



- 1) Pg. 3 - GSH requires that they review the final grading plan due to excessive fills.
- 2) Pg. 6 - GSH recommends a design infiltration rate of 5 minutes per inch.
- 3) Pg. 7 - Existing soils exhibit high strength and moderate to low compressibility.
- 4) Pg. 7 - No ground water encountered in any of the borings.
- 5) Pg. 8 - Existing soils may be used as structural fill if it meets the criteria in this report.
- 6) Pg. 8 - Unsuitable soils must be removed to a depth of 2 feet below slabs, roads, footings, etc.
- 7) Pg. 8 - Difficult to Impossible to compact soils in wet/cold months (i.e. no grading in Winter).
- 8) Pg. 13 - Primary settlement anticipated at less than 1 inch, lightly loaded floor slabs less than 1/4".
- 9) Pg. 17 - Negligible amounts of sulfates encountered; Type 1 or 1A cement recommended.
- 10) Pg. 17 - No seismic faults run through the site.
- 11) Pg. 18 - No liquefaction is anticipated.

**REPORT
GEOTECHNICAL STUDY
PROPOSED RIDLEY'S FAMILY MARKET
DEVELOPMENT
NORTHEAST CORNER OF THE INTERSECTION OF
MAIN STREET AND 400 EAST STREET
SANTAQUIN, UTAH**

Submitted To:

Ridley's Family Markets
621 Washington Street South
Twin Falls, Idaho 83301

Submitted By:

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April 26, 2018

Job No. 2588-001-18

April 26, 2018
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Mr. Mark Ridley
Ridley's Family Markets
621 Washington Street South
Twin Falls, Idaho 83301

Mr. Mark Ridley:

Re: Report
Geotechnical Study
Proposed Ridley's Family Market Development
Northeast Corner of the Intersection of Main Street and 400 East Street
Santaquin, Utah

1. INTRODUCTION

1.1 GENERAL

This report presents the results of our geotechnical study performed at the site of the proposed Ridley's Family Market Development located at the northeast corner of the intersection of Main Street and 400 East Street in Santaquin, Utah. The general location of the site with respect to existing roadways, as of 2018, is presented on Figure 1, Vicinity Map. A more detailed layout of the site showing the proposed development, nearby features, and streets is presented on Figure 2, Site Plan. The approximate locations of the borings drilled and infiltration testing completed in conjunction with this study are also presented on Figure 2.

1.2 OBJECTIVES AND SCOPE

The objectives and scope of our study were planned in discussions among Mr. Mark Ridley of Ridley's Family Markets, Mr. Shaun Young, P.E. of Anderson Wahlen and Associates, and Mr. Mike Huber of GSH Geotechnical, Inc. (GSH).

In general, the objectives of this study were to:

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

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

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

1. A field program consisting of the excavating, logging, and sampling of 32 borings and completing 3 infiltration tests.
2. A laboratory testing program.
3. An office program consisting of the correlation of available data, engineering analyses, and the preparation of this summary report.

1.3 AUTHORIZATION

Authorization was provided by returning a signed copy of our Professional Services Agreement No. 18-0418 dated April 11, 2018.

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, projected groundwater conditions, and the layout and design data discussed in Section 2, Proposed Construction, of this report. 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 project will consist of the development of approximately 20 acres with 5 retail building pads, a fuel center, and associated parking lots. The structures are anticipated to be 1 level, constructed using a combination of light metal/wood framing, reinforced concrete, masonry, and/or steel post/beams supported on conventional spread and continuous wall foundations with slab-on-grade floors. Projected maximum column and continuous wall loads are on the order of 120 kips and 5 kips per lineal foot, respectively.

Three city streets are also proposed to be constructed/updated to service the development.

Projected traffic in the parking areas is anticipated to consist of a light to moderate volume of automobiles and light trucks with occasional medium-weight trucks. In potential delivery areas and primary drive lanes, traffic is projected to consist of a moderate volume of automobiles and light trucks, a light to moderate volume of medium-weight trucks, and occasional heavyweight trucks.

It is proposed to construct/update 400 East Street, Orchard Lane, and 200 North Street. At the time of this report, specific traffic associated with these roadways was not available. Currently, the developed area near the site is primarily single-family residential homes. It is anticipated that future development will consist of additional single-family residential homes and developments similar to this one. Based on the available information, the ultimate traffic on the future roadway is projected to consist of a moderate volume of automobiles and light trucks and occasional medium- and heavyweight trucks. During construction of the current development and future developments, the volume of medium- and heavyweight trucks will be significantly higher. Once additional traffic information is available, GSH must be contacted to update our recommendations.

Maximum site grading cuts to achieve design grades are anticipated to be generally on the order of 2 to 3 feet. GSH understands that certain areas of the site will be raised with up to 15 feet of site grading fill, especially in the area of the proposed Ridley's Family Market structure. Due to the varying degrees of site grading fill, GSH must review final grading plans to provide additional recommendations as needed.

3. SITE INVESTIGATIONS

3.1 FIELD PROGRAM

In order to define and evaluate the subsurface soil and groundwater conditions across the site, 32 borings were drilled at the site. These borings were completed to depths ranging from 3 to 21.5 feet with a truck-mounted drill rig equipped with hollow-stem augers. The approximate locations of the borings 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 3AF, Boring Logs. Soils were classified in accordance with the nomenclature described on Figure 4, Key to Boring Log (USCS).

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

locations and depths. 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 drilling operations, 1.25-inch diameter slotted PVC pipe was installed many of the borings to provide a means of monitoring the potential groundwater fluctuations. The borings were backfilled with auger cuttings.

3.2 LABORATORY TESTING

3.2.1 General

In order to provide data necessary for our engineering analyses, a laboratory testing program was completed. The program included moisture, density, gradation, California Bearing ratio (CBR), consolidation and chemical tests. The following paragraphs describe the tests and summarize the test data.

3.2.2 Moisture and Density Tests

To aid in classifying the soils and to help 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 3AF.

3.2.3 Gradation Tests

To aid in classifying the granular soils, full and partial gradation tests were performed. Results of the tests are tabulated below:

Boring No.	Depth (feet)	Percent Passing Sieve										Soil Classification
		3"	2"	1"	3/4"	3/8"	No. 4	No. 10	No. 40	No. 100	No. 200	
B-2	14.0	--	--	--	--	--	--	--	--	--	3.4	GP
B-5	4.5	--	--	--	--	--	--	--	--	--	56.1	CL/SC
B-7	1.5	100	100	82.9	77.4	55.8	40.7	31.0	19.9	13.8	11.3	SP/SM (Road Base)
B-14	2.5	100	79.4	79.4	60.2	39.7	28.2	21.3	14.	10.8	7.9	GP/GM
B-15	2.5	100	100	100	92.5	59.6	38.2	24.8	12.7	6.4	1.5	SP
B-19	5.0	--	--	--	--	--	--	--	--	--	6.8	GP/GC
B-28	10.0	--	--	--	--	--	--	--	--	--	11.2	SP/SM
B-30	2.5	--	--	--	--	--	--	--	--	--	1.3	GP

3.2.4 California Bearing Ratio (CBR) Test

To determine subgrade characteristics and to provide data for design of future pavements with respect to the existing subgrade soil conditions, a CBR test was performed on the representative bulk sample of the near-surface soils obtained from the borings along the roadway alignments. The test sample was compacted to approximately 100 percent of the Standard Proctor density at optimum moisture content. The test was performed in accordance with the Utah Department of Transportation (UDOT) Procedure 8-9-22 “California Bearing Ratio Soil” as presented in the Utah State Department of Highways Manual of Instruction, Part 8, Materials. The results of the CBR test are tabulated on the following table:

Soil Classification	CL	
Soil Properties as Molded	Dry Density	106.6 pcf
	Moisture Content (Total Sample)	16.2 percent
	Surcharge	10 pounds
	Swell	0.9 percent
CBR	At 0.2" penetration	8.4 percent

3.2.5 Consolidation Tests

To provide data necessary for our settlement analyses, consolidation tests were performed on each of 3 representative samples of the fine-grained soils encountered. The results indicate that the fine-grained soils tested are moderately over-consolidated and will exhibit moderate strength and compressibility characteristics when loaded below the pre-consolidation pressure. Detailed results of the tests are maintained within our files and can be transmitted to you, upon your request.

3.2.6 Chemical Tests

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

Boring No.	Depth (feet)	Soil Classification	pH	Total Water Soluble Sulfate (mg/kg-dry)
B-1	2.5	CL	7.98	50.9

3.3 INFILTRATION TESTS

Three infiltration tests were performed at Borings B-30, B-29, and B-19 at a depth of about 5 feet within the natural gravel soils with varying silt and clay content. The measured infiltration rates ranged from 1 to 2 minutes per inch, which reflects current natural site conditions at the test location and depth. It is our experience that the infiltration rates will decrease over the lifetime of an infiltration system due to siltation and the introduction of other materials. Accordingly, we recommend a design infiltration rate of 5 minutes per inch be used for design purposes within natural granular soils in the area of the tests. Please note that although not encountered within potential retention/detention areas, clay soils are present at the site. Infiltration rates in clay soils will be much slower, and GSH must be notified if clay soils are encountered within the retention/detention areas.

3.4 SUBSURFACE SOIL AND GROUNDWATER

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

The borings were drilled to depths ranging from 3.0 to 21.5 feet. The soil conditions encountered in each of the borings, to the depths penetrated, were generally similar across the boring locations.

- Asphalt was encountered within existing roadways in Borings B-5, B-7, B-14, and B-15. Approximately 3 inches of asphalt and up to 18 inches of aggregate base were encountered.
- Approximately 3 to 6 inches of topsoil was encountered in Borings B-2, B-3, B-6, B-8 through B-13, B-16 through B-22, B-24, and B-28 through B-31. Topsoil thickness is frequently erratic and thicker zones of topsoil should be anticipated.
- Non-engineered fill soils were encountered in Borings B-1 through B-3, B-19, B-27, and B-28, to depths ranging from 0.5 to 4.0 feet beneath the existing ground surface.
- Natural soils were encountered below the ground surface, non-engineered fill, and road base in each of the borings. The natural soils consisted primarily of silty clay with varying sand and gravel content, sand with varying silt and gravel content, and gravel with varying silt, clay, and sand content.
- Materials causing auger refusal were encountered within the dense natural granular soils in Borings B-1, B-3, B-14, and B-15 at depths ranging from 3 feet to 13 feet below the existing ground surface.

The natural clay soils were stiff to hard, slightly moist to moist, light brown, brown, and black in color, and moderately over-consolidated. The natural clay soils are anticipated to exhibit moderate strength and compressibility characteristics under the anticipated loading.

The natural sand and gravel soils were medium dense to very dense, slightly moist to moist, and light brown, brown, and black in color. The natural sand and gravel soils are anticipated to exhibit moderately high strength and moderately low compressibility characteristics under the anticipated load range.

Groundwater was not encountered within the borings and is not anticipated to effect construction.

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

4. DISCUSSIONS AND RECOMMENDATIONS

4.1 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 existing structures and utilities to be demolished/relocated.
2. The existing non-engineered fills encountered in Borings B-1 through B-3, B-19, B-27, and B-28.
3. The shallow depth to auger refusal in Borings B-1, B-3, B-14, and B-15.

Prior to proceeding with construction, demolition and removal of the existing structures, slabs, foundations, pavements, associated debris, surface vegetation, root systems, topsoil, non-engineered fill, and any deleterious materials from beneath an area extending out at least 5 feet from the perimeter of the proposed building foundations and 3 feet beyond floor slabs, 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 developed nature of this site and the surrounding area, additional 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 rigid pavements.

On-site granular soils, including existing non-engineered fills, may be re-utilized as structural site grading fill if they meet the criteria for such, as stated later in this report.

The dense soils encountered at the refusal depths may require additional effort to excavate and should be considered in the design and bidding process.

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

4.2 EARTHWORK

4.2.1 Site Preparation

Prior to proceeding with construction, demolition and removal of the existing structures, slabs, foundations, pavements, associated debris, surface vegetation, root systems, topsoil, non-engineered fill, and any deleterious materials from beneath an area extending out at least 5 feet from the perimeter of the proposed building foundations and 3 feet beyond floor slabs, 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.

All non-engineered fills must be removed below all foundations, floor slabs, and pavements. If footing trenches are backfilled with structural fill below footings the width of the replacement backfill must meet the requirements as discussed in Section 4.3.2, Installation, of this report.

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.

A representative of GSH must verify that all loose/disturbed soils and non-engineered fills have been completely removed below footings, floor slabs, and pavements.

4.2.2 Temporary Excavations

Temporary excavations up to 8 feet deep in fine-grained cohesive soils 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).

To reduce disturbance of the natural soils during excavation, it is recommended that smooth edge buckets/blades be utilized.

Due to the relatively shallow auger refusal depths, additional excavation effort should be anticipated within deeper excavations, such as those for construction of utilities.

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.

4.2.3 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 foundations, floor slabs, and pavements shall consist of a well graded sand and gravel mixture with less than 30 percent retained on the three-quarter-inch sieve and less than 20 percent passing the No. 200 Sieve (clays and silts).

On-site granular soils, including existing non-engineered fills, may be re-utilized as structural site grading fill if they meet the criteria for such as stated herein. However, should some of these soils contain coarse gravel in excess of 30 percent retained on the three-quarter-inch sieve by weight and, therefore, cannot be tested for compaction using conventional means (laboratory Proctors and nuclear densometer), then re-utilization of these fill/natural soils as structural site grading fill will require either screening and/or full-time observation during placement to document compaction means and methods.

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.

4.2.4 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 AASHTO¹ T-180 (ASTM² - D1557) compaction criteria in accordance with the table below:

Location	Total Fill Thickness (feet)	Minimum Percentage of Maximum Dry Density
Beneath an area extending at least 4 feet beyond the perimeter of the structure	0 to 8	95
Beneath an area extending at least 4 feet beyond the perimeter of the structure	8 to 15	100
Site grading fills outside area defined above	0 to 5	90
Site grading fills outside area defined above	5 to 8	95
Site grading fills outside area defined above	8 to 15	100
Utility trenches within structural areas	--	96
Road base	-	96

¹ American Association of State Highway and Transportation Officials

² American Society for Testing and Materials

Structural fills greater than 15 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 4.2.1, 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.

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.

4.2.5 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.

Most 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. 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 T-180 (ASTM - D1557) method of compaction. GSH recommends that as the major utilities continue onto the site that these compaction specifications are followed.

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

Due to the relatively shallow auger refusal depths, additional excavation effort should be anticipated within deeper excavations such as those for construction of utilities.

4.3 SPREAD AND CONTINUOUS WALL FOUNDATIONS

4.3.1 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. For design, the following parameters are provided:

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 on suitable natural soils	- 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.

4.3.2 Installation

Under no circumstances shall the footings be established upon soft, loose or disturbed soils, non-engineered fills, sod, rubbish, frozen soils, debris, or within ponded water. If the natural soils upon which the footings are to be established become loose or disturbed, they must be removed and replaced with granular structural fill. If granular structural fill upon which the footings are to be established become disturbed, they should be recompacted to the requirements for structural fill.

The width of replacement fill below footings should be equal to the width of the footing plus one additional foot for each foot of fill thickness placed. For example, if the width of the footing is

2 feet and the thickness of the structural fill beneath the footing is 1 foot, the width of the structural fill at the base of the footing excavation would be a total of 3 feet.

4.3.3 Settlements

Based on proposed 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.

4.4 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.

4.5 FLOOR SLABS

Floor slabs shall be established upon suitable natural soils and/or upon structural fill extending to suitable stabilized natural soils. Under no circumstances shall floor slabs be established over non-engineered fills, loose/disturbed soils, surface vegetation, root systems, rubbish, construction debris, other deleterious materials, frozen soils, or within ponded water.

In order 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.

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.

4.6 PAVEMENTS

The natural fine-grained soils will exhibit poor to moderate pavement support characteristics when saturated or nearly saturated. The natural subgrade must be properly prepared as discussed in Section 4.2.1 Site Preparation, of this report. With the subgrade soils and the projected traffic as discussed in Section 2, Proposed Construction, the pavement sections below are recommended:

Parking Areas

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

Flexible:

2.5 inches	Asphalt concrete
7.0 inches	Aggregate base
Over	Properly prepared natural subgrade soils and/or structural site grading fill extending to properly prepared natural subgrade soils

Rigid:

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

Internal Roadway/Primary Drive Lanes Areas

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

Flexible:

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

Rigid:

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

Truck Lanes

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

Flexible:

4.0 inches	Asphalt concrete
12.0 inches	Aggregate base

Over	Properly prepared natural subgrade soils and/or structural site grading fill extending to properly prepared natural subgrade soils
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Rigid:

6.5 inches	Portland cement concrete (non-reinforced)
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6.0 inches	Aggregate base
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Over	Properly prepared natural subgrade soils and/or structural site grading fill extending to properly prepared natural subgrade soils
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City Streets (500 East, Orchard Lane, and 200 North Streets)
 (Moderate to Heavy Volume of Automobiles and Light Trucks,
 Moderate Volume of Medium-Weight Trucks,
 and Light Volume of Heavyweight Trucks)
 [60 equivalent 18-kip axle loads per day]

Flexible:

4.5 inches	Asphalt concrete
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12.0 inches	Aggregate base
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Over	Properly prepared natural subgrade soils and/or structural site grading fill extending to properly prepared natural subgrade soils
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It is recommended that “drive-thru” lanes where transactions occur be paved with rigid pavement equivalent to that stipulated for internal roadway in order to eliminate potential rutting from the high volume of tight-maneuvering vehicles.

For dumpster pads, we recommend a pavement section consisting of 6.5 inches of Portland cement concrete, 9.0 inches of aggregate base, over properly prepared suitable natural subgrade or site grading structural fills extending to suitable natural soils. Dumpster pads shall not be constructed overlying non-engineered fills unless heavily reinforced.

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 \pm 1 percent air-entrainment.

4.7 CEMENT TYPES

Laboratory tests indicate that the site soils contain negligible amounts of water soluble sulfates. Therefore, concrete which will be in contact with the site soils may be prepared using Type I or IA cement.

4.8 GEOSEISMIC SETTING

4.8.1 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).

4.8.2 Faulting

Based upon our review of available literature, no active faults are known to pass through the site. The site is located about 0.7 mile west of the mapped Nephi Section of the Wasatch Fault.

4.8.3 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.

4.8.4 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 on the following page 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 (39.9764 degrees north and 111.7760 degrees west, respectively), the values for this site are tabulated on the following page.

Spectral Acceleration Value, T	Site Class B Boundary [mapped values]		Site Class D [adjusted for site class effects]		Design Values (% g)
	(% g)		Site Coefficient	(% g)	
	Peak Ground Acceleration	54.2		$F_a = 1.000$	
0.2 Seconds (Short Period Acceleration)	$S_S = 135.6$		$F_a = 1.000$	$S_{MS} = 135.6$	$S_{DS} = 90.4$
1.0 Second (Long Period Acceleration)	$S_1 = 48.7$		$F_v = 1.513$	$S_{M1} = 73.7$	$S_{D1} = 49.1$

4.8.5 Liquefaction

Liquefaction is defined as the condition when saturated, loose, finer-grained sand-type soils lose their support capabilities because of excessive pore water pressure which develops during a seismic event. Clayey soils, even if saturated, will not liquefy during a major seismic event.

Liquefaction is not anticipated to occur within the soils encountered due to the lack of shallow groundwater and the density of the granular soils.

4.9 SITE VISITS

GSH must verify that all disturbed soil, deleterious materials, and any other unsuitable soils have been removed and that non-engineered fills have been removed, 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.

4.10 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.

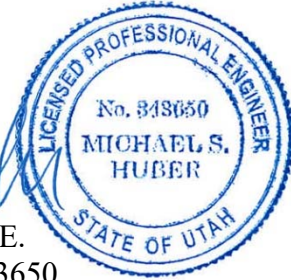


Robert A. Gifford
Project Engineer/Geologist

Reviewed by:



Michael S. Huber, P.E.
State of Utah No. 343650
Vice President/Senior Geotechnical Engineer

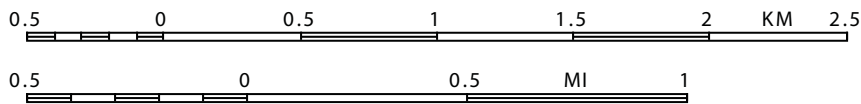
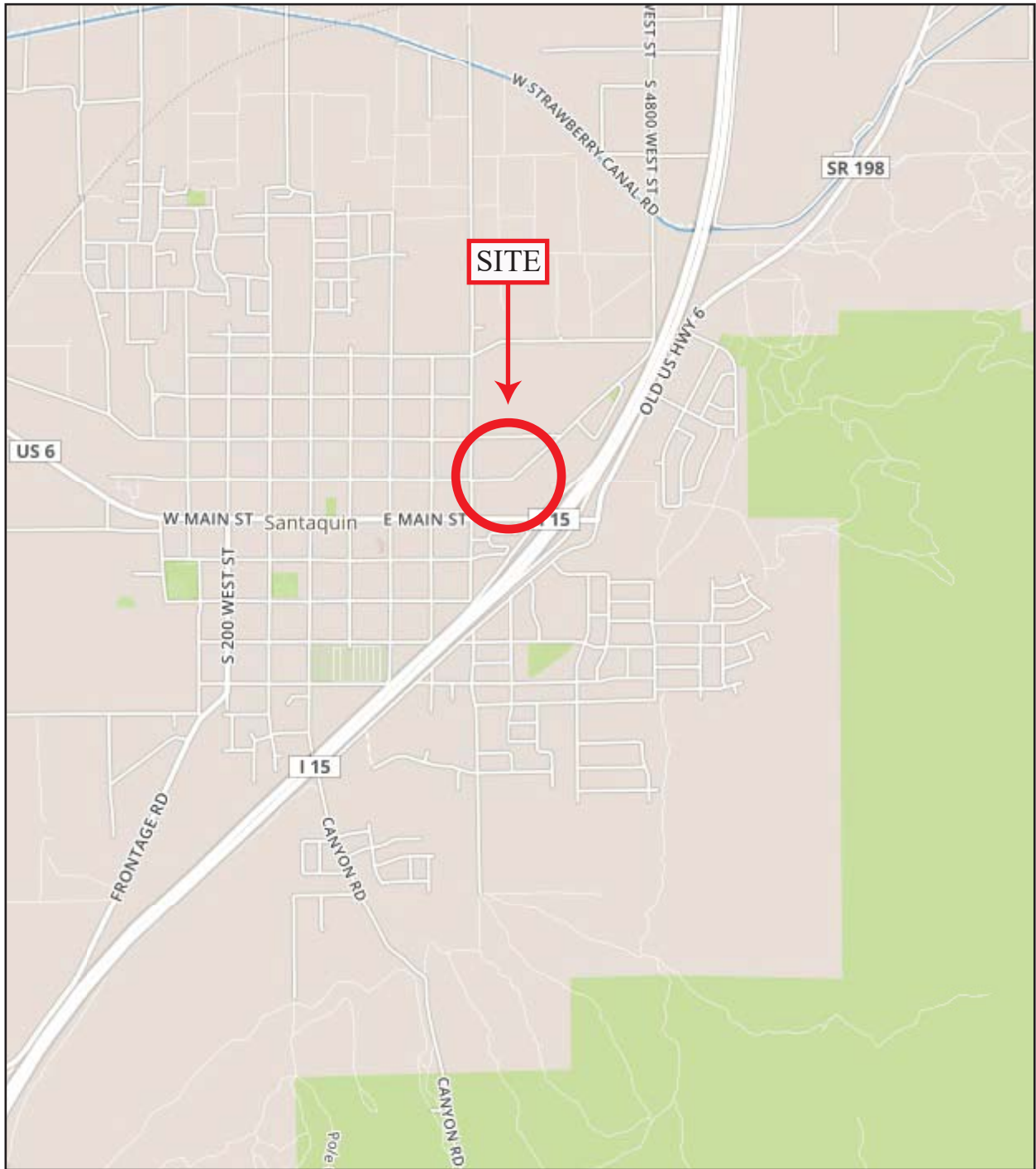


RAG/MSH;jlh

Encl. Figure 1, Vicinity Map
Figure 2, Site Plan
Figures 3A through 3AF, Boring Log
Figure 4, Key to Boring Log (USCS)

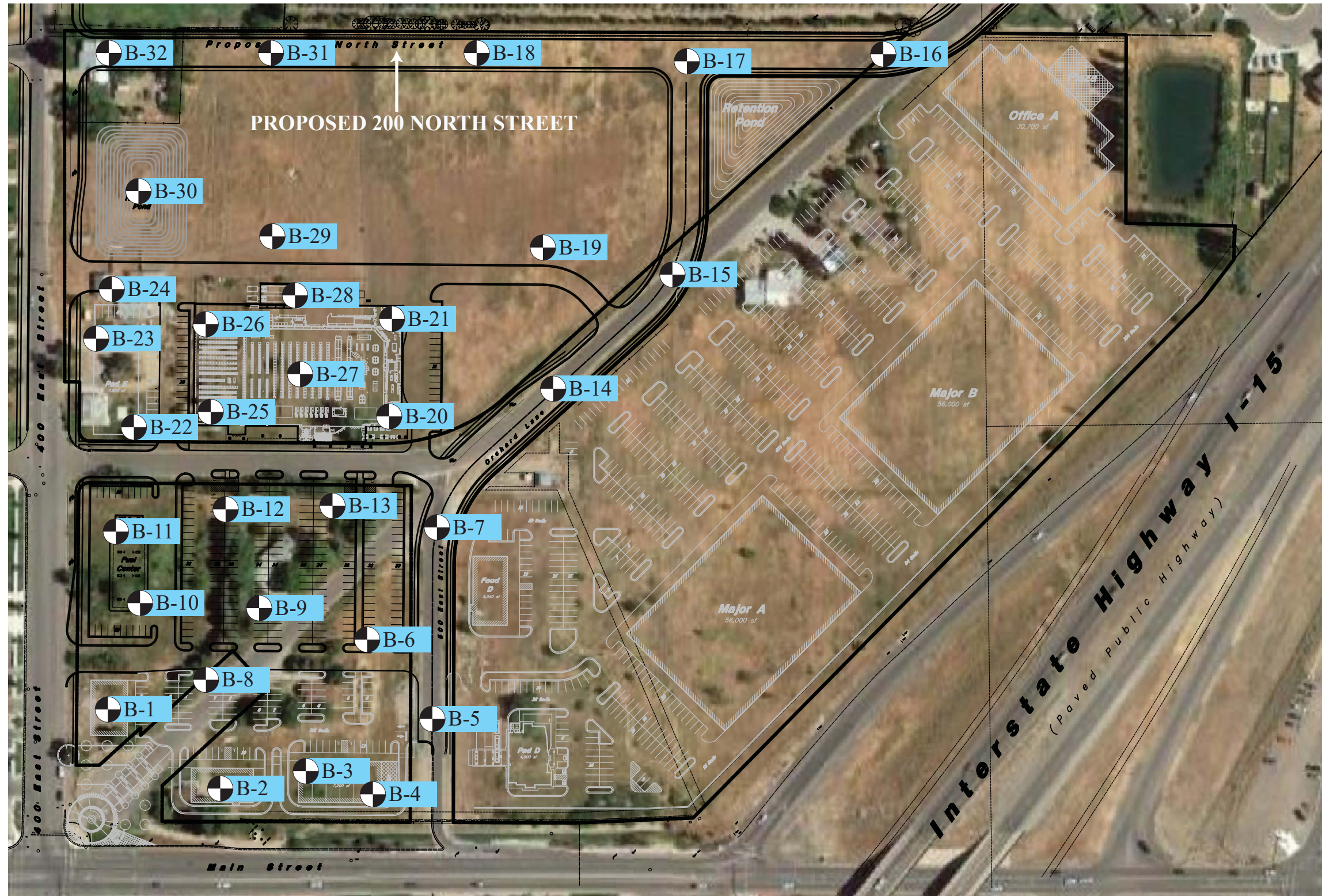
Addressee (email)

cc: Mr. Shaun Young, P.E. (email)
Anderson, Wahlen & Associates



REFERENCE:
ALL TRAILS - NATIONAL GEOGRAPHIC TERRAIN
DATED 2018

FIGURE 1
VICINITY MAP
 GSH



REFERENCE:
ADAPTED FROM DRAWING ENTITLED
"SITE PLAN" PROVIDED BY CLIENT



FIGURE 2
SITE PLAN
 GSH



GSH

BORING LOG

Page: 1 of 1

BORING: B-1

CLIENT: Ridley's Family Markets PROJECT NUMBER: 2588-001-18
 PROJECT: Proposed Ridley's Family Market Development DATE STARTED: 4/17/18 DATE FINISHED: 4/17/18
 LOCATION: Northeast Corner of Main Street and 400 East, Santaquin, Utah GSH FIELD REP.: TH
 DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger HAMMER: Automatic WEIGHT: 140 lbs DROP: 30"
 GROUNDWATER DEPTH: Not Encountered (4/17/18) ELEVATION: ---

WATER LEVEL	U S C S	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								slightly moist stiff
	CL FILL	SILTY CLAY, FILL with fine and coarse gravel; brown									moist very stiff
	CL	SILTY CLAY with some fine sand; brown		26	X	21.2	100				stiff
			5	14	X	22.3	95				hard
		grades with some fine and coarse gravel									
	GP/ GM	FINE TO COARSE SANDY FINE AND COARSE GRAVEL with silt; brown Refusal at 11.0'. No groundwater encountered at time of drilling. Installed 1.25" diameter slotted PVC pipe to 11.0'.	10	50/4"	X						slightly moist very dense
			15								
			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: Ridley's Family Markets PROJECT NUMBER: 2588-001-18
 PROJECT: Proposed Ridley's Family Market Development DATE STARTED: 4/18/18 DATE FINISHED: 4/18/18
 LOCATION: Northeast Corner of Main Street and 400 East, Santaquin, Utah GSH FIELD REP.: TH
 DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger HAMMER: Automatic WEIGHT: 140 lbs DROP: 30"
 GROUNDWATER DEPTH: Not Encountered (4/18/18) ELEVATION: ---

WATER LEVEL	U S C S	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								slightly moist stiff
	CL FILL	SILTY CLAY, FILL with fine and coarse gravel; major roots (topsoil) to 6"; brown									slightly moist stiff
	CL	SILTY CLAY with some fine sand; brown		22	X	19.5	97				slightly moist very stiff
		grades with occasional layers of silty sand up to 2" thick; light brown with oxidation	5								
				34	X						
	GP	FINE AND COARSE GRAVEL with fine to coarse sand and trace silt; light brown	10								slightly moist dense
				76	X	2.2	3.4				
		End of Exploration at 15.5'. No groundwater encountered at time of drilling. Installed 1.25" diameter slotted PVC pipe to 15.5'.	15								
			20								
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3B



GSH

BORING LOG

Page: 1 of 1

BORING: B-3

CLIENT: Ridley's Family Markets

PROJECT NUMBER: 2588-001-18

PROJECT: Proposed Ridley's Family Market Development

DATE STARTED: 4/18/18

DATE FINISHED: 4/18/18

LOCATION: Northeast Corner of Main Street and 400 East, Santaquin, Utah

GSH FIELD REP.: TH

DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger

HAMMER: Automatic

WEIGHT: 140 lbs

DROP: 30"

GROUNDWATER DEPTH: Not Encountered (4/18/18)

ELEVATION: ---

WATER LEVEL	U S C S	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								slightly moist
	CL FILL	SILTY CLAY, FILL with some fine and coarse gravel; major roots (topsoil) to 6"; brown									
	CL	SILTY CLAY with fine gravel; light brown		47							hard slightly moist
			5	70		20.1	99				
	SM	SILTY FINE SAND light brown with oxidation									slightly moist
			10	22							medium dense
	GP	FINE AND COARSE GRAVEL with fine to coarse sand; black									slightly moist very dense
		Refusal at 13.0'. No groundwater encountered at time of drilling. Installed 1.25" diameter slotted PVC pipe to 13.0'.	15								
			20								
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3C



CLIENT: Ridley's Family Markets PROJECT NUMBER: 2588-001-18
 PROJECT: Proposed Ridley's Family Market Development DATE STARTED: 4/18/18 DATE FINISHED: 4/18/18
 LOCATION: Northeast Corner of Main Street and 400 East, Santaquin, Utah GSH FIELD REP.: TH
 DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger HAMMER: Automatic WEIGHT: 140 lbs DROP: 30"
 GROUNDWATER DEPTH: Not Encountered (4/18/18) ELEVATION: ---

WATER LEVEL	U S C S	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								slightly moist
	CL FILL	SILTY CLAY, FILL with fine and coarse gravel; brown									very stiff slightly moist
	CL	SILTY CLAY with fine gravel; brown		30	X						stiff
			5	17	X						moist
	SP	FINE TO COARSE SAND with fine gravel; brown									medium dense
			10	46	X	0.7	100				
		End of Exploration at 11.5'. No groundwater encountered at time of drilling. Installed 1.25" diameter slotted PVC pipe to 11.5'.									
			15								
			20								
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3D



GSH

BORING LOG

Page: 1 of 1

BORING: B-5

CLIENT: Ridley's Family Markets

PROJECT NUMBER: 2588-001-18

PROJECT: Proposed Ridley's Family Market Development

DATE STARTED: 4/18/18

DATE FINISHED: 4/18/18

LOCATION: Northeast Corner of Main Street and 400 East, Santaquin, Utah

GSH FIELD REP.: TH

DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger

HAMMER: Automatic

WEIGHT: 140 lbs

DROP: 30"

GROUNDWATER DEPTH: Not Encountered (4/18/18)

ELEVATION: ---

WATER LEVEL	U S C S	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								
		3" ASPHALT									
		1.5' ROAD BASE									
	SP/ SM	SILTY FINE TO COARSE SAND with fine and coarse gravel; brown									slightly moist dense
	CL/ SC	FINE SANDY CLAY/CLAYEY FINE SAND with fine gravel; brown				13.0		56.1			slightly moist stiff
		End of Exploration at 5.0'. No groundwater encountered at time of drilling.	5								
			10								
			15								
			20								
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3E



GSH

BORING LOG

Page: 1 of 1

BORING: B-6

CLIENT: Ridley's Family Markets PROJECT NUMBER: 2588-001-18
 PROJECT: Proposed Ridley's Family Market Development DATE STARTED: 4/18/18 DATE FINISHED: 4/18/18
 LOCATION: Northeast Corner of Main Street and 400 East, Santaquin, Utah GSH FIELD REP.: TH
 DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger HAMMER: Automatic WEIGHT: 140 lbs DROP: 30"
 GROUNDWATER DEPTH: Not Encountered (4/18/18) ELEVATION: ---

WATER LEVEL	U S C S	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								slightly moist
	CL	SILTY CLAY with some fine sand; major roots (topsoil) to 6"; brown									stiff
		End of Exploration at 5.0'. No groundwater encountered at time of drilling.	5								
			10								
			15								
			20								
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3F



CLIENT: Ridley's Family Markets

PROJECT NUMBER: 2588-001-18

PROJECT: Proposed Ridley's Family Market Development

DATE STARTED: 4/18/18

DATE FINISHED: 4/18/18

LOCATION: Northeast Corner of Main Street and 400 East, Santaquin, Utah

GSH FIELD REP.: TH

DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger

HAMMER: Automatic

WEIGHT: 140 lbs

DROP: 30"

GROUNDWATER DEPTH: Not Encountered (4/18/18)

ELEVATION: ---

WATER LEVEL	U S C S	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								
		3" ASPHALT									
		1.5' ROAD BASE				17.9		1.5			
	SM	SILTY FINE TO COARSE SAND with fine and coarse gravel; brown									slightly moist dense
	CL	SILTY CLAY with fine and coarse gravel; brown	5								slightly moist stiff
		End of Exploration at 5.0'. No groundwater encountered at time of drilling.									
			10								
			15								
			20								
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3G



GSH

BORING LOG

Page: 1 of 1

BORING: B-8

CLIENT: Ridley's Family Markets PROJECT NUMBER: 2588-001-18
 PROJECT: Proposed Ridley's Family Market Development DATE STARTED: 4/19/18 DATE FINISHED: 4/19/18
 LOCATION: Northeast Corner of Main Street and 400 East, Santaquin, Utah GSH FIELD REP.: TH
 DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger HAMMER: Automatic WEIGHT: 140 lbs DROP: 30"
 GROUNDWATER DEPTH: Not Encountered (4/19/18) ELEVATION: ---

WATER LEVEL	U S C S	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								
	CL	SILTY CLAY with some fine sand; major roots (topsoil) to 6"; brown									slightly moist stiff
		End of Exploration at 5.0'. No groundwater encountered at time of drilling.	5								
			10								
			15								
			20								
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3H



GSH

BORING LOG

Page: 1 of 1

BORING: B-9

CLIENT: Ridley's Family Markets

PROJECT NUMBER: 2588-001-18

PROJECT: Proposed Ridley's Family Market Development

DATE STARTED: 4/19/18

DATE FINISHED: 4/19/18

LOCATION: Northeast Corner of Main Street and 400 East, Santaquin, Utah

GSH FIELD REP.: TH

DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger

HAMMER: Automatic

WEIGHT: 140 lbs

DROP: 30"

GROUNDWATER DEPTH: Not Encountered (4/19/18)

ELEVATION: ---

WATER LEVEL	U S C S	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								
	CL	SILTY CLAY with some fine sand; major roots (topsoil) to 6"; brown									slightly moist stiff
		grades with fine and coarse gravel									
		End of Exploration at 5.0'. No groundwater encountered at time of drilling.	5								
			10								
			15								
			20								
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 31



CLIENT: Ridley's Family Markets

PROJECT NUMBER: 2588-001-18

PROJECT: Proposed Ridley's Family Market Development

DATE STARTED: 4/17/18

DATE FINISHED: 4/17/18

LOCATION: Northeast Corner of Main Street and 400 East, Santaquin, Utah

GSH FIELD REP.: TH

DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger

HAMMER: Automatic

WEIGHT: 140 lbs

DROP: 30"

GROUNDWATER DEPTH: Not Encountered (4/17/18)

ELEVATION: ---

WATER LEVEL	U S C S	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								moist
	CL	SILTY CLAY with some fine sand; major roots (topsoil) to 6"; brown grades light brown		19		17.0	106				stiff
			5	50/3"		11.9	97				slightly moist hard
	SM	SILTY FINE SAND light brown with oxidation	10	39							slightly moist medium dense
	SP	FINE TO MEDIUM SAND with trace silt; light brown	15	29							slightly moist medium dense
		End of Exploration at 21.5'. No groundwater encountered at time of drilling. Installed 1.25" diameter slotted PVC pipe to 21.5'.	20	36							
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3J



CLIENT: Ridley's Family Markets

PROJECT NUMBER: 2588-001-18

PROJECT: Proposed Ridley's Family Market Development

DATE STARTED: 4/17/18

DATE FINISHED: 4/17/18

LOCATION: Northeast Corner of Main Street and 400 East, Santaquin, Utah

GSH FIELD REP.: TH

DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger

HAMMER: Automatic

WEIGHT: 140 lbs

DROP: 30"

GROUNDWATER DEPTH: Not Encountered (4/17/18)

ELEVATION: ---

WATER LEVEL	U S C S	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								
	CL	SILTY CLAY with some fine sand; major roots (topsoil) to 6"; brown		13		18.5	105				slightly moist stiff
		grades light brown	5	35		8.0	98				very stiff
		grades with occasional layers of silty fine sand up to 3" thick; oxidation	10	39							
	SM	SILTY FINE SAND light brown with oxidation	15	31							slightly moist medium dense
	GP	FINE AND COARSE GRAVEL with fine to coarse sand; brown	20	69							slightly moist medium dense
		End of Exploration at 21.5'. No groundwater encountered at time of drilling. Installed 1.25" diameter slotted PVC pipe to 21.5'.	25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3K



GSH

BORING LOG

Page: 1 of 1

BORING: B-12

CLIENT: Ridley's Family Markets

PROJECT NUMBER: 2588-001-18

PROJECT: Proposed Ridley's Family Market Development

DATE STARTED: 4/17/18

DATE FINISHED: 4/17/18

LOCATION: Northeast Corner of Main Street and 400 East, Santaquin, Utah

GSH FIELD REP.: TH

DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger

HAMMER: Automatic

WEIGHT: 140 lbs

DROP: 30"

GROUNDWATER DEPTH: Not Encountered (4/17/18)

ELEVATION: ---

WATER LEVEL	U S C S	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								
	CL	SILTY CLAY with some fine sand; major roots (topsoil) to 6"; brown									slightly moist very stiff
			5								moist
		End of Exploration at 5.0'. No groundwater encountered at time of drilling.									
			10								
			15								
			20								
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3L



GSH

BORING LOG

Page: 1 of 1

BORING: B-13

CLIENT: Ridley's Family Markets PROJECT NUMBER: 2588-001-18
 PROJECT: Proposed Ridley's Family Market Development DATE STARTED: 4/19/18 DATE FINISHED: 4/19/18
 LOCATION: Northeast Corner of Main Street and 400 East, Santaquin, Utah GSH FIELD REP.: TH
 DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger HAMMER: Automatic WEIGHT: 140 lbs DROP: 30"
 GROUNDWATER DEPTH: Not Encountered (4/19/18) ELEVATION: ---

WATER LEVEL	U S C S	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								slightly moist stiff
	CL	SILTY CLAY with some fine sand; major roots (topsoil) to 6"; brown									
		End of Exploration at 5.0'. No groundwater encountered at time of drilling.	5								
			10								
			15								
			20								
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3M



GSH

BORING LOG

Page: 1 of 1

BORING: B-14

CLIENT: Ridley's Family Markets PROJECT NUMBER: 2588-001-18
 PROJECT: Proposed Ridley's Family Market Development DATE STARTED: 4/18/18 DATE FINISHED: 4/18/18
 LOCATION: Northeast Corner of Main Street and 400 East, Santaquin, Utah GSH FIELD REP.: TH
 DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger HAMMER: Automatic WEIGHT: 140 lbs DROP: 30"
 GROUNDWATER DEPTH: Not Encountered (4/18/18) ELEVATION: ---

WATER LEVEL	U S C S	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								
		3" ASPHALT									
		1.5' ROAD BASE									
	GP/ GM	FINE TO COARSE SANDY FINE AND COARSE GRAVEL with some silt; brown				2.6		7.9			slightly moist dense
		Refusal at 3.5'. No groundwater encountered at time of drilling.	5								
			10								
			15								
			20								
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3N



GSH

BORING LOG

Page: 1 of 1

BORING: B-15

CLIENT: Ridley's Family Markets PROJECT NUMBER: 2588-001-18
 PROJECT: Proposed Ridley's Family Market Development DATE STARTED: 4/18/18 DATE FINISHED: 4/18/18
 LOCATION: Northeast Corner of Main Street and 400 East, Santaquin, Utah GSH FIELD REP.: TH
 DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger HAMMER: Automatic WEIGHT: 140 lbs DROP: 30"
 GROUNDWATER DEPTH: Not Encountered (4/18/18) ELEVATION: ---

WATER LEVEL	U S C S	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								
		3" ASPHALT									
		1.5' ROAD BASE									
	SP	FINE AND COARSE GRAVELLY FINE TO COARSE SAND with trace silt; brown				6.5		1.5			slightly moist dense
		Refusal at 3.0'. No groundwater encountered at time of drilling.	5								
			10								
			15								
			20								
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 30



GSH

BORING LOG

Page: 1 of 1

BORING: B-16

CLIENT: Ridley's Family Markets

PROJECT NUMBER: 2588-001-18

PROJECT: Proposed Ridley's Family Market Development

DATE STARTED: 4/18/18

DATE FINISHED: 4/18/18

LOCATION: Northeast Corner of Main Street and 400 East, Santaquin, Utah

GSH FIELD REP.: TH

DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger

HAMMER: Automatic

WEIGHT: 140 lbs

DROP: 30"

GROUNDWATER DEPTH: Not Encountered (4/18/18)

ELEVATION: ---

WATER LEVEL	U S C S	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								
	CL	SILTY CLAY with some fine sand; major roots (topsoil) to 4"; brown									slightly moist stiff
		grades with some fine gravel	5								
		End of Exploration at 5.0'. No groundwater encountered at time of drilling.									
			10								
			15								
			20								
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3P



GSH

BORING LOG

Page: 1 of 1

BORING: B-17

CLIENT: Ridley's Family Markets PROJECT NUMBER: 2588-001-18
 PROJECT: Proposed Ridley's Family Market Development DATE STARTED: 4/18/18 DATE FINISHED: 4/18/18
 LOCATION: Northeast Corner of Main Street and 400 East, Santaquin, Utah GSH FIELD REP.: TH
 DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger HAMMER: Automatic WEIGHT: 140 lbs DROP: 30"
 GROUNDWATER DEPTH: Not Encountered (4/18/18) ELEVATION: ---

WATER LEVEL	U S C S	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								slightly moist stiff
	CL	SILTY CLAY with some fine sand; major roots (topsoil) to 4"; brown									
		End of Exploration at 5.0'. No groundwater encountered at time of drilling.	5								
			10								
			15								
			20								
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3Q



GSH

BORING LOG

Page: 1 of 1

BORING: B-18

CLIENT: Ridley's Family Markets

PROJECT NUMBER: 2588-001-18

PROJECT: Proposed Ridley's Family Market Development

DATE STARTED: 4/18/18

DATE FINISHED: 4/18/18

LOCATION: Northeast Corner of Main Street and 400 East, Santaquin, Utah

GSH FIELD REP.: TH

DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger

HAMMER: Automatic

WEIGHT: 140 lbs

DROP: 30"

GROUNDWATER DEPTH: Not Encountered (4/18/18)

ELEVATION: ---

WATER LEVEL	U S C S	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								
	CL	SILTY CLAY with some fine sand; major roots (topsoil) to 4"; brown									slightly moist stiff
		End of Exploration at 5.0'. No groundwater encountered at time of drilling.	5								
			10								
			15								
			20								
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3R



GSH

BORING LOG

Page: 1 of 1

BORING: B-19

CLIENT: Ridley's Family Markets PROJECT NUMBER: 2588-001-18
 PROJECT: Proposed Ridley's Family Market Development DATE STARTED: 4/18/18 DATE FINISHED: 4/18/18
 LOCATION: Northeast Corner of Main Street and 400 East, Santaquin, Utah GSH FIELD REP.: TH
 DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger HAMMER: Automatic WEIGHT: 140 lbs DROP: 30"
 GROUNDWATER DEPTH: Not Encountered (4/18/18) ELEVATION: ---

WATER LEVEL	U S C S	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								
	CL FILL	SILTY CLAY, FILL with some fine gravel; major roots (topsoil) to 4"; brown									slightly moist stiff
	GP/ GC	FINE AND COARSE GRAVEL with some clay; brown				3.1	6.8				slightly moist dense
		End of Exploration at 5.0'. No groundwater encountered at time of drilling.	5								
			10								
			15								
			20								
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3S



GSH

BORING LOG

Page: 1 of 1

BORING: B-20

CLIENT: Ridley's Family Markets PROJECT NUMBER: 2588-001-18
 PROJECT: Proposed Ridley's Family Market Development DATE STARTED: 4/18/18 DATE FINISHED: 4/18/18
 LOCATION: Northeast Corner of Main Street and 400 East, Santaquin, Utah GSH FIELD REP.: TH
 DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger HAMMER: Automatic WEIGHT: 140 lbs DROP: 30"
 GROUNDWATER DEPTH: Not Encountered (4/18/18) ELEVATION: ---

WATER LEVEL	U S C S	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								slightly moist
	CL	SILTY CLAY with some fine sand; major roots (topsoil) to 4"; light brown		27	X	19.1	102				very stiff
	GP	FINE AND COARSE GRAVEL with fine to coarse sand; light brown	5	45	X						slightly moist
			10	43	X						medium dense
		End of Exploration at 11.5'. No groundwater encountered at time of drilling. Installed 1.25" diameter slotted PVC pipe to 11.5'.	15								
			20								
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3T



GSH

BORING LOG

Page: 1 of 1

BORING: B-21

CLIENT: Ridley's Family Markets

PROJECT NUMBER: 2588-001-18

PROJECT: Proposed Ridley's Family Market Development

DATE STARTED: 4/18/18

DATE FINISHED: 4/18/18

LOCATION: Northeast Corner of Main Street and 400 East, Santaquin, Utah

GSH FIELD REP.: TH

DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger

HAMMER: Automatic

WEIGHT: 140 lbs

DROP: 30"

GROUNDWATER DEPTH: Not Encountered (4/18/18)

ELEVATION: ---

WATER LEVEL	U S C S	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								
	CL	SILTY CLAY with some fine sand; major roots (topsoil) to 4"; brown		12		12.9	110				slightly moist stiff
	SP/ SM	FINE TO COARSE SAND with fine and coarse gravel and silt; ight brown	5	62							slightly moist dense
	GP	FINE AND COARSE GRAVEL with fine to coarse sand; light brown	10	98							slightly moist very dense
			15	50/1"							
			20	50/5"							
		End of Exploration at 20.5'. No groundwater encountered at time of drilling. Installed 1.25" diameter slotted PVC pipe to 20.5'.									
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3U



GSH

BORING LOG

Page: 1 of 1

BORING: B-22

CLIENT: Ridley's Family Markets PROJECT NUMBER: 2588-001-18
 PROJECT: Proposed Ridley's Family Market Development DATE STARTED: 4/19/18 DATE FINISHED: 4/19/18
 LOCATION: Northeast Corner of Main Street and 400 East, Santaquin, Utah GSH FIELD REP.: TH
 DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger HAMMER: Automatic WEIGHT: 140 lbs DROP: 30"
 GROUNDWATER DEPTH: Not Encountered (4/19/18) ELEVATION: ---

WATER LEVEL	U S C S	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								
	CL	SILTY CLAY with fine sand; major roots (topsoil) to 6"; brown									slightly moist hard
				82	X	14.8	107				slightly moist
	GP	FINE AND COARSE GRAVEL with fine to coarse sand; light brown	5								medium dense
				41	X						
		End of Exploration at 7.5'. No groundwater encountered at time of drilling.	10								
			15								
			20								
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3V



CLIENT: Ridley's Family Markets

PROJECT NUMBER: 2588-001-18

PROJECT: Proposed Ridley's Family Market Development

DATE STARTED: 4/19/18

DATE FINISHED: 4/19/18

LOCATION: Northeast Corner of Main Street and 400 East, Santaquin, Utah

GSH FIELD REP.: TH

DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger

HAMMER: Automatic

WEIGHT: 140 lbs

DROP: 30"

GROUNDWATER DEPTH: Not Encountered (4/19/18)

ELEVATION: ---

WATER LEVEL	U S C S	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								slightly moist
	GP	FINE AND COARSE GRAVEL with occasional layers of fine to coarse sand up to 2"; brown		52							dense
		grades with fine to coarse sand	5								
				68		3.2	119				
			10								
				78							
		End of Exploration at 14.5'. No groundwater encountered at time of drilling. Installed 1.25" diameter slotted PVC pipe to 14.5'.	15								
			20								
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3W



GSH

BORING LOG

Page: 1 of 1

BORING: B-24

CLIENT: Ridley's Family Markets

PROJECT NUMBER: 2588-001-18

PROJECT: Proposed Ridley's Family Market Development

DATE STARTED: 4/19/18

DATE FINISHED: 4/19/18

LOCATION: Northeast Corner of Main Street and 400 East, Santaquin, Utah

GSH FIELD REP.: TH

DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger

HAMMER: Automatic

WEIGHT: 140 lbs

DROP: 30"

GROUNDWATER DEPTH: Not Encountered (4/19/18)

ELEVATION: ---

WATER LEVEL	U S C S	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								
	GC	FINE AND COARSE GRAVEL with fine to coarse sand with some silty clay; major roots (topsoil) to 6"; brown									slightly moist medium dense
		End of Exploration at 5.0'. No groundwater encountered at time of drilling.	5								
			10								
			15								
			20								
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3X



GSH

BORING LOG

Page: 1 of 1

BORING: B-25

CLIENT: Ridley's Family Markets PROJECT NUMBER: 2588-001-18
 PROJECT: Proposed Ridley's Family Market Development DATE STARTED: 4/19/18 DATE FINISHED: 4/19/18
 LOCATION: Northeast Corner of Main Street and 400 East, Santaquin, Utah GSH FIELD REP.: TH
 DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger HAMMER: Automatic WEIGHT: 140 lbs DROP: 30"
 GROUNDWATER DEPTH: Not Encountered (4/19/18) ELEVATION: ---

WATER LEVEL	U S C S	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								slightly moist
	CL	SILTY CLAY with some fine sand and layers of fine and coarse gravel up to 3" thick; brown		50/3"		10.6	80				hard
	GP	FINE AND COARSE GRAVEL light brown	5	50/4"							slightly moist very dense
		grades with fine to coarse sand	10	41							medium dense
			15	46							
			20	74							dense
		End of Exploration at 21.5'. No groundwater encountered at time of drilling. Installed 1.25" diameter slotted PVC pipe to 21.5'.	25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3Y



GSH

BORING LOG

Page: 1 of 1

BORING: B-26

CLIENT: Ridley's Family Markets

PROJECT NUMBER: 2588-001-18

PROJECT: Proposed Ridley's Family Market Development

DATE STARTED: 4/19/18

DATE FINISHED: 4/19/18

LOCATION: Northeast Corner of Main Street and 400 East, Santaquin, Utah

GSH FIELD REP.: TH

DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger

HAMMER: Automatic

WEIGHT: 140 lbs

DROP: 30"

GROUNDWATER DEPTH: Not Encountered (4/19/18)

ELEVATION: ---

WATER LEVEL	U S C S	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								
	CL	SILTY CLAY with fine and coarse gravel; brown		11		17.0	105				slightly moist stiff
	GP	FINE AND COARSE GRAVEL with fine to coarse sand; light brown	5	45							slightly moist medium dense
	SP	FINE TO COARSE SAND with some fine gravel; light brown	10	50/5"							slightly moist very dense
		End of Exploration at 11.5'. No groundwater encountered at time of drilling. Installed 1.25" diameter slotted PVC pipe to 11.5'.	15								
			20								
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3Z



CLIENT: Ridley's Family Markets PROJECT NUMBER: 2588-001-18
 PROJECT: Proposed Ridley's Family Market Development DATE STARTED: 4/19/18 DATE FINISHED: 4/19/18
 LOCATION: Northeast Corner of Main Street and 400 East, Santaquin, Utah GSH FIELD REP.: TH
 DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger HAMMER: Automatic WEIGHT: 140 lbs DROP: 30"
 GROUNDWATER DEPTH: Not Encountered (4/19/18) ELEVATION: ---

WATER LEVEL	U S C S	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								
	GP FILL	FINE AND COARSE GRAVEL, FILL brown									slightly moist very dense
	CL	SILTY CLAY with gravel; brown		42	X	2.3	128				slightly moist very stiff
	GP	FINE AND COARSE GRAVEL with fine to coarse sand; light brown	5	69	X						slightly moist dense
			10	51	X						medium dense
		End of Exploration at 11.5'. No groundwater encountered at time of drilling. Installed 1.25" diameter slotted PVC pipe to 11.5'.	15								
			20								
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3AA



GSH

BORING LOG

Page: 1 of 1

BORING: B-28

CLIENT: Ridley's Family Markets PROJECT NUMBER: 2588-001-18
 PROJECT: Proposed Ridley's Family Market Development DATE STARTED: 4/19/18 DATE FINISHED: 4/19/18
 LOCATION: Northeast Corner of Main Street and 400 East, Santaquin, Utah GSH FIELD REP.: TH
 DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger HAMMER: Automatic WEIGHT: 140 lbs DROP: 30"
 GROUNDWATER DEPTH: Not Encountered (4/19/18) ELEVATION: ---

WATER LEVEL	U S C S	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								slightly moist
	CL FILL	SILTY CLAY, FILL with fine and coarse gravel; major roots (topsoil) to 5"; light brown		69	X						hard
	CL	SILTY CLAY with some fine sand; light brown	5	65	X	20.1	100				hard
	SP/ SM	FINE TO COARSE SAND with silt and fine and coarse gravel; light brown	10	50/5"	X	1.8		11.2			slightly moist very dense
	GP	FINE AND COARSE GRAVEL with fine to coarse sand; light brown	15	50/5"	X						slightly moist very dense
		End of Exploration at 16.5'. No groundwater encountered at time of drilling. Installed 1.25" diameter slotted PVC pipe to 16.5'.	20								
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3AB



GSH

BORING LOG

Page: 1 of 1

BORING: B-29

CLIENT: Ridley's Family Markets

PROJECT NUMBER: 2588-001-18

PROJECT: Proposed Ridley's Family Market Development

DATE STARTED: 4/19/18

DATE FINISHED: 4/19/18

LOCATION: Northeast Corner of Main Street and 400 East, Santaquin, Utah

GSH FIELD REP.: TH

DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger

HAMMER: Automatic

WEIGHT: 140 lbs

DROP: 30"

GROUNDWATER DEPTH: Not Encountered (4/19/18)

ELEVATION: ---

WATER LEVEL	U S C S	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								
	GP	FINE AND COARSE GRAVEL with fine to coarse sand; major roots (topsoil) to 5"; light brown									slightly moist medium dense
		End of Exploration at 5.0'. No groundwater encountered at time of drilling.	5								
			10								
			15								
			20								
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3AC



GSH

BORING LOG

Page: 1 of 1

BORING: B-30

CLIENT: Ridley's Family Markets

PROJECT NUMBER: 2588-001-18

PROJECT: Proposed Ridley's Family Market Development

DATE STARTED: 4/19/18

DATE FINISHED: 4/19/18

LOCATION: Northeast Corner of Main Street and 400 East, Santaquin, Utah

GSH FIELD REP.: TH

DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger

HAMMER: Automatic

WEIGHT: 140 lbs

DROP: 30"

GROUNDWATER DEPTH: Not Encountered (4/19/18)

ELEVATION: ---

WATER LEVEL	U S C S	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								
	GP	FINE AND COARSE GRAVEL with fine to coarse sand and trace silt; major roots (topsoil) to 5"; brown				1.6		1.3			slightly moist dense
		End of Exploration at 5.0'. No groundwater encountered at time of drilling.	5								
			10								
			15								
			20								
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3AD



GSH

BORING LOG

Page: 1 of 1

BORING: B-31

CLIENT: Ridley's Family Markets

PROJECT NUMBER: 2588-001-18

PROJECT: Proposed Ridley's Family Market Development

DATE STARTED: 4/19/18

DATE FINISHED: 4/19/18

LOCATION: Northeast Corner of Main Street and 400 East, Santaquin, Utah

GSH FIELD REP.: TH

DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger

HAMMER: Automatic

WEIGHT: 140 lbs

DROP: 30"

GROUNDWATER DEPTH: Not Encountered (4/19/18)

ELEVATION: ---

WATER LEVEL	U S C S	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								
	CL	SILTY CLAY with major roots (topsoil) to 5"; black									slightly moist stiff
		grades with fine gravel; light brown	5								
		End of Exploration at 5.0'. No groundwater encountered at time of drilling.									
			10								
			15								
			20								
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3AE



GSH

BORING LOG

Page: 1 of 1

BORING: B-32

CLIENT: Ridley's Family Markets PROJECT NUMBER: 2588-001-18
 PROJECT: Proposed Ridley's Family Market Development DATE STARTED: 4/19/18 DATE FINISHED: 4/19/18
 LOCATION: Northeast Corner of Main Street and 400 East, Santaquin, Utah GSH FIELD REP.: TH
 DRILLING METHOD/EQUIPMENT: 3-3/4" ID Hollow-Stem Auger HAMMER: Automatic WEIGHT: 140 lbs DROP: 30"
 GROUNDWATER DEPTH: Not Encountered (4/19/18) ELEVATION: ---

WATER LEVEL	U S C S	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0								
	GP	FINE AND COARSE GRAVEL with fine to coarse sand; light brown									slightly moist dense
		End of Exploration at 5.0'. No groundwater encountered at time of drilling.	5								
			10								
			15								
			20								
			25								

See Subsurface Conditions section in the report for additional information.

FIGURE 3AF

CLIENT: Ridley's Family Markets
 PROJECT: Proposed Ridley's Family Market Development
 PROJECT NUMBER: 2588-001-18

KEY TO BORING LOG

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	BLOW COUNT	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 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
		GRAVELS WITH FINES (appreciable amount of fines)	GP Poorly-Graded Gravels, Gravel-Sand Mixtures, Little or No Fines
			GM Silty Gravels, Gravel-Sand-Silt Mixtures
		SANDS More than 50% of coarse fraction passing through No. 4 sieve.	CLEAN SANDS (little or no fines)
	SANDS WITH FINES (appreciable amount of fines)		SP Poorly-Graded Sands, Gravelly Sands, Little or No Fines
		FINE-GRAINED SOILS More than 50% of material is smaller than No. 200 sieve size.	SILTS AND CLAYS Liquid Limit less than 50%
CL Inorganic Clays of Low to Medium Plasticity, Gravelly Clays, Sandy Clays, Silty Clays, Lean Clays			
OL Organic Silts and Organic Silty Clays of Low Plasticity			
SILTS AND CLAYS Liquid Limit greater than 50%	MH Inorganic Silts, Micaceous or Diatomaceous 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	









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

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

FIGURE 4

