ALR ENGINEERING & TESTING

Civil & Geotechnical Engineering w/ Material Testing

18361 Symeron Road, Apple Valley, Ca. 92307

760-810-2031 Cell # - 760-242-3130 Office #

(alrengineeringtesting@gmail.com)

REPORT

PRELIMINARY GEOTECHNICAL INVESTIGATION
SEISMIC DESIGN PARAMETERS
STRUCTURAL SECTION
LIMITED SURFACE FAULT RUPTURE EVALUATION AND GEOLOGY REPORT

APN 3066-191-04

On a 3.01-acre parcel located on the Northwest corner of Highway 138 and Beekley Road, in Pinon Hills, County of San Bernardino, California

Prepared for

GEORGE WANIS

9128 Green Road
Pinon Hills, CA. 92397

May 11, 2018 **Project No. 1804420**

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Project No. 1804420

May 11, 2018

GEORGE WANIS
9128 Green Road
Pinon Hills, CA. 92397

Attention: Mr. George Wanis,

Subject: ***Preliminary Geotechnical Investigation*** on the **3.01**-acre parcel, **APN 3066-191-04**, located at the Northwest corner of Highway 138 and Beekley Road, in Pinon Hills, San Bernardino County, California.

In accordance with your authorization, **ALR Engineering & Testing**. performed a ***Preliminary Geotechnical Investigation*** for the above-mentioned property for the purpose of a proposed **4,998 sf** proposed **Gas Station** with **Convenience Store**. The enclosed report contains the results of our field investigation and laboratory testing and classification. Our efforts were directed towards providing classification and strength of the soils for determination of the foundation design.

We sincerely appreciate the opportunity of being service to you on this aspect of the project. Please do not hesitate to call us should you have any questions regarding the content of the reports.

Respectfully submitted,
ALR ENGINEERING & TESTING

John Longoria, EIT, QSP, NICET III, CESSWI, ICC
Senior Associate Engineer

REGISTERED PROFESSIONAL ENGINEER
STEPHAN M. LONGORIA
No. 74782
CIVIL
STATE OF CALIFORNIA

Stephan M. Longoria, PE 74782
Registered Civil Engineer

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1.0 INTRODUCTION AND SCOPE OF WORK

1.1 Introduction

This report presents the results of our Preliminary Geotechnical Investigation for the **3.01** acre parcel, **APN 3066-191-04,** located at the Northwest corner of Highway 138 and Beekley Road in Pinon Hills, San Bernardino County, California. **Figures 1** and **2** Show the property location. We understand that the site will be utilized for a proposed **Gas Station** with **Convenience Store**.

1.2 Scope of Work

Our scope of work included:

* Review of available soils data.
* Perform laboratory testing.
* Subsurface investigation by CAT Backhoe.
* Geotechnical Engineering considerations.
* Report preparation with conclusions and recommendations.

2.0 FIELD INVESTIGATION AND LABORATORY TESTING

2.1 Field Investigation

A field investigation using a CAT backhoe equipped with a 24" bucket was performed on May 5, 2018. Four **(4)** trenches were excavated to an approximate depth of fifteen **(15)** feet measured from the existing ground surface. **Figure 4** shows the approximate location of the trenches.

The purpose of our investigation was to ascertain the geotechnical properties of near surface underlying soils for foundation recommendations, and was not intended to provide evidence of potential environmental conditions. **Appendix A** presents the trench logs. The trench logs and related data depict subsurface conditions only at the specific locations and time indicated.

2.2 Laboratory Testing

Laboratory testing on select representative samples included:

* Maximum Density Tests
* Inplace Dry Density Tests
* Gradation/Sieve Analysis
* Sand Equivalent Tests
* R-Values

Inplace dry density in conjunction with laboratory maximum dry density, provides an indication of relative density (or relative compaction). This inplace relative compaction is utilized in estimation of potential shrinkage factors during grading and recommendations for site preparations, with relative compaction ranging from mid-eighties. two **(2)** Maximum Density Tests were performed in the laboratory on representative bulk samples.

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Gradation/Sieve Analysis is useful in classifying of soils in accordance with the Unified Soil Classification System, ASTM D2487. A total of seven **(7)** Gradation/Sieve Analysis Tests were performed. Gradation analysis can be utilized in qualitative determination of other engineering properties, such as compressibility, shear strength, and R-value.

Sand Equivalent (SE) is an indicator for cleanliness of the coarse-grained soils and is useful in qualitative estimation of the R-value. A total of seven **(7)** sand equivalent tests were performed.

R-Value Tests are used to determine the strength of the soils for the roadways and in determining the structural sections of the streets. A total of two **(2)** R-value tests were performed on the two streets.

Results of our laboratory testing are contained in **Appendix B**.

3.0 SITE AND SUBSURFACE CONDITIONS

3.1 Site Conditions

The subject site is vacant. The proposed location of the proposed **Gas Station** with **Convenience Store** is shown on **Figure 1-4**. The property is located at the Northwest corner of Highway 138 and Beekley Road in Pinon Hills, San Bernardino County. The property is located in a portion of the SW ¼ of ***Section 23, T4N, R7W, APN 3066-191-04***. The surface topography has an approximate gradient slope of **2%** that drains towards the Northwest.

3.2 Subsurface Conditions

Our field investigation and laboratory testing revealed that the near surface soils consist predominantly of silty **SANDS (SM)** and Well graded **SANDS (SW-SM)** with silts and gravel. **Appendix A** presents the detailed logs of soils encountered in our trenches.

4.0 GEOTECHNICAL ENGINEERING CONSIDERATIONS

Our geotechnical engineering evaluations are based on the limited field investigation and laboratory testing performed for the subject project.

4.1 Foundation System Considerations

Allowable bearing pressure for foundations depends upon the shear strength, settlement characteristics of the underlying soils, types of foundation system, acceptable differential movement, and depth of embedment. Based on the type of structures, our evaluations are directed towards the isolated footings as well as continuous footings.

4.2 Settlement and Heaving considerations:

Although no swell consolidation testing was performed, based on low field densities and our observations, the top four feet of soils are likely to settle due to loading and introduction of water. In general, mountain soils are cemented and undergo rapid consolidation due to saturation known as hydro-consolidation. Based on the loose to medium dense condition, the site is susceptible to low to moderate collapse potential according to criteria given below. This condition can be mitigated by over-excavation and re-compaction.

Collapse Potential, %	Severity of Problem
0 - 1	No Problem
1 - 5	Moderate Trouble
5 - 10	Trouble
10 - 20	Severe Trouble
> 20	Very Severe Trouble

4.3 Seismic Considerations

Review of available Alquist-Priolo Special Studies Maps indicate that the site is not located within any known or published active fault zones. Detailed geologic study was not within the scope of this report. It is noted that there are several active faults situated in Southern California. Some of these major fault zones are located within thirty (30) miles of the project location.

According to the **2016 California Building Code (CBC)** the site soils can be classified as **Type D**. The site is considered to be located in **Seismic Zone 4**. The Table below provides the seismic parameters as contained in **2016 CBC**. Any changes in the present code should be considered during the design.

Latitude – N 34.412799 **Longitude –** W -117.589625

Site Classification: D

Short period spectral site acceleration: $S_S = 1.685g$

Spectral acceleration for a 1-se condition period: $S_1 = 0.798g$

Short period acceleration coefficient: $F_a = 1.00$

1-second acceleration coefficient: $F_v = 1.50$

Modified: $SM_S = F_a * S_S = (1.00)(1.685) = 1.685g$

$SM_1 = F_v * S_1 = (1.50)(0.798) = 1.196g$

Design Values: $SD_S = 2/3*(SM_S) = 2/3*1.685 = 1.124g$

$SD_1 = 2/3*(SM_1) = 2/3*1.196 = 0.798g$

Design Response Spectrum: $T_L = 12$ seconds

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4.4 Seismically Induced Settlement

Ground movement and settlement can occur when relatively low-density soils are subject to ground vibrations. Potential for settlement of near surface soils due to earthquake cannot be precluded.

4.5 Liquefaction Potential

Although our field investigation did not extend to great depths, based on our general experience, the site is not subject to liquefaction.

"Liquefaction occurs only when all of the following criteria have been met:

- *The soil is cohesionless*
- *The soil is loose*
- *The soil is saturated*
- *The earthquake produces ground shaking with sufficient intensity and duration*
- *The ground shaking produces undrained conditions in the soil*" **(1)**

4.6 Wind Consideration

The site is located in the high wind zone. Design provisions of the latest California Building Code should be followed.

4.7 Depth of Groundwater

The depth of the groundwater at this site is approximately **500'** from the ground surface. This depth is shown on the ***USGS Water Resources Data*** file for the surrounding area.

5.0 CONCLUSIONS

In our opinion the soils encountered on this project site are suitable for the proposed development of the commercial project provided recommendations contained in this report is followed.

5.1 Upper four (4) feet of the soils are loose to medium dense, and relatively dry. These materials are subject to settlement due to consolidation and ground vibrations. Over-excavation and re-compaction of near surface soils, and other mitigating measures are discussed in **Section 6.0** of this report.

5.2 Our investigation and testing indicate that the near surface soils are likely to exhibit very low to low expansion potential.

5.3 Seismic considerations contained in **Section 4.3** should be considered during planning and design in conjunction with requirements of latest California Building Code.

5.4 The site is situated in a high wind speed area. The design should consider wind forces meeting the current requirements of the latest California Building Code.

(1) Geotechnical Engineering Principles and Practices (p. 692), by Donald Caduto, 1999 Upper Saddle River, NJ 07458, Prentice Hall

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6.0 RECOMMENDATIONS

6.1 Site Preparation

To achieve uniform support for foundations and slab-on-grade, the site should be cleared of all vegetation, debris and any deleterious materials.

As described earlier herein, the upper four **(4)** feet of material is relatively loose to medium dense. To mitigate rapid settlement, and or expansion, we recommend that the building pad areas, extending five **(5)** feet beyond the outer most limits should be over-excavated to a depth of at least three **(3)** feet below the existing or lowest cut grade and further scarified to a depth of twelve **(12)** inches. The scarified surface should be inspected by **ALR Engineering & Testing** prior to re-compaction. Upon approval of the soils engineer, the material should be uniformly moisture conditioned and re-compacted to relative compaction of at least **90** percent. All grading operation, including excavation, removal and re-compaction shall be observed by **ALR Engineering & Testing** or his/her representative.

6.2 Shrinkage and Compaction Settlement During Grading

Our field investigation and field and laboratory testing determined that the near surface soils are loose to medium dense. Accordingly, we estimate the shrinkage factor to be approximately **15** to **20** percent during over-excavation and re-compaction. Shrinkage is defined as the decrease in volume of soil due to artificial compaction, expressed as percentage of ratio of compacted dry density minus inplace density to compacted dry density. Shrinkage factors provided herein assumes an average relative compaction of **92** percent. Additionally, approximately **0.30** to **0.40** feet of compaction settlement should be considered during site grading.

6.3 Over-excavation and Re-compaction

To provide uniform consistent soil support and drainage, we recommend that the upper three **(3)** feet below the existing grade or lowest cut grade be over-excavated and re-compacted. Once the pads have been excavated the bottom should be scarified an additional twelve **(12)** inches, the scarified surface should be observed by an experienced engineer and the bottom should be tested prior to the re-compaction. Upon approval of the engineer, the material shall be uniformly moisture conditioned to near optimum moisture content and re-compacted to a minimum relative compaction of **90%**. The excavation then backfilled and compacted in loose lifts not exceeding eight **(8)** inches, after uniformly moisture conditioned as per compaction criteria provided herein this report.

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6.4 Imported Fill

Imported fill should be free of all deleterious substances, and non-expansive. The source of the imported fill should verified by the Engineer prior to being brought to the site.

6.5 Compaction Criteria

Following compaction criteria should be observed:

Structural Fill-Building areas extending at least 5' beyond the outermost building limit	90% or greater @ -2 to +2% of OMC
Backfill around retaining walls, Trench backfill from 1' to 4' below the subgrade	90% or greater @ -2 to +3% of OMC

All compaction and moisture content criteria are relative to ASTM D1557 Maximum Dry Density (MDD) and Optimum Moisture Content (OMC).

6.6 Foundation Design

The use of shallow, continuous and isolated footing foundation system is recommended provided other recommendations given in our report are followed. The max allowable bearing pressure and minimum footing foundation requirements are given below.

Maximum Allowable Bearing Pressure	# of Floors	Continuos Footings		Isolated Footings		Lateral Bearing Capacity	Sliding Coefficient
		Width	Depth	Width	Depth		
2000 psf	**Single Story**	**12"**	**15"**	**15"**	**15"**	**180 psf**	**0.25**

The bearing pressure can be increased by one-third for seismic or wind loading. As a minimum, all footings should be reinforced with one **(1)** No. 4 bar at the top and one **(1)** No. 4 bar at the bottom. Additional reinforcing should be determined by a structural engineer. A total settlement on the order of **0.75** inches should be anticipated, with differential settlement of about **0.35** inches.

6.7 Slab on Grade

We recommend a minimum thickness of four **(4)** inches. Two **(2)** inches of granular bedding (clean sand) underneath all slabs-on-grade underlain by a **6**-mil thick Visqueen is recommended. All slabs should be reinforced with steel reinforcement of No. 3 bars twenty-four (24) inches on center both ways, placed at mid-height of the slab is recommended. An equivalent-welded wire mesh reinforcement, **6x6 - 6x6** may be used in lieu of No. **3** bars. We recommend construction joints at every approximately **200** square feet. Concrete works exposed to an outside environment should be air contained with an air content of four (4) percent at the time of placement. All concrete should be placed at a slump not to exceeding four (4) inches at time of placement.

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6.8 Cement Type and Corrosion Potential

Based on our experience, we recommend Type II cement for all concrete works in contact with soils. Additionally, we recommend 15 to 20 % Type F Fly Ash as substitute for cement by weight.

6.9 Trench Backfill

Utility trench backfill material should be non-expansive, free of debris and any deleterious substances. Local onsite material is suitable for trench backfill. Granular bedding of one (1) foot underneath the water and sewer line pipes and six (6) inches above the pipes should be considered. The backfill should be compacted in loose lifts not exceeding six (6) inches to achieve relative compaction as set in **Section 6.4 Compaction Criteria**.

6.10 Surface Drainage and Landscaping

All grading should be such to direct surface runoff away from the building foundations. Roof runoff should also be directed away from the foundations.

6.11 Pavement Structure

The following pavement recommendations are based on the existing street and highway plans.

Highway 138	**8.5" of AC over 12.7" of Class II Base**
Beekley Road	**5.0" of AC over 9.0" of Class II Base**
Onsite paving	**4.0" of AC or 6.0" of PCC over compacted native soils**

6.12 Field Observations and Testing

The recommendations contained in this report are based on the results of our limited preliminary investigation and our general experience with the similar soil conditions. It is critical that **ALR Engineering & Testing** observe the earthworks operation and test for compaction at various stages of the related construction activities. These activities include but may not be limited to:

* Over-excavation and scarification.
* Subgrade preparation
* Trench and Utility backfill
* Fill placement and backfilling.
* Placement of Base Course
* When any unusual conditions are encountered.

Based on these observations and testing, it may be necessary to modify the recommendations contained herein.

6.14 Final Report

A final report should be prepared which will contain field observations, test results and additional recommendations, as warranted.

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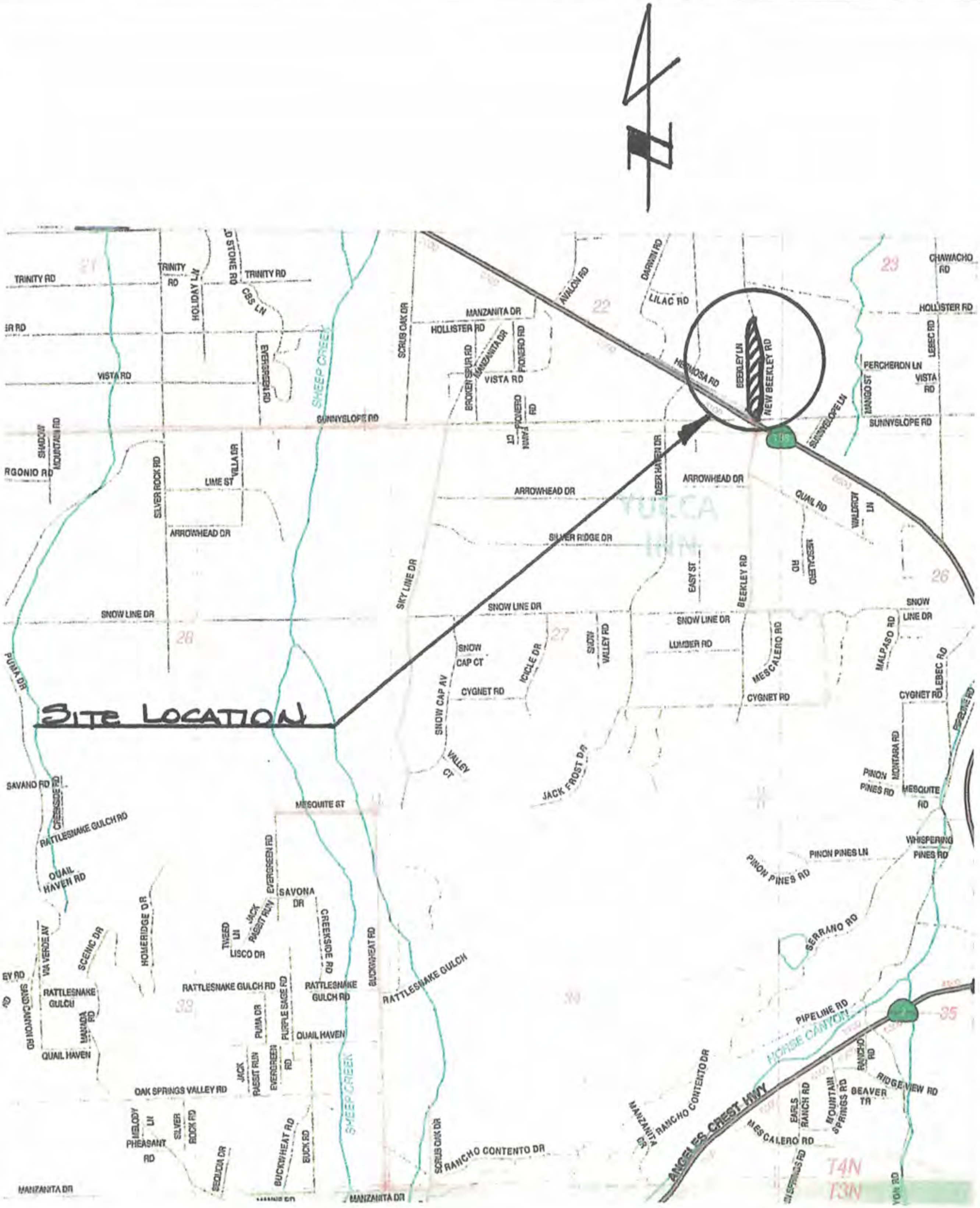
7.0 LIMITATIONS

Conclusions, recommendations and professional opinions resulting from our site observations, field investigation and laboratory testing are intended solely for the **4,998 sf** ***Proposed Gas Station*** *with* ***Convenience Store***.

Our conclusions and recommendations are based on our understanding of the project and consistent with the level of skill ordinarily exercised by other professional consultants under similar circumstances at the same time our services were provided.

This report is exclusively prepared to assist the owner **George Wanis** in the design of the footings and foundation support for the ***Proposed Gas Station*** *with* ***Convenience Store*** described within this report on site.

ALR Engineering & Testing should be consulted to provide written modifications to the Recommendations contained in this report, depending upon the project requirements.



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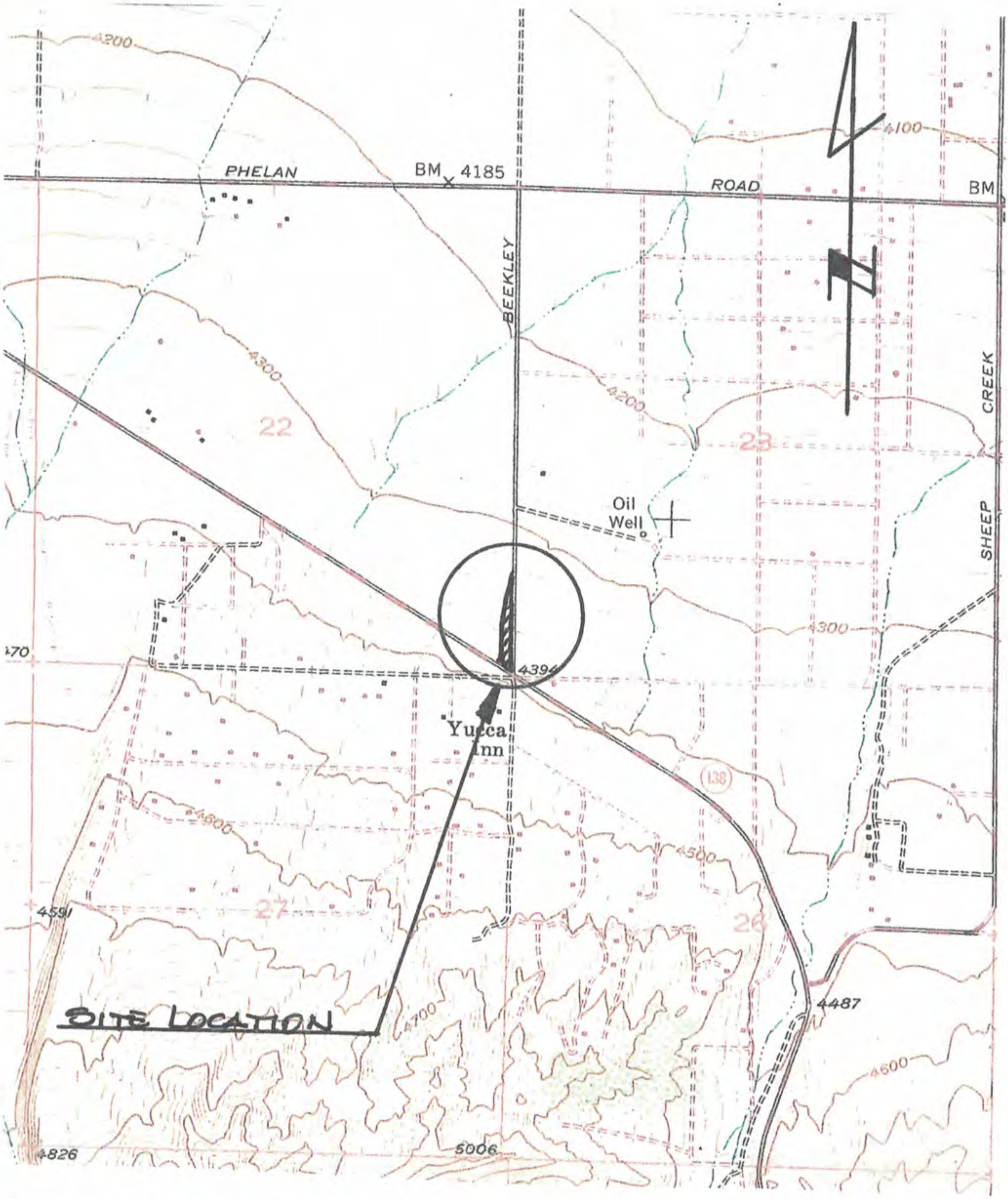
Pinon Hills	Project No. 1804420
APN 3066-191-04	
GEORGE WANIS	
Vicinity Map	Figure No. 1



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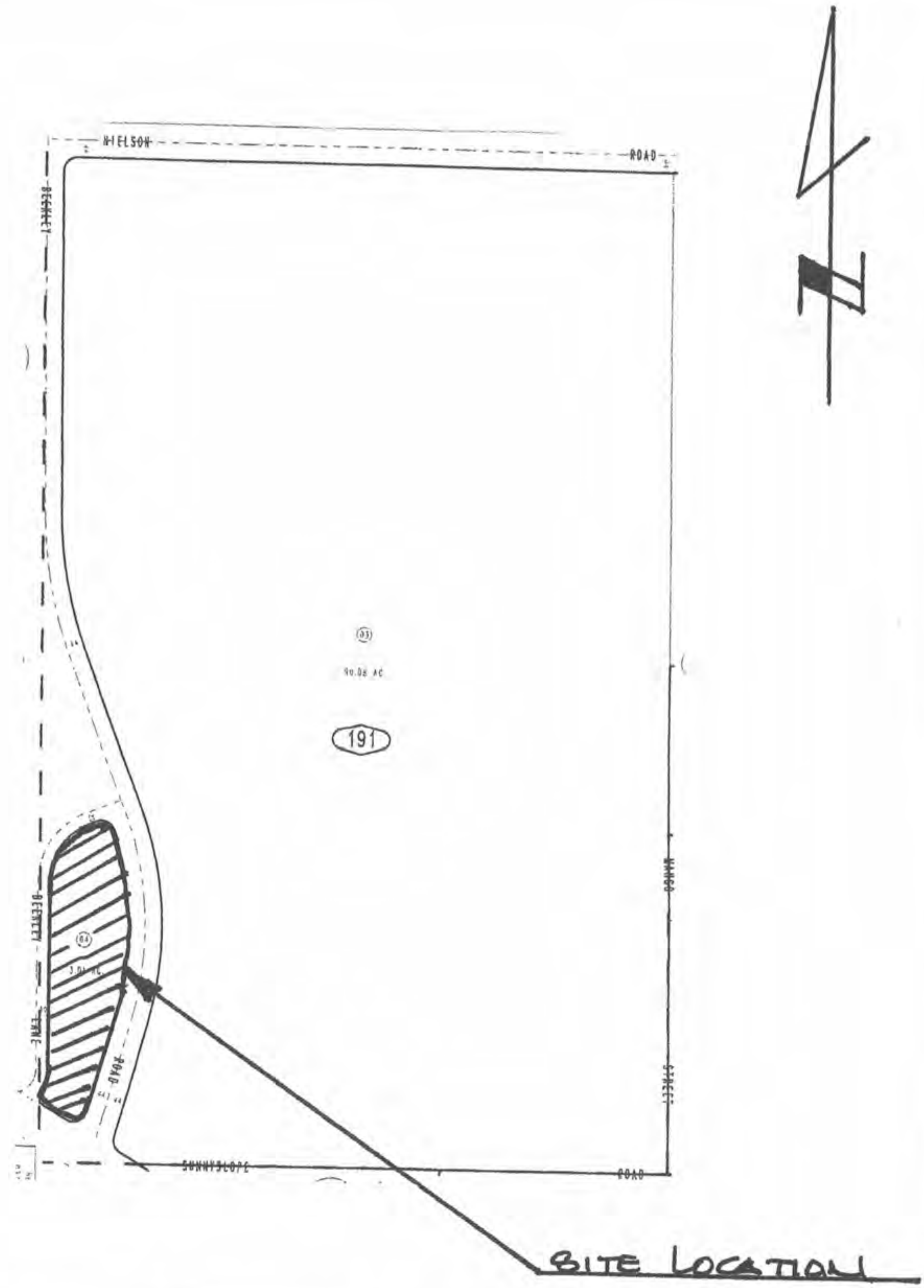
Pinon Hills	Project No. 1804420
APN 3066-191-04	
GEORGE WANIS	
USGS Topo	Figure No. 2



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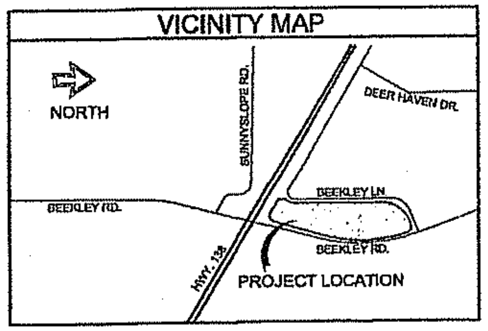
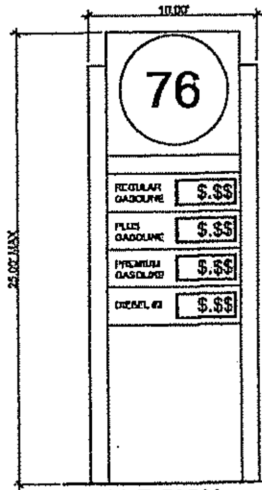
Pinon Hills	Project No. 1804420
APN 3066-191-04	
GEORGE WANIS	
Assessors Map	Figure No. 3

PROPOSED DRAINAGE FIXTURE UNITS - SEWER			
FIXTURE UNITS	QUANTITY	FIXTURE UNITS (EA)	TOTAL UNITS
STORE			
WATER CLOSETS	2	4	8
LAVATORIES	2	1	2
HAND WASH SINKS	1	1	1
MOP SINKS	1	3	3
FLOOR SINK (3 COMPT SINK)	1	3	3
FLOOR SINK (BEVERAGE DISP)	1	1	1
		TOTAL (STORE)	18
LEASE SUITE			
WATER CLOSETS	1	4	4
LAVATORIES	1	1	1
HAND WASH SINKS	1	1	1
MOP SINKS	1	3	3
FLOOR SINK (3 COMPT SINK)	1	3	3
FLOOR SINK (BEVERAGE DISP)	1	1	1
		TOTAL (LEASE SUITE)	13
		GRAND TOTAL	31

MINIMUM SEPTIC TANK CAPACITY PER CPC TABLE H 201.1
25 DFU'S = 1,200 GALLONS
33 DFU'S = 1,500 GALLONS
45 DFU'S = 2,000 GALLONS

VICINITY MAP

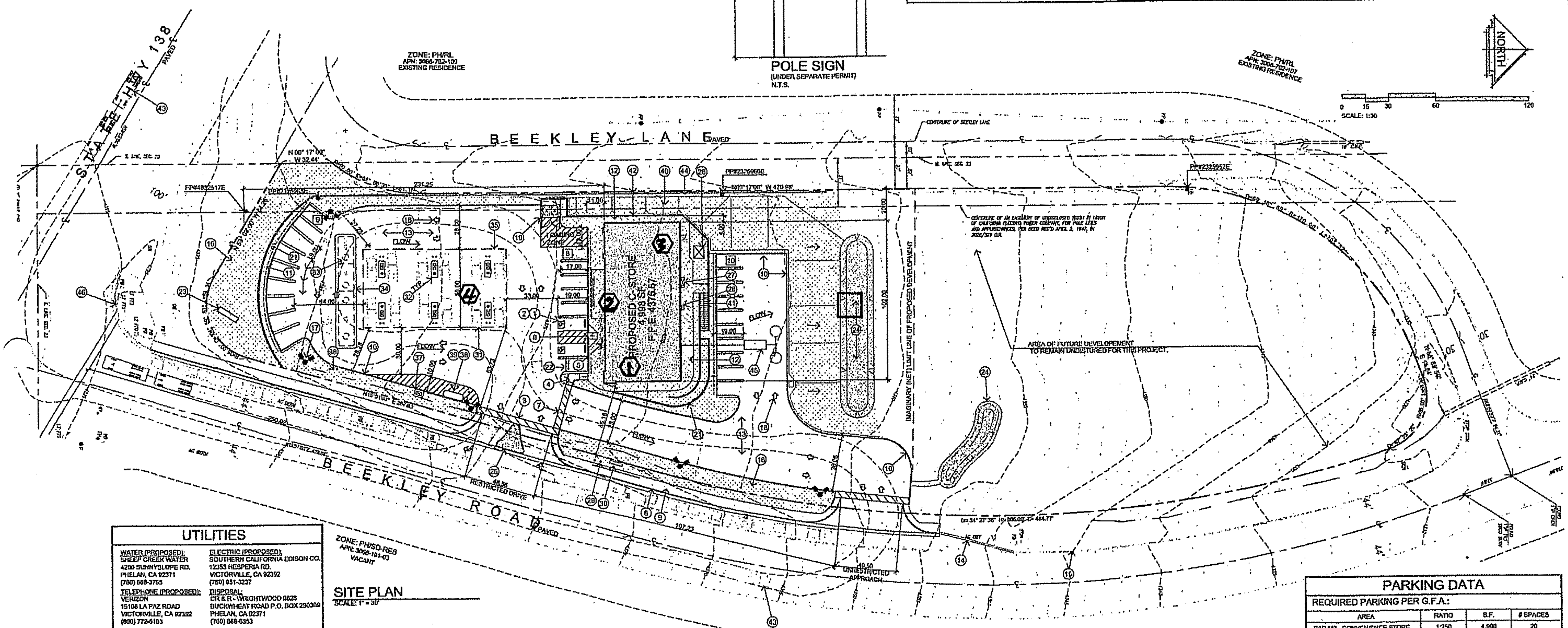




POLE SIGN
(UNDER SEPARATE PERMIT)
N.T.S.

OFFICIAL USE ONLY

⬡ DENOTES EXPLORATORY TRENCH LOCATION
☐ DENOTES INFILTROMETER TRENCH LOCATION



SITE PLAN
SCALE: 1" = 30'

UTILITIES

WATER (PROPOSED):
SHEEP CREEK WATER
4200 SUNNYSLOPE RD.
PHELAN, CA 92371
(760) 868-3755

ELECTRIC (PROPOSED):
SOUTHERN CALIFORNIA EDISON CO.
12353 HESPERIA RD.
VICTORVILLE, CA 92392
(760) 951-3237

TELEPHONE (PROPOSED):
VERIZON
15108 LA PAZ ROAD
VICTORVILLE, CA 92392
(800) 772-5183

DISPOSAL:
CR & R - WRIGHTWOOD 9828
BUCKWHEAT ROAD P.O. BOX 290309
PHELAN, CA 92371
(760) 868-6353

SEWER:

GAS (PROPOSED):
THE GAS COMPANY
CONTACT: STEVE VARGAS
(909) 335-7836

KEYED NOTES

1. VAN ACCESSIBLE PARKING SPACE
2. ACCESSIBILITY STALL EMBLEM PAINTED AS SHOWN
3. 48" WIDE ACCESSIBILITY ACCESS W/ BLUE STRIPES
4. A.D.A. RAMP NOT TO EXCEED 5% SLOPE IN DIRECTION OF RUN AND 2% MAX CROSS SLOPE
5. WARNING SIGNAGE REGARDING UNAUTHORIZED USE OF DISABLED PARKING SPACES
6. TRUNCATED DOMES, 36" DEPT x WIDTH OF RAMP
7. A.D.A. PATH OF TRAVEL
8. PROPOSED CONC. CURB & GUTTER PER CITY/COUNTY STANDARDS
9. PROPOSED 6' WD. CONC. SIDEWALK PER CITY/COUNTY STANDARDS
10. 6" WIDE CONCRETE CURB.
11. 6" WIDE CONCRETE CURB. W/ 2' PARKING NOSE OVER
12. 4" NOMINAL THICK CONCRETE WALKWAYS
13. PROPOSED 6" THK. A.C. PAVING
14. PROPOSED A.C. CURB
15. EXISTING A.C. CURB
16. LANDSCAPED AREA SEE LANDSCAPE PLANS
17. 20' HI SITE LIGHT STANDARD, SEE PLAN FOR NUMBER OF HEADS
18. TRAFFIC FLOW DIRECTIONAL ARROWS PAINTED ON PAVING AS SHOWN ON PLAN
19. 6' H. ACCESSIBLE TRASH ENCLOSURE, PER COUNTY STANDARD
20. 6" THK. REINFORCED CONCRETE PAD W/ 2% MAXIMUM SLOPE AWAY FROM T/E
21. PROPOSED X' HIGH RETAINING WALL, SEE CIVIL DRAWINGS
22. PROVIDE (1) DESIGNATED PARKING STALL FOR FUEL EFFICIENT VEHICLES WITH THE WORDS "CLEAN AIR VEHICLE" PAINTED IN THE SAME STALL STRIPING PAINT & SUCH THAT THE LAST WORD ALIGNS WITH THE END OF THE STALL STRIPING AND IS VISIBLE BENEATH A PARKED VEHICLE.
23. 25' MAX FUEL PRICING POLE SIGN, UNDER SEPARATE PERMIT
24. LOCATION OF RETENTION BASIN. SEE CALCULATIONS
25. 6" HIGH TRAFFIC DIVIDER WITH BRICK IN HERRINGBONE PATTERN.
26. PROPOSED LOCATION OF ELECTRICAL TRANSFORMER W/ CONC. BOLLARDS
27. EXTERIOR MOUNT WEATHER-PROOF ELECTRICAL SWITCHGEAR
28. PROPOSED LOCATION OF GAS METER
29. 6" FIRE P.I.V. & F.D.C., SEE UTILITY PLANS
30. DOUBLE DETECTOR CHECK VALVE, SEE UTILITY PLANS
31. LINE OF FUEL 92'x50' FUEL CANOPY, UNDER SEPARATE PERMIT
32. PROPOSED FUEL DISPENSER, 6 @ (3+0) & 0 @ (3+1)
33. LINES OF UNDER GROUND FUEL STORAGE TANKS, 87 & 91 OCTANE + DIESEL
34. 6" CONCRETE PAVING OVER FUEL TANKS
35. PROPOSED 8" THK. CONCRETE PAVING UNDER FUEL CANOPY
36. VAPOR RECOVERY SYSTEM (TANKLESS)
37. AIR & WATER FOR CUSTOMER USAGE
38. PROPANE DISPENSER & FILLING AREA
39. 499 GALLON PROPANE TANKS WITH CONC. FILLED BOLLARDS
40. 2:1 LANDSCAPED SLOPE
41. CONC. STAIRS DOWN 6" RISE, 16" RUN TOTAL HEIGHT 8'
42. MASONRY RETAINING WALL (SEE PRELIMINARY GRADING FOR HEIGHT)
43. FUEL TANKER TRUCK PATH PULLING A TANKER TRAILER OFF-TRACKING PATH SHOWN
44. CONC. DRAINAGE SWALE
45. 1,500 GALLON SEPTIC TANK w/ 2- 5'D x 26' DP. SEEPAGE PITS W/ 100% OVERFILL PROTECTION FOR SEPTIC TANK
46. EX. CONC. APRON

SHEET INDEX

A-0	SITE PLAN
L-1	LANDSCAPE - PLANTING PLAN
A-1	FLOOR PLAN
A-2	EXTERIOR ELEVATIONS

AREA TABULATIONS

GROSS LAND AREA (3.01 ACRES)	131,454 S.F.	
FUTURE DEVELOPMENT AREA (UNDISTURBED AREA)	59,542 S.F.	
NET AREA PROPOSED DEVELOPMENT (1.65 ACRES)	71,912 S.F.	100%
IMPERVIOUS AREA (OF NET) BLDG., PAVING, FLATWORK	44,152 S.F.	61%
LANDSCAPED AREA (OF NET) INCLUDES RET. BASIN	27,760 S.F.	39%

THE CALCULATIONS FOR THE AMOUNT OF STORMWATER RUNOFF IS USING THE COUNTYS HYDROLOGY METHOD OF PRE & POST IMPERVIOUS AREA ONSITE

PROPOSED
RETENTION BASIN = (40' x 80' x 2') = 6,400 CF

SEE HYDROLOGY STUDY FOR MORE INFORMATION

PARKING DATA

REQUIRED PARKING PER G.F.A.:

AREA	RATIO	S.F.	# SPACES
PAD "A" - CONVENIENCE STORE	1:250	4,998	20
		TOTAL REQUIRED	20

PROVIDED PARKING:

9'x19' ACCESSIBLE PARKING STALLS	= 2 SPACES
9'x19' STANDARD PARKING STALLS	= 25 SPACES

PROJECT DATA

APPLICATION TYPE: CUP -	TO ESTABLISH A SERVICE STATION WITH CONVENIENCE STORE
ZONE:	PH/SD-RES
OCCUPANCY'S:	B,M,
CONSTRUCTION TYPE:	V - B
STORIES:	1
FIRE SPRINKLERS:	NO
A.P.N.	3066-191-04

LEGAL DESCRIPTION:
PTN SW 1/4 SEC 23 TP 4N R 7W LYING SWLY OF BEEKLEY LANE AND NELY STATE HWY EX E 1/2 E 1/2 SW 1/4 AND EX E 1/2 W 1/2 E 1/2 SW 1/4 AND EX STATE HGWY AND EX ST

APPLICANT / OWNER:
GEORGE WANG
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DATE FINISHED
AUGUST 2017

REVISIONS
JAN. 2018

THESE PLANS SHALL COMPLY WITH THE 2016 CALIFORNIA BUILDING CODE WHICH ADOPTS THE 2016 CMC, 2016 CPC, 2016 CEC, 2016 CGC, 2016 CRC AND THE 2016 ENERGY STANDARDS

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PROJECT: COMMERCIAL DEVELOPMENT
PINON HILLS GAS STATION

PROJECT ADDRESS:
NW CORNER BEEKLEY RD. & HWY138
PINON HILLS, CA 92372
APN: 3066-191-01

CONTACT INFO:
GEORGE WANG
C: 661-860-0226

JOB NO.
C16-306

SHEET NAME:
SITE PLAN

PAGE
A-0

APPENDIX - A

TABLE 1 Soil Classification Chart

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests[A]				Soil Classification: Group Symbol	Soil Classification: Group Name[B]
Coarse-Grained Soils More than 50 % retained on No. 200 sieve	Gravels More than 50 % of coarse fraction retained on No. 4 sieve	Clean Gravels Less than 5 % fines[C]	$Cu \geq 4$ and $1 \leq Cc \leq 3$[E]	GW	Well-graded gravel[F]
			$Cu < 4$ and/or $1 > Cc > 3$[E]	GP	Poorly graded gravel[F]
		Gravels with Fines More than 12 % fines[C]	Fines classify as ML or MH	GM	Silty gravel[F,G,H]
			Fines classify as CL or CH	GC	Clayey gravel[F,G,H]
	Sands 50 % or more of coarse fraction passes No. 4 sieve	Clean Sands Less than 5 % fines[D]	$Cu \geq 6$ and $1 \leq Cc \leq 3$[E]	SW	Well-graded sand[I]
			$Cu < 6$ and/or $1 > Cc > 3$[E]	SP	Poorly graded sand[I]
		Sands with Fines More than 12 % fines[D]	Fines classify as ML or MH	SM	Silty sand[G,H,I]
			Fines classify as CL or CH	SC	Clayey sand[G,H,I]
Fine-Grained Soils 50 % or more passes the No. 200 sieve	Silts and Clays Liquid limit less than 50	inorganic	PI > 7 and plots on or above "A" line[J]	CL	Lean clay[K,L,M]
			PI < 4 or plots below "A" line[J]	ML	Silt[K,L,M]
		organic	$\frac{\text{Liquid limit - oven dried}}{\text{Liquid limit - not dried}} < 0.75$	OL	Organic clay[K,L,M,N] Organic silt[K,L,M,O]
	Silts and Clays Liquid limit 50 or more	inorganic	PI plots on or above "A" line	CH	Fat clay[K,L,M]
			PI plots below "A" line	MH	Elastic silt[K,L,M]
		organic	$\frac{\text{Liquid limit - oven dried}}{\text{Liquid limit - not dried}} < 0.75$	OH	Organic clay[K,L,M,P] Organic silt[K,L,M,Q]
Highly organic soils		Primarily organic matter, dark in color, and organic odor		PT	Peat

[A] Based on the material passing the 3-in. (75-mm) sieve.

[B] If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

[C] Gravels with 5 to 12 % fines require dual symbols:
GW-GM well-graded gravel with silt
GW-GC well-graded gravel with clay
GP-GM poorly graded gravel with silt
GP-GC poorly graded gravel with clay

[D] Sands with 5 to 12 % fines require dual symbols:
SW-SM well-graded sand with silt
SW-SC well-graded sand with clay
SP-SM poorly graded sand with silt
SP-SC poorly graded sand with clay

[E] $Cu = D_{60}/D_{10}$ $\quad Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$

[F] If soil contains ≥ 15 % sand, add "with sand" to group name.

[G] If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

[H] If fines are organic, add "with organic fines" to group name.

[I] If soil contains ≥ 15 % gravel, add "with gravel" to group name.

[J] If Atterberg limits plot in hatched area, soil is a CL-ML, silty clay.

[K] If soil contains 15 to 29 % plus No. 200, add "with sand" or "with gravel," whichever is predominant.

[L] If soil contains ≥ 30 % plus No. 200, predominantly sand, add "sandy" to group name.

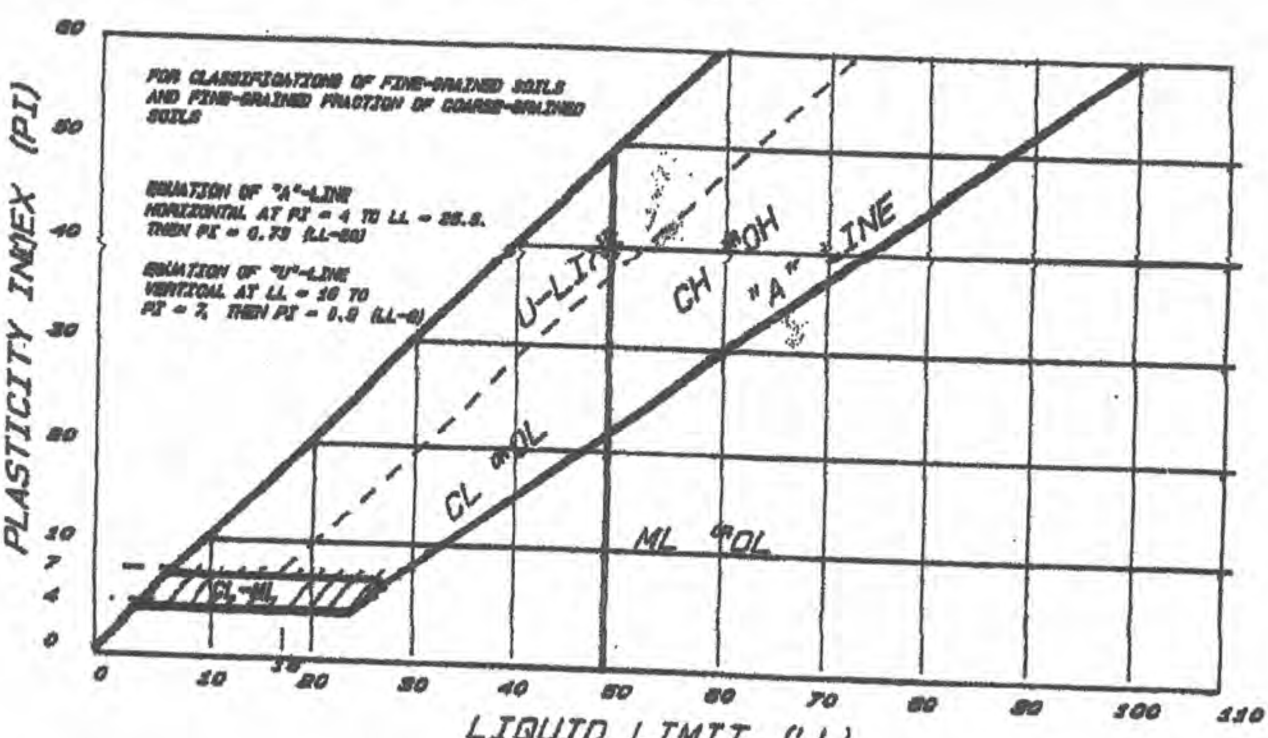
[M] If soil contains ≥ 30 % plus No. 200, predominantly gravel, add "gravelly" to group name.

[N] PI ≥ 4 and plots on or above "A" line.

[O] PI < 4 or plots below "A" line.

[P] PI plots on or above "A" line.

[Q] PI plots below "A" line.



UNIFIED SOIL CLASSIFICATION SYSTEM
ASTM D2487

TEST PIT NO. TP-1

Project: APN 3066-191-04 **Project # 1804420**

Client: GEORGE WANIS **Date: 5-5-18**

Depth Feet	Sample Type	Moisture Content %	Dry Density pcf.	Lab Test Type	Soil Class		Geotechnical Description
1.0'							Well graded SAND with silts with some gravel and rock to 4", Light Brown, Dry, Medium Dense
1.5'							
2.0'	BAG			MAX SIEVE SE	SW-SM		
2.5'							
3.0'							
3.5'							
4.0'	BAG			SIEVE SE	SM		Coarse to medium silty SAND with some gravel and rock to 4" and some clumping, Light Brown, Dry, Medium Dense
4.5'							
5.0'							
5.5'							
6.0'	BAG			SIEVE SE	SW-SM		Well graded SAND with silts and much gravel and some rock to 8", Tan, Dry, Medium Dense
6.5'							
7.0'							
7.5'							
8.0'	BAG			SIEVE SE	SM		Coarse to medium silty SAND with some gravel, Light Brown, Dry, Medium Dense
8.5'							
9.0'							
10.0'							
11.0'							
12.0'							
13.0'							
14.0'							
15.0'							
							Bottom of Exploratory Trench

TEST PIT NO. TP-2

Project: APN 3066-191-04 **Project # 1804420**

Client: GEORGE WANIS **Date: 5-5-18**

Depth Feet	Sample Type	Moisture Content %	Dry Density pcf.	Lab Test Type	Soil Class		Geotechnical Description
1.0'					SM		Medium to fine silty SAND with some clumping and traces of gravel, Light Brown, Dry, Medium Dense
1.5'				MAX SIEVE SE			
2.0'	BAG						
2.5'							
3.0'							
3.5'	BAG			SIEVE SE	SW-SM		Well graded SAND with silts and some gravel and rock to 9", Tan, Dry, Medium Dense to Loose
4.0'							
4.5'							
5.0'							
5.5'							
6.0'							
6.5'							
7.0'							
7.5'							
8.0'							
8.5'							
9.0'							
10.0'							
11.0'							
12.0'							
13.0'							
14.0'							
15.0'							
							Bottom of Exploratory Trench

TEST PIT NO. TP-3

Project: APN 3066-191-04 **Project # 1804420**

Client: GEORGE WANIS **Date: 5-5-18**

Depth Feet	Sample Type	Moisture Content %	Dry Density pcf.	Lab Test Type	Soil Class		Geotechnical Description
1.0'					SW-SM		Well graded SAND with silts with some gravel and rock to 4", Light Brown, Dry, Medium Dense
1.5'							
2.0'							
2.5'							
3.0'							
3.5'							
4.0'							
4.5'					SM		Coarse to medium silty SAND with much gravel and some rock to 8", Light Brown, Dry, Medium Dense
5.0'							
5.5'							
6.0'							
6.5'							
7.0'							
7.5'							
8.0'							
8.5'							
9.0'							
10.0'							
11.0'							
12.0'							
13.0'							
14.0'							
15.0'							**Bottom of Exploratory Trench**

TEST PIT NO. TP-4

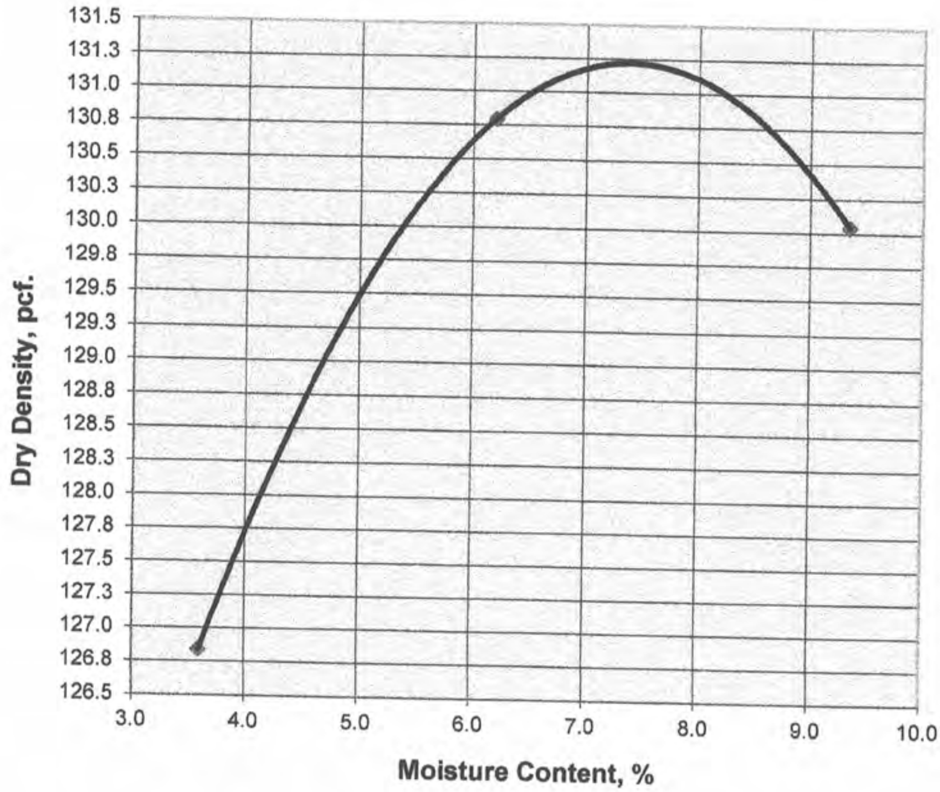
Project: APN 3066-191-04 **Project # 1804420**

Client: GEORGE WANIS **Date: 5-5-18**

Depth Feet	Sample Type	Moisture Content %	Dry Density pcf.	Lab Test Type	Soil Class		Geotechnical Description
1.0'					SW-SM		Well graded SAND with silts with some gravel and rock to 4", Light Brown, Dry, Medium Dense
1.5'							
2.0'							
2.5'							
3.0'							
3.5'							
4.0'							
4.5'							
5.0'							
5.5'							
6.0'					SW-SM		Well graded SAND with silts and much gravel and some rock to 8", Tan, Dry, Medium Dense
6.5'							
7.0'							
7.5'							
8.0'							
8.5'							
9.0'							
10.0'	BAG			SIEVE SE	SM		Medium to fine silty SAND with some clumping and traces of gravel, Light Brown, Dry, Medium Dense
11.0'							
12.0'							
13.0'							
14.0'							
15.0'							Bottom of Exploratory Trench

APPENDIX - B

Dry Density - Moisture Content Relationship



Date: 5/5/2018 Location : TP-1

Field Density Test No. 1 Depth: 2.0'

Soil Type: SM

Method of Compaction: ASTM D 1557A

Maximum Dry Density: 131.25 pcf

Optimum Moisture Content: 7.50%

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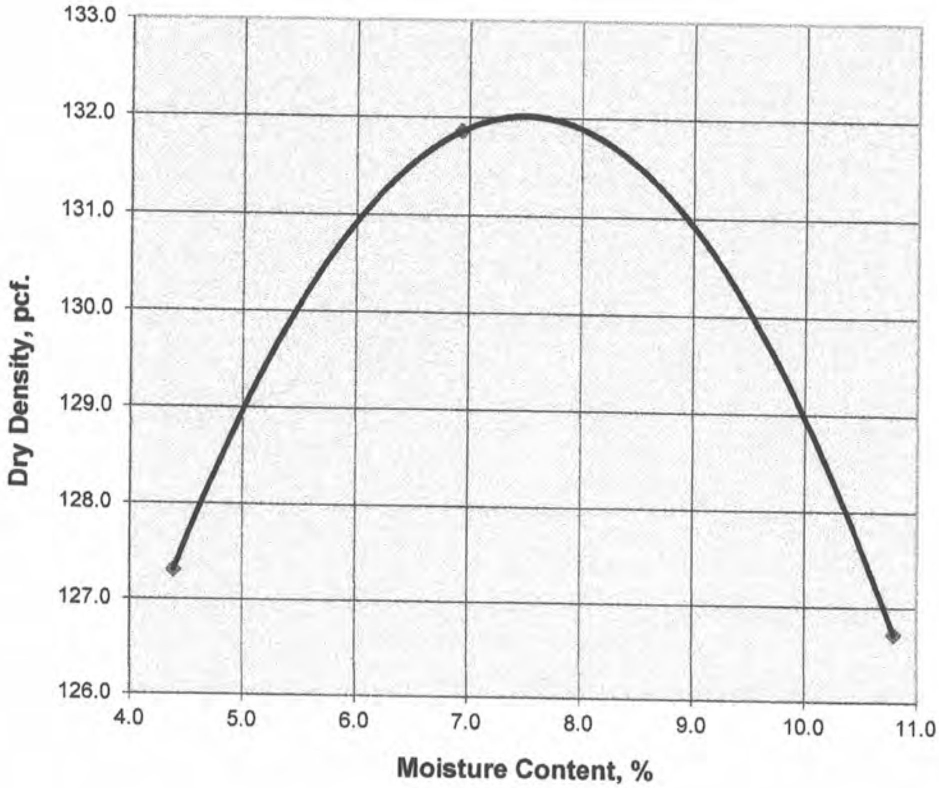
Pinon Hills	Project No. 1804420
APN 3066-191-04	
PLATE B - 1	

Dry Density - Moisture Content Relationship



Date: 5/9/2018 Location : TP-2

Field Density Test No. 2 Depth: 2.0'

Soil Type: SM

Method of Compaction: ASTM D 1557A

Maximum Dry Density: 132.0 pcf

Optimum Moisture Content: 7.50%

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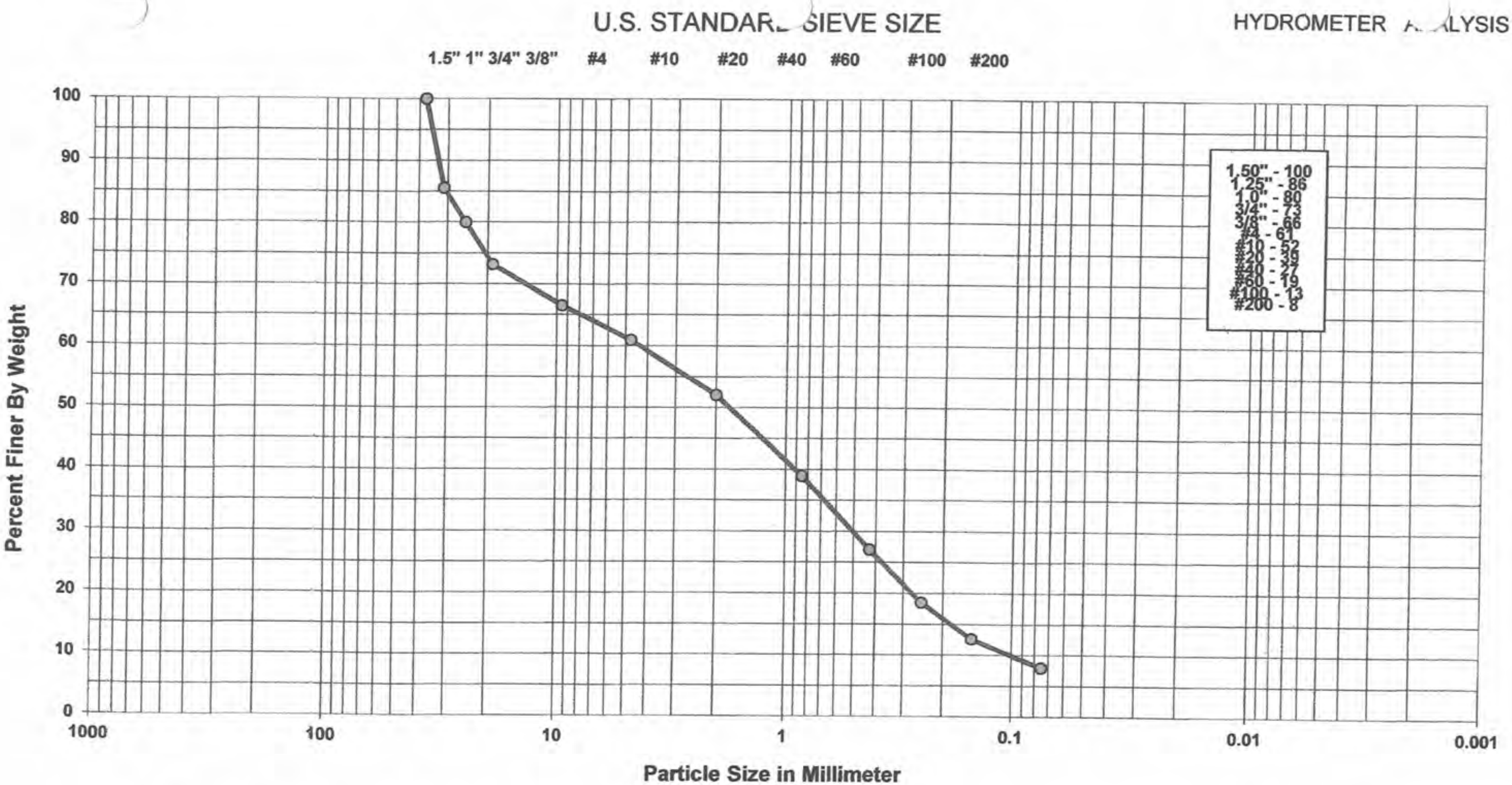
APN 3066-191-04	
PLATE B - 2	



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Location	Type	Depth, ft.	MDD, pcf	Opt H2O	SE		Soil Classification
TP-1	BAG	2.0	131.25	7.50%	34		Well graded SAND with silt (SW-SM)

PARTICLE SIZE ANALYSIS

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Pinon Hills	Project No. 1804420
APN 3066-191-04	
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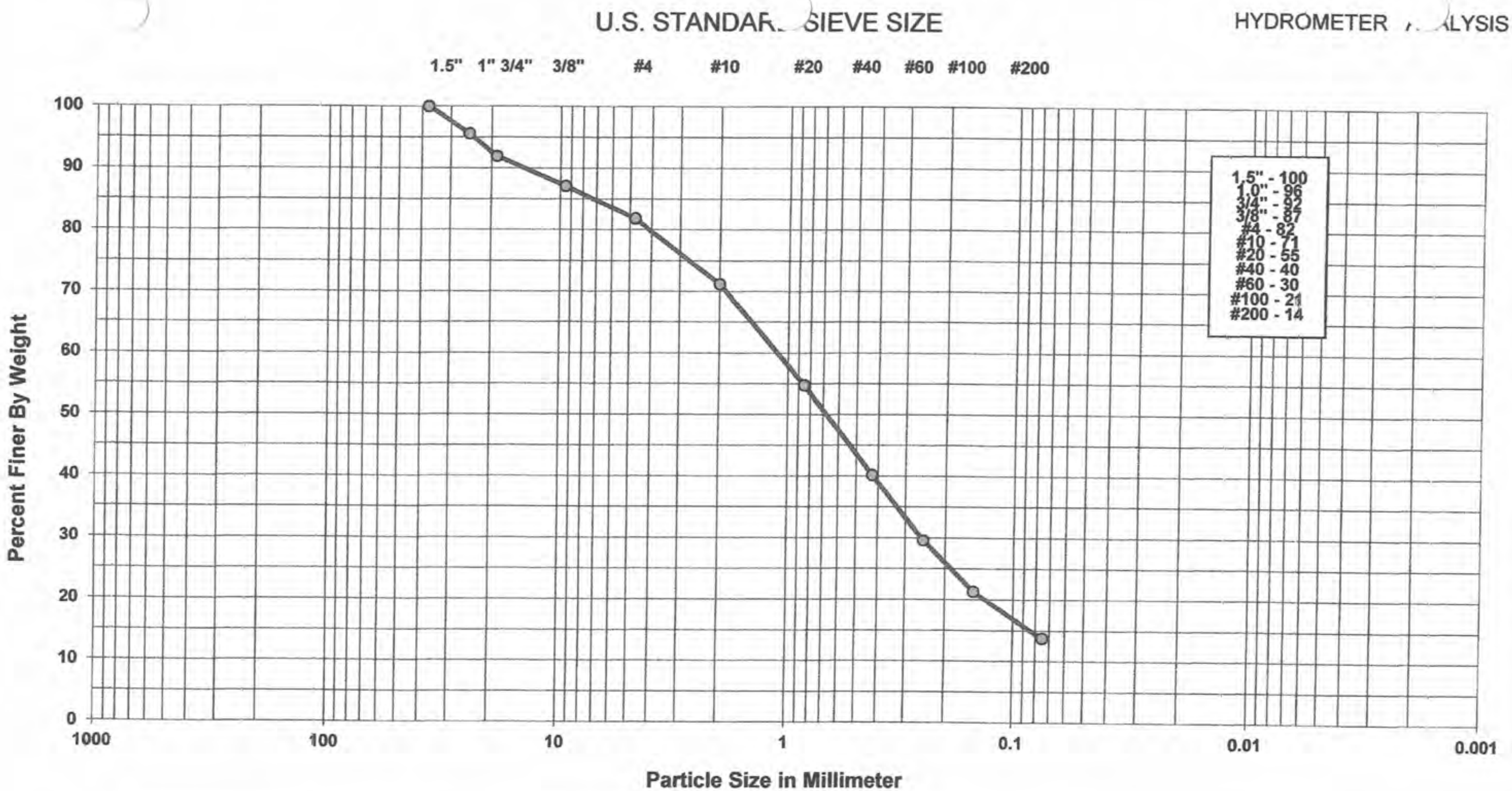
PLATE B-3	



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Location	Type	Depth, ft.			SE		Soil Classification
TP-1	BAG	4.0			31		Silty SAND (SM)

PARTICLE SIZE ANALYSIS

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APN 3066-191-04	
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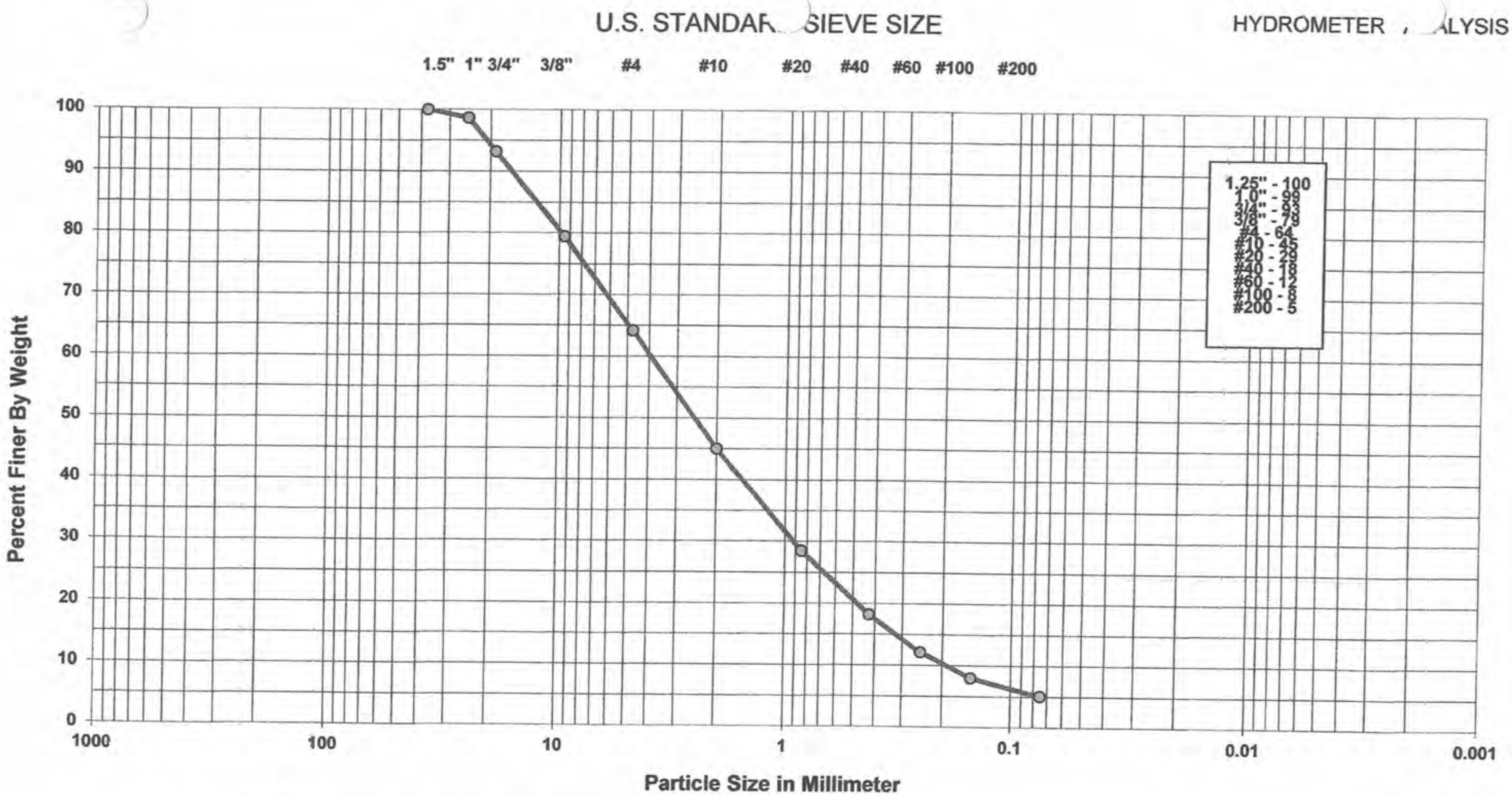
PLATE B-4	



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Location	Type	Depth, ft.			SE		Soil Classification
TP-1	BAG	6.0			43		Well graded SAND with silt (SW-SM)

PARTICLE SIZE ANALYSIS

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Pinon Hills	Project No.	1804420
APN 3066-191-04		
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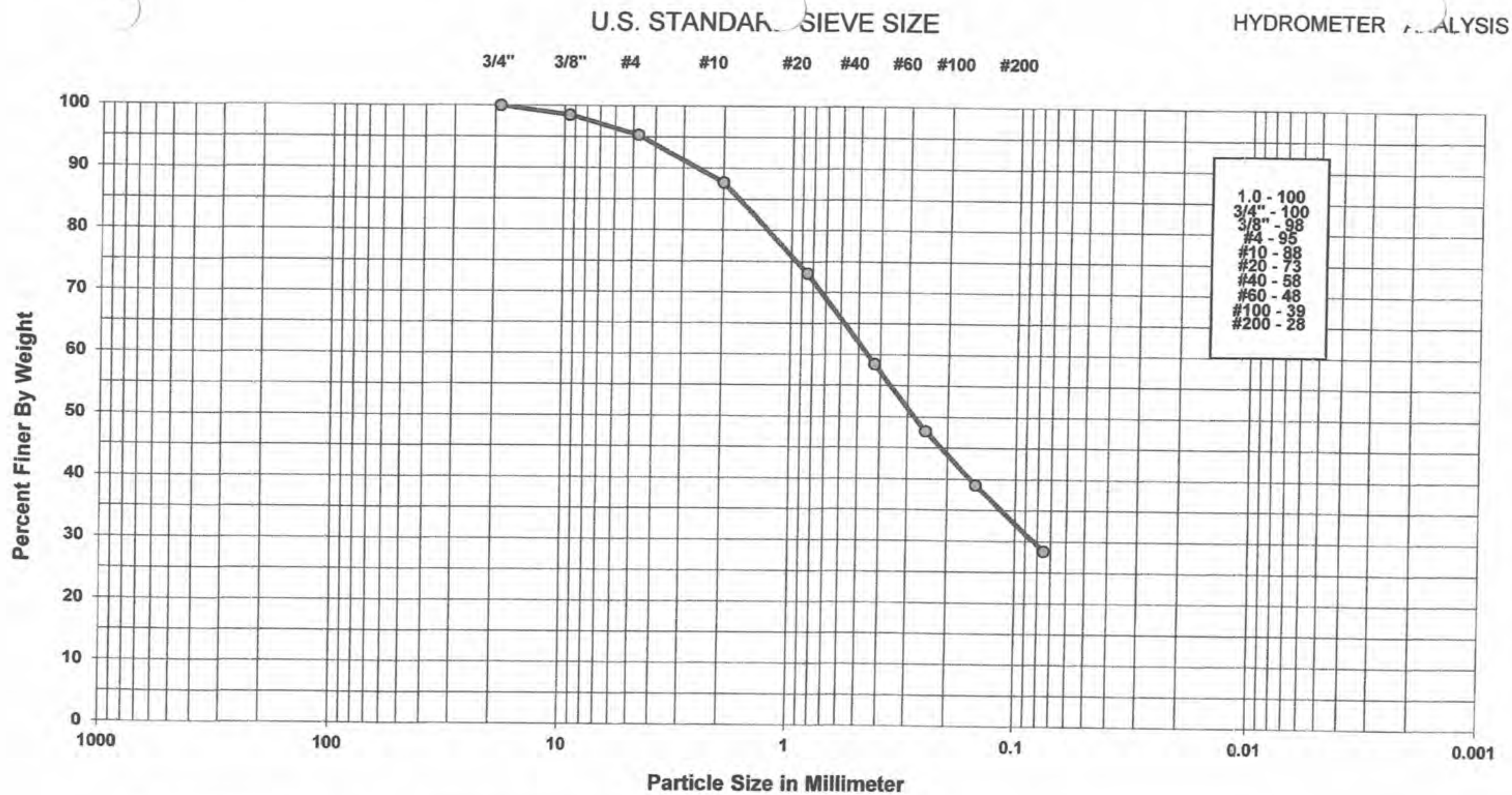
PLATE B-5		



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Location	Type	Depth, ft.			SE		Soil Classification
TP-1	BAG	8.0'			23		Silty SAND (SM)

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Pinon Hills	Project No.	1804420
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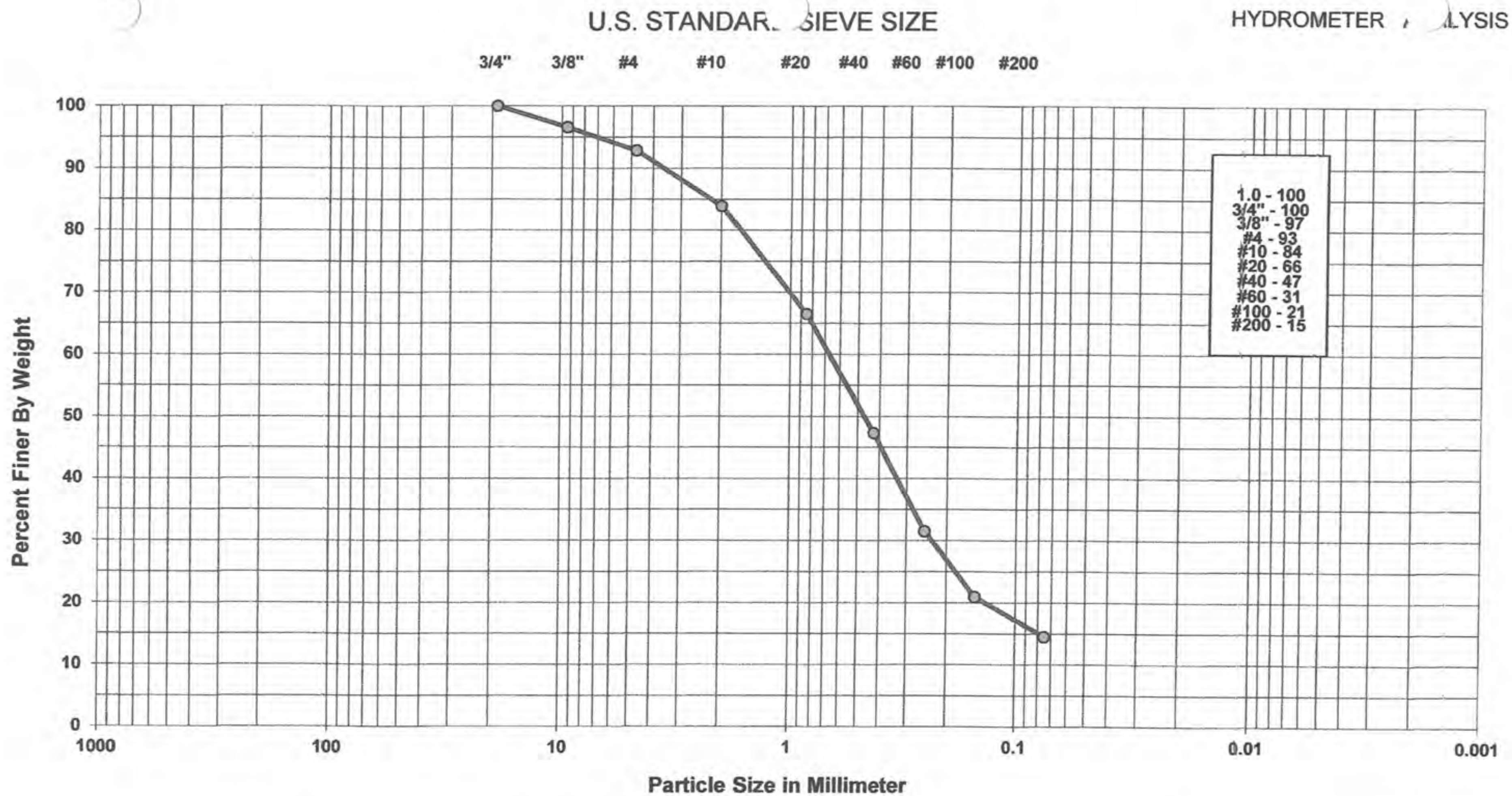
PLATE B-6		



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Location	Type	Depth, ft.	MDD, pcf	Opt H2O	SE		Soil Classification
TP-2	BAG	2.0'	132.00	7.50%	32		Silty SAND (SM)

PARTICLE SIZE ANALYSIS

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APN 3066-191-04	
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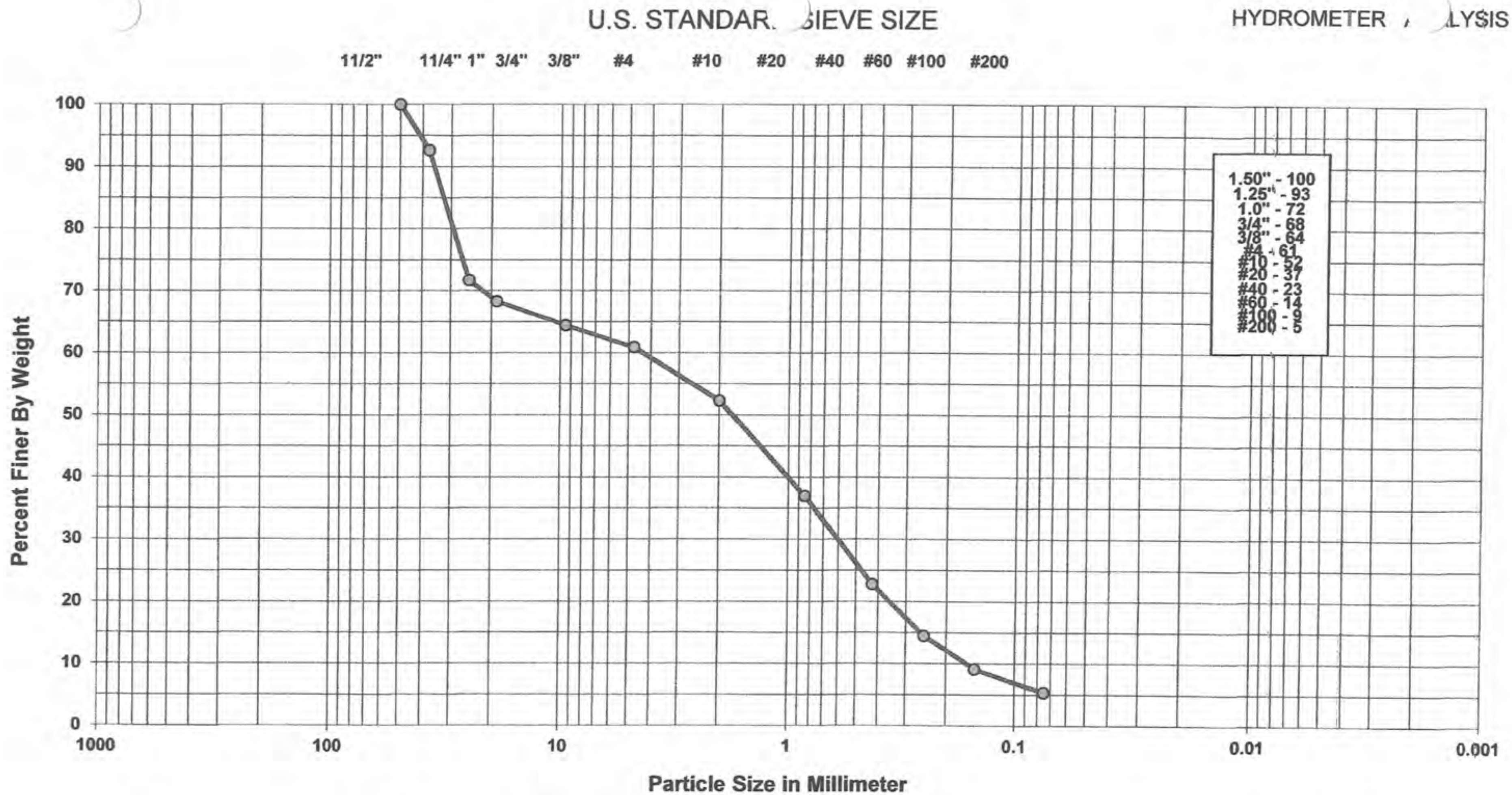
PLATE B-7	



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Location	Type	Depth, ft.			SE		Soil Classification
TP-2	BAG	3.5			43		Well graded SAND with silt (SW-SM)

PARTICLE SIZE ANALYSIS

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APN 3066-191-04		
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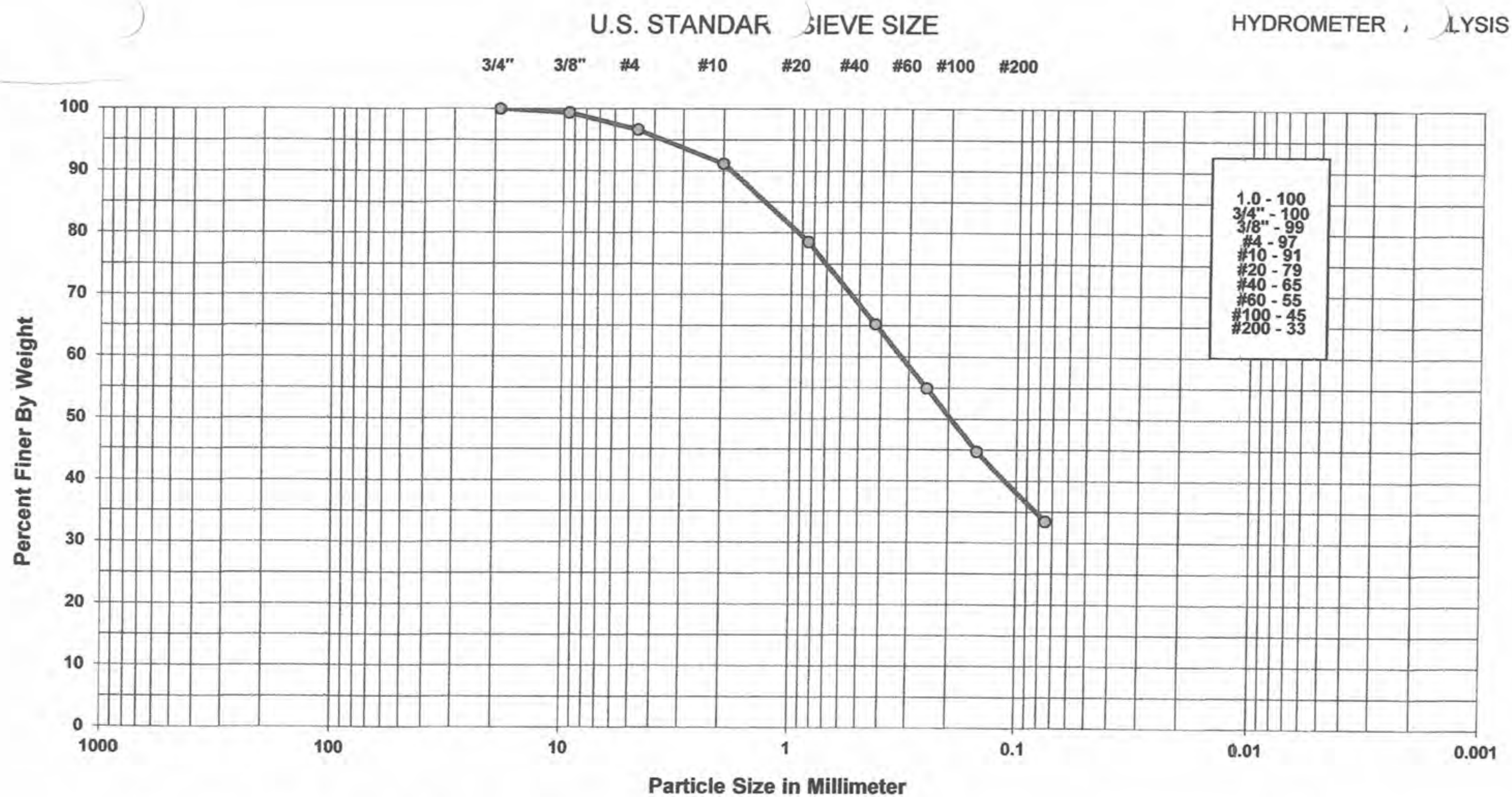
PLATE B-8		



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Location	Type	Depth, ft.			SE		Soil Classification
TP-4	BAG	10.0'			19		Silty SAND (SM)

PARTICLE SIZE ANALYSIS

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APN 3066-191-04	
GEORGE WANIS	
PLATE B-9	

APPENDIX-C

APPENDIX C

GUIDELINE TECHNICAL SPECIFICATIONS FOR EARTHWORKS

1.0 INTRODUCTION

The purpose of these guideline technical specifications is to supplement geotechnical report and the project requirements including the following pertinent code requirements. In case of conflict, recommendations provided in the report and interpretations of the engineer (civil engineer, geotechnical engineer or his/her representative) will govern. Additionally, the specifications are subject to modification if the site subsurface conditions change during the construction.

2.0 TERMS AND DEFINITIONS

2.1 **Earth Materials**: Natural soils encountered at the site or imported, free of organics, vegetation matter and deleterious materials.

2.2 **Suitable Materials**: Local excavated materials are suitable except organic materials, trash, debris, pit, highly-expansive clays. Suitable materials are generally classified as: Sand (SP, SW), silty, gravely or clayey sand (SM- SC), and silty and/or sandy clays (CL) with low plasticity. The classifications of soils are in accordance with United Soil Classification System, (USCS), ASTM D2487.

2.3 **Unsuitable Materials**: Organic soils, debris, trash, pit and highly expansive clays (fat clays) are not suitable. Expansive soils shall require special treatment to be used as foundation support.

2.4 **Unstable Materials**: Unstable materials are generally termed as collapsing and expansive soils. These soils require special treatment including removal and re-compaction, also the material cannot be properly compacted or will not support construction equipment due to high moisture content or very loose is considered to be unstable.

2.5 **Backfill**: Earth material meeting requirements of Section 2.2 "Suitable Materials".

2.6 **ASTM**: American Society for Testing and Materials, latest edition.

2.7 **I.B.C.**: International Building Code, latest edition.

2.8 **Maximum Dry Density (MDD):** is the laboratory maximum dry density determined in a soil sample in conformance with testing procedures of ASTM D1557 unless otherwise specified in the geotechnical report.

2.9 **Optimum Moisture Content (OMC):** is the moisture content corresponding maximum dry density as determined by test procedures conforming to ASTM D1557.

2.10 **Moisture Content (MC):** is the ratio of the weight of water to the weight of the dry solid material expressed as a percentage and determined by ASTM D2216, D3017 or the method approved by the engineer.

2.11 **Field Dry Density (FDD):** is the dry density of natural or compacted material as determined by ASTM D1556 - Sand Cone Method or ASTM D2922 - Nuclear Methods or ASTM D2937 - Drive-Cylinder Method.

2.12 **Relative Compaction**: is the ratio of the field dry density to the maximum dry density, expressed as a percentage.

3.0 GENERAL NOTES

3.1 The Owner shall retain the Soil Engineer for quality assurance and testing services.

3.2 The Contractor shall be responsible for quality control through out the prosecution of the work.

3.3 Contractor shall visit the project site and become familiar with the site conditions prior to the bidding.

3.4 Contractor shall verify the site and subsurface conditions at no cost to the owner. The preliminary soil engineering report does not constitute the actual subsurface conditions at the time of constructions or at the locations different from the excavated test pits/borings.

3.5 All excavations and foundations for the structures shall be inspected and approved by the soil engineer, prior to the preparations of sub-grade, and backfill.

3.6 All foundation soils underneath the retaining wall footings shall be scarified to a depth of at least one (1') foot, brought to uniform moisture content near optimum moisture content and re-compacted to a minimum relative compaction of 95% and as specified in the report.

4.0 FIELD OBSERVATIONS AND TESTING

Field observations and testing shall be performed by an experienced and qualified engineer (civil engineer, geotechnical engineer and their representatives). The engineer will observe and perform adequate amount of testing to meet the project and regulatory requirements. It will be the contractor's responsibility to assist the engineer, allow sufficient time and provide adequate notice to carry out the testing and schedule the personnel.

5.0 PREPARATION OF FILL AREAS

5.1 **Clearing, Over-excavation and Re-compaction**: All areas receiving fill and used as foundation support shall be cleared of topsoil, vegetation, trash, debris and other deleterious materials. After clearing and grubbing, the over excavating, as stated in the preliminary geotechnical report, the area should be scarified as recommended in the report or to a minimum depth of 12 inches.

The over-excavation should extend to a depth recommended in the report or until stable ground is reached. The material scarified will be uniformly moisture conditioned to near optimum moisture content and re-compacted to a relative compaction of 90 percent or greater. The placement of fill will commence upon completion of preparation and approved by the engineer.

5.2 **Benching**: Prior to the construction of fill slopes (embankments) and placement of fill on ground surface sloping steeper than 5 horizontal: 1 vertical, the ground shall be cut in benches. The lowest bench should be at least 12 feet wide to facilitate the fill placement in horizontal lifts. Under certain circumstances and if approved by the engineer, the width may be reduced to the size of the widest equipment (i.e., scraper, compactor or tractor) to be used. The lowest bench shall be at least two (2) feet deep. Other benches will be excavated to a firm material for a minimum width of four (4) feet.

6.0 EXCAVATION AND FILL MATERIAL

6.1 **Excavation**: All excavations should be carried out as per project documents. In general, all channel excavations can be accomplished by conventional heavy earth-moving equipment.

6.2 **Fill Materials**:

6.2.1 **Structural Fill**: The fill material shall be suitable material as defined in Section 2.2 and shall be approved by the engineer. Cobbles (rocks) six (6) inches or greater in size should not be used as structural fill. In general, the fill for structural fill shall be no-to-low in expansion potential meeting the following criteria:

a)	**Liquid Limit**	**<35**
b)	**Plasticity Index**	**<15**
c)	**Expansion Index Under 200 psf Surcharge Load**	**<20**

This material should extend to a minimum depth of five (5) feet below the foundation footing.

6.2.2 **Bedding Material Underneath Pipes and Culverts**: A one (1') foot thick class 2 aggregate base course shall be constructed underneath all culvert slabs and footing foundations for the retaining walls. The base course shall be placed over the prepared sub-grade and shall meet the requirements of "Class 2 Aggregate Base (3/4" max.)", Section 26 of Standard Specifications. The base course shall meet the placement and compaction requirements of sections 26-1.035, 26-1.04, and 26-1.05 of the Standard Specifications.

6.2.3 **Backfill Behind Retaining Structures**: All backfill material behind the retaining structures and box culverts shall be classified as sands (SP, SW) to silty Sand (SM), and meet the requirements of Section 2.2 "Suitable Materials" and shall be approved by the Civil Engineer. Excavated materials from the site meeting the requirements of Section 2.2 shall be used as backfill.

6.2.4 The pervious material (SP, SW) behind the retaining structures shall be hard, durable and free of any organics, vegetation, clay, and other deleterious materials. Contractor shall identify the source of material and furnish 30 days in advanced at least 50 pounds of material for testing and approval. The pervious granular material shall meet the following gradation criteria.

SIEVE SIZE	**PERCENT PASSING**
3/4 inch	100
3/8 inch	85-100
#4	60-80
#10	30-70
#40	0-30
#100	0-5

6.2.5 **Aggregate Base Course**: Aggregate base shall be Class 2 conforming to Section 26 "Standard Specifications:, California Department of Transportation, and shall be approved by the Engineer.

6.2.6 **Imported Material**: Import material to be used as structural fill shall meet the criteria as per Section 6.2.1.

7.0 FILL PLACEMENT

7.1 **General**: Suitable material to be used as fill shall be uniformly moisture conditioned either in stockpile or in-place. Prior to the placement, the area to receive fill shall be prepared as described in Section 4.0 and scarified to provide bond between existing compacted surface and new lift.

7.2 **Fill Placement**: Fill material shall be placed in uniform horizontal lifts not exceeding eight (8) inches, measured loose. The material shall be uniformly spread and should not contain any large rock particles, clods of clay lumps. Clods and clay lumps shall be broken down and thoroughly mixed. Large rock particles greater than six (6) inches shall be removed from the fill area. Fill material shall have uniform moisture content, near optimum as specified under Compaction Criteria, Section 7.4.

7.3 **Compaction**: Each loose lift shall be compacted using proper compaction equipment well suited to the type of material being compacted to produce uniform compaction. After the layer has been compacted, the compacted surface shall be scarified prior to the placement of another lift. Fill slopes should be compacted by back rolling. It may be necessary to overbuild the slopes and trimmed to achieve final finished slope.

7.4 **Compaction Criteria**: In general the compaction criteria given below should be followed. All compaction is relative to ASTM D1557 unless otherwise specifically stated.

Area	Relative Moisture Content Compaction at the time of (Relative Compaction to MDD) (Relative to OMC)
a) Structural fill	90% or greater-2 to +2% of OMC
b) Backfill around retaining walls	90% or greater-2 to +2% of OMC
c) Embankment Fill (levees)	90% or greater-2 to +2% of OMC
d) Trench backfill from 1' below the sub-grade to 4' below the sub-grade	90% or greater-2 to +2% of OMC
e) Trench backfill upper 1'	95% or greater-2 to +2% of OMC
f) Paved areas, both concrete & asphaltic aggregate base & upper 1' of sub-grade	95% or greater-2 to +2% of OMC
g) Sub-grade below concrete slabs at wet crossing, upper 1'	95% or greater-2 to +2% of OMC
h) General nonstructural backfill, (i.e., landscape area)	85% or greater-1 to +3% of OMC

7.5 **Quality Assurance and Testing**: As quality assurance, Engineer will observe over-excavation and placement of fill and conduct field density tests. Field density testing will be performed in conformance with ASTM D1556 - Sand Cone Method and ASTM D2922 - Nuclear Methods. Test location and frequency of testing will be at the discretion of the engineer. However, in general, field density tests will be performed at every two-foot ~~compacted lift and/or every 1,000 cubic yards of fill placed. Additional testing will be~~ performed at the discretion of the engineer. When test results and/or observations indicate, as determined by the engineer, that compaction is not as specified, the material shall be removed, replaced and re-compacted to meet the specifications. It is the contractor's responsibility that both moisture content and relative compaction are met in a consistent manner.

8.0 TRENCH EXCAVATION AND BACKFILLS

8.1 **General**: Excavations for utility trenches greater than five (5) feet deep may require shoring. All excavations should be carried out in accordance with applicable standard specifications, Cal-OSHA requirements and local government agency requirements. Backfill shall be observed and tested by the engineer.

8.2 **Bedding Material**: Bedding material shall conform to applicable requirements of standard specifications and local government agency requirements. In general, granular bedding comprising of coarse sand and gravel is ideally suitable as bedding material. Local sandy soils may be used if acceptable to the governing agency.

8.3 **Backfill Material**: Granular backfill one (1) foot above the pipe is ideally suitable. Local sandy soil may be used if acceptable to the governing agency. Remainder of the trench shall be backfilled with local suitable material.

8.4 **Placement, Moisture Conditioning and Compaction**: Backfill shall be uniformly moisture conditioned and compacted. Compaction criteria provided in Section 6.4 should be followed. Upper one (1) foot of backfill should be compacted to 95 percent relative compaction.

9.0 EXCAVATIONS

Excavations and over-excavations shall be performed in accordance with plans and recommendations contained in the preliminary geotechnical investigation report. All excavations will be observed by the engineer. If unsuitable soils are discovered, the engineer will determine the extent of over-excavation. No fill placement over cut area will commence prior to approval by the engineer. Prior to placement of fill, cut surface shall be scarified and uniformly moisture conditioned and re-compacted.

10.0 UNDER DRAINS

Under drains, if required, shall be constructed in accordance with plans and project requirements. Location of under drains will be surveyed to provide as-built location. Engineer may modify the location and requirement of the under drain depending upon the field condition.

APPENDIX-D

USGS Design Maps Summary Report

User–Specified Input

Report Title GEORGE WANIS
Sat May 12, 2018 18:47:05 UTC

Building Code Reference Document ASCE 7-10 Standard
(which utilizes USGS hazard data available in 2008)

Site Coordinates 34.4128°N, 117.58963°W

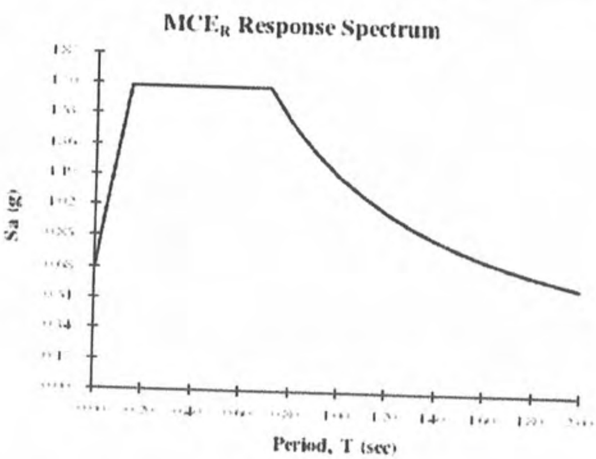
Site Soil Classification Site Class D – "Stiff Soil"

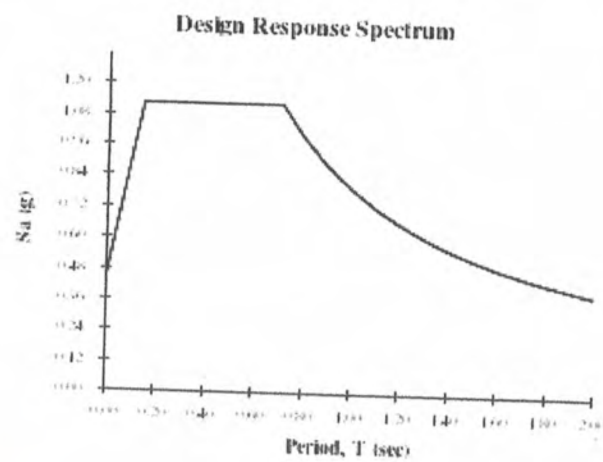
Risk Category I/II/III

USGS–Provided Output

S_S =	1.685 g	S_{MS} =	1.685 g	S_{DS} =	1.124 g
S_1 =	0.798 g	S_{M1} =	1.196 g	S_{D1} =	0.798 g

For information on how the SS and S1 values above have been calculated from probabilistic (risk-targeted) and deterministic ground motions in the direction of maximum horizontal response, please return to the application and select the "2009 NEHRP" building code reference document.





For PGA_M, T_L, C_{RS}, and C_{R1} values, please view the detailed report.

USGS Design Maps Detailed Report

ASCE 7-10 Standard (34.4128°N, 117.58963°W)

Site Class D – "Stiff Soil", Risk Category I/II/III

Section 11.4.1 — Mapped Acceleration Parameters

Note: Ground motion values provided below are for the direction of maximum horizontal spectral response acceleration. They have been converted from corresponding geometric mean ground motions computed by the USGS by applying factors of 1.1 (to obtain S_S) and 1.3 (to obtain S_1). Maps in the 2010 ASCE-7 Standard are provided for Site Class B. Adjustments for other Site Classes are made, as needed, in Section 11.4.3.

From Figure 22-1 [1] $S_S = 1.685$ g

From Figure 22-2 [2] $S_1 = 0.798$ g

Section 11.4.2 — Site Class

The authority having jurisdiction (not the USGS), site-specific geotechnical data, and/or the default has classified the site as Site Class D, based on the site soil properties in accordance with Chapter 20.

Table 20.3–1 Site Classification

Site Class	$\bar{v}_s$	$\bar{N}$ or $\bar{N}_{ch}$	$\bar{s}_u$
A. Hard Rock	>5,000 ft/s	N/A	N/A
B. Rock	2,500 to 5,000 ft/s	N/A	N/A
C. Very dense soil and soft rock	1,200 to 2,500 ft/s	>50	>2,000 psf
D. Stiff Soil	600 to 1,200 ft/s	15 to 50	1,000 to 2,000 psf
E. Soft clay soil	<600 ft/s	<15	<1,000 psf
	Any profile with more than 10 ft of soil having the characteristics: • Plasticity index $PI > 20$, • Moisture content $w \geq 40\%$, and • Undrained shear strength $\bar{s}_u < 500$ psf		
F. Soils requiring site response analysis in accordance with Section 21.1	See Section 20.3.1		

For SI: 1ft/s = 0.3048 m/s 1lb/ft² = 0.0479 kN/m²

Section 11.4.3 — Site Coefficients and Risk-Targeted Maximum Considered Earthquake (MCE_R) Spectral Response Acceleration Parameters

Table 11.4-1: Site Coefficient F_a

Site Class	Mapped MCE_R Spectral Response Acceleration Parameter at Short Period				
	$S_S \le 0.25$	$S_S = 0.50$	$S_S = 0.75$	$S_S = 1.00$	$S_S \ge 1.25$
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.2	1.2	1.1	1.0	1.0
D	1.6	1.4	1.2	1.1	1.0
E	2.5	1.7	1.2	0.9	0.9
F	See Section 11.4.7 of ASCE 7				

Note: Use straight-line interpolation for intermediate values of S_S

For Site Class = D and S_s = 1.685 g, F_a = 1.000

Table 11.4-2: Site Coefficient F_v

Site Class	Mapped MCE_R Spectral Response Acceleration Parameter at 1-s Period				
	$S_1 \le 0.10$	$S_1 = 0.20$	$S_1 = 0.30$	$S_1 = 0.40$	$S_1 \ge 0.50$
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.7	1.6	1.5	1.4	1.3
D	2.4	2.0	1.8	1.6	1.5
E	3.5	3.2	2.8	2.4	2.4
F	See Section 11.4.7 of ASCE 7				

Note: Use straight-line interpolation for intermediate values of S_1

For Site Class = D and S_1 = 0.798 g, F_v = 1.500

Equation (11.4-1): $S_{MS} = F_a S_S = 1.000 \times 1.685 = 1.685$ g

Equation (11.4-2): $S_{M1} = F_v S_1 = 1.500 \times 0.798 = 1.196$ g

Section 11.4.4 — Design Spectral Acceleration Parameters

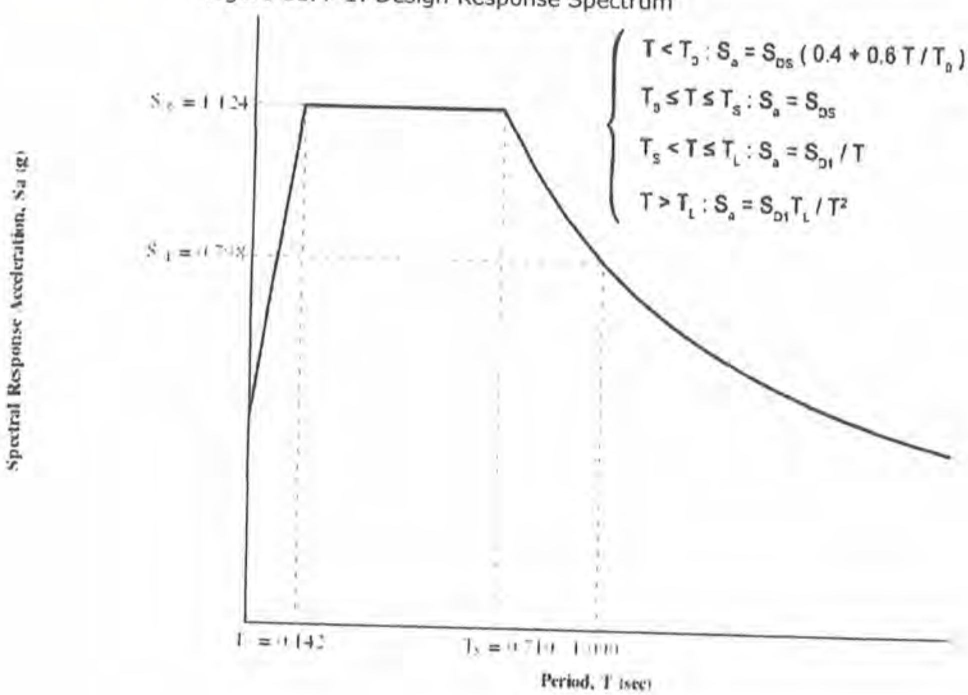
Equation (11.4-3): $S_{DS} = ⅔ \, S_{MS} = ⅔ \times 1.685 = 1.124$ g

Equation (11.4-4): $S_{D1} = ⅔ \, S_{M1} = ⅔ \times 1.196 = 0.798$ g

Section 11.4.5 — Design Response Spectrum

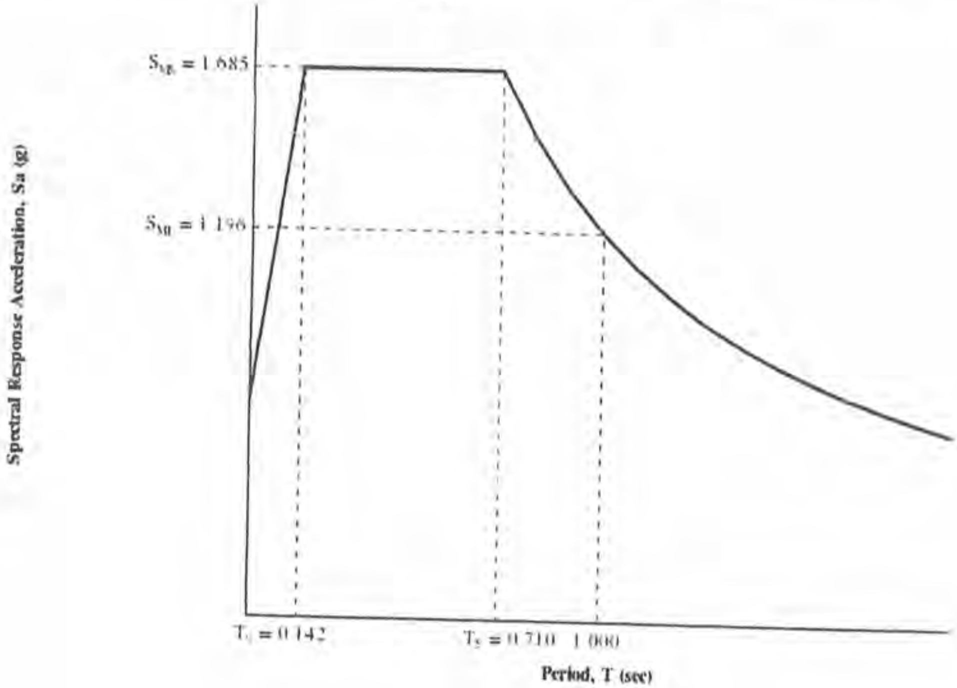
From Figure 22-12 [3] $T_L = 12$ seconds

Figure 11.4-1: Design Response Spectrum



Section 11.4.6 — Risk-Targeted Maximum Considered Earthquake (MCE_R) Response Spectrum

The MCE_R Response Spectrum is determined by multiplying the design response spectrum above by 1.5.



Section 11.8.3 — Additional Geotechnical Investigation Report Requirements for Seismic Design Categories D through F

From Figure 22-7 [4]

$PGA = 0.674$

Equation (11.8–1):

$PGA_M = F_{PGA}PGA = 1.000 \times 0.674 = 0.674$ g

Table 11.8-1: Site Coefficient F_{PGA}

Site Class	Mapped MCE Geometric Mean Peak Ground Acceleration, PGA				
	PGA ≤ 0.10	PGA = 0.20	PGA = 0.30	PGA = 0.40	PGA ≥ 0.50
A	0.8	0.8	0.8	0.8	0.8
B	1.0	1.0	1.0	1.0	1.0
C	1.2	1.2	1.1	1.0	1.0
D	1.6	1.4	1.2	1.1	1.0
E	2.5	1.7	1.2	0.9	0.9
F	See Section 11.4.7 of ASCE 7				

Note: Use straight-line interpolation for intermediate values of PGA

For Site Class = D and PGA = 0.674 g, F_{PGA} = 1.000

Section 21.2.1.1 — Method 1 (from Chapter 21 – Site-Specific Ground Motion Procedures for Seismic Design)

From Figure 22-17 [5]

$C_{RS} = 1.024$

From Figure 22-18 [6]

$C_{R1} = 0.974$

Section 11.6 — Seismic Design Category

Table 11.6-1 Seismic Design Category Based on Short Period Response Acceleration Parameter

VALUE OF S_{DS}	RISK CATEGORY		
	I or II	III	IV
$S_{DS} < 0.167g$	A	A	A
$0.167g \le S_{DS} < 0.33g$	B	B	C
$0.33g \le S_{DS} < 0.50g$	C	C	D
$0.50g \le S_{DS}$	D	D	D

For Risk Category = I and S_{DS} = 1.124 g, Seismic Design Category = D

Table 11.6-2 Seismic Design Category Based on 1-S Period Response Acceleration Parameter

VALUE OF S_{D1}	RISK CATEGORY		
	I or II	III	IV
$S_{D1} < 0.067g$	A	A	A
$0.067g \le S_{D1} < 0.133g$	B	B	C
$0.133g \le S_{D1} < 0.20g$	C	C	D
$0.20g \le S_{D1}$	D	D	D

For Risk Category = I and S_{D1} = 0.798 g, Seismic Design Category = D

Note: When S_1 is greater than or equal to 0.75g, the Seismic Design Category is **E** for buildings in Risk Categories I, II, and III, and **F** for those in Risk Category IV, irrespective of the above.

Seismic Design Category ≡ "the more severe design category in accordance with Table 11.6-1 or 11.6-2" = E

Note: See Section 11.6 for alternative approaches to calculating Seismic Design Category.

References

1. *Figure 22-1*: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-1.pdf
2. *Figure 22-2*: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-2.pdf
3. *Figure 22-12*: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-12.pdf
4. *Figure 22-7*: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-7.pdf
5. *Figure 22-17*: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-17.pdf
6. *Figure 22-18*: https://earthquake.usgs.gov/hazards/designmaps/downloads/pdfs/2010_ASCE-7_Figure_22-18.pdf

APPENDIX-E

ALR ENGINEERING & TESTING

Civil & Geotechnical Engineering w/ Material Testing
18361 Symeron Road, Apple Valley, Ca. 92307
760-810-2031 Cell # - 760-242-3130 Office #
(alrengineeringtesting@gmail.com)

June 6, 2018

STRUCTURAL SECTION DESIGN

APN 3066-191-04

PROPOSED COMMERCIAL DEVELOPMENT

Located on the Northwest corner of Highway 138 and Beekley Road on a 3.01 acre parcel, in the Pinon Hills area of San Bernardino County, California

Prepared for

GEORGE WANIS

9128 Green Road
Pinon Hills, CA. 92397

Project No. 1804420

ALR ENGINEERING & TESTING

Civil & Geotechnical Engineering w/ Material Testing
18361 Symeron Road, Apple Valley, Ca. 92307
760-810-2031 Cell # - 760-242-3130 Office #
(alrengineeringtesting@gmail.com)

June 6, 2018

Project No. 1804420

GEORGE WANIS
9128 Green Road
Pinon Hills, CA. 92397

Subject: Pavement Structure Recommendations for **Ca. Hwy 138**, for the proposed Commercial Development for the **3.01-acre** parcel located on the Northwest corner of Hwy 138 & Beekley Road in the Pinon Hills area of the County of San Bernardino, California

SUBGRADE PREPARATION:

The sub-grade of the roadway shoulders should be cleared of all weeds and deleterious materials prior to sub-grade preparation. We recommend that the upper twelve **(12)** inches of the sub-grade material should be scarified, uniformly moisture conditioned to near Optimum Moisture Content (OMC) (-2 to +2% points from OMC) and re-compacted to a minimum relative compaction of **95%,** relative to **ASTM D 1557** before the Class II Base material is placed.

DESIGN RECOMMENDATIONS:

- Based on the test results and soil classifications following recommendations are made for the structural section design for a Highway and a Collector roadway.

  Ca. Highway 138: **T.I. = 13.0:** 8.5" of Asphalt Concrete over 12.7" of Class II Base

- **PG 64-16** asphalt and aggregates for asphalt concrete materials should conform to all state, and local requirements, and shall meet the requirements of all applicable subsections of **Section 26** and **39** of the **Standard Specifications** for **Caltrans**.
- Asphalt concrete shall meet the **Section 39** of Caltrans and the County of San Bernardino Project Specifications. The asphalt concrete shall be compacted to a minimum of **95%** relative compaction, relative to maximum designed density.

Our design recommendations are based on our visual observations, laboratory testing of samples tested, and Caltrans design procedure.

ALR ENGINEERING & TESTING

REGISTERED PROFESSIONAL ENGINEER
STEPHAN M. LONGORIA
No. 74782
CIVIL
STATE OF CALIFORNIA

John Longoria, EIT, NICET III, QSP, CESSWI, ICC
Senior Associate Engineer

Stephan M. Longoria, PE, QSD/P 74782
Registered Civil Engineer

PAVEMENT THICKNESS DESIGN

Project Name: **GEORGE WANIS**

Project Number: 1804420

Street Name/s: *Ca. Hwy 138*

Classification of Subgrade Soils: Poorly graded SAND with silts (SP-SM)

Traffic Index, T.I.: 13.0		**R-Value:**	Design: 50	Actual: 78	H13
Total Gravel Equivalent, G.E.	[.0032*(100-R)T.I.]		2.08		H15
G.E. For AC Layer	[.0032*(100-R)T.I.]+0.2(FS)	Base R=78	1.1152		H17
Gravel Factor for AC, Gf	[5.67/sqrtT.I.]	sqrt T.I. = ***3.6056***	1.57		H19
CALCULATED Thickness of AC	[G.E./Gf, Ft]=H17/H19		0.71	**Ft**	H21
Thickness of AC layer, INCHES			8.51	**In.**	H23
USE 8.5" THICK AC=8.5"/12.0"			0.710	**Ft.**	H25
Use 8.5 inches thick AC, GE=H25*H19			1.117		H27
AB THICKNESS REQUIRED = H15+0.2-H27+((H21-H25)/H19			1.163		H29
Base Course Thickness = H29/1.1*12			12.7	**Inches**	H31
			1.057	**feet**	

Design: ***8.5 inches of Asphalt Concrete over 12.7 inches of Class II Base***

Notes:
Computations are based on the Caltran's design procedure
ALR Engineering must observe preparation of subgrade and perform field density testing.
Subgrade materials should be compacted to 95% of relative density, relative to Maximum Density as obtained by laboratory test method ASTM 1557 to a depth of at least one (1) foot below the finished subgrade.
Clay soil should be removed and replaced with sandy soil, if encountered.
ALR Engineering must observe preparation of class II base and perform field density testing.

ALR ENGINEERING & TESTING **Civil & Geotechnical Engineering** 18361 Symeron Road Apple Valley, Calif. 92307 (760) 810-2031 Cell # - (760) 242-3130 Office #	**PINON HILLS** **CA. HWY 138** **Pavement Thickness Design**	**FIGURE** **B-1**

TABLE 1 Soil Classification Chart

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests[A]				Soil Classification	
				Group Symbol	Group Name[B]
Coarse-Grained Soils More than 50 % retained on No. 200 sieve	Gravels More than 50 % of coarse fraction retained on No. 4 sieve	Clean Gravels Less than 5 % fines[C]	$Cu \geq 4$ and $1 \leq Cc \leq 3$[E]	GW	Well-graded gravel[F]
			$Cu < 4$ and/or $1 > Cc > 3$[E]	GP	Poorly graded gravel[F]
		Gravels with Fines More than 12 % fines[C]	Fines classify as ML or MH	GM	Silty gravel[F,G,H]
			Fines classify as CL or CH	GC	Clayey gravel[F,G,H]
	Sands 50 % or more of coarse fraction passes No. 4 sieve	Clean Sands Less than 5 % fines[D]	$Cu \geq 6$ and $1 \leq Cc \leq 3$[E]	SW	Well-graded sand[I]
			$Cu < 6$ and/or $1 > Cc > 3$[E]	SP	Poorly graded sand[I]
		Sands with Fines More than 12 % fines[D]	Fines classify as ML or MH	SM	Silty sand[G,H,I]
			Fines classify as CL or CH	SC	Clayey sand[G,H,I]
Fine-Grained Soils 50 % or more passes the No. 200 sieve	Silts and Clays Liquid limit less than 50	inorganic	PI > 7 and plots on or above "A" line[J]	CL	Lean clay[K,L,M]
			PI < 4 or plots below "A" line[J]	ML	Silt[K,L,M]
		organic	$\frac{\text{Liquid limit – oven dried}}{\text{Liquid limit – not dried}} < 0.75$	OL	Organic clay[K,L,M,N] Organic silt[K,L,M,O]
	Silts and Clays Liquid limit 50 or more	inorganic	PI plots on or above "A" line	CH	Fat clay[K,L,M]
			PI plots below "A" line	MH	Elastic silt[K,L,M]
		organic	$\frac{\text{Liquid limit – oven dried}}{\text{Liquid limit – not dried}} < 0.75$	OH	Organic clay[K,L,M,P] Organic silt[K,L,M,Q]
Highly organic soils		Primarily organic matter, dark in color, and organic odor		PT	Peat

[A] Based on the material passing the 3-in. (75-mm) sieve.

[B] If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

[C] Gravels with 5 to 12 % fines require dual symbols:
GW-GM well-graded gravel with silt
GW-GC well-graded gravel with clay
GP-GM poorly graded gravel with silt
GP-GC poorly graded gravel with clay

[D] Sands with 5 to 12 % fines require dual symbols:
SW-SM well-graded sand with silt
SW-SC well-graded sand with clay
SP-SM poorly graded sand with silt
SP-SC poorly graded sand with clay

[E] $Cu = D_{60}/D_{10}$ $\quad Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$

[F] If soil contains ≥ 15 % sand, add "with sand" to group name.

[G] If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

[H] If fines are organic, add "with organic fines" to group name.

[I] If soil contains ≥ 15 % gravel, add "with gravel" to group name.

[J] If Atterberg limits plot in hatched area, soil is a CL-ML, silty clay.

[K] If soil contains 15 to 29 % plus No. 200, add "with sand" or "with gravel," whichever is predominant.

[L] If soil contains ≥ 30 % plus No. 200, predominantly sand, add "sandy" to group name.

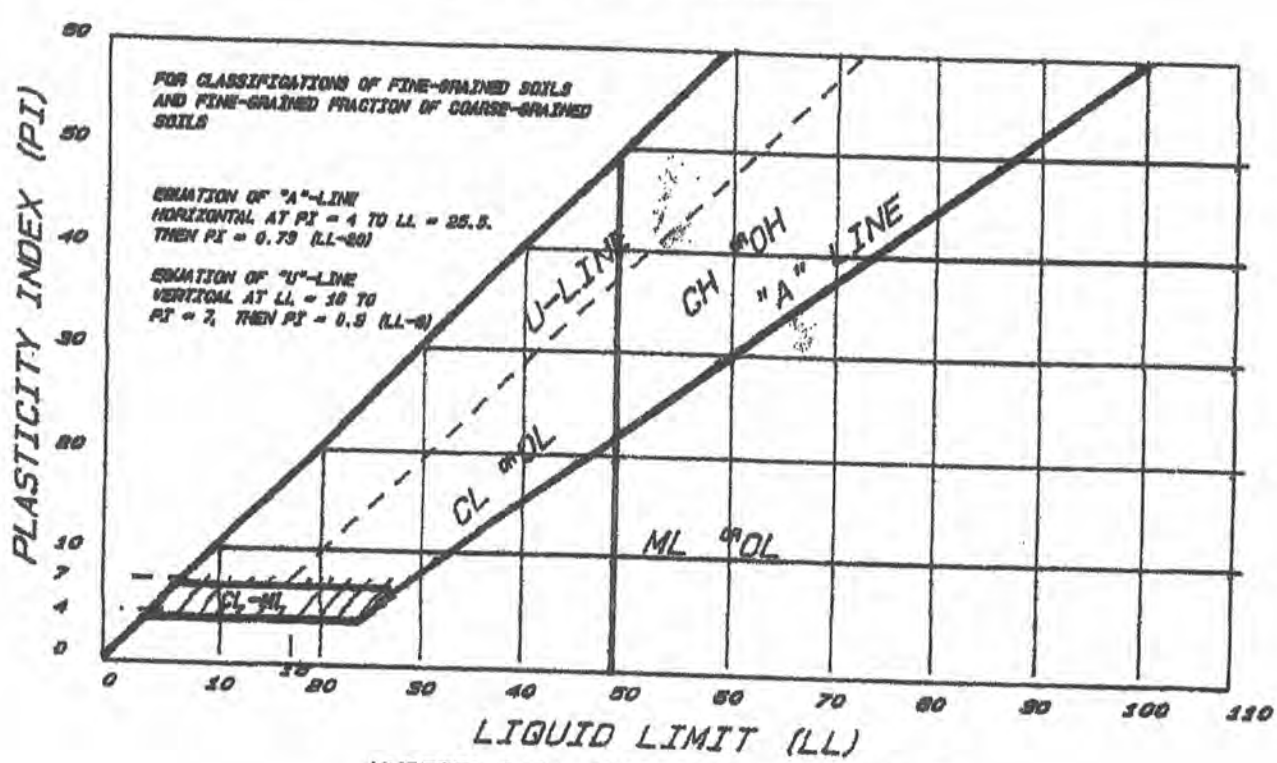
[M] If soil contains ≥ 30 % plus No. 200, predominantly gravel, add "gravelly" to group name.

[N] PI ≥ 4 and plots on or above "A" line.

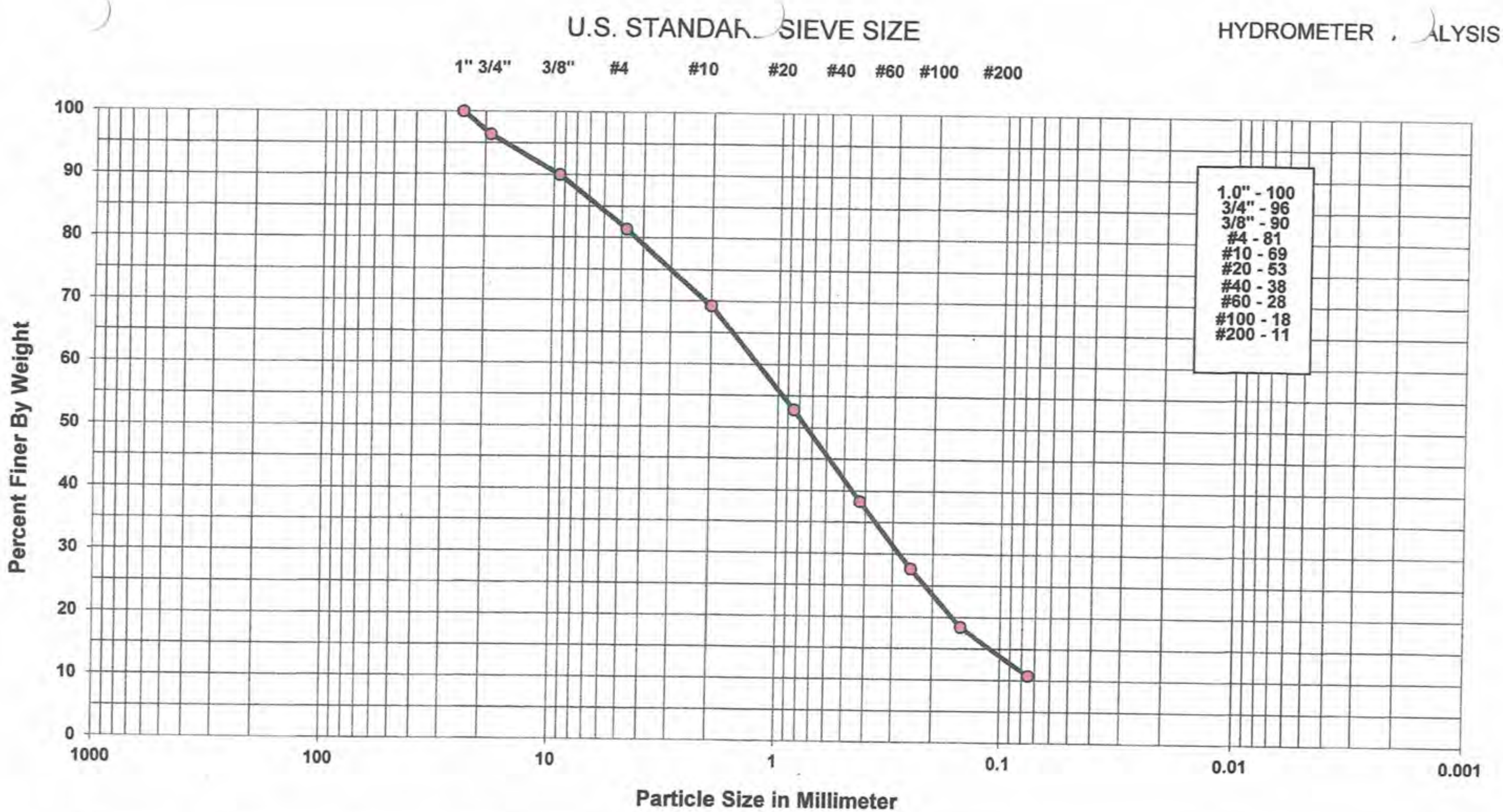
[O] PI < 4 or plots below "A" line.

[P] PI plots on or above "A" line.

[Q] PI plots below "A" line.



UNIFIED SOIL CLASSIFICATION SYSTEM
ASTM D2487



COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

Location	Depth, ft.			SE		Soil Classification
HWY 138	12" - 18"			53		Poorly graded SAND with silts (SP-SM)

PARTICLE SIZE ANALYSIS

ALR ENGINEERING & TESTING
Civil & Geotechnical Engineering w/ Material Testing
18361 Symeron Road, Apple Valley, Ca. 92307
(760) 810-2031 Cell # - (760) 242-3130 Office

Pinon Hills	Project No. 1804420
APN 3066-191-04	
Highway 138 & Beekley Road	
PLATE B-1	

R-Value and Expansion Pressure of Compacted Soils

ASTM D2844

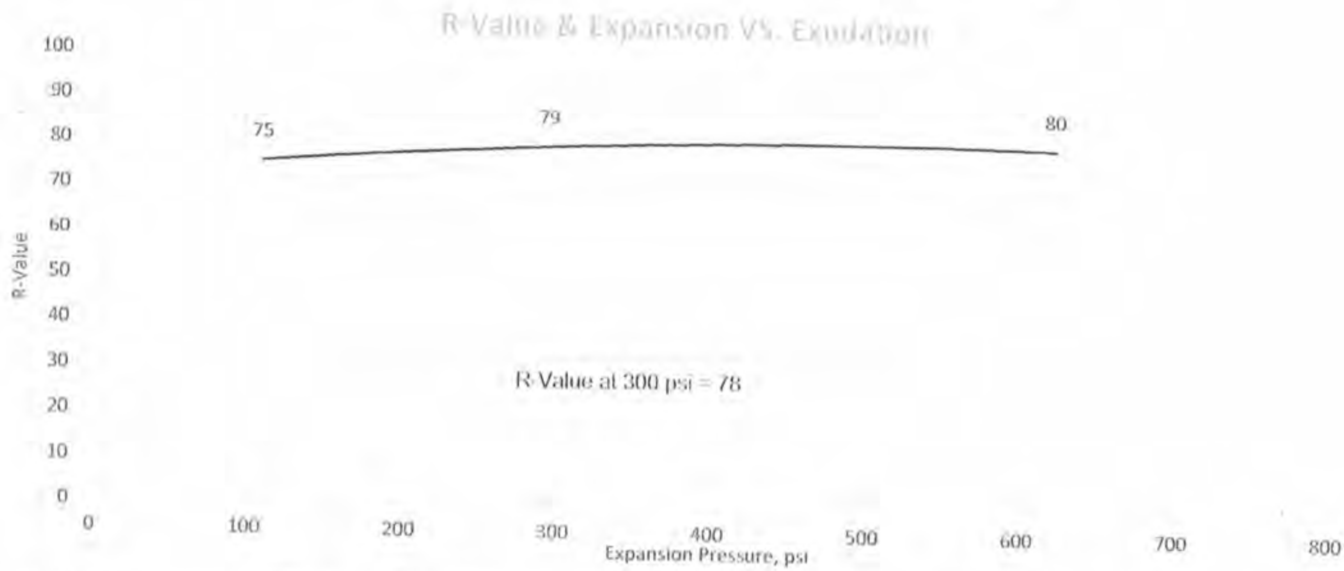
Report Date:	06/05/18
Sheet:	1 *of* 1
Attachment:	SS04
Permit No.:	
Client Project No.:	
Other:	
DSA File No.:	
DSA Application No.:	
DSA LEA No.:	

Project Number: 3460.002.700
Project Title: Laboratory Materials Testing
Project Location: Apple Valley, CA
Client: ALR Engineering and Testing

Sample ID: CLT05291804 ☐ **General Compliance** ☐ **Non-Compliance** ☒ **Not Specified**

Desription: (SP-SM)
Sample Origin: 12" - 16" Hwy 138, Pinon Hills
Tested By: James Albornoz

Briguette Number:	1	2	3
Moisture Content (%):	8.5	9.0	9.9
Dry Density (pcf):	119.2	126.9	121.2
Exudation Pressure (psi):	623	295	110
Expansion Pressure (psf):	0	0	0
R-Value:	80	79	75



The Material	☐ Was	☐ Was Not	Sampled & tested in accordance with the reqs. of the DSA approved documents.
The Material Tested	☐ Met	☐ Did Not Meet	The requirements of the DSA approved documents.

cc: Project Architect, Structural Engineer, Project Inspector, DSA Regional Office, School District

Reviewed By (Signature)

Clayton Garrison / Laboratory Manager
Name / Title

Merrell Johnson Companies

concept to completion
ENGINEERING | SURVEYING | TESTING | INSPECTION

t760.256.2068 f760.256.0419 w/www.merrelljohnson.com

APPENDIX-F

LIMITED SURFACE FAULT RUPTURE EVALUATION/GEOLOGY REPORT FOR THE PROPERTY LOCATED AT THE INTERSECTION OF BEEKLEY ROAD AND CALIFORNIA STATE ROUTE 138, PINON HILLS, CALIFORNIA (APN 3066-191-04-0000)

Prepared by:

MADDOX & ASSOCIATES, INC.
P.O. Box 2944
FLORENCE, AZ 85132

Prepared for;

ALR Engineering & Testing
18361 Symeron Road
Apple Valley, California 92307

June 10, 2018

REPORT SUBMITTAL

All work carried out during the planning of this project, the field investigation, the interpretation of data collected, and the preparation of this report was done according to the accepted standards of the profession. To the best of my knowledge, all of the data presented in this report are accurate. The stated conclusions are based upon a limited amount of data—additional data, if available, may result in modification of some of the conclusions presented herein.

Maddox & Associates, Inc.

Steve Maddox, PG 4814, CHG 298

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June 10, 2018

LIMITED SURFACE FAULT RUPTURE EVALUATION/GEOLOGY REPORT FOR THE PROPERTY LOCATED AT THE INTERSECTION OF BEEKLEY ROAD AND CALIFORNIA STATE ROUTE 138, PINON HILLS, CALIFORNIA (APN 3066-191-04-0000)

1.0 EXECUTIVE SUMMARY

The potential for surface fault rupture at the property located at the intersection (northwest corner) of Beekley Road and California State Highway 138 (APN 3066-191-04-0000), Pinon Hills, California was evaluated using the concepts contained in Appendix C of California Geological Survey Special Publication Number 42 (Interim Revision 2007), with modifications, California Geological Survey Special Publication 42 (2018 Revision) and California Geological Survey Note 49. This surface fault rupture evaluation/geologic report was conducted in response to the requirements contained a letter issued by the San Bernardino County Land Use Services Department dated April 17, 2018 . A limited surface fault rupture investigation was conducted per Appendix C (with modifications) of the California Geological Survey Special Publication 42 (Interim Revision 2007) . It was determined that due to the considerable expense involved, intrusive methods such as trenching, backhoe pits, borings, etc. would not be utilized. The methods utilized were on-site surface mapping, review of pertinent publications, review of any nearby fault trenching projects, discussions with relevant professional Geologists (private and Agencies),

Following is a summary of the determination for the potential for surface fault rupture at the subject site.

The potential for surface fault rupture at the site is considered to be extremely low, to non-existent for the following reasons:

- No Agency or individual have determined that active faulting is present within or anywhere near the site;
- The nearest known active fault, the San Andreas Fault Zone, is located approximately 9 miles to the southwest of the site;
- Review of aerial photographs of the site and surrounding areas did not reveal any evidence of any lineaments/ faulting;
- Physical inspection of the site and adjacent areas revealed no faulting, scarps, or shearing of the geologic materials.

It should be noted that definite proof of the lack of faulting within the site cannot be obtained without further investigative techniques such as trenching, backhoe pits, geophysics, age dating, etc., such as listed in Appendix C

of Special Publication 42 (Interim Revision 2007). These techniques would add significant additional expense and are beyond the scope of this investigation. All data collected to-date indicate that none of these additional investigative methods are warranted.

2.0 INTRODUCTION

The subject site is located at the northwest corner of the intersection of Beekley Road and California State Route 138, Pinon Hills, California (**Figure 1**); the APN is 3066-191-04-0000.

The County of San Bernardino Land Use Services Department typically requires the following criteria be met when conducting a surface fault rupture evaluation for a site:

1) Provide an appropriate analysis to determine if surface displacement due to active faulting associated with the EFZ may occur-the methods specified in Appendix C of Special Publication 42 (California Geological Survey) should be used as a guideline.

2) Report the specific distance from the site to the mapped trace of the fault within the EFZ. In this instance the mapped trace of the San Andreas Fault is the closest mapped subject fault.

3) Provide data on the depth to groundwater beneath the site, if available-also to address the potential for springs or seeps at the site and to provide appropriate recommendations, if any.

4) The report shall include a fault lineament map delineating the lineaments discussed in the report and observed by the project geologist. The lineaments shall be either plotted on the aerial photographs, the SP map, or a separate map.

5) The evaluation of the potential for fault rupture at the site shall include a review and evaluation of any previous fault trenching in the site vicinity, published or unpublished, relative to this project.

6) The project geologist should recommend that a California State Professional Geologist be present during excavation of the footing and utility trenches to determine whether a fault is present.

All figures referenced in this document are contained in **Appendix A.**(Figure index in **Appendix B**) Aerial photos are contained in **Appendix C.**

By preparation of this report, Maddox & Associates does not assume the position of Geotechnical Engineer of Record for the proposed site work. Maddox & Associates was engaged solely to evaluate the potential for surface fault rupture at the subject site.

3.0 CALIFORNIA GEOLOGICAL SURVEY GUIDELINES FOR SURFACE FAULT RUPTURE EVALUATION

3.1 SPECIAL PUBLICTION 42

The primary guidelines to assist Geologists who investigate faults relative to the hazard of surface fault rupture are contained in Special Publication 42, "Fault Rupture Hazard Zones in California", by the California Geological Survey (Interim Revision 2007). Special Publication 42 (SP-42) details the requirements of the Alquist-Priolo Earthquake

Zoning Act, which was signed into law December 22, 1972-it was renamed the Alquist-Priolo Special Studies Zones Act effective May 4, 1975. Appendix C of SP-42, titled "Guidelines for Evaluating the Hazard of Surface Rupture", specifically delineates the procedures to be followed when investigating a site for the potential of surface fault rupture.

Prior to undertaking previous projects such as this, Maddox & Associates, Inc. (M&A) contacted Mr. Steve Kupferman, the San Bernardino County Geologist, to discuss the requirements to conduct this type of evaluation of the potential for surface fault rupture in the general area of the site. Mr. Kupferman stated that these investigations should be conducted per Special Publication 42 (SP-42) of the California Geologic Survey (CGS), and that trenching, and geophysical and other methods outlined in SP-42 might be required at the site.

Due to the location of the property, M&A determined that the initial site evaluation should not include invasive and expensive intrusive methods such as trenching and backhoe pits. Likewise, many of the other investigative methods listed in Appendix C were not considered advisable/practical to undertake initially. They are:

- Intrusive methods such as borings, cone penetrometer, both of which provide small windows into the subsurface;
- Geophysical investigations, which are difficult to use properly in the geologic materials present;
- Age-dating techniques, which are not suitable for this site;
- Various other methods such as aerial reconnaissance over flights, geodetic and strain measurements, and microseismicity monitoring-all of which are not suitable/practical for this site and budget.

Consequently, M&A determined that the most practical initial investigation would include these additional and primary methods of investigation included in Appendix C:

- Review of published and unpublished literature, maps, and records concerning geologic units, faults, groundwater -barriers, and other factors;
- Surface observations including mapping of geologic and soil units, geologic structures, geomorphic features, and surfaces, springs, deformation of engineered structures due to fault creep, both on and off the site.

The methods of investigation utilized are described in detail in Section 4.0 of this report.

It should be noted that the possibility of surface fault rupture at a site presupposes the existence of an active or potentially active fault beneath the site. SP-42 defines an active fault as one which has had surface displacement within Holocene time (about the last 11,700 years), and a potentially active fault as one which shows evidence of surface displacement during Quaternary time (the last 1.6 million years).

3.2 CALIFORNIA GEOLOGICAL SURVEY NOTE 49

In addition to SP-42, California Geological Survey (CGS) Note 49 (revised 5/2002) was reviewed. CGS Note 49 addresses the evaluation of a given site with regard to the potential hazard of surface fault rupture and states that the potential hazard of surface fault rupture is based extensively on the concepts of recency and recurrence of faulting along existing faults. It states that:

- The more recent the faulting, the greater the probability for future faulting;

- Future faulting generally is expected to recur along pre-existing faults;
- The development of a new fault or reactivation of a long-inactive fault is relatively uncommon and generally need not be a concern in site development.
- As a practical matter, fault investigation should be directed at the problem of locating existing faults and then attempting to evaluate the recency of their activity. Recency and recurrence of faulting along existing faults were the concepts used to evaluate the potential for surface fault rupture at the subject site.

4.0 METHODS OF INVESTIGATION

The methods of investigation followed are those outlined in SP-42, with the modifications noted. The following investigative methods were undertaken.

4.1 PHYSIOGRAPHY/GEOLOGY OF THE SITE AREA

The site was initially visited April 24, 2018. The subject site, parcel 04, is shown on **Figure 2.** Parcel 04 (3 acres) is located at the northwest corner of the intersection of California State Route 138 (Pearblossom Highway) and Beekley Road, in the Pinon Hills area of San Bernardino County, California.

The site elevation is approximately 4,390 feet above mean sea level (amsl) at the intersection of Beekley Road with California State Route 138. The surface of the property is generally planar and slopes regularly to the north, from the intersection, a vertical distance of approximately 60 feet over a horizontal distance of approximately 770 feet. The property is located on an alluvial fan (Sheep Creek Fan) that originates in Sheep Creek Canyon, in the Wrightwood area of the San Gabriel Mountains, approximately 9-10 miles to the north.

The surface of the property is covered with indigenous desert brush, with a number of Joshua Trees. **Figure 3**, a color photograph taken from Google Earth, shows the site and surrounding area, with vegetation. **Figure 4**, a photograph taken during the site visit on April 24, 2018 shows the natural state of the site.

4.1.1 GEOLOGY

Figure 5 (geologic map) shows that the site is underlain by Young Alluvial Fan Deposits of Holocene and Late Pleistocene age. These materials are composed of unconsolidated to moderately consolidated, coarse-grained sand to bouldary alluvial fan deposits, having slightly to moderately dissected surfaces. This unit contains abundant clasts of Pelona Schist, which outcrops on the westerly side of the San Andreas Fault, approximately nine miles to the south-southwest of the site, in the Wrightwood area of the San Gabriel Mountains.

4.2 REVIEW OF PUBLISHED AND UNPUBLISHED FAULT LITERATURE

Published maps and reports were reviewed to determine the site location in relation to the nearest active faulting. The closest active fault is the San Andreas Fault Zone, located approximately 9 miles to the south-southwest of the subject site (**Figure 6**). **Figure 6** is taken from Sheet 3 of USGS Open File Report 2006-1217, which shows active fault traces that offset Late Pleistocene and Holocene rock units within the San Bernardino and Santa Ana 30'x60' quadrangles in Southern California.

The closest Alquist-Priolo Special Studies Zones map is the Telegraph Peak Quadrangle. This quadrangle shows the trace of the active San Andreas Fault Zone as it runs up Lone Pine Canyon (westerly from Cajon Pass), and through the Swarthout Valley in Wrightwood, California. As stated above, this portion of the San Andreas Fault is located approximately 9 miles to the southwest of the subject site. The segment shown in red on **Figure 6** is also shown on the Telegraph Peak A-P map at the same location.

Figure 7 (San Bernardino County Geologic Overlay Map EHFH C) does not indicate the presence of any County-mapped faults in or adjacent to the site.

The closest mapped fault to the subject site is the Cajon Valley Fault, located approximately 4 miles to the southwest of the site. USGS Open File Report 01-293 states that the Cajon Valley Fault (right-lateral) is inactive, but was probably an early strand of the San Andreas System. It was active during the deposition of the middle Miocene rocks of Cajon Valley.

4.2.1 SAN ANDREAS FAULT ZONE

Based upon the significant distance from the subject property to the nearest active fault (San Andreas Fault), there is no obvious potential risk of surface fault rupture within the site. However, The USGS Earthquake Hazards Program indicates that the San Andreas Fault in Southern California has been identified as the most likely source of a very large earthquake in Southern California. The USGS estimates that the San Andreas Fault may rupture over a distance of 186 miles, from Bombay Beach at the edge of the Salton Sea in the south, to Lake Hughes northwest of Palmdale in the north, producing an earthquake of 7.8 magnitude. Although the purpose of this report is to evaluate the possibility of surface fault rupture at the site, an earthquake of this large magnitude on the southern California segment of the San Andreas Fault would cause significant shaking at the subject property, but the fault itself would not rupture through the site. Following is a description of the fault history in Southern California.

The San Andreas Fault Zone (SAFZ) is a right-lateral transform fault that forms the boundary between the North American and Pacific tectonic plates. Its trace runs northwest/southeast over a distance of approximately 800 miles, from Cape Mendocino to the Salton Sea. It is thought that the total accumulated displacement from earthquakes and creep along the fault is at least 350 miles since it came into being about 15-20 million years ago.

The largest earthquake to hit Southern California in historic times occurred on January 9, 1857 and is known as the great "Ft. Tejon" earthquake. It occurred on the southern section of the San Andreas Fault and had an approximate magnitude of M7.9. It produced a surface rupture length of as much as 250 miles. The surface rupture extended from Cholame to the Wrightwood area, and produced right lateral offset of up to 30 feet.

An additional large earthquake that impacted Wrightwood occurred on December 8, 1812. The magnitude is estimated to have been M7.5. The location of the epicenter is not precisely known, but it was on the Mojave Segment of the San Andreas Fault, near Wrightwood. It possibly resulted in as much as 106 miles of surface rupture, between Tejon Pass and Cajon Pass.

As the last large earthquake on the southern section of the San Andreas Fault occurred in 1857 (159 years ago), that section is considered a likely location for an earthquake within the next few decades.

NOTE: The fault data presented in this section were obtained on the Internet from brief descriptions presented by the USGS and the Southern California Earthquake Data Center of the California Institute of Technology. They do not have complete, formal attributions, but they were:

- USGS Earthquake Hazards Program, "Sothern California Shakeout";
- USGS-"The San Andreas Fault" by Sandra S. Schulz and Robert E. Wallace;
- Southern California Earthquake Data Center-"Significant Earthquakes and Faults-Ft. Tejon Earthquake, January 9, 1857";
- Southern California Earthquake Data Center-"Wrightwood Earthquake, December 8, 1812".

4.3 INTERPRETATION OF AERIAL PHOTOGRAPHS

Attached to the April 17, 2018 letter from the San Bernardino County Land Services Department was a color air-photo showing the site with the proposed development imposed on it. Also imposed on this photo (**Figure 7**) were 6-8 northwest-trending lineaments shown adjacent to and crossing the site. The April 17, 2018 letter stated that these lineaments may represent fractures or faults and stated that the site needed to be evaluated for active faulting.

Two sets of stereo-pairs of aerial photographs were examined to evaluate the superposed lineaments. The following table contains data for the aerial photographs:

TABLE 4.1

AERIAL PHOTOGRAPH DATA-USDA

SERIES	PHOTO NUMBER	DATE	SCALE
HAP 84 F	194 & 195	6/22/84	1:60,000
AXL-10-W	90 & 91	6/30/59	1:20,000

These two stereo-pair sets were carefully examined utilizing a stereoscope. No evidence of physical lineaments or linear tonal differences were obvious along the plotted traces of the lineaments on the air photo in the vicinity of the subject site. This is not surprising for the following reasons:

- There are no mapped active faults/lineaments anywhere near the subject site;
- The physical properties of the alluvium that underlies the site do not preserve fault features for any significant length of time;
- The geometrical relationships of the imposed lineaments violate the traditional (and expected) geometrical relationships of adjacent fault traces;
- The superposed faults are immediately questionable.
- The superposed fault traces are unlikely to exist.

4.4 REVIEW OF FAULT INVESTIGATION REPORTS IN SITE AREA

There are not Fault Evaluation Reports (FERs) for any faults/geographical areas near the site, or within the quadrangle within which the site is located (Phelan Quadrangle).

4.4.1 PERSONAL COMMUNICATIONS WITH PERTINENT AGENCIES

- **Janis Hernandez, California Geologic Survey Geologist:** Ms. Hernandez stated that the California Geologic Survey did not have any project files for fault-trenching projects in the area of the site.

4.5 SURVEY OF SITE AND IMMEDIATELY ADJACENT AREA FOR OPEN CUTS AND OUTCROP EXPOSURES FOR PRESENCE OF FAULTING, SHEARING, OR FRACTURES

On April 24, 2018 Maddox & Associates visited the subject site. The purpose of the site visit was to survey the site and immediately adjacent area for open cuts and outcrop exposures for the presence of faulting, shearing, or fractures. This survey was an initial, limited evaluation of the site with regard to detection of visible surficial indications of faulting/shearing within the subject site. Based upon the age and nature of the geologic materials at the site, no shears, scarps, or other fault features of any type were visible. Such features are unlikely to be preserved for very long within the Holocene sediments that underlie the site.

5.0 GROUNDWATER

Reference to San Bernardino Geologic Overlay Map #EHFH C (**Figure 8**) indicates there is no potential for liquifaction to occur at the site. Based upon the site topography and a careful on-site investigation, no seeps or springs were suspected or located.

Reference to the "Oeste Hydrologic Sub-Area Hydrogeologic Report", California State University, Fullerton Department of Geological Sciences, June 2009 indicates that the depth to groundwater in the site area likely ranges between 1,300 to 1,400 feet below ground surface. No wells were located within or near the site.

6.0 CONCLUSIONS: POTENTIAL FOR SURFACE RUPTURE AT THE SUBJECT SITE

The potential for surface fault rupture at the site is considered to be extremely low, to non-existent, for the following reasons:

- No Agency or individual have determined that active faulting is present within or anywhere near the site;
- The nearest known active fault, the San Andreas Fault Zone, is located approximately 9 miles to the southwest of the site;
- Review of aerial photographs of the site and surrounding areas did not reveal evidence of any lineaments/ faulting;
- Physical inspection of the site and adjacent areas revealed no faulting, scarps, or shearing of the geologic materials.

It should be noted that definite proof of the lack of faulting within the site cannot be obtained without further investigative techniques such as trenching, backhoe pits, geophysics, age dating, etc., such as listed in Appendix C of Special Publication 42 (Interim Revision 2007). These techniques would add significant additional expense and are beyond the scope of this investigation. All data collected to-date indicate that none of these additional investigative methods are warranted.

7.0 REFERENCES

California Department of Conservation, California Geological Survey:

Special Publication 42 (Interim Revision 2007)-Fault Rupture Hazard Zones in California

Special Publication 42 (Revised 2018)-Earthquake Fault Zones

CGS Note 49-Guidelines for evaluating the hazard of surface fault rupture, 5/2002

California Department of Conservation, California Division of Mines and Geology:

Special Studies Zones, Telegraph Peak Quadrangle, scale 1"=2000', July 1, 1974

California State University, Fullerton Department of Geological Sciences, "Oeste Hydrologic Sub-Area Hydrogeologic Report", July 2009;

Google Earth Air Photo of Subject Site;

Jordan, Frank Jr., San Bernardino County Land Use Services Department Letter, April 17, 2018;

Jordan, Frank Jr., San Bernardino County Land Use Services Department, Air Photo with Superposed Suspected Lineaments;

Phelan, CA 7.5' Topographic Quadrangle Map, 1:24,000, 2015;

Pinon Hills Gas Station Site Design Plan, Steeno Design Studio, page A-0;

San Bernardino County Land Use Plan, Geologic Overlay Map EHFH C, Victorville/San Bernardino

Street Map, Google Map Data

US Geological Survey

Open File Report 01-291, Geologic Map of the Telegraph Peak 7.5' Quadrangle, San Bernardino County, California, D.M. Morton and M.O. Woodburne and J.H. Foster, scale 1:24,000;

Open File Report 2006-1217 (Sheet 1 of 4), Geologic Map of the San Bernardino and Santa Ana 30'x60' Quadrangles, D.M. Morton and Fred K. Miller, 2006, Scale 1:100,000;

Open File Report 2006-1217 (Sheet 3 of 4), Evidence of Fault Movement in Late Pleistocene and and Holocene Rock Units

Phelan, CA Topographic 7.5' Quadrangle, 1:24,000, 2015

APPENDIX A:

FIGURES

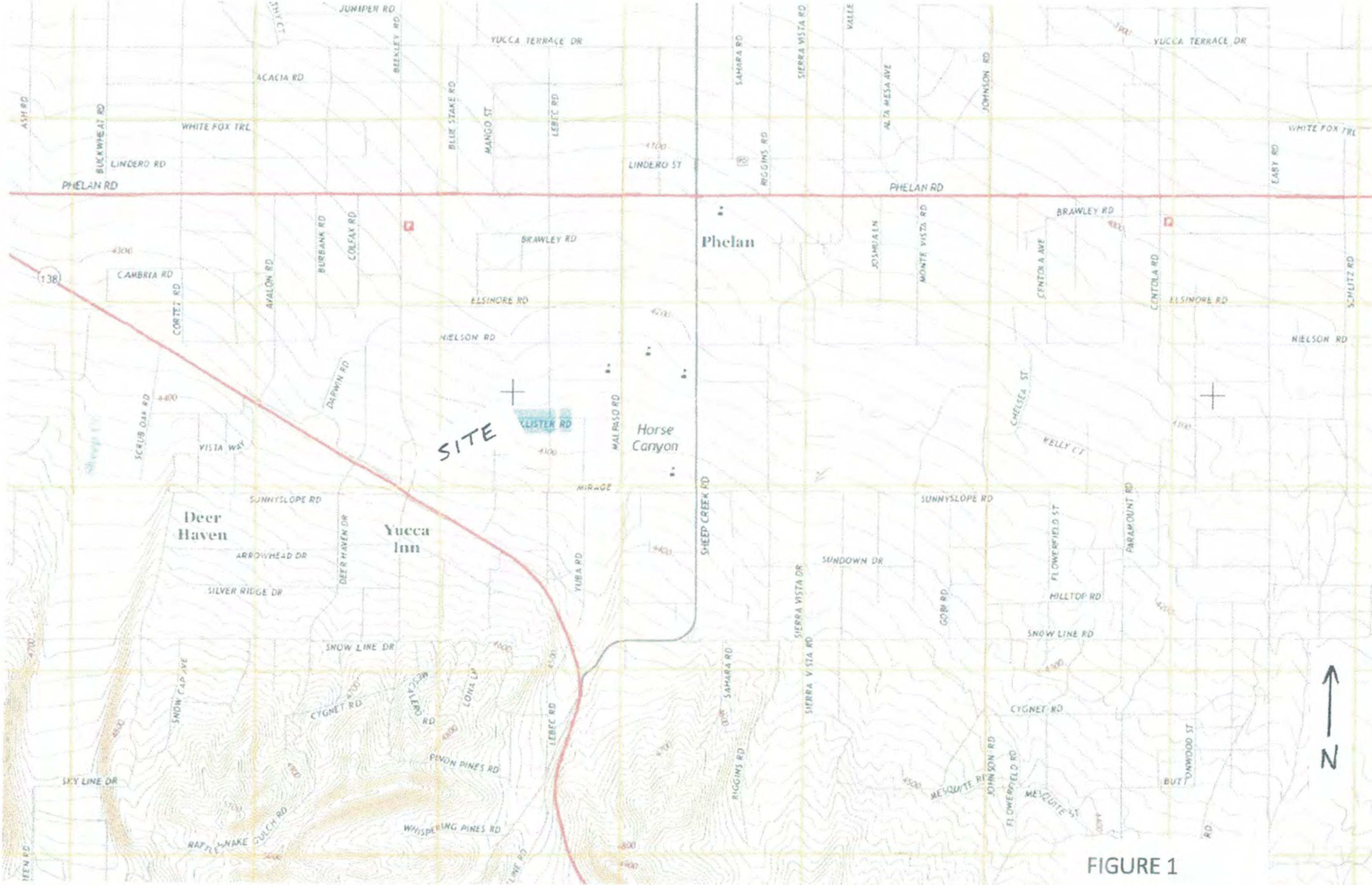


FIGURE 1

SITE LOCATION MAP

SCALE 1:24,000

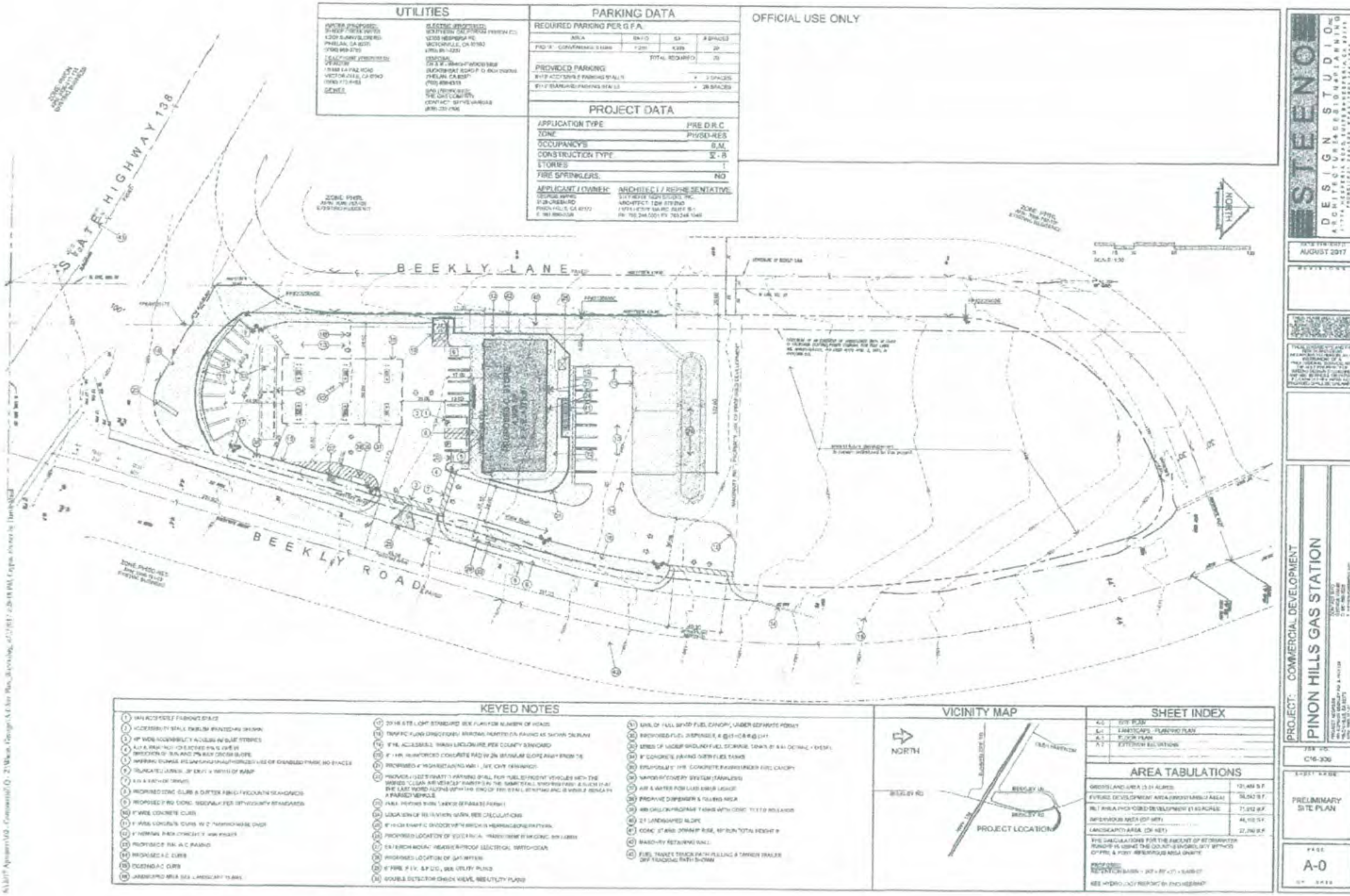


FIGURE 2
SITE MAP
SCALE 1"=105'


SITE
Untitled Placemark
W117.
CA-138
BEEKLEY RD.
HWY 138
N
FIGURE 3
GOOGLE EARTH
SITE PHOTO
SCALE 1"=213'

FIGURE 4
SITE PHOTO

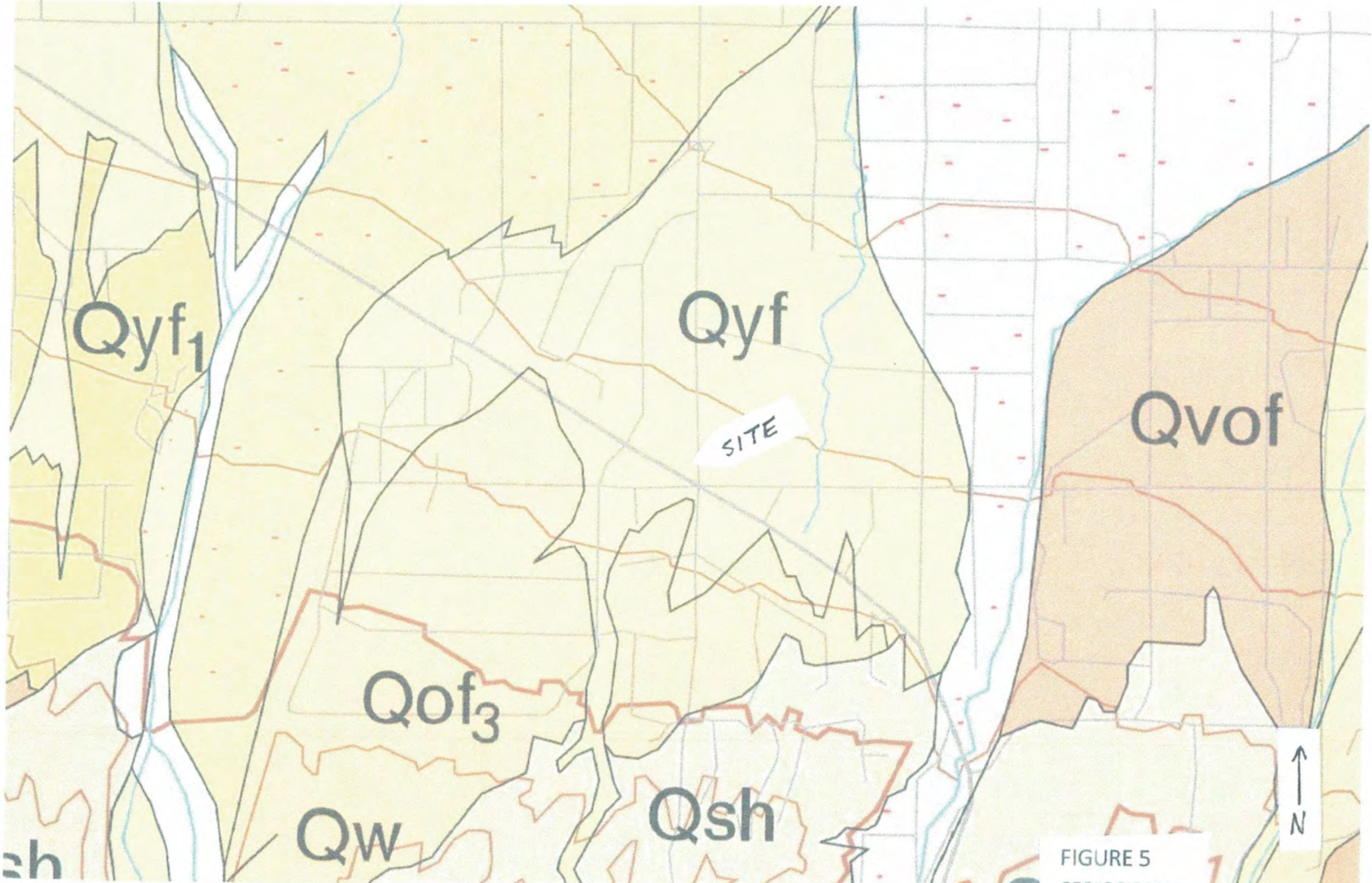


FIGURE 5
GEOLOGIC MAP
SCALE 1"=2,892

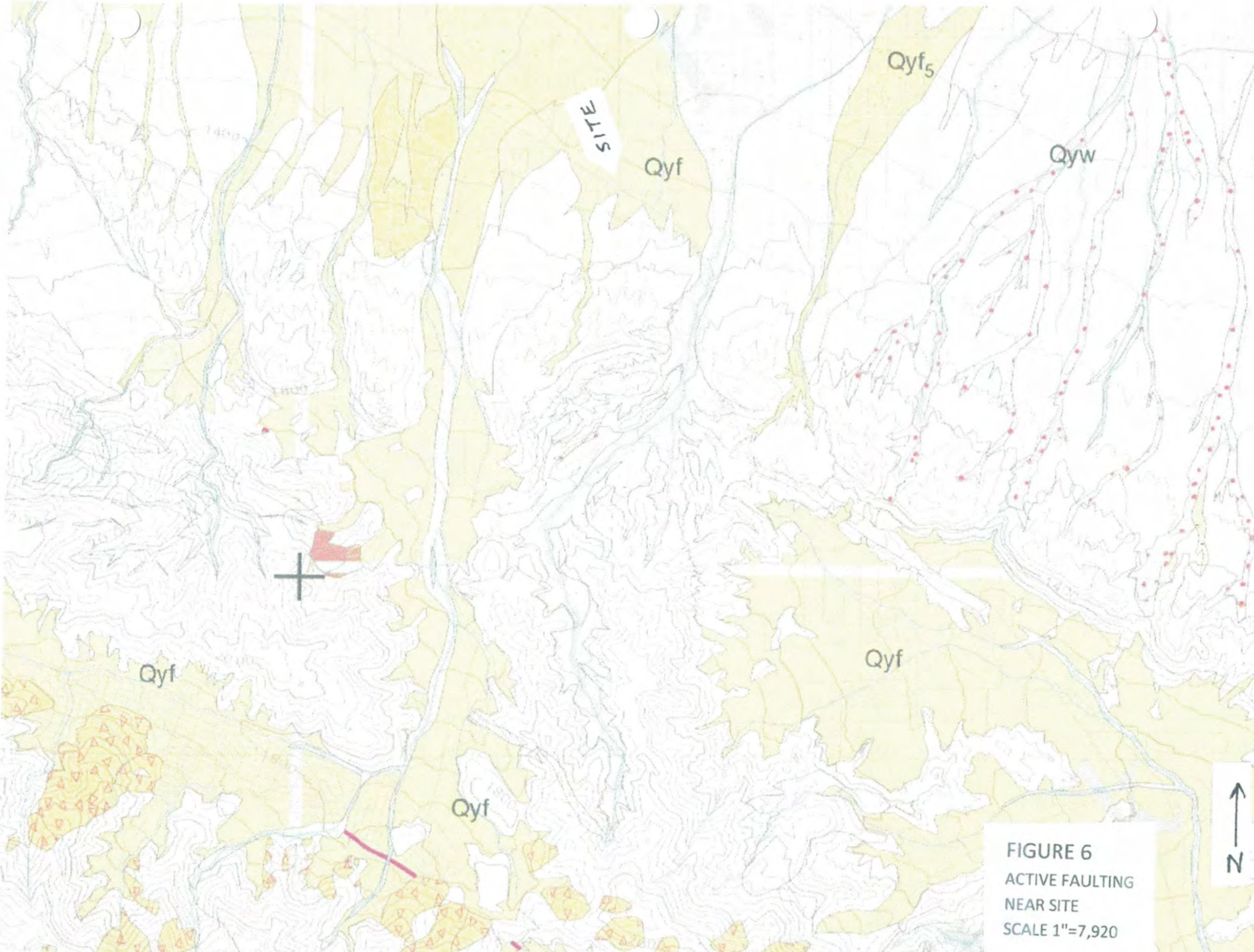


FIGURE 6
ACTIVE FAULTING
NEAR SITE
SCALE 1"=7,920

P2O1700697, APN 3066-191-04 showing proposed store and gasoline pumps and tanks wrt suspected faults (blue lines)

FIGURE 7
SUSPECTED LINEAMENTS
AT SITE
SCALE 1"=277.5'

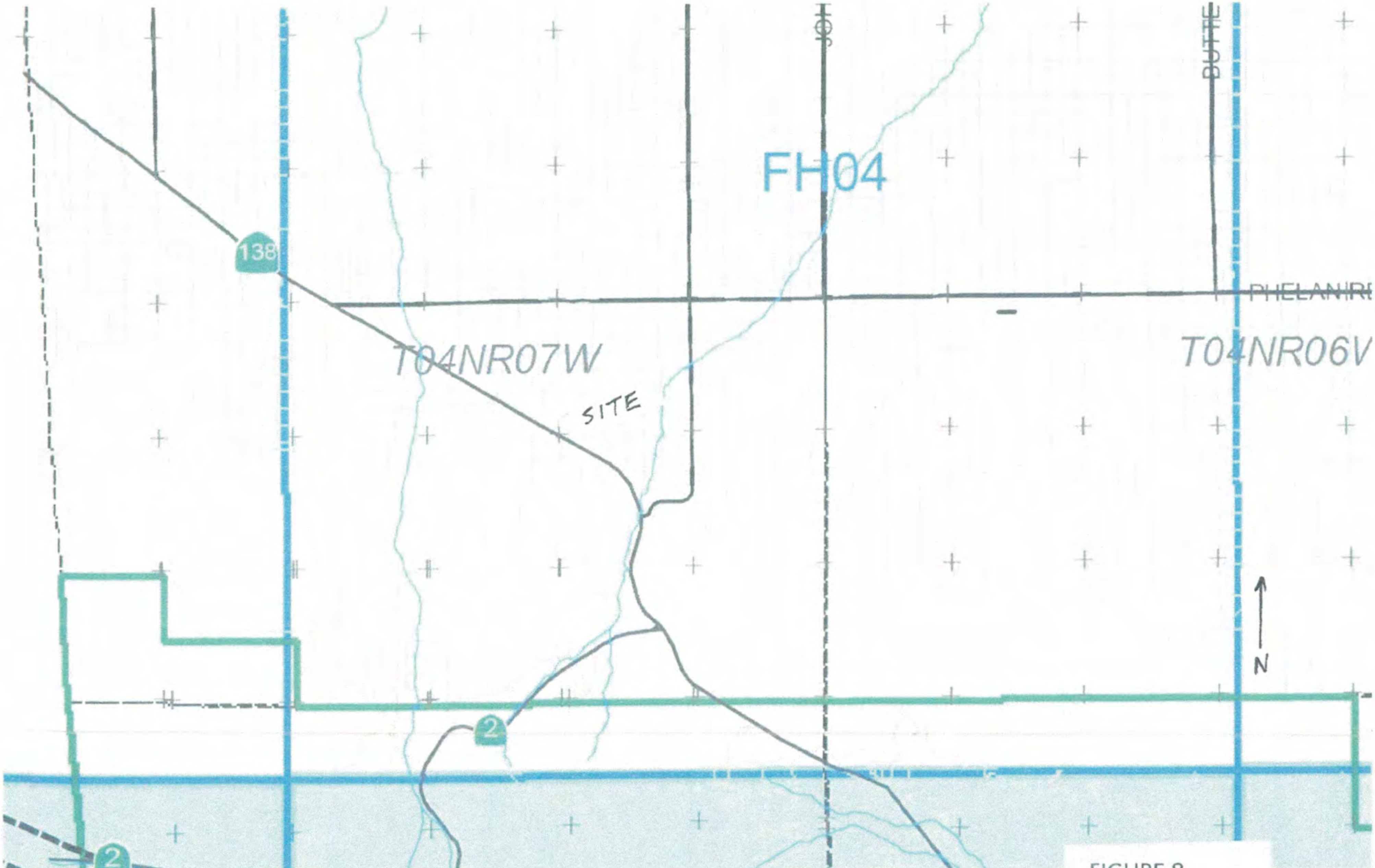


FIGURE 8
GEOLOGIC HAZARDS
SCALE 1"=1,676'

APPENDIX B:

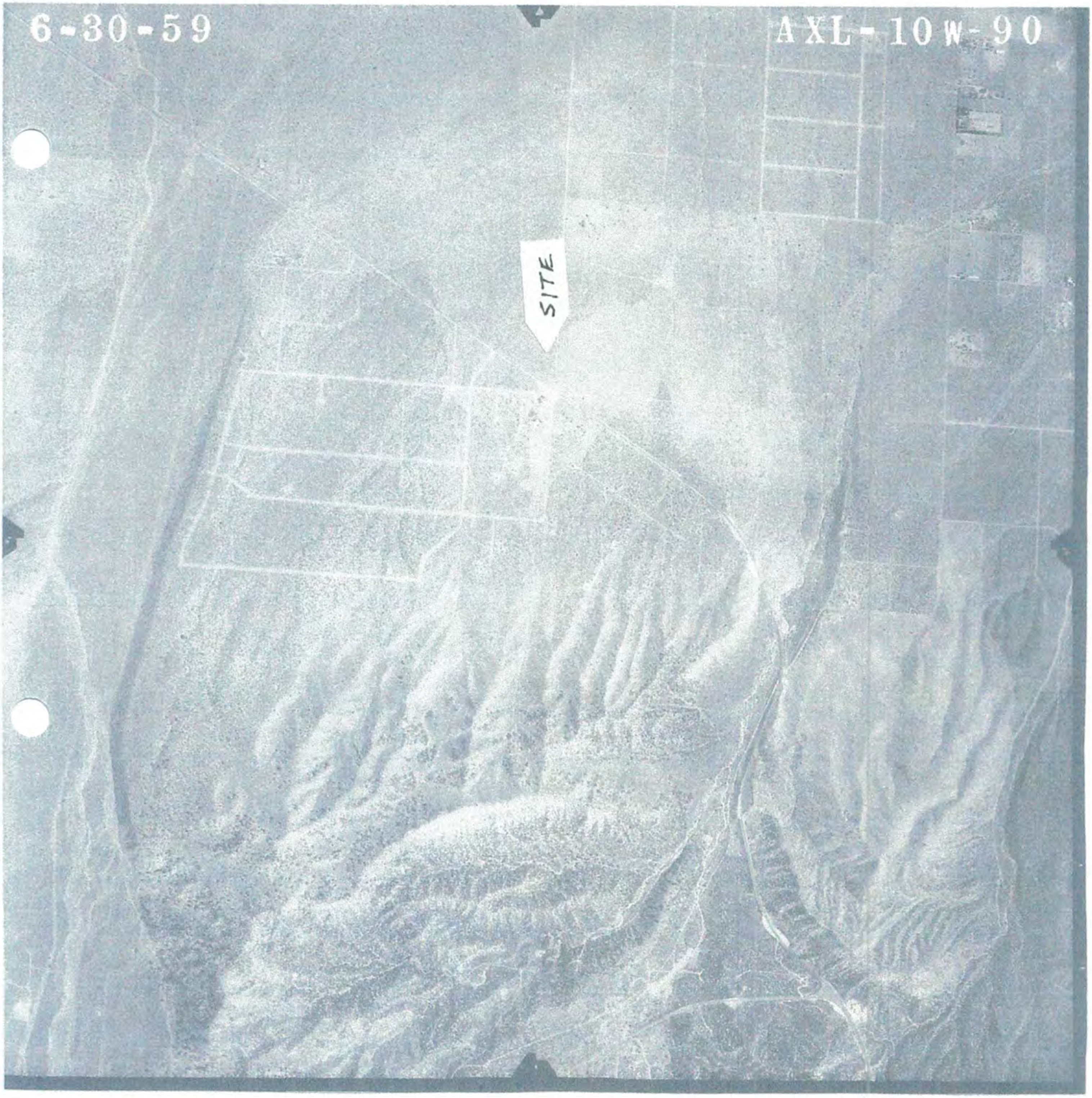
FIGURE INDEX

FIGURE INDEX

FIGURE	TITLE	TAKEN FROM	SCALE	DATE
1	Site Location Map	Phelan, CA 7.5' Topographic Quadrangle Map	1:24,000	2015
2	Site Map	Pinon Hills Gas Station, Steeno Design Studio, Page A-0	1"=105'	
3	Google Earth Site Photo	Google Earth	1"=213'	Recent
4	Site Photo	Maddox & Associates, Inc.	NA	4/24/18
5	Geologic Map	Open File Report 2006-1217 (Sheet 1 of 4), Geologic Map of the San Bernardino and Santa Ana 30'x60' Quadrangles, D.M. Morton and Fred K. MIller	1"=2,892	
6	Active Faulting Near Site	Open File Report 2006-1217 (Sheet 3 of 4), Evidence of Fault Movement in Late Pleistocene And Holocene Rock Units, D. M. Morton and Fred K. Miller, 2006, scale 1:100,000	1"=7,920	
7	Suspected Lineaments at Site	San Bernardino County Land Use Services Department in Letter Dated April 17, 2018	1"=277.5'	
8	Geologic Hazards	San Bernardino County Land Use Plan, Geologic Overlay Nap EHFH C, Victorville/San Bernardino	1"=1,676'	

APPENDIX C:

AERIAL PHOTOGRAPHS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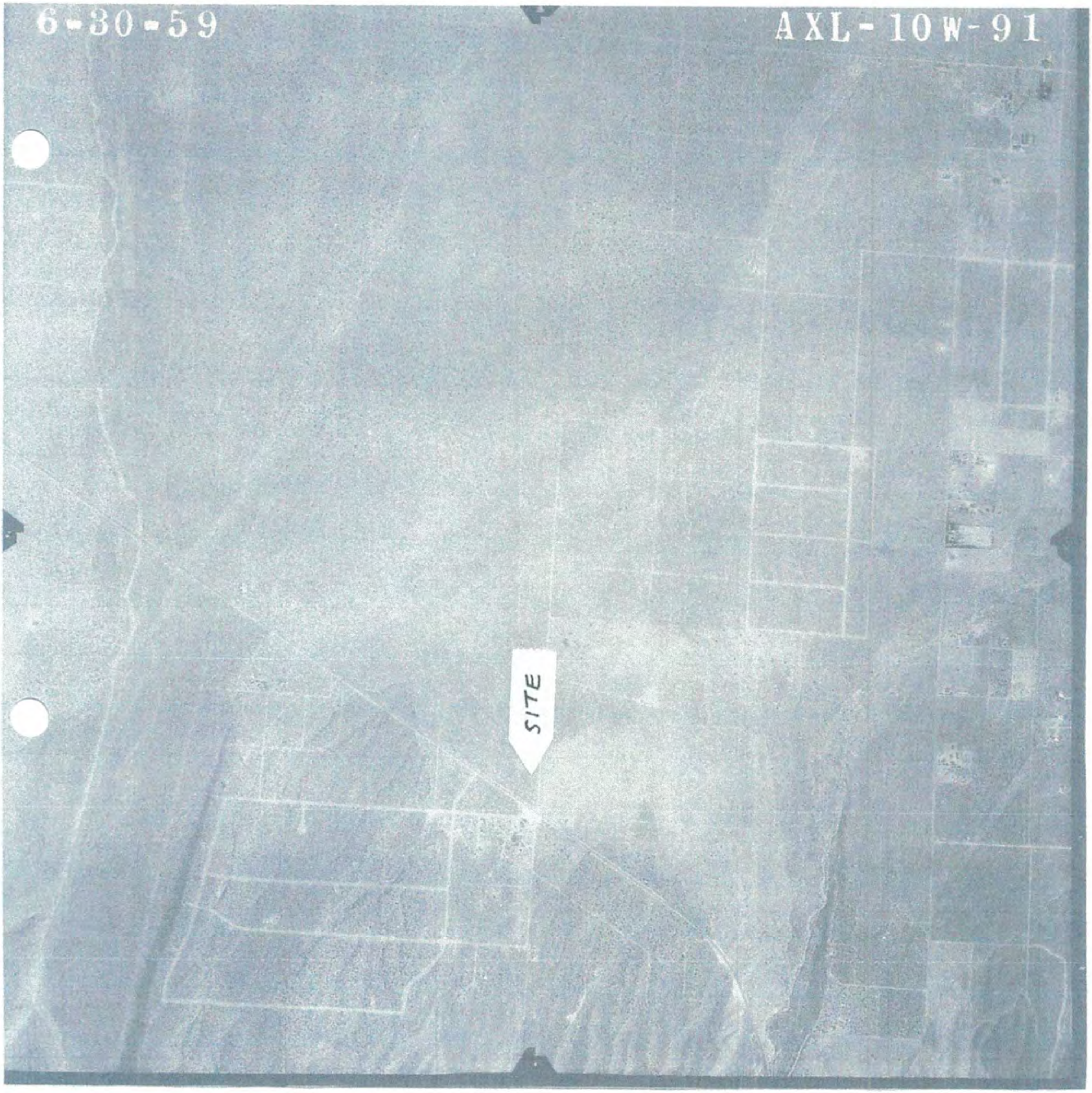
AXL-10W-90
SITE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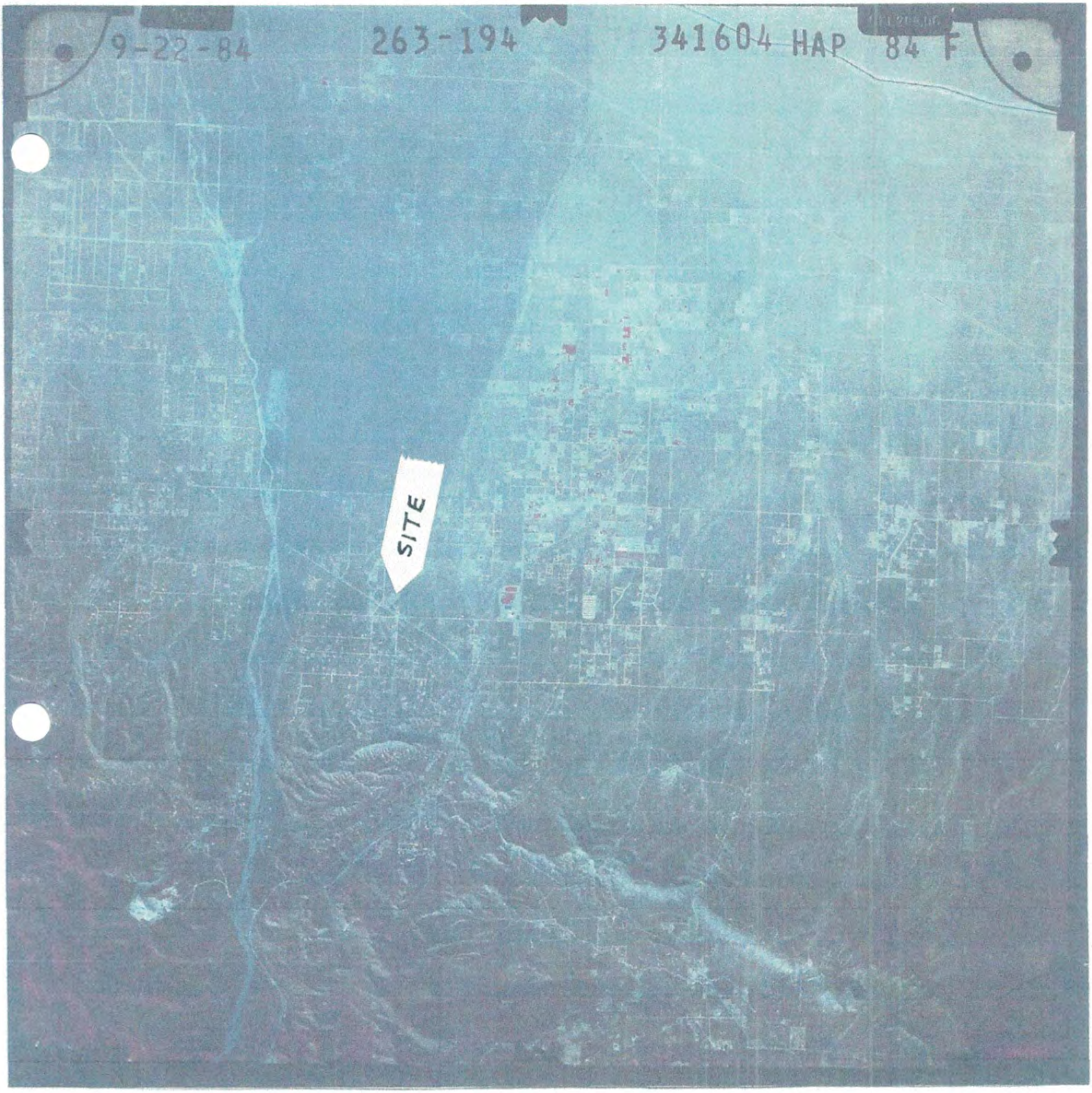
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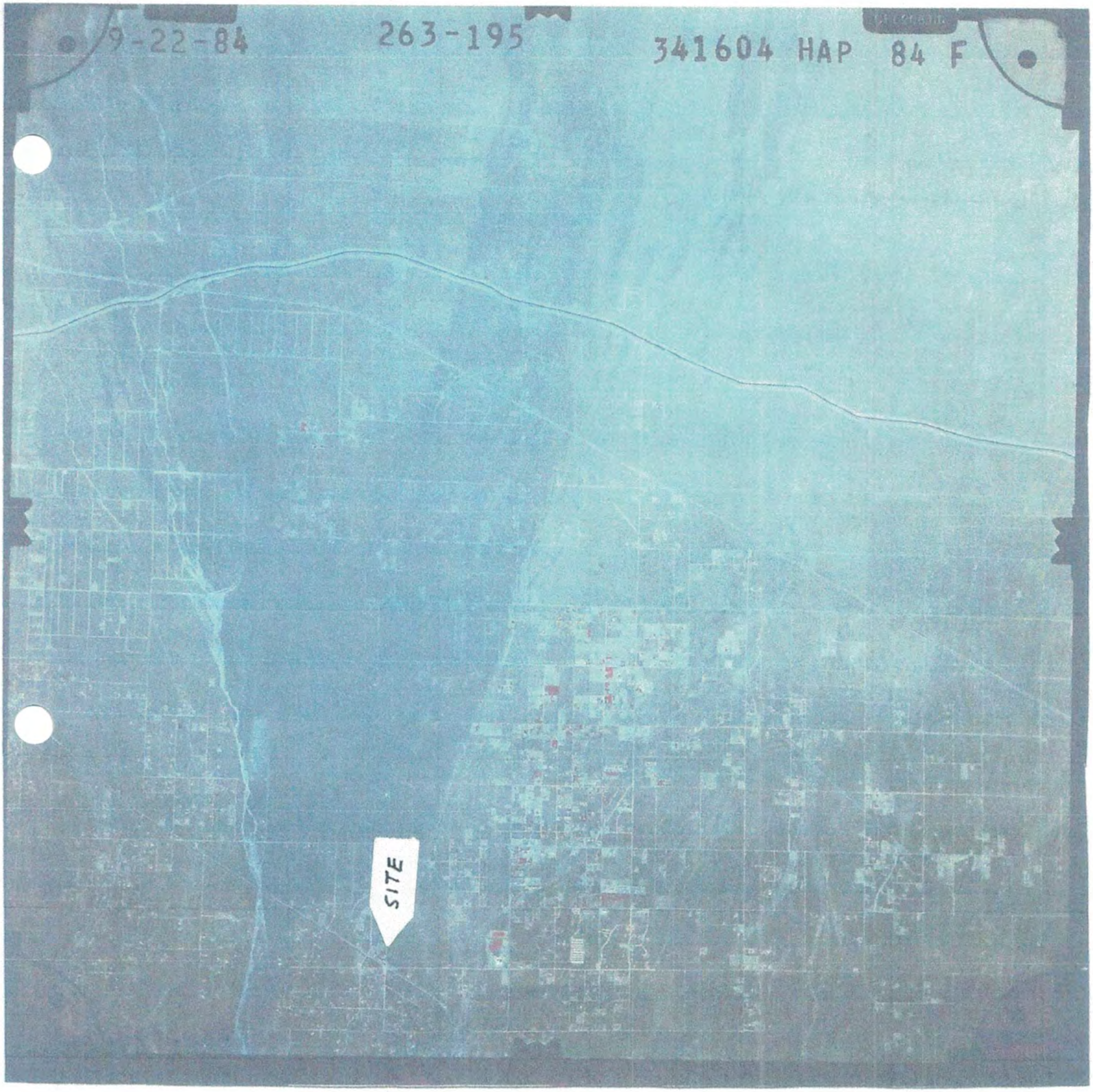
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