Addendum No. 04

April 3, 2024

BAKERSFIELD COLLEGE STUDENT HOUSING

(for DSA Project Name - New Residence Hall)

OWNER:	KERN COMMUNITY COLLEGE DISTRICT 2100 Chester Avenue Bakersfield, CA 93301
PREPARED BY:	PBK Architects, Inc. 4900 California Avenue, Suite 130-A Bakersfield, CA 93309
PBK PROJECT NO.:	S2103400AR
DSA FILE NO.:	15-C1
DSA APPLICATION NO.:	02-122124

NOTICE TO BIDDERS

A. Receipt of this Addendum shall be acknowledged on the Proposal Form.

B. This Addendum forms part of the Contract Documents for the above referenced project and shall be incorporated integrally therewith.

C. Each proposer shall make necessary adjustments and submit their proposal with full knowledge of all modifications, clarifications, and supplemental data included therein. Where provisions of the following supplemental data differ from those of the original Contract Documents, this Addendum shall govern.

ADDITIONAL INFORMATION:

AD4-01 **DIRT STOCKPILE**

Refer to attached campus map for stockpile designated area. Contractor must provide 6'-0" high temporary fence with privacy screen at the north and west sides of the stockpile area.

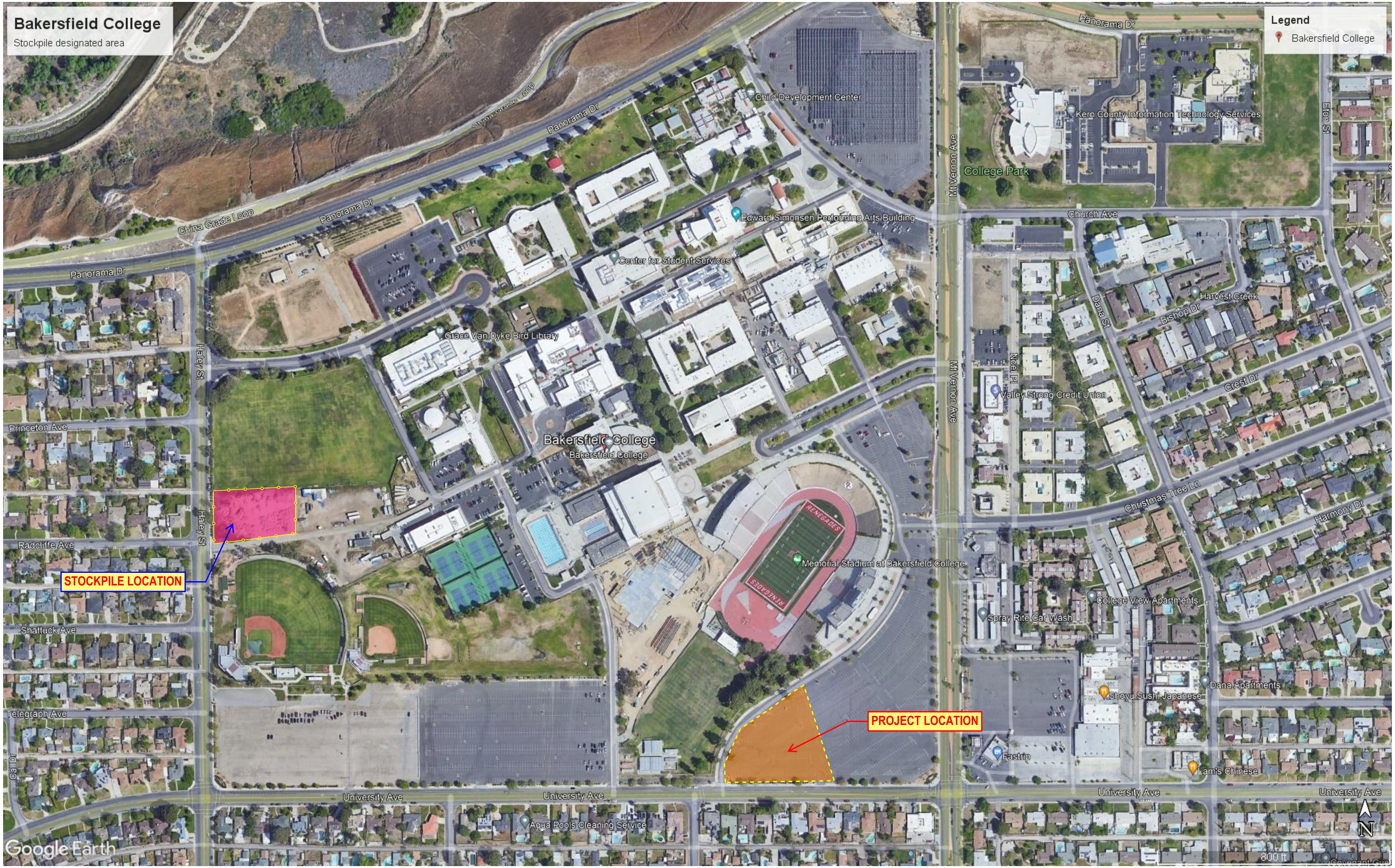
AD4-02 **GEOTECHNICAL INVESTIGATION REPORT**

Refer to attached Geotechnical Investigation Report from Soils Engineering dated January 5, 2022 for existing soils condition. Contractors must adhere to parameters set forth in the Contract Documents in addition to the information provided by the Geotechnical Report attached herein.

AD4-03 **PRE BID RFIs:**

Refer to attached RFI log for Pre-Bid RFI responses. Additional Pre-Bid RFIs not responded in this addendum will be addressed in a forthcoming addendum.

END OF ADDENDUM NO. 4



STOCKPILE LOCATION

PROJECT LOCATION

BAKERSFIELD COLLEGE STUDENT HOUSING SITE MAP - STOCKPILE AREA

Note: Contractor must provide 6'-0" temporary fence with privacy screen at the north and west sides of the stockpile area while the area is in use.

PBK

SOILS ENGINEERING, INC.

GEOTECHNICAL INVESTIGATION

FOR THE

NEW BAKERSFIELD COLLEGE RESIDENCE HALL

1801 PANORAMA DRIVE

BAKERSFIELD, KERN COUNTY, CA

Prepared for:

Kern Community College District
2100 Chester Ave,
Bakersfield, CA 93301

By:

SOILS ENGINEERING, INC.
SEI File No. 21-18248
January 5, 2022

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TABLE OF CONTENTS

GEOTECHNICAL INVESTIGATION

FOR THE

NEW BAKERSFIELD COLLEGE RESIDENCE HALL

1801 PANORAMA DRIVE

BAKERSFIELD, KERN COUNTY, CA

SOILS ENGINEERING, INC.
SEI File No. 21-18248
January 5, 2022

INTRODUCTION

In accordance with your request, we have performed a Geotechnical Investigation at the subject site. Recommendations for site preparation and grading, and 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 the Boring Location Map as Figure 1, showing the approximate location the test bores, and the Logs of Test Borings, Figures 2 through 11.

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

Appendix D, “Geologic Hazard Study,” contains data from EQFault, LiquefyPro and the USGS.

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

Respectfully submitted,
SOILS ENGINEERING, INC.

SITE INFORMATION

A. SITE LOCATION AND CONDITIONS

The proposed project includes a new residence hall near the southeastern corner of the Bakersfield College (BC) campus. This new residence hall will be located northwest of the intersection of Mt. Vernon Avenue and University Avenue in the city of Bakersfield, CA (site). Currently, the site area is the far western portion of the south parking lot for Memorial Stadium and nearby BC buildings. This new residence hall will be a 4-Story Student Housing Complex. The proposed structure will be Type 5-A partially surrounded by Portland-Cement and asphaltic concrete pavement and will be approximately 98,000sf in size. We anticipate the proposed buildings will be constructed of a combination of concrete, wood, masonry and/or metal framing.

Overall, the site area is relatively flat, is currently asphalt paved, and slopes southward at an approximate gradient of 3.5 percent.

B. GEOLOGIC SETTING

According to the 2010 Geologic Map of California the zone of influence for the proposed construction is located wholly within Pliocene-Pleistocene age nonmarine (continental) sedimentary rock deposits (QPc) within the southern San Joaquin Valley. Although the site is not located in an Alquist-Priolo (earthquake fault) Special Study Zone, there are various earthquake faults in the vicinity. Nearby faults, with distances from the site, are tabulated below.

Kern Front	4.4	miles/	7.1	kilometers
White Wolf	17.7	miles/	28.5	Kilometers
Pleito Thrust	27.9	miles/	44.9	Kilometers
Garlock (West)..	36.9	miles/	59.4	Kilometers
San Andreas – Whole M-1a	39.4	miles/	63.4	kilometers
Big Pine	40.4	miles/	65	Kilometers
San Gabriel	48.1	miles/	77.4	Kilometers
San Andreas – Cholame M-1c-1	50.9	miles/	81.9	Kilometers

The largest estimated maximum site acceleration, based on deterministic methods, is 0.356g from a 6.3 magnitude earthquake on the Kern Front approximately 7.1 kilometers away. The information above is from the program EQFault (vers.3.0) and a complete listing of faults within 100-miles is presented in Appendix D along with a complete Geologic Hazard Study.

C. SUBSURFACE CONDITIONS

Surface soils encountered in our field investigation consisted predominately of a yellowish brown, dry to damp, fine grained Clayey Sand or Sandy Clay in the top 5’ to 10’ with some cobbles present. Below the Clayey Sand or Sandy Clay zone is a Poorly-Graded Sand that is light yellowish brown, dry, fine grained with gravel and some cobbles. Auger refusal occurred in all of the soil borings at depths ranging from 4’ (B-5, B-8 and B-9) to 17’ (B-1) where significant cobbles were encountered. These soils are classified as SC, CL and SP respectively in the Unified Soil Classification System (USCS).

The surface soils contain lenses of loose material in the top five feet. They are compressible and should be compacted after the demolition operation is performed to prepare the project area to receive the proposed structures.

During our field investigation, refusal was encountered due to a layer of cobbles encountered in borings B-8 and B-13 at a depth of 4 feet and at 21 feet below the existing ground surface in borings B-5 and B-7.

Testing performed in our laboratory showed Expansion Indexes (EI) ranging from 0 to 39; which indicates a very low to low expansion potential. Expansive soils are defined in the 2019 California Building Code (CBC), Section 1803A.5.3.

Detailed descriptions of the various soils encountered during our field investigation are shown on Figures 2 through 11 in Appendix B, “Field Investigation.” A “Key to Symbols” legend describing the symbols in the boring logs is also attached.

D. GROUNDWATER

No groundwater was encountered in the soil borings (B-1 through B-10) advanced to the total depth explored of 4 feet to 17 feet where refusal occurred. The State SGMA Data Viewer indicates depth to water of 205’ in the Spring of 2021 and 110’ in the Spring of 2012 near the site. It is expected that groundwater will be deep enough to not be an issue to this site.

E. SEISMIC DESIGN VALUES

Per the 2019 California Building Code (CBC) and American Society of Civil Engineers (ASCE) 7-16 Section 20.3, and local knowledge the site is classified as Site Class D. Utilizing the USGS and ASCE 7-16 seismic design methodologies the following seismic design values were determined.

SEISMIC DESIGN CRITERIA		VALUE	SOURCE
Risk Category		**III**	2019 CBC Table 1604.5 or 1604A.5
Site Class		**D**	2019 CBC §1613.2.2 or 1613A.2.2; ASCE 7-16 Table. 20.3-1; Site Specific Soils Report, and local knowledge.
Mapped MCER Spectral Response Acceleration, short period	S_S	**0.906g**	SEAOC-OSHPD software; 2019 CBC Figure 1613.2.1(1)
Mapped MCER Spectral Response Acceleration, at 1-sec. Period	S_1	**0.326g**	SEAOC-OSHPD software; 2019 CBC Figure 1613.2.1(2)
Site Coefficient	F_a	**1.137**	SEAOC- OSHPD software; 2019 CBC Table 1613.2.3(1) or 1613A.2.3(1)
Site Coefficient	F_v*	**1.975***	2019 CBC Table 1613.2.3(2) or 1613A.2.3(2)
Adjusted MCER Spectral Response Acceleration, short period, F_a * S_s	S_{MS}	**1.031g**	SEAOC- OSHPD software; 2019 CBC §1613.2.3 or 1613A.2.3
Adjusted MCER Spectral Response Acceleration, 1-sec. period, F_v * S_1	S_{M1}*	**0.644g***	2019 CBC §1613.2.3 or 1613A.2.3
Design Spectral Response Acceleration, short period, 2/3 * S_{MS}	S_{DS}	**0.687g**	SEAOC- OSHPD software; 2019 CBC §1613.2.4 or 1613A.2.4
Design Spectral Response Acceleration, 1-sec. period, 2/3 * S_{MI}	S_{D1}*	**0.431g***	2019 CBC §1613.2.4 or 1613A.2.4
Peak Ground Acceleration for Max. Considered Earthquake (MCEG)	**PGA**	**0.392g**	SEAOC- OSHPD software; ASCE 7-16 Fig 22-9
Site Coefficient, F_{PGA} = 1.208 F_{PGA}* PGA	PGA_M	**0.474g**	SEAOC- OSHPD software; ASCE 7-16 §11.8.3.2
Mapped Risk Coefficient at 0.2 second Spectral Response Period	C_{RS}	**0.925**	SEAOC- OSHPD software; ASCE 7-16 Figure 22-18A
Mapped Risk Coefficient at 1 second Spectral Response Period	C_{R1}	**0.922**	SEAOC- OSHPD software; ASCE 7-16 Figure 22-19A
Seismic Design Category, short period		**D**	2019 CBC §1613.2.5
Seismic Design Category, 1second period *		**D***	2019 CBC §1613.2.5
MCER = Maximum Considered Earthquake (risk targeted) MCEG = Maximum Considered Earthquake (geometric mean)			
** The project designer shall confirm that a ground motion hazard analysis is not required in accordance with ASCE 7-16 §11.4.8-Exception 2. The values tabulated above for S_{M1}, S_{D1}, and the Seismic Design Category/1-second period are based on the site coefficient, F_v, interpolated from 2019 CBC Table 1613.2.3(2) or 1613A.2.3(2). The use of that table is predicated on the above referenced Exception 2 being applicable for the site and the structure(s). Where the above referenced Exception 2 does not apply, the values for F_v, S_{M1}, S_{D1}, and for the Seismic Design Category/1-second period may not be applicable for the site and structure(s).*			

F. LIQUEFACTION & SETTLEMENT

For liquefaction to occur at a site during a major earthquake a number of physical features need to be present. These include:

1. Shallow groundwater, generally within the top 50’ from the surface.
2. Loose sandy or silty material present.
3. Strong ground-shaking.

This site does not have shallow groundwater or loosely compacted material present so the potential for liquefaction to occur at this site is minimal.

Based on the presence of cobbles within the top 4’ to 17’ across the site area the amount of dynamic settlement that may occur at this site during a major earthquake is estimated at <0.5”. No mitigation for liquefaction or dynamic settlement at this site is warranted. See Appendix D for a complete Geologic Hazard Study.

EARTHWORK RECOMMENDATIONS

"Earthwork Specifications," in Appendix A are provided for general guidance in preparing site grading plans. In addition, the following specific recommendations are provided and supersede the latter wherever discrepancies may exist:

A. COMPACTION AND OPTIMUM MOISTURE

Unless otherwise specified herein, the terms, "Compaction," or "Compacted," wherever used or implied within this report should be interpreted as compaction to 90 percent of the maximum density obtainable by ASTM Test Method D1557. The term, "Optimum Moisture," wherever used or implied within this report, should be interpreted as that obtained by the above-described test method.

B. CLEARING & GRUBBING

Clearing and grubbing should consist of stripping grasses; removing existing structures - foundations, slabs, and miscellaneous concrete; removing buried utility lines; locating and removing or disposing of abandoned septic tanks and seepage pits (dry well) if any are encountered during site clearing and grubbing operations.

Slabs and Pavements - Shall be completely removed. Portland-Cement-Concrete (PCC) fragments may be used in fill provided they are broken down to a maximum dimension of two inches and adequately disbursed within a friable soil matrix. Soil PCC mixtures should not be used above the elevation bottom of the lowest structure footing.

Foundations - Existing at the time of grading should be completely removed.

Basements and septic tanks located in proposed structure areas shall be completely removed. Basements or septic tanks situated outside structure areas may be removed or disposed of by breaking the walls down to not less than two feet below finished grade;

breaking the bottom out to provide drainage, and back-filling and compacting the resulting cavity using a sand slurry or by placing and compacting acceptable soils engineered fill. If a sand slurry is used, no compaction tests will be required.

Seepage pits in proposed structure areas should be removed to a minimum depth of five feet below finished grade or two feet below existing ground, whichever is lower. If a portion of the pit liner is to be abandoned in place, the void should be backfilled with sand slurry. In no instances should liners be left in place within a depth of two feet below existing ground.

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 structure footings. Lines to be abandoned shall be completely removed to a minimum depth of two (2.0) feet below finished building pad grade.

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.

Stripping - Prior to site grading, existing ground surfaces should be stripped of existing pavement, surface vegetation, and high-volume root masses. A stripping depth of one to three inches is generally adequate. Stripped organic material shall not be used as engineered fill or blended with or incorporated into any materials which will underlie any structures or other improvements on the project. Removal of trees or other large plants shall include all roots larger than ¾" diameter. If necessary, root remnants are to be removed by hand-picking. Remove existing structures and improvements, including within the limits of grading or as depicted in the project documents.

C. GROUND SURFACE PREPARATION

Proposed Structure Areas:

The surface soils contain lenses of loose material in the top five feet. They are compressible and shall be excavated after the demolition operation is performed to prepare the project area to receive the proposed structures. Accordingly, ground surfaces in the proposed structure areas should be compacted in accordance with the following procedures:

1. Excavate earth material in the proposed addition area to a minimum depth of five (5) feet below existing grade or three (3) feet below bottom of proposed foundation elevations, whichever is deeper.

2. The bottom of the excavation shall be reviewed by the geotechnical engineer or his or her on-site representative prior to any backfill operations. *The top twelve inches of materials exposed at the bottom of the excavation shall be scarified and compacted to a minimum of 90 percent of ASTM D-1557.*

3. Moisten soils to near the optimum moisture or to a moisture consistent with effective compaction and soil stability. Compact moistened soils to a minimum of 95 percent of the maximum density obtained by ASTM Test Method D1557.

4. Work to lines at least ten (10) feet beyond the outside edges of exterior footings and two feet beyond pavement edges. Where existing improvements may be affected by the excavation and/or compaction activities, the geotechnical engineer, the civil engineer, and the architect shall be notified as quickly as possible so that specific recommendations may be formulated. In no case shall the contractor proceed if there is the potential to undermine or damage adjacent structures, improvements, or utilities.

Over-Excavation:

Excavation and placement of engineered fill should extend laterally beyond the outer edge(s) of the structure foundation(s) a distance equal to, or greater than, the distance between bottom of the foundation and the bottom of the excavation. If existing conditions preclude the achievement of the recommended lateral extent of excavation and backfill, the Geotechnical Engineer should be advised so that the special condition can be addressed.

Review of Excavation Bottoms:

Prior to placement of backfill, excavation bottoms shall be reviewed for indications of loose-fill, discoloration, or loose, compressible, native materials. Where these are encountered, they should be excavated and removed, or excavated and compacted as directed by the geotechnical engineer. Excavation of native soils shall continue in vertical increments of one foot until relative compaction tests taken at the bottom of the working surface (excavation bottom) equal or exceed 80 percent relative compaction. Fill placement in excavations shall not proceed until the geotechnical engineer or his or her representative on the site has reviewed, tested as described above and accepted materials exposed at the bottom of the excavation.

Pavement:

Ground surfaces to receive concrete driveways or bituminous pavements should be scarified and compacted to a minimum depth of 12 inches below the grading plane in cut areas or to a depth of 12 inches below the existing ground surface exposed after stripping in areas to receive fill.

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.

Compaction in proposed pavement areas should be a minimum of 90 percent of the maximum density as obtained by ASTM Test Method D1557 and should extend to a minimum of two feet beyond the outside edges of pavements. The top one foot (1.0') of subgrade below the grading plane shall be compacted to a minimum of 95%. Ground surface preparation for paved areas should extend laterally two feet (2.0') beyond the pavement edges.

Utility Lines:

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.

Where utility trenches extend under, adjacent to, or near the structure, including patio(s), porch(es), garage, etc., the soil in the entire depth of the trench, shall be compacted. Compaction shall extend at least five feet beyond the outside the edge of the structure. Low-permeability, non-expansive soils shall be used for backfill.

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.

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. 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 bedding consisting of clean, cohesionless sand (SP), in the Unified Soils Classification System.

Compaction Requirements - where not otherwise specified in the project documents, or in the manufacturer's specifications, or in these recommendations, the following compaction requirements are applicable to all electrical, gas or water conduits:

TABLE A
COMPACTION DEPTH

Area	**Haunch to 1 ft. Above Top Of Pipe**	**1 ft. Above Top of Pipe to 2'6" Below Finished Grade**	**2'6" Below Finished Grade to Finished Subgrade**
Structural	90%	90%	90%
Pavements	90%	90%	90%
Non-Structural	90%	90%	90%

D. ENGINEERED FILL

Earth materials obtained on site are acceptable for use as engineered fill provided that vegetation and other deleterious debris are removed by proper stripping and separation.

Engineered fill material which has been moisture-conditioned to near the optimum moisture content, or to a moisture content commensurate with effective compaction and soil stability, should be placed in thin uniform layers (less than ten inches uncompacted thickness) and compacted. Refer to “Placing, Spreading and Compacting Fill Materials,” in Appendix A.

E. IMPORTED FILL

Tabulated below are general guidelines for acceptance of imported engineered fill. Materials of equal of better quality than on-site material could be reviewed by the Geotechnical Engineer on a case-by-case basis. No soil materials shall be imported onto the project site without prior approval by the Geotechnical Engineer. Any deviation from the specifications given below shall require prior approval 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*	10
Maximum Percent Retained ¾" Sieve *for landscape areas*	5
Maximum Liquid Limit	40
Maximum Plasticity Index	14
Minimum R-Value *for pavement areas*	50
Minimum R-Value *for building areas*	35
Maximum Expansion Index (per 2019 CBC)	20

Furthermore, the soils proposed for import shall be generally homogenous and shall not contain cemented and/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. 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 sampling and testing by the Geotechnical Engineer.

The contractor shall provide sufficient notice, prior to import operations, to allow sampling, testing, and evaluation of the proposed import material(s). 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 material which was sampled and tested is the same material which is being imported to the project.

F. DRAINAGE

Finish grading and construction of all improvements should be completed in such a manner that there will be no opportunity for water to collect on and/or percolate into the soils adjacent to or near the appurtenant structures or improvements including driveways and sidewalks).

Finish ground surfaces adjacent to the proposed structures should be graded to provide positive, free, and unobstructed drainage away from the foundations for at least five (5) feet. The recommended drainage should be established prior to enclosing the structure.

Drainage should continue by way of drain inlets and pipes or by surface grading to the street. No construction or finish grading should be established or maintained that would allow surface water from on-site or off-site sources to pond or accumulate near foundations or slabs or behind curbs. In areas where such adverse drainage conditions may exist or be created, area drains and/or catch basins with subsurface piping should be installed to collect and convey water to an approved water retention basin or, where permitted, to the adjacent city curb-and-gutter system.

Landscape irrigation should be stringently controlled. Do not apply irrigation water in excess of that needed by the landscape plantings. No water shall be applied to the ground adjacent to or near the structure or appurtenant structures or improvements (including patio(s), porch(es), garage, driveways, sidewalks, etc.).

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 is recommended.

G. SLOPES

Areas to receive fill-slopes should be cleared of all vegetation, debris, and disturbed soils. Permanent fill and cut slopes should be constructed at 2:1 (horizontal to vertical) in accordance with the 2019 California Building Code. Finished slopes nearer than five feet to building foundations should be graded no steeper than five-horizontal to one-vertical (5 H : 1 V) and not flatter than five percent (5 %). A slope ratio of 2 : 1 horizontal to vertical should provide adequate stability for slopes farther than five feet from footings. The fill slopes shall be compacted to a minimum of 95% of ASTM D1557 and in accordance with the Guide Specifications for Earthwork, Appendix A. This should 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.

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

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 with diameters greater than to 2 inches should be removed. 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. Slope maintenance should include proper care of erosion and drainage control devices, rodent control, and immediate planting with deep-rooting, lightweight, drought-resistant vegetation. An erosion control geotextile may also be used in combination with vegetation to control erosion. Experience has shown that slope performance is largely dependent upon proper slope maintenance (i.e., planting, proper watering, clearing of drainage devices, etc.). Slopes properly placed and conscientiously maintained are not expected to display excessive raveling or sloughing.

FOUNDATION RECOMMENDATIONS

The New Residence Hall can be adequately supported on spread footings, structural-mat-foundations, or cast-in-drilled-hole (CIDH) piles or combinations thereof. If CIDH piles are utilized, the drilling-contractor should be advised that special drilling equipment may be required to penetrate cobble-layers. Foundation design parameters are provided below.

Spread Footings – The proposed foundation could be supported on continuous spread footings in accordance with the following Table B:

TABLE B
FOUNDATION DESIGN CRITERIA

Foundation Type	Minimum Width (ft.)	Minimum Depth Below Lowest Adjacent Subgrade (ft.)	Maximum Allowable Soil Bearing Pressure (lbs./sq. ft.)
Continuous-Spread	1.25	2	3000
Isolated	1.25	2	3000
Structural Mat	20.00	2	1500

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

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.

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

Settlement:

Provided maximum allowable soil bearing pressures given above are not exceeded, total 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 settlements should occur before the end of construction. Differential settlements should, accordingly, be less than one-half of an inch for a horizontal span of twenty feet.

Cast-In-Drilled (CIDH) Piles –Structures may also be adequately supported on straight-shafted drilled piers combined with grade beams. Casing may be needed to stabilize the shaft for the proposed piers. Pier design criteria are given below:

1. Friction Values: We recommend a friction value or skin friction (fs) of 350 psf. This value is for dead load plus live loads and can be increased by 1/3 for the total of all loads, including wind or seismic forces. Uplift pressure may be taken as three fourths (3/4) of the downward capacity.

   The top one foot (1.0') of the below-grade portion of the pier shall be excluded when determining the pier frictional resistance.

   In the event that steel casing is required to drill the piers and the casing is to remain in place, the friction values above shall be reduced by one third.

2. Minimum Penetration: The piers should extend a minimum of eight (8) feet below adjacent subgrade or per the structural engineer’s recommendations. Minor deviations from the recommended caisson depths may be necessary upon field review.

   Cobbles may be encountered throughout the proposed site as indicated in borings 5, 7, 8, and 12. Where pile-design depths require, the drilling contractor shall provide equipment with the weight, power and apparatuses necessary to drill into and penetrate these layers.

3. Minimum Diameter: The recommended minimum diameter for friction piers is 24 inches.

4. Concrete Placement: All concrete should be placed in one continuous operation. Vibration to consolidate concrete should be provided. When a casing is used to stabilize the shaft, an adequate height of concrete should be maintained above the bottom of the casing while it is gradually withdrawn. Concrete should be placed as quickly as possible following review, by the Geotechnical Engineer or his representative, of the completed excavation and cleaning.

   Uncased excavations should not be permitted to remain open overnight. Adequate devices should be used to guide the fall of concrete in the pier and prevent it from striking the shaft walls, entraining soil or promoting sloughing during placement.

5. Construction Review and Observations: The Geotechnical Engineer should provide continuous review of pier drilling and concrete placement. The Geotechnical Engineering should also retain the option of reviewing individual piers and requesting minor depth variations when warranted by changes in soil conditions from those assumed during the preparation of this Geotechnical Investigation Report.

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.[1] 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 **w = b** (width) and **l = mb** (length) the variable "**m**" being the ratio of the length to the width of the foundation**.** **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 200 kcf may be used for the subsurface soils.

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 D1194.

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 C**. 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)* of the wall.

(H)* = the height of backfill above the lowest adjacent ground surface.

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

TABLE C
LATERAL EARTH PRESSURES

Case	Lateral Earth Pressures
Active	35 P.C.F.
Passive	400 P.C.F.
At-Rest	55 P.C.F.

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.

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.

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.

Frictional Resistance: A friction coefficient of 0.48 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.

SOIL CORROSIVITY

Soluble Sulfates (SO_4)

The highest Sulfate (SO4) concentration measured was 380 ppm.

Based on Table 19.3.1.1 “Exposure categories and classes” of ACI 318-14 “Building Code Requirements for Structural Concrete” the soil exposure is classified as S0. Per Table 19.3.2.1 “Requirement for Concrete by Exposure Class” of the same reference, no restriction applies to the cement type or mix design.

Chlorides (Cl)

The highest Chloride (Cl) concentration measured was 7.3 ppm. Generally, chloride concentrations greater than 500 ppm are considered to be corrosive to foundation elements. (Ref: Caltrans Corrosion Guidelines / Version 1.0) pH

The soil pH measured between 8.53 and 8.82. Generally, a pH level less than 5.5 is considered to be corrosive to metals in foundation elements. (Ref: Caltrans Corrosion Guidelines/ Version 1.0).

Although preliminary test results indicate that soil corrosivity at the locations and depths tested is low to negligible, if the site grading operations will result in a blend of native and/or imported materials at finished subgrade elevations, additional tests should be performed after rough grading has been completed and prior to concrete and/or mechanical design.

SLABS-ON-GROUND

Slabs-on-ground may be supported on earth materials prepared in accordance with the recommendations of this Geotechnical Investigation.

Moisture protection between the soil and the interior slabs-on-ground is recommended. For exceptions to slab moisture protection, refer to the 2019 California Building Code, §1907.1. The project designer should provide specific details regarding construction of the concrete slab-on-ground, including the moisture barrier or vapor retarder/barrier, capillary break (if included), and blotter material (if included). The American Concrete Institute recommends a minimum moisture vapor retarder of 10 mil thick polyethylene. The vapor retarder should be protected from damage. Punctures and tears should be repaired prior to concrete placement. If landscape irrigation is permitted within ten feet from building exteriors, the inclusion of a capillary break beneath slabs-on-grade should be given serious consideration.

It has been common local practice to use a sandy material as a blotter layer between the moisture barrier and the concrete to absorb some of the bleed water and to potentially reduce slab curling. However, a blotter layer may act as a moisture reservoir. If that occurs, all apparent advantages of its use are negated. A blotter layer should not be incorporated into the section design for moisture-sensitive slabs if it cannot be kept dry prior to concrete placement or if water may migrate into the layer after slab construction (e.g. wet curing, rainfall). If the slab-on-ground section is to include a blotter layer between the moisture barrier and the concrete, it is our recommendation that the blotter material consist of crusher fines (rock dust) or sand with angular, interlocking grains. The material should be easily compacted and should be screened so that 100% of the material is finer than ¼". Do not use blotter material which may be potentially reactive with the alkalis in the concrete or which has high sulfate content. At the time of concrete placement, the blotter material should be dry to damp, compact, and smooth. For slabs which are to be water-cured, a blotter layer should not be used. For further consideration, refer to the American Concrete Institute *Manual of Concrete Practice 302.1R and 360.*

Slab thicknesses, reinforcing, and the concrete characteristics should be in accordance with the project designer's recommendations. The 2019 California Building Code, §1907.1 requires that the slab thickness be not less than 3½".

Pressurized water lines should not be installed beneath slabs-on-ground. Where pressurized water lines must be routed beneath the slab, they should be routed entirely inside continuous sleeves with both ends open to the atmosphere above the slab surface. Gravity flow sewer lines may underlie slabs-on-ground, but they should be routed to the exterior point of connection by the shortest feasible path.

PAVEMENT RECOMMENDATIONS

A total of three (3) borings were drilled to a maximum depth of five (5) feet below existing grade. Bore locations are shown on the attached Boring Location Map, Figure 1.

Hot Mix Asphalt (HMA) pavement shall be designed based on the lowest Resistant (R) Value test result of R=29. The results ranged from 29 through 45 according to our testing program. The laboratory test reports are provided as Figures D-1 through D-3.

HMA design should meet the requirements of the 2010 or newer, State of California, Standard Specifications Manual (SSM), Section 39. Aggregate Base should also meet the Class 2 requirements of the SSM, Section 26.

PCC design should meet the requirements of the American Concrete Institute (ACI) 330R, Guide for the Design and Construction of Concrete.

Ground surfaces to receive HMA or Portland Cement Concrete (PCC) pavements should be scarified and compacted to a minimum depth of 12 inches below the grading plane in cut areas or to 12 inches in areas to receive fill. 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.

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 two feet beyond the outside edges of pavements.

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.

LIMITATIONS, OBSERVATION AND TESTING

Conclusions and recommendations in this report are given for the proposed new Residence Hall located at 1801 Panorama Drive in Bakersfield, Kern County, California:

a. The information retrieved from exploratory borings drilled at the subject site to a maximum depth of 17 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 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.[2]

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.

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[2] 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 or her technical competence for approval upon completion of the work.

It is the responsibility of the owner or his or her 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 or her 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.

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. Wherever exist discrepancies between these guide-specifications and the earthwork recommendations in Section I of the above geotechnical report, the most stringent recommendations shall supersede.

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 or her 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 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 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 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 another specified layer is placed.

3. SITE CONDITIONS

The contractor shall visit the site, prior to bid submittal, to explore existing subsurface conditions; to survey site topographic, and to define the nature of materials that may be encountered while performing its work under this contract. Moreover, the contractor shall make his or her 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 because 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 this 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 be 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 upgraded by mixing with other materials or by other means, they may be rejected by the soils engineer for use in engineered fill. Rocks larger than 12 inches in size in any dimension shall not be allowed in the proposed building area. If a large amount of rocks greater than 12 inches in size in any dimension is encountered, a rock disposal area shall be located on the grading plan. Rocks shall be mixed with well-graded soils to assure that the voids in these areas will fill properly.

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.

5.3.2 The soils engineer shall be given notice of the proposed source of imported materials with adequate time allowance for his or her 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 operations 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 ensure 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 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 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:

5.5.1 The soils engineer shall be provided with a 48-hour 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

Ten (10) test borings were drilled at the subject site and terminated at a maximum depth of 17 feet below the existing ground surface. Borings were advanced using an (4.25) 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 thirty inches (30"). Blow counts for each six inch (6") driven increment was recorded and are reported on the Test Borings 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 11, along with the Legend. Approximate locations of test borings are shown on the Boring Location Map, Figure 1.

SEI No. 18248

CONCEPT PLAN – FLOOR 1

BAKERSFIELD COLLEGE
RESIDENCE HALL
OCTOBER 22, 2021

SIMPBK

Boring Location Map

PROPOSED QUANTITIES
UNIT A = 36 BEDS OR 36 UNITS
UNIT B = 94 BEDS OR 47 UNITS
UNIT C = 24 BEDS OR 6 UNITS
PROPOSED TOTAL = 154 BEDS

APPROXIMATE TOTAL SF = 98,000 SF

BEDS PER FLOOR
FLOOR 1 = 31 BEDS
FLOOR 2 = 41 BEDS
FLOOR 3 = 41 BEDS
FLOOR 4 = 41 BEDS

Legend
⊕ Boring Location
▲ R-Value

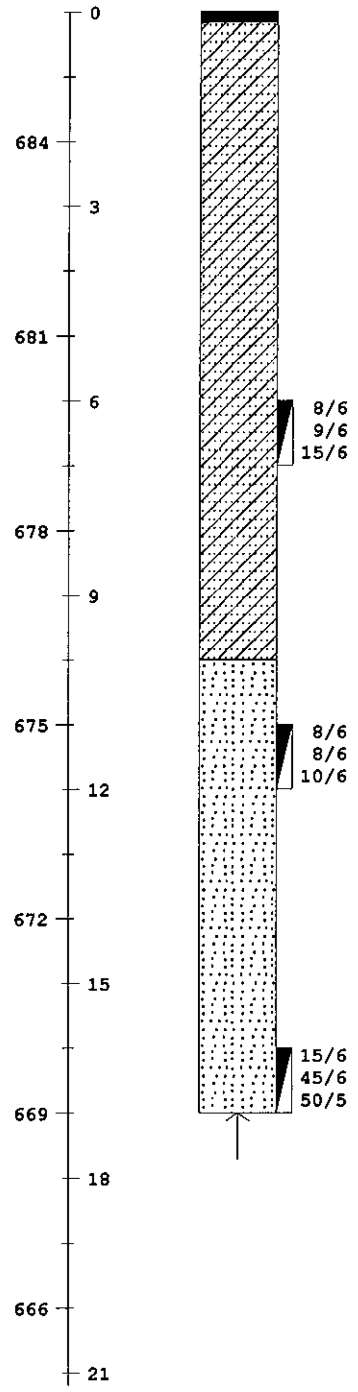
Figure 1

LOG OF TEST BORING

BORING B-1

PROJECT: *New BC Residence Hall*
BORING DATE: *12/6/21*
BORING LOCATION: *See Boring Location Map, Figure 1*
DRILL METHOD: *4.25" I.D. Hollow-Stem Auger*
DESCRIPTION: *Geotechnical & Geologic Engineering Services*
DEPTH TO WATER - ▼ **:** *N/A*
CAVING - ➧ **:** *N/A*

FILE NO: *18248*
ELEV.: *686'*
START: *12/6/21*
FINISH: *12/6/21*
LOGGER: *M. WATTS*



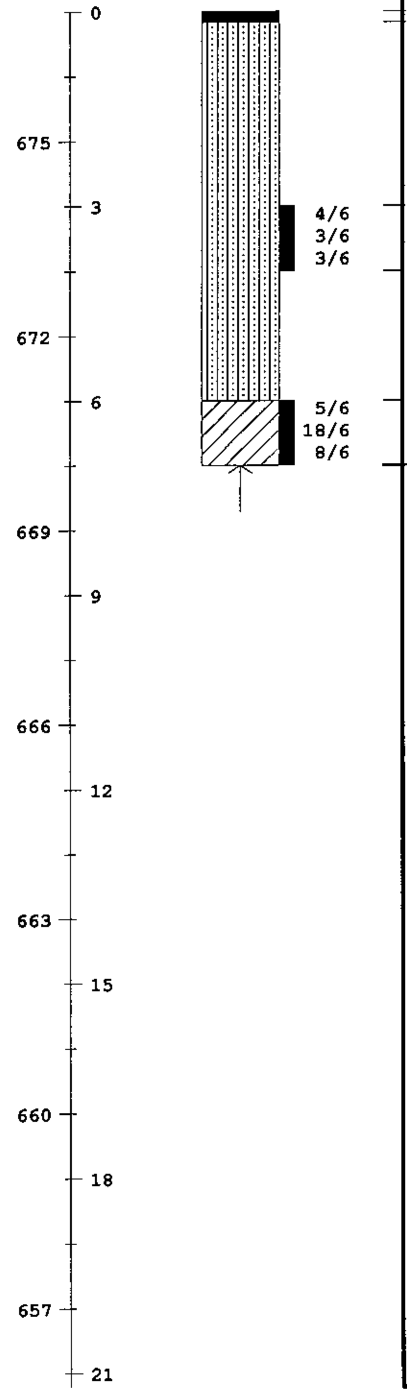
ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Description	Remarks	Density pcf	Moisture %
		SC	Approx. 2 inches asphaltic concrete.			
			CLAYEY SAND; yellowish brown, dry, fine, cobbles.			
			Slow drilling due to cobbles.			
	8/6 9/6 15/6		Medium dense, gravel/cobbles.			6.3
			Slow drilling continued.			
	8/6 8/6 10/6	SP	POORLY GRADED SAND; light yellowish brown, dry, fine, gravel.			2.5
			Slow drilling continued.			
	15/6 45/6 50/5		Very dense.			1.9
			BOTTOM.	Refusal due to rock.		

Figure Number 2

LOG OF TEST BORING
BORING B-2

PROJECT: *New BC Residence Hall*
BORING DATE: *12/6/21*
BORING LOCATION: *See Boring Location Map, Figure 1*
DRILL METHOD: *4.25" I.D. Hollow-Stem Auger*
DESCRIPTION: *Geotechnical & Geologic Engineering Services*
DEPTH TO WATER - ⊻ : *N/A*
CAVING - ► : *N/A*

FILE NO: *18248*
ELEV.: *677'*
START: *12/6/21*
FINISH: *12/6/21*
LOGGER: *M. WATTS*



ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Description	Remarks	Density pcf	Moisture %
		SM	Approx. 2 inches of asphaltic concrete.			
			SILTY SAND; light yellowish brown, dry, fine, rock.			
	4/6 3/6 3/6		Medium stiff.		120.8	10.2
			Slow drilling due to rock.			
	5/6 18/6 8/6	CL	SANDY CLAY; brown, low plasticity, fine, trace of gravel, medium dense.	Refusal due to rock.	94.2	8.6
			BOTTOM.			

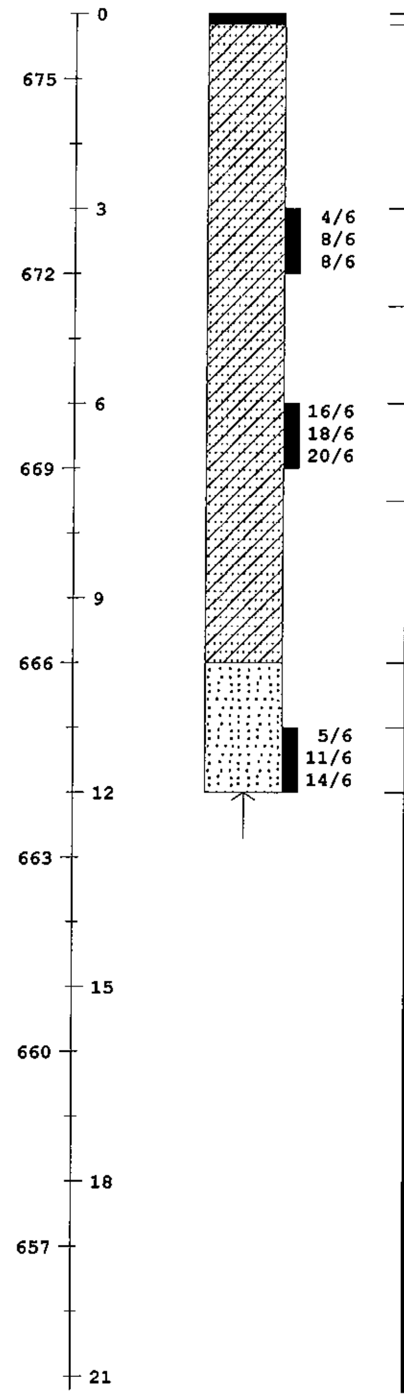
Figure Number 3

LOG OF TEST BORING
BORING B-3

Page 1 of 1

PROJECT: *New BC Residence Hall*
BORING DATE: *12/6/21*
BORING LOCATION: *See Boring Location Map, Figure 1*
DRILL METHOD: *4.25" I.D. Hollow-Stem Auger*
DESCRIPTION: *Geotechnical & Geologic Engineering Services*
DEPTH TO WATER - ▽ **:** *N/A*
CAVING - ➤ **:** *N/A*

FILE NO: *18248*
ELEV.: *676'*
START: *12/6/21*
FINISH: *12/6/21*
LOGGER: *M. WATTS*



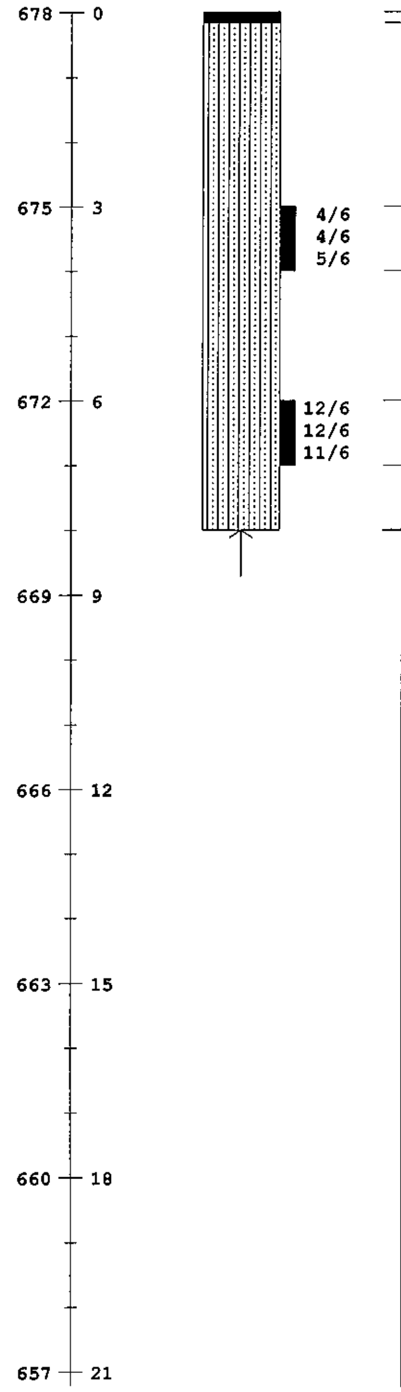
ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Description	Remarks	Density pcf	Moisture %
		SC	Approx. 2 inches of asphaltic concrete.			
			CLAYEY SAND; light brown, dry, fine, rock.			
			Medium dense.		104.5	9.2
			Slow drilling due to rock.			
			Dense.		104.7	5.2
			Slow drilling continues.			
		SP	POORLY GRADED SAND; light yellowish brown, dry, fine, gravel/rock.		109.8	1.9
			Medium dense.	Refusal due to rock.		
			BOTTOM.			

Figure Number 4

LOG OF TEST BORING
BORING B-4

PROJECT: *New BC Residence Hall*
BORING DATE: *12/7/21*
BORING LOCATION: *See Boring Location Map, Figure 1*
DRILL METHOD: *4.25" I.D. Hollow-Stem Auger*
DESCRIPTION: *Geotechnical & Geologic Engineering Services*
DEPTH TO WATER - ⊻ **:** *N/A*
CAVING - ➤ **:** *N/A*

FILE NO: *18248*
ELEV.: *678'*
START: *12/7/21*
FINISH: *12/7/21*
LOGGER: *M. WATTS*



ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Description	Remarks	Density pcf	Moisture %
678 / 0		SM	Approx. 2 inches of asphaltic concrete.			
			SILTY SAND; brown, damp, trace of clay, cohesive, gravel.			
675 / 3	4/6 4/6 5/6		Loose.		109.8	14.8
			Cobbles.			
672 / 6	12/6 12/6 11/6		Medium dense.		114.0	6.0
			Slow/hard drilling due to cobbles.			
			BOTTOM.	Refusal due to rock.		

LOG OF TEST BORING
BORING B-5

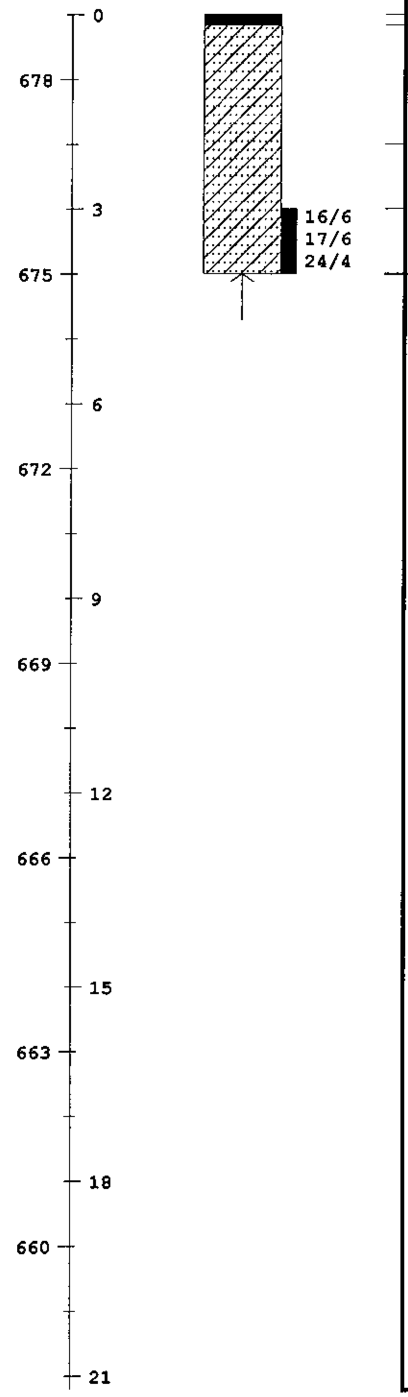
Page 1 of 1

PROJECT: *New BC Residence Hall*
BORING DATE: *12/7/21*
BORING LOCATION: *See Boring Location Map, Figure 1*
DRILL METHOD: *4.25" I.D. Hollow-Stem Auger*
DESCRIPTION: *Geotechnical & Geologic Engineering Services*
DEPTH TO WATER - ▽ : *N/A*
CAVING - ➧ : *N/A*

FILE NO: *18248*
ELEV.: *679'*
START: *12/7/21*
FINISH: *12/7/21*
LOGGER: *M. WATTS*

ELEVATION/ DEPTH (feet)

SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA



USCS	Description	Remarks	Density pcf	Moisture %
SC	Approx. 2 inches asphaltic concrete.			
	CLAYEY SAND; light yellowish brown, dry to damp, fine, gravel.			
	Cobbles.			
	Dense.		114.0	1.6
	BOTTOM.	Refusal due to rock.		

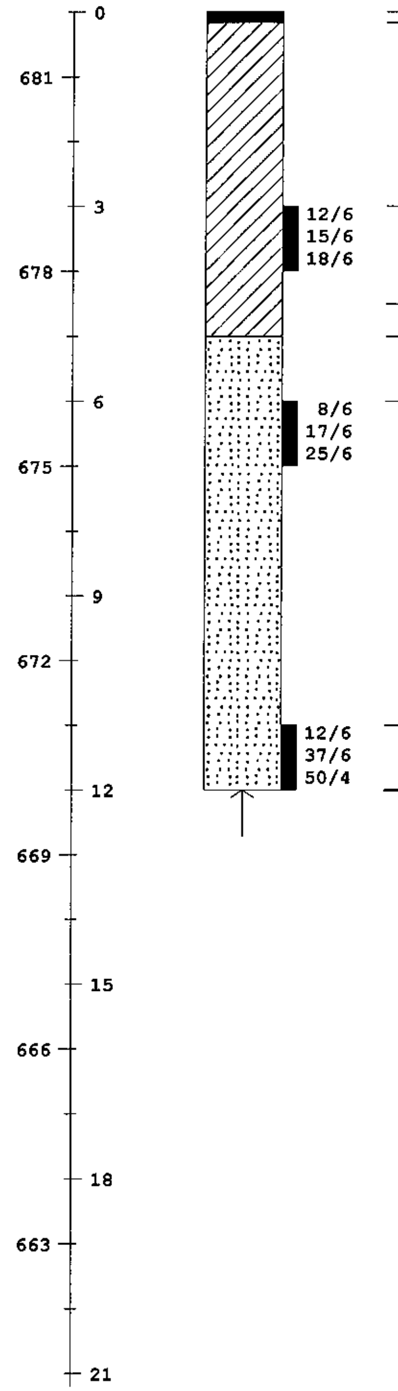
Figure Number 6

LOG OF TEST BORING
BORING B-6

Page 1 of 1

PROJECT: *New BC Residence Hall*
BORING DATE: *12/7/21*
BORING LOCATION: *See Boring Location Map, Figure 1*
DRILL METHOD: *4.25" I.D. Hollow-Stem Auger*
DESCRIPTION: *Geotechnical & Geologic Engineering Services*
DEPTH TO WATER - ▼ **:** *N/A*
CAVING - ► **:** *N/A*

FILE NO: *18248*
ELEV.: *682'*
START: *12/7/21*
FINISH: *12/7/21*
LOGGER: *M. WATTS*



ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Description	Remarks	Density pcf	Moisture %
		CL	Approx. 2 inches asphaltic concrete.			
			SANDY CLAY; light brown, dry, low plasticity, cobbles.			
	12/6 15/6 18/6		Hard.		100.9	3.8
			Hard drilling.			
		SP	POORLY GRADED SAND; light yellowish brown, dry, non cohesive, gravel/cobbles.			
	8/6 17/6 25/6				126.3	2.0
			Dense.			
	12/6 37/6 50/4		Very dense.		122.6	3.8
			BOTTOM.	Refusal due to rock.		

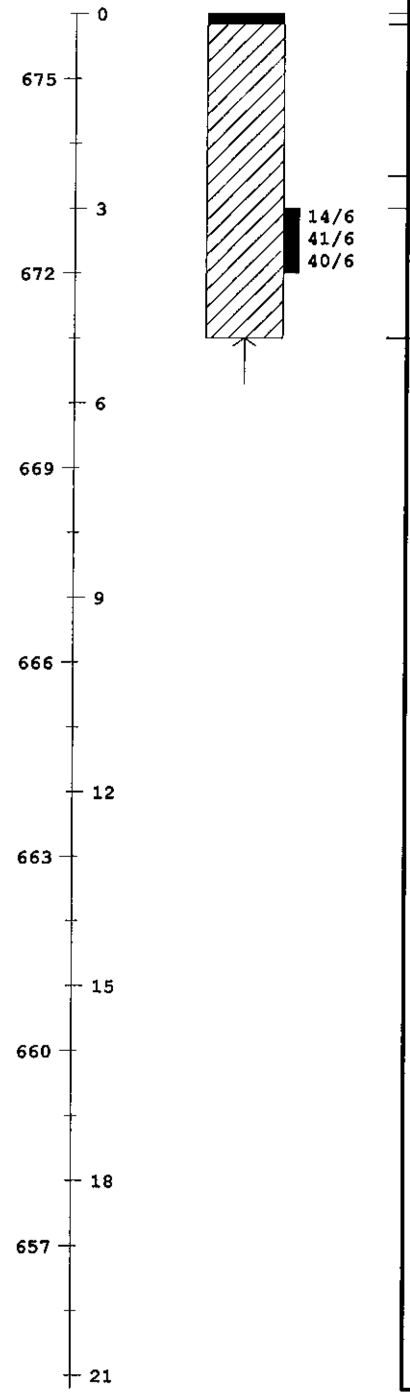
Figure Number 7

LOG OF TEST BORING
BORING B-7

Page 1 of 1

PROJECT: *New BC Residence Hall*
BORING DATE: *12/7/21*
BORING LOCATION: *See Boring Location Map, Figure 1*
DRILL METHOD: *4.25" I.D. Hollow-Stem Auger*
DESCRIPTION: *Geotechnical & Geologic Engineering Services*
DEPTH TO WATER - ▽ : *N/A*
CAVING - ➤ : *N/A*

FILE NO: *18248*
ELEV.: *676'*
START: *12/7/21*
FINISH: *12/7/21*
LOGGER: *M. WATTS*



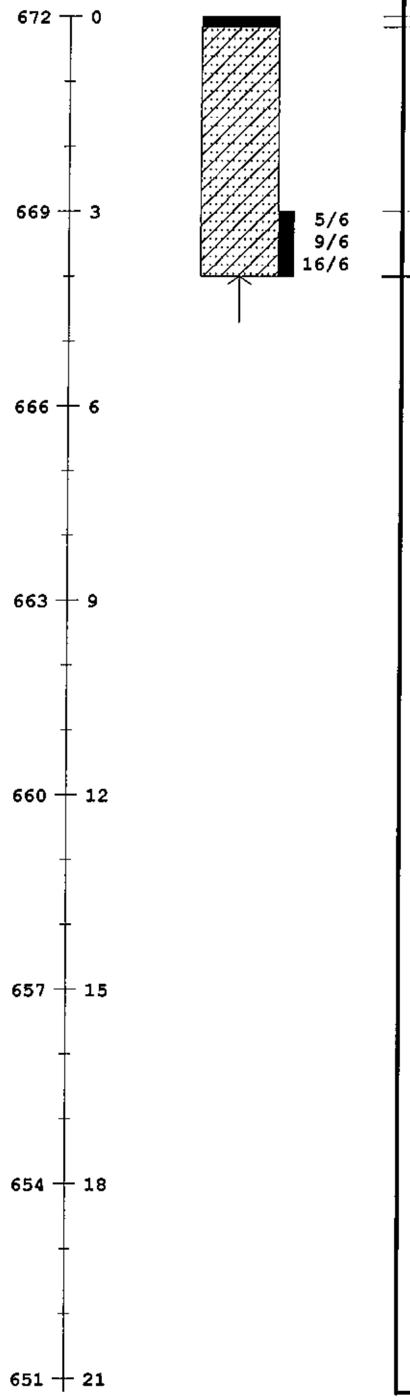
ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Description	Remarks	Density pcf	Moisture %
		CL	Approx. 2 inches asphaltic concrete.			
			SANDY CLAY; brown, damp, low plasticity, cobbles.			
			Hard drilling.			
	14/6 41/6 40/6		Hard.		125.7	1.9
			BOTTOM.	Refusal due to rock.		

LOG OF TEST BORING
BORING B-8

Page 1 of 1

PROJECT: *New BC Residence Hall*
BORING DATE: *12/7/21*
BORING LOCATION: *See Boring Location Map, Figure 1*
DRILL METHOD: *4.25" I.D. Hollow-Stem Auger*
DESCRIPTION: *Geotechnical & Geologic Engineering Services*
DEPTH TO WATER - ≡ **:** *N/A*
CAVING - ➧ **:** *N/A*

FILE NO: *18248*
ELEV.: *672'*
START: *12/7/21*
FINISH: *12/7/21*
LOGGER: *M. WATTS*



ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Description	Remarks	Density pcf	Moisture %
672 0		SC	Approx. 2 inches asphaltic concrete.			
			CLAYEY SAND; yellowish brown, damp, fine, cobbles, hard drilling.			
669 3	5/6 9/6 16/6		Medium dense.		123.3	3.8
			BOTTOM.	Refusal due to rock.		

Figure Number 9

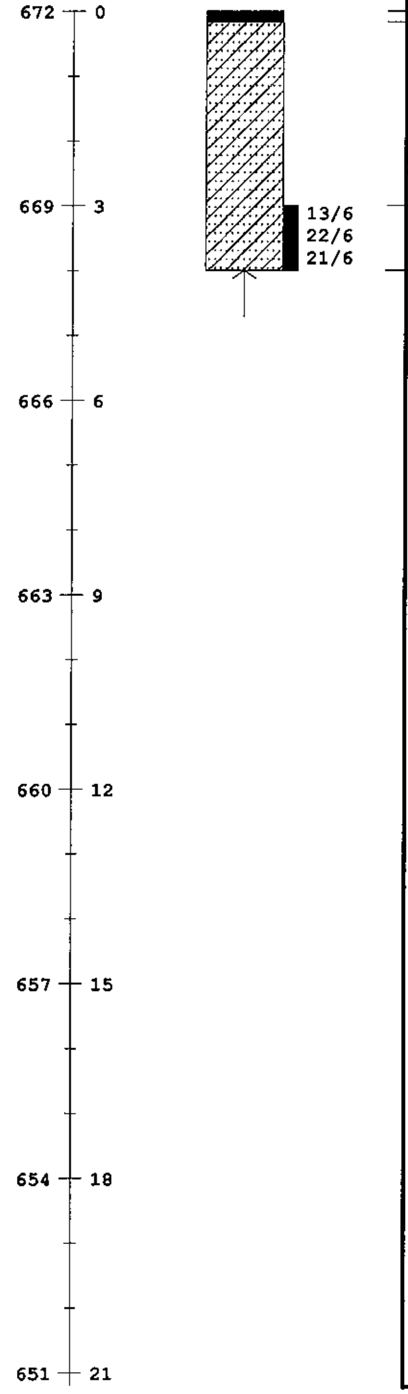
SOILS ENGINEERING, INC.

LOG OF TEST BORING
BORING B-9

PROJECT: *New BC Residence Hall*
BORING DATE: *12/7/21*
BORING LOCATION: *See Boring Location Map, Figure 1*
DRILL METHOD: *4.25" I.D. Hollow-Stem Auger*
DESCRIPTION: *Geotechnical & Geologic Engineering Services*
DEPTH TO WATER - ▽ **:** *N/A*
CAVING - ▶ **:** *N/A*

FILE NO: *18248*
ELEV.: *672'*
START: *12/7/21*
FINISH: *12/7/21*
LOGGER: *M. WATTS*

ELEVATION/ DEPTH (feet) — SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA



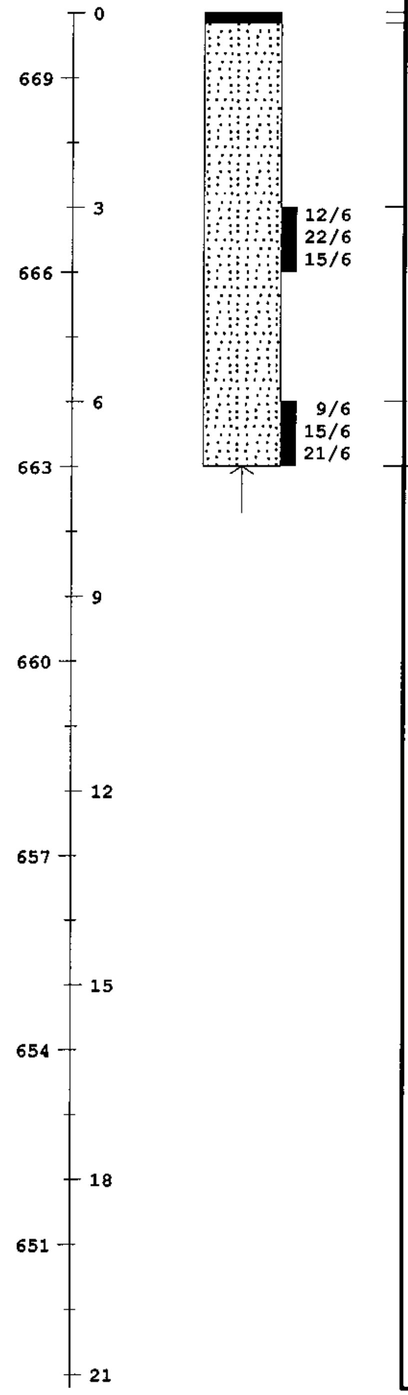
USCS	Description	Remarks	Density pcf	Moisture %
SC	Approx. 2 inches asphaltic concrete.			
	CLAYEY SAND; yellowish brown, damp, low plasticity, fine, gravel/cobbles.			
	Dense.		103.2	6.2
	BOTTOM.	Refusal due to rock.		

Figure Number 10

LOG OF TEST BORING
BORING B-10

PROJECT: *New BC Residence Hall*
BORING DATE: *12/7/21*
BORING LOCATION: *See Boring Location Map, Figure 1*
DRILL METHOD: *4.25" I.D. Hollow-Stem Auger*
DESCRIPTION: *Geotechnical & Geologic Engineering Services*
DEPTH TO WATER - ▽ : *N/A*
CAVING - ➤ : *N/A*

FILE NO: *18248*
ELEV.: *670'*
START: *12/7/21*
FINISH: *12/7/21*
LOGGER: *M. WATTS*



ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Description	Remarks	Density pcf	Moisture %
0		SP	Approx. 2 inches of asphaltic concrete. POORLY GRADED SAND; light yellowish brown, non cohesive, dry to damp.			
3	12/6 22/6 15/6		Dense.		112.2	6.7
6	9/6 15/6 21/6		Slow drilling due to cobbles.		109.1	3.7
663			BOTTOM.	Refusal due to rock.		

Figure Number 11

KEY TO SYMBOLS

Symbol	Description
Strata symbols	
■	Paving
▨	Clayey sand
░	Poorly graded sand
▥	Silty sand
▧	Low plasticity clay
Misc. Symbols	
↑	Drill rejection
Soil Samplers	
◩	Standard penetration test
▮	California sampler

Notes:

1. Ten (10) exploratory borings were drilled between 12/06/2021 and 12/07/2021 using an 8-inch outside diameter hollow-stem auger.

2. No free groundwater was encountered to the maximum depth drilled of 17'.

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 conducted on samples recovered are reported on the logs.

APPENDIX C

SOIL TEST DATA

SIEVE ANALYSES (ASTM D422 and/or ASTM D1140)

Grain size distributions for specimens retrieved from various subsurface elevations were tested to classify the materials. Test results are presented on Figures A-1 and A-2.

IN-SITU DENSITY & MOISTURE RELATIONSHIPS (ASTM D2216 & D2937)

Moisture & density data for undisturbed native soils was obtained by use of a 2-3/8-inch (inside diameter) split-barrel sampler. Test results are given on the Logs of Test Borings, Figures 2 through 11.

CONSOLIDATION TESTS (ASTM D2435)

Compressibility of soils was determined on saturated, undisturbed samples of native materials. Consolidation Test Diagrams, Figures B-1 through B-5, 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 D3080)

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 on Figures C-1 through C-4.

EXPANSION INDEX (ASTM D4829)

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. Near surface soils were obtained and tested for expansiveness. Test results are presented on the Laboratory Testing Recap, Table 1.

R-VALUE TESTS (CTM-301)

R-Value tests were performed to obtain flexible pavement design data. Test results are presented on Figures D-1 through D-3.

SOIL CORROSIVITY (SO_4 / pH / Chlorides)

Tests for Soluble Sulfates (SO_4), Soluble Chlorides (Cl), and pH values were performed on two (2) composite samples retrieved from the upper 3 feet to determine the corrosion potential of the soils. Corrosion prevention measures and the extent to which measures should be taken (if any) should be addressed with the corrosion engineer. Soluble Sulfates and Soluble Chlorides values were determined according to EPA 300.0M. The pH values were determined according to EPA Method 9045C. Results of all the constituents are discussed in the Soil Corrosivity section.

Kern Community College District

Geotechnical Engineering Services
New BC Residence Hall
1801 Panorama Drive, Bakersfield, CA

SEI File No. 21-18248
December 27, 2021

TABLE 1

TEST LOCATION	USCS	% < # 200	CONSOLIDATION				DIRECT SHEAR		UNCONFINED COMPRESSION		E.I.	ATTERBERG LIMITS			R-VALUE @ 300 psi		MAXIMUM DENSITY	
			C_c	C_s	S.P. (psf)	HV %	C, (ksf)	F.A.	Q_U, (psi)	C, (ksf)		LL	PL	PI	R.V.	E.P. (psi)	MDD (pcf)	O.M.
B-2 @ 3'	SM	46	0.05	0.01	0	-0.7												
B-2 @ 6'	CL						0.09	30										
B-3 @ 0-5'	SC	49									39							
B-3 @ 3'	SC	33	0.04	0.01	960	0.2												
B-4 @ 0-5'	SM	39									0							
B-4 @ 6'	SM	2	0.04	0	0	0												
B-6 @ 6'	SP						0	42.4										
B-7 @ 0-5'	SM	20									0							
B-8 @ 3'	SC	34	0.04	0	0	-0.5												
B-9 @ 3'	SC						0.09	36										
B-10 @ 3'	SP		0.03	0	0	-0.2												
B-10 @ 6'	SP						0	45.4										
R-1 @ 0-5'	SC	19													45	0		
R-2 @ 0-5'	SC	25													34	0		
R-3 @ 0-5'	SC	28													29	0		

CONSOLIDATION
Cc - Compression Index
Cs - Swell Index
S.P. (psf) - Swell Pressure
HV % - Heave Precentage / Collapase

UNCONFINED COMPRESSION
Q_U (psi) - Unconfined Compression Strength
C, (ksf) - Cohesion

DIRECT SHEAR
C (ksf) - Cohesion
F.A. - Friction Angle

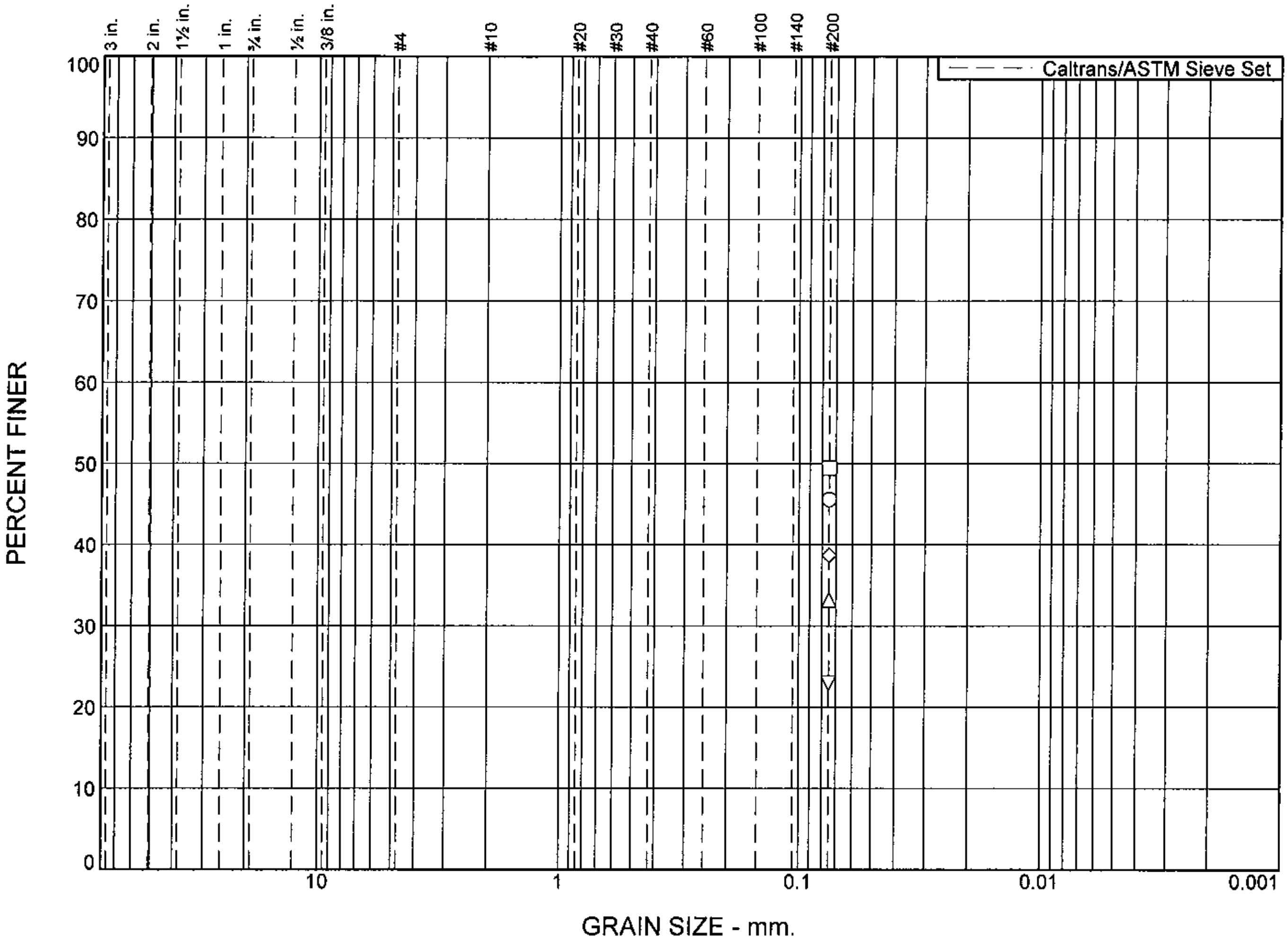
E.I. - EXPANSION INDEX

ATTERBERG LIMITS
LL - Liquid Limit
PL - Plastic Limit
PI - Plasticity Index

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

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

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○							46	
□							49	
△							33	
◇							39	
▽							23	

SOIL DATA

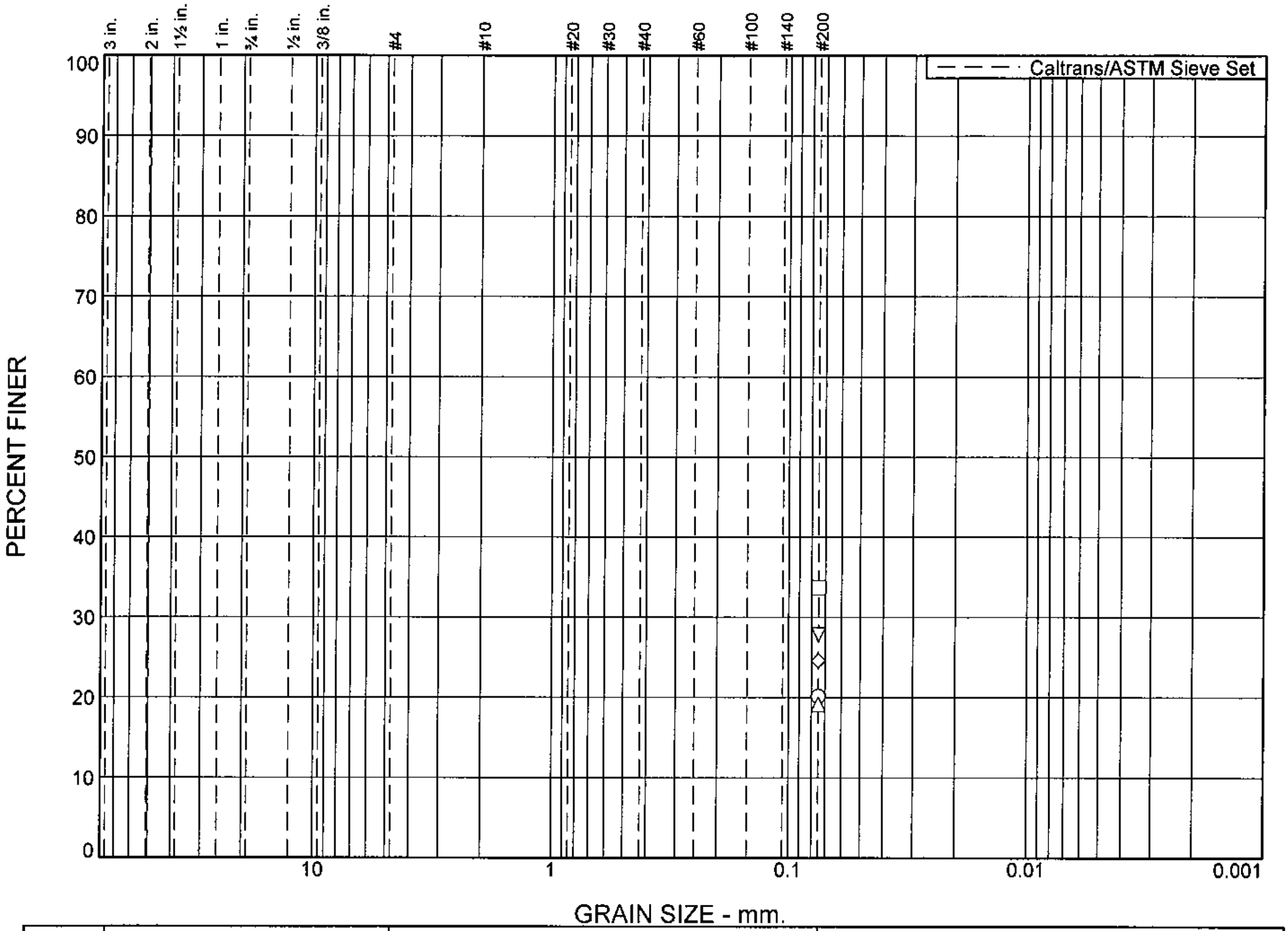
SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○	B-2		3'	SILTY SAND	SM
□		80394	0-5'	CLAYEY SAND (B-3)	SC
△	B-3		3'	CLAYEY SAND	SC
◇		80399	0-5'	SILTY SAND (B-4)	SM
▽	B-4		6'	SILTY SAND	SM

SOILS ENGINEERING, INC.

Client: Kern Community College District
Project: New BC Residence Hall

Project No.: 18248 **Figure** A-1

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○							20	
□							34	
△							19	
◇							25	
▽							28	

SOIL DATA

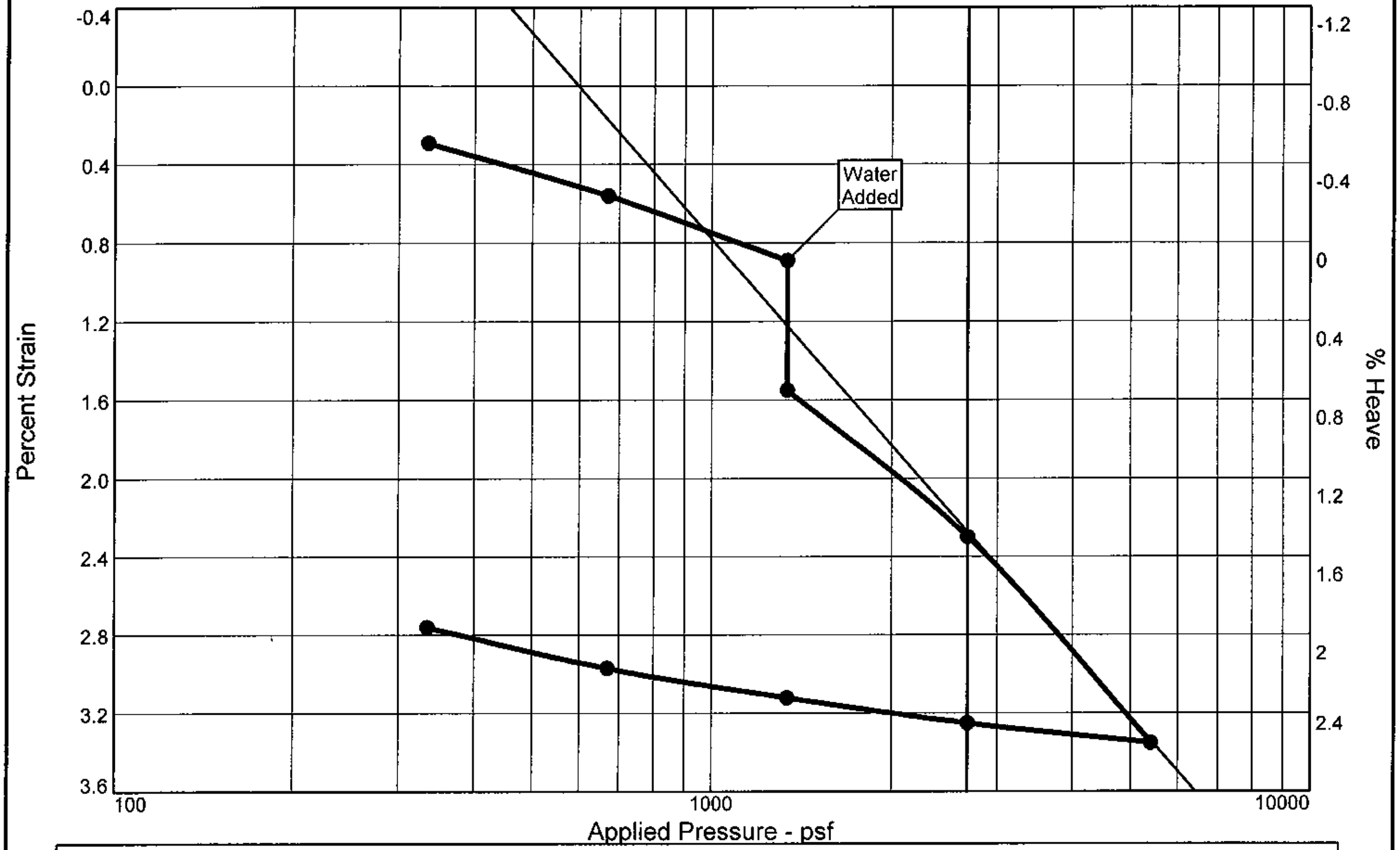
SYMBOL	SOURCE	SAMPLE NO.	DEPTH (ft.)	Material Description	USCS
○		80405	0-5'	SILTY SAND (B-7)	SM
□	B-8		3'	CLAYEY SAND	SC
△		80411	0-5'	CLAYEY SAND (R-1)	SC
◇		80412	0-5'	CLAYEY SAND (R-2)	SC
▽		80413	0-5'	CLAYEY SAND (R-3)	SC

SOILS ENGINEERING, INC.

Client: Kern Community College District
Project: New BC Residence Hall

Project No.: 18248 **Figure** A-2

CONSOLIDATION TEST REPORT



Coefficients of Consolidation and Secondary Consolidation											
No.	Load (psf)	C_V (ft.^{2}/day)	C_α	No.	Load (psf)	C_V (ft.^{2}/day)	C_α	No.	Load (psf)	C_V (ft.^{2}/day)	C_α
1	335	1.191									
2	670	0.223									
3	1340	0.669									
5	2680	1.149									
6	5410	1.244									

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.											
67.6 %	11.4 %	114.5	N/A	N/A	2.65	336	2756	0.05	0.01		-0.7	0.445

MATERIAL DESCRIPTION	USCS	AASHTO
SILTY SAND	SM	N/A

Project No. 18248 **Client:** Kern Community College District

Project: New BC Residence Hall

Source of Sample: B-2 **Depth:** 3'

Remarks:

Test Date: 12/20/21

SOILS ENGINEERING, INC.

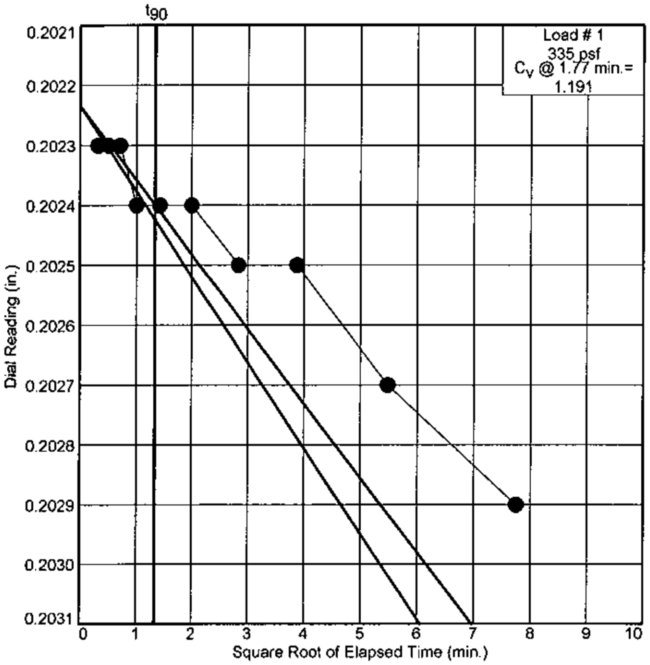
Figure B-1

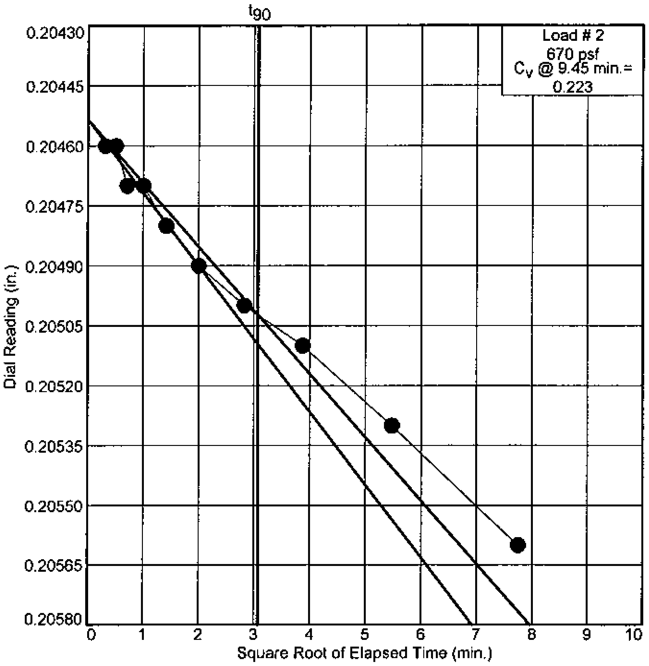
Tested By: JA **Checked By:** AL

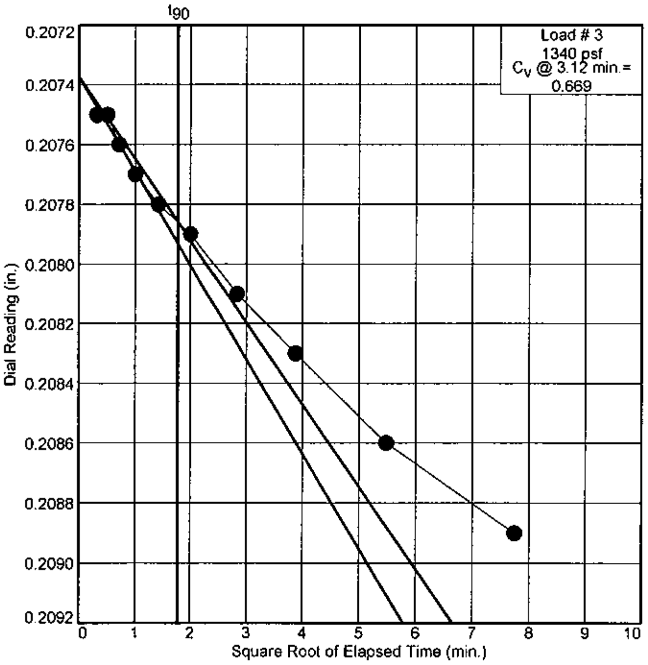
Dial Reading vs. Time

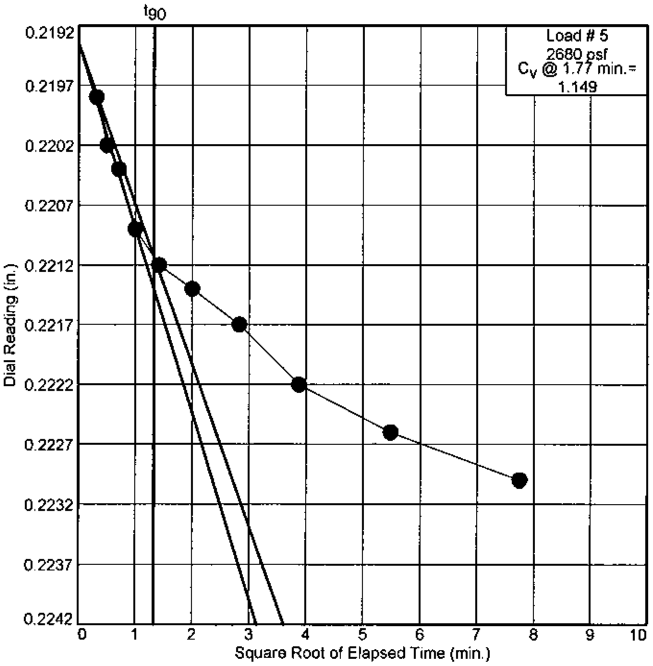
Project No.: 18248
Project: New BC Residence Hall

Source of Sample: B-2 Depth: 3'









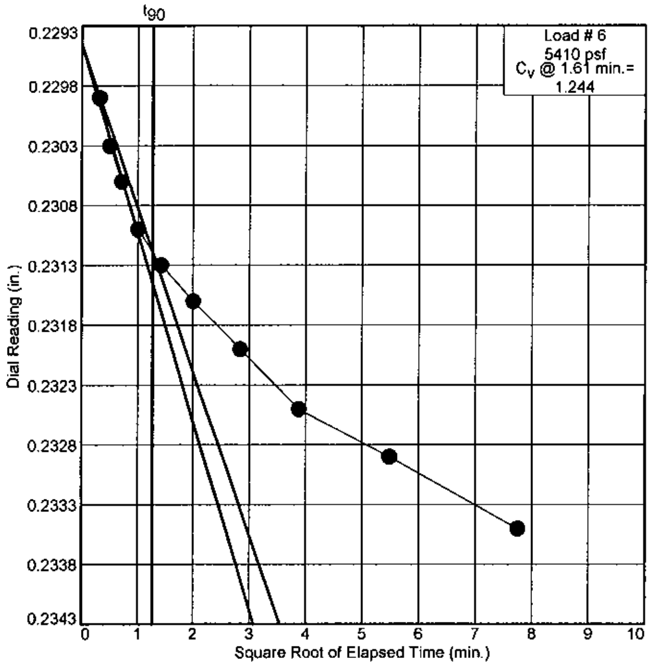
SOILS ENGINEERING, INC.

Figure B-1

Dial Reading vs. Time

Project No.: 18248
Project: New BC Residence Hall

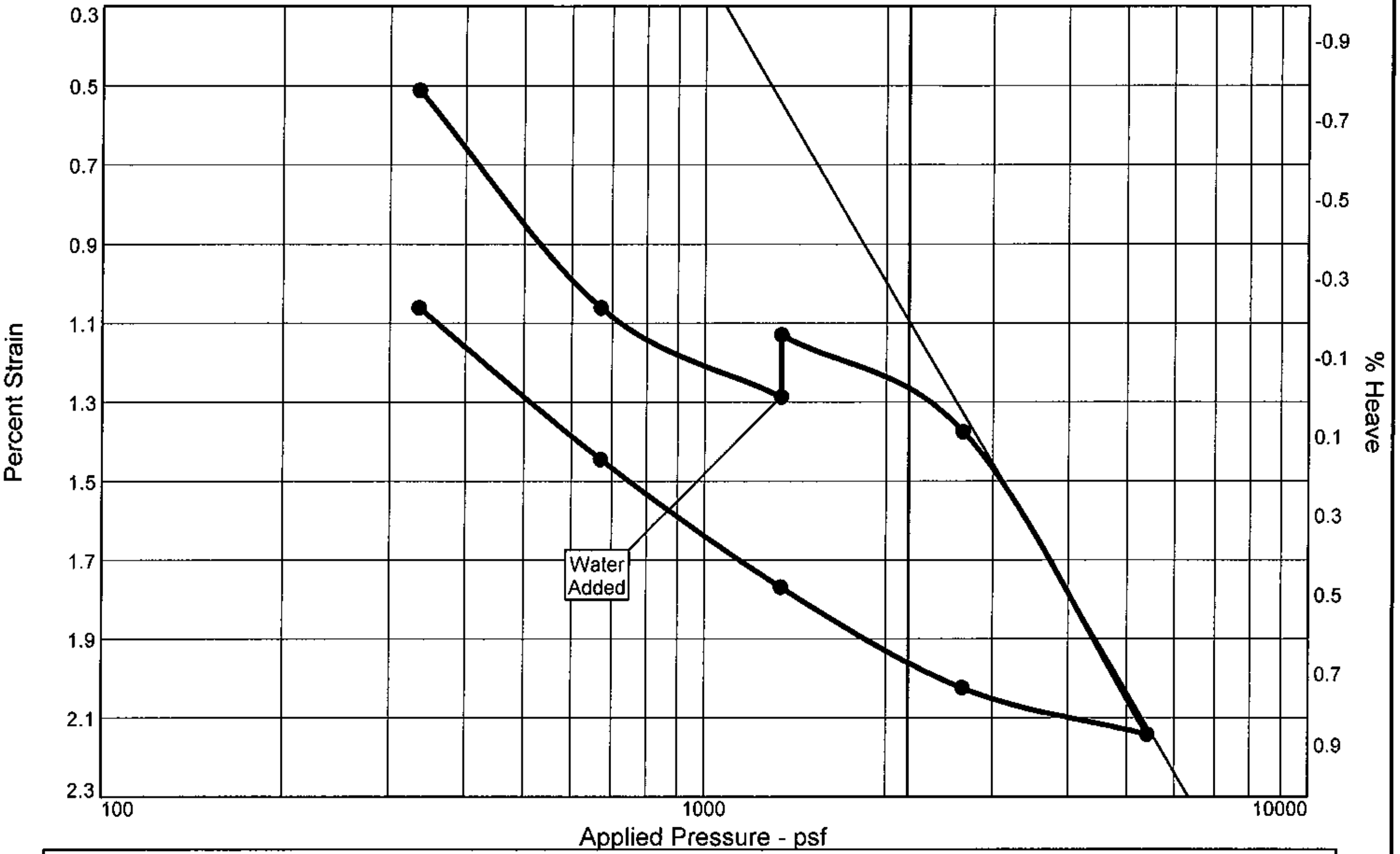
Source of Sample: B-2 Depth: 3'



SOILS ENGINEERING, INC.

Figure B-1

CONSOLIDATION TEST REPORT



Coefficients of Consolidation and Secondary Consolidation											
No.	Load (psf)	C_v (ft.^{2}/day)	C_α	No.	Load (psf)	C_v (ft.^{2}/day)	C_α	No.	Load (psf)	C_v (ft.^{2}/day)	C_α
1	335	8.743									
2	670	0.793									
5	2680	2.822									
6	5410	0.766									

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.											
66.2 %	13.1 %	108.6	N/A	N/A	2.65	336	2602	0.04	0.01	960	0.2	0.523

MATERIAL DESCRIPTION	USCS	AASHTO
CLAYEY SAND	SC	N/A

Project No. 18248 **Client:** Kern Community College District

Project: New BC Residence Hall

Source of Sample: B-3 **Depth:** 3'

Remarks:

Test Date: 12/20/21

SOILS ENGINEERING, INC.

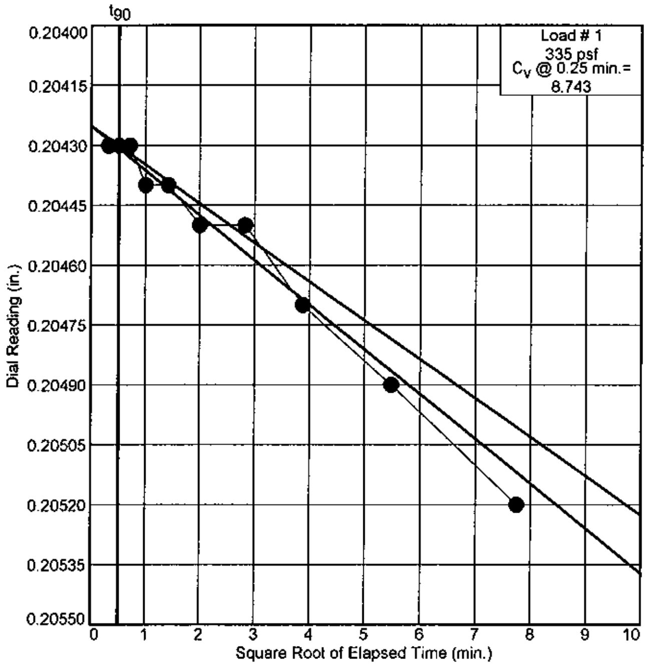
Figure B-2

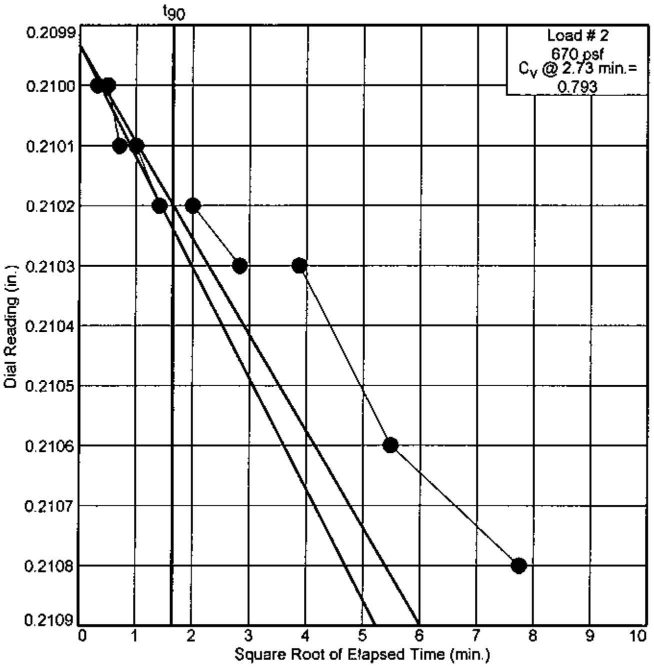
Tested By: JA **Checked By:** AL

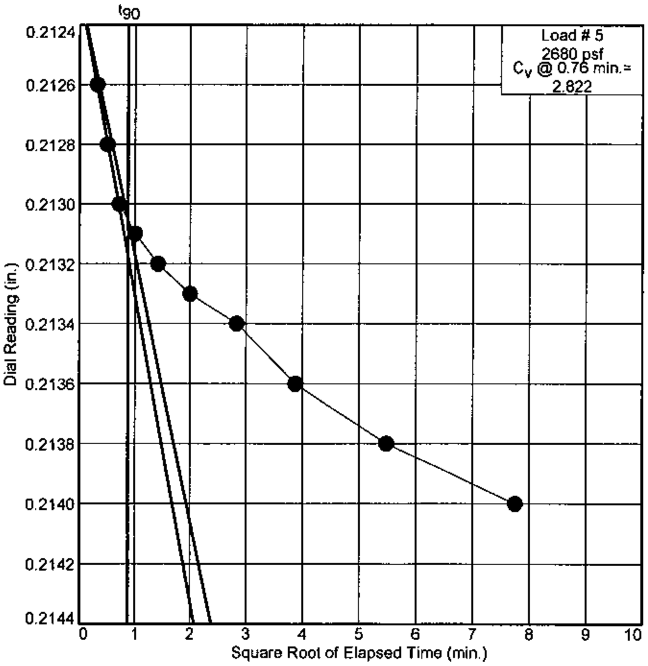
Dial Reading vs. Time

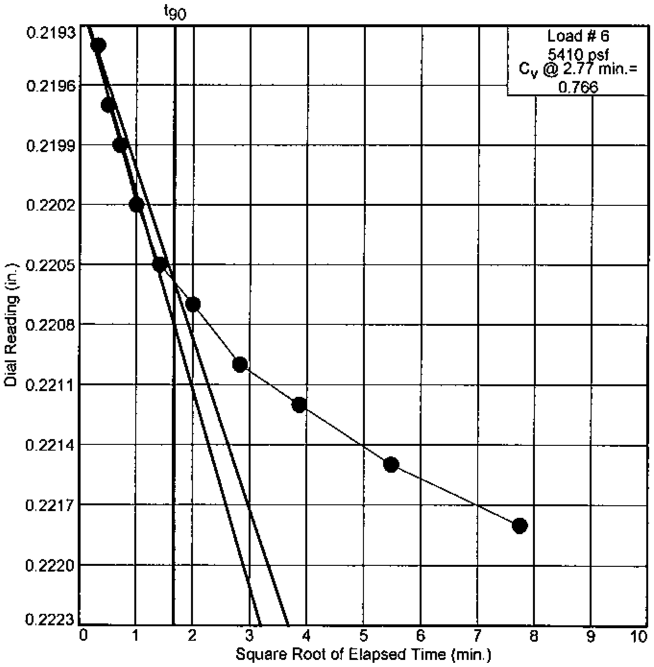
Project No.: 18248
Project: New BC Residence Hall

Source of Sample: B-3 Depth: 3'





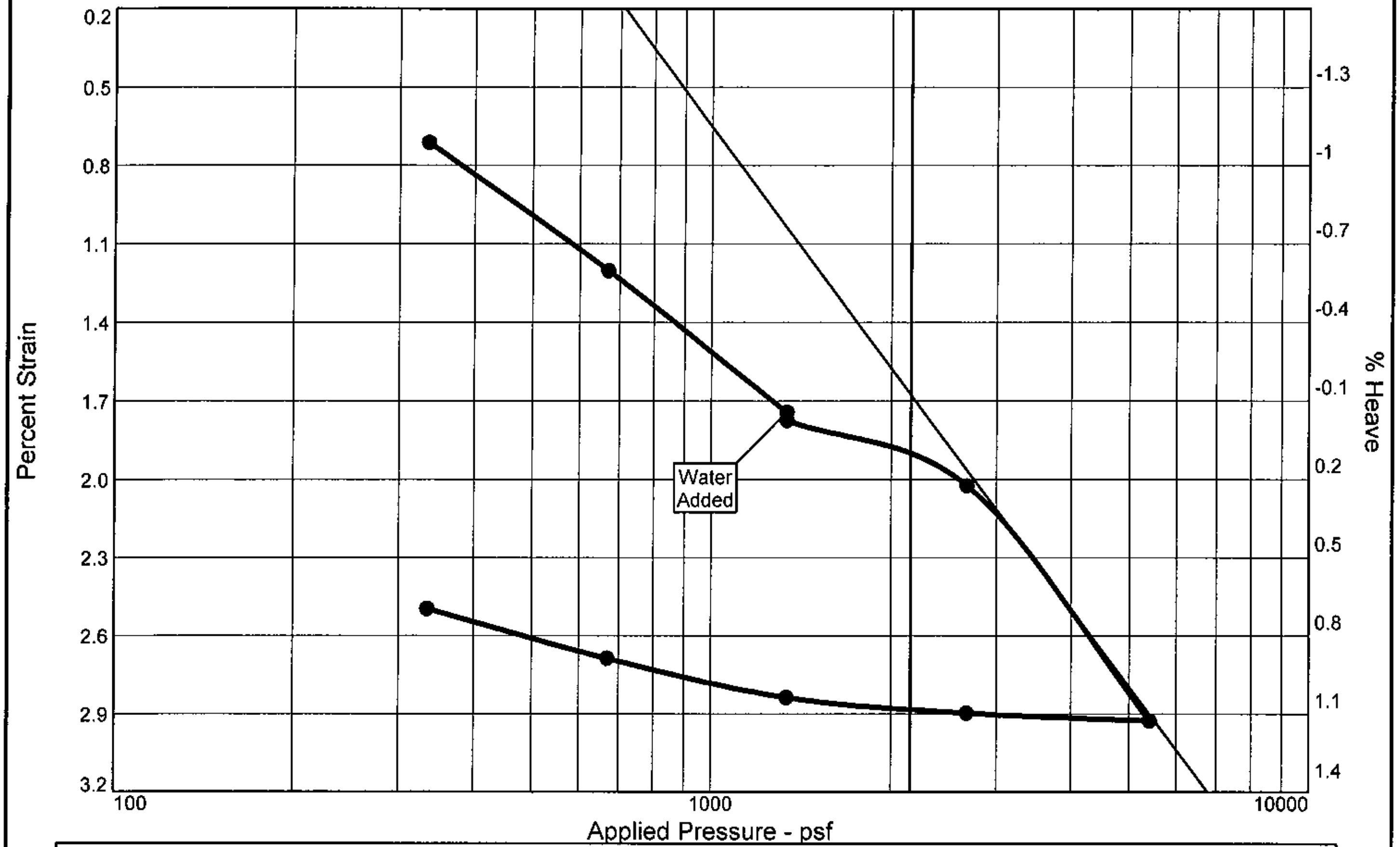




SOILS ENGINEERING, INC.

Figure B-2

CONSOLIDATION TEST REPORT



Coefficients of Consolidation and Secondary Consolidation											
No.	Load (psf)	C_v (ft.^{2}/day)	C_α	No.	Load (psf)	C_v (ft.^{2}/day)	C_α	No.	Load (psf)	C_v (ft.^{2}/day)	C_α
1	335	0.112									
3	1340	0.959									
6	5410	0.623									

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.											
92.9 %	12.3 %	122.5	N/A	N/A	2.65	336	2610	0.04	0.00		0.0	0.350

MATERIAL DESCRIPTION	USCS	AASHTO
SILTY SAND	SM	N/A

Project No. 18248 **Client:** Kern Community College District

Project: New BC Residence Hall

Source of Sample: B-4 **Depth:** 6'

Remarks:

Test Date: 12/20/21

SOILS ENGINEERING, INC.

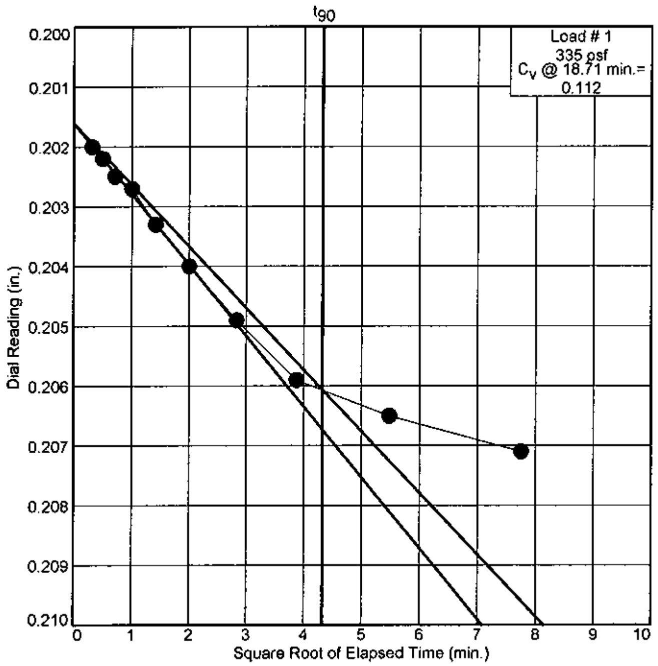
Figure B-3

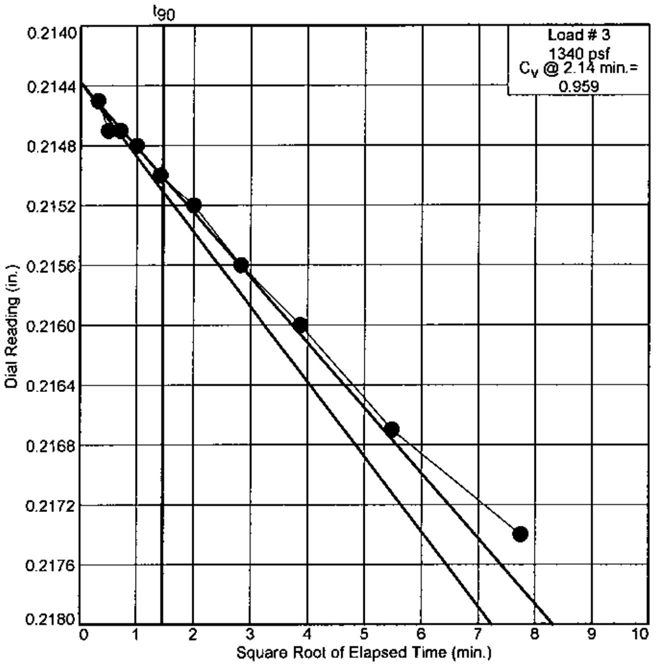
Tested By: JA **Checked By:** AL

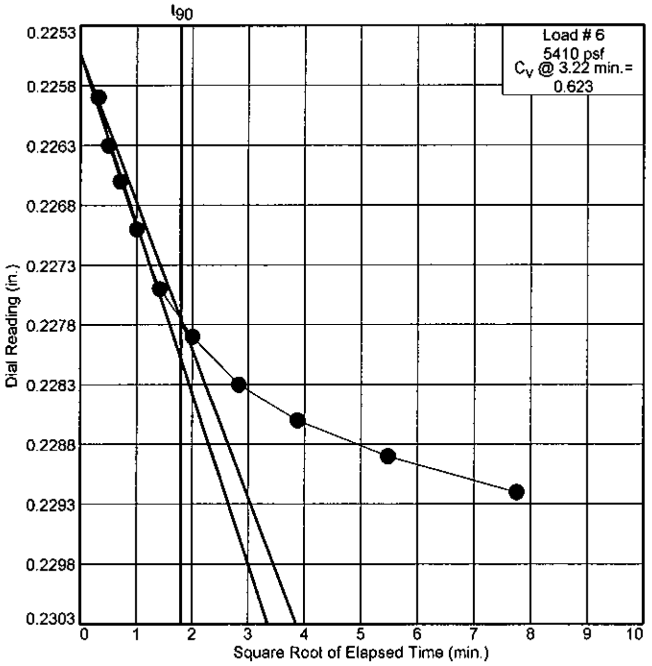
Dial Reading vs. Time

Project No.: 18248
Project: New BC Residence Hall

Source of Sample: B-4 Depth: 6'



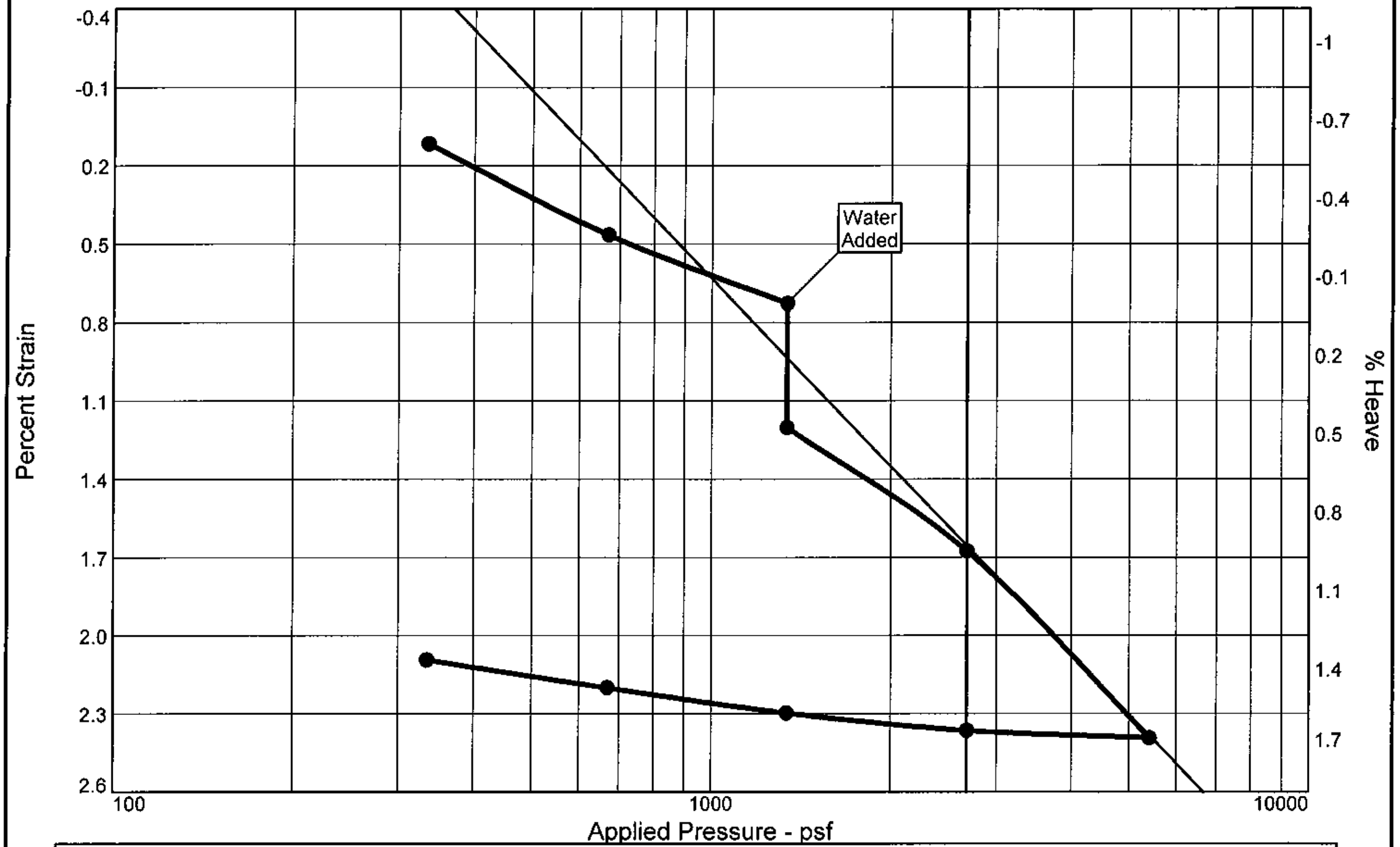




SOILS ENGINEERING, INC.

Figure B-3

CONSOLIDATION TEST REPORT



Coefficients of Consolidation and Secondary Consolidation

No.	Load (psf)	C_v (ft.^{2}/day)	C_α	No.	Load (psf)	C_v (ft.^{2}/day)	C_α	No.	Load (psf)	C_v (ft.^{2}/day)	C_α
1	335	1.682									
2	670	6.818									
3	1340	6.776									
5	2680	0.635									
6	5410	0.753									

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.											
59.9 %	11.6 %	109.3	N/A	N/A	2.65	336	2769	0.04	0.00		-0.5	0.514

MATERIAL DESCRIPTION	USCS	AASHTO
CLAYEY SAND	SC	N/A

Project No. 18248 **Client:** Kern Community College District

Project: New BC Residence Hall

Source of Sample: B-8 **Depth:** 3'

Remarks:
Test Date: 12/20/21

SOILS ENGINEERING, INC.

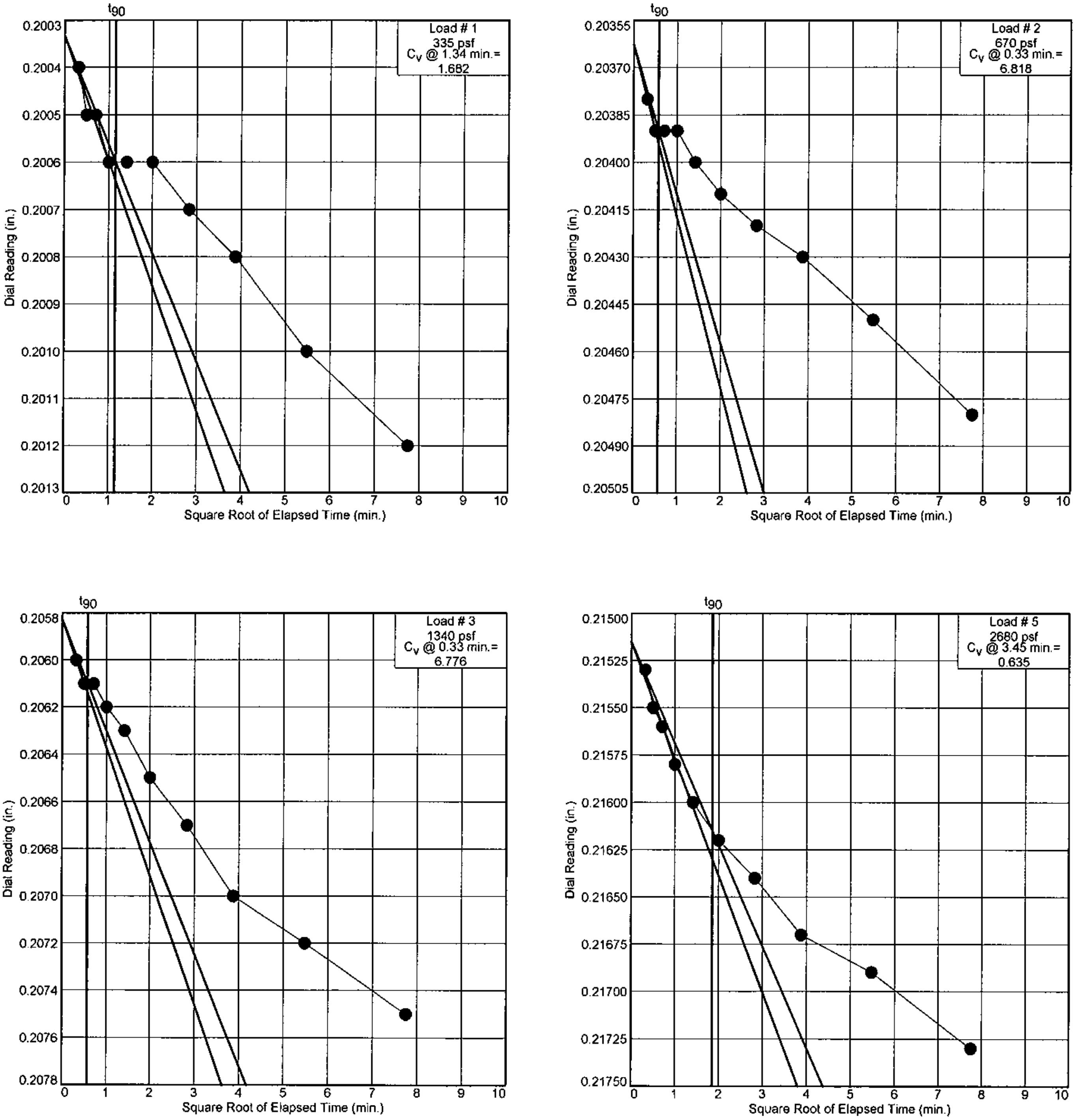
Figure B-4

Tested By: JA **Checked By:** AL

Dial Reading vs. Time

Project No.: 18248
Project: New BC Residence Hall

Source of Sample: B-8 Depth: 3'



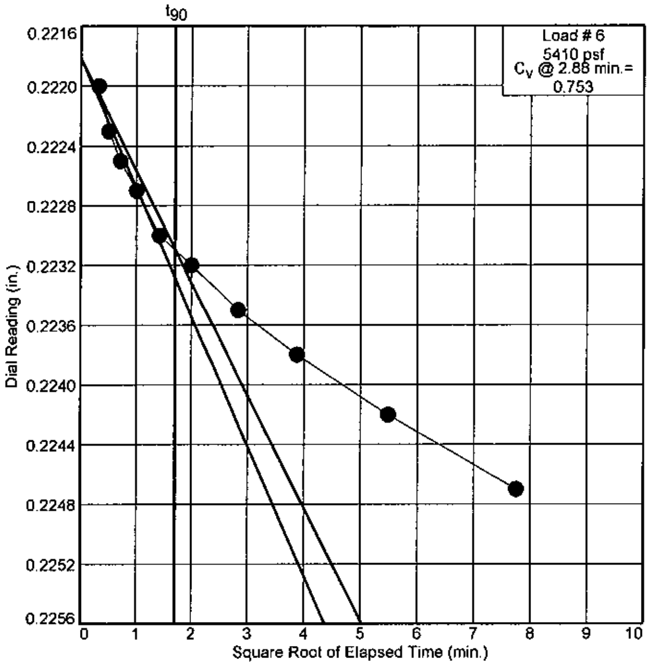
SOILS ENGINEERING, INC.

Figure B-4

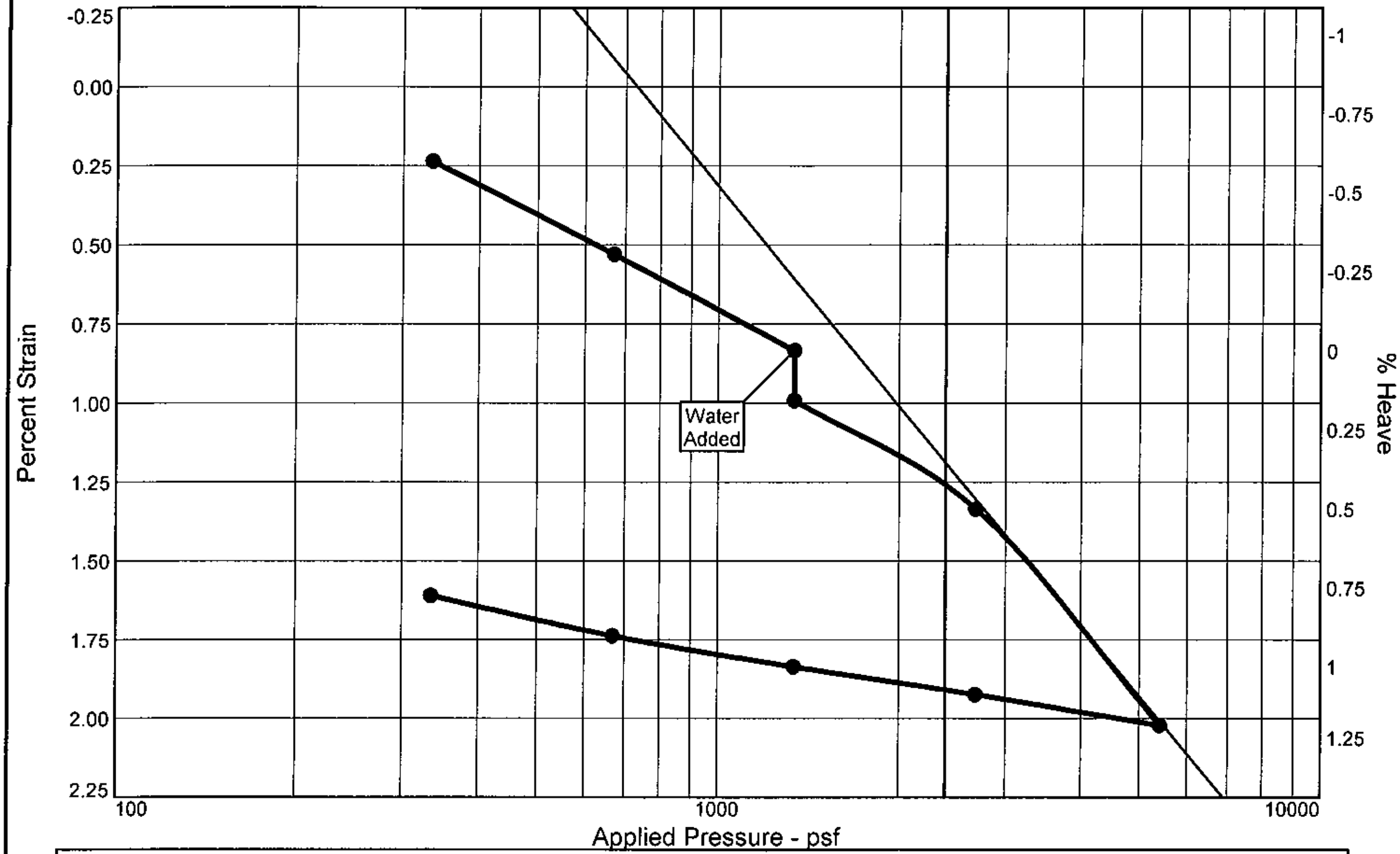
Dial Reading vs. Time

Project No.: 18248
Project: New BC Residence Hall

Source of Sample: B-8 Depth: 3'



CONSOLIDATION TEST REPORT



Coefficients of Consolidation and Secondary Consolidation											
No.	Load (psf)	C_v (ft.^{2}/day)	C_α	No.	Load (psf)	C_v (ft.^{2}/day)	C_α	No.	Load (psf)	C_v (ft.^{2}/day)	C_α
1	335	6.670									
2	670	0.263									
3	1340	6.595									
5	2680	0.810									
6	5410	1.213									

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.											
54.8 %	9.5 %	113.2	N/A	N/A	2.65	336	2631	0.03	0.00		-0.2	0.461

MATERIAL DESCRIPTION	USCS	AASHTO
POORLY GRADED SAND	SP	N/A

Project No. 18248 **Client:** Kern Community College District

Project: New BC Residence Hall

Source of Sample: B-10 **Depth:** 0.17'

Remarks:

Test Date: 12/20/21

SOILS ENGINEERING, INC.

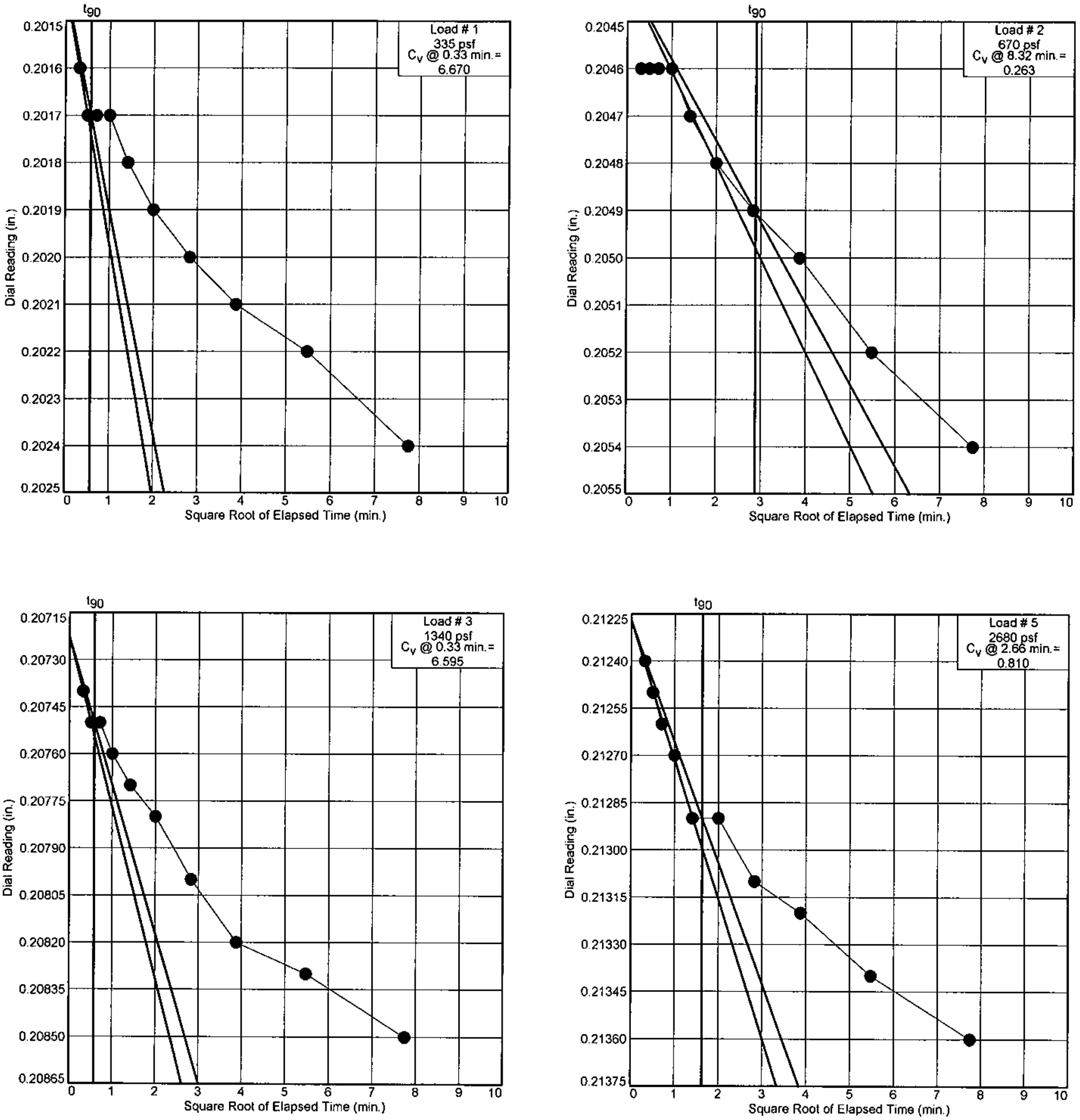
Figure B-5

Tested By: JA **Checked By:** AL

Dial Reading vs. Time

Project No.: 18248
Project: New BC Residence Hall

Source of Sample: B-10 Depth: 0.17'



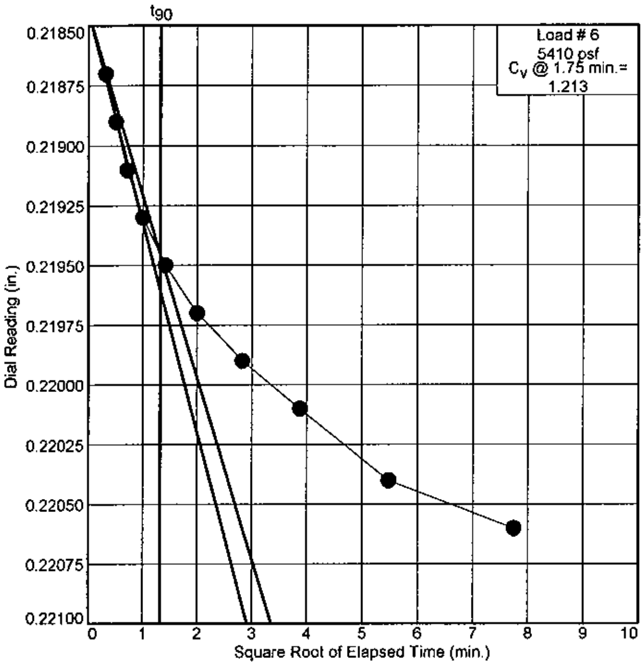
SOILS ENGINEERING, INC.

Figure B-5

Dial Reading vs. Time

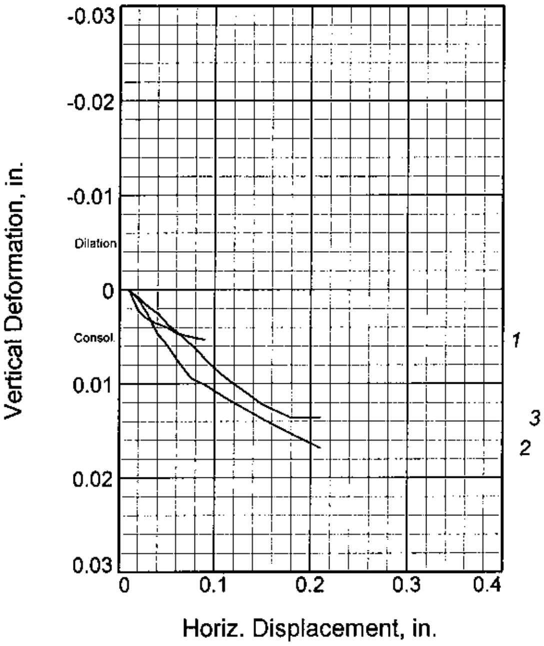
Project No.: 18248
Project: New BC Residence Hall

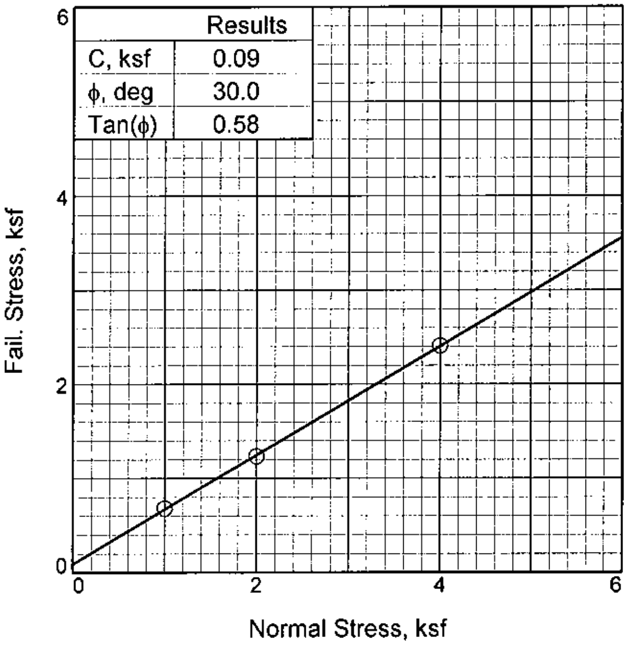
Source of Sample: B-10 Depth: 0.17'



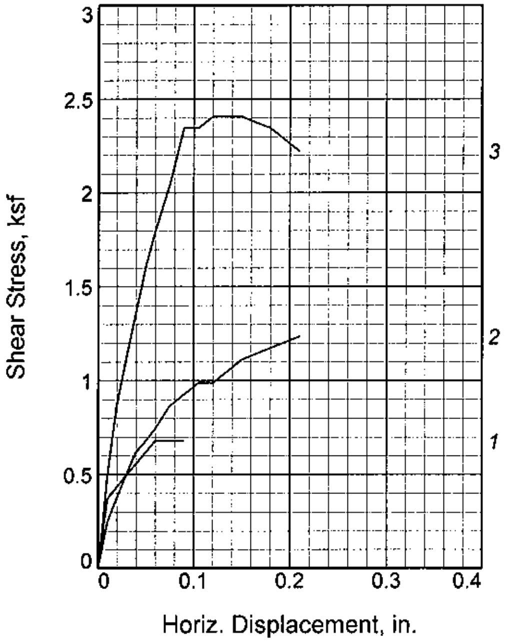
SOILS ENGINEERING, INC.

Figure B-5





Results	
C, ksf	0.09
ϕ, deg	30.0
Tan(ϕ)	0.58



	Sample No.	1	2	3
Initial	Water Content, %	8.8	9.0	9.3
	Dry Density, pcf	109.0	110.0	110.8
	Saturation, %	44.8	47.3	50.0
	Void Ratio	0.5184	0.5042	0.4936
	Diameter, in.	2.38	2.38	2.38
	Height, in.	1.00	1.00	1.00
At Test	Water Content, %	14.4	12.8	12.7
	Dry Density, pcf	109.0	110.0	110.8
	Saturation, %	73.8	67.4	68.4
	Void Ratio	0.5184	0.5042	0.4936
	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	1.24	2.41
	Displacement, in.	0.06	0.21	0.12
	Ult. Stress, ksf			
	Displacement, in.			
	Strain rate, in./min.	N/A	N/A	N/A

Sample Type: 2.5" x 6" TUBE

Description: SANDY CLAY; brown, low plasticity, fine, trace of gravel, medium dense.

LL= N/A **PI=** N/A

Assumed Specific Gravity= 2.65

Remarks: Test Date: 12/20/21

Figure C-1

Client: Kern Community College District

Project: New BC Residence Hall

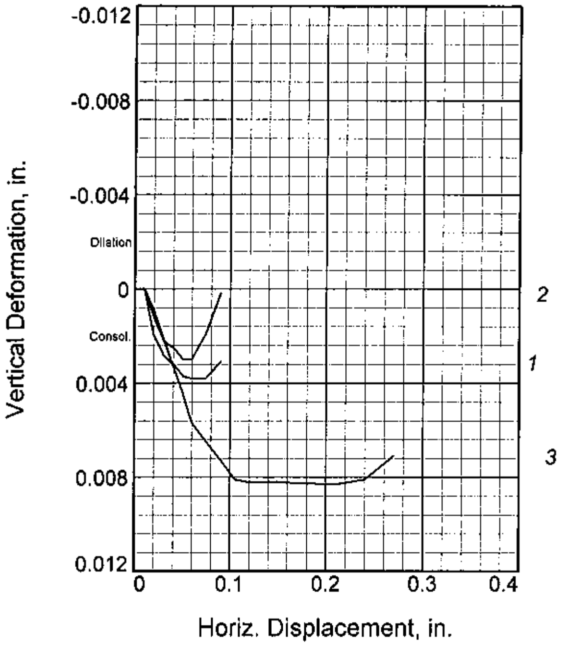
Source of Sample: B-2 **Depth:** 6'

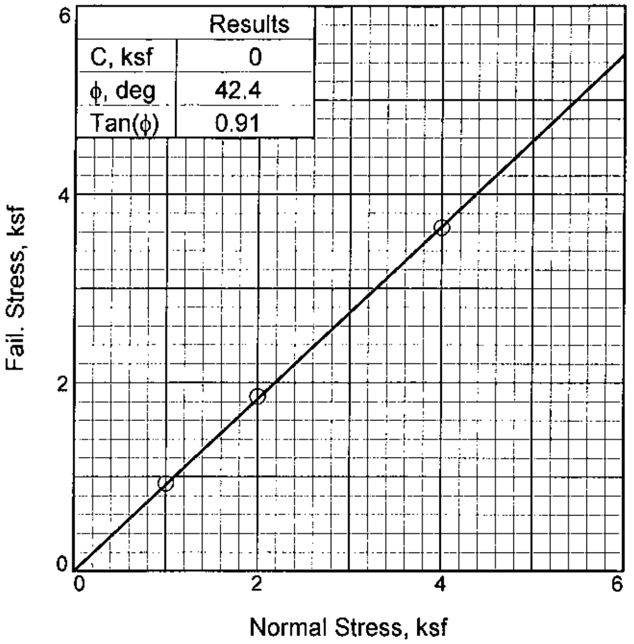
Proj. No.: 18248 **Date Sampled:** 12/06/21

DIRECT SHEAR TEST REPORT

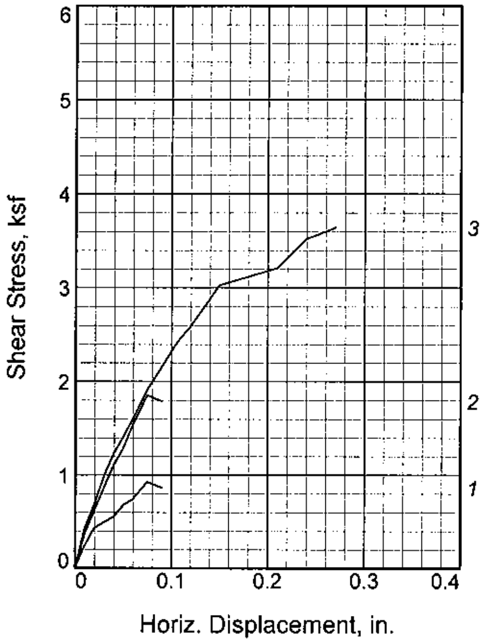
SOILS ENGINEERING, INC.

Tested By: JA **Checked By:** AL





Results	
C, ksf	0
φ, deg	42.4
Tan(φ)	0.91



Sample No.		1	2	3
Initial	Water Content, %	3.2	2.9	3.7
	Dry Density, pcf	118.2	119.5	110.5
	Saturation, %	21.2	19.9	19.9
	Void Ratio	0.3991	0.3840	0.4971
	Diameter, in.	2.38	2.38	2.38
	Height, in.	1.00	1.00	1.00
At Test	Water Content, %	13.0	12.5	13.2
	Dry Density, pcf	118.2	119.5	110.5
	Saturation, %	86.4	86.4	70.1
	Void Ratio	0.3991	0.3840	0.4971
	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		0.93	1.85	3.64
Displacement, in.		0.08	0.08	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: POORLY GRADED SAND; light yellowish brown, dry, non cohesive, gravel/

LL= N/A **PI=** N/A

Assumed Specific Gravity= 2.65

Remarks: Test Date: 12/20/21

Figure C-2

Client: Kern Community College District

Project: New BC Residence Hall

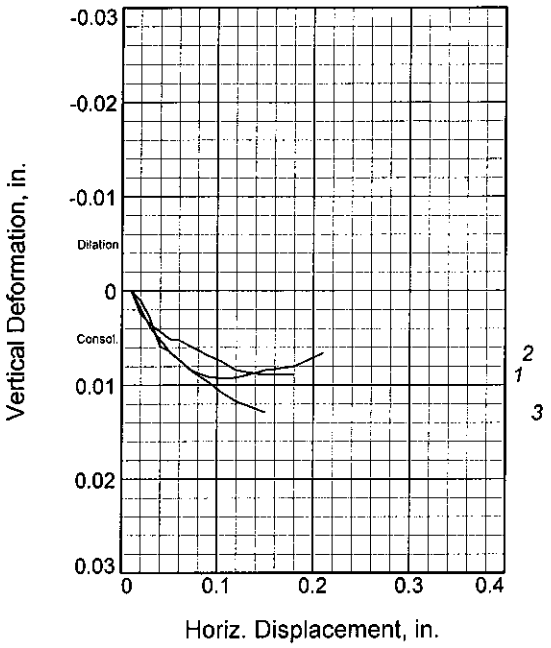
Source of Sample: B-6 **Depth:** 6'

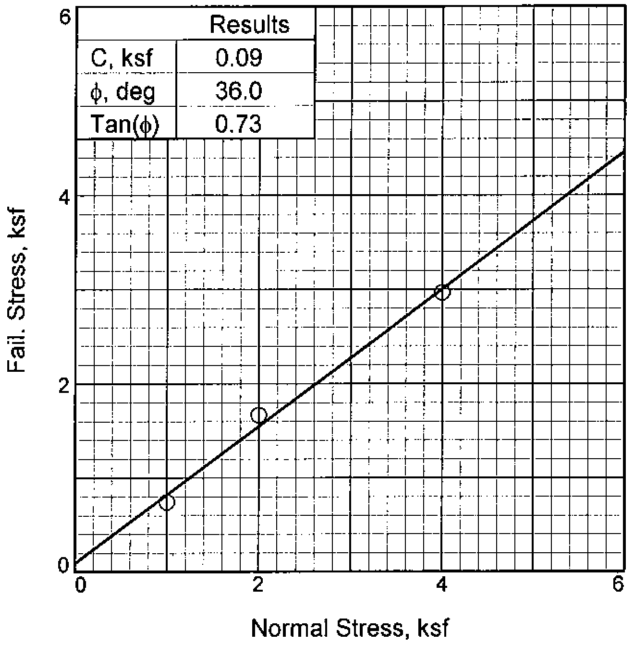
Proj. No.: 18248 **Date Sampled:** 12/07/21

DIRECT SHEAR TEST REPORT

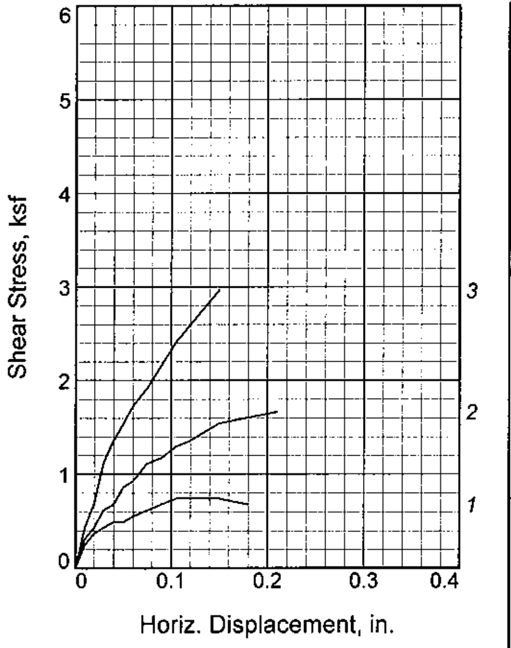
SOILS ENGINEERING, INC.

Tested By: JA **Checked By:** AL





	Results
C, ksf	0.09
ϕ, deg	36.0
Tan(ϕ)	0.73



	Sample No.	1	2	3
Initial	Water Content, %	5.1	5.4	5.3
	Dry Density, pcf	108.0	108.6	108.1
	Saturation, %	25.4	27.3	26.6
	Void Ratio	0.5317	0.5232	0.5305
	Diameter, in.	2.38	2.38	2.38
	Height, in.	1.00	1.00	1.00
At Test	Water Content, %	15.5	14.6	14.1
	Dry Density, pcf	108.0	108.6	108.1
	Saturation, %	77.4	73.8	70.3
	Void Ratio	0.5317	0.5232	0.5305
	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		0.74	1.67	2.96
Displacement, in.		0.11	0.21	0.15
Ult. Stress, ksf				
Displacement, in.				
Strain rate, in./min.		N/A	N/A	N/A

Sample Type: 2.5" x 6" TUBE
Description: CLAYEY SAND; yellowish brown, damp, low plasticity, fine, gravel/cobbles, dense.
LL= N/A **PI=** N/A
Assumed Specific Gravity= 2.65
Remarks: Test Date: 12/20/21

Figure C-3

Client: Kern Community College District

Project: New BC Residence Hall

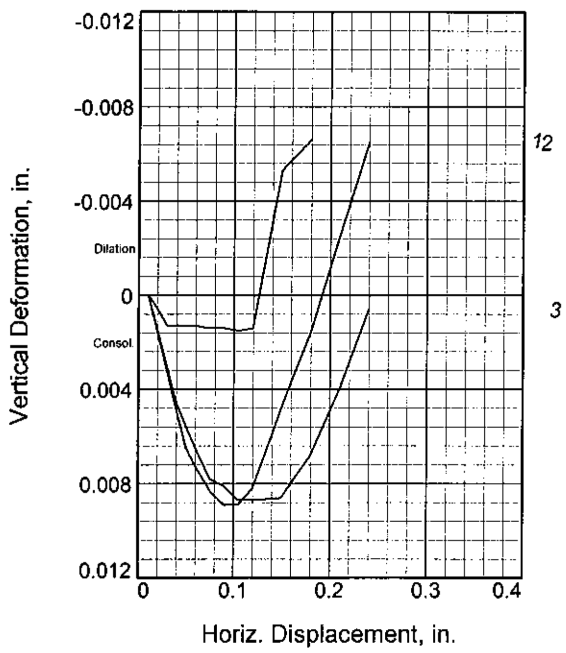
Source of Sample: B-9 **Depth:** 3'

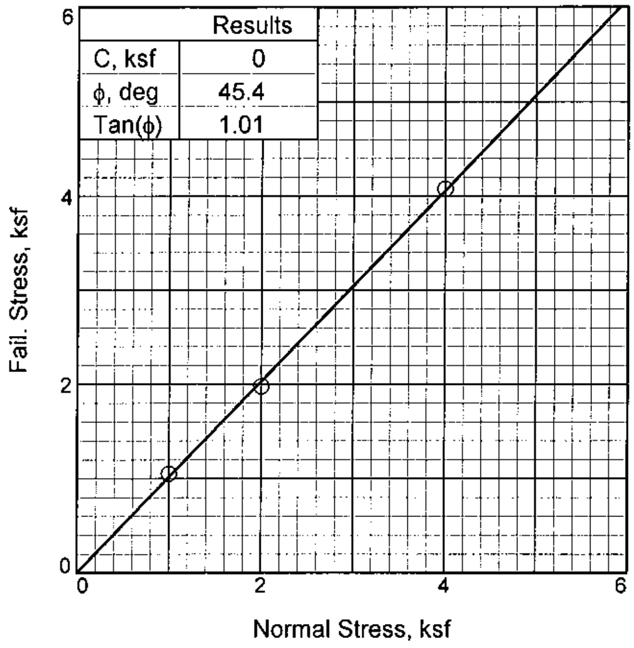
Proj. No.: 18248 **Date Sampled:** 12/07/21

DIRECT SHEAR TEST REPORT

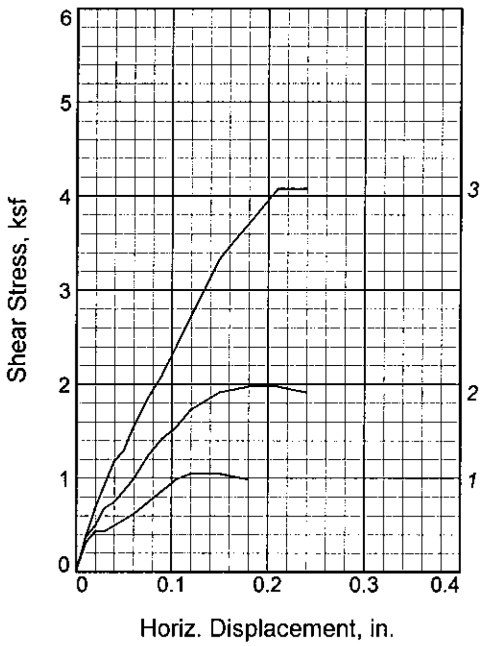
SOILS ENGINEERING, INC.

Tested By: JA





Results	
C, ksf	0
ϕ, deg	45.4
Tan(ϕ)	1.01



	Sample No.	1	2	3
Initial	Water Content, %	3.8	4.5	4.7
	Dry Density, pcf	111.4	110.4	109.8
	Saturation, %	20.7	24.0	24.6
	Void Ratio	0.4844	0.4983	0.5065
	Diameter, in.	2.38	2.38	2.38
	Height, in.	1.00	1.00	1.00
At Test	Water Content, %	14.6	14.8	14.5
	Dry Density, pcf	111.4	110.4	109.8
	Saturation, %	79.8	78.7	75.8
	Void Ratio	0.4844	0.4983	0.5065
	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		1.05	1.98	4.08
Displacement, in.		0.12	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, non cohesive, dry to damp.

LL= N/A **PI=** N/A

Assumed Specific Gravity= 2.65

Remarks: Test Date: 12/20/21

Figure C-4

Client: Kern Community College District

Project: New BC Residence Hall

Source of Sample: B-10 **Depth:** 6'

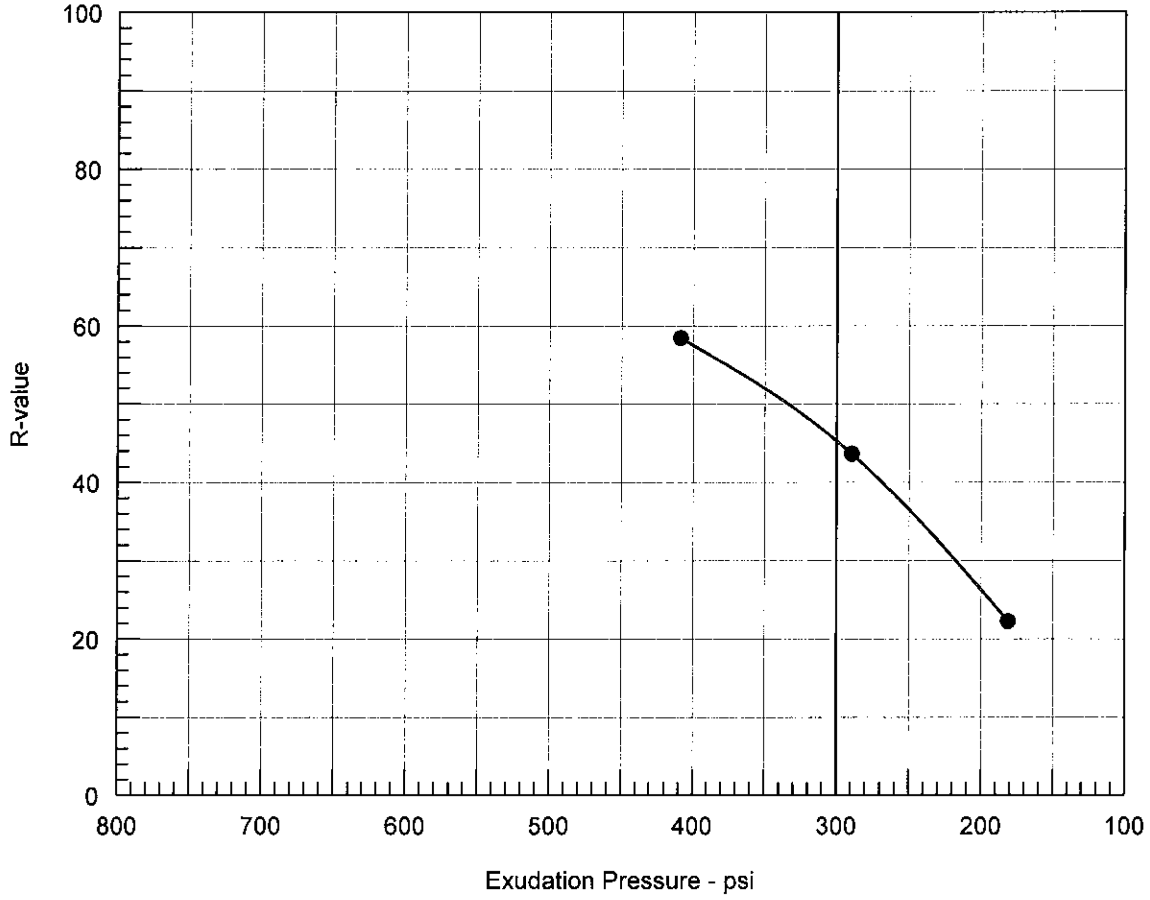
Proj. No.: 18248 **Date Sampled:** 12/07/21

DIRECT SHEAR TEST REPORT

SOILS ENGINEERING, INC.

Tested By: JA

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	150	130.3	6.8	0.00	46	2.46	409	58	58
2	100	133.1	7.9	0.00	63	2.44	290	45	44
3	60	126.6	8.9	0.00	102	2.49	181	22	22

Test Results	Material Description
R-value at 300 psi exudation pressure = 45	CLAYEY SAND; dark brown, cohesive, trace of gravel.

Project No.: 18248

Project: New BC Residence Hall

Location: R-1 @ 0-5'

Sample Number: 80411 **Depth:** 0-5'

Date: 12/27/2021

R-VALUE TEST REPORT

SOILS ENGINEERING, INC.

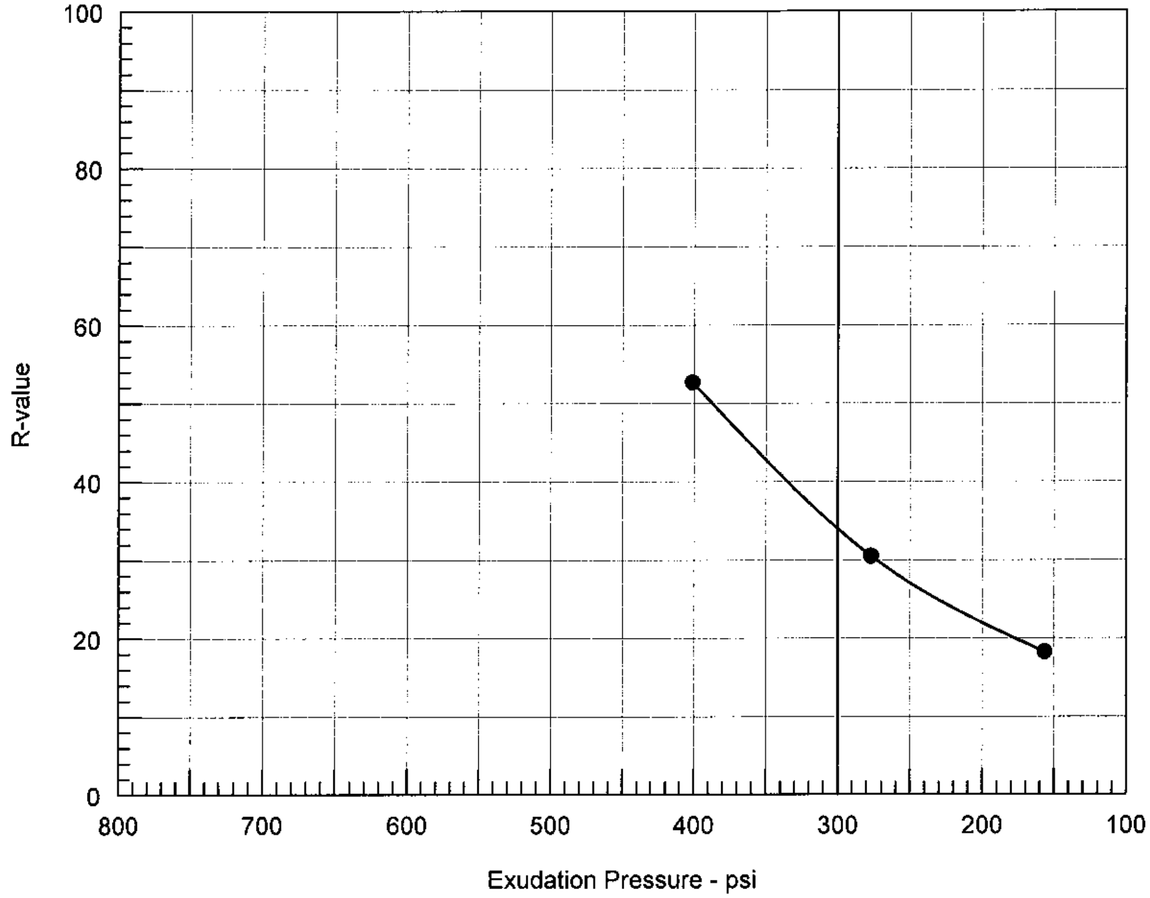
Tested by: RG

Checked by: AL

Remarks:
Test Date: 12/16/21

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	130	130.8	7.7	0.00	52	2.44	401	54	53
2	70	131.2	8.8	0.00	86	2.43	277	32	31
3	40	127.5	9.8	0.00	116	2.45	156	18	18

Test Results	Material Description
R-value at 300 psi exudation pressure = 34	CLAYEY SAND; dark brown, low plasticity, trace of gravel.

Project No.: 18248

Project: New BC Residence Hall

Location: R-2 @ 0-5'

Sample Number: 80412 **Depth:** 0-5'

Date: 12/27/2021

Tested by: RG

Checked by: AL

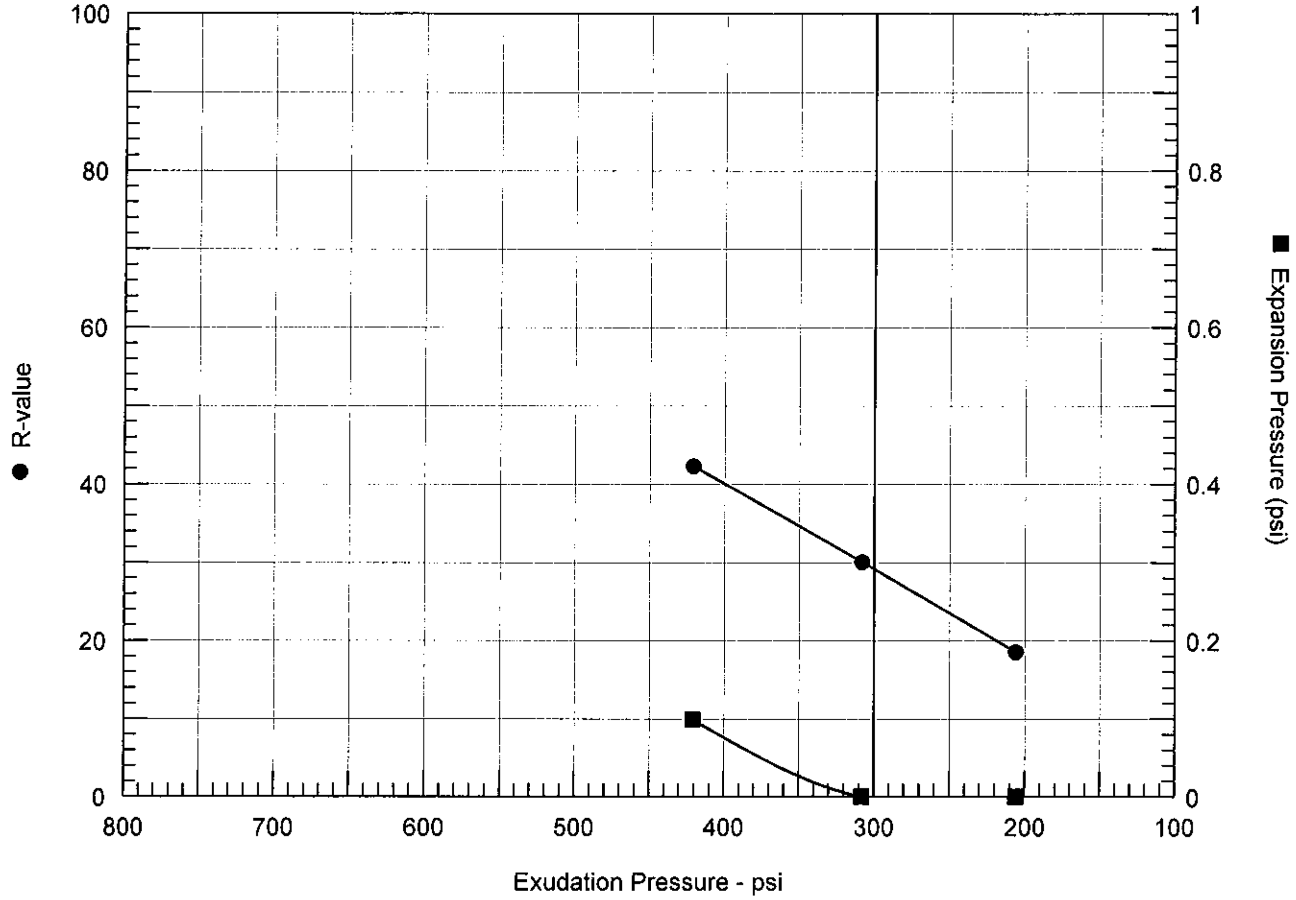
Remarks:
Test Date: 12/16/21

R-VALUE TEST REPORT

SOILS ENGINEERING, INC.

Figure D-2

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	110	129.1	8.3	0.10	68	2.44	421	44	42
2	70	129.2	9.3	0.00	91	2.50	308	30	30
3	40	126.4	10.4	0.00	111	2.47	206	19	19

Test Results	Material Description
R-value at 300 psi exudation pressure = 29 **Exp. pressure at 300 psi exudation pressure =** 0.00 psi	CLAYEY SAND; yellowish brown, low plasticity, trace of gravel.

Project No.: 18248
Project: New BC Residence Hall
Location: R-3 @ 0-5'
Sample Number: 80413 **Depth:** 0-5'
Date: 12/27/2021

Tested by: RG
Checked by: AL

Remarks:
Test Date: 12/16/21

R-VALUE TEST REPORT

SOILS ENGINEERING, INC.

Figure D-3

APPENDIX D

GEOLOGIC HAZARD STUDY

SEISMIC DESIGN INFORMATION
USGS Design Map Summary and Detail Report

EQFAULT
Version 3.00

California Fault Map

and Other Geologic Plates

GEOLOGICAL HAZARD STUDY

For

New Bakersfield College Residence Hall
NW of University Ave. & Mt. Vernon Ave.

in

Bakersfield, California

Prepared For:

Kern Community College District
2100 Chester Ave,
Bakersfield, CA 93301

File No. 21-18248

Prepared By:

Soils Engineering, Inc.
4400 Yeager Way
Bakersfield, CA. 93313

January 2022

Soils Engineering Inc.

January 5, 2022 File No. 21-18248

Kern Community College District
2100 Chester Ave,
Bakersfield, CA 93301

Subject: Geological Hazard Study
New Bakersfield College Residence Hall
NW of University Ave. & Mt. Vernon Ave.
in Bakersfield, CA

In accordance with your request and authorization, Soils Engineering, Inc. (SEI) has performed a Geological Hazards Study for the above described subject property in Bakersfield, California (site). This study was conducted in compliance with the California Code of Regulations, Title 24, Chapters 16, 18 and 33 of the 2019 California Building Code and per the California Education Code.

Our Geological Hazards Assessment indicates that there is a low probability for liquefaction to occur during a major earthquake at the site and that the maximum peak ground acceleration at the site would be 0.356g for a 6.3 magnitude earthquake on the Kern Front Fault approximately 7.1 kilometers away. The computer-modeling program Eqsearchwin estimated that a ground motion of 0.250g occurred from a 6.1 magnitude earthquake (likely aftershock) on the White Wolf Fault on July 29, 1952. The proposed structures should be built to withstand this magnitude of an earthquake and ground motions.

The site-specific design acceleration values to be utilized for the proposed improvements should be 0.687g for short periods (S_{Ds}) and 0.431g for the 1 second period (S_{D1}). The seismic design category is a D for both short and 1-second periods per the 2019 CBC.

In the event of a major earthquake, there is a very low potential for rock falls or landslides to impact the site. The site is located outside of the potential flood zone of an upstream disaster (dam failure). The estimated amount of total dynamic settlement that would occur at this site during a major earthquake is <0.5" and the differential settlement is <0.25". These estimated settlement values appear to be acceptable for the site.

No high-pressure natural gas pipelines or active high-pressure petroleum pipelines appear to be present within 1500' of the site that would be a threat to the site.

The nearest oil wells (dry holes) ever drilled are far enough away from the site that it is not likely that any significant subsurface oilfield related gases (hydrogen sulfide, methane etc.) are present beneath the site.

No further geological assessment or mitigation is recommended.

The accompanying report is an instrument of service of ***Soils Engineering, Inc.***. The report summarizes our findings and relates our opinions with respect to the potential for geological hazards to affect the site. Note that our findings and opinions are based on information that we obtained on given dates, through records review, site review, and related activities. It is possible that other information exists or subsequently has become known, just as it is possible for conditions we observed to have changed after our observation.

Soils Engineering, Inc. will be pleased to provide more information in this regard. Please call us for assistance at (661) 831-5100.

Sincerely,
SOILS ENGINEERING, INC.

ROBERT J. BECKER
No. 2238
Exp. Date 2/28/23

LOUIS THOMAS BAYNE
No. 000125

L. Thomas Bayne

Robert J. Becker, P.G. 5076, C.E.G. 2238
Expires 2/28/23

L. Thomas Bayne, GE 000125
President

Table of Contents

Geological Hazards Study

ATTACHMENTS

I. LIST OF ILLUSTRATIONS

Attachment A: Deterministic Site Parameters - EQFAULTWIN data, EQSEARCHWIN data, USGS Seismic Design Report SEAOC/OSHPD. USGS Unified Hazard Tool results.

Attachment B - Boring Logs, Lake Isabella Flood Inundation Map, Flood Insurance Rate Map, and Lab Results Table.

Soils Engineering Inc.

GEOLOGICAL HAZARD STUDY
For
Bakersfield College

Proposed New Residence Hall
Northwest of University Avenue and Mt. Vernon Avenue
in

Bakersfield, California
January 2022

1.0 Introduction

Soils Engineering, Inc. (SEI) has conducted a Geological Hazards Study for a proposed new Residence Hall on the Bakersfield College campus, located northwest of University Avenue and Mt. Vernon Avenue (site) in Bakersfield, California (see Location Map, Plate 1). The site location coordinates are approximately 35.405447º north, latitude, and -118.969431º west, longitude. The following is an Executive Summary of the investigation conducted in December 2021 and January 2022.

A site reconnaissance, which consisted of walking the property and evaluating the surrounding geological features, was conducted by SEI personnel in December 2021. The project site is located in the southwest corner of an existing parking lot for Bakersfield Colleges Memorial Stadium, as shown on Plate 2. The surrounding area is residential to the south and east and a continuation of the Bakersfield College campus to the north and west.

2.0 Geology and Hydrology

2.1 Geologic Setting

The site has generally flat relief with a slight slope to the southwest. The project site rests on Quaternary Pliocene-Pleistocene deposits (QPc) within the southern portion of the San Joaquin Valley. See the attached Geologic Map (Plate 2A), as interpreted from on-site soil borings and the Bakersfield Sheet of the Geologic Map of California (Smith, Department of Conservation Division of Mines and Geology (CDMG), 1964) and the 2010 Geologic Map of California (CDMG). Active faults within 50 miles are presented below:

Fault	**Distance From Site**			
Kern Front	4.4	miles/	7.1	kilometers
White Wolf	17.7	miles/	28.5	Kilometers
Pleito Thrust	27.9	miles/	44.9	Kilometers
Garlock (West)	36.9	miles/	59.4	Kilometers
San Andreas – Whole M-1a 1857 Rupture, Carrizo, Cho-Moj	39.4	miles/	63.4	kilometers
Big Pine	40.4	miles/	65	Kilometers
San Gabriel	48.1	miles/	77.4	Kilometers

The site is not located within an Alquist-Priolo Special Study Zone (Earthquake Fault Zone), and the Seismic Hazard Atlas map of the Oilcenter Quadrangle shows no active faults near the site (Plate 3). Nearby active faults are shown on the 2010 Fault Activity Map of California (CDMG, 2010) within the general area of the site (Plate 5A) and on the EQFault California Fault Map (Plate 5).

Near surface soils within the zone of influence of future developments consist of interbedded clayey sand, sandy clay, silty sand and sand layers with cobbles overlying bedrock. These sediments were derived in the Sierra Nevada Mountains to the east of the site and deposited by local drainage and the meandering Kern River.

2.2 Surface Lithology

Earth materials identified in the ten (10) onsite soil borings (B-1 to B-10) conducted in December 2021, consisted generally of intervals of Clayey Sand (SC), Sandy Clay (CL) and Silty Sand (SM) in the top 5 feet to 10 feet below ground surface (bgs) which was underlain by a Poorly Graded Sand (SP) with cobbles to the total depth achieved (up to 17') where auger refusal occurred. These soils are classified as SC, CL, SM and SP respectively, in the Unified Soils Classification System. No groundwater was encountered in the borings advanced to a depth of 17'. See attached boring logs included in Appendix B for more detail along with Plate 2B showing a cross-section A to A' between the deeper borings.

2.3 Hydrology

Unconfined Aquifer - The depth to the unconfined aquifer as shown on maps provided on the State SGMA Data Viewer indicates depth to water of 205' in the Spring of 2021 and 110' in the Spring of 2012 near the site. Historical depth to water data (Department of Water Resources (DWR) database and KCWA maps) indicates that the depth to groundwater has been >50' since at least the 1950's within 1-mile of the site. See Plate 4 for a Depth to Water Map.

Perched Water, Ground Water or Seepage – No shallow ground water on the site is shown on Kern Water Agency groundwater maps, dated Summer 2011. The Seismic Hazard Atlas map of the Oilcenter Quadrangle does not show any shallow groundwater within 1-mile of the site. No groundwater was encountered in any of the soil borings conducted at the site to a depth of 17'. See Appendix B for boring logs.

3.0 Seismic and Fault Hazards

3.1 Seismic History

There have been a number of historic earthquakes that may have affected the Bakersfield area. The following is a short summary of the major known events:

- 1/9/1857 - Fort Tejon Earthquake - San Andreas Fault, Estimated Magnitude 8.2+, 30 feet of slippage over a 200 mile area, widespread damage.

- 7/21/1952 - Arvin/Tehachapi - White Wolf Fault, Magnitude 7.7, extensive damage to buildings and highways.

- 8/22/1952 - Bakersfield Quake (Aftershock of Arvin/Tehachapi) - 6 miles ESE of Bakersfield, Magnitude 5.8. Closest aftershock to Bakersfield causing extensive damage to already weakened buildings. Multiple surface fissures were created from the 1952 earthquakes.

SEI utilized the software program EQSEARCHWIN version 3.0 (Thomas F. Blake) to evaluate historical earthquakes in the area of the site over the last 200 years. The Earthquake Epicenter Map (Plate 3A) shows earthquake magnitudes and the epicentral distance from the site. The majority of the seismic activity in the area of the site has been along the White Wolf Fault and the San Andreas Fault. The closest earthquake of at least 5.0 magnitude to the site was 9.3 kilometers away, at a magnitude of 5.8 in August 1952. The largest magnitude earthquake within 100 miles was 7.9 on the San Andreas Fault in 1857. The largest estimated site acceleration is 0.250g from a 6.1 magnitude earthquake (likely aftershock) on the White Wolf Fault on July 29, 1952. The EQSEARCHWIN estimation of Peak Acceleration from California Earthquake Catalogs Table, Earthquake Recurrence Curve, Earthquake Epicenter Map and a graph of the Number of Earthquakes (N) above Magnitude (M) are presented in Appendix A.

3.2 Seismic Evaluation

The site is located within the Oilcenter Quadrangle in the southeastern ¼ of the northeastern ¼ of Section 16, Township 29 South, Range 28 East and is not located in an Alquist-Priolo special studies zone (California Fault Zone). Local faults and general geology are shown on Oilcenter Quadrangle, Seismic Hazard Atlas Maps prepared for the Kern County Council of Governments (Plate 3).

The nearest active fault, as indicated by the computer-modeling program EQFault version

3.0, is the Kern Front Fault, which is approximately 7.1 km to the north. The White Wolf Fault is approximately 28.5 kilometers to the south, southeast of the site. The Pleito Thrust is located approximately 44.9 kilometers south, southwest of the site. The Garlock Fault (west) is approximately 59.4 kilometers south, southeast of the site, and the San Andreas Fault (1857 Rupture, Whole M-la, Cho-Moj and Carrizo) is approximately 63.4 kilometers to the west. The Big Pine Fault is approximately 65 kilometers to the southwest and the San Gabriel Fault is approximately 77.4 kilometers to the southeast. Regional faults in relation to the site location are presented on Plate 5A and are from the 2010 Fault Activity Map of California (CDMG, 2010).

3.3 Seismic Design

Per the 2019 California Building Code (CBC) and American Society of Civil Engineers (ASCE) 7-16 Section 20.3, and local knowledge the site is classified as Site Class D. Utilizing the USGS and ASCE 7-16 seismic design methodologies the following seismic design values were determined.

SEISMIC DESIGN CRITERIA		**VALUE**	**SOURCE**
Risk Category		**III**	2019 CBC Table 1604.5 or 1604A.5
Site Class		**D**	2019 CBC §1613.2.2 or 1613A.2.2; ASCE 7-16 Table. 20.3-1; Site Specific Soils Report, and local knowledge.
Mapped MCER Spectral Response Acceleration, short period	**S_S**	**0.906g**	SEAOC-OSHPD software; 2019 CBC Figure 1613.2.1(1)
Mapped MCER Spectral Response Acceleration, at 1-sec. Period	**S_1**	**0.326g**	SEAOC-OSHPD software; 2019 CBC Figure 1613.2.1(2)
Site Coefficient	**F_a**	**1.137**	SEAOC- OSHPD software; 2019 CBC Table 1613.2.3(1) or 1613A.2.3(1)
Site Coefficient	**F_v***	**1.975***	2019 CBC Table 1613.2.3(2) or 1613A.2.3(2)
Adjusted MCER Spectral Response Acceleration, short period, F_a * S_s	**S_{MS}**	**1.031g**	SEAOC- OSHPD software; 2019 CBC §1613.2.3 or 1613A.2.3
Adjusted MCER Spectral Response Acceleration, 1-sec. period, F_v * S_1	**S_{M1}***	**0.644g***	2019 CBC §1613.2.3 or 1613A.2.3
Design Spectral Response Acceleration, short period, 2/3 * S_{MS}	**S_{DS}**	**0.687g**	SEAOC- OSHPD software; 2019 CBC §1613.2.4 or 1613A.2.4
Design Spectral Response Acceleration, 1-sec. period, 2/3 * S_{MI}	**S_{D1}***	**0.431g***	2019 CBC §1613.2.4 or 1613A.2.4
Peak Ground Acceleration for Max. Considered Earthquake (MCEG)	**PGA**	**0.392g**	SEAOC- OSHPD software; ASCE 7-16 Fig 22-9
Site Coefficient, F_{PGA} = 1.208 F_{PGA}* PGA	**PGA_M**	**0.474g**	SEAOC- OSHPD software; ASCE 7-16 §11.8.3.2
Mapped Risk Coefficient at 0.2 second Spectral Response Period	**C_{RS}**	**0.925**	SEAOC- OSHPD software; ASCE 7-16 Figure 22-18A

SEISMIC DESIGN CRITERIA		**VALUE**	**SOURCE**
Mapped Risk Coefficient at 1 second Spectral Response Period	C_{R1}	**0.922**	SEAOC- OSHPD software; ASCE 7-16 Figure 22-19A
Seismic Design Category, short period		**D**	2019 CBC §1613.2.5
Seismic Design Category, 1second period *		**D***	2019 CBC §1613.2.5
MCER = Maximum Considered Earthquake (risk targeted) MCEG = Maximum Considered Earthquake (geometric mean)			
** The project designer shall confirm that a ground motion hazard analysis is not required in accordance with ASCE 7-16 §11.4.8-Exception 2. The values tabulated above for S_{M1}, S_{D1}, and the Seismic Design Category/1-second period are based on the site coefficient, F_v, interpolated from 2019 CBC Table 1613.2.3(2) or 1613A.2.3(2). The use of that table is predicated on the above referenced Exception 2 being applicable for the site and the structure(s). Where the above referenced Exception 2 does not apply, the values for F_v, S_{M1}, S_{D1}, and for the Seismic Design Category/1-second period may not be applicable for the site and structure(s).*			

See attached SEAOC/OSHPD seismic design data in Appendix A.

3.4 Seismology & Calculation of Earthquake Ground Motion

A ground motion hazard analysis is not required for this site in accordance with ASCE 7-16 §11.4.8-Exception 2. Therefore, a site-specific ground motion analysis was not conducted for this site. The above seismic design information in Section 3.3 will be utilized for this project.

3.5 Possible Earthquake Effects

A number of active faults are located within a 50-mile radius of the subject site. To evaluate the affect a major earthquake might have on the site, the computer modeling programs EQFaultwin vers. 3.0 (Thomas Blake) were utilized. Site-specific parameters were inputted and the programs computed the maximum peak site ground accelerations resulting from an earthquake. Because ground accelerations are based largely on fault distance and magnitude, we have focused our analysis on those faults which are close to the site, or that have large maximum credible magnitudes, or a combination of the two. The result of this analysis is presented below in Table A.

TABLE A

FAULT	Approximate Distance (Km)	Maximum Earthquake Magnitude (Mw)	Maximum Peak Ground Acceleration	Estimated Site Intensity (MM)
Kern Front	**7.1**	6.3	**0.356**	**IX**
White Wolf	28.5	7.3	0.243	**IX**
Pleito Thrust	44.9	7.0	0.147	VIII
Garlock (West)	59.4	7.3	0.114	VII
San Andreas (1857 Rupture, Whole M-1a, Carrizo M-1c-2, Cho-Moj M-1b-1)	63.4	7.2 to **8.0**	0.114 to 0.157	VII to VIII
Big Pine	65	6.9	0.086	VII
San Gabriel	77.4	7.2	0.088	VII

This analysis estimates that a maximum peak ground acceleration of 0.356g would be felt at the site as a result of a maximum earthquake of magnitude 6.3 on the Kern Front Fault approximately 7.1 kilometers away. A maximum probable earthquake of magnitude 7.3 on the White Wolf Fault approximately 28.5 kilometers away would create a peak site ground acceleration of 0.243g at the site. See attached Deterministic Site Parameters for a full listing of computed values for faults within a 100-mile radius of the site in Appendix A. Also attached is a California Fault Map showing nearby faults in relationship to the site (Plate 5).

Utilizing the USGS Unified Hazard Tool program the Probabilistic Seismic Hazard Deaggregation for the Site was calculated to be 0.513g for a 2% chance every 50 years of exceedance. See Appendix A for this calculation results page.

3.6 Potential For Ground Rupture, Ground Shaking, Ground Failure

Ground rupture may occur along a fault trace in a major earthquake. It is unlikely that ground rupture could occur at this site since it is not located within 500 feet of a suspected active fault. Some ground shaking is likely at this site in the event of a major earthquake on one of the nearby faults. Based on the predicted maximum horizontal accelerations at the site and the soil types identified in this investigation ground failure is highly unlikely at this site.

3.7 Potential for Earthquake-Induced Flooding and Flood Zone

The potential for earthquake-induced flooding at the site appears to be low since groundwater has been historically over 50' below the ground surface. The site is located within flood Zone X with minimal potential flooding according to the Flood Insurance Rate Map covering the site area (see Appendix B for map). The Lake Isabella Dam Flood Plain & Dam Inundation Area Map for the Bakersfield Area indicates the site is outside of the flood area (see Appendix B for map).

Repair and improvement to the Lake Isabella Dam by the Army Corps of Engineers is in the planning/approval stages and construction is started in 2018 to further lessen the potential for a major dam release. The amount of water that is stored in the lake is also restricted until these repairs are complete. The proposed improvements will have a detailed Emergency Response Plan prepared which will include protocols for responses to earthquakes, flooding, fire and other hazards.

3.8 Liquefaction Potential

No groundwater was encountered in the recent geotechnical soil borings conducted on-site to depths as great as 17' bgs. The unconfined aquifer is not shown to be less than 50 feet below ground surface at the site based on current and historical information from the Kern County Water Agency and the DWR database. SPT and SPT Equivalent blowcounts in the 10 SEI soil borings ranged from 4 to 95 blowcounts per foot to a maximum depth achieved of 17' where refusal occurred. The lithology encountered in the subsurface includes multiple silty sand, clayey sand, sandy clay and sand with cobbles layers in the borings.

For liquefaction to occur at a site during a major earthquake a number of physical features need to be present. These include:

1. Shallow groundwater, generally within the top 50' from the surface.
2. Loose sandy or silty material present.
3. Strong ground-shaking.

This site does not have shallow groundwater or loosely compacted material present so the potential for liquefaction to occur at this site is minimal.

3.9 *Slope Stability*

The site is located in an area with <0.5 percent slopes across the site. No bedrock outcrops are present within 1/2 mile of the site. No evidence of historic landslides or creep was observed in this area. There is a very low potential for rockfalls or landslides to impact the site in the event of a major earthquake. Overall, the site appears to be stable

3.10 *Settlement*

The estimated amount of dynamic settlement that would occur at this site during a major earthquake is <0.5" based on the lithology encountered and the SPT blowcounts recorded during sampling. The estimated amount of differential settlement is <0.25". These settlement values appear to be acceptable for the proposed development.

3.11 Expansive Soil and Hydrocollapse Potential

Based on the lithology encountered in the top 10 feet in the soil borings it appears unlikely that highly expansive surface soils will be present at this site. Three (3) expansion index (EI) tests were conducted on samples of the top 5' with the EI results ranging from 0 to 39. Four (4) consolidation tests were conducted on samples from 3' and with the result ranging from -0.7% to 0.2%. This indicates a low potential for Hydrocollapse to occur. See Lab Result Table in Appendix B for more detail.

The City of Bakersfield Safety Element includes a discussion on land subsidence potential in the Bakersfield area. The main causes of land subsidence are Tectonic Subsidence, Oil & Gas Fluid Extraction, Groundwater Withdrawal and Hydrocompaction of Moisture Deficient Alluvial Deposits. Figure 15 in the Safety Element shows the areas of significant subsidence within the Bakersfield area. The proposed improvements are located outside the area where the lowest amount of historic land subsidence has occurred and outside of the area of hydrocompaction as shown on attached Plate 7. In addition, the site is in an area where oil & gas activity is minor, agricultural use is decreasing and no public water wells are present nearby so groundwater withdrawal appears to be limited. Based on this information it appears that regional subsidence should not be an issue at this site requiring any special mitigation or requirements.

4.0 High-Pressure Pipelines & Hazardous Materials

4.1 High-Pressure Pipelines

According to field observations and representatives of Pacific Gas & Electric, The Gas Company and a review of the National Pipeline Mapping System, there are no high-pressure natural gas pipelines or petroleum pipelines within 1500' of the project site.

4.2 Hazardous Materials

The site is currently a paved parking lot with no known or suspected hazardous materials present.

The nearest oil wells ever drilled are over ½-mile away (see Plate 6). The site is not located within a known Oil Field. It is also not likely that any significant subsurface oilfield related gases (hydrogen sulfide, methane etc.) would be present beneath the site.

5.0 Conclusions & Recommendations

Our Geological Hazards Assessment indicates that there is a low probability for liquefaction to occur during a major earthquake at the site and that the maximum peak ground acceleration at the site would be 0.356g for a 6.3 magnitude earthquake on the Kern Front Fault approximately 7.1 kilometers away. The computer-modeling program Eqsearchwin estimated that a ground motion of 0.250g occurred onsite from a 6.1 magnitude earthquake (likely aftershock) on the White Wolf Fault on July 29, 1952. The proposed structures should be built to withstand this magnitude of an earthquake and ground motions.

The site-specific design acceleration values to be utilized for the proposed improvements should be 0.687g for short periods (S_{Ds}) and 0.431g for the 1 second period (S_{D1}). The seismic design category is a D for both short and 1-second periods per the 2019 CBC.

In the event of a major earthquake, there is a very low potential for rock falls or landslides to impact the site. The site is located outside of the potential flood zone of an upstream disaster (dam failure). The estimated amount of total dynamic settlement that would occur at this site during a major earthquake is <0.5" and the differential settlement is <0.25". These estimated settlement values appear to be acceptable for the site.

No high-pressure natural gas pipelines or active high-pressure petroleum pipelines appear to be present within 1500' of the site that would be a threat to the site.

The nearest oil wells (dry holes) ever drilled are far enough away from the site that it is not likely that any significant subsurface oilfield related gases (hydrogen sulfide, methane etc.) are present beneath the site.

No further geological assessment or mitigation is recommended.

5.0 Attachments

5.1 Location Map- Plate 1, "Location Map" shows the location of the site with relationship to roads and land features**.**
5.2 Plot Plan - Plate 2, "PLOT PLAN" shows the location and lot configuration of the property.
5.2.1 Plate 2A, Geologic Map shows the site geology related to local topography, streets and nearby surficial features.
5.2.2 Plate 2B, Geologic Cross-Section A to A', shows the subsurface lithology encountered in some of the soil borings at the site.
5.3 Seismic Hazard Atlas Map- Plate 3A, Shows local geology and faults within the Oilcenter Quadrangle near the site.

5.3.1 Earthquake Epicenter Map - Plate 3, Shows the site location on an earthquake epicenter map of historical earthquakes with magnitudes >5.0, from the Eqsearchwin computer modeling program.

5.4 Depth To Groundwater Map - Plate 4, Shows the site location in relation to a Depth To Water Map of the regional area presented on the SGMA data Viewer.

5.5 Fault Location Map- Plate 5, Shows the site in relation to the nearest active faults within 100 miles based on the EQFault program.

5.5.1 Plate 5A shows the Regional Faults based on the Fault Activity Map of California 2010.

5.6 CalGEM Oil Well Map - Plate 6, Shows the site in relation to the nearest oil wells drilled near the site.

5.7 Plate 7, Regional Land Subsidence Map – Shows the site location on a Map that presents the areas of known regional subsidence and hydrocompaction in the Bakersfield area.

5.8 Appendix A - Deterministic Site Parameters - EQFAULTWIN data determined for the site for faults within 100 miles. EQSEARCHWIN data concerning the distance and magnitude of earthquakes within 100 miles of the site is attached. SEAOC/ OSHPD seismic design data and the USGS Unified Hazard Tool results are attached.

5.9 Appendix B - Presents the Boring Logs, the Flood Inundation Map for Lake Isabella, the Flood Insurance Rate Map, and the Lab Result Table.

6.0 References

- Water Supply Reports, Kern County Water Agency, Bakersfield, California, 1983 to 2020.
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- LiquefyPro (version 5.9b), CivilTech Software.
- CalGEM, Online Mapping System.
- Blake, Thomas, Empirical Prediction of Earthquake Induced Liquefaction Potential.
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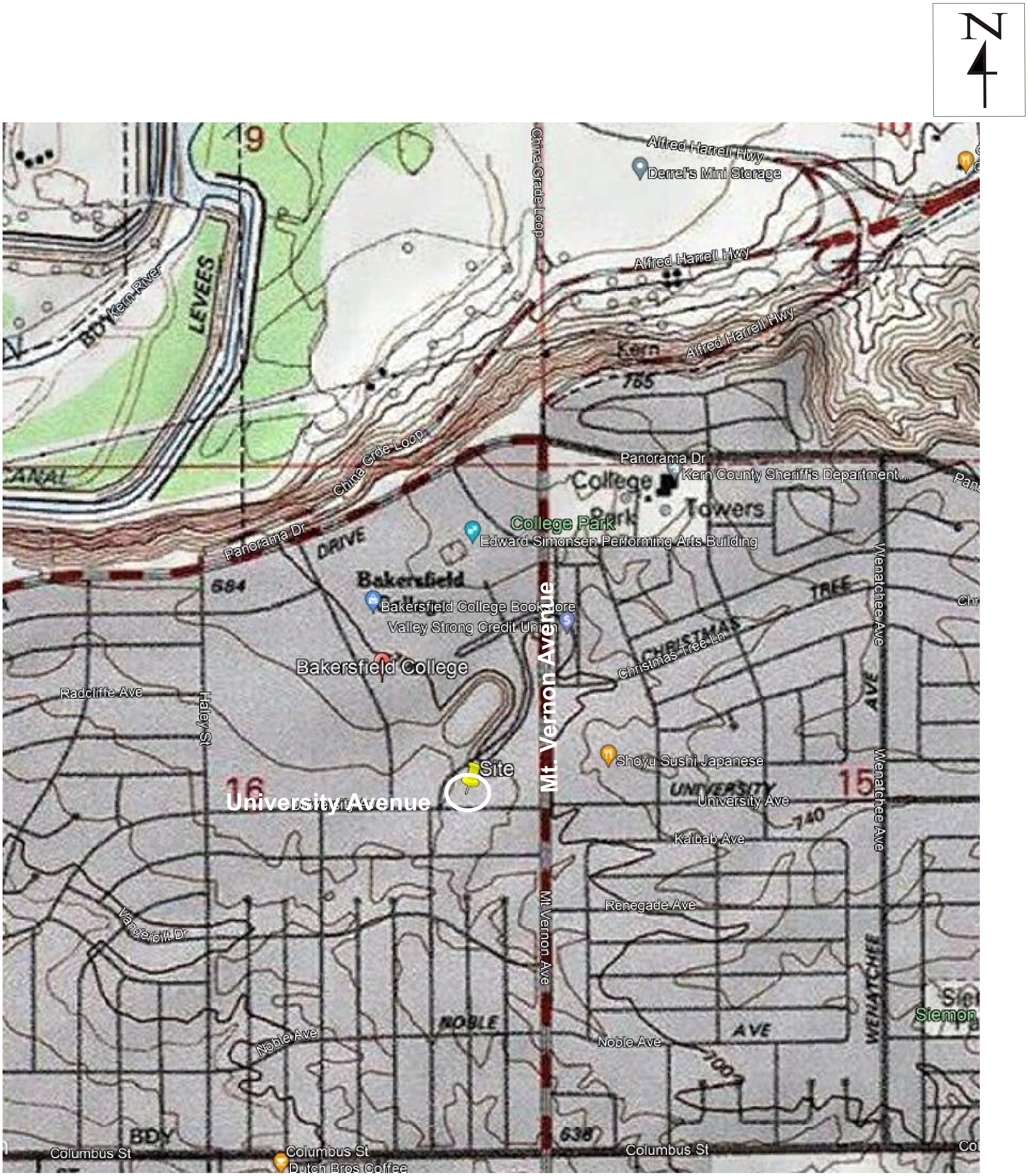
- Department of Water Resources, Groundwater Data Module, web page: http://wdl.water.ca.gov/gw/admin/main_menu_gw.asp

- SGMA Data Viewer:
  https://sgma.water.ca.gov/webgis/?appid=SGMADataViewer#gwlevels
- National Pipeline Mapping System – Public Viewer:
  https://pvnpms.phmsa.dot.gov/PublicViewer/



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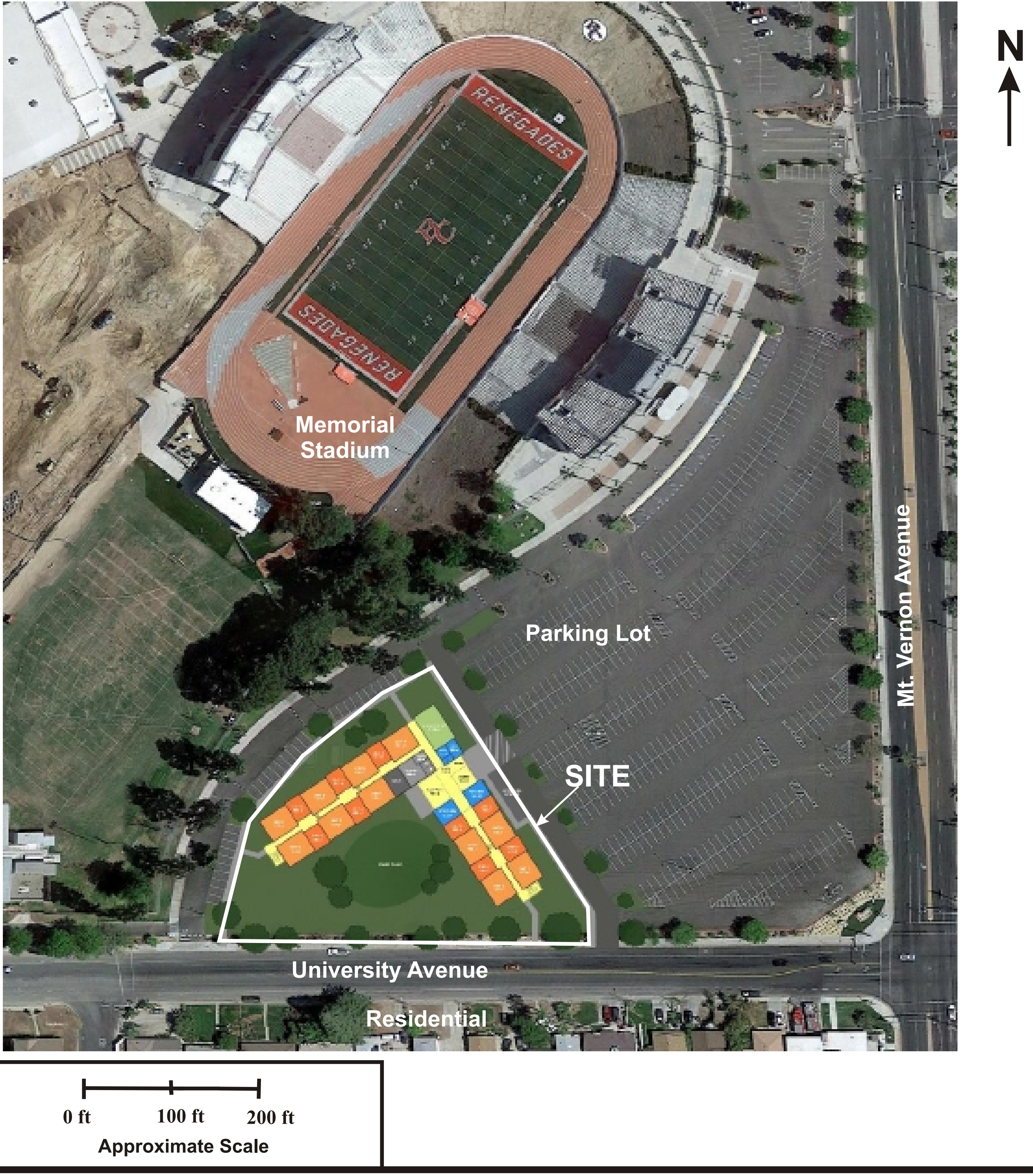
PROJECT: #18248

Bakersfield College New Residence Hall
NW of University Ave. & Mt. Vernon Ave.
Bakersfield, CA

Location Map

PLATE

1



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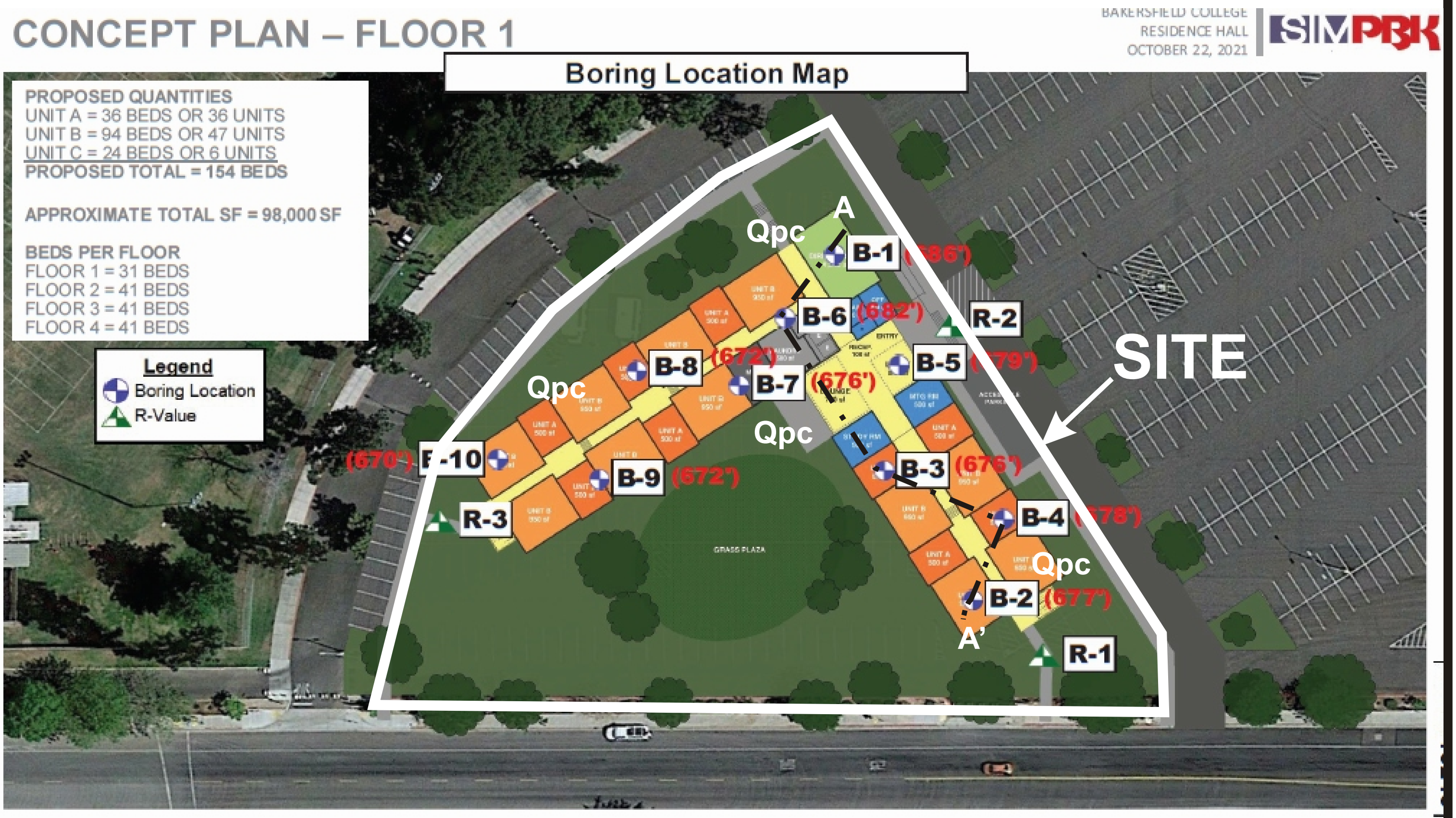
Plot Plan

PLATE
2



Cross-Section Line A- A' (see Plate 2B)

0 ft 100 ft 200 ft

Approximate Scale

QPc = Quarternary Alluvium
(Pliocene-Pleistocene):
Sandy Clay, Clayey Sand,
Silty Sand, Sand, and Cobbles

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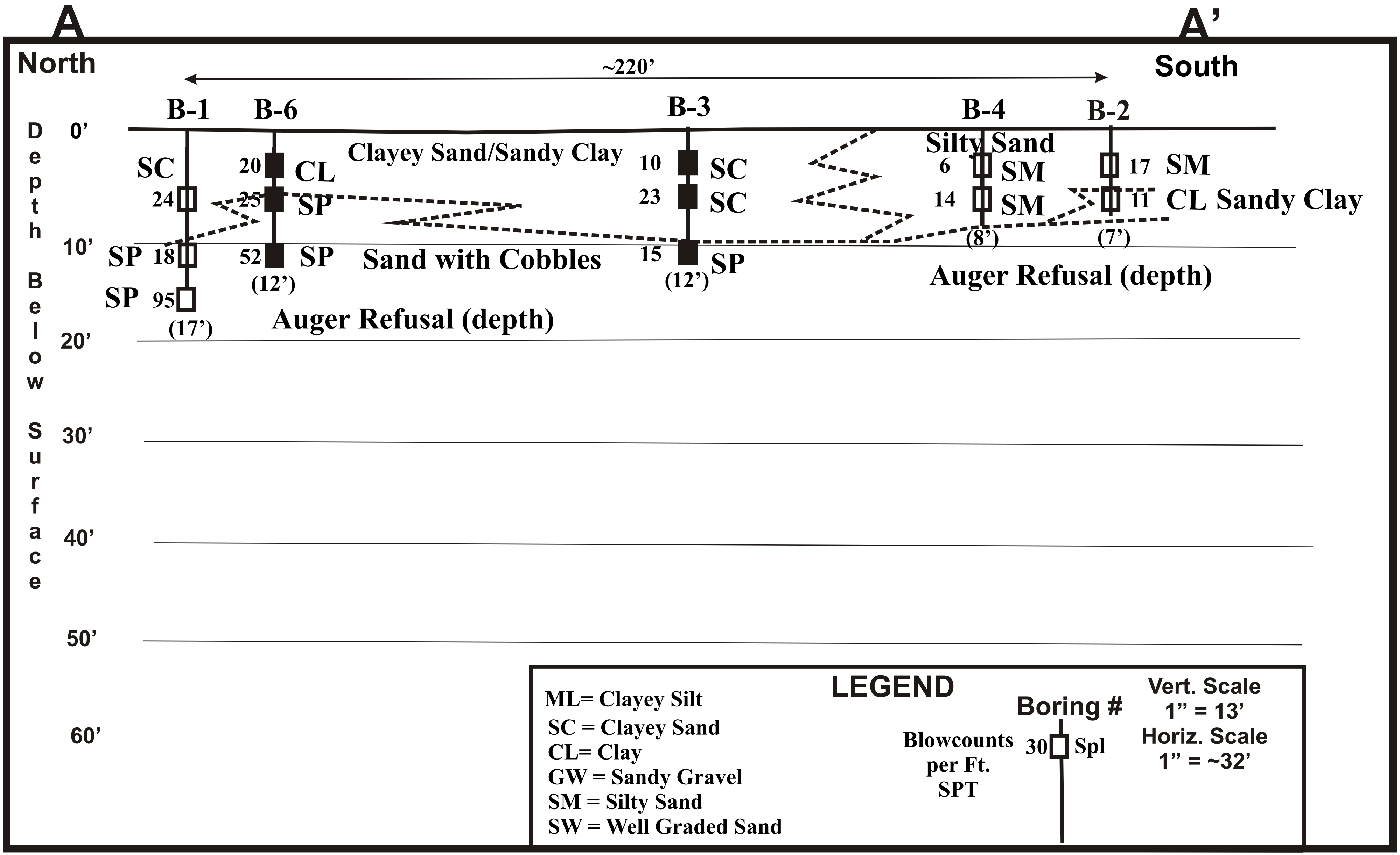
BORING LOCATION/GEOLOGIC MAP

PLATE
2A



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Geologic Cross-section A’ to A

PLATE
2B

SOURCE: Oilcenter Quadrangle, Seismic Hazard Atlas Map, Kern County Council of Govt.

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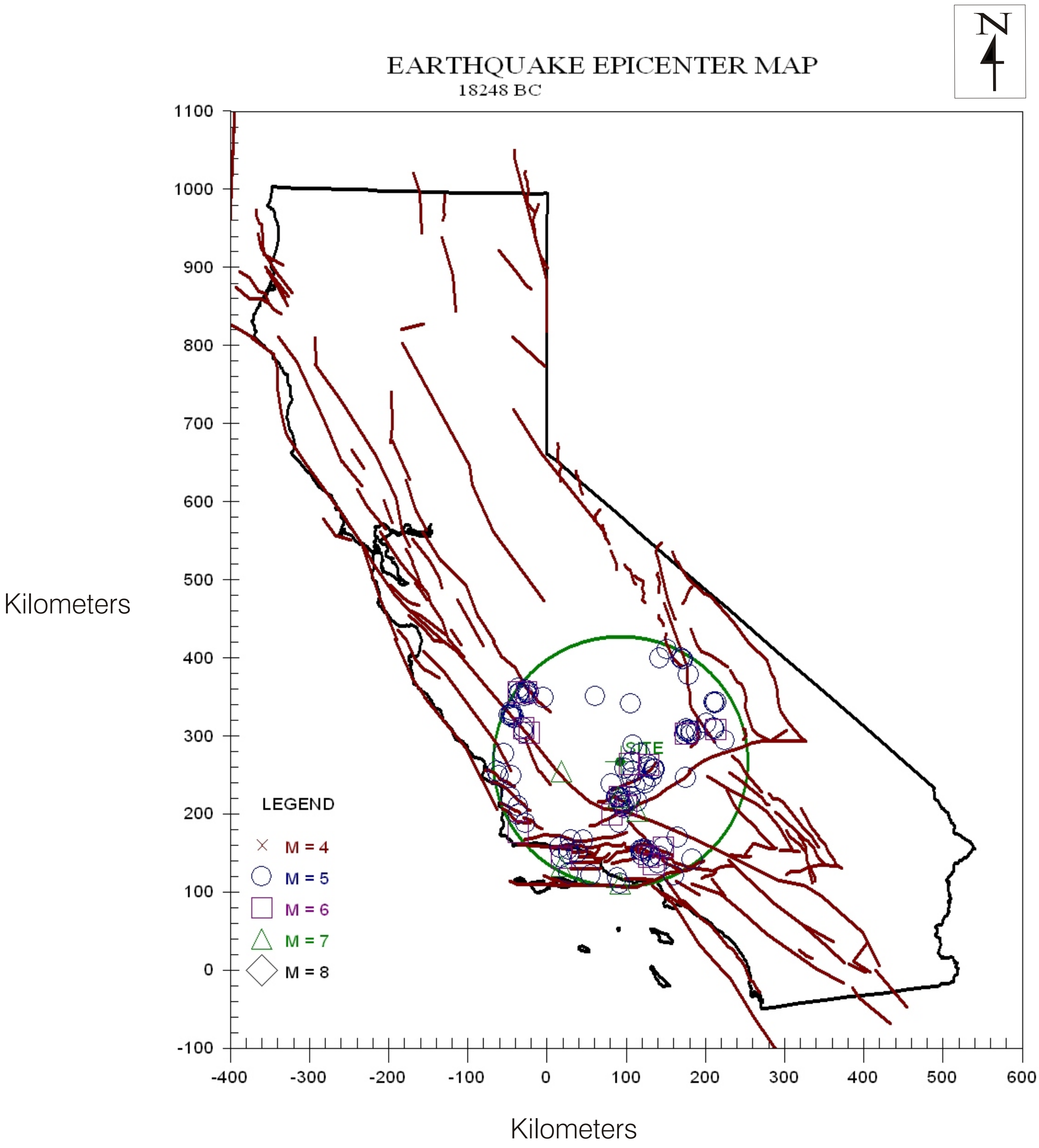
Seismic Hazard Zone Atlas Map

PLATE
3



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Earthquake Epicenter Map

PLATE

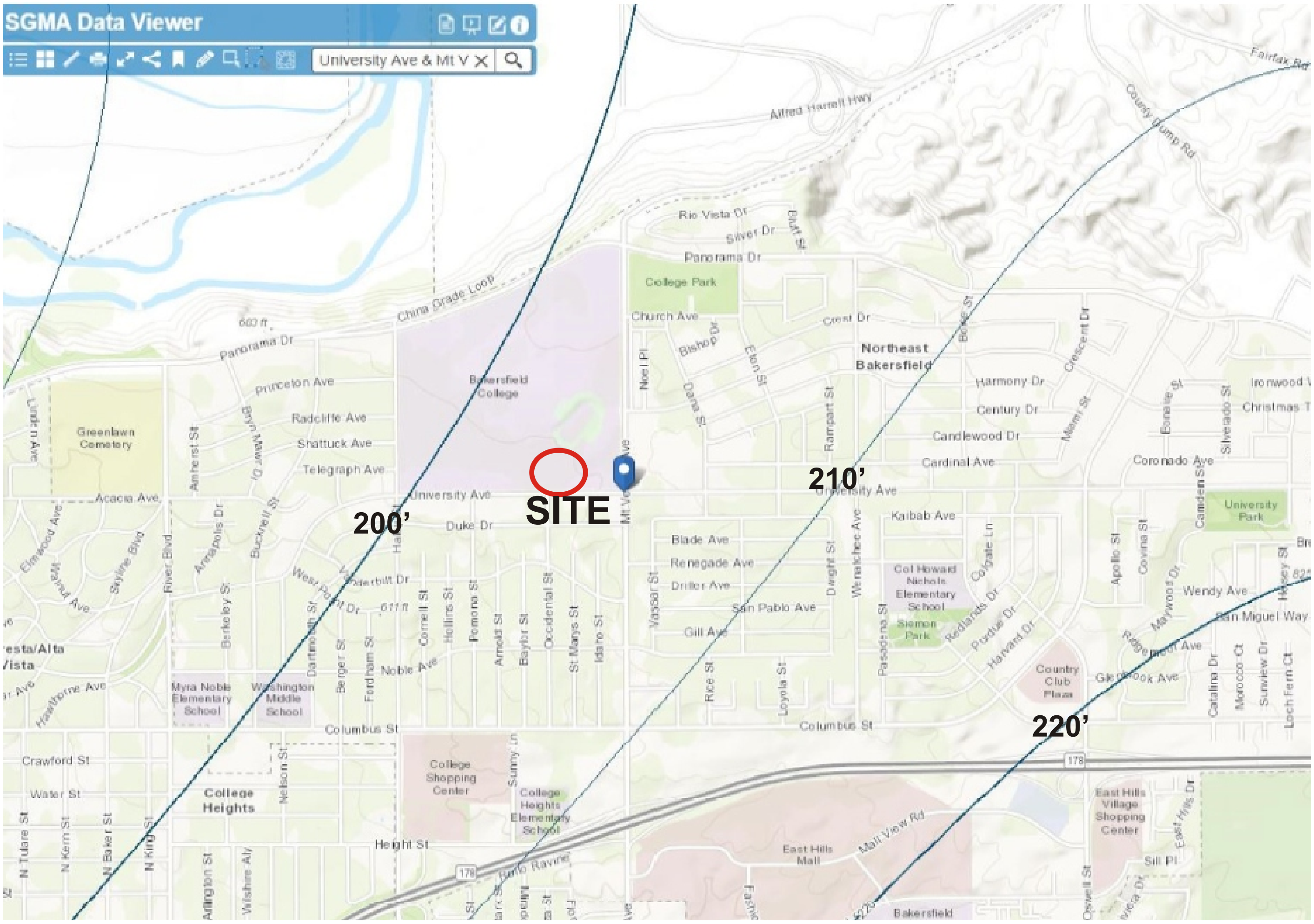
3A

LEGEND

0 1-mile
Scale

200 Depth to Water (20' Contours)

N



SGWA, Depth To Water Map, Spring 2021

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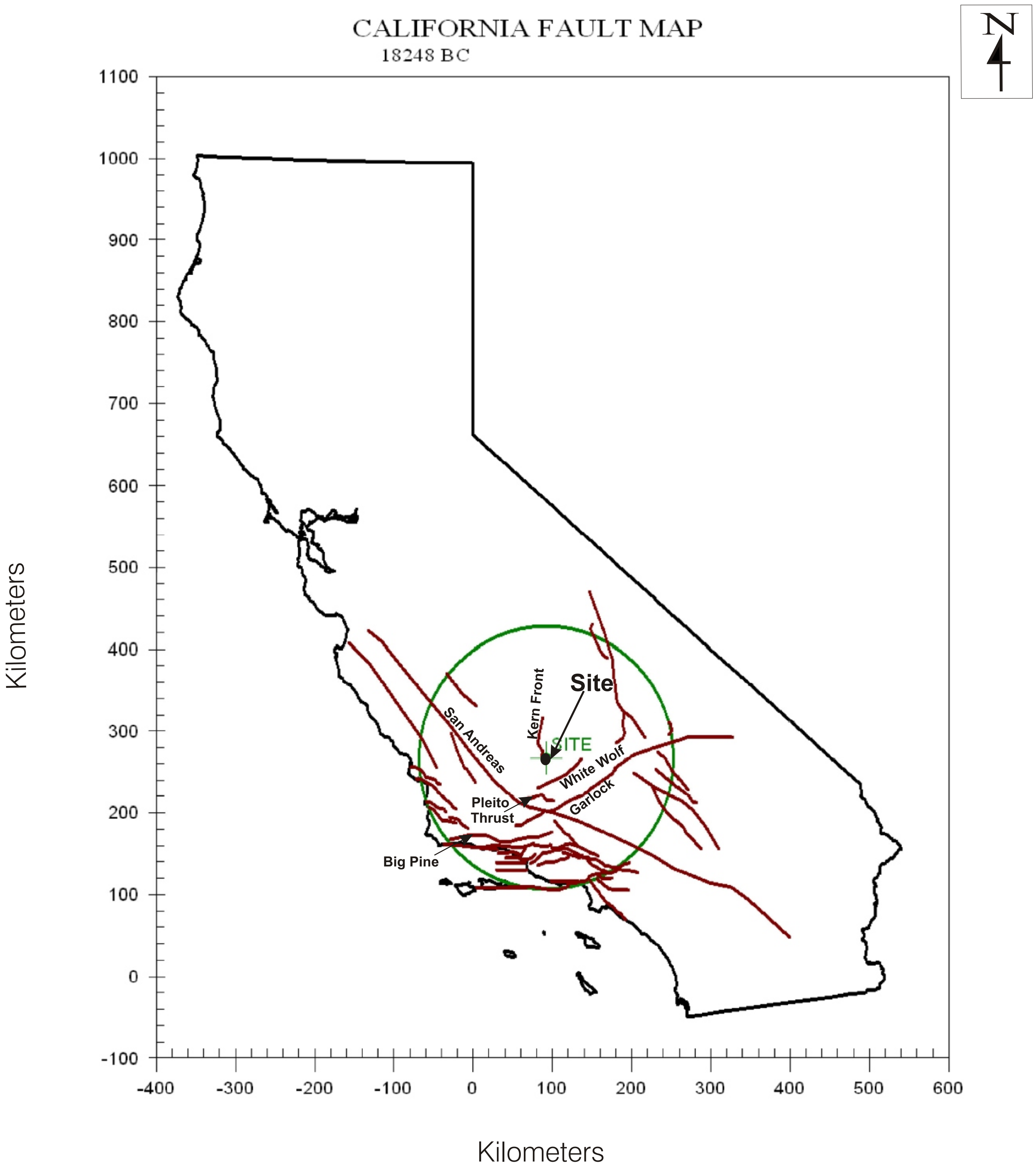
Depth To Water Map

PLATE
4



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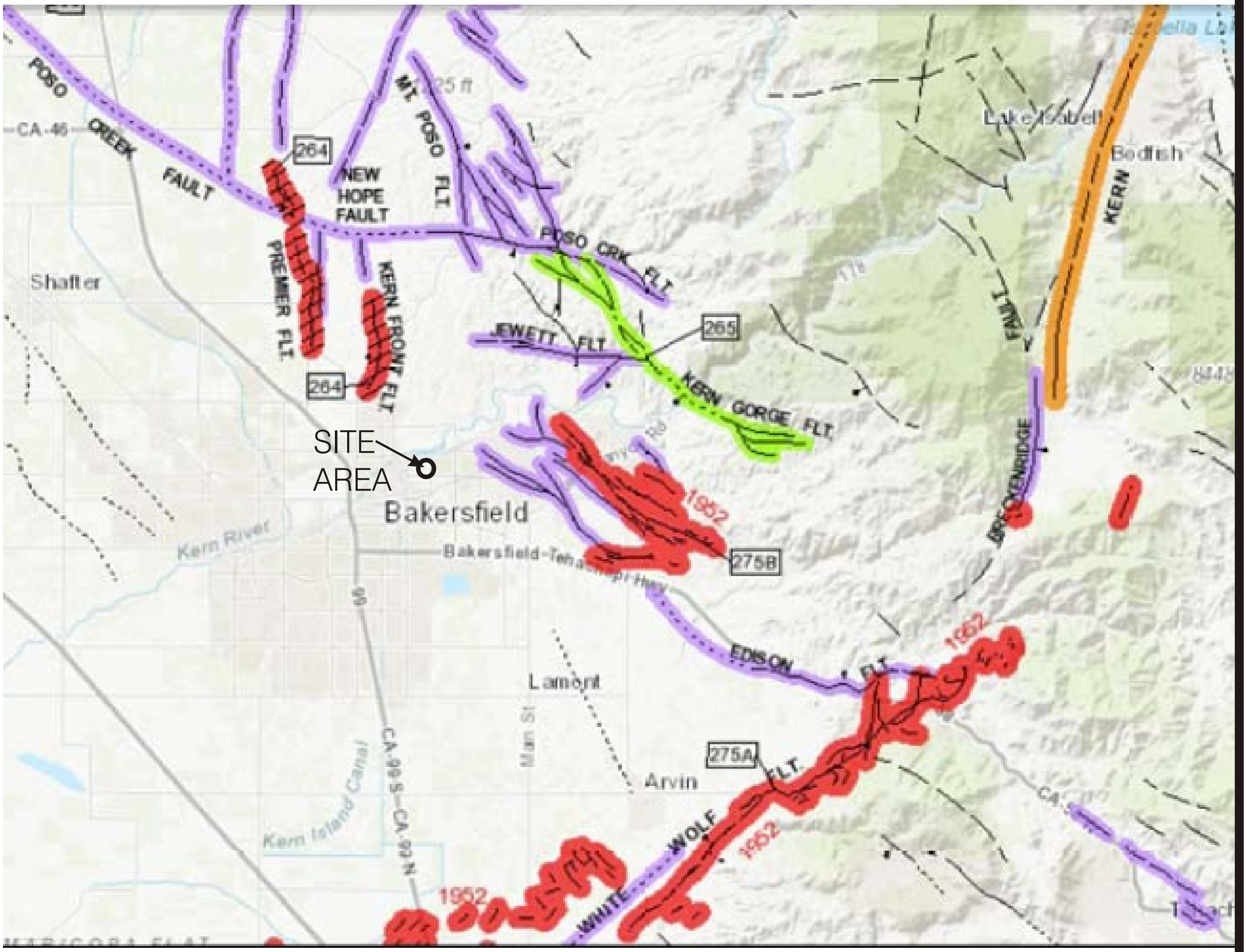
Fault Location Map

PLATE
5



SOURCE: 2010 Fault Activity Map of California, CDMG

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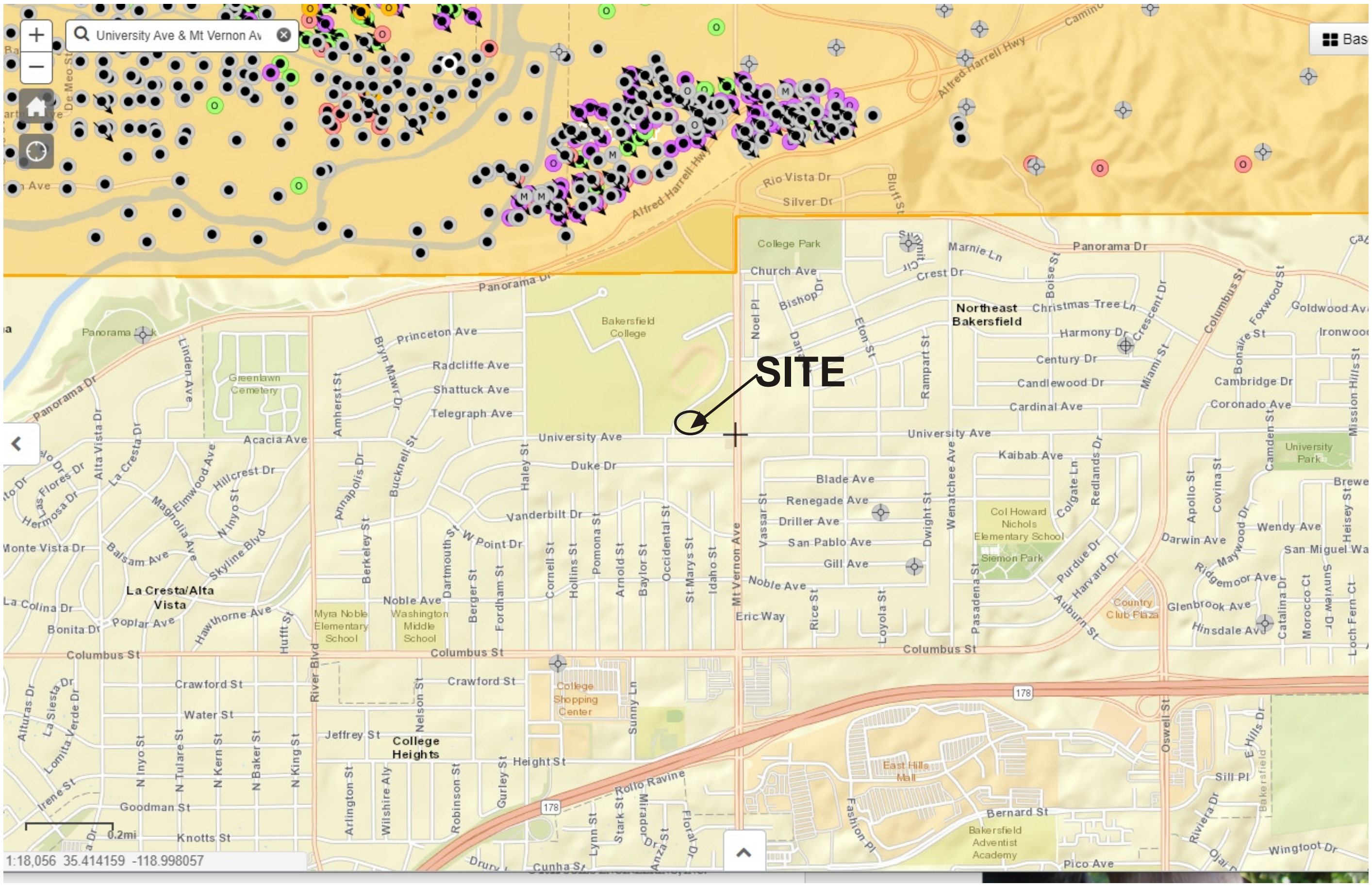
REGIONAL FAULT MAP

PLATE
5A

N



0 mi. 0.2 mi. 0.5mi.

Scale

◎ ● **Plugged Oil Well**

● **Cancelled Oil Well**

● **Idle Oil Well**

● **Active Oil Well**

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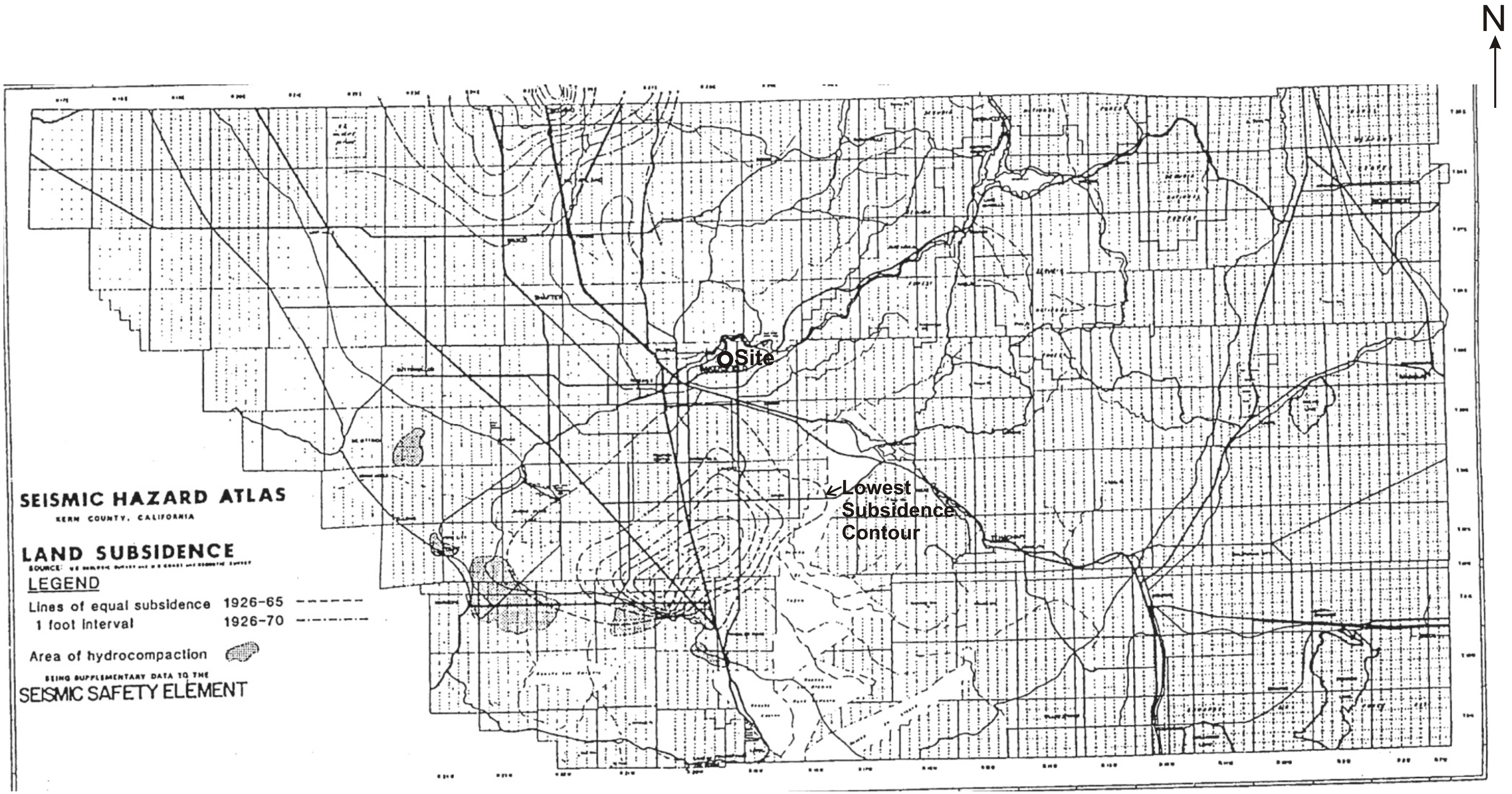
CalGEM Oil Well Map

PLATE

6



Regional Land Subsidence Map

From City of Bakersfield Safety Element (Figure 15)

Plate 7

Appendix A

EQFAULTWIN data, EQSEARCHWIN data, USGS Seismic Design Maps SEAOC/OSHPD and the USGS Unified Hazard Tool Results.

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

                         DETERMINISTIC ESTIMATION OF
                   PEAK ACCELERATION FROM DIGITIZED FAULTS


JOB NUMBER: 18248
                                                     DATE: 12-15-2021

JOB NAME: 18248 BC

CALCULATION NAME: Test Run Analysis

FAULT-DATA-FILE NAME: CGSFLTE.DAT

SITE COORDINATES:
   SITE LATITUDE:  35.4054
   SITE LONGITUDE:  118.9694

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
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                                      ---------------
                                      EQFAULT SUMMARY
                                      ---------------

                              -----------------------------
                              DETERMINISTIC SITE PARAMETERS
                              -----------------------------

Page  1
-------------------------------------------------------------------------------
                                |               |ESTIMATED MAX. EARTHQUAKE EVENT
                                | APPROXIMATE   |-------------------------------
          ABBREVIATED           |   DISTANCE    | MAXIMUM  |   PEAK   |EST. SITE
          FAULT  NAME           |   mi    (km)  |EARTHQUAKE|   SITE   |INTENSITY
                                |               | MAG.(Mw) | ACCEL. g |MOD.MERC.
================================|===============|==========|==========|=========
Kern Front                      |   4.4(   7.1)|   6.3    |   0.356  |   IX
WHITE WOLF                      |  17.7(  28.5)|   7.3    |   0.243  |   IX
PLEITO THRUST                   |  27.9(  44.9)|   7.0    |   0.147  |  VIII
GARLOCK (West)                  |  36.9(  59.4)|   7.3    |   0.114  |   VII
SAN ANDREAS - Whole M-1a        |  39.4(  63.4)|   8.0    |   0.157  |  VIII
SAN ANDREAS - Carrizo M-1c-2    |  39.4(  63.4)|   7.4    |   0.114  |   VII
SAN ANDREAS - 1857 Rupture M-2a |  39.4(  63.4)|   7.8    |   0.141  |  VIII
SAN ANDREAS - Cho-Moj M-1b-1    |  39.4(  63.4)|   7.8    |   0.141  |  VIII
BIG PINE                        |  40.4(  65.0)|   6.9    |   0.086  |   VII
SAN GABRIEL                     |  48.1(  77.4)|   7.2    |   0.088  |   VII
SAN ANDREAS - Cholame M-1c-1    |  50.9(  81.9)|   7.3    |   0.089  |   VII
GARLOCK (East)                  |  53.9(  86.7)|   7.5    |   0.095  |   VII
SAN ANDREAS - Mojave M-1c-3     |  55.3(  89.0)|   7.4    |   0.088  |   VII
So. SIERRA NEVADA               |  56.1(  90.3)|   7.3    |   0.100  |   VII
SANTA YNEZ (East)               |  56.7(  91.2)|   7.1    |   0.074  |   VII
SAN JUAN                        |  58.6(  94.3)|   7.1    |   0.072  |   VI
SAN CAYETANO                    |  61.3(  98.7)|   7.0    |   0.080  |   VII
M.RIDGE-ARROYO PARIDA-SANTA ANA |  62.3( 100.2)|   7.2    |   0.088  |   VII
SANTA SUSANA                    |  67.9( 109.2)|   6.7    |   0.063  |   VI
HOLSER                          |  67.9( 109.3)|   6.5    |   0.057  |   VI
NORTH CHANNEL SLOPE             |  68.2( 109.7)|   7.4    |   0.091  |   VII
GREAT VALLEY 14                 |  68.8( 110.8)|   6.4    |   0.053  |   VI
LENWOOD-LOCKHART-OLD WOMAN SPRGS|  69.2( 111.4)|   7.5    |   0.078  |   VII
RED MOUNTAIN                    |  69.9( 112.5)|   7.0    |   0.072  |   VII
OAK RIDGE (Onshore)             |  70.2( 113.0)|   7.0    |   0.072  |   VI
LITTLE LAKE                     |  70.5( 113.5)|   6.9    |   0.056  |   VI
NORTHRIDGE (E. Oak Ridge)       |  70.7( 113.8)|   7.0    |   0.072  |   VI
SANTA YNEZ (West)               |  71.7( 115.4)|   7.1    |   0.061  |   VI
VENTURA - PITAS POINT           |  72.5( 116.6)|   6.9    |   0.067  |   VI
SIMI-SANTA ROSA                 |  72.8( 117.1)|   7.0    |   0.070  |   VI
SIERRA MADRE (San Fernando)     |  73.4( 118.2)|   6.7    |   0.059  |   VI
SAN LUIS RANGE (S. Margin)      |  75.9( 122.1)|   7.2    |   0.075  |   VII
OAK RIDGE MID-CHANNEL STRUCTURE |  76.3( 122.8)|   6.6    |   0.055  |   VI
OWENS VALLEY                    |  77.6( 124.9)|   7.6    |   0.075  |   VII
SAN ANDREAS - Parkfield         |  78.7( 126.6)|   6.5    |   0.042  |   VI
CHANNEL IS. THRUST (Eastern)    |  80.2( 129.1)|   7.5    |   0.085  |   VII
VERDUGO                         |  80.7( 129.9)|   6.9    |   0.061  |   VI
LOS ALAMOS-W. BASELINE          |  81.6( 131.4)|   6.9    |   0.061  |   VI
GREAT VALLEY 13                 |  83.6( 134.6)|   6.5    |   0.048  |   VI
SIERRA MADRE                    |  83.7( 134.7)|   7.2    |   0.070  |   VI
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                          DETERMINISTIC SITE PARAMETERS
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Page  2
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                                |              |ESTIMATED MAX. EARTHQUAKE EVENT
                                | APPROXIMATE  |-------------------------------
          ABBREVIATED           |   DISTANCE   | MAXIMUM  |   PEAK   |EST. SITE
          FAULT  NAME           |   mi   (km)  |EARTHQUAKE|   SITE   |INTENSITY
                                |              | MAG.(Mw) | ACCEL. g |MOD.MERC.
================================|==============|==========|==========|=========
LIONS HEAD                      |  85.3( 137.2)|   6.6    |   0.050  |   VI
GRAVEL HILLS - HARPER LAKE      |  85.9( 138.3)|   7.1    |   0.053  |   VI
LOS OSOS                        |  86.1( 138.5)|   7.0    |   0.062  |   VI
HELENDALE - S. LOCKHARDT        |  86.1( 138.5)|   7.3    |   0.059  |   VI
ANACAPA-DUME                    |  86.2( 138.7)|   7.5    |   0.080  |   VII
OAK RIDGE(Blind Thrust Offshore)|  86.7( 139.5)|   7.1    |   0.064  |   VI
RINCONADA                       |  87.0( 140.0)|   7.5    |   0.065  |   VI
BLACKWATER                      |  87.7( 141.2)|   7.1    |   0.052  |   VI
CASMALIA (Orcutt Frontal Fault) |  88.6( 142.6)|   6.5    |   0.046  |   VI
INDEPENDENCE                    |  90.4( 145.5)|   7.1    |   0.062  |   VI
MALIBU COAST                    |  91.4( 147.1)|   6.7    |   0.050  |   VI
CLAMSHELL-SAWPIT                |  92.8( 149.3)|   6.5    |   0.045  |   VI
HOLLYWOOD                       |  93.3( 150.2)|   6.4    |   0.042  |   VI
TANK CANYON                     |  94.9( 152.7)|   6.4    |   0.042  |   VI
UPPER ELYSIAN PARK BLIND THRUST |  94.9( 152.8)|   6.4    |   0.042  |    V
SANTA MONICA                    |  95.3( 153.4)|   6.6    |   0.046  |   VI
PUENTE HILLS BLIND THRUST       |  95.9( 154.3)|   7.1    |   0.060  |   VI
RAYMOND                         |  96.3( 154.9)|   6.5    |   0.043  |   VI
SAN ANDREAS (Creeping)          |  98.6( 158.7)|   6.2    |   0.030  |    V
NEWPORT-INGLEWOOD (L.A.Basin)   | 99.6 ( 160.3)|   7.1    |   0.048  |   VI
*******************************************************************************
-END OF SEARCH-   60 FAULTS FOUND WITHIN THE SPECIFIED SEARCH RADIUS.

THE Kern Front                       FAULT IS CLOSEST TO THE SITE.
IT IS ABOUT 4.4 MILES (7.1 km) AWAY.

LARGEST MAXIMUM-EARTHQUAKE SITE ACCELERATION: 0.3562 g
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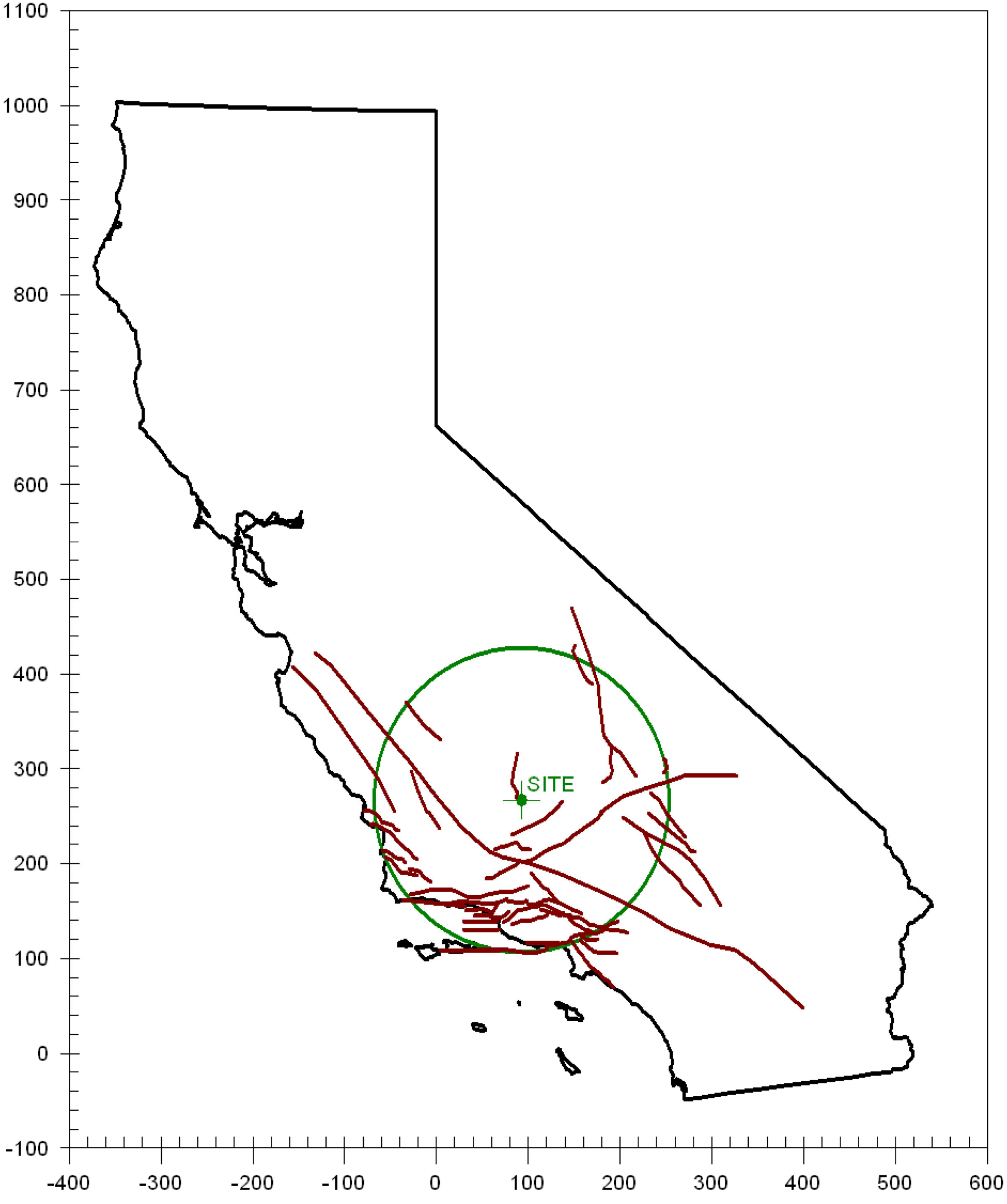
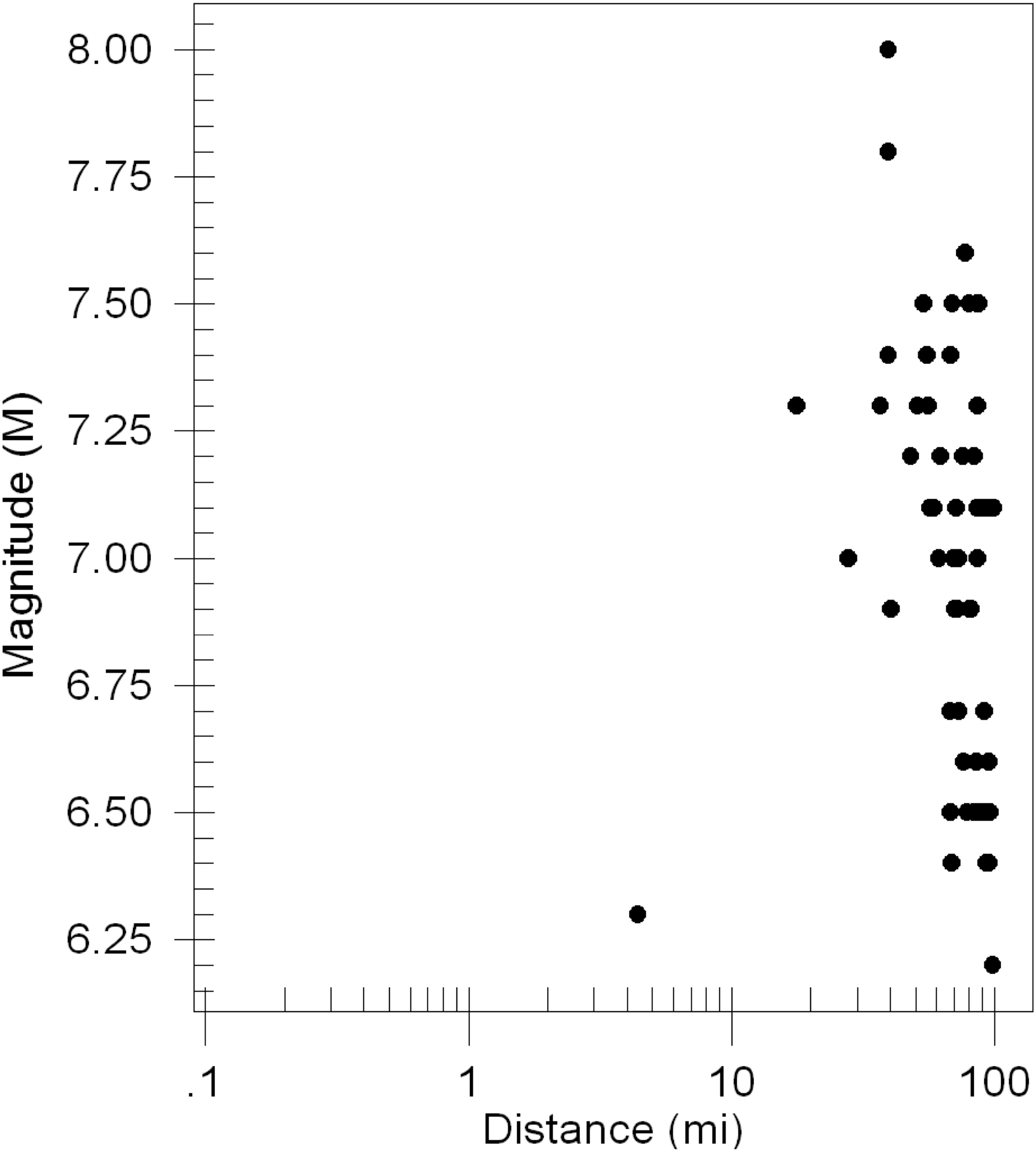
CALIFORNIA FAULT MAP

18248 BC



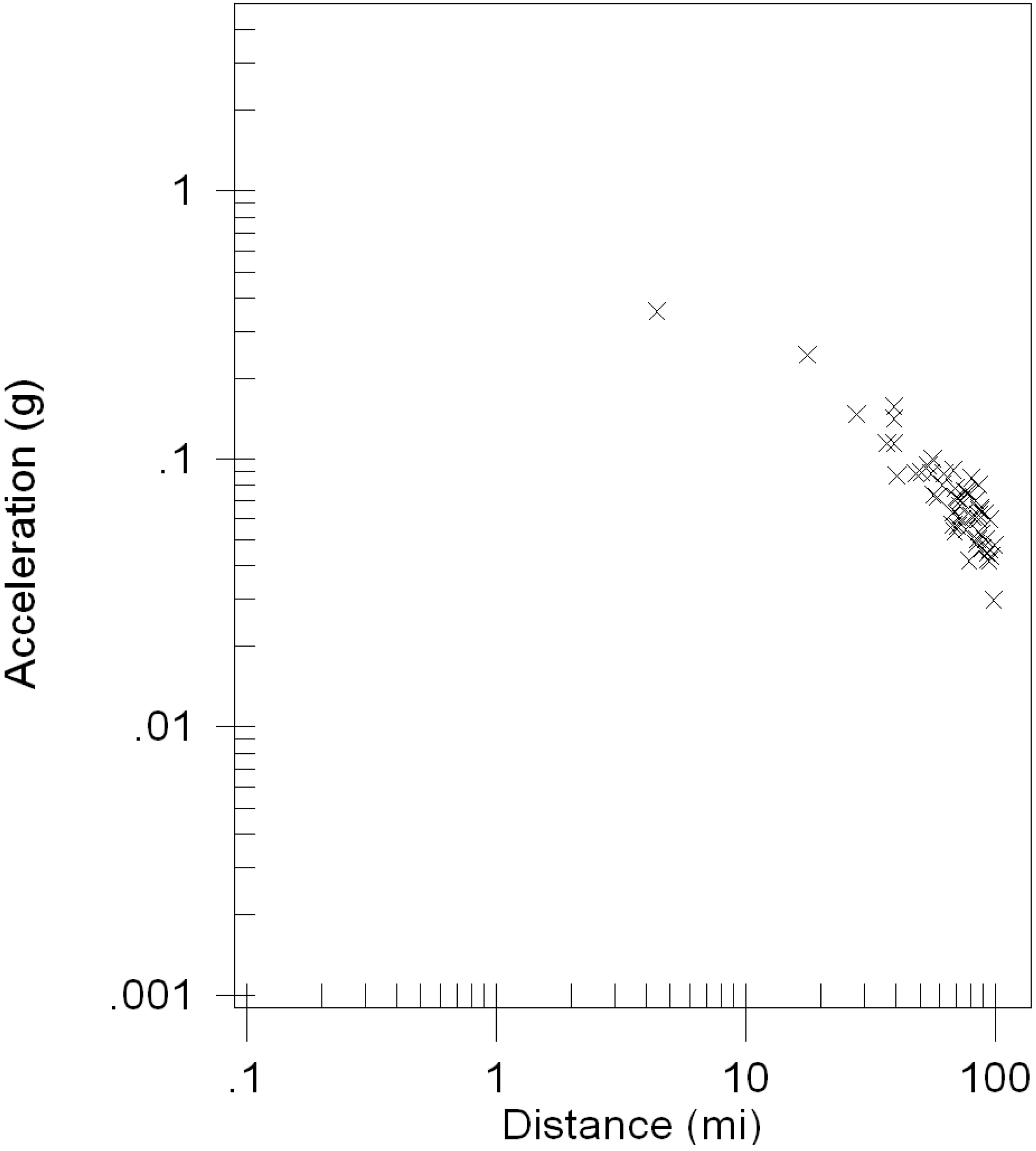
EARTHQUAKE MAGNITUDES & DISTANCES

18248 BC



MAXIMUM EARTHQUAKES

18248 BC



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                           *                       *
                           *    E Q S E A R C H    *
                           *                       *
                           *     Version 3.00      *
                           *                       *
                           *************************

                                 ESTIMATION OF
                            PEAK ACCELERATION FROM
                        CALIFORNIA EARTHQUAKE CATALOGS


JOB NUMBER: 18248
                                                     DATE: 01-04-2022

JOB NAME: 18248 BC

EARTHQUAKE-CATALOG-FILE NAME: ALLQUAKE.DAT

SITE COORDINATES:
   SITE LATITUDE:  35.4054
   SITE LONGITUDE:  118.9694

SEARCH DATES:
           START DATE:   1800
           END DATE:   2010

SEARCH RADIUS:
           100.0 mi
           160.9 km

ATTENUATION RELATION:   3) Boore et al. (1997) Horiz. - NEHRP D (250)
   UNCERTAINTY (M=Median, S=Sigma): M       Number of Sigmas:  0.0
   ASSUMED SOURCE TYPE:  DS [SS=Strike-slip, DS=Reverse-slip, BT=Blind-
thrust]
   SCOND:   0  Depth Source:  A
   Basement Depth:  5.00 km     Campbell SSR:        Campbell SHR:
   COMPUTE PEAK HORIZONTAL ACCELERATION

MINIMUM DEPTH VALUE (km):  0.0
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                             EARTHQUAKE SEARCH RESULTS
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Page  1
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    |       |        |          |  TIME  |     |     | SITE  |SITE|  APPROX.
FILE|  LAT. |  LONG. |   DATE   |  (UTC) |DEPTH|QUAKE|  ACC. | MM |  DISTANCE
CODE| NORTH |  WEST  |          | H M Sec| (km)| MAG.|   g   |INT.|  mi  [km]
----+-------+--------+----------+--------+-----+-----+-------+----+-----------
DMG |35.3330|118.9170|08/22/1952|224124.0|  0.0| 5.80| 0.237 | IX |  5.8(  9.3)
DMG |35.3830|118.8500|07/29/1952| 7 347.0|  0.0| 6.10| 0.250 | IX |  6.9( 11.1)
DMG |35.4000|118.8170|07/29/1952| 8 146.0|  0.0| 5.10| 0.128 |VIII|  8.6( 13.8)
DMG |35.3000|118.8000|12/23/1905|2223 0.0|  0.0| 5.00| 0.096 | VII| 12.0( 19.3)
DMG |35.2170|118.8170|07/23/1952|1317 5.0|  0.0| 5.70| 0.115 | VII| 15.6( 25.1)
DMG |35.6000|118.8000|06/30/1926|1331 0.0|  0.0| 5.00| 0.076 | VII| 16.5( 26.5)
DMG |35.5000|118.7000|01/06/1905|1430 0.0|  0.0| 5.00| 0.076 | VII| 16.5( 26.5)
GSP |35.1490|119.1040|05/28/1993|044740.6| 21.0| 5.20| 0.075 | VII| 19.3( 31.0)
DMG |35.3330|118.6000|07/31/1952|12 9 9.0|  0.0| 5.80| 0.096 | VII| 21.4( 34.4)
DMG |35.3670|118.5830|07/23/1952| 31923.0|  0.0| 5.00| 0.062 | VI | 21.9( 35.3)
DMG |35.3670|118.5830|07/23/1952| 03832.0|  0.0| 6.10| 0.110 | VII| 21.9( 35.3)
DMG |35.1330|118.7670|07/21/1952|194122.0|  0.0| 5.50| 0.080 | VII| 22.0( 35.4)
DMG |35.1830|118.6500|07/21/1952|151358.0|  0.0| 5.10| 0.061 | VI | 23.7( 38.1)
DMG |35.1500|118.6330|01/27/1954|141948.0|  0.0| 5.00| 0.054 | VI | 25.9( 41.7)
DMG |35.3150|118.5160|07/25/1952|194323.7| 11.2| 5.70| 0.078 | VII| 26.3( 42.3)
DMG |35.3110|118.4990|07/25/1952|1313 8.2|  2.8| 5.00| 0.052 | VI | 27.3( 43.9)
DMG |35.2330|118.5330|07/21/1952|174244.0|  0.0| 5.10| 0.055 | VI | 27.3( 44.0)
DMG |35.3170|118.4940|07/25/1952|19 944.6|  5.5| 5.70| 0.075 | VII| 27.5( 44.2)
DMG |35.0000|119.0000|07/21/1952|12 531.0|  0.0| 6.40| 0.107 | VII| 28.0( 45.1)
DMG |35.0000|119.0000|02/16/1919|1557 0.0|  0.0| 5.00| 0.051 | VI | 28.0( 45.1)
DMG |35.0000|119.0170|01/12/1954|233349.0|  0.0| 5.90| 0.082 | VII| 28.1( 45.2)
DMG |35.0000|119.0170|07/21/1952|115214.0|  0.0| 7.70| 0.211 |VIII| 28.1( 45.2)
DMG |35.0000|119.0330|07/21/1952|12 2 0.0|  0.0| 5.60| 0.070 | VI | 28.2( 45.4)
DMG |35.0000|118.8330|07/23/1952|181351.0|  0.0| 5.20| 0.055 | VI | 29.0( 46.7)
DMG |35.0000|118.8330|07/23/1952| 75319.0|  0.0| 5.40| 0.061 | VI | 29.0( 46.7)
DMG |34.9830|118.9830|05/23/1954|235243.0|  0.0| 5.10| 0.052 | VI | 29.2( 46.9)
DMG |34.9500|118.8670|07/21/1952|121936.0|  0.0| 5.30| 0.054 | VI | 32.0( 51.4)
DMG |34.9410|118.9870|11/15/1961| 53855.5| 10.7| 5.00| 0.046 | VI | 32.1( 51.6)
DMG |34.9320|118.9760|03/01/1963| 02557.9| 13.9| 5.00| 0.045 | VI | 32.7( 52.6)
T-A |34.9200|118.9200|01/20/1857| 0 0 0.0|  0.0| 5.00| 0.044 | VI | 33.6( 54.1)
T-A |34.9200|118.9200|05/23/1857| 0 0 0.0|  0.0| 5.00| 0.044 | VI | 33.6( 54.1)
PAS |34.9430|118.7430|06/10/1988|23 643.0|  6.8| 5.40| 0.054 | VI | 34.4( 55.3)
DMG |34.9000|118.9500|08/01/1952|13 430.0|  0.0| 5.10| 0.045 | VI | 34.9( 56.2)
DMG |34.9000|118.9000|10/23/1916| 244 0.0|  0.0| 6.00| 0.073 | VII| 35.1( 56.5)
DMG |34.8670|118.9330|09/21/1941|1953 7.2|  0.0| 5.20| 0.046 | VI | 37.2( 59.9)
T-A |34.8300|118.7500|11/27/1852| 0 0 0.0|  0.0| 7.00| 0.108 | VII| 41.6( 67.0)
DMG |34.8000|119.1000|09/05/1883|1230 0.0|  0.0| 6.00| 0.063 | VI | 42.4( 68.3)
DMG |36.0800|118.8200|05/29/1915| 646 0.0|  0.0| 5.00| 0.034 |  V | 47.3( 76.2)
DMG |35.3000|119.8000|01/09/1857|16 0 0.0|  0.0| 7.90| 0.157 |VIII| 47.3( 76.2)
DMG |34.7000|119.0000|10/23/1916| 254 0.0|  0.0| 5.50| 0.043 | VI | 48.7( 78.4)
GSP |35.2100|118.0660|07/11/1992|181416.2| 10.0| 5.70| 0.045 | VI | 52.7( 84.7)
DMG |35.7150|118.0740|03/15/1946|14 035.4|  0.0| 5.30| 0.036 |  V | 54.6( 87.9)
DMG |35.7250|118.0550|03/15/1946|134935.9| 22.0| 6.30| 0.059 | VI | 55.9( 89.9)
T-A |36.1700|119.3200|07/25/1868| 230 0.0|  0.0| 5.00| 0.030 |  V | 56.3( 90.6)
DMG |35.7450|118.0390|03/16/1946| 94617.9|  0.0| 5.10| 0.031 |  V | 57.3( 92.2)
DMG |35.7780|118.0490|01/28/1961| 81246.2|  5.5| 5.30| 0.034 |  V | 57.7( 92.9)
DMG |35.7510|118.0290|03/15/1946|215433.4|  0.0| 5.20| 0.032 |  V | 57.9( 93.2)
DMG |35.7140|117.9770|03/15/1946|191853.6|  0.0| 5.40| 0.035 |  V | 59.7( 96.0)
DMG |35.7530|117.9860|03/15/1946|1321 0.9|  0.0| 5.20| 0.031 |  V | 60.2( 96.9)
DMG |35.7470|117.9080|03/18/1946|155042.6|  4.4| 5.30| 0.032 |  V | 64.1(103.2)
DMG |34.5000|119.5000|06/29/1926|2321 0.0|  0.0| 5.50| 0.033 |  V | 69.3(111.6)
DMG |34.5000|119.5000|08/05/1930|1125 0.0|  0.0| 5.00| 0.025 |  V | 69.3(111.6)
GSP |34.3940|118.6690|06/26/1995|084028.9| 13.0| 5.00| 0.025 |  V | 71.9(115.7
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                         EARTHQUAKE SEARCH RESULTS
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Page  2
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    |      |       |          |  TIME  |     |     | SITE  |SITE|  APPROX.
FILE|  LAT. |  LONG. |   DATE    |  (UTC) |DEPTH|QUAKE|  ACC. | MM |  DISTANCE
CODE| NORTH |  WEST  |           | H M Sec| (km)| MAG.|   g   |INT.|  mi   [km]
----+------+-------+---------+-------+----+----+------+---+-----------
GSB |34.3790|118.7110|01/19/1994|210928.6| 14.0| 5.50| 0.032 |  V | 72.4(116.4)
GSP |34.3770|118.6980|01/18/1994|004308.9| 11.0| 5.20| 0.027 |  V | 72.6(116.9)
GSP |34.3690|118.6720|04/26/1997|103730.7| 16.0| 5.10| 0.026 |  V | 73.5(118.3)
GSP |34.3780|118.6180|01/19/1994|211144.9| 11.0| 5.10| 0.025 |  V | 73.7(118.6)
DMG |35.8310|117.7610|10/19/1961| 5 943.9| -2.0| 5.20| 0.027 |  V | 73.9(118.9)
T-A |34.5000|119.6700|06/01/1893|12 0 0.0|  0.0| 5.00| 0.024 |  V | 74.0(119.1)
DMG |34.5190|118.1980|08/23/1952|10 9 7.1| 13.1| 5.00| 0.024 | IV | 75.2(121.0)
DMG |35.7500|120.2500|03/10/1922|112120.0|  0.0| 6.50| 0.052 | VI | 75.7(121.9)
DMG |34.4110|118.4010|02/09/1971|14 244.0|  8.0| 5.80| 0.036 |  V | 75.8(122.0)
DMG |34.4110|118.4010|02/09/1971|14 1 8.0|  8.0| 5.80| 0.036 |  V | 75.8(122.0)
DMG |34.4110|118.4010|02/09/1971|141028.0|  8.0| 5.30| 0.028 |  V | 75.8(122.0)
DMG |34.4110|118.4010|02/09/1971|14 041.8|  8.4| 6.40| 0.049 | VI | 75.8(122.0)
GSP |34.3260|118.6980|01/17/1994|233330.7|  9.0| 5.60| 0.032 |  V | 76.1(122.5)
GSP |35.7760|117.6620|08/17/1995|223959.0|  5.0| 5.40| 0.029 |  V | 77.7(125.1)
GSP |35.7660|117.6490|01/07/1996|143253.1|  5.0| 5.20| 0.026 |  V | 78.2(125.9)
GSB |35.7610|117.6390|09/20/1995|232736.3|  5.0| 6.10| 0.041 |  V | 78.6(126.5)
GSP |34.3050|118.5790|01/29/1994|112036.0|  1.0| 5.10| 0.024 |  V | 79.1(127.3)
DMG |34.3000|118.6000|04/04/1893|1940 0.0|  0.0| 6.00| 0.039 |  V | 79.1(127.4)
PAS |36.1510|120.0490|08/04/1985|12 156.0|  6.0| 5.80| 0.035 |  V | 79.4(127.8)
GSB |34.3010|118.5650|01/17/1994|204602.4|  9.0| 5.20| 0.025 |  V | 79.6(128.1)
DMG |34.3670|119.5830|07/01/1941| 75054.8|  0.0| 5.90| 0.037 |  V | 79.7(128.2)
DMG |35.7500|120.3300|08/18/1922| 512 0.0|  0.0| 5.00| 0.023 | IV | 80.0(128.8)
MGI |34.4000|119.7000|03/25/1806| 8 0 0.0|  0.0| 5.00| 0.023 | IV | 80.8(130.0)
DMG |35.8000|120.3300|06/08/1934| 430 0.0|  0.0| 5.00| 0.022 | IV | 81.1(130.5)
DMG |35.8000|120.3300|06/05/1934|2148 0.0|  0.0| 5.00| 0.022 | IV | 81.1(130.5)
DMG |35.8000|120.3300|06/08/1934| 447 0.0|  0.0| 6.00| 0.038 |  V | 81.1(130.5)
DMG |35.8000|120.3300|12/28/1939|121538.0|  0.0| 5.00| 0.022 | IV | 81.1(130.5)
DMG |34.3080|118.4540|02/09/1971|144346.7|  6.2| 5.20| 0.025 |  V | 81.2(130.7)
DMG |35.6310|117.5130|09/17/1938|1423 4.1| -2.0| 5.00| 0.022 | IV | 83.3(134.1)
T-A |34.4200|119.8200|00/00/1862| 0 0 0.0|  0.0| 5.70| 0.032 |  V | 83.4(134.1)
PAS |34.3470|119.6960|08/13/1978|225453.4| 12.8| 5.10| 0.023 | IV | 83.9(135.0)
GSP |34.2310|118.4750|03/20/1994|212012.3| 13.0| 5.30| 0.025 |  V | 85.8(138.1)
GSP |34.2130|118.5370|01/17/1994|123055.4| 18.0| 6.70| 0.053 | VI | 85.9(138.2)
MGI |35.2500|120.5000|07/10/1917| 045 0.0|  0.0| 5.30| 0.025 |  V | 86.9(139.8)
MGI |35.2500|120.5000|07/09/1917|2222 0.0|  0.0| 5.00| 0.021 | IV | 86.9(139.8)
MGI |35.2500|120.5000|07/10/1917| 043 0.0|  0.0| 5.30| 0.025 |  V | 86.9(139.8)
MGI |35.2500|120.5000|07/09/1917|2238 0.0|  0.0| 5.30| 0.025 |  V | 86.9(139.8)
GSP |36.0750|117.6500|11/27/1996|201724.1|  1.0| 5.30| 0.025 |  V | 87.2(140.3)
GSP |36.0670|117.6380|03/06/1998|054740.3|  1.0| 5.20| 0.024 | IV | 87.5(140.8)
DMG |36.4000|118.0000|07/05/1871|21 6 0.0|  0.0| 5.20| 0.024 | IV | 87.5(140.8)
MGI |34.9000|120.4000|03/29/1928| 625 0.0|  0.0| 5.30| 0.025 |  V | 88.0(141.6)
MGI |36.6000|118.4000|09/04/1868| 0 0 0.0|  0.0| 5.00| 0.021 | IV | 88.4(142.3)
GSP |36.0760|117.6180|03/07/1998|003646.8|  1.0| 5.00| 0.021 | IV | 88.8(142.8)
DMG |34.7000|120.3000|07/31/1902| 920 0.0|  0.0| 5.50| 0.027 |  V | 89.6(144.2)
DMG |34.7000|120.3000|01/12/1915| 431 0.0|  0.0| 5.50| 0.027 |  V | 89.6(144.2)
MGI |34.3000|119.8000|07/03/1925|1638 0.0|  0.0| 5.30| 0.024 |  V | 89.7(144.3)
MGI |34.3000|119.8000|07/03/1925|1821 0.0|  0.0| 5.30| 0.024 |  V | 89.7(144.3)
DMG |34.3000|119.8000|06/29/1925|144216.0|  0.0| 6.25| 0.040 |  V | 89.7(144.3)
PAS |36.1820|120.2680|02/14/1987| 72650.8|  6.0| 5.10| 0.022 | IV | 90.4(145.4)
MGI |35.0000|120.5000|11/19/1927| 332 0.0|  0.0| 5.00| 0.021 | IV | 90.8(146.1)
MGI |34.8000|120.4000|12/12/1902| 0 0 0.0|  0.0| 5.70| 0.030 |  V | 91.0(146.4)
GSB |35.9170|120.4650|12/20/1994|102747.2|  8.0| 5.00| 0.021 | IV | 91.0(146.5)
BRK |36.2200|120.2600|09/09/1983| 91614.0|  0.0| 5.40| 0.025 |  V | 91.6(147.
```

```
                                        -------------------------
                                        EARTHQUAKE SEARCH RESULTS
                                        -------------------------

Page  3
-------------------------------------------------------------------------------
    |       |        |          |  TIME  |     |     | SITE  |SITE|  APPROX.
FILE|  LAT. |  LONG. |   DATE   |  (UTC) |DEPTH|QUAKE|  ACC. | MM |  DISTANCE
CODE| NORTH |  WEST  |          | H M Sec| (km)| MAG.|   g   |INT.|  mi  [km]
----+-------+--------+----------+--------+-----+-----+-------+----+-----------
MGI |35.5000|120.6000|01/01/1830| 0 0 0.0|  0.0| 5.00| 0.020 | IV | 91.9(148.0)
DMG |35.9300|120.4800|12/24/1934|1626 0.0|  0.0| 5.00| 0.020 | IV | 92.1(148.3)
DMG |35.9500|120.4700|11/16/1956| 323 9.0|  0.0| 5.00| 0.020 | IV | 92.2(148.3)
DMG |36.1700|120.3200|12/27/1926| 919 0.0|  0.0| 5.00| 0.020 | IV | 92.2(148.4)
DMG |34.0650|119.0350|02/21/1973|144557.3|  8.0| 5.90| 0.033 |  V | 92.6(149.0)
BRK |36.2200|120.2900|05/02/1983|234239.0|  0.0| 6.70| 0.049 | VI | 92.9(149.5)
BRK |36.2200|120.2900|05/02/1983|2346 6.0|  0.0| 5.60| 0.028 |  V | 92.9(149.5)
DMG |34.1000|119.4000|05/19/1893| 035 0.0|  0.0| 5.50| 0.026 |  V | 93.4(150.3)
DMG |35.9500|120.5000|06/28/1966| 42613.4|  0.0| 5.50| 0.026 |  V | 93.7(150.8)
BRK |36.2400|120.2900|05/09/1983| 24912.0|  0.0| 5.20| 0.022 | IV | 93.7(150.8)
DMG |35.9700|120.5000|06/28/1966| 4 856.2|  0.0| 5.10| 0.021 | IV | 94.3(151.7)
MGI |36.5800|118.0800|07/06/1917|11 1 0.0|  0.0| 5.70| 0.029 |  V | 95.1(153.1)
DMG |36.0000|120.5000|03/03/1901| 745 0.0|  0.0| 5.50| 0.026 |  V | 95.1(153.1)
DMG |36.0000|120.5000|02/02/1881| 011 0.0|  0.0| 5.60| 0.027 |  V | 95.1(153.1)
DMG |35.9500|120.5300|06/29/1966|195325.9|  0.0| 5.00| 0.020 | IV | 95.3(153.3)
T-A |36.5800|118.0700|08/13/1882| 0 0 0.0|  0.0| 5.00| 0.020 | IV | 95.4(153.5)
T-A |36.5800|118.0700|04/18/1872| 0 0 0.0|  0.0| 5.00| 0.020 | IV | 95.4(153.5)
DMG |34.2000|119.8000|12/21/1812|19 0 0.0|  0.0| 7.00| 0.057 | VI | 95.6(153.9)
MGI |36.6000|118.1000|05/17/1872|21 0 0.0|  0.0| 5.00| 0.020 | IV | 95.7(154.0)
GSP |34.2620|118.0020|06/28/1991|144354.5| 11.0| 5.40| 0.024 |  V | 96.1(154.7)
T-A |35.2500|120.6700|12/17/1852| 0 0 0.0|  0.0| 5.70| 0.028 |  V | 96.4(155.1)
T-A |35.2500|120.6700|00/00/1830| 0 0 0.0|  0.0| 5.70| 0.028 |  V | 96.4(155.1)
BRK |36.2100|120.3800|07/25/1983|223140.0|  0.0| 5.10| 0.021 | IV | 96.6(155.4)
DMG |36.7000|118.3000|08/17/1896|1130 0.0|  0.0| 5.90| 0.031 |  V | 96.9(155.9)
DMG |34.0000|119.0000|09/24/1827| 4 0 0.0|  0.0| 7.00| 0.056 | VI | 97.0(156.2)
MGI |34.0000|119.0000|12/14/1912| 0 0 0.0|  0.0| 5.70| 0.028 |  V | 97.0(156.2)
BRK |36.2000|120.4000|07/22/1983| 343 2.0|  0.0| 5.00| 0.020 | IV | 97.1(156.2)
MGI |35.3000|120.7000|12/07/1906| 640 0.0|  0.0| 5.90| 0.031 |  V | 97.7(157.3)
BRK |36.2200|120.4000|07/22/1983| 23955.0|  0.0| 6.00| 0.033 |  V | 97.9(157.5)
DMG |34.1180|119.7020|07/05/1968| 04517.2|  5.9| 5.20| 0.022 | IV | 98.1(157.9)
MGI |34.6000|120.4000|07/28/1902| 657 0.0|  0.0| 6.30| 0.038 |  V | 98.2(158.0)
MGI |34.6000|120.4000|08/01/1902| 330 0.0|  0.0| 6.30| 0.038 |  V | 98.2(158.0)
BRK |36.2600|120.4000|07/09/1983| 74052.0|  0.0| 5.30| 0.022 | IV | 99.5(160.1)
MGI |34.0800|118.2600|07/16/1920|18 8 0.0|  0.0| 5.00| 0.019 | IV |100.0(160.9)

*******************************************************************************
-END OF SEARCH-   140 EARTHQUAKES FOUND WITHIN THE SPECIFIED SEARCH AREA.

TIME PERIOD OF SEARCH:   1800  TO  2010

LENGTH OF SEARCH TIME:   211  years

THE EARTHQUAKE CLOSEST TO THE SITE IS ABOUT 5.8 MILES (9.3 km) AWAY.

LARGEST EARTHQUAKE MAGNITUDE FOUND IN THE SEARCH RADIUS: 7.9

LARGEST EARTHQUAKE SITE ACCELERATION FROM THIS SEARCH: 0.250 g

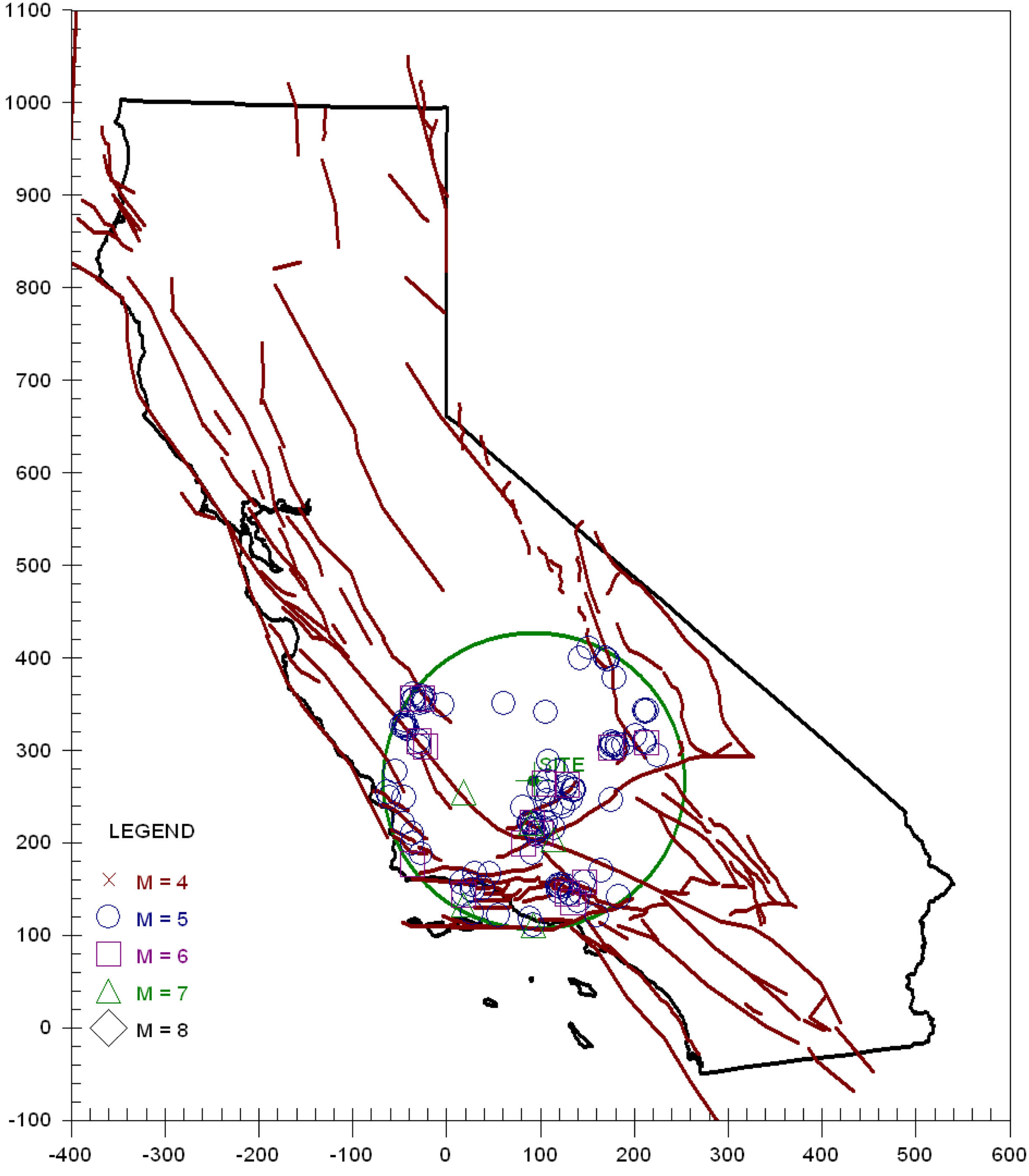
COEFFICIENTS FOR GUTENBERG & RICHTER RECURRENCE RELATION:
  a-value=  1.593
  b-value=  0.403
  beta-value=  0.927
```

```
------------------------------------
TABLE OF MAGNITUDES AND EXCEEDANCES:
------------------------------------

  Earthquake | Number of Times | Cumulative
   Magnitude |    Exceeded     | No. / Year
  -----------+-----------------+-----------
     4.0     |      140        |   0.66667
     4.5     |      140        |   0.66667
     5.0     |      140        |   0.66667
     5.5     |       55        |   0.26190
     6.0     |       22        |   0.10476
     6.5     |        8        |   0.03810
     7.0     |        5        |   0.02381
     7.5     |        2        |   0.00952
```

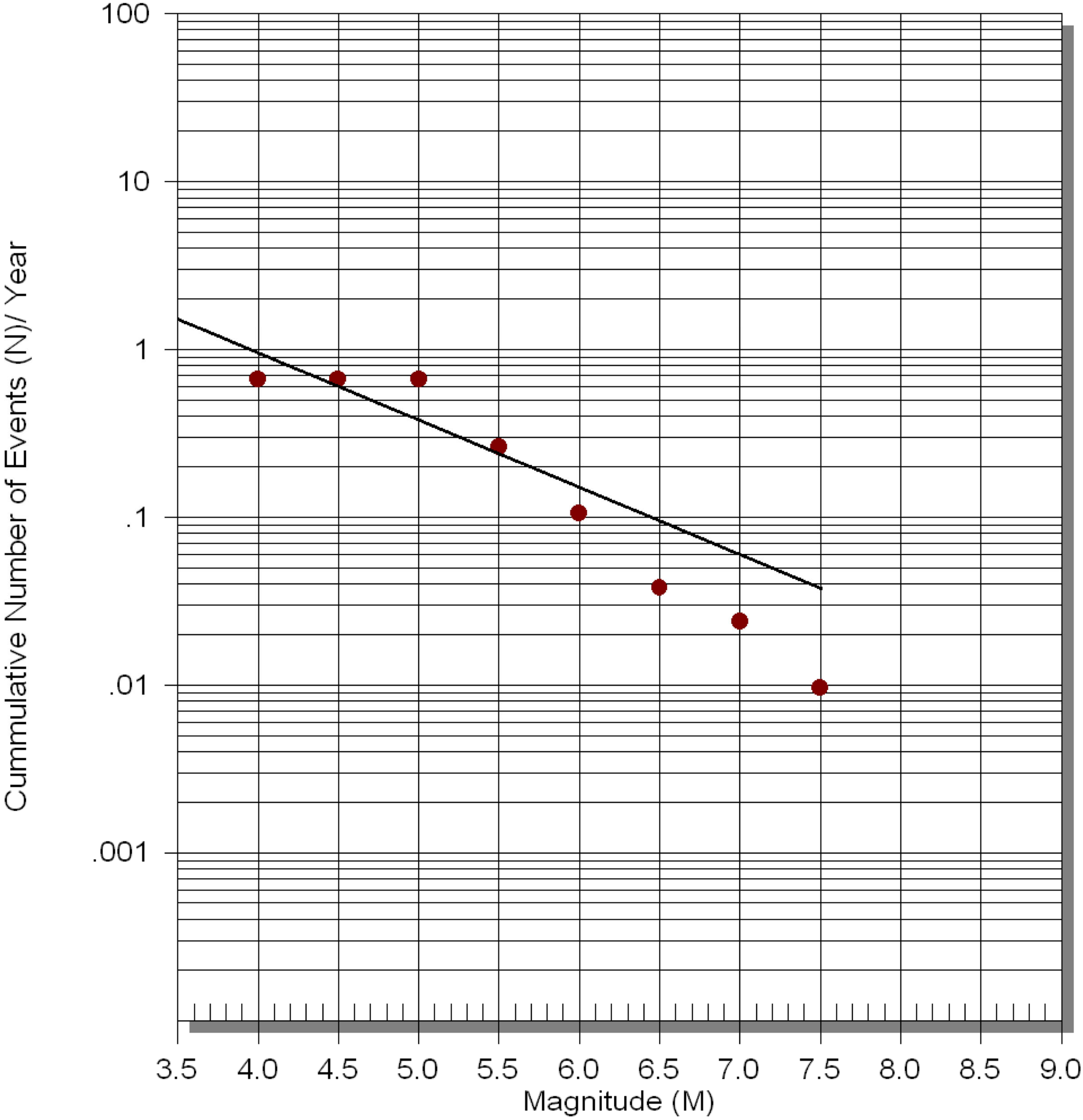
EARTHQUAKE EPICENTER MAP

18248 BC



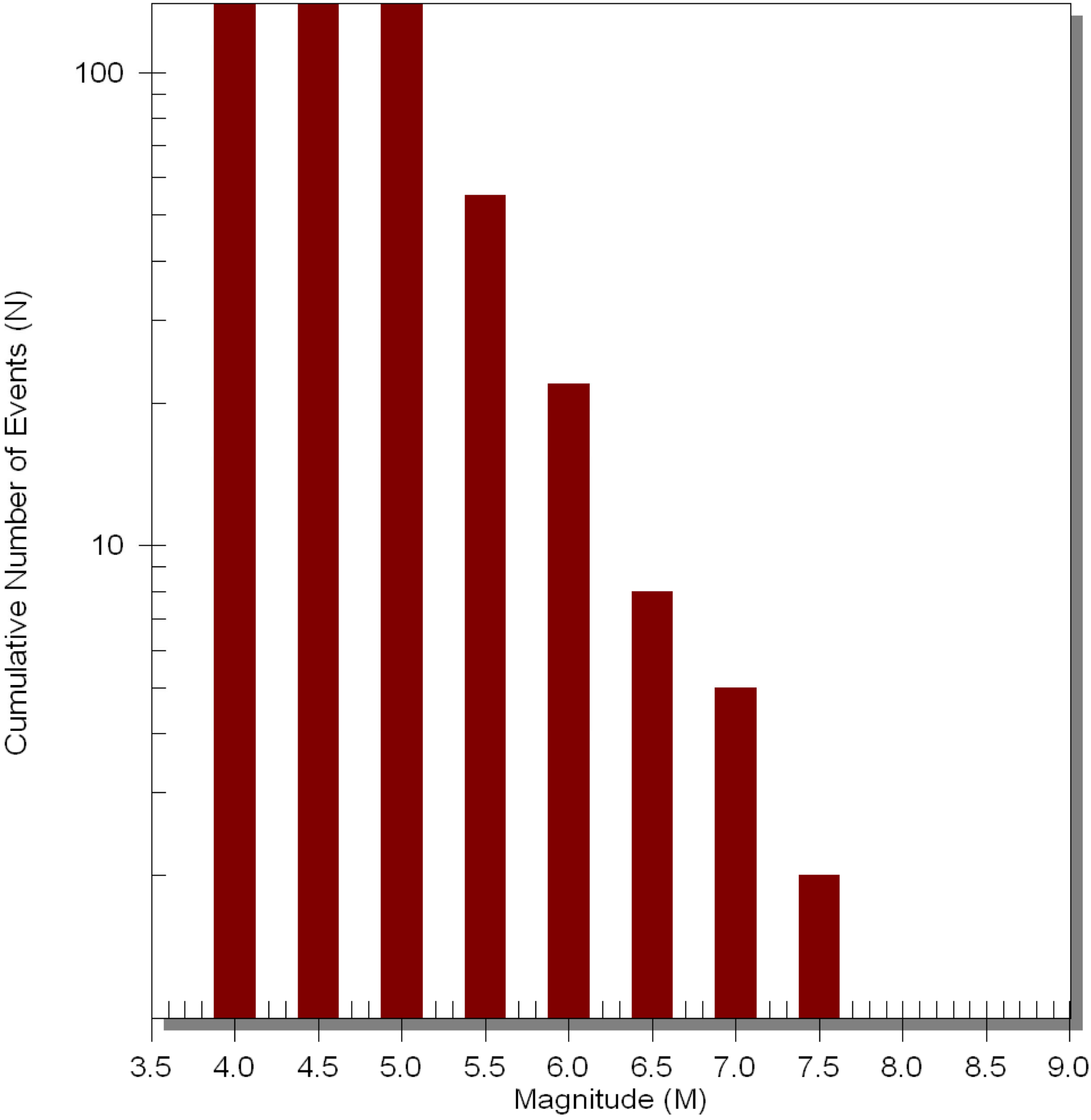
EARTHQUAKE RECURRENCE CURVE

18248 BC



Number of Earthquakes (N) Above Magnitude (M)

18248 BC



KCCD New Residence Housing

Latitude, Longitude: 35.405447, -118.969431

Date	12/15/2021, 3:11:16 PM
Design Code Reference Document	ASCE7-16
Risk Category	III
Site Class	D - Stiff Soil

Type	Value	Description
S_S	0.906	MCE_R ground motion. (for 0.2 second period)
S_1	0.326	MCE_R ground motion. (for 1.0s period)
S_{MS}	1.031	Site-modified spectral acceleration value
S_{M1}	null -See Section 11.4.8	Site-modified spectral acceleration value
S_{DS}	0.687	Numeric seismic design value at 0.2 second SA
S_{D1}	null -See Section 11.4.8	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	null -See Section 11.4.8	Seismic design category
F_a	1.137	Site amplification factor at 0.2 second
F_v	null -See Section 11.4.8	Site amplification factor at 1.0 second
PGA	0.392	MCE_G peak ground acceleration
F_{PGA}	1.208	Site amplification factor at PGA
PGA_M	0.474	Site modified peak ground acceleration
T_L	12	Long-period transition period in seconds
SsRT	0.906	Probabilistic risk-targeted ground motion. (0.2 second)
SsUH	0.98	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	1.5	Factored deterministic acceleration value. (0.2 second)
S1RT	0.326	Probabilistic risk-targeted ground motion. (1.0 second)
S1UH	0.354	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S1D	0.6	Factored deterministic acceleration value. (1.0 second)
PGAd	0.5	Factored deterministic acceleration value. (Peak Ground Acceleration)
C_{RS}	0.925	Mapped value of the risk coefficient at short periods
C_{R1}	0.922	Mapped value of the risk coefficient at a period of 1 s

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U.S. Geological Survey - Earthquake Hazards Program

Unified Hazard Tool

Please do not use this tool to obtain ground motion parameter values for the design code reference documents covered by the U.S. Seismic Design Maps web tools (e.g., the International Building Code and the ASCE 7 or 41 Standard). The values returned by the two applications are not identical.

Input

Edition

Dynamic: Conterminous U.S. 2014 (u…

Latitude

Decimal degrees

35.405447

Longitude

Decimal degrees, negative values for western longitudes

-118.969431

Site Class

259 m/s (Site class D)

Spectral Period

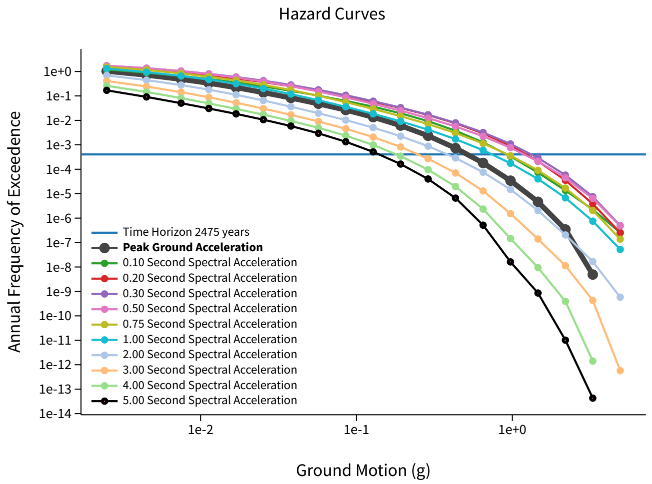
Peak Ground Acceleration

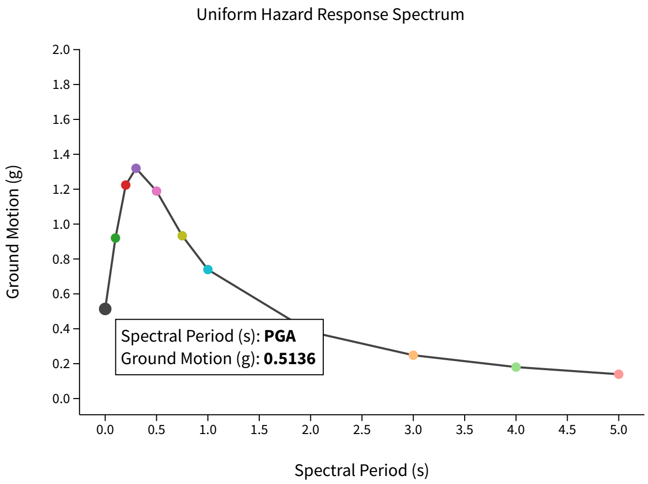
Time Horizon

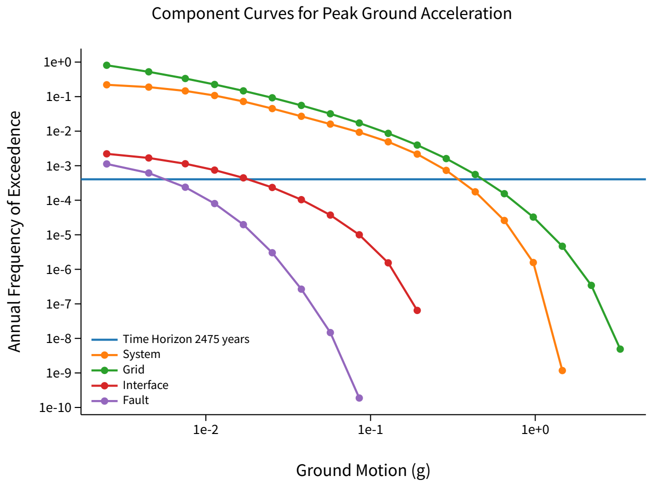
Return period in years

2475

Hazard Curve


Hazard Curves


Uniform Hazard Response Spectrum

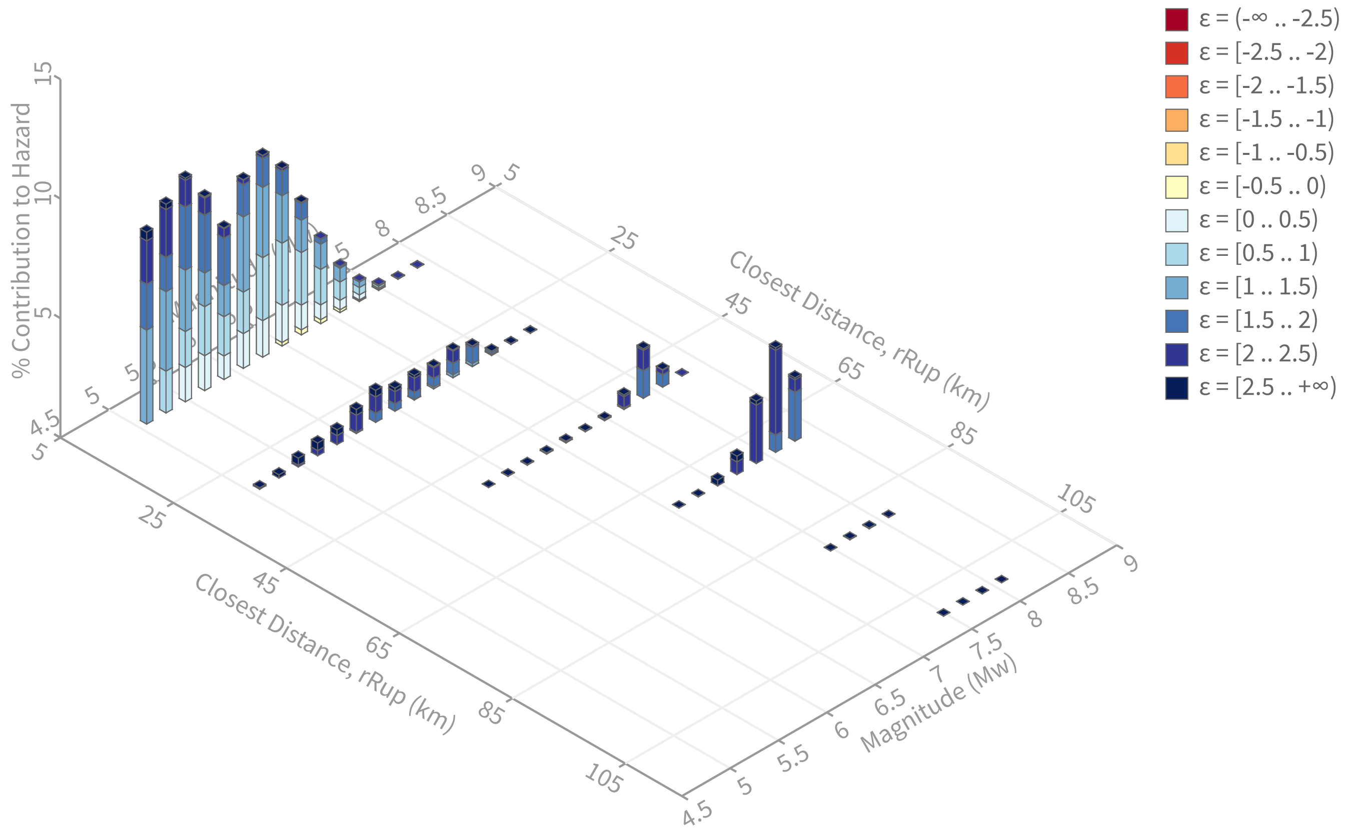

Component Curves for Peak Ground Acceleration

View Raw Data

^ Deaggregation

Component

Total



Summary statistics for, Deaggregation: Total

Deaggregation targets

Return period: 2475 yrs
Exceedance rate: 0.0004040404 yr^{-1}
PGA ground motion: 0.51362941 g

Recovered targets

Return period: 2809.1581 yrs
Exceedance rate: 0.00035597854 yr^{-1}

Totals

Binned: 100 %
Residual: 0 %
Trace: 0.14 %

Mean (over all sources)

m: 6.3
r: 18.5 km
ε₀: 1.4 σ

Mode (largest m-r bin)

m: 5.5
r: 9.35 km
ε₀: 1.31 σ
Contribution: 9.35 %

Mode (largest m-r-ε₀ bin)

m: 5.1
r: 5.64 km
ε₀: 1.22 σ
Contribution: 3.93 %

Discretization

r: min = 0.0, max = 1000.0, Δ = 20.0 km
m: min = 4.4, max = 9.4, Δ = 0.2
ε: min = -3.0, max = 3.0, Δ = 0.5 σ

Epsilon keys

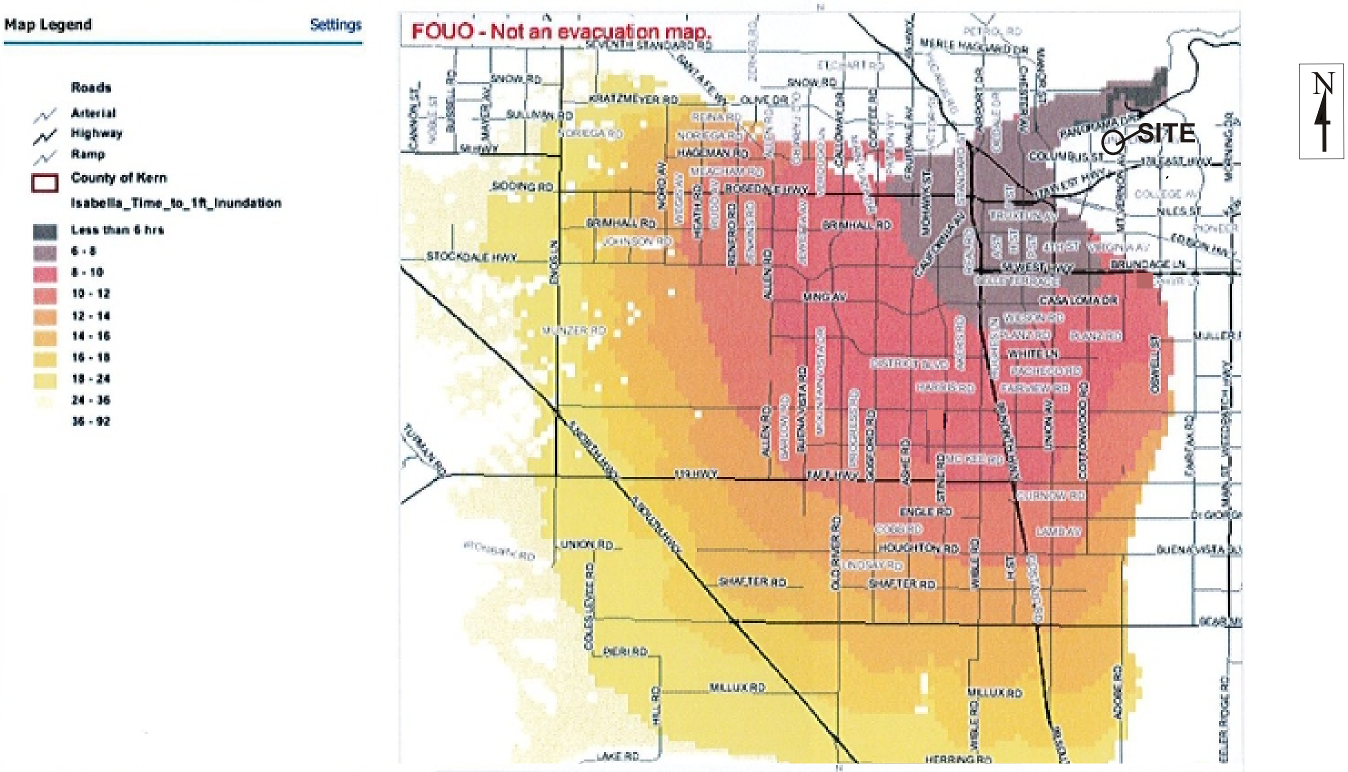
ε0: [-∞ .. -2.5)
ε1: [-2.5 .. -2.0)
ε2: [-2.0 .. -1.5)
ε3: [-1.5 .. -1.0)
ε4: [-1.0 .. -0.5)
ε5: [-0.5 .. 0.0)
ε6: [0.0 .. 0.5)
ε7: [0.5 .. 1.0)
ε8: [1.0 .. 1.5)
ε9: [1.5 .. 2.0)
ε10: [2.0 .. 2.5)
ε11: [2.5 .. +∞]

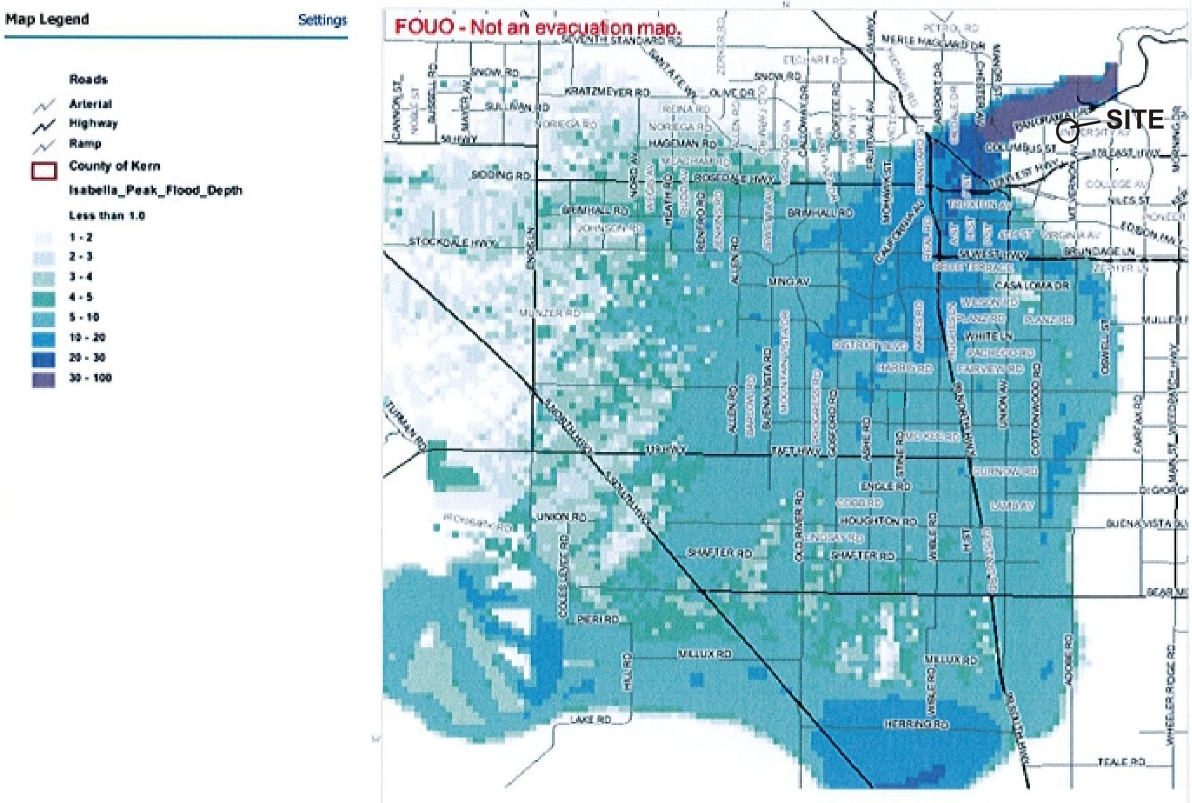
Deaggregation Contributors

Source Set ↳ Source	Type	r	m	ε_0	lon	lat	az	%
UC33brAvg_FM31 (opt)	Grid							41.97
PointSourceFinite: -118.969, 35.428		5.57	5.71	0.76	118.969°W	35.428°N	0.00	6.01
PointSourceFinite: -118.969, 35.428		5.57	5.71	0.76	118.969°W	35.428°N	0.00	6.00
PointSourceFinite: -118.969, 35.464		7.77	5.83	1.06	118.969°W	35.464°N	0.00	3.45
PointSourceFinite: -118.969, 35.464		7.77	5.83	1.06	118.969°W	35.464°N	0.00	3.43
PointSourceFinite: -118.969, 35.518		11.76	6.05	1.43	118.969°W	35.518°N	0.00	2.36
PointSourceFinite: -118.969, 35.518		11.76	6.05	1.43	118.969°W	35.518°N	0.00	2.35
PointSourceFinite: -118.969, 35.500		10.38	5.97	1.32	118.969°W	35.500°N	0.00	1.39
PointSourceFinite: -118.969, 35.500		10.38	5.97	1.32	118.969°W	35.500°N	0.00	1.39
PointSourceFinite: -118.969, 35.509		11.06	6.01	1.37	118.969°W	35.509°N	0.00	1.27
PointSourceFinite: -118.969, 35.509		11.06	6.01	1.37	118.969°W	35.509°N	0.00	1.27
PointSourceFinite: -118.969, 35.545		13.88	6.16	1.58	118.969°W	35.545°N	0.00	1.24
PointSourceFinite: -118.969, 35.545		13.88	6.16	1.58	118.969°W	35.545°N	0.00	1.23
PointSourceFinite: -118.969, 35.527		12.46	6.08	1.48	118.969°W	35.527°N	0.00	1.14
PointSourceFinite: -118.969, 35.527		12.46	6.08	1.48	118.969°W	35.527°N	0.00	1.13
UC33brAvg_FM32 (opt)	Grid							41.92
PointSourceFinite: -118.969, 35.428		5.57	5.71	0.76	118.969°W	35.428°N	0.00	6.00
PointSourceFinite: -118.969, 35.428		5.57	5.71	0.76	118.969°W	35.428°N	0.00	5.99
PointSourceFinite: -118.969, 35.464		7.78	5.83	1.06	118.969°W	35.464°N	0.00	3.44
PointSourceFinite: -118.969, 35.464		7.78	5.83	1.06	118.969°W	35.464°N	0.00	3.43
PointSourceFinite: -118.969, 35.518		11.76	6.05	1.43	118.969°W	35.518°N	0.00	2.36
PointSourceFinite: -118.969, 35.518		11.76	6.05	1.43	118.969°W	35.518°N	0.00	2.35
PointSourceFinite: -118.969, 35.500		10.38	5.97	1.32	118.969°W	35.500°N	0.00	1.39
PointSourceFinite: -118.969, 35.500		10.38	5.97	1.32	118.969°W	35.500°N	0.00	1.39
PointSourceFinite: -118.969, 35.509		11.06	6.01	1.37	118.969°W	35.509°N	0.00	1.27
PointSourceFinite: -118.969, 35.509		11.06	6.01	1.37	118.969°W	35.509°N	0.00	1.27
PointSourceFinite: -118.969, 35.545		13.88	6.16	1.58	118.969°W	35.545°N	0.00	1.24
PointSourceFinite: -118.969, 35.545		13.88	6.16	1.58	118.969°W	35.545°N	0.00	1.23
PointSourceFinite: -118.969, 35.527		12.46	6.08	1.48	118.969°W	35.527°N	0.00	1.14
PointSourceFinite: -118.969, 35.527		12.46	6.08	1.48	118.969°W	35.527°N	0.00	1.13
UC33brAvg_FM31	System							8.08
San Andreas (Big Bend) [3]		63.64	8.07	2.13	119.128°W	34.848°N	193.18	5.00
UC33brAvg_FM32	System							8.02
San Andreas (Big Bend) [3]		63.64	8.08	2.13	119.128°W	34.848°N	193.18	4.98

Appendix B

Boring Logs, Lake Isabella Flood Inundation Map, Flood Insurance Rate Map, and Lab Results Table.





Source: Kern County Map Info System, US Army Corps of Engineers Preliminary Flood Results

SOILS ENGINEERING, INC.
4400 Yeager Way
Bakersfield, CA 93313
(661) 831 - 5100

DATE: 1/22
PROJECT: #18248

Bakersfield College New Residence Hall
NW of University Ave. & Mt. Vernon Ave.
Bakersfield, CA

Lake Isabella Dam Inundation Maps

PLATE

National Flood Hazard Layer FIRMette

FEMA

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS	🟦	Without Base Flood Elevation (BFE) *Zone A, V, A99* With BFE or Depth *Zone AE, AO, AH, VE, AR*
	▨	Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD	🟧	0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
	▨	Future Conditions 1% Annual Chance Flood Hazard *Zone X*
	▨	Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
	▨	Area with Flood Risk due to Levee *Zone D*
OTHER AREAS	NO SCREEN	Area of Minimal Flood Hazard *Zone X*
	▭	Effective LOMRs
	▭	Area of Undetermined Flood Hazard *Zone D*
GENERAL STRUCTURES	- — - -	Channel, Culvert, or Storm Sewer
	ıııııııı	Levee, Dike, or Floodwall
OTHER FEATURES	(B) 20.2	Cross Sections with 1% Annual Chance
	17.5	Water Surface Elevation
	8 - - -	Coastal Transect
	~~ 513 ~~~	Base Flood Elevation Line (BFE)
	═	Limit of Study
	—	Jurisdiction Boundary
	--- ---	Coastal Transect Baseline
	- —	Profile Baseline
	—	Hydrographic Feature
MAP PANELS	☐	Digital Data Available
	☐	No Digital Data Available
	☒	Unmapped
		N
📍		The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 1/4/2022 at 2:24 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

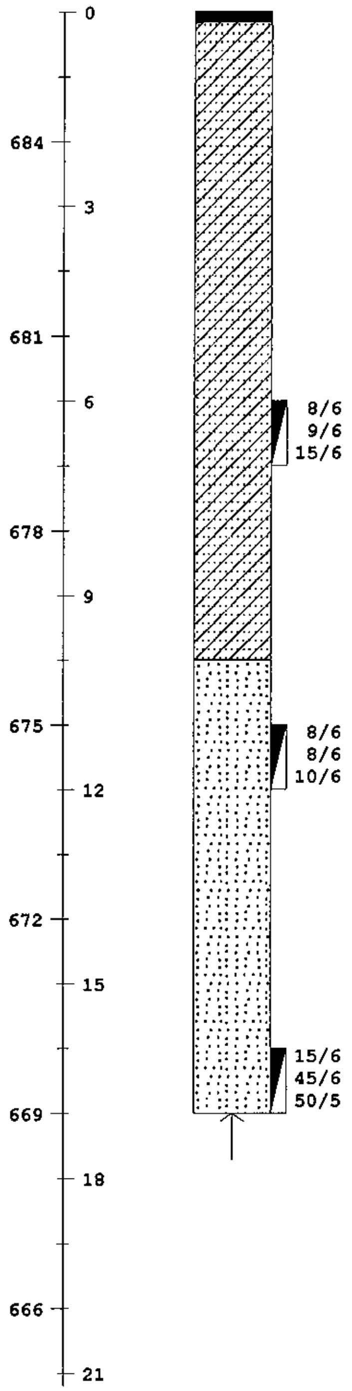
This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

SOILS ENGINEERING, INC. 4400 Yeager Way Bakersfield, CA 93313 (661) 831 - 5100 DATE: 1/22 PROJECT: #18248	**Bakersfield College New Residence Hall** **NW of University Ave. & Mt. Vernon Ave.** **Bakersfield, CA** **FEMA Flood Insurance Rate Map**	**PLATE**

LOG OF TEST BORING
BORING B-1

PROJECT: *New BC Residence Hall*
BORING DATE: *12/6/21*
BORING LOCATION: *See Boring Location Map, Figure 1*
DRILL METHOD: *4.25" I.D. Hollow-Stem Auger*
DESCRIPTION: *Geotechnical & Geologic Engineering Services*
DEPTH TO WATER - ▽ **:** *N/A*
CAVING - ➤ **:** *N/A*

FILE NO: *18248*
ELEV.: *686'*
START: *12/6/21*
FINISH: *12/6/21*
LOGGER: *M. WATTS*

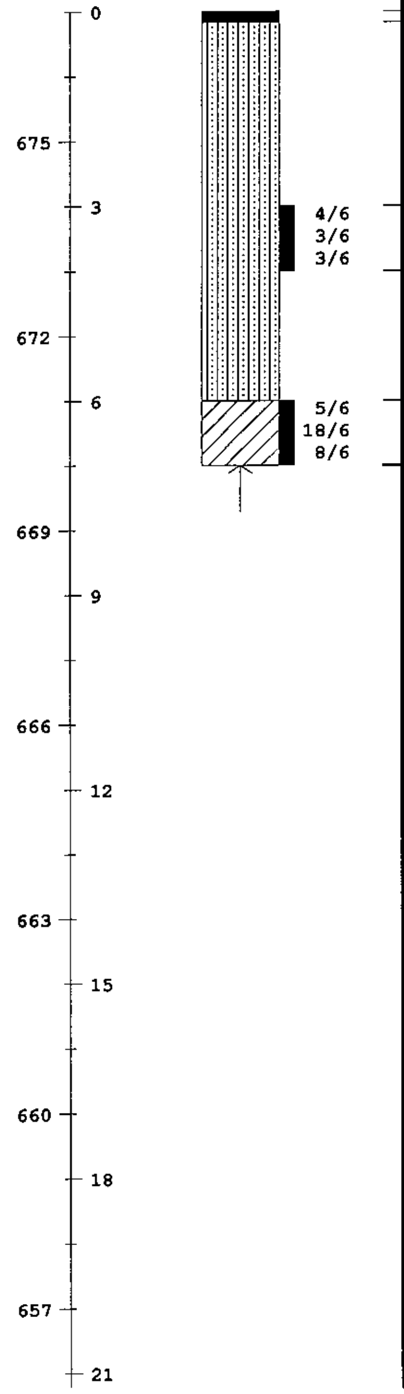


ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Description	Remarks	Density pcf	Moisture %
		SC	Approx. 2 inches asphaltic concrete.			
			CLAYEY SAND; yellowish brown, dry, fine, cobbles.			
			Slow drilling due to cobbles.			
	8/6 9/6 15/6		Medium dense, gravel/cobbles.			6.3
			Slow drilling continued.			
	8/6 8/6 10/6	SP	POORLY GRADED SAND; light yellowish brown, dry, fine, gravel.			2.5
			Slow drilling continued.			
	15/6 45/6 50/5		Very dense.			1.9
			BOTTOM.	Refusal due to rock.		

LOG OF TEST BORING
BORING B-2

PROJECT: *New BC Residence Hall*
BORING DATE: *12/6/21*
BORING LOCATION: *See Boring Location Map, Figure 1*
DRILL METHOD: *4.25" I.D. Hollow-Stem Auger*
DESCRIPTION: *Geotechnical & Geologic Engineering Services*
DEPTH TO WATER - ⊻ **:** *N/A*
CAVING - ➧ **:** *N/A*

FILE NO: *18248*
ELEV.: *677'*
START: *12/6/21*
FINISH: *12/6/21*
LOGGER: *M. WATTS*



ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Description	Remarks	Density pcf	Moisture %
0		SM	Approx. 2 inches of asphaltic concrete. SILTY SAND; light yellowish brown, dry, fine, rock.			
3	4/6 3/6 3/6		Medium stiff.		120.8	10.2
			Slow drilling due to rock.			
6	5/6 18/6 8/6	CL	SANDY CLAY; brown, low plasticity, fine, trace of gravel, medium dense.	Refusal due to rock.	94.2	8.6
			BOTTOM.			

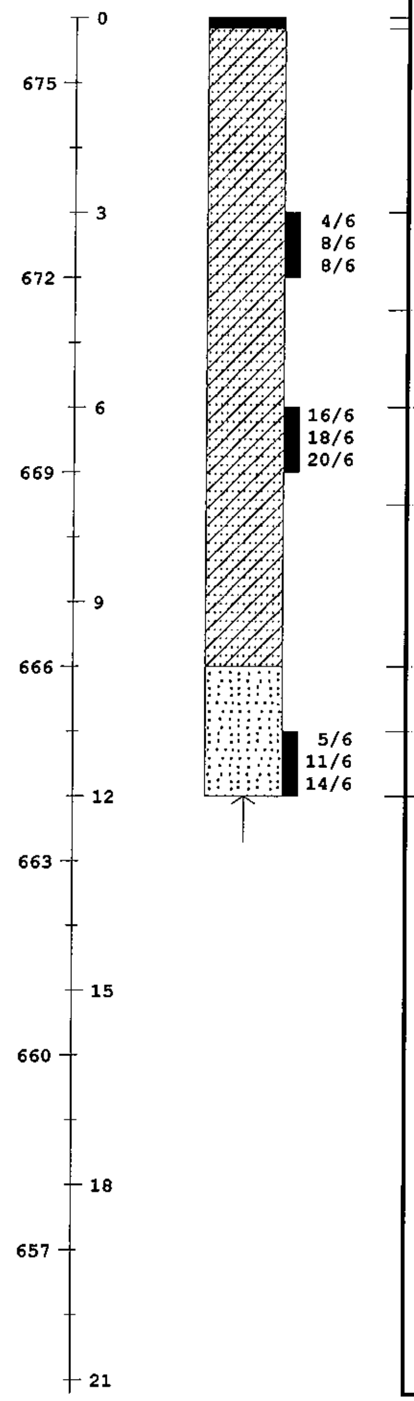
Figure Number 3

LOG OF TEST BORING
BORING B-3

PROJECT: *New BC Residence Hall*
BORING DATE: *12/6/21*
BORING LOCATION: *See Boring Location Map, Figure 1*
DRILL METHOD: *4.25" I.D. Hollow-Stem Auger*
DESCRIPTION: *Geotechnical & Geologic Engineering Services*
DEPTH TO WATER - ▽ **:** *N/A*
CAVING - ➤ **:** *N/A*

FILE NO: *18248*
ELEV.: *676'*
START: *12/6/21*
FINISH: *12/6/21*
LOGGER: *M. WATTS*

ELEVATION/ DEPTH (feet) | SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA



USCS	Description	Remarks	Density pcf	Moisture %
SC	Approx. 2 inches of asphaltic concrete.			
	CLAYEY SAND; light brown, dry, fine, rock.			
	Medium dense.		104.5	9.2
	Slow drilling due to rock.			
	Dense.		104.7	5.2
	Slow drilling continues.			
SP	POORLY GRADED SAND; light yellowish brown, dry, fine, gravel/rock.			
	Medium dense.	Refusal due to rock.	109.8	1.9
	BOTTOM.			

Figure Number 4

LOG OF TEST BORING
BORING B-4

Page 1 of 1

PROJECT: *New BC Residence Hall*
BORING DATE: *12/7/21*
BORING LOCATION: *See Boring Location Map, Figure 1*
DRILL METHOD: *4.25" I.D. Hollow-Stem Auger*
DESCRIPTION: *Geotechnical & Geologic Engineering Services*
DEPTH TO WATER - ⩧ **:** *N/A*
CAVING - ➧ **:** *N/A*

FILE NO: *18248*
ELEV.: *678'*
START: *12/7/21*
FINISH: *12/7/21*
LOGGER: *M. WATTS*

ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Description	Remarks	Density pcf	Moisture %
678 — 0		SM	Approx. 2 inches of asphaltic concrete.			
			SILTY SAND; brown, damp, trace of clay, cohesive, gravel.			
675 — 3	4/6 4/6 5/6		Loose.		109.8	14.8
			Cobbles.			
672 — 6	12/6 12/6 11/6		Medium dense.		114.0	6.0
			Slow/hard drilling due to cobbles.			
			BOTTOM.	Refusal due to rock.		
669 — 9						
666 — 12						
663 — 15						
660 — 18						
657 — 21						

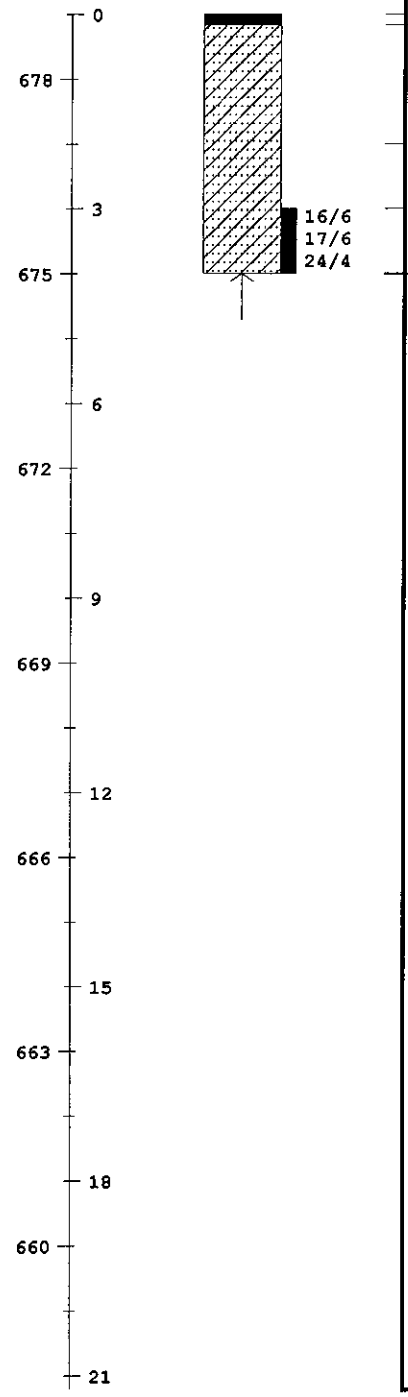
Figure Number

LOG OF TEST BORING
BORING B-5

Page 1 of 1

PROJECT: *New BC Residence Hall*
BORING DATE: *12/7/21*
BORING LOCATION: *See Boring Location Map, Figure 1*
DRILL METHOD: *4.25" I.D. Hollow-Stem Auger*
DESCRIPTION: *Geotechnical & Geologic Engineering Services*
DEPTH TO WATER - ≛ **:** *N/A*
CAVING - ➧ **:** *N/A*

FILE NO: *18248*
ELEV.: *679'*
START: *12/7/21*
FINISH: *12/7/21*
LOGGER: *M. WATTS*



USCS	Description	Remarks	Density pcf	Moisture %
SC	Approx. 2 inches asphaltic concrete.			
	CLAYEY SAND; light yellowish brown, dry to damp, fine, gravel.			
	Cobbles.			
	Dense.		114.0	1.6
	BOTTOM.	Refusal due to rock.		

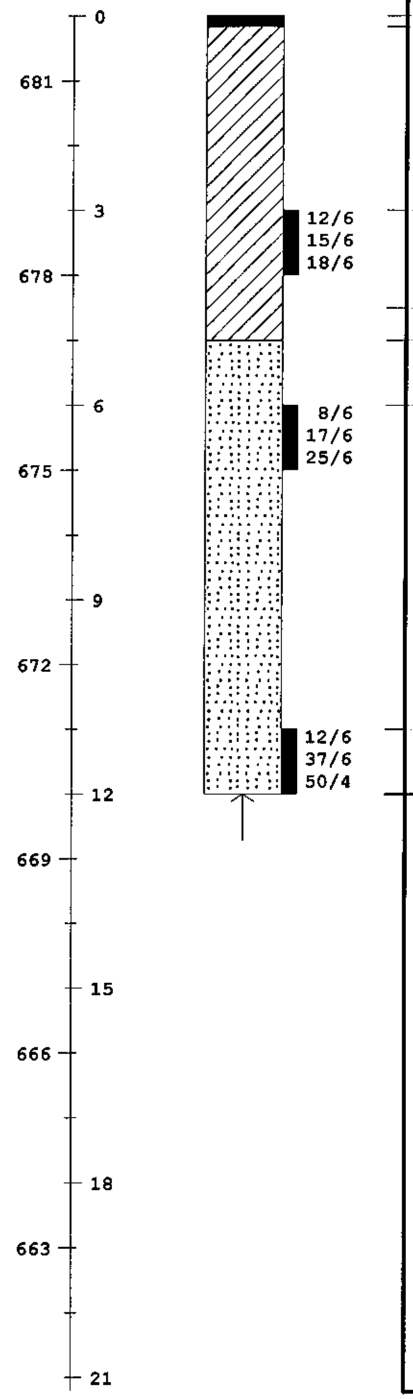
Figure Number 6

LOG OF TEST BORING
BORING B-6

Page 1 of 1

PROJECT: *New BC Residence Hall*
BORING DATE: *12/7/21*
BORING LOCATION: *See Boring Location Map, Figure 1*
DRILL METHOD: *4.25" I.D. Hollow-Stem Auger*
DESCRIPTION: *Geotechnical & Geologic Engineering Services*
DEPTH TO WATER - ▽ **:** *N/A*
CAVING - ➤ **:** *N/A*

FILE NO: *18248*
ELEV.: *682'*
START: *12/7/21*
FINISH: *12/7/21*
LOGGER: *M. WATTS*



ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Description	Remarks	Density pcf	Moisture %
0		CL	Approx. 2 inches asphaltic concrete.			
			SANDY CLAY; light brown, dry, low plasticity, cobbles.			
3	12/6 15/6 18/6		Hard.		100.9	3.8
			Hard drilling.			
6	8/6 17/6 25/6	SP	POORLY GRADED SAND; light yellowish brown, dry, non cohesive, gravel/cobbles.		126.3	2.0
			Dense.			
	12/6 37/6 50/4		Very dense.		122.6	3.8
12			BOTTOM.	Refusal due to rock.		

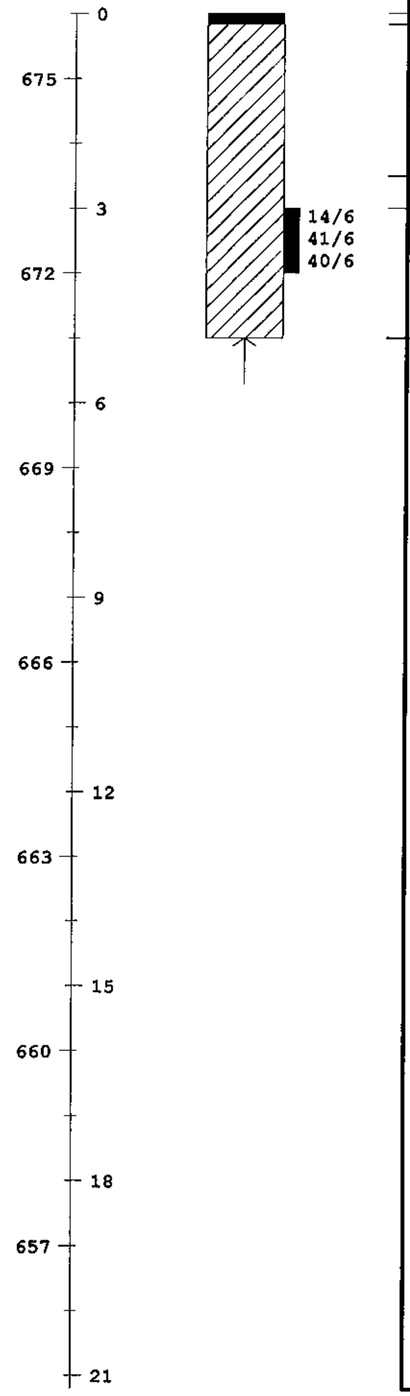
Figure Number 7

LOG OF TEST BORING
BORING B-7

Page 1 of 1

PROJECT: *New BC Residence Hall*
BORING DATE: *12/7/21*
BORING LOCATION: *See Boring Location Map, Figure 1*
DRILL METHOD: *4.25" I.D. Hollow-Stem Auger*
DESCRIPTION: *Geotechnical & Geologic Engineering Services*
DEPTH TO WATER - ≡ : *N/A*
CAVING - ➤ : *N/A*

FILE NO: *18248*
ELEV.: *676'*
START: *12/7/21*
FINISH: *12/7/21*
LOGGER: *M. WATTS*



ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Description	Remarks	Density pcf	Moisture %
		CL	Approx. 2 inches asphaltic concrete.			
			SANDY CLAY; brown, damp, low plasticity, cobbles.			
			Hard drilling.			
	14/6 41/6 40/6		Hard.		125.7	1.9
			BOTTOM.	Refusal due to rock.		

Figure Number 8

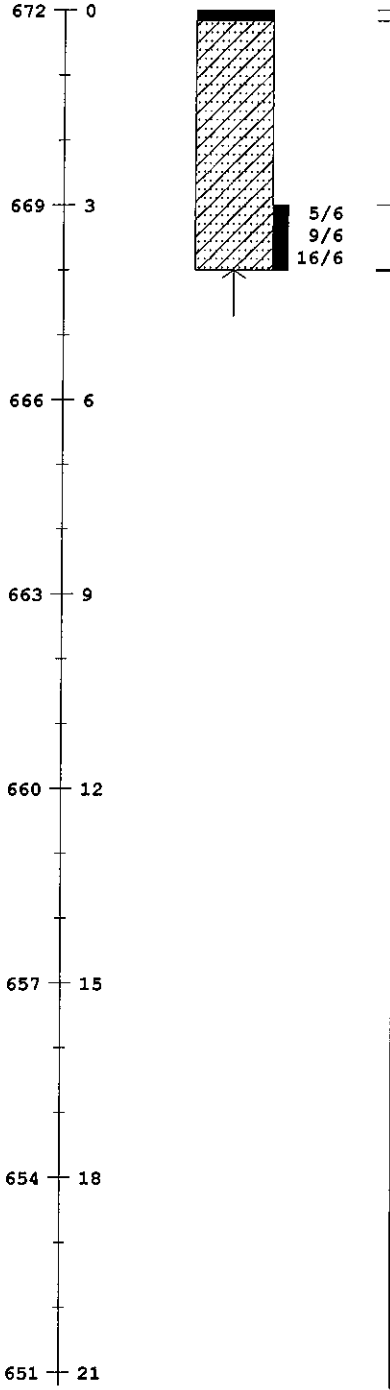
LOG OF TEST BORING
BORING B-8

Page 1 of 1

PROJECT: *New BC Residence Hall*
BORING DATE: *12/7/21*
BORING LOCATION: *See Boring Location Map, Figure 1*
DRILL METHOD: *4.25" I.D. Hollow-Stem Auger*
DESCRIPTION: *Geotechnical & Geologic Engineering Services*
DEPTH TO WATER - ▽ **:** *N/A*
CAVING - ➤ **:** *N/A*

FILE NO: *18248*
ELEV.: *672'*
START: *12/7/21*
FINISH: *12/7/21*
LOGGER: *M. WATTS*

ELEVATION/ DEPTH (feet) | SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA



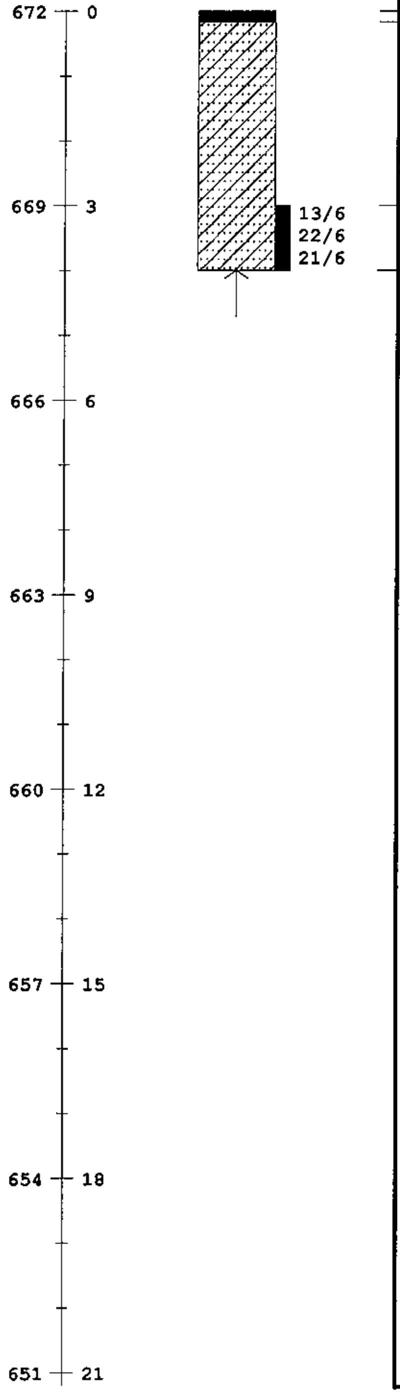
USCS	Description	Remarks	Density pcf	Moisture %
SC	Approx. 2 inches asphaltic concrete.			
	CLAYEY SAND; yellowish brown, damp, fine, cobbles, hard drilling.			
	Medium dense.		123.3	3.8
	BOTTOM.	Refusal due to rock.		

Figure Number 9

LOG OF TEST BORING
BORING B-9

PROJECT: *New BC Residence Hall*
BORING DATE: *12/7/21*
BORING LOCATION: *See Boring Location Map, Figure 1*
DRILL METHOD: *4.25" I.D. Hollow-Stem Auger*
DESCRIPTION: *Geotechnical & Geologic Engineering Services*
DEPTH TO WATER - ≖ : *N/A*
CAVING - ► : *N/A*

FILE NO: *18248*
ELEV.: *672'*
START: *12/7/21*
FINISH: *12/7/21*
LOGGER: *M. WATTS*



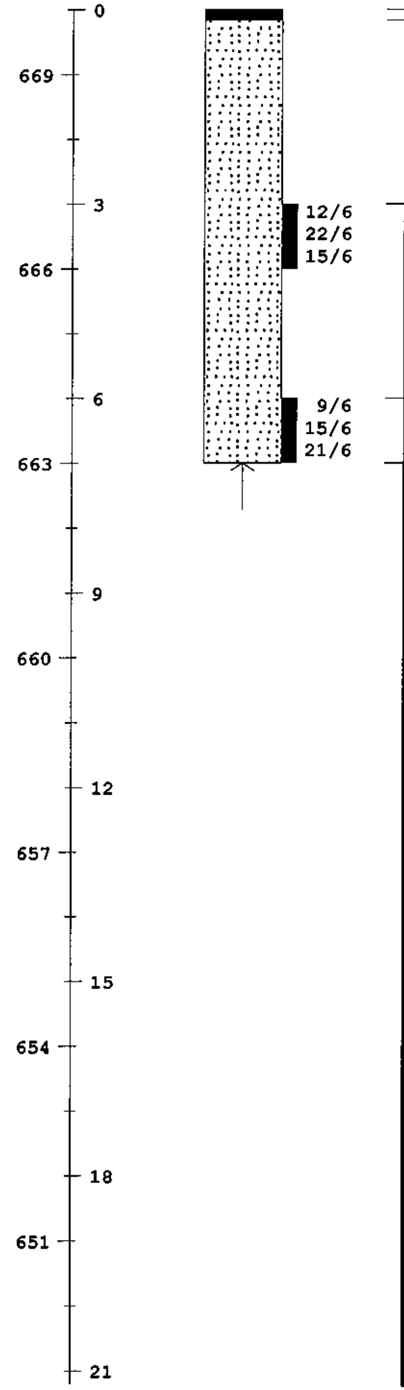
ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Description	Remarks	Density pcf	Moisture %
672 / 0		SC	Approx. 2 inches asphaltic concrete.			
			CLAYEY SAND; yellowish brown, damp, low plasticity, fine, gravel/cobbles.			
669 / 3	13/6 22/6 21/6		Dense.		103.2	6.2
			BOTTOM.	Refusal due to rock.		
666 / 6						
663 / 9						
660 / 12						
657 / 15						
654 / 18						
651 / 21						

LOG OF TEST BORING
BORING B-10

Page 1 of 1

PROJECT: *New BC Residence Hall*
BORING DATE: *12/7/21*
BORING LOCATION: *See Boring Location Map, Figure 1*
DRILL METHOD: *4.25" I.D. Hollow-Stem Auger*
DESCRIPTION: *Geotechnical & Geologic Engineering Services*
DEPTH TO WATER - ▼ **:** *N/A*
CAVING - ➤ **:** *N/A*

FILE NO: *18248*
ELEV.: *670'*
START: *12/7/21*
FINISH: *12/7/21*
LOGGER: *M. WATTS*



ELEVATION/ DEPTH (feet)	SOIL SYMBOLS SAMPLER SYMBOLS AND FIELD TEST DATA	USCS	Description	Remarks	Density pcf	Moisture %
0		SP	Approx. 2 inches of asphaltic concrete.			
			POORLY GRADED SAND; light yellowish brown, non cohesive, dry to damp.			
3	12/6 22/6 15/6		Dense.		112.2	6.7
6	9/6 15/6 21/6		Slow drilling due to cobbles.		109.1	3.7
663			BOTTOM.	Refusal due to rock.		

KEY TO SYMBOLS

Symbol	Description
Strata symbols	
■	Paving
▨	Clayey sand
░	Poorly graded sand
▥	Silty sand
▨	Low plasticity clay
Misc. Symbols	
↑	Drill rejection
Soil Samplers	
◩	Standard penetration test
▮	California sampler

Notes:

1. Ten (10) exploratory borings were drilled between 12/06/2021 and 12/07/2021 using an 8-inch outside diameter hollow-stem auger.

2. No free groundwater was encountered to the maximum depth drilled of 17'.

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 conducted on samples recovered are reported on the logs.

Kern Community College District

Geotechnical Engineering Services
New BC Residence Hall
1801 Panorama Drive, Bakersfield, CA

SEI File No. 21-18248
December 27, 2021

TABLE 1

TEST LOCATION	USCS	% < # 200	CONSOLIDATION				DIRECT SHEAR		UNCONFINED COMPRESSION		E.I.	ATTERBERG LIMITS			R-VALUE @ 300 psi		MAXIMUM DENSITY	
			C_c	C_s	S.P. (psf)	HV %	C, (ksf)	F.A.	Q_U, (psi)	C, (ksf)		LL	PL	PI	R.V.	E.P. (psi)	MDD (pcf)	O.M.
B-2 @ 3'	SM	46	0.05	0.01	0	-0.7												
B-2 @ 6'	CL						0.09	30										
B-3 @ 0-5'	SC	49									39							
B-3 @ 3'	SC	33	0.04	0.01	960	0.2												
B-4 @ 0-5'	SM	39									0							
B-4 @ 6'	SM	2	0.04	0	0	0												
B-6 @ 6'	SP						0	42.4										
B-7 @ 0-5'	SM	20									0							
B-8 @ 3'	SC	34	0.04	0	0	-0.5												
B-9 @ 3'	SC						0.09	36										
B-10 @ 3'	SP		0.03	0	0	-0.2												
B-10 @ 6'	SP						0	45.4										
R-1 @ 0-5'	SC	19													45	0		
R-2 @ 0-5'	SC	25													34	0		
R-3 @ 0-5'	SC	28													29	0		

CONSOLIDATION
Cc - Compression Index
Cs - Swell Index
S.P. (psf) - Swell Pressure
HV % - Heave Precentage / Collapase

UNCONFINED COMPRESSION
Q_U (psi) - Unconfined Compression Strength
C, (ksf) - Cohesion

DIRECT SHEAR
C (ksf) - Cohesion
F.A. - Friction Angle

E.I. - EXPANSION INDEX

ATTERBERG LIMITS
LL - Liquid Limit
PL - Plastic Limit
PI - Plasticity Index

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

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

SOILS ENGINEERING, INC.

SEi
Soils Engineering Inc.

August 25, 2022 SEI File No. 22-18248

Kern Community College District
2100 Chester Ave
Bakersfield, CA 93301

Attention: Mr. Nick Hernandez

Subject: **ADDENDUM 1 – Lateral Earth Pressures**
Project: New Bakersfield College Residence Hall
Location: 1801 Panorama Drive, Bakersfield, Kern County, CA

Reference [1]: Geotechnical Investigation
Project: New Bakersfield College Residence Hall
Location: 1801 Panorama Drive, Bakersfield, Kern County, CA
SEI File No. 22-18335, Dated March 25, 2022

Dear Mr. Hernandez:

As requested by the design structural engineer, Soils Engineering, Inc. has prepared this addendum to provide additional design information for the above-referenced geotechnical investigation.

Regarding seismic force criteria for the retaining walls, for a yielding wall without slope, the seismic increment of the active lateral force can be taken as $12H^2$ (pounds per linear foot of wall length) acting at 0.6H above the wall base.

For sloped soil, active pressure with 1:1 slope, the value is 70 pcf.

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

Respectfully submitted,
SOILS ENGINEERING, INC.

On Man Lau

REGISTERED PROFESSIONAL ENGINEER
ON MAN LAU
GE2644
EXP. 12-31-2023
GEOTECHNICAL
STATE OF CALIFORNIA

On Man Lau, P.E., G.E.
Engineering Manager

4400 YEAGER WAY
BAKERSFIELD, CA 93313-2019
Phone: 661 831 5100
Fax: 661 831 2111
info@soilsengineering.com
www.soilsengineering.com

PBK
7790 N. PALM AVE FRESNO, CA 93711
T 559 448 8400 F 559 448 8467 www.pbk.com

PRE-BID REQUEST FOR INFORMATION LOG

ARCHITECT'S PROJECT NO: **S2103400AR**
PROJECT NAME: **KCCD New Residence Hall**
DSA File No: **15-C1**
DSA App No: **03-122124**
Date: **April 3, 2024**

RFI #	Contr. #	DATE RECEIVED		CONTRACTOR / SUBCONTRACTOR TRADE	RESPONSE	TO	FROM	DATE RETURNED
1	1.01	03/07/24	Please provide Soils Report.	**S.C. Anderson Inc.**	Refer to Addednum No. 4	PBK		4/3/24
2	2.06	03/11/24	On hollow metal frames will we need to figure welded corners only or a completely welded profile?	**S.C. Anderson Inc.**	Frames shall be welded at corners	PBK		4/3/24
	2.13	03/11/24	Per A1.12A: ADD ALT 01 Floor Plan shows walls and improvements in grey scale at multiple room locations (Rooms 101, 102, 105, etc.).	**S.C. Anderson Inc.**	Correct. Interior wall layouts shall be per sheets AU.1 trhough AU.7	PBK		4/3/24
	2.14	03/11/24	Per Sheets S251, S252, S261, and others: shear wall callouts missing from shear wall symbol on plans.	**S.C. Anderson Inc.**	The symbols in question indicate shear walls below per symbol legend on S101.	HOHBACH 3/25	HOHBACH 3/25	4/3/24
3	3.01	03/11/24	SPEC SECTION013100.1.5.C.1.c.1 STATES" DEVELOP AND INCORPORATE COORDINATION DRAWING FILES INTO BUILDING INFORMATION MODEL ESTABLISHED FOR THE PROJECT." WILL THE ARCHITECT BE PROVIDING THE BIM MODEL FOR CLASH DETECTION / CONFLICT ANALYSIS?	**S.C. Anderson Inc.**	Yes. Contractors must submit the CAD/REVIT realese form prior to have access to the eletronic files. Form will be provided to awarded contractor	PBK		4/3/24
	3.02	03/11/24	SPEC SECTION013100.1.6.A STATES" SCHEDULE AND CONDUCT MEETINGS AND CONFERENCES AT THE PROJECT SITE UNLESS OTHERWISE INDICATED." ARE THESE PROJECT MEETINGS INTENDED TO BE BIM CLASH DETECTION MEETINGS?	**S.C. Anderson Inc.**	The standard OAC meetings will be the oprotunity to discuss any items related to the project construction. Reviit and Cad files will be furnished to the contractor as soon as they agree to the terms indicated in the CAD/REVIT Release form. Clash Detectioncan be part of the OAC Discussion.	PBK		4/3/24
	3.03	03/11/24	SPEC SECTION013100.1.6.A.2 STATES" ARCHITECT TO PREPARE MEETING AGENDA AND DISTRIBUTE TO ALL INVITED ATTENDEES." SPEC SECTION013100.1.6.A.3 STATES" ENTITY RESPONSIBLE FOR CONDUCTING MEETING WILL RECORD SIGNIFICANT DISCUSSIONS AND AGREEMENTS ACHIEVED. DISTRIBUTE THE MEETING MINUTES TO EVERYONE CONCERENED, INCLUDING OWNER AND THE ARCHITECT, WITHIN THREE DAYS OF THE MEETING." SINCE THE ARCHITECT IS PREPARING THE AGENDA, IS THE ARCHITECT THE ENTITY RESPONSIBLE FOR CONDUCTING THE MEETING AND RECORDING AND DITRIBUTING THE MINUTES? IF NOT, PLEASE PROVIDE THE SPECIFIC PURPOSE OF THE MEETINGS DESCIBED IN SPEC SECTION013100.1.6.A AND WHO SHOULD BE THE ENTITY RESPONSIBLE FOR CONDUCTING THE MEETINGS.	**S.C. Anderson Inc.**	Per KCCD's direction, the architect will generate and distribute the Agenda and Meeting Minutes. Contractors are respoonsible for keeping RFI, Submittal and COR logs.	PBK/KCCD		3/20/24
4	4.04	03/11/24	Per A1.61/A1.62: the Legend shows 'Roof Trellis Alt. 1'. Please clarify what this alternate is.	**S.C. Anderson Inc.**	Roof trellis was deleted during the Value Engineering period. Roof trellis is no longer part of the project	PBK		4/3/24
	4.07	03/11/24	Per A2.3: General Notes 5, 6, and 7 mention Buildings 1000 and 2000. Where does this apply?	**S.C. Anderson Inc.**	Notes 5 and 6 shall apply to the Residence Hall project. Delete Note No. 7	PBK		4/3//24
	4.12	03/11/24	Spec 23 00 01 Part 2.1.D states that "Kitchen Hood Exhaust Duct: Ductwork shall be galvanized steel all welded construction, ASTM A240." Would welded duct be required for these residential style range hoods?	**S.C. Anderson Inc.**	Yes.	PBK		4/3/24
	5.01	03/14/24	Spec section 015000.1.2.B.1&2 indicates that temporary water, sewer and electric bills are to be paid by the contractors. In past and present projects at the BC campus, contractors have been able to tie into existing water, sewer, electric and telecom facilities for temporary use by the Project. The contractors paid the cost of connection and diconnections but did not have to pay monthly bills for the services. Please confirm if contractors will be responsible for paying monthly bills for warer, sewer, electric, and te telecom if tied into existing services on campus. If contractors will be responsible for paying monthly bills for temporary services, please confirm how the costs will be established.	**S.C. Anderson Inc.**	Contractor will be allowed to tap onto existing utility services on campus. Cost for connection shall by the contractor	PBK		4/3/24

RFI #	Contr. #	DATE RECEIVED		CONTRACTOR / SUBCONTRACTOR TRADE	RESPONSE	TO	FROM	DATE RETURNED
6	5.02	03/14/24	Typical unit finish plans show the bathrooms to have 12x24 porcelain tile floors however interior elevations show rubber topset base to be installed in the bathrooms. Please confirm rubber base is to be installed in the bathrooms.	**S.C. Anderson Inc.**	No. Contractor must provide tile baseat restrooms	PBK		4/3/24
	5.06	03/14/24	The following spec sections are listed in the Project Manual's Table of Contents but are missing from the body of the manual: 1) 03 54 13 Gypsum Cement Underlayment 2) 07 42 16 Metal Soffit Panels 3) 07 97 23 Concrete and Masonry Coatings 4) 31 10 00 Site Clearing	**S.C. Anderson Inc.**	Refer to Addendum No. 3	PBK		4/3/24
	5.09	03/14/24	Per Addendum No. 01, Item AD1-04: with the pre-qualification questionnaire deadline being March 25, 2024, when will the list of pre-qualified bidders be released? How does this pre-qualification affect the subcontractor listing? Does this apply to every subcontractor required to be listed per the Public Works Contract Code?	**S.C. Anderson Inc.**	Refer to addendum No. 2 for clarification on Pre-Qualification requirements	PBK		4/3/24
8	2	03/18/24	If prequalification is required, please advise on each of the following questions: - Please clarify when the “23-BACSH – Contractor Qualifications Questionnaire 1214” for the General Contractor is due. - Please confirm the MEP sub-contractors are the only sub-contractors required to complete the “23-BACSH – Contractor Qualifications Questionnaire 1214” and clarify the deadline for submission. - Please confirm a General Contractors bid will be deemed non-responsive if the bidding contractor and / or any of the listed Mechanical, Electrical, or Plumbing subcontractors are not on the District’s Qualified Bidders List (QBL) AND have completed the project specific prequalification questionnaire. - Please confirm Sheet Metal contractors are not considered part of the Mechanical subcontractor prequalification requirement. - Please advise if Site Utility subcontractors are required to be prequalified. - Please advise if Fire Sprinkler subcontractors are required to be prequalified. - Please provide a final list of prequalified contractors (GC’s & MEP Subs) once the project specific prequalification process is complete.	**Bernards**	Refer to addendum No. 2 for clarification on Pre-Qualification requirements	PBK		4/3/24
	3	03/18/24	Please consider a 1-2 week bid date extension due to the limited amount of time for the subcontractor community to bid this exciting project. This is in the Owners best interest to generate a competitive bidding environment.	**Bernards**	Bid Opening is schedule for April 4, 2024 at 2:00PM. No Extensions at this time	PBK/KCCD		3/20/24
	8	03/18/24	Please refer to specification 051213-1.5 for AISC Requirements. Please advise if the AISC Requirement for the Steel Fabricator can be waived.	**Bernards**	Not required.	HOHBACH 3/25	HOHBACH 3/25	
9		03/19/24	Please clarify the DVBE requirements.	**Bernards**	DVBE is **NOT** requird for this project	PBK/KCCD		3/20/24
		03/19/24	Please confirm the Builder’s Risk Policy is By Owner. If required to be carried by the contractor, please confirm Earthquake, Flood, & Terrorism coverage is not required.	**Bernards**	Contractor must provide the Builder's Risk Policy as indicated in contract documents. Earthquake, Flood and Terrorism coverages are **NOT** required	PBK/KCCD		3/20/24
		03/19/24	Please confirm there are no allowances to be carried by the bidding contractors.	**Bernards**	Confirmed	PBK		
		03/19/24	Please confirm City & State is sufficient for the location of each listed subcontractor on the “List of Subcontractors” form.	**Bernards**	Correct	PBK/KCCD		4/3/24
		03/19/24	Please confirm the list of documents noted below, referenced on the Pre-Bid Handout, are the only documents required to be submitted with the bid: Documents that are required to be submitted with the Bid: - Bid Form - Substitution Listing - Bid Bond - Non-Collusion Affidavit - Exclusion of Lead and Asbestos Products - Certificate of Attendance at Mandatory Job Walk - Contractor's Qualifications Questionnaire	**Bernards**	All documents listed are required with the exception of the Contractor's Qualification Questionnaire. Refer to addendum No. 2 for the Contractor's Qualification Requirements and deadline.	PBK/KCCD		3/20/24
		03/19/24	Please clarify what information the District is requesting for Question #8 on the Contractor’s Qualifications Questionnaire.	**Bernards**	Bidder must provide the requested information for the staff member that attended the Pre-Bid Meeting that occurred on March 6, 2024 at 2:00PM	PBK/KCCD		3/20/24

RFI #	Contr. #	DATE RECEIVED		CONTRACTOR / SUBCONTRACTOR TRADE	RESPONSE	TO	FROM	DATE RETURNED
10	6.03	03/20/24	AS1.00 from Addendum 1 indicates that the fire lane must remain accessible to first responders throughout the duration of the project. Sheet C43 has the storm drain and fire water installations directly under the fire lane. First responders vehicles will not be able to pass during utility installation and final grading and paving. Please confirm if it is acceptble to use an alternate construction entrance for first responders while construction activities take place in the designate fire lane. Also, are knox boxes required at all construction entrance gates?	**S.C. Anderson Inc.**	Contractor shall Contractor shall provide a Logistics plan indicating the alternative route while the scope of work along the fire access lane is under construction.	PBK/KCCD		3/20/24
	6.06	03/20/24	Per 05 51 13 Metal Pan Stairs: This spec references cast-in-place concrete treads but details 6,8,10,20 on AX5.1 call for precast treads. Please clarify if stair treads are to be cast-in-place or precast.	**S.C. Anderson Inc.**	The structural design of the stairs was based on precast concrete treads.	HOHBACH 3/25	HOHBACH 3/25	4/3/24
	6.08	03/20/24	Per 05 12 00 Structural Steel: section 1.2, B calls for AISC certification. Is this certification a requirement for the contractors performing the structural steel scope or are there other certifications that will suffice in lieu of the AISC cert?	**S.C. Anderson Inc.**	Section 1.2.B is a reference to the specifications applicable to steel building, it is not a requirement for certification.	HOHBACH 3/25	HOHBACH 3/25	4/3/24
11	.2	03/20/24	Reference Sheet A2.1. The Door Schedule is missing finish call outs at many of the HM Doors and Frames. Finish General Note 4 says that all HM Doors and Frames (Including Door Edging) on Exterior Side Shall be Painted per KCCD Standards and Per Finish Schedule. Please confirm all HM Doors and Frames listed on A2.1 are to be painted.	**Bernards**	Yes.	PBK		4/3/24
12	.1	03/21/24	Please confirm if anti-graffiti coating will be applied at the site retaining wall and stepped site retaining wall.	**Bernards**	Correct.	PBK		4/3/24
	.2	03/21/24	Please confirm if anti-graffiti coating will be applied at exterior walls of the building. Location for anti-graffiti is not shown on drawings	**Bernards**	Correct. Anti Grafitti coating to be applied up to 12'-0" AFF	PBK		4/3/24
14	.02	03/22/24	On sheets A2.31 and A2.31A, Room 120 (Fire Riser) is called out as sealed concrete on the finish schedule, however it is marked as polished concrete on the floor plan. Please confirm the correct finish.	**Bernards**	Clean flooring from ay construction marks and provide a seal coat.	PBK		4/3/24
	.03	03/22/24	On sheet A2.33, Room 327 (Storage) is called out as sealed concrete on the finish schedule, however it is marked as luxury vinyl tile on the floor plan. Please confirm the correct finish.	**Bernards**	Clean flooring from ay construction marks and provide a seal coat.	PBK		4/3/24
	.04	03/22/24	Spec Section 033543 Polished Concrete Finish lists 4 different levels of sheen. Please confirm which sheen level is required for this project and specify locations if different levels of sheen are required.	**Bernards**	Level 2 finish is required.	PBK		4/3/24
	.05	03/22/24	On sheet A2.31 and A2.31A, Room 121 (Corridor) is called out as luxury vinyl tile on the finish schedule, however it is marked as polished concrete on the floor plan. Please confirm correct finish.	**Bernards**	Polished concrete	PBK		4/3/24
	.08	03/22/24	Is sealed concrete and/or polished concrete required in the base bid (level 1 shell space) and add alt? Or is it only required in the add alt?	**Bernards**	1st floor add alternate flooring finish is not required. Concrete slab must be leveled per specification requirements and clean from any markings or debris.	PBK		4/3/24
	.09	03/22/24	Spec Section 102613 calls out corner guards as one piece, surface mounted with flat head screws. However, on detail 4/AX6.1, it shows corner guards with top trim caps and round head screws. Please confirm the correct specs for corner guards.	**Bernards**	Trim caps and round head screws are required.	PBK		4/3/24
	.10	03/22/24	Specification 062000-1.5.B calls out for Millwork Contractors to have Woodworking Institute Certification. Please advise if Millwork contractors need a WI Cert or if it is acceptable to simply meet Woodwork Institute standards.	**Bernards**	Meet the requirements set forth by the Woodworking Institute	PBK		4/3/24
	.20	03/22/24	There are (2) different Hand Dryers listed in spec 102813-2.1.I Model RA5-974 by World Dryer and another under the schedule is called out as TA-13(a) Model B-750. If Hand Dryers are applicable please clarify which model is to be used and provide locations.	**Bernards**	102813-2.1.I Model RA5-974 by World Dryer is the correct one.	PBK		4/3/24
17	8.15	03/25/24	Per spec 081113, 1.4, H & I Wind Loads and Hurricane Test Performance: Are deferred approved submittal's, wind load calculations and Hurricane Resistance Testing Required for the hollow metal doors and frames on this project as listed in the specifications?	**S.C. Anderson Inc.**	No. Only for the curtain wall system	PBK		4/3/24