APPENDIX O

1. Geotechnical Investigation
2. Attachment A
3. Attachment B

SDC PDS RCVD 10-15-18
STP08-015

1. Geotechnical Investigation

GEOTECHNICAL INVESTIGATION

PROPOSED SAJE COMPLEX
25568 MESA ROCK ROAD
ESCONDIDO, CALIFORNIA

JOB NO. 12-12

NOVEMBER 1, 2012

WEST COAST
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November 1, 2012

Mr. Gary Larson
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San Marcos, CA 92069

Project: Job No. 12-12
Saje Complex
25568 Mesa Rock Road
Escondido, California

Subject: Report of Geotechnical Investigation

Dear Mr. Larson:

In accordance with your request, we have completed a geotechnical investigation for the proposed project. We are presenting to you, herewith, our findings and recommendations for the development of the proposed project.

The findings of this study indicate that the site is suitable for the intended development if the recommendations provided in the attached report are incorporated into the design and construction of this project.

If you have any questions after reviewing the findings and recommendations contained in the attached report, please do not hesitate to contact this office. This opportunity to be of professional service is sincerely appreciated.

Respectfully submitted,
WEST COAST GEOTECHNICAL CONSULTANTS, INC.

Vincent W. Gaby, CEG 1755, Expires 7/31/13
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GEOTECHNICAL INVESTIGATION

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Prepared For:

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Hilltop Group, Inc.
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GEOTECHNICAL CONSULTANTS, INC.

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GEOTECHNICAL INVESTIGATION

PROPOSED SAJE COMPLEX
25568 MESA ROCK ROAD
ESCONDIDO, CALIFORNIA

Introduction and Project Description

This report presents the results of our geotechnical investigation performed on the above referenced site. The purpose of our investigation was to evaluate the existing surface and subsurface conditions from a geotechnical perspective and to provide recommendations for grading, site preparation, foundation design, retaining wall construction and to furnish a preliminary structural pavement section for private driveways and parking lots..

The proposed project will be the construction of a waste recycling facility. The facility will be used to collect and process green waste and construction/demolition waste. The project will be developed in three phases. The first phase will include the earthwork for a 7.1 acre main pad, a circular roadway to surround the main pad and four smaller ancillary pads. The ancillary pads will individually range from approximately 0.27 to 0.39 acres. The grading is expected to result in fills up to 30 feet above existing grade, and maximum cuts on the order of 10 feet below existing grade. Slopes, both cut and fill may reach maximum heights of 35 feet.

Structural improvements for Phase One will consist of a 12,000 square foot metal building and associated parking lot. The metal building will house office space, a shop and a wash facility. Phase Two and Phase Three will be the construction of a 24,000 square foot metal building and a 60,000 square foot metal building, respectively. Each will be used as a recycling facility.

We should be allowed the opportunity to review and amend our recommendations, if necessary, after construction documents have been completed.

The site configuration and the approximate locations of our subsurface explorations are shown on the enclosed Site Plan, Plate No. 1.

Project Scope

This investigation consisted of a surface reconnaissance coupled with a subsurface exploration. Representative samples of soil material were obtained from the site and returned to our laboratory for observation and testing.

Specifically, the intent of this investigation was to:

a) Explore the subsurface conditions to the depths that could be influenced by the proposed construction;

b) Evaluate, by laboratory tests, the pertinent static physical properties of the soil materials expected to support structural improvements;

c) Describe the site geology, including the geologic materials encountered;

d) Estimate potential geologic hazards and their effect upon the proposed development;

e) Provide recommendations for site preparation and grading;

f) Present recommendations for foundation design, including bearing capacity and lateral pressures of the on-site soils;

g) Furnish soil parameters for retaining wall design;

h) Supply preliminary structural pavement sections for private driveways and parking lots.

This report has been prepared for Hilltop Group, Inc. and their design consultants, to be used in the development of the proposed project. This report has not been prepared for use by other parties, and may not contain sufficient information for purposes of other parties or other uses. The information in this report represents professional opinions that have been developed using that degree of care and skill ordinarily exercised, under similar circumstances, by reputable geotechnical consultants practicing in this or similar localities. No other warranty, express or implied, is made as to the professional advice include in this report.

Findings

Site Description: The project site is located west of Interstate Freeway 15, approximately one mile north of the City of Escondido, County of San Diego, California. The property address is 25568 Mesa Rock Road, Escondido, California, 92026. The assessor parcel number is 187-100-37. The site vicinity can be found in the northwest quarter of grid E-3, page 1109, of the Thomas Brothers Guide for San Diego county.

The project area is situated along the lower eastern slopes of a northwesterly trending ridge identified as Merriam Mountain. Based on the site plan prepared by Excel Engineering, elevations range from approximately 1,100 feet above sea level (msl) along the western edge of the proposed development to 970 feet msl near the toe of the proposed eastern fill slope.

The property was utilized in the past as a borrow pit for granitic rock and soil materials. No earthmoving or mining activity was observed on the site at the time of our investigation. Improvements on the property consisted of a trailer with a shade structure and a concrete slab.

Geologic Materials: The subject site is underlain by granitic bedrock that has been mapped by Kennedy (1999) as the Monzogranite of Merriam Mountain. At the locations explored, the bedrock materials are mantled with colluvium and artificial fill. Each stratigraphic unit is described below in order from oldest to youngest.

Monzogranite of Merriam Mountain: The project site is underlain by granitic bedrock that is considered part of the southern California batholith. The batholith complex is composed of numerous plutonic and metamorphic bodies, with a variety of mineral constituents. In the immediate site vicinity the predominant geologic unit is identified as the Monzogranite of Merriam Mountain (Kennedy, 1999). It is described in the literature as medium to coarse grained, leucocratic, hornblende-biotite monzogranite. The bedrock exposed in our exploratory excavations consisted of fine to coarse, medium to coarse and medium to very coarse grained, decomposed, granitic rock. Its mineral constituents were predominantly quartz and feldspar. Mafic (dark colored) minerals, primarily biotite and hornblende, made up approximately 10 to 15 percent. The color of the bedrock materials varied from pale gray, yellowish-gray, orangish-yellow to yellowish-brown.

Near the contact with overlying surface soils, the bedrock was severely weathered to a material identified in the exploratory logs as residuum. At the locations explored, the residuum consisted of slightly silty to silty, fine to coarse and fine to very coarse grained sand. It was generally in a medium dense to dense condition. The residuum often retained the physical characteristics of the parent bedrock.

Colluvium: In the vicinity of the exploratory trenches, the bedrock materials are mantled by a thin layer of poorly consolidated colluvium. For the purposes of this study the term "colluvium" is used to identify redeposited surface soils (slope wash), topsoil and in-place developed soil. These occur as brown, silty, fine to medium, and silty fine to coarse grained sand. The colluvium is damp to moist, and poorly consolidated. In its present condition the colluvium is not considered suitable for the support of structural improvements or compacted fill.

Artificial Fill: Artificial fill was present within 12 of the 16 exploratory trenches. The fill thickness ranged from ½ foot in exploratory trench T-4 to 6 feet in trench T-16. The consistency and the quality of the fill material varied with each location explored. Compaction of the fill appeared to range from loose to dense. Detailed descriptions of the fill soils that were observed are presented in the subsurface exploration logs (Plate No. 3 through 18).

Although some fill materials are moderately to well compacted, they are underlain by potentially compressible colluvial soils that could consolidate differentially under additional loading. Therefore, the existing fill materials should not be relied upon for structural support. Thicker or poorer quality fill may be encountered during site development at locations that were not explored.

Rippability: The majority of the exploratory trenches were excavated prior to our arrival to the site using a rubber-tired backhoe. Therefore we did not witness the effort needed to complete many of the excavations. However, based on our field observations, it appears that in general, the materials exposed may be excavated with well-maintained, heavy-duty earthmoving equipment such as a D-8 bulldozer with a single tooth ripper. Refusal was experienced by the backhoe in exploratory Trench No. T-11 at a depth of 7½ feet. Refusal is a term used to describe the inability to deepen the excavation with the equipment being used. It is possible that resistant bedrock and/or boulders that require pneumatic chipping may be encountered at locations that were not explored and where shallow bedrock is exposed.

Groundwater: Free groundwater was not observed in the exploratory excavations to the depths explored. However, heavily oxidized, mottled soil coloring evident in the deeper sidewalls of trench numbers T-4 and T-5 may be an indication of shallow transient subsurface water. Shallow subsurface seepage will often occur along the contact separating materials of different density and permeability, especially following prolonged or heavy rainfall. The subject site is located along the lower slopes of a significant ridge. Therefore, fluctuations of subsurface water will be affected by variations in annual precipitation and local irrigation. Subsurface water elevations are expected to be influenced by runoff derived from sources located up-slope and up-stream from the project location. Moreover, it has been our experience that periodic events of seepage will occur in areas of significant "cut" or any "below-grade" structures. Therefore, consideration should be given to appropriate surface and subsurface drainage systems.

Geologic Hazards

Faults and Seismic Hazards: The numerous fault zones in southern California include active, potentially active, and inactive faults. Active faults are those which display evidence of movement within Holocene time (from the present to approximately 11 thousand years). Faults that have ruptured geologic units of Pleistocene age (11 thousand to 2 million years) but not Holocene age materials are considered potentially active. Inactive faults are those which exhibit movement that is older than 2 million years. According to available published information, there are no known active or potentially active faults which intercept the project site. The site is not located within an Alquist-Priolo Special Studies Zone. Therefore, the potential for ground rupture at this site is considered low.

There are, however, several active faults located in close proximity; and movement associated with them could cause significant ground motion at the site. Nearby faults include the Elsinore fault zone, which occurs 14 miles to the northeast, the Rose Canyon fault zone, which lies approximately 17 miles offshore to the west, and the Coronado Bank fault zone, located approximately 28 miles to the southwest (offshore).

The Elsinore fault zone is a predominantly northwest-striking group of faults which extend from the Mexican border northward along the west flank of Palomar Mountain, to the city of Corona in Riverside County. The Elsinore fault zone is considered active. Within the regional area of the project site, the Elsinore fault zone is characterized by right lateral strike-slip faulting (Kennedy 1977). Neotectonic studies by Vaughn and Rockwell (1986) within the Agua Tibia Mountains identified thrust faulting north of Pauma Valley near Frey Creek. These studies estimated slip rates of 3-6 millimeters per year for that portion of the Elsinore fault zone. Based on their estimates, the recurrence interval for a magnitude 6 event would be from 50 to 90 years; and for a magnitude 7 event, the recurrence interval would be between 250 and 450 years. Relative to other regional fault zones (e.g., San Jacinto, San Andreas) the frequency of seismic events associated with the Elsinore fault zone has historically been low. The frequency of seismic events apparently increases southward along the fault zone.

Evidence suggesting movement along the Rose Canyon fault zone during the Holocene has been presented by Moore and Kennedy (1975). The State of California has zoned portions of the Rose Canyon fault zone as active under the Alquist-Priolo Senate Bill. This has come about as a result of faulted paleosols in Rose Canyon that are considered to be unquestionable of Holocene age (T. Rockwell, 1989).

The Coronado Bank fault zone is a complex series of left and right stepping enechelon faults. Marine geophysical studies performed by Kennedy and Welday (1980) and others have provided evidence that Holocene sediments have been offset by several faults associated with the Coronado Bank fault zone. Therefore, this fault system should also be considered active.

The table below presents the maximum credible and maximum probable earthquake magnitudes and estimated peak ground accelerations anticipated at the site. These accelerations are based on the assumption that the maximum probable earthquake occurs on specific faults at the closest point on that particular fault to the site.

The maximum credible earthquake is defined as the maximum earthquake that appears to be reasonable capable of occurring under the conditions of the presently known geologic framework. The probability of such an earthquake occurring during the lifetime of this project is considered low. The maximum probable earthquake is considered an event having a return period of 100 years. The severity of ground motion is not anticipated to be any greater at this location than in other areas of San Diego County.

Seismicity of Major Faults

Fault	Distance (Miles)	Maximum Credible Magnitude (Richter)	Maximum Probable Magnitude (Richter)	Estimated Bedrock Acceleration (1) (g)
Coronado Banks	28	$7.6_{L(2)}$	6.7	0.13
Elsinore	14	$7.5_{L(3)}$	6.6	0.26
Rose Canyon	17	$7.0_{L(2)}$	5.9	0.14
San Andreas	63	$8.3_{L(3)}$	8.0	0.08
San Jacinto	37	$7.8_{L(3)}$	7.0	0.11

L = Local Magnitude (1) Seed and Idriss, 1982
(2) Slemmons, 1979
(3) Greensfelder, C.D.M.G. Map Sheet 23, 1994

The preceding table suggests that the Elsinore fault zone would have the predominant influence on the site. The postulated design earthquake and peak ground acceleration is presented in the table below. This is based on a 10% probability that the design earthquake magnitude would be exceeded in a 50 year time span.

Design Earthquake

Fault Zone Source	*Maximum Probable Magnitude (Richter)	**Peak Ground Acceleration (g)
Elsinore	6.6	0.27

*U.S.G.S. - Geologic Hazards Science Center - 2009 Earthquake Probability Mapping.
**C.G.S. - Probabilistic Seismic Hazards Mapping Ground Motion Page.

Based on the U.S.G.S. 2009 PSHA, there is a 10% probability that within a 50-year time span the site would experience the effects of an earthquake with a magnitude greater than 7.0 occurring within 50 kilometers (31 miles). The California Geologic Survey PSHA indicates that there is a 10% probability that a peak ground acceleration of 0.27 would be exceeded in a 50-year time frame.

Liquefaction: The potential for seismically induced liquefaction is greatest where shallow groundwater and poorly consolidated, well-sorted, fine grained sands and silts are present. Liquefaction potential decreases with increasing density, grain size, clay content and gravel content. Conversely, liquefaction potential increases as the ground acceleration and duration of seismic shaking increase.

Groundwater was not observed within our exploratory excavations and the site is underlain by dense granitic bedrock at relatively shallow depths. Furthermore, if the earthwork is performed in accordance with the recommendations presented in this report, then poorly consolidated overburden soils will be removed and/or appropriately compacted.

Based on the conditions observed and the anticipated earthwork, it is our professional opinion that the potential for generalized liquefaction in the event of a strong to moderate earthquake along one of the fault zones listed above would be low.

Landslides and Slope Stability: No evidence indicating the presence of deep-seated landslides was observed on or in the immediate vicinity of the site. There were no remolded clay seams or continuous shear planes exposed in the exploratory excavations. We did not observe any head scarps, tension cracks or excessive hummocky topography that would suggest rotational slumps. Therefore, it is our professional opinion that the potential for deep-seated slope failure is low. The predominant mode of mass wasting on the site appears to be small wedge failures and minor rock falls that are generated along intersecting joint planes in the bedrock. In areas where the bedrock is excessively weathered surficial failure of the slope face can occur. This can be expected following prolonged periods or intensive short-term episodes of surface water infiltration.

Minor shallow seated slope failure may occur on steep slopes. However, if the recommendations presented in this report are followed, the potential for slope failure on this project can be reduced.

Recommendations and Conclusions

Site Preparation

Existing Soil: The existing fill materials are not uniformly compacted, and the underlying colluvium is compressible. Therefore, the existing overburden soils are not considered suitable for the support of foundations, or new fill in their present condition. To provide more uniform support for the proposed improvements and to reduce the potential for differential settlement, we recommend that the existing fill, colluvium and excessively weathered bedrock be completely removed to firm, undisturbed natural ground at the location of planned improvements.

The horizontal limits of removal and recompaction should include the entire areas of proposed structures, pavement, hardscape, fill or any new fill slopes. All soil removal and recompaction should extend at least 8 feet beyond the footprint of any building, where space allows, and 2 feet beyond the perimeter of any pavement.

Based on the results of our field exploration, it appears that the depth of removal may vary from less than 1 foot to approximately 8 feet. Table I (Plate No. 21) of this report presents anticipated removal depths in the area of our subsurface explorations. Thicker and/or less competent materials may be encountered at locations that were not explored.

The on-site soils, minus any debris, expansive soil, organic matter or over-sized rock (greater than 6-inches) may be used as compacted fill. This fill should be compacted to no less than 90% of its maximum dry density (ASTM D1557-09), and placed in accordance with the earthwork recommendations provided in this report.

Expansive Soil: Detrimentally expansive soils (Expansion Index of 21 or greater) were not encountered in the subsurface explorations. The majority of the materials observed consisted of silty, fine to very coarse grained sands derived from weathered granitic bedrock. Nevertheless, the Geotechnical Consultant should be notified if suspected expansive soils (clays or plastic silts) are exposed during construction. Potentially expansive materials should not be placed within 4 feet of finish subgrade where conventional foundations or slabs-on-grade are proposed. Expansive soils should not be used as wall backfill or within 2 feet of finish subgrade beneath concrete pavements or hardscapes.

Imported Fill: Imported fill, if required at this site, shall be approved by our office prior to importing. The Geotechnical Consultant should be provided ample notification so that sampling and testing of potential soils may be performed prior to importing. Approximately 3 to 5 working days may be necessary to sample and evaluate potential import soils. Imported fill material shall have an Expansion Index of 20 or less with not more than 25 percent passing the No. 200 U.S. standard sieve. Imported fill shall be clean, granular soil that does not contain any organic material.

Cut Slopes: According to the referenced grading plan, 1½:1 (horizontal to vertical) cut slopes up to 35 feet in height are proposed. A slope stability analysis was performed using Stabl version 2.0. The analysis resulted in safety factors greater than 1.5 (static conditions) and 1.1 (seismically loaded conditions) when considering the proposed slopes. It is our professional opinion that slopes excavated into the firm bedrock materials should be stable up to their designed heights.

Proposed cut slopes that occur in existing fill, alluvium, colluvium, residuum, adversely fractured formation materials, or any proposed slopes cut into incompetent soil material shall be evaluated by the Geotechnical Engineer or Engineering Geologist. Additional remedial actions may be required to mitigate the effects of detrimental slope conditions. These may include rock bolting, rock netting, retaining walls or reducing the slope inclination.

Fill Slopes: It is our professional opinion that fill slopes constructed at an inclination of 2:1 (horizontal to vertical) or flatter should be stable at the proposed maximum height of 35 feet.

Fill slopes shall be keyed into dense natural ground. The key shall extend through all incompetent soil and be established at least 2 feet into dense competent material. The key shall be a minimum of 2 feet deep at the toe of slope and fall with 5% grade toward the interior of the proposed fill areas. The bottom of the key shall have a width of at least 15 feet.

All keys must be inspected by the Geotechnical Engineer, Engineering Geologist or their representative in the field.

Whenever feasible, the soil material placed within the outer 15 feet of any fill slope, as measured inward horizontally from the face of the slope, should consist of on-site or imported granular soil material with an expansion index of 50 or less. Fill slopes constructed with clayey or expansive soils may experience creep and/or surficial failure.

We recommend that slopes be compacted by backrolling with a loaded sheepsfoot roller at vertical intervals not to exceed 4 feet and should be track walked at the completion of each slope. The face of the slopes should be compacted to no less than 90% relative compaction (ASTM D1557-09). This can best be accomplished by over building the slope at least 4 feet and trimming to design finish slope grade.

Surface Drainage: Surface drainage shall be directed away from structures and paved areas. The ponding of water or saturation of soils should not be allowed adjacent to any of the foundations. We recommend that planters be provided with drains and low flow irrigation systems. Gutters, roof drains and other drainage devices shall discharge water away from the structure into surface drains and storm sewers.

Surface water must not be allowed to drain in an uncontrolled manner over the top of any slope or excavation.

The exterior grades should be sloped to drain away from the structures to minimize ponding of water adjacent to the foundations. Minimum site gradients of at least 2% in the landscaped areas and of 1% in the hardscaped areas are recommended in the vicinity of buildings. These gradients should extend at least 10 feet from the edge of the structures.

To reduce the potential for erosion, the slopes shall be planted as soon as possible after grading. Slope erosion, including sloughing, rilling, and slumping of surface soils may be anticipated if the slopes are left unplanted for a long period of time, especially during rainy seasons. Swales or earth berms are recommended at the top of all permanent slopes to prevent surface water runoff from overtopping the slopes. Animal burrows should be controlled or eliminated since they can serve to collect normal sheet flow on slopes, resulting in rapid and destructive erosion. Erosion control and drainage devices must be installed in compliance with the requirements of the controlling agencies.

Subdrains: Due to the evidence of potential transient subsurface water there is a possibility that subdrains may be needed on this site. We are providing the following recommendations should subsurface conditions exposed during earthwork indicate the need for subdrains. Possible subdrain locations may be near the toe of existing or proposed slopes. The final determination for the location of the subdrains would be made by the Geotechnical Engineer or Engineering Geologist during the site grading.

Subdrains should consist of a trench at least 36 inches deep and 18 inches wide. Mirafi 140N or Amoco 4547 non-woven geotextile fabric, or an approved equivalent, should line the bottom and sides of the trench. Four inches of 3/4-inch rock bedding should be placed on the geotextile at the bottom of the trench. A perforated pipe with a diameter of at least 4 inches should be placed in the trench with the perforations down. A 6-inch diameter pipe may be necessary where larger volumes of water are anticipated. The pipe shall be SDR 35 (ASTM-D3034) or an approved equal.

The drainpipe should have a minimum 1% gradient and be centered within the trench horizontally. A minimum of 3 cubic feet of 3/4-inch rock per linear foot of subdrain should be placed over and around the pipe within the geotextile lined trench. The geotextile should lap at least 12 inches over the top of the rock. The subdrain should outlet away from any structures or slopes in an approved legal manner.

Backdrains will also be required for walls. These are discussed in the retaining wall recommendations presented further in this report.

Earthwork: All earthwork performed on-site must be accomplished in accordance with the attached Specifications for Construction of Controlled Fills (Appendix I). All special site preparation recommendations presented in the sections above will supersede those in the Specifications for Construction of Controlled Fills. All embankments, structural fill, and utility trench backfill shall be compacted to no less than 90% (or 95% where recommended herein) of its maximum dry density. The moisture content of the granular fill soils should be within 2% of optimum moisture content at the time of compaction. The moisture content of the clayey soil materials should be maintained between 2% and 4% over optimum moisture content. The maximum dry density of each soil type shall be determined in accordance with ASTM D1557-09.

Prior to commencement of the brushing operation, a pre-grading meeting shall be held at the site. The Developer, Surveyor, Grading Contractor, and Soil Engineer should attend. Our firm should be given at least 3 days notice of the meeting time and date.

Foundation Recommendations

Seismic Design Parameters: The following seismic parameters may be used for foundation design. These design parameters are based on the information provided in Chapter 16 of the 2010 California Building Code.

Table	1613.5.2 Site Class = C
Figure	1613.5 (3) Spectral Response Acceleration S_s = 115% g
Figure	1613.5 (4) Spectral Response Acceleration S_1 = 43% g
Table	1613.5.3 (1) Site Coefficient F_a = 1.0
Table	1613.5.3 (2) Site Coefficient F_v = 1.4

Soil Classification: For design purposes, the soil materials exposed during construction will likely have Unified Soil Classification of SM, SP and SW.

Foundation Support: If the remedial earthwork recommendations presented previously in this report are performed, then the proposed foundations may be supported on the resulting compacted fill. Foundations supported on fill should be underlain by at least 2 feet of soil having an expansion index of 20 or less. Footings shall be designed with the minimum dimensions and allowable dead plus live load soil bearing values given in the table below. The soil load bearing values of any imported soil should be determined after its selection but prior to its delivery on-site.

Soil Parameters for Footings

Soil Type	Footing Type	Minimum Depth (inches)	Minimum Width (inches)	Allowable Soil Bearing Value (p.s.f.)
Compacted Fill	Continuous	18	15	2,000
Compacted Fill	Square	24	24	2,500

The soil load bearing values presented above may be increased by one-third for short-term loads, including wind or seismic. The minimum depth given shall be below **lowest adjacent** finish subgrade. If foundations are proposed adjacent to the top of any slope, we recommend that the footings be deepened to provide a horizontal distance of not less than 8 feet between the outer edge of the footing and the adjacent slope face.

All footings shall be reinforced in accordance with recommendations provided by a Structural Engineer. From a geotechnical standpoint continuous footings should have minimum reinforcement consisting of two No. 4 bar placed near the top and two No. 4 bar placed 3 inches from the bottom.

Office Area Concrete Slabs-On-Grade: If the soils are prepared as recommended in this report, new concrete slabs-on-grade used for office space shall be supported entirely on compacted fill. No cut/fill transitions should be allowed to occur beneath the structures. Office space slabs-on-grade should have a thickness of no less than 4 inches.

Minimum reinforcement should consist of No. 4 bars placed 18 inches on center in both directions. A low-slump concrete (4-inch maximum slump) should be used to minimize possible curling of the slabs. The concrete slabs should be allowed to cure properly before placing vinyl or other moisture-sensitive floor covering. Optimum curing may be accomplished using burlap covers kept continuously moist for at least seven days. The floor-covering contractor should test the slab for moisture vapor transmission requirements.

These are minimum recommendations only and may be enhanced or increased as directed by the Structural Engineer. Construction joint and weakened plane joint details, spacing and placement shall be provided by the Structural Engineer.

Heavy-Duty Concrete Slabs-On-Grade: These recommendations are provided for concrete slabs-on-grade that will be subject to heavy loads such as forklifts, loaders and trucks. The concrete slab should be a minimum of 10 inches thick and be reinforced with No. 5 rebar at 18 inches on center each way. The rebar should be kept at least 3 inches above the underlying soil materials. The rebar should be supported on 3-inch-tall concrete dobies. These recommendations may be enhanced or increased at the discretion of the Structural Engineer.

Slab-On-Grade Bedding: To provide uniform support and protection against vapor or water transmission through the slabs-on-grade, we recommend that the concrete slabs-on-grade be underlain by a 6-inch thick layer of untreated aggregate base as defined in Section 200-2 of the latest edition of the Standard Specifications for Public Works Construction ("Green Book") or Class 2 Aggregate Base as defined in Section 26 of the State of California Standard Specifications (latest edition). The base course should be compacted to no less than 95% of the maximum dry density (ASTM D1557-09).

Impermeable Membrane: We recommend that the 6-inch-thick aggregate base layer be overlain by a 10-mil-thick impermeable plastic membrane (Stego Wrap or approved equal) to provide additional protection against water vapor transmission through the office or storage area slabs. The vapor barrier should be installed in accordance with the manufacturer's instructions. We recommend that the edges, laps and penetrations for pipes or other devices be sealed with Stego tape.

The impermeable membrane may be eliminated beneath slabs where seepage would not be a nuisance, a hazard or otherwise detrimental to the structures or facility operations.

Transition Areas: Any proposed structures should not be allowed to straddle a cut-fill transition line. Footings and floor slabs should be entirely supported on cut or entirely on fill. The tendency of cut and fill soils to compress differently can frequently result in differential settlement, cracking to portions of the structure and in severe cases structural damage.

To reduce the potential for damage due to differential settlement in transition areas, we recommend that cut areas beneath foundations and slabs-on-grade be over-excavated to a depth of at least 2 feet below the bottom of the **deepest** proposed footing and replaced with non-expansive soil material compacted to at least 90% of its maximum dry density (ASTM D1557-09).

Lateral Resistance: Resistance to lateral loads may be provided by friction at the base of the footings and floor slabs and by the passive resistance of the supporting soils. Allowable values of frictional and passive resistance are presented for the soils in the table below. The frictional resistance and the passive resistance of the materials may be combined without reduction in determining the total lateral resistance.

Lateral Resistance Values

Soil Type	Coefficient of Friction	Allowable Passive Pressure (psf/ft of depth)
Compacted Fill	0.35	300

Footing Observations: Prior to the placement of reinforcing steel and concrete, all foundation excavations should be observed by the Soil Engineer, Engineering Geologist or their representative. Footing excavations shall be cleaned of any loosened soil and debris before placing steel or concrete. Footing excavations should be observed and probed for soft areas. Any soft or disturbed soils shall be over-excavated prior to placement of steel and concrete. Over-excavation of soils should not be performed in locations that were undercut for transition areas. This would compromise the thickness of the soil supporting the footings. In undercut transition areas loose soils should be recompacted.

Retaining Walls

Lateral Pressures: We are providing the following recommendations should retaining/restraining walls be considered for development on this site. Our analysis anticipated the use of retaining walls up to 10 feet in height. These recommendations should be reviewed and updated if walls greater than 10 feet in height are to be installed. For the design of cantilevered retaining walls where the backfill is well drained, the equivalent fluid pressures for both active and at-rest conditions are presented below.

Backfill Inclination	Active Pressure (p.c.f.)	At-Rest Pressure (p.c.f.)
Level	40	55
2:1 Slope	53	68

Wherever walls are subject to surcharge loads, they should be designed for an additional uniform lateral pressure equal to one-third the anticipated surcharge pressure, in case of unrestrained walls, and one-half the anticipated surcharge, in case of restraining walls.

Restrained Walls: This analysis is based on the understanding that restrained walls would be backfilled with best available on-site soils with an expansion index of 20 or less. For restrained earth retaining structures with level backfill, the active soil pressure may be assumed to be equivalent to the pressure of a fluid weighting 40 pounds per cubic foot plus a uniform pressure of *7H* pounds per square foot, where *H* equals the height of the backfill above the top of the footings. These pressures do not consider any surcharge.

Drainage and Waterproofing: If the backfill is placed and compacted as recommended herein and good surface drainage is provided, the infiltration of water into the wall backfill may be reduced. Adequate drainage of adjacent planters should likewise be provided to reduce water infiltration into wall backfills.

To limit the entrapment of water in the backfill behind the proposed walls, backdrains or other drainage measures should be installed. Drainage should consist of vertical gravel drains approximately 18 inches wide connected to a 4-inch-diameter perforated pipe. The pipe shall be SDR 35 (ASTM D3034) or approved equal.

The perforated pipe should be placed with the perforations down and should be surrounded by at least 1 ½ feet of filter gravel or uniformly graded gravel or Caltrans Class 2 permeable material wrapped in a non-woven filter fabric, such as Mirafi 140N, or an approved equivalent. Care should be taken to select a filter fabric compatible with the backfill materials as clogging of the filter material may occur.

The drainpipe should be located near the base of the wall and should discharge into a storm drain or onto a surface draining away from the structure. As an alternative to the vertical gravel drains, a drainage geocomposite such as Miradrain, or an approved equivalent, may be used with a 4-inch diameter, perforated pipe collector drain.

Backfill: The exterior grades should be sloped to drain away from the structures to minimize ponding of water adjacent to the foundations and retaining walls. Compaction of the backfill as recommended herein will be necessary to reduce settlement of the backfill and associated settlement of the overlying walks, paving, and utilities. Soil material used for wall backfill should have an expansion index of 20 or less. All backfill should be compacted to at least 90% of the maximum dry density (ASTM D1577-09). Some settlement of the backfill should be anticipated; and any utilities supported therein should be designed to accept differential settlement, particularly at points of entry into buildings.

Pavement Recommendations

Access Road Pavement Design: The required paving thickness and base thickness will depend on the subgrade soils and on the Traffic Index (T.I.) applicable to the intended usage. In anticipation of daily deliveries by large trucks a T.I. of 8.0 was used for the access road that will surround the large pad and any other driveways or parking lots that will be subject to truck traffic. A T.I. of 4.5 was used for the design of pavements intended for light vehicle loads such as cars and pick-up trucks.

A representative sample of soil was returned to the laboratory to determine the Resistance Value (R-Value). The R-Value test result is presented in the table below and on Plate No. 20 of this report. The asphalt paving section was established based on Caltrans design methods.

Structural Flexible Pavement Section

Location	R-Value	T.I.	Paving Section*
Access Road	78	8.0	4-inches AC over 8-inches AB
Light Vehicle Areas	78	4.5	3-inches AC over 6-inches AB

* AC = Asphaltic Concrete; AB = Aggregate Base

The pavement sections should be verified by observation during construction and, if necessary, confirmed by sampling and performing additional R-Value tests on the soil material at subgrade elevation on completion of the earthwork.

These recommendations are subject to the review and approval of the governing agencies.

Base Material: The aggregate base course should meet the specifications for untreated base as defined in Section 200-2 of the latest edition of the Standard Specifications for Public Works Construction ("Green Book"). If approved by the governing agency, the base course could meet the specifications for Class 2 Aggregate Base as defined in Section 26, of the State of California, Standard Specifications (latest edition). The base course should be compacted to at least 95% of its maximum dry density as determined by ASTM D1557-09. Careful inspection is recommended to verify that the specified thicknesses, or greater, are achieved and that proper construction procedures are used.

Subgrade areas that will receive aggregate base shall be properly moistened and re-compacted to no less than 95 percent of their maximum dry density (ASTM D1557-09) to a depth of at least 12 inches below subgrade.

Subgrade Preparation: Pavement subgrade preparation should consist of scarifying to a minimum depth of 12 inches and re-compacting the subgrade to no less than 95% of its maximum dry density (ASTM D1557-09). If poorly consolidated materials are encountered, removal and recompaction should extend to firm, competent soil or to a maximum depth of 4 feet below subgrade.

Field Explorations

Subsurface conditions were explored by observation of 16 backhoe trenches on August 23 and 24, 2012. The exploratory excavations were extended to depths ranging from 5¾ to 13 feet. Neither caving nor groundwater seepage was observed in the sidewalls of the excavations. The location of the exploratory excavations are depicted on the Site Plan, Plate No. 1, in the back of this report.

The surface reconnaissance and subsurface exploration were conducted by our geology and soil engineering personnel. The soils are described in accordance with the Unified Soil Classification System as illustrated on the attached simplified chart (Plate No. 2). In addition, a verbal textural description, the wet color, the apparent moisture and the density or consistency are presented. The density of granular material is given as either very loose, loose, medium dense, dense or very dense. The consistency of silts or clays is given as either very soft, soft, medium stiff, stiff, very stiff or hard. The sampling and logging of the exploratory excavations was performed using standard geotechnical methods. The logs are presented on Plate No. 3 through 18. Samples of typical and representative soils were obtained and returned to our laboratory for observation and testing.

Laboratory Testing

Laboratory tests were performed in accordance with the American Society for Testing and Materials (ASTM) test methods or suggested procedures. Test results are shown on Plate Nos. 19 and 20.

Plan Review

West Coast Geotechnical Consultants, Inc. should review the final grading and building plans for this project.

Limitations

The recommendations and opinions expressed in this report reflect our best estimate of the project requirements based on an evaluation of the subsurface soil conditions encountered at the subsurface exploration locations and the assumption that the soil conditions do not deviate appreciably from those encountered. It should be recognized that the performance of the foundations, pavements and constructed slopes may be influenced by undisclosed or unforeseen variations in the soil conditions that may occur in the intermediate and unexplored areas. Any unusual conditions not covered in this report that are encountered during site development should be brought to the attention of the geotechnical consultant so that modifications can be made, if necessary.

It is recommended that West Coast Geotechnical Consultants, Inc. be retained to provide continuous geotechnical engineering services during the earthwork operations. This is to observe compliance with the design concepts, specifications or recommendations and to allow design changes in the event that subsurface conditions differ from those anticipated prior to start of construction. West Coast Geotechnical Consultants, Inc. and/or our consultants, will not be held responsible for earthwork of any kind performed without our observation and testing.

This office should be advised of any changes in the project scope so that it may be determined if the recommendations contained herein are appropriate. This should be verified in writing or modified by a written addendum.

The findings of this report are valid as of this date. Changes in the condition of a property can, however, occur with the passage of time, whether they be due to natural processes or the work of man on this or adjacent properties. In addition, changes in the State-of-the-Art and/or Government Codes may occur. Due to such changes, the findings of the report may be invalidated wholly or in part by changes beyond our control. Therefore, this report should not be relied upon after a period of one year without a review by this office verifying the suitability of the conclusions and recommendations.

We will be responsible for our data, interpretations, and recommendations, but shall not be responsible for the interpretations by others of the information developed. Our services consist of professional consultation and observation only, and no warranty of any kind whatsoever, express or implied, is made or intended in connection with the work performed or to be performed by us, or by our proposal for consulting or other services, or by our furnishing of oral or written reports or findings.

It is the responsibility of the Client or the Client's representative to ensure that the information and recommendations contained herein are brought to the attention of the engineer and architect for the project and incorporated into the project's plans and specifications. It is further the responsibility of the Client to take the necessary measures to ensure that the contractor and sub-contractors carry out such recommendations during construction.

Respectfully submitted,

WEST COAST GEOTECHNICAL CONSULTANTS, INC.

Vincent W. Gaby, CEG 1755, Expires 7-31-13
Engineering Geologist

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Geotechnical Engineer

VWG:DEZ/dfg

ATTACHMENTS

WEST COAST
GEOTECHNICAL CONSULTANTS, INC.

SITE PLAN

Plate No. 1

(In Back Pocket)

SUBSURFACE EXPLORATION
LEGEND

UNIFIED SOIL CLASSIFICATION CHART

Soil Description	Group Symbol	Typical Names
I. COARSE GRAINED: More than half of material is larger than No. 200 sieve size.		
Gravels: More than half of coarse fraction is larger than No. 4 sieve size but smaller than 3".		
CLEAN GRAVELS	GW	Well graded gravels, gravel sand mixtures, little or no fines.
	GP	Poorly graded gravels, gravel sand mixtures, little or no fines.
GRAVEL W/FINES	GM	Silty gravels, poorly graded gravel-sand-silt mixtures.
	GC	Clayey gravels, poorly graded gravel-sand-clay mixtures.
Sands: More than half of coarse fraction is smaller than No. 4 sieve size.		
CLEAN SANDS	SW	Well graded sand, gravelly sands, little or no fines.
	SP	Poorly graded sands, gravelly sands, little or no fines.
SANDS W/FINES	SM	Silty sands, poorly graded sand and silt mixtures.
	SC	Clayey sands, poorly graded sand and clay mixtures.
II. FINE GRAINED: More than half of material is smaller than No. 200 sieve size.		
Silts & Clays: Liquid limit less than 50.	ML	Inorganic silts and very fine sands, rock flour, sandy silt or clayey-silt-sand mixtures with slight plasticity.
	CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
	OL	Inorganic silty and organic silty clays of low plasticity.
Silts & Clays:	MH	Inorganic silts, micaceous or diatomaccous fine sandy or silty soils, elastic silts.
	CH	Inorganic clays of high plasticity, fat.
	OH	Organic clays of medium to high plasticity.
HIGHLY ORGANIC SOILS	PT	Peat and other highly organic soils

Plate No. 2

WEST COAST
GEOTECHNICAL CONSULTANTS, INC.

TRENCH NO. T-1

ELEVATION ±1015

SAMPLING METHOD BACKHOE

DEPTH (FEET)	SAMPLE TYPE	SOIL CLASSIFICATION	DESCRIPTION	APPARENT MOISTURE	APPARENT CONSISTENCY	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	RELATIVE COMPACTION %	DEPTH (FEET)
0–1		SW/SM	FILL - Pale Yellowish-Brown, Silty, Fine to Very Coarse Grained Sand	Dry	Dense				
1–2	N	SM	Dark Brown, Very Silty, Fine to Coarse Grained Sand	Moist	Loose	100.6	9.5		
2–4	N, B	SM	COLLUVIUM - Brown, Very Silty, Fine to Coarse Grained Sand	Damp to Moist	Loose	101.6	11.1		
4–6	N	SW/SM	RESIDUUM - Dark Orangish-Yellow, Silty, Fine to Very Coarse Grained Sand	Moist	Medium Dense to Dense	116.9	13.8		
			Grades to						
6–10	N	SW	MONZOGRANITE - Dark Orangish-Yellow, Medium to Very Coarse Grained Sand Decomposed Granitic Rock	Damp to Moist	Dense to Very Dense	123.7	10.0		
10			BOTTOM OF TRENCH @ 10 FEET						

SAMPLING LEGEND
B = BULK SAMPLE
C = CHUNK SAMPLE
N=IN-PLACE TEST USING NUCLEAR GAUGE

JOB NUMBER		DATE LOGGED	LOGGED BY
12-12	SAJE COMPLEX	8-23-12	VWG

SUBSURFACE EXPLORATORY LOG

TRENCH NO. T-2

ELEVATION ±998

SAMPLING METHOD BACKHOE

DEPTH (FEET)	SAMPLE TYPE	SOIL CLASSIFICATION	DESCRIPTION	APPARENT MOISTURE	APPARENT CONSISTENCY	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	RELATIVE COMPACTION %	DEPTH (FEET)
0–1		SW/SM	FILL - Dark Brown, Silty, Fine to Very Coarse Grained Sand	Dry	Medium Dense				0–1
1–2		SW/SM	RESIDUUM - Yellow, Silty, Fine to Coarse Grained Sand	Damp	Medium Dense to Dense				1–2
3			Grades to						3
4	N					114.1	9.5		4
5		SW	MONZOGRANITE - Orangish-Yellow, Fine to Coarse Grained, Decomposed Granitic Rock	Damp to Moist	Dense				5
6	N					112.9	12.1		6
7									7
8									8
9									9
10									10
11			BOTTOM OF TRENCH @ 10-½ FEET						11
12									12
13									13
14									14
15									15
16									16

JOB NUMBER		DATE LOGGED	LOGGED BY
12-12	SAJE COMPLEX	8-23-12	VWG

SUBSURFACE EXPLORATORY LOG

TRENCH NO. T-3

ELEVATION ±990

SAMPLING METHOD BACKHOE

DEPTH (FEET)	SAMPLE TYPE	SOIL CLASSIFICATION	DESCRIPTION	APPARENT MOISTURE	APPARENT CONSISTENCY	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	RELATIVE COMPACTION %	DEPTH (FEET)
1			MONZOGRANITE - Dark Orangish-Yellow, Medium to Very Coarse Grained Decomposed Granitic Rock Dense to Very Dense						1
2									2
3		SW	MONZOGRANITE - Pale Gray, Medium to Coarse Grained Granitic Rock, Slightly Decomposed Very Dense	Damp to Moist	Dense to Very Dense				3
4									4
5									5
6	C					131.3	4.2		6
7									7
8									8
9			← East Trending Weathered Mafic Intrusion Dipping N83°						9
10			BOTTOM OF TRENCH @ 10 FEET						10
11									11
12									12
13									13
14									14
15									15
16									16

JOB NUMBER		DATE LOGGED	LOGGED BY
12-12	SAJE COMPLEX	8-23-12	VWG

SUBSURFACE EXPLORATORY LOG

TRENCH NO. T-4

ELEVATION ±982

SAMPLING METHOD BACKHOE

DEPTH (FEET)	SAMPLE TYPE	SOIL CLASSIFICATION	DESCRIPTION	APPARENT MOISTURE	APPARENT CONSISTENCY	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	RELATIVE COMPACTION %	DEPTH (FEET)
0–0.5		SM	FILL - Brown, Silty, Sand	Dry	Loose				0–0.5
0.5–11		SW	MONZOGRANITE - Pale Gray, with Orange Mottling, Fine to Coarse Grained, Slightly Decomposed Granitic Rock	Damp	Dense to Very Dense				0.5–11
4	C					130.1	4.2		4
9			← MOIST HEAVILY MOTTLED ZONE (MAY BE INDICATIVE OF PAST TRANSIENT SUBSURFACE WATER)						9
11			BOTTOM OF TRENCH @ 11 FEET						11
12–16									12–16

JOB NUMBER		DATE LOGGED	LOGGED BY
12-12	SAJE COMPLEX	8-23-12	VWG

SUBSURFACE EXPLORATORY LOG

DEPTH (FEET)	SAMPLE TYPE	SOIL CLASSIFICATION	TRENCH NO. T-5 ELEVATION ±981 SAMPLING METHOD BACKHOE DESCRIPTION	APPARENT MOISTURE	APPARENT CONSISTENCY	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	RELATIVE COMPACTION %	DEPTH (FEET)
0–2		SM/SP	**COLLUVIUM -** Brown, Silty Sand Interbedded with Orange-Brown, Thinly Bedded Sand	Dry to Damp	Loose				0–2
2–6		SM	**RESIDUUM -** Pale Gray, Silty, Fine to Medium Grained Sand Grades to	Dry to Damp	Medium Dense				2–6
6–8		SW	**MONZOGRANITE -** Gray with Orange Mottling, Fine to Coarse Grained Decomposed Granitic Rock	Damp	Dense to Very Dense				6–8
8–10			← HEAVILY OXIDIXED/MOTTLED, WEATHERED BEDROCK	Damp to Moist	Dense				8–10
10–16			BOTTOM OF TRENCH @ 10 FEET						10–16

JOB NUMBER		DATE LOGGED	LOGGED BY
12-12	SAJE COMPLEX	8-23-12	VWG

SUBSURFACE EXPLORATORY LOG

TRENCH NO. T-6

ELEVATION ±997

SAMPLING METHOD BACKHOE

DEPTH (FEET)	SAMPLE TYPE	SOIL CLASSIFICATION	DESCRIPTION	APPARENT MOISTURE	APPARENT CONSISTENCY	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	RELATIVE COMPACTION %	DEPTH (FEET)
0–2		SW/SM	**RESIDUUM -** Brownish-Orange, Silty, Fine to Coarse Grained Sand, Porous	Damp	Medium Dense to Dense				0–2
2	BNC (2–6)		Grades to						2
3		SW	**MONZOGRANITE -** Brownish-Orange, with Gray Mottling Medium to Very Coarse Grained Granitic Rock	Damp	Dense				3
4						115.2	10.6		4
5			Grades to			123.7	5.8		5
6–9		SW	Orange and Gray Mottled, Fine to Coarse Grained Granitic Rock	Damp to Moist	Dense to Very Dense				6–9
9			BOTTOM OF TRENCH @ 9 FEET						9
10–16									10–16

JOB NUMBER		DATE LOGGED	LOGGED BY
12-12	SAJE COMPLEX	8-23-12	VWG

SUBSURFACE EXPLORATORY LOG

TRENCH NO. T-7
ELEVATION ±1013
SAMPLING METHOD BACKHOE

DEPTH (FEET)	SAMPLE TYPE	SOIL CLASSIFICATION	DESCRIPTION	APPARENT MOISTURE	APPARENT CONSISTENCY	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	RELATIVE COMPACTION %	DEPTH (FEET)
0–1		SM/GM	**FILL -** Brown, Silty, Fine to Very Coarse Grained Sand, with Gravel and Fragments of Asphalt and Granitic Boulders	Dry to Damp	Loose to Medium Dense				0–1
2	N					103.6	6.6		2
3									3
4	N	SW/SM	**RESIDUUM -** Orangish-Brown, Silty, Fine to Very Coarse Grained Sand, with Pockets of Dark Brown, Silty Sand (Burrows?)	Damp to Moist	Medium Dense	113.3	7.5		4
5–6			Grades to						5–6
7		SW	Yellowish-Brown, Very Fine to Coarse Grained Sand	Moist	Medium Dense				7
8	N		Grades to			108.2	11.9		8
9–10	C	SW	**MONZOGRANITE -** Yellowish-Brown, Fine to Very Coarse Grained, Very Weathered Decomposed Granitic Rock	Damp to Moist	Dense	117.2	5.8		9–10
10.5			**BOTTOM OF TRENCH @ 10-½ FEET**						10.5
11–16									11–16

JOB NUMBER		DATE LOGGED	LOGGED BY
12-12	SAJE COMPLEX	8-24-12	VWG

SUBSURFACE EXPLORATORY LOG

DEPTH (FEET)	SAMPLE TYPE	SOIL CLASSIFICATION	TRENCH NO. T-8 ELEVATION ±1037 SAMPLING METHOD BACKHOE DESCRIPTION	APPARENT MOISTURE	APPARENT CONSISTENCY	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	RELATIVE COMPACTION %	DEPTH (FEET)
0–1		SM/SW	**FILL -** Yellowish-Brown, Silty, Fine to Coarse Grained Sand	Damp to Moist	Medium Dense to Dense				0–1
2	N	SW	Grayish-Yellow, Slightly Silty, Fine to Very Coarse Grained Sand			121.3	10.7		2
3		SM/SW	Dark Brown, Silty, Fine to Coarse Grained Sand						3
4		GM	Gray, Silty, Sandy Gravel						4
5		SM	Brown, Silty, Fine to Medium Grained Sand	Moist	Medium Dense to Dense				5
6	N	SW	Dark Brown, Fine to Coarse Grained Sand			121.7	9.0		6
7		SW	**COLLUVIUM/RESIDUUM -** Yellowish-Brown, Very Fine to Coarse Grained Sand	Moist	Medium Dense				7
8	N		Grades to			105.7	12.8		8
9		SW	**MONZOGRAITIE -** Dark Orangish-Brown, Medium to Very Coarse Grained, Very Decomposed Granitic Rock	Moist	Dense to Very Dense				9
10	N					113.2	12.7		10
			BOTTOM OF TRENCH @ 10 FEET						
11–16									11–16

JOB NUMBER		DATE LOGGED	LOGGED BY
12-12	SAJE COMPLEX	8-24-12	VWG

SUBSURFACE EXPLORATORY LOG

TRENCH NO. T-9

ELEVATION ±1037

SAMPLING METHOD BACKHOE

DEPTH (FEET)	SAMPLE TYPE	SOIL CLASSIFICATION	DESCRIPTION	APPARENT MOISTURE	APPARENT CONSISTENCY	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	RELATIVE COMPACTION %	DEPTH (FEET)
0–3		SW/SM	FILL - Dark Brown, Silty, Fine to Very Coarse Grained Sand	Dry	Dense				0–3
2	N					103.1	8.2		2
		SM	Brown, Silty, Fine to Coarse Grained Sand	Damp to Moist	Medium Dense				
3–10	N / B	SW/SM	RESIDUUM - Yellowish-Brown, Silty, Fine to Very Coarse Grained Sand, with Fragments of Granitic Rock	Damp to Moist	Medium Dense	108.2	4.3		3–10
			Grades to						
9		SW	MONZOGRANITE - Yellowish-Brown, Medium to Very Coarse Grained Decomposed Granitic Rock	Damp	Dense				9
9.5	C					126.4	1.0		9.5
10			BOTTOM OF TRENCH @ 10 FEET						10

JOB NUMBER		DATE LOGGED	LOGGED BY
12-12	SAJE COMPLEX	8-24-12	VWG

SUBSURFACE EXPLORATORY LOG

TRENCH NO. T-10
ELEVATION ±1039
SAMPLING METHOD BACKHOE

DEPTH (FEET)	SAMPLE TYPE	SOIL CLASSIFICATION	DESCRIPTION	APPARENT MOISTURE	APPARENT CONSISTENCY	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	RELATIVE COMPACTION %	DEPTH (FEET)
0–2		SW/SM	FILL - Orangish-Brown, Silty, Fine to Very Coarse Grained Sand Inter-layered with Dark Brown, Silty, Fine to Very Coarse Grained Sand	Damp to Moist	Medium Dense to Dense				0–2
2–5		SW/SM	RESIDUUM - Orangish-Brown, Silty, Fine to Coarse Grained Sand Grades to	Damp to Moist	Medium Dense				2–5
5–10	C	SW	MONZOGRANITE - Brownish-Yellow, Medium to Very Coarse Grained Decomposed Granitic Rock	Damp	Dense to Very Dense	151.9	2.8		5–10
10			BOTTOM OF TRENCH @ 10 FEET						10

JOB NUMBER		DATE LOGGED	LOGGED BY
12-12	SAJE COMPLEX	8-24-12	VWG

SUBSURFACE EXPLORATORY LOG

TRENCH NO. T-11
ELEVATION ±1022
SAMPLING METHOD BACKHOE

DEPTH (FEET)	SAMPLE TYPE	SOIL CLASSIFICATION	DESCRIPTION	APPARENT MOISTURE	APPARENT CONSISTENCY	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	RELATIVE COMPACTION %	DEPTH (FEET)
1									1
2		SW	**MONZOGRANITE** - Yellowish-Gray, Medium to Very Coarse Grained Decomposed Granitic Rock	Damp	Dense to Very Dense				2
3									3
4	C					154.9	1.0		4
5									5
6									6
7									7
8			REFUSAL AT TRENCH @ 7-½ FEET						8
9									9
10									10
11									11
12									12
13									13
14									14
15									15
16									16

JOB NUMBER		DATE LOGGED	LOGGED BY
12-12	SAJE COMPLEX	8-24-12	VWG

SUBSURFACE EXPLORATORY LOG

TRENCH NO. T-12

ELEVATION ±1016

SAMPLING METHOD BACKHOE

DEPTH (FEET)	SAMPLE TYPE	SOIL CLASSIFICATION	DESCRIPTION	APPARENT MOISTURE	APPARENT CONSISTENCY	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	RELATIVE COMPACTION %	DEPTH (FEET)
1		SM	FILL - Orangish-Brown and Dark Brown, Silty, Fine to Very Coarse Grained Sand	Dry to Damp	Dense				1
2	N					105.6	5.2		2
3		SM	Dark Brown, Very Silty, Fine to Coarse Grained Sand	Damp	Loose to Medium Dense				3
4									4
5		SM/SW	RESIDUUM - Orangish-Yellow, Silty, Fine to Coarse Grained Sand	Damp	Loose to Medium Dense				5
6	N					102.3	4.7		6
7			Grades to						7
8	N	SW	Orangish-Yellow, Slightly Silty, Fine to Very Coarse Grained Sand	Damp	Medium Dense to Dense	108.5	5.6		8
9									9
10			BOTTOM OF TRENCH @ 10 FEET						10
11									11
12									12
13									13
14									14
15									15
16									16

JOB NUMBER		DATE LOGGED	LOGGED BY
12-12	SAJE COMPLEX	8-24-12	VWG

SUBSURFACE EXPLORATORY LOG

TRENCH NO. T-13

ELEVATION ±1012

SAMPLING METHOD BACKHOE

DEPTH (FEET)	SAMPLE TYPE	SOIL CLASSIFICATION	DESCRIPTION	APPARENT MOISTURE	APPARENT CONSISTENCY	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	RELATIVE COMPACTION %	DEPTH (FEET)
1 – 3		SM	FILL - Dark Brown, Silty, Fine to Coarse Grained Sand	Dry to Damp	Dense to Medium Dense				1 – 3
3 – 4		SM	COLLUVIUM - Brown, Silty, Fine to Medium Grained Sand, Porous	Damp	Loose				3 – 4
5		SW	RESIDUUM - Orangish-Brown, Slightly Silty, Very Fine to Coarse Grained Sand	Damp to Moist	Medium Dense				5
6									6
7				Damp to Moist	Dense				7
8	C					114.8	4.3		8
9									9
10									10
11									11
12									12
13			BOTTOM OF TRENCH @ 13 FEET						13
14									14
15									15
16									16

JOB NUMBER		DATE LOGGED	LOGGED BY
12-12	SAJE COMPLEX	8-24-12	VWG

SUBSURFACE EXPLORATORY LOG

DEPTH (FEET)	SAMPLE TYPE	SOIL CLASSIFICATION	TRENCH NO. T-14 ELEVATION ±1012 SAMPLING METHOD BACKHOE DESCRIPTION	APPARENT MOISTURE	APPARENT CONSISTENCY	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	RELATIVE COMPACTION %	DEPTH (FEET)
0–4.4		SM	FILL - Dark Brown, Silty, Fine to Coarse Grained Sand	Dry to Damp	Dense to Medium Dense				0–4.4
4.4–5		SM	COLLUVIUM - Brown, Silty Sand, Porous	Damp	Loose				4.4–5
5–13		SW	RESIDUUM - Orangish-Brown, Slightly Silty, Very Fine to Coarse Grained Sand	Damp to Moist	Medium Dense to Dense				5–13
13			BOTTOM OF TRENCH @ 13 FEET						13

JOB NUMBER		DATE LOGGED	LOGGED BY
12-12	SAJE COMPLEX	8-24-12	VWG

SUBSURFACE EXPLORATORY LOG

TRENCH NO. T-15

ELEVATION ±1048

SAMPLING METHOD BACKHOE

DEPTH (FEET)	SAMPLE TYPE	SOIL CLASSIFICATION	DESCRIPTION	APPARENT MOISTURE	APPARENT CONSISTENCY	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	RELATIVE COMPACTION %	DEPTH (FEET)
1		SM	FILL - Dark Brown, Silty, Fine to Very Coarse Grained Sand	Damp	Dense				1
2		SW	RESIDUUM - Orangish-Brown, Slightly Silty, Fine to Very Coarse Grained Sand	Damp	Medium Dense to Dense				2
3									3
4			Grades to						4
5		SW	MONZOGRANITE - Brownish-Yellow, Medium to Very Coarse Grained Decomposed Granitic Rock	Damp	Dense to Very Dense				5
6			BOTTOM OF TRENCH @ 5-¾ FEET						6
7									7
8									8
9									9
10									10
11									11
12									12
13									13
14									14
15									15
16									16

JOB NUMBER		DATE LOGGED	LOGGED BY
12-12	SAJE COMPLEX	8-24-12	VWG

SUBSURFACE EXPLORATORY LOG

SUBSURFACE EXPLORATORY LOG

TRENCH NO. T-16
ELEVATION ±1060
SAMPLING METHOD BACKHOE

DEPTH (FEET)	SAMPLE TYPE	SOIL CLASSIFICATION	DESCRIPTION	APPARENT MOISTURE	APPARENT CONSISTENCY	DRY DENSITY (PCF)	MOISTURE CONTENT (%)	RELATIVE COMPACTION %	DEPTH (FEET)
0–1.5		SM/SW	FILL - Brown, Silty, Fine to Very Coarse Grained Sand	Dry to Damp	Dense				
1.5			ONE INCH THICK AC						
1.5–3		SM/SW	FILL - Yellowish-Brown, Silty, Fine to Very Coarse Grained Sand	Damp	Dense				
3–4.5		SM/SW	FILL - Orangish-Brown, Silty, Fine to Very Coarse Grained Sand	Damp	Medium Dense				
4.5–6		SM	FILL - Dark Brown, Silty, Fine to Medium Grained Sand	Damp	Loose				
6–13		SM	**COLLUVIUM/RESIDUUM** - Brown, Silty, Fine to Coarse Grained Sand	Damp to Moist	Loose to Medium Dense				
			Grades to						
		SW/SM	**RESIDUUM** - Orangish-Brown, Slightly Silty, Fine to Very Coarse Grained Sand	Damp to Moist	Medium Dense				
			Grades to						
		SW	**MONZOGRANITE** - Grayish-Yellow, Fine to Very Coarse Grained, Weathered, Decomposed Granitic Rock	Moist	Dense				
13			BOTTOM OF TRENCH @ 13 FEET						

Depth scale: 1 – 16 feet

JOB NUMBER		DATE LOGGED	LOGGED BY
12-12	SAJE COMPLEX	8-24-12	VWG

LABORATORY TEST RESULTS

Maximum Density/Optimum Moisture

Sample Location	Description	Maximum Dry Density (pcf)	Optimum Moisture Content (percent)
T-1 @ 2' to 6'	Orangish-Brown, Silty, Fine to Very Coarse Grained Sand	131.2	8.5
T-6 @ 2' to 6'	Pale Brown, Fine to Very Coarse Grained Sand	130.5	8.0
T-9 @ 3' to 8'	Brown, Slightly Silty, Fine to Very Coarse Grained Sand	130.7	9.3

Direct Shear

Sample Location	Apparent Cohesion (psf)	Angle of Internal Friction (degrees)
*T-1 @ 2' to 6'	250	33
*T-6 @ 2' to 6'	250	30

* Sample remolded to 90 percent of maximum dry density and 3 percent over optimum moisture content.

LABORATORY TEST RESULTS - Cont.

In-Situ Moisture and Density

Sample Location	Dry Density (pcf)	Moisture Content (%)	Sample Location	Dry Density (pcf)	Moisture Content (%)
T-1 @ 2'	100.6	9.5	T-8 @ 2'	121.3	10.7
T-1 @ 4'	101.6	11.1	T-8 @ 6'	121.7	9.0
T-1 @ 6'	116.9	13.8	T-8 @ 8'	105.7	12.8
T-1 @ 8'	123.7	10.0	T-8 @ 10'	113.2	12.7
T-2 @ 4'	114.1	9.1	T-9 @ 2'	103.1	8.2
T-2 @ 6'	112.9	12.1	T-9 @ 4'	108.2	4.3
T-3 @ 6'	131.3	4.2	T-9 @ 9½'	126.4	1.0
T-4 @ 4'	130.1	4.2	T-10 @ 6'	151.9	2.8
T-6 @ 4'	115.2	10.6	T-11 @ 4'	154.9	1.0
T-6 @ 5'	123.7	5.8	T-12 @ 2'	105.6	5.2
T-7 @ 2'	103.6	6.6	T-12 @ 6'	102.3	4.7
T-7 @ 4'	113.3	7.5	T-12 @ 8'	108.5	5.6
T-7 @ 8'	108.2	11.9	T-13 @ 8'	114.8	4.3
T-7 @ 9½'	117.2	5.8			

R-Value Test

Sample Location	R-Value
T-9 @ 3' to 8'	78

TABLE ONE

Trench Number	Depth of Soil Removal Below Existing Grade
T-1	4 Feet
T-2	4 Feet
T-3	½ Foot
T-4	1 Foot
T-5	4 Feet
T-6	3 Feet
T-7	4 Feet
T-8	8 Feet
T-9	8 Feet
T-10	4 Feet
T-11	0 Feet (Note 2)
T-12	8 Feet
T-13	8 Feet
T-14	8 Feet
T-15	4 Feet
T-16	11 Feet

NOTES:

1. It should be recognized that variations in soil conditions may occur between exploration excavations that will require additional removal.
2. Deeper removal and recompaction may also be necessary to undercut transition pads.
3. In areas where fill slope toe keys are proposed, add a minimum of 2 feet to removal depths presented above.
4. Exploratory excavations encountered in the removal process should be re-compacted an additional 2 feet below the depths shown in the above table.

APPENDIX I

SPECIFICATIONS FOR CONSTRUCTION OF CONTROLLED FILLS

General Description: The construction of controlled fills shall consist of adequate geotechnical investigations, and clearing, removal of existing structures and foundations, preparation of land to be filled, excavation of earth rock from cut area, compaction and control of the fill, and all other work necessary to complete the grading of the filled area to conform with the lines, grades, and slopes as shown on the accepted plans.

Clearing and Preparation of Areas to be Filled:

(1) All fill control projects shall have an investigation or a visual examination, depending upon the nature of the job, performed by a qualified soil engineer prior to grading.

(2) All timber, trees, brush, vegetation, and other rubbish shall be removed, piled and burned, or otherwise deposed of to leave the prepared area with a finished appearance free from unsightly debris.

(3) Any soft, swampy or otherwise unsuitable areas, shall be corrected by drainage or removal of compressible material, or both, to the depths indicated on the plans or as directed by the soil engineer.

(4) The natural ground which is determined to be satisfactory for the support of the filled ground shall then be plowed or scarified to a depth of at least six inches (6") or deeper as specified by the soil engineer, and until the surface is free from ruts, hummocks, or other uneven features which would tend to prevent uniform compaction by the equipment to be used.

(5) No fill shall be placed until the prepared native ground has been approved by the soil engineer.

(6) Where fills are made on the hillsides with slopes greater than 5 (horizontal) to 1 (vertical), horizontal benches shall be cut into firm undisturbed natural ground to provide lateral and vertical stability. The initial bench at the tow of the fill shall be at least 10 feet in width on firm undisturbed natural ground at the elevation of the toe stake. The soil engineer shall determine the width and frequency of all succeeding benches, which will vary with the soil conditions, and the steepness of slope.

(7) After the natural ground has been prepared, it shall be brought to the proper moisture content and compacted to not less than 90% of maximum density, ASTM D1557-09.

(8) Expansive soils may require special compaction specifications as directed in the report of geotechnical investigation by the soil engineer.

(9) The cut portions of building pads may require excavation and recompaction for density compatibility with the fill as directed by the soil engineer.

Materials: The fill soils shall consist of select materials graded so that at least 40 percent of the material passes the No. 4 sieve. The material may be obtained from the excavation, a borrow pit, or by mixing soils from one or more sources. The material used shall be free from vegetable matter, and other deleterious substances, and shall not contain rocks or lumps greater than 6 inches in diameter. If excessive vegetation, rocks, or soils with unacceptable physical characteristics are encountered, these materials shall be disposed of in waste areas designated on the plans or as directed by the soil engineer. If soils are encountered during the grading operation which were not reported in the report of geotechnical investigation, further testing will be required to ascertain their engineering properties. Any special treatment recommended in the preliminary or subsequent soil reports not covered herein shall become an addendum to these specifications.

No material of perishable, spongy, or otherwise unstable nature shall be used in the fills.

Placing, Spreading and Compacting Fill Material:

(1) The selected fill material shall be placed in layers which shall not exceed six inches (6") when compacted. Each layer shall be spread evenly and shall be throughly blade-mixed during the spreading to insure uniformity of material and moisture in each layer.

(2) When the moisture content of the fill material is below that specified by the soil engineer, water shall be added until moisture content is near optimum as determined by the soil engineer to assure thorough bonding during the compacting process.

(3) When the moisture content of the fill material is above that specified by the soil engineer, the fill material shall be aerated by blading and scarifying, or other satisfactory methods until the moisture content is near optimum as determined by the soil engineer.

(4) After each layer has been placed, mixed and spread evenly, it shall be throughly compacted to not less than the specified maximum density in accordance with ASTM D1557-09. Compaction shall be by means of tamping or sheepsfoot rollers, multiple-wheel pneumatic-tired rollers, or other types of rollers. Rollers shall be of such design that they will be able to compact the fill to the specified density. Rolling of each layer shall be continuous over its entire area and the roller shall make sufficient passes to obtain the desired density. The entire area to be filled shall be compacted to the specified density

(5) Fill slopes shall be compacted by means of sheepsfoot rollers or other suitable equipment. Compacting operations shall be continued until the slopes are stable and until there is no appreciable amount of loose soil on the slopes. Compacting of the slopes shall be accomplished by backrolling the slopes in increments of 3 to 5 feet in elevation gain or by other methods producing satisfactory results.

(6) Field density tests shall be made by the soil engineer for approximately each foot in elevation gain after compaction, but not to exceed two feet in vertical height between tests. The location of the tests in plan shall be spaced to give the best possible coverage and shall be taken no farther than 100 feet apart. Tests shall be taken on corner and terrace lots for each two feet in elevation again. The soil engineer may take additional tests as considered necessary to check on the uniformity of compaction. Where sheepsfoot rollers are used, the layers of fill shall be spread until the field density tests indicate that the specified density has been obtained.

(7) The fill operation shall be continued in six inch (6") compacted layers, as specified above, until the fill has been brought to the finished slopes and grades as shown on the accepted plans.

Observation: Observation by the soil engineer shall be made during the filling and compacted operations so that he/she can document that the fill was made in accordance with accepted specifications.

The specifications and soil testing of subgrade, subbase, and base materials for roads, or other pubic property shall be done in accordance with specifications of the governing agency.

Seasonal Limits: No fill material shall be placed, spread, or rolled during unfavorable weather conditions. When the work is interrupted by heavy rain, grading shall not be resumed until field test by the soil engineer indicate that the moisture content and density of the fill are as previously specified. In the event that, in the opinion of the engineer, soils unsatisfactory as foundation material are encountered, they shall not be incorporated in the grading, and disposition will be made a the engineer's discretion.

APPENDIX II

REFERENCES

Greensfelder, R.W., 1974, *Maximum Credible rock Accelerations from Earthquakes in California:* California Division of Mines and Geology, Map Sheet 23.

Kennedy, M.P., 1975, *Geology of the San Diego Metropolitan Area, California:* California Division of Mines and Geology, Bulletin 200.

Kennedy, M.P., 1999, *Geologic Map of the Valley Center 7.5' Quadrangle, San Diego County, California,* A Digital Database, Version 1.0, C.D.M.G.

Seed, H.B. and Idriss, I.M., 1982, *Ground Motions and Soil Liquefaction During Earthquakes,* EERI Monograph Series.

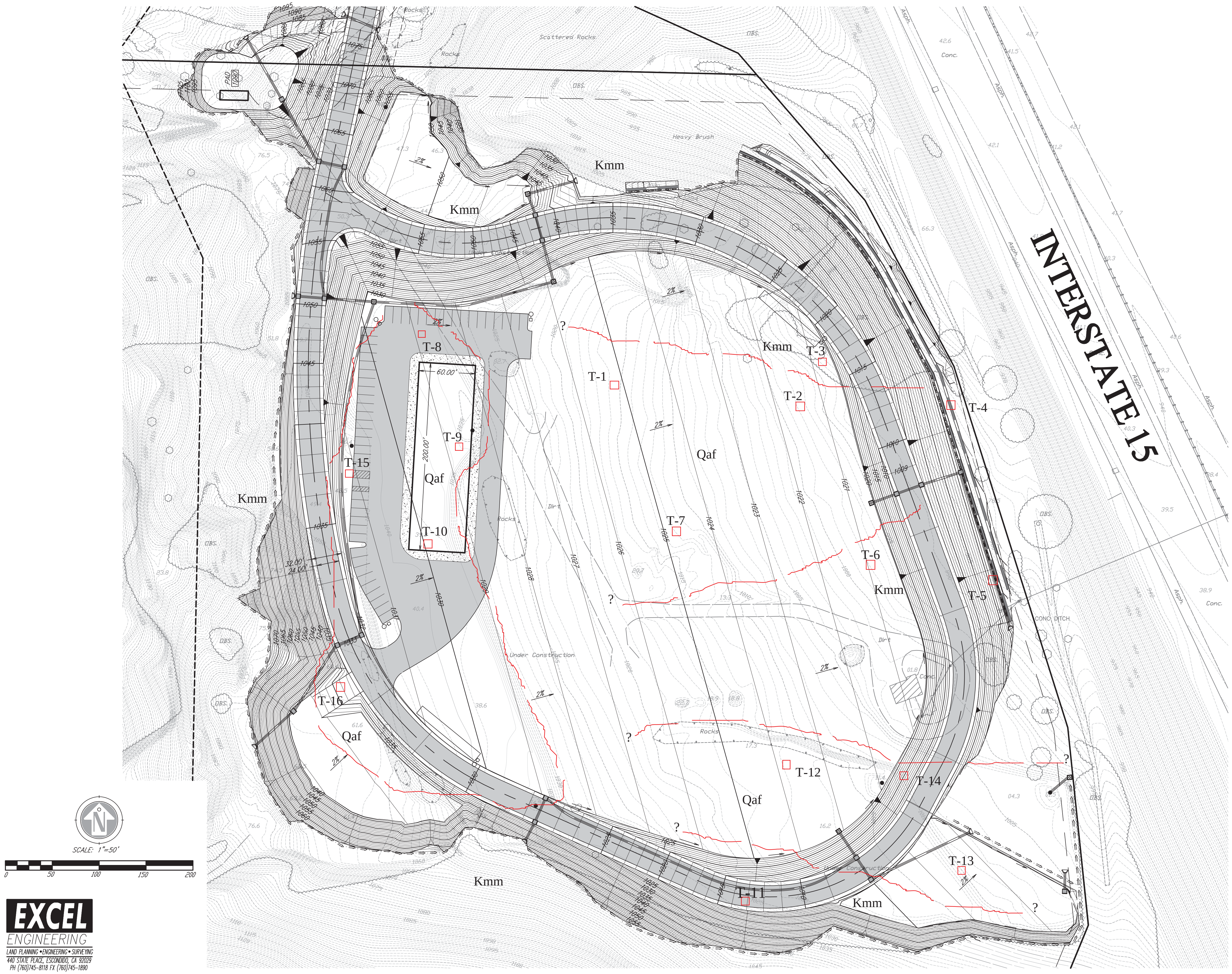
Slemmons, D.B., 1979, *Evaluation of Geomorphic Features of Active Faults for Engineering Design and Siting Studies,* Association of Engineering Geologists Short Coarse.

Vaughn, P. And Rockwell, T., 1986, *Alluvial Stratigraphy and Neotectonics of the Elsinore Fault Zone at Agua Tibia Mountain, Southern California.*

2. Attachment A

PLATE NO. ONE

COUNTY OF SAN DIEGO SITE PLAN
SAJE COMPLEX



LEGEND

ITEM	SYMBOL
EXISTING CONTOUR	990
PROPOSED CONTOUR	1000
FLOW DIRECTION	
CRIB WALL	
BROW DITCH	
6" CURB AND GUTTER	
ASPHALT PAVEMENT	
CUT SLOPE (1.5:1)	
FILL SLOPE (2:1)	

GEOTECHNICAL LEGEND

□	Approximate Location Of Exploratory Trenches
Kmm	Monzogranite Of Merriam Mountain
Qaf	Artificial Fill
(red line)	Approximate Location Of Geologic Contact

WEST COAST
GEOTECHNICAL CONSULTANTS, INC.
JOB NO. 12-12

EXCEL ENGINEERING
LAND PLANNING • ENGINEERING • SURVEYING
440 STATE PLACE, ESCONDIDO, CA 92029
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3. Attachment B

WEST COAST
GEOTECHNICAL CONSULTANTS, INC.

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FAX: (760) 754-2600

423 HALE AVENUE
ESCONDIDO, CA 92029

May 7, 2013

Mr. Gary Larson
Hilltop Group, Inc.
807 E. Mission Road
San Marcos, CA 92069

Project: Job No. 12-12
North County Environmental Resources
(Previously Referred to as Saje Complex)
25568 Mesa Rock Road
Escondido, California

Subject: Addendum No. 2 to our Report of Geotechnical Investigation dated November 1, 2012: Stability of Cut Slopes

Dear Mr. Larson:

In accordance with your request we are providing this Addendum No. 2 to our Report of Geotechnical Investigation that was issued on November 1, 2012. The purpose of this Addendum is to certify that we have investigated the property for he proposed development as we understand it. Specifically this Addendum addresses the planned 1.5:1 (horizontal to vertical) cut slopes that are to be constructed without any drainage terraces.

Our investigation included soil sampling from exploratory trenches placed on the property, laboratory testing of the soil samples and analysis of the field and laboratory data. In addition, we performed a surficial reconnaissance along sections of the proposed access road where the taller cut slopes will be constructed. The surficial reconnaissance involved mapping of the general structural pattern and lithology of the exposed geologic materials. We also reviewed historic air photographs of the property and adjacent areas.

The outcrops and road cuts observed on site exhibited dense to very hard, medium to coarse grained, granitic bedrock. Joint sets in the bedrock appeared to be tightly closed with significant asperity along joint faces. Previous laboratory testing of the remolded granitic soils resulted in a high frictional shear strength, and it can be assumed that the internal angle of friction and cohesion of the undisturbed bedrock will be significantly higher. In conclusion we did not see any evidence of past slope failure on site or in the historic air photographs. It appears that at the locations of slopes that are between 15 and 55 feet in vertical height significant cuts into existing soil materials will be performed. This should result in cut slopes that are established in very dense granitic bedrock. Additional slope stability analysis performed for slopes up to 55 feet in vertical height resulted in factors of safety that exceeded 1.5.

Based on our analysis, conclusions and recommendations presented in the Report of Geotechnical Investigation dated November 1, 2012, and Addendum No. 1 dated March 15, 2013, it is our professional opinion that the proposed 1.5:1 cut slopes will be stable and will not endanger any public or private property, or result in the deposition of debris on any public roadway or into existing drainage courses. It is further our professional opinion that drainage terraces may be omitted from the proposed cut slopes.

We appreciate this opportunity to provide you with our professional services. If you have any questions or comments, we encourage you to contact the undersigned.

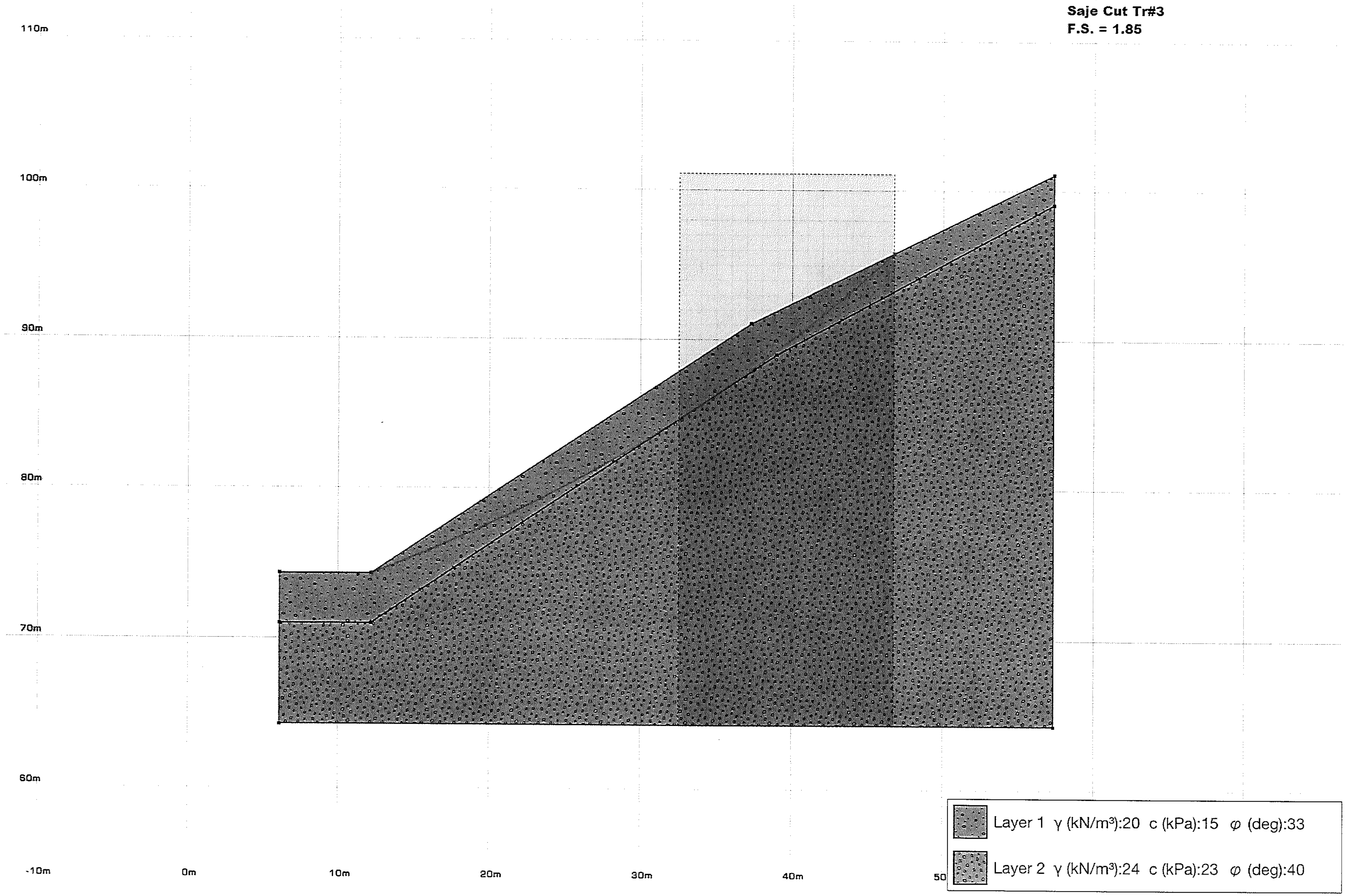
Respectfully submitted,

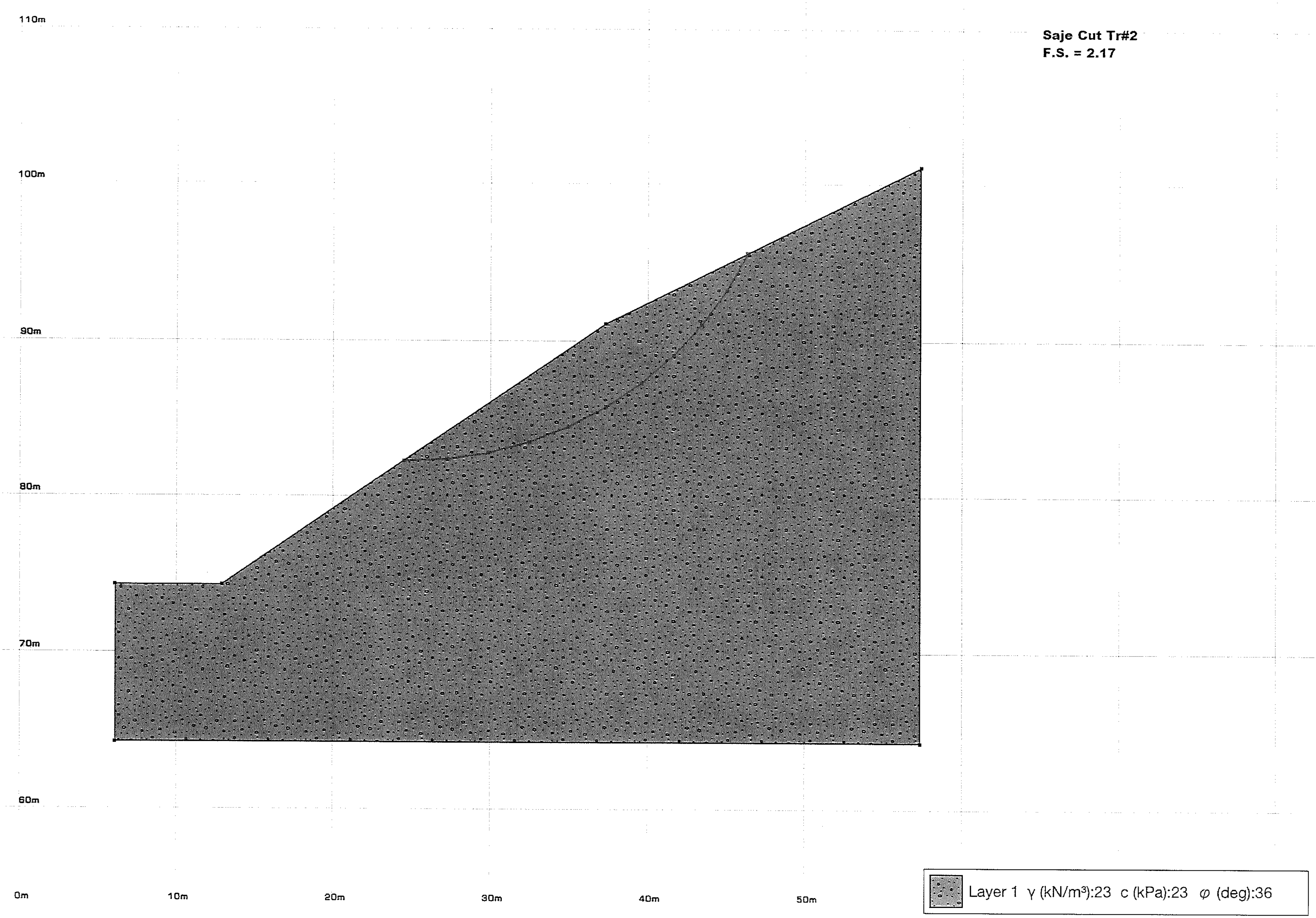
WEST COAST GEOTECHNICAL CONSULTANTS, INC.

Vincent W. Gaby, CEG 1755, Expires 7/31/13
Engineering Geologist

REGISTERED GEOLOGIST
VINCENT W. GABY
No. 1755
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

Distribution: (4) Addressee
VWG:dfg


Saje Cut Tr#3
F.S. = 1.85
110m
100m
90m
80m
70m
60m
-10m
0m
10m
20m
30m
40m
50
Layer 1 γ (kN/m³):20 c (kPa):15 φ (deg):33
Layer 2 γ (kN/m³):24 c (kPa):23 φ (deg):40



Saje Cut Tr#2
F.S. = 2.17
110m
100m
90m
80m
70m
60m
0m
10m
20m
30m
40m
50m
Layer 1 γ (kN/m³):23 c (kPa):23 φ (deg):36