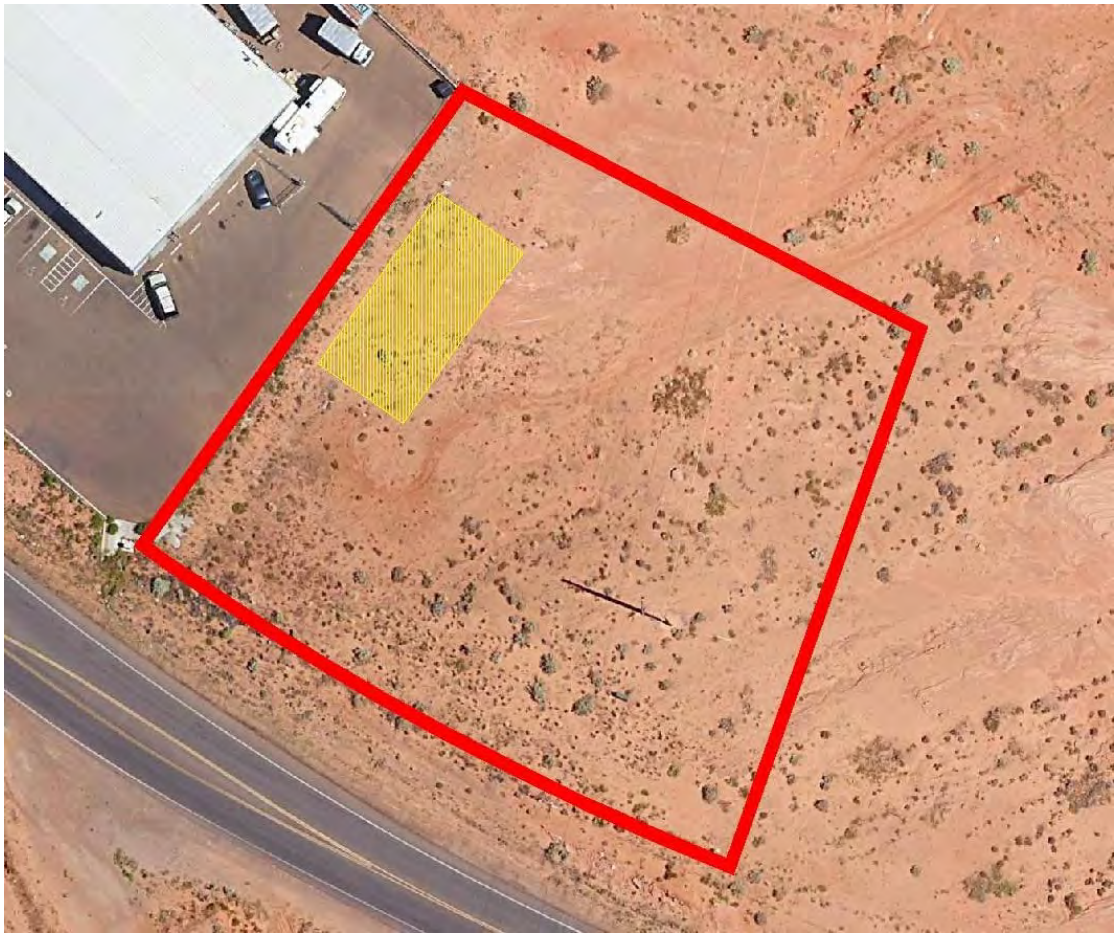
GEOTECHNICAL INVESTIGATION
Proposed Custer Storage Warehouse
947 North Coppermine Road Page, Arizona



Prepared for:

Mr. Phil Custer
P.O. Box 2766
Page, AZ 86040

ROSENBERG ASSOCIATES
CIVIL ENGINEERS LAND SURVEYORS

RA Project No. 12017-20

May 12, 2020

ROSENBERG ASSOCIATES™
CIVIL ENGINEERS LAND SURVEYORS

May 12, 2020

12017-20

Mr. Phil Custer
P.O. Box 2766
Page, AZ 86040
pmcuster@gmail.com

SUBJECT: Geotechnical Investigation
Proposed Custer Storage Warehouse
947 Coppermine Road, Page, Arizona

Dear Mr. Custer:

Enclosed are the findings of a geotechnical investigation conducted by Rosenberg Associates (RA) for a proposed storage warehouse building to be constructed at 947 North Coppermine Road in Page, Arizona. The objectives of RA services were to evaluate the nature and engineering properties of the on-site soils, and to provide geotechnical recommendations for general site preparation and grading, and the design and construction of foundations, concrete slabs-on-grade, and pavements.

Conclusions and opinions provided in the accompanying report are based on our analysis of the data obtained from the field and laboratory investigations, 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 at (435) 673-8586.

Sincerely,

ROSENBERG ASSOCIATES

REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 27639 David R. Black SIGNED 5-12-20 ARIZONA U.S.A.
Exp. 3-31-21

David R. Black, P.E.
Principal Geotechnical Engineer

TABLE OF CONTENTS

EXECUTIVE SUMMARY

The executive summary is not intended to replace the information presented in the accompanying report. The executive summary should not be used separately from the report and is only provided as an overview to summarize conclusions and recommendations. The executive summary may omit several details, any one of which could be crucial to the proper interpretation and application of the report and implementation of the recommendations.

Rosenberg Associates (RA) has performed a geotechnical investigation for a proposed storage warehouse building to be constructed at 947 North Coppermine Road in Page, Arizona. A Vicinity Map showing the location of the proposed site is included as Drawing 1 following the text of this report.

At the time of our field investigation, the subject site was generally undeveloped and generally in a natural condition. Two cargo containers and other construction materials were present on site. As indicated on Drawing 2, exposed sandstone bedrock was observed at various locations across the site. The site is bordered on the west by an existing commercial development, Copper Mine Road to the south, and undeveloped commercial property to the east and north. The commercial property to the west is about 2 to 10 feet higher in elevation with an associated fill slope extending down onto the subject property. Current site drainage is predominately by sheet flow toward the southwest corner of the property, with channelized flow present in a roadside ditch along Coppermine Road. An existing 50-foot utility easement is present along the front of the property, and a 20-foot electric easement with aerial electrical lines extends across the eastern portion of the site.

The natural soils generally consisted of a thin veneer of very loose to loose sands (SP-SM) overlying sandstone bedrock. Sandstone bedrock was encountered within the two exploratory trenches at depths 0.75-feet and 1.25 feet below the surface. As shown on Drawing 2, exposures of sandstone bedrock were observed at various locations across the site. Laboratory test results indicated the native sands exhibited relatively low in-place dry densities. Groundwater was not encountered with the explorations to the maximum depths explored.

Based on the subsurface conditions encountered at the site, it is our opinion, from a geotechnical viewpoint, that the subject site will be suitable for the proposed construction provided that the recommendations contained herein are complied with. Specifically, it is our opinion that the existing loose native sands encountered across the site are not considered suitable for the support of the proposed improvement in their present condition. The engineering properties of the low-density sands can be

improved by reworking (overexcavation, thorough moisture conditioning and recompaction).

Within the proposed building area, and 5 feet beyond, we recommend that the loose surficial sands be overexcavated to expose underlying sandstone bedrock. Suitable materials may be stockpiled for later use as compacted structural fill. Where bedrock is present at the proposed footing elevation, and/or floor slab subgrade elevation, we recommend the following:

a. Individual foundation elements should not be founded on a combination of bedrock and structural fill. Where this situation is encountered, we recommend that either all foundation elements extend down to competent bedrock or that the bedrock be overexcavated a minimum of 1-1/2 feet and replaced with structural fill.
b. Bedrock present within 1½ feet of planned floor slab subgrade elevations should be over-excavated and replaced with structural fill.

The proposed building should then receive adequate support from conventional foundations founded entirely on a zone of properly placed and compacted structural fill or founded entirely on undisturbed sandstone bedrock. The on-site sands should be suitable for use as compacted structural fill following improvement measured outlines in section 4.1.

Within exterior flatwork and pavement areas, overexcavations of the loose surficial sands on the order of 1 foot below the aggregate base materials or 1½ feet below the existing site grade, whichever is greater, are recommended. In general, over-excavations may be terminated on sandstone bedrock if encountered within the excavations. The proposed exterior flatwork and pavement sections should then receive adequate support from a zone of properly placed and compacted structural fill.

This report presents geotechnical recommendations for general earthwork, foundation design, concrete slabs-on-grade, soil corrosion, pavements, moisture protection, design review and construction observation.

1.0 INTRODUCTION

This report presents the results of a geotechnical investigation performed for a proposed storage warehouse building to be constructed at 947 South Coppermine Road in Page, Arizona. A Vicinity Map showing the location of the proposed site is included as Drawing 1 following the text of this report. We understand the proposed structure will consist of single-story steel framed free-span building with concrete slab-on-grade floors and relatively low structural loads. A Site Plan illustrating the proposed facility layout is provided as Drawing 2. The objectives of RA services were to evaluate the nature and engineering properties of the on-site soils, and to provide geotechnical recommendations for general site preparation and grading, and the design and construction of foundations, slab-on-grade concrete, and pavements. Site grading fills up to 5-feet in thickness are anticipated to develop the site.

The recommendations contained in this report are subject to the limitations presented in Section 5.1. In addition, a brochure prepared by the Association of Soil and Foundation Engineers (ASFE) has been included following this report. We recommend that all individuals reading this report read the limitations along with the attached document.

2.0 SCOPE OF WORK

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

1. A site reconnaissance was conducted to evaluate the general conditions at the site and locate the exploration locations.

2. The subsurface soil conditions were explored by excavating 2 exploratory test pits to depths of approximately 0.75-feet and 1.25-feet below the existing site grade where shallow sandstone bedrock was encountered. The approximate locations of the explorations are shown on Drawing. 2. The subsurface conditions encountered during trenching were logged by our field engineer. A description of the equipment and procedures used during trenching, as well as logs of the subsurface conditions, are presented in Appendix A.

3. Soil samples were tested in the laboratory to evaluate the pertinent engineering properties. Tests included unit weight, moisture content, and soil classification. Laboratory test results are presented in Appendix A.

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

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

3.0 GENERALIZED SITE CONDITIONS

3.1 Surface Description

At the time of our field investigation, the subject site was generally undeveloped and generally in a natural condition. Two cargo containers and other construction materials were present on site. As indicated on Drawing 2, exposed sandstone bedrock was observed at various locations across the site. The site is bordered on the west by an existing commercial development, Copper Mine Road to the south, and undeveloped commercial property to the east and north. The commercial property to the west is about 2 to 10 feet higher in elevation with an associated fill slope extending down onto the subject property. Current site drainage is predominately by sheet flow toward the southwest corner of the property, with channelized flow present in a roadside ditch along Coppermine Road. An existing 50-foot utility easement is present along the front of the property, and a 20-foot electric easement with aerial electrical lines extends across the eastern portion of the site.

3.2 Subsurface Conditions

The natural soils generally consisted of a thin veneer of very loose to loose sands (SP-SM) overlying sandstone bedrock. Sandstone bedrock was encountered within the two exploratory trenches at depths 0.75-feet and 1.25 feet below the surface. As shown on Drawing 2, exposures of sandstone bedrock were observed at various locations across the site. Laboratory test results indicated the native sands exhibited relatively low in-place dry densities. Groundwater was not encountered with the explorations to the maximum depths explored.

The subsurface conditions are described in detail on the test pit logs enclosed in Appendix A. Stratification lines shown on the logs represent the approximate boundary between soil types. The actual in-situ transition may be gradual. Due to the nature and depositional characteristics of the native soils, and an anticipated variable depth to

sandstone bedrock, care should be taken in interpolating subsurface conditions beyond the exploration locations.

3.3 Seismicity

Information and values obtained from the USGS U.S. Seismic Design Maps website, and ASCE 7-10, are provided below to aid in the seismic design:

Site Coordinates: 36.899013° N latitude, -111.450904° W longitude
Site Soil Classification: "C" (Soft Rock)
Risk Category: I/II/III
Seismic Site Coefficient, Fv: 1.5
Seismic Site Coefficient, Fa: 1.3

S_S = 0.309g S_1 = 0.096g S_{MS} = 0.402g S_{M1} = 0.145g S_{DS} = 0.268g S_{D1} = 0.096g

4.0 ENGINEERING ANALYSIS AND RECOMMENDATIONS

4.1 General Evaluation

Based on the subsurface conditions encountered at the site, it is our opinion, from a geotechnical viewpoint, that the subject site will be suitable for the proposed construction provided that the recommendations contained herein are complied with. Specifically, it is our opinion that the existing loose native sands encountered across the site are not considered suitable for the support of the proposed improvement in their present condition. The engineering properties of the low-density sands can be improved by reworking (overexcavation, thorough moisture conditioning and recompaction).

Within the proposed building area, and 5 feet beyond, we recommend that the loose surficial sands be overexcavated to expose underlying sandstone bedrock. Suitable materials may be stockpiled for later use as compacted structural fill. Where bedrock is present at the proposed footing elevation, and/or floor slab subgrade elevation, we recommend the following:

a. Individual foundation elements should not be founded on a combination of bedrock and structural fill. Where this situation is encountered, we recommend that either all foundation elements extend down to competent bedrock or that the bedrock be overexcavated a minimum of 1-1/2 feet and replaced with structural fill.
b. Bedrock present within 1½ feet of planned floor slab subgrade elevations should be over-excavated and replaced with structural fill.

The proposed building should then receive adequate support from conventional foundations founded entirely on a zone of properly placed and compacted structural fill or founded entirely on undisturbed sandstone bedrock. The on-site sands should be suitable for use as compacted structural fill following improvement measured outlines in section 4.1.

Within exterior flatwork and pavement areas, overexcavations of the loose surficial sands on the order of 1 foot below the aggregate base materials or 1½ feet below the existing site grade, whichever is greater, are recommended. In general, over-excavations may be terminated on sandstone bedrock if encountered within the excavations. The proposed exterior flatwork and pavement sections should then receive adequate support from a zone of properly placed and compacted structural fill.

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

4.2 Earthwork

All earthwork including clearing, grubbing, excavation, grading, fill materials, and fill placement and compaction should be performed in accordance with the current "Uniform Standard Specifications and Details for Public Works Construction, sponsored and distributed by the Maricopa Association of Governments (MAG)", unless otherwise recommended in this report.

4.2.1 Site Preparation and Grading

Within the areas to be graded, any existing vegetation should be removed and hauled off the site. Any undocumented fill materials and/or loose native sands should be excavated. Suitable materials may be processed and stockpiled for later use as compacted structural fill. The Geotechnical Consultant should observe the site grading operations to observe that unsuitable soils are identified and treated as recommended below.

In general, after clearing and grubbing, and after the required cuts have been made, exposed native sands should be over-excavated, moisture conditioned and recompacted to provide a zone of structural fill for the support of the proposed improvements. Within the proposed building area, and 5 feet beyond, we recommend that the loose surficial sands be overexcavated to expose underlying sandstone

bedrock. Suitable materials may be stockpiled for later use as compacted structural fill. Where bedrock is present at the proposed footing elevation, and/or floor slab subgrade elevation, we recommend the following:

a. Individual foundation elements should not be founded on a combination of bedrock and structural fill. Where this situation is encountered, we recommend that either all foundation elements extend down to competent bedrock or that the bedrock be overexcavated a minimum of 1-1/2 feet and replaced with structural fill.
b. Bedrock present within 1½ feet of planned floor slab subgrade elevations should be over-excavated and replaced with structural fill.

The proposed building should then receive adequate support from conventional foundations founded entirely on a zone of properly placed and compacted structural fill or founded entirely on undisturbed sandstone bedrock. The on-site sands should be suitable for use as compacted structural fill following improvement measured outlines in section 4.1.

Following excavation of the unsuitable soils as described above, the Geotechnical Consultant 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.

4.2.2 Excavations

Subsurface conditions encountered at the site generally consisted of loose sands overlying shallow sandstone bedrock. The sands should be readily excavatable with conventional excavation equipment; however, where sandstone bedrock is encountered during excavation, heavy-duty ripping, Hoe-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. Contractors should meet OSHA health and safety standards. The subsurface soils and bedrock encountered within the explorations performed for this study should be classified (according to OSHA's classification system) as shown in Table 4.2.2.

***Table 4.2.2:* OSHA Soil and Rock Classifications**

Subsurface Condition	OSHA Classification
Sands (SP-SM)	Type C
Sandstone Bedrock	Stable Rock

Surface drainage should be directed away from the top edge of the excavations. Surcharge loads, such as construction equipment or stockpiled materials, should not be placed within 3 feet of the top of sloping trench excavations. Construction traffic should be routed as far away from the excavation as is practicable during construction

4.2.3 Permanent Cut and Fill Slopes

It is recommended that in general, the maximum permanent cut and fill slopes should not be made steeper than 2½:1 (horizontal to vertical). Cut slopes in competent sandstone bedrock may be cut as steep as 1:1 to ½:1 provided that the slopes are observed 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.

4.2.4 Structural Fill Material

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 improved excavated on-site sands or approved imported fill materials. Structural fill should be granular, non-expansive, be free of vegetation and debris, and contain no inert materials larger than 4 inches in nominal size.

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 percent of the maximum dry density as determined by ASTM. The moisture content should be at or above 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.

4.2.5 Utility Trench Construction

Utility trench construction and backfill placement and compaction should be performed in accordance with the current MAG "Uniform Standard Specifications and Details for Public Works Construction". Results of our field and laboratory investigations indicate that the on-site soils do not meet the general MAG requirements for use as pipe bedding, haunching and initial backfill materials. However, it is RA's opinion that the on-site sands (SP-SM), free of vegetation and debris, will be suitable for use as bedding, haunching, initial backfill, and final backfill materials. Any imported backfill materials should be observed and/or tested by the

Geotechnical Consultant for conformance with the project specifications prior to importation to the project site.

4.3 Foundation Design

The proposed building structure should receive adequate support from conventional foundations founded entirely on a zone of properly placed and compacted structural fill, or entirely on undisturbed sandstone bedrock. Conventional should be a minimum of 15 inches wide and embedded a minimum of 18 inches below the lowest adjacent final grade for frost protection. Footings founded on structural fill may be proportioned for a maximum net allowable bearing pressure of 2,000 psf. Footings founded on undisturbed bedrock may be proportioned for a maximum net allowable bearing pressure of 4,000 psf. A one-third increase may be used for transient wind or seismic loads.

Foundations should be reinforced with a minimum of one No. 4 bar near the top of the stem wall, and two No. 4 bars 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 on the order of one inch, or less. Differential settlements should be on the order of ¾ the total settlements. It is expected that most of the anticipated settlement will occur during construction.

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

4.4 Concrete Slabs-on-Grade

Satisfactory support for concrete slab-on-grade floors and exterior concrete flatwork may be provided by a 6-inch layer of compacted gravel overlying a zone of properly placed and compacted structural fill as recommended in Section 4.2. The compacted gravel may consist of road base, or pit-run gravel with a 2-inch maximum particle size and no more than 12 percent fines passing the No. 200 sieve.

All concrete slabs should be designed to minimize cracking as a result of shrinkage. 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. All concrete placement and curing operations

should 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.

4.5 Soil Corrosion

Soils on this site contain sulfates in sufficient concentration to be considered "moderately" corrosive to metal and concrete as defined in Table 1904.3 of the International Building Code (IBC), 2009. Therefore, all concrete in contact with the on-site soils should contain Type V sulfate-resistant cement and be designed in accordance with the provisions provided in the American Concrete Institute Manual of Concrete Practice (ACI) Section 4.3 and the 2006 International Building Code. Table 4.3.1 of ACI 318 should be referenced utilizing a sulfate exposure category of "moderate."

4.6 Pavements

Both flexible (asphaltic concrete) and rigid (Portland cement concrete) pavements were evaluated for the project site. Pavement sections should receive adequate support from a properly prepared subgrade as discussed in Section 4.2. The flexible pavement analysis was based on Caltrans method of designing flexible pavement. In developing recommendations for concrete pavement sections, a soil resilient modulus of 15,000 psi and a subgrade k-value of 200 psi were used for re-compacted on-site soils. The minimum recommended pavement sections are provided in Table 4.6.

Table 4.6: Minimum Recommended Pavement Sections

Traffic Condition	Rigid Pavement		Flexible Pavement	
	Portland Cement (inches)	Road Base (inches)	Asphaltic Concrete (inches)	Road Base Base (inches)
Automobile / Parking & Driveways	5	5	2½	6
Entrance / Large truck Areas	6	5	3	6

Base, asphaltic concrete and Portland cement materials should conform with current sections of the MAG "Uniform Standard Specifications and Details for Public Works Construction." It is assumed that Portland cement concrete will have a 28-day

compressive strength of at least 4,500 psi. Joints for concrete (rigid) pavement should be laid out in a square or rectangular pattern. Joint spacings should not exceed 12-feet. The depth of joints should be at least one-quarter of the slab thickness.

4.7 Moisture Protection and Surface Drainage

Proper site drainage and moisture protection are essential for the project. 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 building. 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 structure. Landscape watering adjacent to the structures should be eliminated. Roof runoff and other sources of moisture should not be allowed to infiltrate the soils near, or up slope from, the structures.

4.8 Design Review

The recommendations presented in this report are based on preliminary design information for the proposed project and the subsurface conditions encountered during our geotechnical evaluation. The recommendations have been prepared to aid in the evaluation of this site and to assist in the design of the project. Prior to bid submittal, the Geotechnical Consultant should be provided the opportunity to review the final grading plans, design drawings, and specifications 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 should be noted in writing and should become a supplement to this report.

We recommend that a pre-construction meeting be held to discuss the project plans and requirements. The Owner or the Owner's representative, the Civil Engineer, the Geotechnical Consultant, and the Contractor should attend the meeting.

4.9 Construction Observation

Sufficient observation and review should be performed to permit correlation between the anticipated field conditions and the actual conditions encountered during construction, and to confirm that the recommendations presented herein are properly implemented. A final report of compliance, including all test results, should be prepared upon completion of the project. Rosenberg Associates does not provide construction observation and materials testing services, therefore, the Geotechnical Consultant selected to provide those services should complete an independent review of this geotechnical report to

satisfy themselves that the recommendations presented herein are appropriate for the project site.

5.0 CLOSURE

5.1 Limitations

Our assumptions, conclusions, recommendations, and opinions contained in this report are: 1) based on the findings of the referenced field and 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 the actual construction changes from the assumptions presented in this report or if any conditions are encountered at this site which are different from those described in this report, our firm should be immediately notified so that the recommendations presented herein can be re-evaluated for applicability to the new conditions.

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.

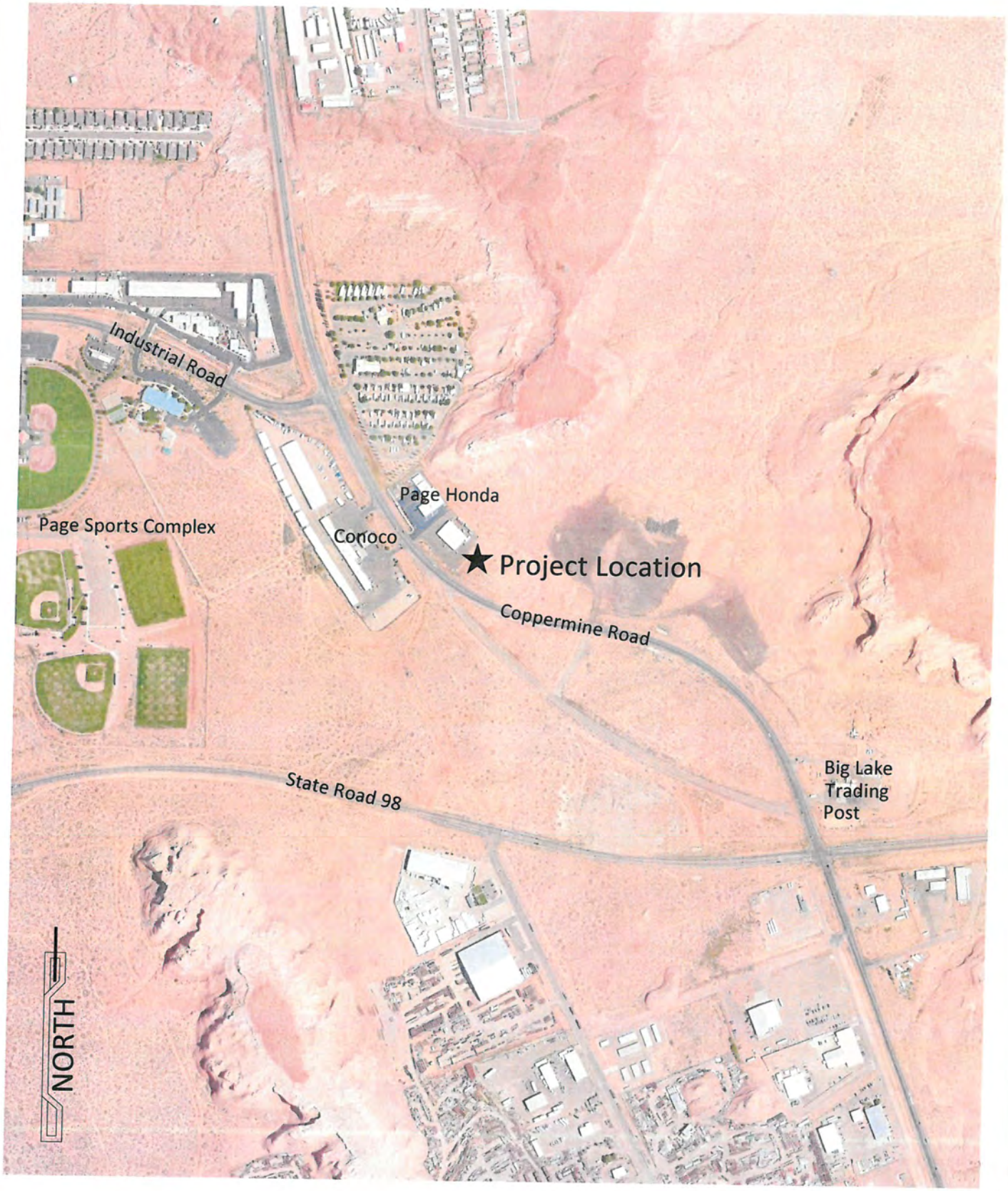
5.2 Closing

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.

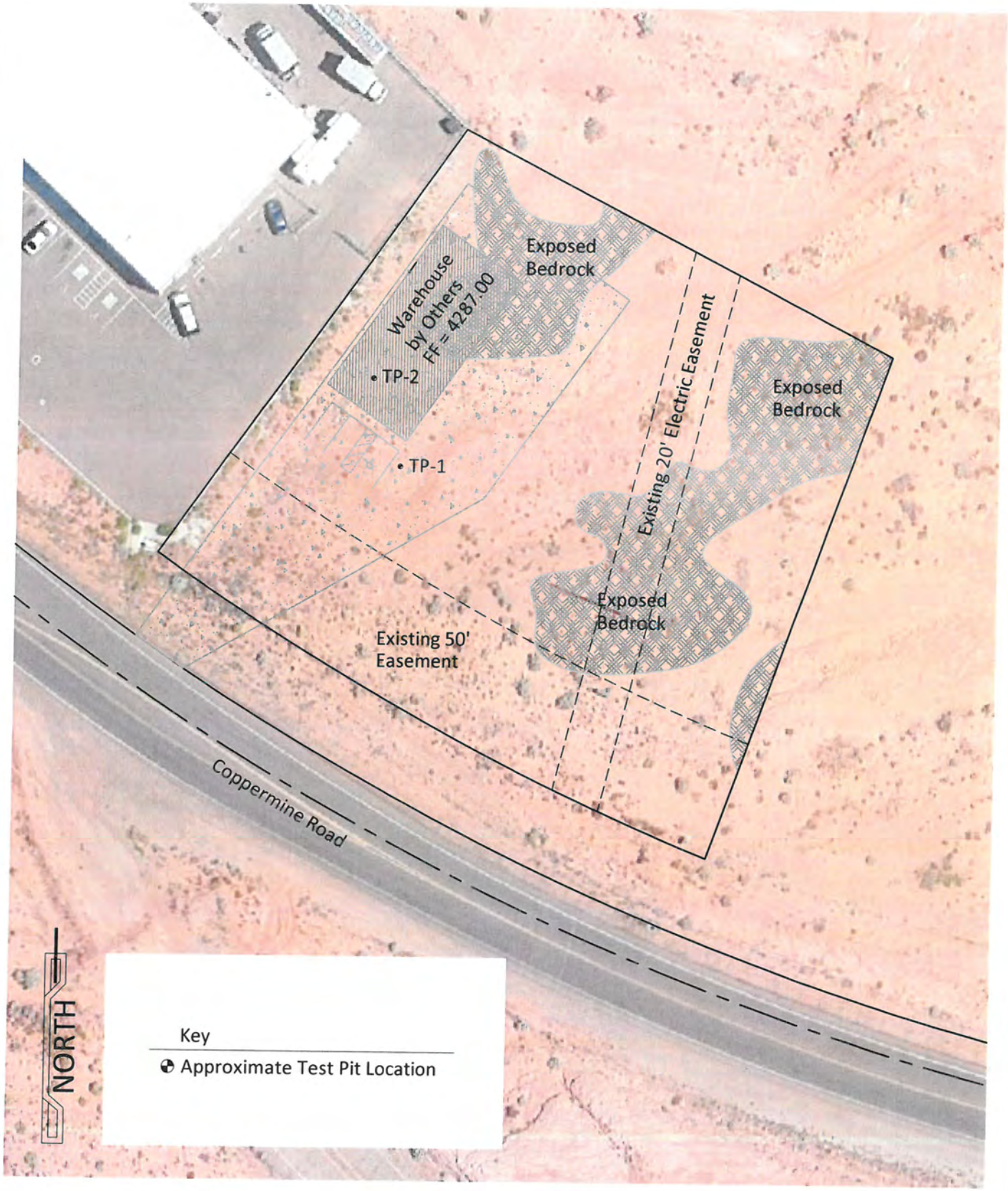
Sincerely,
ROSENBERG ASSOCIATES

Exp 3-31-21

David R. Black, P.E.
Principal Geotechnical Engineer
DRB/JTT/20R-014.G



Scale: NTS	Drawn By: GLM	ROSENBERG ASSOCIATES CIVIL ENGINEERS • LAND SURVEYORS 352 East Riverside Drive Suite A2 St. George, Utah 84790 – (435) 673-8586	Vicinity Map Custer Storage WareHouse Page, Arizona
Drawing Number: 1	Checked By: DRB		
	Date: 5/12/20	Job Number: 12017-20	



Scale: NTS	Drawn By: GLM	ROSENBERG ASSOCIATES CIVIL ENGINEERS • LAND SURVEYORS 352 East Riverside Drive Suite A2 St. George, Utah 84790 – (435) 673-8586	Site Plan Custer Storage WareHouse Page, Arizona
Drawing Number: 2	Checked By: DRB		
	Date: 5/12/20	Job Number: 12017-20	

APPENDIX A

FIELD AND LABORATORY INVESTIGATIONS

APPENDIX A

FIELD AND LABORATORY INVESTIGATIONS

Field Investigation

The subsurface soil conditions were explored by excavating 2 exploratory test pits to depths of approximately ¾-feet and 1¼-feet below the existing site grade where shallow sandstone bedrock was encountered. The approximate locations of the explorations, as well as surficial exposures of bedrock, are shown on Drawing. 2. Continuous logs of the subsurface conditions, as encountered in the explorations, were recorded by our field engineer. The subgrade soils were visually classified in accordance with the Unified Soil Classification System. Summaries of subsurface conditions are presented in this appendix on Drawings A-1 and A-2. A key to the soil symbols and terms is presented on Drawing A-3.

Trenching was performed with a rubber-tired backhoe. Relatively "undisturbed" ring, and disturbed bulk, soil samples were obtained from the trenches using hand-sampling equipment. Representative portions of the soils were packaged and transported to our laboratory for further evaluation.

Laboratory Investigation

Representative soil samples were tested in the laboratory to evaluate the pertinent engineering properties. Moisture/density determinations were conducted to evaluate in-place moisture and density conditions. Atterberg Limits and gradations tests were performed for soil classification purposes. Test results are presented in the summary table below and on the enclosed test pit logs.

Sample Location		Gradation (% Passing)				PI	Classification
No.	Ft.	#4	#10	#40	#200		
B-1	0-¾	94.4	90.7	84.3	11.0	NP	SP-SM

NP=Non-Plastic

Log of Trench No. T-1

Date Trenched: 4/28/20

Logged By: JTT

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)
			SAND (SP-SM) Light Red Brown to Dark Red Brown, With Silt, Trace Roots, Trace Gravel			Slightly Moist / Moist	Very Loose / Loose	0.7	
	1		Refusal at .75' on Bedrock						
	2								
	3								
1	4								
	5								
	6								
2	7								
	8								
	9								
3									

APPROVED BY ON

Groundwater: NE

End of Trench at 0.75 Feet

Project Title: Custer Storage Warehouse

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

Project No. 12017-20

Drawing No. A-1

Log of Trench No. T-2

Date Trenched: 4/28/20

Logged By: JTT

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		SAND (SP-SM) Light Red Brown to Dark Red Brown, With Silt, Trace Roots, Trace Gravel			Slightly Moist / Moist	Very Loose / Loose	1.8	97
	2		Refusal at 1.25' on Bedrock						
1	3								
	4								
	5								
	6								
2	7								
	8								
	9								
3									

APPROVED BY _____ ON _____

Groundwater: NE

End of Trench at 1.25 Feet

Project Title: Custer Storage Warehouse

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

Project No. 12017-20

Drawing No. A-2

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	BLOW COUNTS (N1)60
Very Loose	0 to 4
Loose	5 to 10
Medium Dense	11 to 30
Dense	31 to 50
Very Dense	Greater than 50

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	Blows per 6"
Very Soft	Less than 2
Soft	2 - 4
Firm	5 - 8
Stiff	9 - 15
Very Stiff	16 - 30
Hard	Greater than 30

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

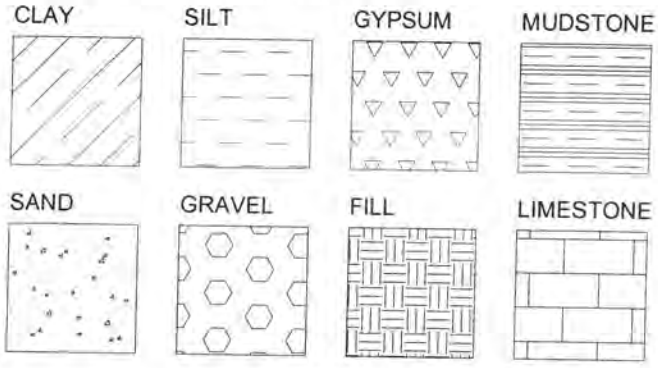
From low to high the soil moisture is indicated by:

Dry	-Absence of Moisture, Dusty, Dry to Touch
Slightly Moist	-Apparent Moisture but well below optimum Moisture Content
Moist	-Damp, but no visible water; at or near optimum Moisture Content
Very Moist	-Above optimum moisture content
Wet	-Visible Free Water; Substantially above optimum moisture content; at or above liquid limit

SIZE PROPORTIONS

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

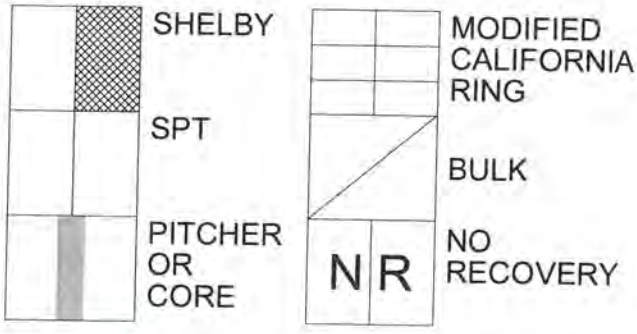
SOIL TYPE KEY



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



ROSENBERG ASSOCIATES

Drawing No. A-3