# Exhibit D

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**SOIL SURVEYS GROUP INC.**

103 CHURCH ST • SALINAS, CALIFORNIA 93901 • TELEPHONE (831) 757-2172

LIB180158

March 26, 2018
Job #6945

John Harwell
227 27th Street
Manhattan Beach, CA 90266

Dear Mr. Harwell:

Submitted herewith is the report of our Geotechnical Investigation for the proposed new garage/workshop/office addition to the existing residence located at 5 La Pradera, APN 103-151-012, in Carmel, California. One boring was drilled on January 3, 2018 for geotechnical investigation purposes. Laboratory tests were subsequently made on driven soil core samples taken from the boring to determine the near surface and subsurface soil conditions and suitability for the construction of the proposed additions. We find that the project site is suitable for the proposed use with the recommendations made herein.

It is a pleasure working with you on this project. If you have any questions regarding our geotechnical investigation or this report, please contact us.

Very truly yours,

SOIL SURVEYS GROUP, INC.

REGISTERED PROFESSIONAL ENGINEER
BELINDA A. TALUBAN
No. 44217
Exp. 6/30/19
CIVIL
STATE OF CALIFORNIA

Belinda A. Taluban, P.E.
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MICHELLE GARCIA
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Engineering Geologist 2668

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cc. Monterey County Resource Management Agency Divisions of Planning and Building Inspection
Wald, Ruhnke & Dost Architects, L.L.P.

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**SOIL SURVEYS GROUP INC.**

103 CHURCH ST • SALINAS, CALIFORNIA 93901 • TELEPHONE (831) 757-2172

*GEOTECHNICAL INVESTIGATION*

*FOR THE PROPOSED NEW GARAGE/WORKSHOP/OFFICE ADDITION*

*TO BE LOCATED AT 5 LA PRADERA*

*APN 103-151-012,*

*CARMEL, CALIFORNIA*

*HARWELL RESIDENCE*

*MARCH 26, 2018; JOB #6945*

## I. INTRODUCTION:

This Geotechnical Investigation was made to determine the suitability of the soils at the project site for the proposed new addition to the existing residence located at 5 La Pradera, APN 103-151-012, in Carmel, California. One boring was drilled on January 3, 2018, and core samples were taken from the boring for laboratory testing. The boring log, our field observations, and field and laboratory test data were analyzed to determine the following:

1. **Suitability of the soils at the project site for the proposed new addition.**
2. **Unsuitable or unstable soil conditions, if any.**
3. **Foundation design criteria for the proposed addition.**
4. **Subsurface groundwater and soil moisture considerations.**
5. **Surface drainage considerations.**
6. **Analysis of seismic hazards and seismic design factors per the 2016 California Building Code.**

**Site Setting:** The subject five acre parcel is on the south side of Aguajito Road at the crest of a knoll, on the east side of La Pradera. The addition, a two level building consisting of office and workshop space below a four care garage, is to be constructed east of the existing residence. The parcel slopes down to the southwest from La Pradera. The soils encountered in our boring are consistent with the Shale Formation shown on the 2007 geologic map for the area by Dibblee et al. No evidence of erosion or mass movement of the soils was observed on the property slopes.

## II. LABORATORY TEST DATA[1]:

Eight moisture density tests were made from the driven core samples. Standard Penetration Tests (SPT) were performed with a Terzaghi Split Spoon sampler. Core samples were also taken with a 2 ½-inch interior diameter (i.d.) Modified California Sampler. All samplers were driven into the soil by a 140 lb. hammer dropped a vertical distance of 30 inches at the sample location. Results of these tests are shown as follows:

***MOISTURE DENSITY TESTS***

| Boring No. | Depth/ Ft. | Water Content % | Dry Density p.c.f. | Standard penetration Tests, Blows /foot | Pocket Penetrometer Tons S.F. |
|---|---|---|---|---|---|
| B-1 | 2-2.5 | 32.5 | 48.7 | 14 | 2.25 |
| B-1 | 3-3.33 | 40.0 | 42.4 | 23(14)/6"* | 0.25 |
| B-1 | 3.33-3.83 | 44.0+ | 63.8+ | 73(44)/10"* | --- |
| B-1 | 5.33-5.83 | 44.2 | 59.3 | 66 | 3.75 |
| B-1 | 9-9.5 | 26.8 | 61.8 | 32 | 3.0 |
| B-1 | 17-17.5 | 44.6 | 48.8 | 14 | 3.0 |
| B-1 | 21-21.5 | 45.8 | 49.5 | 20 | 2.5 |
| B-1 | 25-25.5 | 32.2 | 52.0 | 57 | 0.25 |

*= 2.5-inch mod. Cal not SPT, ( ) = value adjusted to approximate SPT values
+ = Average water content and dry density from Direct Shear data

Three Sieve Analysis tests were made on driven core samples. Results of these tests are shown as follows:

***A.S.T.M. D 422 SIEVE ANALYSIS TEST-Percent Passing***

| Boring No. | Depth/ Ft. | Sieve No. 4 | Sieve No. 10 | Sieve No. 20 | Sieve No. 30 | Sieve No. 40 | Sieve No. 100 | Sieve No. 200 |
|---|---|---|---|---|---|---|---|---|
| B-1 | 2-2.5 | 88 | 82 | 71 | 67 | 62 | 48 | 38 |
| B-1 | 3-3.33 | 84 | 71 | 59 | 54 | 49 | 35 | 27 |
| B-1 | 9-9.5 | 97 | 94 | 89 | 87 | 84 | 69 | 33 |

[1] Boring Log is located in Appendix A

Three plasticity index tests were performed on driven core samples. Results of these tests are as follows:

| PLASTICITY INDEX TEST | | | | | | |
|---|---|---|---|---|---|---|
| Boring No. | Depth/ Feet | % Passing Sieve No. 40 | % Passing Sieve No. 200 | Liquid Limit | Plastic Limit | Plasticity Index |
| B-1 | 2-2.5 | 62 | 38 | 58 | 34 | 24 |
| B-1 | 3-3.33 | 49 | 27 | 78 | 43 | 35 |
| B-1 | 9-9.5 | 84 | 33 | 62 | 27 | 35 |

The test results for samples taken from the borings indicate that the fine fraction of the near surface fine grained silty sand/sandy silt with veins of clay soils encountered in Boring 1 at 2.0 to 2.5 feet; 3 to 3.33 feet; and 9.0-9.5 feet in depth are moderately to highly plastic and moderately to highly expansive.

One Direct Shear test was made from a soil sample taken from Boring 2 at 4.5-5 feet below surface. Results of this test are summarized as follows (see Appendix B for full report sheet):

| Boring No. | Depth/ Ft. | Internal Frict. Angle, $\varphi^{\circ}$ | Cohesion, C p.s.f. | Soil Weight p.c.f. | Description of soil |
|---|---|---|---|---|---|
| B-1 | 3.33-3.83 | 27.7 | 200 | 91.9 | Yellow Rock |

Boring 1 was located in near the northwestern edge of the existing garage, as shown on Figure II. Below two inches of asphaltic concrete and four inches of decomposed granitic sand, the near surface soil consists of stiff/medium dense, cemented silt with silty sand to a depth of 3.5 feet. Below this depth, the soil consists of stiff to hard/medium dense to very dense, cemented silt and shale to the bottom of the boring at 25.5 feet in depth.

No free groundwater was observed in the borings to a maximum explored depth of 25.5 feet. The actual depth to groundwater during rainy months is unknown, but it should be noted that groundwater fluctuations can occur due to variations in rainfall, temperature and other factors not evident during the time of our investigation.

## III. SUITABILITY OF SITE FOR PROPOSED USE:

No unsuitable or unstable soil conditions were found at the boring location except for loose soil in the upper foot and moderately to highly expansive soils at footing depths. In our opinion, the site is suitable for the proposed new addition with the recommendations made herein, specifically the recommendations for the recompaction of any loose soils and the mitigation of expansive soils.

## IV. RECOMMENDED FOUNDATION DESIGN CRITERIA:

Spread footings may be used for the building foundation after the site is cleared, grubbed and the proposed building pads are graded, compacted and properly prepared. Spread footings shall be installed to a minimum depth of 18 inches for both single story and two story portions of the proposed addition. The minimum depths shall be measured from the **inside building pad soil subgrade.** Mitigation for recompaction of any loose soil conditions must be followed.

*Allowable foundation pressures after any recompaction of the building addition pad areas are:*

| | |
|---|---|
| **Continuous footings** | **= 1500p.s.f.** |
| **Isolated rectangular footings** | **= 1800 p.s.f.** |

Continuous footings shall be reinforced with four #4 steel reinforcement bars; two placed near the bottom of the footing and two placed near the top of the footing. Spread footings shall also meet the minimum requirements of the 2016 California Building Code and the County of Monterey Building ordinances for width, thickness, embedment and reinforcement steel. The new addition and any future building additions shall be designed in strict accordance with the requirements specified in the 2016 California Building Code, or latest approved edition, to resist seismic forces.

All concrete floor and garage slabs-on-grade shall be a minimum of five inches thick and shall be reinforced with a minimum of #3 steel reinforcement bars at 12 inches on center or #4 steel reinforcement bars placed 24 inches on center, each way and shall extend into perimeter foundation. *The reinforcement steel must be firmly held in the vertical center of the slabs during placement and finishing of concrete with pre-cast concrete dobies.* All new concrete floor slabs-on-grade shall be underlain by an approved 15 mil. vapor barrier installed over a minimum four inch thick open graded gravel capillary break with two inches of clean sand placed over the vapor barrier as recommended in Section VIII-C herein. ***Concrete slabs shall have weakened plane joints a maximum of fifteen feet on center, each way. All concrete shall be properly cured with an approved curing compound or wetted burlap for a minimum of 14 days.***

Soil Surveys Group, Inc. shall inspect and approve the foundation footing excavations and the subgrade beneath concrete floor slabs for suitable soil bearing and proper penetration into competent soil. We also recommend that Soil Surveys Group, Inc. review and approve the grading, drainage and foundation plans prior to building construction.

A. Concrete Sidewalks and Outside Flatwork:
We recommend that any new on-site concrete sidewalks and outside flatwork be at least five inches thick and be placed over a compacted subgrade. All concrete flatwork should be divided into as nearly square panels as possible. Frequent joints should be installed to provide articulation to the concrete panels. Landscaping and planters adjacent to concrete flatwork should be designed in such a manner that positive drainage away from the new project buildings is achieved. It is assumed that the outside concrete flatwork will be subjected only to pedestrian traffic.

## V. LOOSE AND EXPANSIVE SOIL MITIGATIONS:

To mitigate the effects of any loose near surface soil conditions and the moderately to highly expansive soils at footing depths, the following measures are recommended:

1. Any existing loose soil within the proposed new building pad and extending a minimum of five feet in all directions outside of the proposed building foundations shall be recompacted **as necessary** to 90 percent relative compaction at the direction of Soil Surveys Group, Inc. prior to placing additional building pad fill or finishing the building pad subgrade. Soil Surveys Group, Inc. shall determine the depth of recompaction, if any, within the building perimeter after clearing and grubbing are

completed. Subexcavation and recompaction should be extended under any proposed patios or other permanent flatwork.

2. Spread footings shall be constructed a minimum of 18 inches deep for both single story and two story portions of the proposed new building as measured from the lowest adjacent grade, and continuous non-retaining footings shall be reinforced with four #4 reinforcement bars, two placed near the bottom and two placed near the top of footing.

3. All new concrete floor slabs-on-grade shall be a minimum of five inches thick and shall be reinforced with a minimum of #3 steel rebars at 12 inches on center or #4 steel rebars at 24 inches on center, each way and shall be bent to extend a minimum of eight inches into the perimeter footing.

4. The foundation excavations shall be flooded with three to four inches of water at least 24 hours prior to pouring concrete, and the subgrade for concrete slabs and foundations should be brought to at least three percent over optimum moisture for a depth of at least eight inches prior to pouring concrete. No free water shall remain in the footing excavations during the concrete pour. To achieve the proper moisture conditioning in the subgrade beneath concrete slabs, water should be applied each evening for several days prior to placement of reinforcing steel and concrete.

5. Roof and site rain water should be directed away from the proposed building foundations. Rainfall runoff must not be allowed to collect or flow in a downslope direction against any building foundation.

6. Soil Surveys Group, Inc. shall be retained to inspect and test the recompaction of any loose native soil and new engineered fill within the building pad perimeter and shall inspect and approve foundation footing excavations for soil bearing conditions. Soil Surveys Group, Inc. shall also inspect and approve the subgrade below concrete floor and garage slabs prior to placement of reinforcing steel and shall inspect and approve the installation of all roof and yard drainage facilities.

## VI. SURFACE AND SUBSURFACE DRAINAGE AND EROSION CONSIDERATIONS:

The near surface soil at the project site has the potential to erode, especially if protective vegetation is removed. Therefore all new cut and fill slopes, as well as disturbed soil areas, must be seeded with grass or landscape plants for erosion control and to prevent sloughing soil from blocking drainage patterns at the project site. Such erosion control measures shall be taken during and at completion of grading and during building construction operations.

Concentrated storm water runoff from the project site should not be allowed to discharge uncontrolled onto sloping ground. Suitable energy dissipation systems shall be designed where rainfall runoff is concentrated, or the drainage water should be collected and piped to flat ground or discharged onto a rocked energy dissipater down slope of the building foundations. Rock energy dissipaters consisting of four inch to six inch diameter rock or rubble rip rap should be installed at collection pipe discharge points to reduce soil erosion. Rain gutter downspouts shall discharge onto concrete splash blocks, or shall discharge into collector pipes. The building site, any new paved areas and ground adjacent to the building shall be graded so that rainfall runoff does not become trapped or flow against any new or existing building foundations.

The boring log does not indicate the need for a subsurface drain system. However, the Geotechnical engineer may recommend a system of subsurface drains should wet subsurface soil conditions be encountered during site preparation or excavations for any new building foundations.

## VII. RETAINING WALL AND POOL DESIGN CRITERIA:

The following design criteria are recommended for the project retaining walls:

| | | |
|---|---|---|
| *Friction Angle* | $\varphi$ | *= 27.7 °* |
| *Cohesion* | *c* | *= 200 p.s.f.* |
| *Soil Weight,* | *w* | *= 91.9 p.c.f.* |
| *Equivalent fluid pressure, active* | | *= 39 pounds per square foot per foot of depth for* ***Level Grade*** |
| *Equivalent fluid pressure, active* | | *= 56 p.c.f. with* ***2:1 slope behind wall*** |
| *Equivalent fluid pressure, at rest* | | *= 58 p.c.f., restrained condition* |
| *Equivalent fluid pressure, passive* | | *= 295 p.c.f.* |
| *Sliding friction* | *f* | *= 0.30* |
| *Allowable Footing Toe Pressure* | | *= 2,500 p.s.f. plus ⅓ additional for seismic force (if added)* |

Retaining walls that are more than five feet high, or are part of or within ten feet of a building should include the seismic force of the soil against the retaining wall. The estimated seismically generated ground accelerations to be used for this area are:

**PAGA = 0.368 g**
**RHGA =0.25 g = $k_h$**
**w =91.9 p.c.f.**

The resultant seismic force is calculated by the formula: 3/8 w $H^2 k_h$ per linear foot of retaining wall, or for this case **8.6 $H^2$**, ***where H is the height of the retaining wall. These forces, where needed, should be applied at a height of 0.6H above the base of the retaining wall and must be combined with the force produced by active soil pressure.***

These retaining wall design criteria are based on a fully drained condition. Therefore we recommend that a four-inch diameter perforated NDS or PVC pipe be installed behind or along the top of the footing, holes placed down, behind all walls that retain earth. The pipe shall be covered with a 12-inch wide envelope of ¾-inch drain rock or Class 2 Permeable Material (per Caltrans Standard Specifications Section 68-1.025) which shall extend to at least one foot above the top of pipe, and a filter fabric shall be installed over the top of the drain rock. However, no gravel shall be placed below the pipe. The remainder of the trench can be backfilled with clean native sand. As an alternative to installing drain rock or permeable material, a composite filter material, eg. Miradrain, can be installed with a perforated pipe at the bottom of the material. Clean-out risers must be installed on the perforated pipe at the up-stream ends, every 100-feet, and at 90° angle points. The capped end of the cleanout riser shall be located at the ground surface outside of or behind the retaining walls.

## VIII. RECOMMENDED SPECIFICATIONS:

### A. GRADING:

The building addition pad, extending a minimum of five feet in each direction past new foundation footings shall be cleared and grubbed of all surface vegetation, demolition debris, and organic topsoil before recompacting the original ground, placing engineered fill or finishing the subgrade for the new building pad. On site surface or subsurface grass, roots, deleterious material, or brush (if any) within the new building pad area shall be removed. Soil Surveys Group, Inc. should determine the exact depth of subexcavation necessary, if any, after pad grading is complete. Any subexcavated soil shall then be backfilled in eight inch loose lifts and recompacted to 90 percent relative compaction, prior to placing engineered fill or finishing subgrade of the new building pad.

Any new cut and fill slopes shall be 2:1 or flatter unless retained. The native soil is suitable to be used as engineered fill provided any organics or debris are first removed from the soil to be used as fill. Any native soil used for fill, or any imported fill soil for the new building addition pad shall be compacted to at least 90 percent relative compaction, and any cut portions of the new building addition pad, if located within both cut and fill, shall be subexcavated a minimum of two feet, backfilled in eight inch loose lifts and recompacted to a minimum of 90 percent relative compaction. All fills placed on slope grades of 5:1 or greater shall be provided with a keyway excavated a minimum of two feet below grade, a minimum of 10 feet wide and at a 2% slope into the slope. The bottom of the keyway should be moisture conditioned, compacted (if necessary) and approved by Soil Surveys Group, Inc. prior to backfilling in eight inch loose lifts and compacting the backfill to 90 percent relative compaction. ***Grading, filling, compaction operations and foundation excavations shall be inspected and tested by Soil Surveys Group, Inc.***

### B. COMPACTION:

Laboratory soils compaction test method shall be *A.S.T.M. D 1557-09.* Subgrade *in existing soil* beneath the new building addition pad shall be compacted to 90 percent relative compaction unless waived by the Geotechnical engineer. Subgrade soil below any new pavement shall also be compacted to 95 percent relative compaction, and aggregate base beneath new pavement shall be compacted to 95 percent relative compaction. Any imported sandy soil fill placed for the new building pads shall be compacted to a minimum of 95 percent relative compaction.

### C. CONCRETE FLOOR SLABS-ON-GRADE:

Subgrade in recompacted soil under any new concrete floor slabs-on-grade shall be brought to at least 2% over optimum moisture prior to placing native or imported sandy soil fill, prior to placing the capillary break rock and moisture proof barrier or prior to pouring concrete. We recommend that a capillary break consisting of:

- a mat of clean, open graded rock, four inches thick, shall be placed over the finished soil subgrade
- a minimum 15 mil. water-proof membrane (such as Stego, Moistop or equal) shall be placed over the open graded rock
- two inches of clean, moistened sand shall be placed between the water-proof membrane and the bottom of the concrete floor slab. The moistened sand will help protect the membrane and will assist in equalizing the concrete curing rate to minimize shrinkage cracking.

Class 2 Aggregate Base or sand should not be used as the capillary break material. Capillary break material shall comply with and be installed according to the following:

1. MATERIAL:
   The mineral aggregate for use under the floor slabs shall consist of broken stone, crushed or uncrushed gravel, quarry waste, or a combination of the above. The aggregate shall be free of adobe, vegetable matter, loam, volcanic tuff and other deleterious materials. It shall be of such quality that the absorption of water in a saturated, surface dry condition does not exceed 3% of the oven dry weight of the sample.

2. GRADING:
   The mineral aggregate shall be of such size that the percentage composition by dry weight as determined by laboratory sieves (U.S. Sieves) will conform to the following grading:

| Sieve Size | Percentage Passing Sieve |
|---|---|
| ⅜" to ½" | 100 |
| No. 4 | 0-10 |
| No. 200 | 0-2 |

3. PLACING:
   Subgrade, upon which aggregate base, gravel or crushed rock is to be placed, shall be prepared by removing grass and roots. Where loose topsoil is present, it shall be removed and cleaned of debris and recompacted to 90 percent of maximum density.

4. THICKNESS AND STRENGTH:
   Concrete slabs should be at least five inches thick. Concrete shall be five sack minimum (5.5 sack if pumped) and shall achieve a 28 day compressive strength of at least 2500 p.s.i., or as specified by the project engineer.

5. REINFORCEMENT:
   Concrete slabs-on-grade shall be reinforced with a minimum of #3 steel reinforcement bars placed 12 inches on center, each way or #4 reinforcement bars placed 24 inches on center, each way and shall be bent to extend a minimum of eight inches into the perimeter footings.

**D.** UTILITY TRENCH BACKFILL:

All new on-site utility trenches shall be backfilled with a clean sand having a sand equivalent of 30 or higher. A two feet thick plug of compacted, **clayey soil backfill** or lean concrete shall be required around the pipe or conduit at places where utility trenches intersect the building perimeter. All trench backfill of imported clean sand or clean native sand shall be compacted to 95 percent relative compaction at all locations. Clean native sand shall be approved by Soil Surveys Group, Inc. prior to using for trench backfill.

## IX. GEOLOGIC AND SEISMIC CONSIDERATIONS:

Monterey County is in a seismically active area of the state of California. The following table provides a list of nearby faults that could produce an earthquake that could impact the project site.

| Fault Name | Approximate Distance to Site | Orientation from Site | Data Source |
|---|---|---|---|
| Unnamed (Inferred) | 0.78 km | Northwest | Clark and Other, 1997 |
| Sylvan Thrust (Inferred) | 0.89 km | Northeast | Clark and Other, 1997 |
| Hatton Canyon (Concealed) | 1.07 km | South | Clark and Other, 1997 |
| Monterey Bay-Tularcitos | 4.25 km | Northeast | Uniform Building Code, 1997 |
| San Gregorio (Sur Region) | 9.5 km | Southwest | Uniform Building Code, 1997 |
| Rinconada | 27.75 km | Northeast | Uniform Building Code, 1997 |
| San Andreas Creeping Section(Pajaro) | 33.0 km | Northeast | Uniform Building Code, 1997 |
| Zayante-Vergeles | 38.0 km | Northeast | Uniform Building Code, 1997 |

The new addition and any future building additions must be designed in strict compliance with the 2016 California Building Code to help withstand such seismically generated ground accelerations for a reasonably expected duration without suffering major damage.

The following are the project site coordinates and the seismic design criteria/coefficients per the requirements of the 2016 California Building Code (CBC):

| Site Class | Latitude | Longitude | $S_S$ | $S_1$ | $F_a$ | $F_v$ |
|---|---|---|---|---|---|---|
| D | 36.5681° | -121.9014° | 1.538 | 0.569 | 1.00 | 1.50 |

Frame and semi-rigid structures with proper strengthening connections and hold-down fasteners (where needed) are recommended for the new addition and any future building additions. With proper design parameters, seismic damage to the building can be mitigated for major earthquakes centered near the project area.

Surface rupture, liquefaction, lurch cracking, lateral spreading, and differential settlement are seismic hazards that must be considered at the project site. Surface rupture usually occurs along fault lines, and no known faults have been mapped through the project site. Therefore, the potential for surface rupture or lurch cracking is considered to be low.

Liquefaction and lateral spreading tend to occur in loose, fine saturated sands and in places where the liquefied soils can move toward a free face (e.g. a cliff or ravine). The deeper soils underlying the project site are typically very stiff to hard/very dense, fractured shale soils and no ground water was encountered in the boring to a maximum explored depth of 25.5 feet. Considering the deeper shale soils and the absence of shallow groundwater, the potential risk for occurrence of damaging liquefaction or lateral spreading is considered to be low during a strong seismic event.

Differential compaction and settlement occur generally in loose, granular or unconsolidated semi-cohesive soils during severe ground vibration. In our opinion, the risk for soil consolidation caused differential compaction and settlement during a major seismic event is considered to be low.

## X. UNFORESEEN OR UNUSUAL CONDITIONS:

If any unforseen or unsuitable soils conditions are found during grading or construction of the new addition the Geotechnical engineer shall be notified immediately so that remedial action can be taken. Such unsuitable conditions could be:

1. Wet, soft or unsuitable pockets of sandy soil within the proposed building addition site.
2. Soil with a high organic content at the finished subgrade of the building pad.
3. Any other unforeseen conditions that would require remedial action by the Geotechnical engineer, project engineer, architect or contractor.

## XI. CONCLUSIONS AND RECOMMENDATIONS:

From our field observations, analysis of the test data, and knowledge of the general area soils, the following are concluded:

1. The project soil conditions are suitable for the proposed new addition provided any loose near surface soil is recompacted prior to excavating for the new building foundation or finishing the subgrade of the building pad as recommended in Sections V and VIII herein.

2. Design criteria for a spread footing foundation system for the project building is provided in Sections IV and V. Retaining wall design criteria is provided in Section VII. Design criteria for concrete slabs-on-grade are provided in Sections IV, V and VIII herein.

3. Surface storm water runoff should be carefully controlled around the proposed addition to provide positive drainage away from new and existing building foundations as discussed in Section VI herein.

4. The Geotechnical engineer should review the building and site grading plans for compliance with the recommendations herein and may provide additional specific recommendations for surface or subsurface drainage. The Geotechnical engineer shall inspect and approve all new foundation footing excavations.

5. Grading and compaction specifications and specifications for new concrete floor slabs-on-grade are provided in Section VIII herein.

6. Seismic considerations are discussed, and geoseismic design coefficients are provided in Section IX herein per the 2016 CBC. The potential for damaging earthquake related liquefaction is considered to be low at the project site.

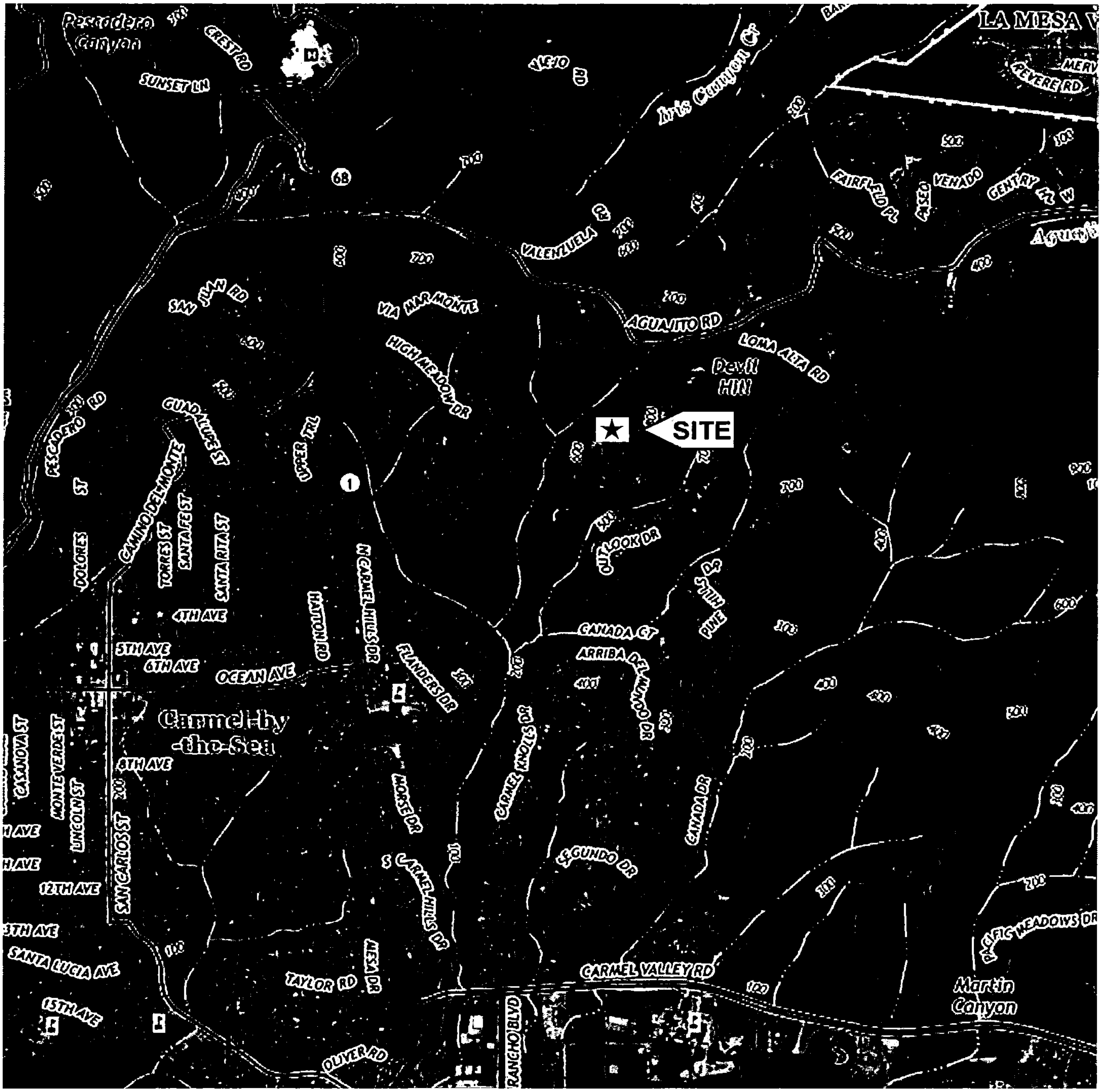
## XII. LIMITATIONS:

This report necessarily assumes that the subsurface conditions are as found in the boring. It should be recognized that the soil conditions described in this report are based on one boring and our knowledge of the general area soils. It must be understood that subsurface soil conditions can vary between borings and from site to site. If any unusual soil conditions are found during grading, installation of underground utilities or building construction, the Geotechnical engineer should be notified immediately so that remedial action can be taken (see Section X).

This report is issued with the understanding that it is the responsibility of the Owner or his representative to ensure that the applicable provisions of the recommendations contained herein are incorporated into the plans and specifications and that the necessary steps are taken to see that contractors and subcontractors carry out such provisions in the field. The use of this report, its contents or any part thereof, by a party or its agents, other than Mr. John Harwell, his engineer, architect, contractor or designated agents, is hereby disallowed unless specific permission is given to do so by Soil Surveys Group, Inc. This investigation and report were prepared with the understanding that a new two-story addition will be constructed at the project site as shown on the Figure II map enclosed herein. The use of this report, boring log and laboratory test data shall be restricted to the original use for which they were prepared and publication by any method, in whole or in part, is prohibited without the written consent of Soil Surveys Group, Inc. Title to the designs remains with Soil Surveys Group, Inc. without prejudice. Visual contact with this report and drawings constitutes prima facie evidence of the acceptance of these restrictions.

Soil Surveys Group, Inc. will not take responsibility for or assume any liability for the recommendations made in this report unless Soil Surveys Group, Inc. performs the field inspections and testing mentioned herein.

The findings and recommendations of this report are considered valid at the present date. However, changes in the property conditions can occur with the passage of time on this or adjacent properties, whether due to natural processes or the works of man. Therefore, the findings of this report shall be considered valid for a period of not more than three years without being reviewed and updated by Soil Surveys Group, Inc.




N

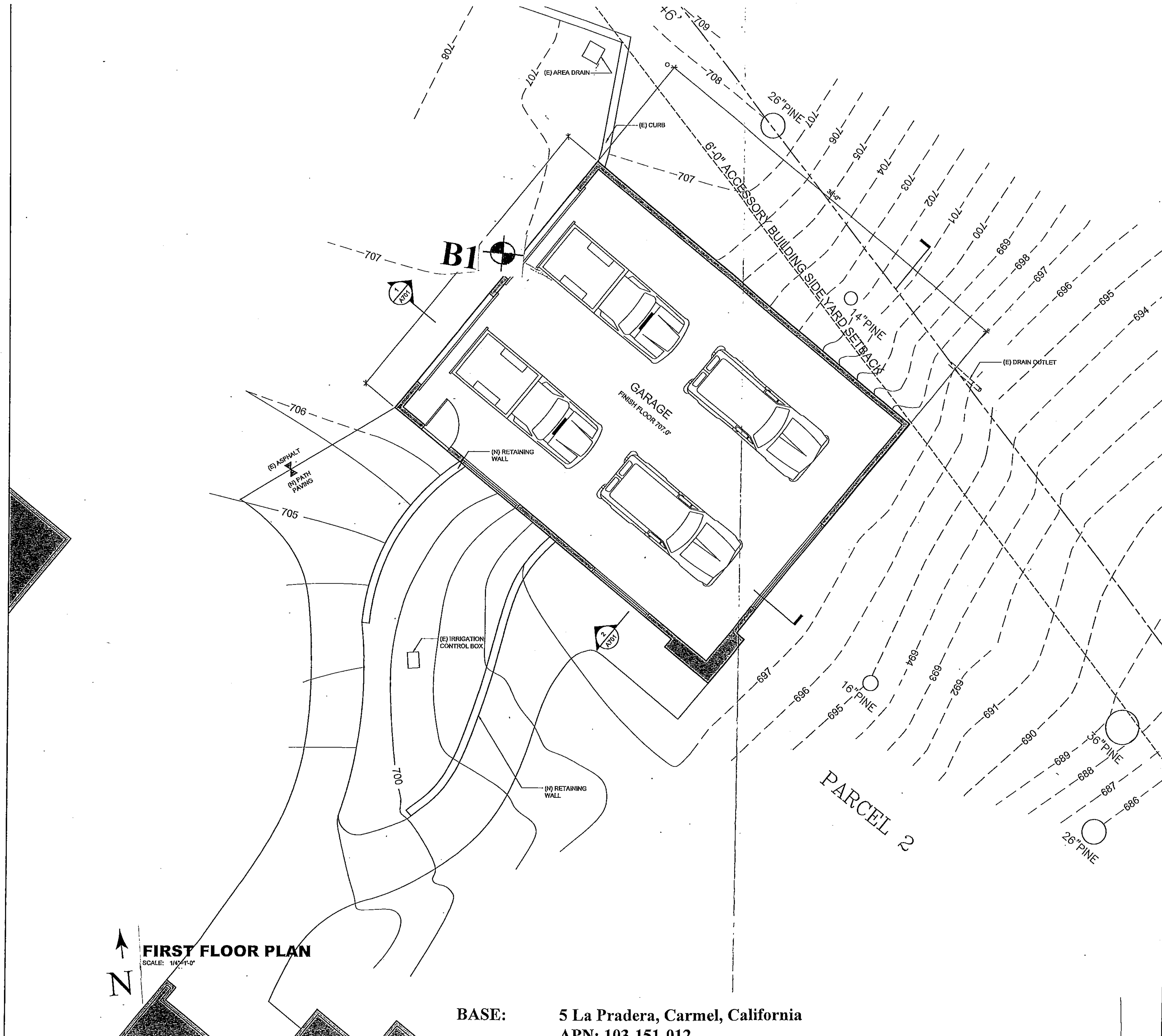
BASE: U.S. Geological Survey, Monterey 7.5' Quadrangle, Monterey, California

**FIGURE I: VICINITY MAP**

SCALE
1" = 2000'

By: Soil Surveys Group, Inc.
103 Church Street
Salinas, CA 93901
831-757-2172

Job #6945




**KEY NOTES**

THE KEY NOTES THAT FOLLOW APPLY TO THE DRAWING(S) ON THIS SHEET ONLY. REFER TO FOLLOWING SHEETS FOR NOTES THAT ARE APPLICABLE TO THOSE DRAWINGS.

1

2

**FIGURE II**

Boring Locations (approx.)

**By:** Soil Surveys Group, Inc.
103 Church Street
Salinas, CA 93901
ph. 831-757-2172
fax 831-755-7330
email: info@soilsurveys.net

**LEGEND**

(E) MINOR CONTOUR

(E) MAJOR CONTOUR

(N) MINOR CONTOUR

(N) MAJOR CONTOUR

PRELIMINARY
NOT FOR CONSTRUCTION

**BASE:** 5 La Pradera, Carmel, California
APN: 103-151-012
Site Plan by Wald Rhunke & Dost Architects, LLP. August 2017- Job #6945

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A.P.N.: 103-151-012

HARWELL GARAGE
JOHN HARWELL
5 LA PRADERA
CARMEL, CA 93923

JOB NO.: JOB# 16149
PRINT DATE:
PLOT DATE: 8.14.2017
DRAWN BY: DD
CHECKED BY: -
SET ISSUED:

SHEET NAME: FLOOR PLAN

SHEET NO.: A202

FILE NAME: 16149-A202

# APPENDIX A
## BORING LOG

| PRIMARY DIVISIONS | | | | GROUP SYMBOL | SECONDARY DIVISIONS |
|---|---|---|---|---|---|
| COARSE GRAINED SOILS | MORE THAN HALF OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE | GRAVELS<br>MORE THAN HALF OF COARSE FRACTION IS LARGER THAN NO. 4 SIEVE | CLEAN GRAVELS (LESS THAN 5% FINES) | GW | Well graded gravels, gravel-sand mixtures, little or no fines. |
| | | | | GP | Poorly graded gravels or gravel-sand mixtures, little or no fines. |
| | | | GRAVEL WITH FINES | GM | Silty gravels, gravel-sand-silt mixtures, non-plastic fines |
| | | | | GC | Clayey gravels, gravel-sand-clay mixtures, plastic fines. |
| | | SANDS<br>MORE THAN HALF OF COARSE FRACTION IS SMALLER THAN NO. 4 SIEVE | CLEAN SANDS (LESS THAN 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<br>LIQUID LIMIT IS 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<br>LIQUID LIMIT IS GREATER THAN 50% | | MH | Inorganic silts, micaceous or diatomaceous fine sandy 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 and other highly organic soils. |

## GRAIN SIZES

U.S STANDARD SERIES SIEVE — 200, 40, 10, 4

CLEAR SQUARE SIEVE OPENINGS — 3/4", 3", 12"

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

## RELATIVE DENSITY

| SANDS AND GRAVELS | BLOWS/FT* |
|---|---|
| VERY LOOSE | 0 - 4 |
| LOOSE | 4-10 |
| MEDIUM DENSE | 10 - 30 |
| DENSE | 30 - 50 |
| VERY DENSE | OVER 50 |

## CONSISTENCY

| SILTS AND CLAYS | STRENGTH** | BLOWS/FT* |
|---|---|---|
| VERY SOFT | 0 - 1/4 | 0 - 2 |
| SOFT | 1/4 - 1/2 | 2 - 4 |
| FIRM | 1/2 - 1 | 4 - 8 |
| STIFF | 1 - 2 | 8 - 16 |
| VERY STIFF | 2 - 4 | 16 - 32 |
| HARD | OVER 4 | OVER 32 |

*Number of blows of 140 pound hammer falling 30 inches to drive a 2 inch O.D. (1 3/8 inch I.D) split spoon (ASTM D-1586)

**Unconfined compressive strength in tons/ft$^2$ as determined by laboratory testing or approximated by the standard penetration test (ASTM D-1586), pocket penetrometer, torvane, or visual observation

FIGURE NO. KEY TO LOGS

# EXPLORATION DRILL LOG

HOLE NO. B-1

PROJECT Harwell Residence, 5 La Pradera, Carmel  Job #6945  DATE 1.3.18  LOGGED BY JG

DRILL RIG CCD Tractor  HOLE DIA. 4"  SAMPLER Terzaghi Split Spoon (SPT) + 2.5" CAL

GROUNDWATER DEPTH: INITIAL ---  FINAL ---  HOLE ELEV. ---

| DESCRIPTION | SOIL TYPE | DEPTH | SAMPLE | BLOWS PER FOOT | DRY DENSITY (pcf) | WATER CONTENT % | LIQUID LIMIT | PLASTIC LIMIT | POCKET PEN. (tsf) |
|---|---|---|---|---|---|---|---|---|---|
| ~2" AC/ 4" Light yellowish-tan decomposed | AC/SP | | | | | | | | |
| granitic SAND | | 1 | | | | | | | |
| Light yellowish-tan, cemented SILT with dark | ML/SM | | SPT | | | | | | |
| brown silty SAND and organics; moist, stiff/medium | | 2 | | | | | | | |
| dense | | | XXX | 14 | 48.7 | 32.5 | 58 | 34 | 2.25 |
| | | 3 | | | | | | | |
| Light yellowish-tan, cemented SILT with dark | ML/SM | | 2.5" CAL | 23(14)/6" | 42.4 | 40.0 | 78 | 43 | 0.25 |
| brown silty SAND and organics; moist, stiff/medium | | 4 | XXX | 73(44)/10" | 63.8 | 44.0 | Shear | test | --- |
| dense | | | SPT | | | | | | |
| Light yellowish-tan, light tan, cemented SILT/ | ML/SM | 5 | | | | | | | |
| SHALE with dark brown silty clay; slightly moist, | | | XXX | 66 | 59.3 | 44.2 | | | 3.75 |
| hard/very dense | | 6 | | | | | | | |
| | | | | | | | | | |
| | | 7 | | | | | | | |
| | | | | | | | | | |
| | | 8 | | | | | | | |
| Light yellowish-tan, light tan, fine grained SAND | SM/ML | | SPT | | | | | | |
| and cemented SILT with thin veins of dark brown | | 9 | | | | | | | |
| clay; slightly moist, dense/hard | | | XXX | 32 | 61.8 | 26.8 | 62 | 27 | 3.0 |
| | | 10 | | | | | | | |
| | | | | | | | | | |
| | | 11 | | | | | | | |
| | | | | | | | | | |
| (Added water) | | 12 | | | | | | | |
| | | | | | | | | | |
| | | 13 | | | | | | | |
| | | | | | | | | | |
| | | 14 | | | | | | | |
| | | | | | | | | | |
| | | 15 | | | | | | | |
| | | | | | | | | | |
| | | 16 | | | | | | | |
| Light grey, reddish-yellowish-tan, fractured SHALE | ML/SM | | SPT | | | | | | |
| with thin veins of dark brown clay; moist, | | 17 | | | | | | | |
| stiff/medium dense | | | XXX | 14 | 48.8 | 44.6 | | | 3.0 |
| | | 18 | | | | | | | |
| | | | | | | | | | |
| (Added water) | | 19 | | | | | | | |
| Same | ML/SM | | | | | | | | |
| | | 20 | | | | | | | |

DEPTH 25.5'

SOIL SURVEYS GROUP, INC.

# EXPLORATION DRILL LOG

HOLE NO. B-1 CONTINUED

| DESCRIPTION | SOIL TYPE | DEPTH | SAMPLE | BLOWS PER FOOT | DRY DENSITY (pcf) | WATER CONTENT % | LIQUID LIMIT | PLASTIC LIMIT | POCKET PEN. (tsf) |
|---|---|---|---|---|---|---|---|---|---|
| Light tan, light reddish-yellowish-tan, fine grained | ML/SM | | SPT | | | | | | |
| sand, cemented SILT/SHALE with thin veins of | | 21 | | | | | | | |
| dark grey clay; moist, very stiff/medium dense | | | XXX | 20 | 49.5 | 45.8 | | | 2.5 |
| | | 22 | | | | | | | |
| | | | | | | | | | |
| | | 23 | | | | | | | |
| | | | | | | | | | |
| | | 24 | | | | | | | |
| Light grey with iron staining, fractured siliceous | ML/SM | | SPT | | | | | | |
| SHALE with thin veins of dark brown clay and light | | 25 | | | | | | | |
| tan silt; moist, hard/very dense | ML/SM | | XXX | 57 | 52.0 | 32.2 | | | 0.25 |
| Bottom of the boring at 25.5' | | 26 | | | | | | | |
| | | | | | | | | | |
| | | 27 | | | | | | | |
| | | | | | | | | | |
| | | 28 | | | | | | | |
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| | | 29 | | | | | | | |
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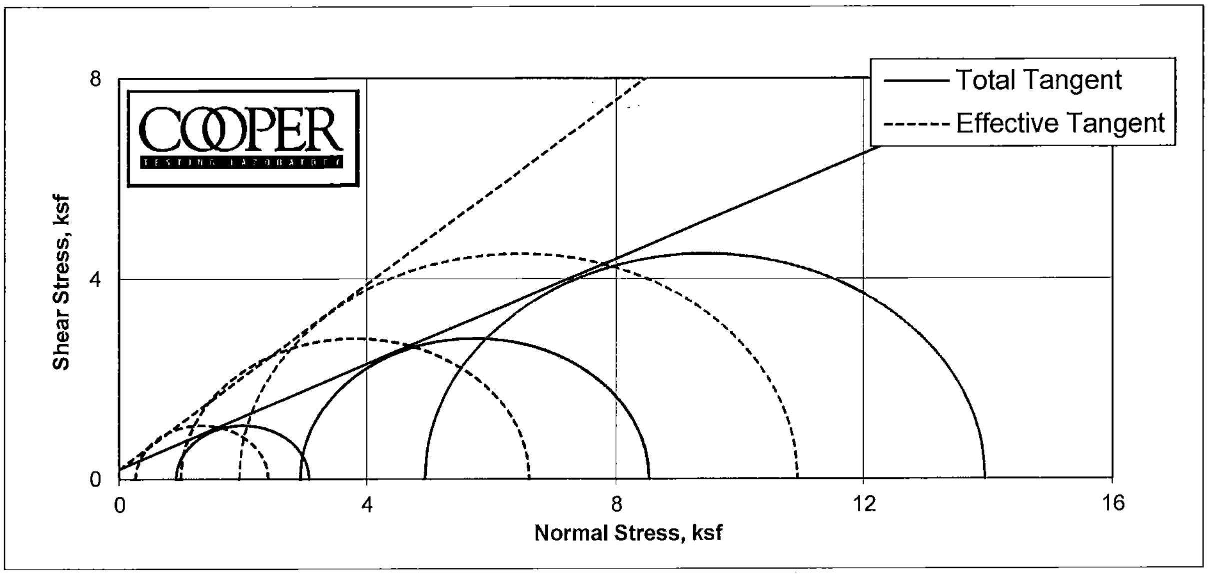
| | | 41 | | | | | | | |
| | | | | | | | | | |
| | | 42 | | | | | | | |
| | | | | | | | | | |

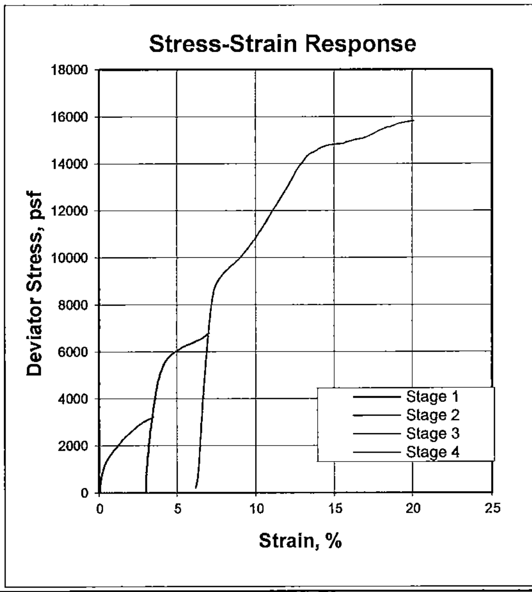
DEPTH 25.5'    Job #6945    SOIL SURVEYS GROUP, INC.

# APPENDIX B

## DIRECT SHEAR TEST

# Staged Consolidated Undrained Triaxial Compression with Pore Pressure
ASTM D4767m




| | | | |
|---|---|---|---|
| **CTL Number:** | 699-091 | | |
| **Client Name:** | Soil Surveys | | |
| **Project Name:** | | | |
| **Project Number:** | 6945 | | |
| **Date:** | 2/5/2018 | By: | MD/DC |
| **Total C** | **0.200** | **ksf** | |
| **Total phi** | **27.7** | **degrees** | |
| **Eff. C** | **0.200** | **ksf** | |
| **Eff. Phi** | **42.7** | **degrees** | © |

| **Stage** | **1** | **2** | **3** | **4** |
|---|---|---|---|---|
| **Boring** | B1 | | | |
| **Sample** | | | | |
| **Depth** | 3.33-3.83 | | | |
| **Visual Description** | Yellow Rock | | | |
| **MC (%)** | 44.0 | | | |
| **Dry Density (pcf)** | 63.8 | | | |
| **Saturation (%)** | 72.4 | | | |
| **Void Ratio** | 1.642 | | | |
| **Diameter (in)** | 2.42 | | | |
| **Height (in)** | 5.01 | | | |
| | **Final** | | | |
| **MC (%)** | 56.7 | 55.1 | 54.3 | |
| **Dry Density (pcf)** | 66.6 | 67.7 | 68.3 | |
| **Saturation (%)** | 100.0 | 100.0 | 100.0 | |
| **Void Ratio** | 1.530 | 1.488 | 1.466 | |
| **Diameter (in)** | 2.37 | 2.39 | 2.42 | |
| **Height (in)** | 4.98 | 4.84 | 4.68 | |
| **Cell Pressure (psi)** | 86.8 | 100.8 | 114.8 | |
| **Back Pressure (psi)** | 80.4 | 80.5 | 80.5 | |
| | **Effective Stresses At:** | | | |
| **Strain (%)** | 1.3 | 1.4 | 1.5 | |
| **Deviator (ksf)** | 2.147 | 5.617 | 8.998 | |
| **Excess PP (psi)** | 4.6 | 13.3 | 20.8 | |
| **Sigma 1 (ksf)** | 2.408 | 6.611 | 10.935 | |
| **Sigma 3 (ksf)** | 0.261 | 0.994 | 1.938 | |
| **P (ksf)** | 1.334 | 3.802 | 6.437 | |
| **Q (ksf)** | 1.073 | 2.809 | 4.499 | |
| **Stress Ratio** | 9.230 | 6.653 | 5.644 | |
| **Rate (in/min)** | 0.0005 | 0.0005 | 0.0005 | |

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