COTTON, SHIRES AND ASSOCIATES, INC.
CONSULTING ENGINEERS AND GEOLOGISTS

May 19, 2011
E0328A
By Mail and Email (iharvancik@saratoga.ca.us)

Ms. Iveta Harvancik
Associate Engineer
CITY OF SARATOGA
13777 Fruitvale Avenue
Saratoga, California 95070

SUBJECT: **Addendum to Geotechnical Investigation (report) dated December 18, 2008**
RE: Saratoga Corporation Yard Carport
Saratoga, California

REFERENCE: Cotton, Shires and Associates, Inc., Geotechnical Investigation report, Saratoga Corporation Yard Carport, Saratoga, California, dated December 18, 2011.

Dear Ms. Harvancik:

Cotton, Shires and Associates, Inc. (CSA) is pleased to provide the City of Saratoga with this addendum to our above referenced Geotechnical Investigation (report) dated December 18, 2008 for the proposed carport at the City's Corporation Yard located at 19700 Allendale Avenue in Saratoga, California.

We understand that the Project Structural Engineer is recommending that the carport structure be supported on a drilled, cast-in-place concrete pier foundation. CSA does not have an objection to a proposed pier foundation system at this location and for the planned carport structure. We have also provided updated seismic loading criteria. The following section provides our recommended design criteria for drilled, cast-in-place piers.

Drilled Cast-in-Place Pier Design Criteria

The drilled, cast-in-place piers should derive vertical support from skin friction in undisturbed alluvium as determined in the field by the project geotechnical engineer at the time of construction. Piers should be sized according to the following criteria:

Vertical Capacity Drilled Piers

Minimum pier diameter ..... 18 inches
Minimum pier penetration ..... 8 feet into Alluvium
Allowable adhesion (skin friction), for reinforced concrete dead plus live loads:
0 to 2 feet in alluvium material ..... 0 psf
Below 2 feet in alluvium material ..... 500 psf

Lateral Passive Resistance Drilled Piers - piers [equivalent fluid pressure applied over an effective width of two (2) pier diameters]

0 to 2 feet in alluvium material ..... 0 pcf
Below 2 feet in alluvium material ..... 450 pcf

Pier Design - The above adhesion value (skin friction) can be increased by 1/3 for seismic loading and should be decreased by 1/2 for uplift. Piers located within 10 feet (measured horizontally) of a slope steeper than 6:1 (H:V) should also be designed to resist a lateral creep load equal to 40 pcf equivalent fluid. This creep load should extend to the depth at which point a 10-foot horizontal earth material cover is achieved, as measured from the outboard edge of the pier to the face of the finished slope. The upper portion of the piers should be formed to create vertical surfaces, and "mushrooming" of pier tops and over-pours around grade beams should be prevented. Drilled pier holes should be machine-cleaned of all loose material prior to the placement of steel and concrete. Hand-excavated piers should have their bottoms broom and dust-pan cleaned prior to pouring. Piers should be steel-reinforced with a minimum of 4, No. 5 bars vertical equally spaced in a cage and No. 3 spirals (with greater reinforcement as required by the Project Structural Engineer).

If water is present in the pier holes, the water should be pumped out until the pier holes are dry prior to placing concrete, or the concrete should be poured using the tremie method to displace the water. Due to the relatively high groundwater (encountered at 16 to 18 feet in our subsurface exploration) and the cohesionless material, caving may occur and consequently casing of drilled holes may be required to keep them open for setting steel and pouring concrete.

Updated Seismic Design Criteria

Based on our geotechnical investigation, the site location and our interpretation of the 2007 CBC documents related to Earthquake Loads (CBC Section 1613) we are providing the following parameter recommendations from the corresponding figures and tables:

Parameter	Referenced Table/Figure/Eqn.	Value
Site Classification	1613.5.2	D
Mapped Spectral Acc. 0.2 Sec. (g)	1613.5(3)	$S_S = 1.5$
Mapped Spectral Acc. 1 Sec. (g)	1613.5(4)	$S_1 = 0.535$
Fa – Site Coefficient	1613.5.3(1)	1.0
Fv – Site Coefficient	1613.5.3(2)	1.5
$S_{MS} = FaS_S$	16-37	1.5
$S_{M1} = FvS_1$	16-38	0.803
$S_{DS}=2/3\ S_{MS}$	16-39	1.0
$S_{D1}=2/3\ S_{M1}$	16-40	0.535

Limitations

Our services consist of professional opinions and conceptual recommendations made in accordance with generally accepted engineering geology and geotechnical engineering principles and practices. No warranty, expressed or implied, or merchantability or fitness, is made in or intended connection with our work, by the proposal for consulting or other services, or by the furnishing of oral or written reports or findings.

If you have any questions, or need additional information, please contact us.

Very truly yours,

COTTON, SHIRES AND ASSOCIATES, INC.

David T. Schrier

David T. Schrier
Principal Geotechnical Engineer
GE 2334

DAVID T. SCHRIER
No. 2334
EXP. 12/31/11
GEOTECHNICAL
STATE OF CALIFORNIA

POS:DTS:st

GEOTECHNICAL INVESTIGATION
SARATOGA CORPORATION YARD CARPORT
19700 Allendale Avenue
Saratoga, California

for:
Mr. Rick Torres
CITY OF SARATOGA
19700 Allendale Avenue
Saratoga, California 95070

December 2008

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COTTON, SHIRES & ASSOCIATES, INC.
CONSULTING ENGINEERS AND GEOLOGISTS

December 18, 2008
E0328

Mr. Rick Torres
CITY OF SARATOGA
19700 Allendale Avenue
Saratoga, California 95070

SUBJECT: **Geotechnical Investigation**
RE: Saratoga Corporation Yard Carport
Saratoga, California

Dear Mr. Torres:

We are pleased to submit the following report in which we describe the findings, conclusions, and recommendations of our geotechnical investigation for the planned carport at the City's Corporation Yard, located at 19700 Allendale Avenue in Saratoga, California. This investigation was performed in accordance with our proposal to you dated September 30, 2008.

In this report, we characterize the geotechnical conditions underlying the proposed carport, and provide conclusions and recommendations regarding geotechnical hazards, foundation type and design criteria, site grading and pavement.

We appreciate the opportunity to have been of service to you on this project. If you have any questions regarding this report, please feel free to call us.

Sincerely,

COTTON, SHIRES AND ASSOCIATES, INC.

David T. Schrier
Principal Geotechnical Engineer
GE 2334

REGISTERED PROFESSIONAL ENGINEER
DAVID T. SCHRIER
No. 2334
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GEOTECHNICAL INVESTIGATION
SARATOGA CORPORATION YARD CARPORT
19700 Allendale Avenue
Saratoga, California

Table of Contents

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EXECUTIVE SUMMARY

In this Executive Summary, we provide a brief explanation of the conclusions and recommendations resulting from our Geotechnical Investigation for a carport structure to be located at the City of Saratoga's Corporation Yard facility at 19700 Allendale Avenue in Saratoga, California. A more detailed discussion of our findings, conclusions and recommendations is presented in the following main body of this technical report.

Conclusions

- The site is feasible for construction of the carport structure provided that the recommendations of this report are incorporated into the design and construction of the project.

- The site will likely be subjected to moderate to strong seismic ground shaking within the life of the project. A probabilistic peak ground acceleration of 0.68g should be anticipated for design.

- The proposed carport site is underlain by deep alluvial fan deposits consisting of medium dense to very dense silty and clayey sands and gravels, medium stiff to very stiff clay, and large cobbles.

- Groundwater was encountered in our exploratory borings at a depths of 16 to 18 feet in three of our borings; however, water levels could be higher at other times and/or locations.

- We conclude that there is a low potential for liquefaction.

- We anticipate that the near surface, medium dense to dense sandy and medium stiff to very stiff clayey materials encountered in the borings could experience total static settlement from the anticipated maximum 3,000 psf design load of less than 1 inch, and differential settlement of less than 1/2 inch, across the carport.

Recommendations

- We recommend that the carport support elements (columns/poles) be supported on a relatively shallow embedded grid of inter-connecting grade beams.

- The grade beams should be founded on firm, undisturbed natural material.

- Based on collected geotechnical data, site grading for the grade beams should be within the capabilities of standard excavation equipment (i.e., backhoes and dozers). While we don't anticipate the need for significant excavations as part of the project, temporary maximum cutslopes should not exceed inclinations of 1.75:1 (H:V) in alluvium. We anticipate moderately high groundwater conditions during construction of the carport.

- The final drawings and specifications should be reviewed and approved by a representative of our office to assure that the recommendations of this report have been incorporated into the design of the project.

- Earthwork construction activities should be inspected and tested by a representative of our office to assure that the recommendations of this report are incorporated into the construction of the project, and to address potential unanticipated soil conditions (if any) not encountered during site investigation.

GEOTECHNICAL INVESTIGATION
SARATOGA CORPORATION YARD CARPORT
19700 Allendale Avenue
Saratoga, California

1.0 INTRODUCTION

1.1 Project Description

In this report, Cotton, Shires and Associates, Inc. (CSA) is pleased to present the results of our geotechnical investigation for the proposed new carport that will be situated in the center of an existing paved parking area of the corporation yard located at 19700 Allendale Avenue in Saratoga, California (see Figure 1). We performed our investigation between November 18 and December 16, 2008.

We understand that the planned carport will have approximate dimensions of 55 feet by 110 feet. We also understand that the carport will be constructed using a design-build methodology.

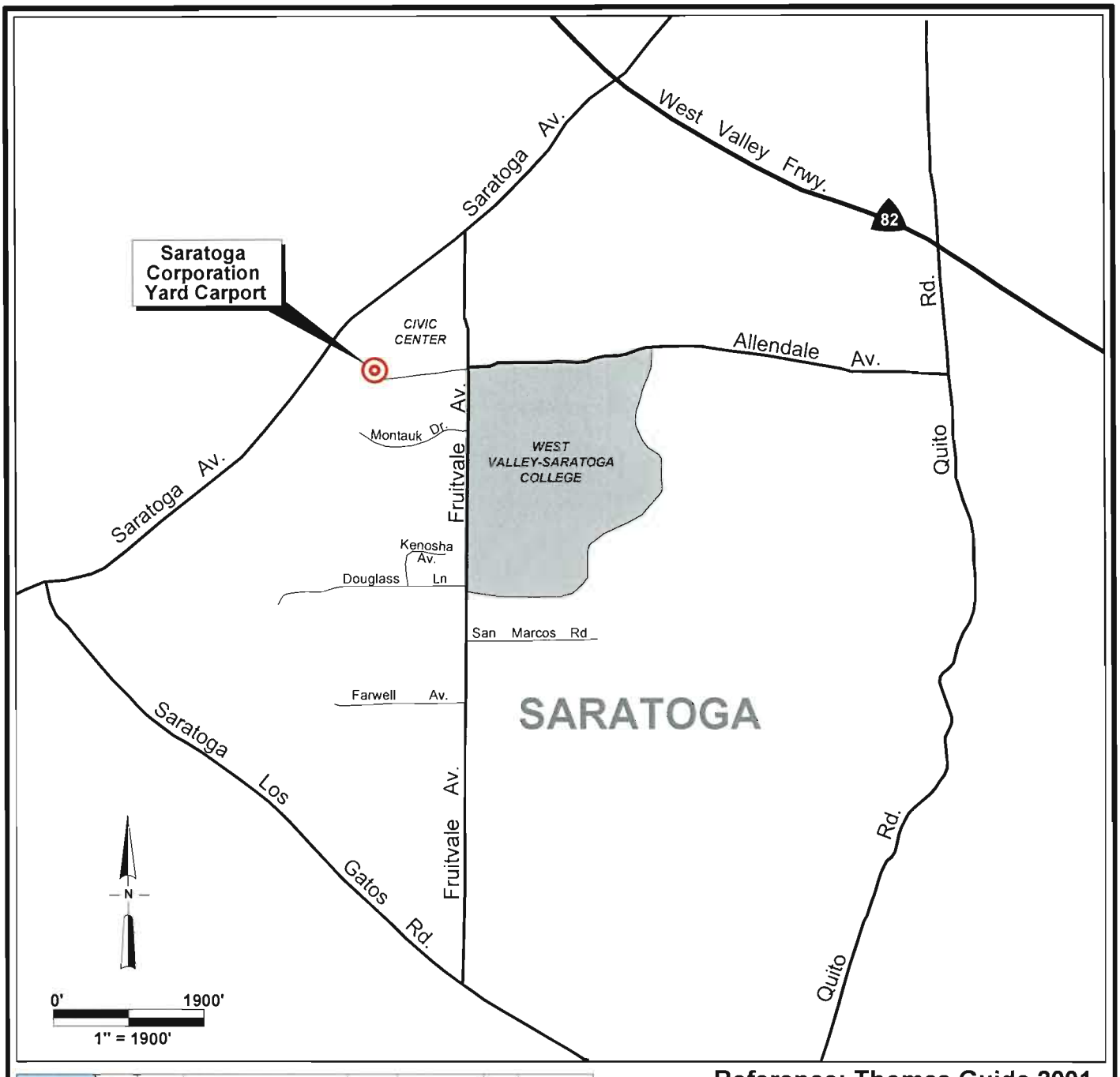
We assume that the maximum dead-plus-live foundation grade beam loads for the new structure will be less than 3,000 psf for dead-plus-live loads.

We assume that the planned grading will consist of minor cuts to prepare a level area for the carport and excavation of the footings.

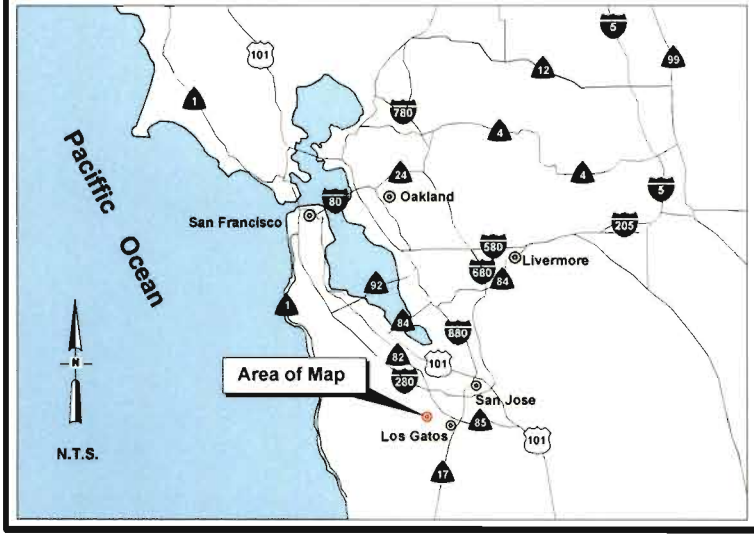
1.2 Purpose and Scope of Work

The purpose of our investigation was to develop geotechnical data for project design. Our objectives were to: 1) evaluate surface and subsurface conditions; and 2) develop conclusions and recommendations regarding the following: geotechnical hazards; site grading; foundation type and design criteria; and pavement design.

The specific scope of work performed for our investigation included the following tasks:



Reference: Thomas Guide 2001



COTTON, SHIRES and ASSOCIATES, INC.
CONSULTING ENGINEERS AND GEOLOGISTS

SITE LOCATION MAP
Saratoga Corporation Yard Carport
Saratoga, California

GEO/ENG BY	SCALE	PROJECT NO.
DTS	AS SHOWN	E0328
APPROVED BY	DATE	FIGURE NO.
POS	December 2008	1

1) Review of in-house geologic data and plans for the planned improvements;
2) Subsurface exploration;
3) Laboratory testing;
4) Engineering analysis; and
5) Preparation of this report.

2.0 PHYSICAL AND GEOLOGIC SETTING

2.1 Terrain

The Saratoga Corporation Yard facility site is located on the western side of the relatively level Santa Clara Valley. The Wildcat Creek channel passes within roughly 40 to 50 feet of the planned northern and western sides of the carport site, respectively. In the vicinity of the Corporation Yard, the bottom of the creek channel is roughly 3 to 6 feet below adjacent grades.

2.2 Geologic Setting

The Saratoga Corporation Yard is located at the base of the Santa Cruz Mountains, near the southern end of the Santa Clara Valley. Locally, the Santa Cruz Mountains consist of Franciscan Complex sedimentary and metamorphic bedrock materials that have been uplifted and thrust over younger bedrock and alluvial soil materials of the Santa Clara Valley. The Santa Clara Valley is an elongated, northwest-trending extension of the San Francisco Bay structural trough, bounded on the west by the Santa Cruz Mountains and on the east by the Diablo Range.

The site is underlain by Quaternary aged alluvial fan deposits (William Lettis, 1994) derived from the Santa Cruz Mountains.

2.3 Seismic Setting

The subject site is situated in an area of high seismicity. The nearest and controlling active faults, with respect to site seismicity, are the Monta Vista fault, located

approximately 2.0 miles to the northwest, and the San Andreas fault located approximately 4.1 miles southwest of the site (see Figure 2).

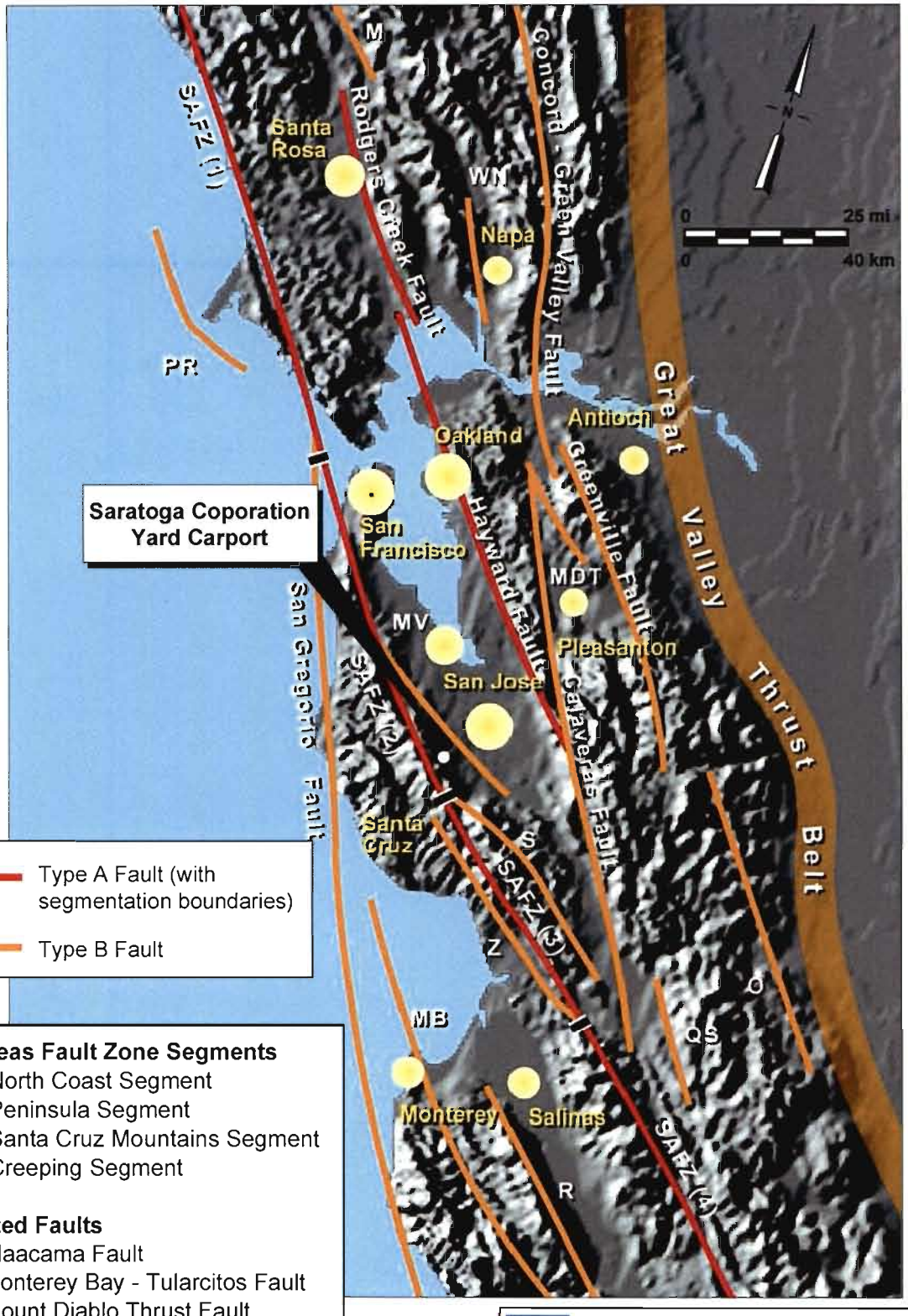
2.3.1 **Deterministic Analysis** - The site could be affected by seismic shaking stemming from earthquakes on any one of several major active earthquake faults in the region. The following table provides the results of our deterministic analysis and lists the major earthquake sources, the distances from the sources to the site, the maximum Moment Magnitudes and the Peak Horizontal Ground Accelerations that are anticipated at the site.

Fault Source	Distance (mi/km)	Moment Magnitude[1]	Peak Horizontal Accelerations (g)[2]
Monta Vista	2.0/3.2	6.7	**0.68**
San Andreas	4.1/6.6	7.9	0.49
Zayante-Vergeles	12.7/20.4	7.0	0.21

[1]Based on "Probabilistic Seismic Hazard Assessment for the State of California" by CDMG, DMG Open-File Report 96-08.

[2]Based on attenuation relationships developed by Bozorgnia, Campbell & Niazi 1999, (horizontal component, Holocene Soil, corrected); as determined using the computer program EQFAULT by T.F. Blake, 1989, and updated 2004.

2.3.2 **Probabilistic Analysis** - We also performed a probabilistic analysis employing the computer program FRISKSP (by T.F. Blake, 1988 and updated 2004) and incorporated moment magnitudes from the California Division of Mines and Geology (CDMG) publication "Probabilistic Seismic Hazard Assessment For The State of California" (DMG Open-File Report 96-08), and attenuation relationships by Bozorgnia, Campbell, and Niazi 1999 (horizontal – Holocene Soil,, corrected). The results of our probabilistic analysis indicate an appropriate Design Basis Earthquake (10 percent probability of exceedance in 50 years, or a 475-year return interval, which is generally used for residential and commercial buildings) peak horizontal ground acceleration is **0.60g**.



San Andreas Fault Zone Segments

SAFZ-1 North Coast Segment
SAFZ-2 Peninsula Segment
SAFZ-3 Santa Cruz Mountains Segment
SAFZ-4 Creeping Segment

Abbreviated Faults

M	Maacama Fault
MB	Monterey Bay - Tularcitos Fault
MDT	Mount Diablo Thrust Fault
MV	Monta Vista - Shannon Fault
O	Ortigalita Fault
PR	Point Reyes Fault
QS	Quien Sabe Fault
R	Rinconada Fault
S	Sargent - Berrocal Fault
WN	West Napa Fault
Z	Zayante - Vergeles Fault

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CONSULTING ENGINEERS AND GEOLOGISTS

SAN FRANCISCO BAY AREA FAULT MAP
Saratoga Coporation Yard Carport
Saratoga, California

GEO/ENG BY	SCALE	PROJECT NO.
JS	AS SHOWN	E0328
APPROVED BY	DATE	FIGURE NO.
DTS	December 2008	2

Taking into account the above earthquake Moment Magnitudes, the 2007 California Building Code (CBC) coefficients presented in Section 5.5, and the results of the deterministic and probabilistic approaches, it is our opinion that project area could experience a peak horizontal ground acceleration (PGA) as high as **0.68g** (equal to the deterministic acceleration calculated for an earthquake on the Monta Vista fault for the site).

3.0 SITE CONDITIONS

3.1 Surface Conditions

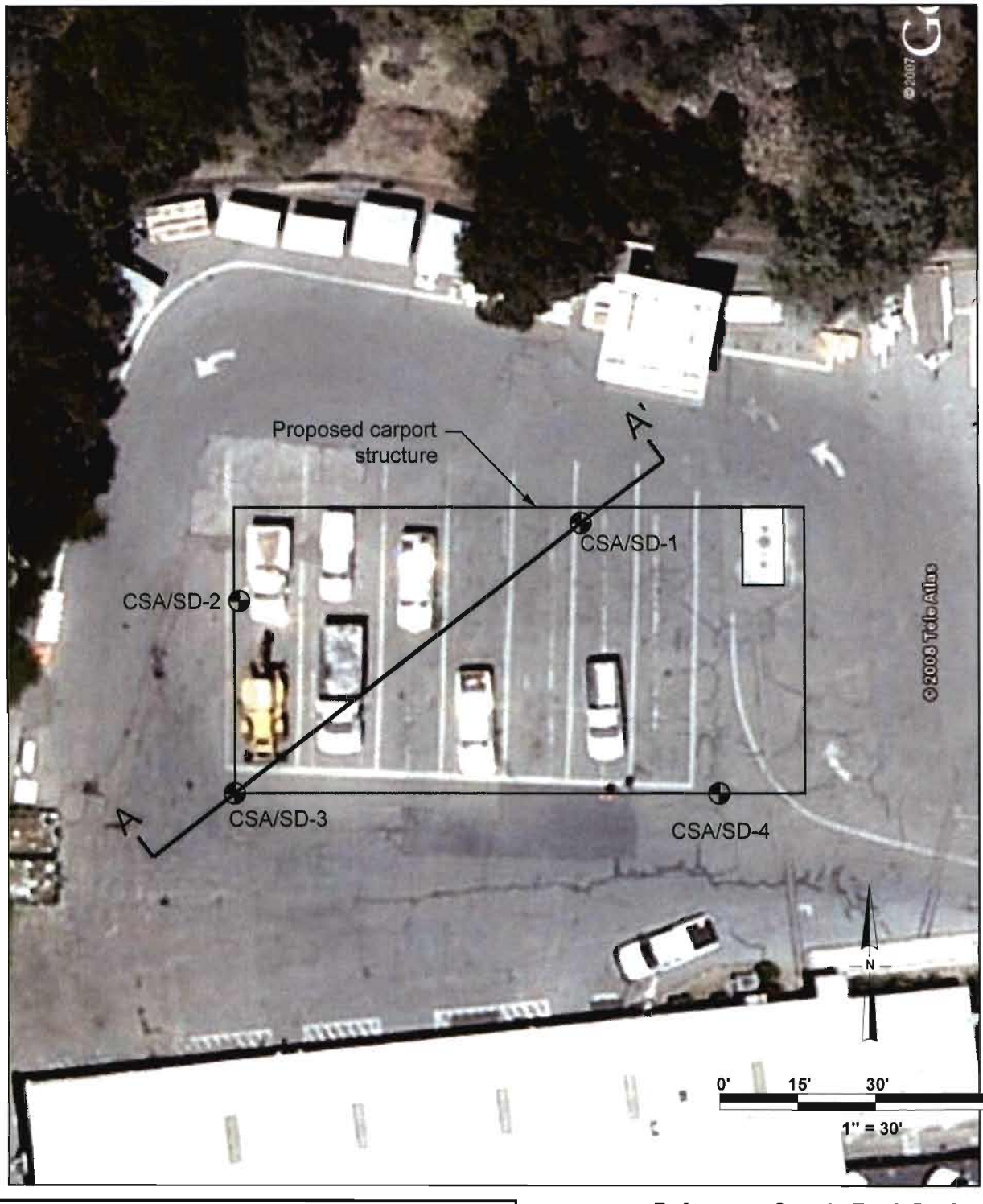
The proposed carport site is a rectangular-shaped area with plan dimensions of about 55 feet by 110 feet, located in the City of Saratoga's Corporation Yard off of Allendale Avenue, in Saratoga, California. The site is located in the existing parking area. Presently, the parking area is paved with asphaltic concrete (AC), and a small concrete slab located in the northeastern corner of the proposed carport. We understand that this concrete slab covers an underground fuel tank.

3.2 Subsurface Conditions

We explored subsurface conditions on November 18, 2008 by means of four exploratory borings drilled to a depth of 13.5 to 26.5 feet at the location shown on Figure 3. In the boring, we generally encountered alluvial soil materials consisting of medium dense to very dense silty and clayey sands and gravels, medium stiff to very stiff clay, and large cobbles to the depths explored (see Figure 4). A detailed description of the exploration program, the log of the borings, and the results of the laboratory testing performed on representative samples are presented on the boring logs in Appendix A and in the laboratory test results of Appendix B.

3.3 Groundwater Conditions

Free groundwater was measured in the exploratory Borings CSA/SD-1 through CSA/SD-3 at depths of 16.0 to 18.0 feet. Fluctuations in the groundwater level could



EXPLANATION

CSA/SD-4 — Location of Small-Diameter Exploratory Boring

A — A' — Location of Engineering Geologic Cross Section

NOTE: Approximate location of proposed carport structure based on white paint outline city of Saratoga

Reference: Google Earth Professional

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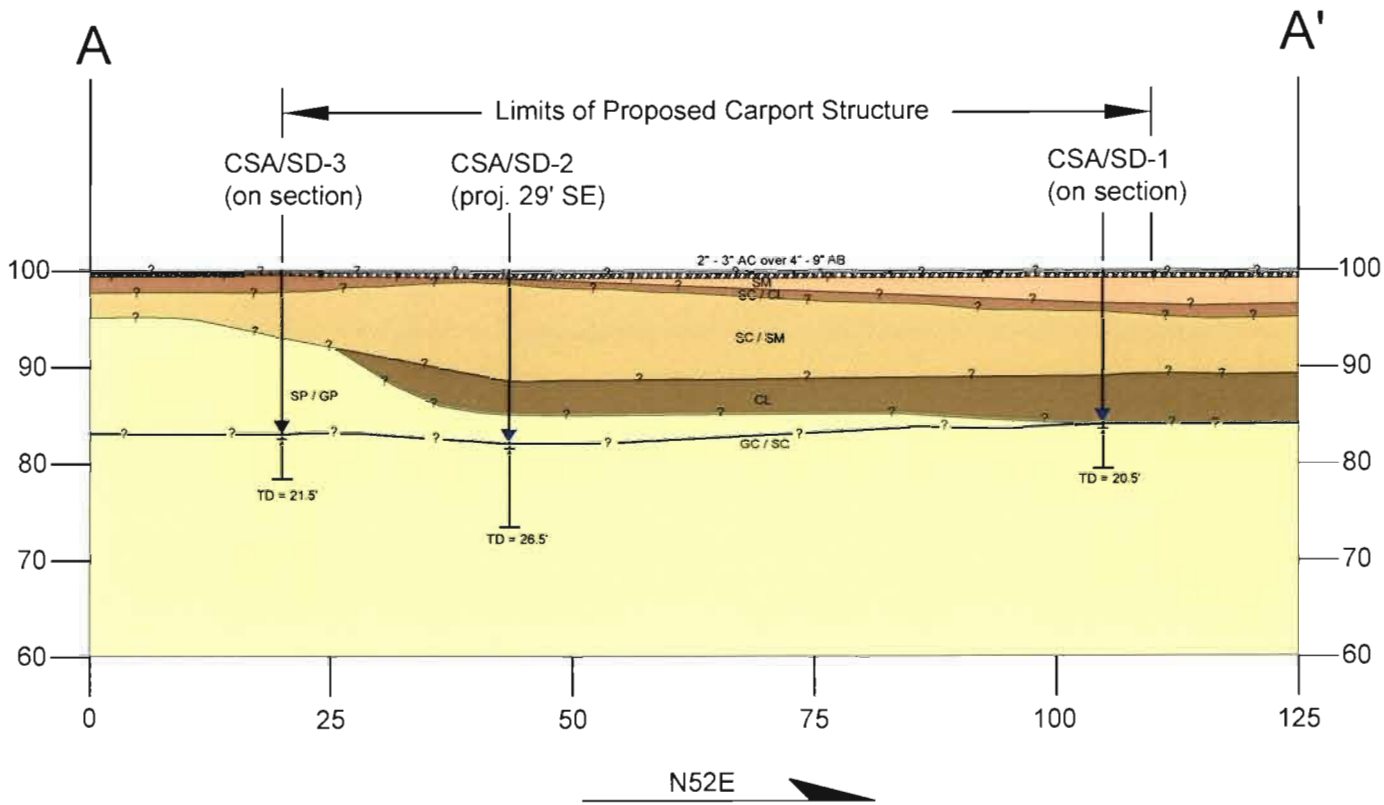
SITE PLAN AND BORING LOCATION MAP
SARATOGA CORPORATION YARD
SARATOGA, CALIFORNIA

GEO/ENG BY	SCALE	PROJECT NO.
JZ	1"=30'	E0328
APPROVED BY	DATE	FIGURE NO.
DTS	December 2008	3



EXPLANATION

EARTH MATERIALS

ALLUVIUM

- SM — Silty Sand, gray brown to yellow brown, moist, medium dense to dense, some fine grained gravels
- SC/CL — Clayey Sand / Sandy Clay, light brown to brown, moist, medium dense to dense / stiff
- SC/SM — Clayey / Silty Sand with gravel, yellow brown to brown, moist, dense to very dense
- CL — Silty Clay, olive gray mottled red brown, moist, stiff to very stiff, some gravels and sand
- SP/GP — Gravelly Sand / Sandy Gravel, yellow brown to brown, moist, medium dense to very dense, some sandstone cobbles
- SC/SC — Clayey Gravel / Clayey Sand, yellow brown to brown with gray clay, moist to wet, dense

SYMBOLS

- Geologic Contact: Dashed Where Approximate, Queried Where Uncertain.
- CSA/SD-2 / TD = 26.5' — Location and Depth of CSA Small-Diameter Boring
- Groundwater location encountered during drilling

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ENGINEERING GEOLOGIC CROSS SECTION A-A'
SARATOGA CORPORATION YARD
SARATOGA, CALIFORNIA

GEO/ENG BY	SCALE	PROJECT NO.
JZ	1"=20'	E0328
APPROVED BY	DATE	FIGURE NO.
DTS	December 2008	4

occur from variations in rainfall, flooding and other factors, and groundwater levels may be different at different times and/or locations.

4.0 POTENTIAL GEOTECHNICAL HAZARDS

In the following section, we list identified potential geotechnical hazards at the City of Saratoga's Corporation Yard facility, along with the corresponding degrees of determined potential risk, as well as our recommendations for possible mitigation measures.

4.1 Seismic Hazards

Seismic ground shaking associated with a large earthquake on any one of the San Andreas or Monta Vista faults is considered to be a hazard in the project area (Figure 2). Peak horizontal ground accelerations between 0.60g and 0.68g should be anticipated at the site (see report Section 2.3).

Seismically-induced ground failure mechanisms include fault rupture, differential compaction, liquefaction and landsliding. Active faults have not been recognized on, or mapped through, the Corporation Yard facility site. Consequently, the potential for fault rupture at the proposed site is considered to be **low**.

The potential for lurching and differential compaction due to earthquake shaking is considered to be **low to moderate,** and could result in differential movements while the potential for seismically induced landsliding (into the nearby Wildcat Creek channel) is considered **low to moderate**. The recommended foundation system is intended to mitigate the potential adverse effects of seismically induced differential settlement.

Due to the relatively dense subsurface materials and the flat terrain, the potential for seismically induced landsliding is generally considered to be **low**. Based on the subsurface conditions encountered in the borings, including the depth to groundwater and the dense consistency of the soils, the potential for liquefaction is generally considered to be **low**

4.2 Expansive Soils

Based on the results of our laboratory testing, the near-surface soils are classified as having low plasticity and consequently have a **low** expansion potential. Highly expansive soils could be subjected to volume changes due to seasonal fluctuations in moisture content of the surficial soils.

4.3 Settlement Behavior

Depending on the loads, there is a **low to moderate** potential that the medium dense to very dense silty and clayey sands and gravels, and medium stiff to very stiff clay soil materials underlying the proposed carport could settle under static foundation loads resulting in minor settlement of the new structure.

The recommended grid of grade beams intended to support the carport should tend to reduce potential impacts associated with future differential settlements due to static loading. The grid of grade beams could experience total static settlement from the anticipated maximum 3,000 psf design load of less than 1 inch, and differential settlement of less than 1/2 inch, across the carport.

5.0 FOUNDATION EVALUATION AND RECOMMENDATIONS

5.1 Foundation Design Considerations

The principal factor affecting foundation type selection is the near-surface medium dense sands and the stiff clays underlying the proposed foundation. The advantage of the recommended grid of inter-connected grade beams is that it will tend to bridge isolated areas of settlement and provide a more uniform response of the structure to seismic shaking.

5.2 Foundation Design Criteria

5.2.1 Grid of Grade Beams - The grade beams (shallow continuous footings) should be at least 18 inches wide (or wider as determined by the project Structural

Engineer), and founded at least 18 inches below the lowest adjacent final grade. Isolated footings are not recommended. The grade beams/footings should be designed for an allowable bearing capacity of 3,000 pounds per square foot (psf) for dead-plus-live loads, and 4,500 psf under total loads, including wind or seismic forces. Resistance to lateral loads should be computed using a concrete/soil base friction coefficient of 0.35 and 400 pcf equivalent fluid passive resistance beginning below an embedment depth of 1 foot.

5.3 Site Grading

5.3.1 Site Preparation - All loose material, vegetation, concrete, asphalt, debris, and other deleterious material should be stripped and removed from the areas to be occupied by the carport supports. This material should be disposed of in a suitable location off-site or stored on-site for later use in landscaping (if approved for such use by the project landscape architect).

Excavation should proceed as necessary for planned excavations, and soft and/or yielding materials in the location of the planned carport foundations should be over-excavated and replaced with engineered fill, or the grade beams can be deepened as necessary. Areas to be filled should be scarified to at least an 8-inch depth, moisture conditioned to at least two percent over optimum moisture content and should be compacted to at least 90 percent relative compaction based on ASTM D-1557-00.

Care should be taken in the vicinity of the reported underground fuel tank located at the northeastern corner of the proposed carport. In addition to the buried tank, there are likely buried utilities. The closest edges of carport foundation supports should be located at least 2 feet from the existing slab-on-grade pad covering the tank.

5.3.2. Compacted Fill - Excavated on-site materials can be re-used as compacted fill provided they are free of organic matter and rock fragments larger than 4 inches in diameter. Imported material should be free of organics; it should contain no material larger than 4 inches and have a plasticity index (P.I.) of less than 15. The fill should be placed in horizontal lifts not exceeding 8 inches in loose thickness, moisture conditioned to at least optimum moisture content, and compacted in lifts to at least 95

percent relative compaction beneath structures, and 90 percent relative compaction elsewhere.

5.3.3 Utility Trench Backfill – Utility trenches should be backfilled with soil that meets the requirements for compacted fill, provided that bedding materials for pipes are in accordance with the manufacturer's recommendations. The backfill should be compacted to a minimum of 90% relative compaction in non-structural areas and a minimum of 95% relative compaction beneath structures and in the upper 18 inches of pavement subgrades. Equipment and methods should be used that are safe and suitable for work in confined areas without damaging the conduits or the trench walls.

Special care should be taken to ensure that utility trenches which extend under the perimeter footing are backfilled with clayey (low permeability) soils for a distance of 3 feet in both directions.

5.3.4 Pavement Subgrade Preparation - After general compaction and compaction of the utility trench backfills, the pavement subgrade surface should be checked for yielding areas by proof-rolling with a loaded water truck or equivalent. Any yielding areas should be excavated and replaced with compacted fill. The upper 18 inches should be moisture conditioned to at least optimum moisture content, and the soil should be compacted to at least 95 percent relative compaction.

5.4 Surface Drainage

We recommend that all surface drainage be permanently diverted away from the planned carport at a minimum 2% grade into an appropriate catch basin/storm drain system. All roof downspouts should be connected to tight line drain pipes that are directed, in turn, into an appropriate catch basin/storm drain system.

5.5 Seismic Design

Based on our geotechnical investigation, the site location and our interpretation of the 2007 CBC documents related to Earthquake Loads (Section 1613), we are providing the following parameter recommendations from the corresponding figures and tables:

Parameter	Referenced Table/Figure/Eqn.	Value
Site Classification	1613.5.2	C
Mapped Spectral Acc. 0.2 Sec. (g)	1613.5(3)	Ss = 2.450
Mapped Spectral Acc. 1 Sec. (g)	1613.5(4)	S_1 = 0.885
Fa – Site Coefficient	1613.5.3(1)	1.0
Fv – Site Coefficient	1613.5.3(2)	1.3
S_{MS} = FaSs	16-37	2.450
S_{M1} = FvS_1	16-38	1.150
S_{DS}=2/3 S_{MS}	16-39	1.633
S_{D1}=2/3 S_{M1}	16-40	0.767

5.6 Pavement Design

While no R-value tests were performed, based on a conservatively assumed (for the perceived site soil conditions) R-value of 35, and an assumed Traffic Index (TI) of 5.5 (corresponding to relatively moderate loading and service vehicle use), we recommend that the pavement section should consist of a minimum of 3 inches thickness of asphaltic concrete (AC) underlain by a minimum of 6 inches thickness of non-recycled aggregate base rock (AB) compacted to a minimum of 95% of maximum relative compaction (ASTM D1557-00). The pavement subgrade should be scarified to a depth of 8 inches, moisture conditioned to greater than optimum moisture content, and compacted to at least 95 percent relative compaction (ASTM D1557-00) to form an unyielding surface.

Asphaltic concrete should be placed and compacted in accordance with the requirements of Section 39 of the Caltrans Standard Specifications; aggregate base rock should conform to the provisions of Section 26 (Caltrans) for 3/4-inch maximum Class 2 Aggregate Base.

5.7 Technical Review

Supplemental geotechnical design recommendations should be provided by our firm based on specific design needs developed by the other project design professionals. This report, and any supplemental recommendations, should be reviewed by the contractor as part of the bid process. It is strongly recommended that no construction be started nor grading undertaken until the final drawings, specifications, and

calculations have been reviewed and approved in writing by a representative of **Cotton, Shires and Associates, Inc.**

5.8 Earthwork Construction Inspection and Testing

All excavations should be inspected by a representative of **Cotton, Shires and Associates, Inc.** prior to filling or pouring of concrete foundations. Any grading should also be inspected and tested as appropriate to assure adequate stripping and compaction. Our office should be contacted with a minimum of 48 hours advance notice of construction activities requiring inspection and/or testing services.

6.0 INVESTIGATION LIMITATIONS

Our services consist of professional opinions and recommendations made in accordance with generally accepted engineering geology and geotechnical engineering principles and practices. No warranty, expressed or implied, or merchan tability of fitness, is made or intended in connection with our work, by the proposal for consulting or other services, or by the furnishing of oral or written reports or findings.

Any recommendations and/or design criteria presented in this report are contingent upon our firm being retained to review the final drawings and specifications, to be consulted when any questions arise with regard to the recommendations contained herein, and to provide testing and inspection services for earthwork and construction operations. Unanticipated soil and geologic conditions are commonly encountered during construction which cannot be fully determined from existing exposures or by limited subsurface investigation. Such conditions may require additional expenditures during construction to obtain a properly constructed project. Some contingency fund is recommended to accommodate these possible extra costs.

This investigation did not include a determination of sulfates, the corrosive nature of the soil, or an evaluation of hazardous or toxic materials in the soil or groundwater, and consequently we have no opinion regarding these issues.

This report is issued with the understanding that it is the responsibility of the owner, or of his representative, to ensure that the information and recommendations contained herein are called to the attention of the project architect and engineer and incorporated into the plans. Furthermore, it is also the responsibility of the owner, or of his representative, to ensure that the contractor and subcontractors carry out such recommendations in the field.

7.0 REFERENCES

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APPENDIX A

Field Investigation
Logs of Exploratory Borings

APPENDIX A
FIELD INVESTIGATION

We explored subsurface conditions at the site of the proposed carport at the Saratoga Corporation Yard facility in Saratoga, California on November 18, 2008, by means of four small-diameter borings drilled to depths of 13.5 to 26.5 feet using truck-mounted, solid-stem auger equipment. The location of the borings is shown on Figure 3. The engineer who logged the borings visually classified the soils in accordance with ASTM D-2487. We obtained relatively undisturbed samples of the materials encountered at selected depths. These samples were obtained in brass liners that were 2.5 inches in outside diameter and 6 inches long; the liners were placed inside a 3-inch diameter modified split-barrel California sampler. The sampler was driven with a 140-pound hammer that was raised by a wire line and allowed to freely fall about 30 inches. We also performed Standard Penetration Tests at selected depths. The depths of the sampling (and penetration testing) are shown on the boring logs. The bold number at the conclusion of the sampling interval represents the corrected blow count from a modified California sampler to Standard Penetration Test value accomplished by multiplying the blow count by a factor of 0.68.

Descriptive logs of the borings are presented in this appendix. These logs depict our interpretation of the subsurface conditions at the date and location indicated, based on representative samples collected at the designated sample intervals. It is not warranted that they are representative of subsurface conditions at other times and locations. The contacts on the logs represent the approximate boundaries between earth materials, and the transitions between these materials may be gradual.

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LOG OF EXPLORATORY DRILLING

Project: Saratoga Corporation Yard Carport — Boring No.: CSA/SD-1

Location: 40 feet west of NE corner of proposed carport structure — Project No.: E0328

Drilling Contractor/Rig: Central Coast Drilling/ Truck mounted Rig — Date of Drilling: 11/18/08

Ground Surface Elev.: — Logged By: JZ — Hole Diameter: 6"

Surface Conditions: Parking Lot, AC — Weather: Clear, warm

Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Density (pcf)	Moisture Content (%)	SPT Bl./ft.	Sample Type	Recov. (%)	Remarks
			ASPHALTIC CONCRETE 0.0'-0.25'							Begin drilling: 8:30 AM
			AGGREGATE BASE 0.25'-0.8'							Driller: Craig
		SM	ALLUVIUM 0.8'-BOH 0.8'-2.25' Silty sand; gray to brown, moist, medium dense to dense.	X			20			
2				T-1			26	MC	11"/18"	
		SM	2.25'- 3.5' Silty/ clayey sand; yellow-brown, moist, dense, fine gravel, oxidized rock fragments (@ bottom of T-2).	T-2	122	5.8	32			
							39			
4		SC/CL		X			7			
			3.5'- 4.25' Clayey sand/ sandy clay; light brown, medium dense to dense, some gravel.	T-3			10	MC	11"/18"	
				T-4	113	11.0	25			
6							24			
			4.25'- 11.0' Silty/ clayey sand; yellow- brown, mottled orange-brown, moist, medium dense, gravel (> 12%)							
8		SM	Occasional sandstone fragments.							
10				X			10			
				T-5			9	MC	14"/18"	
				T-6			27			
12			11.0'- 16.0'Silty clay; olive gray, mottled red-brown, stiff to very stiff, moist, contains some gravel and sand.				24			
		CL								
14										
			15.0' Silty clay with gravel, olive gray with mottled brown, very stiff.	X			5			Groundwater encountered at 16' during drilling.
16				T-7			13	MC	16"/18"	
			16.0'- BOH Clayey gravel/clayey sand; Yellow-brown, mottled brown and gray, wet, very dense.	T-8			20			
							20			
18		GC/ SC								Poor recovery at 20' Collected bag sample from shoe
20				B-1			50/5"	MC	0"/18"	End drilling: 9:30 AM
			Total Depth = 20.5' **Ground water encountered @ 16.0'**							
22										
24										
26										
28										

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LOG OF EXPLORATORY DRILLING

Project: Saratoga Corporation Yard Carport
Boring No.: CSA/SD-2 (NW Lot)
Location: NW corner of proposed carport structure
Project No.: E0328
Drilling Contractor/Rig: Central Coast Drilling/ Truck mounted Rig
Date of Drilling: 11/18/08
Ground Surface Elev.: ____ Logged By: JZ
Hole Diameter: 6"
Surface Conditions: Parking Lot, AC
Weather: Clear, warm

Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Density (pcf)	Moisture Content (%)	SPT Bl./ft.	Sample Type	Recov. (%)	Remarks
			ASPHALTIC CONCRETE 0.0'-0.25'							Begin drilling at 9:22 AM
			AGGREGATE BASE 0.25'-0.9'							Driller: Craig
		CL	ALLUVIUM 0.9'- BOH	T-1			14			
2			0.9'-1.4' Silty clay; brown, moist, stiff	T-2			41	MC		
				X			50/3"			Sandstone cobble at the bottom of T-2.
			1.4'- 11.5' Clayey sand; brown, mottled brown/gray/yellow @ 2.0', very dense, with hard sandstone fragments.							Drilling through rock at 3'.
4				T-3			15			
				T-4	118	7.2	50/6"	MC		
			4.0'-5.0' Red-brown mottling, more gravel.	X						
6										
				B-1			50/4"	MC		Poor recovery.
8		SC								
			Same as above.							
10				X			6			Poor recovery, hard sandstone fragment in shoe.
				T-5			12	MC	5"/18"	
				X			50/4"			
12			11.5'- 15.0' Silty clay with sand; olive gray with red-brown and black mottling, moist, stiff.	B-2			6 7 7	SPT	9"/18"	Ordered SPT at 11.5'.
		CL								
14							14			
			15.0'- BOH Silty/clayey sand with gravel; Brown with yellow-brown mottling, moist, dense, less clayey at 16.5'.	X			12			
16				T-6			21	MC	16"/18"	
				T-7			23			
							30			Cuttings wet, gravelly. Ground water table encountered @ 17.5'. 10:15 AM
18		▼								
			20.0' clayey sand, wet (fine grained gravel?) dense, coarser grained than above.							
20				B-3			17 17 20	SPT		
		SC								
22							37			Driller reports more fine grained cuttings.
24										
			25.0' Same as above	X			15		12"/18"	
				X			23	MC		
26				T-8			34			
							39			End drilling at 10:24 AM Ground water table at 18.0' @ 11:00 AM.
			Total depth = 26.5' **Ground water encountered @ 18.0'**							
28										

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LOG OF EXPLORATORY DRILLING

Project: Saratoga Corporation Yard Carport
Boring No.: CSA/SD-3 (SW Lot)
Location: Southwest corner of proposed covered area
Project No.: E0328
Drilling Contractor/Rig: Central Coast Drilling/ Truck mounted Rig
Date of Drilling: 11/18/08
Ground Surface Elev.: ____ Logged By: JZ
Hole Diameter: 6" diameter,
Surface Conditions: Parking Lot, AC
Weather: Clear, warm

Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Density (pcf)	Moisture Content (%)	SPT Bl./ft.	Sample Type	Recov. (%)	Remarks
			ASPHALTIC CONCRETE 0.0'-0.15'							Begin drilling at 10:30 AM
			AGGREGATE BASE 0.15'-0.5'							Driller: Craig
		SC	ALLUVIUM 0.5'- BOH	X			17			
2			0.5'-2.25' Clayey sand; gray-brown, mottled yellow-brown, moist, medium dense to dense. Grades to red-brown color at 2.0'.	T-1			15	MC	16"/18"	
				T-2	100	8.7	30			
							31			
			2.25'- 7.0' Clayey/ silty sand with gravel; brown, mottled yellow-brown, dense							
4		SC/ SM		X			15			
				T-3	124	6.5	60/5"	MC	11"/18"	
				X						
6										
				B-1			7			
							11	SPT	16"/18"	
							15			
8			7.0'- BOH Gravelly sand/sandy gravel; brown with mottled yellow brown, moist, some sandstone cobbles, medium dense.				26			
10			Same as above, relatively more cobbles, very dense.	B-2			18			
							37	SPT	18"/18"	
							32			
							69			
12		SP								
14			Same as above							
				B-3			28			
16							50/6"	SPT	9"/18"	
										Cuttings wet @ 17.0'
18										Ground water table @ 17.0' during drilling.
			Same as above.							Poor recovery. Large sandstone cobbles wedged in shoe of sampler.
20				X			25			
				X			50/6"	MC	4"/18"	
				X						
22			**Total depth = 21.5'** **Ground water encountered @ 17.0"**							
24										
26										
28										

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LOG OF EXPLORATORY DRILLING

Project: Saratoga Corporation Yard Carport — Boring No.: CSA/SD-4 (SE Lot)

Location: Southeast corner of proposed covered area — Project No.: E0328

Drilling Contractor/Rig: Central Coast Drilling/ Truck mounted Rig — Date of Drilling: 11/18/08

Ground Surface Elev.: — Logged By: JZ — Hole Diameter: 6" diameter

Surface Conditions: Parking Lot, AC — Weather: Clear, warm

Depth (feet)	Graphic Log	USCS Class.	Geotechnical Description	Sample Desig.	Dry Density (pcf)	Moisture Content (%)	SPT Bl./ft.	Sample Type	Recov. (%)	Remarks
			ASPHALTIC CONCRETE 0.0'-0.15'							Begin drilling at 11:30 AM
			AGGREGATE BASE 0.15'-0.5'							
		CL	ALLUVIUM 0.5'- BOH							
2			0.5'-2.25' Clayey sand;brown, moist, stiff.	X			6	MC	14"/18"	Driller: Craig
				T-1			17			LL = 20, PI = 5
				T-2	131	9.0	18			
		SC	2.25'- 3.75' Clayey sand; gray-brown mottled orange-brown, moist, medium dense to dense.				24			
				X			6	MC	16"/18"	TX/UU 2820 (1000psf)
4				T-3	115	15.0	11			
			3.75'- 6.5' Silty clay with sand; brown, some mottled yellow-brown @ 4.5', moist, very stiff.	T-4	113	16.3	21			
		CL					22			
6										
			6.5'-10.0'Silty clay; blue-gray with mottled red-brown, moist, stiff, moderate plasticity.	X			10	MC	8"/18"	Poor recovery.
8		CL		X			12			
				T-5			15			
							18			
10				B-1			50/6"	MC	3"/18"	Bag sample of shoe material collected.
		SC	10.0'-11.0'Clayey sand; yellow-brown, mottled brown, moist, very dense, some sandstone cobbles in cutttings.	X						
12			11.0' - 13.5' Graywacke cobble	X						Drilling through cobble @ 11.5'. Lots of rig chatter between 10.0' and 13.5'. Refusal @ 13.5'.
				B-2						
14			**Total depth = 13.5'** **No ground water encountered.**							Finish drilling at 12:15 PM.
			* Bag sample B-2 collected from cuttings at 13.5'.							No groundwater encountered during drilling.
16										
18										
20										
22										
24										
26										
28										

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APPENDIX B

Laboratory Testing
Summary of Triaxial Shear Strength Testing

APPENDIX B
LABORATORY TESTING

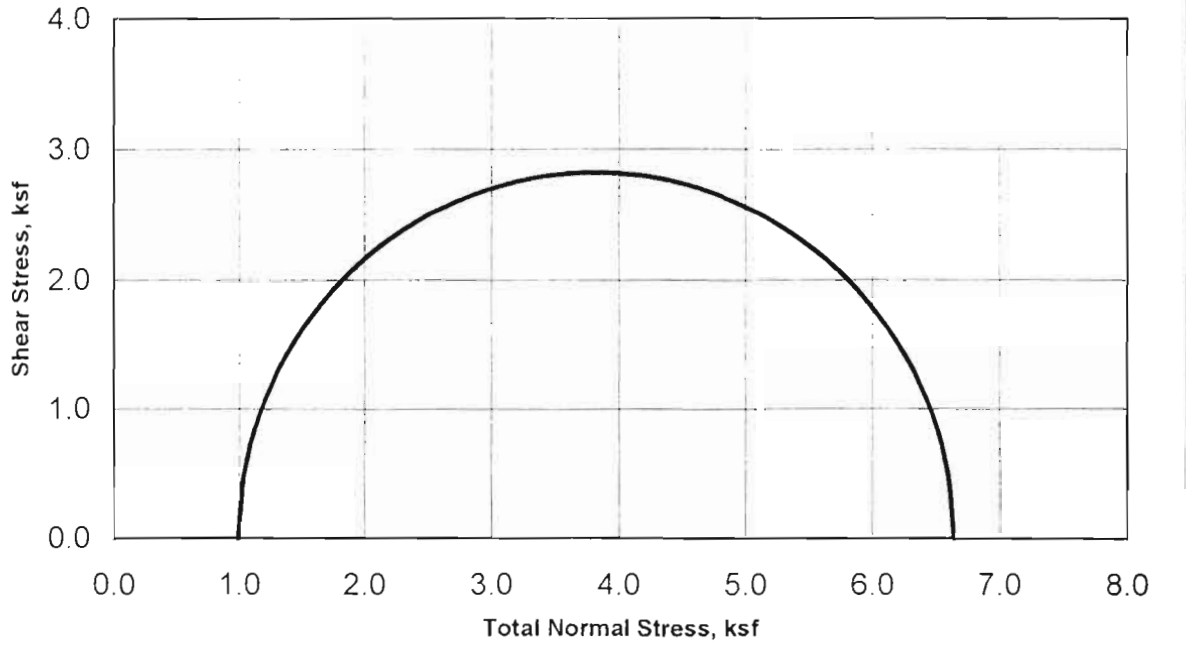
The laboratory analysis performed for the site consisted of limited testing of the principal soil types sampled during the field investigation to evaluate index properties and strength parameters of subsurface materials. The soil descriptions and the field and laboratory test results were used to assign parameters to the various materials at the site. The results of the laboratory testing program are presented in this appendix and on the boring logs.

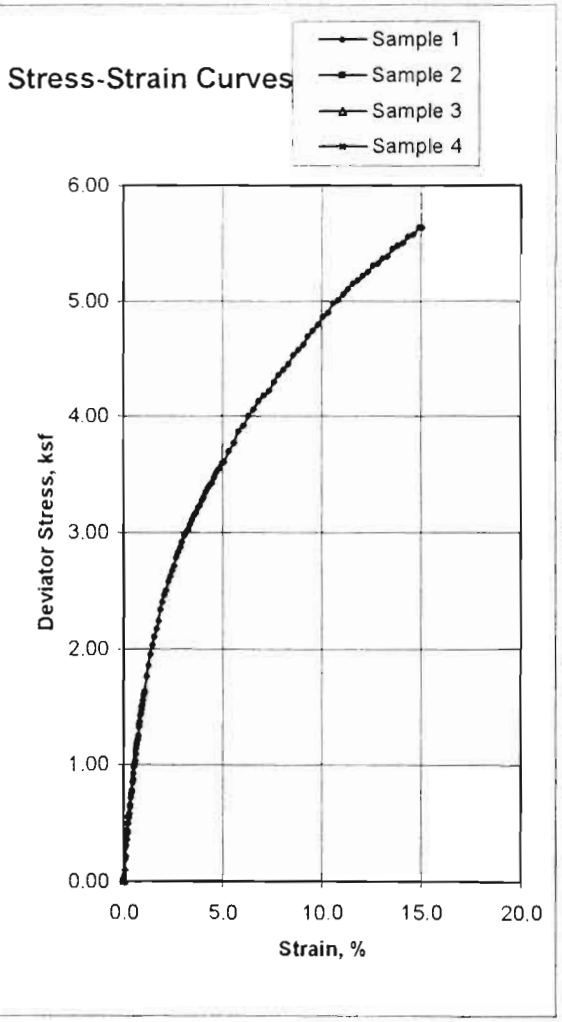
The following laboratory tests were performed as part of this investigation:

1. Detailed soil description, ASTM D 2487;
2. Natural moisture content of the soil, ASTM D 2216;
3. In-situ unit weight of the soil (wet and dry);
4. Atterberg limits determination: ASTM D 4318; and
5. Triaxial compression shear strength of the soil, ASTM 2850.

Unconsolidated-Undrained Triaxial Test

ASTM D-2850





Sample Data				
	1	2	3	4
Moisture %	15.0			
Dry Den,pcf	115.1			
Void Ratio	0.465			
Saturation %	87.0			
Height in	5.00			
Diameter in	2.41			
Cell psi	6.9			
Strain %	14.90			
Deviator, ksf	5.640			
Rate %/min	1.00			
in/min	0.050			
Job No.:	026-415			
Client:	Cotton, Shires & Associates			
Project:	Saratoga Corp. Yard - E0328			
Boring:	SD-4			
Sample:	T-3			
Depth ft:	3.5			

Visual Soil Description	
Sample #	
1	Brown Clayey SAND w/ Gravel
2	
3	
4	
Remarks:	