RMA GeoScience
Every *Project* **Matters** | www.rmacompanies.com

April 8, 2022 RMA Project No: 21G-0735-0

Justin Brevoort
336 The Strand
Unit A
Hermosa Beach, CA 90254

Subject: Geotechnical Investigation for New Residence
237 Montreal Street
Playa Del Rey, CA

In accordance with your request, a geotechnical investigation has been completed for the above referenced property. The results of the investigation are presented in the accompanying report, which includes a description of site conditions, results of our field exploration, laboratory testing, conclusions, and recommendations. This report has been prepared for specific application to this project, in accordance with generally accepted geotechnical engineering practice.

We appreciate this opportunity to be of service to you. If you have any questions regarding this report, please do not hesitate to contact us at your convenience.

Respectfully submitted,
RMA GeoScience

HAIYAN HARRY LIU
C81463
Exp. 9/30/2023
CIVIL

MARK A. SWIATEK
No. 1781
CERTIFIED ENGINEERING GEOLOGIST

Mark Swiatek

Haiyan Liu, PE, C81463
Project Engineer

Mark Swiatek, CEG
Project Engineering Geologist

RMA GeoScience
Every Project Matters | www.rmacompanies.com

GEOTECHNICAL INVESTIGATION FOR NEW RESIDENCE
237 MONTREAL STREET
PLAYA DEL REY, CA

For

Justin Brevoort
336 The Strand
Unit A
Hermosa Beach, CA 90254

April 8, 2022

Project No. 21G-0735-0

Table of Contents

APPENDICES

1.00 Introduction

1.01 Purpose

A geotechnical investigation has been completed at the subject site. The purpose of the investigation is to evaluate the geotechnical conditions at the site in relation to our understanding of the proposed development of the subject property.

1.02 Scope of the Investigation

The general scope of this investigation included the following:

- Review of published and unpublished geologic, seismic, groundwater, and geotechnical literature.
- Examination of aerial photographs and topographic maps.
- Contacting of Underground Service Alert (USA) to locate onsite utility lines.
- Logging, sampling, and backfilling of one (1) exploratory hollow stem boring.
- Laboratory testing of representative soil samples.
- Geotechnical evaluation of the compiled data.
- Engineering analysis of the proposed development
- Preparation of this report presenting our findings, conclusions, and recommendations.

Our scope of work did not include a preliminary site assessment for the potential of hazardous materials onsite.

1.03 Site Location and Description

The subject site is located on the north side of Montreal Street in the Playa Del Rey area of the City of Los Angeles (Figure 1). The hillside property overlooks the Ballona Wetlands and the Marina. The property consists of a 65-foot-high, north-facing slope which descends from Montreal Street down to a paved parking area on Pershing Drive. There is no building pad on the property. There is a guard rail seperating the sidewalk from the top of slope. The north downslope property line is located approximately 20 feet above the toe of slope. The slope has an average gradient of about 2:1 (horizontal:vertical). The site is bordered at the east and west by multi-story, single family residences. The site is currently vacant and is vegetated by natural grasses. Surficial runoff drains down slope to offsite properly along Pershing Drive.

The site is located within a landslide hazard area. It is not located within an Alquist-Priolo fault or liquefaction hazard zone or City of Los Angeles Preliminary Fault Rupture Study Area. Its central geographic position is 34.128321° north latitude and -118.319379° west longitude.

1.04 Planned Development

Preliminary plans have been provided by Zeroplus Architecture. We have included a copy of the plans in Appendix G. The plans utilize a recent topographic survey of the property prepared by Den Engineers at a scale of 1"=8'. The survey and preliminary architectural drawings have been utilized to prepare our Geologic Map, Plate 1 and Geologic Cross Sections, Plate 2. According to the drawings, a multi level up to three story home is planned for the property. The ground level floors will utilize retaining walls up to an approximate maximum height of 7 feet.

1.05 Investigation Methods

Our investigation consisted of research, field exploration, laboratory testing, review of the compiled data, and preparation of this report. It has been performed in a manner consistent with generally accepted engineering and geologic principles and practices and has incorporated applicable requirements of City of Los Angeles and California Building Codes. Definitions of technical terms and symbols used in this report include those of the ASTM International, the California Building Code, and commonly used geologic nomenclature.

Technical supporting data are presented in the attached appendices. Appendix A presents a description of the methods and equipment used in performing the field exploration and logs of our subsurface exploration. Appendix B presents a description of our laboratory testing and the test results. General Earthwork and Grading Specifications are presented in Appendix C. Slope stability calculations are presented in Appendix D. References are presented in Appendix E. Referenced previous reports are presented in Appendix F. The architectural plans are provided in Appendix G.

1.06 Research Findings

Research was conducted via email request to the City of Los Angeles Public Works. We requested soils and Geology files for the subject site as well as the neighboring residences. Although there were no reports for the subject site, we located a report from Geosoils Inc. from November 26, 1990 for the adjacent property at 235 Montreal Street. We have included a copy of the report in Appendix F.

1.07 Research Findings and Site History

Aerial photographs from 1952 to 2021 and topographic maps from 1896 to 2018 were reviewed as part of this investigation (Netr). The neighbors homes are visible on photos dating back to 1972. The homes are not there on the 1963 images. The street is visible on the 1952 photographs.

2.00 Findings

2.01 Geologic Setting

The property is located on a 65 foot tall north-northwest facing bluff above the developed portion of the Ballona wetlands. The bluff is underlain by old sand dune deposits (Qos) which overlie the San Pedro Formation (Qsp). The earth materials encountered during our field investigation are described below. Regional geologic conditions are illustrated on our Regional Geologic Map, Figure 2

No know active faults cross the site or are located within the site vicinity.

2.02 Earth Materials

Old Sand Dunes (Qos)

Quaternary aged sand dunes consisting of slightly moist fine silty sands. The sand dunes are slightly moist and loose to medium dense condition. The dunes are subject to caving in open excavations.

San Pedro Formation (Qsp)

Bedrock consisting of light orange gray fine silty sandstone was encountered at 38.5 feet near the bottom of the boring. The bedrock consist of light orange gray friable fine sandstone/siltstone in a slightly moist, medium dense condition. The San Pedro Formation is subject to caving in open excavations.

The earth materials encountered in the exploratory boring at the site are described in greater detail on the boring log contained in Appendix A.

2.03 Expansive Soils

Based on the test results, the expansion index of the onsite earth materials is 0. Expansion Index (EI) tests indicate that onsite earth materials have a very low potential for expansion.

2.04 Surface and Groundwater Conditions

No groundwater was encountered in the boring drilled to a maximum depth of 50 feet below existing street grade. No seepage was encountered in the boring. Historic high groundwater level is presented on Figure 3.

2.05 Faults

The proposed site is not located within an Alquist-Priolo Earthquake Fault Zone (CDMG, 1999), and there are no known active faults that traverse the property. The site has experienced earthquake-induced ground shaking in the past and can be expected to experience further shaking in the future. The closest zoned faults are the Newport Inglewood Fault located approximately 5.5 miles to the east-northeast and the Santa Monica Fault 5.0 miles to the north.

2.06 Flooding Potential

According to Federal Emergency Management Agency (Flood Insurance Rate Map #06037C1754G), the site is located in an area of Flood Zone X, which is determined to be an area of minimal flood hazard.

2.07 Liquefaction

According to the State of California Earthquake Zones Map of the Venice Quadrangle, Seismic Hazard Zones (1999) the site is not situated within liquefaction hazard zone. Without groundwater present, liquefaction of sand dune deposits is considered negligible.

2.08 Landslides

According to the State of California Earthquake Zones Map of the Venice Quadrangle, Earthquake Fault Zones (1999) the site is located in a landslide hazard zone. The regional geologic map indicates the site may be partially underlain by landslide. Evidence of landslides was not encountered during our review of references, site reconnaissance or subsurface investigation.

2.09 Historic Seismicity

The region of the subject site has experienced shaking from several earthquakes recorded back to 1812. The nearest large historic earthquake occurred in 1855 the epicenter of which is located 12.7 miles to the away from the site. Historic earthquakes with magnitudes of greater than or equal to 6.0 and have been epicentered within approximately 50 miles of the site, are summarized in the following table.

Large Historic Earthquakes

Event	Date	Magnitude	Distance (mi)
-	7/11/1855	6.3	12.7
Northridge Earthquake	1/17/1994	6.7	13.7
-	4/4/1893	6.0	19.9
San Fernando Earthquake	2/9/1971	6.4	20.1
-	9/24/1827	7.0	39.9
Long Beach Earthquake	3/11/1933	6.3	40.7
San Juan Capistrano Earthquake	12/8/1812	7.0	41.7
-	7/30/1894	6.0	42.7
-	12/16/1858	7.0	47.7
-	7/22/1899	6.5	48.3

2.10 Shear Strength Summary

Direct shear tests were performed on undisturbed samples of the major soil and rock types encountered in the test holes, using the standard test method of ASTM D3080 (consolidated and drained). Our direct shear test results are presented in Appendix B. Shear strength data from the referenced GeoSoils Inc. report was also considered.

Soil Type	Wet Unit Weight (pcf)	Cohesion (psf)	Friction Angle (degree)
Dune Sands	100	170	31
	105	190	32
San Pedro Formation	105	90	35
GSI 1999	130	150	34

After considering the shear data form GeoSoils Inc. and our direct shear test results, we utilized the shear strength of 170 psf cohesion and 31 degree friction angle for the Dune Sands and 90 psf cohesion and 35 degree friction angle for the San Pedro Formation in our slope stability analysis.

2.11 Slope Stability Analysis

The gross stability of was performed along Geologic Cross Section A-A’ using XSTABL, a computer program based on the modified Bishop method of slices. The Regional Topographic Map, Figure 4 was used to extend Geologic Cross Section A-A’ to show the topographic conditions on the off site property below the site. This method is based on the static analysis of the mass above any failure arc. The failure mass is broken up into a series of vertical slices and the equilibrium of each of these slices is considered. The force acting along the sides of any slice are assumed to have a zero resultant in the direction normal to the failure arc for that slice. In this method, the stability of the slope is expressed as a safety factor. Safety factor (FOS) is defined as the relationship of the resisting moments, about the center of the failure arc, divided by the overturning moments, about the center of the failure arc.

Seismic coefficient has been calculated as 0.29. Slope stability calculations are summarized below:

Condition	Static FOS	Seismic FOS
Permanent	1.819	1.039

The details of our stability analysis are included in Appendix D.

3.00 Conclusions and Recommendations

3.01 General Conclusion

Based on specific data and information contained in this report, our understanding of the project and our general experience in engineering geology and geotechnical engineering, it is our professional judgment that the proposed improvements are geologically and geotechnically feasible. This is provided that the recommendations presented below are fully implemented during design, and construction. At such time as plans become available an update to this report will be necessary.

The recommended bearing material is the medium dense sand dunes and or San Pedro Formation that underlies the site. The required setback for the planned foundations for the development is the height of slope divided by 3 (h/3) or 40 feet maximum. The use pile foundations will be required to meet foundation setback criteria, provide shoring for temporary excavations and achieve bearing into suitable materials below the existing ground surface.

3.02 Construction Cuts

Temporary excavations will be necessary for the proposed construction. Temporary excavations may be cut to a gradient of 1:1 up to 5 feet. Excavations over 5 feet will require shoring. Soil exposed in the temporary cuts should be kept moist in order to prevent slumping of dry sand. All applicable requirement of the California Construction and General Industry Safety Orders, the Occupational Safety and Health Act of 1970, and the Construction Safety Act should be met. If excavations are to be made during the rainy season, particular care should be given to insure that berms or other devices will prevent water from ponding or flowing over the top of the excavations.

Vehicles, equipment, materials, etc. should be set back a minimum distance of 5 feet from the top edge of temporary excavations. Surface waters should be diverted away from temporary excavations and prevented from draining over the top of the excavation and down the slope face. During periods of heavy rain, the slope face should be protected with sandbags to prevent drainage over the edge of the slope, and a visqueen liner placed on the slope face to prevent erosion of the slope face.

Periodic observations of the excavations should be made by the geotechnical consultant to verify that the geotechnical conditions have not varied from those anticipated and to monitor the overall condition of the temporary excavations over time. If at any time during construction conditions are encountered which differ from those anticipated, the geotechnical consultant should be contacted and allowed to analyze the field conditions prior to commencing work within the excavation.

3.03 Seismic Design Parameters

Mapped Spectral Accelerations were obtained by using the online ATC Calculator (ASCE 7-16 Standard) and a site class D-default was used for the project site based on seismic shear-wave survey results. Since the mapped risk-targeted maximum considered earthquake (MCE_R) spectral response acceleration parameter at a period of 1 second (S_1) is greater than 0.2, a ground motion hazard analysis is required per ACSE/SEI 7-16 to be performed in accordance with Section 21.2 for structures on Site Class D. However, as an alternative of performing the ground motion hazard analysis, a long period coefficient (F_V) of 1.7 may be utilized for calculation of Ts, provided that the value of the Seismic Response Coefficient (C_S) is determined by Equation 12.8-2 for values of the fundamental period of the building (T) less than or equal to $1.5T_S$, and taken as 1.5 times the value computed in accordance with either Equation 12.8-3 for T greater than $1.5T_S$ and less than or equal to T_L or Equation 12.8-4 for T greater than T_L.

The parameters generated for the subject site are presented in the following table:

2019 California Building Code (CBC) Seismic Parameters

Parameter	Value
Site Location	Latitude = 33.958812 degrees Longitude = -118.447357 degrees
Site Class	Site Class = D-default
Mapped Spectral Accelerations	S_s (0.2- second period) = 1.836g S_1 (1-second period) = 0.649g
Site Coefficients (Site Class D-default)	F_a = 1.2 F_v = 1.7
Maximum Considered Earthquake Spectral Accelerations (Site Class D-default)	S_{MS} (0.2- second period) = 2.203g S_{M1} (1-second period) = 1.103g
Design Earthquake Spectral Accelerations (Site Class D-default)	S_{DS} (0.2- second period) = 1.469g S_{D1} (1-second period) = 0.735g

For Risk Category II structures with mapped spectral response acceleration parameter at 1-s period (S_1) is less than 0.75, the Seismic Design Category is D (ASCE 7-16 Section 11.6).

Peak earthquake ground acceleration adjusted for site class effects (PGA_M) has been determine in accordance with ASCE 7-16 Section 11.8.3 as follows: $PGA_M = F_{PGA} \times PGA = 1.2 \times 0.786g = 0.943g$.

3.04 Liquefaction and Secondary Earthquake Hazards

Potential secondary seismic hazards that can affect land development project include liquefaction, tsunamis, seiches, seismically induced settlement, seismically induced flooding and seismically induced landsliding.

Liquefaction

Liquefaction is a phenomenon where earthquake-induced ground vibrations increase the pore pressure in saturated, granular soils until it is equal to the confining, overburden pressure. When this occurs, the soil can completely lose its shear strength and enter a liquefied state. In order for liquefaction to occur, three criteria must be met: underlying loose, coarse-grained (sandy) soils, a groundwater depth of less than about 50 feet, and a potential for seismic shaking from nearby large-magnitude earthquake. There is no groundwater present or is anticipated to rise within 50 feet of the ground surface; therefore, the risk of liquefaction occurring during a design seismic event is considered nil.

Tsunamis and Seiches

Tsunamis are sea waves that are generated in response to large-magnitude earthquakes. When these waves reach shorelines, they sometimes produce coastal flooding. Seiches are the oscillation of large bodies of standing water, such as lakes, that can occur in response to ground shaking. Tsunamis and seiches do not pose hazards due to the inland location of the site and lack of nearby bodies of standing water. According to the City of Los Angeles Safety Element of the General Plan the site is not located in an Inundation and Tsunami Hazard Area.

Seismically Induced Landsliding

The site has been identified as being located within a seismically induced landslide area (CGS, 1999). Slope stability analyses completed as a part of this investigation indicate the slope has adequate factors of safety against seismically induced landsliding.

3.05 Conventional Foundations

Continuous footings may be used in areas where slope setback distance is equal to or greater than the code requirement. Footings may be designed using the following allowable bearing values:

- Conventional Retaining Wall Footings:

  Footings for retaining walls with a minimum width of 12 inches and a minimum embedment depth of 18 inches into compacted fill or native soil will have an allowable bearing capacity of 1,500 pounds per square foot (psf). This bearing capacities represent an allowable net increase in soil pressure over existing soil pressure and may be increased by one-third for short-term wind or seismic loads. All footings should be designed with steel reinforcing as specified by the Project Structural Engineer. As a minimum, reinforcement for continuous footings should include at least two #4 bars near both the top and bottom of footings.

3.06 Pile Foundation Systems

The proposed residential structure may be supported on pile foundations systems with grade beams. Piles should extend a minimum depth of 10 feet into competent native soil. The point of fixity is assumed to be at 5 feet below lowest ground elevation. Piles in groups should be spaced at least 3 diameters on center. There will be no reduction in the downward capacities of the shafts due to group action if the shafts are spaced as recommended.

The pile design skin friction values are presented in the following table with a maximum depth of 40 feet below the lowest ground elevation. No ending bearing is recommended. The uplift capacity of piles due to skin friction can be considered one half on the upward capacities.

Depth below Slope Setback Zone, ft	Allowable Skin Friction*, psf
0	0
5	131
10	257
15	383
20	510
25	636
30	762
35	888
40	1014

* *The values can be linearized between depths.*

The piles and structural grade beams should be designed by a structural engineer that has experience with these types of improvements. The anticipated settlement of the pile foundations, if designed as recommended and properly constructed, should be negligible. Maximum differential settlement between adjacent columns supported by deep foundations should be negligible.

When designing piles, the allowable passive earth may be computed as an equivalent fluid having a density of 250 pounds per square foot per foot to a maximum passive earth pressure of 5,000 pounds per square foot. When designing piles, the allowable passive earth pressure may be increase by 100 percent for piles that are considered isolated. Piles with spacing greater than three times of pile diameter can be considered as isolated piles. To develop the full lateral value, provisions should be implemented to assure firm contact between the soldier piles and undisturbed bedrock.

If piles are within 10 feet of a down slope, the upper 5 feet of the piles should be designed for 1000 pounds per foot of creep load.

3.07 Lateral Loads

For permanent wall design, lateral loads may be resisted by soil friction and the passive resistance of the soil. The following parameters are recommended.

- Allowable Passive Earth Pressure = 250 psf (the upper 12 inches of subgrade should be ignored in unpaved areas, this value includes a factor of safety = 1.5)
- Coefficient of Friction (soil to footing) = 0.26 (includes a factor of safety = 1.5)
- Retaining structures with a non-expansive backfill should be designed to resist the following lateral active earth pressures:

Surface Slope of Retained Materials (Horizontal:Vertical)	Equivalent Fluid Weight (pcf)
Level	35
5:1	37
4:1	39
3:1	42
2:1	53

These active earth pressures are only applicable if the retained earth is allowed to strain sufficiently to achieve the active state. The required minimum horizontal strain to achieve the active state is approximately 0.0025H. Retaining structures should be designed to resist an at-rest lateral earth pressure if this horizontal strain cannot be achieved.

At-rest Lateral Earth Pressure for level non-expansive backfill = 54 psf/ft (Jaky, 1994)

For walls over 6 feet, earthquake motions have been considered as required by Section 1803.5.12 of the LABC that for Seismic Design Categories D through F. The seismic lateral earth pressure shall be applied in addition to static lateral earth pressure, and can be applied assuming an inverted triangular distribution, with resultant applied at a height of ⅓ h measured from the bottom of the wall footings.

$$\Upsilon_{EFP(seismic)} = \frac{3}{4} k_h \, \Upsilon_{soil} = 28 \text{ psf/ft}$$

3.08 Foundation Setback from Slopes

Typically, footings adjacent to a descending slope with a gradient steeper than 3:1 should maintain a minimum horizontal distance of 1/3 the height of the slope but need not exceed a horizontal distance of 40 feet from the bottom outer edge of the footing to the face of the slope.

3.09 Miscellaneous Concrete Flatwork

Miscellaneous concrete flatwork and walkways should be designed with a minimum thickness of 4 inches. Large slabs should be reinforced with a minimum of #3 rebar placed 24 inches on-center in both directions. The reinforcement must be placed at mid-height in the slab. Control joints should be constructed to create squares or rectangles with a maximum spacing of 12 feet. Walkways should be separated from foundations with a thick expansion joint filler. Control joints should be constructed into non-reinforced walkways at a maximum of 5 feet spacing. The Project Civil Engineer should provide design details and specifications for all exterior concrete flatwork including the thickness of slabs, required reinforcement, and joint spacing.

Concrete driveways and any other concrete flatwork that will be subject to vehicular traffic, should be at least 5 inches thick and reinforced with at least #4 rebar placed 18” on-center in both directions in the middle of the slab. These slabs should be underlain by at least 8 inches of Class 2 Aggregate Base compacted to a relative compaction of at least 95 percent. The location and spacing of construction and contraction joints should also be determined by the Project Civil Engineer.

The subgrade soils beneath all miscellaneous concrete flatwork should be moisture conditioned and compacted in accordance with the General Earthwork and Grading Specifications in Appendix C of this report.

3.10 Cement Type and Corrosion Potential

Soluble sulfate tests indicate that water-soluble sulfate in the site soil will have a negligible effect on concrete. . Our preliminary recommendations for concrete exposed to sulfate-containing soils are presented in the following table.

RECOMMENDATIONS FOR CONCRETE EXPOSED TO SULFATE-CONTAINING SOILS

Sulfate Exposure	Water Soluble Sulfate (SO_4) in Soil (% by Weight)	Sulfate (SO_4) in Water (ppm)	Cement Type (ASTM C150)	Maximum Water-Cement Ratio (by Weight)	Minimum Compressive Strength (psi)
Negligible	0.00 - 0.10	0-150	--	--	2,500
Moderate	0.10 - 0.20	150-1,500	II	0.50	4,000
Severe	0.20 - 2.00	1,500-10,000	V	0.45	4,500
Very Severe	Over 2.00	Over 10,000	V plus pozzolan or slag	0.45	4,500

Use of alternate combinations of cementitious materials may be permitted if the combinations meet design recommendations contained in American Concrete Institute guideline ACI 318-11.

The soils were also tested for soil reactivity (pH). The test results indicate that the on-site soils have a soil reactivity of 7.6 and an electrical resistivity of 6,800 ohm-cm. A neutral or non-corrosive soil has a value ranging from 5.5 to 8.4. Generally, soils that could be considered moderately corrosive to ferrous metals have resistivity values of about 3,000 ohm-cm to 10,000 ohm-cm. Soils with resistivity values less than 3,000 ohm-cm can be considered corrosive and soils with resistivity values less than 1,000 ohm-cm can be considered extremely corrosive.

Based on our analysis, it appears that the underlying onsite soils are moderately corrosive to ferrous metals.

3.11 Pile and Footing Excavations3

Proper construction techniques and quality control are essential to installation of the CIDH piles. Groundwater was not encountered in our boring at the time of field exploration. However, localized perched water could be encountered. Due to presence granular soils, caving should be anticipated in construction of the CIDH piles. Mitigation of caving soils like drilling casing might be required during pile drilling.

The Contractor should drill the bottom three feet with a clean-out bucket, or equivalent. Specifications should require that sufficient space is allowed within the reinforcement cage to allow for the insertion of a tremmie tube. The pile reinforcement should be installed immediately after the drilling and inspection and the concrete poured. No boring should be allowed to remain open overnight. No boring should be drilled immediately adjacent to another boring until the concrete in the adjacent boring has attained its initial set. Concrete placement by pumping or tremmie tube is strongly advised and should be addressed in the specifications

Convention footing excavations and bottom excavations should be observed by the geotechnical consultant to verify that they have been excavated into competent native or compaction fill. The foundation excavations should be observed prior to the placement of forms, reinforcement steel, or concrete. These excavations should be evenly trimmed and level. Prior to concrete placement, any loose or soft soils should be removed. Excavated soils should not be placed on slab or footing areas unless properly compacted.

Prior to the placement of the moisture barrier and sand, the subgrade soils underlying the slab should be observed by the geotechnical consultant to verify that all under-slab utility trenches have been properly backfilled and compacted, that no loose or soft soils are present, and that the slab subgrade has been properly compacted to a minimum of 95 percent relative compaction within the upper 12 inches.

Footings may experience an overall loss in bearing capacity or an increased potential to settle where located in close proximity to existing or future utility trenches. Furthermore, stresses imposed by the footings on the utility lines may cause cracking, collapse and/or a loss of serviceability. To reduce this risk, footings should extend below a 1:1 plane projected upward from the closest bottom of the trench.

Slabs on grade and walkways should be brought to a minimum of 2% and a maximum of 6% above their optimum moisture content for a depth of 18 inches prior to the placement of concrete. The geotechnical consultant should perform insitu moisture tests to verify that the appropriate moisture content has been achieved a maximum of 24 hours prior to the placement of concrete or moisture barriers.

3.12 Drainage Moisture Proofing

Surface drainage should be directed away from the proposed structure into suitable drainage devices. Neither excess irrigation nor rainwater should be allowed to collect or pond against building foundations or within low-lying or level areas of the lot. Surface waters should be diverted away from the tops of slopes and prevented from draining over the top of slopes and down the slope face.

Walls and portions thereof that retain soil and enclose interior spaces and floors below grade should be waterproofed and damp proofed in accordance with CBC Section 1805A.

3.13 Plan Review

Once formal plans are prepared for the subject property, this office should review the plans from a geotechnical viewpoint, comment on changes from the schematic design used during preparation of this report and revise the recommendations of this report where necessary.

4.00 Closure

The findings, conclusions and recommendations in this report were prepared in accordance with generally accepted engineering and geologic principles and practices. No other warranty, either expressed or implied, is made. This report has been prepared for Justin Brevoort to be used solely for design purposes. Anyone using this report for any other purpose must draw their own conclusions regarding required construction procedures and subsurface conditions.

The geotechnical and geologic consultant should be retained during the earthwork and foundation phases of construction to monitor compliance with the design concepts and recommendations and to provide additional recommendations as needed. Should subsurface conditions be encountered during construction that are different from those described in this report, this office should be notified immediately so that our recommendations may be re-evaluated.

FIGURES

Source: Google Earth Images

Site Vicinity Map

237 Montreal Street
Los Angeles, California

Figure 1

RMA Job No:	21G-0735
Report Date:	3/2022
Prepared By:	MRM

RMA GeoScience

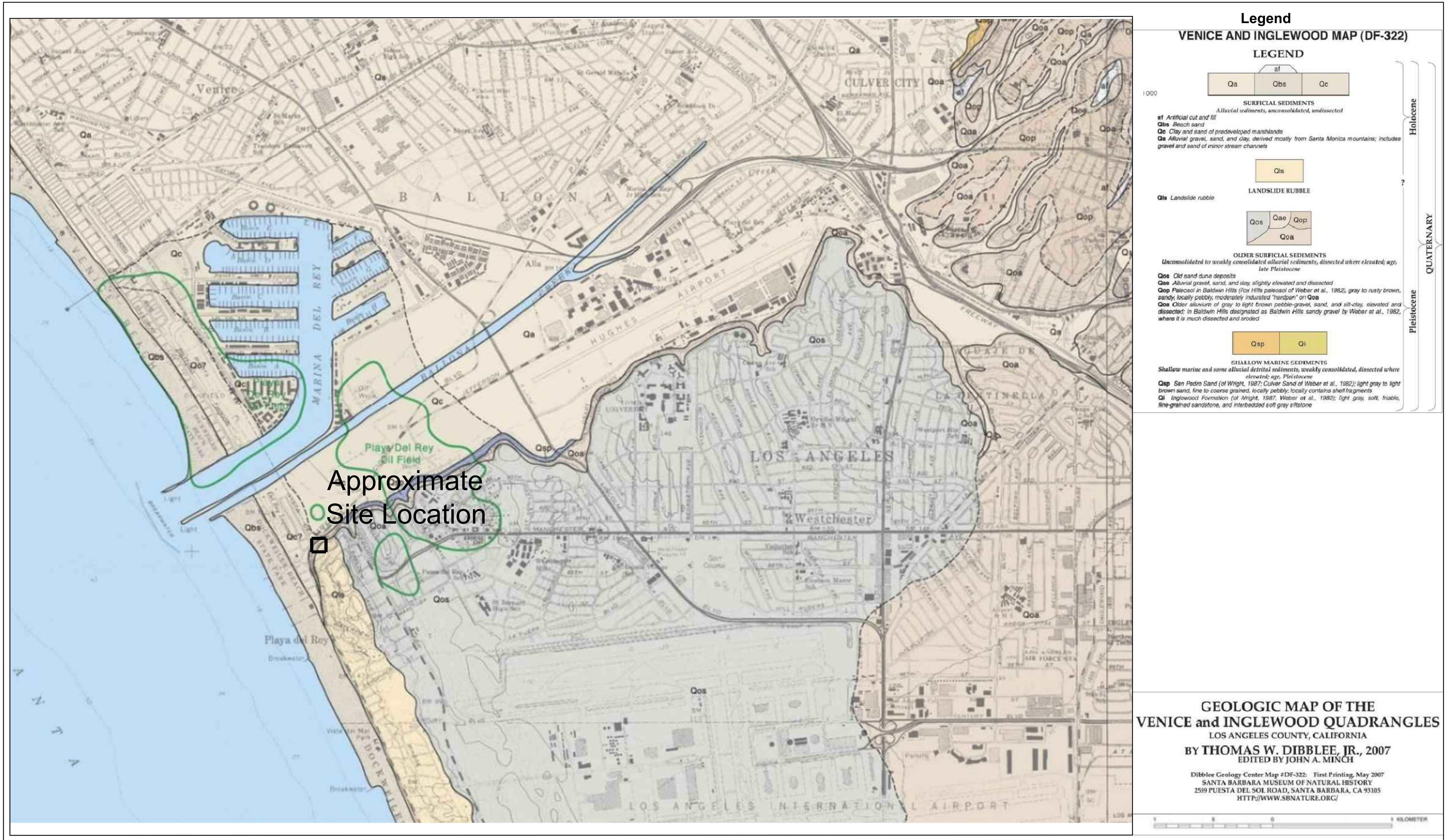


Figure 2

Regional Geologic Map

237 Montreal Street
Los Angeles, California

RMA Job No:	21G-0735
Report Date:	3/2022
Prepared By:	MRM

Approximate Site Location

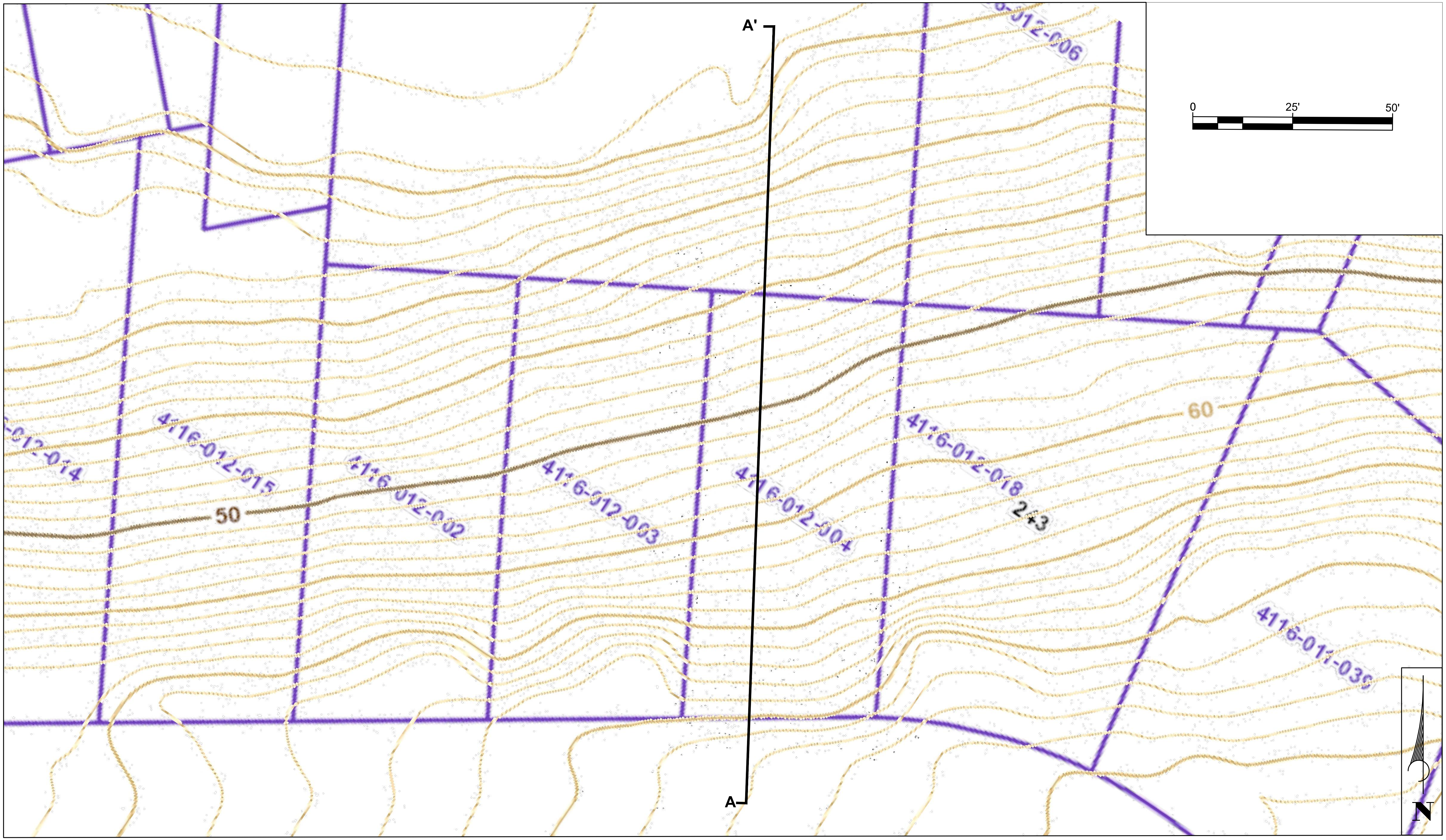
Ref: CDMG, 1998, Seismic Hazard Zone Report 036

RMA GeoScience

Historic High Groundwater Map
237 Montreal Street
Los Angeles, California

Figure 3

RMA Job No:	21G-0628
Report Date:	4/2022
Prepared By:	MRM



Source: GISNET

RMA GeoScience

Regional Topography Map

237 Montreal Street
Los Angeles, California

Figure 4

RMA Job No:	21G-0735
Report Date:	4/2022
Prepared By:	MRM

APPENDIX A

FIELD INVESTIGATION

APPENDIX A

FIELD INVESTIGATION

A-1.00 FIELD EXPLORATION

A-1.01 Number of Borings

Our subsurface investigation consisted of the excavation of one hollow stem auger borings excavated with limited access drilling equipment.

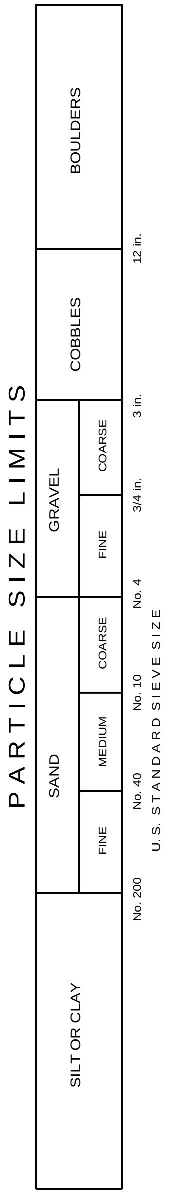
A-1.02 Location of Boring

The locations of the Boring is shown on the Geologic Map, Plate 1.

A-1.03 Boring Logging

A Log of the boring is attached in this appendix. The logs contain factual information and interpretation of subsurface conditions between samples. The strata indicated on these logs represent the approximate boundary between earth units and the transition may be gradual. The logs show subsurface conditions at the dates and locations indicated, and may not be representative of subsurface conditions at other locations and times.

Identification of the soils encountered during the subsurface exploration was made using the field identification procedure of the Unified Soils Classification System (ASTM D2488). A legend indicating the symbols and definitions used in this classification system and a legend defining the terms used in describing the relative compaction, consistency or firmness of the soil are attached in this appendix. Bag samples of the major earth units were obtained for laboratory inspection and testing, and the in-place density of the various strata encountered in the exploration was determined.



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

<u>BOUNDARY CLASSIFICATIONS:</u> Soils possessing characteristics of two groups are designated by combinations of group symbols.

<u>UNIFIED SOIL CLASSIFICATION SYSTEM</u>

I. SOIL STRENGTH/DENSITY

BASED ON STANDARD PENETRATION TESTS

Compactness of sand		Consistency of clay	
Penetration Resistance N (blows/Ft)	Compactness	Penetration Resistance N (blows/ft)	Consistency
0-4	Very Loose	<2	Very Soft
4-10	Loose	2-4	Soft
10-30	Medium Dense	4-8	Medium Stiff
30-50	Dense	8-15	Stiff
>50	Very Dense	15-30	Very Stiff
		>30	Hard

N = Number of blows of 140 lb. weight falling 30 in. to drive 2-in OD sampler 1 ft.

BASED ON RELATIVE COMPACTION

Compactness of sand		Consistency of clay	
% Compaction	Compactness	% Compaction	Consistency
<75	Loose	<80	Soft
75-83	Medium Dense	80-85	Medium Stiff
83-90	Dense	85-90	Stiff
>90	Very Dense	>90	Very Stiff

II. SOIL MOISTURE

Moisture of sands		Moisture of clays	
% Moisture	Description	% Moisture	Description
<5%	Dry	<12%	Dry
5-12%	Moist	12-20%	Moist
>12%	Very Moist	>20%	Very Moist, wet

RMA GeoScience
Every Project Matters | www.rmacompanies.com

REFERENCE TEST PIT LOGS

RMA GeoScience
9854 Glenoaks Blvd., Sun Valley, CA 91352

BORING NUMBER 1
Page 1 of 2

Client: Justin Brevoort
Project Name: PDR Hillside Home
Project Number: 21G-0735-0
Project Location: 237 Montreal St., Playa Del Ray, CA
Date Started: 2/7/2022 Completed 2/7/2022
Ground Elevation: 83* Boring Diameter: 9"
Excavation Method: Hollowstem Auger
Ground Water Levels: No Groundwater
Drilling Contractor: Leon Krous Drilling
Notes: 140 lbs Auto Hammer with 30" Drop
Logged By: mbk Checked By: HHL
*LA GISNET

Material Description

■ Thin Wall Tube ☒ 2.5" Ring Sample
▨ Bulk Sample ◫ Standard Split Spoon Sample ▽ Static Water Table

Depth (ft)	Drive Sample	Blow Count (N Value)	Bulk Sample	Moisture Content (%)	Dry Unit Weight (pcf)	Wet Unit Weight (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Material Description	<#200	D_{50}	USCS Classification
			▨							**Old Sand Dune Deposits (Qos):** 0-38.25' Light yellowish brown gray fine Silty SAND with roots in upper 1 foot, slighlty micaceous, friable, slighlty moist, loose			SM-SP
	☒	1,2,2		2.6	99.9	102.5				@ 2.5' Same as above, friable, slightly moist, loose			
5	☒	1,2,3		2.3	102.1	104.5				@ 5', Same as above, friable, slightly moist, loose			
	☒	1,3,9		2.4	99.0	101.4				@ 7.5', Same above, friable, slightly moist, loose			
10	☒	1,2,4		1.4						@ 10', Same as above, friable, slightly moist, loose			
15	☒	3,3,7		2.6	99.5	102.1				@ 15', Same as above, silt content decreased, friable, slighlty moist, medium dense			
20	☒	5,7,9		2.6	98.0	100.5				@ 20', same as above, very slighlty micaceous, friable, slighlty moist, medium dense			
25	☒	5,9,11								@ 25', Same as above with layers or lenses of fine Silty SAND and fine to medium Silty SAND, slightly moist, medium dense			
30	☒	4,8,12								@ 30', Sand with minor silt, very friable, slightly moist, medium dense, sample disturbed	1	0.5	SP
										@ 32-33' drilling starts to get tighter			

BORING NUMBER 1

Page 2 of 2

RMA GeoScience
9854 Glenoaks Blvd., Sun Valley, CA 91352

Client: Justin Brevoort

Project Name: PDR Hillside Home

Project Number: 21G-0735-0

Project Location: 237 Montreal St., Playa Del Ray, Ca

Date Started: 2/7/2022 Completed 2/7/2022

Ground Elevation: 83' Boring Diameter: 9"

Excavation Method: Hollowstem Auger

Ground Water Levels: No Groundwater

Drilling Contractor: Leon Krous Drilling

Notes: 140 lbs Auto Hammer with 30" Drop

Logged By: mbk Checked By: HHL

*LA GISNET

Depth (ft)	Drive Sample	Blow Count (N Value)	Bulk Sample	Moisture Content (%)	Dry Unit Weight (pcf)	Wet Unit Weight (pcf)	Liquid Limit	Plastic Limit	Plasticity Index	Material Description ■ Thin Wall Tube ☒ 2.5" Ring Sample ▨ Bulk Sample ◫ Standard Split Spoon Sample ∇ Static Water Table	<#200	D_{50}	USCS Classification
	☒	3,8,13								**Old Sand Dune Deposits (Qos) (con't):** 0-38.25' @ 35', Very light yellowish brown gray fine Silty SAND, friable, slightly moist, medium dense			SM-SP
40	☒	4,7,12								**San Pedro Formation (Qsp)?:** 38.5-51.5' @ 40', Light orange gray fine SAND with Silt, very friable, slightly medium dense, no ring samples, sample in shoe - -			SP
45													
50	☒	5,6,13								@ 50', Same as above, very friable, slightly moist, medium dense			
55										Total Depth Drilled 51.5' Very Little Cuttings From Borehole In Upper 15' No Groundwater Encountered Borehole Caved To 17' After Auger Pulled Backfilled With Cuttings 2/7/22			
60													
65													

APPENDIX B

LABORATORY TESTS

APPENDIX B

B-1.00 LABORATORY TESTS

B-1.01 Maximum Density

Maximum density - optimum moisture relationships for the major soil type encountered during the field exploration were performed in the laboratory using the standard procedures of ASTM D1557.

B-1.02 Expansion Tests

Expansion index testing was performed on a representative sample of the major soil type encountered during the field exploration by the test methods outlined in ASTM D4829.

B-1.03 Soluble Sulfates and Chloride Contents

Tests were performed in accordance with California Test Methods 417 and 422 on a near-surface soil sample obtained during the field exploration. These tests were performed by AP Engineering and Testing located in Pomona, California. Test results are included in this section.

B-1.04 Soil Reactivity (pH) and Electrical Conductivity (Ec)

Representative soil sample was tested for soil reactivity (pH) and electrical conductivity (Ec) using California Test Method 643. The pH measurement determines the degree of acidity or alkalinity in the soils. The Ec is a measure of the electrical resistivity and is expressed as the reciprocal of the resistivity. These tests were performed by AP Engineering and Testing located in Pomona, California. Test results are included in this section.

B-1.05 Moisture Determination

Moisture content of the soil samples was performed in accordance to standard method for determination of water content of soil by drying oven, ASTM D2216. The mass of material remaining after oven drying is used as the mass of the solid particles. The results of our laboratory tests are presented on the test pit logs.

B-1.06 Density of Split-Barrel Samples

The density of tube samples, which were obtained using a split-barrel sampler, was determined in accordance with ASTM D2937. The results of these tests are provided on the test pit logs presented in Appendix A.

B-1.07 Particle Size Analysis

Particle size analysis was performed on a representative sample of the on-site soils in accordance with the standard test methods of the ASTM D422. The test results are included in this Appendix.

B-1.08 Direct Shear

Direct shear test was performed on undisturbed samples encountered in the test hole using the standard test method of ASTM D3080 (consolidated and drained). Shear tests were performed on a direct shear machine of the strain-controlled type. To simulate possible adverse field conditions, the samples were saturated prior to shearing. Samples were sheared at varying normal loads and the results plotted to establish the angle of the internal friction and cohesion of the tested samples. Graphic representation of the result is included in this section.

B-1.09 Test Results

Results for laboratory tests performed on representative samples obtained during the field investigation are presented in this appendix and on test pit logs presented in Appendix A.

MAXIMUM DENSITY - OPTIMUM MOISTURE

(Test Method: ASTM D1557)

Sample Number	Optimum Moisture (Percent)	Maximum Density (lbs/ft^3)
B1 @ 0-7.5 ft	10.5	119.5

EXPANSION TEST

Test Method: ASTM D4829

Sample Location	Expansion Index	Expansion Classification
B1 @ 0-7.5 feet	0	Very Low

SOLUBLE SULFATE AND CHLORIDE CONTENTS

(California Test Method 417 & 422)

Sample Number	Sulfate Content (ppm)	Chloride Content (ppm)
B1 @ 0-7.5 ft	70	17

SOIL REACTIVITY (pH) AND ELECTRICAL CONDUCTIVITY

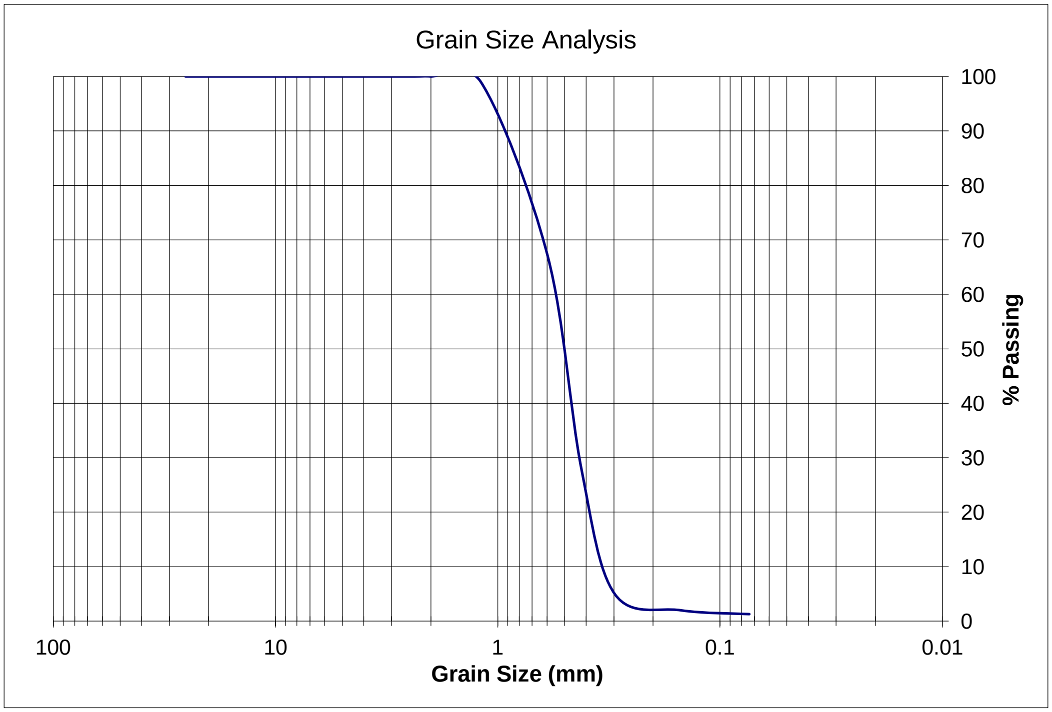
(Test Method: ASTM D4972)

Sample Location	pH	Resistivity (Ohm-cm)
B1 @ 0-7.5 ft	7.6	6800

PARTICLE SIZE ANALYSIS
ASTM D422

Project ID: 21G-0735
Location: B1
Depth: 30 feet
Soil Description: Sand with minor silt

Screen Size	% Passing
1"	100
3/4"	100
1/2"	100
3/8"	100
#4	100
#8	100
#10	100
#16	99
#30	67
#40	28
#50	5
#100	2
#200	1



DIRECT SHEAR TEST
ASTM D3080

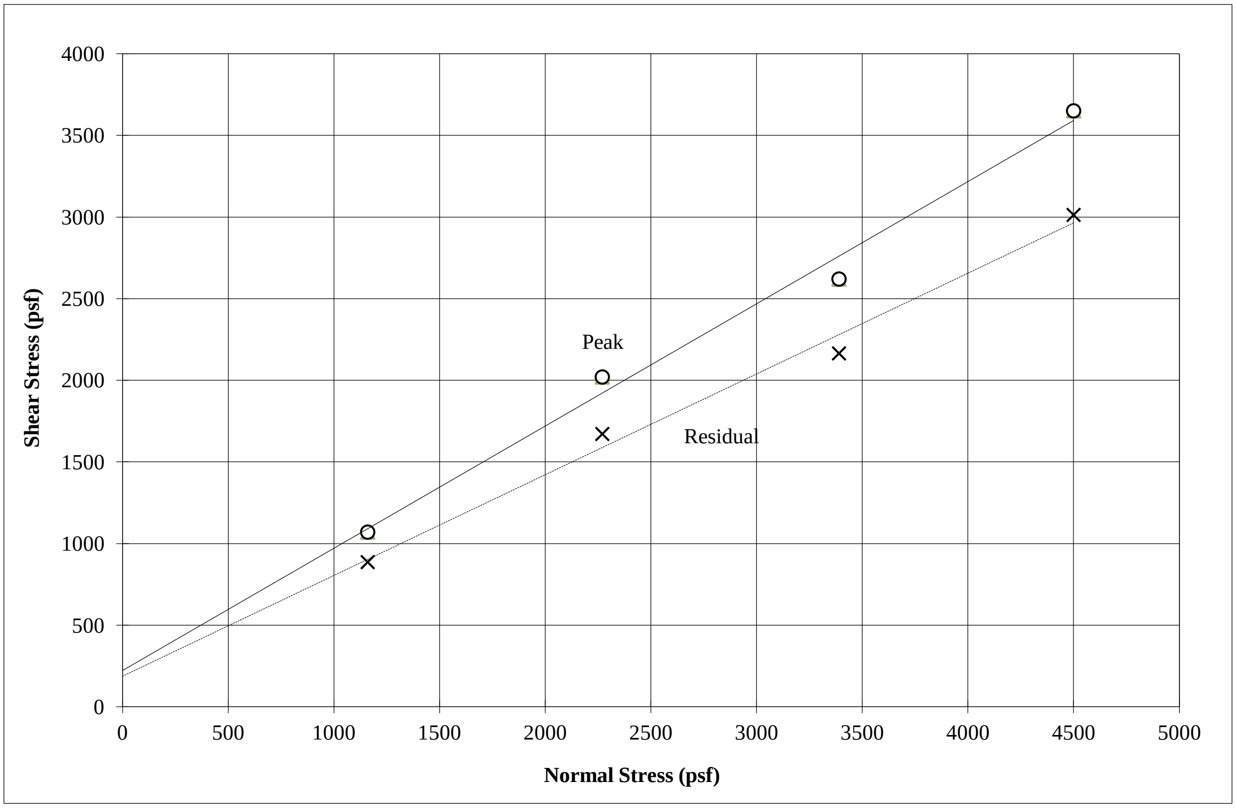
Remolded or Undisturbed: Undisturbed
Maximum Dry Density (pcf) = N/A
Optimum Moisture Content (%) = N/A
Initial Dry Density (pcf) = 102.1
Relative Compaction (%) = N/A
Initial Moisture Content (%) = 3.7%
Final Moisture Content (%) = 23.8%

Project ID: 21G-0735-0
Location: B1
Depth: 25
Soil Description: Brown Medium Sand

Diameter (in)	2.41
Area of sample (in^2)	4.56
Load Ring Constant (lb/in)	4010

Load Applied (g)	Normal Pressure (psf)	Peak		Residual	
		Dial Reading	Shear Resist (psf)	Dial Reading	Shear Resist (psf)
16615	1160	0.0085	1070	0.0070	886
32600	2270	0.0160	2020	0.0132	1671
48674	3390	0.0207	2620	0.0171	2165
64681	4500	0.0288	3650	0.0238	3013

	Peak	Residual
Cohesion (psf) =	220	190
Friction Angle (deg) =	37	32



DIRECT SHEAR TEST
ASTM D3080

Undisturbed

Maximum Dry Density (pcf) = N/A
Optimum Moisture Content (%) = N/A

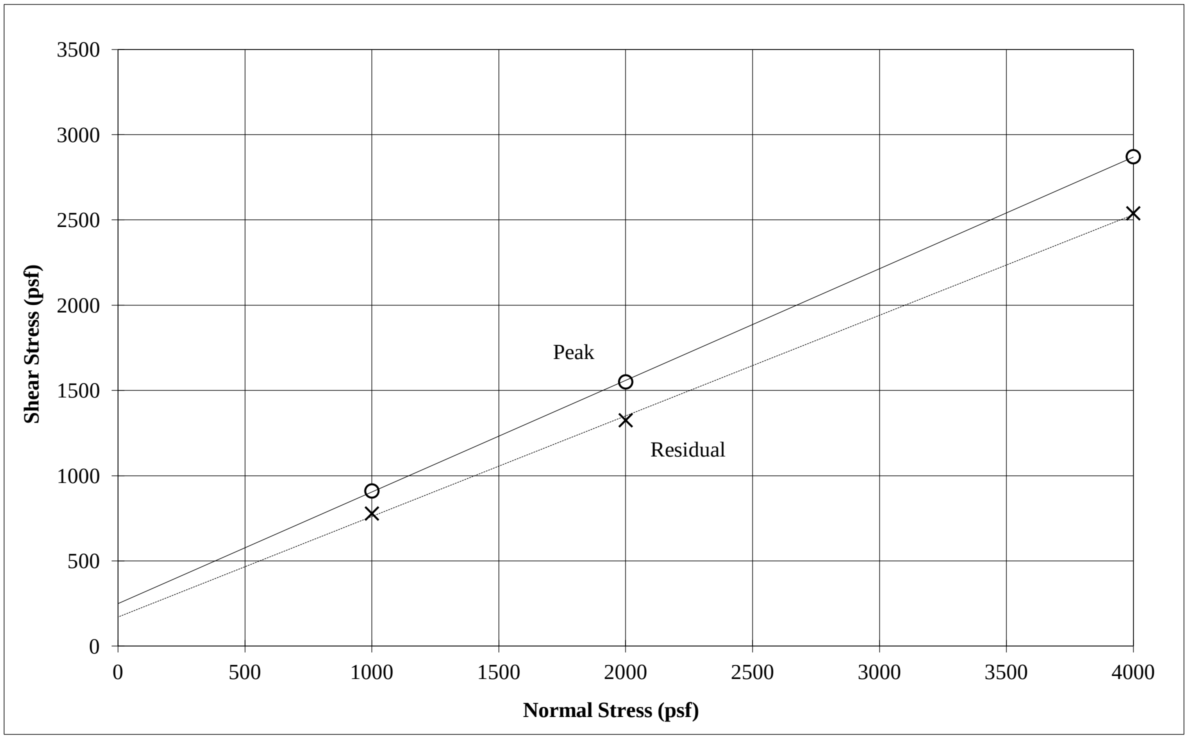
Project ID: 21G-0735-0
Location: B1
Depth: 35 feet
Soil Description: Silty Sand

Initial Dry Density (pcf) = 100.4
Relative Compaction (%) = N/A
Initial Moisture Content (%) = 4.1
Final Moisture Content (%) = 23.3

Diameter (in)	2.42
Area of sample (in^2)	4.60
Load Ring Constant (lb/in)	4480

Normal Pressure (psf)	Peak	Residual
	Shear Resist (psf)	Shear Resist (psf)
1000	910	778
2000	1550	1325
4000	2871	2539

	Peak	**Residual**
Cohesion (psf) =	**250**	**170**
Friction Angle (deg) =	**33**	**31**



DIRECT SHEAR TEST
ASTM D3080

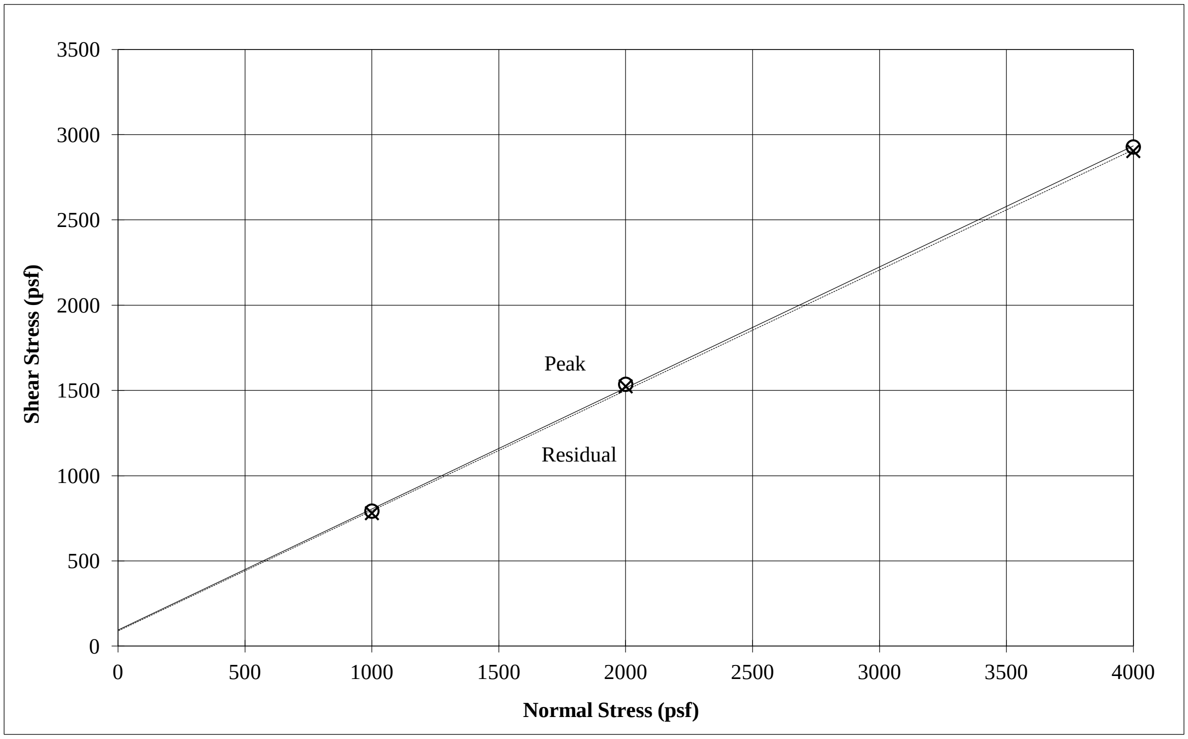
Undisturbed
Maximum Dry Density (pcf) = N/A
Optimum Moisture Content (%) = N/A
Initial Dry Density (pcf) = 99.7
Relative Compaction (%) = N/A
Initial Moisture Content (%) = 5.7
Final Moisture Content (%) = 21.9

Project ID: 21G-0735-0
Location: B1
Depth: 50 feet
Soil Description: Silty Sand

Diameter (in)	2.42
Area of sample (in^2)	4.60
Load Ring Constant (lb/in)	4480

Normal Pressure (psf)	Peak	Residual
	Shear Resist (psf)	Shear Resist (psf)
1000	792	780
2000	1536	1524
4000	2928	2904

	Peak	**Residual**
Cohesion (psf) =	**100**	**90**
Friction Angle (deg) =	**35**	**35**



APPENDIX C

GENERAL EARTHWORK
AND
GRADING SPECIFICATIONS

GENERAL EARTHWORK AND GRADING SPECIFICATIONS

C-1.00 GENERAL DESCRIPTION

C-1.01 Introduction

These specifications present our general recommendations for earthwork and grading for the subject project. These specifications shall cover all clearing and grubbing, removal of existing structures, preparation of land to be filled, filling of the land, spreading, compaction and control of the fill, and all subsidiary work necessary to complete the grading of the filled areas to conform with the lines, grades and slopes as shown on the approved plans.

The recommendations contained in the geotechnical report of which these general specifications are a part of shall supersede the provisions contained hereinafter in case of conflict.

C-1.02 Laboratory Standard and Field Test Methods

The laboratory standard used to establish the maximum density and optimum moisture shall be ASTM D1557.

The insitu density of earth materials (field compaction tests) shall be determined by the sand cone method (ASTM D1556), direct transmission nuclear method (ASTM D2922) or other test methods as considered appropriate by the geotechnical consultant.

Relative compaction is defined, for purposes of these specifications, as the ratio of the in-place density to the maximum density as determined in the previously mentioned laboratory standard.

C-2.00 Clearing

C-2.01 Surface Clearing

All structures marked for removal, timber, logs, trees, brush and other rubbish shall be removed and disposed of off the site. Any trees to be removed shall be pulled in such a manner so as to remove as much of the root system as possible.

C-2.02 Subsurface Removals

A thorough search should be made for possible underground storage tanks and/or septic tanks and cesspools. If found, tanks should be removed and cesspools pumped dry.

Any concrete irrigation lines shall be crushed in place and all metal underground lines shall be removed from the site.

C-2.03 Backfill of Cavities

All cavities created or exposed during clearing and grubbing operations or by previous use of the site shall be cleared of deleterious material and backfilled with native soils or other materials approved by the soil engineer. Said backfill shall be compacted to a minimum of 90% or 95% relative compaction (ASTM: D1557) provided that footing overexcavation requirements are met. The minimum of 90% or 95% compaction requirements will be determined by performing hydrometer testing on representative soil samples during grading to define the percentage of passing 2-microns required by City of Los Angeles.

C-3.00 ORIGINAL GROUND PREPARATION

C-3.01 Stripping of Vegetation

After the site has been properly cleared, all vegetation and topsoil containing the root systems of former vegetation shall be stripped from areas to be graded. Materials removed in this stripping process may be used as fill in areas designated by the soil engineer, provided the vegetation is mixed with a sufficient amount of soil to assure that no appreciable settlement or other detriment will occur due to decaying of the organic matter. Soil materials containing more than 3% organics shall not be used as structural fill.

C-3.02 Removals of Non-Engineered Fills

Any non-engineered fills encountered during grading shall be completely removed and the underlying ground shall be prepared in accordance to the recommendations for original ground preparation contained in this section. After cleansing of any organic matter the fill material may be used for engineered fill.

C-3.03 Overexcavation of Fill Areas

The existing ground in all areas determined to be satisfactory for the support of fills shall be scarified to a minimum depth of 6 inches. Scarification shall continue until the soils are broken down and free from lumps or clods and until the scarified zone is uniform. The moisture content of the scarified zone shall be adjusted to within 2% of optimum moisture. The scarified zone shall then be uniformly compacted to 95% relative compaction.

Where fill material is to be placed on ground with slopes steeper than 5:1 (H:V) the sloping ground shall be benched. The lowermost bench shall be a minimum of 15 feet wide, shall be a minimum of 2 feet deep, and shall expose firm material as determined by the geotechnical consultant. Other benches shall be excavated to firm material as determined by the geotechnical consultant and shall have a minimum width of 4 feet.

Existing ground that is determined to be unsatisfactory for the support of fills shall be overexcavated in accordance to the recommendations contained in the geotechnical report of which these general specifications are a part.

C-4.00 FILL MATERIALS

C-4.01 General

Materials for the fill shall be free from vegetable matter and other deleterious substances, shall not contain rocks or lumps of a greater dimension than is recommended by the geotechnical consultant, and shall be approved by the geotechnical consultant. Soils of poor gradation, expansion, or strength properties shall be placed in areas designated by the geotechnical consultant or shall be mixed with other soils providing satisfactory fill material.

C-4.02 Oversize Material

Oversize material, rock or other irreducible material with a maximum dimension greater than 12 inches, shall not be placed in fills, unless the location, materials, and disposal methods are specifically approved by the geotechnical consultant. Oversize material shall be placed in such a manner that nesting of oversize material does not occur and in such a manner that the oversize material is completely surrounded by fill material compacted to a minimum of 95% relative compaction. Oversize material shall not be placed within 10 feet of finished grade without the approval of the geotechnical consultant.

C-4.03 Import

Material imported to the site shall conform to the requirements of Section 4.01 of these specifications. Potential import material shall be approved by the geotechnical consultant prior to importation to the subject site.

C-5.00 PLACING AND SPREADING OF FILL

C-5.01 Fill Lifts

The selected fill material shall be placed in nearly horizontal layers which when compacted will not exceed approximately 6 inches in thickness. Thicker lifts may be placed if testing indicates the compaction procedures are such that the required compaction is being achieved and the geotechnical consultant approves their use.
Each layer shall be spread evenly and shall be thoroughly blade mixed during the spreading to insure uniformity of material in each layer.

C-5.02 Fill Moisture

When the moisture content of the fill material is below that recommended by the soils engineer, water shall then be added until he moisture content is as specified to assure thorough bonding during the compacting process.

When the moisture content of the fill material is above that recommended by the soils engineer, the fill material shall be aerated by blading or other satisfactory methods until the moisture content is as specified.

C-5.03 Fill Compaction

After each layer has been placed, mixed, and spread evenly, it shall be thoroughly compacted to not less than 90% or 95% depending on the guidelines of the governing agency, relative compaction . Compaction shall be by sheepsfoot rollers, multiple-wheel pneumatic tired rollers, or other types approved by the soil engineer.

Rolling shall be accomplished while the fill material is at the specified moisture content. Rolling of each layer shall be continuous over its entire area and the roller shall make sufficient trips to insure that the desired density has been obtained.

C-5.04 Fill Slopes

Fill slopes shall be compacted by means of sheepsfoot rollers or other suitable equipment. Compacting of the slopes may be done progressively in increments of 3 to 4 feet in fill height. At the completion of grading, the slope face shall be compacted to a minimum of 90% or 95%, depending on the requirements of the governing agency, relative compaction. This may require track rolling or rolling with a grid roller attached to a tractor mounted side-boom.

Slopes may be over filled and cut back in such a manner that the exposed slope faces are compacted to a minimum of 95% relative compaction.

The fill operation shall be continued in six inch (6") compacted layers, or as specified above, until the fill has been brought to the finished slopes and grades as shown on the accepted plans.

C-5.05 Compaction Testing

Field density tests shall be made by the geotechnical consultant of the compaction of each layer of fill. Density tests shall be made at locations selected by the geotechnical consultant.

Frequency of field density tests shall be not less than one test for each 2.0 feet of fill height and at least every one thousand cubic yards of fill. Where fill slopes exceed four feet in height their finished faces shall be tested at a frequency of one test for each 1000 square feet of slope face.

Where sheepsfoot rollers are used, the soil may be disturbed to a depth of several inches. Density reading shall be taken in the compacted material below the disturbed surface. When these readings indicate that the density of any layer of fill or portion thereof is below the required density, the particular layer or portion shall be reworked until the required density has been obtained.

C-6.00 SUBDRAINS

C-6.01 Subdrain Material

Subdrains shall be constructed of a minimum 4-inch diameter pipe encased in a suitable filter material. The subdrain pipe shall be Schedule 40 Acrylonitrile Butadiene Styrene (ABS) or Schedule 40 Polyvinyl Chloride Plastic (PVC) pipe or approved equivalent. Subdrain pipe shall be installed with perforations down. Filter material shall consist of 3/4" to 1 1/2" clean gravel wrapped in an envelope of filter fabric consisting of Mirafi 140N or approved equivalent.

C-6.02 Subdrain Installation

Subdrain systems, if required, shall be installed in approved ground to conform the approximate alignment and details shown on the plans or herein. The subdrain locations shall not be changed or modified without the approval of the geotechnical consultant. The geotechnical consultant may recommend and direct changes in the subdrain line, grade or material upon approval by the design civil engineer and the appropriate governmental agencies.

C-7.00 EXCAVATIONS

C-7.01 General

Excavations and cut slopes shall be examined by the geotechnical consultant. If determined necessary by the geotechnical consultant, further excavation or overexcavation and refilling of overexcavated areas shall be performed, and/or remedial grading of cut slopes shall be performed.

C-7.02 Fill-Over-Cut Slopes

Where fill-over-cut slopes are to be graded the cut portion of the slope shall be made and approved by the geotechnical consultant prior to placement of materials for construction of the fill portion of the slope.

C-8.00 TRENCH BACKFILL

C-.01 General

Trench backfill within street right of ways shall be compacted to 95% relative compaction as determined by the ASTM D1557 test method. Backfill may be jetted as a means of initial compaction; however, mechanical compaction will be required to obtain the required percentage of relative compaction. If trenches are jetted, there must be a suitable delay for drainage of excess water before mechanical compaction is applied.

C-9.00 SEASONAL LIMITS

C-9.01 General

No fill material shall be placed, spread or rolled while it is frozen or thawing or during unfavorable weather conditions. When the work is interrupted by heavy rain, fill operations shall not be resumed until field tests by the soils engineer indicate that the moisture content and density of the fill are as previously specified.

C-10.00 SUPERVISION

C-10.01 Prior to Grading

The site shall be observed by the geotechnical consultant upon completion of clearing and grubbing, prior to the preparation of any original ground for preparation of fill.

The supervisor of the grading contractor and the field representative of the geotechnical consultant shall have a meeting and discuss the geotechnical aspects of the earthwork prior to commencement of grading.

C-10.02 During Grading

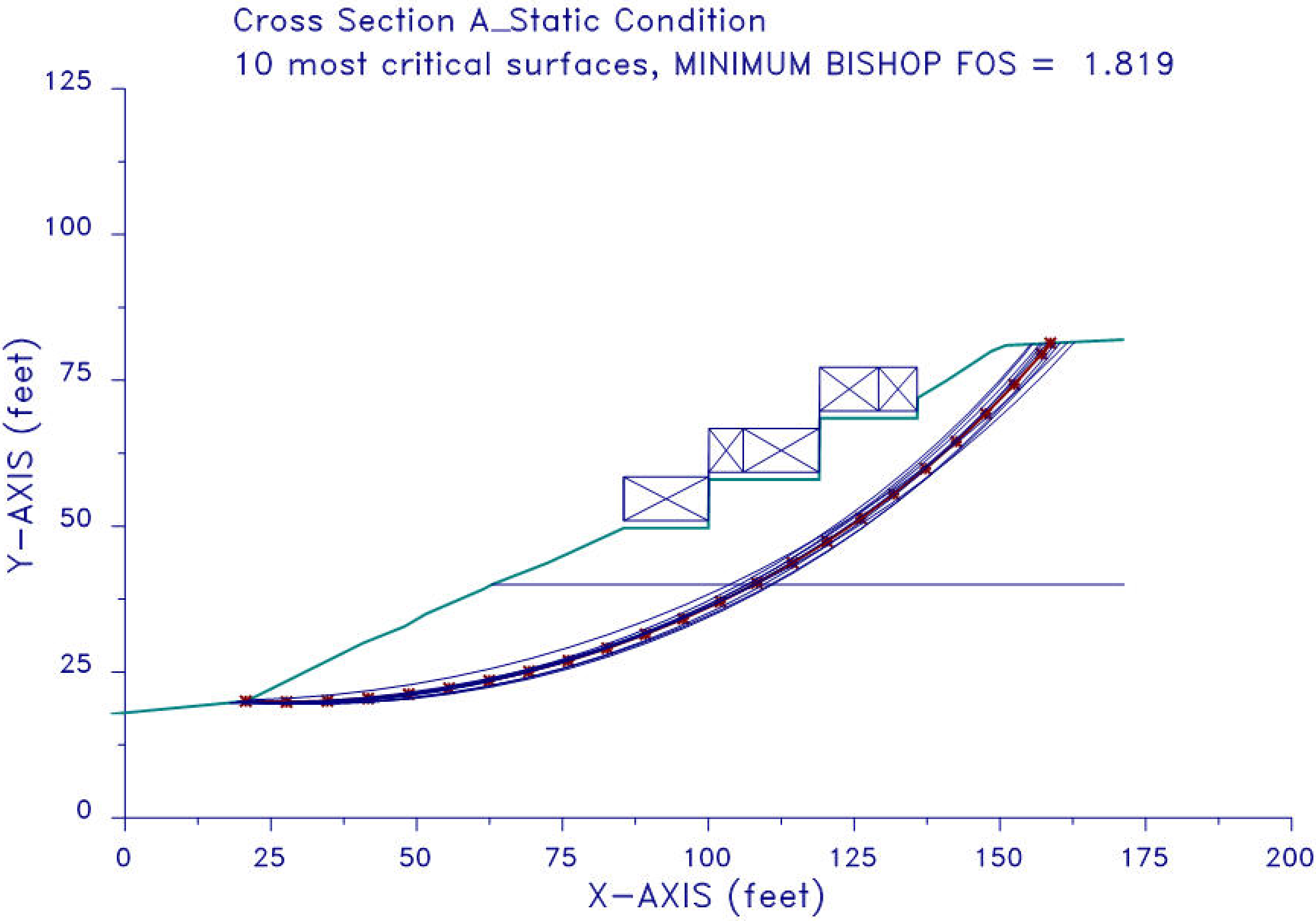
Site preparation of all areas to receive fill shall be tested and approved by the geotechnical consultant prior to the placement of any fill.

The geotechnical consultant or his representative shall observe the fill and compaction operations so that he can provide an opinion regarding the conformance of the work to the recommendations

APPENDIX D

SLOPE STABILITY ANALYSIS RESULTS

21G735ST 4-07-22 10:51



Cross Section A_Static Condition

10 most critical surfaces, MINIMUM BISHOP FOS = 1.819

```
XSTABL File: 21G735ST   4-07-22   10:51

          ******************************************
          *             X S T A B L                *
          *                                        *
          *        Slope Stability Analysis        *
          *               using the                *
          *             Method of Slices           *
          *                                        *
          *        Copyright (C) 1992 - 2013       *
          *   Interactive Software Designs, Inc.   *
          *        Moscow, ID 83843, U.S.A.        *
          *                                        *
          *          All Rights Reserved           *
          *                                        *
          *  Ver. 5.209                96 - 2086  *
          ******************************************


    Problem Description : Cross Section A_Static Condition




    -----------------------------
    SEGMENT BOUNDARY COORDINATES
    -----------------------------

       20 SURFACE boundary segments

    Segment    x-left    y-left    x-right    y-right    Soil Unit
       No.      (ft)      (ft)       (ft)       (ft)    Below Segment

        1          .0      18.0       20.8       20.0          2
        2        20.8      20.0       40.9       30.0          2
        3        40.9      30.0       47.9       32.8          2
        4        47.9      32.8       51.7       35.0          2
        5        51.7      35.0       61.4       39.2          2
        6        61.4      39.2       62.9       40.0          2
        7        62.9      40.0       72.4       43.7          1
        8        72.4      43.7       85.5       49.7          1
        9        85.5      49.7      100.0       49.7          1
       10       100.0      49.7      100.1       58.0          1
       11       100.1      58.0      106.0       58.0          1
       12       106.0      58.0      119.0       58.0          1
       13       119.0      58.0      119.1       68.5          1
       14       119.1      68.5      129.2       68.5          1
       15       129.2      68.5      135.8       68.5          1
       16       135.8      68.5      135.9       72.0          1
       17       135.9      72.0      140.9       75.0          1
```

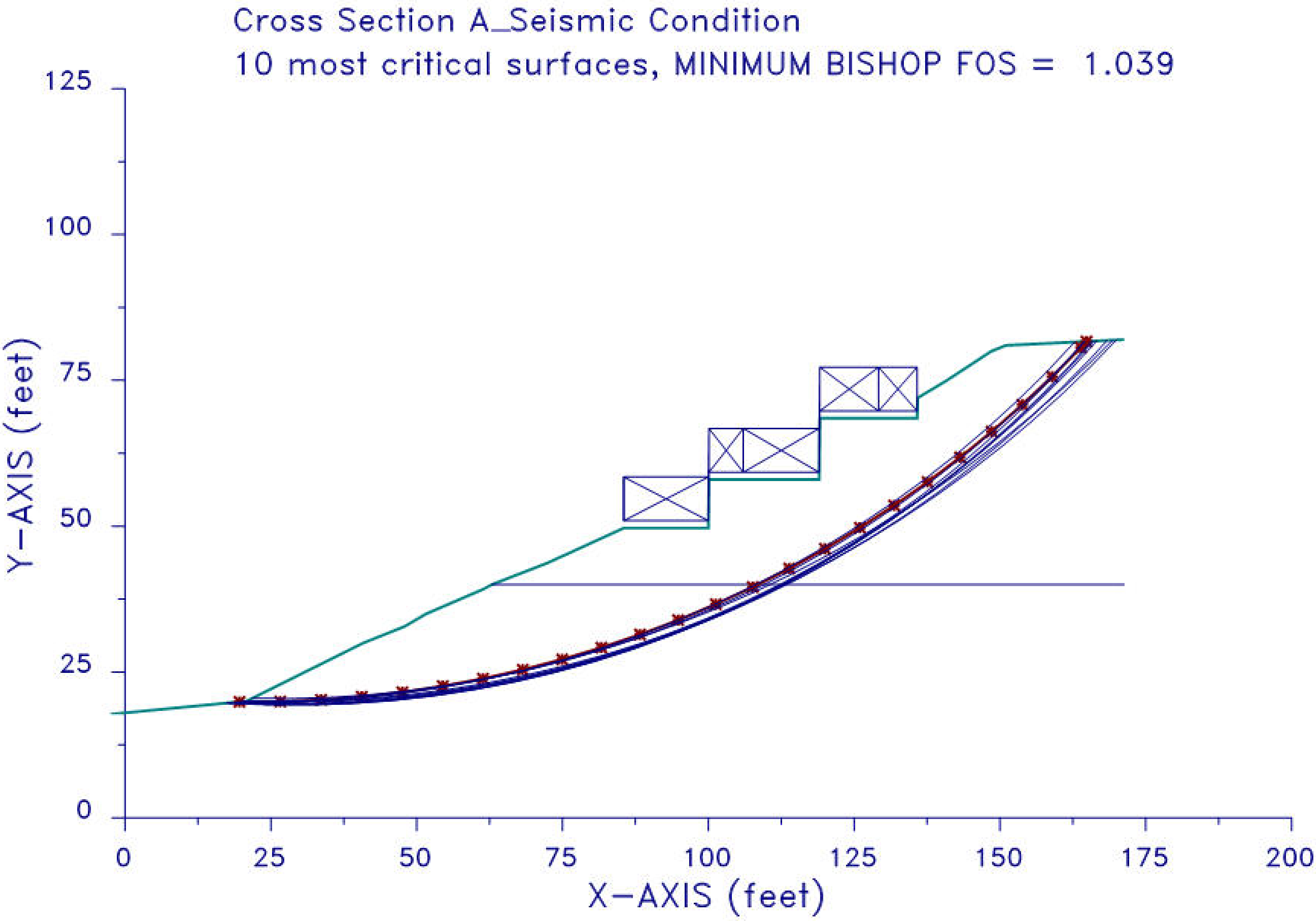
```
   18       140.9      75.0      148.5      80.0          1
   19       148.5      80.0      151.0      81.0          1
   20       151.0      81.0      171.3      82.0          1


    1 SUBSURFACE boundary segments

Segment    x-left    y-left    x-right   y-right     Soil Unit
   No.      (ft)      (ft)       (ft)      (ft)    Below Segment

    1        62.9      40.0      171.3      40.0          2


--------------------------
ISOTROPIC Soil Parameters
--------------------------

 2 Soil unit(s) specified

Soil   Unit Weight   Cohesion  Friction    Pore Pressure      Water
Unit  Moist    Sat.  Intercept   Angle  Parameter  Constant  Surface
 No.  (pcf)   (pcf)    (psf)      (deg)       Ru      (psf)      No.

  1   100.0   105.0      90.0    35.00      .000         .0      0
  2   100.0   105.0     170.0    31.00      .000         .0      0


---------------
BOUNDARY LOADS
---------------

    1 load(s) specified


Load        x-left      x-right     Intensity     Direction
 No.         (ft)         (ft)        (psf)         (deg)

  1           85.5        135.8       300.0          .0


NOTE - Intensity is specified as a uniformly distributed
       force acting on a HORIZONTALLY projected surface.



A critical failure surface searching method, using a random
technique for generating CIRCULAR surfaces has been specified.


 1600 trial surfaces will be generated and analyzed.
```

```
  40 Surfaces initiate from each of  40 points equally spaced
along the ground surface between  x =      4.0 ft
                             and  x =     25.0 ft


Each surface terminates between   x =    150.0 ft
                            and   x =    171.0 ft


Unless further limitations were imposed, the minimum elevation
at which a surface extends is  y =       .0 ft



* * * * *  DEFAULT SEGMENT LENGTH SELECTED BY XSTABL  * * * * *

    7.0 ft line segments define each trial failure surface.



---------------------
ANGULAR RESTRICTIONS
---------------------

  The first segment of each failure surface will be inclined
  within the angular range defined by :

          Lower angular limit :=   -45.0 degrees
          Upper angular limit :=  (slope angle - 5.0) degrees





Factors of safety have been calculated by the :

* * * * *   SIMPLIFIED BISHOP METHOD   * * * * *



  The most critical circular failure surface
  is specified by 24 coordinate points

       Point      x-surf      y-surf
        No.        (ft)        (ft)

         1         20.69       19.99
         2         27.69       19.86
```

```
         3        34.69       20.02
         4        41.68       20.47
         5        48.64       21.20
         6        55.56       22.21
         7        62.44       23.51
         8        69.26       25.09
         9        76.01       26.94
        10        82.68       29.07
        11        89.25       31.47
        12        95.73       34.14
        13       102.08       37.07
        14       108.32       40.26
        15       114.41       43.70
        16       120.36       47.39
        17       126.16       51.31
        18       131.79       55.47
        19       137.24       59.86
        20       142.51       64.47
        21       147.59       69.29
        22       152.46       74.31
        23       157.13       79.53
        24       158.65       81.38

****  Simplified BISHOP FOS =   1.819  ****




The following is a summary of the TEN most critical surfaces

Problem Description : Cross Section A_Static Condition

       FOS      Circle Center    Radius   Initial Terminal  Resisting
    (BISHOP)  x-coord  y-coord            x-coord  x-coord   Moment
                (ft)     (ft)      (ft)     (ft)     (ft)    (ft-lb)

 1.   1.819     27.30   190.94   171.08     20.69   158.65  2.407E+07
 2.   1.820     26.89   189.87   170.21     19.08   157.98  2.384E+07
 3.   1.820     26.17   189.14   169.46     19.08   156.83  2.305E+07
 4.   1.824     27.03   184.26   164.77     18.00   155.57  2.235E+07
 5.   1.824     24.93   188.28   168.70     18.00   155.25  2.214E+07
 6.   1.824     31.18   179.07   159.61     19.62   157.30  2.323E+07
 7.   1.824     23.32   208.11   188.32     19.08   162.80  2.751E+07
 8.   1.824     30.80   186.26   166.66     20.15   160.35  2.526E+07
 9.   1.825     16.09   223.35   203.20     21.23   161.57  2.656E+07
10.   1.826     32.40   181.24   161.68     20.69   159.54  2.457E+07
```

* * * END OF FILE * * *

21G735SE 4-07-22 10:53



```
XSTABL File: 21G735SE   4-07-22   10:53

             ******************************************
             *              X S T A B L               *
             *                                        *
             *        Slope Stability Analysis        *
             *                using the               *
             *            Method of Slices            *
             *                                        *
             *        Copyright (C) 1992 - 2013       *
             *   Interactive Software Designs, Inc.   *
             *        Moscow, ID 83843, U.S.A.        *
             *                                        *
             *          All Rights Reserved           *
             *                                        *
             *  Ver. 5.209                 96 - 2086  *
             ******************************************


    Problem Description : Cross Section A_Seismic Condition




    -----------------------------
    SEGMENT BOUNDARY COORDINATES
    -----------------------------

       20 SURFACE boundary segments

    Segment    x-left    y-left    x-right   y-right     Soil Unit
       No.      (ft)      (ft)       (ft)      (ft)    Below Segment

        1          .0      18.0       20.8      20.0         2
        2        20.8      20.0       40.9      30.0         2
        3        40.9      30.0       47.9      32.8         2
        4        47.9      32.8       51.7      35.0         2
        5        51.7      35.0       61.4      39.2         2
        6        61.4      39.2       62.9      40.0         2
        7        62.9      40.0       72.4      43.7         1
        8        72.4      43.7       85.5      49.7         1
        9        85.5      49.7      100.0      49.7         1
       10       100.0      49.7      100.1      58.0         1
       11       100.1      58.0      106.0      58.0         1
       12       106.0      58.0      119.0      58.0         1
       13       119.0      58.0      119.1      68.5         1
       14       119.1      68.5      129.2      68.5         1
       15       129.2      68.5      135.8      68.5         1
       16       135.8      68.5      135.9      72.0         1
       17       135.9      72.0      140.9      75.0         1
```

```
   18       140.9      75.0      148.5      80.0         1
   19       148.5      80.0      151.0      81.0         1
   20       151.0      81.0      171.3      82.0         1


    1 SUBSURFACE boundary segments

Segment    x-left    y-left    x-right   y-right     Soil Unit
   No.      (ft)      (ft)       (ft)      (ft)    Below Segment

    1        62.9      40.0      171.3      40.0         2


--------------------------
ISOTROPIC Soil Parameters
--------------------------

 2 Soil unit(s) specified

Soil   Unit Weight   Cohesion  Friction    Pore Pressure      Water
Unit  Moist    Sat.  Intercept   Angle  Parameter  Constant  Surface
 No.  (pcf)   (pcf)    (psf)     (deg)      Ru      (psf)      No.

  1   100.0   105.0      90.0    35.00      .000         .0      0
  2   100.0   105.0     170.0    31.00      .000         .0      0



A horizontal earthquake loading coefficient
of   .290 has been assigned

A vertical earthquake loading coefficient
of   .000 has been assigned


---------------
BOUNDARY LOADS
---------------

    1 load(s) specified


Load        x-left      x-right     Intensity     Direction
 No.         (ft)         (ft)        (psf)         (deg)

  1           85.5        135.8       300.0          .0


NOTE - Intensity is specified as a uniformly distributed
       force acting on a HORIZONTALLY projected surface.
```

```
A critical failure surface searching method, using a random
technique for generating CIRCULAR surfaces has been specified.


 1600 trial surfaces will be generated and analyzed.


  40 Surfaces initiate from each of  40 points equally spaced
along the ground surface between  x =      4.0 ft
                             and  x =     25.0 ft


Each surface terminates between   x =    150.0 ft
                            and   x =    171.0 ft


Unless further limitations were imposed, the minimum elevation
at which a surface extends is  y =       .0 ft



* * * * *  DEFAULT SEGMENT LENGTH SELECTED BY XSTABL  * * * * *

    7.0 ft line segments define each trial failure surface.



---------------------
ANGULAR RESTRICTIONS
---------------------

  The first segment of each failure surface will be inclined
  within the angular range defined by :

          Lower angular limit :=   -45.0 degrees
          Upper angular limit :=  (slope angle - 5.0) degrees





Factors of safety have been calculated by the :

* * * * *   SIMPLIFIED BISHOP METHOD   * * * * *
```

```
  The most critical circular failure surface
  is specified by 25 coordinate points

       Point      x-surf      y-surf
        No.        (ft)        (ft)

         1         19.62       19.89
         2         26.62       19.93
         3         33.61       20.22
         4         40.59       20.76
         5         47.54       21.55
         6         54.47       22.58
         7         61.35       23.86
         8         68.18       25.39
         9         74.95       27.16
        10         81.66       29.17
        11         88.29       31.42
        12         94.83       33.91
        13        101.28       36.62
        14        107.63       39.57
        15        113.87       42.74
        16        120.00       46.13
        17        126.00       49.74
        18        131.86       53.56
        19        137.59       57.58
        20        143.17       61.81
        21        148.59       66.23
        22        153.86       70.85
        23        158.95       75.65
        24        163.87       80.63
        25        164.84       81.68

****  Simplified BISHOP FOS =   1.039  ****




The following is a summary of the TEN most critical surfaces

Problem Description : Cross Section A_Seismic Condition

       FOS      Circle Center    Radius  Initial Terminal  Resisting
    (BISHOP)  x-coord  y-coord          x-coord  x-coord    Moment
                (ft)     (ft)     (ft)    (ft)     (ft)     (ft-lb)

 1.   1.039     21.98   215.93   196.06   19.62   164.84  2.652E+07
 2.   1.039     28.59   208.42   188.60   20.69   168.37  2.864E+07
 3.   1.039     28.66   202.21   182.71   18.54   165.99  2.720E+07
```

```
  4.   1.040     21.59   226.90   207.02    19.62   169.32  3.001E+07
  5.   1.040     26.31   217.11   197.27    20.15   169.97  3.009E+07
  6.   1.040     23.32   208.11   188.32    19.08   162.80  2.502E+07
  7.   1.040     26.86   207.32   187.87    17.46   166.60  2.789E+07
  8.   1.040     29.88   196.02   176.60    18.54   164.41  2.603E+07
  9.   1.040     28.79   200.79   181.47    17.46   165.70  2.716E+07
 10.   1.040     26.35   206.92   186.49    21.77   164.51  2.544E+07

                   * * *  END OF FILE  * * *
```

APPENDIX E

REFERENCES

REFERENCES

1. California Building Standards Commission, 2019 California Building Code.
2. California Division of Mines and Geology, 1998, Seismic Hazards Zone Report for the Venice 7.5-Minute Quadrangle, Los Angeles County, California, Seismic Hazard Zone Report 036.
3. California Geologic Survey (CGS), 1999, Earthquake Zones of Required Investigation Venice Quadrangle, 7.5-Minute Quadrangle, Los Angeles County, California, Scale 1:24,000.
4. Dibblee, T.W., 2007, Geologic map of the Venice Quadrangle, Los Angeles County, California: Dibblee Geological Foundation, Dibblee Foundation Map DF-322, scale 1:24,000
5. Google Earth, Aerial Photographs, 1985-2021
6. Historic Aerials by NETR, Aerial Photographs from 1947to 2021, Topographic Maps from 1896 to 2018 http://www.historicaerials.com
7. International Code Counsel, Inc., 2019, 2019California Building Code, California Code of Regulations, Title 24.
8. Naval Facilities Engineering Command, Foundations & Earth Structures, Design Manual 7.02, Revalidated by Change 1 September 1986.
9. SEAOC Seismology Committee (2019), “Seismically Induced Lateral Earth Pressures on Retaining Structures and Basement Walls,” August 2019, *The SEAOC Blue Book: Seismic Design Recommendations*, Structural Engineers Association of California, Sacramento, CA.
10. Seed, H.B. and Whitman, R.V., 1970, Design of Earth.
11. Geosoils Inc., Geotechnical Investigation for Proposed Addition to Existing Residence at 235 Montreal Street, Community of Playa Del Rey, City of Los Angeles, CA, November 26, 1990
12. Kramer, S.L., “Geotechnical Earthquake Engineering,” Prentice Hall, 1996.
13. Applied Technology Council (ATC) Hazards by Location https://hazards.atcouncil.org

APPENDIX F

REFERENCED REPORTS

GRADING DOCUMENT MICROFILM SHEET

LEGAL DESCRIPTION AND CORRESPONDING ADDRESS(ES)

Write a number in the first blank of the Legal Description and corresponding Address line to link up the legal(s) with the address(es) listed below. For example, if one address has two legal descriptions, write the number 1 in each of the first two legal description lines and the address line:

____ Tract 8557 Blk 17 Lot 35

____ Tract ____ Blk ____ Lot ____

____ Address 235 Montreal St Unit ____

____ Address ____ Unit ____

____ Address ____ Unit ____

DOCUMENT TYPE (Use a separate sheet for each doc type & include dates)

	Name	Document Date(s)	
____	Admin. Approval (11)	Dt ____	ENTER DATA FROM ADMN APPRVL FORM
____	Grdg Affidavit (14)	Dt ____	ENTER DATA FROM AFFIDAVIT FORM
____	Grdg Compaction File (5)	Ltr ____	Rpts ____
	Grdg Dept. Letter (7)		
____	Methane Control File	Ltr ____	Rpts ____
____	Contaminated Soil File	Ltr ____	Rpts ____
____	E.I.R. File	Ltr ____	Rpts ____
____	Other ____	Ltr ____	Rpts ____
____	Grdg Foundation File (1)	Ltr ____	Rpts ____
____	Grdg Responsibility Ltr (18)	____	
____	Grdg Seismology File (6)	Ltr ____	Rpts ____
✓	Grdg Soils/Geo File (2)	Ltr 1-28-91 Rpts ____	Rpts 11-26-90
____	Grdg Storm Damage File (17)	Ltr ____	Rpts ____
____	Grdg Tent. Tract Doc. (51)	____	
____	Grdg Information Only (9)	____	
____	Grdg Oversized Doc (92)	X-Ref 21 Dt 11-26-90	X-Ref ____ Dt ____

DAFS DATABASE COMMENT

Any comment printed on the line below will be typed in the DAFS Comment field:

____

DOCUMENT PREPARATION AND RETENTION

Reviewed by ____ Document(s) Stored in Retention Box No. 1061

CITY OF LOS ANGELES

CALIFORNIA

TOM BRADLEY
MAYOR

COMMISSIONERS

MARCIA MARCUS
PRESIDENT
TOM WOO
VICE-PRESIDENT
REVELACION P. ABRACOSA
RICHARD W. HARTZLER
BENITO A. SINCLAIR

DEPARTMENT OF
BUILDING AND SAFETY
411, CITY HALL
LOS ANGELES, CA 90012-4869

WARREN V. O'BRIEN
GENERAL MANAGER

EARL SCHWARTZ
EXECUTIVE OFFICER

January 28, 1991

Log # 21496
C.D. 6

Mr. H. Hinzdel
235 Montreal Street
Los Angeles, CA 90293

TRACT: 8557
LOT: 35 of BLK 17
LOCATION: 235 MONTREAL STREET

Geological and Soil Engineering Report No. 3558-VN, dated November 26, 1990, prepared by GeoSoils, Inc.

The above report concerning construction of a room addition has been reviewed by the Grading Division of the Department of Building and Safety.

According to the report, a slope descends below the street at up to 2:1 in gradient.

The report is acceptable, provided the following conditions are complied with during site development:

1. The existing footings shall not be used for support of the proposed addition unless they are underpinned to below the recommended foundation setback line.
2. The proposed footings shall be founded below the foundation setback line as recommended.
3. Grading shall be limited to the necessary excavations for placement of footings.
4. The geologist and soils engineer shall review and approve the detailed plans prior to issuance of any permits. This approval shall be by signature on the plans which clearly

indicates that the geologist and soils engineer have reviewed the plans prepared by the design engineer and that the plans include the recommendations contained in their reports.

5. All recommendations of the report which are in addition to or more restrictive than the conditions contained herein shall be incorporated into the plans.

6. A copy of the subject and appropriate referenced reports and this approval letter shall be attached to the District Office and field set of plans. Submit one copy of the above reports to the Building Department Plan Checker prior to issuance of the permit.

7. All roof and pad drainage shall be conducted to the street in an acceptable manner.

8. The geologist shall inspect the excavations for the footings to determine that they are founded in the recommended strata before calling the Department for footing inspection.

GERALD TAKAKI
Chief of Grading Division

Ivan O. Tkatch

IVAN O. TKATCH
Engineering Geologist

Jay Shih

JAY SHIH
Structural Engineering Associate

IOT/JS:ge
TGRSG012891A/6GR
(213) 485-2160

cc: GeoSoils, Inc.
WLA District Office

GeoSoils, Inc.

Geotechnical Engineering • Engineering Geology

6634 Valjean Avenue • Van Nuys, California 91406 • (818) 785-2158 • FAX (818) 785-1548

November 26, 1990
W.O. 3558-VN

Mr. Jim Hinzdel
c/o Jim Hinzdel and Associates, Inc.
2554 Lincoln Boulevard, Suite 1062
Marina Del Rey, California 90291

Subject: Geotechnical Investigation for Proposed
Addition to Existing Residence at
235 Montreal Street, Community of Playa Del Rey
City of Los Angeles, California

INTRODUCTION

As requested, GeoSoils, Inc., has completed a geotechnical investigation for the proposed addition to the existing residential structure at 235 Montreal Street, Community of Playa Del Rey, City of Los Angeles, California. The purpose of the investigation was to evaluate on-site geologic and geotechnical conditions in relation to the planned addition.

Our investigation consisted of: 1) research of pertinent literature, 2) reconnaissance geologic mapping, 3) excavation, logging and sampling of two hand-dug test pits, 4) laboratory testing and engineering analysis, and 5) preparation of this report. The

Orange County Office: (714) 647-0277 • San Diego County Office: (619) 438-3155 • Riverside County Office: (714) 677-9651

test pit locations are shown on the enclosed Site Plan (Plate 1) and the logs of the test pits along with the results of the laboratory tests are included as Appendix C.

SITE DESCRIPTION

The site is located on the north side of Montreal Street in the low-lying hills above Dockweiler State Beach, in the community of Playa Del Rey, California.

The property is rectangular in shape and encompasses approximately 3,580 square feet. The site is bordered on the west by residential development, on the east by a vacant lot, on the north by hillside terrain descending to Culver Boulevard, and on the south by Montreal Street.

Topographically, the site is characterized by descending hillside terrain with relief of approximately 51 feet and a slope gradient of approximately 2:1. The highest elevation on-site is approximately 77 feet above sea level located adjacent to Montreal Street. The lowest elevation is at the northwest corner of the property, approximately 26 feet above sea level.

A two-story residence currently occupies the property, which was developed as Tract 8357, Lot 35, City of Los Angeles. Vegetation on-site is sparse and consists of weeds and shrubs.

PROPOSED DEVELOPMENT

Proposed development will consist of a room addition onto the northern portion of the existing structure. In effect the addition will entail adding a third story to the existing two-story residence. No regrading of the slope is proposed to achieve planned development. The proposed room addition will extent over the existing slope on a series of caissons and piles.

EARTH MATERIALS

Earth materials underlying the site consists of artificial fill and dune sand deposits.

Artificial Fill (af)

Artificial fill deposits found on-site consisted of brown, fine to medium sand with a slight silty binder. The fill is very difficult to distinguish from the underlying dune sand, except for the presence of man-made debris. The fill material is generally very loose, porous and friable, and not suitable for support of structures. Artificial fill deposits exposed in the exploratory test pits were found to have a maximum thickness of approximately two feet.

Dune Sand Deposits (Qs)

Dune sand deposits consist of brown to yellowish brown, fine to medium sand. The deposits for the most part are massive, slightly porous, dense and very friable. No apparent bedding planes or geologic structure (faults, joints, etc.) was observed in the test pits. Dune sand deposits should perform well as foundation materials.

SEISMICITY

The property, as with all of Southern California, is in an area subject to periodic earthquake-induced ground shaking. Although there are no active faults known to pass through the property, there are both active and potentially active faults in sufficient proximity to be of importance for seismic evaluation. EQFAULT and EQSEARCH computer programs have been utilized to perform deterministic and historical seismic hazard analyses of the subject site. The results of these analyses are included as Appendix B.

Slope Stability

A circular and surficial slope stability analysis was performed on the descending 2:1 slope at the rear of the existing residence. The analysis indicates factors of safety greater than the minimum City of Los Angeles Code requirements. (see Appendix A)

CONCLUSIONS

Review of the proposed addition shows the plan to be acceptable in relation to the geotechnical and geologic environment of the site. Safe and stable construction can be accomplished, as long as recommendations included within this report are incorporated into final design and implemented during construction.

RECOMMENDATIONS

Foundation Setback

The City of Los Angeles requires all structural footings on, or adjacent to descending slopes, be setback from the slope face. The City Code states that footings shall be located a distance of one-third of the vertical height of the slope with a maximum setback of 40 feet, measured horizontally from the slope surface to the lower edge of the footing. Descending slopes below the existing residence are at a gradient of approximately 2:1 or less, with an average height of approximately 64 feet. Therefore, we recommend that a setback of 22 feet be used for all footings below the proposed addition (see Cross-section A-A').

Existing Footings

No existing footings are to be used for structural support of the proposed improvements.

Deepened Foundations

Deepened foundations or caissons/piles should penetrate into the dune sand deposits located below the site, and may be designed with an allowable bearing pressure of 3000 pounds per square foot, when resting below the setback zone.

In lieu of end bearing caissons, friction piles may be used. For design of friction piles, an allowable frictional resistance of 500 pounds per square foot is recommended. For design, no frictional resistance should be assumed to exist in the dune sand deposits above the setback zone, to a maximum depth of ten feet below grade. All proposed piles/caissons are to be tied together with grade beams and/or tie beams in two directions to allow the piles/caissons to act uniformly.

Passive pressures of the dune deposits may be computed as an equivalent fluid having a density of 200 pounds per cubic foot, with a maximum earth pressure of 2,000 pounds per square foot. This passive fluid pressure may not be assumed to exist in the top five feet of the local earth materials. An allowable coefficient of friction between earth material and concrete of 0.4 may be used for design. When combining passive pressure and frictional resistance, the passive pressure component should be reduced by one-third. For design of isolated poles, the allowable passive pressure may be increased by 100 percent.

Prior to concrete placement in the caisson excavations, an observation should be made by our representative to ensure that the caissons are free of loose and disturbed soils and are embedded to the recommended depth. It should be noted that the dune sands are subject to caving, and that the caisson excavations may need casing to allow for construction.

Floor Slabs

It is our understanding that proposed floors are to be a raised floor system. We recommend that slabs-on-grade not be used.

Drainage

All roof and pad drainage shall be conducted to the street via approved non-erosive channels or piping in an acceptable manner.

PLAN REVIEW

This report has been compiled as an aid into site evaluation and to assist the architect and structural engineer in the design of the proposed structure. It is recommended that we be provided with the opportunity to review final design to ensure that it complies with the recommendations of this report prior to submittal to review agencies.

CONSTRUCTION OBSERVATION

Recommendations given in this report require the foundation system be placed in competent dune sand deposits. Prior to foundation construction, all excavations should be observed by the Geotechnical Engineer to verify conformance with our recommendations.

INVESTIGATION LIMITATIONS

The materials encountered on the project site and utilized in our laboratory investigation are believed representative of the total area; however, soil materials may vary in character between excavations and materials found throughout the site. Since our investigation is based upon the site materials observed, selective laboratory testing and engineering analyses, the conclusions and recommendations included within this report are professional opinions. These opinions have been derived in accordance with current standard of practice, and no warranty is expressed or implied.

If you should have any questions, or if we may be of any further service to you, please do not hesitate to contact us.

Very truly yours,

GEOSOILS, INC.

GEORGE R. LARSON
CEG 161

Paul Bopp
PAUL A. BOPP
Staff Geologist

DANIEL D. OVERTON
RCE 44121

REGISTERED PROFESSIONAL ENGINEER
DANIEL D. OVERTON
No. 44121
Exp. 6-30-93
CIVIL
STATE OF CALIFORNIA

GRL/PAB/DDO/slh.B1:1197

Enc: References
Plate 1, Geologic Map/ Site Plan
Plate 2, Geologic Cross-Sections
Appendix A, Slope Stability Analysis
Appendix B, Seismic Analysis
Appendix C, Laboratory Results and Test Pit Logs
Plates TP-1 and TP-2, Test Pit Logs
Plates C-1 through C-3, Consolidation Test Data
Plates SH-1 through SH-4, Shear Test Data
Plate M-1, Maximum Density Curve
Plate G-1, Gradation Curve

cc: (4) Addressee

November 26, 1990
W.O. 3558-VN

REFERENCES

1) Nelson, J.W. (1919). Soil Survey of The Los Angeles Area, California. U.S. Department of Agriculture.

2) Poland, J.F., and Garret, A.A. (1959). Geology, Hydrology, and Chemical Character of Ground Waters in the Torrance-Santa Monica Area, California. Geological Survey Water-Supply Paper 1461.

November 26, 1990
W.O. 3558-VN

APPENDIX A

SLOPE STABILITY ANALYSIS

November 26, 1990
W.O. 3558-VN

APPENDIX A

CIRCULAR SLOPE STABILITY ANALYSIS

A. INTRODUCTION OF TSTAB COMPUTER PROGRAM

B. CIRCULAR SLOPE STABILITY ANALYSIS

C. SURFICIAL SLOPE STABILITY ANALYSIS

November 26, 1990
W.O. 3558-VN

APPENDIX A

CIRCULAR SLOPE STABILITY ANALYSIS

A. INTRODUCTION OF TSTAB COMPUTER PROGRAM

1. Introduction

TSTAB is a computer program for analysis of slope stability by limit equilibrium methods. The user may choose between two analysis procedures: Spencer's Method or Bishop's Simplified Method. TSTAB is used for analysis of circular slip surface and has the capability to search for the critical circular which has the minimum factor of safety.

The version of TSTAB contains the following features:

- Uses either Bishop's Simplified or Spencer's Method.
- Can analyze specified circles or search for the critical circle.
- Allows application of line loads and pressures to the slope.
- Automatically calculates pressures on a submerged slope from fluid surface elevation.

Appendix A

* Performs pseudo-static seismic analysis with optional search for the critical seismic coefficient.

* Search for critical seismic coefficient may be for specified or critical circle or for moving circle.

* Allows user to specify curved Mohr-Coulomb shear strength envelope and combined S-R strength envelopes when using Spencer's Method.

* Includes option to specify profile of undrained shear strength with depth.

* Includes option to specify s_u/σ'_v for undrained analyses.

* Includes option to modify the undrained shear strength based on slip surface inclination.

* Includes option to model progressive failure using the local residual factor scheme proposed by Bishop (1971).

* Provides choice of automatic computation of pore pressures from average pore pressure ratio or specified phreatic surface or for specification of pore pressures as contours or on a grid.

- Provides printer plot of slope geometry, specified or critical circles, and factors of safety for each circle analyzed.

- Generates Zeta compatible plot files for pen plots showing slope geometry, soil layers, pore pressure contours, specified slip circles or trial slip circles with critical circles highlighted.

2. Geometry

The slope geometry is described in a x-y coordinate system. The x-coordinates (horizontal) increase from the top to the toe of the slope (either left or right) and the y-coordinates (vertical) increase downward.

Vertical sections are used to define the geometry as shown in Figure A-1. At each section, the y-coordinate of the ground surface, the bottom of tension crack, the water level in tension crack, and each soil layer boundary are specified. However, interpolation can be used to specify any of these quantities when there is no change in slope at a vertical section by specifying zero for the y-coordinate as shown in Figure A-1. The program interpolates between vertical requirements for both static and seismic stability situations.

Table 1 Summary of Circular Slope Stability Analysis

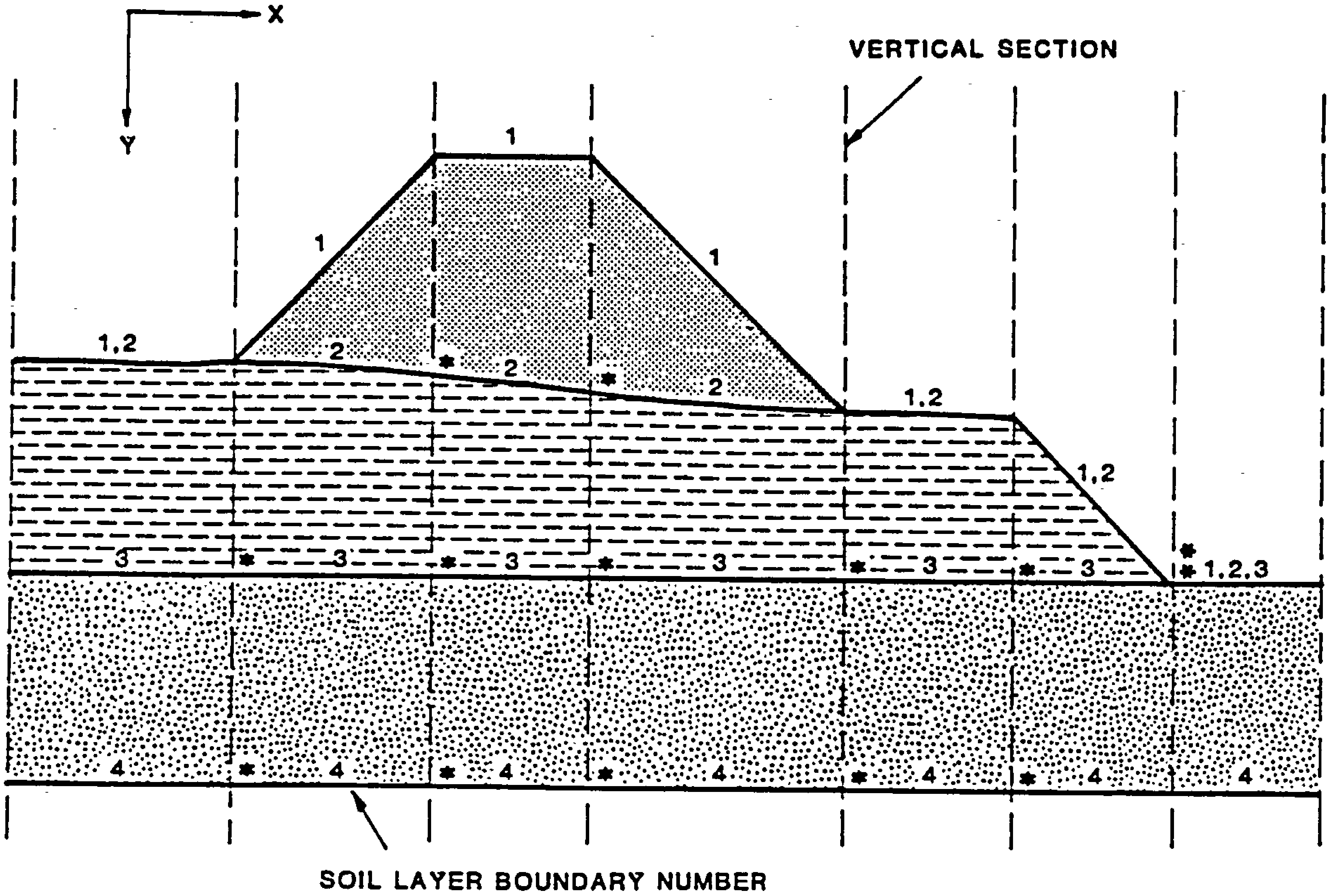
Section	Failure Mode	Factor of Safety Static	Factor of Safety Seismic	Remark
A-A'	circular failure	1.71	1.36	Figures A-2 and A-3, Plates A-1 through A-4

C. SURFICIAL SLOPE STABILITY ANALYSIS

The surficial slope stability analysis was performed to calculate the static stability situations of the 2:1 natural slope. The results are presented in Table 2. The detailed numerical data are presented in Plate A-5. The analysis indicates factor of safety greater than minimum Code requirement.

Table 2 Summary of Surficial Slope Stability Analysis

Cases	Factor of Safety	Remark
2:1 natural slope	1.64	Plate A-5



✱ INDICATES LOCATIONS WHERE Y-COORDINATE CAN BE INTERPOLATED BETWEEN VERTICAL SECTIONS BY SPECIFYING Y=O

✱ NOTE THAT THE INTERPOLATION CAN BE USED HERE ONLY FOR SOIL LAYER
✱ BOUNDARY NUMBER 3

GeoSoils, Inc.

DESCRIPTION OF TSTAB GEOMETRY

JIM HINZDEL

DATE 11/90

W.O. NO 3558-VN

Geotechnical Engineering • Engineering Geology

FORM 87/6-9

FIGURE A-1

sections, calculates the correct y-coordinate, and shows the correct value in the output.

B. CIRCULAR SLOPE STABILITY ANALYSIS

1. General

This slope stability analysis was performed to analyze both the static and seismic stability situations of the 2:1 natural slope in cross section A-A'.

2. Shear Strength Parameters Used in Analysis

The shear strength parameters of laboratory results are used in the analysis, and for your convenience are listed below:

Material	Unit Weight (pcf)	Friction Angle		Cohesion, psf	
		peak	residual	peak	residual
Sand	130	36	34	175	150

A seismic coefficient of 0.15 was used in pseudo-static stability analyses.

3. Results

The results are summarized in Table 1. Detailed numerical data is presented in Plates A-1 through A-4. The analyses indicate factors of safety greater than minimum Code

```
******************************************************************
  JIM HINZEL (W.O. 3556-VN) X-SECTION A-A', STATIC
******************************************************************



****************************************
  ANALYSIS BY BISHOP'S SIMPLIFIED METHOD
****************************************


*************
  INPUT DATA
*************


 CONTROL DATA,
      AUTOMATIC SEARCH FOR CRITICAL CIRCLE
      NUMBER OF DEPTH LIMITING TANGENTS                0
      NUMBER OF VERTICAL SECTIONS                     12
      NUMBER OF SOIL LAYER BOUNDARIES                  2
      NUMBER OF POINTS DEFINING COHESION PROFILE       0
      NUMBER OF CURVES DEFINING COHESION ANISOTROPY    0
      NUMBER OF BOUNDARY LINE LOADS                    0
      NUMBER OF BOUNDARY PRESSURE LOADS                0

      SEISMIC COEFFICIENT              =       .000
      ATMOSPHERIC PRESSURE             =       .000
      UNIT WEIGHT OF WATER             =     62.440
      UNIT WEIGHT OF WATER IN TENSION CRACK =  62.440

 SEARCH STARTS AT CENTER ( 140.0, -50.0),WITH FINAL GRID OF  2.0

 ALL CIRCLES PASS THROUGH THE POINT ( 146.0,  74.0)

 GEOMETRY

     SECTIONS     -50.00    14.00    17.00    17.01    26.00    53.00    73.00    79.00   109.00   115.00   146.00   260.00

     T. CRACKS      8.00     8.00     8.50    11.50    11.50    27.00    37.00    39.00    56.00    57.50    74.00    74.00
     W IN CRACK     8.00     8.00     8.50    11.50    11.50    27.00    37.00    39.00    56.00    57.50    74.00    74.00
     BOUNDARY 1     8.00     8.00     8.50    11.50    11.50    27.00    37.00    39.00    56.00    57.50    74.00    74.00
     BOUNDARY 2   130.00   130.00   130.00   130.00   130.00   130.00   130.00   130.00   130.00   130.00   130.00   130.00

 SOIL PROPERTIES

      LAYER   DENSITY    COHESION  FRICTION ANGLE  DELTA PHI
        1      130.00     150.00       34.00          .00
```

GeoSoils, Inc.

SLOPE STABILITY CALCULATION — STATIC

JIM HINZDEL

DATE 11/90

W.O. NO 3558-VN

Geotechnical Engineering • Engineering Geology

FORM 89/22

PLATE A-1

```
************
 RESULTS
************

NUMBER  TANGENT  RADIUS   (X) CENTER  (Y) CENTER     F.S.

  1      74.1    154.1      140.0       -80.0        1.726
  2      74.3    154.3      136.0       -80.0        1.739
  3      74.1    158.1      140.0       -84.0        1.725
  4      74.0    154.0      144.0       -80.0        1.717
  5      74.1    154.1      142.0       -80.0        3.643
  6      74.0    154.0      146.0       -80.0        1.717
  7      74.0    152.0      144.0       -78.0        1.718
  8      74.1    156.1      142.0       -82.0        2.141
  9      74.0    156.0      146.0       -82.0        1.714
 10      74.0    152.0      146.0       -78.0        1.720
 11      74.0    158.0      148.0       -84.0        1.714
 12      74.0    160.0      144.0       -86.0        2.188
 13      74.0    160.0      146.0       -86.0        1.711
 14      74.0    156.0      148.0       -82.0        1.717
 15      74.0    162.0      148.0       -86.0        1.710
 16      74.0    160.0      150.0       -86.0        1.715
 17      74.0    162.0      146.0       -88.0        3.711
 18      74.0    162.0      150.0       -88.0        1.711
 19      74.0    164.0      146.0       -90.0        2.234
 20      74.0    164.0      150.0       -90.0        1.709
 21      74.0    160.0      150.0       -86.0        1.715
 22      74.0    166.0      150.0       -92.0        1.707
 23      74.1    164.1      152.0       -90.0        1.713
 24      74.0    166.0      148.0       -92.0        3.744
 25      74.1    166.1      152.0       -92.0        1.710
 26      74.0    168.0      148.0       -94.0        2.279
 27      74.1    168.1      152.0       -94.0        1.707
 28      74.1    164.1      152.0       -90.0        1.713
 29      74.2    168.2      154.0       -94.0        1.712
 30      74.0    170.0      150.0       -96.0        3.778
 31      74.2    170.2      154.0       -96.0        1.709
 32      74.0    172.0      150.0       -98.0        2.324
 33      74.2    172.2      154.0       -98.0        1.706
 34      74.2    168.2      154.0       -94.0        1.712

 F.S. MINIMUM= 1.705 FOR THE CIRCLE OF CENTER ( 152.0, -96.0)
```

GeoSoils, Inc.

SLOPE STABILITY CALCULATION — STATIC

JIM HINZDEL

DATE 11/90

W.O. NO. 3558-VN

Geotechnical Engineering • Engineering Geology

PLATE A-2

```
*******************************************************************
  JIM HINZEL (W.O. 3556-VN) X-SECTION A-A', SEISMIC
*******************************************************************


****************************************
  ANALYSIS BY BISHOP'S SIMPLIFIED METHOD
****************************************


**************
  INPUT DATA
**************


 CONTROL DATA,
      AUTOMATIC SEARCH FOF CRITICAL CIRCLE
      NUMBER OF DEPTH LIMITING TANGENTS                0
      NUMBER OF VERTICAL SECTIONS                     12
      NUMBER OF SOIL LAYER BOUNDARIES                  2
      NUMBER OF POINTS DEFINING COHESION PROFILE       0
      NUMBER OF CURVES DEFINING COHESION ANISOTROPY    0
      NUMBER OF BOUNDARY LINE LOADS                    0
      NUMBER OF BOUNDARY PRESSURE LOADS                0

      SEISMIC COEFFICIENT                 =        .150
      ATMOSPHERIC PRESSURE                =        .000
      UNIT WEIGHT OF WATER                =      62.400
      UNIT WEIGHT OF WATER IN TENSION CRACK =    62.400

 SEARCH STARTS AT CENTER ( 140.0, -80.0),WITH FINAL GRID OF  2.0

 ALL CIRCLES PASS THROUGH THE POINT ( 146.0,  74.0)

 GEOMETRY

     SECTIONS     -50.00    14.00    17.00    17.01    26.00    53.00    73.00    79.00   109.00   115.00   146.00   260.00

     T. CRACKS      8.00     8.00     8.50    11.50    11.50    27.00    37.00    39.00    56.00    57.50    74.00    74.00
     W IN CRACK     8.00     8.00     8.50    11.50    11.50    27.00    37.00    39.00    56.00    57.50    74.00    74.00
     BOUNDARY 1     8.00     8.00     8.50    11.50    11.50    27.00    37.00    39.00    56.00    57.50    74.00    74.00
     BOUNDARY 2   130.00   130.00   130.00   130.00   130.00   130.00   130.00   130.00   130.00   130.00   130.00   130.00

  SOIL PROPERTIES

      LAYER   DENSITY    COHESION  FRICTION ANGLE  DELTA PHI
        1      130.00     175.00       36.00          .00
```

SLOPE STABILITY CALCULATION—SEISMIC

JIM HINZDEL

DATE 11/90

W.O. NO 3558-VN

GeoSoils, Inc.

Geotechnical Engineering • Engineering Geology

PLATE A-3

FORM 89/22

```
***********
  RESULTS
***********

 NUMBER  TANGENT  RADIUS   (X) CENTER  (Y) CENTER      F.S.

    1     74.1    154.1      140.0       -80.0        1.371
    2     74.3    154.3      136.0       -80.0        1.378
    3     74.1    158.1      140.0       -84.0        1.369
    4     74.0    154.0      144.0       -80.0        1.366
    5     74.1    150.1      140.0       -76.0        3.680
    6     74.1    154.1      142.0       -80.0        3.704
    7     74.0    154.0      146.0       -80.0        1.367
    8     74.0    152.0      144.0       -78.0        1.368
    9     74.1    156.1      142.0       -82.0        2.115
   10     74.0    156.0      146.0       -82.0        1.365
   11     74.0    152.0      146.0       -78.0        1.371
   12     74.0    158.0      146.0       -84.0        1.363
   13     74.0    156.0      148.0       -82.0        1.368
   14     74.0    158.0      144.0       -84.0        3.729
   15     74.0    158.0      148.0       -84.0        1.365
   16     74.0    160.0      144.0       -86.0        2.157
   17     74.0    160.0      148.0       -86.0        1.362
   18     74.0    156.0      148.0       -82.0        1.368
   19     74.0    162.0      148.0       -88.0        1.360
   20     74.0    160.0      150.0       -86.0        1.367
   21     74.0    162.0      146.0       -88.0        3.753
   22     74.0    162.0      150.0       -88.0        1.363
   23     74.0    164.0      146.0       -90.0        2.199
   24     74.0    164.0      150.0       -90.0        1.360
   25     74.0    160.0      150.0       -86.0        1.367

F.S. MINIMUM= 1.360 FOR THE CIRCLE OF CENTER ( 148.0, -88.0)
```

GeoSoils, Inc.

SLOPE STABILITY CALCULATION – SEISMIC

JIM HINZDEL

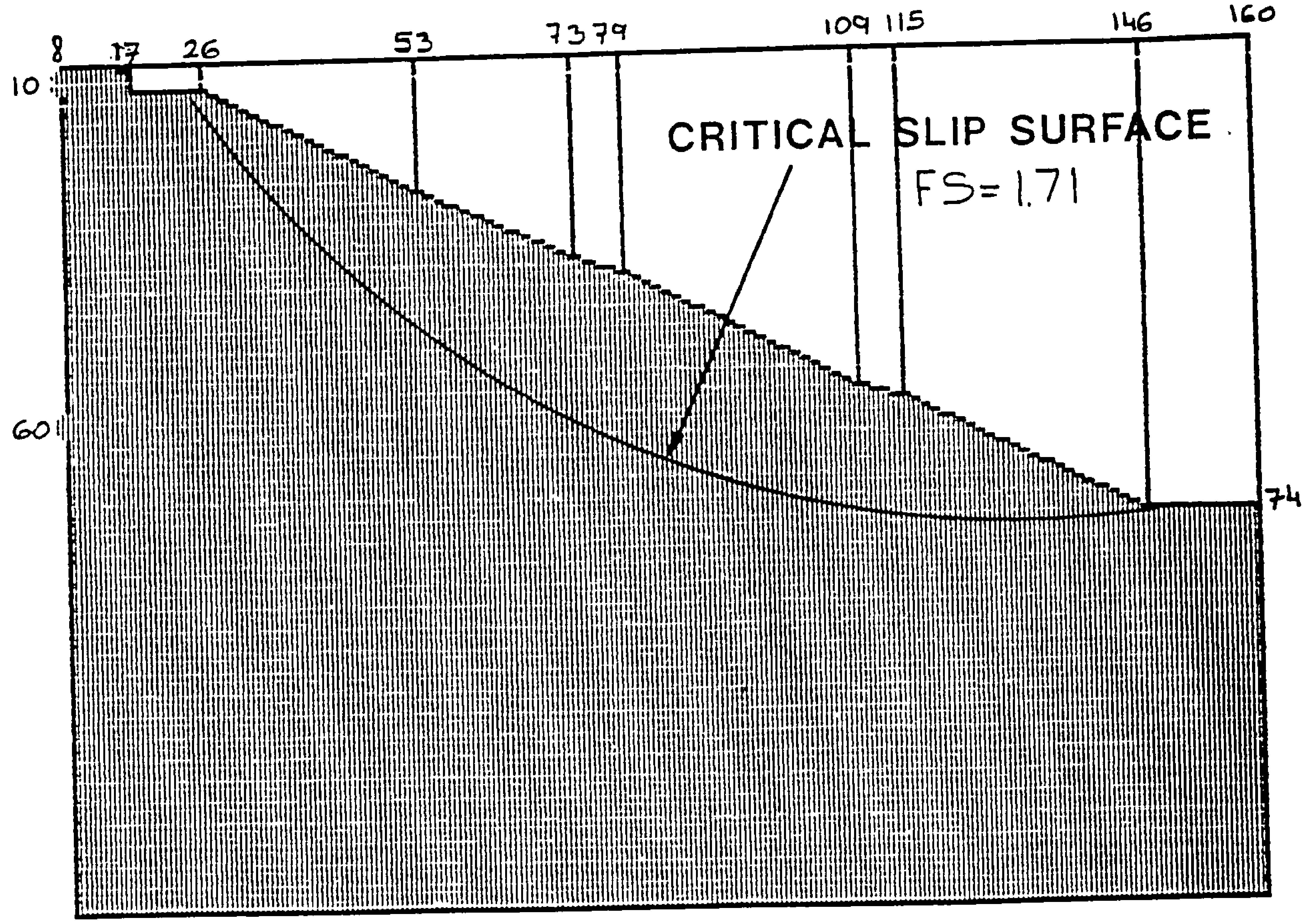
DATE 11/90

W.O. NO. 3558-VN

Geotechnical Engineering • Engineering Geology

FORM 89/22

PLATE A-4



GeoSoils, Inc.

SLOPE STABILITY CALCULATION- STATIC

JIM HINZDEL

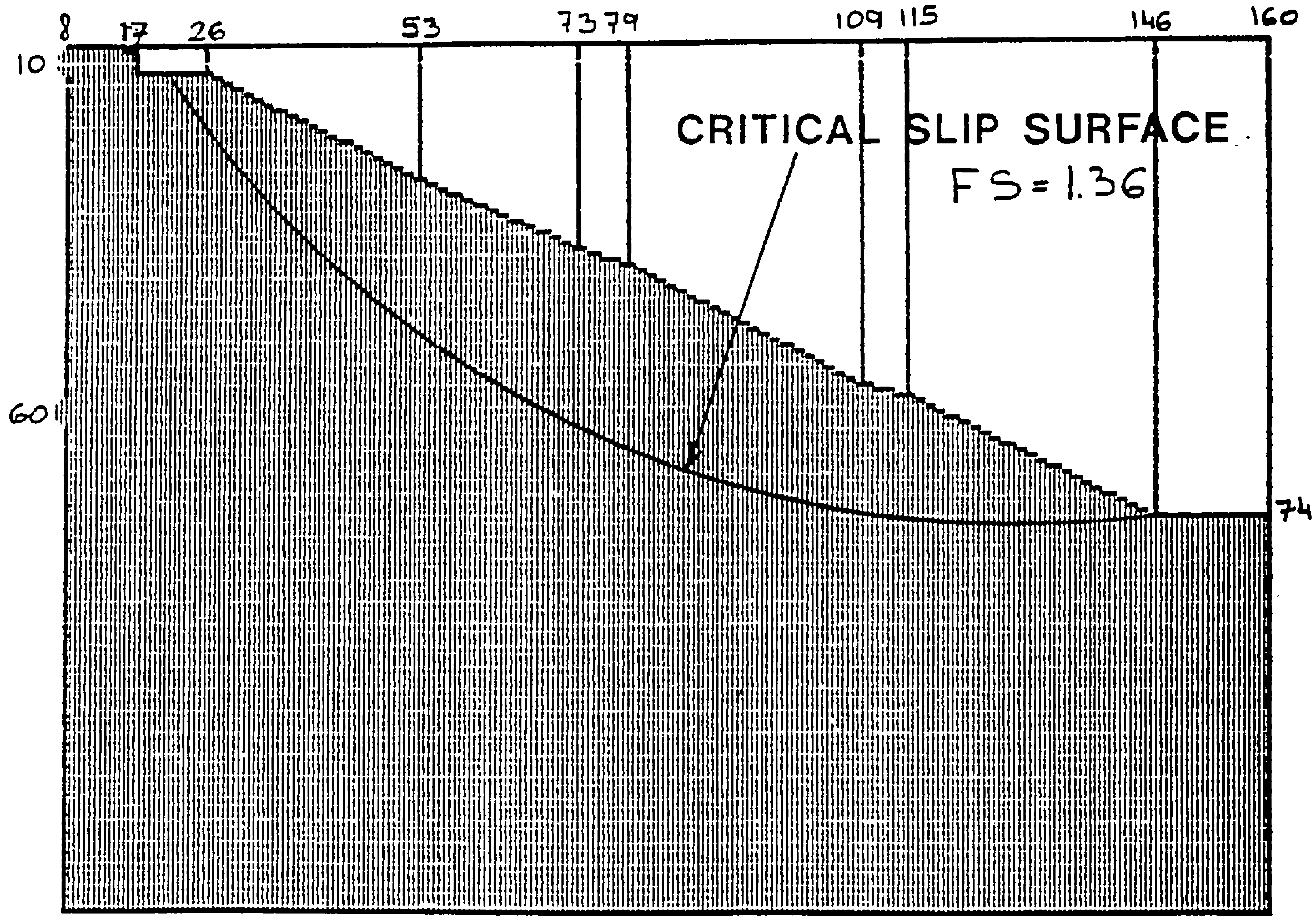
DATE 11/90

W.O. NO. 3558-VN

Geotechnical Engineering • Engineering Geology

FIGURE A-2

FORM 89/22



SLOPE STABILITY CALCULATION – **SEISMIC**

JIM HINZDEL

GeoSoils, Inc.

DATE 11/90

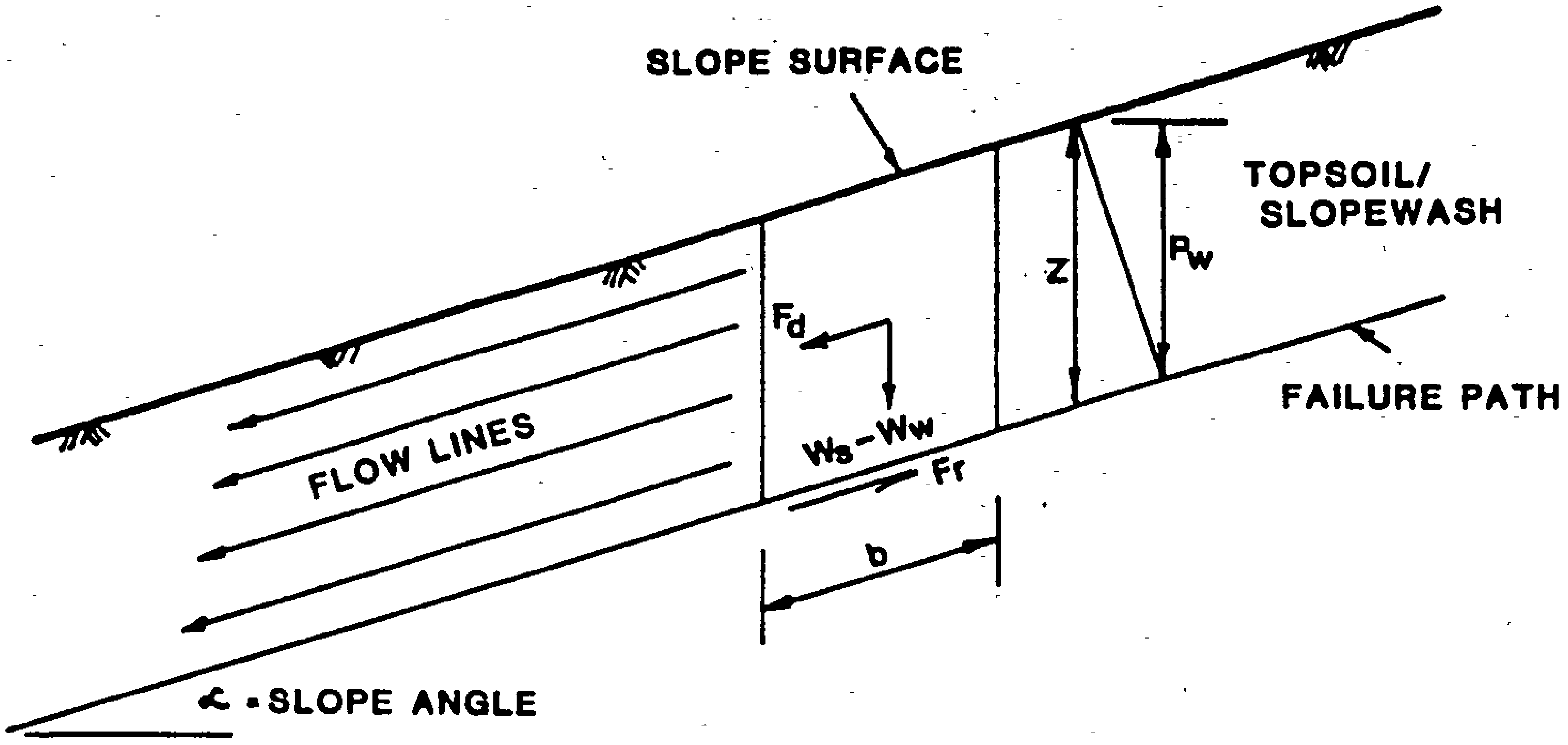
W.O. NO. 3558-VN

Geotechnical Engineering • Engineering Geology

FORM 89/22

FIGURE A-3

SURFICIAL SLOPE STABILITY



STATIC STABILITY ANALYSIS

Unit weight of saturated soil ws = 130 pcf

Unit weight of soil water ww = 62.4 pcf

Angle of internal friction = 34

Cohesion c = 150 psf

Inclination of slope = 27

Vertical thickness of top soil = 3

FD = WS * z * sin * cos

FD = 130 * 3 * sin 27 * cos 27

FD = 157.8 psf

FR = (WS - WW) * z * cos * tg + c

FR = (130 - 62.4) * 3 * cos 27 * tg 34 + 150

FR = 258.6 psf

FD - Driving force

FR - Resisting force

FS - Factor of safety

FS = FR / FD = 258.6 / 157.8 = 1.64

Factor of safety for surficial static stability analysis is

FS = 1.64

GeoSoils, Inc.

JIM HINZDEL

DATE 11/90

W.O. NO. 3558-VN

Geotechnical Engineering • Engineering Geology

FORM 89/22

PLATE A-5

November 26, 1990
W.O. 3558-VN

APPENDIX B

SEISMIC ANALYSIS

EQFAULT AND EQSEARCH

November 26, 1990
W.O. 3558-VN

APPENDIX B

EQSEARCH

INTRODUCTION

EQSEARCH, written by Thomas F. Blake, is a computer program for the estimation of peak horizontal acceleration from southern California historical earthquake catalogs. The program performs historical-earthquake searches using an abbreviated and supplemented, version of the California Division of Mines and Geology (C.D.M.G.) computerized earthquake catalog for the state of California. Search parameters (i.e., geographic limits, limiting dates, and limiting magnitudes) are specified and one of 14 available acceleration-attenuation relations is selected by the user. The user also has the option of using computed peak acceleration values or estimating "Repeatable High Ground Acceleration" (RHGA) values from the peak values. For each historical earthquake in the search area, EQSEARCH prints latitude, longitude, date of event, depth, Richter magnitude, computed site-acceleration, computed site-Modified-Mercalli-Intensity, and the approximate earthquake-to-site distance in both miles and kilometers. An epicenter map and a seismic recurrence curve are also created by EQSEARCH.

```
DATE: Tuesday, October 16, 1990

                    *************************************
                    *                                   *
                    *           E Q S E A R C H         *
                    *                                   *
                    *              Ver. 1.50            *
                    *                                   *
                    * Licensed to: GEOSOILS, INCORPORATED *
                    *                                   *
                    *************************************

                (Estimation of RHGA Horizontal Acceleration
                   From California Earthquake Catalogs)

SEARCH PERFORMED FOR:  GEOSOILS, INC.

JOB NUMBER:  3558-VN

JOB NAME:  HINZDEL RESIDENCE

SITE COORDINATES:
   LATITUDE:  33.9594  N
   LONGITUDE:  118.4463  W

TYPE OF SEARCH:   RADIUS
  SEARCH RADIUS:  65  mi

SEARCH MAGNITUDES: 5.0 TO 8.5

SEARCH DATES:  1800  TO  1989

ATTENUATION RELATION: CAMPBELL (1987) Unconstrained - mean

    Soil Conditions: Deep Soil

COMPUTE RHGA HORIZ. ACCEL.  (FACTOR:  0.650   DISTANCE:    20.0 mi)

EARTHQUAKE-DATA FILE USED: ALLQUAKE.DAT

TIME PERIOD OF EXPOSURE FOR STATISTICAL COMPARISON:  25  years
```

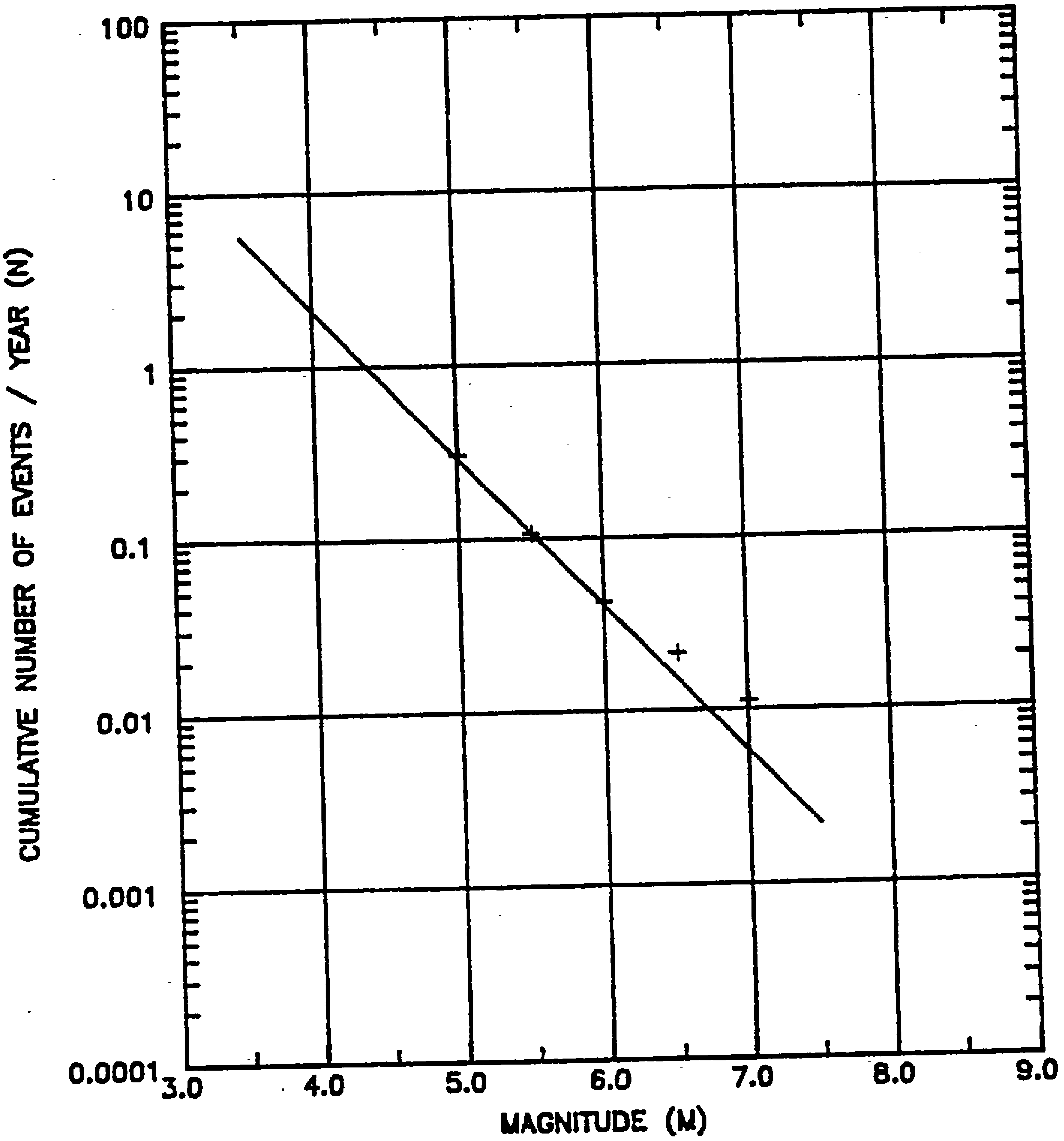
```
PAGE   1

-------------------------------------------------------------------------------------------
    |       |        |              |         |      |       | SITE  |SITE|  APPROX.
FILE| LAT.  | LONG.  |    DATE      |  TIME   |DEPTH|QUAKE  | ACC.  | MM |  DISTANCE
CODE|NORTH  | WEST   |              |  (GMT)  | (km)| MAG.  |   g   |INT.|  mi   [km]
----|-------|--------|--------------|---------|-----|-------|-------|----|------------
DMG |33.700|117.900| 12/ 8/1812 |15 0  0.0|  0.0| 6.90 | 0.052 | V1 |  36 [  58]
T-A |34.000|118.250|  9/23/1827 | 0 0  0.0|  0.0| 5.00 | 0.030 |  V |  12 [  19]
DMG |34.000|119.000|  9/24/1827 | 4 0  0.0|  0.0| 5.50 | 0.023 | IV |  32 [  51]
T-A |34.830|118.750| 11/27/1852 | 0 0  0.0|  0.0| 7.00 | 0.030 |  V |  63 [ 101]
MG1 |34.100|118.100|  7/11/1855 | 415  0.0|  0.0| 6.30 | 0.059 | V1 |  22 [  36]
T-A |34.000|118.250|  1/10/1856 | 0 0  0.0|  0.0| 5.00 | 0.030 |  V |  12 [  19]
MGI |34.000|117.500| 12/16/1858 |10 0  0.0|  0.0| 7.00 | 0.035 |  V |  54 [  87]
T-A |34.000|118.250|  3/26/1860 | 0 0  0.0|  0.0| 5.00 | 0.030 |  V |  12 [  19]
DMG |34.100|117.900|  8/28/1889 | 215  0.0|  0.0| 5.20 | 0.019 | IV |  33 [  53]
DMG |34.300|118.600|  4/ 4/1893 |1940  0.0|  0.0| 5.40 | 0.028 |  V |  25 [  40]
DMG |34.100|119.400|  5/19/1893 | 035  0.0|  0.0| 5.50 | 0.012 | III|  55 [  89]
DMG |34.300|117.600|  7/30/1894 | 512  0.0|  0.0| 5.90 | 0.017 | IV |  54 [  87]
DMG |34.200|117.400|  7/22/1899 | 046  0.0|  0.0| 5.50 | 0.011 | III|  62 [ 100]
DMG |34.300|117.500|  7/22/1899 |2032  0.0|  0.0| 6.50 | 0.023 | IV |  59 [  95]
MGI |34.000|118.000| 12/25/1903 |1745  0.0|  0.0| 5.00 | 0.021 | IV |  26 [  41]
MGI |34.000|118.300|  9/ 3/1905 | 540  0.0|  0.0| 5.30 | 0.046 | VI |   9 [  14]
DMG |33.700|117.400|  4/11/1910 | 757  0.0|  0.0| 5.00 | 0.008 | II |  63 [ 101]
DMG |33.700|117.400|  5/13/1910 | 620  0.0|  0.0| 5.00 | 0.008 | II |  63 [ 101]
DMG |23.700|117.400|  5/15/1910 |1547  0.0|  0.0| 6.00 | 0.015 | IV |  63 [ 101]
MGI |34.000|119.000| 12/14/1912 | 0 0  0.0|  0.0| 5.70 | 0.027 |  V |  32 [  51]
DMG |34.700|119.000| 10/23/1916 | 254  0.0|  0.0| 5.50 | 0.011 | III|  60 [  97]
MGI |33.800|117.600|  4/22/1918 |2115  0.0|  0.0| 5.00 | 0.010 | III|  50 [  80]
MGI |34.000|118.500| 11/19/1918 |2018  0.0|  0.0| 5.00 | 0.056 | VI |   4 [   7]
MGI |34.080|118.260|  7/16/1920 |18 8  0.0|  0.0| 5.00 | 0.026 |  V |  14 [  22]
DMG |34.000|119.500|  2/18/1926 |1818  0.0|  0.0| 5.00 | 0.008 | III|  60 [  97]
DMG |34.000|118.500|  8/ 4/1927 |1224  0.0|  0.0| 5.00 | 0.056 | VI |   4 [   7]
DMG |33.950|118.632|  8/31/1930 | 04036.0|  0.0| 5.20 | 0.037 |  V |  11 [  17]
DMG |33.617|117.967|  3/11/1933 | 154  7.8|  0.0| 6.30 | 0.035 |  V |  36 [  58]
DMG |33.750|118.083|  3/11/1933 | 2 9  0.0|  0.0| 5.00 | 0.021 | IV |  25 [  41]
DMG |33.750|118.093|  3/11/1933 | 230  0.0|  0.0| 5.10 | 0.023 | IV |  25 [  41]
DMG |33.750|118.083|  3/11/1933 | 323  0.0|  0.0| 5.00 | 0.021 | IV |  25 [  41]
DMG |33.700|118.067|  3/11/1933 | 51022.0|  0.0| 5.10 | 0.020 | IV |  28 [  45]
DMG |33.575|117.983|  3/11/1933 | 518  4.0|  0.0| 5.20 | 0.016 | IV |  38 [  60]
DMG |33.683|118.050|  3/11/1933 | 658  3.0|  0.0| 5.50 | 0.025 |  V |  30 [  48]
DMG |33.700|118.067|  3/11/1933 | 85457.0|  0.0| 5.10 | 0.020 | IV |  28 [  45]
DMG |33.750|118.083|  3/11/1933 | 910  0.0|  0.0| 5.10 | 0.023 | IV |  25 [  41]
DMG |33.850|118.267|  3/11/1933 |1425  0.0|  0.0| 5.00 | 0.028 |  V |  13 [  21]
DMG |33.750|118.083|  3/13/1933 |131828.0|  0.0| 5.30 | 0.026 |  V |  25 [  41]
DMG |33.617|118.017|  3/14/1933 |19 150.0|  0.0| 5.10 | 0.017 | IV |  34 [  55]
DMG |33.783|118.133| 10/ 2/1933 | 91017.6|  0.0| 5.40 | 0.033 |  V |  22 [  35]
DMG |33.699|117.511|  5/31/1938 | 83455.4| 10.0| 5.50 | 0.012 | III|  57 [  91]
DMG |33.783|118.250| 11/14/1941 | 84136.3|  0.0| 5.40 | 0.028 |  V |  17 [  27]
DMG |34.519|118.198|  8/23/1952 |10 9  7.1| 13.1| 5.00 | 0.012 | III|  41 [  66]
DMG |33.291|119.193| 10/24/1969 | 82912.1| 10.0| 5.10 | 0.008 | III|  63 [ 101]
DMG |34.270|117.540|  9/12/1970 |143053.0|  8.0| 5.40 | 0.012 | III|  56 [  90]
DMG |34.411|118.401|  2/ 9/1971 |14 041.8|  8.4| 6.40 | 0.043 | VI |  31 [  50]
DMG |34.411|118.401|  2/ 9/1971 |14 1 8.0|  8.0| 5.80 | 0.029 |  V |  31 [  50]
DMG |34.411|118.401|  2/ 9/1971 |14 244.0|  8.0| 5.80 | 0.029 |  V |  31 [  50]
DMG |34.411|118.401|  2/ 9/1971 |141028.0|  8.0| 5.30 | 0.021 | IV |  31 [  50]
DMG |34.308|118.454|  2/ 9/1971 |144346.7|  6.2| 5.20 | 0.026 |  V |  24 [  39]
DMG |34.065|119.035|  2/21/1973 |144557.3|  8.0| 5.90 | 0.028 |  V |  34 [  55]
DMG |33.986|119.475|  8/ 6/1973 |232917.0| 16.9| 5.00 | 0.008 | III|  59 [  95]
PAS |33.944|118.681|  1/ 1/1979 |231438.9| 11.3| 5.00 | 0.027 |  V |  13 [  22]
PAS |33.671|119.111|  9/ 4/1981 |155050.3|  5.0| 5.30 | 0.015 | IV |  43 [  69]
PAS |34.061|118.079| 10/ 1/1987 |144220.0|  9.5| 5.90 | 0.045 | VI |  22 [  36]
PAS |34.073|118.098| 10/ 4/1987 |105938.2|  8.2| 5.30 | 0.031 |  V |  21 [  34]
PAS |33.919|118.627|  1/19/1989 | 65328.8| 11.9| 5.00 | 0.032 |  V |  11 [  17]
*******************************************************************************************
 END OF SEARCH-  [illegible]  RECORDS FOUND
```

```
COMPUTER TIME REQUIRED FOR EARTHQUAKE SEARCH:  11.1 minutes

MAXIMUM SITE ACCELERATION DURING TIME PERIOD 1800 TO 1989:  0.059 g

MAXIMUM SITE INTENSITY (MM) DURING TIME PERIOD 1800 TO 1989:  VI

MAXIMUM MAGNITUDE ENCOUNTERED IN SEARCH: 7.00

NEAREST HISTORICAL EARTHQUAKE WAS ABOUT    4 MILES AWAY FROM SITE.

NUMBER OF YEARS REPRESENTED BY SEARCH:  190  years
```

```
                    RESULTS OF PROBABILITY ANALYSES
                    -------------------------------

TIME PERIOD OF SEARCH:  1800  TO  1989
LENGTH OF SEARCH TIME:  190  years
ATTENUATION RELATION: CAMPBELL (1987) Unconstrained - mean
*** TIME PERIOD OF EXPOSURE FOR PROBABILITY:  25  years

PROBABILITY OF EXCEEDANCE FOR ACCELERATION
------------------------------------------
-----------------------------------------------------------------------------------------
-----|NO.OF| AVE. |RECURR.|          COMPUTED PROBABILITY OF EXCEEDANCE|
ACC. |TIMES|OCCUR.|INTERV.|  in  |  in  |  in  |  in  |  in  |  in  |  in
 g   |EXCED| #/yr | years |0.5 yr|  1 yr| 10 yr| 50 yr| 75 yr|100 yr|*** yr
-----|-----|------|-------|------|------|------|------|------|------|------
-----|-----|------|-------|------|------|------|------|------|------|0.9989
0.01|   52| 0.274|   3.654|0.1279|0.2394|0.9352|1.0000|1.0000|1.0000|0.9941
0.02|   39| 0.205|   4.872|0.0975|0.1856|0.8716|1.0000|1.0000|1.0000|0.8932
0.03|   17| 0.089|  11.176|0.0438|0.0856|0.5913|0.9886|0.9988|0.9999|0.6019
0.04|    7| 0.037|  27.143|0.0183|0.0362|0.3082|0.8415|0.9369|0.9749|0.4092
0.05|    4| 0.021|  47.500|0.0105|0.0208|0.1898|0.6510|0.7938|0.8782|
-----------------------------------------------------------------------------------------
```

```
PROBABILITY OF EXCEEDANCE FOR MAGNITUDE
---------------------------------------

--------------------------------------------------------------------------------
    |NO.OF| AVE.  |RECURR.|        COMPUTED PROBABILITY OF EXCEEDANCE
MAG.|TIMES|OCCUR.|INTERV.|  in   |  in   |  in   |  in   |  in   |  in   |  in
    |EXCED| #/yr  | years |0.5 yr|  1 yr| 10 yr| 50 yr| 75 yr|100 yr|*** yr
----|-----|------|-------|------|------|------|------|------|------|------
5.00|   57| 0.300|  3.333|0.1393|0.2592|0.9502|1.0000|1.0000|1.0000|0.9994
5.50|   20| 0.105|  9.500|0.0513|0.0999|0.6510|0.9948|0.9996|1.0000|0.9280
6.00|    8| 0.042| 23.750|0.0208|0.0412|0.3436|0.8782|0.9575|0.9852|0.6510
6.50|    4| 0.021| 47.500|0.0105|0.0208|0.1898|0.6510|0.7938|0.8782|0.4092
7.00|    2| 0.011| 95.000|0.0052|0.0105|0.0999|0.4092|0.5459|0.6510|0.2314
--------------------------------------------------------------------------------


 GUTENBERG & RICHTER RECURRENCE RELATIONSHIP:

 a-value=  3.732
 b-value=  0.853

 beta-value=  1.964
```

LOG N = 3.732 - 0.853M

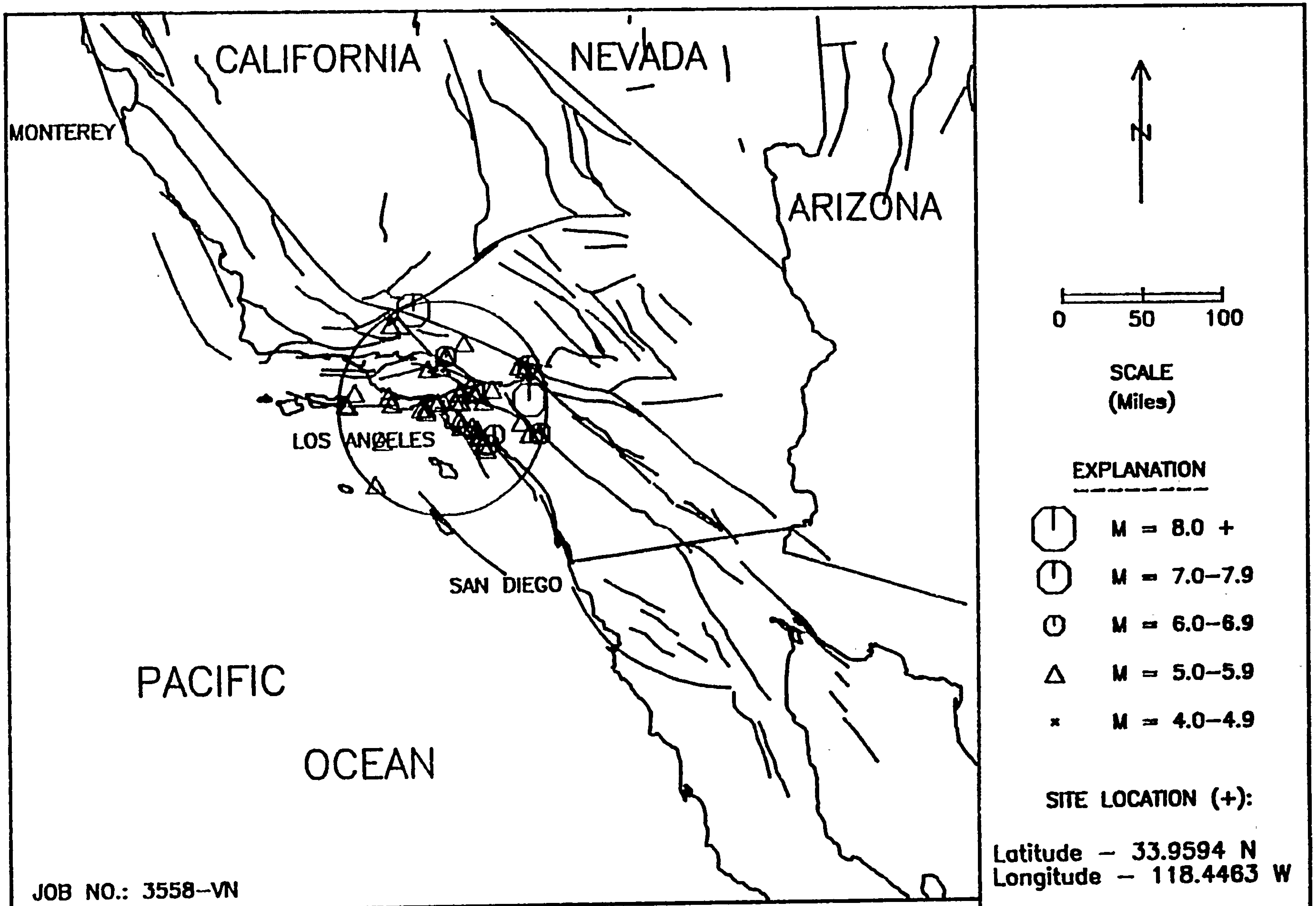


SEISMIC RECURRENCE CURVE

HISTORICAL EARTHQUAKES FROM 1800 TO 1989

HINZDEL RESIDENCE

9110270590



HISTORICAL EARTHQUAKES 1800 TO 1989

Appendix B

EQFAULT

INTRODUCTION

EQFAULT, a computer program written by Thomas F. Blake, effectively performs deterministic seismic hazard analyses using up to 150 digitized California faults as earthquake sources. The program estimates the closest distance between each fault and a user-specified site. If a fault is found to be within a user-selected radius, the program estimates peak horizontal ground acceleration that may occur at the site from the "maximum credible" and "maximum probable" earthquakes on that fault. EQFAULT allows the option of using computed peak acceleration values or estimating "Repeatable High Ground Acceleration" (RGHA) values from the peak values. Site acceleration (g) is computed by any of the 14 user-selected acceleration-attenuation relations that are contained in EQFAULT. Site Modified Mercalli Intensities are also predicted for each earthquake event. A fault-model map and a comparison plot of earthquake accelerations are also created by EQFAULT.

```
DATE: Tuesday, October 16, 1990
                         ************************************
                         *                                  *
                         *            E Q F A U L T         *
                         *                                  *
                         *              Ver. 1.01           *
                         *                                  *
                         *    Licensed to:  GEOSOILS, INC.  *
                         *                                  *
                         ************************************

                       (Estimation of RHGA Horizontal Acceleration
                           From Digitized California Faults)


 SEARCH PERFORMED FOR:  GEOSOILS, INC.

 JOB NUMBER:  3558-VN

 JOB NAME:  HINZDEL RESIDENCE

 SITE COORDINATES:
    LATITUDE:  33.9594  N
    LONGITUDE:  118.4463  W

 SEARCH RADIUS:  65  mi

 ATTENUATION RELATION: CAMPBELL (1987) Unconstrained - mean

    Soil Conditions: Deep Soil

 COMPUTE RHGA HORIZ. ACCEL.  (FACTOR:  0.650   DISTANCE:    20.0 mi)

 FAULT-DATA FILE USED: CALIFLT.DAT
```

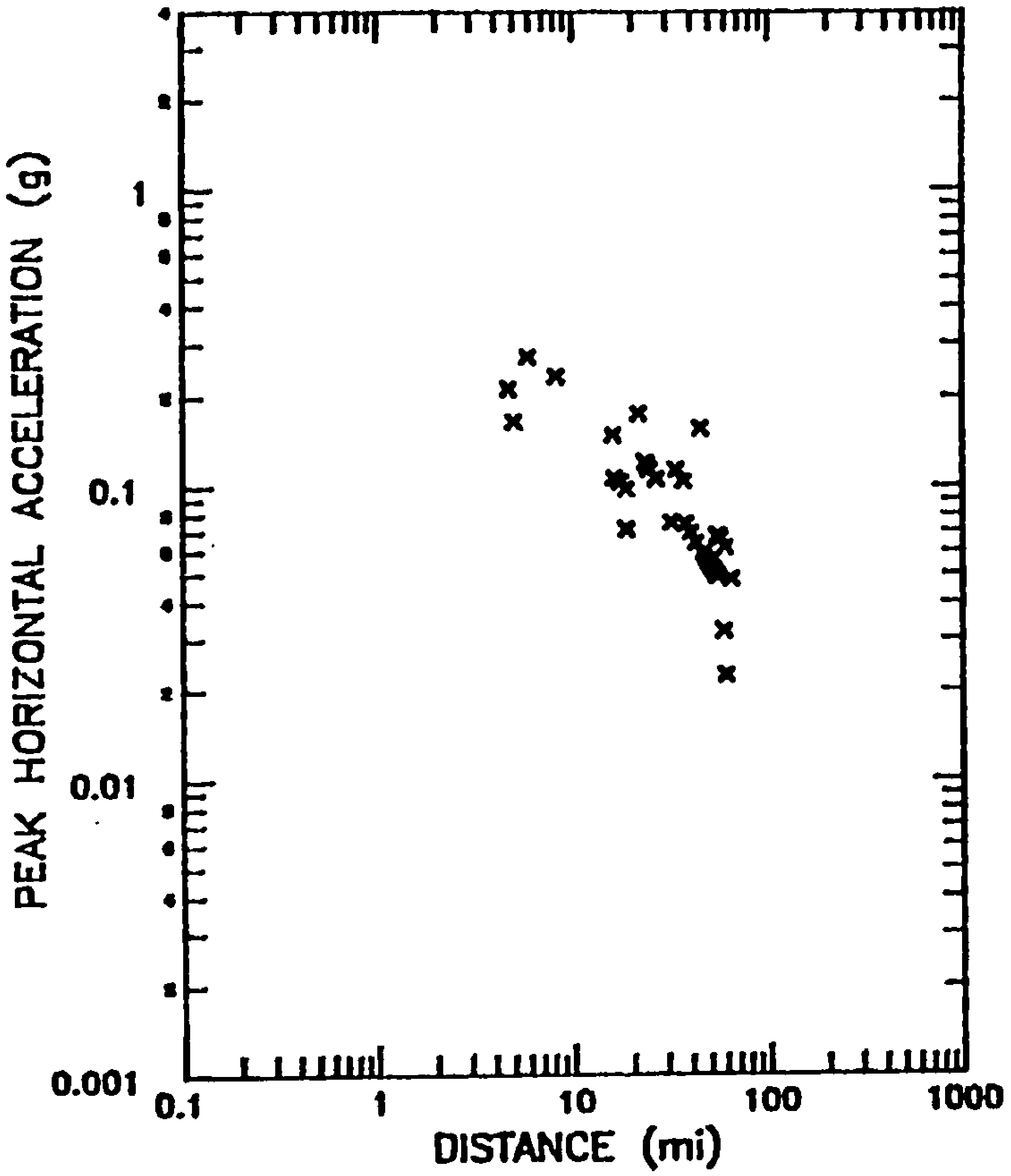
DETERMINISTIC SITE PARAMETERS

ABBREVIATED FAULT NAME	APPROX. DISTANCE mi (km)	MAX. CREDIBLE EVENT			MAX. PROBABLE EVENT		
		MAX. CRED. MAG.	RHGA SITE ACC. g	SITE INTENS MM	MAX. PROB. MAG.	RHGA SITE ACC. g	SITE INTENS MM
ANACAPA	19 (30)	7.00	0.095	VII	6.25	0.060	VI
ARROYO PARIDA - MORE RANCH	51 (82)	7.00	0.052	VI	6.00	0.026	V
CHINO	40 (64)	7.00	0.068	V1	4.75	0.015	IV
CLEARWATER	43 (69)	7.00	0.063	VI	3.00	0.004	1
CLEGHORN	61 (99)	6.50	0.022	IV	6.25	0.019	IV
CUCAMONGA	38 (61)	7.00	0.072	VII	6.75	0.061	VI
ELSINORE	55 (88)	7.50	0.048	VI	6.75	0.029	V
FRAZIER MOUNTAIN	60 (96)	6.50	0.031	V	3.00	0.003	I
GARLOCK (West)	65 (104)	7.75	0.047	VI	6.75	0.024	V
GLN.HELEN-LYTLE CR-CLREMNT	53 (85)	7.50	0.050	VI	7.00	0.036	V
HOLSER	32 (51)	6.75	0.073	VII	6.25	0.053	VI
MALIBU COAST	8 (13)	7.50	0.229	IX	5.00	0.055	VI
NEWPORT - INGLEWOOD	5 (8)	7.50	0.208	VIII	6.50	0.127	VIII
NORTHRIDGE HILLS	19 (30)	6.50	0.069	VI	4.00	0.013	III
OAK RIDGE	34 (54)	7.50	0.111	VII	6.25	0.050	VI
OFFSHORE ZONE OF DEFORM.	47 (75)	7.50	0.058	VI	6.00	0.021	IV
PALOS VERDES HILLS	5 (8)	7.00	0.161	VIII	5.50	0.071	VI
PINE MOUNTAIN	49 (79)	7.00	0.054	VI	4.50	0.010	III
RAYMOND	16 (26)	7.50	0.145	VIII	5.50	0.043	VI
RED MOUNTAIN	55 (89)	7.50	0.066	VI	6.00	0.024	V
SAN ANDREAS (Mojave)	45 (73)	8.50	0.152	VIII	8.25	0.131	VIII
SAN ANDREAS (Southern)	60 (97)	8.00	0.060	VI	7.25	0.037	V
SAN CAYETANO	37 (59)	7.50	0.102	VII	6.25	0.045	VI
SAN CLEMENTE	54 (88)	7.50	0.049	VI	6.25	0.021	IV
SAN GABRIEL	24 (39)	7.50	0.111	VII	6.25	0.051	V1

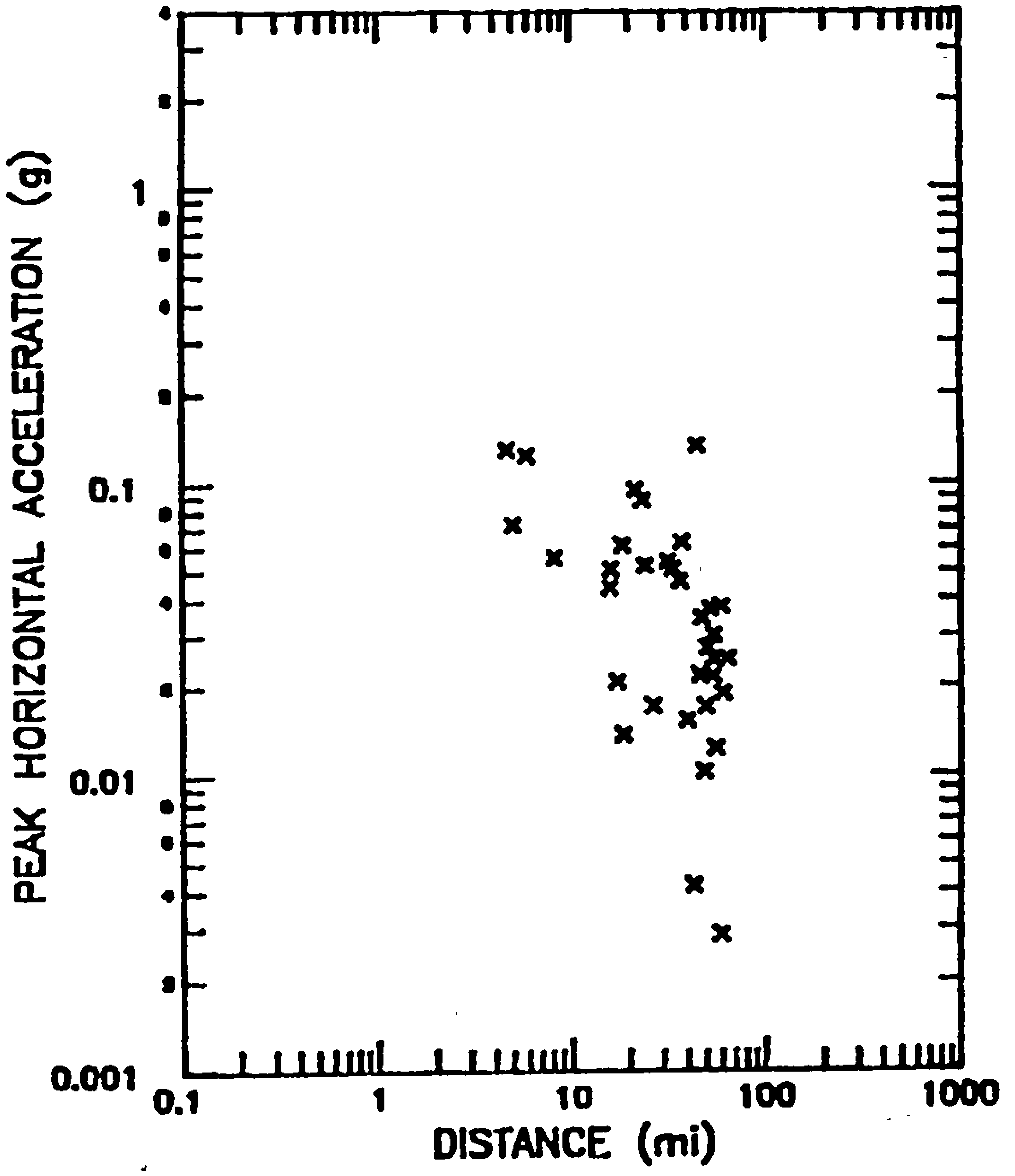
```
                              -----------------------------
                              DETERMINISTIC SITE PARAMETERS
                              -----------------------------

Page   2
-------------------------------------------------------------------------------
|                              |            |MAX. CREDIBLE EVENT||MAX. PROBABLE EVENT|
|                              | APPROX.    |-------------------||-------------------|
|        ABBREVIATED           |DISTANCE    | MAX.| RHGA | SITE || MAX.| RHGA | SITE |
|        FAULT NAME            | mi (km)    |CRED.| SITE |INTENS||PROB.| SITE |INTENS|
|                              |            | MAG.|ACC. g|  MM  || MAG.|ACC. g|  MM  |
|------------------------------|------------|-----|------|------||-----|------|------|
|SANTA CRUZ ISLAND             | 56 ( 90)   | 7.50| 0.065|  VI  || 5.00| 0.012|  III |
|------------------------------|------------|-----|------|------||-----|------|------|
|SANTA MONICA - HOLLYWOOD      |  6 ( 10)   | 7.50| 0.265|  IX  || 6.00| 0.122|  VII |
|------------------------------|------------|-----|------|------||-----|------|------|
|SANTA SUSANA                  | 24 ( 38)   | 7.00| 0.117|  VII || 6.50| 0.086|  VII |
|------------------------------|------------|-----|------|------||-----|------|------|
|SANTA YNEZ (East)             | 50 ( 80)   | 7.50| 0.053|  VI  || 5.75| 0.017|  IV  |
|------------------------------|------------|-----|------|------||-----|------|------|
|SIERRA MADRE-SAN FERNANDO     | 22 ( 35)   | 7.50| 0.171| VIII || 6.50| 0.093|  VII |
|------------------------------|------------|-----|------|------||-----|------|------|
|SIMI - SANTA ROSA             | 27 ( 43)   | 7.00| 0.103|  VII || 4.25| 0.017|  IV  |
|------------------------------|------------|-----|------|------||-----|------|------|
|VENTURA - PITAS POINT         | 48 ( 77)   | 7.00| 0.056|  VI  || 6.25| 0.034|   V  |
|------------------------------|------------|-----|------|------||-----|------|------|
|VERDUGO                       | 17 ( 28)   | 7.00| 0.101|  VII || 4.50| 0.020|  IV  |
|------------------------------|------------|-----|------|------||-----|------|------|
|WHITTIER - NORTH ELSINORE     | 16 ( 26)   | 7.50| 0.104|  VII || 6.25| 0.050|  VI  |
|------------------------------|------------|-----|------|------||-----|------|------|
*******************************************************************************

-END OF SEARCH-   34  FAULTS FOUND WITHIN THE SPECIFIED SEARCH RADIUS.

THE NEWPORT - INGLEWOOD FAULT IS CLOSEST TO THE SITE.
IT IS ABOUT   4.7 MILES AWAY.

LARGEST MAXIMUM-CREDIBLE SITE ACCELERATION:  0.265 g

LARGEST MAXIMUM-PROBABLE SITE ACCELERATION:  0.131 g
```

COMPARISON OF MAXIMUM EARTHQUAKES

MAXIMUM CREDIBLE EARTHQUAKES

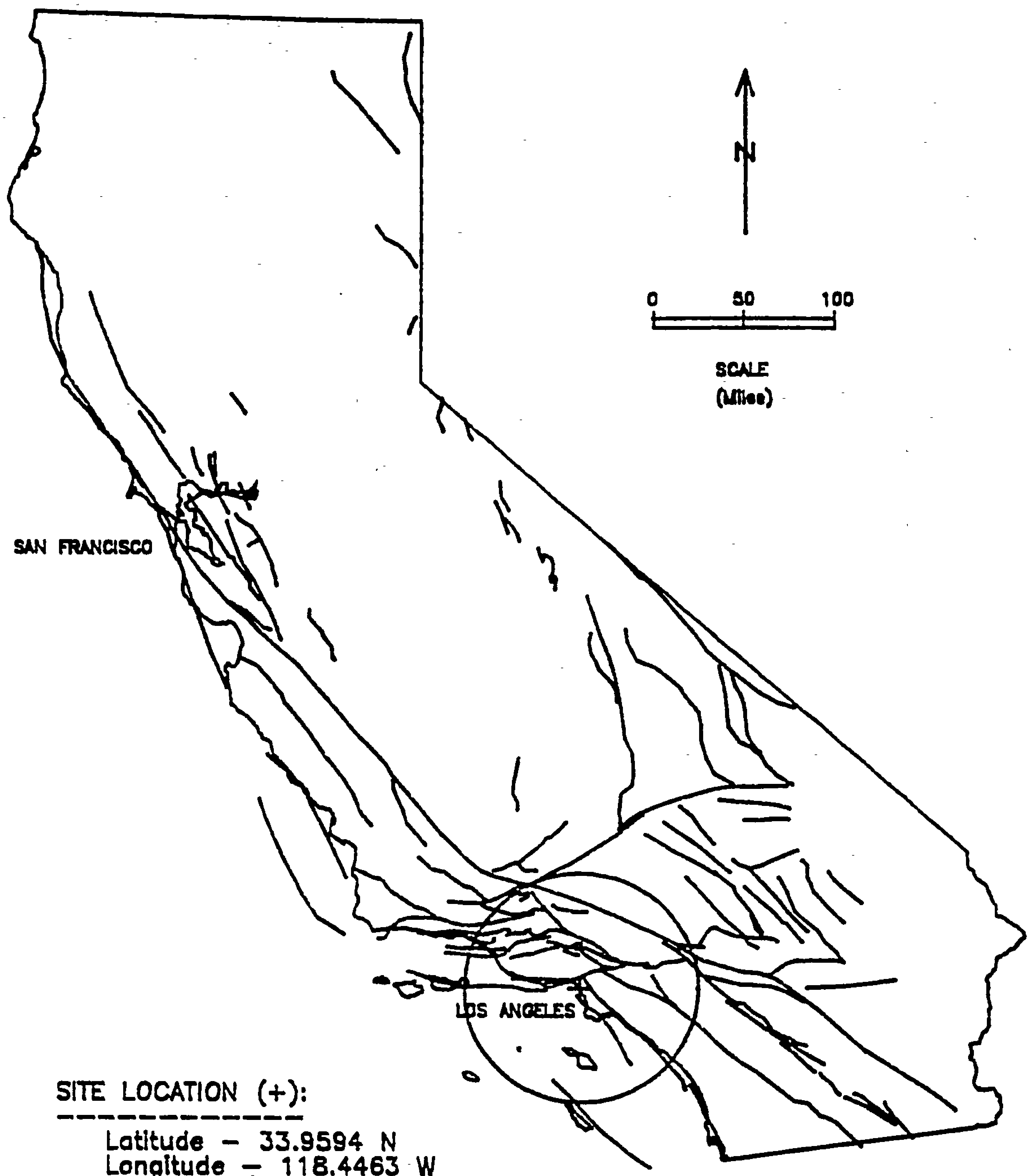


MAXIMUM PROBABLE EARTHQUAKES



JOB NO.: 3558–VN

LATITUDE: 33.9594 N – LONGITUDE: 118.4463 W



SITE LOCATION (+):

Latitude – 33.9594 N
Longitude – 118.4463 W
HINZDEL RESIDENCE

CALIFORNIA FAULT MAP

November 26, 1990
W.O. 3558-VN

APPENDIX C

LABORATORY RESULTS AND TEST PIT LOGS

November 26, 1990
W.O. 3558-VN

APPENDIX C

LABORATORY TESTING

Moisture-Density

The field moisture content and dry unit weights were determined for each of the ring samples. The information is moderately useful in providing a gross picture of the soil consistency between test pits and any local variations. The dry unit weight is determined in pounds per cubic foot and is shown on the test pit logs (see Plates TP-1 and TP-2). The field moisture content is determined as a percentage of the dry weight.

Consolidation Tests

Three consolidation tests were performed on selected ring samples to develop data for settlement studies. These tests were performed primarily on materials which would be most susceptible to consolidation under increased loading, and for materials which would directly affect settlement of the foundation system. Loads were applied to each sample in several increments in geometric progression, and the resulting deformation were recorded at selected time intervals. Porous stones were placed in contact with the top and bottom of each specimen to permit the release and addition of pore fluid. Inundation of each of the samples was performed at a load of one ton per square foot. Results of the consolidation tests are shown as Plates C-1 through C-3.

Shear Tests

Shear tests were performed in a strain controlled type Direct Shear Machine. The rate of deformation was approximately 0.05 inch per minute. The samples were sheared under varying confining loads in order to determine the Coulomb shear strength parameters; cohesion (c), and angle of internal friction (ø) for peak and residual strength conditions. The samples were tested in an artificially saturated condition. The results are plotted and a linear approximation is drawn of the failure curve. Results are shown on the Shear Test Diagrams included with this report as Plates SH-1 through SH-4.

Plate SH-3 shows test results of a sample remolded by GeoSoils, Inc., to 90 percent of maximum laboratory density as determined in accordance with ASTM Test Designation D-1557-78. All remolded specimens were made up of material sieved through a No. 4 sieve.

Plate SH-4 is a summary of undisturbed shear test data.

Appendix C

Compaction Tests

To determine the moisture-density relationship of the on-site soils, compaction tests were performed in accordance with ASTM Test Designation D-1557-78. The moisture-density relationship is as follows (Compaction Curve Shown on Plate M-1):

Sample	Soil-Type	Maximum Dry Unit Weight (pcf)	Optimum Moisture (%)
TP-2 @ 5'	Orange-brown medium to coarse SAND with CLAY	114.0	14.5

Grain Size Analysis

A Washed sieve analysis of a selected representative sample was performed for grain size determination in accordance with California Test 202. This test establishes gradation (grain size) for the coarse-grained particles (i.e., sand and gravel). The gradation curve is included in this report as Plate G-1.

Log PB
W.O. 3558-VN

TEST PIT LOGS

Test Pit No.	Depth Below Surface (FT.)	Material Type	Material Description	Comments		
				Depth	Dry Unit Weight	Moisture (%)
Tp-1	0-2'	ARTIFICIAL FILL:	Brown (10Yr 5/3) fine medium SAND with some silt binder, dry, porous, loose, very friable with abundant roots.	3'	100.1	1.1
	2-5'	SAND DUNE DEPOSITS:	Yellowish brown (10Yr 5/4) fine medium sand slightly moist, slightly porous, dense, very friable	5'	106.7	1.6
			Total Depth 5' Slight Caving No Groundwater			

Log JW
W.O. 3558-VN

TEST PIT LOGS

Test Pit No.	Depth Below Surface (FT.)	Material Type	Material Description	Comments		
				Depth	Dry Unit Weight	Moisture (%)
Tp-2	0-1'	ARTIFICIAL FILL:	Brown (10Yr 5/3) fine to medium SAND with minor silt binder, dry, porous, loose. Abundant roots present	5'	101.8	3.2
	2-4'	SAND DUNE DEPOSIT:	Dark yellow brown (10Yr 4/4) fine to medium SAND slightly, moist, slightly porous, moderate dense.	8'	104.0	4.8
	4-7'		Dark yellow brown (10Yr 4/4) fine to medium SAND with lenses of slight clayey binder, moist, slightly porous, dense.	10'	105.5	5.0
	7-10'		Yellowish brown (10Yr 5/6) fine to medium SAND, moist, slightly porous, dense.			
			Total Depth 10' Slight Caving No Groundwater			

FORM 88/8

1 1 3 0 7 6 0 1 0 3

GEOSOILS, INC.
CONSOLIDATION TEST

CLIENT: Jim Hinzdel

WORK ORDER NO. 3558-VN

DATE 11/90

BORING	SAMPLE	DEPTH FEET	WATER CONTENT, % BEFORE	WATER CONTENT, % AFTER	HEIGHT INCHES	DIA. INCHES	CLASSIFICATION
TP	1	3'	1.1	8.0	1.00	2.36	Brown fine sand with small rocks

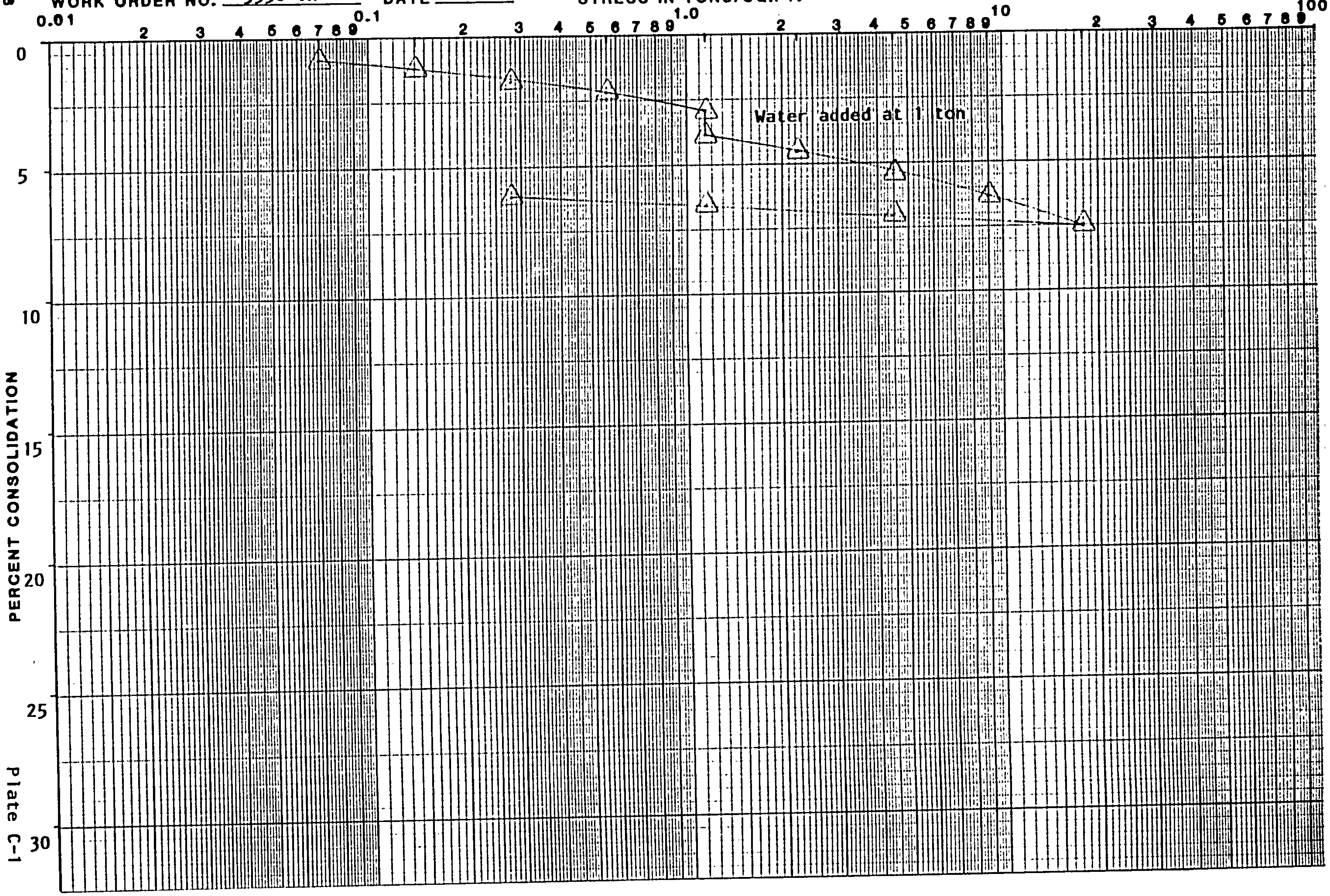


Plate C-1

FORM 88/8

GEOSOILS, INC.
CONSOLIDATION TEST

CLIENT: Jim Hinzdel

WORK ORDER NO. 3558-VN DATE 11/90

BORING	SAMPLE	DEPTH FEET	WATER CONTENT, % BEFORE	AFTER	HEIGHT INCHES	DIA. INCHES	CLASSIFICATION
Tp	2	5'	3.2	16.1	1.00	2.36	Brown fine silty sand

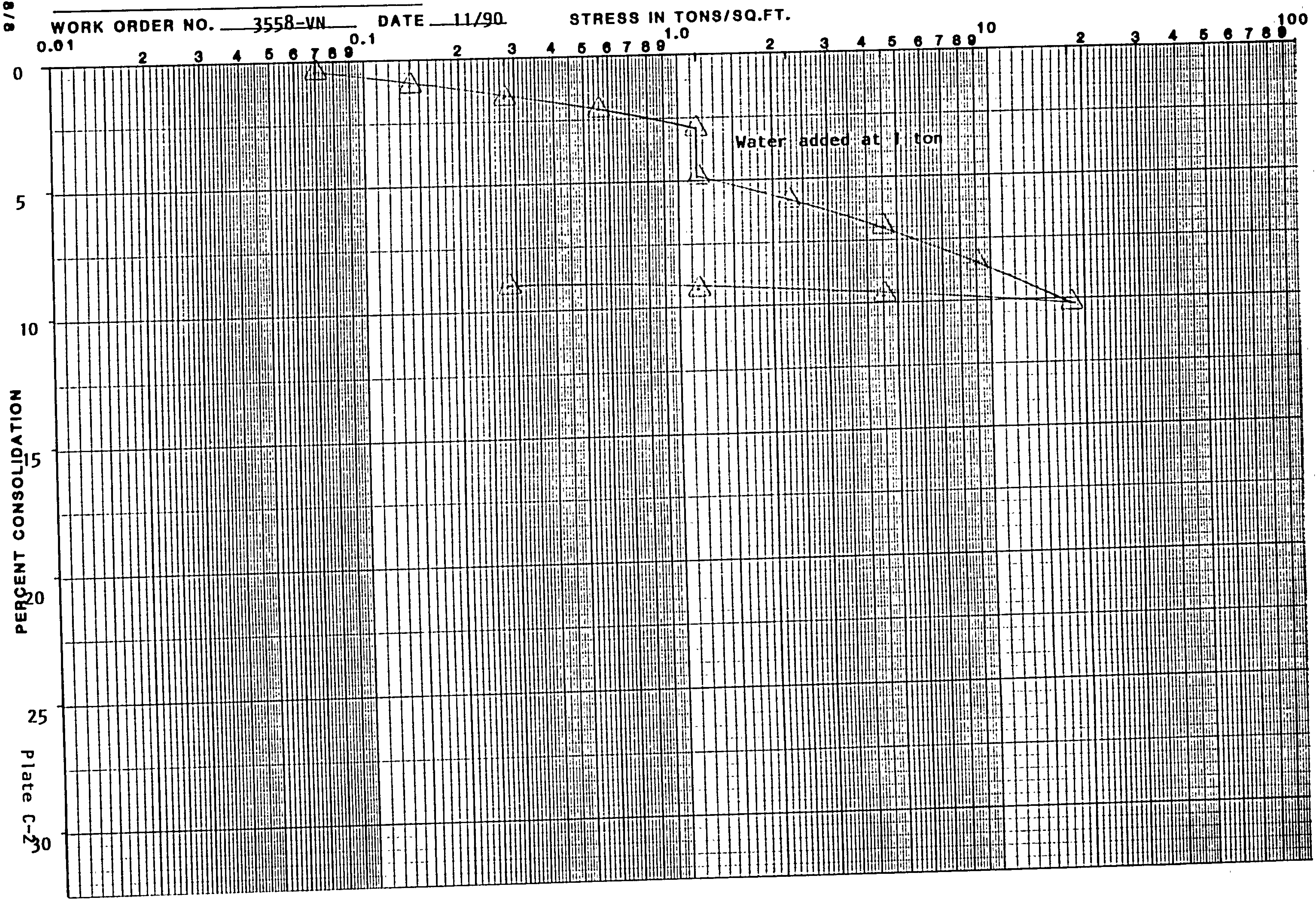


Plate C-2

FORM 88/8

GEOSOILS, INC.
CONSOLIDATION TEST

CLIENT: Jim Hinzdel

WORK ORDER NO. 3558-VN

DATE 11/90

BORING	SAMPLE	DEPTH FEET	WATER CONTENT, % BEFORE	WATER CONTENT, % AFTER	HEIGHT INCHES	DIA. INCHES	CLASSIFICATION
TP	2	8	4.8	20.3	1.00	2.36	Brown fine to silty sand

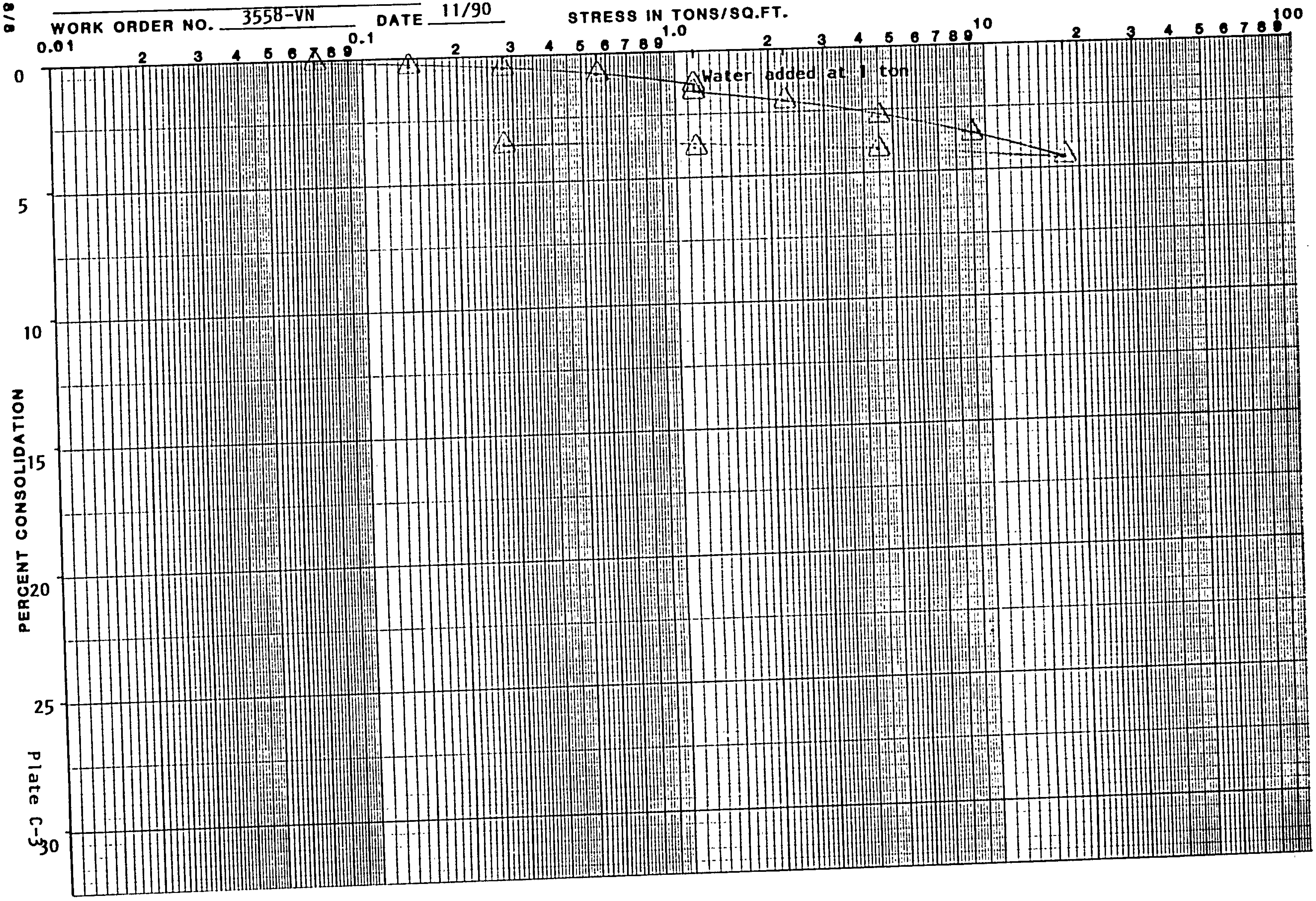
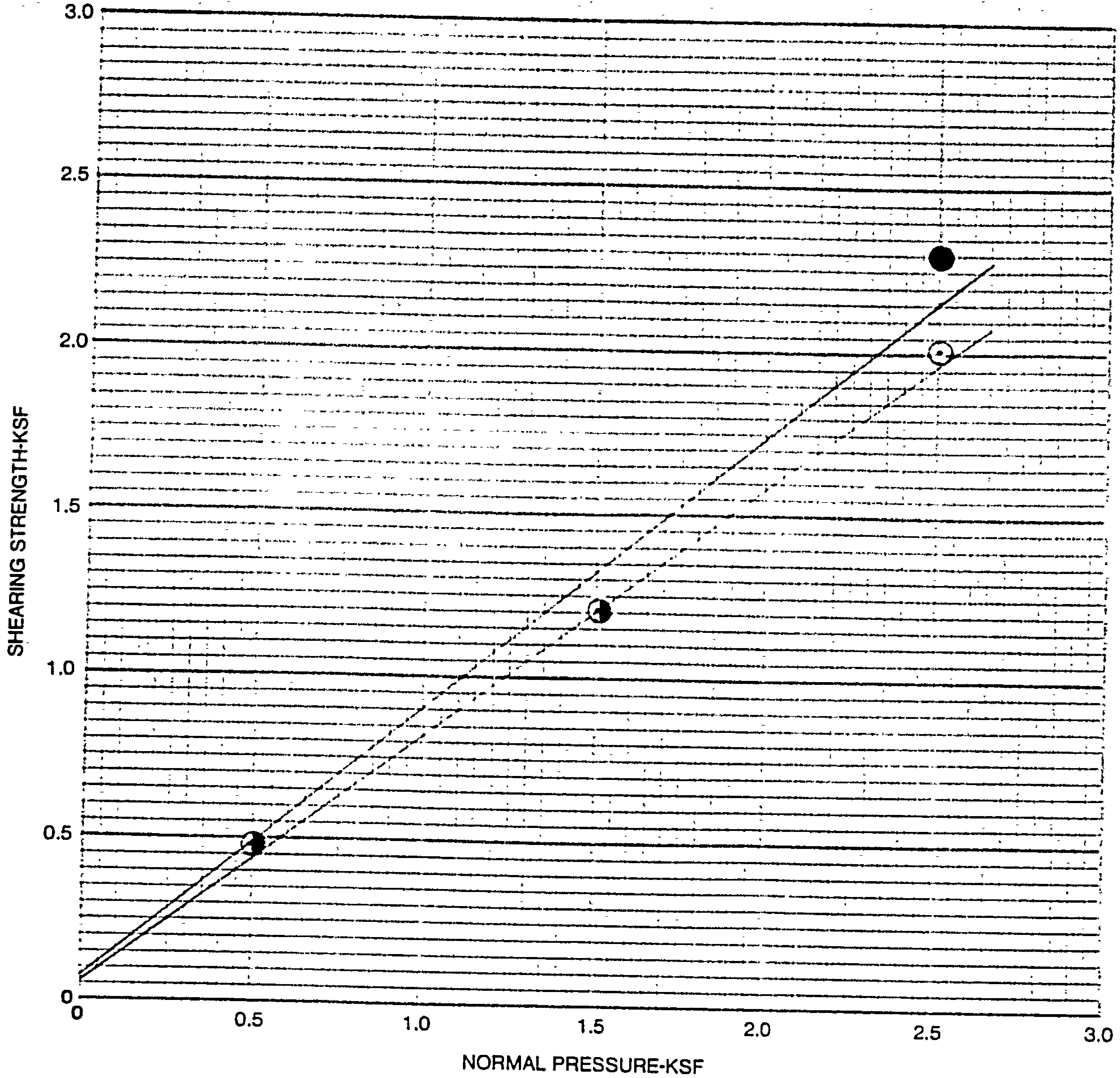


Plate C-3



EXPLANATION

● PEAK - AT SATURATION MOISTURE CONTENT	C - 70 psf	Ø - 40.0°
○ RESHEAR - AT SATURATION MOISTURE CONTENT	C - 60 psf	Ø - 37.5°

DIRECT SHEAR REMOLDED TO 90%
RELATIVE DENSITY, THEN SATURATED

PCF % MOISTURE

% SATURATED MOISTURE CONTENT

UNDISTURBED NATURAL SHEAR SATURATED
Tp-2 @ 5'
Brown fine silty sand

% SATURATED MOISTURE CONTENT

GeoSoils, Inc.

SHEAR TEST DIAGRAM

Jim Hinzdel

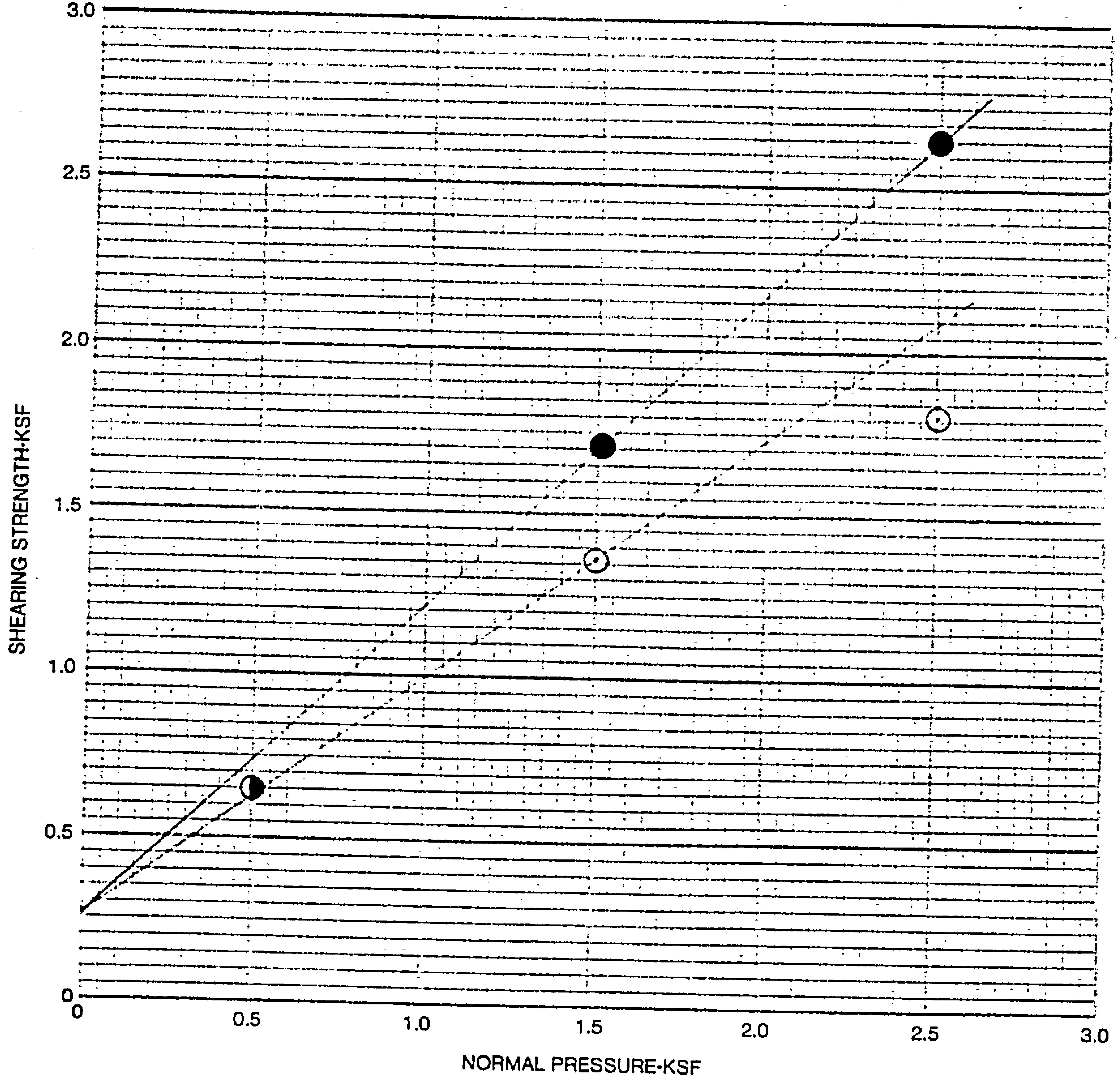
DATE 11/90

W.O. NO. 3558-VN

Geotechnical Engineering • Engineering Geology

Plate SH-1

FORM 87/8-2C



EXPLANATION

● PEAK - AT SATURATION MOISTURE CONTENT	C - 260 psf	Ø - 43.5°
○ RESHEAR - AT SATURATION MOISTURE CONTENT	C - 260 psf	Ø - 36.5°

DIRECT SHEAR REMOLDED TO 90% RELATIVE DENSITY, THEN SATURATED PCF % MOISTURE % SATURATED MOISTURE CONTENT	UNDISTURBED NATURAL SHEAR SATURATED Tp-2 @ 8' Brown fine sand % SATURATED MOISTURE CONTENT

GeoSoils, Inc.

SHEAR TEST DIAGRAM

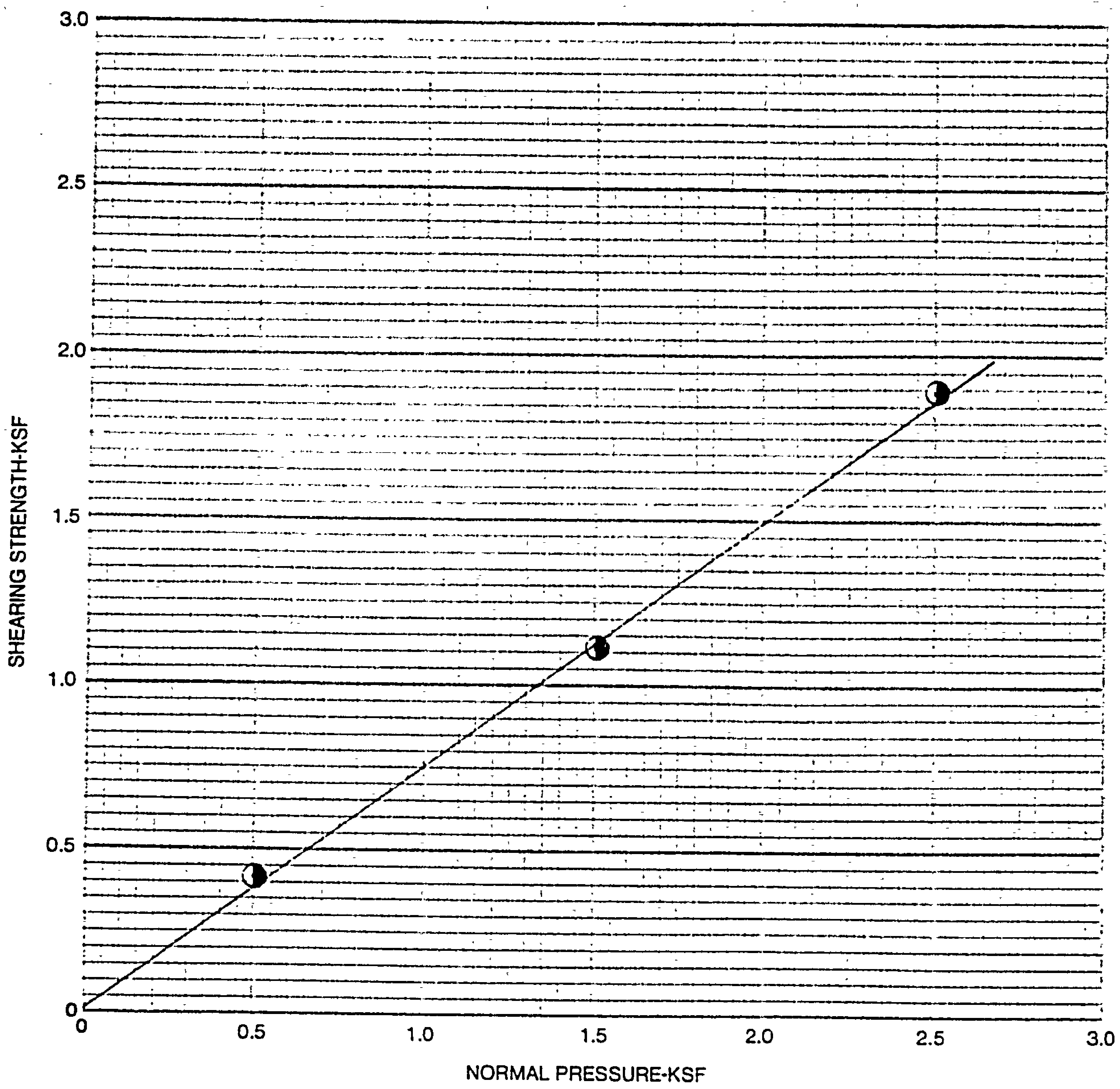
Jim Hinzdel

DATE 11/90 W.O. NO. 3558-VN

Geotechnical Engineering • Engineering Geology

Plate SH-2

FORM 87/8-2C



EXPLANATION

● PEAK - AT SATURATION MOISTURE CONTENT　C - 20 psf　Ø - 36.5°

○ RESHEAR - AT SATURATION MOISTURE CONTENT　C - 20 psf　Ø - 36.5°

DIRECT SHEAR REMOLDED TO 90% RELATIVE DENSITY, THEN SATURATED	UNDISTURBED NATURAL SHEAR SATURATED
Tp-2 @ 5' Orange brown medium to coarse sand with clay 114.0 PCF　14.5 % MOISTURE 19.9 % SATURATED MOISTURE CONTENT	% SATURATED MOISTURE CONTENT

GeoSoils, Inc.

SHEAR TEST DIAGRAM

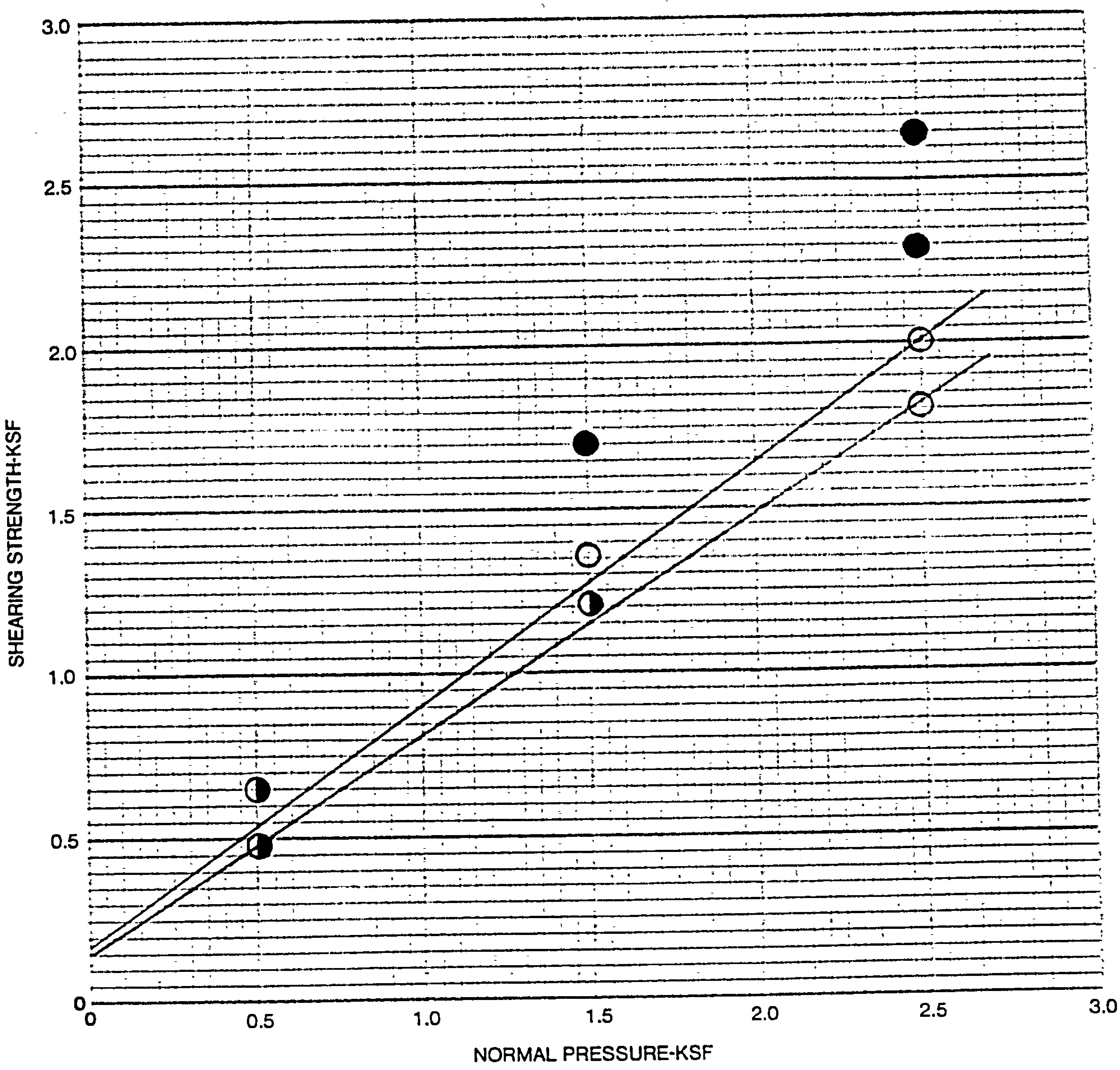
Jim Hinzdel

DATE 11/90　W.O. NO. 3558-VN

Geotechnical Engineering • Engineering Geology

Plate SH-3

FORM 87/8-2C



EXPLANATION

● PEAK - AT SATURATION MOISTURE CONTENT   C - 175 psf   Ø - 36°

○ RESHEAR - AT SATURATION MOISTURE CONTENT   C - 150 psf   Ø - 34°

DIRECT SHEAR REMOLDED TO 90% RELATIVE DENSITY, THEN SATURATED PCF % MOISTURE % SATURATED MOISTURE CONTENT	UNDISTURBED NATURAL SHEAR SATURATED Summary of Shear Test Data Brown, fine to medium SAND % SATURATED MOISTURE CONTENT

GeoSoils, Inc.

SHEAR TEST DIAGRAM

JIM HINZDEL

DATE 11/90 | W.O. NO. 3558-VN

Geotechnical Engineering • Engineering Geology

Plate SH-4

FORM 87/8-2C

GEOSOILS INC.

WORK ORDER: 3558-VN DATE: 11/90

CLIENT: Jim Hinzdel

SOIL TYPE:

EXCAVATION: Tp-2 @ 5'

CLASSIFICATION: Orange-brown medium to coarse sand with clay

MAXIMUM DENSITY CURVE

114.0 pcf @ 14.5%

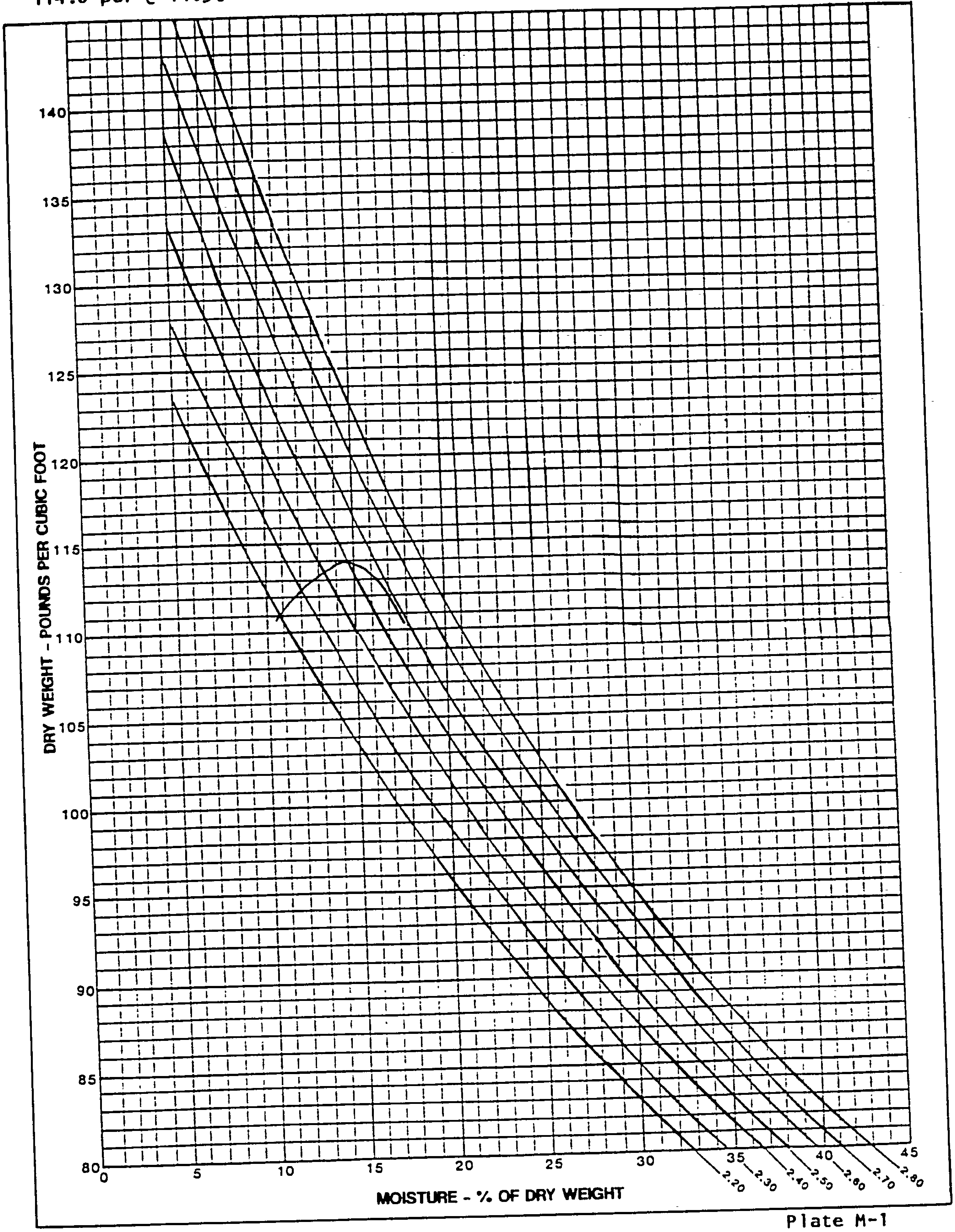
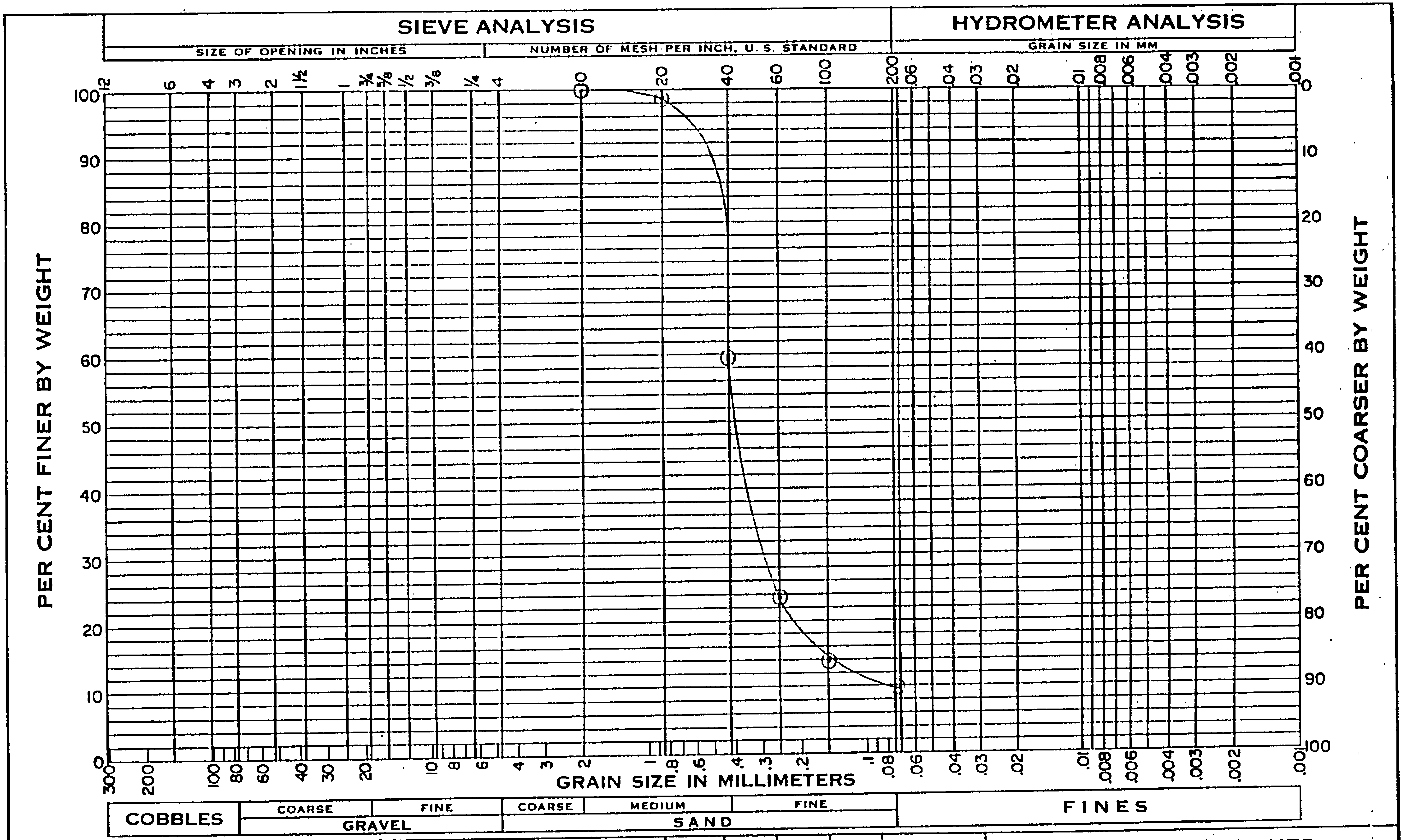


Plate M-1

FORM 89/30



SAMPLE NO.	DEPTH –FT.	CLASSIFICATION	NAT. W.C.	LL	PL	PI	
TP-2	5	Orangish-brown, medium to fine-grained SAND					

GRADATION CURVES

GeoSoils, Inc.

Plate G-1

BIG MAP (   )

B&S

TRACT: 8557
BLOCK: 17
LOT: 35
JOB ADDRESS: 235 Montreal St

#2   11-26-90

GRADING FILES

55A D2

CITY OF LOS ANGELES
DEPARTMENT OF BUILDING AND SAFETY
GRADING DIVISION
REVIEW OF ENGINEERING AND/OR GEOLIGICAL REPORTS

LOC. # 21496

Date Submitted 12-6-90 Date to Insp. 12-11-90 Date Rec. L.A.

Job Address 235 MONTREAL ST District Office WLA

Tract 8557 Block 17 Lot 35

District Map # P.C.# Thomas Guide

Owner JAMES HINZDEL Address 235 MONTREAL ST

City L.A Phone # (213) 822-8420

Engineer GeoSoils, Inc. Report # WO3558-UN Date 11-26-90

Geologist " Report # " Date "

No. of copies ea. submitted (Geo.) (Engr.) 1

OFFICE

Fees Paid Yes ✓ No
Sewers Available Yes ✓ No
Previous Correspondence or B/L's Yes No ✓
Pertinent Tract File Information Yes No ✓
Pertinent Info. on File Adjoining Lot Yes No ✓
Plans Submitted with Report Yes No ✓
Return Plans to ________ Office Yes No ✓

FIELD

Landslide or Problem Area Yes No ✓
Site Description Per Report Yes ✓ No
On Site Hazard Yes No ✓
Hazards To Adjoining Property Yes No ✓
Hazards From Adjoining Property Yes No ✓
Existing Fill Not Mentioned in Report Yes No ✓
Existing Cut Not Mentioned in Report Yes No ✓

FURTHER COMMENTS: AS PER REPORT

INSPECTOR M. IWAOKA Date 12-11-90 Branch WLA
Returned to Los Angeles City Hall, Room 460-A

B&S G-2 (Rev.11/90)

APPENDIX G

ARCHITECTURAL PLANS

ABBREVIATIONS

CL.	centerline
PL.	plate
DIA.	diameter
#	pound or number
(E)	existing
(N)	new
ABV.	above
ACC.	access
ACOUS.	aoustical
A.D.	area drain
ADJ.	adjustable
A.F.F.	above finish floor
A.I.B.	air infiltration
ALT	barrier
ALUM	alternate
APPROX.	aluminum
ARCH.	approximate
	architectural
BD	
BLCKG	board
BM	blocking
B.O.	beam
BOT.	bottom of
B.O.F.	bottom
	bottom of footing
CAB.	
C.B.	cabinet
C/C	catch basin
CEM.	center to center
CER.	cement
C.I.P.	ceramic
C.J.	cast-in-place
CLG.	control joint
CLKG.	ceiling
CLOS.	caulking
CLR.	closet
CMU.	clear
CNTR.	concrete masonry
CONC	counter
COL.	concrete
CONT	column
CORR.	continuous
CT	connection
	continuous

CRT.	ceramic tile
CPT	carpet; carpeted
CNTR	center
DBL.	double
DEMO.	demolition
DET.	detail
D.F.	douglas fir
DIA.	diameter
DIM.	dimension
DN	down
D.O.	door opening
DR	door
D.S.	downspout
DW.	dishwasher
DWG.	drawing
E	east
EA.	each
EL	elevation
ELEC	electrical
ELEV	elevator
ENCL	enclosure
EQ.	equal
EQUIP.	equipment
EST	estimate
EXIST	existing
EXP	expanded expansion
EXPO.	exposed
EXT	exterior
F.D.	floor drain
F.E.	fire extinguisher
F/F	finish to finish
F.I.P.	finish in place
FIN.	finish
FLASH	flash flashing
FLR	floor flooring
FLOUR	flourescent
F.O.C.	face of concrete
F.O.F.	face of finish
F.O.I.C.	furnished by owner
	install by contractor
F.O.M.	face of masonry

F.O.S.	face of studs
FR.	frame
FRPF	fireproof
FRPL.	fireplace
FT	foot
FURR	furring
FUT	future
F.W.	full width
GA	gauge
GALV	galvanized
G.C.	general contractor
GL	glass
GLAM	glue-laminated
GR	grade
GWB	gypsum wall board
H.B.	hose bibb
H.C.	hollow core
H.D.O.	high density overlay
HDR.	header
HRWD	hardwood
HDWE	hardware
HM	hollow metal
HORIZ	horizontal
H.P.	high point
HR	hour
HT	height
HVAC	heating/ventilating/
	air conditioning
HW	hot water
I.D.	inside diameter
IN	inch
INSUL	insulation
INT	interior
J.B.	junction box
J.F.	joint filler
JT.	joint
KIT.	kitchen
LAM.	laminate, laminated

LAV.	lavatory
L.F.	lineal feet
LOC.	location
L.P.	low point
LT.	light
MAS	masonry
MAX	maximum
MB	machine bolt
M.C.	medicine cabinet
MDO	medium density overlay
MECH	mechanical
MEMB	membrane
MET	metal
MFR	manufacturer
MIN	minimum
MIR.	mirror
MISC	miscellaneous
MTD	mounted
MTL	material
MUL	mullion
N	north
N/A	not applicable
N.I.C.	not in contract
NO.	number
NOM	nominal
N.R.	noise reduction
N.T.S	not to scale;
	not too sure
O.A.	overall
O.C.	on center
O.D.	outside diameter
OH	overhead
ONPNG	opening
OPP	opposite
PBJ	peanut butter & jelly
PERF	perforated
PERP	perpendicular
PL	plate
PLAN	plastic laminate
PLAS	plaster

PLYWD	plywood
PNL.	panel
PR.	pair
PRCST	pre-cast
PT	point
PTN	partition
QT	quarry tile
R	riser
R.A.	return air
RAD	radius
RB	rubber base
REF	reference
REF	refrigerator
REINF	reinforced
REQ	required
RESIL	resilient
REV	revision; revised
RGTR	register
RH	right hand
RM	room
RO	rough opening
S	south
S.C.	solid core
S.D.	smoke detector
SCHED	schedule
SECT	section
S.G.	safety glass
SH	shelf
SHR	shower
SHT	sheet
SHTG	sheeting
SIM	similar
S.O.G.	slab on grade
SPEC	specification
SQ.FT.	square foot (feet)
SQ.IN.	square inch(es)
S.S.	stainless steel
STA	station
STD	STANDARD
STL	steel
STOR	storage
STRL	structural

SUSP	suspended
SYM	symmetrical
T	tread
T.B.	towel bar
T.C.	top of curb
TEL	telephone
TER	terrazzo
T&G	tongue and groove
T.G.	tempered glass
THK.	thick
T.O.	top of...
T.O.P.	top of pavement
T.O.S.	top of slab; top of steel
T.O.W.	top of wall
T.P.	toilet paper holder
TYP.	typical
U.N.O.	unless noted otherwise
V.B.	vinyl base
VCT.	VINYL composition tile
VEN	veneer
VERT	vertical
VEST	vestibule
V.T.	vinyl tile
W	west
W/	with
W.C.	water closet
WD	wood
W.F.	wide flange
W.G.	wired glass
W.H.	water heater
W.L.	water line
W/O	without
WIN.	window.
WP	WATERPROOF
WR	water resistant
WS	weatherstrip
WSCT	wainscot
W.S.G.	wire safety glass
WT.	weight
X	type 'x'

DRAWING KEY

6 7 A52 3 3/A51	ELEVATION
study 206	ROOM NAME/NUMBER
206b	DOOR TYPE
1 a46	SECTION CUT
B	WALL TYPE
2 a82	DETAIL LOCATION
+100'-0" T.O. FLOOR	ELEVATION DATUM
1	WINDOW TYPE
2	GRIDLINE

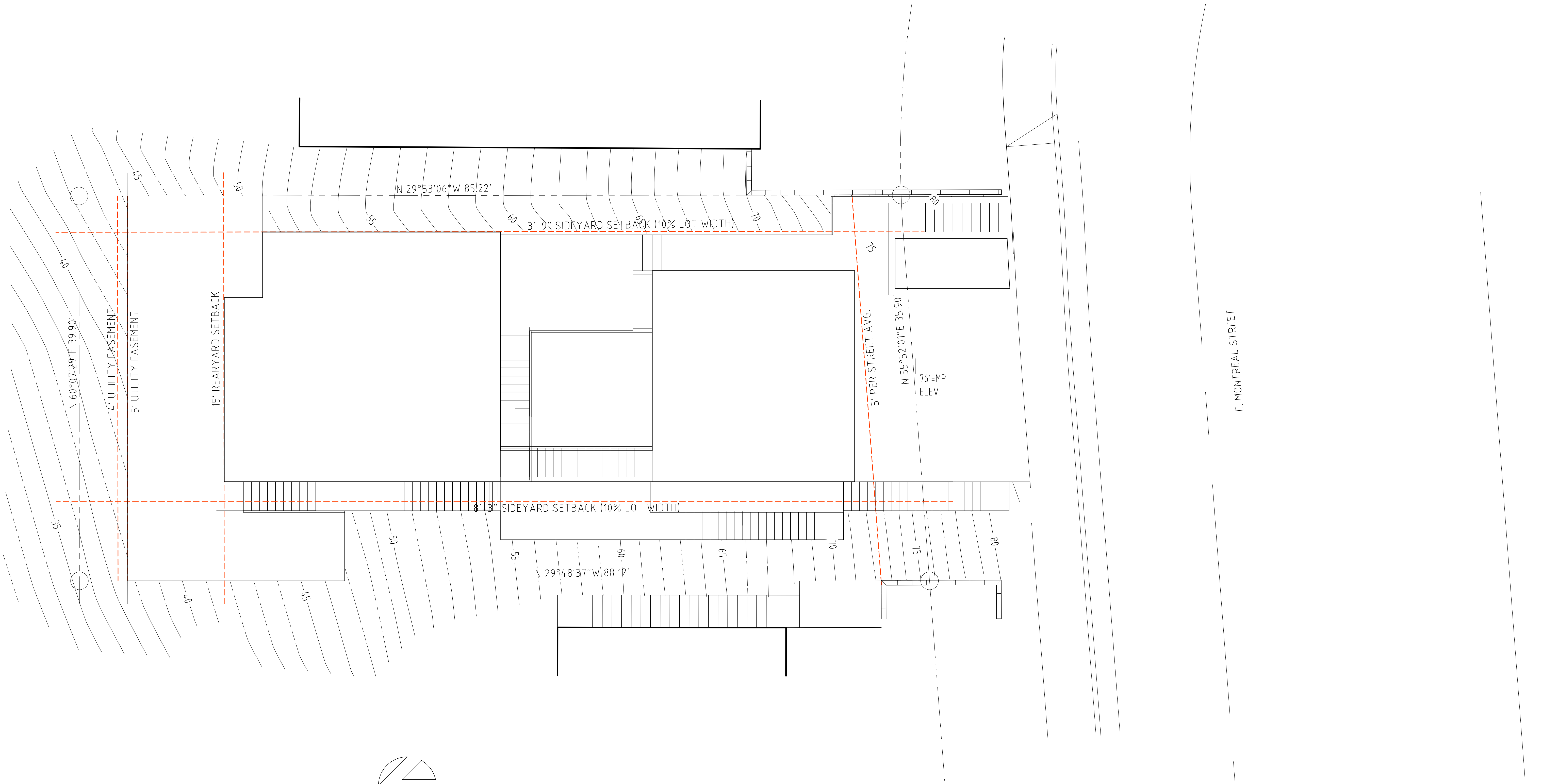
PROJECT DESCRIPTION

NEW SINGLE FAMILY RESIDENCE

ADDRESS:	237 E MONTREAL STREET, PLAY DEL REY, CA 90293
PARCEL #	4116012004
LEGAL DESCRIPTION	TR 8557 B17 L37
WORK DESCRIPTION	NEW SINGLE FAMILY RESIDENCE
OCCUPANCY	R3
ZONING	R1
CONSTRUCTION TYPE	TYPE VB (SPRINKLERED)
LOT COVERAGE	
TOTAL LOT AREA	3,461 SF
MAX LOT COVERAGE @45%	1,558 SF
ACTUAL LOT COVERAGE	1,551 SF
ALLOWABLE RFAR	1,840 X 3 = 5520 SF
PROJECT SF	
INTERIOR	
GARAGE	418
MAIN	589
BEDROOM	325
M BEDROOM	589
STUDIO	529
STUDIO LOFT	241
TOTAL SF	3034 SF < 5520 SF ALLOWED
DECKS STAIRS	
ROOF DECK	500
MAIN FLOOR	447
BEDROOM	338
STUDIO	72
	1375

CONTACT

SITE	237 E MONTREAL STREET, PLAYA DEL REY, CA 90293
OWNER ADDRESS	JUSTIN BREVOORT 336 THE STRAND HERMOSA BEACH, CA 90254
PHONE	310 376 2537
EMAIL	CREATIVELABZ@ME.COM
ARCHITECT CONTACT ADDRESS	ZEROPLUS JOSHUA BREVOORT / LISA CHUN 1000 S. WELLER #0 SEATTLE, WA 98104
PHONE	206 323 4009
EMAIL	MAIL@0-PLUS.COM
CONTRACTOR CONTACT ADDRESS	SURFSIDE CONSTRUCTION MIKE CLELAND
PHONE	3108904980
EMAIL	MJC@SURFSIDEPROPERTIESINC.COM
GEOTECHNICAL ENGINEER CONTACT ADDRESS	RMA GEOSCIENCE, INC. MARK SWIATEK 9854 GLENOAKS BOULEVARD SUN VALLEY, CA 91352-1044
PHONE	800.RMA.4396
EMAIL	MSWIATEK@RMAGEOSCIENCE.COM



1 site plan
1:70

SHEET LIST

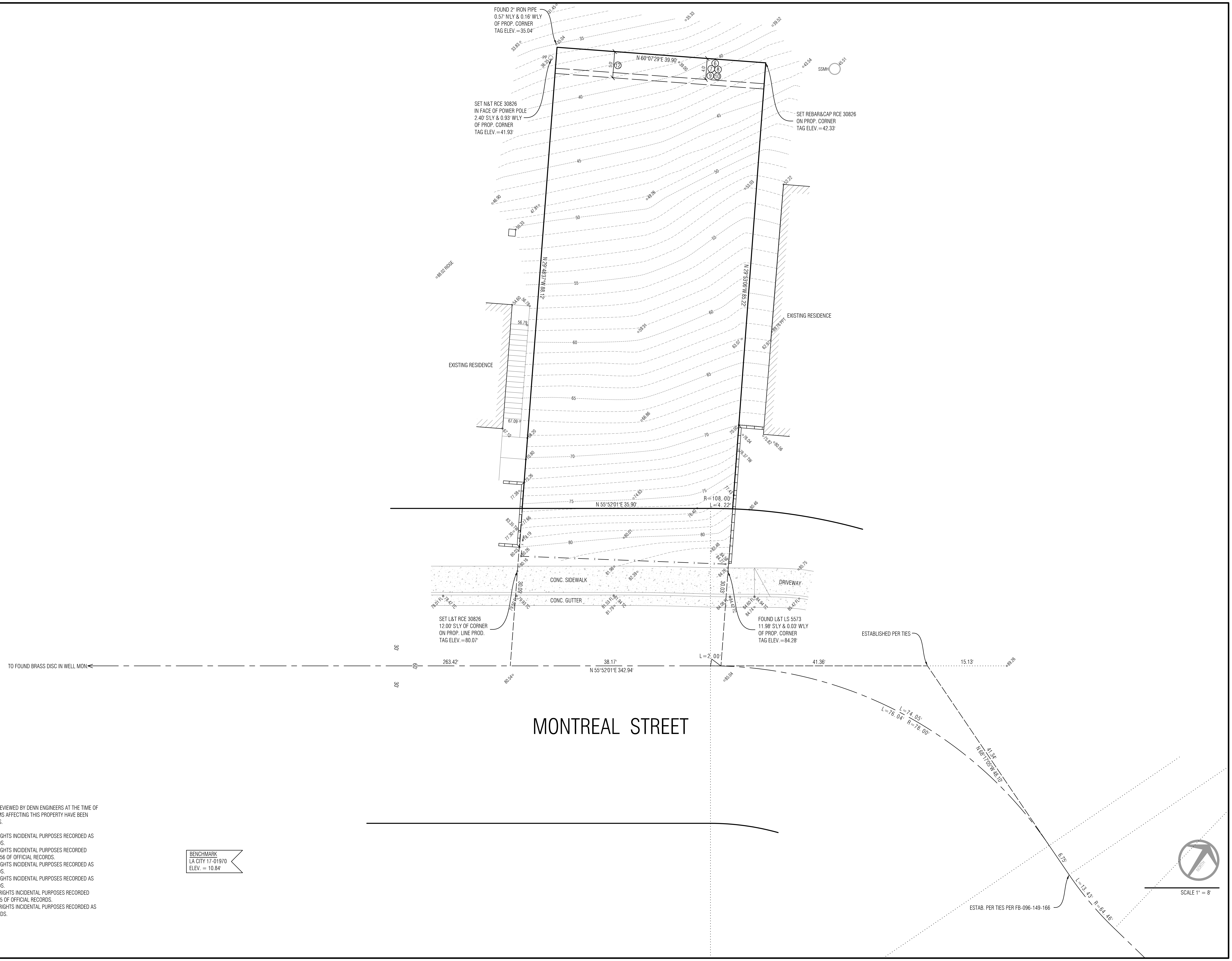
zeroplus

1000 S Weller #0
Seattle, WA 98104
ph: 206 323 4009
e: mail@0-plus.com

Playa Del Rey

geotech set
032322

a00



FOUND 2" IRON PIPE
0.57' N'LY & 0.16' W'LY
OF PROP. CORNER
TAG ELEV.=35.04'

SET N&T RCE 30826
IN FACE OF POWER POLE
2.40' S'LY & 0.93' W'LY
OF PROP. CORNER
TAG ELEV.=41.93'

SET REBAR&CAP RCE 30826
ON PROP. CORNER
TAG ELEV.=42.33'

SET L&T RCE 30826
12.00' S'LY OF CORNER
ON PROP. LINE PROD.
TAG ELEV.=80.07'

FOUND L&T LS 5573
11.98' S'LY & 0.03' W'LY
OF PROP. CORNER
TAG ELEV.=84.28'

ESTABLISHED PER TIES

ESTAB. PER TIES PER FB-096-149-166

BENCHMARK
LA CITY 17-01970
ELEV. = 10.84'

NOTE:
A TITLE POLICY HAS BEEN PROVIDED AND REVIEWED BY DENN ENGINEERS AT THE TIME OF THIS SURVEY. ANY READILY AVAILABLE ITEMS AFFECTING THIS PROPERTY HAVE BEEN PLOTTED BASED ON PROVIDED DOCUMENTS.

⑥ ITEM #6 - EASEMENT FOR UTILITIES AND RIGHTS INCIDENTAL PURPOSES RECORDED AS BOOK 19641, PAGE 67 OF OFFICIAL RECORDS.
⑦ ITEM #7 - EASEMENT FOR UTILITIES AND RIGHTS INCIDENTAL PURPOSES RECORDED FEBRUARY 15, 1950 AS BOOK 3478, PAGE 256 OF OFFICIAL RECORDS.
⑧ ITEM #8 - EASEMENT FOR UTILITIES AND RIGHTS INCIDENTAL PURPOSES RECORDED AS BOOK 7028, PAGE 175 OF OFFICIAL RECORDS.
⑨ ITEM #9 - EASEMENT FOR UTILITIES AND RIGHTS INCIDENTAL PURPOSES RECORDED AS BOOK 7124, PAGE 248 OF OFFICIAL RECORDS.
⑩ ITEM #10 - EASEMENT FOR UTILITIES AND RIGHTS INCIDENTAL PURPOSES RECORDED FEBRUARY 15, 1950 AS BOOK 3521, PAGE 65 OF OFFICIAL RECORDS.
⑫ ITEM #12 - EASEMENT FOR UTILITIES AND RIGHTS INCIDENTAL PURPOSES RECORDED AS BOOK 31992, PAGE 320 OF OFFICIAL RECORDS.

CHICAGO TITLE COMPANY
ORDER NO. 112126547-MD
DATED NOVEMBER 16, 2021

DENN ENGINEERS
3914 DEL AMO BLVD, SUITE 921
TORRANCE, CA 90503 (310) 542-9433

SURVEY AND TOPOGRAPHY

FOR
JUSTIN BREVOORT
336 THE STRAND, UNIT A
HERMOSA BEACH, CA 90254
PHONE 310-529-9944

JOB ADDRESS

237 MONTREAL STREET
LOS ANGELES, CA 90293

LEGAL DESCRIPTION

LOT 37, BLOCK 17
TRACT NO. 8557
M.B. 103-1-3
APN 4116-012-004

THIS MAP CORRECTLY REPRESENTS A SURVEY MADE BY ME OR UNDER MY DIRECTION IN CONFORMANCE WITH THE REQUIREMENTS OF PROFESSIONAL LAND SURVEYORS' ACT

Gary J. Roehl

R.C.E. 30826

GARY J. ROEHL R.C.E. 30826

DRAWN BY KW CHECK BY XX

DRAWN ON JANUARY 31, 2022

REVISIONS

REVISIONS

LEGEND

▨ EXISTING BUILDING
▨ BRICK
▒ CONCRETE
▨ WOOD DECK
∘106.76 EXISTING ELEVATION
100 EXISTING CONTOUR
BLOCK WALL
—— X —— EXISTING FENCE

BCR	BEGINNING OF CURB RETURN
CATV	CABLE TV PULL BOX
CONC.	CONCRETE
CHMNY	CHIMNEY
CEFB	CITY ENGINEERS FIELD BOOK
C/L	CENTERLINE
C.L.F. / W.I.F.	CHAIN LINK FENCE / WROUGHT IRON FENCE
E'LY	EASTERLY
EG	EDGE OF GUTTER
EM	ELECTRIC METER
FF	FINISH FLOOR
FH	FIRE HYDRANT
FL	FLOW LINE
GFF	GARAGE FINISH FLOOR
GM	GAS METER
GUY / GW	GUY WIRE
I.P.	IRON PIPE MONUMENT
L&T	LEAD AND TACK / TAG MONUMENT
MH	MANHOLE (SANITARY SEWER / STORM DRAIN)
N'LY	NORTHERLY
N&T	NAIL AND TAG MONUMENT
PB	PULL BOX (EDISON / TRAFFIC / STREET LIGHT
PB (CONT)	TELEPHONE / CABLE TV)
PC	PROPERTY CORNER / PROP. CORNER
PL	PROPERTY LINE / PROP. LINE
PP / UP	POWER POLE / UTILITY POLE
PPT	PARAPET
PWFB	PUBLIC WORKS FIELD BOOK
R.R.	RAIL ROAD
RDFB	ROAD DEPARTMENT FIELD BOOK
R.S.	RECORD OF SURVEY
SPK / S&W	SPIKE / SPIKE AND WASHER MONUMENT
S'LY	SOUTHERLY
SSCO	SANITARY SEWER CLEANOUT
STK / STK&T	STAKE / STAKE AND TAG MONUMENT
STLT / LT	STREET LIGHT POLE / LIGHT POLE
TC	TOP OF CURB
TX / BX	TOP OF APRON / BOTTOM OF APRON
W'LY	WESTERLY
WM	WATER METER

NOTE: ALL SETBACK DIMENSIONS SHOWN ARE MEASURED TO EXTERIOR SURFACE OF BUILDINGS UNLESS OTHERWISE NOTED.

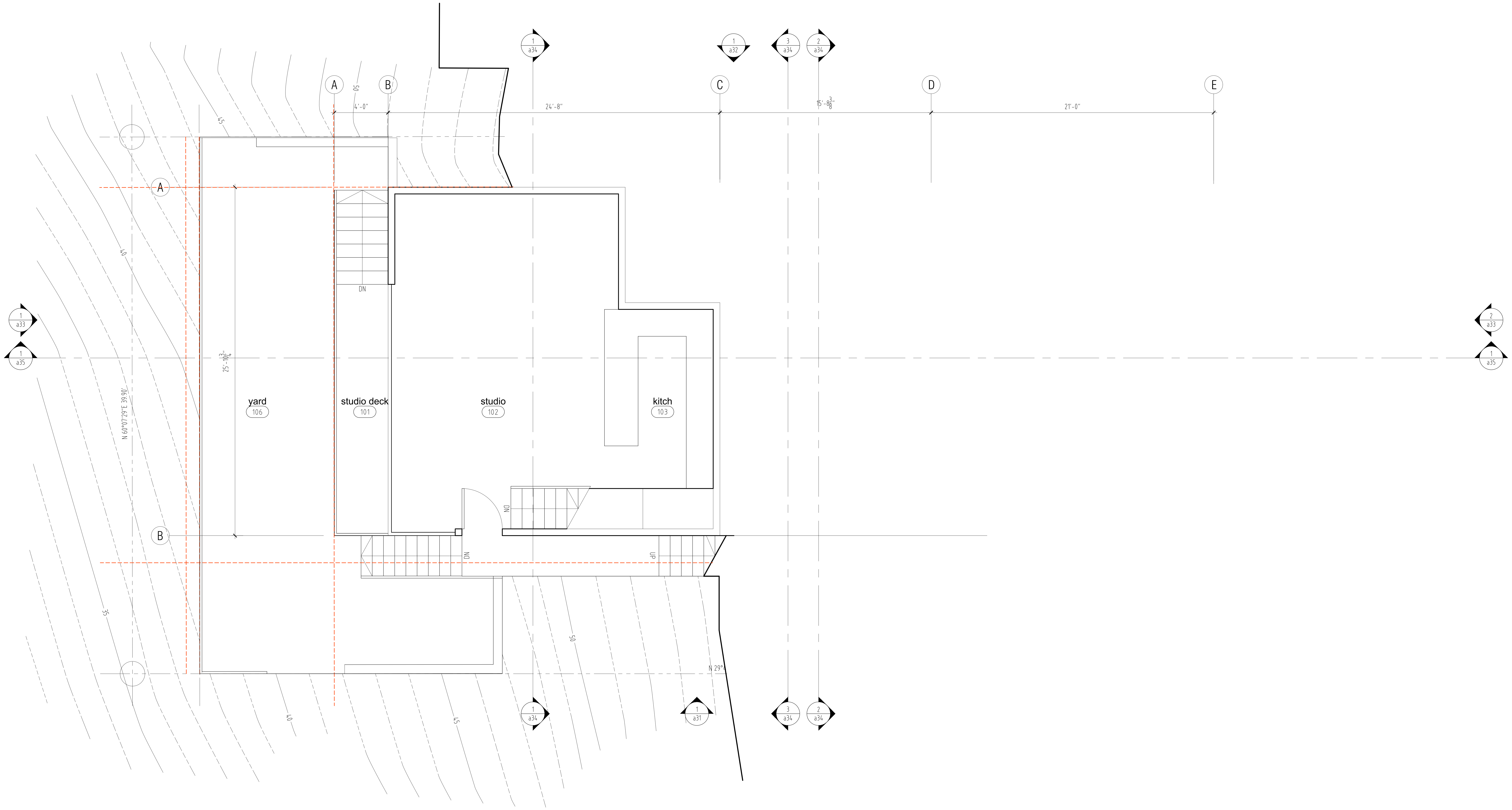
BOUNDARY MONUMENTS ARE NOT NECESSARILY SET ON PROPERTY CORNERS. PLEASE REFER TO THE NOTATION ON THIS SURVEY PLAT FOR OFFSET DIMENSIONS. IF THERE ARE ANY QUESTIONS, PLEASE DO NOT HESITATE TO CONTACT DENN ENGINEERS FOR CLARIFICATION BY PHONE AT: (310) 542-9433, M-F 8:00 AM TO 5:00 PM.

COPYRIGHT

ANY CHANGES OR MODIFICATIONS MADE TO THIS PLAN WITHOUT WRITTEN CONSENT OF DENN ENGINEERS SHALL RELIEVE DENN ENGINEERS FROM ANY LIABILITY OR DAMAGE RESULTING FROM SUCH CHANGES OR MODIFICATIONS, INCLUDING ANY ATTORNEYS FEES OR COSTS INCURRED IN ANY PROCEEDING THAT DENN ENGINEERS MAY BE JOINED.

SHEET 1 OF 1

JOB NO. 21-584



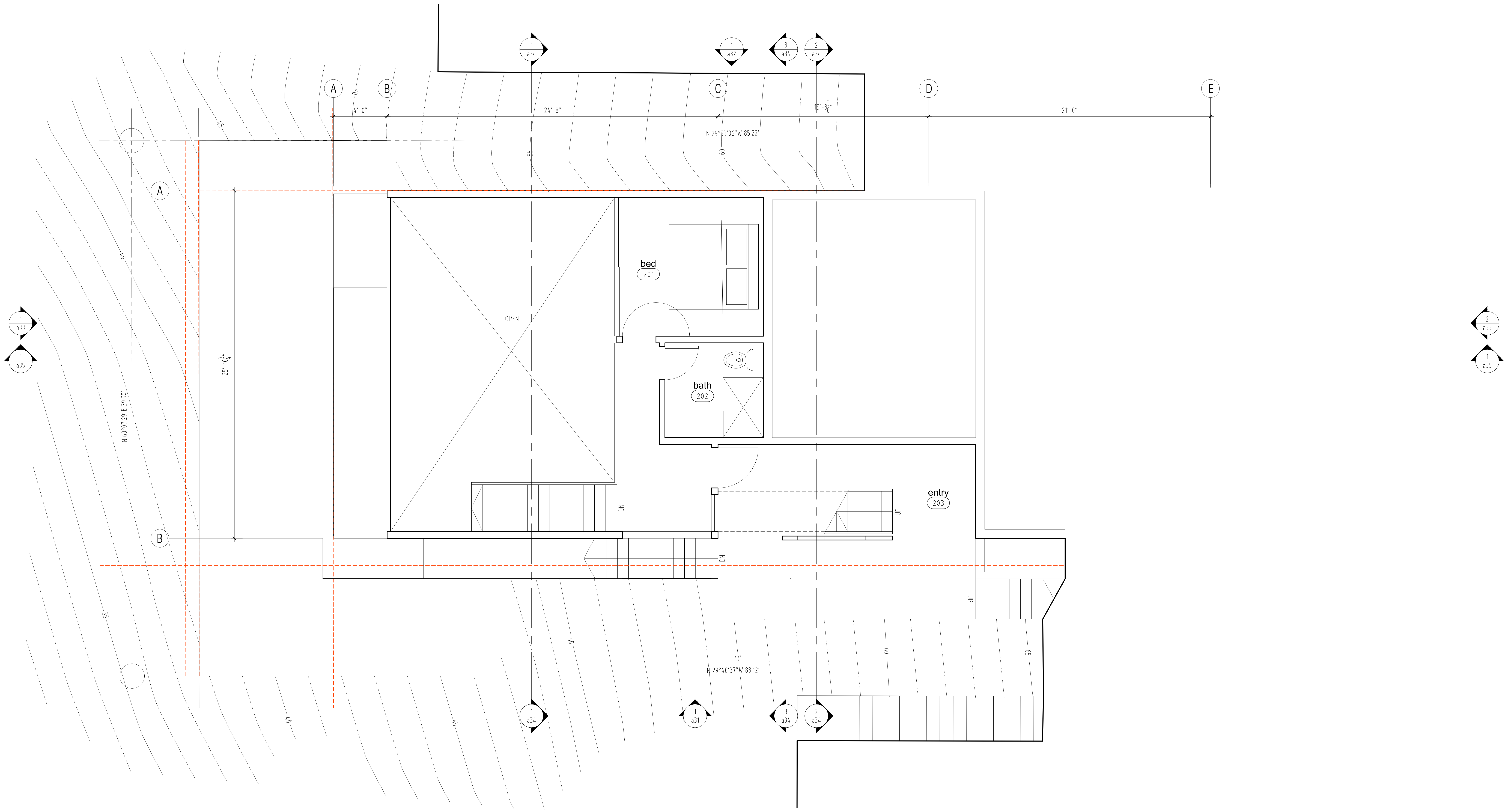
① studio
1/4" = 1'-0"

zeroplus

1000 S Weller #0
Seattle, WA 98104
ph: 206 323 4009
e: mail@0-plus.com

Playa Del Rey

geotech set
032322



1 studio loft
1/4" = 1'-0"

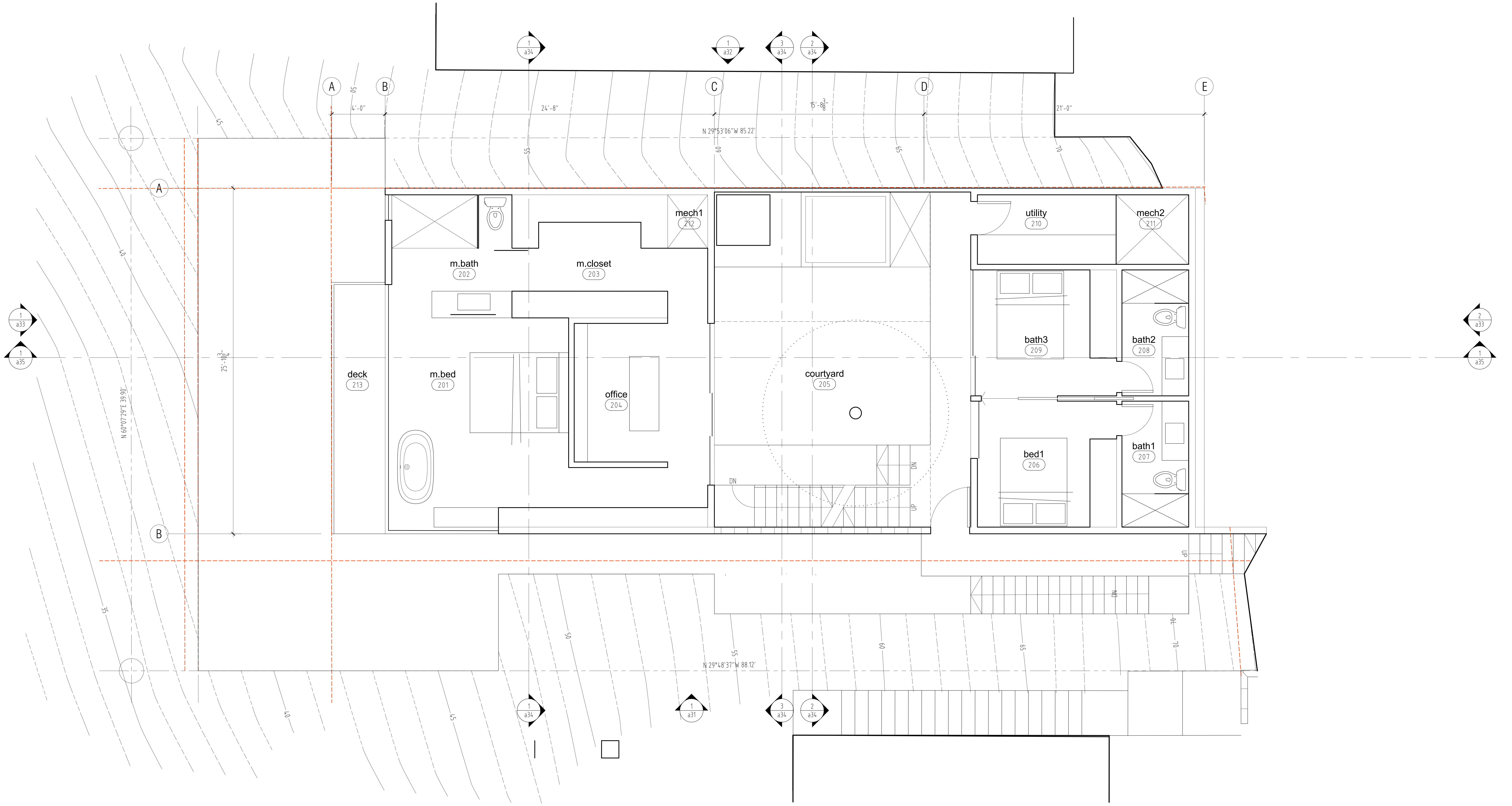
zeroplus

1000 S Weller #0
Seattle, WA 98104
ph: 206 323 4009
e: mail@0-plus.com

Playa Del Rey

geotech set
032322

a22



1 bedroom floor
1/4" = 1'-0"

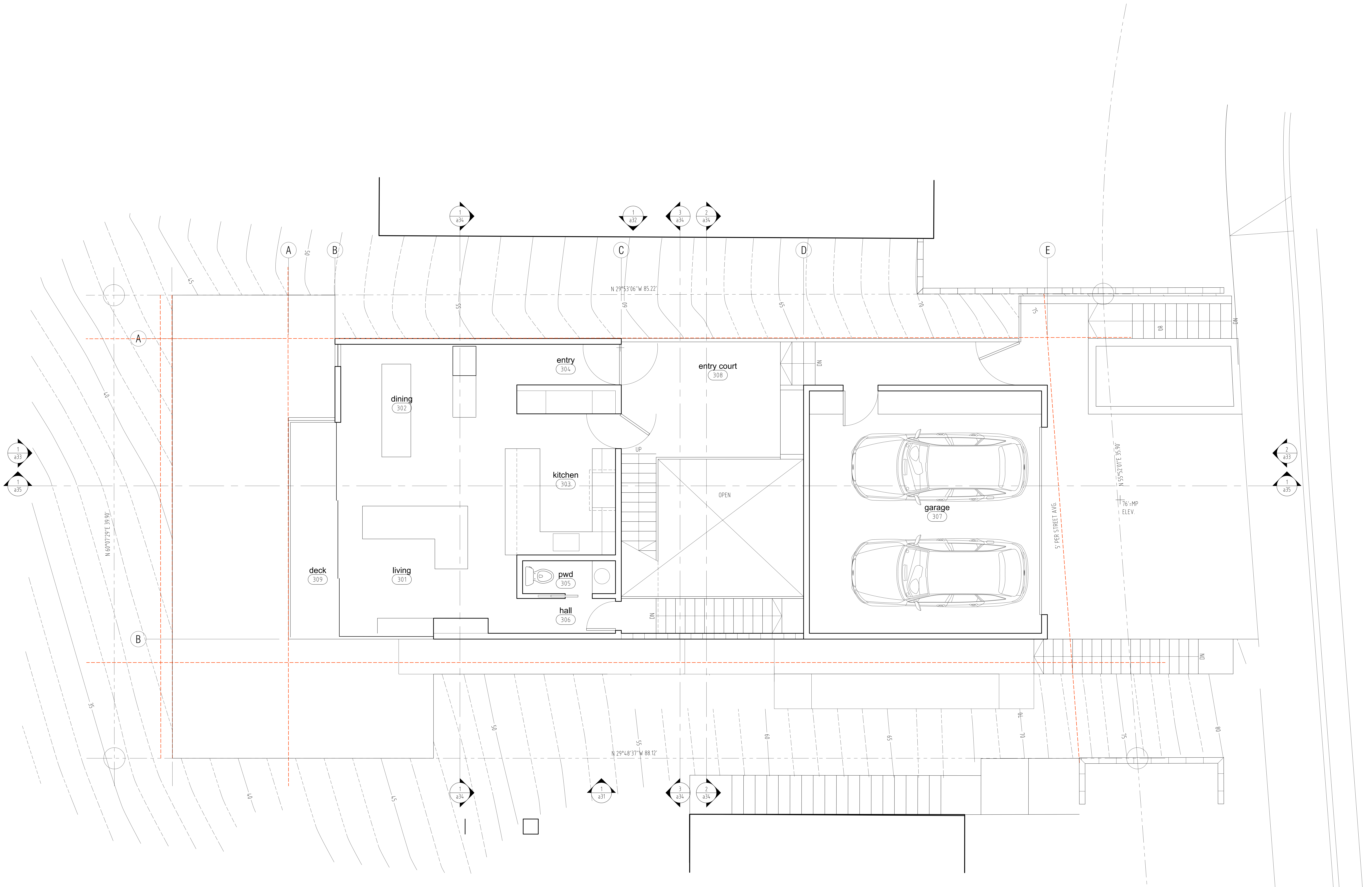
zeroplus

1000 S Weller #0
Seattle, WA 98104
ph: 206 323 4009
e: mail@0-plus.com

Playa Del Rey

geotech set

032322



1 main floor
1/4" = 1'-0"

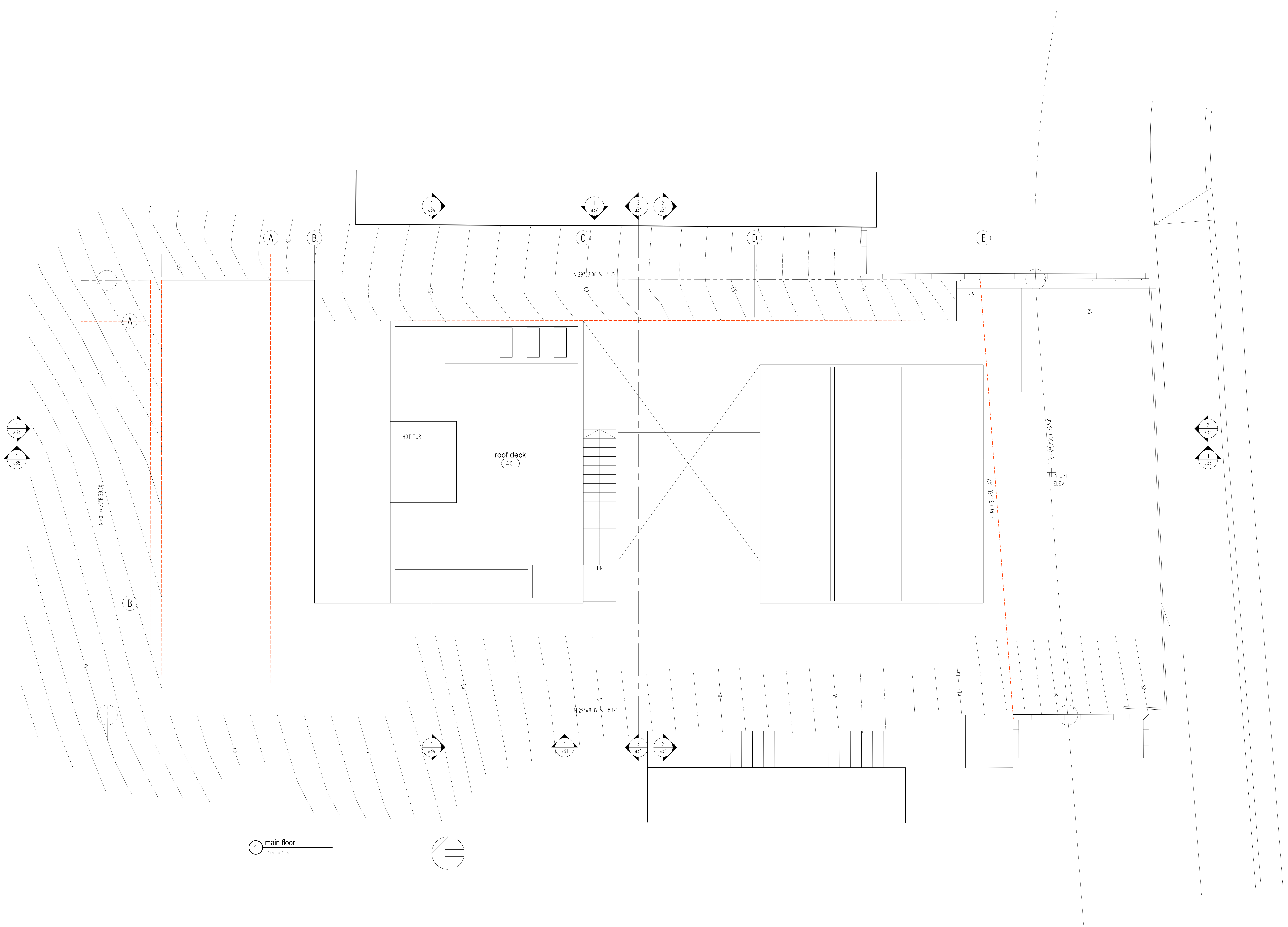
zeroplus

1000 S Weller #0
Seattle, WA 98104
ph: 206 323 4009
e: mail@0-plus.com

Playa Del Rey

geotech set
032322

a24



1 main floor
1/4" = 1'-0"

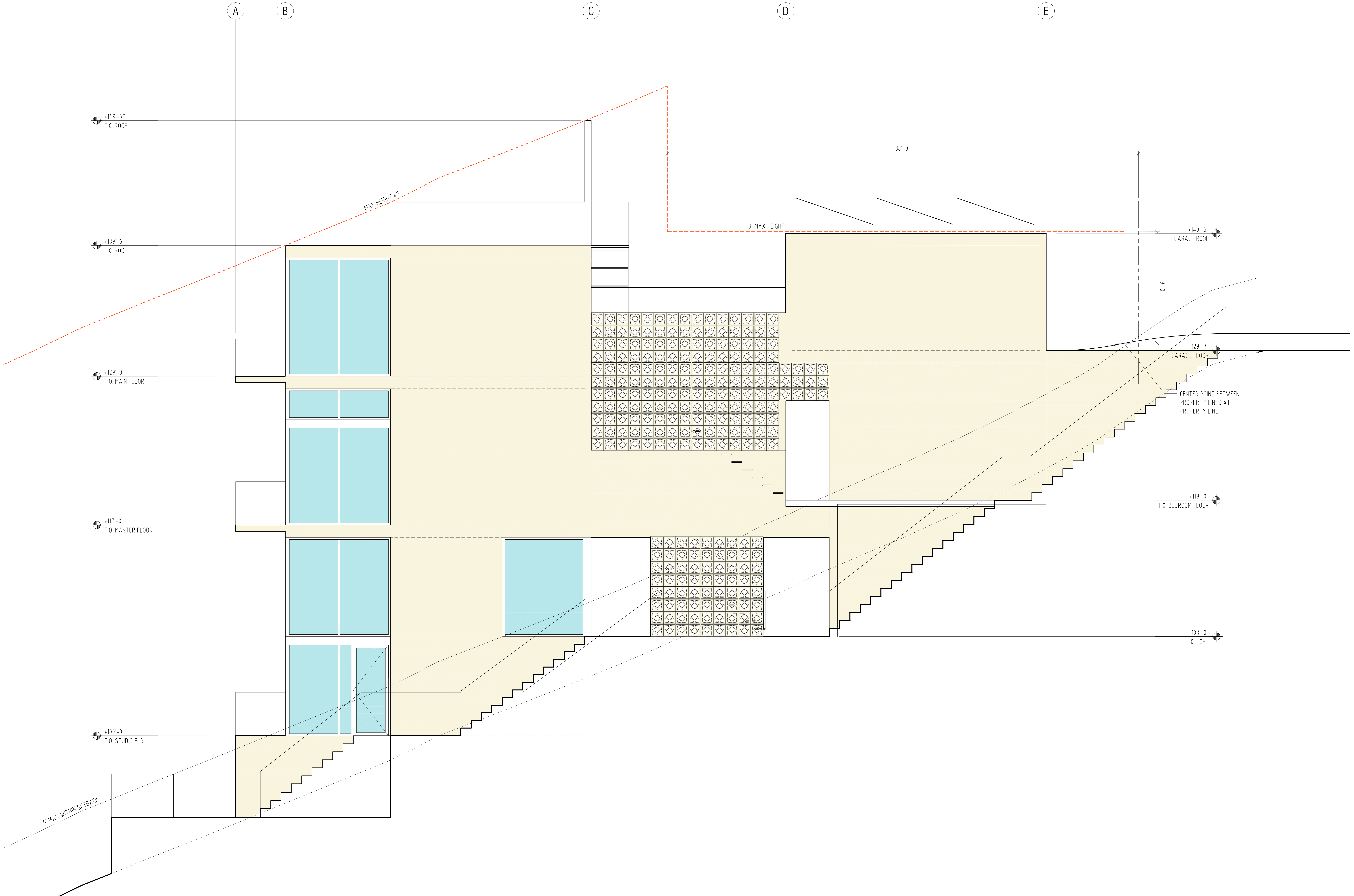
zeroplus

1000 S Weller #0
Seattle, WA 98104
ph: 206 323 4009
e: mail@0-plus.com

Playa Del Rey

geotech set
032322

a25



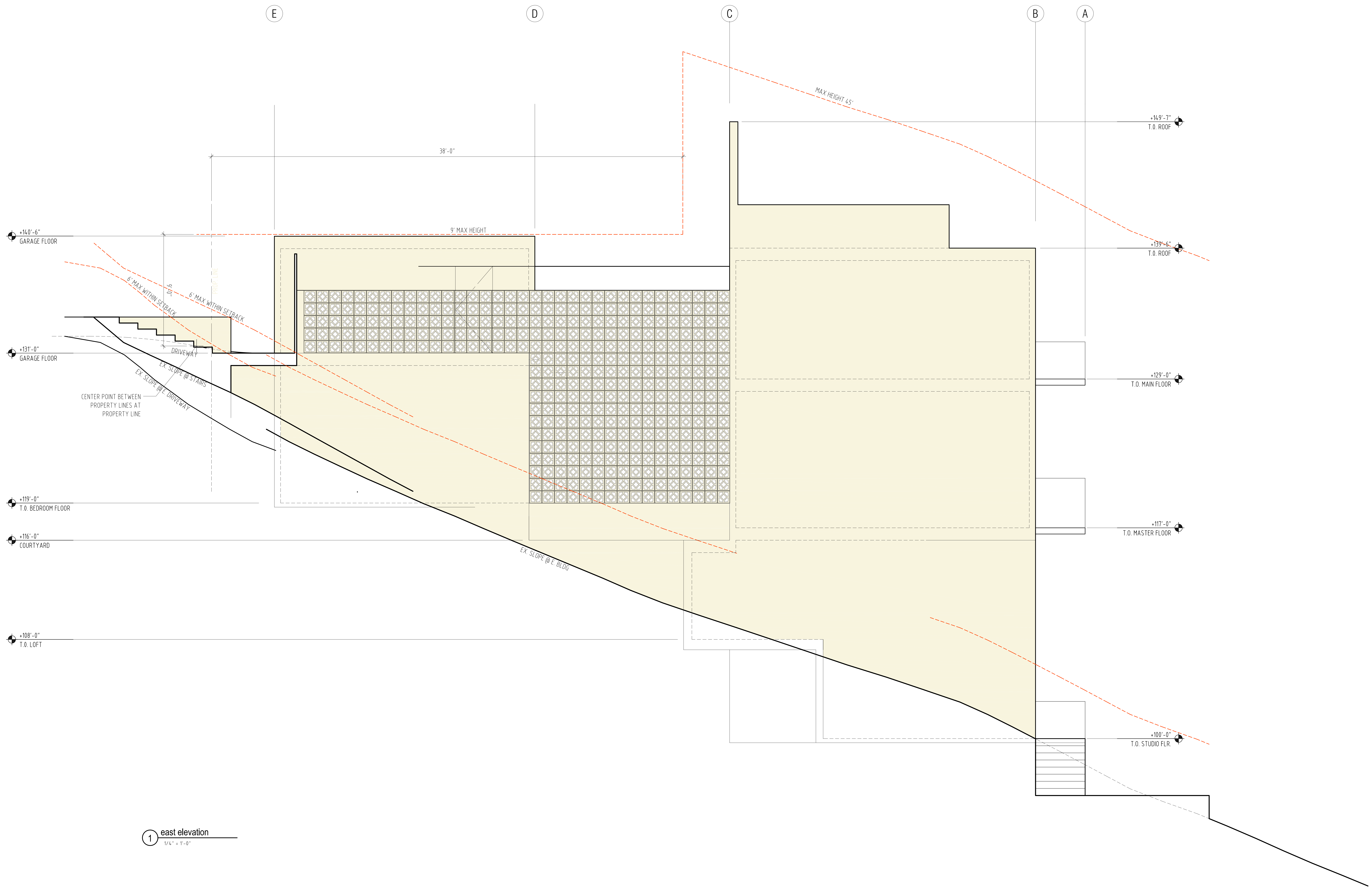
① west elevation
1/4" = 1'-0"

zeroplus

1000 S Weller #0
Seattle, WA 98104
ph: 206 323 4009
e: mail@0-plus.com

Playa Del Rey

preliminary
031822



① east elevation
1/4" = 1'-0"

zeroplus

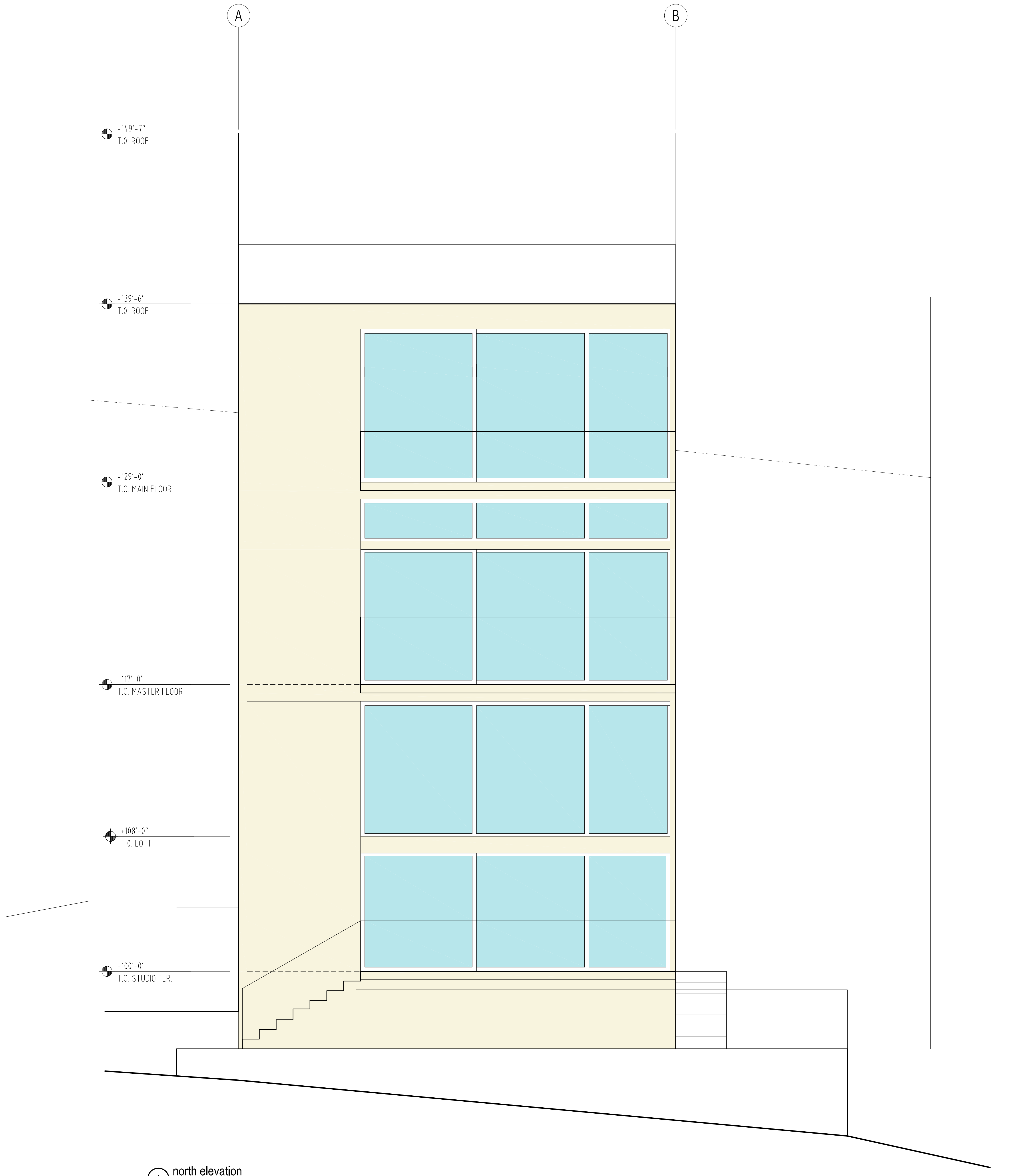
1000 S Weller #0
Seattle, WA 98104
ph: 206 323 4009
e: mail@0-plus.com

Playa Del Rey

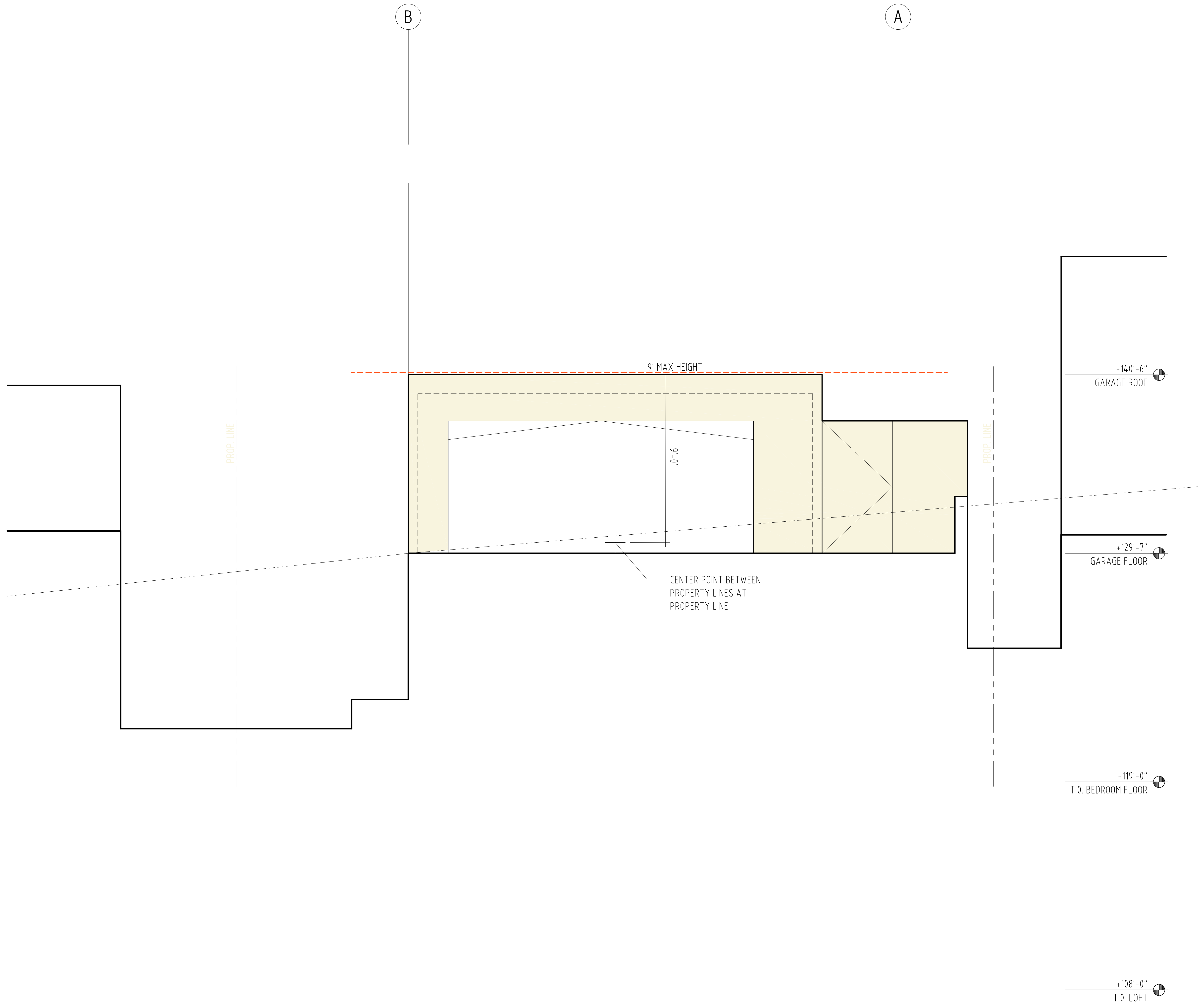
preliminary

031822

a32



① north elevation
1/4" = 1'-0"



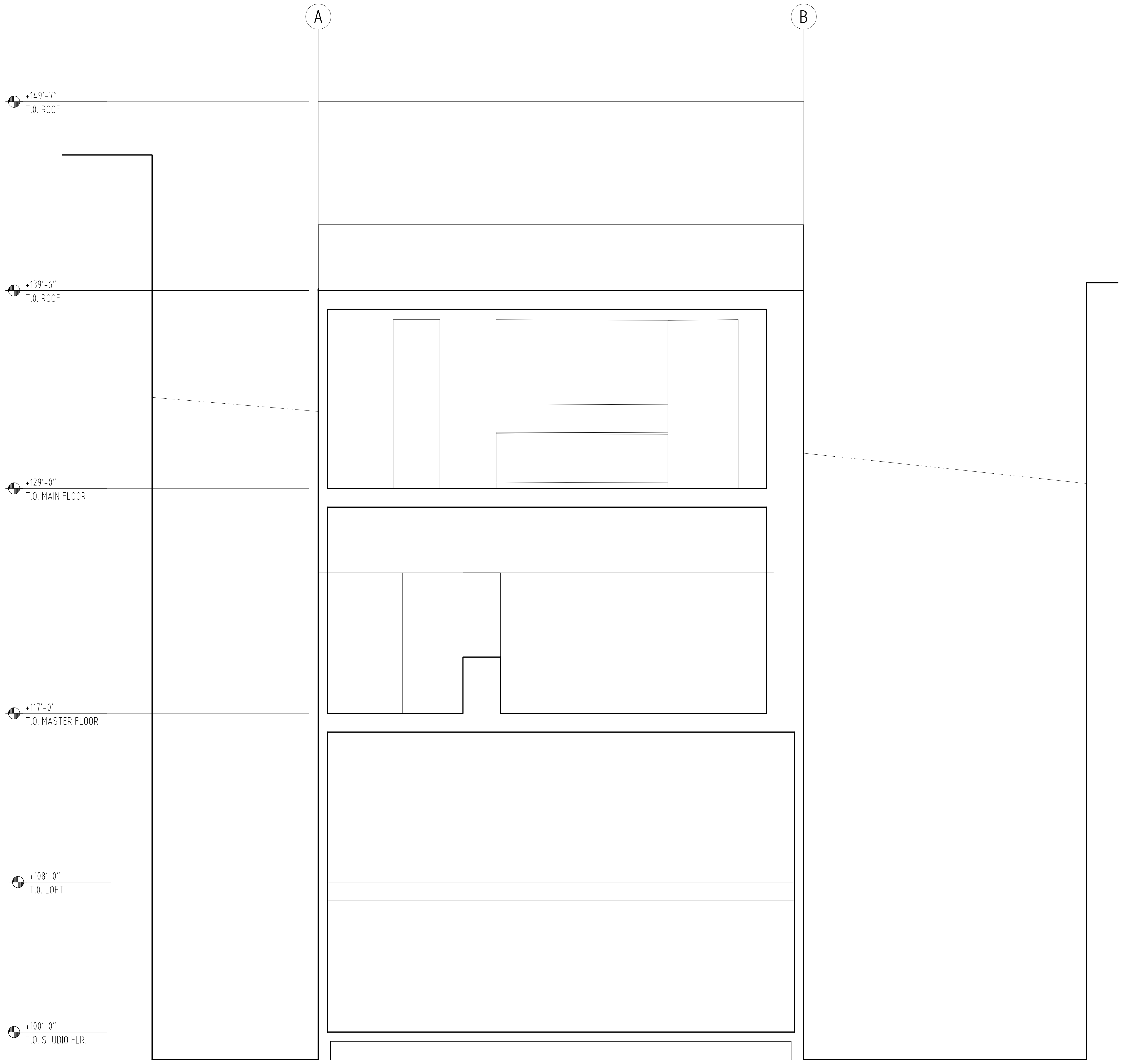
② south elevation
1/4" = 1'-0"

zeroplus

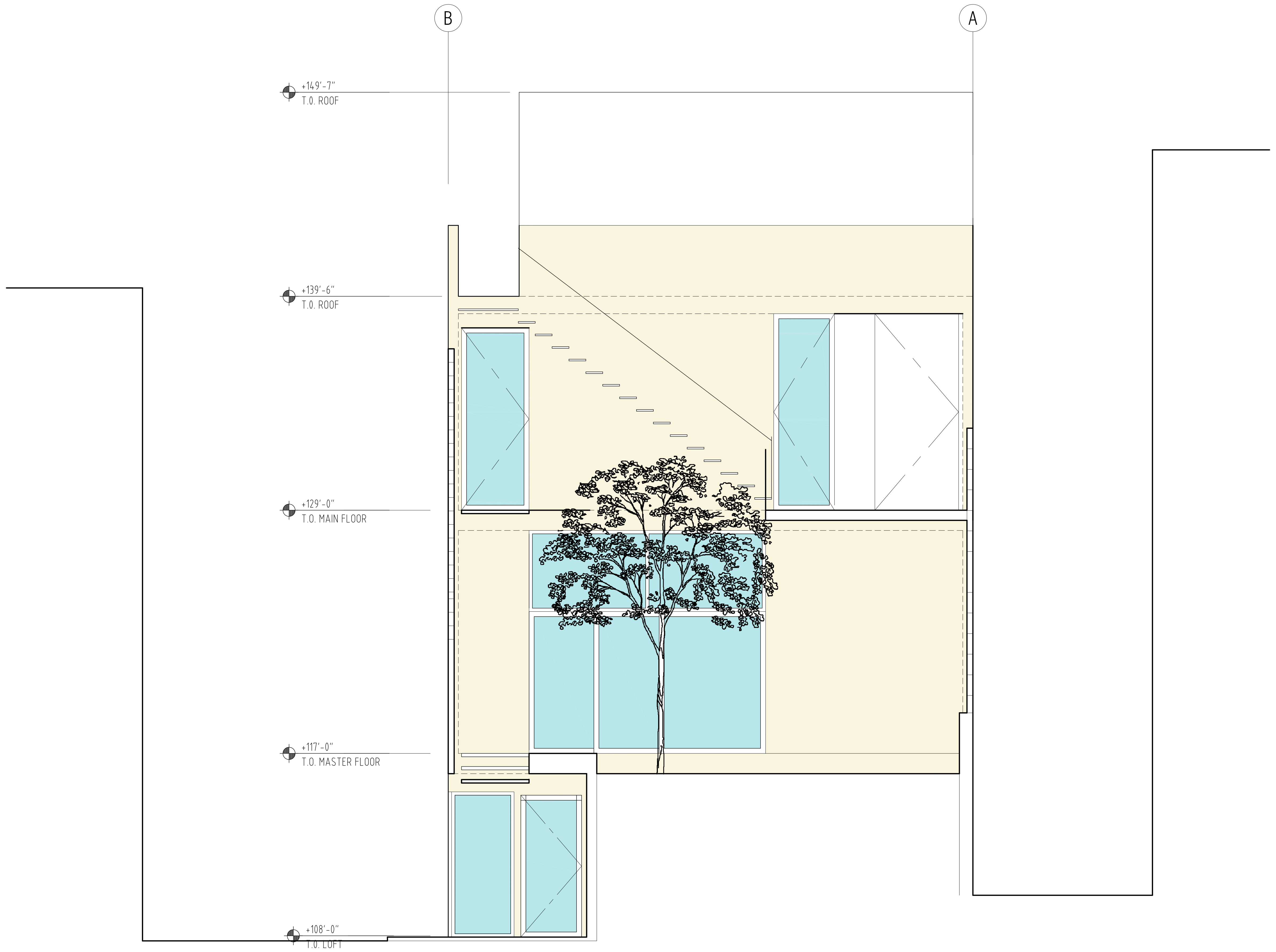
1000 S Weller #0
Seattle, WA 98104
ph: 206 323 4009
e: mail@0-plus.com

Playa Del Rey

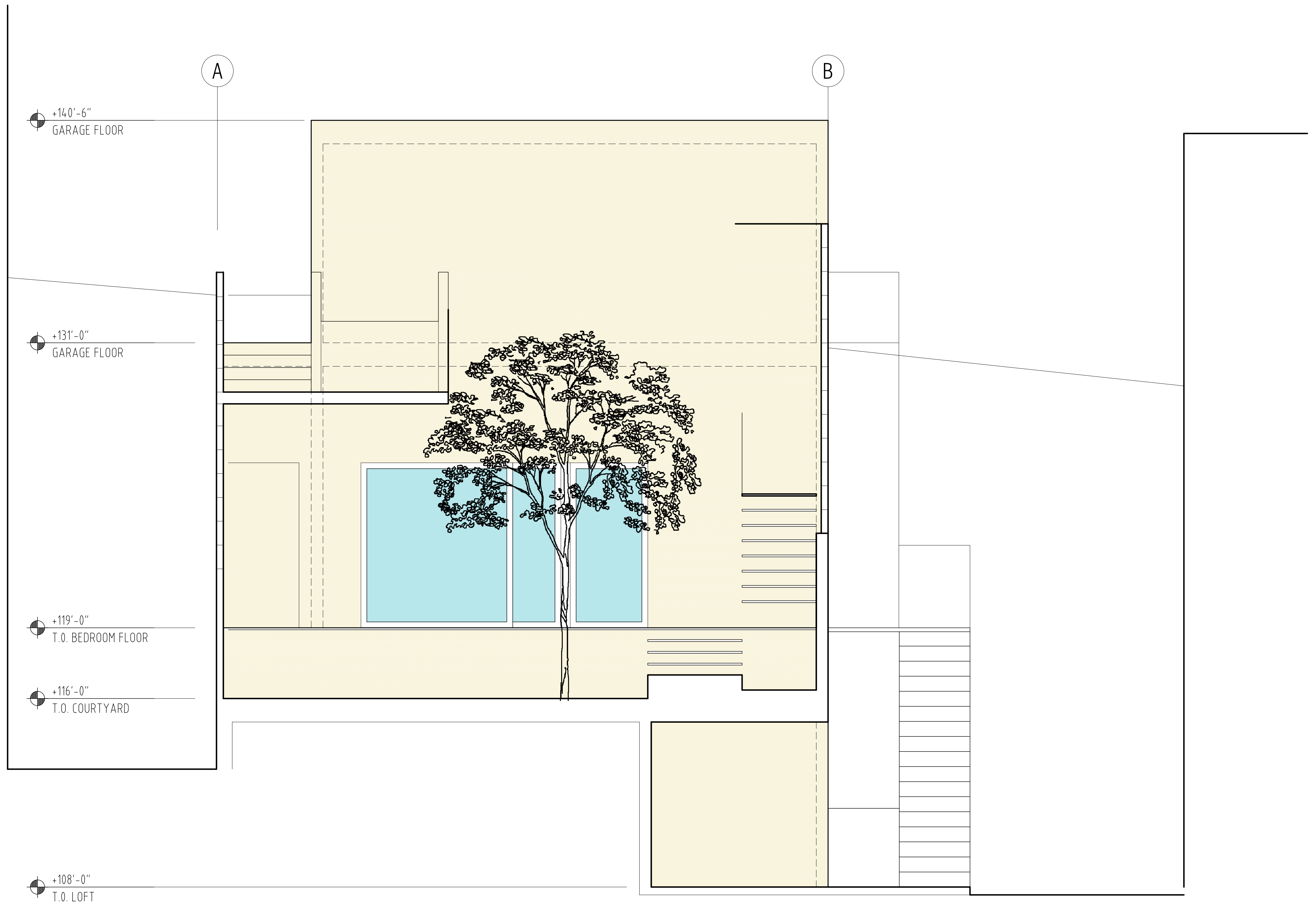
preliminary
031822



1 e w section
1/4" = 1'-0"



2 north courtyard elevation
1/4" = 1'-0"



3 south courtyard elevation
1/4" = 1'-0"

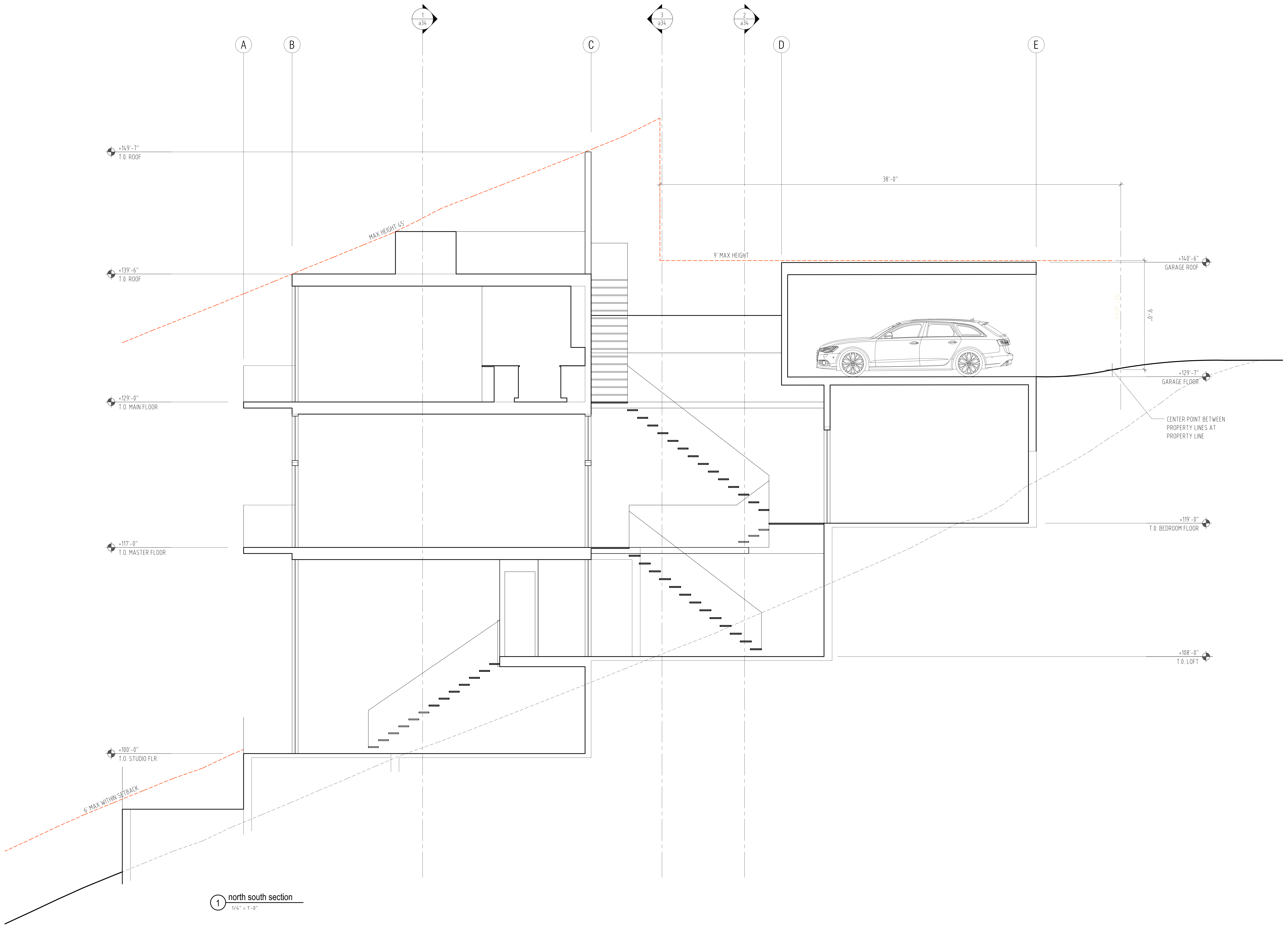
zeroplus

1000 S Weller #0
Seattle, WA 98104
ph: 206 323 4009
e: mail@0-plus.com

Playa Del Rey

preliminary

031822



1 north south section

1/4" = 1'-0"

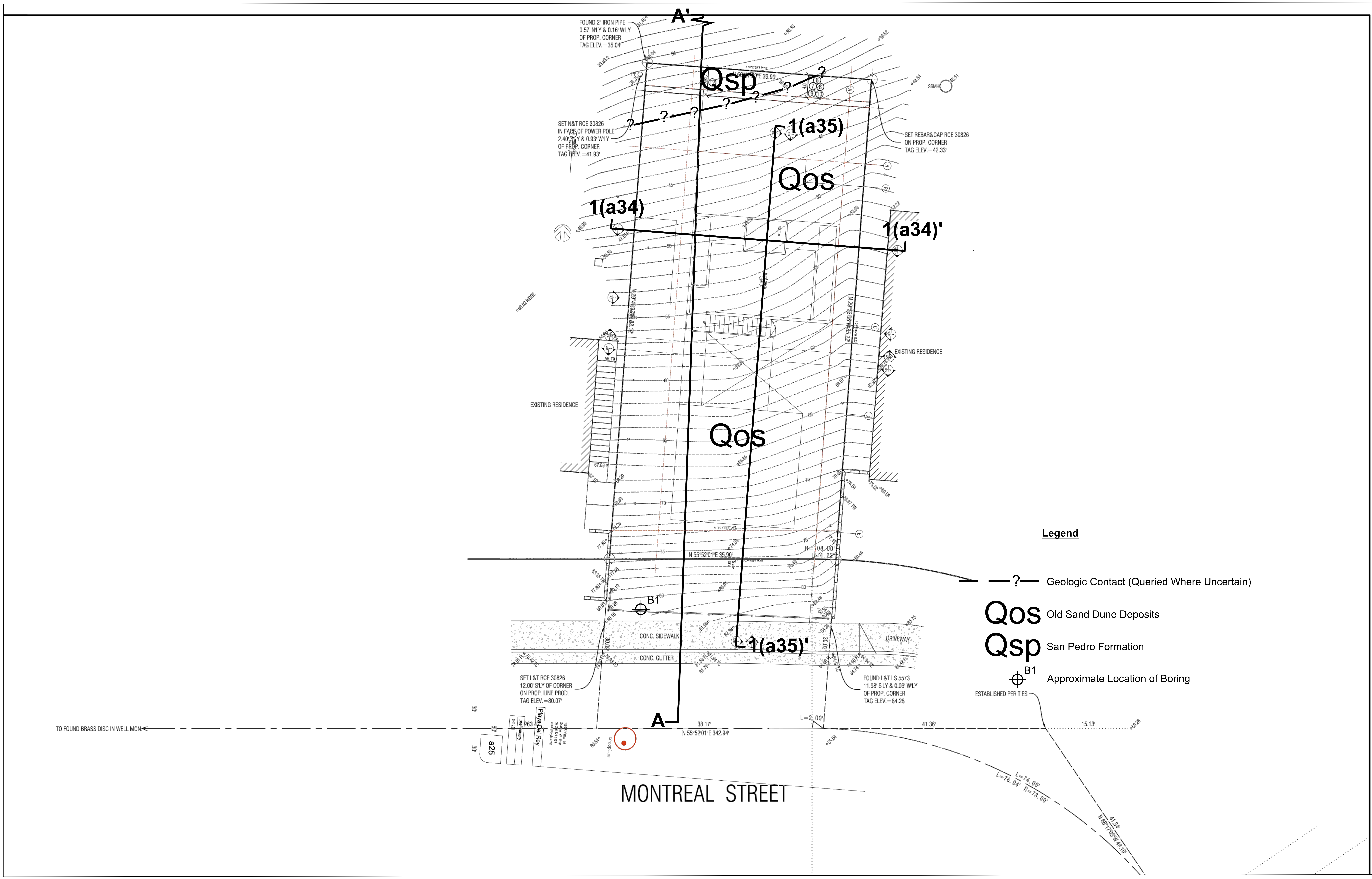
zeroplus

1000 S Weller #0
Seattle, WA 98104
ph: 206 323 4009
e: mail@0-plus.com

Playa Del Rey

preliminary

031822



DENN ENGINEE

3914 DEL AMO BLVD, SUITE 921
TORRANCE, CA 90503 (310) 542-9433

SURVEY AND
TOPOGRAPHY

FOR
JUSTIN BREVOORT
336 THE STRAND, UNIT A
HERMOSA BEACH, CA 90254
PHONE 310-529-9944

JOB ADDRESS
237 MONTREAL STREET
LOS ANGELES, CA 90293

LEGAL DESCRIPTION
LOT 37, BLOCK 17
TRACT NO. 8557
M.B. 103-1-3
APN 4116-012-004

THIS MAP CORRECTLY REPRESENTS A SURVEY MADE BY M
UNDER MY DIRECTION IN CONFORMANCE WITH THE REQUIRE
OF PROFESSIONAL LAND SURVEYORS' ACT

GARY J. ROEHL
R.C.E. 30826

Gary J. Roehl

GARY J. ROEHL R.C.E. 30826

DRAWN BY KW CHECK BY XX

DRAWN ON JANUARY 31,

REVISIONS

REVISIONS

LEGEND

▨ EXISTING BUILDING
▨ BRICK
▨ CONCRETE
▨ WOOD DECK
∘106.76 EXISTING ELEVATION
100 EXISTING CONTOUR
BLOCK WALL
—X— EXISTING FE

BCR	BEGINNING OF CURB RETURN
CATV	CABLE TV PULL BOX
CONC.	CONCRETE
CHMNY	CHIMNEY
CEFB	CITY ENGINEERS FIELD BOOK
C/L	CENTERLINE
C.L.F. / W.I.F.	CHAIN LINK FENCE / WROUGHT IRON FENCE
E'LY	EASTERLY
EG	EDGE OF GUTTER
EM	ELECTRIC METER
FF	FINISH FLOOR
FH	FIRE HYDRANT
FL	FLOW LINE
GFF	GARAGE FINISH FLOOR
GM	GAS METER
GUY / GW	GUY WIRE
I.P.	IRON PIPE MONUMENT
L&T	LEAD AND TACK / TAG MONUMENT
MH	MANHOLE (SANITARY SEWER / STORM DRAIN)
N'LY	NORTHERLY
N&T	NAIL AND TAG MONUMENT
PB	PULL BOX (EDISON / TRAFFIC / STREET LIGHT
PB (CONT)	TELEPHONE / CABLE TV)
PC	PROPERTY CORNER / PROP. CORNER
PL	PROPERTY LINE / PROP. LINE
PP / UP	POWER POLE / UTILITY POLE
PPT	PARAPET
PWFB	PUBLIC WORKS FIELD BOOK
R.R.	RAIL ROAD
RDFB	ROAD DEPARTMENT FIELD BOOK
R.S.	RECORD OF SURVEY
SPK / S&W	SPIKE / SPIKE AND WASHER MONUMENT
S'LY	SOUTHERLY
SSCO	SANITARY SEWER CLEANOUT
STK / STK&T	STAKE / STAKE AND TAG MONUMENT
STLT / LT	STREET LIGHT POLE / LIGHT POLE
TC	TOP OF CURB

RMA GeoScience

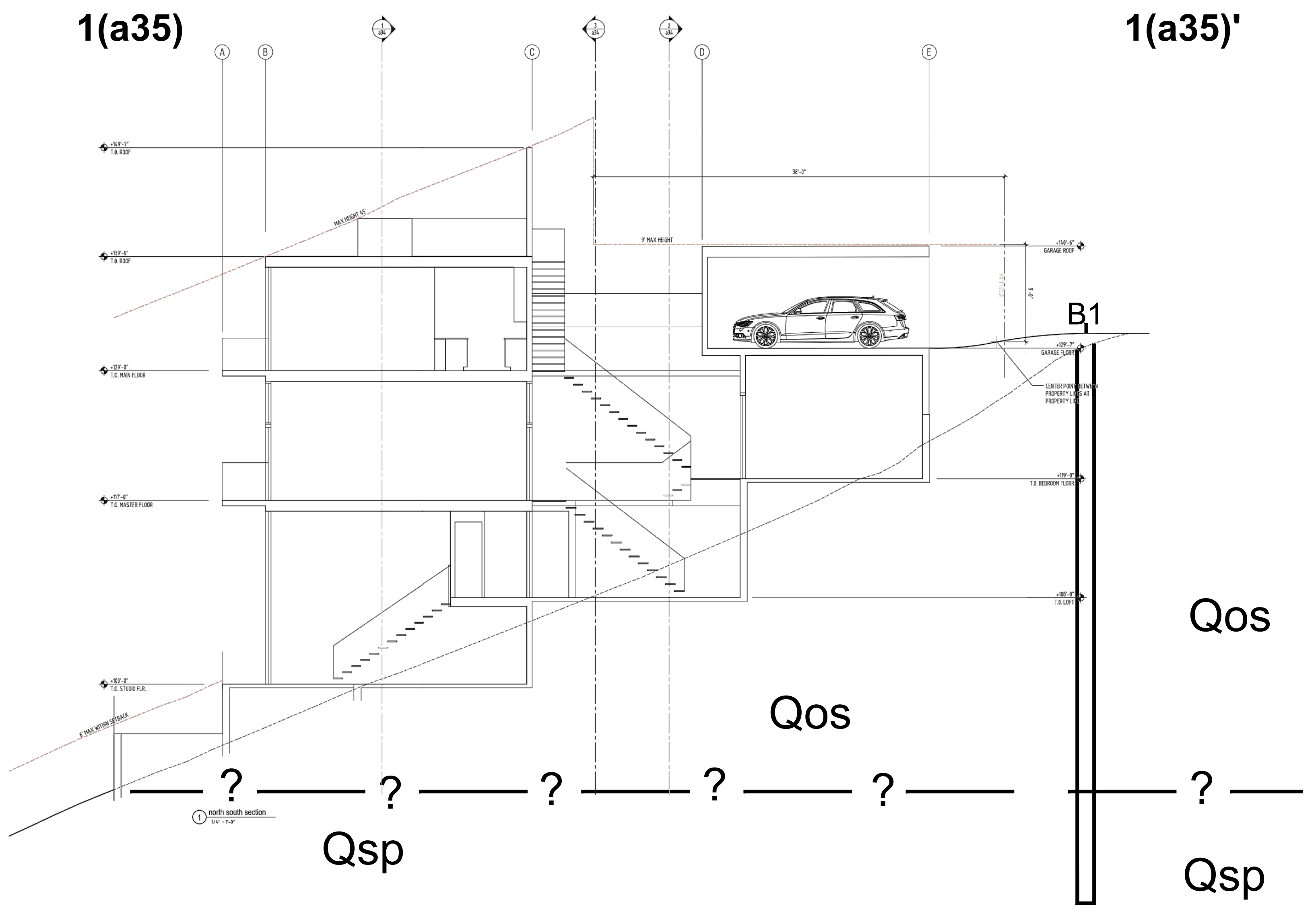
Geotechnical Map

237 Montreal Street
Los Angeles, California

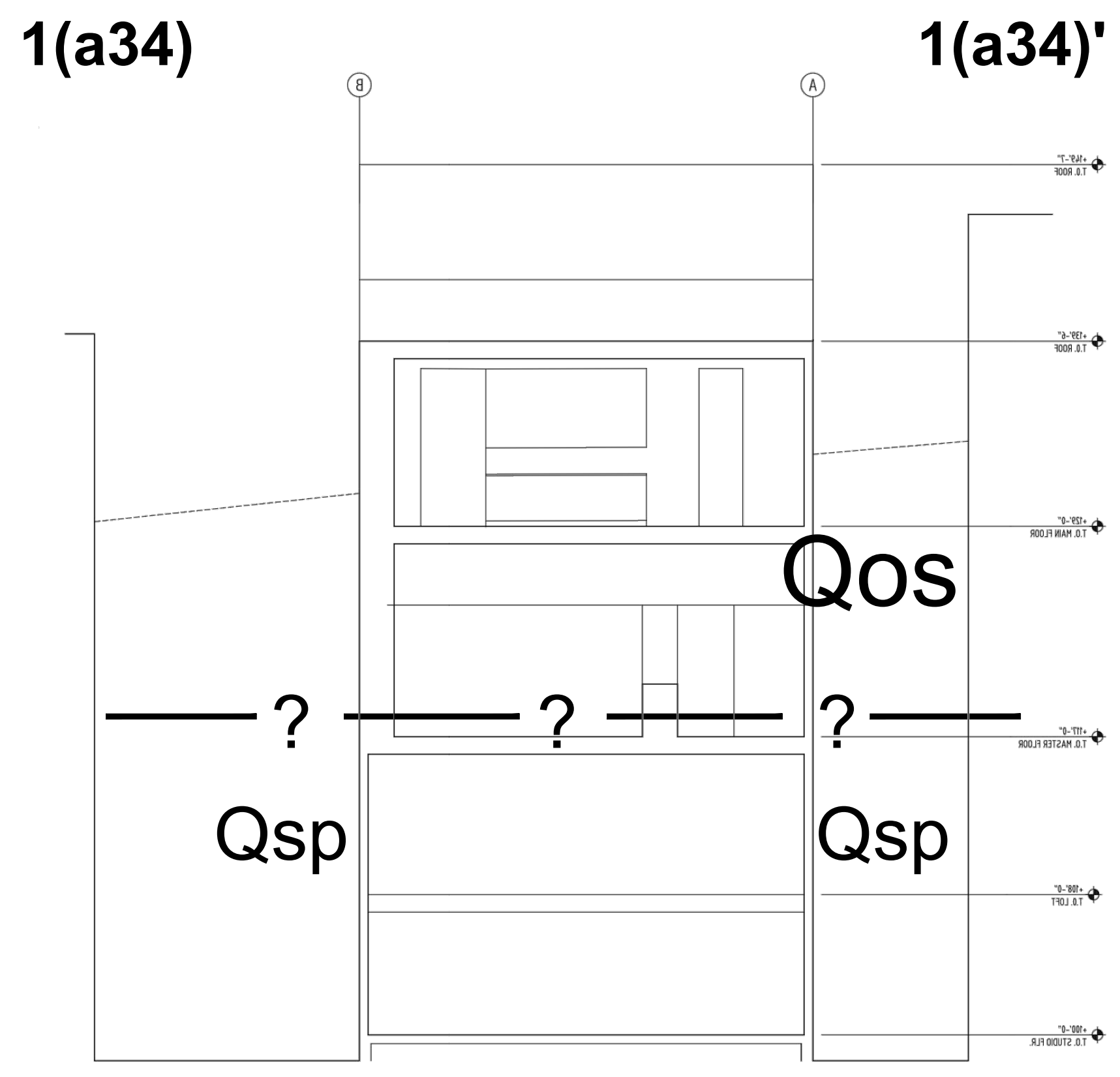
PLATE 1

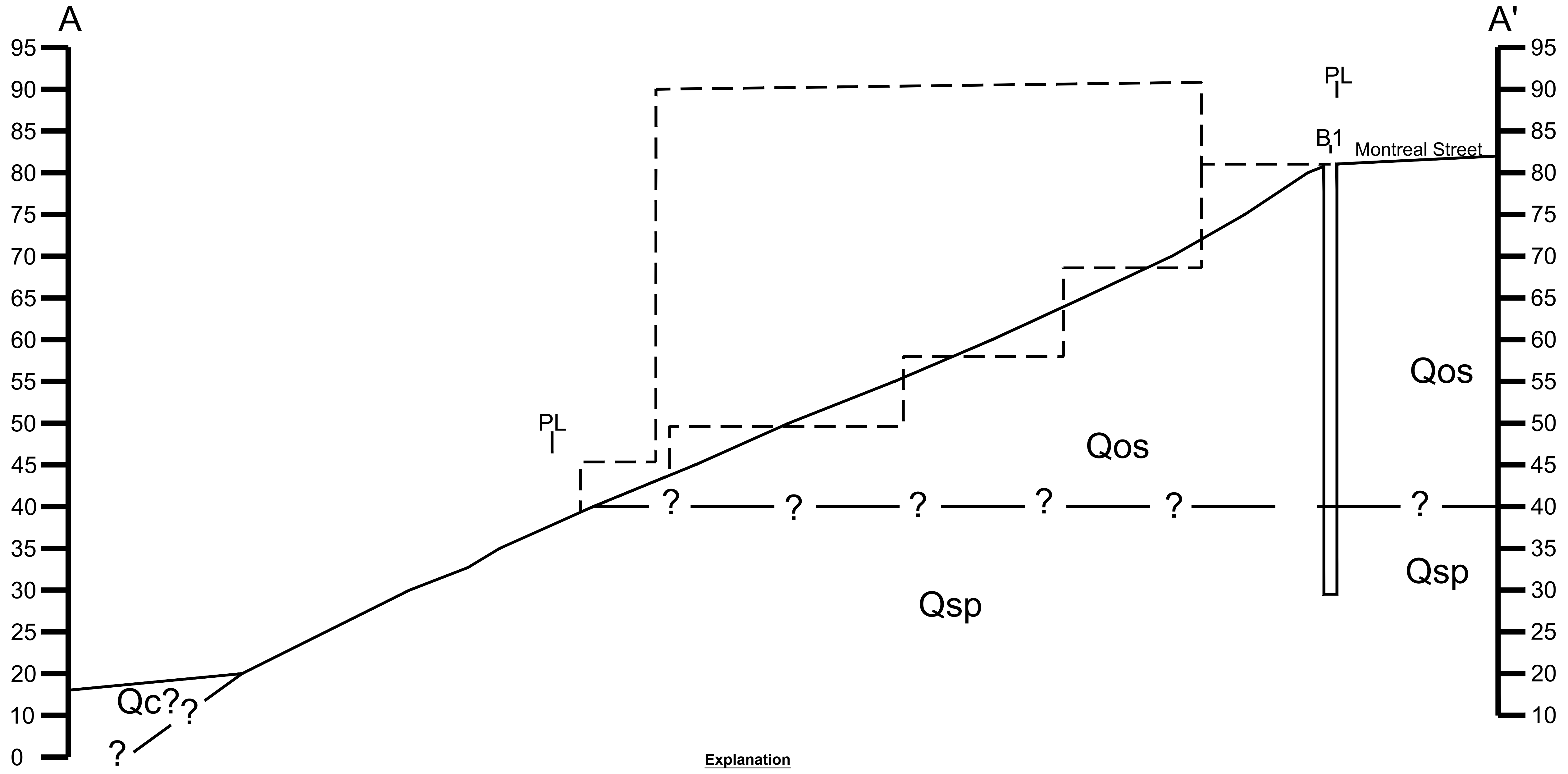
RMA Job No:	21G-0735
Report Date:	4/2022
Prepared By:	MRM

Section 1 (a35)



Section 1 (a34)





Explanation

—————— Existing

– – – – – – Proposed

—— ——— ? —— Geologic Contact (Queried where Uncertain)

Qc?	Clay and Sand of Predeveloped Marshlands
Qos	Old Sand Dune Deposits
Qsp	San Pedro Formation

RMA GeoScience

Cross Sections

237 Montreal Street
Los Angeles, California

Plate 2

RMA Job No:	21G-0735
Report Date:	4/2022
Prepared By:	MRM