GEOTECHNICAL EXPLORATION REPORT
6 PLEX MULTI-FAMILY RESIDENTIAL
251 SOUTH TEXAS AVENUE
APN: 179-18-710-194
HENDERSON, NEVADA

PROJECT NO.: G-18-103
JUNE 15, 2018

Prepared for:

MONTGOMERY CONSULTING ENGINEERS, LLC

Prepared by:

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1.0 INTRODUCTION

This report presents the results of our geotechnical exploration for a proposed 6-plex multi-family residence. The site is located at 251 South Texas Avenue in Henderson, Nevada. The general location of the site is shown on Figure No. 1, Vicinity Map.

The purpose of our services was to provide information and geotechnical engineering recommendations relative to:

- Subsurface soil conditions
- General geology of the area
- Foundation design and construction
- Retaining wall design and construction
- Floor slab design and construction
- Pavement design and construction
- Earthwork

This report is for the purpose of providing geotechnical engineering and/or testing information and requirements. The scope of our services for this project did not include any environmental assessment or investigation for the presence or absence of hazardous or toxic material in structures, soil, surface water, groundwater or air, below or around this site.

2.0 PROJECT INFORMATION

The site consists of approximately 0.15 acres and will be used for a proposed 6-plex multi-family residence. It is assumed the structure will be one and/or two-stories in height, of wood-frame construction with concrete slab-on-grade lower floors and no basement. Structural loads for the proposed building were not provided. We have assumed maximum dead- plus live-loads for columns and wall loading at approximately 68 kips and 2.0 kips per lineal foot, respectively. There will be on-site paved areas. It is further assumed that final grades will generally be at or near existing site grades (plus or minus 4 feet).

3.0 SITE EXPLORATION

The scope of our services for this project included a subsurface exploration program. The subsurface exploration program consisted of drilling two (2) borings to depths of approximately 15 feet below existing site grades. The borings were logged during drilling by a graduate geologist and samples were obtained to aid in material classification and for possible laboratory testing. The approximate locations of the borings are shown on Figure No. 2, Site Map. The locations of the borings were determined in the field by approximating distances from existing features or improvements. The location of the borings should be accurate only to the degree implied by the method used. Results of the borings are presented in the Appendix.

4.0 SITE CONDITIONS

4.1 Surface

At the time of our exploration the site was vacant. Any structures on the site had been previously removed and the site was covered by approximately one-half to a foot of landscape rock. The site was surrounded by a chain link fence. There was no vegetation on site. Site drainage was generally by sheet flow to the northeast to an alley way.

4.2 Subsurface

Fill was encountered in both explorations. The fill generally consisted of about one foot of landscape rock. However, due to previous site development/grading there could be deeper and/or poorer quality fill in other areas of the site beyond our explorations.

Natural soils at the site generally consisted of medium dense to dense sand with gravel. Soils encountered at the site were granular and non-expansive. Groundwater was not encountered within the depths explored. The boring logs and laboratory test results presented in the Appendix should be referred to for more detailed information.

5.0 GEOLOGIC INFORMATION

The site is located in the southeast corner of the Las Vegas Valley. This location places the site in an area underlain by thick alluvial deposits (hundreds of feet).

The nearest mapped fissure zone is approximately 4.4 miles west of the site.[1] The cumulative evidence indicates that fissures are the result of a subsurface erosional process. The erosional

[1] Bell, John W., et. al., 2001, "Las Vegas Valley, 1998 Subsidence Report", Nevada Bureau of Mines and Geology, Open-File Report 01-4, Plate No. 1.

process occurs in tensional fractures at or near the surface in uncemented, relatively fine-grained soils. The nearest mapped fault is approximately 2.15 miles west of the site.[1]

Liquefaction is defined as the condition when saturated, loose, finer-grained sand-type soils lose their support capabilities because of excessive pore water pressure which develops during a seismic event. Due to consistency of the native soils and the anticipated depth of the groundwater, liquefaction is not likely to occur at the site during the design seismic event.

6.0 RECOMMENDATIONS

6.1 General

Our recommendations are based on the assumption that the soil conditions are similar to those disclosed by the explorations. If variations are noted during construction or if changes are made in site plan, structural loading, foundation type or floor level, we should be notified so we can supplement our recommendations, as applicable.

As indicated, there was fill on-site. This fill would be considered uncontrolled fill unless observation and testing was performed during placement. All uncontrolled fill should be removed and replaced with properly compacted fill. The uncontrolled fill soils can be re-used for controlled fill provided almost all oversize material, unsuitable material (as determined by the geotechnical engineer), vegetation and debris is removed.

6.2 Foundations

If the grading recommendations presented in the Earthwork section of this report are complied with, the proposed structure may be supported by conventional or post-tensioned type foundations. Any proposed retaining walls or block walls may be established on conventional footings. Foundations should be established on undisturbed natural soils having a consistency of at least medium dense and/or properly compacted fill.

Conventional foundations or the thickened edge of post-tensioned foundations should be at least 12 inches wide and the bottom of the foundations should be established at least 12 inches below the lowest adjacent final compacted subgrade (generally pad grade). Foundations established as recommended, may be designed to impose a net dead- plus live-load pressure of 2,000 pounds per square foot (psf). The bearing value may be increased by 1,000 psf for each additional 12 inches of embedment, or portion thereof. However, the maximum net bearing value should not exceed 3,500 psf. A one-third increase may be used for wind or seismic loads.

Since soils are non-expansive, it is our understanding post-tensioned slabs would primarily be used for "crack-control" or other non-soil related reasons. Therefore, the structural engineer should determine the appropriate design values for the BRAB Type I or Type II slabs as

recommended in the Post-Tensioning Institute (PTI), Design and Construction of Post-Tensioned Slabs-On-Ground (3rd Edition).

Settlement of the proposed structure, supported as recommended, should be within acceptable limits (less than 1 inch). Differential settlement should be less than ½-inch. However, it is important that recommendations presented in the Drainage and Moisture Protection section of this report be adhered to.

6.3 Site Class

Based on the information presented on the City of Henderson Site Class Map, a Site Class C may be used at this site for seismic design.

The site is located at approximately the following latitude and longitude:

LATITUDE	LONGITUDE
36.0316°	-114.9784°

A search of the USGS Earthquake Hazards Program's U.S. Seismic Design Maps website, 2012 IBC data, indicated the following spectral accelerations parameters for the location indicated above and a Site Class C.

MAPPED ACCELERATION PARAMETERS	
S_S	0.498 g
S_1	0.162 g
DESIGN ACCELERATION PARAMETERS	
S_{DS}	0.398 g
S_{D1}	0.177 g

6.4 Lateral Earth Pressures and Retaining Walls

For soils above any free water surface, with level backfill and no surcharge loads, we recommend the following equivalent fluid pressures and coefficient of friction:

- Active..... 35 pcf
- At-Rest ..... 55 pcf
- Passive..... 250 pcf
- Coefficient of Friction.....0.40
- Unit Weight of Backfill (Native Soils) ..... 135 pcf

Notes:

1. Active pressure assumes unrestrained (cantilever) wall and assumes no loading from heavy compaction equipment.
2. Passive pressure should not exceed a maximum of 3000 psf. A one-third increase may be used for wind or seismic loads.
3. The passive pressure and the frictional resistance of the soils may be combined without reduction in determining the total lateral resistance.

If required by the 2012 IBC, the lateral seismic pressure acting on an unrestrained wall can be estimated by the method presented in Section 1610.1.1 of the Southern Nevada Amendments to the 2012 IBC, where the dynamic (seismic) lateral thrust, ΔP_{AE}, per linear foot of wall may be determined as follows:

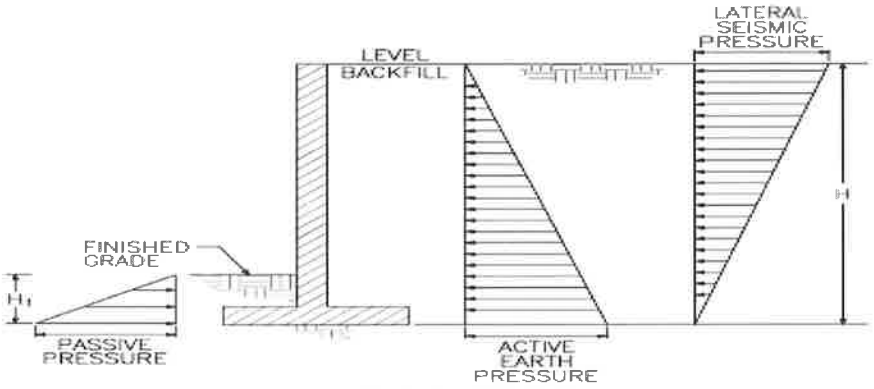
$$\Delta P_{AE} = {}^{3}/_{8}(k_h)H^2\gamma$$

- k_h is equal to $S_{DS}/2.5$
- H is the height of the wall in feet
- γ is equal to the unit weight of the backfill material, in pcf

The resultant dynamic force acts at a distance of 0.6H above the base of the wall. This equation applies to level backfill and walls that retain no more than 15 feet.

Where the design includes unrestrained walls, above any free water, with level backfill and no surcharge loads, we recommend the wall be designed to resist an earth pressure with the distribution shown below:

NON-RESTRAINED WALL



H = HEIGHT OF WALL
H_1 = DEPTH OF EMBEDMENT

Any surcharge from adjacent loadings should be added to the retaining wall pressures using a factor of 0.30. As indicated, the aforementioned pressures assume that there will be no build-up of hydrostatic pressure. Therefore, if walls will be subject to saturated conditions, we recommend weep holes (if practical) and a wall drainage system. The wall drainage may consist of a minimum of 2 cubic feet of drain rock per foot of length of retaining wall wrapped in filter fabric, Mirafi 140N or equivalent, placed at the base of the wall and discharge to an appropriate outlet. Drain rock should consist of ¾-inch Drain Backfill as per Section 704.03.02 of the USS. The structural fill immediately behind retaining walls (6 to 12 inches) should be granular and free draining. The upper 2 feet of backfill should consist of compacted native soils. As an option, a prefabricated drain may be used behind walls. The wall drainage system is an integral part of the retaining wall design. The retaining wall designer is ultimately responsible for the retaining wall design and shall ensure that the above recommended drainage system is compatible with the design of the wall or select a different drainage system at their discretion. All walls below grade should be waterproofed or at least dampproofed.

Fill against foundations, grade beams and retaining walls should be properly placed and compacted. Backfill should be mechanically compacted in layers (6 to 8 inches maximum thickness); flooding should not be permitted. Backfill within 2 feet of the back of retaining walls should be compacted to at least 90 percent of the maximum dry density obtainable by the ASTM D1557 method. Backfill outside the 2 foot zone should be compacted as outlined in the Fill Placement and Compaction section of this report. Care should be taken when placing backfill so as not to damage the walls. Compaction of each lift adjacent to walls should be accomplished with hand-operated tampers or other lightweight compactors. Overcompaction may cause excessive lateral earth pressures which could result in wall movements. Retaining walls should not be backfilled until the concrete or masonry has reached an adequate strength as specified by the wall designer.

6.5 Earthwork

6.5.1 General

- All earthwork should be performed in accordance with the guidelines presented in Chapter 18 of the 2012 IBC and the Southern Nevada Amendments to the 2012 IBC, except where specific recommendations are presented in this report. It is recommended that contractors perform their own reconnaissance of the site. If the contractors have any questions regarding site conditions, site preparation or recommendations in this report, they should contact a representative of NOVA Geotechnical & Inspection Services.

6.5.2 Site Clearing

- Strip and remove existing vegetation, debris, uncontrolled fill, all loose or disturbed natural soils, and other deleterious materials from proposed building areas, adjacent walks and slabs, and in areas to be paved. Excavations should extend at least 5 feet beyond the areas to be improved in plan view. Uncontrolled fill is defined as any existing fill that was not properly placed, observed and tested.

- All exposed surfaces should be free of mounds and depressions which could prevent uniform compaction.

- If unexpected fills or abandoned structures/improvements are encountered during site clearing, such features should be removed and the excavation thoroughly cleaned and backfilled. All excavations should be observed by the geotechnical engineer prior to backfill placement.

6.5.3 Excavation

- It is anticipated that excavation of the on-site natural non-cemented deposits for the proposed project can be accomplished with conventional earthmoving equipment.

- Contractors, especially those excavating for utilities, should satisfy themselves as to the hardness of materials and equipment required.

- Excavation, trenching and shoring should be conducted in accordance with the U.S. Department of Labor Occupational Safety and Health Administration's (OSHA) Excavation and Trenching Standard, Title 29 of the Code of Federal Regulation (CFR), Part 1926.650. Safety of construction personnel is the responsibility of the contractor.

6.5.4 Fill Materials

- On-site soils, meeting the following criteria, may be used in required fills:
  - the majority of the material (85 to 90 percent) is 6 inches or less in maximum dimension.
  - the minus 6-inch material is comprised of at least 40 percent by weight of material finer than ¾-inch in size.
  - the material is free of almost all debris and organic matter.

- Fill containing material greater than 6 inches in diameter should not be used in any utility trenches, behind retaining walls or against foundations or grade beams.

- Imported material should be compatible with on-site soils in addition to being suitable for its intended use. All imported materials should be approved, by the geotechnical firm providing testing during construction, prior to importing. In general, imported soils should be granular and non-expansive, have a maximum solubility of 0.50%, a maximum sulfate content of 0.10% a maximum sodium sulfate content of 0.20% and a maximum chloride content of 500mg/Kg.

- Select free draining granular materials should be used as backfill immediately behind retaining walls (6 to 12 inches). As an option, a prefabricated drain may be used and should be installed in accordance with the manufacturer's recommendations.

6.5.5 Fill Placement and Compaction

- After performing required excavations, the exposed soils should be carefully observed to verify removal of all unsuitable deposits. Exposed soils should then be scarified to a depth of 6 inches (not necessary if caliche exposed), watered as necessary, and compacted as recommended.

- Fill materials should be placed on a horizontal plane unless otherwise accepted by the geotechnical engineer.

- Where the slope ratio of the original ground is steeper than 5 horizontal to 1 vertical, the slope should be benched to create near-level areas for the placement of fill. The maximum allowable height of the bench is 3 feet. Bench excavation should be continued to the top of the existing slope in structural fill areas or the daylight (cut/fill) contact.

- All required fill should be placed in loose lifts generally not over 8 to 12 inches in thickness.

- Materials should be compacted to the following:

PERCENT COMPACTION (ASTM D1557)	MOISTURE CONTENT
95 minimum	-2 percent of optimum (minimum)

Note: Street/pavement subgrade only needs to be compacted to a minimum of 90 percent.

- Structural fill should be observed and tested as necessary to determine compliance with the compaction requirements presented in this report. In general, one compaction test should be performed for approximately every 1000 cubic yards of fill, one for one foot of fill placed, or change in material.

6.6 Pavement

6.6.1 General

The pavement area subgrade should be properly prepared as outlined in the Earthwork section of this report before placing any asphalt or base materials. Proper drainage of the paved areas should be provided to increase the pavement life. In addition, pavements must be maintained for durability and integrity during their life. Therefore, periodic seal coating, crack sealing, and/or patching may be required.

Asphalt and base course materials and compaction should meet the criteria set forth in the Uniform Standard Specifications for Public Works' Construction, Off-Site Improvements, Clark County Area, Nevada. Subgrade should be compacted to a minimum of 90 percent (ASTM D1557). Field and laboratory testing of asphalt and base materials should be performed to determine whether specified requirements have been met.

6.6.2 On-Site Pavement

Based on the soil classifications, assumed traffic volumes, the following minimum pavement sections are recommended for paved areas:

TRAFFIC AREA	ASPHALT (Inches)	TYPE II BASE COURSE (Inches)
Automobile Parking	2.0	4.0
Main Corridors and Truck Access	3.0	4.0

The performance of the pavement can be enhanced by minimizing excess moisture which can reach the subgrade soils. The following recommendations should be followed, where possible:

- Site grading at a minimum 2% grade away from the pavements.
- Compaction of any utility trenches for landscaped areas to the same criteria as the pavement subgrade.
- Placing compacted backfill against the exterior side of curb and gutter.

6.6.3 Off-Site Pavement

Based on our experience/test results, the on-site soils should have an R-value on the order of 64. Therefore, based on the Pavement Structure Design Guideline Chart (DWG. Nos. 200 and 200.1) in the Uniform Standard Drawings for Clark County Area, Nevada, the following preliminary pavement sections will be applicable:

ROADWAY TYPE	PAVEMENT SECTION (Inches)	
	ASPHALT CONCRETE	TYPE II BASE
Minor Collector	3.0	4.0
Major Collector	4.0	5.0

As indicated, the pavement sections presented are preliminary. City of Henderson will require that final sections be based on R-value tests performed at subgrade. Therefore, final pavement sections may vary depending on those R-value test results.

6.7 Drainage and Moisture Protection

Foundation soils should generally not be allowed to become saturated during or after construction, except when necessary to increase moisture contents prior to construction. Infiltration of water into foundation or utility excavations should be prevented during construction. Utility lines should be properly installed and the backfill properly compacted to avoid possible sources for subsurface saturation.

Positive drainage away from the structure should be provided during construction and maintained throughout the life of the structure. Any downspouts, roof drains or scuppers should discharge into splash blocks or extensions and away from the structures. Backfill against footings, exterior walls and in utility trenches should be properly compacted and free of all construction debris to reduce the possibility of moisture infiltration.

Performance of the foundation system recommended in this report is dependent on the ability to keep moisture from penetrating the soils below foundations and slabs. Therefore, we recommend the following:

- Positive drainage should be maintained away from the structure, adjoining concrete slabs and block walls. Positive drainage of 2% minimum shall be maintained for areas adjacent to structures or block walls that are not covered by concrete or asphalt. The 2% should be maintained for a distance of 10 feet. Where concrete or asphalt abut structures or block walls, the surface of these materials should be sloped a minimum of 2% away from structures or block walls. If physical obstructions or lot lines prohibit 10 feet of horizontal distance, the slope should be provided to an approved alternate method of drainage.
- Watering should be kept to a minimum.

It should be understood, if the above recommendations are not followed there would be an increased risk/potential for increasing moisture below foundations and slabs which could result in additional movement and distress to structures and slabs.

6.8 Floor Slabs

If grading recommendations are complied with, concrete floor slabs may be supported on a 4-inch layer of Type II. If the potential for a damp floor slab is a concern, moisture protection should be provided by a relatively impervious vapor barrier/retarder placed beneath interior slabs. The vapor barrier/retarder should be a Class A vapor barrier at least 10 mils in thickness, meeting the requirements of ASTM E1745, and should conform to and be placed in accordance with the requirements of the project structural engineer or architect. If the concrete is to be placed directly on Type II or sand, the Type II or sand should be moistened (but not saturated) prior to placement of concrete.

Recommendations presented by the American Concrete Institute (ACI 302-1R-96) for slabs-on-grade should be complied with for all concrete placement and curing operations. Improper curing techniques and/or excessive slump (water-cement ratio) could cause excessive drying/shrinkage resulting in random cracking and/or slab curling. Concrete slabs should be allowed to cure adequately before placing vinyl or other moisture sensitive floor coverings.

6.9 Corrosivity

Based on test results and Table 4.2.1 of ACI 318 Section 4.2, the on-site soils classify as having a negligible **(S0)** sulfate exposure. Consideration should be given to providing protection to buried metal pipes or use of nonmetallic pipe where permitted by local building codes. Non-corrosive backfill, protective coatings and wrappings, sacrificial anodes, or a combination of these methods could be considered. It should be understood that NOVA Geotechnical & Inspection

Services personnel are not experts regarding corrosion and/or corrosion protection and that we recommend a "Corrosion Engineer" be consulted for actual recommendations regarding the necessity and/or method of cathodic protection.

7.0 OTHER SERVICES

NOVA Geotechnical & Inspection Services should be retained to provide a general review of final design plans and specifications in order that grading and foundation recommendations may be interpreted and implemented. In the event that any changes of the proposed project are planned, the conclusions and recommendations contained in this report should be reviewed and the report modified or supplemented as necessary.

NOVA Geotechnical & Inspection Services should also be retained to provide services during excavation, grading, foundation and construction phases of work. Observation of foundation excavations should be performed prior to placement of reinforcing and concrete to confirm that satisfactory bearing materials are present. Field and laboratory testing of concrete and soils should be performed to determine whether applicable requirements have been met. In addition, the level of special inspection required for soils should not be less than **4a** as specified in the Southern Nevada Amendments to the 2012 IBC, Table 1705.6.

The analyses and recommendations in this report are based in part upon data obtained from the field exploration. The nature and extent of variations beyond the locations of the explorations may not become evident until construction. If variations then appear evident, it may be necessary to re-evaluate the recommendations of this report.

8.0 CLOSURE

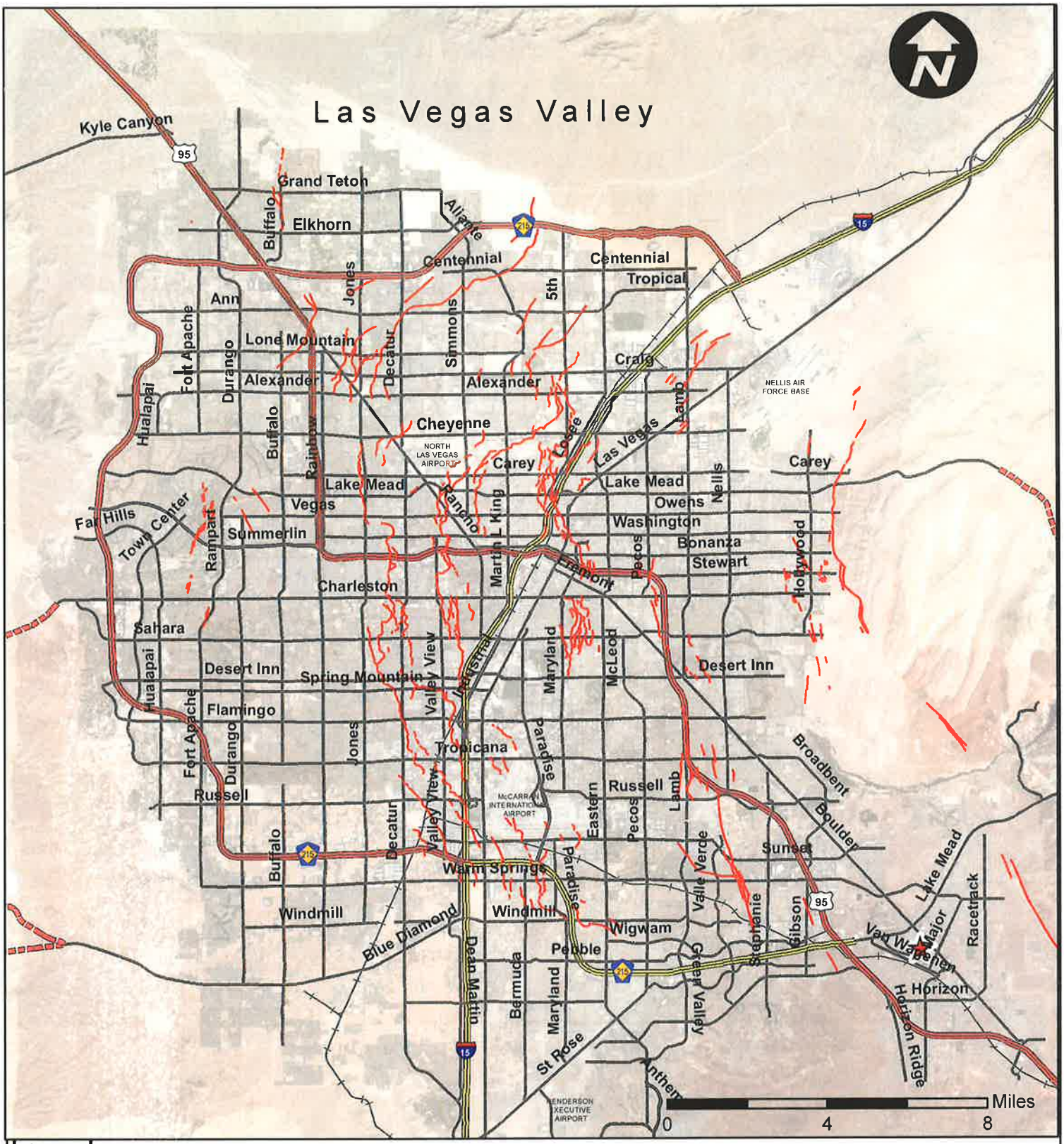
Our professional services were performed using the degree of care and skill ordinarily exercised, under similar circumstances, by reputable geotechnical engineers practicing in this or similar localities. No warranties, either expressed or implied, are intended or made. We prepared this report as an aid in design of the proposed project. This report is not a bidding document. Any contractor reviewing this report must draw his own conclusions regarding site conditions and specific construction techniques to be used on this project.

NOVA GEOTECHNICAL & INSPECTION SERVICES, LLC

Prepared by:

Kul Shrestha
Geotechnical Staff Professional

Reviewed by:
Larry W. Snedegar, P.E., P.G.
Sr. Project Engineer



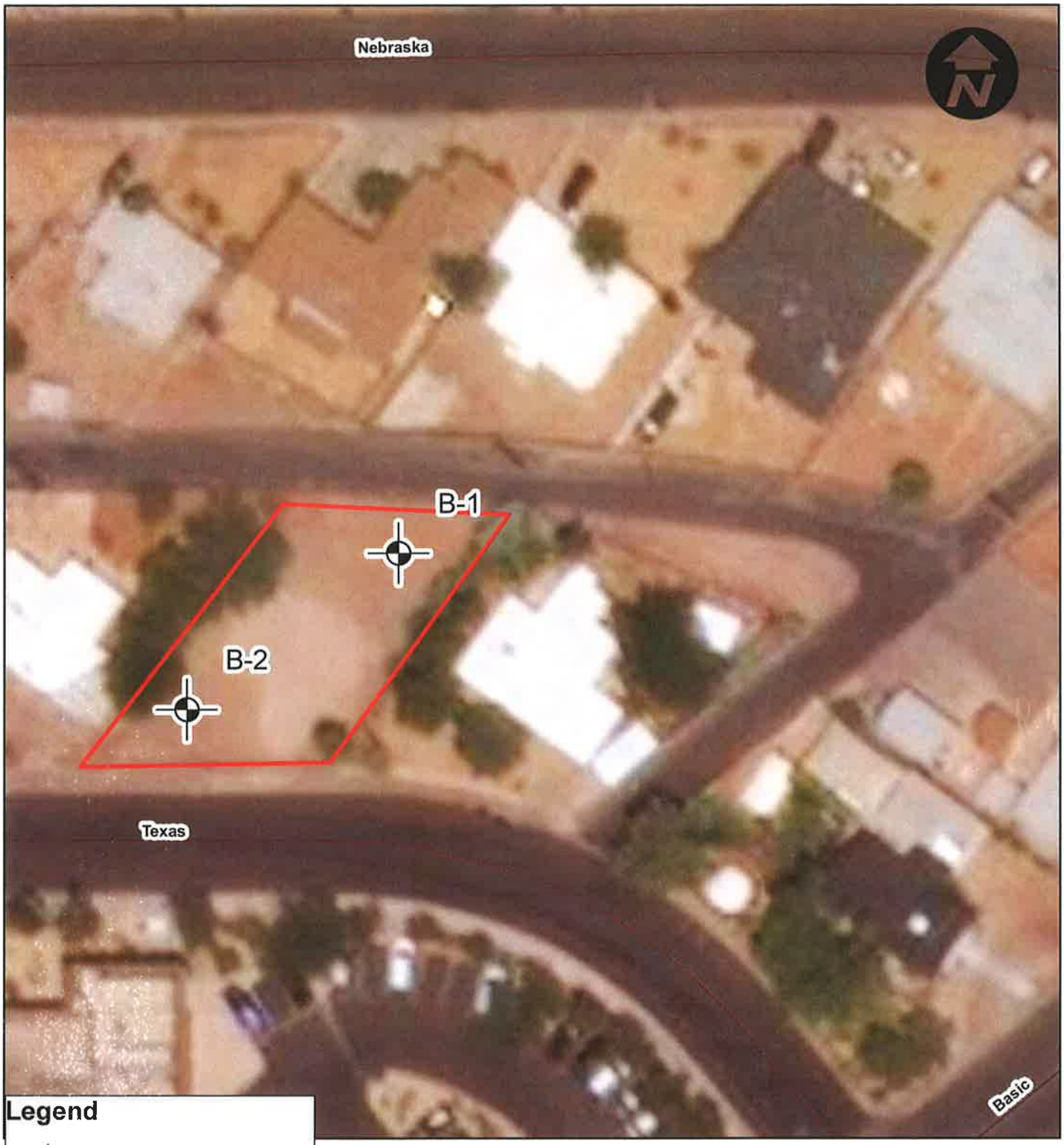
Legend

★ Approximate Site Location

Las Vegas Faults (CCBD GISMO, 2014)

The presented layers were obtained from various sources including ESRI, USGS, USDA, CCBD GIZMO, CCFCD, GIS User Community among others. The GIS information is presented for reference only. No warranties, either expressed or implied, are intended or made. If you have any questions regarding this information, please contact NOVA.

NOVA Geotechnical & Inspection Services	PROJECT: **6-Plex Multi-Family Residential** **251 South Texas Avenue** **Henderson, Nevada**	**VICINITY MAP**
	CLIENT: **Montgomery Consulting Engineers, LLC**	PROJECT NO: **G-18-103** FIGURE NO: **1**



Legend

Approximate Boring Location

Approximate Site Boundary

Feet
0 20 40 60 80

The presented layers were obtained from various sources including ESRI, USGS, USDA, CCBD GIZMO, CCFCD, GIS User Community among others. The GIS information is presented for reference only. No warranties, either expressed or implied, are intended or made. If you have any questions regarding this information, please contact NOVA.

NOVA Geotechnical & Inspection Services	PROJECT: **6 Plex Multi-Family Residential 251 South Texas Avenue Henderson, Nevada**	SITE MAP	
	CLIENT: **Montgomery Consulting Engineers, LLC**	PROJECT NO: **G-18-103**	FIGURE NO: **2**

Appendix

APPENDIX

Site Exploration

The subsurface conditions of the site were explored by drilling two (2) borings to depths of approximately 15 feet below existing site grades. Borings were drilled using a rotary drill rig.

Soils were logged during drilling by a graduate geologist and samples were obtained to aid in material classification and for possible laboratory testing. Boring logs are presented on Plates 1 and 2. The number of blows required to drive a 2-inch diameter sampler (SPT) or 3-inch diameter sampler (Ring) 12 inches using a 140 pound weight dropped 30-inches are shown on the logs. The soils are generally classified by the Unified Soil Classification System. Plate 3 presents an explanation of material classifications used in this report.

Laboratory Testing

Laboratory testing was performed on selected samples of on-site soils. Tests were performed in general accordance with applicable ASTM or local standards.

A sieve analysis and Atterberg Limits was performed to determine the grain-size distribution and soil classification of a representative sample. The results are presented on Plate 4.

Chemical tests were performed on representative samples by Silver State Analytical Laboratories. Tests were performed to determine the percent chloride, water soluble sodium, sulfate and sodium sulfate, as well as the soil solubility. Test results are presented on Plate 5.

BORING LOG B-1

CLIENT:	PROJECT:
Montgomery Consulting Engineers, LLC	6 Plex Multi-Family Residential
BORING LOCATION: see site map	**ELEVATION (ft):** N/A
SITE: 251 South Texas Avenue, Henderson, NV	

MOISTURE CONTENT %	DRY DENSITY PCF	SAMPLE TYPE*	SAMPLE	BLOWS/FT	DEPTH, FT	USCS SYMBOL	GRAPHIC	SOIL DESCRIPTION	CONSISTENCY
					0	Fill		Fill- Landscape Rock, slightly moist, gray,	
					1	SM		Silty SAND with gravel, silt, slightly moist, brown	M. Dense
		SPT		26	2				
					3				
					4				
					5				
					6				
		SPT		27	7				
					8				
					9				
					10				Dense
					11				
		SPT		44	12				
					13				
					14				
					15			Bottom of Boring at 15 feet	

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL AND ROCK TYPES: IN-SITU, THE TRANSITION MAY BE GRADUAL.

* SAMPLE TYPE: R = RING B = BAG SPT = STANDARD PENETRATION BN = BULL NOSE C = CORE

NOVA GEOTECHNICAL AND INSPECTION SERVICES

NOTES:
Groundwater not encountered within drilled depths

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PROJECT NO.:	**FIGURE NO.:**
G-18-103	1

THIS SUMMARY APPLIES ONLY AT THIS LOCATION AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER WITH TIME AND AT OTHER LOCATIONS.

BORING LOG B-2

CLIENT:		PROJECT:
Montgomery Consulting Engineers, LLC		6 Plex Multi-Family Residential
BORING LOCATION: see site map	ELEVATION (ft): N/A	SITE: 251 South Texas Avenue, Henderson, NV

MOISTURE CONTENT %	DRY DENSITY PCF	SAMPLE TYPE*	SAMPLE	BLOWS/FT	DEPTH, FT	USCS SYMBOL	GRAPHIC	SOIL DESCRIPTION	CONSISTENCY
					0	Fill		Fill- Landscape Rock, slightly moist, gray	
		SPT		18	1	SM		Silty SAND with gravel, slightly moist, brown	M. Dense
		B			2				
					3				
					4				
		SPT		24	5				
					6				
					7				
					8				
					9				Dense
		SPT		30	10				
					11				
					12				
					13				
					14				
					15			Bottom of Boring at 15 feet	

THE STRATIFICATION LINES REPRESENT THE APPROXIMATE BOUNDARY LINES BETWEEN SOIL AND ROCK TYPES: IN-SITU, THE TRANSITION MAY BE GRADUAL.

* SAMPLE TYPE: R = RING B = BAG SPT = STANDARD PENETRATION BN = BULL NOSE C = CORE

NOVA GEOTECHNICAL AND INSPECTION SERVICES

NOTES:
Groundwater not encountered within drilled depths

DATE DRILLED:	PAGE NO:
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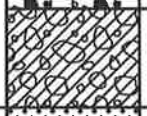
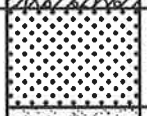
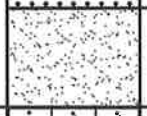
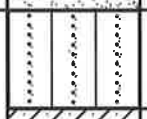
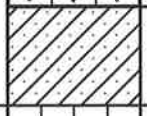
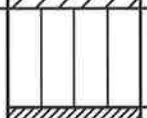
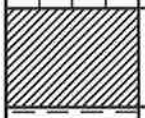
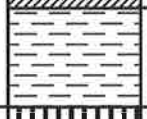
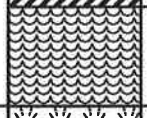
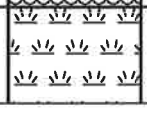
THIS SUMMARY APPLIES ONLY AT THIS LOCATION AT THE TIME OF LOGGING. CONDITIONS MAY DIFFER WITH TIME AND AT OTHER LOCATIONS.

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS
			GRAPH	LETTER	
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		(LITTLE OR NO FINES)		GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	GRAVELS WITH FINES		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
		(APPRECIABLE AMOUNT OF FINES)		GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	SAND AND SANDY SOILS	CLEAN SANDS		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
		(LITTLE OR NO FINES)		SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	SANDS WITH FINES		SM	SILTY SANDS, SAND - SILT MIXTURES
		(APPRECIABLE AMOUNT OF FINES)		SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOVA GEOTECHNICAL & INSPECTION SERVICES

CLIENT: Montgomery Consulting Engineers, LLC

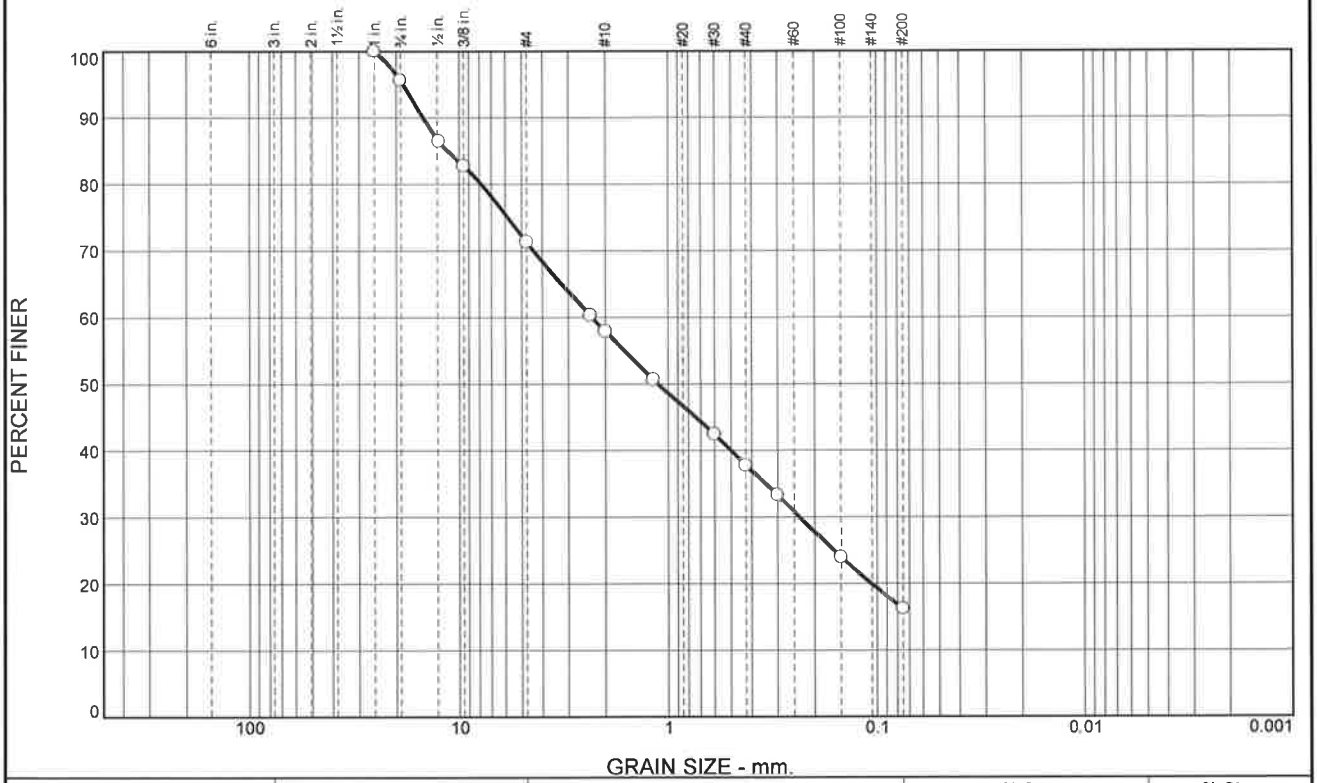
PROJECT: 6 Plex Multi-Family Residential
251 S Texas Avenue

Materials Classification

PROJECT NO.: G-18-103

PLATE NO.: 3

Particle Size Distribution Report



% +3"	% Gravel	% Sand	% Silt	% Clay
0	29	55	16	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
1"	100		
3/4"	96		
1/2"	86		
3/8"	83		
#4	71		
#8	60		
#10	58		
#16	51		
#30	42		
#40	38		
#50	33		
#100	24		
#200	16		

* (no specification provided)

Material Description

silty SAND with gravel

Atterberg Limits

PL= NP LL= NV PI= NP

Coefficients

D_{90}= 14.8464 D_{85}= 11.4290 D_{60}= 2.3141
D_{50}= 1.1232 D_{30}= 0.2361 D_{15}=
D_{10}= C_u= C_c=

Classification

USCS= SM AASHTO= A-1-b

Remarks

1 to 5 feet

Source of Sample: B-2 **Depth:** 1

Date: 6/6/18

Nova Geotechnical and Inspection Services Las Vegas, Nevada

Client: Montgomery Consulting Engineers, LLC
Project: 6 Plex Multi-Family Residential

Project No: G-18-103 **Figure**

Tested By: DP **Checked By:** KS

SilverState Analytical Laboratories
Sierra Environmental Monitoring
Silver State Labs-Las Vegas
3626 E. Sunset Road, Suite 100
Las Vegas, NV 89120
(702) 873-4478 FAX: (702) 873-7967
www.ssalabs.com

Analytical Report

WO#: **18060411**
Date Reported: **6/8/2018**

CLIENT: Nova Geotechnical
Project: G18-101 A-C
Lab ID: 18060411-02
Client Sample ID 101B, B2@1-5.0'

Collection Date:
Matrix: SOIL

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
SOIL 5. WSSS(SODIUM SULFATE),SOL,CH-CCBD CHLORIDE - SOILS				**SM 4500CL B**		Analyst: **SBK**
Chloride	ND	50		mg/Kg	5	6/8/2018 1:06:00 PM
SOIL 5. WSSS(SODIUM SULFATE),SOL,CH-CCBD SODIUM SULFATES - CALCULATION 0NLY.				**CALCULATION**		Analyst: **SBK**
Sodium Sulfate as Na2SO4	0.0220	0		%	1	6/8/2018 3:54:00 PM
SOIL 5. WSSS(SODIUM SULFATE),SOL,CH-CCBD WATER SOLUBLE SULFATE (SO4)				**SM 4500 SO4 E**		Analyst: **SBK**
Sulfate	0.0300	0.0100		%	1	6/8/2018 1:05:17 PM
SOIL 5. WSSS(SODIUM SULFATE),SOL,CH-CCBD WATER SOLUBLE SODIUM (NA)				**ASTM D2791**		Analyst: **SBK**
Sodium	0.0100	0.0100		%	1	6/8/2018 1:07:00 PM
SOIL 5. WSSS(SODIUM SULFATE),SOL,CH-CCBD TOTAL SALTS (SOLUBILITY)				**SM 2540 C**		Analyst: **JCT**
Solubility	0.0600	0.0100		%	1	6/8/2018 11:32:00 AM

Qualifiers: (Qual)

*	Value exceeds Maximum Contaminant Level.	C	Value is below Minimum Compound Limit.
DF	Dilution Factor.	H	Holding times for preparation or analysis exceeded.
MCL	Maximum Contaminant Level.	ND	Not Detected at the PQL.
PQL	Practical Quantitation Limit.		

Original