GEOTECHNICAL ENGINEERING REPORT

SAGE CREEK CENTER

LOCATED AT

NE OF LIMONITE AVENUE & SUMNER AVENUE
CORONA, RIVERSIDE COUNTY, CALIFORNIA

FOR

BICKEL UNDERWOOD
3600 BIRCH STREET, SUITE 120
NEWPORT BEACH, CALIFORNIA 92660

PROJECT G-3510-06

SEPTEMBER 7, 2007

GEOTECHNICAL SOLUTIONS, INC.
GEOTECHNICAL AND ENVIRONMENTAL
ENGINEERING

Geotechnical Solutions, Inc.
Geotechnical, Structural & Environmental Engineering

September 7, 2007

Project No. G-3510-06

Bickel Underwood
3600 Birch Street
Newport Beach, California 92660

Re: Sage Creek Center
NE Corner of Limonite Avenue & Sumner Avenue
Corona, California

Gentlemen:

Submitted herewith is a report of a Geotechnical Investigation conducted by this office for the proposed Sage Creek Shopping Center located at north-east corner of Limonite Avenue and Sumner Avenue, City of Corona, Riverside County, California.

The Geotechnical Investigation covers project development consisting of the construction of a new shopping center and retail stores. Other features of development are new asphalt concrete driveways, block walls, parking area and landscaping at the existing vacant pieces of land at the referenced project site.

Based upon the findings of our investigation, it is revealed that the subgrade soil is favorable for new construction. Conventional shallow spread or continuous footings will be suitable for foundation support, subject to compliance with the recommendations of this report.

The property lies within a seismically active portion of Southern California and should be expected to experience occasional ground shaking from low to moderate magnitude earthquake in the future.

The closest known active fault capable of producing a major earthquake is the Chino-Central Ave. (Elsinore) Fault, which is located about 5.7 miles (9.1 km) to the west of the proposed site.

The site does not lie within or near an Earthquake Fault Zone as designated by the California Geological Survey. The potential for direct surface fault rupture at the site is considered unlikely. The land is not in a FEMA floodplain or floodway.

The investigations included surface and subsurface exploration including field and laboratory tests considered necessary in the circumstances.

In the opinion of the undersigned, the accompanying report has been substantiated by mathematical and other data and presents fairly the design information requested by your organization.

Respectfully submitted,

Geotechnical Solutions, Inc.

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Introduction

The primary objectives of this study were to explore subsurface conditions beneath the project site and evaluate the existing earth materials relative to foundation support, lateral pressure design factors, asphalt concrete pavement section, earthwork and seismic consideration. Also, presented in this report are data and observations with respect to soil concrete corrosion potential. In general, the study objectives were met by a review of the conceptual site plan, exploratory drilling, and sampling of earth materials, laboratory testing, and engineering analysis. The general scope and objectives of the study were established in collaboration with the project architect.

Site Conditions

The site is an existing vacant land located at northeast corner of Sumner Avenue and Limonite Avenue, in the City of Corona, Riverside County, California. The site is bounded on the north and east by the residential areas, Limonite Avenue on the south, and Sumner Avenue on the west. The property is located at Lot 310 of Tract No. 30633 and APN 164-030-019.

Existing topography of the site is relatively level with drainage slope approximately 1-2% to the existing drainage facility to the adjoining street.

Proposed Construction

It is understood that the development will consist of a new typical shopping retail facility with a total land area of 366,996 square feet (8.425 acres) and total building area of 56,700 square feet under existing and proposed zoning C-P-S. Existing zoning of properties immediately surrounding subject property are zoned as R-4. The following table shows the distribution of areas for various components of the proposed construction.

TABLE 1

PROPOSED DEVELOPMENT

DESCRIPTION	AREA (SF.)	% COVERAGE
Total Building Area	75,759 SF.	20.6 %
• Major 1 Building	43,887 SF.	
• Major 2 Building	17,272 SF.	
• Pad A	7,000 SF.	
• Pad B	5,000 SF.	
• Shops A	2,600 SF.	
Total Landscape Area	56,700 SF.	15.45 %
Total Parking Area	203,095 SF.	55.3 %
Total Pavement Area	31,442 SF.	8.57 %
Total Land Area	366, 996 SF.	100 %

Regional Geologic Conditions

The subject site is in the northern part of the Peninsular Range Province of Southern California (Jahns, Richard H., 1954). The Peninsular Range province is a well defined geologic and physiographic unit that extends southeastward from the latitude of Los Angeles to the southern tip of the Baja California. It is bounded on the northeast by the Colorado Desert (Coachella and Imperial Valleys) and the Gulf of California, and it extends southwestward beneath the Pacific Ocean to form the continental borderland, parts of which appears as Santa Catalina, San Clemente, and other islands. The northern

part of the Peninsular Range province is an uplifted and southeasterly tilted mass that is separated into several large, elongate, northwest-trending blocks by subparallel faults. These blocks are further sliced by lesser faults, and most are also segmented by cross faults. Both dip-slip and strike-slip components of movement have been recognized along most of the breaks, and several of the master faults show evidence of major right-lateral displacements. Determination of the direction and amount of net slip on any of these breaks however, remains an unsolved problem at the present time. Most of the principal faults of the area are intermittently active. Folding has been distinctly subordinate to faulting in most areas. Recent activity on some of these regional faults is evidenced by scarplets in alluvium, sag ponds, anomalies in stream profiles, offset drainage lines, and by historic records of earthquakes.

Site Geology

The site is located on a broad, gently sloping surface at an approximate ground elevation of 660 feet above sea level. The local ground surface slopes gently toward the northwest at slope angles of approximately 40 feet per mile.

According to the soil survey for western Riverside County (U.S. Department of Agriculture, 1971), the native near-surface soils at the site area belong to the Delhi soil series (Delhi loamy fine sand) that formed on dunes and, to a lesser extent, alluvial fans. The pre-grade native vegetation was mainly annual grasses, alfilaria, and flat-top buckwheat. In a typical profile, the surface layer of the Delhi soil, the surface layer is a 10-inch thick light brownish gray fine sand. The underlying soils, to a depth of at least 64 inches, is light brownish-gray to light olive-brown stratified fine sand, loamy fine sand, and fine sandy loam with low shrink-swell potential. From an engineering standpoint, these soils classify as silty sand (SM).

As delineated on the geologic map by Morton and Gray (2002), the pre-grade near-surface soils at the site consist of young eolian deposits of Holocene to late Pleistocene

age (see Figure). These sandy soils primarily include unconsolidated sand dune deposits that are moderately well sorted and fine-to-medium grained. Young alluvial soils (of Holocene and late Pleistocene age) consisting of arkosic sand underlie the young eolian deposits.

As observed in the soil samples retrieved from the drill holes at the time of drilling, the existing fill pad which covers the entire site ranges from approximately eight (8) to twelve feet thick and consists of olive gray to dark grayish brown, moist and hard to very dense silty and silty sand. The native eolian and young alluvial soils encountered beneath the fill pad are interbedded and generally consist of moist silty sand, sand, silt and clay in a dense to stiff condition. As the entire site is covered by an existing fill pad, no site-specific geologic map is presented.

Seismic Risk

The site is considered a seismically active area, as is most of southern California. Seismic risk for the proposed site is considered relatively high as compared to other areas of southern California because of the close proximity to the active Chino and San Jacinto fault zones and their related fault splays. The site may also be affected by activity on other active faults such as the Elsinore, Whittier, San Andreas or any of many other active or potentially active faults in southern California region. It should be anticipated that the site will experience moderate to strong ground shaking in the near-future.

Faulting and Seismicity

The site is not located within an Earthquake Fault Zone as mapped by California Geological Survey and no active faults were observed during this investigation. The nearest active faults are Chino-Central Ave. (Elsinore) Fault, which is located 5.7 miles (9.1 km) to the west of the proposed site, is the northward extension of the Elsinore Fault Zone and San Jacinto Fault Zone.

Two of the most important faults in the site vicinity are the Chino and San Jacinto fault zones. Several other regionally active faults, such as the Elsinore, Whittier, Puente Hills blind thrust, Raymond, Cucamonga, San Andreas, San Jose and Sierra Madre faults also contribute to the seismic risk of the site (see below).

The Chino fault zone, located about 6.8 miles west of the proposed site, is the northward extension of the Elsinore Fault Zone, and is located along the north side of the Puente Hills Evidence of offset drainages, fault scarps and trench excavations show that this is an active fault. It is considered capable of generating an earthquake of maximum moment magnitude (Mw) 6.7. Moment magnitude (Mw) is a measurement of an earthquake's magnitude based on area of the fault, amount of movement during the earthquake, and the strength of the rocks ruptured during the earthquake. The San Jacinto Valley and San Bernardino segments of the San Jacinto fault zone, located as close as approximately 15.5 miles east of the site, is a system of faults and fault splays that extends southeastward across the San Bernardino valley, along the southwestern margin of the San Jacinto Mountains. Its known length is on the order of 180 miles as it traverses in a southeasterly direction near the communities of Lytle Creek, San Bernardino, Loma Linda, San Jacinto, Hemet, Anza, Borrego Springs, and Ocotillo Wells. Along this fault, slip rate is variable, ranging from approximately 2 to 20 mm/yr. A slip rate of 12 ± 6 mm/yr has been estimated for the San Bernardino segment of the fault with an earthquake of moment magnitude of Mw 6.7 considered possible. The interval between surface ruptures on the fault is thought to be on the order of 100 to 250 years.

UBCSEIS (version 1.03) indicates the Chino-Central Ave. (Elsinore) fault to be the closest fault, Type B fault and has a slip rate of 1.0 mm per year, magnitude of 6.7 but Cucamonga Fault is Type A fault, has a slip rate of 5.0 mm per year and an earthquake magnitude of 7.0 and is located approximately 13 miles from the project site.

EQFAULT (version 3.00) also indicates the Chino-Central Ave. to be the closest fault at a distance of 6.8 miles (10.9 km) having an earthquake magnitude of 6.7, and peak site acceleration of 0.41g.

FRISKSP provides a probabilistic seismic hazard assessment of the amount of ground shaking, which can be expected at the site. Considering a 10% probability of exceedance in 50 years, peak horizontal ground acceleration of 0.42g with an average return period of 475 years can be expected for the site vicinity (Campbell & Bozorgnia, 1997).

Under the criteria published (ICBO, 1997) in the Uniform Building Code (UBC), the Chino-Central Ave. (Elsinore) Fault is considered to be a "seismic source type "B". The site is located within "seismic zone" 4 with a "seismic zone factor" of 0.4 (Table 16-I). Field observations and field blow counts indicate the underlying material to be "soil profile type" "S_D" (Table 16-J).

In addition to possible strong earthquake ground motion at the site, the secondary effects of earthquake-induced liquefaction, and earthquake-induced landsliding, were considered. Guidelines for evaluating and mitigation seismic hazards in California (CDMG, 1997, SP-117) summarizes procedures for evaluating the earthquake-induced landslide and liquefaction potential for the state.

Ground Rupture Potential

Based on review of the Fault-Rupture Hazard Zone maps of California (California Division of Mines and Geology, 1997), the subject site is not located within an earthquake hazard zone and no known active faults occur at the subject site. Preliminary review of the orthophotoquad used as a base map for the County soil survey does not reveal any evidence of lineaments or other features suggestive of past ground rupture at the site. Further review of a U.S. Geological Survey photograph dated 6/2/02 also does not reveal the presence of any lineaments.

As ground ruptures due to faulting tend to occur along zones of previous faulting, the likelihood of future ground rupture due to faulting is considered low.

Groundwater

Groundwater was not encountered in any of the ten soil borings which were advanced to depths ranging up to 50.5 feet below existing grade. Soil mottling, such as observed in boring B-1 at depths of 25 and 40 feet below grade suggest that historic groundwater levels could have been shallower. Therefore, for the purposes of this investigation, a historic groundwater depth of 25 feet below existing grade (at boring B-1) is assumed.

Liquefaction: The site is not within a zone mapped as requiring evaluation of earthquake-induced liquefaction potential. Due to the relatively dense and cohesive nature of the native and fill pad soils, high blow counts encountered at the site, and the appreciable depth to groundwater, liquefaction potential at the site is considered to be low.

Landsliding: The site is not within a zone mapped as requiring evaluation of earthquake-induced landsliding potential. Due to the relatively flat nature of the area, no landslides are present or would be anticipated at the site.

Tsunamis and Seiches

Because the site is located a sufficient distance inland from the coast and at an elevation of approximately 660 above mean sea level, inundation by tsunamis is not considered possible. Further, there are no large areas of impounded lakes or reservoirs that could credibly impact the site so seiche potential is also not considered possible at the site.

Methane

Because the site was formerly used for cattle ranching, the potential exists for methane seepage within the near surface (pre-grade) soils. Boring B-2 encountered dark gray fine

silty sand with a rotten egg odor at the base of the fill pad at a depth of approximately 10-feet below existing grade. An evaluation of the site for methane potential site was beyond the scope of work for this investigation. However, given the presence of possibly organic zone(s) near the base of the fill pad (such as at boring B-2), and as suspected from review of a U.S. Geological Survey photograph dated 6/2/02 that indicates anomalously dark areas of soil several tens of square feet in area beneath the proposed parking lot (approximately mid-way between borings B-2 and B-4; http://terraserver-usa.com/image.aspx) a third-party methane evaluation should be conducted for the site (if it has not already been done).

Field Investigation

Ten (10) test holes were drilled by means of an 8" hollow-stem rig at the locations shown on Plate B. A continuous record of the materials encountered during the drilling was made by our field representative and is presented on Plates E-1 through E-10, Log of Test Holes. The lines designating the interface between soil strata on the log of Test Holes represent approximate boundaries since the transition between strata may be gradual. Undisturbed samples were secured at frequent intervals from various locations for laboratory testing. The relative sampler penetration resistance exhibited by the soils types encountered is tabulated in the blows per foot column of the Log of Test Holes.

Laboratory Testing

Laboratory testing was programmed following a review of the field investigation data to be evaluated. Tests included physical testing to determine foundation load bearing characteristics and selective classification tests.

A. Moisture Density

In-Place density and moisture content values were determined at the laboratory and test results are shown on Plates E-1 through E-10.

B. Mechanical Analysis

Mechanical analysis by the hydrometer test method was performed to confirm field classifications. Test results are as follows:

Test Hole No.	Sample Depth (ft)	Sand Percent	Silt Percent	Clay Percent
1	1-2	88	7	5
3	1-2	87	8	5
4	1-2	78	15	7
5	1-2	77	16	7
6	1-2	80	15	5
7	1-2	75	20	5
8	1-2	87	11	2
9	1-2	87	10	3

C. Direct Shear

Direct shear test was performed on selected typical upper soil samples under various normal loads. All tests were performed in saturated and drained condition. A cumulative plot of test results are presented on Plate F.

D. Consolidation

Consolidation (load deformation) tests were performed on selected undisturbed samples. Plotted test results are presented on Plates G through L.

E. Chemical Analysis

Chemical tests were performed on near surface soil. Test results are as follows:

Soil Soluble Sulfate	453 parts per million
pH	8.5

Soluble Chloride	428 Parts per million
Minimum Resistivity	600 max or <1000 ohm-cm

F. Expansion

Expansion characteristics were determined by the Expansion Index test on a typical bulk sample considered to be generally representative of the near subgrade soils. Test results were as follows:

Moisture Content (percent)	Dry Density (pct)	Expansion Index
10.7	107.0	0

According to the current Uniform Building Code, Table 18-I-1, the underlying soil is classified as non- expansive.

H. Maximum Density & Optimum Moisture

Maximum density and optimum moisture content of the subgrade soil was determined by the ASTM D-1557 test method on a typical bulk sample considered to be generally representative of the near subgrade soils. Test results were as follows:

Optimum Moisture (percent)	Max Dry Density (pct)
10.5	121.0

I. Stabilometer "R" Value

"R" Value test was performed on a representative subgrade sample for pavement section determination. The test results are as follows:

Test No.	Moisture @ Compaction (%)	Dry Unit Wt. (pcf)	Exudation Pressure (psi)	Stabilometer "R Value
a	11.5	115.7	108	45
b	10.8	119.1	236	58
c	10.2	120.8	406	66
				63*

*Interpolated 300 psi by exudation.

Design Values

Representative values were selected from the test data and other sources for design and is tabulated below:

Field Density	115	pcf
Expansion Index	0	
Angle of Internal Friction	31	
Cohesion	200	psf
Subgrade Reaction (K)	100	pci
Subgrade "R" Value	63	

Seismic Factors

Following seismic factors are according to our specific seismic study, soils profile and 1997 UBC.

a. Soil Profile Type = Type S_D

b. Seismic Zone = 4

c. Seismic zone Factor = 0.4.

d. Earthquake Magnitude = M 6.7

e. Fault Distance = 5.7 miles (9.1 km)

f. Seismic Source Type = Type B

g. Seismic Coefficient $C_a = 0.44\ N_a$ $C_v = 0.64\ N_v$

h. Near Source Factor $N_a = 1.0$ $N_v = 1.0$

i. Maximum Slip Rate = 1.0 mm / year

j. Probabilistic Acceleration = 0.42g

Earthquake Induced Liquefaction Potential

Earthquake-induced vibrations can be the cause of several significant phenomena, including liquefaction in fine silt and sands. Liquefaction results in a complete loss of strength and can cause structures to settle or even overturn, if it occurs in the bearing zone. If liquefaction occurs beneath sloping ground, phenomena known as Lateral Spreading can occur. Liquefaction is typically limited to the upper (50) feet of the subsurface of the soils.

Four items are generally considered to have the most significance in liquefaction:

1. Poorly graded fine and silty sands are the types of soils most susceptible to liquefaction. Soils that contain a wide range of soil particle sizes and coarse soils that drain freely are not generally susceptible to liquefaction.

2. The water table perched or otherwise usually must be within the upper fifty- (50) feet of soils, for liquefaction to occur. Soils above the water table do not liquefy.

3. Liquefaction has been shown to be unlikely where the relative density of the soils is greater than seventy (70%) percent. A soil that has relative density of less than seventy (70%) percent, may liquefy depending on a number of factors. The two

most important of which are the strength and duration of the seismic shaking and the percentage of the soil particles that are silt and clay sized.

4. If the clay content (determined by the percent finer than 0.005 mm) is greater than fifteen (15%) percent, the soil is usually considered non-liquefiable, unless it is extremely sensitive.

The site will be susceptible to liquefaction, if all four items discussed above meet the criteria. An examination of the existing conditions at the site, in relation to the criteria listed above, indicate the following:

1. Determination of soil gradation shows that the underlying soil particle sizes are medium to coarse, generally gravelly.

2. Groundwater was not encountered at the full depth of exploration.

3. Penetration test using California Sampler and Standard Penetration Test (SPT) sampling indicates that the soil within the depth range studied is in a medium to high dense state, with a relative density of over 70 percent and a relatively high shear resistance.

4. The soil contains low percentage of clay constituent (i.e. less than 15 percent).

Based on the above, most of the items do not meet the liquefaction susceptibility criteria. It is our opinion that conditions indicate, a potential for liquefaction is very low at this site. Hence, no mitigative measure is necessary.

Conclusions and Recommendations

Based on the findings of this investigation, it is concluded that the site is suitable for proposed development. Proposed new shopping retail facility consisting of five buildings may be supported by conventional continuous footings bearing on newly compacted subgrade soil. Following is specific recommendations for design and construction.

A. Foundation

The proposed shopping retail facility buildings may be supported by an 18-inch deep continuous footing resting on compacted fill. Since existing subgrade is in dry condition, and in order to provide a uniform subgrade for the foundation and slab support, it is recommended to excavate the building area to a depth of 6 inches below bottom of the footings then scarify additional six inches and backfill with recompacted soil, according to Section G of this report.

An 18-inch deep and minimum 12 inches wide continuous footings, resting on newly compacted subgrade soil may be designed for an allowable bearing value of 1,500 pounds per square foot. The estimated total settlement will be less than one-half inches and differential settlement is expected to be less than one-third of an inch up to a horizontal distance of 40-feet.

The basic bearing value may be increased by 100 and 200 pounds per square foot for one-foot increase in width and depth respectively to a maximum of 2,500 pounds per square foot.

The recommended bearing values are for dead plus live loads and may be increased by one-third for combined dead, live, and transient forces.

B. Lateral Pressures.

1. Passive Pressure.

Horizontal forces may be resisted by the combined effect of sliding resistance of 0.4 times the dead load and a passive pressure of 300 pounds per square foot per foot of embedment from lowest adjacent grade to a maximum of 3,000 psf.

The allowable bearing capacity, and the allowable resistance of horizontal forces may be increased by one-third for earthquakes and other temporary forces. If combining frictional resistance with the passive, the friction component should be decreased by one-third.

2. Active Pressure

Recommended active lateral soil pressure values for design of drained retaining walls are as follows:

Surface Slope of Retained earth	Equivalent Fluid Pressure (pcf)
Active (level backfill)	35
At-rest	60

A pipe and gravel drain (4" perforated PVC, Schedule 40 covered with at least three cubic feet of gravel per lineal foot of pipe) should be provided on the retained side near the base of the wall. While all backfill should be compacted to the required degree, care should be taken when working close to the walls to prevent excessive pressure.

C. Floor Slab

Based on field observation and test results, the surficial subgrade soils are non-expansive, therefore expansion mitigation will not be required for the slab on grade. It is recommended to maintain subgrade near optimum moisture content and provide # 3 bars 18 inches center to center cross pattern. The thickness of slab should not be less than 4-inches.

It is also recommended to provide capillary moisture barrier under slab on grade where moisture would be detrimental.

In the opinion of the undersigned the following design measures should be adequate: Providing ten (10) mil Visqueen or equivalent lining with six inch sealed laps and one to two inches of protective clean sand over and under.

D. Corrosion Potential

1. Based upon test results, the amount of soluble sulfate in the soil was very low; however, it is recommended that Type II cement be used in the concrete on or below grade.

2. Based on preliminary chemical analysis showing minimum resistivity of 600 ohm-cm, severely corrosive in case of buried metallic pipe may be anticipated. Ferrous conduits exposed to the soil will generally tend to corrode; therefore, precautions such as wrappings and/or coatings are recommended to assure adequate service life. Special protection does not appear necessary for plastic piping. The pH value of 8.5 shows the soil is strongly alkaline in nature.

E. Pavement

Subsequent to the review of the subgrade "R" value test and the proposed grading, recommended pavement section for the future parking area are as follows:

Traffic Condition	Assumed Traffic Index	A.C (in)	A.B. (in)
Parking Stalls	6.0	2.5	6

At the proposed parking areas, the top 12 inches of subgrade should be scarified; moisture conditioned and recompacted prior to placing the rock base and asphalt concrete. Rock-base material should be class II aggregate base. Both asphalt concrete and aggregate base should be compacted to 95% relative compaction. Asphalt concrete should be Performance Grade PG 64-10.

F. Exterior Concrete Slab or Sidewalks

Exterior concrete walkways, gutters and curbs are subject to potential subgrade deflection and distress. It is recommended that these concrete elements be placed over 12-inches of compacted subgrade soil. Subgrade of these areas should be scarified to a depth of 12 inches and compacted to 90%. The subgrade should be kept near optimum moisture content and to be moisture conditioned during the scarification and recompaction as needed. Expansion joints should be provided, and should not exceed 6 feet.

G. Grading Procedures

1. After the site clearing and removal of debris, and vegetation, the existing soil at the building area should be excavated; moisture conditioned and recompacted to a depth of 6 inches below bottom of footings. Over-excavation and re-compaction should extend 5 feet outside the building perimeter, where possible.

2. The bottom of over-excavation should be scarified to an additional depth of 6 inches.

3. The excavated areas should be refilled to finish grade with on-site materials and/or approved import soil and re-compacted to subsequently described standards.

4. Any abandoned structure, buried cesspool or septic tank etc. discovered during excavation and grading operations must be removed entirely and backfilled with compacted soil or slurry or pea gravel.

5. On-site material is acceptable for backfill if moisture conditioned. If required, import fill should consist of clean, granular, non-expansive soils free from vegetation, debris or rocks larger than three inches in size. The Expansion Index value should not exceed a maximum of 20.

6. All recompacted native and import soil should be spread, watered or aerated, mixed and compacted by mechanical means of approximately six inches thick lifts. The minimum degree of compaction obtained should be at least 90 and 95 percent of the ASTM D-1557 Laboratory test standard for subgrade and base respectively.

7. Backfill placed in narrow, restricted areas such as along utility trenches, may be placed in 12 to 18 inches thick lifts, provided, the minimum required degree of compaction is obtained.

8. Observation and testing of all compaction should be under the direction of the Geotechnical Engineer. The Engineer should be notified at least two days in advance of the start of the grading.

Recommendations for Construction

Preconstruction Meeting. A meeting between representatives of the contractor, the governmental agencies, the soil engineer, the architect, and the owner should be held at the job site at the time equipment is at the site and work is about to commence. The purpose of the meeting is to review the responsibilities of each member of the team.

Changed Conditions. Fill or any changed conditions not found during the exploration should be brought to the attention of the soil engineer. As a result of the changed conditions, the soil engineer will provide further recommendations.

Site Drainage. The site should be sloped to direct water away from all structures. Water should flow via gutters or non-erodable pipes to a positive drainage system. Building should be provided with gutters and down-spots. Planters adjacent to the building should be avoided or waterproofed.

Limitations

This report is issued with the understanding that it is the responsibility of the owner or his representative to see that the information and recommendations contained herein are called to the attention of the other members of the design team for the project and that the applicable information is incorporated into the plans, and that the necessary steps are taken to see that the contractors and the subcontractors carry out such recommendations. The findings of this report are valid as of the present date. However, changes in the conditions of a property can occur with the passage of time, whether due to natural processes or to the works of man, on this or adjacent properties. In addition, changes in applicable or appropriate standards may occur, whether they result from legislation or the broadening of knowledge.

Accordingly, the findings of this report may be invalidated, wholly or in part, by changes outside of our control. The validity of the recommendations of this report assumes that Geotechnical Solutions, Inc. will be retained to provide these services.

Conclusions

We conclude that the site will be suitable for the proposed construction described in this report, providing the design and construction are properly executed. Our recommendations are based on site conditions encountered during exploration, laboratory tests, and experience with similar sites, and are in accordance with generally accepted procedures of geotechnical engineering.

Geotechnical Solutions, Inc.

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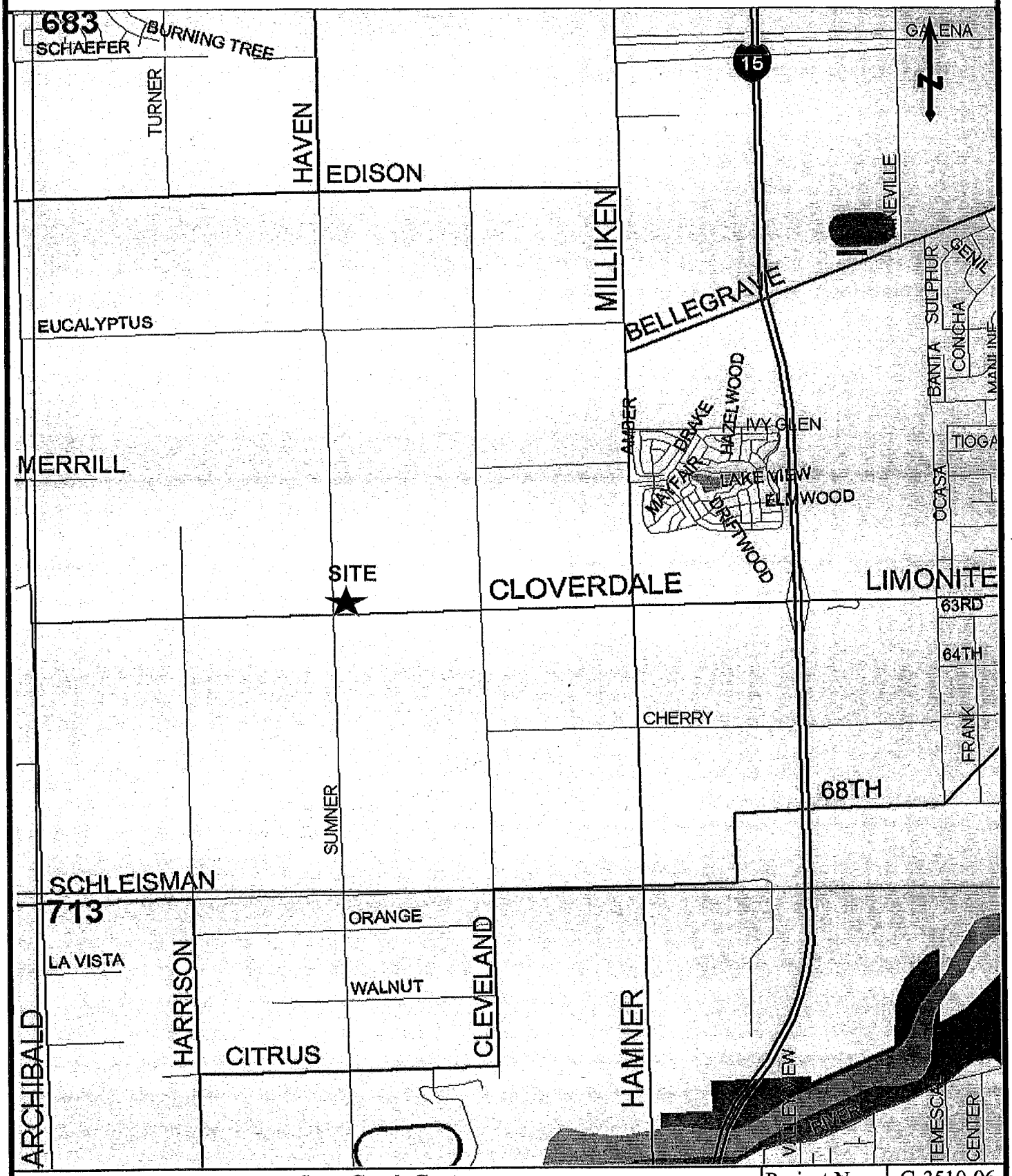
Appendix A

- Vicinity Map
- Plot Plan & Test Hole Locations
- Topo Map
- Geology Map
- Test Boring Logs
- Direct Shear Test
- Consolidation Test

VICINITY MAP



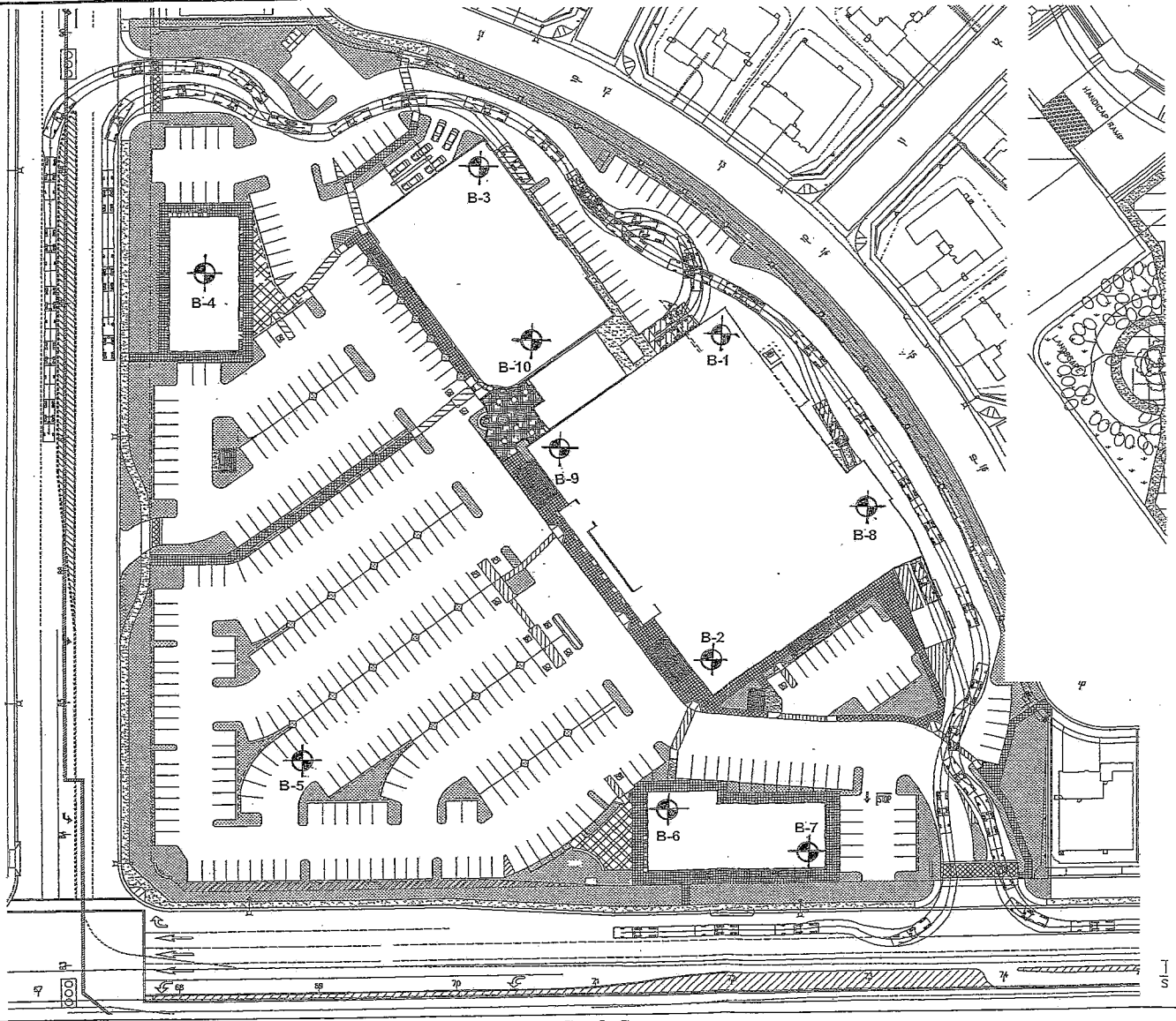
Sage Creek Center

NE of Limonite & Sumner Avenue, Corona, California

Project No.	G-3510-06
Plate:	A

Geotechnical Solutions, Inc.

PLOT PLAN AND TEST BORING LOCATIONS



LEGEND :

Test Boring Locations

Boring No.	Depth (ft)
B-1	50.5
B-2	31.5
B-3	31.5
B-4	21.5
B-5	6.5
B-6	21.5
B-7	21.5
B-8	21.5
B-9	21.5
B-10	21.5

N

SCALE: 1" = 80'

Sage Creek Center

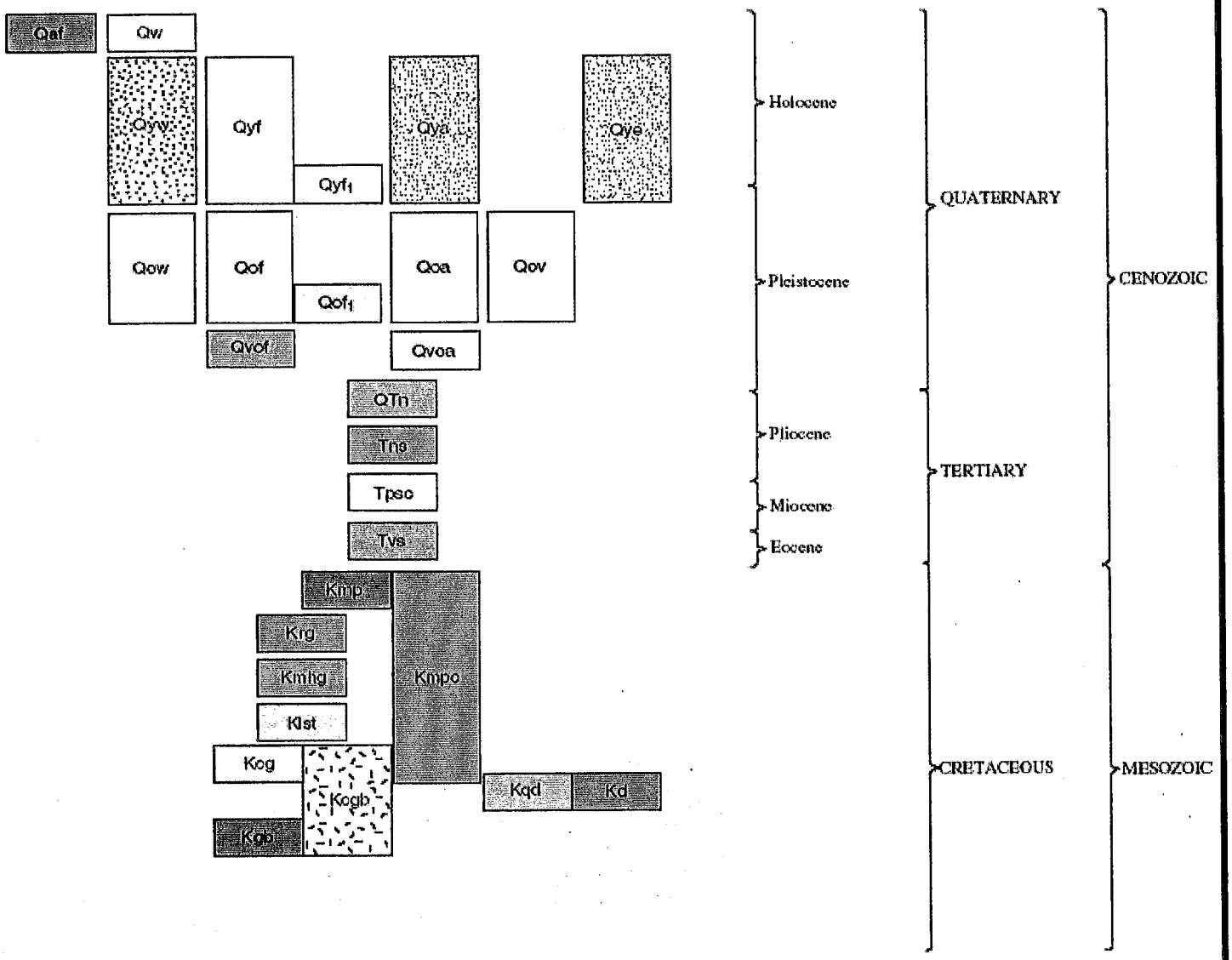
NE of Limonite & Sumner Avenue, Corona, California

Project No.	G-3510-06
Plate:	B

Geotechnical Solutions, Inc.

GEOLOGY MAP

CORRELATION OF MAP UNITS



Qya **Young alluvial channel deposits (Holocene and late Pleistocene)**—Gray, unconsolidated alluvium consisting of medium- to fine-grained sand and lesser silt flooring Temescal Wash and several of its tributaries in the southwestern part of quadrangle. North of Santa Ana River, includes sediments in Mill Creek drainage

Qye **Young eolian deposits (Holocene and late Pleistocene)**—Sand dune deposits, inactive except for very minor amount of sediment movement during Santa Ana wind storms. Chiefly unconsolidated, moderately well sorted, fine- to medium-grained sand

Sage Creek Center
NE of Limonite & Sumner Avenue, Corona, California

Project No. G-3510-06
Plate: C-1

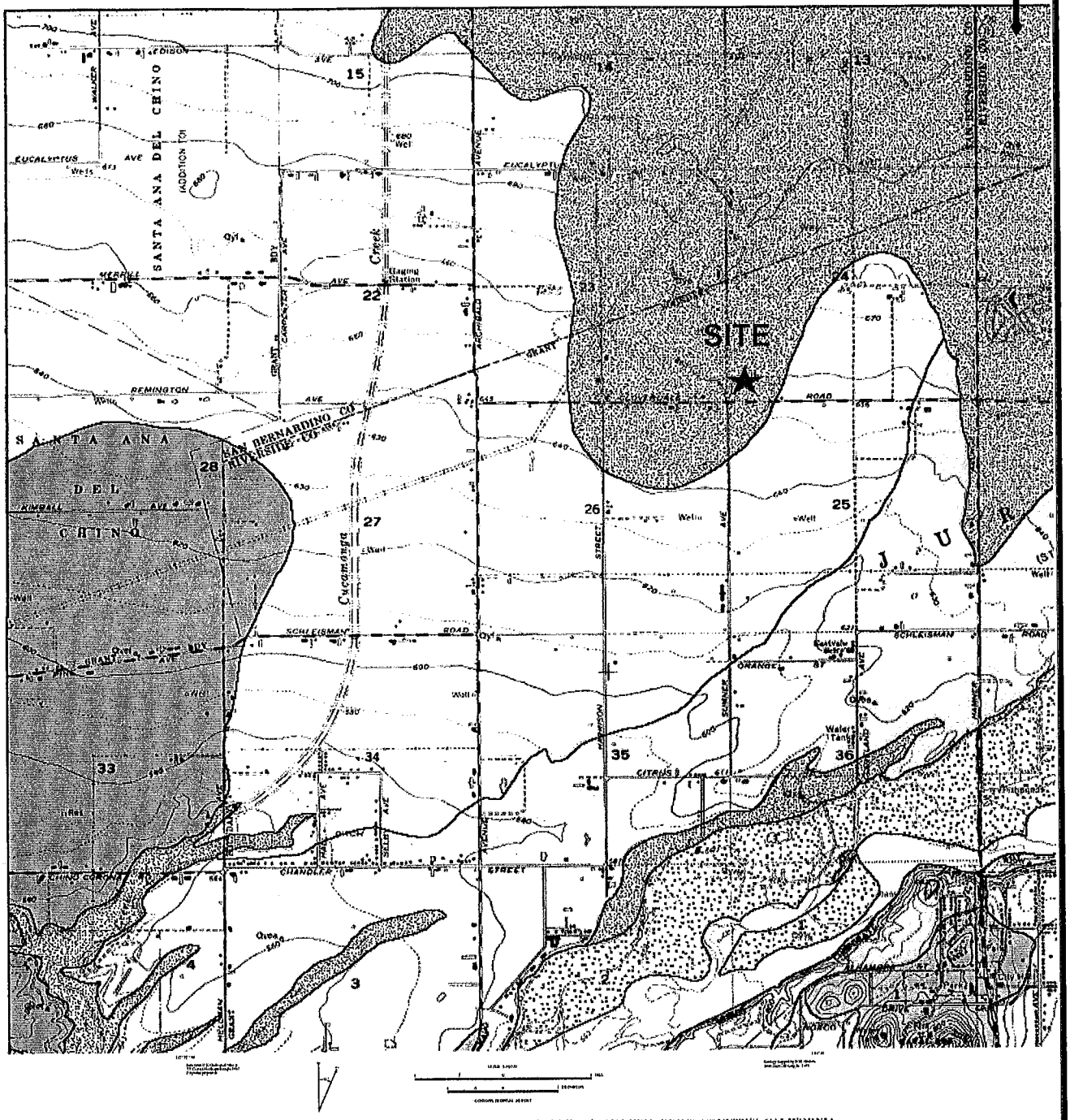
Geotechnical Solutions, Inc.

GEOLOGY MAP

USGS
science for a changing world

U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

117°37' 30"
34°00'



GEOLOGIC MAP OF THE CORONA NORTH 7.5' QUADRANGLE, RIVERSIDE and SAN BERNARDINO COUNTIES, CALIFORNIA

Version 1.0

By

Douglas M. Morton[1] and C.H. Grey, Jr.[2,3]

Digital preparation by

Kelly R. Bovard[1] and Michael Dawson[1]

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Sage Creek Center

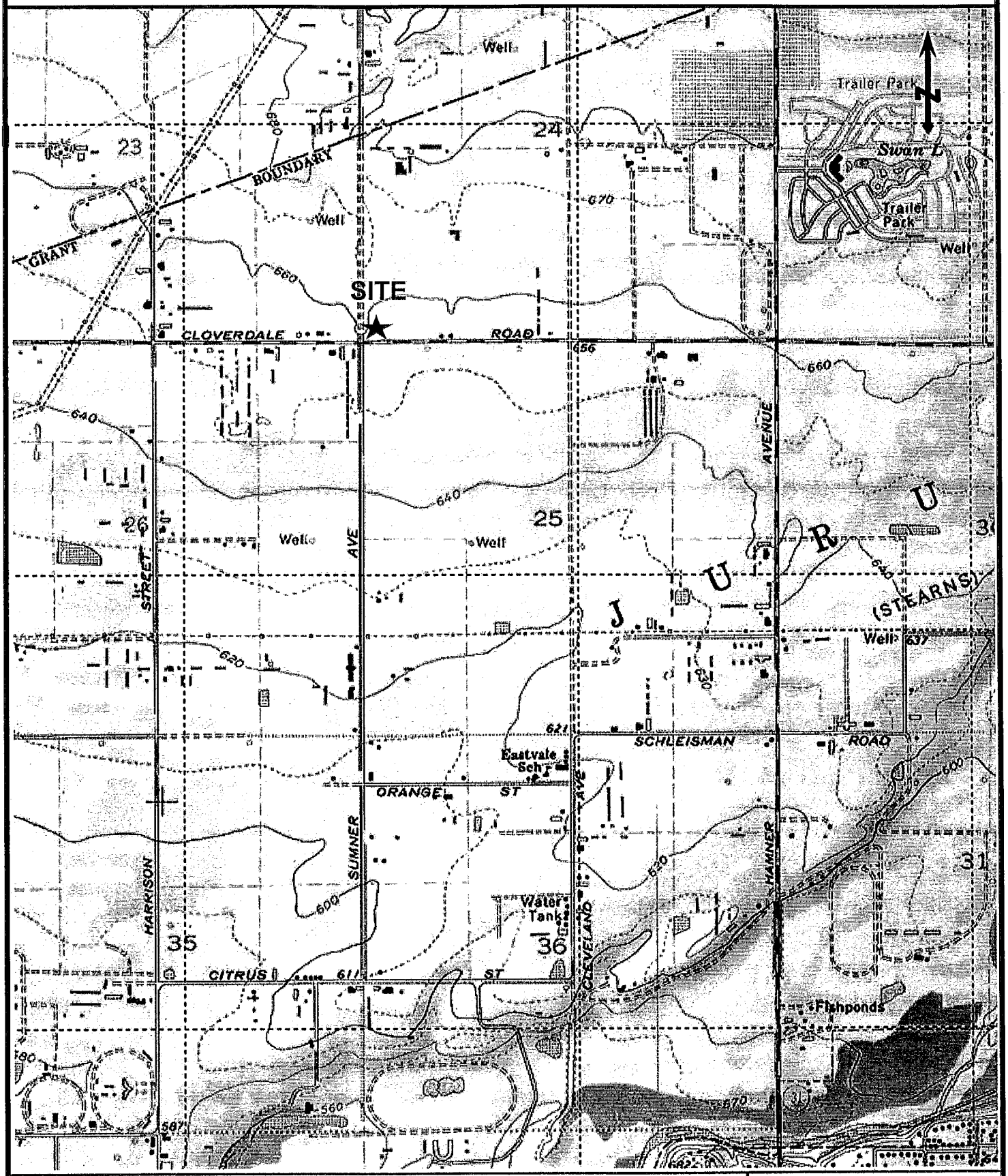
NE of Limonite & Sumner Avenue, Corona, California

Project No. G-3510-06

Plate: C-2

Geotechnical Solutions, Inc.

SITE TOPO MAP



Sage Creek Center

NE of Limonite & Sumner Avenue, Corona, California

Project No. G-3510-06

Plate: D

Geotechnical Solutions, Inc.

Project :	Sage Creek Center	Key to Log of Test Hole Plate No. E
Project Location:	NE of Limonite & Sumner Avenue, Corona, California	
Project Number:	G-3510-06	

Elevation, feet	Depth, feet	SAMPLES: Type	SAMPLES: Number	SAMPLES: Penetration Resistance, Blows / 6 in.	No Recovery (NR)	Blows / 12 in	MATERIAL DESCRIPTION	Moisture Content, %	Dry Unit Weight, pcf	Percent Passing No. 200 Sieve	OTHER TESTS AND REMARKS
1	2	3	4	5	6	7	8	9	10	11	12

COLUMN DESCRIPTIONS

1 **Elevation:** Elevation in feet referenced to mean sea level (MSL) or site datum.

2 **Depth:** Depth in feet below the ground surface.

3 **Sample Type:** Type of soil sample collected at depth interval shown; sampler symbols are explained below.

4 **Sample Number:** Sample identification number; "[NR]" after number indicates no sample recovery.

5 **Blows / 6 in.:** Number of blows to advance driven sampler each 6-inch drive interval, or distance notes, using a 140-lb hammer with a 30-inch drop (unless otherwise noted)

6 **No Recovery (NR)** No recovery of sample

7 **Blows / 12 in.:** Blows per 12" based on Col. 5 equal to uncorrected N-Value where SPT used

8 **Material Description:** Description of material encountered; may include color, moisture, grain size, and density / consistency. Approx. "and" = 35%-50%; "some" = 20%-35%; "little" = 10%-20%; "trace" = 0%-10%.

9 **Moisture Content:** Moisture content of sample, as percentage of dry weight of soil, meausred in lab according to ASTM D2937.

10 **Dry Unit Weight:** Dry unit weight of soil sample, in pounds per cubic foot, measured in lab according to ASTM D422.

11 **Percent Passing No. 200 Sieve:** Percent of soil by weight finer than the No. 200 sieve according to ASTM D422.

12 **Other Tests and Remarks:** Comments and observations regarding drilling or sampling made by driller or field personnel. Other lab tests are indicated using abbreviations explained below.

TYPICAL SAMPLER GRAPHIC SYMBOLS

- California (ring-lined) (C-1, 2, ...)
- Modified California (brass tube-lined)
- Standard Penetration Test (SPT) split spoon (S-1,2,.....)
- Shelby Tube
- Bulk Sample
- Grab Sample

OTHER LABORATORY TEST ABBREVIATIONS

AL	Atterberg Limits Test (ASTM D4318)
COMP	Compaction test by modified effort (ASTM D1557)
CONS	One-dimensional consolidation test (ASTM D2435)
DS	Direct shear test (ASTM D3080)
EI	Expansion index test (ASTM 4829), index at 50% saturation
HD	Hydrometer analysis (ASTM D422), %<5 micros
LL	Liquid Limit from Atterberg Limites test
PI	Plasticity Index from Atterberg Limits test
SA	Sieve analysis (ASTM D422), %<#200 sieve
SE	Sand equivalent test for fines contamination (ASTM D2419)
UC	Unconfined compressive strength test (ASTM D2166)
WA	Wash analysis (ASTM D422), %<#200 sieve

OTHER GRAPHIC SYMBOLS

- First water encountered at time of drilling and sampling (ATD)
- Static water level measured at specified time after drilling
- Change in material properties within a lithologic stratum
- Inferred contact between soil strata or gradational lithologic change

Soil Classification are based on the Unified Soil Classification System. Descriptions and stratum lines are interpretive; field descriptions may have been modified to reflect lab test results. Descriptions on these logs apply only at the specific boring locations and at the time the borings were advanced; they are not warranted to be representative of subsurface conditions between samples, at other locations, or times.

Project :	**Sage Creek Center**	**LOG OF TEST HOLE**	Borehole No. B-1
Project Location :	**NE of Limonite & Sumner Avenue, Corona, California**		Plate No. E-1a
Project Number :	**G-3510-06**		Page 1 of 2

Date(s) Drilled :	August 7, 2007	Logged By :	Omid	Checked By :	A. Baha
Drilling Method :	Hollow-Stem Auger	Drill Bit Size / Type :	8-inch-OD rock bit	Total Depth of Borehole, feet :	51.5
Drill Rig Type :	Mobile B-61	Drilling Contractor :	Redman	Approx. Surface Elevation, feet :	171 feet MSL
Groundwater Level and Date Measured:	None	Sampling Method :	California (ring), SPT bulk	Hammer Data :	Downhole wire 140 lbs / 30-inch drop
Borehole Backfill :	Drill cuttings	Comments :	Refer to site plan for location		

Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Penetration Resistance, Blows / 6"	SAMPLES No Recovery (NR)	Blows / 12"	MATERIAL DESCRIPTION	Moisture Content, %	Dry Unit Weight, pcf	Percent Passing No. 200 Sieve (%)	OTHER TESTS AND REMARKS
171	0		Bag #1				@ 0-12' : **FILL**				HD: SA:SI:CL 88:7:5
	2		C-1	18-36-39		75	@2': Olive Brown, **Fine SAND,** slightly silty, moist, very dense	8	119		
166	5		C-2	10-20-32		52	@5': Dark Grayish Brown, **Fine Sandy SILT,** moist hard, few fine subangular gravel to 1/4" dia.	10	120		
161	10		C-3	14-23-27		50	@10': Dark Grayish Brown, **Fine Sandy SILT to Silty v. fine** SAND, moist, hard to dense	13	117		
							Native @ 12'				
156	15		S-1	7-10-13		23	@15': Gray **SILT**, moist, very stiff, scattered black flakes of charcoal	2	-		
151	20		S-2	8-11-15		26	@20': Dark Grayish Brown, **Silty fine SAND,** moist med. dense	8	-		
146	25		S-3	11-21-27		48	@25': Grayish Brown, **v. fine grained sandy SILT to silty fine grained SAND**, moist, dense, mottled.	7			
141	30		S-4	12-14-26		40	@30': Light Olive Gray, **slightly silty fine SAND** w/scattered subrounded gravel clusts to 1/4", moist med. dense	5			
136	35		S-5	6-10-11		21	@35': Light Olive Gray, **slightly silty fine SAND** w/scattered subrounded gravel clusts to 1/4", moist med. dense	29			
131	40		S-6	5-7-7		14	@40': Olive Brown, silty **CLAY,** stiff, moist- v. moist, mottled	39			
126	45		S-7	10-15-17		32		15	-		

GEOTECHNICAL SOLUTIONS, INC.

Project :	**Sage Creek Center**	**LOG OF TEST HOLE**	Borehole No. B-1
Project Location :	**NE of Limonite & Sumner Avenue, Corona, California**		Plate No. E-1b
Project Number :	**G-3510-06**		Page 1 of 2

Date(s) Drilled :	August 7, 2007	Logged By :	Omid	Checked By :	A. Baha
Drilling Method :	Hollow-Stem Auger	Drill Bit Size / Type :	8-inch-OD rock bit	Total Depth of Borehole, feet :	51.5
Drill Rig Type :	Mobil B-61	Drilling Contractor :	Redman	Approx. Surface Elevation, feet :	171 feet MSL
Groundwater Level and Date Measured:	None	Sampling Method :	California (ring), SPT bulk	Hammer Data :	Downhole wire 140 lbs / 30-inch drop
Borehole Backfill :	Drill cuttings	Comments :	Refer to site plan for location		

Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Penetration Resistance, Blows / 6"	SAMPLES No Recovery (NR)	Blows / 12"	MATERIAL DESCRIPTION	Moisture Content, %	Dry Unit Weight, pcf	Percent Passing No. 200 Sieve (%)	OTHER TESTS AND REMARKS
121	45		S-7	10-15-17		32	@45': Olive, **silty SAND**, mottled w/ red oxide stains, moist, dense	15	-		
116	50		S-8	7-17-26		42	@50': Olive, **silty SAND** w/ trace of fine subangular gravel to 1/4" diameter, moist, dense	12	-		
							Total Depth of Drilling = 51.5 feet No Groundwater was encountered. Backfilled w/cuttings				

GEOTECHNICAL SOLUTIONS, INC.

Project :	**Sage Creek Center**	**LOG OF TEST HOLE**	Borehole No. B-2
Project Location :	**NE of Limonite & Sumner Avenue, Corona, California**		Plate No. E-2
Project Number :	**G-3510-06**		Page 1 of 1

Date(s) Drilled :	August 7, 2007	Logged By :	Omid	Checked By :	A. Baha
Drilling Method :	Hollow-Stem Auger	Drill Bit Size / Type :	8-inch-OD rock bit	Total Depth of Borehole, feet :	31.5
Drill Rig Type :	Mobile B-61	Drilling Contractor :	Redman	Approx. Surface Elevation, feet :	171 feet MSL
Groundwater Level and Date Measured:	None	Sampling Method :	California (ring), SPT bulk	Hammer Data :	Downhole wire 140 lbs / 30-inch drop
Borehole Backfill :	Drill cuttings	Comments :	Refer to site plan for location		

Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Penetration Resistance, Blows / 6"	SAMPLES No Recovery (NR)	Blows / 12"	MATERIAL DESCRIPTION	Moisture Content, %	Dry Unit Weight, pcf	Percent Passing No. 200 Sieve (%)	OTHER TESTS AND REMARKS
171	0		Bag #1				@0-8' : **FILL**				HD: SA:SI:CL
	2		C-1	9-17-31		48	@2': Olive **silty SAND** w/ trace of fine gravel to 1/4" dia. moist, dense	17	110		
166	5		C-2	11-15-22		37	@5': Olive gray, **v. fine grained sandy SILT**, moist, stiff - hard	13	109		
							Native @ 8'				
161	10		C-3	18-22-39		61	@10': Dark gray, **fine silty SAND**, rotten egg odor (cows?), moist, dense, looks like native (?)	10	111		
156	15		S-1	7-9-16		25	@15': Dark gray, **slightly silty - v. f. silty SAND to SAND**, moist, med. dense	14	-		
151	20		S-2	15-22-34		56	@20': Gray to light gray, **gravelly SAND**, med. moist, dense med. to large subrounded gravel clusts in cuttings to 3" dia.	3	-		
146	25		S-3	23-33-41		74	@25': Gray, **med. gr. SAND**, scattered gravel to 1/2", v. dense slightly moist	2	-		
141	30		S-4	16-18-19		37	@30': Gray, **SILT**, moist - v. moist, v. stiff	14	-		
							Total Depth of Drilling = 31.5 feet No Groundwater was encountered. Backfilled w/cuttings				

GEOTECHNICAL SOLUTIONS, INC.

Project :	**Sage Creek Center**	**LOG OF TEST HOLE**	Borehole No. B-3
Project Location :	**NE of Limonite & Sumner Avenue, Corona, California**		Plate No. E-3
Project Number :	**G-3510-06**		Page 1 of 1

Date(s) Drilled :	August 7, 2007	Logged By :	Omid	Checked By :	A. Baha
Drilling Method :	Hollow-Stem Auger	Drill Bit Size / Type :	8-inch-OD rock bit	Total Depth of Borehole, feet :	31.5
Drill Rig Type :	Mobile B-61	Drilling Contractor :	Redman	Approx. Surface Elevation, feet :	171 feet MSL
Groundwater Level and Date Measured:	None	Sampling Method :	California (ring), SPT bulk	Hammer Data :	Downhole wire 140 lbs / 30-inch drop
Borehole Backfill :	Drill cuttings	Comments :	Refer to site plan for location		

Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Penetration Resistance, Blows / 6"	SAMPLES No Recovery (NR)	Blows / 12"	MATERIAL DESCRIPTION	Moisture Content, %	Dry Unit Weight, pcf	Percent Passing No. 200 Sieve (%)	OTHER TESTS AND REMARKS
171	0		Bag #1				@ 0-12' : **FILL**				**HD: SA:SI:CL 87:8:5**
	2		C-1	9-27-34		61	@0-2': Dark Olive **silty SAND**, moist, dense - v. dense	6	119		
166	5		C-2	11-30-36		66	@5': Olive, **silty SAND**, moist, dense	10	120		
161	10		C-3	12-25-39		64	@10': Olive gray, **slightly silty SAND**, moist, dense - v. dense	11	118		
							Native @ 12'				
156	15		S-1	7-8-14		22	@15': Olive gray, **clayey SILT to silty CLAY**, flakes of black & red - brown charcoal, moist, stiff	29	-		
151	20		S-2	3-4-15		19	@20':Same as above stiff - firm	20	-		
146	25		S-3	8-14-19		33	@25': Olive gray, **SILT, slightly clayey**, moist, stiff-hard	19			
141	30		S-4	10-12-15		27	@30': Olive, **v. fine sandy SILT**, moist, stiff-hard	17			
							Total Depth of Drilling = 31.5 feet No Groundwater was encountered. Backfilled w/cuttings				

GEOTECHNICAL SOLUTIONS, INC.

Project : **Sage Creek Center**		**LOG OF TEST HOLE**	Borehole No. B-4
Project Location : **NE of Limonite & Sumner Avenue, Corona, California**			Plate No. E-4
Project Number : **G-3510-06**			Page 1 of 1

Date(s) Drilled :	August 7, 2007	Logged By :	Omid	Checked By :	A. Baha
Drilling Method :	Hollow-Stem Auger	Drill Bit Size / Type :	8-inch-OD rock bit	Total Depth of Borehole, feet :	21.5
Drill Rig Type :	Mobile B-61	Drilling Contractor :	Redman	Approx. Surface Elevation, feet :	171 feet MSL
Groundwater Level and Date Measured:	None	Sampling Method :	California (ring), SPT bulk	Hammer Data :	Downhole wire 140 lbs / 30-inch drop
Borehole Backfill :	Drill cuttings	Comments :	Refer to site plan for location		

Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Penetration Resistance, Blows / 6"	SAMPLES No Recovery (NR)	Blows / 12"	MATERIAL DESCRIPTION	Moisture Content, %	Dry Unit Weight, pcf	Percent Passing No. 200 Sieve (%)	OTHER TESTS AND REMARKS
171	0						Base at Top and up to10': **FILL**				**HD: SA:SI:CL**
							fine SAND				**78:15:7**
	2		C-1	11-22-37		59	@2': Olive Brown, **fine SAND**, moist, medium dense	14	109		
166	5		C-2	27-39-47		86	@5': Olive Brown, fine **silty SAND**, moist, dense	13	112		
161	10						Native @10'				
			C-3	10-10-14		24	@10': Olive, **SILT**, Sandy, moist, stiff	22	109		
156	15		S-1	9-9-11		20	@15': Olive, **silty fine SAND**, moist, very stiff	9	-		
151	20		S-2	9-8-12		20	@20':Olive, **v. silty SAND - v. sandy SILT**, moist, very stiff	16	-		
							Total Depth of Drilling = 21.5 feet				
							No Groundwater was encountered.				
							Backfilled w/ cuttings				

GEOTECHNICAL SOLUTIONS, INC.

Project :	**Sage Creek Center**	**LOG OF TEST HOLE**	Borehole No. B-5
Project Location :	**NE of Limonite & Sumner Avenue, Corona, California**		Plate No. E-5
Project Number :	**G-3510-06**		Page 1 of 1

Date(s) Drilled :	August 7, 2007	Logged By :	Omid	Checked By :	A. Baha
Drilling Method :	Hollow-Stem Auger	Drill Bit Size / Type :	8-inch-OD rock bit	Total Depth of Borehole, feet :	6.5
Drill Rig Type :	Mobile B-61	Drilling Contractor :	Redman	Approx. Surface Elevation, feet :	171 feet MSL
Groundwater Level and Date Measured:	None	Sampling Method :	California (ring), SPT bulk	Hammer Data :	Downhole wire 140 lbs / 30-inch drop
Borehole Backfill :	Drill cuttings	Comments :	Refer to site plan for location		

Elevation, feet	Depth, feet	SAMPLES: Type	SAMPLES: Number	SAMPLES: Penetration Resistance, Blows / 6"	SAMPLES: No Recovery (NR)	Blows / 12"	MATERIAL DESCRIPTION	Moisture Content, %	Dry Unit Weight, pcf	Percent Passing No. 200 Sieve (%)	OTHER TESTS AND REMARKS
171	0		Bag #1				Base at Top and up to 6.5'+ **FILL** fine SAND				**HD: SA:SI:CL 77:16:7**
	2		C-1	11-27-31		58	@2': Olive Brown, **slightly silty fine SAND**, moist, medium dense	5	120		
166	5						@5': Same as above				
							Total Depth of Drilling = 6.5 feet No Groundwater was encountered. Backfilled w/cuttings				

GEOTECHNICAL SOLUTIONS, INC.

Project :	**Sage Creek Center**	**LOG OF TEST HOLE**	Borehole No. B-6
Project Location :	**NE of Limonite & Sumner Avenue, Corona, California**		Plate No. E-6
Project Number :	**G-3510-06**		Page 1 of 1

Date(s) Drilled :	August 7, 2007	Logged By :	Omid	Checked By :	A. Baha
Drilling Method :	Hollow-Stem Auger	Drill Bit Size / Type :	8-inch-OD rock bit	Total Depth of Borehole, feet :	21.5
Drill Rig Type :	Mobile B-61	Drilling Contractor :	Redman	Approx. Surface Elevation, feet :	171 feet MSL
Groundwater Level and Date Measured:	None	Sampling Method :	California (ring), SPT bulk	Hammer Data :	Downhole wire 140 lbs / 30-inch drop
Borehole Backfill :	Drill cuttings	Comments :	Refer to site plan for location		

Elevation, feet	Depth, feet	SAMPLES Type	Number	Penetration Resistance, Blows / 6"	No Recovery (NR)	Blows / 12"	MATERIAL DESCRIPTION	Moisture Content, %	Dry Unit Weight, pcf	Percent Passing No. 200 Sieve (%)	OTHER TESTS AND REMARKS
171	0						Base at Top and up to 7': **FILL** fine SAND				HD: SA:SI:CL 80:15:5
	2		C-1	9-17-23		40	@2': Olive Brown, **silty fine SAND,** slightly moist, med dense	7	114		
166	5		C-2	14-33-39		72	@5': Same as above	10	110		
							Native @ 7'				
161	10		C-3	13-20-31		51	@10': Same as above Dark Olive	13	119		
156	15		S-1	9-13-19		32	@15': Olive brown, **fine - med. SAND,** moist, dense	4	-		
151	20		S-2	14-24-29		53	@20':Olive brown, **fine - coarse SAND,** moist, very dense	3	-		
							Total Depth of Drilling = 21.5 feet No Groundwater was encountered. Backfilled w/ cuttings				

GEOTECHNICAL SOLUTIONS, INC.

Project :	**Sage Creek Center**	**LOG OF TEST HOLE**	Borehole No. B-7
Project Location :	**NE of Limonite & Sumner Avenue, Corona, California**		Plate No. E-7
Project Number :	**G-3510-06**		Page 1 of 1

Date(s) Drilled :	August 7, 2007	Logged By :	Omid	Checked By :	A. Baha
Drilling Method :	Hollow-Stem Auger	Drill Bit Size / Type :	8-inch-OD rock bit	Total Depth of Borehole, feet :	21.5
Drill Rig Type :	Mobile B-61	Drilling Contractor :	Redman	Approx. Surface Elevation, feet :	171 feet MSL
Groundwater Level and Date Measured:	None	Sampling Method :	California (ring), SPT bulk	Hammer Data :	Downhole wire 140 lbs / 30-inch drop
Borehole Backfill :	Drill cuttings	Comments :	Refer to site plan for location		

Elevation, feet	Depth, feet	SAMPLES Type	Number	Penetration Resistance, Blows / 6"	No Recovery (NR)	Blows / 12"	MATERIAL DESCRIPTION	Moisture Content, %	Dry Unit Weight, pcf	Percent Passing No. 200 Sieve (%)	OTHER TESTS AND REMARKS
171	0						Base at Top and up to 5': **FILL** Silty SAND				**HD: SA:SI:CL 75:20:5**
	2		C-1	29-50/4"		>100	@2': Olive Brown, slightly **silty fine SAND,** slightly moist, very dense	4	109		
166	5						NATIVE @5':				
			C-2	13-18-26		44	@5': Dark Olive, **silty fine SAND**, moist, medium dense	11	114		
161	10		C-3	14-27-30		57	@10': Dark Olive, **fine SAND**, moist, very dense	10	116		
156	15		S-1	8-12-17		29	@15': Olive, **SILT**, moist, very stiff	19	-		
151	20		S-2	26-34-41		75	@20':Olive , **fine - coarse SAND**, some pebble, moist, hard	3	-		
							Total Depth of Drilling = 21.5 feet No Groundwater was encountered. Backfilled w/ cuttings				

GEOTECHNICAL SOLUTIONS, INC.

Project :	**Sage Creek Center**	**LOG OF TEST HOLE**	Borehole No. B-8
Project Location :	**NE of Limonite & Sumner Avenue, Corona, California**		Plate No. E-8
Project Number :	**G-3510-06**		Page 1 of 1

Date(s) Drilled :	August 7, 2007	Logged By :	Omid	Checked By :	A. Baha
Drilling Method :	Hollow-Stem Auger	Drill Bit Size / Type :	8-Inch-OD rock bit	Total Depth of Borehole, feet :	21.5
Drill Rig Type :	Mobile B-61	Drilling Contractor :	Redman	Approx. Surface Elevation, feet :	171 feet MSL
Groundwater Level and Date Measured:	None	Sampling Method :	California (ring), SPT bulk	Hammer Data :	Downhole wire 140 lbs / 30-Inch drop
Borehole Backfill :	Drill cuttings	Comments :	Refer to site plan for location		

Elevation, feet	Depth, feet	SAMPLES Type	SAMPLES Number	SAMPLES Penetration Resistance, Blows / 6"	SAMPLES No Recovery (NR)	Blows / 12"	MATERIAL DESCRIPTION	Moisture Content, %	Dry Unit Weight, pcf	Percent Passing No. 200 Sieve (%)	OTHER TESTS AND REMARKS
171	0						Base at Top and up to 9': **FILL**				**HD: SA:SI:CL 87:11:2**
	2						Fine SAND				
			C-1	11-28-36		64	@2': Olive Brown, slightly **silty fine SAND,** moist	6	120		
166	5										
			C-2	19-50/6"		>100	@5': Dark Olive, **silty fine SAND**, moist **(No recovery)**				
161	10						NATIVE @9':				
			C-3	19-23-27		50	@10': Olive, **SILT**, moist	15	92		
156	15										
			S-1	8-11-11		22	@15': Olive, **SILT**, moist	22	-		
151	20										
			S-2	11-18-31		49	@20':Olive , **fine - coarse SAND**, some pebble, moist	3	-		
							Total Depth of Drilling = 21.5 feet No Groundwater was encountered. Backfilled w/ cuttings				

GEOTECHNICAL SOLUTIONS, INC.

Project :	**Sage Creek Center**	**LOG OF TEST HOLE**	Borehole No. B-9
Project Location :	**NE of Limonite & Sumner Avenue, Corona, California**		Plate No. E-9
Project Number :	**G-3510-06**		Page 1 of 1

Date(s) Drilled :	August 7, 2007	Logged By :	Omid	Checked By :	A. Baha
Drilling Method :	Hollow-Stem Auger	Drill Bit Size / Type :	8-inch-OD rock bit	Total Depth of Borehole, feet :	21.5
Drill Rig Type :	Mobile B-61	Drilling Contractor :	Redman	Approx. Surface Elevation, feet :	171 feet MSL
Groundwater Level and Date Measured:	None	Sampling Method :	California (ring), SPT bulk	Hammer Data :	Downhole wire 140 lbs / 30-inch drop
Borehole Backfill :	Drill cuttings	Comments :	Refer to site plan for location		

Elevation, feet	Depth, feet	SAMPLES Type	Number	Penetration Resistance, Blows / 6"	No Recovery (NR)	Blows / 12"	MATERIAL DESCRIPTION	Moisture Content, %	Dry Unit Weight, pcf	Percent Passing No. 200 Sieve (%)	OTHER TESTS AND REMARKS
171	0						Base at Top and up to 9': **FILL** Fine SAND				HD: SA:SI:CL 87:10:3
	2		C-1	15-20-28		48	@2': Olive, **fine - coarse SAND,** moist, medium dense	4	118		
166	5		C-2	13-18-25		43	@5': Dark Olive, slightly **silty fine SAND**, moist, medium dense	7	120		
161	10		C-3	9-13-21		33	Native @9': @10': Olive, **fine SAND**, moist, medium dense	6	116		
156	15		S-1	10-15-18		33	@15': Same as above	6	-		
151	20		S-2	11-7-10		17	@20':Olive , **fine sandy SILT**, moist, very stiff	2	-		
							Total Depth of Drilling = 21.5 feet No Groundwater was encountered. Backfilled w/ cuttings				

GEOTECHNICAL SOLUTIONS, INC.

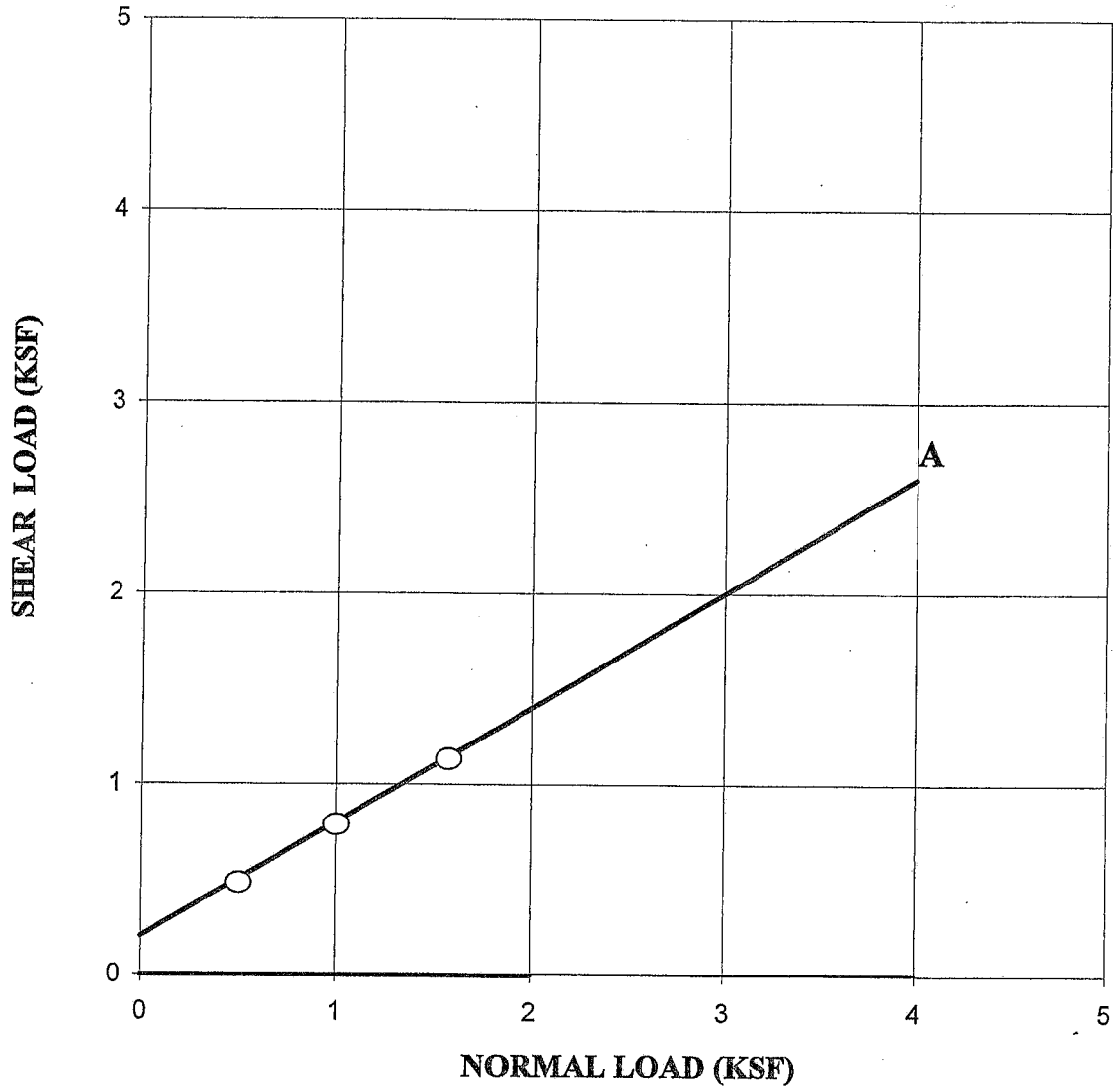
Project :	**Sage Creek Center**	**LOG OF TEST HOLE**	Borehole No. B-10
Project Location :	**NE of Limonite & Sumner Avenue, Corona, California**		Plate No. E-10
Project Number :	**G-3510-06**		Page 1 of 1

Date(s) Drilled :	August 7, 2007	Logged By :	Omid	Checked By :	A. Baha
Drilling Method :	Hollow-Stem Auger	Drill Bit Size / Type :	8-inch-OD rock bit	Total Depth of Borehole, feet :	21.5
Drill Rig Type :	Mobile B-61	Drilling Contractor :	Redman	Approx. Surface Elevation, feet :	171 feet MSL
Groundwater Level and Date Measured:	None	Sampling Method :	California (ring), SPT bulk	Hammer Data :	Downhole wire 140 lbs / 30-inch drop
Borehole Backfill :	Drill cuttings	Comments :	Refer to site plan for location		

Elevation, feet	Depth, feet	SAMPLES Type	Number	Penetration Resistance, Blows / 6"	No Recovery (NR)	Blows / 12"	MATERIAL DESCRIPTION	Moisture Content, %	Dry Unit Weight, pcf	Percent Passing No. 200 Sieve (%)	OTHER TESTS AND REMARKS
171	0						Base at Top and up to 10': **FILL** Fine SAND				**HD: SA:SI:CL**
	2		C-1	7-11-28		39	@2': Brown, **fine SAND,** moist, medium dense	4	119		
166	5		C-2	23-50/5"		>100	@2': Brown, **fine - coarse SAND,** moist, very dense	15	112		
161	10		C-3	11-16-21		37	Native @10' @10': Olive, **sandy SILT**, moist, very stiff	15	113		
156	15		S-1	9-13-19		32	@15': Olive brown, **silty SAND**, moist, dense	16	-		
151	20		S-2	8-8-11		19	@20':Same as above, medium dense	23	-		
							Total Depth of Drilling = 21.5 feet No Groundwater was encountered. Backfilled w/ cuttings				

GEOTECHNICAL SOLUTIONS, INC.

DIRECT SHEAR

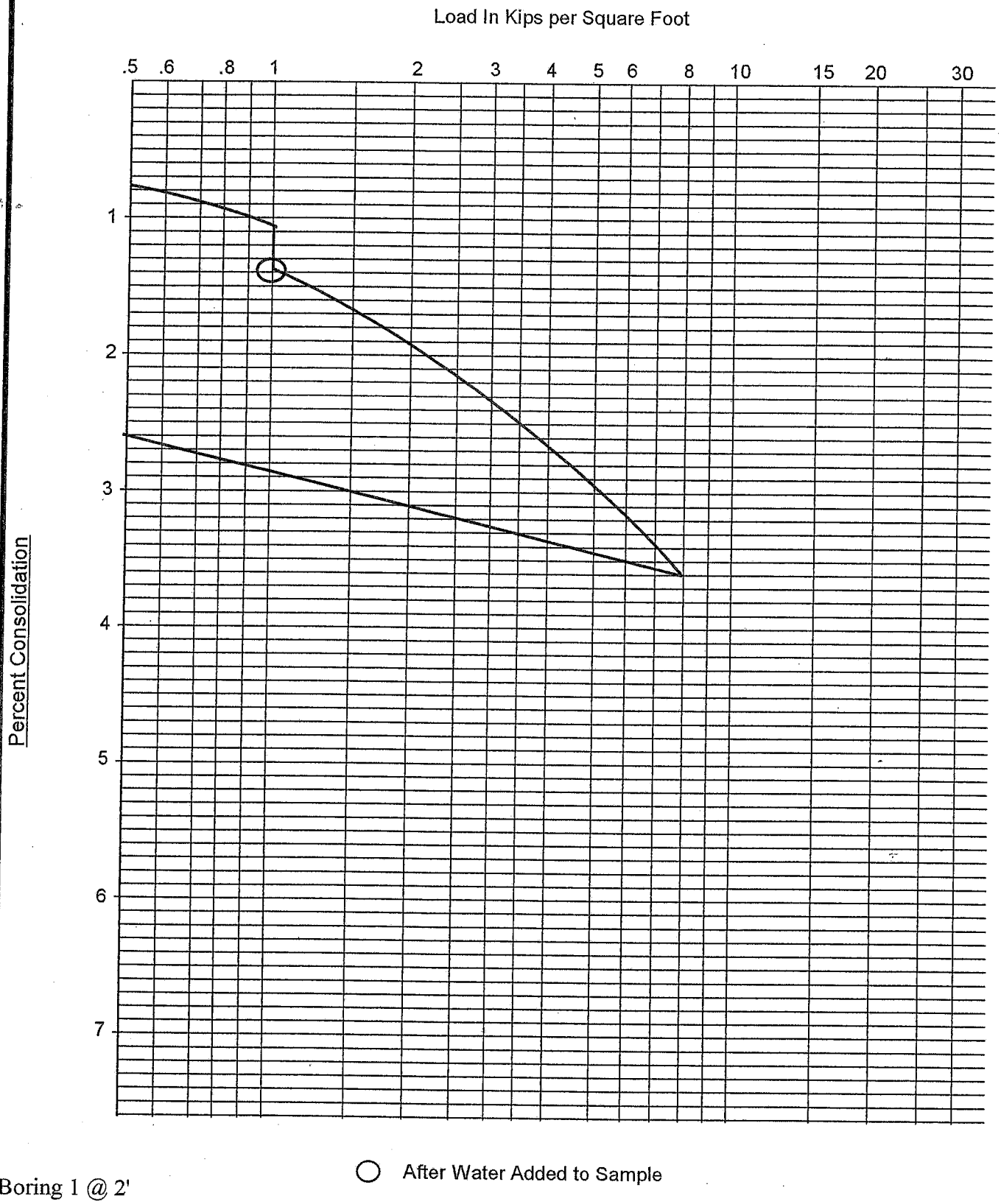


SYMBOL	LOCATION	DEPTH (FT)	TEST CONDITION	COHESION (PSF)	FRICTION (DEG)
A	Boring B-1	2	Saturated - Drained	200	31

Sage Creek Center NE of Limonite & Sumner Avenue, Corona, California	Project No.	G-3510-06
	Plate:	F

Geotechnical Solutions, Inc.

CONSOLIDATION

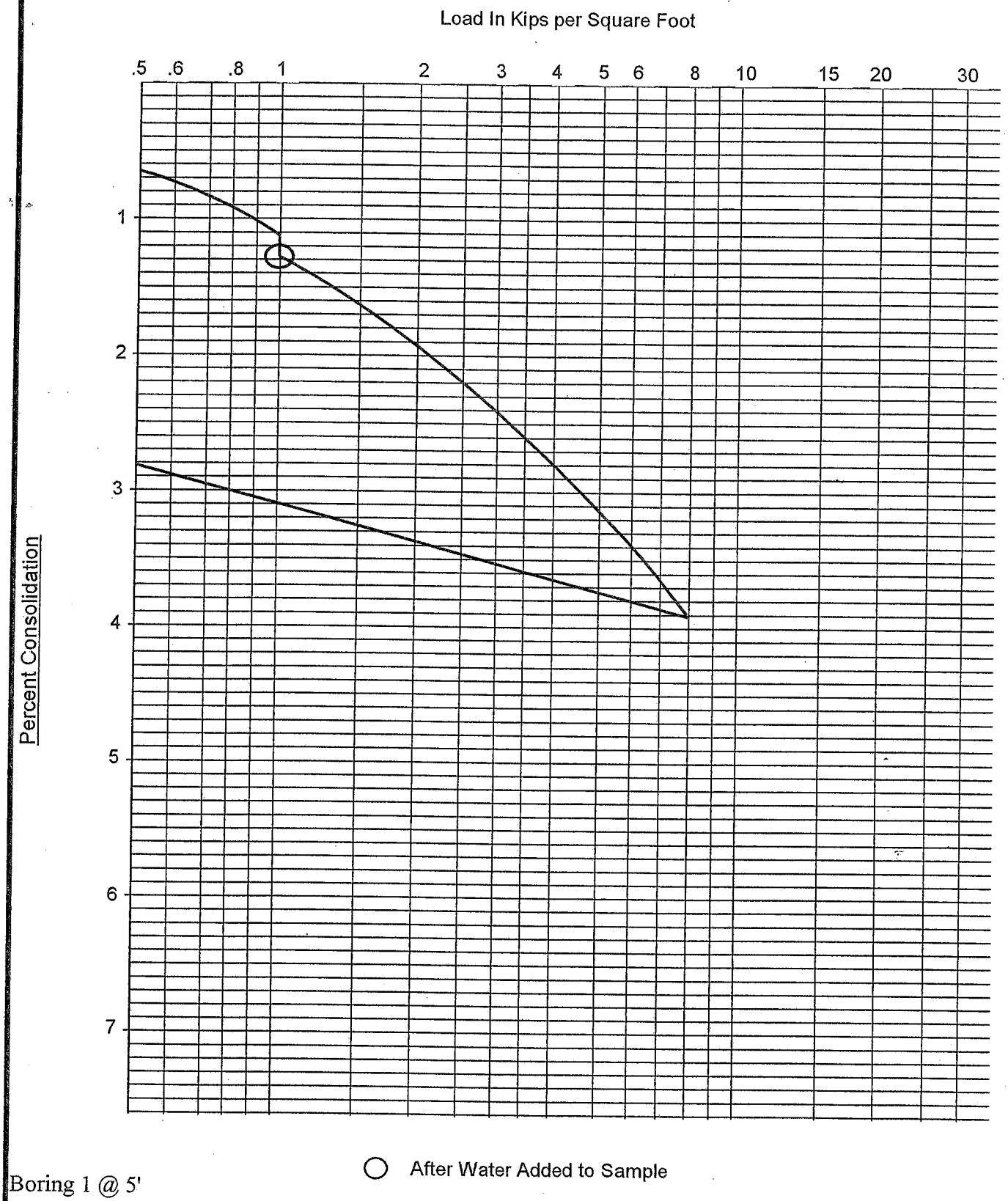


Boring 1 @ 2'

Sage Creek Center NE of Limonite & Sumner Avenue, Corona, California	Project No.	G-3510-06
	Plate:	G

Geotechnical Solutions, Inc.

CONSOLIDATION

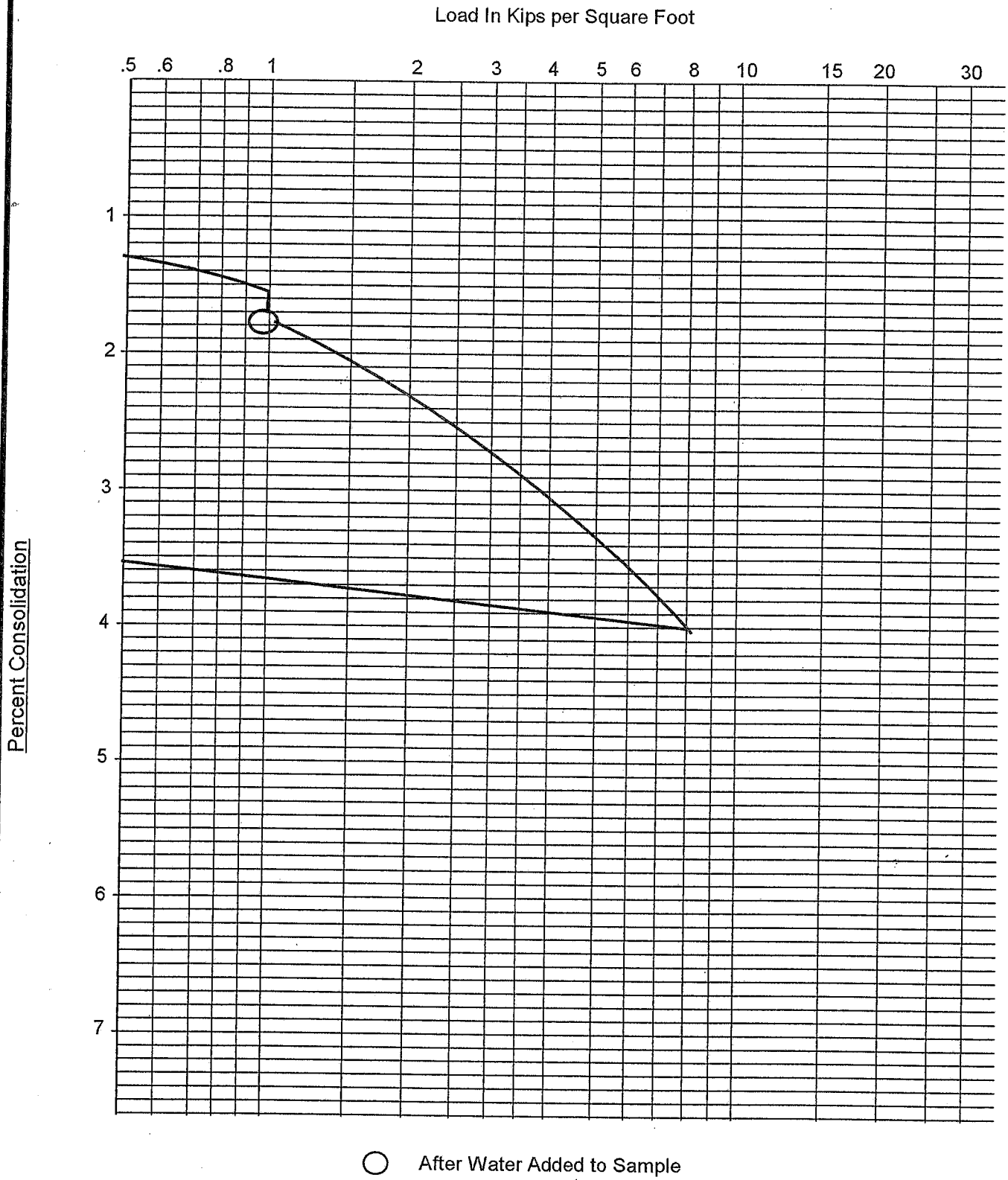


Boring 1 @ 5'

Sage Creek Center NE of Limonite & Sumner Avenue, Corona, California	Project No.	G-3510-06
	Plate:	H

Geotechnical Solutions, Inc.

CONSOLIDATION

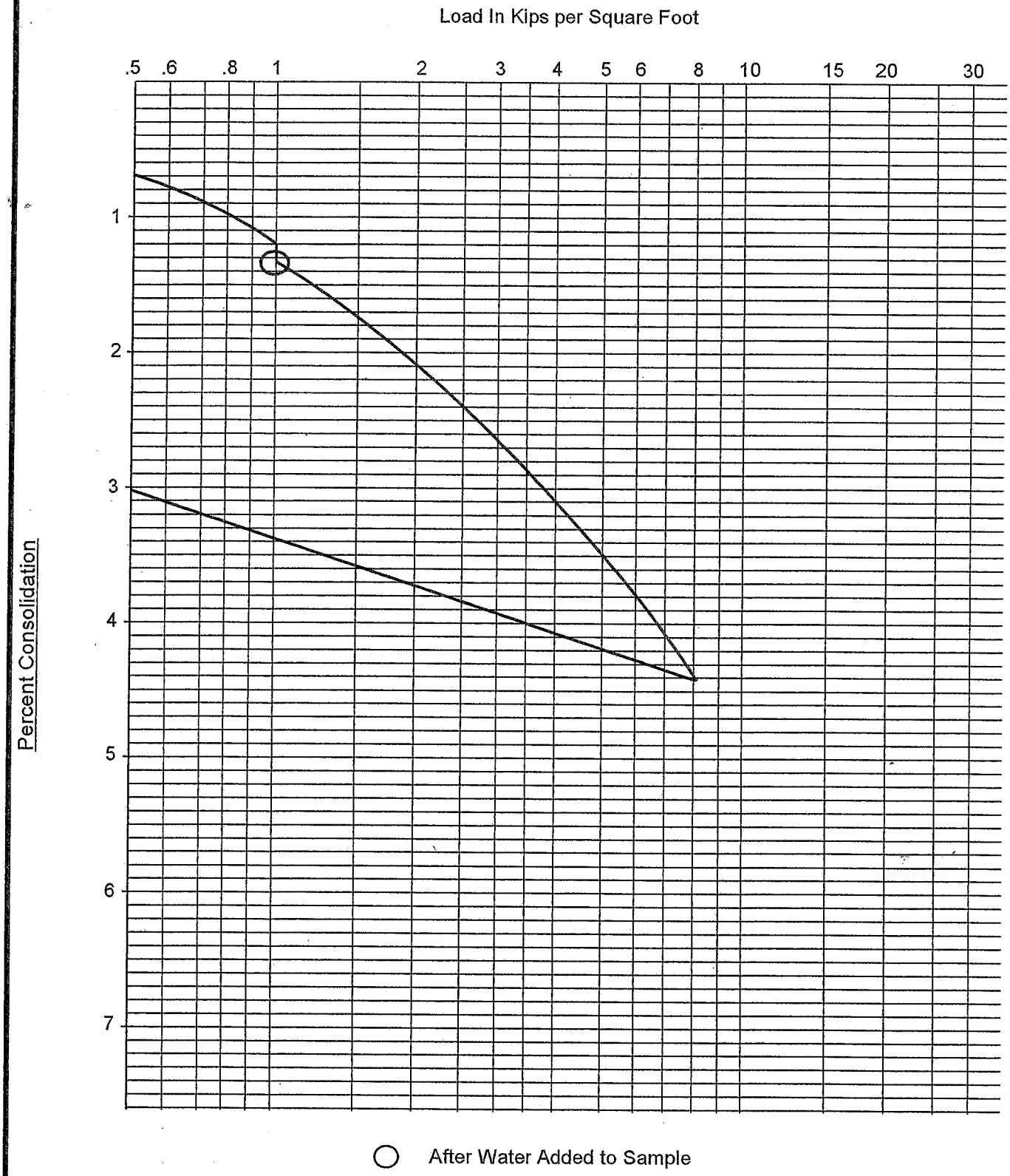


Boring 1 @ 10'

Sage Creek Center NE of Limonite & Sumner Avenue, Corona, California	Project No.	G-3510-06
	Plate:	I

Geotechnical Solutions, Inc.

CONSOLIDATION

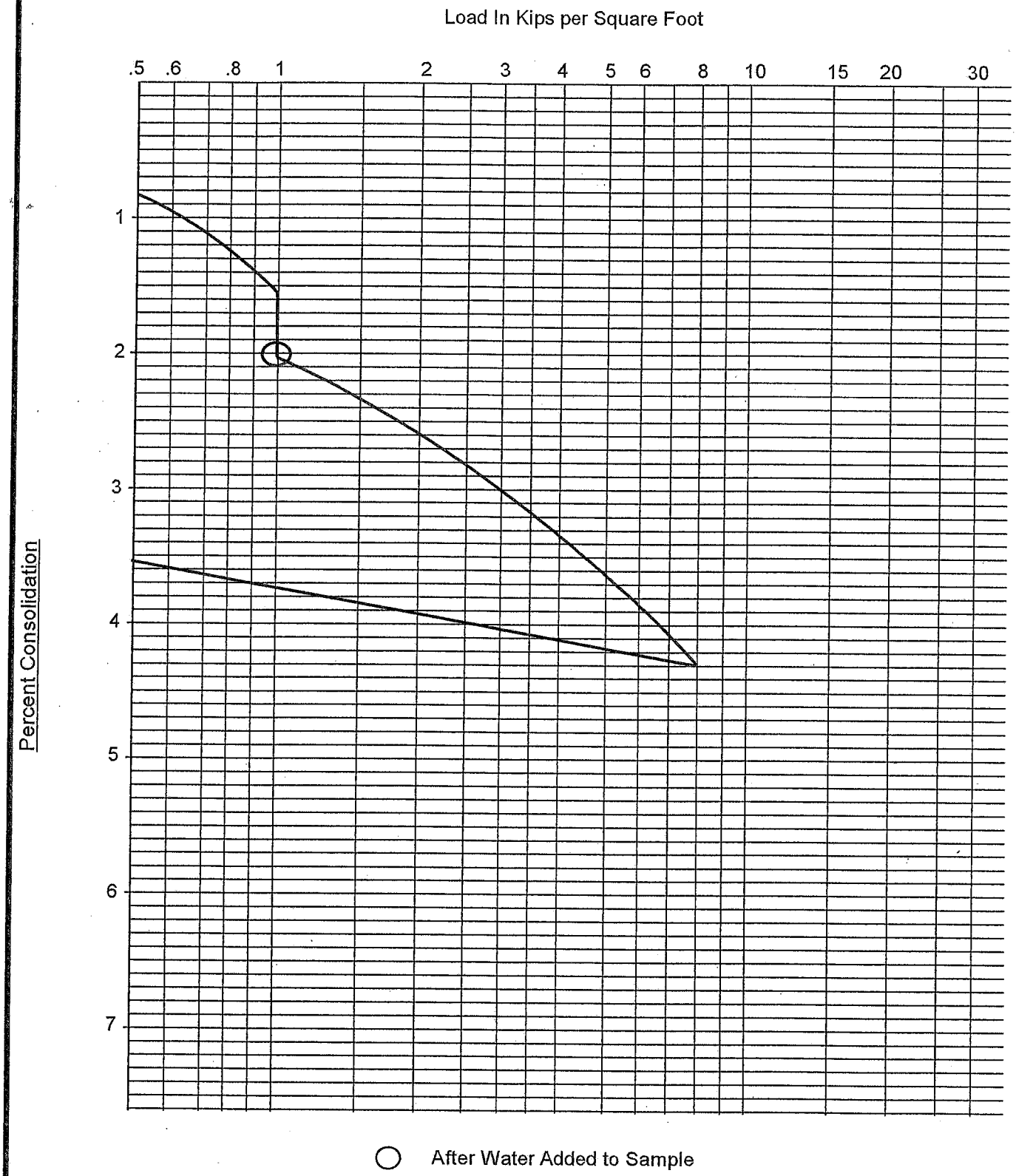


Boring 2 @ 5'

Sage Creek Center NE of Limonite & Sumner Avenue, Corona, California	Project No.	G-3510-06
	Plate:	J

Geotechnical Solutions, Inc.

CONSOLIDATION



Boring 2 @ 10'

Sage Creek Center NE of Limonite & Sumner Avenue, Corona, California	Project No.	G-3510-06
	Plate:	K

Geotechnical Solutions, Inc.

Appendix B

Seismic Data

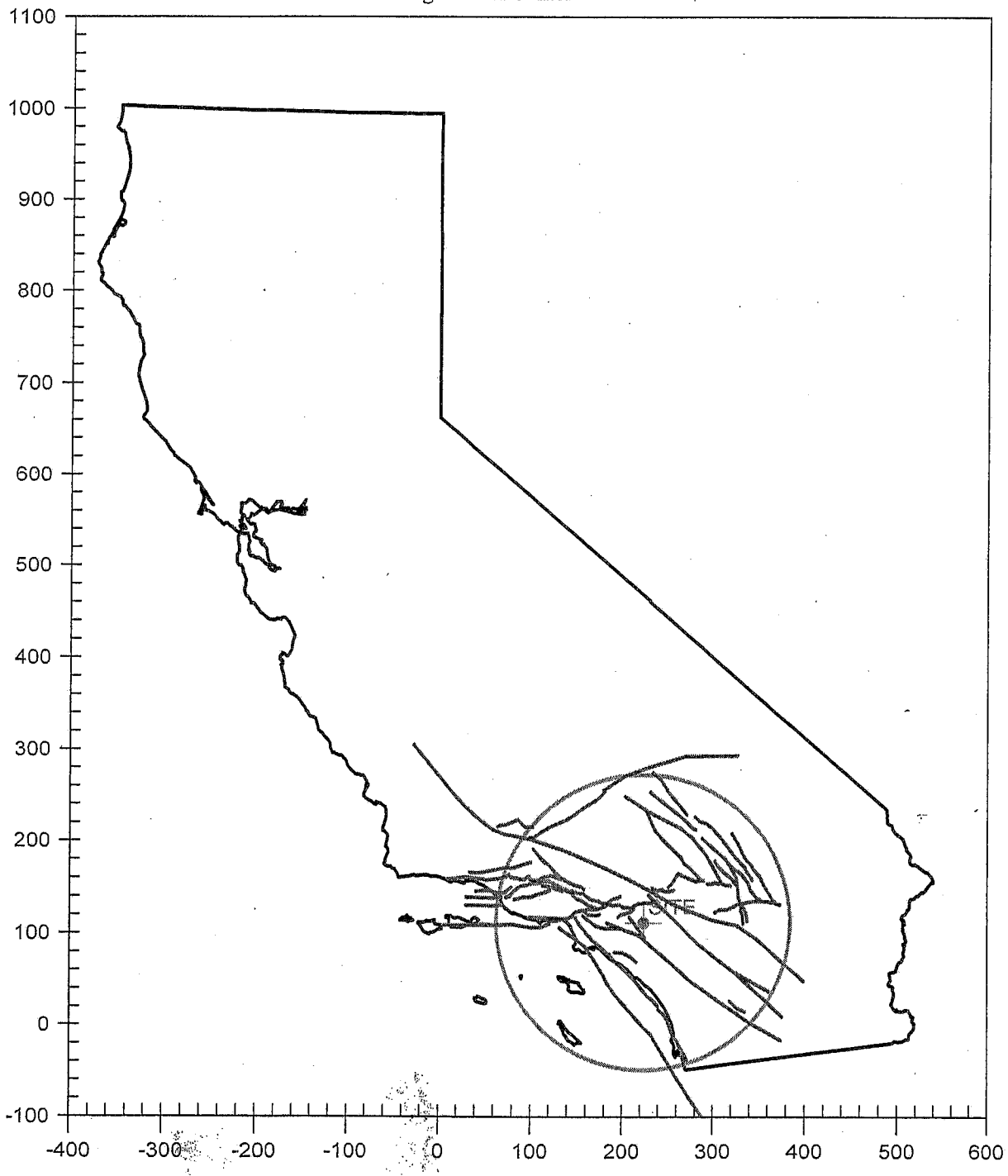
UBCSEIS

EQFAULT

FRISKSP

CALIFORNIA FAULT MAP

Sage Creek Center



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*    U B C S E I S   *
*                    *
*    Version  1.03   *
*                    *
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COMPUTATION OF 1997
UNIFORM BUILDING CODE
SEISMIC DESIGN PARAMETERS

JOB NUMBER: **G-3510-01** DATE: 08-20-2007

JOB NAME: **Sage Creek Center**

FAULT-DATA-FILE NAME: CDMGUBCR.DAT

SITE COORDINATES:
SITE LATITUDE: 33.9769
SITE LONGITUDE: 117.5753

UBC SEISMIC ZONE: 0.4

UBC SOIL PROFILE TYPE: SD

NEAREST TYPE A FAULT:
NAME: CUCAMONGA
DISTANCE: 20.9 km

NEAREST TYPE B FAULT:
NAME: CHINO-CENTRAL AVE. (Elsinore)
DISTANCE: 9.1 km

SELECTED UBC SEISMIC COEFFICIENTS:
Na: 1.0
Nv: 1.0
Ca: 0.44
Cv: 0.66
Ts: 0.603
To: 0.121

```
**********************************************************************
* CAUTION:  The digitized data points used to model faults are       *
*           limited in number and have been digitized from small-    *
*           scale maps (e.g., 1:750,000 scale).  Consequently,       *
*           the estimated fault-site-distances may be in error by    *
*           several kilometers.  Therefore, it is important that     *
*           the distances be carefully checked for accuracy and      *
*           adjusted as needed, before they are used in design.      *
**********************************************************************
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SUMMARY OF FAULT PARAMETERS

Sage Creek Center G-3510-01, Page 1

ABBREVIATED FAULT NAME	APPROX. DISTANCE (km)	SOURCE TYPE (A,B,C)	MAX. MAG. (Mw)	SLIP RATE (mm/yr)	FAULT TYPE (SS,DS,BT)
CHINO-CENTRAL AVE. (Elsinore)	9.1	B	6.7	1.00	DS
ELSINORE-WHITTIER	14.8	B	6.8	2.50	SS
ELSINORE-GLEN IVY	14.8	B	6.8	5.00	SS
SAN JOSE	18.4	B	6.5	0.50	DS
CUCAMONGA	20.9	A	7.0	5.00	DS
SIERRA MADRE (Central)	22.2	B	7.0	3.00	DS
SAN JACINTO-SAN BERNARDINO	24.9	B	6.7	12.00	SS
SAN JACINTO-SAN JACINTO VALLEY	31.5	B	6.9	12.00	SS
SAN ANDREAS - Southern	34.3	A	7.4	24.00	SS
SAN ANDREAS - 1857 Rupture	37.3	A	7.8	34.00	SS
CLEGHORN	38.3	B	6.5	3.00	SS
CLAMSHELL-SAWPIT	38.5	B	6.5	0.50	DS
ELSINORE-TEMECULA	42.6	B	6.8	5.00	SS
RAYMOND	44.9	B	6.5	0.50	DS
NORTH FRONTAL FAULT ZONE (West)	45.6	B	7.0	1.00	DS
NEWPORT-INGLEWOOD (L.A.Basin)	51.7	B	6.9	1.00	SS
NEWPORT-INGLEWOOD (Offshore)	53.1	B	6.9	1.50	SS
VERDUGO	54.1	B	6.7	0.50	DS
HOLLYWOOD	62.4	B	6.5	1.00	DS
SAN JACINTO-ANZA	66.2	A	7.2	12.00	SS
PALOS VERDES	67.3	B	7.1	3.00	SS
SIERRA MADRE (San Fernando)	74.3	B	6.7	2.00	DS
SAN GABRIEL	75.2	B	7.0	1.00	SS
NORTH FRONTAL FAULT ZONE (East)	76.9	B	6.7	0.50	DS
HELENDALE - S. LOCKHARDT	77.7	B	7.1	0.60	SS
SANTA MONICA	77.7	B	6.6	1.00	DS
PINTO MOUNTAIN	79.1	B	7.0	2.50	SS
ELSINORE-JULIAN	84.5	A	7.1	5.00	SS
CORONADO BANK	85.2	B	7.4	3.00	SS
MALIBU COAST	88.4	B	6.7	0.30	DS
SANTA SUSANA	93.2	B	6.6	5.00	DS
ROSE CANYON	95.2	B	6.9	1.50	SS
LENWOOD-LOCKHART-OLD WOMAN SPRGS	96.2	B	7.3	0.60	SS
HOLSER	101.8	B	6.5	0.40	DS
JOHNSON VALLEY (Northern)	102.7	B	6.7	0.60	SS
ANACAPA-DUME	103.2	B	7.3	3.00	DS
BURNT MTN.	108.5	B	6.5	0.60	SS
LANDERS	108.8	B	7.3	0.60	SS
EUREKA PEAK	110.2	B	6.5	0.60	SS
EMERSON So. - COPPER MTN.	113.9	B	6.9	0.60	SS
SAN JACINTO-COYOTE CREEK	114.1	B	6.8	4.00	SS
OAK RIDGE (Onshore)	114.4	B	6.9	4.00	DS
GRAVEL HILLS - HARPER LAKE	116.1	B	6.9	0.60	SS
SIMI-SANTA ROSA	118.0	B	6.7	1.00	DS
SAN CAYETANO	120.8	B	6.8	6.00	DS
CALICO - HIDALGO	123.5	B	7.1	0.60	SS

SUMMARY OF FAULT PARAMETERS

Sage Creek Center G-3510-01, Page 2

ABBREVIATED FAULT NAME	APPROX. DISTANCE (km)	SOURCE TYPE (A,B,C)	MAX. MAG. (Mw)	SLIP RATE (mm/yr)	FAULT TYPE (SS,DS,BT)
EARTHQUAKE VALLEY	127.3	B	6.5	2.00	SS
BLACKWATER	127.3	B	6.9	0.60	SS
PISGAH-BULLION MTN.-MESQUITE LK	131.7	B	7.1	0.60	SS
SANTA YNEZ (East)	138.9	B	7.0	2.00	SS
GARLOCK (West)	140.5	A	7.1	6.00	SS
VENTURA - PITAS POINT	150.1	B	6.8	1.00	DS
GARLOCK (East)	151.2	A	7.3	7.00	SS
PLEITO THRUST	153.2	B	6.8	2.00	DS
SAN JACINTO - BORREGO	153.9	B	6.6	4.00	SS
M.RIDGE-ARROYO PARIDA-SANTA ANA	156.6	B	6.7	0.40	DS
ELSINORE-COYOTE MOUNTAIN	158.7	B	6.8	4.00	SS
BIG PINE	162.0	B	6.7	0.80	SS
RED MOUNTAIN	164.1	B	6.8	2.00	DS
WHITE WOLF	167.0	B	7.2	2.00	DS
So. SIERRA NEVADA	175.7	B	7.1	0.10	DS
SANTA CRUZ ISLAND	178.9	B	6.8	1.00	DS
LITTLE LAKE	181.7	B	6.7	0.70	SS
BRAWLEY SEISMIC ZONE	186.0	B	6.5	25.00	SS
TANK CANYON	187.5	B	6.5	1.00	DS
SUPERSTITION MTN. (San Jacinto)	187.6	B	6.6	5.00	SS
ELMORE RANCH	190.4	B	6.6	1.00	SS
PANAMINT VALLEY	192.1	B	7.2	2.50	SS
OWL LAKE	192.3	B	6.5	2.00	SS
SUPERSTITION HILLS (San Jacinto)	192.7	B	6.6	4.00	SS
SANTA YNEZ (West)	198.0	B	6.9	2.00	SS
ELSINORE-LAGUNA SALADA	209.2	B	7.0	3.50	SS
DEATH VALLEY (South)	211.0	B	6.9	4.00	SS
SANTA ROSA ISLAND	215.0	B	6.9	1.00	DS
IMPERIAL	219.3	A	7.0	20.00	SS
LOS ALAMOS-W. BASELINE	240.8	B	6.8	0.70	DS
DEATH VALLEY (Graben)	241.8	B	6.9	4.00	DS
OWENS VALLEY	249.0	B	7.6	1.50	SS
SAN JUAN	255.6	B	7.0	1.00	SS
LIONS HEAD	258.0	B	6.6	0.02	DS
SAN LUIS RANGE (S. Margin)	262.9	B	7.0	0.20	DS
CASMALIA (Orcutt Frontal Fault)	274.3	B	6.5	0.25	DS
HUNTER MTN. - SALINE VALLEY	278.2	B	7.0	2.50	SS
INDEPENDENCE	284.7	B	6.9	0.20	DS
LOS OSOS	292.2	B	6.8	0.50	DS
DEATH VALLEY (Northern)	292.9	A	7.2	5.00	SS
HOSGRI	303.9	B	7.3	2.50	SS
RINCONADA	308.4	B	7.3	1.00	SS
BIRCH CREEK	340.8	B	6.5	0.70	DS
WHITE MOUNTAINS	345.7	B	7.1	1.00	SS
SAN ANDREAS (Creeping)	355.6	B	5.0	34.00	SS
DEEP SPRINGS	364.5	B	6.6	0.80	DS

SUMMARY OF FAULT PARAMETERS

Sage Creek Center G-3510-01, Page 3

ABBREVIATED FAULT NAME	APPROX. DISTANCE (km)	SOURCE TYPE (A,B,C)	MAX. MAG. (Mw)	SLIP RATE (mm/yr)	FAULT TYPE (SS,DS,BT)
DEATH VALLEY (N. of Cucamongo)	371.0	A	7.0	5.00	SS
ROUND VALLEY (E. of S.N.Mtns.)	375.7	B	6.8	1.00	DS
FISH SLOUGH	383.8	B	6.6	0.20	DS
HILTON CREEK	401.8	B	6.7	2.50	DS
HARTLEY SPRINGS	426.1	B	6.6	0.50	DS
ORTIGALITA	435.9	B	6.9	1.00	SS
CALAVERAS (So.of Calaveras Res)	444.0	B	6.2	15.00	SS
MONTEREY BAY - TULARCITOS	451.0	B	7.1	0.50	DS
PALO COLORADO - SUR	455.2	B	7.0	3.00	SS
QUIEN SABE	456.4	B	6.5	1.00	SS
MONO LAKE	462.1	B	6.6	2.50	DS
ZAYANTE-VERGELES	476.0	B	6.8	0.10	SS
SARGENT	480.7	B	6.8	3.00	SS
SAN ANDREAS (1906)	481.2	A	7.9	24.00	SS
ROBINSON CREEK	493.4	B	6.5	0.50	DS
SAN GREGORIO	525.7	A	7.3	5.00	SS
GREENVILLE	527.2	B	6.9	2.00	SS
HAYWARD (SE Extension)	529.5	B	6.5	3.00	SS
MONTE VISTA - SHANNON	530.7	B	6.5	0.40	DS
ANTELOPE VALLEY	533.7	B	6.7	0.80	DS
HAYWARD (Total Length)	548.6	A	7.1	9.00	SS
CALAVERAS (No.of Calaveras Res)	548.6	B	6.8	6.00	SS
GENOA	559.2	B	6.9	1.00	DS
CONCORD - GREEN VALLEY	594.8	B	6.9	6.00	SS
RODGERS CREEK	634.0	A	7.0	9.00	SS
WEST NAPA	634.2	B	6.5	1.00	SS
HUNTING CREEK - BERRYESSA	655.3	B	6.9	6.00	SS
POINT REYES	655.5	B	6.8	0.30	DS
MAACAMA (South)	695.8	B	6.9	9.00	SS
COLLAYOMI	711.9	B	6.5	0.60	SS
BARTLETT SPRINGS	714.4	A	7.1	6.00	SS
MAACAMA (Central)	737.3	A	7.1	9.00	SS
MAACAMA (North)	796.0	A	7.1	9.00	SS
ROUND VALLEY (N. S.F.Bay)	800.8	B	6.8	6.00	SS
BATTLE CREEK	820.1	B	6.5	0.50	DS
LAKE MOUNTAIN	859.0	B	6.7	6.00	SS
GARBERVILLE-BRICELAND	876.7	B	6.9	9.00	SS
MENDOCINO FAULT ZONE	933.8	A	7.4	35.00	DS
LITTLE SALMON (Onshore)	938.9	A	7.0	5.00	DS
MAD RIVER	940.7	B	7.1	0.70	DS
CASCADIA SUBDUCTION ZONE	948.0	A	8.3	35.00	DS
McKINLEYVILLE	951.4	B	7.0	0.60	DS
TRINIDAD	952.8	B	7.3	2.50	DS
FICKLE HILL	953.5	B	6.9	0.60	DS
TABLE BLUFF	959.6	B	7.0	0.60	DS
LITTLE SALMON (Offshore)	972.7	B	7.1	1.00	DS

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*    E Q F A U L T   *
*                    *
*    Version 3.00    *
*                    *
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DETERMINISTIC ESTIMATION OF
PEAK ACCELERATION FROM DIGITIZED FAULTS

JOB NUMBER: **G-3510-01**

DATE: 08-20-2007

JOB NAME: **Sage Creek Center**

CALCULATION NAME: Fault Analysis

FAULT-DATA-FILE NAME: C:\Program Files\EQFAULT1\CGSFLTE.DAT

SITE COORDINATES:
SITE LATITUDE: 33.9769
SITE LONGITUDE: 117.5753

SEARCH RADIUS: 100 mi

ATTENUATION RELATION: 14) Campbell & Bozorgnia (1997 Rev.) - Alluvium
UNCERTAINTY (M=Median, S=Sigma): M Number of Sigmas: 0.0
DISTANCE MEASURE: cdist
SCOND: 0
Basement Depth: 5.00 km Campbell SSR: 0 Campbell SHR: 0
COMPUTE PEAK HORIZONTAL ACCELERATION

FAULT-DATA FILE USED: C:\Program Files\EQFAULT1\CGSFLTE.DAT

MINIMUM DEPTH VALUE (km): 3.0

71 FAULTS FOUND WITHIN THE SPECIFIED SEARCH RADIUS.

THE CHINO-CENTRAL AVE. (Elsinore) FAULT IS CLOSEST TO THE SITE.
IT IS ABOUT 6.8 MILES (10.9 km) AWAY.

LARGEST MAXIMUM-EARTHQUAKE SITE ACCELERATION: 0.4065 g

EQFAULT SUMMARY

DETERMINISTIC SITE PARAMETERS

Sage Creek Center G-3510-01, Page 1

ABBREVIATED FAULT NAME	APPROXIMATE DISTANCE mi (km)	ESTIMATED MAX. EARTHQUAKE EVENT: MAXIMUM EARTHQUAKE MAG. (Mw)	PEAK SITE ACCEL. g	EST. SITE INTENSITY MOD. MERC.
CHINO-CENTRAL AVE. (Elsinore)	6.8(10.9)	6.7	0.407	X
WHITTIER	8.9(14.3)	6.8	0.284	IX
ELSINORE (GLEN IVY)	9.4(15.1)	6.8	0.272	IX
SAN JOSE	12.1(19.5)	6.4	0.196	VIII
CUCAMONGA	14.9(23.9)	6.9	0.212	VIII
SIERRA MADRE	14.9(24.0)	7.2	0.251	IX
SAN JACINTO-SAN BERNARDINO	15.8(25.5)	6.7	0.153	VIII
PUENTE HILLS BLIND THRUST	17.2(27.7)	7.1	0.203	VIII
SAN JACINTO-SAN JACINTO VALLEY	19.9(32.0)	6.9	0.138	VIII
SAN ANDREAS - SB-Coach. M-1b-2	20.8(33.4)	7.7	0.236	IX
SAN ANDREAS - San Bernardino M-1	20.8(33.4)	7.5	0.206	VIII
SAN ANDREAS - Whole M-1a	20.8(33.4)	8.0	0.283	IX
SAN ANDREAS - SB-Coach. M-2b	20.8(33.4)	7.7	0.236	IX
SAN ANDREAS - 1857 Rupture M-2a	22.1(35.6)	7.8	0.237	IX
SAN ANDREAS - Cho-Moj M-1b-1	22.1(35.6)	7.8	0.237	IX
SAN ANDREAS - Mojave M-1c-3	22.1(35.6)	7.4	0.180	VIII
CLEGHORN	23.9(38.4)	6.5	0.080	VII
CLAMSHELL-SAWPIT	25.8(41.5)	6.5	0.079	VII
SAN JOAQUIN HILLS	25.9(41.7)	6.6	0.085	VII
ELSINORE (TEMECULA)	26.5(42.7)	6.8	0.091	VII
RAYMOND	27.4(44.1)	6.5	0.073	VII
NORTH FRONTAL FAULT ZONE (West)	28.8(46.4)	7.2	0.115	VII
UPPER ELYSIAN PARK BLIND THRUST	30.8(49.5)	6.4	0.057	VI
NEWPORT-INGLEWOOD (L.A.Basin)	31.8(51.1)	7.1	0.093	VII
NEWPORT-INGLEWOOD (Offshore)	33.1(53.2)	7.1	0.089	VII
VERDUGO	34.1(54.9)	6.9	0.073	VII
HOLLYWOOD	39.1(62.9)	6.4	0.041	V
SAN JACINTO-ANZA	41.1(66.2)	7.2	0.074	VII
PALOS VERDES	42.0(67.6)	7.3	0.078	VII
SAN GABRIEL	46.8(75.3)	7.2	0.063	VI
SIERRA MADRE (San Fernando)	47.0(75.7)	6.7	0.040	V
NORTH FRONTAL FAULT ZONE (East)	47.7(76.7)	6.7	0.039	V
HELENDALE - S. LOCKHARDT	48.3(77.8)	7.3	0.066	VI
SANTA MONICA	49.1(79.0)	6.6	0.035	V
PINTO MOUNTAIN	49.3(79.4)	7.2	0.059	VI
NORTHRIDGE (E. Oak Ridge)	52.1(83.9)	7.0	0.044	VI
ELSINORE (JULIAN)	52.5(84.5)	7.1	0.050	VI
CORONADO BANK	52.9(85.2)	7.6	0.076	VII
MALIBU COAST	55.0(88.5)	6.7	0.032	V
SANTA SUSANA	58.3(93.9)	6.7	0.030	V

DETERMINISTIC SITE PARAMETERS

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ABBREVIATED FAULT NAME	APPROXIMATE DISTANCE mi (km)	ESTIMATED MAX. EARTHQUAKE EVENT: MAXIMUM EARTHQUAKE MAG. (Mw)	ESTIMATED MAX. EARTHQUAKE EVENT: PEAK SITE ACCEL. g	ESTIMATED MAX. EARTHQUAKE EVENT: EST. SITE INTENSITY MOD. MERC.
ROSE CANYON	59.7(96.1)	7.2	0.046	VI
LENWOOD-LOCKHART-OLD WOMAN SPRGS	59.8(96.3)	7.5	0.059	VI
HOLSER	63.4(102.1)	6.5	0.022	IV
SAN ANDREAS - Coachella M-1c-5	63.5(102.2)	7.2	0.042	VI
JOHNSON VALLEY (Northern)	63.7(102.5)	6.7	0.027	V
ANACAPA-DUME	64.9(104.4)	7.5	0.048	VI
BURNT MTN.	66.9(107.6)	6.5	0.021	IV
LANDERS	67.1(108.0)	7.3	0.043	VI
SIMI-SANTA ROSA	67.9(109.3)	7.0	0.030	V
EUREKA PEAK	68.4(110.1)	6.4	0.019	IV
EMERSON So. - COPPER MTN.	70.6(113.6)	7.0	0.031	V
SAN JACINTO-COYOTE CREEK	71.0(114.2)	6.6	0.021	IV
OAK RIDGE (Onshore)	71.3(114.7)	7.0	0.028	V
GRAVEL HILLS - HARPER LAKE	72.2(116.2)	7.1	0.033	V
SAN ANDREAS - Carrizo M-1c-2	73.1(117.7)	7.4	0.042	VI
SAN CAYETANO	75.9(122.2)	7.0	0.026	V
CALICO - HIDALGO	76.7(123.5)	7.3	0.036	V
EARTHQUAKE VALLEY	79.2(127.4)	6.5	0.017	IV
BLACKWATER	79.2(127.4)	7.1	0.029	V
PISGAH-BULLION MTN.-MESQUITE LK	81.9(131.8)	7.3	0.033	V
SANTA YNEZ (East)	86.4(139.1)	7.1	0.026	V
GARLOCK (West)	87.1(140.1)	7.3	0.031	V
VENTURA - PITAS POINT	93.6(150.6)	6.9	0.018	IV
GARLOCK (East)	93.9(151.1)	7.5	0.033	V
OAK RIDGE(Blind Thrust Offshore)	94.9(152.7)	7.1	0.020	IV
PLEITO THRUST	95.3(153.4)	7.0	0.019	IV
SAN JACINTO - BORREGO	95.6(153.9)	6.6	0.014	IV
CHANNEL IS. THRUST (Eastern)	96.9(156.0)	7.5	0.027	V
M.RIDGE-ARROYO PARIDA-SANTA ANA	98.2(158.0)	7.2	0.021	IV
ELSINORE (COYOTE MOUNTAIN)	98.6(158.7)	6.8	0.017	IV
OAK RIDGE MID-CHANNEL STRUCTURE	99.3(159.8)	6.6	0.013	III

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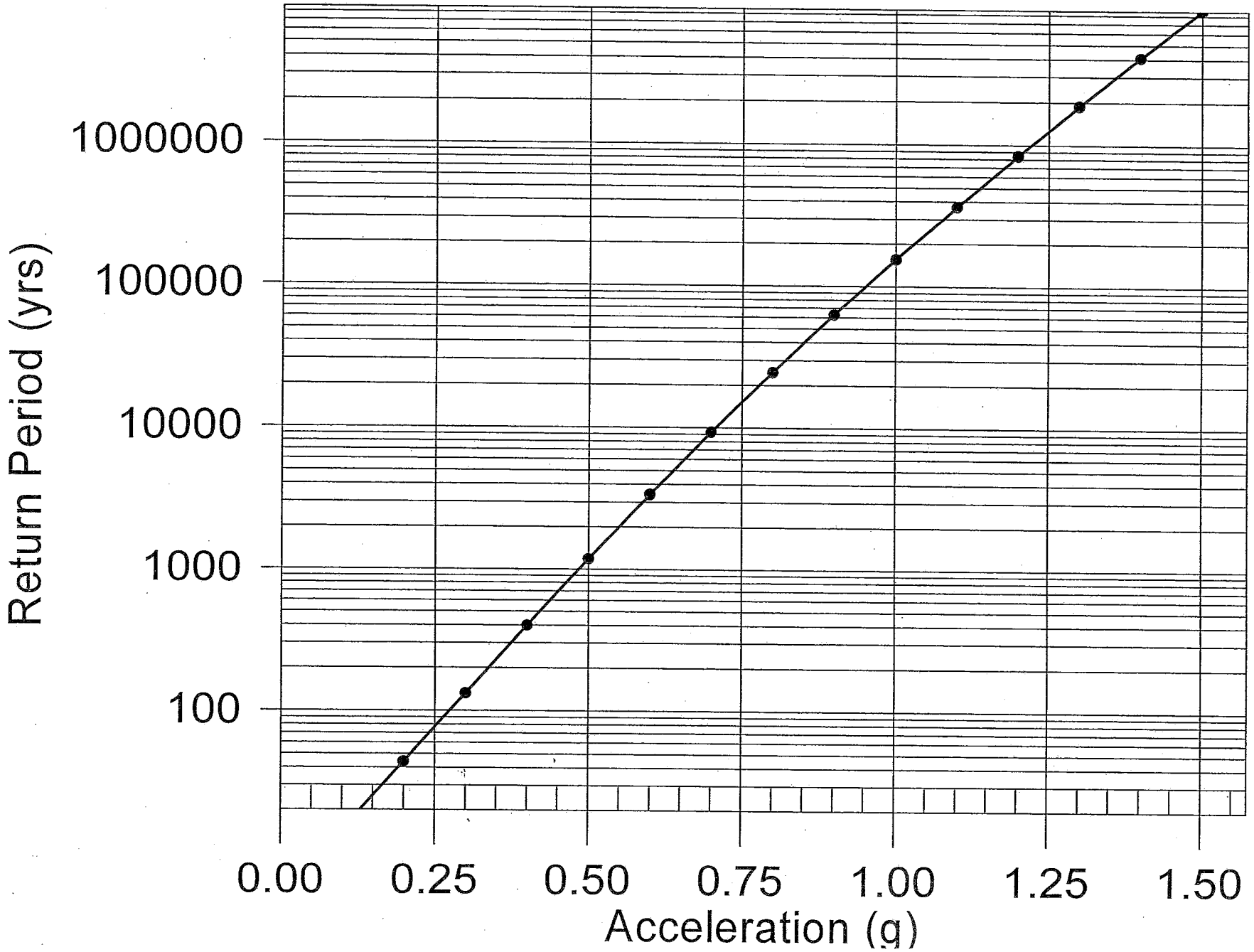
-END OF SEARCH-

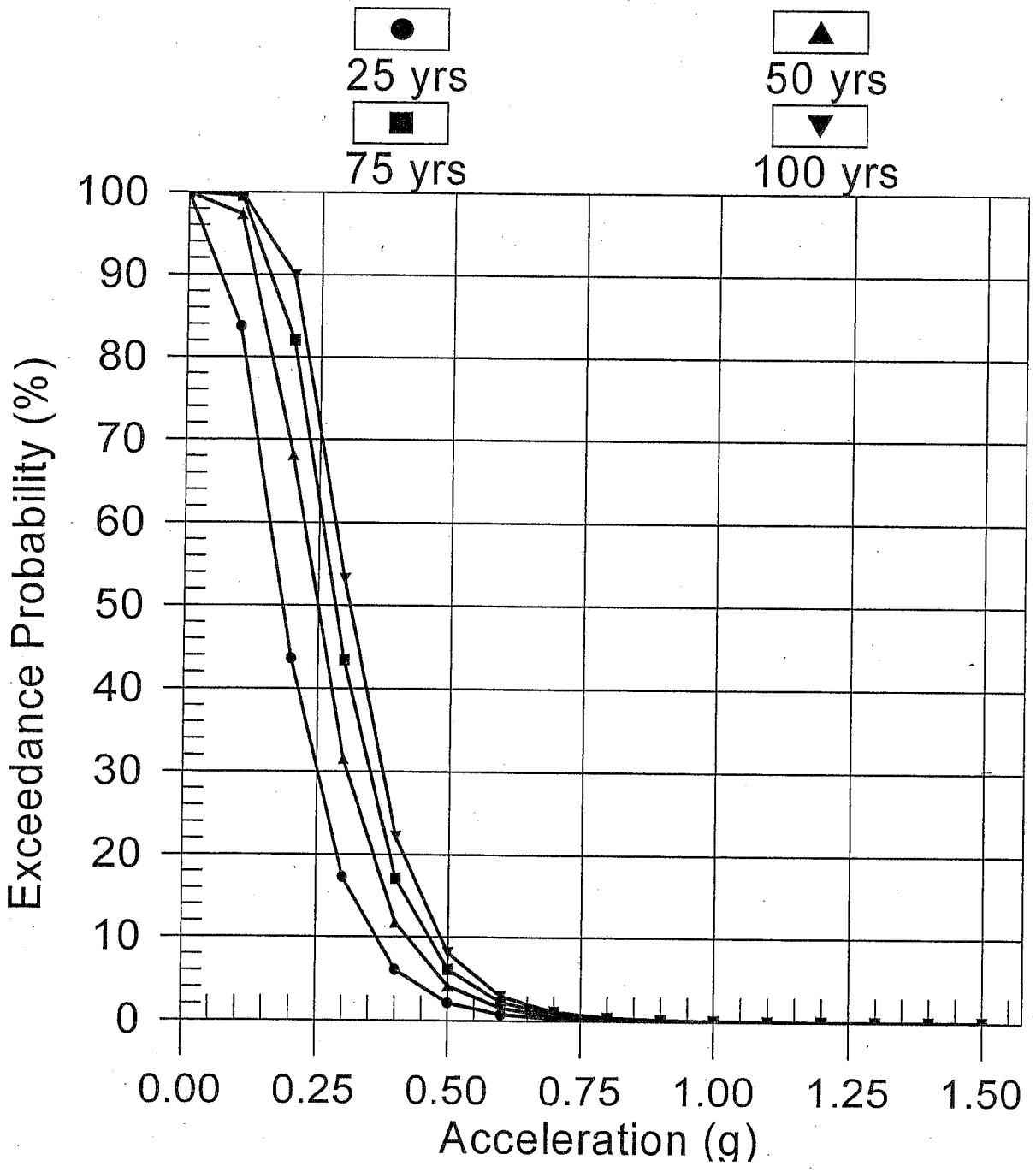
RETURN PERIOD vs. ACCELERATION

CAMP. & BOZ. (1997 Rev.) AL 1 Sage Creek Center G-3510-01



PROBABILITY OF EXCEEDANCE

CAMP. & BOZ. (1997 Rev.) AL 1 Sage Creek Center G-3510-01



Appendix C

Grading Specifications

SUGGESTED INPUT FOR ENGINEERED FILL SPECIFICATIONS

1.0 General

1.1 Description

1.1.1 These specifications cover preparation of the subject site to receive fills, the type of soils suitable for use in fills, the compaction standards, and the methods of testing compacted fills.

1.1.2 The Contractor shall furnish all labor, supervision, equipment, operations, and materials to excavate to the required grade, support existing underground facilities, stockpile material, compact fill and backfill, and fine grade. The work of the Contractor shall include all clearing and grubbing, removing existing unsatisfactory material, preparing areas to be filled, spreading and compacting of fill in the areas to be filled and all other work necessary to complete the grading of the filled areas. It shall be the Contractor's responsibility to place, spread, moisten or dry, and compact the fill in strict accordance with these specifications to the lines and grades indicated on project plans or as directed in writing by the Civil Engineer.

1.1.3 Deviations from these specifications will be permitted only upon written authorization from the Owner or his representative.

1.2 Role of the Geotechnical Engineer

1.2.1 Construction - The Owner will employ a Geotechnical Consultant to observe and test this work as it is being performed. The Contractor shall cooperate with the Geotechnical Consultant and allow his unrestricted access to the site as required for the performance of his duties.

The Contractor shall provide a minimum notice of 48 hours to the Geotechnical Engineer before beginning or restarting earthwork operations that will require the presence of the Geotechnical Engineer or his representative on site.

1.2.2 Subsurface Investigations - A geotechnical engineering report for design purposes was prepared by Geotechnical Solutions, Inc., Irvine, California. Any recommendations made in the geotechnical report or subsequent reports are made part of these specifications. These reports are available for review upon request to the Owner.

1.2.3 Observation and Testing - The Geotechnical Engineer's representative shall observe the clearing and grubbing, excavation, filling and compacting operations and shall take density tests in the fill material so that he can state his opinion as to whether or not the fill was constructed in accordance with the specifications. All fill will be tested shortly after its placement to ascertain that the required compaction is achieved. A minimum of one density test will be made on each 500 cubic yards of fill placed, with a minimum of at least one test per every 2 feet of vertical height of fill. If the surface is disturbed, the density tests shall be made in the compacted materials below the disturbed zone. When these tests indicate that the density or water content of any layer of fill or portion thereof does not meet the specified density or water content, the particular layer or portions thereof shall be reworked until the specified density and water content have been obtained.

After the completion of grading, the Geotechnical Engineer will prepare a written opinion of grading. Neither the testing performed by the Geotechnical Consultant nor his opinion as to whether or not the fill was constructed in accordance with these Specifications shall relieve the Contractor of his responsibility to construct the fills in accordance with the Contract Documents.

1.3 Reference Standards

The following ASTM (American Society for Testing and Materials) codes and standards shall be used to the extent indicated by references herein. The most recent revision of the standards shall be used.

D422 - "Standard Test Method for Particle-Size Analysis of Soils"

D 1556 - "Standard Test Method for Density of Soil in Place by the Sand-Cone Method"

D1557 - "Standard Test Methods for Moisture-Density Relations of Soils and Soil Aggregate Mixtures Using 10-lb (4.54 kg) and 18-inch (457-mm) Drop"

D2216 - "Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil, Rock, and Soil-Aggregate Mixtures"

D2922 - "Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)"

D3017 - "Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)"

D4318 - "Standard Test Method for Liquid Limit, Plastic Limit, and Plasticity Index of Soils"

D4718 - "Standard Practice for Correction of Unit Weight and Water Content for Soils Containing Oversize Particles"

D4829 - "Standard Test Method for Expansion Index of Soils"

D4944 - "Standard Test Method for Field Determination of Water (Moisture) Content of Soil by the Calcium Carbide Gas Pressure Tester Method."

1.4 Degree of Fill Compaction

The degree to which fill is to be compacted is expressed in terms of "relative compaction." Relative compaction is defined as the ratio; expressed in percent, of the in-place dry density of the compacted fill to the reference maximum dry density. The reference maximum dry density shall be obtained following ASTM D1557. Optimum water content shall be obtained in the same test used to obtain the reference maximum dry density. Correction of the maximum dry density and optimum water content for oversize particles of gravel and cobbles shall be made following ASTM D4718 when, in the opinion of the Geotechnical Engineer, such correction is appropriate. The in-place density shall be obtained following ASTM D1556 (sand cone method) or ASTM D2922 (nuclear method-shallow depth) test method. The in-place water content shall be obtained following ASTM D4944 (calcium carbide gas pressure meter), ASTM D3017 (nuclear method-shallow depth), or ASTM D2216 (oven drying). Correction of the in-place density and water content for oversize particles of gravel and cobbles shall be made following ASTM D4718 when, in the opinion of the Geotechnical Engineer, such correction is appropriate.

If any of the test methods specified in this section are judged by the Geotechnical Engineer to be impractical or unreliable because the material has a coarse particle size distribution, or for other reasons, the Geotechnical Engineer shall establish other procedures to obtain the required soil characteristics.

2.0 Products

2.1 Materials

2.1.1 General - During grading operations, soil types other than those identified in the geotechnical investigation report may be encountered by the Contractor. Consult the

Geotechnical Consultant for his evaluation of the suitability of using these soils a fill material prior to placement or disposal.

2.1.2 General Fill - Materials for compacted fill shall consist of material imported from outside the site or excavated from the site that, in the opinion of the Geotechnical Engineer, is suitable for use in constructing engineered fills. The material shall not contain rocks or hard lumps greater than 6 inches in maximum dimension, and at least 70 percent (by weight) of its particles shall pass through a U.S. Standard 3/8 inch sieve. Material greater than 3 inches, but less than 6 inches in maximum dimension, shall be placed by the Contractor so that it is completely surrounded by compacted, finer material; no nesting of rocks shall be permitted. Do not use any perishable, spongy, hazardous, or other undesirable materials as fill.

2.1.3 Select Fill - Select fill shall meet all criteria for general fill but shall also contain no rocks or hard lumps greater than 3 inches in maximum dimension, and at least 80 percent (by weight) shall pass through a U.S. Standard 3/8-inch sieve. The expansion index of select material shall be less than 50 (i.e., 5.0 percent swell) when tested in accordance with ASTM D4829.

3.0 Execution

3.1 Clearing and Grubbing

Within the project limits, tile Contractor shall demolish structures as specified on the Drawings.

Unless otherwise indicated on the Drawings or by the Owner in writing, the Contractor shall clear and grub all trees, stumps, roots, brush, grass, and other vegetation within construction, fill and stockpile areas to a minimum depth of 3 feet below the existing ground surface or below finished grade, whichever is deeper, unless otherwise recommended by the Geotechnical Engineer's Field Representative.

Remove cleared and grubbed materials from the site and dispose of them legally. No onsite burning or burying of cleared and grubbed materials is permitted. No placement of cleared and grubbed materials in topsoil stockpiles is permitted. No mulching of branches or roots is permitted. Incorporating vegetative matter into stockpiled materials which are to be used in fill is not permitted.

Stockpile organic-laden topsoil separate from other fill materials.

Remove any remaining vegetative matter from the deeper excavated soils, which may result from roots deeper than those encountered during clearing and grubbing operations. All material thereby removed shall be piled at a location away from the immediate work area so as to avoid burying of piled material.

3.2 Compacted Fills

3.2.1 Preparing Areas to be Filled - Brush, grass, and other objectionable materials shall be collected, piled, and disposed of as indicated in Section 3.1 by the Contractor so as to leave the areas that have been cleared with a neat and finished appearance, free from unsightly debris.

Remove all loose soil, uncertified fill, landslide debris, and weathered bedrock to firm material or in-situ bedrock, as approved by the Geotechnical Consultant. The Contractor shall obtain approval from the Geotechnical Engineer or his representative of stripping and site preparation before the compaction of any fill subgrade begins. The surface shall then be scarified to a minimum depth of 6 inches until the surface is free from uneven features that would tend to prevent uniform compaction by the equipment used, and shall be brought to the specified water content and relative compaction. Compact scarified materials to a minimum relative compaction of 90 percent, relative to ASTM D1557, prior to placement of any fill material.

3.2.2 Placing, Spreading, and Compacting, Fill Material - Onsite soil obtained from removals, borrow, or cut areas may be reused as compacted fill provided it is free from deleterious debris and meets the other requirements of the "Materials" portion of this Specification Section.

Use of soil containing deleterious debris from the clearing and grubbing operation or from other sources is not permitted. The fill materials shall be placed by the Contractor in horizontal layers not greater than 8 inches thick, measured before compaction. Each layer shall be spread evenly and shall be thoroughly mixed during the spreading to obtain uniformity of material and moisture in each layer. The moisture content of material used for compacted fill should be adjusted to be at or above optimum water content as determined by ASTM D1557. When the water content of the fill material is too high, the fill materials shall be aerated by the Contractor by blading, mixing, or other satisfactory methods until the water content is as specified.

After each layer has been placed, mixed, and spread evenly, it shall be thoroughly compacted by the Contractor to a relative compaction of at least 90 percent of the maximum dry density as determined by ASTM D1557 for general fill, and 95 percent of the maximum dry density as determined by ASTM D1557 for select fill, compacted fill pads, and the upper 1 foot of pavement subgrade. Compaction shall be accomplished by: sheep foot rollers; vibratory rollers; multiple-wheel, pneumatic-tired rollers; or other types of acceptable compacting equipment. Equipment shall be of such design that it is able to compact the fill to the specified density. Compaction shall be continuous over the entire area, and the equipment shall make sufficient passes to obtain the desired density uniformly. All fill placed on site shall be treated in like manner until finished grades are attained. Jetting, puddling, and hydro consolidation techniques shall not be used, including backfill of utility trenches.

The placement of topsoil is subject to the approval of the Geotechnical Engineer. Topsoil shall not be placed beneath concrete flatwork, beneath or behind retaining walls, or within structural fill. All topsoil material is subject to the same moisture conditioning, placement, and compaction requirements as General Fill. Roots, branches and other organic debris are not permitted within the compacted topsoil layer.

When backfilling around footings and compacting behind retaining walls and flexible retaining structures, the Contractor shall use lightweight compaction equipment such as hand-operated equipment, shoring, or other means to avoid over-stressing structural walls. When using lightweight compaction equipment, the fill materials shall be spread in horizontal layers not greater than 6 inches thick, measured before compaction.

As an alternative, sand-cement slurry may be used to backfill trenches. The slurry shall have minimum cement content of 3 sacks per cubic yard within the zone of influence of foundations and other settlement sensitive structures. A minimum of 2 sacks per cubic yard of slurry shall be used elsewhere within building limits, and a minimum of one sack per cubic yard of slurry shall be used elsewhere. Slurry shall not be used in those areas where such placement would result in the obstruction of water flow, and is subject to the approval of the Geotechnical Engineer.

3.3 Protection of Work and Adjacent Properties

3.3.1 During Construction - The Contractor shall grade all excavated surfaces to provide good drainage away from construction slopes and prevent ponding of water. He shall control surface water and the transport of silt and sediment to avoid damage to adjoining properties or to finished work on the site. The Contractor shall take remedial measures to prevent erosion of freshly graded areas until such time as permanent drainage and erosion control measures have been installed.

Dispose of all water resulting from dewatering operations legally and in ways that will not cause damage to public or private property, or constitute a nuisance or menace to the public, in accordance with municipal requirements.

The Contractor shall make every effort to minimize the amount of dust raised in excavating, on haul roads and access roads, and all other work areas in the course of construction activities.

Protect benchmarks, monuments, and other reference points against displacement or damage. Repair or replace benchmarks, monuments, and other permanent survey data that become displaced or damaged due to the performance of this work.

3.3.2 After Completion - After earthwork is completed and the, Geotechnical Engineer has finished his observations of the work, no further excavation, filling or backfilling shall be performed except under the observation of the Geotechnical Engineer.