DuPont Engineering, Inc.
8349 Shady Lady Court
Las Vegas, NV 89131
(702) 364-5099

Mr. David Reynolds
431 Hull Street
Henderson, Nevada 89015

December 15, 2019

Subject: Geotechnical Investigation Report Update
Single Family Residence
NWC North Racetrack Road and Havre Avenue
APN 179-04-405-011
Henderson, Nevada

DEI No.: 19-0873

Reference: Geotechnical Investigation Report by Action Technologies and Engineering (No.: 7205, dated May 2, 2005)

Mr. Reynolds:

This letter is an update to the referenced Geotechnical Investigation Report for the subject project. We visited the site on December 10, 2019 to determine the current conditions. The original report was prepared for a total of 6 lots totaling 2.64 acres. Since the time of the report two of the six lots have been developed with single family residences. At this time a residence is prepared for the lot at the northwest corner of North Racetrack Road and Havre Avenue. This update letter is for the one referenced lot only.

Explorations

The original borings were drilled to a depths of 10 feet and 15 feet. However, current code requirements state that explorations be made to a minimum depth of 15 feet. Based upon the planned construction, the soil conditions, and the fact that the lots were already graded, warranting further earthwork irrelevant, an additional 5 feet of boring depth would not result in any changes to the recommendations. Therefore, it is our opinion that the existing borings are acceptable and that no new borings are necessary.

Faulting

The nearest known Holocene fault is the Black Hills fault and is located approximately 6 miles south of the site. The nearest mapped Quaternary fault is located approximately 3000 feet to the east of the site. The Quaternary fault locations were originally mapped by Bell and Price in the 1980's. Their study was published in 1993 and was subsequently used by the Clark County Building

Department to create the "Clark County Soil Guidelines Map" in 1997. The Soil Guidelines Map is the reference used for determining the distance to the nearest Quaternary fault. There are no known geologic features that would require mitigation at this site. No faults are known to traverse the site, nor are any fissures observed.

Appendix P of the 2018 SNBCA requires that a seismic hazard study be performed when a mapped or known fault is within 1000 feet from the site. Per the Clark County Soil Guidelines Map the nearest mapped fault is approximately 3000 feet from the site. Therefore, a seismic hazard study is not required.

The latitude and longitude at the boring locations are as follows:

Boring	Latitude	Longitude
TP-1	36.0594	-114.9501
TP-2	36.0586	-114.9505

The Clark County Seismic Map indicates that the Site Classifies as Site Class C. Based upon our knowledge of the soils in the vicinity of the site, we concur with the County map. The Site Class and Seismic Design Category (ASCE 7-16) are C based on the following data:

SITE CLASS	ASSUMED SEISMIC USE GROUP	S_S	S_1	S_{DS}	S_{D1}	SEISMIC DESIGN CATEGORY
C	II	0.487	0.164	0.422	0.164	C

Liquefaction

Appendix O of the 2018 SNBCA requires that a liquefaction study be performed when groundwater is within 50 feet of the surface. Therefore, we reviewed drilling logs from nearby wells to determine groundwater conditions at the time of drilling to determine if groundwater may be shallower than 50 feet. It must be understood that groundwater levels fluctuate slightly throughout the year. Furthermore, groundwater levels can sometimes lower significantly due to draw down from pumping, or can increase due to recharge from development. The nearest recently drilled well was Well 81520, drilled in 2000. The well log for that well indicated that groundwater was at 250 feet at the time of drilling. That well was located approximately 1/3 mile to the south of the site. Based upon the depth to groundwater in the nearby well groundwater was determined to be deep.

Therefore, a liquefaction study is not required and the liquefaction potential should be considered low.

Clark County Soil Hazards Maps

The Clark County Building Department created two maps which illustrate potential soils hazard areas within the Las Vegas Valley. The intent of the maps is to provide guidance to engineers performing investigations within any of these areas.

The Clark County Soil Guidelines Map (August 2001) delineates four types of potential soil hazards and a non-hazard type generally consisting of mixed alluvial sand and gravel. The four hazard types are:

(i) Areas within 2000 feet of compaction or tectonic faults. These areas include 90 percent of all mapped fissure zones. Soil subsidence is the general hazard associated with this type of soil. These phenomena are discussed in the previous report section, Regional Seismicity.

(ii) Areas within 1000 feet of mapped washes. Aside from evaluating possible erosional damage to the property, the general hazards associated with these areas include recent sediment deposits and soils with a potential for solubility, clay swell, corrosion, gypsum salts, or hydro collapse.

(iii) Areas with the same potential hazards as described in Paragraph (ii) except for the recent sediment deposits and possible erosional damage.

(iv) Areas with ground slopes in excess of 15 percent and the potential for shallow bedrock.

Per the Clark County Soil Guidelines Map the subject site is located in the non-hazard area.

The Clark County Expansive Soil Guidelines Map (September 2006) delineates potential expansive soil areas. According to the map, the map is intended to show general trends of near surface soils in the Las Vegas Valley. The soil conditions for a specific site could vary considerably from those described on the map. The areas are defined on the map as follows:

(i) Areas with greater than 12 percent expansion potential which is considered critical.

(ii) Areas with 8 to 12 percent expansion potential which is considered high.

(iii) Areas with 4 to 8 percent expansion potential which is considered moderate.

(iv) Areas with 0 to 4 percent expansion potential which is considered none to low.

Per the map the subject site is located within an area not described on the map.

When developing the recommendations for this report, we reviewed both maps and utilized the information they contain in conjunction with our field and laboratory testing data as well as our experience in the vicinity.

Conclusions and Recommendations

Based upon our investigation, it is our opinion that, with regard to geotechnical considerations, construction of the proposed project is feasible at the site.

Grading

For the purposes of this report the building pad area is considered to encompass the footprint of the structure plus a distance of 5 feet laterally beyond the structure in each direction. Prior to grading operations being performed, all vegetation, debris, and fill piles, if any, should be removed from the pad area.

Any spread fill at the site would be considered uncontrolled fill unless documentation can be provided indicating that the fill in the pad area was properly observed, tested, and certified by a Clark County approved Quality Assurance Agency. Uncontrolled fill must be removed from the pad area regardless of depth.

Prior to any filling and after any necessary excavations are made to remove fill and/or loose soils, the soils within the pad area are to be scarified to a depth of 12 inches, moisture conditioned, then recompacted.

If any fill piles were present at the site prior to grading they would be considered imported material and would have to meet the requirements of Table 2 below prior to acceptance for use as fill. Any on-site soils removed from the excavation and subsequently stockpiled may be re-used as fill in the pad area. However, for both stockpiled on-site soils and approved in-place fill piles, any

oversized material (particles larger than 6 inches in maximum diameter) should be removed prior to re-use as fill. Particles less than 6 inches in size, including asphalt, rock, and concrete, are acceptable. Additionally, any debris, vegetation, or soils highly rich in organic matter should also be removed.

The thickness of any lift of soil should not exceed 8 inches in loose thickness. All fill and scarified soil should be moisture conditioned and compacted in accordance with the specifications of Table 1. ASTM Test Method D 1557 should be used for determining the laboratory maximum dry density.

TABLE 1

Soil Type	Moisture Content	Relative Compaction
Coarse-grained*	Near optimum	Minimum 95 percent

If imported soils are necessary to reach the site grade, they should comply with the following specifications contained in Table 2. If possible, the imported materials should be tested for compliance prior to hauling the material to the site.

TABLE 2

Sieve Screen	Percent Passing (%)
3 inch	100
¾ inch	75 - 100
No. 4	25 - 75
No. 200	5 - 25

Liquid Limit < 20	Soluble Sulfate < 0.10%
Plasticity Index < 6	Sodium Sulfate < 0.10%
Expansion Potential < 1% (oven-dried, 60 psf surcharge)	Total Solubility < 0.5 %

We anticipate that excavation and recompaction of the on-site soils will result in minimal shrinkage losses. Subsidence of the on-site soils which are scarified and recompacted will also be minimal. Based on the composition of the on-site soils, the site is classified as Special Inspection Category G-A. Therefore, periodic inspection during grading operations is permitted.

Foundations

The Foundations section of the original report is amended as follows. Under seismic conditions, the active and at-rest equivalent fluid unit weight should be increased to 54 and 90 pcf, respectively. The resultant of the seismic component of earth pressure should be applied at 0.6 of the height where lateral soil pressure is acting. If seismic lateral pressure distribution is needed, it may be taken as an inverted triangle (see attached Earth Pressure Distribution figure). If the backfill behind the wall is not horizontal or if surcharge loads exist, these earth pressure design parameters should be reviewed.

Slabs

The Slabs section of the original report is amended as follows. As a minimum, the visqueen thickness should be increased to 10-mil.

Concrete Durability

The Concrete Durability section of the report is amended as follows. The concentration of soluble sulfates in the on-site soils as determined by Silver State Analytical Laboratories was 0.14 percent. This concentration may be considered to be moderate with respect to concrete deterioration. All concrete in contact with the on-site soils should be prepared in accordance with the following table:

SEVERITY	EXPOSURE CLASS	WATER-SOLUBLE SULFATE (SO_4) IN SOIL, percentage by weight	SULFATE (SO_4) IN WATER, ppm	CEMENT TYPE ASTM C150	$CaCl_2$ ADMIX	MAXIMUM WATER TO CEMENT RATIO	MINIMUM f'_c NORMAL WEIGHT AND LIGHTWEIGHT AGGREGATE CONCRETE, psi
Negligible	S0	0.00 - 0.10	0 - 150	NR	NR	NA	2500
Moderate	S1	0.10 - 0.20	150 - 1500	II	NR	0.50	4000
Severe	S2	0.20 - 2.00	1500 - 10000	V	NP	0.45	4500
Very severe	S3	Over 2.00	Over 10000	V+ Pozz. or Slag	NP	0.45	4500

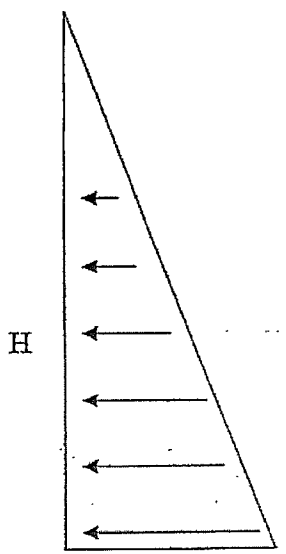
These recommendations are based on the chemical properties of the on-site soils. Landscaping materials that are high in sulfates could cause deterioration of concrete made with Type II cement. If imported soils are used, an additional soluble sulfate test should be performed. The above table should be used to determine the design for concrete in contact with the imported soil.

It is our opinion that all other recommendations provided in the original report remain valid. If you have questions, please contact us.

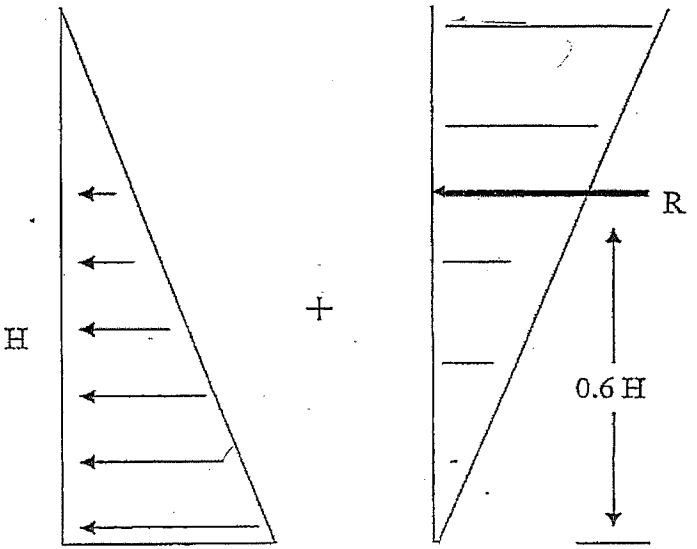
Respectfully submitted,
DuPont Engineering, Inc.

David R. DuPont, P.E.
President

Earth Pressure Distribution



Static Condition



Seismic Condition

For Yielding Walls: $P_H = 3/8 K_h \gamma H^2$

For Non Yielding Walls: $P_H = K_h \gamma H^2$

Where P_H = Lateral Load
$K_h = S_{ds} / 2.5$
H = Height of backfill

DuPont Engineering, Inc.

Geotechnical Exploration Report

Proposed Residences
(2.64 Acres)

Northwest Corner of
Racetrack Road & Havre Avenue,
APN 179-04-405-004
Henderson, Nevada

Job No. 7205
May 2, 2005

Action Technologies & Engineering, Inc.
Las Vegas, Nevada

Action Technologies & Engineering, Inc.

3535 W. Harmon Avenue, Suite I, Las Vegas, NV 89103
(702) 736-1901 Fax (702) 736-3844

May 2, 2005

Job No. 7205

David Reynolds
Henderson, Nevada

Subject: **GEOTECHNICAL EXPLORATION** - Residences, 2.64 acres, northwest corner of Racetrack Road and Havre Avenue, Henderson, Nevada

APN 179-04-405-004

Dear Mr. David Reynolds:

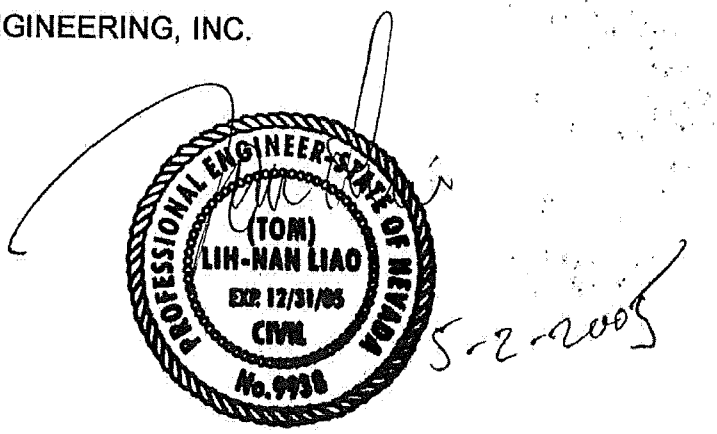
In accordance with your request, we have performed a subsurface investigation for the subject project. Our investigation has indicated that the site is predominantly underlain with 1' to 5.5' silty gravel and silty caliche gravel with caliche cobbles, occasional caliche boulders and trace of clay, over silty gravel with cobbles and occasional boulders. The surface imported fills, approximate 1' to 5.5', and top 1' of native gravel soils were in loose to medium dense conditions. The native soils, from 12" depth and the deeper section, were in medium dense to very dense conditions. The imported fills and top 1' native soil shall be over-excavated/scarified and recompacted before receiving additional fill.

The results of our field investigation, laboratory test program, and subsequent analyses indicate that the proposed structures may be supported on shallow foundations bearing on recompacted on-site soils and additional imported granular soils. According to the current grade, approximate 1' to 3' fills may be needed for design grade. Specific recommendations are contained in the accompanying report.

If you have any questions concerning our findings, please contact us at your convenience.

Very truly yours,

ACTION TECHNOLOGIES & ENGINEERING, INC.



Tom L. Liao, P. E.

Distribution: (6) Addressee

To: David Reynolds

Job No. 7205

GEOTECHNICAL EXPLORATION
Proposed Residences,
Northwest Corner of
Racetrack Road & Havre Avenue,
APN 179-04-405-004
Henderson, Nevada

CONDUCTED FOR

David Reynolds
Henderson, Nevada

To: David Reynolds

Job No. 7205

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Job No. 7205

GEOTECHNICAL EXPLORATION
Proposed Residences,
Northwest Corner of
Racetrack Road & Havre Avenue,
APN 179-04-405-004
Henderson, Nevada

INTRODUCTION

This report presents the results of our subsurface investigation made at the subject site. The site is located at northwest corner of Racetrack Road and Havre Avenue, Henderson, Nevada. The site is shown on Plate 1, entitled Vicinity Map. The purpose of the investigation was to determine the nature and engineering properties of the soils underlying the site and to determine the suitability of the site for the proposed projects and make necessary recommendations. The investigation included visual observations, excavated two test pits, laboratory testing, engineering analyses, and preparation of this report.

The approximate locations of the testing pits are shown on the attached Site Plan, Plate 2. Logs of the test pits are provided in Plate 3 through 4. Laboratory test results are given on the test pit logs and Table 1, "Summary of Laboratory Tests".

PROJECT DESCRIPTION

The site is approximate 2.64 acres in size and will be utilized for 6 half-acre single family residence lots. The residence is one or two-story, single family wood-framed structure with concrete roof tile and concrete slab-on-grade. The wall and column loads are assumed to be 1 to 5 klf and 5 to 40 kips respectively. According to the current grade, approximate 1' to 3' fills may be needed for design grade.

SITE DESCRIPTION

At the time of our investigation, the site was covered by 1' to 5.5' uncontrolled fills. The surface soils were in loose to dense conditions. North, west, south and east sides of the site was bounded by the partly paved streets. The elevation of the site is

approximate 0' to 3' higher than the adjacent streets. The topography of the site generally is sloping downward towards the northwest in approximate 3% to 7%. Site drainage was by sheet flow and shallow swales to the west street.

GEOTECHNICAL AREA CONSIDERATION

In accordance with Clark County Soil Guidelines Map and Bulletin 95, the site is within "Standard geotechnical consideration area". Based on the site observation and subsurface exploration, the uncontrolled fills were our mayor concerns.

FIELD INVESTIGATION

Two test pits were excavated with a backhoe at the locations shown on the Site Plan, Plate 2. The undisturbed exposed wall surfaces of test pits had been examined and probed for compactness. A description of the subsurface soils encountered is presented in the Test Pit Logs, Plate 3 through 4. All soils were classified in accordance with the Unified Soil Classification System.

Loose bulk samples were obtained at various depth for stratum identification and necessary laboratory tests.

LABORATORY TESTS:

Laboratory tests consisted of moisture contents, soil classification, and sulfate test. The test results are shown on the test pit logs, and Table 1, The Summary of Laboratory Tests.

SUBSURFACE CONDITIONS:

The site was predominantly underlain with 0.5' to 5.5' silty gravel and silty caliche gravel with caliche cobbles, occasional boulders and trace of clay, over silty gravel with cobbles and occasional boulders. The surface imported fills, approximate 1' to 5.5', and top 1' of native gravel soils were in loose to medium dense conditions. The

native soils, from 12" depth and the deeper section, were in medium dense to very dense conditions. The imported fills and top 1' native soil shall be over-excavated/scarified and recompacted before receiving additional fill. At time of our investigation, the moisture contents are generally low near the surface and increased slightly with depth. No groundwater was encountered at the depth of exploration.

CONCLUSION AND RECOMMENDATIONS

The results of the field and laboratory investigations indicate that the top imported fills, approximate 1' to 5.5', and top 1' of native gravel soils were in loose to medium dense conditions and shall be overexcavated/scarified and recompacted to a minimum of 90 percent relative compaction before additional filling to be made. Imported material should be salt-free, predominantly granular, and non-expansive.
Detailed recommendations for the site preparation, grading, design of footings, floor slabs, and flat works are presented in the following paragraphs.

Grading (refer to Fig. 1)

1. The grading operation should be performed in accordance with the attached General Grading Guidelines except as noted otherwise.
2. Prior to grading, all existing vegetation, grass and roots on proposed site, if any, should be stripped and removed from the site.
3. The pad for buildings should be extended at least five feet beyond the exterior footings. The pads for flatwork, such as patio, pavement, and concrete driveway, should be extended one feet beyond the edges. If a slope at the edge of pad exists, a two to one ratio of slope (2 in horizontal distance for 1 in vertical height) should be maintained. The exposed slope surface should be compacted to avoid erosions.

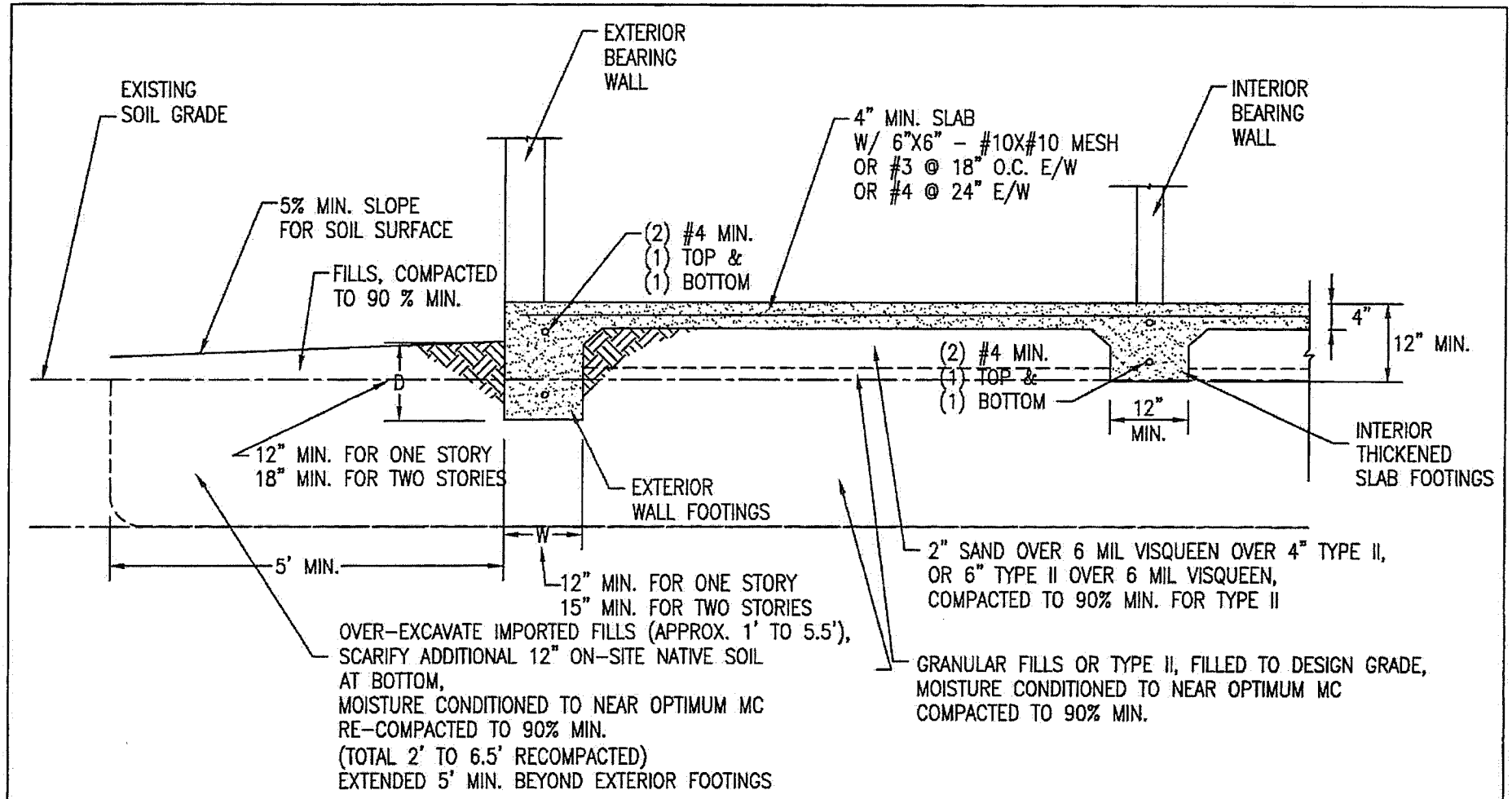

FIG. 1, GRADING AND FOUNDATION SUPPORT SECTIONS

(MINIMUM REQUIREMENTS FOR SOIL PURPOSE ONLY)

4. The building area should be overexcavated to depth of natural grade. Flat work areas, such as concrete driveway, walk and patio, shall also be overexcavated to depth of natural grade.

5. After excavation, the exposed surface should be scarified to a depth of at least 12", moisture conditioned to near optimum moisture content. The soils should be recompacted to a minimum of 90 percent relative compaction. The test standard for all engineered fill should be as determined by ASTM test designated D 1557.

6. The excavated soils, after removal of over-sized rocks (larger than 10" in any dimension, may be used as engineered fills and should be moisture conditioned and compacted as paragraph "5".

7. If more soil needed for design grade, the imported soils for building pad, flat work and pavement should be salt-free, predominantly granular, and non-expansive. The imported materials should be approved by soil engineer or meet the following general criteria:

    1). Containing no rocks larger than 6 inches in diameter.

    2). Containing 10 % to 70 % of gravel (larger than No. 4 sieve but smaller than 3")

    3). Free of organic matter and debris.

    4). Containing no or limited quantity of gypsum, solubility less than 2 %.

    5). Low expansion potential (the portion of soils passing No. 10 sieve should have expansion potential less than 2%, under 60 psf surcharge, compacted in 90 % density, air dried).

    6). Containing water soluble sulfate less than 0.1%. If sulfate content greater than 0.1%, the concrete with high durability should be used for the portion contact with soil, such as footings or slab. (refer to section"Concrete")

All imported fills should be compacted to 90 percent relative compaction at near optimum moisture content.

8. The site grading should be accomplished in such a manner that will provide positive drainage away from foundations and flatwork. Ponding of water should not be permitted adjacent to structures or flatwork.

Foundations (refer to Fig. 1)

1. On the basis of our analyses of data obtained from the field and the laboratory it is recommended that the structure be founded on shallow spread footings, deriving their support on dense undisturbed soils or compacted soils.
2. Footings should be designed for a maximum allowable bearing pressure of 2000 pounds per square foot for combined dead plus live loads. The allowable values may be increased one third when considering wind or earthquake forces. For section of two stories, the exterior footings should be minimum of 15 inches wide and a depth of 18 inches should be maintained from lowest adjacent finished compacted grade. For section of one story, the exterior footings should be minimum of 12 inches wide and a depth of 12 inches should be maintained from lowest adjacent finished compacted grade. A thicken slab with 12 inches in total thickness from the surface of slab can be used for interior footings. For the exterior and interior bearing wall footings minimum one # 4 bars at top, one # 4 bars at bottom, continuously, should be placed to prevent possible differential movement of footing.
3. Settlement of foundations constructed in accordance with the recommendations presented in this report is estimated within 0.50". Differential settlement between footings is estimated less than 0.25".

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Lateral Pressures

For structures subject to lateral pressure, the following values as an equivalent fluid density can be used for design.

Active earth pressure	30 pound per cube foot
passive earth pressure	300 pound per cube foot
Coefficient of base friction	0.35

Floor Slabs (refer to Fig. 1)

Beneath the floor slabs, a four inches layer of Type II overlain by a 6 mil visqueen membrane covered with 2 inches of sand is recommended. As an alternate, a 6 mil visqueen membrane may be placed under a 6" layer of select material(Type II) and sand be eliminated. The sand or select material may be moistened prior to pouring the concrete to aid in concrete cure. The Type II material should be compacted to a minimum of 90 percent relative compaction at near optimum moisture content. Floor slabs should be at least four inches thick and reinforced as required for temperature and load requirements. Reinforcement with 6" x 6" - #10 x #10 welded wire mesh or # 3 bars at spacing of 18 inches each way or #4 bars at spacing of 24 inches each way, located in the center of the slab can be used.

On large or irregular shape slab areas, saw cut or control joints should be considered to control the location of shrinkage cracks. Maximum spacing of 15 feet for saw cut is recommended.

Exterior Flat work (refer to Fig. 2)

Area to support exterior flat work, such as concrete driveway, patio, concrete walk, should be prepared with 4 inches type II over compacted granular soils. (refer to section of "Site Grading").

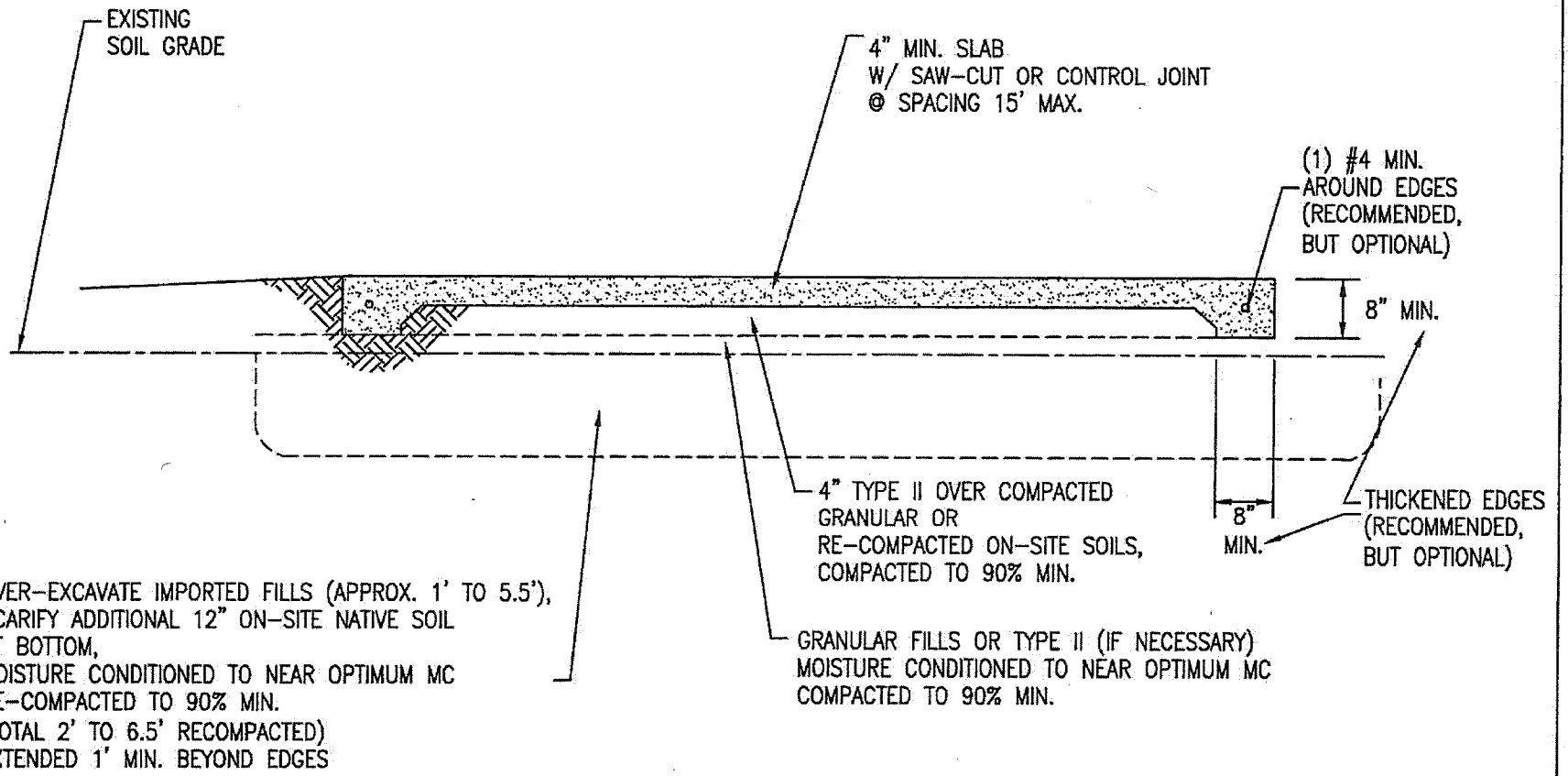

FIG. 2, TYPICAL FLAT WORKS SECTION (DRIVEWAY, WALK, PATIO)

(MINIMUM REQUIREMENTS FOR SOIL PURPOSE ONLY)

Concrete

From the laboratory test results, the existing on-site soil contains 0.14 % (imported fills) water soluble sulfate and was classified as "moderate" exposure. For durability requirement, the concrete contacting with the on-site soil, such as footing and slab, should be **type V cement, with 0.50 maximum water-cement ratio, with 4000 psi minimum strength.**

Corrosivity

According to our experience on the soil of this area, the soil may possess sufficient concentrations of chemicals to be considered corrosive to some metal and concrete. Consideration should be given to provide protection to buried metal pipes or use of nonmetallic pipes where permitted by local building codes.

Drainage (refer to Fig. 1)

Soils under structures and exterior flatwork should not be allowed to become saturated during or after construction. The ground surface should slope away from the exterior walls of the structures. For the first ten feet away from the buildings, the minimum recommended slope is 5 % for soil surfaces. Proper drainage should be provided for entire site grade. Water and sewer utility lines should be properly installed to avoid possible sources for subsurface saturation. Utility trenches should be properly backfilled.

Seismic Consideration

No active faults were noted with regard to the site of the proposed construction. The bearing soils are not susceptible to liquefaction.

The Site Class D may be used in seismic design under current International Building Code (IBC). Seismic Use Group I, with Seismic Factor Ie=1.00, and Seismic Design Category D may be used. The following values may be used for design.

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Design spectral response acceleration parameter at short period, Sds,	0.55g
Design spectral response acceleration parameter at 1 second period, Sd1,	0.24g
Soil unit weight	130 pcf

Excavation

The conventional equipment may be used for excavation.

Inspection

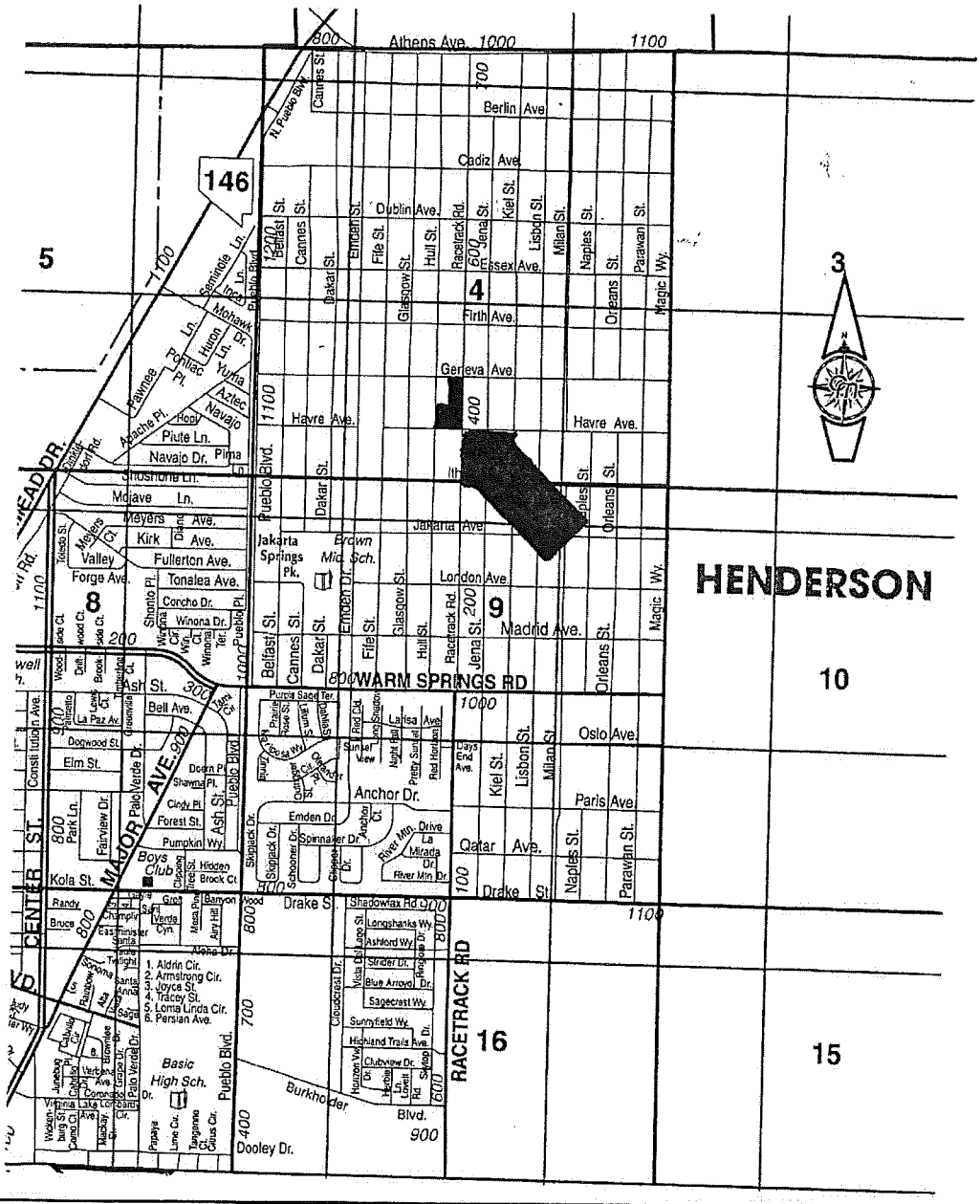
All site excavation and grading should be performed in accordance with the recommendations presented in this report, and the attached General Grading Guidelines. All foundation excavations should be inspected for compactness prior to placing concrete.

CLOSURE

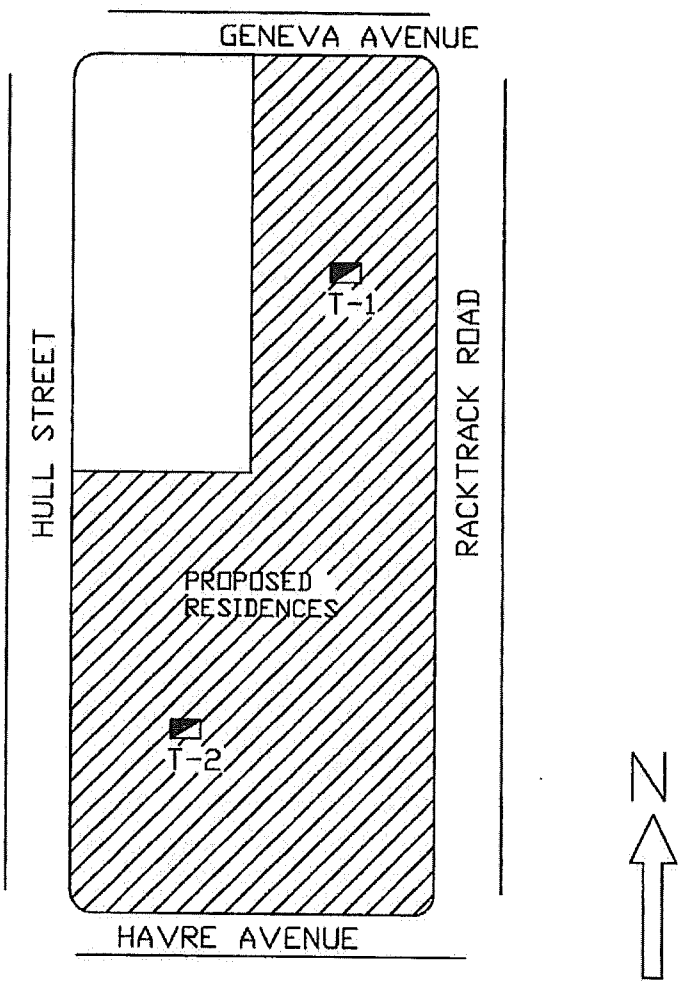
This investigation was conducted in accordance with generally accepted principles and practices of professional engineering. Recommendations are based upon the results of the field and laboratory investigations together with interpolation of subsurface conditions between boring locations. If conditions are encountered that appear to be different from those presented herein, this office should be notified.

ACTION TECHNOLOGIES & ENGINEERING, INC.

Tom L. Liao, P. E.



Legend	Drawing	VICINITY MAP	
	Project	Residences, Racetrack Road, north of Havre Avenue, Henderson, NV	
	By	Job Number	7205
	Date	Plate No.	1



Legend	*Drawing*		*Site Plan*	
Approximate Locations of Test Pits	*Project*		Residences, Racetrack Road, north of Havre Avenue, Henderson, NV	
	By		*Job Number*	7205
	Date		*Plate No.*	2

Action Technologies & Engineering, Inc.
TEST PIT LOG

Depth (Feet)	*Sample No.*	*Pene. Resist (Blows/ft)*	*Dry Density (Pcf)*	*Moisture Content (%)*	*Classification & Description*
—1—	S-1			1.1	**SILTY GRAVEL AND SILTY CALICHE GRAVEL w/caliche cobbles & occasional boulders and trace of clay (GM-GC)** , imported fills, approx. 3.5', light brown, slightly moist, loose to medium dense
—2—	S-2			2.5	-medium dense
—3—					
—4—	S-3			3.4	**SILTY GRAVEL w/cobbles & occasional boulders (GM-GP)** , native soils, brown, slightly moist, loose to medium dense -medium dense to dense
—5—					
—6—					-w/ thin layer of fine pea gravel, dense
—7—	S-4			4.9	
—8—					
—9—					
—10—					EXPLORATION TERMINATED @ 10. FEET No groundwater was encountered at time of exploration
—11—					
—12—					
—13—					
—14—					
—15—					

Driving Wt. (lbs)	
Drop (inches)	
Exploration Number	T-1
Surface Elev. (ft)	Existing Grade
Date of Exploration	04-23-2005
Job Number	7205

Notes:

R- Ring Sample

S- Bag Sample

Plate Number 3

Action Technologies & Engineering, Inc.
TEST PIT LOG

Depth (Feet)	*Sample No.*	*Pene. Resist (Blows/ft)*	*Dry Density (Pcf)*	*Moisture Content (%)*	*Classification & Description*
—1—	S-1			1.4	**SILTY GRAVEL AND SILTY CALICHE GRAVEL, w/trace of clay (GM-GC)** , imported fills, approx. 1', light brown, slightly moist, loose
—2—	S-2			1.5	**SILTY GRAVEL w/cobbles & occasional boulders (GM-GP)** , native soils, brown, slightly moist, loose to medium dense -dense
—3—					
—4—	S-3			2.8	
—5—					-lightly cemented, dense
—6—	S-4			4.0	
—7—					
—8—					
—9—					
—10—					EXPLORATION TERMINATED @ 10. FEET No groundwater was encountered at time of exploration
—11—					
—12—					
—13—					
—14—					
—15—					

Driving Wt. (lbs)	
Drop (inches)	
Exploration Number	T-2
Surface Elev. (ft)	Existing Grade
Date of Exploration	04-23-2005
Job Number	7205

Notes:

R- Ring Sample

S- Bag Sample

Plate Number **4**

To: David Reynolds

Job No: 7205

TABLE 1 - SUMMARY OF LABORATORY TESTS

SULFATE TESTS

Sample Identification	1		
Sample Location	T-1 & T-2		
Sample Depth (ft)	0' - 2'		
Sample In-Place Moisture Content (%)	1.2		
Sampling Method & Sample Type	Bulks, composite (imported)		
Name of Sampling Person	TL		
USCS Classification	Silty Gravel & Silty Caliche Gravel w/ trace of clay (GM-GC)		
% passing No. 10	35		
Water Soluble Sulfate in Soil, % by Weight	0.14		
Sulfate Exposure	Moderate		

Tested by: TL

Reviewed by: TL

Notes:

(1) Water soluble sulfate was tested with standard method SM 4500 D published by AWWA.

(2) Soil fraction passing through the No. 10 sieve was used for extraction of an aqueous solution. The test results were not numerically reduced to account for portion larger than No. 10 sieve.

(3) "Sulfate Exposure" was classified according to current IBC Code as "Negligible", "Moderate", "Severe" and "Very Severe"

APPENDIX A

GENERAL GRADING GUIDELINES

I. GENERAL

1. For the purpose of these guidelines, inspection by the Soil Engineer includes that inspection performed by any person or persons employed by, and responsible to, the licensed Soil Engineer.

2. All clearing, site preparation, or earthwork performed in the project should be conducted by the Contractor under the observation of a qualified Soil Engineer.

3. It is the Contractor's responsibility to prepare the ground surface to receive the fills to the satisfaction of the Soil Engineer and to place, spread, water, mix and compact the fill in accordance with the specifications. The Contractor should also remove all material considered unsatisfactory by the Soil Engineer.

4. It is also the Contractor's responsibility to have suitable and sufficient compaction equipment on the job site to handle the amount of fill being placed. If necessary, excavation equipment will be shout down by the Contractor to permit completion of compaction. Sufficient watering apparatus will also be provided by the Contractor, with due consideration for the fill material, rate of placement, and time of year.

5. Variations from the specifications or from the grading plan must be approved in writing by the Soil Engineer. The owner or Builder and the controlling Governmental Authorities shall be notified prior to implementing any variation.

6. These guidelines are of a general nature, and some items may not apply to each and every fact of a specific project. If there are any inconsistencies, the "Conclusions and Recommendations" section listed in the report takes precedence.

II. SITE PREPARATION

1. All vegetation and deleterious material such as rubbish shall be disposed of off-site. This removal should be concluded prior to placing fill.

2. Soil, alluvium, or rock materials determined by the Soil Engineer as being unsuitable for placement in compacted fills shall be removed and wasted from the site. Any material incorporated as a part of a compacted fill should be approved by the Soil Engineer.

3. After the ground surface to receive fill has been cleared, it should be scarified. diced, or bladed by the Contractor until it is uniform and free from ruts, hollows, hummocks, or other uneven features which may prevent uniform compaction.

4. The scarified ground surface should be brought to near optimum moisture for granular soil and 2% to 5 % over optimum moisture content for clayey soils, mixed as required, and compacted as specified. If the scarified zone is greater than twelve inches in depth, the excess should be removed and placed in lifts of six to eight inches. If heavy equipments are applied and upon the approval of Soil Engineer, 10 " lift may be placed and compacted.

5. Prior to placing fill, the ground surface should be approved by the Soil Engineer. Watercourses and gullies should be cleaned under the observation of the Soil Engineer.

6. Any underground structures such as cesspools, cisterns, mining shafts, tunnels, septic tanks, wells, pipelines, or others not located prior to grading are to be removed or treated in a manner prescribed by the appropriate governing agencies.

III. COMPACT FILLS

1. Any material imported or excavated on the property may be utilized in the fill, provided each material has been determined to be suitable by the Soil Engineer. Roots, tree branches, and other matter missed during clearing shall be removed from the fill.

2. Rock fragments less than six (6) inches in diameter may be utilized in the fill, provided: (1). They are not placed in concentrated pockets. (2). There is a sufficient percentage of fine-grained material imported to surround the rocks. (3). The distribution of the rocks is approved by the Soil Engineer.

3. Rocks greater than six (6) inches in diameter shall be taken off the site, or else be placed in areas designated as suitable for rock disposal. Details for rock disposal such as location, moisture control, percentage of rock placed, etc., will be referred to in the "Conclusions and Recommendations" section for the soil report.

4. No material that is spongy, subject to decay, or otherwise considered unsuitable should be used in the compacted fill.

5. Representative samples of materials to be utilized as compacted fill should be analyzed in the laboratory by the Soil Engineer to determine their physical properties. If any material other than that previously tested in encountered during grading , the appropriate analysis of this material should be conducted by the Soil engineer.

6. Material used in the compacting process should be evenly spread, watered, processed, and compacted in six to eight inch lifts to obtain a uniformly dense layer. If heavy equipments are applied and upon the approval of Soil Engineer, 10 " lift may be placed and compacted. The fill should be placed and compacted on a horizontal plane unless otherwise approved by the Soil Engineer.

7. Each layer shall be compacted to 90 percent of the maximum density in compliance with the testing method specified by the controlling Governmental Authority. In general, the ASTM D 1557 will be used. If compaction to a lesser percentage is authorized by the controlling Governmental Authorities because of a specific land use or expansive soil conditions, the area to receive fill compacted to less than 90 percent should either be delineated on the grading plan or appropriate reference made to the area in the soil report.

8. All fills should be keyed and benched into bedrock or firm material where the slope receiving fill exceeds a ratio of five (5) horizontal to one (1) vertical.

9. The key for side hill fills should be a minimum of 15 feet within bed rock or firm materials unless otherwise specified in the soil report.

10. Drainage terraces and subdrainage devices should be constructed in compliance with the ordinances of controlling Governmental Authorities or with the recommendations of the Soil Engineer.

11. To insure the proper compaction on the face of fill slopes, the slope face should either be rolled with sheepsfoot rollers at every three-foot vertical lift (and then grid-rolled upon compaction), or the fill slope should be overbuilt and cut back to the compacted core.

12. All fill slopes should be planted or protected from erosion by methods specified in the soil report.

13. Fill overcut slopes should be properly keyed into rock or firm material and the transition should be stripped of all soil prior to placing fill.

IV. CUT SLOPES

1. The Soil Engineer shall inspect all cut slopes excavated in rock, lithified, or formation material at vertical intervals not exceeding ten feet.

2. If any conditions not anticipated in the preliminary report such as perched water, seepage, lenticularity or confined strata of a potentially adverse nature, unfavorable inclined bedding, joints, or fault planes are encountered during grading, these conditions should be analyzed by the Soil Engineer and recommendations made to treat these problems.

3. Cut Slopes that face in the same direction as the prevailing drainage should be protected from slope wash by a non-erosive interceptor swale placed at the top of the slope.

4. Unless otherwise specified in the soil report, no cut slopes should be excavated higher or steeper than that allowed by the ordinances of controlling Governmental Authorities.

5. Drainage terraces should be constructed in compliance with the ordinances of controlling Governmental Authorities of with the recommendations of the Soil Engineer.

V. GRADING CONTROL

1. Inspection of the fill placement should be provided by the Soil Engineer during the process of grading.

2. For the placement of structural fill within the structural area and its specified extended perimeter limits, the excavated soil and fills, after removal of over-size materials (larger than 10"), may be used as engineered fills below 2' form rough finished grade.

   The excavated soils and fills, after removal of over-size materials (larger than 6"), may be used as engineered fills for the top 2' form rough finished grade.

3. Field density tests shall be made at intervals not exceeding 18" of fill height at maximum 500 cubic yards of fill placed. The field density test shall be performed in accordance with Sand-Cone Method (ASTM 1556) or Nuclear Method (ASTM 6938).

4. Density tests should also be made on the surface material to receive fill if required by the Soil Engineer.

5. If the results of the density tests are unsatisfactory, the Contractor will rework the critical area until approved by the Soil Engineer.

VI. CONSTRUCTION CONSIDERATIONS

1. Erosion control measures, when necessary, should be provided by the Contractor during grading and prior to the completion and construction of permanent drainage controls.

2. Upon completion of grading and termination of inspections by the Soil Engineer, no further filling or excavating, including that necessary for footings, foundations, large tree wells, retaining walls, or other features should be performed without notification of the Soil Engineer.

3. Care should be taken by the Contractor during final grading to preserve any berm, drainage terraces, interceptor swales, or other devices of a permanent nature on or adjacent to the property.

VII. SEASONAL LIMITS

No earthwork shall be permitted when ground is frozen or other unfavorable weather conditions prevail. When work has been interrupted by weather conditions, previously placed fill shall be approved by the Soil Engineer before resuming operations.