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CLARK COUNTY, NEVADA
BID NO. 603226-14
UMC APARTMENT BUILDING DEMOLITION, ENVIRONMENTAL REMEDIATION AND PARKING LOT DEVELOPMENT

February 10, 2014

ADDENDUM NO. 1

INVITATION TO BID

1. The Bid opening date of March 6, 2014 at 2:15:00 p.m. **remains unchanged.**

SPECIFICATIONS

2. **Add** the Geotechnical Engineering Study (Attachment 1) and Addendum No. 1 to the Geotechnical Engineering Study (Attachment 2) to the Specifications of this project.

Should you have any questions, please contact me at (702) 455-4230 or via email at jhaining@clarkcountynv.gov.

ISSUED BY:

JIM HAINING, CPSM, CPSD, C.P.M., A.P.P., MBA
Sr. Purchasing Analyst

Attachment(s): Attachment 1 - Geotechnical Engineering Study
Attachment 2 - Addendum No. 1 to the Geotechnical Engineering Study

Cc: Cesar Ceballos, Real Property Management
Brian Connolly, Real Property Management
Tony Williams, AWA Architects
Dale Walsh, Converse Consultants
David Brice, UMC Facilities & Engineering

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GEOTECHNICAL ENGINEERING STUDY

UMC APARTMENT DEMOLITION FOR NEW PARKING
812 WILLOW STREET
LAS VEGAS, NEVADA

Prepared for:

AWA Architecture
7451 O'Bannon Drive
Las Vegas, NV 89117

Converse Project No. 12-33207-01

August 3, 2012

Converse Consultants
Geotechnical Engineering, Environmental & Groundwater Science, Inspection & Testing Services

August 3, 2012 12-33207-01

Mr. Anthony Williams
AWA Architecture
7451 O'Bannon Drive
Las Vegas, NV 89117

Subject: **Geotechnical Engineering Study**
UMC Apartment Demolition for New Parking
812 Willow Street
Las Vegas, Nevada

Dear Mr. Williams:

Converse Consultants (Converse) is pleased to submit this Geotechnical Engineering Study for the proposed demolition of an existing apartment building located at 812 Willow Street at the University Medical Center (UMC) campus in Las Vegas, Nevada. Services were provided in accordance with our proposal dated June 19, 2012.

The subgrade soils encountered at the site generally consisted of silty, clayey sand. Groundwater was not encountered to the depth explored for this project.

We appreciate the opportunity to be of service to you. If you have questions concerning this report, please contact us at your convenience.

Respectfully submitted,

CONVERSE CONSULTANTS

James L. Werle, P.E.
Vice President

JLW:JPS:ls

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Contents

		Page
1.0	Introduction	1
2.0	Field Investigation	1
3.0	Laboratory Testing	2
4.0	Site Conditions	2
4.1	Surface	2
4.2	Subsurface Conditions	2
4.3	Local Faulting and Seismicity	3
5.0	Engineering Analyses and Recommendations	4
5.1	Demolition	4
5.2	Site Grading and Earthwork	5
5.3	Conventional Foundations	8
5.4	New Pavement Sections	11
5.5	Corrosion and Sulfate Protection	12
5.6	Project Review and Observation	12
6.0	Closure	13

Plate No 1

Appendix A – Field Exploration and Laboratory Testing

1.0 Introduction

This report presents the results of our geotechnical engineering study performed for the proposed demolition of an existing apartment building located at 812 Willow Street at the University Medical Center (UMC) campus in Las Vegas, Nevada. A vicinity map showing the location of the project in the Las Vegas Valley is provided on Plate No. 1.

It is our understanding that the existing vacant apartment building is to be demolished and that the area will be improved to expand the adjacent parking lot.

The scope of services for this study was outlined in our proposal dated June 19, 2012. The purposes of this study were to provide specifications for demolition and to evaluate the site's general subsurface conditions and develop geotechnical recommendations for design and construction of the project.

2.0 Field Exploration

The field exploration included drilling two (2) exploratory borings on July 26, 2012 to depths of approximately 15 feet each below the existing ground surface. The approximate locations of the exploratory borings are shown on Plate No. 1.

The exploratory borings were performed under the direction of a Converse Staff Professional. Continuous logs of the soil conditions encountered were recorded and samples were obtained during the field exploration program. Summaries of the subsurface conditions encountered in the exploratory borings are presented on the boring logs, Drawing Nos. A-1 and A-2 in Appendix A. Field drilling procedures are further described in Appendix A.

The locations of the exploratory borings were selected in the field by approximating distances from the existing structure and identifiable landmarks. The locations were then recorded in the field with a handheld GPS unit. The locations of the borings shown on Plate No. 1 should be considered accurate only to the degree implied by the method used.

3.0 Laboratory Testing

Samples obtained during the field exploration were taken to the laboratory where they were visually classified in accordance with ASTM D-2488, which are based on the Unified Soils Classification System. Representative samples were then selected for testing to determine certain physical and engineering properties. These tests included moisture content and dry density, grain size distribution, Atterberg limits, R-value, and chemical analyses.

The testing procedures and results of the laboratory tests are summarized in Appendix A. This information, together with field observations, was used to prepare the boring logs.

The soil samples presently stored in our laboratory will be discarded after 30 days unless this office receives a specific request to retain the samples for a longer period.

4.0 Site Conditions

4.1 Surface

At the time of our field exploration, the site was occupied by a vacant apartment building. The site is situated within the southeastern portion of an existing UMC employee parking lot which is bound by Rose Street and the UMC Trauma Center to the west, additional medical buildings to the south, Goldring Avenue to the north, and Willow Street to the east.

4.2 Subsurface Conditions

The subgrade soils observed in the borings at the site generally consisted of silty, clayey sand underlying approximately 1 foot of granular fill and 2.5 inches of asphalt.

Summaries of the subsurface conditions encountered during the exploration activities are described in detail on the boring logs, Drawing Nos. A-1 and A-2, in Appendix A and in the discussion in Appendix A.

Laboratory test results indicate that the on-site soils generally have a low degree of solubility, a low chemical (salt) heave potential, and a water soluble sulfate content that classifies as negligible based on ACI 318, Section 4.3, Table 4.3.1. Laboratory test results are described in detail in Appendix A.

Free groundwater was not encountered in the field borings to the depths explored; we anticipate that groundwater should not present a concern during construction excavations. Many factors contribute to fluctuations in groundwater levels. A detailed analysis of these factors is beyond the scope of this investigation.

The stratification lines shown on the enclosed boring logs represent the approximate boundary between soil types. The actual transition may be gradational. Due to the nature and depositional characteristics of the native soils, care should be taken in interpolating subsurface conditions between and beyond the boring locations.

4.3 Local Faulting and Seismicity

Quaternary-age faults within the Las Vegas Valley are considered to have tectonic origin. The nearest fault, as mapped on the Map of Faults and Earth Fissures in the Las Vegas Area, published by the Nevada Bureau of Mines and Geology, C.M. dePolo and John W. Bell, 2000, is approximately ¾ miles west of the site.

Earth fissures commonly develop near fault zones along pre-existing zones of weakness in response to land subsidence due to regional groundwater withdrawal. The nearest mapped fissure zone is located approximately 1½ miles northwest of the site. We observed no evidence of fissuring during our field reconnaissance of the site.

To our knowledge, evidence has not been presented to date that documents tectonic movement along faults within the Valley in the last 10,000 years (Holocene epoch of the Quaternary period). The nearest fault with evidence of geologically recent displacement (that is, within the last 10,000 years) is the Black Hills Fault located in the Eldorado Valley approximately 20 miles southeast of the site.

5.0 Engineering Analysis and Recommendations

The following sections present a discussion of our engineering analysis and recommendations for demolition, earthwork, conventional foundations, lateral earth pressures, new pavements, and corrosion and sulfate protection. Specific recommendations are presented in each section.

5.1 Demolition

Demolition of existing buildings, underground utilities, and pavements should be done in accordance with the recommendations for demolition provided below. Periodic observations during demolition of existing improvements should be performed to confirm that demolished structural materials are completely removed and that the excavations are properly backfilled.

General Specifications for Demolition

1. Demolition and site preparation shall include the removal of all foundations, walls, slabs, pavements, walkways, buried structures and drain lines, utilities, pipes and unsuitable material within the project area. Excavations caused by removal of existing foundations and sewage facilities shall be cleared of all waste, debris, and loose soil, and refilled with compacted fill. All fill compaction should be performed under observation and testing by the Geotechnical Engineer.

2. Foundation demolition includes complete removal of all building foundation walls, footings, slabs, and any other abandoned on-grade and below-grade construction. Broken concrete and other foundation materials shall be considered waste, and shall be removed from the site.

3. Any existing drain lines, pipes, wires, conduits, utilities, etc., which are to remain on the site shall be protected from damage. Buried drain lines, pipes conduits, utilities, etc., which are necessarily cut shall be either carefully and permanently capped at the property line as specified by the City Engineer or re-routed as indicated on the drawings. Utility lines not specifically noted for disposition, but which are encountered in the work shall be capped, extended, protected, or re-worked as necessary for completion of the work as directed.

4. All work shall be performed in accordance with the *Federal Occupational Safety and Health Administration* and the *Nevada Department of Industrial Relations, Division of Occupational Safety and Health* requirements and applicable ordinances of the governing municipality.

5. Care shall be taken not to damage adjoining utilities, sidewalks, or pavements to remain after completion of the work. Finished work damaged by operations during demolition and site preparation shall be repaired or replaced to the satisfaction of the Owner at no cost to the Owner.

6. All materials resulting from demolition and site preparation not designated by the Owner to be recovered or to be relocated by the Contractor shall be removed promptly and disposed of off the site.

7. Upon completion of demolition and site preparation, the site shall be "raked clean" and all waste, rubble, debris, etc. shall be removed and disposed of off the site.

5.2 Site Grading and Earthwork

For areas that are to receive new pavement sections, any existing asphalt and base course that is not to remain in place should be removed and the exposed native soils should be excavated to the depth required for the new pavement section, which includes the asphaltic concrete and aggregate base shown in Table No. 1 presented in *Section 5.4 New Pavement Sections*, or to the depth necessary to remove all trash, organic material, demolition debris, and disturbed, loose, soft, or firm soils, whichever is greater. Any existing aggregate base that is removed may not be reinstalled as aggregate base unless it is kept separate from other materials and testing shows that it meets all requirements of *Type II Aggregate Base* described in the *Uniform Standard Specifications for Public Works' Construction, Off-Site Improvements, Clark County Area, Nevada* (USSPWC) after the material has been stockpiled.

Further requirements for earthwork suitability, placement, and compaction procedures are provided as follows:

1. Existing pavement, vegetation, organic material, undocumented fill, and debris shall be removed from the areas to be graded. In locations where new pavement will be constructed adjacent to existing pavement to remain, the existing pavement should be saw cut full depth 1-foot from the existing edge or project boundary and carefully removed to prevent excessive disturbance to the pavement and aggregate base that is to remain.

2. After the required removals have been made, a minimum 8-inch zone of scarified and recompacted subgrade should be provided for support of the pavement section. All soils within the compacted subgrade zone should be moisture conditioned to a moisture content at least 3 percent above optimum and compacted to at least 90 percent of maximum density. Maximum density of the fill material should be determined in accordance with ASTM D1557. Once initially approved, the moisture content of the subgrade soil shall be maintained at or above optimum until the aggregate base is placed.

3. If required, structural fill may be placed on native soils that have been properly scarified to a minimum depth of 8 inches, moisture conditioned and recompacted as specified in Item No. 2 above. Special care and detailed inspections shall be performed to make certain that the entire area is well prepared, with particular attention to the subgrade at the edges of the project.

4. The prepared surface should be observed prior to continuing grading to determine if the scarification and recompaction operations have been performed in accordance with our recommendations and if the areas are properly prepared (including moisture content) to receive structural fill and/or aggregate base material.

5. All fill placed for the support of the asphaltic pavement section should be considered structural fill. Structural fill may consist of imported fill materials with the following characteristics:

   a) Maximum particle size not exceeding 4 inches and be free of organics and inert materials.

b) Have less than 0.1 percent water-soluble sulfate, or the concrete mix should be designed to resist the sulfate levels indicated by the laboratory test results.

c) Have a solubility of 1 percent or less after being placed.

d) Have a swell potential less than 4 percent as determined by standard 60 psf swell test.

e) Imported fill materials should be similar to on-site soils. All imported fill should be evaluated and/or tested for conformance with the above characteristics before importation to the site.

6. Structural fill should be evenly spread, moisture conditioned, and compacted as specified above. The fill shall be placed and compacted on a horizontal plane.

7. If the recompacted subgrade or structural fill has been disturbed or dried out prior to the placement of *Type II Aggregate Base*, the top 6 inches should be moisture conditioned and recompacted as specified above.

8. Based on observations made during our field explorations, most of the natural surficial soils are non-cemented and can be excavated with conventional earthwork equipment.

9. Fill materials should not be placed, spread, or compacted during unfavorable weather conditions. When site grading is interrupted by heavy rain, filling operations shall not resume until the Geotechnical Engineer approves the moisture and density conditions of the previously placed fill.

10. Field density tests shall be made during grading to provide an opinion on the degree of compaction being obtained by the Contractor. Where compaction of less than specified herein is indicated, additional compactive effort with adjustment of the moisture content shall be made as necessary until the required degree of compaction is obtained.

11. A sufficient number of field density tests shall be performed to provide an opinion to the degree of compaction achieved. In general, density tests should be performed on each one-foot lift of fill, but not less than one for each 500 cubic yards of fill placed. All density tests shall be taken in the compacted soils beneath the surface if the surficial materials are disturbed.

12. During the earthwork phases of the project, fill materials should be observed for suitability and consistency. A documented testing program should be conducted to determine that soil compaction is in accordance with requirements.

13. There will be shrinkage when excavating and compacting the on-site soils. An estimated shrinkage factor of 10 to 20 percent is applicable for the on-site soils. A shrinkage factor of 10 to 20 percent should be used in all areas where the exposed native soils are scarified to a depth of 8 inches and processed in-place.

5.3 Conventional Foundations

If included in the project, small structures such as signs, monuments, or retaining walls may be supported by conventional spread footings founded on properly placed and compacted structural fill. Total settlements of less than 1 inch are estimated for foundations designed and constructed in accordance with these recommendations. Differential settlements are not anticipated to exceed ½ inch. Specific design recommendations are provided as follows:

1. Foundations at least 12 inches wide and embedded at least 12 inches below the nearest adjacent ground surface may be designed for a maximum allowable bearing pressure of 1,400 pounds per square foot (psf). This allowable value may be increased by 300 psf for each additional foot of width and 1,050 psf for each additional foot of embedment up to a maximum of 2,000 psf. A one-third increase in allowable bearing pressures may be used for short duration loads such as wind or seismic.

2. Lateral loads may be resisted by friction between the footing base and supporting soil, and lateral bearing pressure against the sides of footings. For design purposes, an ultimate coefficient of friction of 0.58 and an allowable passive lateral bearing pressure of 240 psf per foot

of depth, up to a maximum of 2,000 psf, are appropriate. If the design makes use of passive earth pressures, it is important that a representative of this office be present during the placement of any backfill against footings to observe and/or test the backfill or to verify that lateral bearing elements are cast "neat" against undisturbed native soils or compacted fill.

3. Due to the potential for damaging differential settlement, individual spread footings should not bear on both cemented soils and uncemented soils. If both are present at the footing base, the cemented soil should be overexcavated by a depth of 12 inches below the bottom of footing and replaced with properly placed and compacted structural fill or the uncemented soil should be overexcavated to expose the underlying cemented soil and replaced with lean concrete.

4. Concrete placement, curing operations, and control joint spacing should be in accordance with American Concrete Institute (ACI) recommendations.

5.4 Lateral Earth Pressures

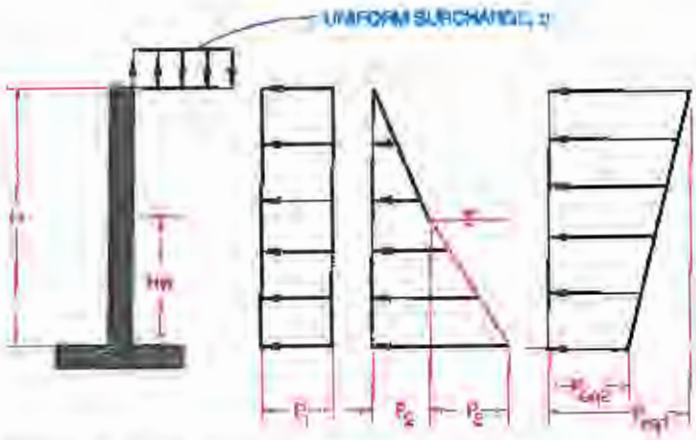
If retaining walls are necessary for grade transitions, and assuming that retaining wall backfill consists of structural fill that conforms to and has been placed and compacted in accordance with the grading recommendations of this report, unrestrained (cantilevered) retaining walls should be designed for an active lateral earth pressure of 40 pcf equivalent fluid density. Lateral pressures imposed by adjacent uniform surcharge loads may be estimated using a pressure coefficient of 0.33.

An "at-rest" lateral earth pressure of 60 pcf equivalent fluid pressure should be used for structural fill placed behind restrained (e.g., basement walls) retaining walls. Lateral pressures imposed by adjacent uniform surcharge loads against restrained retaining walls may be estimated using a pressure coefficient of 0.50.

The design values indicated above assume that retaining walls will have a height not exceeding about 4 feet and that the build-up of hydrostatic pressure will be prevented by "weep holes" or a footing drain system.

Seismic forces against free-standing retaining walls would be applied as an inverted trapezoidal pressure distribution as shown in Figure Nos. 1 and 2 below. The resultant force of the seismic pressure is assumed to act at a point 0.6 times the height of the soil-retaining portion of the wall above the bottom of the wall. Seismic lateral loads need only be considered for Seismic Design Categories D, E, or F.

Recommendations for lateral wall pressures, which are based on a soil unit weight of 120 pcf, are summarized in Figure Nos. 1 and 2 below.



Total Earth Pressure, P

$P = P_1+P_2+P_3+(P_{eq1}+P_{eq2})/2$

Where

$P_1 = 0.33\ q$

$P_2 = 40\ (H-H_w)$

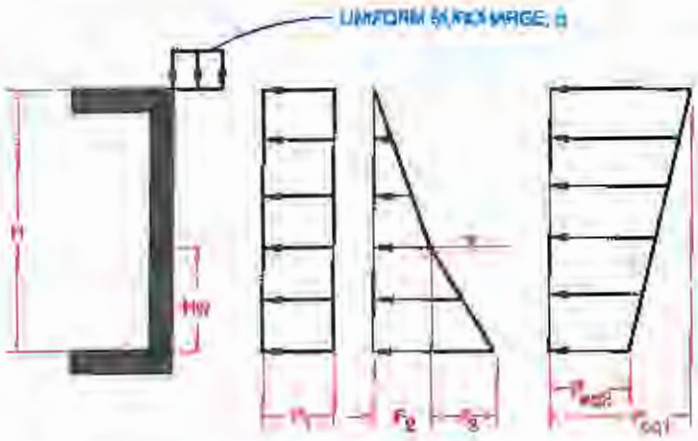
$P_3 = 82\ H_w$

$P_{eq1} = 14.5\ H$

$P_{eq2} = 3.6\ H$

Pressures are in psf,
Heights are in feet

Figure No. 1 - Unrestrained Wall Pressures (Level Backfill)



Total Earth Pressure, P

$P = P_1+P_2+P_3+(P_{eq1}+P_{eq2})/2$

Where

$P_1 = 0.50\ q$

$P_2 = 60\ (H-H_w)$

$P_3 = 91\ H_w$

$P_{eq1} = 38.7\ H$

$P_{eq2} = 9.7\ H$

Pressures are in psf,
Heights are in feet

Figure No. 2 - Restrained Wall Pressures (Level Backfill)

Wall backfill should consist of granular soil, should be placed in accordance with the grading recommendations of this report, and should be compacted to between 90 and 95 percent relative compaction as determined by ASTM D1557. Compaction of the retaining wall backfill should not exceed 95 percent

relative compaction to minimize the lateral earth pressures against the walls. Compaction of backfill within a horizontal distance of 5 feet behind the wall should be completed using lightweight, hand operated compaction equipment to avoid overstressing the walls.

5.4 New Pavement Sections

Asphaltic concrete (A.C.) pavement sections were developed for non-dedicated areas. In developing our recommendations, we have assumed that: (1) the native soils beneath the pavement section will be scarified to a depth of at least 8 inches and recompacted to at least 90 percent of the maximum laboratory dry density as determined by ASTM D1557 and (2) traffic volumes for non-dedicated areas may be adequately represented by Traffic Index values of 4.5 for light automobile traffic and parking, 5.5 for high automobile and light truck traffic, and 6.5 for heavy truck traffic; and (3) an R-value of 39 is representative of recompacted native soil.

1. The following table presents the minimum recommended structural pavement sections for non-dedicated areas:

Table No. 1

Traffic Condition	Assumed Traffic Index (T.I.)	Asphalt Thickness (Inches)	Type II Base Thickness (Inches)	Compacted Subgrade Thickness* (Inches)
Automobiles	4.5	2.0	5.0	8.0
High Traffic, Trucks	5.5	2.0	8.0	8.0
Heavy Delivery Trucks and Buses	6.5	3.0	8.0	8.0

*May be terminated at a shallower depth or omitted entirely if moderately hard to very hard, partially to fully cemented soil is encountered.

2. Asphaltic concrete should be mixed and placed in accordance with Section 401 of the USSPWC.

3. *Type II Aggregate Base* should conform to Subsection 704.03.04 of the USSPWC. Base materials should be placed and compacted in accordance with Section 302 of the USSPWC.

4. Asphaltic concrete and base materials should be tested before delivery to the site and during placement to determine conformance with the project specifications.

5.5 Corrosion and Sulfate Protection

Chemical tests performed on the on-site soils showed negligible sulfate exposure according to ACI 318, Section 4.3, Table 4.3.1; however, it is possible that the on-site soils may be corrosive to concrete and buried metal Therefore, we recommended the following:

1. Consideration should be given to corrosion protection systems for buried metal such as protective coatings, wrappings, or the use of PVC where permitted by local building codes.

2. All concrete in contact with the on-site and imported soil should be made with Type V cement.

3. The concrete should be placed with a maximum 4-inch slump and good densification procedures should be used during placement to prevent honeycombing.

5.6 Project Review and Observation

This report has been prepared to aid in the evaluation of this site and to assist in the design of this project, not as a bidding or construction document. 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 design drawings and specifications should be noted in writing and become a supplement to this report. If the recommendations presented in this report are not adhered to, it will be necessary for us to review our recommendations, and modifications to our recommendations may be necessary.

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 and to confirm the recommendations presented herein, this office should be retained to perform sufficient review during construction of this project.

6.0 Closure

The information presented in this report is based on the results of field and laboratory investigations, combined with interpolation of subsurface conditions between and beyond a limited number of exploration locations. The nature and extent of variations between the exploration locations may not become evident until the actual construction. If variations are then exposed, it will be necessary to re-evaluate the information presented in this report.

If changes in the nature and design of the planned project or the location of the site are planned and differ from those assumed for this preliminary investigation, the information contained in this report shall not be considered valid unless the changes are reviewed and the recommendations presented in this report are modified or verified in writing.

The scope of work of this investigation was limited to conventional geotechnical engineering services and did not include any environmental evaluations or assessments. Silence in the report with respect to the site environmental conditions does not indicate the absence of any potential environmental concerns.

This report is intended for use in the design of the facilities described. Any person using this report for bidding or construction purposes should perform such independent investigation as he deems necessary to satisfy himself as to the surface and subsurface conditions to be encountered and the procedures to be used in the performance of work on this project. If conditions are encountered during construction that appear to be different than indicated by this report, this office should be notified so that our recommendations can be reviewed and modified if necessary.

It has been our pleasure to serve you on this project. If you have any questions, please contact this office.

Respectfully submitted,

CONVERSE CONSULTANTS

Jeremy P. Scheffner
Senior Staff Geologist

Martin D. Jensen, P.E.
Geotechnical Department Head

PROFESSIONAL ENGINEER STATE OF NEVADA
MARTIN D. JENSEN
EXP. 6-30-13
CIVIL
No. 15673

8/3/12

MDJ:JPS:ls

Encl: Plate No. 1
Appendices A and B

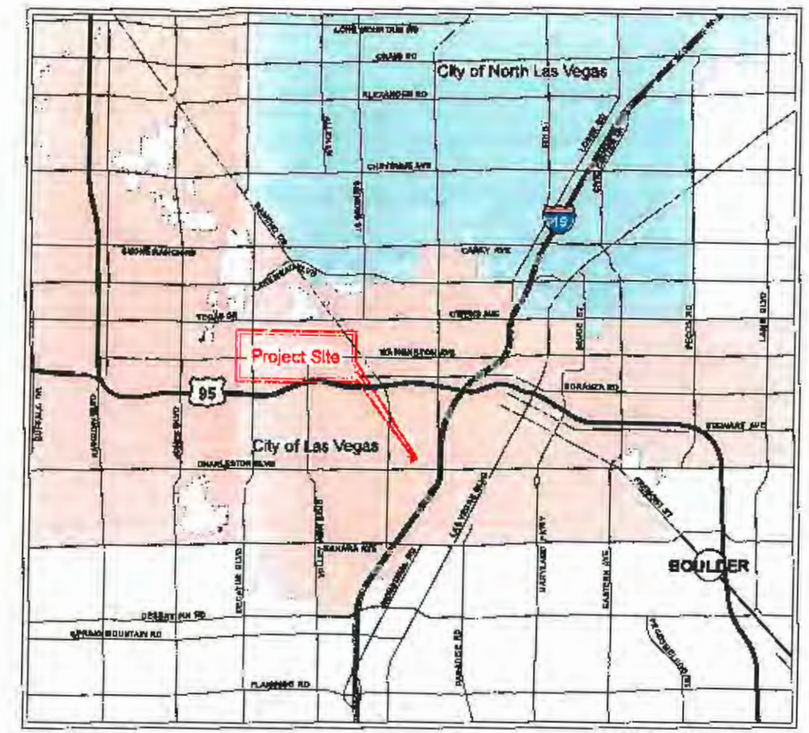
Dist: 3/Addressee (plus 1 via email: AWAArch@embarqmail.com)

Converse Consultants
Over 60 Years of Geotechnical Engineering, Environmental & Groundwater Science, Inspection & Testing Services

1 Inch = 100 feet

0 50 100 200 300 400 500 Feet

UMC Borings.mxd



1 Inch = 2 miles

Legend

Boring Locations

Project Boundary

FIELD EXPLORATION MAP

UMC APARTMENT DEMOLITION FOR NEW PARKING

812 Willow Street
Las Vegas, Nevada

Plate No. 1

Date Created: 07/26/12 Project No: 12-33207-01

Field Exploration

The subsurface soil conditions for the current study were explored by drilling two (2) borings to depths of about 15 feet below the existing ground surface. The approximate locations of the explorations are shown on Plate No. 1. Continuous logs of the subsurface conditions as encountered in the explorations were recorded at the time of drilling by a Converse Staff Professional. The subsurface conditions encountered were visually classified in accordance with ASTM D2488, which is based on the Unified Soil Classification System. Summaries of the subsurface conditions encountered are presented on the boring logs, Drawing Nos. A-1 and A-2. A key to soil symbols and terms is found on Drawing No. A-3. The soil classification system for engineering purposes is further explained on Drawing No. A-4.

Drilling operations were accomplished on July 26, 2012 with a truck-mounted hollow stem auger drill rig equipped for soil sampling. Relatively undisturbed soil samples were obtained using a 2.4-inch inside diameter modified split-spoon sampler driven with a 140-pound hammer free-falling through a distance of 30 inches (Note that a 140-pound hammer was used with a modified split-barrel sampler). Sampler driving resistance, expressed as blows per foot of penetration, is presented on the boring logs at the respective sampling depths. In some cases, the sampler could not be driven for a full foot. When this occurred, the number of blows and the distance driven were recorded. The sampled soil is retained in brass rings one inch in height, which line the sampler. A representative portion of each sample was retained and carefully sealed in waterproof plastic containers for transport to the laboratory. Bulk samples of the soils encountered were also collected and taken to our laboratory for testing.

The stratification lines shown on the boring logs presented in Appendix A represent the approximate boundaries between soil types. The actual transition between materials may be more gradual than indicated. Due to the nature and depositional characteristics of the native soils, care should be taken in interpolating and extrapolating subsurface conditions beyond the boring locations. Information on actual subsurface conditions exists only at the specific locations indicated.

Laboratory Testing

Laboratory tests were conducted on representative soil samples for the purpose of classification and determination of their physical properties and engineering characteristics. The amount and selection of the types of testing for a given study are based on the geotechnical conditions of the project. A summary of the various laboratory tests conducted for this project and the test results are presented herein.

Moisture Content and Dry Density

Data obtained from these tests, performed on relatively undisturbed samples obtained from the field, were used in the classification and correlation of the soils and to provide qualitative information regarding soil strength and compressibility. Test results are presented on the boring logs on Drawing Nos. A-1 and A-2.

Grain-Size Distribution

Grain-size distributions for soil specimens were determined by sieve analysis in accordance with ASTM C136. A sieve analysis is conducted by passing the soil through a number of different sized sieves and measuring the amount of soil retained on each sieve. The test results and grain size distribution curve are presented on Drawing No. A-5.

Atterberg Limits

The liquid limit, plastic limit, and plasticity index of representative samples of the soils were determined to aid in the classification of the soils and in the evaluation of other engineering parameters. The test was performed in general accordance with ASTM D4318. The results are presented on Drawing No. A-5.

R-Value Test

A representative soil sample was tested in the laboratory to determine the R-value using ASTM D2844. R-value results are a measure of the subgrade resistance to wheel loads and are used in the design of flexible asphaltic pavement and rigid concrete pavement. The results of the R-value test are presented on Drawing No. A-5 and in the following table:

Exploration Location	Sample Depth (Feet)	Soil Description	R-Value
B-2	2 - 6	Silty, Clayey Sand	39

Chemical Analysis

Chemical tests were performed on selected samples of the natural soils obtained from the borings to investigate for soil solubility, corrosivity, and chemical heave. *Terracon Consulting Engineers and Scientists* in Las Vegas performed the chemical analysis for sodium, water-soluble sulfate, total available water-soluble sodium sulfate, and solubility. The results of the chemical tests are presented on Drawing No. A-6.

Log No. B-1

DRAFTED BY: JPS

Date of Drilling: 07/26/12
Driller: Elite Drilling, Inc.
Logged By: J. Schefline

Location: See Plate No. 1
Borehole Diameter: 8"
Groundwater Depth (ft): Not Encountered

Ground Surface Elevation (ft): Not Measured
Equipment: CME 75 with Hollow Stem Augers
Driving Wt. and Drop: 140# / 30"

SUMMARY OF SUBSURFACE CONDITIONS

This log is part of the report prepared by Converse for this project and should be read with the report. This summary applies only at the location and time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplified model of the actual conditions encountered.

Depth (ft)	Graphic Log	Summary of Subsurface Conditions	Samples: Drive	Samples: Bulk	Samples: Blow Count	Drill Rate (sec/ft)	Moisture (%)	Dry Density (lb/cf)	Field or Lab Tests
0		FILL: ASPHALTIC CONCRETE; 2.5 inches							
		--FILL: POORLY GRADED SAND With Silt and Gravel; slightly moist, light brown							
2		SILTY, CLAYEY SAND (SC-SM); slightly moist, light brown	▼		9		7	100	
4									
			▼		8		14	97	
6									
		SANDY LEAN CLAY (CL); slightly moist, light brown							
8									
		CLAYEY SAND With Gravel (SC); partially cemented, slightly moist, light gray							
10			▼		49				
12									
14									
		--moist	⊠		50/4"				
16									
18									
20									
22									
24									

End of Exploration at 25.3'

▼ CA Modified Sampler (white symbol=no recovery) ▼ SPT Sampler (white symbol=no recovery)

UMC APARTMENT DEMOLITION FOR NEW PARKING
812 Willow Street
Las Vegas, Nevada

Project No.
12-33207-01

Converse Consultants

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Drawing No.
A-1

Log No. B-2

DRAFTED BY: JPS

Date of Drilling: 07/26/12
Driller: Elite Drilling, Inc
Logged By: J. Schoffner

Location: See Plate No. 1
Borehole Diameter: 8"
Groundwater Depth (ft): Not Encountered

Ground Surface Elevation (ft): Not Measured
Equipment: CME 75 with Hollow Stem Augers
Driving Wt. and Drop: 140# / 30"

SUMMARY OF SUBSURFACE CONDITIONS

This log is part of the report prepared by Converse for this project and should be read with the report. This summary applies only at the location and time of the exploration. Subsurface conditions may differ at other locations and may change at this location with the passage of time. The data presented is a simplified model of the actual conditions encountered.

Depth (ft)	Graphic Log	Description	Samples: Drive	Samples: Bulk	Samples: Blow Count	Drill Rate (sec/ft)	Moisture (%)	Dry Density (lb/cf)	Field or Lab Tests
0		FILL: ASPHALTIC CONCRETE; 2.5 inches							
		---FILL: POORLY GRADED SAND With Silt and Gravel; slightly moist, light brown							
2		SILTY, CLAYEY SAND (SC-SM); slightly moist, light brown	X		18		7	111	A, CR, G, RV
4			X		10		11	92	
6		SANDY LEAN CLAY (CL), slightly moist, light brown							
8									
10		---few caliche fragments, light gray	X		26				
12		CALICHE; slightly moist, light gray							
14		SANDY LEAN CLAY (CL); some caliche fragments, slightly moist, light gray							
16		---moist	X		17				
18									
20									
22									
24									

End of Exploration at 16.5'

X CA Modified Sampler (white symbol=no recovery) | SPT Sampler (white symbol=no recovery)

UMC APARTMENT DEMOLITION FOR NEW PARKING
812 Willow Street
Las Vegas, Nevada

Project No.
12-33207-01

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Drawing No.
A-2

KEY TO SOIL SYMBOLS AND TERMS

Terms used in this report for describing soils according to their texture and 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 clean gravels, silty or clayey gravels, and silty, clayey, or gravelly sands. Consistency is rated according to relative density, as determined by laboratory tests.

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 inorganic and organic silts and clays, gravelly, silty, or sandy clays, and 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 up

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

DESCRIPTIVE TERM	CRITERIA
soft	can be dug by hand and crushed with fingers
moderately hard	friable, can be gouged deeply with knife and will crumble readily under light hammer blows
hard	knife scratch leaves dust trace and will withstand a few hammer blows before breaking
very hard	scratched with knife with difficulty and is difficult to break with hammer blows

SIZE PROPORTIONS

DESIGNATION	PERCENT BY WEIGHT
trace	0 to 5
few	5 to 10
little	15 to 25
some	30 to 45
mostly	50 to 100

SOIL TYPE GRAPHIC KEY

SOIL TYPE GRAPHIC KEY

MOISTURE CONTENT IS INDICATED BY:

dry
slightly moist
moist
very moist
wet

LEGEND OF FIELD OR LABORATORY TESTS

A	Liquid & Plastic Limits	G	Grain Size	R	Resistivity
C	Consolidation	H	Horticultural Tests	RV	R-Value
Ch	Chemical	K	Permeability	S	Swell
Disp	Dispersion	P	Compaction	Sol	Solubility
DR	Drill Rate	PP	Unconfined Compressive Strength (tsf) Pocket Penetrometer	T	Triaxial
DS	Direct Shear			UC	Unconfined Compression

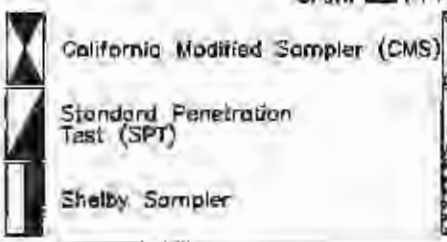
GROUNDWATER LEVEL KEY

Water level during drilling
Stabilized water level

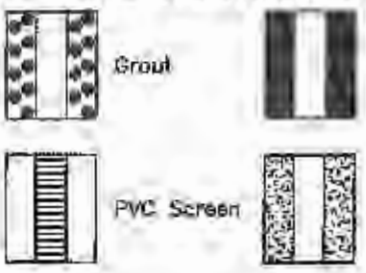
BLOW COUNT KEY

NR Not Recorded (R) Refusal

SAMPLER TYPES



WELL DESIGN GRAPHIC KEY



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Drawing No.

A-3

CLASSIFICATION OF SOILS

ASTM Designation: D2487–00
(ASTM version of Unified Soil Classification System)

			Criteria for Assigning Group Symbols and Group Names using Laboratory Tests[a]	Soil Classification Group Symbol	Soil Classification Group Name[b]
COARSE-GRAINED SOILS More than 50% retained on No. 200 sieve	Gravels More than 50% of coarse fraction retained on #4 sieve	Clean Gravels Less than 5% fines[c]	$Cu \geq 4$ and $1 \leq Cc \leq 3$[e]	GW	Well-graded gravel[f]
			$Cu < 4$ and/or $Cc < 1$ or $Cc > 3$[e]	GP	Poorly graded gravel[f]
		Gravels with Fines More than 12% fines[c]	Fines classify as ML or MH	GM	Silty gravel[f,g,h]
			Fines classify as CL or CH	GC	Clayey gravel[f,g,h]
	Sands 50% or more of coarse fraction passes #4 sieve	Clean Sands Less than 5% fines[d]	$Cu \geq 6$ and $1 \leq Cc \leq 3$[e]	SW	Well-graded sand[i]
			$Cu < 6$ and/or $Cc < 1$ or $Cc > 3$[e]	SP	Poorly graded sand[i]
		Sands with Fines More than 12% fines[d]	Fines classify as ML or MH	SM	Silty sand[g,h,i]
			Fines classify as CL or CH	SC	Clayey sand[g,h,i]
FINE-GRAINED SOILS 50% or more passes the No. 200 sieve	Silts and Clays Liquid limit less than 50	Inorganic	PI > 7 and plots on or above "A" line[j]	CL	Lean clay[k,l,m]
			PI < 4 or plots below "A" line[j]	ML	Silt[k,l,m]
		Organic	Liquid limit – oven dried / Liquid limit – not dried < 0.75	OL	Organic clay[k,l,m,n] / Organic silt[k,l,m,o]
	Silts and Clays Liquid limit 50 or more	Inorganic	PI plots on or above "A" line	CH	Fat clay[k,l,m]
			PI plots below "A" line	MH	Elastic silt[k,l,m]
		Organic	Liquid limit – oven dried / Liquid limit – not dried < 0.75	OH	Organic clay[k,l,m,p] / Organic silt[k,l,m,q]
HIGHLY ORGANIC SOILS	Primarily organic matter, dark in color, and organic odor			PT	Peat

a. Based on the material passing the 3-in. (75-mm) sieve.

b. If field sample contained cobbles or boulders, or both, add "with cobbles" or "with boulders", or both to group name.

c. GW–GM well graded gravel with silt
GW–GC well graded gravel with clay
GP–GM poorly graded gravel with silt
GP–GC poorly graded gravel with clay

d. Sands with 5–12% fines require dual symbols:
SW–SM well graded sand with silt
SW–SC well graded sand with clay
SP–SM poorly graded sand with silt
SP–SC poorly graded sand with clay

e. $Cu = \frac{D_{60}}{D_{10}}$ $Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$

f. If soil contains ≥ 15% sand, add "with sand" to group name.

g. If fines classify as CL–ML, use dual symbol GC–GM or SC–SM.

h. If fines are organic, add "with organic fines" to group name.

i. If soil contains ≥ 15% gravel, add "with gravel" to group name.

j. If Atterberg limits plot in hatched area, soil is a CL–ML, silty clay.

k. If soil contains 15–29% plus No. 200, add "with sand" or "with gravel", whichever is predominant.

l. If soil contains ≥ 30% plus No. 200, predominantly sand, add "sandy" to group name.

m. If soil contains ≥ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.

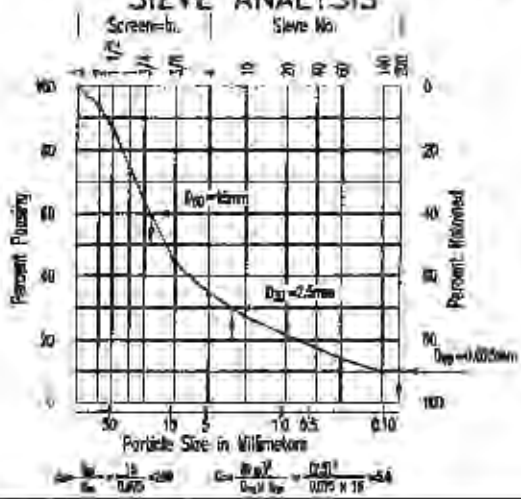
n. PI ≥ 4 and plots on or above "A" line

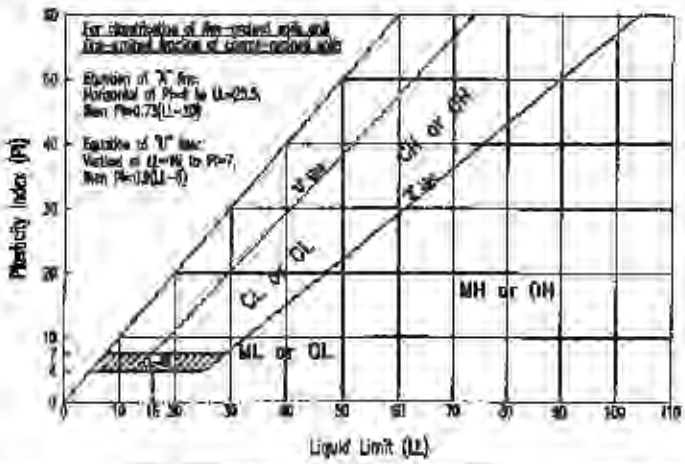
o. PI < 4 or plots below "A" line

p. PI plots on or above "A" line

q. PI plots below "A" line

SIEVE ANALYSIS





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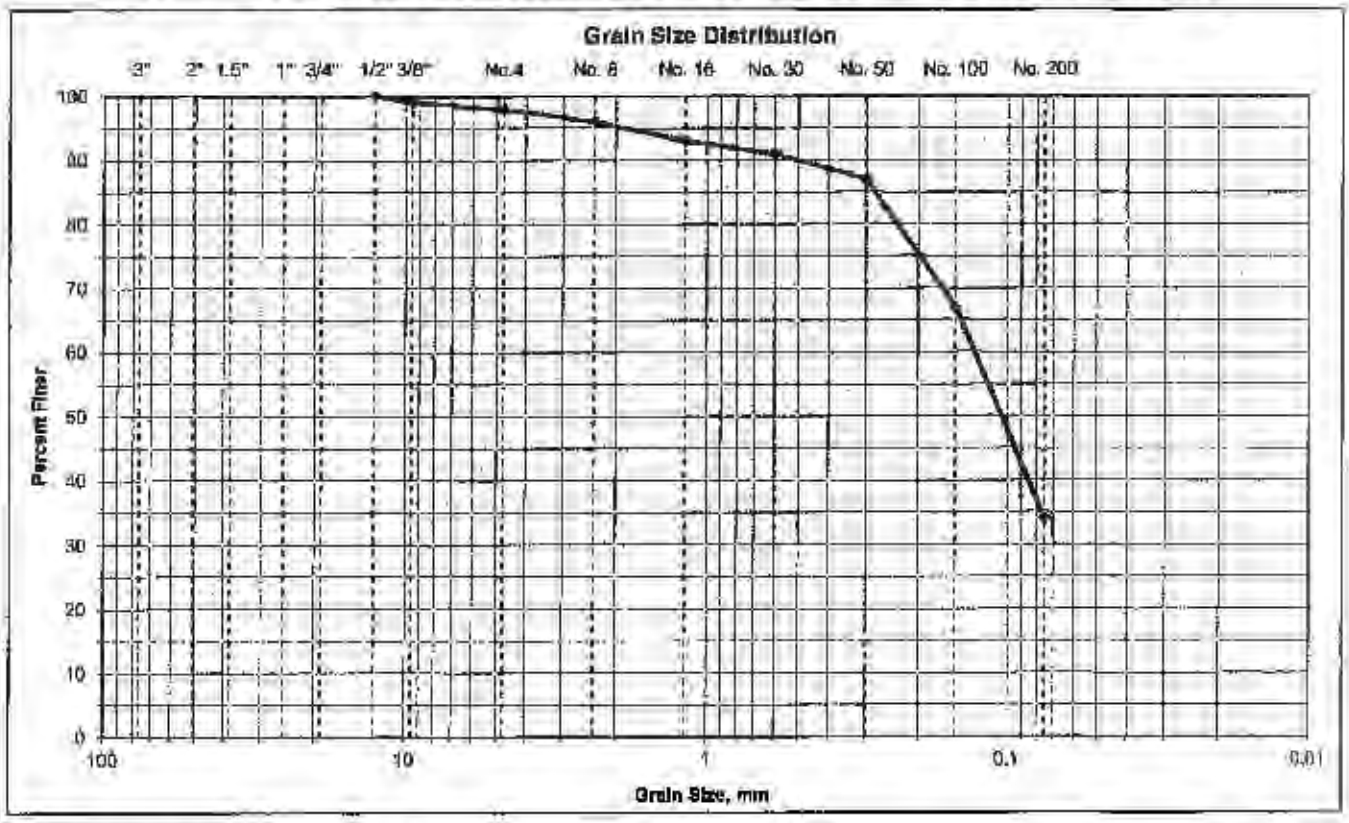
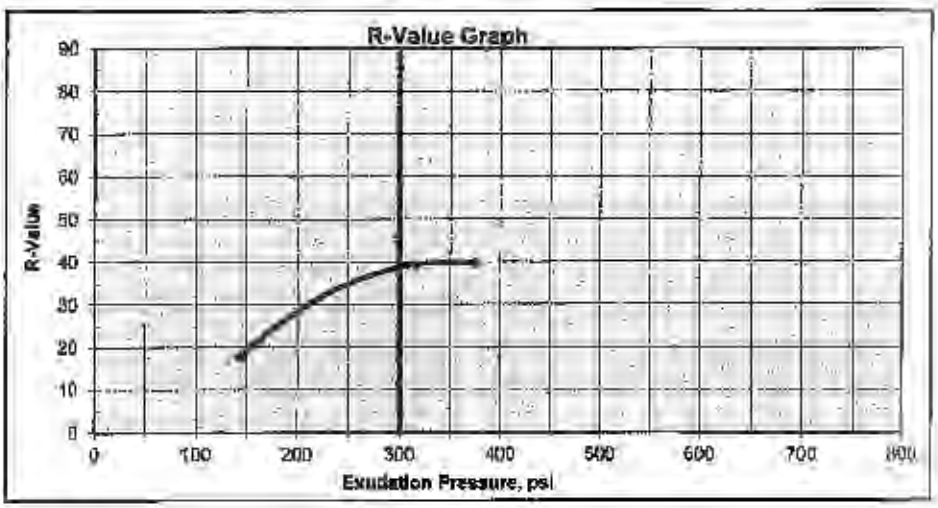
Drawing No.
A-4

REPORT OF LABORATORY SOIL TEST RESULTS



Sieve Analysis (AASHTO T 27)	
Sieve size	Percent Passing
3"	
2"	
1.5"	
1"	
3/4"	
1/2"	100
3/8"	99
No.4	96
No. 8	96
No. 16	93
No. 30	91
No. 50	87
No. 100	67
No. 200	34



Laboratory Test	Test Method	Results
Liquid Limit	ASTM D 4318	21
Plastic Limit	ASTM D 4318	16
Plasticity Index		5
R - Value @ 300 psi	ASTM D 2844	39

Sample Information	
Boring No.	B-2
Depth (feet)	2 - 6
USCS	SC-SM

UMC APARTMENT DEMOLITION FOR NEW PARKING
812 Willow Street
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12-33207-01

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Drawing No.
A-5

CHEMICAL LABORATORY TEST REPORT

Report Number: 64121026.0035
Service Date: 08/01/12
Report Date: 08/02/12
Task: Proj# 12-33207-01, UMC Parking Lot

Terracon
750 Pilot Road Suite F
Las Vegas, NV 89119
702-597-9393

Client

Converse Consultants
Attn: James Werle, P.E.
731 Pilot Road, Suite H
Las Vegas, NV 89119

Project

Converse Consultants- Chemical Lab testing
731 Pilot Road, Suite H
Las Vegas, NV 89119

Project No. 64121026 Lab No.: 12-0224

Results of Water Soluble Salt Analysis

Sample No.:	
Sample Location:	B-2
Sample Depth:	2.0-6.0
Sodium, AWWA 3500-Na D (percent %)	<0.01
Water Soluble Sulfate (SO4), AWWA 4500 E (percent %)	0.03
Water Soluble Sodium Sulfate Na2SO4 By Calculation (%)	0.01
Solubility, AWWA 2540 C (percent %)	0.27

Sample Submitted By: Client **Date Received:** 8/1/2012
Analyzed By: Kurt D. Ergun **Started:**
Title: Chemist **Finished:**
Lunch/NC:

Report Distribution

(1) Converse Consultants, Emailed

Reviewed By: 8/2/12
Charles F. Kajkowski

The tests were performed in general accordance with applicable ASTM, AASHTO, or DOT test methods. This report is exclusively for the use of the client indicated above and shall not be reproduced except in full without the written consent of our company. Test results transmitted herein are only applicable to the actual samples tested at the location(s) referenced and are not necessarily indicative of the properties of other apparently similar or identical materials.

Drawing No. A-6

Converse Consultants
Geotechnical Engineering, Environmental & Groundwater Science, Inspection & Testing Services

January 3, 2013 12-33207-01

Mr. Anthony Williams
AWA Architecture
7451 O'Bannon Drive
Las Vegas, NV 89117

Subject: **Geotechnical Engineering Study – Addendum No. 1**
UMC Apartment Demolition for New Parking
812 Willow Street
Las Vegas, Nevada

Greetings, Mr. Williams:

Converse Consultants (Converse) is pleased to present this addendum to our *Geotechnical Engineering Study* report dated August 3, 2012 (Converse Project No. 12-33207-01) for the proposed demolition of an existing apartment building located at 812 Willow Street at the University Medical Center (UMC) campus in Las Vegas, Nevada. The purpose of this addendum is to provide recommendations for the preliminary pavement design section of Willow Street, which is a dedicated right-of-way of the City of Las Vegas.

In addition to the recommendation for onsite parking and driveways presented in Section 5.4, *New Pavement Sections*, the following additional recommendations should be used for the preliminary design of dedicated streets for the project:

The following table presents the standard minimum structural pavement sections for dedicated street improvements based on an R-value of 38 (actual R-value test result of 39). The recommended pavement section is based upon Drawing No. 200.1 of the *Uniform Standard Drawings, Clark County Area* dated November 10, 2004. Willow Street is a 60-foot wide Minor Collector.

731 Pilot Road, Suite H, Las Vegas, Nevada 89119-4437
Telephone: (702) 269-8336 ◆ Facsimile: (702) 269-8353 ◆ email: lasvegas@converseconsultants.com

Street Name	Street Designation	Right-of-Way (ft)	Traffic Volume	Assumed Traffic Index	Asphalt Concrete Thickness (in)	Type II Base Thickness (in)	Compacted Subgrade Thickness (in)*
Willow Street	Minor Collector	60	Normal	6.0	3.0	5.0	8

*May be reduced or eliminated if cemented soils are exposed.

If we can be of further assistance, or if you have any questions, please contact the undersigned.

Respectfully submitted,

CONVERSE CONSULTANTS

Martin D. Jensen, P.E.
Geotechnical Department Head

REGISTERED PROFESSIONAL ENGINEER STATE OF NEVADA
MARTIN D. JENSEN
CIVIL
Exp. 6/30/13
NO. 15673
1/3/13

MDJ:ls

Dist: 3/Addressee (plus 1 via email: AWAArch@embarqmail.com)