GSH
Gordon Spilker Huber
Geotechnical Consultants, Inc.

REPORT (UPDATED)
GEOTECHNICAL STUDY
PROPOSED KOHL'S DEPARTMENT STORE
AND ADJOINING FACILITIES
WEST OF 3600 WEST AND NORTH OF
13400 SOUTH STREET
RIVERTON, UTAH

Submitted To:

Riverton Depot 10 LLC
90 East 7200 South #200
Midvale, Utah 84047-1565

Submitted By:

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

January 25, 2008

Job No. 0219-006-07

GSH
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Geotechnical Consultants, Inc.

January 25, 2008
Job No. 0219-006-07

Riverton Depot 10 LLC
90 East 7200 South #200
Midvale, Utah 84047-1565

Attention: Mr. Mike Stangl

Ladies and Gentlemen:

Re: Report (Updated)
Geotechnical Study
Proposed Kohl's Department Store
and Adjoining Facilities
West of 3600 West and North of 13400 South Street
Riverton, Utah

1. INTRODUCTION

1.1 GENERAL

Our original report pertaining to the referenced Kohl's store was submitted on August 21, 2007[1]. Subsequently, a number of questions were asked. This updated report includes our responces to the questions and presents laboratory data not available at the time the original report was submitted.

This report presents the results of our geotechnical study performed at the site of the proposed Kohl's Department Store and adjoining facilities, which is located west of 3600 West and north of 13400 South Streets in Riverton, Utah. The general location of the site with respect to major topographic features and existing facilities, as of 1999, is presented on Figure 1, Vicinity Map. A more detailed layout of the site showing existing and proposed facilities with regard to adjoining roadways is presented on Figure 2, Site Plan. The locations of the borings drilled in conjunction with this study and an August 25, 2005[2] study of the area are also presented on Figure 2.

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1 "Report (Updated), Geotechnical Study, Proposed Kohl's Department Store and Adjoining Facilities, West of 3600 West and North of 13400 South Street, Riverton, Utah," GSH Job No. 0219-006-07.

2 "Geotechnical Report, Riverton Market Center, 13400 South and 3600 West Streets, Riverton, Utah," Kleinfelder File No. 59938.001.

During the course of this study, some of the discussions and recommendations summarized herein were transmitted verbally to representatives of Riverton Depot 10 LLC.

1.2 OBJECTIVES AND SCOPE

The objectives and scope of our study were planned in discussions between Mr. Mike Stangl of Riverton Depot 10 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 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 facility.

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

1. A field program consisting of the drilling, logging, and sampling of 12 exploration borings.

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.

Field and office portions of this study were performed in accordance with Kohl's requirements for geotechnical studies.

1.3 AUTHORIZATION

Authorization was provided by returning a signed copy of our Professional Services Agreement No. 07-0621 dated June 18, 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 primary structure within the overall development will be a 90,000 square foot Kohl's Department Store. In addition, 2 one-level retail structures and extensive at-grade pavements for parking and roadways are proposed. Proposed prepared layout of the facilities is presented on Figure 2.

The Kohl's structure will be roughly rectangular in shape with plan dimensions on the order of 249-feet by 321-feet. The structure will be one level in height but will contain an approximately 8,200 square foot mezzanine. The structure will be established approximately one to one and one-half feet above final adjacent grade. A loading/unloading dock ramp will be constructed on the north side.

The structure will be of light steel-frame and tilt-up concrete wall construction. Loads will be transmitted down through the columns and bearing walls to the supporting foundations. Available data indicates that the maximum column loads will be in the range of 75 to 195 kips in the non-mezzanine and mezzanine areas, respectively. Wall loads will range from 3.5 to 7.0 kips per lineal foot, again in the non-mezzanine and mezzanine areas. Typical floor loads will be in the range of 150 pounds per square foot.

The other structures will be one level in height and of light steel-frame and masonry and possibly concrete tilt-up wall construction. Structural loads will be transmitted down through columns and bearing walls to supporting foundations. Loads imposed will be equal to or less than the loads imposed by the proposed Kohl's store.

Around the perimeter of the structures will be extensive at-grade pavements for parking and roadways.

The pavement design requirements as requested by Kohl's are included in this report. The recommendations provided follow the "AASHTO Guide for Design of Pavement Structures." The pavement design requirements that are for standard duty and heavy duty pavements were provided as 50,000 and 185,000 Equivalent Single/Axial Loading (ESAL), respectively. Traffic in the parking lot areas of the facilities will consist of a moderate volume of automobiles and light trucks and occasional medium-weight trucks. In the primary roadways and loading/unloading dock areas, traffic will consist of a moderate volume of automobiles and light- to heavy-weight trucks. On January 23, 2008, the need to increase the standard design ESAL's considering "multiple tenant sites" was discussed with a representative of Galloway Engineers, the project engineers. Based upon the discussion, it is our opinion that the standard ESAL numbers do not need to be increased.

Overall site development will require a moderate amount of earthwork in the form of cutting and filling. At this time, we project that the maximum cuts and fills will generally not exceed two to three feet.

3. SITE INVESTIGATIONS

3.1 FIELD PROGRAM

In order to define and evaluate the subsurface conditions across the site, a total of 12 exploration borings were drilled to depths ranging from 6 to 30 feet with a truck-mounted rig equipped with hollow-stem augers. Many borings were terminated because of refusal. In addition, borings drilled across the overall site in conjunction with the report dated August 25, 2005 were reviewed. The locations of the borings drilled in conjunction with this study and the previous study are presented on Figure 2.

The field portion of this 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 in the borings drilled in conjunction with this study is presented on Figures 3A through 3L, Log of Borings. Soils were classified in accordance with the nomenclature described on Figure 4, 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. 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.

In order to provide a means of monitoring groundwater fluctuations, one and one-quarter-inch diameter slotted PVC pipe was installed in all of the borings except Borings B-7 and B-10.

3.2 LABORATORY TESTING

3.2.1 General

To provide data necessary for our engineering analyses, a laboratory testing program was initiated. The program included moisture and density, collapse-consolidation, and chemical tests. A description of the tests plus a summary of the test results are presented in the following sections.

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 undisturbed samples. The results of these tests are presented on the boring logs, Figures 3A through 3L.

3.2.3 Collapse-Consolidation Test

To provide data necessary for our settlement analyses, a collapse-consolidation test was performed on each of eight representative samples of the surficial fine-grained soils.

The collapse portion of the tests was performed as follows:

1. Load sample at in-situ moisture content to specific axial pressure.
2. Measure and record axial deflection.
3. Saturate sample.
4. Measure and record resulting collapse.

The test results are tabulated below:

Boring No.	Depth (feet)	Soil Type	In-situ Dry Density (pcf)	In-situ Moisture Content (percent)	Axial Load at Time of Saturated (psf)	Collapse (-) or Swell (+) (percent)	"Consolidation" Pressure (psf)
B-2	5.0	CL	79	9.4	200	9.6 (-)	Collapsible
B-4	3.5	CL	77	17.9	800	0.3 (-)	Non-collapsible 2,000
B-4	10.0	CL/ML	80	19.8	1,600	1.1 (-)	Non-collapsible 2,900
B-5	5.0	CL	90	21.8	1,600	2.0 (-)	Collapsible 800
B-6	5.0	SM/ML	88	14.1	1,600	1.3 (-)	Non-collapsible 2,200
B-8	2.0	CL	95	8.0	800	0.3 (+)	Non-collapsible 3,400
B-8	5.0	SM/ML	76	10.1	1,600	4.9 (-)	Collapsible ≈800
B-9	5.0	CL	97	12.1	800	0.1 (+)	Non-collapsible 3,200

* Collapse potential is based upon the percent collapse and shape of the consolidated test loading curve.

The results of the tests indicate that the soils tested are only slightly collapsible.

Following the collapse test, normal consolidation test loading was applied. The results of these tests show that many of the soils when saturated are only slightly over-consolidated. This is a secondary test that indicates soils are moisture sensitive. 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 two representative samples of the near-surficial fine-grained soil. The results of the chemical tests are tabulated below:

Boring No.	Depth (feet)	Soil Type	pH	Total Water Soluble Sulfate (ppm)
B-1	3.0	CL	8.0	300
B-9	3.0	SP/SM	7.98	0

4. SITE CONDITIONS

4.1 SURFACE

The site is a presently open and relatively undeveloped parcel covered with dry grasses and weeds up to three feet in height. In the far southeast corner of the site is a small fairly shallow retention basin.

The site itself is bounded to the east by 3600 West Street followed by a subdivision; to the south by 13400 South Street followed by commercial buildings under construction; and to the north and west by Market Center Drive followed by office buildings and commercial buildings under construction.

The site is relatively flat and has a total relief down to the east of approximately four to five feet.

4.2 SUBSURFACE SOIL AND GROUNDWATER

Subsurface conditions at the boring locations were found to be moderately consistent. At all of the borings, a surface layer of silty clay with trace fine sand was encountered to depths ranging from four and one-half to eight feet. The upper three to four inches contain major roots which have been classified as topsoil. The upper six to eight inches, including the topsoil zone, are loose and will exhibit variable and generally poor engineering characteristics. Beneath the loose surface zone and extending to depths of approximately three and one-half to five feet, the soils

contain "pinholes" and, on occasion, have a very porous structure. Both of these conditions are indicative of potentially collapsible soils. Collapsible soils will exhibit moderately high strength and low compressibility characteristics when dry, but lose strength, become highly compressible, and collapse with significant increase in moisture content. Our laboratory tests indicate that collapsible soils extend to depths of three and one-half to approximately five feet. From four to six feet to the bottom of this surface clay zone, the soils exhibit higher strength and lower compressibility characteristics, are moderately over-consolidated, and generally not collapsible.

In most of the exploration borings, the surface silty clays are underlain by more than eight feet of silty very fine sand and very fine sandy silt, which exhibits moderate strength and compressibility characteristics and is not moisture sensitive. In a few of the borings, the surface clays are underlain by deeper silty clays which also exhibit relatively high strength and low compressibility characteristics. Beneath the soils, as discussed above, and the silty clays and clayey silts in Boring B-2, a layer of dense to very dense silty fine to coarse sands and gravels and silty gravels with some sands were encountered. These deeper sands and gravels exhibit very high strength and low compressibility characteristics.

Groundwater was not encountered to the depths penetrated.

5. DISCUSSIONS AND RECOMMENDATIONS

5.1 SUMMARY OF FINDINGS

The most significant geotechnical aspects of the site are:

1. The upper six to eight inches of the very loose surface fine-grained soils.

2. Upper approximately three and one-half to five feet of surface clays which generally exhibit very low preconsolidation pressures and when saturated become highly compressible.

Although the proposed structures can be supported upon conventional spread and continuous wall foundations, it is our recommendation that the footings be underlain by select replacement granular fill extending at least four feet below existing grade. This is required in order to allow for significantly higher bearing pressures to be utilized in proportioning the footings and to control total and differential settlements. Under low loads such as imposed by floor slabs or pavements, the surface potentially compressible soils, excluding the surface six to eight inches of loose soils, do not need to be removed or specifically prepared.

During our field investigation, no evidence of hydrocarbon contaminated soils was observed.

In the following sections, detailed discussions pertaining to earthwork, foundations, lateral pressures and resistance, floor slabs, pavements, and the geoseismic setting of the site are provided.

5.2 EARTHWORK

5.2.1 Site Preparation

Prior to the initiation of any construction activities, all utility lines passing through the site must be identified and then either avoided, relocated, or abandoned. Subsequently, earthwork operations may be initiated with the initial operations consisting of the stripping of all surface vegetation, topsoil, and other deleterious materials. Field data indicates that the average depth of stripping will be on the order of three to four inches. Subsequent to the above operations, the remaining portion of the surface six to eight inches of loose soils must either be: 1) scarified, moisture prepared, and recompacted to the requirements for structural fill; or 2) removed and subsequently re-utilized as structural site grading fill after the subgrade has been proofrolled. These surface soils are extremely dry and fine-grained and will be very difficult to properly moisture prepare in-situ; therefore, we strongly recommend that they be removed and incorporated into structural site grading fill. The exposed subgrade should be proofrolled by running moderate-weight rubber tire-mounted construction equipment uniformly over the surface at least three times. If any soft or otherwise unsuitable soil zones are encountered, they must be removed to the maximum depth of two feet and replaced with compacted granular fill.

5.2.2 Structural Fill

Structural fill will be required as site grading fill, as backfill over foundations and utilities, and as replacement fill below footings. All structural fill must be free of sod, rubbish, construction debris, frozen soil, and other deleterious materials. Maximum particle size within structural site grading fill should generally be restricted to 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 generally be restricted to two and one-half inches. Structural site grading fill is defined as fill placed over fairly open areas to raise overall site grade. For the Kohl's structure, the maximum particle size should not exceed three inches.

The on-site fine-grained soils can be re-utilized as structural site grading fill but need to be properly moisture prepared and maintained during placement and compaction. This will be extremely difficult, even during the warm and relatively dry late spring to late fall months, and nearly impossible during the winter months.

Imported fine-grained soils can be utilized; however, their maximum Plasticity Index and Liquid Limit should not exceed 18 percent and 38 percent, respectively. With regard to granular soils, it is recommended that they be well-graded mixtures of sands and gravels containing at least 20 percent fines. These materials, when properly placed and compacted, will exhibit relatively low permeability characteristics, which is desirable in the upper potentially moisture sensitive sequence.

5.2.3 Fill Placement and Compaction

All structural fill should be placed in lifts not exceeding eight inches in loose thickness. Within an area extending out at least 3 feet from the perimeter of the proposed structures, the fill must be compacted to at least 95 percent of the maximum dry density as determined by the AASHTO[3] T-180 (ASTM[4] D-1557) compaction criteria. All other areas, where the fills are less than 5 feet thick, should be compacted to at least 90 percent of the above-defined criteria. If the fill thickness in these areas exceeds 5 feet, the degree of compaction should be increased to 92 percent.

Prior to the placement of site grading fill, the subgrade should be prepared as discussed in Section 5.2.1, Site Preparation.

5.2.4 Areal Settlements

Our calculations indicate that the areal settlements resulting from placement of approximately four feet of site grading/dock-height fill should not exceed one-quarter of an inch. Settlements will occur almost instantaneously with application of load.

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.

Because of the moisture sensitive soils, it is our recommendation that the granular fills utilized meet the requirement as stated in Section 5.2.2., Structural Fill. This backfill, when properly compacted, will exhibit low permeability characteristics.

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3 American Association of State Highway and Transportation Officials
4 American Society for Testing and Materials

The natural fine-grained cohesive soils are not recommended for use as trench backfill.

5.3 SPREAD AND CONTINUOUS WALL FOUNDATIONS

5.3.1 Design Data

Results of our study show that the proposed structures can be supported upon conventional spread and continuous wall foundations. The upper approximately four to six feet of the site soils exhibit moisture sensitive characteristics and will become highly compressible when saturated or near saturated. We, therefore, recommend that the footings be underlain by select granular structural fill extending at least four feet below existing grade. For these conditions, 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	- 2,500 pounds per square foot*
Bearing Pressure Increase for Seismic Loading	- 50 percent

* This assumes that all footings will be underlain by a minimum of two feet of granular structural 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

If the natural soils upon which the select granular structural fills will be placed become loose or disturbed, they must be removed and replaced with granular structural fill. If the granular fills or granular structural fill upon which the footings are to be established become disturbed, they must be recompacted to the requirements for structural fill.

Under no circumstances should the footings be underlain by loose or disturbed soils, sod, rubbish, construction debris, or other deleterious materials. If unsuitable soils are encountered, they must be removed and replaced with compacted granular fill.

The width of the replacement fill should be equal to the width of the footing plus one foot for each foot of fill thickness. If the replacement granular fill becomes loose or disturbed, it must be appropriately recompacted before the footings are poured.

5.3.3 Settlements

Settlements of foundations designed and installed in accordance with the above recommendations and supporting the maximum loads should not exceed one-half to five-eighths of an 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 0.45 should be utilized. 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 LATERAL PRESSURES

Although subsurface levels are not anticipated, there will be some structures, such as loading/unloading docks, where lateral soil pressures will be induced on subgrade walls. Under these circumstances, we recommend that the backfill consist of the granular soils as previously discussed and previously compacted. For this material, an equivalent fluid pressure of 45 pounds per cubic foot may be utilized. For laterally imposed pressures under seismic loading a uniform pressure of 55 pounds per square foot should be added.

5.6 FLOOR SLABS

Because of the depth of the water table, it is our opinion that the at-grade floor slabs should be underlain by four inches of aggregate base coarse material extending to properly prepared subgrade and/or structural fill extending to suitable natural soils. The settlements of floor slabs should be negligible.

The sequence of at least four inches of aggregate base underlain by structural site grading fill and/or properly prepared non-saturated natural soils will exhibit a subgrade modulus "k" of 150 pounds per cubic inch or greater.

5.7 PAVEMENTS

The surface silty clay soils will exhibit poor pavement support characteristics when saturated or near saturated. For design, a California Bearing Ratio (CBR) of 3 was utilized. For this subgrade condition and the projected traffic, the following pavement sections are recommended:

Parking Areas

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

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

Parking Areas
[Kohl's Criteria]

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

3.0 inches	Asphalt concrete
6.0 inches	Aggregate base
8.0 inches or more	Granular subbase*
Over	Properly prepared natural soil subgrade and/or structural fill extending to subgrade

Alternate:

3.5 inches	Asphalt concrete
10.0 inches	Aggregate base
Over	Properly prepared natural fine-grained soil subgrade

* Granular structural site grading fill will satisfy this requirement.

Primary Roadway Areas

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

3.5 inches	Asphalt concrete
6.0 inches	Aggregate base
10.0 inches	Granular subbase
Over	Properly prepared subgrade and/or structural site grading fill extending to subgrade

Alternate:

4.0 inches	Asphalt concrete
11.0 inches	Aggregate base
Over	Properly prepared natural fine-grained soil subgrade

Roadway Areas/Loading Areas
[Kohl's Criteria]

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

4.5 inches	Asphalt concrete
11.0 inches	Aggregate base
Over	Properly prepared natural fine-grained soil subgrade

Alternate:

4.0 inches	Asphalt concrete
6.0 inches	Aggregate base
12.0 inches	Granular subbase*
Over	Properly prepared natural fine-grained soil subgrade

Loading/Unloading Dock and Dumpster Areas

6.5 inches	Portland cement concrete (non-reinforced)
6.0 inches	Aggregate base
Over	Properly prepared subgrade and/or structural site grading fill extending to subgrade

* Granular structural site grading fill will satisfy this requirement.

During the course of this study, the Salt Lake City representative of TENSOR developed alternate pavement sections utilizing a layer of BX1100 geogrid. In TENSOR's analysis, a CBR value of 6 and ESAL's based upon AASTHO 93 design guidelines were utilized. GSH is in contact with the TENSOR representative and will transmit the CBR and traffic parameters that were used in our analysis.

From past experience, it is our opinion that the concept is acceptable. Cost comparison will basically determine if it is a viable alternate. A copy of TENSOR's initial analysis is attached.

The above 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.

5.8 GEOSEISMIC SETTING

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

5.8.2 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 2006 can be utilized.

5.8.3 Faulting

Review of available literature indicates no active faults pass through or immediately adjacent to the site.

5.8.4 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 (40.5099 degrees north and 111.9783 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 D [adjusted for site class effects] (% g)
Peak Ground Acceleration	0.440	0.466
0.2 Seconds, (Short Period Acceleration)	$S_S = 1.099$	$S_{MS} = 1.165$
1.0 Seconds (Long Period Acceleration)	$S_1 = 0.442$	$S_{M1} = 0.688$

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).

5.8.5 Liquefaction

Soils to depths penetrated are not saturated and, therefore, not susceptible to liquefaction, even during major seismic event.

5.9 CEMENT TYPES

Laboratory tests show that the amount of water soluble sulfates in the soils vary from negligible to moderate. Because of the moderate content, it is our recommendation that concrete which will be in contact with the site soils be prepared using Type II or V cement. As an alternate, a standard Type I cement can be utilized if the mixture is enriched by one bag of cement and 10 percent Pozzolan.

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,

Gordon Spilker Huber Geotechnical Consultants, Inc.

William J. Gordon, State of Utah No. 146417
Professional Engineer

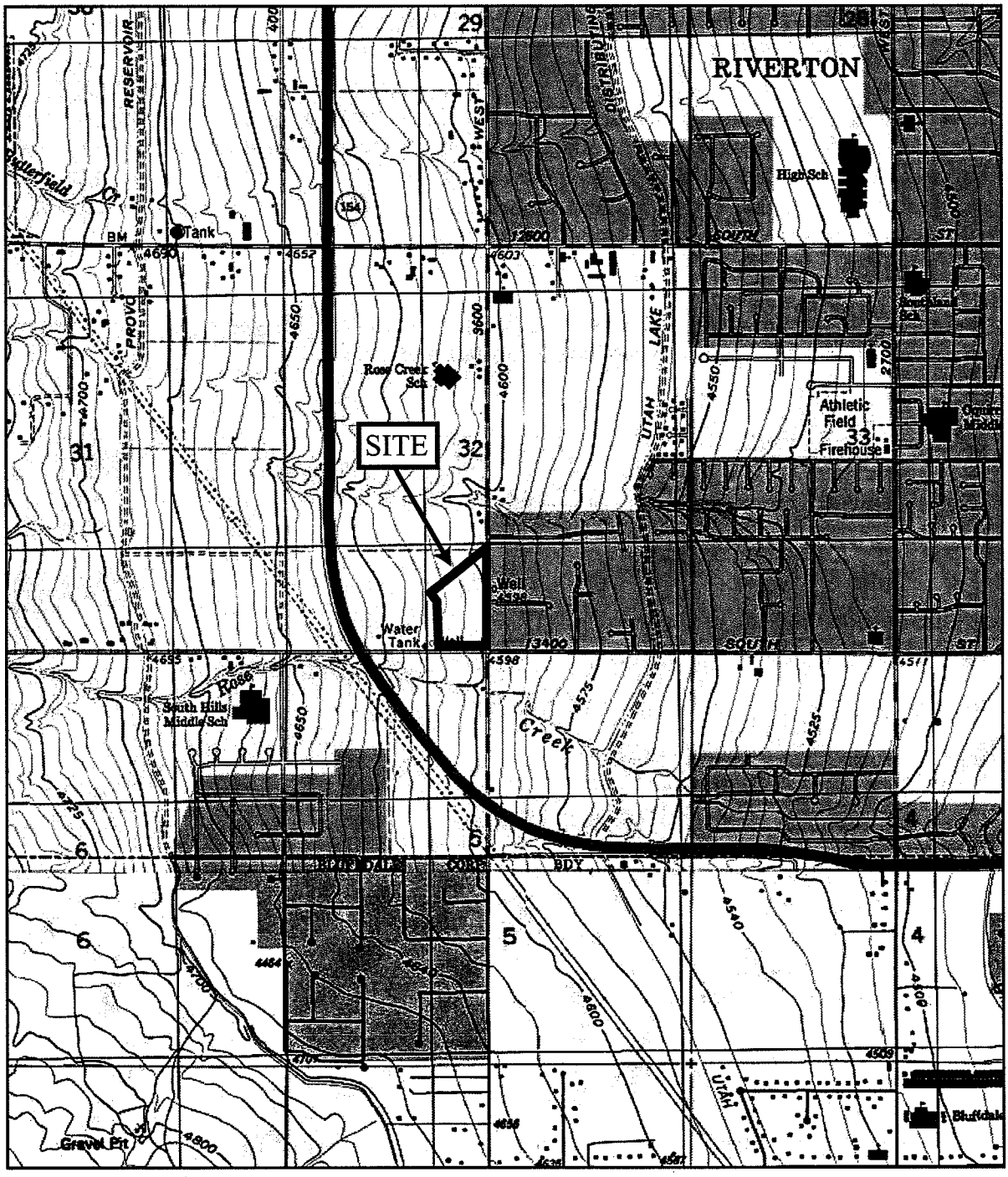
WJG:jlh/sn

Encl. Figure 1, Vicinity Map
Figure 2, Site Plan
Figures 3A through 3L, Log of Borings
Figure 4, Unified Soil Classification System
TENSOR's Initial Analysis
Reliance Letter

Addressee (3 + email)
c: Ms. Amanda O'Connor (1 + email)
Galloway
5350 DTC Parkway
Greenwood Village, Colorado 80111

Mr. Robert F. Doren, P.E., Site Developer Manager (1 + email)
Kohl's Department Stores, Inc.
N56 W17000 Ridgewood Drive
Menomonee Falls, Wisconsin 53051

RIVERTON DEPOT 10 LLC
JOB NO. 0219-006-07



SCALE IN FEET
1000 0 1000 2000

FIGURE 1
VICINITY MAP

REFERENCE:
USGS 7.5 MINUTE TOPOGRAPHIC QUADRANGLE MAPS
TITLED "MIDVALE, UTAH" AND "JORDAN NARROWS, UTAH"
DATED 1999

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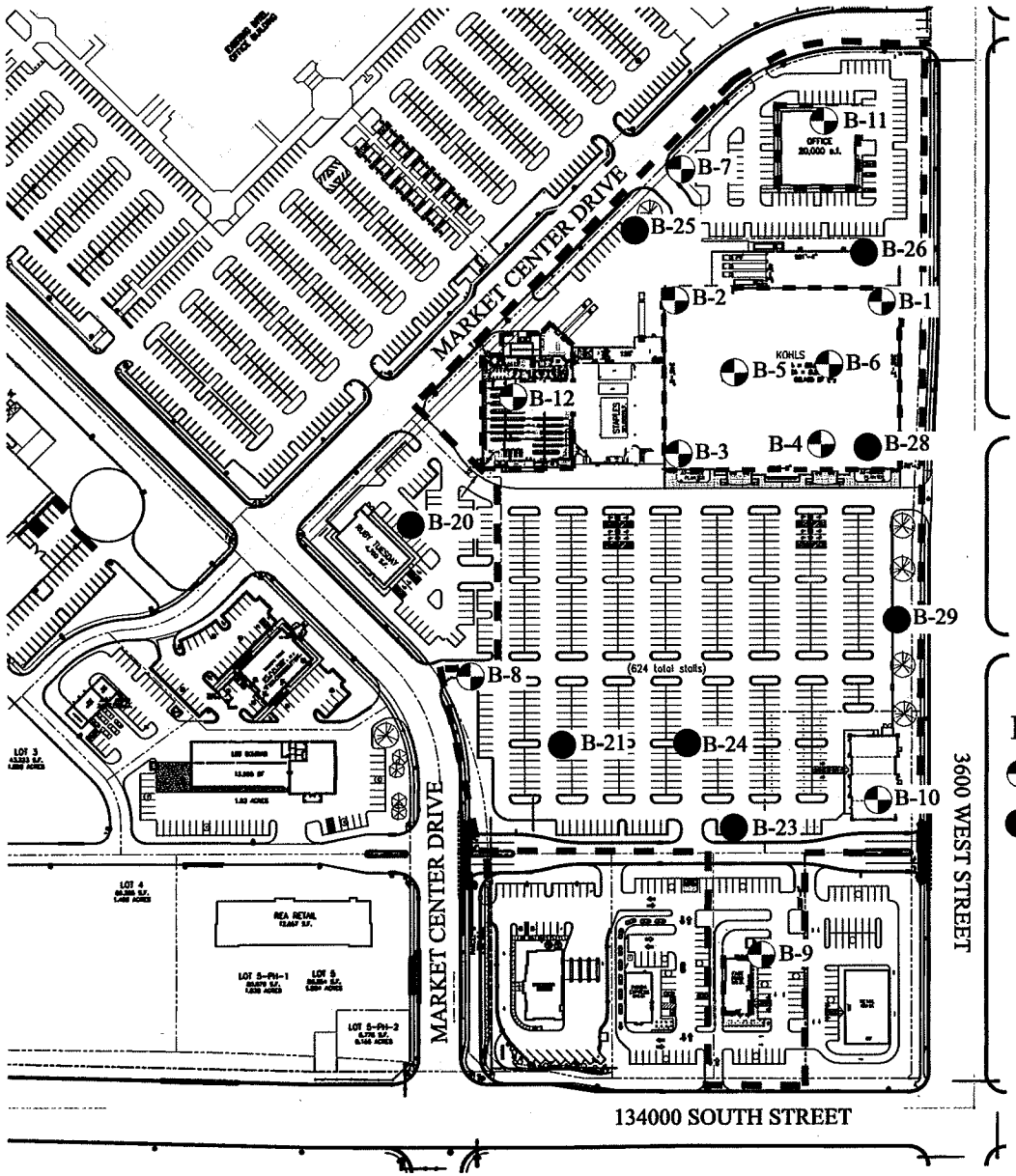
RIVERTON DEPOT 10 LLC
JOB NO. 0219-006-07



APPROXIMATE SCALE: 1" = 66'

REFERENCE:
ADAPTED FROM DRAWING
PROVIDED BY CLIENT

FIGURE 2
SITE PLAN

GSH
Gordon Spilker Huber
Geotechnical Consultants, Inc.

BOREHOLE B-1

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

Project Name: Prop Kohl's Dept Store & Adjoining Facilities
Project No.: 0219-006-07
Location: W of 3600 W and N of 13400 S, Riverton, Utah
Client: Riverton Depot 10 LLC
Drilling Method: 3-3/4" ID Hollow-Stem Auger
Date Drilled: 07-09-07
Elevation: Overall Site Approximately 4605' +/-
Water Level: No groundwater encountered
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 CLAY with trace fine sand; major roots (topsoil) to 4"; brown (CL)									loose to 8" dry
		porous structures to 3.5'		22		18.1		89			slightly moist stiff/very stiff moist
			5	44		32.7		84			very stiff moist medium dense
		SILTY SAND very fine sand; light grayish-brown (SM/ML)									moist dense
		SILTY SAND AND GRAVEL fine to coarse sand; fine and coarse gravel; grayish-brown (SM/GM)	10	85		6.2		110			
			15	100 3.5"							very dense
			20	173							
			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 3A

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

Project Name: Prop Kohl's Dept Store & Adjoining Facilities
Project No.: 0219-006-07
Location: W of 3600 W and N of 13400 S, Riverton, Utah
Client: Riverton Depot 10 LLC
Drilling Method: 3-3/4" ID Hollow-Stem Auger
Date Drilled: 07-09-07
Elevation: Overall Site Approximately 4605' +/-
Water Level: No groundwater encountered
Remarks:

Graphical Log	Water Level	DESCRIPTION	DEPTH FT.	BLOWS/FT	SAMPLE SYMBOL	MOISTURE (%)	% PASSING 200	DRY DENSITY (PCF)	Liquid Limit (%)	Plastic Limit (%)	REMARKS
				172							
			30	100 2"							
		Stopped drilling at 29.5'. Stopped sampling at 30.0'. No groundwater encountered at time of drilling. Installed 1-1/4" diameter slotted PVC pipe to 30.0'.	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 3A
(con't)

BOREHOLE B-2

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

Project Name: Prop Kohl's Dept Store & Adjoining Facilities
Project No.: 0219-006-07
Location: W of 3600 W and N of 13400 S, Riverton, Utah
Client: Riverton Depot 10 LLC
Drilling Method: 3-3/4" ID Hollow-Stem Auger
Date Drilled: 07-09-07
Elevation: Overall Site Approximately 4605' +/-
Water Level: No groundwater encountered
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 CLAY with some fine sand; major roots (topsoil) to 3"; brown (CL)									loose to 8" dry very stiff
				48							
		porous structures to approximately 5.0'	5	33		9.4		79			slightly moist
		SILTY GRAVEL AND SAND fine and coarse gravel; fine to coarse sand; brown (GM/SM)									dry very dense
			10	100							
			15	100 5.5"							
		SILTY CLAY with some fine sand; brown (CL)	20	46		21.1		96			moist very stiff
		SILTY SAND AND GRAVEL fine to coarse sand; fine and coarse gravel; brown (SM/GM)		100 2"							
		Drilling refusal at 23.0'. Stopped sampling at 21.0 Installed 1-14" diameter slotted PVC pipe to 21.0'. Groundwater not encountered at time of drilling.	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 3B

BOREHOLE B-3

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

Project Name: Prop Kohl's Dept Store & Adjoining Facilities
Project No.: 0219-006-07
Location: W of 3600 W and N of 13400 S, Riverton, Utah
Client: Riverton Depot 10 LLC
Drilling Method: 3-3/4" ID Hollow-Stem Auger
Date Drilled: 07-10-07
Elevation: Overall Site Approximately 4605' +/-
Water Level: No groundwater encountered
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 CLAY with trace fine sand; major roots (topsoil) to 3"; brown (CL)									loose to 8" dry
		porous desicated structures to 4.0'		37							very stiff
		grades with some zones of silty fine to coarse sand and gravel	5	26							
		SILTY SAND with some medium to coarse sand and fine gravel; brown (SM)									slightly moist medium dense
		drilling indicates gravels at 11.0'	10	45							
			15	100 1"							
		Drilling refusal at 15.0'.									
		Stopped sampling at 14.5'.									
		Installed 1-1/4" diameter slotted PVC pipe to 15.0'.									
		Groundwater not encountered at time of drilling.	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 3C

BOREHOLE B-4

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

Project Name: Prop Kohl's Dept Store & Adjoining Facilities
Project No.: 0219-006-07
Location: W of 3600 W and N of 13400 S, Riverton, Utah
Client: Riverton Depot 10 LLC
Drilling Method: 3-3/4" ID Hollow-Stem Auger
Date Drilled: 07-10-07
Elevation: Overall Site Approximately 4605' +/-
Water Level: No groundwater encountered
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 CLAY with trace fine sand; no topsoil; brown (CL)									loose to 6" dry
		pinhole structures to 4.0'		27		17.9		77			very stiff
		SILTY VERY FINE SAND with trace medium to coarse sand and fine gravel; brown (SM)	5								slightly moist loose
				12							
			10	11		19.8		80			moist moist
		SILTY CLAY/CLAYEY SILT with fine sand; brown (CL/ML)									slightly moist stiff
		grades with occasional layers up to 1/2" of silty fine sand	15	16							
		drilling indicates gravel at 16.0'									
		Drilling refusal at 17.0'.									
		Stopped sampling at 16.0'.									
		Installed 1-1/4" diameter slotted PVC pipe to 16.0'.	20								
		Groundwater not encountered at time of drilling.									
			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 3D

BOREHOLE B-5

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

Project Name: Prop Kohl's Dept Store & Adjoining Facilities
Project No.: 0219-006-07
Location: W of 3600 W and N of 13400 S, Riverton, Utah
Client: Riverton Depot 10 LLC
Drilling Method: 3-3/4" ID Hollow-Stem Auger
Date Drilled: 07-10-07
Elevation: Overall Site Approximately 4605' +/-
Water Level: No groundwater encountered
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 CLAY with trace fine sand; major roots (topsoil) to 4"; pinholes; brown (CL)									loose to 6" dry
				32							very stiff
		pinholes grade out	5	17		21.8		90			stiff
		SILTY FINE SAND with trace medium to coarse sand and fine gravel; brown (SM)									
			10	100+							moist very dense
				100+							
		Drilling refusal at 13.0'.									
		Stopped sampling at 13.0'.	15								
		Installed 1-1/4" diameter slotted PVC pipe to 13.0'.									
		Groundwater not encountered at time of drilling.	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 3E

BOREHOLE B-6

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

Project Name: Prop Kohl's Dept Store & Adjoining Facilities
Project No.: 0219-006-07
Location: W of 3600 W and N of 13400 S, Riverton, Utah
Client: Riverton Depot 10 LLC
Drilling Method: 3-3/4" ID Hollow-Stem Auger
Date Drilled: 07-10-07
Elevation: Overall Site Approximately 4605' +/-
Water Level: No groundwater encountered
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 CLAY with trace fine sand; major roots (topsoil) to 4"; brown (CL)									loose to 6" dry
		some pineholes and light brown		30							slightly moist very stiff
		SILTY VERY FINE SAND/VERY FINE SANDY SILT with trace medium to coarse sand and fine gravel; brown (SM/ML)	5	16		14.1		88			slightly moist loose
		grades with occasional up to 1" layers of silty clay									
		SILTY SAND AND GRAVEL fine to coarse sand; fine and coarse gravel; brown (SM/GM)	10	100+							moist very dense
		Stopped drilling at 9.5'.									
		Stopped sampling at 10.5'.									
		Groundwater not encountered at time of drilling.	15								
			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 3F

BOREHOLE B-7

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

Project Name: Prop Kohl's Dept Store & Adjoining Facilities
Project No.: 0219-006-07
Location: W of 3600 W and N of 13400 S, Riverton, Utah
Client: Riverton Depot 10 LLC
Drilling Method: 3-3/4" ID Hollow-Stem Auger
Date Drilled: 07-10-07
Elevation: Overall Site Approximately 4605' +/-
Water Level: No groundwater encountered
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 CLAY with trace fine sand; major roots (topsoil) to 3"; brown (CL)									loose to 12" dry
		grades with occasional pinholes		36							slightly moist very stiff
			5	61		18.1		74			hard moist
		CLAYEY SILT with some fine sand and trace fine gravel; brown (SM/ML)									medium dense
		grades with occasional coarse gravel at 6.5'									
		SILTY SAND AND GRAVEL fine sand; fine and coarse gravel; brown (SM/GM)		58							moist medium dense
		Drilling refusal at 9.5'.	10								
		Stopped sampling at 9.5'.									
		Groundwater not encountered at time of drilling.	15								
			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 3G

BOREHOLE B-8

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

Project Name: Prop Kohl's Dept Store & Adjoining Facilities
Project No.: 0219-006-07
Location: W of 3600 W and N of 13400 S, Riverton, Utah
Client: Riverton Depot 10 LLC
Drilling Method: 3-3/4" ID Hollow-Stem Auger
Date Drilled: 07-10-07
Elevation: Overall Site Approximately 4605' +/-
Water Level: No groundwater encountered
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 CLAY with some fine sand; major roots (topsoil) to 3"; brown (CL)									loose to 8" dry
		pinholes		35		8.0		95			very stiff
		SILTY SAND very fine sand; brown (SM/ML)	5	22		10.1		76			dry medium dense dry
		SILTY CLAY/CLAYEY SILT with trace very fine sand; light brown (CL/ML)									very stiff
		grades with some fine sand	10	30							slightly moist very stiff
			15	37							
		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 3H

BOREHOLE B-9

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

Project Name: Prop Kohl's Dept Store & Adjoining Facilities
Project No.: 0219-006-07
Location: W of 3600 W and N of 13400 S, Riverton, Utah
Client: Riverton Depot 10 LLC
Drilling Method: 3-3/4" ID Hollow-Stem Auger
Date Drilled: 07-10-07
Elevation: Overall Site Approximately 4605' +/-
Water Level: No groundwater encountered
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 CLAY with trace fine to coarse sand and fine gravel; major roots (topsoil) to 2"; brown (CL)									loose to 8" dry
		pinhole structure		35		11.2		96			very stiff
			5	85		12.1		97			hard
											dry
		SANDS with some silt; fine sand; light grayish-brown (SP/SM)	10	41		4.0		90			slightly moist medium dense
		SILTY CLAY/CLAYEY SILT with some fine sand; light brown (CL/ML)									very stiff
			15	55							moist medium dense
		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 3I

BOREHOLE B-10

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

Project Name: Prop Kohl's Dept Store & Adjoining Facilities
Project No.: 0219-006-07
Location: W of 3600 W and N of 13400 S, Riverton, Utah
Client: Riverton Depot 10 LLC
Drilling Method: 3-3/4" ID Hollow-Stem Auger
Date Drilled: 07-10-07
Elevation: Overall Site Approximately 4605' +/-
Water Level: No groundwater encountered
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 SAND with major roots (topsoil) to 2"; fine sand; brown (SM)									loose to 6" dry
		grades with zones of fine medium sand with some silt		59							slightly moist medium dense
		SILTY GRAVEL with some fine sand; fine and coarse gravel; brown (GM)	5	100+							moist very dense
		Drilling refusal at 6.0'.									
		Stopped sampling at 5.5'.									
		Groundwater not encountered at time of drilling.	10								
			15								
			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 3J

BOREHOLE B-11

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

Project Name: Prop Kohl's Dept Store & Adjoining Facilities
Project No.: 0219-006-07
Location: W of 3600 W and N of 13400 S, Riverton, Utah
Client: Riverton Depot 10 LLC
Drilling Method: 3-3/4" ID Hollow-Stem Auger
Date Drilled: 07-10-07
Elevation: Overall Site Approximately 4605' +/-
Water Level: No groundwater encountered
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 CLAY with trace fine sand; major roots (topsoil) to 3"; brown (CL)									loose to 6" dry
		pinhole and light brown		48		17.3		96			slightly moist very stiff
			5								
		SILTY SANDS very fine sand; brown (SM/ML)		25							moist slightly moist loose
		SANDS with fine gravel and some silt; fine and coarse sand; brown (SP/SM)	10	133							moist very dense
		SILTY GRAVEL with some fine sand; fine and coarse gravel; brown (GM)	15	94							moist very dense
		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 3K

BOREHOLE B-12

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

Project Name: Prop Kohl's Dept Store & Adjoining Facilities
Project No.: 0219-006-07
Location: W of 3600 W and N of 13400 S, Riverton, Utah
Client: Riverton Depot 10 LLC
Drilling Method: 3-3/4" ID Hollow-Stem Auger
Date Drilled: 07-10-07
Elevation: Overall Site Approximately 4605' +/-
Water Level: No groundwater encountered
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 CLAY with trace fine sand; major roots (topsoil) to 2"; pinholes; brown (CL)									loose to 8" dry
				50							slightly moist very stiff
			5	36		15.4		80			
		drilling indicates gravel at 7.5'									
		SILTY GRAVEL with some fine sand and occasional layers up to 2" of silty fine sand; fine gravel; brown (GM)									slightly moist
			10	58							moist medium dense
		Drilling refusal at 9.5'.									
		Stopped sampling at 10.5'.									
		Groundwater not encountered at time of drilling.	15								
			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 3L

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.
	IDENTIFICATION PROCEDURES ON FRACTION SMALLER THAN No. 40 SIEVE SIZE					
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)		DRY STRENGTH (CRUSHING CHARACTERISTICS)	DILATANCY (REACTION TO SHAKING)	TOUGHNESS (CONSISTENCY NEAR PLASTIC LIMIT)		
	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.

USG

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.

LOG KEY SYMBOLS

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

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

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 thichness

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
Gordon Spilker Huber
Geotechnical Consultants, Inc.

Tensar INTERNATIONAL

Branden Reall, P.E.
Mountain West Regional Manager
9601 Timp View Dr.
Eagle Mountain, UT 84043
Tel. 801•789•5407
Fax 801•789•5408
Cell 801•787•3343

December 15, 2007

RE: Conceptual design for standard and heavy duty pavements for the Kohl's Riverton project

Mr. Mike Stangl,

On behalf of Tensar, thanks for allowing us to present alternate standard and heavy duty pavement sections for the Riverton Kohl's project.

In order to evaluate an equivalent alternate reinforced section, Equivalent Single Axle Loads (ESALs) were determined for the current unreinforced section based on AASHTO '93 design guidelines. Values used for layer coefficients, drainage factors, and reliability were based on the UDOT standard values. A subgrade strength of 9000 psi was used for the subgrade based on the SPT data. Although this value may not be exactly what was used in the design – it was kept constant throughout to provide an accurate comparison. (However, if the subgrade strength is lower than this, a constructability check should be performed.) Alternative sections were then designed with Tensar reinforcement. A layered analysis was also run on the current and reinforced sections to observe how the individual layers of the pavement section would perform. Comparable sections from the analysis, comparing the current sections to Tensar BX reinforced sections, are as follows:

Standard Duty

(Two standard duty sections were provided in the geotech report. In order to provide an alternate, the section with the highest expected performance, based on structural number, was used for comparison.)

Current Pavement Section	Alternate A (BX1100 option)
3.0-inches HMA	3.0-inches HMA
6.0-inches UTBC	9-inches UTBC
8.0-inches Granular Subbase	-- Layer of BX1100

Heavy Duty

(Two heavy duty sections were provided in the geotech report. In order to provide an alternate, the section with the highest expected performance, based on structural number, was used for comparison.)

Current Pavement Section	Alternate A (BX1100 option)
4.0-inches HMA	4.0-inches HMA
6.0-inches UTBC	9-inches UTBC
12.0-inches Granular Subbase	-- Layer of BX1200

The application of Base Reinforcement was utilized for analyzing this option. The inclusion of the Tensar BX geogrid into a base course improves structural performance by resisting lateral movement of the base course. The benefit a geogrid provides in this application is typically measured by a Traffic Benefit Ratio (TBR). This TBR value is defined by AASHTO as the "ratio of the number of load cycles of a reinforced pavement structure to reach a defined failure state to the number of loads for the same unreinforced section to reach the same defined failure state (PP 46-01)." Traffic Benefit Ratios (TBRs) of 2.7 and 4.5 were used for our BX1100 and BX1200, respectively. Test results by the The Corps of Engineers (at WES), and Montana State University (Dr. Perkins) substantiate these TBR values. Copies of these reports can also be provided upon request.

By using the Tensar BX reinforced sections, several benefits will likely be seen, these include:

1) The geogrid provides a uniform, engineered platform on which to build from.
2) The geogrid will not stop settlement, but it can help limit the effects of differential settlement
3) The BX options listed almost provide a "uniform subgrade" elevation. Although the Heavy duty sections will need slightly more excavation (one inch), the subgrade elevation will be kept almost uniform. Areas in the standard duty parking will need BX1100 while areas that will receive more traffic will need BX1200.

Concerning the site-specific project requirements, we would recommend that all adjacent geogrid rolls be overlapped one foot. Also, we would recommend that any lift of aggregate placed on top of the geogrid be at least 6 inches thick. If different subgrade conditions or construction requirements are required, initial lift thicknesses may be altered accordingly.

For further reference and help, the following are included in this submittal:

- Tensar Spectra Brochure
- Tensar Installation Guide
- SpectraPave analysis
- Recommended Specification Criteria

If you have any questions during your review, or need further information, please feel free to contact me at (801) 789-5407.

Respectfully Submitted,

Branden Reall

Branden Reall, P.E.
Mountain West Regional Manager
Office: (801) 789-5407
Mobile: (801) 787-3343
Fax: (801) 789-5408

GSH
Gordon Spilker Huber
Geotechnical Consultants, Inc.

RELIANCE LETTER

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

Kohl's Department Stores, Inc.
N56 W17000 Ridgewood Drive
Menomonee Falls, Wisconsin 53051

Attention: Mr. Robert F. Doren, P.E.,
Site Developer Manager

Re: Site Development Agreement ("**SDA**") between Riverton Depot 10 LLC ("**Developer**") and Kohl's Department Stores, Inc. ("**Kohl's**") with respect to site work for the shopping center development located west of 3600 West and north of 13400 South Street in the City of Riverton, Salt Lake County, Utah (the "**Project**")

Dear Mr. Doren:

Gordon Spilker Huber Geotechnical Consultants, Inc. [GSH] ("**Engineer**") and Developer have previously entered into a Professional Services Agreement ("**Contract**") with respect to a certain geotechnical study ("**Services**") to be provided by Engineer with respect to the Project. Pursuant to the Contract, Engineer shall prepare and perform field and laboratory testing, analysis, and reports, together with all amendments, addenda, supplements, and modification thereto, whether now or hereafter existing ("**Contract Documents**").

Pursuant to the terms of the SDA, Engineer hereby acknowledges and agrees with Kohl's as follows:

Engineer hereby agrees that Kohl's may rely upon all Contract Documents to the same extent as if prepared by Kohl's. Engineer further acknowledges and agrees that: (i) under certain circumstances, Kohl's has a right to takeover Developer's obligations under the SDA in whole or in part, and (ii) if such takeover right is exercised, Kohl's shall have the right to use the Contract Documents and Engineer shall continue to render Services as hereinafter provided.

Engineer shall give Kohl's written notice of any default by Developer under the Contract and agrees that Kohl's shall have an additional 30 days after any applicable cure period (or 30 days if no cure period is stated) to cure such default and to require Engineer to continue its performance under the Contract on Kohl's behalf in accordance with the terms thereof. Engineer agrees that it will not terminate the Contract or cease to perform Services thereunder for any reason, including but not limited to Developer's failure to make any payments to Engineer without giving written notice to Kohl's of such intention to terminate or cease performance of

Services at least 30 days prior thereto, in order that Kohl's may exercise its takeover rights under the SDA.

If Developer is in default under the SDA, (i) then upon receipt by Engineer of written notice from Kohl's that Developer is in default under the SDA, Kohl's shall be authorized to use the Contract Documents for purposes of completing construction of the Site Work (as defined in the SDA) without additional cost or expense; and (ii) Engineer will continue, at Kohl's direction, to perform services for Kohl's pursuant to and in accordance with the terms of the Contract Documents provided that Kohl's pays to Engineer the fees for those Services rendered to Kohl's in accordance with the terms of the Contract, irrespective of any contrary instructions, direction or requests from Developer.

It is expressly understood that Kohl's neither assumes nor has any obligation to Engineer to exercise its takeover rights as provided herein, but that the option to exercise such right rests in the sole and absolute discretion of Kohl's. Unless and until Kohl's exercises such takeover rights pursuant to the SDA, nothing in the SDA or this letter shall in any manner render Kohl's liable for any amounts due Engineer (or any party claiming by, through our under Engineer) under the Contract Documents.

Notices to be given hereunder shall be sufficiently given if in writing and delivered in person, or sent via United States certified mail, return receipt requested, postage prepaid or via reputable overnight courier confirmed delivery, in each case addressed to the party being given such notice. Any such notice shall be deemed given upon receipt or refusal of receipt at the following addresses or at such other address as the party to be notified shall have provided the other party in writing:

Engineer: Gordon Spilker Huber Geotechnical Consultants, Inc.
4426 South Century Drive, Suite 100
Salt Lake City, Utah 84123
Attention: Mr. Bill Gordon
Facsimile Number: (801) 685-9190

Kohl's: Kohl's Department Stores, Inc.
N56 W17000 Ridgewood Drive
Menomonee Falls, Wisconsin 53051
Attention: Law Department
Facsimile Number: (262) 703-7274

with copies to :

Kohl's Department Stores, Inc.
N56 W17000 Ridgewood Drive
Menomonee Falls, Wisconsin 53051
Attention: Mr. Robert F. Doren, P.E., Site Developer Manager
Facsimile Number: (262) 703-7105

and

Riverton Depot 10 LLC
90 East 7200 South #200
Midvale, Utah 84047-1565
Attention: Mr. Mike Stangl
Facsimile Number: (801) 255-2314

Engineer agrees to provide Kohl's with written notice of changes to the Contract and/or Contract Document that modify Site Work (including, without limitation, the time for performance and completion thereof and the costs thereof) in any material respect.

EXECUTED: January 25, 2008

ENGINEER:

Gordon Spilker Huber Geotechnical Consultants, Inc.

By: _____
Name: William J. Gordon
Title: President