Structural Calculations For:

Dignity Moves - Ojai

408 S Signal St

Ojai, CA 93023

Prepared for: DJA Architects

Job #: 02061-2025-01

Date: October 16, 2025

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Criteria Sheet

Codes

Structural	CBC 2022
Loading	ASCE 7-16
Wood:	NDS 2018 / SDPWS 2021
Steel:	AISC 360-16
Concrete:	ACI 318-19
Masonry:	TMS 402/602-16

Project Location

Street & Number	408 S Signal St
City:	Ojai
State:	CA
ZIP:	93023
Latitude:	34.4443 N
Longitude:	-119.2457 W
Ground Elevation	752 ft

Occupancy Category

Risk Category: II — ASCE 7 Table 1.5-1

Seismic Load Summary:

Analysis Procedure: Equivalent Lateral Force Procedure

Lateral System: Light-frame (wood) Walls Sheathed with Wood Structural Panels Rated for Shear Resistance

R:	6.50	C_d=	4
Base Shear V =	182 kips	Ω_o=	2.5
S_S=	1.846	S_1=	0.702
S_{DS}=	1.48	S_{D1}=	1.19
C_s=	0.227	I_E=	1.0

Story Information

# Stories Above Grade (Including Mezzanine Levels)	1

Horizontal and Vertical Irregularities:

Is the building a "Regular Structure"? (No horizontal or vertical irregularities)	No

Wind Load Summary:

V= 98 K_{ZT}= 1.00

Exposure = B

Dead Loads:

Roof			Wall		
(2) Durapanel	8	psf	(2) Durapanel	10	psf
1/2" Sheathing	1.8	psf	1/2" Sheathing	2	psf
Trusses @ 24" oc	2.5	psf	Studs @ 16" oc	2.2	psf
Misc./Mech.	1.5	psf	Misc./Mech.	2	psf
Roofing	5	psf	Ceiling Finish	2.8	
Roof Tiles	20	psf		19	psf
Solar Panels	5	psf	Use	20	psf
	44	psf			
Use	45	psf			
Add'l Seismic Weight	5	psf			
Seismic Weight	50	psf			

Live Loads:

Roof	20	psf
Floor	40	psf

Snow Loading Criteria:

Ground Snow, p_g	25 psf	Flat Roof Snow Load, p_f	25.0 psf	Importance Factor, I_s	1.00
Exposure Factor, C_e	1.00	Sloped Roof Snow Load, p_s	25.0 psf		
Thermal Factor, C_t	1.00	Slope Factor, C_s	1.00		

Soils:

Allowable Bearing	1500	psf	Active	55/35	pcf (Restrained/Unrestrained)
Sliding, μ	0.3		Seismic Surcharge	8H	
Passive	250	pcf			

Soils Report Provided?	No	To be approved by the authority having jurisdiction, per 11.8.2 exception.
Site Specific Ground Motion Hazard Analysis Provided?	No	

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Dignity Moves Ojai	DATE 10/14/2025
Criteria	PROJ. #
	DESIGN AGL
	SHEET 1

Seismic Design

ASCE 7-16 Seismic Analysis | Equivalent Lateral Force Procedure | Apply Section 12.8.1.3 (Where Applicable)? Yes

Seismic Force Resisting System Per Table 12.2-1		
	System	Bearing Wall Systems
	Type:	Light-frame (wood) Walls Sheathed with Wood Structural Panels Rated for Shear Resistance

Seismic Design Cat.	D	
Risk Category	II	I, II, or III, or IV per Table 1.5-1
Site Class	D (Default)	Assumed default soil properties, per 11.4.3.
Diaphragm Flexibility	Flexible	

Section 12.8.1.3

1. Regular Structure	No
2. ≤ 5 Stories above grade	Yes
3. T ≤ 0.5s	Yes
4. ρ = 1.0	No
5. Not Site Class E or F	Yes
6. Risk Category I or II	Yes

If all items above are met, S_{DS} may be taken as 1.0, but not less than 0.7*(Calculated S_{DS})

S_S	1.846 g	2% in 50 yr, Latitude & Longitude lookup
S_1	0.702 g	2% in 50 yr, Latitude & Longitude lookup
R	6.50	
C_d	4.0	
Ω_o	2.5	
I_e	1.00	Table 1.5-2
h_n	10.0 ft	
Ct	0.02	Table 12.8-2
x	0.75	Table 12.8-2
T_a	0.11 sec	
T	0.11 sec	Eq. 12.8-7
T_0	0.16 sec	
T_S	0.81 sec	
T_L	8.00 sec	
F_a	1.20	Table 11.4-1
F_v	1.70	Table 11.4-2
S_{MS}	2.22 g	Eq. 11.4-1
S_{M1}	1.79 g	Eq. 11.4-2
S_{DS}	1.477 g	Eq. 11.4-3
S_{D1}	1.193 g	Eq. 11.4-4
C_s	***0.227 Controls***	Eq. 12.8-2
	1.632	Eq. 12.8-3 need not exceed, T < T_L
	0.054	Eq. 12.8-5 or 12.8-6 minimum
C_s, design	0.227	Section 11.4.8 Exception 2 Applied
Bldg. Weight	800.0 k	
V = C_SW	181.8 k	Eq. 12.8-1, Strength Level Base Shear
V = C_{Sasd}W	127.2 k	Eq. 12.8-1 ASD Base Shear

Building Period Per Alternate Analysis

T (sec)	

Per Geotech Report

F_a	
F_v	

$$T_a = C_t h_n^x \quad \text{Eq. 12.8.7}$$

$$S_{MS} = F_a S_S \quad \text{Eq. 11.4-1}$$
$$S_{M1} = F_v S_1 \quad \text{Eq. 11.4-2}$$
$$S_{DS} = {}^2/_3\, S_{MS} \quad \text{Eq. 11.4-3}$$
$$S_{D1} = {}^2/_3\, S_{M1} \quad \text{Eq. 11.4-4}$$

$$C_S = \frac{S_{DS}}{(R/I_e)} \quad \text{Eq. 12.8-2}$$
$$C_S = \frac{S_{D1}}{T(R/I_e)} \quad \text{Eq. 12.8-3}$$
$$C_S = \frac{S_{D1} T_L}{T^2 (R/I_e)} \quad \text{Eq. 12.8-4}$$
$$C_S \geq 0.044 S_{DS} I_e \quad \text{Eq. 12.8-5}$$
$$C_S \geq 0.01 \quad \text{Eq. 12.8-5}$$
$$C_S \geq 0.5 \frac{S_1}{(R/I_e)} \quad \text{Eq. 12.8-6}$$

$$C_{VX} = w_x h_x^k / \sum_{i=1}^{n} w_x h_i^k \quad \text{Eq. 12.8-12}$$

$$F_{px} = {}^{\sum_{i=x}^{n} F_i}/_{\sum_{i=x}^{n} w_i}\, w_{px} \quad \text{Eq. 12.10-1}$$
$$F_{px} \geq 0.2 S_{DS} I_e w_{px} \quad \text{Eq. 12.10-2}$$
$$F_{px} \leq 0.4 S_{DS} I_e w_{px} \quad \text{Eq. 12.10-3}$$

Vertical Distribution ASD ρ= 1.3 k= 1.000

Level	h_x (ft)	W_x (k)	h_x^k (ft)	$W_x h_x^k$	Story Shear ASD C_{vx} (%)	Story Shear ASD F_x (k)	Story Shear ASD SV (k)	Diaphragm Force (ρ not included) $F_{px,calc}$	$F_{px,min}$	$F_{px,max}$	$F_{px,design}$	γ=F_{px}/F_x
1	10.0	800	10.0	8000	1.000	165.4	**165.4**	127.2	165.4	330.8	**165.4**	1.00
Σ		800.0		8000		**165.4**						

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Wind Design - MWFRS

ASCE 7 Chapter 27 - Directional Procedure

Design Method	ASD

Wind Coefficients

Exposure	B	
V=	98	mph
K_d=	0.85	Table 26.6-1
K_h=	0.66	Table 26.10-1
K_e=	0.97	Table 26.9-1
G=	0.85	26.9.4

Transverse Wind Pressures

L/B = 0.89 h/L = 0.39

Pressure Coefficients from Figure 27.3-1:

Bldg Face	C_p
Windward Wall	0.8
Leeward Wall	-0.50
Windward Roof	-0.2 / 0.24
Leeward Roof	-0.60

Location and Building Dimensions

Calculate Kzt?	Yes	
Kzt	1.00	
Roof Type	Gable	
Roof Slope - Transverse Dir	30	degrees
Roof Slope - Long Dir	0	degrees
Ground to top of roof	30	ft
Bot of roof to top of roof	10.5	ft
Mean Roof Height, h	24.75	ft
Short Plan Dimension	63	ft
Long Plan Dimension	71	ft
Parapet ?	No	
Ground to top of parapet		ft
Average Parapet Height		ft

Velocity Pressure at Mean Roof Height, q_h =	13.5	psf

Wall Pressures (Unfactored): ASD

Ht	K_z	q_z	$P_{ww\ walls}$	$P_{lwwalls}$	**P_{walls} (psf)**
0-15	0.57	11.59	7.88	5.73	**9.6**
15-20	0.62	12.61	8.57	5.73	**9.6**
20-25	0.66	13.42	9.13	5.73	**9.6**
25-30	0.7	14.24	9.68	5.73	**9.6**
30-40	0.76	15.46	10.51	5.73	**9.7**
41-50	0.81	16.47	11.20	5.73	**10.2**
51-60	0.85	17.29	11.75	5.73	**10.5**
61-70	0.89	18.10	12.31	5.73	**10.8**
71-80	0.93	18.91	12.86	5.73	**11.2**
81-90	0.96	19.52	13.28	5.73	**11.4**
91-100	0.99	20.13	13.69	5.73	**11.7**

Roof Pressures (Unfactored) ASD

Windward		Leeward	**Horiz Proj (psf)**
Max	Min		
2.8	-2.3	-6.9	**5.80**

Longitudinal Wind Pressures

L/B = 1.13 h/L = 0.35

Pressure Coefficients from Figure 27.4-1:

Bldg Face	C_p
Windward Wall	0.8
Leeward Wall	-0.47
Windward Roof	-0.9 / -0.18
Leeward Roof	-0.41

Wall Pressures (Unfactored): ASD

Ht	K_z	q_z	$P_{ww\ walls}$	$P_{lwwalls}$	**P_{walls} (psf)**
0-15	0.57	11.59	7.88	5.44	**9.60**
15-20	0.62	12.61	8.57	5.44	**9.60**
20-25	0.66	13.42	9.13	5.44	**9.60**
25-30	0.7	14.24	9.68	5.44	**9.60**
30-40	0.76	15.46	10.51	5.44	**9.60**
41-50	0.81	16.47	11.20	5.44	**9.99**
51-60	0.85	17.29	11.75	5.44	**10.32**
61-70	0.89	18.10	12.31	5.44	**10.65**
71-80	0.93	18.91	12.86	5.44	**10.98**
81-90	0.96	19.52	13.28	5.44	**11.23**
91-100	0.99	20.13	13.69	5.44	**11.48**

Roof Pressures (Unfactored) ASD

Windward		Leeward	**Horiz Proj (psf)**
Max	Min		
-2.1	-10.3	-4.7	**4.80**

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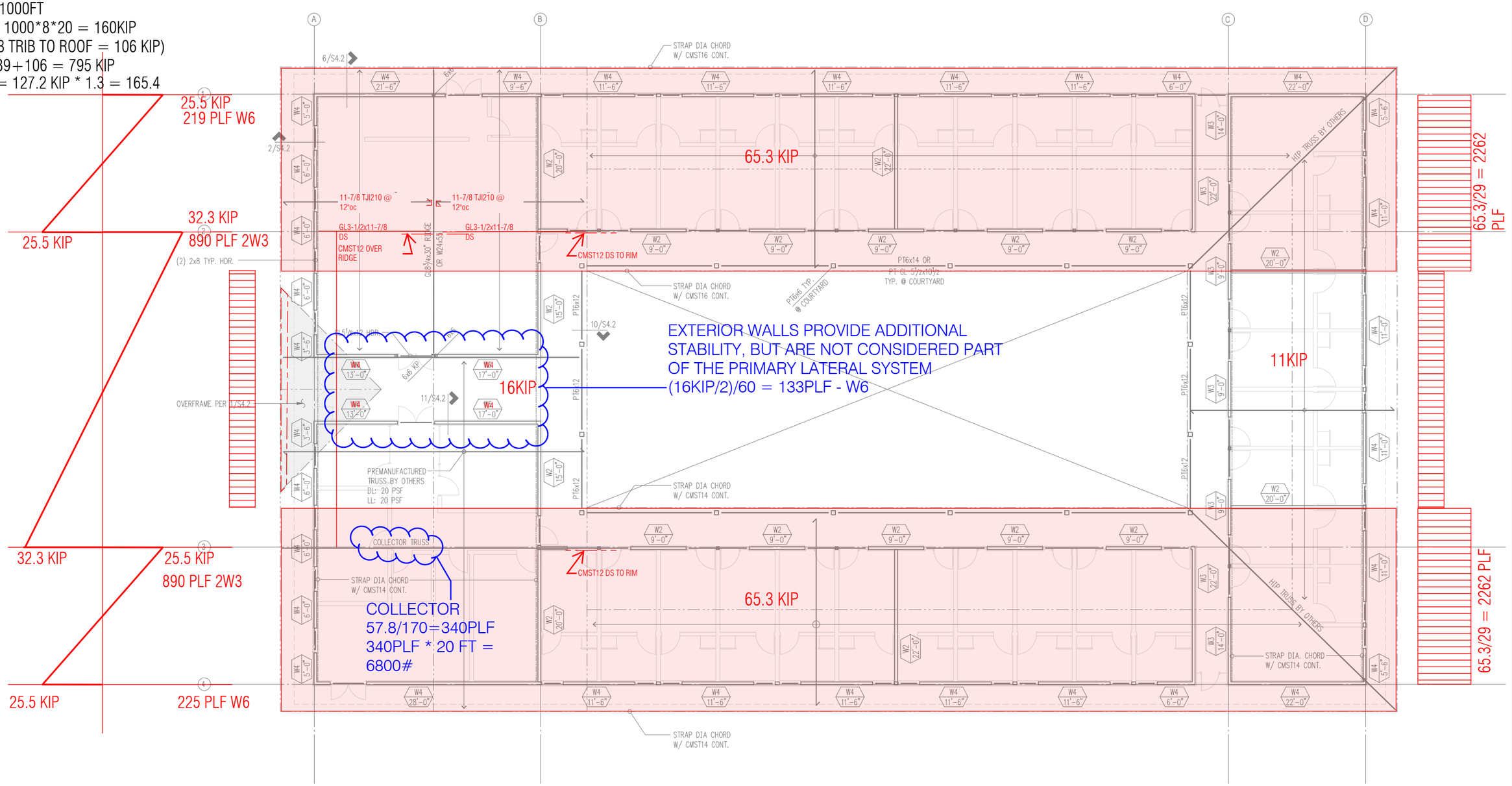
A_ROOF = 15300 FT2
W_ROOF =688.5KIP
L_DURA = 1000FT
W_DURA = 1000*8*20 = 160KIP
ASSUME 2/3 TRIB TO ROOF = 106 KIP)
W TOT = 689+106 = 795 KIP
V SEISMIC = 127.2 KIP * 1.3 = 165.4



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DMOS - LATERAL DESIGN SEISMIC, N/S DIRECTION

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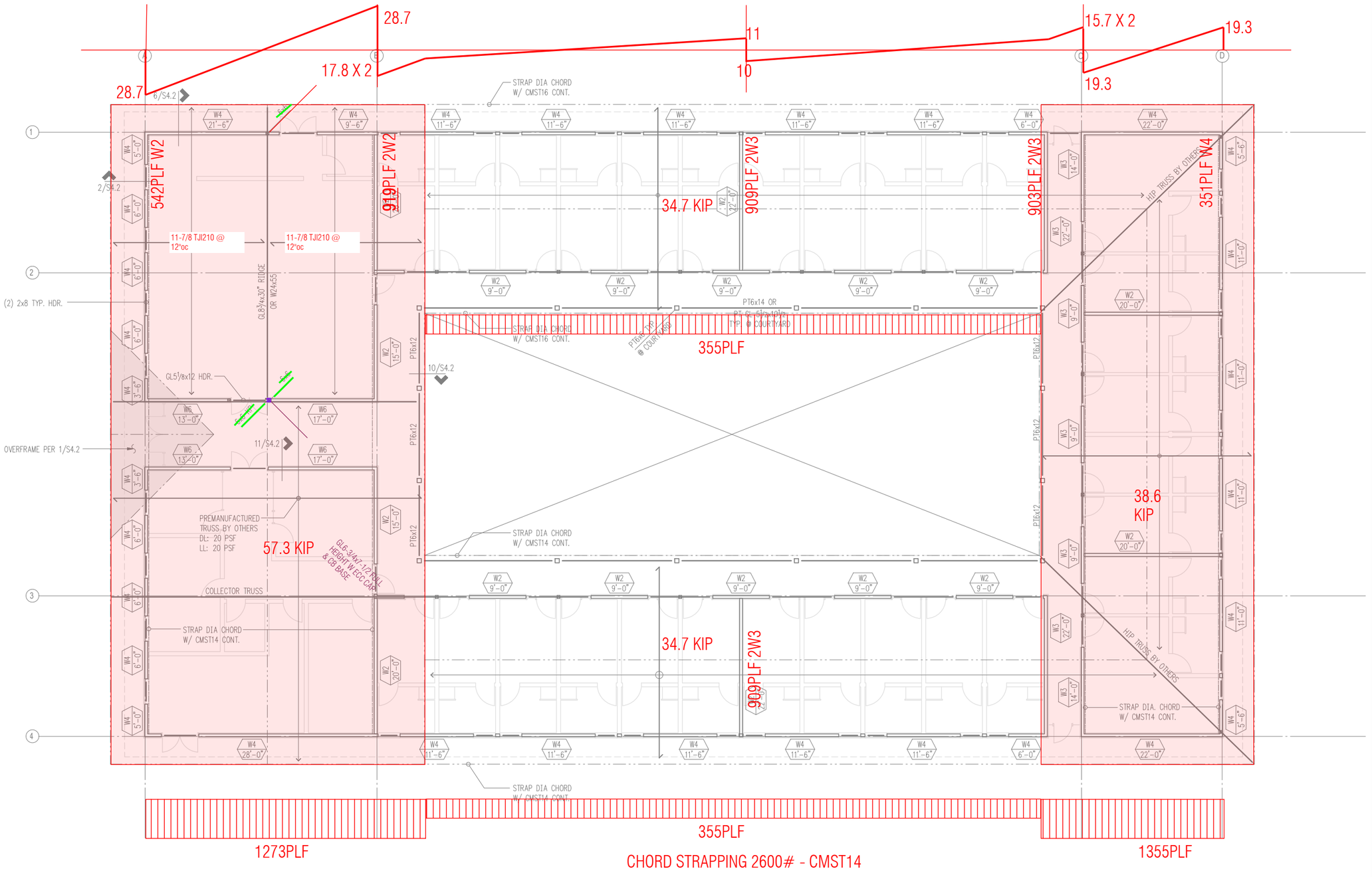
A_ROOF = 15300 FT2
W_ROOF =688.5KIP
L_DURA = 1000FT
W_DURA = 1000*8*20 = 160KIP
ASSUME 2/3 TRIB TO ROOF = 106 KIP)
W TOT = 689+106 = 795 KIP
V SEISMIC = 127.2 KIP * 1.3 = 165.4

WORST CASE OVERTURNING
919 PLF*8'0" = 7352#
0.6DL = 0.6 * 16*8*15/2 = 576LBS
OT = 6776LBS
SIMPSON HDU8



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Project Title:

DMOS - LATERAL DESIGN SEISMIC, E/W DIRECTION

Sheet Title:

Date

SSF project no.

Design

Drawn

Sheet

SW Schedule : 3/4" Floor Sheathing

Mark	Controlling Capacity		Sheathing	Panel Edge Nailing			Top Plate Connection				Base Plate Connection			
				Type	Capacity		Type	Capacity	Type	Capacity	At Wood	Capacity	At Concrete	Capacity
	V_s	V_w			V_s	V_w	TJI	ASD	2x or LSL	ASD		ASD		ASD
W6	*242*	*264*	**15/32" CDX PLYWOOD**	8d @ 6" oc	*242*	*339*	16d @ 6" oc	*285*	A35/LTP4 @ 24" oc	*288*	16d @ 6" oc	*264*	5/8" DIA A.B. @ 48" oc	*344*
W4	*353*	*396*	**15/32" CDX PLYWOOD**	8d @ 4" oc	*353*	*495*	16d @ 4" oc	*427*	A35/LTP4 @ 16" oc	*431*	16d @ 4" oc	*396*	5/8" DIA A.B. @ 32" oc	*516*
W3	*456*	*527*	**15/32" CDX PLYWOOD**	8d @ 3" oc	*456*	*637*	(2)rows 16d @ 4" oc	*854*	A35/LTP4 @ 12" oc	*575*	(2)rows 16d @ 6" oc	*527*	5/8" DIA A.B. @ 24" oc	*688*
W2	*595*	*767*	**15/32" CDX PLYWOOD**	8d @ 2" oc	*595*	*832*	(2)rows 16d @ 4" oc	*854*	A35/LTP4 @ 9" oc	*767*	(2)rows 16d @ 4" oc	*791*	5/8" DIA A.B. @ 16" oc	*1032*
2W3	*911*	*1150*	**15/32" CDX PLYWD. EA. SIDE**	8d @ 3" oc EA. SIDE	*911*	*1274*	n/a	-	A35/LTP4 @ 6" oc	*1150*	(3)rows 16d @ 4" oc	*1187*	5/8" DIA A.B. @ 16" oc	*1284*
2W2	*1187*	*1187*	**15/32" CDX PLYWD. EA. SIDE**	8d @ 2" oc EA. SIDE	*1190*	*1665*	n/a	-	HGA10KT @ 8" oc	*1260*	(3)rows 16d @ 4" oc	*1187*	5/8" DIA A.B. @ 12" oc	*1712*
2W2-10	*1432*	*1582*	**15/32" CDX PLYWD. EA. SIDE**	10d @ 2" oc EA. SIDE	*1432*	*2004*	n/a	-	HGA10KT @ 6" oc	*1680*	(4)rows 16d @ 4" oc	*1582*	5/8" DIA A.B. @ 12" oc	*1712*

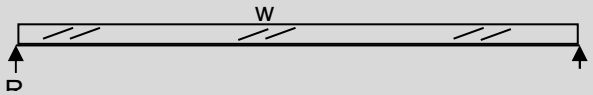
SW Schedule : 3/4" Floor Sheathing - DF

Mark	Controlling Capacity		Sheathing	Panel Edge Nailing			Top Plate Connection				Base Plate Connection			
				Type	Capacity		Type	Capacity	Type	Capacity	At Wood	Capacity	At Concrete	Capacity
	V_s	V_w			V_s	V_w	TJI	ASD	2x or LSL	ASD		ASD		ASD
W6	*260*	*288*	**15/32" CDX PLYWOOD**	8d @ 6" oc	*260*	*365*	16d @ 6" oc	*330*	A35/LTP4 @ 24" oc	*288*	16d @ 6" oc	*305*	5/8" DIA A.B. @ 48" oc	*344*
W4	*380*	*396*	**15/32" CDX PLYWOOD**	8d @ 4" oc	*380*	*533*	16d @ 4" oc	*427*	A35/LTP4 @ 16" oc	*431*	16d @ 4" oc	*396*	5/8" DIA A.B. @ 32" oc	*516*
W3	*490*	*527*	**15/32" CDX PLYWOOD**	8d @ 3" oc	*490*	*685*	(2)rows 16d @ 4" oc	*854*	A35/LTP4 @ 12" oc	*670*	(2)rows 16d @ 6" oc	*527*	5/8" DIA A.B. @ 24" oc	*688*
W2	*640*	*767*	**15/32" CDX PLYWOOD**	8d @ 2" oc	*640*	*895*	(2)rows 16d @ 4" oc	*854*	A35/LTP4 @ 9" oc	*767*	(2)rows 16d @ 4" oc	*791*	5/8" DIA A.B. @ 16" oc	*1032*
2W3	*980*	*1150*	**15/32" CDX PLYWD. EA. SIDE**	8d @ 3" oc EA. SIDE	*980*	*1370*	n/a	-	A35/LTP4 @ 6" oc	*1150*	(3)rows 16d @ 4" oc	*1187*	5/8" DIA A.B. @ 16" oc	*1284*
2W2	*1187*	*1187*	**15/32" CDX PLYWD. EA. SIDE**	8d @ 2" oc EA. SIDE	*1280*	*1790*	n/a	-	HGA10KT @ 8" oc	*1748*	(3)rows 16d @ 4" oc	*1187*	5/8" DIA A.B. @ 12" oc	*1712*
2W2-10	*1540*	*1582*	**15/32" CDX PLYWD. EA. SIDE**	10d @ 2" oc EA. SIDE	*1540*	*2155*	n/a	-	HGA10KT @ 6" oc	*2330*	(4)rows 16d @ 4" oc	*1582*	5/8" DIA A.B. @ 12" oc	*1712*

SW Schedule : 1 1/8" Floor Sheathing

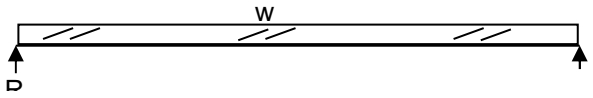
Mark	Controlling Capacity		Sheathing	Panel Edge Nailing			Top Plate Connection				Base Plate Connection			
				Type	Capacity		Type	Capacity	Type	Capacity	At Wood	Capacity	At Concrete	Capacity
	V_s	V_w			V_s	V_w	TJI	ASD	2x or LSL	ASD		ASD		ASD
W6	*242*	*277*	**15/32" CDX PLYWOOD**	8d @ 6" oc	*242*	*339*	16d @ 6" oc	*285*	A35/LTP4 @ 24" oc	*288*	16d @ 4" oc	*277*	5/8" DIA A.B. @ 48" oc	*344*
W4	*353*	*427*	**15/32" CDX PLYWOOD**	8d @ 4" oc	*353*	*495*	16d @ 4" oc	*427*	A35/LTP4 @ 16" oc	*431*	(2)rows 16d @ 4" oc	*554*	5/8" DIA A.B. @ 32" oc	*516*
W3	*456*	*554*	**15/32" CDX PLYWOOD**	8d @ 3" oc	*456*	*637*	(2)rows 16d @ 4" oc	*854*	A35/LTP4 @ 12" oc	*575*	(2)rows 16d @ 4" oc	*554*	5/8" DIA A.B. @ 24" oc	*688*
W2	*595*	*767*	**15/32" CDX PLYWOOD**	8d @ 2" oc	*595*	*832*	(2)rows 16d @ 4" oc	*854*	A35/LTP4 @ 9" oc	*767*	(3)rows 16d @ 4" oc	*831*	5/8" DIA A.B. @ 16" oc	*1032*
2W3	*911*	*1108*	**15/32" CDX PLYWD. EA. SIDE**	8d @ 3" oc EA. SIDE	*911*	*1274*	n/a	-	A35/LTP4 @ 6" oc	*1150*	(4)rows 16d @ 4" oc	*1108*	5/8" DIA A.B. @ 16" oc	*1284*
2W2	*1190*	*1216*	**15/32" CDX PLYWD. EA. SIDE**	8d @ 2" oc EA. SIDE	*1190*	*1665*	n/a	-	HGA10KT @ 8" oc	*1260*	rows SDS 1/4 x 5" @ 6'	*1216*	5/8" DIA A.B. @ 12" oc	*1712*
2W2-10	*1432*	*1680*	**15/32" CDX PLYWD. EA. SIDE**	10d @ 2" oc EA. SIDE	*1432*	*2004*	n/a	-	HGA10KT @ 6" oc	*1680*	n/a	-	5/8" DIA A.B. @ 12" oc	*1712*

Roof Joists	B1		48	GL	1 1/2 x 12	
w=	70	plf		R=	700	lbs
L=	20	ft		M=	3,500	ft-lbs
b=	1.50	in		Fb=	1,167	psi
d=	12.00	in		Fv=	53	psi
E=	1800	ksi		Δ=	0.65	in
Cv=	1.00	≤1.0		l /	370	



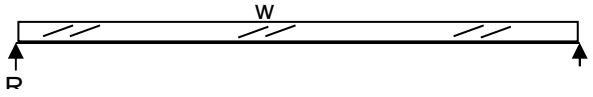
TJI Size	11.88	in		RE 1.75	11.875 TJI 210	
EI =	315	in^4		Ma=	3795	lb-ft
Δ =	0.863	in		Va=	1655	lbs
l /	278			Ra=	1005	lbs

Ridge Beam	B2			GL	8 3/4 x 30	
w=	1400	plf		R=	25,200	lbs
L=	36	ft		M=	226,800	ft-lbs
b=	8.75	in		Fb=	2,074	psi
d=	30.00	in		Fv=	124	psi
E=	1800	ksi		Δ=	1.49	in
Cv=	0.82	≤1.0		l /	289	

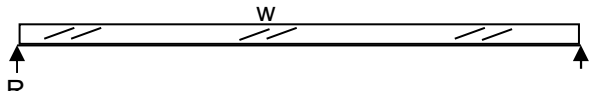


Steel Size					W24X55	
I =	1360	in^4		Fy=	50	ksi
Δ =	1.34	in		Mn/Ω =	336.8	k-ft
l /	322			Vn/Ω =	160.3	kips

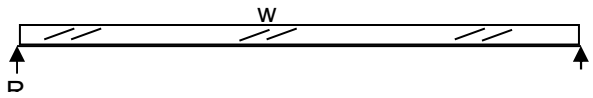
Courtyard Beam	B3			GL	5 1/2 x 10 1/2	
w=	225	plf		R=	2,025	lbs
L=	18	ft		M=	9,113	ft-lbs
b=	5.50	in		Fb=	1,082	psi
d=	10.50	in		Fv=	47	psi
E=	1800	ksi		Δ=	0.56	in
Cv=	1.00	≤1.0		l /	388	



Door Headers	B4			HF	3 x 10	
w=	1050	plf		R=	2,625	lbs
L=	5	ft		M=	3,281	ft-lbs
b=	3.00	in		Fb=	920	psi
d=	9.25	in		Fv=	98	psi
E=	1300	ksi		Δ=	0.06	in
Cv=	1.00	≤1.0		l /	1045	



Corridor Beam	B5			GL	5 1/8 x 12	
w=	1470	plf		R=	7,350	lbs
L=	10	ft		M=	18,375	ft-lbs
b=	5.13	in		Fb=	1,793	psi
d=	12.00	in		Fv=	143	psi
E=	1800	ksi		Δ=	0.25	in
Cv=	1.00	≤1.0		l /	482	



NOTE: TYPICAL ROOF FRAMING TO BE PREMANUFACTURED TRUSSES DESIGNED BY OTHERS. CAFETERIA TO BE TIMBER FRAMED @ 4'0"oc WITH SIP SHEATHING

SSF STRUCTURAL ENGINEERING

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Project: DMOS
GRAVITY FRAMING

Date: 10/14/25
Project #:
Design: AGL
Sheet:

Column Buckling Calculations

NDS 2015

Column Geometry Data

Hem-Fir #2 Studs		
Hem-Fir Plates		
b	1.5	in
d	5.5	in
Le_1	8.00	ft
Le_2	8.00	ft
$le_{bending}$		ft

Column Design Values

F_b	850	psi
F_c	1300	psi
E'min	470	ksi
Fcperp	405	psi
cb	1.00	

Column Loading

P	3350	lbs
W_1	0	plf
M1	0	ft-lbs
W_2	0	plf
M2 (Braced)	0	ft-lbs

Flexural Stress Adjustment Factors

Roof/EQ / Wind - C_D	1.60
Size Factor - C_F	1.30
Repetitive - C_r	1.15

Compressive Parallel Adjustment Factors

Roof/EQ / Wind - C_D	1.60
Size Factor - C_F	1.10

Other Factors

Visually Graded Lumber	
c	0.8
Solid Column	
Kf	1
Column: Pinned Pinned	
Ke	1

Bracing

Braced
No Brace

Bearing
Area
Increase
No

Column Stability Factor Calculation

	Strong Axis		Weak Axis	
Fce_1	1268	psi	Fce_2	24146 psi
Fc^*_1	2288	psi	Fc^*_2	2288 psi
Fce_1/Fc^*_1	0.554		Fce_2/Fc^*_2	10.553
Cp_1	0.471		Cp_2	1.000

Beam Stability Factor Calculation

	Strong Axis		Weak Axis	
Fbe_1	1334	psi	Fbe_2	1,053,148 psi
Fb'_1	2033	psi	Fb'_2	2033 psi
Fbe_1/Fb'_1	1.0		Fbe_2/Fb'_2	518
le	14.4	ft		
CL_1	1.00			

Adjusted Allowable Stresses

Strong Axis			Weak Axis	
Fc'_1	1077	psi	Fc'_2	2288 psi
Fb'_1	2033	psi	Fb'_2	2033 psi

Imposed Column Stresses

Strong Axis			Weak Axis	
fc_1	406	psi	fc_2	406 psi
fb_1	0	psi	fb_2	0 psi

Perpendicular to Grain Stress Check fcp/Fcp =	***406 / 405***	**NG**
Slenderness Check le/d	**17**	**OK**
Slenderness Check le/b	**64**	**OK***

* = Braced

(1) $$\left(\frac{f_c}{F_c'}\right)^2+\frac{f_{b1}}{F_{b1}'\left[1-f_c/F_{cE1}\right]}+\frac{f_{b2}}{F_{b2}'\left[1-f_c/F_{cE2}-\left(f_{b1}/F_{bE1}\right)\right]}\le 1.0$$

(2) $$\frac{fc}{F_{cE2}}+\left(\frac{f_{b1}}{F_{bE}}\right)^2<1.0$$

(3) $$\frac{f_c}{F_{c'}},\frac{f_{b1}}{F_{b1}'},\frac{f_{b2}}{F_{b2}'}<1.0$$

Allowable Stress Interaction Formula	**0.38**	**OK**

STRUCTURAL ENGINEERING

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Project: Typ Wood Stud — *Date:* *10/14/2025*

2x6 interior — Project #:

Design: AGL

Sheet: 1

Column Buckling Calculations

NDS 2015

Column Geometry Data

Hem-Fir #2 Studs		
Hem-Fir Plates		
b	1.5	in
d	5.5	in
Le_1	8.00	ft
Le_2	8.00	ft
$le_{bending}$		ft

Bracing

Braced
No Brace

Column Design Values

F_b	850	psi
F_c	1300	psi
E'min	470	ksi
Fcperp	405	psi
cb	1.00	

Bearing
Area
Increase
No

Column Loading

P	3350	lbs
W_1	15	plf
M1	120	ft-lbs
W_2	0	plf
M2 (Braced)	0	ft-lbs

Flexural Stress Adjustment Factors

Roof/EQ / Wind - C_D	1.60
Size Factor - C_F	1.30
Repetitive - C_r	1.15

Compressive Parallel Adjustment Factors

Roof/EQ / Wind - C_D	1.15
Size Factor - C_F	1.10

Other Factors

Visually Graded Lumber	
c	0.8
Solid Column	
Kf	1
Column: Pinned Pinned	
Ke	1

Column Stability Factor Calculation

	Strong Axis		Weak Axis	
Fce_1	1268	psi	Fce_2	24146 psi
Fc^*_1	1645	psi	Fc^*_2	1645 psi
Fce_1/Fc^*_1	0.771		Fce_2/Fc^*_2	14.683
Cp_1	0.596		Cp_2	1.000

Beam Stability Factor Calculation

	Strong Axis		Weak Axis	
Fbe_1	1334	psi	Fbe_2	1,053,148 psi
Fb'_1	2033	psi	Fb'_2	2033 psi
Fbe_1/Fb'_1	1.0		Fbe_2/Fb'_2	518
le	14.4	ft		
CL_1	1.00			

Adjusted Allowable Stresses

Strong Axis			Weak Axis	
Fc'_1	980	psi	Fc'_2	1645 psi
Fb'_1	2033	psi	Fb'_2	2033 psi

Imposed Column Stresses

Strong Axis			Weak Axis	
fc_1	406	psi	fc_2	406 psi
fb_1	190	psi	fb_2	0 psi

Perpendicular to Grain Stress Check fcp/Fcp =	***406 / 405***	**NG**
Slenderness Check le/d	**17**	**OK**
Slenderness Check le/b	**64**	**OK***

* = Braced

(1) $$\left(\frac{f_c}{F_c'}\right)^2+\frac{f_{b1}}{F_{b1}'\left[1-f_c/F_{cE1}\right]}+\frac{f_{b2}}{F_{b2}'\left[1-f_c/F_{cE2}-\left(f_{b1}/F_{bE1}\right)\right]}\le 1.0$$

(2) $$\frac{fc}{F_{cE2}}+\left(\frac{f_{b1}}{F_{bE}}\right)^2<1.0$$

(3) $$\frac{f_c}{F_{c'}},\frac{f_{b1}}{F_{b1}'},\frac{f_{b2}}{F_{b2}'}<1.0$$

Allowable Stress Interaction Formula	**0.41**	**OK**

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Project:	Typ Wood Stud	*Date:*	*10/14/2025*
	2x6 Exterior	Project #:	
	11psf wind	Design:	AGL
		Sheet:	1

Column Buckling Calculations

NDS 2015

Column Geometry Data

4X Posts Doug Fir - Larch #2		
Hem-Fir Plates		
b	3.5	in
d	5.5	in
Le_1	8.00	ft
Le_2	8.00	ft
$le_{bending}$		ft

Bracing

No Brace
No Brace

Column Design Values

F_b	900	psi
F_c	1350	psi
E'min	580	ksi
Fcperp	405	psi
cb	1.00	

Bearing
Area
Increase
No

Column Loading

P	7800	lbs
W_1	0	plf
M1	0	ft-lbs
W_2	0	plf
M2	0	ft-lbs

Flexural Stress Adjustment Factors

Roof/EQ / Wind - C_D	1.60
Size Factor - C_F	1.30
Repetitive - C_r	1.00

Compressive Parallel Adjustment Factors

Roof/EQ / Wind - C_D	1.15
Size Factor - C_F	1.10

Other Factors

Visually Graded Lumber	
c	0.8
Solid Column	
Kf	1
Column: Pinned Pinned	
Ke	1

Column Stability Factor Calculation

	Strong Axis		Weak Axis	
Fce_1	1565	psi	Fce_2 634	psi
Fc^*_1	1708	psi	Fc^*_2 1708	psi
Fce_1/Fc^*_1	0.916		Fce_2/Fc^*_2 0.371	
Cp_1	0.660		Cp_2 0.337	

Beam Stability Factor Calculation

	Strong Axis		Weak Axis	
Fbe_1	8962	psi	Fbe_2 34,812	psi
Fb'_1	1872	psi	Fb'_2 1872	psi
Fbe_1/Fb'_1	4.8		Fbe_2/Fb'_2 19	
le	14.4	ft		
CL_1	0.99			

Adjusted Allowable Stresses

Strong Axis			Weak Axis	
Fc'_1	1127	psi	Fc'_2 575	psi
Fb'_1	1848	psi	Fb'_2 1872	psi

Imposed Column Stresses

Strong Axis			Weak Axis	
fc_1	405	psi	fc_2 405	psi
fb_1	0	psi	fb_2 0	psi

Perpendicular to Grain Stress Check fcp/Fcp =	***405 / 405***	**NG**
Slenderness Check le/d	**17**	**OK**
Slenderness Check le/b	**27**	**OK**

(1) $$\left(\frac{f_c}{F_c'}\right)^2+\frac{f_{b1}}{F_{b1}'\left[1-f_c/F_{cE1}\right]}+\frac{f_{b2}}{F_{b2}'\left[1-f_c/F_{cE2}-\left(f_{b1}/F_{bE1}\right)\right]}\le 1.0$$

(2) $$\frac{fc}{F_{cE2}}+\left(\frac{f_{b1}}{F_{bE}}\right)^2<1.0$$

(3) $$\frac{f_c}{F_{c'}},\frac{f_{b1}}{F_{b1}'},\frac{f_{b2}}{F_{b2}'}<1.0$$

Allowable Stress Interaction Formula	**0.70**	**OK**

STRUCTURAL ENGINEERING

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Project: Typ Wood Stud — *Date:* *10/14/2025*

4x6 Post — Project #:

Max Allowable Load — Design: AGL

Sheet: 1

Column Buckling Calculations

NDS 2015

Column Geometry Data

6X Posts Doug Fir - Larch #1		
-N/A-		
b	5.5	in
d	5.5	in
Le_1	8.00	ft
Le_2	8.00	ft
$le_{bending}$		ft

Bracing

No Brace	
No Brace	

Column Design Values

F_b	1200	psi
F_c	1000	psi
E'min	580	ksi
Fcperp	0	psi
cb	1.00	

Bearing
Area
Increase
No

Column Loading

P	17000	lbs
W_1	0	plf
M1	1300	ft-lbs
W_2	0	plf
M2	0	ft-lbs

Flexural Stress Adjustment Factors

Roof/EQ / Wind - C_D	1.00
Size Factor - C_F	1.00
Repetitive - C_r	1.00

Compressive Parallel Adjustment Factors

Roof/EQ / Wind - C_D	1.60
Size Factor - C_F	1.05

Other Factors

Visually Graded Lumber	
c	0.8
Solid Column	
Kf	1
Column: Pinned Pinned	
Ke	1

Column Stability Factor Calculation

	Strong Axis		Weak Axis	
Fce_1	1565	psi	Fce_2 1565	psi
Fc^*_1	1680	psi	Fc^*_2 1680	psi
Fce_1/Fc^*_1	0.931		Fce_2/Fc^*_2 0.931	
Cp_1	0.666		Cp_2 0.666	

Beam Stability Factor Calculation

	Strong Axis		Weak Axis	
Fbe_1	22130	psi	Fbe_2 22,153	psi
Fb'_1	1200	psi	Fb'_2 1200	psi
Fbe_1/Fb'_1	18.4		Fbe_2/Fb'_2 18	
le	14.4	ft		
CL_1	1.00			

Adjusted Allowable Stresses

Strong Axis			Weak Axis	
Fc'_1	1119	psi	Fc'_2 1119	psi
Fb'_1	1200	psi	Fb'_2 1200	psi

Imposed Column Stresses

Strong Axis			Weak Axis	
fc_1	562	psi	fc_2 562	psi
fb_1	563	psi	fb_2 0	psi

Perpendicular to Grain Stress Check fcp/Fcp =	***-N/A-***	**OK**
Slenderness Check le/d	**17**	**OK**
Slenderness Check le/b	**17**	**OK**

(1) $$\left(\frac{f_c}{F_c'}\right)^2+\frac{f_{b1}}{F_{b1}'\left[1-f_c/F_{cE1}\right]}+\frac{f_{b2}}{F_{b2}'\left[1-f_c/F_{cE2}-\left(f_{b1}/F_{bE1}\right)\right]}\le 1.0$$

(2) $$\frac{fc}{F_{cE2}}+\left(\frac{f_{b1}}{F_{bE}}\right)^2<1.0$$

(3) $$\frac{f_c}{F_{c'}},\frac{f_{b1}}{F_{b1}'},\frac{f_{b2}}{F_{b2}'}<1.0$$

Allowable Stress Interaction Formula	**0.98**	**OK**

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Project: Balcony Support — *Date:* *10/14/2025*

6x6 Post — Project #:

Seismic — Design: AGL

Sheet: 1

Column Buckling Calculations

NDS 2015

Column Geometry Data

Glue-Lam		
-N/A-		
b	6.75	in
d	7	in
Le_1	12.00	ft
Le_2	12.00	ft
$le_{bending}$		ft

Bracing

No Brace
No Brace

Column Stability Factor Calculation

	Strong Axis		Weak Axis	
Fce_1	1806	psi	Fce_2	1680 psi
Fc^*_1	1898	psi	Fc^*_2	1898 psi
Fce_1/Fc^*_1	0.952		Fce_2/Fc^*_2	0.885
Cp_1	0.674		Cp_2	0.647

Column Design Values

F_b	2400	psi
F_c	1650	psi
E'min	930	ksi
Fcperp	0	psi
cb	1.00	

Bearing
Area
Increase
No

Beam Stability Factor Calculation

	Strong Axis		Weak Axis	
Fbe_1	28406	psi	Fbe_2	27,894 psi
Fb'_1	4416	psi	Fb'_2	4416 psi
Fbe_1/Fb'_1	6.4		Fbe_2/Fb'_2	6
le	21.3	ft		
CL_1	0.99			

Column Loading

P	55000	lbs
W_1	0	plf
M1	0	ft-lbs
W_2	0	plf
M2	0	ft-lbs

Adjusted Allowable Stresses

Strong Axis			Weak Axis	
Fc'_1	1278	psi	Fc'_2	1229 psi
Fb'_1	4376	psi	Fb'_2	4416 psi

Flexural Stress Adjustment Factors

Roof/EQ / Wind - C_D	1.60
Size Factor - C_F	1.00
Repetitive - C_r	1.15

Imposed Column Stresses

Strong Axis			Weak Axis	
fc_1	1164	psi	fc_2	1164 psi
fb_1	0	psi	fb_2	0 psi

Compressive Parallel Adjustment Factors

Roof/EQ / Wind - C_D	1.15
Size Factor - C_F	1.00

Perpendicular to Grain Stress Check fcp/Fcp =	***-N/A-***	**OK**
Slenderness Check le/d	**21**	**OK**
Slenderness Check le/b	**21**	**OK**

Other Factors

Visually Graded Lumber	
c	0.8
Solid Column	
Kf	1
Column: Pinned Pinned	
Ke	1

(1) $$\left(\frac{f_c}{F_c'}\right)^2+\frac{f_{b1}}{F_{b1}'\left[1-f_c/F_{cE1}\right]}+\frac{f_{b2}}{F_{b2}'\left[1-f_c/F_{cE2}-\left(f_{b1}/F_{bE1}\right)\right]}\le 1.0$$

(2) $$\frac{fc}{F_{cE2}}+\left(\frac{f_{b1}}{F_{bE}}\right)^2<1.0$$

(3) $$\frac{f_c}{F_{c'}},\frac{f_{b1}}{F_{b1}'},\frac{f_{b2}}{F_{b2}'}<1.0$$

Allowable Stress Interaction Formula	**0.95**	**OK**

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Project: Typ Wood Stud — *Date:* 10/14/2025

Cafeteria Post — Project #:

Design: AGL

Sheet: 1

Spread Footing Soil Bearing Design

Service Loads Loading

Dead Load =	19.5 kips
Live Load =	7.8 kips
Wind/EQ Load =	0.0 kips
Wind/EQ Moment (M_Y) =	0 ft-kips
Gravity Load Eccentricity (±X)=	0.00 ft.
Footing Weight =	3.8 kips
Total Load =	31.1 kips
Total Moment =	0 ft-kips

Service Load Factors

DL	1
LL	1
EQ/Wind	1

Soil Properties

Allowable Soil Brg. (Qa) =	2.00 ksf
Overburdan Density (γs) =	120 psf
Net Ftg Wt? (γ_c-γ_s)	No

Column Dimensions and Location

Column Xc Dimension (Dx) =	5.50 in.
Column Yc Dimension (Dy) =	5.50 in.
Column Face from right (Cr) =	2.27 ft.
Column Face from left (Cl) =	2.27 ft.

Soil Bearing Check (Allowable)

Eccentricity =	0.00 ft.	
Leng. Soil Brg. Under Ftg.=	5.00 ft.	
qmax =	1.24 ksf	OK
qmin =	1.24 ksf	

Footing Dimensions

L Dimension (X) =	5.00 ft.
B Dimension (Y) =	5.00 ft.
Footing Thickness (t) =	12.00 in.
Ftg Overburden (Ot) =	0.00 ft.

Soil Pressure Equations:

$e \le L/6$

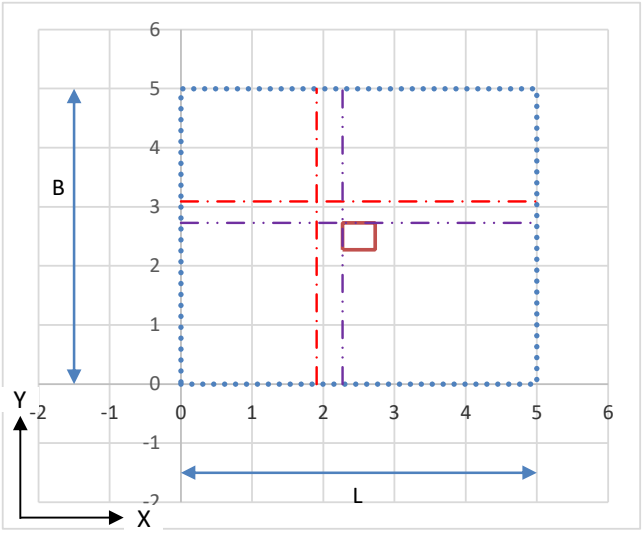
$qmax = \frac{Q}{LB}\left(1 + \frac{6e}{L}\right)$

$qmin = \frac{Q}{LB}\left(1 - \frac{6e}{L}\right)$

$e > L/6$

$qmax = \frac{4Q}{3L(L-2e)}$

$qmin = 0$



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PROJECT	DMOS
	Footing
	Cafeteria
DATE	10/14/2025
PROJ. #	AGL
DESIGN	
SHEET	

Spread Footing Concrete Design - ACI 318-19

Footing Properties

Concrete Strength (f'c) =	3000 psi
Rebar Yield Strength (f_y) =	60000 psi
Reinforcing Clear Cover (cvr) =	3.00 in.
Reinforcing Depth (d) =	8.75 in.

Factored Loads

Factored Total Load =	40.4 kips
Factored Total moment =	0 ft-kips

Factored Bearing

Eccentricity =	0.00 ft.
Length of Soil Brg. Under Ftg. =	5.00 ft.
qmax =	1.62 ksf
qcolr =	1.62 ksf
qcoll =	1.62 ksf
qmin =	1.62 ksf

Strength Load Factors

DL	1.2
LL	1.6
EQ/Wind	1

ϕb	0.9
ϕv	0.75

Factored Moments and Shears

	Mu k-ft	Vu kips
X Right Side	21	15
X Left Side	21	15
Y Both Sides	21	15

Flexural Design - X Direction

Top Bar Size =	#4	
Top Bars =	5	
Bot Bar Size =	#4	
Bot Bars =	5	
Mu =	21 ft-kips	
ØMn =	38 ft-kips	OK
ρ_{min} =	0.0018	*Controls*
ρ_{req} =	0.0010	
$A_{s\ FLEX}$ Required =	0.54 sq. in.	
$A_{s\ FLEX}$ Provided =	**1.00 sq. in.**	OK
$A_{s\ Min}$ Required =	1.30 sq. in.	
$A_{s\ Tot}$ Provided =	**2.00 sq. in.**	OK

Flexural Design - Y Direction

Top Bar Size =	#4	
Top Bars =	5	
Bot Bar Size =	#4	
Bot Bars =	5	
Mu =	21 ft-kips	
ØMn =	38 ft-kips	OK
ρ_{min} =	0.0018	*Controls*
ρ_{req} =	0.0010	
$A_{s\ FLEX}$ Required =	0.54 sq. in.	
$A_{s\ FLEX}$ Provided =	1.00 sq. in.	OK
$A_{s\ Min}$ Required =	1.30 sq. in.	
$A_{s\ Tot}$ Provided =	**2.00 sq. in.**	

One-Way Shear Design - X Direction (ACI

Vu =	15 kips	
ØVn =	43 kips	OK

One-Way Shear Design - Y Direction

Vu =	15 kips	
ØVn =	43 kips	OK

Minimum Bars in Short Direction (ACI 13.3.3.3)

β =	1.0
$\gamma_s = 2/(\beta+1)$ =	1.00
Provide $2\beta/(\beta+1)$	1.00 sq. in.

Two-Way (Punching) Shear Design

b_o =	57 in	
Vu =	38 kips	
ØVn =	80 kips	OK

Concrete Capacity Equations:

$$Mn = A_s F_y \left[d - \frac{1}{2}\left(\frac{A_s F_y}{0.85 f'c\, b} \right) \right] \qquad vn = min \begin{pmatrix} 4\sqrt{f'c} \\ \left(2 + \frac{4}{\beta}\right)\sqrt{f'c} \\ \left(2 + \frac{\alpha_s d}{b_o}\right)\sqrt{f'c} \end{pmatrix} b_o d$$

$$Vn = 2\,\gamma\sqrt{f'c}\, b_w d \qquad b_o = 2(Dx + d) + 2(Dy + d)$$

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STRUCTURAL ENGINEERING

DMOS

PROJECT: Footing

Cafeteria

10/14/2025

DATE

PROJ. # AGL

DESIGN

SHEET

Spread Footing Soil Bearing Design

Service Loads Loading

Dead Load =	3.0 kips
Live Load =	1.2 kips
Wind/EQ Load =	0.0 kips
Wind/EQ Moment (M_Y) =	0 ft-kips
Gravity Load Eccentricity (±X)=	0.00 ft.
Footing Weight =	0.5 kips
Total Load =	4.7 kips
Total Moment =	0 ft-kips

Service Load Factors

DL	1
LL	1
EQ/Wind	1

Soil Properties

Allowable Soil Brg. (Qa) =	2.00 ksf
Overburdan Density (γs) =	120 psf
Net Ftg Wt? (γ_c-γ_s)	No

Column Dimensions and Location

Column Xc Dimension (Dx) =	5.50 in.
Column Yc Dimension (Dy) =	5.50 in.
Column Face from right (Cr) =	0.77 ft.
Column Face from left (Cl) =	0.77 ft.

Soil Bearing Check (Allowable)

Eccentricity =	0.00 ft.	
Leng. Soil Brg. Under Ftg.=	2.00 ft.	
qmax =	1.18 ksf	OK
qmin =	1.18 ksf	

Footing Dimensions

L Dimension (X) =	2.00 ft.
B Dimension (Y) =	2.00 ft.
Footing Thickness (t) =	10.00 in.
Ftg Overburden (Ot) =	0.00 ft.

Soil Pressure Equations:

$e \le L/6$

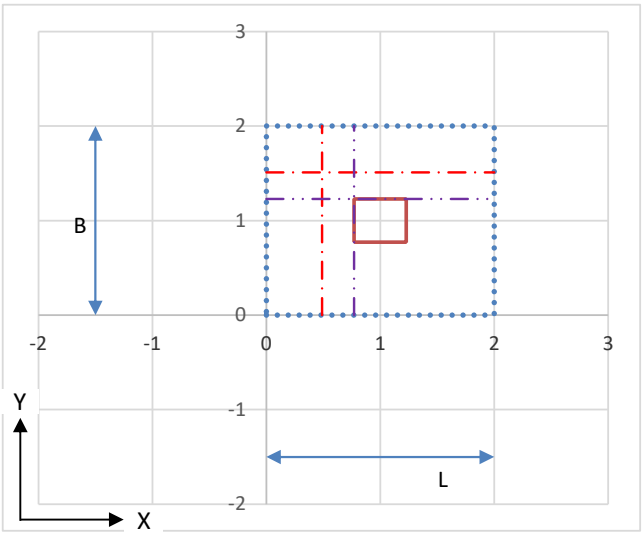
$qmax = \frac{Q}{LB}\left(1 + \frac{6e}{L}\right)$

$qmin = \frac{Q}{LB}\left(1 - \frac{6e}{L}\right)$

$e > L/6$

$qmax = \frac{4Q}{3L(L-2e)}$

$qmin = 0$



SSF STRUCTURAL ENGINEERING

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PROJECT	Typ Courtyard footing
	Footing
DATE	10/14/2025
PROJ. #	AGL
DESIGN	
SHEET	

Spread Footing Concrete Design - ACI 318-19

Footing Properties

Concrete Strength (f'c) =	3000 psi
Rebar Yield Strength (f_y) =	60000 psi
Reinforcing Clear Cover (cvr) =	3.00 in.
Reinforcing Depth (d) =	6.75 in.

Factored Loads

Factored Total Load =	6.1 kips
Factored Total moment =	0 ft-kips

Factored Bearing

Eccentricity =	0.00 ft.
Length of Soil Brg. Under Ftg. =	2.00 ft.
qmax =	1.53 ksf
qcolr =	1.53 ksf
qcoll =	1.53 ksf
qmin =	1.53 ksf

Strength Load Factors

DL	1.2
LL	1.6
EQ/Wind	1

ϕb	0.9
ϕv	0.75

Factored Moments and Shears

	Mu k-ft	Vu kips
X Right Side	1	1
X Left Side	1	1
Y Both Sides	1	1

Flexural Design - X Direction

Top Bar Size =	None	
Top Bars =		
Bot Bar Size =	#4	
Bot Bars =	3	
Mu =	1 ft-kips	
ØMn =	17 ft-kips	OK
ρ_{min} =	0.0018	*Controls*
ρ_{req} =	0.0002	
$A_{s\ FLEX}$ Required =	0.03 sq. in.	
$A_{s\ FLEX}$ Provided =	**0.60 sq. in.**	OK
$A_{s\ Min}$ Required =	0.43 sq. in.	
$A_{s\ Tot}$ Provided =	**0.60 sq. in.**	OK

Flexural Design - Y Direction

Top Bar Size =	None	
Top Bars =		
Bot Bar Size =	#4	
Bot Bars =	3	
Mu =	1 ft-kips	
ØMn =	17 ft-kips	OK
ρ_{min} =	0.0018	*Controls*
ρ_{req} =	0.0002	
$A_{s\ FLEX}$ Required =	0.03 sq. in.	
$A_{s\ FLEX}$ Provided =	0.60 sq. in.	OK
$A_{s\ Min}$ Required =	0.43 sq. in.	
$A_{s\ Tot}$ Provided =	**0.60 sq. in.**	

One-Way Shear Design - X Direction (ACI

Vu =	1 kips	
ØVn =	13 kips	OK

One-Way Shear Design - Y Direction

Vu =	1 kips	
ØVn =	13 kips	OK

Minimum Bars in Short Direction (ACI 13.3.3.3)

β =	1.0
$\gamma_s = 2/(\beta+1)$ =	1.00
Provide $2\beta/(\beta+1)$	0.60 sq. in.

Two-Way (Punching) Shear Design

b_o =	49 in	
Vu =	5 kips	
ØVn =	52 kips	OK

Concrete Capacity Equations:

$$Mn = A_s F_y \left[d - \frac{1}{2}\left(\frac{A_s F_y}{0.85 f'c\, b} \right) \right] \qquad vn = min \begin{pmatrix} 4\sqrt{f'c} \\ \left(2 + \frac{4}{\beta}\right)\sqrt{f'c} \\ \left(2 + \frac{\alpha_s d}{b_o}\right)\sqrt{f'c} \end{pmatrix} b_o d$$

$$Vn = 2\,\gamma\sqrt{f'c}\, b_w d \qquad b_o = 2(Dx + d) + 2(Dy + d)$$

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SWENSON SAY FAGÉT

PROJECT	Typ Courtyard footing
	Footing
DATE	*10/14/2025*
PROJ. #	AGL
DESIGN	
SHEET	

SITE STRUCTURES
TRASH ENCLOSURE & STORAGE UNIT

STRUCTURAL ENGINEERING

SEATTLE 2124 Third Avenue, Suite 100, Seattle, WA 98121
TACOMA 1818 Tacoma Avenue S, Suite 200, Tacoma, WA 98402
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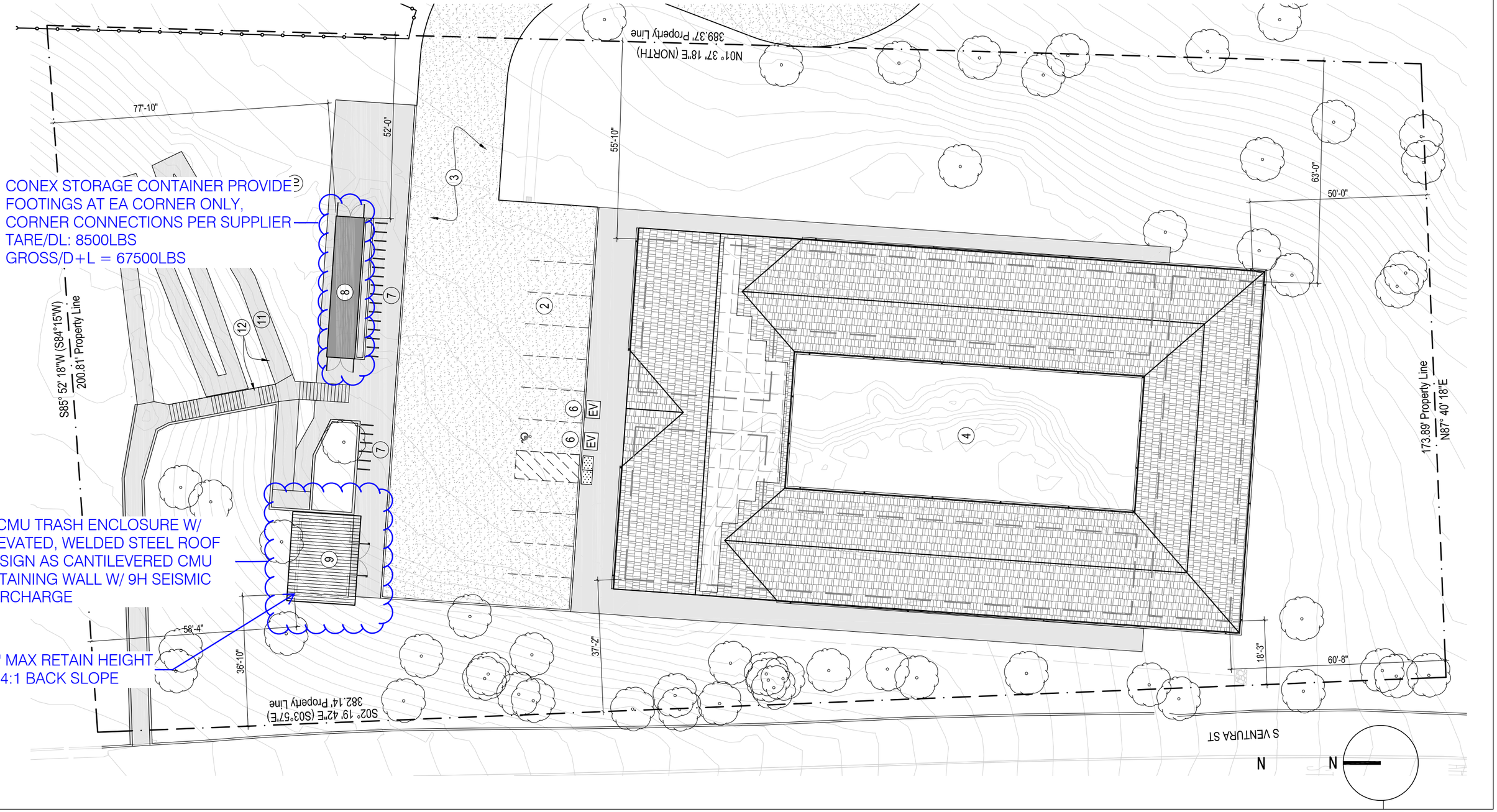

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414 N Pearl Street, Suite 8
Ellensburg, WA 98926

Project Title:

DMOS -SITE STRUCTURES

Sheet Title:

SITE KEY PLAN

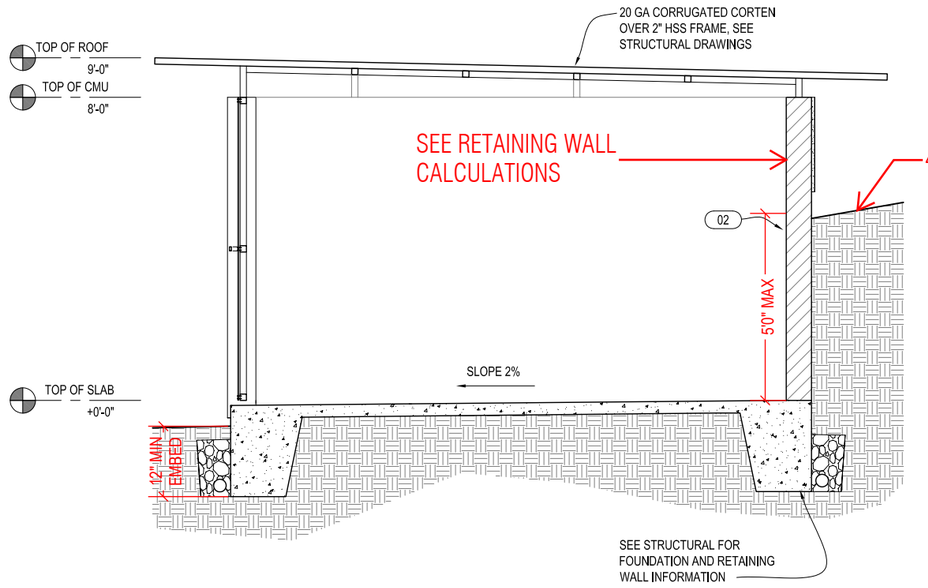
Date

Design

Drawn

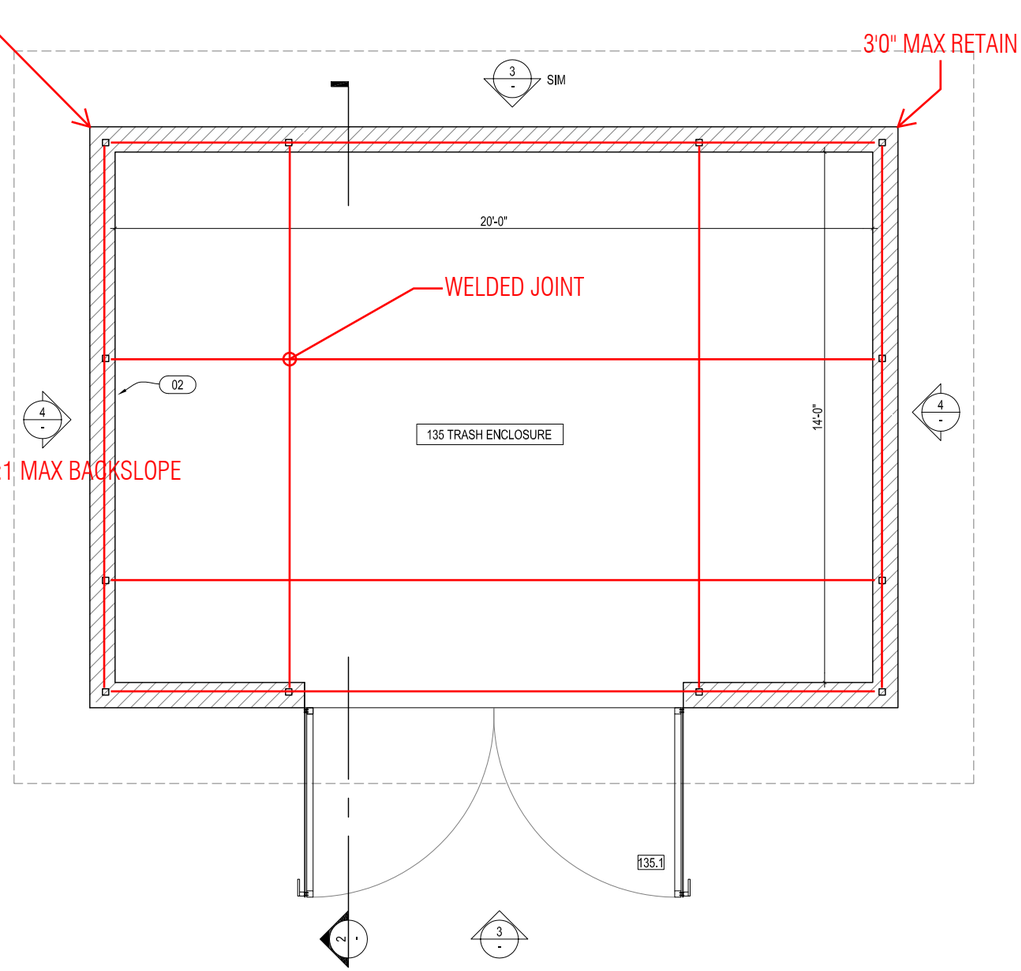
SSF project no.

Sheet



2 A2.8 SECTION

1/2" = 1'-0"



1 A2.7 FLOOR PLAN

1/2" = 1'-0"

N N

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Project Title:

DMOS -SITE STRUCTURES

Sheet Title:

TRASH ENCLOSURE

Date

SSF project no.

Design

Drawn

Sheet

Project Title: DMOS Trash Enclosure
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: Trash Enclosure.ec6

DESCRIPTION: 5ft Retain

Code Reference

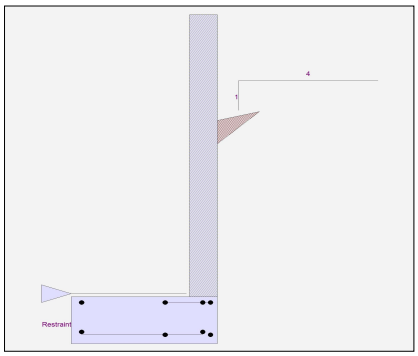
Calculations per IBC 2021 1807.3, ASCE 7-16

Criteria

Retained Height	=	5.00 ft
Wall height above soil	=	3.00 ft
Slope Behind Wall	=	4.00
Height of Soil over Toe	=	0.00 in
Water table above bottom of footing	=	0.0 ft

Soil Data

Allow Soil Bearing	=	1,500.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	35.0 psf/ft
	=	
Passive Pressure	=	250.0 psf/ft
Soil Density, Heel	=	120.00 pcf
Soil Density, Toe	=	120.00 pcf
Footing||Soil Friction	=	0.400
Soil height to ignore for passive pressure	=	12.00 in



Surcharge Loads

Surcharge Over Heel	=	0.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	0.0
Used for Sliding & Overturning		

Lateral Load Applied to Stem

Lateral Load	=	0.0 #/ft
...Height to Top	=	0.00 ft
...Height to Bottom	=	0.00 ft
Load Type	=	Wind (W) (Service Level)
Wind on Exposed Stem (Strength Level)	=	0.0 psf

Adjacent Footing Load

Adjacent Footing Load	=	0.0 lbs
Footing Width	=	0.00 ft
Eccentricity	=	0.00 in
Wall to Ftg CL Dist	=	0.00 ft
Footing Type		Spread Footing
Base Above/Below Soil at Back of Wall	=	0.0 ft
Poisson's Ratio	=	0.300

Axial Load Applied to Stem

Axial Dead Load	=	0.0 lbs
Axial Live Load	=	0.0 lbs
Axial Load Eccentricity	=	0.0 in

Earth Pressure Seismic Load

Method : Uniform		
Multiplier Used	=	9.000
(Multiplier used on soil density)		
Uniform Seismic Force	=	57.000
Total Seismic Force	=	361.001

Project Title: DMOS Trash Enclosure
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: Trash Enclosure.ec6

DESCRIPTION: 5ft Retain

Design Summary

Wall Stability Ratios

Overturning	=	1.47	Ratio < 1.5!
Slab Resists All Sliding !			
Global Stability	=	1.88	

Total Bearing Load	=	1,372	lbs	
...resultant ecc.	=	11.63	in	
Eccentricity outside middle third				
Soil Pressure @ Toe	=	1,172	psf	OK
Soil Pressure @ Heel	=	0	psf	OK
Allowable	=	1,500	psf	
Soil Pressure Less Than Allowable				
ACI Factored @ Toe	=	1,641	psf	
ACI Factored @ Heel	=	0	psf	
Footing Shear @ Toe	=	8.3	psi	OK
Footing Shear @ Heel	=	0.0	psi	OK
Allowable	=	82.2	psi	

Sliding Calcs

Lateral Sliding Force	=	954.6	lbs

Vertical component of active lateral soil pressure IS NOT considered in the calculation of soil bearing

Load Factors

Building Code	
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.600
Seismic, E	1.000

Stem Construction

		Bottom		
		Stem OK		
Design Height Above Ftg	ft =	0.00		
Wall Material Above "Ht"	=	Masonry		
Design Method	=	ASD	SD	SD
Thickness	=	8.00		
Rebar Size	=	# 5		
Rebar Spacing	=	8.00		
Rebar Placed at	=	Center		

Design Data

fb/FB + fa/Fa	=	**0.997**
Total Force @ Section		
Service Level	lbs =	722.5
Strength Level	lbs =	
Moment....Actual		
Service Level	ft-# =	1,441.7
Strength Level	ft-# =	
Moment.....Allowable	=	1,444.6
Shear.....Actual		
Service Level	psi =	7.9
Strength Level	psi =	
Shear.....Allowable	psi =	45.8
Anet (Masonry)	in2 =	91.50
Wall Weight	psf =	84.0
Rebar Depth 'd'	in =	3.81

Masonry Data

f'm	psi =	1,500
Fs	psi =	32,000
Solid Grouting	=	Yes
Modular Ratio 'n'	=	21.48
Equiv. Solid Thick.	in =	7.63
Masonry Block Type	=	
Masonry Design Method	=	ASD

Concrete Data

f'c	psi =	
Fy	psi =	

Project Title: DMOS Trash Enclosure
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: Trash Enclosure.ec6

DESCRIPTION: 5ft Retain

Footing Data

Toe Width	=	2.83 ft
Heel Width	=	0.67
Total Footing Width	=	3.50
Footing Thickness	=	16.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	0.00 ft

f'c = 3,000 psi Fy = 60,000 psi
Footing Concrete Density = 150.00 pcf
Min. As % = 0.0018
Cover @ Top 2.00 @ Btm.= 3.00 in

Footing Design Results

		Toe	Heel	
Factored Pressure	=	1,641	0	psf
Mu' : Upward	=	3,943	0	ft-#
Mu' : Downward	=	1,076	0	ft-#
Mu: Design	=	2,866 OK	0	ft-# OK
phiMn	=	24,546	OK - Flush	
Actual 1-Way Shear	=	8.27	0.00	psi
Allow 1-Way Shear	=	82.16	82.16	psi

Toe Reinforcing = # 7 @ 16.00 in
Heel Reinforcing = Flush heel condition. No reinforcing required.
Key Reinforcing = None Spec'd
Footing Torsion, Tu = 0.00 ft-lbs
Footing Allow. Torsion, phi Tu = 0.00 ft-lbs

If torsion exceeds allowable, provide supplemental design for footing torsion.

Other Acceptable Sizes & Spacings

Toe: #4@ 6.94 in, #5@ 10.76 in, #6@ 15.27 in, #7@ 20.83 in, #8@ 27.43 in, #9@ 34.72 in, #10@ 44.09 in

Heel: Flush heel condition. No reinforcing required.

Key: No key defined

Min footing T&S reinf Area 1.21 in2
Min footing T&S reinf Area per foot 0.35 in2 /ft

If one layer of horizontal bars:	If two layers of horizontal bars:
#4@ 6.94 in	#4@ 13.89 in
#5@ 10.76 in	#5@ 21.53 in
#6@ 15.28 in	#6@ 30.56 in

Project Title: DMOS Trash Enclosure
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: Trash Enclosure.ec6

DESCRIPTION: 5ft Retain

Summary of Overturning & Resisting Forces & Moments

Item		.....OVERTURNING..... Force lbs	Distance ft	Moment ft-#		.....RESISTING..... Force lbs	Distance ft	Moment ft-#
HL Act Pres (ab water tbl)		701.9	2.11	1,481.9	Soil Over HL (ab. water tbl)	0.0	3.50	0.1
HL Act Pres (be water tbl)					Soil Over HL (bel. water tbl)		3.50	0.1
Hydrostatic Force					Water Table			
Buoyant Force	=				Sloped Soil Over Heel	= 0.0	3.50	0.0
Surcharge over Heel	=				Surcharge Over Heel	=		
Surcharge Over Toe	=				Adjacent Footing Load	=		
Adjacent Footing Load	=				Axial Dead Load on Stem	=		
Added Lateral Load	=				* Axial Live Load on Stem	=		
Load @ Stem Above Soil	=				Soil Over Toe	=		
Seismic Earth Load	=	252.7	3.17	800.2	Surcharge Over Toe	=		
	=				Stem Weight(s)	= 672.0	3.17	2,127.8
Total	=	954.6	**O.T.M.** =	2,282.1	Earth @ Stem Transitions	=		
					Footing Weight	= 699.9	1.75	1,224.8
					Key Weight	=		
					Vert. Component	=		
					Total =	1,372.0 lbs	**R.M.=**	3,352.6

Resisting/Overturning Ratio = **1.47**
Vertical Loads used for Soil Pressure = 1,372.0 lbs

* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.

If seismic is included, the OTM and sliding ratios may be 1.1 per section 1807.2.3 of IBC.

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Sliding Resistance.

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Overturning Resistance.

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus	250.0	pci
Horizontal Defl @ Top of Wall (approximate only)	0.074	in

The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe, because the wall would then tend to rotate into the retained soil.

Cantilevered Retaining Wall

DESCRIPTION: 5ft Retain

Rebar Lap & Embedment Lengths Information

Stem Design Segment: Bottom
Stem Design Height: 0.00 ft above top of footing
Calculated Rebar Stress, fs = 11606.28 psi

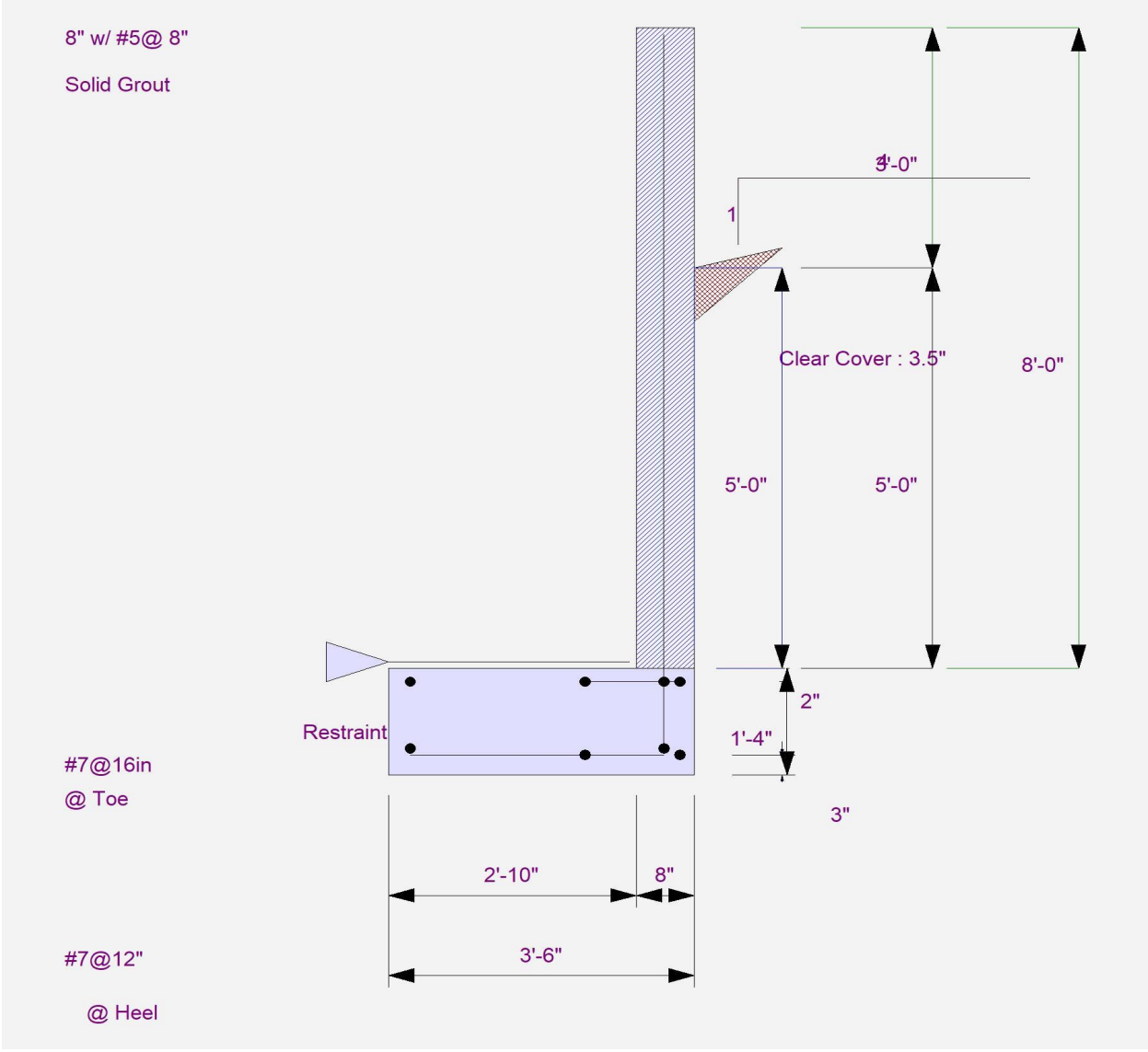
Lap Splice length for #5 bar specified in this stem design segment (25.4.2.4a) =	25.00 in
Development length for #5 bar specified in this stem design segment =	14.51 in
Hooked embedment length into footing for #5 bar specified in this stem design segment =	7.87 in
As Provided =	0.4650 in2/ft
As Required =	0.1611 in2/ft

Project Title: DMOS Trash Enclosure
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: Trash Enclosure.ec6

DESCRIPTION: 5ft Retain

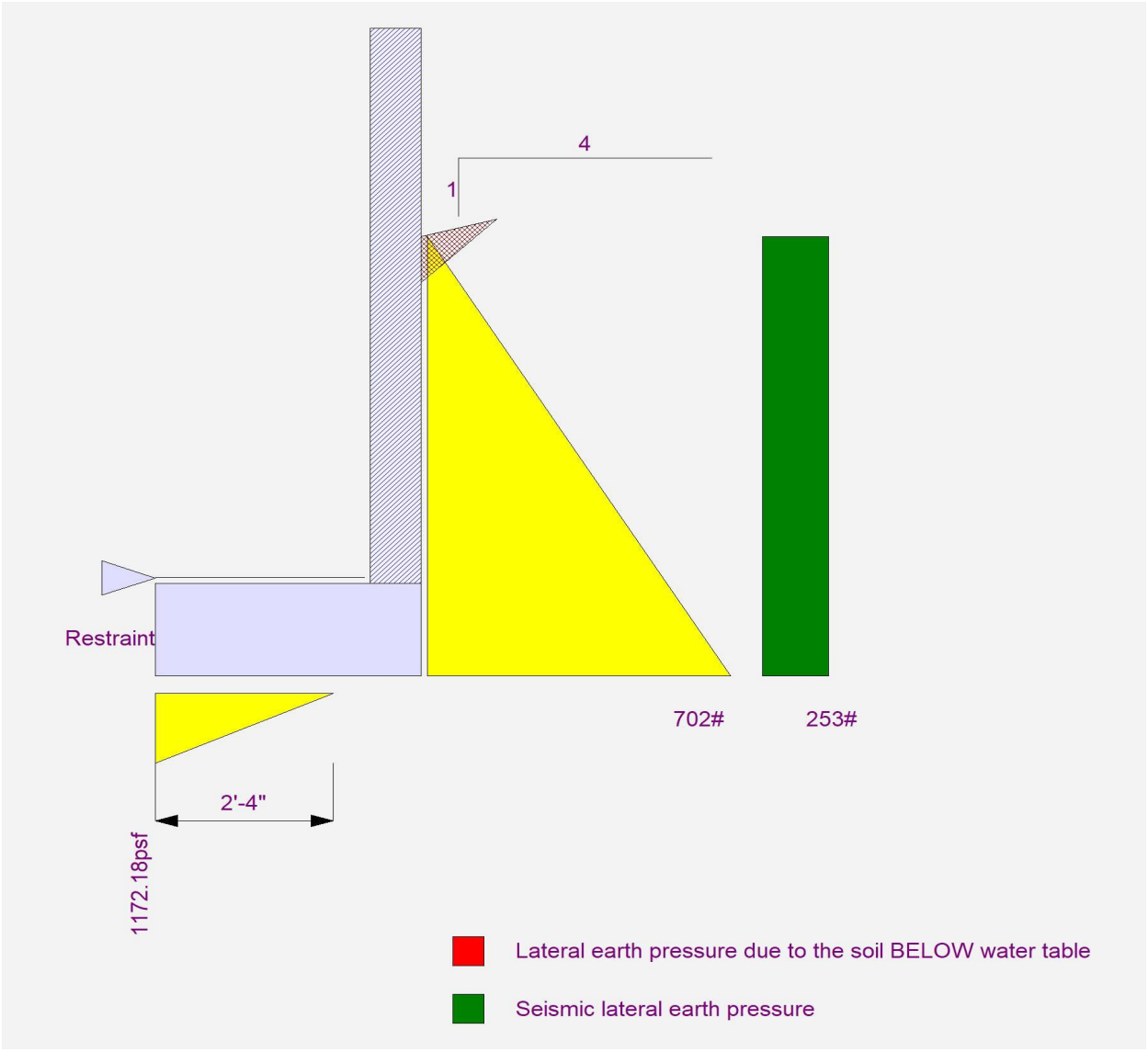


Project Title: DMOS Trash Enclosure
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: Trash Enclosure.ec6

DESCRIPTION: 5ft Retain



Project Title: DMOS Trash Enclosure
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: Trash Enclosure.ec6

DESCRIPTION: 3ft Retain & Typical

Code Reference

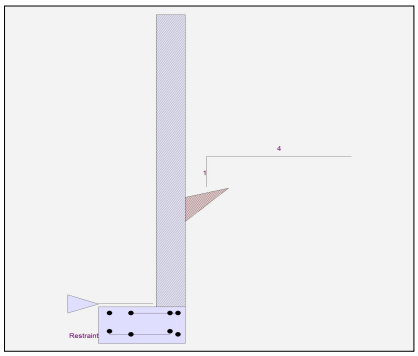
Calculations per IBC 2021 1807.3, ASCE 7-16

Criteria

Retained Height	=	3.00 ft
Wall height above soil	=	5.00 ft
Slope Behind Wall	=	4.00
Height of Soil over Toe	=	0.00 in
Water table above bottom of footing	=	0.0 ft

Soil Data

Allow Soil Bearing	=	1,500.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	35.0 psf/ft
	=	
Passive Pressure	=	250.0 psf/ft
Soil Density, Heel	=	120.00 pcf
Soil Density, Toe	=	120.00 pcf
Footing||Soil Friction	=	0.400
Soil height to ignore for passive pressure	=	12.00 in



Surcharge Loads

Surcharge Over Heel	=	0.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	0.0
Used for Sliding & Overturning		

Lateral Load Applied to Stem

Lateral Load	=	0.0 #/ft
...Height to Top	=	0.00 ft
...Height to Bottom	=	0.00 ft
Load Type	=	Wind (W) (Service Level)
Wind on Exposed Stem (Strength Level)	=	0.0 psf

Adjacent Footing Load

Adjacent Footing Load	=	0.0 lbs
Footing Width	=	0.00 ft
Eccentricity	=	0.00 in
Wall to Ftg CL Dist	=	0.00 ft
Footing Type		Spread Footing
Base Above/Below Soil at Back of Wall	=	0.0 ft
Poisson's Ratio	=	0.300

Axial Load Applied to Stem

Axial Dead Load	=	0.0 lbs
Axial Live Load	=	0.0 lbs
Axial Load Eccentricity	=	0.0 in

Earth Pressure Seismic Load

Method : Uniform		
Multiplier Used	=	9.000
(Multiplier used on soil density)		
Uniform Seismic Force	=	36.008
Total Seismic Force	=	144.060

Project Title: DMOS Trash Enclosure
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: Trash Enclosure.ec6

DESCRIPTION: 3ft Retain & Typical

Design Summary

Wall Stability Ratios

Overturning	=	2.47	OK
Slab Resists All Sliding !			
Global Stability	=	1.49	

Total Bearing Load	=	973 lbs	
...resultant ecc.	=	1.58 in	
Eccentricity within middle third			
Soil Pressure @ Toe	=	679 psf	OK
Soil Pressure @ Heel	=	294 psf	OK
Allowable	=	1,500 psf	
Soil Pressure Less Than Allowable			
ACI Factored @ Toe	=	951 psf	
ACI Factored @ Heel	=	412 psf	
Footing Shear @ Toe	=	7.7 psi	OK
Footing Shear @ Heel	=	0.0 psi	OK
Allowable	=	82.2 psi	

Sliding Calcs

Lateral Sliding Force	=	381.0 lbs

Vertical component of active lateral soil pressure IS NOT considered in the calculation of soil bearing

Load Factors

Building Code	
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.600
Seismic, E	1.000

Stem Construction

		Bottom		
		Stem OK		
Design Height Above Ftg	ft =	0.00		
Wall Material Above "Ht"	=	Masonry		
Design Method	=	ASD	SD	SD
Thickness	=	8.00		
Rebar Size	=	# 4		
Rebar Spacing	=	24.00		
Rebar Placed at	=	Center		
Design Data				
fb/FB + fa/Fa	=	**0.370**		
Total Force @ Section				
Service Level	lbs =	265.5		
Strength Level	lbs =			
Moment....Actual				
Service Level	ft-# =	319.5		
Strength Level	ft-# =			
Moment.....Allowable	=	863.4		
Shear.....Actual				
Service Level	psi =	2.9		
Strength Level	psi =			
Shear.....Allowable	psi =	45.8		
Anet (Masonry)	in2 =	91.50		
Wall Weight	psf =	84.0		
Rebar Depth 'd'	in =	3.81		

Masonry Data

f'm	psi =	1,500
Fs	psi =	32,000
Solid Grouting	=	Yes
Modular Ratio 'n'	=	21.48
Equiv. Solid Thick.	in =	7.63
Masonry Block Type	=	
Masonry Design Method	=	ASD

Concrete Data

f'c	psi =	
Fy	psi =	

Project Title: DMOS Trash Enclosure
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: Trash Enclosure.ec6

DESCRIPTION: 3ft Retain & Typical

Footing Data

Toe Width	=	1.33 ft
Heel Width	=	0.67
Total Footing Width	=	2.00
Footing Thickness	=	12.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	1.08 ft

f'c = 3,000 psi Fy = 60,000 psi
Footing Concrete Density = 150.00 pcf
Min. As % = 0.0018
Cover @ Top 2.00 @ Btm.= 3.00 in

Footing Design Results

		Toe	Heel
Factored Pressure	=	951	412 psf
Mu' : Upward	=	735	0 ft-#
Mu' : Downward	=	199	0 ft-#
Mu: Design	=	536 OK	0 ft-# OK
phiMn	=	11,695	OK - Flush
Actual 1-Way Shear	=	7.71	0.01 psi
Allow 1-Way Shear	=	82.16	82.16 psi

Toe Reinforcing = # 5 @ 12.00 in
Heel Reinforcing = Flush heel condition. No reinforcing required.
Key Reinforcing = None Spec'd
Footing Torsion, Tu = 0.00 ft-lbs
Footing Allow. Torsion, phi Tu = 0.00 ft-lbs

If torsion exceeds allowable, provide supplemental design for footing torsion.

Other Acceptable Sizes & Spacings

Toe: #4@ 9.25 in, #5@ 14.35 in, #6@ 20.37 in, #7@ 27.77 in, #8@ 36.57 in, #9@ 46.29 in, #10@ 58.79 in

Heel: Flush heel condition. No reinforcing required.

Key: No key defined

Min footing T&S reinf Area 0.52 in2
Min footing T&S reinf Area per foot 0.26 in2 /ft

If one layer of horizontal bars:	If two layers of horizontal bars:
#4@ 9.26 in	#4@ 18.52 in
#5@ 14.35 in	#5@ 28.70 in
#6@ 20.37 in	#6@ 40.74 in

Project Title: DMOS Trash Enclosure
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: Trash Enclosure.ec6

DESCRIPTION: 3ft Retain & Typical

Summary of Overturning & Resisting Forces & Moments

Item		.....OVERTURNING..... Force lbs	Distance ft	Moment ft-#		.....RESISTING..... Force lbs	Distance ft	Moment ft-#
HL Act Pres (ab water tbl)		280.1	1.33	373.6	Soil Over HL (ab. water tbl)	1.2	2.00	2.4
HL Act Pres (be water tbl)					Soil Over HL (bel. water tbl)		2.00	2.4
Hydrostatic Force					Water Table			
Buoyant Force	=				Sloped Soil Over Heel =	0.0	2.00	0.0
Surcharge over Heel	=				Surcharge Over Heel =			
Surcharge Over Toe	=				Adjacent Footing Load =			
Adjacent Footing Load	=				Axial Dead Load on Stem =			
Added Lateral Load	=				* Axial Live Load on Stem =			
Load @ Stem Above Soil	=				Soil Over Toe =			
Seismic Earth Load	=	100.8	2.00	201.7	Surcharge Over Toe =			
	=				Stem Weight(s) =	672.0	1.66	1,117.8
					Earth @ Stem Transitions =			
					Footing Weight =	300.0	1.00	300.0
					Key Weight =		1.08	
					Vert. Component =			
Total	=	381.0	**O.T.M.** =	575.3	**Total =**	973.2 lbs	**R.M.=**	1,420.2

Resisting/Overturning Ratio = **2.47**
Vertical Loads used for Soil Pressure = 973.2 lbs

* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.

If seismic is included, the OTM and sliding ratios may be 1.1 per section 1807.2.3 of IBC.

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Sliding Resistance.

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Overturning Resistance.

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus	250.0	pci
Horizontal Defl @ Top of Wall (approximate only)	0.075	in

The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe, because the wall would then tend to rotate into the retained soil.

Cantilevered Retaining Wall

DESCRIPTION: 3ft Retain & Typical

Rebar Lap & Embedment Lengths Information

Stem Design Segment: Bottom
Stem Design Height: 0.00 ft above top of footing
Calculated Rebar Stress, fs = 11024.15 psi

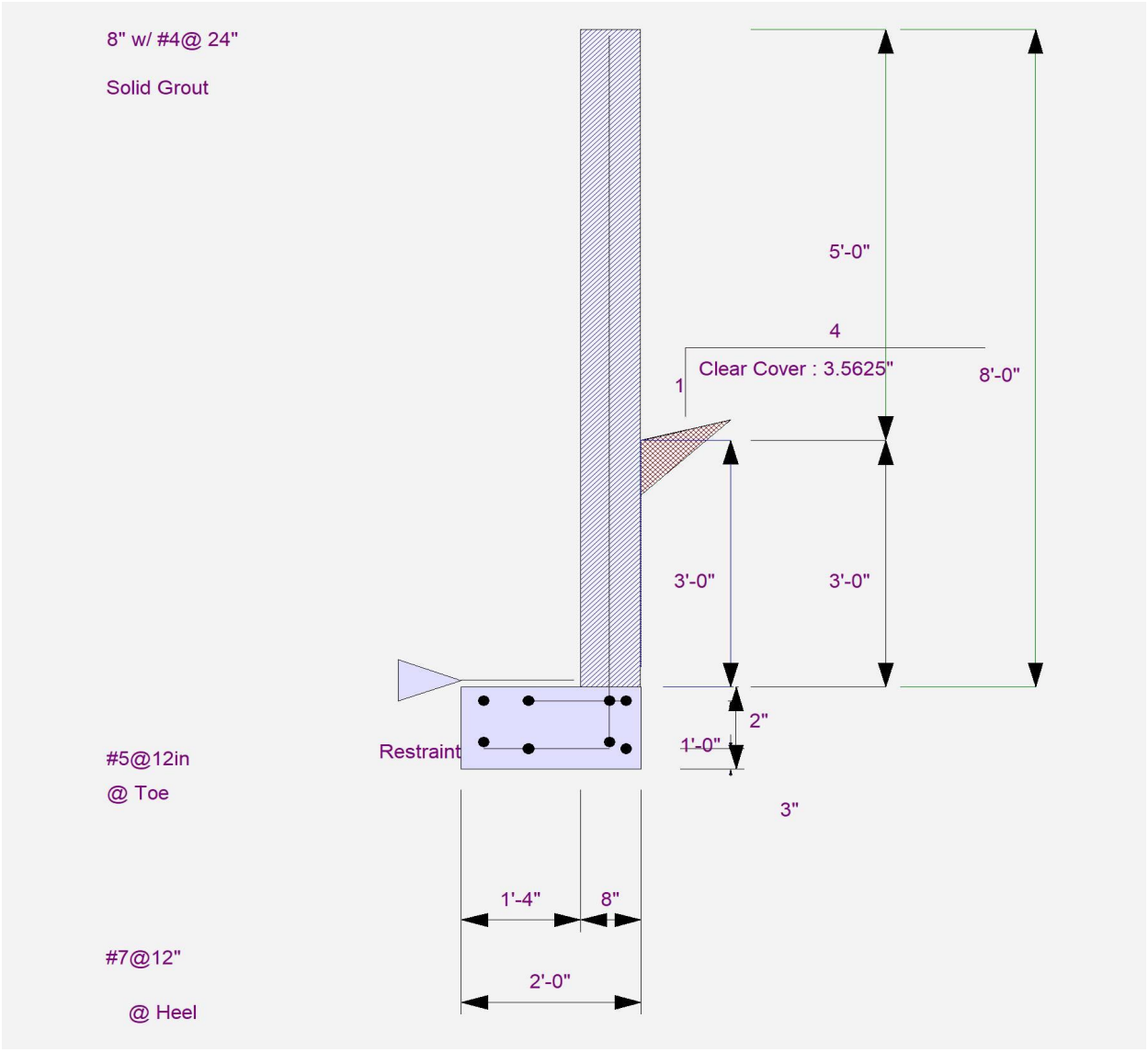
Lap Splice length for #4 bar specified in this stem design segment (25.4.2.4a) =	20.00 in
Development length for #4 bar specified in this stem design segment =	12.00 in
Hooked embedment length into footing for #4 bar specified in this stem design segment =	5.63 in
As Provided =	0.1000 in2/ft
As Required =	0.0351 in2/ft

Project Title: DMOS Trash Enclosure
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: Trash Enclosure.ec6

DESCRIPTION: 3ft Retain & Typical

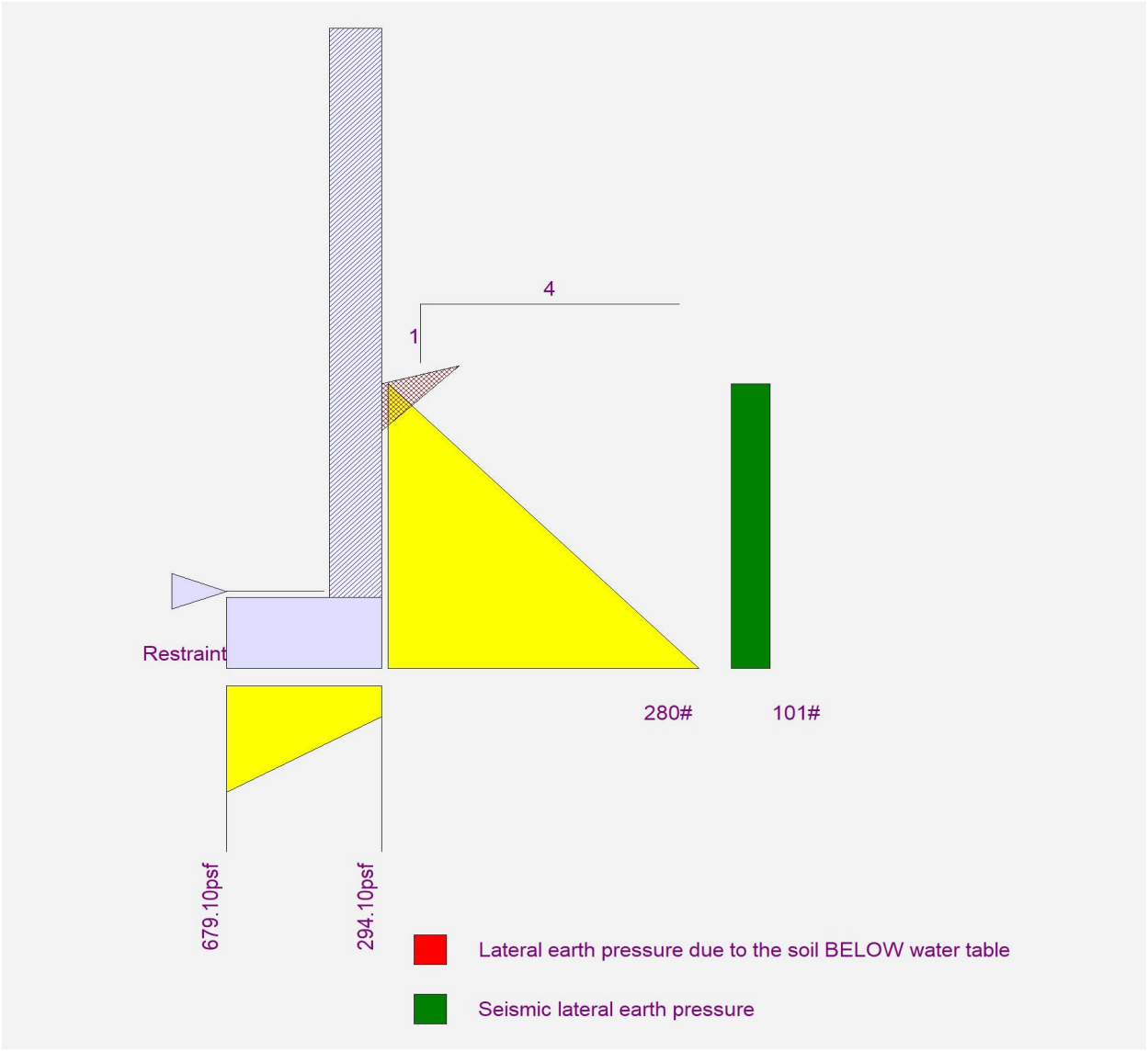


Project Title: DMOS Trash Enclosure
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: Trash Enclosure.ec6

DESCRIPTION: 3ft Retain & Typical



Project Title: DMOS Trash Enclosure
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: Trash Enclosure.ec6

DESCRIPTION: 7ft Retain Height

Code Reference

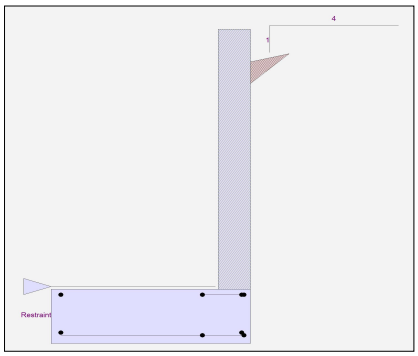
Calculations per IBC 2021 1807.3, ASCE 7-16

Criteria

Retained Height	=	7.00 ft
Wall height above soil	=	1.00 ft
Slope Behind Wall	=	4.00
Height of Soil over Toe	=	0.00 in
Water table above bottom of footing	=	0.0 ft

Soil Data

Allow Soil Bearing	=	1,500.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	35.0 psf/ft
	=	
Passive Pressure	=	250.0 psf/ft
Soil Density, Heel	=	120.00 pcf
Soil Density, Toe	=	120.00 pcf
Footing||Soil Friction	=	0.400
Soil height to ignore for passive pressure	=	12.00 in



Surcharge Loads

Surcharge Over Heel	=	0.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	0.0
Used for Sliding & Overturning		

Axial Load Applied to Stem

Axial Dead Load	=	0.0 lbs
Axial Live Load	=	0.0 lbs
Axial Load Eccentricity	=	0.0 in

Lateral Load Applied to Stem

Lateral Load	=	0.0 #/ft
...Height to Top	=	0.00 ft
...Height to Bottom	=	0.00 ft
Load Type	=	Wind (W) (Service Level)
Wind on Exposed Stem (Strength Level)	=	0.0 psf

Adjacent Footing Load

Adjacent Footing Load	=	0.0 lbs
Footing Width	=	0.00 ft
Eccentricity	=	0.00 in
Wall to Ftg CL Dist	=	0.00 ft
Footing Type		Spread Footing
Base Above/Below Soil at Back of Wall	=	0.0 ft
Poisson's Ratio	=	0.300

Earth Pressure Seismic Load

Method : Uniform		
Multiplier Used	=	9.000
(Multiplier used on soil density)		
Uniform Seismic Force	=	78.000
Total Seismic Force	=	676.000

Project Title: DMOS Trash Enclosure
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: Trash Enclosure.ec6

DESCRIPTION: 7ft Retain Height

Design Summary

Wall Stability Ratios

Overturning	=	1.25	Ratio < 1.5!
Slab Resists All Sliding !			
Global Stability	=	1.71	

Total Bearing Load	=	2,124	lbs	
...resultant ecc.	=	22.86	in	
Eccentricity outside middle third				
Soil Pressure @ Toe	=	2,087	psf	NG
Soil Pressure @ Heel	=	0	psf	OK
Allowable	=	1,500	psf	
Soil Pressure Exceeds Allowable!				
ACI Factored @ Toe	=	2,922	psf	
ACI Factored @ Heel	=	0	psf	
Footing Shear @ Toe	=	8.5	psi	OK
Footing Shear @ Heel	=	0.0	psi	OK
Allowable	=	82.2	psi	

Sliding Calcs

Lateral Sliding Force	=	1,787.6	lbs

Vertical component of active lateral soil pressure IS NOT considered in the calculation of soil bearing

Load Factors

Building Code	
Dead Load	1.200
Live Load	1.600
Earth, H	1.600
Wind, W	1.600
Seismic, E	1.000

Stem Construction

		Bottom		
		Stem OK		
Design Height Above Ftg	ft =	0.00		
Wall Material Above "Ht"	=	Masonry		
Design Method	=	ASD	SD	SD
Thickness	=	10.00		
Rebar Size	=	# 5		
Rebar Spacing	=	8.00		
Rebar Placed at	=	Edge		
Design Data				
fb/FB + fa/Fa	=	**0.910**		
Total Force @ Section				
Service Level	lbs =	1,403.5		
Strength Level	lbs =			
Moment....Actual				
Service Level	ft-# =	3,911.8		
Strength Level	ft-# =			
Moment.....Allowable	=	4,297.3		
Shear.....Actual				
Service Level	psi =	12.2		
Strength Level	psi =			
Shear.....Allowable	psi =	45.7		
Anet (Masonry)	in2 =	115.50		
Wall Weight	psf =	104.0		
Rebar Depth 'd'	in =	7.25		

Masonry Data

f'm	psi =	1,500
Fs	psi =	32,000
Solid Grouting	=	Yes
Modular Ratio 'n'	=	21.48
Equiv. Solid Thick.	in =	9.63
Masonry Block Type	=	
Masonry Design Method	=	ASD

Concrete Data

f'c	psi =	
Fy	psi =	

Project Title: DMOS Trash Enclosure
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: Trash Enclosure.ec6

DESCRIPTION: 7ft Retain Height

Footing Data

Toe Width	=	4.33 ft
Heel Width	=	0.83
Total Footing Width	=	5.17
Footing Thickness	=	20.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	0.00 ft

f'c = 3,000 psi Fy = 60,000 psi
Footing Concrete Density = 150.00 pcf
Min. As % = 0.0018
Cover @ Top 2.00 @ Btm.= 3.00 in

Footing Design Results

		Toe	Heel	
Factored Pressure	=	2,922	0	psf
Mu' : Upward	=	10,866	0	ft-#
Mu' : Downward	=	3,087	0	ft-#
Mu: Design	=	7,779 OK	0	ft-# OK
phiMn	=	32,646	OK - Flush	
Actual 1-Way Shear	=	8.45	0.00	psi
Allow 1-Way Shear	=	82.16	0.00	psi

Toe Reinforcing = # 7 @ 16.00 in
Heel Reinforcing = Flush heel condition. No reinforcing required.
Key Reinforcing = None Spec'd
Footing Torsion, Tu = 0.00 ft-lbs
Footing Allow. Torsion, phi Tu = 0.00 ft-lbs

If torsion exceeds allowable, provide supplemental design for footing torsion.

Other Acceptable Sizes & Spacings

Toe: #4@ 5.55 in, #5@ 8.61 in, #6@ 12.22 in, #7@ 16.66 in, #8@ 21.94 in, #9@ 27.77 in, #10@ 35.27 in

Heel: Flush heel condition. No reinforcing required.

Key: No key defined

Min footing T&S reinf Area 2.23 in2
Min footing T&S reinf Area per foot 0.43 in2 /ft

If one layer of horizontal bars:	If two layers of horizontal bars:
#4@ 5.56 in	#4@ 11.11 in
#5@ 8.61 in	#5@ 17.22 in
#6@ 12.22 in	#6@ 24.44 in

Project Title: DMOS Trash Enclosure
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: Trash Enclosure.ec6

DESCRIPTION: 7ft Retain Height

Summary of Overturning & Resisting Forces & Moments

Item		.....OVERTURNING..... Force lbs	Distance ft	Moment ft-#		.....RESISTING..... Force lbs	Distance ft	Moment ft-#
HL Act Pres (ab water tbl)		1,314.4	2.89	3,797.3	Soil Over HL (ab. water tbl)			
HL Act Pres (be water tbl)					Soil Over HL (bel. water tbl)			
Hydrostatic Force					Water Table			
Buoyant Force	=				Sloped Soil Over Heel	=	5.17	
Surcharge over Heel	=				Surcharge Over Heel	=		
Surcharge Over Toe	=				Adjacent Footing Load	=		
Adjacent Footing Load	=				Axial Dead Load on Stem	=		
Added Lateral Load	=				* Axial Live Load on Stem	=		
Load @ Stem Above Soil	=				Soil Over Toe	=		
Seismic Earth Load	=	473.2	4.33	2,050.5	Surcharge Over Toe	=		
	=				Stem Weight(s)	=	832.0	4.75	3,951.7
					Earth @ Stem Transitions	=			
Total	=	1,787.6	**O.T.M.** =	5,847.8	Footing Weight	=	1,291.6	2.58	3,336.4
					Key Weight	=			
					Vert. Component	=			
					Total =		2,123.6 lbs	**R.M.=**	7,288.1

Resisting/Overturning Ratio = **1.25**
Vertical Loads used for Soil Pressure = 2,123.6 lbs

* Axial live load NOT included in total displayed, or used for overturning resistance, but is included for soil pressure calculation.

If seismic is included, the OTM and sliding ratios may be 1.1 per section 1807.2.3 of IBC.

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Sliding Resistance.

Vertical component of active lateral soil pressure IS NOT considered in the calculation of Overturning Resistance.

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus	250.0	pci
Horizontal Defl @ Top of Wall (approximate only)	0.090	in

The above calculation is not valid if the heel soil bearing pressure exceeds that of the toe, because the wall would then tend to rotate into the retained soil.

Cantilevered Retaining Wall

DESCRIPTION: 7ft Retain Height

Rebar Lap & Embedment Lengths Information

Stem Design Segment: Bottom
Stem Design Height: 0.00 ft above top of footing
Calculated Rebar Stress, fs = 15931.26 psi

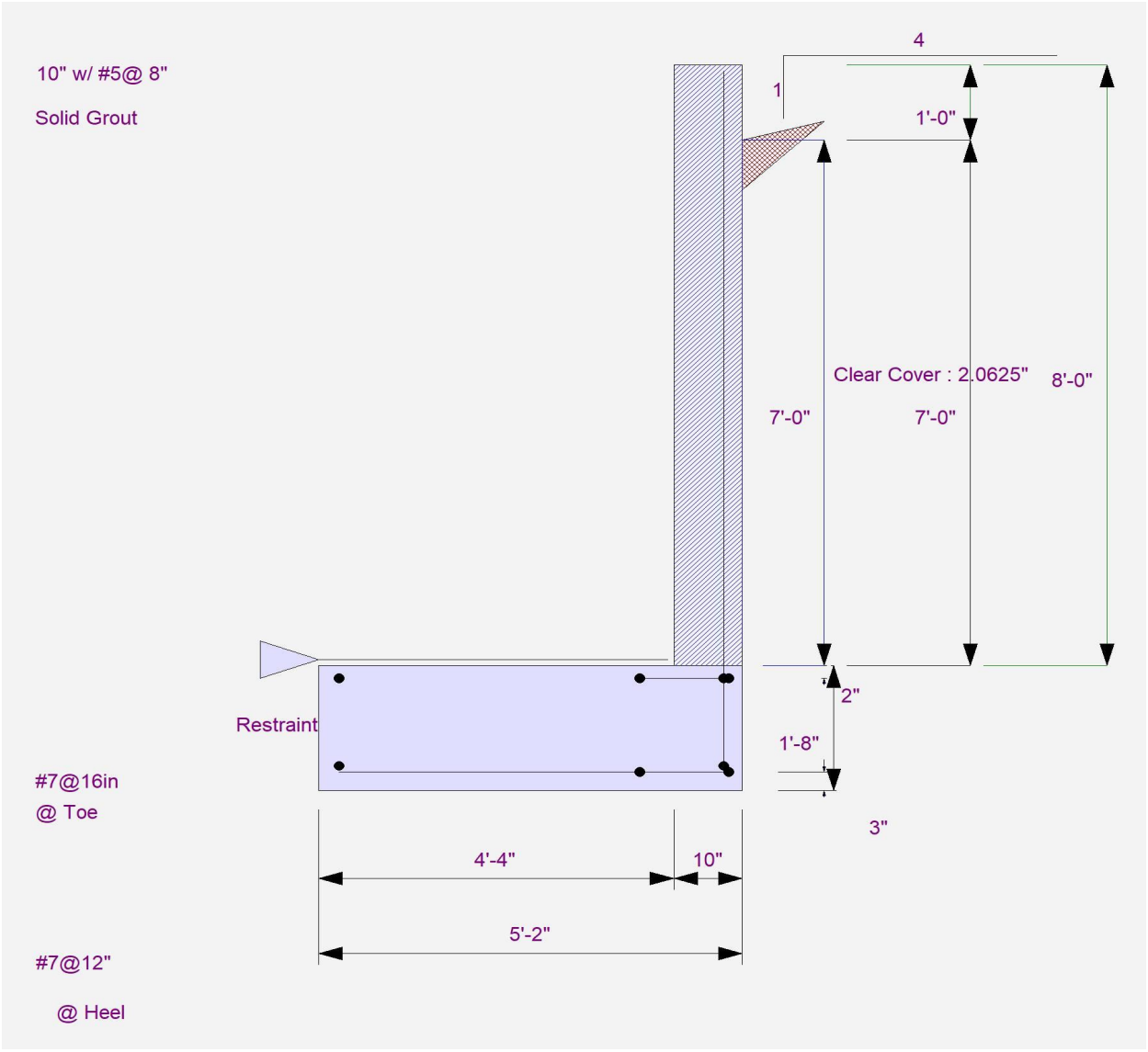
Lap Splice length for #5 bar specified in this stem design segment (25.4.2.4a) =	25.00 in
Development length for #5 bar specified in this stem design segment =	19.91 in
Hooked embedment length into footing for #5 bar specified in this stem design segment =	7.87 in
As Provided =	0.4650 in2/ft
As Required =	0.2286 in2/ft

Project Title: DMOS Trash Enclosure
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: Trash Enclosure.ec6

DESCRIPTION: 7ft Retain Height

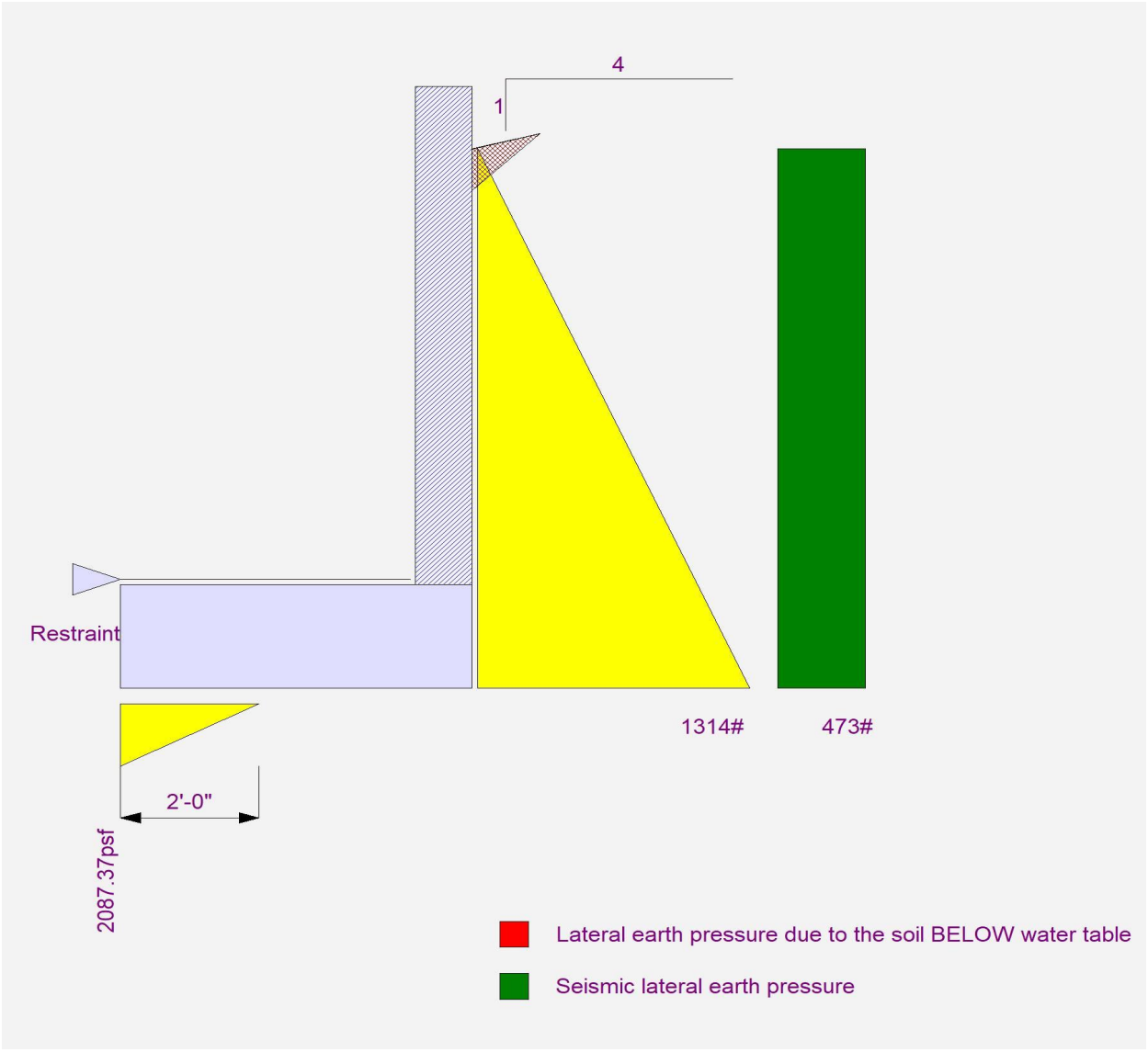


Project Title: DMOS Trash Enclosure
Engineer:
Project ID:
Project Descr:

Cantilevered Retaining Wall

Project File: Trash Enclosure.ec6

DESCRIPTION: 7ft Retain Height



Beam Analysis

Beam:		Trash Enclosure Roof					
Load		Dead	Live	Snow	Wind	Factored	Location
Distributed (k/ft)	w_1	**0.080**	**0.160**			0.240	
	w_2					0.000	
	w_3					0.000	
	w_4					0.000	
	w_5					0.000	
	w_6					0.000	
	w_7					0.000	
	w_8					0.000	
	w_9					0.000	
	w_{10}					0.000	
Trapezoidal (k/ft/ft)	t_1					0.000	
	t_2					0.000	
	t_3					0.000	
	t_4					0.000	
	t_5					0.000	
	t_6					0.000	
Point (k)	P_1					0.000	
	P_2					0.000	
	P_3					0.000	
	P_4					0.000	
	P_5					0.000	
	P_6					0.000	
	P_7					0.000	
	P_8					0.000	
	P_9					0.000	
	P_{10}					0.000	

Support Locations and Reactions		
# of Supports		2
Total Beam Length		**9.00**
Left End Condition		**Pinned**
Right End Condition		**Pinned**
R_1	1.080	**0.00**
R_2	1.080	**9.00**
R_3	0.000	**9.00**
R_4	0.000	**9.00**
R_5	0.000	**9.00**
R_6	0.000	**9.00**
R_7	0.000	**9.00**
R_8	0.000	**9.00**
R_9	0.000	**9.00**
R_{10}	0.000	**9.00**

Demand Output		
Location, ft		**4.50**
Shear, k		0.00
Moment, k-ft	M =	2.43
Deflection, in	D =	-0.40
Δ/Span		L/267

Load Factors	
Dead	**1.00**
Live	**1.00**
Snow	**1.00**
Wind	**1.00**

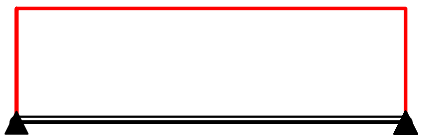
Stresses @ Input Location	
f_v (psi)	0
f_b (psi)	14507

Max/Min Stresses	
f_{v_MAX} (psi)	1570
f_{v_MIN} (psi)	-1570
f_{b_MAX} (psi)	35104
f_{b_MIN} (psi)	0

Beam Properties	
E (ksi)	**29000**
b (in)	**84**
d (in)	**3.5**
I (in^4)	3.02
S (in^3)	2.01
A (in^2)	1.07
I (Override)	
S (Override)	
A (Override)	

Steel Beam Section		HSS3x3x1/4	
F_y, ksi		46	
Beam Weight (plf)		8.81	
Axis of Bending		Strong	
Unbr. Length (L_b), ft		4.5	
C_b		1	
A_w	1.07 in^2	V_n/Ω_v	17.7 k
S	2.01 in^3	$\phi_v V_n$	26.6 k
Z	2.48 in^3	M_n/Ω_b	5.69 k-ft
I	3.02 in^4	$\phi_b M_n$	8.56 k-ft

Beam Loading Diagram



Span	V_L (kips)	V_R (kips)	M(-) (k-ft)	M(+) (k-ft)	Δ_{TL} (in)	@ x =	L/	Δ_{LL} (in)	@ x =	L/
Span 1	1.68	-1.68	-	5.88	-11.2 (↓)	7	L/10	-7.44 (↓)	7	L/14

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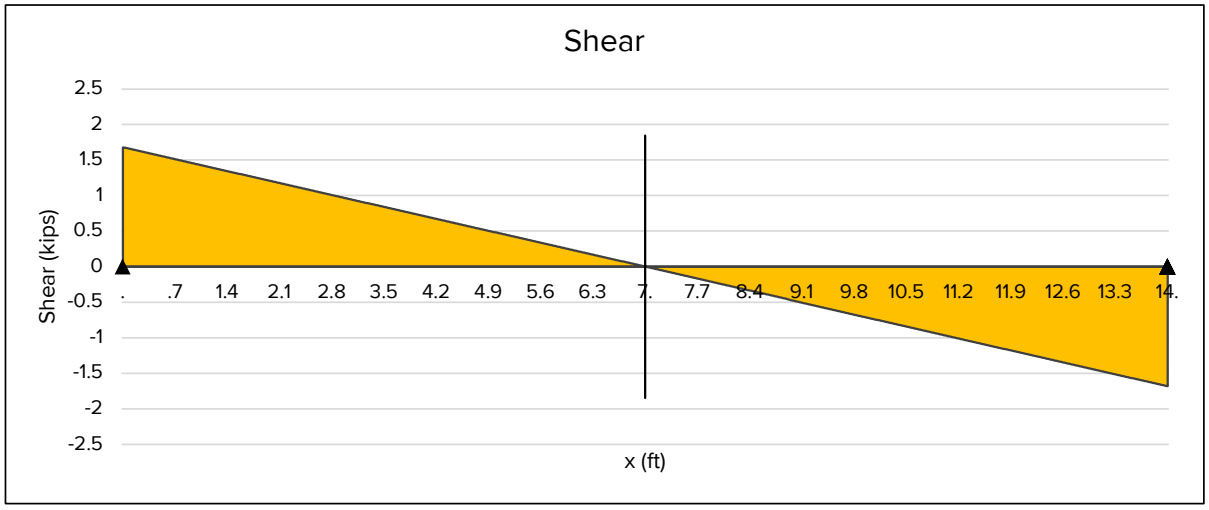
TACOMA 934 Broadway, Suite 100, Tacoma, WA 98402 | O 253.284.9470
ssfengineers.com

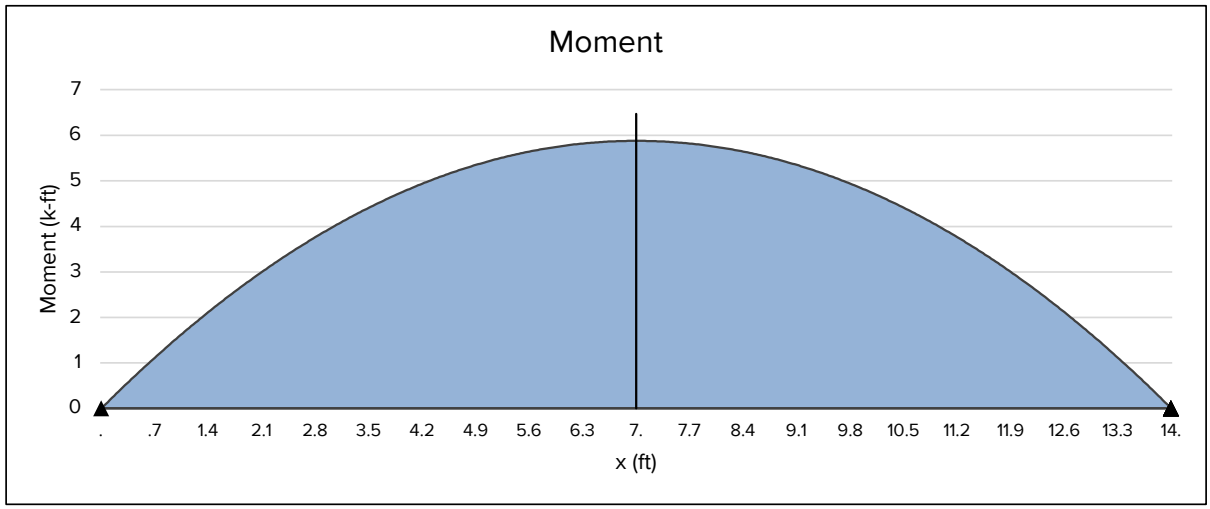
STRUCTURAL ENGINEERING

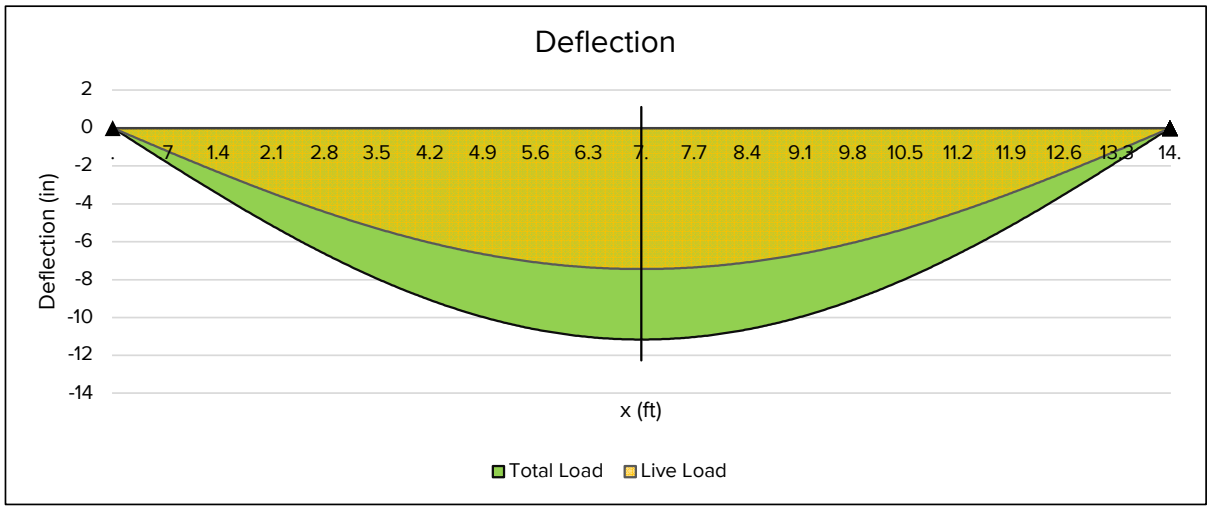
PROJECT UWBP
CLIMBING WALL SILL PLATE

DATE 10/16/2025
PROJ. #
DESIGN AGL
SHEET 1

Beam Analysis







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STRUCTURAL ENGINEERING

PROJECT	UWBP
	CLIMBING WALL SILL PLATE
DATE	*10/16/2025*
PROJ. #	
DESIGN	AGL
SHEET	2

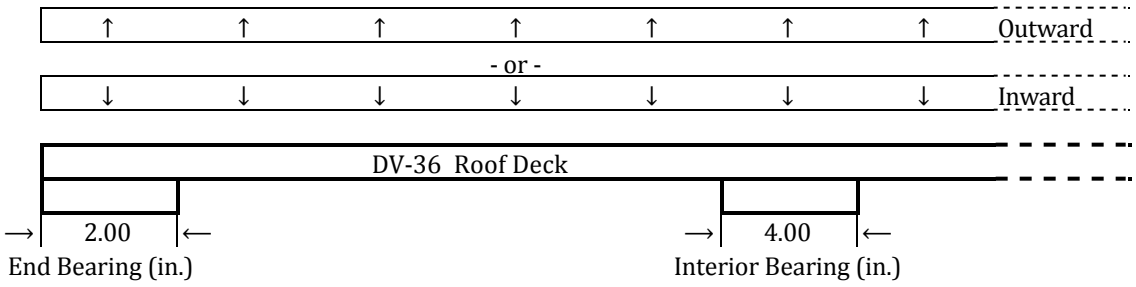
DV-36 Grade 80 20

Uniform Allowable Load Table, ASD (psf)

For End Lapped Deck

36/6 Connection Pattern to Supports with
#12 Screw

Support Member A572 GR42
$0.125 \le t_2$ (in.) ≤ 0.5



Inward Uniform Allowable Load Table, ASD (psf)

Span	Span	5'-0"	5'-6"	6'-0"	6'-6"	7'-0"	7'-6"	8'-0"	8'-6"
1	Wn/Ω	195	162	136	116	100	87	76	68
	L/240	75	56	43	34	27	22	18	15
2	Wn/Ω	194	161	135	115	99	87	76	67
	L/240	181	136	105	82	66	54	44	37
3	Wn/Ω	242	200	169	144	124	108	95	84
	L/240	142	106	82	64	52	42	35	29

Outward (Uplift) Uniform Allowable Load Table, ASD (psf)

Span	Span	5'-0"	5'-6"	6'-0"	6'-6"	7'-0"	7'-6"	8'-0"	8'-6"
1	Wn/Ω	195	162	136	116	100	87	76	68
	Rn/Ω	184	167	153	141	131	122	115	108
	L/240	75	56	43	34	27	22	18	15
2	Wn/Ω	194	161	135	115	99	87	76	67
	Rn/Ω	147	134	122	113	105	98	92	86
	L/240	-	-	105	82	66	54	44	37
3	Wn/Ω	242	200	169	144	124	108	95	84
	Rn/Ω	167	152	139	128	119	111	104	98
	L/240	142	106	82	64	52	42	35	29

Steel Deck Properties

t	Design Fy	wdd	Id+	Id-	Se+	Se-	Mn+/Ω	Mn-/Ω	Vn/Ω
in	ksi	psf	$in.^4/ft$	$in.^4/ft$	$in.^3/ft$	$in.^3/ft$	lbs-ft/ft	lbs-ft/ft	lbs/ft
0.0374	60	2.10	0.143	0.143	0.204	0.204	611	611	5321

Where: $W \le Wn/\Omega$

W = Required strength of the governing ASD load combination
Wn/Ω = Allowable strength governed by the steel deck
Rn/Ω = Allowable strength governed by connection tension

Bare Deck Uniform Load V1.0.7 in accordance with:
AISI S100-16 (2020) w/ S2-20
IAPMO UES ER-0423
IAPMO UES ER-2018

Date: 10/15/2025

Spread Footing Soil Bearing Design

Service Loads Loading

Dead Load =	2.1 kips
Live Load =	14.8 kips
Wind/EQ Load =	0.0 kips
Wind/EQ Moment (M_Y) =	0 ft-kips
Gravity Load Eccentricity (±X)=	0.00 ft.
Footing Weight =	2.0 kips
Total Load =	18.9 kips
Total Moment =	0 ft-kips

Service Load Factors

DL	1
LL	1
EQ/Wind	1

Soil Properties

Allowable Soil Brg. (Qa) =	1.50 ksf
Overburdan Density (γs) =	120 psf
Net Ftg Wt? (γ_c-γ_s)	No

Column Dimensions and Location

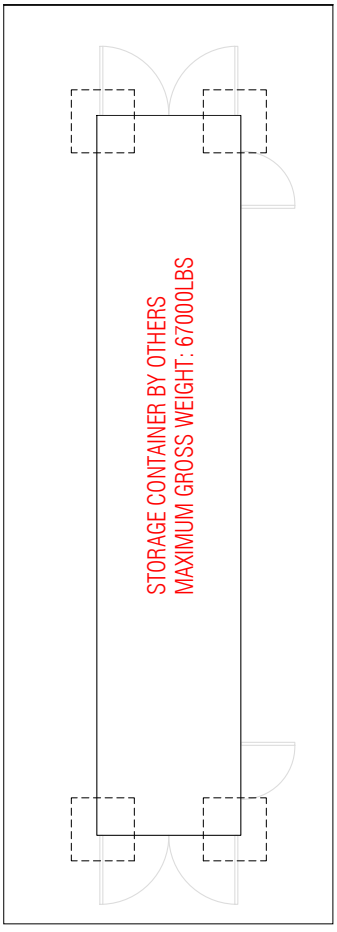
Column Xc Dimension (Dx) =	6.00 in.
Column Yc Dimension (Dy) =	6.00 in.
Column Face from right (Cr) =	1.75 ft.
Column Face from left (Cl) =	1.75 ft.

Soil Bearing Check (Allowable)

Eccentricity =	0.00 ft.	
Leng. Soil Brg. Under Ftg.=	4.00 ft.	
qmax =	1.18 ksf	OK
qmin =	1.18 ksf	

Footing Dimensions

L Dimension (X) =	4.00 ft.
B Dimension (Y) =	4.00 ft.
Footing Thickness (t) =	10.00 in.
Ftg Overburden (Ot) =	0.00 ft.



Soil Pressure Equations:

$e \le L/6$

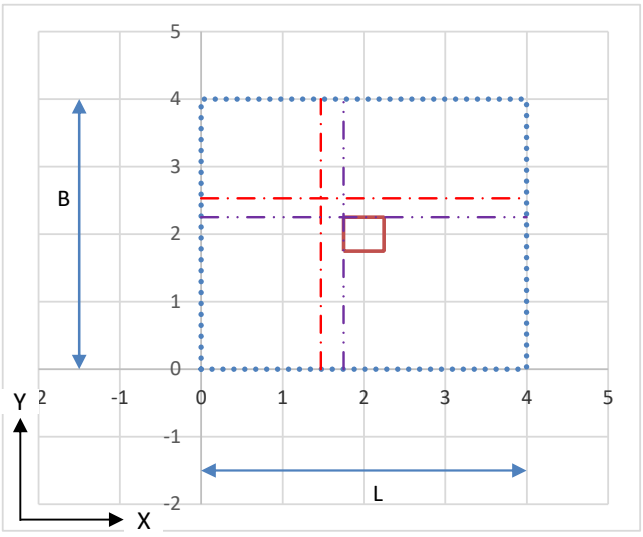
$qmax = \frac{Q}{LB}\left(1 + \frac{6e}{L}\right)$

$qmin = \frac{Q}{LB}\left(1 - \frac{6e}{L}\right)$

$e > L/6$

$qmax = \frac{4Q}{3L(L-2e)}$

$qmin = 0$



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Spread Footing Concrete Design - ACI 318-19

Footing Properties

Concrete Strength (f'c) =	3000 psi
Rebar Yield Strength (f_y) =	60000 psi
Reinforcing Clear Cover (cvr) =	3.00 in.
Reinforcing Depth (d) =	6.69 in.

Factored Loads

Factored Total Load =	28.6 kips
Factored Total moment =	0 ft-kips

Factored Bearing

Eccentricity =	0.00 ft.
Length of Soil Brg. Under Ftg. =	4.00 ft.
qmax =	1.78 ksf
qcolr =	1.78 ksf
qcoll =	1.78 ksf
qmin =	1.78 ksf

Strength Load Factors

DL	1.2
LL	1.6
EQ/Wind	1

ϕb	0.9
ϕv	0.75

Factored Moments and Shears

	Mu k-ft	Vu kips
X Right Side	11	11
X Left Side	11	11
Y Both Sides	11	11

Flexural Design - X Direction

Top Bar Size =	None	
Top Bars =		
Bot Bar Size =	#5	
Bot Bars =	3	
Mu =	11 ft-kips	
ØMn =	27 ft-kips	OK
ρ_{min} =	0.0018	*Controls*
ρ_{req} =	0.0011	
$A_{s\ FLEX}$ Required =	0.37 sq. in.	
$A_{s\ FLEX}$ Provided =	**0.93 sq. in.**	OK
$A_{s\ Min}$ Required =	0.86 sq. in.	
$A_{s\ Tot}$ Provided =	**0.93 sq. in.**	OK

Flexural Design - Y Direction

Top Bar Size =	None	
Top Bars =		
Bot Bar Size =	#5	
Bot Bars =	3	
Mu =	11 ft-kips	
ØMn =	27 ft-kips	OK
ρ_{min} =	0.0018	*Controls*
ρ_{req} =	0.0011	
$A_{s\ FLEX}$ Required =	0.37 sq. in.	
$A_{s\ FLEX}$ Provided =	0.93 sq. in.	OK
$A_{s\ Min}$ Required =	0.86 sq. in.	
$A_{s\ Tot}$ Provided =	**0.93 sq. in.**	

One-Way Shear Design - X Direction (ACI

Vu =	11 kips	
ØVn =	26 kips	OK

One-Way Shear Design - Y Direction

Vu =	11 kips	
ØVn =	26 kips	OK

Minimum Bars in Short Direction (ACI 13.3.3.3)

β =	1.0
$\gamma_s = 2/(\beta+1)$ =	1.00
Provide $2\beta/(\beta+1)$	0.93 sq. in.

Two-Way (Punching) Shear Design

b_o =	51 in	
Vu =	27 kips	
ØVn =	53 kips	OK

Concrete Capacity Equations:

$$Mn = A_s F_y \left[d - \frac{1}{2}\left(\frac{A_s F_y}{0.85 f'c\, b} \right) \right] \qquad vn = min \begin{pmatrix} 4\sqrt{f'c} \\ \left(2 + \frac{4}{\beta}\right)\sqrt{f'c} \\ \left(2 + \frac{\alpha_s d}{b_o}\right)\sqrt{f'c} \end{pmatrix} b_o d$$

$$Vn = 2\,\gamma\sqrt{f'c}\, b_w d \qquad b_o = 2(Dx + d) + 2(Dy + d)$$

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