SOIL SEARCH ENGINEERING
GEOTECHNICAL & ENVIRONMENTAL CONSULTANTS
4088 BRIDGE ST. #9, FAIR OAKS, CA 95628 (916)966-3902

May 17, 2014
Job No. 1423G

Marty Maskall
4025 New York Avenue
Fair Oaks, CA 95628

Subject: Fair Oaks EcoHousing
9620 Fair Oaks Boulevard
Fair Oaks, California
Geotechnical Investigation

Dear Marty:

Pursuant to your request, we are presenting herewith the results of the geotechnical investigation performed for the above subject project site. Our study consisted of subsurface exploration, necessary soil sampling and testing, a visual reconnaissance, and review of available literature and reports. The results of our field investigation, necessary laboratory tests, and engineering analysis are presented. The conclusions and recommendations are based upon applicable standards of our profession at the time this report has been prepared.

Based on the results of our field study and review of available literature and reports, the subject site is suitable for the proposed project provided the recommendations contained in this report are carefully followed. Our office will be retained to provide observations and material testing during the construction of this project. If you have any questions or require additional information, please contact our office at your convenience.

Very truly yours,

SOIL SEARCH ENGINEERING

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Ahmad Badie
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GEOTECHNICAL INVESTIGATION

FAIR OAKS ECOHOUSING
4025 NEW YORK AVENUE
FAIR OAKS, CALIFORNIA

BY

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GEOTECHNICAL INVESTIGATION
FOR

FAIR OAKS ECOHOUSING
4025 NEW YORK AVENUE
FAIR OAKS, CALIFORNIA

INTRODUCTION

We are pleased to transmit herein the results of the soil and foundation consultation performed for the proposed new residential condo community project site, located at 4025 New York Avenue, Fair Oaks, California, as shown on the Vicinity Map, Plate Number-1, Appendix "B". The study conducted at this site was prepared for the use of the architect and structural engineer for application to the design of the site grading, building foundations, slab-on-grade floors and retaining structures, in accordance with generally accepted geotechnical engineering practices. No warranty is expressed or implied. This report presents the results of this study.

Based on our conversations with involved parties, the development will consist of construction of a new single family residential condo community, as shown on the Site Plan, Plate Number-2, Appendix "B". The project site is irregular in shape and the general topography of the area is rolling hills. Anticipated grading calls for minor cuts and fills to develop the site for the above subject project.

Purpose and Scope

The purpose of our investigation was to examine, and evaluate the foundation soils and provide recommendations concerning the soils and foundation engineering aspects of the project. The scope of work performed in this investigation included a review of pertinent available data, a site reconnaissance, subsurface exploration, necessary laboratory testing, engineering analyses of the field and laboratory data and the preparation of this report. The data obtained and the analyses performed were for the purpose of providing design and construction criteria for site grading, building foundations, slab-on-grade floors and retaining structures.

This report has been prepared for the exclusive use of Marty Maskall, project manager and future resident, of Fair Oaks, California, for the specific application to the proposed project in accordance with generally accepted soil and foundation engineering practices. No warranty is expressed or implied. If any unusual soil conditions are encountered during the construction, or if there are any changes in the nature, design or plan, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed and conclusions and recommendations of this report modified or verified in writing.

Site Description

The site is irregular in shape and the general topography of the area is rolling hills. At the time of our field investigation there were two residential structures on the site and the vacant part of the site was covered with moderate growth of grass, weeds and a number of native trees. It is our understanding that the property is 3.5 acres in size, to be developed to the proposed condominium community with 30 attached town homes and flats. Anticipated grading calls for minor cuts and fills to develop the site for the above subject project.

SUBSURFACE CONDITIONS

General

A subsurface investigation was performed on May 17, 2014, using a rubber tire backhoe, to sample and investigate the subsurface soils. The field investigation conducted at this site consisted of excavating ten exploratory test pits, carried to the depths of 6 to 7 feet, to Location Map, Plate Number-3, Appendix "B".

The location of the test pits was determined by pacing. Hence, accuracy can be implied only to the degree that this method warrants. The graphic log of the test pits together with the available data is shown on the Soil Profile Sheets, Plates Number-4 thru 13. The Soil Classification System is shown on Plate Number-14, Appendix "B".

Soil Conditions

Visual classification of each soil stratum encountered was made in the field at the time the test pits were trenched. The soil samples retained were checked in the laboratory by our office to augment the field classification and a description of each soil encountered is shown on the Soil Profile Sheets.

The surface soils encountered in our exploratory test pits, below the organic laden top soil, consisted of dark brown silty clayey sand with organics in fill areas to depths of 2 to 6 feet and brown silty sands to maximum depth explored of 7 feet. The surface soils at the site generally have a low plasticity and expansion potential. Detailed descriptions of the soils encountered in each of the exploratory test pits are presented on the Soil Profile Sheets.

The attached test pits logs and related information depict subsurface conditions only at the specific locations shown on the location map and on the particular date designated. The test pit logs show subsurface conditions at the date and location indicated and it is not warranted that they are representative of subsurface conditions at other locations and times. Also, the passage of time may result in changes in the subsurface conditions due to environmental changes. The location of the test pits was approximately determined by pacing and should be considered accurate only to the degree implied by the method used.

Groundwater

No free groundwater was encountered, below the existing ground elevation, in the exploratory test pits at the time of trenching. All test pits were backfilled immediately after trenching. It should be noted that the test pits may not have been left open for a sufficient period of time to establish equilibrium groundwater conditions. In addition, fluctuations in the groundwater level could occur due to change in seasons, variations in rainfall, and other factors.

GEOLOGY

The area of the proposed residential site lies in the north eastern margin of the Great Valley province. The Great Valley is the elongated lowland between the Sierra Nevada and Coast Ranges. It is about 400 miles long and 50 miles wide. This lowland rises from slightly below sea level to about 400 feet at its north and south ends. The Sacramento River drains the northern half, and the San Joaquin River the southern half.

The Great Valley is geologically monotonous, representing primarily the alluvial, flood, and delta plains of its two major rivers and their tributaries. The land is well watered due mainly to the rain and snowfall of Sierra Nevada. Only two topographic breaks occur on the lowland floor: Sutter (Marysville) Buttes in Sacramento Valley, reaching 2100 feet in elevation, and the Kettleman Hills and other anticlinal arches on the western side of the southern San Joaquin Valley, having elevations of about 1800 feet (Norris & Webb, 1976).

The region persisted as a lowland or shallow marine embayment during the entire Cenozoic and at least the later Mesozoic. In the late Cenozoic, much of the area was occupied by shallow brackish and freshwater lakes. Lake Corcoran, now extinct, spread over much of the northern San Joaquin Valley during the middle and late Pleistocene. Today the only outward drainage is through Carquinez Strait, into San Francisco Bay (Norris & Webb, 1976).

The foothills and mountains of the Sierra Nevada and the Sacramento Valley are the result of a complex geologic history, some aspects of which are unclear even now (Butte County Planning Department, L. Painter, 10-94). The old bedrock, or metamorphic base rock, series of the Sierra Nevada has been subjected to an intense deformation resulting in dynamically metamorphosed rocks. Intense folding and faulting have produced an area of steep, commonly eastwardly dipping, northwesterly striking bedrock series through the center of the Sierra Nevada. This bedrock series is bound on the east and west by zones of active and potentially active faults.

The area containing the subject site, as shown on Plate Number-15, Appendix "B" is mapped by Charles W. Jennings, 1977, fifth printing 2000, Geologic map of California, as Pliocene and/or Pleistocene sandstone, shale, and gravel deposits; mostly loosely consolidated.

FAULTS AND SEISMICITY

Faults are indications of past seismic activity. It is assumed that the faults that have been active recently are the most likely to be active in the future, although even inactive faults may not be dead. The recency of activity is measured in geologic terms, or geologic time. Geologically recent is within the past two million years (The Quaternary period). All faults believed to have been active during the Quaternary time are considered potentially active within the last 11,000 years are called active. If a fault is considered to be historically active, it has exhibit activity within the last 200 years. Faults for which there is no evidence of activity during the last two million years are considered inactive. Table 1, Appendix "C", lists selected significant known active faults and their approximate distances from the subject site.

An earthquake scale that describes the effects of ground shaking on people and buildings was developed by Mercalli and is known as the Modified Mercalli Intensity Scale. Attempts have been made to correlate the intensities with Richter magnitude, Table 2, Appendix “C”. However, the magnitude scale is an instrumental measure of the size of an earthquake, and cannot be directly compared to the effects of an earthquake.

Surface fault rupture occurs along faults during earthquakes that are typically magnitude 5.5 and larger. Table-3, Appendix “C”, lists the selected historic earthquakes in California, most of which had associated surface rupture.

The relevant selected known faults and epicenters whose movements might produce shaking at the site were evaluated for this investigation. Plate Number-16 of Appendix "B", shows significant known active faults and their recent seismic activity in the project site area. Plate Number-17 of Appendix "B" is a probabilistic seismic hazard map for California showing the peak horizontal ground acceleration, uniform firm-rock site condition.

There is no evidence to indicate any likelihood for shallow ground rupture due to faulting in the area. However historical earthquake records indicate a potential for strong earthquake shaking throughout the entire area, and future earthquake shaking should be anticipated at the site. We recommend to design and construct the project in strict conformance with current standards for earthquake-resistant construction. The following faults merit additional comments because of their activity and proximity to the site.

The San Andreas Fault is the most important of the San Andreas Fault system. It has a cumulative right-lateral offset on the order of 330 miles. The fault has been active during recent and historic time, producing either sudden ground rupture associated with earthquakes or fault creep (CDMG, OFR 81-3, 86-3SF). This fault was responsible for the M7.1 Loma Prieta earthquake on October 17, 1989. The epicenter was located 10 miles northeast of Santa Cruz in the Santa Cruz Mountains. This earthquake was the largest quake to occur in the San Francisco Bay area since the 1906 earthquake and the largest anywhere in California since 1952.

Calaveras Fault borders the eastern flank of the Berkeley-Hayward Hills, and extends to the southeast where it joins the San Andreas Fault south of Hollister. Epicenters of recent earthquakes with Richter Magnitudes up to 4.5 have been located along, or near this fault. In 1868 an earthquake of unknown magnitude caused ground breakage near Danville. Several centimeters of creep have

been measured in Hollister, where a Calaveras Fault trace cuts through a residential area. The pattern of offset curbs and sidewalks is similar to that of creep and faulting along other branches of the San Andreas system.

Green Valley - Concord fault Zone extends from Walnut Creek to west of Fairfield, has experienced displacement throughout most of its length within recent geologic time. An earthquake of 5.4 magnitude occurred in 1955 along part of the fault near Concord and an earthquake of 5.7 magnitude occurred in 1969 along part of the fault near Santa Rosa. There is currently evidence of some movement along the fault in the City of Concord. The greatest probable earthquake generated by this fault is not expected to exceed a magnitude of 7 on the Richter Scale.

The Hayward Fault is located east of San Francisco Bay and extends southeast to where it probably merges with the Calaveras Fault north of Hollister. A review of the recent history of this fault shows two major earthquakes (1836 and 1868), each with an estimated Richter Scale Magnitude of 6.5 to 7.5. Current measurements indicate creeping at rates up to one centimeter per year in places. Numerous small earthquakes (Richter Scale Magnitude of 3 to 5) have occurred along this fault in recent years, indicating continued activity.

The Rodgers Creek fault zone is a major right-lateral strike-slip fault zone located north of San Pablo Bay. It extends from near Sears Point to the vicinity Petaluma Reservoir. This fault zone is irregular in width but is readily delineated by the many scarfs, laterally offset streams, linear troughs, and land-slides. Recent movement along this fault is evidenced by a prominent northeast facing ramp and scarp in a Holocene alluvial fan near California Highway 121 (Helley and Herd, 1977).

The Cleveland Hill fault is an oblique slip fault with both normal and right-lateral strike-slip components of displacement. Cleveland Hill fault is the only known active faults in Butte County, where activity on 1 August 1975 resulted in the Oroville earthquake. This earthquake has a Richter magnitude of 5.7 and resulted in about 2.2 miles of surface cracking along the western flank of Cleveland Hill, as presented in the Report adopted March 15, 1977, Butte County General Plan, Seismic Safety element. Movement on the Cleveland Hill fault on 1 August 1975 was apparently the result of crustal strain developed in the foothill shear zone. The Cleveland Hill fault, located about 6 miles southeast of Oroville , trends north-northwest and is approximately 10 miles long (Sherburne and Hauge, Oroville, California Earthquake, 1 August 1975, California Division of Mines and Geology). Reports by The California Division of Mines and Geology indicate that the ground motion at Gridley, which is located on valley sediment, was approximately 0.1 times acceleration of gravity.

The 80 mile-long Midland-Sweitzer fault is located approximately 40 miles south-southwest of Butte County. This fault is considered active and has caused historic earthquake of Richter Magnitudes between 6 to 6.9, Butte County General Plan, Adopted March 15, 1977. Greensfelder, 1973, estimated that the Midland-Sweitzer fault is capable of producing a magnitude 7.0 earthquake, probably based on the occurrence of two strong earthquakes in the area in 1892. The first of these earthquakes had an intensity of X on the Modified Mercalli scale in Solano County, and was felt as far away as western Nevada. The second earthquake occurred in the Wieners area and had an intensity of Modified Mercalli IX. Damage was reported as far away as Grass Valley and Lodi.

Potentially active faults which could result in ground motion at the site include the Foothills shear zone, Sutter's Butte faults, Willows fault, Dunnigan fault, Coast Range Thrust zone, Big Bend fault zone, Camel's Peak fault, Melones-Dogwood Peak faults and Hawkins Valley faults. According to Butte County General Plan, Seismic Safety Element, March 15, 1977, these faults should be considered potentially active due to geologic, historic, or seismic data.

Generally, ground shaking is the primary geologic hazard. Secondary geologic hazard, such as liquefaction, seismic settlement and landsliding are a result of ground shaking. The site does not lie within a Special Studies Zone as defined by the State Geologist. There is no evidence to indicate any likelihood for shallow ground rupture due to faulting. Based on the interpretation of the data and the inclusion of the information from the available pertinent reports, it is our opinion that the liquefaction potential for the subject site is expected to be low should seismic shaking occur.

CONCLUSIONS

From a soil and engineering standpoint, it is our opinion that the site is suitable for the proposed project, provided the recommendations set forth in this report are incorporated into the design considerations and the project plans and specifications.

All fill that does not meet the specification requirements shall be removed, reworked and/or recompacted until the requirements are satisfied. The surface soils, at the project site, generally, have a low plasticity and expansion potential when subjected to fluctuations in moisture.

All imported soils for engineered fill should be approved by the soil engineer before commencement of the grading operations. The organically contaminated surface soils, are not suitable for engineered fill. The organically contaminated soils may be used for landscaping only.

The subject project shall be designed and constructed to resist the effect of earthquake motions in accordance with "2013 California Building Code", California Code of Regulations, Title 24, "2013 ASCE 7; Minimum Design Loads for Buildings and Other Structures" and other applicable codes. Based on the results of our investigation, we recommend that the following seismic design criteria, be confirmed and used in accordance with the "2013 California Building Code" and "2013 ASCE 7". The seismic design category for structure is permitted to be determined in accordance with section 1613 or ASCE 7.

According to 2013 CBC and 2013 ASCE 7, it is our opinion that the soil profile at the site best corresponds to a Site Class "D" and alternate simplified seismic design as outlined in the 2013 California Building Code and 2013 ASCE 7 "Minimum Design Loads for Buildings and Other Structures" may be used.

In order to provide adequate and uniform bearing, areas with soft and compressible materials, if any, must be excavated, to competent native soil, and replaced with engineered fill as recommended. The over excavations may be backfilled with native or import materials compacted to the requirements given for engineered fill. All fill that does not meet the specification requirements, shall be removed, reworked and/or recompacted until the requirements are satisfied.

Existing drainage courses shall not be obstructed and alterations to them must conform to the approved plans and specifications. Drainage facilities shall be provided to carry surface and subsurface waters to the nearest drainage course designated for such a purpose.

Where utility lines cross under or through perimeter footings, they should be completely sealed to prevent moisture intrusion into the areas under the slab and/or footings. The utility trench backfill should be of impervious material for at least three feet on both sides of the exterior footings. The impervious material should be compacted to at least 90 percent relative compaction.

We recommend that our firm be provided the opportunity for a general review of the final design and specifications in order that the earthwork and foundation recommendations may be properly interpreted and implemented in the design and specifications.

Recommendations presented in the following sections are based on the preliminary site plan, our site observation and our conversation with involved parties. These recommendations are general in nature and set forth the minimum standard to satisfy other requirements of this report. Upon review of the final site, grading and drainage plans, additional recommendations may be presented.

RECOMMENDATIONS

Grading and site Development

1. The placement of fill and control of any grading operations at the site shall be done in accordance with the recommendations of this report. These recommendations set forth the minimum standards to satisfy other requirements of this report.

2. All existing surface and subsurface structures that will not be incorporated in the final development shall be removed prior to any grading operations. These objects shall be carefully located on the grading plans to help assist the field engineer in establishing proper control over their removal. All existing water/dry wells as well as septic tanks, if any, shall be abandoned/removed pursuant to the environmental management as well as other applicable requirements. Guide Specifications for well/septic is presented in Appendix "A" for the use of the design civil engineer.

3. All organic surface material and debris, including, grass and weeds shall be stripped prior to any other grading operations, and transported away from all areas that are to receive structures or engineered fill. These organic laden top soils may be stockpiled for later use in landscaping only. All fill that does not meet the specification requirements shall be removed, reworked and/or recompacted until the requirements are satisfied.

4. The depressions left by the removal of subsurface materials and structures, shall be cleaned of all debris, and backfilled with clean, native or imported soils. This backfill must be engineered fill and the operation must be conducted under the supervision of the soil engineer.

5. After removing all the subsurface structures and after stripping off the organic laden top soils, the planned building area should be ripped by machine to a depth of 8 to 12 inches and cleaned of all roots, vegetation, and other deleterious matter.

6. Following the removal, stripping, ripping, and cleaning operations, the soil on the area to be backfilled with engineered fill, should be scarified to a depth of 8 to 12 inches, moisture conditioned and compacted to 90 percent relative compaction as determined by the ASTM Test Designation D1557. At this point, the site will be in proper condition to receive any compacted fill.

7. All engineered fill should be placed in uniform horizontal lifts of not more than 6 to 8 inches in uncompacted thickness and compacted to 90 percent relative compaction using the ASTM D1557 procedure. Before Compaction begins, the fill shall be brought to a water content that will permit proper compaction by either aerating the material if it is too wet, or spaying the material with water if it is too dry. Each lift shall be thoroughly mixed before compaction to assure a uniform distribution of water content. When fill material includes rock, nesting of rocks will not be permitted, and all voids must be carefully filled and properly compacted.

8. Imported soils for engineered fill should be approved by the soil engineer before commencement of the grading operations. All fill placed at the site should not contain more than 15 percent rocks or lumps larger than 2.5 inches.

9. All structural fill less than 5 feet thick should be compacted to at least 90 percent relative compaction as determined by the ASTM Test Designation D1557, except for the upper 12 inches of subgrade soils under pavements which should be compacted to at least 95 percent relative compaction. Structural fill or wall backfill greater than 5 feet deep should be entirely compacted to at least 95 percent relative compaction. Fill material should be spread and compacted in lifts not exceeding 6 to 8 inches in uncompacted thickness.

10. Pipeline trenches should be backfilled with fill placed in lifts of approximately 8 inches in uncompacted thickness. If on-site soil is used, the material should be compacted to at least 90 percent relative compaction by mechanical means only. In slab and pavement areas, the upper 3 feet of trench backfill should be compacted to at lest 90 percent relative compaction for on-site soils, and 95 percent where imported backfill is used. In addition, the upper 6 inches of all trench backfill in pavement areas should be compacted to at least 95 percent relative compaction.

11. We recommend that the backfilling operations for any excavations to remove deleterious material be carried out under the observation of the soil engineer, so that these excavations will be properly backfilled. The soil engineer should be notified at least two days prior to commencement of any grading operations so that the work in the field may be coordinated with the contractor. All imported borrow materials must be approved by the soil engineer before being brought to the site.

12. If construction proceeds during or shortly after wet weather conditions, the moisture content of the on-site soils may be appreciably above optimum. Consequently, subgrade preparation, placement and/or reworking of on-site soils as structural fill may not be possible. Alternative wet weather construction recommendations will be provided in the field at the time of construction.

13. We recommend that our firm be provided the opportunity for a general review of the final design and specifications in order that the earthwork and foundation recommendations may be properly interpreted and implemented in the design and specifications.

14. Grading Specifications for site earthwork is presented in Appendix "A" for the use of the design civil engineer. It should be pointed out, however, that these specifications are only general in nature and the actual job specifications should incorporate all requirements contained in the report.

Cut and Fill Slopes

Construction work should be performed section by section and by an experienced contractor. The amount of cut or fill that can be done safely depends on the steepness of the slopes and the proper control of drainage on and adjacent to them and should be dealt with on case by case basis. However, generally, cut slopes should not exceed 2 (horizontal) to 1 (vertical), with an 8-foot wide bench for each 20 feet of vertical section. These cuts should be observed by the our office for additional recommendations during the grading operations. All fill slopes should be constructed with engineered fill meeting the minimum density requirements of this report.

Fill slopes should not exceed 2 (horizontal) to 1 (vertical), with an 8-foot wide bench for 15 feet of vertical section. Fill slopes should be properly consecutively keyed into natural slopes steeper than 6 (horizontal) to 1 (vertical) with a 10-foot wide base key that has a 2% downward gradient into the slope. Rounding on the upper few feet of all slopes is recommended to reduce sloughing.

Cut slopes for temporary excavations should conform to Occupational Safety and Health (OSHA) regulations. It is the contractor's responsibility to provide safe working conditions. Shoring may be necessary if unstable conditions are encountered. Exterior fill slopes should not be constructed steeper than 2:1. Cut slopes under the structure in engineered fill should not be steeper than 2 :1. If a fill slope is to be placed above a cut slope, the toe of the fill slope should be set back at least 8 feet horizontally from the top of the cut slope. A lateral surface drain should be placed in the area between the cut and fill slopes.

Overflow of water on slopes will not be permitted. Berms should be constructed on the crest of all new slopes to prevent the overflow. In order to further minimize erosion damages to the new earth slopes, the final grades of benches should have downward gradient of 1 % into the slopes. Concrete-lined drainage ditches should be constructed on the inside edge of the benches to conduct the water.

The surface of the slopes should be compacted to provide a surface free of loose material. The finished ground surface should be planted with ground cover and continually maintained to minimize surface erosion. No slope surface soil shall be exposed through the rainy season without erosion control measure having been provided.

It should be noted that with time, most slopes, regardless of precautions taken, experience some erosion, raveling and sloughing. Therefore, slope maintenance and repair should be considered a part of hillside construction where slopes are present. Periodic debris removing and maintenance should be considered part of the hill side construction at the subject site. The frequency and amount of slope maintenance is generally greater where the slope are steeper and the rainfall is heavier.

Seismic Design

The subject project shall be designed and constructed to resist the effect of earthquake motions in accordance with "2013 California Building Code", California Code of Regulations, Title 24, "2013 ASCE 7; Minimum Design Loads for Buildings and Other Structures" and other applicable codes.

Based on the results of our investigation, we recommend that the following seismic design criteria, be confirmed and used in accordance with the "2013 California Building Code" and "2013 ASCE 7". The seismic design category for structure is permitted to be determined in accordance with section 1613 or ASCE 7.

Soil profile at the site best corresponds to Site Class "D", according to 2013 California Building Code, “Site Class Definitions". Site Class is a classification assigned to a site based on the types of soils present and their engineering properties, as defined in the above mentioned code. Based on the site soil properties, the site shall be classified as Site Class A, B, C, D, E or F in accordance with Chapter 20 of ASCE 7. Additional specific information will be presented as an addendum, upon request.

According to 2013 CBC and 2013 ASCE 7, it is our opinion that the soil profile at the site best corresponds to a Site Class "D" and alternate simplified seismic design as outlined in the 2013 California Building Code and 2013 ASCE 7 "Minimum Design Loads for Buildings and Other Structures" may be used.

Foundation Design Criteria

Footings

The proposed condo community structures can be supported on conventional continuous footings bearing on competent native soil/rock. All footings should be founded at least 12 inches below lowest adjacent grade for one story structure and 18 inches below lowest adjacent grade for two story structure. In addition, footings located adjacent to the other footings or utility trenches should have their bearing surfaces situated below an imaginary 1.5 horizontal to 1 vertical plane projected upward from the bottom edge of the slope, adjacent footings or utility trench.

It is our understanding that, in order to provide adequate and uniform bearing, the foundation excavations will be carried through the fill materials to competent native soil/rock. The over excavation to remove the compressible soils may be backfilled with lean concrete. The foundation will be tied to the, hard to remove, rock exposed in the building envelope area. The foundation trenches should be kept moist and be thoroughly cleaned of all slough or loose materials prior to pouring concrete.

At the above depth, the footings bearing on competent native soils or prepared engineered fill can be designed for allowable bearing pressures of 2000 pounds per square foot due to dead loads plus live loads and may be increased by one-third for short term wind or seismic loads. These allowable bearing pressures are net values; therefore, the weight of the footing can be neglected for design purposes. Footings should not, however, have a width of less than 12 inches.

All continuous footings must be designed with both top and bottom reinforcing to provide structural continuity and permit spanning of local irregularities. The foundation trenches should be kept moist and be thoroughly cleaned of all slough or loose materials prior to pouring concrete. To assure that footings are founded on appropriate material, we recommend that we observe the footing excavations prior to placing reinforcing steel or concrete.

Lateral load resistance can be developed in friction between the foundation and the supporting soils. A friction coefficient of 0.35 is considered applicable. As an alternative, a passive resistance equal to an equivalent fluid weighing 350 pounds per cubic foot acting against the foundations may be used. Final design of the foundations and reinforcing requirements shall be determined by the project structural engineer responsible for foundation design.

Slabs on Grade Construction

For slabs on grade, we recommend that they be supported on properly prepared subgrade soils. Preparation of the subgrade was discussed previously under "Grading and Site Development". Prior to final construction of the slab, the subgrade surface should be proof-rolled to provide a smooth, firm surface for slab support.

A minimum of 4 inches of clean gravel well graded between a maximum size of 1 inch and a minimum size of 1/4 inch should be placed beneath the slab on grade. It should be noted that slab reinforcing should be designed by the structural engineer in accordance with the anticipated use and loading of the slab.

Where passage of moisture through the slab would be detrimental, an impervious moisture barrier and/or capillary break should be provided between the slab and subgrade. Moisture barrier, if required, consist of 4 inches of free draining gravel covered with an impermeable membrane placed between the subgrade soil and the slab. The membrane should be covered with 2 inches of sand to protect it during construction, and the sand should be lightly moistened just prior to placing the concrete. Alternatively, a capillary break can be provided by using 6 inches of free draining gravel well graded between a maximum size of 1 inch and a minimum size of 1/4 inch with zero percent passing the No. 4 sieve.

Reinforcement of slab-on-grade floors consist of at least 6x6/W2.9xW2.9 welded wire fabric. Alternatively, minimum reinforcement may consist of No. 3 rebar on 18-inch centers, both ways. It is important that the reinforcement be placed at mid-slab height. This slab reinforcement is provided as guide "minimum only". Final reinforcement and joint spacing should be determined by the structural engineer based on the anticipated slab loading. Temporary loads exerted during construction from vehicle traffic, cranes, forklifts, and storage of pelletized construction materials should be considered in the design of the slab.

The recommendations presented above will mitigate soils-related cracking of slab-on-grade floors. Equally important to the performance and appearance of Portland-cement concrete slabs is the quality of the concrete, the skill of the concrete contractor, the curing techniques utilized, and the spacing of control joints. We recommend that the general contractor, concrete subcontractor, owner/tenant, and the project design team meet prior to construction of interior floor slabs to discuss the construction sequence and the construction methods.

Retaining Structures

Retaining walls must be designed to resist both lateral earth pressures and any additional lateral loads caused by surcharge loads on the adjoining ground surface. Retaining walls should be supported on foundations designed in accordance with the recommendations presented previously under Foundation Design Criteria. Lateral load resistance for the walls can be developed in accordance with the recommendations presented below.

We recommend that unrestrained walls with a level backfill be designed to resist an equivalent fluid pressure of 45 pounds per cubic foot. We recommend that restrained walls be designed to resist an equivalent fluid pressure of 55 pounds per cubic foot. In addition, walls that have a backfill that slopes upward away from the wall should be designed for an additional equivalent fluid pressure of 1 pound per cubic foot for every 2 degrees of slope inclination.

Wherever walls will be subjected to surcharge loads, they should be designed for an additional uniform lateral pressure equal to one-third or one-half the anticipated surcharge load depending on whether the wall is unrestrained or restrained. Lateral load resistance can be developed in friction between the foundation and the supporting soil. A friction coefficient of 0.35 is considered applicable. As an alternative, a passive resistance equal to an equivalent fluid weighing 350 pounds per cubic foot acting against the foundations may be used.

The preceding pressures assume sufficient drainage behind the walls to prevent the build-up of hydrostatic pressures from surface water infiltration and/or a rise in the groundwater level. Adequate drainage can be provided by means of a system of subdrains. In addition, the walls should be water-proofed, where migration of moisture through retaining walls would be detrimental or undesirable. The top of the perforated pipes should be below the bottom of the adjacent slab.

Backfill behind the walls should be compacted to at least 90 percent relative compaction using light compaction equipment. Retaining walls will yield slightly during backfilling. Therefore, walls should be backfilled prior to building onto or adjacent to walls. If heavy compaction equipment is used, the walls should be appropriately designed for the heavy equipment and/or temporarily braced.

Drainage

Existing drainage courses shall not be obstructed and alterations to them must conform to the approved plans and specifications. Drainage facilities shall be provided to carry surface and subsurface waters to the nearest drainage course designated for such a purpose. Surface and subsurface drainage will have to be carefully controlled to limit erosion of the natural slope and the cut and fill slopes created for this development, and to remove excess water from beneath the fills. Berms, concrete-lined ditches, and subdrains should be used for this purpose.

Positive surface gradients should be provided adjacent to the proposed structure so as to direct surface water away from foundations and slabs toward suitable discharge facilities. Rain water discharge at downspout must be directed onto acceptable facilities which will prevent erosion in the soil adjacent to the foundation. Drainage from impermeable surfaces must be collected and routed toward suitable discharge facilities. Ponding of surface water should not be allowed adjacent to the structures or on pavements.

Overflow of water on slopes will not be permitted. Berms should be constructed on the crest of all new slopes to prevent the overflow. In order to further minimize erosion damages to the new earth slopes, the final grades of benches should have downward gradient of 1 % into the slopes. Concrete-lined drainage ditches should be constructed on the inside edge of the benches to conduct the water.

Due to the potential of subsurface erosion, it would be prudent not to use imported sand for backfilling trenches. Great care should be exercised in the installation and backfilling of utility trenches. If utility trenches are not well compacted and adequate erosion control and drainage measures are not taken, the utility trenches channel water and lead to significant erosion and gullying. Periodic land maintenance will be required. Surface and subsurface drainage facilities should be checked frequently, and cleaned and maintained as necessary.

Where utility lines cross under or through perimeter footings, they should be completely sealed to prevent moisture intrusion into the areas under the slab and/or footings. The utility trench backfill should be of impervious material for at least three feet on both sides of the exterior footings. The impervious material should be compacted to at least 90 percent relative compaction.

We recommend that our office be provided the opportunity for a general review of the drainage plan formulated by the project engineer for the site and observe the installation of drainage facilities during construction.

General Foundation Requirements

The final design of the foundations and reinforcing requirements shall be determined by the project structural engineer responsible for the foundation design. It is suggested that the foundation design be reviewed by soil engineer prior to construction.

We do not anticipate any appreciable settlement, however, slight settlements shall be considered in the design of the foundations and the proposed structures.

Upon completion of the project, we should perform a final inspection and finalize the results of our work in a final report. These services will be performed upon request. We do not accept responsibility for items that we are not notified to observe. We recommend that the owner or the contractor be responsible for the notification.

It will be necessary to have a window of at least several days of no rain to mix and compact the subgrade soils. It is also essential to grade the site to drain, at the end of each day, in order to prevent the accumulation of water on the pavement areas.

If construction proceeds during or shortly after wet weather conditions, the moisture content of the on-site soils may be appreciably above optimum. Consequently, subgrade preparation, placement and/or reworking of on-site soils as structural fill may not be possible. Alternative wet weather construction recommendations will be provided in the field at the time of construction.

We recommend that our office be retained to provide soil engineering services during grading, excavation and pavement construction phases of the work. This is to observe compliance with the design concepts, specifications and recommendations and to allow design changes in the event that subsurface conditions differ from that anticipated prior to the start of the construction.

We do not accept responsibility for items that we are not notified to observe. Upon completion of the project, we should perform a final inspection and finalize the results of our work in a final report. These services will be performed upon request.

LIMITATIONS AND UNIFORMITY OF CONDITIONS

The recommendations of this report are based on the information provided regarding the proposed construction as well as the subsoil conditions encountered at the test trench/ boring locations. We have used our best engineering judgement based on information provided and the data generated

from our investigation. If the proposed construction is modified or re-sited, or if it is found during construction that subsurface conditions differ from those described on the boring logs, the conclusions and recommendations of this report should be considered invalid unless the changes are reviewed and the modified conclusions and recommendations are approved in writing.

The analysis, conclusions and recommendations contained in this report are based on the site conditions as they existed at the time we trenched/drilled our test pits/holes. It was assumed that the test pits/holes are representative of the subsurface conditions throughout the site.

If there is a substantial lapse of time between the submission of our report and the start of work at the site, or if conditions have changed due to natural causes or construction operations at or adjacent to the site, we urge that our report be reviewed to determine the applicability of the conclusions and recommendations considering the changed conditions and time lapse. This report is applicable only for the proposed project and the site studied. This report is subject to review and should not be relied upon after 3 years.

Our professional services, findings, and recommendations are in accordance with generally accepted engineering principles and practices. This warranty is in lieu of all other warranties either expressed or implied. Test findings and statements of professional opinion do not constitute a guarantee or warranty, expressed or implied.

This report is issued with the understanding that it is the responsibility of the owner, or his/her representative, to ensure that the information and recommendations contained herein are called to the attention of the project architects and engineers and incorporated into the plans, and the necessary steps are taken to ensure that the contractor and subcontractors carry out such recommendations in the field.

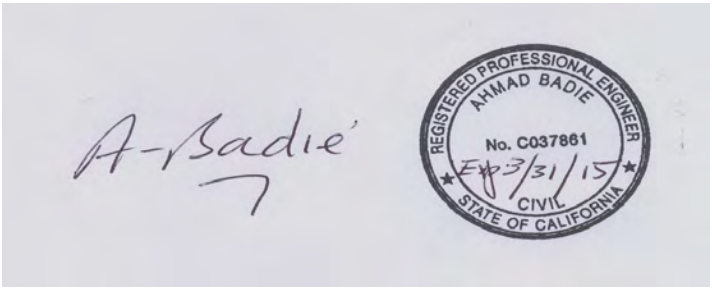
This report is the property of SSE and prepared exclusively for the specified client and project to develop geotechnical engineering recommendations to aid in the evaluation of the subject project. This report shall not be reproduced or used for any other purposes without express written consent of our firm. This report is applicable only to the proposed construction and the investigated site and should not be utilized for construction on any other site.

The scope of our services did not include any environmental assessment or investigation for the presence or absence of wetlands, hazardous or toxic materials in the soil, or water, on, below or around this site. Any statements in this report regarding odors noted, unusual or suspicious items or conditions observed are strictly for the information of our client.

ADDITIONAL SERVICES

We recommend that our firm be retained to perform a general review of the final design and specifications of the proposed development to verify that the earthwork and foundation recommendations have been properly interpreted and implemented in the design and in the construction documents. We also recommend that our office be retained to provide monitoring and testing services for geotechnically related work construction. 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 that anticipated prior to the start of the construction.

SOIL SEARCH ENGINEERING



Ahmad Badie, Ph.D., President
REA II-20168, RCE #37861
1423G.rpt

APPENDIX "A"

GUIDE SPECIFICATIONS

SITE EARTHWORK

GUIDE SPECIFICATIONS
FOR

FAIR OAKS ECOHOUSING
4025 NEW YORK AVENUE
FAIR OAKS, CALIFORNIA

I. GENERAL

These specifications are prepared for the above project site earthwork and include, but not limited to, performance, clearing, grubbing, stripping, preparation of the site, excavations, compaction and control of the filled areas to conform with the lines, grades, elevations and slopes as shown on the approved plans.

The following guide specifications are presented herein for the use of the design personnel only. These specifications are only general in nature and set forth the minimum standard. The actual job specifications should incorporate all requirements contained in the report. No deviation from the specifications shall be made except upon written approval of the responsible engineer.

The soil engineer is not responsible for determining lines, grades, elevations and slope gradients. The owner or his/her representative shall designate a responsible party to ensure that necessary steps are taken for determining the above mentioned items.

The Contractor shall be responsible for the satisfactory completion of all site earthwork in accordance with the project plans and specifications. This work shall be observed and tested by a representative of Soil Search Engineering herein after known as the Soil Engineer. Both the Soil Engineer and the Architect/Engineer are the Owner's representatives. If the Contractor should fail to meet the technical or design requirements embodied in this document and on the applicable plans, he shall make the necessary readjustments until all work is deemed satisfactory as determined by the Soil Engineer and the Architect/Engineer.

No site earthwork shall be performed without the knowledge, field observation, testing and approval of the Soil Engineer. The Contractor shall notify the Soil Engineer at least two working days prior to commencement of any aspect of the site earthwork. The Soil Engineer shall be the Owner's representative to observe the grading operations during the site preparation work and the placement and compaction of fills. He shall be called to make a sufficient number of tests and/or observations to enable him to form an opinion regarding the adequacy of the site preparation, the acceptability of the fill material, and the extend to which the compaction of the fill, as placed, meets the specification requirements. Any fill that does not meet the specification requirements shall be removed and/or recompacted until the requirements are satisfied.

In accordance with generally accepted construction practices, the Contractor shall be solely and completely responsible for working conditions at the job site, including safety of all persons and property during performance of the work. This requirement shall apply continuously and shall not be limited to normal work hours.

Any construction review of the Contractor's performance conducted by the Soil Engineer is not intended to include review of the adequacy of the Contractor's safety measures in, on or near the construction site.

Upon completion of the construction work, the Contractor shall certify that all compacted fills and foundations are in place at the correct locations, have the correct dimensions, are plumb, and have been constructed in accordance with sound construction practice. In addition, he shall certify that the materials used are of the types, quantity and quality required by the plans and specifications.

The Contractor is presumed to have visited the site and to have familiarized himself with existing site conditions and the attached soil report. The Contractor shall not be relieved of liability under the contract for any loss sustained as a result of any variance between conditions indicated by or deduced from the soil report and the actual conditions encountered during the course of the work.

The Contractor shall, upon becoming aware of surface and/or subsurface conditions differing from those disclosed by the original soil investigation, promptly notify the Owner as to the nature and extent of the differing conditions, first verbally to permit verification of the conditions, and then in writing. No claim by the Contractor for any conditions differing from those anticipated in the plans and specifications and disclosed by the soil investigation will be allowed unless the Contractor has so notified the Owner, verbally and in writing, as required above, of such changed conditions.

The Contractor shall assume responsibility for the alleviation or prevention of any dust nuisance on or about the site or off-site borrow areas. The Contractor shall assume all liability, including court costs of co-defendants, for all claims related to dust or windblown materials attributable to his work.

II. TESTS

The standard test used to define maximum densities of all compaction work shall be the ASTM Test Designation 1557-78. All in-place dry-density of the compacted fill material shall be expressed as a relative compaction in terms of the maximum dry density obtained in the laboratory by the foregoing standard procedure.

III. SITE PREPARATION

The Contractor shall accept the site in its present condition and shall remove from the area of the designated project earthwork all obstructions including existing buildings and associated foundations telephone booths and poles, asphalt and gravel paving, designated above and below ground utilities, steel posts and any other matter determined by the Engineer to be deleterious. Such material shall become the property of the Contractor and shall be removed from the site. Holes resulting from the removal of underground obstructions that extend below finish grades shall be cleared and backfilled with structural fill.

Where vegetation exists, the site shall be stripped to a minimum depth of 1 to 2 inches or to such greater depth as the Soil Engineer in the field may consider as being advisable to remove all surface vegetation and organic laden topsoil. Stripped topsoil with an organic content in excess of 3 percent by volume shall be stockpiled for possible use in landscaped areas.

Surfaces to receive compacted fill, and those on which concrete slabs and pavements will be constructed, shall be scarified to a minimum depth of 6 inches and compacted. All ruts, hummocks, or other uneven surface features shall be removed by surface grading prior to placement of any fill materials. All areas which are to receive fill material shall be approved by the Soil Engineer prior to the placement of any fill material.

IV. EXCAVATION

All excavation shall be performed to the lines and grades and within the tolerances specified on the project grading plans. All over excavation below the grades specified shall be backfilled at the Contractor's expense and shall be compacted in accordance with the specifications. The Contractor shall assume full responsibility for the stability of all temporary construction slopes at the site.

V. FILL MATERIAL REQUIREMENTS

All fill material must be approved by the Soil Engineer. The material shall be a soil or soil-rock mixture which is free from organic matter or other deleterious substances. The fill material shall not contain rocks or rock fragments over 2.5 inches in greatest dimension. On-site material having an organic content of less than 3 percent by volume is suitable for use as fill in all areas except where non-expansive import material is specified.

All imported fill material shall be non-expansive with a plasticity index of 7 or less. At least ten days prior to the placement of any fill, the Soils Engineer shall be notified of the source of materials and samples shall be obtained to determine the suitability of the materials and for conducting compaction tests on these samples.

VI. FILL COMPACTION REQUIREMENTS

All structural fill shall be compacted by mechanical means to produce a minimum degree of compaction of 90 percent as determined by ASTM Test Designation D1557-85. Field density tests shall be performed in accordance with either ASTM Test Designation D1556-64 (Sand-Cone Method) or ASTM Test Designation D2922-71 and D3017-72 (Nuclear Probe Method). The locations and number of field density tests shall be determined by the Soil Engineer. The results of these tests and compliance with these specifications shall be the basis upon which satisfactory completion of work shall be judged by the Soil Engineer.

Any slope greater than 5 horizontal to 1 vertical shall be contour ploughed or benched, as deemed necessary by the Soils Engineer, prior to the placing of any fill. The fill shall be placed in sections which are essentially horizontal.

Fill materials shall be spread in layers and with a uniform moisture content to provide the specified dry density after compaction. If necessary to obtain uniform distribution of moisture, water shall be added to each layer by sprinkling and the soil disced, harrowed, or otherwise manipulated after the water is added. The layers of the fill material shall not exceed 6 to 8 inches and each layer shall be compacted with suitable compaction equipment to provide the specified dry densities.

VII. SLOPES

The amount of cut or fill that can be done safely depends on the steepness of the slopes and the proper control of drainage on and adjacent to them. Cut slopes should not exceed 2 (horizontal) to 1 (vertical), with an 8-foot wide bench for each 20 feet of vertical section. These cuts should be observed by the Soil Engineer for additional recommendations, if necessary, during the grading operations. Fill slopes should not exceed 2 (horizontal) to 1 (vertical), with an 8-foot wide bench for 15 feet of vertical section. Fill slopes should be properly consecutively keyed into natural slopes steeper than 6 (horizontal) to 1 (vertical) with a 10-foot wide base key that has a 2% downward gradient into the slope. Rounding on the upper few feet of all slopes is recommended to reduce sloughing.

Overflow of water on slopes will not be permitted. Berms should be constructed on the crest of all new slopes to prevent the overflow. In order to further minimize erosion damages to the new earth slopes, the final grades of benches should have downward gradient of 1 % into the slopes. Concrete-lined drainage ditches should be constructed on the inside edge of the benches to conduct the water.

The surface of the slopes should be compacted to provide a surface free of loose material. Provisions should be made for planting of the slopes for erosion control. No slope surface soil shall be exposed through the rainy season without erosion control measure having been provided.

VIII. SUBDRAIN INSTALLATION

Provide and install permeable material and perforated metal or plastic pipes for subdrains as shown on the plans or as recommended by the Soil Engineer and as specified in the current edition of the Standard Specifications, State of California, Department of Transportation, except modified below.

Clay drain tile, porous concrete pipe, perforated asbestos-cement pipe bituminous fiber pipe or perforated clay pipe will not be permitted for subdrain materials. Use no wyes, elbows, tees or other joints of these materials

Filter material shall conform to Class one, Type B permeable materials as specified in "Subsurface Drains" section of the latest edition of Standard Specifications, State of California, Department of Transportation, unless otherwise permitted by written authorization of the Soil engineer.

Unless recommended otherwise, use pipes not less that 4 inches in diameter of laterals up to 50 feet in length. Use pipes of not less than 6 inches in diameter for laterals up to 250 feet in length. Use pipes of not less than 8 inches in diameter for laterals greater than 250 feet in length.

Width of the excavated trenches shall not be less than the outside diameter of the pipe plus one foot, and at a gradient not less than 2%. The pipe shall be place over a minimum of 6 inches and under a minimum of two feet of filter material, or as directed by the Soil Engineer.

IX. WATER WELLS

Any water and/or dry well on the site which are to be abandoned shall be capped according to the requirements of the local/county Health Department and/or any other agency required to approve and/or perform the inspection. The final elevation of the top of the well casing must be a minimum of 3 feet below any adjacent grade prior to any grading operations. Building foundation shall not be placed over a capped well.

X. SEPTIC TANK

All existing septic tanks must be located by electronic tank locator, information from the former tenant/owner or any other means. The septic tank is to be abandoned in place under the permit from the city/county. The top of the tank, which is to be abandoned, must be exposed, the contents should be pumped out and the tank should be filled with clean gravel or any other approved material. We recommended that demolition and the backfilling operations be carried out under the observation of the soil engineer. The abandoned septic tank should be inspected by the city/county or any other agency required to perform the inspection.

XI. CATCHMENT WALLS

Where at least 25 feet of level buffer area is not provided between the structure and the steep uphill slope, a catchment wall should be provided.

XII. BACKFILL

Retaining structures as well as trenches shall be backfilled with compacted structural fill placed in lifts not exceeding 8 inches in uncompacted thickness. If onsite soil is used, the material shall be compacted by mechanical means to a minimum degree of compaction of 90 percent. Imported sand may also be used for backfilling trenches provided it is compacted to at least 90 percent. If imported sand backfilling is used, sufficient water shall be added during the trench backfilling operations to prevent the soil from bulking during compaction. The upper 3 feet of trench backfill, in building pad and pavement areas, shall be compacted to a minimum degree of compaction of 90 percent for onsite soils and 95 percent where imported sand backfill is used.

XIII. SEASON LIMITS

After stopping the placement of fill operations, due to adverse weather conditions, no additional fill material shall be placed until the last compacted layer has been retested and found to be compacted to the specified requirements.

XIV. UNUSUAL CONDITIONS

If any unusual conditions, not covered by special provisions, are encountered during the grading operations, the Soil Engineer shall be notified immediately for directions.

XV. COMPLETION OF EARTHWORK

After completion of the earthwork operations as well as the observation by the Soil Engineer, no further earthwork operations shall be performed except under the observation and the approval of the Soil Engineer. It shall be the responsibility of the Contractor to prevent erosion of freshly graded areas during construction and prior to the installation of the pertinent permanent drainage systems.

XVI. CONSTRUCTION SAFETY

In sloping ground, the contractor shall be responsible for performing all works in a safe and reasonable manner with respect to both personal safety and property safety, and in accordance with all governing safety regulations and commonly accepted safety practices. The contractor shall be responsible for the means, methods, techniques and sequence of construction. The contractor shall

also be solely responsible for all safety programs and procedures during construction. During construction, the contractor should use considerable care and prudence so as not to undermine or damage any of the neighboring properties or adjacent structures.

In order to construct foundations, retaining walls, subdrains, fill keyways, etc., it is usually required to excavate temporary construction slopes during the construction process. During construction, the contractor should take appropriate care to provide safe construction slopes so as not to endanger the workmen who might be passing by or who are attracted by the work. Therefore, all construction slopes and construction activities should be carried out in accordance with accepted, safe and prudent procedures, and also in accordance with the State of California Construction Safety Orders as well as Occupational Safety and Health Act's minimum requirements.

The contractor shall provide adequate shoring and bracing of the structure, cuts, and excavations as required during construction, and shall maintain the shoring and bracing until the new permanent structure can provide adequate vertical and lateral support of the soils, bedrock an structures.

XVII. EROSION CONTROL

On hillside locations, it is highly recommend that prudent erosion control measures be taken during and after construction, including limitation of site disturbance outside the actual building area and proper planting and vegetation restoration of all barren and disturbed areas after construction.

Existing drainage courses shall not be obstructed and alterations to them must conform to the approved plans and specifications. Drainage facilities shall be provided to carry surface and subsurface waters to the nearest drainage course designated for such a purpose.

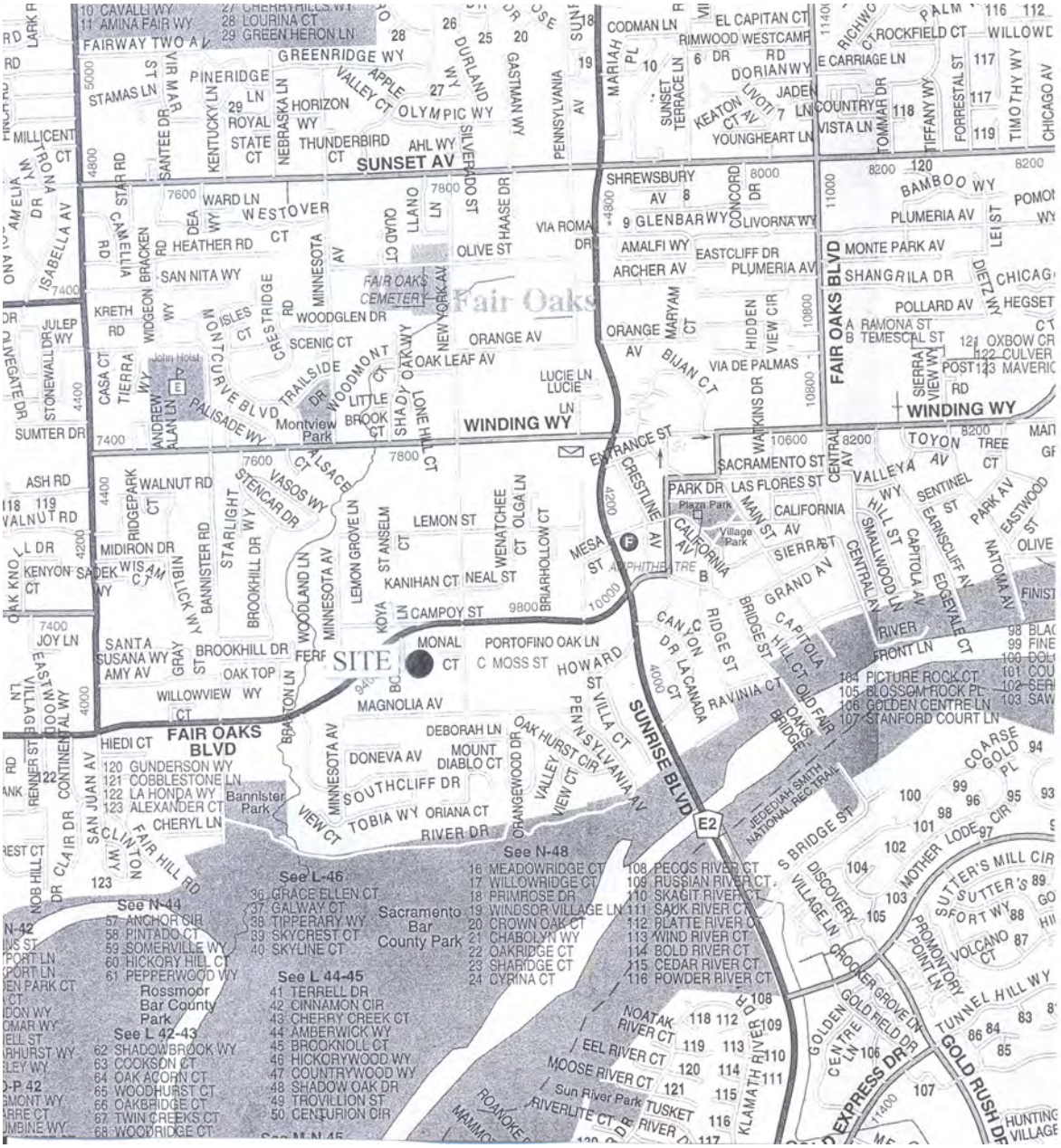
Great care should be exercised in the installation and backfilling of utility trenches. If utility trenches are not well compacted and adequate erosion control and drainage measures are not taken, the utility trenches channel water and lead to significant erosion and gullying.

All waste fill materials should be removed from the site and hauled away. Merely pushing or depositing loose fill material within the site creates a potential hazard, risk, and nuisance to adjacent and down slope property and development, as well as this site. Loose fill on a hillside is prone to sliding, upsetting the existing site equilibrium and triggering larger slides in the loose surface soils.

It should be noted that with time, most slopes, regardless of precautions taken, experience some erosion, raveling and sloughing. Therefore, slope maintenance and repair should be considered a part of hillside construction where slopes are present. Periodic debris removing and maintenance should be considered part of the hill side construction at the subject site. The frequency and amount of slope maintenance is generally greater where the slope are steeper and where the rainfall is heavier.

APPENDIX "B"

FIGURES

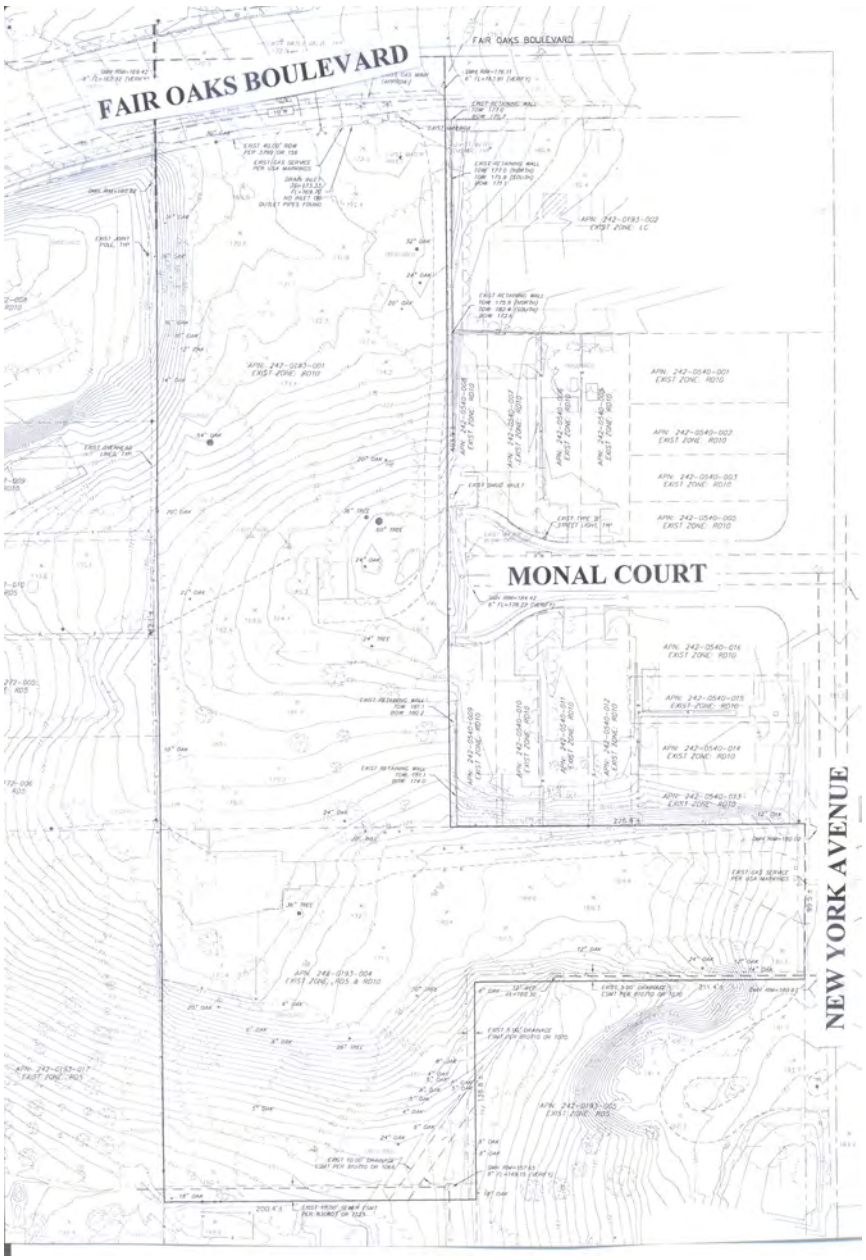


VICINITY MAP

JOB NUMBER 1423G	MAY 17, 2014	VICINITY MAP	PLATE No. 1

FAIR OAKS ECOHOUSING
4025 NEW YORK AVENUE
FAIR OAKS, CALIFORNIA

SSE 4088 Bridge Street # 9, Fair Oaks, CA 95628 (916) 966-3902

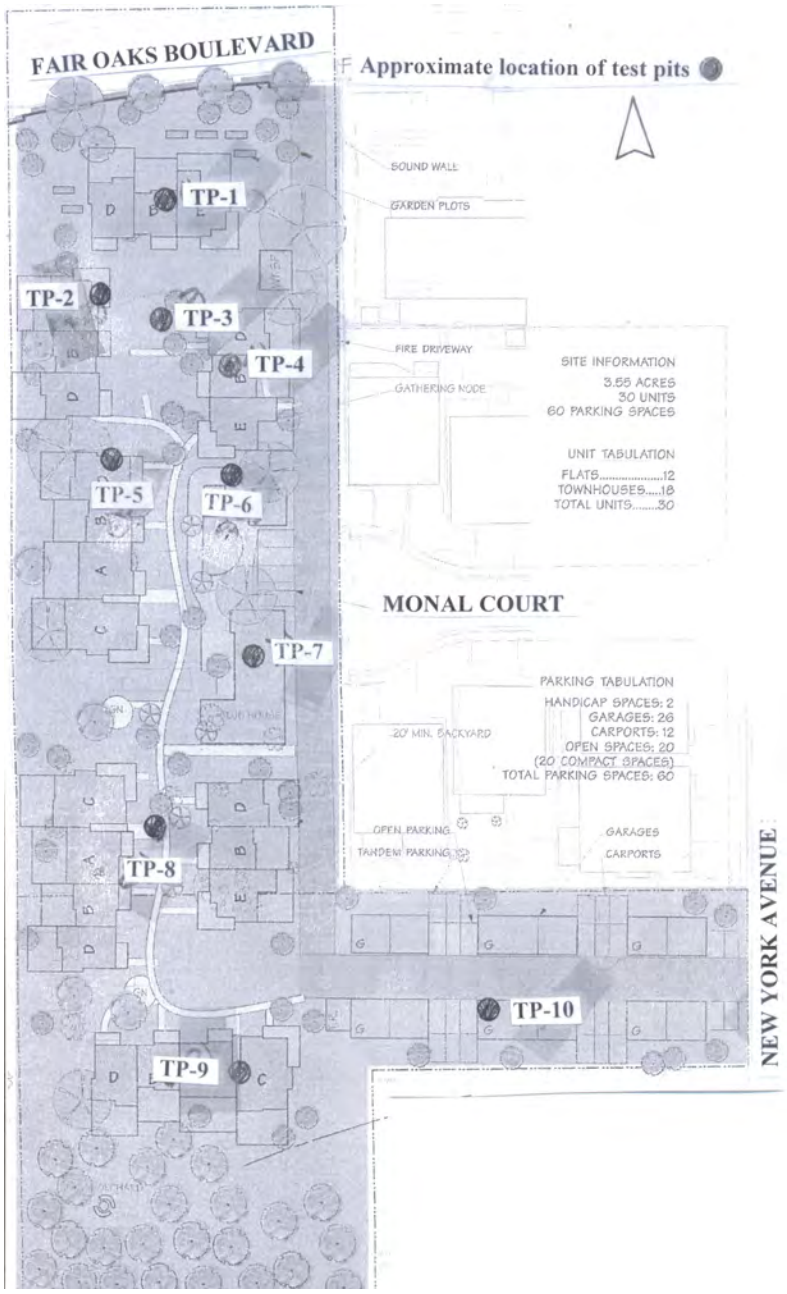


SITE PLAN

JOB NUMBER 1423G	MAY 17, 2014	SITE PLAN	PLATE No. 2

FAIR OAKS ECOHOUSING
4025 NEW YORK AVENUE
FAIR OAKS, CALIFORNIA

SSE 4088 Bridge Street # 9, Fair Oaks, CA 95628 (916) 966-390



LOCATION MAP

JOB NUMBER 1423G	MAY 17, 2014	LOCATION MAP	PLATE No. 3

FAIR OAKS ECOHOUSING
4025 NEW YORK AVENUE
FAIR OAKS, CALIFORNIA

SSE 4088 Bridge Street # 9, Fair Oaks, CA 95628 (916) 966-3902

EXPLORATORY BORING LOG Hole No. TP1

Depth feet	Dry Density p.c.f.	Moisture content %	Penetration Resistance Blows/ft, N	Cohesion of soil p.s.f	Friction Angle Degree	Sample No.	Group Symbol USCS	Description
1							SM	Dark brown silty clayey sand with organics, fill
2								
3								
4								
5							SM	Brown silty sand
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								

REMARKS: "U" designates a 2 inch Split Spoon Sampler with 140 lb hammer 30 inch drop or 2.5 inch Sampler with 175 lb hammer 24 inch drop - "H" Designates 3 inch Modified California Hand Sampler with 35 lb hammer 30 inch drop. - "TP" designates Test Pit - "N": Standard Penetration Number or equivalent.- Surface elevation: existing grade - Boring diameter 4" - The interface between types of soils are approximate. The transition between the materials may be abrupt or gradual. Only at the boring/pit locations should profiles be considered as reasonably accurate. - "*" Designates estimated value - Free ground water table was not encountered at the time of trenching- Bottom of test pit: 6 feet. Date trenched: 5-17-2014 - Logged by A.B.

JOB NUMBER 1423G **MAY 17, 2014** **SOIL PROFILE** **PLATE No. 4**

FAIR OAKS ECOHOUSING
4025 NEW YORK AVENUE
FAIR OAKS, CALIFORNIA

SSE 4088 Bridge Street # 9, Fair Oaks, CA 95628 (916) 966-3902

EXPLORATORY BORING LOG								Hole No. TP2
Depth in feet	Dry Density p.c.f.	Moisture content %	Penetration Resistance Blows/ft, N	Cohesion of soil p.s.f.	Friction Angle Degree	Sample No.	Group Symbol USCS	Description
1							SM	Dark brown to brown silty clayey sand with organics, fill
2								
3								
4								
5								
6								
7							SM	Brown silty sand
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								

REMARKS: "U" designates a 2 inch Split Spoon Sampler with 140 lb hammer 30 inch drop or 2.5 inch Sampler with 175 lb hammer 24 inch drop - "H" Designates 3 inch Modified California Hand Sampler with 35 lb hammer 30 inch drop. - "TP" designates Test Pit - "N": Standard Penetration Number or equivalent.- Surface elevation: existing grade - Boring diameter 4" - The interface between types of soils are approximate. The transition between the materials may be abrupt or gradual. Only at the boring/pit locations should profiles be considered as reasonably accurate. - "*" Designates estimated value - Free ground water table was not encountered at the time of trenching- Bottom of test pit: 7 feet. Date trenched: 5-17-2014 - Logged by A.B.

JOB NUMBER 1423G **MAY 17, 2014** **SOIL PROFILE** **PLATE No. 5**

FAIR OAKS ECOHOUSING
4025 NEW YORK AVENUE
FAIR OAKS, CALIFORNIA

SSE 4088 Bridge Street # 9, Fair Oaks, CA 95628 (916) 966-3902

EXPLORATORY BORING LOG							Hole No. TP3	
Depth feet	Dry Density p.c.f.	Moisture content %	Penetration Resistance Blows/ft, N	Cohesion of soil p.s.f.	Friction Angle Degree	Sample No.	Group Symbol USCS	Description
1							SM	Dark brown to brown silty sand with organics, fill
2								
3								
4								
5							SM	Brown silty sand
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								

REMARKS: "U" designates a 2 inch Split Spoon Sampler with 140 lb hammer 30 inch drop or 2.5 inch Sampler with 175 lb hammer 24 inch drop - "H" Designates 3 inch Modified California Hand Sampler with 35 lb hammer 30 inch drop. - "TP" designates Test Pit - "N": Standard Penetration Number or equivalent.- Surface elevation: existing grade - Boring diameter 4" - The interface between types of soils are approximate. The transition between the materials may be abrupt or gradual. Only at the boring/pit locations should profiles be considered as reasonably accurate. - "*" Designates estimated value - Free ground water table was not encountered at the time of trenching- Bottom of test pit: 6 feet. Date trenched:5-17-2014 - Logged by A.B.

JOB NUMBER 1423G **MAY 17, 2014** **SOIL PROFILE** **PLATE No. 6**

FAIR OAKS ECOHOUSING
4025 NEW YORK AVENUE
FAIR OAKS, CALIFORNIA

SSE 4088 Bridge Street # 9, Fair Oaks, CA 95628 (916) 966-3902

EXPLORATORY BORING LOG							Hole No. TP4	
Depth feet	Dry Density p.c.f.	Moisture content %	Penetration Resistance Blows/ft, N	Cohesion of soil p.s.f.	Friction Angle Degree	Sample No.	Group Symbol USCS	Description
1							SM	Brown silty sand
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								

REMARKS: "U" designates a 2 inch Split Spoon Sampler with 140 lb hammer 30 inch drop or 2.5 inch Sampler with 175 lb hammer 24 inch drop - "H" Designates 3 inch Modified California Hand Sampler with 35 lb hammer 30 inch drop. - "TP" designates Test Pit - "N": Standard Penetration Number or equivalent.- Surface elevation: existing grade - Boring diameter 4" - The interface between types of soils are approximate. The transition between the materials may be abrupt or gradual. Only at the boring/pit locations should profiles be considered as reasonably accurate. - "*" Designates estimated value - Free ground water table was not encountered at the time of trenching- Bottom of test pit: 6 feet. Date trenched:5-17-2014 - Logged by A.B.

JOB NUMBER 1423G **MAY 17, 2014** **SOIL PROFILE** **PLATE No. 7**

FAIR OAKS ECOHOUSING
4025 NEW YORK AVENUE
FAIR OAKS, CALIFORNIA

SSE 4088 Bridge Street # 9, Fair Oaks, CA 95628 (916) 966-3902

EXPLORATORY BORING LOG							Hole No. TP5	
Depth feet	Dry Density p.c.f.	Moisture content %	Penetration Resistance Blows/ft, N	Cohesion of soil p.s.f.	Friction Angle Degree	Sample No.	Group Symbol USCS	Description
1							SM	Brown silty sand
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								

REMARKS: "U" designates a 2 inch Split Spoon Sampler with 140 lb hammer 30 inch drop or 2.5 inch Sampler with 175 lb hammer 24 inch drop - "H" Designates 3 inch Modified California Hand Sampler with 35 lb hammer 30 inch drop. - "TP" designates Test Pit - "N": Standard Penetration Number or equivalent.- Surface elevation: existing grade - Boring diameter 4" - The interface between types of soils are approximate. The transition between the materials may be abrupt or gradual. Only at the boring/pit locations should profiles be considered as reasonably accurate. - "*" Designates estimated value - Free ground water table was not encountered at the time of trenching- Bottom of test pit: 6 feet. Date trenched: 5-17-2014 - Logged by A.B.

JOB NUMBER 1423G **MAY 17, 2014** **SOIL PROFILE** **PLATE No. 8**

FAIR OAKS ECOHOUSING
4025 NEW YORK AVENUE
FAIR OAKS, CALIFORNIA

SSE 4088 Bridge Street # 9, Fair Oaks, CA 95628 (916) 966-3902

EXPLORATORY BORING LOG							Hole No. TP6	
Depth feet	Dry Density p.c.f.	Moisture content %	Penetration Resistance Blows/ft, N	Cohesion of soil p.s.f.	Friction Angle Degree	Sample No.	Group Symbol USCS	Description
1							SM	Dark brown silty sand, fill
2							SM	Brown silty sand
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								

REMARKS: "U" designates a 2 inch Split Spoon Sampler with 140 lb hammer 30 inch drop or 2.5 inch Sampler with 175 lb hammer 24 inch drop - "H" Designates 3 inch Modified California Hand Sampler with 35 lb hammer 30 inch drop. - "TP" designates Test Pit - "N": Standard Penetration Number or equivalent.- Surface elevation: existing grade - Boring diameter 4" - The interface between types of soils are approximate. The transition between the materials may be abrupt or gradual. Only at the boring/pit locations should profiles be considered as reasonably accurate. - "*" Designates estimated value - Free ground water table was not encountered at the time of trenching- Bottom of test pit: 6 feet. Date trenched: 5-17-2014 - Logged by A.B.

JOB NUMBER 1423G **MAY 17, 2014** **SOIL PROFILE** **PLATE No. 9**

FAIR OAKS ECOHOUSING
4025 NEW YORK AVENUE
FAIR OAKS, CALIFORNIA

SSE 4088 Bridge Street # 9, Fair Oaks, CA 95628 (916) 966-3902

EXPLORATORY BORING LOG								Hole No. TP7
Depth feet	Dry Density p.c.f.	Moisture content %	Penetration Resistance Blows/ft, N	Cohesion of soil p.s.f.	Friction Angle Degree	Sample No.	Group Symbol USCS	Description
1							SM SC	Dark brown silty clayey sand with organics, fill
2								
3							SM	Dark brown silty sand
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								

REMARKS: "U" designates a 2 inch Split Spoon Sampler with 140 lb hammer 30 inch drop or 2.5 inch Sampler with 175 lb hammer 24 inch drop - "H" Designates 3 inch Modified California Hand Sampler with 35 lb hammer 30 inch drop. - "TP" designates Test Pit - "N": Standard Penetration Number or equivalent.- Surface elevation: existing grade - Boring diameter 4" - The interface between types of soils are approximate. The transition between the materials may be abrupt or gradual. Only at the boring/pit locations should profiles be considered as reasonably accurate. - "*" Designates estimated value - Free ground water table was not encountered at the time of trenching- Bottom of test pit: 6 feet. Date trenched: 5-17-2014 - Logged by A.B.

JOB NUMBER 1423G **MAY 17, 2014** **SOIL PROFILE** **PLATE No. 10**

FAIR OAKS ECOHOUSING
4025 NEW YORK AVENUE
FAIR OAKS, CALIFORNIA

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EXPLORATORY BORING LOG							Hole No. TP8	
Depth feet	Dry Density p.c.f.	Moisture content %	Penetration Resistance Blows/ft, N	Cohesion of soil p.s.f.	Friction Angle Degree	Sample No.	Group Symbol USCS	Description
1							SM SC	Dark brown silty clayey sand with organics, fill
2								
3							SM	Brown silty sand
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								

REMARKS: "U" designates a 2 inch Split Spoon Sampler with 140 lb hammer 30 inch drop or 2.5 inch Sampler with 175 lb hammer 24 inch drop - "H" Designates 3 inch Modified California Hand Sampler with 35 lb hammer 30 inch drop. - "TP" designates Test Pit - "N": Standard Penetration Number or equivalent.- Surface elevation: existing grade - Boring diameter 4" - The interface between types of soils are approximate. The transition between the materials may be abrupt or gradual. Only at the boring/pit locations should profiles be considered as reasonably accurate. - "*" Designates estimated value - Free ground water table was not encountered at the time of trenching- Bottom of test pit: 7 feet. Date trenched: 5-17-2014 - Logged by A.B.

JOB NUMBER 1423G **MAY 17, 2014** **SOIL PROFILE** **PLATE No. 11**

FAIR OAKS ECOHOUSING
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FAIR OAKS, CALIFORNIA

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EXPLORATORY BORING LOG							Hole No. TP9	
Depth feet	Dry Density p.c.f.	Moisture content %	Penetration Resistance Blows/ft, N	Cohesion of soil p.s.f.	Friction Angle Degree	Sample No.	Group Symbol USCS	Description
1							SM SC	Dark brown silty clayey sand with organics, fill
2								
3							SM	Brown silty sand
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								

REMARKS: "U" designates a 2 inch Split Spoon Sampler with 140 lb hammer 30 inch drop or 2.5 inch Sampler with 175 lb hammer 24 inch drop - "H" Designates 3 inch Modified California Hand Sampler with 35 lb hammer 30 inch drop. - "TP" designates Test Pit - "N": Standard Penetration Number or equivalent.- Surface elevation: existing grade - Boring diameter 4" - The interface between types of soils are approximate. The transition between the materials may be abrupt or gradual. Only at the boring/pit locations should profiles be considered as reasonably accurate. - "*" Designates estimated value - Free ground water table was not encountered at the time of trenching- Bottom of test pit: 7 feet. Date trenched: 5-17-2014 - Logged by A.B.

JOB NUMBER 1423G **MAY 17, 2014** **SOIL PROFILE** **PLATE No. 12**

FAIR OAKS ECOHOUSING
4025 NEW YORK AVENUE
FAIR OAKS, CALIFORNIA

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EXPLORATORY BORING LOG								Hole No. TP10
Depth feet	Dry Density p.c.f.	Moisture content %	Penetration Resistance Blows/ft, N	Cohesion of soil p.s.f.	Friction Angle Degree	Sample No.	Group Symbol USCS	Description
1							SM SC	Dark brown to brown silty clayey sand with organics, fill
2								
3								
4								
5							SM	Brown silty sand
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								

REMARKS: "U" designates a 2 inch Split Spoon Sampler with 140 lb hammer 30 inch drop or 2.5 inch Sampler with 175 lb hammer 24 inch drop - "H" Designates 3 inch Modified California Hand Sampler with 35 lb hammer 30 inch drop. - "TP" designates Test Pit - "N": Standard Penetration Number or equivalent.- Surface elevation: existing grade - Boring diameter 4" - The interface between types of soils are approximate. The transition between the materials may be abrupt or gradual. Only at the boring/pit locations should profiles be considered as reasonably accurate. - "*" Designates estimated value - Free ground water table was not encountered at the time of trenching- Bottom of test pit: 6 feet. Date trenched: 5-17-2014 - Logged by A.B.

JOB NUMBER 1423G **MAY 17, 2014** **SOIL PROFILE** **PLATE No. 13**

FAIR OAKS ECOHOUSING
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FAIR OAKS, CALIFORNIA

SSE 4088 Bridge Street # 9, Fair Oaks, CA 95628 (916) 966-3902

KEY TO BORING LOGS UNIFIED SOIL CLASSIFICATION SYSTEM(ASTM D-2487)

PRIMARY DIVISIONS			SYMBOL		TYPICAL NAMES - SECONDARY DIVISIONS
COARSE GRAIN SOILS MORE THAN HALF OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVELS MORE THAT HALF OF COARSE FRACTION IS > THAN NO. 4 SIEVE	CLEAN GRAVEL <5% FINES	GW		Well-graded gravels & gravel-sand mixtures, little fines
			GP		Poorly-graded gravels & gravel-sand mixtures, little fines
		GRAVEL WITH FINES	GM		Silty gravels, gravel-sand-silt mixtures, non-plastic fines
			GC		Clayey gravels, gravel-sand-clay mixtures. Plastic fines
	SANDS MORE THAN HALF OF COARSE FRACTION IS < THAN NO. 4 SIEVE	CLEAN SAND <5% FINES	SW		Well-graded sands, gravelly sands, little or no fines
			SP		Poorly-graded sands or gravelly sands, little or no fines
		SANDS WITH FINES	SM		Silty sands, sand-silt mixtures, non-plastic fines
			SC		Clayey sands, sand-clay mixtures, plastic fines
FINE GRAINED SOILS MORE THAN HALF OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS LIQUID LIMIT LESS THAN 50%		ML		Inorganic silts and very fine sands, rock flour, 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, fine sands or silty soils , 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.S. St andard series sieve C lear square sieve openings

2 00 40 10 4 3/4" 3" 12"

SILTS AND CLAYS	SAND			GRAVEL		COBBLES	BOULDERS
	FINE	MEDIUM	COARSE	FINE	COARSE		

Consistency	Blows/ft *	Strength**	Consistency	Blows/ft *	Relative Density	Angle of Friction
Very soft	0 - 2	0.0 - 0.25	Very loose	< 4	< .2	< 29
Soft	2 - 4	0.25 - 0.5	Loose	4 - 10	0.2 - 0.4	29 - 30
Medium stiff	4 - 8	0.5 - 1.0	Medium	10 - 30	0.4 - 0.6	30 - 36
Stiff	8 - 16	1.0 - 2.0	Dense	30 - 50	0.6 - 0.8	36 - 41
Very stiff	16 - 32	2.0 - 4.0	Very dense	> 50	> 0.8	> 41
Hard	> 32	> 4				

* Number of blows of 140 pound hammer falling 30 inches to drive a 2. Inch O.D. split spoon sampler (ASTM D-1586).

** Unconfined compressive strength in tons / sq. ft. as determined by laboratory testing or approximated by Standard Penetration Test (ASTM D-1586), pocket penetrometer, torvane or visual observation.

JOB NUMBER 1423G MAY 17, 2014 KEY LOG PLATE No. 14

FAIR OAKS ECOHOUSING
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FAIR OAKS, CALIFORNIA

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GEOLOGIC MAP

JOB NUMBER 1423G	MAY 17, 2014	GEOLOGIC MAP	PLATE No. 15

FAIR OAKS ECOHOUSING
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FAIR OAKS, CALIFORNIA

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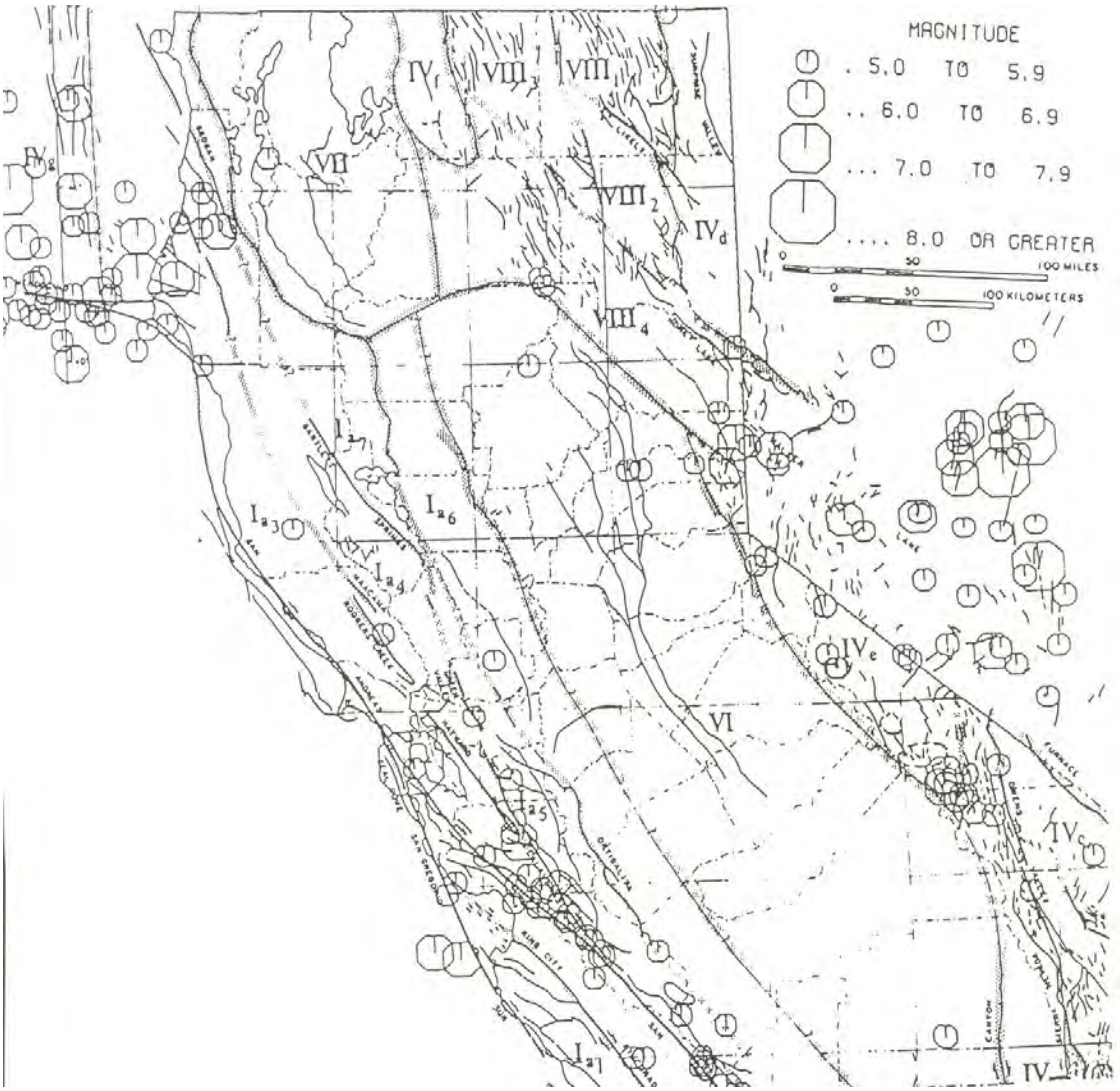

SEISMIC ACTIVITY MAP

JOB NUMBER 1423G MAY 17, 2014 SEISMIC ACTIVITY MAP PLATE No. 16

FAIR OAKS ECOHOUSING
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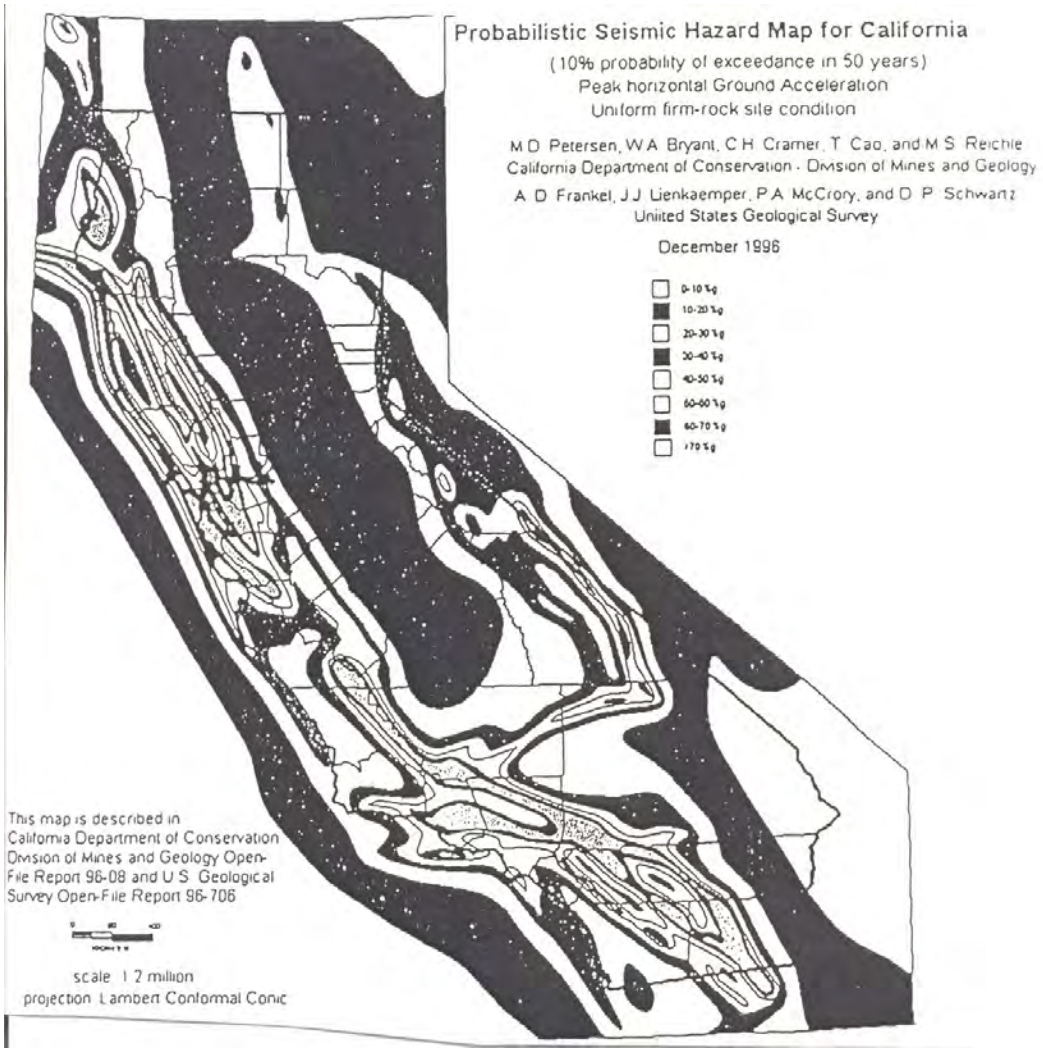

SEISMIC HAZARD MAP

JOB NUMBER 1423G	MAY 17, 2014	SEISMIC HAZARD MAP	PLATE No. 17

FAIR OAKS ECOHOUSING
4025 NEW YORK AVENUE
FAIR OAKS, CALIFORNIA

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APPENDIX "C"

TABLES

TABLE - 1

ACTIVE FAULT ZONES WITH MAXIMUM CREDIBLE EARTHQUAKE MAGNITUDES					
Fault Name / Activity Rating *	Style **	Proximate County	Magnitude MCE	Distance (mile)	Slip Rate (mm/yr)
Calaveras/1,2,3	ST	Alameda	7.5	>60	7
Hayward/1,2,3	ST	Contra Costa	7.5	>60	9
Rodgers Creek/3,4	ST	Sonoma	7.0	>60	8.5
Green Valley-Concord/4	ST	Solano	7.0	>60	5

Notes:

* Activity rating; 1- Surface rupture during a historic earthquake
2 - Presently occurring creep
3 - Alignment of earthquake epicenters
4 - Late Quaternary of Holocene displacement
5 - Quaternary displacement
6 - Representative fault in a seismically active tectonic province
7 - Possible source of a major historic earthquake

** Style of faulting
NL - Normal
NO - Normal-oblique
RE - Reverse, including thrust
RO - Reverse-oblique
ST - Strike-slip
? - Estimated style uncertain

.Repeatable High Ground Acceleration (RHGA) may more closely approximate a design acceleration than maximum or peak acceleration (Ploessel and Slosson, 1974). The RHGA averages 65% of the maximum acceleration.

References:

Reconciliation between OSHPD Review and Seismic Hazards Mapping Approach To Probabilistic Seismic Hazard Assessments, Division of Mines and Geology, Status Report, September 26, 1994.
L. Mualchin and A.L. Jones, 1992; Peak acceleration from maximum credible earthquakes in California.

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TABLE - 2

MODIFIED MERCALLI INTENSITY SCALE AND RICHTER MAGNITUDE		
Magnitude, M	Intensity, MM	Effects
2	I	Not felt. Marginal and long-period effects of large earthquakes
3	II	Felt by persons at rest on upper floors or favorably paced.
	III	Felt indoors. Hanging objects swing. Vibration like passing of light trucks. Duration estimated. May not be recognized as an earthquake.
4	IV	Hanging objects swing. Vibration like passing of heavy trucks or sensation of a jolt similar to a heavy ball striking the walls. Standing motor cars rock. Windows, dishes, doors, rattle. Glasses clink. Crockery clashes. In the upper range of IV, wooden walls and frames creak.
	V	Felt outdoors; direction estimated. Sleepers wakened. Liquids disturbed, some spilled. Small unstable objects displaced or upset. Doors swing, close, open. Shutters, pictures move.
5	VI	Felt by all. Many frightened and run outdoors. Persons walk unsteadily. Windows, dishes, glassware broken. Knickknacks, books, etc., off shelves. Pictures off walls. Furniture moved or overturned. Weak plaster and masonry D Cracked. Small bells ring (church, school). Trees, bushes shaken (visibly or heard to rustle - CFR).
6	VII	Difficult to stand. Noticed by drivers of motor cars. Objects quiver. Furniture broken. Damage to masonry D, including cracks. Weak chimneys broken at roof line. Fall of plaster, loose bricks, stones, tiles, cornices (also unbraced parapets and architectural ornaments - CFR). Some cracks in masonry C. Waves on ponds; water turbid with mud. Small slides and caving in along sand or gravel banks. Large bells ring. Concrete irrigation ditches damaged.
	VIII	Steering of motor cars affected. Damage to masonry C; Partial collapse. Some damage to masonry B; None to masonry A. Fall of stucco and some masonry walls. Twisting, fall of chimneys, factory stacks, monuments, towers, elevated tanks. Frame houses moved on foundations if not bolted down; loose panel walls thrown out. Decayed piling broken off. Branches broken from trees. Changes in flow or temperature or springs and wells. Cracks in wet ground and on steep slopes.
7	IX	General panic. Masonry D destroyed; masonry C heavily damaged, sometimes with complete collapse; masonry B seriously damaged. (General damage to foundation - CFR). Frame structures, if not bolted, shifted off foundations. Frames cracked. Serious damage to reservoirs. In alleviated areas, sand and mud ejected, earthquake fountains, sand craters.
8	X	Most masonry and frame structures destroyed with their foundations. Some well-build wooden structures and bridges destroyed. Serious damage to dams, dikes, embankments. Large landslides. Water thrown on banks of canals, rivers, lakes, etc. Sand and mud shifted horizontally on beaches and flat land. Rails bent slightly.
	XI	Rails bent greatly. Underground pipelines completely out of service.
	XII	Damage nearly total. Large rock masses displaced. Lines of sight and level distorted. Objects thrown into the air.

Notes: Masonry A - Good workmanship, mortar, and design; reinforced; designated to resist lateral forces.
Masonry D - Weak materials such as adobe; poor mortar, low standards of workmanship; weak horizontally.

TABLE - 3

SELECTED HISTORIC EARTHQUAKES IN CALIFORNIA *					
Date	Fault Name	Location	Magnitude	Epicenter Intensity	Sense of Slip **
1836	Hayward	Hayward	7.0	X	RL
1838	San Andreas	San Francisco Peninsula	7.0	X	
1865	San Andreas	Santa Cruz Mountains		IX	
1868	Hayward	Hayward	6.7	X	RL, V
1906	San Andreas	Point Reyes	8.3	XI	RL, V
1969	Rodgers Creek	Santa Rosa	5.7 ***	VIII	
1975	Cleveland Hill	Oroville	5.7	IX	RL,V
1984	Calaveras	Morgan Hill	6.2	VII	RL
1989	San Andreas	Santa Cruz Mountains	7.1	X	RL, V

Notes:

* Unless otherwise noted, references are Bolt, 1989, and Jennings, 1985

** Abbreviations: RL - Right Lateral
LL - Left Lateral
V - Vertical
T - Thrust

*** Gere and Shah, 1984

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APPENDIX "D"

ADDITIONAL SERVICES

SOIL SEARCH ENGINEERING
GEOTECHNICAL & ENVIRONMENTAL CONSULTANTS
4088 BRIDGE ST. #9, FAIR OAKS, CA 95628 (916)966-3902

Soil Search Engineering Services

Soil Search Engineering is pleased to present geotechnical and environmental investigation, material testing, construction observation and quality control services for your project. Services provided consist of, but not limited to the following:

GEOTECHNICAL ENGINEERING
RESIDENTIAL , COMMERCIAL/RETAIL
STORAGE BIN, TOWER, DAM
RETAINING WALL & SEA WALL
FOUNDATION INVESTIGATION
SEISMIC FOUNDATION DESIGN
PLAN REVIEW
CONSTRUCTION SUPERVISION
CONSTRUCTION INSPECTION
FIELD TESTING AND OBSERVATION
SOIL LABORATORY TESTING
PAVEMENT DESIGN

ENVIRONMENTAL ASSESSMENT
PHASE I SITE ASSESSMENTS
SITE CHARACTERIZATION
COASTAL PROTECTION PROJECTS
FIELD INVESTIGATION
HEALTH AND SAFETY PLAN
"SPCC" PLAN

If you have any question or require additional information, call our office at your convenience. Please feel free to contact our office for further information regarding our services and fees. Proposals will be provided upon request.