

STRUCTURAL CALCULATIONS

FOR

PUYALLUP STORAGE
PUYALLUP, WA

October 18, 2024

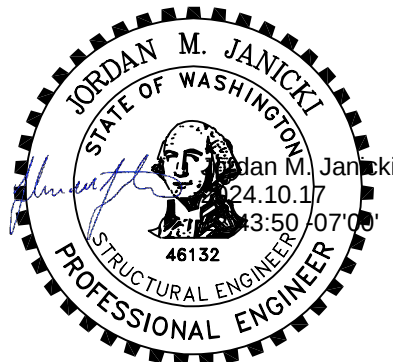
PRCNC20250116

Calculations required to be provided by
the Permittee on site for all Inspections

ITEM

PAGE

Design Criteria.....	DC-1 to DC-4
Gravity Design	GD-1 to GD-92
Lateral Design.....	LD-1 to LD-67



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STRUCTURAL CALCULATIONS

DESIGN CRITERIA

PUYALLUP STORAGE PUYALLUP, WA

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 FACET	Date:	10/15/2024
	Made By:	LAO
Project:	Puyallup Storage	
Description:	Design Criteria	

Design Criteria

Code: 2021 International Building Code
Engineered Design By 2021 IBC (R301.1)

Seismic:

Latitude = 47.1915046 North
Longitude = 122.2877184 West
Spectral Response Acceleration, S_s & S_1 = 1.269 & 0.437
Spectral Response Acceleration, S_{ds} & S_{d1} = 1.015 & 0.543
Soil Site Class, F_a & F_v = 1.200 & 1.863
Response Modification Factor, R = 6.5/5

Wind:

Exposure = B
Basic Wind Speed = 110 mph
Topographical Terrain = Flat
 K_{zt} = 1.00

Live Loads:

Roof Snow = 25 psf
Floor = 65 psf

Soils:

Assumed By Owner
Soil Bearing = 1,500 psf
Active Soil Pressure = 35 pcf
Passive Soil Pressure = 250 pcf
IBC Soil Site Classification = D
Frost Depth = 18 inches


FACET

Date: 10/14/2024

Made By: LAO

 Project: **Puyallup Storage**
 Description: **Dead Loads**
Roof Assembly

Dead Load:

Comp. Shingle Roof.....	2.0 psf		
19/32" Plywood Sheathing.....	2.0 psf		
2x12 Rafters at 24" o.c.....	2.2 psf		
Insulation.....	1.5 psf		
(1) Layers of 5/8" GWB.....	2.8 psf		
Miscellaneous	1.0 psf		
Total	11.5 psf	Use DL =	12.0 psf
		W/ Solar	17.0 psf

Floor Assembly

Dead Load:

Flooring	4.0 psf		
3/4" T & G Plywood	2.5 psf		
2x12 at 16" o.c.....	3.5 psf		
(1) Layers of 5/8" GWB.....	2.8 psf		
Miscellaneous	1.5 psf		
Total	14.3 psf	Use DL =	15.0 psf

Exterior CMU Wall Assembly

8" CMU Wall at 16" o.c.....	81.0 psf		
Insulation Soil Bearing = 1,500	1.0 psf		
Miscellaneous	0.5 psf		
Total	82.5 psf	Use DL =	83.0 psf

Exterior Wall Assembly

Siding.....	1.5 psf		
2x6 at 16" o.c.....	1.7 psf		
Insulation	1.0 psf		
15/32" Plywood Sheathing.....	1.7 psf		
(1) Layers of 5/8" GWB	2.8 psf		
Miscellaneous	0.5 psf		
Total	9.2 psf	Use DL =	10.0 psf

Interior Wall Assembly

(2) Layers of 1/2" GWB	4.4 psf		
2x8 at 24" o.c.....	1.5 psf		
Insulation.....	0.5 psf		
Miscellaneous	0.5 psf		
Total	6.9 psf	Use DL =	7.0 psf

[The ATC Hazards by Location website will not be updated to support ASCE 7-22. Find out why.](#)

ATC

Hazards by Location

Search Information

Address:11 5th St SE, Puyallup, WA 98372, USA

Coordinates:47.19150459999999, -122.2877184

Elevation:49 ft

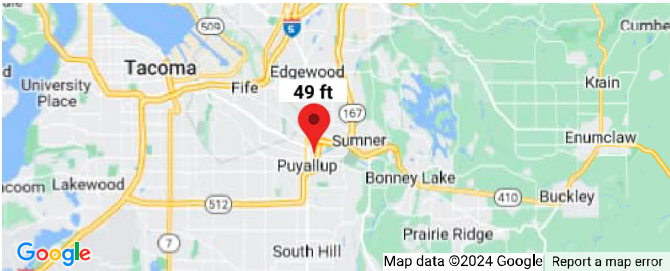
Timestamp:2024-08-16T23:14:58.058Z

Hazard Type:Seismic

Reference Document:ASCE7-16

Risk Category:II

Site Class:D-default



Basic Parameters

Name	Value	Description
S _S	1.269	MCE _R ground motion (period=0.2s)
S ₁	0.437	MCE _R ground motion (period=1.0s)
S _{MS}	1.523	Site-modified spectral acceleration value
S _{M1}	* null	Site-modified spectral acceleration value
S _{DS}	1.015	Numeric seismic design value at 0.2s SA
S _{D1}	* null	Numeric seismic design value at 1.0s SA



Facet

Table R301.2(1) Climatic and Geographical Design Criteria											
Ground Snow Load	Wind Design		Seismic Design Category ^f	Subject to Damage from			Winter Design Temp ^e	Ice Shield Underlay _h	Flood Hazards ^g	Air Freeze Index _i	Mean Annual Temp _j
	Speed ^d (mph)	Topograp hical effects _k		Weathering ^a	Frost Line Depth _b	Termites ^c					
20 lbs/ft	85	No	D-1	Moderate	12 inches	Slight to Moderate	17°	No	Puyallup Municipal Code 21.07	250	50°

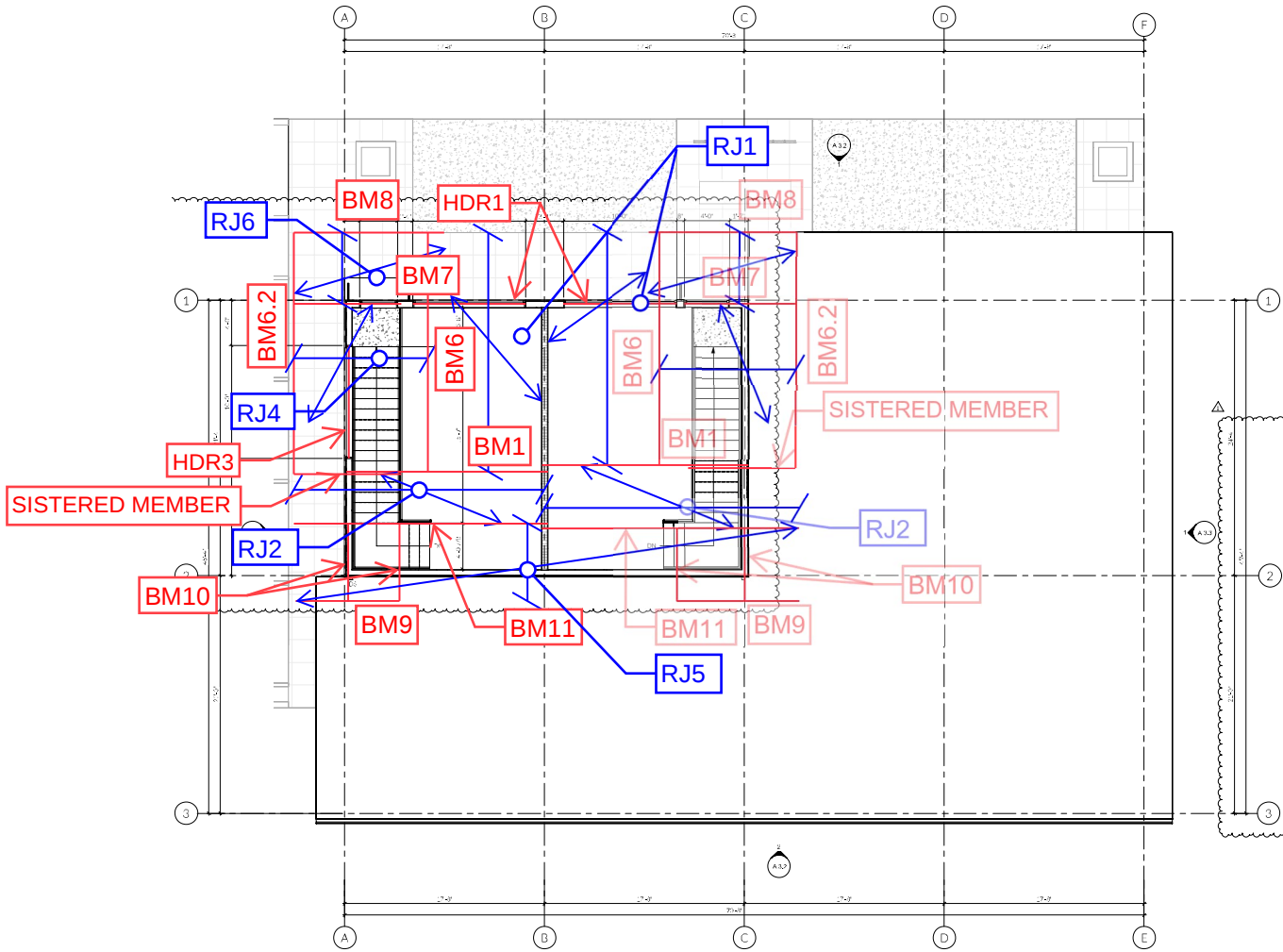


STRUCTURAL CALCULATIONS

GRAVITY DESIGN

PUYALLUP STORAGE PUYALLUP, WA

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Wood Beam

Project File: Enercalc_Puyallup Storage.ec

LIC# : KW-06012482, Build:20.24.10.03

FACET

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: RJ1 Outrigger (2x12 at 24" o.c. 6'-0" Max Cantilever)**CODE REFERENCES**

Calculations per NDS 2018, IBC 2021, SDPWS 2021

Load Combination Set : ASCE 7-16

Material Properties

Analysis Method : Allowable Stress Design

Load Combination : ASCE 7-16

Wood Species : Douglas Fir-Larch

Wood Grade : No.1

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb + 1,000.0 psi

Fb - 1,000.0 psi

Fc - Prll 1,500.0 psi

Fc - Perp 625.0 psi

Fv 180.0 psi

Ft 675.0 psi

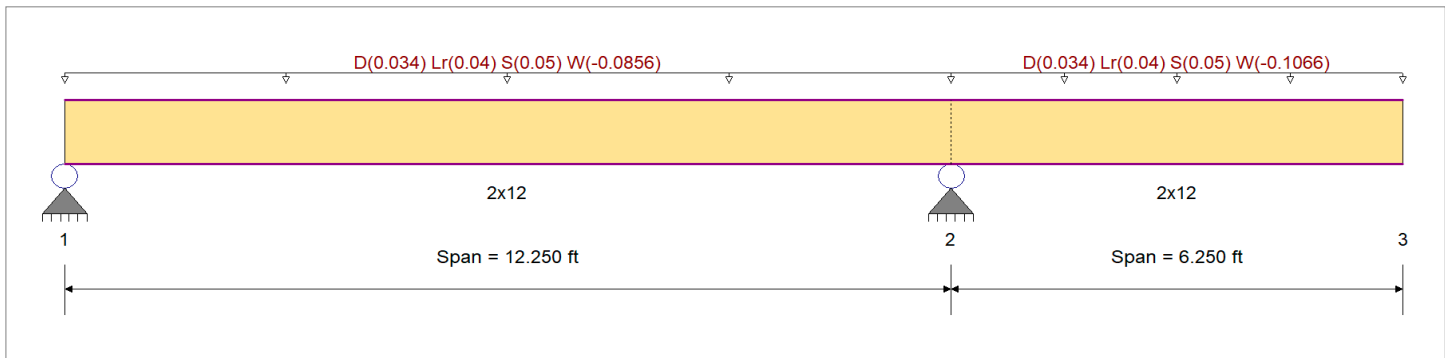
E : Modulus of Elasticity

Ebend- xx 1,700.0 ksi

Eminbend - xx 620.0 ksi

Density 31.210pcf

Repetitive Member Stress Increase

**Applied Loads**

Service loads entered. Load Factors will be applied for calculation

Beam self weight calculated and added to loading

Load for Span Number 1

Uniform Load : D = 0.0170, Lr = 0.020, S = 0.0250, W = -0.04280 ksf, Tributary Width = 2.0 ft

Load for Span Number 2

Uniform Load : D = 0.0170, Lr = 0.020, S = 0.0250, W = -0.05330 ksf, Tributary Width = 2.0 ft, (Roof Load)

DESIGN SUMMARY**Design OK**

Maximum Bending Stress Ratio		=	0.491 : 1	Maximum Shear Stress Ratio		=	0.257 : 1
Section used for this span			2x12	Section used for this span			2x12
fb: Actual	=	649.31psi		fv: Actual	=	53.22 psi	
F'b	=	1,322.50psi		F'v	=	207.00 psi	
Load Combination		+D+S+H		Load Combination		+D+S+H	
Location of maximum on span	=	12.250ft		Location of maximum on span	=	11.360 ft	
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 1	
Maximum Deflection							
Max Downward Transient Deflection	0.157 in	Ratio =	952 >= 360	Span: 2 : Lr Only, LL Comb Run (*L)			
Max Upward Transient Deflection	-0.109 in	Ratio =	1370 >= 360	Span: 2 : Lr Only, LL Comb Run (L*)			
Max Downward Total Deflection	0.202 in	Ratio =	740 >= 240	Span: 2 : +D+Lr+H, LL Comb Run (*L)			
Max Upward Total Deflection	-0.115 in	Ratio =	1308 >= 240	Span: 2 : +D+0.750Lr+0.750L+0.420W+H, LL Comb Run			

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Max Upward from all Load Conditions	0.416	1.225	
Max Upward from Load Combinations	0.416	1.225	
Max Upward from Load Cases	0.245	0.698	
Max Downward from all Load Conditions	-0.354	-1.361	
Max Downward from Load Combinations	-0.110	-0.501	
Max Downward from Load Cases (Resis)	-0.354	-1.361	
+D+H	0.171	0.526	
+D+L+H, LL Comb Run (*L)	0.171	0.526	
+D+L+H, LL Comb Run (L*)	0.171	0.526	
+D+L+H, LL Comb Run (LL)	0.171	0.526	

Wood Beam

Project File: Enercalc_Puyallup Storage.ec

LIC# : KW-06012482, Build:20.24.10.03

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(c) ENERCALC, LLC 1982-2024

DESCRIPTION: RJ1 Outrigger (2x12 at 24" o.c. 6'-0" Max Cantilever)**Vertical Reactions**

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
+D+Lr+H, LL Comb Run (*L)	0.107	0.840	
+D+Lr+H, LL Comb Run (L*)	0.416	0.771	
+D+Lr+H, LL Comb Run (LL)	0.352	1.085	
+D+S+H	0.397	1.225	
+D+0.750Lr+0.750L+H, LL Comb Run (*)	0.123	0.761	
+D+0.750Lr+0.750L+H, LL Comb Run (L)	0.354	0.710	
+D+0.750Lr+0.750L+H, LL Comb Run (L)	0.307	0.945	
+D+0.750L+0.750S+H, LL Comb Run (*L)	0.341	1.050	
+D+0.750L+0.750S+H, LL Comb Run (L*)	0.341	1.050	
+D+0.750L+0.750S+H, LL Comb Run (LL)	0.341	1.050	
+D+0.60W+H	-0.042	-0.290	
+D+0.750Lr+0.750L+0.450W+H, LL Comb	-0.037	0.149	
+D+0.750Lr+0.750L+0.450W+H, LL Comb	0.195	0.098	
+D+0.750Lr+0.750L+0.450W+H, LL Comb	0.147	0.333	
+D+0.750L+0.750S+0.450W+H, LL Comb	0.181	0.438	
+D+0.750L+0.750S+0.450W+H, LL Comb	0.181	0.438	
+D+0.750L+0.750S+0.450W+H, LL Comb	0.181	0.438	
+0.60D+0.60W+0.60H	-0.110	-0.501	
+D+0.70E+0.60H	0.171	0.526	
+D+0.750L+0.750S+0.5250E+H, LL Comb	0.341	1.050	
+D+0.750L+0.750S+0.5250E+H, LL Comb	0.341	1.050	
+D+0.750L+0.750S+0.5250E+H, LL Comb	0.341	1.050	
+0.60D+0.70E+H	0.102	0.316	
D Only	0.171	0.526	
Lr Only, LL Comb Run (*L)	-0.064	0.314	
Lr Only, LL Comb Run (L*)	0.245	0.245	
Lr Only, LL Comb Run (LL)	0.181	0.559	
S Only	0.227	0.698	
W Only	-0.354	-1.361	
H Only			

Wood Beam

Project File: Enercalc_Puyallup Storage.ec

LIC#: KW-06012482, Build:20.24.10.03

FACET

(c) ENERCALC, LLC 1982-2024

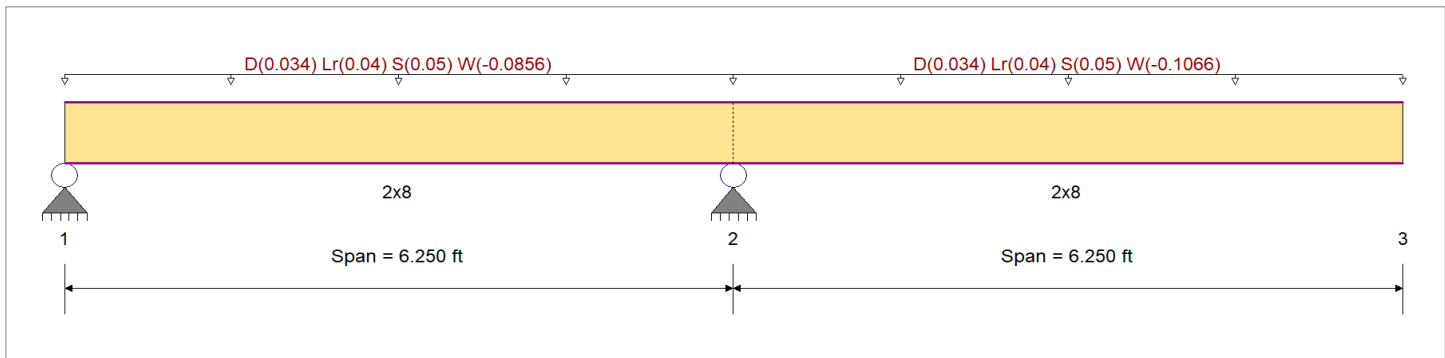
DESCRIPTION: RJ1 Notched Outrigger (2x8 at 24" o.c. 6'-0" Max Cantilever)**CODE REFERENCES**

Calculations per NDS 2018, IBC 2021, SDPWS 2021

Load Combination Set : ASCE 7-16

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	1,000.0 psi	E : Modulus of Elasticity	
Load Combination :	ASCE 7-16	Fb -	1,000.0 psi	Ebend- xx	1,700.0 ksi
		Fc - Prll	1,500.0 psi	Eminbend - xx	620.0 ksi
Wood Species :	Douglas Fir-Larch	Fc - Perp	625.0 psi		
Wood Grade :	No.1	Fv	180.0 psi		
		Ft	675.0 psi	Density	31.210pcf
Beam Bracing :	Beam is Fully Braced against lateral-torsional buckling			Repetitive Member Stress Increase	

**Applied Loads**

Service loads entered. Load Factors will be applied for calculation

Beam self weight calculated and added to loading

Load for Span Number 1

Uniform Load : D = 0.0170, Lr = 0.020, S = 0.0250, W = -0.04280 ksf, Tributary Width = 2.0 ft

Load for Span Number 2

Uniform Load : D = 0.0170, Lr = 0.020, S = 0.0250, W = -0.05330 ksf, Tributary Width = 2.0 ft, (Roof Load)

DESIGN SUMMARY**Design OK**

Maximum Bending Stress Ratio		=	0.971 : 1	Maximum Shear Stress Ratio	=	0.325 : 1
Section used for this span			2x8	Section used for this span		2x8
fb: Actual	=	1,540.26psi		fv: Actual	=	67.38 psi
F'b	=	1,587.00psi		F'v	=	207.00 psi
Load Combination		+D+S+H		Load Combination		+D+S+H
Location of maximum on span	=	6.250ft		Location of maximum on span	=	5.656 ft
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 1
Maximum Deflection						
Max Downward Transient Deflection	0.406 in	Ratio =	368 >= 240	Span: 2 : S Only		
Max Upward Transient Deflection	-0.376 in	Ratio =	398 >= 240	Span: 2 : +0.420W		
Max Downward Total Deflection	0.702 in	Ratio =	212 >= 180	Span: 2 : +D+S+H		
Max Upward Total Deflection	-0.198 in	Ratio =	754 >= 180	Span: 2 : +0.60D+0.420W+0.60H		

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Max Upward from all Load Conditions	0.125	1.079	
Max Upward from Load Combinations	0.125	1.079	
Max Upward from Load Cases	0.125	0.625	
Max Downward from all Load Conditions	-0.125	-1.267	
Max Downward from Load Combinations	-0.125	-0.487	
Max Downward from Load Cases (Resis)	-0.125	-1.267	
+D+H	0.000	0.454	
+D+L+H, LL Comb Run (*L)	0.000	0.454	
+D+L+H, LL Comb Run (L*)	0.000	0.454	
+D+L+H, LL Comb Run (LL)	0.000	0.454	

Wood Beam

Project File: Enercalc_Puyallup Storage.ec

LIC# : KW-06012482, Build:20.24.10.03

FACET

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: RJ1 Notched Outrigger (2x8 at 24" o.c. 6'-0" Max Cantilever)**Vertical Reactions**

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
+D+Lr+H, LL Comb Run (*L)	-0.125	0.829	
+D+Lr+H, LL Comb Run (L*)	0.125	0.579	
+D+Lr+H, LL Comb Run (LL)	0.000	0.954	
+D+S+H	0.000	1.079	
+D+0.750Lr+0.750L+H, LL Comb Run (*)	-0.094	0.736	
+D+0.750Lr+0.750L+H, LL Comb Run (L)	0.094	0.548	
+D+0.750Lr+0.750L+H, LL Comb Run (L)	0.000	0.829	
+D+0.750L+0.750S+H, LL Comb Run (*L)	0.000	0.923	
+D+0.750L+0.750S+H, LL Comb Run (L*)	0.000	0.923	
+D+0.750L+0.750S+H, LL Comb Run (LL)	0.000	0.923	
+D+0.60W+H	0.039	-0.306	
+D+0.750Lr+0.750L+0.450W+H, LL Comb	-0.064	0.166	
+D+0.750Lr+0.750L+0.450W+H, LL Comb	0.123	-0.022	
+D+0.750Lr+0.750L+0.450W+H, LL Comb	0.030	0.259	
+D+0.750L+0.750S+0.450W+H, LL Comb	0.030	0.353	
+D+0.750L+0.750S+0.450W+H, LL Comb	0.030	0.353	
+D+0.750L+0.750S+0.450W+H, LL Comb	0.030	0.353	
+0.60D+0.60W+0.60H	0.039	-0.487	
+D+0.70E+0.60H	0.000	0.454	
+D+0.750L+0.750S+0.5250E+H, LL Comb	0.000	0.923	
+D+0.750L+0.750S+0.5250E+H, LL Comb	0.000	0.923	
+D+0.750L+0.750S+0.5250E+H, LL Comb	0.000	0.923	
+0.60D+0.70E+H	0.000	0.273	
D Only	0.000	0.454	
Lr Only, LL Comb Run (*L)	-0.125	0.375	
Lr Only, LL Comb Run (L*)	0.125	0.125	
Lr Only, LL Comb Run (LL)	0.000	0.500	
S Only	0.000	0.625	
W Only	0.066	-1.267	
H Only			

Wood Beam

Project File: Enercalc_Puyallup Storage.ec

LIC#: KW-06012482, Build:20.24.10.03

FACET

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: RJ2 Outrigger (2x12 at 24" o.c. 4'-6" Cantilever)**CODE REFERENCES**

Calculations per NDS 2018, IBC 2021, SDPWS 2021

Load Combination Set : ASCE 7-16

Material Properties

Analysis Method : Allowable Stress Design

Load Combination : ASCE 7-16

Wood Species : Douglas Fir-Larch

Wood Grade : No.1

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb + 1,000.0 psi

Fb - 1,000.0 psi

Fc - Prll 1,500.0 psi

Fc - Perp 625.0 psi

Fv 180.0 psi

Ft 675.0 psi

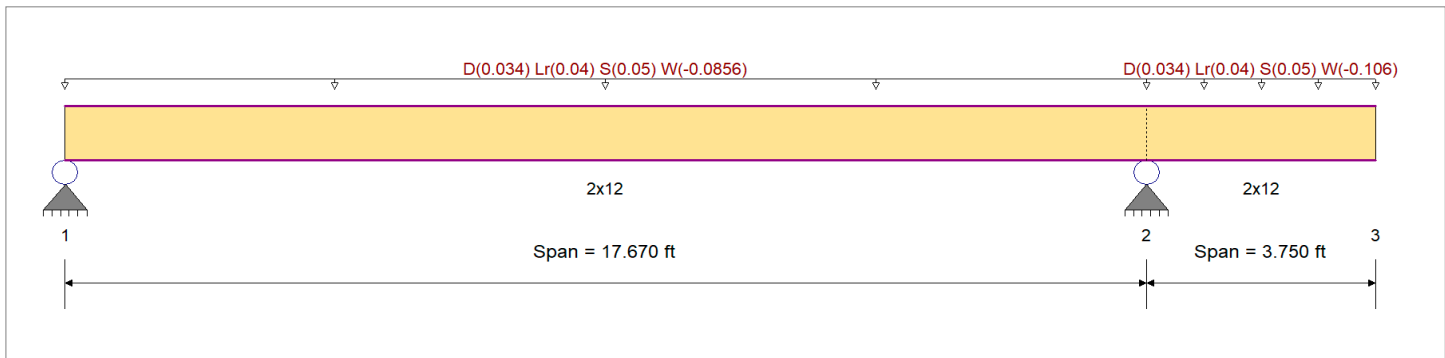
E : Modulus of Elasticity

Ebend- xx 1,700.0 ksi

Eminbend - xx 620.0 ksi

Density 31.210 pcf

Repetitive Member Stress Increase

**Applied Loads**

Service loads entered. Load Factors will be applied for calculation

Beam self weight calculated and added to loading

Load for Span Number 1

Uniform Load : D = 0.0170, Lr = 0.020, S = 0.0250, W = -0.04280 ksf, Tributary Width = 2.0 ft, (Roof Load)

Load for Span Number 2

Uniform Load : D = 0.0170, Lr = 0.020, S = 0.0250, W = -0.0530 ksf, Tributary Width = 2.0 ft, (Roof Load)

DESIGN SUMMARY**Design OK**

Maximum Bending Stress Ratio		=	0.895	1	Maximum Shear Stress Ratio		=	0.314	1
Section used for this span			2x12		Section used for this span			2x12	
fb: Actual	=	1,183.22psi			fv: Actual	=	65.02 psi		
F'b	=	1,322.50psi			F'v	=	207.00 psi		
Load Combination		+D+S+H			Load Combination		+D+S+H		
Location of maximum on span	=	8.391ft			Location of maximum on span	=	16.782 ft		
Span # where maximum occurs	=	Span # 1			Span # where maximum occurs	=	Span # 1		
Maximum Deflection									
Max Downward Transient Deflection	0.326 in	Ratio =	649	>=240	Span: 1 : S Only				
Max Upward Transient Deflection	-0.197 in	Ratio =	456	>=240	Span: 2 : Lr Only, LL Comb Run (L*)				
Max Downward Total Deflection	0.572 in	Ratio =	370	>=180	Span: 1 : +D+S+H				
Max Upward Total Deflection	-0.344 in	Ratio =	260	>=180	Span: 2 : +D+Lr+H, LL Comb Run (L*)				

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Max Upward from all Load Conditions	0.740	1.138	
Max Upward from Load Combinations	0.740	1.138	
Max Upward from Load Cases	0.422	0.649	
Max Downward from all Load Conditions	-0.714	-1.196	
Max Downward from Load Combinations	-0.238	-0.424	
Max Downward from Load Cases (Resis)	-0.714	-1.196	
+D+H	0.318	0.489	
+D+L+H, LL Comb Run (*L)	0.318	0.489	
+D+L+H, LL Comb Run (L*)	0.318	0.489	
+D+L+H, LL Comb Run (LL)	0.318	0.489	

Wood Beam

Project File: Enercalc_Puyallup Storage.ec

LIC# : KW-06012482, Build:20.24.10.03

FACET

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: RJ2 Outrigger (2x12 at 24" o.c. 4'-6" Cantilever)**Vertical Reactions**

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
+D+Lr+H, LL Comb Run (*L)	0.302	0.655	
+D+Lr+H, LL Comb Run (L*)	0.671	0.842	
+D+Lr+H, LL Comb Run (LL)	0.655	1.008	
+D+S+H	0.740	1.138	
+D+0.750Lr+0.750L+H, LL Comb Run (*)	0.306	0.613	
+D+0.750Lr+0.750L+H, LL Comb Run (L)	0.583	0.754	
+D+0.750Lr+0.750L+H, LL Comb Run (L)	0.571	0.878	
+D+0.750L+0.750S+H, LL Comb Run (*L)	0.634	0.976	
+D+0.750L+0.750S+H, LL Comb Run (L*)	0.634	0.976	
+D+0.750L+0.750S+H, LL Comb Run (LL)	0.634	0.976	
+D+0.60W+H	-0.111	-0.229	
+D+0.750Lr+0.750L+0.450W+H, LL Comb	-0.016	0.075	
+D+0.750Lr+0.750L+0.450W+H, LL Comb	0.261	0.216	
+D+0.750Lr+0.750L+0.450W+H, LL Comb	0.249	0.340	
+D+0.750L+0.750S+0.450W+H, LL Comb	0.313	0.438	
+D+0.750L+0.750S+0.450W+H, LL Comb	0.313	0.438	
+D+0.750L+0.750S+0.450W+H, LL Comb	0.313	0.438	
+0.60D+0.60W+0.60H	-0.238	-0.424	
+D+0.70E+0.60H	0.318	0.489	
+D+0.750L+0.750S+0.5250E+H, LL Comb	0.634	0.976	
+D+0.750L+0.750S+0.5250E+H, LL Comb	0.634	0.976	
+D+0.750L+0.750S+0.5250E+H, LL Comb	0.634	0.976	
+0.60D+0.70E+H	0.191	0.293	
D Only	0.318	0.489	
Lr Only, LL Comb Run (*L)	-0.016	0.166	
Lr Only, LL Comb Run (L*)	0.353	0.353	
Lr Only, LL Comb Run (LL)	0.337	0.519	
S Only	0.422	0.649	
W Only	-0.714	-1.196	
H Only			

Wood Beam

Project File: Enercalc_Puyallup Storage.ec

LIC#: KW-06012482, Build:20.24.10.03

FACET

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: RJ2 Noched Outtrigger (2x8 at 24" o.c. 4'-6" Cantilever)**CODE REFERENCES**

Calculations per NDS 2018, IBC 2021, SDPWS 2021

Load Combination Set : ASCE 7-16

Material Properties

Analysis Method : Allowable Stress Design

Load Combination : ASCE 7-16

Wood Species : Douglas Fir-Larch

Wood Grade : Select Structural

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb + 1,500.0 psi

Fb - 1,500.0 psi

Fc - Prll 1,700.0 psi

Fc - Perp 625.0 psi

Fv 180.0 psi

Ft 1,000.0 psi

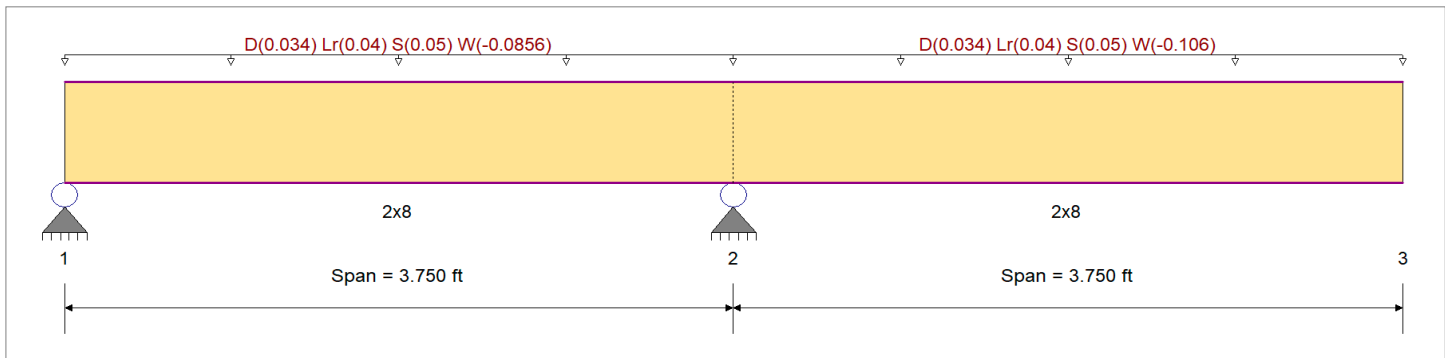
E : Modulus of Elasticity

Ebend- xx 1,900.0ksi

Eminbend - xx 690.0ksi

Density 31.210pcf

Repetitive Member Stress Increase

**Applied Loads**

Service loads entered. Load Factors will be applied for calculation

Beam self weight calculated and added to loading

Load for Span Number 1

Uniform Load : D = 0.0170, Lr = 0.020, S = 0.0250, W = -0.04280 ksf, Tributary Width = 2.0 ft, (Roof Load)

Load for Span Number 2

Uniform Load : D = 0.0170, Lr = 0.020, S = 0.0250, W = -0.0530 ksf, Tributary Width = 2.0 ft, (Roof Load)

DESIGN SUMMARY**Design OK**

Maximum Bending Stress Ratio			=	0.233	1	Maximum Shear Stress Ratio			=	0.182	1
Section used for this span				2x8		Section used for this span				2x8	
fb: Actual			=	554.49psi		fv: Actual			=	37.68 psi	
F'b			=	2,380.50psi		F'v			=	207.00 psi	
Load Combination				+D+S+H		Load Combination				+D+S+H	
Location of maximum on span			=	3.750ft		Location of maximum on span			=	3.163ft	
Span # where maximum occurs			=	Span # 1		Span # where maximum occurs			=	Span # 1	
Maximum Deflection											
Max Downward Transient Deflection			0.047 in	Ratio =	1910	>=360	Span: 2 : S Only				
Max Upward Transient Deflection			-0.103 in	Ratio =	872	>=360	Span: 2 : W Only				
Max Downward Total Deflection			0.081 in	Ratio =	1106	>=240	Span: 2 : +D+S+H				
Max Upward Total Deflection			-0.041 in	Ratio =	2178	>=240	Span: 2 : +0.60D+0.60W+0.60H				

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Max Upward from all Load Conditions	0.075	0.648	
Max Upward from Load Combinations	0.075	0.648	
Max Upward from Load Cases	0.075	0.375	
Max Downward from all Load Conditions	-0.075	-0.757	
Max Downward from Load Combinations	-0.075	-0.290	
Max Downward from Load Cases (Resis)	-0.075	-0.757	
+D+H	-0.000	0.273	
+D+L+H, LL Comb Run (*L)	-0.000	0.273	
+D+L+H, LL Comb Run (L*)	-0.000	0.273	
+D+L+H, LL Comb Run (LL)	-0.000	0.273	

Wood Beam

Project File: Enercalc_Puyallup Storage.ec

LIC# : KW-06012482, Build:20.24.10.03

FACET

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: RJ2 Noched Outrigger (2x8 at 24" o.c. 4'-6" Cantilever)**Vertical Reactions**

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
+D+Lr+H, LL Comb Run (*L)	-0.075	0.498	
+D+Lr+H, LL Comb Run (L*)	0.075	0.348	
+D+Lr+H, LL Comb Run (LL)	-0.000	0.573	
+D+S+H	-0.000	0.648	
+D+0.750Lr+0.750L+H, LL Comb Run (*)	-0.056	0.441	
+D+0.750Lr+0.750L+H, LL Comb Run (L)	0.056	0.329	
+D+0.750Lr+0.750L+H, LL Comb Run (L)	-0.000	0.498	
+D+0.750L+0.750S+H, LL Comb Run (*L)	-0.000	0.554	
+D+0.750L+0.750S+H, LL Comb Run (L*)	-0.000	0.554	
+D+0.750L+0.750S+H, LL Comb Run (LL)	-0.000	0.554	
+D+0.60W+H	0.023	-0.181	
+D+0.750Lr+0.750L+0.450W+H, LL Comb	-0.039	0.101	
+D+0.750Lr+0.750L+0.450W+H, LL Comb	0.073	-0.012	
+D+0.750Lr+0.750L+0.450W+H, LL Comb	0.017	0.157	
+D+0.750L+0.750S+0.450W+H, LL Comb	0.017	0.213	
+D+0.750L+0.750S+0.450W+H, LL Comb	0.017	0.213	
+D+0.750L+0.750S+0.450W+H, LL Comb	0.017	0.213	
+0.60D+0.60W+0.60H	0.023	-0.290	
+D+0.70E+0.60H	-0.000	0.273	
+D+0.750L+0.750S+0.5250E+H, LL Comb	-0.000	0.554	
+D+0.750L+0.750S+0.5250E+H, LL Comb	-0.000	0.554	
+D+0.750L+0.750S+0.5250E+H, LL Comb	-0.000	0.554	
+0.60D+0.70E+H	-0.000	0.164	
D Only	-0.000	0.273	
Lr Only, LL Comb Run (*L)	-0.075	0.225	
Lr Only, LL Comb Run (L*)	0.075	0.075	
Lr Only, LL Comb Run (LL)		0.300	
S Only	0.000	0.375	
W Only	0.038	-0.757	
H Only			

Wood Beam

Project File: Enercalc_Puyallup Storage.ec

LIC#: KW-06012482, Build:20.24.10.03

FACET

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: RJ4 Outrigger (2x12 at 24" o.c. 4'-6" Cantilever)**CODE REFERENCES**

Calculations per NDS 2018, IBC 2021, SDPWS 2021

Load Combination Set : ASCE 7-16

Material Properties

Analysis Method : Allowable Stress Design

Load Combination : ASCE 7-16

Wood Species : Douglas Fir-Larch

Wood Grade : No.2

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb + 900.0 psi

Fb - 900.0 psi

Fc - Prll 1,350.0 psi

Fc - Perp 625.0 psi

Fv 180.0 psi

Ft 575.0 psi

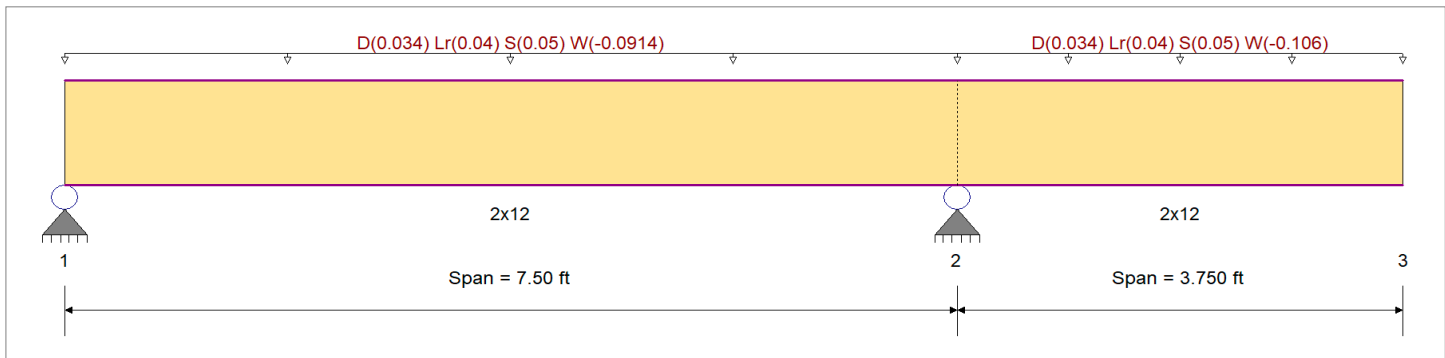
E : Modulus of Elasticity

Ebend- xx 1,600.0ksi

Eminbend - xx 580.0ksi

Density 31.210pcf

Repetitive Member Stress Increase

**Applied Loads**

Service loads entered. Load Factors will be applied for calculation

Beam self weight calculated and added to loading

Load for Span Number 1

Uniform Load : D = 0.0170, Lr = 0.020, S = 0.0250, W = -0.04570 ksf, Tributary Width = 2.0 ft

Load for Span Number 2

Uniform Load : D = 0.0170, Lr = 0.020, S = 0.0250, W = -0.0530 ksf, Tributary Width = 2.0 ft, (Roof Load)

DESIGN SUMMARY**Design OK**

Maximum Bending Stress Ratio			=	0.196	1	Maximum Shear Stress Ratio			=	0.142	1
Section used for this span				2x12		Section used for this span				2x12	
fb: Actual			=	233.75psi		fv: Actual			=	29.34 psi	
F'b			=	1,190.25psi		F'v			=	207.00 psi	
Load Combination				+D+S+H		Load Combination				+D+S+H	
Location of maximum on span			=	7.500ft		Location of maximum on span			=	6.578ft	
Span # where maximum occurs			=	Span # 1		Span # where maximum occurs			=	Span # 1	
Maximum Deflection											
Max Downward Transient Deflection			0.022 in	Ratio =	4094	Span: 2 : Lr Only, LL Comb Run (*L)					
Max Upward Transient Deflection			-0.022 in	Ratio =	4150	Span: 2 : W Only					
Max Downward Total Deflection			0.028 in	Ratio =	3260	Span: 2 : +D+Lr+H, LL Comb Run (*L)					
Max Upward Total Deflection			-0.016 in	Ratio =	5580	Span: 2 : +D+0.750Lr+0.750L+0.450W+H, LL Comb Run					

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Max Upward from all Load Conditions	0.256	0.740	
Max Upward from Load Combinations	0.256	0.740	
Max Upward from Load Cases	0.150	0.422	
Max Downward from all Load Conditions	-0.243	-0.840	
Max Downward from Load Combinations	-0.082	-0.313	
Max Downward from Load Cases (Resis)	-0.243	-0.840	
+D+H	0.106	0.318	
+D+L+H, LL Comb Run (*L)	0.106	0.318	
+D+L+H, LL Comb Run (L*)	0.106	0.318	
+D+L+H, LL Comb Run (LL)	0.106	0.318	

Wood Beam

Project File: Enercalc_Puyallup Storage.ec

LIC# : KW-06012482, Build:20.24.10.03

FACET

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: RJ4 Outrigger (2x12 at 24" o.c. 4'-6" Cantilever)**Vertical Reactions**

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
+D+Lr+H, LL Comb Run (*L)	0.068	0.505	
+D+Lr+H, LL Comb Run (L*)	0.256	0.468	
+D+Lr+H, LL Comb Run (LL)	0.218	0.655	
+D+S+H	0.247	0.740	
+D+0.750Lr+0.750L+H, LL Comb Run (*)	0.078	0.458	
+D+0.750Lr+0.750L+H, LL Comb Run (L)	0.218	0.430	
+D+0.750Lr+0.750L+H, LL Comb Run (L)	0.190	0.571	
+D+0.750L+0.750S+H, LL Comb Run (*L)	0.211	0.634	
+D+0.750L+0.750S+H, LL Comb Run (L*)	0.211	0.634	
+D+0.750L+0.750S+H, LL Comb Run (LL)	0.211	0.634	
+D+0.60W+H	-0.040	-0.186	
+D+0.750Lr+0.750L+0.450W+H, LL Comb	-0.032	0.081	
+D+0.750Lr+0.750L+0.450W+H, LL Comb	0.109	0.052	
+D+0.750Lr+0.750L+0.450W+H, LL Comb	0.081	0.193	
+D+0.750L+0.750S+0.450W+H, LL Comb	0.102	0.256	
+D+0.750L+0.750S+0.450W+H, LL Comb	0.102	0.256	
+D+0.750L+0.750S+0.450W+H, LL Comb	0.102	0.256	
+0.60D+0.60W+0.60H	-0.082	-0.313	
+D+0.70E+0.60H	0.106	0.318	
+D+0.750L+0.750S+0.5250E+H, LL Comb	0.211	0.634	
+D+0.750L+0.750S+0.5250E+H, LL Comb	0.211	0.634	
+D+0.750L+0.750S+0.5250E+H, LL Comb	0.211	0.634	
+0.60D+0.70E+H	0.064	0.191	
D Only	0.106	0.318	
Lr Only, LL Comb Run (*L)	-0.038	0.188	
Lr Only, LL Comb Run (L*)	0.150	0.150	
Lr Only, LL Comb Run (LL)	0.113	0.338	
S Only	0.141	0.422	
W Only	-0.243	-0.840	
H Only			

Wood Beam

Project File: Enercalc_Puyallup Storage.ec

LIC# : KW-06012482, Build:20.24.10.03

FACET

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: RJ4 Notched Outrigger (2x8 at 24" o.c. 4'-6" Cantilever)**CODE REFERENCES**

Calculations per NDS 2018, IBC 2021, SDPWS 2021

Load Combination Set : ASCE 7-16

Material Properties

Analysis Method : Allowable Stress Design

Load Combination : ASCE 7-16

Wood Species : Douglas Fir-Larch

Wood Grade : No.2

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb + 900.0 psi

Fb - 900.0 psi

Fc - Prll 1,350.0 psi

Fc - Perp 625.0 psi

Fv 180.0 psi

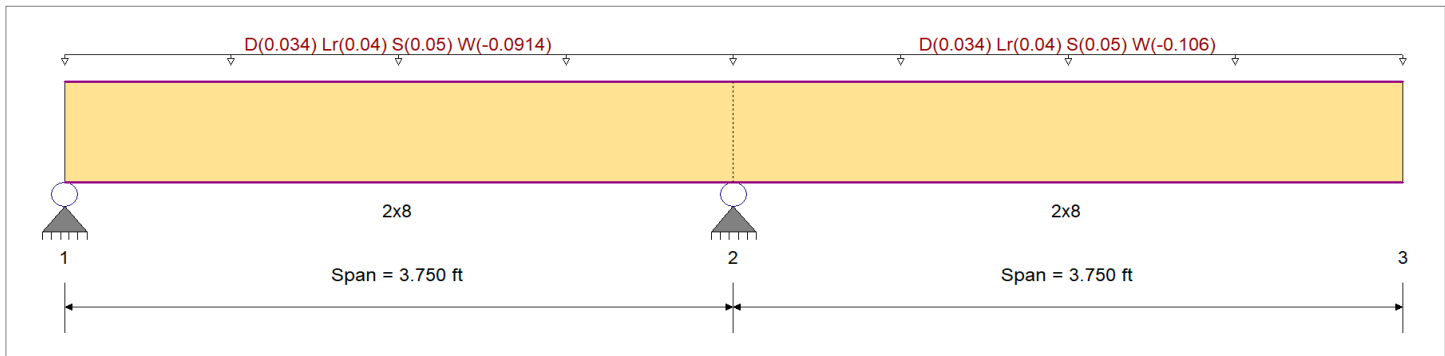
Ft 575.0 psi

E : Modulus of Elasticity

E bend- xx 1,600.0 ksi

E min bend - xx 580.0 ksi

Density 31.210 pcf

**Applied Loads**

Service loads entered. Load Factors will be applied for calculation

Beam self weight calculated and added to loading

Load for Span Number 1

Uniform Load : D = 0.0170, Lr = 0.020, S = 0.0250, W = -0.04570 ksf, Tributary Width = 2.0 ft, (Roof Load)

Load for Span Number 2

Uniform Load : D = 0.0170, Lr = 0.020, S = 0.0250, W = -0.0530 ksf, Tributary Width = 2.0 ft, (Roof Load)

DESIGN SUMMARY**Design OK**

Maximum Bending Stress Ratio			=	0.446	1	Maximum Shear Stress Ratio			=	0.182	: 1
Section used for this span				2x8		Section used for this span				2x8	
fb: Actual			=	554.49psi		fv: Actual			=	37.68 psi	
F'b			=	1,242.00psi		F'v			=	207.00 psi	
Load Combination				+D+S+H		Load Combination				+D+S+H	
Location of maximum on span			=	3.750ft		Location of maximum on span			=	3.750ft	
Span # where maximum occurs			=	Span # 1		Span # where maximum occurs			=	Span # 1	
Maximum Deflection											
Max Downward Transient Deflection				0.056 in	Ratio =	1608	>=360	Span: 2 : S Only			
Max Upward Transient Deflection				-0.121 in	Ratio =	740	>=360	Span: 2 : W Only			
Max Downward Total Deflection				0.097 in	Ratio =	930	>=240	Span: 2 : +D+S+H			
Max Upward Total Deflection				-0.048 in	Ratio =	1860	>=240	Span: 2 : +0.60D+0.60W+0.60H			

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Max Upward from all Load Conditions	0.075	0.648	
Max Upward from Load Combinations	0.075	0.648	
Max Upward from Load Cases	0.075	0.375	
Max Downward from all Load Conditions	-0.075	-0.768	
Max Downward from Load Combinations	-0.075	-0.297	
Max Downward from Load Cases (Resis	-0.075	-0.768	
+D+H	0.000	0.273	
+D+L+H, LL Comb Run (*L)	0.000	0.273	
+D+L+H, LL Comb Run (L*)	0.000	0.273	
+D+L+H, LL Comb Run (LL)	0.000	0.273	

Wood Beam

Project File: Enercalc_Puyallup Storage.ec

LIC# : KW-06012482, Build:20.24.10.03

FACET

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: RJ4 Notched Outrigger (2x8 at 24" o.c. 4'-6" Cantilever)**Vertical Reactions**

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
+D+Lr+H, LL Comb Run (*L)	-0.075	0.498	
+D+Lr+H, LL Comb Run (L*)	0.075	0.348	
+D+Lr+H, LL Comb Run (LL)	0.000	0.573	
+D+S+H	0.000	0.648	
+D+0.750Lr+0.750L+H, LL Comb Run (*)	-0.056	0.441	
+D+0.750Lr+0.750L+H, LL Comb Run (L)	0.056	0.329	
+D+0.750Lr+0.750L+H, LL Comb Run (L)	0.000	0.498	
+D+0.750L+0.750S+H, LL Comb Run (*L)	0.000	0.554	
+D+0.750L+0.750S+H, LL Comb Run (L*)	0.000	0.554	
+D+0.750L+0.750S+H, LL Comb Run (LL)	0.000	0.554	
+D+0.60W+H	0.016	-0.188	
+D+0.750Lr+0.750L+0.450W+H, LL Comb	-0.044	0.096	
+D+0.750Lr+0.750L+0.450W+H, LL Comb	0.069	-0.017	
+D+0.750Lr+0.750L+0.450W+H, LL Comb	0.012	0.152	
+D+0.750L+0.750S+0.450W+H, LL Comb	0.012	0.208	
+D+0.750L+0.750S+0.450W+H, LL Comb	0.012	0.208	
+D+0.750L+0.750S+0.450W+H, LL Comb	0.012	0.208	
+0.60D+0.60W+0.60H	0.016	-0.297	
+D+0.70E+0.60H	0.000	0.273	
+D+0.750L+0.750S+0.5250E+H, LL Comb	0.000	0.554	
+D+0.750L+0.750S+0.5250E+H, LL Comb	0.000	0.554	
+D+0.750L+0.750S+0.5250E+H, LL Comb	0.000	0.554	
+0.60D+0.70E+H	0.000	0.164	
D Only	0.000	0.273	
Lr Only, LL Comb Run (*L)	-0.075	0.225	
Lr Only, LL Comb Run (L*)	0.075	0.075	
Lr Only, LL Comb Run (LL)	0.000	0.300	
S Only	0.000	0.375	
W Only	0.027	-0.768	
H Only			

Wood Beam

Project File: Enercalc_Puyallup Storage.ec

LIC# : KW-06012482, Build:20.24.10.03

FACET

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: RJ5 (2x12 at 24" o.c. 2'-6" Cantilever)**CODE REFERENCES**

Calculations per NDS 2018, IBC 2021, SDPWS 2021

Load Combination Set : ASCE 7-16

Material Properties

Analysis Method : Allowable Stress Design

Load Combination : ASCE 7-16

Wood Species : Douglas Fir-Larch

Wood Grade : No.2

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb + 900.0 psi

Fb - 900.0 psi

Fc - Prll 1,350.0 psi

Fc - Perp 625.0 psi

Fv 180.0 psi

Ft 575.0 psi

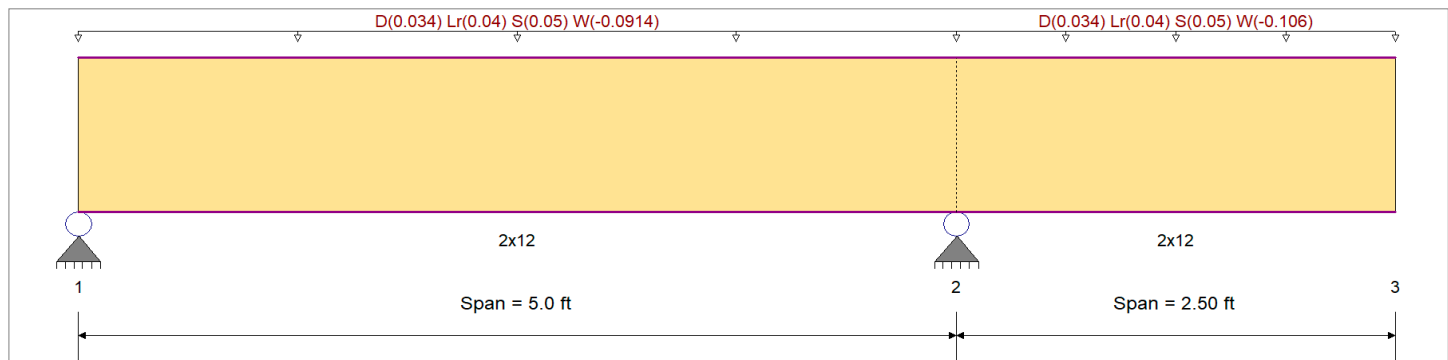
E : Modulus of Elasticity

Ebend- xx 1,600.0ksi

Eminbend - xx 580.0ksi

Density 31.210pcf

Repetitive Member Stress Increase

**Applied Loads**

Service loads entered. Load Factors will be applied for calculation

Beam self weight calculated and added to loading

Load for Span Number 1

Uniform Load : D = 0.0170, Lr = 0.020, S = 0.0250, W = -0.04570 ksf, Tributary Width = 2.0 ft

Load for Span Number 2

Uniform Load : D = 0.0170, Lr = 0.020, S = 0.0250, W = -0.0530 ksf, Tributary Width = 2.0 ft, (Roof Load)

DESIGN SUMMARY**Design OK**

Maximum Bending Stress Ratio		=	0.087 : 1	Maximum Shear Stress Ratio		=	0.083 : 1
Section used for this span			2x12	Section used for this span			2x12
fb: Actual	=	103.89psi		fv: Actual	=	17.17 psi	
F'b	=	1,190.25psi		F'v	=	207.00 psi	
Load Combination		+D+S+H		Load Combination		+D+S+H	
Location of maximum on span	=	5.000ft		Location of maximum on span	=	4.078ft	
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 1	
Maximum Deflection							
Max Downward Transient Deflection	0.004 in	Ratio =	13820 >= 360	Span: 2 : Lr Only, LL Comb Run (*L)			
Max Upward Transient Deflection	-0.004 in	Ratio =	14010 >= 360	Span: 2 : W Only			
Max Downward Total Deflection	0.005 in	Ratio =	11002 >= 240	Span: 2 : +D+Lr+H, LL Comb Run (*L)			
Max Upward Total Deflection	-0.003 in	Ratio =	18832 >= 240	Span: 2 : +D+0.750Lr+0.750L+0.450W+H, LL Comb Run			

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Max Upward from all Load Conditions	0.171	0.493	
Max Upward from Load Combinations	0.171	0.493	
Max Upward from Load Cases	0.100	0.281	
Max Downward from all Load Conditions	-0.162	-0.560	
Max Downward from Load Combinations	-0.055	-0.209	
Max Downward from Load Cases (Resis)	-0.162	-0.560	
+D+H	0.071	0.212	
+D+L+H, LL Comb Run (*L)	0.071	0.212	
+D+L+H, LL Comb Run (L*)	0.071	0.212	
+D+L+H, LL Comb Run (LL)	0.071	0.212	

Wood Beam

Project File: Enercalc_Puyallup Storage.ec

LIC# : KW-06012482, Build:20.24.10.03

FACET

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: RJ5 (2x12 at 24" o.c. 2'-6" Cantilever)**Vertical Reactions**

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
+D+Lr+H, LL Comb Run (*L)	0.046	0.337	
+D+Lr+H, LL Comb Run (L*)	0.171	0.312	
+D+Lr+H, LL Comb Run (LL)	0.146	0.437	
+D+S+H	0.164	0.493	
+D+0.750Lr+0.750L+H, LL Comb Run (*)	0.052	0.306	
+D+0.750Lr+0.750L+H, LL Comb Run (L)	0.146	0.287	
+D+0.750Lr+0.750L+H, LL Comb Run (L)	0.127	0.381	
+D+0.750L+0.750S+H, LL Comb Run (*L)	0.141	0.423	
+D+0.750L+0.750S+H, LL Comb Run (L*)	0.141	0.423	
+D+0.750L+0.750S+H, LL Comb Run (LL)	0.141	0.423	
+D+0.60W+H	-0.027	-0.124	
+D+0.750Lr+0.750L+0.450W+H, LL Comb	-0.021	0.054	
+D+0.750Lr+0.750L+0.450W+H, LL Comb	0.073	0.035	
+D+0.750Lr+0.750L+0.450W+H, LL Comb	0.054	0.129	
+D+0.750L+0.750S+0.450W+H, LL Comb	0.068	0.171	
+D+0.750L+0.750S+0.450W+H, LL Comb	0.068	0.171	
+D+0.750L+0.750S+0.450W+H, LL Comb	0.068	0.171	
+0.60D+0.60W+0.60H	-0.055	-0.209	
+D+0.70E+0.60H	0.071	0.212	
+D+0.750L+0.750S+0.5250E+H, LL Comb	0.141	0.423	
+D+0.750L+0.750S+0.5250E+H, LL Comb	0.141	0.423	
+D+0.750L+0.750S+0.5250E+H, LL Comb	0.141	0.423	
+0.60D+0.70E+H	0.042	0.127	
D Only	0.071	0.212	
Lr Only, LL Comb Run (*L)	-0.025	0.125	
Lr Only, LL Comb Run (L*)	0.100	0.100	
Lr Only, LL Comb Run (LL)	0.075	0.225	
S Only	0.094	0.281	
W Only	-0.162	-0.560	
H Only			

Wood Beam

Project File: Enercalc_Puyallup Storage.ec

LIC# : KW-06012482, Build:20.24.10.03

FACET

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DESCRIPTION: RJ5 (2x8 at 24" o.c. 2'-6" Cantilever)**CODE REFERENCES**

Calculations per NDS 2018, IBC 2021, SDPWS 2021

Load Combination Set : ASCE 7-16

Material Properties

Analysis Method : Allowable Stress Design

Load Combination : ASCE 7-16

Wood Species : Douglas Fir-Larch

Wood Grade : No.2

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb + 900.0 psi

Fb - 900.0 psi

Fc - Prll 1,350.0 psi

Fc - Perp 625.0 psi

Fv 180.0 psi

Ft 575.0 psi

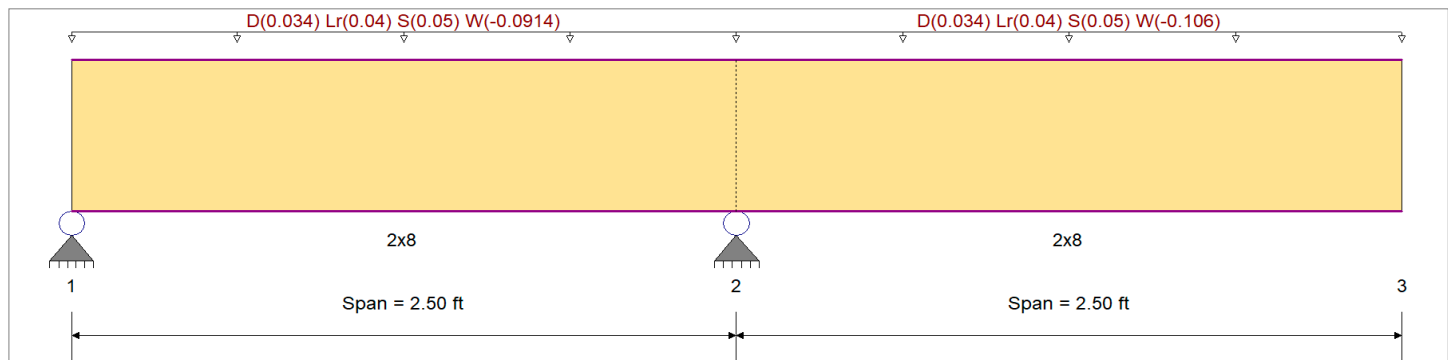
E : Modulus of Elasticity

Ebend- xx 1,600.0ksi

Eminbend - xx 580.0ksi

Density 31.210pcf

Repetitive Member Stress Increase

**Applied Loads**

Service loads entered. Load Factors will be applied for calculation

Beam self weight calculated and added to loading

Load for Span Number 1

Uniform Load : D = 0.0170, Lr = 0.020, S = 0.0250, W = -0.04570 ksf, Tributary Width = 2.0 ft

Load for Span Number 2

Uniform Load : D = 0.0170, Lr = 0.020, S = 0.0250, W = -0.0530 ksf, Tributary Width = 2.0 ft, (Roof Load)

DESIGN SUMMARY**Design OK**

Maximum Bending Stress Ratio			=	0.173	1	Maximum Shear Stress Ratio			=	0.109	1
Section used for this span				2x8		Section used for this span				2x8	
fb: Actual			=	246.44psi		fv: Actual			=	22.62 psi	
F'b			=	1,428.30psi		F'v			=	207.00 psi	
Load Combination				+D+S+H		Load Combination				+D+S+H	
Location of maximum on span			=	2.500ft		Location of maximum on span			=	1.899ft	
Span # where maximum occurs			=	Span # 1		Span # where maximum occurs			=	Span # 1	
Maximum Deflection											
Max Downward Transient Deflection			0.011 in	Ratio =	5428	>=360	Span: 2 : S Only				
Max Upward Transient Deflection			-0.024 in	Ratio =	2502	>=360	Span: 2 : W Only				
Max Downward Total Deflection			0.019 in	Ratio =	3142	>=240	Span: 2 : +D+S+H				
Max Upward Total Deflection			-0.010 in	Ratio =	6276	>=240	Span: 2 : +0.60D+0.60W+0.60H				

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Max Upward from all Load Conditions	0.050	0.432	
Max Upward from Load Combinations	0.050	0.432	
Max Upward from Load Cases	0.050	0.250	
Max Downward from all Load Conditions	-0.050	-0.512	
Max Downward from Load Combinations	-0.050	-0.198	
Max Downward from Load Cases (Resis)	-0.050	-0.512	
+D+H	0.000	0.182	
+D+L+H, LL Comb Run (*L)	0.000	0.182	
+D+L+H, LL Comb Run (L*)	0.000	0.182	
+D+L+H, LL Comb Run (LL)	0.000	0.182	

Wood Beam

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FACET

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: RJ5 (2x8 at 24" o.c. 2'-6" Cantilever)**Vertical Reactions**

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
+D+Lr+H, LL Comb Run (*L)	-0.050	0.332	
+D+Lr+H, LL Comb Run (L*)	0.050	0.232	
+D+Lr+H, LL Comb Run (LL)	0.000	0.382	
+D+S+H	0.000	0.432	
+D+0.750Lr+0.750L+H, LL Comb Run (*)	-0.037	0.294	
+D+0.750Lr+0.750L+H, LL Comb Run (L)	0.038	0.219	
+D+0.750Lr+0.750L+H, LL Comb Run (L)	0.000	0.332	
+D+0.750L+0.750S+H, LL Comb Run (*L)	0.000	0.369	
+D+0.750L+0.750S+H, LL Comb Run (L*)	0.000	0.369	
+D+0.750L+0.750S+H, LL Comb Run (LL)	0.000	0.369	
+D+0.60W+H	0.011	-0.125	
+D+0.750Lr+0.750L+0.450W+H, LL Comb	-0.029	0.064	
+D+0.750Lr+0.750L+0.450W+H, LL Comb	0.046	-0.011	
+D+0.750Lr+0.750L+0.450W+H, LL Comb	0.008	0.101	
+D+0.750L+0.750S+0.450W+H, LL Comb	0.008	0.139	
+D+0.750L+0.750S+0.450W+H, LL Comb	0.008	0.139	
+D+0.750L+0.750S+0.450W+H, LL Comb	0.008	0.139	
+0.60D+0.60W+0.60H	0.011	-0.198	
+D+0.70E+0.60H	0.000	0.182	
+D+0.750L+0.750S+0.5250E+H, LL Comb	0.000	0.369	
+D+0.750L+0.750S+0.5250E+H, LL Comb	0.000	0.369	
+D+0.750L+0.750S+0.5250E+H, LL Comb	0.000	0.369	
+0.60D+0.70E+H	0.000	0.109	
D Only	0.000	0.182	
Lr Only, LL Comb Run (*L)	-0.050	0.150	
Lr Only, LL Comb Run (L*)	0.050	0.050	
Lr Only, LL Comb Run (LL)	0.000	0.200	
S Only	0.000	0.250	
W Only	0.018	-0.512	
H Only			

Wood Beam

Project File: Enercalc_Puyallup Storage.ec

LIC# : KW-06012482, Build:20.24.09.03

FACET

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DESCRIPTION: RJ6**CODE REFERENCES**

Calculations per NDS 2018, IBC 2021, SDPWS 2021

Load Combination Set : ASCE 7-16

Material Properties

Analysis Method : Allowable Stress Design

Load Combination : ASCE 7-16

Wood Species : Douglas Fir-Larch

Wood Grade : No.2

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb + 875 psi

Fb - 875 psi

Fc - Prll 600 psi

Fc - Perp 625 psi

Fv 170 psi

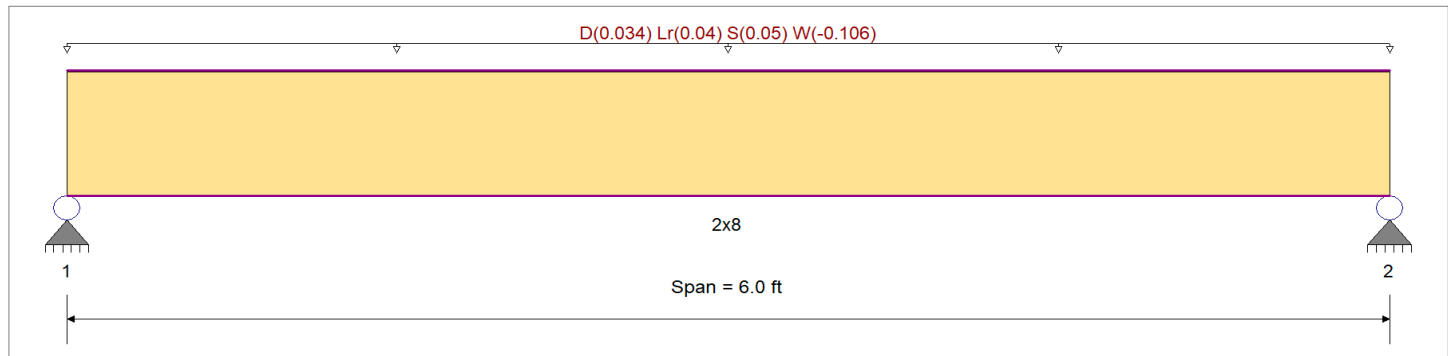
Ft 425 psi

E : Modulus of Elasticity

Eband- xx 1300ksi

Eminbend - xx 470ksi

Density 31.21pcf

**Applied Loads**

Service loads entered. Load Factors will be applied for calculation

Beam self weight calculated and added to loading

Uniform Load : D = 0.0170, Lr = 0.020, S = 0.0250, W = -0.0530 ksf, Tributary Width = 2.0 ft, (Roof Load)

DESIGN SUMMARY**Design OK**

Maximum Bending Stress Ratio		=	0.294	1	Maximum Shear Stress Ratio		=	0.147	: 1
Section used for this span			2x8		Section used for this span			2x8	
fb: Actual		=	354.87psi		fv: Actual		=	28.69 psi	
F'b		=	1,207.50psi		F'v		=	195.50 psi	
Load Combination			+D+S		Load Combination			+D+S	
Location of maximum on span		=	3.000ft		Location of maximum on span		=	0.000 ft	
Span # where maximum occurs		=	Span # 1		Span # where maximum occurs		=	Span # 1	
Maximum Deflection									
Max Downward Transient Deflection		0.024 in	Ratio =	3040	>=360	Span: 1 : S Only			
Max Upward Transient Deflection		-0.050 in	Ratio =	1434	>=360	Span: 1 : W Only			
Max Downward Total Deflection		0.041 in	Ratio =	1760	>=240	Span: 1 : +D+S			
Max Upward Total Deflection		-0.020 in	Ratio =	3637	>=240	Span: 1 : +0.60D+0.60W			

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	0.259	0.259
Max Upward from Load Combinations	0.259	0.259
Max Upward from Load Cases	0.150	0.150
Max Downward from all Load Conditions	-0.318	-0.318
Max Downward from Load Combinations	-0.125	-0.125
Max Downward from Load Cases (Resis	-0.318	-0.318
D Only	0.109	0.109
+D+Lr	0.229	0.229
+D+S	0.259	0.259
+D+0.750Lr	0.199	0.199
+D+0.750S	0.222	0.222
+D+0.60W	-0.082	-0.082
+D+0.750Lr+0.450W	0.056	0.056

Wood Beam

Project File: Enercalc_Puyallup Storage.ec

LIC# : KW-06012482, Build:20.24.09.03

FACET

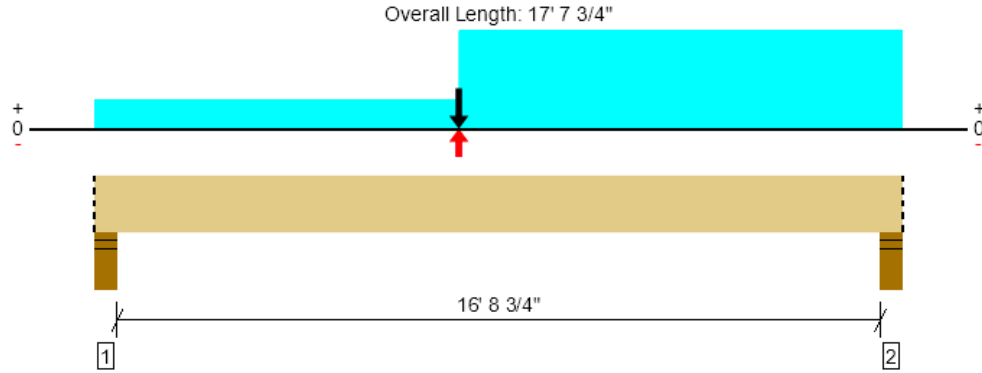
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DESCRIPTION: RJ6

Vertical Reactions		Support notation : Far left is #1		Values in KIPS
Load Combination	Support 1	Support 2		
+D+0.750S+0.450W	0.078	0.078		
+0.60D+0.60W	-0.125	-0.125		
+0.60D	0.065	0.065		
Lr Only	0.120	0.120		
S Only	0.150	0.150		
W Only	-0.318	-0.318		

Upper Roof, Upper BM1

1 piece(s) 5 1/2" x 12" 24F-V4 DF Glulam



Drawing is Conceptual, All locations are measured from the outside face of left support (or left cantilever end), All dimensions are horizontal (typ.).

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern) [Group]
Member Reaction (lbs)	2944 @ 17' 3 3/4"	18906 (5.50")	Passed (16%)	—	1.0 D + 1.0 S (All Spans) [1]
Shear (lbs)	2477 @ 16' 2 1/4"	13409	Passed (18%)	1.15	1.0 D + 1.0 S (All Spans) [1]
Pos Moment (Ft-lbs)	12557 @ 8' 5 9/16"	30360	Passed (41%)	1.15	1.0 D + 1.0 S (All Spans) [1]
Neg Moment (Ft-lbs)	-2634 @ 8' 1 7/16"	32560	Passed (8%)	1.60	0.6 D + 0.6 W (All Spans) [8]
Live Load Defl. (in)	0.249 @ 8' 11 11/16"	0.566	Passed (L/817)	—	1.0 D + 1.0 S (All Spans) [1]
Total Load Defl. (in)	0.430 @ 8' 11 3/4"	0.849	Passed (L/474)	—	1.0 D + 1.0 S (All Spans) [1]

Member Length : 17' 7 3/4"
System : Roof
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD
Member Pitch : 0/12

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Critical positive moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 16' 11 3/4".
- Critical negative moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 16' 11 3/4".
- 263 lbs uplift at support located at 4". Strapping or other restraint may be required.
- 594 lbs uplift at support located at 17' 3 3/4". Strapping or other restraint may be required.
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)					Accessories
	Total	Available	Required	Dead	Roof Live	Snow	Wind	Factored	
1 - Stud wall - DF	5.50"	5.50"	1.50"	819	499	1063	-1257	1882/-263	Blocking
2 - Stud wall - DF	5.50"	5.50"	1.50"	1254	1065	1690	-2243	2944/-594	Blocking

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	17' 8" o/c	
Bottom Edge (Lu)	17' 8" o/c	

- Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Roof Live (1.25)	Snow (1.15)	Wind (1.60)	Comments
0 - Self Weight (PLF)	0 to 17' 7 3/4"	N/A	16.0	—	—	—	
1 - Uniform (PSF)	7' 11 1/2" to 17' 7 3/4" (Front)	6' 3"	17.0	20.0	25.0	-38.9	Roof Load
2 - Uniform (PSF)	0 to 17' 7 3/4" (Front)	1'	17.0	20.0	25.0	-	Roof Load
3 - Point (lb)	7' 11 1/2" (Front)	N/A	460	-	799	775/-1145	Linked from: Upper BM6, Support 1

- Side loads are assumed to not induce cross-grain tension.

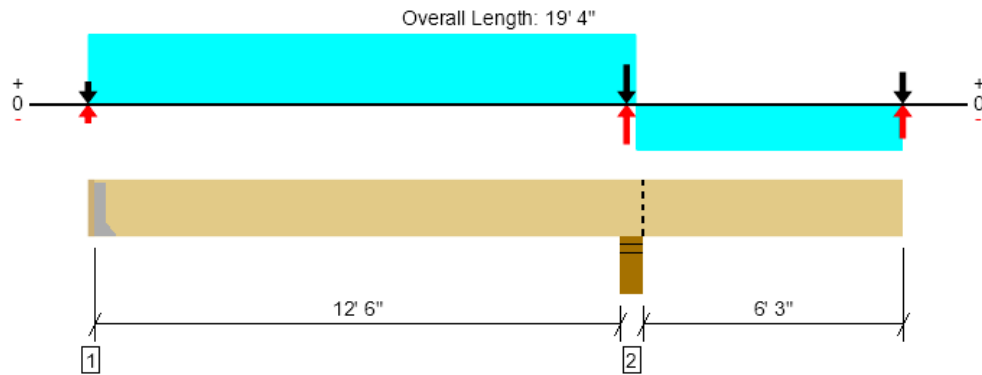
FortewEB Software Operator	Job Notes
Luis Ortega Davido Consulting Group (360) 899-1110 luis@dcgengr.com	



10/15/2024 5:42:41 PM UTC
FortewEB v3.8, Engine: V8.4.1.24, Data: V8.1.6.3
File Name: 2401.0362 Puyallup Storage

Upper Roof, Upper BM6

3 piece(s) 1 3/4" x 7 1/4" 2.0E Microllam® LVL



Drawing is Conceptual. All locations are measured from the outside face of left support (or left cantilever end). All dimensions are horizontal (typ.).

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern) [Group]
Member Reaction (lbs)	1189 @ 1 1/2"	5906 (1.50")	Passed (20%)	—	1.0 D + 1.0 S (Alt Spans) [5]
Shear (lbs)	1826 @ 12' 1/4"	8317	Passed (22%)	1.15	1.0 D + 1.0 S (All Spans) [5]
Moment (Ft-lbs)	-6202 @ 12' 10 1/4"	12273	Passed (51%)	1.15	1.0 D + 1.0 S (All Spans) [5]
Live Load Defl. (in)	0.541 @ 19' 4"	0.648	Passed (2L/288)	—	1.0 D + 1.0 S (Alt Spans) [5]
Total Load Defl. (in)	0.832 @ 19' 4"	0.864	Passed (2L/186)	—	1.0 D + 1.0 S (Alt Spans) [5]

- Deflection criteria: LL (L/240) and TL (L/180).
- Overhang deflection criteria: LL (2L/240) and TL (2L/180).
- Upward deflection on right cantilever exceeds overhang deflection criteria.
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Upward deflection on right cantilever exceeds 0.4".
- 411 lbs uplift at support located at 1 1/2". Strapping or other restraint may be required.

Member Length : 19' 2 1/2"
System : Roof
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD
Member Pitch : 0/12

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Snow	Wind	Factored	
1 - Hanger on 7 1/4" DF beam	1.50"	Hanger ¹	1.50"	460	799	775/-1145	1259/-411	See note ¹
2 - Stud wall - DF	5.50"	5.50"	1.50"	1218	1874	-3889	3092/-1603	Blocking

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.
- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- ¹ See Connector grid below for additional information and/or requirements.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	19' 3" o/c	
Bottom Edge (Lu)	19' 3" o/c	

- Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
1 - Face Mount Hanger	HU68	2.50"	N/A	14-10dx1.5	6-10d	

- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

ForteWEB Software Operator	Job Notes
Luis Ortega Davido Consulting Group (360) 899-1110 luis@dcgengr.com	



10/15/2024 5:42:41 PM UTC
ForteWEB v3.8, Engine: V8.4.1.24, Data: V8.1.6.3
File Name: 2401.0362 Puyallup Storage

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Wind (1.60)	Comments
0 - Self Weight (PLF)	1 1/2" to 19' 4"	N/A	11.1	--	—	
1 - Uniform (PSF)	0 to 12' 11 1/2" (Front)	5' 6"	17.0	25.0	-38.9	Default Load
2 - Uniform (PSF)	12' 11 1/2" to 19' 4" (Front)	1'	17.0	25.0	-53.3	Changed trib to 2' and added wind load
3 - Point (lb)	19' 4" (Front)	N/A	336	449	-924	Linked from: BM8 (Upper), Support 2
4 - Point (lb)	12' 8 3/4" (Front)	N/A	-191	106/-381	1104/-683	Linked from: Upper BM7, Support 1
5 - Point (lb)	0 (Front)	N/A	-26	42/-85	243	Linked from: Upper Sistered Outrigger, Support 1

• Side loads are assumed to not induce cross-grain tension.

Weyerhaeuser Notes

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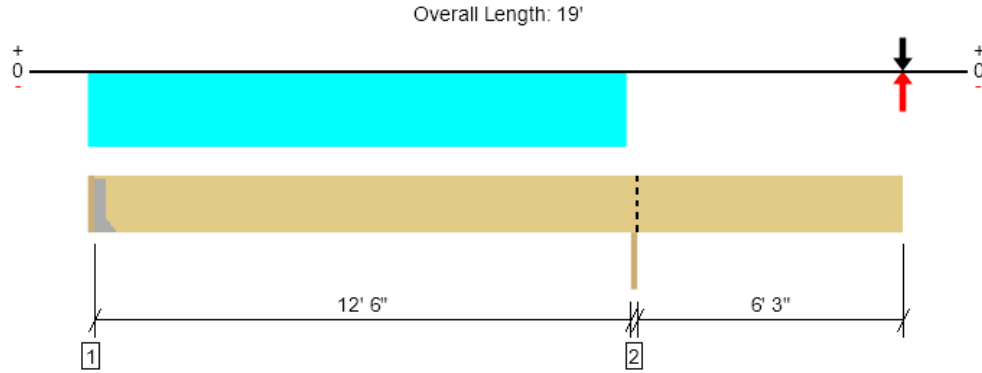
The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Luis Ortega Davido Consulting Group (360) 899-1110 luis@dcgengr.com	



Upper Roof, Upper BM6.2

4 piece(s) 1 3/4" x 7 1/4" 2.0E Microllam® LVL



Drawing is Conceptual, All locations are measured from the outside face of left support (or left cantilever end), All dimensions are horizontal (typ.).

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1837 @ 12' 8 1/4"	6563 (1,50")	Passed (28%)	—	1.0 D + 1.0 S (All Spans)
Shear (lbs)	914 @ 12' 1/4"	11089	Passed (8%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	-5250 @ 12' 8 1/4"	16363	Passed (32%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.400 @ 19'	0.631	Passed (2L/380)	—	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.684 @ 19'	0.842	Passed (2L/222)	—	1.0 D + 1.0 S (Alt Spans)

- Deflection criteria: LL (L/240) and TL (L/180).
- Overhang deflection criteria: LL (2L/240) and TL (2L/180).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Upward deflection on right cantilever exceeds 0.4".
- 233 lbs uplift at support located at 1 1/2". Strapping or other restraint may be required.
- 569 lbs uplift at support located at 12' 8 1/4". Strapping or other restraint may be required.
- Member should be side-loaded from both sides of the member or braced to prevent rotation.

Member Length : 18' 10 1/2"
System : Roof
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD
Member Pitch : 0/12

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Snow	Wind	Factored	
1 - Hanger on 7 1/4" DF beam	1.50"	Hanger ¹	1.50"	91	167/-83	455/-480	364/-233	See note ¹
2 - Beam - DF	1.50"	1.50"	1.50"	896	941	-1845	1837/-569	Blocking

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.
- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- ¹ See Connector grid below for additional information and/or requirements.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	18' 11" o/c	
Bottom Edge (Lu)	18' 11" o/c	

- Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie

Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
1 - Face Mount Hanger	Connector not found	N/A	N/A	N/A	N/A	

- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Wind (1.60)	Comments
0 - Self Weight (PLF)	1 1/2" to 19'	N/A	14.8	--	--	
1 - Uniform (PSF)	0 to 12' 6" (Front)	1' 9"	17.0	25.0	-42.8	
2 - Point (lb)	19' (Front)	N/A	336	449	-924	Linked from: BM8 (Upper), Support 1

- Side loads are assumed to not induce cross-grain tension.

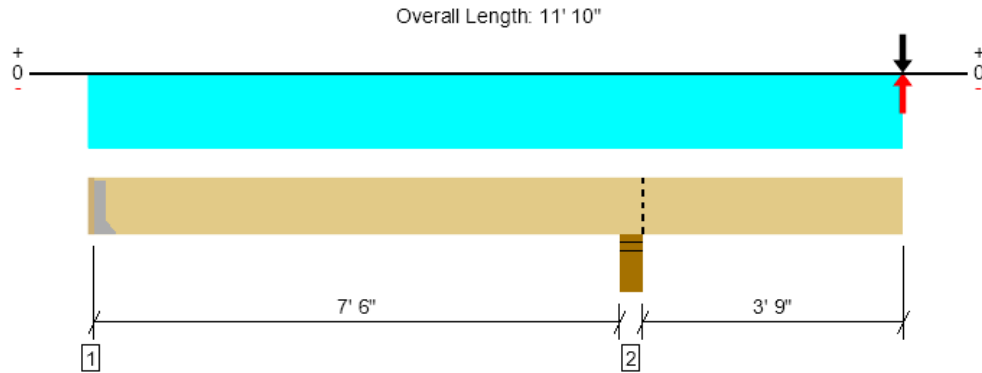
ForteWEB Software Operator	Job Notes
Luis Ortega Davido Consulting Group (360) 899-1110 luis@dcgengr.com	



10/15/2024 8:43:44 PM UTC
ForteWEB v3.8, Engine: V8.4.1.24, Data: V8.1.6.3
File Name: 2401.0362 Puyallup Storage

Upper Roof, Upper BM7

4 piece(s) 1 3/4" x 7 1/4" 2.0E Microllam® LVL



Drawing is Conceptual. All locations are measured from the outside face of left support (or left cantilever end). All dimensions are horizontal (typ.).

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	4325 @ 7' 10 1/4"	24063 (5,50")	Passed (18%)	—	1.0 D + 1.0 S (All Spans)
Shear (lbs)	2360 @ 8' 8 1/4"	11089	Passed (21%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	-8550 @ 7' 10 1/4"	16363	Passed (52%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.265 @ 11' 10"	0.398	Passed (2L/360)	—	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.489 @ 11' 10"	0.531	Passed (2L/196)	—	1.0 D + 1.0 S (Alt Spans)

- Deflection criteria: LL (L/240) and TL (L/180).
- Overhang deflection criteria: LL (2L/240) and TL (2L/180).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- 572 lbs uplift at support located at 1 1/2". Strapping or other restraint may be required.
- Member should be side-loaded from both sides of the member or braced to prevent rotation.

Member Length : 11' 8 1/2"
System : Roof
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD
Member Pitch : 0/12

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Snow	Wind	Factored	
1 - Hanger on 7 1/4" DF beam	1.50"	Hanger ¹	1.50"	-191	106/-381	1104/-683	548/-601	See note ¹
2 - Stud wall - DF	5.50"	5.50"	1.50"	2013	2312	-4313	4325/-1380	Blocking

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.
- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- ¹ See Connector grid below for additional information and/or requirements.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	11' 9" o/c	
Bottom Edge (Lu)	11' 9" o/c	

- Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
1 - Face Mount Hanger	Connector not found	N/A	N/A	N/A	N/A	

- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

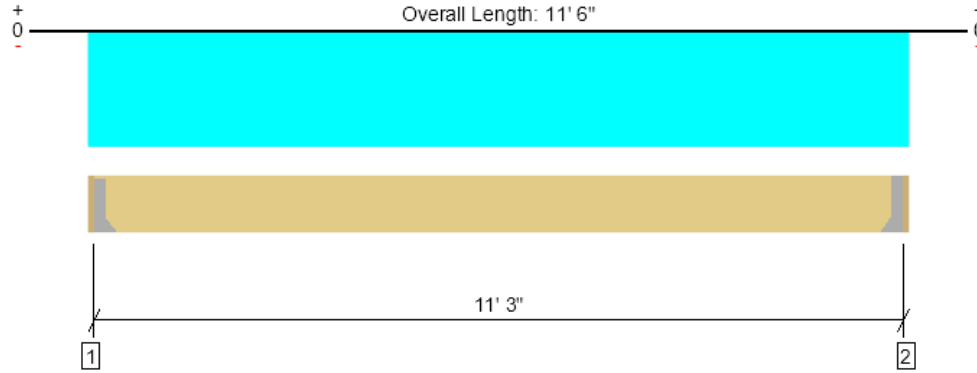
Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Wind (1.60)	Comments
0 - Self Weight (PLF)	1 1/2" to 11' 10"	N/A	14.8	--	--	
1 - Uniform (PSF)	0 to 11' 10" (Front)	4'	17.0	25.0	-42.8	Eave
2 - Point (lb)	11' 10" (Front)	N/A	844	941	-1845	Linked from: Upper BM6.2, Support 2

- Side loads are assumed to not induce cross-grain tension.

FortewEB Software Operator	Job Notes
Luis Ortega Davido Consulting Group (360) 899-1110 luis@dcgengr.com	



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File Name: 2401.0362 Puyallup Storage



Drawing is Conceptual, All locations are measured from the outside face of left support (or left cantilever end), All dimensions are horizontal (typ.).

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	769 @ 1 1/2"	2813 (1,50")	Passed (27%)	—	1.0 D + 1.0 S (All Spans)
Shear (lbs)	687 @ 8 3/4"	3002	Passed (23%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	2164 @ 5' 9"	2720	Passed (80%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.185 @ 5' 9"	0.563	Passed (L/731)	—	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.323 @ 5' 9"	0.750	Passed (L/417)	—	1.0 D + 1.0 S (All Spans)

- Deflection criteria: LL (L/240) and TL (L/180).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- 352 lbs uplift at support located at 1 1/2". Strapping or other restraint may be required.
- 352 lbs uplift at support located at 11' 4 1/2". Strapping or other restraint may be required.
- Applicable calculations are based on NDS.

Member Length : 11' 3"
System : Roof
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD
Member Pitch : 0/12

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Snow	Wind	Factored	
1 - Hanger on 7 1/4" DF beam	1.50"	Hanger ¹	1.50"	336	449	-924	786/-352	See note ¹
2 - Hanger on 7 1/4" DF beam	1.50"	Hanger ¹	1.50"	336	449	-924	786/-352	See note ¹

• At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger

• ¹ See Connector grid below for additional information and/or requirements.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	11' 3" o/c	
Bottom Edge (Lu)	11' 3" o/c	

• Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie

Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
1 - Face Mount Hanger	LUS26-2	2.00"	N/A	4-10dx1.5	4-10d	
2 - Face Mount Hanger	LUS26-2	2.00"	N/A	4-10dx1.5	4-10d	

• Refer to manufacturer notes and instructions for proper installation and use of all connectors.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Wind (1.60)	Comments
0 - Self Weight (PLF)	1 1/2" to 11' 4 1/2"	N/A	5.5	--	—	
1 - Uniform (PSF)	0 to 11' 6" (Front)	3' 1 1/2"	17.0	25.0	-51.4	Roof

• Side loads are assumed to not induce cross-grain tension.

Weyerhaeuser Notes

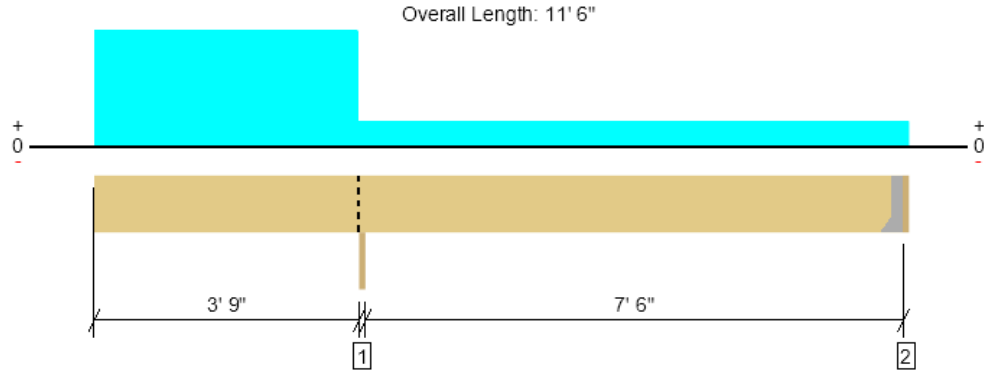
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The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

ForteWEB Software Operator	Job Notes
Luis Ortega Davido Consulting Group (360) 899-1110 luis@dcgengr.com	



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Drawing is Conceptual, All locations are measured from the outside face of left support (or left cantilever end), All dimensions are horizontal (typ.).

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	997 @ 3' 9 3/4"	2813 (1,50")	Passed (35%)	—	1.0 D + 1.0 S (All Spans)
Shear (lbs)	513 @ 3' 1 3/4"	3002	Passed (17%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	-1185 @ 3' 9 3/4"	2720	Passed (44%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0,090 @ 0	0,381	Passed (2L/999+)	—	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0,145 @ 0	0,508	Passed (2L/632)	—	1.0 D + 1.0 S (Alt Spans)

- Deflection criteria: LL (L/240) and TL (L/180).
- Overhang deflection criteria: LL (2L/240) and TL (2L/180).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- 378 lbs uplift at support located at 3' 9 3/4". Strapping or other restraint may be required.
- Applicable calculations are based on NDS.

Member Length : 11' 4 1/2"
System : Roof
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD
Member Pitch : 0/12

Supports	Bearing Length			Loads to Supports (lbs)					Accessories
	Total	Available	Required	Dead	Roof Live	Snow	Wind	Factored	
1 - Beam - DF	1,50"	1,50"	1,50"	432	453	566	-1061	997/-378	Blocking
2 - Hanger on 7 1/4" DF beam	1,50"	Hanger ¹	1,50"	37	62/-22	77/-27	157/-251	131/-128	See note ¹

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.
- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- ¹ See Connector grid below for additional information and/or requirements.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	11' 5" o/c	
Bottom Edge (Lu)	11' 5" o/c	

- Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
2 - Face Mount Hanger	LUS26-2	2.00"	N/A	4-10dx1.5	3-10d	

- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Roof Live (1.25)	Snow (1.15)	Wind (1.60)	Comments
0 - Self Weight (PLF)	0 to 11' 4 1/2"	N/A	5.5	—	—	—	
1 - Uniform (PSF)	0 to 3' 9" (Front)	3' 9"	17.0	20.0	25.0	-45.7	Roof Load
2 - Uniform (PSF)	3' 9" to 11' 6" (Front)	1' 3"	17.0	20.0	25.0	-51.4	Roof Load

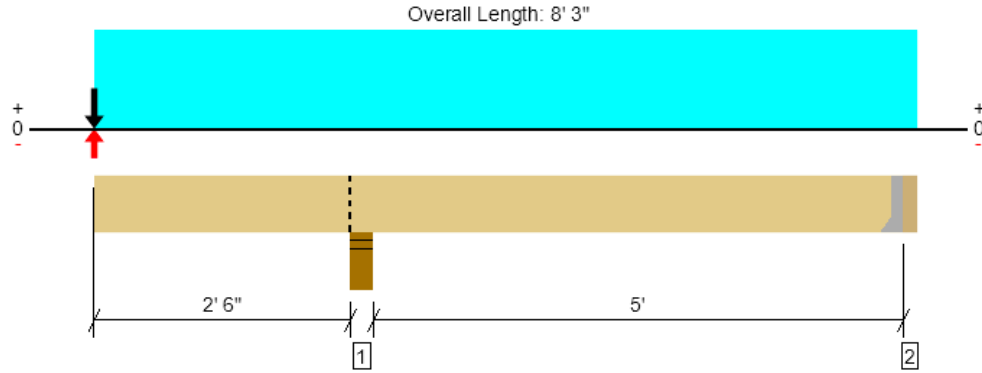
- Side loads are assumed to not induce cross-grain tension.

FortewEB Software Operator	Job Notes
Luis Ortega Davido Consulting Group (360) 899-1110 luis@dcgengr.com	



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Upper Roof, BM10
3 piece(s) 2 x 12 DF No.2



Drawing is Conceptual, All locations are measured from the outside face of left support (or left cantilever end), All dimensions are horizontal (typ.).

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	2105 @ 2' 8 3/4"	15469 (5.50")	Passed (14%)	—	1.0 D + 1.0 S (All Spans)
Shear (lbs)	1149 @ 1' 6 3/4"	6986	Passed (16%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	-3084 @ 2' 8 3/4"	8187	Passed (38%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.024 @ 0	0.273	Passed (2L/999+)	—	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.042 @ 0	0.364	Passed (2L/999+)	—	1.0 D + 1.0 S (Alt Spans)

- Deflection criteria: LL (L/240) and TL (L/180).
- Overhang deflection criteria: LL (2L/240) and TL (2L/180).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- 404 lbs uplift at support located at 2' 8 3/4". Strapping or other restraint may be required.
- 378 lbs uplift at support located at 7' 11 1/2". Strapping or other restraint may be required.
- Applicable calculations are based on NDS.

Member Length : 7' 11 1/2"
System : Roof
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD
Member Pitch : 0/12

Supports	Bearing Length			Loads to Supports (lbs)					Accessories
	Total	Available	Required	Dead	Roof Live	Snow	Wind	Factored	
1 - Stud wall - DF	5.50"	5.50"	1.50"	941	932	1164	-1615	2105/-404	Blocking
2 - Hanger on 11 1/4" DF beam	3.50"	Hanger ¹	1.50"	-126	-201	-251	554	256/-378	See note ¹

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.
- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- ¹ See Connector grid below for additional information and/or requirements.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	8' o/c	
Bottom Edge (Lu)	8' o/c	

- Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
2 - Face Mount Hanger	LUS210-3	2.00"	N/A	8-10dx1.5	6-10d	

- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

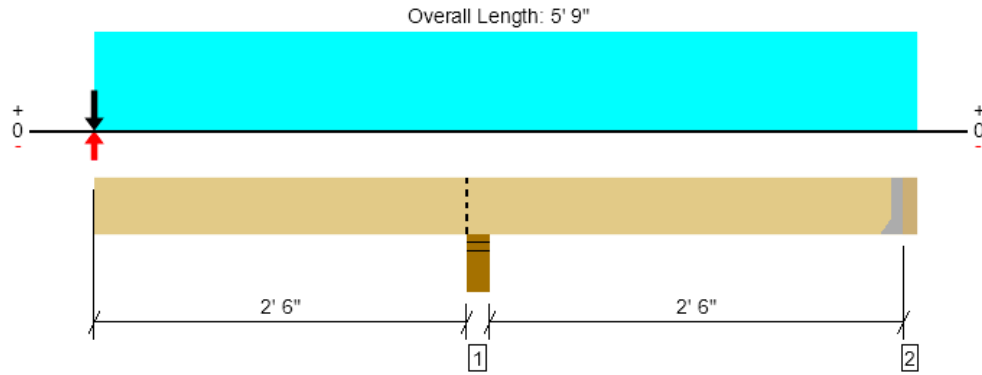
Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Roof Live (1.25)	Snow (1.15)	Wind (1.60)	Comments
0 - Self Weight (PLF)	0 to 7' 11 1/2"	N/A	12.8	—	—	—	
1 - Uniform (PSF)	0 to 8' 3" (Front)	2'	17.0	20.0	25.0	-	Roof Load
2 - Point (lb)	0 (Front)	N/A	432	453	566	-1061	Linked from: BM9, Support 1

- Side loads are assumed to not induce cross-grain tension.

ForteWEB Software Operator	Job Notes
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File Name: 2401.0362 Puyallup Storage



Drawing is Conceptual. All locations are measured from the outside face of left support (or left cantilever end). All dimensions are horizontal (typ.).

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	2500 @ 2' 8 3/4"	15469 (5,50")	Passed (16%)	—	1.0 D + 1.0 S (All Spans)
Shear (lbs)	1173 @ 1' 10 3/4"	4502	Passed (26%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	-3067 @ 2' 8 3/4"	4080	Passed (75%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.064 @ 0	0.273	Passed (2L/999+)	—	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.112 @ 0	0.364	Passed (2L/584)	—	1.0 D + 1.0 S (Alt Spans)

- Deflection criteria: LL (L/240) and TL (L/180).
- Overhang deflection criteria: LL (2L/240) and TL (2L/180).
- Left cantilever length exceeds 1/3 member length or 1/2 back span length. Additional bracing should be considered.
- Allowed moment does not reflect the adjustment for the beam stability factor.
- 616 lbs uplift at support located at 2' 8 3/4". Strapping or other restraint may be required.
- Applicable calculations are based on NDS.

Member Length : 5' 5 1/2"
System : Roof
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD
Member Pitch : 0/12

Supports	Bearing Length			Loads to Supports (lbs)					Accessories
	Total	Available	Required	Dead	Roof Live	Snow	Wind	Factored	
1 - Stud wall - DF	5.50"	5.50"	1.50"	1095	1124	1405	-2122	2500/-616	Blocking
2 - Hanger on 7 1/4" DF beam	3.50"	Hanger ¹	1.50"	-422	-469	-586	1061	383/-1008	See note ¹

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.
- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- ¹ See Connector grid below for additional information and/or requirements.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	5' 6" o/c	
Bottom Edge (Lu)	5' 6" o/c	

- Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
2 - Face Mount Hanger	LUS28-3	2.00"	N/A	6-16d	4-16d	

- Refer to manufacturer notes and instructions for proper installation and use of all connectors.

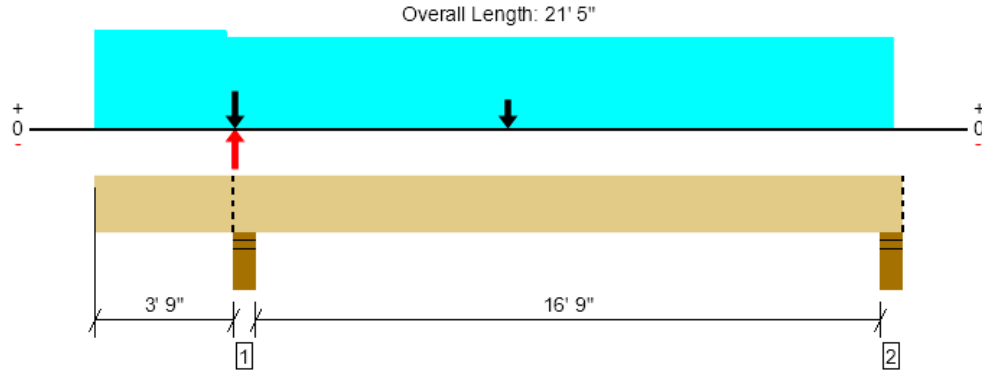
Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Roof Live (1.25)	Snow (1.15)	Wind (1.60)	Comments
0 - Self Weight (PLF)	0 to 5' 5 1/2"	N/A	8.3	—	—	—	
1 - Uniform (PSF)	0 to 5' 9" (Front)	2'	17.0	20.0	25.0	-	Roof Load
2 - Point (lb)	0 (Front)	N/A	432	453	566	-1061	Linked from: BM9, Support 1

- Side loads are assumed to not induce cross-grain tension.

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Luis Ortega Davido Consulting Group (360) 899-1110 luis@dcgengr.com	



Upper Roof, BM11
3 piece(s) 2 x 12 DF No.2



Drawing is Conceptual, All locations are measured from the outside face of left support (or left cantilever end), All dimensions are horizontal (typ.).

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1875 @ 3' 11 3/4"	15469 (5.50")	Passed (12%)	—	1.0 D + 0.45 W + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	1370 @ 5' 1 3/4"	6986	Passed (20%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	6080 @ 12' 4 5/16"	8187	Passed (74%)	1.15	1.0 D + 1.0 S (Alt Spans)
Live Load Defl. (in)	0.212 @ 12' 6 7/16"	0.855	Passed (L/969)	—	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.366 @ 12' 7"	1.140	Passed (L/560)	—	1.0 D + 1.0 S (Alt Spans)

- Deflection criteria: LL (L/240) and TL (L/180).
- Overhang deflection criteria: LL (2L/240) and TL (2L/180).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Applicable calculations are based on NDS.

Member Length : 21' 5"
System : Roof
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD
Member Pitch : 0/12

Supports	Bearing Length			Loads to Supports (lbs)					Accessories
	Total	Available	Required	Dead	Roof Live	Snow	Wind	Factored	
1 - Stud wall - DF	5.50"	5.50"	1.50"	847	789	987	640	1875	Blocking
2 - Stud wall - DF	5.50"	5.50"	1.50"	620	633	791	53/-8	1411	Blocking

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	14' 11" o/c	
Bottom Edge (Lu)	21' 5" o/c	

- Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Roof Live (1.25)	Snow (1.15)	Wind (1.60)	Comments
0 - Self Weight (PLF)	0 to 21' 5"	N/A	12.8	—	—	—	
1 - Uniform (PSF)	0 to 3' 6" (Front)	3' 9"	17.0	20.0	25.0	-	Roof load
2 - Uniform (PSF)	3' 6" to 21' 2" (Front)	3' 6"	17.0	20.0	25.0	-	Roof Load
3 - Point (lb)	10' 11 1/2" (Front)	N/A	62	108	135	131	Linked from: Copy of BM10, Support 2
4 - Point (lb)	3' 8 3/4" (Front)	N/A	-144	-201	-251	554	Linked from: BM10, Support 2

- Side loads are assumed to not induce cross-grain tension.

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The product application, input design loads, dimensions and support information have been provided by ForteWEB Software Operator

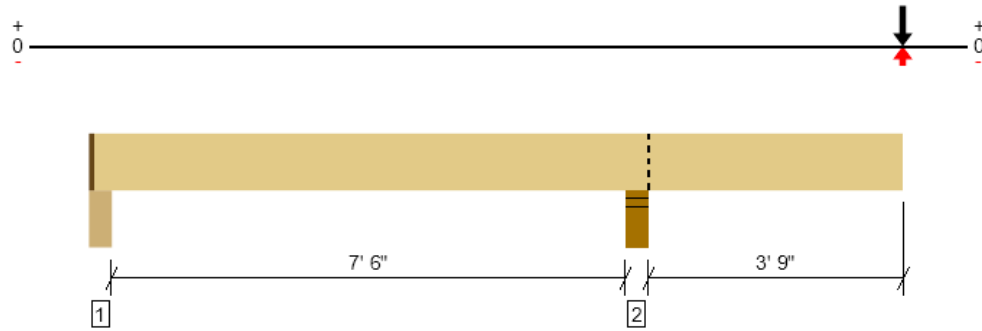
ForteWEB Software Operator	Job Notes
Luis Ortega Davido Consulting Group (360) 899-1110 luis@dcgengr.com	



10/15/2024 7:50:36 PM UTC
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File Name: 2401.0362 Puyallup Storage

Upper Roof, Upper Sistered Outrigger
1 piece(s) 1 3/4" x 7 1/4" 2.0E Microllam® LVL

Overall Length: 12' 2"



Drawing is Conceptual, All locations are measured from the outside face of left support (or left cantilever end), All dimensions are horizontal (typ.).

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern) [Group]
Member Reaction (lbs)	659 @ 8' 2 1/4"	6016 (5.50")	Passed (11%)	—	1.0 D + 0.45 W + 0.75 L + 0.75 S (All Spans) [1]
Shear (lbs)	427 @ 9' 1/4"	3857	Passed (11%)	1.60	1.0 D + 0.45 W + 0.75 L + 0.75 S (All Spans) [1]
Moment (Ft-lbs)	-1683 @ 8' 2 1/4"	5692	Passed (30%)	1.60	1.0 D + 0.45 W + 0.75 L + 0.75 S (All Spans) [1]
Live Load Defl., (in)	0.329 @ 12' 2"	0.398	Passed (2L/290)	—	1.0 D + 0.45 W + 0.75 L + 0.75 S (All Spans) [1]
Total Load Defl., (in)	0.421 @ 12' 2"	0.531	Passed (2L/228)	—	1.0 D + 0.45 W + 0.75 L + 0.75 S (All Spans) [1]

- Deflection criteria: LL (L/240) and TL (L/180).
- Overhang deflection criteria: LL (2L/240) and TL (2L/180).
- Allowed moment does not reflect the adjustment for the beam stability factor.

Member Length : 12' 3/4"
System : Roof
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD
Member Pitch : 0/12

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Snow	Wind	Factored	
1 - Beam - DF	5.50"	4.25"	1.50"	-33	34/-89	-220	1/-199	1 1/4" Rim Board
2 - Stud wall - DF	5.50"	5.50"	1.50"	167	264/-102	654	659	Blocking

- Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.
- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	12' 1" o/c	
Bottom Edge (Lu)	12' 1" o/c	

- Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Wind (1.60)	Comments
0 - Self Weight (PLF)	1 1/4" to 12' 2"	N/A	3.7	--	—	
1 - Point (lb)	12' 2" (Front)	N/A	89	175/-68	434	Linked from: Copy of BM6.2, Support 1

- Side loads are assumed to not induce cross-grain tension.

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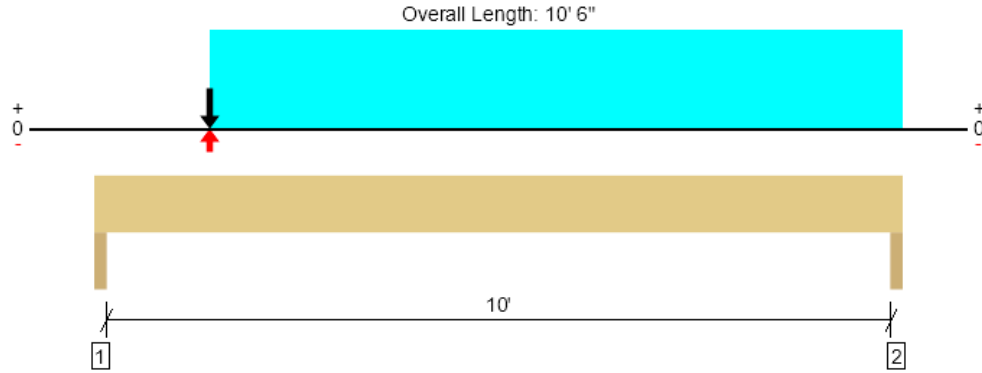
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ForteWEB Software Operator	Job Notes
Luis Ortega Davido Consulting Group (360) 899-1110 luis@dcgengr.com	



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ForteWEB v3.8, Engine: V8.4.1.24, Data: V8.1.6.3
File Name: 2401.0362 Puyallup Storage

Upper Roof, HDR1
1 piece(s) 6 x 12 DF No.2



Drawing is Conceptual, All locations are measured from the outside face of left support (or left cantilever end), All dimensions are horizontal (typ.).

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	4656 @ 1' 1/2"	10313 (3,00")	Passed (45%)	—	1,0 D + 1,0 S (All Spans)
Shear (lbs)	4637 @ 1' 2 1/2"	8244	Passed (56%)	1,15	1,0 D + 1,0 S (All Spans)
Moment (Ft-lbs)	9788 @ 4' 9 1/2"	10166	Passed (96%)	1,15	1,0 D + 1,0 S (All Spans)
Live Load Defl. (in)	0,116 @ 5' 1 5/8"	0,342	Passed (L/999+)	—	1,0 D + 1,0 S (All Spans)
Total Load Defl. (in)	0,208 @ 5' 1 5/8"	0,512	Passed (L/591)	—	1,0 D + 1,0 S (All Spans)

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Lumber grading provisions must be extended over the length of the member per NDS 4.2.5.5.
- Applicable calculations are based on NDS.

Member Length : 10' 6"
System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

Supports	Bearing Length			Loads to Supports (lbs)					Accessories
	Total	Available	Required	Dead	Roof Live	Snow	Wind	Factored	
1 - Trimmer - DF	3.00"	3.00"	1.50"	2056	1076	2601	-700	4656	None
2 - Trimmer - DF	3.00"	3.00"	1.50"	1590	1444	1995	-109	3585	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	10' 6" o/c	
Bottom Edge (Lu)	10' 6" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location	Tributary Width	Dead (0.90)	Roof Live (1.25)	Snow (1.15)	Wind (1.60)	Comments
0 - Self Weight (PLF)	0 to 10' 6"	N/A	16.0	—	—	—	
1 - Uniform (PLF)	1' 6" to 10' 6"	N/A	263.0	280.0	349.0	-	RJ1 Reaction 2 (Reaction/2 to get PLF)
2 - Point (lb)	1' 6"	N/A	1110	-	1455	-809	Linked from: BM6, Support 2

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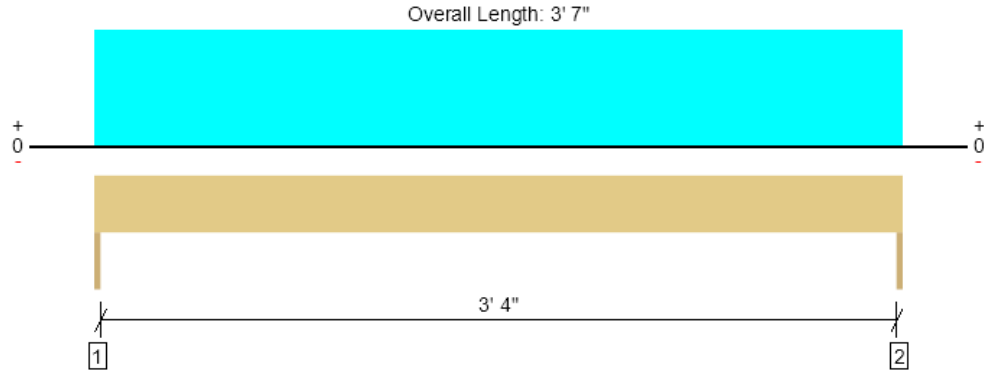
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Drawing is Conceptual, All locations are measured from the outside face of left support (or left cantilever end), All dimensions are horizontal (typ.).

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	912 @ 0	3281 (1,50")	Passed (28%)	—	1,0 D + 1,0 S (All Spans)
Shear (lbs)	615 @ 7"	2657	Passed (23%)	1,15	1,0 D + 1,0 S (All Spans)
Moment (Ft-lbs)	817 @ 1' 9 1/2"	1979	Passed (41%)	1,15	1,0 D + 1,0 S (All Spans)
Live Load Defl. (in)	0,014 @ 1' 9 1/2"	0,119	Passed (L/999+)	—	1,0 D + 1,0 S (All Spans)
Total Load Defl. (in)	0,024 @ 1' 9 1/2"	0,179	Passed (L/999+)	—	1,0 D + 1,0 S (All Spans)

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Applicable calculations are based on NDS.

Member Length : 3' 7"
System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Roof Live	Snow	Factored	
1 - Trimmer - DF	1,50"	1,50"	1,50"	374	430	538	912	None
2 - Trimmer - DF	1,50"	1,50"	1,50"	374	430	538	912	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	3' 7" o/c	
Bottom Edge (Lu)	3' 7" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location	Tributary Width	Dead (0.90)	Roof Live (1.25)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 3' 7"	N/A	4,9	—	—	
1 - Uniform (PSF)	0 to 3' 7"	12'	17,0	20,0	25,0	Roof Load

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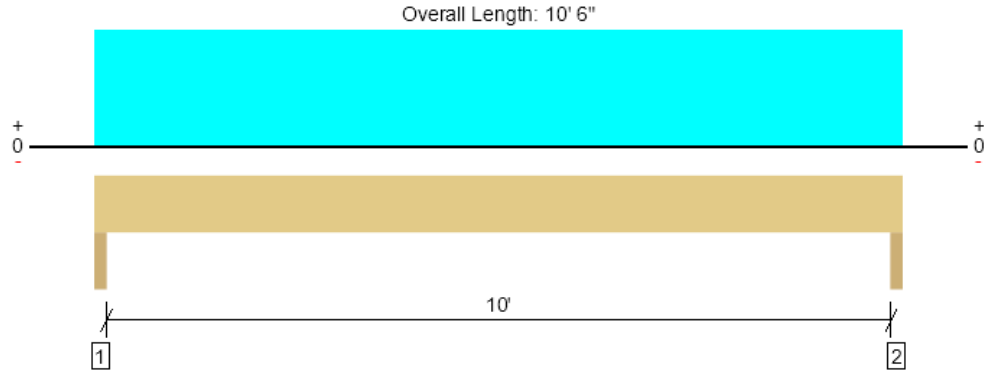
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Upper Roof, HDR3
1 piece(s) 6 x 10 DF No.2



Drawing is Conceptual, All locations are measured from the outside face of left support (or left cantilever end), All dimensions are horizontal (typ.).

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1723 @ 1' 1/2"	10313 (3.00")	Passed (17%)	—	1.0 D + 1.0 S (All Spans)
Shear (lbs)	1381 @ 1' 1/2"	6810	Passed (20%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	4311 @ 5' 3"	6937	Passed (62%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0,091 @ 5' 3"	0,342	Passed (L/999+)	—	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0,160 @ 5' 3"	0,512	Passed (L/771)	—	1.0 D + 1.0 S (All Spans)

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Lumber grading provisions must be extended over the length of the member per NDS 4.2.5.5.
- Applicable calculations are based on NDS.

Member Length : 10' 6"
System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Roof Live	Snow	Factored	
1 - Trimmer - DF	3.00"	3.00"	1.50"	739	788	984	1723	None
2 - Trimmer - DF	3.00"	3.00"	1.50"	739	788	984	1723	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	10' 6" o/c	
Bottom Edge (Lu)	10' 6" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location	Tributary Width	Dead (0.90)	Roof Live (1.25)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 10' 6"	N/A	13.2	—	—	
1 - Uniform (PSF)	0 to 10' 6"	7' 6"	17.0	20.0	25.0	Roof Load

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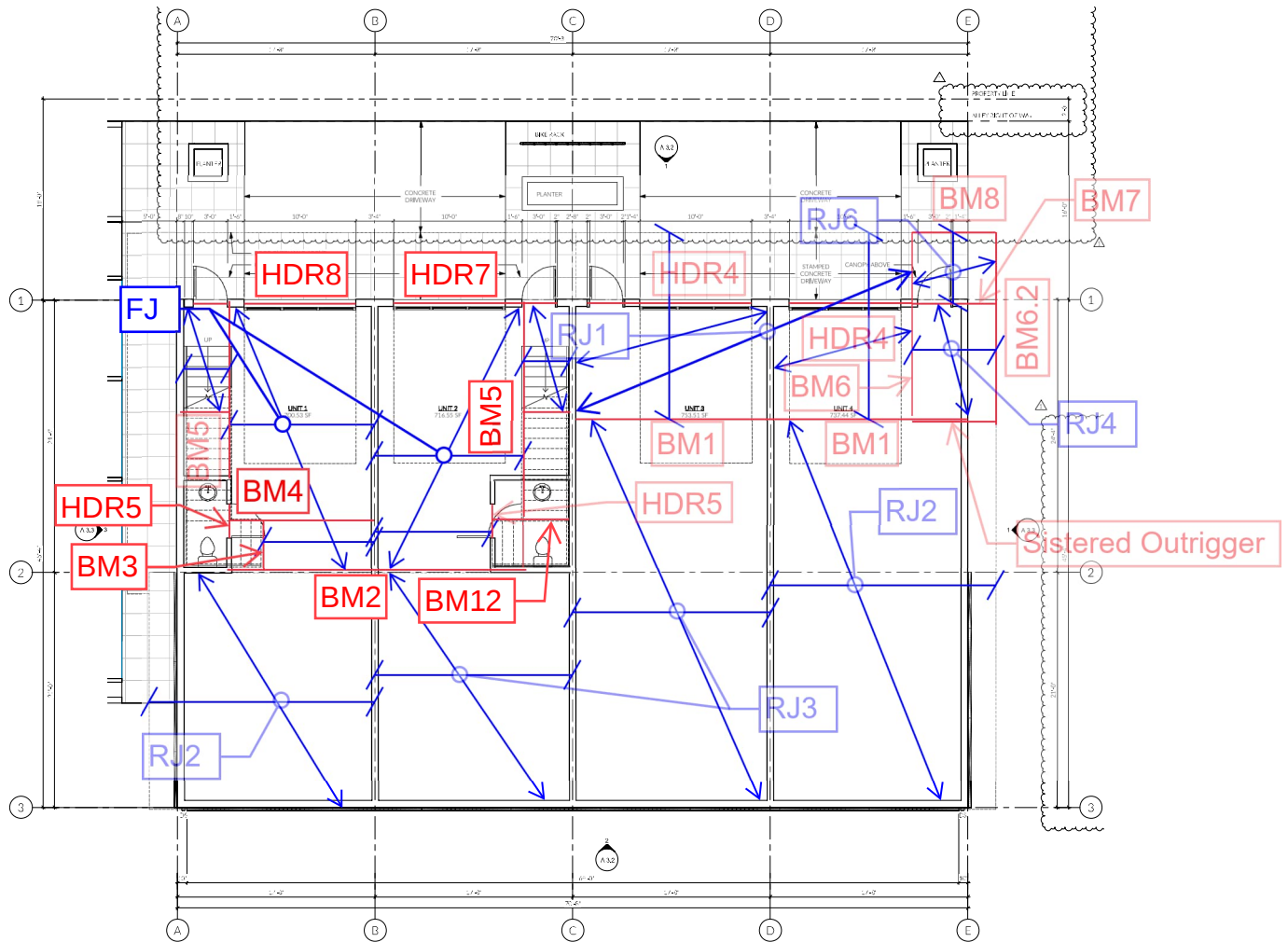
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For the following calcs please refer to the following pages:

BM1 - GD-17

BM6 - GD-18

BM6.2 - GD-20

BM7 - GD-21

BM8 - GD-22

Sistered Outrigger - GD-26

RJ1 - GD-2 - GD-5

RJ2 - GD-6 - GD-9

RJ4 - GD-10 - GD-13

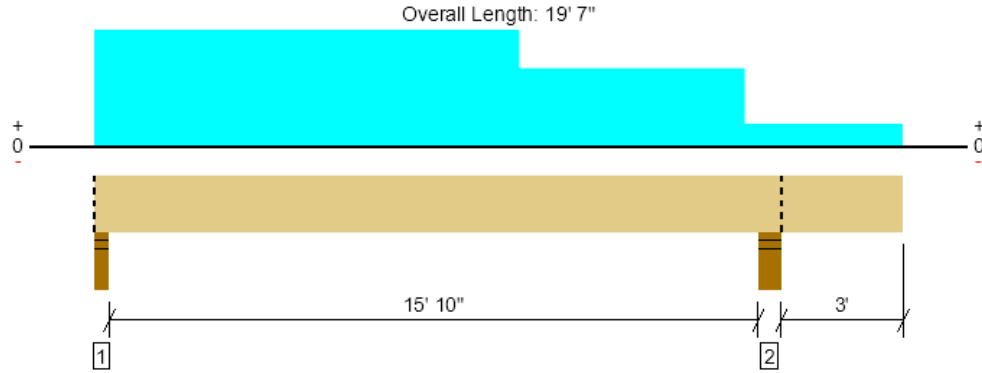
RJ6 - GD-15

L1 Floor/Roof Kevplan

Scale: $1/16" = 1'$

Floor, BM5

1 piece(s) 5 1/2" x 15" 24F-V4 DF Glulam



Drawing is Conceptual, All locations are measured from the outside face of left support (or left cantilever end), All dimensions are horizontal (typ.).

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	6614 @ 2"	12031 (3.50")	Passed (55%)	—	1.0 D + 1.0 L (Alt Spans)
Shear (lbs)	5319 @ 1' 6 1/2"	14575	Passed (36%)	1.00	1.0 D + 1.0 L (Alt Spans)
Pos Moment (Ft-lbs)	24947 @ 7' 10 1/2"	41125	Passed (61%)	1.00	1.0 D + 1.0 L (Alt Spans)
Neg Moment (Ft-lbs)	-939 @ 16' 4 1/4"	31797	Passed (3%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.332 @ 8' 1 15/16"	0.405	Passed (L/585)	—	1.0 D + 1.0 L (Alt Spans)
Total Load Defl. (in)	0.417 @ 8' 1 7/8"	0.809	Passed (L/465)	—	1.0 D + 1.0 L (Alt Spans)

Member Length : 19' 7"
System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Overhang deflection criteria: LL (2L/480) and TL (2L/240).
- Upward deflection on right cantilever exceeds overhang deflection criteria.
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Critical positive moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 16' 1 5/8".
- Critical negative moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 3' 4 7/8".
- The effects of positive or negative camber have not been accounted for when calculating deflection.
- The specified glulam is assumed to have its strong laminations at the bottom of the beam. Install with proper side up as indicated by the manufacturer.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - DF	3.50"	3.50"	1.92"	1362	5252/-42	6614	Blocking
2 - Stud wall - DF	5.50"	5.50"	1.71"	1293	4591	5884	Blocking

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	19' 7" o/c	
Bottom Edge (Lu)	19' 7" o/c	

- Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 19' 7"	N/A	20.0	--	
1 - Uniform (PSF)	0 to 10' 3 1/2" (Front)	10' 3"	15.0	65.0	Floor Load
2 - Uniform (PSF)	10' 3 1/2" to 15' 9" (Front)	6' 10 3/4"	15.0	65.0	Floor Load
3 - Uniform (PSF)	15' 9" to 19' 7" (Front)	2'	15.0	65.0	Floor Load

- Side loads are assumed to not induce cross-grain tension.

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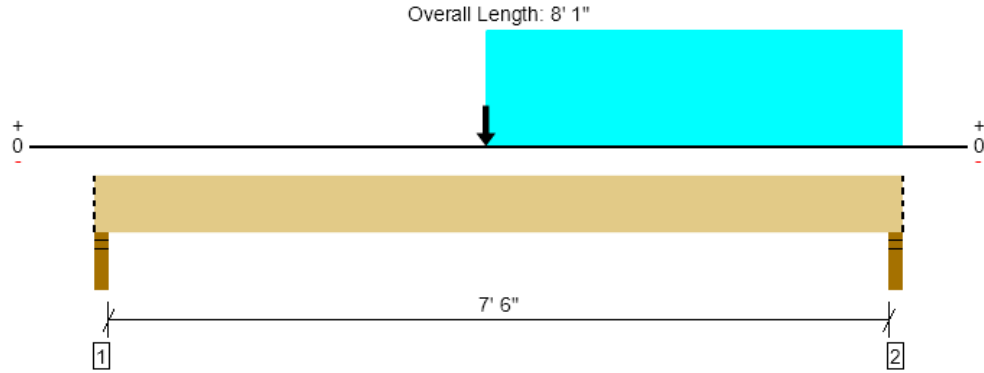
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Floor, BM12

1 piece(s) 4 x 12 DF No.2



Drawing is Conceptual, All locations are measured from the outside face of left support (or left cantilever end), All dimensions are horizontal (typ.).

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	2777 @ 7' 11"	7656 (3,50")	Passed (36%)	—	1.0 D + 1.0 L (All Spans)
Shear (lbs)	1962 @ 6' 10 1/4"	4725	Passed (42%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	5361 @ 3' 11"	6091	Passed (88%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0,066 @ 4' 2 3/16"	0,194	Passed (L/999+)	—	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0,079 @ 4' 2 1/8"	0,387	Passed (L/999+)	—	1.0 D + 1.0 L (All Spans)

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Applicable calculations are based on NDS.

Member Length : 8' 1"
System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Factored	
1 - Stud wall - DF	3,50"	3,50"	1,50"	263	1187	1450	Blocking
2 - Stud wall - DF	3,50"	3,50"	1,50"	472	2305	2777	Blocking

- Blocking Panels are assumed to carry no loads applied directly above them and the full load is applied to the member being designed.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	8' 1" o/c	
Bottom Edge (Lu)	8' 1" o/c	

- Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 8' 1"	N/A	10.0	—	
1 - Point (lb)	3' 11" (Front)	N/A	225	1200	Stair Landing Load (4'/2*7,5'*80psf)
2 - Uniform (PSF)	3' 11" to 8' 1" (Front)	6' 10 1/2"	15.0	80.0	Stair case loading

- Side loads are assumed to not induce cross-grain tension.

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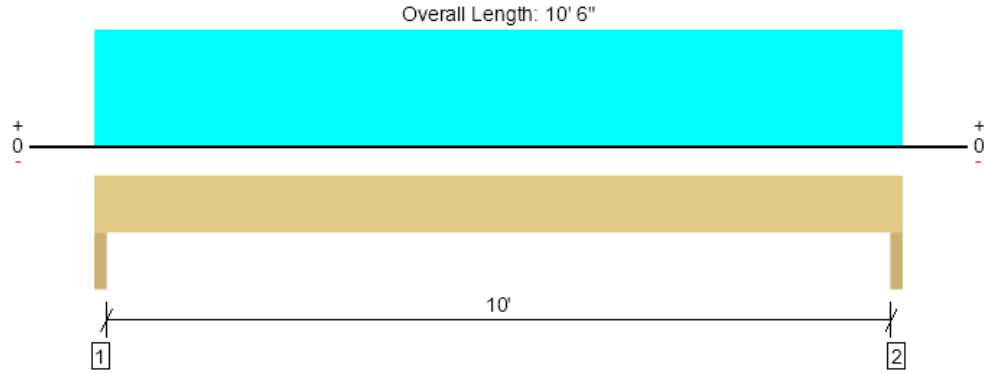
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Upper Roof, HDR8
1 piece(s) 4 x 12 DF No.2



Drawing is Conceptual, All locations are measured from the outside face of left support (or left cantilever end), All dimensions are horizontal (typ.).

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	604 @ 1' 1/2"	6563 (3,00")	Passed (9%)	—	1.0 D (All Spans)
Shear (lbs)	467 @ 1' 2 1/4"	4253	Passed (11%)	0,90	1.0 D (All Spans)
Moment (Ft-lbs)	1510 @ 5' 3"	5482	Passed (28%)	0,90	1.0 D (All Spans)
Live Load Defl. (in)	0,000 @ 0	0,342	Passed (2L/999+)	—	1.0 D (All Spans)
Total Load Defl. (in)	0,043 @ 5' 3"	0,512	Passed (L/999+)	—	1.0 D (All Spans)

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Applicable calculations are based on NDS.

Member Length : 10' 6"
System : Wall
Member Type : Header
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

Supports	Bearing Length			Loads to Supports (lbs)		Accessories
	Total	Available	Required	Dead	Factored	
1 - Trimmer - DF	3.00"	3.00"	1.50"	604	604	None
2 - Trimmer - DF	3.00"	3.00"	1.50"	604	604	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	10' 6" o/c	
Bottom Edge (Lu)	10' 6" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location	Tributary Width	Dead (0.90)	Comments
0 - Self Weight (PLF)	0 to 10' 6"	N/A	10.0	
1 - Uniform (PSF)	0 to 10' 6"	10' 6"	10.0	Wall DL (Trib W = Wall H)

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Wood Beam

Project File: Enercalc_Puyallup Storage.ec

LIC# : KW-06012482, Build:20.24.10.03

FACET

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DESCRIPTION: FJ1 2x12 at 16" o.c. (Office Load)**CODE REFERENCES**

Calculations per NDS 2018, IBC 2021, SDPWS 2021

Load Combination Set : ASCE 7-16

Material Properties

Analysis Method : Allowable Stress Design

Load Combination : ASCE 7-16

Wood Species : Douglas Fir-Larch

Wood Grade : No.2

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb + 900.0 psi

Fb - 900.0 psi

Fc - Prll 1,350.0 psi

Fc - Perp 625.0 psi

Fv 180.0 psi

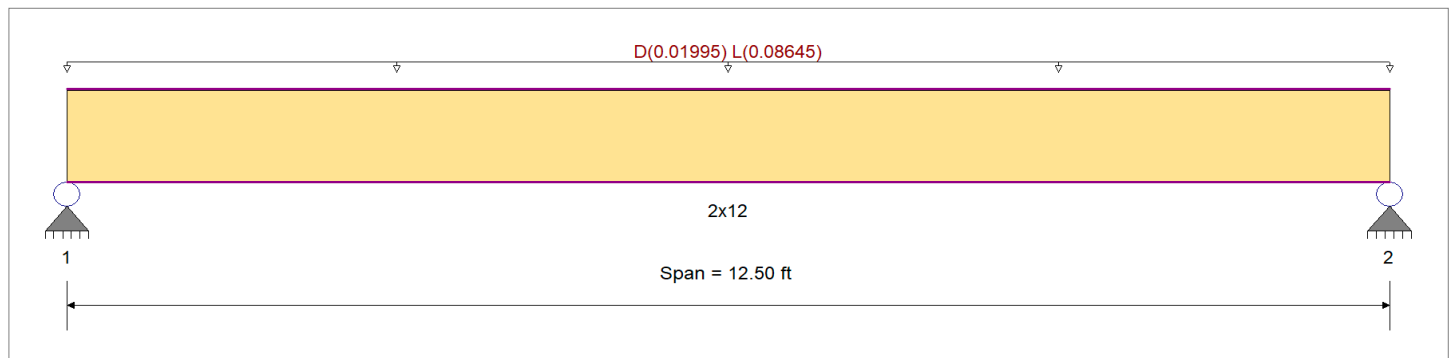
Ft 575.0 psi

E : Modulus of Elasticity

Ebend- xx 1,600.0ksi

Eminbend - xx 580.0ksi

Density 31.210pcf

**Applied Loads**

Service loads entered. Load Factors will be applied for calculation

Beam self weight calculated and added to loading

Uniform Load : D = 0.0150, L = 0.0650 ksf, Tributary Width = 1.330 ft, (Floor Load)

DESIGN SUMMARY**Design OK**

Maximum Bending Stress Ratio			=	0.906 1			Maximum Shear Stress Ratio			=	0.290 : 1		
Section used for this span				2x12			Section used for this span				2x12		
fb: Actual			=	815.24psi			fv: Actual			=	52.22 psi		
F'b			=	900.00psi			F'v			=	180.00 psi		
Load Combination				+D+L			Load Combination				+D+L		
Location of maximum on span			=	6.250ft			Location of maximum on span			=	11.588 ft		
Span # where maximum occurs			=	Span # 1			Span # where maximum occurs			=	Span # 1		
Maximum Deflection													
Max Downward Transient Deflection				0.168 in			Ratio =				894 >=360		
Max Upward Transient Deflection				0 in			Ratio =				0 <360		
Max Downward Total Deflection				0.214 in			Ratio =				702 >=240		
Max Upward Total Deflection				0 in			Ratio =				0 <240		
											Span: 1 : L Only		
											n/a		
											Span: 1 : +D+L		
											n/a		

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	0.688	0.688
Max Upward from Load Combinations	0.688	0.688
Max Upward from Load Cases	0.540	0.540
D Only	0.148	0.148
+D+L	0.688	0.688
+D+0.750L	0.553	0.553
+0.60D	0.089	0.089
L Only	0.540	0.540

Wood Beam

Project File: Enercalc_Puyallup Storage.ec

LIC# : KW-06012482, Build:20.24.10.03

FACET

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DESCRIPTION: FJ1 2x12 at 16" o.c. (Office Load, Cantilever)**CODE REFERENCES**

Calculations per NDS 2018, IBC 2021, SDPWS 2021

Load Combination Set : ASCE 7-16

Material Properties

Analysis Method : Allowable Stress Design

Load Combination : ASCE 7-16

Wood Species : Douglas Fir-Larch

Wood Grade : No.2

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb + 900.0 psi

Fb - 900.0 psi

Fc - Prll 1,350.0 psi

Fc - Perp 625.0 psi

Fv 180.0 psi

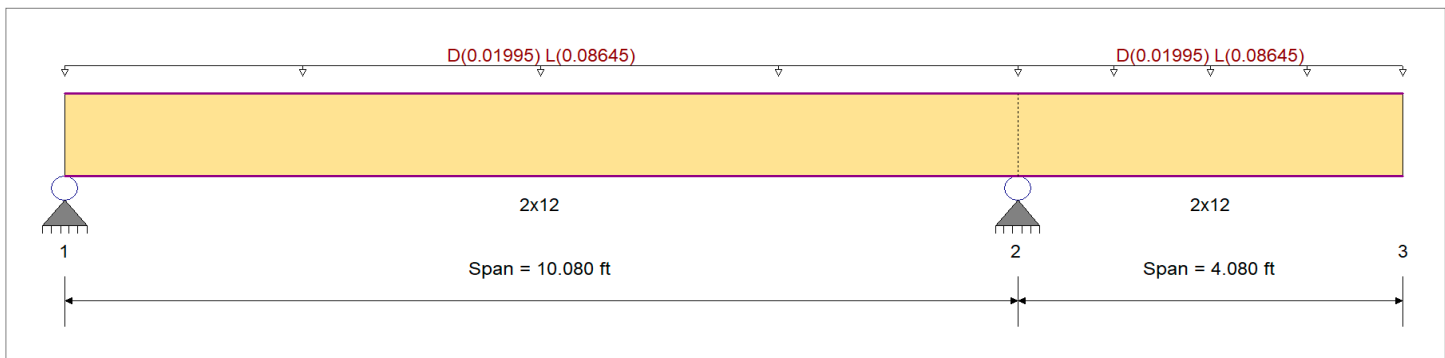
Ft 575.0 psi

E : Modulus of Elasticity

Ebend- xx 1,600.0ksi

Eminbend - xx 580.0ksi

Density 31.210pcf

**Applied Loads**

Service loads entered. Load Factors will be applied for calculation

Beam self weight calculated and added to loading

Load for Span Number 1

Uniform Load : D = 0.0150, L = 0.0650 ksf, Tributary Width = 1.330 ft, (Floor Load)

Load for Span Number 2

Uniform Load : D = 0.0150, L = 0.0650 ksf, Tributary Width = 1.330 ft, (Floor Load)

DESIGN SUMMARY**Design OK**

Maximum Bending Stress Ratio			=	0.412	1	Maximum Shear Stress Ratio			=	0.270	: 1
Section used for this span				2x12		Section used for this span				2x12	
fb: Actual			=	370.66psi		fv: Actual			=	48.57 psi	
F'b			=	900.00psi		F'v			=	180.00 psi	
Load Combination				+D+L		Load Combination				+D+L	
Location of maximum on span			=	4.223ft		Location of maximum on span			=	9.179ft	
Span # where maximum occurs			=	Span # 1		Span # where maximum occurs			=	Span # 1	
Maximum Deflection											
Max Downward Transient Deflection			0.044 in	Ratio =	2775	>=360	Span: 1 : L Only				
Max Upward Transient Deflection			-0.013 in	Ratio =	7318	>=360	Span: 2 : L Only				
Max Downward Total Deflection			0.055 in	Ratio =	2179	>=240	Span: 1 : +D+L				
Max Upward Total Deflection			-0.017 in	Ratio =	5748	>=240	Span: 2 : +D+L				

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2	Support 3
Max Upward from all Load Conditions	0.464	1.095	
Max Upward from Load Combinations	0.464	1.095	
Max Upward from Load Cases	0.364	0.860	
D Only	0.099	0.235	
+D+L	0.464	1.095	
+D+0.750L	0.373	0.880	
+0.60D	0.060	0.141	
L Only	0.364	0.860	

Wood Beam

Project File: Enercalc_Puyallup Storage.ec

LIC#: KW-06012482, Build:20.24.10.03

FACET

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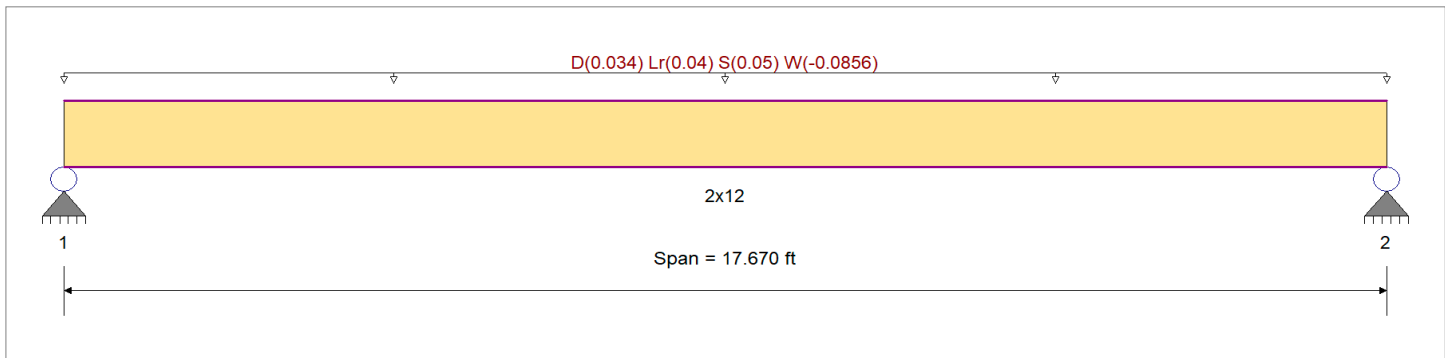
DESCRIPTION: Copy of RJ3 (Simple Span 17'-8")**CODE REFERENCES**

Calculations per NDS 2018, IBC 2021, SDPWS 2021

Load Combination Set : ASCE 7-16

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	1,000.0 psi	E : Modulus of Elasticity	
Load Combination :	ASCE 7-16	Fb -	1,000.0 psi	Ebend- xx	1,700.0 ksi
		Fc - Prll	1,500.0 psi	Eminbend - xx	620.0 ksi
Wood Species :	Douglas Fir-Larch	Fc - Perp	625.0 psi		
Wood Grade :	No.1	Fv	180.0 psi		
		Ft	675.0 psi	Density	31.210pcf
Beam Bracing :	Beam is Fully Braced against lateral-torsional buckling			Repetitive Member Stress Increase	

**Applied Loads**

Service loads entered. Load Factors will be applied for calculation

Beam self weight calculated and added to loading

Uniform Load : D = 0.0170, Lr = 0.020, S = 0.0250, W = -0.04280 ksf, Tributary Width = 2.0 ft, (Roof Load)

DESIGN SUMMARY**Design OK**

Maximum Bending Stress Ratio				Maximum Shear Stress Ratio			
Section used for this span		0.981 : 1		Section used for this span		0.299 : 1	
		2x12				2x12	
fb: Actual	=	1,297.50psi		fv: Actual	=	61.81 psi	
F'b	=	1,322.50psi		F'v	=	207.00 psi	
Load Combination	=	+D+S+H		Load Combination	=	+D+S+H	
Location of maximum on span	=	8.835ft		Location of maximum on span	=	16.767 ft	
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 1	
Maximum Deflection							
Max Downward Transient Deflection	0.365 in	Ratio =	581 >= 360	Span: 1 : S Only			
Max Upward Transient Deflection	-0.262 in	Ratio =	808 >= 360	Span: 1 : +0.420W			
Max Downward Total Deflection	0.639 in	Ratio =	331 >= 240	Span: 1 : +D+S+H			
Max Upward Total Deflection	-0.097 in	Ratio =	2176 >= 240	Span: 1 : +0.60D+0.420W+0.60H			

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	0.774	0.774
Max Upward from Load Combinations	0.774	0.774
Max Upward from Load Cases	0.442	0.442
Max Downward from all Load Conditions	-0.756	-0.756
Max Downward from Load Combinations	-0.254	-0.254
Max Downward from Load Cases (Resis	-0.756	-0.756
+D+H	0.333	0.333
+D+L+H	0.333	0.333
+D+Lr+H	0.686	0.686
+D+S+H	0.774	0.774
+D+0.750Lr+0.750L+H	0.598	0.598
+D+0.750L+0.750S+H	0.664	0.664
+D+0.60W+H	-0.121	-0.121

Wood Beam

Project File: Enercalc_Puyallup Storage.ec

LIC# : KW-06012482, Build:20.24.10.03

FACET

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DESCRIPTION: Copy of RJ3 (Simple Span 17'-8")**Vertical Reactions**

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
+D+0.750Lr+0.750L+0.450W+H	0.257	0.257
+D+0.750L+0.750S+0.450W+H	0.324	0.324
+0.60D+0.60W+0.60H	-0.254	-0.254
+D+0.70E+0.60H	0.333	0.333
+D+0.750L+0.750S+0.5250E+H	0.664	0.664
+0.60D+0.70E+H	0.200	0.200
D Only	0.333	0.333
Lr Only	0.353	0.353
S Only	0.442	0.442
W Only	-0.756	-0.756
H Only		

Wood Beam

Project File: Enercalc_Puyallup Storage.ec

LIC# : KW-06012482, Build:20.24.10.03

FACET

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DESCRIPTION: BM2**CODE REFERENCES**

Calculations per NDS 2018, IBC 2021, SDPWS 2021

Load Combination Set : ASCE 7-16

Material Properties

Analysis Method : Allowable Stress Design

Load Combination : ASCE 7-16

Wood Species : Douglas Fir-Larch

Wood Grade : No.2

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb + 900.0 psi

Fb - 900.0 psi

Fc - Prll 1,350.0 psi

Fc - Perp 625.0 psi

Fv 180.0 psi

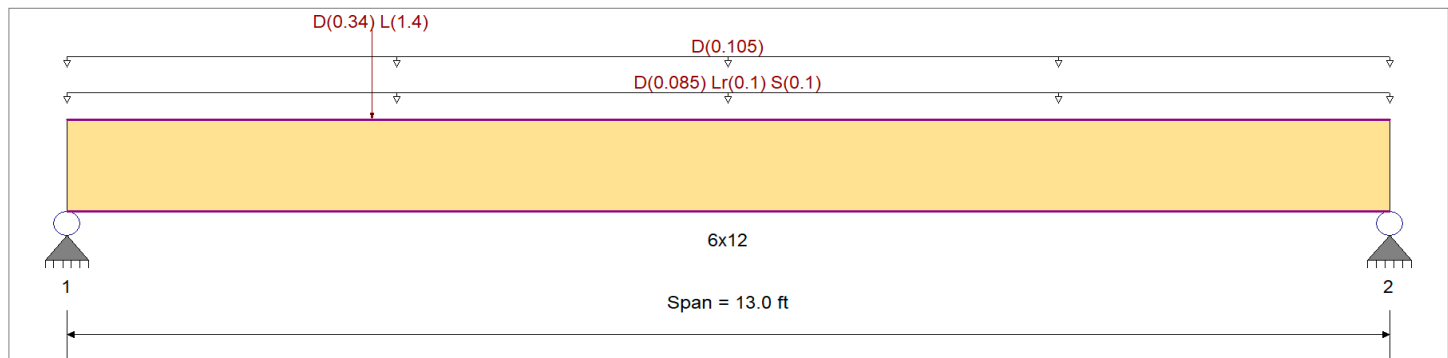
Ft 575.0 psi

E : Modulus of Elasticity

Ebend- xx 1,600.0ksi

Eminbend - xx 580.0ksi

Density 31.210pcf

**Applied Loads**

Service loads entered. Load Factors will be applied for calculation

Beam self weight calculated and added to loading

Uniform Load : D = 0.0170, Lr = 0.020, S = 0.020 ksf, Tributary Width = 5.0 ft, (Roof Load)

Uniform Load : D = 0.010 ksf, Tributary Width = 10.50 ft, (Wall DL (Trib W = Wall H))

Point Load : D = 0.340, L = 1.40 k @ 3.0 ft, (BM3 Reaction)

DESIGN SUMMARY**Design OK**

Maximum Bending Stress Ratio		=	0.804	1	Maximum Shear Stress Ratio		=	0.325	1
Section used for this span			6x12		Section used for this span			6x12	
fb: Actual	=	723.49psi			fv: Actual	=	58.56 psi		
F'b	=	900.00psi			F'v	=	180.00 psi		
Load Combination		+D+L+H			Load Combination		+D+L+H		
Location of maximum on span	=	4.507ft			Location of maximum on span	=	0.000ft		
Span # where maximum occurs	=	Span # 1			Span # where maximum occurs	=	Span # 1		
Maximum Deflection									
Max Downward Transient Deflection		0.065 in	Ratio =	2383	>=360	Span: 1 : L Only			
Max Upward Transient Deflection		0 in	Ratio =	0	<360	n/a			
Max Downward Total Deflection		0.226 in	Ratio =	691	>=240	Span: 1 : +D+0.750Lr+0.750L+H			
Max Upward Total Deflection		0 in	Ratio =	0	<240	n/a			

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	2.881	2.132
Max Upward from Load Combinations	2.881	2.132
Max Upward from Load Cases	1.586	1.403
+D+H	1.586	1.403
+D+L+H	2.663	1.726
+D+Lr+H	2.236	2.053
+D+S+H	2.236	2.053
+D+0.750Lr+0.750L+H	2.881	2.132
+D+0.750L+0.750S+H	2.881	2.132
+D+0.60W+H	1.586	1.403
+D+0.750Lr+0.750L+0.450W+H	2.881	2.132

Wood Beam

Project File: Enercalc_Puyallup Storage.ec

LIC# : KW-06012482, Build:20.24.10.03

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DESCRIPTION: BM2

Vertical Reactions		Support notation : Far left is #1		Values in KIPS
Load Combination	Support 1	Support 2		
+D+0.750L+0.750S+0.450W+H	2.881	2.132		
+0.60D+0.60W+0.60H	0.951	0.842		
+D+0.70E+0.60H	1.586	1.403		
+D+0.750L+0.750S+0.5250E+H	2.881	2.132		
+0.60D+0.70E+H	0.951	0.842		
D Only	1.586	1.403		
Lr Only	0.650	0.650		
L Only	1.077	0.323		
S Only	0.650	0.650		
H Only				

Wood Beam

Project File: Enercalc_Puyallup Storage.ec

LIC# : KW-06012482, Build:20.24.10.03

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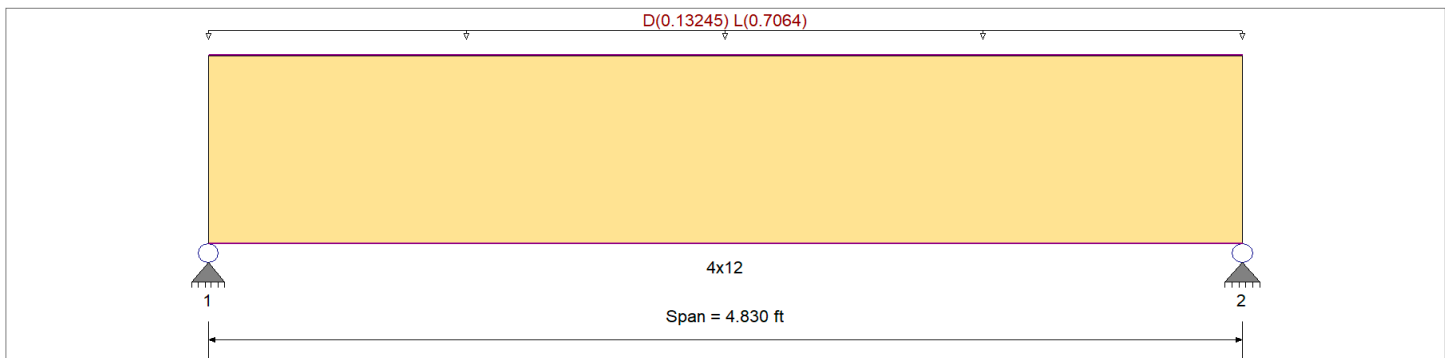
DESCRIPTION: BM3**CODE REFERENCES**

Calculations per NDS 2018, IBC 2021, SDPWS 2021

Load Combination Set : ASCE 7-16

Material Properties

Analysis Method :	Allowable Stress Design	Fb +	900.0 psi	E : Modulus of Elasticity	
Load Combination :	ASCE 7-16	Fb -	900.0 psi	Ebend- xx	1,600.0 ksi
		Fc - Prll	1,350.0 psi	Eminbend - xx	580.0 ksi
Wood Species :	Douglas Fir-Larch	Fc - Perp	625.0 psi		
Wood Grade :	No.2	Fv	180.0 psi		
		Ft	575.0 psi	Density	31.210 pcf
Beam Bracing :	Beam is Fully Braced against lateral-torsional buckling				

**Applied Loads**

Service loads entered. Load Factors will be applied for calculation

Beam self weight calculated and added to loading

Uniform Load : D = 0.0150, L = 0.080 ksf, Tributary Width = 8.830 ft, (Floor Load)

DESIGN SUMMARY**Design OK**

Maximum Bending Stress Ratio				Maximum Shear Stress Ratio			
Section used for this span	=	0.406	1	Section used for this span	=	0.266	1
		4x12				4x12	
fb: Actual	=	401.65psi		fv: Actual	=	47.80 psi	
F'b	=	990.00psi		F'v	=	180.00 psi	
Load Combination	=	+D+L+H		Load Combination	=	+D+L+H	
Location of maximum on span	=	2.415ft		Location of maximum on span	=	3.896ft	
Span # where maximum occurs	=	Span # 1		Span # where maximum occurs	=	Span # 1	
Maximum Deflection							
Max Downward Transient Deflection	0.013 in	Ratio =	4426 >= 360	Span: 1 : L Only			
Max Upward Transient Deflection	0 in	Ratio =	0 < 360	n/a			
Max Downward Total Deflection	0.016 in	Ratio =	3689 >= 240	Span: 1 : +D+L+H			
Max Upward Total Deflection	0 in	Ratio =	0 < 240	n/a			

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	2.046	2.046
Max Upward from Load Combinations	2.046	2.046
Max Upward from Load Cases	1.706	1.706
+D+H	0.340	0.340
+D+L+H	2.046	2.046
+D+Lr+H	0.340	0.340
+D+S+H	0.340	0.340
+D+0.750Lr+0.750L+H	1.620	1.620
+D+0.750L+0.750S+H	1.620	1.620
+D+0.60W+H	0.340	0.340
+D+0.750Lr+0.750L+0.450W+H	1.620	1.620
+D+0.750L+0.750S+0.450W+H	1.620	1.620
+0.60D+0.60W+0.60H	0.204	0.204

Wood Beam

Project File: Enercalc_Puyallup Storage.ec

LIC# : KW-06012482, Build:20.24.10.03

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DESCRIPTION: BM3

Vertical Reactions		Support notation : Far left is #1		Values in KIPS
Load Combination	Support 1	Support 2		
+D+0.70E+0.60H	0.340	0.340		
+D+0.750L+0.750S+0.5250E+H	1.620	1.620		
+0.60D+0.70E+H	0.204	0.204		
D Only	0.340	0.340		
L Only	1.706	1.706		
H Only				

Wood Beam

Project File: Enercalc_Puyallup Storage.ec

LIC# : KW-06012482, Build:20.24.10.03

FACET

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DESCRIPTION: BM4**CODE REFERENCES**

Calculations per NDS 2018, IBC 2021, SDPWS 2021

Load Combination Set : ASCE 7-16

Material Properties

Analysis Method : Allowable Stress Design

Load Combination : ASCE 7-16

Wood Species : Douglas Fir-Larch

Wood Grade : No.2

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

Fb + 875.0 psi

Fb - 875.0 psi

Fc - Prll 600.0 psi

Fc - Perp 625.0 psi

Fv 170.0 psi

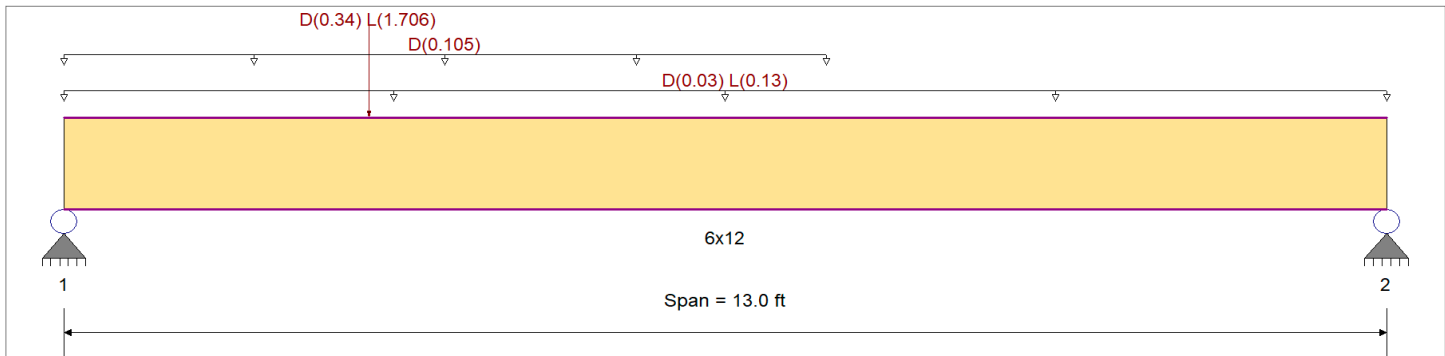
Ft 425.0 psi

E : Modulus of Elasticity

Ebend- xx 1,300.0ksi

Eminbend - xx 470.0ksi

Density 31.210pcf

**Applied Loads**

Service loads entered. Load Factors will be applied for calculation

Beam self weight calculated and added to loading

Uniform Load : D = 0.0150, L = 0.0650 ksf, Tributary Width = 2.0 ft, (Floor Load)

Point Load : D = 0.340, L = 1.706 k @ 3.0 ft, (BM3 Reaction)

Uniform Load : D = 0.010 ksf, Extent = 0.0 --> 7.50 ft, Tributary Width = 10.50 ft, (Wall DL (Trib Width = Wall H))

DESIGN SUMMARY**Design OK**

Maximum Bending Stress Ratio			=	0.995 1			Maximum Shear Stress Ratio			=	0.418 : 1		
Section used for this span				6x12			Section used for this span				6x12		
fb: Actual			=	870.71psi			fv: Actual			=	71.12 psi		
F'b			=	875.00psi			F'v			=	170.00 psi		
Load Combination				+D+L+H			Load Combination				+D+L+H		
Location of maximum on span			=	4.365ft			Location of maximum on span			=	0.000ft		
Span # where maximum occurs			=	Span # 1			Span # where maximum occurs			=	Span # 1		
Maximum Deflection													
Max Downward Transient Deflection			0.190 in	Ratio =	820 >=360			Span: 1 : L Only					
Max Upward Transient Deflection			0 in	Ratio =	0 <360			n/a					
Max Downward Total Deflection			0.287 in	Ratio =	542 >=240			Span: 1 : +D+L+H					
Max Upward Total Deflection			0 in	Ratio =	0 <240			n/a					

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	3.263	1.828
Max Upward from Load Combinations	3.263	1.828
Max Upward from Load Cases	2.157	1.239
+D+H	1.106	0.590
+D+L+H	3.263	1.828
+D+Lr+H	1.106	0.590
+D+S+H	1.106	0.590
+D+0.750Lr+0.750L+H	2.724	1.519
+D+0.750L+0.750S+H	2.724	1.519
+D+0.60W+H	1.106	0.590
+D+0.750Lr+0.750L+0.450W+H	2.724	1.519

Wood Beam

Project File: Enercalc_Puyallup Storage.ec

LIC# : KW-06012482, Build:20.24.10.03

FACET

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DESCRIPTION: BM4

Vertical Reactions		Support notation : Far left is #1		Values in KIPS
Load Combination	Support 1	Support 2		
+D+0.750L+0.750S+0.450W+H	2.724	1.519		
+0.60D+0.60W+0.60H	0.664	0.354		
+D+0.70E+0.60H	1.106	0.590		
+D+0.750L+0.750S+0.5250E+H	2.724	1.519		
+0.60D+0.70E+H	0.664	0.354		
D Only	1.106	0.590		
L Only	2.157	1.239		
H Only				

Wood Beam

Project File: Enercalc_Puyallup Storage.ec

LIC# : KW-06012482, Build:20.24.10.03

FACET

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DESCRIPTION: HDR5**CODE REFERENCES**

Calculations per NDS 2018, IBC 2021, SDPWS 2021

Load Combination Set : ASCE 7-16

Material Properties

Analysis Method : Allowable Stress Design

Load Combination : ASCE 7-16

Wood Species : Douglas Fir-Larch

Wood Grade : No.2

Beam Bracing : Beam is Fully Braced against lateral-torsional buckling

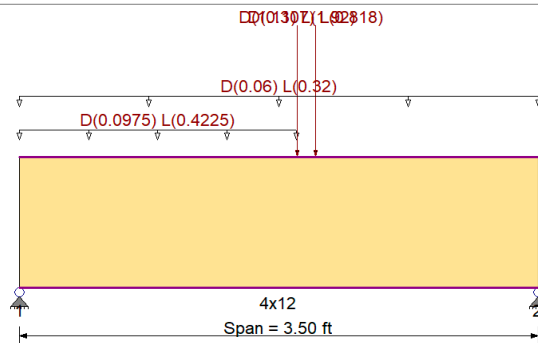
Fb + 900.0 psi
 Fb - 900.0 psi
 Fc - Prll 1,350.0 psi
 Fc - Perp 625.0 psi
 Fv 180.0 psi
 Ft 575.0 psi

E : Modulus of Elasticity

Ebend- xx 1,600.0ksi

Eminbend - xx 580.0ksi

Density 31.210pcf

**Applied Loads**

Service loads entered. Load Factors will be applied for calculation

Beam self weight calculated and added to loading

Load for Span Number 1

Uniform Load : D = 0.0150, L = 0.0650 ksf, Extent = 0.0 --> 1.875 ft, Tributary Width = 6.50 ft, (Floor Load)

Point Load : D = 1.110, L = 1.920 k @ 1.875 ft, (BM 4 Reaction 1)

Point Load : D = 0.3070, L = 0.8180 k @ 2.0 ft, (Stair Landing Support)

Uniform Load : D = 0.0150, L = 0.080 ksf, Tributary Width = 4.0 ft, (Stair Load)

DESIGN SUMMARY**Design OK**

Maximum Bending Stress Ratio			=	0.748 1	Maximum Shear Stress Ratio			=	0.602 : 1
Section used for this span				4x12	Section used for this span				4x12
fb: Actual			=	740.22psi	fv: Actual			=	108.38 psi
F'b			=	990.00psi	F'v			=	180.00 psi
Load Combination				+D+L	Load Combination				+D+L
Location of maximum on span			=	1.878ft	Location of maximum on span			=	2.568 ft
Span # where maximum occurs			=	Span # 1	Span # where maximum occurs			=	Span # 1
Maximum Deflection									
Max Downward Transient Deflection			0.009 in	Ratio =	4592	>=360		Span: 1 : L Only	
Max Upward Transient Deflection			0 in	Ratio =	0	<360		n/a	
Max Downward Total Deflection			0.013 in	Ratio =	3219	>=240		Span: 1 : +D+L	
Max Upward Total Deflection			0 in	Ratio =	0	<240		n/a	

Vertical Reactions

Support notation : Far left is #1

Values in KIPS

Load Combination	Support 1	Support 2
Max Upward from all Load Conditions	3.283	3.207
Max Upward from Load Combinations	3.283	3.207
Max Upward from Load Cases	2.382	2.268
D Only	0.901	0.939
+D+L	3.283	3.207
+D+0.750L	2.687	2.640
+0.60D	0.540	0.563
L Only	2.382	2.268

Masonry Beam

Project File: Enercalc_Puyallup Storage.ec6

LIC# : KW-06012482, Build:20.24.09.03

FACET

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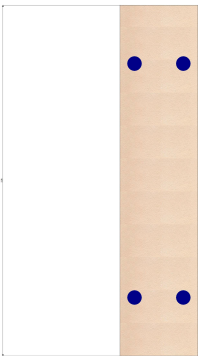
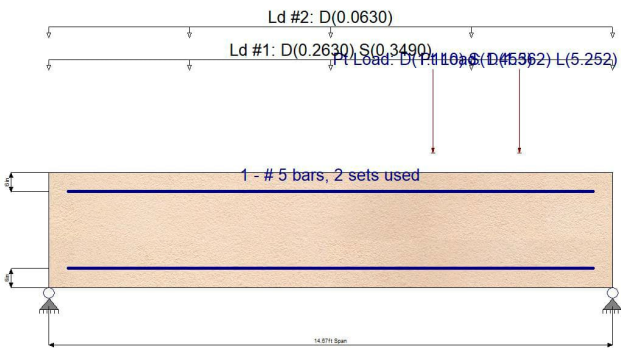
DESCRIPTION: HDR7 SDT

Code References

Calculations per TMS 402-16, IBC 2021, SDPWS 2021
Load Combinations Used : ASCE 7-16

General Information

f'm	2,000.0 psi	Clear Span	14.670 ft	Rebar Size	5.0
f _y	60,000.0 psi	Beam Depth	3.0 ft	# Bars E/F	1
Em = f'm *	900.0	Thickness	8 in	Top Clear	6.0 in
Wall Wt Mult.	1.0	End Fixity	Pin-Pin	Btm Clear	6.0 in
Block Type	Normal Wt	Equiv. Solid Thick	7.60 in	# Bar Sets	2
Lateral Wind Load	30.0 psf	Wall Weight	86.0 psf	Bar Spacing	5.0 in
Beam is Fully Braced ?	No	E	1,800.0 ksi	Shear Reinf Bar Size	# 4
Lateral Wall Weight Seismic Factor	0.4060	n	16.111	Shear Reinf Bar Spacing	24.0 in
Calculate vertical beam weight ?	Yes				
Note! Shear calculated at "d/2" from edge of beam					



Point Loads

	Distance	Dead Load	L : Floor Live	Lr : Roof Live	S : Snow	W : Wind	E : Earthquake
#1	10.0 ft	1.110			1.455		k
#2	12.250 ft	1.362	5.252				k
#3	ft						k
#4	ft						k

Uniform Loads

	Start X	End X	Dead Load	L : Floor Live	Lr : Roof Live	S : Snow	W : Wind	E : Earthquake
#1	ft	14.670 ft	0.2630			0.3490		k/ft
#2	ft	14.670 ft	0.0630					k/ft
#3	ft	ft						k/ft
#4	ft	ft						k/ft

DESIGN SUMMARY

Design OK

Maximum Stress Ratios...

	Vertical	Lateral	SRSS Combination
Mu / Phi*Mn	0.6653	0.0	0.6653 : 1.00
Vu / Phi*Vn	0.5425	0.0	0.5425 : 1.00

Maximum Moment

	Actual	Allowable
Vertical Loads	52.855 k-ft	79.451 k-ft
for Load Combination 1: 20D+L+1.60S		
Lateral Loads	2.817 k-ft	16.717
for Load Combination 1: 20D+L+0.20S+E		

	Actual	Allowable
Maximum Tension As	0.620 in^2	2.177 in^2

Maximum Shear

	Actual	Allowable
Vertical Loads	57.90 psi	106.728 psi
for Load Combination 1: 20D+L+1.60S		
Lateral Loads	3.381 psi	80.498 psi
for Load Combination 1: 20D+L+0.20S+E		

Minimum Mn = 1.3 * Fcr * S = 29.083 k-ft

Masonry Beam

Project File: Enercalc_Puyallup Storage.ec6

LIC# : KW-06012482, Build:20.24.09.03 FACET (c) ENERCALC, LLC 1982-2024

DESCRIPTION: HDR7 SDT

Vertical Strength

As - (per bar set at one side of beam) 0.620 in^2
Phi * Mn 79.451 k-ft

Note! Strength uses two bottom bar sets.

Lateral Strength

(Checking lateral bending for span)

As - (all bar sets at one side of beam) 0.620 in^2
Phi * Mn 16.717 k-ft

Note! Strength uses bar set on each side of beam.

Detailed Load Combination Results

Load Combinatic	Vertical				Lateral			
	Mmax k-ft	Mallow k-ft	fv : Vert psi	Fv : Vert psi	Mactual k-ft	Mallow k-ft	fv psi	Fv psi
+1.20D+1.60L	37.16	79.45	49.35	112.09	0.00	16.72	0.00	80.50
+1.20D+1.60L+0.50S	43.55	79.45	55.02	109.15	0.00	16.72	0.00	80.50
+1.20D+L	32.03	79.45	39.76	108.09	0.00	16.72	0.00	80.50
+1.20D+0.50W	24.28	79.45	23.79	106.73	1.21	16.72	1.45	80.50
+1.20D+L+1.60S	52.86	79.45	57.90	106.73	0.00	16.72	0.00	80.50
+1.20D+1.60S+0.50W	45.21	79.45	41.92	106.73	1.21	16.72	1.45	80.50
+1.20D+L+W	32.03	79.45	39.76	108.09	2.42	16.72	2.90	80.50
+1.20D+L+0.50S+W	38.52	79.45	45.43	106.73	2.42	16.72	2.90	80.50
+0.90D+W	18.21	79.45	17.84	106.73	2.42	16.72	2.90	80.50
+1.20D+L+0.20S+E	34.62	79.45	42.03	106.73	2.82	16.72	3.38	80.50
+0.90D+E	18.21	79.45	17.84	106.73	2.82	16.72	3.38	80.50



Date:10/15/2024

Made By:LAO

Project: Puyallup Storage

Description: Bearing Wall Layout

Typ. 2x6 Exterior Wall

Wall Type:Exterior

Wall Load:10psf

LEVEL	DEAD LOAD	LIVE LOAD	ROOF SNOW LOAD	WALL LOAD	TRIB WIDTH	WALL HT	LOAD/ ft	WIND LOAD	Studs	2x6
	psf	psf	psf	psf	ft	ft	plf	psf		
Roof	17.0	0.0	25.0	10.0	12.0	10.5	609	33	2x6 DF Stud 16" o.c.	
Roof	17.0	65.0		10.0	1.0	10.5	731	34	2x6 DF Stud 16" o.c.	

2x6 Interior 12' Wall

Wall Type:Exterior

Wall Load:10psf

LEVEL	DEAD LOAD	LIVE LOAD	Roof SNOW LOAD	WALL LOAD	TRIB WIDTH	WALL HT	LOAD/ ft	WIND LOAD	Studs	2x6
	psf	psf	psf	psf	ft	ft	plf	psf		
Roof	17.0	0.0	25.0	10.0	12.6	10.5	634	33	2x6 DF Stud 16" o.c.	
L2	15.0	65.0	0.0	10.0	9.0	12.0	1249	33	2x6 DF Stud 16" o.c.	

2x6 Interior 15' Wall

Wall Type:Interior

Wall Load:7psf

LEVEL	DEAD LOAD	LIVE LOAD	ROOF SNOW LOAD	WALL LOAD	TRIB WIDTH	WALL HT	LOAD/ ft	WIND LOAD	Studs	2x6
	psf	psf	psf	psf	ft	ft	plf	psf		
Roof	17.0		25.0	10.0	18.0	15.3	909	33	2x6 DF Stud 16" o.c.	

WF1 Loading

Wall Type:Exterior

Wall Load:10psf

LEVEL	DEAD LOAD	LIVE LOAD	ROOF SNOW LOAD	WALL LOAD	TRIB WIDTH	WALL HT	LOAD/ ft	WIND LOAD	Studs	2x6
	psf	psf	psf	psf	ft	ft	plf	psf		
Roof	17.0		25.0	10.0	12.0	6.5	569	33	--	
L1	15.0	65.0		83.0	1.0	15.3	1856	34	--	

Typ. 2x6 Exterior Wall

Loading		
Dead	Live	Roof Snow
309	0	300
431	65	300

2x6 Interior 12' Wall

Loading		
Dead	Live	Roof Snow
319.2	0	315
574.2	585	315

2x6 Interior 15' Wall

Loading		
Dead	Live	Roof Snow
459.3	0	450

WF1 Loading

Loading		
Dead	Live	Roof Snow
269	0	300
1556	65	300

Steel Column

Project File: Enercalc_Puyallup Storage.ec

LIC# : KW-06012482, Build:20.24.10.03

FACET

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: Garage Door Post**Code References**

Calculations per AISC 360-16, IBC 2021, SDPWS 2021

Load Combinations Used : ASCE 7-16

General InformationSteel Section Name : **HSS5x5x1/4**

Analysis Method : Load Resistance Factor
 Steel Stress Grade : A500, Grade B, $F_y = 46$ ksi, Carbon Steel
 F_y : Steel Yield 46.0 ksi
 E : Elastic Bending Modulus 29,000.0 ksi

Overall Column Height 15.0 ft
 Top & Bottom Fixity Top & Bottom Pinned

Brace condition :
 Unbraced Length for buckling ABOUT X-X Axis = 10 ft, $K = 1.0$
 Unbraced Length for buckling ABOUT Y-Y Axis = 10 ft, $K = 1.0$

Applied Loads

Service loads entered. Load Factors will be applied for calculation

Column self weight included : 234.30 lbs * Dead Load Factor

AXIAL LOADS . . .

Axial Load at 15.0 ft, $D = 3.0$ k

BENDING LOADS . . .

C&C Wind Load: Lat. Uniform Load creating M_x -x, $W = 0.1640$ k/ftCMU Seismic Self weight 9' trib: Lat. Uniform Load from 10.0-->15.0 ft creating M_x -x, $E = 0.3150$ k/ftCMU Seismic Self Weight 1'8" Trib: Lat. Uniform Load from 0.0-->10.0 ft creating M_x -x, $E = 0.05840$ k/ft

**POST CAP FASTENER
 CAPACITY = 420LBS *4 =
 1680>1507 DESIGN OK**

DESIGN SUMMARY**Bending & Shear Check Results****PASS** Max. Axial+Bending Stress Ratio =

Load Combination

Location of max.above base

At maximum location values are . . .

 P_u $0.9 * P_n$ M_u -x $0.9 * M_n$ -x : M_u -y $0.9 * M_n$ -y :**0.1898** : 1

+1.20D+W

7.450 ft

3.881 k

137.256 k

4.612 k-ft

26.255 k-ft

0.0 k-ft

26.255 k-ft

Maximum Load Reactions . .

Top along X-X

Bottom along X-X

Top along Y-Y

Bottom along Y-Y

0.0 k

0.0 k

1.507 k

1.230 k

Maximum Load Deflections . . .

Along Y-Y 0.3032 in at
 for load combination E Only

Along X-X 0.0 in at
 for load combination

8.054ft above base

0.0ft above base

PASS Maximum Shear Stress Ratio

Load Combination

Location of max.above base

At maximum location values are . . .

 V_u : Applied $V_n * \Phi$: Allowable**0.03633** : 1

+1.20D+E

15.0 ft

1.507 k

41.488 k

**BASE CONNECTION
 CAPACITY = 1917LBS*2 =
 3834>1230 DESIGN OK**

Load Combination Results

Load Combination	Maximum Axial + Bending Stress Ratios				Cb _x	Cb _y	K _x L _x /R _x	K _y L _y /R _y	Maximum Shear Ratios		
	Stress Ratio	Status	Location						Stress Ratio	Status	Location
+1.20D	0.028	PASS	0.00 ft	1.14	1.00	62.18	62.18	0.000	PASS		0.00 ft
+1.20D+0.50W	0.102	PASS	7.45 ft	1.14	1.00	62.18	62.18	0.015	PASS		0.00 ft
+1.20D+W	0.190	PASS	7.45 ft	1.14	1.00	62.18	62.18	0.030	PASS		0.00 ft
+0.90D+W	0.186	PASS	7.45 ft	1.14	1.00	62.18	62.18	0.030	PASS		0.00 ft
+1.20D+E	0.151	PASS	10.17 ft	1.14	1.00	62.18	62.18	0.036	PASS		15.00 ft
+0.90D+E	0.148	PASS	10.17 ft	1.14	1.00	62.18	62.18	0.036	PASS		15.00 ft

Maximum Reactions

Note: Only non-zero reactions are listed

Load Combination	Axial Reaction		X-X Axis Reaction		k	Y-Y Axis Reaction		M _x - End Moments		M _y - End Moments	
	@ Base		@ Base	@ Top		@ Base	@ Top	@ Base	@ Top	@ Base	@ Top
D Only	3.234										
+D+0.60W	3.234					0.738	0.738				
+D+0.450W	3.234					0.554	0.553				
+0.60D+0.60W	1.941					0.738	0.738				
+D+0.70E	3.234					0.456	1.055				
+D+0.5250E	3.234					0.342	0.791				

Steel Column

Project File: Enercalc_Puyallup Storage.ec

LIC# : KW-06012482, Build:20.24.10.03

FACET

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: Garage Door Post**Maximum Reactions**

Note: Only non-zero reactions are listed

Load Combination	Axial Reaction @ Base	X-X Axis Reaction @ Base @ Top	k	Y-Y Axis Reaction @ Base @ Top	Mx - End Moments @ Base @ Top	k-ft	My - End Moments @ Base @ Top
+0.60D+0.70E	1.941			0.456 1.055			
W Only				1.230 1.230			
E Only				0.652 1.507			

Extreme Reactions

Item	Extreme Value	Axial Reaction @ Base	X-X Axis Reaction @ Base @ Top	k	Y-Y Axis Reaction @ Base @ Top	Mx - End Moments @ Base @ Top	k-ft	My - End Moments @ Base @ Top
Axial @ Base	Maximum	3.234						
"	Minimum				1.230 1.230			
Reaction, X-X Axis Base	Maximum	3.234						
"	Minimum	3.234						
Reaction, Y-Y Axis Base	Maximum				1.230 1.230			
"	Minimum	3.234						
Reaction, X-X Axis Top	Maximum	3.234						
"	Minimum	3.234						
Reaction, Y-Y Axis Top	Maximum	3.234						
"	Minimum	3.234						
Moment, X-X Axis Base	Maximum	3.234						
"	Minimum	3.234						
Moment, Y-Y Axis Base	Maximum	3.234						
"	Minimum	3.234						
Moment, X-X Axis Top	Maximum	3.234						
"	Minimum	3.234						
Moment, Y-Y Axis Top	Maximum	3.234						
"	Minimum	3.234						

Maximum Deflections for Load Combinations

Load Combination	Max. Deflection in X dir	Distance	Max. Deflection in Y dir	Distance
D Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.420W	0.0000 in	0.000 ft	0.171 in	7.550 ft
+0.60D+0.420W	0.0000 in	0.000 ft	0.171 in	7.550 ft
+D+0.70E	0.0000 in	0.000 ft	0.212 in	8.054 ft
+D+0.5250E	0.0000 in	0.000 ft	0.159 in	8.054 ft
+0.60D+0.70E	0.0000 in	0.000 ft	0.212 in	8.054 ft
+0.420W	0.0000 in	0.000 ft	0.171 in	7.550 ft
E Only	0.0000 in	0.000 ft	0.303 in	8.054 ft

Steel Section Properties : HSS5x5x1/4

Depth	=	5.000 in	I xx	=	16.00 in^4	J	=	25.800 in^4
Design Thick	=	0.233 in	S xx	=	6.41 in^3			
Width	=	5.000 in	R xx	=	1.930 in			
Wall Thick	=	0.250 in	Zx	=	7.610 in^3			
Area	=	4.300 in^2	I yy	=	16.000 in^4	C	=	10.500 in^3
Weight	=	15.620 plf	S yy	=	6.410 in^3			
			R yy	=	1.930 in			

Ycg = 0.000 in

Steel Column

Project File: Enercalc_Puyallup Storage.ec

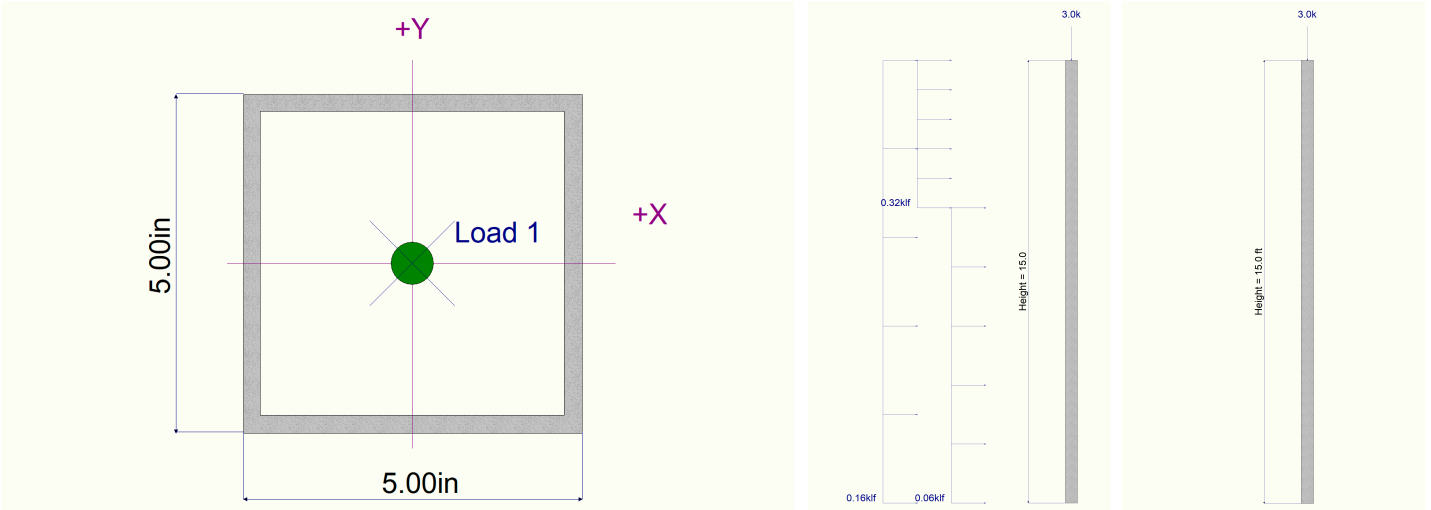
LIC# : KW-06012482, Build:20.24.10.03

FACET

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DESCRIPTION: Garage Door Post

Sketches



Wood Column

Project File: Enercalc_Puyallup Storage.ec

LIC# : KW-06012482, Build:20.24.09.03

FACET

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: 2x6 at 12" O.C. Stud Wall - Exterior - 30 psf Uniform Wind Load - 3.2 k/ft Cap.**Code References**

Calculations per NDS 2018, IBC 2021, SDPWS 2021

Load Combinations Used : ASCE 7-16

General Information

Analysis Method :	Allowable Stress Design			Wood Section Name	2x6		
End Fixities	Top & Bottom Pinned			Wood Grading/Manuf.	Graded Lumber		
Overall Column Height	10.0 ft			Wood Member Type	Sawn		
(Used for non-slender calculations)				Exact Width	1.50 in	Allow Stress Modification Factors	
Wood Species	Douglas Fir-Larch			Exact Depth	5.50 in	Cf or Cv for Bending	1.0
Wood Grade	Stud			Area	8.250 in^2	Cf or Cv for Compression	1.0
Fb +	700 psi	Fv	180 psi	Ix	20.797 in^4	Cf or Cv for Tension	1.0
Fb -	700 psi	Ft	450 psi	Iy	1.547 in^4	Cm : Wet Use Factor	1.0
Fc - Prll	850 psi	Density	31.21 pcf			Ct : Temperature Fact	1.0
Fc - Perp	625 psi					Cfu : Flat Use Factor	1.0
E : Modulus of Elasticity . . .	x-x Bending	y-y Bending	Axial			Kf : Built-up columns	1.0
	Basic	1400	1400	1400 ksi		Use Cr : Repetitive ?	No
	Minimum	510	510				
Column Buckling Condition:							
ABOUT X-X Axis: Lux = 10.0 ft, Kx = 1.0							
Fully braced against buckling ABOUT Y-Y Axis							

Applied Loads

Service loads entered. Load Factors will be applied for calculation

Column self weight included : 17.881 lbs * Dead Load Factor

AXIAL LOADS . . .

Axial Load at 10.0 ft, D = 3.20 k

BENDING LOADS . . .

Lat. Uniform Load creating Mx-x, W = 0.030 k/ft

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.990 : 1**

Load Combination +D+0.60W

Governing NDS Forumla Comp + Mxx, NDS Eq. 3.9-3

Location of max.above base 4.966 ft

At maximum location values are . .

Applied Axial 3.218 k

Applied Mx 0.2250 k-ft

Applied My 0.0 k-ft

Fc : Allowable 719.21 psi

PASS Maximum Shear Stress Ratio = **0.05682 : 1**

Load Combination +D+0.60W

Location of max.above base 10.0 ft

Applied Design Shear 24.545 psi

Allowable Shear 288.0 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y 0.150 k Bottom along Y-Y 0.150 k

Top along X-X 0.0 k Bottom along X-X 0.0 k

Maximum SERVICE Load Lateral Deflections . . .

Along Y-Y 0.2343 in at 5.034 ft above base

for load combination W Only

Along X-X 0.0 in at 0.0 ft above base

for load combination n/a

Other Factors used to calculate allowable stresses . . .Bending Compression Tension**Load Combination Results**

Load Combination	C _D	C _P	Maximum Axial + Bending Stress Ratios			Maximum Shear Ratios		
			Stress Ratio	Status	Location	Stress Ratio	Status	Location
D Only	0.900	0.737	0.6915	PASS	0.0 ft	0.0	PASS	10.0 ft
+D+0.60W	1.600	0.529	0.990	PASS	4.966 ft	0.05682	PASS	10.0 ft
+D+0.450W	1.600	0.529	0.8160	PASS	5.034 ft	0.04261	PASS	10.0 ft
+0.60D+0.60W	1.600	0.529	0.6339	PASS	5.034 ft	0.05682	PASS	10.0 ft
+0.60D	1.600	0.529	0.3254	PASS	0.0 ft	0.0	PASS	10.0 ft

Wood Column

Project File: Enercalc_Puyallup Storage.ec

LIC# : KW-06012482, Build:20.24.09.03

FACET

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DESCRIPTION: 2x6 at 12" O.C. Stud Wall - Exterior - 30 psf Uniform Wind Load - 3.2 k/ft Cap.

Maximum Reactions

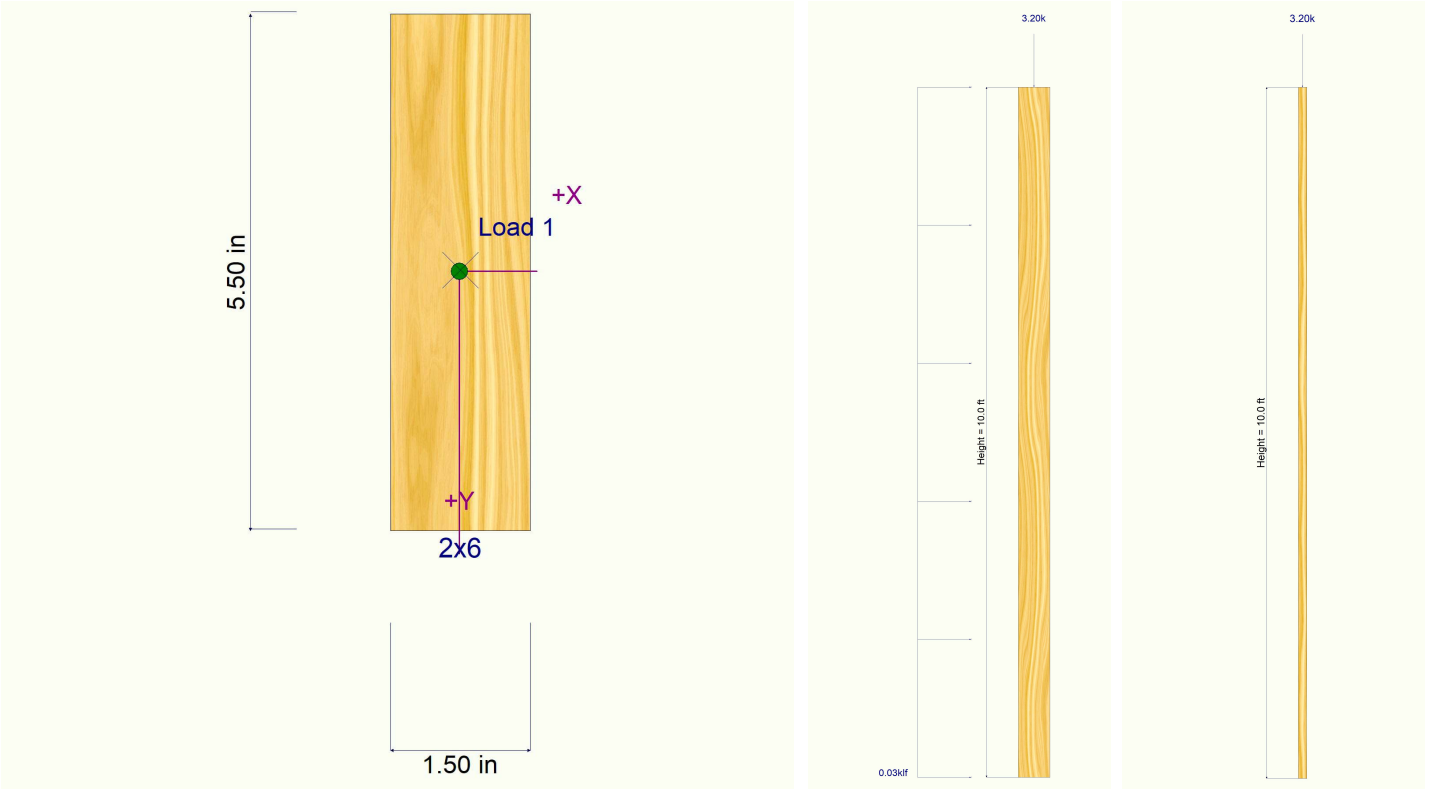
Note: Only non-zero reactions are listed

Load Combination	X-X Axis Reaction		k	Y-Y Axis Reaction		Axial Reaction	My - End Moments		Mx - End Moments	
	@ Base	@ Top		@ Base	@ Top	@ Base	@ Base	@ Top	@ Base	@ Top
D Only						3.218				
+D+0.60W				0.090	0.090	3.218				
+D+0.450W				0.068	0.068	3.218				
+0.60D+0.60W				0.090	0.090	1.931				
+0.60D						1.931				
W Only				0.150	0.150					

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
D Only	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+0.60W	0.0000 in	0.000ft	0.141 in	5.034 ft
+D+0.450W	0.0000 in	0.000ft	0.105 in	5.034 ft
+0.60D+0.60W	0.0000 in	0.000ft	0.141 in	5.034 ft
+0.60D	0.0000 in	0.000ft	0.000 in	0.000 ft
W Only	0.0000 in	0.000ft	0.234 in	5.034 ft

Sketches



Wood Column

Project File: Enercalc_Puyallup Storage.ec

LIC#: KW-06012482, Build:20.24.09.03

FACET

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DESCRIPTION: Interior 2x6 at 12" O.C. Stud Wall - Exterior - 5 psf Uniform Wind Load - 2.3 k/ft Cap.**Code References**

Calculations per NDS 2018, IBC 2021, SDPWS 2021

Load Combinations Used : ASCE 7-16

General Information

Analysis Method :		Allowable Stress Design		Wood Section Name		2x6	
End Fixities		Top & Bottom Pinned		Wood Grading/Manuf.		Graded Lumber	
Overall Column Height		15 ft		Wood Member Type		Sawn	
(Used for non-slender calculations)							
Wood Species		Douglas Fir-Larch		Exact Width		1.50 in	
Wood Grade		Stud		Exact Depth		5.50 in	
Fb +		700.0 psi	Fv	180.0 psi	Area	8.250 in^2	Allow Stress Modification Factors
Fb -		700.0 psi	Ft	450.0 psi	Ix	20.797 in^4	Cf or Cv for Bending
Fc - Prll		850.0 psi	Density	31.210 pcf	Iy	1.547 in^4	Cf or Cv for Compression
Fc - Perp		625.0 psi					Cf or Cv for Tension
E : Modulus of Elasticity . . .		x-x Bending	y-y Bending	Axial			Cm : Wet Use Factor
Basic		1,400.0	1,400.0	1,400.0 ksi			Ct : Temperature Fact
Minimum		510.0	510.0				Cfu : Flat Use Factor
							Cf : Built-up columns
							Use Cr : Repetitive ?
							No
Column Buckling Condition:							
ABOUT X-X Axis: Lux = 15 ft, Kx = 1.0							
Fully braced against buckling ABOUT Y-Y Axis							

Applied Loads

Service loads entered. Load Factors will be applied for calculation

Column self weight included : 26.821 lbs * Dead Load Factor

AXIAL LOADS . . .

Axial Load at 15.0 ft, D = 2.10 k

BENDING LOADS . . .

Lat. Uniform Load creating Mx-x, W = 0.0050 k/ft

DESIGN SUMMARY**Bending & Shear Check Results**

PASS Max. Axial+Bending Stress Ratio = **0.9256 : 1**

Load Combination +D+0.60W

Governing NDS Forumla Comp + Mxx, NDS Eq. 3.9-3

Location of max.above base 7.450 ft

At maximum location values are . .

Applied Axial 2.127 k

Applied Mx 0.08437 k-ft

Applied My 0.0 k-ft

Fc : Allowable 364.678 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y	0.03750 k	Bottom along Y-Y	0.03750 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

Maximum SERVICE Load Lateral Deflections . .

Along Y-Y	0.1977 in	at	7.550 ft	above base
for load combination W Only				
Along X-X	0.0 in	at	0.0 ft	above base
for load combination n/a				

Other Factors used to calculate allowable stresses . .

<u>Bending</u>	<u>Compression</u>	<u>Tension</u>
----------------	--------------------	----------------

PASS Maximum Shear Stress Ratio = **0.01421 : 1**

Load Combination +D+0.60W

Location of max.above base 0.0 ft

Applied Design Shear 6.136 psi

Allowable Shear 288.0 psi

Load Combination Results

Load Combination	C _D	C _P	Maximum Axial + Bending Stress Ratios			Maximum Shear Ratios		
			Stress Ratio	Status	Location	Stress Ratio	Status	Location
D Only	0.900	0.442	0.7629	PASS	0.0 ft	0.0	PASS	15.0 ft
+D+0.60W	1.600	0.268	0.9256	PASS	7.450 ft	0.01421	PASS	0.0 ft
+D+0.450W	1.600	0.268	0.8191	PASS	7.450 ft	0.01065	PASS	0.0 ft
+0.60D+0.60W	1.600	0.268	0.4381	PASS	7.450 ft	0.01421	PASS	0.0 ft
+0.60D	1.600	0.268	0.4241	PASS	0.0 ft	0.0	PASS	15.0 ft

Wood Column

Project File: Enercalc_Puyallup Storage.ec

LIC# : KW-06012482, Build:20.24.09.03

FACET

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: Interior 2x6 at 12" O.C. Stud Wall - Exterior - 5 psf Uniform Wind Load - 2.3 k/ft Cap.

Maximum Reactions

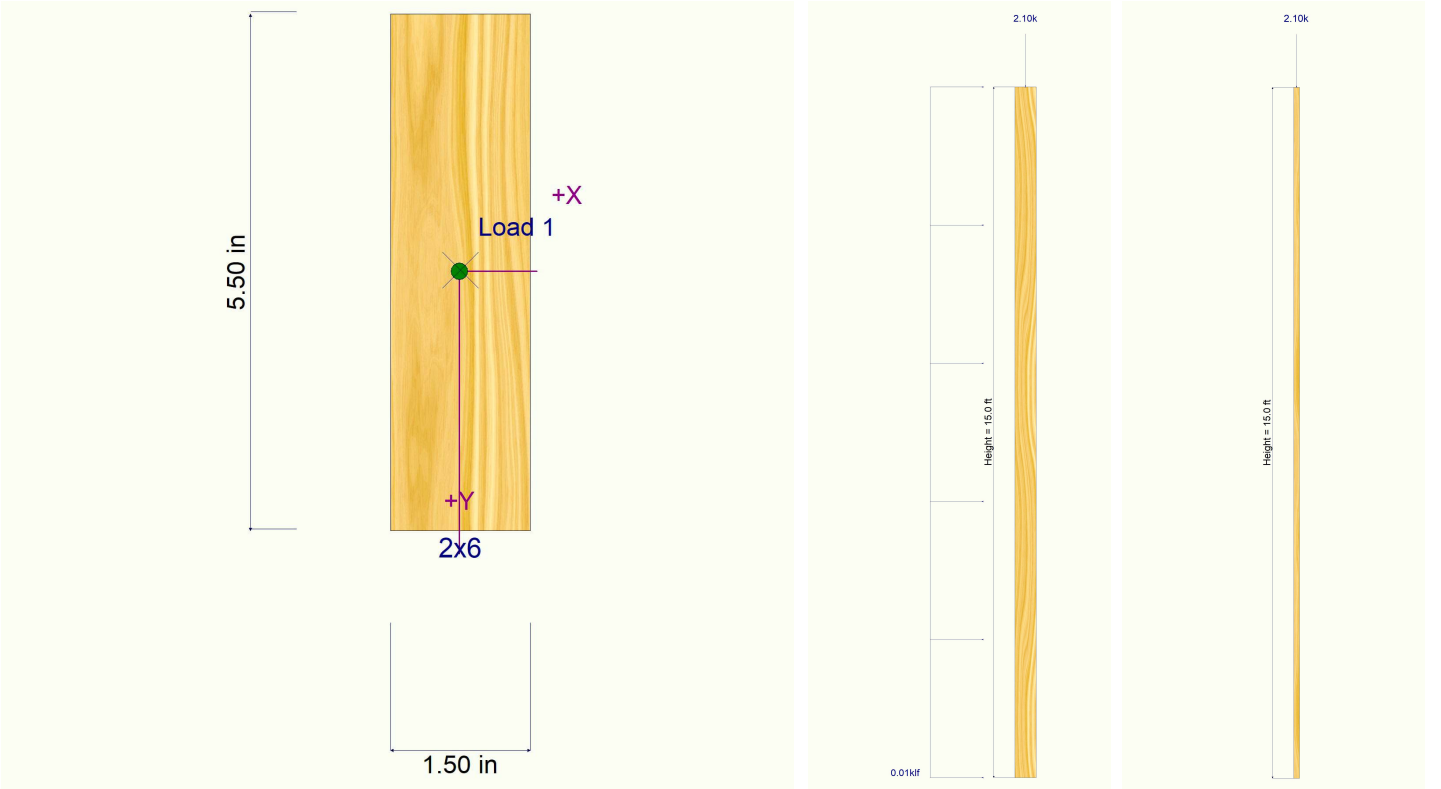
Note: Only non-zero reactions are listed

Load Combination	X-X Axis Reaction		k	Y-Y Axis Reaction		Axial Reaction	My - End Moments		k-ft	Mx - End Moments	
	@ Base	@ Top		@ Base	@ Top		@ Base	@ Top		@ Base	@ Top
D Only						2.127					
+D+0.60W				0.023	0.022	2.127					
+D+0.450W				0.017	0.017	2.127					
+0.60D+0.60W				0.023	0.022	1.276					
+0.60D						1.276					
W Only				0.038	0.037						

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
D Only	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+0.60W	0.0000 in	0.000ft	0.119 in	7.550 ft
+D+0.450W	0.0000 in	0.000ft	0.089 in	7.550 ft
+0.60D+0.60W	0.0000 in	0.000ft	0.119 in	7.550 ft
+0.60D	0.0000 in	0.000ft	0.000 in	0.000 ft
W Only	0.0000 in	0.000ft	0.198 in	7.550 ft

Sketches



Wood Column

Project File: Enercalc_Puyallup Storage.ec

LIC# : KW-06012482, Build:20.24.09.03

FACET

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: (1)2x6 Stud Post - 3.8k Max Cap.**Code References**

Calculations per NDS 2018, IBC 2021, SDPWS 2021
 Load Combinations Used : ASCE 7-16

General Information

Analysis Method :	Allowable Stress Design			Wood Section Name	2x6	
End Fixities	Top & Bottom Pinned			Wood Grading/Manuf.	Graded Lumber	
Overall Column Height	12 ft			Wood Member Type	Sawn	
(Used for non-slender calculations)						
Wood Species	Douglas Fir-Larch			Exact Width	1.50 in	Allow Stress Modification Factors
Wood Grade	Stud			Exact Depth	5.50 in	Cf or Cv for Bending 1.0
Fb +	700 psi	Fv	180 psi	Area	8.250 in^2	Cf or Cv for Compression 1.0
Fb -	700 psi	Ft	450 psi	Ix	20.797 in^4	Cf or Cv for Tension 1.0
Fc - Prll	850 psi	Density	31.21 pcf	Iy	1.547 in^4	Cm : Wet Use Factor 1.0
Fc - Perp	625 psi					Ct : Temperature Fact 1.0
E : Modulus of Elasticity . . .	x-x Bending	y-y Bending	Axial			Cfu : Flat Use Factor 1.0
	Basic	1400	1400	1400 ksi		Kf : Built-up columns 1.0
	Minimum	510	510			Use Cr : Repetitive ? No
Column Buckling Condition:						
ABOUT X-X Axis: Lux = 12 ft, Kx = 1.0						
Fully braced against buckling ABOUT Y-Y Axis						

Applied Loads

Service loads entered. Load Factors will be applied for calculation

Column self weight included : 21.457 lbs * Dead Load Factor

AXIAL LOADS . . .

Axial Load at 12.0 ft, D = 3.80 k

DESIGN SUMMARY**Bending & Shear Check Results****PASS** Max. Axial+Bending Stress Ratio = **0.9937 : 1**

Load Combination	D Only
Governing NDS Formula	Comp Only, f_c/F_c'
Location of max.above base	0.0 ft
At maximum location values are . .	
Applied Axial	3.821 k
Applied Mx	0.0 k-ft
Applied My	0.0 k-ft
Fc : Allowable	466.147 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

Maximum SERVICE Load Lateral Deflections . . .

Along Y-Y	0.0 in	at	0.0 ft	above base
for load combination	n/a			
Along X-X	0.0 in	at	0.0 ft	above base
for load combination	n/a			

Other Factors used to calculate allowable stresses . . .**Bending** **Compression** **Tension****PASS** Maximum Shear Stress Ratio = **0.0 : 1**

Load Combination	+0.60D
Location of max.above base	12.0 ft
Applied Design Shear	0.0 psi
Allowable Shear	288.0 psi

Load Combination Results

Load Combination	C _D	C _P	Maximum Axial + Bending Stress Ratios			Maximum Shear Ratios		
			Stress Ratio	Status	Location	Stress Ratio	Status	Location
D Only	0.900	0.609	0.9937	PASS	0.0 ft	0.0	PASS	12.0 ft
+0.60D	1.600	0.397	0.5144	PASS	0.0 ft	0.0	PASS	12.0 ft

Maximum Reactions

Note: Only non-zero reactions are listed

Load Combination	X-X Axis Reaction		k	Y-Y Axis Reaction		Axial Reaction	My - End Moments		Mx - End Moments	
	@ Base	@ Top		@ Base	@ Top		@ Base	@ Top	@ Base	@ Top
D Only						3.821				
+0.60D						2.293				

Wood Column

LIC# : KW-06012482, Build:20.24.09.03

Project File: Enercalc_Puyallup Storage.ec

FACET

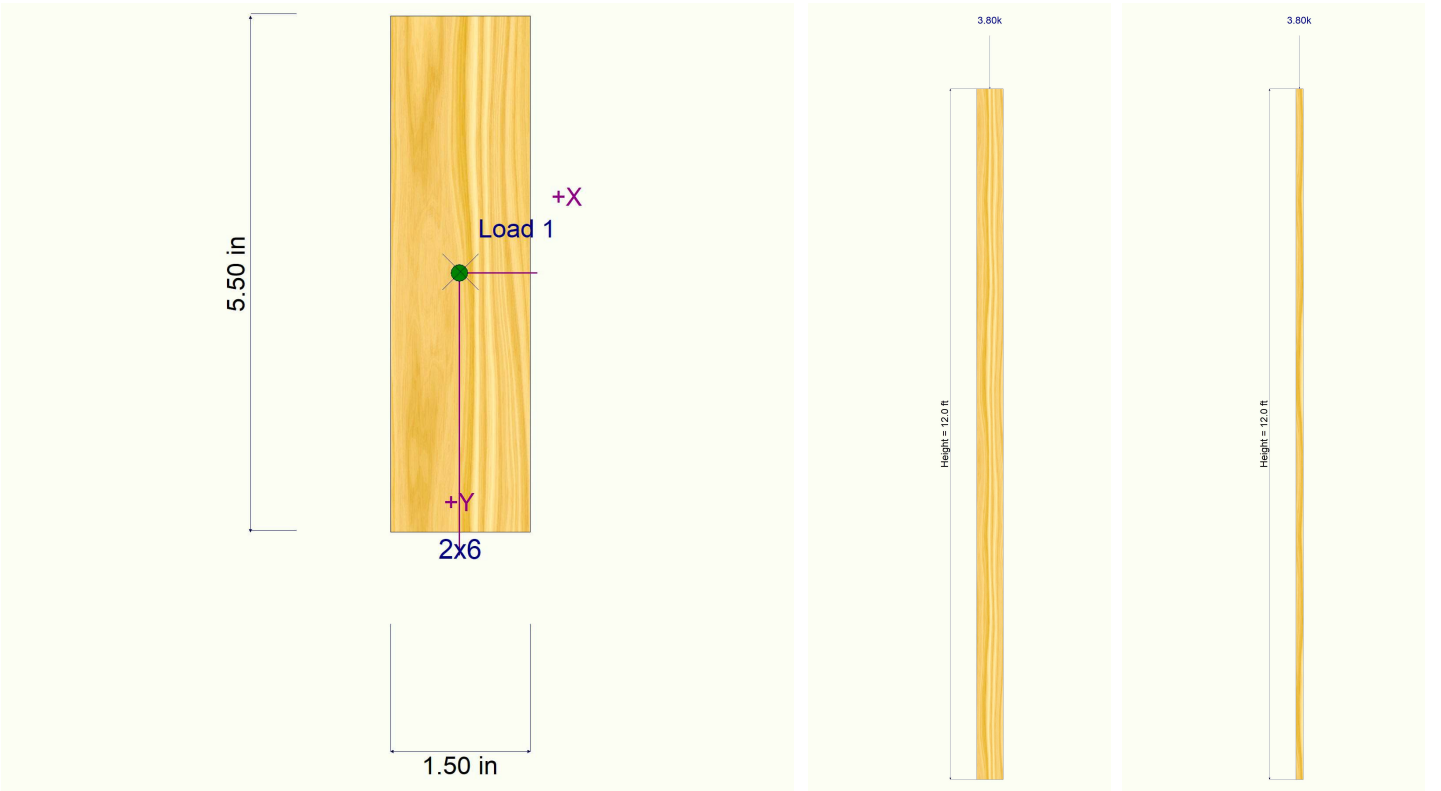
(c) ENERCALC, LLC 1982-2024

DESCRIPTION: (1)2x6 Stud Post - 3.8k Max Cap.

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
D Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
+0.60D	0.0000 in	0.000 ft	0.000 in	0.000 ft

Sketches



Wood Column

Project File: Enercalc_Puyallup Storage.ec

LIC# : KW-06012482, Build:20.24.09.03

FACET

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: (2)2x6 Multi-Stud Post - 7.6k Max Cap.**Code References**

Calculations per NDS 2018, IBC 2021, SDPWS 2021

Load Combinations Used : ASCE 7-16

General Information

Analysis Method :		Allowable Stress Design		Wood Section Name		2-2x6	
End Fixities		Top & Bottom Pinned		Wood Grading/Manuf.		Graded Lumber	
Overall Column Height		12 ft		Wood Member Type		Sawn	
(Used for non-slender calculations)							
Wood Species		Douglas Fir-Larch		Exact Width		3.0 in	
Wood Grade		Stud		Exact Depth		5.50 in	
Fb +		700.0 psi	Fv	180.0 psi	Area	16.50 in^2	Allow Stress Modification Factors
Fb -		700.0 psi	Ft	450.0 psi	Ix	41.594 in^4	Cf or Cv for Bending
Fc - Prll		850.0 psi	Density	31.210 pcf	Iy	12.375 in^4	Cf or Cv for Compression
Fc - Perp		625.0 psi					Cf or Cv for Tension
E : Modulus of Elasticity . . .		x-x Bending	y-y Bending	Axial			Cm : Wet Use Factor
Basic		1,400.0	1,400.0	1,400.0 ksi			Ct : Temperature Fact
Minimum		510.0	510.0				Cfu : Flat Use Factor
				Column Buckling Condition:			Kf : Built-up columns
				ABOUT X-X Axis: Lux = 12 ft, Kx = 1.0			Use Cr : Repetitive ?
				Fully braced against buckling ABOUT Y-Y Axis			No

Applied Loads

Service loads entered. Load Factors will be applied for calculation

Column self weight included : 42.914 lbs * Dead Load Factor

AXIAL LOADS . . .

Axial Load at 12.0 ft, D = 7.60 k

DESIGN SUMMARY**Bending & Shear Check Results****PASS** Max. Axial+Bending Stress Ratio = **0.9937 : 1**

Load Combination	D Only
Governing NDS Formula	Comp Only, f_c/F_c'
Location of max.above base	0.0 ft
At maximum location values are . .	
Applied Axial	7.643 k
Applied Mx	0.0 k-ft
Applied My	0.0 k-ft
Fc : Allowable	466.147 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

Maximum SERVICE Load Lateral Deflections . . .

Along Y-Y	0.0 in	at	0.0 ft	above base
for load combination	n/a			
Along X-X	0.0 in	at	0.0 ft	above base
for load combination	n/a			

Other Factors used to calculate allowable stresses . . .**Bending** **Compression** **Tension****PASS** Maximum Shear Stress Ratio = **0.0 : 1**

Load Combination	+0.60D
Location of max.above base	12.0 ft
Applied Design Shear	0.0 psi
Allowable Shear	288.0 psi

Load Combination Results

Load Combination	C _D	C _P	Maximum Axial + Bending Stress Ratios			Maximum Shear Ratios		
			Stress Ratio	Status	Location	Stress Ratio	Status	Location
D Only	0.900	0.609	0.9937	PASS	0.0 ft	0.0	PASS	12.0 ft
+0.60D	1.600	0.397	0.5144	PASS	0.0 ft	0.0	PASS	12.0 ft

Maximum Reactions

Note: Only non-zero reactions are listed

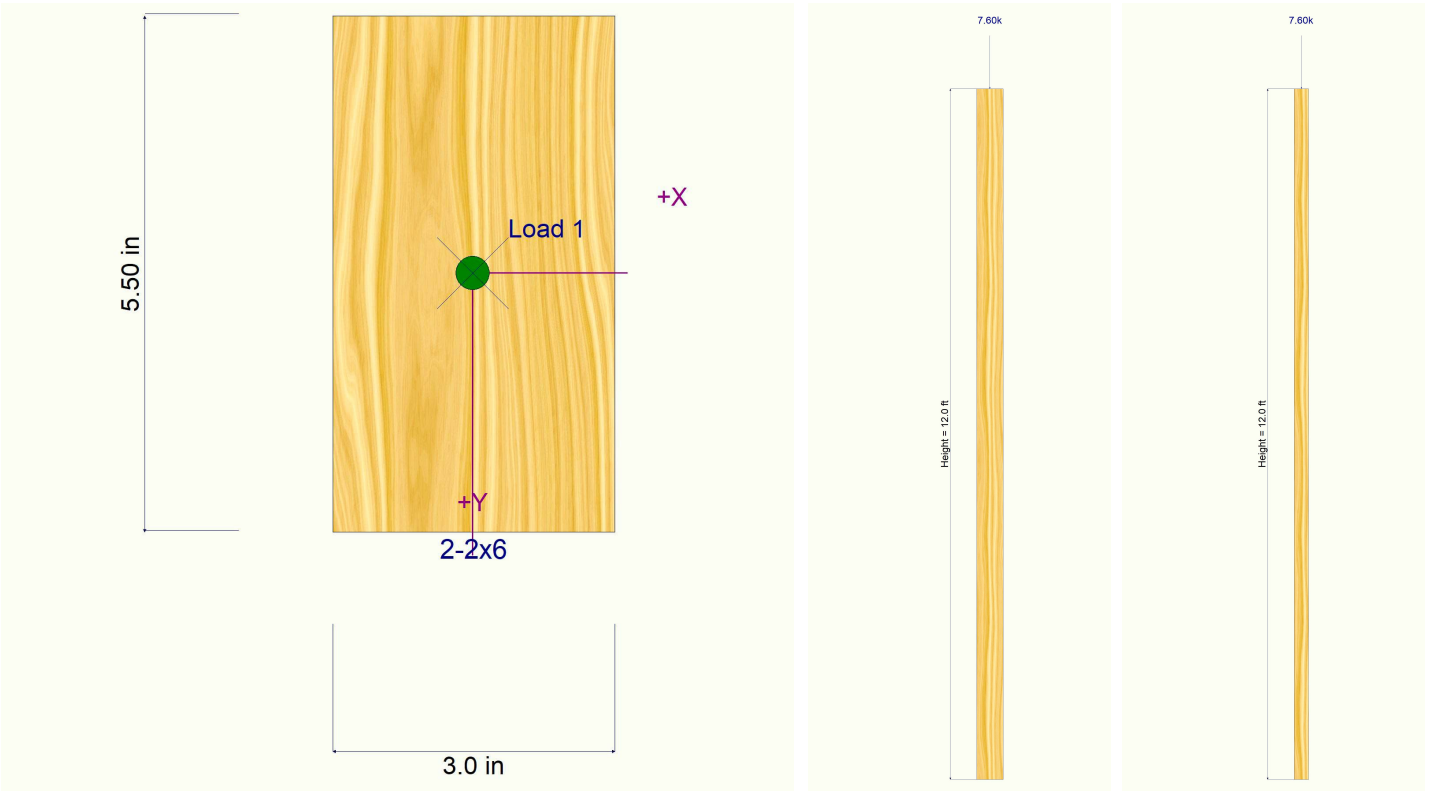
Load Combination	X-X Axis Reaction		k	Y-Y Axis Reaction		Axial Reaction	My - End Moments		k-ft	Mx - End Moments	
	@ Base	@ Top		@ Base	@ Top		@ Base	@ Top		@ Base	@ Top
D Only						7.643					
+0.60D						4.586					

DESCRIPTION: (2)2x6 Multi-Stud Post - 7.6k Max Cap.

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
D Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
+0.60D	0.0000 in	0.000 ft	0.000 in	0.000 ft

Sketches



Wood Column

Project File: Enercalc_Puyallup Storage.ec

LIC#: KW-06012482, Build:20.24.09.03

FACET

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: (3)2x6 Multi-Stud Post - 11.4k Max Cap.**Code References**

Calculations per NDS 2018, IBC 2021, SDPWS 2021
Load Combinations Used : ASCE 7-16

General Information

Analysis Method :		Allowable Stress Design		Wood Section Name		3-2x6	
End Fixities		Top & Bottom Pinned		Wood Grading/Manuf.		Graded Lumber	
Overall Column Height		12 ft		Wood Member Type		Sawn	
(Used for non-slender calculations)							
Wood Species		Douglas Fir-Larch		Exact Width		4.50 in	
Wood Grade		Stud		Exact Depth		5.50 in	
Fb +		700.0 psi	Fv	180.0 psi	Area	24.750 in^2	Allow Stress Modification Factors
Fb -		700.0 psi	Ft	450.0 psi	Ix	62.391 in^4	Cf or Cv for Bending
Fc - Prll		850.0 psi	Density	31.210 pcf	Iy	41.766 in^4	Cf or Cv for Compression
Fc - Perp		625.0 psi					Cf or Cv for Tension
E : Modulus of Elasticity . . .		x-x Bending	y-y Bending	Axial			Cm : Wet Use Factor
Basic		1,400.0	1,400.0	1,400.0 ksi			Ct : Temperature Fact
Minimum		510.0	510.0				Cfu : Flat Use Factor
				Column Buckling Condition:			Cf or Cv for Compression
				ABOUT X-X Axis: Lux = 12 ft, Kx = 1.0			Ct : Temperature Fact
				Fully braced against buckling ABOUT Y-Y Axis			Cfu : Flat Use Factor
							Kf : Built-up columns
							Use Cr : Repetitive ?
							No

Applied Loads

Service loads entered. Load Factors will be applied for calculation

Column self weight included : 64.371 lbs * Dead Load Factor

AXIAL LOADS . . .

Axial Load at 12.0 ft, D = 11.40 k

DESIGN SUMMARY**Bending & Shear Check Results**

PASS Max. Axial+Bending Stress Ratio = **0.9937 : 1**
 Load Combination D Only
 Governing NDS Formula Comp Only, f_c/F_c'
 Location of max.above base 0.0 ft
 At maximum location values are . .
 Applied Axial 11.464 k
 Applied Mx 0.0 k-ft
 Applied My 0.0 k-ft
 Fc : Allowable 466.147 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

Maximum SERVICE Load Lateral Deflections . . .

Along Y-Y	0.0 in	at	0.0 ft	above base
for load combination	n/a			
Along X-X	0.0 in	at	0.0 ft	above base
for load combination	n/a			

Other Factors used to calculate allowable stresses . . .

Bending	Compression	Tension
---------	-------------	---------

PASS Maximum Shear Stress Ratio = **0.0 : 1**
 Load Combination +0.60D
 Location of max.above base 12.0 ft
 Applied Design Shear 0.0 psi
 Allowable Shear 288.0 psi

Load Combination Results

Load Combination	C _D	C _P	Maximum Axial + Bending Stress Ratios			Maximum Shear Ratios		
			Stress Ratio	Status	Location	Stress Ratio	Status	Location
D Only	0.900	0.609	0.9937	PASS	0.0 ft	0.0	PASS	12.0 ft
+0.60D	1.600	0.397	0.5144	PASS	0.0 ft	0.0	PASS	12.0 ft

Maximum Reactions

Note: Only non-zero reactions are listed

Load Combination	X-X Axis Reaction		k	Y-Y Axis Reaction		Axial Reaction	My - End Moments		k-ft	Mx - End Moments	
	@ Base	@ Top		@ Base	@ Top		@ Base	@ Top		@ Base	@ Top
D Only						11.464					
+0.60D						6.879					

DESCRIPTION: (3)2x6 Multi-Stud Post - 11.4k Max Cap.

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
D Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
+0.60D	0.0000 in	0.000 ft	0.000 in	0.000 ft

Sketches



Wood Column

Project File: Enercalc_Puyallup Storage.ec

LIC# : KW-06012482, Build:20.24.09.03

FACET

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: (4)2x6 Multi-Stud Post - 19.4k Max Cap.**Code References**

Calculations per NDS 2018, IBC 2021, SDPWS 2021

Load Combinations Used : ASCE 7-16

General Information

Analysis Method :		Allowable Stress Design		Wood Section Name	4-2x6	
End Fixities		Top & Bottom Pinned		Wood Grading/Manuf.	Graded Lumber	
Overall Column Height		12 ft		Wood Member Type	Sawn	
(Used for non-slender calculations)						
Wood Species	Douglas Fir-Larch (North)			Exact Width	6.0 in	Allow Stress Modification Factors
Wood Grade	Construction			Exact Depth	5.50 in	
Fb +	950.0 psi	Fv	180.0 psi	Area	33.0 in^2	Cf or Cv for Bending 1.0
Fb -	950.0 psi	Ft	575.0 psi	Ix	83.188 in^4	Cf or Cv for Compression 1.0
Fc - Prll	1,800.0 psi	Density	30.590 pcf	Iy	99.0 in^4	Cf or Cv for Tension 1.0
Fc - Perp	625.0 psi					Cm : Wet Use Factor 1.0
E : Modulus of Elasticity . . .		x-x Bending	y-y Bending	Axial		Ct : Temperature Fact 1.0
	Basic	1,500.0	1,500.0	1,500.0 ksi		Cfu : Flat Use Factor 1.0
	Minimum	550.0	550.0			Kf : Built-up columns 1.0
				Column Buckling Condition:		Use Cr : Repetitive ? No
				ABOUT X-X Axis: Lux = 12 ft, Kx = 1.0		
				Fully braced against buckling ABOUT Y-Y Axis		

Applied Loads

Service loads entered. Load Factors will be applied for calculation

Column self weight included : 84.123 lbs * Dead Load Factor

AXIAL LOADS . . .

Axial Load at 12.0 ft, D = 19.40 k

DESIGN SUMMARY**Bending & Shear Check Results**

PASS Max. Axial+Bending Stress Ratio = **0.9982 : 1**

Load Combination D Only

Governing NDS Formula Comp Only, f_c/F_c'

Location of max.above base 0.0 ft

At maximum location values are . .

Applied Axial 19.484 k

Applied Mx 0.0 k-ft

Applied My 0.0 k-ft

Fc : Allowable 591.50 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y 0.0 k Bottom along Y-Y 0.0 k

Top along X-X 0.0 k Bottom along X-X 0.0 k

Maximum SERVICE Load Lateral Deflections . . .

Along Y-Y 0.0 in at 0.0 ft above base

for load combination n/a

Along X-X 0.0 in at 0.0 ft above base

for load combination n/a

Other Factors used to calculate allowable stresses . . .

Bending Compression Tension

PASS Maximum Shear Stress Ratio = **0.0 : 1**

Load Combination +0.60D

Location of max.above base 12.0 ft

Applied Design Shear 0.0 psi

Allowable Shear 288.0 psi

Load Combination Results

Load Combination	C _D	C _P	Maximum Axial + Bending Stress Ratios			Maximum Shear Ratios		
			Stress Ratio	Status	Location	Stress Ratio	Status	Location
D Only	0.900	0.365	0.9982	PASS	0.0 ft	0.0	PASS	12.0 ft
+0.60D	1.600	0.217	0.5669	PASS	0.0 ft	0.0	PASS	12.0 ft

Maximum Reactions

Note: Only non-zero reactions are listed

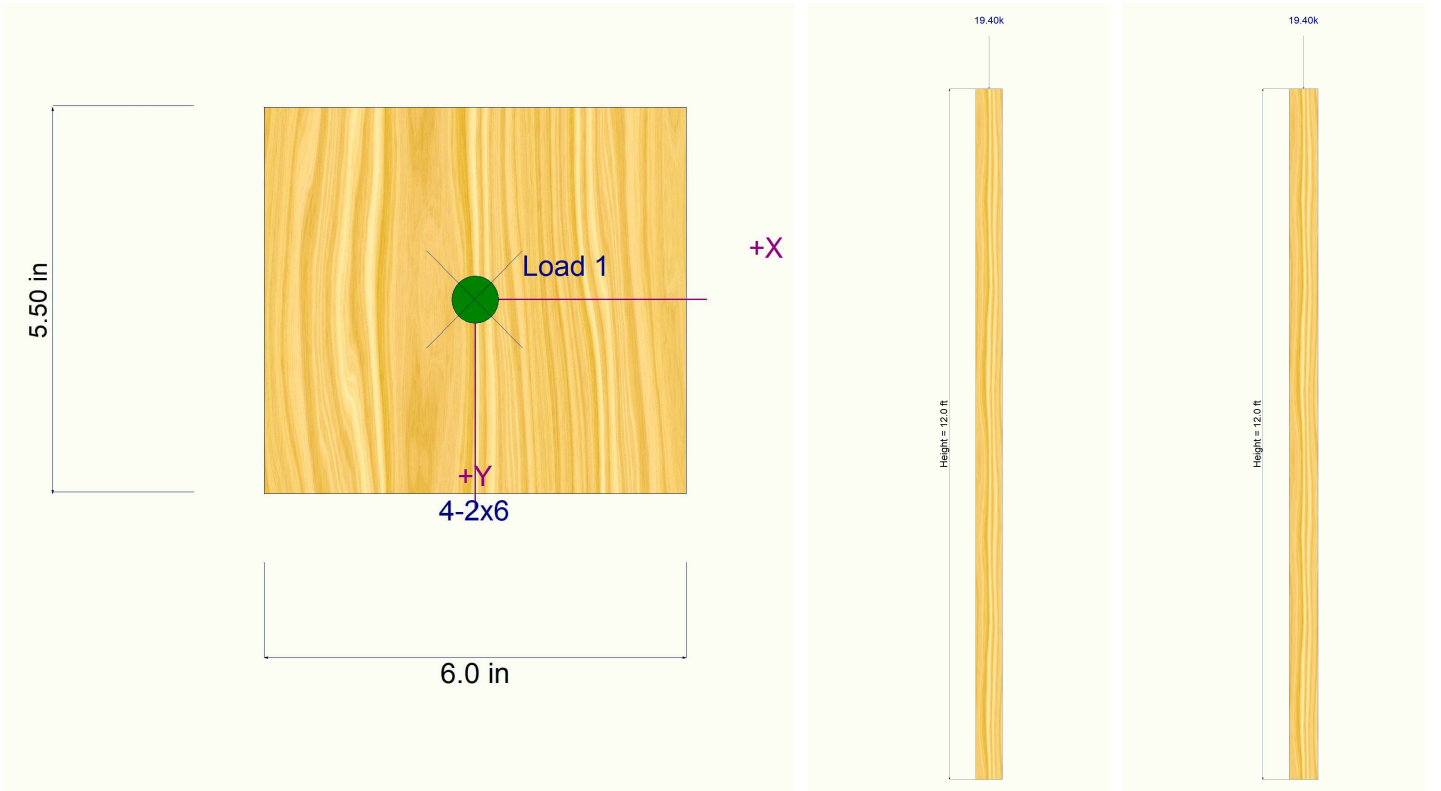
Load Combination	X-X Axis Reaction		k	Y-Y Axis Reaction		Axial Reaction	My - End Moments		Mx - End Moments	
	@ Base	@ Top		@ Base	@ Top		@ Base	@ Top	@ Base	@ Top
D Only						19.484				
+0.60D						11.690				

DESCRIPTION: (4)2x6 Multi-Stud Post - 19.4k Max Cap.

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
D Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
+0.60D	0.0000 in	0.000 ft	0.000 in	0.000 ft

Sketches



Wood Column

Project File: Enercalc_Puyallup Storage.ec

LIC# : KW-06012482, Build:20.24.09.03

FACET

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: (1)2x6 Stud Post 15' - 2.75k Max Cap.**Code References**

Calculations per NDS 2018, IBC 2021, SDPWS 2021
 Load Combinations Used : ASCE 7-16

General Information

Analysis Method :		Allowable Stress Design		Wood Section Name	2x6	
End Fixities		Top & Bottom Pinned		Wood Grading/Manuf.	Graded Lumber	
Overall Column Height		15 ft		Wood Member Type	Sawn	
(Used for non-slender calculations)						
Wood Species	Douglas Fir-Larch			Exact Width	1.50 in	Allow Stress Modification Factors
Wood Grade	Stud			Exact Depth	5.50 in	Cf or Cv for Bending 1.0
Fb +	700.0 psi	Fv	180.0 psi	Area	8.250 in^2	Cf or Cv for Compression 1.0
Fb -	700.0 psi	Ft	450.0 psi	Ix	20.797 in^4	Cf or Cv for Tension 1.0
Fc - Prll	850.0 psi	Density	31.210 pcf	Iy	1.547 in^4	Cm : Wet Use Factor 1.0
Fc - Perp	625.0 psi					Ct : Temperature Fact 1.0
E : Modulus of Elasticity . . .	x-x Bending	y-y Bending	Axial			Cfu : Flat Use Factor 1.0
	Basic	1,400.0	1,400.0	1,400.0 ksi		Kf : Built-up columns 1.0
	Minimum	510.0	510.0			Use Cr : Repetitive ? No
Column Buckling Condition:						
ABOUT X-X Axis: Lux = 15 ft, Kx = 1.0						
Fully braced against buckling ABOUT Y-Y Axis						

Applied Loads

Service loads entered. Load Factors will be applied for calculation

Column self weight included : 26.821 lbs * Dead Load Factor

AXIAL LOADS . . .

Axial Load at 15.0 ft, D = 2.750 k

DESIGN SUMMARY**Bending & Shear Check Results**

PASS Max. Axial+Bending Stress Ratio = **0.9960 : 1**
 Load Combination D Only
 Governing NDS Formula Comp Only, f_c/F_c'
 Location of max.above base 0.0 ft
 At maximum location values are . .
 Applied Axial 2.777 k
 Applied Mx 0.0 k-ft
 Applied My 0.0 k-ft
 Fc : Allowable 337.925 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

Maximum SERVICE Load Lateral Deflections . . .

Along Y-Y	0.0 in	at	0.0 ft	above base
for load combination	n/a			
Along X-X	0.0 in	at	0.0 ft	above base
for load combination	n/a			

Other Factors used to calculate allowable stresses . . .

Bending	Compression	Tension
---------	-------------	---------

PASS Maximum Shear Stress Ratio = **0.0 : 1**
 Load Combination +0.60D
 Location of max.above base 15.0 ft
 Applied Design Shear 0.0 psi
 Allowable Shear 288.0 psi

Load Combination Results

Load Combination	C _D	C _P	Maximum Axial + Bending Stress Ratios			Maximum Shear Ratios		
			Stress Ratio	Status	Location	Stress Ratio	Status	Location
D Only	0.900	0.442	0.9960	PASS	0.0 ft	0.0	PASS	15.0 ft
+0.60D	1.600	0.268	0.5538	PASS	0.0 ft	0.0	PASS	15.0 ft

Maximum Reactions

Note: Only non-zero reactions are listed

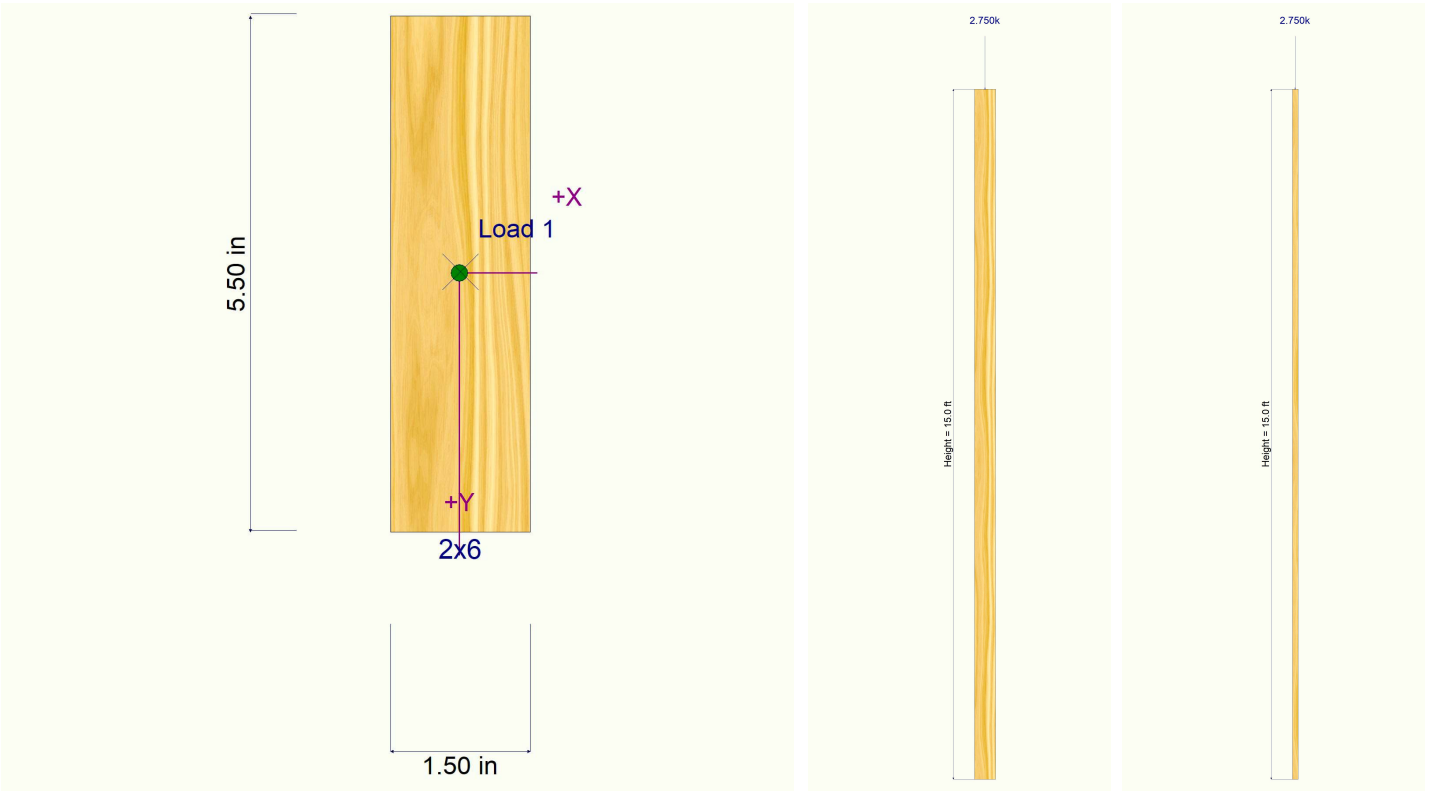
Load Combination	X-X Axis Reaction		k	Y-Y Axis Reaction		Axial Reaction	My - End Moments		k-ft	Mx - End Moments	
	@ Base	@ Top		@ Base	@ Top		@ Base	@ Top		@ Base	@ Top
D Only						2.777					
+0.60D						1.666					

DESCRIPTION: (1)2x6 Stud Post 15' - 2.75k Max Cap.

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
D Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
+0.60D	0.0000 in	0.000 ft	0.000 in	0.000 ft

Sketches



Wood Column

Project File: Enercalc_Puyallup Storage.ec

LIC# : KW-06012482, Build:20.24.09.03

FACET

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: (2)2x6 Stud Post 15' - 5.5k Max Cap.**Code References**

Calculations per NDS 2018, IBC 2021, SDPWS 2021

Load Combinations Used : ASCE 7-16

General Information

Analysis Method :		Allowable Stress Design		Wood Section Name		2-2x6	
End Fixities		Top & Bottom Pinned		Wood Grading/Manuf.		Graded Lumber	
Overall Column Height		15 ft		Wood Member Type		Sawn	
(Used for non-slender calculations)							
Wood Species		Douglas Fir-Larch		Exact Width		3.0 in	
Wood Grade		Stud		Exact Depth		5.50 in	
Fb +		700.0 psi	Fv	180.0 psi	Area	16.50 in^2	Allow Stress Modification Factors
Fb -		700.0 psi	Ft	450.0 psi	Ix	41.594 in^4	Cf or Cv for Bending
Fc - Prll		850.0 psi	Density	31.210 pcf	Iy	12.375 in^4	Cf or Cv for Compression
Fc - Perp		625.0 psi					Cf or Cv for Tension
E : Modulus of Elasticity . . .		x-x Bending	y-y Bending	Axial			Cm : Wet Use Factor
		Basic	1,400.0	1,400.0	1,400.0 ksi		Ct : Temperature Fact
		Minimum	510.0	510.0			Cfu : Flat Use Factor
					Column Buckling Condition:		Kf : Built-up columns
					ABOUT X-X Axis: Lux = 15 ft, Kx = 1.0		Use Cr : Repetitive ?
					Fully braced against buckling ABOUT Y-Y Axis		No

Applied Loads

Service loads entered. Load Factors will be applied for calculation

Column self weight included : 53.642 lbs * Dead Load Factor

AXIAL LOADS . . .

Axial Load at 15.0 ft, D = 5.50 k

DESIGN SUMMARY

Bending & Shear Check Results

PASS Max. Axial+Bending Stress Ratio = **0.9960 : 1**

Load Combination	D Only
Governing NDS Formula	Comp Only, f_c/F_c'
Location of max.above base	0.0 ft
At maximum location values are . .	
Applied Axial	5.554 k
Applied Mx	0.0 k-ft
Applied My	0.0 k-ft
Fc : Allowable	337.925 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y	0.0 k	Bottom along Y-Y	0.0 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

Maximum SERVICE Load Lateral Deflections . . .

Along Y-Y	0.0 in	at	0.0 ft	above base
for load combination	n/a			
Along X-X	0.0 in	at	0.0 ft	above base
for load combination	n/a			

Other Factors used to calculate allowable stresses . . .**Bending Compression Tension****PASS** Maximum Shear Stress Ratio = **0.0 : 1**

Load Combination	+0.60D
Location of max.above base	15.0 ft
Applied Design Shear	0.0 psi
Allowable Shear	288.0 psi

Load Combination Results

Load Combination	C _D	C _P	Maximum Axial + Bending Stress Ratios			Maximum Shear Ratios		
			Stress Ratio	Status	Location	Stress Ratio	Status	Location
D Only	0.900	0.442	0.9960	PASS	0.0 ft	0.0	PASS	15.0 ft
+0.60D	1.600	0.268	0.5538	PASS	0.0 ft	0.0	PASS	15.0 ft

Maximum Reactions

Note: Only non-zero reactions are listed

Load Combination	X-X Axis Reaction		k	Y-Y Axis Reaction		Axial Reaction	My - End Moments		k-ft	Mx - End Moments	
	@ Base	@ Top		@ Base	@ Top		@ Base	@ Top		@ Base	@ Top
D Only						5.554					
+0.60D						3.332					

Wood Column

Project File: Enercalc_Puyallup Storage.ec

LIC# : KW-06012482, Build:20.24.09.03

FACET

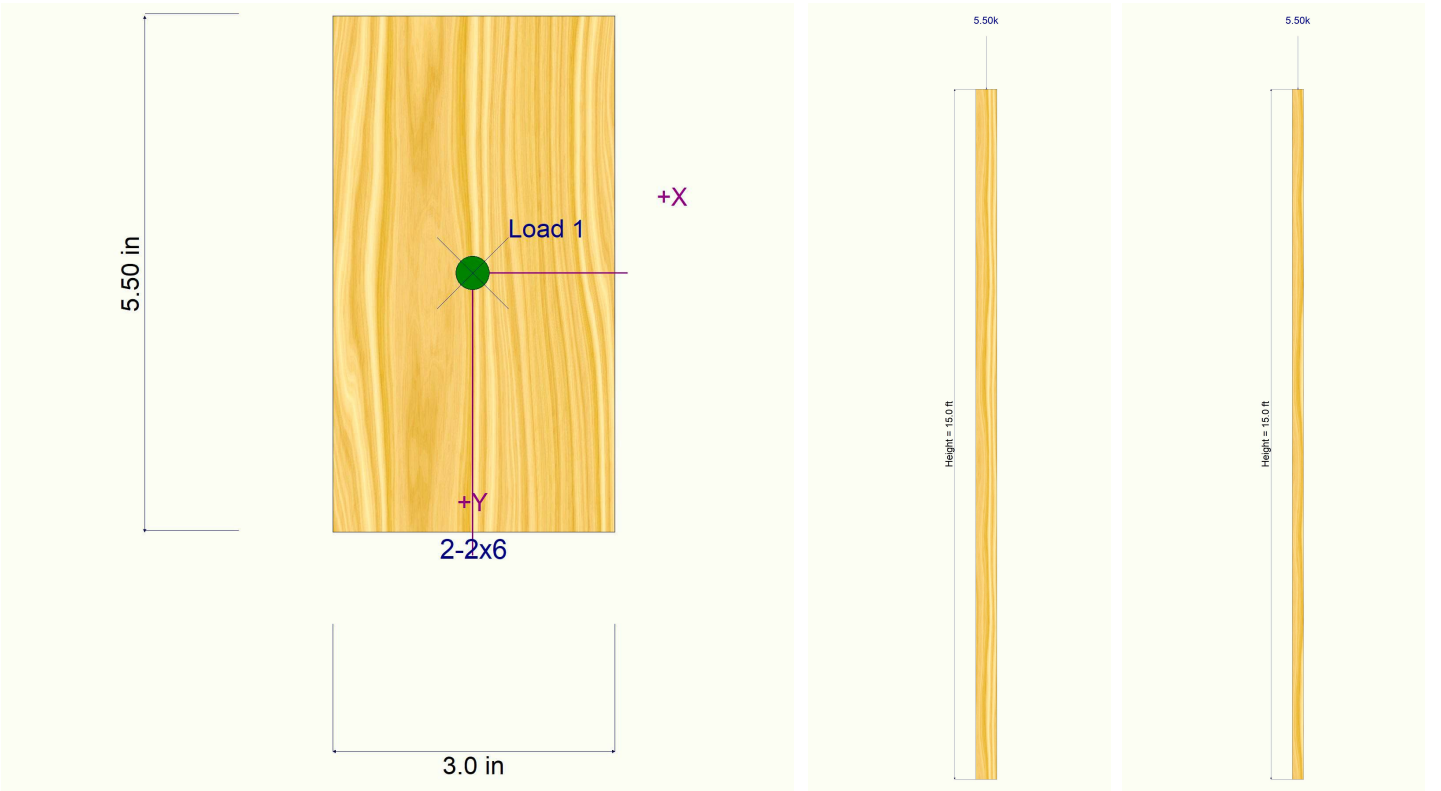
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DESCRIPTION: (2)2x6 Stud Post 15' - 5.5k Max Cap.

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
D Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
+0.60D	0.0000 in	0.000 ft	0.000 in	0.000 ft

Sketches



Wood Column

Project File: Enercalc_Puyallup Storage.ec

LIC#: KW-06012482, Build:20.24.10.03

FACET

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: OPP 10'-6" (1) 2x6 King Stud Post - Openings Up To 5'-0"**Code References**

Calculations per NDS 2018, IBC 2021, SDPWS 2021
 Load Combinations Used : ASCE 7-16

General Information

Analysis Method :	Allowable Stress Design			Wood Section Name	2x6	
End Fixities	Top & Bottom Pinned			Wood Grading/Manuf.	Graded Lumber	
Overall Column Height	10.5 ft			Wood Member Type	Sawn	
(Used for non-slender calculations)						
Wood Species	Douglas Fir-Larch			Exact Width	1.50 in	Allow Stress Modification Factors
Wood Grade	Stud			Exact Depth	5.50 in	
Fb +	700.0 psi	Fv	180.0 psi	Area	8.250 in^2	Cf or Cv for Bending 1.0
Fb -	700.0 psi	Ft	450.0 psi	Ix	20.797 in^4	Cf or Cv for Compression 1.0
Fc - Prll	850.0 psi	Density	31.210 pcf	Iy	1.547 in^4	Cf or Cv for Tension 1.0
Fc - Perp	625.0 psi					Cm : Wet Use Factor 1.0
E : Modulus of Elasticity . . .		x-x Bending	y-y Bending	Axial		Ct : Temperature Factor 1.0
	Basic	1,400.0	1,400.0	1,400.0 ksi		Cfu : Flat Use Factor 1.0
	Minimum	510.0	510.0			Kf : Built-up columns 1.0
				Column Buckling Condition:		Use Cr : Repetitive ? No
				ABOUT X-X Axis: Lux = 10.5 ft, Kx = 1.0		
				Fully braced against buckling ABOUT Y-Y Axis		

Applied Loads

Service loads entered. Load Factors will be applied for calculation

Column self weight included : 18.775 lbs * Dead Load Factor

BENDING LOADS . . .

Lat. Uniform Load creating Mx-x, W = 0.0690 k/ft

DESIGN SUMMARY**Bending & Shear Check Results**

PASS Max. Axial+Bending Stress Ratio = **0.9859 : 1**
 Load Combination +D+0.60W
 Governing NDS Forumla Comp + Mxx, NDS Eq. 3.9-3
 Location of max.above base 5.215 ft
 At maximum location values are . .
 Applied Axial 0.01878 k
 Applied Mx 0.5705 k-ft
 Applied My 0.0 k-ft
 Fc : Allowable 669.15 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y	0.3623 k	Bottom along Y-Y	0.3623 k
Top along X-X	0.0 k	Bottom along X-X	0.0 k

Maximum SERVICE Load Lateral Deflections . . .

Along Y-Y	0.2752 in	at	5.285 ft	above base
for load combination +D+0.420W				
Along X-X	0.0 in	at	0.0 ft	above base
for load combination n/a				

Other Factors used to calculate allowable stresses . . .

Bending	Compression	Tension
---------	-------------	---------

PASS Maximum Shear Stress Ratio = **0.1372 : 1**
 Load Combination +D+0.60W
 Location of max.above base 0.0 ft
 Applied Design Shear 59.277 psi
 Allowable Shear 288.0 psi

Load Combination Results

Load Combination	C _D	C _P	Maximum Axial + Bending Stress Ratios			Maximum Shear Ratios		
			Stress Ratio	Status	Location	Stress Ratio	Status	Location
D Only	0.900	0.706	0.004215	PASS	0.0 ft	0.0	PASS	10.50 ft
+D+0.60W	1.600	0.492	0.9859	PASS	5.215 ft	0.1372	PASS	0.0 ft
+D+0.450W	1.600	0.492	0.7394	PASS	5.215 ft	0.1029	PASS	0.0 ft
+0.60D+0.60W	1.600	0.492	0.9847	PASS	5.215 ft	0.1372	PASS	0.0 ft
+0.60D	1.600	0.492	0.002041	PASS	0.0 ft	0.0	PASS	10.50 ft

Maximum Reactions

Note: Only non-zero reactions are listec

Load Combination	X-X Axis Reaction		Y-Y Axis Reaction		Axial Reaction @ Base	My - End Moments		Mx - End Moments	
	@ Base	@ Top	@ Base	@ Top		@ Base	@ Top	@ Base	@ Top
D Only					0.019				
+D+0.60W			0.217	0.217	0.019				

DESCRIPTION: OPP 10'-6" (1) 2x6 King Stud Post - Openings Up To 5'-0"

Maximum Reactions

Note: Only non-zero reactions are listed

Load Combination	X-X Axis Reaction		k	Y-Y Axis Reaction		Axial Reaction	My - End Moments		k-ft	Mx - End Moments	
	@ Base	@ Top		@ Base	@ Top		@ Base	@ Top		@ Base	@ Top
+D+0.450W				0.163	0.163	0.019					
+0.60D+0.60W				0.217	0.217	0.011					
+0.60D						0.011					
W Only				0.362	0.362						

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
D Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.420W	0.0000 in	0.000 ft	0.275 in	5.285 ft
+0.60D+0.420W	0.0000 in	0.000 ft	0.275 in	5.285 ft
+0.60D	0.0000 in	0.000 ft	0.000 in	0.000 ft
+0.420W	0.0000 in	0.000 ft	0.275 in	5.285 ft

Sketches



Wood Column

Project File: Enercalc_Puyallup Storage.ec

LIC#: KW-06012482, Build:20.24.10.03

FACET

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: OPP 10'-6" (2) 2x6 King Stud Post - Openings Up To 13'-6"**Code References**

Calculations per NDS 2018, IBC 2021, SDPWS 2021

Load Combinations Used : ASCE 7-16

General Information

Analysis Method :		Allowable Stress Design		Wood Section Name		2-2x6	
End Fixities		Top & Bottom Pinned		Wood Grading/Manuf.		Graded Lumber	
Overall Column Height		10.5 ft		Wood Member Type		Sawn	
(Used for non-slender calculations)							
Wood Species		Douglas Fir-Larch		Exact Width		3.0 in	
Wood Grade		Stud		Exact Depth		5.50 in	
Fb +		700.0 psi	Fv	180.0 psi	Area	16.50 in^2	Allow Stress Modification Factors
Fb -		700.0 psi	Ft	450.0 psi	Ix	41.594 in^4	Cf or Cv for Bending
Fc - Prll		850.0 psi	Density	31.210 pcf	Iy	12.375 in^4	Cf or Cv for Compressor
Fc - Perp		625.0 psi					Cf or Cv for Tension
E : Modulus of Elasticity . . .		x-x Bending	y-y Bending	Axial			Cm : Wet Use Factor
Basic		1,400.0	1,400.0	1,400.0 ksi			Ct : Temperature Fact
Minimum		510.0	510.0				Cfu : Flat Use Factor
				Column Buckling Condition:			Kf : Built-up columns
				ABOUT X-X Axis: Lux = 10.5 ft, Kx = 1.0			Use Cr : Repetitive ?
				Fully braced against buckling ABOUT Y-Y Axis			No

Applied Loads

Service loads entered. Load Factors will be applied for calculation

Column self weight included : 37.550 lbs * Dead Load Factor

BENDING LOADS . . .

Lat. Uniform Load creating Mx-x, W = 0.1670 k/ft

DESIGN SUMMARY**Bending & Shear Check Results****PASS** Max. Axial+Bending Stress Ratio = **0.9967 : 1**

Load Combination +D+0.60W

Governing NDS Forumla Comp + Mxx, NDS Eq. 3.9-3

Location of max.above base 5.285 ft

At maximum location values are . .

Applied Axial 0.03755 k

Applied Mx 1.381 k-ft

Applied My 0.0 k-ft

Fc : Allowable 669.15 psi

PASS Maximum Shear Stress Ratio = **0.1661 : 1**

Load Combination +D+0.60W

Location of max.above base 0.0 ft

Applied Design Shear 71.734 psi

Allowable Shear 288.0 psi

Maximum SERVICE Lateral Load Reactions . .

Top along Y-Y 0.8768 k Bottom along Y-Y 0.8768 k

Top along X-X 0.0 k Bottom along X-X 0.0 k

Maximum SERVICE Load Lateral Deflections . . .

Along Y-Y 0.3330 in at 5.285 ft above base

for load combination +D+0.420W

Along X-X 0.0 in at 0.0 ft above base

for load combination n/a

Other Factors used to calculate allowable stresses . . .**Bending Compression Tension****Load Combination Results**

Load Combination	C _D	C _P	Maximum Axial + Bending Stress Ratios			Maximum Shear Ratios		
			Stress Ratio	Status	Location	Stress Ratio	Status	Location
D Only	0.900	0.706	0.004215	PASS	0.0 ft	0.0	PASS	10.50 ft
+D+0.60W	1.600	0.492	0.9967	PASS	5.285 ft	0.1661	PASS	0.0 ft
+D+0.450W	1.600	0.492	0.7475	PASS	5.215 ft	0.1245	PASS	0.0 ft
+0.60D+0.60W	1.600	0.492	0.9956	PASS	5.285 ft	0.1661	PASS	0.0 ft
+0.60D	1.600	0.492	0.002041	PASS	0.0 ft	0.0	PASS	10.50 ft

Maximum Reactions

Note: Only non-zero reactions are listec

Load Combination	X-X Axis Reaction		Y-Y Axis Reaction		Axial Reaction	My - End Moments		Mx - End Moments	
	@ Base	@ Top	@ Base	@ Top		@ Base	@ Top	@ Base	@ Top
D Only					0.038				
+D+0.60W			0.526	0.526	0.038				

Wood Column

Project File: Enercalc_Puyallup Storage.ec

LIC# : KW-06012482, Build:20.24.10.03

FACET

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: OPP 10'-6" (2) 2x6 King Stud Post - Openings Up To 13'-6"

Maximum Reactions

Note: Only non-zero reactions are listed

Load Combination	X-X Axis Reaction		k	Y-Y Axis Reaction		Axial Reaction	My - End Moments		k-ft	Mx - End Moments	
	@ Base	@ Top		@ Base	@ Top		@ Base	@ Top		@ Base	@ Top
+D+0.450W				0.395	0.395	0.038					
+0.60D+0.60W				0.526	0.526	0.023					
+0.60D						0.023					
W Only				0.877	0.877						

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
D Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.420W	0.0000 in	0.000 ft	0.333 in	5.285 ft
+0.60D+0.420W	0.0000 in	0.000 ft	0.333 in	5.285 ft
+0.60D	0.0000 in	0.000 ft	0.000 in	0.000 ft
+0.420W	0.0000 in	0.000 ft	0.333 in	5.285 ft

Sketches



Wood Column

Project File: Enercalc_Puyallup Storage.ec

LIC#: KW-06012482, Build:20.24.10.03

FACET

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: OPP 12'-0" (1) 2x6 King Stud Post - Openings Up To 4'-0"**Code References**

Calculations per NDS 2018, IBC 2021, SDPWS 2021
 Load Combinations Used : ASCE 7-16

General Information

Analysis Method :		Allowable Stress Design		Wood Section Name	2x6		
End Fixities		Top & Bottom Pinned		Wood Grading/Manuf.	Graded Lumber		
Overall Column Height		12 ft		Wood Member Type	Sawn		
(Used for non-slender calculations)							
Wood Species	Douglas Fir-Larch			Exact Width	1.50 in	Allow Stress Modification Factors	
Wood Grade	Stud			Exact Depth	5.50 in		
Fb +	700.0 psi	Fv	180.0 psi	Area	8.250 in^2	Cf or Cv for Bending	1.0
Fb -	700.0 psi	Ft	450.0 psi	Ix	20.797 in^4	Cf or Cv for Compressor	1.0
Fc - Prll	850.0 psi	Density	31.210 pcf	Iy	1.547 in^4	Cf or Cv for Tension	1.0
Fc - Perp	625.0 psi					Cm : Wet Use Factor	1.0
E : Modulus of Elasticity . . .	x-x Bending	y-y Bending	Axial			Ct : Temperature Fact	1.0
	Basic	1,400.0	1,400.0	1,400.0 ksi		Cfu : Flat Use Factor	1.0
	Minimum	510.0	510.0			Kf : Built-up columns	1.0
				Column Buckling Condition:		Use Cr : Repetitive ?	No
				ABOUT X-X Axis: Lux = 12 ft, Kx = 1.0			
				Fully braced against buckling ABOUT Y-Y Axis			

Applied Loads

Service loads entered. Load Factors will be applied for calculation

Column self weight included : 21.457 lbs * Dead Load Factor

BENDING LOADS . . .

Lat. Uniform Load creating Mx-x, W = 0.0530 k/ft

DESIGN SUMMARY**Bending & Shear Check Results**

PASS Max. Axial+Bending Stress Ratio = **0.9905 : 1**
 Load Combination +D+0.60W
 Governing NDS Forumla Comp + Mxx, NDS Eq. 3.9-3
 Location of max.above base 6.040 ft
 At maximum location values are . . .
 Applied Axial 0.02146 k
 Applied Mx 0.5724 k-ft
 Applied My 0.0 k-ft
 Fc : Allowable 540.33 psi

Maximum SERVICE Lateral Load Reactions . .
 Top along Y-Y 0.3180 k Bottom along Y-Y 0.3180 k
 Top along X-X 0.0 k Bottom along X-X 0.0 k

Maximum SERVICE Load Lateral Deflections . . .
 Along Y-Y 0.3606 in at 6.040 ft above base
 for load combination +D+0.420W
 Along X-X 0.0 in at 0.0 ft above base
 for load combination n/a

Other Factors used to calculate allowable stresses . . .
 Bending Compression Tension

PASS Maximum Shear Stress Ratio = **0.1205 : 1**
 Load Combination +D+0.60W
 Location of max.above base 12.0 ft
 Applied Design Shear 52.036 psi
 Allowable Shear 288.0 psi

Load Combination Results

Load Combination	C _D	C _P	Maximum Axial + Bending Stress Ratios			Maximum Shear Ratios		
			Stress Ratio	Status	Location	Stress Ratio	Status	Location
D Only	0.900	0.609	0.005579	PASS	0.0 ft	0.0	PASS	12.0 ft
+D+0.60W	1.600	0.397	0.9905	PASS	6.040 ft	0.1205	PASS	12.0 ft
+D+0.450W	1.600	0.397	0.7429	PASS	5.960 ft	0.09034	PASS	0.0 ft
+0.60D+0.60W	1.600	0.397	0.9888	PASS	6.040 ft	0.1205	PASS	12.0 ft
+0.60D	1.600	0.397	0.002888	PASS	0.0 ft	0.0	PASS	12.0 ft

Maximum Reactions

Note: Only non-zero reactions are listec

Load Combination	X-X Axis Reaction		Y-Y Axis Reaction		Axial Reaction @ Base	My - End Moments		Mx - End Moments	
	@ Base	@ Top	@ Base	@ Top		@ Base	@ Top	@ Base	@ Top
D Only					0.021				
+D+0.60W			0.191	0.191	0.021				

DESCRIPTION: OPP 12'-0" (1) 2x6 King Stud Post - Openings Up To 4'-0"

Maximum Reactions

Note: Only non-zero reactions are listed

Load Combination	X-X Axis Reaction		k	Y-Y Axis Reaction		Axial Reaction	My - End Moments		Mx - End Moments	
	@ Base	@ Top		@ Base	@ Top	@ Base	@ Base	@ Top	@ Base	@ Top
+D+0.450W				0.143	0.143	0.021				
+0.60D+0.60W				0.191	0.191	0.013				
+0.60D						0.013				
W Only				0.318	0.318					

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
D Only	0.0000 in	0.000ft	0.000 in	0.000 ft
+D+0.420W	0.0000 in	0.000ft	0.361 in	6.040 ft
+0.60D+0.420W	0.0000 in	0.000ft	0.361 in	6.040 ft
+0.60D	0.0000 in	0.000ft	0.000 in	0.000 ft
+0.420W	0.0000 in	0.000ft	0.361 in	6.040 ft

Sketches



Wood Column

Project File: Enercalc_Puyallup Storage.ec

LIC#: KW-06012482, Build:20.24.10.03

FACET

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: OPP 12'-0" (2) 2x6 King Stud Post - Openings Up To 10'-6"**Code References**

Calculations per NDS 2018, IBC 2021, SDPWS 2021
 Load Combinations Used : ASCE 7-16

General Information

Analysis Method :		Allowable Stress Design		Wood Section Name		2-2x6	
End Fixities		Top & Bottom Pinned		Wood Grading/Manuf.		Graded Lumber	
Overall Column Height		12 ft		Wood Member Type		Sawn	
(Used for non-slender calculations)							
Wood Species		Douglas Fir-Larch		Exact Width		3.0 in	
Wood Grade		Stud		Exact Depth		5.50 in	
Fb +		700.0 psi	Fv	180.0 psi	Area	16.50 in^2	Allow Stress Modification Factors
Fb -		700.0 psi	Ft	450.0 psi	Ix	41.594 in^4	Cf or Cv for Bending
Fc - Prll		850.0 psi	Density	31.210 pcf	Iy	12.375 in^4	Cf or Cv for Compressor
Fc - Perp		625.0 psi					Cf or Cv for Tension
E : Modulus of Elasticity . . .		x-x Bending	y-y Bending	Axial			Cm : Wet Use Factor
Basic		1,400.0	1,400.0	1,400.0 ksi			Ct : Temperature Fact
Minimum		510.0	510.0				Cfu : Flat Use Factor
				Column Buckling Condition:			Kf : Built-up columns
				ABOUT X-X Axis: Lux = 12 ft, Kx = 1.0			Use Cr : Repetitive ?
				Fully braced against buckling ABOUT Y-Y Axis			No

Applied Loads

Service loads entered. Load Factors will be applied for calculation

Column self weight included : 42.914 lbs * Dead Load Factor

BENDING LOADS . . .

Lat. Uniform Load creating Mx-x, W = 0.1280 k/ft

DESIGN SUMMARY**Bending & Shear Check Results**

PASS Max. Axial+Bending Stress Ratio = **0.9992 : 1**
 Load Combination +D+0.60W
 Governing NDS Forumla Comp + Mxx, NDS Eq. 3.9-3
 Location of max.above base 5.960 ft
 At maximum location values are . .
 Applied Axial 0.04291 k
 Applied Mx 1.382 k-ft
 Applied My 0.0 k-ft
 Fc : Allowable 540.33 psi

Maximum SERVICE Lateral Load Reactions . .
 Top along Y-Y 0.7680 k Bottom along Y-Y 0.7680 k
 Top along X-X 0.0 k Bottom along X-X 0.0 k

Maximum SERVICE Load Lateral Deflections . . .
 Along Y-Y 0.4354 in at 6.040 ft above base
 for load combination +D+0.420W
 Along X-X 0.0 in at 0.0 ft above base
 for load combination n/a

Other Factors used to calculate allowable stresses . . .
 Bending Compression Tension

PASS Maximum Shear Stress Ratio = **0.1455 : 1**
 Load Combination +D+0.60W
 Location of max.above base 12.0 ft
 Applied Design Shear 62.836 psi
 Allowable Shear 288.0 psi

Load Combination Results

Load Combination	C _D	C _P	Maximum Axial + Bending Stress Ratios			Maximum Shear Ratios		
			Stress Ratio	Status	Location	Stress Ratio	Status	Location
D Only	0.900	0.609	0.005579	PASS	0.0 ft	0.0	PASS	12.0 ft
+D+0.60W	1.600	0.397	0.9992	PASS	5.960 ft	0.1455	PASS	12.0 ft
+D+0.450W	1.600	0.397	0.7494	PASS	5.960 ft	0.1091	PASS	12.0 ft
+0.60D+0.60W	1.600	0.397	0.9975	PASS	5.960 ft	0.1455	PASS	12.0 ft
+0.60D	1.600	0.397	0.002888	PASS	0.0 ft	0.0	PASS	12.0 ft

Maximum Reactions

Note: Only non-zero reactions are listec

Load Combination	X-X Axis Reaction		Y-Y Axis Reaction		Axial Reaction	My - End Moments		Mx - End Moments	
	@ Base	@ Top	@ Base	@ Top		@ Base	@ Top	@ Base	@ Top
D Only					0.043				
+D+0.60W			0.461	0.461	0.043				

DESCRIPTION: OPP 12'-0" (2) 2x6 King Stud Post - Openings Up To 10'-6"

Maximum Reactions

Note: Only non-zero reactions are listed

Load Combination	X-X Axis Reaction		k	Y-Y Axis Reaction		Axial Reaction	My - End Moments		k-ft	Mx - End Moments	
	@ Base	@ Top		@ Base	@ Top		@ Base	@ Top		@ Base	@ Top
+D+0.450W				0.346	0.346	0.043					
+0.60D+0.60W				0.461	0.461	0.026					
+0.60D						0.026					
W Only				0.768	0.768						

Maximum Deflections for Load Combinations

Load Combination	Max. X-X Deflection	Distance	Max. Y-Y Deflection	Distance
D Only	0.0000 in	0.000 ft	0.000 in	0.000 ft
+D+0.420W	0.0000 in	0.000 ft	0.435 in	6.040 ft
+0.60D+0.420W	0.0000 in	0.000 ft	0.435 in	6.040 ft
+0.60D	0.0000 in	0.000 ft	0.000 in	0.000 ft
+0.420W	0.0000 in	0.000 ft	0.435 in	6.040 ft

Sketches





FACET

Date: 10/15/2024
Design By: LAO

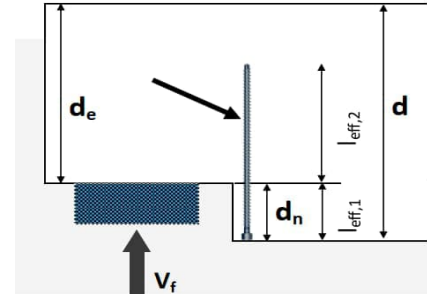
Project: Puyallup Storage
Description: Notched Roof Joist Reinforcement

Beam Geometry:

$b = 1.5$ in (Beam Width)
 $d = 11.25$ in (Beam Depth)
 $D_{n,max} = 1.125$ in (Max Notch Depth NDS 5.4.5)
 $D_n = 4$ in (Notch Depth)
 $D_e = 7.25$ in (Distance from potential crack to edge)

Factors/Conditions:

MC = 15 %
 MC Condition = Dry
 $T = T \leq 100$ degrees
 $C_D = 0.9$ Load Duration Factor (NDS Table 2.3.2)
 $C_M = 1$ Wet-Service Condition Factor (NDS Supplement)
 $C_t = 1$ Temperature Factor (NDS 2.3.3)
 $C_{vr} = 0.72$ Shear Reduction Factor (NDS 5.3.10)
 $C_i = 1$ Incising Factor
 $C_F = 1.00719672$ Size Factor
 $C_{eg} = 1$ End Grain Factor



Design Values:

$F_{vx} = 180$ psi Shear Parallel to Grain

Adjusted ASD Shear Design Value

$F_v' = 162$ psi $F_v' = F_v * C_D * C_M * C_t * C_i$

Shear Force in Beam (ASD)

$A = 16.88$ in²
 $V_u = 1823$ lbs
 $V_u = 1.823$ k

Adjusted Allowable Shear in Beam due to Notch (ASD)

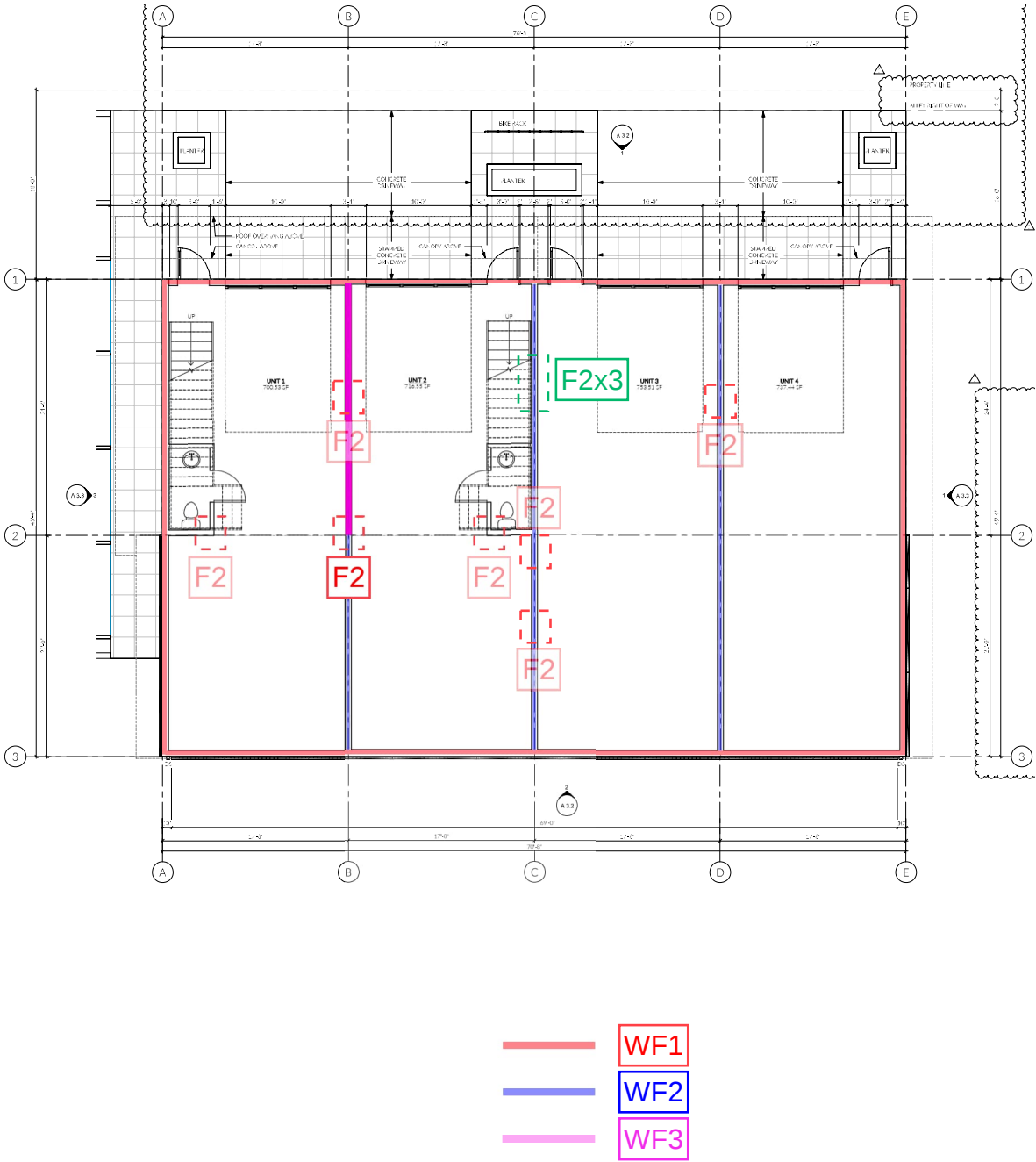
$V_r' = 488$ lbs NDS 3.4.3.2
 $V_r' = 0.488$ k
 $V = 1036$ lbs $f_v = 92.1$ psi
 Reinf Req'd

Screw Option	Company	Head Diameter (in)	ASD Tension	ASD Shear	Bending Yield	Nominal Dia. (in)	Screw length	Thread length
sdcf221014	SST	0.591	2000	1400	185,000	0.315	10.24	9.8

Screws Specs

Screw Head depth = 0.44 in
 $l_{eff,1} = 3.56$ in
 Thread Length = 9.8 in
 $l_{eff,2} = 6.24$ in

Withdrawal			
SG	0.5		
W =	265 lbs	PULLTHROUGH	255 LBS
Adjstuted Withdrawal Design Value			
W'=	238.5 lbf/in		
W'*leff2=	1488.24 lb/screw		
Tension Cap. =	2000 lbs		
Max Withdrawl =	1488.24		
# of Screws =	1		
V ma =	1036.00 lbs		
W'=	1488.24		
W'*leff1 + PT=	1104.06 lb/screw		
Shear Difference =	548.22 lbs	Use 1 Screws	
# of Screws =	0.50		
	Okay		



Foundation Keyplan
Scale: 1/16" = 1'

Wall Footing

Project File: Enercalc_Puyallup Storage.ec

LIC# : KW-06012482, Build:20.24.10.03FACET(c) ENERCALC, LLC 1982-2024

DESCRIPTION: WF1

Code References

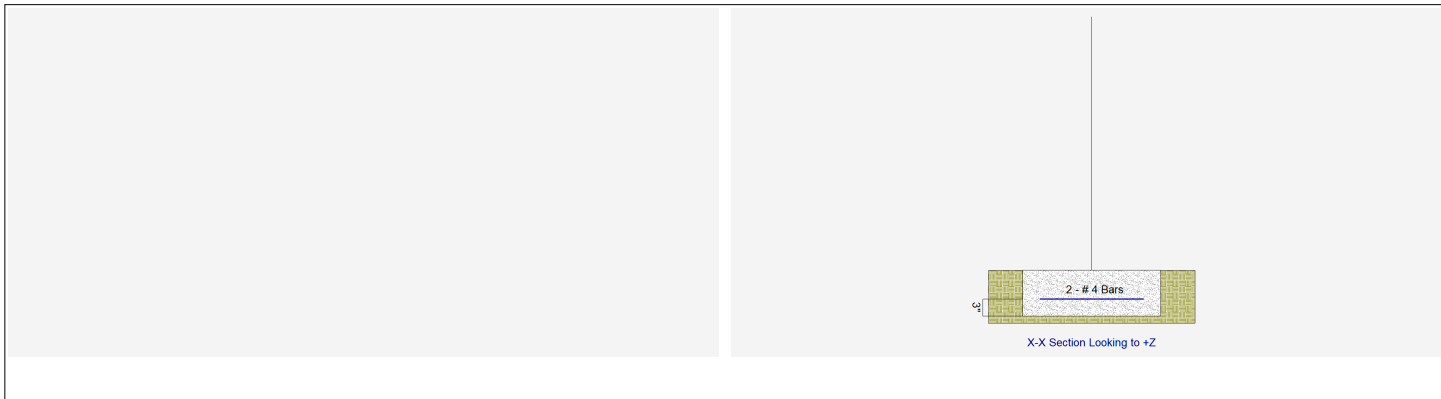
Calculations per ACI 318-19, IBC 2021, ASCE 7-16
Load Combinations Used : ASCE 7-16

General Information

Material Properties			Soil Design Values		
f'c : Concrete 28 day strength	=	2.50 ksi	Allowable Soil Bearing	=	1.50 ksf
fy : Rebar Yield	=	60.0 ksi	Increase Bearing By Footing Weight	=	No
Ec : Concrete Elastic Modulus	=	2,850.0 ksi	Soil Passive Resistance (for Sliding)	=	250.0 pcf
Concrete Density	=	145.0 pcf	Soil/Concrete Friction Coeff.	=	0.30
φ Values Flexure	=	0.90	Increases based on footing Depth		
Shear	=	0.750	Reference Depth below Surface	=	ft
Analysis Settings			Allow. Pressure Increase per foot of depth	=	ksf
Min Steel % Bending Reinf.	=		when base footing is below	=	ft
Min Allow % Temp Reinf.	=	0.00180	Increases based on footing Width		
Min. Overturning Safety Factor	=	1.0 : 1	Allow. Pressure Increase per foot of width	=	ksf
Min. Sliding Safety Factor	=	1.0 : 1	when footing is wider than	=	ft
AutoCalc Footing Weight as DL :	=	Yes	Adjusted Allowable Bearing Pressure	=	1.50 ksf

Dimensions

Footing Width	=	2.0 ft	Footing Thickness	=	8.0 in	Bars along X-X Axis	
Wall Thickness	=	in	Rebar Centerline to Edge of Concrete...			# of Bars in 12" Width	= 2
Wall center offset			at Bottom of footing	=	3.0 in	Reinforcing Bar Size	= # 4
from center of footing	=	0 in					



Applied Loads

		D	Lr	L	S	W	E	H
P : Column Load	=	1.560	0.240		0.30			k
OB : Overburden	=							ksf
V-x	=							k
M-zz	=							k-ft
Vx applied	=			in	above top of footing			

Wall Footing

Project File: Enercalc_Puyallup Storage.ec

LIC# : KW-06012482, Build:20.24.10.03

FACET

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: WF1**DESIGN SUMMARY****Design OK**

Factor of Safety	Item	Applied	Capacity	Governing Load Combination
PASS	n/a	Overturning - Z-Z	0.0 k-ft	No Overturning
PASS	n/a	Sliding - X-X	0.0 k	No Sliding
PASS	n/a	Uplift	0.0 k	No Uplift
Utilization Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.6844	Soil Bearing	1.027 ksf	+D+S
PASS	0.07924	Z Flexure (+X)	0.6460 k-ft	+1.20D+1.60S
PASS	0.06636	Z Flexure (-X)	0.5410 k-ft	+1.20D+0.20S
PASS	0.2288	1-way Shear (+X)	12.9 psi	+1.20D+1.60S
PASS	0.2288	1-way Shear (-X)	12.9 psi	+1.20D+1.60S

Detailed Results**Soil Bearing**

Rotation Axis & Load Combination...	Gross Allowable	Xecc	Actual Soil Bearing Stress		Actual / Allowable Ratio
			-X	+X	
D Only	1.50 ksf	0.0 in	0.8767 ksf	0.8767 ksf	0.584
+D+Lr	1.50 ksf	0.0 in	0.9967 ksf	0.9967 ksf	0.664
+D+S	1.50 ksf	0.0 in	1.027 ksf	1.027 ksf	0.684
+D+0.750Lr	1.50 ksf	0.0 in	0.9667 ksf	0.9667 ksf	0.644
+D+0.750S	1.50 ksf	0.0 in	0.9892 ksf	0.9892 ksf	0.659
+0.60D	1.50 ksf	0.0 in	0.5260 ksf	0.5260 ksf	0.351

Units : k-ft

Overturning Stability

Rotation Axis & Load Combination...	Overturning Moment	Resisting Moment	Stability Ratio	Status
Footing Has NO Overturning				

Sliding Stability

Force Application Axis Load Combination...	Sliding Force	Resisting Force	Sliding SafetyRatio	Status
Footing Has NO Sliding				

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Which Side ?	Tension @ Bot. or Top ?	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
+1.20D+0.50Lr	0.556	-X	Bottom	0.1728	Min Temp %	0.4	8.153	OK
+1.20D+0.50Lr	0.556	+X	Bottom	0.1728	Min Temp %	0.4	8.153	OK
+1.20D+0.50S	0.5635	-X	Bottom	0.1728	Min Temp %	0.4	8.153	OK
+1.20D+0.50S	0.5635	+X	Bottom	0.1728	Min Temp %	0.4	8.153	OK
+1.20D+1.60Lr	0.622	-X	Bottom	0.1728	Min Temp %	0.4	8.153	OK
+1.20D+1.60Lr	0.622	+X	Bottom	0.1728	Min Temp %	0.4	8.153	OK
+1.20D+1.60S	0.646	-X	Bottom	0.1728	Min Temp %	0.4	8.153	OK
+1.20D+1.60S	0.646	+X	Bottom	0.1728	Min Temp %	0.4	8.153	OK
+0.90D	0.3945	-X	Bottom	0.1728	Min Temp %	0.4	8.153	OK
+0.90D	0.3945	+X	Bottom	0.1728	Min Temp %	0.4	8.153	OK
+1.20D+0.20S	0.541	-X	Bottom	0.1728	Min Temp %	0.4	8.153	OK
+1.20D+0.20S	0.541	+X	Bottom	0.1728	Min Temp %	0.4	8.153	OK

Units : k

One Way Shear

Load Combination...	vu @ -X	vu @ +X	vu:Max	Phi vn	vu / Phi vn	Status
+1.20D+0.50Lr	11.1 psi	11.1 psi	11.1 psi	56.5 psi	0.197	OK
+1.20D+0.50S	11.3 psi	11.3 psi	11.3 psi	56.5 psi	0.200	OK
+1.20D+1.60Lr	12.4 psi	12.4 psi	12.4 psi	56.5 psi	0.220	OK
+1.20D+1.60S	12.9 psi	12.9 psi	12.9 psi	56.5 psi	0.229	OK
+0.90D	7.9 psi	7.9 psi	7.9 psi	56.5 psi	0.140	OK
+1.20D+0.20S	10.8 psi	10.8 psi	10.8 psi	56.5 psi	0.192	OK

Wall Footing

Project File: Enercalc_Puyallup Storage.ec

LIC# : KW-06012482, Build:20.24.10.03

FACET

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: WF2

Code References

Calculations per ACI 318-19, IBC 2021, ASCE 7-16
Load Combinations Used : ASCE 7-16

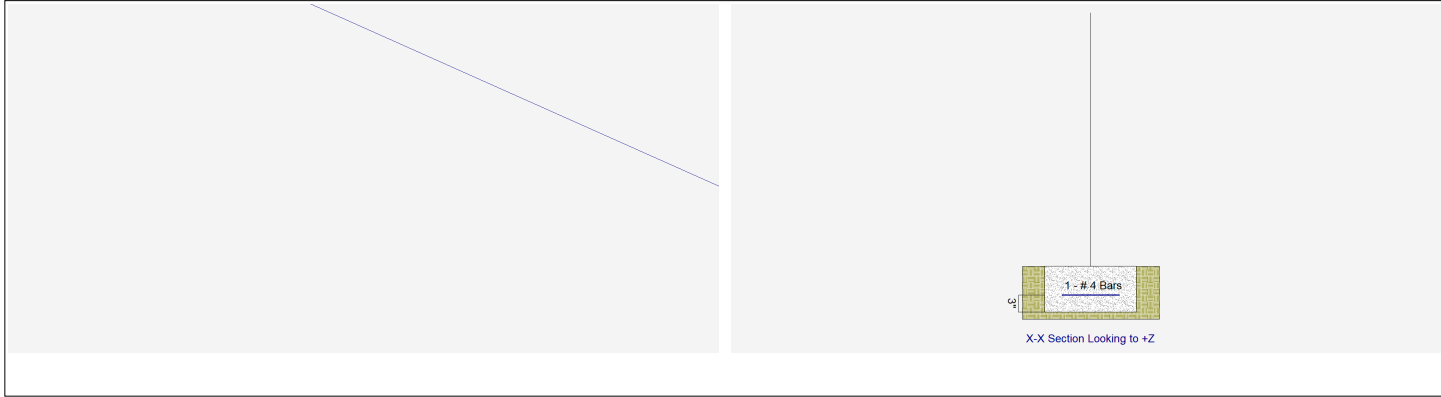
General Information

Material Properties			Soil Design Values		
f'c : Concrete 28 day strength	=	2.50 ksi	Allowable Soil Bearing	=	1.50 ksf
fy : Rebar Yield	=	40.0 ksi	Increase Bearing By Footing Weight	=	No
Ec : Concrete Elastic Modulus	=	2,850.0 ksi	Soil Passive Resistance (for Sliding)	=	250.0 pcf
Concrete Density	=	145.0 pcf	Soil/Concrete Friction Coeff.	=	0.30
φ Values Flexure	=	0.90	Increases based on footing Depth		
Shear	=	0.750	Reference Depth below Surface	=	ft
Analysis Settings			Allow. Pressure Increase per foot of depth	=	ksf
Min Steel % Bending Reinf.	=		when base footing is below	=	ft
Min Allow % Temp Reinf.	=	0.00180	Increases based on footing Width		
Min. Overturning Safety Factor	=	1.0 : 1	Allow. Pressure Increase per foot of width	=	ksf
Min. Sliding Safety Factor	=	1.0 : 1	when footing is wider than	=	ft
AutoCalc Footing Weight as DL :	=	Yes	Adjusted Allowable Bearing Pressure	=	1.50 ksf

Dimensions

Footing Width	=	1.330 ft	Footing Thickness	=	8.0 in	Bars along X-X Axis	
Wall Thickness	=	in	Rebar Centerline to Edge of Concrete...			# of Bars in 12" Width	= 1
Wall center offset			at Bottom of footing	=	3.0 in	Reinforcing Bar Size	= # 4
from center of footing	=	0 in					

Reinforcing



Applied Loads

		D	Lr	L	S	W	E	H
P : Column Load	=	0.5740	0.3150	0.5850	0			k
OB : Overburden	=							ksf
V-x	=							k
M-zz	=							k-ft
Vx applied	=							in above top of footing

Wall Footing

Project File: Enercalc_Puyallup Storage.ec

LIC# : KW-06012482, Build:20.24.10.03

FACET

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: WF2**DESIGN SUMMARY****Design OK**

Factor of Safety	Item	Applied	Capacity	Governing Load Combination
PASS	n/a	Overturning - Z-Z	0.0 k-ft	No Overturning
PASS	n/a	Sliding - X-X	0.0 k	No Sliding
PASS	n/a	Uplift	0.0 k	No Uplift
Utilization Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.6905	Soil Bearing	1.036 ksf	+D+0.750Lr+0.750L
PASS	0.1108	Z Flexure (+X)	0.3220 k-ft	+1.20D+0.50Lr+1.60L
PASS	0.03618	Z Flexure (-X)	0.1051 k-ft	+0.90D
PASS	0.1296	1-way Shear (+X)	5.8 psi	+1.20D+0.50Lr+1.60L
PASS	0.1296	1-way Shear (-X)	5.8 psi	+1.20D+0.50Lr+1.60L

Detailed Results**Soil Bearing**

Rotation Axis & Load Combination...	Gross Allowable	Xecc	Actual Soil Bearing Stress		Actual / Allowable Ratio
			-X	+X	
D Only	1.50 ksf	0.0 in	0.5282 ksf	0.5282 ksf	0.352
+D+L	1.50 ksf	0.0 in	0.9681 ksf	0.9681 ksf	0.645
+D+Lr	1.50 ksf	0.0 in	0.7651 ksf	0.7651 ksf	0.510
+D+0.750Lr+0.750L	1.50 ksf	0.0 in	1.036 ksf	1.036 ksf	0.691
+D+0.750L	1.50 ksf	0.0 in	0.8581 ksf	0.8581 ksf	0.572
+0.60D	1.50 ksf	0.0 in	0.3169 ksf	0.3169 ksf	0.211

Units : k-ft

Overturning Stability

Rotation Axis & Load Combination...	Overturning Moment	Resisting Moment	Stability Ratio	Status
Footing Has NO Overturning				

Sliding Stability

Force Application Axis Load Combination...	Sliding Force	Resisting Force	Sliding SafetyRatio	Status
Footing Has NO Sliding				

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Which Side ?	Tension @ Bot. or Top ?	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
+1.20D+0.50Lr+1.60L	0.322	-X	Bottom	0.1728	Min Temp %	0.2	2.906	OK
+1.20D+0.50Lr+1.60L	0.322	+X	Bottom	0.1728	Min Temp %	0.2	2.906	OK
+1.20D+1.60L	0.2958	-X	Bottom	0.1728	Min Temp %	0.2	2.906	OK
+1.20D+1.60L	0.2958	+X	Bottom	0.1728	Min Temp %	0.2	2.906	OK
+1.20D+1.60Lr+L	0.3212	-X	Bottom	0.1728	Min Temp %	0.2	2.906	OK
+1.20D+1.60Lr+L	0.3212	+X	Bottom	0.1728	Min Temp %	0.2	2.906	OK
+1.20D+1.60Lr	0.224	-X	Bottom	0.1728	Min Temp %	0.2	2.906	OK
+1.20D+1.60Lr	0.224	+X	Bottom	0.1728	Min Temp %	0.2	2.906	OK
+1.20D+L	0.2374	-X	Bottom	0.1728	Min Temp %	0.2	2.906	OK
+1.20D+L	0.2374	+X	Bottom	0.1728	Min Temp %	0.2	2.906	OK
+1.20D	0.1402	-X	Bottom	0.1728	Min Temp %	0.2	2.906	OK
+1.20D	0.1402	+X	Bottom	0.1728	Min Temp %	0.2	2.906	OK
+1.20D+0.50Lr+L	0.2636	-X	Bottom	0.1728	Min Temp %	0.2	2.906	OK
+1.20D+0.50Lr+L	0.2636	+X	Bottom	0.1728	Min Temp %	0.2	2.906	OK
+0.90D	0.1051	-X	Bottom	0.1728	Min Temp %	0.2	2.906	OK
+0.90D	0.1051	+X	Bottom	0.1728	Min Temp %	0.2	2.906	OK

Units : k

One Way Shear

Load Combination...	vu @ -X	vu @ +X	vu:Max	Phi vn	vu / Phi vn	Status
+1.20D+0.50Lr+1.60L	5.8 psi	5.8 psi	5.8 psi	44.8 psi	0.130	OK
+1.20D+1.60L	5.3 psi	5.3 psi	5.3 psi	44.8 psi	0.119	OK
+1.20D+1.60Lr+L	5.8 psi	5.8 psi	5.8 psi	44.8 psi	0.129	OK
+1.20D+1.60Lr	4.0 psi	4.0 psi	4.0 psi	44.8 psi	0.090	OK
+1.20D+L	4.3 psi	4.3 psi	4.3 psi	44.8 psi	0.096	OK
+1.20D	2.5 psi	2.5 psi	2.5 psi	44.8 psi	0.056	OK

Wall Footing

Project File: Enercalc_Puyallup Storage.ec

LIC# : KW-06012482, Build:20.24.10.03FACET(c) ENERCALC, LLC 1982-2024

DESCRIPTION: WF2

One Way ShearUnits : k

Load Combination...	vu @ -X	vu @ +X	vu:Max	Φ vn	vu / Φ vn	Status
+1.20D+0.50Lr+L	4.8 psi	4.8 psi	4.8 psi	44.8 psi	0.106	OK
+0.90D	1.9 psi	1.9 psi	1.9 psi	44.8 psi	0.042	OK

Wall Footing

Project File: Enercalc_Puyallup Storage.ec

LIC# : KW-06012482, Build:20.24.10.03

FACET

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: WF3

Code References

Calculations per ACI 318-19, IBC 2021, ASCE 7-16
Load Combinations Used : ASCE 7-16

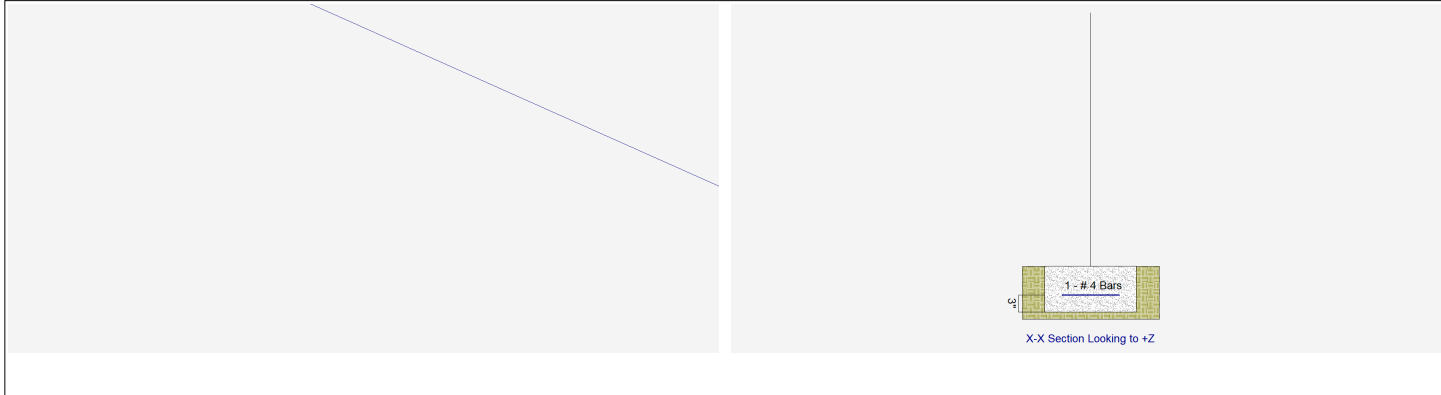
General Information

Material Properties			Soil Design Values		
f'c : Concrete 28 day strength	=	2.50 ksi	Allowable Soil Bearing	=	1.50 ksf
fy : Rebar Yield	=	40.0 ksi	Increase Bearing By Footing Weight	=	No
Ec : Concrete Elastic Modulus	=	2,850.0 ksi	Soil Passive Resistance (for Sliding)	=	250.0 pcf
Concrete Density	=	145.0 pcf	Soil/Concrete Friction Coeff.	=	0.30
φ Values Flexure	=	0.90	Increases based on footing Depth		
Shear	=	0.750	Reference Depth below Surface	=	ft
Analysis Settings			Allow. Pressure Increase per foot of depth	=	ksf
Min Steel % Bending Reinf.	=		when base footing is below	=	ft
Min Allow % Temp Reinf.	=	0.00180	Increases based on footing Width		
Min. Overturning Safety Factor	=	1.0 : 1	Allow. Pressure Increase per foot of width	=	ksf
Min. Sliding Safety Factor	=	1.0 : 1	when footing is wider than	=	ft
AutoCalc Footing Weight as DL :	=	Yes	Adjusted Allowable Bearing Pressure	=	1.50 ksf

Dimensions

Footing Width	=	1.330 ft	Footing Thickness	=	8.0 in	Bars along X-X Axis	
Wall Thickness	=	in	Rebar Centerline to Edge of Concrete...			# of Bars in 12" Width	= 1
Wall center offset			at Bottom of footing	=	3.0 in	Reinforcing Bar Size	= # 4
from center of footing	=	0 in					

Reinforcing



Applied Loads

		D	Lr	L	S	W	E	H
P : Column Load	=	.432	0.0	1.190				k
OB : Overburden	=							ksf
V-x	=							k
M-zz	=							k-ft
Vx applied	=							in above top of footing

Wall Footing

Project File: Enercalc_Puyallup Storage.ec

LIC# : KW-06012482, Build:20.24.10.03

FACET

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: WF3**DESIGN SUMMARY****Design OK**

Factor of Safety	Item	Applied	Capacity	Governing Load Combination
PASS	n/a	Overturning - Z-Z	0.0 k-ft	No Overturning
PASS	n/a	Sliding - X-X	0.0 k	No Sliding
PASS	n/a	Uplift	0.0 k	No Uplift
Utilization Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.8775	Soil Bearing	1.316 ksf	+D+L
PASS	0.1474	Z Flexure (+X)	0.4284 k-ft	+1.20D+1.60L
PASS	0.02886	Z Flexure (-X)	0.08388 k-ft	+0.90D
PASS	0.1725	1-way Shear (+X)	7.7 psi	+1.20D+1.60L
PASS	0.1725	1-way Shear (-X)	7.7 psi	+1.20D+1.60L

Detailed Results**Soil Bearing**

Rotation Axis & Load Combination...	Gross Allowable	Xecc	Actual Soil Bearing Stress		Actual / Allowable Ratio
			-X	+X	
D Only	1.50 ksf	0.0 in	0.4215 ksf	0.4215 ksf	0.281
+D+L	1.50 ksf	0.0 in	1.316 ksf	1.316 ksf	0.878
+D+0.750L	1.50 ksf	0.0 in	1.093 ksf	1.093 ksf	0.728
+0.60D	1.50 ksf	0.0 in	0.2529 ksf	0.2529 ksf	0.169

Overturning Stability

Units : k-ft

Rotation Axis & Load Combination...	Overturning Moment	Resisting Moment	Stability Ratio	Status
Footing Has NO Overturning				

Sliding Stability

Force Application Axis Load Combination...	Sliding Force	Resisting Force	Sliding SafetyRatio	Status
Footing Has NO Sliding				

Footing Flexure

Flexure Axis & Load Combination	Mu k-ft	Which Side ?	Tension @ Bot. or Top ?	As Req'd in^2	Gvrn. As in^2	Actual As in^2	Phi*Mn k-ft	Status
+1.20D+1.60L	0.4284	-X	Bottom	0.1728	Min Temp %	0.2	2.906	OK
+1.20D+1.60L	0.4284	+X	Bottom	0.1728	Min Temp %	0.2	2.906	OK
+1.20D+L	0.3097	-X	Bottom	0.1728	Min Temp %	0.2	2.906	OK
+1.20D+L	0.3097	+X	Bottom	0.1728	Min Temp %	0.2	2.906	OK
+1.20D	0.1118	-X	Bottom	0.1728	Min Temp %	0.2	2.906	OK
+1.20D	0.1118	+X	Bottom	0.1728	Min Temp %	0.2	2.906	OK
+0.90D	0.08388	-X	Bottom	0.1728	Min Temp %	0.2	2.906	OK
+0.90D	0.08388	+X	Bottom	0.1728	Min Temp %	0.2	2.906	OK

Units : k

One Way Shear

Load Combination...	vu @ -X	vu @ +X	vu:Max	Φ vn	vu / Φ vn	Status
+1.20D+1.60L	7.7 psi	7.7 psi	7.7 psi	44.8 psi	0.173	OK
+1.20D+L	5.6 psi	5.6 psi	5.6 psi	44.8 psi	0.125	OK
+1.20D	2.0 psi	2.0 psi	2.0 psi	44.8 psi	0.045	OK
+0.90D	1.5 psi	1.5 psi	1.5 psi	44.8 psi	0.034	OK

General Footing

Project File: Enercalc_Puyallup Storage.ec

LIC#: KW-06012482, Build:20.24.10.03

FACET

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: F2**Code References**

Calculations per ACI 318-19, IBC 2021, SDPWS 2021

Load Combinations Used : ASCE 7-16

General Information**Material Properties**

f'c : Concrete 28 day strength	=	2.50 ksi
fy : Rebar Yield	=	40.0 ksi
Ec : Concrete Elastic Modulus	=	2,850.0 ksi
Concrete Density	=	145.0 pcf
φ Values Flexure	=	0.90
Shear	=	0.750

Analysis Settings

Min Steel % Bending Reinf.	=	
Min Allow % Temp Reinf.	=	0.00180
Min. Overturning Safety Factor	=	1.0 : 1
Min. Sliding Safety Factor	=	1.0 : 1
Add Ftg Wt for Soil Pressure	:	Yes
Use ftg wt for stability, moments & shears	:	Yes
Add Pedestal Wt for Soil Pressure	:	No
Use Pedestal wt for stability, mom & shear	:	No

Soil Design Values

Allowable Soil Bearing	=	1.50 ksf
Soil Density	=	110.0 pcf
Increase Bearing By Footing Weight	=	No
Soil Passive Resistance (for Sliding)	=	250.0 pcf
Soil/Concrete Friction Coeff.	=	0.30

Increases based on footing Depth

Footing base depth below soil surface	=	ft
Allow press. increase per foot of depth when footing base is below	=	ksf
	=	ft

Increases based on footing plan dimension

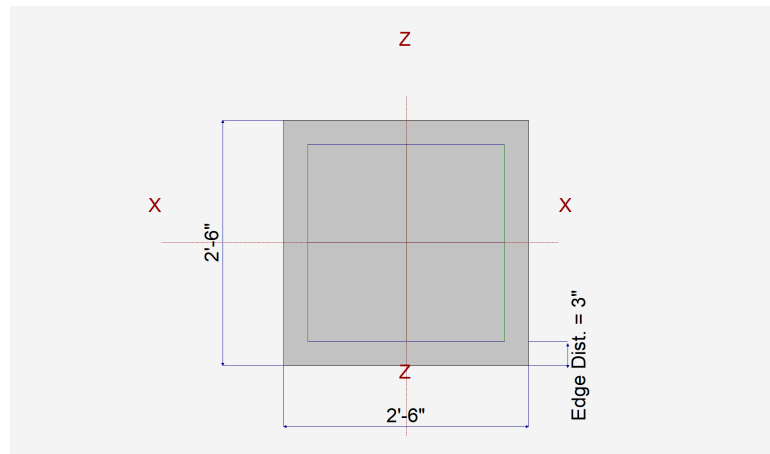
Allowable pressure increase per foot of depth when max. length or width is greater than	=	ksf
	=	ft

Dimensions

Width parallel to X-X Axis	=	2.50 ft
Length parallel to Z-Z Axis	=	2.50 ft
Footing Thickness	=	8.0 in

Pedestal dimensions...

px : parallel to X-X Axis	=	in
pz : parallel to Z-Z Axis	=	in
Height	=	in
Rebar Centerline to Edge of Concrete... at Bottom of footing	=	3.0 in

**Reinforcing**

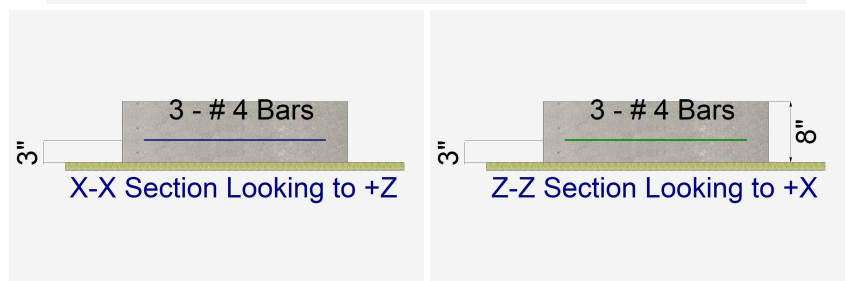
Bars parallel to X-X Axis	=	
Number of Bars	=	3
Reinforcing Bar Size	=	# 4

Bars parallel to Z-Z Axis	=	
Number of Bars	=	3
Reinforcing Bar Size	=	# 4

Bandwidth Distribution Check (ACI 15.4.4.2)

Direction Requiring Closer Separation

# Bars required within zone	n/a
# Bars required on each side of zone	n/a

**Applied Loads**

	D	Lr	L	S	W	E	H
P : Column Load	=	3.170	1.30	2.630	1.630		k
OB : Overburden	=						ksf
M-xx	=						k-ft
M-zz	=						k-ft
V-x	=						k
V-z	=						k

General Footing

Project File: Enercalc_Puyallup Storage.ec

LIC# : KW-06012482, Build:20.24.10.03

FACET

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: F2**DESIGN SUMMARY****Design OK**

	Min. Ratio	Item	Applied	Capacity	Governing Load Combination
PASS	0.7433	Soil Bearing	1.115 ksf	1.50 ksf	+D+0.750L+0.750S about Z-Z axis
PASS	n/a	Overturning - X-X	0.0 k-ft	0.0 k-ft	No Overturning
PASS	n/a	Overturning - Z-Z	0.0 k-ft	0.0 k-ft	No Overturning
PASS	n/a	Sliding - X-X	0.0 k	0.0 k	No Sliding
PASS	n/a	Sliding - Z-Z	0.0 k	0.0 k	No Sliding
PASS	n/a	Uplift	0.0 k	0.0 k	No Uplift
PASS	0.3262	Z Flexure (+X)	1.130 k-ft/ft	3.464 k-ft/ft	+1.20D+L+1.60S
PASS	0.3262	Z Flexure (-X)	1.130 k-ft/ft	3.464 k-ft/ft	+1.20D+L+1.60S
PASS	0.3262	X Flexure (+Z)	1.130 k-ft/ft	3.464 k-ft/ft	+1.20D+L+1.60S
PASS	0.3262	X Flexure (-Z)	1.130 k-ft/ft	3.464 k-ft/ft	+1.20D+L+1.60S
PASS	0.4177	1-way Shear (+X)	19.892 psi	47.622 psi	+1.20D+L+1.60S
PASS	0.4177	1-way Shear (-X)	19.892 psi	47.622 psi	+1.20D+L+1.60S
PASS	0.4177	1-way Shear (+Z)	19.892 psi	47.622 psi	+1.20D+L+1.60S
PASS	0.4177	1-way Shear (-Z)	19.892 psi	47.622 psi	+1.20D+L+1.60S
PASS	0.5874	2-way Punching	88.105 psi	150.0 psi	+1.20D+L+1.60S

Combined Footing

Project File: Enercalc_Puyallup Storage.ec

LIC#: KW-06012482, Build:20.24.10.03

FACET

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: F2x3**Code References**

Calculations per ACI 318-19, IBC 2021, SDPWS 2021

Load Combinations Used : ASCE 7-16

General Information**Material Properties**

f'_c : Concrete 28 day strength	2.50 ksi
f_y : Rebar Yield	60.0 ksi
E_c : Concrete Elastic Modulus	2,850.0 ksi
Concrete Density	145.0 pcf
ϕ : Phi Values	
Flexure :	0.90
Shear :	0.750

Analysis/Design Settings

Calculate footing weight as dead load ?	Yes
Calculate Pedestal weight as dead load ?	No
Min Steel % Bending Reinf (based on 'd')	
Min Allow % Temp Reinf (based on thick)	0.00180
Min. Overturning Safety Factor	1.0: 1
Min. Sliding Safety Factor	1.0: 1

Soil Information

Allowable Soil Bearing	1.50 ksf
Increase Bearing By Footing Weight	No
Soil Passive Sliding Resistance	250.0 pcf
(Uses entry for "Footing base depth below soil surface" for force)	
Coefficient of Soil/Concrete Friction	0.30

Soil Bearing Increase

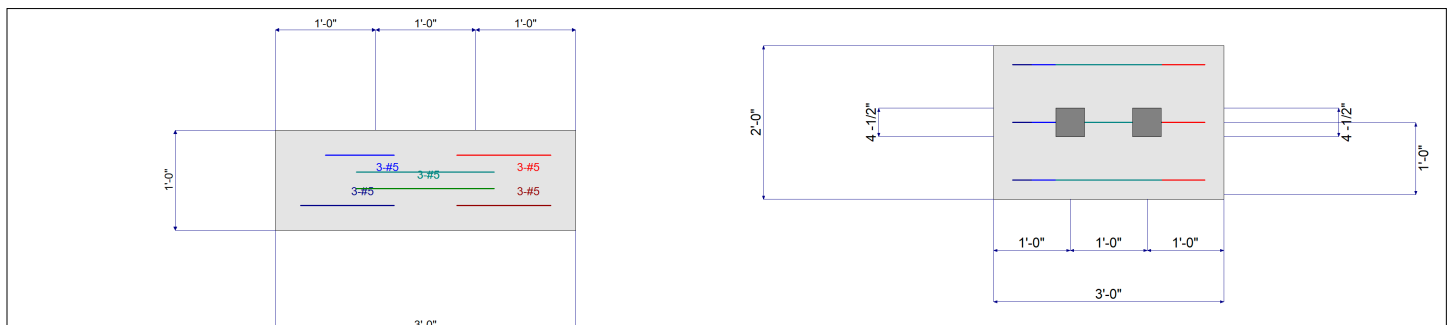
Footing base depth below soil surface	ft
Increases based on footing Depth	
Allowable pressure increase per foot when base of footing is below	ksf
	ft
Increases based on footing Width . . .	
Allowable pressure increase per foot when maximum length or width is greater than	ksf
	ft
Maximum Allowed Bearing Pressure	10.0 ksf
(A value of zero implies no limit)	
Adjusted Allowable Soil Bearing	ksf
(Allowable Soil Bearing adjusted for footing weight and depth & width increases as specified by user.)	

Dimensions & Reinforcing

Distance Left of Column #1	=	1.0 ft	Pedestal dimensions...		Col #1	Col #2	Bars left of Col #1	Count	Size #	As Provided	As Req'd
Between Columns	=	1.0 ft									
Distance Right of Column #2	=	1.0 ft	Sq. Dim. =	4.50	4.50 in	in	Bottom Bars	3.0	5	0.930	0.5184 in^2
Total Footing Length	=	ft									
Footing Width	=	2.0 ft	Height =				Bars Btwn Cols	Bottom Bars	3.0	5	0.930
Footing Thickness	=	12.0 in									
Rebar Center to Concrete Edge @ Top	=	3.0 in					Bars Right of Col #2	Bottom Bars	3.0	5	0.930
Rebar Center to Concrete Edge @ Bottom	=	3.0 in									
							Top Bars	3.0	5	0.930	0.0 in^2
							Top Bars	3.0	5	0.930	0.0 in^2
							Top Bars	3.0	5	0.930	0.0 in^2

Applied Loads

Applied @ Left Column	D	Lr	L	S	W	E	H
Axial Load Downward	=	2.120	1.540		1.690		k
Moment (+CW)	=						k-ft
Shear (+X)	=						k
Applied @ Right Column							
Axial Load Downward	=	1.940	1.580		1.379		k
Moment (+CW)	=						k-ft
Shear (+X)	=						k
Overburden	=						



Combined Footing

Project File: Enercalc_Puyallup Storage.ec

LIC# : KW-06012482, Build:20.24.10.03

FACET

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: F2x3**DESIGN SUMMARY****Design OK**

Factor of Safety	Item	Applied	Capacity	Governing Load Combination
PASS	No OTM	Overturning	0.0 k-ft	No OTM
PASS	No Sliding	Sliding	0.0 k	No Sliding
PASS	No Uplift	Uplift	0.0 k	No Uplift

Utilization Ratio	Item	Applied	Capacity	Governing Load Combination	
PASS	0.943	Soil Bearing	1.415 ksf	1.50 ksf	+D+S
PASS	0.020	1-way Shear - Col #1	1.0 psi	48.8 psi	+1.20D+1.60S
PASS	0.018	1-way Shear - Col #2	0.9 psi	48.8 psi	+1.20D+1.60Lr
PASS	0.043	2-way Punching - Col #1	6.4 psi	150.0 psi	+1.20D+1.60S
PASS	0.044	2-way Punching - Col #2	6.4 psi	150.0 psi	+1.20D+1.60S
PASS	No Bending	Flexure - Left of Col #1 - Top	0.0 k-ft	0.0 k-ft	N/A
PASS	0.032	Flexure - Left of Col #1 - Bottom	1.134 k-ft	35.376 k-ft	+1.20D+1.60S
PASS	No Bending	Flexure - Between Cols - Top	0.0 k-ft	0.0 k-ft	N/A
PASS	0.040	Flexure - Between Cols - Bottom	1.433 k-ft	35.376 k-ft	+1.20D+1.60S
PASS	No Bending	Flexure - Right of Col #2 - Top	0.0 k-ft	0.0 k-ft	N/A
PASS	0.030	Flexure - Right of Col #2 - Bottom	1.065 k-ft	35.376 k-ft	+1.20D+1.60Lr

Soil Bearing

Load Combination...	Total Bearing	Eccentricity from Ftg CL	Actual Soil Bearing Stress		Allowable	Actual / Allow Ratio
			@ Left Edge	@ Right Edge		
D Only	4.93 k	-0.018 ft	0.85 ksf	0.79 ksf	1.50 ksf	0.568
+D+Lr	8.05 k	-0.009 ft	1.36 ksf	1.32 ksf	1.50 ksf	0.910
+D+S	8.00 k	-0.031 ft	1.41 ksf	1.25 ksf	1.50 ksf	0.943
+D+0.750Lr	7.27 k	-0.010 ft	1.24 ksf	1.19 ksf	1.50 ksf	0.824
+D+0.750S	7.23 k	-0.029 ft	1.27 ksf	1.14 ksf	1.50 ksf	0.849
+0.60D	2.96 k	-0.018 ft	0.51 ksf	0.48 ksf	1.50 ksf	0.341

Overturning Stability

Load Combination...	Moments about Left Edge k-ft			Moments about Right Edge k-ft		
	Overturning	Resisting	Ratio	Overturning	Resisting	Ratio
D Only	0.00	0.00	999.000	0.00	0.00	999.000
+D+Lr	0.00	0.00	999.000	0.00	0.00	999.000
+D+S	0.00	0.00	999.000	0.00	0.00	999.000
+D+0.750Lr	0.00	0.00	999.000	0.00	0.00	999.000
+D+0.750S	0.00	0.00	999.000	0.00	0.00	999.000
+0.60D	0.00	0.00	999.000	0.00	0.00	999.000

Sliding Stability

Load Combination...	Sliding Force	Resisting Force	Sliding SafetyRatio
D Only	0.00 k	1.48 k	999
+D+Lr	0.00 k	2.42 k	999
+D+S	0.00 k	2.40 k	999
+D+0.750Lr	0.00 k	2.18 k	999
+D+0.750S	0.00 k	2.17 k	999
+0.60D	0.00 k	0.89 k	999

Z-Axis Footing Flexure - Maximum Values for Load Combination

Load Combination...	Mu (ft-k)	Distance from left (ft)	Tension Side	As Req'd (in^2)	Governed by	Actual As (in^2)	Phi*Mn (ft-k)	Mu / PhiMn
+0.60D	0.000	0.000	0	0.000	0	0.000	0.000	0.000
+0.60D	0.000	0.008	0	0.000	0	0.000	0.000	0.000
+0.60D	0.000	0.015	0	0.000	0	0.000	0.000	0.000
+0.60D	0.000	0.023	0	0.000	0	0.000	0.000	0.000
+0.60D	0.000	0.030	0	0.000	0	0.000	0.000	0.000
+0.60D	0.000	0.038	0	0.000	0	0.000	0.000	0.000
+0.60D	0.000	0.045	0	0.000	0	0.000	0.000	0.000
+0.60D	0.000	0.053	0	0.000	0	0.000	0.000	0.000
+0.60D	0.000	0.060	0	0.000	0	0.000	0.000	0.000

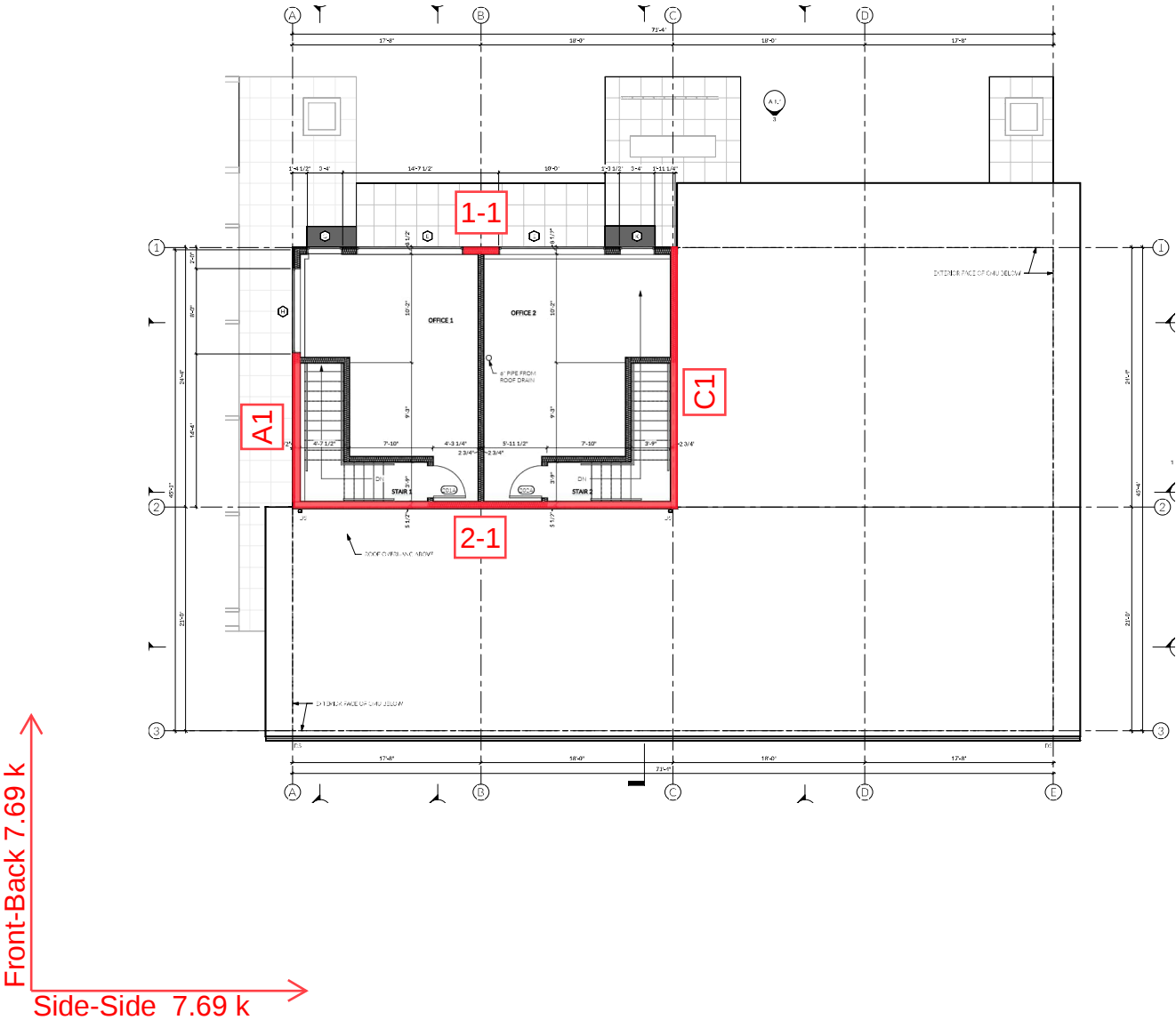


STRUCTURAL CALCULATIONS

LATERAL DESIGN

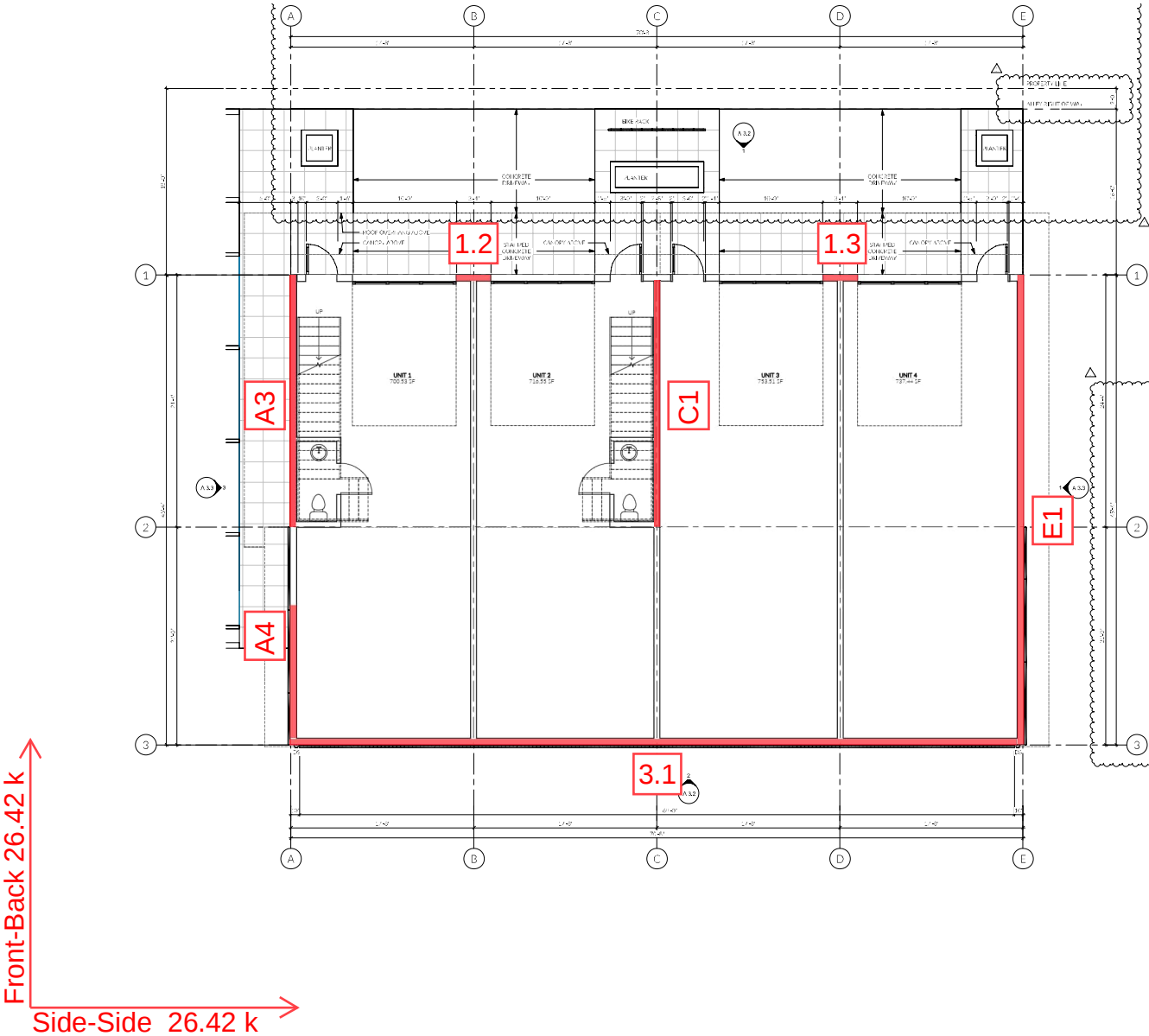
PUYALLUP STORAGE PUYALLUP, WA

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L2 Shear Wall Keyplan

Scale: 1/16" = 1'



L1 Shear Wall Keyplan

Scale: 1/16" = 1'

Project: Puyallup Storage
Description: Wind Base Shear

Assmptions:

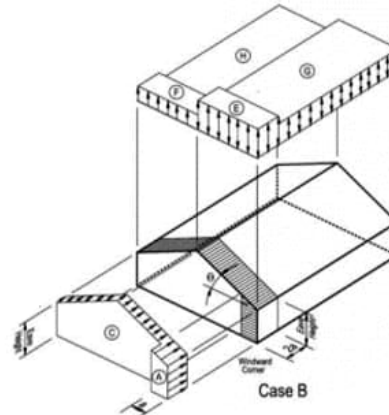
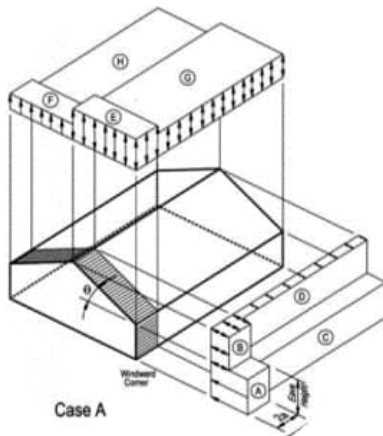
Enclosed structure with simple diaphragm low-rised with flat, gable or hip roofs.

Reference from ASCE 7-16

Site Data
Residence

Risk Category	$I_w =$	II	Table 1.5-1
Basic Wind Speed	$V =$	110 mph	Figs 26.5-1 or 26.5-2
Exposure Category		B	Section 26.7
Topographic Factor	$K_{zt} =$	1.00	Section 26.8
Mean roof height	$h =$	22.50 ft	
Floor Depth	$J =$	11.88 in	
Adjustment Factor for Height & Exposure	$\lambda =$	1.00	Figure 28.5-1
Front/Back Dimension	$B =$	70.67	
Front/Back Roof Pitch:	0 :12	$\Theta_B = 0.00^\circ$	Hip
Side/Side Dimension	$L =$	45.50	
End Zone Width	$a_B =$	9.10	
Side/Side Roof Pitch:	0 :12	$\Theta_L = 0.00^\circ$	Hip
End Zone Width	$a_L =$	9.10	

Design wind pressure are determine from the following equation and Figure 28.5-1



ASCE 7-16 F28.5-1 for V= 110 mph

Roof Angle	Load Case	A	B	C	D
5	1	19.2	-10.0	12.7	-5.9
10	1	21.6	-9.0	14.4	-5.2
15	1	24.1	-8.0	16.0	-4.6
20	1	26.6	-7.0	17.7	-3.9
25	1	24.1	3.9	17.4	4.0
30	1	21.6	14.8	17.2	11.8
45	1	21.6	14.8	17.2	11.8
25	2	--	--	--	--
30	2	21.6	14.8	17.2	11.8
45	2	21.6	14.8	17.2	11.8

Design Wind Presures, p_s

$$p_s = \lambda K_{zt} p_{s30}$$

Direction	Roof Angle	HORIZONTAL LOAD (LRFD, psf)			
		End zone		Interior zone	
		Wall A	Roof B	Wall C	Roof D
F/B	0.00	19.20	0.00	12.70	0.00
S/S	0.00	19.20	0.00	12.70	0.00

Project: Puyallup Storage

HORIZONTAL WIND FORCES:

Front/Back Direction:

Location		Width	Height	Plane	End Zone	End Zone		Int Zone	Int Zone		LRFD Force	ASD Force	MIN Force	Force Used
		feet	feet		length	A	B	length	C	D	kips	kips	kips	kips
ROOF	Top Roof to Eave	0.0	0.00	roof	9.10	19.20	0.00	-9.1	12.70	0.00	0.00	0.00	0.00	
	Eave to Midwall	35.8	5.25	wall	9.10	19.20	0.00	26.7	12.70	0.00	2.69	1.62	1.80	
											$\Sigma =$	2.69	1.62	1.80
2nd Flr	Mid to Floor	35.8	5.25	wall	9.1	19.20	0.00	26.7	12.70	0.00	2.69	1.62	1.80	
	Low Roof to Plate	35.8	0.00	Hip	9.1	19.20	0.00	26.7	12.70	0.00	0.00	0.00	0.00	
	Floor to Mid	70.7	7.92	wall	9.1	19.20	0.00	61.6	12.70	0.00	7.58	4.55	5.37	
											$\Sigma =$	10.27	6.16	7.17

Total Wind Base Shear (ASD, kips), $V_{Side} = 8.98$

Side/Side Direction:

Location		Width	Height	Plane	End Zone	End Zone		Int Zone	Int Zone		LRFD Force	ASD Force	MIN Force	Force Used
		feet	feet		length	A	B	length	C	D	kips	kips	kips	kips
ROOF	Top Roof to Eave	0.0	0.00	roof	9.1	19.20	0.00	-9.1	12.70	0.00	0.00	0.00	0.00	
	Eave to Midwall	24.5	5.25	wall	9.1	19.20	0.00	15.4	12.70	0.00	1.94	1.17	1.23	
											$\Sigma =$	1.94	1.17	1.23
2nd Flr	Mid to Floor	24.5	5.25	wall	9.1	19.20	0.00	15.4	12.70	0.00	1.94	1.17	1.23	
	Low Roof to Plate	21.0	0.00	Hip	9.1	19.20	0.00	11.9	12.70	0.00	0.00	0.00	0.00	
	Floor to Mid	45.5	7.92	wall	9.1	19.20	0.00	36.4	12.70	0.00	5.05	3.03	3.46	
											$\Sigma =$	6.99	4.19	4.69

Total Wind Base Shear (ASD, kips), $V_{Side} = 5.93$



FACET

Date: 10/9/2024

Made By: LAO

Project: Puyallup Storage
Description: Seismic Weights

DEAD LOAD WEIGHTS FOR SEISMIC CALCULATIONS:

Unit Roof Weight: 17 psf Unit Exterior Wall Wt. 10 psf
Unit Floor Weight: 25 psf
Unit CMU Exterior Wall Wt: 82 psf
Unit Interior Wall Wt: 10 psf

		AREA / LENGTH	HEIGHT	UNIT WT.		Total Wt.	Sub-Total	
		sf / ft	ft	psf		(lbs)	(kips)	
ROOF LEVEL:	Roof	1424	1	17	=	24208		
	Ext. Wall Below	118	5.25	10	=	6195		
	Int. Wall Below	51	5.25	10	=	2678		
							33.1 Kips	
2nd FLOOR LEVEL:	Floor	690	1	25	=	17250		
	Low Roof	2748	1	17	=	46716		
	CMU Ext. Wall Above	45	3.08	82	=	11365		
	Ext. Wall Above	45	1.67	10	=	752		
	Ext. Wall Above	74	5.25	10	=	3885		
	Int. Wall Above	51	5.25	10	=	2678		
	Ext. Wall Below	14.67	6	10	=	880		
	Ext Wall Below	14.67	4	10	=	587		
	CMU Ext Wall Below	14.67	2	82	=	2406		
	CMU Ext Wall Below	30	6	82	=	14760		
	12' Floor Level	Interior Below	65	6	82	=	31980	
	15' Wall	CMU Ext. Wall Below	30	5.08	82	=	12497	
Ext. Wall Below		30	2.33	10	=	699		
CMU Ext. Wall Below		144	7.67	10	=	11045		
Int. Wall Below		85	7.67	10	=	6520		
						164.0 Kips		
Ground Level:	CMU Ext. Wall Above	30	6.0	10	=	1800		
	CMU Int. Wall Above	65	6.0	82	=	31980		
	Ext. Wall Above	29.34	6.0	10	=	1760		
	CMU Ext. Wall Above	144	7.7	82	=	90567		
	Int. Wall Above	115	7.7	10	=	8821		
						134.9 Kips		
STRUCTURE WEIGHT FOR SEISMIC BASE SHEAR:						197.1 Kips		
TOTAL WEIGHT OF STRUCTURE:						332.0 Kips		


FACET

Date: 10/9/2024

Made By: LAO

Project: Puyallup Storage

Description: Seismic Story Shear

ASCE 7-16

Seismic Use Group = II From Table 1.5-1

Site Classification = D

Geotech Report Provided = No

Refer to attached sheet for Map specified variables

$$S_s = 1.269 \quad F_a = 1.200 \text{ (Table 11.4-1)}$$

$$S_1 = 0.437 \quad F_v = 1.863 \text{ (Table 11.4-1)}$$

$$S_{DS} = 1.015 = 0.67 * F_a * S_s \text{ (11.4-1 & 11.4-3)}$$

$$S_{D1} = 0.543 = 0.67 * F_v * S_1 \text{ (11.4-2 & 11.4-4)}$$

$$\text{Building Height, } h_n = 22.5 \text{ ft}$$

$$\text{Building Period Coefficients, } C_T = 0.020 \quad \chi = 0.750 \text{ per Table 12.8-2}$$

$$\text{Approx. Fundamental Period, } T = 0.207 = C_T * (h_n)^{0.75} \text{ (12.8-7)}$$

$$\text{Response Spectrum, } S_a = 1.0152 \text{ (11.4-5 & 11.4-6)}$$

$$\text{Response Modification Factor, } R = 5$$

$$\text{Occupancy Importance Factor, } I = 1.0 \text{ per Table 1.5-2}$$

$$\text{Seismic Design Category} = D \text{ -11.6}$$

$$\text{Redundancy Factor, } \rho = \text{Calculation Required}$$

$$\text{Calculated Redundancy Factor, } \rho = 1.3$$

Seismic Response Coefficient

$$C_s = S_{DS}/R/I = 0.203 \text{ (12.8-2)}$$

$$C_{s, \text{MAX}} = S_{D1}/T(R/I) = 0.525 \text{ (12.8-3)}$$

$$C_{s, \text{MIN}} = 0.044 S_{DS} I = 0.045 \text{ (12.8-5)}$$

$$C_s = 0.203$$

Seismic Base Shear

$$\text{Seismic Base Shear, } V = 0.203 W \text{ (12.8-1)}$$

$$W = 197.101 \text{ kips}$$

$$V = 40.02 \text{ kips}$$

$$V_{\text{final}} = 0.7 \rho V = 36.42 \text{ kips}$$

Vertical Distribution of Seismic Forces

12.8.3

$$k = 1$$

Floor	Story Height H (ft)	Total Height h _x (ft)	Story Weight w _x (kips)	w _x h _x ^k (k-ft)	Story Force F _i (kips)	Story Shear V (kips)
Roof	10.50	22.50	33.1	744.3	9.99	9.99
Second	12.00	12.00	164.0	1968.2	26.42	36.42
Base	0.00	0.00	134.9	0.0	0.00	36.42

$$\text{Sum} = 2712.6$$



FACET

Date:

10/9/2024

Made By:

LAO

Project:

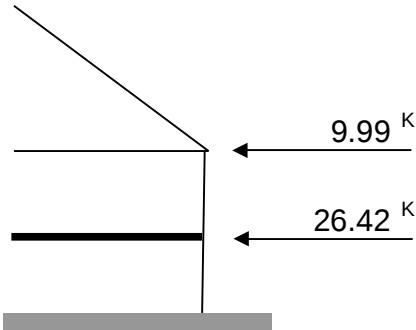
Puyallup Storage

Description:

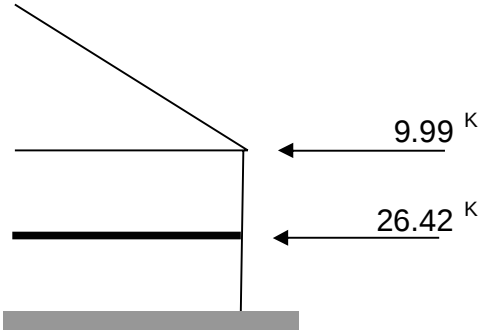
Lateral Design Load

Level	Wind Front/Back (kips)	Wind Side (kips)	Seismic (kips)
Roof	1.80	1.23	9.99
Second	7.17	4.69	26.42
Total	8.98	5.93	36.42

Controlling:
Front/Back - Seismic
Side - Seismic



Front/Back Direction



Side/Side Direction


FACET

Date: 10/9/2024

Made By: LAO

Project: Puyallup Storage

Description: Seismic Story Shear

ASCE 7-16

Seismic Use Group = II From Table 1.5-1

Site Classification = D

Geotech Report Provided = No

Refer to attached sheet for Map specified variables

$$S_s = 1.269 \quad F_a = 1.200 \text{ (Table 11.4-1)}$$

$$S_1 = 0.437 \quad F_v = 1.863 \text{ (Table 11.4-1)}$$

$$S_{DS} = 1.015 = 0.67 * F_a * S_s \text{ (11.4-1 & 11.4-3)}$$

$$S_{D1} = 0.543 = 0.67 * F_v * S_1 \text{ (11.4-2 & 11.4-4)}$$

$$\text{Building Height, } h_n = 22.5 \text{ ft}$$

$$\text{Building Period Coefficients, } C_T = 0.020 \quad \chi = 0.750 \text{ per Table 12.8-2}$$

$$\text{Approx. Fundamental Period, } T = 0.207 = C_T * (h_n)^{0.75} \text{ (12.8-7)}$$

$$\text{Response Spectrum, } S_a = 1.0152 \text{ (11.4-5 & 11.4-6)}$$

$$\text{Response Modification Factor, } R = 6.5$$

$$\text{Occupancy Importance Factor, } I = 1.0 \text{ per Table 1.5-2}$$

$$\text{Seismic Design Category} = D \text{ -11.6}$$

$$\text{Redundancy Factor, } \rho = \text{Calculation Required}$$

$$\text{Calculated Redundancy Factor, } \rho = 1.3$$

Seismic Response Coefficient

$$C_s = S_{DS}/R/I = 0.156 \text{ (12.8-2)}$$

$$C_{s, \text{MAX}} = S_{D1}/T(R/I) = 0.404 \text{ (12.8-3)}$$

$$C_{s, \text{MIN}} = 0.044 S_{DS} * I = 0.045 \text{ (12.8-5)}$$

$$C_s = 0.156$$

Seismic Base Shear

$$\text{Seismic Base Shear, } V = 0.156 W \text{ (12.8-1)}$$

$$W = 197.101 \text{ kips}$$

$$V = 30.78 \text{ kips}$$

$$V_{\text{final}} = 0.7 \rho V = 28.01 \text{ kips}$$

Vertical Distribution of Seismic Forces

12.8.3

$$k = 1$$

Floor	Story Height H (ft)	Total Height h _x (ft)	Story Weight w _x (kips)	w _x h _x ^k (k-ft)	Story Force F _i (kips)	Story Shear V (kips)
Roof	10.50	22.50	33.1	744.3	7.69	7.69
Second	12.00	12.00	164.0	1968.2	20.33	28.01
Base	0.00	0.00	134.9	0.0	0.00	28.01

$$\text{Sum} = 2712.6$$



FACET

Date:

10/9/2024

Made By:

LAO

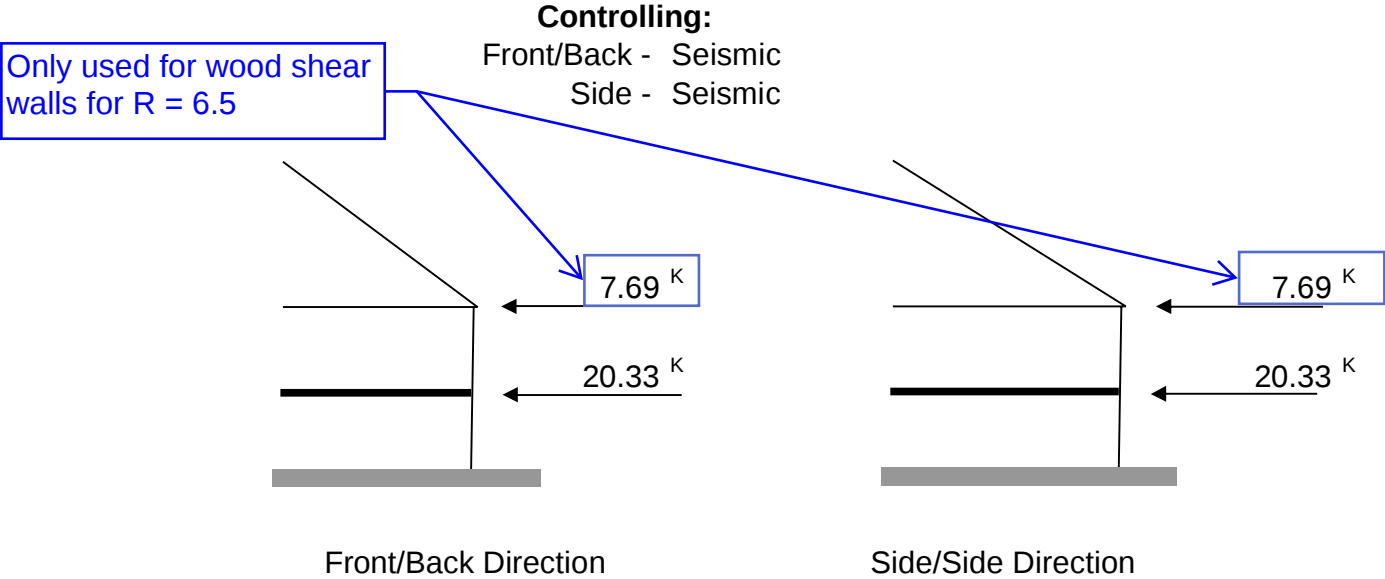
Project:

Puyallup Storage

Description:

Lateral Design Load

Level	Wind Front/Back (kips)	Wind Side (kips)	Seismic (kips)
Roof	1.80	1.23	7.69
Second	7.17	4.69	20.33
Total	8.98	5.93	28.01





Project:

Description:

Date:

Made By:

10/9/2024

LAO

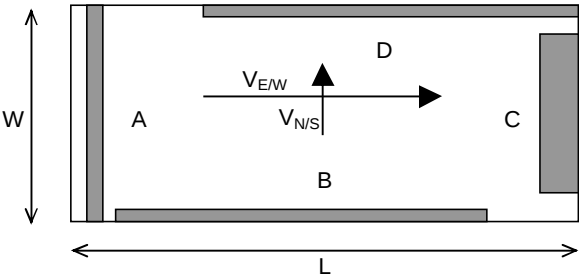
Project:

Puyallup Storage Wood

Description:

Rigid Diaphragm Distribution

Assumptions:
*Design based on a solid, rectangular, rigid diaphragm



Diaphragm Width, W = 24.08 ft
Diaphragm Legth, L = 35.30 ft
Laterateral Force on Diaphragm (N/S) = 7.69 kips
Laterateral Force on Diaphragm (E/W) = 7.69 kips

Shear Wall Side A				Shear Wall Side B			
Wall	Length (ft)	Stiffness	D off Edge	Wall	Length (ft)	Stiffness	D off Edge
A1	14.50	1	0.00	2.1	35.30	1	0.00
	0.00	1	0.00		0.00	1	0.00
	0.00	1	0.00		0.00	1	0.00
	0.00	1	0.00		0.00	1	0.00
	0.00	1	0.00		0.00	1	0.00
Shear Wall Side C				Shear Wall Side D			
Wall	Length (ft)	Stiffness	D off Edge	Wall	Length (ft)	Stiffness	D off Edge
C1	24.25	1	0.00	1.1	3.33	1	0.00
	0.00	1	0.00		0.00	1	0.00
	0.00	1	0.00		0.00	1	0.00
	0.00	1	0.00		0.00	1	0.00
	0.00	1	0.00		0.00	1	0.00

Maximum Distributed Shear in Each Wall					
Based on Code Added 5% Eccentricity in Each Direction					
	Kips	Load Case		Kips	Load Case
A1	2.37	2	C1	5.98	1
0	0.00	1	0	0.00	1
0	0.00	1	0	0.00	1
0	0.00	1	0	0.00	1
0	0.00	1	0	0.00	1
2.1	7.51	4	1.1	0.29	3
0	0.00	1	0	0.00	1
0	0.00	1	0	0.00	1
0	0.00	1	0	0.00	1
0	0.00	1	0	0.00	1

Case 1 - Ecc. in East Direction
Case 2 - Ecc. in West Direction
Case 3 - Ecc. in North Direction
Case 4 - Ecc. in South Direction

Torsional Analysis of Rigid Diaphragm

Project File: Rigid Diaphragm.ecf

LIC# : KW-06012482, Build:20.24.10.03

FACET

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: CMU Rigid Distribution

General Information

Applied Lateral Force in "X" Direction 51.690 k
Applied Lateral Force in "Y" Direction 48.850 k

Note: These loads are resolved into X & Y components when applied to the system of elements at angular increment

Load Orientation Angular Increment 15.0 deg
Load Location Angular Increment 30.0 deg

Center of Rigidity Location (calculated) . . .
"X" dist. from Datum 6.072 ft
"Y" dist. from Datum 0.09678 ft

Accidental Eccentricity +/- from "Y"
Accidental Eccentricity +/- from "X"

CMU Lateral Load Plus Wall 2.1 Load:
 $(7.51k/.7)*(6.5/5)+(26.42-.7)$
= 51.69

Distance from "Y" datum point

22.340 ft

Accidental Torsion values per ASCE 7-05 12.8.4.2
Ecc. as % of Maximum Dimension

5.00 %

Maximum Dimensions :
Along "X" Axis
Along "Y" Axis

51.690 ft
48.850 ft

CMU Lateral Load Plus Wall C1 Load:
 $(5.98k/.7)*(6.5/5)+(26.42-.7)$
= 48.85

2.585 ft
2.443 ft

Wall Information

Label : A3	X Wall C.G. Location	-35.33 ft	Length	24.33 ft
	Y Wall C.G. Location	32.83 ft	Height	12 ft
Wall Deflections (Stiffness) for 1.0 kip load :	Wall Angle CCW	90 deg	Thickness	1 in
Along Wall "y" Dir 1.0718E-003 in	Wall Fixity	Fix-Pin	E - Bending	1 Mpsi
Along Wall "x" Dir 4.0910E+006 in			E - Shear	1 Mpsi
Label : Wall 1.2	X Wall C.G. Location	-17.67 ft	Length	3.25 ft
	Y Wall C.G. Location	44.67 ft	Height	12 ft
Wall Deflections (Stiffness) for 1.0 kip load :	Wall Angle CCW	0 deg	Thickness	1 in
Along Wall "y" Dir 2.0578E-001 in	Wall Fixity	Fix-Pin	E - Bending	1 Mpsi
Along Wall "x" Dir 3.0626E+007 in			E - Shear	1 Mpsi
Label : Wall 1.3	X Wall C.G. Location	17.67 ft	Length	3.25 ft
	Y Wall C.G. Location	44.67 ft	Height	15.33 ft
Wall Deflections (Stiffness) for 1.0 kip load :	Wall Angle CCW	0 deg	Thickness	1 in
Along Wall "y" Dir 4.2545E-001 in	Wall Fixity	Fix-Pin	E - Bending	1 Mpsi
Along Wall "x" Dir 6.3851E+007 in			E - Shear	1 Mpsi
Label : Wall 3.1	X Wall C.G. Location	0 ft	Length	70.67 ft
	Y Wall C.G. Location	0 ft	Height	15.33 ft
Wall Deflections (Stiffness) for 1.0 kip load :	Wall Angle CCW	0 deg	Thickness	1 in
Along Wall "y" Dir 3.0114E-004 in	Wall Fixity	Fix-Pin	E - Bending	1 Mpsi
Along Wall "x" Dir 2.9364E+006 in			E - Shear	1 Mpsi
Label : Wall A4	X Wall C.G. Location	-35.33 ft	Length	13 ft
	Y Wall C.G. Location	6.5 ft	Height	15.33 ft
Wall Deflections (Stiffness) for 1.0 kip load :	Wall Angle CCW	90 deg	Thickness	1 in
Along Wall "y" Dir 3.0549E-003 in	Wall Fixity	Fix-Pin	E - Bending	1 Mpsi
Along Wall "x" Dir 1.5963E+007 in			E - Shear	1 Mpsi
Label : Wall C2	X Wall C.G. Location	0 ft	Length	23.75 ft
	Y Wall C.G. Location	32.5 ft	Height	12 ft
Wall Deflections (Stiffness) for 1.0 kip load :	Wall Angle CCW	90 deg	Thickness	0.00255 in
Along Wall "y" Dir 4.4011E-001 in	Wall Fixity	Fix-Pin	E - Bending	1 Mpsi
Along Wall "x" Dir 2.5274E+014 in			E - Shear	1 Mpsi
Label : Wall E1	X Wall C.G. Location	35.33 ft	Length	45.33 ft
	Y Wall C.G. Location	22.67 ft	Height	15.33 ft
Wall Deflections (Stiffness) for 1.0 kip load :	Wall Angle CCW	90 deg	Thickness	1 in
Along Wall "y" Dir 5.6054E-004 in	Wall Fixity	Fix-Pin	E - Bending	1 Mpsi
Along Wall "x" Dir 4.5779E+006 in			E - Shear	1 Mpsi

ANALYSIS SUMMARY

Maximum shear forces applied to resisting elements. Eccentricity with respect to Center of Rigidity

Max Shear along Member Local "y-y" Axis					Max Shear along Member Local "x-x" Axis			
Resisting Element	Load Angle	X-Ecc (ft)	Y-Ecc (ft)	Shear Force (k)	Load Angle	X-Ecc (ft)	Y-Ecc (ft)	Shear Force (k)
A3	240	6.07	24.69	22.294	0	8.66	22.24	0.000
Wall 1.2	0	6.07	24.69	0.150	90	8.66	22.24	0.000
Wall 1.3	0	6.07	24.69	0.073	90	8.66	22.24	0.000
Wall 3.1	0	8.66	22.24	51.578	90	8.66	22.24	0.000

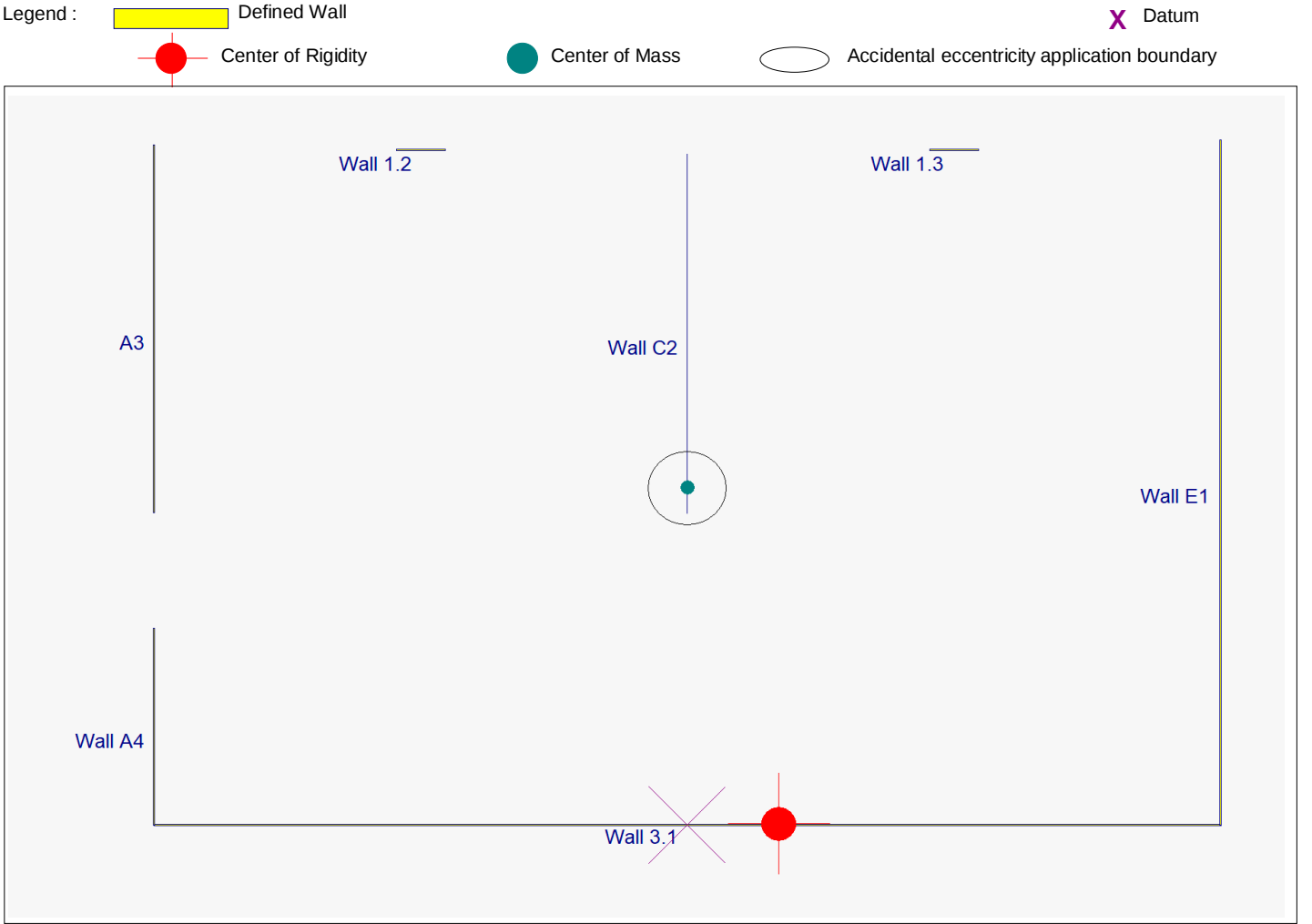
DESCRIPTION: CMU Rigid Distribution

ANALYSIS SUMMARY

Maximum shear forces applied to resisting elements. Eccentricity with respect to Center of Rigidity

Resisting Element	Load Angle	Max Shear along Member Local "y-y" Axis			Load Angle	Max Shear along Member Local "x-x" Axis		
		X-Ecc (ft)	Y-Ecc (ft)	Shear Force (k)		X-Ecc (ft)	Y-Ecc (ft)	Shear Force (k)
Wall A4	240	6.07	24.69	7.822	0	8.66	22.24	0.000
Wall C2	90	6.07	24.69	0.038	285	8.66	22.24	0.000
Wall E1	60	8.31	23.46	38.280	0	8.66	22.24	0.000

Layout of Resisting Elements



 FACET Project: Puyallup Storage Description: Shear Wall Sheathing	Date: 10/15/2024
	Made By: LAO

AWC SDPWS 2021 Table 4.3A

Panel Grade	Nominal Thickness	Minimum Penetration	Common or Galv. Box Nail Size	Nail Spacing at Panel Edges			
				6" o.c.	4" o.c.	3" o.c.	2" o.c.
Wood Structural Panels - Sheathing	5/16	1 1/4	6d	360	540	700	900
	3/8			440	640	820	1060
	7/16	1 3/8	8d	480	700	900	1170
	15/32			520	760	980	1280
	15/32	1 1/2	10d	620	920	1200	1540
	19/32			680	1020	1330	1740

Stud Species: DF Sheathing Thickness: 15/32
 Specific Gravity: 0.50 Shear Wall Nailing: 10d
 Design Method ASD, Ω $1-(0.5-SG)/\Omega = 0.50$
 Factor: 2.00

AWC SDPWS 2021 Table 4.3A Adjusted for Grade and Design Method

Panel Grade	Nominal Thickness	Minimum Penetration	Common or Galv. Box Nail Size	Nail Spacing at Panel Edges			
				6" o.c.	4" o.c.	3" o.c.	2" o.c.
Wood Structural Panels - Sheathing	5/16	1 1/4	6d	180	270	350	450
	3/8			220	320	410	530
	7/16	1 3/8	8d	240	350	450	585
	15/32			260	380	490	640
	15/32	1 1/2	10d	310	460	600	770
	19/32			340	510	665	870

Notes:

- 1) Unit shear capacity from SDPWS 2015 Table 4.3A are adjusted for design method.
- 2) Allowable shear values in framing members other than Douglas fir-larch shall be calculated by multiplying the shear capacities for nails in DF by $1-(0.5-SG)$.
- 3) Values for 3/8 and 7/16 ply may be increased to the values allowed for 15/32, if framing is spaced maximum of 16" o.c. or panels are applied long way across the studs.
- 4) Shaded values require 3x framing or Dbl 2x at all abutting panel edges.

Shear Wall Sheathing Used in Design

Panel Grade	Nominal Thickness	Minimum Penetration	Common or Galv. Box Nail Size	Nail Spacing at Panel Edges			
				10d at 6" o.c.	10d at 4" o.c.	10d at 3" o.c.	10d at 2" o.c.
Panel Sheathing	15/32	1 1/2	10d	310	460	600	770
					(2)10d at 4"	(2)10d at 3"	(2)10d at 2"
					920	1200	1540

 FACET Project: Puyallup Storage Description: Shear Wall Plate Connections	Date: 9/25/2024
	Made By: LAO

Species = DF
 Base Plate = 2x Plate
 Base Plate Thickness = 1 1/2 in
 Sheathing Thickness = 3/4 in

Note: For SDS into narrow face of 1 1/4" LVL Rim use HF values for a DF plate

Base plate nailing

$$Z' = Z C_D C_M C_t$$

Applicability of Adjustment Factor for Connections per NDS Table 11.3.1

Duration Factor, C_D = 1.60 Wind or Seismic
 Wet Service Factor, C_M = 1.00 Moisture content < 19%
 Temperature Factor, C_t = 1.00 Temperatures < 150 °F
 Total Adjustment Factor, Z' = 1.60

Top plate/Rim connection

Hardware	Fasteners	Allowable Loads (lbs)						
		Each	24" o.c.	16" o.c.	12" o.c.	8" o.c.	12" o.c. ea. face	8" o.c. ea. Face
Simpson A35	(12) 8dx 1-1/2"	650	325	488	650	975	1300	1950
Simpson LTP4	(12) 8dx 1-1/2"	625	313	469	625	938	1250	1875

- 1) Values are based on Simpson C-C-2019 Catalog.
- 2) All capacities include adjustment for wind and seismic forces.

Base plate/Rim nailing - Single Shear Connection

Fasteners	Diameter (in)	Length (in)	Embed (in)	ent Factor	Values (lbs)	1 1/2 -in plate and 3/4 -in Flr Sheathing (lbs)				
						Per Nail	6" o.c.	4" o.c.	3" o.c.	2" o.c.
16d Box Nails	0.135	3.5	1.25	1.48	103	153	305	458	610	916
16d Sinkers	0.148	3.25	1.00	1.08	118	128	255	383	510	765
16d Commons	0.162	3.5	1.25	1.23	141	174	348	522	696	1044

Fasteners	Diameter (in)	Length (in)	Embed (in)	ent Factor	Values (lbs)	1 -in plate and 3/4 -in Flr Sheathing (lbs)				
						Per Nail	16" o.c.	8" o.c.	6" o.c.	4" o.c.
1/4"Øx4-1/2" SDS	0.25	4.5	2.25	1.44	220	317	238	475	634	950
1/4"Øx5" SDS	0.25	5	2.75	1.60	220	352	264	528	704	1056
1/4"Øx6" SDS	0.25	6	3.75	1.60	220	352	264	528	704	1056

- 1) Single shear values for 16d are based on NDS-2018 Table 12N.
- 2) Values have been reduced for penetration reduction per Table 12N footnote 3.
- 3) SDS values are based on values in Simpson C-F-2019TECHSUP catalog, page 79.
- 4) All values have been multiplied by adjustment factor indicated above.

Anchor Bolts - Single Shear Connection

Fasteners	Diameter (in)	Adjustment Factor	Table Values (lbs)	1 1/2 -in plate and 3/4 -in Flr Sheathing (lbs)					
				Per Bolt	48" o.c.	32" o.c.	24" o.c.	16" o.c.	8" o.c.
1/2"Ø Anchor Bolts	0.5	1.60	650	1040	260	390	520	780	1560
5/8"Ø Anchor Bolts	0.625	1.60	930	1488	372	558	744	1116	2232
3/4"Ø Anchor Bolts	0.75	1.60	1270	2032	508	762	1016	1524	3048
Simpson MASAP	---	---	1235	1235	309	463	618	926	1853

- 1) Single shear values for anchor bolts are based on NDS-2018 Table 12E.
- 2) Bolt bending yield strength, $F_y = 45,000$ psi.
- 3) Dowel bearing strength, $F_c = 7,500$ psi.
- 4) Concrete compressive strength, $f'_c = 2,500$ psi.
- 5) All values have been multiplied by adjustment factor indicated above.
- 6) Standard installing for MASAP is assumed. Refer to Simpson catalog C-C-2019, page 29 for additional information.

 FACET Project: Puyallup Storage Description: Holdown and Straps	Date:	9/25/2024
	Made By:	LAO

Floor to Floor Holdowns

Model	Post		Anchor			Allowable Load
	Min. Dim (IN)	Fasteners	Diameter	Centerline	Embedment	
MST37	3.00	(6) 1/4"Øx2 1/2 SDS	0.625	1.313	8	2,705
MST48	3.00	(10) 1/4"Øx2 1/2 SDS	0.625	1.313	8	4,200
MST60	3.00	(14) 1/4"Øx2 1/2 SDS	0.625	1.313	9	6,235
HDU11	5.50	(30) 1/4"Øx2 1/2 SDS	1.000	1.375	12	9,335

- 1) Refer to Simpson catalog C-C-2019, page 264 for additional information.
- 2) All loads have been adjusted for wind and seismic load duration ($C_D = 1.6$).
- 3) Holdowns straps to clear span floor diaphragm (16" max).

Shear Wall to Foundation Holdowns

Model	Post		Anchor			Allowable Load
	Min. Dim	Fasteners	Diameter	Centerline	Embedment	
HDU2	3.00	(6) 1/4"Øx2 1/2 SDS	0.625	1.313	8	3,075
HDU4	3.00	(10) 1/4"Øx2 1/2 SDS	0.625	1.313	8	4,565
HDU5	3.00	(14) 1/4"Øx2 1/2 SDS	0.625	1.313	9	5,645
HDU8	3.00	(20) 1/4"Øx2 1/2 SDS	0.875	1.375	10	6,765
HDU11	5.50	(30) 1/4"Øx2 1/2 SDS	1.000	1.375	12	9,335
HDU14	5.50	(36) 1/4"Øx2 1/2 SDS	1.000	1.5625	12	14,400

- 1) Refer to Simpson catalog C-C-2019, page 53 for additional information.
- 2) All loads have been adjusted for wind and seismic load duration ($C_D = 1.6$).
- 3) See attached calculations for anchor bolt embedment length.
- 4) Holdowns may be installed with up to 18" above the top of concrete with no load reduction.

Strap Around Openings

Model	Required Fasteners ea. side of opening	Minimum Length (in)	Allowable Load
CS16	(20) 10d	16	1,705
CMSTC16	(50) 16d	27	4,690
CMST14	(56) 16d	36	6,475

- 1) Refer to Simpson catalog C-C-2019, page 267 for additional information.
- 2) All loads have been adjusted for wind and seismic load duration ($C_D = 1.6$).
- 3) See attached calculations for anchor bolt embedment length.
- 4) Holdowns may be installed with up to 18" above the top of concrete with no load reduction.
- 5) Use half of the required nails in each member being connected.

Sheathing Thickness: 15/32 in

Shearwall Nailing: 10d

Base Plate Nails: 16d Commons

Top Plate Hardware: Simpson LTP4

Anchor Bolts: 5/8"Ø Anchor Bolts

S_{PS}: 1.015 Seismic Controls

2nd story

Front-Back

Input

Story shear(kips) = 7.69

Story height (ft) = 10.50

Total Width(ft) = 35.67

Facet	Story	Wall	Wall D (ft)	Wall Height (ft)	Opening Width (ft)	Opening Height (ft)	Opening to Edge (ft)	Plate to Opening (ft)	h (ft)	% Sharing	Story V (kips)	Sum V (kips)	Roof		Floor		Wall DL (psf)	Story DL (klf)	Sum DL (klf)
													Trib (ft)	DL (psf)	Trib (ft)	DL (psf)			
2nd	A1	14.50	10.50	0.00	0.00	0.00	0.00	0.00	17.84	1.00	2.37	2.37	11.00	17.00	0.00	15.00	10.00	0.29	0.29
	C1	24.25	10.50	0.00	0.00	0.00	0.00	0.00	17.84	1.00	5.98	5.98	11.00	17.00	0.00	15.00	10.00	0.29	0.29
	Sum	38.75									8.35	8.35	Indicates rigid diaph. design. Please see rigid diaphragm calc						

1st story

Front-Back

Input

Story shear(kips) = 25.01

Story height (ft) = 12.00

Total Width(ft) = 40.00

Commutative = 32.70

Story	Wall	Wall D (ft)	Wall Height (ft)	Opening Width (ft)	Opening Height (ft)	Opening to Edge (ft)	Plate to Opening (ft)	h (ft)	% Sharing	Story V (kips)	Sum V (kips)	Roof		Floor		Wall DL (psf)	Story DL (klf)	Sum DL (klf)
												Trib (ft)	DL (psf)	Trib (ft)	DL (psf)			
1st	A3	24.33	12.00	0.00	0.00	0.00	0.00	17.84	0.65	22.29	25.16	0.00	12.00	1.00	15.00	10.00	0.14	0.43
1st	A4	13.00	12.00	0.00	0.00	0.00	0.00	17.84	0.35	7.82	9.35	0.00	12.00	1.00	15.00	10.00	0.14	0.14
1st	C2	24.25	12.00	0.00	0.00	0.00	0.00	17.84	1.00	0.04	6.02	0.00	12.00	5.00	15.00	10.00	0.20	0.49
1st	E1	45.25	12.00	0.00	0.00	0.00	0.00	17.84	1.00	38.28	38.28	0.00	12.00	1.00	15.00	10.00	0.14	0.43
	Sum	106.83								68.43	78.82	Indicates rigid diaph. design. Please see rigid diaphragm calc						



Date:10/15/2024

Made By:LAO

Project:Puyallup Storage

Description:Front-Back Shear Walls

Sheathing Thickness:

15/32 in

Shearwall Nailing:

10d

Base Plate Nails:

16d Commons

Top Plate Hardware:

Simpson LTP4

Anchor Bolts:

5/8"Ø Anchor Bolts

SDS:

1.015

Seismic Controls

2nd story

Front-Back
Output

Story	Wall	Aspect Ratio ¹		Panel Shear Factor ²	Panel Shear (plf) ³	Panel Edge	Plate Shear (plf) ⁴	Base Connection	BTM Plate	Top Plate	Sum OTM (k-ft) ⁵	RM (k-ft) ⁶	Resultant HD (kips) ⁷	Holdown	Force at Window (kips)	Window Strap
		Wall	Pier			Nailing			Connection	LTP4						
2nd	A1	0.72	0.00	1.00	163	10d at 6" o.c.	163	A. Bolt	x w/AB at 48" o.c.	at 24" o.c.	24.89	30.70	0.77	NA	NA	NA
2nd	C1	0.43	0.00	1.00	247	10d at 6" o.c.	247	Nail	16d at 6" o.c.	at 24" o.c.	62.79	85.86	0.99	NA	NA	NA

1st story

Front-Back
Output

Story	Wall	Aspect Ratio ¹		Panel	Panel	Panel Edge	Plate	Base Connection	BTM Plate	Top Plate	Sum	RM	Resultant	Holdown	Force at	Window
		Wall	Pier	Shear Factor ²	Shear (plf) ³	Nailing	Shear (plf) ⁴		Connection	LTP4	OTM (k-ft) ⁵	(k-ft) ⁶	HD (kips) ⁷		Window (kips)	Strap
1st	A3	Masonry Shear Wall, Please Refer to Calc														
1st	A4	Masonry Shear Wall, Please Refer to Calc														
1st	C2	0.49	0.00	1.00	248	10d at 6" o.c.	248	A. Bolt	x w/AB at 48" o.c.	at 24" o.c.	135.01	143.19	2.92	HDU2	NA	NA
1st	E1	Masonry Shear Wall, Please Refer to Calc														



Date:10/15/2024

Made By:LAO

Project:Puyallup Storage

Description:Side-Side Shear Walls

Sheathing Thickness:15/32 in

Shearwall Nailing:10d

Base Plate Nails:16d Commons

Top Plate Hardware:Simpson LTP4

Anchor Bolts:5/8"Ø Anchor Bolts

S_{DS}:1.015Seismic Controls

2nd story

Side-Side

Input

Story shear(kips) = 7.69

Story height (ft) = 10.50

Total Width(ft) = 24.50

Story	Wall	Wall D (ft)	Wall Height (ft)	Opening Width (ft)	Opening Height (ft)	Opening to Edge (ft)	Plate to Opening (ft)	Trib.Width (ft)	% Sharing	Story V (kips)	Sum V (kips)	Roof		Floor		Wall DL (psf)	Story DL (klf)	Sum DL (klf)
												Trib (ft)	DL (psf)	Trib (ft)	DL (psf)			
Facet	2nd	1.1	3.33	6.67	0.00	0.00	0.00	12.25	1.00	0.29	0.29	7.00	17.00	0.00	15.00	10.00	0.19	0.19
	2nd	2.1	35.00	10.50	0.00	0.00	0.00	12.25	1.00	7.51	7.51	3.00	17.00	0.00	15.00	10.00	0.16	0.16
	Sum		38.33							7.80	7.80	Indicates rigid diaph. design. Please see rigid diaphragm calc						

1st story

Side-Side

Input

Story shear(kips) = 25.01

Story height (ft) = 12.00

Total Width(ft) = 45.50

Commutative = 32.70

Story	Wall	Wall D (ft)	Wall Height (ft)	Opening Width (ft)	Opening Height (ft)	Opening to Edge (ft)	Plate to Opening (ft)	Trib.Width (ft)	% Sharing	Story V (kips)	Sum V (kips)	Roof		Floor		Wall DL (psf)	Story DL (klf)	Sum DL (klf)
												Trib (ft)	DL (psf)	Trib (ft)	DL (psf)			
1st	1.2	3.25	15.33	0.00	0.00	0.00	0.00	11.38	0.50	0.15	0.42	0.00	12.00	1.00	15.00	10.00	0.17	0.35
1st	1.3	3.25	15.33	0.00	0.00	0.00	0.00	11.38	0.50	0.07	0.34	0.00	12.00	1.00	15.00	10.00	0.17	0.17
1st	3.1	35.00	15.33	0.00	0.00	0.00	0.00	11.38	1.00	51.58	51.58	0.00	12.00	1.00	15.00	10.00	0.17	0.32
Sum		41.50								38.28	52.34	Indicates rigid diaph. design. Please see rigid diaphragm calc						



Date:10/15/2024

Made By:LAO

Project:Puyallup Storage

Description:Side-Side Shear Walls

Sheathing Thickness:15/32 in

Shearwall Nailing:10d

Base Plate Nails:16d Commons

Top Plate Hardware:Simpson LTP4

Anchor Bolts:5/8"Ø Anchor Bolts

SDS:1.015Seismic Controls

2nd story

Side-Side
Output

Story	Wall	Aspect Ratio ¹		Panel Shear Factor ²	Panel Shear (plf) ³	Panel Edge	Plate Shear (plf) ⁴	Base Connection	BTM Plate	Top Plate	Sum OTM (k-ft) ⁵	RM (k-ft) ⁶	Resultant HD (kips) ⁷	Holdown	Force at Window (kips)	Window Strap
		Wall	Pier			Nailing			Connection	LTP4						
2nd	1.1	2.00	0.00	1.00	87.12	10d at 6" o.c.	87.09	A. Bolt	2x w/AB at 48" o.c.	at 24" o.c.	1.93	1.03	0.52	NA	NA	NA
2nd	2.1	0.30	0.00	1.00	215	10d at 6" o.c.	215	Nail	16d at 6" o.c.	at 24" o.c.	78.86	95.55	0.91	NA	NA	NA

1st story

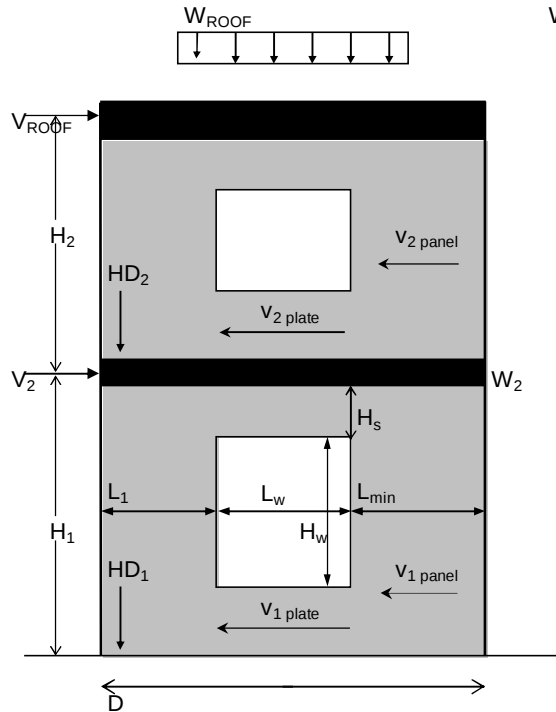
Side-Side
Output

Story	Wall	Aspect Ratio ¹		Panel Shear Factor ²	Panel Shear (plf) ³	Panel Edge	Plate Shear (plf) ⁴	Base Connection	BTM Plate	Top Plate	Sum OTM (k-ft) ⁵	RM (k-ft) ⁶	Resultant HD (kips) ⁷	Holdown	Force at Window (kips)	Window Strap
		Wall	Pier			Nailing			Connection	LTP4						
1st	1.2	Masonry Shear Wall, Please Refer to Calc														
1st	1.3	Masonry Shear Wall, Please Refer to Calc														
1st	3.1	Masonry Shear Wall, Please Refer to Calc														

Shear Wall Calculation Equation Diagram (SWCED)

SW

Shear Wall with Window based on Shear Transfer



Where:

V_i = Story Shear

W_i = Story Dead Load

HD_i = Story Holddown

M_{OTi} = Story Over Turning Moment

M_{Ri} = Story Resisting Moment

$$M_{OT\ ROOF} = V_{ROOF} \times H_2$$

$$M_{OT1} = [(V_2 + V_{ROOF}) \times H_1] + M_{OT\ ROOF}$$

$$M_{R\ ROOF} = 0.6 \times W_{ROOF} \times D^2/2$$

$$M_{R1} = 0.6 \times (W_2 + W_{ROOF}) \times D^2/2$$

$$HD_2 = (M_{OT\ ROOF} - M_{R\ ROOF}) / (D - 6'') \quad HD_1 = (M_{OT1} - M_{R1}) / (D - 6'')$$

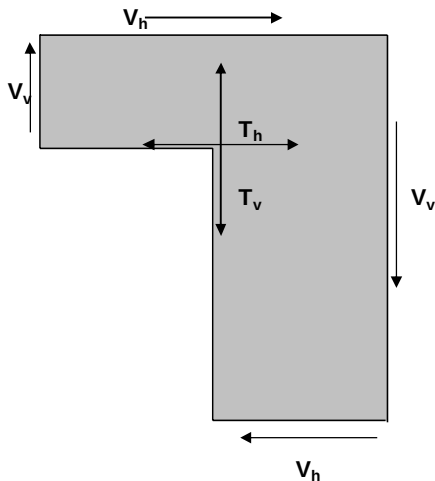
$$V_{2\ panel} = V_{ROOF} / (L_1 + L_{min})$$

$$V_{1\ panel} = (V_{ROOF} + V_2) / (L_1 + L_{min})$$

$$V_{2\ plate} = V_{ROOF} / D$$

$$V_{1\ plate} = (V_{ROOF} + V_2) / D$$

Force Transfer Around Window Calculation



$$V_h = V_{i\ panel} \times L_{min}$$

$$V_v = HD_i$$

$$T_h = V_h (H_w / 2 + H_s) / H_s$$

T_v = Is resisted by the continuous stud adjacent to the window.
No calculation is required.

Masonry Shear Wall

Project File: Rigid Diaphragm.ecf

LIC# : KW-06012482, Build:20.24.10.03

FACET

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: Shear Wall A4**Code References**

Calculations per TMS 402-16, IBC 2021, SDPWS 2021
 Load Combinations Used : ASCE 7-16

General Information

Wall Material	MASONRY	f'm	2.0 ksi	Block Class	
Total Wall Height	15.330 ft	Fy - Rebar	60.0 ksi	Concrete Density	150.0 pcf
Base Wall Length	13.0 ft	Fy - HJR	70.0 ksi	Min. Bending As %	0.00180
R: Resp. Mod Factor	1	Em	1,800.0 ksi		
Ie: Seismic Import. Factor	1.0	Phi - Shear	0.80	Phi : Axial & Flexure	0.90

Wall Data**Bottom**

Analysis Height	0.00 ft
Wall Offset	(datum) ft
Wall Length	13.0 ft
Effective Length 'd'	152.0 in
Nominal Block Thickness	8.0 in
Solid Grout?	Solid Grouted

Reinforcing in Field of Wall

Vertical Bar Size #	5
Vertical Bar Spacing	48 in
Horiz. joint reinf. area (HJR)	in
HJR Spacing	48 in
Bond beam reinf. area	.31 in
Spacing of bond beams	48 in

In each chord cell:

Vertical rebar size #	5
# Chord Cells @ Each End	1.0

Masonry Shear Wall

Project File: Rigid Diaphragm.ecf

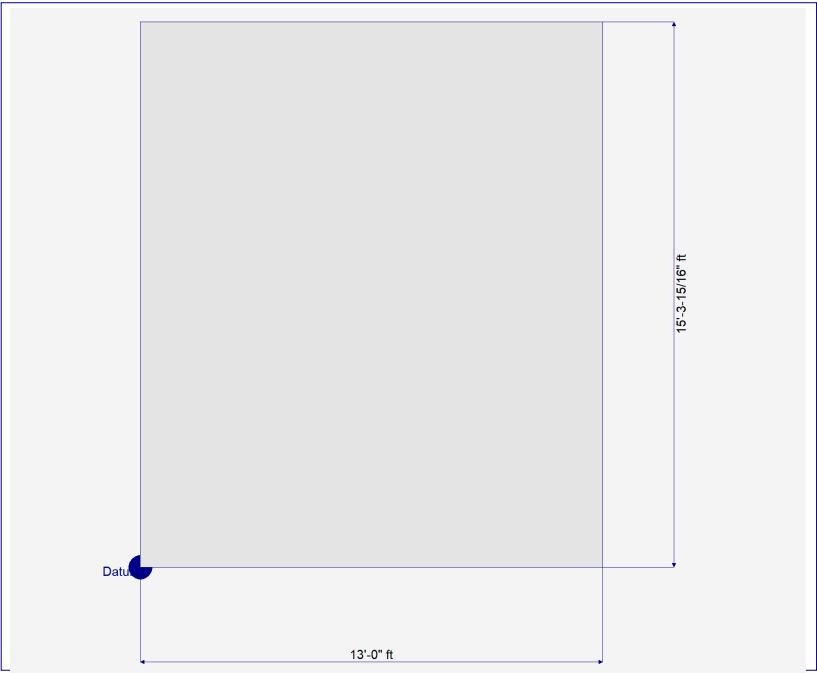
LIC# : KW-06012482, Build:20.24.10.03

FACET

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DESCRIPTION: Shear Wall A4

Wall Sketch



Applied Concentrated Vertical Loads

Load Location (ft)		Load Magnitude (kips)				
X Location	Y Location	Dead Load	Roof Live Load	Live Load	Snow Load	Earth Load
		6.0				

Applied Distributed Vertical Loads

Load Location (ft)			Load Magnitude (kips)			
Start Location	End Location	Height of Application	Dead Load	Roof Live Load	Live Load	Snow Load
	13.0	15.330	0.1990	0.2270		0.2830

Applied Concentrated Lateral Loads

Load "Y" Location (ft)		Load Magnitude (kips)				
		Dead Load	Roof Live Load	Floor Live Load	Wind Load	Seismic Load
	15.330					9.340

Masonry Shear Wall

Project File: Rigid Diaphragm.ecf

LIC# : KW-06012482, Build:20.24.10.03

FACET

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DESCRIPTION: Shear Wall A4**SHEAR ANALYSIS**

		Bottom Level
Special Boundary		
Elements Req'd?		Not Req'd
Vu : Story Shear		9.340 k
for Load Combination		+1.20D+0.20S+E
Anv		in^2
Controlling Mu/(Vud)		0.89
Vn Masonry		138.681 k
Vn Steel		24.180 k
Vn Masonry + Vn Steel		162.861 k
Vn Max		227.618 k
Phi Vn		130.289 k
Ratio: Vu/PhiVn (controlling)		
Vertical As >= Av/3		OK
Vertical Bar Spacing <= 96"		OK

AXIAL ANALYSIS

		Bottom Level
H / d Ratio		1.21
Pu		36.758 k
for Load Combination		+1.20D+1.60S
Phi Pn		1.20D+1.60S k
Ratio: Pu/PhiPn (controlling)		0.02139

BENDING ANALYSIS

		Bottom Level
"a" : Flexural compression		1.52 in
Length of defined chord zone is >= the "a" dimension of the masonry (the compression zone)		OK
"d" : Eff depth to tension reinf		152.0
As-flex < As-max ?		J<=1, R<=1.5
Mu		108.082 k
for Load Combination		+0.90D+E
Phi Mn		210.977 k
Ratio: Mu/PhiMn (controlling)		0.5123

Force Summary

Load Combination	Values for Wall section			Resultant Ecc (ft)	Overturning Ratio	Uplift (k)	
	Wall Level	Vu (k)	Mu (k)	Pu (k)		Left	Right
+1.20D+0.50Lr	Wall Level : 1		46.800	32.347	1.447		
+1.20D+0.50S	Wall Level : 1		46.800	32.711	1.431		
+1.20D+1.60Lr	Wall Level : 1		46.800	35.593	1.315		

Masonry Shear Wall

Project File: Rigid Diaphragm.ecf

LIC# : KW-06012482, Build:20.24.10.03

FACET

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: Shear Wall A4**Force Summary**

Load Combination Wall Level	Values for Wall section			Resultant Ecc (ft)	Overturning Ratio	Uplift (k)	
	Vu (k)	Mu (k)	Pu (k)			Left	Right
+1.20D+1.60S Wall Level : 1		46.800	36.758	1.273			
+0.90D Wall Level : 1		35.100	23.153	1.516			
+1.20D+0.20S+E Wall Level : 1	9.340	96.382	31.607	3.049	1.762		
+0.90D+E Wall Level : 1	9.340	108.082	23.153	4.668	1.296		

Footing Information**Footing Dimensions**

Dist. Left	2.50 ft	f'c	2.50 ksi	Rebar Cover	3.0 in
Wall Length	13.0 ft	Fy	60.0 ksi	Footing Thickness	8.0 in
Dist. Right	1.0 ft			Width	2.0 ft
Total Ftg Length	16.50 ft				

Max Factored Soil Pressures

@ Left Side of Footing	1,446.63 psf
.... governing load comb	+1.20D+1.60S
@ Right Side of Footing	2,711.87 psf
.... governing load comb	+0.90D+E

Max UNfactored Soil Pressures

@ Left Side of Footing	1,178.50 psf
.... governing load comb	+D+S
@ Right Side of Footing	1,984.36 psf
.... governing load comb	+0.60D+0.70E

Footing One-Way Shear Check...

vu @ Left End of Footing	58.001 psi
Phi * vn : Allowable	51.771 psi
vu / Phi * vn	1.12
vu @ Right End of Footing	30.080 psi
Phi * vn : Allowable	44.21 psi
vu / Phi * vn	0.68

Overturning Stability...**@ Left End of Ftg****@ Right End of Ftg**

Overturning Moment	114.582 k-ft	114.582 k-ft
Resisting Moment	128.588 k-ft	152.235 k-ft
Stability Ratio	1.122 : 1	1.329 : 1
.... governing load comb	+0.60D+0.70E	+0.60D+0.70E

Footing Bending Design...**@ Left End****@ Right End**

Mu	8.908 k-ft	2.618 k-ft
Ru	197.947 psi	58.180 psi
As % Req'd	0.004625 in^2	0.00180 in^2
As Req'd in Footing Width	0.5550 in^2	0.3456 in^2

Masonry Shear Wall

Project File: Rigid Diaphragm.ecf

LIC# : KW-06012482, Build:20.24.10.03

FACET

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: Shear Wall A3**Code References**

Calculations per TMS 402-16, IBC 2021, SDPWS 2021
 Load Combinations Used : ASCE 7-16

General Information

Wall Material	MASONRY	f'm	2.0 ksi	Block Class	
Total Wall Height	15.330 ft	Fy - Rebar	60.0 ksi	Concrete Density	150.0 pcf
Base Wall Length	28.0 ft	Fy - HJR	70.0 ksi	Min. Bending As %	0.00180
R: Resp. Mod Factor	1	Em	1,800.0 ksi		
Ie: Seismic Import. Factor	1.0	Phi - Shear	0.80	Phi : Axial & Flexure	0.90

Wall Data**Bottom**

Analysis Height	0.00 ft
Wall Offset	(datum) ft
Wall Length	28.0 ft
Effective Length 'd'	332.0 in
Nominal Block Thickness	8.0 in
Solid Grout?	Solid Grouted

Reinforcing in Field of Wall

Vertical Bar Size #	5
Vertical Bar Spacing	48 in
Horiz. joint reinf. area (HJR)	in
HJR Spacing	48 in
Bond beam reinf. area	.31 in
Spacing of bond beams	48 in

In each chord cell:

Vertical rebar size #	5
# Chord Cells @ Each End	1.0

Masonry Shear Wall

Project File: Rigid Diaphragm.ecf

LIC# : KW-06012482, Build:20.24.10.03

FACET

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DESCRIPTION: Shear Wall A3

Wall Sketch



SHEAR ANALYSIS

		Bottom Level
Special Boundary		
Elements Req'd?		Not Req'd
Vu : Story Shear		25.110 k
for Load Combination	+1.20D+L+0.20S+E	
Anv		2,553.60 in^2
Controlling Mu/(Vud)		0.51
Vn Masonry		372.486 k
Vn Steel		28.514 k
Vn Masonry + Vn Steel		401.0 k
Vn Max		606.76 k
Phi Vn		320.80 k
Ratio: Vu/PhiVn (controlling)		0.07827
Vertical As >= Av/3		OK
Vertical Bar Spacing <= 96"		OK

AXIAL ANALYSIS

		Bottom Level
H / d Ratio		0.55
Pu		68.508 k
for Load Combination	+1.20D+L+1.60S	
Phi Pn	20D+L+1.60S k	
Ratio: Pu/PhiPn (controlling)		0.01853

Masonry Shear Wall

Project File: Rigid Diaphragm.ecf

LIC# : KW-06012482, Build:20.24.10.03

FACET

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DESCRIPTION: Shear Wall A3**BENDING ANALYSIS**Bottom Level

"a" : Flexural compression 1.52 in

Length of defined chord zone
is >= the "a" dimension of the
masonry (the compression zone) OK

"d" : Eff depth to tension reinf 332.0

As-flex < As-max ? $\lambda \leq 1, R \leq 1.5$

Mu 356.877 k

for Load Combination +0.90D+E

Phi Mn 462.077 k

Ratio: Mu/PhiMn (controlling) **0.7723**

Force Summary

Load Combination Wall Level	Values for Wall section			Resultant Ecc (ft)	Overturning Ratio	Uplift (k)	
	Vu (k)	Mu (k)	Pu (k)			Left	Right
+1.20D+0.50Lr+1.60L Wall Level : 1		41.310	57.583	0.717			
+1.20D+1.60L+0.50S Wall Level : 1		56.844	59.528	0.955			
+1.20D+1.60Lr+L Wall Level : 1		51.650	62.286	0.829			
+1.20D+1.60Lr Wall Level : 1		52.078	61.139	0.852			
+1.20D+L+1.60S Wall Level : 1		101.360	68.508	1.480			
+1.20D+1.60S Wall Level : 1		101.788	67.361	1.511			
+1.20D+0.50Lr+L Wall Level : 1		41.567	56.895	0.731			
+1.20D+L+0.50S Wall Level : 1		57.101	58.840	0.970			
+0.90D Wall Level : 1		28.059	39.974	0.702			
+1.20D+L+0.20S+E Wall Level : 1	25.110	339.906	56.203	6.048	2.161		
+0.90D+E Wall Level : 1	25.110	356.877	39.974	8.928	1.527		

Masonry Shear Wall

Project File: Rigid Diaphragm.ecf

LIC# : KW-06012482, Build:20.24.10.03

FACET

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DESCRIPTION: Shear Wall A3**Footing Information****Footing Dimensions**

Dist. Left	1.0 ft	f'c	2.50 ksi	Rebar Cover	3.0 in
Wall Length	28.0 ft	Fy	40.0 ksi	Footing Thickness	8.0 in
Dist. Right	2.0 ft			Width	2.0 ft
Total Ftg Length	31.0 ft				

Max Factored Soil Pressures

@ Left Side of Footing	1,649.09 psf
.... governing load comb	+1.20D+L+1.60S
@ Right Side of Footing	2,052.91 psf
.... governing load comb	+1.20D+L+0.20S+E

Max UNfactored Soil Pressures

@ Left Side of Footing	1,264.76 psf
.... governing load comb	+D+S
@ Right Side of Footing	1,528.13 psf
.... governing load comb	+D+0.70E

Footing One-Way Shear Check...

vu @ Left End of Footing	18.771 psi
Phi * vn : Allowable	44.208 psi
vu / Phi * vn	0.42
vu @ Right End of Footing	62.108 psi
Phi * vn : Allowable	53.13 psi
vu / Phi * vn	1.17

Overturning Stability...**@ Left End of Ftg**

Overturning Moment	302.703 k-ft
Resisting Moment	427.162 k-ft
Stability Ratio	1.411 : 1
.... governing load comb	+0.60D+0.70E

@ Right End of Ftg

Overturning Moment	302.703 k-ft
Resisting Moment	491.224 k-ft
Stability Ratio	1.623 : 1
.... governing load comb	+0.60D+0.70E

Footing Bending Design...**@ Left End**

Mu	1.640 k-ft
Ru	36.444 psi
As % Req'd	0.00180 in^2
As Req'd in Footing Width	0.3456 in^2

@ Right End

Mu	7.859 k-ft
Ru	174.638 psi
As % Req'd	0.0050 in^2
As Req'd in Footing Width	0.60 in^2

Masonry Shear Wall

Project File: Rigid Diaphragm.ecf

LIC# : KW-06012482, Build:20.24.10.03

FACET

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DESCRIPTION: Shear Wall 3.1**Code References**

Calculations per TMS 402-16, IBC 2021, SDPWS 2021
 Load Combinations Used : ASCE 7-16

General Information

Wall Material	MASONRY	f'm	2.0 ksi	Block Class	
Total Wall Height	15.330 ft	Fy - Rebar	60.0 ksi	Concrete Density	150.0 pcf
Base Wall Length	70.670 ft	Fy - HJR	70.0 ksi	Min. Bending As %	0.00180
R: Resp. Mod Factor	1	Em	1,800.0 ksi		
Ie: Seismic Import. Factor	1.0	Phi - Shear	0.80	Phi : Axial & Flexure	0.90

Wall DataBottom

Analysis Height	0.00 ft
Wall Offset	(datum) ft
Wall Length	70.670 ft
Effective Length 'd'	844.04 in
Nominal Block Thickness	8 in
Solid Grout?	Solid Grouted

Reinforcing in Field of Wall

Vertical Bar Size #	5
Vertical Bar Spacing	48 in
Horiz. joint reinf. area (HJR)	in
HJR Spacing	40 in
Bond beam reinf. area	.31 in
Spacing of bond beams	48 in

In each chord cell:

Vertical rebar size #	5
# Chord Cells @ Each End	1.0

Masonry Shear Wall

Project File: Rigid Diaphragm.ecf

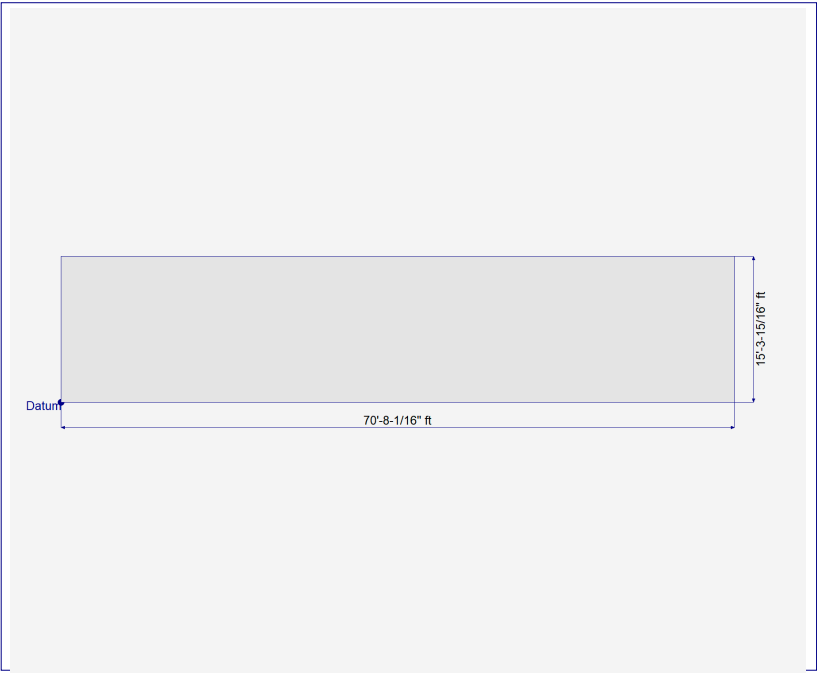
LIC# : KW-06012482, Build:20.24.10.03

FACET

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: Shear Wall 3.1

Wall Sketch



Applied Distributed Vertical Loads

Load Location (ft)			Load Magnitude (kips)					
Start Location	End Location	Height of Application	Dead Load	Roof Live Load	Live Load	Snow Load	Earth Load	
	70.670	15.330	0.0170	0.020		0.020		

Applied Concentrated Lateral Loads

Load "Y" Location (ft)		Load Magnitude (kips)						
		Dead Load	Roof Live Load	Floor Live Load	Wind Load	Seismic Load	Earth Load	
	15.330					51.580		

SHEAR ANALYSIS

		Bottom Level
Special Boundary		
Elements Req'd?	Not Req'd	
Vu : Story Shear	51.580 k	
for Load Combination	+1.20D+0.20S+E	
Anv	in^2	
Controlling Mu/(Vud)	0.22	
Vn Masonry	1,072.39 k	
Vn Steel	28.514 k	
Vn Masonry + Vn Steel	1,100.91 k	
Vn Max	1,729.40 k	
Phi Vn	880.73 k	
Ratio: Vu/PhiVn (controlling)		
Vertical As >= Av/3	OK	
Vertical Bar Spacing <= 96"	OK	

Masonry Shear Wall

Project File: Rigid Diaphragm.ecf

LIC# : KW-06012482, Build:20.24.10.03

FACET

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: Shear Wall 3.1**AXIAL ANALYSIS**Bottom Level

H / d Ratio 0.22

Pu 115.507 k

for Load Combination +1.20D+1.60Lr

Phi Pn 1.20D+1.60Lr k

Ratio: Pu/PhiPn (controlling) **0.01239**

BENDING ANALYSISBottom Level

"a" : Flexural compression 1.52 in

Length of defined chord zone
is >= the "a" dimension of the
masonry (the compression zone) OK

"d" : Eff depth to tension reinf 844.04

As-flex < As-max ? J<=1, R<=1.5

Mu 790.72 k

for Load Combination +1.20D+0.20S+E

Phi Mn 1,176.37 k

Ratio: Mu/PhiMn (controlling) **0.6722**

Force Summary

Load Combination Wall Level	Values for Wall section			Resultant Ecc (ft)	Overturning Ratio	Uplift (k)	
	Vu (k)	Mu (k)	Pu (k)			Left	Right
+1.20D+0.50Lr Wall Level : 1			113.952				
+1.20D+0.50S Wall Level : 1			113.952				
+1.20D+1.60Lr Wall Level : 1			115.507				
+1.20D+1.60S Wall Level : 1			115.507				
+0.90D Wall Level : 1			84.934				
+1.20D+0.20S+E Wall Level : 1	51.580	790.721	113.528	6.965	5.073		
+0.90D+E Wall Level : 1	51.580	790.721	84.934	9.310	3.795		

Masonry Shear Wall

Project File: Rigid Diaphragm.ecf

LIC# : KW-06012482, Build:20.24.10.03

FACET

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DESCRIPTION: Shear Wall 3.1**Footing Information****Footing Dimensions**

Dist. Left	0.3149 ft	f'c	2.50 ksi	Rebar Cover	3.0 in
Wall Length	70.670 ft	Fy	40.0 ksi	Footing Thickness	8.0 in
Dist. Right	0.3490 ft			Width	1.50 ft
Total Ftg Length	71.334 ft				

Max Factored Soil Pressures

@ Left Side of Footing	1,202.0 psf
.... governing load comb	+1.20D+1.60Lr
@ Right Side of Footing	1,829.04 psf
.... governing load comb	+1.20D+0.20S+E

Max UNfactored Soil Pressures

@ Left Side of Footing	997.25 psf
.... governing load comb	+D+Lr
@ Right Side of Footing	1,435.52 psf
.... governing load comb	+D+0.70E

Footing One-Way Shear Check...

vu @ Left End of Footing	0.0 psi
Phi * vn : Allowable	44.208 psi
vu / Phi * vn	0.00
vu @ Right End of Footing	0.0 psi
Phi * vn : Allowable	44.21 psi
vu / Phi * vn	0.00

Overturning Stability...**@ Left End of Ftg****@ Right End of Ftg**

Overturning Moment	631.91 k-ft	631.91 k-ft
Resisting Moment	2,201.78 k-ft	2,203.71 k-ft
Stability Ratio	3.484 : 1	3.487 : 1
.... governing load comb	+0.60D+0.70E	+0.60D+0.70E

Footing Bending Design...**@ Left End****@ Right End**

Mu	0.08939 k-ft	0.1669 k-ft
Ru	2.649 psi	4.944 psi
As % Req'd	0.00180 in^2	0.00180 in^2
As Req'd in Footing Width	0.2592 in^2	0.2592 in^2

Masonry Shear Wall

Project File: Rigid Diaphragm.ecf

LIC# : KW-06012482, Build:20.24.10.03

FACET

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DESCRIPTION: Shear Wall E1**Code References**

Calculations per TMS 402-16, IBC 2021, SDPWS 2021

Load Combinations Used : ASCE 7-16

General Information

Wall Material	MASONRY	f'm	2.0 ksi	Block Class	
Total Wall Height	15.330 ft	Fy - Rebar	60.0 ksi	Concrete Density	150.0 pcf
Base Wall Length	45.50 ft	Fy - HJR	70.0 ksi	Min. Bending As %	0.00180
R: Resp. Mod Factor	1	Em	1,800.0 ksi		
Ie: Seismic Import. Factor	1.0	Phi - Shear	0.80	Phi : Axial & Flexure	0.90

Wall DataBottom

Analysis Height	0.00 ft
Wall Offset	(datum) ft
Wall Length	45.50 ft
Effective Length 'd'	542.0 in
Nominal Block Thickness	8 in
Solid Grout?	Solid Grouted

Reinforcing in Field of Wall

Vertical Bar Size #	5
Vertical Bar Spacing	48 in
Horiz. joint reinf. area (HJR)	in
HJR Spacing	48 in
Bond beam reinf. area	.31 in
Spacing of bond beams	48 in

In each chord cell:

Vertical rebar size #	5
# Chord Cells @ Each End	1.0

Masonry Shear Wall

Project File: Rigid Diaphragm.ecf

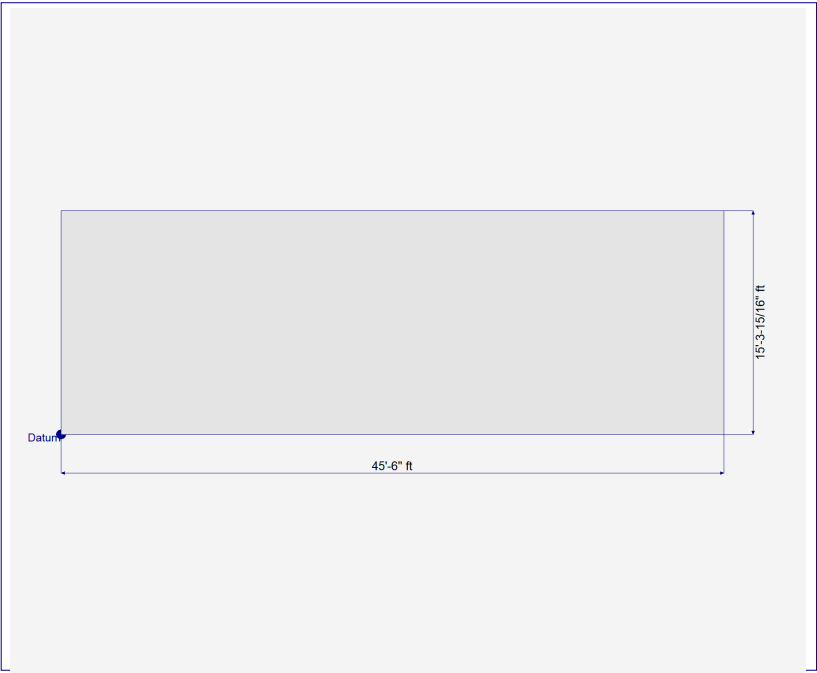
LIC# : KW-06012482, Build:20.24.10.03

FACET

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DESCRIPTION: Shear Wall E1

Wall Sketch



Applied Distributed Vertical Loads

Load Location (ft)			Load Magnitude (kips)					
Start Location	End Location	Height of Application	Dead Load	Roof Live Load	Live Load	Snow Load	Earth Load	
	45.50	15.330	0.1930	0.2270		0.2830		

Applied Concentrated Lateral Loads

Load "Y" Location (ft)		Load Magnitude (kips)						
		Dead Load	Roof Live Load	Floor Live Load	Wind Load	Seismic Load	Earth Load	
	15.330						38.740	

SHEAR ANALYSIS

		Bottom Level
Special Boundary		
Elements Req'd?	Not Req'd	
Vu : Story Shear	38.740 k	
for Load Combination	+1.20D+0.20S+E	
Anv	in^2	
Controlling Mu/(Vud)	0.34	
Vn Masonry	658.67 k	
Vn Steel	28.514 k	
Vn Masonry + Vn Steel	687.18 k	
Vn Max	1,070.44 k	
Phi Vn	549.74 k	
Ratio: Vu/PhiVn (controlling)		
Vertical As >= Av/3	OK	
Vertical Bar Spacing <= 96"	OK	

Masonry Shear Wall

Project File: Rigid Diaphragm.ecf

LIC# : KW-06012482, Build:20.24.10.03

FACET

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DESCRIPTION: Shear Wall E1**AXIAL ANALYSIS**Bottom Level

H / d Ratio	0.34
Pu	103.124 k
for Load Combination	+1.20D+1.60S
Phi Pn	.1.20D+1.60S k
Ratio: Pu/PhiPn (controlling)	0.01717

BENDING ANALYSISBottom Level

"a" : Flexural compression	1.52 in
Length of defined chord zone is >= the "a" dimension of the masonry (the compression zone)	OK
"d" : Eff depth to tension reinf	542.0
As-flex < As-max ?	J<=1, R<=1.5
Mu	593.88 k
for Load Combination	+1.20D+0.20S+E
Phi Mn	755.03 k
Ratio: Mu/PhiMn (controlling)	0.7866

Force Summary

Load Combination Wall Level	Values for Wall section			Resultant Ecc (ft)	Overturning Ratio	Uplift (k)	
	Vu (k)	Mu (k)	Pu (k)			Left	Right
+1.20D+0.50Lr Wall Level : 1			87.686				
+1.20D+0.50S Wall Level : 1			88.960				
+1.20D+1.60Lr Wall Level : 1			99.047				
+1.20D+1.60S Wall Level : 1			103.124				
+0.90D Wall Level : 1			61.891				
+1.20D+0.20S+E Wall Level : 1	38.740	593.884	85.097	6.979	3.260		
+0.90D+E Wall Level : 1	38.740	593.884	61.891	9.596	2.371		

Masonry Shear Wall

Project File: Rigid Diaphragm.ecf

LIC# : KW-06012482, Build:20.24.10.03

FACET

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DESCRIPTION: Shear Wall E1**Footing Information****Footing Dimensions**

Dist. Left	1.0 ft	f'c	2.50 ksi	Rebar Cover	3.0 in
Wall Length	45.50 ft	Fy	40.0 ksi	Footing Thickness	8.0 in
Dist. Right	1.0 ft			Width	2.0 ft
Total Ftg Length	47.50 ft				

Max Factored Soil Pressures

@ Left Side of Footing	1,206.30 psf
.... governing load comb	+1.20D+1.60S
@ Right Side of Footing	1,840.53 psf
.... governing load comb	+1.20D+0.20S+E

Max UNfactored Soil Pressures

@ Left Side of Footing	960.07 psf
.... governing load comb	+D+S
@ Right Side of Footing	1,401.32 psf
.... governing load comb	+D+0.70E

Footing One-Way Shear Check...

vu @ Left End of Footing	13.797 psi
Phi * vn : Allowable	44.208 psi
vu / Phi * vn	0.31
vu @ Right End of Footing	20.936 psi
Phi * vn : Allowable	44.21 psi
vu / Phi * vn	0.47

Overturning Stability...**@ Left End of Ftg**

Overturning Moment	468.783 k-ft
Resisting Moment	1,088.24 k-ft
Stability Ratio	2.321 : 1
.... governing load comb	+0.60D+0.70E

@ Right End of Ftg

Overturning Moment	468.783 k-ft
Resisting Moment	1,088.24 k-ft
Stability Ratio	2.321 : 1
.... governing load comb	+0.60D+0.70E

Footing Bending Design...**@ Left End**

Mu	1.206 k-ft
Ru	26.807 psi
As % Req'd	0.00180 in^2
As Req'd in Footing Width	0.3456 in^2

@ Right End

Mu	1.829 k-ft
Ru	40.644 psi
As % Req'd	0.00180 in^2
As Req'd in Footing Width	0.3456 in^2

Masonry Shear Wall

Project File: Rigid Diaphragm.ecf

LIC# : KW-06012482, Build:20.24.10.03

FACET

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: Shear Wall 1.2**Code References**

Calculations per TMS 402-16, IBC 2021, SDPWS 2021
 Load Combinations Used : ASCE 7-16

General Information

Wall Material	MASONRY	f'm	2.0 ksi	Block Class	
Total Wall Height	15.330 ft	Fy - Rebar	60.0 ksi	Concrete Density	150.0 pcf
Base Wall Length	3.250 ft	Fy - HJR	70.0 ksi	Min. Bending As %	0.00180
R: Resp. Mod Factor	1	Em	1,800.0 ksi		
Ie: Seismic Import. Factor	1.0	Phi - Shear	0.80	Phi : Axial & Flexure	0.90

Wall Data**Bottom**

Analysis Height	0.00 ft
Wall Offset	(datum) ft
Wall Length	3.250 ft
Effective Length 'd'	35.0 in
Nominal Block Thickness	8 in
Solid Grout?	Solid Grouted

Reinforcing in Field of Wall

Vertical Bar Size #	5
Vertical Bar Spacing	48 in
Horiz. joint reinf. area (HJR)	in
HJR Spacing	48 in
Bond beam reinf. area	.31 in
Spacing of bond beams	48 in

In each chord cell:

Vertical rebar size #	5
# Chord Cells @ Each End	1.0

Masonry Shear Wall

LIC# : KW-06012482, Build:20.24.10.03

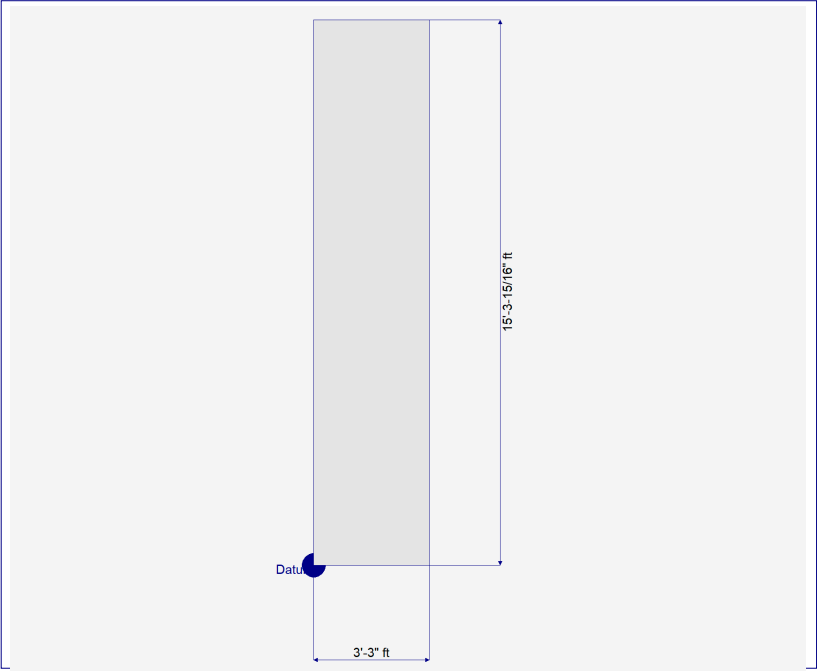
DESCRIPTION: Shear Wall 1.2

Project File: Rigid Diaphragm.ecf

FACET

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Wall Sketch



Applied Distributed Vertical Loads

Load Location (ft)			Load Magnitude (kips)				
Start Location	End Location	Height of Application	Dead Load	Roof Live Load	Live Load	Snow Load	Earth Load
	3.250	15.330	0.2690	0.240	0.040	0.30	

Applied Concentrated Lateral Loads

Load "Y" Location (ft)		Load Magnitude (kips)					
		Dead Load	Roof Live Load	Floor Live Load	Wind Load	Seismic Load	Earth Load
	15.330					0.420	

SHEAR ANALYSIS

Special Boundary		Bottom Leve
Elements Req'd?		Not Req'd
Vu : Story Shear		0.420 k
for Load Combination		+1.20D+L+0.20S+E
Anv		in^2
Controlling Mu/(Vud)		1.00
Vn Masonry		31.795 k
Vn Steel		6.045 k
Vn Masonry + Vn Steel		37.840 k
Vn Max		53.022 k
Phi Vn		30.272 k
Ratio: Vu/PhiVn (controlling)		
Vertical As >= Av/3		OK
Vertical Bar Spacing <= 96"		OK

Masonry Shear Wall

Project File: Rigid Diaphragm.ecf

LIC# : KW-06012482, Build:20.24.10.03

FACET

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: Shear Wall 1.2**AXIAL ANALYSIS**Bottom Level

H / d Ratio 5.26

Pu 7.881 k

for Load Combination +1.20D+L+1.60S

Phi Pn 20D+L+1.60S k

Ratio: Pu/PhiPn (controlling) **0.01822**

BENDING ANALYSISBottom Level

"a" : Flexural compression 1.52 in

Length of defined chord zone
is >= the "a" dimension of the
masonry (the compression zone) OK

"d" : Eff depth to tension reinf 35.0

As-flex < As-max ? 310 <= 3.153

Mu 6.439 k

for Load Combination +1.20D+L+0.20S+E

Phi Mn 47.762 k

Ratio: Mu/PhiMn (controlling) **0.1348**

Force Summary

Load Combination Wall Level	Values for Wall section			Resultant Ecc (ft)	Overturning Ratio	Uplift (k)	
	Vu (k)	Mu (k)	Pu (k)			Left	Right
+1.20D+0.50Lr+1.60L Wall Level : 1			6.789				
+1.20D+1.60L+0.50S Wall Level : 1			6.886				
+1.20D+1.60Lr+L Wall Level : 1			7.569				
+1.20D+1.60Lr Wall Level : 1			7.439				
+1.20D+L+1.60S Wall Level : 1			7.881				
+1.20D+1.60S Wall Level : 1			7.751				
+1.20D+0.50Lr+L Wall Level : 1			6.711				
+1.20D+L+0.50S Wall Level : 1			6.808				
+0.90D Wall Level : 1			4.643				
+1.20D+L+0.20S+E Wall Level : 1	0.420	6.439	6.516	0.988	1.644		
+0.90D+E Wall Level : 1	0.420	6.439	4.643	1.387	1.172		

Masonry Shear Wall

Project File: Rigid Diaphragm.ecf

LIC# : KW-06012482, Build:20.24.10.03

FACET

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: Shear Wall 1.2**Footing Information****Footing Dimensions**

Dist. Left	1.0 ft	f'c	2.50 ksi	Rebar Cover	3.0 in
Wall Length	3.250 ft	Fy	40.0 ksi	Footing Thickness	8.0 in
Dist. Right	1.0 ft			Width	1.50 ft
Total Ftg Length	5.250 ft				

Max Factored Soil Pressures

@ Left Side of Footing	1,121.44 psf
.... governing load comb	+1.20D+L+1.60S
@ Right Side of Footing	1,923.53 psf
.... governing load comb	+1.20D+L+0.20S+E

Max UNfactored Soil Pressures

@ Left Side of Footing	879.51 psf
.... governing load comb	+D+S
@ Right Side of Footing	1,438.22 psf
.... governing load comb	+D+0.70E

Footing One-Way Shear Check...

vu @ Left End of Footing	12.827 psi
Phi * vn : Allowable	44.208 psi
vu / Phi * vn	0.29
vu @ Right End of Footing	20.761 psi
Phi * vn : Allowable	44.21 psi
vu / Phi * vn	0.47

Overturning Stability...**@ Left End of Ftg****@ Right End of Ftg**

Overturning Moment	7.202 k-ft	7.202 k-ft
Resisting Moment	9.118 k-ft	9.118 k-ft
Stability Ratio	1.266 : 1	1.266 : 1
.... governing load comb	+0.60D+0.70E	+0.60D+0.70E

Footing Bending Design...**@ Left End****@ Right End**

Mu	0.8411 k-ft	1.350 k-ft
Ru	24.921 psi	39.992 psi
As % Req'd	0.00180 in^2	0.00180 in^2
As Req'd in Footing Width	0.2592 in^2	0.2592 in^2

Masonry Shear Wall

Project File: Rigid Diaphragm.ecf

LIC# : KW-06012482, Build:20.24.10.03

FACET

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DESCRIPTION: Shear Wall 1.3**Code References**

Calculations per TMS 402-16, IBC 2021, SDPWS 2021
 Load Combinations Used : ASCE 7-16

General Information

Wall Material	MASONRY	f'm	2.0 ksi	Block Class	
Total Wall Height	15.330 ft	Fy - Rebar	60.0 ksi	Concrete Density	150.0 pcf
Base Wall Length	3.250 ft	Fy - HJR	70.0 ksi	Min. Bending As %	0.00180
R: Resp. Mod Factor	1	Em	1,800.0 ksi		
Ie: Seismic Import. Factor	1.0	Phi - Shear	0.80	Phi : Axial & Flexure	0.90

Wall Data**Bottom**

Analysis Height	0.00 ft
Wall Offset	(datum) ft
Wall Length	3.250 ft
Effective Length 'd'	35.0 in
Nominal Block Thickness	8 in
Solid Grout?	Solid Grouted

Reinforcing in Field of Wall

Vertical Bar Size #	5
Vertical Bar Spacing	48 in
Horiz. joint reinf. area (HJR)	in
HJR Spacing	48 in
Bond beam reinf. area	.31 in
Spacing of bond beams	48 in

In each chord cell:

Vertical rebar size #	5
# Chord Cells @ Each End	1.0

Masonry Shear Wall

Project File: Rigid Diaphragm.ecf

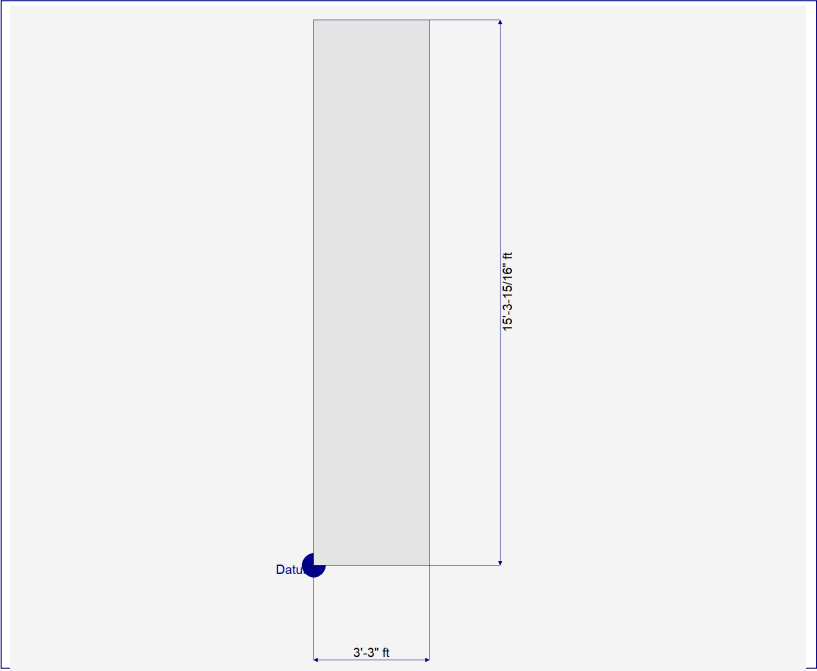
LIC# : KW-06012482, Build:20.24.10.03

FACET

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DESCRIPTION: Shear Wall 1.3

Wall Sketch



Applied Distributed Vertical Loads

Load Location (ft)			Load Magnitude (kips)				
Start Location	End Location	Height of Application	Dead Load	Roof Live Load	Live Load	Snow Load	Earth Load
	3.250	15.330	0.2040	0.240		0.30	

Applied Concentrated Lateral Loads

Load "Y" Location (ft)		Load Magnitude (kips)					
		Dead Load	Roof Live Load	Floor Live Load	Wind Load	Seismic Load	Earth Load
	15.330					0.340	

SHEAR ANALYSIS

Special Boundary		Bottom Leve
Elements Req'd?		Not Req'd
Vu : Story Shear		0.340 k
for Load Combination		+1.20D+0.20S+E
Anv		in^2
Controlling Mu/(Vud)		1.00
Vn Masonry		31.699 k
Vn Steel		6.045 k
Vn Masonry + Vn Steel		37.744 k
Vn Max		53.022 k
Phi Vn		30.195 k
Ratio: Vu/PhiVn (controlling)		
Vertical As >= Av/3		OK
Vertical Bar Spacing <= 96"		OK

Masonry Shear Wall

Project File: Rigid Diaphragm.ecf

LIC# : KW-06012482, Build:20.24.10.03

FACET

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: Shear Wall 1.3**AXIAL ANALYSIS**Bottom Level

H / d Ratio 5.26

Pu 7.497 k

for Load Combination +1.20D+1.60S

Phi Pn .1.20D+1.60S k

Ratio: Pu/PhiPn (controlling) **0.01734**

BENDING ANALYSISBottom Level

"a" : Flexural compression 1.52 in

Length of defined chord zone
is >= the "a" dimension of the
masonry (the compression zone) OK

"d" : Eff depth to tension reinf 35.0

As-flex < As-max ? 310 <= 3.153

Mu 5.212 k

for Load Combination +1.20D+0.20S+E

Phi Mn 47.762 k

Ratio: Mu/PhiMn (controlling) **0.1091**

Force Summary

Load Combination Wall Level	Values for Wall section			Resultant Ecc (ft)	Overturning Ratio	Uplift (k)	
	Vu (k)	Mu (k)	Pu (k)			Left	Right
+1.20D+0.50Lr Wall Level : 1			6.327				
+1.20D+0.50S Wall Level : 1			6.425				
+1.20D+1.60Lr Wall Level : 1			7.185				
+1.20D+1.60S Wall Level : 1			7.497				
+0.90D Wall Level : 1			4.453				
+1.20D+0.20S+E Wall Level : 1	0.340	5.212	6.132	0.850	1.912		
+0.90D+E Wall Level : 1	0.340	5.212	4.453	1.171	1.388		

Masonry Shear Wall

Project File: Rigid Diaphragm.ecf

LIC# : KW-06012482, Build:20.24.10.03

FACET

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DESCRIPTION: Shear Wall 1.3**Footing Information****Footing Dimensions**

Dist. Left	1.0 ft	f'c	2.50 ksi	Rebar Cover	3.0 in
Wall Length	3.250 ft	Fy	40.0 ksi	Footing Thickness	8.0 in
Dist. Right	1.0 ft			Width	1.50 ft
Total Ftg Length	5.250 ft				

Max Factored Soil Pressures

@ Left Side of Footing	1,072.71 psf
.... governing load comb	+1.20D+1.60S
@ Right Side of Footing	1,688.70 psf
.... governing load comb	+1.20D+0.20S+E

Max UNfactored Soil Pressures

@ Left Side of Footing	852.66 psf
.... governing load comb	+D+S
@ Right Side of Footing	1,281.37 psf
.... governing load comb	+D+0.70E

Footing One-Way Shear Check...

vu @ Left End of Footing	12.270 psi
Phi * vn : Allowable	44.208 psi
vu / Phi * vn	0.28
vu @ Right End of Footing	18.312 psi
Phi * vn : Allowable	44.21 psi
vu / Phi * vn	0.41

Overturning Stability...**@ Left End of Ftg**

Overturning Moment	6.306 k-ft
Resisting Moment	8.785 k-ft
Stability Ratio	1.393 : 1
.... governing load comb	+0.60D+0.70E

@ Right End of Ftg

Overturning Moment	6.306 k-ft
Resisting Moment	8.785 k-ft
Stability Ratio	1.393 : 1
.... governing load comb	+0.60D+0.70E

Footing Bending Design...**@ Left End**

Mu	0.8045 k-ft
Ru	23.838 psi
As % Req'd	0.00180 in^2
As Req'd in Footing Width	0.2592 in^2

@ Right End

Mu	1.191 k-ft
Ru	35.299 psi
As % Req'd	0.00180 in^2
As Req'd in Footing Width	0.2592 in^2

Masonry Column

Project File: Rigid Diaphragm.ecf

LIC# : KW-06012482, Build:20.24.10.03

FACET

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: 8" CMU Unbraced Wall Deflection Check**Code References**

Calculations per TMS 402-16, IBC 2021, ASCE 7-16

Load Combinations Used : ASCE 7-16

General Information

Material Properties		Column Data		Analysis Settings	
F'm	= 2,000.0 psi	Column width along X-X	= 13.625 in	Analysis Method	= Strength Design
Fr - Rupture	= 100.0 psi	Column depth along Y-Y	= 7.625 in	φ factor for Strength Design	= 0.90
Em = f'm *	= 900.0	Longitudinal Bar Size	= # 4.0	End Fixity Condition	= Top Pinned, Bottom Pinned
Column Density	= 130.0 pcf	Bars per side at +Y & -Y	= 2	Overall Column Height	= 14.50 ft
Rebar Grade	= Grade 60	Bars per side at +X & -X	= 2	Construction Type	Solid Grouted Hollow Concrete Mason
Fy - Yield	= 60000 psi	Cover from ties	= 1.50 in	Tie Bar Size	= # 4.0
Fs - Allowable	= 32000 psi	Actual Edge to Bar Center	= 2.25 in	Tie Bar Spacing	= 7.620 in
E - Rebar	= 29,000.0 ksi			Hoop/ties at ALL longitudinal bars	
Brace condition for deflection (buckling) along columns :					
X-X (width) axis : Unbraced Length for buckling ABOUT Y-Y Axis = 14.50 ft, K = 1.0					
Y-Y (depth) axis : Fully braced against buckling ABOUT X-X Axis					

Applied Loads

Service loads entered. Load Factors will be applied for calculation

Column self weight included : 1,359.96 lbs * Dead Load Factor

AXIAL LOADS . . .

BENDING LOADS . . .

Lat. Uniform Load creating Mx-x, E = 0.2980 k/ft

DESIGN SUMMARY**Bending Check Results**

PASS	Maximum Bending Stress Ratio	=	0.960	: 1
	Load Combination		+0.90D+E	
	Location of max.above base		7.201 ft	
	At maximum location values are . . .			
	Axial - Applied		1.224 k	
	Axial - Allowable		1.543 k	
	Moment - Applied		7.831	
	Moment - Allowable		8.116 k-ft	

Maximum SERVICE Load Reactions . .

Top along X-X	2.161 k
Bottom along X-X	2.161 k

Maximum SERVICE Load Deflections . . .

Along x-x	0.331 in	at	7.299 ft	above base
for load combination E Only				

Compressive Strength 104.439 k (TMS 402-16, Sec. 9.3.4.1.1)
 $\phi P_n = 0.9 * 0.8 * [0.8 * f'm * (A_n - A_{st}) + f_y * A_{st}] * [1 - (h / (140 * r))^2]$

PASS	Reinforcing Area Check	(TMS 402-16, Sec 5.3.1.3)
	As : Actual Reinforcement	0.800
	Min: 0.0025 * An	0.260
	Max: 0.04 * An	4.156

PASS Column Ties and Clear Cover Checks (TMS 402-16, Sec 5.3.1.4 & 6.1.3.2)

Min. Allowable Tie Dia. = 1/4", # 4 bar provided
 Max Allowable Tie Spacing = 7.63 in, Provided = 7.62 in
 Min Allowable Clear Spacing between Long Bars = 1.50 in
 Provided clear spacing along X-axis = 8.63 in << See note below
 Provided clear spacing along Y-axis = 2.63 in

	Dimensional Checks	
	Min. Side Dim. >= 8"	(TMS 402-16, Sec. 5.3.1.1(b))
PASS	Max K * Lu / r <= 99	(TMS 402-16, Sec. 5.3.1.1(a))
	Kx Lu-xx / rx = 79.0	Ky Lu-yy / ry = 0.0

Note: Per TMS 402-16 Sec. 5.3.1.4(c), no longitudinal bar shall be greater than 6 in clear on each side from a laterally supported bar. Verify your tie detailing is in conformance.

Load Combination Results

Load Combination	Maximum Bending Stress Ratios			Maximum Axial Load		Maximum Moments	
	Stress Ratio	Status	Location	Actual	Allow	Actual	Allow
+1.20D	0.01553	PASS	0.0 ft	1.632 k	104.283 k	0.0 k-ft	13.079 k-ft
+0.90D	0.01165	PASS	0.0 ft	1.224 k	104.283 k	0.0 k-ft	13.079 k-ft
+1.20D+E	0.9478	PASS	7.201 ft	1.632 k	2.176 k	7.831 k-ft	8.155 k-ft
+0.90D+E	0.9595	PASS	7.201 ft	1.224 k	1.543 k	7.831 k-ft	8.116 k-ft

Maximum Reactions

Note: Only non-zero reactions are listed

Load Combination	Y-Y Axis Reaction		Axial Reaction
	@ Base	@ Top	@ Base
D Only	k	k	1.360 k
+0.60D	k	k	0.816 k

Masonry Column

LIC# : KW-06012482, Build:20.24.10.03

DESCRIPTION: 8" CMU Unbraced Wall Deflection Check

Project File: Rigid Diaphragm.ecf

FACET

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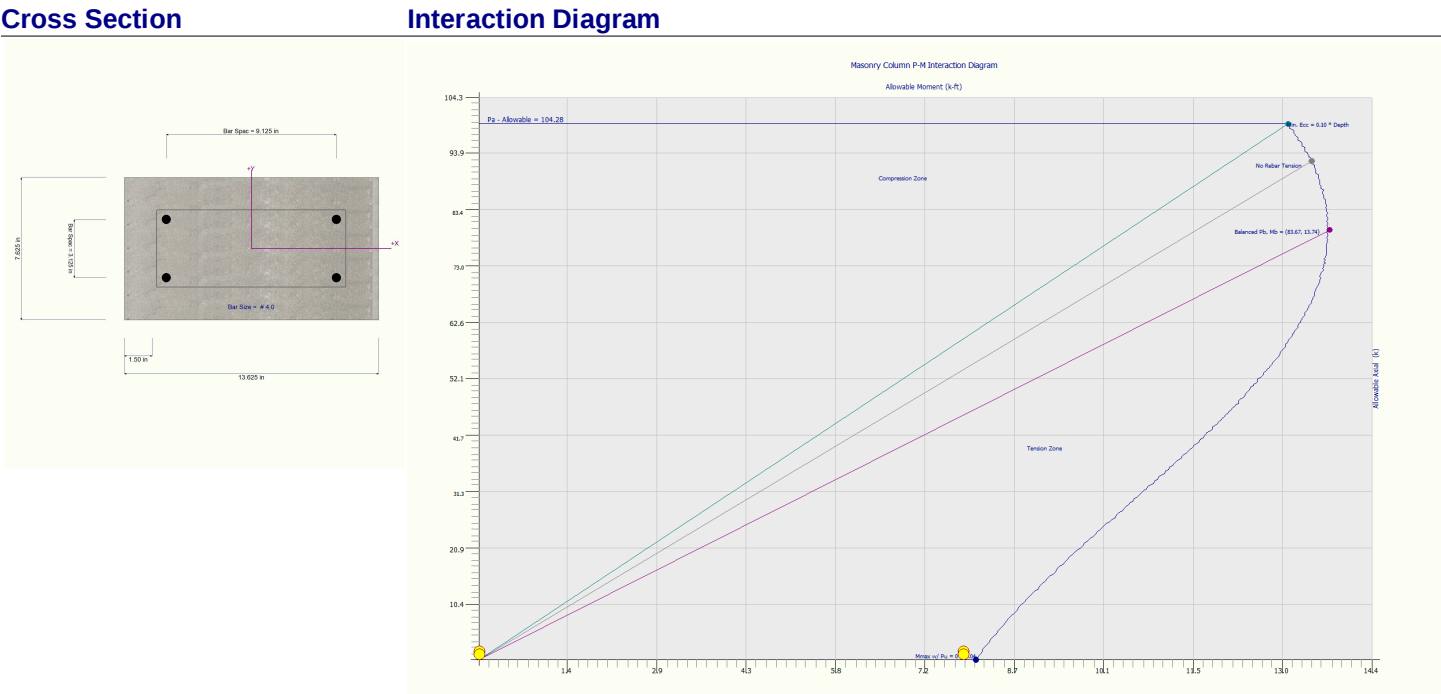
Maximum Reactions

Note: Only non-zero reactions are listed

Load Combination	Y-Y Axis Reaction		Axial Reaction @ Base
	@ Base	@ Top	
+D+0.70E	1.512 k	1.512 k	1.360 k
+D+0.5250E	1.134 k	1.134 k	1.360 k
+0.60D+0.70E	1.512 k	1.512 k	0.816 k
E Only	2.161 k	2.160 k	k

Maximum Deflections for Load Combinations

Load Combination	Max. Y-Y Deflection	Distance
D Only	0.0000 in	0.000 ft
+0.60D	0.0000 in	0.000 ft
+D+0.70E	0.2315 in	7.299 ft
+D+0.5250E	0.1736 in	7.299 ft
+0.60D+0.70E	0.2315 in	7.299 ft
E Only	0.3307 in	7.299 ft



Masonry Slender Wall

Project File: Rigid Diaphragm.ecf

LIC# : KW-06012482, Build:20.24.10.03

FACET

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DESCRIPTION: Wall 1.2 OOP**Code References**

Calculations per TMS 402-16, IBC 2021, ASCE 7-16

Load Combinations Used : ASCE 7-16

General Information

Calculations per TMS 402-16, IBC 2021, ASCE 7-16

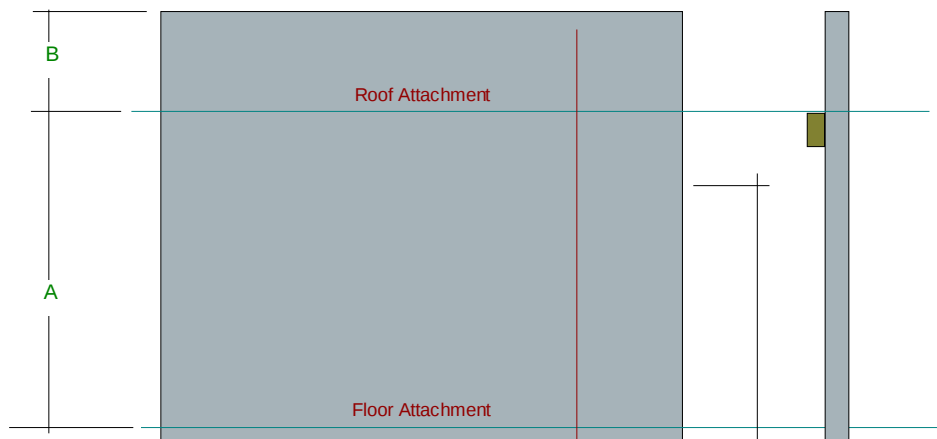
Construction Type : Grouted Hollow Concrete Masonry

F'm	=	2.0 ksi	Nom. Wall Thickness	8 in	Temp Diff across thickness	=	deg F
Fy - Yield	=	60.0 ksi	Actual Thickness	7.625 in	Min Allow Out-of-plane Defl Ra	=	0.0
Fr - Rupture	=	61.0 psi	Rebar "d" distance	3.8125 in	Minimum Vertical Steel %	=	0.0020
Em = f'm *	=	900.0	Lower Level Rebar . . .				
Max % of ρ bal.	=	0.008306	Bar Size	# 5			
Grout Density	=	140 pcf	Bar Spacing	48 in			
Block Weight		Normal Weight					
Wall Weight	=	86.0 psf					
Wall is Solid Grouted							

One-Story Wall Dimensions

A Clear Height	=	12.0 ft
B Parapet height	=	3.333 ft

Wall Support Condition Top Pinned, Bottom F

**Vertical Loads**

Vertical Uniform Loads . . . (Applied per foot of Strip Width)

			DL : Dead	Lr : Roof Live	Lf : Floor Live	S : Snow	W : Wind
Ledger Load	Eccentricity	0.50 in	0.1190	0.140		0.1750	k/ft
Concentric Load			3.2551		1.284		k/ft

Lateral Loads

Wind Loads :

Full area WIND load 15.0 psf

Seismic Loads :

Wall Weight Seismic Load Input Method : ASCE seismic factors entered

SDS Value per ASCE 12.11.1 $S_{DS} * I = 1.015$ $F_p = \text{Wall Wt.} * 0.4060 = 34.916 \text{ psf}$

Masonry Slender Wall

Project File: Rigid Diaphragm.ecf

LIC# : KW-06012482, Build:20.24.10.03

FACET

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: Wall 1.2 OOP**DESIGN SUMMARY**

Results reported for "Strip Width" of 12.0 in

Governing Load Combination . . .		Actual Values . . .		Allowable Values . . .	
PASS	Moment Capacity Check +0.90D+E	Maximum Bending Stress Ratio0.2355			
		Max Mu	-0.5357 k-ft	Phi * Mn	2.274 k-ft
PASS	Service Deflection Check E Only	Actual Defl. Ratio L/	22568	Allowable Defl. Ratio	150.0
		Max. Deflection	0.006381 in		
PASS	Axial Load Check +1.20D+L+0.20S+E	Max Pu / Ag	75.910 psi	Max. Allow. Defl.	0.960 in
		Location	0.20 ft	0.2 * f'm	400.0 psi
	Reinforcing Limit Check				
		Actual As/bd	0.001694	Max Allow As/bd	0.008306
		Maximum Reactions for Load Combination....			
		Top Horizontal E Only			297.710 k
		Base Horizontal E Only			237.657 k
		Vertical Reaction +D+L			5.977 k

Design Maximum Combinations - Moments

Results reported for "Strip Width" = 12 in.

Load Combination	Axial Load		Mcr k-ft	Mu k-ft	Moment Values			As Ratio	0.6 * rho bal	Bar 'd'
	Pu k	0.2*f'm*b*t k			Phi	Phi Mn k-ft	As in^2			
+1.40D at 11.60 to 12.00	5.173	36.624	0.59	0.01	0.90	2.51	0.078	0.0017	0.0076	0.00
+1.20D+0.50Lr+1.60L at 11.60 to 12.00	6.559	36.624	0.59	0.01	0.90	2.86	0.078	0.0017	0.0071	0.00
+1.20D+1.60L+0.50S at 11.60 to 12.00	6.576	36.624	0.59	0.01	0.90	2.86	0.078	0.0017	0.0071	0.00
+1.20D+1.60Lr+L at 11.60 to 12.00	5.942	36.624	0.59	0.02	0.90	2.71	0.078	0.0017	0.0074	0.00
+1.20D+1.60Lr+0.50W at 0.00 to 0.40	5.855	36.624	0.59	0.12	0.90	2.69	0.078	0.0017	0.0074	0.00
+1.20D+L+1.60S at 11.60 to 12.00	5.998	36.624	0.59	0.02	0.90	2.72	0.078	0.0017	0.0073	0.00
+1.20D+1.60S+0.50W at 0.00 to 0.40	5.911	36.624	0.59	0.12	0.90	2.70	0.078	0.0017	0.0074	0.00
+1.20D+0.50Lr+L+W at 0.00 to 0.40	6.985	36.624	0.59	0.23	0.90	2.96	0.078	0.0017	0.0070	0.00
+1.20D+L+0.50S+W at 0.00 to 0.40	7.003	36.624	0.59	0.23	0.90	2.97	0.078	0.0017	0.0070	0.00
+0.90D+W at 0.00 to 0.40	4.223	36.624	0.59	0.23	0.90	2.27	0.078	0.0017	0.0080	0.00
+1.20D+L+0.20S+E at 0.00 to 0.40	6.950	36.624	0.59	0.54	0.90	2.96	0.078	0.0017	0.0070	0.00
+0.90D+E at 0.00 to 0.40	4.223	36.624	0.59	0.54	0.90	2.27	0.078	0.0017	0.0080	0.00

Design Maximum Combinations - Deflections

Results reported for "Strip Width" = 12 in.

Load Combination	Axial Load Pu k	Moment Values		I gross in^4	Stiffness		Deflections	
		Mcr k-ft	Mactual k-ft		I cracked in^4	I effective in^4	Deflection in	Defl. Ratio
D Only at 7.60 to 8.00	4.039	0.59	0.00	443.30	22.43	443.300	0.000	#####
+D+L at 7.60 to 8.00	5.323	0.59	0.00	443.30	25.03	443.300	0.000	#####
+D+Lr at 7.60 to 8.00	4.179	0.59	0.01	443.30	22.72	443.300	0.000	#####
+D+S at 7.60 to 8.00	4.214	0.59	0.01	443.30	22.79	443.300	0.000	#####
+D+0.750Lr+0.750L at 7.60 to 8.00	5.107	0.59	0.00	443.30	24.60	443.300	0.000	#####
+D+0.750L+0.750S at 7.60 to 8.00	5.133	0.59	0.00	443.30	24.65	443.300	0.000	#####
+D+0.60W at 6.40 to 6.80	4.142	0.59	0.07	443.30	22.65	443.300	0.002	84,421.5
+D+0.750Lr+0.750L+0.450W at 6.40 to 6.80	5.210	0.59	0.06	443.30	24.80	443.300	0.001	107391.1
+D+0.750L+0.750S+0.450W at 6.40 to 6.80	5.237	0.59	0.06	443.30	24.86	443.300	0.001	106460.8
+0.60D+0.60W at 6.40 to 6.80	2.485	0.59	0.07	443.30	19.13	443.300	0.002	85,651.2
+D+0.70E at 6.40 to 6.80	4.142	0.59	0.20	443.30	22.65	443.300	0.005	31,707.1
+D+0.750L+0.750S+0.5250E at 6.40 to 6.80	5.237	0.59	0.15	443.30	24.86	443.300	0.003	41,351.5
+0.60D+0.70E at 6.40 to 6.80	2.485	0.59	0.19	443.30	19.13	443.300	0.005	31,918.8
Lr Only at 7.60 to 8.00	0.140	0.59	0.00	443.30	13.72	443.300	0.000	#####
	0.000	0.00	0.00	0.00	0.00	0.000	0.000	0.0

Masonry Slender Wall

Project File: Rigid Diaphragm.ecf

LIC# : KW-06012482, Build:20.24.10.03

FACET

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: Wall 1.2 OOP

S Only at 7.60 to 8.00	0.175	0.59	0.00	443.30	13.81	443.300	0.000	#####
W Only at 6.40 to 6.80	0.000	0.59	0.12	443.30	13.38	443.300	0.003	52,532.3
E Only at 6.40 to 6.80	0.000	0.59	0.28	443.30	13.38	443.300	0.006	22,568.0

Reactions - Vertical & Horizontal

Load Combination	Base Horizontal	Top Horizontal	Vertical @ Wall Base
D Only	0.0 k	0.00 k	4.693 k
+D+L	0.0 k	0.00 k	5.977 k
+D+Lr	0.0 k	0.00 k	4.833 k
+D+S	0.0 k	0.00 k	4.868 k
+D+0.750Lr+0.750L	0.0 k	0.00 k	5.761 k
+D+0.750L+0.750S	0.0 k	0.00 k	5.787 k
+D+0.60W	0.1 k	0.08 k	4.693 k
+D+0.750Lr+0.750L+0.450W	0.0 k	0.06 k	5.761 k
+D+0.750L+0.750S+0.450W	0.0 k	0.06 k	5.787 k
+0.60D+0.60W	0.1 k	0.08 k	2.816 k
+D+0.70E	0.2 k	0.21 k	4.693 k
+D+0.750L+0.750S+0.5250E	0.1 k	0.15 k	5.787 k
+0.60D+0.70E	0.2 k	0.21 k	2.816 k
Lr Only	0.0 k	0.00 k	0.140 k
L Only	0.0 k	0.00 k	1.284 k
S Only	0.0 k	0.00 k	0.175 k
W Only	0.1 k	0.13 k	0.000 k
E Only	0.2 k	0.30 k	0.000 k

Masonry Slender Wall

Project File: Rigid Diaphragm.ecf

LIC# : KW-06012482, Build:20.24.10.03

FACET

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: Wall 1.3 OOP

Code References

Calculations per TMS 402-16, IBC 2021, ASCE 7-16
Load Combinations Used : ASCE 7-16

General Information

Calculations per TMS 402-16, IBC 2021, ASCE 7-16

Construction Type : Grouted Hollow Concrete Masonry

F'm = 2.0 ksi

Fy - Yield = 60.0 ksi

Fr - Rupture = 61.0 psi

Em = f'm * = 900.0

Max % of ρ bal. = 0.008785

Grout Density = 140 pcf

Block Weight Normal Weight

Wall Weight = 86.0 psf

Wall is Solid Grouted

Nom. Wall Thickness 8 in

Actual Thickness 7.625 in

Rebar "d" distance 3.8125 in

Lower Level Rebar . . .

Bar Size # 5

Bar Spacing 40 in

Temp Diff across thickness = deg F

Min Allow Out-of-plane Defl Ra = 0.0

Minimum Vertical Steel % = 0.0020

One-Story Wall Dimensions

A Clear Height = 15.330 ft

B Parapet height = ft

Wall Support ConditionTop Pinned, Bottom F

Vertical Loads

Vertical Uniform Loads . . . (Applied per foot of Strip Width)			DL : Dead	Lr : Roof Live	Lf : Floor Live	S : Snow	W : Wind
Ledger Load	Eccentricity	0.50 in	0.2630	0.3490		0.680	k/ft
Concentric Load			1.93	2.054		2.56	k/ft

Lateral Loads

Wind Loads :
Full area WIND load 30.0 psf

Seismic Loads :
Wall Weight Seismic Load Input Method : ASCE seismic factors entered

SDS Value per ASCE 12.11.1

S_{DS} * I = 1.015

Fp = Wall Wt. * 0.4060 = 34.916 psf

Masonry Slender Wall

Project File: Rigid Diaphragm.ecf

LIC# : KW-06012482, Build:20.24.10.03

FACET

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: Wall 1.3 OOP**DESIGN SUMMARY**

Results reported for "Strip Width" of 12.0 in

Governing Load Combination . . .		Actual Values . . .		Allowable Values . . .	
PASS	Moment Capacity Check +0.90D+E	Maximum Bending Stress Ratio0.7546			
		Max Mu	-1.673 k-ft	Phi * Mn	2.217 k-ft
PASS	Service Deflection Check E Only	Actual Defl. Ratio L/	2,499	Allowable Defl. Ratio	150.0
		Max. Deflection	0.07360 in		
PASS	Axial Load Check +0.90D+E	Max Pu / Ag	34.514 psi	Max. Allow. Defl.	1.226 in
		Location	0.2555 ft	0.2 * f'm	400.0 psi
	Reinforcing Limit Check				
		Actual As/bd	0.002033	Max Allow As/bd	0.008785

Maximum Reactions for Load Combination....

Top Horizontal	E Only	153.80 k
Base Horizontal	E Only	381.462 k
Vertical Reaction	+D+S	6.751 k

Design Maximum Combinations - Moments

Results reported for "Strip Width" = 12 in.

Load Combination	Axial Load		Mcr k-ft	Mu k-ft	Moment Values			As in ²	As Ratio	0.6 * rho bal	Bar 'd'
	Pu k	0.2*f'm*b*t k			Phi	Phi Mn k-ft					
+1.40D at 14.82 to 15.33	3.132	36.624	0.59	0.02	0.90	2.21	0.093	0.0020	0.0084	0.00	
+1.20D+0.50Lr at 14.82 to 15.33	3.886	36.624	0.59	0.02	0.90	2.40	0.093	0.0020	0.0081	0.00	
+1.20D+0.50S at 14.82 to 15.33	4.304	36.624	0.59	0.03	0.90	2.51	0.093	0.0020	0.0079	0.00	
+1.20D+1.60Lr at 14.82 to 15.33	6.529	36.624	0.59	0.04	0.90	3.06	0.093	0.0020	0.0071	0.00	
+1.20D+1.60Lr+0.50W at 0.00 to 0.51	8.058	36.624	0.59	0.46	0.90	3.43	0.093	0.0020	0.0066	0.00	
+1.20D+1.60S at 14.82 to 15.33	7.868	36.624	0.59	0.06	0.90	3.38	0.093	0.0020	0.0067	0.00	
+1.20D+1.60S+0.50W at 0.00 to 0.51	9.398	36.624	0.59	0.48	0.90	3.74	0.093	0.0020	0.0061	0.00	
+1.20D+0.50Lr+W at 0.00 to 0.51	5.415	36.624	0.59	1.27	0.90	2.78	0.093	0.0020	0.0075	0.00	
+1.20D+0.50S+W at 0.00 to 0.51	5.834	36.624	0.59	1.28	0.90	2.89	0.093	0.0020	0.0074	0.00	
+0.90D+W at 0.00 to 0.51	3.160	36.624	0.59	1.30	0.90	2.22	0.093	0.0020	0.0084	0.00	
+1.20D+0.20S+E at 0.00 to 0.51	4.862	36.624	0.59	1.66	0.90	2.65	0.093	0.0020	0.0077	0.00	
+0.90D+E at 0.00 to 0.51	3.160	36.624	0.59	1.67	0.90	2.22	0.093	0.0020	0.0084	0.00	

Design Maximum Combinations - Deflections

Results reported for "Strip Width" = 12 in.

Load Combination	Axial Load Pu k	Moment Values		I gross in ⁴	Stiffness		Deflections	
		Mcr k-ft	Mactual k-ft		I cracked in ⁴	I effective in ⁴	Deflection in	Defl. Ratio
D Only at 9.71 to 10.22	2.676	0.59	0.01	443.30	21.53	443.300	0.000	888911.3
+D+Lr at 9.71 to 10.22	5.079	0.59	0.01	443.30	26.37	443.300	0.000	380031.2
+D+S at 9.71 to 10.22	5.916	0.59	0.02	443.30	27.96	443.300	0.001	246192.5
+D+0.750Lr at 9.71 to 10.22	4.479	0.59	0.01	443.30	25.20	443.300	0.000	443792.7
+D+0.750S at 9.71 to 10.22	5.106	0.59	0.02	443.30	26.42	443.300	0.001	300861.0
+D+0.60W at 8.69 to 9.20	2.764	0.59	0.30	443.30	21.72	443.300	0.012	15,453.0
+D+0.750Lr+0.450W at 8.69 to 9.20	4.567	0.59	0.23	443.30	25.37	443.300	0.009	19,973.5
+D+0.750S+0.450W at 8.69 to 9.20	5.194	0.59	0.23	443.30	26.59	443.300	0.009	19,547.9
+0.60D+0.60W at 8.69 to 9.20	1.659	0.59	0.30	443.30	19.35	443.300	0.012	15,591.4
+D+0.70E at 8.69 to 9.20	2.764	0.59	0.41	443.30	21.72	443.300	0.016	11,409.4
+D+0.750S+0.5250E at 8.69 to 9.20	5.194	0.59	0.31	443.30	26.59	443.300	0.013	14,636.8
+0.60D+0.70E at 8.69 to 9.20	1.659	0.59	0.40	443.30	19.35	443.300	0.016	11,499.0
Lr Only at 9.71 to 10.22	2.403	0.59	0.01	443.30	20.96	443.300	0.000	670132.9
S Only at 9.71 to 10.22	3.240	0.59	0.01	443.30	22.70	443.300	0.001	343318.9
W Only at 8.69 to 9.20	0.000	0.59	0.27	443.30	15.61	443.300	0.049	3,733.8

Masonry Slender Wall

Project File: Rigid Diaphragm.ecf

LIC# : KW-06012482, Build:20.24.10.03

FACET

(c) ENERCALC, LLC 1982-2024

DESCRIPTION: Wall 1.3 OOP

E Only at 9.20 to 9.71 0.000 0.59 0.30 443.30 15.61 443.300 0.074 2,499.4

Reactions - Vertical & Horizontal

Load Combination	Base Horizontal	Top Horizontal	Vertical @ Wall Base
D Only	0.0 k	0.00 k	3.511 k

Reactions - Vertical & Horizontal

Load Combination	Base Horizontal	Top Horizontal	Vertical @ Wall Base
+D+Lr	0.0 k	0.00 k	5.914 k
+D+S	0.0 k	0.00 k	6.751 k
+D+0.750Lr	0.0 k	0.00 k	5.314 k
+D+0.750S	0.0 k	0.00 k	5.941 k
+D+0.60W	0.2 k	0.10 k	3.511 k
+D+0.750Lr+0.450W	0.1 k	0.08 k	5.314 k
+D+0.750S+0.450W	0.1 k	0.07 k	5.941 k
+0.60D+0.60W	0.2 k	0.10 k	2.107 k
+D+0.70E	0.2 k	0.14 k	3.511 k
+D+0.750S+0.5250E	0.2 k	0.10 k	5.941 k
+0.60D+0.70E	0.2 k	0.14 k	2.107 k
Lr Only	0.0 k	0.00 k	2.403 k
S Only	0.0 k	0.00 k	3.240 k
W Only	0.3 k	0.14 k	0.000 k
E Only	0.4 k	0.15 k	0.000 k



Anchor Designer™ for Concrete Software

Version 3.3.2404.1

Company:	Facet	Date:	2/17/2023
Engineer:	LAO	Page:	1/5
Project:	Puyallup Storage		
Address:	2210 Riverside Dr. Suite 110		
Phone:	360-899-1110		
E-mail:	lortega@facetnw.com		

1. Project information

Project description:

Location:

Fastening description:

Comment:

2. Input Data & Anchor Parameters

General

Design method: ACI 318-19

Units: Imperial units

Anchor Information:

Anchor type: Bonded anchor

Material: F1554 Grade 36

Diameter (inch): 0.625

Effective Embedment depth, h_{ef} (inch): 7.000

Code report: ICC-ES ESR-4057

Anchor category: -

Anchor ductility: Yes

h_{min} (inch): 8.38

C_{ac} (inch): 15.19

C_{min} (inch): 1.75

S_{min} (inch): 3.00

Base Material

Concrete: Normal-weight

Concrete thickness, h (inch): 12.00

State: Cracked

Compressive strength, f'_c (psi): 2500

$\Psi_{c,v}$: 1.0

Reinforcement condition: Supplementary reinforcement present

Supplemental edge reinforcement: Not applicable

Reinforcement provided at corners: No

Ignore concrete breakout in tension: No

Ignore concrete breakout in shear: No

Hole condition: Dry concrete

Inspection: Continuous

Temperature range, Short/Long: 150/110°F

Reduced installation torque (for AT-3G): Not applicable

Ignore 6do requirement: Not applicable

Build-up grout pad: No

Recommended Anchor

Anchor Name: SET-3G™ - SET-3G w/ 5/8"Ø F1554 Gr. 36

Code Report: ICC-ES ESR-4057



Input data and results must be checked for agreement with the existing circumstances, the standards and guidelines must be checked for plausibility.

Simpson Strong-Tie Company Inc. 5956 W. Las Positas Boulevard Pleasanton, CA 94588 Phone: 925.560.9000 Fax: 925.847.3871 www.strongtie.com



**Anchor Designer™ for
Concrete Software**
Version 3.3.2404.1

Company:	Facet	Date:	2/17/2023
Engineer:	LAO	Page:	2/5
Project:	Puyallup Storage		
Address:	2210 Riverside Dr. Suite 110		
Phone:	360-899-1110		
E-mail:	lortega@facetnw.com		

Load and Geometry

Load factor source: ACI 318 Section 5.3

Load combination: not set

Seismic design: Yes

Anchors subjected to sustained tension: No

Ductility section for tension: 17.10.5.3 (a) (iii)-(vi) is satisfied

Ductility section for shear: 17.10.6.2 not applicable

Ω_0 factor: not set

Apply entire shear load at front row: Yes

Anchors only resisting wind and/or seismic loads: Yes

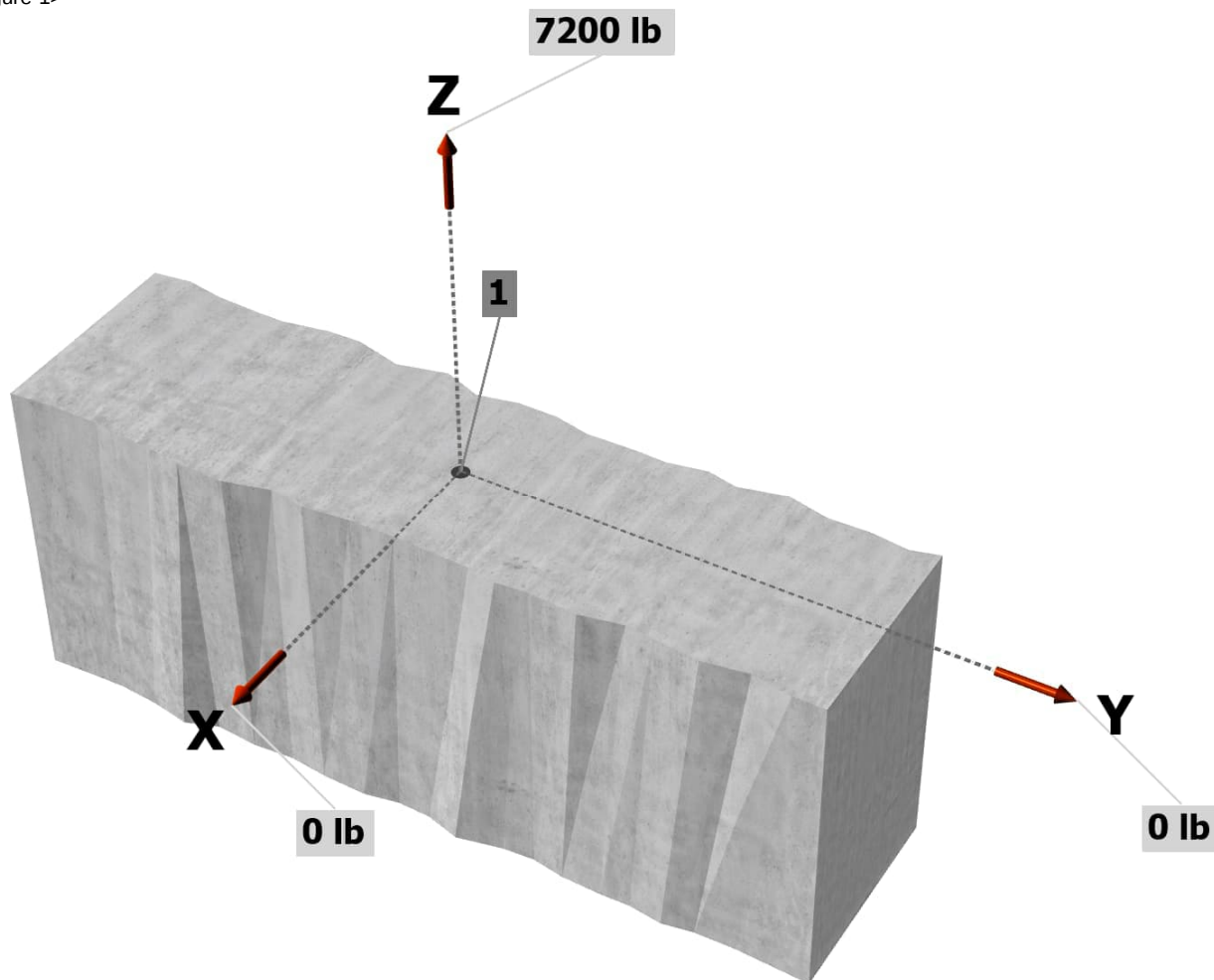
Strength level loads:

N_{ua} [lb]: 7200

V_{uax} [lb]: 0

V_{uay} [lb]: 0

<Figure 1>



Input data and results must be checked for agreement with the existing circumstances, the standards and guidelines must be checked for plausibility.

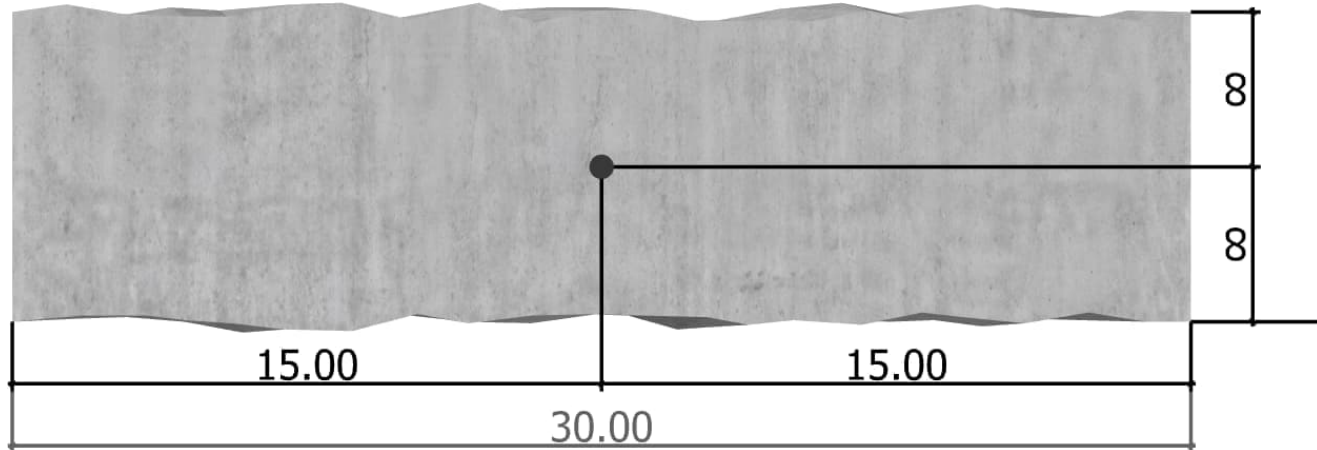
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<Figure 2>



3. Resulting Anchor Forces

Anchor	Tension load, N_{ua} (lb)	Shear load x, V_{uax} (lb)	Shear load y, V_{uay} (lb)	Shear load combined, $\sqrt{(V_{uax})^2 + (V_{uay})^2}$ (lb)
1	7200.0	0.0	0.0	0.0
Sum	7200.0	0.0	0.0	0.0

Maximum concrete compression strain (%): 0.00

Maximum concrete compression stress (psi): 0

Resultant tension force (lb): 7200

Resultant compression force (lb): 0

Eccentricity of resultant tension forces in x-axis, e'_{Nx} (inch): 0.00

Eccentricity of resultant tension forces in y-axis, e'_{Ny} (inch): 0.00

Input data and results must be checked for agreement with the existing circumstances, the standards and guidelines must be checked for plausibility.

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4. Steel Strength of Anchor in Tension (Sec. 17.6.1)

N_{sa} (lb)	ϕ	ϕN_{sa} (lb)
13110	0.75	9833

5. Concrete Breakout Strength of Anchor in Tension (Sec. 17.6.2)

$$N_b = k_c \lambda_a \sqrt{f'_c} h_{ef}^{1.5} \text{ (Eq. 17.6.2.2.1)}$$

k_c	λ_a	f'_c (psi)	h_{ef} (in)	N_b (lb)
17.0	1.00	2500	7.000	15742

$$0.75 \phi N_{cb} = 0.75 \phi (A_{Nc} / A_{Nco}) \Psi_{ed,N} \Psi_{c,N} \Psi_{cp,N} N_b \text{ (Sec. 17.5.1.2 & Eq. 17.6.2.1a)}$$

A_{Nc} (in ²)	A_{Nco} (in ²)	$C_{a,min}$ (in)	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	ϕ	$0.75 \phi N_{cb}$ (lb)
441.00	441.00	15.00	1.000	1.00	1.000	15742	0.75	8855

6. Adhesive Strength of Anchor in Tension (Sec. 17.6.5)

$$\tau_{k,cr} = \tau_{k,cr,short-term} K_{sat} (f'_c / 2,500)^n \alpha_{N,seis}$$

$\tau_{k,cr}$ (psi)	$f_{short-term}$	K_{sat}	$\alpha_{N,seis}$	f'_c (psi)	n	$\tau_{k,cr}$ (psi)
1356	1.00	1.00	1.00	2500	0.24	1356

$$N_{ba} = \lambda_a \tau_{k,cr} \pi d_a h_{ef} \text{ (Eq. 17.6.5.2.1)}$$

λ_a	$\tau_{k,cr}$ (psi)	d_a (in)	h_{ef} (in)	N_{ba} (lb)
1.00	1356	0.63	7.000	18637

$$0.75 \phi N_a = 0.75 \phi (A_{Na} / A_{Na0}) \Psi_{ed,Na} \Psi_{cp,Na} N_{ba} \text{ (Sec. 17.5.1.2 & Eq. 17.6.5.1a)}$$

A_{Na} (in ²)	A_{Na0} (in ²)	C_{Na} (in)	$C_{a,min}$ (in)	$\Psi_{ed,Na}$	$\Psi_{cp,Na}$	N_{a0} (lb)	ϕ	$0.75 \phi N_a$ (lb)
307.10	307.10	8.76	15.00	1.000	1.000	18637	0.65	9086

11. Results

Interaction of Tensile and Shear Forces (Sec. 17.8)

Tension	Factored Load, N_{ua} (lb)	Design Strength, ϕN_n (lb)	Ratio	Status
Steel	7200	9833	0.73	Pass
Concrete breakout	7200	8855	0.81	Pass (Governs)

Input data and results must be checked for agreement with the existing circumstances, the standards and guidelines must be checked for plausibility.

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Adhesive 7200 9086 0.79 Pass

SET-3G w/ 5/8"Ø F1554 Gr. 36 with hef = 7.000 inch meets the selected design criteria.

ACI 318-19 Section 17.10.5.3(a) (i) & (ii) Calculations for Ductility requirement for tension load

Steel	Factored Load, N_{ua} (lb)	1.2 x Nominal Strength, N_n (lb)	Ratio	
Steel	7200	15732	45.8%	Governs
Concrete	Factored Load, N_{ua} (lb)	Nominal Strength, N_n (lb)	Ratio	
Concrete breakout	7200	15742	45.7%	
Adhesive	7200	18637	38.6%	

ACI 318-19 Section 17.10.5.3(a) (i) & (ii) satisfied since steel ratio governs and the steel element is ductile.

12. Warnings

- Per designer input, the shear component of the strength-level earthquake force applied to anchors does not exceed 20 percent of the total factored anchor shear force associated with the same load combination. Therefore the ductility requirements of ACI 318 17.10.6.2 for shear need not be satisfied – designer to verify.
- Designer must exercise own judgement to determine if this design is suitable.
- Refer to manufacturer's product literature for hole cleaning and installation instructions.



ADM Anchor Designer Masonry

LD-58

Input Data

Masonry Wall Details

Design Method	Wall Type	Nominal Thickness (in)	CMU State	Hole Condition	Anchor Location	Compression Strength (psi)	Temperature Range
ACI 318-19 / ESR-4844	Grout Filled CMU	8	Cracked	Dry	Face	2000	Short-term = 140°F, long-term = 110°F
Head Joint Type		Head Joint (in)			Bed Joint (in)		
Solid Head Joint		8			4		

Anchor

Product	Embedment Depth (in)
SET-3G w/ 1/2"Ø F1554 Gr. 36	4.5

Load Condition

Seismic or Design Category 0.75 Reduction Factor	Sustained Tension	Apply Entire Shear Load at Front Row
Yes	No	No

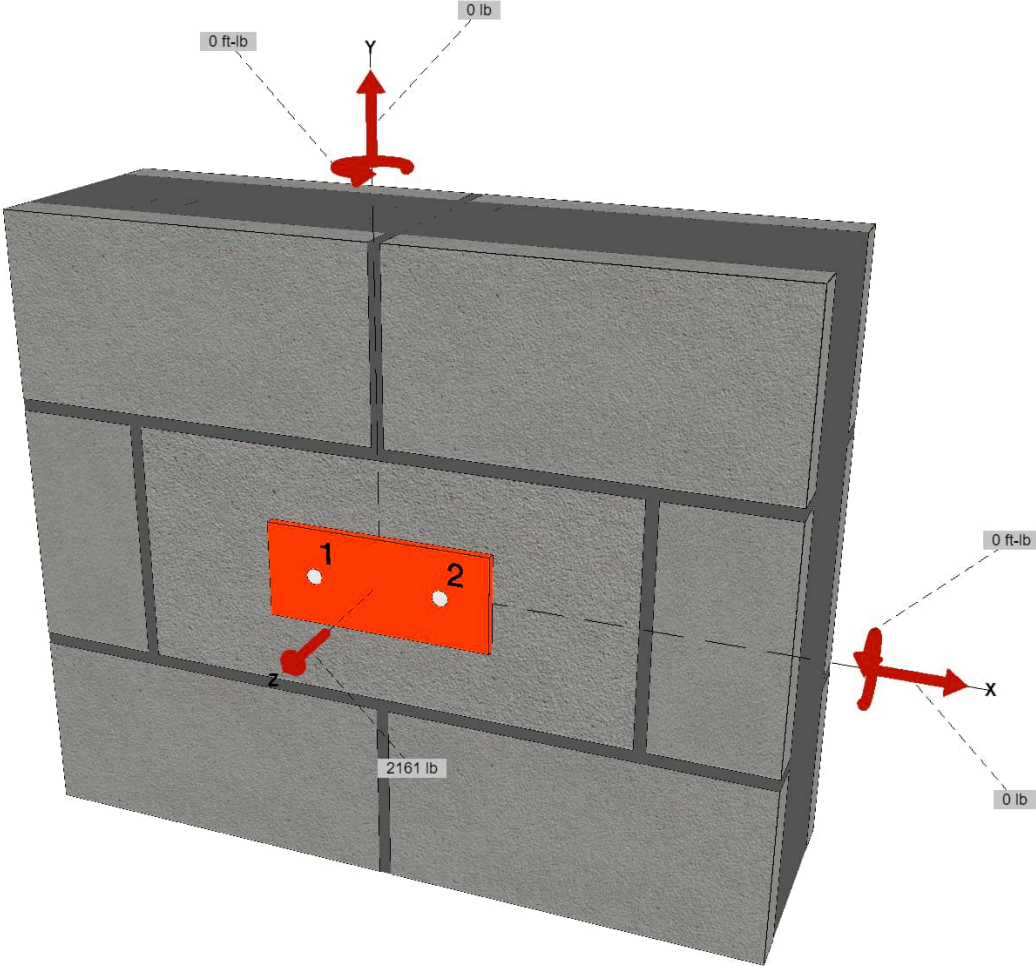
Load

N _{ua} (lb)	V _{uax} (lb)	V _{uay} (lb)	M _{ux} (ft-lb)	M _{uy} (ft-lb)
2161	0	0	0	0

UNBRACED CMU WALL
ANCHOR DESIGN

LD-58

Facet



UNBRACED CMU WALL
ANCHOR DESIGN

LD-60



LD-60

Results

Resulting Anchor Forces

Resulting Anchor Forces		
Anchor	Tension (lb)	Shear (lb)
1	1080	0
2	1080	0

Limit States in Tension

Tension			
Limit State Identity	Limit State Status	Demand (lb)	Capacity (lb)
Steel Strength	● 17.49%	1080.50	6176.25
Masonry Breakout Strength	● 66.75%	2161.00	3237.38
Adhesive Strength	● 95.69%	2161.00	2258.37

Facet

UNBRACED CMU WALL
ANCHOR DESIGN

Result

SET-3G w/ 1/2"Ø F1554 Gr. 36 with hef=4.5 inches *does meet* the selected design criteria.

Warnings

- Designer must exercise own judgment to determine if this design is suitable.
- Refer to manufacturer's product literature for hole cleaning and installation instructions.

Facet

UNBRACED CMU WALL
ANCHOR DESIGN



ADM Anchor Designer Masonry

LD-63

Input Data

Masonry Wall Details

Design Method	Wall Type	Nominal Thickness (in)	CMU State	Hole Condition	Anchor Location	Compression Strength (psi)	Temperature Range
ACI 318-19 / ESR-4844	Grout Filled CMU	8	Cracked	Dry	Face	2000	Short-term = 140°F, long-term = 110°F
Head Joint Type		Head Joint (in)			Bed Joint (in)		
Solid Head Joint		8			4		

Anchor

Product	Embedment Depth (in)
SET-3G w/ 1/2"Ø F1554 Gr. 36	4.5

Load Condition

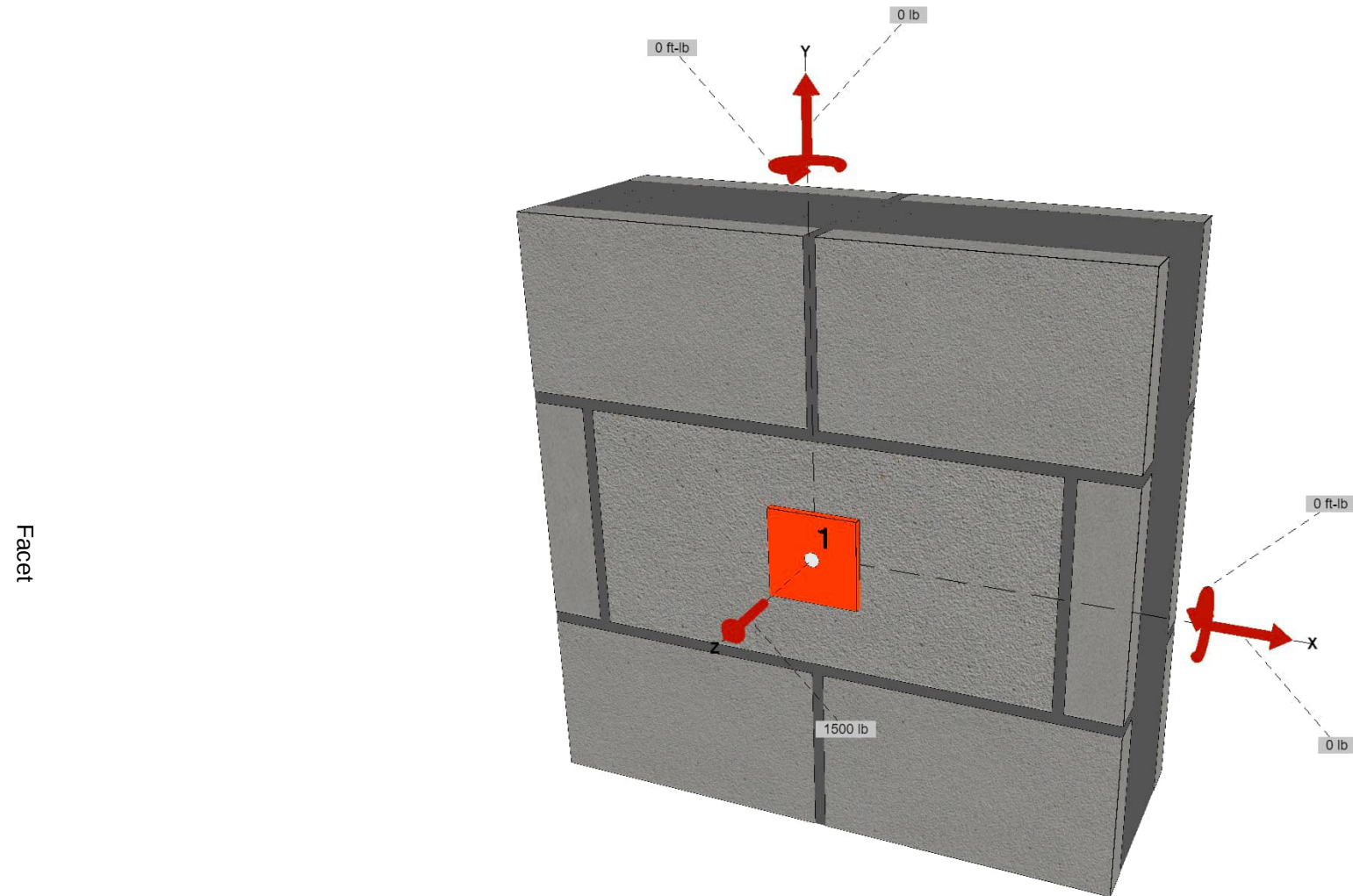
Seismic or Design Category 0.75 Reduction Factor	Sustained Tension	Apply Entire Shear Load at Front Row
Yes	No	No

Load

N _{ua} (lb)	V _{uax} (lb)	V _{uay} (lb)	M _{ux} (ft-lb)	M _{uy} (ft-lb)
1500	0	0	0	0

HSS CMU ANCHOR
BOLT DESIGN

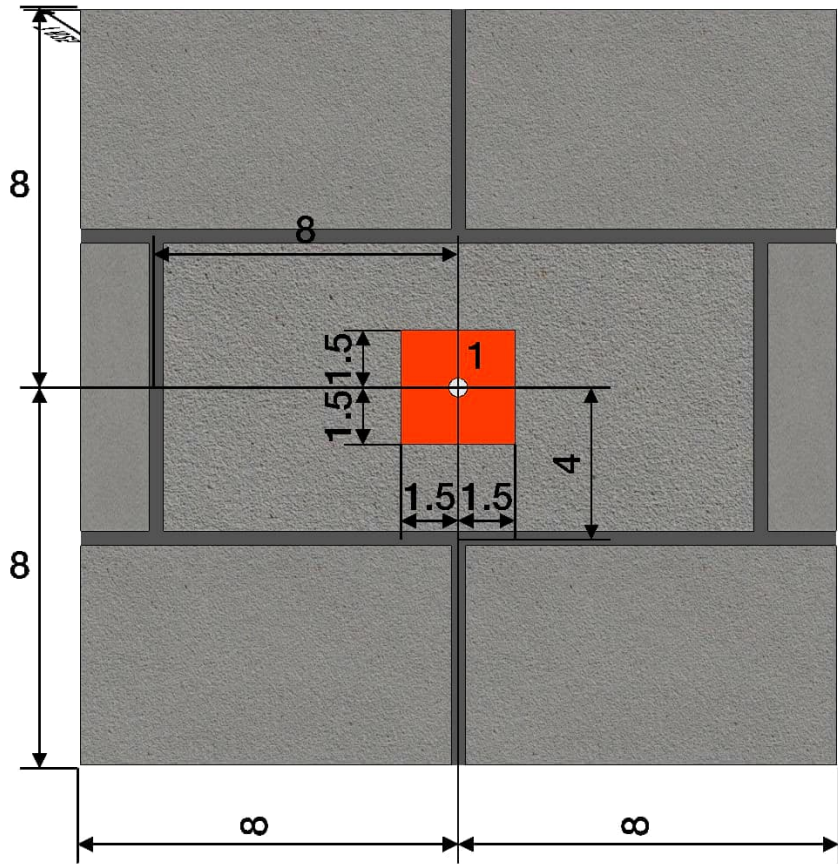
LD-63



HSS CMU ANCHOR BOLT DESIGN

Geometry

Facet



HSS CMU ANCHOR
BOLT DESIGN

Results

Resulting Anchor Forces

Resulting Anchor Forces		
Anchor	Tension (lb)	Shear (lb)
1	1500	0

Limit States in Tension

Tension			
Limit State Identity	Limit State Status	Demand (lb)	Capacity (lb)
Steel Strength	● 24.29%	1500.00	6176.25
Masonry Breakout Strength	● 60.06%	1500.00	2497.41
Adhesive Strength	● 96.73%	1500.00	1550.67

Facet

HSS CMU ANCHOR
BOLT DESIGN

Result

SET-3G w/ 1/2"Ø F1554 Gr. 36 with hef=4.5 inches *does meet* the selected design criteria.

Warnings

- Designer must exercise own judgment to determine if this design is suitable.
- Refer to manufacturer's product literature for hole cleaning and installation instructions.

Facet

HSS CMU ANCHOR
BOLT DESIGN