State of Utah

JON M. HUNTSMAN, JR.
Governor

GARY R. HERBERT
Lieutenant Governor

Department of Administrative Services
KIMBERLY K. HOOD
Executive Director

Division of Facilities Construction and Management
DAVID G. BUXTON
Director

ADDENDUM #1

Date: June 19, 2007

To: Contractors

From: Matthias Mueller, Project Manager, DFCM

Reference: New St. George ABC Store – Design/Build
Department of Alcoholic Beverage Control – St. George, Utah
DFCM Project No. 05052030

Subject: **Addendum No. 1**

Pages			
	Addendum	1	page
	Geotechnical Investigation	28	pages
	Total	**29**	**pages**

Note: This Addendum shall be included as part of the Contract Documents. Items in this Addendum apply to all drawings and specification sections whether referenced or not involving the portion of the work added, deleted, modified, or otherwise addressed in the Addendum. Acknowledge receipt of this Addendum in the space provided on the Bid Form. Failure to do so may subject the Bidder to Disqualification.

1.1 **SCHEDULE CHANGES –** There are no changes to the Project Schedule.

1.2 **GENERAL –** Description of the Work: The site geotechnical investigation/analysis and ALTA/topographic surveyinng services will be provided by DFCM. The completed geotechnical investigation is attached to this addendum. The ALTA/topographic survey is in progress. The design/build team shall still be responsible for obtaining the water flow analysis for the site.

End of Addendum #1

Geotechnical Investigation
Approximately 4-Acre Parcel
Near 150 North and 900 East
St. George, Utah

Prepared For:

Andy Leavitt
5404 North 1530 West
St. George, Utah 84770

Rosenberg Associates
Project No: 4207-03

February 17, 2004

ROSENBERG ASSOCIATES
CONSULTING ENGINEERS AND LAND SURVEYORS

February 17, 2004 4207-03

Andy Leavitt
5404 North 1530 West
St. George, Utah 84770

Subject: Geotechnical Investigation for an Approximately 4-Acre Parcel
Near 150 North and 900 East, St. George, Utah

Dear Mr. Leavitt:

We are pleased to submit the results of our geotechnical investigation performed at the above-referenced site. Our field explorations indicated relatively thin surficial silty sand soils overlying sandstone bedrock in most areas of the site. Thicker soil deposits were present in the southeastern area of the property. In addition, a relatively large waste asphalt pile was present in the eastern area of the site.

Based on the results of our investigation, the subject site is suitable for the proposed development (from a geotechnical view point) providing that the recommendations presented in this report are complied with. Specifically, it is our opinion that the loose surficial silty sand soils are not suitable for the support of the proposed improvements in their existing condition. These soils should be reworked (excavated, moisture conditioned, and recompacted) to a minimum depth of 1 foot below the existing site grade or 1 foot below the bottom of footing elevation and flatwork/pavement subgrades, whichever is greater. Excavations may be terminated on competent sandstone bedrock. The proposed improvements should then receive adequate support from properly placed and compacted reworked native soils/structural fill or competent bedrock. Individual foundation elements should not be founded on a combination of native soils/structural fill and bedrock. Where this situation is encountered, we recommend that the bedrock be excavated a minimum depth of 1 foot and replaced with structural fill, or that all foundation elements extend down to competent bedrock.

It is our standard practice to recommend that structures and improvements not be founded on uncontrolled fill (such as the asphalt pile on the eastern side of the site and the disturbed soils in various areas of the site associated primarily with spring development activities) due to the potential for random settlements and potential distress. Therefore, we recommend that all uncontrolled fill materials within proposed building areas be overexcavated down to expose the underlying native soils or bedrock and then be properly replaced to the desired grade with approved structural fill.

It should be noted that waste asphalt is not a "hazardous" waste as defined by current regulations, but is considered a "special" waste. Under Utah Code of Regulations, Section R315-315-9 titled "Waste Asphalt", it states that the preferred management of waste asphalt is recycling. Recycling includes use: (1) as feedstock in the manufacture of new mix, (2) as underlayment in road construction, (3) as subgrade in road construction when the asphalt is above the historical high level of groundwater, (4) under parking lots when the asphalt is above the historical high level of groundwater, or (5) as road shoulder when the use meets engineering requirements. If the waste asphalt is not recycled, it must be disposed in a permitted landfill.

Conclusions and opinions provided in the accompanying report have been based upon our analysis of the data obtained from the field and limited laboratory investigation programs, and our previous geotechnical experience with similar soil conditions. If you have any questions concerning the information contained in this report, please contact us at your convenience.

Sincerely,

ROSENBERG ASSOCIATES

David R. Black, P.E.
Geotechnical Division Manager

RLO/drb/04R-041.G

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INTRODUCTION

This report presents the results of a geotechnical investigation performed for an approximately 4-acre site located near 150 North and 900 East in St. George, Utah (see Drawing No. 1 included at the end of the text of this report for the general project location). The purposes of this investigation were to evaluate the nature and engineering properties of the subsurface soils, and to provide recommendations for general site grading and the design and construction of foundations, concrete slabs-on-grade, and asphaltic concrete pavements.

For the purposes of this report, it is assumed that the proposed structures will consist of one- to two-story construction with concrete slab-on-grade floors and relatively low to moderate structural loads.

The recommendations contained in this report are subject to the limitations presented in the "Limitations" section of this report. In addition, a brochure prepared by ASFE (The Association of Engineering Firms Practicing in the Geosciences) has been included following this report. We recommend that all individuals reading this report read the limitations along with the attached document.

SCOPE OF WORK

Our scope of work included subsurface exploration, limited soil sampling and laboratory testing, engineering analyses, and preparation of this report. The following tasks were included in our scope of work.

1. The subsurface soil conditions at the site were explored in November 2003 by excavating 5 exploratory trenches to depths ranging from 1½ to 7½ feet below the existing site grade. The approximate locations of the explorations are shown on Drawing No. 2 included at the end of the text of this report. The subsurface conditions encountered during trenching were logged by our geologist. The equipment and methods used during our field investigation are described further in Appendix A.

2. Limited soil samples were obtained at selected depths from the trench sidewalls using 2.5-inch I.D. hand sampling equipment. Representative portions of the soil were packaged and transported to our laboratory for further evaluation.

3. Soil samples were tested in the laboratory to evaluate the pertinent engineering properties. Tests included unit weight and moisture content determinations and a modified consolidation (collapse) test.

4. Results of the field exploration and limited laboratory testing were evaluated and engineering analyses were performed to develop appropriate recommendations for the design and construction of the proposed project.

5. This report was prepared to present the results of our findings, conclusions, and recommendations.

GENERALIZED SITE CONDITIONS

SURFACE DESCRIPTION

At the time of our field investigation (November 2003), the land surface consisted of a steep downward slope in the northern portion of the parcel followed by a more moderate sloping topography in the middle. This moderate sloping area was followed by another steep downward slope which continued to the southern extent of the property with the exception of the southeastern corner which was relatively flat. The property was crossed by a few densely vegetated, narrow-channeled washes, especially in the lower, steeply-sloped region. Vegetative cover was generally sparse to moderate in the flatter areas while, other than in the washes, sandstone bedrock was exposed predominantly in the steep sloping areas. Some springs were present which were in various stages of development (collection areas, piping, etc.) and some water was present in the bottom of the washes. Uncontrolled fill soils and disturbed soils were present in various areas of the site, associated primarily with the various spring development activities. In addition, a relatively large asphalt fill pile was present on the eastern side of the property.

The property was bounded by 900 East Street to the East, generally undeveloped property and Skyline Drive to the north, undeveloped property the west, and Gibson's Carpet Gallery and other businesses followed by St. George Boulevard to the south.

SUBSURFACE CONDITIONS

The subsurface conditions encountered in the explorations completed at the site generally consisted of relatively thin deposits of loose silty sand soils (½ to 1 foot thick) overlying sandstone bedrock. In the southeastern corner of the site, the soils consisted of silty sand with caliche nodules which were cemented at a depth of 3½ feet. One exploration was completed in the waste asphalt area. This trench indicated an asphalt thickness of 5½ feet. The surficial soils exhibited a low relative in-place dry density and a moderate potential for hydrocollapse (rapid movement under increased loading and moisture conditions). Groundwater was not encountered in the explorations at the depths explored.

ENGINEERING ANALYSIS AND RECOMMENDATIONS

GENERAL EVALUATION

Based on the results of our investigation, the subject site is suitable for the proposed development (from a geotechnical view point) providing that the recommendations presented in this report are complied with. Specifically, it is our opinion that the loose surficial silty sand soils are not suitable for the support of the proposed improvements in their existing condition. These soils should be reworked (excavated, moisture conditioned, and recompacted) to a minimum depth of 1 foot below the existing site grade or 1 foot below the bottom of footing elevation and flatwork/pavement subgrades, whichever is greater. Excavations may be terminated on competent sandstone bedrock. The proposed improvements should then receive adequate support from properly placed and compacted reworked native soils/structural fill or competent bedrock. Individual foundation elements should not be founded on a combination of native soils/structural fill and bedrock. Where

this situation is encountered, we recommend that the bedrock be excavated a minimum depth of 1 foot and replaced with structural fill, or that all foundation elements extend down to competent bedrock.

It is our standard practice to recommend that structures and improvements not be founded on uncontrolled fill (such as the asphalt pile on the eastern side of the site and the disturbed soils in various areas of the site associated primarily with spring development activities) due to the potential for random settlements and potential distress. Therefore, we recommend that all uncontrolled fill materials within proposed building areas be overexcavated down to expose the underlying native soils or bedrock and then be properly replaced to the desired grade with approved structural fill.

It should be noted that waste asphalt is not a "hazardous" waste as defined by current regulations, but is considered a "special" waste. Under Utah Code of Regulations, Section R315-315-9 titled "Waste Asphalt", it states that the preferred management of waste asphalt is recycling. Recycling includes use: (1) as feedstock in the manufacture of new mix, (2) as underlayment in road construction, (3) as subgrade in road construction when the asphalt is above the historical high level of groundwater, (4) under parking lots when the asphalt is above the historical high level of groundwater, or (5) as road shoulder when the use meets engineering requirements. If the waste asphalt is not recycled, it must be disposed in a permitted landfill.

The following sections of this report present our recommendations for general site grading, foundation design, retaining walls, concrete slabs-on-grade, soil corrosion, asphaltic concrete pavement for parking areas, and moisture protection. We recommend that the Geotechnical Engineer be allowed to review the final grading plans when prepared to evaluate the compatibility of these recommendations.

EARTHWORK

Site Preparation and Grading

Within the areas to be graded, any existing vegetation and debris should be removed and hauled off the site. The existing uncontrolled fill materials and disturbed soils should be excavated. Suitable fill materials may be stockpiled for later use as recompacted structural fill. The loose surficial soils should then be reworked (excavated, moisture conditioned, and recompacted) to a minimum depth of 1 foot below the existing site grade or 1 foot below the bottom of footing elevation and flatwork/pavement subgrades, whichever is greater. Excavations may be terminated on competent sandstone bedrock. The proposed improvements should then receive adequate support from properly placed and compacted reworked native soils/structural fill. Individual foundation elements should not be founded on a combination of native soils/structural fill and bedrock. Where this situation is encountered, we recommend that the bedrock be excavated a minimum depth of 1 foot and replaced with structural fill, or that all foundation elements extend down to competent bedrock.

It is our standard practice to recommend that structures and improvements not be founded on uncontrolled fill (such as the asphalt pile on the eastern side of the site and the disturbed soils in various areas of the site associated primarily with spring development activities) due to the potential for random settlements and potential distress. Therefore, we recommend that all uncontrolled fill materials within proposed building areas be overexcavated down to expose the underlying native soils or bedrock and then be properly replaced to the desired grade with approved structural fill.

Following excavation of the unsuitable soils as described above, the Geotechnical Engineer should observe the excavation bottoms prior to the continuance of grading to observe that the recommended removals have been made and whether the exposed soils are suitable for the support of structural fill. Prior to placement of structural fill, the exposed soils should be scarified to a minimum depth of 6 inches, brought to within 2% of optimum moisture content, and recompacted to 95% of the laboratory maximum dry density as determined by

ASTM D-1557. Scarification operations may be terminated where sandstone bedrock is encountered. The site should then be brought to rough grade with structural fill as described in a subsequent section.

Excavations

The thin surficial soils encountered at the site should be readily excavatible with conventional excavation equipment. However, shallow bedrock is present over the majority of the site. Where encountered during site grading and utility trench excavation, heavy-duty backhoe, heavy-duty ripping, ho-ram, or other rock excavation techniques should be anticipated. Temporary excavations should be laid back to safe slopes or properly shored. Safety of construction personnel is the responsibility of the Contractor.

Springs and Washes

Natural drainage washes and springs are present on the site which may require special attention during site grading and project construction. The washes contain heavy vegetation, and may have organic soils, and soft and loose native soils which will require removal down to competent bedrock. The springs are in various stages of development (collection systems, piping, etc.) and any planned future spring development should be incorporated into the project development specifications so that spring water flows are properly contained and do not impact on-site improvements. The locations of the springs and associated appertenances are shown on the as-built survey prepared by Rosenberg Associates.

A quantitative analysis of the potential for groundwater fluctuations would be difficult and is beyond the scope of our work. However, rises in groundwater level should be anticipated which could have adverse affects on foundations, pavements, and underground utilities. Installation of permanent subdrains in the bottoms of the natural washes and/or containment structures for spring water flows may be pertinent depending on the final project design. In order to minimize the potential for damage to on-site improvements from the on-site water, the Geotechnical Engineer should be consulted during preparation of the grading plan so that geotechnical engineering recommendations are incorporated.

Permanent Cut and Fill Slopes

It is recommended that in general, the maximum permanent cut and fill slopes should not be made steeper than 2:1 (horizontal to vertical). Cuts made in competent sandstone bedrock may be as steep as ¾ to ½:1 if the slope is observed and approved by the Geotechnical Engineer. These requirements should be adequate for overall stability; however, flatter slopes may be desired for erosion control. Also, to reduce the potential for erosion, all drainage above the slopes should be directed away from the slope face. Where steeper slopes are desired within the development, retaining structures, reinforced slopes and/or additional analysis will be required.

The minimum setback requirements for building structures on all slopes over 5 feet in height is a horizontal distance of 20 feet from the top of the slope. The edge of block wall footings should not be placed closer than 3 feet from the slope face.

Structural Fill

All fill placed for the support of footings, concrete floor slabs, exterior flatwork, and pavements should consist of structural fill. Structural fill may consist of excavated on-site sandy soils or approved imported fill materials. Structural fill should be granular, non-expansive, have a solubility of less than 2%, be free of vegetation and debris, and contain no inert materials larger than 6 inches in nominal size. Granular fill materials used in the top 6 inches of building pad subgrades should consist of the above soils with a maximum particle size of 4 inches. Waste asphalt is not suitable for use as structural fill in all situations. However, the Utah Code of Regulations, Section R315-315-9 titled "Waste Asphalt", states that the preferred management of waste asphalt is recycling. Recycling includes use: (1) as feedstock in the manufacture of new mix, (2) as underlayment in road construction, (3) as subgrade in road construction when the asphalt is above the historical high level of groundwater, (4) under parking lots when the asphalt is above the historical high level of groundwater, or (5) as road shoulder when the use meets engineering requirements.

Structural fill should be placed in maximum 8-inch loose lifts and compacted on a horizontal plane, unless otherwise approved by the Geotechnical Engineer. Soils in compacted fills should be compacted to at least 95% of the maximum dry density as determined by ASTM. The moisture content should be within 2% of optimum. Any imported fill materials should be approved prior to importing. Prior to placing any fill, the excavations should be observed by the Geotechnical Engineer to observe that unsuitable materials have been removed.

Rock may be used in structural fill areas under the following conditions:

- The upper 2 feet of compacted fill shall contain rock no larger than 6 inches in diameter.
- Rock larger than 12 inches in diameter may be used at a depth greater than 4 feet from final grade if special compaction procedures are used in the placement and compaction of such rocks. These special procedures shall be subject to the approval of the Geotechnical Engineer.
- All rock shall be placed in such a manner that it does not nest or create voids between adjacent rocks.

Where fill is placed on a natural slope steeper than 5:1, the slope surface should be cut to form benches with horizontal and vertical faces. All unsuitable materials on the slope surface should be removed by stripping prior to benching, or during the benching process. Unsuitable materials consist of all existing vegetation, debris and undocumented fill soils, along with any loose or disturbed natural soils. The minimum bench dimensions should be 2 feet horizontal by 2 feet vertical; however, the bench under the toe of the fill should be at least 10 feet wide. The compacted fill should be benched into competent natural materials. The compaction requirements for the fill slopes shall extend out to the slope face. An effective method for compacting the slope face is to overfill and then cut back to the properly compacted material.

FOUNDATION DESIGN

The proposed structures should receive adequate support from conventional strip and/or spread footings founded on entirely on properly placed and compacted structural

fill/reworked native soils or entirely on competent sandstone bedrock as described in the Earthwork section of this report. Individual foundation elements should not be founded on a combination of reworked native soils/structural fill and bedrock. If these mixed conditions are encountered at subgrade, it is recommended that the sandstone bedrock should be overexcavated to a depth of at least 1 foot and replaced with properly compacted structural fill, or that all foundation elements extend down to competent bedrock. All structural fill should be placed and compacted as recommended in the Structural Fill section of this report. Conventional strip and/or spread footings should be a minimum of 12 and 15 inches wide and embedded a minimum of 12 and 18 inches below the lowest adjacent final grade for one- and two-story structures, respectively. Footings founded on structural fill may be proportioned for a maximum net allowable bearing pressure of 2,000 psf. Footings founded entirely on competent bedrock may be designed for a maximum net allowable bearing pressure of 3,000 psf. A one-third increase may be used for transient wind or seismic loads.

It is our opinion that foundations should be reinforced with a minimum of one No. 4 bar near the top of the stemwall, and one No. 4 bar near the footing base. Additional reinforcing may be required as per the Structural Engineer's design.

Settlements of properly designed and constructed foundations are anticipated to be less than one inch. Differential settlements should be on the order of one-half the total settlements. It is expected that the majority of the anticipated settlement will occur during construction.

Prior to constructing the foundations, the footing excavations should be observed by the Geotechnical Engineer to observe whether suitable bearing soils have been exposed and whether the excavation bottoms are free of loose or disturbed soils.

Horizontal loads acting on foundations formed in open excavations will be resisted by friction acting at the base of foundations and by passive earth pressures. If the design makes use of passive earth pressures, it is important that the Geotechnical Engineer be present during any footing backfill placement. The friction acting along the base of footings founded on suitable foundation soils may be computed by using a coefficient of friction of 0.4 with

the normal dead load. An allowable lateral passive earth pressure may be computed by using an equivalent fluid weighing 250 pcf for the side of footings poured against properly placed and compacted structural fill. The maximum allowable passive pressure should not exceed 1,000 psf. The values given above may be increased by one-third for transient wind or seismic loads.

SEISMIC CONSIDERATIONS

The project site is located in Seismic Risk Zone 2B of the Seismic Zone Map for the United States as indicated by the latest Uniform Building Code, Figure 16-2. This represents a low to moderate earthquake zone. Based on the results of our investigation, it is our opinion that the seismic site classification for the site is best represented by Classification "C" as described in Table 1615.1.1 of the International Building Code (IBC), 2000.

CONCRETE SLABS-ON-GRADE

Satisfactory support for concrete slabs-on-grade and exterior concrete flatwork may be provided by a 4-inch layer of compacted gravel overlying a zone of properly placed and compacted structural fill as recommended in the Earthwork section of this report. The layer of compacted gravel may consist of roadbase, or pit-run gravel with a 2-inch maximum particle size and no more than 12% fines passing the No. 200 sieve.

If moisture sensitive floor coverings are used, we suggest using an impervious membrane (visqueen) in conjunction with the gravel layer. If used, the visqueen moisture barrier should be at least 10 mils in thickness and covered with two inches of sand for puncture protection and to aid in concrete curing.

All concrete slabs should be designed to minimize cracking as a result of shrinkage. Any steel reinforcement should be installed at mid-height in the slab unless directed otherwise by the Structural Engineer.

Special precautions should be taken during the placement and curing of all concrete slabs. Excessive slump (high water-cement ratio) of the concrete and/or improper curing procedures used during either hot or cold weather conditions could lead to excessive shrinkage, cracking or curling in the slabs. We recommend that all concrete placement and curing operations be performed in accordance with the American Concrete Institute (ACI) guidelines. We further recommend that control joint and expansion joint spacing be in accordance with ACI recommendations.

SOIL CORROSION

Based on our geotechnical experience with similar soil conditions, soils on this site contain salts in sufficient concentration to be considered "severely" corrosive to metal and concrete as defined in Table 1904.3 of the International Building Code (IBC), 2000. Therefore, all concrete in contact with the on-site soils should contain Type V or equivalent sulfate-resistant cement, and should be placed with a maximum four inch slump. Special protection to buried metal pipes and water lines will be essential for long term performance of these underground utilities. Consideration should be given to cathodic protection of buried metal pipes, or to the use of PVC pipe where permitted by local building codes.

ASPHALTIC CONCRETE PAVEMENT

Asphaltic concrete pavement sections in non-dedicated areas should receive adequate support from properly prepared subgrade. We recommend that the pavement subgrade consist of at least 1 foot of properly compacted structural fill and reworked native soils as discussed in the Earthwork section of this report. In developing recommendations for asphaltic pavement sections, a minimum R-value (based on soil classification) of 50 was used for recompacted on-site soils. A traffic index of 5.0 was assumed for parking and entrance areas. If the assumed T.I. value is not considered appropriate, this office should be notified. Our design procedures were in accordance with the Caltrans method of designing flexible pavement. Table No. 1 on the following page presents the minimum recommended structural pavement section for the assumed design traffic conditions.

Table No. 1: Recommended Minimum Asphaltic Pavement Sections

Traffic Condition	Traffic Index (T.I.)	Asphalt Thickness (inches)	Road Base Thickness (inches)	Structural Fill Thickness (inches)
Parking/Entrance Areas	5.0	2½	4	12

Base and asphaltic concrete materials should conform with St. George City standards. Base material should be placed and compacted to at least 95% of the maximum dry density (ASTM D-1557). Asphalt should be compacted to minimum of 96% of the Marshall maximum density, or a minimum of 92% of the Rice Density. Asphaltic concrete and base materials should be tested prior to delivery to the site and during placement to determine conformance with the project specifications. It is important that pavement grades be set to provide positive drainage to suitable drainage structures.

MOISTURE PROTECTION AND SURFACE DRAINAGE

Special precautions should be taken to minimize changes in moisture content of foundation soils. Positive drainage should be established away from the exterior walls of the structures. The recommended minimum slope is 5% in landscape areas and 2% in flatwork and pavement areas, for a minimum distance of 10 feet from the structures. Watering adjacent to the structures should be eliminated, or kept to a minimum and properly maintained to prevent overwatering. Roof runoff and other sources of moisture should not be allowed to infiltrate the soils in the vicinity of, or upslope from, the structures.

FOUNDATION REVIEW AND OBSERVATION

This report has been prepared to aid in the evaluation of this site and to assist in the design of the project. This office should be provided the opportunity to review the final grading plans, design drawings, and specifications in order to determine whether the assumptions and recommendations presented in this report are valid and have been implemented. Review of the final grading plan, design drawings, and specifications will be noted in writing and will become a supplement to this report.

Variations in soil conditions may be encountered during construction of this project. In order to permit correlation between the field conditions encountered in this investigation and the actual conditions encountered during construction, the Geotechnical Engineer should be retained to perform observation and testing during construction.

CLOSURE

LIMITATIONS

Our assumptions, conclusions, recommendations, and opinions contained in this report are: (1) based on the findings of the field and limited laboratory investigation programs; (2) based on our geotechnical experience with similar soil conditions; (3) based on our understanding of the proposed construction; (4) subject to confirmation of the conditions encountered during construction, and (5) based upon the assumption that sufficient observation and testing will be provided during construction. If any conditions are encountered at this site which are different from those described in this report, our firm should be immediately notified.

This report was prepared in accordance with the generally accepted standard of practice existing at the time the report was written. No warranty, express or implied, is made.

It is the Client's responsibility to see that all parties to the project, including the Designer, Contractor, Subcontractors, etc., are made aware of this report in its entirety. The use of information contained in this report for bidding purposes should be done at the Contractor's option and risk.

CLOSING

We appreciate the opportunity to be of service on this project. Should you have any questions regarding the report or wish to discuss additional services, please contact us at your convenience at (435) 673-8586.

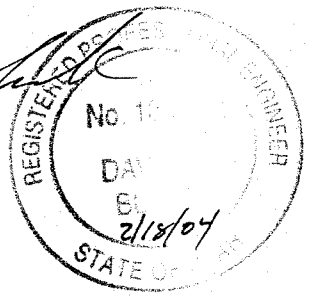
Sincerely,

ROSENBERG ASSOCIATES

Robert L. Oliver

Robert L. Oliver, P.G.
Senior Geologist

David R. Black, P.E.
Geotechnical Division Manager



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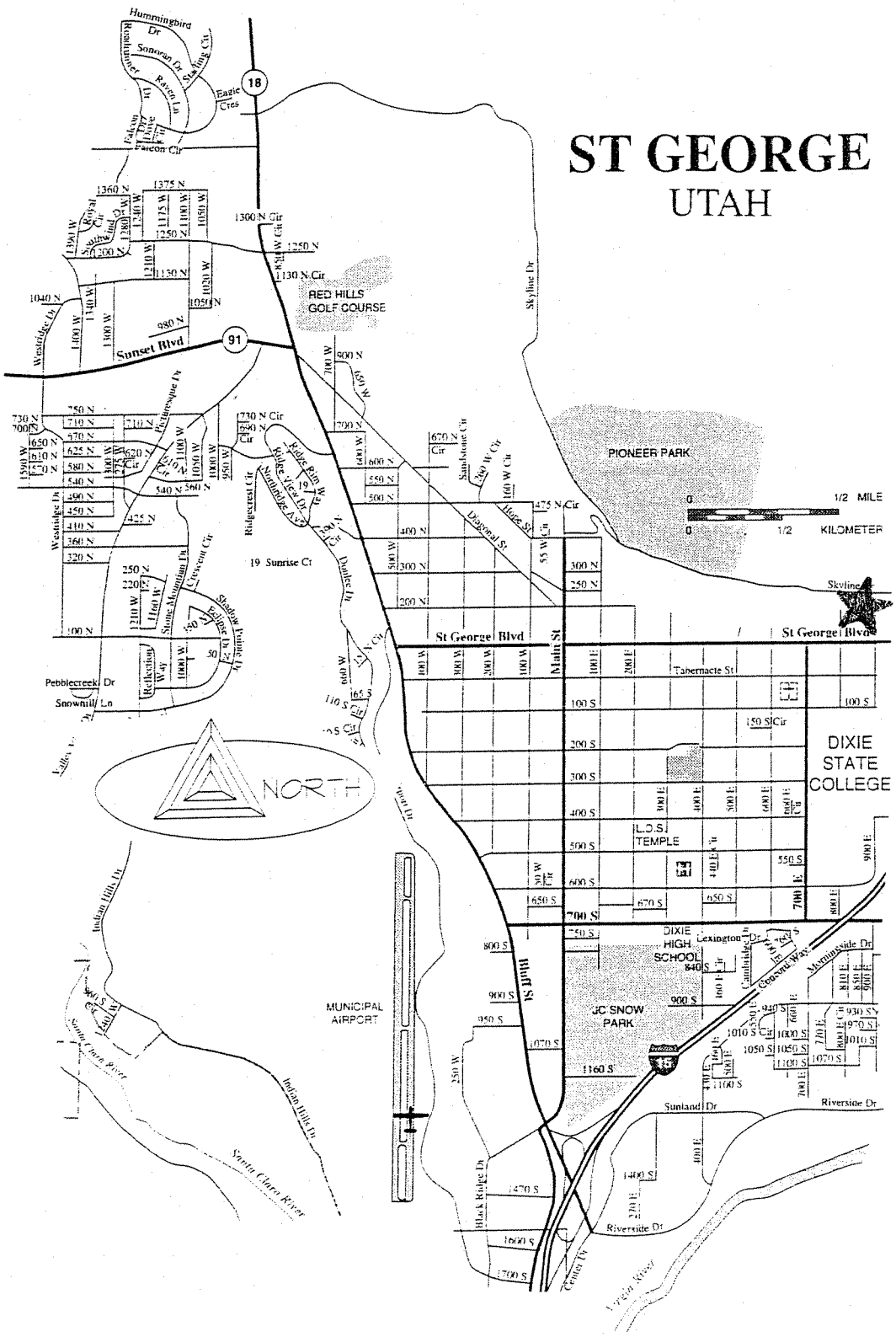
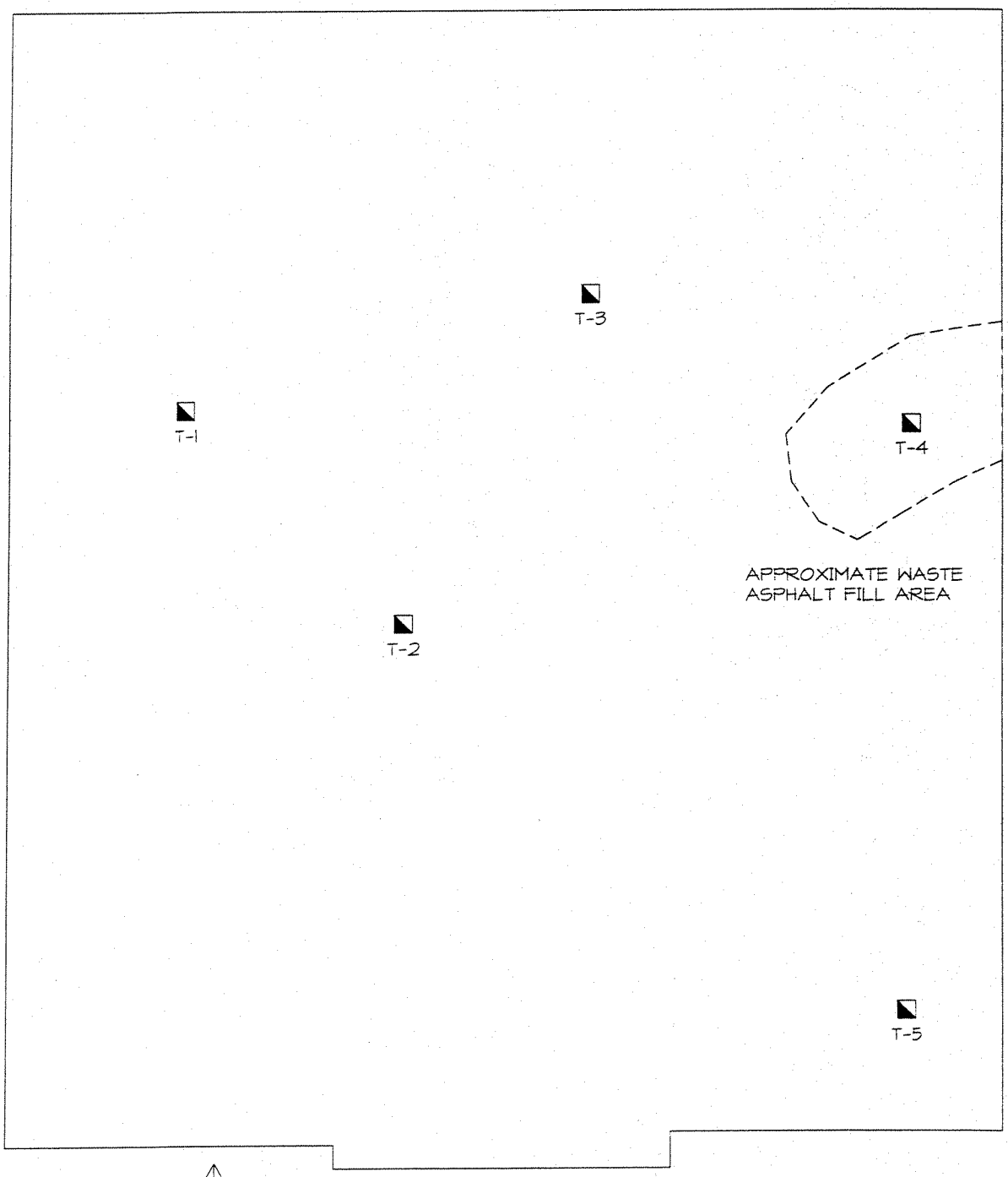


Scale: NTS	Drawn By: GLM	ROSENBERG ASSOCIATES CONSULTING ENGINEERS AND LAND SURVEYORS 352 East Riverside Drive, Suite A2 St. George, Utah 84790 - (435) 673-8586	Vicinity Map 150 North 900 East St. George Utah
Drawing Number: 1	Checked By: RLO		
	Date: 2/18/04	Job Number: 4207-03	



Scale: NTS	Drawn By: GLM	ROSENBERG ASSOCIATES CONSULTING ENGINEERS AND LAND SURVEYORS 352 East Riverside Drive, Suite A2 St. George, Utah 84790 - (435) 673-8586	Site Plan 150 North 900 East St. George, Utah
Drawing Number: 2	Checked By: RLO		
	Date: 2/18/04	Job Number: 4207-03	

APPENDIX A

FIELD AND LABORATORY INVESTIGATIONS

APPENDIX A

FIELD AND LABORATORY INVESTIGATIONS

Field Investigation

The subsurface soil conditions at the site were explored by excavating 5 exploratory trenches to depths ranging from about 1½ to 7½ feet below the existing site grade. The approximate exploratory trench locations are shown on Drawing No. 2. Continuous logs of the subsurface conditions, as encountered in the explorations, were recorded by our geologist. The subgrade soils were visually classified in accordance with the Unified Soil Classification System. Trench logs are included as Drawings No. A-1 through A-5 at the end of this appendix. A Key to Soil Symbols and Terms is included as Drawing No. A-6.

Trenching was performed with a small trackhoe. Limited soil samples were obtained at selected depths using 2.5-inch I.D. hand sampling equipment. Representative portions of the soil were packaged and transported to our laboratory for further evaluation.

Laboratory Investigation

Soil samples were tested in the laboratory to evaluate the pertinent engineering properties. Unit weight and moisture content determinations were performed to evaluate the in-place moisture and density conditions of the on-site soils. A modified consolidation (collapse) test was also conducted to evaluate the potential for movement under increased loading and moisture conditions. Test results are presented on the enclosed Trench Logs and on Drawing No. A-7 entitled "Consolidation Test" included at the end of this appendix.

Log of Trench No. T-1

Date Trenched: 11/6/03

Logged By: DRB/RLO

Ground Surface Elevation: _____

DEPTH (m)	DEPTH (ft.)	GRAPHIC LOG	SUMMARY OF SUBSURFACE CONDITIONS The following is a summary of subsurface conditions encountered at the time of exploration. Subsurface conditions may differ at other locations and may vary at this location with the passage of time. The data contained in this log is a simplification of actual conditions.	DRIVE	BULK	MOISTURE	CONSISTENCY	FIELD MOISTURE (%)	FIELD DENSITY (pcf)
	1		SILTY SAND (SM) Red Brown, Transitioning to Weathered Sandstone Backhoe Refusal at 1.5' on Sandstone			Slightly Moist	Loose Dense to Moderate Hard		
	2								
1	3								
	4								
	5								
	6								
2	7								
	8								
	9								
3									

APPROVED BY RLO ON

Groundwater: NE

End of Trench at 1.5 Feet

Project Title: 150 North 900 East

ROSENBERG ASSOCIATES
CONSULTING ENGINEERS AND LAND SURVEYORS
352 East Riverside Drive, Suite A2 St. George, Utah 84790 - (435) 673-8586

Project No. 4207-03

Drawing No. A-1

Log of Trench No. T-2

Date Trenched: 11/6/03

Logged By: DRB/RLO

Ground Surface Elevation: _____

DEPTH (m)	DEPTH (ft.)	GRAPHIC LOG	SUMMARY OF SUBSURFACE CONDITIONS The following is a summary of subsurface conditions encountered at the time of exploration. Subsurface conditions may differ at other locations and may vary at this location with the passage of time. The data contained in this log is a simplification of actual conditions.	DRIVE	BULK	MOISTURE	CONSISTENCY	FIELD MOISTURE (%)	FIELD DENSITY (pcf)
	0		SILTY SAND (SM) Red Brown, Transitioning to Weathered Sandstone			Slightly Moist	Loose		
	1						Dense to Moderate Hard		
	2		Backhoe Refusal at 2' on Sandstone						
1	3								
	4								
	5								
2	6								
	7								
	8								
	9								
3									

APPROVED BY R.K.O. ON

Groundwater: NE

End of Trench at 2 Feet

Project Title: 150 North 900 East

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Project No. 4207-03

Drawing No. A-2

Log of Trench No. T-3

Date Trenched: 11/6/03

Logged By: DRB/RLO

Ground Surface Elevation: _____

DEPTH (m)	DEPTH (ft)	GRAPHIC LOG	SUMMARY OF SUBSURFACE CONDITIONS	DRIVE	BULK	MOISTURE	CONSISTENCY	FIELD MOISTURE (%)	FIELD DENSITY (pcf)
			The following is a summary of subsurface conditions encountered at the time of exploration. Subsurface conditions may differ at other locations and may vary at this location with the passage of time. The data contained in this log is a simplification of actual conditions.						
	1		SILTY SAND (SM) Red Brown, Slightly Porous			Slightly Moist	Loose		
	2						Medium Dense		
1	3		——Slightly Purple Color to 4'						
	4								
	5		WEATHERED SANDSTONE – Red Brown				Moderate Hard		
			Backhoe Refusal at 5.5' on Sandstone						
	6								
2	7								
	8								
	9								
3									

APPROVED BY RLO ON

Groundwater: NE

End of Trench at 5.5 Feet

Project Title: 150 North 900 East

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Project No. 4207-03

Drawing No. A-3

Log of Trench No. T-4

Date Trenched: 11/6/03

Logged By: DRB/RLO

Ground Surface Elevation: _____

DEPTH (m)	DEPTH (ft.)	GRAPHIC LOG	SUMMARY OF SUBSURFACE CONDITIONS The following is a summary of subsurface conditions encountered at the time of exploration. Subsurface conditions may differ at other locations and may vary at this location with the passage of time. The data contained in this log is a simplification of actual conditions.	DRIVE	BULK	MOISTURE	CONSISTENCY	FIELD MOISTURE (%)	FIELD DENSITY (pcf)
	1		ROTOMILLED A.C.			Slightly Moist	Fill		
	2								
1	3								
	4								
	5								
	6		SILTY SAND (SM) Red Brown, Transitioning to Weathered Sandstone			Moist	Medium Dense		
2	7								
	8		Backhoe Refusal at 7.5' on Sandstone						
	9								
3									

APPROVED BY R.L.O-ON

Groundwater: NE

End of Trench at 7.5 Feet

Project Title: 150 North 900 East

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Project No. 4207-03

Drawing No. A-4

Log of Trench No. T-5

Date Trenched: 11/6/03

Logged By: DRB/RLO

Ground Surface Elevation: _____

DEPTH (m)	DEPTH (ft)	GRAPHIC LOG	SUMMARY OF SUBSURFACE CONDITIONS The following is a summary of subsurface conditions encountered at the time of exploration. Subsurface conditions may differ at other locations and may vary at this location with the passage of time. The data contained in this log is a simplification of actual conditions.	DRIVE	BULK	MOISTURE	CONSISTENCY	FIELD MOISTURE (%)	FIELD DENSITY (pcf)
0	0		SILTY SAND (SM) Light Red Brown, With Caliche Nodules below 1'. Slightly Porous			Slightly Moist	Loose		
	1						Medium Dense to Dense		
	2								
1	3		--Cemented				Moderate Hard		
	4		Backhoe Refusal at 3.5' on Caliche						
	5								
	6								
2	7								
	8								
	9								
3									

APPROVED BY RLO ON

Groundwater: NE

End of Trench at 3.5 Feet

Project Title: 150 North 900 East

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Project No. 4207-03

Drawing No. A-5

KEY TO SOIL SYMBOLS AND TERMS

Terms used in this report for describing soils according to their texture or grain size distributions are generally in accordance with the Unified Soils Classification System.

TERMS DESCRIBING CONDITION, CONSISTENCY AND HARDNESS

COARSE GRAINED SOILS:

Major portion retained on No. 200 sieve. Includes: (1) clean gravels, (2) silty or clayey gravels and (3) silty, clayey or gravelly sands. Consistency is rated according to relative density, as determined by laboratory test.

DESCRIPTIVE TERM	RELATIVE DENSITY
Very Loose	0 to 15%
Loose	15 to 40%
Medium Dense	40 to 70%
Dense	70 to 85%
Very Dense	85 to 100%

FINE GRAINED SOILS:

Major portion passing No. 200 sieve. Includes: (1) inorganic and organic silts and clays (2) gravelly, sandy or silty clays, and (3) clayey silts. Consistency is rated according to shearing strength as indicated by penetrometer readings or by direct shear tests.

DESCRIPTIVE TERM	SHEAR STRENGTH (ksf)
Very Soft	Less than 0.25
Soft	0.25 to 0.50
Firm	0.50 to 1.00
Stiff	1.00 to 2.00
Very Stiff	2.00 to 4.00
Hard	4.00 and higher

ROCK:

Includes gravels, cobbles, rock, caliche and bedrock materials. Hardness is related to field identification procedures described below.

DESCRIPTIVE TERM	FIELD IDENTIFICATION TEST
Soft	Can be dug by hand and crushed by fingers.
Moderate Hard	Friable, can be gouged deeply with knife and will crumble readily under light hammer blows.
Hard	Knife scratch leaves dust trace, will withstand a few hammer blows before breaking.
Very Hard	Scratched with knife with difficulty, difficult to break with hammer blows.

SOIL MOISTURE

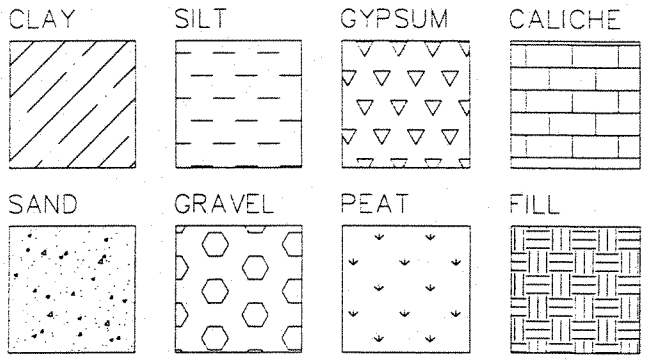
From low to high the soil moisture is indicated by:

Dry	Very Moist
Slightly Moist	Wet
Moist	

SIZE PROPORTIONS

DESCRIPTIVE TERM	PERCENT BY WEIGHT
Trace	0 to 10
With	10 to 20
Some	20 to 35
And	35 to 50

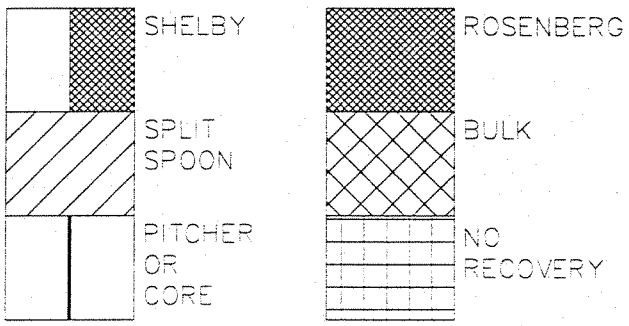
SOIL TYPE KEY



LEGEND OF LABORATORY TEST

G – Grain	CH – Chemical
S – Swell	N – Chemical Heave
DS – Direct Shear	C – Consolidation
A – Liquid & Plastic Limits	T – Triaxial
PP – Pocket Penetrometer	Sol – Solubility
U – Unconfined	P – Compaction

SAMPLER TYPES



Project Title: 150 North 900 East

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Project No. 4207-03

Drawing No. A-6