Appendix D Geotechnical Engineering/Geologic Hazards Investigation

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GEOTECHNICAL ENGINEERING/GEOLOGIC HAZARDS INVESTIGATION
PROPOSED SANTA FE ELEMENTARY SCHOOL NEW CLASSROOM BUILDINGS AND PAVEMENT IMPROVEMENTS
286 E. ORANGE AVENUE
PORTERVILLE, TULARE COUNTY, CALIFORNIA

PROJECT NO. 012-23164
JANUARY 5, 2024

Prepared for:

MR. BRAD ROHRBACH
PORTERVILLE UNIFIED SCHOOL DISTRICT
600 WEST GRAND AVENUE
PORTERVILLE, CALIFORNIA 93257

Prepared by:

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Krazan & ASSOCIATES, INC.
GEOTECHNICAL ENGINEERING • ENVIRONMENTAL ENGINEERING
CONSTRUCTION TESTING & INSPECTION

January 5, 2024 KA Project No. 012-23164

Mr. Brad Rohrbach
Porterville Unified School District
600 West Grand Avenue
Porterville, California 93257

RE: Geotechnical Engineering/Geologic Hazards Investigation
Proposed Santa Fe Elementary School
New Classroom Buildings and Pavement Improvements
286 E. Orange Avenue
Porterville, Tulare County, California

Dear Mr. Rohrbach:

In accordance with your request, we have completed a Geotechnical Engineering/Geologic Hazards Investigation for the above-referenced site. The results of our investigation are presented in the attached report.

If you have any questions, or if we may be of further assistance, please do not hesitate to contact our office at (559) 348-2200.

Respectfully submitted,
KRAZAN & ASSOCIATES, INC.

REGISTERED PROFESSIONAL ENGINEER
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TABLE OF CONTENTS

FIGURES

TABLES

APPENDICES

Krazan & ASSOCIATES, INC.
GEOTECHNICAL ENGINEERING • ENVIRONMENTAL ENGINEERING
CONSTRUCTION TESTING & INSPECTION

January 5, 2024 KA Project No. 012-23164

GEOTECHNICAL ENGINEERING/GEOLOGIC HAZARDS INVESTIGATION
PROPOSED SANTA FE ELEMENTARY SCHOOL
NEW CLASSROOM BUILDINGS AND PAVEMENT IMPROVMENTS
286 E. ORANGE AVENUE
PORTERVILLE, TULARE COUNTY, CALIFORNIA

INTRODUCTION

This report presents the results of our Geotechnical Engineering/Geologic Hazards Investigation for the proposed Santa Fe Elementary School new classroom buildings and pavement improvements located at 286 E. Orange Avenue in Porterville, Tulare County, California. Discussions regarding site conditions are presented herein, together with conclusions and recommendations pertaining to site preparation, Engineered Fill, utility trench backfill, drainage and landscaping, foundations, concrete floor slabs and exterior flatwork, retaining walls, and pavement design.

A site plan showing the approximate boring locations is presented following the text of this report. A description of the field investigation, boring logs, and the boring log legend are presented in Appendix A. Appendix A contains a description of the laboratory testing phase of this study, along with the laboratory test results. Appendices B and C contain guides to earthwork and pavement specifications. When conflicts in the text of the report occur with the general specifications in the appendices, the recommendations in the text of the report have precedence.

PURPOSE AND SCOPE

This investigation was conducted to evaluate the soil and groundwater conditions at the site, to make geotechnical engineering recommendations for use in design of specific construction elements, and to provide criteria for site preparation and Engineered Fill construction.

Our scope of services was outlined in our proposal dated August 16, 2023 (KA Proposal No. 515-23) and included the following:

- A site reconnaissance by a member of our engineering staff to evaluate the surface conditions at the project site.
- A review of available data for evaluation of subsurface conditions at the project site. This included review of a Geologic Hazard Report prepared by Enviro Assessment, P.C. dated July 1, 2013 (Project No. 2013-03-016).
- Aerial photograph interpretation.

- A search of geologic and seismologic literature pertaining to the area of the site.
- Evaluation of potential geologic hazards.
- A field investigation consisting of drilling 7 borings to depths ranging from approximately 10 to 30 feet for evaluation of the subsurface conditions at the project site. Borings No. B-2 and B-5 were terminated due to refusal.
- Performing laboratory tests on representative soil samples obtained from the borings to evaluate the physical and index properties of the subsurface soils.
- Evaluation of the data obtained from the investigation and an engineering analysis to provide recommendations for use in the project design and preparation of construction specifications.
- Preparation of this report summarizing the results, conclusions, recommendations, and findings of our investigation.

PROPOSED CONSTRUCTION

We understand that design of the proposed development is currently underway. Some of the final details pertaining to the structures are unavailable. It is understood the building additions and pavement improvements to Santa Fe Elementary School are in the design stages. The proposed improvements will include two new classroom buildings, a new parking area, new drop off area, bus lane, and concrete flatwork. The buildings will range from approximately 5,823 square feet (Building 700) to 10,354 square feet (Building 800). It is anticipated the buildings will be single- or two-story structures utilizing conventional shallow foundations or mat foundations. Foundation loads are anticipated to be light to moderate. On-site landscaping and paved areas are also planned to be associated with the project.

In the event these structural or grading details are inconsistent with the final design criteria, the Soils Engineer should be notified so that we may update this writing as applicable.

SITE LOCATION, SITE HISTORY AND SITE DESCRIPTION

The proposed Santa Fe Elementary School two new classroom buildings, bus lane drop off, and parking lot addition is located northeast of the intersection of E. Orange Avenue and S. Wallace Street in the west and northwestern portion of the existing school site. The site address is 286 E. Orange Avenue in Porterville, Tulare County, California (see Vicinity Map, Figure 1). The school site encompasses approximately 13.5 acres and is comprised of seven school buildings, solar canopies, lawn and asphaltic play areas, a vacant field, school garden, and asphaltic concrete parking lots. The proposed project areas are bound to the north by a vacant field, lawn play area, chain linked fence, abandoned asphaltic concrete road, an apartment complex, and a bike trail; to the east by school buildings, asphaltic concrete and lawn play areas, a chain linked fence, and residential developments; to the west by residential developments and E. Orange Avenue; and to the south by school buildings, E. Orange Avenue, and residential developments. The central portion of the existing school site has a longitude 119.010017° West and latitude 36.061100° North. The USGS "Porterville" topographic quadrangle map, dated 1993 indicates that surface elevations in the vicinity of the site are on the order of 460 feet above mean sea level. A major water course identified as the Tule River is located approximately 1,200 feet south of the subject site. Other water courses in the area are the Porter Slough, which is piped under ground running generally east to west along the northern portion of the school site; the Pioneer Ditch, located approximately 1,800 feet north of the site; the Poplar Ditch, located approximately 2,000 feet south of the site; and the Campbell-Moreland Ditch, located approximately 5,000 feet southeast of the site.

Site history was obtained by reviewing historical aerial photographs taken in 1934, 1937, 1940, 1952, 1957, 1963, 1969, 1972, 1984, 1994, 2006, 2009, 2012, 2016, and 2020. Review of the 1934 aerial photograph indicates that the project site included a rail road line running northwest-southeast along the western portion of the site. The remaining area of the site was mostly a vacant field with some sort of structure being located in the southeast portion of the site. Orange Avenue was located along the western edge of the property and a rural-residences and an agricultural field was located to the east. Vacant land and a creek channel were located to the north of the site.

Review of the 1937 through 1940 aerial photographs indicate that the project site conditions appeared to be relatively similar to that noted in the 1934 aerial photograph, with the structure in the southeast portion of the site no longer appearing.

Review of the 1952 aerial photograph indicates that approximately 40 structures or housing units appeared on the eastern portion of the site.

Review of the 1957 aerial photograph indicates that the site conditions appeared to be relatively similar to that noted in the 1952 aerial photograph.

Review of the 1963 aerial photograph indicates that the 40 structures or housing units were removed and a residential development appeared to the east.

Review of the 1969 aerial photograph indicates that the project site conditions appeared to be relatively similar to that noted in the 1963 aerial photograph, with a few scattered trees appearing across the site.

Review of the 1972 through 1984 aerial photographs indicate that the site conditions appeared to be relatively similar to that noted in the 1969 aerial photograph.

Review of the 1994 aerial photograph indicates that the rail road line appeared to be abandoned and tracks removed. The creek to the north appeared to be channelized and an apartment complex and shopping center also appeared to the north.

Review of the 2006 aerial photograph indicates that the rail road line was completely removed and a school appeared. The school consisted of approximately six buildings, an asphaltic concrete parking lot and play area, a grass play area, and a vacant field in the northwest portion.

Review of the 2009 aerial photograph indicates that the site conditions appeared to be relatively similar to that noted in the 2006 aerial photograph, with an additional school building appearing on the east edge of the site.

Review of the 2016 aerial photograph indicates that the site conditions appeared to be relatively similar to that noted in the 2012 aerial photograph, with solar panels appearing in the southwest parking lot area.

Review of the 2020 aerial photograph indicates that the site conditions appeared to be relatively similar to that noted in the 2016 aerial photograph.

Presently, the site consists of Santa Fe Elementary School. The school site is comprised of seven school buildings; solar canopies; lawn and asphaltic play areas; a vacant field and school garden; and asphaltic concrete parking lots and bus lanes. Some previous disking or shallow surface grading operations have been performed in the vacant field located in the northwest portion of the school property. The proposed two new classroom buildings are going to be located in the existing school garden area and grass play field in the northwestern portion of the school property. The proposed asphaltic concrete parking area, drop off area, bus lane, and concrete flatwork areas are going to be located on the west and northwestern portion of the school property. Buried utility lines are located along the edges of the site and extend into the site.

The proposed building and pavement improvement areas are covered by a grass ball field, a disced vacant field with sparse dry grass and weed growth, or asphaltic concrete. The surface soils have a loose consistency. The site is relatively level with no major changes in grade. Approximately five feet of relief exist across the site.

No evidence of surface faulting was observed on the property during our reconnaissance. No evidence of slope failures or instabilities were observed on the subject property or adjoining properties.

GEOLOGIC SETTING

General

The subject property is located within the San Joaquin Valley portion of the Great Valley Geomorphic Province of California. The Great Valley is bordered to the north by the Cascade and Klamath Ranges, to the west by the Coast Ranges, to the east by the Sierra Nevada, and the south by the Transverse Ranges. The valley formed by tilting of the Sierran Block with the western side dropping to form the valley and eastern side being uplifted to form the Sierra Nevada. The valley is characterized by a thick sequence of sediments derived from erosion of the adjacent Sierra Nevada to the east and the Coast Ranges to the west. These sedimentary rocks are mainly Cretaceous in age. The depth of the sediments varies from a thin veneer at the edges of the valley to depths in excess of 30,000 feet in the south and 50,000 feet in the north along the western edge of the valley. The subject site is approximately one mile north of the Tule River.

A Regional Geologic Map and Local Geologic Map are presented on Figures 4 and 5, respectively.

Lithology

According to California Geological Survey Mapping, Compilation by Matthews and Burnett (1965) the surface deposits in the vicinity of the subject site are recognized as recent age alluvial fan sediments derived from the western slopes of the Sierra Nevada and deposited by the Tule River. Geologic materials in the vicinity of the site include Quaternary fan deposits consisting of unweathered gravels, sands, silts, and clays deposited by the present-day stream, slough, and river systems along with Pleistocene nonmarine deposits.

The subsurface information obtained in conjunction with the soil borings performed during previous Geotechnical Engineering and Geologic Hazard Investigations indicate that the surface and near-surface deposits at the subject site consist predominately of silty sands, sandy silts, and sands. Some of these soils contain varying amounts of gravels. These observed deposits are consistent with those mapped in the area, and are further described in soil profile section within this report.

Structure and Faults

The general area of the subject site is underlain by a momoclinal series of Cenozoic deposits dipping gently to the southwest towards the center of the San Joaquin Valley. The contact between the Cenozoic and basement rocks dips nearly 8 degrees southwest, or at a slightly greater inclination than does the on-lapping homoclinal Cenozoic sequence. No active faults are mapped within the Porterville area, and based on mapping and historical seismicity, the seismicity of the Porterville area is considered low by the scientific community.

Adjacent to the San Joaquin Valley, the Sierra Nevada and Coast Ranges are geologically young mountain ranges that possess active and potentially active fault zones. Major active faults and fault zones occur at some distance to the east and west of the project site (see the Fault Map, Figure 6). Table I is a listing of significant active faults within 100 miles of the site.

Numerous active faults are present within the central Coast Ranges west of the site including the San Andreas Fault located approximately 70 miles west of the subject site.

The San Andreas Fault is considered active and is of primary concern in evaluating seismic hazards throughout California. The 684-mile-long San Andreas Fault zone is the principal element of the San Andreas Fault system, a network of faults with predominately dextral strike-slip displacement that collectively accommodates the majority of relative north-south motion between North American and Pacific plates. The San Andreas Fault zone is considered to be the Holocene and historically active dextral strike-slip fault that extends along most of coastal California from its complex junction with the Mendocino fault zone on the north, southeast to the northern Transverse Range and inland to the Salton Sea, where a well-defined zone of seismicity transfers the slip to the Imperial fault along a right-releasing step (USGS 2006).

Two major surface rupturing earthquakes have occurred on the San Andreas Fault in historic time: the 1857 Fort Tejon and 1906 San Francisco earthquakes. Additional historic surface rupturing earthquakes include the unnamed 1812 earthquake along the Mojave section and the northern part of the San

Bernardino Mountains section, and a large earthquake in the San Francisco Bay area that occurred in 1838 that was probably on the Peninsula section. Historic fault creep rates are as high as 32 millimeters per year for the 82-mile-long creeping section in central California with creep rates gradually tapering to zero at the northwestern and southeastern edge of the section.

One of the nearest seismotectonic sources is the Great Valley Fault Zone (Coast Ranges-Central Valley boundary zone), located approximately 51 miles west of the site. The Great Valley Fault zone is the geomorphic boundary of the Coast Ranges and the Central Valley and is underlain by a 300-mile long seismically active fold and thrust belt that has been the source of recent earthquakes, such as the 1983 magnitude 6.5 Coalinga and the 1985 magnitude 6.1 Kettleman Hills earthquakes. Nearly the entire thrust system is concealed or "blind". The basal detachment of this thrust system dips at a shallow angle to the west. East-directed thrusting over ramps in the detachment and west-directed thrusting on backthrusts are responsible for the uplift along the eastern range front of the Coast Ranges. Based on earthquake focal mechanisms, movement on the thrust zone is generally perpendicular to the strike of the geomorphic boundary and trend of the San Andreas Fault system. Shortening along the geomorphic boundary is driven by a component of the Pacific-North American Plate motion that is normal to the plate boundary. The Great Valley Fault zone is considered the dominant seismic feature with potential for affecting the subject site.

The White Wolf Fault is located approximately 56 miles south of the subject site. The White Wolf Fault is traceable in the southern San Joaquin Valley from Tehachapi Canyon southwestward along the base of the northwest face of Bear Mountain to a point where it is lost beneath the alluvium near Wheeler Ridge. A magnitude 7.7 earthquake occurred on this fault near Wheeler Ridge that affected Kern County and surrounding areas. The ground ruptured in a generally discontinuous trend along most of the length of the fault from Wheeler Ridge to Caliente. The maximum vertical displacement along the rupture measured at roughly three feet. Surface cracks and evidence of lurching were observed for several miles on each side of the fault as a result of this movement and numerous subsequent aftershocks.

Active and potentially active faults on the east side of the Sierra Nevada include the Sierra Nevada Fault (located 56 miles east), the Independence Fault (located 58 miles east), and the Owens Valley Fault (located 63 miles east). A number of other faults with related activity, including the Little Lake, Pleito, Birch Creek, Hunter Mountain, Fish Slough, Deep Springs, and Hilton Creek faults, are associated with potential volcanism in the Long Valley Caldera, the Mono Craters Caldera, and Inyo Craters. The Owens Valley Fault was responsible for generating the 8+ magnitude earthquake occurring in 1872.

The Pond-Posa Creek Fault is located approximately 30 miles southwest of the subject site. The Pond-Poso Creek Faults trends northwesterly for 35± miles from the eastern margin of the valley to near the center of the valley just southwest of Delano. Modern aseismic activity occurs on this fault along a 2.1-mile-long surface scarp a few miles southwest of Delano. The activity is restricted to an area of land subsidence caused by declines in groundwater levels. Although modern movement has been attributed by some geologist to local tectonics, measurements of fault movement and corresponding groundwater level support a relation between modern faulting and groundwater withdrawal. From February 1977 to March 1979, the fault moved at monitored locations only during periods when the water table declined. During periods of water table recovery, fault movement ceased.

The eastern border of the southern San Joaquin Valley is cut by a series of en-eschelon range front faults. These faults are mainly northwest trending normal faults, down dropped to the west and with a near vertical dip. Three unnamed, northwest trending inferred faults are mapped approximately 1,500 feet east of the subject site, extending along the edge of the Foothills, from an area approximately 4 miles south of State Highway 190 to State Highway 201 near Dinuba. These faults are considered to be pre-Quaternary faults or faults without recognized Quaternary displacement. These faults are not necessarily inactive.

Further discussion relating to active faults in the region is presented in the Probabilistic Seismic Hazards Analysis section of this report.

GEOLOGIC HAZARDS

Fault Rupture Hazard Zones in California

The Alquist-Priolo Geologic Hazards Zones Act went into effect in March, 1973. Since that time, the act has been amended 10 times (Hart, 1994). The purpose of the Act, as provided in DMG Special Publication 42 (SP 42), is to prohibit the location of most structures for human occupancy across the traces of active faults and to mitigate thereby the hazard of fault-rupture." The act was renamed the Alquist-Priolo Earthquake Fault Zoning Act in 1994, and at that time, the originally designated "Special Studies Zones" was renamed the "Earthquake Fault Zones."

The subject site does not lie on a Fault Rupture Hazard Zones Map, and accordingly, the site is not within a Fault-Rupture Hazard Zone. The nearest zoned fault is a portion of the Great Valley Fault system located more than 51 miles west of the subject site.

Seismic Hazard Zones in California

In 1990, the California State Legislature passed the Seismic Hazard Mapping Act to protect public safety from the effects of strong shaking, liquefaction, landslides, or other ground failure, and other hazards caused by earthquakes. The Act requires that the State Geologist delineate various seismic hazards zones on Seismic Hazards Zones Maps. Specifically, the maps identify areas where soil liquefaction and earthquake-induced landslides are most likely to occur. A site-specific geotechnical evaluation is required prior to permitting most urban developments within the mapped zones. The Act also requires sellers of real property within the zones to disclose this fact to potential buyers. The area of the subject site is not included on any of the maps released to date. It is not known whether the subject site will be within a seismic hazard zone on a future map.

Historic Seismicity/Earthquake Epicenter Distribution

The Porterville area has historically experienced a low to moderate degree of seismicity. A listing of historic earthquakes with magnitudes greater than 4.0 within approximately 50 miles (80 kilometers) of the subject site was obtained from the comprehensive California Geological Survey computerized earthquake catalog for the State of California, the Townley and Allen (1939) catalog and the U.S. Geological Survey Earthquake Data Base System. In addition, a listing was obtained for all historic earthquakes with magnitudes greater than 5.0 within approximately 100 miles of the site. The listings include the date, time, location, depth, magnitude, and intensity all recorded events within the search radius between 1800 and 2021. A review of the literature for pre-1900 earthquakes (Toppozada, 1991) does not reveal any significant recorded seismic events in the vicinity of the subject site prior to the period covered by the above listing.

The historic earthquake listings are included in Appendix D. A plot of epicenters associated with historic earthquakes in the region of the site with magnitudes greater than 5 is shown on Figure 8, Epicenter Map. The earthquake data indicates that 45 events with magnitudes greater than 4.0 occurred within 50 miles of the subject site between 1800 and 2021. The data indicates that 124 events exceeded magnitudes 5.0 within 100 miles of the subject site. The nearest listed magnitude 5.0 event occurred approximately 10.7 miles from the site in 1915 with a magnitude of 5.0. Four of the listed earthquakes with magnitudes greater than 4.0 occurred within 25 miles of the site. Numerous earthquakes are listed with magnitudes between 5.0 and 6.0 beyond about 50 miles of the site. Twenty events were recorded with magnitudes greater than 6.0 within 100 miles of the site.

The geologic literature indicates that groundshaking of VII intensity (Modified Mercalli Scale) was felt in Porterville from the 1872 Owens Valley Earthquake. This is the largest known earthquake event to have affected the Porterville area. The most recent earthquake significant to the Porterville area, was the Coalinga seismic event which occurred on May 2, 1983 within the Coast Ranges-Sierran Block Boundary Seismotectonic structure. The Coalinga seismic event had a magnitude of Mw 6.5. The initial shock had a Modified Mercalli Intensity of V in the Porterville area. This earthquake and aftershocks had a substantial affect on the Porterville area but no damage, either architectural or structural, was reported in the area of the subject site.

Geologic Subgrade

Information obtained from the geologic literature, as well as data from the above-described site exploration, indicate the general soil profile at the site consists predominately of loose to dense silty sands, sandy silts, and relatively clean sands. Some of these soils contained varying amounts of gravels. These younger soils are underlain at depth by very dense decomposed granite and granitic rock. Assuming that any loose surface soil and fill materials on the site are removed and recompacted as recommended in our Geotechnical Engineering Investigation, the geologic subgrade of the site can be conservatively approximated as "stiff soil". A Joyner-Boore Class C subgrade classification is considered appropriate for the soil profile and corresponds with a National Earthquake Hazard Reduction Program (NEHRP) (BSSC, 1994) Site Class D. The site class definition from the 2022 California Building Code that is most consistent with the site conditions is Site Class D.

Soil Liquefaction

Soil liquefaction is a state of soil particles suspension caused by a complete loss of strength when the effective stress drops to zero. Liquefaction normally occurs in soils such as sand in which the strength is purely friction. However, liquefaction has occurred in soils other than clean sand. Liquefaction usually occurs under vibratory conditions such as those induced by seismic event.

To evaluate the liquefaction potential of the site, the following items were evaluated:

1) Groundwater depth;

2) Soil type;

3) Relative density;

4) Initial confining pressure;

5) Intensity and duration of groundshaking.

The soils encountered within a depth of 29 feet on the project site predominately consist of loose to dense silty sands, sandy silts, silty sand/sands, and sands. Some of these soils contained varying amounts of gravels. Dense to very dense gravelly sand with trace cobbles was encountered at depths of approximately 23 to 24 feet below site grade. Groundwater was encountered within at a depth of 20 to 24 feet during our subsurface exploration. Available groundwater data was gathered from the California Department of Water Recourses and indicates that groundwater depth has been as shallow as 10.2 feet within approximately one mile of the project site vicinity. Well site code No. 360503N1190242W001 is located approximately 1.1 miles to the southwest of the site and a reading on February 4th of 1964 showed that ground surface elevation to water surface elevation was measured at 10.2 feet.

The potential for soil liquefaction during a seismic event was evaluated using the LIQUEFYPRO computer program (version 5.8h) developed by CivilTech Software. For the analysis, a maximum earthquake magnitude of 6.21 was used. A peak horizontal ground surface acceleration of 0.339g was considered conservative and appropriate for the liquefaction analysis. A groundwater depth of 10.2 feet was used for the analysis. The analysis indicates that the on-site soils are considered to be slightly to moderately liquefiable with factors of safety ranging from 0.45 to 5.0. The analysis indicates that the total and differential seismic induced settlement is not anticipated to exceed 3¼ inches and 2 inches, respectively. The differential settlement is estimated over a horizontal distance of 100 feet. Accordingly, the liquefaction potential at the site is considered moderate and the anticipated settlements should be considered in the project design.

Based on our analysis, liquefaction is considered a viable geologic hazard at the subject site.

Seismic Settlement

One of the most common phenomena during seismic shaking accompanying any earthquake is the induced settlement of loose unconsolidated soils. Based on the nature of the subsurface materials, the plan to excavate and recompact the upper soils and any loose fill soils within the proposed building areas and the relatively low to moderate seismicity of the region, we would not expect seismic settlement or lateral spread to represent a significant geologic hazard to the site provided that the recommendations of our referenced Geotechnical Engineering Investigation are followed.

The estimated seismic settlement was determined at the site using the settlement analysis method by Tokimatsu/Seed and Modify Stark/Olsen (1987). The results of the settlement analysis are included as follows:

	Seismic Settlement (inches)				
Location	**Saturated Settlement**	**Unsaturated Settlement**	**Total Settlement**	**Range of Differential Settlement**	**Design for Differential Settlement**
B2	2.95	0.08	3.03	1.513 to 1.998	2 Inches in 100 Feet

The above settlement values were determined at a specific boring location. The consolidated settlement (under static load of specific structures) and differential settlement (per specified length in building area) are indicated in the Foundations section of this report. However, the project's Structural Engineer should consider the estimated settlements when designing the foundations for the proposed structures.

The native soils within the project site are not conducive to hydrocollapse due to the relatively medium dense soil conditions, low void-ratio, and moderate to high penetration resistance measured. Any loose fill material at the site could be vulnerable to hydrocollapse. However, it is recommended the loose soils and fill material be moisture-conditioned and recompacted. Therefore, the structure will not be vulnerable to hydrocollapse. In addition, this hazard can be mitigated by following the design and construction recommendations of current and future Geotechnical Engineering Investigations (over-excavation and rework of any loose soils and/or uncertified fill materials).

The potential for lateral spreading was evaluated using the "Revised Multilinear Regression Equations for Predication of Lateral Spread Displacement" by Youd, Hansen, Corbett and Bartlett (2002). Based on a lack of shallow liquefiable soils within the subject site, more than 300 feet distance of proposed structures from the Porter Slough and Tule River, and a lack of saturated cohesionless sediments with $(N1)_{60}$ less than 15, the site is not likely subject to lateral spreading hazards.

Subsidence Due to Fluid Withdrawal

Portions of California, such as the San Joaquin Valley have been subject to land subsidence due to fluid withdrawal (groundwater and petroleum). However, the area of the subject site is not known to be subject to such subsidence hazards.

Expansive Soils

The surface and near-surface soils observed on the site surface consist of silty sands, clayey sands, sandy silts and sands. These materials are considered to have a low expansion potential. Recommendations are provided in the Site Preparation section of this report to mitigate expansive soils.

Inundation Hazards

A review of Federal Emergency Management Agency (FEMA) Flood Insurance Mapping for the area of the subject site (Community Panel Numbers 06107C1634E and 06107C1642E) indicates that the subject site is located within both a Special Flood Hazard Areas Inundated by 1% and a 0.2 % annual chance flood hazard (refer to Flood Map, Figure 11).

An inundation hazard of the site would be likely do to the fact that Schafer Dam (Lake Success) is located 4.7 miles east of the site on the Tule River. The elevation difference of the Tule River bottom near the site is approximately 15 feet below the site elevation and is located approximately 1,200 feet north of the Tule River. (refer to Inundation Map, Figure 12).

Tsunamis and Seiches

A tsunami is a series of ocean waves generated in the ocean by an impulsive disturbance. Due to the inland location of the subject site, tsunamis are not considered a threat to the site. Seiches are standing waves in a body of water such as a lake or reservoir. Because such a body of water is not located near the site, seiches are not anticipated to affect the subject site.

Slope Stability and Potential for Slope Failure

Due to the generally flat-lying nature of the site and surrounding areas, problems from landslides are not anticipates to affect this site.

Volcanic Hazards

The subject site is not within an area known to be affected by volcanic hazards (Miller, 1989, USGS Bulletin, 1847).

County Seismic Safety Element

Documentation and mapping included in the Health and Safety Element of the City of Porterville County General Plan, dated 2021, were reviewed. The seismic information contained within the Safety Elements is somewhat dated and or generalized and is superseded by more recent information and analyses described herein. The referenced documents generally indicate that the site area is subject to relatively low to moderate seismicity and related hazards.

FIELD AND LABORATORY INVESTIGATIONS

Subsurface soil conditions were explored by drilling 7 borings to depths ranging from approximately 10 to 30 feet below existing site grade, using a truck-mounted drill rig. Some of the borings were terminated due to auger refusal in cobble. In addition, 2 bulk subgrade samples were obtained from the site for laboratory R-value testing. The approximate boring and bulk sample locations are shown on the Site Geologic Map, Figure No. 2. During drilling operations, penetration tests were performed at regular intervals to evaluate the soil consistency and to obtain information regarding the engineering properties of the subsoils. Soil samples were retained for laboratory testing. The soils encountered were continuously examined and visually classified in accordance with the Unified Soil Classification System.

Laboratory tests were performed on selected soil samples to evaluate their physical characteristics and engineering properties. The laboratory testing program was formulated with emphasis on the evaluation of natural moisture, density, gradation, shear strength, consolidation potential, R-value and moisture-density relationships of the materials encountered. In addition, chemical tests were performed to evaluate the soil cement reactivity. Details of the laboratory test program and results of the laboratory tests are summarized in Appendix A. This information, along with the field observations, was used to prepare the final boring logs in Appendix A.

SOIL PROFILE AND SUBSURFACE CONDITIONS

Based on our findings, the subsurface conditions encountered appear typical of those found in the geologic region of the site. In the proposed building areas, Borings No. B-4 and B-5 contained approximately 2 to 4 feet of fill material. In Borings No. B-1 and B-3 within the proposed asphaltic concrete pavement improvement areas, the pavement section consisted of approximately 3 to 4 inches of asphaltic concrete pavement underlain by 3 to 4 inches of aggregate base. The pavement section was underlain by approximately 2 to 7 feet of fill material. The fill material predominately consisted of silty sand, sandy silt, and clayey sand. Some of these soils contained varying amounts of gravel. The thickness and extent of fill material was determined based on limited test borings and visual observation. Thicker fill may be present at the site. Limited testing was performed on the fill soils during the time of our field and laboratory investigations. The limited testing indicates that some compaction effort was applied to the fill material at the time of placement.

The upper soils within the other 3 borings predominately consisted of approximately 6 to 12 inches of very loose silty sand. These soils are disturbed, have low strength characteristics and are highly compressible when saturated.

Below the fill and loose surface soils, approximately 2 to 3 feet of loose to medium dense silty sand, silty sand/sand, and sand were encountered. Some of these soils contained varying amounts of gravels. Field and laboratory tests suggest that these soils are moderately strong and slightly compressible. Penetration resistance ranged from 13 to 21 blows per foot. Dry densities ranged from 97 to 112 pcf. Representative soil samples consolidated approximately 1½ to 2½ percent under a 2 ksf load when saturated.

Below 4 to 7 feet, layers of predominately loose to dense silty sand, silty sand/sand, and sand were encountered. Some of these soils contained varying amounts of gravels and/or cobbles. Field and laboratory tests suggest that these soils are moderately strong and slightly compressible. Penetration resistance ranged from 6 to 44 blows per foot. Dry densities ranged from 97 to 126 pcf. Representative soil samples consolidated approximately 1 to 2 percent under a 2 ksf load when saturated. Representative samples of these soils contained approximately 2 to 40 percent fines. These soils had similar strength characteristics as the upper soils and extended to the termination depth of our borings.

For additional information about the soils encountered, please refer to the logs of borings in Appendix A.

GROUNDWATER

Test boring locations were checked for the presence of groundwater during and immediately following the drilling operations. Free groundwater was encountered within a depth of 20 to 24 feet below site grade. Review of the Department of Water Resources groundwater level readings from September 1961 to March 2018 indicates that the historic high groundwater within the project site and vicinity ranged from 10.7 to 80.8 feet below site grade. Groundwater information was obtained from 4 groundwater wells located within approximately 1.1 miles of the subject site (Well Site Code: 360503N1190242W001, 360712N1190155W001, 360606N1190028W001 and 360511N1190228W001.

It should be recognized that water table elevations may fluctuate with time, being dependent upon seasonal precipitation, irrigation, land use and climatic conditions, as well as other factors. Therefore, water level observations at the time of the field investigation may vary from those encountered during the construction phase of the project. The evaluation of such factors is beyond the scope of this report.

CONCLUSIONS AND RECOMMENDATIONS

Based on the findings of our field and laboratory investigations, along with previous geotechnical experience in the project area, the following is a summary of our evaluations, conclusions, and recommendations.

Administrative Summary

In brief, the subject site and soil conditions with the exception of the fill material, loose surface soils, potential settlement associated with a seismic event, and existing development, appear to be conducive to the development of the project. The surface soils are disturbed, have low strength characteristics, and are highly compressible when saturated. Accordingly, it is recommended that the surface soils be recompacted. This compaction effort should stabilize the surface soils and locate any unsuitable or pliant areas not found during our field investigation.

Previous grading operations have been performed within the project site and vicinity associated with the existing and surrounding developments. In the proposed building areas, approximately 2 to 4 feet of fill material was encountered within Borings No. B-4 and B-5. In Borings No. B-1 and B-3 within the proposed asphaltic concrete pavement improvement areas, the pavement section was underlain by approximately 4 to 7 feet of fill material. The fill material predominately consisted of silty sand, sandy silt, and clayey sand. Some of these soils contained gravel. The thickness and extent of fill material was determined based on limited test borings and visual observation. Thicker fill may be present at the site. Limited testing was performed on the fill soils during the time of our field and laboratory investigations. The limited testing indicates that some compaction effort was applied to the fill material at the time of placement. It is recommended that fill soils which are not properly compacted and certified be excavated and stockpiled so that the native soils can be properly prepared. Preliminary testing indicates the fill material will be suitable for reuse as Engineered Fill, provided it is cleansed of excessive organics, debris, and fragments larger than 4 inches in maximum size. Prior to backfilling, Krazan & Associates, Inc. should inspect the bottom of the excavation to verify no additional removal is required.

The site is located within an elementary school campus. The proposed development areas presently consist of an asphaltic concrete parking lot, concrete and grass garden area, grass play field, and a vacant disced field. Associated with these developments may be buried structures, such as utility lines and irrigation lines that may extend into the project site. Any surface or buried structures, including pipelines or loosely backfilled excavations, encountered during construction should be properly removed and/or relocated. It is suspected demolition of the existing structures will disturb the upper soils. The resulting excavations should be cleaned to firm native ground and backfilled with Engineered Fill. Disturbed areas caused by demolition activities should be removed and/or recompacted.

Based on the soil liquefaction analysis performed within the site, the estimated total seismic-induced settlement is less than 3¼ inches. Differential settlement caused by a seismic event is estimated to be less than 2 inches. The anticipated differential settlement is estimated over a horizontal distance of 100 feet. The seismic settlements would develop if liquefaction of the underlying saturated subsoils were to occur during a seismic event. If these potential movements are not tolerable, mitigation measures are recommended to reduce structural damage due to soil liquefaction. Recommendations for structural slabs and geogrid reinforced soil are provided in the report.

Several trees are located throughout the site. If not utilized for the proposed development, tree removal operations should include roots greater than 1 inch in diameter. The resulting excavations should be backfilled with Engineered Fill compacted to a minimum of 90 percent of maximum density based on ASTM Test Method D1557.

Sandy and gravelly soil conditions were encountered at the site. These cohesionless soils have a tendency to cave in trench wall excavations. Shoring or sloping back trench sidewalls may be required within these sandy and gravelly soils.

After completion of the recommended site preparation, the site should be suitable for shallow footing support. The proposed structure footings may be designed as conventional spread or continuous footings with an allowable bearing pressure of 2,500 psf for dead-plus-live loads. Conventional footings should have a minimum embedment of 18 inches. As an alternative, the structure may be supported on a post-tension or mat foundation designed to withstand the estimated seismic settlements. Recommendations regarding post-tension, structural slab, or mat foundations are provided in the Foundation section of this report.

Groundwater Influence on Structures/Construction

Groundwater was encountered at approximately 20 to 24 feet below the site surface in Borings No. B-2, B-5, and B-7. Based on our findings and historical records, it is not anticipated that groundwater will not rise within the zone of structural influence or affect the construction of foundations and pavements for the project. However, if earthwork is performed during or soon after periods of precipitation, the subgrade soils may become saturated, "pump," or not respond to densification techniques. Typical remedial measures include: discing and aerating the soil during dry weather; mixing the soil with dryer materials; removing and replacing the soil with an approved fill material; or mixing the soil with an approved lime or cement product. Our firm should be consulted prior to implementing remedial measures to observe the unstable subgrade conditions and provide appropriate recommendations.

Site Preparation - General

General site clearing should include removal of vegetation; existing utilities; structures including foundations; basement walls and floors; existing stockpiled soil; trees and associated root systems; rubble; rubbish; and any loose and/or saturated materials. Site stripping should extend to a minimum depth of 2 to 4 inches or until all organics in excess of 3 percent by volume are removed. Deeper stripping may be required in localized areas. These materials will not be suitable for use as Engineered Fill. However, stripped topsoil may be stockpiled and reused in landscape or non-structural areas.

Previous grading operations have been performed within the project site and vicinity associated with the existing and surrounding developments. In the proposed building areas, approximately 2 to 4 feet of fill material was encountered within Borings No. B-4 and B-5. In Borings No. B-1 and B-3, the asphaltic concrete pavement was underlain by approximately 4 to 7 feet of fill material. The fill material predominately consisted of silty sand, sandy silt, and clayey sand. These soils contained varying amounts of gravel. The thickness and extent of fill material was determined based on limited test borings and visual observation. Thicker fill may be present at the site. Limited testing was performed on the fill soils during the time of our field and laboratory investigations. The limited testing indicates that some compaction effort was applied to the fill material at the time of placement. It is recommended that fill soils which are not properly compacted and certified be excavated and stockpiled so that the native soils can be properly prepared. Preliminary testing indicates the fill material will be suitable for reuse as Engineered Fill, provided it is cleansed of excessive organics, debris, and fragments larger than 4 inches in maximum size. Prior to backfilling, Krazan & Associates, Inc. should inspect the bottom of the excavation to verify no additional removal is required.

The site is located within an elementary school campus. The proposed development area presently consists of an asphaltic concrete parking lot, asphaltic concrete play area, grass play field, classroom buildings, and a vacant disced field. Associated with these developments may be buried structures, such as utility lines and irrigation lines that may extend into the project site. Any surface or buried structures, including pipelines or loosely backfilled excavations, encountered during construction should be properly removed and/or relocated. It is suspected demolition of the existing structures will disturb the upper soils. The resulting excavations should be cleaned to firm native ground and backfilled with Engineered Fill. Disturbed areas caused by demolition activities should be removed and/or recompacted.

Following stripping, demolition activities and fill removal or certification, the exposed subgrade within the proposed building areas should be excavated to a depth of at least 12 inches below existing subgrade or 12 inches below the bottom of footings, whichever is deeper, worked until uniform and free from large clods, moisture-conditioned to at or above optimum moisture content, and recompacted to a minimum of 90 percent of maximum density based on ASTM Test Method D1557. Limits of recompaction should extend 5 feet beyond structural elements. Prior to fill placement, the exposed subgrade soils should be proofrolled and observed by Krazan & Associates, Inc. to verify stability. This compaction effort should stabilize the surface soils and locate any unsuitable or pliant areas not found during our field investigation. Soft or pliant areas should be excavated to firm native ground.

Following stripping and demolition activities, the exposed subgrade within the proposed exterior flatwork and pavement areas should be excavated to a depth of at least 12 inches, worked until uniform and free from large clods, moisture-conditioned to at or above optimum moisture content, and recompacted to a minimum of 90 percent of maximum density based on ASTM Test Method D1557. Limits of recompaction should extend 2 feet beyond flatwork and pavements. Prior to fill placement, the exposed subgrade soils should be proofrolled and observed by Krazan & Associates, Inc. to verify stability. This compaction effort should stabilize the surface soils and locate any unsuitable or pliant areas not found during our field investigation. Soft or pliant areas encountered should be excavated to firm native ground.

Several trees are located throughout the site. If not utilized for the proposed development, tree removal operations should include roots greater than 1 inch in diameter. The resulting excavations should be backfilled with Engineered Fill compacted to a minimum of 90 percent of maximum density based on ASTM Test Method D1557.

Sandy and gravelly soil conditions were encountered at the site. These cohesionless soils have a tendency to cave in trench wall excavations. Shoring or sloping back trench sidewalls may be required within these sandy and gravelly soils.

Relatively clean sands were encountered at various locations throughout the site. The possibility exists that site grading operations could expose these soils in areas of proposed buildings, pavements, and/or retaining walls. The Contractor should note that these soils lack the cohesion necessary to stand vertically, even in shallow excavations such as footing trenches. If these conditions are encountered, it will be necessary to over-excavate the affected area(s) to a minimum of 12 inches below the proposed bearing surface. These areas may be backfilled using a mix of the silty sand and sand soils that contains at least 20 percent fines and meeting the requirements for Engineered Fill. This material may be obtained from elsewhere at the site, imported to the site from an approved off-site source, or manufactured through blending of the excavated clean sand with other suitable material containing a higher percentage of fines to result in material meeting the requirements for Engineered Fill.

The upper soils, during wet winter months, become very moist due to the absorptive characteristics of the soil. Earthwork operations performed during winter months may encounter very moist unstable soils which may require removal to grade a stable building foundation. Project site winterization consisting of placement of aggregate base and protecting exposed soils during the construction phase should be performed.

A representative of our firm should be present during all site clearing and grading operations to test and observe earthwork construction. This testing and observation is an integral part of our service as acceptance of earthwork construction is dependent upon compaction of the material and the stability of the material. The Soils Engineer may reject any material that does not meet compaction and stability requirements. Further recommendations of this report are predicated upon the assumption that earthwork construction will conform to recommendations set forth in this section and the Engineered Fill section.

Supplemental Site Preparation - Liquefaction Mitigation - Geogrid

Subsurface soils within the proposed building area are prone to liquefaction under high ground shaking acceleration during an earthquake. If the proposed structures will be supported on shallow conventional foundations and cannot withstand the potential movements associated with a seismic event mitigation measures will be required. In order to reduce differential settlement associated with seismic settlement, the proposed structure may be constructed over geogrid reinforced Engineered Fill. If this option is utilized, the building area should be excavated to a depth of 5 feet or until all existing fill is removed, whichever is deeper, and the resulting excavation should be backfilled with a layered system of Engineered Fill and geogrid reinforcing. The depth of the over-excavation should be measured from existing ground or rough pad grade, whichever is deeper.

The first layer of geogrid reinforcement will be placed directly at the bottom of the excavation. The geogrid material should be overlapped a minimum of 3 feet in all directions. The geogrid strips should be “shingled” such that the exposed geogrid edge is opposite the direction of fill placement (as roof shingles to rain runoff). The interlock between the geogrid and Engineered Fill will provide load transfer. No vehicles may traverse the geogrid prior to placement of the Engineered Fill cover.

The next layer of geogrid should be placed on top of the compacted Engineered Fill. This and subsequent layers need only be overlapped a minimum of 1 foot on all sides. The geogrid strips of this layer, and all subsequent layers within the footprint, should be placed with lengths perpendicular to those in the layer immediately below. The fill soils excavated from the area beneath the structure may be moisture-conditioned and recompacted between geogrid layers as reinforced fill. The reinforced fill should be conditioned to a minimum of 2 percent above optimum moisture content and recompacted to a minimum of 90 percent of maximum density based on ASTM D1557 Test Method.

A total of 4 geogrid layers, including the layer at the base of the excavation, should be installed at vertical increments of 1 foot. The geogrid layers should extend to a minimum of 5 feet beyond the exterior footing perimeter of the structure. The geogrid reinforcement fabric should consist of Tensar® TriAx TX7, NX750, or equivalent. Any additional unstable soils within building areas should be excavated and backfilled with Engineered Fill as requested by the Soil Engineer.

It is recommended that the building site be excavated at once, and soils be stockpiled. The geogrid and excavated soil may then be placed and recompacted as recommended herein. Alternatively, the Contractor may elect to excavate the site in two stages, where excavated soil can be stockpiled over one-half of the site while the other half is mitigated. However, if the Contractor elects the option of two stages over the preferred option of using one stage, a minimum of 5 feet of geogrid from the first half should overlap the second half. Furthermore, the overlapping geogrid should be protected from damages, which may be caused by operating equipment. It is further recommended that flexible utility connections be used for the project.

Engineered Fill

The on-site, upper native soils, and fill material are predominately silty sands, sandy silts, clayey sands, and sands. Some of these soils contained varying amounts of gravels. These soils will be suitable for reuse as Engineered Fill, provided they are cleansed of excessive organics, debris and fragments greater than 4 inches in maximum dimension. Soils with an expansion index greater than 15 should not be used in the upper 12 inches of soil supporting slabs-on-grade or exterior flatwork.

Relatively clean sands were encountered at various locations throughout the site. The possibility exists that site grading operations could expose these soils in areas of proposed buildings, pavements, and/or retaining walls. The Contractor should note that these soils lack the cohesion necessary to stand vertically, even in shallow excavations such as footing trenches. If these conditions are encountered, it will be necessary to over-excavate the affected area(s) to a minimum of 12 inches below the proposed bearing surface. These areas may be backfilled using a mix of the silty sand and sand soils that contains at least 20 percent fines and meeting the requirements for Engineered Fill. This material may be obtained from elsewhere at the site, imported to the site from an approved off-site source, or manufactured through blending of the excavated clean sand with other suitable material containing a higher percentage of fines to result in material meeting the requirements for Engineered Fill.

The preferred materials specified for Engineered Fill are suitable for most applications with the exception of exposure to erosion. Project site winterization and protection of exposed soils during the construction phase should be the sole responsibility of the Contractor, since he has complete control of the project site at that time.

Imported Fill should consist of a well-graded, slightly cohesive, fine silty sand or sandy silt, with relatively impervious characteristics when compacted. This material should be approved by the Soils Engineer prior to use and should typically possess the following characteristics:

Percent Passing No. 200 Sieve	20 to 50
Plasticity Index	10 maximum
UBC Standard 29-2 Expansion Index	15 maximum

Fill soils should be placed in lifts approximately 6 inches thick, moisture-conditioned as necessary, and compacted to achieve at least 90 percent of maximum density based on ASTM Test Method D1557. Additional lifts should not be placed if the previous lift did not meet the required dry density or if soil conditions are not stable.

Drainage and Landscaping

The ground surface should slope away from building pad and pavement areas toward appropriate drop inlets or other surface drainage devices. In accordance with Section 1804 of the 2022 California Building Code, it is recommended that the ground surface adjacent to foundations be sloped a minimum of 5 percent for a minimum distance of 10 feet away from structures, or to an approved alternative means of drainage conveyance. Swales used for conveyance of drainage and located within 10 feet of foundations should be sloped a minimum of 2 percent. Impervious surfaces, such as pavement and exterior concrete flatwork, within 10 feet of building foundations should be sloped a minimum of 1 percent away from the structure. Drainage gradients should be maintained to carry all surface water to collection facilities and off-site. These grades should be maintained for the life of the project.

Slots or weep holes should be placed in drop inlets or other surface drainage devices in pavement areas to allow free drainage of adjoining base course materials. Cutoff walls should be installed at pavement edges adjacent to vehicular traffic areas; these walls should extend to a minimum depth of 12 inches below pavement subgrades to limit the amount of seepage water that can infiltrate the pavements. Where cutoff walls are undesirable, subgrade drains can be constructed to transport excess water away from planters to drainage interceptors. If cutoff walls can be successfully used at the site, construction of subgrade drains is considered unnecessary.

Utility Trench Backfill

Utility trenches should be excavated according to accepted engineering practices following OSHA (Occupational Safety and Health Administration) standards by a Contractor experienced in such work. The responsibility for the safety of open trenches should be borne by the Contractor. Traffic and vibration adjacent to trench walls should be reduced; cyclic wetting and drying of excavation side slopes should be avoided. Depending upon the location and depth of some utility trenches, groundwater flow into open excavations could be experienced; especially during or following periods of precipitation.

Sandy and gravelly soil conditions were encountered at the site. These cohesionless soils have a tendency to cave in trench wall excavations. Shoring or sloping back trench sidewalls may be required within these sandy and gravelly soils.

Utility trench backfill placed in or adjacent to buildings and exterior slabs should be compacted to at least 90 percent of maximum density based on ASTM Test Method D1557. Utility trench backfill placed in pavement areas should be compacted to at least 90 percent of maximum density based on ASTM Test Method D1557. Pipe bedding should be in accordance with pipe manufacturer's recommendations.

The Contractor is responsible for removing all water-sensitive soils from the trench regardless of the backfill location and compaction requirements. The Contractor should use appropriate equipment and methods to avoid damage to the utilities and/or structures during fill placement and compaction.

Foundations - Conventional

The proposed structures may be supported on a shallow foundation system bearing on a minimum of 12 inches of Engineered Fill. Spread and continuous footings supported on a minimum of 12 inches of engineered fill can be designed for the following maximum allowable soil bearing pressures:

Load	Allowable Loading
Dead Load Only	2,250 psf
Dead-Plus-Live Load	3,000 psf
Total Load, including wind or seismic loads	4,000 psf

The footings should have a minimum embedment depth of 18 inches below pad subgrade (soil grade) or adjacent exterior grade, whichever is lower. Footings should have a minimum width of 12 inches, regardless of load. Footings supported on geogrid reinforced Engineered Fill can be designed for the following maximum allowable bearing pressures:

Load	Allowable Loading
Dead Load Only	2,650 psf
Dead-Plus-Live Load	3,500 psf
Total Load, including wind or seismic loads	4,650 psf

The footings should have a minimum depth of 18 inches below pad subgrade (soil grade) or adjacent exterior grade, whichever is lower. Footings should have a minimum width of 12 inches, regardless of load. Ultimate design of foundations and reinforcement should be performed by the project Structural Engineer.

The footing excavations should not be allowed to dry out any time prior to pouring concrete. It is recommended that footings be reinforced by at least one No. 4 reinforcing bar in both top and bottom.

The total static movement is not expected to exceed 1 inch. Differential movement should be less than ½ inch. Most of the settlement is expected to occur during construction as the loads are applied. However, additional post-construction movement may occur if the foundation soils are flooded or saturated.

The total seismic-induced settlement is not expected to exceed 3¼ inches. Differential settlement caused by a seismic event should be less than 2 inches. For structures supported on geogrid reinforced Engineered Fill as described in the optional site preparation section of this report, differential settlement caused by a seismic event should be less than 1 inch. The anticipated differential settlement is estimated over a horizontal distance of 100 feet.

Resistance to lateral footing displacement can be computed using an allowable friction factor of 0.35 acting between the base of foundations and the supporting subgrade. Lateral resistance for footings can alternatively be developed using an equivalent fluid passive pressure of 325 pounds per cubic foot acting against the appropriate vertical footing faces. The frictional and passive resistance of the soil may be combined without reduction in determining the total lateral resistance. A ⅓ increase in the above value may be used for short duration, wind, or seismic loads.

Foundations - Structural Mat Slab or Post-Tensioned Slab

The potential for structural damage as a result of differential settlement due to the potential effects of soil consolidation associated with applied structural loads can be reduced by supporting the building on a very stiff structural mat-slab foundation. The foundation should be designed to distribute the building loads uniformly onto the supporting subgrade. By designing a relatively stiff mat, the settlement of the structure will be relatively uniform. The foundation should be designed to be sufficiently rigid to prevent the introduction of excess stresses in the superstructure above the foundation.

Support of structures with a mat-slab foundation is a method used to aid in controlling differential settlement of structures over weak soils. The foundation distributes high point loads and line loads over a much broader area resulting in significantly reduced stresses and a more uniform loading condition over the building area. This reduces the differential settlement of walls and columns that would be expected when supported by dissimilarly loaded footings and footings of differing sizes, and can result in less total settlement of the superstructure when support by the structural slab. The slab also provides increase confinement for sands below the surface reducing the potential for abrupt loss of support of foundation elements due to sand boils where shallow liquefiable sands are present.

The slab foundation should be designed to resist both bending and punching shear associated with the structural loads and design live loads. With the potential for arching or bending of the slab foundation to occur as a result of differential settlement, we recommend that the slab be designed to span over local areas of settlement and to act as a cantilevered beam to support the perimeter of the building should local settlement occur in areas of the perimeter.

For preliminary purposes, an allowable bearing pressure of 1,500 pounds per square foot may be used for design of the slab. For preliminary modeling purposes a vertical modulus of subgrade reaction (Kv1), also referred to as a soil spring, of 35 pounds per square inch per inch may be used for long term conditions. An increased modulus of 45 pounds per square inch per inch may be used for short term loading to evaluate punching shear at columns and walls. The slab design should ultimately limit slab bending or arching in the lightly loaded mid-slab areas between load bearing columns and walls. Based on the preliminary nature of the project design and a lack of formal design documents, these values should be considered preliminary and should be reevaluated during final design. The values should be reevaluated in order to determine soil support values appropriate for the actual design conditions.

In addition to the settlement parameters provided below, the following preliminary parameters are recommended for use in the structural design of the post-tensioned slab-on-grade foundations in accordance with *Design of Post-Tensioned Slabs-on-Ground*, 3rd Edition, by the Post-Tensioning Institute. In addition, the computer software program Volflo 1.5, by Geostructural Tool Kit, Inc. was also utilized in the analyses. The recommended edge moisture variation (e_m) and differential swell (y_m) values for use in preliminary design of post-tensioned slabs are as follows:

Edge Moisture Variation Distance:	Estimated Differential Swell:
Center lift, e_m = 6 feet	Center lift, y_m = ¾ inch
Edge lift, e_m = 4 feet	Edge lift, y_m = 1 inch

With the use of the stiff mat and with consideration of static and seismic induced settlements, the building should experience differential settlement of about 1-inch or less between adjacent columns, contingent on the degree of stiffness of the slab as determined through structural design. Total and differential settlement associated with seismic shaking of the site is estimated at less than 3¼ inches and 2 inches, respectively.

Excavation Stability

Temporary excavations planned for the construction of the building and other associated structures may be excavated according to the accepted engineering practices following Occupational Safety and Health Administration (OSHA) standards by a Contractor experienced in such work. Open, unbraced excavations in undisturbed soils should be made according to the table below.

Recommended Excavation Slopes

Depth of Excavation (ft)	Slope (Horizontal:Vertical)
	Temporary
0-6	1:1
6-12	1½:1
12-18	1¾:1
18+	2:1

If, due to space limitation, excavation near existing structures or roads is performed in a vertical position, braced shorings or shields may be used for supporting vertical excavations. Therefore, in order to comply with the local and state safety regulations, a properly designed and installed shoring system would be required to accomplish planned excavation and installation. A specialty Shoring Contractor should be responsible for the design and installation of such a shoring system during construction. The lateral pressures provided below may be used in the design of a braced-type shoring system.

Recommended Lateral Earth Pressure for Braced Shoring

Depth of Excavation Below Ground Surface (feet)	Lateral Soil Pressure (psf)
0	35 H
0.25 H	35 H
H	35 H

Where H is the total depth of the excavation in feet.

The foregoing does not include excess hydrostatic pressure or surcharge loading. Fifty percent of any surcharge load, such as construction equipment weight, should be added to the lateral load given above.

Since the Contractor has the ultimate responsibility for excavation stability, he may design a different shoring system for the excavation.

The excavation/shoring recommendations provided herein are based on soil characteristics derived from limited test borings within the site. Variations in soil conditions will likely be encountered during the excavations. Krazan & Associates, Inc. should be afforded the opportunity to provide field review to evaluate the actual conditions and account for field condition variations not otherwise anticipated in the preparation of this recommendation.

Floor Slabs and Exterior Flatwork

In areas that will utilize moisture-sensitive floor coverings, concrete slab-on-grade floors should be underlain by a water vapor retarder. The water vapor retarder should be installed in accordance with accepted engineering practice. The water vapor retarder should consist of a vapor retarder sheeting underlain by a minimum of 3 inches of compacted, clean, gravel of ¾-inch maximum size. To aide in concrete curing, an optional 2 to 4 inches of granular fill may be placed on top of the vapor retarder. The granular fill should consist of damp clean sand with at least 10 to 30 percent of the sand passing the 100 sieve. The sand should be free of clay, silt, or organic material. Rock dust which is manufactured sand from rock crushing operations is typically suitable for the granular fill. This granular fill material should be compacted.

The floor slab should be reinforced at a minimum with #3 reinforcement bars at 24 inches on-center each way within the floor slab's middle-third. Thicker floor slabs with increased concrete strength and reinforcement should be designed wherever heavy concentrated loads, heavy equipment, or machinery is anticipated.

The exterior floors should be poured separately in order to act independently of the walls and foundation system. All fills required to bring the building pads to grade should be Engineered Fills.

Moisture within the structure may be derived from water vapors which were transformed from the moisture within the soils. This moisture vapor can travel through the vapor membrane and penetrate the slab-on-grade. This moisture vapor penetration can affect floor coverings and produce mold and mildew in the structure. To reduce moisture vapor intrusion, it is recommended that a vapor retarder be installed. It is recommended that the utility trenches within the structure be compacted, as specified in our report, to reduce the transmission of moisture through the utility trench backfill. Special attention to the immediate drainage and irrigation around the building is recommended. Positive drainage should be established away from the structure and should be maintained throughout the life of the structure. Ponding of water should not be allowed adjacent to the structure. Over-irrigation within landscaped areas adjacent to the structure should not be performed. In addition, ventilation of the structure (i.e. ventilation fans) is recommended to reduce the accumulation of interior moisture.

Lateral Earth Pressures and Retaining Walls

Walls retaining horizontal backfill and capable of deflecting a minimum of 0.1 percent of its height at the top may be designed using an equivalent fluid active pressure of 35 pounds per square foot per foot of depth. Walls that are incapable of this deflection or walls that are fully constrained against deflection may be designed for an equivalent fluid at-rest pressure of 55 pounds per square foot per foot per depth. Expansive soils should not be used for backfill against walls. The wedge of non-expansive backfill material should extend from the bottom of each retaining wall outward and upward at a slope of 2:1 (horizontal to vertical) or flatter. The stated lateral earth pressures do not include the effects of hydrostatic water pressures generated by infiltrating surface water that may accumulate behind the retaining walls; or loads imposed by construction equipment, foundations, or roadways.

Retaining and/or below grade walls should be drained with either perforated pipe encased in free-draining gravel or a prefabricated drainage system. The gravel zone should have a minimum width of 12 inches and should extend upward to within 12 inches of the top of the wall. The upper 12 inches of backfill should consist of native soils, concrete, asphaltic concrete or other suitable backfill to reduce surface drainage into the wall drain system. The aggregate should conform to Class 2 permeable materials graded in accordance with the CalTrans Standard Specifications (2018). Prefabricated drainage systems, such as Miradrain®, Enkadrain®, or an equivalent substitute, are acceptable alternatives in lieu of gravel provided they are installed in accordance with the manufacturer's recommendations. If a prefabricated drainage system is proposed, our firm should review the system for final acceptance prior to installation.

Drainage pipes should be placed with perforations down and should discharge in a non-erosive manner away from foundations and other improvements. The pipes should be placed no higher than 6 inches above the heel of the wall in the center line of the drainage blanket and should have a minimum diameter of 4 inches. Collector pipes may be either slotted or perforated. Slots should be no wider than ⅛ inch in diameter, while perforations should be no more than ¼ inch in diameter. If retaining walls are less than 6 feet in height, the perforated pipe may be omitted in lieu of weep holes on 4 feet maximum spacing. The weep holes should consist of 4-inch diameter holes (concrete walls) or unmortared head joints (masonry walls) and not be higher than 18 inches above the lowest adjacent grade. Two 8-inch square overlapping patches of geotextile fabric (conforming to the CalTrans Standard Specifications for "edge drains") should be affixed to the rear wall opening of each weep hole to retard soil piping.

During grading and backfilling operations adjacent to any walls, heavy equipment should not be allowed to operate within a lateral distance of 5 feet from the wall or within a lateral distance equal to the wall height, whichever is greater, to avoid developing excessive lateral pressures. Within this zone, only hand operated equipment ("whackers," vibratory plates, or pneumatic compactors) should be used to compact the backfill soils.

R-Value Test Results and Pavement Design

Two R-value samples were obtained from the project site at the locations shown on the attached site plan. The samples were tested in accordance with the State of California Materials Manual Test Designation 301. Results of the tests are as follows:

Sample	Depth	Description	R-Value at Equilibrium
1	12-24"	Silty Sand (SM)	52
2	12-24"	Silty Sand (SM)	58

The test results are moderate and indicate good subgrade support characteristics under dynamic traffic loads. The following table shows the recommended pavement sections for various traffic indices

Traffic Index	Asphaltic Concrete	Class II Aggregate Base*	Compacted Subgrade**
4.0	2.0"	4.0"	12.0"
4.5	2.5"	4.0"	12.0"
5.0	2.5"	4.0"	12.0"
5.5	3.0"	4.0"	12.0"
6.0	3.0"	4.0"	12.0"
6.5	3.5"	4.0"	12.0"
7.0	4.0"	4.5"	12.0"
7.5	4.0"	5.5"	12.0"

**** 95% compaction based on ASTM Test Method D1557 or CAL 216***
***** 90% compaction based on ASTM Test Method D1557 or CAL 216***

If traffic indices are not available, an estimated (typical value) index of 4.5 may be used for light automobile traffic and an index of 7.0 may be used for light truck traffic.

The following recommendations are for light-duty and heavy-duty Portland Cement Concrete pavement sections.

PORTLAND CEMENT PAVEMENT
LIGHT DUTY

Traffic Index	Portland Cement Concrete***	Class II Aggregate Base*	Compacted Subgrade**
4.5	5.0"	--	12.0"

HEAVY DUTY

Traffic Index	Portland Cement Concrete***	Class II Aggregate Base*	Compacted Subgrade**
7.0	6.5"	--	12.0"

**** 95% compaction based on ASTM Test Method D1557 or CAL 216***
***** 90% compaction based on ASTM Test Method D1557 or CAL 216***
******Minimum compressive strength of 3000 psi***

It is recommended that any uncertified fill material encountered within pavement areas be removed and/or recompacted. The fill material should be moisture-conditioned to near optimum moisture and recompacted to a minimum of 90 percent of maximum density based on ASTM Test Method D1557. As an alternative, the Owner may elect not to recompact the existing fill within paved areas. However, the Owner should be aware that the paved areas may settle which may require annual maintenance. At a minimum, it is recommended that the upper 12 inches of subgrade soil be moisture-conditioned as necessary and recompacted to a minimum of 90 percent of maximum density based on ASTM Test Method D1557.

Seismic Parameters – 2022 California Building Code

The Site Class per Section 1613A of the 2022 California Building Code (2022 CBC) and ASCE 7-16, Chapter 20 is based upon the site soil conditions. It is our opinion that a Site Class D is most consistent with the subject site soil conditions. For seismic design of the structures based on the seismic provisions of the 2022 CBC, we recommend the following parameters:

Seismic Item	Value	CBC Reference
Site Class	D	Section 1613A.2.2
Site Coefficient F_a	1.336	Table 1613A.2.3 (1)
S_s	0.580	Section 1613A.2.1
S_{MS}	0.775	Section 1613A.2.3
S_{DS}	0.517	Section 1613A.2.4
Site Coefficient F_v	2.150	Table 1613A.2.3 (2)
S_1	0.225	Section 1613A.2.1
S_{M1}	0.484	Section 1613A.2.3
S_{D1}	0.323	Section 1613A.2.4
T_S	0.624	Section 1613A.2

* Based on Equivalent Lateral Force (ELF) Design Procedure being used.

Soil Cement Reactivity

Excessive sulfate in either the soil or native water may result in an adverse reaction between the cement in concrete (or stucco) and the soil. HUD/FHA and CBC have developed criteria for evaluation of sulfate levels and how they relate to cement reactivity with soil and/or water.

Soil samples were obtained from the site and tested in accordance with State of California Materials Manual Test Designation 417. The sulfate concentrations detected from these soil samples were less than 150 ppm (28.7 ppm) and are below the maximum allowable values established by HUD/FHA and CBC. Therefore, no special mitigation measures are required to compensate for sulfate reactivity with the cement. A representative soil sample had a chloride concentration of 27.0 ppm and a pH of 8.1.

Compacted Material Acceptance

Compaction specifications are not the only criteria for acceptance of the site grading or other such activities. However, the compaction test is the most universally recognized test method for assessing the performance of the Grading Contractor. The numerical test results from the compaction test cannot be used to predict the engineering performance of the compacted material. Therefore, the acceptance of compacted materials will also be dependent on the stability of that material. The Soils Engineer has the option of rejecting any compacted material regardless of the degree of compaction if that material is considered to be unstable or if future instability is suspected. A specific example of rejection of fill material passing the required percent compaction is a fill which has been compacted with an in-situ moisture content significantly less than optimum moisture. This type of dry fill (brittle fill) is susceptible to future settlement if it becomes saturated or flooded.

Testing and Inspection

A representative of Krazan & Associates, Inc., should be present at the site during the earthwork activities to confirm that actual subsurface conditions are consistent with the exploratory fieldwork. This activity is an integral part of our service, as acceptance of earthwork construction is dependent upon compaction testing and stability of the material. This representative can also verify that the intent of these recommendations is incorporated into the project design and construction. Krazan & Associates, Inc., will not be responsible for grades or staking, since this is the responsibility of the Prime Contractor.

LIMITATIONS

Soils Engineering is one of the newest divisions of Civil Engineering. This branch of Civil Engineering is constantly improving as new technologies and understanding of earth sciences advance. Although your site was analyzed using the most appropriate and most current techniques and methods, undoubtedly there will be substantial future improvements in this branch of engineering. In addition to advancements in the field of Soils Engineering, physical changes in the site, either due to excavation or fill placement, new agency regulations, or possible changes in the proposed structure after the soils report is completed may require the soils report to be professionally reviewed. In light of this, the Owner should be aware that there is a practical limit to the usefulness of this report without critical review. Although the time limit for this review is strictly arbitrary, it is suggested that 2 years be considered a reasonable time for the usefulness of this report.

Foundation and earthwork construction is characterized by the presence of a calculated risk that soil and groundwater conditions have been fully revealed by the original foundation investigation. This risk is derived from the practical necessity of basing interpretations and design conclusions on limited sampling of the earth. The recommendations made in this report are based on the assumption that soil conditions do not vary significantly from those disclosed during our field investigation. If any variations or undesirable conditions are encountered during construction, the Soils Engineer should be notified so that supplemental recommendations may be made.

The conclusions of this report are based on the information provided regarding the proposed construction. If the proposed construction is relocated or redesigned, the conclusions in this report may not be valid. The Soils Engineer should be notified of any changes so the recommendations may be reviewed and re-evaluated.

This report is a Geotechnical Engineering Investigation with the purpose of evaluating the soil conditions in terms of foundation design. The scope of our services did not include any Environmental Site Assessment for the presence or absence of hazardous and/or toxic materials in the soil, groundwater, or atmosphere; or the presence of wetlands. Any statements, or absence of statements, in this report or on any boring log regarding odors, unusual or suspicious items, or conditions observed, are strictly for descriptive purposes and are not intended to convey engineering judgment regarding potential hazardous and/or toxic assessment.

The geotechnical engineering information presented herein is based upon professional interpretation utilizing standard engineering practices and a degree of conservatism deemed proper for this project. It is not warranted that such information and interpretation cannot be superseded by future geotechnical engineering developments. We emphasize that this report is valid for the project outlined above and should not be used for any other sites.

If you have any questions, or if we may be of further assistance, please do not hesitate to contact our office at (559) 348-2200.

Respectfully submitted,
KRAZAN & ASSOCIATES, INC.

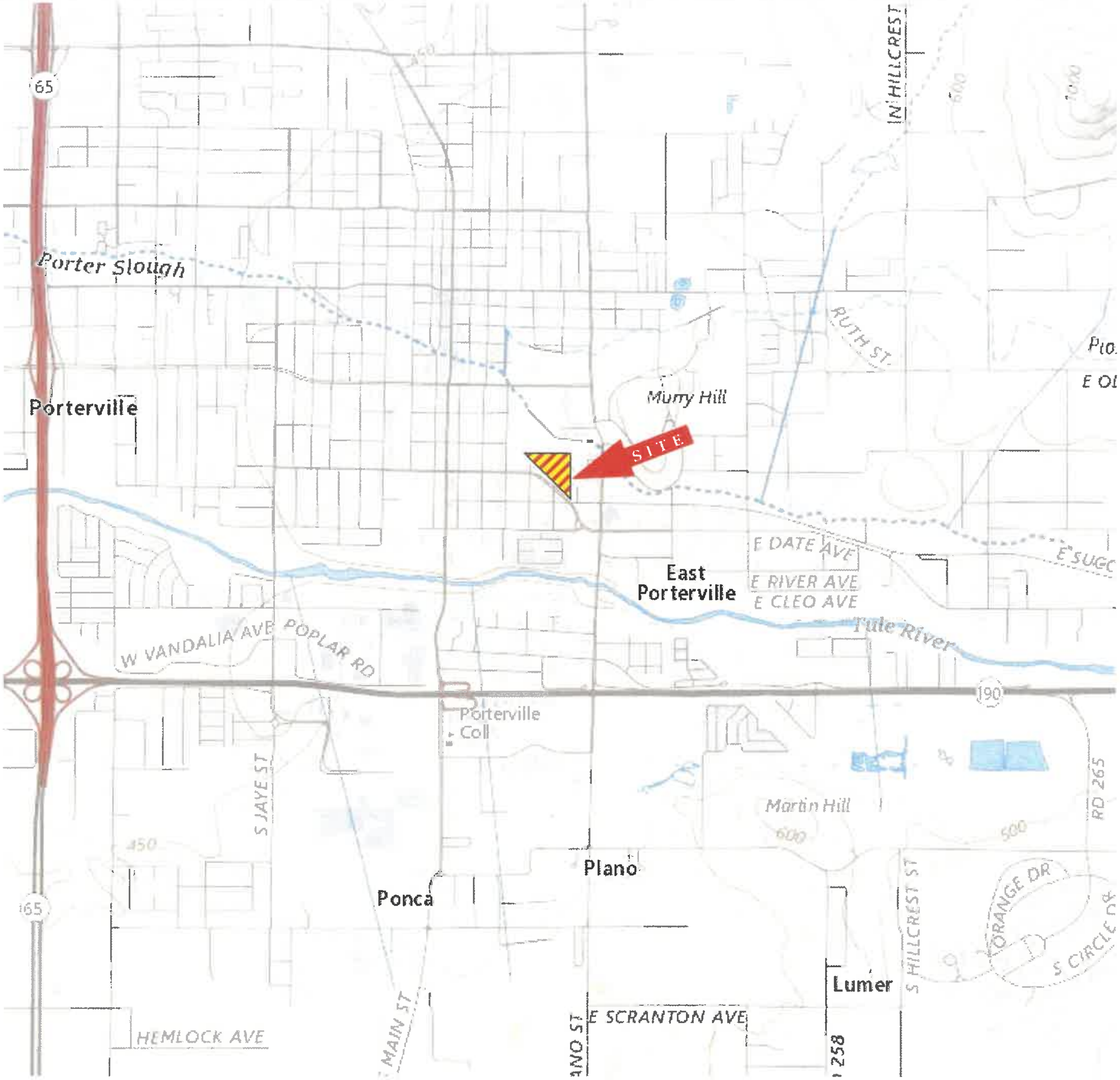
STEPHEN J. NELSON
No. 2146

Stephen J. Nelson
Certified Engineering Geologist
CEG No. 2146

DAVID R. JAROSZ II
2698

David R. Jarosz, II
Managing Engineer
RGE No. 2698/RCE No. 60185

SJN/DRJ:ht



VICINITY MAP

NORTH

0 ½ 1

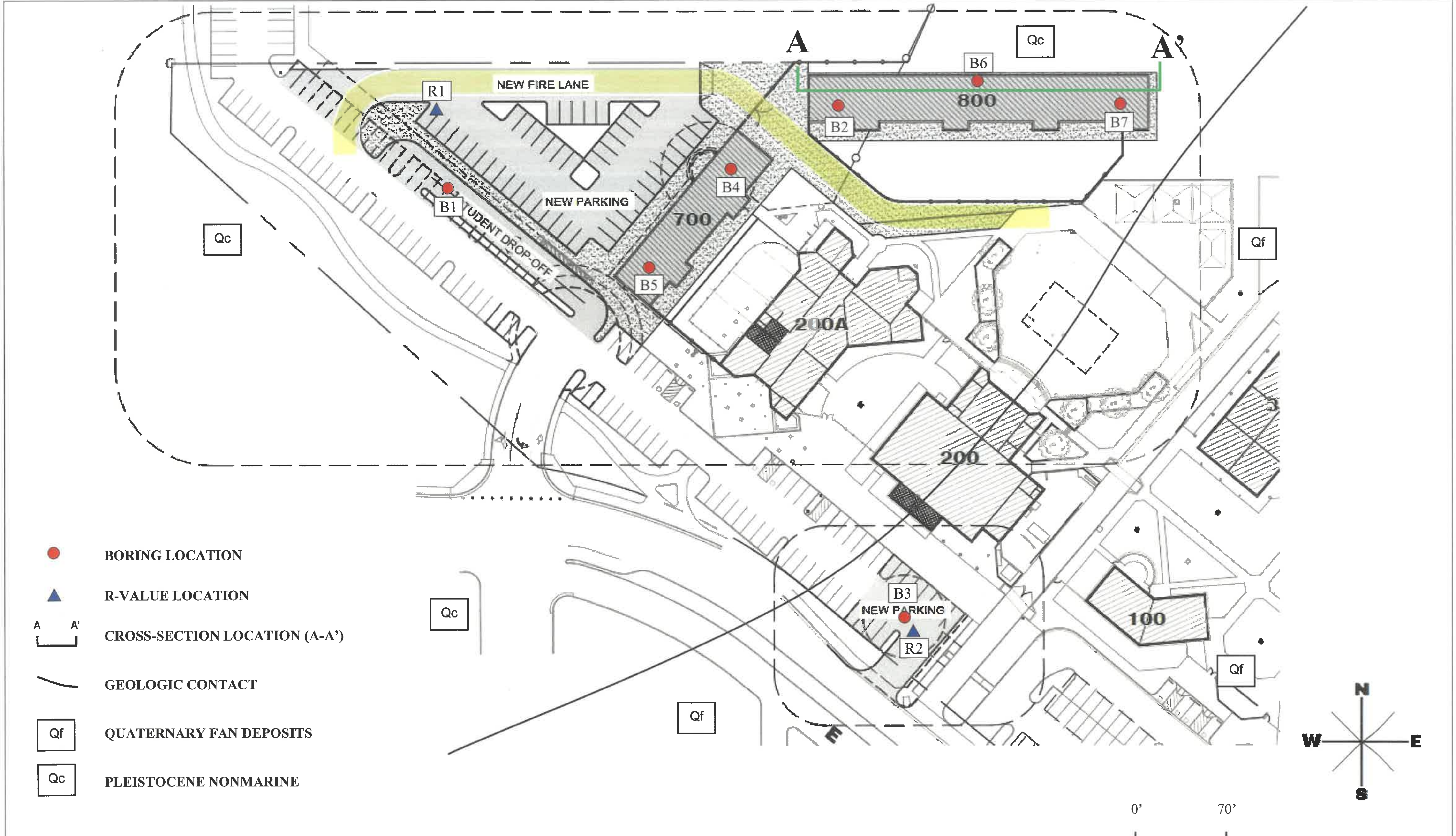
SCALE IN MILES (±)

MAP SOURCE:
U.S.G.S. TOPOZONE, TULARE COUNY
PORTERVILLE AREA
HTTPS://WWW.TOPOZONE.COM

GEOTECHNICAL ENGINEERING INVESTIGATION
SANTA FE ELEMENTARY SCHOOL
286 E. Orange Avenue
Porterville, California

Scale: As Shown	**Date:** Jan. 2024
Drawn by: WA	**Approved by:** SN
Project No. 012-23164	**Figure No.** 1

Krazan
GEOTECHNICAL ENGINEERING



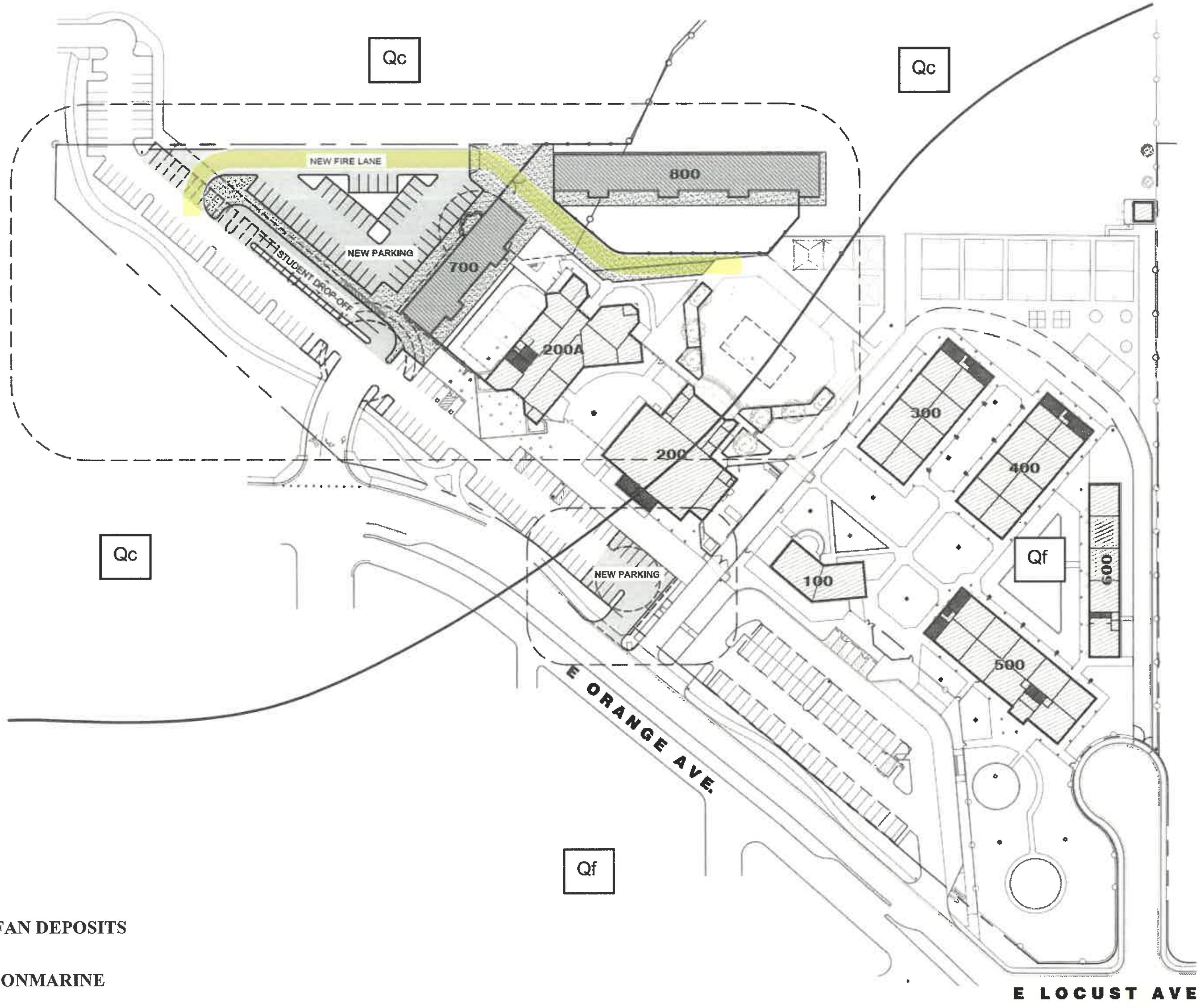
MAP BY: MANGINI ASSOCIATES, INC

SITE GEOLOGIC MAP

GEOTECHNICAL ENGINEERING INVESTIGATION
SANTA FE ELEMENTARY SCHOOL
286 E. Orange Avenue
Porterville, California

Scale: As Shown	Date: January 2024
Drawn by: WA	Approved by: DJ
Project No. 012-23164	Figure No. 2

Krazan
GEOTECHNICAL ENGINEERING



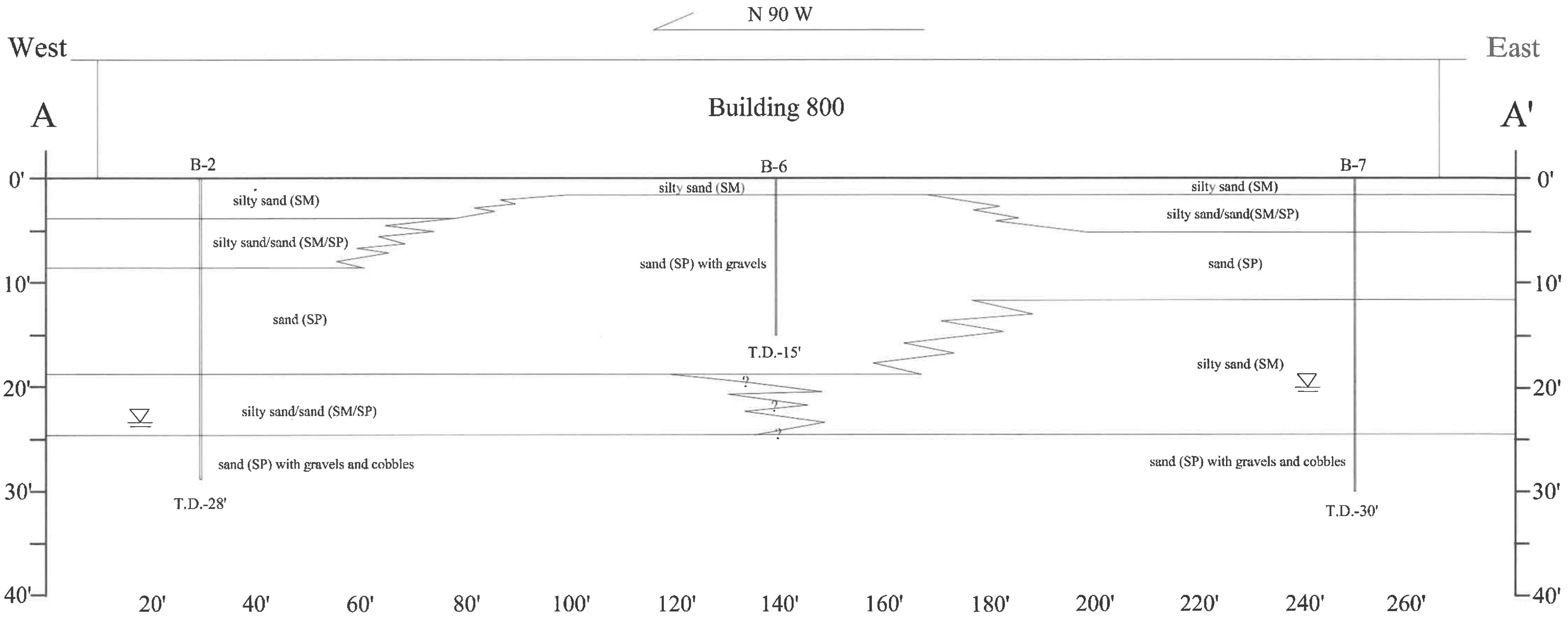
Qf	- QUATERNARY FAN DEPOSITS
Qc	-PLEISTOCENE NONMARINE
- - - - - -	-PROJECT AREAS
───	-GEOLOGIC UNIT CONTACT

MAP BY: MANGINI ASSOCIATES, INC

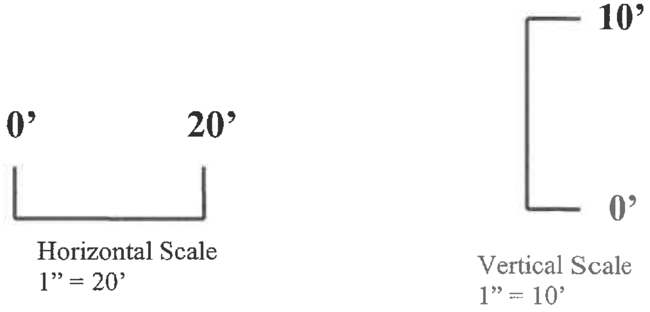
0’ 120’

N
W E
S

SITE MAP	Scale: As Shown	Date: January 2024	Krazan GEOTECHNICAL ENGINEERING
GEOTECHNICAL ENGINEERING INVESTIGATION SANTA FE ELEMENTARY SCHOOL 286 E. Orange Avenue Porterville, California	Drawn by: WA	Approved by: DJ	
	Project No. 012-23164	Figure No. 2.1	



SITE GEOLOGIC CROSS SECTION A-A'

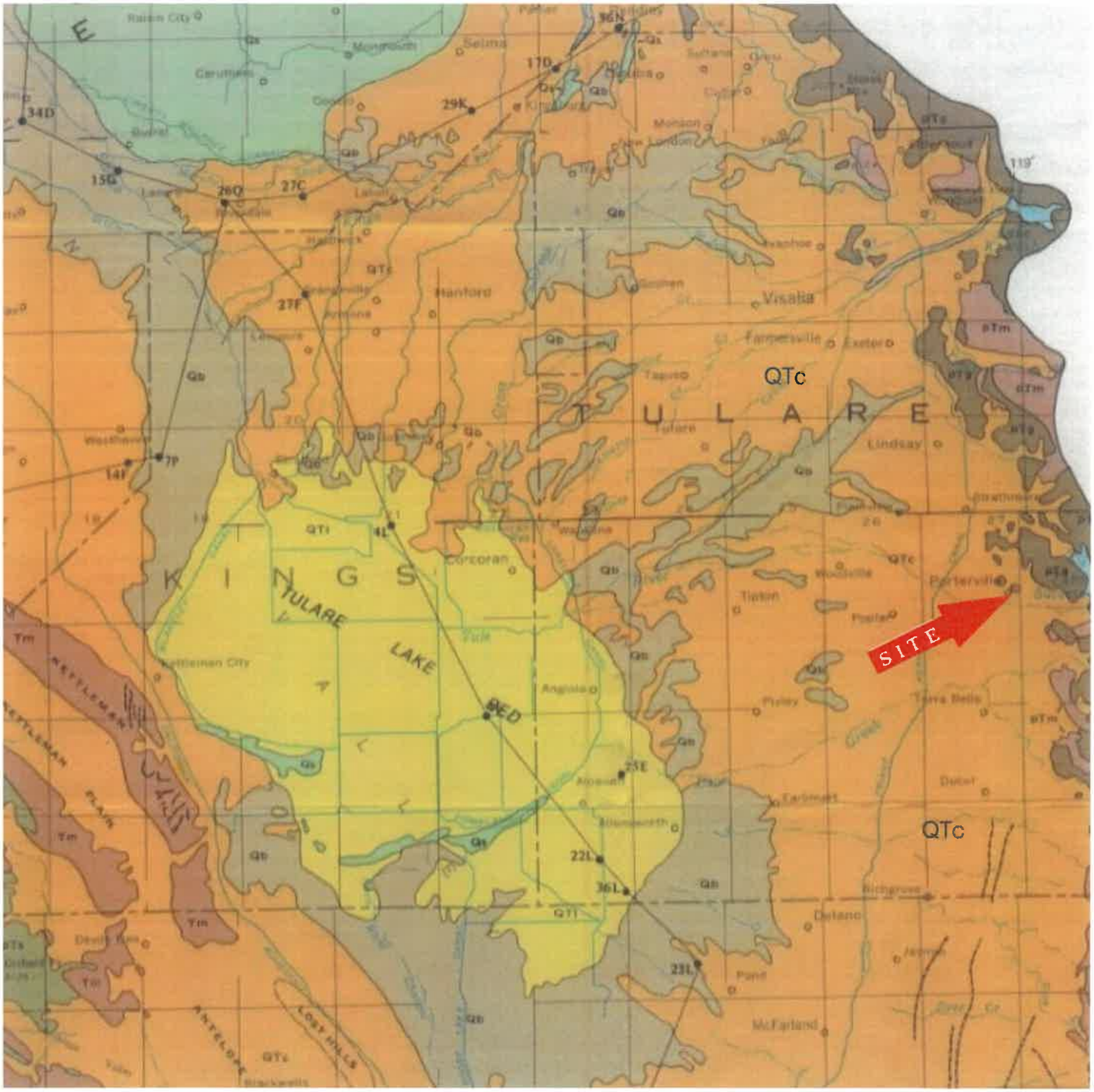


GEOTECHNICAL ENGINEERING INVESTIGATION

SANTA FE ELEMENTARY SCHOOL
286 E. Orange Avenue
Porterville, California

Scale: As Shown	**Date:** January 2024
Drawn by: WA	**Approved by:** SN
Project No. 012-23164	**Figure No.** 3

Krazan
GEOTECHNICAL ENGINEERING



REGIONAL GEOLOGIC MAP

FROM:
GEOLOGIC MAP OF THE SAN JOAQUIN VALLEY,
TULARE, KINGS, KERN, AND FRESNO COUNTIES,
CALIFORNIA.
COMPILATION BY R.W. PAGE, 1985

NORTH

0 8 16

SCALE IN MILES (±)

GEOTECHNICAL ENGINEERING INVESTIGATION **SANTA FE ELEMENTARY SCHOOL** 286 E. Orange Avenue Porterville, California	**Scale:** As Shown	**Date:** Jan. 2024	Krazan **GEOTECHNICAL ENGINEERING**
	Drawn by: WA	**Approved by:** SN	
	Project No. 012-23164	**Figure No.** 4	

DESCRIPTION OF MAP UNITS

Qs	**Sand dunes (Holocene)** Windblown sand and dune sand
Qb	**Flood-basin deposits (Holocene)** Clay, silt, and some sand; near Stockton consist of muck, peat, and other organic soils. In places may include part of the Modesto Formation (Pleistocene)
Qr	**River deposits (Holocene)** Gravel, sand, silt, and minor amounts of clay; deposited along channels, flood plains, and natural levees of main streams. In places may include part of Modesto Formation (Pleistocene)
QTl	**Lacustrine and marsh deposits (Pliocene to Holocene)** Clay, silt, and some sand; in subsurface include three widespread clays: A clay (Pleistocene and Holocene?); C clay (Pleistocene); and modified E clay (Pleistocene), includes Corcoran Clay Member of Tulare and Turlock Lake Formations
QTc	**Continental rocks and deposits (Miocene to Holocene)** Heterogeneous mix of generally poorly sorted clay, silt, sand, and gravel; some beds of claystone, siltstone, sandstone, and conglomerate. Include some informal units: younger alluvium (Holocene), older alluvium (Pleistocene and Holocene?) and continental deposits (Pliocene and Pleistocene); three formations of Pleistocene age: Modesto, Riverbank, and Turlock Lake; Tulare Formation (Pliocene and Pleistocene) on western side of valley, Laguna Formation (Pliocene) on eastern side, and Kern River Formation (Miocene to Pleistocene?) on southeastern part
Tvd	**Volcanic rocks and deposits (Miocene and Pliocene)** Massive tuff with large fragments of vesicular basalt northwest of Tracy; tuff, and volcanic breccia at south end of valley
Tcpm	**Continental rocks and deposits (Miocene and Pliocene)** Gravel, sand, silt, clay, conglomerate, sandstone, siltstone, and claystone, contain andesitic material. Principally Mehrten Formation (Miocene and Pliocene) on eastern side of valley; include continental equivalents of Etchegoin Formation (Miocene and Pliocene) on western side of valley, and Chanac Formation (Miocene) on southern part
Tcmd	**Continental and marine rocks and deposits (Miocene and Pliocene)** Gravel, sand, silt, clay, silty sandstone, and siltstone. Include continental and marine equivalents of San Joaquin Formation (Pliocene) and Etchegoin Formation (Miocene and Pliocene)

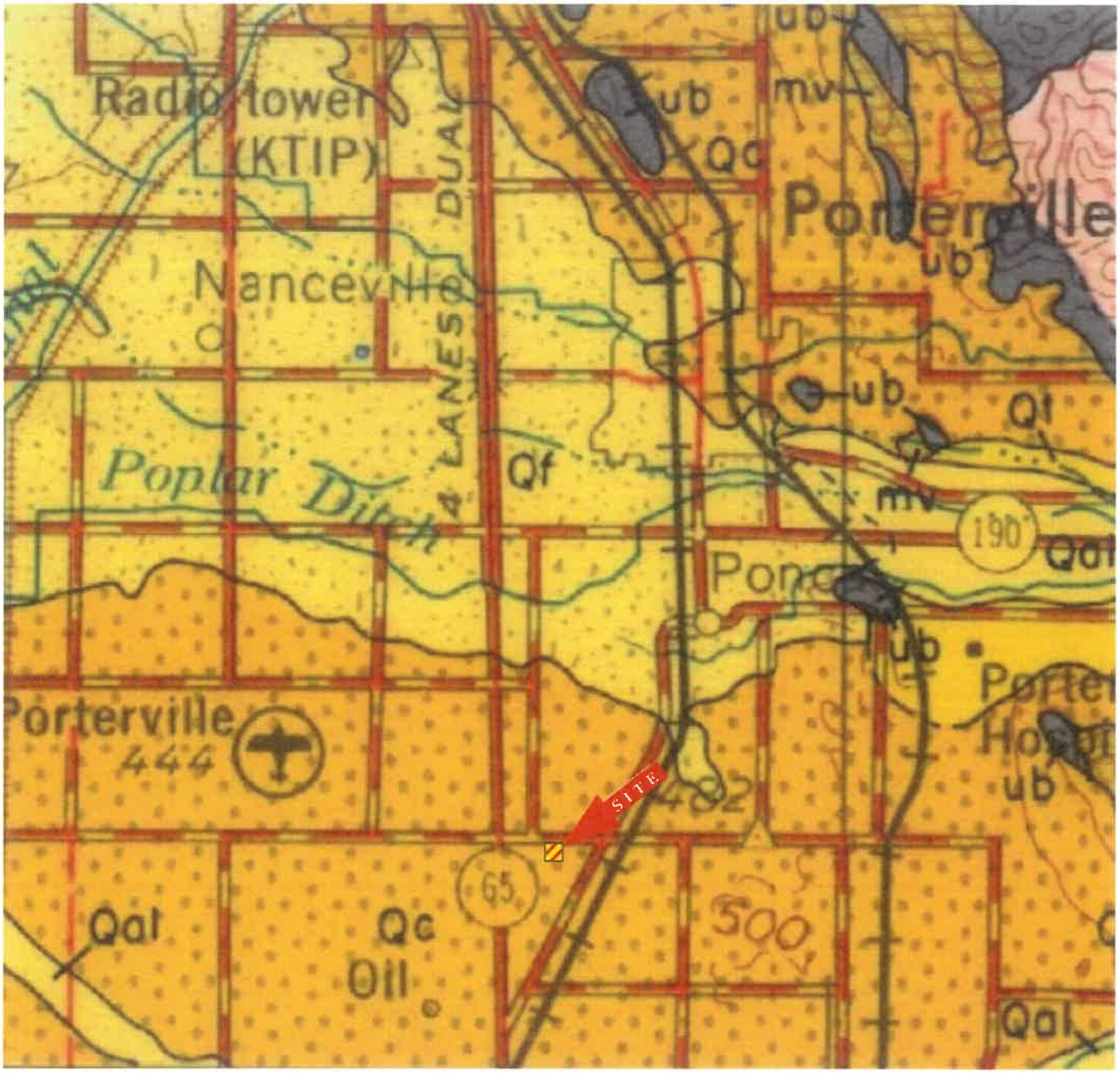
REGIONAL GEOLOGIC MAP
EXPLANATION

FROM:
GEOLOGIC MAP OF THE SAN JOAQUIN VALLEY,
TULARE, KINGS, KERN, AND FRESNO COUNTIES,
CALIFORNIA.
COMPILATION BY R.W. PAGE, 1985

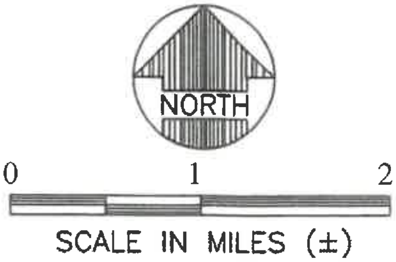
GEOTECHNICAL ENGINEERING INVESTIGATION
SANTA FE ELEMENTARY SCHOOL
286 E. Orange Avenue
Porterville, California

Scale: As Shown	**Date:** Jan. 2024
Drawn by: WA	**Approved by:** SN
Project No. 012-23164	**Figure No.** 4a

Krazan
GEOTECHNICAL ENGINEERING



LOCAL GEOLOGIC MAP



FROM:
GEOLOGIC MAP OF CALIFORNIA, FRESNO SHEET,
OLAF P. JENKINS EDITION
COMPILATION BY: ROBERT A. MATTHEWS AND
JOHN L. BURNETT, 1965

GEOTECHNICAL ENGINEERING INVESTIGATION **HOPE ELEMENTARY SCHOOL** 613 W. Teapot Dome Avenue Porterville, California	**Scale:** As Shown	**Date:** Jan. 2024	Krazan **GEOTECHNICAL ENGINEERING**
	Drawn by: WA	**Approved by:** SN	
	Project No. 012-23205	**Figure No.** 5	

Qs	Sand Dunes (Holocene)
Qal	Alluvium (Holocene)
Qsc	Stream Channel Deposits (Holocene)
Qf	Fan Deposits (Holocene)
Qt	Nonmarine Terrace Deposits (Quaternary)
Qc	Pleistocene Nonmarine (Pleistocene)
ub	Ultrabasic Intrusive Rocks (Mesozoic)
mv	Metavolcanic Rocks (Pre-Cretaceous)

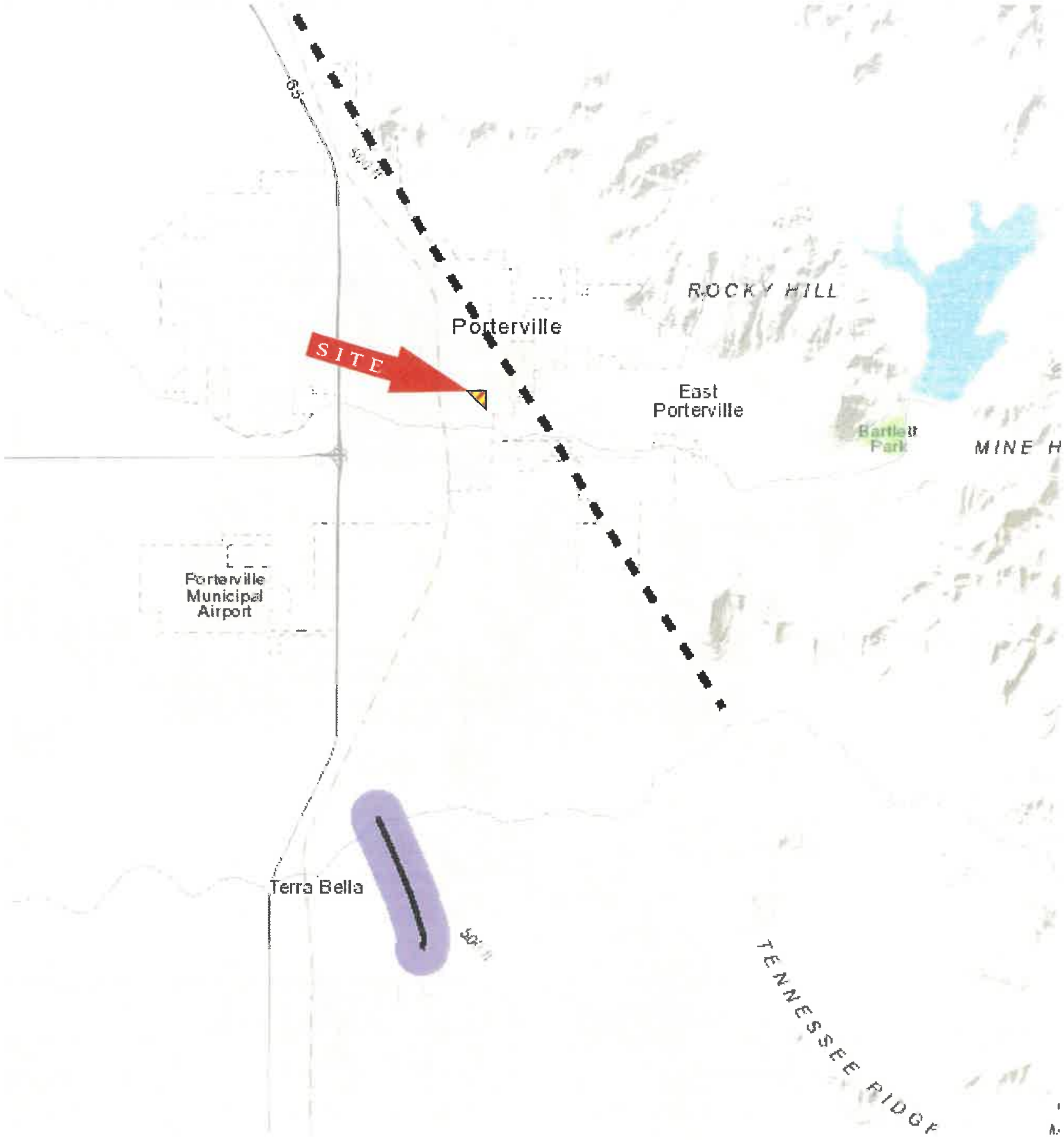
LOCAL GEOLOGIC MAP EXPLANATION

FROM:
GEOLOGIC MAP OF CALIFORNIA, FRESNO SHEET,
OLAF P. JENKINS EDITION COMPILATION BY:
COMPILATION BY: ROBERT A. MATTHEWS AND
JOHN L. BURNETT, 1965

GEOTECHNICAL ENGINEERING INVESTIGATION
SANTA FE ELEMENTARY SCHOOL
286 E. Orange Avenue
Porterville, California

Scale: As Shown	**Date:** Jan. 2024
Drawn by: WA	**Approved by:** SN
Project No. 012-23164	**Figure No.** 5a

Krazan
GEOTECHNICAL ENGINEERING



NOTES:

FAULT ACTIVITY MAP

PREPARED FROM THE C.G.S. "FAULT ACTIVITIY MAP OF CALIFORNIA" JENNINGS AND BRYANT, 2010

FAULT TRACES ON LAND ARE INDICATED BY SOLID LINES WHERE WELL LOCATED, BY DASHED LINES WHERE CONCEALED BY YOUNGER ROCKS OR BY LAKES OR BAYS. FAULT TRACES ARE QUERIED WHERE CONTINUATION OR EXISTENCE IS UNCERTAIN.

NORTH

0 2 4

SCALE IN MILES (±)

GEOTECHNICAL ENGINEERING INVESTIGATION
SANTA FE ELEMENTARY SCHOOL
286 E. Orange Avenue
Porterville, California

Scale: As Shown	**Date:** Jan. 2024
Drawn by: WA	**Approved by:** SN
Project No. 012-23164	**Figure No.** 6

Krazan
GEOTECHNICAL ENGINEERING

🟥 ?	Fault along which historic (last 200 years) displacement has occurred and is associated with one or more of the following: (a) a recorded earthquake with surface rupture. (Also included are some well-defined surface breaks caused by ground shaking during earthquakes, e.g. extensive ground breakage, not on the White Wolf fault, caused by the Arvin-Tehachapi earthquake of 1952). The date of the associated earthquake is indicated. Where repeated surface ruptures on the same fault have occurred, only the date of the latest movement may be indicated, especially if earlier reports are not well documented as to location of ground breaks. (b) fault creep slippage - slow ground displacement usually without accompanying earthquakes. (c) displaced survey lines.
🟥 ▶ ◀ 🟥 ▷ ◁	A triangle to the right or left of the date indicates termination point of observed surface displacement. Solid red triangle indicates known location of rupture termination point. Open black triangle indicates uncertain or estimated location of rupture termination point.
🟥 ▶ ◀	Date bracketed by triangles indicates local fault break.
🟥	No triangle by date indicates an intermediate point along fault break.
🟥 CREEP	Fault that exhibits fault creep slippage. Hachures indicate linear extent of fault creep. Annotation (creep with leader) indicates representative locations where fault creep has been observed and recorded.
🟥 ■ ■	Square on fault indicates where fault creep slippage has occured that has been triggered by an earthquake on some other fault. Date of causative earthquake indicated. Squares to right and left of date indicate terminal points between which triggered creep slippage has occurred (creep either continuous or intermittent between these end points).
🟧 ?.	Holocene fault displacement (during past 11,700 years) without historic record. Geomorphic evidence for Holocene faulting includes sag ponds, scarps showing little erosion, or the following features in Holocene age deposits: offset stream courses, linear scarps, shutter ridges, and triangular faceted spurs. Recency of faulting offshore is based on the interpreted age of the youngest strata displaced by faulting.
🟨 ?.	Late Quaternary fault displacement (during past 700,000 years). Geomorphic evidence similar to that described for Holocene faults except features are less distinct. Faulting may be younger, but lack of younger overlying deposits precludes more accurate age classification.
— — ……?.	Quaternary fault (age undifferentiated). Most faults of this category show evidence of displacement sometime during the past 1.6 million years; possible exceptions are faults which displace rocks of undifferentiated Plio-Pleistocene age. Unnumbered Quaternary faults were based on Fault Map of California, 1975. See Bulletin 201, Appendix D for source data.
—— — ……?.	Pre-Quaternary fault (older that 1.6 million years) or fault without recognized Quaternary displacement. Some faults are shown in this category because the source of mapping used was of reconnaissnce nature, or was not done with the object of dating fault displacements. Faults in this category are not necessarily inactive.

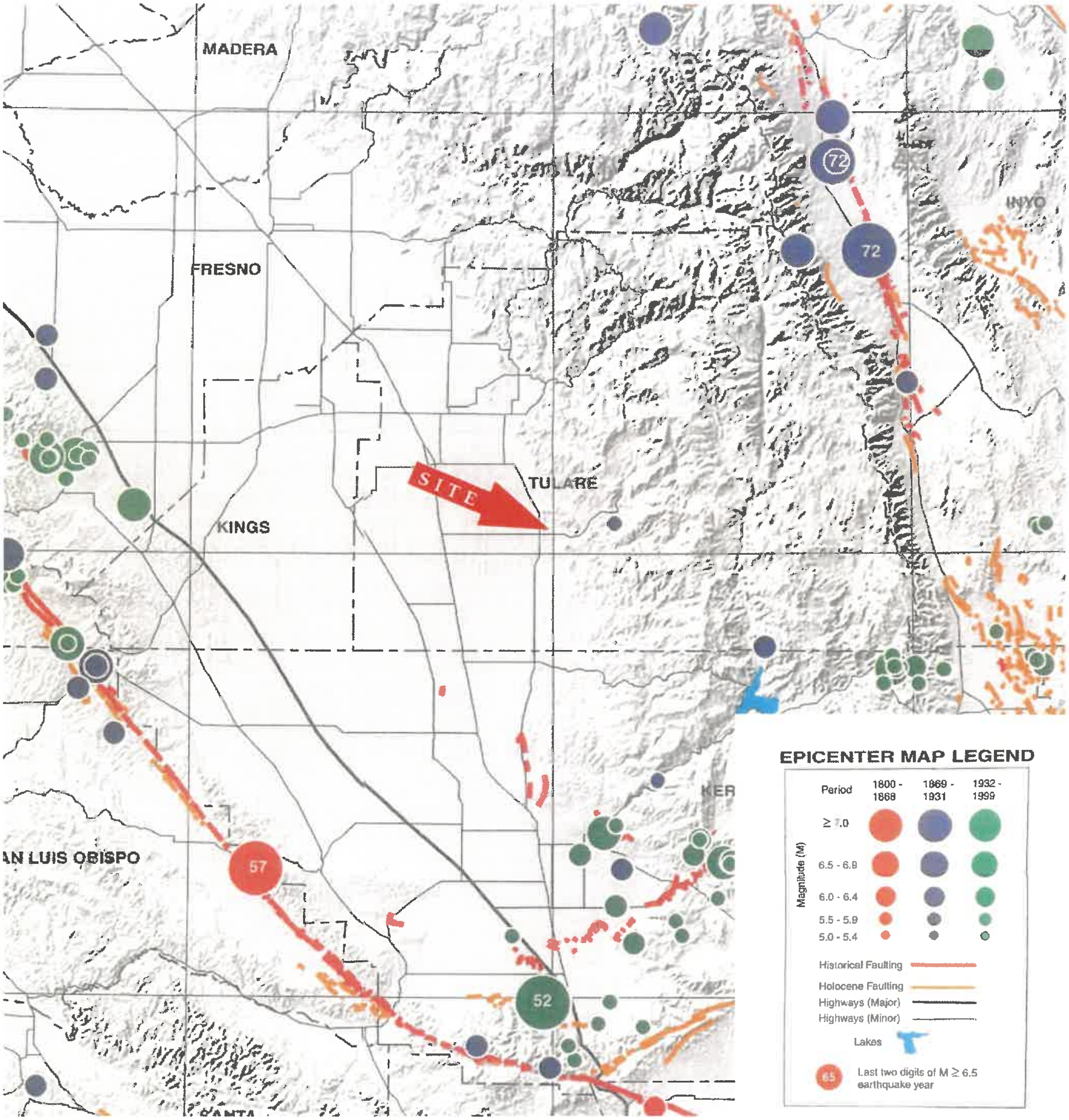
FAULT ACTIVITY MAP
EXPLANATION

NOTES:

PREPARED FROM THE C.G.S. "FAULT ACTIVITIY MAP OF CALIFORNIA" JENNINGS AND BRYANT, 2010

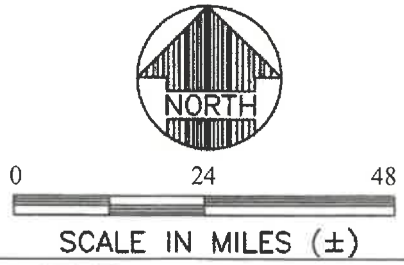
FAULT TRACES ON LAND ARE INDICATED BY SOLID LINES WHERE WELL LOCATED, BY DASHED LINES WHERE CONCEALED BY YOUNGER ROCKS OR BY LAKES OR BAYS. FAULT TRACES ARE QUERIED WHERE CONTINUATION OR EXISTENCE IS UNCERTAIN.

GEOTECHNICAL ENGINEERING INVESTIGATION **SANTA FE ELEMENTARY SCHOOL** 286 E. Orange Avenue Porterville, California	**Scale:** As Shown	**Date:** Jan. 2024	Krazan **GEOTECHNICAL ENGINEERING**
	Drawn by: WA	**Approved by:** SN	
	Project No. 012-23164	**Figure No.** 6a	



MAP SOURCE:
CGS MAP SHEET 49
EPICENTERS OF AND AREAS
DAMAGED BY M > 5 CALIFORNIA
EARTHQUAKES, 1800-1999
BY TOPPOZADA, BRANUM, PETERSEN,
HALLSTROM, CRAMER & REICHLE, 2000

EPICENTER MAP



GEOTECHNICAL ENGINEERING INVESTIGATION
SANTA FE ELEMENTARY SCHOOL
286 E. Orange Avenue
Porterville, California

Scale: As Shown	**Date:** Jan. 2024
Drawn by: WA	**Approved by:** SN
Project No. 012-23164	**Figure No.** 7

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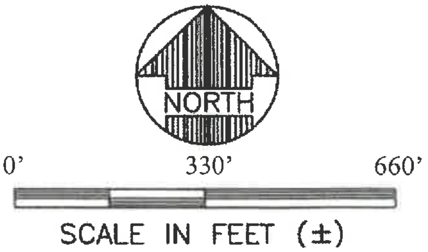
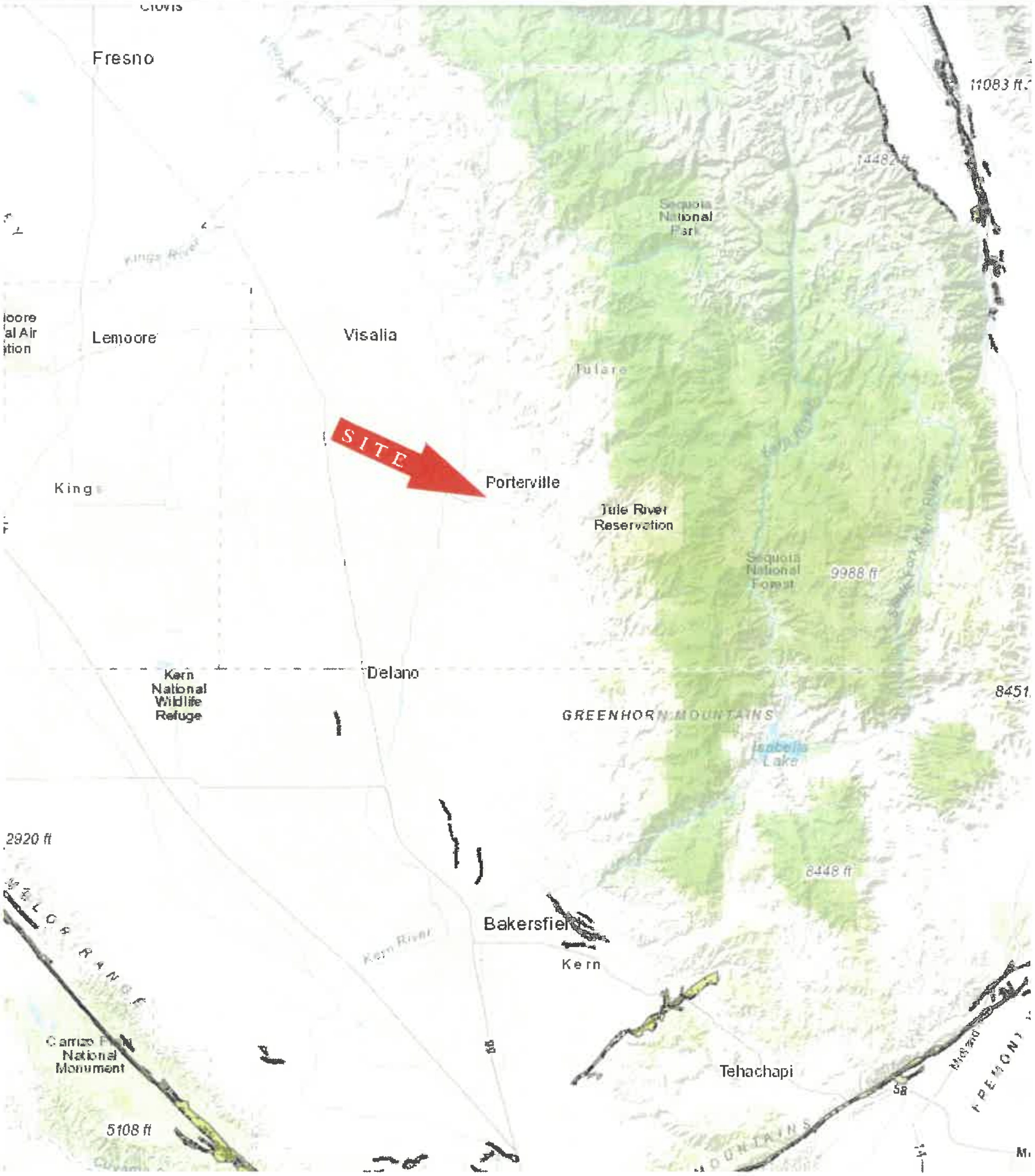
GEOTECHNICAL ENGINEERING

AERIAL PHOTO



FROM:
GOOGLE EARTH PRO, 2023

GEOTECHNICAL ENGINEERING INVESTIGATION **SANTA FE ELEMENTARY SCHOOL** 286 E. Orange Avenue Porterville, California	**Scale:** As Shown	**Date:** Jan. 2024	Krazan **GEOTECHNICAL ENGINEERING**
	Drawn by: WA	**Approved by:** SN	
	Project No. 012-23164	**Figure No.** 8	



EARTHQUAKE ZONES OF REQUIRED INVESTIGATION (FAULTS)

MAP SOURCE:
Earthquake Fault Zones and Seismic Hazard Zones.
By John Parrish, PhD., State Geologist, 2003

NORTH

0 15 30

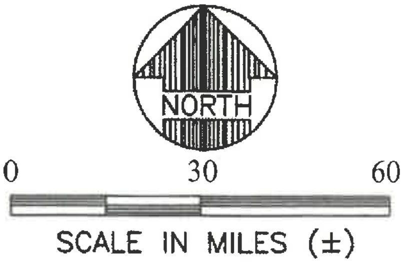
SCALE IN MILES (±)

GEOTECHNICAL ENGINEERING INVESTIGATION **SANTA FE ELEMENTARY SCHOOL** 286 E. Orange Avenue Porterville, California	**Scale:** As Shown	**Date:** Jan. 2024
	Drawn by: WA	**Approved by:** SN
	Project No. 012-23164	**Figure No.** 9

Krazan
GEOTECHNICAL ENGINEERING

EARTHQUAKE ZONES OF REQUIRED INVESTIGATION

(NO LIQUEFACTION MAPS AVAILABLE IN SITE VICINITY)



MAP SOURCE:

Earthquake Fault Zones and Seismic Hazard Zones.
By John Parrish, PHD., State Geologist, 2003

GEOTECHNICAL ENGINEERING INVESTIGATION
SANTA FE ELEMENTARY SCHOOL
286 E. Orange Avenue
Porterville, California

Scale: As Shown	**Date:** Jan. 2024
Drawn by: WA	**Approved by:** SN
Project No. 012-23164	**Figure No.** 10

Krazan
GEOTECHNICAL ENGINEERING

Earthquake Zones of Required Investigation

This Map Shows Both Alquist-Priolo Earthquake Fault Zones And Seismic Hazard Zones

This map shows the location of Alquist-Priolo (AP) Earthquake Fault Zones and Seismic Hazard Zones, collectively referred to here as Earthquake Zones of Required Investigation. The Geographic Information System (GIS) digital files of these regulatory zones released by the California Geological Survey (CGS) are the "Official Maps." GIS files are available at the CGS website http://maps.conservation.ca.gov/cgs/informationwarehouse/. These zones will assist cities and counties in fulfilling their responsibilities for protecting the public from the effects of surface fault rupture and earthquake-triggered ground failure as required by the AP Earthquake Fault Zoning Act (Public Resources Code Sections 2621-2630) and the Seismic Hazards Mapping Act (Public Resources Code Sections 2690-2699.6). For information regarding the general approach and recommended methods for preparing these zones, see CGS Special Publication 42, *Earthquake Fault Zones, a Guide for Government Agencies, Property Owners/Developers, and Geoscience Practitioners for Assessing Fault Rupture Hazards in California*, Appendix C, and CGS Special Publication 118, *Recommended Criteria for Delineating Seismic Hazard Zones in California*.

For information regarding the scope and recommended methods to be used in conducting required site investigations refer to CGS Special Publication 42, and CGS Special Publication 117A, *Guidelines for Evaluating and Mitigating Seismic Hazards in California*. For a general description of the AP and Seismic Hazards Mapping acts, the zonation programs, and related information, please refer to the website at www.conservation.ca.gov/cgs/.

MAP EXPLANATION

EARTHQUAKE FAULT ZONES

🟨 **Earthquake Fault Zones**
Zone boundaries are delineated by straight-line segments; the boundaries define the zone encompassing active faults that constitute a potential hazard to structures from surface faulting or fault creep such that avoidance as described in Public Resources Code Section 2621.5(a) would be required.

Active Fault Traces
Faults considered to have been active during Holocene time and to have potential for surface rupture: Solid Line in Black or Red where Accurately Located; Long Dash in Black or Solid Line in Purple where Approximately Located; Short Dash in Black or Solid Line in Orange where Inferred; Dotted Line in Black or Solid Line in Rose where Concealed; Query (?) indicates additional uncertainty. Evidence of historic offset indicated by year of earthquake-associated event or C for displacement caused by fault creep.

SEISMIC HAZARD ZONES

🟩 **Liquefaction Zones**
Areas where historical occurrence of liquefaction, or local geological, geotechnical and ground water conditions indicate a potential for permanent ground displacements such that mitigation as defined in Public Resources Code Section 2693(c) would be required.

🟦 **Earthquake-Induced Landslide Zones**
Areas where previous occurrence of landslide movement, or local topographic, geological, geotechnical and subsurface water conditions indicate a potential for permanent ground displacements such that mitigation as defined in Public Resources Code Section 2693(c) would be required.

OVERLAPPING EARTHQUAKE FAULT AND SEISMIC HAZARD ZONES

🟨🟩 **Overlap of Earthquake Fault Zone and Liquefaction Zone**
Areas that are covered by both Earthquake Fault Zone and Liquefaction Zone.

🟨🟦 **Overlap of Earthquake Fault Zone and Earthquake-Induced Landslide Zone**
Areas that are covered by both Earthquake Fault Zone and Earthquake-Induced Landslide Zone.

**Note: Mitigation methods differ for each zone –
AP Act only allows avoidance; Seismic Hazard Mapping Act allows mitigation by engineering/geotechnical design as well as avoidance.**

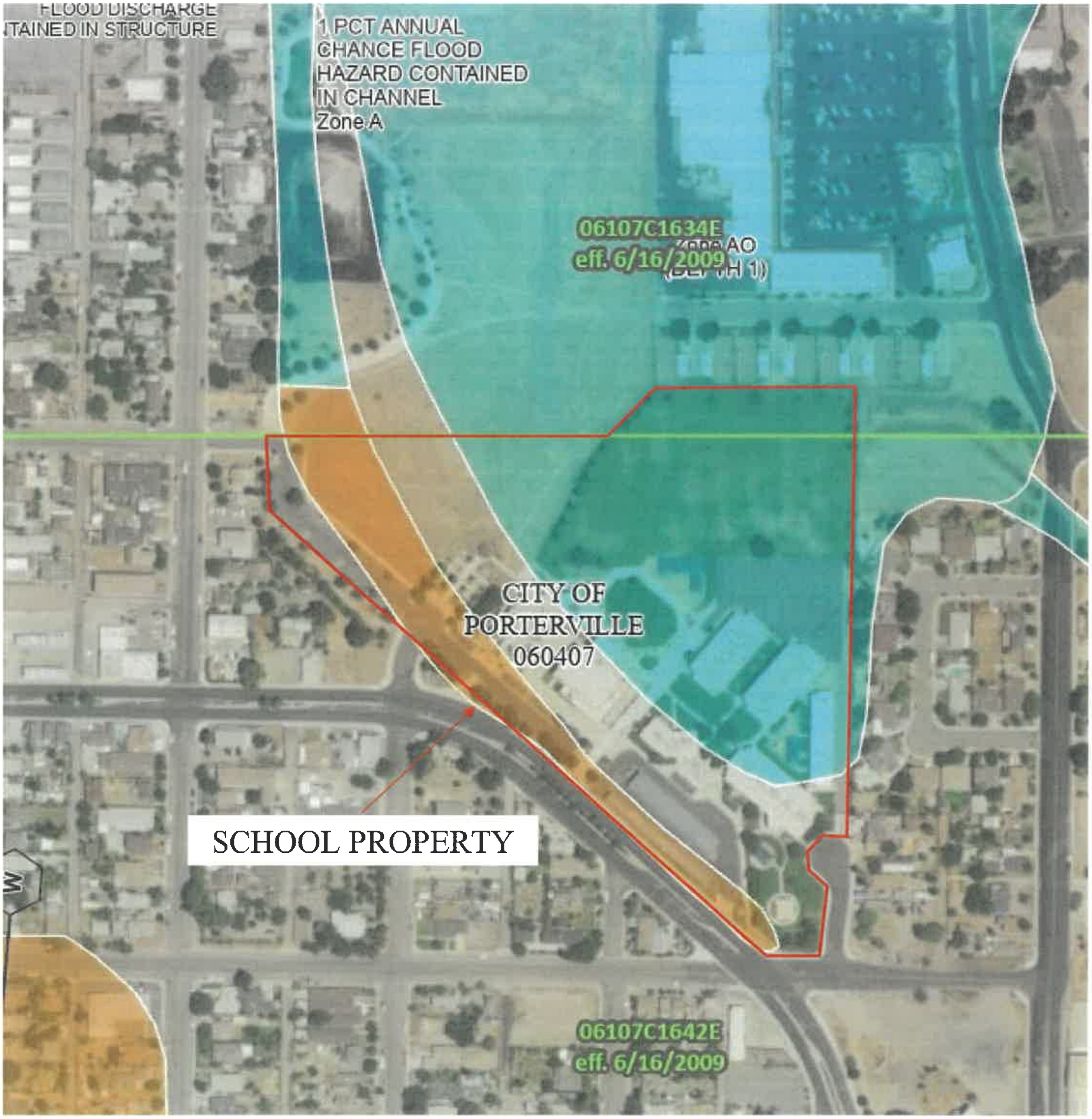
EARTHQUAKE ZONES OF REQUIRED INVESTIGATION EXPLANATION

MAP SOURCE:
Earthquake Fault
Zones and Seismic Hazard Zones. Madera Quadrangle
By John Parrish, PHD., State Geologist, 2003

**GEOTECHNICAL ENGINEERING INVESTIGATION
SANTA FE ELEMENTARY SCHOOL**
286 E. Orange Avenue
Porterville, California

Scale: As Shown
Date: Jan. 2024
Drawn by: WA
Approved by: SN
Project No. 012-23164
Figure No. 10a

Krazan
GEOTECHNICAL ENGINEERING



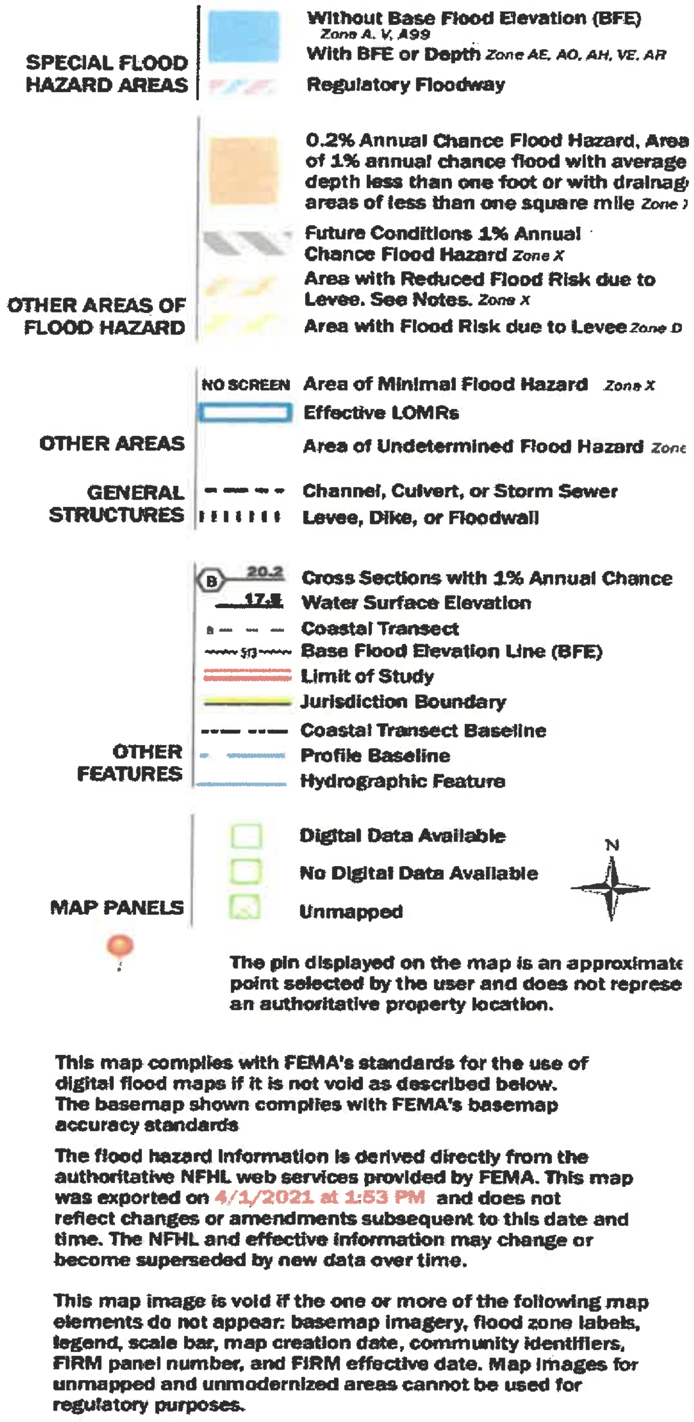
FLOOD MAP

FEMA FLOOD INSURANCE
MAP, 2019

GEOTECHNICAL ENGINEERING INVESTIGATION
SANTA FE ELEMENTARY SCHOOL
286 E. Orange Avenue
Porterville, California

Scale: As Shown	**Date:** Jan. 2024
Drawn by: WA	**Approved by:** SN
Project No. 012-23164	**Figure No.** 11

Krazan
GEOTECHNICAL ENGINEERING



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, Area of 1% annual chance flood with average depth less than one foot or with drainag areas of less than one square mile *Zone)*

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*

GENERAL STRUCTURES

Channel, Culvert, or Storm Sewer

Levee, Dike, or Floodwall

OTHER FEATURES

B 20.2 17.5 Cross Sections with 1% Annual Chance Water Surface Elevation

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 approximat point selected by the user and does not represe 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

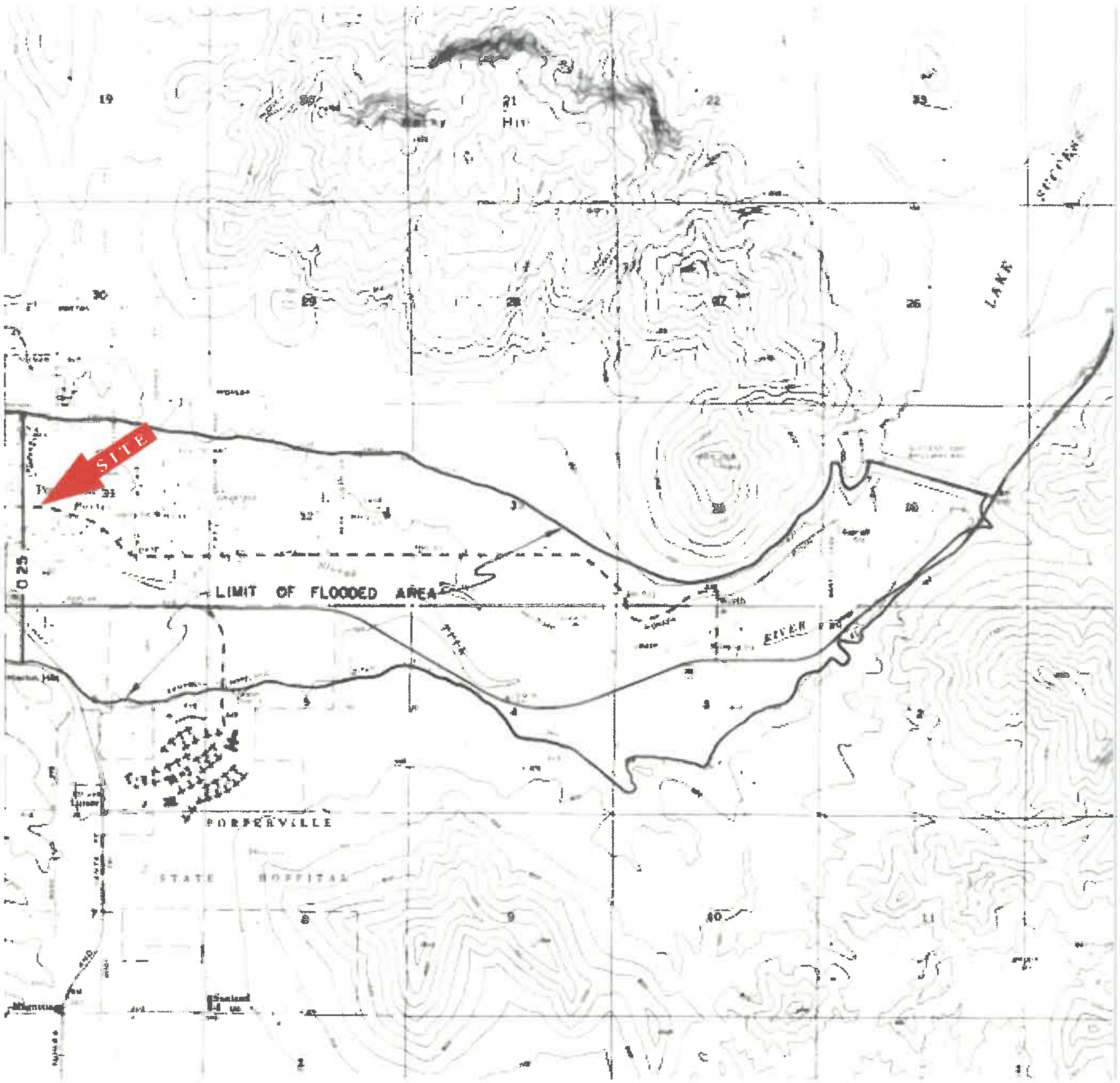
The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 4/1/2021 at 1:53 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new 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.

FLOOD MAP
EXPLANATION

FEMA FLOOD INSURANCE
MAP, 2019

GEOTECHNICAL ENGINEERING INVESTIGATION **SANTA FE ELEMENTARY SCHOOL** 286 E. Orange Avenue Porterville, California	**Scale:** As Shown	**Date:** Jan. 2024	Krazan **GEOTECHNICAL ENGINEERING**
	Drawn by: WA	**Approved by:** SN	
	Project No. 012-23164	**Figure No.** 11a	



INUNDATION LIMITS

FROM:
MAPPED, EDITED, AND PUBLISHED BY THE
GEOLOGICAL SURVEY, CULTURE AND
DRAINAGE COMPILED FROM AERIAL
PHOTGRAPHS TAKEN 1952. TOPOGRAPHY
BY PLANTABLE METHODS1954

DAM INUNDATION MAP
LAKE SUCCESS

NORTH

0 1 2

SCALE IN MILES (±)

GEOTECHNICAL ENGINEERING INVESTIGATION
SANTA FE ELEMENTARY SCHOOL
286 E. Orange Avenue
Porterville, California

Scale: As Shown	**Date:** Jan. 2024
Drawn by: WA	**Approved by:** SN
Project No. 012-23164	**Figure No.** 12

Krazan
GEOTECHNICAL ENGINEERING

U.S. Geological Survey - Earthquake Hazards Program

2008 National Seismic Hazard Maps - Source Parameters

New Search

Distance in Miles	Name	State	Pref Slip Rate (mm/yr)	Dip (degrees)	Dip Dir	Slip Sense	Rupture Top (km)	Rupture Bottom (km)	Length (km)
51.21	Great Valley 14 (Kettleman Hills)	CA	1.5	22	W	thrust	8.1	22	24
55.64	White Wolf	CA	2	75	S	reverse	0	14	63
56.14	So Sierra Nevada	CA	0.1	50	E	normal	0	14	112
58.14	Independence	CA	0.2	50	E	normal	0	15	48
62.13	Great Valley 13 (Coalinga)	CA	1.5	15	W	thrust	9.1	15	32
63.12	Owens Valley	CA	1.5	90	V	strike slip	0	14	86
63.97	Little Lake	CA	0.7	90	V	strike slip	0	13	40
70.06	S. San Andreas;PK+CH+CC+BB+NM+SM+NSB	CA	n/a	90	V	strike slip	0.1	13	377
70.06	S. San Andreas;PK+CH+CC+BB+NM+SM	CA	n/a	90	V	strike slip	0.1	13	342
70.06	S. San Andreas;PK+CH+CC+BB+NM	CA	n/a	90	V	strike slip	0.1	12	245
70.06	S. San Andreas;PK+CH+CC+BB	CA	n/a	90	V	strike slip	0.1	12	208
70.06	S. San Andreas;PK+CH+CC	CA	n/a	90	V	strike slip	0.2	11	158
70.06	S. San Andreas;PK+CH	CA	n/a	90	V	strike slip	0.4	8	99
70.06	S. San Andreas;CH+CC+BB+NM+SM+NSB+SSB+BG	CA	n/a	86		strike slip	0	14	442
70.06	S. San Andreas;CH+CC+BB+NM+SM+NSB+SSB	CA	n/a	90	V	strike slip	0	14	384
70.06	S. San Andreas;CH+CC	CA	n/a	90	V	strike slip	0	14	122
70.06	S. San Andreas;CH+CC+BB	CA	n/a	90	V	strike slip	0	14	171
70.06	S. San Andreas;PK+CH+CC+BB+NM+SM+NSB+SSB+BG	CA	n/a	86		strike slip	0.1	13	479
70.06	S. San Andreas;CH+CC+BB+NM+SM	CA	n/a	90	V	strike slip	0	14	306
70.06	S. San Andreas;CH	CA	34	90	V	strike slip	0	12	63

70.06	S. San Andreas;CH+CC+BB+NM+SM+NSB+SSB+BG+CO	CA	n/a	86		strike slip	0.1	13	512
70.06	S. San Andreas;PK+CH+CC+BB+NM+SM+NSB+SSB	CA	n/a	90	V	strike slip	0.1	13	421
70.06	S. San Andreas;CH+CC+BB+NM+SM+NSB	CA	n/a	90	V	strike slip	0	14	341
70.06	S. San Andreas;CH+CC+BB+NM	CA	n/a	90	V	strike slip	0	14	208
70.06	S. San Andreas;PK+CH+CC+BB+NM+SM+NSB+SSB+BG+CO	CA	n/a	86		strike slip	0.1	13	548
70.53	S. San Andreas;CC+BB	CA	n/a	90	V	strike slip	0	15	109
70.53	S. San Andreas;CC+BB+NM+SM	CA	n/a	90	V	strike slip	0	14	243
70.53	S. San Andreas;CC+BB+NM+SM+NSB	CA	n/a	90	V	strike slip	0	14	279
70.53	S. San Andreas;CC+BB+NM+SM+NSB+SSB	CA	n/a	90	V	strike slip	0	14	322
70.53	S. San Andreas;CC+BB+NM+SM+NSB+SSB+BG+CO	CA	n/a	86		strike slip	0.1	13	449
70.53	S. San Andreas;CC+BB+NM+SM+NSB+SSB+BG	CA	n/a	85		strike slip	0	14	380
70.53	S. San Andreas;CC	CA	34	90	V	strike slip	0	15	59
70.53	S. San Andreas;CC+BB+NM	CA	n/a	90	V	strike slip	0	15	146
72.68	Pleito	CA	2	46	S	reverse	0	14	44
73.37	Birch Creek	CA	0.7	50	E	normal	0	13	15
75.48	S. San Andreas;PK	CA	34	90	V	strike slip	4	6	36
76.82	San Juan	CA	1	90	V	strike slip	0	13	68
77.11	Garlock;GE+GC+GW	CA	n/a	90	V	strike slip	0.3	12	256
77.11	Garlock;GE+GC	CA	n/a	90	V	strike slip	0	12	156
77.11	Garlock;GC	CA	7	90	V	strike slip	0	12	111
77.11	Garlock;GC+GW	CA	n/a	90	V	strike slip	0.4	12	210
77.31	Great Valley 12	CA	1.5	15	W	thrust	7	10	17
77.63	Garlock;GW	CA	6	90	V	strike slip	0.7	14	98

78.05	Hunter Mountain Connected	CA	2.5	90	V	strike slip	0	13	186
80.14	S. San Andreas;BB+NM+SM+NSB+SSB+BG+CO	CA	n/a	85		strike slip	0.1	13	390
80.14	S. San Andreas;BB	CA	34	90	V	strike slip	0	15	50
80.14	S. San Andreas;BB+NM	CA	n/a	90	V	strike slip	0	15	87
80.14	S. San Andreas;BB+NM+SM	CA	n/a	90	V	strike slip	0	14	184
80.14	S. San Andreas;BB+NM+SM+NSB	CA	n/a	90	V	strike slip	0	14	220
80.14	S. San Andreas;BB+NM+SM+NSB+SSB	CA	n/a	90	V	strike slip	0	14	263
80.14	S. San Andreas;BB+NM+SM+NSB+SSB+BG	CA	n/a	84		strike slip	0	14	321
81.18	White Mountains	CA	1	90	V	strike slip	0	13	111
84.58	Round Valley	CA	1	50	E	normal	0	13	43
85.70	Great Valley 11	CA	1.5	15	W	thrust	7	10	24
86.67	S. San Andreas;NM+SM	CA	n/a	90	V	strike slip	0	14	134
86.67	S. San Andreas;NM+SM+NSB	CA	n/a	90	V	strike slip	0	13	170
86.67	S. San Andreas;NM+SM+NSB+SSB+BG+CO	CA	n/a	84		strike slip	0.1	13	340
86.67	S. San Andreas;NM+SM+NSB+SSB	CA	n/a	90	V	strike slip	0	13	213
86.67	S. San Andreas;NM	CA	27	90	V	strike slip	0	15	37
86.67	S. San Andreas;NM+SM+NSB+SSB+BG	CA	n/a	83		strike slip	0	14	271
87.00	San Andreas fault - creeping segment	CA	34	90	V	strike slip	0		125
90.64	Lenwood-Lockhart-Old Woman Springs	CA	0.9	90	V	strike slip	0	13	145
92.96	Panamint Valley	CA	2.5	90	V	strike slip	0	13	110
93.17	San Gabriel	CA	1	61	N	strike slip	0	15	71
96.01	Fish Slough	CA	0.2	50	E	normal	0	13	26
96.36	Deep Springs	CA	0.8	50	NW	normal	0	13	25
97.82	Hilton Creek	CA	2.5	50	E	normal	0	13	29

98.09	S. San Andreas;SM+NSB+SSB+BG	CA	n/a	81		strike slip	0	13	234
98.09	S. San Andreas;SM+NSB+SSB+BG+CO	CA	n/a	83		strike slip	0.1	13	303
98.09	S. San Andreas;SM	CA	29	90	V	strike slip	0	13	98
98.09	S. San Andreas;SM+NSB	CA	n/a	90	V	strike slip	0	13	133
98.09	S. San Andreas;SM+NSB+SSB	CA	n/a	90	V	strike slip	0	13	176
99.11	Blackwater	CA	0.5	90	V	strike slip	0	12	60
99.28	Great Valley 10	CA	1.5	15	W	thrust	7	10	22
99.33	Rinconada	CA	1	90	V	strike slip	0	10	191

APPENDIX A

FIELD AND LABORATORY INVESTIGATIONS

Field Investigation

The field investigation consisted of a surface reconnaissance and a subsurface exploratory program. Seven 4½-inch to 6½-inch exploratory borings were advanced. The boring locations are shown on the site plan.

The soils encountered were logged in the field during the exploration and with supplementary laboratory test data are described in accordance with the Unified Soil Classification System.

Modified standard penetration tests and standard penetration tests were performed at selected depths. These tests represent the resistance to driving a 2½-inch and 1½-inch diameter split barrel sampler, respectively. The driving energy was provided by a hammer weighing 140 pounds falling 30 inches. Relatively undisturbed soil samples were obtained while performing this test. Bag samples of the disturbed soil were obtained from the auger cuttings. The modified standard penetration tests are identified in the sample type on the boring logs with a full shaded in block. The standard penetration tests are identified in the sample type on the boring logs with half of the block shaded. All samples were returned to our Clovis laboratory for evaluation.

Laboratory Investigation

The laboratory investigation was programmed to determine the physical and mechanical properties of the foundation soil underlying the site. Test results were used as criteria for determining the engineering suitability of the surface and subsurface materials encountered.

In-situ moisture content, dry density, consolidation, direct shear, and sieve analysis tests were completed for the undisturbed samples representative of the subsurface material. R-value tests were completed for select bag samples obtained from the auger cuttings. These tests, supplemented by visual observation, comprised the basis for our evaluation of the site material.

The logs of the exploratory borings and laboratory determinations are presented in this Appendix.

UNIFIED SOIL CLASSIFICATION SYSTEM

UNIFIED SOIL CLASSIFICATION AND SYMBOL CHART

COARSE-GRAINED SOILS (more than 50% of material is larger than No. 200 sieve size.)			
GRAVELS More than 50% of coarse fraction larger than No. 4 sieve size	Clean Gravels (Less than 5% fines)		
	▨	GW	Well-graded gravels, gravel-sand mixtures, little or no fines
	▨	GP	Poorly-graded gravels, gravel-sand mixtures, little or no fines
	Gravels with fines (More than 12% fines)		
	▨	GM	Silty gravels, gravel-sand-silt mixtures
	▨	GC	Clayey gravels, gravel-sand-clay mixtures
SANDS 50% or more of coarse fraction smaller than No. 4 sieve size	Clean Sands (Less than 5% fines)		
	▨	SW	Well-graded sands, gravelly sands, little or no fines
	▨	SP	Poorly graded sands, gravelly sands, little or no fines
	Sands with fines (More than 12% fines)		
	▨	SM	Silty sands, sand-silt mixtures
	▨	SC	Clayey sands, sand-clay mixtures
FINE-GRAINED SOILS (50% or more of material is smaller than No. 200 sieve size.)			
SILTS AND CLAYS Liquid limit less than 50%	▨	ML	Inorganic silts and very fine sands, rock flour, silty of clayey fine sands or clayey silts with slight plasticity
	▨	CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
	▨	OL	Organic silts and organic silty clays of low plasticity
SILTS AND CLAYS Liquid limit 50% or greater	▨	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
	▨	CH	Inorganic clays of high plasticity, fat clays
	▨	OH	Organic clays of medium to high plasticity, organic silts
HIGHLY ORGANIC SOILS	▨	PT	Peat and other highly organic soils

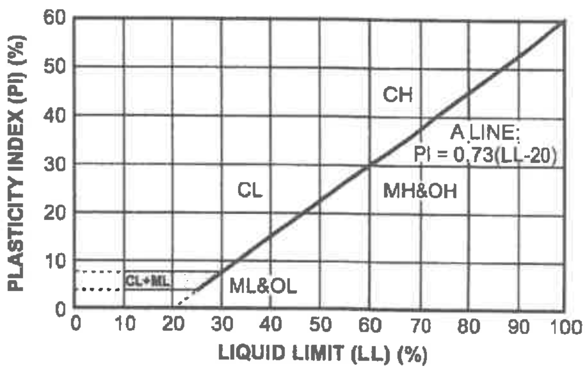
CONSISTENCY CLASSIFICATION

Description	Blows per Foot
Granular Soils	
Very Loose	< 5
Loose	5 – 15
Medium Dense	16 – 40
Dense	41 – 65
Very Dense	> 65
Cohesive Soils	
Very Soft	< 3
Soft	3 – 5
Firm	6 – 10
Stiff	11 – 20
Very Stiff	21 – 40
Hard	> 40

GRAIN SIZE CLASSIFICATION

Grain Type	*Standard Sieve Size*	*Grain Size in Millimeters*
Boulders	Above 12 inches	Above 305
Cobbles	12 to 13 inches	305 to 76.2
Gravel	3 inches to No. 4	76.2 to 4.76
Coarse-grained	3 to ¾ inches	76.2 to 19.1
Fine-grained	¾ inches to No. 4	19.1 to 4.76
Sand	No. 4 to No. 200	4.76 to 0.074
Coarse-grained	No. 4 to No. 10	4.76 to 2.00
Medium-grained	No. 10 to No. 40	2.00 to 0.42
Fine-grained	No. 40 to No. 200	0.42 to 0.074
Silt and Clay	Below No. 200	Below 0.074

PLASTICITY CHART



Log of Boring B1

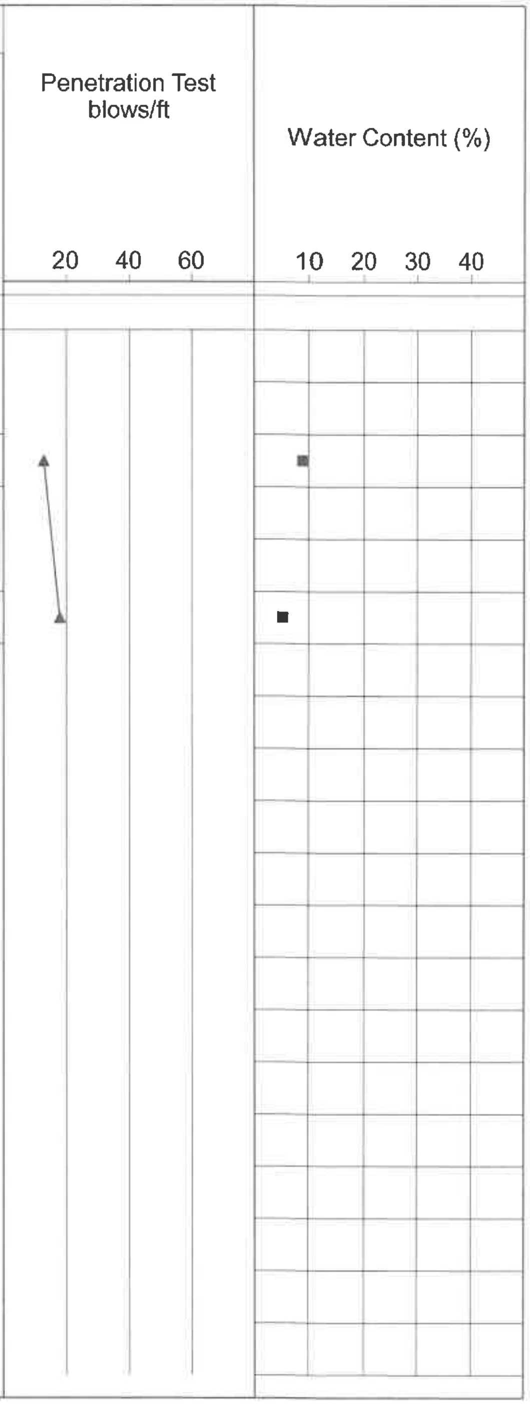
Project: Santa Fe Elementary School
Project No: 012-23164

Client: Porterville Unified School District
Figure No.: A-1

Location: 286 E. Orange Avenue, Porterville, California
Logged By: Dave Adams

Depth to Water>
Initial: None
At Completion: None

SUBSURFACE PROFILE			SAMPLE			
Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.
		Ground Surface				
0		ASPHALTIC CONCRETE = 3 inches AGGREGATE BASE = 3 inches				
2		***SANDY SILT (ML)*** FILL, fine- to medium-grained; dark brown, damp, drills easily	124.3	9.1	■	13
4		***SILTY SAND (SM)*** FILL, fine- to coarse-grained with GRAVEL; brown, damp, drills easily				
6		***SILTY SAND/SAND (SM/SP)*** Medium dense, fine- to medium-grained with GRAVEL; brown, damp, drills easily	103.7	5.4	■	18
8						
10		End of Borehole				
12						
14						
16						
18						
20						



Drill Method: Solid Flight
Drill Date: 10-10-23

Drill Rig: CME 45C-4
Krazan and Associates
Hole Size: 4½ Inches

Driller: Jim Watts
Elevation: 10 Feet

Sheet: 1 of 1

Log of Boring B2

Project: Santa Fe Elementary School

Project No: 012-23164

Client: Porterville Unified School District

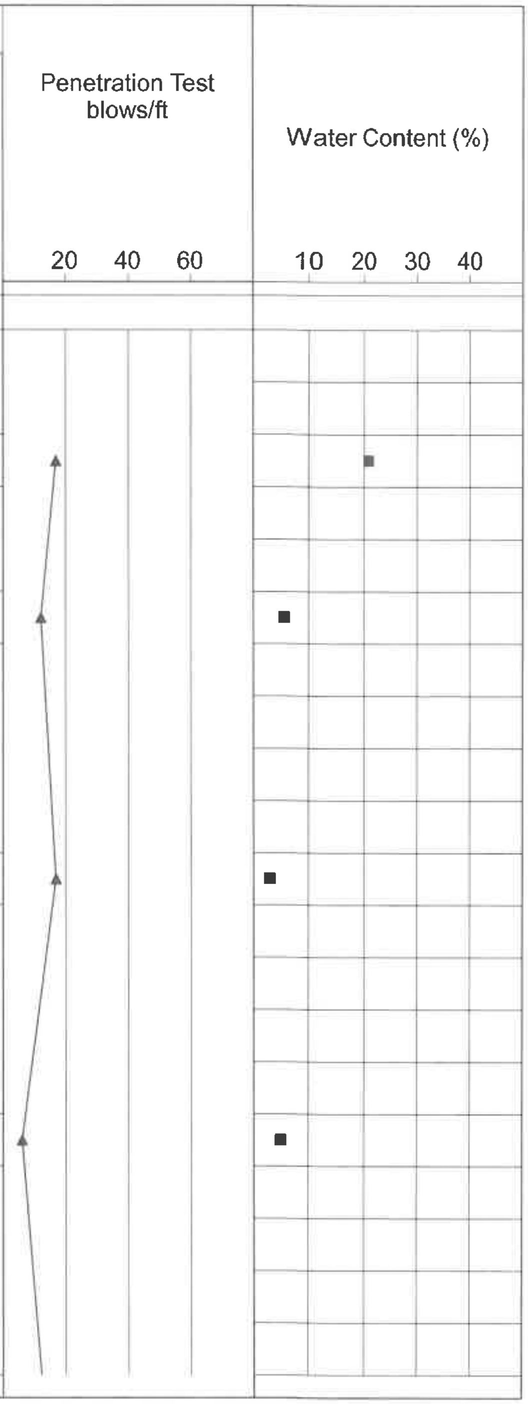
Figure No.: A-2

Location: 286 E. Orange Avenue, Porterville, California

Logged By: Dave Adams

Depth to Water> **Initial:** 23 Feet **At Completion:** 23 Feet

SUBSURFACE PROFILE		SAMPLE			
Depth (ft)	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.
0	Ground Surface				
0–4	***SILTY SAND (SM)*** Very loose, fine- to medium-grained; brown, damp, drills easily Loose below 12 inches Medium dense with trace GRAVEL below 2 feet				
2–3		98.3	20.9	■	17
4–8	***SILTY SAND/SAND (SM/SP)*** Loose, fine- to medium-grained; brown, damp, drills easily				
5–6		108.8	5.8	■	12
8–18	***SAND (SP)*** Medium dense, fine- to medium-grained; brown, damp, drills easily				
10–11		102.5	3.1	■	17
13	Loose and fine- to coarse-grained below 13 feet				
15–16		97.4	5.0	◢	6
18–20	***SILTY SAND/SAND (SM/SP)*** Medium dense, fine- to coarse-grained; brown, moist, drills easily				



Drill Method: Hollow Stem

Drill Rig: CME 45C-4

Driller: Jim Watts

Krazan and Associates

Drill Date: 10-10-23

Hole Size: 6½ Inches

Elevation: 28 Feet

Sheet: 1 of 2

Log of Boring B2

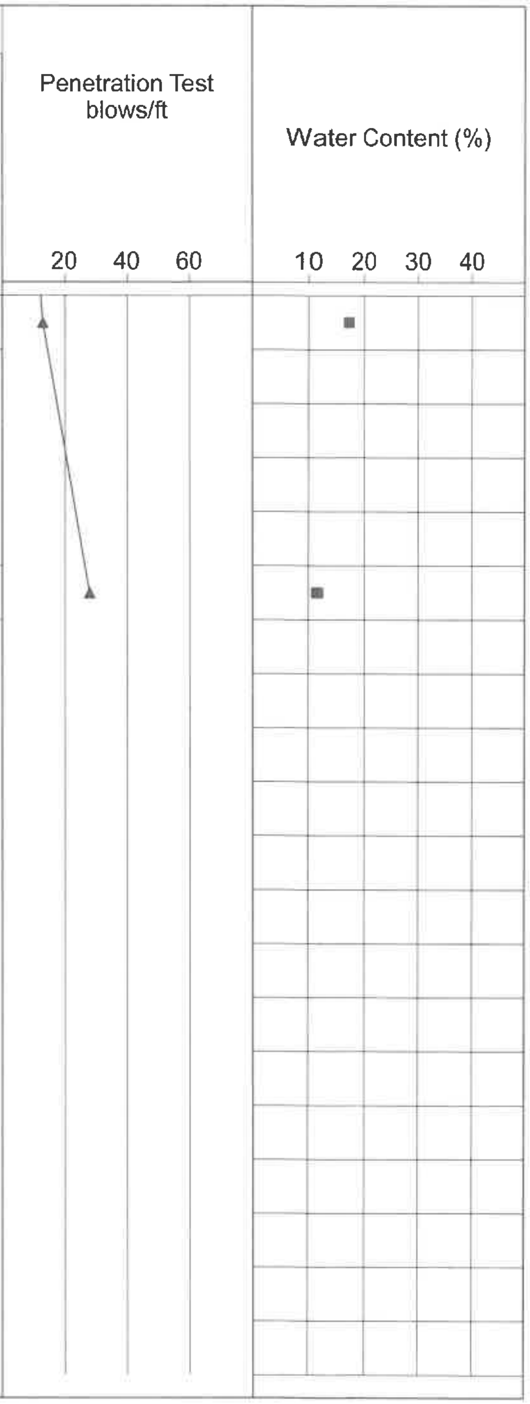
Project: Santa Fe Elementary School
Project No: 012-23164

Client: Porterville Unified School District
Figure No.: A-2

Location: 286 E. Orange Avenue, Porterville, California
Logged By: Dave Adams

Depth to Water>
Initial: 23 Feet
At Completion: 23 Feet

SUBSURFACE PROFILE			SAMPLE			
Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.
			108.9	17.1	◢	13
22						
		▽ **_SAND (SP)_** Medium dense, fine- to coarse-grained with GRAVEL and COBBLE; brown, moist, drills hard Saturated below 23 feet				
24						
			109.4	11.5	◢	28
26						
28		Auger refusal at 28 feet End of Borehole				
30						
32						
34						
36						
38						
40						



Drill Method: Hollow Stem
Drill Date: 10-10-23

Drill Rig: CME 45C-4
Krazan and Associates
Hole Size: 6½ Inches

Driller: Jim Watts
Elevation: 28 Feet

Sheet: 2 of 2

Log of Boring B3

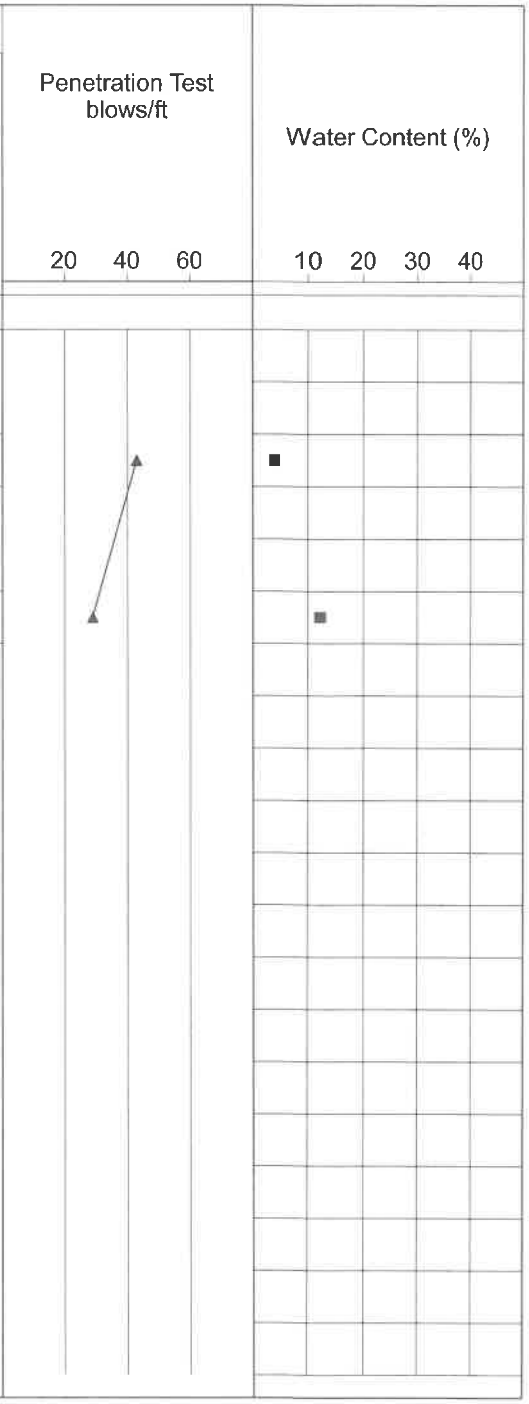
Project: Santa Fe Elementary School
Project No: 012-23164

Client: Porterville Unified School District
Figure No.: A-3

Location: 286 E. Orange Avenue, Porterville, California
Logged By: Dave Adams

Depth to Water> **Initial:** None **At Completion:** None

SUBSURFACE PROFILE			SAMPLE			
Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.
		Ground Surface				
0		ASPHALTIC CONCRETE = 4 inches AGGREGATE BASE = 4 inches				
2		***SILTY SAND (SM)*** FILL, fine- to coarse-grained with trace GRAVEL; brown, damp, drills easily	127.0	4.2	■	43
4		***CLAYEY SAND (SC)*** FILL, fine- to coarse-grained with GRAVEL; light brown, damp, drills easily	122.3	12.2	■	29
8		***SAND (SP)*** Medium dense, fine- to medium-grained; light brown, damp, drills easily				
10		End of Borehole				
12						
14						
16						
18						
20						



Drill Method: Solid Flight
Drill Date: 10-10-23

Drill Rig: CME 45C-4
Krazan and Associates
Hole Size: 4½ Inches

Driller: Jim Watts
Elevation: 10 Feet
Sheet: 1 of 1

Log of Boring B4

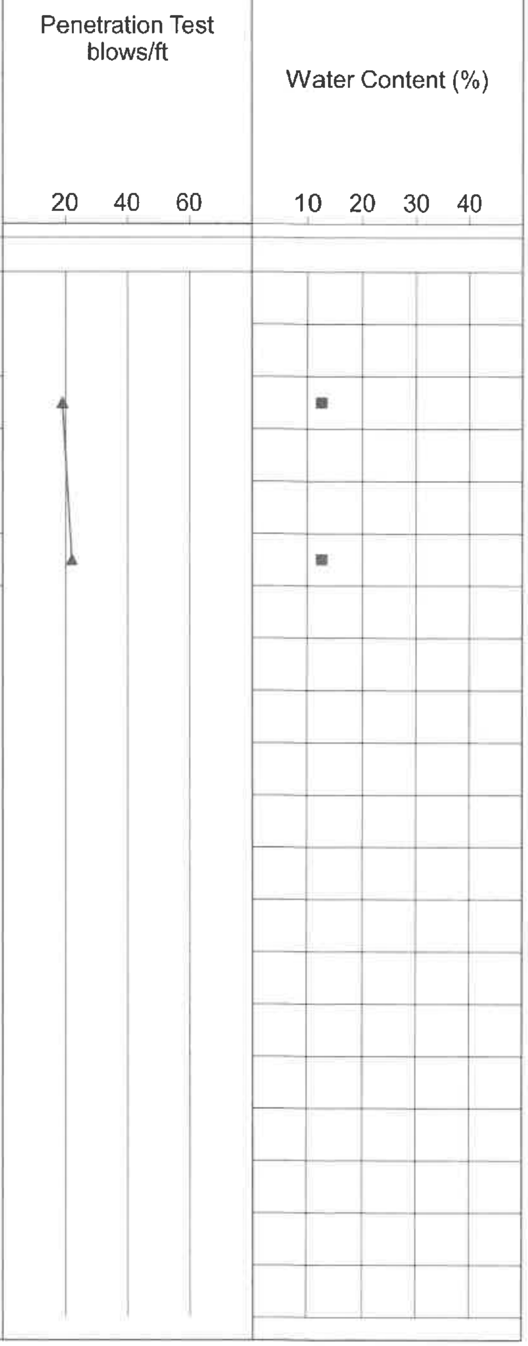
Project: Santa Fe Elementary School
Project No: 012-23164

Client: Porterville Unified School District
Figure No.: A-4

Location: 286 E. Orange Avenue, Porterville, California
Logged By: Dave Adams

Depth to Water>
Initial: None
At Completion: None

SUBSURFACE PROFILE			SAMPLE			
Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.
		Ground Surface				
0	▨	***SILTY SAND (SM)*** FILL, fine- to medium-grained; dark brown, damp, drills easily With trace CLAY, gray and moist below 18 inches				
2	▨		117.9	12.5	■	19
4	▨	***SILTY SAND (SM)*** Medium dense, fine- to coarse-grained with trace GRAVEL; brown, moist, drills easily				
	▨		97.2	12.6	■	22
6	▨					
8	▨	With increased SAND below 8 feet				
10		End of Borehole				
12						
14						
16						
18						
20						



Drill Method: Solid Flight
Drill Date: 10-10-23

Drill Rig: CME 45C-4
Krazan and Associates
Hole Size: 4½ Inches

Driller: Jim Watts
Elevation: 10 Feet

Sheet: 1 of 1

Log of Boring B5

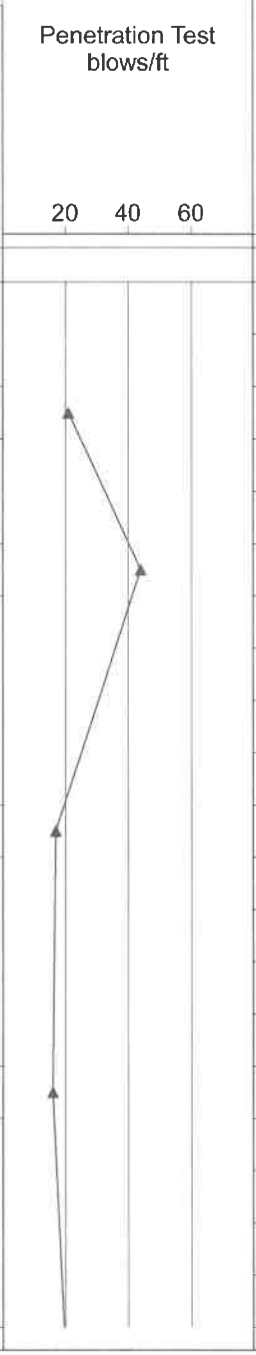
Project: Santa Fe Elementary School
Project No: 012-23164

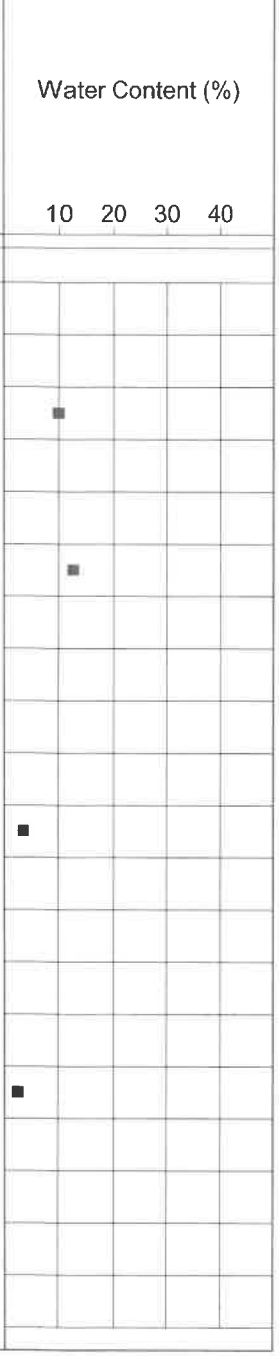
Client: Porterville Unified School District
Figure No.: A-5

Location: 286 E. Orange Avenue, Porterville, California
Logged By: Dave Adams

Depth to Water> **Initial:** 24 Feet **At Completion:** 24 Feet

SUBSURFACE PROFILE			SAMPLE			
Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.
		Ground Surface				
0		***SILTY SAND (SM)*** FILL, fine- to medium-grained; brown, damp, drills easily				
2		***SILTY SAND (SM)*** Medium dense, fine- to medium-grained; brown, moist, drills easily	112.3	10.0	■	21
4		Dense below 5 feet	120.9	12.6	■	44
8		***SAND (SP)*** Medium dense, fine- to coarse-grained with trace GRAVEL; gray, moist, drills easily	104.8	3.6	■	17
14		***SILTY SAND (SM)*** Medium dense, fine- to medium-grained; light brown, moist, drills easily		2.5	■	16
20					■	





Drill Method: Solid Flight
Drill Date: 10-10-23

Drill Rig: CME 45C-4
Hole Size: 4½ Inches

Krazan and Associates

Driller: Jim Watts
Elevation: 29 Feet

Sheet: 1 of 2

Log of Boring B5

Project: Santa Fe Elementary School

Project No: 012-23164

Client: Porterville Unified School District

Figure No.: A-5

Location: 286 E. Orange Avenue, Porterville, California

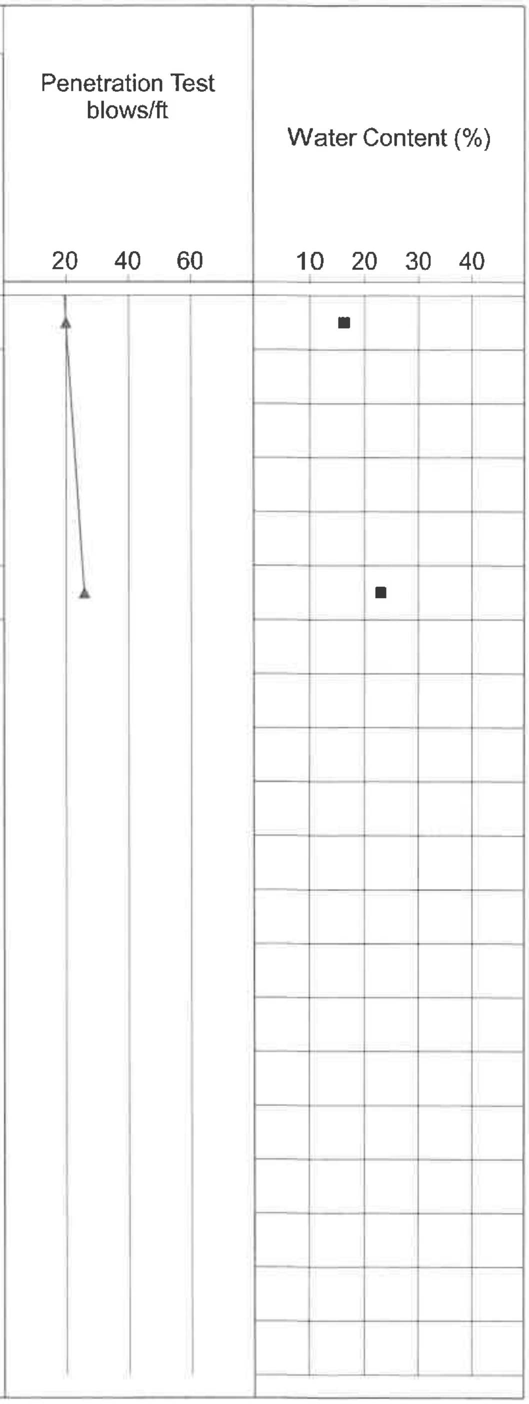
Logged By: Dave Adams

Depth to Water>

Initial: 24 Feet

At Completion: 24 Feet

SUBSURFACE PROFILE			SAMPLE			
Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.
			106.2	16.1	■	20
22						
24		▽ ***SILTY SAND (SM)*** Medium dense, fine- to medium-grained with GRAVEL; brown, moist, drills easily Saturated below 24 feet				
26		With COBBLE, increased GRAVEL and drills hard below 26 feet	102.0	23.2	■	26
28		Auger refusal at 29 feet				
		End of Borehole				
30						
32						
34						
36						
38						
40						



Drill Method: Solid Flight

Drill Date: 10-10-23

Drill Rig: CME 45C-4

Krazan and Associates

Hole Size: 4½ Inches

Driller: Jim Watts

Elevation: 29 Feet

Sheet: 2 of 2

Log of Boring B6

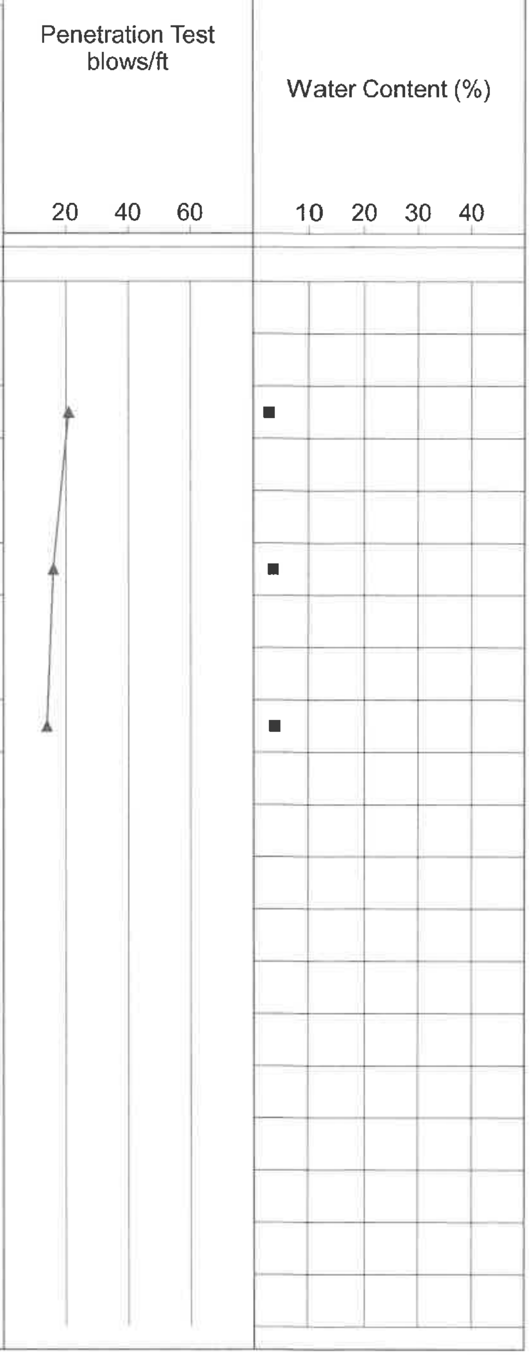
Project: Santa Fe Elementary School
Project No: 012-23164

Client: Porterville Unified School District
Figure No.: A-6

Location: 286 E. Orange Avenue, Porterville, California
Logged By: Dave Adams

Depth to Water> **Initial:** None **At Completion:** None

SUBSURFACE PROFILE	SAMPLE			
Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.
Ground Surface				
SILTY SAND (SM) Very loose, fine- to medium-grained; brown, damp, drills easily Loose below 12 inches				
SAND (SP) Medium dense, fine- to coarse-grained with trace GRAVEL; light brown, damp, drills easily With increased GRAVEL below 4 feet	99.2	3.0	■	21
	102.5	3.8	■	16
Loose below 8 feet	100.9	4.0	■	14
Medium dense and drills firmly below 13 feet				
End of Borehole				



Depth (ft): 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20

Drill Method: Solid Flight
Drill Date: 10-10-23

Drill Rig: CME 45C-4
Krazan and Associates
Hole Size: 4½ Inches

Driller: Jim Watts
Elevation: 15 Feet

Sheet: 1 of 1

Log of Boring B7

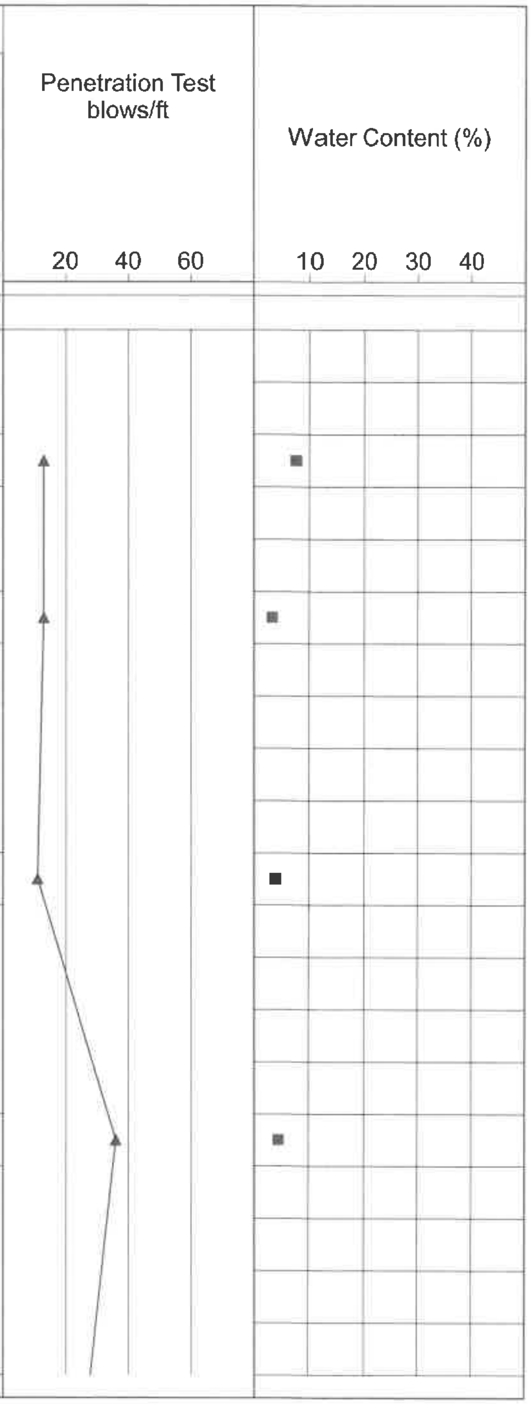
Project: Santa Fe Elementary School
Project No: 012-23164

Client: Porterville Unified School District
Figure No.: A-7

Location: 286 E. Orange Avenue, Porterville, California
Logged By: Dave Adams

Depth to Water>
Initial: 20 Feet
At Completion: 20 Feet

SUBSURFACE PROFILE			SAMPLE			
Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.
		Ground Surface				
0		***SILTY SAND (SM)*** Very loose, fine- to medium-grained; brown, damp, drills easily Loose below 12 inches				
2		***SILTY SAND/SAND (SM/SP)*** Loose, fine- to coarse-grained; light brown, damp, drills easily	97.3	7.8	■	13
4		***SAND (SP)*** Loose, fine- to medium-grained; light brown, damp, drills easily	105.6	3.4	■	13
10		With GRAVEL below 10 feet	99.0	4.1	■	11
14		***SILTY SAND/SAND (SM/SP)*** Medium dense, fine- to medium-grained; light brown, damp, drills easily	125.6	4.5	■	36
20		Saturated below 20 feet ▽			■	



Drill Method: Solid Flight
Drill Date: 10-10-23

Drill Rig: CME 45C-4
Krazan and Associates
Hole Size: 4½ Inches

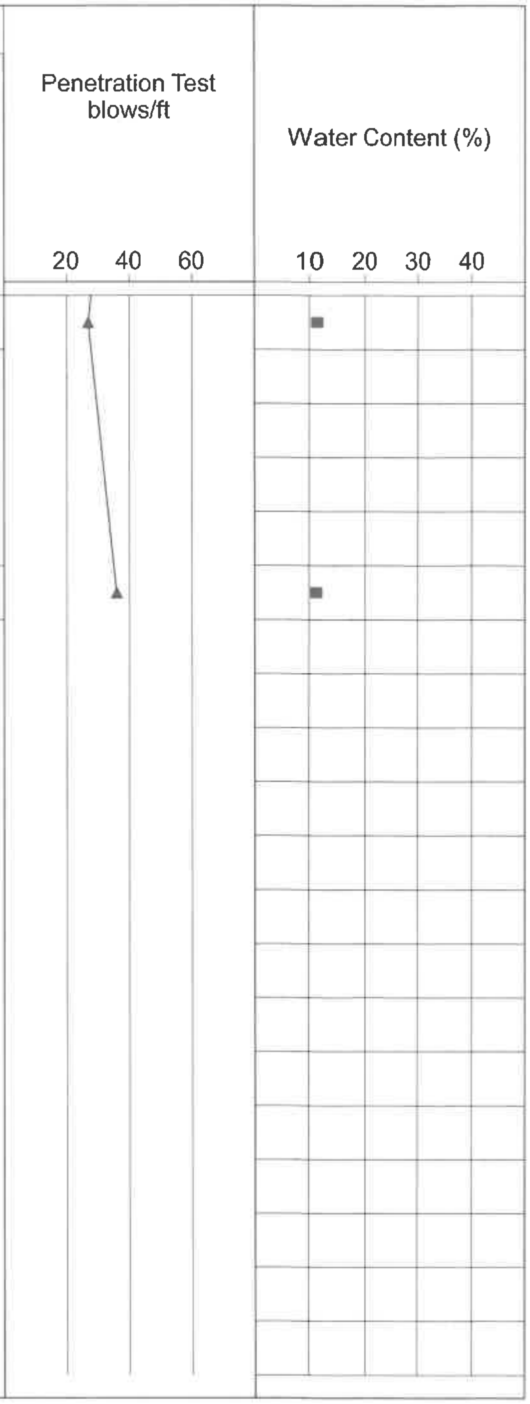
Driller: Jim Watts
Elevation: 30 Feet

Sheet: 1 of 2

Log of Boring B7

Project: Santa Fe Elementary School
Project No: 012-23164
Client: Porterville Unified School District
Figure No.: A-7
Location: 286 E. Orange Avenue, Porterville, California
Logged By: Dave Adams
Depth to Water>
Initial: 20 Feet
At Completion: 20 Feet

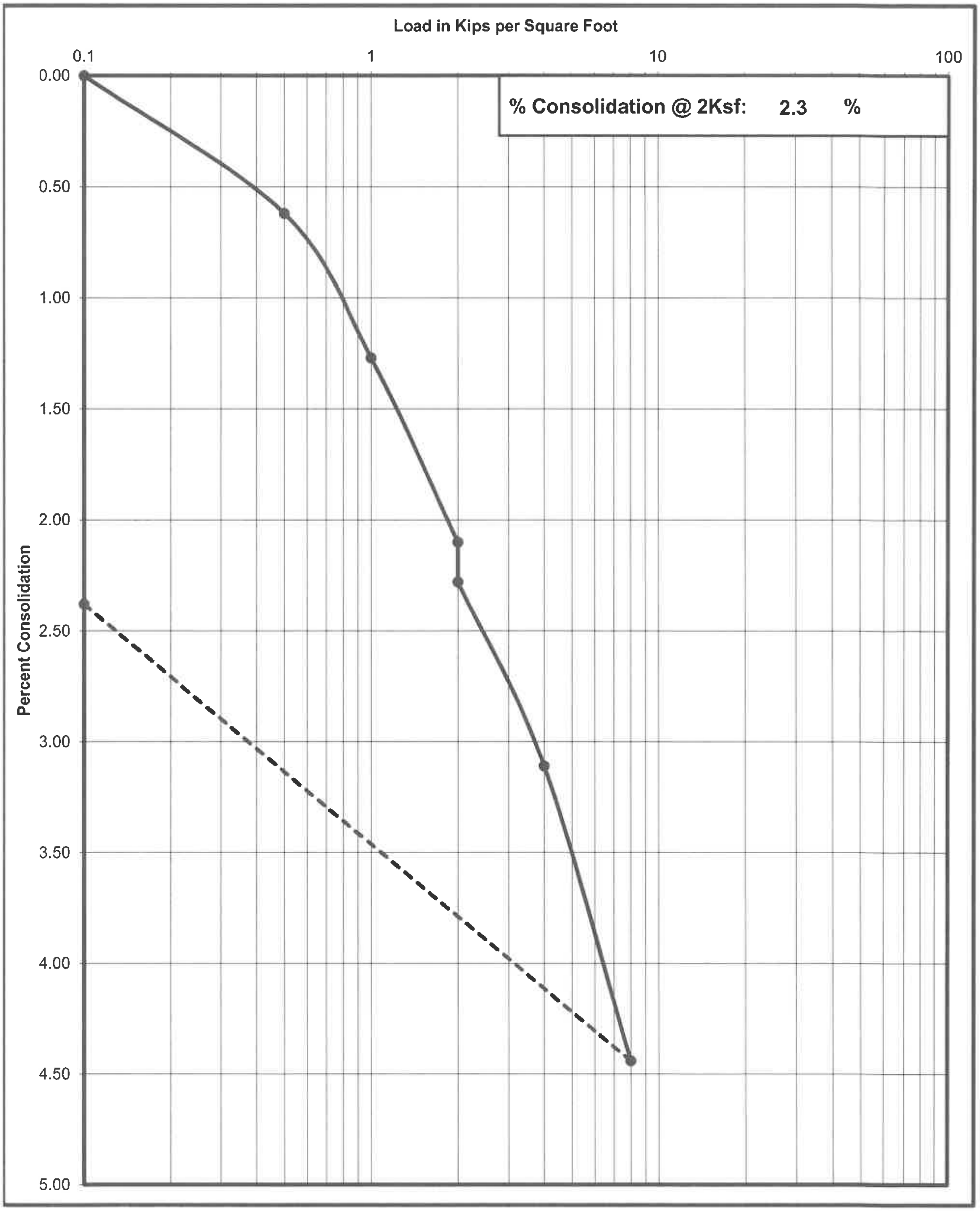
SUBSURFACE PROFILE			SAMPLE			
Depth (ft)	Symbol	Description	Dry Density (pcf)	Moisture (%)	Type	Blows/ft.
	▨	***SAND (SP)*** Medium dense, fine- to coarse-grained with GRAVEL and COBBLE; brown, saturated, drills easily	119.9	11.4	■	27
22	▨					
24	▨					
	▨		125.3	11.3	■	36
26	▨					
28	▨					
30		End of Borehole				
32						
34						
36						
38						
40						



Drill Method: Solid Flight
Drill Date: 10-10-23
Drill Rig: CME 45C-4
Krazan and Associates
Hole Size: 4½ Inches
Driller: Jim Watts
Elevation: 30 Feet
Sheet: 2 of 2

Consolidation Test

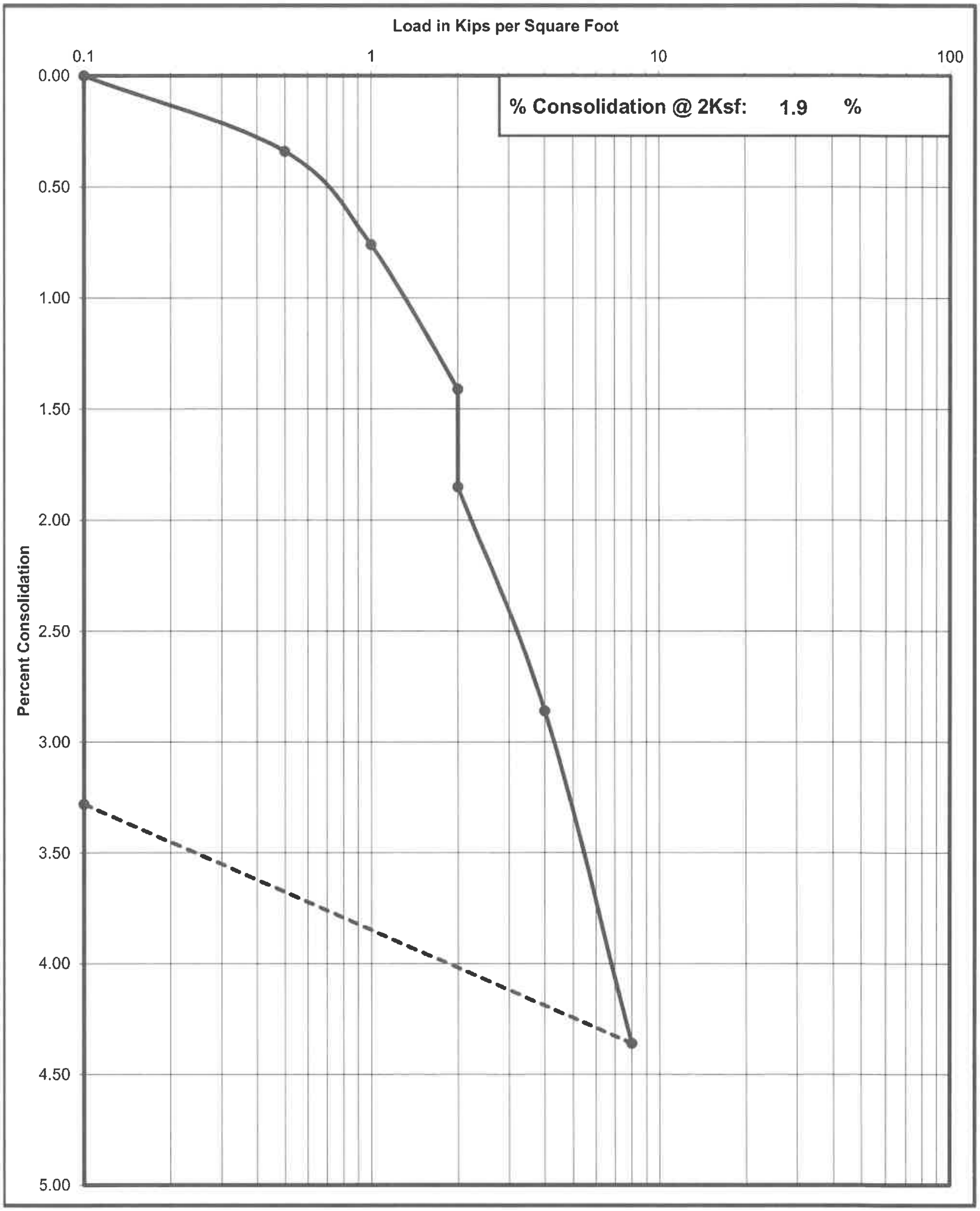
Project No	Boring No. & Depth	Date	Soil Classification
012-23164	B2 @ 2-3'	10/16/2023	SM



Krazan Testing Laboratory

Consolidation Test

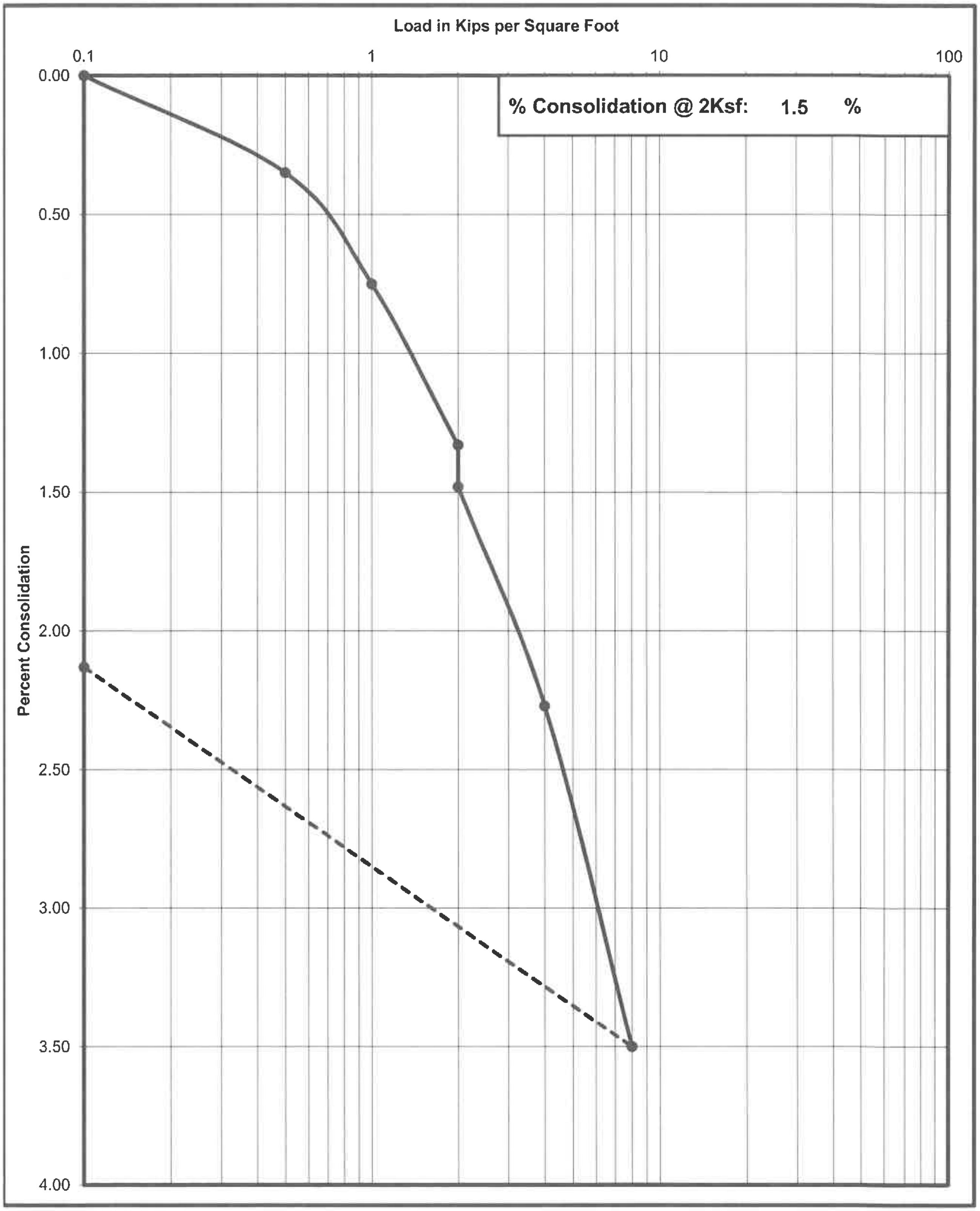
Project No	Boring No. & Depth	Date	Soil Classification
012-23164	B2 @ 5-6'	10/16/2023	SM/SP



Krazan Testing Laboratory

Consolidation Test

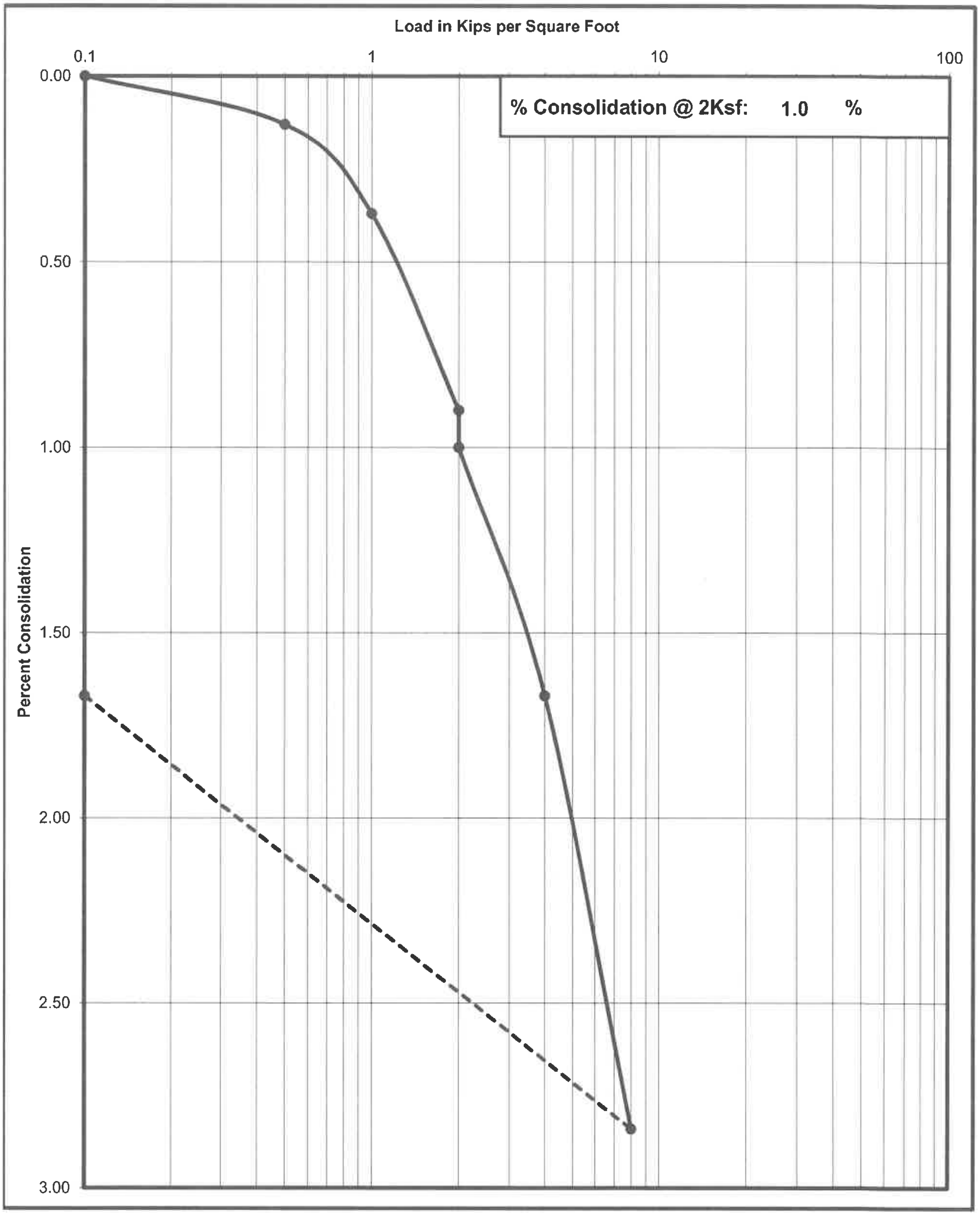
Project No	Boring No. & Depth	Date	Soil Classification
012-23164	B7 @ 2-3'	10/16/2023	SM/SP



Krazan Testing Laboratory

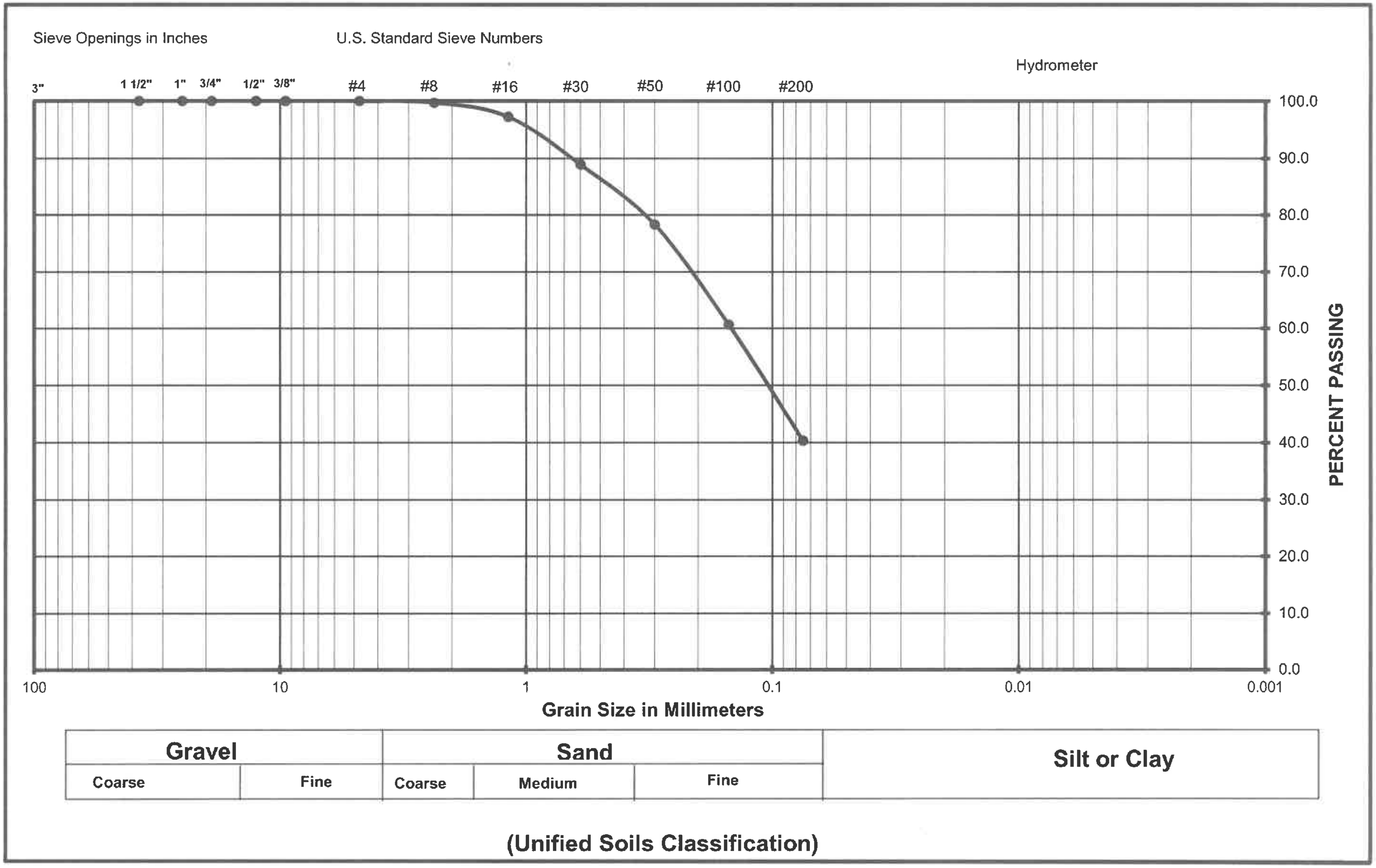
Consolidation Test

Project No	Boring No. & Depth	Date	Soil Classification
012-23164	B7 @ 5-6'	10/16/2023	SP



Krazan Testing Laboratory

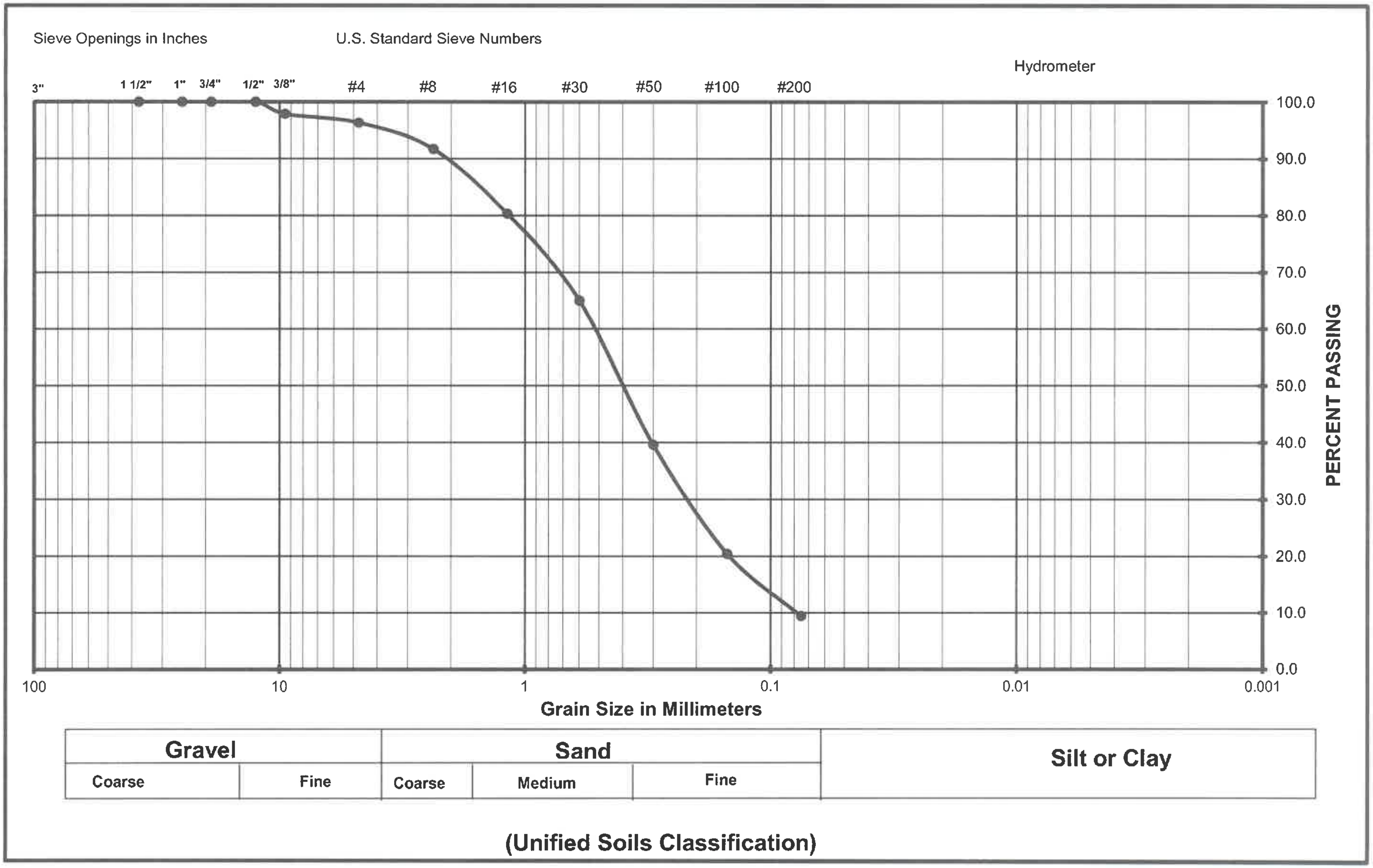
Grain Size Analysis



Project Name	Sante Fe Elementary School
Project Number	012-23164
Soil Classification	SM
Sample Number	B2 @ 2-3'

Krazan Testing Laboratory

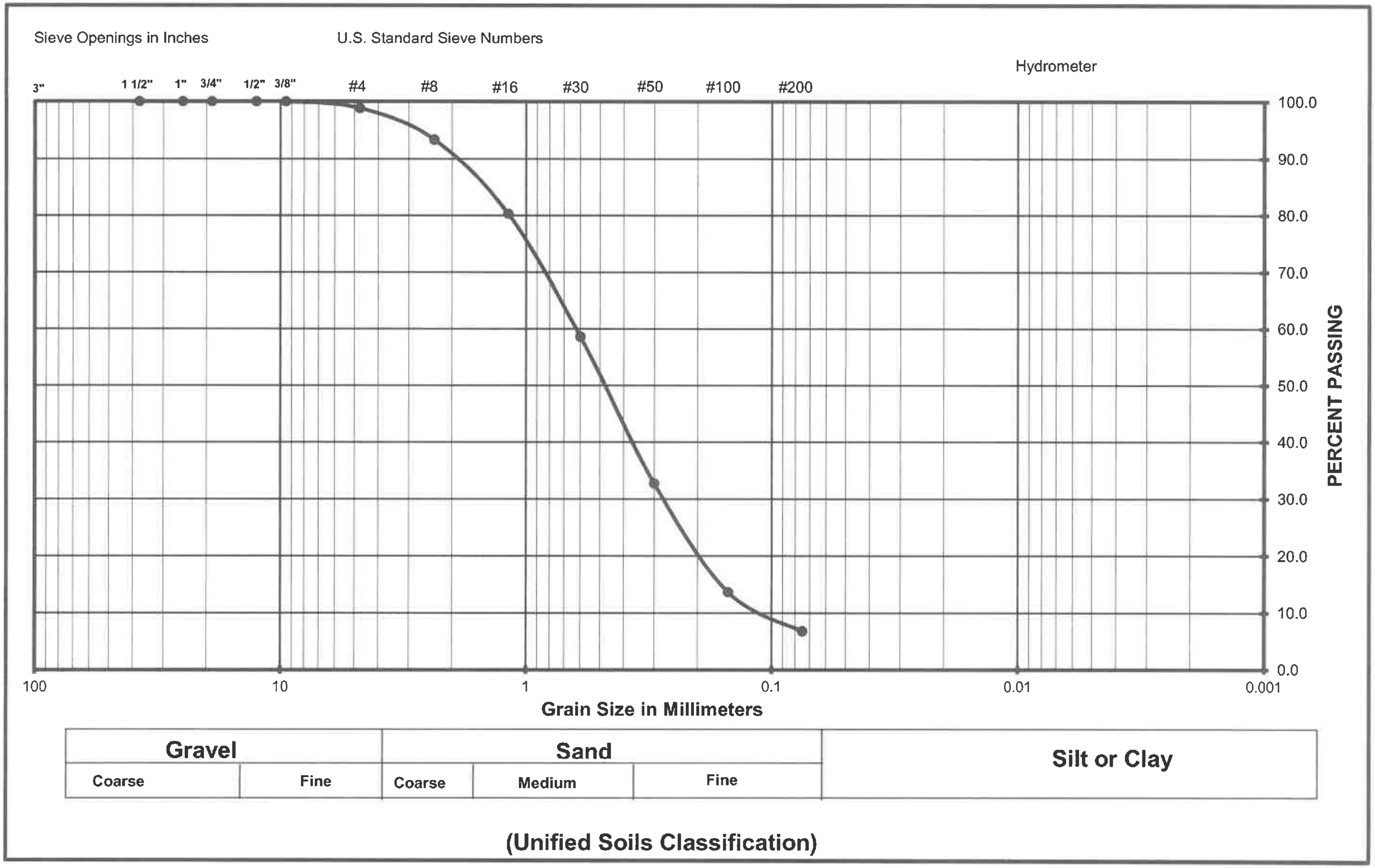
Grain Size Analysis



Project Name	Sante Fe Elementary School
Project Number	012-23164
Soil Classification	SM/SP
Sample Number	B2 @ 5-6'

Krazan Testing Laboratory

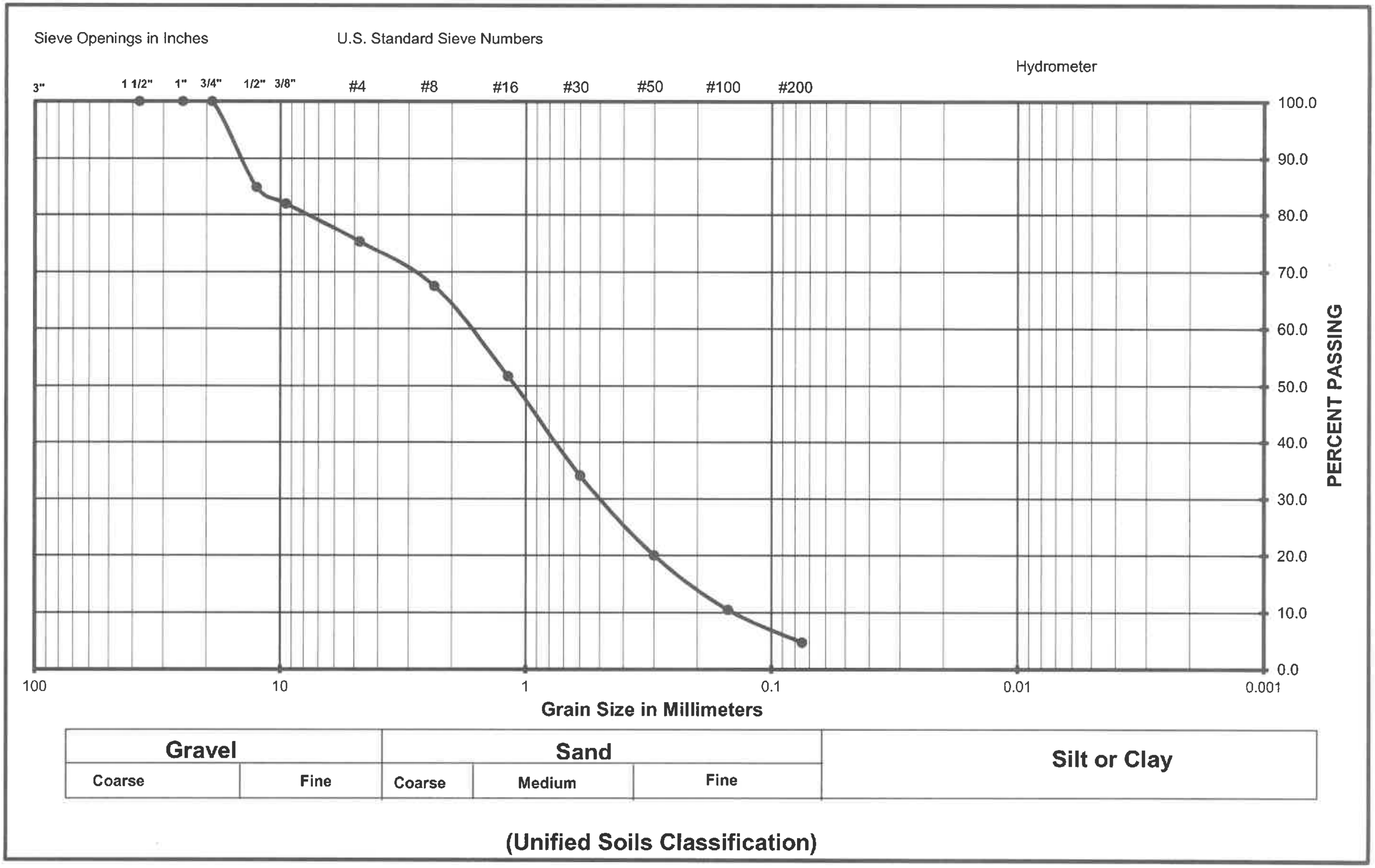
Grain Size Analysis



Project Name	Sante Fe Elementary School
Project Number	012-23164
Soil Classification	SM/SP
Sample Number	B2 @ 20-21'

Krazan Testing Laboratory

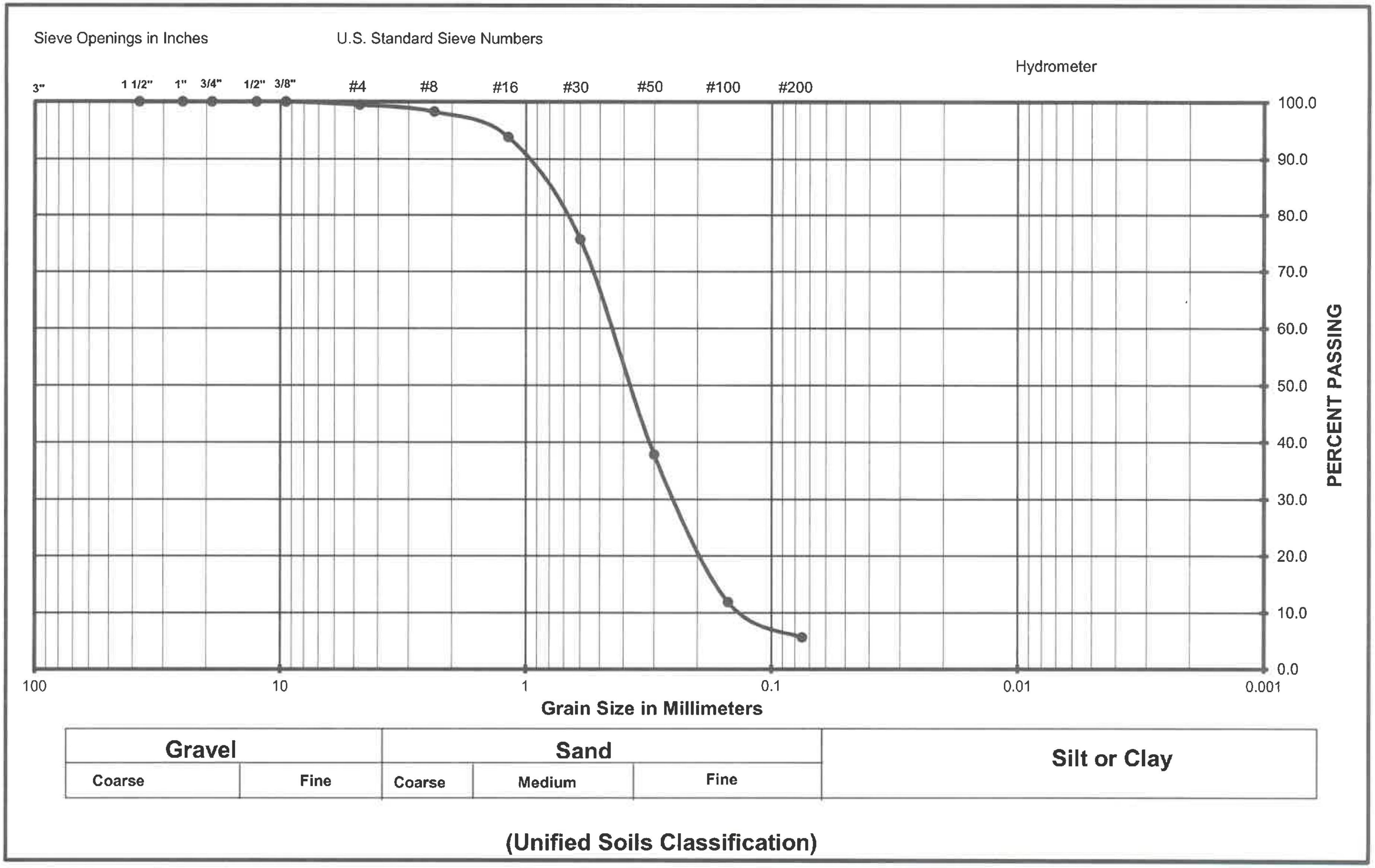
Grain Size Analysis



Project Name	Sante Fe Elementary School
Project Number	012-23164
Soil Classification	SP w/ grvl
Sample Number	B2 @ 25-26'

Krazan Testing Laboratory

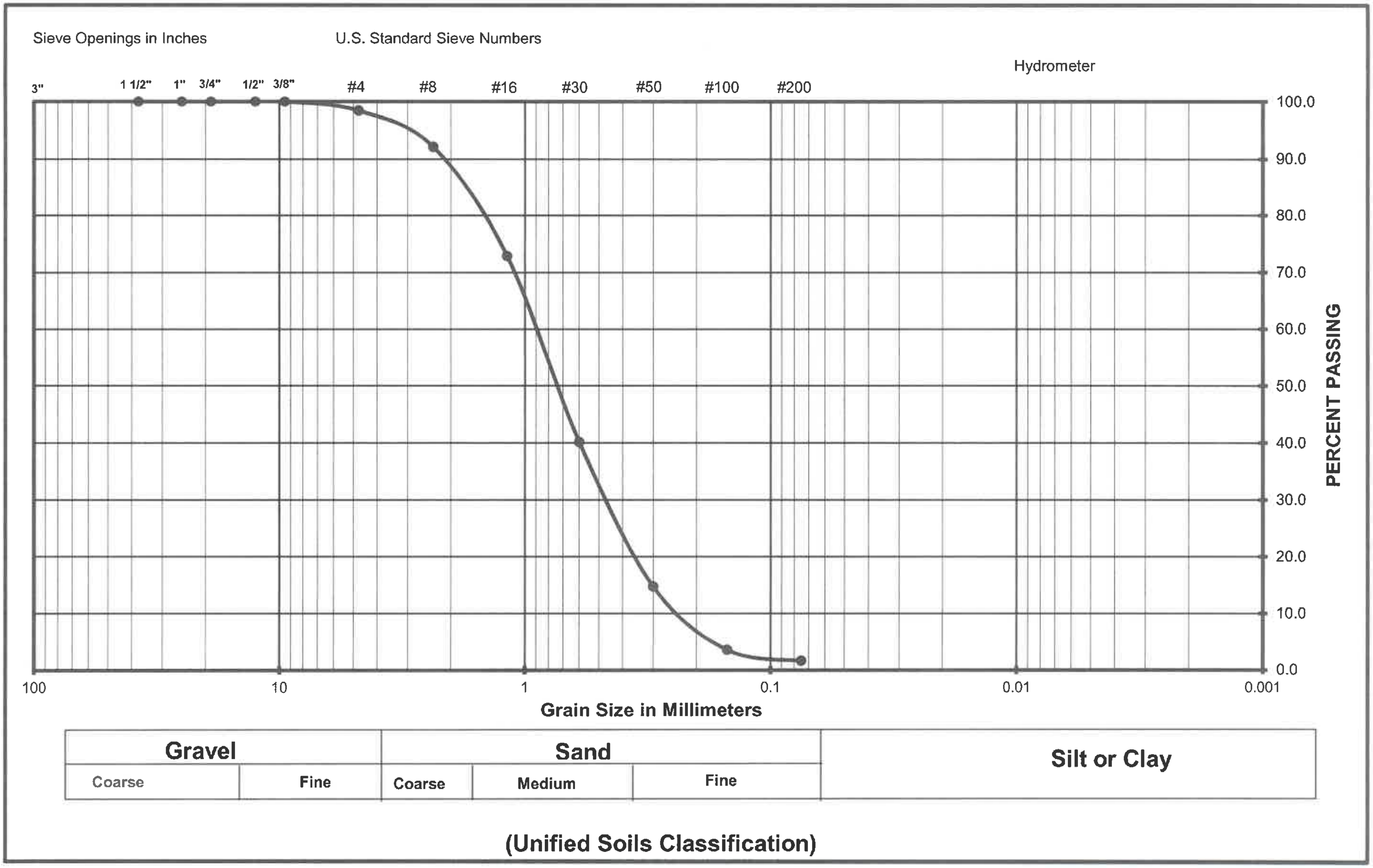
Grain Size Analysis



Project Name	Sante Fe Elementary School
Project Number	012-23164
Soil Classification	SM/SP
Sample Number	B7 @ 2-3'

Krazan Testing Laboratory

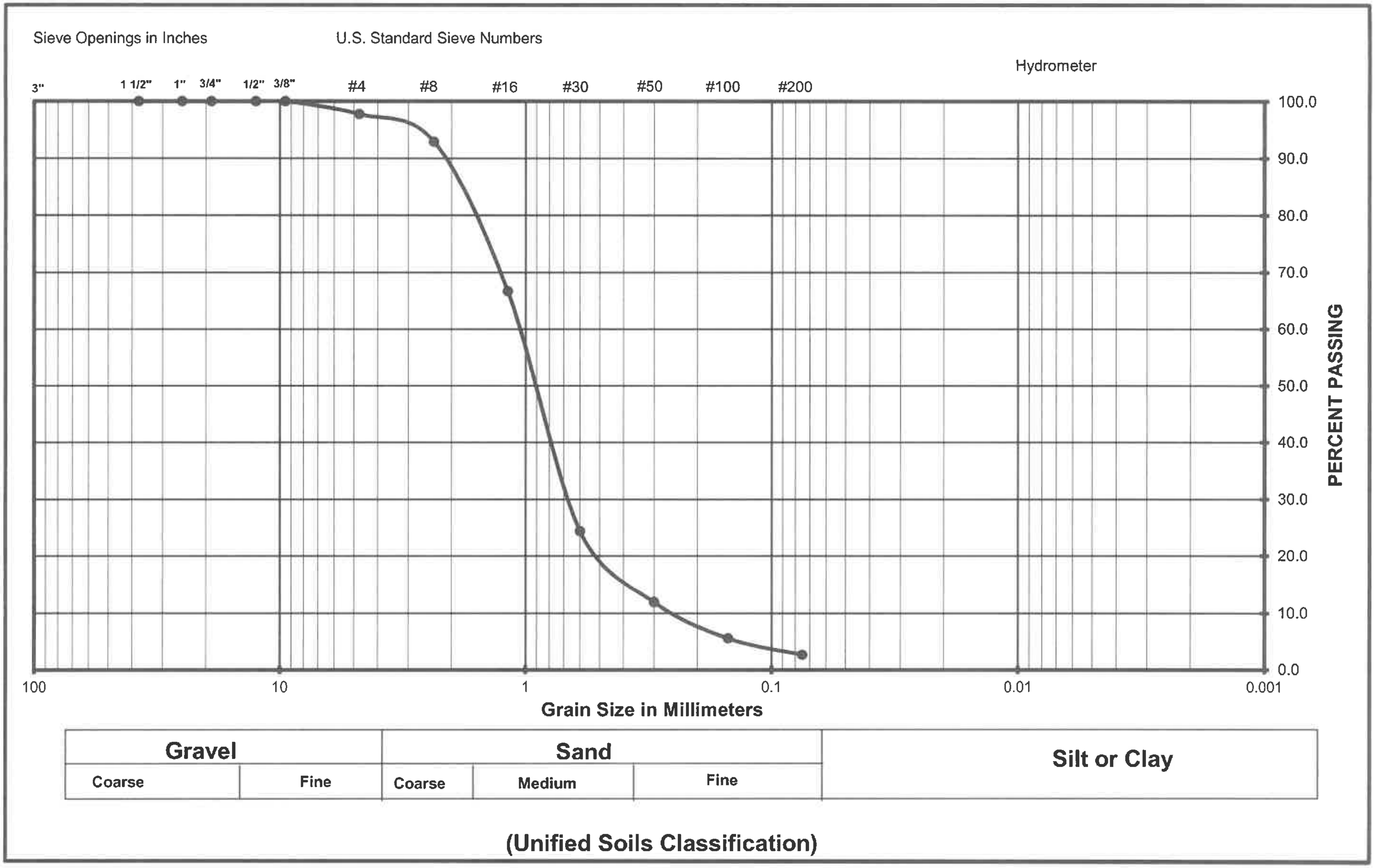
Grain Size Analysis



Project Name	Sante Fe Elementary School
Project Number	012-23164
Soil Classification	SP
Sample Number	B7 @ 5-6'

Krazan Testing Laboratory

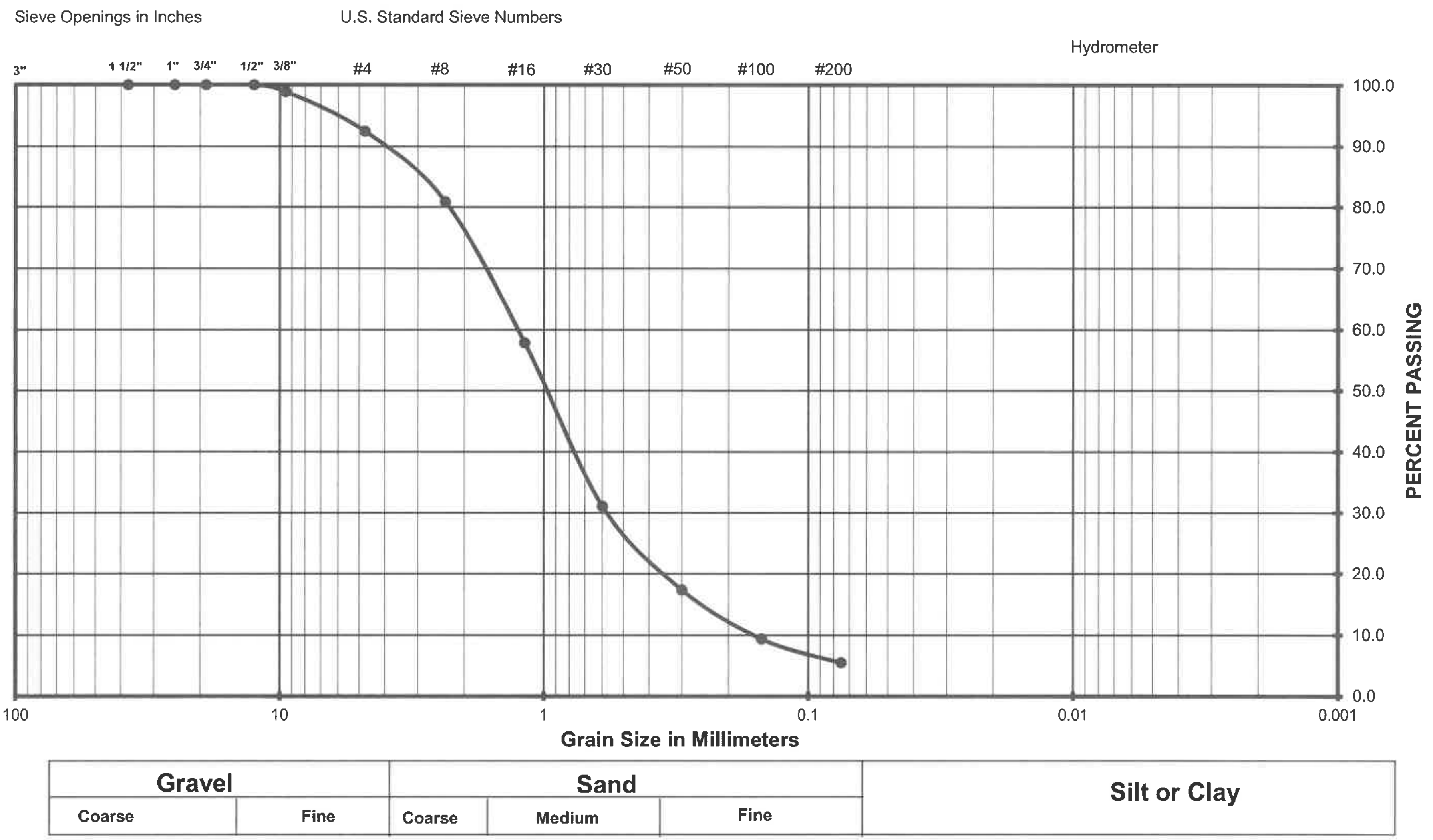
Grain Size Analysis



Project Name	Sante Fe Elementary School
Project Number	012-23164
Soil Classification	SP
Sample Number	B7 @ 10-11'

Krazan Testing Laboratory

Grain Size Analysis

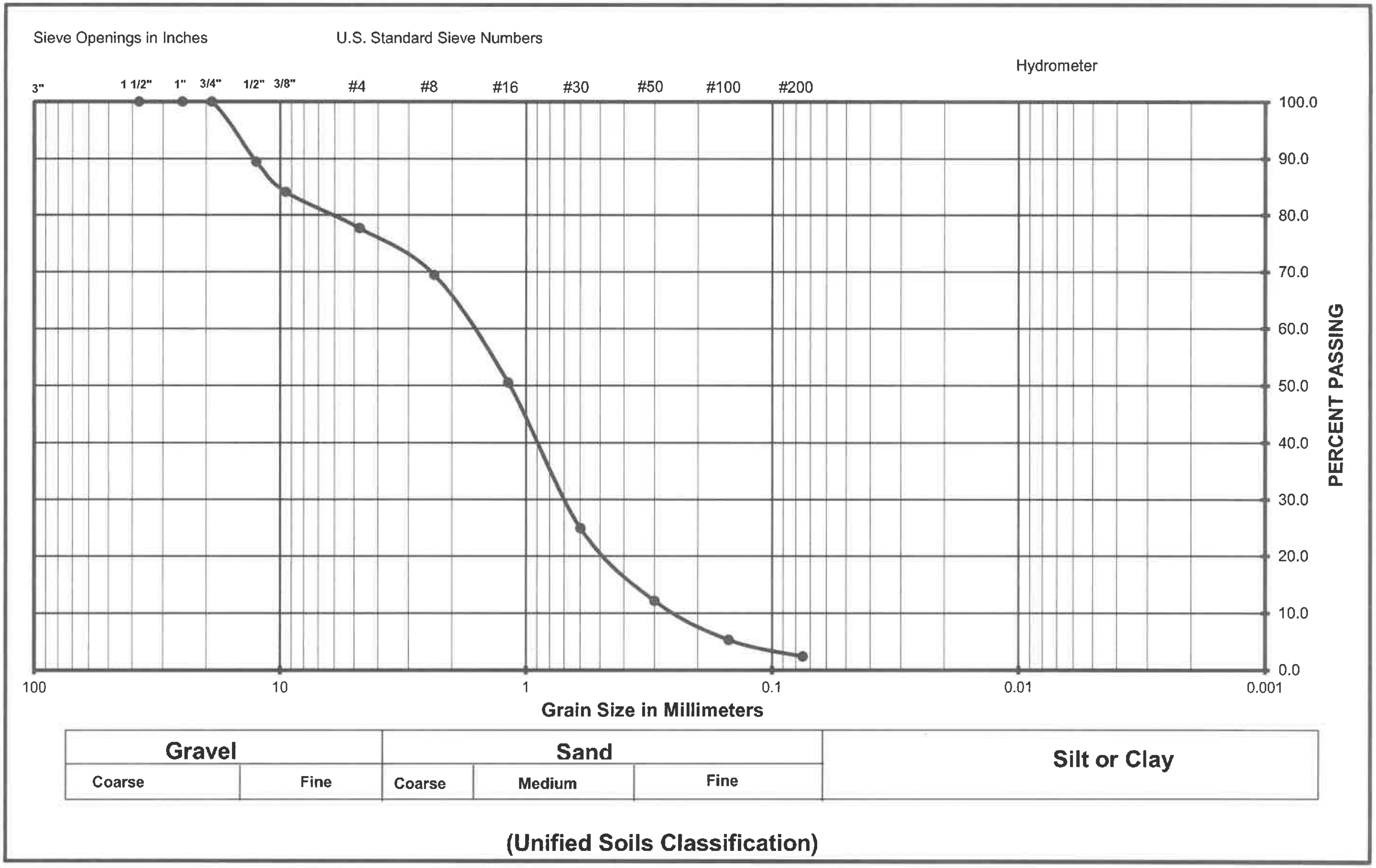


(Unified Soils Classification)

Project Name	Sante Fe Elementary School
Project Number	012-23164
Soil Classification	SM/SP
Sample Number	B7 @ 15-16'

Krazan Testing Laboratory

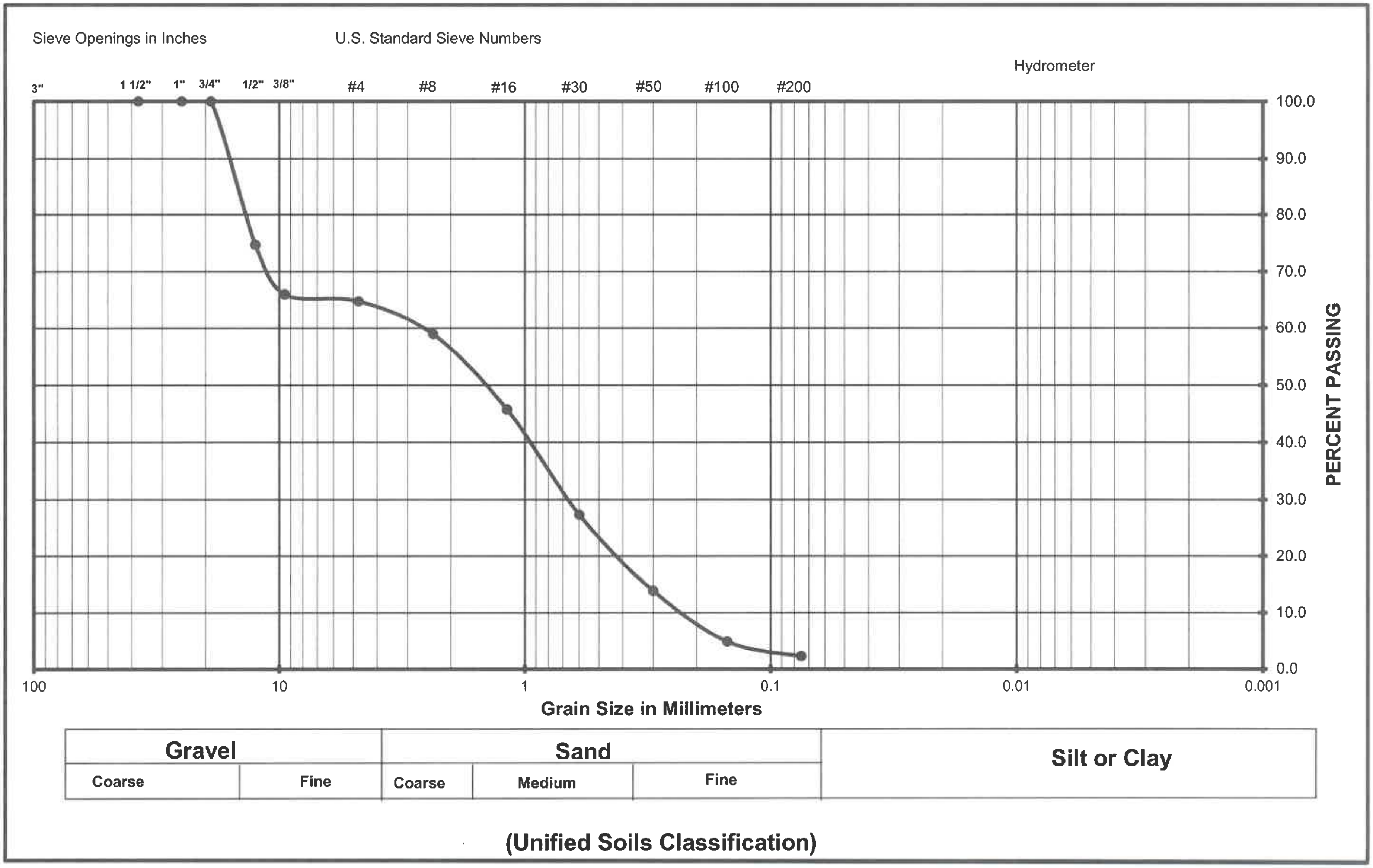
Grain Size Analysis



Project Name	Sante Fe Elementary School
Project Number	012-23164
Soil Classification	SP w/ grvl
Sample Number	B7 @ 20-21'

Krazan Testing Laboratory

Grain Size Analysis



Project Name	Sante Fe Elementary School
Project Number	012-23164
Soil Classification	SP w/ grvl
Sample Number	B7 @ 25-26'

Krazan Testing Laboratory

APPENDIX B

EARTHWORK SPECIFICATIONS

GENERAL

When the text of the report conflicts with the general specifications in this appendix, the recommendations in the report have precedence.

SCOPE OF WORK: These specifications and applicable plans pertain to and include all earthwork associated with the site rough grading, including but not limited to the furnishing of all labor, tools, and equipment necessary for site clearing and grubbing, stripping, preparation of foundation materials for receiving fill, excavation, processing, placement and compaction of fill and backfill materials to the lines and grades shown on the project grading plans, and disposal of excess materials.

PERFORMANCE: The Contractor shall be responsible for the satisfactory completion of all earthwork in accordance with the project plans and specifications. This work shall be inspected and tested by a representative of Krazan and Associates, Inc., hereinafter known as the Soils Engineer and/or Testing Agency. Attainment of design grades when achieved shall be certified by the project Civil Engineer. Both the Soils Engineer and the Civil Engineer are the Owner's representatives. If the Contractor should fail to meet the technical or design requirements embodied in this document and on the applicable plans, he shall make the necessary readjustments until all work is deemed satisfactory as determined by both the Soils Engineer and the Civil Engineer. No deviation from these specifications shall be made except upon written approval of the Soils Engineer, Civil Engineer or project Architect.

No earthwork shall be performed without the physical presence or approval of the Soils Engineer. The Contractor shall notify the Soils Engineer at least 2 working days prior to the commencement of any aspect of the site earthwork.

The Contractor agrees that he shall assume sole and complete responsibility for job site conditions during the course of construction of this project, including safety of all persons and property; that this requirement shall apply continuously and not be limited to normal working hours; and that the Contractor shall defend, indemnify and hold the Owner and the Engineers harmless from any and all liability, real or alleged, in connection with the performance of work on this project, except for liability arising from the sole negligence of the Owner or the Engineers.

TECHNICAL REQUIREMENTS: All compacted materials shall be densified to a density not less than 90 percent relative compaction based on ASTM Test Method D1557 or CAL-216, as specified in the technical portion of the Soil Engineer's report. The location and frequency of field density tests shall be as determined by the Soils Engineer. The results of these tests and compliance with these specifications shall be the basis upon which satisfactory completion of work will be judged by the Soils Engineer.

SOILS AND FOUNDATION CONDITIONS: The Contractor is presumed to have visited the site and to have familiarized himself with existing site conditions and the contents of the data presented in the soil report.

The Contractor shall make his own interpretation of the data contained in said report, and the Contractor shall not be relieved of liability under the Contract documents for any loss sustained as a result of any variance between conditions indicated by or deduced from said report and the actual conditions encountered during the progress of the work.

DUST CONTROL: The work includes dust control as required for the alleviation or prevention of any dust nuisance on or about the site or the borrow area, or off-site if caused by the Contractor's operation either during the performance of the earthwork or resulting from the conditions in which the Contractor leaves the site. The Contractor shall assume all liability, including court costs of codefendants, for all claims related to dust or windblown materials attributable to his work.

SITE PREPARATION

Site preparation shall consist of site clearing and grubbing and the preparations of foundation materials for receiving fill.

CLEARING AND GRUBBING: The Contractor shall accept the site in this present condition and shall demolish and/or remove from the area of designated project earthwork all structures, both surface and subsurface, trees, brush, roots, debris, organic matter, and all other matter determined by the Soils Engineer to be deleterious or otherwise unsuitable. Such materials shall become the property of the Contractor and shall be removed from the site.

Tree root systems in proposed building areas should be removed to a minimum depth of 3 feet and to such an extent which would permit removal of all roots larger than 1 inch. Tree roots removed in parking areas may be limited to the upper 1½ feet of the ground surface. Backfill of tree root excavations should not be permitted until all exposed surfaces have been inspected and the Soils Engineer is present for the proper control of backfill placement and compaction. Burning in areas which are to receive fill materials shall not be permitted.

SUBGRADE PREPARATION: Surfaces to receive Engineered Fill, building or slab loads shall be prepared as outlined above, excavated/scarified to a depth of 12 inches, moisture-conditioned as necessary, and compacted to 90 percent relative compaction.

Loose soil areas, areas of uncertified fill, and/or areas of disturbed soils shall be moisture-conditioned as necessary and recompacted to 90 percent relative compaction. All ruts, hummocks, or other uneven surface features shall be removed by surface grading prior to placement of any fill materials. All areas which are to receive fill materials shall be approved by the Soils Engineer prior to the placement of any of the fill material.

EXCAVATION: All excavation shall be accomplished to the tolerance normally defined by the Civil Engineer as shown on the project grading plans. All over-excavation below the grades specified shall be backfilled at the Contractor's expense and shall be compacted in accordance with the applicable technical requirements.

FILL AND BACKFILL MATERIAL: No material shall be moved or compacted without the presence of the Soils Engineer. Material from the required site excavation may be utilized for construction site fills provided prior approval is given by the Soils Engineer. All materials utilized for constructing site fills shall be free from vegetation or other deleterious matter as determined by the Soils Engineer.

PLACEMENT, SPREADING AND COMPACTION: The placement and spreading of approved fill materials and the processing and compaction of approved fill and native materials shall be the responsibility of the Contractor. However, compaction of fill materials by flooding, ponding, or jetting shall not be permitted unless specifically approved by local code, as well as the Soils Engineer.

Both cut and fill areas shall be surface-compacted to the satisfaction of the Soils Engineer prior to final acceptance.

SEASONAL LIMITS: No fill material shall be placed, spread, or rolled while it is frozen or thawing or during unfavorable wet weather conditions. When the work is interrupted by heavy rains, fill operations shall not be resumed until the Soils Engineer indicates that the moisture content and density of previously placed fill are as specified.

APPENDIX C

PAVEMENT SPECIFICATIONS

1. DEFINITIONS - The term "pavement" shall include asphaltic concrete surfacing, untreated aggregate base, and aggregate subbase. The term "subgrade" is that portion of the area on which surfacing, base, or subbase is to be placed.

The term “Standard Specifications”: hereinafter referred to is the 2018 Standard Specifications of the State of California, Department of Transportation, and the "Materials Manual" is the Materials Manual of Testing and Control Procedures, State of California, Department of Public Works, Division of Highways. The term "relative compaction" refers to the field density expressed as a percentage of the maximum laboratory density as defined in the applicable tests outlined in the Materials Manual.

2. SCOPE OF WORK - This portion of the work shall include all labor, materials, tools, and equipment necessary for, and reasonably incidental to the completion of the pavement shown on the plans and as herein specified, except work specifically noted as "Work Not Included."

3. PREPARATION OF THE SUBGRADE - The Contractor shall prepare the surface of the various subgrades receiving subsequent pavement courses to the lines, grades, and dimensions given on the plans. The upper 12 inches of the soil subgrade beneath the pavement section shall be compacted to a minimum relative compaction of 90 percent. The finished subgrades shall be tested and approved by the Soils Engineer prior to the placement of additional pavement courses.

4. UNTREATED AGGREGATE BASE - The aggregate base material shall be spread and compacted on the prepared subgrade in conformity with the lines, grades, and dimensions shown on the plans. The aggregate base material shall conform to the requirements of Section 26 of the Standard Specifications for Class 2 material, 1½ inches maximum size. The aggregate base material shall be spread and compacted in accordance with Section 26 of the Standard Specifications. The aggregate base material shall be spread in layers not exceeding 6 inches and each layer of aggregate material course shall be tested and approved by the Soils Engineer prior to the placement of successive layers. The aggregate base material shall be compacted to a minimum relative compaction of 95 percent.

5. AGGREGATE SUBBASE - The aggregate subbase shall be spread and compacted on the prepared subgrade in conformity with the lines, grades, and dimensions shown on the plans. The aggregate subbase material shall conform to the requirements of Section 25 of the Standard Specifications for Class 2 material. The aggregate subbase material shall be compacted to a minimum relative compaction of 95 percent, and it shall be spread and compacted in accordance with Section 25 of the Standard Specifications. Each layer of aggregate subbase shall be tested and approved by the Soils Engineer prior to the placement of successive layers.

6. ASPHALTIC CONCRETE SURFACING - Asphaltic concrete surfacing shall consist of a mixture of mineral aggregate and paving grade asphalt, mixed at a central mixing plant and spread and compacted on a prepared base in conformity with the lines, grades and dimensions shown on the plans. The viscosity grade of the asphalt shall be PG 64-10. The mineral aggregate shall be Type B, ½ inch maximum size, medium grading and shall conform to the requirements set forth in Section 39 of the Standard Specifications. The drying, proportioning and mixing of the materials shall conform to Section 39.

The prime coat, spreading and compacting equipment and spreading and compacting mixture shall conform to the applicable chapters of Section 39, with the exception that no surface course shall be placed when the atmospheric temperature is below 50° F. The surfacing shall be rolled with a combination of steel wheel and pneumatic rollers, as described in Section 39-6. The surface course shall be placed with an approved self-propelled mechanical spreading and finishing machine.

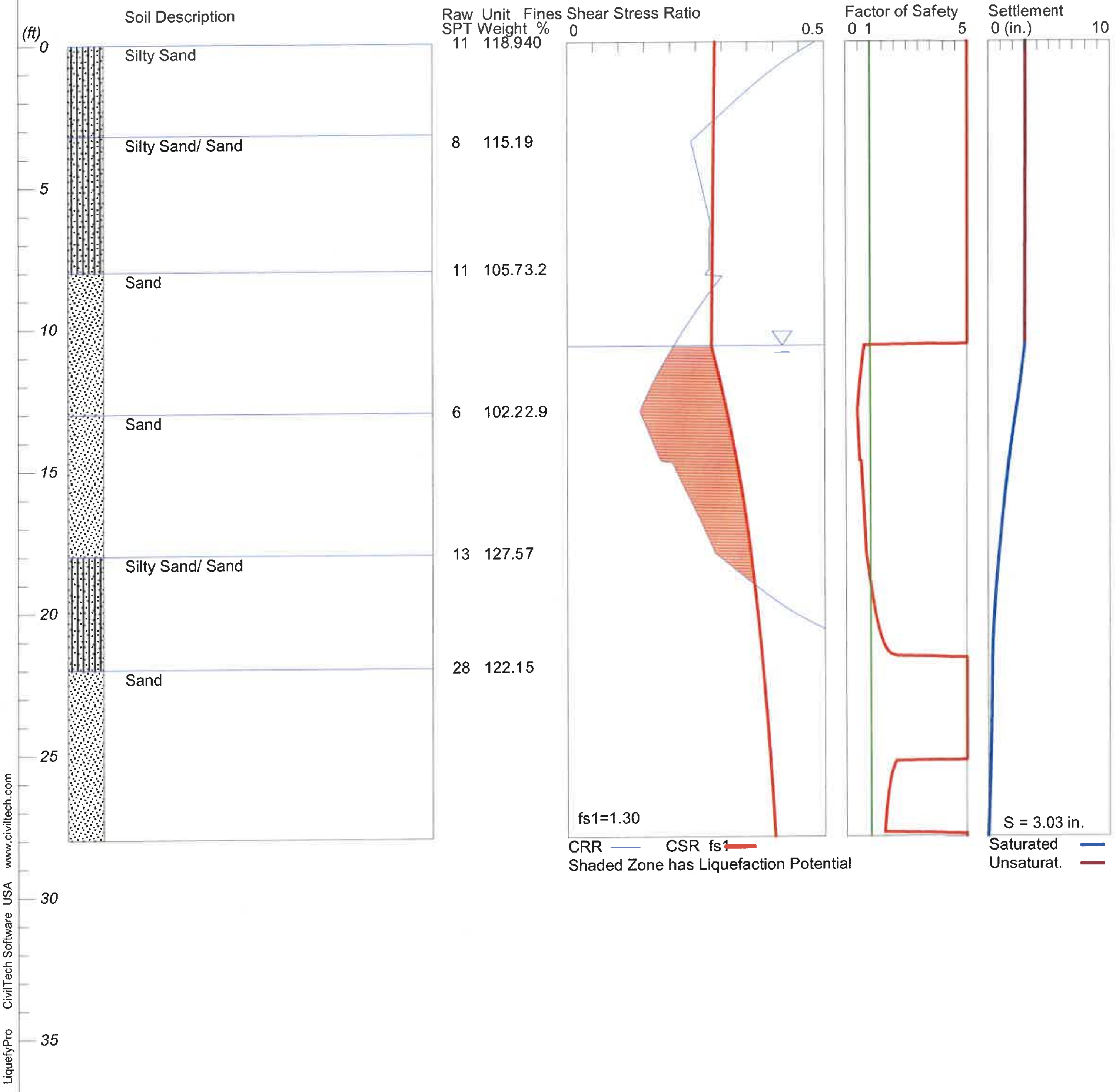
7. FOG SEAL COAT - The fog seal (mixing type asphaltic emulsion) shall conform to and be applied in accordance with the requirements of Section 37.

LIQUEFACTION ANALYSIS

Santa Fe Elementary

Hole No.=B2 ***Water Depth=10.7 ft***

Magnitude=6.21
Acceleration=0.339g



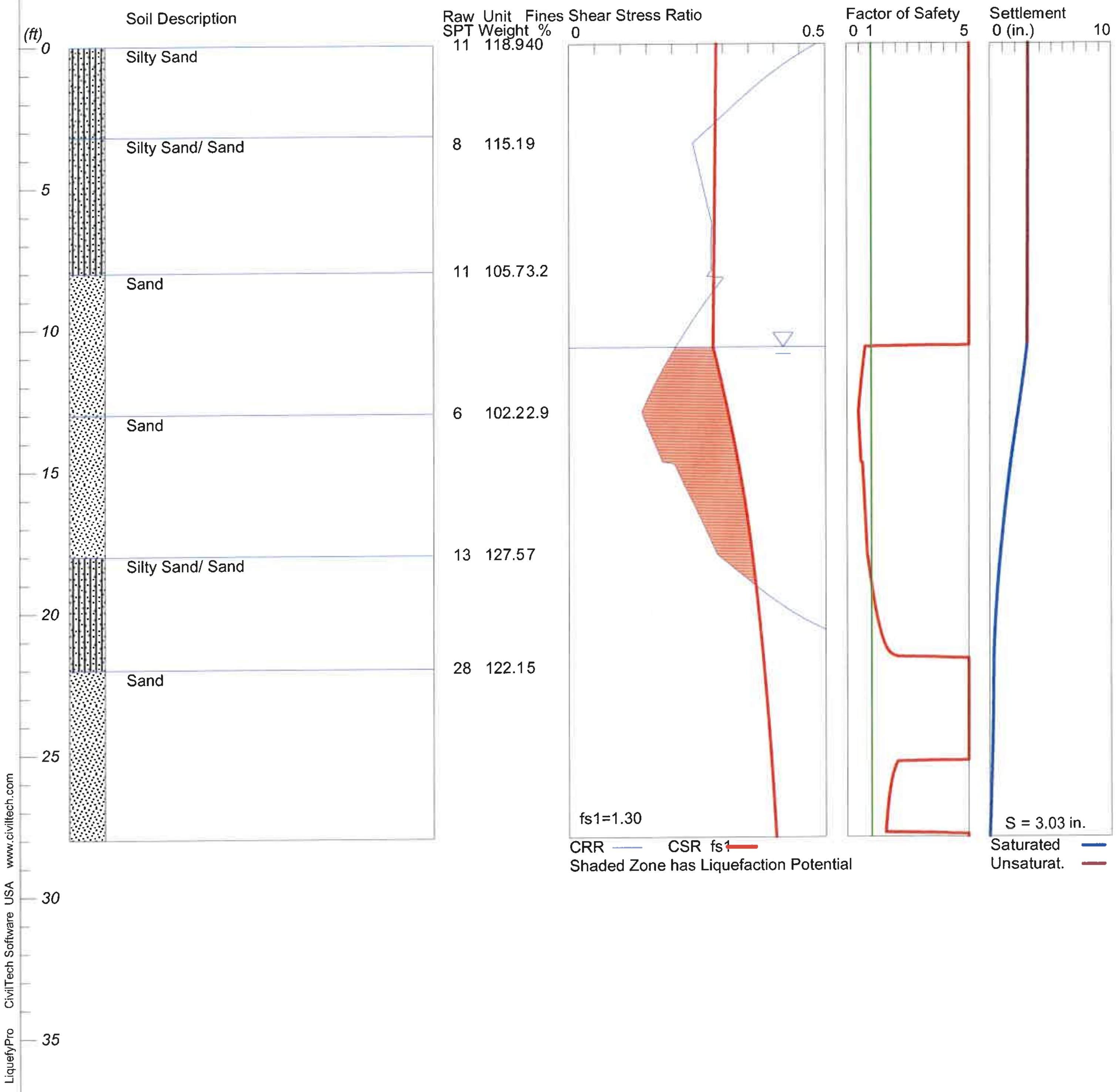
CivilTech Corporation **Porterville** **Plate A-1**

LIQUEFACTION ANALYSIS

Santa Fe Elementary

Hole No.=B2 Water Depth=10.7 ft

Magnitude=6.21
Acceleration=0.339g



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*******************************************************************
                                      LIQUEFACTION ANALYSIS SUMMARY
                                     Copyright by CivilTech Software
                                        www.civiltechsoftware.com
*******************************************************************
    Font: Courier New, Regular, Size 8 is recommended for this report.
    Licensed to krazan,     10/18/2023      2:52:20 PM
    Input File Name: H:\Liquefy5\01223164B2.liq
    Title:  Santa Fe Elementary
    Subtitle:  Porterville
    Hole No.=B2
    Depth of Hole= 28.00 ft
    Water Table during Earthquake= 10.70 ft
    Water Table during In-Situ Testing= 20.00 ft
    Max. Acceleration= 0.34 g
    Earthquake Magnitude= 6.21
Input Data:
    Surface Elev.=
    Hole No.=B2
    Depth of Hole=28.00 ft
    Water Table during Earthquake= 10.70 ft
    Water Table during In-Situ Testing= 20.00 ft
    Max. Acceleration=0.34 g
    Earthquake Magnitude=6.21
    No-Liquefiable Soils:   Based on Analysis

    1. SPT or BPT Calculation.
    2. Settlement Analysis Method: Tokimatsu/Seed
    3. Fines Correction for Liquefaction: Modify Stark/Olson
    4. Fine Correction for Settlement: During Liquefaction*
    5. Settlement Calculation in: All zones*
    6. Hammer Energy Ratio,                             Ce = 1.25
    7. Borehole Diameter,                                   Cb= 1
    8. Sampling Method,                                     Cs= 1
    9. User request factor of safety (apply to CSR) ,   User= 1.3
       Plot one CSR curve (fs1=User)
    10. Use Curve Smoothing: Yes*
    * Recommended Options

    In-Situ Test Data:
    Depth   SPT     gamma   Fines
    ft              pcf     %
    ____________________________________
    0.00    11.00   118.90  40.00
    3.50    8.00    115.10  9.00
    8.00    11.00   105.70  3.20
    13.00   6.00    102.20  2.90
    18.00   13.00   127.50  7.00
    22.00   28.00   122.10  5.00
    28.00   28.00   122.10  5.00
    ____________________________________

Output Results:
    Settlement of Saturated Sands=2.95 in.
    Settlement of Unsaturated Sands=0.08 in.
    Total Settlement of Saturated and Unsaturated Sands=3.03 in.
    Differential Settlement=1.513 to 1.998 in.
```

Depth ft	CRRm	CSRfs	F.S.	S_sat. in.	S_dry in.	S_all in.
0.00	0.48	0.29	5.00	2.95	0.08	3.03
0.05	0.48	0.29	5.00	2.95	0.08	3.03
0.10	0.47	0.29	5.00	2.95	0.08	3.03
0.15	0.47	0.29	5.00	2.95	0.08	3.03
0.20	0.46	0.29	5.00	2.95	0.08	3.03
0.25	0.46	0.29	5.00	2.95	0.08	3.03
0.30	0.46	0.29	5.00	2.95	0.08	3.03
0.35	0.45	0.29	5.00	2.95	0.08	3.03
0.40	0.45	0.29	5.00	2.95	0.08	3.03
0.45	0.44	0.29	5.00	2.95	0.08	3.03
0.50	0.44	0.29	5.00	2.95	0.08	3.03
0.55	0.43	0.29	5.00	2.95	0.08	3.03
0.60	0.43	0.29	5.00	2.95	0.08	3.03
0.65	0.43	0.29	5.00	2.95	0.08	3.03
0.70	0.42	0.29	5.00	2.95	0.08	3.03
0.75	0.42	0.29	5.00	2.95	0.08	3.03
0.80	0.41	0.29	5.00	2.95	0.08	3.03
0.85	0.41	0.29	5.00	2.95	0.08	3.03
0.90	0.41	0.29	5.00	2.95	0.08	3.03
0.95	0.40	0.29	5.00	2.95	0.08	3.03
1.00	0.40	0.29	5.00	2.95	0.08	3.03
1.05	0.39	0.29	5.00	2.95	0.08	3.03
1.10	0.39	0.29	5.00	2.95	0.08	3.03
1.15	0.39	0.29	5.00	2.95	0.08	3.03
1.20	0.38	0.29	5.00	2.95	0.08	3.03
1.25	0.38	0.29	5.00	2.95	0.08	3.03
1.30	0.38	0.29	5.00	2.95	0.08	3.03
1.35	0.37	0.29	5.00	2.95	0.08	3.03
1.40	0.37	0.29	5.00	2.95	0.08	3.03
1.45	0.37	0.29	5.00	2.95	0.08	3.03
1.50	0.36	0.29	5.00	2.95	0.08	3.03
1.55	0.36	0.29	5.00	2.95	0.08	3.03
1.60	0.36	0.29	5.00	2.95	0.08	3.02
1.65	0.35	0.29	5.00	2.95	0.08	3.02
1.70	0.35	0.29	5.00	2.95	0.07	3.02
1.75	0.35	0.29	5.00	2.95	0.07	3.02
1.80	0.34	0.29	5.00	2.95	0.07	3.02
1.85	0.34	0.29	5.00	2.95	0.07	3.02
1.90	0.34	0.29	5.00	2.95	0.07	3.02
1.95	0.33	0.29	5.00	2.95	0.07	3.02
2.00	0.33	0.29	5.00	2.95	0.07	3.02
2.05	0.33	0.29	5.00	2.95	0.07	3.02
2.10	0.33	0.29	5.00	2.95	0.07	3.02
2.15	0.32	0.29	5.00	2.95	0.07	3.02
2.20	0.32	0.28	5.00	2.95	0.07	3.02
2.25	0.32	0.28	5.00	2.95	0.07	3.02
2.30	0.31	0.28	5.00	2.95	0.07	3.02
2.35	0.31	0.28	5.00	2.95	0.07	3.02
2.40	0.31	0.28	5.00	2.95	0.07	3.02
2.45	0.30	0.28	5.00	2.95	0.07	3.02
2.50	0.30	0.28	5.00	2.95	0.07	3.02
2.55	0.30	0.28	5.00	2.95	0.07	3.02
2.60	0.29	0.28	5.00	2.95	0.07	3.02
2.65	0.29	0.28	5.00	2.95	0.07	3.02
2.70	0.29	0.28	5.00	2.95	0.07	3.02

2.75	0.29	0.28	5.00	2.95	0.07	3.02
2.80	0.28	0.28	5.00	2.95	0.07	3.02
2.85	0.28	0.28	5.00	2.95	0.07	3.02
2.90	0.28	0.28	5.00	2.95	0.07	3.02
2.95	0.27	0.28	5.00	2.95	0.07	3.02
3.00	0.27	0.28	5.00	2.95	0.07	3.02
3.05	0.27	0.28	5.00	2.95	0.07	3.02
3.10	0.26	0.28	5.00	2.95	0.07	3.02
3.15	0.26	0.28	5.00	2.95	0.07	3.02
3.20	0.26	0.28	5.00	2.95	0.07	3.02
3.25	0.26	0.28	5.00	2.95	0.07	3.02
3.30	0.25	0.28	5.00	2.95	0.07	3.02
3.35	0.25	0.28	5.00	2.95	0.07	3.02
3.40	0.25	0.28	5.00	2.95	0.07	3.02
3.45	0.24	0.28	5.00	2.95	0.07	3.02
3.50	0.24	0.28	5.00	2.95	0.07	3.02
3.55	0.24	0.28	5.00	2.95	0.07	3.02
3.60	0.24	0.28	5.00	2.95	0.07	3.02
3.65	0.24	0.28	5.00	2.95	0.07	3.02
3.70	0.24	0.28	5.00	2.95	0.07	3.01
3.75	0.24	0.28	5.00	2.95	0.06	3.01
3.80	0.24	0.28	5.00	2.95	0.06	3.01
3.85	0.25	0.28	5.00	2.95	0.06	3.01
3.90	0.25	0.28	5.00	2.95	0.06	3.01
3.95	0.25	0.28	5.00	2.95	0.06	3.01
4.00	0.25	0.28	5.00	2.95	0.06	3.01
4.05	0.25	0.28	5.00	2.95	0.06	3.01
4.10	0.25	0.28	5.00	2.95	0.06	3.01
4.15	0.25	0.28	5.00	2.95	0.06	3.01
4.20	0.25	0.28	5.00	2.95	0.06	3.01
4.25	0.25	0.28	5.00	2.95	0.06	3.01
4.30	0.25	0.28	5.00	2.95	0.06	3.01
4.35	0.25	0.28	5.00	2.95	0.06	3.01
4.40	0.25	0.28	5.00	2.95	0.06	3.01
4.45	0.25	0.28	5.00	2.95	0.06	3.01
4.50	0.25	0.28	5.00	2.95	0.06	3.01
4.55	0.25	0.28	5.00	2.95	0.06	3.01
4.60	0.25	0.28	5.00	2.95	0.06	3.01
4.65	0.26	0.28	5.00	2.95	0.06	3.01
4.70	0.26	0.28	5.00	2.95	0.06	3.01
4.75	0.26	0.28	5.00	2.95	0.06	3.01
4.80	0.26	0.28	5.00	2.95	0.06	3.01
4.85	0.26	0.28	5.00	2.95	0.06	3.01
4.90	0.26	0.28	5.00	2.95	0.06	3.01
4.95	0.26	0.28	5.00	2.95	0.06	3.01
5.00	0.26	0.28	5.00	2.95	0.06	3.01
5.05	0.26	0.28	5.00	2.95	0.06	3.01
5.10	0.26	0.28	5.00	2.95	0.06	3.00
5.15	0.26	0.28	5.00	2.95	0.05	3.00
5.20	0.26	0.28	5.00	2.95	0.05	3.00
5.25	0.26	0.28	5.00	2.95	0.05	3.00
5.30	0.26	0.28	5.00	2.95	0.05	3.00
5.35	0.26	0.28	5.00	2.95	0.05	3.00
5.40	0.27	0.28	5.00	2.95	0.05	3.00
5.45	0.27	0.28	5.00	2.95	0.05	3.00
5.50	0.27	0.28	5.00	2.95	0.05	3.00
5.55	0.27	0.28	5.00	2.95	0.05	3.00
5.60	0.27	0.28	5.00	2.95	0.05	3.00

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5.65    0.27    0.28    5.00    2.95    0.05    3.00
5.70    0.27    0.28    5.00    2.95    0.05    3.00
5.75    0.27    0.28    5.00    2.95    0.05    3.00
5.80    0.27    0.28    5.00    2.95    0.05    3.00
5.85    0.27    0.28    5.00    2.95    0.05    3.00
5.90    0.27    0.28    5.00    2.95    0.05    3.00
5.95    0.27    0.28    5.00    2.95    0.05    3.00
6.00    0.27    0.28    5.00    2.95    0.05    3.00
6.05    0.27    0.28    5.00    2.95    0.05    3.00
6.10    0.27    0.28    5.00    2.95    0.05    3.00
6.15    0.28    0.28    5.00    2.95    0.05    3.00
6.20    0.28    0.28    5.00    2.95    0.05    3.00
6.25    0.28    0.28    5.00    2.95    0.05    3.00
6.30    0.28    0.28    5.00    2.95    0.05    3.00
6.35    0.28    0.28    5.00    2.95    0.05    3.00
6.40    0.28    0.28    5.00    2.95    0.05    3.00
6.45    0.28    0.28    5.00    2.95    0.05    3.00
6.50    0.28    0.28    5.00    2.95    0.04    2.99
6.55    0.28    0.28    5.00    2.95    0.04    2.99
6.60    0.28    0.28    5.00    2.95    0.04    2.99
6.65    0.28    0.28    5.00    2.95    0.04    2.99
6.70    0.28    0.28    5.00    2.95    0.04    2.99
6.75    0.28    0.28    5.00    2.95    0.04    2.99
6.80    0.28    0.28    5.00    2.95    0.04    2.99
6.85    0.28    0.28    5.00    2.95    0.04    2.99
6.90    0.28    0.28    5.00    2.95    0.04    2.99
6.95    0.28    0.28    5.00    2.95    0.04    2.99
7.00    0.28    0.28    5.00    2.95    0.04    2.99
7.05    0.28    0.28    5.00    2.95    0.04    2.99
7.10    0.28    0.28    5.00    2.95    0.04    2.99
7.15    0.28    0.28    5.00    2.95    0.04    2.99
7.20    0.28    0.28    5.00    2.95    0.04    2.99
7.25    0.28    0.28    5.00    2.95    0.04    2.99
7.30    0.28    0.28    5.00    2.95    0.04    2.99
7.35    0.28    0.28    5.00    2.95    0.04    2.99
7.40    0.28    0.28    5.00    2.95    0.04    2.99
7.45    0.28    0.28    5.00    2.95    0.04    2.99
7.50    0.28    0.28    5.00    2.95    0.04    2.99
7.55    0.28    0.28    5.00    2.95    0.04    2.99
7.60    0.28    0.28    5.00    2.95    0.04    2.99
7.65    0.28    0.28    5.00    2.95    0.04    2.99
7.70    0.28    0.28    5.00    2.95    0.04    2.98
7.75    0.28    0.28    5.00    2.95    0.03    2.98
7.80    0.28    0.28    5.00    2.95    0.03    2.98
7.85    0.28    0.28    5.00    2.95    0.03    2.98
7.90    0.28    0.28    5.00    2.95    0.03    2.98
7.95    0.28    0.28    5.00    2.95    0.03    2.98
8.00    0.28    0.28    5.00    2.95    0.03    2.98
8.05    0.27    0.28    5.00    2.95    0.03    2.98
8.10    0.27    0.28    5.00    2.95    0.03    2.98
8.15    0.27    0.28    5.00    2.95    0.03    2.98
8.20    0.27    0.28    5.00    2.95    0.03    2.98
8.25    0.30    0.28    5.00    2.95    0.03    2.98
8.30    0.30    0.28    5.00    2.95    0.03    2.98
8.35    0.30    0.28    5.00    2.95    0.03    2.98
8.40    0.29    0.28    5.00    2.95    0.03    2.98
8.45    0.29    0.28    5.00    2.95    0.03    2.98
8.50    0.29    0.28    5.00    2.95    0.03    2.98
```

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8.55     0.29     0.28     5.00     2.95     0.03     2.98
8.60     0.29     0.28     5.00     2.95     0.03     2.98
8.65     0.28     0.28     5.00     2.95     0.03     2.98
8.70     0.28     0.28     5.00     2.95     0.03     2.98
8.75     0.28     0.28     5.00     2.95     0.03     2.98
8.80     0.28     0.28     5.00     2.95     0.03     2.98
8.85     0.28     0.28     5.00     2.95     0.03     2.98
8.90     0.27     0.28     5.00     2.95     0.02     2.97
8.95     0.27     0.28     5.00     2.95     0.02     2.97
9.00     0.27     0.28     5.00     2.95     0.02     2.97
9.05     0.27     0.28     5.00     2.95     0.02     2.97
9.10     0.27     0.28     5.00     2.95     0.02     2.97
9.15     0.26     0.28     5.00     2.95     0.02     2.97
9.20     0.26     0.28     5.00     2.95     0.02     2.97
9.25     0.26     0.28     5.00     2.95     0.02     2.97
9.30     0.26     0.28     5.00     2.95     0.02     2.97
9.35     0.26     0.28     5.00     2.95     0.02     2.97
9.40     0.25     0.28     5.00     2.95     0.02     2.97
9.45     0.25     0.28     5.00     2.95     0.02     2.97
9.50     0.25     0.28     5.00     2.95     0.02     2.97
9.55     0.25     0.28     5.00     2.95     0.02     2.97
9.60     0.25     0.28     5.00     2.95     0.02     2.97
9.65     0.24     0.28     5.00     2.95     0.02     2.97
9.70     0.24     0.28     5.00     2.95     0.02     2.97
9.75     0.24     0.28     5.00     2.95     0.02     2.96
9.80     0.24     0.28     5.00     2.95     0.01     2.96
9.85     0.24     0.28     5.00     2.95     0.01     2.96
9.90     0.23     0.28     5.00     2.95     0.01     2.96
9.95     0.23     0.28     5.00     2.95     0.01     2.96
10.00    0.23     0.28     5.00     2.95     0.01     2.96
10.05    0.23     0.28     5.00     2.95     0.01     2.96
10.10    0.23     0.28     5.00     2.95     0.01     2.96
10.15    0.23     0.28     5.00     2.95     0.01     2.96
10.20    0.22     0.28     5.00     2.95     0.01     2.96
10.25    0.22     0.28     5.00     2.95     0.01     2.96
10.30    0.22     0.28     5.00     2.95     0.01     2.96
10.35    0.22     0.28     5.00     2.95     0.01     2.96
10.40    0.22     0.28     5.00     2.95     0.00     2.95
10.45    0.21     0.28     5.00     2.95     0.00     2.95
10.50    0.21     0.28     5.00     2.95     0.00     2.95
10.55    0.21     0.28     5.00     2.95     0.00     2.95
10.60    0.21     0.28     5.00     2.95     0.00     2.95
10.65    0.21     0.28     5.00     2.95     0.00     2.95
10.70    0.21     0.28     0.74*    2.95     0.00     2.95
10.75    0.20     0.28     0.73*    2.94     0.00     2.94
10.80    0.20     0.28     0.72*    2.92     0.00     2.92
10.85    0.20     0.28     0.72*    2.91     0.00     2.91
10.90    0.20     0.28     0.71*    2.89     0.00     2.89
10.95    0.20     0.28     0.70*    2.88     0.00     2.88
11.00    0.20     0.28     0.69*    2.87     0.00     2.87
11.05    0.19     0.28     0.69*    2.85     0.00     2.85
11.10    0.19     0.28     0.68*    2.84     0.00     2.84
11.15    0.19     0.29     0.67*    2.82     0.00     2.82
11.20    0.19     0.29     0.66*    2.81     0.00     2.81
11.25    0.19     0.29     0.66*    2.79     0.00     2.79
11.30    0.19     0.29     0.65*    2.78     0.00     2.78
11.35    0.19     0.29     0.64*    2.76     0.00     2.76
11.40    0.18     0.29     0.64*    2.75     0.00     2.75
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11.45    0.18    0.29    0.63*   2.73    0.00    2.73
11.50    0.18    0.29    0.62*   2.72    0.00    2.72
11.55    0.18    0.29    0.62*   2.70    0.00    2.70
11.60    0.18    0.29    0.61*   2.69    0.00    2.69
11.65    0.18    0.29    0.60*   2.67    0.00    2.67
11.70    0.17    0.29    0.60*   2.66    0.00    2.66
11.75    0.17    0.29    0.59*   2.64    0.00    2.64
11.80    0.17    0.29    0.58*   2.63    0.00    2.63
11.85    0.17    0.29    0.58*   2.61    0.00    2.61
11.90    0.17    0.30    0.57*   2.60    0.00    2.60
11.95    0.17    0.30    0.57*   2.58    0.00    2.58
12.00    0.17    0.30    0.56*   2.56    0.00    2.56
12.05    0.16    0.30    0.55*   2.55    0.00    2.55
12.10    0.16    0.30    0.55*   2.53    0.00    2.53
12.15    0.16    0.30    0.54*   2.52    0.00    2.52
12.20    0.16    0.30    0.54*   2.50    0.00    2.50
12.25    0.16    0.30    0.53*   2.48    0.00    2.48
12.30    0.16    0.30    0.52*   2.47    0.00    2.47
12.35    0.16    0.30    0.52*   2.45    0.00    2.45
12.40    0.16    0.30    0.51*   2.43    0.00    2.43
12.45    0.15    0.30    0.51*   2.42    0.00    2.42
12.50    0.15    0.30    0.50*   2.40    0.00    2.40
12.55    0.15    0.30    0.50*   2.38    0.00    2.38
12.60    0.15    0.30    0.49*   2.37    0.00    2.37
12.65    0.15    0.30    0.49*   2.35    0.00    2.35
12.70    0.15    0.31    0.48*   2.33    0.00    2.33
12.75    0.15    0.31    0.48*   2.32    0.00    2.32
12.80    0.14    0.31    0.47*   2.30    0.00    2.30
12.85    0.14    0.31    0.47*   2.28    0.00    2.28
12.90    0.14    0.31    0.46*   2.26    0.00    2.26
12.95    0.14    0.31    0.46*   2.25    0.00    2.25
13.00    0.14    0.31    0.45*   2.23    0.00    2.23
13.05    0.14    0.31    0.46*   2.21    0.00    2.21
13.10    0.14    0.31    0.46*   2.19    0.00    2.19
13.15    0.14    0.31    0.46*   2.18    0.00    2.18
13.20    0.14    0.31    0.47*   2.16    0.00    2.16
13.25    0.15    0.31    0.47*   2.14    0.00    2.14
13.30    0.15    0.31    0.47*   2.12    0.00    2.12
13.35    0.15    0.31    0.47*   2.11    0.00    2.11
13.40    0.15    0.31    0.48*   2.09    0.00    2.09
13.45    0.15    0.31    0.48*   2.07    0.00    2.07
13.50    0.15    0.31    0.48*   2.05    0.00    2.05
13.55    0.15    0.32    0.48*   2.04    0.00    2.04
13.60    0.15    0.32    0.49*   2.02    0.00    2.02
13.65    0.16    0.32    0.49*   2.00    0.00    2.00
13.70    0.16    0.32    0.49*   1.99    0.00    1.99
13.75    0.16    0.32    0.50*   1.97    0.00    1.97
13.80    0.16    0.32    0.50*   1.95    0.00    1.95
13.85    0.16    0.32    0.50*   1.94    0.00    1.94
13.90    0.16    0.32    0.50*   1.92    0.00    1.92
13.95    0.16    0.32    0.51*   1.91    0.00    1.91
14.00    0.16    0.32    0.51*   1.89    0.00    1.89
14.05    0.16    0.32    0.51*   1.87    0.00    1.87
14.10    0.17    0.32    0.52*   1.86    0.00    1.86
14.15    0.17    0.32    0.52*   1.84    0.00    1.84
14.20    0.17    0.32    0.52*   1.83    0.00    1.83
14.25    0.17    0.32    0.52*   1.81    0.00    1.81
14.30    0.17    0.32    0.53*   1.79    0.00    1.79
```

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14.35   0.17   0.32   0.53*  1.78   0.00   1.78
14.40   0.17   0.32   0.53*  1.76   0.00   1.76
14.45   0.17   0.32   0.53*  1.75   0.00   1.75
14.50   0.17   0.33   0.54*  1.73   0.00   1.73
14.55   0.18   0.33   0.54*  1.72   0.00   1.72
14.60   0.18   0.33   0.54*  1.70   0.00   1.70
14.65   0.18   0.33   0.55*  1.69   0.00   1.69
14.70   0.18   0.33   0.55*  1.67   0.00   1.67
14.75   0.18   0.33   0.55*  1.66   0.00   1.66
14.80   0.20   0.33   0.62*  1.64   0.00   1.64
14.85   0.20   0.33   0.62*  1.63   0.00   1.63
14.90   0.21   0.33   0.62*  1.61   0.00   1.61
14.95   0.21   0.33   0.63*  1.60   0.00   1.60
15.00   0.21   0.33   0.63*  1.59   0.00   1.59
15.05   0.21   0.33   0.63*  1.57   0.00   1.57
15.10   0.21   0.33   0.64*  1.56   0.00   1.56
15.15   0.21   0.33   0.64*  1.54   0.00   1.54
15.20   0.21   0.33   0.64*  1.53   0.00   1.53
15.25   0.21   0.33   0.64*  1.52   0.00   1.52
15.30   0.22   0.33   0.65*  1.50   0.00   1.50
15.35   0.22   0.33   0.65*  1.49   0.00   1.49
15.40   0.22   0.33   0.65*  1.48   0.00   1.48
15.45   0.22   0.33   0.66*  1.46   0.00   1.46
15.50   0.22   0.34   0.66*  1.45   0.00   1.45
15.55   0.22   0.34   0.66*  1.44   0.00   1.44
15.60   0.22   0.34   0.67*  1.42   0.00   1.42
15.65   0.23   0.34   0.67*  1.41   0.00   1.41
15.70   0.23   0.34   0.67*  1.40   0.00   1.40
15.75   0.23   0.34   0.68*  1.39   0.00   1.39
15.80   0.23   0.34   0.68*  1.37   0.00   1.37
15.85   0.23   0.34   0.68*  1.36   0.00   1.36
15.90   0.23   0.34   0.68*  1.35   0.00   1.35
15.95   0.23   0.34   0.69*  1.33   0.00   1.33
16.00   0.23   0.34   0.69*  1.32   0.00   1.32
16.05   0.24   0.34   0.69*  1.31   0.00   1.31
16.10   0.24   0.34   0.70*  1.30   0.00   1.30
16.15   0.24   0.34   0.70*  1.28   0.00   1.28
16.20   0.24   0.34   0.70*  1.27   0.00   1.27
16.25   0.24   0.34   0.71*  1.26   0.00   1.26
16.30   0.24   0.34   0.71*  1.25   0.00   1.25
16.35   0.24   0.34   0.71*  1.23   0.00   1.23
16.40   0.25   0.34   0.72*  1.22   0.00   1.22
16.45   0.25   0.34   0.72*  1.21   0.00   1.21
16.50   0.25   0.34   0.72*  1.20   0.00   1.20
16.55   0.25   0.34   0.72*  1.19   0.00   1.19
16.60   0.25   0.34   0.73*  1.17   0.00   1.17
16.65   0.25   0.35   0.73*  1.16   0.00   1.16
16.70   0.25   0.35   0.73*  1.15   0.00   1.15
16.75   0.25   0.35   0.74*  1.14   0.00   1.14
16.80   0.26   0.35   0.74*  1.13   0.00   1.13
16.85   0.26   0.35   0.74*  1.11   0.00   1.11
16.90   0.26   0.35   0.75*  1.10   0.00   1.10
16.95   0.26   0.35   0.75*  1.09   0.00   1.09
17.00   0.26   0.35   0.75*  1.08   0.00   1.08
17.05   0.26   0.35   0.75*  1.07   0.00   1.07
17.10   0.26   0.35   0.76*  1.06   0.00   1.06
17.15   0.27   0.35   0.76*  1.04   0.00   1.04
17.20   0.27   0.35   0.76*  1.03   0.00   1.03
```

17.25	0.27	0.35	0.77*	1.02	0.00	1.02
17.30	0.27	0.35	0.77*	1.01	0.00	1.01
17.35	0.27	0.35	0.77*	1.00	0.00	1.00
17.40	0.27	0.35	0.77*	0.99	0.00	0.99
17.45	0.27	0.35	0.78*	0.98	0.00	0.98
17.50	0.27	0.35	0.78*	0.97	0.00	0.97
17.55	0.28	0.35	0.78*	0.95	0.00	0.95
17.60	0.28	0.35	0.78*	0.94	0.00	0.94
17.65	0.28	0.35	0.79*	0.93	0.00	0.93
17.70	0.28	0.35	0.79*	0.92	0.00	0.92
17.75	0.28	0.35	0.79*	0.91	0.00	0.91
17.80	0.28	0.35	0.80*	0.90	0.00	0.90
17.85	0.28	0.35	0.80*	0.89	0.00	0.89
17.90	0.28	0.35	0.80*	0.88	0.00	0.88
17.95	0.29	0.36	0.80*	0.87	0.00	0.87
18.00	0.29	0.36	0.81*	0.86	0.00	0.86
18.05	0.29	0.36	0.81*	0.84	0.00	0.84
18.10	0.29	0.36	0.82*	0.83	0.00	0.83
18.15	0.30	0.36	0.83*	0.82	0.00	0.82
18.20	0.30	0.36	0.84*	0.81	0.00	0.81
18.25	0.30	0.36	0.85*	0.80	0.00	0.80
18.30	0.31	0.36	0.86*	0.79	0.00	0.79
18.35	0.31	0.36	0.87*	0.78	0.00	0.78
18.40	0.31	0.36	0.88*	0.77	0.00	0.77
18.45	0.32	0.36	0.88*	0.76	0.00	0.76
18.50	0.32	0.36	0.89*	0.75	0.00	0.75
18.55	0.32	0.36	0.90*	0.74	0.00	0.74
18.60	0.33	0.36	0.91*	0.73	0.00	0.73
18.65	0.33	0.36	0.92*	0.72	0.00	0.72
18.70	0.33	0.36	0.93*	0.71	0.00	0.71
18.75	0.34	0.36	0.94*	0.70	0.00	0.70
18.80	0.34	0.36	0.94*	0.70	0.00	0.70
18.85	0.34	0.36	0.95*	0.69	0.00	0.69
18.90	0.35	0.36	0.96*	0.68	0.00	0.68
18.95	0.35	0.36	0.97*	0.67	0.00	0.67
19.00	0.35	0.36	0.98*	0.66	0.00	0.66
19.05	0.36	0.36	0.99*	0.65	0.00	0.65
19.10	0.36	0.36	1.00*	0.64	0.00	0.64
19.15	0.36	0.36	1.01	0.63	0.00	0.63
19.20	0.37	0.36	1.01	0.63	0.00	0.63
19.25	0.37	0.36	1.02	0.62	0.00	0.62
19.30	0.38	0.36	1.03	0.61	0.00	0.61
19.35	0.38	0.36	1.04	0.60	0.00	0.60
19.40	0.38	0.36	1.05	0.59	0.00	0.59
19.45	0.39	0.36	1.06	0.58	0.00	0.58
19.50	0.39	0.36	1.07	0.58	0.00	0.58
19.55	0.39	0.37	1.08	0.57	0.00	0.57
19.60	0.40	0.37	1.09	0.56	0.00	0.56
19.65	0.40	0.37	1.10	0.55	0.00	0.55
19.70	0.41	0.37	1.11	0.54	0.00	0.54
19.75	0.41	0.37	1.12	0.54	0.00	0.54
19.80	0.41	0.37	1.13	0.53	0.00	0.53
19.85	0.42	0.37	1.14	0.52	0.00	0.52
19.90	0.42	0.37	1.15	0.51	0.00	0.51
19.95	0.43	0.37	1.16	0.51	0.00	0.51
20.00	0.43	0.37	1.17	0.50	0.00	0.50
20.05	0.43	0.37	1.18	0.49	0.00	0.49
20.10	0.44	0.37	1.19	0.49	0.00	0.49

20.15	0.44	0.37	1.20	0.48	0.00	0.48
20.20	0.45	0.37	1.21	0.47	0.00	0.47
20.25	0.45	0.37	1.23	0.46	0.00	0.46
20.30	0.46	0.37	1.24	0.46	0.00	0.46
20.35	0.46	0.37	1.25	0.45	0.00	0.45
20.40	0.47	0.37	1.26	0.44	0.00	0.44
20.45	0.47	0.37	1.28	0.44	0.00	0.44
20.50	0.48	0.37	1.29	0.43	0.00	0.43
20.55	0.48	0.37	1.30	0.42	0.00	0.42
20.60	0.49	0.37	1.32	0.42	0.00	0.42
20.65	0.50	0.37	1.33	0.41	0.00	0.41
20.70	0.50	0.37	1.35	0.41	0.00	0.41
20.75	0.51	0.37	1.36	0.40	0.00	0.40
20.80	0.51	0.37	1.38	0.39	0.00	0.39
20.85	0.52	0.37	1.40	0.39	0.00	0.39
20.90	0.53	0.37	1.41	0.38	0.00	0.38
20.95	0.53	0.37	1.43	0.38	0.00	0.38
21.00	0.54	0.37	1.45	0.37	0.00	0.37
21.05	0.55	0.37	1.47	0.37	0.00	0.37
21.10	0.56	0.37	1.49	0.36	0.00	0.36
21.15	0.56	0.37	1.51	0.36	0.00	0.36
21.20	0.57	0.37	1.53	0.35	0.00	0.35
21.25	0.58	0.37	1.56	0.35	0.00	0.35
21.30	0.59	0.37	1.58	0.34	0.00	0.34
21.35	0.60	0.38	1.61	0.34	0.00	0.34
21.40	0.62	0.38	1.64	0.34	0.00	0.34
21.45	0.63	0.38	1.68	0.33	0.00	0.33
21.50	0.65	0.38	1.73	0.33	0.00	0.33
21.55	0.67	0.38	1.79	0.33	0.00	0.33
21.60	0.71	0.38	1.88	0.32	0.00	0.32
21.65	0.78	0.38	2.06	0.32	0.00	0.32
21.70	3.24	0.38	5.00	0.32	0.00	0.32
21.75	3.24	0.38	5.00	0.32	0.00	0.32
21.80	3.24	0.38	5.00	0.32	0.00	0.32
21.85	3.24	0.38	5.00	0.31	0.00	0.31
21.90	3.24	0.38	5.00	0.31	0.00	0.31
21.95	3.24	0.38	5.00	0.31	0.00	0.31
22.00	3.24	0.38	5.00	0.31	0.00	0.31
22.05	3.24	0.38	5.00	0.31	0.00	0.31
22.10	3.24	0.38	5.00	0.31	0.00	0.31
22.15	3.24	0.38	5.00	0.31	0.00	0.31
22.20	3.24	0.38	5.00	0.31	0.00	0.31
22.25	3.24	0.38	5.00	0.31	0.00	0.31
22.30	3.24	0.38	5.00	0.31	0.00	0.31
22.35	3.24	0.38	5.00	0.30	0.00	0.30
22.40	3.24	0.38	5.00	0.30	0.00	0.30
22.45	3.24	0.38	5.00	0.30	0.00	0.30
22.50	3.24	0.38	5.00	0.30	0.00	0.30
22.55	3.24	0.38	5.00	0.30	0.00	0.30
22.60	3.24	0.38	5.00	0.30	0.00	0.30
22.65	3.24	0.38	5.00	0.30	0.00	0.30
22.70	3.24	0.38	5.00	0.30	0.00	0.30
22.75	3.24	0.38	5.00	0.30	0.00	0.30
22.80	3.24	0.38	5.00	0.29	0.00	0.29
22.85	3.24	0.38	5.00	0.29	0.00	0.29
22.90	3.24	0.38	5.00	0.29	0.00	0.29
22.95	3.24	0.38	5.00	0.29	0.00	0.29
23.00	3.24	0.38	5.00	0.29	0.00	0.29

23.05	3.24	0.38	5.00	0.29	0.00	0.29
23.10	3.24	0.38	5.00	0.29	0.00	0.29
23.15	3.24	0.38	5.00	0.29	0.00	0.29
23.20	3.24	0.38	5.00	0.28	0.00	0.28
23.25	3.24	0.38	5.00	0.28	0.00	0.28
23.30	3.24	0.38	5.00	0.28	0.00	0.28
23.35	3.24	0.38	5.00	0.28	0.00	0.28
23.40	3.24	0.39	5.00	0.28	0.00	0.28
23.45	3.24	0.39	5.00	0.28	0.00	0.28
23.50	3.24	0.39	5.00	0.28	0.00	0.28
23.55	3.24	0.39	5.00	0.28	0.00	0.28
23.60	3.24	0.39	5.00	0.27	0.00	0.27
23.65	3.24	0.39	5.00	0.27	0.00	0.27
23.70	3.24	0.39	5.00	0.27	0.00	0.27
23.75	3.24	0.39	5.00	0.27	0.00	0.27
23.80	3.24	0.39	5.00	0.27	0.00	0.27
23.85	3.24	0.39	5.00	0.27	0.00	0.27
23.90	3.24	0.39	5.00	0.26	0.00	0.26
23.95	3.24	0.39	5.00	0.26	0.00	0.26
24.00	3.24	0.39	5.00	0.26	0.00	0.26
24.05	3.24	0.39	5.00	0.26	0.00	0.26
24.10	3.24	0.39	5.00	0.26	0.00	0.26
24.15	3.24	0.39	5.00	0.25	0.00	0.25
24.20	3.24	0.39	5.00	0.25	0.00	0.25
24.25	3.24	0.39	5.00	0.25	0.00	0.25
24.30	3.24	0.39	5.00	0.25	0.00	0.25
24.35	3.24	0.39	5.00	0.24	0.00	0.24
24.40	3.24	0.39	5.00	0.24	0.00	0.24
24.45	3.24	0.39	5.00	0.24	0.00	0.24
24.50	3.24	0.39	5.00	0.24	0.00	0.24
24.55	3.24	0.39	5.00	0.24	0.00	0.24
24.60	3.24	0.39	5.00	0.23	0.00	0.23
24.65	3.24	0.39	5.00	0.23	0.00	0.23
24.70	3.24	0.39	5.00	0.23	0.00	0.23
24.75	3.24	0.39	5.00	0.23	0.00	0.23
24.80	3.24	0.39	5.00	0.22	0.00	0.22
24.85	3.24	0.39	5.00	0.22	0.00	0.22
24.90	3.24	0.39	5.00	0.22	0.00	0.22
24.95	3.24	0.39	5.00	0.21	0.00	0.21
25.00	3.24	0.39	5.00	0.21	0.00	0.21
25.05	3.24	0.39	5.00	0.21	0.00	0.21
25.10	3.24	0.39	5.00	0.21	0.00	0.21
25.15	3.24	0.39	5.00	0.20	0.00	0.20
25.20	3.24	0.39	5.00	0.20	0.00	0.20
25.25	3.24	0.39	5.00	0.20	0.00	0.20
25.30	3.24	0.39	5.00	0.19	0.00	0.19
25.35	0.81	0.39	2.06	0.19	0.00	0.19
25.40	0.80	0.39	2.02	0.19	0.00	0.19
25.45	0.79	0.39	2.00	0.18	0.00	0.18
25.50	0.78	0.39	1.97	0.18	0.00	0.18
25.55	0.77	0.39	1.95	0.18	0.00	0.18
25.60	0.76	0.39	1.93	0.17	0.00	0.17
25.65	0.75	0.39	1.91	0.17	0.00	0.17
25.70	0.75	0.39	1.89	0.17	0.00	0.17
25.75	0.74	0.39	1.87	0.16	0.00	0.16
25.80	0.73	0.39	1.86	0.16	0.00	0.16
25.85	0.73	0.39	1.84	0.16	0.00	0.16
25.90	0.72	0.40	1.83	0.15	0.00	0.15

```
        25.95   0.72    0.40    1.82    0.15    0.00    0.15
        26.00   0.71    0.40    1.80    0.15    0.00    0.15
        26.05   0.71    0.40    1.79    0.14    0.00    0.14
        26.10   0.71    0.40    1.78    0.14    0.00    0.14
        26.15   0.70    0.40    1.77    0.14    0.00    0.14
        26.20   0.70    0.40    1.76    0.13    0.00    0.13
        26.25   0.69    0.40    1.75    0.13    0.00    0.13
        26.30   0.69    0.40    1.74    0.13    0.00    0.13
        26.35   0.69    0.40    1.73    0.12    0.00    0.12
        26.40   0.68    0.40    1.73    0.12    0.00    0.12
        26.45   0.68    0.40    1.72    0.12    0.00    0.12
        26.50   0.68    0.40    1.71    0.11    0.00    0.11
        26.55   0.68    0.40    1.70    0.11    0.00    0.11
        26.60   0.67    0.40    1.70    0.11    0.00    0.11
        26.65   0.67    0.40    1.69    0.10    0.00    0.10
        26.70   0.67    0.40    1.68    0.10    0.00    0.10
        26.75   0.67    0.40    1.68    0.09    0.00    0.09
        26.80   0.66    0.40    1.67    0.09    0.00    0.09
        26.85   0.66    0.40    1.66    0.09    0.00    0.09
        26.90   0.66    0.40    1.66    0.08    0.00    0.08
        26.95   0.66    0.40    1.65    0.08    0.00    0.08
        27.00   0.66    0.40    1.65    0.08    0.00    0.08
        27.05   0.65    0.40    1.64    0.07    0.00    0.07
        27.10   0.65    0.40    1.63    0.07    0.00    0.07
        27.15   0.65    0.40    1.63    0.06    0.00    0.06
        27.20   0.65    0.40    1.62    0.06    0.00    0.06
        27.25   0.65    0.40    1.62    0.06    0.00    0.06
        27.30   0.65    0.40    1.61    0.05    0.00    0.05
        27.35   0.64    0.40    1.61    0.05    0.00    0.05
        27.40   0.64    0.40    1.60    0.05    0.00    0.05
        27.45   0.64    0.40    1.60    0.04    0.00    0.04
        27.50   0.64    0.40    1.60    0.04    0.00    0.04
        27.55   0.64    0.40    1.59    0.03    0.00    0.03
        27.60   0.64    0.40    1.59    0.03    0.00    0.03
        27.65   0.63    0.40    1.58    0.03    0.00    0.03
        27.70   0.63    0.40    1.58    0.02    0.00    0.02
        27.75   0.63    0.40    1.57    0.02    0.00    0.02
        27.80   0.63    0.40    1.57    0.01    0.00    0.01
        27.85   0.63    0.40    1.57    0.01    0.00    0.01
        27.90   3.24    0.40    5.00    0.00    0.00    0.00
        27.95   3.24    0.40    5.00    0.00    0.00    0.00
        28.00   3.24    0.40    5.00    0.00    0.00    0.00
        -------------------------------------------------------
        * F.S.<1, Liquefaction Potential Zone
        (F.S. is limited to 5,  CRR is limited to 2,   CSR is limited to 2)

        Units:  Unit: qc, fs, Stress or Pressure = atm (1.0581tsf); Unit Weight = pcf;
Depth = ft; Settlement = in.


------------------------------------------------------------------------------------
        1 atm (atmosphere) = 1 tsf (ton/ft2)
        CRRm            Cyclic resistance ratio from soils
        CSRsf           Cyclic stress ratio induced by a given earthquake (with user
request factor of safety)
        F.S.            Factor of Safety against liquefaction, F.S.=CRRm/CSRsf
        S_sat           Settlement from saturated sands
        S_dry           Settlement from Unsaturated Sands
        S_all           Total Settlement from Saturated and Unsaturated Sands
```

NoLiq	No-Liquefy Soils

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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: 01223164
                                                    DATE: 10-24-2023

JOB NAME: 01223164

EARTHQUAKE-CATALOG-FILE NAME: ALLQUAKE.DAT


MAGNITUDE RANGE:
   MINIMUM MAGNITUDE:  4.00
   MAXIMUM MAGNITUDE:  9.00

SITE COORDINATES:
   SITE LATITUDE:  36.0611
   SITE LONGITUDE:  119.0100

SEARCH DATES:
           START DATE:   1800
           END DATE:   2021

SEARCH RADIUS:
           50.0 mi
           80.5 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
-------------------------------------------------------------------------------
    |       |        |          |  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 |36.0900|118.8700|02/11/1948|  32928.3|  11.7|  4.60| 0.103 | VII|  8.1( 13.0)
DMG |36.0800|118.8300|05/29/1915|  830 0.0|   0.0|  4.50| 0.083 | VII| 10.1( 16.3)
DMG |36.0800|118.8200|05/29/1915|  646 0.0|   0.0|  5.00| 0.105 | VII| 10.7( 17.2)
T-A |36.1700|119.3200|07/25/1868|  230 0.0|   0.0|  5.00| 0.069 | VI | 18.9( 30.3)
DMG |35.8000|118.5330|07/26/1932|  65158.3|   0.0|  4.50| 0.035 |  V | 32.2( 51.8)
PAS |35.7550|118.5420|04/17/1975|  91833.8|   9.6|  4.00| 0.026 |  V | 33.6( 54.1)
GSG |35.9280|118.4280|07/13/1992|095305.9|   5.0|  4.00| 0.026 |  V | 33.8( 54.4)
DMG |35.6000|118.8000|06/30/1926|1331 0.0|   0.0|  5.00| 0.044 | VI | 33.9( 54.6)
GSB |35.9960|118.3690|09/06/1993|103233.0|   9.0|  4.00| 0.025 |  V | 36.1( 58.0)
DMG |36.2000|118.3830|05/18/1945|  94440.0|   0.0|  4.00| 0.025 |  V | 36.3( 58.3)
GSP |35.7310|118.4790|07/11/1999|182046.8|   4.0|  4.40| 0.030 |  V | 37.4( 60.2)
PAS |35.9300|118.3410|10/19/1983|14 037.2|   1.5|  4.00| 0.024 | IV | 38.4( 61.9)
DMG |35.5000|118.9670|09/29/1948| 4 648.0|   0.0|  4.20| 0.026 |  V | 38.8( 62.5)
PAS |35.9260|118.3340|10/21/1983|224413.3|   0.0|  4.50| 0.030 |  V | 38.9( 62.6)
DMG |35.7500|119.6170|04/15/1950|115632.0|   0.0|  4.60| 0.031 |  V | 40.2( 64.6)
GSP |35.5423|119.3728|02/24/2016|000223.6|  22.1|  4.87| 0.035 |  V | 41.2( 66.3)
DMG |36.2600|118.3100|10/03/1969|233227.1|   0.2|  4.00| 0.022 | IV | 41.4( 66.6)
GSP |35.6800|118.4300|11/11/1991|045327.0|   4.0|  4.00| 0.022 | IV | 41.8( 67.2)
DMG |35.5000|118.7000|01/06/1905|1430 0.0|   0.0|  5.00| 0.037 |  V | 42.5( 68.3)
DMG |36.6020|119.3750|09/15/1973| 1 315.4|   8.0|  4.40| 0.027 |  V | 42.5( 68.4)
PAS |35.4520|118.8990|02/08/1985|  65816.9|  11.1|  4.60| 0.030 |  V | 42.5( 68.4)
DMG |35.6670|118.4040|03/08/1971|23 8 7.7|   5.9|  4.10| 0.023 | IV | 43.5( 70.0)
DMG |35.4500|119.2500|01/23/1935|1352 0.0|   0.0|  4.00| 0.021 | IV | 44.3( 71.3)
DMG |35.6590|118.3780|03/03/1971|12 516.0|   4.1|  4.00| 0.021 | IV | 45.0( 72.3)
DMG |35.4650|118.6680|02/07/1964|221052.0|  -0.5|  4.20| 0.023 | IV | 45.4( 73.1)
DMG |35.4330|118.7000|05/01/1954|22 439.0|   0.0|  4.20| 0.023 | IV | 46.7( 75.2)
DMG |35.4000|118.8170|07/29/1952| 8 146.0|   0.0|  5.10| 0.036 |  V | 46.9( 75.5)
DMG |35.6470|118.3450|06/05/1946|215932.4|   0.0|  4.30| 0.024 | IV | 46.9( 75.5)
DMG |36.0000|118.1670|02/26/1933|  655 0.0|   0.0|  4.00| 0.020 | IV | 47.3( 76.0)
DMG |35.4170|119.3000|06/04/1941|  84719.0|   0.0|  4.00| 0.020 | IV | 47.3( 76.2)
GSB |35.8113|119.8008|12/13/2013|074957.4|  22.2|  4.10| 0.021 | IV | 47.4( 76.4)
DMG |35.4320|118.6640|09/30/1964|175125.8|   7.4|  4.00| 0.020 | IV | 47.6( 76.5)
DMG |35.4540|118.6050|02/07/1964|22 750.3|  -2.0|  4.40| 0.025 |  V | 47.7( 76.7)
DMG |35.3830|118.8500|07/29/1952| 7 347.0|   0.0|  6.10| 0.061 | VI | 47.7( 76.7)
DMG |35.3830|118.8500|10/13/1952|222035.0|   0.0|  4.00| 0.020 | IV | 47.7( 76.7)
DMG |35.5000|118.5000|07/27/1952|  24912.0|   0.0|  4.00| 0.020 | IV | 48.1( 77.5)
DMG |35.3670|118.8830|09/12/1953|  64116.0|   0.0|  4.10| 0.021 | IV | 48.4( 78.0)
GSP |35.3700|118.8500|12/18/1990|165643.0|   6.0|  4.20| 0.022 | IV | 48.5( 78.1)
DMG |35.7890|118.2040|04/16/1946|1037 4.7|   0.0|  4.10| 0.021 | IV | 48.8( 78.6)
DMG |35.3670|118.8330|03/17/1935|2026 0.0|   0.0|  4.00| 0.020 | IV | 48.9( 78.8)
DMG |35.7330|118.2330|07/10/1943|  31233.0|   0.0|  4.00| 0.020 | IV | 49.0( 78.9)
DMG |35.6870|118.2630|05/03/1936|1421 1.8|  10.0|  4.00| 0.020 | IV | 49.1( 79.1)
DMG |35.3500|118.9670|02/04/1954|204841.0|   0.0|  4.00| 0.020 | IV | 49.2( 79.1)
GSP |35.4663|118.5210|04/19/2014|121513.0|  -0.8|  4.24| 0.022 | IV | 49.4( 79.4)
PAS |35.3720|118.7740|12/15/1987|182346.1|   3.2|  4.10| 0.021 | IV | 49.4( 79.5)

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-END OF SEARCH-   45 EARTHQUAKES FOUND WITHIN THE SPECIFIED SEARCH AREA.

TIME PERIOD OF SEARCH:   1800  TO  2021

LENGTH OF SEARCH TIME:   222  years

THE EARTHQUAKE CLOSEST TO THE SITE IS ABOUT 8.1 MILES (13.0 km) AWAY.

LARGEST EARTHQUAKE MAGNITUDE FOUND IN THE SEARCH RADIUS: 6.1

LARGEST EARTHQUAKE SITE ACCELERATION FROM THIS SEARCH: 0.105 g

COEFFICIENTS FOR GUTENBERG & RICHTER RECURRENCE RELATION:
  a-value=  2.783
  b-value=  0.884
  beta-value=  2.036


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TABLE OF MAGNITUDES AND EXCEEDANCES:
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  Earthquake | Number of Times | Cumulative
   Magnitude |    Exceeded     | No. / Year
  -----------+-----------------+------------
     4.0     |       45        |  0.20362
     4.5     |       13        |  0.05882
     5.0     |        6        |  0.02715
     5.5     |        1        |  0.00452
     6.0     |        1        |  0.00452
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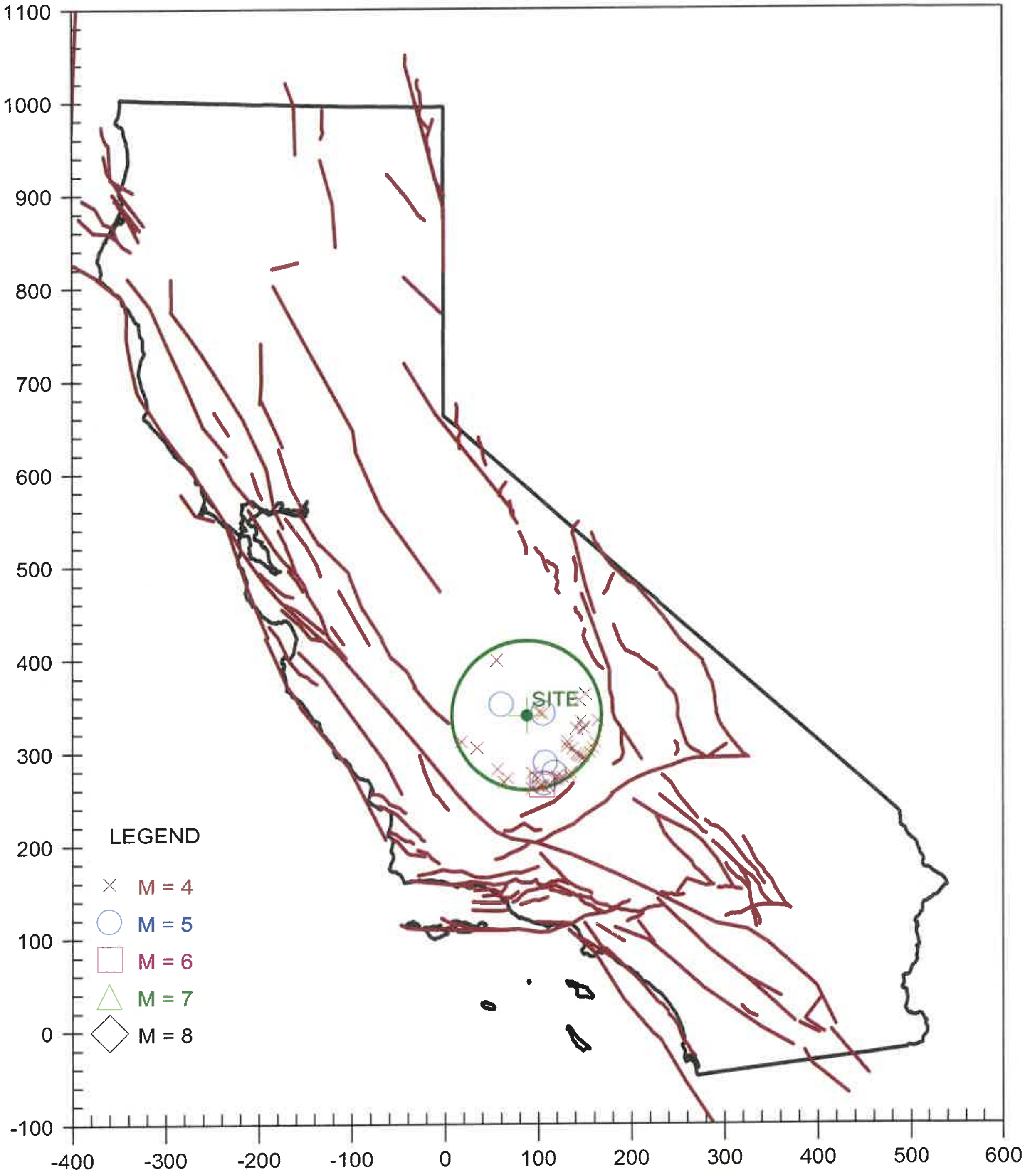
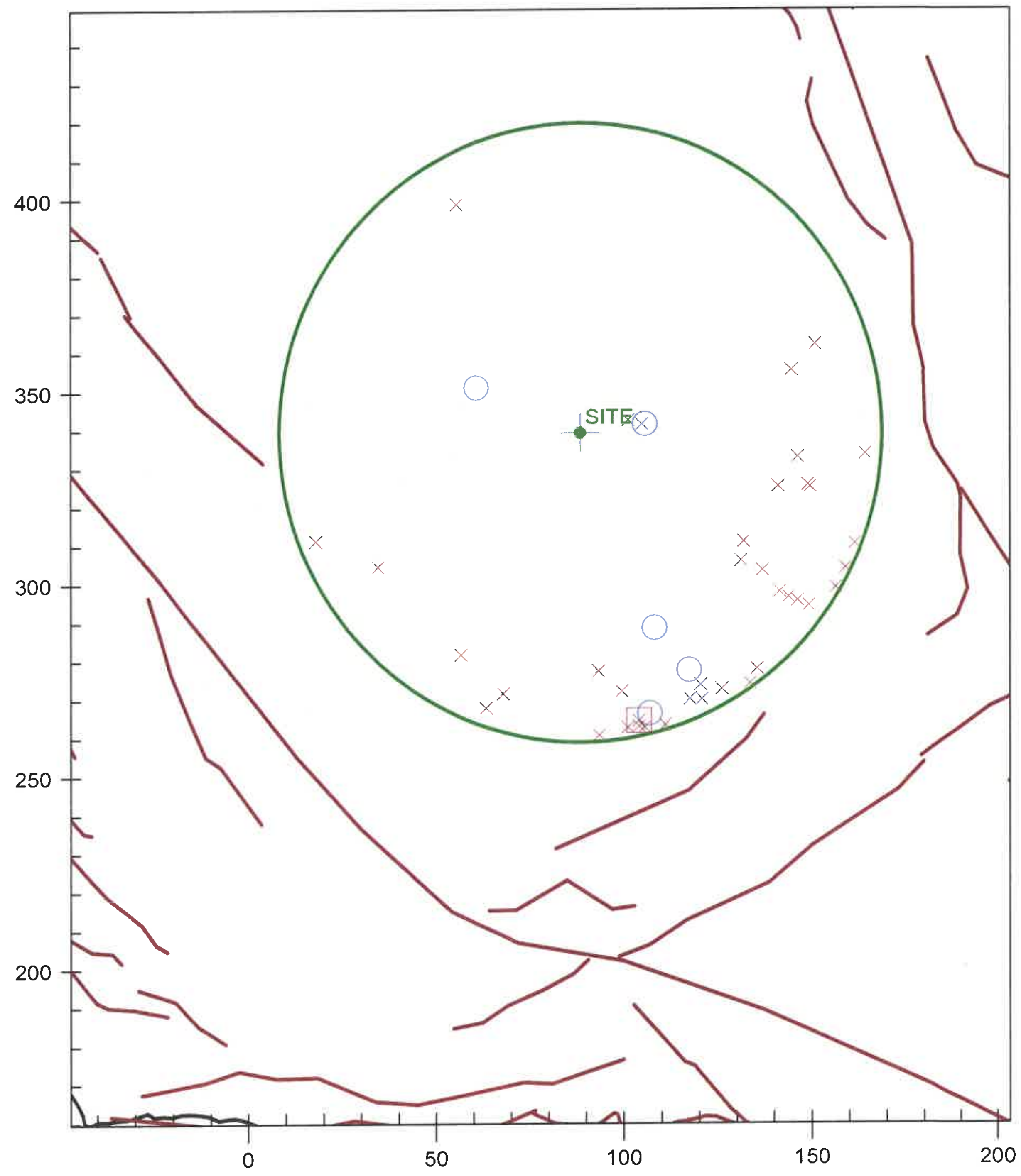
EARTHQUAKE EPICENTER MAP

01223164



EARTHQUAKE EPICENTER MAP

01223164



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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: 01223164
                                                 DATE: 10-24-2023

JOB NAME: 01223164

EARTHQUAKE-CATALOG-FILE NAME: ALLQUAKE.DAT


MAGNITUDE RANGE:
   MINIMUM MAGNITUDE:  5.00
   MAXIMUM MAGNITUDE:  9.00

SITE COORDINATES:
   SITE LATITUDE:  36.0611
   SITE LONGITUDE:  119.0100

SEARCH DATES:
           START DATE:   1800
           END DATE:   2021

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 |36.0800|118.8200|05/29/1915| 646 0.0|  0.0| 5.00| 0.105 | VII| 10.7( 17.2)
T-A |36.1700|119.3200|07/25/1868| 230 0.0|  0.0| 5.00| 0.069 | VI | 18.9( 30.3)
DMG |35.6000|118.8000|06/30/1926|1331 0.0|  0.0| 5.00| 0.044 | VI | 33.9( 54.6)
DMG |35.5000|118.7000|01/06/1905|1430 0.0|  0.0| 5.00| 0.037 |  V | 42.5( 68.3)
DMG |35.4000|118.8170|07/29/1952| 8 146.0|  0.0| 5.10| 0.036 |  V | 46.9( 75.5)
DMG |35.3830|118.8500|07/29/1952| 7 347.0|  0.0| 6.10| 0.061 | VI | 47.7( 76.7)
MGI |36.6000|118.4000|09/04/1868| 0 0 0.0|  0.0| 5.00| 0.032 |  V | 50.4( 81.0)
DMG |35.3330|118.9170|08/22/1952|224124.0|  0.0| 5.80| 0.049 | VI | 50.5( 81.3)
GSP |35.3900|118.6230|09/29/2004|225454.2|  3.0| 5.00| 0.032 |  V | 51.2( 82.3)
DMG |35.3670|118.5830|07/23/1952| 31923.0|  0.0| 5.00| 0.031 |  V | 53.6( 86.2)
DMG |35.3670|118.5830|07/23/1952| 03832.0|  0.0| 6.10| 0.055 | VI | 53.6( 86.2)
DMG |35.3000|118.8000|12/23/1905|2223 0.0|  0.0| 5.00| 0.031 |  V | 53.8( 86.7)
DMG |35.3330|118.6000|07/31/1952|12 9 9.0|  0.0| 5.80| 0.046 | VI | 55.3( 89.0)
DMG |35.7780|118.0490|01/28/1961| 81246.2|  5.5| 5.30| 0.034 |  V | 57.2( 92.0)
DMG |35.7150|118.0740|03/15/1946|14 035.4|  0.0| 5.30| 0.034 |  V | 57.5( 92.6)
DMG |35.7250|118.0550|03/15/1946|134935.9| 22.0| 6.30| 0.058 | VI | 58.2( 93.7)
PAS |36.1510|120.0490|08/04/1985|12 156.0|  6.0| 5.80| 0.044 | VI | 58.3( 93.8)
DMG |35.3150|118.5160|07/25/1952|194323.7| 11.2| 5.70| 0.042 | VI | 58.5( 94.1)
DMG |35.7450|118.0390|03/16/1946| 94617.9|  0.0| 5.10| 0.030 |  V | 58.5( 94.2)
DMG |35.7510|118.0290|03/15/1946|215433.4|  0.0| 5.20| 0.032 |  V | 58.9( 94.8)
DMG |35.3170|118.4940|07/25/1952|19 944.6|  5.5| 5.70| 0.042 | VI | 59.0( 94.9)
DMG |35.3110|118.4990|07/25/1952|1313 8.2|  2.8| 5.00| 0.029 |  V | 59.2( 95.2)
DMG |36.7000|118.3000|08/17/1896|1130 0.0|  0.0| 5.90| 0.046 | VI | 59.2( 95.2)
DMG |35.2170|118.8170|07/23/1952|1317 5.0|  0.0| 5.70| 0.041 |  V | 59.3( 95.4)
DMG |36.4000|118.0000|07/05/1871|21 6 0.0|  0.0| 5.20| 0.031 |  V | 60.9( 98.0)
DMG |35.7530|117.9860|03/15/1946|1321 0.9|  0.0| 5.20| 0.031 |  V | 61.1( 98.3)
DMG |35.7140|117.9770|03/15/1946|191853.6|  0.0| 5.40| 0.034 |  V | 62.6(100.7)
MGI |36.6000|118.1000|05/17/1872|21 0 0.0|  0.0| 5.00| 0.027 |  V | 62.8(101.1)
MGI |36.5800|118.0800|07/06/1917|11 1 0.0|  0.0| 5.70| 0.040 |  V | 62.9(101.3)
DMG |35.2330|118.5330|07/21/1952|174244.0|  0.0| 5.10| 0.029 |  V | 63.1(101.6)
GSP |35.1490|119.1040|05/28/1993|044740.6| 21.0| 5.20| 0.030 |  V | 63.2(101.7)
T-A |36.5800|118.0700|04/18/1872| 0 0 0.0|  0.0| 5.00| 0.027 |  V | 63.4(102.0)
T-A |36.5800|118.0700|08/13/1882| 0 0 0.0|  0.0| 5.00| 0.027 |  V | 63.4(102.0)
DMG |35.1830|118.6500|07/21/1952|151358.0|  0.0| 5.10| 0.028 |  V | 63.9(102.8)
DMG |35.7470|117.9080|03/18/1946|155042.6|  4.4| 5.30| 0.031 |  V | 65.3(105.1)
DMG |35.1330|118.7670|07/21/1952|194122.0|  0.0| 5.50| 0.034 |  V | 65.5(105.4)
DMG |35.1500|118.6330|01/27/1954|141948.0|  0.0| 5.00| 0.026 |  V | 66.4(106.8)
DMG |36.7000|118.1000|03/26/1872|1030 0.0|  0.0| 7.80| 0.114 | VII| 67.1(108.0)
GSP |36.3910|117.8610|10/03/2009|011600.3|  0.0| 5.20| 0.029 |  V | 67.9(109.3)
GSP |36.3880|117.8580|10/01/2009|100124.7|  5.0| 5.00| 0.026 |  V | 68.0(109.5)
DMG |35.3000|119.8000|01/09/1857|16 0 0.0|  0.0| 7.90| 0.118 | VII| 68.7(110.6)
BRK |36.2200|120.2600|09/09/1983| 91614.0|  0.0| 5.40| 0.031 |  V | 70.6(113.5)
PAS |36.1820|120.2680|02/14/1987| 72650.8|  6.0| 5.10| 0.026 |  V | 70.7(113.7)
T-A |36.8300|118.1700|07/12/1871| 330 0.0|  0.0| 5.00| 0.025 |  V | 70.7(113.7)
T-A |36.8300|118.1700|02/28/1895| 825 0.0|  0.0| 5.00| 0.025 |  V | 70.7(113.7)
DMG |35.8310|117.7610|10/19/1961| 5 943.9| -2.0| 5.20| 0.027 |  V | 71.6(115.2)
BRK |36.2200|120.2900|05/02/1983|2346 6.0|  0.0| 5.60| 0.034 |  V | 72.2(116.2)
BRK |36.2200|120.2900|05/02/1983|234239.0|  0.0| 6.70| 0.060 | VI | 72.2(116.2)
BRK |36.2400|120.2900|05/09/1983| 24912.0|  0.0| 5.20| 0.027 |  V | 72.4(116.5)
DMG |35.7500|120.2500|03/10/1922|112120.0|  0.0| 6.50| 0.054 | VI | 72.6(116.8)
DMG |35.0000|119.0170|07/21/1952|115214.0|  0.0| 7.70| 0.101 | VII| 73.3(117.9)
DMG |35.0000|119.0170|01/12/1954|233349.0|  0.0| 5.90| 0.039 |  V | 73.3(117.9)
DMG |35.0000|119.0000|07/21/1952|12 531.0|  0.0| 6.40| 0.051 | VI | 73.3(117.9)
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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]
----+-------+--------+----------+---------+-----+-----+--------+----+----------
DMG |35.0000|119.0000|02/16/1919|1557 0.0|  0.0| 5.00| 0.024 |  V |  73.3(117.9)
DMG |35.0000|119.0330|07/21/1952|12 2 0.0|  0.0| 5.60| 0.033 |  V |  73.3(117.9)
DMG |36.9000|118.2000|03/26/1872|14 6 0.0|  0.0| 6.50| 0.054 | VI |  73.3(118.0)
DMG |36.1700|120.3200|12/27/1926| 919 0.0|  0.0| 5.00| 0.024 |  V |  73.4(118.2)
DMG |36.9000|118.1900|11/28/1929|1949 0.0|  0.0| 5.50| 0.031 |  V |  73.7(118.5)
DMG |35.0000|118.8330|07/23/1952|181351.0|  0.0| 5.20| 0.027 |  V |  73.9(119.0)
DMG |35.0000|118.8330|07/23/1952| 75319.0|  0.0| 5.40| 0.030 |  V |  73.9(119.0)
DMG |34.9830|118.9830|05/23/1954|235243.0|  0.0| 5.10| 0.025 |  V |  74.4(119.8)
GSP |36.0750|117.6500|11/27/1996|201724.1|  1.0| 5.30| 0.028 |  V |  75.9(122.1)
DMG |35.8000|120.3300|06/05/1934|2148 0.0|  0.0| 5.00| 0.024 | IV |  76.0(122.2)
DMG |35.8000|120.3300|06/08/1934| 447 0.0|  0.0| 6.00| 0.040 |  V |  76.0(122.2)
DMG |35.8000|120.3300|12/28/1939|121538.0|  0.0| 5.00| 0.024 | IV |  76.0(122.2)
DMG |35.8000|120.3300|06/08/1934| 430 0.0|  0.0| 5.00| 0.024 | IV |  76.0(122.2)
GSP |36.0670|117.6380|03/06/1998|054740.3|  1.0| 5.20| 0.026 |  V |  76.6(123.2)
DMG |35.7500|120.3300|08/18/1922| 512 0.0|  0.0| 5.00| 0.023 | IV |  76.9(123.7)
BRK |36.2100|120.3800|07/25/1983|223140.0|  0.0| 5.10| 0.025 |  V |  77.1(124.0)
DMG |34.9500|118.8670|07/21/1952|121936.0|  0.0| 5.30| 0.027 |  V |  77.1(124.1)
DMG |34.9410|118.9870|11/15/1961| 53855.5| 10.7| 5.00| 0.023 | IV |  77.3(124.5)
GSB |35.8190|120.3640|09/28/2004|171524.2|  8.0| 6.00| 0.039 |  V |  77.5(124.7)
GSP |36.0760|117.6180|03/07/1998|003646.8|  1.0| 5.00| 0.023 | IV |  77.7(125.0)
GSP |35.7760|117.6620|08/17/1995|223959.0|  5.0| 5.40| 0.029 |  V |  77.9(125.4)
DMG |34.9320|118.9760|03/01/1963| 02557.9| 13.9| 5.00| 0.023 | IV |  78.0(125.5)
BRK |36.2000|120.4000|07/22/1983| 343 2.0|  0.0| 5.00| 0.023 | IV |  78.1(125.7)
BRK |36.2200|120.4000|07/22/1983| 23955.0|  0.0| 6.00| 0.039 |  V |  78.3(126.0)
PAS |34.9430|118.7430|06/10/1988|23 643.0|  6.8| 5.40| 0.028 |  V |  78.6(126.6)
BRK |36.2600|120.4000|07/09/1983| 74052.0|  0.0| 5.30| 0.027 |  V |  78.7(126.6)
GSP |35.7660|117.6490|01/07/1996|143253.1|  5.0| 5.20| 0.026 |  V |  78.8(126.8)
DMG |37.0000|118.2000|04/03/1872|1215 0.0|  0.0| 6.10| 0.041 |  V |  78.9(126.9)
T-A |34.9200|118.9200|01/20/1857| 0 0 0.0|  0.0| 5.00| 0.023 | IV |  78.9(127.0)
T-A |34.9200|118.9200|05/23/1857| 0 0 0.0|  0.0| 5.00| 0.023 | IV |  78.9(127.0)
GSP |35.2100|118.0660|07/11/1992|181416.2| 10.0| 5.70| 0.033 |  V |  79.1(127.3)
GSB |35.7610|117.6390|09/20/1995|232736.3|  5.0| 6.10| 0.041 |  V |  79.4(127.8)
PAS |36.2860|120.4130|10/25/1982|2226 4.0|  6.0| 5.60| 0.031 |  V |  79.7(128.3)
MGI |37.0000|118.1700|12/08/1929|1245 0.0|  0.0| 5.30| 0.027 |  V |  79.8(128.5)
MGI |37.0000|118.1700|12/02/1929| 7 0 0.0|  0.0| 5.30| 0.027 |  V |  79.8(128.5)
DMG |34.9000|118.9500|08/01/1952|13 430.0|  0.0| 5.10| 0.024 | IV |  80.2(129.1)
DMG |34.9000|118.9000|10/23/1916| 244 0.0|  0.0| 6.00| 0.038 |  V |  80.4(129.4)
DMG |37.2000|118.7000|09/30/1889| 520 0.0|  0.0| 5.60| 0.031 |  V |  80.5(129.5)
GSB |35.9170|120.4650|12/20/1994|102747.2|  8.0| 5.00| 0.022 | IV |  81.9(131.8)
DMG |35.9500|120.4700|11/16/1956| 323 9.0|  0.0| 5.00| 0.022 | IV |  81.9(131.8)
BRK |36.2500|120.4700|06/11/1983| 3 954.0|  0.0| 5.10| 0.023 | IV |  82.4(132.6)
DMG |34.8670|118.9330|09/21/1941|1953 7.2|  0.0| 5.20| 0.025 |  V |  82.6(132.9)
DMG |35.9300|120.4800|12/24/1934|1626 0.0|  0.0| 5.00| 0.022 | IV |  82.6(132.9)
DMG |36.0000|120.5000|03/03/1901| 745 0.0|  0.0| 5.50| 0.029 |  V |  83.3(134.1)
DMG |36.0000|120.5000|02/02/1881| 011 0.0|  0.0| 5.60| 0.030 |  V |  83.3(134.1)
DMG |35.9700|120.5000|06/28/1966| 4 856.2|  0.0| 5.10| 0.023 | IV |  83.4(134.3)
DMG |35.9500|120.5000|06/28/1966| 42613.4|  0.0| 5.50| 0.029 |  V |  83.6(134.5)
GSB |35.9530|120.5020|09/29/2004|171004.0| 11.0| 5.10| 0.023 | IV |  83.7(134.6)
DMG |35.9500|120.5300|06/29/1966|195325.9|  0.0| 5.00| 0.022 | IV |  85.2(137.2)
T-A |34.8300|118.7500|11/27/1852| 0 0 0.0|  0.0| 7.00| 0.061 | VI |  86.2(138.8)
DMG |34.8000|119.1000|09/05/1883|1230 0.0|  0.0| 6.00| 0.036 |  V |  87.2(140.4)
DMG |35.6310|117.5130|09/17/1938|1423 4.1| -2.0| 5.00| 0.021 | IV |  88.9(143.0)
DMG |36.2300|120.6500|02/05/1947| 614 0.0|  0.0| 5.00| 0.020 | IV |  92.2(148.3)
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                         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]
----+-------+--------+----------+---------+-----+-----+-------+----+------------
DMG |37.3500|118.5500|08/04/1959| 73659.0|  0.0| 5.20| 0.023 | IV | 92.6(149.0)
DMG |37.3300|118.4200|01/05/1912| 354 0.0|  0.0| 5.50| 0.026 |  V | 93.5(150.5)
DMG |37.3300|118.4200|05/06/1910|1640 0.0|  0.0| 5.50| 0.026 |  V | 93.5(150.5)
DMG |34.7000|119.0000|10/23/1916| 254 0.0|  0.0| 5.50| 0.026 |  V | 94.0(151.2)
DMG |37.4170|118.6670|02/02/1961| 0 742.0|  0.0| 5.10| 0.021 | IV | 95.5(153.7)
PAS |37.4230|118.6080|11/23/1984|191235.3|  6.0| 5.40| 0.024 |  V | 96.6(155.5)
MGI |35.5000|120.6000|01/01/1830| 0 0 0.0|  0.0| 5.00| 0.020 | IV | 97.1(156.3)
GSB |37.0640|117.7770|05/18/1993|234853.9|  3.0| 5.20| 0.022 | IV | 97.3(156.6)
PAS |37.4640|118.8230|05/27/1980|145057.1|  2.4| 6.30| 0.039 |  V | 97.4(156.8)
PAS |37.4490|118.6530|11/26/1984|162141.4|  6.0| 5.50| 0.025 |  V | 97.8(157.4)
DMG |37.4500|118.6330|02/02/1961| 0 416.0|  0.0| 5.30| 0.023 | IV | 98.1(157.9)
DMG |37.4530|118.6040|12/03/1938|174252.6| 10.0| 5.70| 0.028 |  V | 98.7(158.8)
PAS |37.4480|118.5450|03/25/1985|16 513.6|  6.0| 5.00| 0.019 | IV | 99.2(159.6)
PAS |37.4860|118.7830|05/25/1980|164930.3|  4.7| 5.80| 0.029 |  V | 99.2(159.6)
DMG |37.0830|117.7500|02/11/1949|21 524.0|  0.0| 5.60| 0.026 |  V | 99.3(159.8)
USG |37.4980|118.8380|06/06/1980|141817.2|  2.0| 5.27| 0.022 | IV | 99.7(160.4)
PAS |37.4700|118.5970|11/23/1984|18 825.6|  6.0| 6.20| 0.036 |  V | 99.9(160.8)
PAS |37.5090|119.0430|06/11/1980| 441 1.1| 14.1| 5.00| 0.019 | IV |100.0(160.9)

*******************************************************************************
-END OF SEARCH-   124 EARTHQUAKES FOUND WITHIN THE SPECIFIED SEARCH AREA.

TIME PERIOD OF SEARCH:    1800  TO  2021

LENGTH OF SEARCH TIME:    222  years

THE EARTHQUAKE CLOSEST TO THE SITE IS ABOUT 10.7 MILES (17.2 km) AWAY.

LARGEST EARTHQUAKE MAGNITUDE FOUND IN THE SEARCH RADIUS: 7.9

LARGEST EARTHQUAKE SITE ACCELERATION FROM THIS SEARCH: 0.118 g

COEFFICIENTS FOR GUTENBERG & RICHTER RECURRENCE RELATION:
  a-value=  1.518
  b-value=  0.403
  beta-value=  0.928


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TABLE OF MAGNITUDES AND EXCEEDANCES:
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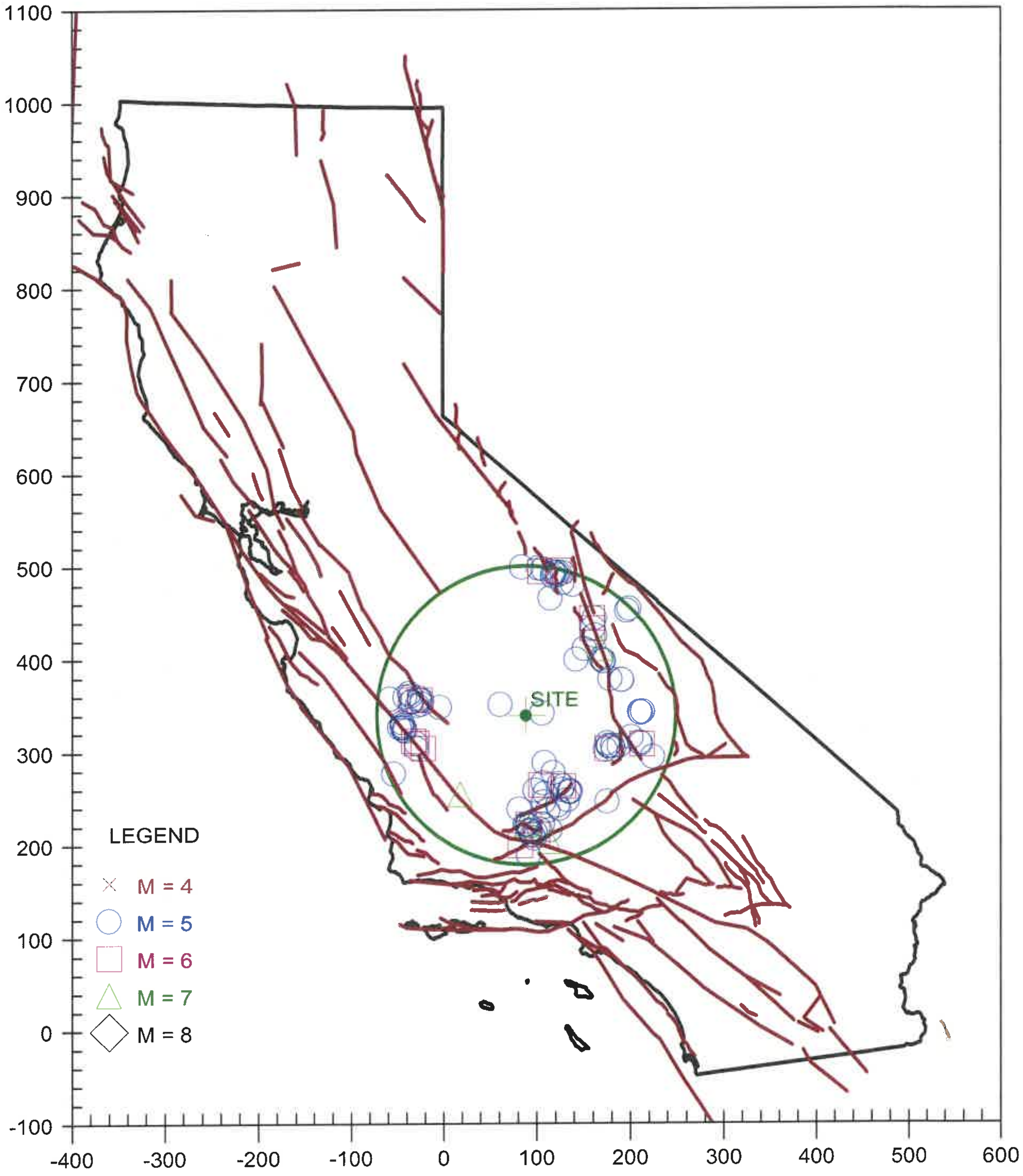
  Earthquake | Number of Times  | Cumulative
   Magnitude |    Exceeded      | No. / Year
  -----------+------------------+------------
     4.0     |       124        |  0.56109
     4.5     |       124        |  0.56109
     5.0     |       124        |  0.56109
     5.5     |        46        |  0.20814
     6.0     |        20        |  0.09050
     6.5     |         7        |  0.03167
     7.0     |         4        |  0.01810
     7.5     |         3        |  0.01357
```

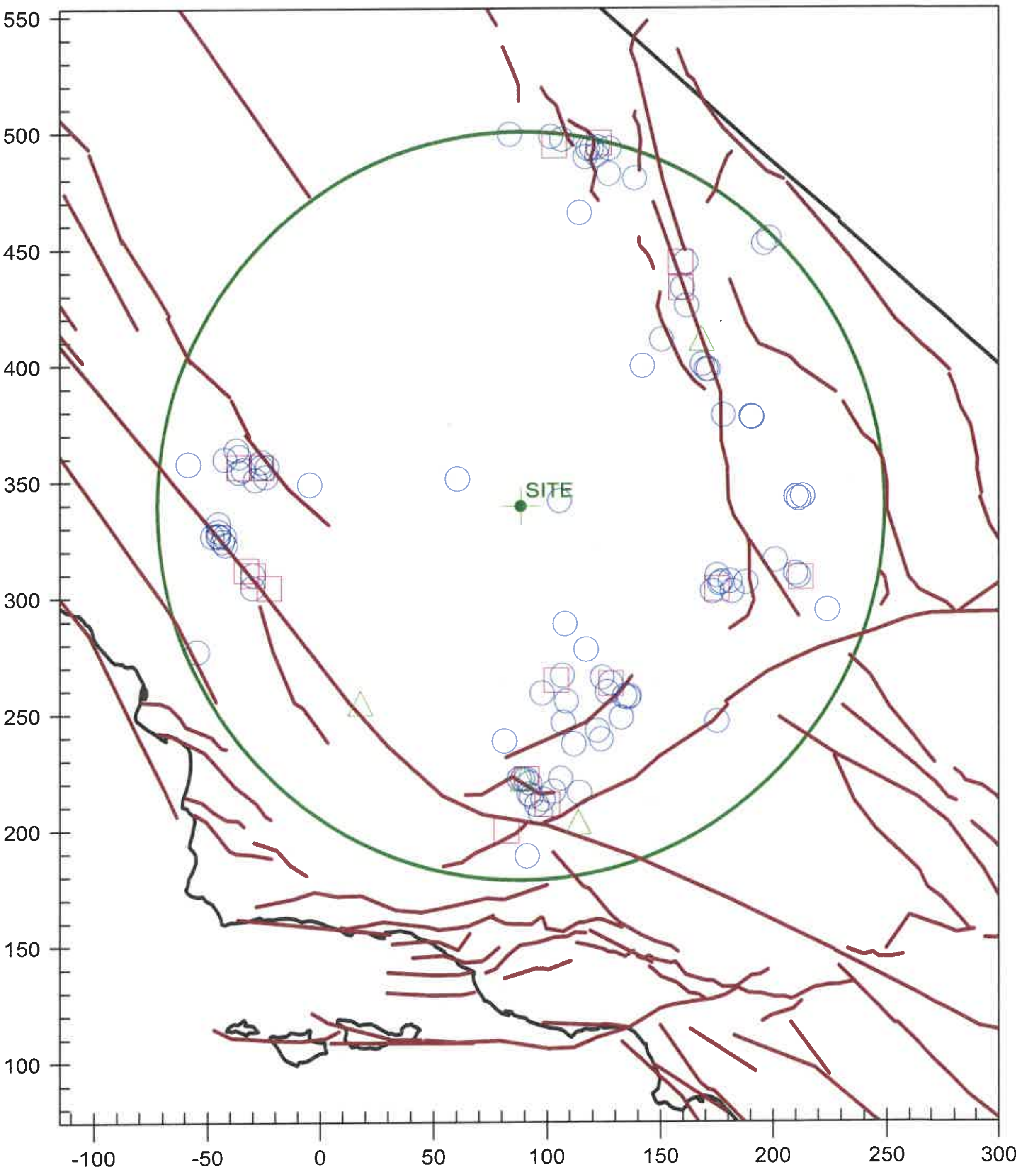
EARTHQUAKE EPICENTER MAP

01223164



EARTHQUAKE EPICENTER MAP

01223164



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