

**SOIL ENGINEERING INVESTIGATION
PROPOSED ADU
AT
510 E SANTA PAULA STREET
SANTA PAULA, CALIFORNIA
FOR
BIRD**



**HEATHCOTE
GEOTECHNICAL**

SOIL TESTING • FOUNDATIONS • INSPECTION



HEATHCOTE GEOTECHNICAL

SOIL TESTING • FOUNDATIONS • INSPECTION
1884 EASTMAN AVENUE, SUITE 105, VENTURA, CALIFORNIA 93003



Lynn Bird
510 E Santa Paula Street
Santa Paula, CA 93060

Job: 23114
Date: August 21, 2023

Ladies/Gentlemen:

We are pleased to present this soil engineering report to aid in the design of the proposed project.

The report is for a soil engineering investigation for the proposed ADU. The project is located at 510 E Santa Paula Street, Santa Paula, California.

There is anticipated to build a 2 story ADU residence. The structure will be of wood frame construction. Concrete slabs on grade will be used. The building will be placed near existing grade. Some minor grading will be done. Light loads are anticipated. No basement is intended. Retaining walls are not anticipated. Public sewers will be used.

Change of grade is not anticipated.

Submittal of this report to appropriate governmental agencies is the responsibility of the owner or his representatives.

The project will safe for the intended use as long as the recommendations of this report are followed.

The report will follow and includes; a comprehensive task list, observations and findings, recommendations, basis of report, results of testing, plot plan, and borings.

It has been our pleasure to serve you and if you have any questions or need additional service, please contact us.

Fred Heathcote
Civil Engineer
No. C48316



COMPREHENSIVE TASK LIST

GENERAL

This portion of the report specifies all the work that was performed and the procedures used. This investigation did not address the possibility of any geologic hazards or contaminants in the soil, although none were noted.

SITE WORK

1. Reviewed site for soil engineering problems.
2. Drilled two borings, up to 10 feet in depth, using a 8 inch hollow stem augers.
Undisturbed samples taken with a 2-1/2 inch I.D. sampler using a 140 pound weight dropped 30 inches. Refusal to advance the boring due to rocky soils at 20 feet.
3. Visual logging of the borings for classification of soil types and characteristics.
4. Obtained a bulk sample for laboratory testing.

LABORATORY TESTING

1. Determined in place density and moisture of undisturbed samples and is shown on boring logs.
2. Performed expansion index test of the soils. The test was performed according to the guidelines set forth in the latest ASTM version.
3. Performed compaction test of the soils to aid in grading and density testing. The test was performed according to latest version of ASTM (five layers, 25 blows/layer, 10 lb. hammer, 18" drop, 1/30 c.f. mold).

Results of testing are presented in the boring logs and following the Basis of Report.

REPORT

1. Comprehensive task list
2. Findings and Observations
 - a) site conditions
 - b) soil conditions
 - c) geologic conditions
 - d) liquefaction
3. Recommendations
 - a) foundation: bearing values, depths, settlements, and lateral values
 - b) slabs on grade
 - c) drains and grades
 - d) construction procedures: earthwork, inspection
4. Basis of report
5. Results of testing
6. Boring logs

FINDINGS AND OBSERVATIONS

SITE CONDITIONS

The area for the proposed residence is located on flat topography. Buildings are present on site and adjacent lots. There is a garage that will not be removed. Minor vegetation is present. No drainage patterns are evident.

SOIL CONDITIONS

Fill soils were not encountered. Fill soils may be encountered in the construction phase.

The upper natural soils are clayey silts. The soils are moderately loose in the upper 4 feet. These soils are compressible and have a medium expansion potential.

Groundwater was not observed at 10 feet. Historical groundwater is at 50 feet. This historical groundwater is not within 5 feet of the finished floor elevation.

GEOLOGIC HAZARDS

This report is not a geology report, but certain things should be noted.

The area is listed in a 500 year flood zone.

No identified faults are within the nearby vicinity of the project. Oak Ridge fault is the closest. This information could be addressed in a geology report to determine the exact distances to any known faults, if desired.

The site is not prone to surficial failure. No slopes in the area.

Seiche danger could be present due to dams to the east.

LIQUEFACTION

The site is situated within the alluvial area of the Santa Clara River valley and Santa Paula Creek. As with most of Southern California, this area is bordered by faults which are active, potentially active and inactive. Faults which are most concern from a ground shaking viewpoint are the San Andreas, Simi-Santa Rosa, San Cayetano, Ventura Pitas Point, Santa Ynez, Malibu Coast and Oak Ridge faults. Each are capable shaking at the site. The site will experience of generating large to moderate earthquakes and of causing significant significantly strong coseismic ground motions caused by activity on regional faults at some time in the future.

The soil profile will most likely not experience liquefaction due to very dense, older alluvial soils and lack of groundwater. The liquefaction induced settlement is on the order of 0 inch.

We have evaluated the possibility of lateral spreading. Due to the lack of liquefaction, we do not feel that lateral spreading will occur on the project. No surface displacements due lateral spreading or faulting.

We will not need to enlarge footings and slabs will due to seismic induced settlement problems.

SEISMIC FACTORS



510 E Santa Paula St, Santa Paula, CA 93060, USA

Latitude, Longitude: 34.354563, -119.069425



Date	8/16/2023, 11:11:01 AM
Design Code Reference Document	ASCE7-16
Risk Category	II
Site Class	D - Stiff Soil

Type	Value	Description
S_S	1.964	MCE_R ground motion. (for 0.2 second period)
S_1	0.75	MCE_R ground motion. (for 1.0s period)
S_{MS}	1.964	Site-modified spectral acceleration value
S_{M1}	null -See Section 11.4.8	Site-modified spectral acceleration value
S_{DS}	1.309	Numeric seismic design value at 0.2 second SA
S_{D1}	null -See Section 11.4.8	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	null -See Section 11.4.8	Seismic design category
F_a	1	Site amplification factor at 0.2 second
F_v	null -See Section 11.4.8	Site amplification factor at 1.0 second
PGA	0.87	MCE_G peak ground acceleration
F_{PGA}	1.1	Site amplification factor at PGA
PGA_M	0.957	Site modified peak ground acceleration
T_L	8	Long-period transition period in seconds
S_{sRT}	1.964	Probabilistic risk-targeted ground motion. (0.2 second)
S_{sUH}	2.225	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
S_{sD}	2.704	Factored deterministic acceleration value. (0.2 second)
S_{1RT}	0.75	Probabilistic risk-targeted ground motion. (1.0 second)
S_{1UH}	0.849	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S_{1D}	0.864	Factored deterministic acceleration value. (1.0 second)
PGA_d	1.092	Factored deterministic acceleration value. (Peak Ground Acceleration)
PGA_{UH}	0.87	Uniform-hazard (2% probability of exceedance in 50 years) Peak Ground Acceleration
C_{RS}	0.882	Mapped value of the risk coefficient at short periods
C_{R1}	0.884	Mapped value of the risk coefficient at a period of 1 s
C_v	1.493	Vertical coefficient

RECOMMENDATIONS

FOUNDATIONS

The expansion potential of the natural soils indicates a foundation design for medium expansion soils is needed for the foundations. Foundations should have at least 2-#4 bar at top and 2-#4 bars at the bottom.

No lateral pressure on foundations due to seismic loads are anticipated.

No lateral loads or movement are expected on foundations due to liquefaction. There are no retaining walls that will be affected by liquefaction. There is no flotation of buried structures that will affect the project.

No ground stabilization is deemed necessary. Our foundations have been structurally reinforced normally, due to the lack of liquefiable soils. Differential settlement has been accounted for in the design.

Supporting Soils

The proposed structure may be supported on the properly compacted fill soils as detailed in the earthwork section.

Depth and Width

The footings must extend at least 21 inches below lowest finished grade. Minimum width for the footings is 15 inches.

Allowable Bearing Value

The proposed foundations may be designed to place a load of 2000 pounds per square foot on the soil. This value may be increased by 1/3 for wind or seismic forces.

Settlement

Load induced settlement of the structures should not exceed $\frac{1}{2}$ inch. Differential settlement should be less than $\frac{1}{4}$ inch. Liquefaction induced settlement is on the order of 0 inches.

Lateral Values

The allowable coefficient of sliding is 0.3. The allowable passive pressure is equal to a fluid density of 250 pounds per cubic foot. This value may be increased by 1/3 for wind or seismic forces. Sliding resistance and passive pressure may be used to resist lateral forces without reduction.

SLABS ON GRADE

The slabs, if any, may be placed on the resulting compacted fill from proper grading. The slabs should be designed for soils of medium expansion. Reinforcing should have a minimum of #4 bars at 18 inches on centers each way. Slab should be a minimum of 4 inches thick.

If a floor covering is used that will be affected by moisture, then we recommend that you use a 4 inch layer of gravel beneath the slab as a capillary break. The gravel should be of 3/4 inch variety with less than 10% sand with very little amount of fines.

A visquene covering must be used to serve as a water vapor barrier. To reduce problems associated with the concrete curing process, a 2 inch layer of sand should be placed on top of the visquene or a low slump concrete should be used.

DRAINS AND GRADES

All grades shall drain away from the foundations. Downspouts should be drained away from the foundations. All CBC recommendations shall be followed for grades around the proposed residence.

CONSTRUCTION PROCEDURES

EARTHWORK

To support foundations and slabs for the structure the following must be excavated to at least 5 feet the perimeter of the residence where possible.

- 1) In the area of the proposed building all organic material should be removed and taken off site.
- 2) Any fill soils under the proposed structure.
- 3) All soils to a depth of 4 feet from existing grade.

After excavation the following must be accomplished.

- 1) All bottoms of the excavation, areas to receive slabs, and foundations should be scarified and compacted to 90% compaction.
- 2) All fills and backfills should be placed in horizontal layers less than 8 inches in loose thickness.

- 3) The soils shall be compacted to a minimum of 90% of the maximum density rendered by the latest version of the ASTM(D-1557). Field density testing per latest ASTM version for Sand Cone Method.
- 4) The moisture content should not vary more than 2% from the optimum moisture content, although the grading process will be more easily accomplished with the soils being 1 to 2% wetter than optimum moisture content.
- 5) Any utility trenches will need to be properly backfilled as detailed in 2,3 and 4 above.
- 6) All on site soils may be used. Any import soils should be approved by our firm and should not have an expansion index greater than 35.

INSPECTION

This is an important step to obtain quality construction and to obtain correct design. The following will need inspection by our firm.

- * Foundations
- * All earthwork
 - a) All fill and backfills
 - b) Testing frequency is at all bottoms and every 2 vertical feet

Inspection, by our firm, is needed to assure that the soil conditions are consistent with this report and design assumptions. Inspection by local government agencies may also be needed.

BASIS OF REPORT

RIGHT OF USE

This report is intended exclusively for the use of the Birds and the project designers.

METHODS

This report has been developed based on our understanding of the project details, field review, boring excavations, laboratory testing, engineering analyses, and experience with similar soil conditions with similar use and loads.

DEGREE OF PERFORMANCE

The work was performed using the methods and degree of care used by other soil engineering firms operating in this vicinity, for similar projects, in this time period. This firm is responsible only for our own negligent errors and negligent omissions. Any error or omission that results in an unexpected cost that normally would have been present, is not the responsibility of our firm. Nothing else is warranted, implied or expressed, as to the details presented in this report.

VALIDITY OF REPORT

Changes

This report is valid for this specific project as described in the text of the report and on the plot plan. Any change in project size, loads, location, grade or use would require a review of this report.

Inspection

The recommendations given in this report are based on the assumption that all necessary inspection work will be performed during the construction phase of the project. The initial soil engineering investigation is only a part of the work needed to obtain correct engineering design. The soil conditions are only anticipated in the initial report. The inspection work verifies the conditions are as expected and allow our firm the ability to modify the recommendations in the event that the soil conditions are different.

The presence of inspection will provide the owner with the ability to obtain advice as to soil related construction procedures and answer related questions as to the implementation of the recommendations provided in this report.

If another firm is used to perform the construction inspection of the soil related aspects, our professional liability and responsibility would be drastically reduced to the point that we would no longer be the engineer of record.

RESULTS OF TESTING

EXPANSION INDEX TEST

Sample Location:	Boring 1@0-1'
Soil type:	Clayey Silt
Confining Pressure:	144 psf
Initial Moisture Content: (% of dry wt.)	11.7
Final Moisture Content: (% of dry wt.)	23.1
Dry Density:	103 pcf
Expansion Index:	58

TEST METHOD:
THE LATEST ASTM VERSION
EXPANSION INDEX TEST

COMPACTION TEST

Sample Location: Boring1@0-1'

Soil type: Clayey Silt

Maximum Dry Density: 121 pcf

Optimum Moisture Content: 11
(% of dry wt.)

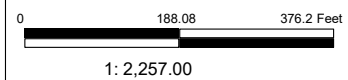
TEST METHOD:
LATEST VERSION OF ASTM
COMPACTION TEST



County View

Legend

- 100 Year Floodplain
- 500 Year Floodplain
- Actual and Potential Landslides
- All Faults
- Earthquake Fault Hazard Zones
- Liquefaction
- Potential EQ-Induced Landslides
- Subsidence Zone
- Tsunami Inundation
- Parcels



Notes

Disclaimer: The information contained on this web site and in this application was created by the Ventura County Geographical Information System (GIS), which is designed and operated solely for the convenience of the County and related contract entities. The County does not warrant the accuracy of this information, and no decision involving a risk of economic loss or physical injury should be made in reliance thereon.

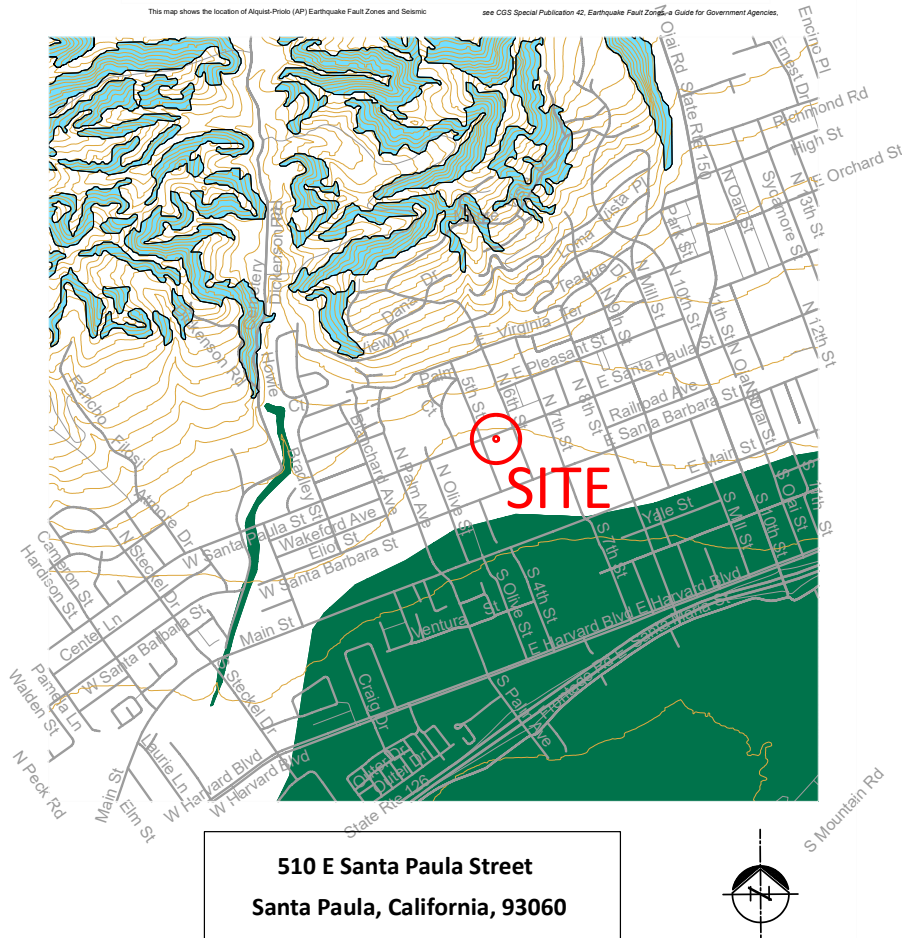
Earthquake Zones of Required Investigation Santa Paula Quadrangle

California Geological Survey

This Map Shows Both Alquist-Priolo Earthquake Fault Zones And
Seismic Hazard Zones Issued For The Santa Paula Quadrangle

This map shows the location of Alquist-Priolo (API) Earthquake Fault Zones and Seismic

see CGS Special Publication 42, Earthquake Fault Zones, a Guide for Government Agencies.



SEISMIC HAZARD ZONES

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



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



EARTHQUAKE FAULT ZONES

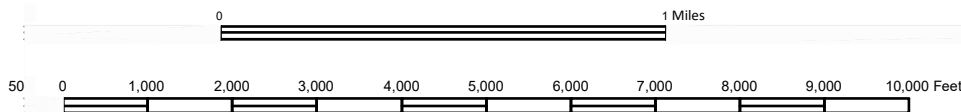
Earthquake Fault Zones
Zone boundaries are delineated by straight-line segments; the boundaries of the fault zone encompassing active faults that constitute a potential hazard to structures and investigation as defined in Public Resources Code Section 2621.5(b) would be required.

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

Note:

Site Location

Scale 1: 24000



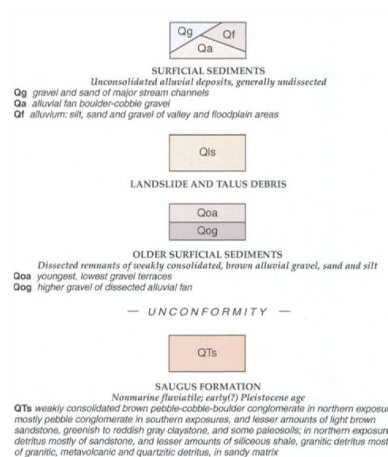
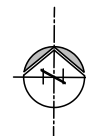
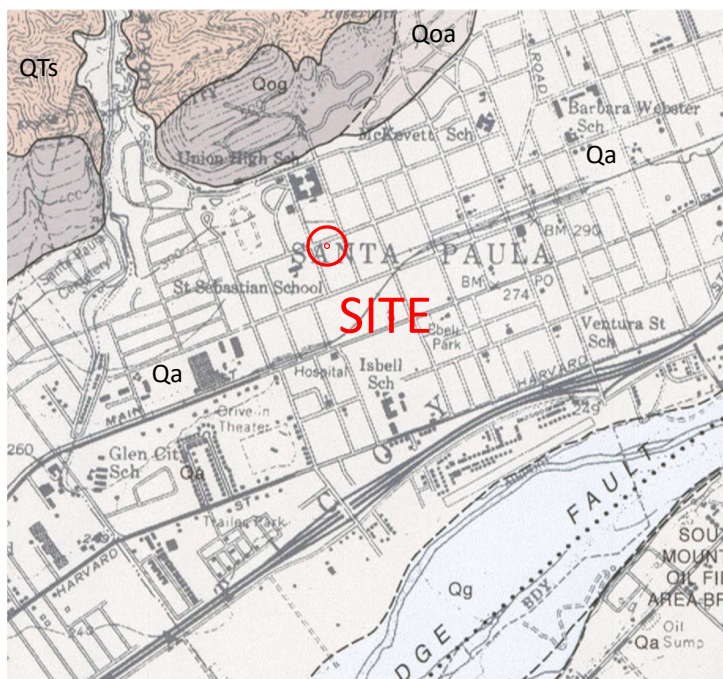
Contour Interval 20 Feet

GEOLOGIC MAP OF THE SANTA PAULA QUADRANGLE VENTURA COUNTY, CALIFORNIA

BY THOMAS W. DIBBLEE, JR., 1992

EDITED BY HELMUT E. EHRENSPECK, 1992

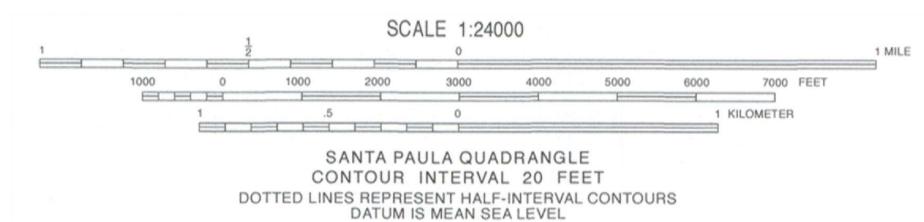
EDITED BY JOHN A. MINCH, 2010



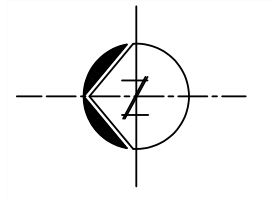
510 E Santa Paula Street
Santa Paula, California 93060

Notes:

Location



SITE PLAN

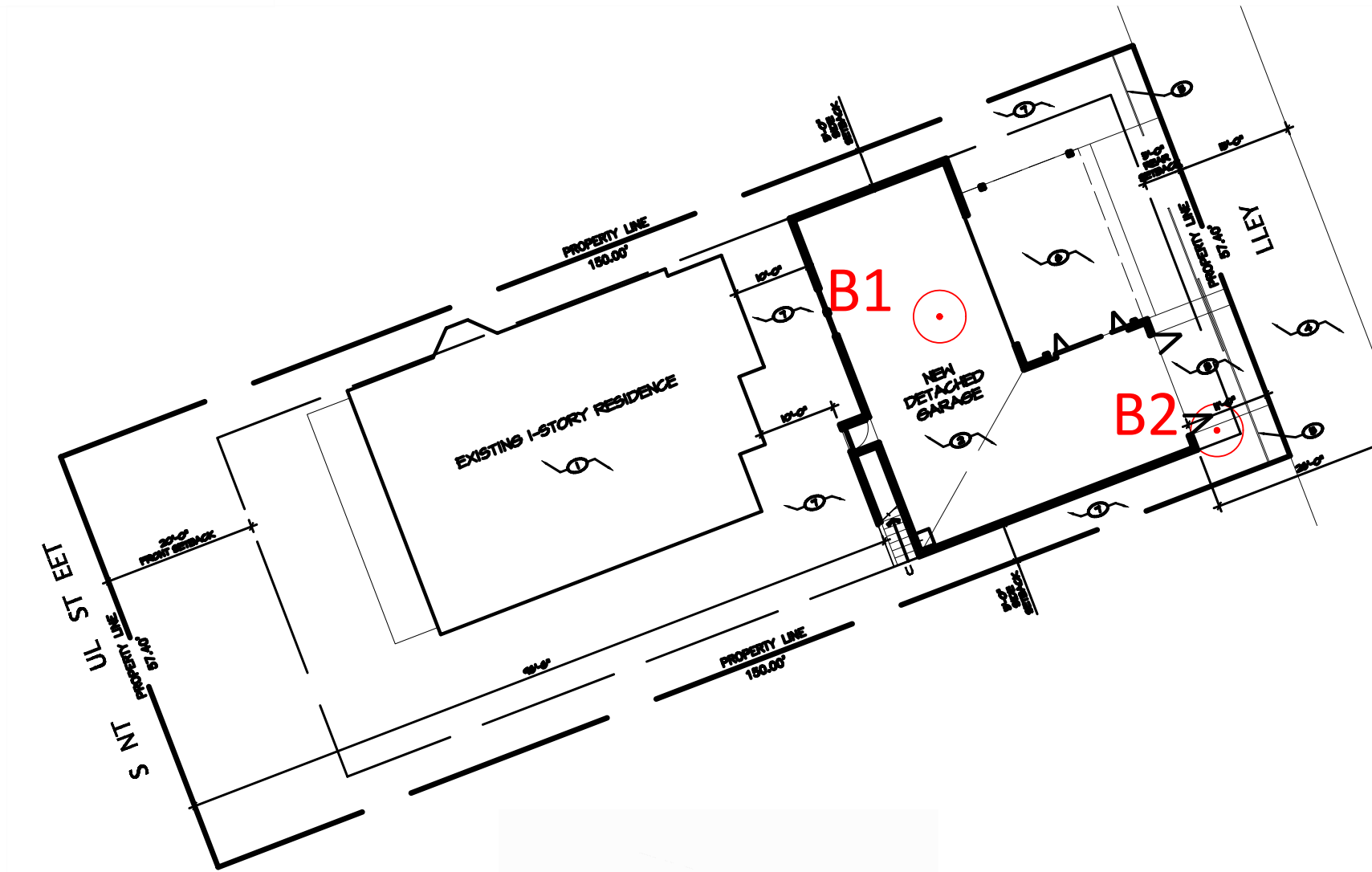


Notes:

⊙ Boring Location

Scale: 1"=20'

0' 20'



510 E Santa Paula Street
Santa Paula, California 93060

STANDARD PEN (blows per foot)	MOISTURE CONTENT (% of dry weight)	DRY DENSITY (lbs. per cubic foot)	DRIVE ENERGY (kip-feet)	ELEVATION (feet)	DEPTH (feet)	SAMPLE LOCATION	BORING 1	
	5.6	94	5				JOB: 23114	
	13.0	99	7				FIELD ENGINEER: FRED HEATHCOTE	
			18				DATES DRILLED: JULY 25, 2023	
							DRILLING EQUIPMENT: 8-INCH HOLLOW STEM AUGER	
							ML	CLAYEY SILT- mod compacted, brown, damp
								mod firm

WATER NOT ENCOUNTERED

STANDARD PEN (blows per foot)	MOISTURE CONTENT (% of dry weight)	DRY DENSITY (lbs. per cubic foot)	DRIVE ENERGY (kip-feet)	ELEVATION (feet)	DEPTH (feet)	SAMPLE LOCATION	BORING 2	
							JOB: 23114	
							FIELD ENGINEER: FRED HEATHCOTE	
							DATES DRILLED: JULY 25, 2023	
							DRILLING EQUIPMENT: 8-INCH HOLLOW STEM AUGER	
							ML	CLAYEY SILT- mod compacted, brown, damp
								mod firm

WATER NOT ENCOUNTERED