REPORT

PRELIMINARY SOIL AND GEOLOGY INVESTIGATION

Proposed Mixed-Use Development
24631 Via Valmonte
Torrance, California

for

Ashai Design Corporation
9744 Wilshire Boulevard
Beverly Hills, California 90212

Project No. GSS-2364-2
January 3, 2017

REPORT

PRELIMINARY SOIL AND GEOLOGY INVESTIGATION

PROPOSED MIXED-USE DEVELOPMENT

24631 VIA VALMONTE

TORRANCE, CALIFORNIA

FOR

ASHAI DESIGN CORPORATION

INTRODUCTION

The following report presents the results of a preliminary soil and geology investigation conducted on the property located at 24631 Via Valmonte, in the City of Torrance, County of Los Angeles, California. The location of the site relative to surrounding streets and landmarks is shown on Plate 1, Vicinity Map. A geology study of the site was performed by our consultant Mr. Ray A. Eastman, Engineering Geologist. A report of his findings and conclusions is attached as a part of this report.

The purpose of this investigation was to obtain the geotechnical engineering properties of the subsurface soils and bedrock at the subject site on which to base conclusions and recommendations for foundations support and other geotechnical matters pertinent to the proposed construction. Implementation of the recommendations made in this report is intended to reduce certain risks associated with construction projects. The scope of this investigation does not include the work related in any way to identify asbestos and/or hazardous waste material.

This report has been prepared for use in design of the described project. It may not contain sufficient information for other purposes. Our professional services have been performed in accordance with generally accepted engineering procedures under similar circumstances. No other warranty, expressed or implied, is made as to the professional advice included in this report.

PROPOSED CONSTRUCTION

It is understood that the subject property will be utilized for the development of a mixed-use building. The proposed structure will be three stories over a basement, constructed of concrete wall and masonry/wood frame with slab on grade.

The finish grade of the proposed basement will be at the elevation near 180 feet. Cut approximately 10 to 15 feet in height and fill approximately 10 feet in depth will be required for constructing the building pad. Retaining walls around 10 to 15 feet in height are also proposed to be constructed around the basement. No detailed grading plan and design loads are available at the time of this investigation.

SITE CONDITIONS

The subject site is located at the northwest corner of Hawthorne Boulevard and Via Valmonte, in the City of Torrance, County of Los Angeles, California. The site is bordered by a gas station on the northeast, and by a single-family house on the northwest.

The site consists of an irregular-shaped lot that measured approximately 280 wide by 70 to 110 feet deep in plan dimensions. Topography of the site consists of a northerly facing descending slope. The gradients of the slopes are approximately 2 to 7 horizontal to 1 vertical. Total relief over the site is approximately 30 feet. At the time of this investigation, the lot was vacant. Surface vegetation at the site consists of growth of wild grasses and plants.

Cross sections showing the existing grades and proposed constructions are depicted on Plates 3 to 6.

FIELD EXPLORATIONS AND LABORATORY TESTING

Field explorations were performed to establish the geotechnical conditions of the site. Seven (7) test pits and one (1) test boring were excavated at the locations shown on Plate 2. The explorations were logged by our field engineer and engineering geologist and relatively undisturbed samples were obtained for laboratory testing and inspection. A detailed description of the exploration procedures and the logs of test pits/boring are presented in the Appendix.

Laboratory tests were performed to evaluate static soil and bedrock properties. A description of the test procedures and the test results are also presented in the Appendix.

GEOLOGIC AND SOIL CONDITIONS

Soil Conditions

The subsurface soils disclosed at the test pits/boring locations consist of fill, terrace deposit, and bedrock. Please refer to the logs of test pits/boring for detail description of the onsite material.

Fill

Fill encountered at the site consists of moderately stiff, fine to medium sandy clay, and medium dense, fine to coarse, silty sand with gravels and cobbles, and loose, fine to medium sandy silt with rootlets, as well as fine to medium sandy gravels with boulders.

Terrace Deposit

Terrace deposit material encountered at the site consists of medium dense to dense, fine to coarse, silty sand with gravels and cobbles, as well as moderately stiff to stiff, fine to medium sandy, silty clay with gravels, cobbles, and porous texture.

Bedrock

Bedrock encountered at the site consists of dense to very dense, fine, silty, San Pedro sand.

Groundwater

No shallow groundwater, seepage or springs was observed anywhere on the site, including within the test pits/boring penetrated to a maximum depth of 30 feet. However, it must be noted that fluctuations in the level of the groundwater may occur due to variations in rainfall, temperature, and other factors not evident at the time measurements were made and reported herein.

EARTHQUAKE HAZARDS

Seismicity

The subject property lies within the seismically active southern California region. As with all sites in southern California, the site is expected to experience ground shaking from both near and distant earthquake sources during the life of the proposed structure. The type and magnitude of seismic hazard affecting the site are dependent on the distance of causative faults and the intensity and magnitude of the seismic event.

Surface Rupture

The site is not located within a currently designated Alquist-Priolo Earthquake Fault Zone. No faults, active or potentially active, are known to exist within the site. The probability of surface rupture at the site is, therefore, considered very low.

Ground Shaking

Based on “Maps of Known Active Fault Near-Source Zones in California and Adjacent Portions of Nevada” by California Department of Conservation, the site is located within 2 km of the Palos Verdes Fault. It is our opinion that the intensity of future ground shaking at the site is not expected to be greater than any other sites in the immediate vicinity. The proposed structures shall be designed in accordance with the Earthquake Regulations of the California Building Code and the seismic design parameters provided in the other section of this report.

Soil Liquefaction

Earthquake-induced liquefaction is a phenomenon in which loose to medium dense saturated cohesionless soils undergo extreme losses in shear strength due to earthquake shaking. The liquefaction potential is directly related to the groundwater conditions at the site, as well as to the characteristics of the underlying soil deposits. Loose to medium dense sands below groundwater level are generally considered to be susceptible to liquefaction under strong ground shaking conditions.

The site is not located in the area as delineated by the State Geologist to have potential of soil liquefaction during strong earthquakes. Hence, no soil liquefaction study is performed for the site. As no groundwater was encountered in the test pits/boring to a maximum depth of 30 feet, it is our opinion that potential for soil liquefaction at the subject property is considered low.

CONCLUSIONS AND RECOMMENDATIONS

General

Based on an evaluation of the site conditions and findings of this investigation, it is concluded that the subject property is suitable for the proposed development from a geotechnical engineering viewpoint provided the following recommendations are incorporated into design criteria and project specifications and are implemented during construction.

Conventional spread footings and piles founded into competent undisturbed bedrock will provide adequate support for the proposed structure.

Your attention is directed to the fact that the onsite soils are relatively dry and cohesionless. It is likely that a trench or excavation in these materials would subject to caving. It is anticipated that shoring/casing may be required during the onsite excavation.

Site Preparation

General

Precautions should be taken during the performance of all work under the following sections, especially if construction is performed during the rainy season of approximately October 1 to April 15. Protection should be provided to the work site, particularly excavated areas, from flooding, ponding, and inundation due to poor or improper temporary surface drainage. During periods of impending inclement weather, temporary provisions should be made to adequately direct surface drainage, from all sources, away from and off the work site and to provide adequate pumps and sumps to handle any flow into the excavations.

Site Clearing

Clearing and grubbing should consist of the removal of vegetation such as brush, grass, woods, stumps, trees, roots of trees and otherwise deleterious natural materials from the areas to be graded. Clearing and grubbing should extend to the outside of all proposed excavation and fill areas.

Debris generated during clearing, grubbing and/or demolition operations should be wasted from areas to be graded and disposed of off-site. During site grading, laborers should clear any roots, tree branches, and other deleterious materials missed during clearing and grubbing operations from all areas to receive fill.

The depths of excavation should be reviewed by the Soils Engineer during actual construction. Any surface or subsurface obstructions, or questionable material, encountered during grading should be brought immediately to the attention of the Soils Engineer for proper exposure, removal or processing as directed. No underground obstructions or facilities should remain in any structural areas.

Trees and Surface Vegetation

Removal of designated trees and shrubs in areas of proposed construction should include rootballs. Resultant cavities should be cleansed of loose soils and roots and rolled to a firm unyielding surface prior to backfilling.

Grass and weed growth in areas of future construction should be stripped and disposed of off site. Stripping should penetrate three to six inches into surface soils. Any soils sufficiently contaminated with organic matter (such as root systems or stripping mixed into the soils) so as to prevent proper compaction shall be disposed of off site or set aside for future use in landscape areas.

S_{MS}	1.730
S_{M1}	1.011
S_{DS}	1.154
S_{D1}	0.674

Foundation Recommendations

Conventional Spread Footings into Bedrock

An allowable bearing value of 2200 pounds per square foot is recommended for spread footings of at least 15 inches in width, placed at a depth of at least 2 feet below the lowest adjacent final grade, and at least 12 inches into competent undisturbed bedrock.

The bearing value is for dead plus live load and may be increased by one-third for momentary wind or seismic loads.

Friction Piles

Piles may be designed for a skin friction value of 400 pounds per square foot for that portion of pile in contact with competent undisturbed bedrock. Piles shall be a minimum of 24 inches in diameter and shall be spaced at a minimum of three (3) times pile diameter to develop the allowable design values for single piles. In determining allowable bearing capacity, the upper fill and terrace deposit should be assumed not to have any frictional support. Uplift frictional resistance may be assumed as one-half of the downward resistance. All piles shall be properly reinforced and structurally tied into grade beams in both directions.

The capacities presented are based on the strength of the earth materials. The compressive and tensile strength of the pile sections should be checked by the project structural engineer to verify the structural capacity of the piles.

Pile should be penetrated to a depth of at least 10 feet into competent undisturbed bedrock but not less than the depth requirements to meet structural considerations defined by the project structural engineer or the minimum setback requirements from descending slope. Piles may be assumed fixed at five feet below the pile cap or grade beam or three feet into firm undisturbed bedrock, whichever is greater.

All pile excavations shall be inspected by the Soils Engineer to verify the underlying soil conditions prior to placing the reinforcement steel and pouring the concrete.

Continuous Footing Reinforcement

Continuous footings should be reinforced with at least four No. 4 bars; two near the top and two near the bottom of the footings. Reinforcement of isolated footings shall be utilized as deemed necessary by the Structural Engineer for the project. This reinforcement is based on soil characteristics and is not intended to be in lieu of reinforcement necessary to satisfy structural considerations.

Foundation Settlement

Total and differential settlement between adjacent foundations is expected to be negligible if foundations are founded into competent bedrock as recommended.

Foundation Inspections

All foundation excavations should be inspected and approved by the Soils Engineer prior to placement of forms, reinforcement or concrete. The excavations should be trimmed neat, level and square. All loose, sloughed and moisture softened materials should be removed prior to the placement of concrete.

Footings should be located below a line measured upward at a 45-degree angle from the bottom of the adjacent footings or utility trench, unless review and approved by the Soils Engineer.

Materials from foundation excavations should not be spread in the adjacent areas unless they are compacted and tested.

Foundation Setback From Descending Slope

Foundations located on/or adjacent to a descending slope shall be placed at sufficient depth to provide horizontal setback from the slope surface. The required setback of the Building Code is 1/3 the height of the slope with a minimum of five feet and a maximum of 40 feet measured horizontally from the base of the foundation to the slope face.

Lateral Design

An allowable lateral bearing value against the sides of footings or pile shafts of 350 pounds per square foot per foot of depth, to a maximum of 3000 pounds per square foot, may be used provided there is positive contact between the vertical bearing surface and undisturbed bedrock. Friction between the base of the conventional spread footings and the underlying bedrock may be assumed to be 0.4 times the dead load. When combining passive pressure and friction for lateral resistance, the passive component should be reduced by one-third. For isolated piles, the recommended lateral bearing values may be increased by 100 percent.

Slabs On Grade

Unless all of the existing onsite fill or unsuitable terrace deposit material within the proposed building area be removed and recompacted, structural slab should be utilized.

Floor Slab

Slabs on grade should be cast over properly prepared subgrade. Any soils loosened or over-excavated should be wasted from the site or properly compacted in-place.

Subgrade soils disturbed due to installation of utility lines should either be completely removed or be properly compacted prior to concrete pour. The subgrade fill soils should be moisture-conditioned to achieve near optimum water content and then compacted to at least 90 percent of the maximum dry density as determined by the ASTM D-1557-09 compaction test method.

It should be recognized that minor cracks normally occur in concrete slabs due to shrinkage during curing or redistribution of stresses and thus, some cracks should be anticipated. Such cracks are not necessarily indicative of excessive vertical movements.

Slab Reinforcement

Slab resting on expansive soil shall be designed per Building Code Section 1808.6.2. The following recommendations are considered minimum and are not intended to preclude the code requirement.

Floor slabs constructed on-grade should be a minimum thickness of 5 inches and be reinforced with at least No. 4 bars spaced 16 inches on centers, both ways. All slab reinforcement should be supported on concrete chairs or brick to ensure the desired placement near mid-depth.

The above criteria are recommended to minimize potential distress to floor slabs related to the effects of subgrade soil conditions. The Structural Engineer for the project may need to address other factors that may require modification of the above recommendations.

Moisture Barrier

A moisture barrier beneath slabs-on-grade, consisting of a waterproof vapor barrier, such as a plastic membrane of at least 10 mils in thickness, is recommended in areas where slab moisture would be detrimental. The membrane should be overlain by a minimum of 2 inches of clean sands to provide a working surface and aid in concrete curing.

It is important that the soil subgrade, which will support the concrete slab, is maintained at the "as-graded" or has a sufficient soil water content. Prior to slab construction, the water content of the soil subgrade should be measured to verify that the subgrade has not dried out significantly. It is suggested that slab areas be thoroughly moistened prior to placing of moisture barrier and pouring of concrete.

Retaining Wall

Wall Footings

Retaining wall footings founded into competent undisturbed bedrock by conventional spread footings or piles may be designed for the same allowable bearing value as given in the previous sections for building foundations.

Active Earth Pressures

Retaining walls should be designed to resist lateral earth pressure exerted by the retained compacted backfill plus any additional lateral forces that will be applied to the walls due to surface loads placed at or near the wall or from footings behind the walls.

It is recommended that retaining walls that are free to rotate be designed for an assumed earth pressure equivalent to that exerted by a fluid weighing of 40 pounds per cubic foot. The recommended earth pressure is for walls retaining drained earth with level backfill.

Walls that are restrained against movement or rotation at the top should be designed for the at-rest equivalent fluid pressure. An at-rest equivalent fluid pressure of 60 pounds per cubic foot can be used for walls with level soil backfill.

The lateral earth pressures assume that a permanent drainage system will be installed so that hydrostatic water pressure will not be developed against the walls. If a drainage system is not provided, the walls should be designed to resist an external hydrostatic pressure due to water in addition to the lateral earth pressure.

Seismic Retaining Wall Lateral Pressure Analysis

According to County of Los Angeles Manual #1014 R 404.4 Article 1, Design of Retaining Walls, the proposed retaining wall should be designed to resist a seismic induced lateral force in addition to the static force. The seismic lateral pressure is vertically distributed as an inverted triangle. The resultant seismic lateral force acts at a distance of 0.6H from base of the wall, where H is the wall height. The resultant force ($F_{seismic}$) can be calculated by the following formula:

$F_{seismic} = 3/8*K_h*\gamma*H^2$

Where;

$K_h = S_{DS}/2.5 = 0.46g$

H = Wall Height (feet)

γ = 125 pcf

Wall Drainage

All retaining walls should be waterproofed and/or damp-proofed, depending on the desired moisture protection. The walls should be provided with weep holes or perforated pipe and gravel subdrain to prevent entrapment of water in the backfill. Weep holes should consist of unmortared joints in block walls or two-inch diameter round holes in poured concrete walls. The openings should be at least 3 inches above finished grade to prevent surface water from flowing back into the holes.

Any water that may accumulate in the drainage material should be collected and discharged by a 4-inch diameter, perforated PVC Schedule 40 or ABS SDR-35 pipe placed near the bottom of the drainage material but at least one foot below the interior floor. The pipe should be embedded in at least one cubic foot drainage material per linier foot of wall length. The pipe perforations should be placed with the holes down, and should not be greater than 1/4 inch in diameter.

As the proposed basement floor is below the street level, subdrain behind the basement walls should be directed to a sump pump so that water collected in the subdrain system and drained to the sump pump will be pumped to the street.

The subdrain should outlet at appropriate discharge locations that will ensure all discharge will not scour or erode the surrounding soil, and the pipe will not become damaged or clogged. The outlet pipe should be a solid pipe that meets minimum specification set forth above for the subdrain pipe.

The drainage material that will be used to backfill the wall should consist of 3/4 to 1-1/2 inch clean durable, coarse aggregate. The drainage material should be separated from all adjacent soil by Mirafi 140NL, or approved equivalent. The fabric should be handled in accordance with the respective manufacturers requirements, and should be constructed such that all fabric overlaps are a minimum of 12 inches.

Retaining walls retaining upslope should be provided with at least one foot of freeboard. A concrete paved drainage swale should be placed at the top of the wall to intercept runoff and conduct water to the street.

Waterproofing

Rooms located below grade have a history of moisture intrusion, seepage, and leakage. Conventional waterproofing materials, such as asphalt emulsion, have often proved ineffective. Certain precautions can be taken to reduce the possibility of future seepage problems.

It is possible that retaining walls will form portions of the building interiors at the basement level. Where this occurs, very special consideration should be given to waterproofing of the walls to prevent damage to the interior of the house or garage. Unless dampness is acceptable on exterior wall faces, waterproofing should also be incorporated into exterior retaining wall design.

Although the project architect is the party who should provide actual waterproofing details, it is suggested the waterproofing consist of a multi-layered system such as an initial generously applied layer of hot-mopped asphalt over which a layer of construction felt could be applied, then thoroughly mopped again with hot asphalt. In the case of all retaining walls, it is suggested that a layer of 10-mil Visqueen be placed as a finish layer. The multi-layered system should be covered with protective foam-board, or similar, to prevent damage during the backfilling operation.

Even though groundwater is not expected to be a significant problem at this site, extreme care should be exercised in sealing walls against water and water vapor migration. Where retaining walls are planned against interior space, continuity should be provided between the aforementioned wall moisture proofing on the back of the retaining wall and the moisture barrier typically placed under slab areas. This waterproofing is necessary to prevent the foundation concrete acting as a wick through which moisture migrates to the interior space despite wall moisture proofing.

Wall Backfill

Prior to backfilling, the excavation between retaining walls and the temporary cut bank should be cleared of all loose materials, debris, and construction materials, etc.

Proper compaction of the backfill will be necessary to reduce settlement of the backfill. Some settlement of the backfill should be anticipated and any utilities and sidewalks supported therein should be designed to accept differential settlement, particularly at the points of entry to the structure.

All wall backfill should be placed in horizontal lifts not more than 4 inches in thickness, watered as necessary to achieve near optimum moisture conditions, and mechanically compacted to at least 90 percent of the ASTM D-1557-09 standard. Flooding or jetting of backfill materials should be avoided. Probing and testing should be performed by the project soils engineer to verify proper compaction.

Where the ground slope is steeper than 5 horizontal to 1 vertical, the existing ground shall be benched as the fill thereon is brought up in layers. Where space limitations do not allow for conventional backfill compaction operations, the space between the excavation and wall may be backfilled with concrete as primary structural fill or slurry as non-structural fill. A layer of plastic sheet shall be placed on top of the gravel drain system prior to placing of concrete to prevent the subdrain system is clogged by concrete or slurry. Pea gravel or crashed rock may be used if the backfill is not surcharged by the adjacent footings or it is to be considered as non-structural fill. The pea gravel or crashed rock backfill should be placed in lifts of no more than 2 feet in thickness and should be compacted with vibratory equipment. Ideally, the top of two feet of backfill, exposed to water infiltration should be consisting of clayey material so that a relatively impervious condition is developed.

Contractors should be informed that the use of heavy compaction equipment within close proximity to retaining walls could cause excessive wall movement and/or earth pressure in excess of design values.

Excavation

Excavation should be in accordance with all applicable requirements of the State of California Construction and General Industry Safety Order, the Occupational Safety and Health Act of 1970, the Construction Safety Act, and all other public agencies have jurisdiction. Construction specifications should clearly establish the responsibilities of the contractor for construction safety in accordance with CAL/OSHA requirements.

Severe caving was encountered in the areas of Test Pit Nos. 3 and 4 during our onsite investigation. Temporary excavation in these areas may require special attention. Shoring may be required. In the areas other than the aforementioned area, temporary excavation for construction purposes may be made vertically in the onsite terrace deposit or bedrock material to a maximum height of 4 feet without shoring or bracing, provided no surcharge loads or adjacent structures are located within a horizontal distance equal to the depth of excavation. For cuts made to a depth greater than 4 feet, the lower 4 feet can be made vertically and the portion above 4 feet should be sloped back to an inclination of 1 horizontal to 1 vertical. All cut made in the onsite fill material should be trimmed to an inclination of 1 horizontal to 1 vertical.

In areas where sloping excavation is constrained by the property boundaries or excavation will remove lateral support of the adjacent structures, walls or public right way, shoring with lagging or bracing shall be provided. Shoring installation shall be continuously observed and approved by the Soils engineer.

For purposes of this report the term of "temporary" shall refer to those excavations that remain unsupported for a period of time not to exceed 30 days.

Careful examination of the soils by the Soils Engineer during cutting of the banks is mandatory to verify the conditions or to make such recommendations as are pertinent if different conditions are encountered.

Excavated surfaces should be kept moist but not saturated to retard raveling and sloughing during construction. Water should not be allowed to pond on the top of the excavation nor flow towards it.

No excavation shall be made during unfavorable weather. It is recommended that the excavated banks be entirely covered with plastic sheets when threatened by rains. When the excavation is interrupted by rain, operations shall not be resumed until the Soils Engineer indicates that conditions will permit satisfactory results.

Post Grading Considerations

Site Drainage

The provision and maintenance of adequate site drainage and moisture protection of supporting soil is an important design consideration. Foundation recommendations presented herein assume proper site drainage will be established and maintained.

To enhance future site performance, positive drainage devices such as sloping sidewalks, graded swales, and/or area drains should be provided around the building to collect and direct all water away from the structure. Neither rain nor excess irrigation water should be allowed to collect or pond on the property unless approved by the soil engineer. Where slabs or pavement are not feasible adjacent to the buildings, the ground surface should be provided with a minimum gradient away from the structures per 2013 CBC. All drainage should ultimately be directed to street or other designated area.

Water should be transported off the site in approved drainage devices or unobstructed swales. Drainage swales should have a minimum gradient per 2013 CBC. Where necessary, drainage paths could be shortened by use of area drains and collector pipes.

Planters adjacent to buildings should be avoided insofar as possible. Planting areas at grade should be provided with good positive drainage. Wherever possible, exposed soil areas should be above adjacent paved grades. Planters should not be depressed below adjacent paved grades unless provisions for drainage, such as catch basins and pipe drains are made.

Adequate drainage gradient, devices and curbing should be provided to prevent runoff from adjacent pavement or walks into planting areas. Consideration should be given to irrigation methods that will promote uniformity of moisture in planters and beneath adjacent concrete "flat-work". Over-watering and under-watering of landscape areas must be avoided.

All roof and wall surface drainage should be collected and conducted by a non-erosive device to the streets or to a designated area.

Trench Backfill

It is our opinion that utility trench and/or structural backfill consisting of the on-site material types could be best placed by mechanical compaction to a minimum of 90 percent of the laboratory maximum dry density. Density testing, along with probing, should be performed by the project soils engineer, or his representative, to verify proper compaction.

If utility contractors indicate that it is undesirable to use compaction equipment in close proximity to a buried conduit, we would recommend the utilization of lightweight mechanical equipment and/or bedding of conduit with clean granular material prior to initiating mechanical compaction procedures. Other methods of utility trench compaction may also be appropriate as approved by the project geotechnical consultant at the time of construction.

Where utility trenches are proposed parallel to building footings (interior and/or exterior trenches), the bottom of the trench should not extend below a 1 horizontal to 1 vertical plane project downward from the outside bottom edge of the adjacent footing. Where this condition occurs, the adjacent footing should be deepened.

Plan Review

In order to prevent misinterpretation of this report by other consultants it is recommended that the Soils Engineer be provided the opportunity to review the final grading and foundation plans. The Soils Engineer will also determine whether any change in concept may have had any effect on the validity of the Soils Engineer's recommendations, and whether those recommendations have, in fact, been implemented in the design and specifications.

If the Soils Engineer is not accorded the privilege of making this recommended review, he can assume no responsibility for misinterpretation or misapplication of his recommendations or for their validity in the event changes have been made in the original design concept without this prior review.

Geotechnical Inspection

All rough grading of the property must be performed under engineering supervision of the geotechnical consultants. Rough grading includes, but is not limited to, site preparation, cleaning, over-excavation, and fill placement.

The geotechnical consultant should inspect all foundation excavations. Inspections should be made prior to installation of concrete forms and reinforcing steel to verify or modify, if necessary, conclusions and recommendations in this report.

Inspections of the finish grading, utility or other trench backfill, or other earthwork completed for the subject project should also be performed by the geotechnical consultant.

If any of these inspections to verify site geotechnical conditions are not performed by the geotechnical consultant, liability for the safety and stability of the project is limited only to the actual portions of the project approved by the geotechnical consultant.

It should be understood that the contractor shall supervise and direct the work and he shall be responsible for all construction means, methods, techniques, sequences and procedures. The contractor will be solely and completely responsible for conditions at the job site, including safety of all persons and property during the performance of the work. Periodic or continuous inspection by GSS Engineering, Inc. is not intended to include verification of dimensions or review of the adequacy of the contractor's safety measures in, on or near the construction site.

GRADING SPECIFICATIONS

The following guidelines may be used in preparation of the grading plan and job specifications.

1) All site grading operations should conform to the local building and safety codes and to the rules and regulations of those governmental agencies having jurisdiction over the subject construction.

2) The grading contractor is responsible to notify governmental agencies, as required, and the Soils Engineer prior to initiating grading operations and any time grading is resumed after an interruption.

3) A diligent search for septic tanks, cesspools or underground lines should be performed during grading operations. Any abandoned water or oil wells encountered should be properly capped and treated in accordance with best-accepted practices.

4) Please refer to 'Subgrade Preparation' of this report for detail removal and recompaction specifications.

5) The on-site soils are suitable for use in compacted fills provided all trash, vegetation and other deleterious materials are removed prior to placement.

6) No rock over 3 inches in greatest dimension shall be used in fill unless otherwise approved by the Soils Engineer.

7) Where import materials are required for use on site, the Soils Engineer should be notified at least 48 hours in advance of importing in order to sample and test materials from proposed borrow sites. No import materials should be delivered for use on site without prior sampling and testing by the Soils Engineer.

8) All new fill shall consist of approved clean on-site or similar earth material, free of trash or debris, roots, vegetation or other deleterious material and shall be placed in thin horizontal lifts not exceeding 8 inches in loose thickness prior to compaction. Each lift should be watered or dried as needed, thoroughly blended to achieve near optimum moisture conditions then thoroughly compacted by mechanical methods.

9) No jetting or water tamping of fill soils shall be permitted.

10) No fill materials should be placed, spread or rolled during unfavorable weather conditions. When work is interrupted by heavy rains, fill operations should not be resumed until the field tests by the Soils Engineer indicate that the moisture content and density of the fill are as previously specified.

11) Unless otherwise specified, all other fills and backfills should be compacted to at least 90 percent of maximum laboratory dry density.

12) The compaction characteristics of all fill soils shall be determined by ASTM D-1557-09 standard. The field density and degree of compaction shall be determined by ASTM D-1556, or by other ASTM standard methods that are acceptable to the governing public agency.

13) Observation and testing of all compaction shall be under the direction of the Soils Engineer. The Soils Engineer shall advise the owner and grading contractor immediately if any unsatisfactory soils related conditions exist and shall have the authority to reject the compacted fill ground until such time as corrective measures necessary are taken to comply with the specifications.

14) The Soils Engineer should be notified at least 2 days in advance of the start of grading. A joint meeting between a representative of the client, the contractor, and the Soils Engineer is recommended prior to grading to discuss specific procedures and scheduling.

INVESTIGATION LIMITATIONS

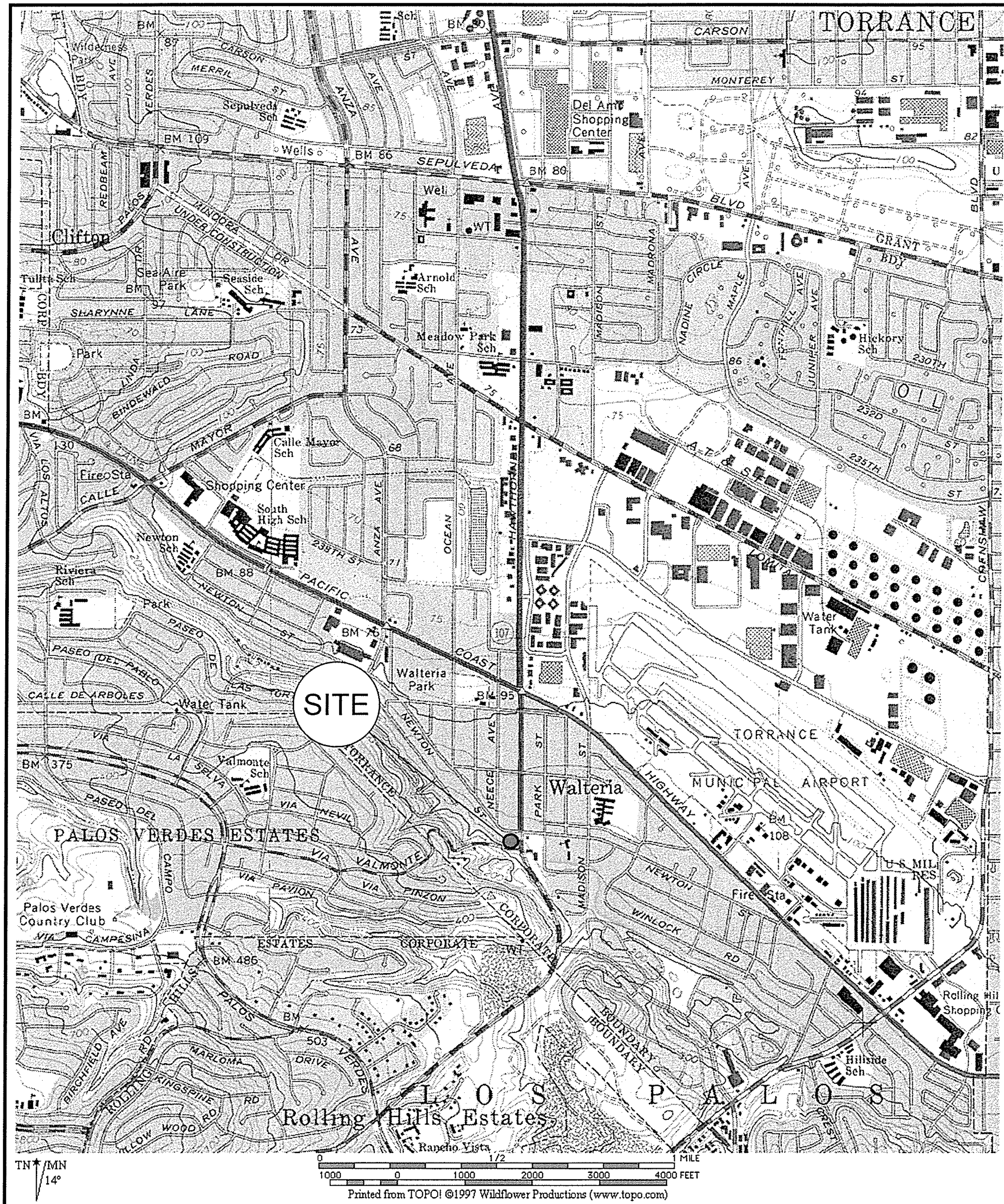
The conclusions and recommendations contained in this report are based on the data obtained from the test pits/boring at the dates and locations indicated in the logs and the site plan. It is assumed that the soil conditions at the other areas do not deviate significantly from those disclosed in the test pits/boring. If any variations or undesirable conditions are encountered during construction, this office should be notified so as to consider the need for modifications.

No responsibility for construction compliance with the design concepts, specifications, or recommendations is assumed unless an on-site review by a representative of this office is performed during the course of construction that pertains to the specific areas covered by the recommendations contained herein.

This report has been compiled for the exclusive use of Ashai Design Corporation, or its authorized agent. It shall not be transferred to any other party or to any other project without the consent and/or thorough review of this office.

The findings of this report are valid as of the present date. However, changes in the conditions of the property can occur with the passage of time, whether they are 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 partially, by changes outside of our control. Therefore, this report is subject to review and should not be relied upon after a period of one year without such a review.

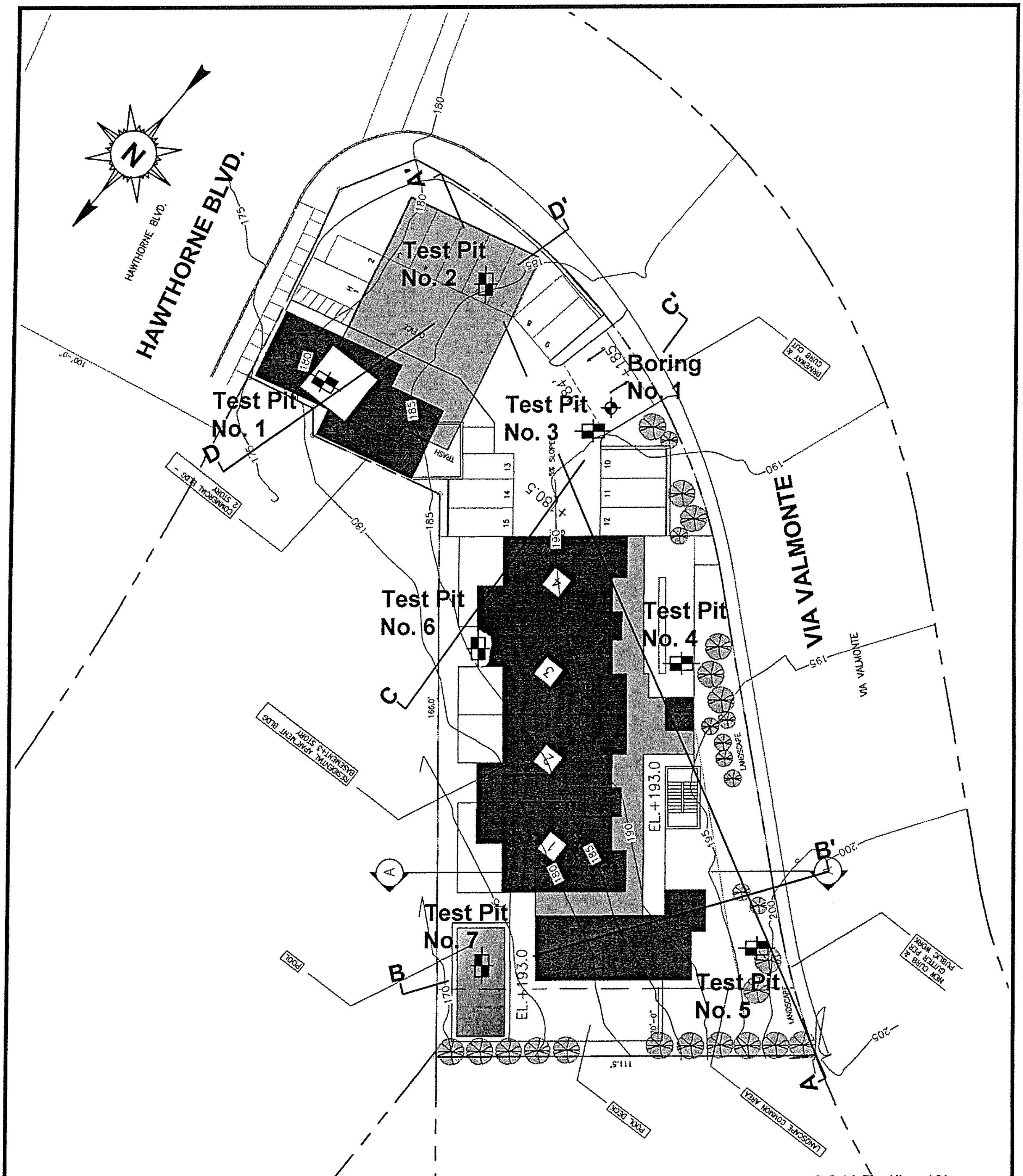
This report is issued with the understanding that it is the responsibility of the owner, or the proper representative thereof, to insure that the information and recommendations contained herein are called to the attention of all parties interested in the project and that the necessary steps are taken to see that the contractors and subcontractors carry out such recommendations in the field.



VICINITY MAP

Proposed Mixed-Use Development
24631 Via Valmonte
Torrance, California

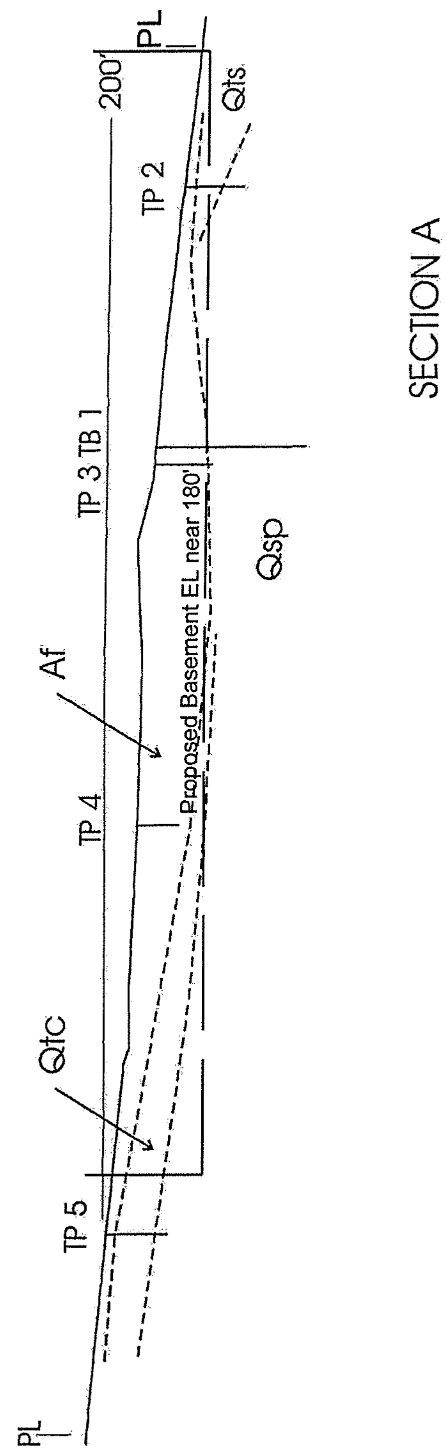
GSS ENGINEERING, INC. *Geotechnical Engineering Consultants* | **PROJECT No.** GSS-2364-2 | **PLATE** 1



REFERENCE: "Site Plan", prepared by Ashai Design Corp., dated 10/25/2016.

SCALE: 1" = 40'

PLOT PLAN AND TEST PIT LOCATION	Proposed Mixed-Use Development 24631 Via Valmonte Torrance, California
GSS ENGINEERING, INC. *Geotechnical Engineering Consultants*	**PROJECT NO.** GSS-2364-2 — **PLATE** 2



SCALE: 1" = 40'

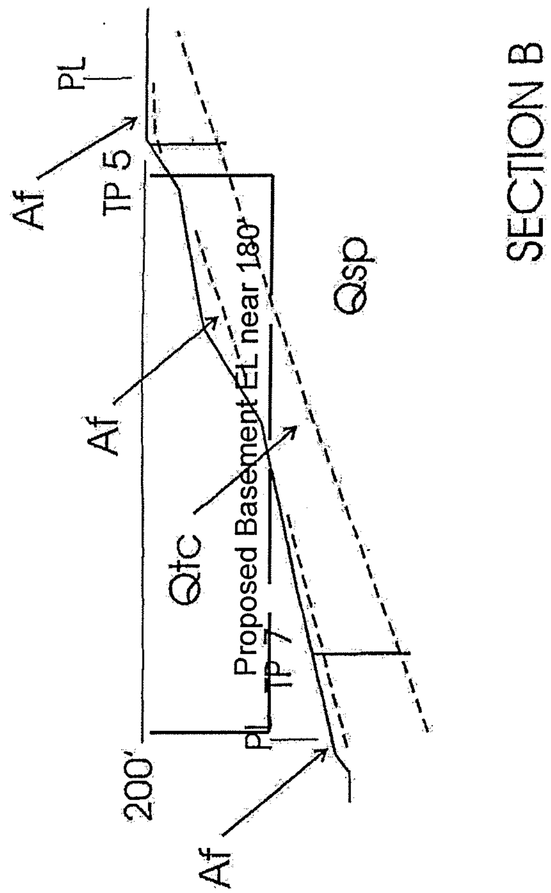
CROSS SECTION

Proposed Mixed-Use Development
24631 Via Valmonte
Torrance, California

GSS ENGINEERING, INC. *Geotechnical Engineering Consultants*

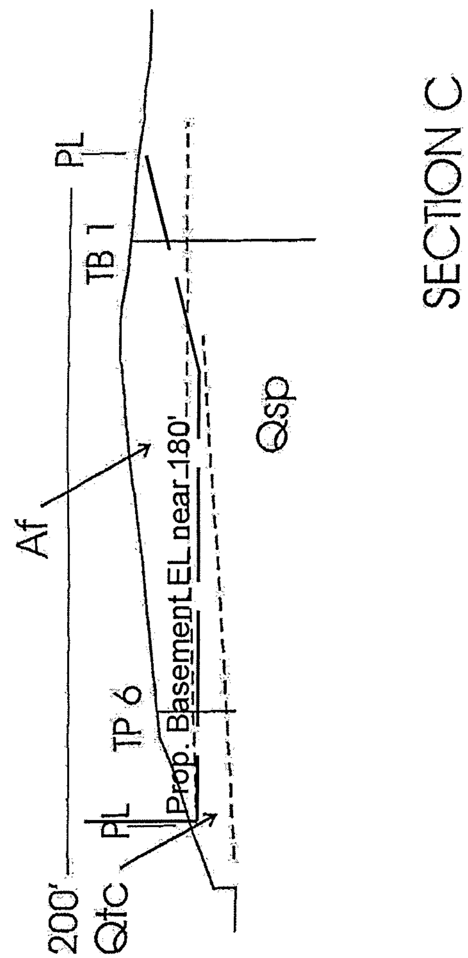
PROJECT NO. GSS-2364-2

PLATE 3



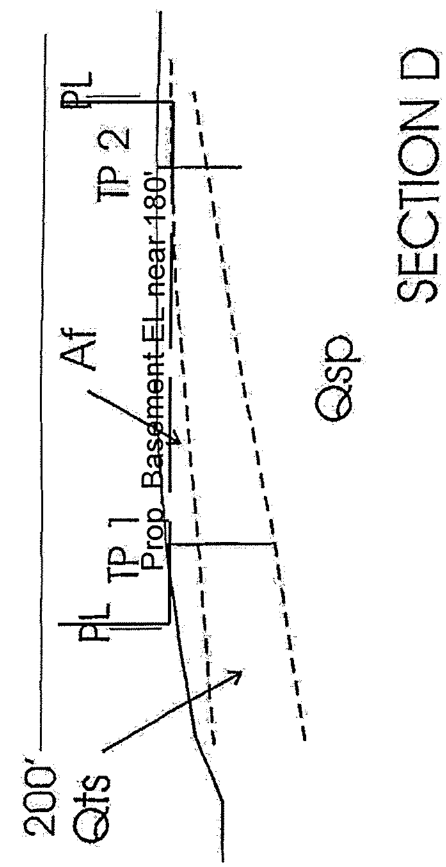
SCALE: 1" = 30'

CROSS SECTION	Proposed Mixed-Use Development 24631 Via Valmonte Torrance, California
GSS ENGINEERING, INC. *Geotechnical Engineering Consultants*	**PROJECT NO.** GSS-2364-2 — **PLATE** 4



SCALE: 1" = 30'

CROSS SECTION	Proposed Mixed-Use Development 24631 Via Valmonte Torrance, California
GSS ENGINEERING, INC. *Geotechnical Engineering Consultants*	**PROJECT NO.** GSS-2364-2 — **PLATE** 5



SCALE: 1" = 30'

CROSS SECTION	Proposed Mixed-Use Development 24631 Via Valmonte Torrance, California
GSS ENGINEERING, INC. *Geotechnical Engineering Consultants*	**PROJECT NO.** GSS-2364-2 — **PLATE** 6

APPENDIX

FIELD EXPLORATION AND LABORATORY TESTING

FIELD EXPLORATIONS

The subsurface conditions at the site were explored by excavating seven (7) test pits and one (1) test boring at the locations shown on the Plot Plan, Plate 2. The test pits and boring were excavated by means of the backhoe and a 6-inch diameter hollow stem auger depths of 8 to 30 feet below the existing ground surface. Test Pit Nos. 3 and 4 were terminated due to severe caving. The approximate locations of the test pits and boring were determined by tape measurements from the property boundaries. The locations of the test pits and boring should be considered accurate only to the degree implied by the method used.

The soils and bedrock encountered during excavation were logged by the field engineer and engineering geologist. The soils are classified in accordance with the Unified Soil Classification System described on Plate A-1. Undisturbed samples of on-site soils and bedrock were extracted at selected intervals from the test pits and boring in a barrel sampler with tapered cutting shoe. The bulk and undisturbed soil and bedrock retained in 2.5-inch diameter by one-inch rings within the sampler were secured in moisture resistant bags and plastic sample cans as soon as taken to minimize the loss of field moisture while being transported to the laboratory for testing. The relative sampler penetration resistance exhibited by the soil types encountered is tabulated in the Blow per Foot column of the Log of Test Pit/ Boring. Detailed logs of test pits/boring are presented on Plates A-2 through A-9, Log of Test Pit/ Boring.

The lines designating the interface between soil and rock materials on the logs of test pits/ boring represent approximate boundaries. The transition between materials may be gradual.

LABORATORY TESTING

Moisture-Density

The field moisture content and dry density of the materials encountered were determined by performing tests on selected undisturbed samples to aid in the classification and correlation of the soil and bedrock and to obtain qualitative information relative to their strengths and compressibility. The field moisture content and dry density of the samples were determined in accordance with ASTM-2216 and ASTM D-2937 standard. The results of the tests are shown on the Log of Test Pit/Boring, Plates A-2 through A-9.

Direct Shear Tests

Direct shear tests were performed in accordance with ASTM D-3080 standard on selected undisturbed samples of the onsite material to evaluate shear strength and supporting capacity of the foundation materials. Shear tests were made with a direct shear machine of the displacement control type at a displacement rate of approximately 0.005 inches per minute. The samples were soaked in water for at least 24 hours to approximately saturated moisture condition and then sheared under various normal stresses. The residual shear strength values determined from the tests are presented on Plate A-10, Direct Shear Test.

Expansion Tests

Expansion tests were performed on representative samples of the on-site materials in accordance with the ASTM D-4829 to evaluate its volume change with moisture. The results are as follows:

Sample	Classification	Expansion Index	Expansion Potential
TP-6 @ 6'	CLAY, silty, fine to medium sandy	52	medium

MAJOR DIVISIONS			GROUP SYMBOLS	TYPICAL NAMES
COARSE GRAINED SOILS (More than 50% of material is LARGER than No. 200 sieve size)	GRAVELS (More than 50% of coarse fraction is LARGER than No. 4 sieve size)	CLEAN GRAVELS (Little or no fines)	GW	Well graded gravels and gravel - sand mixtures, little or no fines
			GP	Poorly graded gravels and gravel - sand mixtures, little or no fines
		GRAVELS WITH FINES (Appreciable Amount of fines)	GM	Silty gravels, gravel - sand - silt mixtures
			GC	Clayey gravels, gravel - sand - clay mixtures
	SANDS (More than 50% of coarse fraction is SMALLER than No. 4 sieve size)	CLEAN SANDS (Little or no fines)	SW	Well graded sands and gravelly sands, little or no fines
			SP	Poorly graded sands and gravelly sands, little or no fines
		SANDS WITH FINES (Appreciable Amount of fines)	SM	Silty sands, sand - silt mixtures
			SC	Clayey sands, sand - clay mixtures
FINE GRAINED SOILS (More than 50% of material is SMALLER than No. 200 sieve size)	SILTS AND CLAYS (Liquid limit LESS than 50)		ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
			OL	Organic silts and organic silty clays of low plasticity
	SILTS AND CLAYS (Liquid limit GREATER than 50)		MH	Inorganic silts, micaceous or diatomaceous fine sands or silts, elastic silts
			CH	Inorganic clays of high plasticity, fat clays
			OH	Organic clays of medium to high plasticity, organic silts
HIGHLY ORGANIC SOILS			Pt	Peat, muck and other highly organic soils

<u>**BOUNDARY CLASSIFICATIONS**</u>: Soils possessing characteristics of two groups are designated by combinations of group symbols.

Reference: The Unified Soil Classification System, Corps of Engineers, U. S. Army Technical Memorandum No. 3 - 357, Vol 1, March, 1953 (Revised April, 1960)

UNIFIED SOIL CLASSIFICATION SYSTEM

Proposed Mixed-Use Development
24631 Via Valmonte
Torrance, California

GSS ENGINEERING, INC. *Geotechnical Engineering Consultants* | **PROJECT No.** GSS-2364-2 | **PLATE** A-1

NOTE: The data presented on this log is a simplification of actual subsurface conditions encountered and applies only at the location of this pit and the date of drilling. It is not warranted to be representative of subsurface conditions at other locations and times.

TEST PIT NO. 1

Elevation: N/A

Depth in Feet	Blow per Foot	Field Moisture % of Dry Weight	Dry Density lbs./cu.ft.	Shear Resistance kips/sq.ft.	Confining Pressure kips/sq.ft.	Unified Classification	Soil Symbol		Description	Color	Moisture	Consistency
						CL		FILL	CLAY, fine to medium sandy	brown	dry	m stiff
						SM			SAND, fine to coarse, silty w/ gravels and cobbles	gray brown		med dense
5	18	4.1	99.2			SM		TERRACE DEPOSIT	SAND, fine, silty	dark gray brown	slightly moist	med dense to dense
									SAND, fine to coarse, silty w/ pea gravels			
10												
	bag	2.3							SAND, fine to medium, silty	brown		
15									SAND, fine to m., silty, w/ gravels & cobbles			

End of Test Pit @ 15'

Date Drilled: 11/7/16
Drilling Equipment: backhoe
Driving Weight: 50 lbs @ 30-inch drop
Water Depth: not encountered

LOG OF TEST PIT

Proposed Mixed-Use Development
24631 Via Valmonte
Torrance, California

GSS ENGINEERING, INC. *Geotechnical Engineering Consultants* **PROJECT No.** GSS-2364-2 **PLATE** A-2

NOTE: The data presented on this log is a simplification of actual subsurface conditions encountered and applies only at the location of this pit and the date of drilling. It is not warranted to be representative of subsurface conditions at other locations and times.

TEST PIT NO. 2

Elevation: N/A

Depth in Feet	Blow per Foot	Field Moisture % of Dry Weight	Dry Density lbs./cu.ft.	Shear Resistance kips/sq.ft.	Confining Pressure kips/sq.ft.	Unified Classification	Soil Symbol	Unit	Description	Color	Moisture	Density
						ML		FILL	SILT, fine to medium sandy, w/ rootlets	brown	dry	loose
	24	2.1	108.4			SM		TERRACE DEPOSIT	SAND, fine to medium, silty w/ gravels & cobbles	light brown	slightly moist	medium dense
5	bag	0.6										
10	bag	8.2						BEDROCK	SAN PEDRO SAND, fine to coarse, silty w/ trace of clay & caliche	brown	moist	dense

End of Test Pit @ 12'

Date Drilled: 11/7/16
Drilling Equipment: backhoe
Driving Weight: 50 lbs @ 30-inch drop
Water Depth: not encountered

LOG OF TEST PIT

Proposed Mixed-Use Development
24631 Via Valmonte
Torrance, California

GSS ENGINEERING, INC. *Geotechnical Engineering Consultants*

PROJECT No. GSS-2364-2 **PLATE** A-3

NOTE: The data presented on this log is a simplification of actual subsurface conditions encountered and applies only at the location of this pit and the date of drilling. It is not warranted to be representative of subsurface conditions at other locations and times.

TEST PIT NO. 3

Elevation: N/A

Depth in Feet	Blow per Foot	Field Moisture % of Dry Weight	Dry Density lbs./cu.ft.	Shear Resistance kips/sq.ft.	Confining Pressure kips/sq.ft.	Unified Classification	Soil Symbol	Description	Color	Moisture	Density
						GM		FILL GRAVEL, fine to medium sandy w/ boulders	gray brown	dry	loose to medium dense
5	bag	3.6									
						SM		SAND, fine to medium, silty	light brown		
10	bag	2.8									
								severe caving			

End of Test Pit @ 12' due to severe caving

Date Drilled: 11/7/16
Drilling Equipment: backhoe
Driving Weight: 50 lbs @ 30-inch drop
Water Depth: not encountered

LOG OF TEST PIT

Proposed Mixed-Use Development
24631 Via Valmonte
Torrance, California

GSS ENGINEERING, INC. *Geotechnical Engineering Consultants* | **PROJECT No.** GSS-2364-2 | **PLATE** A-4

NOTE: The data presented on this log is a simplification of actual subsurface conditions encountered and applies only at the location of this pit and the date of drilling. It is not warranted to be representative of subsurface conditions at other locations and times.

TEST PIT NO. 4

Elevation: N/A

Depth in Feet	Blow per Foot	Field Moisture % of Dry Weight	Dry Density lbs./cu.ft.	Shear Resistance kips/sq.ft.	Confining Pressure kips/sq.ft.	Unified Classification	Soil Symbol		Description	Color	Moisture	Density
						ML		FILL	SILT, fine to med. sandy, w/ gravels & rootlets	brown	dry	loose
						GM			GRAVEL, fine to medium sandy w/ cobbles & boulders	light gray brown	dry	loose to medium dense
5												
	bag	5.0							severe caving			

End of Test Pit @ 8' due to severe caving

Date Drilled: 11/7/16
Drilling Equipment: backhoe
Driving Weight: 50 lbs @ 30-inch drop
Water Depth: not encountered

LOG OF TEST PIT

Proposed Mixed-Use Development
24631 Via Valmonte
Torrance, California

GSS ENGINEERING, INC. *Geotechnical Engineering Consultants* | **PROJECT No.** GSS-2364-2 | **PLATE** A-5

NOTE: The data presented on this log is a simplification of actual subsurface conditions encountered and applies only at the location of this pit and the date of drilling. It is not warranted to be representative of subsurface conditions at other locations and times.

TEST PIT NO. 5

Elevation: N/A

Depth in Feet	Blow per Foot	Field Moisture % of Dry Weight	Dry Density lbs./cu.ft.	Shear Resistance kips/sq.ft.	Confining Pressure kips/sq.ft.	Unified Classification	Soil Symbol	Unit	Description	Color	Moisture	Consistency
						CL		**FILL**	CLAY, fine to medium sandy w/ gravel & rootlets	dark brown	dry	loose
5	30	8.8	91.3			ML		**TERRACE DEPOSIT**	SILT, fine to medium sandy w/ gravel & cobbles	dark brown	slightly moist to moist	mod firm to firm
10						CL			CLAY, fine to medium sandy			stiff
	bag	6.4						**BEDROCK**	SAN PEDRO SAND, fine to coarse, silty	brown	sl moist to moist	dense

End of Test Pit @ 12.5'

Date Drilled: 11/7/16
Drilling Equipment: backhoe
Driving Weight: 50 lbs @ 30-inch drop
Water Depth: not encountered

LOG OF TEST PIT

Proposed Mixed-Use Development
24631 Via Valmonte
Torrance, California

GSS ENGINEERING, INC. *Geotechnical Engineering Consultants* | **PROJECT No.** GSS-2364-2 | **PLATE** A-6

NOTE: The data presented on this log is a simplification of actual subsurface conditions encountered and applies only at the location of this pit and the date of drilling. It is not warranted to be representative of subsurface conditions at other locations and times.

TEST PIT NO. 6

Elevation: N/A

Depth in Feet	Blow per Foot	Field Moisture % of Dry Weight	Dry Density lbs./cu.ft.	Shear Resistance kips/sq.ft.	Confining Pressure kips/sq.ft.	Unified Classification	Soil Symbol	Unit	Description	Color	Moisture	Consistency
0–4						ML		FILL	SILT, fine to medium sandy w/ gravels, cobbles, & lootles	gry brn to dark brown	dry	mod firm
5	33	8.3	89.2			CL		TERRACE DEPOSIT	CLAY, silty, fine to medium sandy w/ gravels, cobbles, & porous texture	dark brown	slightly moist to moist	mod stiff to stiff
10	40	10.4	98.7									
	bag	5.5						BEDROCK	SAN PEDRO SAND, SAND, fine, silty	lt brown	sl moist	dense

End of Test Pit @ 12'

Date Drilled: 12/2/16
Drilling Equipment: backhoe/hand tools by owner
Driving Weight: 50 lbs @ 30-inch drop
Water Depth: not encountered

LOG OF TEST PIT

Proposed Mixed-Use Development
24631 Via Valmonte
Torrance, California

GSS ENGINEERING, INC. *Geotechnical Engineering Consultants* | **PROJECT No.** GSS-2364-2 | **PLATE** A-7

NOTE: The data presented on this log is a simplification of actual subsurface conditions encountered and applies only at the location of this pit and the date of drilling. It is not warranted to be representative of subsurface conditions at other locations and times.

TEST PIT NO. 7

Elevation: N/A

Depth in Feet	Blow per Foot	Field Moisture % of Dry Weight	Dry Density lbs./cu.ft.	Shear Resistance kips/sq.ft.	Confining Pressure kips/sq.ft.	Unified Classification	Soil Symbol		Description	Color	Moisture	Consistency
						ML		**FILL**	SILT, fine to medium sandy, w/ rootlets	brown	dry	loose
5						CL		**TERRACE DEPOSIT**	CLAY, silty w/ scattered rock frag. & rootlets	dark brown	slightly moist to moist	mod stiff
									CLAY, silty, fine to medium sandy w/ scattered rock frag. & porous texture			
10									CLAY, silty, fine to medium sandy w/ scattered rock frag. & porous texture	brown		mod stiff to stiff
									CLAY, silty, fine to medium sandy w/ scattered rock frag. & porous texture	gray brown		
15								**BEDROCK**	SAN PEDRO SAND, fine, silty	brown	slightly moist	dense

End of Test Pit @ 15'

Date Drilled: 12/6/16
Drilling Equipment: backhoe/hand tools by owner
Driving Weight: 50 lbs @ 30-inch drop
Water Depth: not encountered

LOG OF TEST PIT

Proposed Mixed-Use Development
24631 Via Valmonte
Torrance, California

GSS ENGINEERING, INC. *Geotechnical Engineering Consultants* **PROJECT No.** GSS-2364-2 **PLATE** A-8

NOTE: The data presented on this log is a simplification of actual subsurface conditions encountered and applies only at the location of this boring and the date of drilling. It is not warranted to be representative of subsurface conditions at other locations and times.

BORING NO. 1

Elevation: N/A

Depth in Feet	Blow per Foot	Field Moisture % of Dry Weight	Dry Density lbs./cu.ft.	Shear Resistance kips/sq.ft.	Confining Pressure kips/sq.ft.	Unified Classification	Soil Symbol	Description	Color	Moisture	Density
0						SM		**FILL** SAND, fine, silty, with gravels	gray brown	dry	loose to medium dense
10	29	3.8	102.2					**BEDROCK** SAN PEDRO SAND, fine, silty, with pea gravels	light brown	slightly moist	dense
14								SAN PEDRO SAND, fine, silty			
15	45	3.7	103.6								
20	45	5.0	100.0								
22											dense to very dense
25	53	3.4	102.8								
30	72	4.4	102.0								

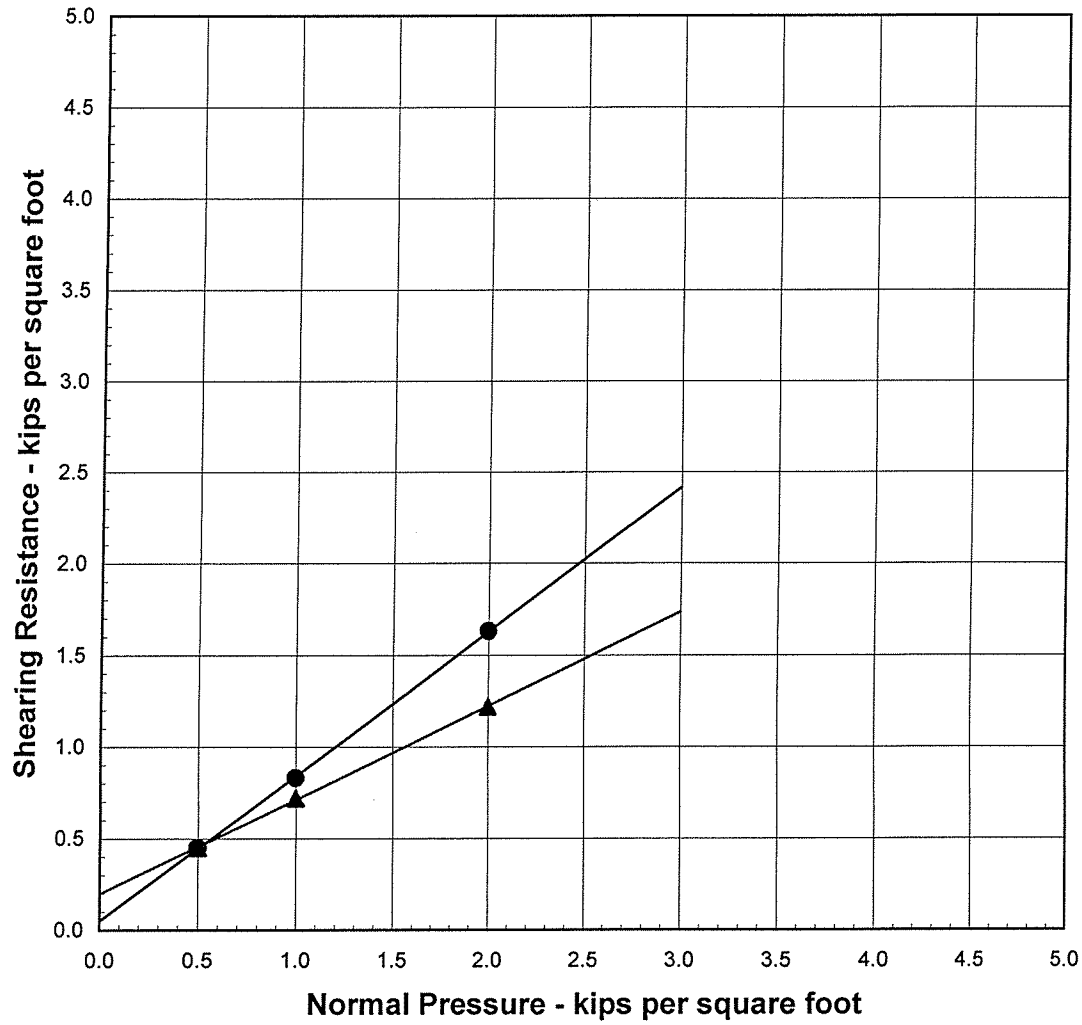
End of Test Boring @ 30'

Date Drilled: 12/14/2016
Drilling Equipment: 6-inch diameter hollow stem auger
Driving Weight: 140 lbs @ 30-inch drop
Water Depth: not encountered

LOG OF TEST BORING

Proposed Mixed-Use Development
24631 Via Valmonte
Torrance, California

GSS ENGINEERING, INC. *Geotechnical Engineering Consultants* **PROJECT No.** GSS-2364-2 **PLATE** A-9



Samples were tested under saturated and drained conditions.

	Test Pit No.	Depth (feet)	UC	Initial Water Content (% of dry wt.)	Final Water Content (% of dry wt.)	Dry Density (lbs / cu.ft.)	Cohesion (lbs / sq. ft.)	Angle of Friction (degrees)
●	1	5	SM	4.1	25.3	99.2	50 residual shear strength	38
▲	5	5	ML	8.8	31.1	91.3	200 residual shear strength	27

DIRECT SHEAR TEST DATA

Proposed Mixed-Use Development
24631 Via Valmonte
Torrance, California

GSS ENGINEERING, INC. *Geotechnical Engineering Consultants* | **PROJECT No.** GSS-2364-2 | **PLATE** A-10

RAY A. EASTMAN
ENGINEERING GEOLOGIST

2461 East Orangethorpe Avenue, Suite 214
Fullerton, California 92831
(714) 879-2378

December 16, 2016

GSS Engineering Incorporated
11823 Slauson Avenue, Su 46
Santa Fe Springs, CA. 90670

Subject: Interim Phase of Engineering Geologic Exploration
Proposed Residential/Commercial Development
24631 Via Valmonte
Torrance, CA.
Project No. 4012

Gentlemen:

At your request, we have conducted an interim phase of engineering geologic exploration in order to identify pertinent geologic factors with respect to a proposed residential/ commercial development. The main factors, in turn, included evaluation of the geologic setting with particular interest directed towards the stratigraphy, structural features and seismicity at the site.

The development plan is conceptual and the discussions and recommendations provided herein must be considered as general. We understand, however, that proposed building will be comprised by a structure of two to four stories of wood and/or steel framing and masonry construction; the related foundations may typically consist of continuous footing, grade beam and/or drilled pile type systems. Also, we understand that related grading may typically consist of nominal cut/fill with associated retaining walls and slopes at 2:1 that range from ~ 5 to 20 feet in height.

SCOPE OF WORK

The geologic work was based upon conceptual planning information and same was conducted in accordance with generally accepted practice for the particular circumstances. More specifically, typical factors include:

- ✓ Review of selected geologic maps.
- ✓ Field geologic observation of the site.
- ✓ Subsurface geologic exploration by seven test pits and one test boring.
- ✓ And, visual evaluation of the units encountered with respect to proposed construction.

The said review in this case also included U.S. Geological Survey topographic maps for 1928 and 2015.

SITE CONDITIONS

The overall site occupies ~ 0.65 acres of graded but vacant land situated at the lower northerly edge of the Palos Verdes Hills. It is bounded on the south by Via Valmonte, on the east by Hawthorne Boulevard, on the south by an abandoned gravel quarry and otherwise in general by residential/commercial development. Unfortunately, the detailed history of grading remains unknown as of this writing.

Topography of the site is formed by two main aspects: namely, a relatively level pad adjacent to Via Valmonte and a descending slope of irregular but moderate steepness with a relief of ~ 30 feet at the rear thereof. Topographic conditions off site include a level pad towards the north, irregular ground at the noted quarry site and a high retaining wall at the west side of the site.

Also, of course, see the accompanying base maps for an overview of the site and topographic conditions.

GEOLOGIC CONDITIONS

The geologic province of interest is formed by the moderately rugged Peninsular Range, which extends southeasterly from the nearby Santa Monica and San Gabriel Mountains into Baja California. The major geologic formations in the area include alluvium at the valley floors and terrace deposits and sedimentary bedrock in the foothill terrain; major fault lines include the nearby Palos Verdes and Inglewood systems.

Geology at the site is inclusive of four basic units: namely, sedimentary bedrock, sandy terrace deposit, clayey terrace deposit and fill soils. Also, of course, see the accompanying geologic maps, section lines and logs for an overview.

✓ The bedrock in this case is assigned to the San Pedro Sand Formation. Locally, it typically consists of dense, tan-brown, thickly bedded silty f-c sand with gravel and cobbles; the associated bedding at the quarry site is moderately folded with dips of ~ 10-50 degrees towards the north.

✓ The sandy terrace deposit is present as significant wedges of ~ 2-10 feet in thickness at the easterly one third of the site. Locally, it typically consists of medium dense, gray brown-lt brown, thickly bedded, silty f-m sand with gravel and cobbles; of notice with this unit is the presence of clam borings in the cobbles.

✓ The clayey terrace deposit in turn is present as significant wedges of ~ 2-15 feet in thickness at the westerly two thirds of the site. Locally, it typically consists of medium stiff, dk brown, f-m sandy and silty clay with scattered gravel and cobbles.

✓ The fill is present as significant wedges of ~ 2-15 feet in depth at various portions of the site. Locally, it typically consists of loose, gray brown, silty f-c sand with an abundance of gravel and boulders.

Finally, we may note that groundwater seepage was not encountered during the field exploration work.

SEISMIC CONDITIONS

Relatively nearby active faults of significance to the site include:

Fault Zone	Approximation Location		Earthquake Magnitude*
Palos Verdes	0.13 miles	S	7.3
Inglewood	7 "	NE	7.2
Puente Hills	14 "	NE	7.0
San Pedro Basin	14 "	SW	6.6
Santa Monica	17 "	N	6.6
Malibu	19 "	N	6.7
Anacapa	19 "	NW	7.2
Elysian	20 "	NE	6.7
Hollywood	20 "	N	6.7.

(*) Maximum probable moment magnitude, CDMG 2008.

Also, of course, see the accompanying fault and earthquake epicenter maps for an overview.

CONCLUSIONS/RECOMMENDATIONS

Constraints to development are, of course, posed by the presence of significant fill soils and terrace deposits that contain sands and gravel with boulders that in turn are subject to severe caving. More specifically, typical factors include:

✓ Geologic Stability – The site topography and dense–thickly bedded characteristics of the San Pedro Sand bedrock are favorable for gross stability. The fill soils and terrace deposits, however, are typically subject to settlements and sloughing and these features, of course, require consideration.

✓ Seismicity – Nearby active fault lines include the Palos Verdes and Inglewood and these have associated postulated, maximum probable earthquake magnitudes of 7.2-7.3. In turn, the probabilistic ground motion accelerations may range upwards to ~ 0.72g as per a 2 percent in 50 years criterion.

✓ Site Grading – The site grading is anticipated to be amenable to the use of conventional earth moving equipment with moderate to extremely heavy ripping. The bulk of excavated materials are anticipated to be suitable for use in compacted fills albeit subject to special processing of the cobble and boulder layers. Naturally, stripping of unsuitable soils and fills to expose underlying competent soils and/or bedrock will be required prior to placement of newly compacted fill.

✓ Proposed Cut and Fill Slopes – Typically, cut slopes are encompassed by two main factors: namely, 1) those that are at 2:1 with favorable soil conditions and/or bedrock with into slope bedding, jointing or faulting are anticipated to be stable to heights on the order of 40 feet; and 2) those that expose unfavorable soil conditions and/or out of slope bedding, jointing or faulting are anticipated to require buttress fills or retaining walls. In turn, fill slopes of compacted soils at 2:1 are typically stable to heights on the order of 40 feet.

Cut slopes of significance are anticipated to encounter existing fill soils of sands with gravel and boulders, and terrace deposits of clays and sands with gravel and cobbles.

✓ Expansive Soils – Portions of the geologic units are anticipated to be expansive and precautions may be required relative thereto.

✓ Foundation Criteria – Two basic considerations must be fulfilled with respect to the engineering geologic aspects of the foundation criteria: namely, 1) the foundations must be safe against shear failure of the soils or rock, and 2) the post-construction settlement must be within permissive limits.

Compacted fills and/or building and wall foundations are anticipated to have adequate support provided by the San Pedro Sand bedrock subject, of course, to the earlier discussions. Naturally, we recommend that all fills and building/wall foundations be established in said competent bedrock or newly compacted fill as the case may be. As may be surmised, the existing fills and terrace deposits are considered to be marginal with respect to the support of additional fill or building/wall loads. Also, the foundations should be established such as to have minimal setbacks per the applicable building code from any adjacent ascending or descending slope faces and/or a 1:1 projection from the base of any adjacent descending slope or excavation. Lastly, the footing excavations and detailed work areas may require extremely heavy ripping and jackhammer work due to zones of hard rock and/or boulders.

✓ Engineering Geologic Inspection – We recommend that our geologist review the finalized grading and construction plans in order to verify our findings. Further, we recommend that site inspections be made by our geologist during grading and construction in order to verify the geologic conditions encountered and, of course, additional recommendations may be required if conditions other than anticipated are found.

SELECTED REFERENCES

Probabilistic Seismic Hazard Assessment, California Division of Mines and Geology, 2008; Geologic Map of the Northeast Part of the Palos Verdes Hills, California Division of Mines and Geology, 1976; Geologic Map of the Palos Verdes Peninsula, T.W. Dibblee, 1999; Active Fault Source Data, U.S. Geological Survey Web Page, 2016; Ground Acceleration Data, U.S. Geological Survey Web Page, 2016; Map Showing Late Quaternary Faults of the Los Angeles Region, U.S. Geological Survey, 1989; Evaluating Earthquake Hazards in the Los Angeles Region, U.S. Geological Survey, 1985; Geologic Map of the Palos Verdes Hills, U.S. Geological Survey, 1946.

REMARKS

Several of the aforementioned items, of course, also fall under the purview of your office as the soils engineer and same may require further evaluation; these items include the site grading, slope stability, expansive soils, retaining walls, shoring and foundation design criteria.

The conclusions and recommendations express our best evaluation of the project requirements as based upon the planning information provided and information obtained at the geologic exposures and exploratory pit/boring locations. The client must recognize, however, that evaluation of subsurface deposits is subject to the influence of undisclosed and unforeseen variations in conditions that may occur and the client has a related responsibility to bring to our attention any unusual condition that may be encountered.

We trust that this interim engineering geologic exploration report will meet with your needs at this time.

Sincerely,

Ray A. Eastman, CEG 423

PROFESSIONAL GEOLOGIST
RAY A. EASTMAN
CERTIFIED
ENGINEERING
GEOLOGIST
NO.423
2/18
STATE OF CALIFORNIA

GEOLOGIC LOG - TEST PIT

Project No.: 4012
Equipment: Backhoe

Date: 11/7/16
Dimensions: 3'/20'/15'

Pit No.: 1
Elevation: --

Depth, '	Description	Geologic Unit
0.5	Loose dry brn f-m sdy clay w/ rootlets	Fill
.5-4	Med loose dry gr & brn si f-c sand w/ gravel & cobbles	
4-7	Med dense damp dk gr brn si f sand	Terrace deposit
7-11	Med dense damp dk gr brn si f-c sand w/ pea gravel	
11-14	Med dense damp brn si f-m sand	
14-15	Same w/ gravel & cobbles w/ clam borings	
	Backfilled	

GEOLOGIC LOG - TEST PIT

Project No.: 4012
Equipment: Backhoe

Date: 11/7/16
Dimensions: 3'/20'/12'

Pit No.: 2
Elevation: --

Depth, '	Description	Geologic Unit
0-1.5	Loose dry brn f-m sdy silt w/ rootlets	Fill
1.5-8	Med loose damp lt brn si f-m sand w/ gravel & cobbles at 5-7' w/ clam borings	Terrace deposit
8-12	Dense damp brn si f-c sand – massive w/ trace clay & caliche – at 5' on W side	San Pedro Sand
	Backfilled	

"The Geologic Outfit"

GEOLOGIC LOG - TEST PIT

Project No.: 4012
Equipment: Backhoe

Date: 11/7/16
Dimensions: 3-8'/20'/12'

Pit No.: 3
Elevation: --

Depth, '	Description	Geologic Unit
0-5	Loose dry gr brn f-m sdy gravel w/ boulders	Fill
5-12	Loose dry lt brn si f-m sand – severe caving/unable to proceed	
	Backfilled	

"The Geologic Outfit"

GEOLOGIC LOG - TEST PIT

Project No.: 4012
Equipment: Backhoe

Date: 11/7/16
Dimensions: 3-8'/20'/8'

Pit No.: 4
Elevation: --

Depth, '	Description	Geologic Unit
0-1	Loose dry brn f-m sdy silt w/ gravel & rootlets	Fill
1-8	Loose dry lt gr brn f-m sdy gravel w/ cobbles & boulders – severe caving/unable to proceed	
	Backfilled	

"The Geologic Outfit"

GEOLOGIC LOG - TEST PIT

Project No.: 4012
Equipment: Backhoe

Date: 11/7/16
Dimensions: 3'/15'/12.5'

Pit No.: 5
Elevation: --

Depth, '	Description	Geologic Unit
0-1.5	Loose dry dk brn f-m sdy clay w/ gravel & rootlets	Fill
1.5-10	Med stiff damp dk brn f-m sdy silt & clay w/ gravel & cobbles	Terrace deposit
10-11	Med stiff damp dk brn f-m sdy clay	
11-12.5	Dense damp brn si f-c sand - massive	San Pedro Sand
	Backfilled	

GEOLOGIC LOG - TEST PIT

Project No.: 4012
Equipment: Backhoe

Date: 12/2/16
Dimensions: 3'/10'/12'

Pit No.: 6
Elevation: --

Depth, '	Description	Geologic Unit
0-4	Med loose dry gr brn-dk brn f-m sdy silt w/ gravel - cobbles & rootlets	Fill
4-11	Med stiff dry dk brn f-m sdy clay w/ gravel - cobbles & porous texture - 7-9' blk & 9-11' dk red brn	Terrace deposit
11-12	Dense damp lt brn si f sand - massive	San Pedro Sand
	Backfilled	

"The Geologic Outfit"

GEOLOGIC LOG - TEST PIT

Project No.: 4012
Equipment: Backhoe

Date: 12/6/16
Dimensions: 3'/12'/15'

Pit No.: 7
Elevation: --

Depth '	Description	Geologic Unit
0-1.5	Loose dry brn f-m sdy silt w/ rootlets	Fill
1.5-5	Med loose damp dk brn si clay w/ scattered rk fgs & rootlets	Terrace deposit
5-8	Med stiff damp dk brn f-m sdy clay w/ scattered rk fgs & porous texture	
8-11	Stiff damp brn f-m sdy clay w/ scattered rk fgs & porous texture	
11-13	Stiff damp gr brn cly f-m sand w/ scattered rk fgs & porous texture	
13-15	Dense damp brn si f sand w/ carbon chips	San Pedro Sand
	Backfilled	

GEOLOGIC LOG - TEST BORING

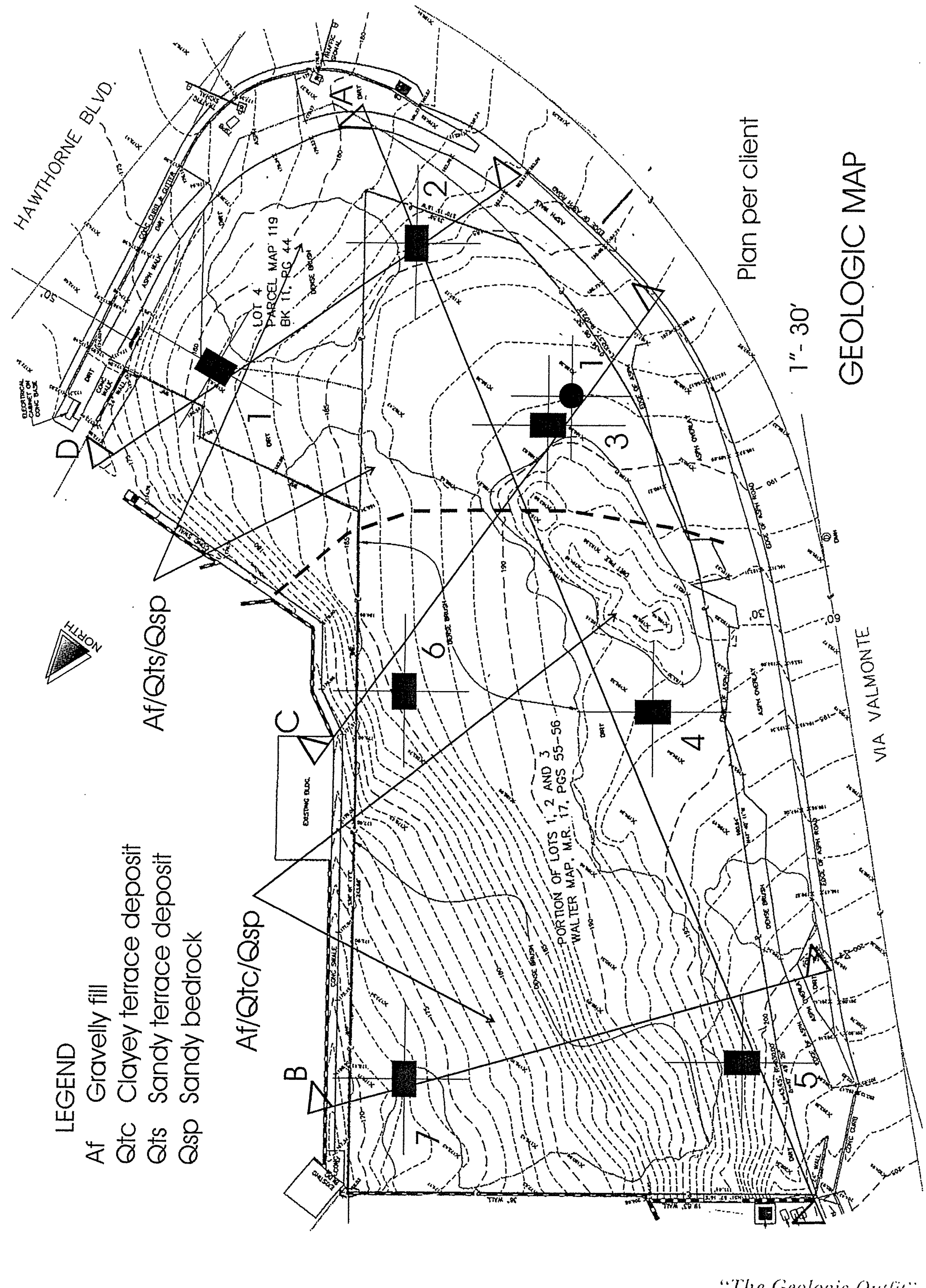
Project No.: 4012
Equipment: Hollowstem

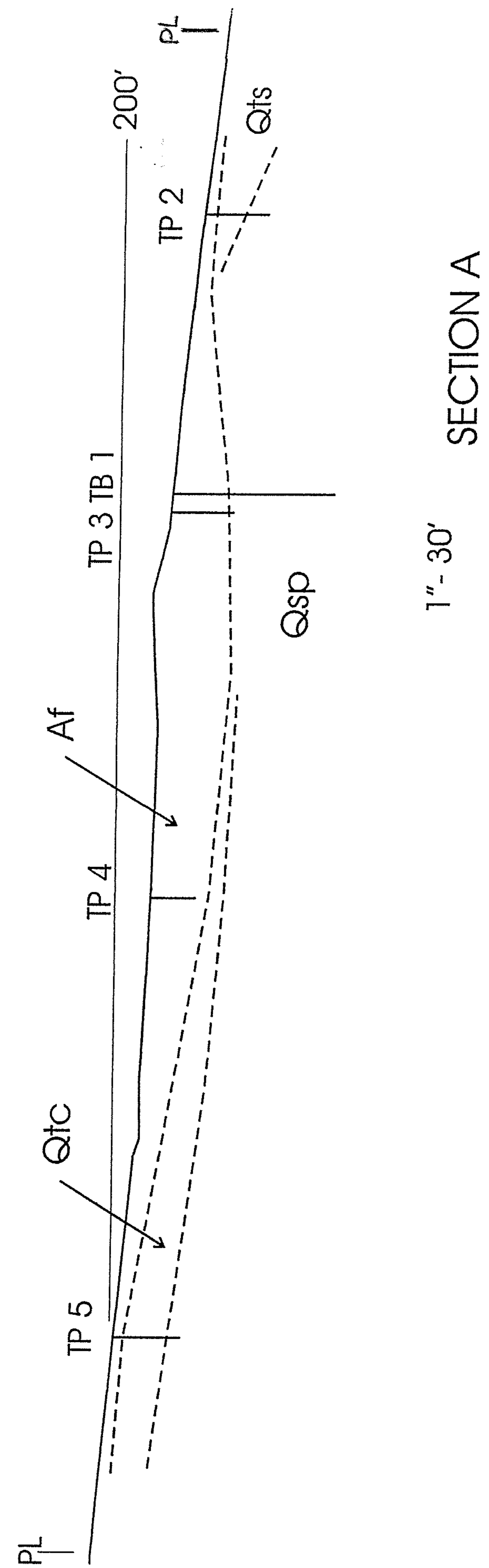
Date: 12/14/16
Dimensions: 8"/30'

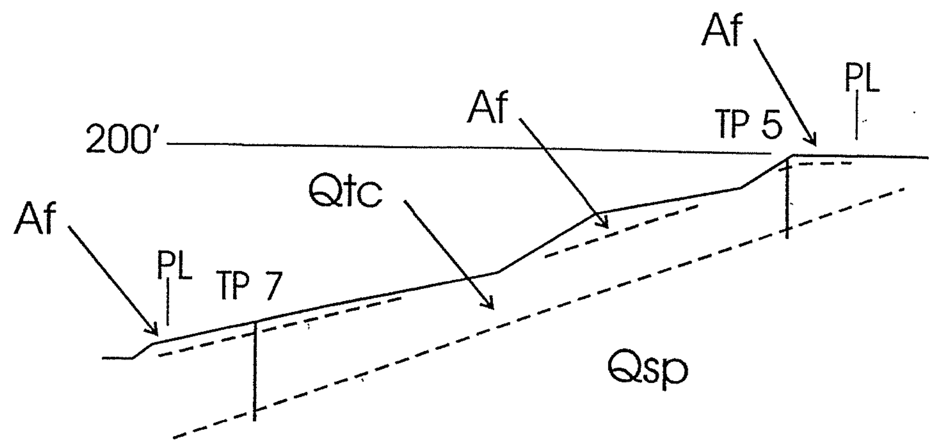
Boring No.: 1
Elevation: --

Depth '	Description	Geologic Unit
0-9	Loose dry gr brn si f sand w/ gravel	Fill
9-13	Med dense damp lt brn si f sand w/ pea gravel	San Pedro Sand
13-22	Med dense damp lt brn si f sand	
22-30	Dense damp lt brn si f sand	
	Backfilled	

Blow count w/ split barrel sampler
10' – 29
15' – 45
20' – 45
25' – 53
30' – 72

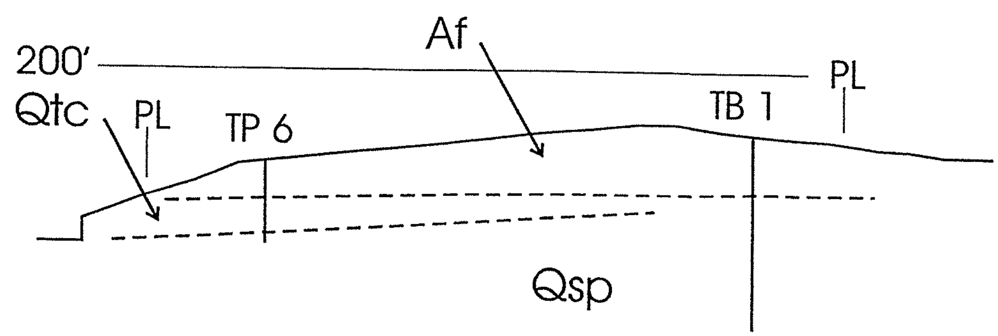

GEOLOGIC MAP
1"- 30'
Plan per client
HAWTHORNE BLVD.
VIA VALMONTE
NORTH
LOT 4
PARCEL MAP 119
BK 11, PG 44
PORTION OF LOTS 1, 2 AND 3
WALTER MAP, M.R. 17, PGS 55-56
EXISTING BLDG.
Af/Qts/Qsp
Af/Qtc/Qsp
A
B
C
D
1
2
3
4
5
6
7
LEGEND
Af Gravelly fill
Qtc Clayey terrace deposit
Qts Sandy terrace deposit
Qsp Sandy bedrock


PL
200'
Qts
TP 2
SECTION A
TP 3 TB 1
Qsp
1"- 30'
Af
TP 4
Qtc
TP 5
PL



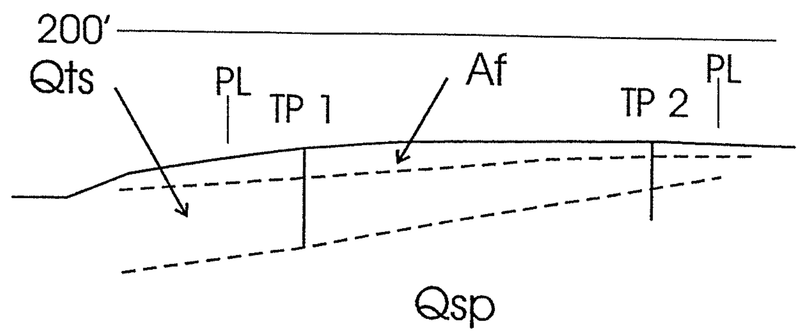
1"- 30'

SECTION B

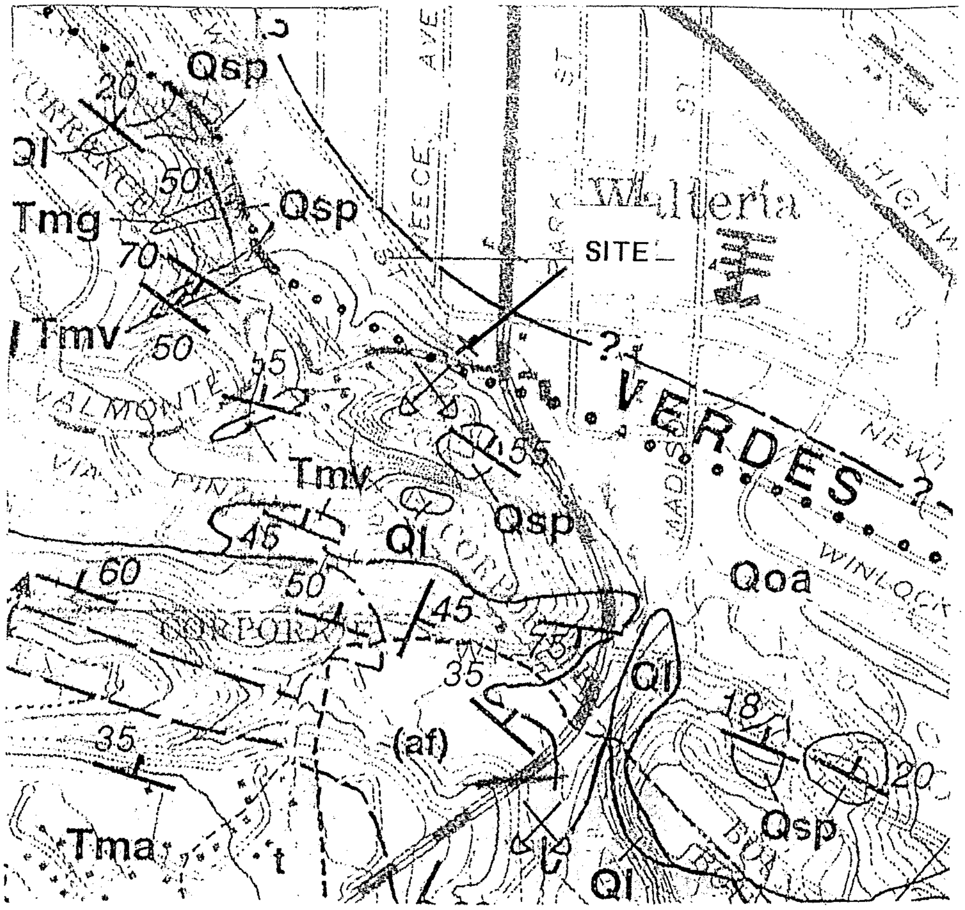


1"- 30'

SECTION C



1"- 30'   SECTION D



Dibblee.

OLDER SURFICIAL SEDIMENTS

Qos *older, stabilized dune and drift sand - mostly unconsolidated fine-grained sand*

√**Qoa** *older alluvium - nonmarine terrace cover of Woodring et al.,1946; Poland et al., 1959; Cleveland, 1972; sandy loam and loamy clay, includes sand and pebble gravel in Palos Verdes Hills, with pebbles derived mostly from Miocene hard siliceous shale and limestone; includes Palos Verdes Sand of Woodring et al.,1946, not differentiated on this map*

t *elevated old marine terrace remnants in Palos Verdes Hills, with little or no alluvial sedimentary cover; compiled in large part from Woodring et al.,1946; Cleveland, 1972*

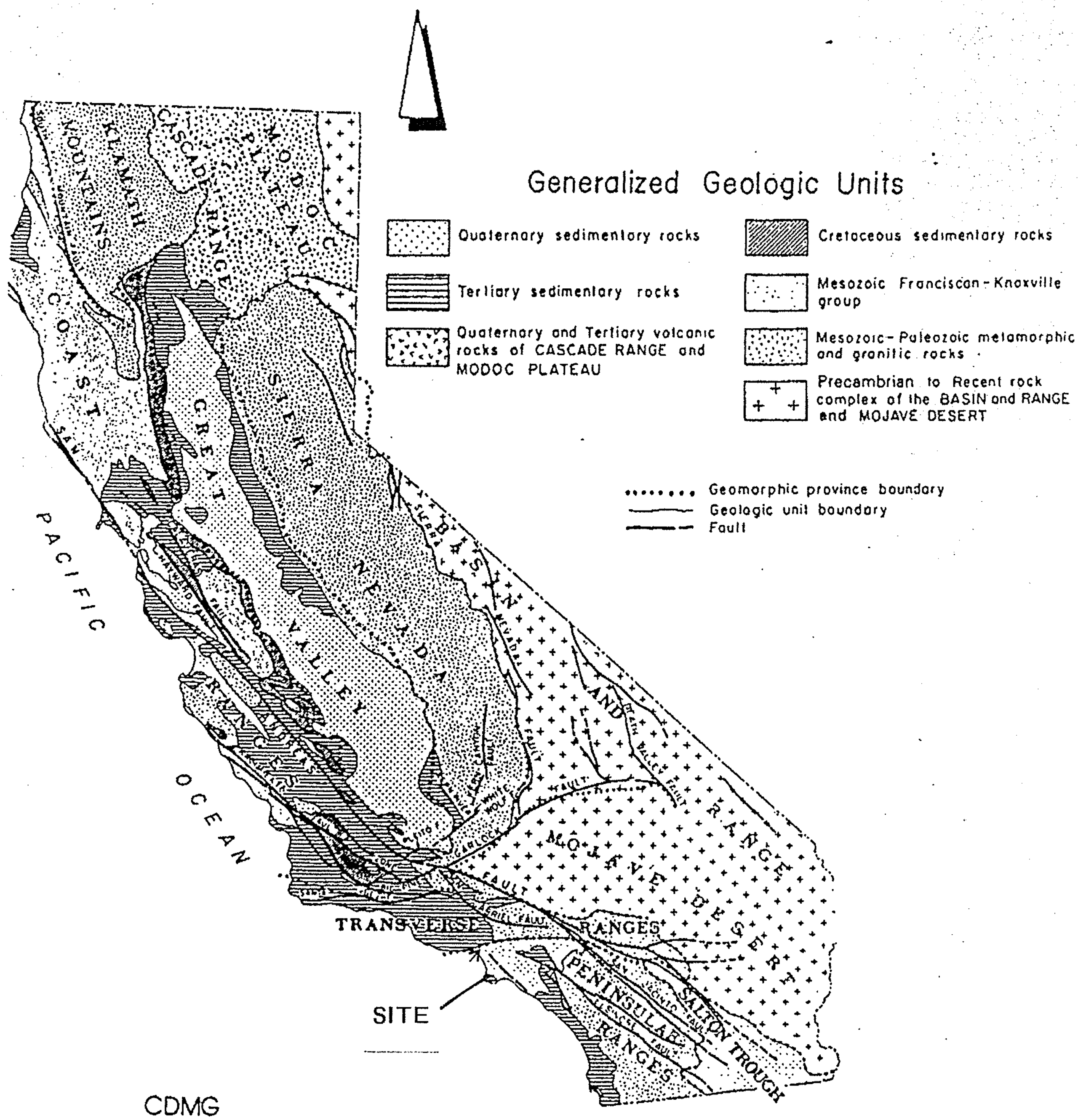
SHALLOW MARINE SEDIMENTS

~~nonmarine(?) to~~ shallow marine clastic sediments, weakly indurated; contain abundant marine molluscan fossils and microfossils; Pleistocene (Hallian Stage)

√**Qsp** ***San Pedro Sand:*** *light gray to reddish-tan sand and pebble gravel, pebbles derived mostly from Miocene hard siliceous shale and limestone detritus; massive to locally cross-bedded*

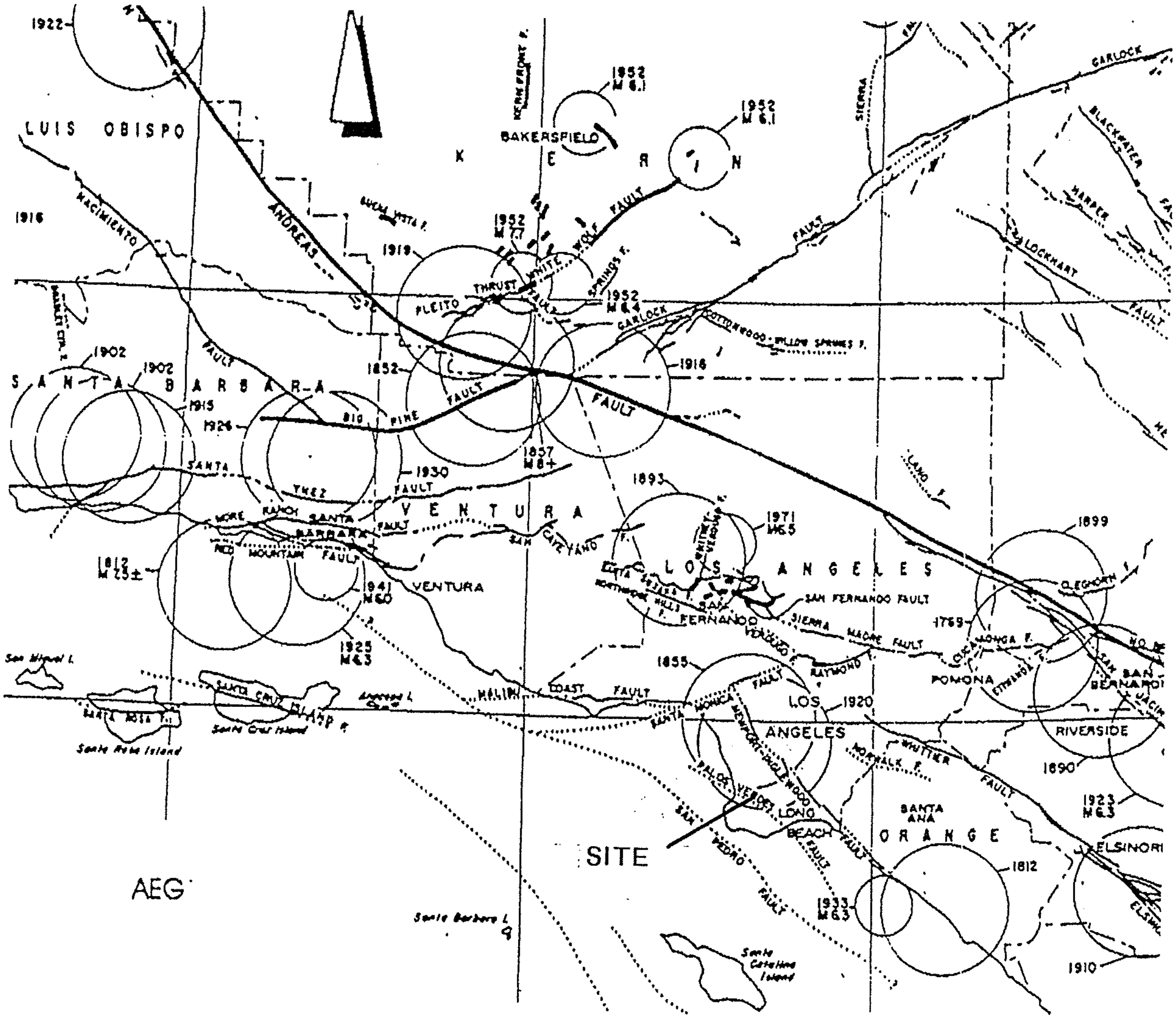
AREA GEOLOGIC MAP

1 in ~ 1000 ft



REGIONAL GEOLOGIC MAP

1 in ~ 100 mi



EXPLANATION

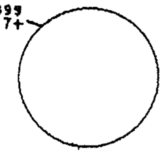
ACTIVE FAULTS

Total length of fault zone that breaks Holocene deposits or that has had seismic activity.

Fault segment with surface rupture during an historic earthquake, or with aseismic fault creep.

EARTHQUAKE LOCATIONS

1899 M 7+



FAULT MAP

1 in ~ 30 mi

GSS ENGINEERING, INC.
GEOTECHNICAL / ENVIRONMENTAL CONSULTANTS

December 12, 2017
GSS-2364-2

Ashai Design Corporation
9744 Wilshire Boulevard
Beverly Hills, California 90212

SUBJECT: **RESPONSE TO CITY REVIEW LETTER**
Proposed Mixed-Use Development
24631 Via Valmonte
Torrance, California

REFERENCE: **1. "Preliminary Soil and Geology Investigation Report", dated January 3, 2017, prepared by GSS Engineering, Inc.**

2. City of Torrance Planning Department Review Letter, dated December 7, 2017.

Gentlemen:

The following information is submitted in response to the City of Torrance Planning Department Review Letter dated December 7, 2017.

<u>City's Comment: *Complete questions a-e Section VI "Geology and Soil" of CEQA Initial Study*</u>

ITEM	Checklist	Justification
a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:		
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.	No Impact	The site is not located within Alquist-Priolo Earthquake Fault Zone. Please refer to Page 4 of the referenced soil report.
ii) Strong seismic ground shaking?	Less Than Significant with Mitigation Incorporated	Please refer to Page 4 of the referenced soil report.
iii) Seismic-related ground failure, including liquefaction?	No Impact	The site is not located within State Published liquefaction Zone. Please refer to Page 5 of the referenced soil report.

iv) Landslides?	No Impact	The site is not located within State Published Seismic Induced Landslide Zone.
b) Result in substantial soil erosion or the loss of topsoil?	Less Than Significant with Mitigation Incorporated	Per development plan, majority of the existing slope will be removed and the remaining slope will be protected by retaining wall.
c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?	No Impact	All foundations are recommended to be founded into competent bedrock.
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?	Less Than Significant with Mitigation Incorporated	The onsite soil is medium expansive. This soil characteristic has been incorporated into geotechnical design recommendations.
e) Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?	No Impact	Per information provided by the project architect, the site has public sewer system.

If you have any further questions regarding this response letter or we can be of further assistance, please do not hesitate to contact this office.

Respectfully submitted,
GSS ENGINEERING, INC.

REGISTERED PROFESSIONAL ENGINEER
ALLEN LEE
No. 2781
Exp. 06-30-19
GEOTECHNICAL
STATE OF CALIFORNIA

Allen Lee, GE
Principle Engineer

Ray A. Eastman
CEG 423

PROFESSIONAL GEOLOGIST
RAY A. EASTMAN
CERTIFIED ENGINEERING GEOLOGIST
NO. 423
2/19
STATE OF CALIFORNIA