

A.M. BAIRD

ENGINEERING & SURVEYING, INC.

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CONSULTING – LAND DEVELOPMENT – DESIGN – SURVEYING

ENGINEERING GEOLOGIC SOILS REPORT

GEOLOGIC HAZARDS AND DEVELOPMENT CLASS R2

PREPARED FOR:

Tim Walsh
2027 Irving Drive
Eureka, CA 95503
APN: 306-371-017
Humboldt County

PREPARED BY:


ALLAN M. BAIRD, RCE 23681



December 7, 2023

Job# 23-6050



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Building Official
County of Humboldt Building Department
3015 H Street, Eureka, California 95501

RE: Humboldt County Engineering Geologic Soils Report, R-2
Client: Tim Walsh
Site Address: 2027 Irving Drive, Eureka, CA 95503
Site APN: 306-371-017-000
Site Coordinates, Parcel Centroid (WGS84): 40.7241 (latitude) , -124.2103 (longitude)

Introduction

Representatives from A.M. Baird Engineering performed a site investigation on November 21, 2023 at the above referenced parcel in Eureka, California to collect requisite data for a soils suitability report pertaining to proposed residential construction. This report is furnished to satisfy criteria required by the County of Humboldt for a Preliminary Engineering Geologic Report as outlined by Title III, Division 3, Chapter 6, Section 336-5 of the Humboldt County Code.

Site Description

The subject parcel is located on Humboldt Hill overlooking Humboldt Bay near the southern reaches of Eureka, CA. The total area of the parcel is 7.43 acres. The parcel is largely wooded with slopes ranging from 15% to 50% throughout most of the property. There is a small, flat clearing near the northern boundary of the parcel fronting Irving Drive. The property is served by municipal water service and municipal sanitary sewer service.

Site Investigation

A topographic survey and boundary survey of the lot and part of the adjacent roadway was performed during the site investigation on November 21, 2023. A test hole was excavated to a depth of approximately 2 feet where a sample was collected from the bottom of the test hole. The soil sample was delivered to the soils laboratory at A.M. Baird Engineering & Surveying, Inc. for analyses.

Soil Conditions

Soil sampling at TH#1 revealed single-grain, Zone 2 dark brown sandy loam (Munsell color 10 YR 3/3) from approximately 0.5 feet in depth to approximately 2.0 feet in depth with a coarse content of approximately 10% consisting of gravel and small angular rock. The soil is loose when moist and non-sticky when wet with no plasticity. No soil mottling or redoximorphic features were observed.

Groundwater

Groundwater was not observed during the site investigation.

Slope Stability and Drainage Hazards

The nature of the entire property appears to be stable and should remain stable provided the recommendations given in this report are followed. Areas disturbed during construction activities



should be re-vegetated prior to the rainy season. Impermeable surfaces such as driveways and rooftops should be designed to uniformly diffuse runoff away from structures, and significant quantities of concentrated runoff should not be discharged over slopes greater than 20%.

Geological Hazards

This area of California is very seismically active and is subject to earthquakes of large magnitude, which can produce significant ground shaking. In general, there are many sources of large magnitude earthquakes that could potentially affect this project area. These sources include but are not limited to the Mendocino *Fault Zone located some 20 miles northeast of Shelter Cove, the San Andreas Fault which leads out to sea at Point Delgada, the subducted Gorda Oceanic Crustal Plate North of Shelter Cove*, the complex northwesterly oriented fault systems surrounding the Humboldt Bay area (including the Little Salmon, Mad River, Freshwater, and Gorda Fault Zones), and the Cascadia Subduction Zone near Cape Mendocino.

The San Andreas Fault has produced major earthquakes in this area at intervals of approximately 75-150 years. Earthquakes with average magnitudes of 5.8 occur on average every 2 years at varying locations in or near Humboldt County, and geological evidence suggests that the San Andreas Fault is capable of generating magnitudes much higher (greater than 7.0). This high to very high level of risk of seismic hazard is typical for Northern California, and residents assume this risk when they choose to build in this area. This site is located approximately 700 feet west and 950 feet north of Alquist-Priolo fault traces on Humboldt Hill.

Earthquakes capable of causing intense ground shaking and structural damage can be expected to occur within the design life of the proposed structure (40+ years). Residents should be aware of this inherent risk and should understand that these risks cannot be fully eliminated with engineered design. As required, all structural design should be in conformance with the 2022 California Building Code (CBC) Seismic Design Category (SDC) E (Section 1613A, 2022 CBC). Site coordinates were taken from the Humboldt County Web GIS website (County of Humboldt, 2023). Site-specific soil parameters were calculated using the USGS U.S. Seismic Design Maps (Table 1) (ATC, 2023):

Table 1: USGS Ground Motion Parameters.

Latitude	40.7241
Longitude	-124.2103
Occupancy Category	II (normal buildings)
Importance Factor, I	1.0
Site Class	D (stiff soil)
Site Coefficients	$F_a=1.2$
	$F_v=null$
Mapped Spectral Response Acceleration Parameters	$S_s=2.677$ g (0.2-second spectral response)
	$S_1=1.093$ g (1-second spectral response)
Design Spectral Response Acceleration Parameters	$S_{MS}=3.213$ g (0.2-second period)
	$S_{M1}=null$ (1-second period)
Design Spectral Response Acceleration Parameters (five-percent damped design spectral response)	$S_{DS}=2.142$ g (0.2-second period)
	$S_{D1}=null$ (1-second period)
Seismic Design Category (SDC)	E ($S_1>0.75g$)
Peak Ground Acceleration ($S_s/2.5$)	1.0708 g



Flood Hazards

The site is not within the 100-yr flood zone (see Flood Map, attached).

Existing Grade (Cut/Fill)

Slopes exceed 15% on most of the parcel. No grading has occurred on the property.

Earthquake Motion Hazards

Slope instability, liquefaction, and surface rupture due exclusively to faulting or lateral spreading are not considered consequential as to require specific analysis. Dynamic seismic loading for retaining walls supporting more than 6 feet of backfill and peak ground acceleration for design purposes shall be $S_s/2.5$ and use ASCE 7-22 Figure 22-7, unless additional site-specific analysis is provided beyond the scope contained herein.

Recommendations

No expansive soils were encountered during this investigation that require specific recommendations. The soil onsite is capable of supporting a load of 1,500 pounds per square foot (psf). One, two, or three-level structures are suitable uses for this property. Settlement is not anticipated to be detrimental provided considerations are given to the recommendations presented herein:

1. Foundations for any residence should be reinforced and be contained in firm, undisturbed native soil. The foundation should be extended a minimum of 12 inches *past any topsoil or fill* and into natural undisturbed ground for single-story structures, a minimum of 18 inches for two-story structures and a minimum of 24 inches for three-story structures. Spread footings and foundation walls should be reinforced and be at minimum 15 inches wide for single-story structures, a minimum of 18 inches wide for two-story structures and a minimum of 24 inches wide for three-story structures. Foundation walls should be a minimum of 7.5 inches thick for single-story structures, a minimum of 8 inches thick for two-story structures and a minimum of 10 inches thick for three-story structures. Foundation footings shall be setback a minimum distance of 4 feet from bottom of footing as measured horizontally to daylight from slopes dropping over 30%. Foundation footing setbacks to slope breaks shall comply with specifications in Section 1808.7 and Figure 1808.7.1 of the 2022 CBC.
2. All surface runoff from developed or paved areas of the lot should be controlled to flow and drain away or be routed in such a manner as to not affect slope stability or the integrity of foundation soil. Erosion control dissipation devices shall be installed at all locations where water is discharged over slopes greater than 20%. Lots shall be graded to drain surface water away from foundation walls. The grade shall fall a minimum of 6 inches within the first 10 feet (3048 mm); wherein, the grade shall be 5% for the first 10 feet away from foundations. Exception: Where lot lines, walls, slopes or other physical barriers prohibit 6 inches of fall within 10 feet, drains or swales shall be constructed to ensure drainage away from the structure. Impervious surfaces within 10 feet of the building foundation shall be sloped a minimum of 2 percent away from the building.
3. All excavation shall be completed in conformance with Section 1804 of the 2022 CBC. Additionally, earthwork grading/excavation shall be conducted during the dry season, unless



constructed in conformance with a grading and erosion control plan, Humboldt County codes, and the recommendations in this report.

4. All existing and proposed fill and cut slopes are to be re-vegetated to prevent erosion. This is to be done to the satisfaction of local building officials. Existing vegetation beyond the construction area should be left undisturbed if feasible.
5. If cutting or grading is to be done at a depth greater than 5 feet, it is recommended that this office be contacted for specific comments and recommendations. Cut and fill under 5 feet should be limited to 2:1 max slope.
6. Gutters are to extend along all rooflines and lead to down spouts. In turn, down spouts should lead to pipes carrying roof runoff away from the building site, as well as any fill or foundations that may adversely affect the site soil or adjacent slopes.
7. Floor slabs should be reinforced by #3 reinforcing bars at 18" o.c. or #4 reinforcing bars at 24" o.c. each way and be underlain by at least 4" of class 2 aggregate bases with limited fines to act as a capillary moisture break and a vapor barrier. The vapor barrier shall be in direct contact with concrete. Contractor and owner are responsible for determining the extent of waterproofing methods necessary and implementing the appropriate measures as described in recommendation #10 and shall be aware of the current recommendations and guidelines for slabs below grade according to the American Concrete Institute.
8. All foundation design and construction shall be in conformance with Chapter 18 of the 2022 CBC. All footings are to meet local requirements for seismic criteria, as required by the 2022 CBC. Seismic design parameters included in this report are based on latitude and longitude values for the subject parcel's centroid taken from the Humboldt County Web GIS website (County of Humboldt, 2022).
9. Due to the close proximity of this parcel to the Special Studies Earthquake Zone, it is recommended that this office be contacted for footing and framing review.
10. Any floor space at or below existing grade level that will be used as inhabitable areas or for storage shall be appropriately damp-proof or waterproofed as described in Section 1805 of the 2022 CBC. These appropriate measures at minimum will constitute installation of 6-mil vapor barrier or equivalent against the foundation or retaining wall, along with drain rock a minimum of 12" thick to the bottom of the footing and made to drain by 4" perforated pipe tight-lines to daylight away from the foundation soils. It is recommended that slabs below grade used for living space be underlain with a minimum of 6" of open graded aggregate instead of 4" as described in recommendation #7 for an increased protection from capillary water infiltration. Additional or superior measures may include installation of sub-slab drainage pipes or geo-textile membranes and should be installed according to current standards of practice.

Based upon the review conducted by this office of the site and surrounding terrain no further geological evaluation is required; therefore, no geotechnical engineer consultation is warranted. This office shall be contacted if subsurface conditions differ significantly from those stated in this report, or if further investigation or inspection is requested by involved agencies.



It has been assumed that observed soils are representative of the entire subsurface conditions on the property in question. If it is found during construction that subsoil conditions differ from those described, the conclusions and recommendations of this report should be considered invalid unless the changes are reviewed and the conclusions and recommendations are modified or approved in writing.

This analysis was conducted in accordance with the standards maintained by professionals in the engineering field, and the findings presented herein are reasonably representative of site conditions and probable site behavior based on this investigation. Due to the inexact nature of many engineering analyses, including those employed during the preparation of this report, there is no guarantee or warranty expressed or implied. Enclosed in this report are site maps, Assessor's Parcel Maps, and geologic maps as referenced.

If you have any questions regarding this report, or to schedule an inspection, please feel free to contact this office at (707) 725-5182.

Sincerely,

Allan M. Baird
Principal, RCE# 23681



References

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<https://hazards.atcouncil.org/#/seismic?lat=40.0242&lng=-124.0398&address=>

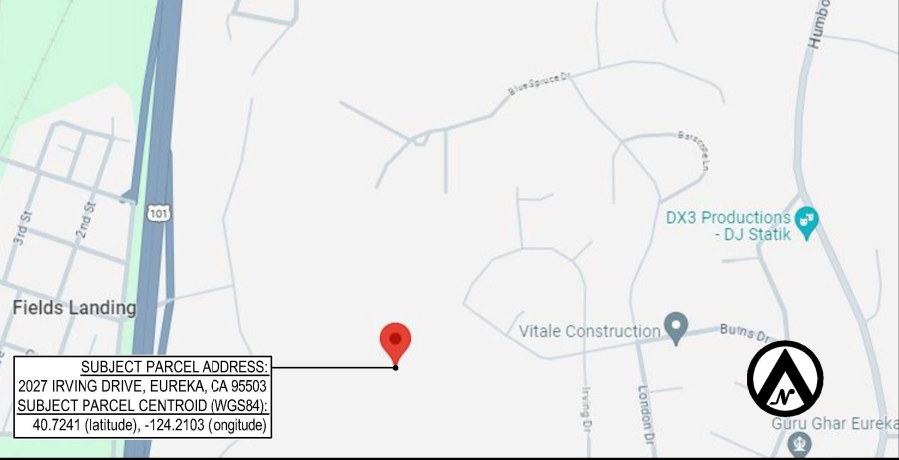


Appendix

- Site Plan
- Assessor's Parcel Map
- Topographic Map
- Flood Map
- Historic Landslide Map
- Fault Activity Map
- Seismic Design Parameters
- Soil Profile Test Hole #1
- Soil Texture Test Hole #1
- Soil Chart

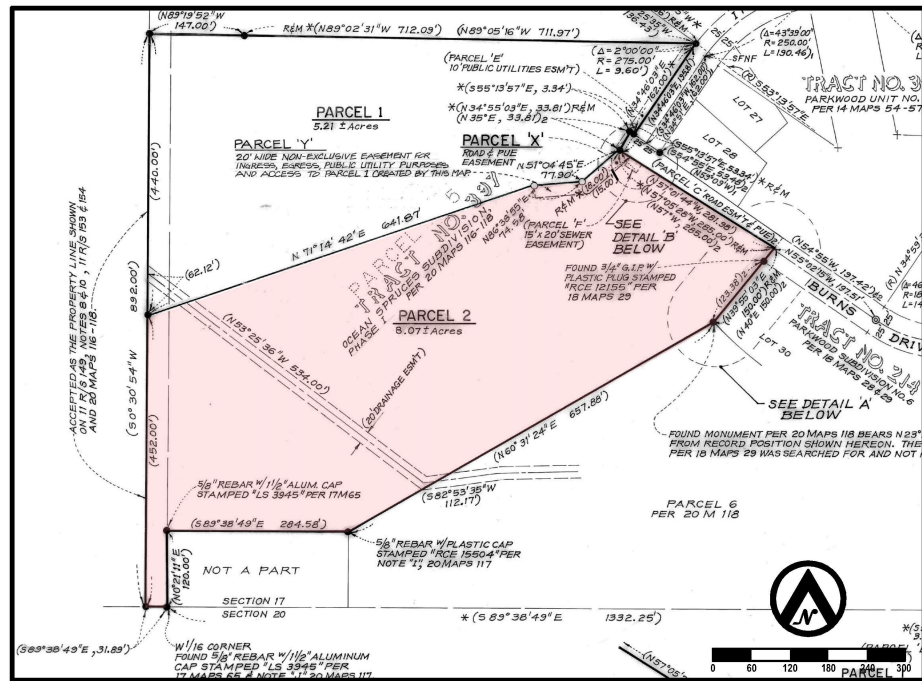
DIRECTIONS TO SITE

From: Eureka, CA
 Merge onto US-101 S, 0.7 mi
 Take exit 701 toward Humboldt Hill, 0.5 mi
 Continue onto Humboldt Hill Rd, 1.2 mi
 Follow Bret Harte Ln and Burns Dr to Irving Dr, 2 min (0.5 mi)
 Destination: 2027 Irving Dr., Eureka, CA 95503



VICINITY MAP

SCALE: 1"=NTS



PROPERTY MAP

SCALE: 1"=300'

APPLICANT

NAME: Tim Walsh
 MAILING ADDRESS: 2050 Irving Dr. Eureka, CA 95501
 EMAIL: timwalsh1@suddenlink.net
 PHONE: 707-443-0604

OWNER OF RECORD

NAME: Tim Walsh
 MAILING ADDRESS: 2050 Irving Dr. Eureka, CA 95501
 EMAIL: timwalsh1@suddenlink.net
 PHONE: 707-443-0604

PROPERTY DETAILS

SITE ADDRESS: 2027 Irving Dr., Eureka, CA 95503
 ASSESSOR'S PARCEL NUMBER (APN): 306-371-017-000
 PARCEL CENTROID (WGS84): 40.7241 (latitude), -124.2103 (longitude)

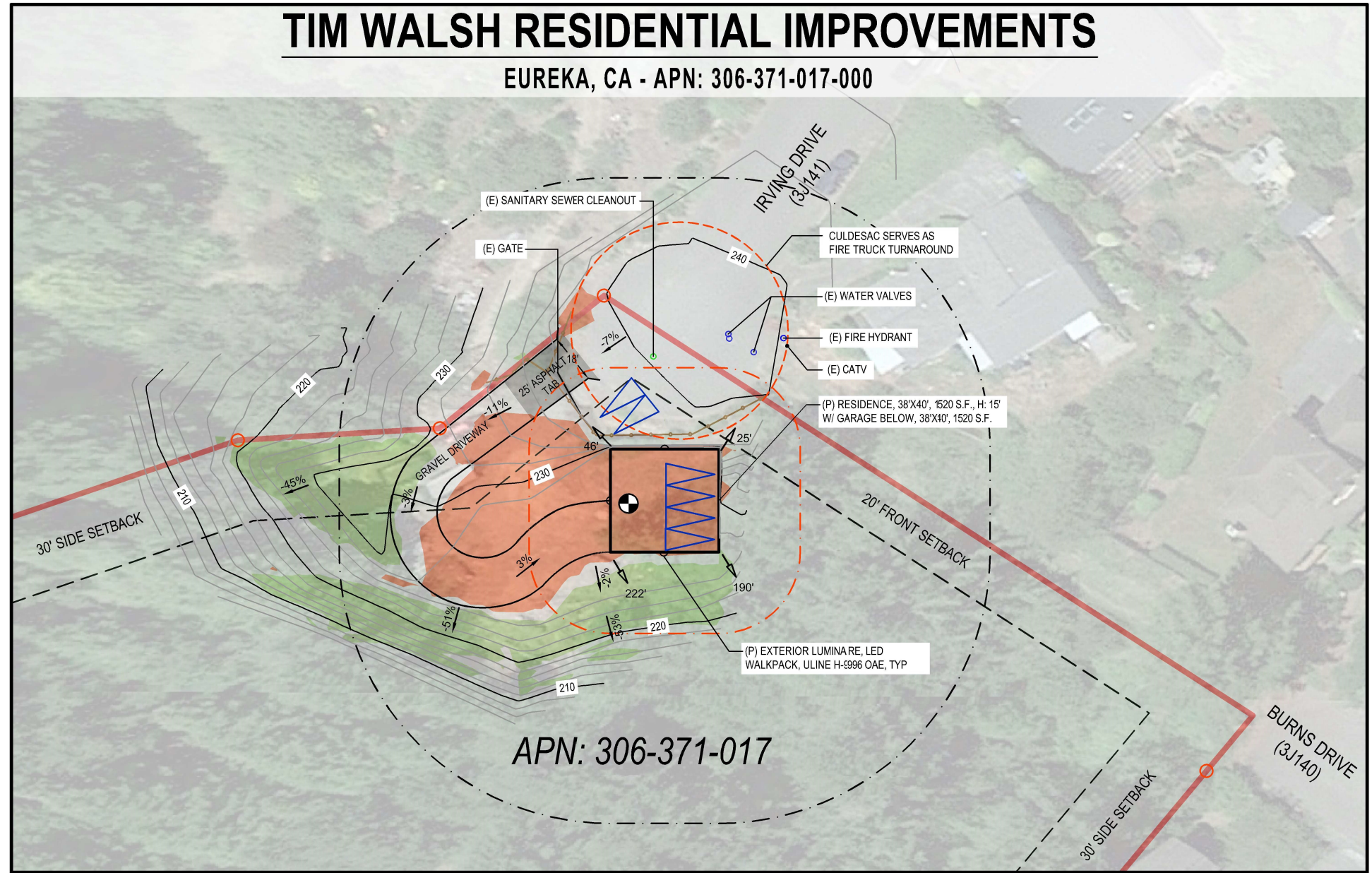
PARCEL SIZE: 7.43 acres
 ZONING: RA-5/A
 USE: Residential

100-YR FLOOD ZONE: No
 COASTAL ZONE: Yes
 RELATIVE SLOPE STABILITY: Low Instability, Moderate Instability

ALQUIST-PRIOLO FAULT HAZARD ZONE: Yes
 AIRPORT COMPATIBILITY ZONE: No
 STATE FIRE RESPONSIBILITY AREA (SRA): No

TIM WALSH RESIDENTIAL IMPROVEMENTS

EUREKA, CA - APN: 306-371-017-000



SITE PLAN

SCALE: 1"=50' (11"x17" PAPER)



LEGEND

- PROPERTY LINE
- SETBACK / EASEMENT
- 30 FT DEFENSIBLE SPACE ZONE
- 100 FT REDUCED FUEL ZONE
- EXISTING FENCE
- PROPOSED CUT
- PROPOSED FILL
- # — DISTANCE & DIRECTION TO PROPERTY LINE
- % — SLOPE
- ▲ PARKING SPACE, 8'X18'
- SOIL TEST LOCATION
- PROPERTY CORNER
- ROW RIGHT OF WAY
- (E) EXISTING
- (P) PROPOSED

NOTES

1. BUILDING SETBACK(S): 20' FRONT, 30' SIDES, 30' REAR.
2. 50' RIGHT OF WAY FOR IRVING DRIVE (3J141), 2% GRADIENT IN CULDESAC FRONTING PARCEL.
3. 50' RIGHT OF WAY FOR BURNS DRIVE (3J140), <5% GRADIENT IN ROADWAY FRONTING PARCEL.
4. GRADING REQUIRED FOR THIS PROJECT: 713.24 CUBIC YARDS OF CUT, 403.22 CUBIC YARDS OF FILL, 310.03 CUBIC YARDS EXCESS MATERIAL.
5. EXCESS GRADING MATERIAL TO BE TRANSPORTED OFFSITE TO AN APPROVED SOIL DEPOSITION AREA.
6. SITE SERVED BY MUNICIPAL WATER SUPPLY.
7. SITE SERVED BY MUNICIPAL SANITARY SEWER.
8. NO TREES 12" OR GREATER TO BE REMOVED.
9. NO STREAM(S) OR WETLAND(S) IN DEVELOPMENT AREA.
10. NO HISTORICAL BUILDINGS OR KNOWN ARCHAEOLOGICAL OR PALEONTOLOGICAL RESOURCES IN DEVELOPMENT AREA.
11. RE-VEGETATE ALL DISTURBED AREAS W/ NATIVE GRASSES & COVER W/ STRAW MULCH. KEEP MOIST UNTIL VEGETATION HAS BECOMES 80% ESTABLISHED.
12. ENGINEERED GRADING, EXCAVATION, EROSION AND SEDIMENT CONTROL SHALL BE IN CONFORMANCE WITH THE COUNTY OF HUMBOLDT GRADING ORDINANCE COUNTY CODE SECTION 311-14.

DISCLAIMER

MAPPING INFORMATION PROVIDED IS FOR HUMBOLDT COUNTY BUILDING & GRADING PERMITTING PURPOSES ONLY.

THIS SITE PLAN REFLECTS MANY MAPPING DETAILS THAT ARE USEFUL TO ASSURE THAT THE STRUCTURES ARE LOCATED APPROPRIATE TO THEIR SURROUNDINGS. HOWEVER, NONE OF THE INFORMATION SHOWN IS IMPLIED TO SUGGEST OR SUBSTITUTE FOR A CONTRACTED ACTUAL LAND SURVEY.

A. M. BAIRD, ENGINEERING AND SURVEYING, INC. ASSUMES NO RESPONSIBILITY ARISING FROM THE USE OF INFORMATION PROVIDED, OTHER THAN WHAT HAS BEEN SPECIFICALLY INTENDED FOR.

DATE	DESCRIPTION	BY
##/##/##	HUMICO BLDG SUB 1	CPL

A.M. BAIRD
 ENGINEERING & SURVEYING, INC.

1257 MAIN STREET, P.O. BOX 396
 FORTUNA, CA 95540 (707) 725-5182

SCALE: AS NOTED
 DRAWN BY: CPL
 CHKD: AMB
 DATE: 12/7/2023

TIM WALSH
 2027 IRVING DR., EUREKA, CA 95503
 APN: 306-371-017-000

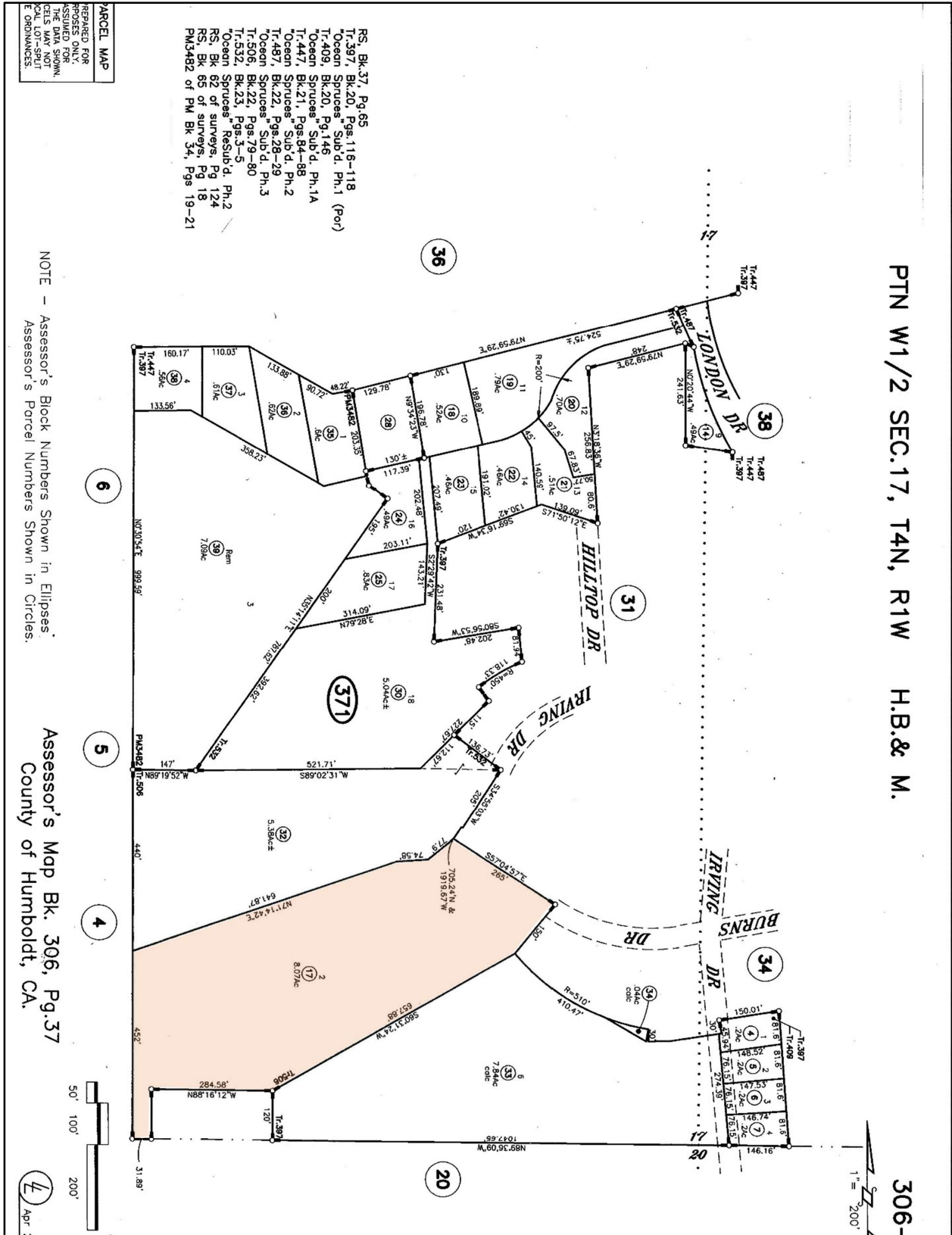
SITE PLAN

JOB #
 23-6050

SHEET #
SP1



Assessor's Parcel Map



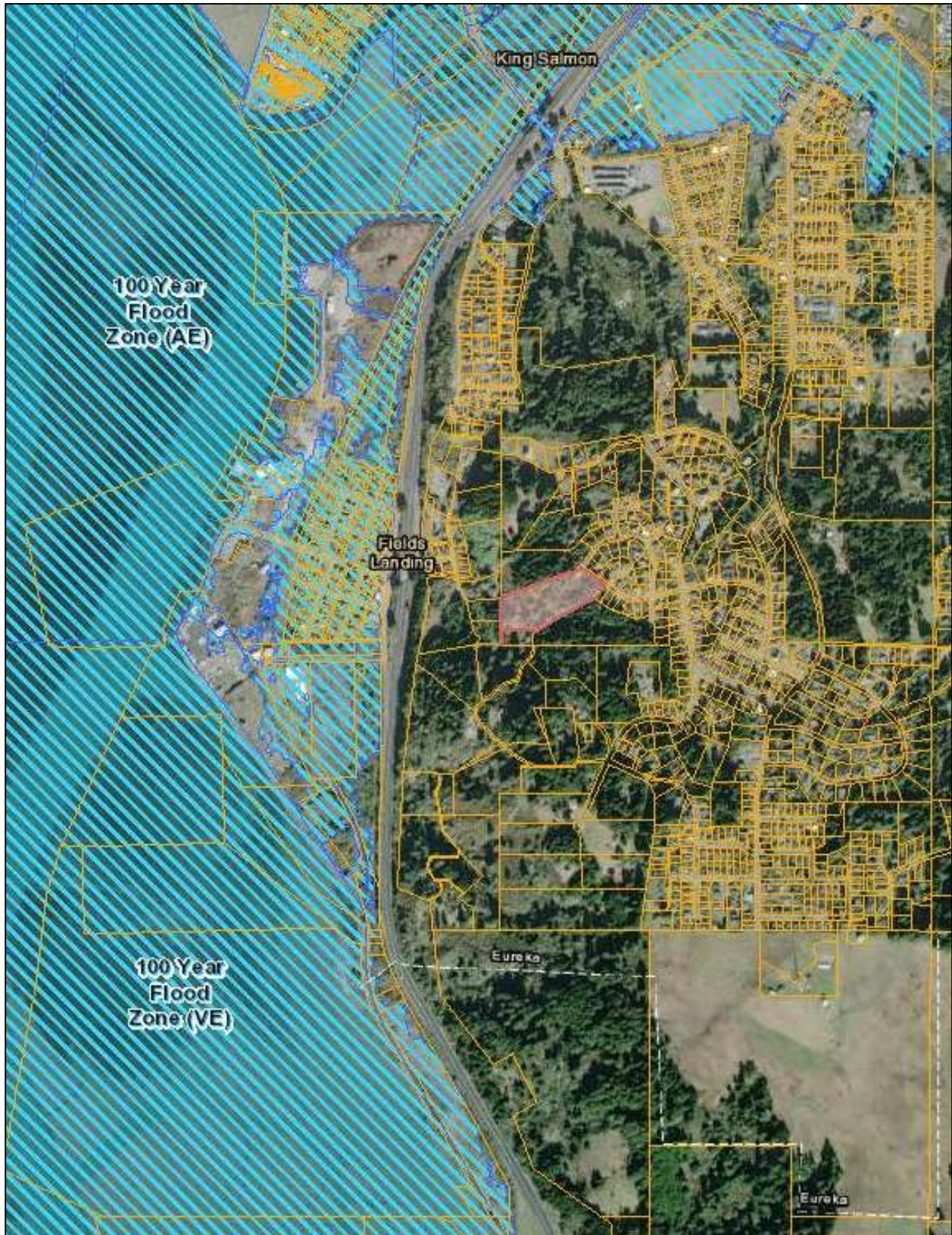


Topographic Map





Flood Map, 100-yr



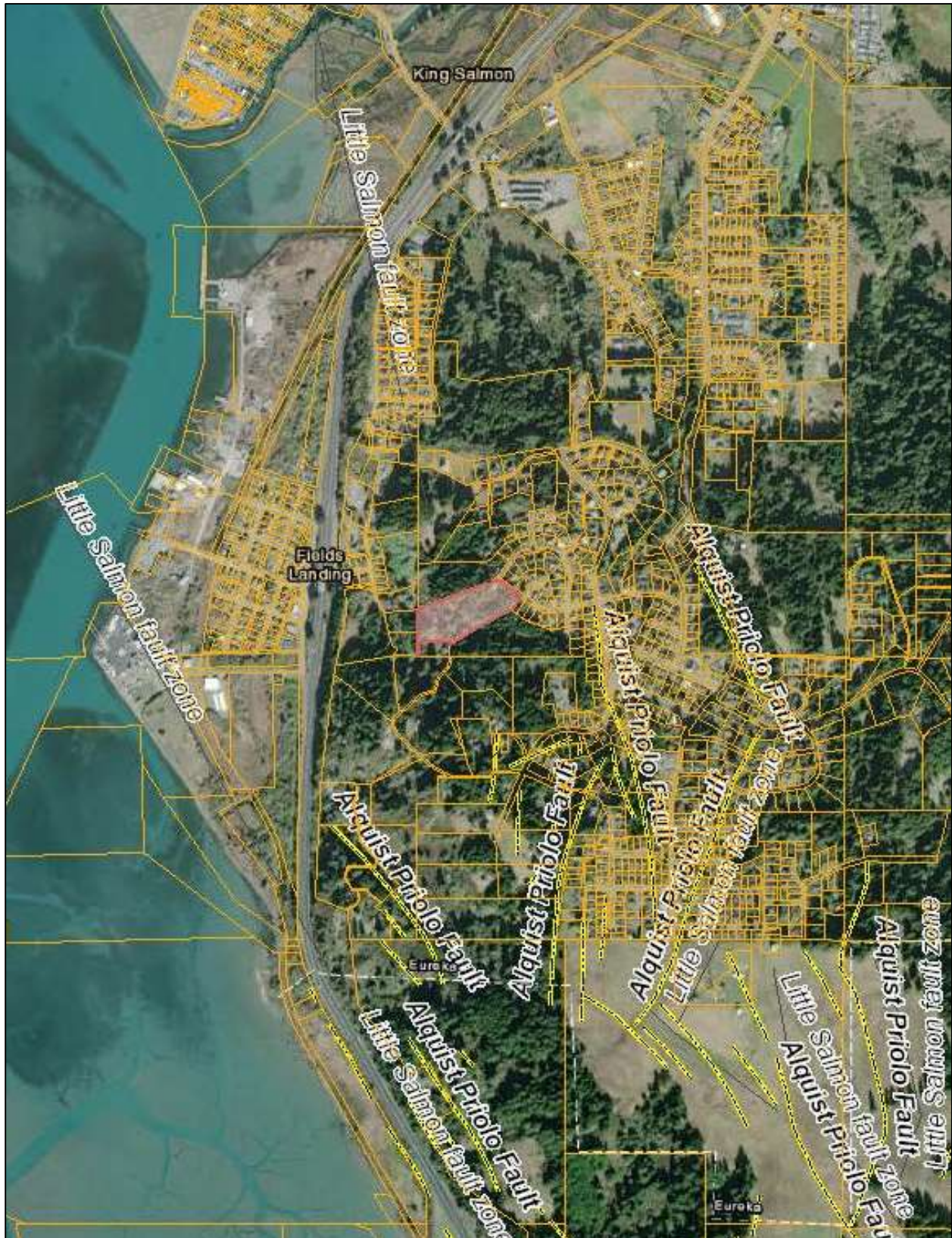


Historic Landslide Map





Fault Activity Map



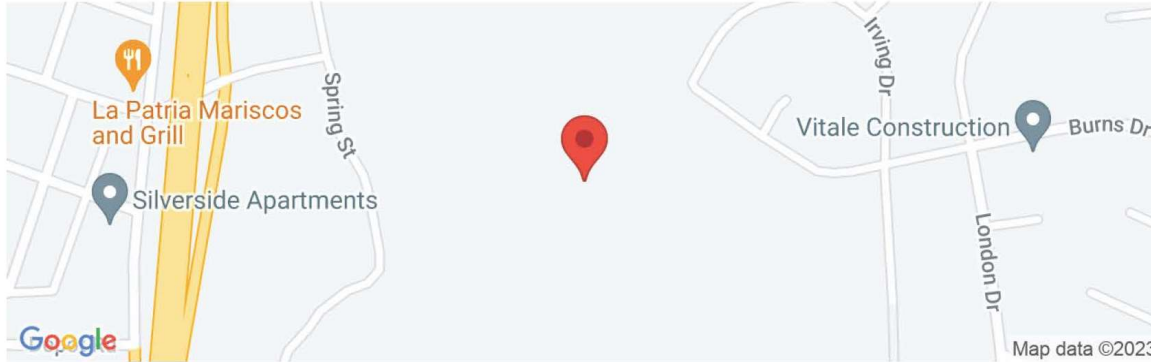


Seismic Design Parameters

USGS web services were down for some period of time and as a result this tool wasn't operational, resulting in *timeout* error.
 USGS web services are now operational so this tool should work as expected.



Latitude, Longitude: 40.7241, -124.2103



Date	11/28/2023, 11:18:05 AM
Design Code Reference Document	ASCE7-16
Risk Category	II
Site Class	D - Default (See Section 11.4.3)

Type	Value	Description
S_S	2.677	MCE_R ground motion. (for 0.2 second period)
S_1	1.093	MCE_R ground motion. (for 1.0s period)
S_{MS}	3.213	Site-modified spectral acceleration value
S_{M1}	null -See Section 11.4.8	Site-modified spectral acceleration value
S_{DS}	2.142	Numeric seismic design value at 0.2 second SA
S_{D1}	null -See Section 11.4.8	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	null -See Section 11.4.8	Seismic design category
F_a	1.2	Site amplification factor at 0.2 second
F_v	null -See Section 11.4.8	Site amplification factor at 1.0 second
PGA	1.09	MCE_G peak ground acceleration
F_{PGA}	1.2	Site amplification factor at PGA
PGA_M	1.308	Site modified peak ground acceleration
T_L	8	Long-period transition period in seconds
$SsRT$	2.814	Probabilistic risk-targeted ground motion. (0.2 second)
$SsUH$	3.169	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	2.677	Factored deterministic acceleration value. (0.2 second)
$S1RT$	1.19	Probabilistic risk-targeted ground motion. (1.0 second)
$S1UH$	1.364	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
$S1D$	1.093	Factored deterministic acceleration value. (1.0 second)
PGA_d	1.09	Factored deterministic acceleration value. (Peak Ground Acceleration)
PGA_{UH}	1.273	Uniform-hazard (2% probability of exceedance in 50 years) Peak Ground Acceleration
C_{RS}	0.888	Mapped value of the risk coefficient at short periods



Soil Profile Test Hole #1

DEPTH (ft)	DESCRIPTION	COLOR	SAMPLE DEPTH	SOIL CLASS
0	DRIED LEAVES, FOREST COVER			
-	TOP SOIL , ROOTS			LOAM
0.5				
-	MUNSELL COLOR: 10 YR 3/3 - dark brown			
1.0	GRAVEL (%): ~15%			
-	ROOTS: first 8 inches			
-	STRUCTURE: Single Grain, crumb			SANDY LOAM
1.5	CONSISTENCY: Wet: non-sticky (0) ; non-plastic (0) ; Moist: loose (0)			
-	GROUNDWATER: no signs of groundwater observed from 0"-24"			
2.0	NO GROUNDWATER			
-	END OF EXCAVATION			
2.5				
-				
3.0				
-				
3.5				
-				
4.0				
-				
4.5				
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5.0				
-				
5.5				
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6.0				
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6.5				
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7.0				
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7.5				
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8.0				
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8.5				
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9.0				
-				
9.5				
-				
10.0				



Soil Texture Test Hole #1

PROJECT NAME:	WALSH	DATE OF EXCAVATION:	11/19/2023
PROJECT #:	23-6050	EXCAVATION METHOD:	EXCAVATOR / HAND
SITE APN:	306-371-017	WEATHER CONDITIONS:	SUNNY DAY , DRY
TEST HOLE #:	1	LOGGED BY:	LBA , CPL
TH1-1	SAMPLE NUMBER		
2.0	DEPTH (ft)		
816.0	TOTAL SAMPLE WEIGHT (gm)		
96.0	COARSE WEIGHT (gm)		
75.0	A. OVENDRY WEIGHT (gm)		
1:00:00 PM	B. STARTING TIME (hh:mm:ss)		
69.8	C. TEMP @ 40 SEC. (°F)		
22.0	D. HYDROMETER READING @ 40 SEC. (gm/l)		
-6.1	E. COMPOSITE CORRECTION (gm/l)		
15.9	F. TRUE DENSITY @ 40 SEC. (gm/l) [D-E]		
69.0	G. TEMP @ 2.0 HRS. (°F)		
12.0	H. HYDROMETER READING @ 2.0 HRS. (gm/l)		
-6.3	I. COMPOSITE CORRECTION (gm/l)		
5.7	J. TRUE DENSITY @ 2.0 HRS. (gm/l) [H-I]		
78.9	K. % SAND [100-(F/A *100)]		
7.6	L. % CLAY [J/A *100]		
13.5	M. % SILT [100-K-L]		
SANDY LOAM	N. USDA TEXTURE		
2	O. SOIL PERCOLATION SUITABILITY CHART ZONE		
21.1	P. COMBINED % SILT AND CLAY [L+M]		
11.8	Q. COARSE % BY WEIGHT [COARSE WEIGHT/A *100]		
1.4	R. % COARSE ADJUSTMENT [0.000006Q ³ +0.00012Q ² +0.11936Q-0.01882]		



Soil Chart

PROJECT NAME:	WALSH	DATE OF EXCAVATION:	11/19/2023
PROJECT #:	23-6050	EXCAVATION METHOD:	EXCAVATOR / HAND
SITE APN:	306-371-017	WEATHER CONDITIONS:	SUNNY DAY , DRY
TEST HOLE #:	1	LOGGED BY:	LBA , CPL

COARSE ADJUSTMENT: TH#1 @ 2.0' = 1.4%

