fine sand; major roots (topsoil) to 8"; light brown with oxidation									slightly moist
				17							stiff
		grades light grayish-brown with oxidation									
			5	17		16.6	90				
		grades with occasional layers of silty fine sand up to 1/4" thick									
			10	18							very stiff
		End of Exploration at 11.0'. No groundwater encountered at time of drilling. Installed 1.25" diameter slotted PVC pipe to 11.0'.									
			15								
			20								
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3J

BORING LOG

Page: 1 of 1

BORING: B-11

CLIENT: Wise Management, LLC | PROJECT NUMBER: 2164-002-19

PROJECT: Proposed Davenport Crossing Development | DATE STARTED: 3/8/19 | DATE FINISHED: 3/8/19

LOCATION: 4792 West SR-112, Grantsville, Utah | GSH FIELD REP.: AV

DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger | HAMMER: Automatic | WEIGHT: 140 lbs | DROP: 30"

GROUNDWATER DEPTH: Not Encountered (3/8/19) | ELEVATION: ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								
	CL	SILTY CLAY with trace fine sand; major roots (topsoil) to 8"; light brown with oxidation									slightly moist
				23							very stiff
			5								
		grades light grayish-brown with oxidation									
			10	32							
		End of Exploration at 11.0'. No groundwater encountered at time of drilling. Installed 1.25" diameter slotted PVC pipe to 11.0'.									
			15								
			20								
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3K

BORING LOG

Page: 1 of 1

BORING: B-12

CLIENT: Wise Management, LLC | PROJECT NUMBER: 2164-002-19

PROJECT: Proposed Davenport Crossing Development | DATE STARTED: 3/8/19 | DATE FINISHED: 3/8/19

LOCATION: 4792 West SR-112, Grantsville, Utah | GSH FIELD REP.: AV

DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger | HAMMER: Automatic | WEIGHT: 140 lbs | DROP: 30"

GROUNDWATER DEPTH: Not Encountered (3/8/19) | ELEVATION: ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								
	CL	SILTY CLAY with trace fine sand; major roots (topsoil) to 6"; light brown with oxidation									slightly moist
			5	20							very stiff
		grades light grayish-brown	10	27							
		grades with occasional layers of silty fine sand up to 3/4" thick	15	44							hard
		End of Exploration at 16.0'. No groundwater encountered at time of drilling. Installed 1.25" diameter slotted PVC pipe to 16.0'.	20								
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3L

BORING LOG

Page: 1 of 1

BORING: B-13

CLIENT: Wise Management, LLC | PROJECT NUMBER: 2164-002-19

PROJECT: Proposed Davenport Crossing Development | DATE STARTED: 3/8/19 | DATE FINISHED: 3/8/19

LOCATION: 4792 West SR-112, Grantsville, Utah | GSH FIELD REP.: BZ

DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger | HAMMER: Automatic | WEIGHT: 140 lbs | DROP: 30"

GROUNDWATER DEPTH: Not Encountered (3/8/19) | ELEVATION: ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								
	CL	SILTY CLAY with trace fine sand; major roots (topsoil) to 8"; brown									dry
				61							hard
			5	57							very stiff slightly moist
		grades with some fine sand and occasional layers of silty fine sand up to 1/2" thick									
			10	50							
		End of Exploration at 11.0'. No groundwater encountered at time of drilling. Installed 1.25" diameter slotted PVC pipe to 11.0'.	15								
			20								
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3M

BORING LOG

Page: 1 of 1

BORING: B-14

CLIENT: Wise Management, LLC | PROJECT NUMBER: 2164-002-19

PROJECT: Proposed Davenport Crossing Development | DATE STARTED: 3/8/19 | DATE FINISHED: 3/8/19

LOCATION: 4792 West SR-112, Grantsville, Utah | GSH FIELD REP.: AV

DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger | HAMMER: Automatic | WEIGHT: 140 lbs | DROP: 30"

GROUNDWATER DEPTH: Not Encountered (3/8/19) | ELEVATION: ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								
	CL	SILTY CLAY with trace fine sand; major roots (topsoil) to 6"; light brown with oxidation									slightly moist
				19							very stiff
			5								
		grades light grayish-brown									
			10	20		23.1	97				
		End of Exploration at 11.0'. No groundwater encountered at time of drilling. Installed 1.25" diameter slotted PVC pipe to 11.0'.									
			15								
			20								
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3N

BORING LOG

Page: 1 of 1

BORING: B-15

CLIENT: Wise Management, LLC | PROJECT NUMBER: 2164-002-19

PROJECT: Proposed Davenport Crossing Development | DATE STARTED: 3/8/19 | DATE FINISHED: 3/8/19

LOCATION: 4792 West SR-112, Grantsville, Utah | GSH FIELD REP.: BZ

DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger | HAMMER: Automatic | WEIGHT: 140 lbs | DROP: 30"

GROUNDWATER DEPTH: Not Encountered (3/8/19) | ELEVATION: ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								
	CL	SILTY CLAY with trace fine sand; major roots (topsoil) to 6"; brown									dry
				76							hard
			5	82							slightly moist
		grades with some fine sand	10	53							
		End of Exploration at 11.0'. No groundwater encountered at time of drilling. Installed 1.25" diameter slotted PVC pipe to 11.0'.	15								
			20								
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3O

BORING LOG

Page: 1 of 1

BORING: B-16

CLIENT: Wise Management, LLC | PROJECT NUMBER: 2164-002-19

PROJECT: Proposed Davenport Crossing Development | DATE STARTED: 3/8/19 | DATE FINISHED: 3/8/19

LOCATION: 4792 West SR-112, Grantsville, Utah | GSH FIELD REP.: AV

DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger | HAMMER: Automatic | WEIGHT: 140 lbs | DROP: 30"

GROUNDWATER DEPTH: Not Encountered (3/8/19) | ELEVATION: ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								
	CL	SILTY CLAY with trace fine sand; major roots (topsoil) to 8"; light brown with oxidation									slightly moist
			5	29		13.6	112				very stiff
		grades light grayish-brown with oxidation	10	27							
		End of Exploration at 11.0'. No groundwater encountered at time of drilling. Installed 1.25" diameter slotted PVC pipe to 11.0'.	15								
			20								
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3P

BORING LOG

Page: 1 of 1

BORING: B-17

CLIENT: Wise Management, LLC | PROJECT NUMBER: 2164-002-19

PROJECT: Proposed Davenport Crossing Development | DATE STARTED: 3/8/19 | DATE FINISHED: 3/8/19

LOCATION: 4792 West SR-112, Grantsville, Utah | GSH FIELD REP.: BZ

DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger | HAMMER: Automatic | WEIGHT: 140 lbs | DROP: 30"

GROUNDWATER DEPTH: Not Encountered (3/8/19) | ELEVATION: ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								
	CL	SILTY CLAY with trace fine sand and occasional layers of silty fine sand up to 1/2" thick; major roots (topsoil) to 8"; brown									dry
				62							hard
			5	71							slightly moist
		grades with some sand	10	38							very stiff
		End of Exploration at 11.0'. No groundwater encountered at time of drilling. Installed 1.25" diameter slotted PVC pipe to 11.0'.	15								
			20								
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3Q

BORING LOG

Page: 1 of 1

BORING: B-18

CLIENT: Wise Management, LLC | PROJECT NUMBER: 2164-002-19

PROJECT: Proposed Davenport Crossing Development | DATE STARTED: 3/9/19 | DATE FINISHED: 3/9/19

LOCATION: 4792 West SR-112, Grantsville, Utah | GSH FIELD REP.: AV

DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger | HAMMER: Automatic | WEIGHT: 140 lbs | DROP: 30"

GROUNDWATER DEPTH: Not Encountered (3/9/19) | ELEVATION: ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								
	CL	SILTY CLAY with trace fine sand; major roots (topsoil) to 8"; light brown with oxidation									slightly moist
				27							very stiff
		grades light grayish-brown	5								
			10	32							
		End of Exploration at 11.0'. No groundwater encountered at time of drilling. Installed 1.25" diameter slotted PVC pipe to 11.0'.	15								
			20								
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3R

BORING LOG

Page: 1 of 1

BORING: B-19

CLIENT: Wise Management, LLC | PROJECT NUMBER: 2164-002-19

PROJECT: Proposed Davenport Crossing Development | DATE STARTED: 3/9/19 | DATE FINISHED: 3/9/19

LOCATION: 4792 West SR-112, Grantsville, Utah | GSH FIELD REP.: AV

DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger | HAMMER: Automatic | WEIGHT: 140 lbs | DROP: 30"

GROUNDWATER DEPTH: Not Encountered (3/9/19) | ELEVATION: ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								
	CL	SILTY CLAY with trace fine sand; major roots (topsoil) to 6"; light brown with oxidation									slightly moist
			5	28		11.8	96				very stiff
			10	46							hard
		End of Exploration at 11.0'. No groundwater encountered at time of drilling. Installed 1.25" diameter slotted PVC pipe to 11.0'.	15								
			20								
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3S

BORING LOG

Page: 1 of 1

BORING: B-20

CLIENT: Wise Management, LLC | PROJECT NUMBER: 2164-002-19

PROJECT: Proposed Davenport Crossing Development | DATE STARTED: 3/9/19 | DATE FINISHED: 3/9/19

LOCATION: 4792 West SR-112, Grantsville, Utah | GSH FIELD REP.: AV

DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger | HAMMER: Automatic | WEIGHT: 140 lbs | DROP: 30"

GROUNDWATER DEPTH: Not Encountered (3/9/19) | ELEVATION: ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								
	CL	SILTY CLAY with trace fine sand; major roots (topsoil) to 8"; light brown with oxidation									dry
			5	28							very stiff slightly moist
		grades with occasional layers of silty sand up to 1/8" thick; light-grayish-brown	10	22		21.8	100				
		End of Exploration at 11.0'. No groundwater encountered at time of drilling. Installed 1.25" diameter slotted PVC pipe to 11.0'.	15								
			20								
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3T

BORING LOG

Page: 1 of 1

BORING: B-21

CLIENT: Wise Management, LLC | PROJECT NUMBER: 2164-002-19

PROJECT: Proposed Davenport Crossing Development | DATE STARTED: 3/9/19 | DATE FINISHED: 3/9/19

LOCATION: 4792 West SR-112, Grantsville, Utah | GSH FIELD REP.: AV

DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger | HAMMER: Automatic | WEIGHT: 140 lbs | DROP: 30"

GROUNDWATER DEPTH: Not Encountered (3/9/19) | ELEVATION: ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								
	CL	SILTY CLAY with trace fine sand; major roots (topsoil) to 6"; light brown with oxidation									dry
				31		13.0	101				very stiff
			5								slightly moist
		grades with occasional layers of fine sand up to 1/8" thick; light grayish-brown	10	22		26.2	90				
		End of Exploration at 11.0'. No groundwater encountered at time of drilling. Installed 1.25" diameter slotted PVC pipe to 11.0'.	15								
			20								
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3U

BORING LOG

Page: 1 of 1

BORING: B-22

CLIENT: Wise Management, LLC | PROJECT NUMBER: 2164-002-19

PROJECT: Proposed Davenport Crossing Development | DATE STARTED: 3/9/19 | DATE FINISHED: 3/9/19

LOCATION: 4792 West SR-112, Grantsville, Utah | GSH FIELD REP.: AV

DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger | HAMMER: Automatic | WEIGHT: 140 lbs | DROP: 30"

GROUNDWATER DEPTH: Not Encountered (3/9/19) | ELEVATION: ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								
	CL	SILTY CLAY with trace fine sand; major roots (topsoil) to 6"; light grayish-brown									dry
			5	22							very stiff slightly moist
		grades with occasional layers of fine sand up to 1/8" thick; light grayish-brown	10	23							
		End of Exploration at 11.0'. No groundwater encountered at time of drilling. Installed 1.25" diameter slotted PVC pipe to 11.0'.	15								
			20								
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3V

BORING LOG

Page: 1 of 1

BORING: B-23

CLIENT: Wise Management, LLC | PROJECT NUMBER: 2164-002-19

PROJECT: Proposed Davenport Crossing Development | DATE STARTED: 3/9/19 | DATE FINISHED: 3/9/19

LOCATION: 4792 West SR-112, Grantsville, Utah | GSH FIELD REP.: AV

DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger | HAMMER: Automatic | WEIGHT: 140 lbs | DROP: 30"

GROUNDWATER DEPTH: Not Encountered (3/9/19) | ELEVATION: ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								
	CL	SILTY CLAY with trace fine sand; major roots (topsoil) to 8"; light brown with oxidation									dry
				25							very stiff
			5								slightly moist
		grades light grayish-brown									
			10	19							stiff
		End of Exploration at 11.0'. No groundwater encountered at time of drilling. Installed 1.25" diameter slotted PVC pipe to 11.0'.									
			15								
			20								
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3W

BORING LOG

Page: 1 of 1

BORING: B-24

CLIENT: Wise Management, LLC | PROJECT NUMBER: 2164-002-19

PROJECT: Proposed Davenport Crossing Development | DATE STARTED: 3/9/19 | DATE FINISHED: 3/9/19

LOCATION: 4792 West SR-112, Grantsville, Utah | GSH FIELD REP.: AV

DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger | HAMMER: Automatic | WEIGHT: 140 lbs | DROP: 30"

GROUNDWATER DEPTH: Not Encountered (3/9/19) | ELEVATION: ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								
	CL	SILTY CLAY with trace fine sand; major roots (topsoil) to 6"; light brown with oxidation									dry
				22							very stiff
			5								slightly moist
		grades with occasional layers of fine sand up to 1/8" thick; light grayish-brown	10	20							stiff
		End of Exploration at 11.0'. No groundwater encountered at time of drilling. Installed 1.25" diameter slotted PVC pipe to 11.0'.	15								
			20								
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3X

TEST PIT LOG

Page: 1 of 1

TEST PIT: TP-1

CLIENT: Wise Management, LLC | PROJECT NUMBER: 2164-002-19

PROJECT: Proposed Davenport Crossing | DATE STARTED: 3/12/19 | DATE FINISHED: 3/12/19

LOCATION: 4792 West R-112, Grantsville, Utah | GSH FIELD REP.: SH

EXCAVATING METHOD/EQUIPMENT: CAT 430D - Backhoe

GROUNDWATER DEPTH: Not Encountered (3/12/19) | ELEVATION: ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0							
	CL	SILTY CLAY with trace fine sand; major roots (topsoil) to 6"; light brown								dry medium stiff
			5							
		grades with trace fine and coarse gravel								stiff
		End of exploration at 10.0'. No significant sidewall caving. No groundwater encountered at time of excavation. Installed 1.25" diameter slotted PVC pipe to 10.0'.	10							
			15							
			20							
			25							

See Subsurface Conditions section in the report for additional information.

FIGURE 4A

TEST PIT LOG

Page: 1 of 1

TEST PIT: TP-2

CLIENT: Wise Management, LLC | PROJECT NUMBER: 2164-002-19

PROJECT: Proposed Davenport Crossing | DATE STARTED: 3/12/19 | DATE FINISHED: 3/12/19

LOCATION: 4792 West R-112, Grantsville, Utah | GSH FIELD REP.: SH

EXCAVATING METHOD/EQUIPMENT: CAT 430D - Backhoe

GROUNDWATER DEPTH: Not Encountered (3/12/19) | ELEVATION: ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0							
	CL	SILTY CLAY with trace fine sand; major roots (topsoil) to 6"; light brown								dry stiff
		grades with trace fine and coarse gravel	5							
		grades with occasional layers of silty fine sand up to 1/2" thick	10							slightly moist
		End of exploration at 15.0'. No significant sidewall caving. No groundwater encountered at time of excavation. Installed 1.25" diameter slotted PVC pipe to 15.0'.	15							
			20							
			25							

See Subsurface Conditions section in the report for additional information.

FIGURE 4B

TEST PIT LOG

Page: 1 of 1

TEST PIT: TP-3

CLIENT: Wise Management, LLC | PROJECT NUMBER: 2164-002-19

PROJECT: Proposed Davenport Crossing | DATE STARTED: 3/12/19 | DATE FINISHED: 3/12/19

LOCATION: 4792 West R-112, Grantsville, Utah | GSH FIELD REP.: SH

EXCAVATING METHOD/EQUIPMENT: CAT 430D - Backhoe

GROUNDWATER DEPTH: Not Encountered (3/12/19) | ELEVATION: ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0							
	CL	SILTY CLAY with trace fine sand; major roots (topsoil) to 6"; light grayish-brown								dry stiff
		grades with trace fine and coarse gravel	5							slightly moist
		End of exploration at 10.0'. No significant sidewall caving. No groundwater encountered at time of excavation. Installed 1.25" diameter slotted PVC pipe to 10.0'.	10							
			15							
			20							
			25							

See Subsurface Conditions section in the report for additional information.

FIGURE 4C

TEST PIT LOG

Page: 1 of 1

TEST PIT: TP-4

CLIENT: Wise Management, LLC | PROJECT NUMBER: 2164-002-19

PROJECT: Proposed Davenport Crossing | DATE STARTED: 3/12/19 | DATE FINISHED: 3/12/19

LOCATION: 4792 West R-112, Grantsville, Utah | GSH FIELD REP.: SH

EXCAVATING METHOD/EQUIPMENT: CAT 430D - Backhoe

GROUNDWATER DEPTH: Not Encountered (3/12/19) | ELEVATION: ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0							
	CL	SILTY CLAY with trace fine sand; major roots (topsoil) to 6"; light grayish-brown								dry stiff
		grades with occasional layers of silty fine sand up to 3/4" thick	5 10							slightly moist
		End of exploration at 15.0'. No significant sidewall caving. No groundwater encountered at time of excavation. Installed 1.25" diameter slotted PVC pipe to 15.0'.	15 20 25							

See Subsurface Conditions section in the report for additional information.

FIGURE 4D

TEST PIT LOG

Page: 1 of 1

TEST PIT: TP-5

CLIENT: Wise Management, LLC | PROJECT NUMBER: 2164-002-19

PROJECT: Proposed Davenport Crossing | DATE STARTED: 3/12/19 | DATE FINISHED: 3/12/19

LOCATION: 4792 West R-112, Grantsville, Utah | GSH FIELD REP.: SH

EXCAVATING METHOD/EQUIPMENT: CAT 430D - Backhoe

GROUNDWATER DEPTH: Not Encountered (3/12/19) | ELEVATION: ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0							
	CL	SILTY CLAY with trace fine sand; major roots (topsoil) to 6"; light brown								dry stiff
			5							
		grades with occasional layers of silty fine sand up to 1/2" thick	10							slightly moist
			15							
		End of exploration at 15.0'. No significant sidewall caving. No groundwater encountered at time of excavation. Installed 1.25" diameter slotted PVC pipe to 15.0'.	20							
			25							

See Subsurface Conditions section in the report for additional information.

FIGURE 4E

TEST PIT LOG

Page: 1 of 1

TEST PIT: TP-6

CLIENT: Wise Management, LLC | PROJECT NUMBER: 2164-002-19

PROJECT: Proposed Davenport Crossing | DATE STARTED: 3/12/19 | DATE FINISHED: 3/12/19

LOCATION: 4792 West R-112, Grantsville, Utah | GSH FIELD REP.: SH

EXCAVATING METHOD/EQUIPMENT: CAT 430D - Backhoe

GROUNDWATER DEPTH: Not Encountered (3/12/19) | ELEVATION: ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0							
	CL	SILTY CLAY with trace fine sand; major roots (topsoil) to 6"; light grayish-brown								dry stiff
		grades with occasional layers of silty fine sand up to 1/2" thick	5							slightly moist
		End of exploration at 10.0'. No significant sidewall caving. No groundwater encountered at time of excavation. Installed 1.25” diameter slotted PVC pipe to 10.0’.	10							
			15							
			20							
			25							

See Subsurface Conditions section in the report for additional information.

FIGURE 4F

TEST PIT LOG

Page: 1 of 1

TEST PIT: TP-7

CLIENT: Wise Management, LLC | PROJECT NUMBER: 2164-002-19

PROJECT: Proposed Davenport Crossing | DATE STARTED: 3/12/19 | DATE FINISHED: 3/12/19

LOCATION: 4792 West R-112, Grantsville, Utah | GSH FIELD REP.: SH

EXCAVATING METHOD/EQUIPMENT: CAT 430D - Backhoe

GROUNDWATER DEPTH: Not Encountered (3/12/19) | ELEVATION: ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0							
	CL	SILTY CLAY with trace fine sand; major roots (topsoil) to 6"; light brown								dry stiff
			5							slightly moist
		grades with occasional layers of silty fine sand up to 1" thick	10							
			15							
		End of exploration at 15.0'. No significant sidewall caving. No groundwater encountered at time of excavation. Installed 1.25" diameter slotted PVC pipe to 15.0'.	20							
			25							

See Subsurface Conditions section in the report for additional information.

FIGURE 4G

TEST PIT LOG

Page: 1 of 1

TEST PIT: TP-8

CLIENT: Wise Management, LLC | PROJECT NUMBER: 2164-002-19

PROJECT: Proposed Davenport Crossing | DATE STARTED: 3/12/19 | DATE FINISHED: 3/12/19

LOCATION: 4792 West R-112, Grantsville, Utah | GSH FIELD REP.: SH

EXCAVATING METHOD/EQUIPMENT: CAT 430D - Backhoe

GROUNDWATER DEPTH: Not Encountered (3/12/19) | ELEVATION: ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0							
	CL	SILTY CLAY with trace fine sand; major roots (topsoil) to 6"; light brown								dry stiff
			5							slightly moist
		grades with occasional layers of silty fine sand up to 1/2" thick	10							
		End of exploration at 10.0'. No significant sidewall caving. No groundwater encountered at time of excavation. Installed 1.25” diameter slotted PVC pipe to 10.0’.	15							
			20							
			25							

See Subsurface Conditions section in the report for additional information.

FIGURE 4H

TEST PIT LOG

Page: 1 of 1

TEST PIT: TP-9

CLIENT: Wise Management, LLC | PROJECT NUMBER: 2164-002-19

PROJECT: Proposed Davenport Crossing | DATE STARTED: 3/12/19 | DATE FINISHED: 3/12/19

LOCATION: 4792 West R-112, Grantsville, Utah | GSH FIELD REP.: SH

EXCAVATING METHOD/EQUIPMENT: CAT 430D - Backhoe

GROUNDWATER DEPTH: Not Encountered (3/12/19) | ELEVATION: ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0							
	CL	SILTY CLAY with trace fine sand; major roots (topsoil) to 6"; light grayish-brown								dry stiff
			5							slightly moist
		grades with occasional layers of silty fine sand up to 3/4" thick	10							
		End of exploration at 15.0'. No significant sidewall caving. No groundwater encountered at time of excavation. Installed 1.25” diameter slotted PVC pipe to 15.0’.	15							
			20							
			25							

See Subsurface Conditions section in the report for additional information.

FIGURE 4I

TEST PIT LOG

Page: 1 of 1

TEST PIT: TP-10

CLIENT: Wise Management, LLC | PROJECT NUMBER: 2164-002-19

PROJECT: Proposed Davenport Crossing | DATE STARTED: 3/12/19 | DATE FINISHED: 3/12/19

LOCATION: 4792 West R-112, Grantsville, Utah | GSH FIELD REP.: SH

EXCAVATING METHOD/EQUIPMENT: CAT 430D - Backhoe

GROUNDWATER DEPTH: Not Encountered (3/12/19) | ELEVATION: ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0							
	CL	SILTY CLAY with trace fine sand; major roots (topsoil) to 6"; light grayish-brown								dry stiff
			5							slightly moist
		grades with occasional layers of silty fine sand up to 1" thick	10							
		End of exploration at 10.0'. No significant sidewall caving. No groundwater encountered at time of excavation. Installed 1.25” diameter slotted PVC pipe to 10.0’.	15							
			20							
			25							

See Subsurface Conditions section in the report for additional information.

FIGURE 4J

TEST PIT LOG

Page: 1 of 1

TEST PIT: TP-11

CLIENT: Wise Management, LLC | PROJECT NUMBER: 2164-002-19

PROJECT: Proposed Davenport Crossing | DATE STARTED: 3/12/19 | DATE FINISHED: 3/12/19

LOCATION: 4792 West R-112, Grantsville, Utah | GSH FIELD REP.: SH

EXCAVATING METHOD/EQUIPMENT: CAT 430D - Backhoe

GROUNDWATER DEPTH: Not Encountered (3/12/19) | ELEVATION: ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0							
	CL	SILTY CLAY with trace fine sand; major roots (topsoil) to 6"; gray/light brown								dry stiff
		grades with occasional layers of silty fine sand up to 1/2" thick	5							slightly moist
		End of exploration at 10.0'. No significant sidewall caving. No groundwater encountered at time of excavation. Installed 1.25” diameter slotted PVC pipe to 10.0’.	10							
			15							
			20							
			25							

See Subsurface Conditions section in the report for additional information.

FIGURE 4K

CLIENT: Wise Management, LLC
PROJECT: Proposed Davenport Crossing Development
PROJECT NUMBER: 2164-002-19

KEY TO BORING LOG

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫

COLUMN DESCRIPTIONS

① **Water Level:** Depth to measured groundwater table. See symbol below.

② **USCS:** (Unified Soil Classification System) Description of soils encountered; typical symbols are explained below.

③ **Description:** Description of material encountered; may include color, moisture, grain size, density/consistency,

④ **Depth (ft.):** Depth in feet below the ground surface.

⑤ **Blow Count:** Number of blows to advance sampler 12" beyond first 6", using a 140-lb hammer with 30" drop.

⑥ **Sample Symbol:** Type of soil sample collected at depth interval shown; sampler symbols are explained below.

⑦ **Moisture (%):** Water content of soil sample measured in laboratory; expressed as percentage of dryweight of

⑧ **Dry Density (pcf):** The density of a soil measured in laboratory; expressed in pounds per cubic foot.

⑨ **% Passing 200:** Fines content of soils sample passing a No. 200 sieve; expressed as a percentage.

⑩ **Liquid Limit (%):** Water content at which a soil changes from plastic to liquid behavior.

⑪ **Plasticity Index (%):** Range of water content at which a soil exhibits plastic properties.

⑫ **Remarks:** Comments and observations regarding drilling or sampling made by driller or field personnel. May include other field and laboratory test results using the following abbreviations:

CEMENTATION:

Weakly: Crumbles or breaks with handling or slight finger pressure.

Moderately: Crumbles or breaks with considerable finger pressure.

Strongly: Will not crumble or break with finger pressure.

MODIFIERS:

Trace <5%

Some 5-12%

With > 12%

MOISTURE CONTENT (FIELD TEST):

Dry: Absence of moisture, dusty, dry to the touch.

Moist: Damp but no visible water.

Saturated: Visible water, usually soil below water table.

Descriptions and stratum lines are interpretive; field descriptions may have been modified to reflect lab test results. Descriptions on the logs apply only at the specific boring locations and at the time the borings were advanced; they are not warranted to be representative of subsurface conditions at other locations or times.

UNIFIED SOIL CLASSIFICATION SYSTEM (USCS)

MAJOR DIVISIONS			USCS SYMBOLS	TYPICAL DESCRIPTIONS
COARSE-GRAINED SOILS More than 50% of material is larger than No. 200 sieve size.	GRAVELS More than 50% of coarse fraction retained on No. 4 sieve.	CLEAN GRAVELS (little or no fines)	GW	Well-Graded Gravels, Gravel-Sand Mixtures, Little or No Fines
			GP	Poorly-Graded Gravels, Gravel-Sand Mixtures, Little or No Fines
		GRAVELS WITH FINES (appreciable amount of fines)	GM	Silty Gravels, Gravel-Sand-Silt Mixtures
			GC	Clayey Gravels, Gravel-Sand-Clay Mixtures
	SANDS More than 50% of coarse fraction passing through No. 4 sieve.	CLEAN SANDS (little or no fines)	SW	Well-Graded Sands, Gravelly Sands, Little or No Fines
			SP	Poorly-Graded Sands, Gravelly Sands, Little or No Fines
		SANDS WITH FINES (appreciable amount of fines)	SM	Silty Sands, Sand-Silt Mixtures
			SC	Clayey Sands, Sand-Clay Mixtures
FINE-GRAINED SOILS More than 50% of material is smaller than No. 200 sieve size.	SILTS AND CLAYS Liquid Limit less than 50%		ML	Inorganic Silts and Very Fine Sands, Rock Flour, Silty or Clayey Fine Sands or Clayey Silts with Slight Plasticity
			CL	Inorganic Clays of Low to Medium Plasticity, Gravelly Clays, Sandy Clays, Silty Clays, Lean Clays
			OL	Organic Silts and Organic Silty Clays o f Low Plasticity
	SILTS AND CLAYS Liquid Limit greater than 50%		MH	Inorganic Silts, Micacious or Diatomacious Fine Sand or Silty Soils
			CH	Inorganic Clays of High Plasticity, Fat Clays
			OH	Organic Silts and Organic Clays of Medium to High Plasticity
HIGHLY ORGANIC SOILS			PT	Peat, Humus, Swamp Soils with High Organic Contents

Note: Dual Symbols are used to indicate borderline soil classifications.

STRATIFICATION:

DESCRIPTION	THICKNESS
Seam	up to 1/8"
Layer	1/8" to 12"

Occasional: One or less per 6" of thickness

Numerous; More than one per 6" of thickness

TYPICAL SAMPLER GRAPHIC SYMBOLS

- Bulk/Bag Sample
- Standard Penetration Split Spoon Sampler
- Rock Core
- No Recovery
- 3.25" OD, 2.42" ID D&M Sampler
- 3.0" OD, 2.42" ID D&M Sampler
- California Sampler
- Thin Wall

WATER SYMBOL

Water Level

FIGURE 5

GSH

CLIENT: Wise Management, LLC
PROJECT: Proposed Davenport Crossing
PROJECT NUMBER: 2164-002-19

KEY TO TEST PIT LOG

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪

COLUMN DESCRIPTIONS

① **Water Level:** Depth to measured groundwater table. See symbol below.

② **USCS:** (Unified Soil Classification System) Description of soils encountered; typical symbols are explained below.

③ **Description:** Description of material encountered; may include color, moisture, grain size, density/consistency,

④ **Depth (ft.):** Depth in feet below the ground surface.

⑤ **Sample Symbol:** Type of soil sample collected at depth interval shown; sampler symbols are explained below.

⑥ **Moisture (%):** Water content of soil sample measured in laboratory; expressed as percentage of dryweight of

⑦ **Dry Density (pcf):** The density of a soil measured in laboratory; expressed in pounds per cubic foot.

⑧ **% Passing 200:** Fines content of soils sample passing a No. 200 sieve; expressed as a percentage.

⑨ **Liquid Limit (%):** Water content at which a soil changes from plastic to liquid behavior.

⑩ **Plasticity Index (%):** Range of water content at which a soil exhibits plastic properties.

⑪ **Remarks:** Comments and observations regarding drilling or sampling made by driller or field personnel. May include other field and laboratory test results using the following abbreviations:

CEMENTATION:

Weakly: Crumbles or breaks with handling or slight finger pressure.

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MODIFIERS:

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			GP	Poorly-Graded Gravels, Gravel-Sand Mixtures, Little or No Fines
		GRAVELS WITH FINES (appreciable amount of fines)	GM	Silty Gravels, Gravel-Sand-Silt Mixtures
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			CL	Inorganic Clays of Low to Medium Plasticity, Gravelly Clays, Sandy Clays, Silty Clays, Lean Clays
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WATER SYMBOL

- Water Level

FIGURE 6

GSH