GSH

REPORT
GEOTECHNICAL STUDY
PROPOSED TACO BELL RESTAURANT
12600 SOUTH KIMBER LANE
RIVERTON, UTAH

Submitted To:

Desert De Oro Foods, Inc./Gen2 Utah Properties, LLC
P.O. Box 4179
Kingman, AZ 86401

Submitted By:

GSH Geotechnical, Inc.
473 West 4800 South
Salt Lake City, Utah 84123

May 10, 2016

Job No. 1558-003-16

RC. BKM

Taco Bell
16-8007

May 10 2016
Job No. 1558-003-16

Ms. Carmen Onken
Desert De Oro Foods, Inc./Gen2 Utah Properties, LLC
P.O. Box 4179
Kingman, AZ 86401

Ms. Onken:

Re: Report
Geotechnical Study
Proposed Taco Bell Restaurant
12600 South Kimber Lane
Riverton, Utah

1. INTRODUCTION

1.1 GENERAL

This report presents the results of our geotechnical study performed at the site of the proposed Taco Bell restaurant located at 12600 South Kimber Lane in Riverton, Utah. The general location of the site with respect to major topographic features and existing facilities, as of 2016, is presented on Figure 1, Vicinity Map. A more detailed layout of the site showing the existing proposed development is presented on Figure 2, Site Plan. The locations of the test pits excavated 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 between Ms. Carmen Onken of Desert De Oro Foods, Inc. and Mr. Alan Spilker of GSH Geotechnical, Inc. (GSH).

In general, the objectives of this study were to:

1. Accurately 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.

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

1. A field program consisting of the excavating, logging, and sampling of 5 test pits.

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. 15-1223 dated December 8, 2015.

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 test pits, 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

A single-story restaurant structure with a footprint of approximately 2,000 square feet is proposed for the site. It is anticipated that the structure will be of wood-frame construction with a stone/stucco veneer established slab on grade.

Structural loads will be transmitted down through columns and bearing walls to the supporting foundations. Maximum column and wall loads are anticipated to be on the order of 30 to 50 kips and 3 to 4 kips per lineal foot, respectively. At-grade floor slab loads will be relatively light, on the order of 200 pounds per square foot.

Site development will require a minimal amount of earthwork in the form of site grading. We estimate that maximum cuts and fills will be on the order of 1 to 2 feet to achieve design grades.

At-grade paved parking and drive areas will be part of the overall development. Projected traffic within access roadways and drive-thru areas will consist of a moderate volume of automobiles

and light trucks and a light volume of medium- and heavy-weight trucks. In parking areas, projected traffic will consist of a light volume of automobiles and light trucks and occasional medium-weight trucks.

3. SITE INVESTIGATIONS

3.1 FIELD PROGRAM

In order to define and evaluate the subsurface soil and groundwater conditions, 5 test pits were excavated to depths ranging from 5.0 to 15.5 feet below existing grades. The test pits were excavated using a rubber tire-mounted backhoe. Locations of the 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 excavation 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 have been supplemented by subsequent inspection and testing in our laboratory. Detailed graphical representation of the subsurface conditions encountered is presented on Figures 3A through 3E, Log of Test Pits. Soils were classified in accordance with the nomenclature described on Figure 4, Key to Test Pit Log (USCS).

A 2.42-inch inside diameter thin-wall drive sampler was utilized in the subsurface sampling at the site.

Following completion of the test pit excavations, 1.25-inch diameter slotted PVC pipe was installed in Test Pit TP-2 to provide a means of monitoring the groundwater fluctuations. Subsequent to installing the pipe, each test pit was backfilled. Although an effort was made to compact the backfill with the backhoe, backfill was not placed in uniform lifts and compacted to a specific density. Consequently, settlement of the backfill with time is likely to occur.

3.2 LABORATORY TESTING

In order to provide data necessary for our engineering analyses, a laboratory testing program was performed. The program included partial and full gradation, Atterberg limits, consolidation, and chemical tests. The following paragraphs describe the tests and summarize the test data.

3.2.1 Gradation Tests

Full and partial gradation tests were performed to aid in classifying soils. The test results are tabulated on the table on the following page and are presented on the Test Pit Logs, Figures 3A through 3E.

Test Pit No.	Depth (feet)	Percent Passing Sieve										
		3"	2"	1"	3/4"	3/8"	No. 4	No. 10	No. 40	No. 100	No. 200	Soil Classification
TP-1	1.0	100	100	100	86.3	72.5	64.9	59.6	51.1	39.1	32.6	SM (Fill)
TP-1	7.0	---	---	---	---	---	---	---	---	---	74.1	CL
TP-2	9.0	---	---	---	---	---	---	---	---	---	60.9	CL
TP-2	15.0	---	---	---	---	---	---	---	---	---	17.5	SM

3.2.2 Atterberg Limits Test

To aid in classifying the soils, an Atterberg limits test was performed on a sample of the fine-grained cohesive soils. Results of the test are tabulated below:

Test Pit No.	Depth (feet)	Liquid Limit (percent)	Plastic Limit (percent)	Plasticity Index (percent)	Soil Classification
TP-2	6.0	42	31	11	ML

3.2.3 Consolidation Tests

To provide data necessary for our settlement analyses, consolidation tests were performed on each of 2 representative samples of the fine-grained soils encountered. The results indicate that the tested finer-grained soils are slightly to moderately over-consolidated and will exhibit moderate 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.

3.2.4 Chemical Tests

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

Test Pit No.	Depth (feet)	Soil Classification	pH	Total Water Soluble Sulfate (mg/kg-dry)
TP-3	1.5	CL (Fill)	8.42	<5.81

4. SITE CONDITIONS

4.1 SURFACE

The site of the proposed Taco Bell restaurant is located at 12600 South Kimber Lane in Riverton, Utah. At the time of the field investigation, the site was vacant/undeveloped and the surface had been grubbed and graded.

The site is relatively flat with a slight downward slope to the northeast with and overall relief of approximately of 2 to 3 feet.

The site is bounded to the north by single-family residences, to the east by a McDonald's restaurant with a Mountain America Credit Union beyond, to the south by 12600 South Street with a vacant/undeveloped lot beyond, and to the west by Kimber Lane with a cellular tower transmitting facility beyond.

4.2 SUBSURFACE SOIL AND GROUNDWATER

The soil conditions encountered in each of the borings, to the depths penetrated, were relatively similar. Encountered from the surface and extending to depth ranging from 1.0 to over 5.0 feet was non-engineered fill consisting of silty sand, silty clay, and gravel. The review of historical aerial photographs indicates that a small residential structure was present on the southwest corner of the parcel and has since been demolished. Deeper fills are likely associated with foundations previously constructed and subsequently demolished at the site.

Underlying the fill soils and extending to the maximum depths of 10.5 feet in Test Pit TP-1, 5.0 feet in TP-3, 5.5 feet in TP-5, and 11.5 feet in TP-2 was native silty clay with varying silt and sand content. Underlying the clay in Test Pit TP-2 was 2.5 feet of fine and coarse gravel with sand. The gravel was underlain by silty fine to coarse sand that extended to the maximum depth explored of 15.5 feet below ground surface.

The native clay soils were dry to slightly moist, medium stiff to very stiff, and brown in color. The native clay soils are anticipated to exhibit moderate strength and compressibility characteristics under the designed load range.

The native granular soils were dry to slightly moist, medium dense, and brown in color. The native granular soils are anticipated to exhibit relatively high strength and relatively low compressibility characteristics under the designed load range.

During drilling operations, groundwater was not encountered at the maximum explored depth of 15.5 feet. Seasonal and longer-term groundwater fluctuations on the order of 1 to 2 feet are projected. The highest seasonal levels generally occur during the late spring and early summer months.

5. DISCUSSIONS AND RECOMMENDATIONS

5.1 SUMMARY OF FINDINGS

The geotechnical aspect of the site that will most influence the design and construction of the proposed structure and pavements is loose and disturbed surficial fill soils encountered to a depth greater than 5.0 feet below existing grades at the test pit locations.

All non-engineered fills must be removed below all foundations. The in-situ, non-engineered fills may remain below pavements and floor slabs if free of any deleterious materials and are properly prepared, as discussed later in this report. Any loose fill piles across the surface must be completely removed.

Our analysis indicates that the proposed structure may be supported upon conventional spread and continuous wall foundations supported upon natural suitable soils and/or structural fill extending to natural suitable soils.

Detailed discussions pertaining to earthwork, foundations, lateral resistance, floor slabs, pavements, and the geoseismic setting of the site are discussed in the following sections.

5.2 EARTHWORK

5.2.1 Site Preparation

Preparation of the site must consist of the removal of all loose surficial soils, surface vegetation, topsoil, and other deleterious materials from beneath an area extending at least 3 feet beyond the perimeter of the proposed building, pavement, and exterior flatwork areas.

All non-engineered fills must be removed below all foundations. In-situ, non-engineered fills less than 3.0 feet in total thickness may remain below floor slabs and pavements if free of debris and deleterious materials and if properly prepared. Proper preparation below pavements will consist of the scarification of the upper 12 inches below asphalt concrete (flexible pavement) and 24 inches below rigid pavement/floor slabs followed by moisture preparation and re-compaction to the requirements of structural fill. The thicker sequence of prepared soils below slabs/rigid pavements would require the temporary removal of 12 inches of fill, scarifying, moisture conditioning, and recompacting the underlying 12 inches and backfilling with 12 inches of compacted suitable fills. In areas where the fill is thicker than 3.0 feet, proper preparation below pavements will consist of the temporary removal of 12 inches of fill, scarifying, moisture conditioning, and recompacting the underlying 12 inches and backfilling with 12 inches of compacted suitable fills.

It must be noted that from a handling and compaction standpoint, on-site 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 recompacting. As an alternative, the fills may be removed and replaced with imported granular structural fill over unfrozen, proof rolled subgrade. Even with proper preparation, pavements/slabs established overlying non-engineered fills may encounter some long-term movements unless the non-engineered fills are completely removed. Installing reinforcement in slabs over fills may help reduce potential displacement cracking.

Subsequent to the above operations and prior to the placement of footings, structural site grading fill, floor slabs, or pavements, the exposed natural subgrade must be proof rolled by running moderate-weight rubber tire-mounted construction equipment uniformly over the surface at least 3 times. If excessively soft or otherwise unsuitable soils are encountered beneath footings, they must be totally removed. In pavement, floor slab, and outside flatwork areas, unsuitable natural soils shall be removed to a maximum depth of 2 feet and replaced with compacted granular structural fill.

Surface vegetation and other deleterious materials shall generally be removed from the site. Topsoil, a loose surficial soil, although unsuitable for utilization as structural fill, may be stockpiled for subsequent landscaping purposes.

5.2.2 Excavations

Temporary construction excavations not exceeding 4 feet in depth may be constructed with near-vertical sideslopes. Temporary excavations up to 8 feet deep in cohesive soils may be constructed with sideslopes no steeper than one-half horizontal to one vertical (0.5H:1V). Temporary excavations deeper than 8 feet are not anticipated at the site. If excessive sloughing occurs and/or if layers of clean granular material are encountered, the sideslopes must be flattened and dewatering and/or shoring provided.

To reduce disturbance, we recommend that excavation be accomplished utilizing a backhoe with a smooth-lip bucket.

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, dock-height fill, and as replacement fill below the building. Structural site grading fill is defined as fill placed over fairly large open areas to raise overall site grades.

All structural fill must be free of sod, organic material, rubbish, debris, frozen soil, and other deleterious materials. All imported granular structural fill shall consist of a fairly well graded mixture of sand and gravel with the maximum fines content (material passing the No. 200 sieve) not exceeding 18 percent. The plasticity index of fine-grained soils, if used as site grading fill from on-site or imported sources, must not exceed 18 percent.

For structural site grading fill, the maximum particle size shall generally not exceed 4 inches or two-thirds the thickness of the fill, whichever is less; 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 should generally be restricted to 2.5 inches.

The on-site natural soils may be utilized as structural site grading fill if they meet the requirements as stated above. However, clayey soils will be difficult, if not impossible, to place and compact as structural fill during colder weather and/or periods of precipitation.

All imported granular structural fill should consist of a fairly well-graded mixture of sand and gravel with the maximum fines content (material passing the No. 200 sieve) not exceeding 18 percent. Only granular soils are recommended as structural fill below foundations and in confined areas, such as backfill around foundations or within utility trenches.

Non-structural site grading fill is defined as all fill material not designated as structural fill and may consist of any cohesive or granular soils not containing excessive amounts of degradable material.

To stabilize soft subgrade conditions or where structural fill is required to be placed below a level one foot above the water table at the time of construction, a mixture of coarse gravels and cobbles and/or 1.5- to 2.0-inch gravel (stabilizing fill) should be utilized.

5.2.4 Fill Placement and Compaction

Coarse 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 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.

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] T-180 (ASTM[2] D-1557) 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 3 feet beyond the perimeter of the structure	0 to 10	95
Outside area defined above	0 to 5	90
Outside area defined above	5 to 10	92

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.

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.

5.2.5 Utility Trenches

All utility trench backfill material below structurally loaded facilities (flatwork, floor slabs, paved areas, etc.) should be placed to the same material and density requirements established for structural fill. If the surface of the backfill becomes disturbed during the course of construction, the backfill should be proof rolled and/or properly compacted prior to the construction of any exterior flatwork over a backfilled trench. Proof rolling may 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 should 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

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

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 D-1557) method of compaction.

On-site fine-grained cohesive (clayey) soils are not recommended for use as trench backfill.

5.3 SPREAD AND CONTINUOUS WALL FOUNDATIONS

5.3.1 Design Data

The results of our analyses indicate that the proposed structures may be supported upon conventional spread and/or continuous wall foundations established upon suitable natural soils and/or structural fill extending to suitable natural soil. For design, the following parameters are recommended:

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 Pressure for Real Load Conditions	- 1,500 pounds per square foot
Bearing Pressure Increase for Seismic Loading	- 50 percent

The term "net bearing pressure" refers to the 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.

5.3.2 Installation

Under no circumstances shall the footings be established upon loose or disturbed soils, sod, rubbish, construction debris, non-engineered fill, other deleterious materials, frozen soils, or within ponded water. If unsuitable soils are encountered, they must be removed and replaced

with compacted structural fill. If granular structural fills become loose or disturbed, they must be recompacted to the requirements for structural fill.

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

5.3.3 Settlements

Settlements of foundations designed and installed in accordance with the above recommendations and supporting maximum loads, as discussed in Section 2, Proposed Construction, are anticipated to be less than 1 inch. Settlements will occur rapidly with approximately 50 to 60 percent of the quoted settlements occurring during construction.

5.4 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 0.40 should be utilized for footings established upon natural soils or structural fills. 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, if encountered, 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.

5.5 FLOOR SLABS

Floor slabs shall be established upon suitable natural soils, structural fill extending to suitable soils, or properly prepared fills. Under no circumstances shall floor slabs be established upon unprepared non-engineered fill, topsoil, loose/disturbed soils, sod, rubbish, deleterious materials, frozen soils, or within ponded water. In order to provide a capillary break and to facilitate curing of the concrete, it is recommended that floor slabs/exterior flatwork 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 (average uniform pressure of 200 pounds per square foot) is anticipated to be on the order of one-quarter of an inch.

5.6 PAVEMENTS

The existing natural silty clay soils and non-engineered fill soil encountered at the site will exhibit poor pavement characteristics when saturated or near saturated. Considering silty clay as

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 Heavy-Weight Trucks)
[1 equivalent 18-kip axle load per day]

Flexible:

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

Rigid:

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

Primary Drive Lanes

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

Flexible:

3.0 inches	Asphalt concrete
8.0 inches	Aggregate base

	Over	Properly prepared natural soils and/or structural site grading fill extending to suitable natural soils.
Rigid:		
	5.5 inches	Portland cement concrete (non-reinforced)
	4.0 inches	Aggregate base
	Over	Properly prepared natural soils and/or structural site grading fill extending to suitable natural soils.

For dumpster pads, we recommend a pavement section consisting of 6.5 inches of Portland cement concrete, 4.0 inches of aggregate base, over properly prepared natural subgrade or site grading structural fills.

These rigid pavement sections are for non-reinforced Portland cement concrete. Construction of the rigid pavement should be in sections 10 to 12 feet in width with construction or expansion joints or one-quarter depth saw-cuts on no more than 12-foot centers. Saw-cuts must be completed within 24 hours of the "initial set" of the concrete and should be performed under the direction of the concrete paving contractor. 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.

5.7 CEMENT TYPES

The laboratory tests indicate that the natural soils tested contain a negligible amount of water soluble sulfates. Based on our test results, concrete in contact with the on-site soil will have a low potential for sulfate reaction (ACI 318, Table 4.3.1). Therefore, all concrete which will be in contact with the site soils may be prepared using Type I or IA cement.

5.8 GEOSEISMIC SETTING

5.8.1 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).

5.8.2 Faulting

Based upon our review of available literature, no active faults are known to pass through or immediately adjacent to the site. The site is located outside fault investigation zones identified by Salt Lake County. The nearest active fault is the Salt Lake Section of the Wasatch Fault, approximately 5.6 miles east of the site.

5.8.3 Soil Class

For dynamic structural analysis, the Site Class D - Stiff Soil Profile as defined in Table 1613.5.2, Site Class Definitions, of the IBC 2015 can be utilized.

5.8.4 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 following table 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 (40.52271 degrees north and 111.94549 degrees west, respectively), the values for this site are tabulated below:

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	52.9	F_a = 1.000	52.9	35.3
0.2 Seconds (Short Period Acceleration)	S_S = 132.3	F_a = 1.000	S_{MS} = 132.3	S_{DS} = 88.2
1.0 Second (Long Period Acceleration)	S_1 = 44.1	F_v = 1.559	S_{M1} = 68.8	S_{D1} = 45.9

5.8.5 Liquefaction

The site is located in an area that has been identified by Salt Lake County as having a "very low" liquefaction potential. 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.

Liquefaction is not anticipated to occur at the site during the design seismic event due to the dense nature of the granular soils encountered and the lack of a shallow groundwater table at the site.

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
Staff Engineer/Geologist

Reviewed by:

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

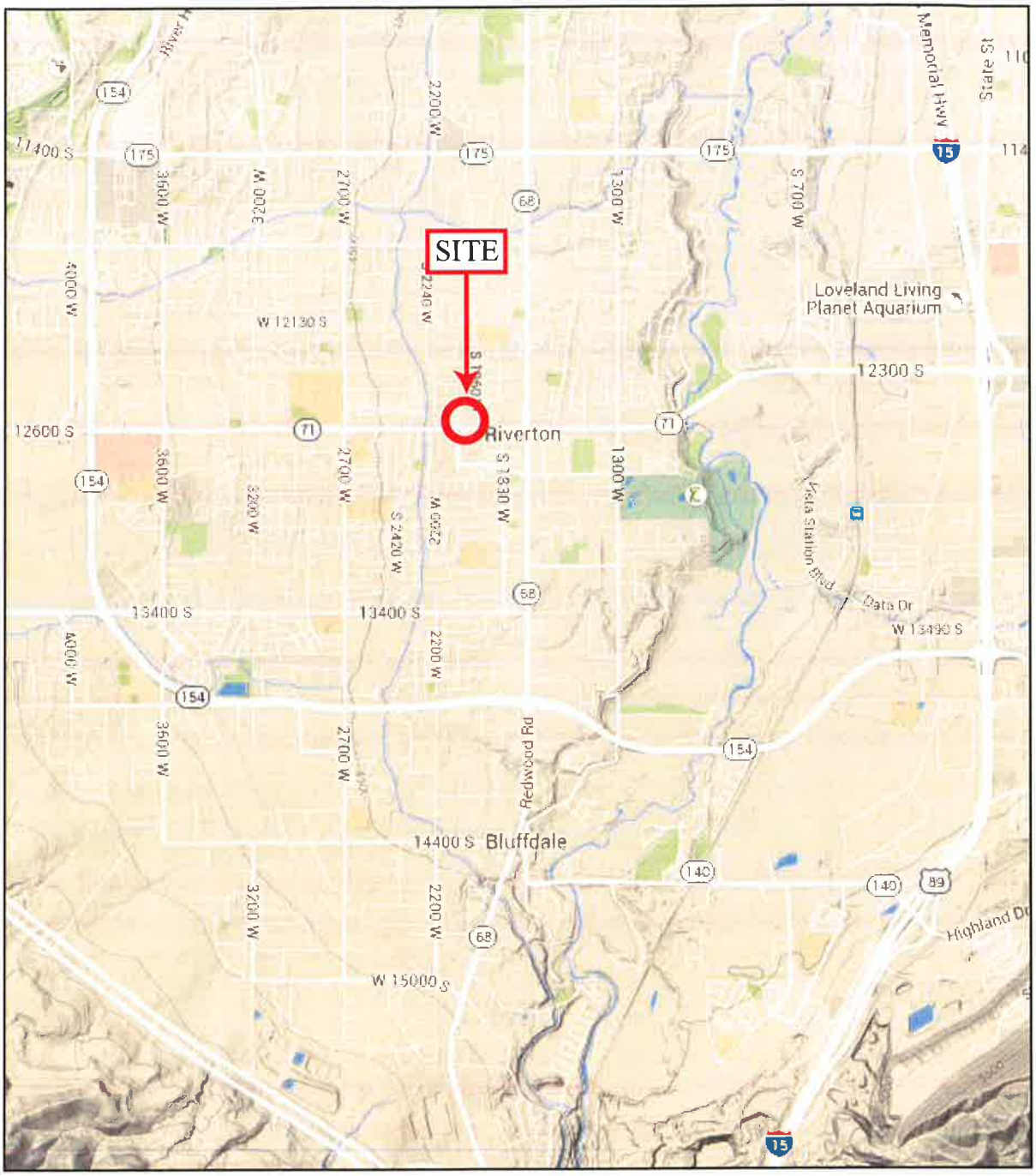
REGISTERED PROFESSIONAL ENGINEER
No. 334228
ALAN D. SPILKER
STATE OF UTAH

RAG/ADS:jlh

Encl. Figure 1, Vicinity Map
Figure 2, Site Plan
Figures 3A through 3E, Log of Test Pits
Figure 4, Key to Test Pit Log (USCS)

cc: Mr. Brad Doeden, AIA, LEED AP
GLMV Architecture
1525 East Douglas
Wichita, Kansas 67211

DESERT DE ORO FOODS, INC/GEN2 UTAH PROPERTIES, LLC
JOB NO. 1558-003-16



1 0 1 2 3 4 KM 5

1 0 1 MI 2

FIGURE 1
VICINITY MAP

REFERENCE:
ALL TRAILS - NATIONAL GEOGRAPHIC TERRAIN
DATED 2016

GSH

DESERT DE ORO FOODS, INC/GEN2 UTAH PROPERTIES, LLC
JOB NO. 1558-003-16

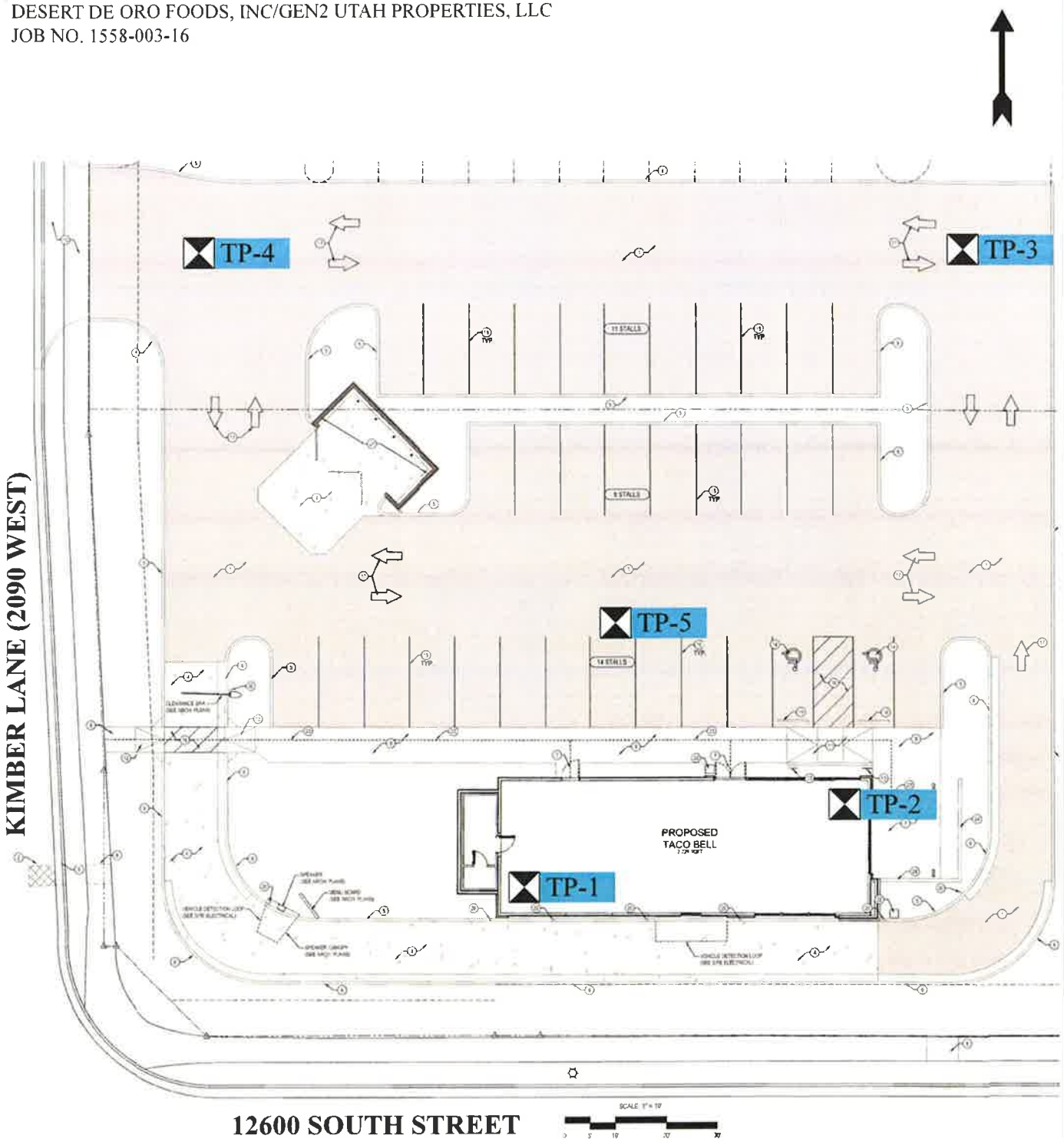


FIGURE 2
SITE PLAN

REFERENCE:
ADAPTED FROM DRAWING ENTITLED
"TACO BELL, C1.01" BY MCNEIL ENGINEERING
NOT DATED

GSH

GSH — TEST PIT LOG

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TEST PIT: TP-1

CLIENT: Desert De Oro Foods, Inc/Gen2 Utah Properties, LLC — PROJECT NUMBER: 1558-003-16

PROJECT: Proposed Taco Bell Restaurant — DATE STARTED: 4/25/16 — DATE FINISHED: 4/25/16

LOCATION: 12600 South Kimber Lane, Riverton, Utah — GSH FIELD REP.: ZM

EXCAVATING METHOD/EQUIPMENT: JCB 214S - Backhoe

GROUNDWATER DEPTH: Not Encountered (4/25/16) — ELEVATION: ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0							
	SM FILL	SILTY FINE TO COARSE SAND, FILL with some fine gravel; major roots (topsoil) to 4"; brown								loose to 4" dry
					9.3		32.6			slightly moist
										medium dense
	CL	SILTY CLAY with some fine sand; brown								moist
					13.2	91				very stiff
			5							slightly moist
		grades with white oxidation								
					12.5		74.1			
										dry
			10							
		End of Exploration at 16.0'								
		No significant sidewall caving.								
		No groundwater encountered at time of excavation.								
			15							
			20							
			25							

See Subsurface Conditions section in the report for additional information.

FIGURE 3A

GSH

TEST PIT LOG

Page: 1 of 1

TEST PIT: TP-2

CLIENT: Desert De Oro Foods, Inc/Gen2 Utah Properties, LLC — PROJECT NUMBER: 1558-003-16

PROJECT: Proposed Taco Bell Restaurant — DATE STARTED: 4/25/16 — DATE FINISHED: 4/25/16

LOCATION: 12600 South Kimber Lane, Riverton, Utah — GSH FIELD REP.: ZM

EXCAVATING METHOD/EQUIPMENT: JCB 214S - Backhoe

GROUNDWATER DEPTH: Not Encountered (4/25/16) — ELEVATION: ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0							
	SM FILL	SILTY FINE TO COARSE SAND, FILL major roots (topsoil) to 4"; brown								loose to 4" slightly moist
	CL	SILTY CLAY with some fine sand; brown			15.2	83				very stiff
		grades with occasional layers up to 6" thick of clayey silt	5							
								42	11	
		grades with oxidation								dry
		grades fine sandy clay			15.0		60.9			
			10							
	GP	COARSE TO FINE GRAVEL with some fine to medium sand; brown								dry medium dense
	SM	SILTY FINE TO COARSE SAND with some fine gravel and silt; brown								slightly moist medium dense
			15		8.1		17.5			
		End of Exploration at 15.5' No significant sidewall caving. No groundwater encountered at time of excavation. Installed 1.25" diameter slotted PVC pipe to 15.5'.								
			20							
			25							

See Subsurface Conditions section in the report for additional information.

FIGURE 3B

GSH	TEST PIT LOG Page: 1 of 1	TEST PIT: TP-4

CLIENT: Desert De Oro Foods, Inc/Gen2 Utah Properties, LLC — PROJECT NUMBER: 1558-003-16

PROJECT: Proposed Taco Bell Restaurant — DATE STARTED: 4/25/16 — DATE FINISHED: 4/25/16

LOCATION: 12600 South Kimber Lane, Riverton, Utah — GSH FIELD REP.: ZM

EXCAVATING METHOD/EQUIPMENT: JCB 214S - Backhoe

GROUNDWATER DEPTH: Not Encountered (4/25/16) — ELEVATION: ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0							
	CL FILL	SILTY CLAY, FILL with some fine sand; major roots (topsoil) to 4"; brown								loose to 4" moist medium stiff
		End of Exploration at 5.0' No significant sidewall caving. No groundwater encountered at time of excavation.	5							
			10							
			15							
			20							
			25							

See Subsurface Conditions section in the report for additional information.

FIGURE 3D

GSH

TEST PIT LOG

Page: 1 of 1

TEST PIT: TP-5

CLIENT: Desert De Oro Foods, Inc/Gen2 Utah Properties, LLC — PROJECT NUMBER: 1558-003-16

PROJECT: Proposed Taco Bell Restaurant — DATE STARTED: 4/25/16 — DATE FINISHED: 4/25/16

LOCATION: 12600 South Kimber Lane, Riverton, Utah — GSH FIELD REP.: ZM

EXCAVATING METHOD/EQUIPMENT: JCB 214S - Backhoe

GROUNDWATER DEPTH: Not Encountered (4/25/16) — ELEVATION: ---

WATER LEVEL	USCS	DESCRIPTION	DEPTH (FT.)	SAMPLE SYMBOL	MOISTURE (%)	DRY DENSITY (PCF)	% PASSING 200	LIQUID LIMIT (%)	PLASTICITY INDEX	REMARKS
		Ground Surface	0							
	GP FILL	COARSE TO FINE GRAVEL, FILI with some fine sand; major roots (topsoil) to 1"; brown								loose to 4" dry
	CL	SILTY CLAY with some fine sand; brown								slightly moist medium stiff
			5							very stiff
		End of Exploration at 5 5' No significant sidewall caving. No groundwater encountered at time of excavation.								
			10							
			15							
			20							
			25							

See Subsurface Conditions section in the report for additional information.

FIGURE 3E

CLIENT: Desert De Oro Foods, Inc/Gen2 Utah Properties, LLC
PROJECT: Proposed Taco Bell Restaurant
PROJECT NUMBER: 1558-003-16

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	MODIFIERS	MOISTURE CONTENT (FIELD TEST):
Weakly: Crumbles or breaks with handling or slight finger pressure.	**Trace** <5%	**Dry:** Absence of moisture, dusty, dry to the touch.
Moderately: Crumbles or breaks with considerable finger pressure.	**Some** 5-12%	**Moist:** Damp but no visible water.
Strongly: Will not crumble or break with finger pressure.	**With** > 12%	**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 4

GSH