Gordon Spilker Huber
Geotechnical Consultants, Inc.

REPORT
GEOTECHNICAL STUDY
PROPOSED STATE LIQUOR STORE ADDITION
1255 NORTH TEMPLE
SALT LAKE CITY, UTAH

Submitted To:

Eaton Architecture LLC
77 West 200 South, Suite 302
Salt Lake City, Utah 84101

Submitted By:

Gordon Spilker Huber Geotechnical Consultants, Inc.
4426 South Century Drive, Suite 100
Salt Lake City, Utah 84123

October 17, 2007

Job No. 0005-007-07

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Eaton Architecture LLC
77 West 200 South, Suite 302
Salt Lake City, Utah 84101

Attention: Mr. Bob Eaton

Gentlemen:

Re: Report
Geotechnical Study
Proposed State Liquor Store Addition
1255 North Temple
Salt Lake City, Utah

1. INTRODUCTION

1.1 GENERAL

This report presents the results of our geotechnical study performed at the site of the proposed State Liquor Store building addition, which is located at 1255 North Temple in Salt Lake City, Utah. The proposed building addition will be located on the south side of the existing liquor store. The general location of the site with respect to major topographic features and existing facilities, as of 1998, is presented on Figure 1, Vicinity Map. A more detailed layout of the site with respect to adjoining roadways and other facilities, on an air photo base, is presented on Figure 2, Area Map. A map showing the locations of the proposed building and pavement areas, along with existing buildings and streets, is presented on Figure 3, Site Plan. The locations of the borings drilled in conjunction with this study are also presented on Figure 3.

1.2 OBJECTIVES AND SCOPE

The objectives and scope of our study were planned in discussions between Mr. Bob Eaton of Eaton Architecture LLC, and Mr. Bill Gordon of Gordon Spilker Huber Geotechnical Consultants, 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, and pavement recommendations 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 drilling, logging, and sampling of 2 exploration borings extending to depths of 16 to 31 feet.

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. 07-1016 dated October 10, 2007.

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 existing development includes a single-story building, paved driveways, and parking areas. An addition will be added to the south side of the existing building. Layouts of the existing and proposed facilities are shown on Figure 3.

General information provided by Eaton Architecture, LLC indicates that the building addition will be approximately 3,000 square feet in area, one-level, and will be constructed slab-on-grade. The building will be of light steel-frame and masonry/block construction. The projected real wall loads will range from 2 to 3 kips per lineal foot. Projected real column loads will range from 50 to 80 kips. Real loads are defined as the total of all dead plus frequently applied (reduced) live loads. The average uniform floor slab loads should be on the order of 150 to

200 pounds per square foot. Loads associated with the addition are not proposed to be imposed upon the existing structure. The floor slab of the addition will match the existing building floor slab.

A dock-height loading/unloading ramp is proposed to be constructed at the southwest corner of the proposed addition. The loading ramp will slope downward approximately four feet below existing grade.

The pavement areas will consist primarily of asphalt-paved driveways and parking areas. Pavements will include roadways entering and exiting the parking lot areas, as well as the driveway that circles the building. Traffic over the roadways will consist of a light to moderate volume of automobiles and light trucks, a light volume of medium-weight trucks, and occasional heavy-weight trucks.

Site grading cuts and fills of one to two feet are anticipated.

3. SITE INVESTIGATIONS

3.1 FIELD PROGRAM

In order to define and evaluate the subsurface soil and groundwater conditions within the area of the proposed building footprint, 2 borings were drilled to depths of 16 to 31 feet with a truck-mounted drill rig equipped with hollow-stem augers. Locations of the borings drilled in conjunction with this study are presented on Figure 3. A boring was extended to a depth of 31 feet to address the liquefaction potential.

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, relatively undisturbed and small disturbed 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 4A and 4B, Log of Borings. Soils were classified in accordance with the nomenclature described on Figure 5, Unified Soil Classification System.

A 3.25-inch outside diameter, 2.42-inch inside diameter drive sampler (Dames & Moore) was utilized in the majority of the subsurface sampling at the site. Additionally, a 2.0-inch outside diameter, 1.38-inch inside diameter drive sampler (SPT) was utilized at select locations. 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, one and one-quarter-inch diameter slotted PVC pipe was installed in Borings B-1 and B-2 in order to provide a means of monitoring the groundwater fluctuations.

3.2 LABORATORY TESTING

3.2.1 General

In order to provide data necessary for our engineering analyses, a laboratory testing program has been performed. The testing program included moisture, density, 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 the consolidation test data, moisture and density tests were performed on selected undisturbed samples. The results of these tests are presented on the boring logs, Figures 4A and 4B.

3.2.3 Consolidation Tests

To provide data necessary for our settlement analyses, a consolidation test was performed on a representative sample of the near-surface fine-grained cohesive soils. The results of the test indicate that the soils are moderately over-consolidated and when loaded below the over-consolidation pressure will exhibit relatively low compressibility characteristics. 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. The results of the chemical tests are tabulated below:

Test Pit No.	Depth (feet)	pH	Total Water Soluble Sulfate (mg/kg-dry)
B-2	5.0	7.2	200

4. SITE CONDITIONS

4.1 SURFACE

The site is located at 1255 North Temple in Salt Lake City, Utah, is rectangular in shape, and is presently occupied by a state liquor store building. Paved parking areas and driveways exist immediately west of the building. The remaining area of the site to the south is presently unpaved and utilized primarily as a storage area.

The north property boundary is formed by North Temple Street, followed by commercial and residential structures. The property to the east consists of an unpaved parking area. The property to the west is occupied by a commercial building and paved parking. The south property boundary is occupied by a power plant facility. The site is fairly level with a gentle overall downward slope to the north. The relief across the site is approximately two to three feet.

4.2 SUBSURFACE SOIL

The soil conditions encountered in each of the borings, to the depths penetrated, consist primarily of two natural soil types and surface fills, silty clays with some fine sand, and silty fine to coarse sands. The clays are moist to saturated, medium stiff to stiff, brown grading to gray with depth and extend from beneath the surface fills to depths of 8 to 13 feet in Borings B-1 and B-2, respectively. Underlying the silty clays are moist to saturated, loose to medium dense, and brown grading to gray with depth. The soils extend to the depth penetrated by Boring B-2, 17 feet, and to a depth of 23 feet in Boring B-1. Gray silty clays underlie the sands in Boring B-1 and extend to the depth penetrated, 31.5 feet. Fills consisting of silty fine and coarse gravel with some fine to coarse sand were encountered to depths of three and one-half to four feet. The fills exhibit variable and possibly poor engineering characteristics. The natural silty clay below the fill zone will exhibit moderate strength and compressibility characteristics within the anticipated loading range. A prominent sand layer was identified from approximately 8 to 23 feet in Boring B-1.

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.

4.3 GROUNDWATER

To facilitate monitoring future groundwater fluctuations and before backfilling Borings B-1 and B-2, a one and one-quarter-inch diameter slotted PVC pipe was installed. The following chart summarizes the groundwater levels measured:

Boring No.	Groundwater Depth (feet)	
	September 12, 2007	**September 26, 2007**
B-1	8.5	9.2
B-2	14.0	9.3

Seasonal and longer-term groundwater fluctuations on the order of one to two feet are projected, with the highest seasonal levels generally occurring during the late spring and early summer months.

5. DISCUSSIONS AND RECOMMENDATIONS

5.1 SUMMARY OF FINDINGS

The most significant geotechnical aspect of the site is the surficial fills that range in depth from three and one-half to four feet at the boring locations. The existing fills, although granular, were observed to be inconsistent in composition and, in our opinion, should be considered non-engineered. Non-engineered fills generally exhibit variable and, in many cases, very poor engineering characteristics. Unless the fills can be shown to have been properly placed and compacted through documentation or in-place density testing, they should not be considered suitable to support footings or floor slabs.

The proposed structure can be supported upon conventional spread and continuous wall foundations proportioned utilizing a net bearing pressure of 2,500 pounds per square foot. The footings must be established directly upon the upper suitable natural near-surface clay soils and/or structural fill extending to suitable natural soil. The fill soils encountered may be re-utilized as structural fill within the building area.

In the following sections, detailed discussions pertaining to earthwork, spread and continuous wall foundations, lateral resistances, floor slabs, pavements, and the geoseismic setting of the site are provided.

5.2 EARTHWORK

5.2.1 Site Preparation

Prior to initiation of site preparation operations, all utility lines which pass beneath the proposed building addition must be abandoned or relocated. Subsequently, all surface vegetation, topsoil, and other deleterious material must be stripped from an area extending out at least three feet from the perimeter of all areas which will be structurally loaded. This includes the building footprint and areas of proposed outside flatwork and pavements. Topsoil is defined as the zone of soil containing major roots. Field data indicates that the depth of the topsoil is generally less than two to three inches. Subsequently, all except the bottom nine inches of the surface non-engineered fills must also be removed from an area extending out three feet from the building footprint. These non-engineered fills may be left in place in other areas if properly prepared.

Prior to the placement of any structural site grading fill, floor slabs, foundations, etc., the remaining nine inches of the fills within the building footprint area and the upper portion of the fills in pavement areas must be scarified, moisture prepared, and recompacted to the requirements for structural fill. Natural soils must be proofrolled by running over the surface continuously at least three times with moderate-weight rubber tire-mounted construction equipment. If any soft or unstable soil zones are encountered in pavement or outside flatwork areas, the unsuitable soils must be removed to a maximum depth of two feet and replaced with compacted granular fill. In foundation areas, all unsuitable soils must be removed.

5.2.2 Excavations

Temporary construction excavations not exceeding four feet in depth through cohesive soils above or below the water table may be constructed with near-vertical sideslopes. For excavations up to eight feet through cohesive soils above or below the water table, sideslopes should be no steeper than one-half horizontal to one vertical. If granular soils are encountered above the water table, sideslopes should be flattened to three-quarters horizontal to one vertical. If below the water table, the slopes must be further flattened.

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 may be required as site grading fill, possibly as replacement fill below some foundations, and as backfill over foundations and utilities. Either fine-grained and/or granular soils may be utilized as site grading fill. Site grading fill is defined as fill placed over fairly large open areas to raise overall site grade. The on-site fine-grained soils can be utilized as structural site grading fill but will require extremely close moisture control during placement and compaction. This will be very difficult, except during the late spring to mid fall months.

All structural fill must be free of sod, rubbish, construction debris, frozen soil, and other deleterious materials. The maximum particle size within structural site grading fill should generally not exceed four inches; although, occasional particles up to six to eight inches may be incorporated provided that they do not result in “honeycombing” or preclude the obtainment of the desired degree of compaction In confined areas, the maximum particle size should not exceed two and one-half inches. The maximum amount of fines within granular imported material should generally be restricted to 18 percent. Fine-grained soils utilized as structural site grading fill should have a plasticity index of 18 percent or less.

5.2.4 Fill Placement and Compaction

All structural fill placed within the area extending out 3 feet from the perimeter of the proposed addition must to be compacted to at least 95 percent of the maximum dry density as determined by the AASHTO[1] T-180 (ASTM[2] D-1557) compaction criteria. In proposed pavements and outside flatwork areas, fills can be compacted to 90 percent of the above-defined criteria

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

provided that the fill thicknesses do not exceed 5 feet. The moisture content during placement and compaction of fine-grained soils should be maintained within 2 percent of optimum. Moisture content of granular soils should be such that the compaction criteria can be achieved.

Subsequent to stripping and prior to the placement of structural site grading fill, the subgrade should 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.

5.2.5 Utility Trenches

All utility trench backfill material below structurally loaded facilities (flatwork, floor slabs, roads, etc.) should 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 should be proofrolled and/or properly compacted prior to the construction of any exterior flatwork over a backfilled trench. Proofrolling 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 proofrolling, they should be removed to a maximum depth of two feet below design finish grade and replaced with structural fill.

Most utility companies and City-County governments are now requiring that Type A-1 or A-1a (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 D-1557) method of compaction. We recommend that as the major utilities continue onto the site that these compaction specifications are followed.

On-site clayey soils are not recommended for utility line backfill.

5.3 SPREAD AND CONTINUOUS WALL FOUNDATIONS

5.3.1 Design Data

Our analyses indicate that the proposed structure may be supported upon conventional spread and continuous wall foundations. The footings can be established directly upon suitable near-surface clay soils and/or structural fill extending to suitable natural soils. The site soils are, in fact, capable of imposing higher pressures. 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 Pressure for Real Load Conditions - 2,500 pounds per square foot*

Bearing Pressure Increase for Seismic Loading - 50 percent

* If required, higher bearing pressures are possible with granular structural replacement fill.

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 should the footings be established upon loose or disturbed soil, sod, rubbish, construction debris, non-engineered fill, frozen soil, or other deleterious materials. If fine-grained soils become loose or disturbed, they must be totally removed and replaced with compacted granular fill. If granular soils become loose and disturbed, they must be recompacted to the requirements for structural fill before the footings are poured. The width of the replacement fill below footings should 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 various loads are tabulated below:

Footing Type	Load	Net Bearing Pressure (psf)	Projected Maximum Settlements (inches)
Spread	Up to 80 kips	2,500	¼ to ⅝
Continuous Wall	Up to 5 kips per lineal foot	2,500	¼ to ½

Settlements will occur fairly 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. If established upon granular soil, a coefficient of 0.5 may be used. Passive resistance provided by properly placed and compacted granular structural fill above the water table may be considered equivalent to a fluid with a density of 300 pounds per cubic foot. Below the water table, this granular soil should be considered equivalent to a fluid with a density of 150 pounds per cubic foot.

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

5.5 FLOOR SLABS

Floor slabs may be established upon properly prepared existing suitable near-surface soils and/or upon structural fill extending to suitable natural soils. To act as a capillary break, it is recommended that floor slabs be directly underlain by at least four inches of “free-draining” fill, such as “pea” gravel or three-quarters to one-inch minus clean gap-graded gravel. Settlements of lightly to moderately loaded floor slabs are anticipated to be minor (less than one-quarter inch).

5.6 PAVEMENTS

At the boring locations, fills consisting of silty gravel with some sand were encountered. This fill, if properly prepared, and granular site grading fill placed to achieve final grade will exhibit good pavement support. With these projected subgrade soils and the projected traffic as discussed in Section 2., Proposed Construction, the pavement sections on the following pages are recommended.

Parking Areas

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

Flexible:

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

Rigid:

5.0 inches	Portland cement concrete (non-reinforced)
4.0 inches	Aggregate base course
Over	Properly prepared existing granular and/or structural site grading fill extending to suitable natural soils or fills

Primary Roadway Areas

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

Flexible:

3.0 inches	Asphalt concrete
8.0 inches	Aggregate base course
Over	Properly prepared existing granular and/or structural site grading fill extending to suitable natural soils or fills

Rigid:

6.0 inches	Portland cement concrete (non-reinforced)
6.0 inches	Aggregate base course
Over	Properly prepared existing granular and/or structural site grading fill extending to suitable natural soils or fills

For dumpster pads and loading/unloading dock, we recommend a pavement section consisting of six and one-half inches of Portland cement concrete, four inches of aggregate base course over properly prepared existing granular subgrade or granular site grading fills.

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 GEOSEISMIC SETTING

5.7.1 General

Utah municipalities adopted the International Building Code (IBC) 2006 on January 1, 2007. The IBC 2006 code determines the seismic hazard for a site based upon 2002 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).

The structure must be designed in accordance with the procedure presented in Section 1613, Earthquake Loads, of the IBC 2006 edition.

5.7.2 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 Taylorsville portion of the Wasatch fault, which is approximately 1.0 miles east of the site. The Wasatch fault zone is considered capable of generating earthquakes as large as magnitude 7.3[3].

5.7.3 Soil Class

For dynamic structural analysis, the Site Class E - Soft Soil Profile as defined in Table 1613.5.2, Site Class Definitions, of the IBC 2006 can be utilized.

5.7.4 Ground Motions

The IBC 2006 code is based on 2002 USGS (United States Geologic Survey) mapping, which provides values of short and long period accelerations for the Site Class B-C boundary for the Maximum Considered Earthquake (MCE). This Site Class B-C boundary represents a hypothetical bedrock surface and must be corrected for local soil conditions. The following table summarizes the peak ground and short and long period accelerations for a MCE event and incorporates a soil amplification factor for a Site Class D soil profile in the second column. Based on the site latitude and longitude (40.7709 degrees north and 111.9275 degrees west, respectively), the values for this site are tabulated below:

Spectral Acceleration Value, T Seconds	Site Class B-C Boundary [mapped values] (% g)	Site Class E [adjusted for site class effects] (% g)
Peak Ground Acceleration	68.4	68.4
0.2 Seconds, (Short Period Acceleration)	$S_S = 171.0$	$S_{MS} = 171.0$
1.0 Seconds (Long Period Acceleration)	$S_1 = 69.3$	$S_{M1} = 103.9$

The IBC 2006 code design accelerations (S_{DS} and S_{D1}) are based on multiplying the above accelerations (adjusted for site class effects) for the MCE event by two-thirds (⅔).

3 Arabasz, W.J., Pechmann, J.C., and Brown, E.D., 1992, Observational seismology and the evaluation of earthquake hazards and risk in the Wasatch Front area, Utah, in Gori, P.L., and Hays, W.W., eds., Assessment of regional earthquake hazards and risk along the Wasatch Front, Utah: U.S. Geological Survey Professional Paper 1500-D, 36 p.

GSH
Gordon Spilker Huber
Geotechnical Consultants, Inc.

5.7.5 Liquefaction

The site is located in an area that has been identified by Salt Lake County as having a "high" liquefaction potential. Liquefaction is defined as the condition when saturated, loose, granular soils lose their support capabilities because of excessive pore water pressure which develops during a seismic event. Clayey soils, even if saturated, will not liquefy during a major seismic event.

Due to the depth of groundwater and the upper silty clay soils, the upper 9 to 13 feet should not liquefy, even during a major seismic event.

Our liquefaction analysis indicates that some of the silty sand layers in the borings could liquefy during a major seismic event. Settlement related to liquefaction could be in the range of approximately one to two inches. Because of the thickness of non-liquefiable soils, ground rupture due to deeper liquefaction should not occur. The structure must be designed to maintain life safety during the design seismic event.

Calculations performed used the procedure described in NCEER-97-0022 entitled "Procedures of the NCEER Workshop on Evaluation of Liquefaction Resistance of Soils," and only applies to the saturated cohesionless deposits.

We appreciate the opportunity of providing this service for you. If you have any questions or require additional information, please do not hesitate to contact us.

Respectfully submitted,

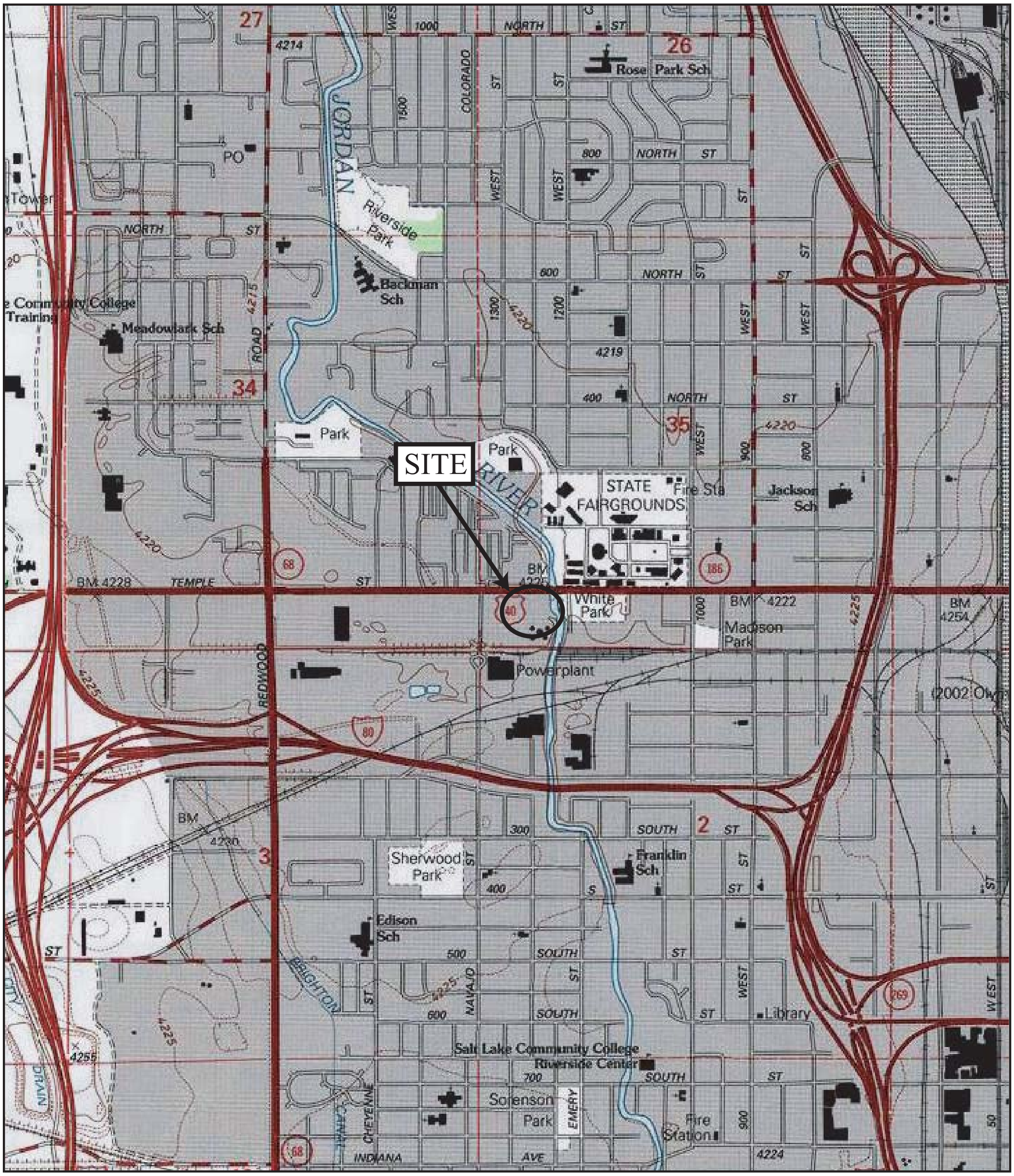
GSH Geotechnical Consultants, Inc.	Reviewed by:
Hogan R. Wright, State of Utah No. 178699	William J. Gordon, State of Utah No. 146417
Professional Engineer	Professional Engineer

HRW/WJG:jlh

Encl. Figure 1, Vicinity Map
Figure 2, Area Map
Figure 3, Site Plan
Figures 4A and 4B, Log of Borings
Figure 5, Unified Soil Classification System

Addressee (3)

EATON ARCHITECTURE, LLC
JOB NO. 0005-007-07



SCALE IN FEET
1000 0 1000 2000

FIGURE 1
VICINITY MAP

Gordon Spilker Huber
Geotechnical Consultants, Inc.

REFERENCE:
USGS 7.5 MINUTE TOPOGRAPHIC AREA MAP
TITLED "SALT LAKE CITY NORTH, UTAH"
DATED 1998

EATON ARCHITECTURE, LLC
JOB NO. 0005-007-07

NOT TO SCALE

FIGURE 2
AREA MAP

GSH
Gordon Spilker Huber
Geotechnical Consultants, Inc.

REFERENCE:
ADAPTED FROM GOOGLE MAP
DATED 2007

EATON ARCHITECTURE, LLC
JOB NO. 0005-007-07

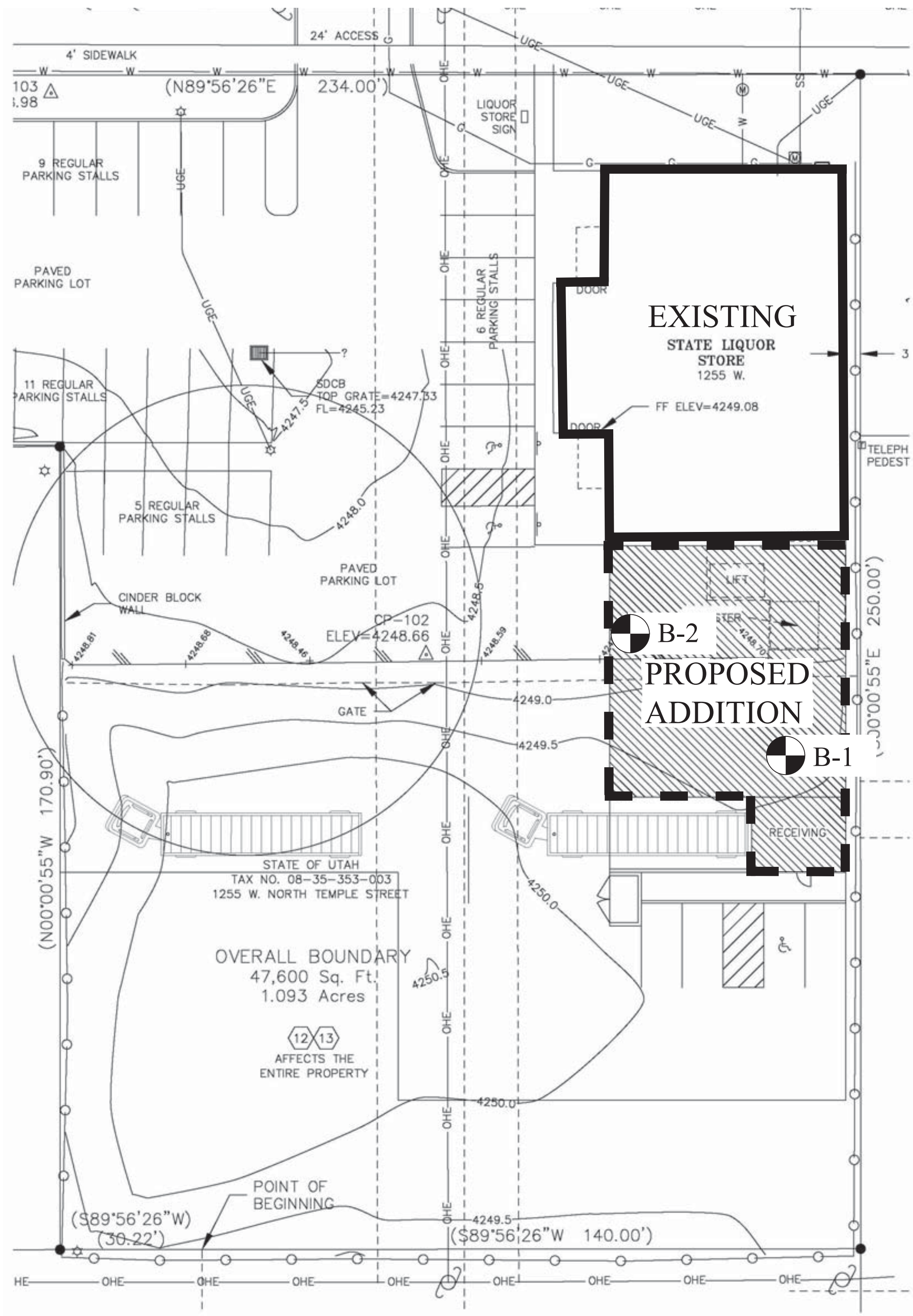


FIGURE 3
SITE PLAN

NOT TO SCALE

REFERENCE:
ADAPTED FROM DRAWING ENTITLED
"PROPOSED SITE PLAN" BY EATON ARCHITECTURE
NOT DATED

Gordon Spilker Huber
Geotechnical Consultants, Inc.

BOREHOLE B-1

Gordon Spilker Huber Geotechnical Consultants, Inc.
Salt Lake City, Utah 84123

Project Name: Proposed State Liquor Store Addition
Project No.: 0005-007-07
Location: 1255 North Temple, Salt Lake City, Utah
Client: Eaton Architecture, LLC
Drilling Method: 3-3/4" ID Hollow-Stem Auger
Date Drilled: 09-12-07
Elevation: Approximately 4230' +/-
Water Level: Approximately 8.5' (09-12-07) 9.2' (09-26-07)
Remarks:

Graphical Log	Water Level	DESCRIPTION	DEPTH FT.	BLOWS/FT	SAMPLE SYMBOL	MOISTURE (%)	% PASSING 200	DRY DENSITY (PCF)	Liquid Limit (%)	Plastic Limit (%)	REMARKS
		Ground Surface	0								
		SILTY GRAVEL, FILL with some fine sand and debris consisting of pieces of brick; fine and coarse gravel; brown, FILL (GM)		40							slightly moist medium dense
		SILTY CLAY with trace fine sand; dark brown (CL)	5	15		22.1		74			moist medium stiff
	▼	**SILTY SAND** fine sand; gray	10	13			16.8				saturated loose
		grades with medium sand; gray	15	18			3.3				
		SAND fine to coarse sand; occasional layers up to 1/2" of sitly clay; gray (SP)	20	8			6.3				saturated loose
		SILTY CLAY with trace fine sand; gray (CL)	25								saturated very soft

The discussion in the text under the section titled, SUBSURFACE CONDITIONS, is necessary for a proper understanding of the nature of the subsurface material.

FIGURE 4A

Gordon Spilker Huber Geotechnical Consultants, Inc.
Salt Lake City, Utah 84123

Project Name: Proposed State Liquor Store Addition
Project No.: 0005-007-07
Location: 1255 North Temple, Salt Lake City, Utah
Client: Eaton Architecture, LLC
Drilling Method: 3-3/4" ID Hollow-Stem Auger
Date Drilled: 09-12-07
Elevation: Approximately 4230' +/-
Water Level: Approximately 8.5' (09-12-07) 9.2' (09-26-07)
Remarks:

Graphical Log	Water Level	DESCRIPTION	DEPTH FT.	BLOWS/FT	SAMPLE SYMBOL	MOISTURE (%)	% PASSING 200	DRY DENSITY (PCF)	Liquid Limit (%)	Plastic Limit (%)	REMARKS
				0							
		grades with occasional layers up to 1.0" of silty fine sand; gray	30	10							
		Stopped drilling at 29.5'. Stopped sampling at 31.0'. Installed 1-1/4" diameter slotted PVC pipe to 31.0'.	35								
			40								
			45								
			50								

The discussion in the text under the section titled, SUBSURFACE CONDITIONS, is necessary for a proper understanding of the nature of the subsurface material.

FIGURE 4A
(con't)

Gordon Spilker Huber Geotechnical Consultants, Inc.
Salt Lake City, Utah 84123

BOREHOLE B-2

Project Name: Proposed State Liquor Store Addition
Project No.: 0005-007-07
Location: 1255 North Temple, Salt Lake City, Utah
Client: Eaton Architecture, LLC
Drilling Method: 3-3/4" ID Hollow-Stem Auger
Date Drilled: 09-12-07
Elevation: Approximately 4230' +/-
Water Level: Approximately 14.0' (09-12-07) 9.3' (09-26-07)
Remarks:

Graphical Log	Water Level	DESCRIPTION	DEPTH FT.	BLOWS/FT	SAMPLE SYMBOL	MOISTURE (%)	% PASSING 200	DRY DENSITY (PCF)	Liquid Limit (%)	Plastic Limit (%)	REMARKS
		Ground Surface	0								
		SILTY GRAVEL, FILL with some fine sand; fine gravel; brown, FILL (GM)									moist medium dense
				53							
		SILTY CLAY with trace fine sand; dark brown (CL)									moist very stiff
			5	19		32.4		84			stiff
	▼										
		grades with some fine sand; gray	10	17		27.3		89			
		SILTY SAND fine sand; gray									saturated medium dense
			15	55							
		Stopped drilling at 14.5'.									
		Stopped sampling at 16.0'.									
		Installed 1-1/4" diameter slotted PVC pipe to 16.0'.	20								
			25								

The discussion in the text under the section titled, SUBSURFACE CONDITIONS, is necessary for a proper understanding of the nature of the subsurface material.

FIGURE 4B

UNIFIED SOIL CLASSIFICATION SYSTEM

FIELD IDENTIFICATION PROCEDURES				GRAPH SYMBOL	LETTER SYMBOL [1]	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS More than half of material is larger than No. 200 sieve size. [2] (The No. 200 sieve size is about the smallest particle visible to the naked eye)	GRAVELS More than half of coarse fraction is larger than No. 4 sieve size. (For visual classifications, the 1/4" size may be used as equivalent to the No. 4 sieve size.)	CLEAN GRAVELS (Little or no fines)	Wide range in grain size and substantial amounts of all intermediate particle sizes.		GW	Well graded gravels, gravel-sand mixtures, little or no fines.
			Predominantly one size or a range of sizes with some intermediate sizes missing.		GP	Poorly graded gravels, gravel-sand mixtures, little or no fines.
		GRAVELS WITH FINES (Appreciable amount of fines)	Non-plastic fines (for identification procedures see ML below).		GM	Silty gravels, poorly graded gravel-sand-silt mixtures.
			Plastic fines (for identification procedures see CL below).		GC	Clayey gravels, poorly graded gravel-sand-clay mixtures.
	SANDS More than half of coarse fraction is smaller than No. 4 sieve size. (For visual classifications, the 1/4" size may be used as equivalent to the No. 4 sieve size.)	CLEAN SANDS (Little or no fines)	Wide range in grain sizes and substantial amounts of all intermediate particle sizes.		SW	Well graded sands, gravelly sands, little or no fines.
			Predominantly one size or a range of sizes with some intermediate sizes missing.		SP	Poorly graded sands, gravelly sands, little or no fines.
		SANDS WITH FINES (Appreciable amount of fines)	Non-plastic fines (for identification procedures see ML below).		SM	Silty sands, poorly graded sand-silt mixtures.
			Plastic fines (for identification procedures see CL below).		SC	Clayey sands, poorly graded sand-clay mixtures.

FIELD IDENTIFICATION PROCEDURES		IDENTIFICATION PROCEDURES ON FRACTION SMALLER THAN No. 40 SIEVE SIZE			GRAPH SYMBOL	LETTER SYMBOL	TYPICAL DESCRIPTIONS
		DRY STRENGTH (CRUSHING CHARACTERISTICS)	DILATANCY (REACTION TO SHAKING)	TOUGHNESS (CONSISTENCY NEAR PLASTIC LIMIT)			
FINE GRAINED SOILS More than half of material is smaller than No. 200 sieve size. (The No. 200 sieve size is about the smallest particle visible to the naked eye)	SILTS AND CLAYS Liquid limit less than 50	None to slight	Quick to slow	None		ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sand with slight plasticity.
		Medium to high	None to very slow	Medium		CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
		Slight to medium	Slow	Slight		OL	Organic silts and organic silt-clays of low plasticity.
	SILTS AND CLAYS Liquid limit greater than 50	Slight to medium	Slow to none	Slight to medium		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts.
		High to very high	None	High		CH	Inorganic clays of high plasticity, fat clays.
		Medium to high	None to very slow	Slight to medium		OH	Organic clays of medium to high plasticity.
HIGHLY ORGANIC SOILS		Readily identified by color, odor, spongy feel and frequently by fibrous texture.				Pt	Peat and other highly organic soils.

[1] Boundary classifications:—Soils possessing characteristics of two groups are designated by combinations of group symbols. For example GW—GC, well graded gravel—sand mixture with clay binder.
[2] All sieve sizes on this chart are U.S. standard.

GENERAL NOTES

1. In general, Unified Soil Classification Designations presented on the logs were evaluated by visual methods only. There rore, actual designations (based on laboratory testing) may differ.

2. Lines seperating strata on the logs represent approximate boundaries only Actual transitions may be gradual.

3. Logs represent general soil conditions observed at teh point of exploration onthe date indicated.

4. No warranty is provided as to the continuity of soil conditions between individual sample locations.

FINE - GRAINED SOIL

CONSISTENCY	SPT (blows/ft)	TORVANE UNDRAINED SHEAR STRENGTH (tsf)	POCKET PENETROMETER UNCONFINED COMPRESSIVE STRENGTH (tsf)	FIELD TEST
Very Soft	<2	<0.125	<0.25	Easily penetrated several inches by Thumb. Squeezes through fingers.
Soft	2 - 4	0.125 - 0.25	0.25 - 0.5	Easily penetrated 1 " by Thumb . Molded by light finger pressure.
Medium Stiff	4 - 8	0.25 - 0.5	0.5 - 1.0	Penetrated over 1/2 " by Thumb with moerate effort. Molded by strong finger pressure.
Stiff	8 - 15	0.5 - 1.0	1.0 - 2.0	Indented about 1/2 " by Thumb but penetrated only with great effort
Very Stiff	15 - 30	1.0 - 2.0	2.0 - 4.0	Readily indented by Thumbnail
Hard	>30	>2.0	>4.0	Indented with difficulty by Thumbnail

LOG KEY SYMBOLS

- Bulk / Bag Sample
- Thin Wall
- Standard Penetration Split Spoon Sampler
- No Recovery
- Rock Core
- 3-3/4" ID D&M Sampler
- 3" ID D&M Sampler
- Water Level
- California Sampler

COARSE -GRAINDE SOIL

APPERENT DENSITY	SPT (blows/ft)	RELATIVE DENSITY (%)	FIELD TEST
Very Loose	<4	0 - 15	Easily penetrated with 1/2 " reinforcing rod pushed by hand
Loose	4 - 10	15 - 35	Difficult to penetrated with 1/2 " reinforcing rod pushed by hand
Medium Dense	10 - 30	35 - 65	Easily penetrated a foot with 1/2 " reinforcing rod driven with 5-lb hammer
Dense	30 - 50	65 - 85	Difficult to penetrated a foot with 1/2 " reinforcing rod driven with 5-lb hammer
Very Dense	>50	85 - 100	Penetrated only a few inches with 1/2 " reinforcing rod driven with 5-lb hammer

STRATIFICATION

DESCRIPTION	THICKNESS
SEAM	1/16 - 1/2 "
LAYER	1/2 - 12 "

DESCRIPTION	THICKNESS
Occasional	One or less per foot of thickness
Frequent	More than on per foot of thickness

CEMENTATION

DESCRIPTION	DESCRIPTION
Weakely	Crumbles or breaks with handling of slight finger pressure
Moderately	Crumbles or breaks with considerable finger pressure
Strongly	Will not crumbles or breaks with finger pressure

MODIFIERS

DESCRIPTION	%
Trace	<5
Some	5 - 12
With	>12

MOISTURE CONTENT

DESCRIPTION	FIELD TEST
Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible water, usually soil below Water Table

FIGURE 4

GSH
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