H & T SOILS TESTING

PRELIMINARY SOILS INVESTIGATION & FOUNDATION STUDIES

FILL CONTROL

344 N. LINCOLN STREET • ORANGE, CA 92866

PHONE/FAX (714) 997-0679

PRELIMINARY SOILS AND FOUNDATION INVESTIGATION

2.85 acre site to be subdivided into 39 detached homes, located on the south side of Starr Street commencing approximately 200 feet east of Beach Blvd. and extending southward from Starr St. approximately 300 feet. Address 8042 Starr Street, Stanton, CA.
Tentative Tract No. 17286

Owner-Developer:	Brandywine Homes 16580 Aston Irvine, CA 92606 Mr. Jim Barisic Phone (949) 296-2400 FAX (949) 296-2420
Site Engineer:	DMS Consultants 12377 Lewis Street, #101 Garden Grove, CA 92640 Surender M. Dewan, RCE 3455 Phone (714) 740-8840
Architect:	Langston-Steichen Associates 2021 Fourth Street Santa Ana, CA 92705 Phone (714) 667-8247

Job No. F08-41

September 19, 2008

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Site Engineer:	**DMS Consultants (Surender Dewan)**
Architect:	**Langston-Steichen Associates**

INTRODUCTION

Pursuant to authorization by Brandywine Homes and a site map provided by DMS Consultants, we have proceeded with a geotechnical soil study on the subject 2.85 acre property, which is the southerly portion across the street of the overall Hobby City property.

Our complete soils investigation took place over a period of approximately one month and consisted of four separate field inspections, during which time the complete area was investigated. Exploratory borings were conducted along with complete soil sampling procedures. All of our work is in complete compliance with provisions as outlined in the Uniform Building Code, Chapter 70, along with additional modifications by the California Building Code as well as building and grading ordinances for the City of Stanton.

We were already involved in a number of housing projects in the City of Stanton, and we have been performing soils engineering in Stanton over the past forty-five years.

We have conferred with Mr. Allan Ansdell representing Hobby City, and he unlocked the rear gate so we could gain access to all portions of the site in order to conduct our soils investigation.

The property is roughly square in shape, with a frontage along Starr Street of 414 feet and a depth southward of 300 feet. The approximate easterly one-third of the site is a parking facility with curbs, gutters, tree islands and asphaltic concrete, which is an excellent condition. The remaining central and westerly portion of the site of approximately two-thirds of an acre is abandoned land for the southerly half and up the westerly side towards the north. The remaining northeasterly quadrant contains houses, sheds, driveways and trees.

GENERAL SITE CONDITIONS AND SITE TOPOGRAPHY

The overall site is reasonably flat and level with a very slight general slope towards the southwest, which is typical of all of this portion of Orange County. The easterly parking lot has an excellent paved surface of asphaltic concrete and is very flat but would probably drain slightly towards the south. The lowest portion of the property is in the southwest corner, which would be the normal slight gradient of the land. However, it also appears that this portion was excavated from 1.0 to 2.0 feet in depth, and the soils were used to generate small mounds or miniature playground type hills towards the southeasterly area. Heavy dried marsh grasses have grown in the low area, which in times of precipitation, probably became somewhat swampy. However, at the present time everything is extremely dry and all of the vegetation is in a very dry state.

There are numerous trees on the property as can be seen from the aerial photograph. The northerly central portion where the houses exist have a considerable amount of landscaping along with concrete driveways and fences. There is a concrete block wall up the west property line and along the south property line. However, the driveway facility has a chain link fence along the easterly property line and also separating it from the remainder of the property to the west.

GENERAL SURFACE AND SUBSURFACE SOIL CONDITIONS

There is no evidence of any blanket type fills on the site; however, there are some man-made earth ridges or mini-hills in the south central region along with some igloo type concrete structures that were evidently part of a recreational site at some time in the past. All of this area is totally abandoned at this time, and all of the grasses are dead. There is a considerable amount of debris and junk at this location, which will all require removal. All of this grass vegetation and the trees will have to be removed along with any grass sod or organic material near the surface.

All of the soils on the site fall into the silty fine sand or clean fine sand and fine to medium sand, with very low moisture content. The only moist soils on the total property would be in portions along the perimeter where some form of sprinkler systems are present.

There are some large trees located in the parking lot and inside the two or three main dwellings where landscape is involved. There are also a number of trees over towards the northwest portion. All of these will probably be removed, as it does not appear that any of them can be saved with the layout of the thirty-nine new proposed residences.

A large amount of cleanup will be involved. Our firm will provide daily inspection and control of both the cleanup operations, followed by the satisfactory excavation and recompaction of all structural earth materials.

FIELD EXPLORATION AND SAMPLING OPERATIONS

Four separate site investigations were carried out over the past month. A total of five (5) 6-inch diameter power auger borings were drilled at the approximate four corners and the approximate center of the site wherever it was possible to gain access. A series of soil samples were procured and both disturbed and undisturbed soil sampling was undertaken with all of the soil samples sealed in moisture-tight containers and transported to the laboratory for a comprehensive soil testing program.

Only clean, approved soils will be used for grading purposes. After the cleanup has been completed, all of the existing native soils can be utilized and are classified as slightly silty very fine to fine sands with some clean fine sands and a small amount of fine to medium sands with occasional pebbles below the surface.

The overall property has an elevation of approximately 80 feet above sea level, and there was no evidence whatsoever of any perched or true groundwater aquifer to the depth explored. Based on past experience, the true groundwater surface is at a depth of 50 feet or more, which will present no problem whatsoever for any of the underground utility lines and for any type of unstable soil conditions. The final building pads will provide a solid, permanent and secure foundation for the proposed homes.

LIQUEFACTION CRITERIA

The true depth of the groundwater permanent aquifer would be at a depth of 50 feet or more. This is a result of infiltration from the Santa Ana River settling basins. After the site has been completely cleaned so that all of the vegetation and trees are removed and all tree basins completely cleaned, the total building pads will be excavated a depth of 3.0 feet below the final graded surface. All final compacted soils will have at least 90%, averaging about 93%. All of the soils are non-expansive and with proper mixing of these earth materials and a high degree of compaction, the void ratio will be very low and will be relatively impervious to upward moisture migration. It is therefore concluded that potential liquefaction on this site due to seismic activity would be considered low to nil.

SEISMIC INFORMATION

The north portion of Stanton along with the rest of Stanton is situated in the central region of Orange County and somewhat towards the west side. There are no known active faults in proximity to or on the subject site. We have included the Major Faults and Activities Within 100 Mile Radius.

Table 1.
MAJOR EARTHQUAKES WITHIN 100-MILE RADIUS (1) (2) (4)

DATE	LOCATION	CAUSATIVE FAULT SYSTEM	RICHTER MAGNI-TUDE	APPROX. DISTANCE (IN MILES) TO SITE	EST. MAX. BED-ROCK ACCEL. AT SITE (g) (3)
4/21/18	Hemet Riv. County	San Jacinto	6.8	56 (SE)	0.7
4/23/23	Box Spr. Mt. Riv. Co.	San Jacinto	6.3	52 (SE)	0.7
3/11/33	Newport Bch Orange Co.	Newport-Inglewood	6.3	22 (S)	0.12
3/25/37	Clark Lake Riv. County	San Jacinto	6.0	96 (SE)	0.02
12/4/48	Thous. Palms Riv. County	San Andreas	6.5	94 (E)	0.02
3/19/54	Rabbit Peak San Diego Co.	San Jacinto	6.2	99 (SE)	0.02
2/9/71	San Fernando L.A. Co.	Sierra Madre	6.4	44 (NW)	0.04
2/21/73	Pt. Mugu Ventura Co.	Malibu Coast	6.0	64 (NW)	0.03
10/1/87	Whittier L.A. Co.	Whittier-Elsinore	6.1	8 (N)	0.18

(1) CDWR Bulletin, #116-2, 1964
(2) Hileman, 1973, and Friedman, 1976
(3) Schnabel and Seed, 1973
(4) Real, Toppozada and Parke, 1978

Table 2.
Probability of Ground Acceleration

Acceleration of Gravity	Probability of One Occurrence per 100 Years
0.05	97%
0.10	90%
0.15	66%
0.20	45%
0.30	29%
0.35	18%

Based on earthquake requirements as outlined in the 1997 Uniform Building Code and the modified California Building Code information, seismic coefficients are outlined as "Site Categorization Procedure."

Soil Profile: S_D The soils on the subject site would be classified in this range as medium dense soil, having a velocity between 600 feet per second and 1200 feet per second and N > 30.

Table 16S – Near-Source Factor (N_a) with a distance greater than 10 kilometers (6 miles), N_a = 1.0, distance 11 kilometers, maximum magnitude 6.9.

Some shaking that could be considered of a significant nature has taken place from earthquakes as would apply to most of central Orange County. However, based on our testing over the last 50 years in this area there has been no reported or visible structural damage to any homes in this portion of Orange County or in the vicinity of this site. The new subdivision will have excellent excavated and recompacted soils for the building pads.

Southern California is considered susceptible to a large earthquake, and design must be in accordance with the Uniform Building Code. Statistical analysis of earthquake records for California would indicate that a ground acceleration of 0.25 to 0.35 would have a 20% probability, based on a 50-year life structure. This is predicated on the repeatable high ground acceleration being approximately 65% of maximum ground acceleration.

The present building codes and our knowledge of this site would indicate category S_D, where the typical soils would be firm, alluvial type material such as stiff clays or dense silty sands. Table 16-S – Near-Source Factor (N_a) with a distance greater than 10 kilometers, N_a=1.0; Table 16-T N_v) = 1.0. The maximum fills that will be placed on the site will be on the order of about 3.0 feet. Including the excavated areas there would be from 5 to 6 feet of solid, compacted soils representing the building pads.

FILL DEPTHS

The maximum fill depths that will be placed on this property would be on the order of approximately 3.0 feet, with most of the areas having from 1.0 to 1.5 feet in depth. In addition to that, the building pads will be excavated for at least 3.0 feet with the underlying soils processed and compacted, which will result in a 5 to 6-foot thick area of solid compacted structural fill that the building foundations will rest on.

PERIMETER CONCRETE BLOCK WALLS

The lower portion of the perimeter concrete block walls will be retaining as the inside soils will probably be raised 1.0 to 2.0 feet above the surrounding outside property. Our normal procedure for any new concrete block walls where the lower portion are used as retaining walls will be to excavate the soils approximately 8 to 10 feet wide to a depth of approximately 3.0 feet, and to recompact these soils so that when the new wall foundations are excavated they will be into competent structural fills that will have at least 90% compaction.

LABORATORY TESTING PROGRAM

The native soils on the property that will comprise the bulk of the grading operations are uniform in composition and are described as clean or slightly silty, slightly micaceous, very fine to fine sands with some pebbles at depth. Import soils will be inspected and approved and will be of similar composition. A maximum density determination was conducted in accordance with A.S.T.M. D1557-70T, modified to use 25 blows on each of five layers with a 10-pound hammer falling 18 inches in a mold of 1/30 cubic foot volume.

<u>Soil Type A</u>: Gray-brown very fine to fine sandy silt; Maximum Density 112.9 p.c.f. at 11.9% Optimum Moisture;

<u>Soil Type B</u>: Tan and light brown slightly silty very fine to fine sand; Maximum Density 109.8 p.c.f. at 9.3% Optimum Moisture; and

<u>Soil Type C</u>: Brown very fine to fine sandy silt with occasional small pebbles; Maximum Density 117.8 p.c.f. at 12.8% Optimum Moisture.

Expansion Tests

The results of expansion tests performed on the remolded samples of the typical foundation soils, compacted to over 90% and set up to be equal to 50% saturation, and then measured to full 100% saturation after a period of several days and until no further expansion occurred in a 24-hour period in accordance with Table 29-C of the Uniform Building Code, are as follows:

Expansion Test Results

Soil Type	Confining Load	Expansion Index	% Expansion
A	144 p.s.f.	5	0.5
B	144 p.s.f.	2	0.2
C	144 p.s.f.	7	0.7

As indicated in Table 29-C of the Uniform Building Code, "Classification of Expansive Soils," the typical earth materials are clean sands or silty fine sands and they fall into the classification of very low potential expansion. During the excavation and grading procedures, any new soils that are involved will be properly tested, along with any import soils that might be involved. It appears at this time that all of the soils involved will be non-expansive sandy-type earth materials. This foundation report will provide the required minimum reinforcement of the foundations to allow for minor seasonal volume change or limited post-construction residual settlement after all of the grading and compaction has been completed.

ALLOWABLE SOIL BEARING VALUES

The results of laboratory tests on the typical native soils determined an angle of internal friction of 26° with 100 p.s.f. available cohesion. These strength parameters were determined utilizing a direct shear machine and saturated samples with a rate of strain of 0.050 inch per minute.

In accordance with the Terzaghi Bearing Capacity Equation with a factor of safety of 3.0, the following calculations have been determined:

$$\begin{aligned} q &= CNc + wDfNq + wBNw \\ &= 100(23) + 100(1.0)12 + 100(0.5)10 \\ &= 2300 + 1200 + 500 \\ &= 4000 \text{ p.s.f. (ultimate)} \end{aligned}$$

q_a = 1330 p.s.f. (allowable for square or continuous footings not less than 12 inches wide and embedded at least 12 inches below approved finished grade);

q_a = 1415 p.s.f. (allowable for square or continuous footings not less than 18 inches wide and embedded at least 12 inches below approved finished grade);

q_a = 1500 p.s.f. (allowable for square or continuous footings not less than 24 inches wide and embedded at least 12 inches below approved finished grade);

q_a = 1580 p.s.f. (allowable for square or continuous footings not less than 30 inches wide and embedded at least 12 inches below approved finished grade);

q_a = 1530 p.s.f. (allowable for square or continuous footings not less than 12 inches wide and embedded at least 18 inches below approved finished grade);

q_a = 1615 p.s.f. (allowable for square or continuous footings not less than 18 inches wide and embedded at least 18 inches below approved finished grade);

q_a = 1700 p.s.f. (allowable for square or continuous footings not less than 24 inches wide and embedded at least 18 inches below approved finished grade);

q_a = 1780 p.s.f. (allowable for square or continuous footings not less than 30 inches wide and embedded at least 18 inches below approved finished grade);

q_a = 1730 p.s.f. (allowable for square or continuous footings not less than 18 inc24 wide and embedded at least 124 inches below approved finished grade);

q_a = 1815 p.s.f. (allowable for square or continuous footings not less than 24 inches wide and embedded at least 24 inches below approved finished grade); and

q_a = 1900 p.s.f. (allowable for square or continuous footings not less than 30 inches wide and embedded at least 24 inches below approved finished grade).

NOTE: All allowable soil bearing pressures may be increased by a factor of one-third when considering momentary wind and/or seismic loading which are not considered to act simultaneously and are in accordance with the Uniform Building Code. In accordance with the City of Stanton and the Uniform Building Code, single-story structures may use a 12-inch deep footing; two-story structures an 18-inch deep footing; and 3-story structures a 24-inch deep footing.

ACTIVE PRESSURES

For design of free-standing retaining walls where native soils or similar import soils are utilized for backfill which are sandy in nature and not clays, we recommend that the active pressure be 30 p.c.f. equivalent fluid pressure where there is a level backfill against the retaining wall

If a rising slope occurs behind the wall at a 2:1 angle, then the active pressure should be increased to 40 p.c.f. equivalent fluid pressure. If the retaining wall is fixed at the top, such as in the case of a building foundation wall, then the active pressure should be increased to 50 p.c.f. equivalent fluid pressure.

LATERAL RESISTANCE SOIL CRITERIA

For determining lateral resistance and foundation design, passive pressures of 300 p.s.f. per foot of depth may be used, up to a maximum of 2400 p.s.f. a coefficient of friction of 0.35 can be used for lateral resistance for all foundations making contact with the approved building pad. If this value is used in conjunction with the passive pressure, then the coefficient of friction may be left at 0.35 but the passive pressure should be reduced to 250 p.s.f. per foot of depth.

The lateral resistance from coefficient of friction is determined by taking the actual load of the building on the soil times the foundation area times the coefficient of friction.

SETTLEMENT INFORMATION

The results of undisturbed sampling near the surface indicate a considerable amount of settlement under the present soil conditions. The results were plotted on semi-logarithmic graphs, and a tangent to the curves has been determined through the proposed pressure zones that would be applicable. The compression indices for these test results were:

Cons. I

$$\frac{C_1}{T_0} = \frac{0.79-0.64}{0.79} = 0.19$$

Cons. II

$$\frac{C_t}{T_o} = \frac{0.86-0.76}{0.86} = 0.012$$

Total Calculated Settlement Table
(inches)

	Low	High
Single story	1.6	2.4
Two story	1.8	2.8

The total amounts of calculated settlement under the present soil conditions are high because the near surface soils where the samples were taken are in a very dry, loose condition. The purpose of these tests is just to indicate how much settlement could occur if no excavation and recompaction were undertaken.

After a supervised and tested grading operation has been conducted where the top 3.0 feet of the existing native soils are removed, with the underlying soils watered and processed for an additional foot, and all of the replaced structural fill material is at near optimum moisture and compacted to at least 90% averaging about 93%, the final post-construction differential settlement for will be ½ -inch or less over the span of the proposed foundation and approximately ¼-inch or less between adjacent structural loads. This will apply to all 39 houses. Horizontal reinforcement will be outlined in this report. Final post-construction differential settlement will be well within design tolerances for a reinforced concrete foundation as well as a post-tensioned type of reinforced concrete foundation slab.

SHRINKAGE

The typical earth materials are dry and loose near the surface, and a slight increase in compaction was observed with depth. Our test results indicate an average of 82% for the near surface soils. Assuming that the average compaction will be 93% and about a 4% wastage factor, our calculations indicate that approximately 17% shrinkage in the cut and fill grading operations.

SUBSIDENCE

As the present soils are not highly compacted and are dry, our best estimate is that there will be approximately 0.20 foot of overall subsidence for the underlying ground when it is processed and recompacted and the final structural fills are placed upon it. All of these factors must be considered in determining the overall shrinkage factor in the cut and fill grading operations.

GENERAL EXCAVATION PROCEDURES

Only clean stockpiled soils may be utilized in the overall grading. The remainder of landscaping soils or mulches will be removed from the site. All of the existing junk and surface debris will require removal from the property along with all organic material, grass, sod and dried grasses and marsh organic materials.

For all of the building pads and extending 5 feet beyond the limits of the proposed foundations, they will be excavated for a depth of 3 feet below the final ground level. For the street and driveway areas we would recommend that at least 1 foot of the native soils be removed, with an additional 6 inches of processing and watering below that depth.

The bottom of all of the building pad excavations must be scarified for at least 6 inches, heavily watered and properly mixed. Heavy rolling with tractor equipment, rubber-tired equipment or sheepsfoot rollers will produce excellent compaction when the soils are brought to near or slightly over optimum moisture. A large amount of water will be needed in these soils as they are all below optimum moisture at the present time.

NOTE: If any vertical cuts are required in these dry soils, some caving can be anticipated. However, with an addition of moisture with the use of fire hoses or water trucks, it is our opinion that these soils will stand vertical for about 3.0 feet over a short period of time. It might be necessary to cut back deeper trenches to a 1:1 or provide adequate shoring if they are cut down into the underlying clean sands and are subject to caving.

GENERAL SITE CLEANUP

All of the existing houses and sheds will require removal from the front central portion of the property. There will be a large amount of concrete driveway and other concrete foundations to be removed from these areas. The large parking facility on the east side of the property will also have to be totally excavated. It might be possible to utilize the concrete curbing and gutter areas where the material can be broken up into pieces not larger than 6 inches and free of any reinforcing steel. This type of broken concrete could be utilized in the overall deeper fills with proper spacing of clean earth materials around it. It must not interfere with any of the trenching that will be involved for the underground utilities, so it will be limited where it can be utilized.

It is also considered a reasonable possibility that all of the asphaltic concrete could be pulverized with the use of an on-site type of asphalt pulverizing machine, which can break this asphalt up into pieces of approximately ½ inch or less in diameter. This pulverized asphaltic concrete could be utilized in the overall fill operations, especially in the lower portion which would actually give added stability to the compacted earth materials.

A careful search will be made during all of the excavation operations to look for old sewage disposal systems. If any septic tanks are involved, they will be completely excavated. If any wells are encountered, they must be capped at least 5 feet below grade with a cement plug or by welding a steel plate over the top of them. All excavations must be inspected and approved by the soils engineer and backfilled with clean soils that are compacted to a minimum of 90%.

If any metal pipes or irrigation lines are encountered, they must be completely excavated and removed. If old concrete irrigation lines are anywhere on the site, they can be broken up by crushing in place with the heavy grading equipment, and small pieces of concrete no larger than 6 inches in the maximum dimension could be incorporated in small quantities in the deeper fills.

COMPACTION PROCEDURES

The typical native soils are sandy in composition and will make excellent fill material. Any import soils will first be inspected and tested, and they can be silty sands or even some clayey sands. When mixed with the more sandy native soils, they will make a more impervious structural fill, which will have a higher maximum density.

The normal procedure is to excavate the property in phases. Watering with the use of fire hoses and water trucks will be required as the soils are well below optimum moisture at the present time. The water content will need to be raised to between 9% and 14%. With the right amount of water, good compaction can be attained with the use of heavy pneumatic wheelrolling, trackrolling and vibratory sheepsfoot rolling.

If the site has substantial perimeter concrete block walls where the lower portion will be a retaining wall, then a complete excavation for the wall footings will be undertaken. These excavations will also be taken to a depth of approximately 3 feet so that when the final wall foundations are poured, there will be at least 2 feet of compacted structural fill soil to provide the necessary support and allow these perimeter walls to remain vertical permanently and to support the increase in the height of the final soils on the site.

APPROVED ALLOWABLE SOIL BEARING PRESSURES

These compacted and tested building pads will then be satisfactory for allowable soil bearing pressures varying from a low of 1330 p.s.f. for a 12-inch wide and 12-inch deep footing, up to a maximum of 1900 p.s.f. for a 30-inch wide and 24-inch deep footing. It should be understood that single-story structures will have a minimum 12-inch deep footing and two-story structures will have a minimum 18-inch deep footing. The higher bearing value will tend to slightly increase the amount of settlement but still be within design tolerances.

Minimum Allowable Foundation Reinforcement

All of the soils that will be involved in this project will have low potential expansion; therefore, there will be very little volume change from seasonal variation from the moisture content. Settlement of the structures will be minimal; however, the complete site will require horizontal reinforcement. We recommend for minimum reinforcement that a #4 steel bar be placed in the top and one #4 steel bar in the bottom of all continuous bearing footings. Depth of footings will be as already outlined: 12-inch deep for single-story and18-inch deep for two-story. In all instances, the building codes and City of Stanton building department requirements will be adhered to. Final structural design of the foundations will be outlined with sufficient reinforcement.

Floor Slab Reinforcement

Minimum slab reinforcement is 6"x6"-10/10 welded wire mesh. However, as an alternate we would suggest #3 bars placed on 18- inch centers each way. A nominal 4-inch thick slab will be satisfactory.

All utility trenches that will be cut through the building pad areas must be backfilled with clean soils that are moistened and properly wheelrolled or tamped so that a firm, compact condition provides uniform support for the floor slabs.

Any excavated soils from the footing trenches or other loose soils that are placed beneath the slab area must be watered and wheelrolled so that in all cases a compact soil condition results.

Moisture Barrier

Where floor covering or offices are involved or where living area slabs are involved, then we would recommend a moisture barrier in the form of a 6-mil visqueen membrane, sealed or lapped at all joins. The membrane is normally protected with a few inches of sand above and below it, which will protect it and also assist the concrete slab to cure properly.

NOTE: If the final soils are sandy in composition and there are no sharp pebbles, then it might be possible to place the membrane directly on the final sandy soil building pad with only a few inches placed above the slab, which has worked quite well in the past.

The complete building pad should be of sufficient height above the surrounding area so that positive drainage can be maintained. All such drainage waters should be directed towards the driveways, streets and/or proper drainage systems.

PAVEMENT SECTION INFORMATION

The typical earth materials on the site are granular and have fair to moderate resistance to concentrated wheel loads. A conservative R-value of 30 would be applicable to these soils. All of the subgrade earth materials should have a minimum compaction of 90% for the upper 12 inches of subgrade. For all that fills are involved in the street areas they must also have at least 90% compaction.

A minimum section for interior streets would be 3.5 inches of asphaltic concrete placed over 4.0 inches of Class II type aggregate base, or 3.0 inches of asphaltic concrete placed over 5.0 inches of Class II type aggregate base.

Curb and gutter areas should also have a well-compacted subgrade and can be poured directly on an approved, properly compacted soil surface, however, in some instances it is helpful and beneficial to use a small amount of Class II base for added support.

SOLUBLE SULFATE

All of these earth materials are slightly silty or clean very fine to fine sands. Previous tests on the same type of earth materials from this vicinity indicate that per CTM-417 they would fall into the 250 to 500 parts per million range. This is a very low amount of soluble sulfate and all of the concrete foundations may use Type II cement with a compressive strength of 2500 p.s.i.

CONCLUSIONS AND SUMMATION

Our soil testing and geotechnical soil analysis in Orange County goes back to 1954. We have been actively engaged in soil testing procedures for all forms of subdivisions, shopping centers, streets, overpasses and bridges since 1958 all over Orange County and many jobs in the City of Stanton or the immediate vicinity.

This Preliminary Soils and Foundation Investigation has been conducted in accordance with all prevailing geotechnical soils engineering practices and building code requirements. Our laboratory and engineering analysis with the recommendations were based on soil samples over the complete site and good correlation was noted in the native, undisturbed soils. All of the earth materials on this site are reasonably similar in composition and other structural characteristics.

If any unusual soil conditions occur during the cleanup operation, we will be involved in the inspection and testing program. We will make any required changes or modifications as required. Based on what we have tested to date, we do not expect any significant change or modification of our testing and recommendations.

The firm of H & T Soils Testing will remain the controlling soils engineers for this project and we will be prepared for a pre-grading meeting prior to the commencement of overall cleanup and grading procedures. We will be available to provide field memos for any portion of the work as the City Inspector dictates. We will also provide a total Final

Report of Compacted Fill covering the complete operation from beginning to end, along with all of the required compaction testing procedures.

We thank you for this opportunity to be of continued service and we will be prepared to provide the remainder of the soils engineering work and would appreciate approximately one week's notice before our services are required. We will also be available for interpretation of this report or any additional soils information that might be required.

Respectfully submitted,

H & T SOILS TESTING

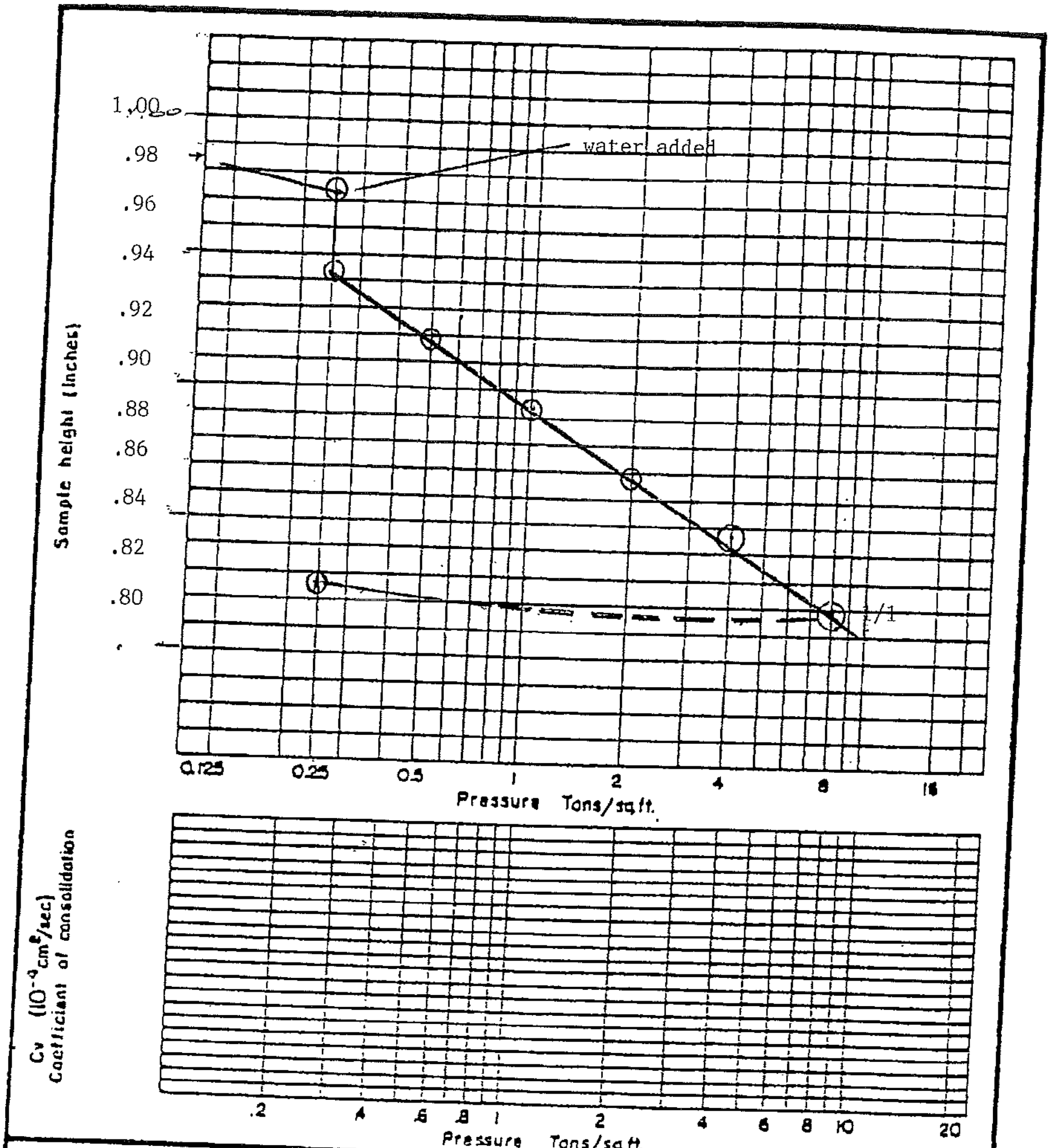
Ross Hammond,
Soils Consultant

Robert J. Nugent
R.C.E. 9200

REGISTERED PROFESSIONAL ENGINEER
No. 9200
Exp. 12-31-08
CIVIL
STATE OF CALIFORNIA

4 – Brandywine (incl.
wet-ink sigs. for Bldg. Dept.)

H & T SOILS ENGINEERING

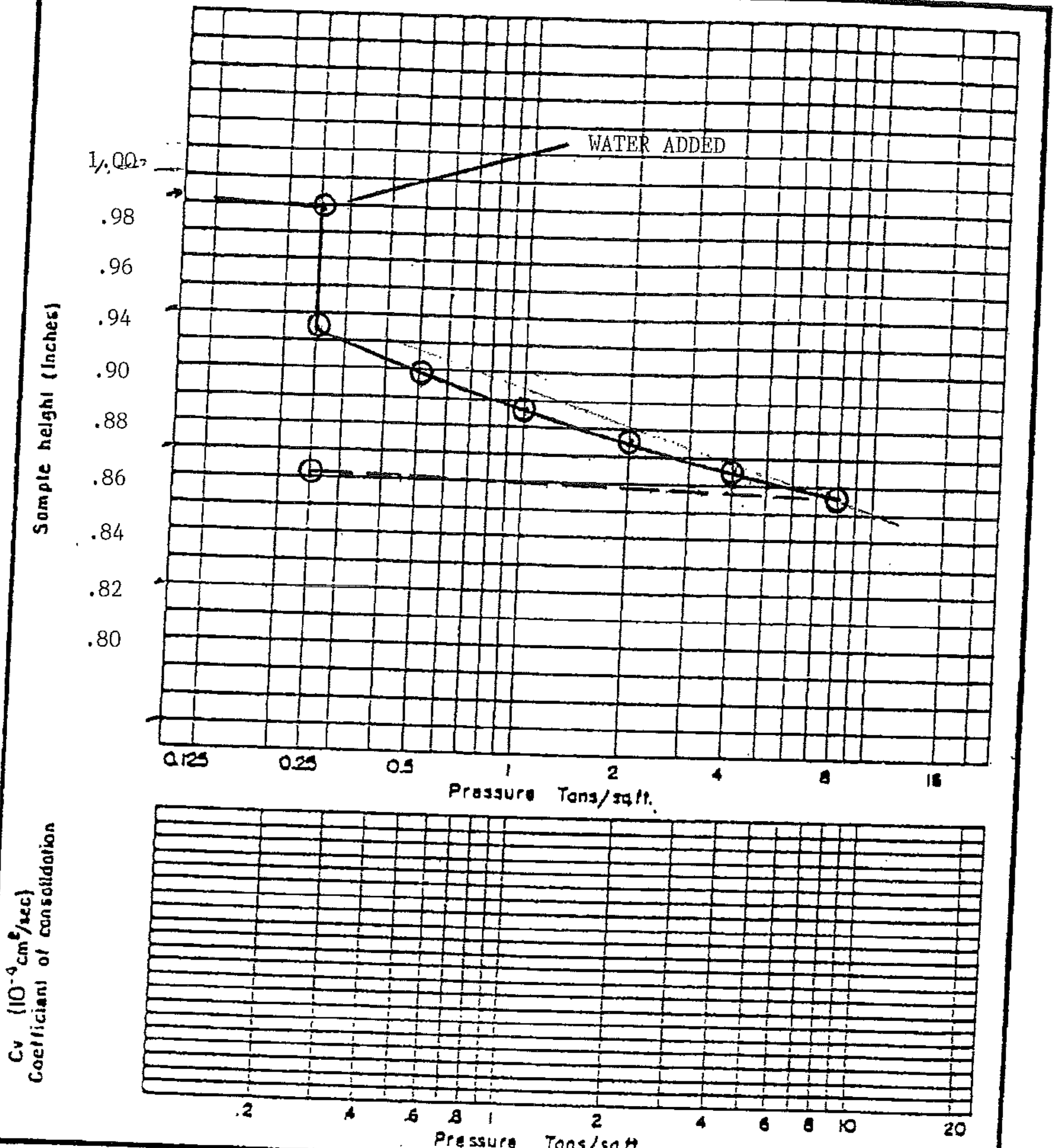


Project	2.85 acres, 8042 Starr St., Stanton	No. F08-41
Client	Brandywine Homes	
Boc/Sample No. 1/1	Depth - Elev.	Date 9-19-08

CONSOLIDATION TEST - PRESSURE CURVES

FIGURE I

H & T SOILS ENGINEERING



Project 2.85 acres, 8042 Starr St., Stanton	No. F08-41
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Boc/Sample No. Depth - Elev.	Date 9-19-08

CONSOLIDATION TEST - PRESSURE CURVES

FIGURE II

TEST BORING LOG

H & T SOILS ENGINEERING

Job No: F08-41

BORING NO: 1 & 2

Type

Depth in feet	Dry density (lbs./cu.ft.)	Moisture (%)	Relative Compaction %	Group Symbol	Sample No.	Soil description
0.0						Junk (grass & weeds 12" to 3 ft.)
	86.7	2.1	77			Dry loose black-brown organic very fine sandy silt.
	83.4	1.6	74			Alternating layers of tan dry to damp slightly silty very fine slightly compact sand
2.5		5.6				and
						damp brown slightly compact very fine sandy silt.
5.0						
7.5						TOTAL DEPTH 10.0 FT.

BORING 2

Depth in feet	Dry density (lbs./cu.ft.)	Moisture (%)	Relative Compaction %	Group Symbol	Sample No.	Soil description
0.0						Light dry grass sod 0.2 ft.
						Dry dark gray-brown slightly compact silty very fine sand.
	89.3	1.1	81			Very dry light brown loose slightly micaceous clean very fine to fine sand.
2.5						Alternating layers of clean fine sand and silty very fine to medium sand.
		1.3				
5.0						
7.5						
10.0						TOTAL DEPTH 10.0 FT.

TEST BORING LOG

H & T SOILS ENGINEERING

Job No: F08-41

BORING NO: 3 & 4

Depth in feet	Dry density (lbs./cu.ft.)	Moisture (%)	Relative Compaction %	Group Symbol	Sample No.	Type	Soil description
							BORING 3
0.0							Leaves & grass 0.2"
							Dark brown moist silty fine to medium sand.
2.5	100.7	11.3	86				
							Loose to slightly compact tan and light brown slightly silty very fine to fine sand with some clean very fine to medium sand layers.
		13.5					
5.0							
7.5							TOTAL DEPTH 7.6 FT.
							BORING 4
0.0							Loose organic damp topsoil)0.7 ft.)
							Dry loose to slightly compact tan slightly silty fine to medium sand, merging to
2.5							
							clean dry to slightly damp tan very fine sand with occasional fine sandy silt layers.
5.0							
7.5							TOTAL DEPTH 7.8 FT.

TEST BORING LOG

H & T SOILS ENGINEERING

Job No: F08-41

BORING NO: 5

Type / Depth in feet	Dry density (lbs./cu.ft)	Moisture (%)	Relative Compaction %	Group Symbol	Sample No.	Soil description
						BORING 5
0.0						Loose dark brown dry to moist fine sandy silt.
	98.7	4.5	84			Tan loose to slightly compact clean very fine sand with layers of micaceous damp light brown silty very fine to fine sand with occasional small pebbles.
2.5						
		6.2				
5.0						
						TOTAL DEPTH 6.0 FT.
7.5						

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

BOUNDARY CLASSIFICATIONS: Soils possessing characteristics of two groups are designated by combinations of group symbols

PARTICLE SIZE LIMITS

SILT OR CLAY	SAND			GRAVEL		COBBLES	BOULDERS
	FINE	MEDIUM	COARSE	FINE	COARSE		

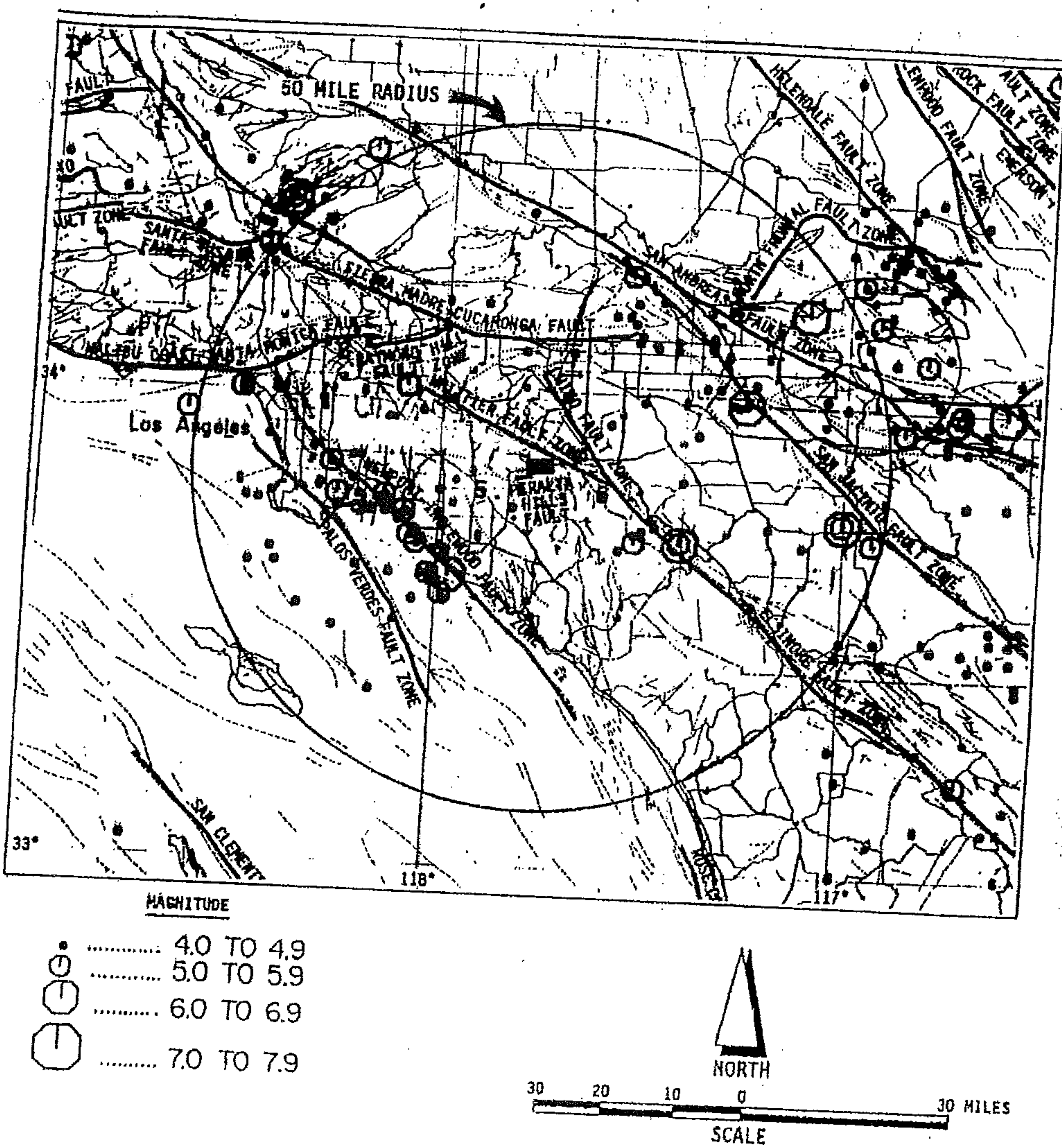
NO 200 — NO 40 — NO 10 — NO 4 — ¾ in — 3 in — (12 in)

U S STANDARD SIEVE SIZE

UNIFIED SOIL CLASSIFICATION SYSTEM

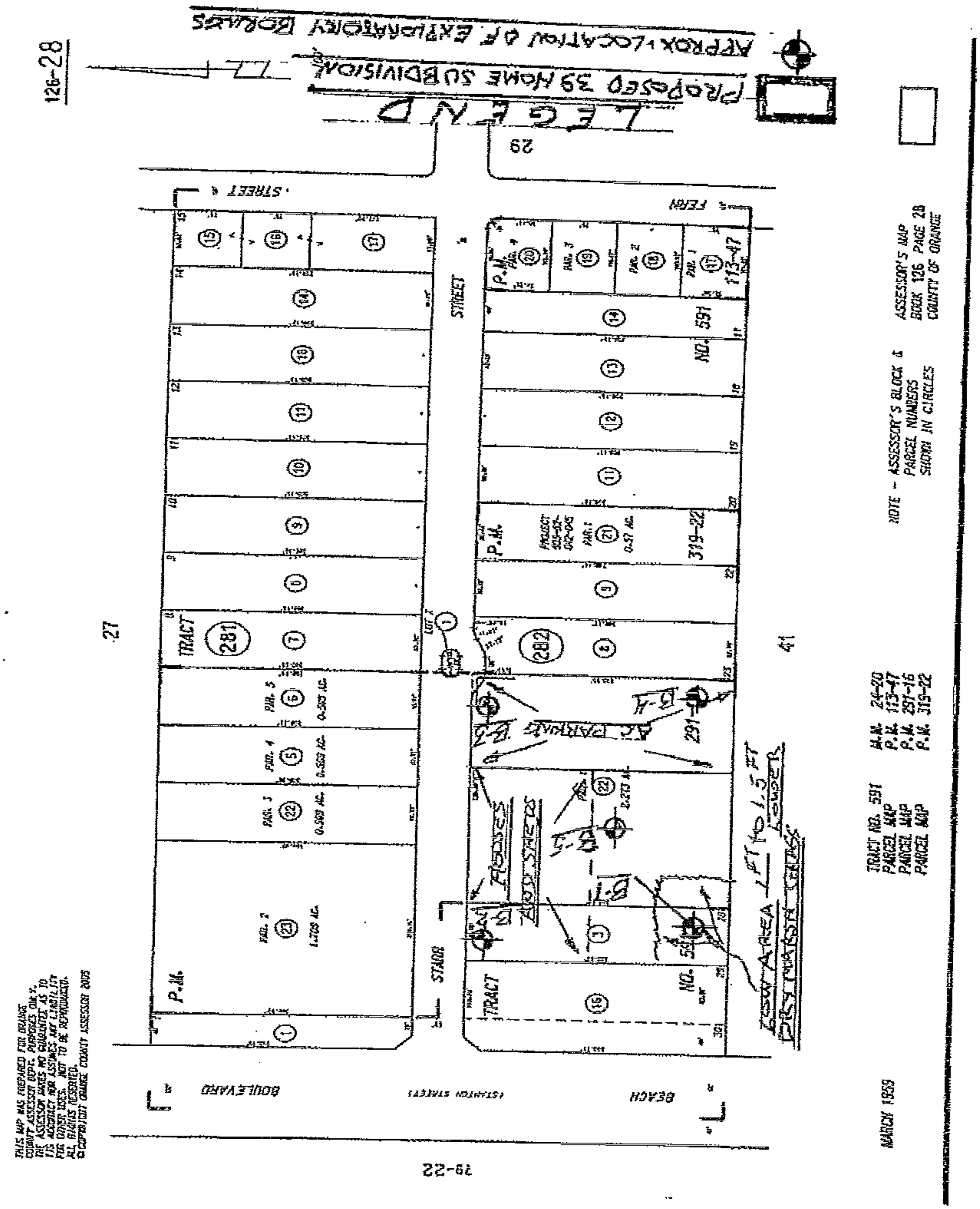
Reference
The Unified Soil Classification System, Corps of Engineers, U S Army Technical Memorandum No 3-357, Vol March, 953 (Revised April 1960)

Hammond Soils Testing
(H & T Soils Engineering)



Active Faults and Seismicity Map

Job No. F08-41 Brandywine
Tr. 17286, 8042 Starr, Stanton
H&T Soils Testing 8-19-08



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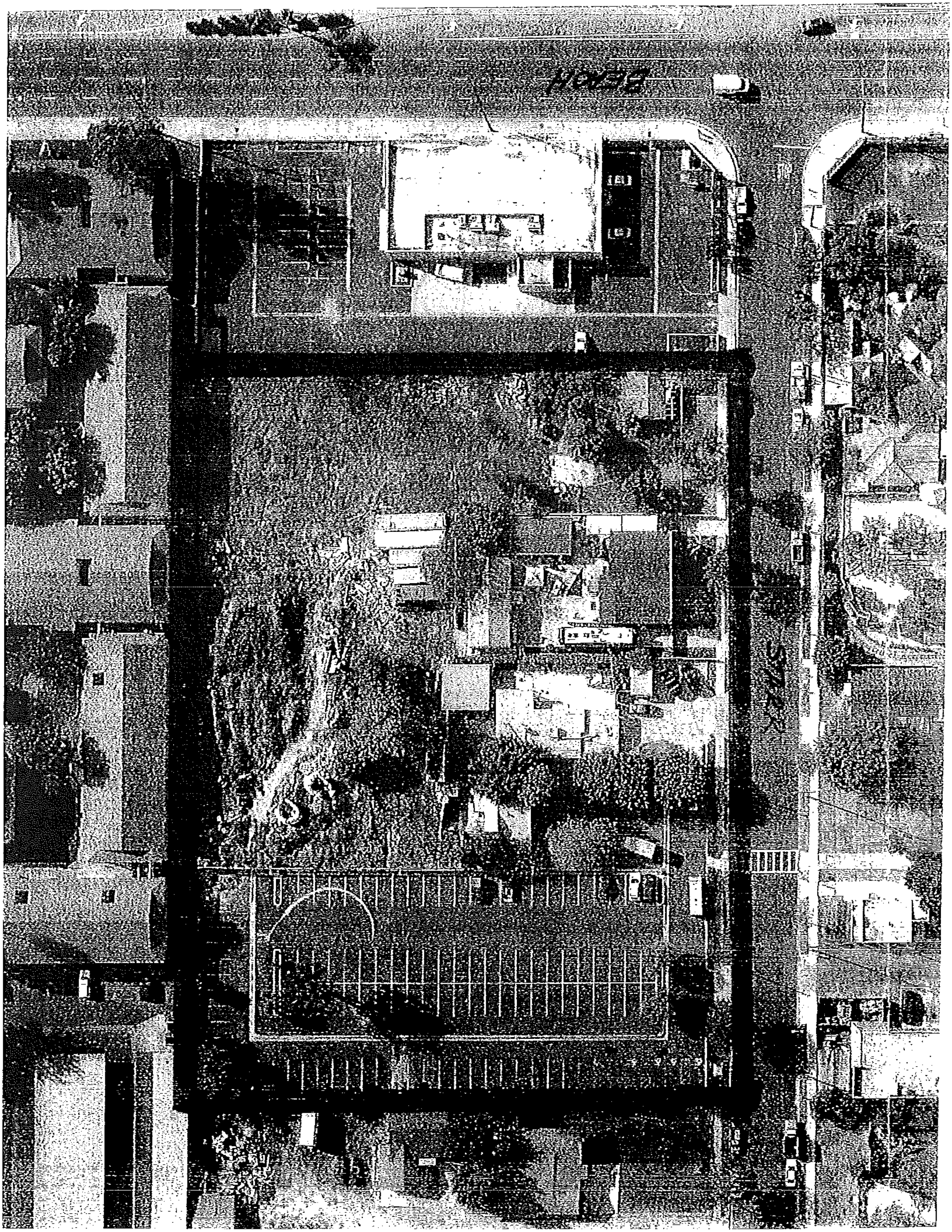
BEACH

Job No. F08-41 Brandywine
Tr. 17286, 8042 Starr, Stant
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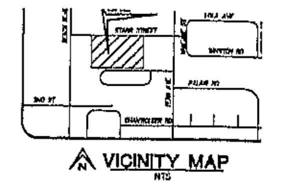

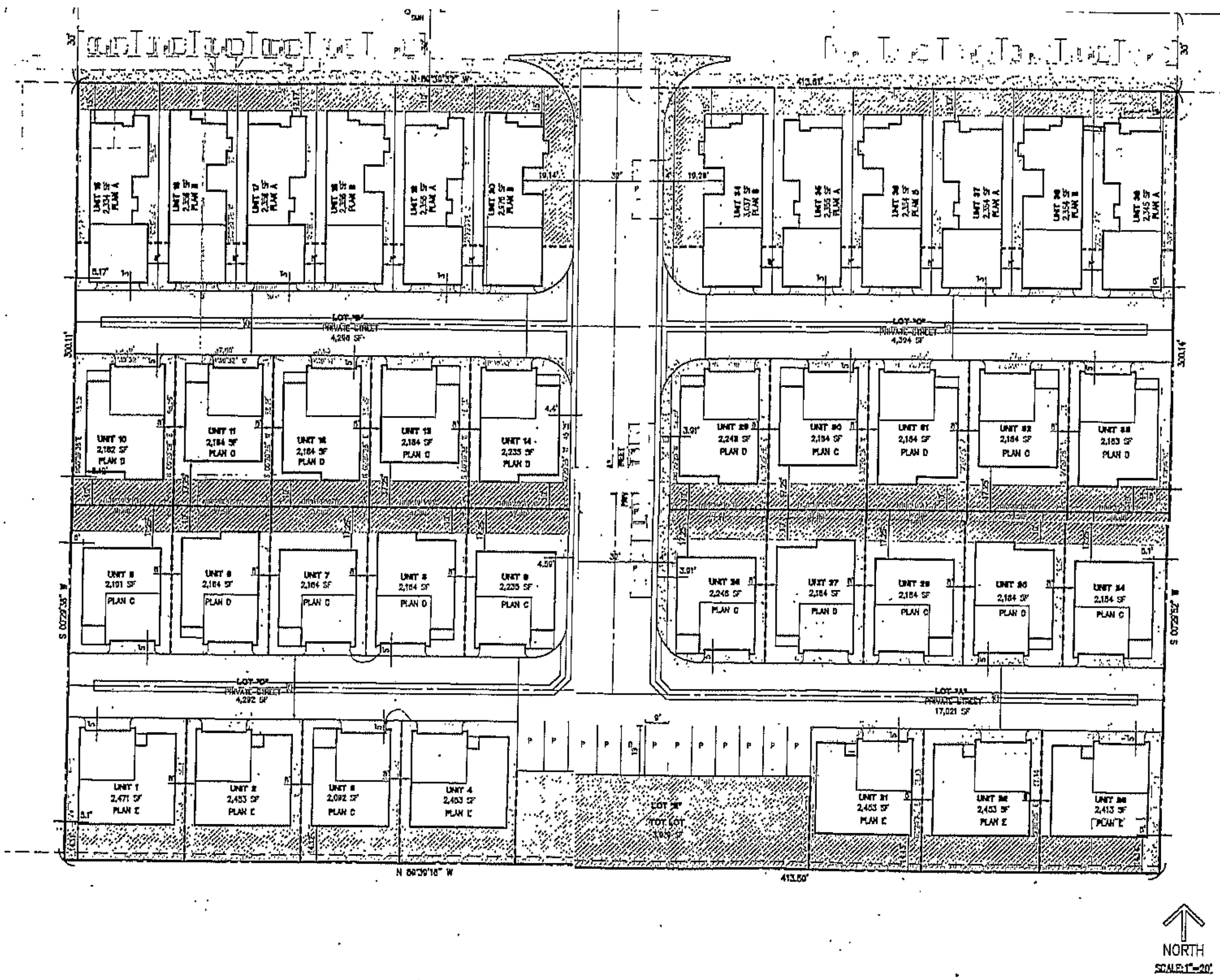

BUILDING SQ. FOOTAGE

- BUILDING A = 1605 SF
- BUILDING B = 1932 SF
- BUILDING C = 1474 SF
- BUILDING D = 1610 SF
- BUILDING E = 1909 SF

TOTAL NO. OF LOTS = 44
NUMBERED LOTS = 39
LETTERED LOTS = 5 (LOTS A TO E)

GROSS/NET AREA = 2.85 Acres
AREA FOR PRIVATE DRIVE = 0.60 Acres
TOTAL NUMBER OF UNITS = 39
DENSITY = 16.05 UNITS/ACRE

NO. OF COVERED PARKING SPACES = 78
NO. OF GUEST PARKING SPACES = 16

SURROUNDING ZONING AND USE

NORTH: C2– GENERAL COMMERCIAL
EAST: CR– COMMERCIAL RESIDENTIAL
SOUTH: R2– MULTIPLE FAMILY RESIDENTIAL
WEST: C2– GENERAL COMMERCIAL

EXISTING USE:

MEDIUM DENSITY RESIDENTIAL

PROPOSED USE

SINGLE FAMILY RESIDENTIAL

LIST OF UTILITY COMPANIES

WATER	– GOLDEN STATE WATER COMPA
SEWER	– CITY OF STANTON
DRAINAGE	– CITY OF STANTON
CABLE	– WARNER CABLE
GAS	– SOUTHERN CALIFORNIA GAS C
ELECTRICITY	– SOUTHERN CALIFORNIA EDISO

LEGEND

OPEN SPACE AREA
WOOD FENCE

ARCHITECT	BENCHMARK	PREPARED UNDER THE SUPERVISION OF:	OWNER'S	DEVELOPER	ASSESSOR PARCEL NO.
LANGSTON-STEICHEN ASSOCIATES 2021 4TH STREET Santa Ana, CA. 92705 PHONE (714) 667-8247	BM 10-83-74 ELEV: 64.616 DESCRIBED BY OCS 2002-FOUND 3 3/4" OCS ALUMINUM BENCHMARK DISK STAMPED "10-83-74", SET IN THE SE COR. OF A 4FT. BY 15FT. CONC. CATCH BASIN. MON. IS LOCATED IN THE NE COR. OF THE INT. OF KATELLA AVE. AND BEACH BLVD., 47FT. N OF C/L OF KATELLA AVE.	DMS CONSULTANTS, INC.	1. STANTON'S HOPE FOR THE FUTURE, LLC, A NEVADA LIMITED LIABILITY COMPANY	BRANDYWINE HOMES	CITY OF STANTON SITE PLAN TENTATIVE TRACT 17286

Conterminous 48 States
2003 NEHRP Seismic Design Provisions
Zip Code = 90680
Spectral Response Accelerations Ss and S1
Ss and S1 = Mapped Spectral Acceleration Values
Data are based on a 0.01 deg grid spacing

Period (sec)	Centroid Sa (g)	
0.2	1.385	(Ss)
1.0	0.502	(S1)

Period (sec)	Maximum Sa (g)	
0.2	1.434	(Ss)
1.0	0.515	(S1)

Period (sec)	Minimum Sa (g)	
0.2	1.376	(Ss)
1.0	0.498	(S1)

Conterminous 48 States
2003 NEHRP Seismic Design Provisions
Zip Code = 90680
Spectral Response Accelerations SMs and SM1
SMs = Fa x Ss and SM1 = Fv x S1
Site Class B

Period (sec)	Centroid Sa (g)	
0.2	1.385	(SMs, Fa = 1.000)
1.0	0.502	(SM1, Fv = 1.000)

Period (sec)	Maximum Sa (g)	
0.2	1.434	(SMs, Fa = 1.000)
1.0	0.515	(SM1, Fv = 1.000)

Period Minimum Sa
(sec) (g)

0.2	1.3[illegible]	(SMs, Fa = 1.000)
1.0	0.498	(SM1, Fv = 1.000)

Conterminous 48 States
2003 NEHRP Seismic Design Provisions
Zip Code = 90680
Spectral Response Accelerations SDs and SD1
SDs = 2/3 x SMs and SD1 = 2/3 x SM1
Site Class B

Period (sec)	Centroid Sa (g)	
0.2	0.923	(SDs)
1.0	0.334	(SD1)

Period (sec)	Maximum Sa (g)	
0.2	0.956	(SDs)
1.0	0.343	(SD1)

Period (sec)	Minimum Sa (g)	
0.2	0.917	(SDs)
1.0	0.332	(SD1)

Conterminous 48 States
2003 NEHRP Seismic Design Provisions
Zip Code = 90680
MCE Response Spectrum for Site Class B
Ss and S1 = Mapped Spectral Acceleration Values
Site Class B - Fa = 1.0 ,Fv = 1.0

Period (sec)	Sa (g)	Sd (inches)
0.000	0.554	0.000
0.072	1.385	0.071
0.200	1.385	0.541
0.362	1.385	1.774
0.400	1.254	1.960
0.500	1.003	2.450
0.600	0.836	2.940
0.700	0.716	3.430
0.800	0.627	3.920

0.900	0.557	4.410
1.000	0.501	4.900
1.100	0.456	5.389
1.200	0.418	5.879
1.300	0.386	6.369
1.400	0.358	6.859
1.500	0.334	7.349
1.600	0.313	7.839
1.700	0.295	8.329
1.800	0.279	8.819
1.900	0.264	9.309
2.000	0.251	9.799

Conterminous 48 States
2003 NEHRP Seismic Design Provisions
Latitude = 33.8147
Longitude = -117.9917
Spectral Response Accelerations Ss and S1
Ss and S1 = Mapped Spectral Acceleration Values
Site Class B - Fa = 1.0 ,Fv = 1.0
Data are based on a 0.01 deg grid spacing

Period (sec)	Sa (g)
0.2	1.393 (Ss, Site Class B)
1.0	0.503 (S1, Site Class B)

Conterminous 48 States
2003 NEHRP Seismic Design Provisions
Latitude = 33.8147
Longitude = -117.9917
Spectral Response Accelerations SMs and SM1
SMs = Fa x Ss and SM1 = Fv x S1
Site Class B - Fa = 1.0 ,Fv = 1.0

Period (sec)	Sa (g)
0.2	1.393 (SMs, Site Class B)
1.0	0.503 (SM1, Site Class B)

Conterminous 48 States
2003 NEHRP Seismic Design Provisions
Latitude = 33.8147

Longitude = -117.9917
Design Spectral Response Accelerations SDs and SD1
SDs = 2/3 x SMs and SD1 = 2/3 x SM1
Site Class B - Fa = 1.0 ,Fv = 1.0

Period (sec)	Sa (g)
0.2	0.929 (SDs, Site Class B)
1.0	0.336 (SD1, Site Class B)

Conterminous 48 States
2003 NEHRP Seismic Design Provisions
Latitude = 33.8147
Longitude = -117.9917
Spectral Response Accelerations SMs and SM1
SMs = Fa x Ss and SM1 = Fv x S1
Site Class B - Fa = 1.0 ,Fv = 1.0

Period (sec)	Sa (g)
0.2	1.393 (SMs, Site Class B)
1.0	0.503 (SM1, Site Class B)

Conterminous 48 States
2003 NEHRP Seismic Design Provisions
Latitude = 33.8147
Longitude = -117.9917
Design Spectral Response Accelerations SDs and SD1
SDs = 2/3 x SMs and SD1 = 2/3 x SM1
Site Class B - Fa = 1.0 ,Fv = 1.0

Period (sec)	Sa (g)
0.2	0.929 (SDs, Site Class B)
1.0	0.336 (SD1, Site Class B)

Conterminous 48 States
2003 NEHRP Seismic Design Provisions
Latitude = 33.8147
Longitude = -117.9917
MCE Response Spectrum for Site Class B
Ss and S1 = Mapped Spectral Acceleration Values

Site Class B - Fa = 1.0 ,Fv = 1.0

Period (sec)	Sa (g)	Sd (inches)
0.000	0.557	0.000
0.072	1.393	0.071
0.200	1.393	0.544
0.361	1.393	1.777
0.400	1.259	1.967
0.500	1.007	2.459
0.600	0.839	2.951
0.700	0.719	3.443
0.800	0.629	3.935
0.900	0.559	4.426
1.000	0.503	4.918
1.100	0.458	5.410
1.200	0.420	5.902
1.300	0.387	6.394
1.400	0.360	6.886
1.500	0.336	7.377
1.600	0.315	7.869
1.700	0.296	8.361
1.800	0.280	8.853
1.900	0.265	9.345
2.000	0.252	9.837

Conterminous 48 States
2003 NEHRP Seismic Design Provisions
Latitude = 33.8147
Longitude = -117.9917
Site Modified Response Spectrum for Site Class B
SMs = FaSs and SM1 = FvS1
Site Class B - Fa = 1.0 ,Fv = 1.0

Period (sec)	Sa (g)	Sd (inches)
0.000	0.557	0.000
0.072	1.393	0.071
0.200	1.393	0.544
0.361	1.393	1.777
0.400	1.259	1.967
0.500	1.007	2.459
0.600	0.839	2.951
0.700	0.719	3.443

0.800	0.629	3.935
0.900	0.559	4.426
1.000	0.503	4.918
1.100	0.458	5.410
1.200	0.420	5.902
1.300	0.387	6.394
1.400	0.360	6.886
1.500	0.336	7.377
1.600	0.315	7.869
1.700	0.296	8.361
1.800	0.280	8.853
1.900	0.265	9.345
2.000	0.252	9.837

Conterminous 48 States
2003 NEHRP Seismic Design Provisions
Latitude = 33.8147
Longitude = -117.9917
Design Response Spectrum for Site Class B
SDs = 2/3 x SMs and SD1 = 2/3 x SM1
Site Class B - Fa = 1.0 ,Fv = 1.0

Period (sec)	Sa (g)	Sd (inches)
0.000	0.371	0.000
0.072	0.929	0.047
0.200	0.929	0.363
0.361	0.929	1.185
0.400	0.839	1.312
0.500	0.671	1.639
0.600	0.559	1.967
0.700	0.479	2.295
0.800	0.420	2.623
0.900	0.373	2.951
1.000	0.336	3.279
1.100	0.305	3.607
1.200	0.280	3.935
1.300	0.258	4.263
1.400	0.240	4.590
1.500	0.224	4.918
1.600	0.210	5.246
1.700	0.197	5.574
1.800	0.186	5.902
1.900	0.177	6.230