APPENDIX A.

GEOTECHNICAL REPORT

SOUTHERN CALIFORNIA SOIL & TESTING, INC

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GEOTECHNICAL REPORT
NEW PALM SPRINGS ANIMAL SHELTER
VELLA ROAD AT MESQUITE AVENUE
PALM SPRINGS, CALIFORNIA

PREPARED FOR:

CITY OF PALM SPRINGS
PROCUREMENT AND CONTRACTING
3200 E, TAHQUITZ CANYON WAY
PALM SPRINGS, CA 92262

PREPARED BY:

SOUTHERN CALIFORNIA SOIL & TESTING, INC.
6280 RIVERDALE STREET
SAN DIEGO, CALIFORNIA 92120

Providing Professional Engineering Services Since 1959

SOUTHERN CALIFORNIA SOIL & TESTING, INC

SC
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August 5, 2008

SCS&T No. 0821025
Report No. 1

Allen F. Smoot
Owner's Representative
City of Palm Springs
Procurement and Contracting
3200 E. Tahquitz Canyon Way
Palm Springs, CA 92262

Subject: GEOTECHNICAL REPORT
NEW PALM SPRINGS ANIMAL SHELTER
VELLA ROAD AT MESQUITE AVENUE
PALM SPRINGS, CALIFORNIA

Dear Mr. Smoot:

This letter transmits Southern California Soil & Testing, Inc.'s geotechnical report for the subject project. This investigation was performed in general conformance with the scope of work presented in SCS&T's proposal, 08IS059, dated May 8, 2008.

If you have questions concerning this report, please call us at (760) 775-5983.

Respectfully submitted,
SOUTHERN CALIFORNIA SOIL & TESTING, INC.

James J. Stone, RGE 808
Principal Geotechnical Engineer

JJS:gf

(4) Addressee

TABLE OF CONTENTS

SECTION PAGE

EXECUTIVE SUMMARY i

1. INTRODUCTION 1

1.1 GENERAL 1
1.2 SCOPE OF WORK 1

2. DATA ACQUISITION 1

2.1 FIELD EXPLORATION 1
2.2 LABORATORY TESTING 2

3. FINDINGS 2

3.1 SITE DESCRIPTION 2
3.2 SUBSURFACE CONDITIONS 2

4. CONCLUSIONS AND RECOMMENDATIONS 2

4.1 GENERAL 2
4.2 EARTHWORK 2
4.2.1 Site Preparation – Building Area 2
4.2.2 Site Preparation – Hardscape and Parking Areas 3
4.2.3 Fill and Backfill Placement and Compaction 3
4.2.4 Expansive Material 3
4.2.5 Imported Soil 3
4.2.6 Surface Drainage 3
4.3 SEISMIC AND GEOLOGIC CONSIDERATIONS 4
4.4 FOUNDATION DESIGN 4
4.4.1 General 4
4.4.2 Resistance to Lateral Loads 4
4.4.3 Static Settlement characteristics 5
4.5 SLABS-ON-GRADE 5
4.5.1 Interior Concrete Slabs-on-Grade 5
4.5.2 Exterior Slabs-on-Grade 5
4.6 CORROSION 6
4.7 PAVEMENT STRUCTURAL SECTIONS 6

5. GEOTECHNICAL ENGINEERING DURING CONSTRUCTION 6

6. CLOSURE 7

ATTACHMENTS

Figure 1 ..... Site Map
Figure 2 ..... Boring Location Map

APPENDICES

Appendix I ..... Field Investigation
Appendix II ..... Laboratory Test Results

EXECUTIVE SUMMARY

This report presents the results of the geotechnical investigation performed by Southern California Soil and Testing for the new animal shelter in the City of Palm Springs. The facility will be constructed on the corner of Vella Road and Mesquite Avenue. The building will cover approximately 22,000 square feet. Parking areas will be to the south and the northeast of the building. One acre east of the building will be set aside for expansion. Structural plans have not yet been developed. We understand that the City has adopted the 2007 CBC as its building code.

Six exploratory test borings were drilled with a truck-mounted hollow stem auger. The test borings extended approximately 25 feet below the existing grade. Selected samples from the borings were tested to evaluate pertinent classification and engineering properties to assist in the development of geotechnical conclusions and recommendations.

Materials encountered in the borings consisted of fill and alluvium. The fill is comprised of loose to medium dense silty sand that extends to depths of about 1 to 5 feet below the existing ground surface. The alluvium consists of medium dense to dense silty sand that extends to the maximum depth explored, 25 feet. Groundwater was not encountered in our borings.

The existing fill below planned building and parking areas should be excavated. This material can be replaced as compacted fill where needed to meet planned final grades.

The planned building can be supported on shallow foundations with bottom levels in compacted fill following site preparation as described in the main text. The recommendations presented in this report may need to be updated once final grading and foundation plans have been prepared.

1. INTRODUCTION

1.1 GENERAL

This report presents the results of the geotechnical investigation performed by Southern California Soil & Testing, Inc. (SCS&T) for the new animal shelter in the City of Palm Springs. The facility will be constructed on the corner of Vella Road and Mesquite Avenue. The building will cover approximately 22,000 square feet. Parking areas will be to the south and the northeast of the building. One acre east of the building will be set aside for expansion. Structural plans have not yet been developed. The location is shown on Figure 1.

The purpose of this study was to evaluate site and subsurface conditions and develop recommendations for earthwork, appropriate foundation systems, slab-on-grade floor support, and parking lot pavements.

1.2 SCOPE OF WORK

The geotechnical study performed by SCS&T consisted of surface reconnaissance, subsurface exploration, soil sampling, laboratory testing, engineering analyses, and development of conclusions and recommendations regarding:

1. Subsurface conditions beneath the site.
2. Geologic and seismic hazards that could have an impact on the project.
3. Criteria for seismic design in accordance with CBC procedures.
4. Alternatives for foundation support along with geotechnical engineering criteria for design of the foundations.
5. Resistance to lateral loads.
6. Estimated foundation settlements.
7. Support for slab-on-grade floors.
8. Flexible pavement structural sections for parking lots.
9. The corrosion potential of on-site soils with respect to ferrous metals and reinforced concrete.

2. DATA ACQUISITION

2.1 FIELD EXPLORATION

Six exploratory test borings were drilled with a truck-mounted hollow stem auger at the locations shown on Figure 2. The test borings extended 25 feet below existing grade. A SCS&T engineer logged the materials encountered in the borings and obtained samples for examination and laboratory testing.

The boring logs are presented in Appendix I. Soils are classified according to the Unified Soil Classification System, which is explained in Appendix I.

2.2 LABORATORY TESTING

Samples from the borings were obtained for laboratory testing. Brief descriptions of the laboratory test procedures and the test results are presented in Appendix II.

3. FINDINGS

3.1 SITE DESCRIPTION

The subject site is a rectangular shaped parcel located on the southeast corner of the intersection of Vella Road and Mesquite Avenue in the city of Palm Springs, California. The site is bounded on the north by Mesquite Avenue, on the west Vella Rod, on the east by commercial development, and on the south by vacant land. Topographically, the south-central portion of the site is a basin that extends 20 to 30 feet below street grade. The remainder of the surface of the site outside the basin is relatively level. The ground is mostly barren but contains a few scattered bushes and small trees.

3.2 SUBSURFACE CONDITIONS

Materials encountered in the borings consisted of fill and alluvium. The fill is comprised of loose silty sand that extends to depths of about 1 to 5 feet below the existing ground surface. The alluvial soils consist of medium dense to very dense silty sand that extend to the maximum depth explored, 25 feet. Groundwater was not encountered in our borings.

4. CONCLUSIONS AND RECOMMENDATIONS

4.1 GENERAL

The existing fill is loose and should be excavated from beneath planned building, hardscape and parking areas. This material can be replaced as compacted fill where needed to meet planned final grades.

The planned building can be supported on shallow foundations with bottom levels in compacted fill following site preparation as described below. The recommendations presented in this report may need to be updated once final grading and foundation plans have been prepared.

4.2 EARTHWORK

4.2.1 Site Preparation – Building Area

Existing vegetation and debris should be stripped and removed from the site. The existing fill should be excavated from beneath the planned building area. Total excavation depth for removal of the fill is expected to be about five feet below existing grade. Horizontally the excavation should extend a minimum of five feet beyond perimeter building lines or to property lines, whichever is less. A SCS&T representative should observe conditions exposed in the bottom of the excavation and evaluate whether additional excavation is required.

The surface exposed by excavation should be scarified to a depth of 8 inches, moisture conditioned to approximately 2 percentage points above optimum moisture content and compacted to at least 90% relative compaction based on the ASTM D 1557 laboratory test method. All references to relative compaction and optimum moisture content in this report are based on this test method.

4.2.2 Site Preparation – Hardscape and Parking Areas

The existing fill should be excavated to a depth of two feet below the existing grade or finished subgrade, whichever is more. Horizontally the excavation should extend a minimum of five feet beyond the perimeter of the improvements or to the property line, whichever is less. A SCS&T representative should observe conditions exposed in the bottom of the excavation and evaluate whether additional excavation is required.

The surface exposed by excavation should be scarified to a depth of 8 inches, moisture conditioned to approximately 2 percentage points above optimum moisture content and compacted to at least 90% relative compaction.

4.2.3 Fill and Backfill Placement and Compaction

Generally, the excavated soil will be suitable for use as new compacted fill and backfill. Fill and backfill should be placed in lifts 8 inches or less in loose thickness, moisture conditioned to approximately 2 percentage points above optimum moisture content and compacted to at least 90% relative compaction.

4.2.4 Expansive Material

The existing materials on-site have a very low expansion potential. The recommendations in this report are based on this condition.

4.2.5 Imported Soil

Imported fill should consist of predominately granular soils free of organic material and rocks greater than 6 inches in maximum dimension. Imported soils should have an Expansion Index of 20 or less. Imported soils should be inspected and, if appropriate, tested by SCS&T prior to transport to the site.

4.2.6 Surface Drainage

Final surface grades around the improvements should be designed to collect and direct surface water away from the structures and toward appropriate drainage facilities. The ground around the structures should be graded so that surface water flows rapidly away from the structures without ponding. In general, we recommend that the ground adjacent to the structures slope

away at a gradient of at least 2%. Densely vegetated areas where runoff can be impaired should have a minimum gradient of at least 5% within the first 5 feet from the structure.

Drainage patterns established at the time of fine grading should be maintained throughout the life of the structures. Site irrigation should be limited to the minimum necessary to sustain landscape growth. Should excessive irrigation, impaired drainage, or unusually high rainfall occur, saturated zones of perched groundwater can develop.

4.3 SEISMIC AND GEOLOGIC CONSIDERATIONS

The site coefficients and adjusted maximum considered earthquake spectral response acceleration parameters in accordance with the 2007 California Building Code are presented below:

Site Coordinates: Latitude 33° 46' 29"
Longitude 116° 29' 48"
Site Class: D
Site Coefficient F_a = 1.0
Site Coefficient F_v = 1.5
Spectral Response Acceleration at Short Periods S_s = 1.500
Spectral Response Acceleration at 1-Second Period S_1 = 0.600
$S_{MS}=F_aS_s=1.500$
$S_{M1}=F_vS_1=0.900$
$S_{DS}=2/3^* S_{MS}=1.000$
$S_{D1}=2/3^* S_{M1}=0.600$

The County of Riverside Land Information System indicates that the soils underlying the property have a moderate potential for liquefaction. However, no groundwater was encountered in the test borings, and the materials below a depth of about 10 feet are medium dense to dense. Consequently, the potential for liquefaction is negligible. No faults are known to cross the site, and the potential for flooding, seiches or tsunamis to affect the property is also negligible.

4.4 FOUNDATION DESIGN

4.4.1 General

The structure can be supported on spread footings with bottom levels in new compacted fill. Footings should have bottom levels at a minimum depth of 18 inches below the lowest adjacent finished grade. A minimum width of 12 inches is recommended for continuous footings for single story structures and 15 inches for 2-story structures. Isolated footings should be at least 24 inches wide. A bearing capacity of 2500 pounds per square foot can be used. This value can be increased by ⅓ when considering the total of all loads, including wind or seismic forces.

4.4.2 Resistance to Lateral Loads

Lateral loads will be resisted by friction between the bottoms of footings and passive pressure on the faces of footings and other structural elements below grade. A friction factor of 0.35 can be used. Passive pressure can be computed using a lateral pressure value of 350 psf per foot of

depth below the ground surface. The upper 1 foot of soil should not be relied on for passive support unless the ground is covered with pavements or slabs.

4.4.3 Static Settlement characteristics

Total footing settlements are expected to be less than ½ inch. Differential settlements between adjacent footings, and between the middle and ends of continuous footings, are expected to be less than ½ inch. Settlement should occur rapidly and be essentially complete shortly after construction is complete.

4.5 SLABS-ON-GRADE

4.5.1 Interior Concrete Slabs-on-Grade

Concrete slabs-on-grade, including the basement floor, should have a thickness of at least 5 inches and be reinforced with at least No. 3 reinforcing bars placed at 18 inches on-center each way. Slab reinforcement should be placed approximately at mid-height of the slab and extend at least 6 inches down into the footings.

Slabs-on-grade should be underlain by a 4-inch thick blanket of clean, poorly graded, coarse sand or crushed rock. A moisture vapor retarder/barrier should be placed beneath slabs where floor coverings will be installed. Typically, plastic is used as a vapor retardant. If plastic is used, a minimum 10-mil is recommended. The plastic should comply with ASTM E 1745. Plastic installation should comply with ASTM E 1643.

Current construction practice typically includes placement of a two-inch thick sand cushion between the bottom of the concrete slab and the moisture vapor retarder/barrier. This cushion can provide some protection to the vapor retarder/barrier during construction, and may assist in reducing the potential for edge curling in the slab during curing. However, the sand layer also provides a source of moisture vapor to the underside of the slab that can increase the time required to reduce moisture vapor emissions to limits acceptable for the type of floor covering placed on top of the slab. The floor covering manufacturer should be contacted to determine the volume of moisture vapor allowable and any treatment needed to reduce moisture vapor emissions to acceptable limits for the particular type of floor covering installed.

4.5.2 Exterior Slabs-on-Grade

The upper 2 feet of soil below exterior concrete slabs-on-grade should have an Expansion Index of 20 or less. Exterior concrete slabs-on-grade should have a minimum thickness of 4 inches and be reinforced with at least No. 3 bars at 18 inches on center each way. Slabs should be provided with weakened plane joints. Joints should be placed in accordance with the American Concrete Institute Guidelines. The landscape architect should be consulted in selecting the final joint patterns.

A 1-inch maximum size aggregate mix is recommended for concrete for exterior slabs. A water/cement ratio of less than 0.45 also is recommended, to decrease the potential for shrinkage cracks. The corrosion potential of on-site soils with respect to reinforced concrete will need to be taken into account in concrete mix design. Coarse and fine aggregate in concrete should conform to the "Greenbook" Standard Specifications for Public Works Construction.

4.6 CORROSION

Based on Caltrans "Corrosion Guidelines, Version 1.0", dated September 2003, laboratory test results indicate that the materials tested form a non-corrosive environment with respect to steel and concrete. Nevertheless, Type II modified portland cement is recommended for use in concrete in contact with ground.

4.7 PAVEMENT STRUCTURAL SECTIONS

Traffic into and out of the animal shelter is expected to consist mainly of automobiles and light trucks. Pavement support characteristics (Appendix II) are good. A Traffic Index (TI) of 5.0 is considered appropriate for parking areas. On this basis, the following flexible pavement structural section is recommended for the parking lots and driveways:

Location	Assumed TI	Design R-value	AC[1]	AB[2]
Parking Lot and Driveway	5.0	50	2–½	4

1. Asphalt Concrete – Standard Specifications for Public Works Construction (SSPWC)
2. Crushed Aggregate Base – (SSPWC).

Areas where refuse trucks will maneuver, such as in front of refuse containers, should be paved with a minimum of 6 inches of portland cement concrete pavement underlain by at least 4 inches of AB.

The upper 12 inches of subgrade soils beneath both flexible and rigid pavements should be scarified, moisture conditioned to 2 percentage points above optimum moisture content and compacted to at least 95% relative compaction.

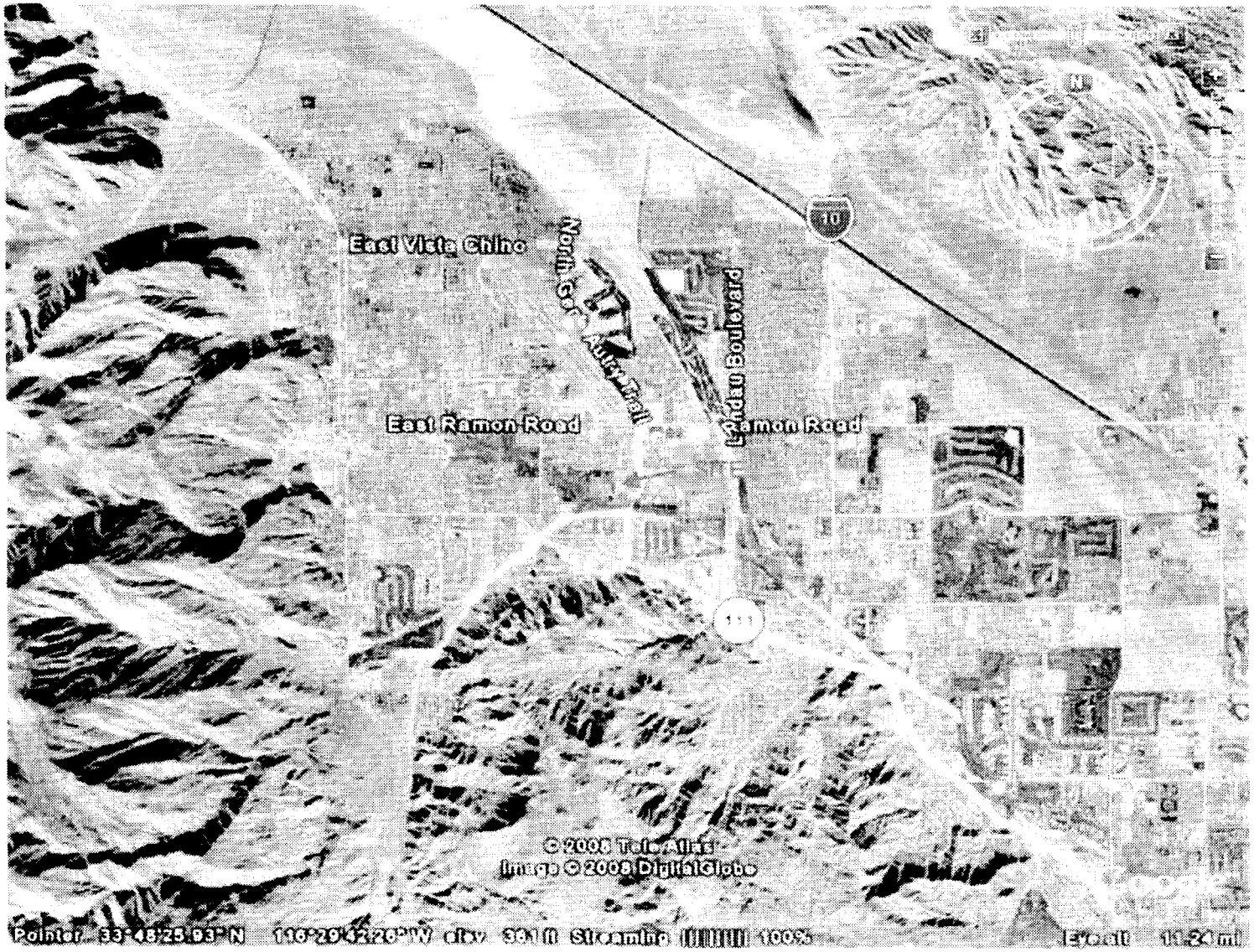
5. GEOTECHNICAL ENGINEERING DURING CONSTRUCTION

The geotechnical engineer should review project plans and specifications prior to construction to check that the intent of the recommendations in this report has been incorporated. Observations and tests should be performed during construction. If the conditions encountered during construction differ from those anticipated based on the subsurface exploration program, the presence of the geotechnical engineer during construction will enable an evaluation of the exposed conditions and modifications of the recommendations in this report or development of additional recommendations in a timely manner.

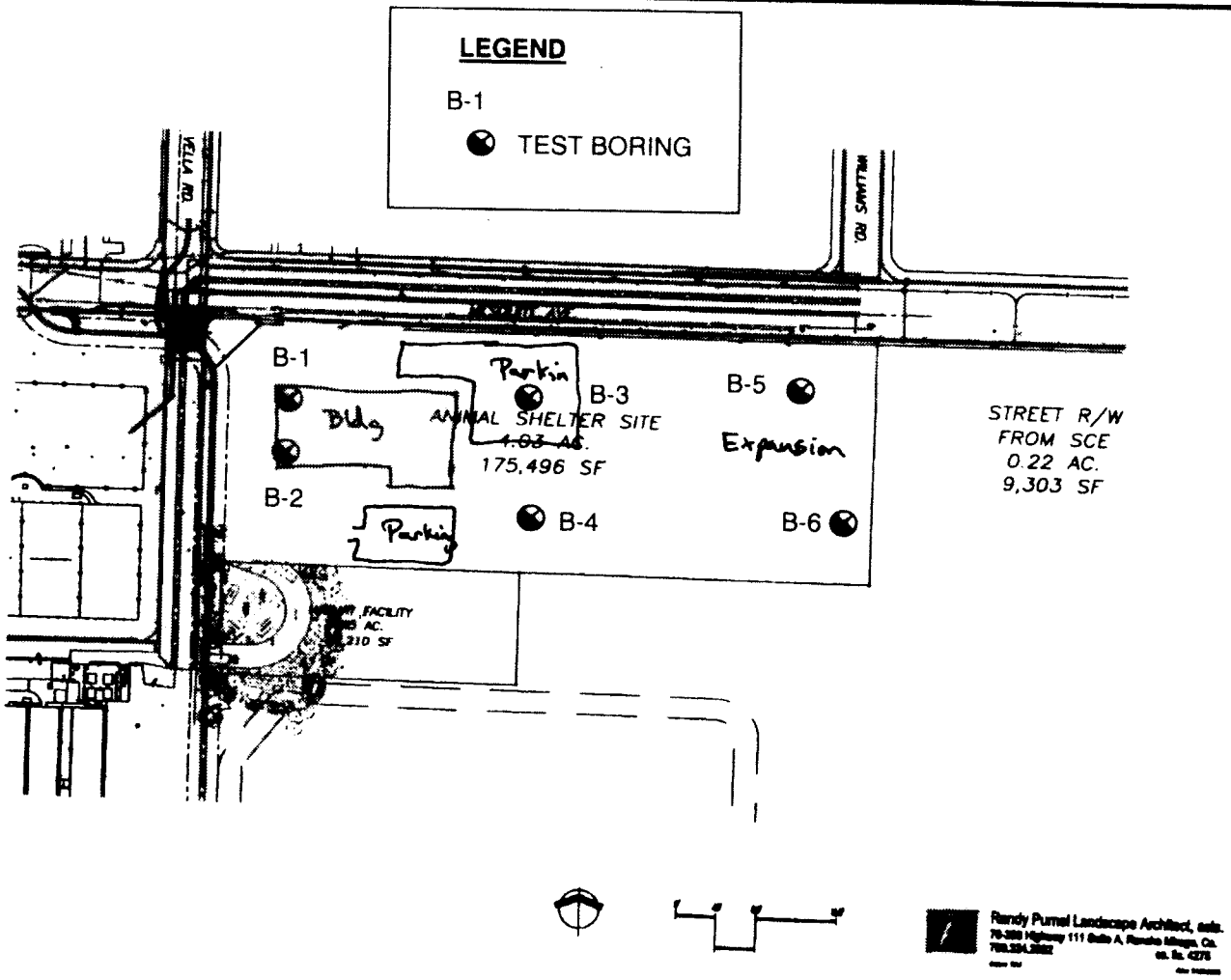
6. CLOSURE

SCS&T should be advised of any changes in the project scope so that the recommendations contained in this report can be evaluated with respect to the revised plans. The findings in this report are valid as of the date of this report. Changes in the condition of the site can occur with the passage of time, whether they are due to natural processes or work on this or adjacent areas. In addition, changes in the standards of practice and government regulations can occur. Thus, the findings in this report could be invalidated by changes beyond our control. This report should not be relied upon after a period of two years without a review by us verifying the continued suitability of the conclusions and recommendations to site conditions at that time.

In the performance of our professional services, we comply with that level of care and skill ordinarily exercised by members of our profession currently practicing under similar conditions and in the same locality. Subsurface conditions can vary from those encountered at the boring locations, and our data, interpretations, and recommendations are based solely on the information obtained by us. We will be responsible for those data, interpretations, and recommendations, but will not be responsible for interpretations by others of the information developed. Our services consist of professional consultation and observation only, and no warranty of any kind whatsoever, express or implied, is made or intended in connection with the work performed or to be performed by us, or by our proposal for consulting or other services, or by our furnishing of oral or written reports or findings.



SC ST	SOUTHERN CALIFORNIA SOIL & TESTING, INC.	PROJECT LOCATION	
		BY: JJS	DATE: 8/5/2008
		JOB NUMBER: 0821025	FIGURE 1



SOUTHERN CALIFORNIA SOIL & TESTING, INC.	PALM SPRINGS ANIMAL SHELTER		
	BY: JJS	DATE:	8/5/2008
	JOB NUMBER: 0821025	FIGURE	2

APPENDIX I
FIELD INVESTIGATION

Six exploratory test borings were drilled at the locations indicated on Figure 2. The field work was performed under the observation of our engineering personnel, who also logged the borings and obtained samples of the materials encountered. Relatively undisturbed samples were obtained with a 2.5-inch inner diameter sampler driven with a 140-pound weight falling 30 inches. Disturbed samples were obtained from drill cuttings and during Standard Penetration Testing. SPTs were performed by driving a 1.4-inch inner diameter sampler with a 140-pound hammer falling 30 inches. The number of blows required to drive both types of samplers the final 12 inches of an 18-inch drive are noted on the borings logs as "PENETRATION (blows/ft. of drive)."

The boring logs are presented on Figures I-2 through I-13. Soils are described in accordance with the Unified Soil Classification System illustrated on Figure I-1.

SUBSURFACE EXPLORATION LEGEND

UNIFIED SOIL CLASSIFICATION CHART

SOIL DESCRIPTION		GROUP SYMBOL	TYPICAL NAMES
I. COARSE GRAINED, more than half of material is larger than No. 200 sieve size.			
GRAVELS More than half of coarse fraction is larger than No. 4 sieve size but smaller than 3".	CLEAN GRAVELS	GW	Well graded gravels, gravel-sand mixtures, little or no fines.
		GP	Poorly graded gravels, gravel sand mixtures, little or no fines.
	GRAVELS WITH FINES (Appreciable amount of fines)	GM	Silty gravels, poorly graded gravel-sand-silt mixtures.
		GC	Clayey gravels, poorly graded gravel-sand, clay mixtures.
SANDS More than half of coarse fraction is smaller than No. 4 sieve size.	CLEAN SANDS	SW	Well graded sand, gravelly sands, little or no fines.
		SP	Poorly graded sands, gravelly sands, little or no fines.
	SANDS WITH FINES (Appreciable amount of fines)	SM	Silty sands, poorly graded sand and silty mixtures.
		SC	Clayey sands, poorly graded sand and clay mixtures.
II. FINE GRAINED, more than half of material is smaller than No. 200 sieve size.			
	SILTS AND CLAYS Liquid Limit less than 50	ML	Inorganic silts and very fine sands, rock flour, sandy silt or clayey-silt-sand mixtures 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 or low plasticity.
	SILTS AND CLAYS Liquid Limit greater than 50	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts.
		CH	Inorganic clays of high plasticity, fat clays.
		OH	Organic clays of medium to high plasticity.
III. HIGHLY ORGANIC SOILS		PT	Peat and other highly organic soils.

▽	Water level at time of excavation or as indicated	CK	Undisturbed chunk sample
US	Undisturbed, driven ring sample or tube sample	☒	Bulk Sample
SC	Sand Cone	DS	Direct Shear
CON	Consolidation	SA	Sieve Analysis
EI	Expansion Index	PI	Plasticity Index
MS	Maximum Size of Particle	RC	Relative Compaction
MAX	Maximum Density	UC	Unconfined Compression
ST	Shelby Tube	TX	Triaxial Compression
SPT	Standard Penetration Sample	RS	Ring Shear
pH	pH & Resistivity	AL	Atterberg Limits
SF/CL	Sulfate & Chloride	RV	R Value

SOUTHERN CALIFORNIA SOIL & TESTING, INC.	PALM SPRINGS ANIMAL SHELTER			
	By:	JS	Date:	8/5/2008
	Job Number:	0821025	Figure I -	1

LOG OF EXPLORATORY BORING NUMBER B-1

Date Drilled:	7/8/2008	Logged by:	EL
Equipment:	Hollow Stem Auger	Project Manager:	JS
Surface Elevation (ft):	367 (msl)	Depth to Water (ft):	N/A

DEPTH (ft)	USCS	SUMMARY OF SUBSURFACE CONDITIONS	SAMPLES: UNDISTURBED	SAMPLES: BULK	PENETRATION (blows/ ft. of drive)	MOISTURE (%)	DRY UNIT WT. (pcf)	LABORATORY TESTS
	SM	**FILL:** Gray, moist, medium dense SILTY SAND						
2				X				EI
4			US	X	23	1.3	104	
	SM	**ALLUVIUM:** Brown, moist, medium dense SILTY SAND						
6								
8								
10			SPT		10			
12								
14			US		17			
16								
18								
20			SPT		14			SA

Continued

LOG OF EXPLORATORY BORING NUMBER B-1 - CONTINUED

Date Drilled: 7/8/2008
Equipment: Hollow Stem Auger
Surface Elevation (ft): 367 (msl)

Logged by: EL
Project Manager: JS
Depth to Water (ft): N/A

DEPTH (ft)	USCS	SUMMARY OF SUBSURFACE CONDITIONS	SAMPLES: UNDISTURBED	SAMPLES: BULK	PENETRATION (blows/ ft. of drive)	MOISTURE (%)	DRY UNIT WT. (pcf)	LABORATORY TESTS
	SP-SM	**ALLUVIUM:** Gray, moist, medium dense SILTY SAND						
22								
24			US		40			
		Bottom of Boring at 25 feet						
26								
28								
30								
32								
34								
36								
38								
40								

SOUTHERN CALIFORNIA SOIL & TESTING, INC.	PALM SPRINGS ANIMAL SHELTER		
	By: JS	Date: 8/5/2008	
	Job Number: 0821025	Figure I - 3	

LOG OF EXPLORATORY BORING NUMBER B-2

Date Drilled:	7/8/2008	Logged by:	EL
Equipment:	Hollow Stem Auger	Project Manager:	JS
Surface Elevation (ft):	365 (msl)	Depth to Water (ft):	N/A

DEPTH (ft)	USCS	SUMMARY OF SUBSURFACE CONDITIONS	SAMPLES: UNDISTURBED	SAMPLES: BULK	PENETRATION (blows/ ft. of drive)	MOISTURE (%)	DRY UNIT WT. (pcf)	LABORATORY TESTS
	SM	**FILL:** Gray, moist, medium dense SILTY SAND		X				
2								pH SF/CL
	SM	**ALLUVIUM:** Brown, moist, medium dense SILTY SAND						
4			SPT		11			
6				X				
8								SA
10			US		22			DS
12								
14			SPT		6			
16								
18								
20			US		39			

Continued

LOG OF EXPLORATORY BORING NUMBER B-2 - CONTINUED

Date Drilled: 7/8/2008
Equipment: Hollow Stem Auger
Surface Elevation (ft): 365 (msl)

Logged by: EL
Project Manager: JS
Depth to Water (ft): N/A

DEPTH (ft)	USCS	SUMMARY OF SUBSURFACE CONDITIONS	SAMPLES: UNDISTURBED	SAMPLES: BULK	PENETRATION (blows/ ft. of drive)	MOISTURE (%)	DRY UNIT WT. (pcf)	LABORATORY TESTS
	SM	**ALLUVIUM:** Gray, moist, medium dense SILTY SAND						
22								
24			SPT		27			
		Bottom of Boring at 25 feet						
26								
28								
30								
32								
34								
36								
38								
40								

SOUTHERN CALIFORNIA SOIL & TESTING, INC.

PALM SPRINGS ANIMAL SHELTER

By: JS | Date: 8/5/2008

Job Number: 0821025 | Figure I - 5

LOG OF EXPLORATORY BORING NUMBER B-3

Date Drilled:	7/8/2008	Logged by:	EL
Equipment:	Hollow Stem Auger	Project Manager:	JS
Surface Elevation (ft):	368 (msl)	Depth to Water (ft):	N/A

DEPTH (ft)	USCS	SUMMARY OF SUBSURFACE CONDITIONS	SAMPLES: UNDISTURBED	SAMPLES: BULK	PENETRATION (blows/ ft. of drive)	MOISTURE (%)	DRY UNIT WT. (pcf)	LABORATORY TESTS
	SM	**FILL:** Gray, moist, medium dense SILTY SAND						
2								
4			US		27	1.5	103	DS
	SM	**ALLUVIUM:** Brown, moist, medium dense SILTY SAND						
6								
8								
10			SPT		13			
12								
14			US		28			
16								
18								
20			SPT		13			

Continued

LOG OF EXPLORATORY BORING NUMBER B-3 - CONTINUED

Date Drilled: 7/8/2008
Equipment: Hollow Stem Auger
Surface Elevation (ft): 365 (msl)

Logged by: EL
Project Manager: JS
Depth to Water (ft): N/A

DEPTH (ft)	USCS	SUMMARY OF SUBSURFACE CONDITIONS	SAMPLES: UNDISTURBED	SAMPLES: BULK	PENETRATION (blows/ ft. of drive)	MOISTURE (%)	DRY UNIT WT. (pcf)	LABORATORY TESTS
	SM	**ALLUVIUM:** Gray, moist, medium dense SILTY SAND						
22								
24			SPT		15			
		Bottom of Boring at 25 feet						
26								
28								
30								
32								
34								
36								
38								
40								

SOUTHERN CALIFORNIA SOIL & TESTING, INC.	PALM SPRINGS ANIMAL SHELTER	
	By: JS	Date: 8/5/2008
	Job Number: 0821025	Figure I - 7

LOG OF EXPLORATORY BORING NUMBER B-4

Date Drilled:	7/8/2008	Logged by:	EL
Equipment:	Hollow Stem Auger	Project Manager:	JS
Surface Elevation (ft):	366 (msl)	Depth to Water (ft):	N/A

DEPTH (ft)	USCS	SUMMARY OF SUBSURFACE CONDITIONS	SAMPLES: UNDISTURBED	SAMPLES: BULK	PENETRATION (blows/ ft. of drive)	MOISTURE (%)	DRY UNIT WT. (pcf)	LABORATORY TESTS
	SP-SM	**FILL:** Gray, moist, medium dense SILTY SAND						
2								RV
4			SPT		21	1.5	103	DS
	SM	**ALLUVIUM:** Brown, moist, medium dense SILTY SAND						
6								
8								
10			US		14			
12								
14			SPT		13			SA
16								
18								
20			SPT		21			

Continued

LOG OF EXPLORATORY BORING NUMBER B-4 - CONTINUED

Date Drilled: 7/8/2008
Equipment: Hollow Stem Auger
Surface Elevation (ft): 366 (msl)

Logged by: EL
Project Manager: JS
Depth to Water (ft): N/A

DEPTH (ft)	USCS	SUMMARY OF SUBSURFACE CONDITIONS	SAMPLES: UNDISTURBED	SAMPLES: BULK	PENETRATION (blows/ ft. of drive)	MOISTURE (%)	DRY UNIT WT. (pcf)	LABORATORY TESTS
	SM	**ALLUVIUM:** Gray, moist, medium dense SILTY SAND						
22								
24			SPT		17			
		Bottom of Boring at 25 feet						
26								
28								
30								
32								
34								
36								
38								
40								

SOUTHERN CALIFORNIA SOIL & TESTING, INC.

PALM SPRINGS ANIMAL SHELTER

By: JS | Date: 8/5/2008

Job Number: 0821025 | Figure I - 9

LOG OF EXPLORATORY BORING NUMBER B-5

Date Drilled:	7/8/2008	Logged by:	EL
Equipment:	Hollow Stem Auger	Project Manager:	JS
Surface Elevation (ft):	370 (msl)	Depth to Water (ft):	N/A

DEPTH (ft)	USCS	SUMMARY OF SUBSURFACE CONDITIONS	SAMPLES: UNDISTURBED	SAMPLES: BULK	PENETRATION (blows/ ft. of drive)	MOISTURE (%)	DRY UNIT WT. (pcf)	LABORATORY TESTS
	SM	**FILL:** Gray, moist, medium dense SILTY SAND						
	SM	**ALLUVIUM:** Brown, moist, medium dense SILTY SAND						RV
2								
4			US	X	20	1.0	105	DS
6								
8								
10			SPT		10			
12								
14			SPT		13			SA
16								
18								
20			SPT		8			

Continued

LOG OF EXPLORATORY BORING NUMBER B-5 - CONTINUED

Date Drilled: 7/8/2008
Equipment: Hollow Stem Auger
Surface Elevation (ft): 370 (msl)

Logged by: EL
Project Manager: JS
Depth to Water (ft): N/A

DEPTH (ft)	USCS	SUMMARY OF SUBSURFACE CONDITIONS	SAMPLES: UNDISTURBED	SAMPLES: BULK	PENETRATION (blows/ ft. of drive)	MOISTURE (%)	DRY UNIT WT. (pcf)	LABORATORY TESTS
	SM	**ALLUVIUM:** Gray, moist, medium dense SILTY SAND						
22								
24			SPT		16			
		Bottom of Boring at 25 feet						
26								
28								
30								
32								
34								
36								
38								
40								

SOUTHERN CALIFORNIA SOIL & TESTING, INC.	PALM SPRINGS ANIMAL SHELTER		
	By: JS	Date: 8/5/2008	
	Job Number: 0821025	Figure I - 11	

LOG OF EXPLORATORY BORING NUMBER B-6

Date Drilled:	7/8/2008	Logged by:	EL
Equipment:	Hollow Stem Auger	Project Manager:	JS
Surface Elevation (ft):	368 (msl)	Depth to Water (ft):	N/A

DEPTH (ft)	USCS	SUMMARY OF SUBSURFACE CONDITIONS	SAMPLES: UNDISTURBED	SAMPLES: BULK	PENETRATION (blows/ ft. of drive)	MOISTURE (%)	DRY UNIT WT. (pcf)	LABORATORY TESTS
	SM	**FILL:** Gray, moist, medium dense SILTY SAND						
	SM	**ALLUVIUM:** Brown, moist, medium dense SILTY SAND						
2								
4			US	X	21	0.8	104	
6								
8								
10			SPT		10			
12								
14			US		20			
16								
18								
20			SPT		8			SA

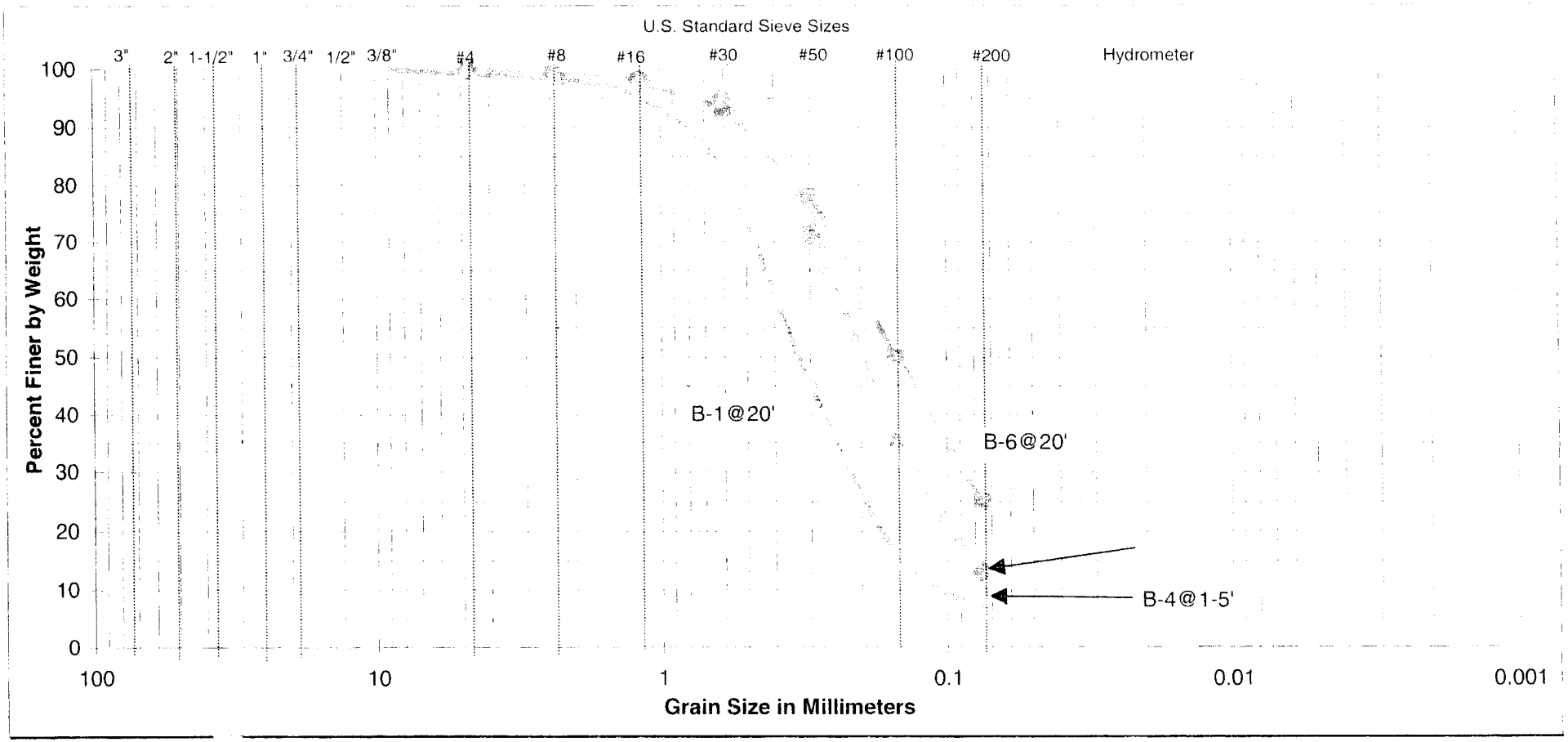
Continued

APPENDIX II

LABORATORY TESTING

Laboratory tests were performed to provide geotechnical parameters for engineering analyses. The following tests were conducted:

- **CLASSIFICATION:** Field classifications were verified in the laboratory by visual examination. The final soil classifications are in accordance with the Unified Soil Classification System.
- **GRAIN SIZE DISTRIBUTION:** Grain size distributions were determined for 4 samples in accordance with ASTM D 422. The results of the tests are presented on Figure II-1.
- **DIRECT SHEAR:** Direct shear tests were performed in accordance with ASTM D 3080. The shear stress was applied at a constant rate of strain of approximately 0.003 inch per minute. The results of the tests are presented on Figure II-2, II-3, and II-4.
- **CORROSIVITY:** Corrosivity tests were performed on 1 sample. The pH and minimum resistivity were determined in general accordance with California Test 643. Soluble sulfate content was determined in accordance with California Test 417. Total chloride ion content was determined in accordance with California Test 422. Results are presented on Figure II-5.
- **R-VALUE:** An R-value test was performed on a sample of soil expected to be present at pavement subgrade levels in the parking lots in accordance with California Test 301 procedures. An R-value of 76 was measured.



COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND
GRAVEL		SAND			CLAY

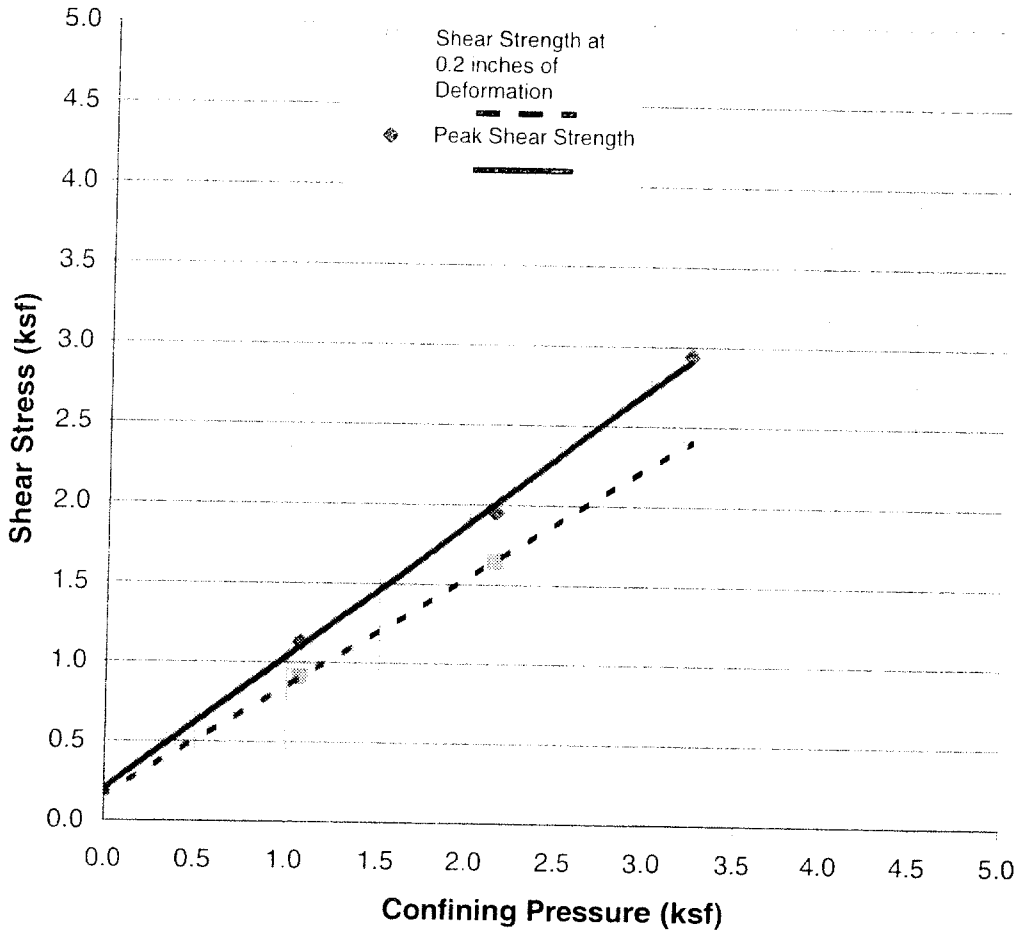
SAMPLE
TEST BORING NO.:
SAMPLE DEPTH:

DESCRIPTION:

SAND EQUIVALENT

SC ST	**SOUTHERN CALIFORNIA SOIL & TESTING, INC.**	PALM SPRINGS ANIMAL SHELTER	
		BY: JJS	DATE: 8/5/2008
		JOB NUMBER: 0821025	FIGURE: II-1

Direct Shear Test Results



SAMPLE	DESCRIPTION	ANGLE OF INTERNAL FRICTION	COHESION INTERCEPT (PSF)
B-1@15'	UNDISTURBED		
Peak		40	200
Shear Strength at		35	150
0.2 inches of Deformation			

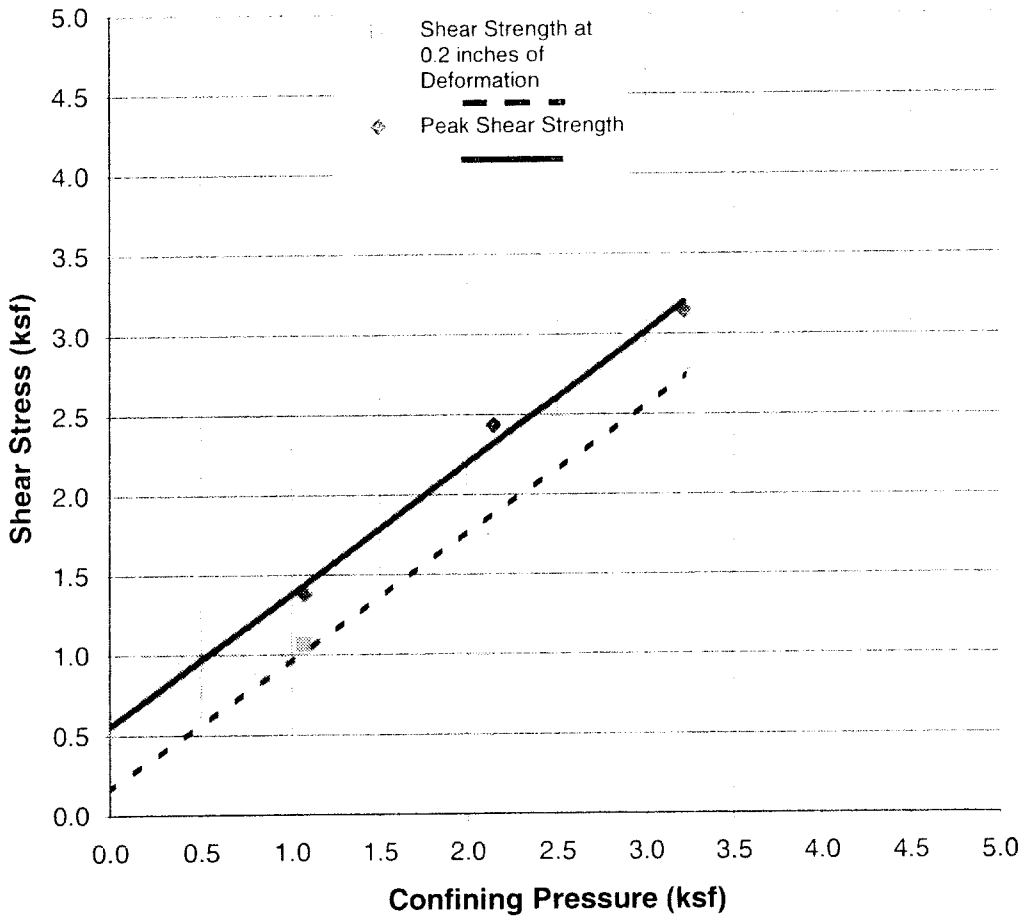
SC ST

SOUTHERN CALIFORNIA SOIL & TESTING

PALM SPRINGS ANIMAL SHELTER

BY:	JJS	DATE:	8/5/2008
JOB NUMBER:	0821025	FIGURE:	**II-2**

Direct Shear Test Results

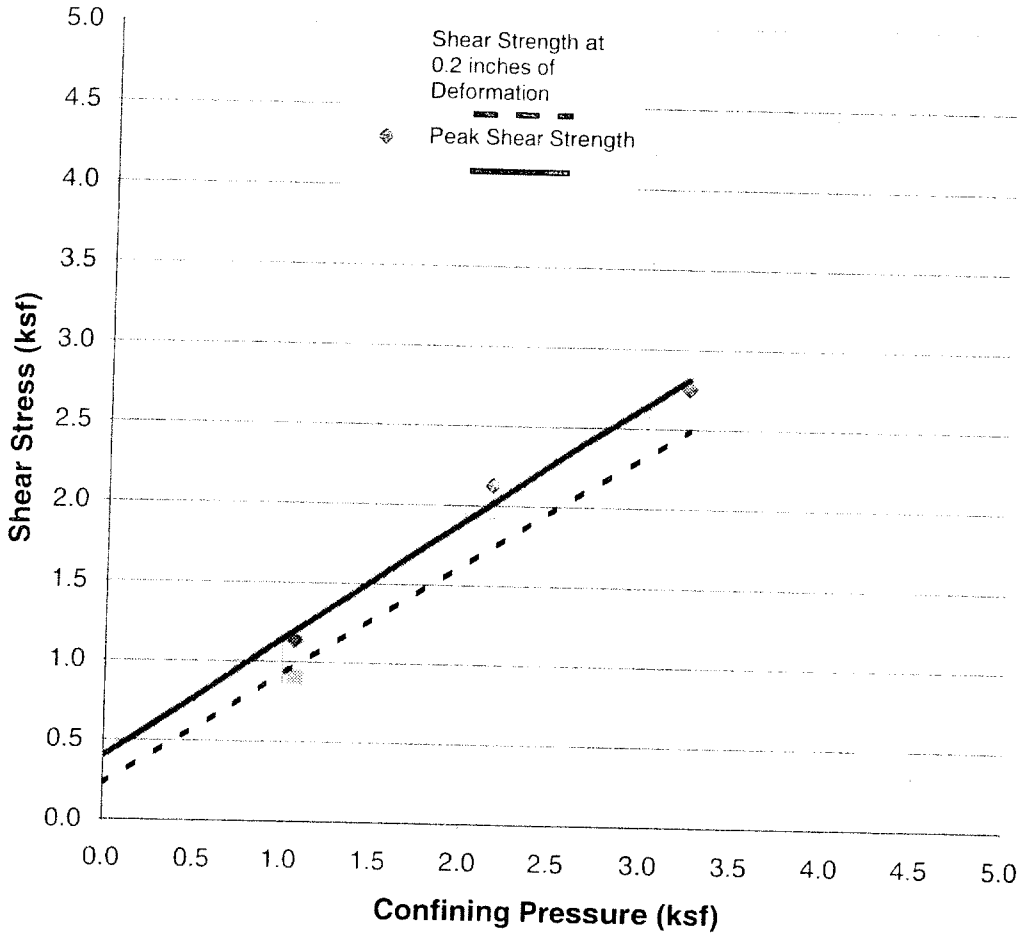


SAMPLE	DESCRIPTION	ANGLE OF INTERNAL FRICTION	COHESION INTERCEPT (PSF)
B-2@10'	UNDISTURBED		
Peak		39	560
Shear Strength at		39	150
0.2 inches of Deformation			

SOUTHERN CALIFORNIA SOIL & TESTING

PALM SPRINGS ANIMAL SHELTER			
BY:	JJS	DATE:	8/5/2008
JOB NUMBER:	0821025	FIGURE:	**II-3**

Direct Shear Test Results



SAMPLE	DESCRIPTION	ANGLE OF INTERNAL FRICTION	COHESION INTERCEPT (PSF)
B-3@5'	UNDISTURBED		
Peak		37	400
Shear Strength at 0.2 inches of Deformation		35	220

SCST

SOUTHERN CALIFORNIA SOIL & TESTING

PALM SPRINGS ANIMAL SHELTER

BY:	JJS	DATE:	8/5/2008
JOB NUMBER:	0821025	FIGURE:	**II-4**

SAMPLE IDENTIFICATION	EXPANSION INDEX
B-1@1 - 5'	0

1 California Building Code Standard 18-2

EXPANSION INDEX	POTENTIAL EXPANSION
1 - 20	Very low
21 - 50	Low
51 - 90	Medium
91 - 130	High
Above 131	Very high

SAMPLE IDENTIFICATION	RESISTIVITY[1] (W - cm)	pH[1]	SOLUBLE SULFATE[2] (%)	CHLORIDE[3] (%)
B-2@1-3'	8400	8.3	<0.001	0.002

[1] California Test 643
[2] California Test 417
[3] California Test 422

ACI 318 Building Code Requirements for Structural Concrete -
Table 4.3.1 Requirements for Concrete Exposed to Sulfate-Containing Solutions

Sulfate Exposure	Water-Soluble Sulfate in Soil Percentage by Weight	Cement Type	Maximum Water-Cementitious Materials Ratio, By Weight, Normal Weight Aggregate Concrete(1)	Minimum f'c, Normal-Weight and Lightweight Aggregate Concrete, psi
Negligible	0.00-0.10	-	-	
Moderate	0.10-0.20	II,IP(MS),IS(MS)	0.50	4,000
Severe	0.20-2.00	V	0.45	4,500
Very Severe	Over 2.00	V plus pozzolan	0.45	4,500

Caltrans Corrosion Criteria

	RESISTIVITY(W - cm)	pH	SOLUBLE SULFATE (%)	CHLORIDE (%)
Corrosive Environment*	<1000**	<5.5	>0.2	>0.05

* Corrosive enivronment as determined by the California Department of Transportation Division of Engineering Services, Materials Engineering and testing Services Corrosion Technology Branch, 2003 Corrosion Guidelines Version 1.0, September 2003

SOUTHERN CALIFORNIA SOIL & TESTING, INC.

PALM SPRINGS ANIMAL SHELTER

BY:	JJS	DATE:	8/5/2008
JOB NUMBER:	0821025	FIGURE	II-5

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December 14, 2009

SCS&T No. 0821025
Report No. 4

Mr. Allen F. Smoot
Owner's Representative
City of Palm Springs
Procurement and Contracting
3200 E. Tahquitz Canyon Way
Palm Springs, California 92262

Subject: SUPPORT FOR SLAB-ON-GRADE FLOORS
NEW PALM SPRINGS ANIMAL SHELTER
VELLA ROAD AT MESQUITE AVENUE
PALM SPRINGS, CALIFORNIA

Dear Mr. Smoot:

The concrete slab-on-grade floor can be poured directly on the moisture vapor retarder/barrier. From the bottom, then, it would be the prepared subgrade, 4 inches of a granular soil that serves as a capillary moisture break, the vapor retarder/barrier (Visqueen or Stegowrap), and the concrete.

The configuration described above without the sand layer is in accordance with current recommendations of the American Concrete Institute (ACI). Several agencies, including in particular the San Diego Unified School District, started eliminating the sand layer over the vapor retarder/barrier several years ago to reduce the volume of moisture vapor transmitted through the slab in the long term.

If you have questions or need additional information, please call us at (760) 775-5983.

Respectfully Submitted,
SOUTHERN CALIFORNIA SOIL & TESTING, INC.

REGISTERED PROFESSIONAL ENGINEER
JAMES J. STONE
No. GE000000
Exp. 12/31/09
GEOTECHNICAL
STATE OF CALIFORNIA

James J. Stone, RGE 000000
Principle Geotechnical Engineer

JJS:js

(1) Addressee
(1) E-mail thotz@swattmiers.com