APPENDIX B -
GEOLOGY AND SOILS INPUT REPORT

GEOLABS-WESTLAKE VILLAGE
Foundation and Soils Engineering, Geology

a dba of
R & R Services
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August 27, 2018
W.O. 5094

Development Planning Service
211 Village Commons Boulevard, Unit 15
Camarillo, CA 93012

Attention: Mr. Dennis Hardgrave

SUBJECT: Geology and Soils Input, Environmental Impact Report,
5153 Camino Ruiz, APN 160-0-093-195, RPD -201,
City of Camarillo, California.

Mr. Hardgrave:

We are pleased to present the following geology and soils input for the Environmental Impact Report (EIR) on the subject property. In accordance with your request, our firm has undertaken a desktop study of the geological and geotechnical features on the subject property for the purpose of providing such information for the EIR.

The scope of work performed by our office for this project site included the following:

- review of both published and unpublished information (including digital media) in both our files and those of the City of Camarillo
- geotechnical analysis of the assembled data
- preparation of this report

BACKGROUND

The project site is a semi-rectangular, nearly level parcel of about 13.76 acres located southeast of the intersection of Verdugo Way and Camino Ruiz in the City of Camarillo (Plate 1). It is currently the site of an abandoned office and industrial complex, attendant infrastructure, and parking areas.

PROPOSED PROJECT

We understand that the proposed project will consist of multi-family attached housing with parking and landscaping.

GEOLOGIC SETTING

Regionally, the site is located in the western portion of the Transverse Ranges geomorphic province of Southern California. The Transverse Ranges are essentially east-west trending elongate mountain ranges and valleys that are geologically complex. Structurally, the province reflects the north-south compressional forces that are the result of a bend in the San Andreas Fault. As the Pacific Plate (westerly side of the fault) and the North American Plate (easterly side) move past one another along the fault, the bend allows for large accumulations of compressional energy. Some of these forces are spent in deforming the crust into roughly east-west trending folds and secondary faults. The most significant of these faults are typically reverse or thrust faults, which help accommodate the crustal shortening taking place regionally.

EARTH MATERIALS

Our study noted two geologic units on the site: engineered fill and alluvium. Detailed descriptions of these units are provided below.

Engineered Fill

Engineered fill presently covers the entire pad area; it was placed during grading operations for the abandoned industrial/office complex. The depth of fill is unknown, but probably ranges from 3-10 feet. It is important to note that the fill was placed under grading ordinances in force at the time (mid 1980s) and may not meet today's standards.

Alluvial Deposits

Alluvial deposits occur at depth beneath the artificial fill. It generally consists of admixtures of sand and silt with occasional horizons of sandy clay. These sediments are characteristically in a moderately compact condition, but become more compact with depth.

These earth materials will be satisfactory for the support of the proposed project provided the Geotechnical Engineer's recommendations are followed.

GEOLOGIC STRUCTURE

Geologic structure in the on-site alluvial deposits is commonly subhorizontal. No significant folding has been reported.

LANDSLIDING

No landslides are present on or adjacent to the site, neither is the site prone to earthquake induced land sliding (CGS, 2002).

FAULTING

The subject property is not situated within either a State-defined Earthquake Fault Zone assigned by the State Geologist to Active faults or a City of Camarillo Fault Hazard Zone. The closest Active fault is the Simi-Santa Rosa fault approximately 900 feet to the northwest. Plate 1 illustrates the relationship of the fault zones to the subject property.

SEISMICITY

The property is situated within the seismically active Southern California region and strong ground shaking is likely to occur due to earthquakes caused by movement along nearby faults.

Seismic Ground Motion Values

The following table provides seismic ground motion values in accordance with the 2016 CBC (California Building Code).

Latitude: 34.2135º Longitude: -119.0013º	**Factor/Coefficient**	**Value**
Site Profile Type	Site Class	D
Short-Period MCE at 0.2s	S_s	2.125
1.0s Period MCE	S_1	0.766
Site Coefficient	F_a	1.000
Site Coefficient	F_v	1.500
Adjusted MCE Spectral Response Parameters	S_{ms} S_{m1}	2.125 1.148
Design Spectral Acceleration Parameters	S_{DS} S_{D1}	1.417 0.766
Peak Ground Acceleration	PGA	0.778

GROUNDWATER

Groundwater has been encountered in previous, adjacent geotechnical investigations at depths ranging from 20-30 feet (Geolabs, 1997). Based on the available data, groundwater did not adversely impact the grading operations on those developments.

LIQUEFACTION POTENTIAL

Liquefaction is a condition in which relatively weak soil undergoes continued deformation at a constant low residual stress due to the build-up of high porewater pressures. The possibility of liquefaction occurring at a given site is dependent upon the occurrence of a significant earthquake in the vicinity; sufficient groundwater to cause high pore pressures; and on the grain size, relative density, and confining pressures of the soil at the site.

Seismic Hazard Zone Report 054 (CGS, 2002), indicates that the site is within a zone mandating investigation of the potential for liquefaction. It is our opinion that the potential for liquefaction can be mitigated by appropriate earthmoving procedures, perhaps coupled with appropriate foundation design, recommended by the Geotechnical Engineer.

SOIL EROSION

Due to the relatively level nature of the existing site and the abundance of non-erodible surfaces associated with the proposed project, soil erosion is expected to be insignificant.

LATERAL SPREADING, SUBSIDENCE, AND HYDROCOLLAPSE

None of these phenomena have been reported, but they are addressed by the Geotechnical Engineer during the project design. Mitigation measures involve appropriate earthmoving procedures and foundation designs.

EXPANSIVE SOIL

Expansive soil is known to occur in the vicinity. The level of expansiveness is determined by the Geotechnical Engineer who will provide appropriate design-level parameters for foundation design.

CLOSURE

This geotechnical evaluation has been prepared in accordance with generally accepted engineering practices at this time and location. No other warranties, either express or implied, are made as to the professional advice provided under the terms of our agreement and included in this report.

Thank you for this opportunity to be of service. Please do not hesitate to call if you have any questions regarding this report.

Respectfully submitted,
GEOLABS-WESTLAKE VILLAGE

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CAS:LKS:RZS:af

Enclosures:
Location Map ....Plate 1
County View.......................................Plate 2
Fault Zone Map ....Plate 2a
Seismic Design Criteria.......................Appendix A
References ....Plate R

XC: (1) Addressee

LOCATION MAP

5153 Camino Ruiz
Camarillo, California

N
Geolabs WV

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GEOLOGY AND SOIL ENGINEERING

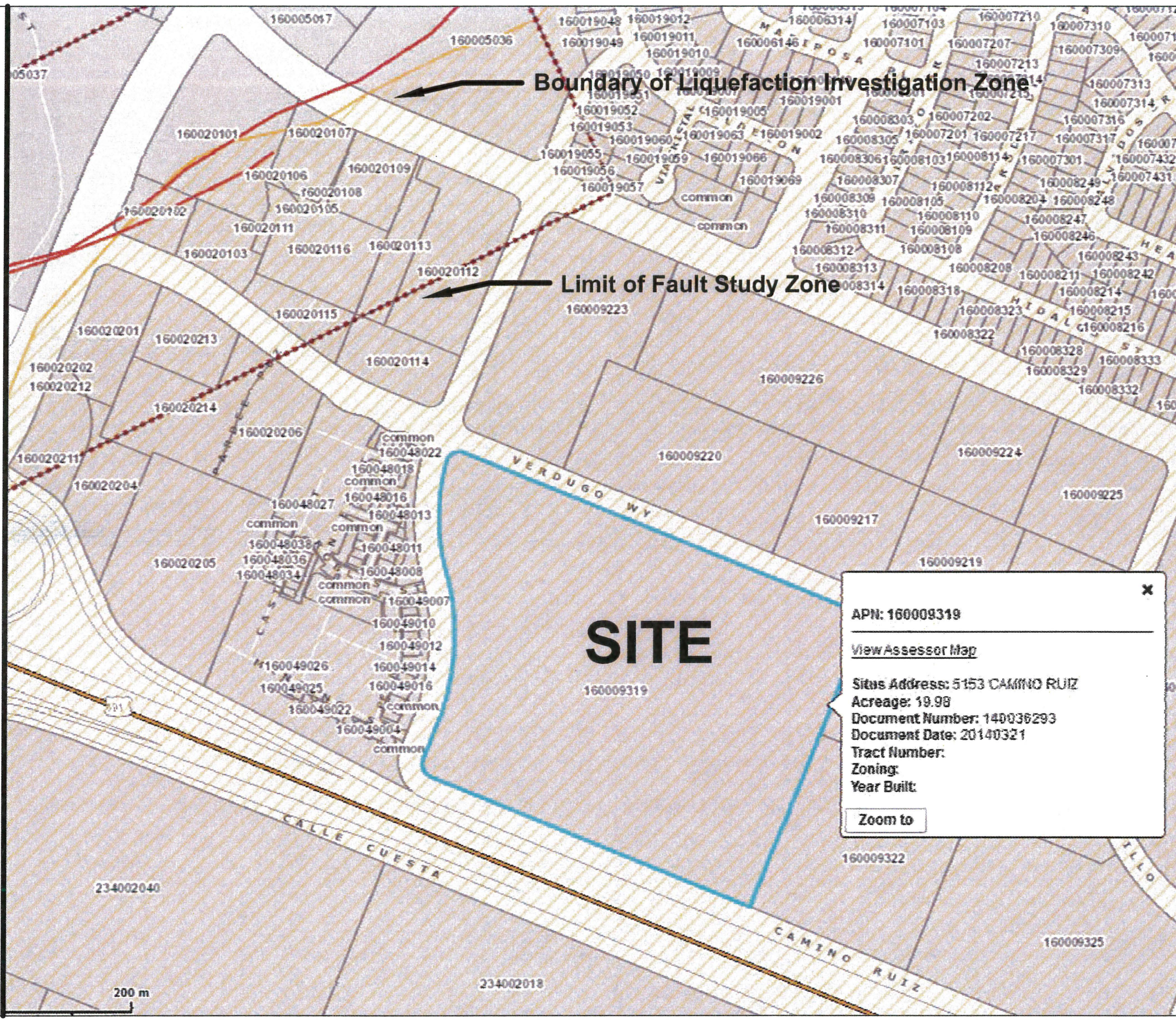
DATE 8/27/2018 BY
SCALE NTS W.O. 5094

Base Map: County of Ventura "County View" website

PLATE 1

"COUNTY VIEW" MAP

5153 Camino Ruiz
Camarillo, California



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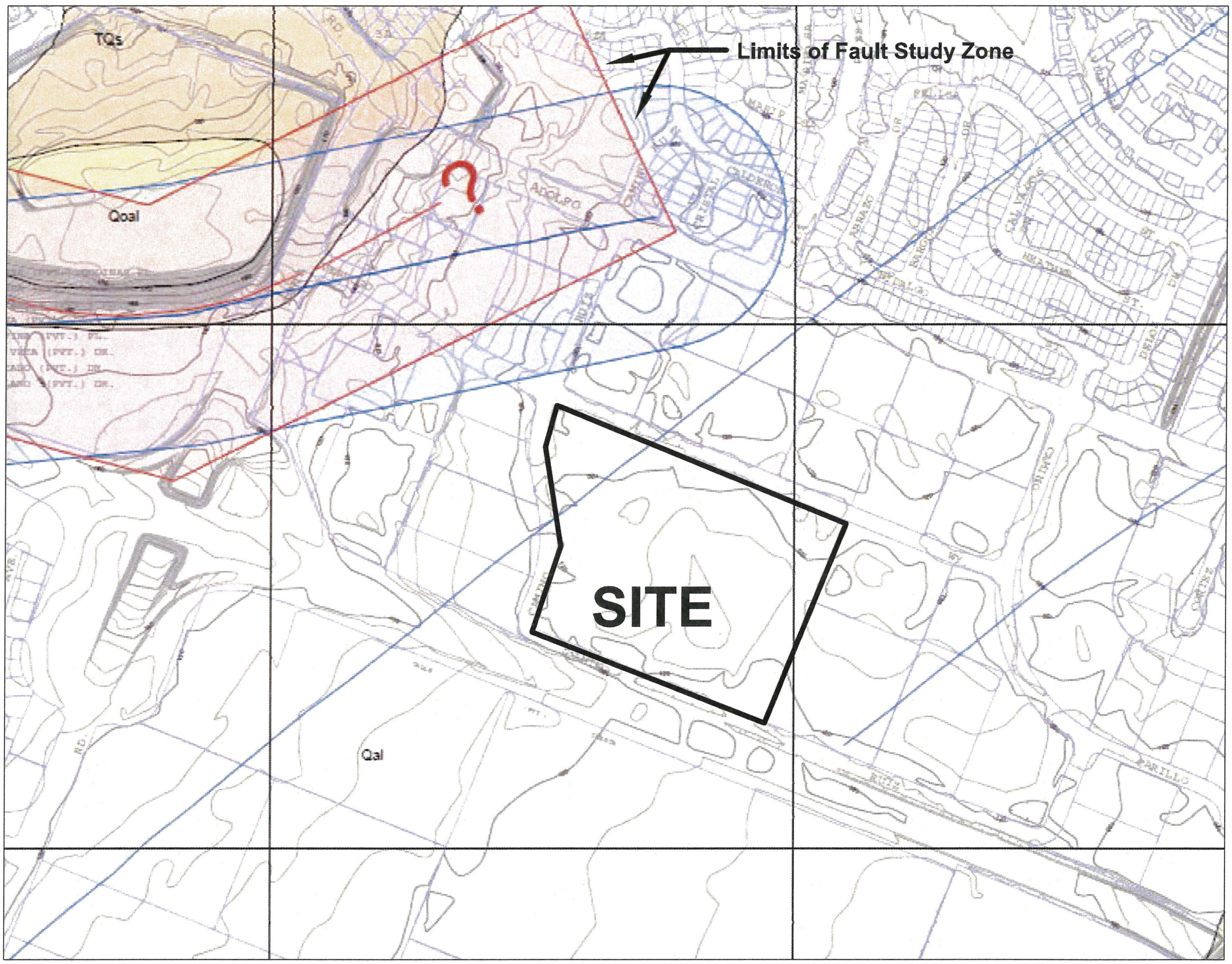
Base Map: County of Ventura "County View" website

PLATE 2

"FAULT ZONE" MAP

5153 Camino Ruiz
Camarillo, California



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Base Map: County of Ventura "County View" website

PLATE 2a

APPENDIX A
Seismic Design Criteria

August 30, 2018
W.O. 5094

USGS Design Maps Summary Report

User–Specified Input

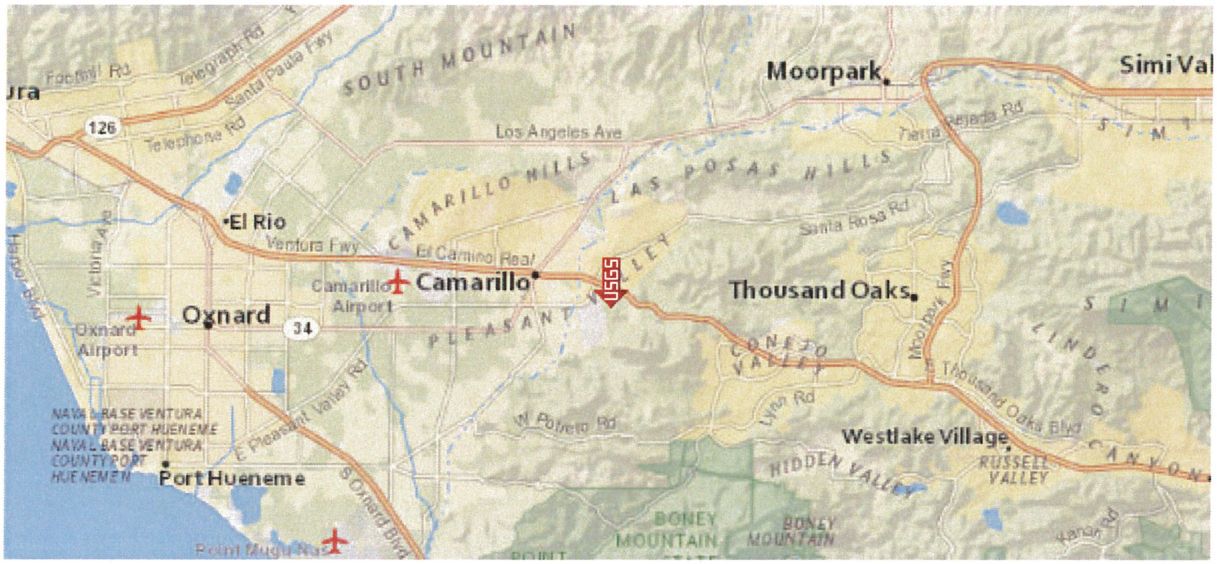
Report Title 5094 DPS
Thu August 30, 2018 22:33:12 UTC

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

Site Coordinates 34.2135°N, 119.0013°W

Site Soil Classification Site Class D – "Stiff Soil"

Risk Category I/II/III

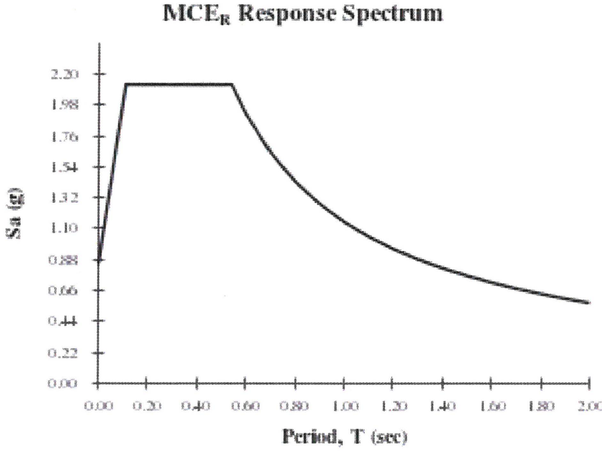


USGS–Provided Output

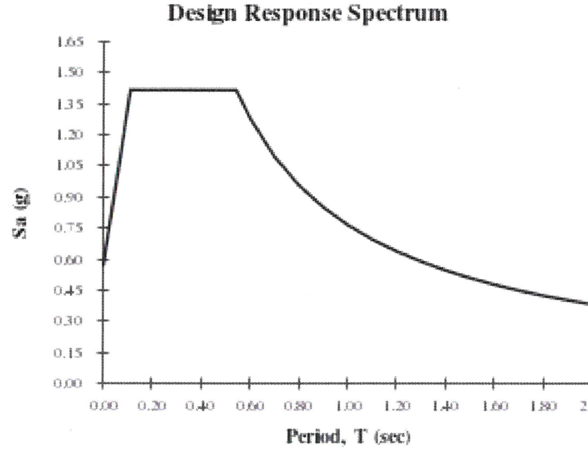
$S_S =$	2.125 g	$S_{MS} =$	2.125 g	$S_{DS} =$	1.417 g
$S_1 =$	0.766 g	$S_{M1} =$	1.148 g	$S_{D1} =$	0.766 g

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.

MCE_R Response Spectrum



Design Response Spectrum



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 (34.2135°N, 119.0013°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] $S_S = 2.125$ g

From Figure 22-2 [2] $S_1 = 0.766$ 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* ≥ 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 = 2.125 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 = 0.766 g, F_v = 1.500

Equation (11.4–1): $S_{MS} = F_aS_S = 1.000 \times 2.125 = 2.125$ g

Equation (11.4–2): $S_{M1} = F_vS_1 = 1.500 \times 0.766 = 1.148$ g

Section 11.4.4 — Design Spectral Acceleration Parameters

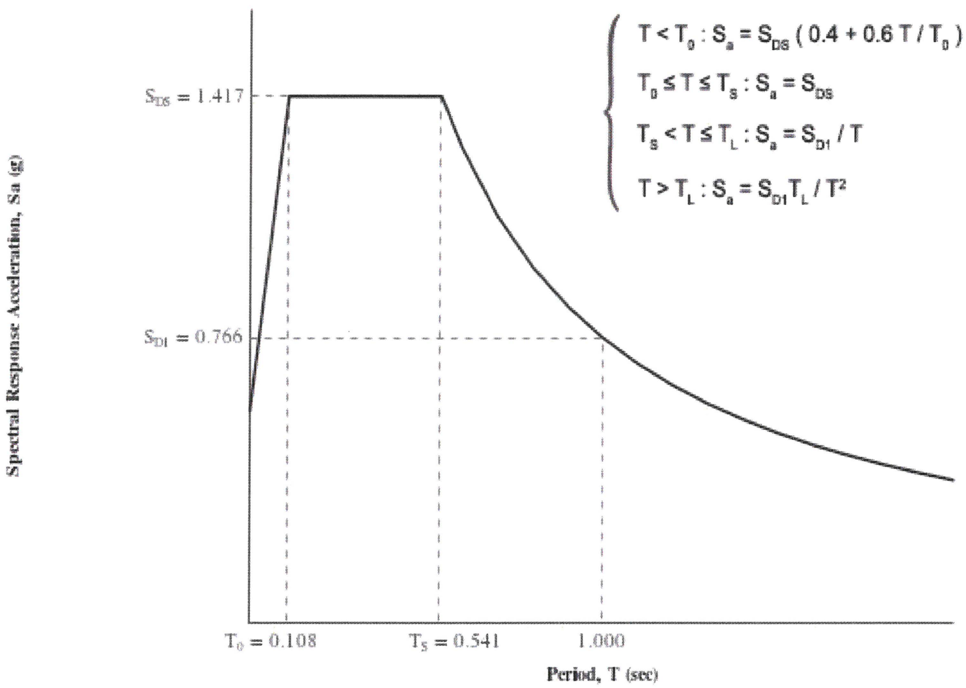
Equation (11.4–3): $S_{DS} = ⅔ S_{MS} = ⅔ \times 2.125 = 1.417$ g

Equation (11.4–4): $S_{D1} = ⅔ S_{M1} = ⅔ \times 1.148 = 0.766$ g

Section 11.4.5 — Design Response Spectrum

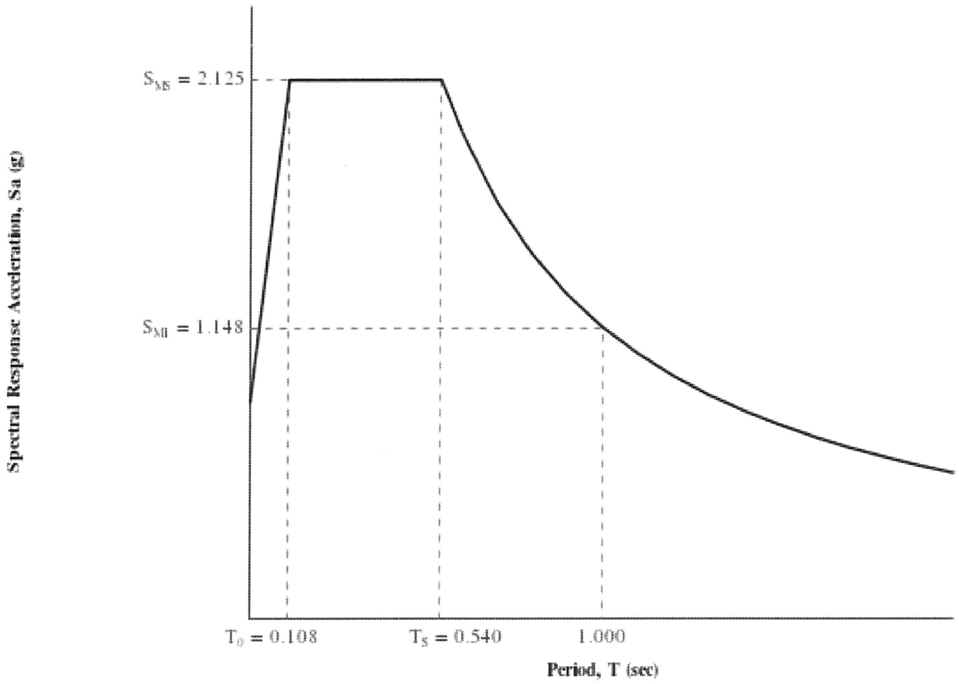
From Figure 22-12 [3] T_L = 8 seconds

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 = 0.778

Equation (11.8–1): $PGA_M = F_{PGA}PGA = 1.000 \times 0.778 = 0.778$ 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	$\boxed{1.0}$
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 = 0.778 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} = 0.974

From Figure 22-18 [6] C_{R1} = 0.978

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} = 1.417 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} = 0.766 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

REFERENCES

California Division of Mines and Geology, May 1, 1998; Special Studies Zone Map, Camarillo Quadrangle, Ventura County, California

California Geological Survey, 2002; Seismic Hazard Zone Report for the Camarillo 7.5 Minute Quadrangle, Ventura County, California, SHZR 054

Geolabs-Westlake Village, Sept. 22, 1997; Update Report and Supplemental Geotechnical Evaluation, Lots 8 & 12 of Tract 4272, Lots 1-4, 20-25, 30-33, and 37-40 of Tract 2347-1, Santa Rosa Road and Adolfo Road, City of Camarillo, California

...December 9, 2010, Update Report and Supplemental Geotechnical Evaluation, Lots 30-33, Tract 2347-1, IPD 397, Santa Rosa Road and Adolfo Road, City of Camarillo, California

...April 24, 2015, Supplemental Geotechnical Investigation, Lots 30-33, Tract 2347-1, IPD 397, Verdugo Way and Camino Ruiz City of Camarillo, California

...August 18, 2015; Fault Location and Activity Assessment, Lots 30-33, Tract 2347-1, IPD 397, Mission Oaks, Verdugo Way and Camino Ruiz, City of Camarillo, California

Ventura County, 2017, County View

Weber, F.H. Jr. et al, 1973; Geology and mineral resources study of Southern Ventura County, California: <u>in</u> Calif. Div. of Mines and Geol. Preliminary Report 14, 102p.