SOILS ENGINEERING, INC.

GEOTECHNICAL INVESTIGATION
FOR THE PROPOSED
FOUR-STORY MEDICAL OFFICE BUILDING
TO BE LOCATED ON THE SOUTHWEST CORNER OF
"K" STREET AND 27TH STREET
IN
BAKERSFIELD, CALIFORNIA

Prepared for:

Swinerton Builders
7944 North Maple Avenue, suite 111
Fresno, California
93720-0292

April 20, 2011

File No. 11-13542

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April 20, 2011

File No. 11-13542

Swinerton Builders
7944 North Maple Avenue, Suite 111
Fresno, CA 93720-0292

Attention: Mr. Rick Bishoff

Subject: Geotechnical Investigation for
Proposed four-story Medical Office Building
At the southwest corner of "K" Street
and 27th Street in Bakersfield, California

Dear Mr. Bishoff:

In accordance with your request, we have performed a Geotechnical Investigation at the subject site. Recommendations for site preparation and grading; criteria for foundation design are provided in the attached report.

Appendix A, "Guide Specifications for Earthwork," is provided as a supplement to Section I, "Earthwork," in the recommendations of the report.

Appendix B, "Field Investigation," contains logs of Test Borings, Figures 2 through 7, and a site plan, Figure 1, showing approximate test boring locations.

Appendix C, "Soils Test Data," contains tabulations of laboratory test data.

Appendix D, "Seismic Information," contains information provided by EQFAULT and the 2010 CBC seismic design parameters.

We hope this provides the information you require. If you have any questions regarding the contents of our report, or it we can be of further assistance, please contact us.

Respectfully submitted,
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Field and Laboratory Investigation

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GEOTECHNICAL INVESTIGATION FOR THE PROPOSED FOUR-STORY MEDICAL OFFICE BUILDING TO BE LOCATED ON THE SOUTHWEST CORNER OF "K" STREET AND 27TH STREET IN BAKERSFIELD, CALIFORNIA

SCOPE

This report was prepared to provide recommendations for preparation and grading, and criteria for selections and design foundation for the proposed structures. The following recommendations are addressed herein:

EARTHWORK

Site preparation and grading in areas to receive the proposed structure(s) and pavement.

Quality control of engineered fill.

FOUNDATIONS

Foundation types most adequate for the proposed structures.

Anticipated total and differential settlements.

Lateral earth pressures for evaluating the passive and frictional resistance of foundations to sliding.

PAVEMENT

Structural section design recommendations for proposed roadways.

PROJECT DESCRIPTION

The project site is located at the southwest corner of "K" Street and 27th Street and has a total lot area of 19,154 square feet. The proposed building is expected to have a footprint of 16,683 square feet and a gross building area of 60,021 square feet. The balance of the site will be used for parking, pedestrian ways, landscaping and utility yards.

STRUCTURAL CONSIDERATIONS

The building is expected to be steel post-and-beam construction on reinforced concrete spread footings with a slab-on-grade; structural steel columns, braced frame with fluted metal deck; and, exterior will consist of cementitious plaster and aluminum glazing system.[a]

The proposed building is expected to be a four-story, steel post-and-beam structure. Maximum and minimum column and wall loads are expected to range between 100 Kips to 2500 kips; and 3 to 10 kips per foot, respectively. Maximum and minimum lengths for bays and spandrels will vary from 18 to 35 feet for bays and 24 to 46 feet for spandrels.

Structural details were not available at the time this report was prepared. Accordingly, structural loads have been estimated based on the maximum values available from Architectural Graphic Standards[b]. Tributary areas were assumed based on maximum span lengths given in the architectural reference. Maximum column loads are estimated to be 2300 Kips. Maximum wall loads on the order of 6 Kips per foot are anticipated.

SITE LOCATION AND CONDITIONS

At the time of our investigation the project site was occupied by several abandoned structures and a parking canopy, all of which are to be demolished. The balance of the area was covered with asphaltic paving.

The proposed site is located at the southwest corner of "K" Street and 27th Street in Bakersfield, California. Chester Avenue and K Street bound the project site to the west and east, respectively. The site extends approximately 150' north and south of 27th street. The alley between Chester Avenue and K Street bisects the site. A small building with a canopy and parking areas is located at the SW corner of K St. and 27th Street. We expect this building to be demolished in the clearing phase of construction. Two parking lots are located on the north side of 27th St. with a small structure and a canopy on the NW parking lot. Fencing surrounds the northern parking lot area.

The project site is virtually flat and level with a slight slope to the southwest. Existing ground surface elevations generally coincide with adjoining street edge of pavement or top of curb grades.

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[a] Soils Foundation Investigation Information Request; bfgc/IBI Group

[b] American Institute of Architects – Ramsey/Sleeper; Architectural Graphic Standards – Tenth Edition; John Wiley and Sons; 2000; pages 28 – 34.

The surrounding properties are commercial.

The project site plan showing the approximate project boundaries, proposed structure locations is provided as Figure No. 1. Existing structure locations were not available at the time this report was prepared.

SUBSURFACE CONDITIONS

Earth materials encountered in our test borings consist of granular materials comprising upper layers, three to eleven feet thick, of sandy silt and silty-fine-sand underlain by poorly-graded to well-graded sand, gravelly-sand and sandy-gravel. These materials are classified ML and SM; and SW, SP, and GW, respectively, in the Unified Soils Classification System (USCS).

Average soil densities generally increase with depth as depicted on Plate 1 which shows a plot of density versus depth. The average soil density increases from 95 pounds per cubic foot at three feet below the ground surface to 142 pounds per cubic foot at a depth of 46 feet. Conversely, moisture contents, as shown on Plate 2, generally decrease from an average of 11 percent at 3 feet below the ground surface to one percent at a depth of 42 feet.

Soil penetration resistance trends greater with increasing depth, as shown on Plate 3, increasing from a low of 5 blows per foot for near-surface materials to 90 blows per foot at 46 feet.

Silts and silty-sands in the upper three to eleven feet are loose to medium-dense. These soils should be excavated and replaced with sand, sandy-gravel, and gravelly sand available on site at depths in the range of 3 to 11 feet to provide adequate support for the proposed structure(s).

More detailed descriptions of the subsurface soils encountered are provided on the log of test borings, Figures 2 through 7, along with the test boring legend.

GROUNDWATER

Groundwater was encountered at a depth of 33' in soil boring B-1. Historical groundwater in this area of Bakersfield could be as shallow as 20' from the surface due to the proximity of canals and the Kern River. Groundwater should be deep enough to be of no concern to foundation stability.

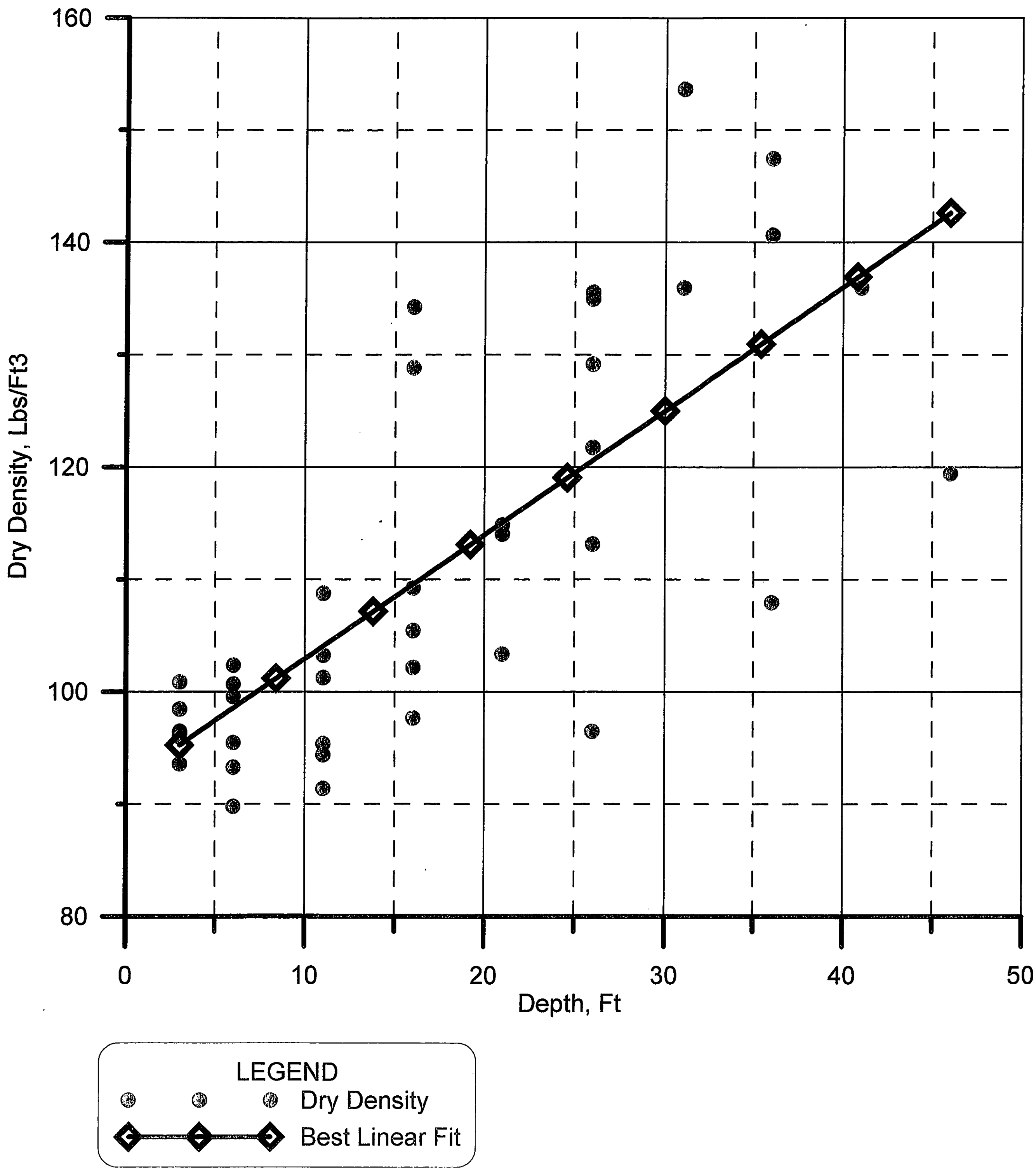
SEISMIC DESIGN VALUES

The seismic design data reported is in accordance with the new 2007 California Building Code (CBC). These values were calculated utilizing USGS maps and software and CBC Section 1613.5.

Geotechnical Investigation
4 Story Medical Office Building
1400 Block of 27th Street
Bakersfield, CA

File 13542
3/30/11
Plate 1

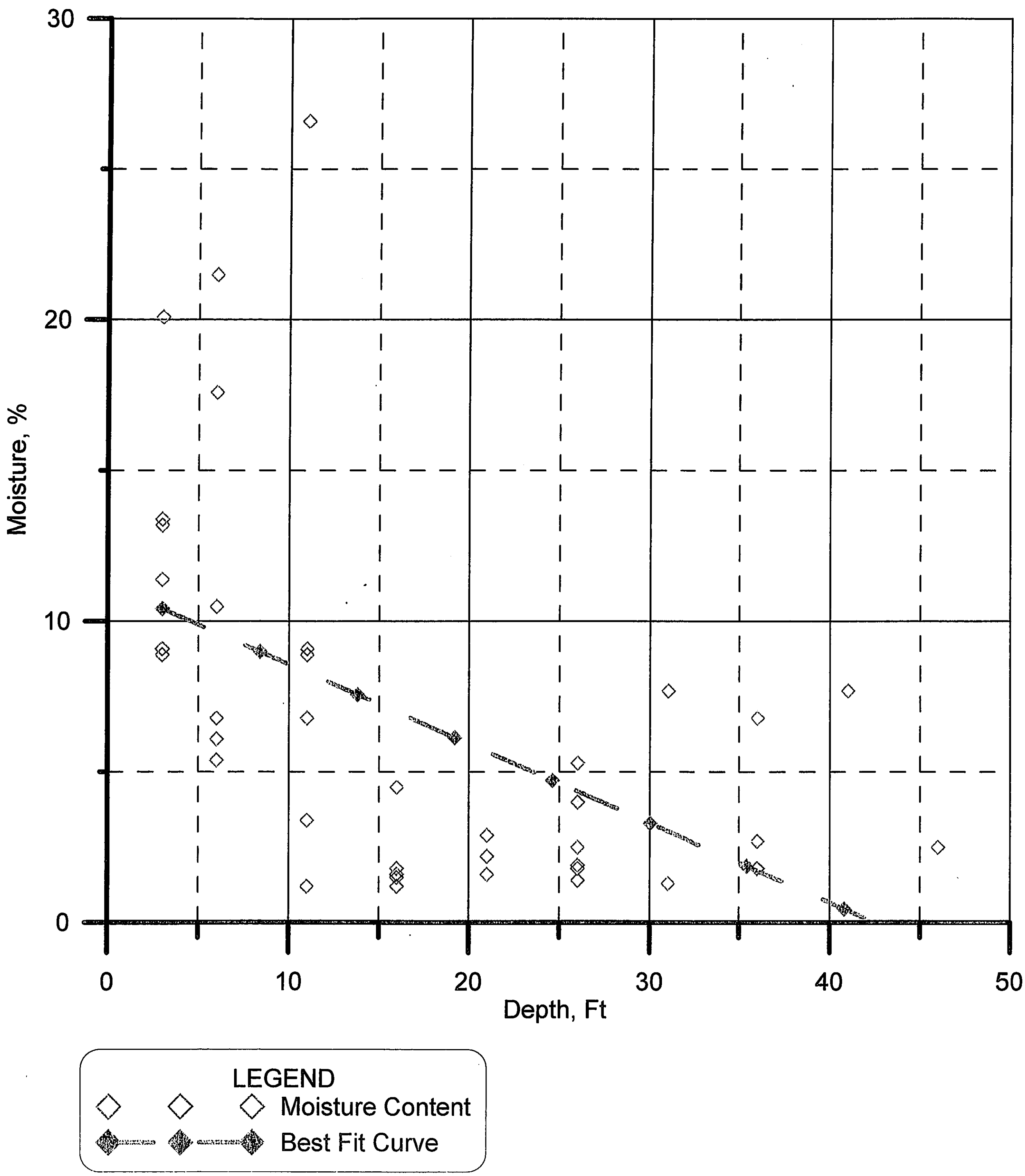
Dry Density vs. Depth



Geotechnical Investigation
4 Story Medical Office Building
1400 Block of 27th Street
Bakersfield, CA

File 13542
3/30/11
Plate 2

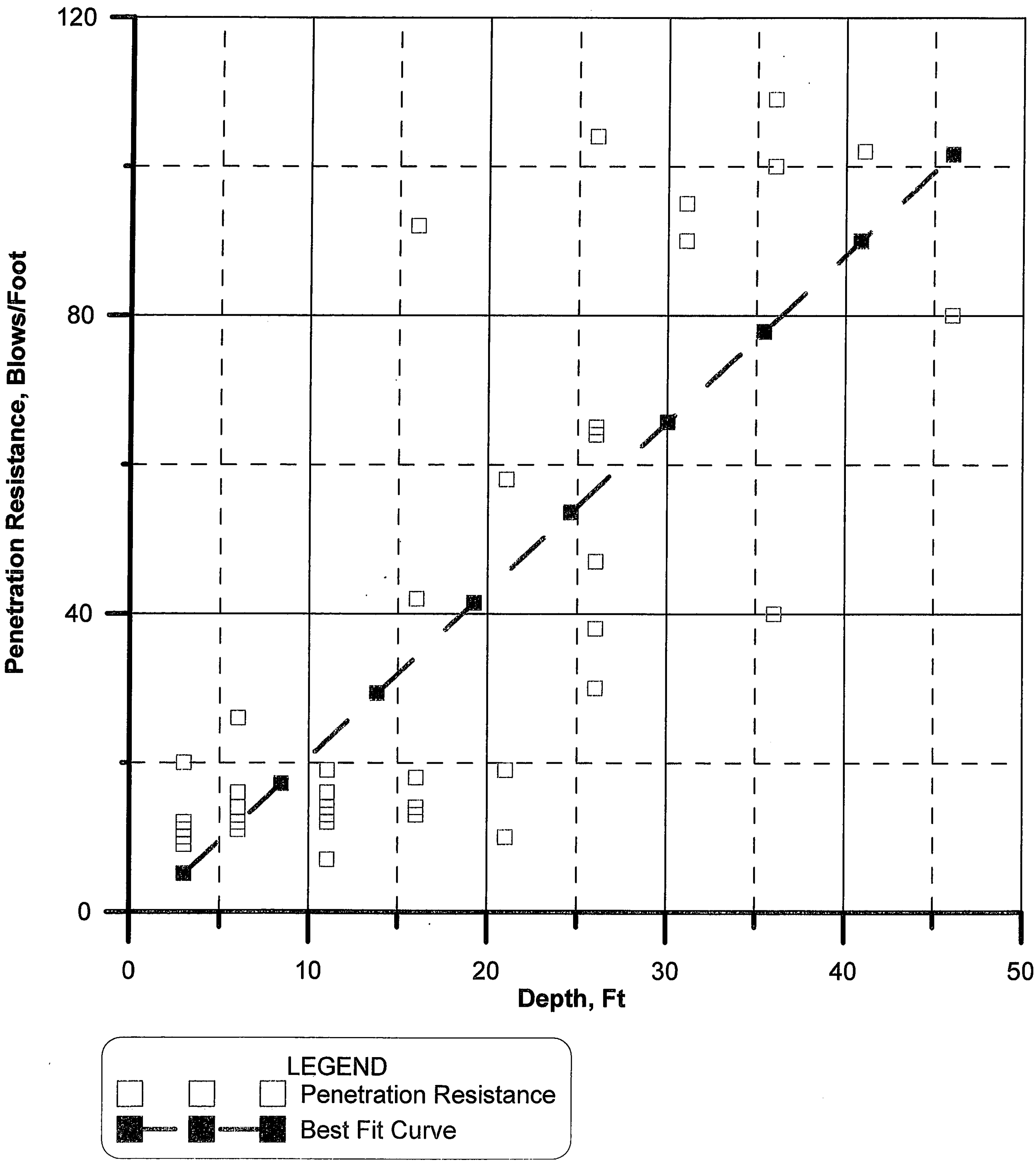
Moisture Content vs. Depth



Geotechnical Investigation
4 Story Medical Office Building
1400 Block of 27th Street
Bakersfield, CA

File 13542
3/30/11
Plate 3

Penetration Resistance vs. Depth



SEISMIC DESIGN CRITERIA	VALUE	SOURCE
Occupancy Category	*I*	2007 CBC Table 1604.5
Site Class	*D*	Site Specific Soils Report 2007 CBC Table 1613.5.2
Mapped MCE Spectral Response Acceleration, short period, S_s	*1.147*	USGS maps/Software - 2007 CBC Figure 1613.5 (3)
Mapped MCE Spectral Response Acceleration, at 1-sec. Period, S_1	*0.407*	USGS Maps/Software - 2007 CBC Table 1613.5 (4)
Site Coefficient, F_a	*1.041*	USGS Software - 2007 CBC Table 1613.5.3 (1)
Site Coefficient, F_v	*1.593*	USGS Software - 2007 CBC Table 1613.5.3 (2)
Adjusted MCE Spectral Response Acceleration, Short periods, $S_{MS} = F_a S_s$	*1.194*	USGS Software - 2007 CBC Section 1613.5.3
Adjusted MCE Spectral Response Acceleration, 1-sec. Period, $S_{M1} = F_v S_1$	*0.648*	USGS Software - 2007 CBC Section 1613.5.3
Design Spectral Response Acceleration, short periods, $S_{DS} = 2/3\ S_{MS}$	*0.796*	USGS Software - 2007 CBC Section 1613.5.4
Design Spectral Response Acceleration, 1-sec period, $S_{D1} = 2/3\ S_{MI}$	*0.432*	USGS Software - 2007 CBC Section 1613.5.4
Seismic Design Category short periods (S_{DS})	*D*	2007 CBC Table 1613.5.6 (1)
Seismic Design Category, 1-sec period (S_{D1})	*D*	2007 CBC Table 1613.5.6 (2)

MCE = Maximum Considered Earthquake

Site Seismic Parameters

Major fault systems and their distances from the site are given in EQFault Summary attached. The site is not located within an Alquist-Priolo Earthquake Fault Zone (AP Zone or Earthquake Fault Zone). The kern Front Fault is located approximately 5.0 kilometers to the north. The White Wolf Fault is located approximately 29.3 kilometers to the southeast. The San Andreas Fault Zone (multiple segments) is located approximately 59.5 kilometers east of the site. The largest maximum site acceleration based on deterministic methods is 0.412g from a 6.3 magnitude earthquake on the Kern Front Fault approximately 5 kilometers away. See attached copies of the computer modeling data.

RECOMMENDATIONS

I. **EARTHWORK** - Earthwork is expected to consist of excavating and replacing the upper ten feet of existing fine silty sand and sandy-silt with select fill materials obtained from on-site excavation and consisting of sand and gravelly sand taken from five to ten feet below the existing ground surface. We recommend that the grading plan prepared for the project include a geotechnical grading plan which delineates areas of the site where acceptable earth materials can be obtained.

After site clearing, **Phase 1** of earthwork operations should consist of excavating existing silts and fine silty sands from the upper five to ten feet of existing soils. The over-excavation depth should be uniform across the building site and of sufficient depth to remove most of materials described as Sandy-Silt (ML) and Silty Sand (SM) with fine sand content.

Phase 2 will consist of removing over-burden soils from an area delineated on the Geotechnical Grading Plan to a sufficient depth to expose materials classified as SW, SP, GW, GP, or GM. Overburden materials should be stockpiled for use later in filling the borrow site created by the above described mining operation.

In **Phase 3**, granular soils classified as SW, SP, GW, GP, or GM should be excavated on site or imported from off site and placed to fill the void created by Phase 1.

Finally, in **Phase 4**, Silty Fine Sands (SM) and Sandy Silts (ML) removed from the proposed building site in Phase 1 will be used, along with the stockpiled overburden soils from Phase 2 to fill the borrow site excavation created in Phase 3.

The sequence of operations described above should be considered as a suggestion. The contractor may determine that other sequencing or methods may be more economical.

"Earthwork Specifications," in Appendix A are provided for general guidance in preparing site grading plans and earthwork estimates. The following special provisions are made and supersede any conflicts which may be present in the Guide Specifications for Earthwork wherever discrepancies may exist:

a. **Compaction** - Unless otherwise specified herein, the terms, "Compaction," or "Compacted," wherever used or implied within this report should be interpreted as compaction of 90 percent of the maximum density obtainable by ASTM Test Method D1557.

b. **Optimum Moisture** - The term, "Optimum Moisture," wherever used or implied within this report should be interpreted as that obtained by the above described Test Method C.

c. **Clearing and Grubbing** - Clearing and grubbing shall consist of removing all debris such as metal, broken concrete, trash, vegetation growth and other biodegradable substances, from all areas to be graded. Existing obstructions below shall be removed in accordance with the following procedures:

1. **Buried Utilities** - such as sewer, water and gas lines or electrical conduits to remain in service shall be re-routed to pass no closer than four (4.0) feet to the outside edge of proposed exterior footings of structures. Lines to be abandoned shall be completely removed to a minimum depth of two (2.0) feet below finished building pad grade. Concrete lines deeper than two (2.0) feet below finished building pad grade and having diameters less than six (6.0) inches can be crushed in placed.

2. **Existing Structures** – Existing structures shall be completely removed to a minimum depth of two (2.0) feet below the bottom of the lowest proposed structure footing or to two (2.0) feet below finished subgrade, whichever depth is lower.

3. **Cavities** - resulting from clearing and grubbing or cavities existing on the site as a result of man-made or natural activity shall be backfilled with earth materials placed and compacted in accordance with Sections 5.3 and 5.4 of Appendix A.

d. Ground Surface Preparation

i. ***Proposed Structure Areas:*** The objective of the overexcavation and compaction of the upper layer of soils in the building area is to remove the loose soils and construct a uniform engineered fill layer that will minimize the static and dynamic settlements of the proposed structures. Following are our recommendations:

1. Excavate earth material to a minimum depth of ten (10) feet below the lowest existing grade in the proposed building footprint;

2. The bottom of the excavation shall be reviewed by the soil engineer or his representative prior to any backfill operations. The top twelve (12) inches or materials exposed at the bottom of the excavation shall be scarified and compacted to a minimum of 90 percent of ASTM D1557.

3. Moisten excavated and imported soils to near the optimum moisture or to moisture content consistent with effective compaction and soil stability. Compact moistened soils to a minimum of 90 percent of the maximum density obtained by ASTM Test Method D1557.

4. Work to lines at least fifteen (15) feet beyond the outside edges of exterior footing except where excavation may undermine or damage adjacent structures or utilities.

ii. ***Pavement Areas***

1. Ground surfaces to receive concrete driveway and bituminous pavements should be scarified and compacted to a minimum depth of two (2) below the grading place in cut areas or to a minimum of two (2) feet in areas to receive fill.

2. Engineered fill placed in proposed pavement areas should conform to the requirements of section 5.4, "Placing, Spreading and Compacting Fill Materials," of Appendix A.

3. Compaction in proposed pavement areas should be a minimum of 90 percent of the maximum density as obtained to ASTM Test Method D1557, and should extend to a minimum of four (4) feet beyond the outside edges of pavements.

4. The top 8 inches of the pavement subgrade shall be compacted to a minimum of 95 percent of ASTM D1557.

e. Utility Lines

1. Backfill for utility lines traversing areas proposed for facilities, pavements, concrete slabs-on-grade, or areas to receive engineered fill for future construction should be compacted in accordance with the same requirements for adjacent and/or overlying fill materials.

2. Compaction should include haunch area, spring line and from top of pipe to finished subgrade. The haunch area up to one foot above the top of the pipe should be backfilled with "cohesionless" material.

3. Cohesionless native materials may be used for trench and pipe or conduit backfill. The term "cohesionless," as used herein, is defined as material which, when dry, will flow readily in the haunch areas of the pipe trench.

4. Pipe backfill materials should not contain rocks larger than two inches in maximum dimension. Where adjacent native materials exposed on the trench bottoms contain protruding rock fragments larger than two inches in maximum dimension, conduits and pipelines should be laid on a bed consisting of clean, cohesionless sand (SP), in the Unified Soils Classification System.

5. Compaction Requirements – where not otherwise specified in our plans or in these recommendations, the following compaction requirements are applicable to all electrical, gas or water conduits:

6. The top 8 inches of the pavement subgrade shall be compacted to minimum of 95 percent of ASTM D1557.

f. Engineered Fill

1. Earth materials obtained on site are acceptable for use as engineered fill provided that all grasses, weeds and other deleterious debris are first removed.

2. Engineered fill materials should be placed in thin layers (less than ten inches uncompacted thickness), brought to near the optimum moisture

content or to a moisture content commensurate with effective compaction and soil stability, and compacted to a minimum of 90 percent of the maximum density obtainable by ASTM Test Method D1557, "Placing, Spreading and Compacting Fill Materials," in Appendix A.

g. Imported Fill

1. The table shown below provides general guidelines for acceptance of import engineered fill.

2. Materials of equal or better quality than on-site material could be reviewed by the Geotechnical Engineer on a case-by-case basis.

3. No soil materials shall be imported onto the project site without prior approval by the Geotechnical Engineer.

4. Any deviation from the specifications given below shall be approved by the Geotechnical Engineer prior to import operations.

Maximum Percent Passing #200 Sieve	40
Maximum Percent Retained 3" Sieve	0
Maximum Percent Retained 1½" Sieve *for building areas*	15
Maximum Percent Retained ¾" Sieve *for landscape areas*	5
Maximum Liquid Limit	40
Maximum Plasticity Index	14
Minimum R-Value *for pavement areas*	50

5. The soils proposed for import shall be generally homogenous and shall not contain cemented or clayey and/or silty lumps larger than one inch. When such lumps are present, they shall not represent more than ten percent (10%) of the material by dry weight.

6. Where a proposed import source contains obviously variable soils, such as clay and/or silt layers, the soils which do not meet the above requirements shall be segregated and not used for this project or the various layers shall be thoroughly mixed prior to acceptance testing by the Geotechnical Engineer.

7. The contractor shall provide sufficient advance notice, prior to import operations, to allow testing and evaluation of the proposed import materials. Because of the time needed to perform the above tests, the contractor shall provide a means by which the Geotechnical Engineer or others can verify that the soil(s) which was sampled and tested is the same soil(s) which is being imported to the project.

h. Drainage

1. Finished ground grades adjacent to the proposed structures should be sloped to provide positive free drainage away from the foundations.

2. No areas should be constructed that would allow drainage generated on the site, or water impinging upon the site from outside sources, to pond near footings and slabs or behind curbs.

3. Where ground surfaces adjacent to subsurface walls are to be landscaped, walls should be waterproofed. Installation of gravel-filled drains to route subsurface drainage away from walls will reduce the thickness of damp-proofing resulting in a considerable savings.

I. Slopes - Slope performance is dependent upon proper slope maintenance (i.e., planting, proper watering, clearing of drainage devices, etc.). Slopes properly placed and conscientiously maintained should not display excessive raveling or sloughing.

iii. Permanent Slopes

Both fill and cut slopes should be constructed at 2:1 (horizontal to vertical) in accordance with the California Building Code (2010).

1. Where nearer than five feet from building foundations or flatwork, tops of finished slopes should be graded no steeper than five horizontal to one vertical (5:1).

2. A slope ratio of two horizontal to one vertical (2:1) should provide adequate stability for slopes farther than five feet from footing lines.

3. Fill slopes shall be compacted to a minimum of 90% of ASTM D-1557 and in accordance with the Guide Specifications for Earthwork, Appendix A. This may be achieved by overfilling the constructed slope and trimming to a compacted finished surface, rolling the slope face with a sheepsfoot as the level of the fill is raised, or any method that achieves the desired product.

4. The cut portion of the slope should be constructed first. Prior to construction of the fill slope, incompetent surface soils should be removed from the top of the cut.

5. Slopes constructed on ground surfaces steeper than five horizontal to one vertical (5:1) shall be placed in level benches. Minimum bench widths shall be equal to the minimum width of earth-moving equipment. In no instances shall benches be less than four feet in width.

6. Areas to receive fill or to support structures, slabs or pavements should be cleared of all vegetation, debris and disturbed soils. All existing undocumented fill materials should be excavated to expose competent native soils.

7. Existing underground pipelines, private sewage disposal systems and any water or oil wells, if encountered during grading, should be removed or capped in accordance with procedures considered acceptable by the appropriate governing agency. Tree roots to 2 inches in diameter should be removed.

8. Both fill and cut slopes will be subject to erosion immediately after grading, and should be designed to reduce surficial sloughing by implementing a permanent slope maintenance program as soon as practical after completion of slope construction.

9. Slope maintenance should include proper care of erosion and drainage control devices, rodent control, and immediate planting with deep-rooting, lightweight, drought-resistant vegetation.

10. Where slopes are not planted or overlain with crushed rock, gunnite or shotcrete, an erosion control geotextile, should be used to control erosion.

iv. Temporary Slopes

Temporary slopes consisting of cohesive soils with sufficient silt and clay binder to be stable may be constructed at a gradient of one and one half horizontal to one vertical (1.5:1). Temporary slopes consisting of cohesionless materials classified as SP, SW, GP, GW and SM with low to negligible silt binder shall be constructed no steeper than two horizontal to one vertical (2:1)

II. FOUNDATIONS

a. The proposed structure can best be supported on a system of structurally connected, continuous and / or isolated spread footings or a mat foundation.

b. ***Structurally Connected Spread Footings*** – The proposed foundation could be supported on structurally connected, continuous spread footings, isolated rectangular footings or combinations or the above; or on a mat or raft footing.

c. Foundation design criteria are presented in Table A.

TABLE A FOUNDATION DESIGN CRITERIA			
Footing Type	**Minimum Width (ft.)**	**Minimum Depth Below Lowest Adjacent Subgrade (ft.)**	**Maximum Allowable Soil Bearing Pressure (lbs./sq.ft.)**
Continuous / Combined	4	2	4000
Isolated Rectangular	10	2	4000
Raft or Mat	N/A	2	1500

d. Bearing pressures given are for the minimum widths and depths shown above.

e. Bearing pressures given above are for dead and sustained (loads acting most of the time) live loads; they may be increased by one-third for wind and/or seismic loading conditions.

f. The proposed foundations shall be reinforced in accordance with the structural engineer's recommendations.

g. *Settlement:* Provided maximum allowable soil bearing pressures given above are not exceeded, total static settlement should not exceed one inch. A major portion … two-thirds to one-half … of total settlement should occur before the end of construction. Differential static settlement should occur before the end of construction and should, accordingly, be less than one-half of an inch.

III. MODULUS OF SUBGRADE REACTION

Modulus of subgrade reaction for use in design of foundations is based on ranges of values for soil types provided by Foundation Analysis and Design by Joseph E Bowles.[c] Equation 1 should be used for footings on sandy soils. Foundations on clay soils should employ Equation 2. Equation 3 is for rectangular footings having dimensions **b** and **mb**. **K_{s1}** is the modulus of subgrade reaction from the source referenced above based on a 1 foot x 1 foot square plate. For general guidance K_{s1} of 400 kcf may be used.

Equation (1) $$k_{sf} = K_{s1} \times \left(\frac{B+1}{2B}\right)^2$$

Equation (2) $$k_{sf} = K_{s1} \times B$$

Equation (3) $$k_{sf} = K_{s1} \times \frac{m+.5}{1.5 \times m}$$

Values given above should be used for guidance. Local values may be higher or lower and should be based on results of in-situ plate bearing tests performed in accordance with ASTM Test Method D1195.

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c Bowles, Joseph E; FOUNDATION ANALYSIS AND DESIGN; McGraw-Hill Book Company (1977); Table 9-1 pg 269

IV. LATERAL EARTH PRESSURES

Lateral earth pressures and friction coefficients for determining the passive lateral resistance of foundations against lateral movement and the active lateral forces against retaining walls and subsurface walls, expressed as equivalent fluid pressures, are given below in Table B.

TABLE B
LATERAL EARTH PRESSURES

Case	Lateral Earth Pressures
Active	36 P.C.F.
Passive	310 P.C.F.
At-Rest	49 P.C.F.

a. Lateral earth pressures were computed assuming that backfill materials are essentially free draining and level; and that no surcharge loads or sloping backfills are present within a distance from the wall equal to or less than the height, H[d] of the wall.

b. *Active Case:* Active lateral earth pressures should be used when computing forces against free standing retaining walls, unrestrained at the tops. Active pressures should not be used where tilting outward of the walls is greater than .002H would not be desirable.

c. *Passive Case*: Passive lateral earth pressures should be used when computing the lateral resistance provided by undisturbed or compacted native soils against the movement of footing. When computing passive resistance, the upper one foot of embedment depth should be discounted.

d. *At-Rest Case*: At-rest pressures should be used for subsurface walls restrained at their tops by floor diaphragms or tie-backs and for retaining walls where tilting outward greater than .002 H would not be desirable.

e. *Frictional Resistance*: A friction coefficient of **0.40** may be used when computing the frictional resistance to sliding of footings, grade beams, and slabs-on-grade. Frictional resistance and passive lateral soil resistance may be combined without reduction.

V. SOIL CORROSIVITY

Soil samples from the structure areas shall be taken and delivered to an analytical laboratory to be tested for pH, chlorides, sulfate and resistivity, after the grading operations are completed.

[d] H = the height of backfill above the lowest adjacent ground surface.

Based on the Soluble Sulfate test results, a concrete mix design to resist sulfate exposure be formulated in accordance with guidelines of Table 4.3.1 "Requirement for concrete exposed to sulfate-containing solutions" of ACI 318, section 4.3.

VI. SLABS-ON-GRADE

a. Slabs-on-grade can be adequately supported by compacted native soils or by compacted import materials of equal or superior quality.

b. We recommend that moisture protection be provided for those proposed slabs on which moisture sensitive floor coverings, structural elements, or equipment are to be installed. The moisture protection underlying the slab(s) should consist of a minimum 10 mil polyethylene sheet or other durable sheet vapor retarder or barrier with equivalent or greater resistance to physical damage and chemical and bacteriological attack. It is recommended that this be overlain by a thin layer (one to two inches) of compacted crushed fines or rock dust to absorb some of the bleed water from the concrete. The layer of crushed fines or rock dust should be firm and dry to damp at the time of concrete placement. For moisture-sensitive slabs which are to be water-cured, the layer of fines, which would act as a reservoir, is not recommended. More details are given in ACI Manual of Concrete Practice § 302.1R.3.2.3.

c. Porosity is directly related to the amount of extra water added to the concrete mix of the slab when it was created. The extra water creates permanent space in the slab. Once it is evacuated, that space remains moist and easily passes vapor through it. Creating a slab with the lowest possible permeability starts with keeping a low water/cement ratio.

d. Slabs should have a minimum thickness of four inches and should be reinforced per the structural engineer's recommendations.

e. Pressurized water lines should not be placed beneath slabs. Gravity flow sewer lines may underlie slabs, but they should be exited by the shortest available route.

VII. PAVEMENTS

Pavement design recommendations provided below are based on California Department of Transportation (CalTrans) design procedures.[e]

Asphaltic concrete structural section design shall be designed based on the R-value test results shown on Figures D-1 and D-2 in Appendix C, "Soil Test Data".

Asphaltic concrete should meet the requirements of Type B[f]. Aggregate Base should be Class 2[g].

[e] CALTRANS Highway Design Manual, Chapter 630 Flexible Pavement.
[f] Section 29, CALTRANS Standard Specifications.

The subgrade surface should be according to our recommendations in this report.

These recommendations are valid only if the pavement is properly drained and shoulder areas are graded to prevent water ponding at pavement edges.

All construction should be subject to adequate tests and observations to verify conformance with these recommendations.

VIII. LIMITATIONS, OBSERVATION AND TESTING

Conclusions and recommendations in this report are given for the Four-Story Medical Building at "K" Street and 27th Street in Bakersfield, California and are based on the following:

a. The information retrieved from six (6) exploratory borings drilled at the subject site to a maximum depth of 50 feet below the existing ground surface.

b. Our laboratory testing program results.

c. Our engineering analysis based on the information defined in this report.

d. Our experience in the Kern County area.

Variations in soil type, strength and consistency may exist between specific boring locations. These variations may not become evident until after the start of construction. If such variations appear, a re-evaluation of the soils test data and recommendations may be necessary.

Unless a Geotechnical Engineer of this firm is afforded the opportunity to review plans and specifications, we accept no responsibility for compliance with design concepts or interpretations made by others with regard to foundation support, fill selection, fill placement or other recommendations presented in this report.

Changes in conditions of the subject property can occur with time because of natural processes or the works of man on the subject site or on adjacent properties. Changes in applicable engineering and construction standards can also occur as the result of legislation or from the broadening of knowledge. Accordingly, the finding of this report may be invalidated, wholly or in part, by changes beyond our control. Therefore, this report is subject to review and should not be relied upon without review after a period of two years or after any modifications to the site.

Review of Earthwork Operations

Review of earthwork operations relating to site clearing, ground stabilization, placement and compaction of fill materials, and finished grading is critical to the structural integrity of building

[g] Section 26, Aggregate Bases, Standard Specifications.

foundation and floor systems. While the preliminary Geotechnical investigation and report provide guidelines which are used by the design team, i.e., architects, grading engineers, structural engineers, landscape engineers, etc., in completing their respective tasks, review of plans and site review and testing during earthwork operations are vital adjuncts to the completion of the Geotechnical engineer's tasks.

The most prevalent cause of failure of a structure foundation system is lack of adequate review and testing during the earthwork phase of the project. Projects rarely reach completion without some alteration being required such as may result from a change in subsurface conditions, an amendment in the size and scope of the project, a revision of the grading plans or a variation in structural details. Occasionally, even minor changes can significantly affect the performance of foundations.

The most prevalent secondary cause for foundation failure is inadequate implementation of Geotechnical recommendations during the formulation of foundation designs and grading plans. The error in a foundation design or an omission of a key element from a grading plan occurs most often as a result of inadequate communication between the various project consultants and -- when a change in consultants occurs -- improper transfer of authority and responsibility[h].

It is imperative, therefore, that any revisions to the project scope, any change in structural detail, or change in consultant, be brought to the attention of Soils Engineering, Inc. to allow for timely review and revision of recommendations and for an orderly transfer of responsibility and approval.

It is the responsibility of the owner or his representative to ensure that a representative of our firm is present at all times during earthwork operations relating to site preparation and grading, so that relative compaction tests can be performed, earthwork operations can be observed and compliance with the recommendations provided herein can be established.

This engineering report has been prepared within the limits prescribed to us by the client or his representative, in accordance with the generally accepted principles and practices of Geotechnical engineering. No other warranty, expressed or implied, is included or intended in this report.

Respectfully submitted,
SOILS ENGINEERING, INC.

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h "If the civil engineer, the soils engineer, the engineering geologist or the testing agency of record is changed during the course of the work, the work shall be stopped until the replacement has agreed to accept the responsibility within the area of his technical competence for approval upon completion of the work."

APPENDIX A

GENERAL GUIDE SPECIFICATIONS FOR EARTHWORK

1. GENERAL

1.1 Scope

These specifications and plans include all earthwork pertaining to site rough grading including, but not limited to furnishing all labor and equipment necessary for clearing and grubbing; stripping; preparation of ground surfaces to receive fill; excavation; placement and compaction of structural and non-structural fill; disposal of excess materials and products of clearing, grubbing, and stripping; and any other work necessary to bring ground elevations to the lines and grades shown on the project plans.

1.2 Performance:

It shall be the responsibility of the contractor to complete all earthwork in accordance with project plans and specifications. No variance from plans and specifications shall be permitted without written approval of the Engineer-of-Record, hereinafter referred to as the "engineer" or his designated representative, hereinafter referred to as the "soils engineer." Earthwork shall not be considered complete until the "engineer" has issued a written statement confirming substantial compliance of earthwork operations to these specifications and to the project plans.

The contractor shall assume sole responsibility for job site conditions during the course of earthwork operations on the project, including safety of all persons and preservation of all property; this requirement shall apply continuously and not be limited to normal working hours. The contractor shall defend, indemnify, and hold harmless the owners, engineer, and soils engineer from any and all liability and claims, real or alleged, arising out of performance of earthwork on this project, except from liability incurred through sole negligence of the owner, engineers, or soils engineers.

2. DEFINITIONS

2.1 Excavations:

Excavation shall be defined within the content of these specifications as earth material excavated for the purpose of constructing fill embankment;

grading the site to elevations shown on project plans; or placing underground pipelines, conduits, or other subsurface utilities or minor structures.

Excavations shall be made true to the lines shown on project plans and to within plus or minus one-tenth (0.1) of a foot, of grades shown on the accepted site grading plans.

2.2 Engineered Fill:

Engineered fill shall be construed within the body of these specifications as earth materials conforming to specifications provided in the soils or geotechnical report placed to raise the grade of the site, to backfill excavations, or to construct asphaltic concrete or Portland cement concrete pavement; and upon which the soils engineer has performed sufficient tests and has made sufficient observation during placement and compaction to enable him to issue a written statement confirming substantial conformance of the work to project earthwork specifications.

2.3 On-Site Material:

On-site material is earth material obtained in excavation made on the project site.

2.4 Imported Material:

Imported materials are earth materials obtained off the site, hauled in, and placed as fill.

2.5 "Compaction" or "Compacted:"

Wherever expressed or implied within the context of these specifications shall be interpreted as compaction to ninety (90) percent of the maximum density obtainable by ASTM Test Method D1557.

2.6 Grading Plane:

The grading Plane is the surface of the basement material upon which the lowest layer of subbase, base, asphaltic or Portland cement concrete, surfacing, or other specified layer is placed.

3. SITE CONDITIONS

The contractor shall visit the site, prior to bid submittal, to determine existing soil and topographic conditions, and the nature of materials that may be encountered during the course of the work under this contract, and make his own interpretation of the contents of the Geotechnical Report, as they pertain to said conditions.

The contractor shall assume all liability under the contract for any loss sustained as a result of variations which may exist between specific soil boring locations or changed conditions resulting from natural or man-made circumstances occurring after the date of the Preliminary Field Investigations.

4. CLEARING AND GRUBBING

4.1 Clearing and Grubbing

Clearing and grubbing shall consist of removing all debris such as metal, broken concrete, trash, vegetation growth and other biodegradable substances, from all areas to be graded. Existing obstructions below shall be removed in accordance with the following procedures:

4.1.1 **Slabs and Pavements** - Shall be completely removed. Asphaltic or Portland Cement, concrete fragments may be used in engineered fills provided they are broken down to a maximum dimension of six (6.0) inches and thoroughly dispersed within a friable soil matrix. Engineered fill containing said fragments should not be placed above the elevation of the bottom of the lowest structure footing.

4.1.2 **Foundations** - existing at the time of grading shall be removed to a depth not less than two (2.0) feet below the bottom of the lowest structure footing.

4.1.3 **Basements, Septic Tanks** – buried concrete containers of similar construction located within areas destined to receive pavements, structures, or engineered fills should be completely removed and disposed of off the site. Basements, septic tanks, etc., situated outside structures, or structural fill areas shall be disposed of by breaking an opening in bottoms to permit drainage, and by breaking walls down to not less than two (2.0) feet below finished subgrade.

4.1.4 **Buried Utilities** – such as sewer, water and gas lines or electrical conduits to remain in service shall be re-routed to pass no closer than four (4.0) feet to the outside edge of proposed exterior footings of structures. Lines to be abandoned shall be completely removed to a minimum depth of two (2.0) feet below finished building pad grade. Concrete lines deeper than two (2.0) feet below finished building pad grade and having diameters less than six (6.0) inches can be crushed in place.

4.1.5 **Root Systems** – shall be completely removed to a minimum depth of two (2.0) feet below the bottom of the lowest proposed structure footing or to two (2.0) feet below finished subgrade, whichever depth is lower. Root systems deeper than the elevation indicated above shall be excavated to allow no roots larger than two (2.0) inches in diameter.

4.1.6 **Cavities** – resulting from clearing and grubbing or cavities existing on the site as a result of man-made or natural activity shall be backfilled with earth materials placed and compacted in accordance with Sections 5.3 and 5.4 of these specifications.

4.1.7 **Preservation or Monuments, Construction Stakes, Property Corner Stakes**, or other temporary or permanent horizontal or vertical control reference points shall be the responsibility of the contractor. Where these markers are disturbed, they shall be replaced at the contractor's expense.

5. SITE GRADING

Site grading shall consist of excavation and placement of fills to lines and grades shown on the project plans and in accordance with project specifications and recommendations of the Preliminary Soils Report, whichever is more stringent. The following are recommendations issued in this report.

5.1 Areas to Receive Fill:

5.1.1 Surfaces to receive fill shall be scarified to a depth of at least six (6.0) inches, or as recommended in this report, whichever is greater, until the surface is free from ruts, hummocks or other uneven features which would tend to prevent uniform compaction by the equipment to be used.

5.1.2 After the area to receive fill has been cleared and scarified, it shall be moistened and compacted to a depth of at least six (6.0) inches in accordance with specifications for compacting fill material in paragraph 5.4, below.

5.2 Excavation:

5.2.1 Excavations shall be cut to elevations plus or minus 0.1 foot of the grades shown on the accepted plans.

5.2.2 When excavated materials are to be used in engineered fill, the excavation shall be made in a manner to produce as much mixing of the excavated materials as practicable.

5.2.3 When excavations are to backfilled, and where surfaces exposed by excavation are to support structures or concrete floor slabs, the exposed surfaces shall be scarified, moistened and compacted, as stated above for areas to receive fill. Over excavation below specified depths will not eliminate the requirement for exposed surface compaction.

5.3 Fill Materials:

5.3.1 Materials obtained from on-site excavations will be considered satisfactory for construction of on-site engineered fills unless otherwise stated in the Soils Report or Foundation Investigation. If unexpected pockets of poor or weak materials are encountered in excavations, and they cannot be u-graded by mixing with other materials or by other means, they may be rejected by the soils engineer for use in engineered fill.

5.3.2 When imported fill materials are necessary to bring the site up to planned grades, no material shall be imported prior to its approval and acceptance by the soils engineer.

5.3.3 The soils engineer shall be given notice of the proposed source of imported materials with adequate time allowance for his testing of the proposed materials. The time required for testing will vary with different types of materials, job conditions, and ultimate function of filled areas. Under best conditions the time requirement will not be less than 48 hours.

5.4 Placing, Spreading, and Compacting Fill Material:

5.4.1 The fill materials shall be placed in layers which, when compacted, shall not exceed six (6.0) inches in thickness. Each layer shall be spread evenly and shall be thoroughly mixed during the spreading to insure uniformity of material in each layer. Increased thickness of layers may be approved by the soils engineer when conditions warrant.

5.4.2 All fills shall be placed in level layers; layers shall be continuous over the area of any structural unit, and all portions of the fill shall be brought up simultaneously within the area of any structural unit. When imported material is used, it must be placed so that its thickness is as uniform as possible within the area of any structural unit.

5.4.3 When materials are to be excavated and replaced in a compacted condition, segmented, or leap-frogging of cut-fill operation within the area of any structural unit will not be permitted unless the method is specifically described by the soils engineer.

5.4.4 When the moisture content of fill material is below the lower limit specified by the Soils Engineer, water shall be added until the moisture content is as specified; and when it is above the upper limit specified, the material shall be aerated by blading or other satisfactory methods until the moisture content is as specified.

5.4.5 After each layer has been placed, mixed, and spread evenly, it shall be thoroughly compacted to not less than ninety (90) percent of maximum density in accordance with ASTM Density Test Method D1557. Compaction shall be by equipment of such design that it will be able to compact the fill to specified density. When the soils engineer specifies a specific type of compaction equipment to be used, such equipment shall be used as specified.

5.4.6 Compaction of each layer shall be continuous over its entire area and the equipment shall make sufficient trips to insure that the desired density has been obtained.

5.4.7 Field density tests shall be made by the soils engineer. The compaction of each layer of fill shall be subject to testing. Where sheepsfoot rollers are used, the soil may be disturbed to a depth of several inches. Density tests shall be taken in the compacted material below the disturbed surface. When tests indicate the density of any layer of fill or portion thereof is below the required ninety (90) percent density, the particular layer or portion shall be re-worked until the required density has been obtained.

5.4.8 When the soils engineer specifies compaction to other standards or to percentages other than ninety (90) percent, such specification, with respect to the particular items shall supersede these specifications.

5.4.9 The fill operation shall be continued in six (6) inch compacted layers, as specified above, until the fill has been brought to within 0.1 foot, plus or minus of the finished slopes and grades, as shown on the accepted plans. The finished surface of fill areas shall be graded or bladed to a smooth and uniform surface and no loose material shall be left on the surface.

5.4.10 No fill materials shall be placed, spread, or compacted while it is frozen or thawing or during unfavorable weather conditions. When work is interrupted by weather conditions, fill operations shall not be resumed until the soils engineer indicates that moisture content and density of previously placed fill are satisfactory.

5.5 Observations and Testing:

The soils engineer shall be provided with a 48 hour advance notice, in order that he may be present at the site during all earthwork activities related to excavation, tree root removal, stripping, backfill, and compaction and filling of the site and to perform periodic compaction tests so that substantial conformance to these recommendations can be established.

APPENDIX B

FIELD INVESTIGATION

Six (6) test borings were drilled at the subject site and terminated drilling to a maximum depth of 47 feet below the existing ground surface. Borings were advanced using an eight (8.0) inch hollow stem auger. Test data and descriptions from these holes form the basis of the conclusions and recommendations contained in this report.

Undisturbed samples and disturbed bulk samples were obtained. Undisturbed samples were taken using either a 2-3/8" (inside diameter) split-barrel sampler or a 1-3/8 (inside diameter), 2" (outside diameter) Standard Penetration Sampler (SPT). Penetration resistance of undisturbed soils was obtained by driving the above described sampler using a one-hundred-forty pound hammer falling a distance of thirty (30.0) inches and recording blow counts for each six (6.0) inch increment of drive on Test Boring Logs. In addition, bulk soil samples, selected as most representative of near surface soils encountered, were taken for laboratory testing.

As drilling progressed, earth materials encountered were logged and classified in accordance with the Unified Soils Classification System and presented graphically on Logs of Test Borings, Figures 2 through 7, along with the Legend.

Approximate locations of test borings are shown on the Boring Location Map, Figure 1.

UNIFIED SOIL CLASSIFICATION SYSTEM (USCS)

COARSE-GRAINED SOILS
Less than 50% Fines*

Group Symbols	Description	Major Divisions
GW	Well-graded gravels or gravel-sand mixtures, less than 5% fines	GRAVELS More than half of coarse fraction is larger than No. 4 sieve size
GP	Poorly-Graded gravels or gravel-sand mixture less than 5% fines	
GM	Silty Gravels, Gravel-sand silt mixtures, more than 12% fines	
GC	Clayey Gravels, gravel-sand-clay mixtures, more than 12% fines	
SW	Well-Graded sands or Gravelly Sands, less than 5%	SANDS More than half of coarse fraction is smaller than No. 4 sieve size
SP	Poorly-graded Sands or Gravelly Sands, less than 5% fines	
SM	Silty Sands, Sand-Silt Mixtures, more than 12% fines	
SC	Clayey Sands, Sand-Clay Mixtures, more than 12% fines	

NOTE: coarse-grained soils receive dual symbols if they contain 5 to 12% fines (e.g. SW-SM, GP-GC, etc.)

SOIL SIZES

COMPONENT	SIZE RANGE
BOULDERS	ABOVE 12 in.
COBBLES	3 in. to 12 in.
GRAVEL Coarse Fine	No. 4 to 3 in. 3/4 in. to 3 in. No. 4 to 3/4 in.
SAND Coarse Medium Fine	No. 200 to No. 4 No. 10 to No. 4 No. 40 to No. 10 No. 200 to No. 40
* Fines (Silt or Clay)	BELOW No. 200

NOTE: Only sized small than three inches are used to Classify soils

PLASTICITY OF FINE GRAINED SOILS

PLASTICITY INDEX	VOLUME CHANGE POTENTIAL
0 - 15	Probably Low
15 - 30	Probably Moderate
30 or more	Probably High

FINE-GRAINED SOILS
More than 50% Fines

Group Symbols	Description	Major Divisions
ML	Inorganic Silts, very fine sands, Rock Flour, Silty or Clayey Fine Sands	SILTS AND CLAYS Liquid limit less than 50
CL	Inorganic Clays of low to medium plasticity, Gravelly Clays, Sandy Clays, Silty Clays, Lean Clays	
OL	Organic Silts or Organic Silt-Clays of Low Plasticity	
MH	Inorganic Silts, Micaceous or Diatomaceous Fine Sands or Silts, Elastic Silts	SILTS AND CLAYS Liquid limit more than 50
CH	Inorganic Clays of High Plasticity, Fat Clays	
OH	Organic Clays of Medium to High Plasticity	
PT	Peat, Mulch, and other Highly Organic Soils	HIGHLY ORGANIC SOILS

NOTE: Fine-grained soils may receive dual classification based upon plasticity characteristics

CONSISTENCY

CLAYS & SILTS	BLOWS/FOOT*
VERY SOFT	0 - 2
SOFT	2 - 4
FIRM	4 - 8
STIFF	8 - 15
VERY STIFF	15 - 30
HARD	Over 30

RELATIVE DENSITY

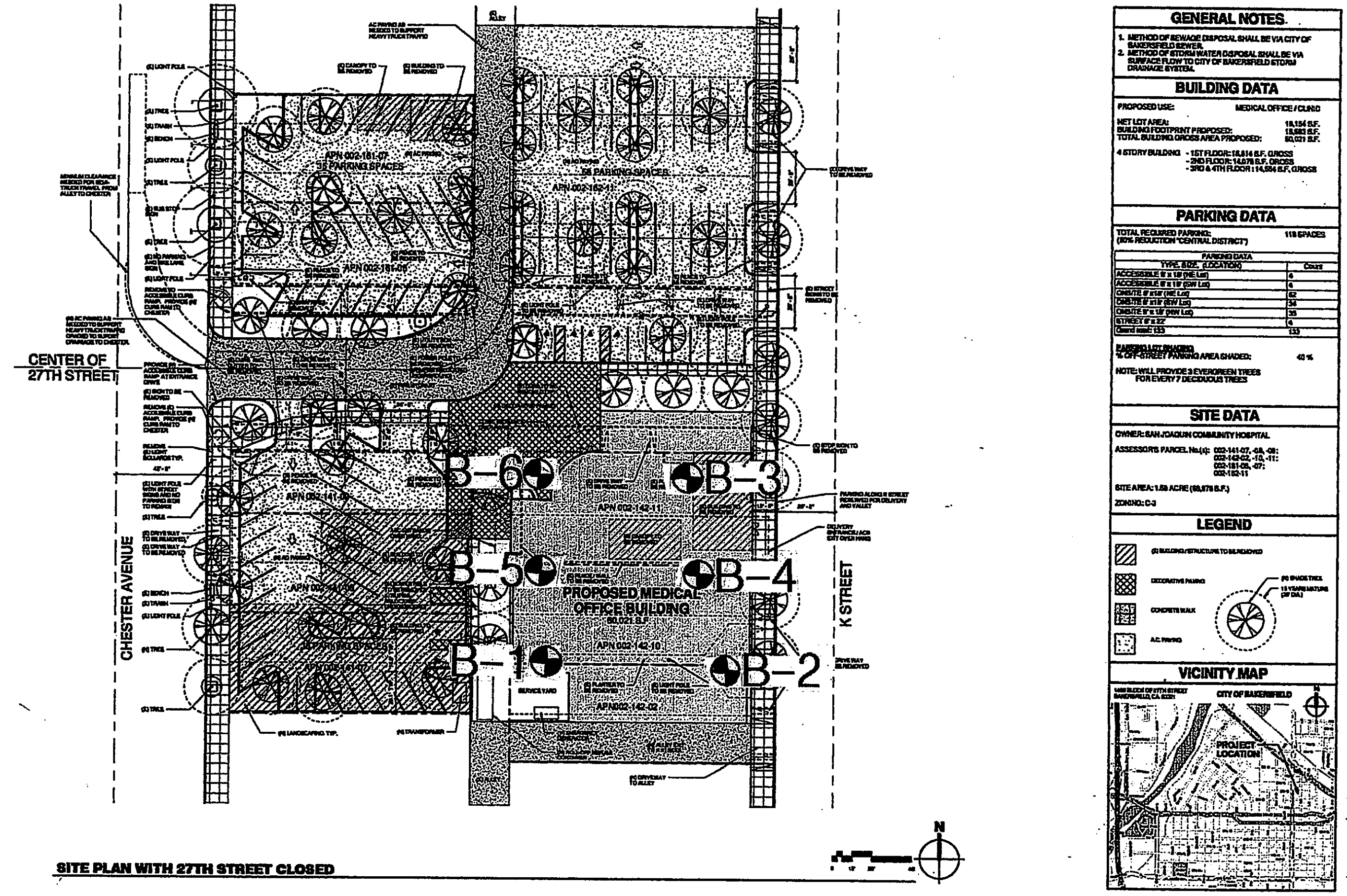
SANDS & GRAVELS	BLOWS/FOOT*
VERY LOOSE	0 - 4
LOOSE	4 - 10
MEDIUM DENSE	10 - 30
DENSE	30 - 50
VERY DENSE	Over 50

* Number of blows of 140 pound hammer falling 30 inches to drive a 2-inch O.D. (1 3/8" I.D.) Split-spoon (ASTM D1586)

DEFINITION OF WATER CONTENT

DRY: no feel of moisture
DAMP: much less than normal moisture
MOIST: normal moisture
WET: much greater than normal moisture
SATURATED: at or near saturation

Soils Engineering Inc.



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BORING LOCATION MAP **Figure Number 1**

LOG OF TEST BORING
BORING B-1

PROJECT: *4-STORY MEDICAL BUILDINGS, SJCH*
FILE NO: *11-13542*
BORING DATE: *2/17/2011*
ELEV.: *100' ASSUMED*
BORING LOCATION: *SEE BORING LOCATION MAP, FIGURE 1*
START: *2/17/2011*
DRILL METHOD: *4-1/4 INCH I.D. HOLLOW-STEM AUGER*
FINISH: *2/17/2011*
DESCRIPTION: *GEOTECHNICAL INVESTIGATION*
DEPTH TO WATER - : *N/A*
CAVING - : *N/A*
LOGGER: *B. Carolina*

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Description	Remarks	Density pcf	Moisture %
0 / 99		ML	SANDY SILT: dark grayish brown; very moist; cohesive fines; firm.			
	2/6 4/6 5/6	SM	SILTY SAND: yellowish brown; moist; fines; slightly cohesive fines; medium dense.		96.5	20.1
5.5 / 93.5	4/6 5/6 7/6	SP	POORLY-GRADED SAND: light yellowish brown; moist; fines; clean; medium dense.		99.6	10.5
11 / 88	5/6 8/6 8/6		light gray; slightly moist; fines		95.4	9.1
16.5	5/6 6/6 8/6				97.7	4.5
82.5		SW	WELL-GRADED SAND: light yellowish brown; slightly moist; fine to medium; clean; medium dense.			
	4/6 5/6 5/6				114.1	2.9
22 / 77			gravel			
	14/6 20/6 27/6		cobbles; very dense		96.5	5.3
27.5 / 71.5			rock; very dense			
	17/6 40/6 55/6	GW	SANDY GRAVEL: light yellowish brown; slightly moist; fine to coarse; clean; very dense; rock.		135.3	3.6
33 / 66						
38.5						

Figure Number 2

LOG OF TEST BORING
BORING B-1

PROJECT: *4-STORY MEDICAL BUILDINGS, SJCH*
FILE NO: *11-13542*
BORING DATE: *2/17/2011*
ELEV.: *100' ASSUMED*
BORING LOCATION: *SEE BORING LOCATION MAP, FIGURE 1*
START: *2/17/2011*
DRILL METHOD: *4-1/4 INCH I.D. HOLLOW-STEM AUGER*
FINISH: *2/17/2011*
DESCRIPTION: *GEOTECHNICAL INVESTIGATION*
DEPTH TO WATER - : *N/A*
CAVING - : *N/A*
LOGGER: *B. Carolina*

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Description	Remarks	Density pcf	Moisture %
60.5	40/6 47/6 55/6				136.0	7.7
44						
55						
			BOTTOM			
49.5						
49.5						
55						
44						
60.5						
38.5						
66						
33						
71.5						
27.5						
77						

Figure Number 2

LOG OF TEST BORING
BORING B-2

PROJECT: 4-STORY MEDICAL BUILDINGS, SJCH
FILE NO: 11-13542
BORING DATE: 2/17/2011
ELEV.: 100' ASSUMED
BORING LOCATION: SEE BORING LOCATION MAP, FIGURE 1
START: 2/17/2011
DRILL METHOD: 4-1/4 INCH I.D. HOLLOW-STEM AUGER
FINISH: 2/17/2011
DESCRIPTION: GEOTECHNICAL INVESTIGATION
DEPTH TO WATER - : N/A
CAVING - : N/A
LOGGER: B. Carolina

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Description	Remarks	Density pcf	Moisture %
0 / 99		ML	SANDY SILT: dark brown; very moist; cohesive fines; firm.			
	3/6 5/6 7/6				96.0	11.4
5.5 / 93.5	8/6 11/6 15/6		dark yellowish brown; slightly moist; fines; slightly cohesive		89.8	5.4
11 / 88	5/6 7/6 12/6	SW	WELL-GRADED SAND: light yellowish brown; slightly moist; fine to coarse; clean; medium dense.		103.3	1.2
16.5 / 82.5	13/6 37/6 55/6	GW	SANDY GRAVEL: light yellowish brown; slightly moist; fine to coarse; clean; very dense; rock.		134.3	1.2
22 / 77	5/6 7/6 12/6	SW	WELL-GRADED SAND: light yellowish brown; slightly moist; fine to medium; clean; medium dense.		103.4	1.6
27.5 / 71.5	17/6 30/6 35/6	GW	SANDY GRAVEL: light yellowish brown; slightly moist; fine to coarse; clean; very dense; cobbles.		135.0	1.9
33 / 66			BOTTOM			
38.5						

Figure Number 3

LOG OF TEST BORING
BORING B-3

PROJECT: *4-STORY MEDICAL BUILDINGS, SJCH*
FILE NO: *11-13542*
BORING DATE: *2/17/2011*
ELEV.: *100' ASSUMED*
BORING LOCATION: *SEE BORING LOCATION MAP, FIGURE 1*
START: *2/17/2011*
DRILL METHOD: *4-1/4 INCH I.D. HOLLOW-STEM AUGER*
FINISH: *2/17/2011*
DESCRIPTION: *GEOTECHNICAL INVESTIGATION*
DEPTH TO WATER - : *N/A*
CAVING - : *N/A*
LOGGER: *B. Carolina*

ELEVATION/DEPTH (feet) scale — Depth: 0, 5.5, 11, 16.5, 22, 27.5, 33, 38.5; Elevation: 99, 93.5, 88, 82.5, 77, 71.5, 66

SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Description	Remarks	Density pcf	Moisture %
	ML	SANDY SILT: dark brown; very moist; cohesive fines; firm.			
5/6 5/6 5/6				98.5	8.9
4/6 5/6 6/6				93.3	17.6
	ML	SANDY SILT: dark brown; very moist; cohesive fines; firm.			
4/6 6/6 8/6	SW	WELL-GRADED SAND: light yellowish brown; slightly moist; fine to coarse; clean; medium dense; slight gravel.		101.3	3.4
	GW	SANDY GRAVEL: light yellowish brown; slightly moist; fine to coarse; clean; medium dense.			
7/6 9/6 9/6				105.5	1.5
19/6 26/6 32/6				114.9	2.2
		cobbles; very dense			
16/6 19/6 19/6				121.8	2.5
30/6 40/6 50/6		cobbles		153.7	1.3
	SW	WELL-GRADED SAND: light yellowish brown; slightly moist; fine to medium; clean; dense.			
14/6 17/6 23/6				108.0	6.8
		cobbles			

LOG OF TEST BORING
BORING B-3

PROJECT: *4-STORY MEDICAL BUILDINGS, SJCH* **FILE NO:** *11-13542*
BORING DATE: *2/17/2011* **ELEV.:** *100' ASSUMED*
BORING LOCATION: *SEE BORING LOCATION MAP, FIGURE 1* **START:** *2/17/2011*
DRILL METHOD: *4-1/4 INCH I.D. HOLLOW-STEM AUGER* **FINISH:** *2/17/2011*
DESCRIPTION: *GEOTECHNICAL INVESTIGATION*
DEPTH TO WATER - : *N/A* **CAVING -** : *N/A* **LOGGER:** *B. Carolina*

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Description	Remarks	Density pcf	Moisture %
60.5						
			No Recovery			
			BOTTOM			
44 / 55						
49.5 / 49.5						
55 / 44						
60.5 / 38.5						
66 / 33						
71.5 / 27.5						
77						

Figure Number 4

LOG OF TEST BORING
BORING B-4

PROJECT: *4-STORY MEDICAL BUILDINGS, SJCH*
FILE NO: *11-13542*
BORING DATE: *2/17/2011*
ELEV.: *100' ASSUMED*
BORING LOCATION: *SEE BORING LOCATION MAP, FIGURE 1*
START: *2/17/2011*
DRILL METHOD: *4-1/4 INCH I.D. HOLLOW-STEM AUGER*
FINISH: *2/17/2011*
DESCRIPTION: *GEOTECHNICAL INVESTIGATION*
DEPTH TO WATER - : *N/A* **CAVING -** : *N/A*
LOGGER: *B. Carolina*

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Description	Remarks	Density pcf	Moisture %
0 / 99		ML	SANDY SILT: dark brown; moist; fines; cohesive; firm.			
	4/6, 4/6, 5/6		yellowish brown; moist; fines; slightly cohesive; loose.		93.6	13.2
5.5 / 93.5	3/6, 5/6, 7/6				95.5	21.5
11 / 88	3/6, 5/6, 7/6	SP	POORLY-GRADED SAND: light yellowish brown; slightly moist; fines; clean; medium dense.		108.8	8.9
		GW	gravel			
16.5 / 82.5	19/6, 23/6, 19/6		SANDY GRAVEL; light yellowish brown; slightly moist; fine to coarse; clean; medium dense; rock.		128.9	1.5
22 / 77			cobbles			
27.5 / 71.5	14/6, 28/6, 36/6				135.6	1.4
33 / 66			BOTTOM			
38.5						

3 Inches AC over 4 inches Base

Figure Number 5

LOG OF TEST BORING
BORING B-5

PROJECT: *4-STORY MEDICAL BUILDINGS, SJCH*
FILE NO: *11-13542*
BORING DATE: *2/18/2011*
ELEV.: *100' ASSUMED*
BORING LOCATION: *SEE BORING LOCATION MAP, FIGURE 1*
START: *2/18/2011*
DRILL METHOD: *4-1/4 INCH I.D. HOLLOW-STEM AUGER*
FINISH: *2/18/2011*
DESCRIPTION: *GEOTECHNICAL INVESTIGATION*
DEPTH TO WATER - : *N/A*
CAVING - : *N/A*
LOGGER: *B. Carolina*

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Description	Remarks	Density pcf	Moisture %
	3/6 4/6 7/6	SM	SILTY SAND: dark yellowoish brown; moist; fines; slightly cohesive; medium dense.		100.9	13.4
	4/6 5/6 9/6	SP	POORLY-GRADED SAND: light yellowish brown; slightly moist; fines; clean; medium dense.		102.4	6.1
	5/6 6/6 7/6				94.4	6.8
	4/6 6/6 7/6	SW	WELL-GRADED SAND: light yellowish brown; slightly moist; fine to medium; clean; medium dense.		102.2	1.8
			gravel; very dense			
	30/6 47/6 57/6	GW	SANDY GRAVEL: light yellowish brown; fine to coarse; clean; very dense.		129.2	1.8
	27/6 49/6 60/6				147.5	1.8
			cobbles; very dense			

Depth scale: 0, 5.5, 11, 16.5, 22, 27.5, 33, 38.5
Elevation scale: 99, 93.5, 88, 82.5, 77, 71.5, 66

3 Inches AC over 4 inches Base

Figure Number 6

LOG OF TEST BORING
BORING B-5

PROJECT: *4-STORY MEDICAL BUILDINGS, SJCH*
FILE NO: *11-13542*
BORING DATE: *2/18/2011*
ELEV.: *100' ASSUMED*
BORING LOCATION: *SEE BORING LOCATION MAP, FIGURE 1*
START: *2/18/2011*
DRILL METHOD: *4-1/4 INCH I.D. HOLLOW-STEM AUGER*
FINISH: *2/18/2011*
DESCRIPTION: *GEOTECHNICAL INVESTIGATION*
DEPTH TO WATER - : *N/A*
CAVING - : *N/A*
LOGGER: *B. Carolina*

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Description	Remarks	Density pcf	Moisture %
60.5						
44						
55	47/6 40/6 40/6				119.5	2.5
			BOTTOM			
49.5						
49.5						
55						
44						
60.5						
38.5						
66						
33						
71.5						
27.5						
77						

3 Inches AC over 4 inches Base

Figure Number 6

LOG OF TEST BORING
BORING B-6

PROJECT: 4-STORY MEDICAL BUILDINGS, SJCH
BORING DATE: 2/18/2011
BORING LOCATION: SEE BORING LOCATION MAP, FIGURE 1
DRILL METHOD: 4-1/4 INCH I.D. HOLLOW-STEM AUGER
DESCRIPTION: GEOTECHNICAL INVESTIGATION
DEPTH TO WATER - : N/A
CAVING - : N/A

FILE NO: 11-13542
ELEV.: 100' ASSUMED
START: 2/18/2011
FINISH: 2/18/2011
LOGGER: B. Carolina

ELEVATION/ DEPTH (feet): Depth 0, 5.5, 11, 16.5, 22, 27.5, 33, 38.5; Elevation 99, 93.5, 88, 82.5, 77, 71.5, 66

SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Description	Remarks	Density pcf	Moisture %
7/6 9/6 11/6	ML	SANDY SILT; dark brown; moist; cohesive fines; firm.		96.1	9.1
5/6 6/6 10/6	SP	POORLY-GRADED SAND: light yellowish brown; slightly moist; fines; clean; medium dense.		100.7	6.8
3/6 3/6 4/6	ML	SANDY SILT: dark yellowish brown; moist; slightly cohesive; very loose.		91.4	26.6
	SP	POORLY-GRADED SAND: light yellowish brown; slightly moist; fines; very loose.			
3/6 5/6 9/6	SW	WELL-GRADED SAND: light yellowish brown; slightly moist; fine to coarse; clean; medium dense.		109.3	1.6
12/6 14/6 16/6		rock; dense		113.2	4.0
		cobbles; very dense			
25/6 48/6 52/6		rock; very dense		140.7	2.7
		BOTTOM			

Figure Number 7

KEY TO SYMBOLS

Symbol Description

Strata symbols

Silt

Silty sand

Poorly graded sand

Well graded sand

Well graded gravel

Misc. Symbols

Boring continues

Soil Samplers

California sampler

Standard penetration test

Notes:

1. Six (6) Exploratory borings were drilled on 02/17/2011 and 02/18/2011 using a 4 1/4 inch I.D. hollow-stem auger.
2. No free water was encountered in any of the borings to the maximum depth drilled of 47 feet.
3. Boring locations are shown on the Boring Location Map, Figure 1.
4. These logs are subject to the limitations, conclusions, and recommendations in this report.
5. Results of tests for moisture & density conducted on samples recovered are reported on the logs.

APPENDIX C

SOIL TEST DATA

SIEVE ANALYSES

Grain size distributions for samples selected as most representative of sub-soils encountered in our test borings were determined by sieve analysis (ASTM Test Method D422). Test results are shown in Figures A-1 through A-6.

IN-SITU MOISTURE RELATIONSHIPS (ASTM D 2216)

Moisture density data for disturbed native soils was obtained by use of a 2-3/8 inch (inside diameter) split-barrel sampler. Test results are given on the Test Boring Logs.

CONSOLIDATION TESTS (ASTM D 2435)

Compressibility of soils was determined on saturated, undisturbed samples of native materials. Consolidation Test Diagrams, Figures B-1 thru B-4, graphically express the relationship of vertical strain vs. applied vertical (normal) load for earth materials selected as most representative of the soil strata within the anticipated zone of influence of foundation loads.

DIRECT SHEAR TESTS (ASTM D 3080)

Six (6) quick-consolidated direct shear tests were performed on an undisturbed, saturated sample of native earth materials. This test provides information on soil shear strength vs. normal load and is used to determine the angle of internal friction and cohesion of earth materials under essentially drained conditions. Test results are presented in Figures C-1 thru C-6.

R-VALUE TESTS

Two (2) R-Value tests were performed in accordance with Test Method No. California 301-F to obtain flexible pavement design data. Test results are given in Figures D-1 and D-2.

EXPANSION INDEX (UBC Standard 18-2)

The Expansion Index test is designed to measure a basic index property of soil and in this respect is comparable to other index tests such as the Atterberg Limits. In formulating the test procedures, no attempt has been made to duplicate any particular moisture or loading conditions which may occur in the field. Rather, an attempt has been made to control all variables which influence the expansive characteristics of a particular soil and still retain a practical test for general engineering usage. Two samples of near surface soils were obtained and tested for expansiveness. Test results are presented on the Laboratory Testing Recap table, page C-3. Classification of Expansive Soils is given below in UBC Table 18A-1-B.

TABLE 18A-I-B – CLASSIFICATION OF EXPANSIVE SOIL	
Expansion Index	**Potential Expansion**
0-20	Very Low
21-50	Low
51-90	Medium
91-130	High
Above 130	Very High

SOIL-BORNE SALTS

Two (2) samples taken from the upper 24 inches were tested for soluble sulfate, pH, and Chloride to determine the extent to which measures (if any) should be taken to prevent sulfate attack on concrete surfaces exposed to direct contact with soils. Results are shown in Table 1.

TEST LOCATION	USCS	% < # 200	CONSOLIDATION			DIRECT SHEAR		S.G.	E.I.	ATTERBERG LIMITS		R-VALUE @ 300 psi		MAXIMUM DENSITY	
			C_C	C_S	S.P. (psf)	C, (ksf)	F.A.			LL	PL	R.V.	E.P. (psi)	MDD (pcf)	O.M.
B-1 @ 11'	SP					0.25	40.8								
B-2 @ 3'	ML	60	0.06	0.03	0										
B-2 @ 6'	ML					0.43	34.5								
B-3 @ 3'	SM	30	0.06	0.01	0										
B-3 @ 6'	ML					0.31	36.5								
B-4 @ 6'	ML	66	0.06	0.02	0										
B-5 @ 6'	SP					0.37	33.8								
B-5 @ 16'	SW					0	39.7								
B-6 @ 3'	ML	54	0.07	0.01	0										
B-6 @ 16'	SW					0	40.6								
R-1 @ 0-5'	ML	51										55	0		
R-2 @ 0-5'	ML	54										70	0.07		

CONSOLIDATION
Cc - Compression Index
Cs - Swell Index
S.P. (psf) - Swell Pressure

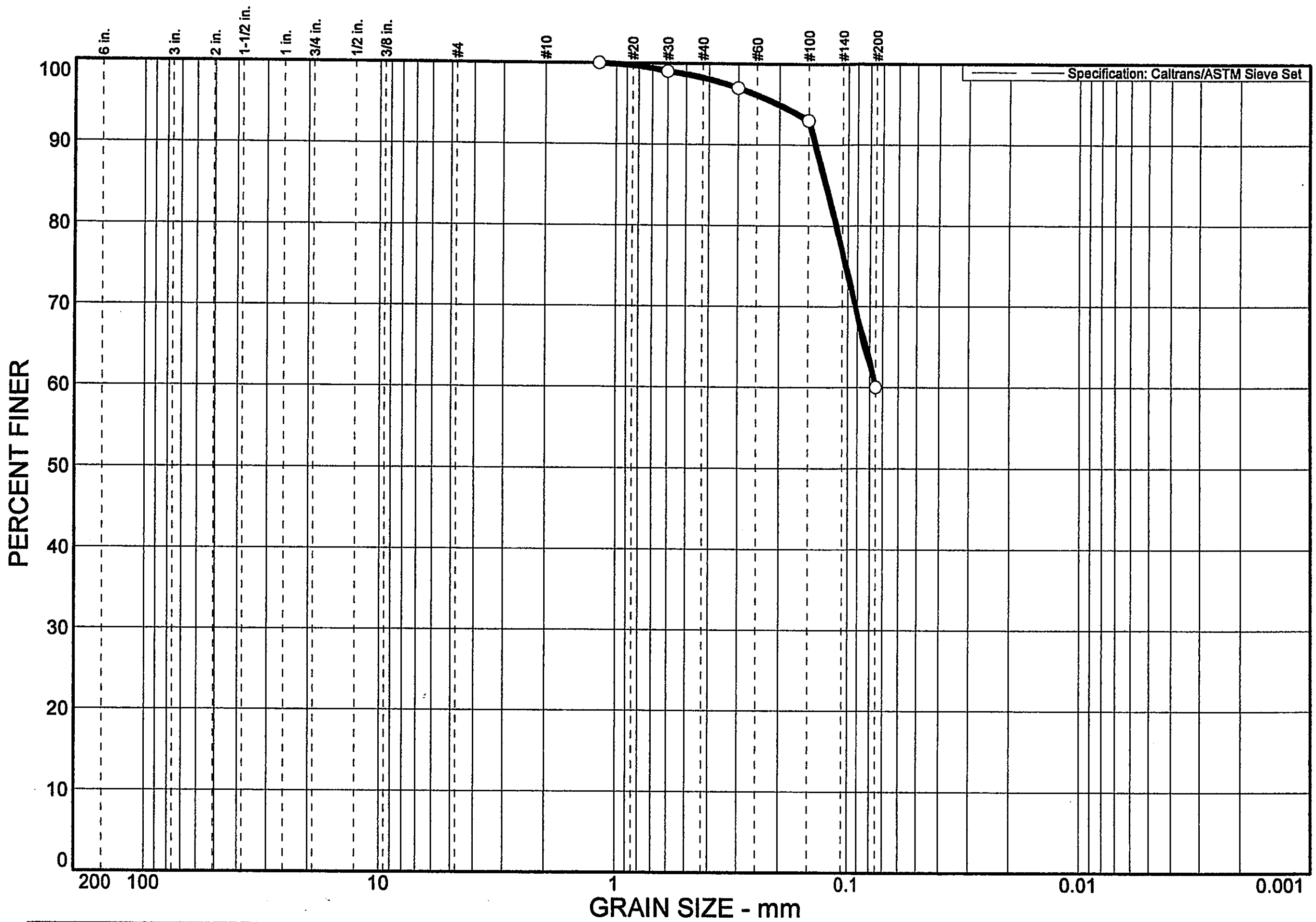
DIRECT SHEAR
C (ksf) - Cohesion
F.A. - Friction Angle
S.G. - Specfic Gravity

E.I. - EXPANSION INDEX
ATTERBERG LIMITS
LL - Liquid Limit
PL - Plastic Limit

(R)ESISTANCE VALUE
RV - R-Value @ 300 psi
EP - Expansion Press @ 300 psi

MAXIMUM DENSITY
MDD (pcf) - Max Dry Density
O.M. - Optimum Moisture

Grain Size Distribution Report



	% + 3"	% GRAVEL		% SAND			% FINES	
		CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
○	0	0	0	0	2	38	60	

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	DESCRIPTION	USCS
○	B-2		3	SANDY SILT	ML

Grain Size Distribution Report

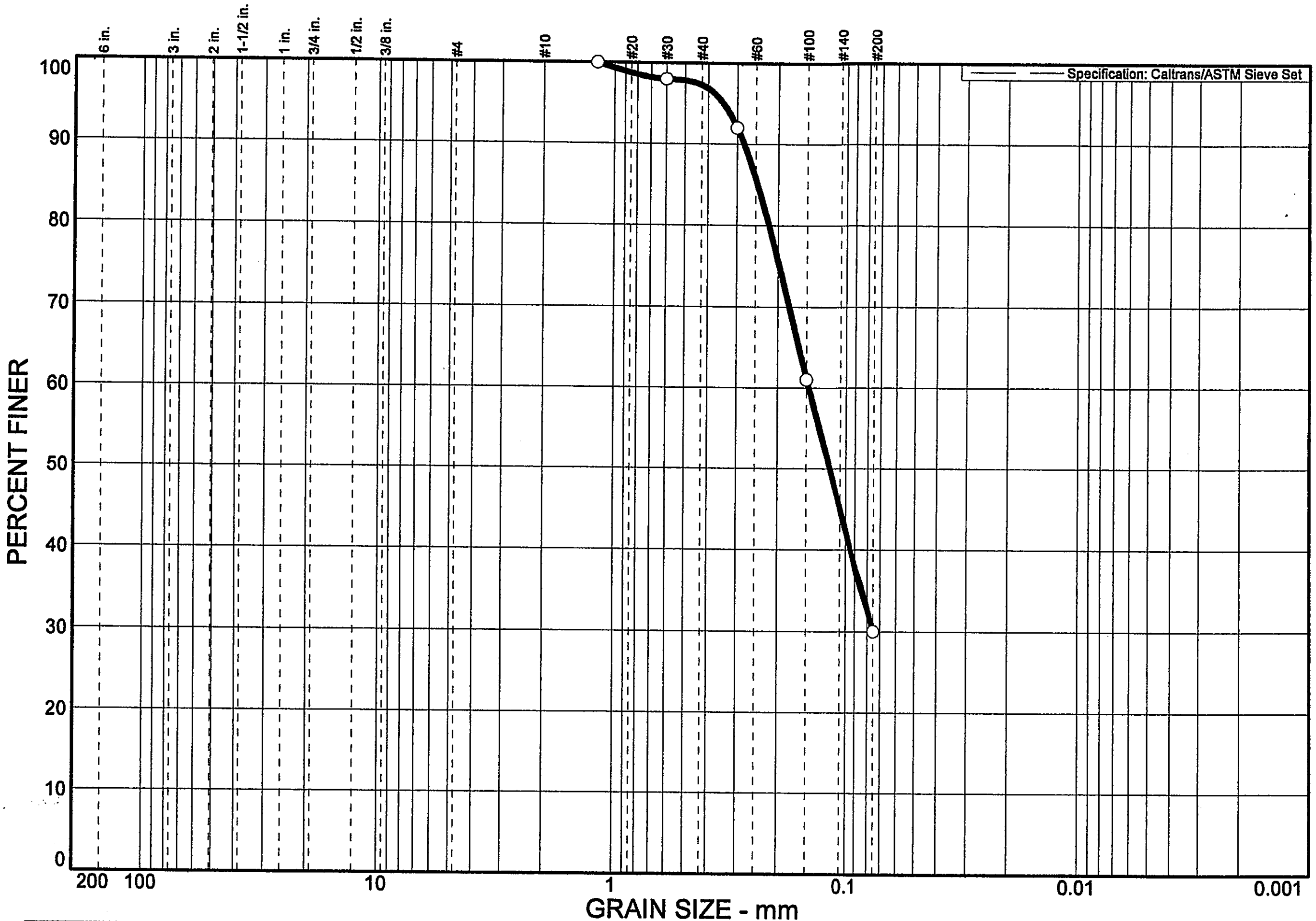
SOILS ENGINEERING, INC.

Client: SWINERTON BUILDERS

Project: 4-STORY MEDICAL BUILDINGS, SJCH

Project No.: 11-13542 **Figure** A-1

Grain Size Distribution Report



	% + 3"	% GRAVEL		% SAND			% FINES	
		CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
○	0	0	0	0	3	67	30	

SOIL DATA

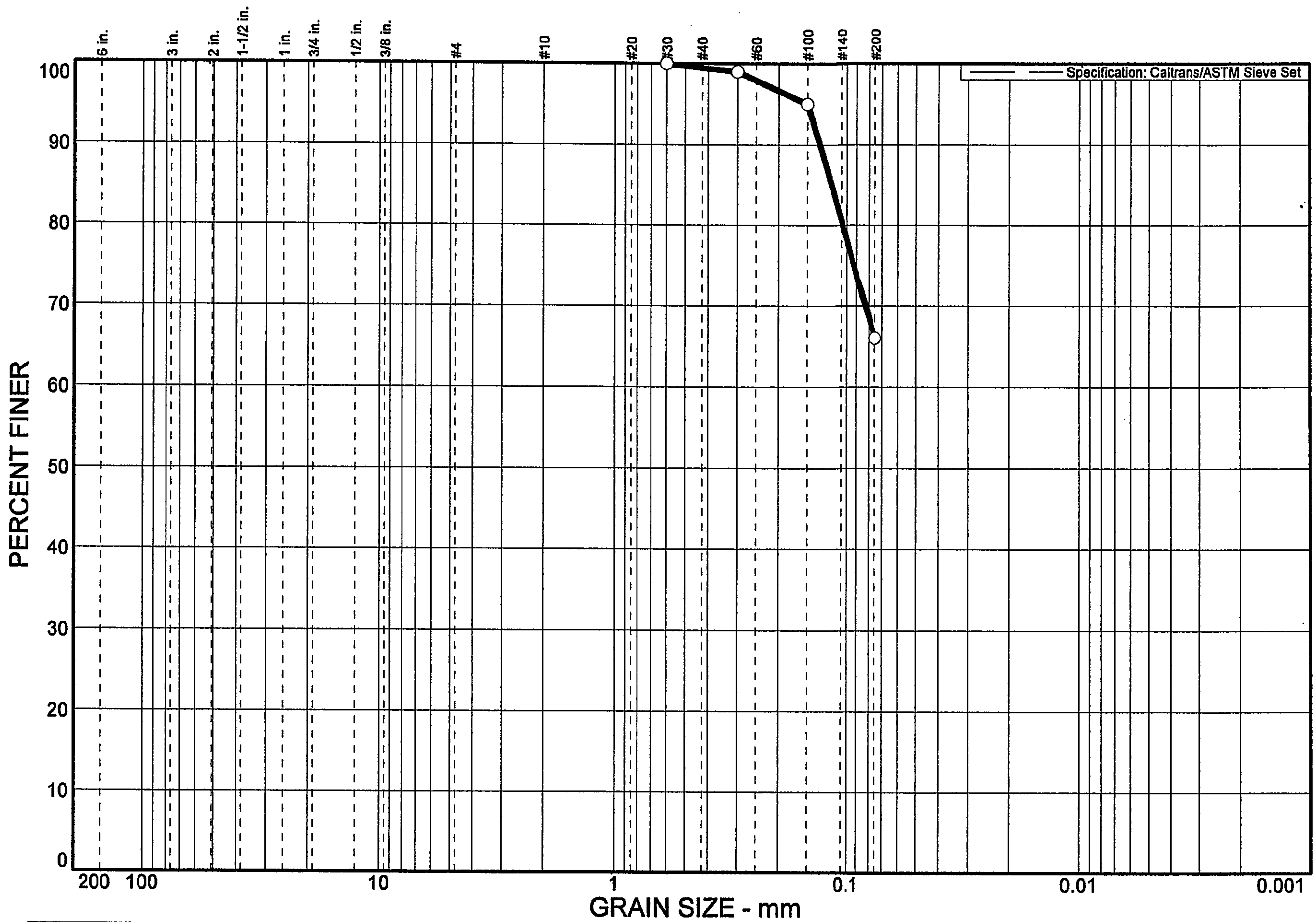
SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	DESCRIPTION	USCS
○	B-3		3	SILTY SAND	SM

Grain Size Distribution Report

SOILS ENGINEERING, INC.

Client: SWINERTON BUILDERS
Project: 4-STORY MEDICAL BUILDINGS, SJCH
Project No.: 11-13542
Figure A-2

Grain Size Distribution Report



	% + 3"	% GRAVEL		% SAND			% FINES	
		CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
○	0	0	0	0	0	34	66	

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	DESCRIPTION	USCS
○	B-4		6	SANDY SILT	ML

Grain Size Distribution Report

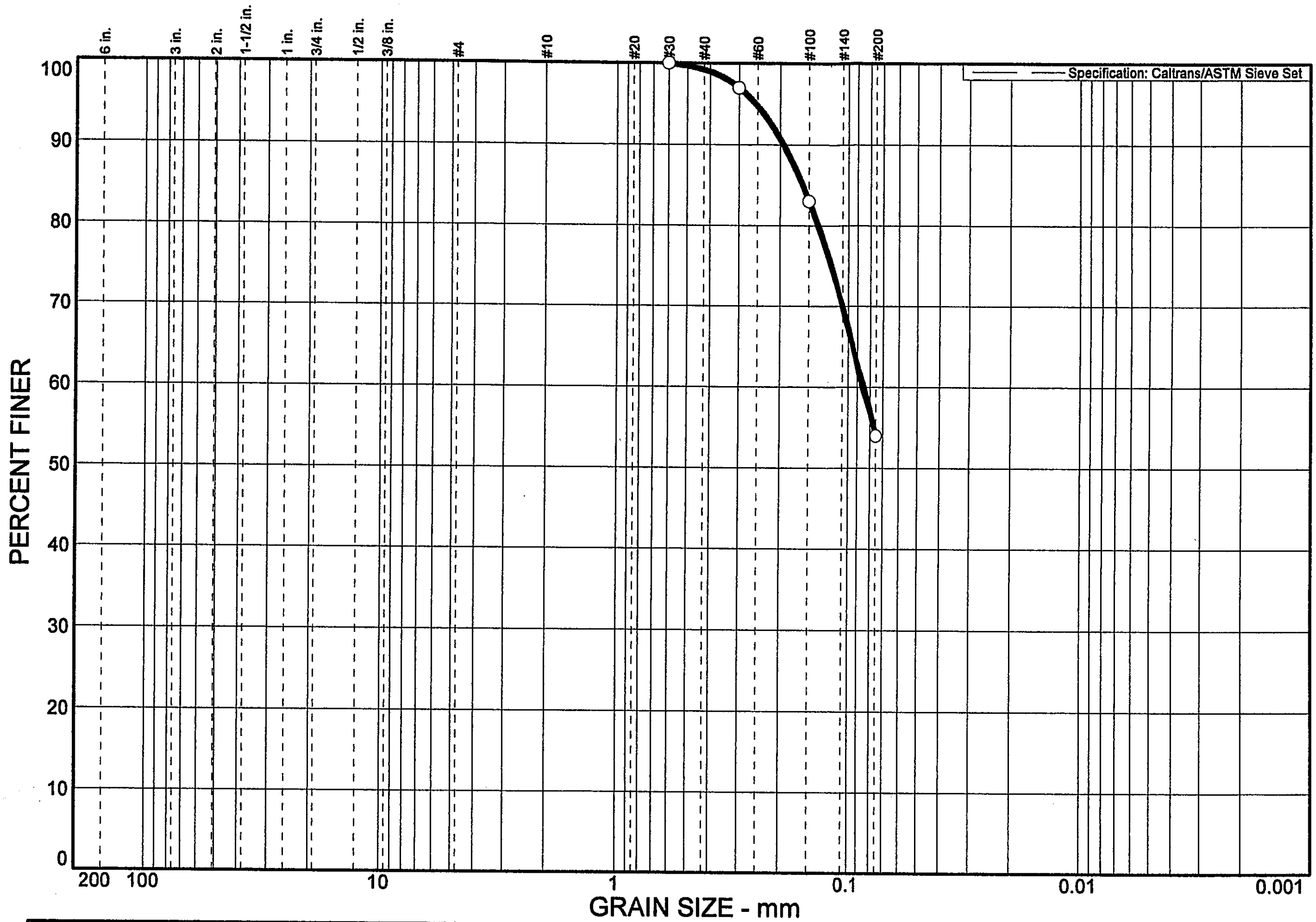
SOILS ENGINEERING, INC.

Client: SWINERTON BUILDERS

Project: 4-STORY MEDICAL BUILDINGS, SJCH

Project No.: 11-13542 **Figure** A-3

Grain Size Distribution Report



	% + 3"	% GRAVEL		% SAND			% FINES	
		CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
○	0	0	0	0	1	45	54	

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	DESCRIPTION	USCS
○	B-6		3	SANDY SILT	ML

Grain Size Distribution Report

SOILS ENGINEERING, INC.

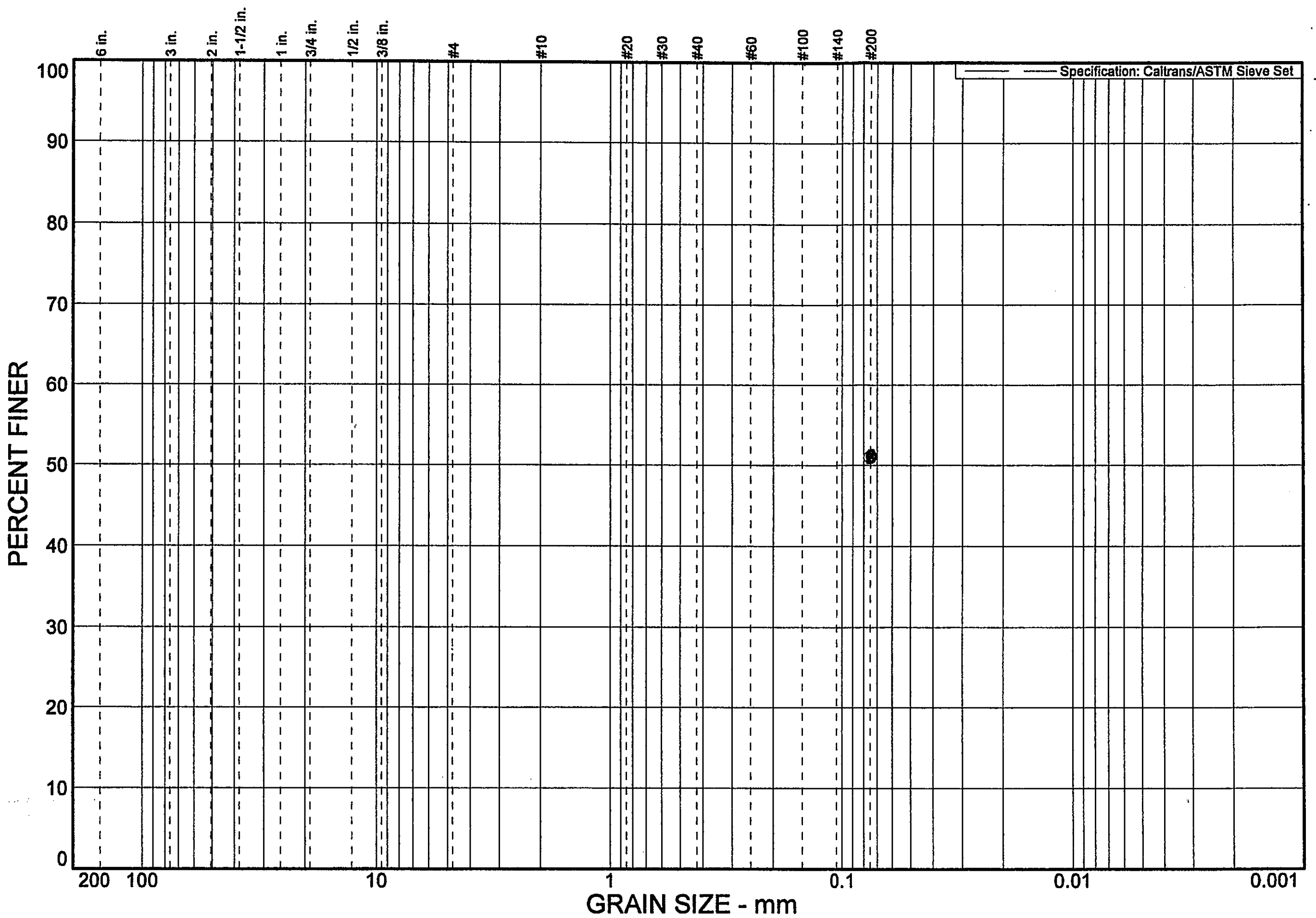
Client: SWINERTON BUILDERS

Project: 4-STORY MEDICAL BUILDINGS, SJCH

Project No.: 11-13542

Figure A-4

Grain Size Distribution Report



	% + 3"	% GRAVEL		% SAND			% FINES	
		CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
○							51	

SOIL DATA

SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	DESCRIPTION	USCS
○		34855	0-5'	SANDY SILT	ML
				Location: R-1 @ 0-5'	
				Large Bag Sample	

Grain Size Distribution Report

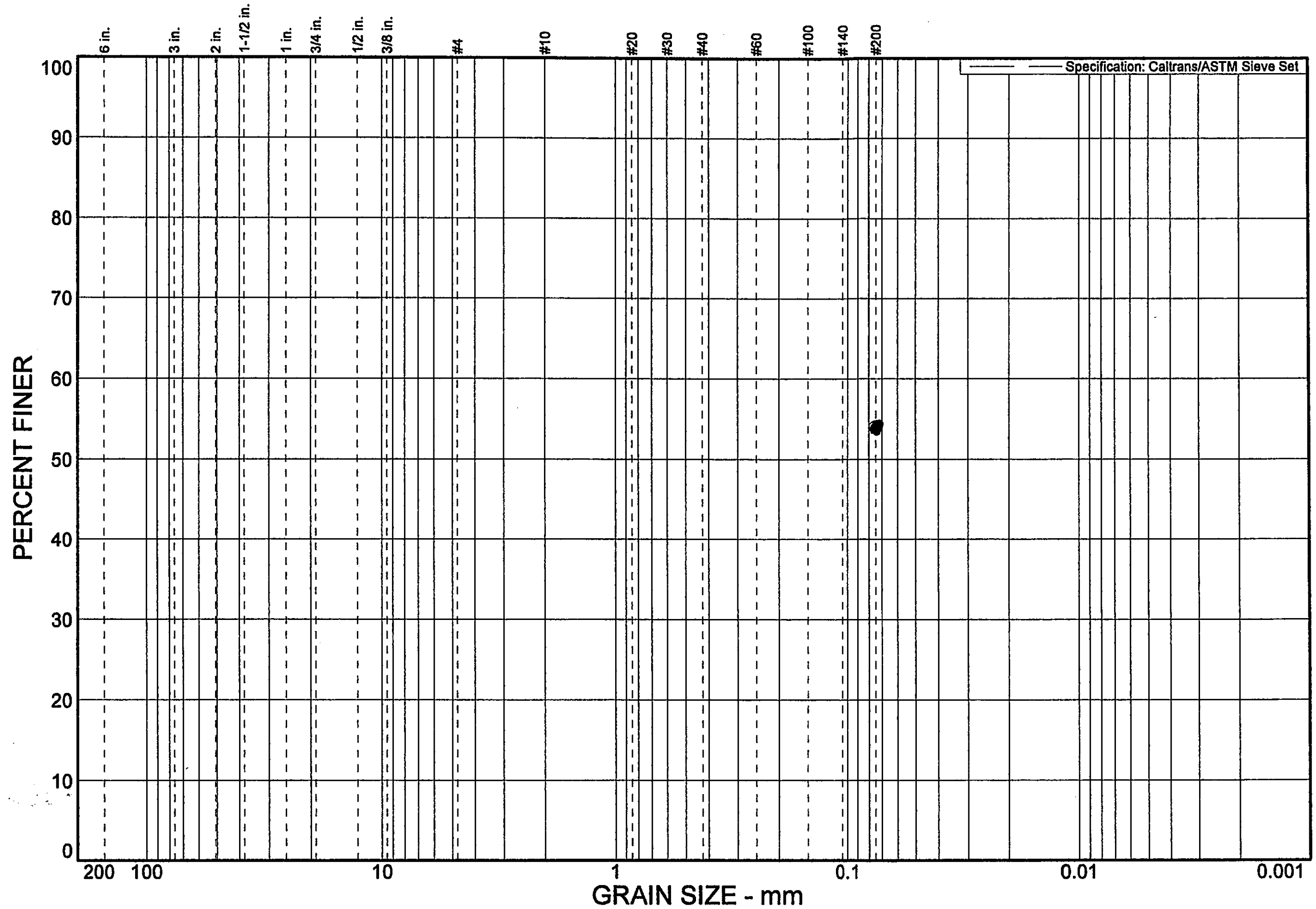
SOILS ENGINEERING, INC.

Client: SWINERTON BUILDERS

Project: 4-STORY MEDICAL BUILDINGS, SJCH

Project No.: 11-13542 **Figure** A-5

Grain Size Distribution Report



	% + 3"	% GRAVEL		% SAND			% FINES	
		CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
○							54	

SOIL DATA					
SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	DESCRIPTION	USCS
○		34856	0-5'	SANDY SILT	ML
				Location: R-2 @ 0-5'	
				Large Bag Sample	

Grain Size Distribution Report

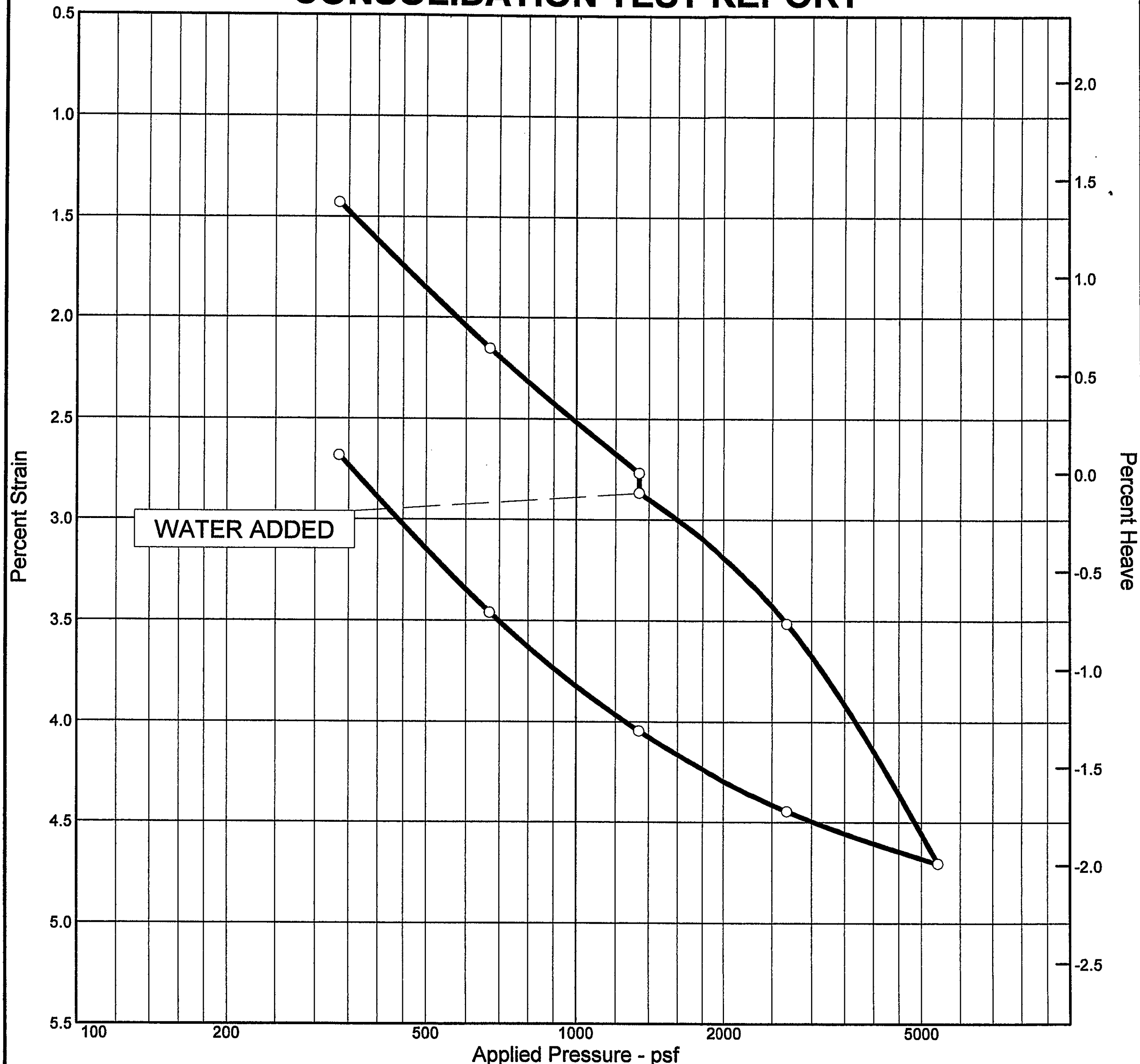
SOILS ENGINEERING, INC.

Client: SWINERTON BUILDERS

Project: 4-STORY MEDICAL BUILDINGS, SJCH

Project No.: 11-13542 **Figure** A-6

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (psf)	P_c (psf)	C_c	C_s	Swell Press. (psf)	Heave %	e_o
Sat.	Moist.											
60.5 %	14.1 %	88.3	N/A	N/A	2.65	335	2850	0.06	0.03		-0.1	0.617

MATERIAL DESCRIPTION	USCS	AASHTO
SANDY SILT	ML	N/A

Project No. 11-13542 **Client:** SWINERTON BUILDERS

Project: 4-STORY MEDICAL BUILDINGS, SJCH

Source: B-2 **Elev./Depth:** 3

CONSOLIDATION TEST REPORT

SOILS ENGINEERING, INC.

Remarks:
Test Date: 02/28/11
Tested By: AL
Sample No: 34712

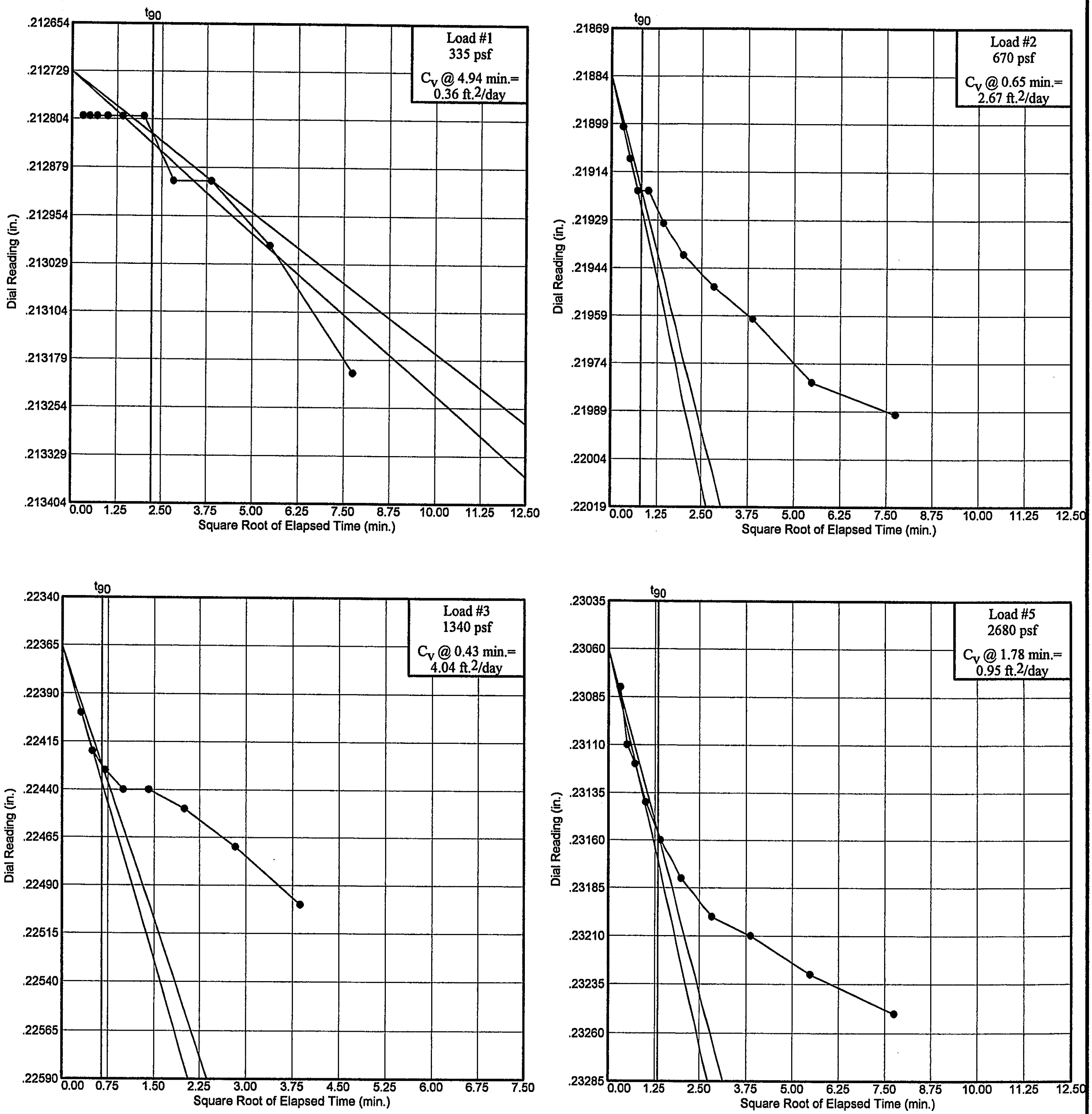
Figure B-1

Dial Reading vs. Time

Project No.: 11-13542
Project: 4-STORY MEDICAL BUILDINGS, SJCH

Source: B-2

Elev./Depth: 3



Dial Reading vs. Time

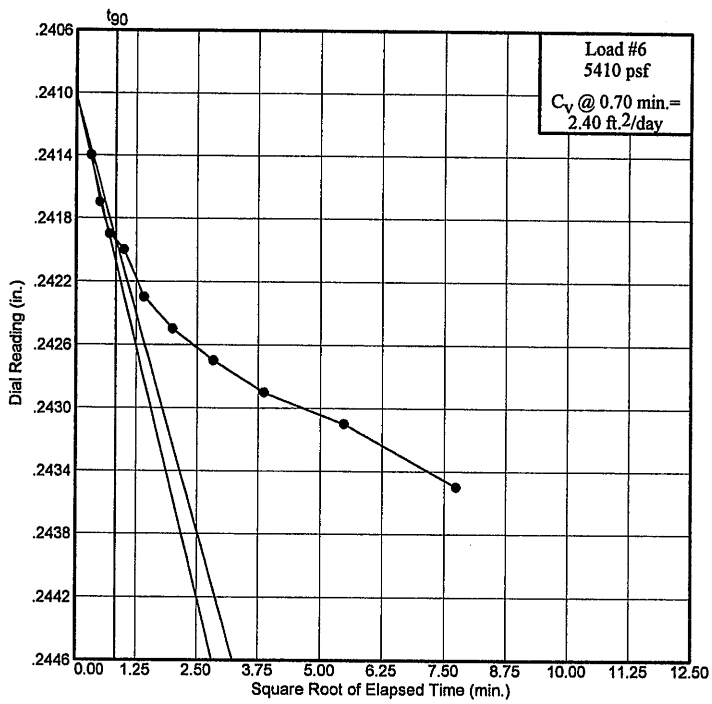
SOILS ENGINEERING, INC.

Figure B-1

Dial Reading vs. Time

Project No.: 11-13542
Project: 4-STORY MEDICAL BUILDINGS, SJCH

Source: B-2 | Elev./Depth: 3

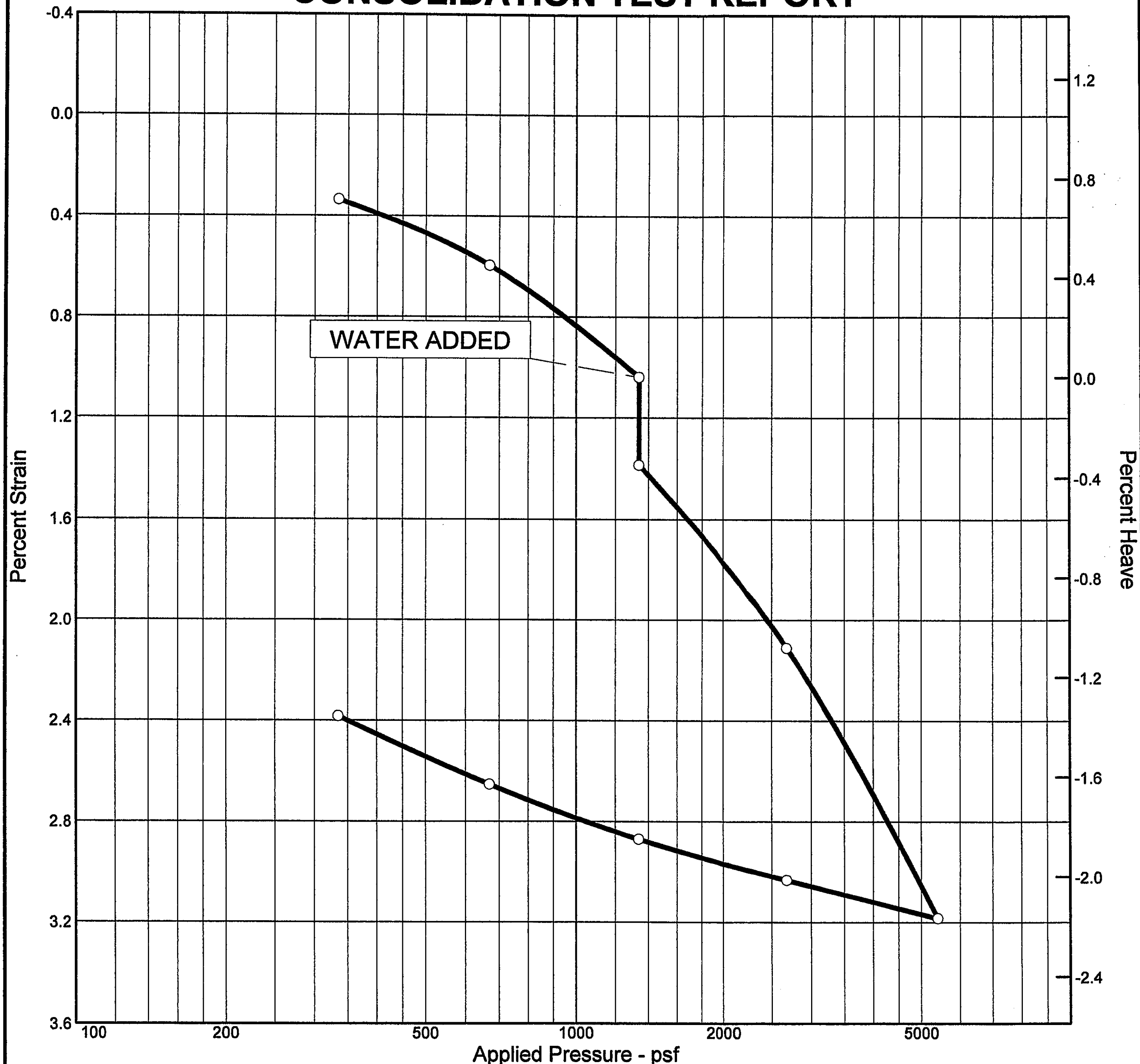


Dial Reading vs. Time

SOILS ENGINEERING, INC.

Figure B-1

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (psf)	P_c (psf)	C_c	C_s	Swell Press. (psf)	Heave %	e_o
Sat.	Moist.											
33.7 %	8.9 %	90.9	N/A	N/A	2.65	335	1133	0.06	0.01		-0.4	0.700

MATERIAL DESCRIPTION	USCS	AASHTO
SILTY SAND	SM	N/A

Project No. 11-13542 **Client:** SWINERTON BUILDERS

Project: 4-STORY MEDICAL BUILDINGS, SJCH

Source: B-3 **Elev./Depth:** 3

CONSOLIDATION TEST REPORT

SOILS ENGINEERING, INC.

Remarks:

Test Date: 02/28/11

Tested By: AL

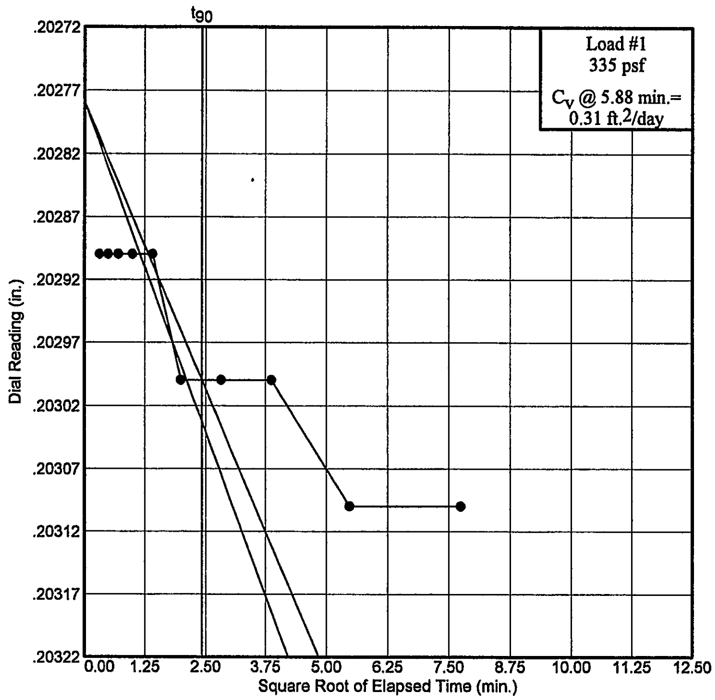
Sample No: 34720

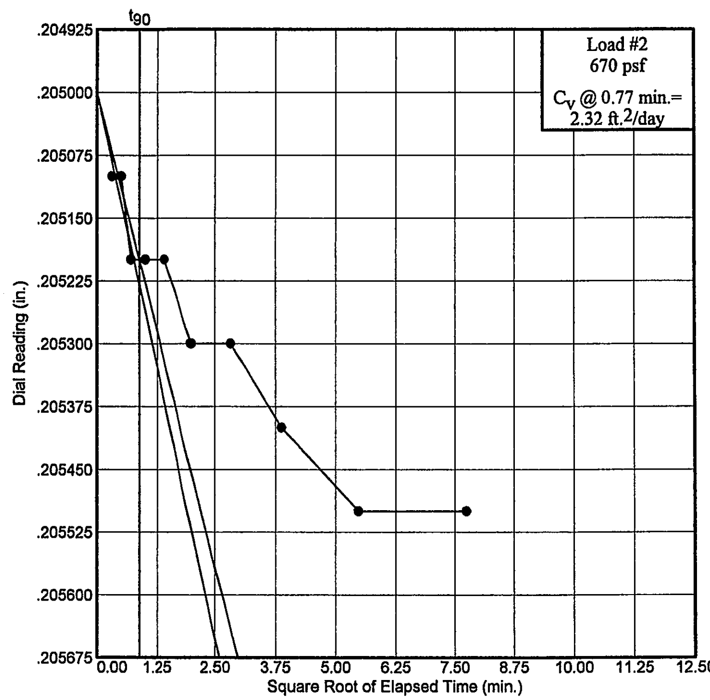
Figure B-2

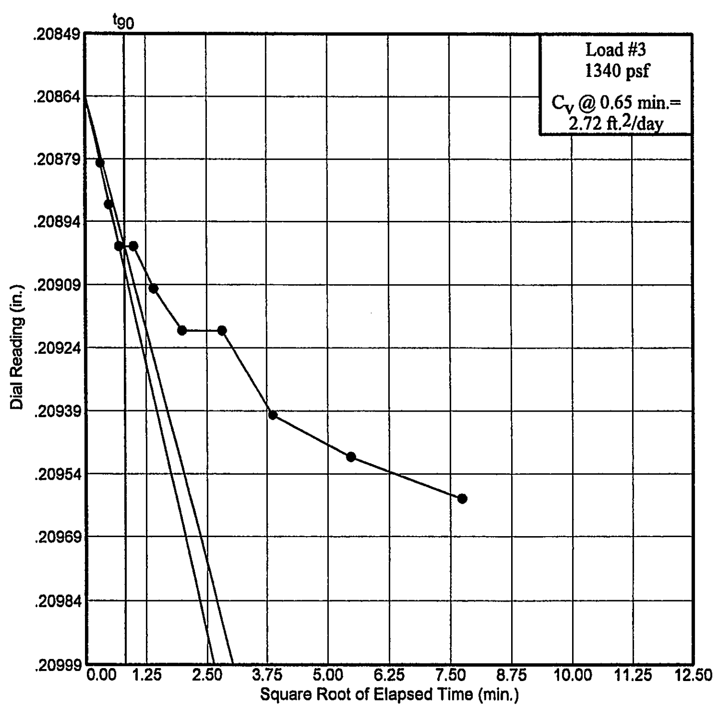
Dial Reading vs. Time

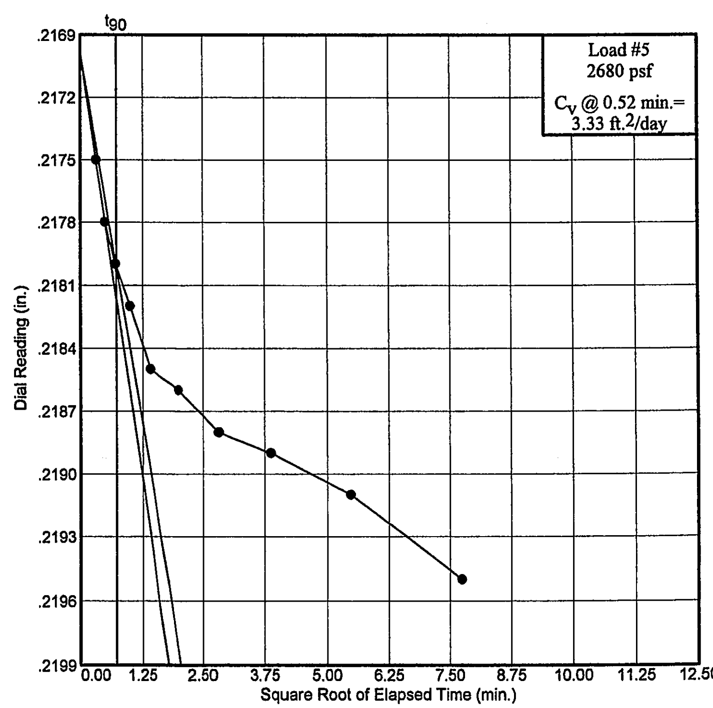
Project No.: 11-13542
Project: 4-STORY MEDICAL BUILDINGS, SJCH

Source: B-3 Elev./Depth: 3









Dial Reading vs. Time

SOILS ENGINEERING, INC.

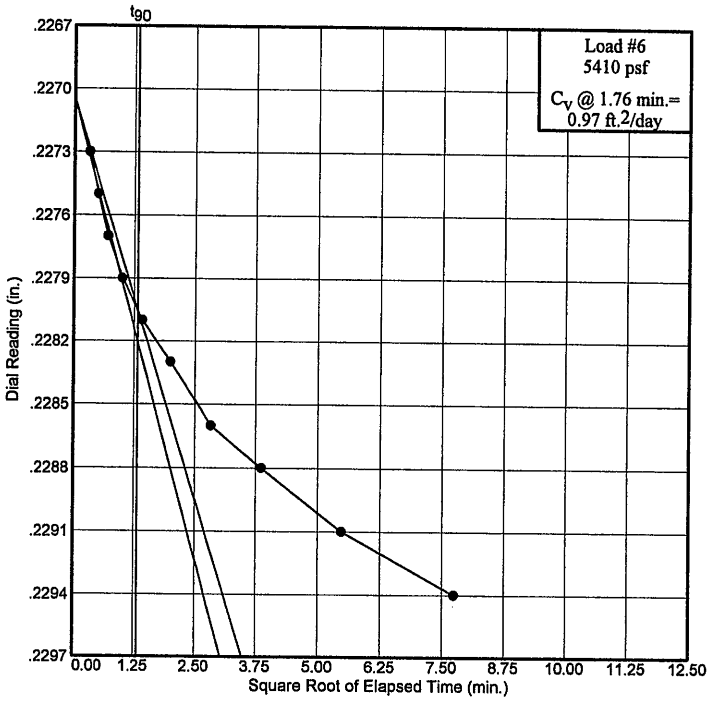
Figure B-2

Dial Reading vs. Time

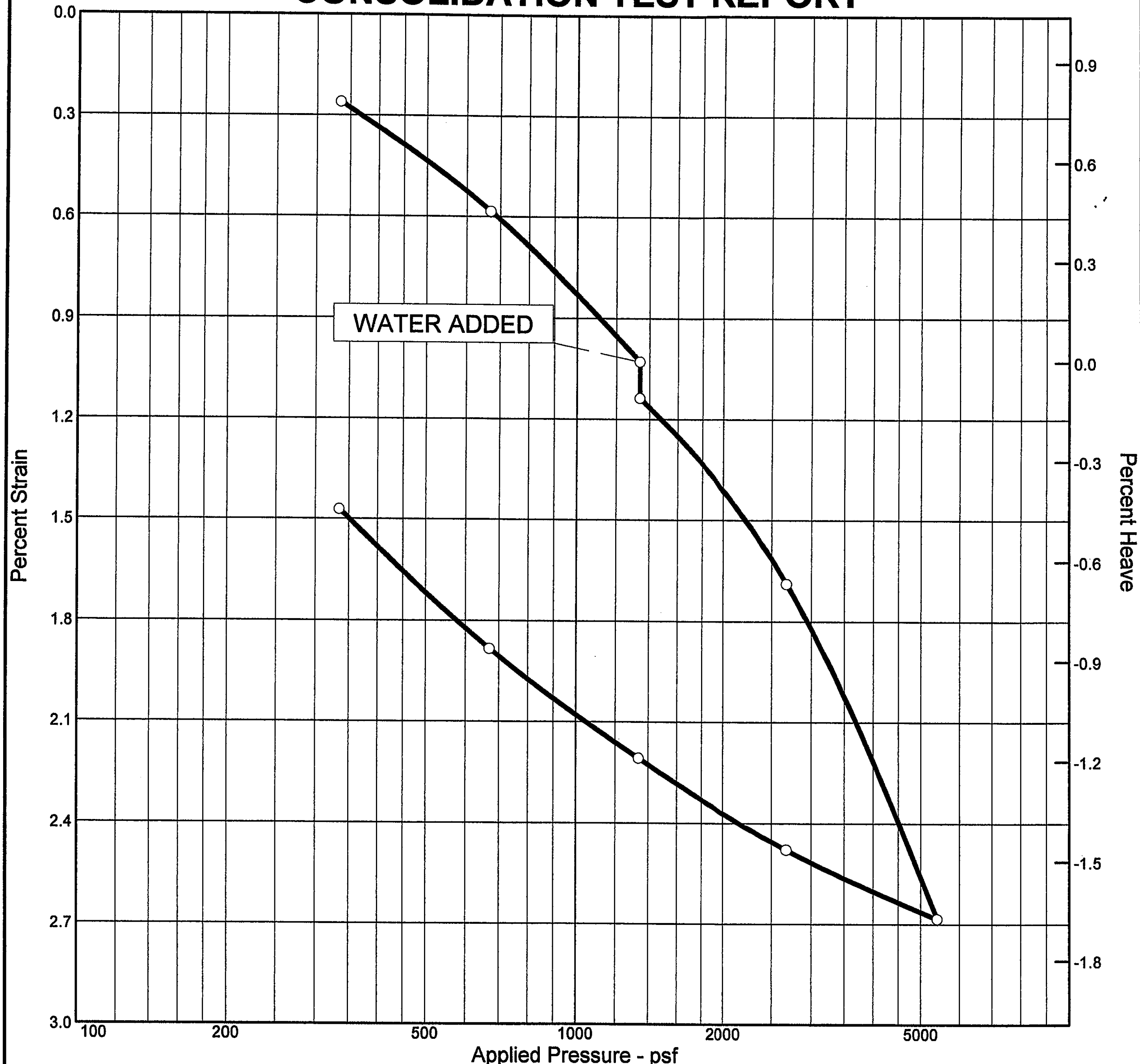
Project No.: 11-13542
Project: 4-STORY MEDICAL BUILDINGS, SJCH

Source: B-3

Elev./Depth: 3



CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (psf)	P_c (psf)	C_c	C_s	Swell Press. (psf)	Heave %	e_o
Sat.	Moist.											
75.6 %	18.3 %	100.8	N/A	N/A	2.65		2748	0.06	0.02		-0.1	0.641

MATERIAL DESCRIPTION	USCS	AASHTO
SANDY SILT	ML	N/A

Project No. 11-13542 **Client:** SWINERTON BUILDERS

Project: 4-STORY MEDICAL BUILDINGS, SJCH

Source: B-4 **Elev./Depth:** 6

Remarks:
Test Date: 02/28/11
Tested By: AL
Sample No: 34729

CONSOLIDATION TEST REPORT

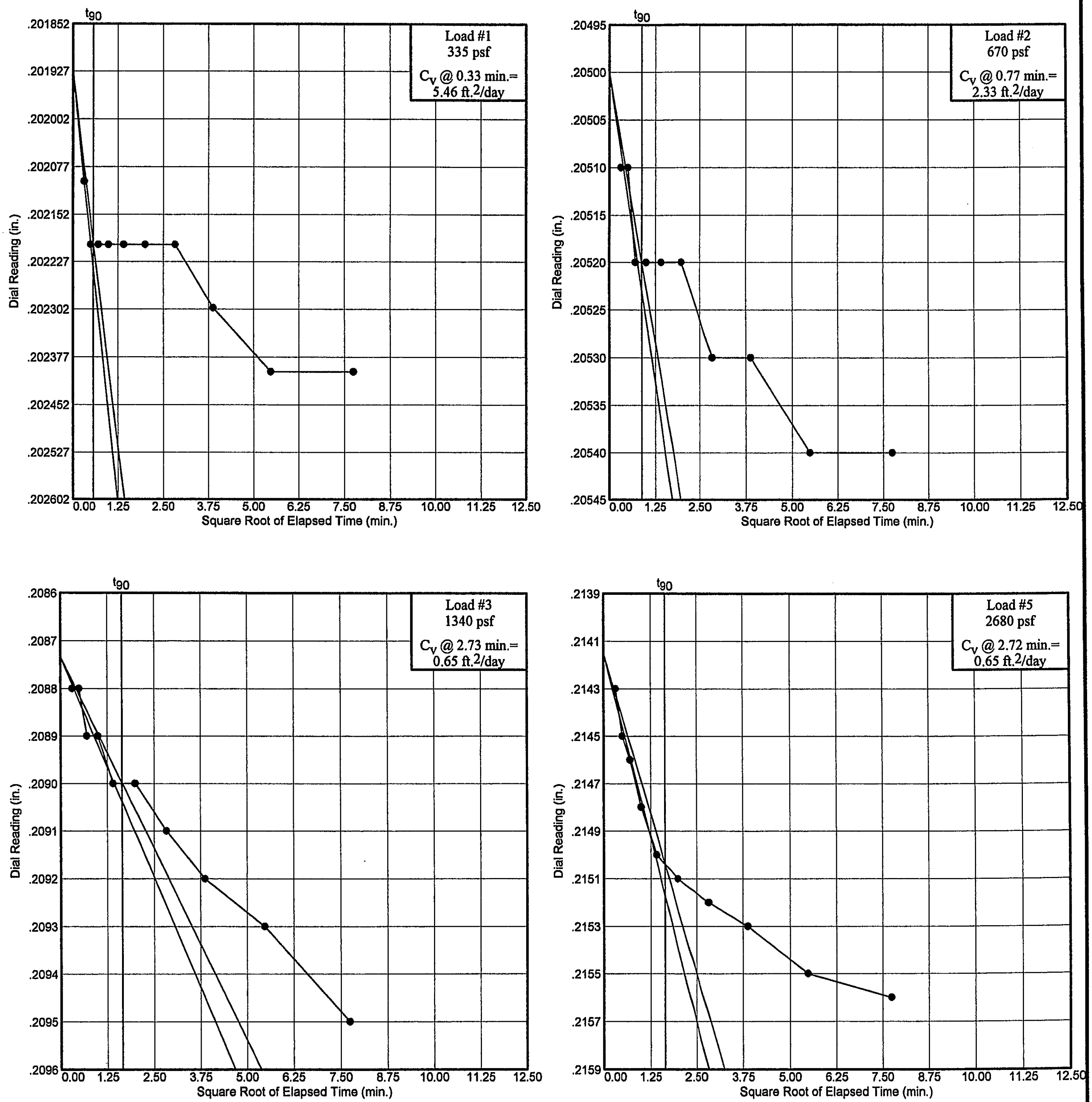
SOILS ENGINEERING, INC.

Figure B-3

Dial Reading vs. Time

Project No.: 11-13542
Project: 4-STORY MEDICAL BUILDINGS, SJCH

Source: B-4 Elev./Depth: 6



Dial Reading vs. Time

SOILS ENGINEERING, INC.

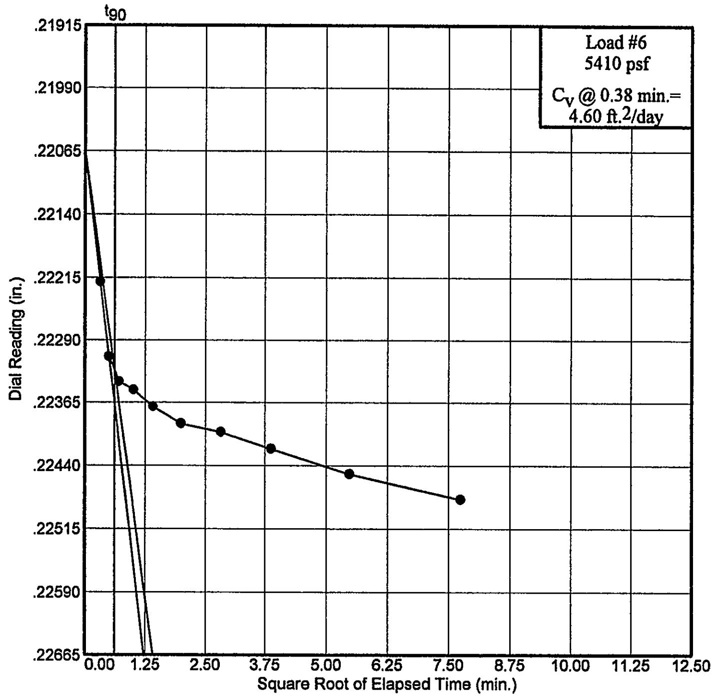
Figure B-3

Dial Reading vs. Time

Project No.: 11-13542
Project: 4-STORY MEDICAL BUILDINGS, SJCH

Source: B-4

Elev./Depth: 6

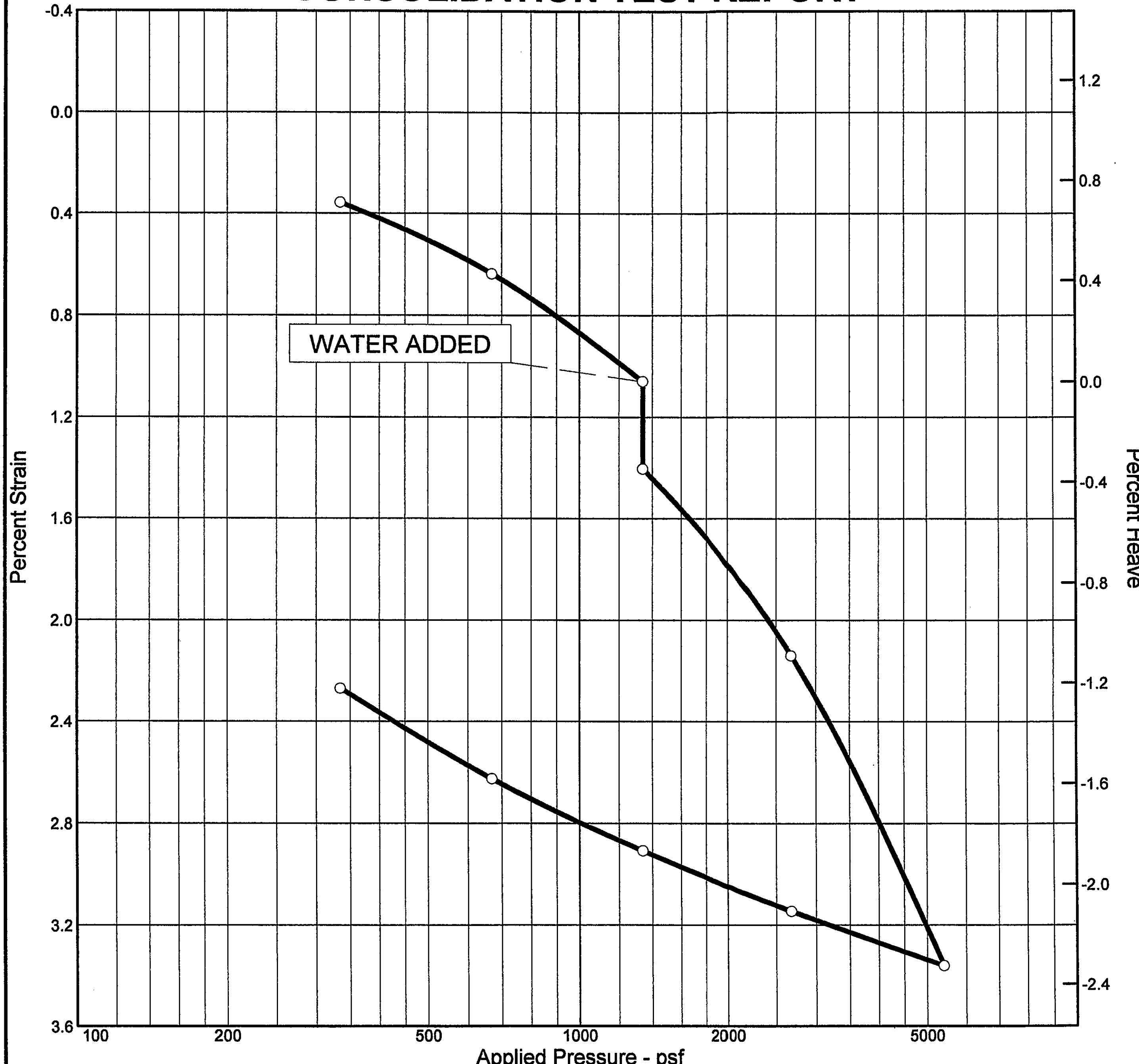


Dial Reading vs. Time

SOILS ENGINEERING, INC.

Figure B-3

CONSOLIDATION TEST REPORT



Natural		Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (psf)	P_c (psf)	C_c	C_s	Swell Press. (psf)	Heave %	e_o
Sat.	Moist.											
50.2 %	11.5 %	96.2	N/A	N/A	2.65	335	2807	0.07	0.01		-0.3	0.605

MATERIAL DESCRIPTION	USCS	AASHTO
SANDY SILT	ML	N/A

Project No. 11-13542 **Client:** SWINERTON BUILDERS

Project: 4-STORY MEDICAL BUILDINGS, SJCH

Source: B-6 **Elev./Depth:** 3

Remarks:

Test Date: 02/28/11
Tested By: AL
Sample No: 34740

CONSOLIDATION TEST REPORT

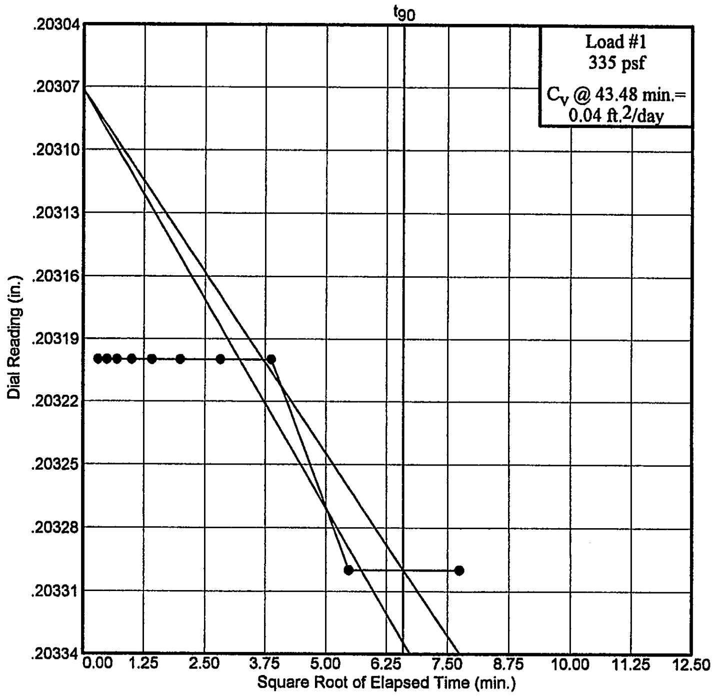
SOILS ENGINEERING, INC.

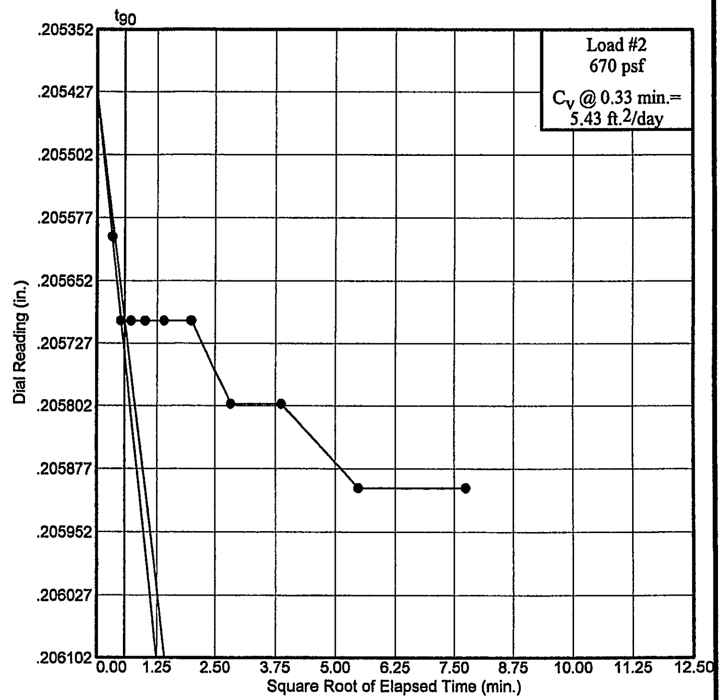
Figure B-4

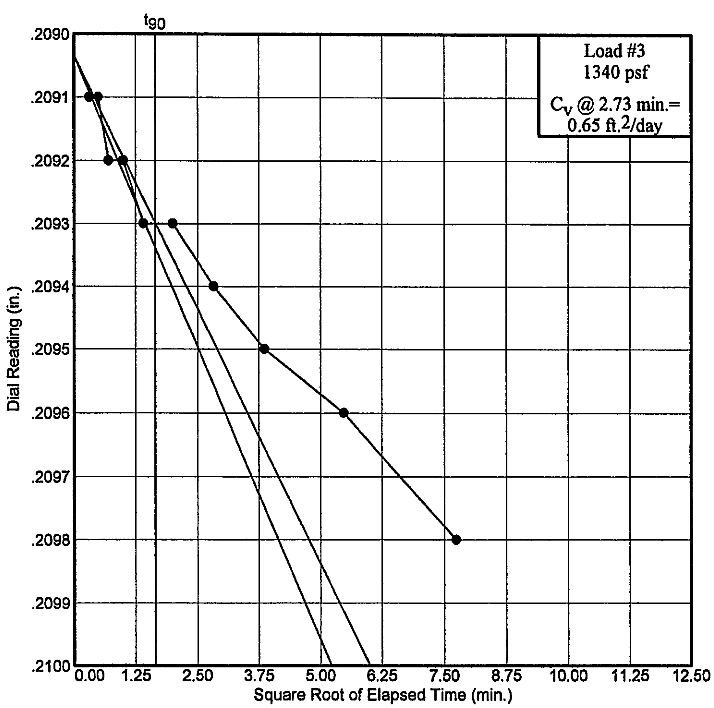
Dial Reading vs. Time

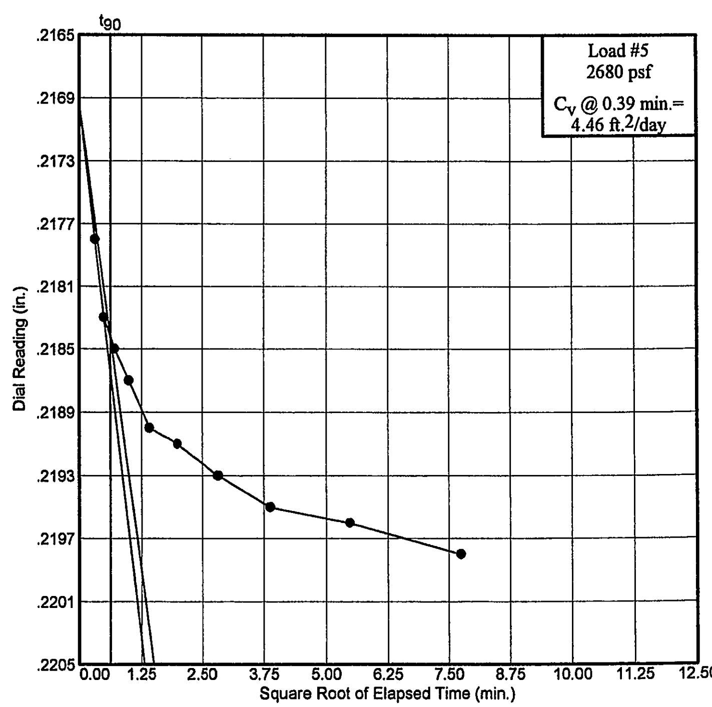
Project No.: 11-13542
Project: 4-STORY MEDICAL BUILDINGS, SJCH

Source: B-6 Elev./Depth: 3









Dial Reading vs. Time

SOILS ENGINEERING, INC.

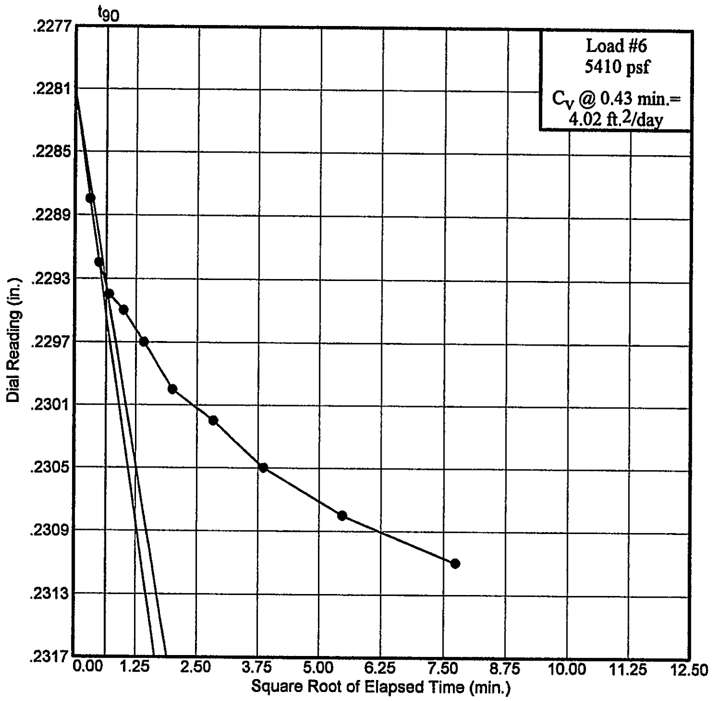
Figure B-4

Dial Reading vs. Time

Project No.: 11-13542
Project: 4-STORY MEDICAL BUILDINGS, SJCH

Source: B-6

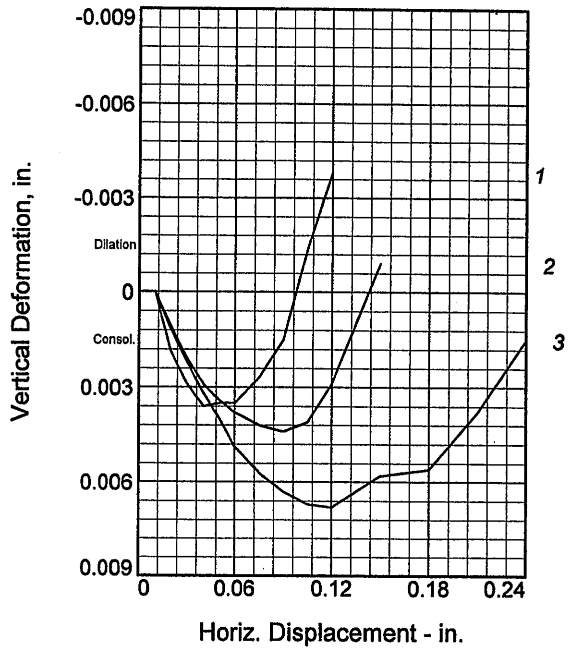
Elev./Depth: 3

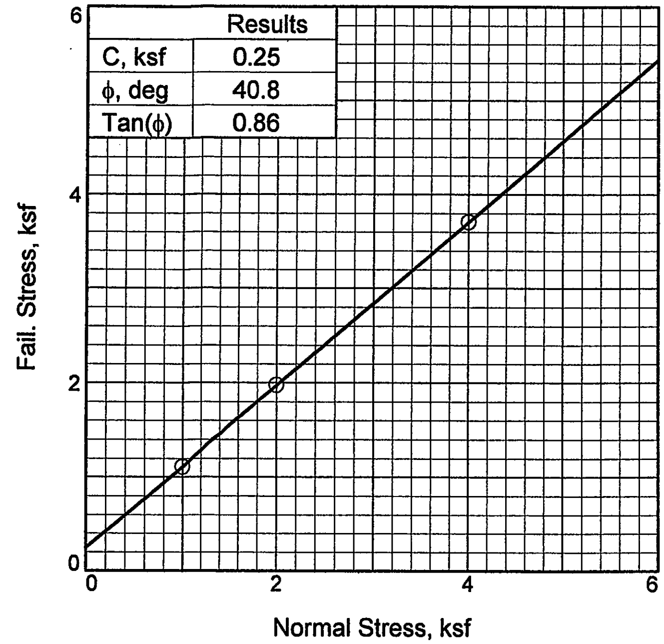


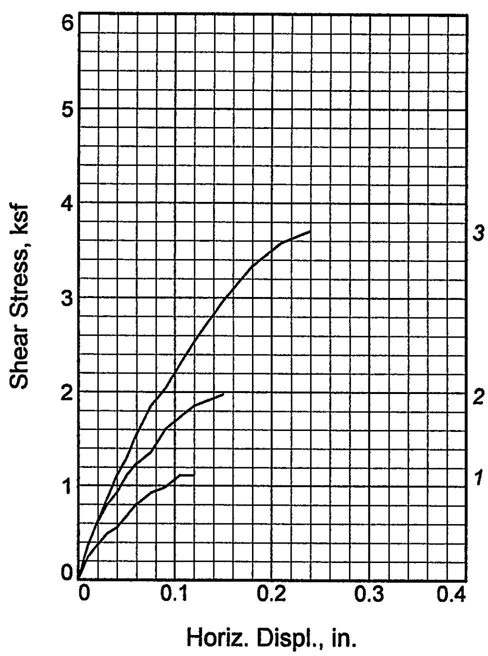
Dial Reading vs. Time

SOILS ENGINEERING, INC.

Figure B-4







Sample No.		1	2	3
Initial	Water Content, %	7.8	6.3	7.2
	Dry Density, pcf	88.8	87.6	85.6
	Saturation, %	24.1	18.7	20.6
	Void Ratio	0.8624	0.8879	0.9315
	Diameter, in.	2.38	2.38	2.38
	Height, in.	1.00	1.00	1.00
At Test	Water Content, %	26.3	26.3	27.3
	Dry Density, pcf	88.8	87.6	85.6
	Saturation, %	80.9	78.5	77.7
	Void Ratio	0.8624	0.8879	0.9315
	Diameter, in.	2.38	2.38	2.38
	Height, in.	1.00	1.00	1.00
Normal Stress, ksf		1.00	2.00	4.00
Fail. Stress, ksf		1.11	1.98	3.71
Displacement, in.		0.11	0.15	0.24
Ult. Stress, ksf				
Displacement, in.				
Strain rate, in./min.		N/A	N/A	N/A

Sample Type: 2.5" x 6" TUBE
Description: POORLY-GRADED SAND: light gray; slightly moist; fines; clean; medium dense.
LL= N/A **PL=** **PI=** N/A
Assumed Specific Gravity= 2.65
Remarks: Test Date: 03/03/11

Figure C-1

Client: SWINERTON BUILDERS

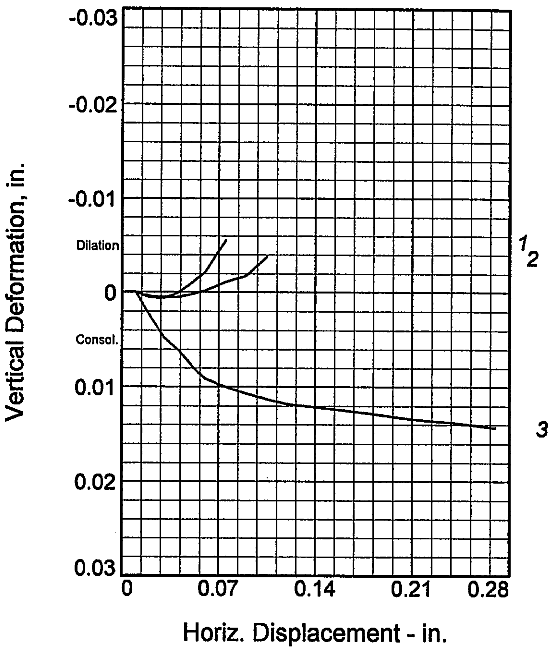
Project: 4-STORY MEDICAL BUILDINGS, SJCH

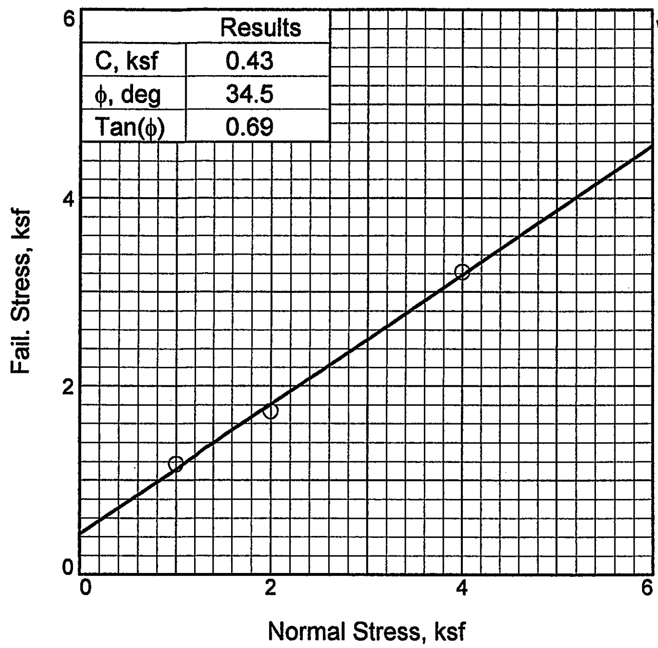
Source of Sample: B-1 **Depth:** 11
Sample Number: 34706
Proj. No.: 11-13542 **Date:** 02/17/11

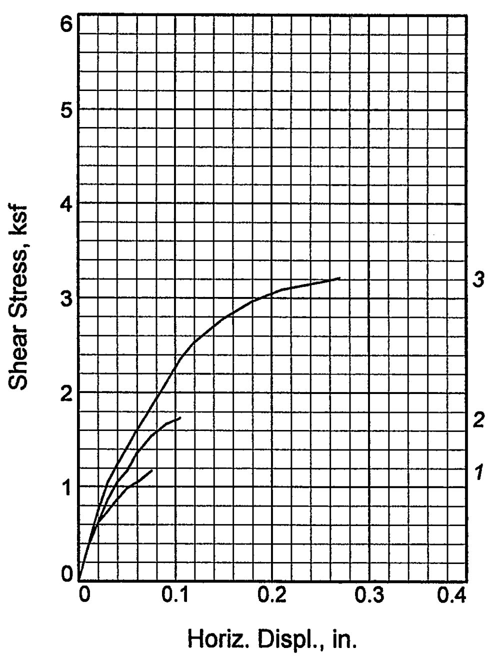
DIRECT SHEAR TEST REPORT

SOILS ENGINEERING, INC.

Tested By: PS **Checked By:** JW







	Sample No.	1	2	3
Initial	Water Content, %	5.4	5.8	6.1
	Dry Density, pcf	92.0	90.4	86.4
	Saturation, %	18.0	18.5	17.6
	Void Ratio	0.7980	0.8305	0.9142
	Diameter, in.	2.38	2.38	2.38
	Height, in.	1.00	1.00	1.00
At Test	Water Content, %	28.3	30.1	31.2
	Dry Density, pcf	92.0	90.4	86.4
	Saturation, %	94.0	95.9	90.6
	Void Ratio	0.7980	0.8305	0.9142
	Diameter, in.	2.38	2.38	2.38
	Height, in.	1.00	1.00	1.00
Normal Stress, ksf		1.00	2.00	4.00
Fail. Stress, ksf		1.17	1.73	3.21
Displacement, in.		0.08	0.11	0.27
Ult. Stress, ksf				
Displacement, in.				
Strain rate, in./min.		N/A	N/A	N/A

Sample Type: 2.5" x 6" TUBE
Description: SANDY SILT: dark yellowish brown; slightly moist; fines; slightly cohesive
LL= N/A **PL=** **PI=** N/A
Assumed Specific Gravity= 2.65
Remarks: Test Date: 03/04/11

Figure C-2

Client: SWINERTON BUILDERS

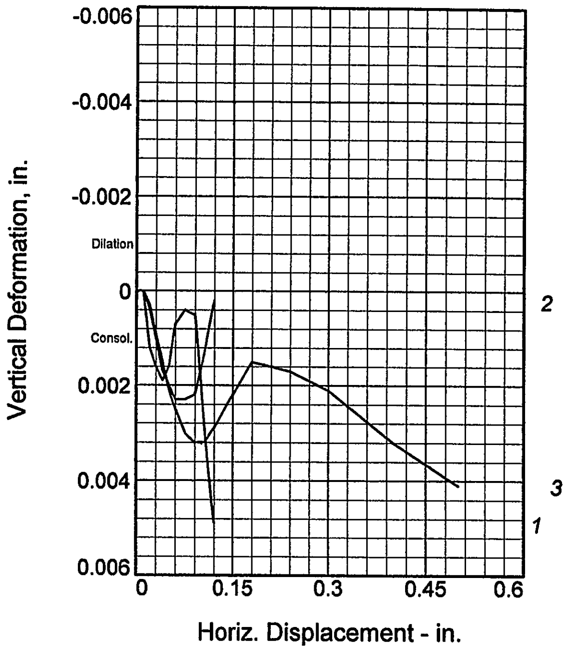
Project: 4-STORY MEDICAL BUILDINGS, SJCH

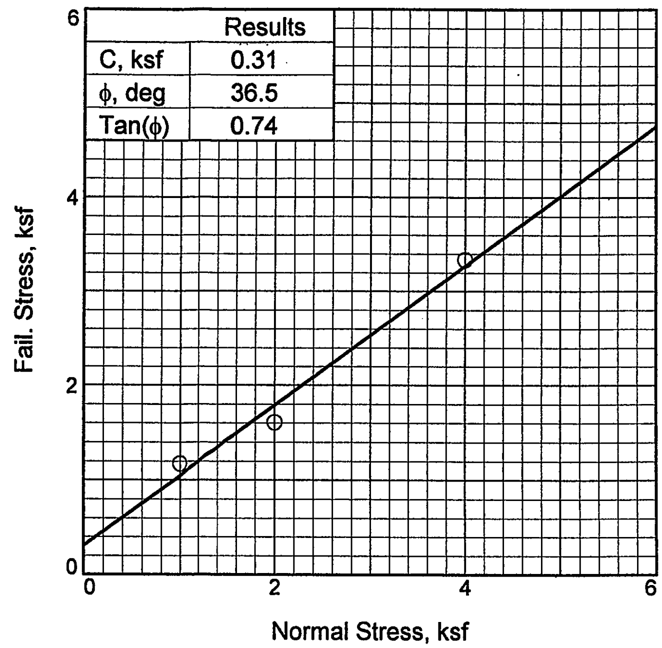
Source of Sample: B-2 **Depth:** 6
Sample Number: 34713
Proj. No.: 11-13542 **Date:** 02/17/11

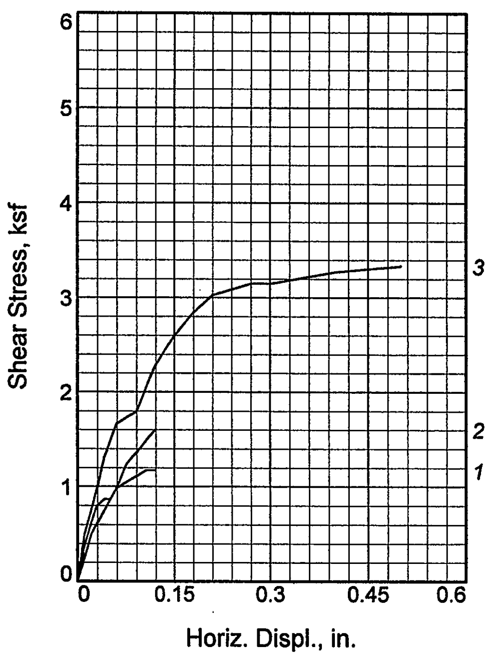
DIRECT SHEAR TEST REPORT

SOILS ENGINEERING, INC.

Tested By: PS **Checked By:** JW







Sample No.		1	2	3
Initial	Water Content, %	19.7	14.9	13.4
	Dry Density, pcf	92.4	91.1	87.5
	Saturation, %	66.2	48.4	39.8
	Void Ratio	0.7896	0.8166	0.8898
	Diameter, in.	2.38	2.38	2.38
	Height, in.	1.00	1.00	1.00
At Test	Water Content, %	25.4	27.3	29.5
	Dry Density, pcf	92.4	91.1	87.5
	Saturation, %	85.2	88.6	87.8
	Void Ratio	0.7896	0.8166	0.8898
	Diameter, in.	2.38	2.38	2.38
	Height, in.	1.00	1.00	1.00
Normal Stress, ksf		1.00	2.00	4.00
Fail. Stress, ksf		1.17	1.61	3.33
Displacement, in.		0.11	0.12	0.50
Ult. Stress, ksf				
Displacement, in.				
Strain rate, in./min.		N/A	N/A	N/A

Sample Type: 2.5" x 6" TUBE
Description: SANDY SILT: yellowish brown; slightly moist; fines; slightly cohesive; medium
LL= N/A **PL=** **PI=** N/A
Assumed Specific Gravity= 2.65
Remarks: Test Date: 03/07/11

Figure C-3

Client: SWINERTON BUILDERS

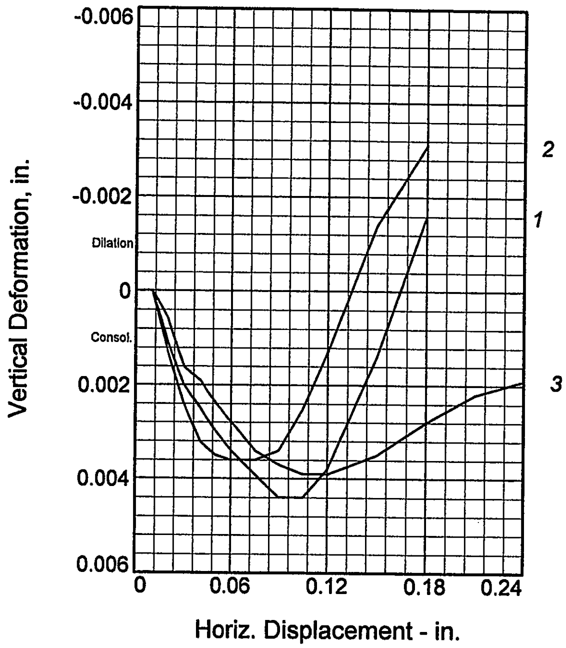
Project: 4-STORY MEDICAL BUILDINGS, SJCH

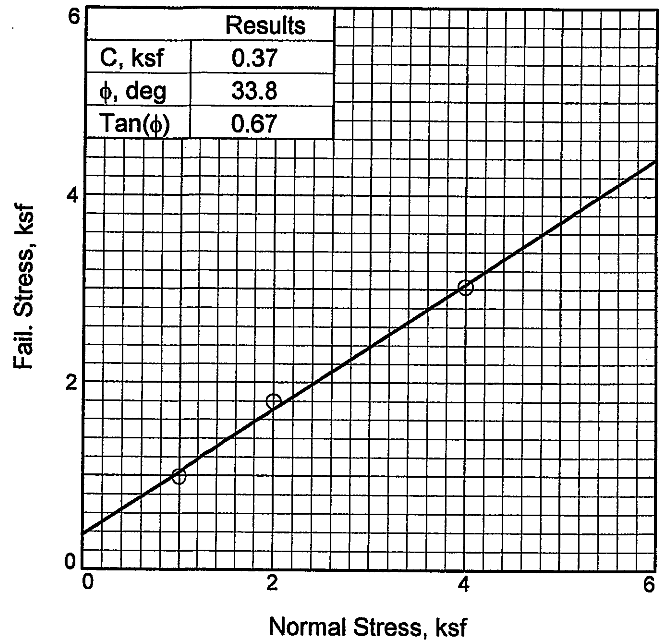
Source of Sample: B-3 **Depth:** 6
Sample Number: 34721
Proj. No.: 11-13542 **Date:** 02/17/11

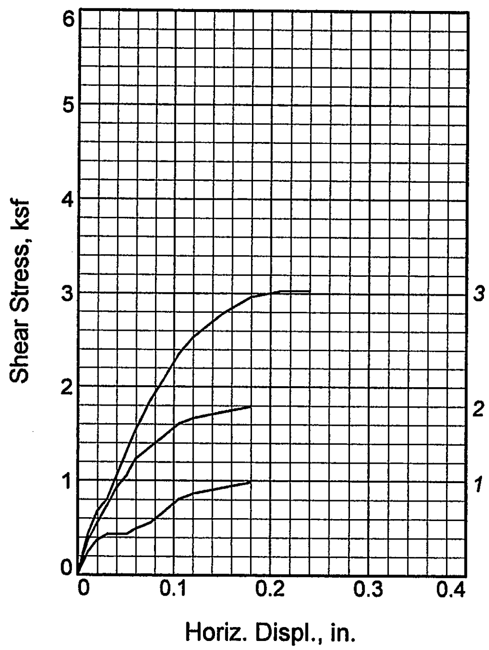
DIRECT SHEAR TEST REPORT

SOILS ENGINEERING, INC.

Tested By: BF **Checked By:** JW







	Sample No.	1	2	3
Initial	Water Content, %	9.1	11.5	11.1
	Dry Density, pcf	91.4	92.4	88.0
	Saturation, %	29.9	38.7	33.5
	Void Ratio	0.8098	0.7896	0.8806
	Diameter, in.	2.38	2.38	2.38
	Height, in.	1.00	1.00	1.00
At Test	Water Content, %	24.6	26.1	27.7
	Dry Density, pcf	91.4	92.4	88.0
	Saturation, %	80.3	87.7	83.3
	Void Ratio	0.8098	0.7896	0.8806
	Diameter, in.	2.38	2.38	2.38
	Height, in.	1.00	1.00	1.00
	Normal Stress, ksf	1.00	2.00	4.00
	Fail. Stress, ksf	0.99	1.79	3.03
	Displacement, in.	0.18	0.18	0.21
	Ult. Stress, ksf			
	Displacement, in.			
	Strain rate, in./min.	N/A	N/A	N/A

Sample Type: 2.5" x 6" TUBE
Description: POORLY-GRADED SAND: light yellowish brown; slightly moist; fines; clean;
LL= N/A **PL=** **PI=** N/A
Assumed Specific Gravity= 2.65
Remarks: Test Date: 03/07/11

Figure C-4

Client: SWINERTON BUILDERS

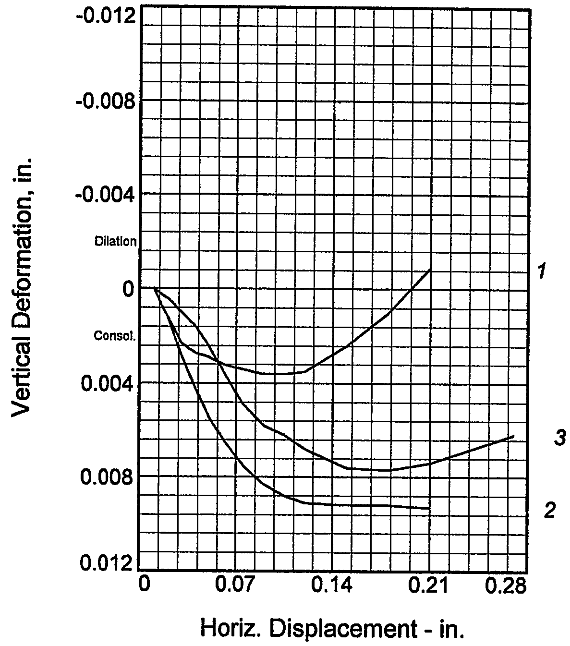
Project: 4-STORY MEDICAL BUILDINGS, SJCH

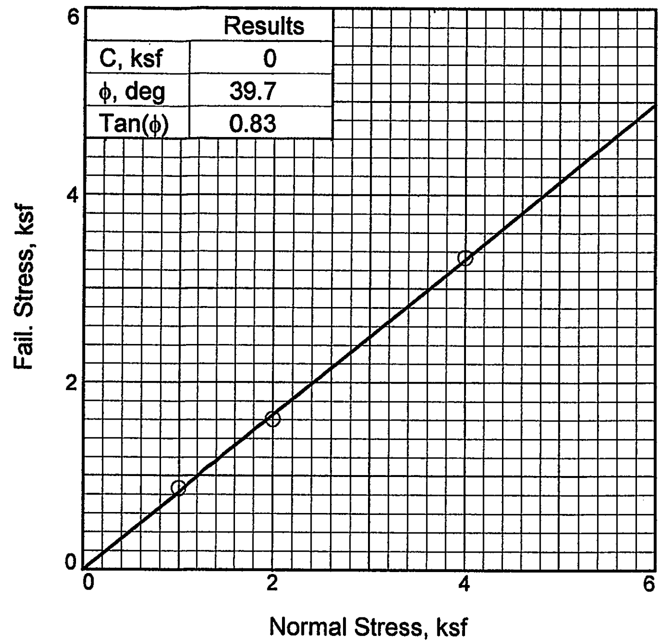
Source of Sample: B-5 **Depth:** 6
Sample Number: 34734
Proj. No.: 11-13542 **Date:** 02/17/11

DIRECT SHEAR TEST REPORT

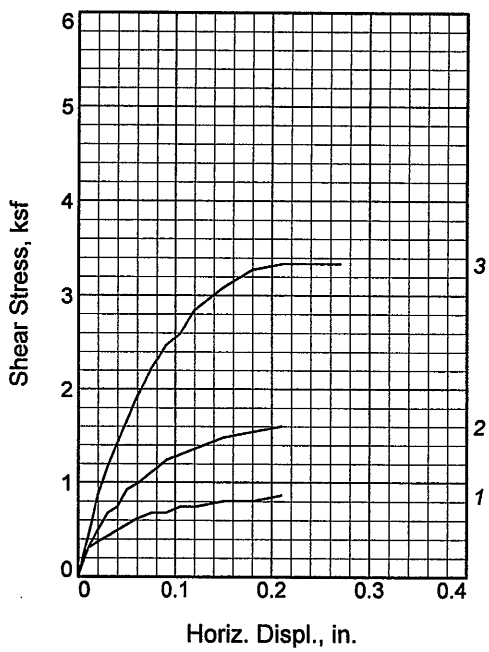
SOILS ENGINEERING, INC.

Tested By: BF **Checked By:** JW





Results	
C, ksf	0
ϕ, deg	39.7
Tan(ϕ)	0.83



	Sample No.	1	2	3
Initial	Water Content, %	10.3	12.8	19.2
	Dry Density, pcf	90.8	82.0	77.6
	Saturation, %	33.3	33.3	44.9
	Void Ratio	0.8218	1.0166	1.1328
	Diameter, in.	2.38	2.38	2.38
	Height, in.	1.00	1.00	1.00
At Test	Water Content, %	27.9	26.8	29.4
	Dry Density, pcf	90.8	82.0	77.6
	Saturation, %	90.1	70.0	68.7
	Void Ratio	0.8218	1.0166	1.1328
	Diameter, in.	2.38	2.38	2.38
	Height, in.	1.00	1.00	1.00
	Normal Stress, ksf	1.00	2.00	4.00
	Fail. Stress, ksf	0.86	1.61	3.33
	Displacement, in.	0.21	0.21	0.21
	Ult. Stress, ksf			
	Displacement, in.			
	Strain rate, in./min.	N/A	N/A	N/A

Sample Type: 2.5" x 6" TUBE
Description: WELL-GRADED SAND: light yellowish brown; slightly moist; fine to medium;
LL= N/A **PL=** **PI=** N/A
Assumed Specific Gravity= 2.65
Remarks: Test Date: 03/08/11

Figure C-5

Client: SWINERTON BUILDERS

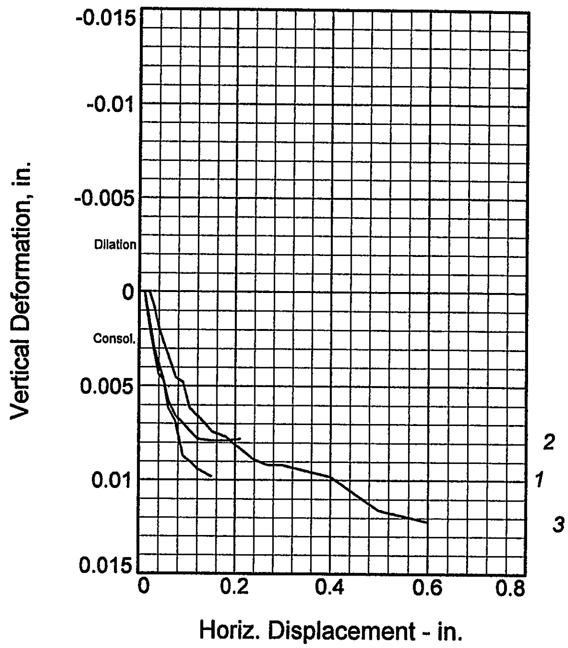
Project: 4-STORY MEDICAL BUILDINGS, SJCH

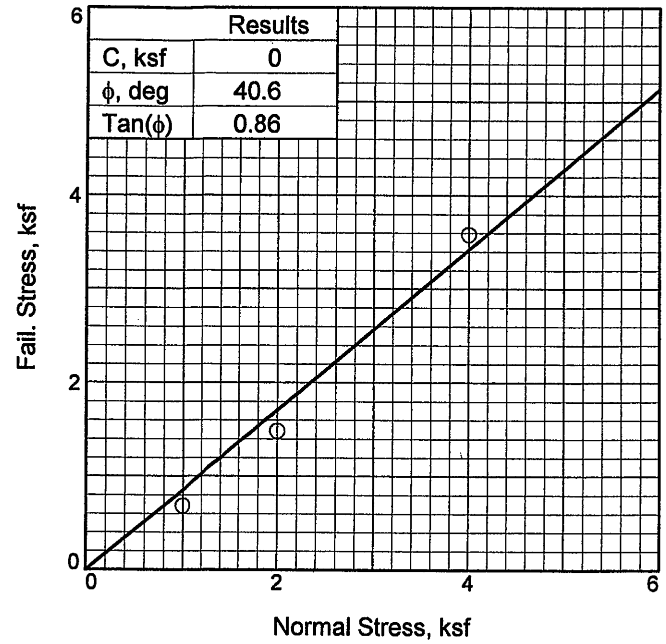
Source of Sample: B-5 **Depth:** 16
Sample Number: 34736
Proj. No.: 11-13542 **Date:** 02/17/11

DIRECT SHEAR TEST REPORT

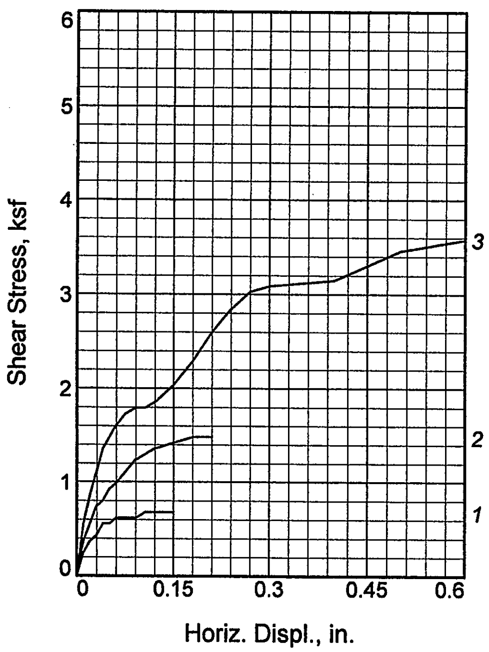
SOILS ENGINEERING, INC.

Tested By: BF **Checked By:** JW





Results	
C, ksf	0
ϕ, deg	40.6
Tan(ϕ)	0.86



	Sample No.	1	2	3
Initial	Water Content, %	11.4	14.6	16.7
	Dry Density, pcf	95.9	94.7	94.9
	Saturation, %	41.6	51.9	59.5
	Void Ratio	0.7254	0.7473	0.7426
	Diameter, in.	2.38	2.38	2.38
	Height, in.	1.00	1.00	1.00
At Test	Water Content, %	23.1	25.0	24.5
	Dry Density, pcf	95.9	94.7	94.9
	Saturation, %	84.5	88.6	87.3
	Void Ratio	0.7254	0.7473	0.7426
	Diameter, in.	2.38	2.38	2.38
	Height, in.	1.00	1.00	1.00
Normal Stress, ksf		1.00	2.00	4.00
Fail. Stress, ksf		0.68	1.48	3.58
Displacement, in.		0.11	0.18	0.60
Ult. Stress, ksf				
Displacement, in.				
Strain rate, in./min.		N/A	N/A	N/A

Sample Type: 2.5" x 6" TUBE
Description: WELL-GRADED SAND: light yellowish brown; slightly moist; fine to coarse;
LL= N/A **PL=** **PI=** N/A
Assumed Specific Gravity= 2.65
Remarks: Test Date: 03/08/11

Figure C-6

Client: SWINERTON BUILDERS

Project: 4-STORY MEDICAL BUILDINGS, SJCH

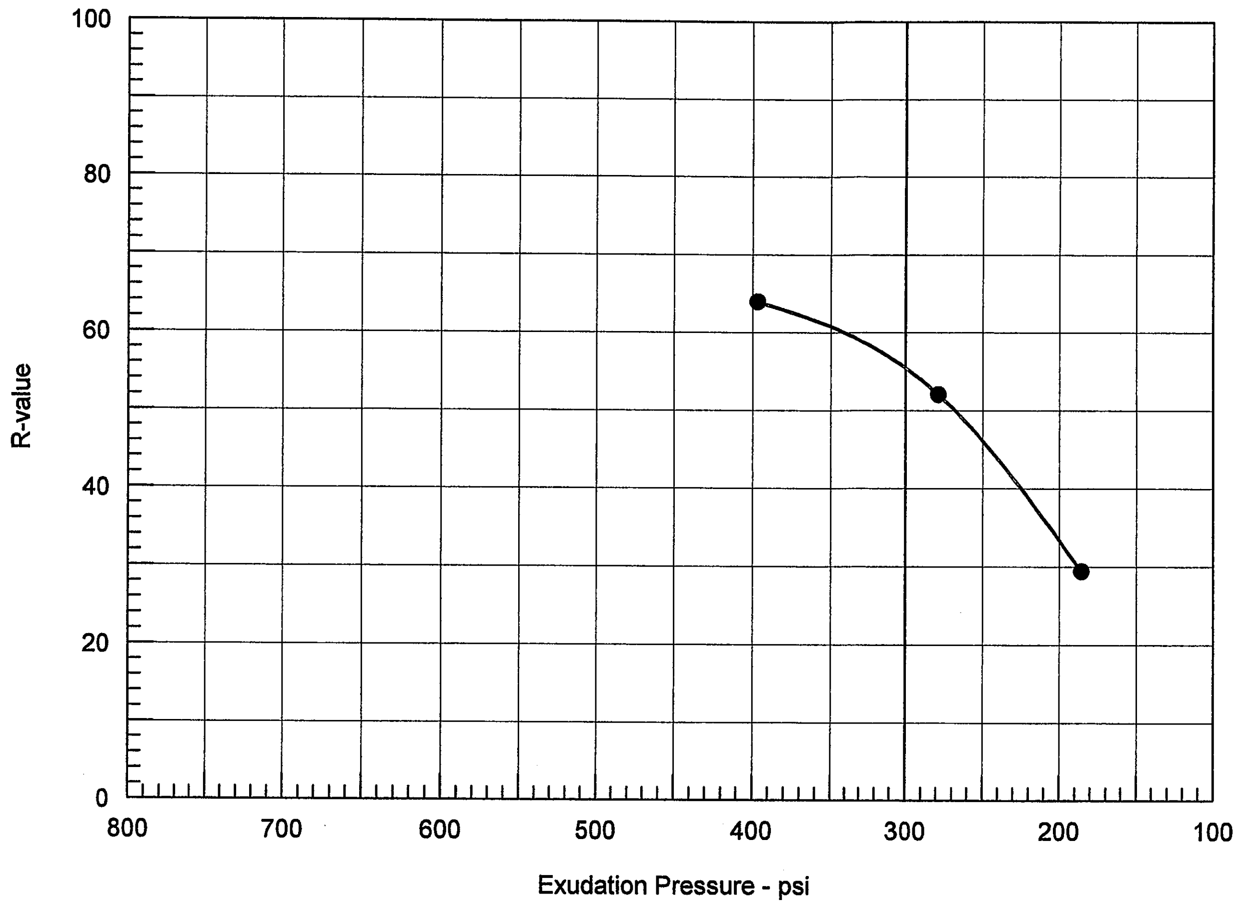
Source of Sample: B-6 **Depth:** 16
Sample Number: 34743
Proj. No.: 11-13542 **Date:** 02/17/11

DIRECT SHEAR TEST REPORT

SOILS ENGINEERING, INC.

Tested By: BF **Checked By:** JW

R-VALUE TEST REPORT



Resistance R-Value and Expansion Pressure - Cal Test 301

No.	Compact. Pressure psi	Density pcf	Moist. %	Expansion Pressure psi	Horizontal Press. psi @ 160 psi	Sample Height in.	Exud. Pressure psi	R Value	R Value Corr.
1	350	116.1	13.1	0.00	39	2.61	397	61	64
2	350	114.9	14.1	0.00	53	2.59	279	50	52
3	350	113.4	15.1	0.00	82	2.58	186	28	29

Test Results	Material Description
R-value at 300 psi exudation pressure = 55	SANDY SILT; Olive Brown, Well Graded, High Plasticity

Project No.: 11-13542

Project:4-STORY MEDICAL BUILDINGS, SJCH

Location: R-1 @ 0-5'

Sample Number: 34855 **Depth:** 0-5'

Date: 3/11/2011

R-VALUE TEST REPORT

SOILS ENGINEERING, INC.

Tested by: AL

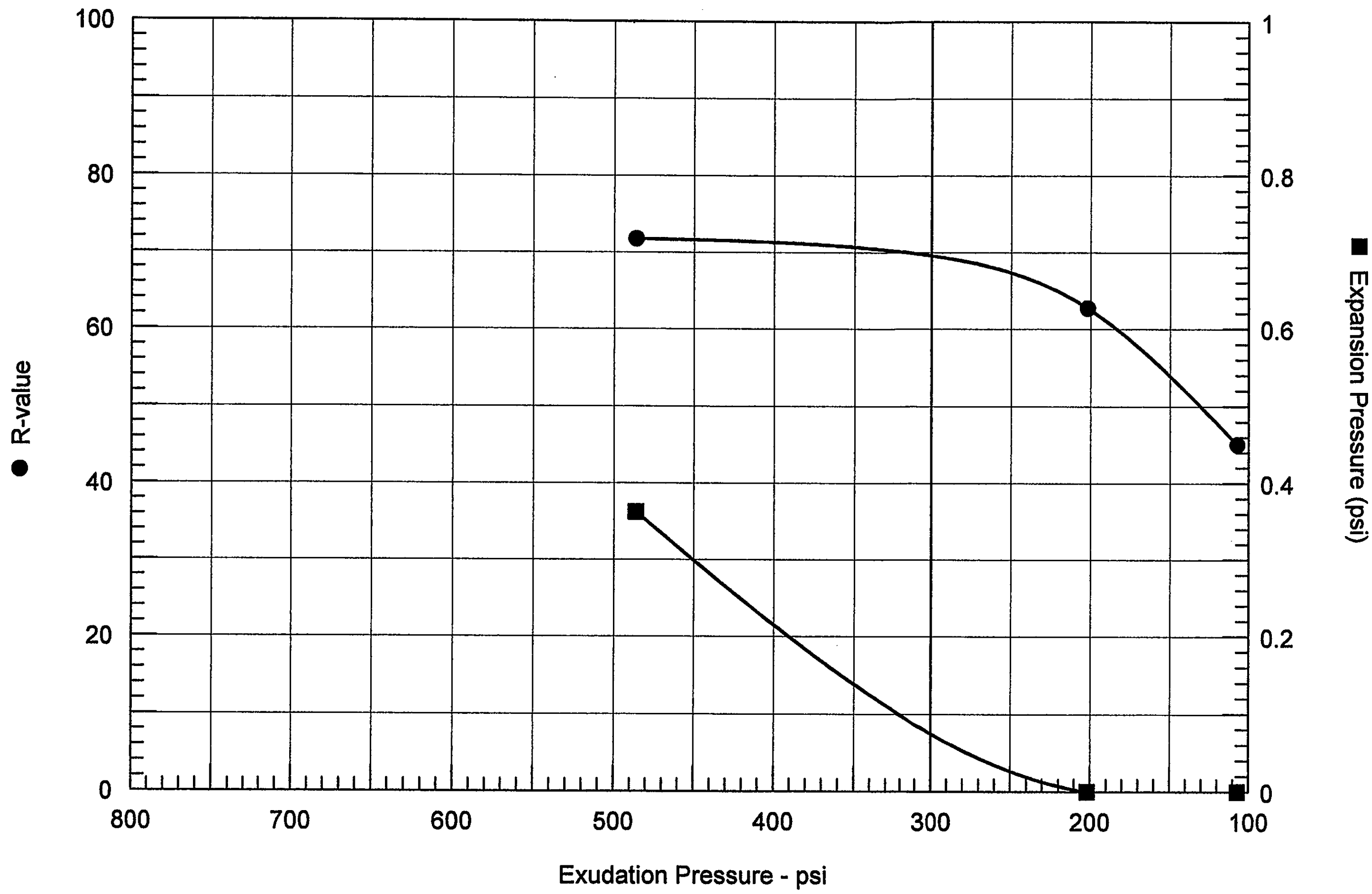
Checked by: JW

Remarks:

Test Date: 03/10/11

Figure D-1

R-VALUE TEST REPORT



Resistance R-Value and Expansion Pressure - Cal Test 301

No.	Compact. Pressure psi	Density pcf	Moist. %	Expansion Pressure psi	Horizontal Press. psi @ 160 psi	Sample Height in.	Exud. Pressure psi	R Value	R Value Corr.
1	350	115.0	13.0	0.36	30	2.59	486	70	72
2	350	113.5	14.0	0.00	40	2.57	202	61	63
3	350	112.6	15.1	0.00	58	2.50	107	45	45

Test Results	Material Description
R-value at 300 psi exudation pressure = 70 **Exp. pressure at 300 psi exudation pressure =** 0.07 psi	SANDY SILT; Olive Brown, Well Graded, High Plasticity

Project No.: 11-13542

Project:4-STORY MEDICAL BUILDINGS, SJCH

Location: R-2 @ 0-5'

Sample Number: 34856 **Depth:** 0-5'

Date: 3/11/2011

Tested by: AL

Checked by: JW

Remarks:
Test Date: 03/10/11

R-VALUE TEST REPORT

SOILS ENGINEERING, INC.

Figure D-2

TABLE 1

ANALYTICAL TEST RESULTS

BORING NUMBER	DEPTH	pH	CHLORIDE ppm	Water-Soluble Sulfate (SO_4) in Soil, Percentage by Weight
1	0-2 ft	7.36	ND*	ND*
3	0-2 ft	9.25	ND*	ND*

*ND = Analyte Not Detected at or above reporting limit

TABLE 4.3.1
REQUIREMENTS FOR CONCRETE EXPOSED TO SULFATE-CONTAINING SOLUTIONS

SULFATE EXPOSURE	WATER-SOLUBLE SULFATE (SO_4) IN SOIL, PERCENTAGE BY WEIGHT	SULFATE (SO_4) IN WATER, ppm	CEMENT TYPE	MAXIMUM WATER-CEMENTITIOUS MATERIALS RATIO, BY WEIGHT, NORMAL-WEIGHT AGGREGATE CONCRETE	MINIMUM f'_c, NORMAL-WEIGHT AND LIGHTWEIGHT AGGREGATE CONCRETE, psi x 0.00689 for MPa
Negligible	0.00-0.10	0-150	-----	-----	-----
Moderate[2]	0.10-0.20	150-1,500	II, IP (MS), IS (MS)	0.50	4,000
Severe	0.20-2.00	1,500-10,000	V	0.45	4,500
Very severe	Over 2.00	Over 10,000	V plus possolan[3]	0.45	4,500

[1] a lower water-cementitious materials ratio or higher strength may be required for low permeability or for protection against corrosion of embedded items for freezing and thawing (Table 19-A-2).

[2] Seawater.

[3] Pozzolan that has been determined by test or service record to improve sulfate resistance when used in concrete containing Type V cement.

(American Concrete Institute 318 section 4.3)

APPENDIX D

SEISMIC INVESTIGATION

EQFAULT
Version 3.0

13542 seismic SJCH Med Bldg
Conterminous 48 States
2009 International Building Code
Latitude = 35.383644
Longitude = -119.017882
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	1.158	(Ss, Site Class B)
1.0	0.411	(S1, Site Class B)

Conterminous 48 States
2009 International Building Code
Latitude = 35.383644
Longitude = -119.017882
Spectral Response Accelerations SMs and SM1
SMs = Fa x Ss and SM1 = Fv x S1
Site Class D - Fa = 1.037 ,Fv = 1.589

Period (sec)	Sa (g)	
0.2	1.201	(SMs, Site Class D)
1.0	0.653	(SM1, Site Class D)

Conterminous 48 States
2009 International Building Code
Latitude = 35.383644
Longitude = -119.017882
Design Spectral Response Accelerations SDs and SD1
SDs = 2/3 x SMs and SD1 = 2/3 x SM1
Site Class D - Fa = 1.037 ,Fv = 1.589

Period (sec)	Sa (g)	
0.2	0.801	(SDs, Site Class D)
1.0	0.435	(SD1, Site Class D)

```
***********************
*                     *
*    E Q F A U L T    *
*                     *
*    Version 3.00     *
*                     *
***********************
```

DETERMINISTIC ESTIMATION OF
PEAK ACCELERATION FROM DIGITIZED FAULTS

JOB NUMBER: 13542

DATE: 02-21-2011

JOB NAME: 13542 Med Bdlg

CALCULATION NAME: Test Run Analysis

FAULT-DATA-FILE NAME: CGSFLTE.DAT

SITE COORDINATES:
SITE LATITUDE: 35.3836
SITE LONGITUDE: 119.0179

SEARCH RADIUS: 100 mi

ATTENUATION RELATION: 3) Boore et al. (1997) Horiz. - NEHRP D (250)
UNCERTAINTY (M=Median, S=Sigma): M Number of Sigmas: 0.0
DISTANCE MEASURE: cd_2drp
SCOND: 0
Basement Depth: 5.00 km Campbell SSR: Campbell SHR:
COMPUTE PEAK HORIZONTAL ACCELERATION

FAULT-DATA FILE USED: CGSFLTE.DAT

MINIMUM DEPTH VALUE (km): 0.0

EQFAULT SUMMARY

DETERMINISTIC SITE PARAMETERS

Page 1

ABBREVIATED FAULT NAME	APPROXIMATE DISTANCE mi (km)	ESTIMATED MAX. EARTHQUAKE EVENT: MAXIMUM EARTHQUAKE MAG.(Mw)	PEAK SITE ACCEL. g	EST. SITE INTENSITY MOD.MERC.
Kern Front	3.7(6.0)	6.3	0.384	X
WHITE WOLF	17.4(28.0)	7.3	0.246	IX
PLEITO THRUST	26.0(41.9)	7.0	0.155	VIII
GARLOCK (West)	37.0(59.5)	7.3	0.114	VII
SAN ANDREAS - Whole M-1a	37.3(60.0)	8.0	0.164	VIII
SAN ANDREAS - Carrizo M-1c-2	37.3(60.0)	7.4	0.119	VII
SAN ANDREAS - 1857 Rupture M-2a	37.3(60.0)	7.8	0.147	VIII
SAN ANDREAS - Cho-Moj M-1b-1	37.3(60.0)	7.8	0.147	VIII
BIG PINE	38.8(62.5)	6.9	0.089	VII
SAN GABRIEL	47.0(75.6)	7.2	0.090	VII
SAN ANDREAS - Cholame M-1c-1	48.0(77.3)	7.3	0.093	VII
SAN ANDREAS - Mojave M-1c-3	55.4(89.1)	7.4	0.088	VII
SANTA YNEZ (East)	55.4(89.2)	7.1	0.075	VII
SAN JUAN	55.6(89.4)	7.1	0.075	VII
GARLOCK (East)	56.4(90.8)	7.5	0.091	VII
So. SIERRA NEVADA	59.1(95.1)	7.3	0.096	VII
SAN CAYETANO	60.1(96.7)	7.0	0.081	VII
M.RIDGE-ARROYO PARIDA-SANTA ANA	60.3(97.0)	7.2	0.090	VII
NORTH CHANNEL SLOPE	65.4(105.3)	7.4	0.094	VII
SANTA SUSANA	66.9(107.7)	6.7	0.064	VI
HOLSER	67.0(107.8)	6.5	0.057	VI
GREAT VALLEY 14	67.6(108.8)	6.4	0.054	VI
RED MOUNTAIN	67.7(108.9)	7.0	0.074	VII
SANTA YNEZ (West)	69.0(111.1)	7.1	0.063	VI
OAK RIDGE (Onshore)	69.2(111.4)	7.0	0.073	VII
NORTHRIDGE (E. Oak Ridge)	69.8(112.4)	7.0	0.072	VII
VENTURA - PITAS POINT	70.6(113.6)	6.9	0.068	VI
LENWOOD-LOCKHART-OLD WOMAN SPRGS	71.6(115.3)	7.5	0.076	VII
SIMI-SANTA ROSA	71.9(115.7)	7.0	0.071	VI
SAN LUIS RANGE (S. Margin)	72.8(117.2)	7.2	0.078	VII
SIERRA MADRE (San Fernando)	73.1(117.7)	6.7	0.060	VI
LITTLE LAKE	73.7(118.6)	6.9	0.054	VI
OAK RIDGE MID-CHANNEL STRUCTURE	74.3(119.5)	6.6	0.056	VI
SAN ANDREAS - Parkfield	76.6(123.2)	6.5	0.043	VI
CHANNEL IS. THRUST (Eastern)	78.2(125.9)	7.5	0.086	VII
LOS ALAMOS-W. BASELINE	78.6(126.5)	6.9	0.063	VI
VERDUGO	80.7(129.8)	6.9	0.061	VI
OWENS VALLEY	80.7(129.8)	7.6	0.073	VII
LIONS HEAD	82.2(132.3)	6.6	0.052	VI
GREAT VALLEY 13	82.5(132.7)	6.5	0.049	VI

DETERMINISTIC SITE PARAMETERS

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ABBREVIATED FAULT NAME	APPROXIMATE DISTANCE mi (km)	ESTIMATED MAX. EARTHQUAKE EVENT MAXIMUM EARTHQUAKE MAG.(Mw)	PEAK SITE ACCEL. g	EST. SITE INTENSITY MOD.MERC.
LOS OSOS	83.1(133.7)	7.0	0.063	VI
SIERRA MADRE	83.9(135.0)	7.2	0.070	VI
RINCONADA	84.2(135.5)	7.5	0.067	VI
ANACAPA-DUME	84.4(135.9)	7.5	0.081	VII
OAK RIDGE(Blind Thrust Offshore)	84.7(136.3)	7.1	0.066	VI
CASMALIA (Orcutt Frontal Fault)	85.5(137.6)	6.5	0.047	VI
HELENDALE - S. LOCKHARDT	88.3(142.1)	7.3	0.058	VI
GRAVEL HILLS - HARPER LAKE	88.5(142.5)	7.1	0.052	VI
MALIBU COAST	90.0(144.9)	6.7	0.051	VI
BLACKWATER	90.5(145.7)	7.1	0.051	VI
HOLLYWOOD	93.0(149.6)	6.4	0.042	VI
CLAMSHELL-SAWPIT	93.1(149.8)	6.5	0.044	VI
INDEPENDENCE	93.2(150.0)	7.1	0.061	VI
SANTA MONICA	94.3(151.7)	6.6	0.046	VI
UPPER ELYSIAN PARK BLIND THRUST	94.8(152.6)	6.4	0.042	VI
PUENTE HILLS BLIND THRUST	95.9(154.3)	7.1	0.060	VI
RAYMOND	96.1(154.7)	6.5	0.043	VI
SAN ANDREAS (Creeping)	96.8(155.8)	6.2	0.030	V
TANK CANYON	97.9(157.5)	6.4	0.041	V
NEWPORT-INGLEWOOD (L.A.Basin)	99.1(159.5)	7.1	0.048	VI
GREAT VALLEY 12	99.9 (160.8)	6.3	0.038	V

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-END OF SEARCH- 61 FAULTS FOUND WITHIN THE SPECIFIED SEARCH RADIUS.

THE Kern Front FAULT IS CLOSEST TO THE SITE.
IT IS ABOUT 3.7 MILES (6.0 km) AWAY.

LARGEST MAXIMUM-EARTHQUAKE SITE ACCELERATION: 0.3842 g