

STRUCTURAL CALCULATION REPORT

FOR PROJECT

METAL STAIRS GUARD-RAIL STRUCTURAL SUPPORT JONATHAN AJIMINE RESIDENCE

PROJECT ADDRESS

3203 SEAWOOD CT, FULLERTON, CA 92835



PER

ASCE 7-22

Section 4.5.1 of ASCE 7-22, which addresses Minimum Design Loads for Buildings and Other Structures.

Section 4.5.1: This section covers loads on guardrails and handrails, specifying the minimum load requirements that guardrails must withstand to ensure safety.



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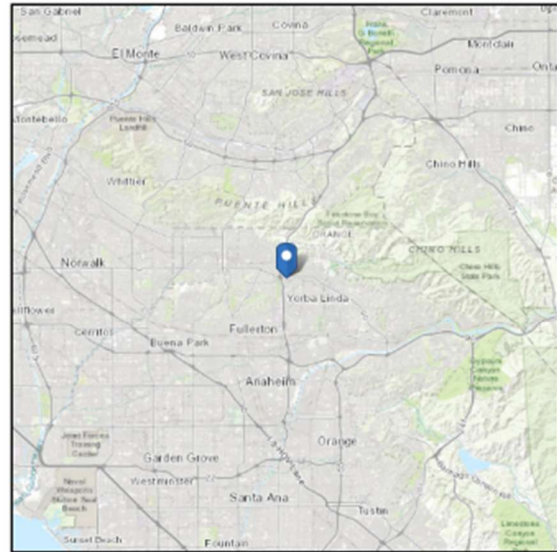
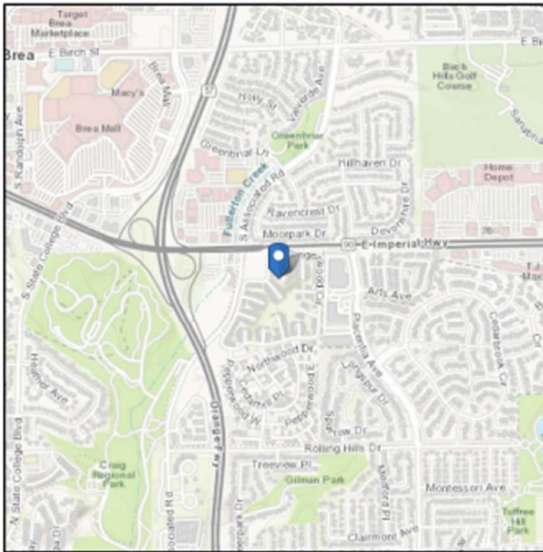


Address:
3203 Seawood Ct
Fullerton, California
92835

ASCE Hazards Report

Standard: ASCE/SEI 7-22
Risk Category: II
Soil Class: Default

Latitude: 33.909705
Longitude: -117.878514
Elevation: 341.799514724922 ft
(NAVD 88)



Wind

Results:

Wind Speed	95 Vmph
10-year MRI	66 Vmph
25-year MRI	72 Vmph
50-year MRI	76 Vmph
100-year MRI	81 Vmph
300-year MRI	89 Vmph
700-year MRI	95 Vmph
1,700-year MRI	102 Vmph
3,000-year MRI	106 Vmph
10,000-year MRI	115 Vmph
100,000-year MRI	133 Vmph
1,000,000-year MRI	151 Vmph

Data Source:

ASCE/SEI 7-22, Fig. 26.5-1B and Figs. CC.2-1–CC.2-4, and Section 26.5.2

Date Accessed:

Thu Oct 31 2024

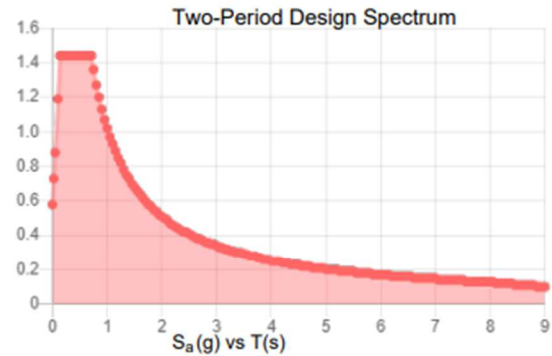
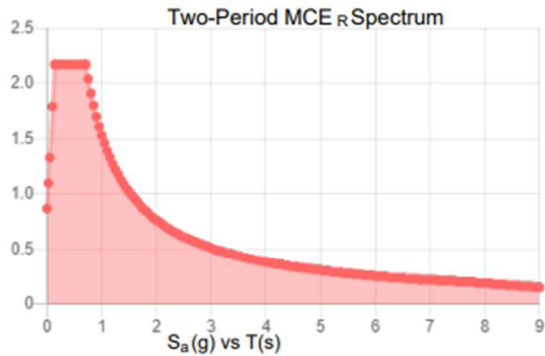
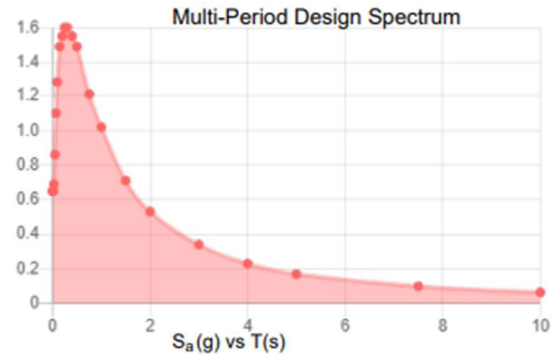
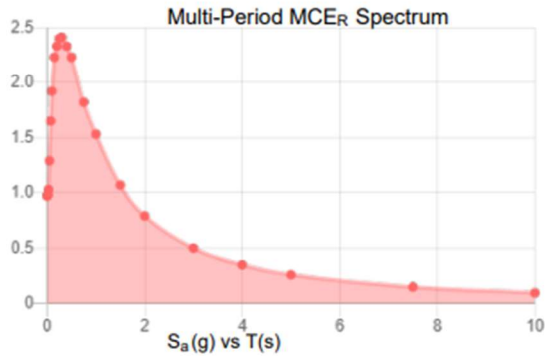
ASCE AMERICAN SOCIETY OF CIVIL ENGINEERS Seismic

Site Soil Class: Default

Results:

PGA _M :	0.87	T _L :	8
S _{MS} :	2.17	S _S :	2.03
S _{M1} :	1.53	S ₁ :	0.72
S _{DS} :	1.44	V _{S30} :	260
S _{D1} :	1.02		

Seismic Design Category: D



MCE_R Vertical Response Spectrum
Vertical ground motion data has not yet been made available by USGS.

Design Vertical Response Spectrum
Vertical ground motion data has not yet been made available by USGS.



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LOADS PER APPROVED PROJECT'S STRUCTURAL PLANS. SHEET S0.0

DESIGN LOADS:

LIVE LOADS:

ROOF = 20 PSF
CEILING = 10 PSF

DEAD LOADS:

ROOF = 16.5 PSF
CEILING = 8 PSF

WIND ANALYSIS PER CHAPTER 26 OF THE CODE:

$I_w = 1.0$ (STANDARD STRUCTURE)
ULTIMATE BASIC WIND SPEED = 95 mph
EXPOSURE = C

SEISMIC ANALYSIS PER CHAPTER 16 OF THE CODE UTILIZING THE EQUIVALENT LATERAL FORCE PROCEDURE:

DESIGN BASE SHEAR = 0.1538 W (A.S.D.)
SEISMIC DESIGN CATEGORY: D SITE CLASS: D
FA = 1.20 FV = 1.50
S1 = 0.6192 Ss = 1.70
SEISMIC-FORCE-RESISTING SYSTEM: PLYWOOD SHEARWALLS
I = 1 R = 6.5

2. CBC 2022

3. FBC 2020

- A. LIVE LOADS uniform (psf): 100
- B. LIVE LOADS concentrated (lb): 300
- C. LIVE LOADS handrail (plf): 50
- D. LIVE LOADS handrail concentrated (lb): 200

STRUCTURAL STEEL:

1. SEE NOTES ON PRIMARY CODES AND SPECIFICATIONS.

2. MATERIALS:

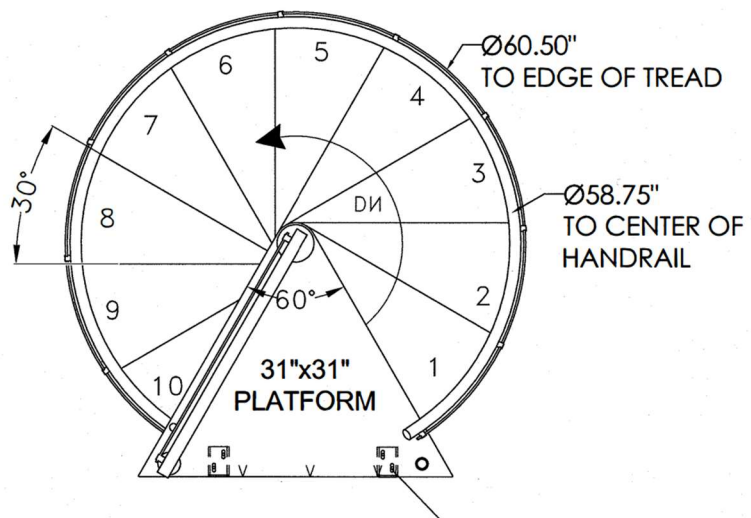
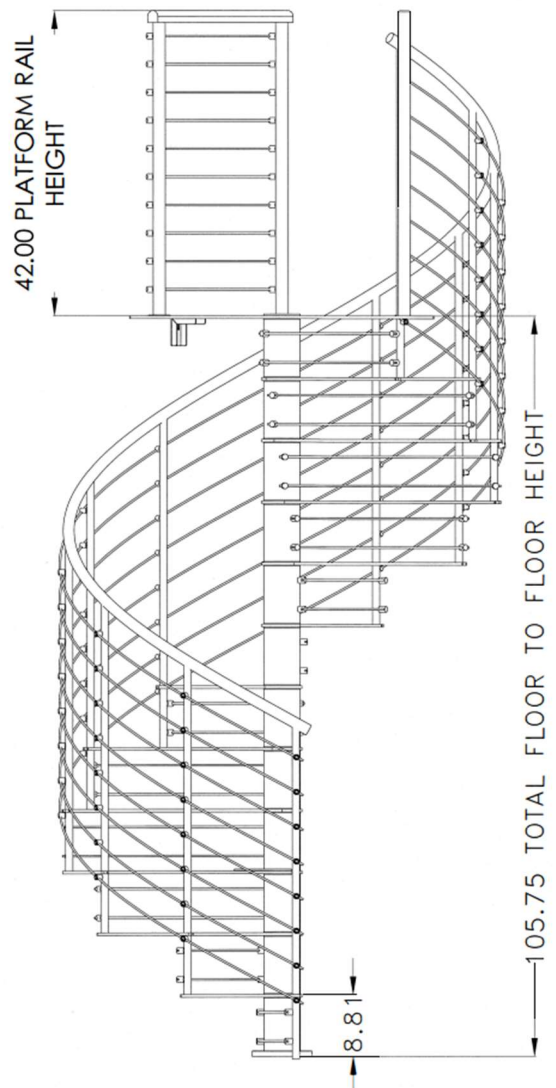
W-SHAPES & WT-SHAPES..... ASTM A992
S-SHAPES, M-SHAPES, HP-SHAPES..... ASTM A36
ST-SHAPES & MT-SHAPES..... ASTM A36
C-SHAPES & MC-SHAPES..... ASTM A36
ANGLES & PLATES..... ASTM A36, ASTM A709 Gr50
HSS SHAPES..... ASTM A500, GRADE B
HSS ROUNDS..... ASTM A500 GRADE B
HIGH STRENGTH BOLTS..... ASTM F3125
MACHINE BOLTS..... ASTM A307
ANCHOR RODS..... ASTM F1554, GRADE 55
WELDED HEADED STUDS..... ASTM A108
DEFORMED BAR ANCHORS..... ASTM A496
WELDING ELECTRODES..... AWS D1.1, E70 SERIES



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UPPER LEVEL
HEADROOM: 87.76



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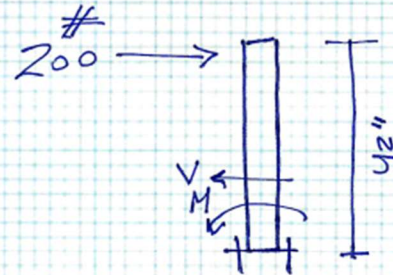
Design Engineer : Ben Hamed
Structural Hand Calculation Sheet

PROJECT: 3203 Seawood Ct. Fullerton

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* The moment at The Base

$$M = F \times h = 200 \times 3.5' = 700 \text{ #'} \\ = 8400 \text{ lb-in}$$



* Shear Force at The Base
= 200 lb.

* Check For Shear and pull out

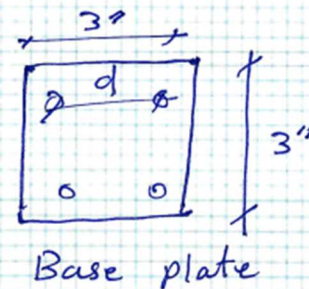
$$V_{\text{screw}} = \frac{200}{4} = 50 \text{ lb} \text{ For Four screws plate}$$

- Tension Requirement

Assume screws From Tension side will carry The moment load

$$\therefore T_{\text{screw}} = \frac{M}{2 \times d} = \frac{8400 \text{ lb-in}}{2 \times 3"} \\ = 1400 \text{ lb}$$

\therefore each screw on The tension must Resist 1400 lb pullout Force.



* Pull out capacity

$$\text{embedment depth} = \frac{T_{\text{screw}}}{\text{withdrawal}}$$



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$$\text{embedment length} = \frac{1400}{300} = 4.67 \text{ in}$$

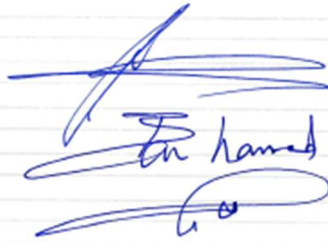
5 inches screw is good
+ Base plate thickness

6 inches minimum
screw length

— a 3/8" Diam.

6" in screw fully

Embedded into Beam below
a min. of 3/8" Dia. per
screw


Ben Hamed

10/31/24



Summary

To securely attach the guardrail to the glulam beam, use **3/8" diameter lag screws** with a **minimum length of 5.5 inches**. This will ensure an embedment depth of at least 5 inches, providing sufficient resistance to both pull-out and shear forces per ASCE 7-22 requirements.