Structural Calculations Cover Sheet

Project Number: **2023.102** **Date:** **January 26, 2024**
Project Name: **Macintyre**

Structural Design For: Structural design for an addition and remodel
Construction Type: Conventional wood platform framing with conventional concrete foundations

CODES

2018 International Building Code (IBC)
2018 NDS
ASCE 7-16

LOADS

Dead Loads	As required
Floor Load	40 psf
Roof Load	25 psf
Wind	110 mph, Exposure B, Per ASCE 7-16 Section 28, Kzt = 1.38
Seismic	Per ASCE 7-16 Section 12

Peak Ground Accelerations (PGA) based on USGS Hazards Program 2003, by Lat/Lon.
PGA 1 sec = .508 PGA .2 sec = 1.472 %V = .181 * DL

Material Design Values

Soils (assumed)	Minimum 2,000 psf allowed bearing (subject to field verification)	
Concrete	f'c=2,500 psi; 5-1/2 sack mix, or alternate mix pre-approved by bldg. dept.	
Reinforcing	Grade 60; Fy=60,000 psi minimum	
Sawn Lumber	Joists, Rafters:	Hem-Fir #2 and better
	Beams, Posts:	DF-L #2
	Studs & Plates:	Hem-Fir Standard
Glu-Lam Beams	24F-V4 for simple span beams, 24F-V8 for cantilevered beams	
Structural Steel	ASTMA500, Fy=46 ksi Tubes	
Anchor Bolts	ASTM A325 hold down bolts, F1554 Anchor Bolts, A307 other bolts	

CONSULTING STRUCTURAL ENGINEERING SERVICES, INC.
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Structural Engineering Consulting and Design

John S. Apolis, P.E. **CSES, Inc.** Job number: **2023.102**

Project: **Macintyre** Date: 26-Jan-24

Architect: Page number: R1

BEAM DESIGN (Uniform Load+Concentrated Load)

2018 International Building Code (IBC) **2018 NDS**

Beam Description: Roof Rafters

Fully Supported:	1	Snow Load:	1	Wind Load:	
Repetitive Member:		P.T. Lumber:		Wet Use:	

Geometry and Loads:

Span:	14 ft	Tributary Width:	2 ft	P Location:	14 ft
Add'l uniform DL:		DL unit load:	15 psf	Concentrated DL:	
Add'l uniform LL:		LL unit load:		Concentrated LL:	
Add'l uniform SL:		SL unit load:	25 psf	Concentrated SL:	
Add'l uniform WL:		WL unit load:		Concentrated WL:	

DL Reaction 1:	210 lbs	DL Reaction 2:	210 lbs	Note: Design automatically uses
LL Reaction 1:	0 lbs	LL Reaction 2:	0 lbs	ASD load combinations
SL Reaction 1:	350 lbs	SL Reaction 2:	350 lbs	
WL Reaction 1:	0 lbs	WL Reaction 2:	0 lbs	
Total Reaction 1:	**560 lbs**	Total Reaction 2:	**560 lbs**	

Material Properties:

E	1.3 msi	E'	1.3 msi
Fb	850 psi	Fb'	978 psi
Fv	150 psi	Fv'	173 psi
Fc perp	405 psi	Fc perp'	405 psi
Emin	0.47 msi	Emin'	0.47 msi

Deflection analysis:

For total load: Allowed deflection criteria, span/			240	
For LL only: Allowed deflection criteria, span/			360	
Max. allowed total defl:	0.7 in	Max LL defl:		0.47 in
Total defl. * I:	53.19 in^4	Required I:		75.99 in^4
LL defl. * I:	33.24 in^4	Required I:		71.24 in^4
Actual deflections:	TOTAL:	0.3 in		0.19 in

Force analysis:

Max. moment:	1960 ft-lb	Max Shear:	560 lbs

Selected Member:	(1) HF #2	**1.5**	**x**	**11.25**

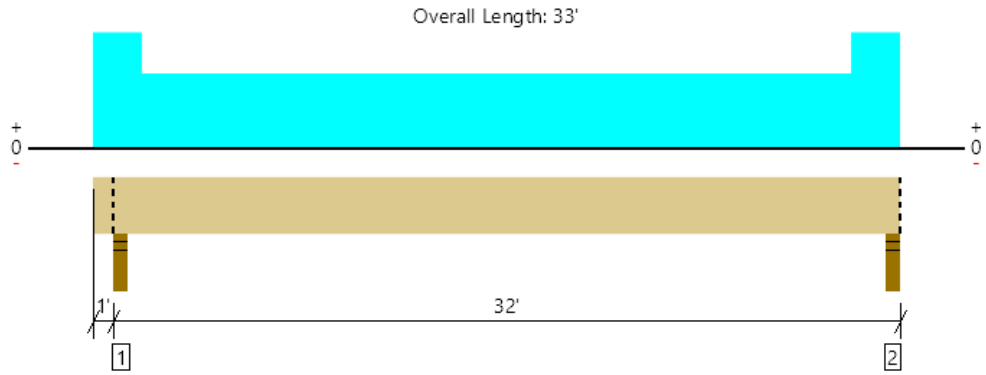
Member properties:	**Provided:**		**Required:**
Moment of inertia:	177.98 in^4		75.99 in^4
Section Modulus:	31.64 in^3		24.06 in^3
Section Area:	16.88 in^2		4.87 in^2
Bearing Area:			1.38 in^2
Minimum bearing dimensions:	1.5 in	x	0.92 in

FORTEWEB

MEMBER REPORT

PASSED
R2

Roof, Beams Supporting Window/Rafters
1 piece(s) 5 1/2" x 18" 24F-V4 DF Glulam



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	4163 @ 1' 1 3/4"	8181 (3.50")	Passed (51%)	--	1.0 D + 1.0 Lr (All Spans)
Shear (lbs)	3436 @ 2' 9 1/2"	21863	Passed (16%)	1.25	1.0 D + 1.0 Lr (All Spans)
Pos Moment (Ft-lbs)	30289 @ 17' 1/8"	67951	Passed (45%)	1.25	1.0 D + 1.0 Lr (Alt Spans)
Neg Moment (Ft-lbs)	-191 @ 1' 1 3/4"	57234	Passed (0%)	1.25	1.0 D + 0.75 L + 0.75 Lr (All Spans)
Live Load Defl. (in)	0.883 @ 16' 11 15/16"	1.056	Passed (L/431)	--	1.0 D + 1.0 Lr (Alt Spans)
Total Load Defl. (in)	1.138 @ 16' 11 15/16"	1.584	Passed (L/334)	--	1.0 D + 1.0 Lr (Alt Spans)

System : Floor
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Overhang deflection criteria: LL (2L/360) and TL (2L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Critical positive moment adjusted by a volume/size factor of 0.92 that was calculated using length L = 31' 7 7/8".
- Critical negative moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 1' 2 1/2".
- 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	Roof Live	Factored	
1 - Stud wall - SPF	3.50"	3.50"	1.78"	974	193	3189	4163	Blocking
2 - Stud wall - SPF	3.50"	3.50"	1.68"	915	184/-2	3000	3915	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)	33' o/c	
Bottom Edge (Lu)	33' o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Roof Live (non-snow: 1.25)	Comments
0 - Self Weight (PLF)	0 to 33'	N/A	24.1	--	--	
1 - Uniform (PSF)	0 to 2' (Front)	3' 9"	15.0	25.0	-	Default Load
2 - Uniform (PLF)	2' to 31' (Front)	N/A	30.0	-	-	Glass
3 - Uniform (PSF)	0 to 33' (Front)	7' 6"	-	-	25.0	Rafters
4 - Uniform (PSF)	31' to 33' (Front)	3' 9"	15.0	25.0	-	

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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
Demetri Dalas CSES (425) 736-3569 demetri@cses-engineering.com	

Weyerhaeuser

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File Name: Macintyre 2023.102

John S. Apolis, P.E.	**CSES, Inc.**	Job number:	**2023.102**
Project:	**Macintyre**	Date:	19-Dec-23
Architect:		Page number:	R3

Post Design (Combined Axial and Moment Loading)

2018 International Building Code (IBC) **2018 NDS**

Beam Description: Full Height Post Supporting North Side of R2

Snow Load:	1	Wind Load:	
Repetitive Member:		P.T. Lumber:	

Geometry and loads:

Height	15 ft	w(d)	0 plf	M(d)	2100 ft-lbs
Axial Load	4163 lbs	w(b)	0 plf	M(b)	0 ft-lbs
Le(d)	15 ft	Le(b)	15 ft		

Material Properties:

Fb1	2400 psi	Fb(d)'	2760 psi
Fb2	2400 psi	Fb(b)'	2760 psi
Fc	2500 psi	Fc'	607.3 psi
E	1.8 msi	E'	1.8 msi
Emin	0.915 msi	Emin'	0.915 msi

Selected Member: PSL 5.25 (b) x 5.25 (d)

Member properties:

Section Modulus (d):	24.1 in^3	Rb(d)	5.86
Section Modulus (b):	24.1 in^3	Rb(b)	5.86
Section Area:	27.6 in^2	c	0.8

Variables:

Member stresses:

	Provided			Required		
FcE(d)	640 psi	>	fc	151 psi	OK
FcE(b)	640 psi	>	fc	151 psi	OK
FbE	32025 psi	>	fb(d)	1045 psi	OK
FbE	32025 psi	>	fb(b)	0 psi	OK

Bending and Axial Compression Check:

NDS 2018 EQ 3.9-3 0.56 < 1.0 **OK**

John S. Apolis, P.E.	**CSES, Inc.**	Job number:	**2023.102**
Project:	**Macintyre**	Date:	19-Dec-23
Architect:		Page number:	R3a

Post Design (Combined Axial and Moment Loading)

2018 International Building Code (IBC) **2018 NDS**

Beam Description: Full Height Studs On North Wall

Snow Load:	1	Wind Load:	
Repetitive Member:		P.T. Lumber:	

Geometry and loads:

Height	15 ft	w(d)	18.62 plf	M(d)	0 ft-lbs
Axial Load		w(b)	0 plf	M(b)	0 ft-lbs
Le(d)	15 ft	Le(b)	15 ft		

Material Properties:

Fb1	850 psi	Fb(d)'	977.5 psi
Fb2	850 psi	Fb(b)'	977.5 psi
Fc	1300 psi	Fc'	105.71 psi
E	1.3 msi	E'	1.3 msi
Emin	0.47 msi	Emin'	0.47 msi

Selected Member: HF #2 3 (b) x 5.5 (d)

Member properties:		**Variables:**	
Section Modulus (d):	15.1 in^3	Rb(d)	4.23
Section Modulus (b):	8.3 in^3	Rb(b)	10.49
Section Area:	16.5 in^2	c	0.8

Member stresses:	Provided			Required	
FcE(d)	361 psi	>	fc	0 psi	OK
FcE(b)	107 psi	>	fc	0 psi	OK
FbE	5127 psi	>	fb(d)	415 psi	OK
FbE	5127 psi	>	fb(b)	0 psi	OK

Bending and Axial Compression Check:

NDS 2018 EQ 3.9-3	0.43	<	1.0	**OK**

John S. Apolis, P.E. **CSES, Inc.** Job number: **2023.102**

Project: **Macintyre** Date: 18-Dec-23

Architect: Page number: R4

Post Design (Combined Axial and Moment Loading)

2018 International Building Code (IBC) **2018 NDS**

Beam Description: Post Supporting South Side of R2

Snow Load:	1	Wind Load:	
Repetitive Member:		P.T. Lumber:	

Geometry and loads:

Height	9 ft	w(d)	0 plf	M(d)	0 ft-lbs
Axial Load	3915 lbs	w(b)	0 plf	M(b)	0 ft-lbs
Le(d)	9 ft	Le(b)	9 ft		

Material Properties:

Fb1	900 psi	Fb(d)'	1035 psi
Fb2	900 psi	Fb(b)'	1035 psi
Fc	1350 psi	Fc'	461.64 psi
E	1.6 msi	E'	1.6 msi
Emin	0.58 msi	Emin'	0.58 msi

Selected Member: DF #2 3.5 x 5.5

b d

Member properties:		**Variables:**	
Section Modulus (d):	17.6 in^3	Rb(d)	3.53
Section Modulus (b):	11.2 in^3	Rb(b)	6.96
Section Area:	19.3 in^2	c	0.8

Member stresses:	Provided			Required	
FcE(d)	1236 psi	>	fc	203 psi	OK
FcE(b)	501 psi	>	fc	203 psi	OK
FbE	14354 psi	>	fb(d)	0 psi	OK
FbE	14354 psi	>	fb(b)	0 psi	OK

Bending and Axial Compression Check:

NDS 2018 EQ 3.9-3 0.19 < 1.0 **OK**

John S. Apolis, P.E. **CSES, Inc.** Job number: **2023.102**

Project: **Macintyre** Date: 18-Dec-23

Architect: Page number: R5

BEAM DESIGN (Uniform Load+Concentrated Load)

2018 International Building Code (IBC) **2018 NDS**

Beam Description: Gable Entry Roof Rafters

Fully Supported:	1	Snow Load:	1	Wind Load:	
Repetitive Member:		P.T. Lumber:		Wet Use:	

Geometry and Loads:

Span:	5.5 ft	Tributary Width:	2 ft	P Location:	5.5 ft
Add'l uniform DL:		DL unit load:	15 psf	Concentrated DL:	
Add'l uniform LL:		LL unit load:		Concentrated LL:	
Add'l uniform SL:		SL unit load:	25 psf	Concentrated SL:	
Add'l uniform WL:		WL unit load:		Concentrated WL:	

DL Reaction 1:	83 lbs	DL Reaction 2:	83 lbs	Note: Design automatically uses
LL Reaction 1:	0 lbs	LL Reaction 2:	0 lbs	ASD load combinations
SL Reaction 1:	138 lbs	SL Reaction 2:	138 lbs	
WL Reaction 1:	0 lbs	WL Reaction 2:	0 lbs	
Total Reaction 1:	**220 lbs**	Total Reaction 2:	**220 lbs**	

Material Properties:

E	1.3 msi	E'	1.3 msi
Fb	850 psi	Fb'	1173 psi
Fv	150 psi	Fv'	173 psi
Fc perp	405 psi	Fc perp'	405 psi
Emin	0.47 msi	Emin'	0.47 msi

Deflection analysis:

For total load: Allowed deflection criteria, span/ 240

For LL only: Allowed deflection criteria, span/ 360

Max. allowed total defl:	0.28 in	Max LL defl:	0.18 in
Total defl. * I:	1.27 in^4	Required I:	4.61 in^4
LL defl. * I:	0.79 in^4	Required I:	4.32 in^4
Actual deflections:	TOTAL: 0.03 in		0.02 in

Force analysis:

Max. moment:	303 ft-lb	Max Shear:	220 lbs

Selected Member:	(1) HF #2	**1.5**	**x**	**7.25**

Member properties:	**Provided:**		**Required:**
Moment of inertia:	47.63 in^4		4.61 in^4
Section Modulus:	13.14 in^3		3.09 in^3
Section Area:	10.88 in^2		1.91 in^2
Bearing Area:			0.54 in^2
Minimum bearing dimensions:	1.5 in	x	0.36 in

John S. Apolis, P.E. **CSES, Inc.** Job number: **2023.102**

Project: **Macintyre** Date: 18-Dec-23

Architect: Page number: R6

BEAM DESIGN (Uniform Load+Concentrated Load)

2018 International Building Code (IBC) **2018 NDS**

Beam Description: Gable Entry Ridge Beam

Fully Supported:	1	Snow Load:	1	Wind Load:	
Repetitive Member:		P.T. Lumber:		Wet Use:	

Geometry and Loads:

Span:	12 ft	Tributary Width:	5.5 ft	P Location:	12 ft
Add'l uniform DL:		DL unit load:	15 psf	Concentrated DL:	
Add'l uniform LL:		LL unit load:		Concentrated LL:	
Add'l uniform SL:		SL unit load:	25 psf	Concentrated SL:	
Add'l uniform WL:		WL unit load:		Concentrated WL:	

DL Reaction 1:	495 lbs	DL Reaction 2:	495 lbs	Note: Design automatically uses
LL Reaction 1:	0 lbs	LL Reaction 2:	0 lbs	ASD load combinations
SL Reaction 1:	825 lbs	SL Reaction 2:	825 lbs	
WL Reaction 1:	0 lbs	WL Reaction 2:	0 lbs	
Total Reaction 1:	**1320 lbs**	Total Reaction 2:	**1320 lbs**	

Material Properties:

E	1.3 msi	E'	1.3 msi
Fb	850 psi	Fb'	1173 psi
Fv	150 psi	Fv'	173 psi
Fc perp	405 psi	Fc perp'	405 psi
Emin	0.47 msi	Emin'	0.47 msi

Deflection analysis:

For total load: Allowed deflection criteria, span/ 240

For LL only: Allowed deflection criteria, span/ 360

Max. allowed total defl:	0.6 in	Max LL defl:	0.4 in
Total defl. * I:	78.96 in^4	Required I:	131.59 in^4
LL defl. * I:	49.35 in^4	Required I:	123.37 in^4
Actual deflections:	TOTAL: 0.34 in		0.21 in

Force analysis:

Max. moment:	3960 ft-lb	Max Shear:	1320 lbs

Selected Member: (1) HF #2 **3.5** **x** **9.25**

Member properties:	**Provided:**		**Required:**
Moment of inertia:	230.84 in^4		131.59 in^4
Section Modulus:	49.91 in^3		40.51 in^3
Section Area:	32.38 in^2		11.48 in^2
Bearing Area:			3.26 in^2
Minimum bearing dimensions:	3.5 in	x	0.93 in

John S. Apolis, P.E. **CSES, Inc.** Job number: **2023.102**

Project: **Macintyre** Date: 18-Dec-23

Architect: Page number: R6a

BEAM DESIGN (Uniform Load+Concentrated Load)

2018 International Building Code (IBC) **2018 NDS**

Beam Description: Gable Entry Roof Beams

Fully Supported:	1	Snow Load:	1	Wind Load:	
Repetitive Member:		P.T. Lumber:		Wet Use:	

Geometry and Loads:

Span:	12 ft	Tributary Width:	2.5 ft	P Location:	12 ft
Add'l uniform DL:		DL unit load:	15 psf	Concentrated DL:	
Add'l uniform LL:		LL unit load:		Concentrated LL:	
Add'l uniform SL:		SL unit load:	25 psf	Concentrated SL:	
Add'l uniform WL:		WL unit load:		Concentrated WL:	

DL Reaction 1:	225 lbs	DL Reaction 2:	225 lbs	Note: Design automatically uses
LL Reaction 1:	0 lbs	LL Reaction 2:	0 lbs	ASD load combinations
SL Reaction 1:	375 lbs	SL Reaction 2:	375 lbs	
WL Reaction 1:	0 lbs	WL Reaction 2:	0 lbs	
Total Reaction 1:	**600 lbs**	Total Reaction 2:	**600 lbs**	

Material Properties:

E	1.3 msi	E'	1.3 msi
Fb	850 psi	Fb'	1173 psi
Fv	150 psi	Fv'	173 psi
Fc perp	405 psi	Fc perp'	405 psi
Emin	0.47 msi	Emin'	0.47 msi

Deflection analysis:

For total load: Allowed deflection criteria, span/ 240

For LL only: Allowed deflection criteria, span/ 360

Max. allowed total defl:	0.6 in	Max LL defl:	0.4 in
Total defl. * I:	35.89 in^4	Required I:	59.82 in^4
LL defl. * I:	22.43 in^4	Required I:	56.08 in^4
Actual deflections:	TOTAL: 0.16 in		0.1 in

Force analysis:

Max. moment:	1800 ft-lb	Max Shear:	600 lbs

Selected Member:	(1) HF #2	**3.5**	**x**	**9.25**

Member properties:	**Provided:**		**Required:**
Moment of inertia:	230.84 in^4		59.82 in^4
Section Modulus:	49.91 in^3		18.41 in^3
Section Area:	32.38 in^2		5.22 in^2
Bearing Area:			1.48 in^2
Minimum bearing dimensions:	3.5 in	x	0.42 in

John S. Apolis, P.E. **CSES, Inc.** Job number: **2023.102**

Project: **Macintyre** Date: 18-Dec-23

Architect: Page number: R6b

BEAM DESIGN (Uniform Load+Concentrated Load)

2018 International Building Code (IBC) **2018 NDS**

Beam Description: Beam receiveing Ridge Post Load

Fully Supported:	1	Snow Load:	1	Wind Load:	
Repetitive Member:		P.T. Lumber:		Wet Use:	

Geometry and Loads:

Span:	8.5 ft	Tributary Width:	2 ft	P Location:	4.25 ft
Add'l uniform DL:		DL unit load:	15 psf	Concentrated DL:	495 lbs
Add'l uniform LL:		LL unit load:		Concentrated LL:	
Add'l uniform SL:		SL unit load:	25 psf	Concentrated SL:	825 lbs
Add'l uniform WL:		WL unit load:		Concentrated WL:	

DL Reaction 1:	375 lbs	DL Reaction 2:	375 lbs	Note: Design automatically uses
LL Reaction 1:	0 lbs	LL Reaction 2:	0 lbs	ASD load combinations
SL Reaction 1:	625 lbs	SL Reaction 2:	625 lbs	
WL Reaction 1:	0 lbs	WL Reaction 2:	0 lbs	
Total Reaction 1:	**1000 lbs**	Total Reaction 2:	**1000 lbs**	

Material Properties:

E	1.3 msi	E'	1.3 msi
Fb	850 psi	Fb'	1173 psi
Fv	150 psi	Fv'	173 psi
Fc perp	405 psi	Fc perp'	405 psi
Emin	0.47 msi	Emin'	0.47 msi

Deflection analysis:

For total load: Allowed deflection criteria, span/ 240

For LL only: Allowed deflection criteria, span/ 360

Max. allowed total defl:	0.43 in	Max LL defl:	0.28 in
Total defl. * I:	29.68 in^4	Required I:	69.83 in^4
LL defl. * I:	18.55 in^4	Required I:	65.46 in^4
Actual deflections:	TOTAL: 0.13 in		0.08 in

Force analysis:

Max. moment:	3528 ft-lb	Max Shear:	1000 lbs

Selected Member: (1) HF #2 **3.5** **x** **9.25**

Member properties:	**Provided:**		**Required:**
Moment of inertia:	230.84 in^4		69.83 in^4
Section Modulus:	49.91 in^3		36.09 in^3
Section Area:	32.38 in^2		8.7 in^2
Bearing Area:			2.47 in^2
Minimum bearing dimensions:	3.5 in	x	0.71 in

John S. Apolis, P.E. **CSES, Inc.** Job number: **2023.102**

Project: **Macintyre** Date: 18-Dec-23

Architect: Page number: R7

BEAM DESIGN (Uniform Load+Concentrated Load)

2018 International Building Code (IBC) **2018 NDS**

Beam Description: West Window Headers

Fully Supported:	1	Snow Load:	1	Wind Load:	
Repetitive Member:		P.T. Lumber:		Wet Use:	

Geometry and Loads:

Span:	5.8 ft	Tributary Width:	4.25 ft	P Location:	5.8 ft
Add'l uniform DL:		DL unit load:	15 psf	Concentrated DL:	
Add'l uniform LL:		LL unit load:		Concentrated LL:	
Add'l uniform SL:		SL unit load:	25 psf	Concentrated SL:	
Add'l uniform WL:		WL unit load:		Concentrated WL:	

DL Reaction 1:	185 lbs	DL Reaction 2:	185 lbs	Note: Design automatically uses
LL Reaction 1:	0 lbs	LL Reaction 2:	0 lbs	ASD load combinations
SL Reaction 1:	308 lbs	SL Reaction 2:	308 lbs	
WL Reaction 1:	0 lbs	WL Reaction 2:	0 lbs	
Total Reaction 1:	**493 lbs**	Total Reaction 2:	**493 lbs**	

Material Properties:

E	1.3 msi	E'	1.3 msi
Fb	850 psi	Fb'	1075 psi
Fv	150 psi	Fv'	173 psi
Fc perp	405 psi	Fc perp'	405 psi
Emin	0.47 msi	Emin'	0.47 msi

Deflection analysis:

For total load: Allowed deflection criteria, span/ 240

For LL only: Allowed deflection criteria, span/ 360

Max. allowed total defl:	0.29 in	Max LL defl:	0.19 in
Total defl. * I:	3.33 in^4	Required I:	11.48 in^4
LL defl. * I:	2.08 in^4	Required I:	10.76 in^4
Actual deflections:	TOTAL: 0.02 in		0.01 in

Force analysis:

Max. moment:	715 ft-lb	Max Shear:	493 lbs

Selected Member:	(2) HF #2	**1.5**	**x**	**9.25**

Member properties:	**Provided:**		**Required:**
Moment of inertia:	197.86 in^4		11.48 in^4
Section Modulus:	42.78 in^3		7.98 in^3
Section Area:	27.75 in^2		4.29 in^2
Bearing Area:			1.22 in^2
Minimum bearing dimensions:	3. in	x	0.41 in

John S. Apolis, P.E. **CSES, Inc.** Job number: **2023.102**

Project: **Macintyre** Date: 18-Dec-23

Architect: Page number: R8

BEAM DESIGN (Uniform Load+Concentrated Load)

2018 International Building Code (IBC) **2018 NDS**

Beam Description: South Window Headers

Fully Supported:	1	Snow Load:	1	Wind Load:	
Repetitive Member:		P.T. Lumber:		Wet Use:	

Geometry and Loads:

Span:	4.5 ft	Tributary Width:	16.25 ft	P Location:	4.5 ft
Add'l uniform DL:		DL unit load:	15 psf	Concentrated DL:	
Add'l uniform LL:		LL unit load:		Concentrated LL:	
Add'l uniform SL:		SL unit load:	25 psf	Concentrated SL:	
Add'l uniform WL:		WL unit load:		Concentrated WL:	

DL Reaction 1:	548 lbs	DL Reaction 2:	548 lbs	Note: Design automatically uses
LL Reaction 1:	0 lbs	LL Reaction 2:	0 lbs	ASD load combinations
SL Reaction 1:	914 lbs	SL Reaction 2:	914 lbs	
WL Reaction 1:	0 lbs	WL Reaction 2:	0 lbs	
Total Reaction 1:	**1463 lbs**	Total Reaction 2:	**1463 lbs**	

Material Properties:

E	1.3 msi	E'	1.3 msi
Fb	850 psi	Fb'	1173 psi
Fv	150 psi	Fv'	173 psi
Fc perp	405 psi	Fc perp'	405 psi
Emin	0.47 msi	Emin'	0.47 msi

Deflection analysis:

For total load: Allowed deflection criteria, span/ 240

For LL only: Allowed deflection criteria, span/ 360

Max. allowed total defl:	0.23 in	Max LL defl:	0.15 in
Total defl. * I:	4.61 in^4	Required I:	20.5 in^4
LL defl. * I:	2.88 in^4	Required I:	19.22 in^4
Actual deflections:	TOTAL: 0.05 in		0.03 in

Force analysis:

Max. moment:	1645 ft-lb	Max Shear:	1463 lbs

Selected Member:	(2) HF #2	**1.5**	**x**	**7.25**

Member properties:	**Provided:**		**Required:**
Moment of inertia:	95.27 in^4		20.5 in^4
Section Modulus:	26.28 in^3		16.83 in^3
Section Area:	21.75 in^2		12.72 in^2
Bearing Area:			3.61 in^2
Minimum bearing dimensions:	3. in	x	1.2 in

John S. Apolis, P.E. **CSES, Inc.** Job number: **2023.102**

Project: **Macintyre** Date: 18-Dec-23

Architect: Page number: R9

BEAM DESIGN (Uniform Load+Concentrated Load)

2018 International Building Code (IBC) **2018 NDS**

Beam Description: Smaller South Window Headers

Fully Supported:	1	Snow Load:	1	Wind Load:	
Repetitive Member:		P.T. Lumber:		Wet Use:	

Geometry and Loads:

Span:	3 ft	Tributary Width:	16.25 ft	P Location:	3 ft
Add'l uniform DL:		DL unit load:	15 psf	Concentrated DL:	
Add'l uniform LL:		LL unit load:		Concentrated LL:	
Add'l uniform SL:		SL unit load:	25 psf	Concentrated SL:	
Add'l uniform WL:		WL unit load:		Concentrated WL:	

DL Reaction 1:	366 lbs	DL Reaction 2:	366 lbs	Note: Design automatically uses
LL Reaction 1:	0 lbs	LL Reaction 2:	0 lbs	ASD load combinations
SL Reaction 1:	609 lbs	SL Reaction 2:	609 lbs	
WL Reaction 1:	0 lbs	WL Reaction 2:	0 lbs	
Total Reaction 1:	**975 lbs**	Total Reaction 2:	**975 lbs**	

Material Properties:

E	1.3 msi	E'	1.3 msi
Fb	850 psi	Fb'	1271 psi
Fv	150 psi	Fv'	173 psi
Fc perp	405 psi	Fc perp'	405 psi
Emin	0.47 msi	Emin'	0.47 msi

Deflection analysis:

For total load: Allowed deflection criteria, span/ 240

For LL only: Allowed deflection criteria, span/ 360

Max. allowed total defl:	0.15 in	Max LL defl:	0.1 in
Total defl. * I:	0.91 in^4	Required I:	6.08 in^4
LL defl. * I:	0.57 in^4	Required I:	5.7 in^4
Actual deflections:	TOTAL: 0.02 in		0.01 in

Force analysis:

Max. moment:	731 ft-lb	Max Shear:	975 lbs

Selected Member: (2) HF #2 **1.5** **x** **5.5**

Member properties:	**Provided:**		**Required:**
Moment of inertia:	41.59 in^4		6.08 in^4
Section Modulus:	15.13 in^3		6.91 in^3
Section Area:	16.5 in^2		8.48 in^2
Bearing Area:			2.41 in^2
Minimum bearing dimensions:	3. in	x	0.8 in

John S. Apolis, P.E. **CSES, Inc.** Job number: **2023.102**

Project: **Macintyre** Date: 18-Dec-23

Architect: Page number: R10

BEAM DESIGN (Uniform Load+Concentrated Load)

2018 International Building Code (IBC) **2018 NDS**

Beam Description: 11' Long East Window Header

Fully Supported:	1	Snow Load:	1	Wind Load:	
Repetitive Member:		P.T. Lumber:		Wet Use:	

Geometry and Loads:

Span:	11 ft	Tributary Width:	7 ft	P Location:	11 ft
Add'l uniform DL:		DL unit load:	15 psf	Concentrated DL:	
Add'l uniform LL:		LL unit load:		Concentrated LL:	
Add'l uniform SL:		SL unit load:	25 psf	Concentrated SL:	
Add'l uniform WL:		WL unit load:		Concentrated WL:	

DL Reaction 1:	578 lbs	DL Reaction 2:	578 lbs	Note: Design automatically uses
LL Reaction 1:	0 lbs	LL Reaction 2:	0 lbs	ASD load combinations
SL Reaction 1:	963 lbs	SL Reaction 2:	963 lbs	
WL Reaction 1:	0 lbs	WL Reaction 2:	0 lbs	
Total Reaction 1:	**1540 lbs**	Total Reaction 2:	**1540 lbs**	

Material Properties:

E	1.3 msi	E'	1.3 msi
Fb	850 psi	Fb'	1173 psi
Fv	150 psi	Fv'	173 psi
Fc perp	405 psi	Fc perp'	405 psi
Emin	0.47 msi	Emin'	0.47 msi

Deflection analysis:

For total load: Allowed deflection criteria, span/ 240

For LL only: Allowed deflection criteria, span/ 360

Max. allowed total defl:	0.55 in	Max LL defl:	0.37 in
Total defl. * I:	70.95 in^4	Required I:	129. in^4
LL defl. * I:	44.35 in^4	Required I:	120.94 in^4
Actual deflections:	TOTAL: 0.31 in		0.19 in

Force analysis:

Max. moment:	4235 ft-lb	Max Shear:	1540 lbs

Selected Member:	(1) HF #2	**3.5**	**x**	**9.25**

Member properties:	**Provided:**		**Required:**
Moment of inertia:	230.84 in^4		129. in^4
Section Modulus:	49.91 in^3		43.32 in^3
Section Area:	32.38 in^2		13.39 in^2
Bearing Area:			3.8 in^2
Minimum bearing dimensions:	3.5 in	x	1.09 in

John S. Apolis, P.E. **CSES, Inc.** Job number: **2023.102**

Project: **Macintyre** Date: 18-Dec-23

Architect: Page number: R11

BEAM DESIGN (Uniform Load+Concentrated Load)

2018 International Building Code (IBC) **2018 NDS**

Beam Description: 3' Long East Window Header

Fully Supported:	1	Snow Load:	1	Wind Load:	
Repetitive Member:		P.T. Lumber:		Wet Use:	

Geometry and Loads:

Span:	3 ft	Tributary Width:	7 ft	P Location:	3 ft
Add'l uniform DL:		DL unit load:	15 psf	Concentrated DL:	
Add'l uniform LL:		LL unit load:		Concentrated LL:	
Add'l uniform SL:		SL unit load:	25 psf	Concentrated SL:	
Add'l uniform WL:		WL unit load:		Concentrated WL:	

DL Reaction 1:	158 lbs	DL Reaction 2:	158 lbs	Note: Design automatically uses
LL Reaction 1:	0 lbs	LL Reaction 2:	0 lbs	ASD load combinations
SL Reaction 1:	263 lbs	SL Reaction 2:	263 lbs	
WL Reaction 1:	0 lbs	WL Reaction 2:	0 lbs	
Total Reaction 1:	**420 lbs**	Total Reaction 2:	**420 lbs**	

Material Properties:

E	1.3 msi	E'	1.3 msi
Fb	850 psi	Fb'	1271 psi
Fv	150 psi	Fv'	173 psi
Fc perp	405 psi	Fc perp'	405 psi
Emin	0.47 msi	Emin'	0.47 msi

Deflection analysis:

For total load: Allowed deflection criteria, span/ 240

For LL only: Allowed deflection criteria, span/ 360

Max. allowed total defl:	0.15 in	Max LL defl:	0.1 in
Total defl. * I:	0.39 in^4	Required I:	2.62 in^4
LL defl. * I:	0.25 in^4	Required I:	2.45 in^4
Actual deflections:	TOTAL: 0.01 in		0.01 in

Force analysis:

Max. moment:	315 ft-lb	Max Shear:	420 lbs

Selected Member:	(2) HF #2	**1.5**	**x**	**5.5**

Member properties:	**Provided:**		**Required:**
Moment of inertia:	41.59 in^4		2.62 in^4
Section Modulus:	15.13 in^3		2.97 in^3
Section Area:	16.5 in^2		3.65 in^2
Bearing Area:			1.04 in^2
Minimum bearing dimensions:	3. in	x	0.35 in

John S. Apolis, P.E. **CSES, Inc.** Job number: **2023.102**

Project: **Macintyre** Date: 18-Dec-23

Architect: Page number: R12

BEAM DESIGN (Uniform Load+Concentrated Load)

2018 International Building Code (IBC) **2018 NDS**

Beam Description: North Window Headers

Fully Supported:	1	Snow Load:	1	Wind Load:	
Repetitive Member:		P.T. Lumber:		Wet Use:	

Geometry and Loads:

Span:	6 ft	Tributary Width:	16.25 ft	P Location:	6 ft
Add'l uniform DL:		DL unit load:	15 psf	Concentrated DL:	
Add'l uniform LL:		LL unit load:		Concentrated LL:	
Add'l uniform SL:		SL unit load:	25 psf	Concentrated SL:	
Add'l uniform WL:		WL unit load:		Concentrated WL:	

DL Reaction 1:	731 lbs	DL Reaction 2:	731 lbs	Note: Design automatically uses
LL Reaction 1:	0 lbs	LL Reaction 2:	0 lbs	ASD load combinations
SL Reaction 1:	1219 lbs	SL Reaction 2:	1219 lbs	
WL Reaction 1:	0 lbs	WL Reaction 2:	0 lbs	
Total Reaction 1:	**1950 lbs**	Total Reaction 2:	**1950 lbs**	

Material Properties:

E	1.3 msi	E'	1.3 msi
Fb	850 psi	Fb'	1075 psi
Fv	150 psi	Fv'	173 psi
Fc perp	405 psi	Fc perp'	405 psi
Emin	0.47 msi	Emin'	0.47 msi

Deflection analysis:

For total load: Allowed deflection criteria, span/ 240

For LL only: Allowed deflection criteria, span/ 360

Max. allowed total defl:	0.3 in	Max LL defl:	0.2 in
Total defl. * I:	14.58 in^4	Required I:	48.6 in^4
LL defl. * I:	9.11 in^4	Required I:	45.56 in^4
Actual deflections:	TOTAL: 0.07 in		0.05 in

Force analysis:

Max. moment:	2925 ft-lb	Max Shear:	1950 lbs

Selected Member:	(2) HF #2	**1.5**	**x**	**9.25**

Member properties:	**Provided:**		**Required:**
Moment of inertia:	197.86 in^4		48.6 in^4
Section Modulus:	42.78 in^3		32.64 in^3
Section Area:	27.75 in^2		16.96 in^2
Bearing Area:			4.81 in^2
Minimum bearing dimensions:	3. in	x	1.6 in

John S. Apolis, P.E. **CSES, Inc.** Job number: **2023.102**

Project: **Macintyre** Date: 12-Jan-24

Architect: Page number: R13

BEAM DESIGN (Uniform Load+Concentrated Load)

2018 International Building Code (IBC) **2018 NDS**

Beam Description: Skylight Framing

Fully Supported:	1	Snow Load:	1	Wind Load:	
Repetitive Member:		P.T. Lumber:		Wet Use:	

Geometry and Loads:

Span:	2 ft	Tributary Width:	11 ft	P Location:	2 ft
Add'l uniform DL:		DL unit load:	15 psf	Concentrated DL:	
Add'l uniform LL:		LL unit load:		Concentrated LL:	
Add'l uniform SL:		SL unit load:	25 psf	Concentrated SL:	
Add'l uniform WL:		WL unit load:		Concentrated WL:	

DL Reaction 1:	165 lbs	DL Reaction 2:	165 lbs	Note: Design automatically uses
LL Reaction 1:	0 lbs	LL Reaction 2:	0 lbs	ASD load combinations
SL Reaction 1:	275 lbs	SL Reaction 2:	275 lbs	
WL Reaction 1:	0 lbs	WL Reaction 2:	0 lbs	
Total Reaction 1:	**440 lbs**	Total Reaction 2:	**440 lbs**	

Material Properties:

E	1.3 msi	E'	1.3 msi
Fb	850 psi	Fb'	1369 psi
Fv	150 psi	Fv'	173 psi
Fc perp	405 psi	Fc perp'	405 psi
Emin	0.47 msi	Emin'	0.47 msi

Deflection analysis:

For total load: Allowed deflection criteria, span/ 240

For LL only: Allowed deflection criteria, span/ 360

Max. allowed total defl:	0.1 in	Max LL defl:	0.07 in
Total defl. * I:	0.12 in^4	Required I:	1.22 in^4
LL defl. * I:	0.08 in^4	Required I:	1.14 in^4
Actual deflections:	TOTAL: 0. in		0. in

Force analysis:

Max. moment:	220 ft-lb	Max Shear:	440 lbs

Selected Member: (1) HF #2 **3.5** **x** **5.5**

Member properties:	**Provided:**		**Required:**
Moment of inertia:	48.53 in^4		1.22 in^4
Section Modulus:	17.65 in^3		1.93 in^3
Section Area:	19.25 in^2		3.83 in^2
Bearing Area:			1.09 in^2
Minimum bearing dimensions:	3.5 in	x	0.31 in

John S. Apolis, P.E. **CSES, Inc.** Job number: **2023.102**

Project: **Macintyre** Date: 18-Dec-23

Architect: Page number: M1

BEAM DESIGN (Uniform Load+Concentrated Load)

2018 International Building Code (IBC) **2018 NDS**

Beam Description: Addition Floor Joists

Fully Supported:	1	Snow Load:		Wind Load:	
Repetitive Member:		P.T. Lumber:		Wet Use:	

Geometry and Loads:

Span:	12 ft	Tributary Width:	1.3333 ft	P Location:	12 ft
Add'l uniform DL:		DL unit load:	15 psf	Concentrated DL:	
Add'l uniform LL:		LL unit load:	40 psf	Concentrated LL:	
Add'l uniform SL:		SL unit load:		Concentrated SL:	
Add'l uniform WL:		WL unit load:		Concentrated WL:	

DL Reaction 1:	120 lbs	DL Reaction 2:	120 lbs	Note: Design automatically uses
LL Reaction 1:	320 lbs	LL Reaction 2:	320 lbs	ASD load combinations
SL Reaction 1:	0 lbs	SL Reaction 2:	0 lbs	
WL Reaction 1:	0 lbs	WL Reaction 2:	0 lbs	
Total Reaction 1:	**440 lbs**	Total Reaction 2:	**440 lbs**	

Material Properties:

E	1.3 msi	E'	1.3 msi
Fb	850 psi	Fb'	935 psi
Fv	150 psi	Fv'	150 psi
Fc perp	405 psi	Fc perp'	405 psi
Emin	0.47 msi	Emin'	0.47 msi

Deflection analysis:

For total load: Allowed deflection criteria, span/			240		
For LL only: Allowed deflection criteria, span/			360		
Max. allowed total defl:	0.6 in		Max LL defl:	0.4 in	
Total defl. * I:	26.32 in^4		Required I:	43.86 in^4	
LL defl. * I:	19.14 in^4		Required I:	47.85 in^4	
Actual deflections:	TOTAL:	0.27 in		0.19 in	

Force analysis:

Max. moment:	1320 ft-lb	Max Shear:	440 lbs

Selected Member:	(1) HF #2	**1.5**	**x**	**9.25**

Member properties:	**Provided:**		**Required:**
Moment of inertia:	98.93 in^4		47.85 in^4
Section Modulus:	21.39 in^3		16.94 in^3
Section Area:	13.88 in^2		4.4 in^2
Bearing Area:			1.09 in^2
Minimum bearing dimensions:	1.5 in	x	0.72 in

John S. Apolis, P.E. **CSES, Inc.** Job number: **2023.102**

Project: **Macintyre** Date: 18-Dec-23

Architect: Page number: M2

BEAM DESIGN (Uniform Load+Concentrated Load)

2018 International Building Code (IBC) **2018 NDS**

Beam Description: South Typical Headers

Fully Supported:	1	Snow Load:		Wind Load:	
Repetitive Member:		P.T. Lumber:		Wet Use:	

Geometry and Loads:

Span:	3 ft	Tributary Width:	1.3333 ft	P Location:	3 ft
Add'l uniform DL:	240 lbs/ft	DL unit load:	15 psf	Concentrated DL:	
Add'l uniform LL:		LL unit load:	40 psf	Concentrated LL:	
Add'l uniform SL:	400 lbs/ft	SL unit load:		Concentrated SL:	
Add'l uniform WL:		WL unit load:		Concentrated WL:	

DL Reaction 1:	390 lbs	DL Reaction 2:	390 lbs	Note: Design automatically uses
LL Reaction 1:	80 lbs	LL Reaction 2:	80 lbs	ASD load combinations
SL Reaction 1:	600 lbs	SL Reaction 2:	600 lbs	
WL Reaction 1:	0 lbs	WL Reaction 2:	0 lbs	
Total Reaction 1:	**990 lbs**	Total Reaction 2:	**990 lbs**	

Material Properties:

E	1.3 msi	E'	1.3 msi
Fb	850 psi	Fb'	1105 psi
Fv	150 psi	Fv'	150 psi
Fc perp	405 psi	Fc perp'	405 psi
Emin	0.47 msi	Emin'	0.47 msi

Deflection analysis:

For total load: Allowed deflection criteria, span/ 240

For LL only: Allowed deflection criteria, span/ 360

Max. allowed total defl:	0.15 in	Max LL defl:	0.1 in
Total defl. * I:	1. in^4	Required I:	6.67 in^4
LL defl. * I:	0.64 in^4	Required I:	6.36 in^4
Actual deflections:	TOTAL: 0.02 in		0.02 in

Force analysis:

Max. moment:	742 ft-lb	Max Shear:	990 lbs

Selected Member:	(2) HF #2	**1.5**	**x**	**5.5**

Member properties:	**Provided:**		**Required:**
Moment of inertia:	41.59 in^4		6.67 in^4
Section Modulus:	15.13 in^3		8.06 in^3
Section Area:	16.5 in^2		9.9 in^2
Bearing Area:			2.44 in^2
Minimum bearing dimensions:	3. in	x	0.81 in

John S. Apolis, P.E. **CSES, Inc.** Job number: **2023.102**

Project: **Macintyre** Date: 18-Dec-23

Architect: Page number: M3

BEAM DESIGN (Uniform Load+Concentrated Load)

2018 International Building Code (IBC) **2018 NDS**

Beam Description: East Typical Header

Fully Supported:	1	Snow Load:		Wind Load:	
Repetitive Member:		P.T. Lumber:		Wet Use:	

Geometry and Loads:

Span:	6 ft	Tributary Width:	6 ft	P Location:	6 ft
Add'l uniform DL:	60 lbs/ft	DL unit load:	15 psf	Concentrated DL:	
Add'l uniform LL:		LL unit load:	40 psf	Concentrated LL:	
Add'l uniform SL:	100 lbs/ft	SL unit load:		Concentrated SL:	
Add'l uniform WL:		WL unit load:		Concentrated WL:	

DL Reaction 1:	450 lbs	DL Reaction 2:	450 lbs	Note: Design automatically uses
LL Reaction 1:	720 lbs	LL Reaction 2:	720 lbs	ASD load combinations
SL Reaction 1:	300 lbs	SL Reaction 2:	300 lbs	
WL Reaction 1:	0 lbs	WL Reaction 2:	0 lbs	
Total Reaction 1:	**1215 lbs**	Total Reaction 2:	**1215 lbs**	

Material Properties:

E	1.3 msi	E'	1.3 msi
Fb	850 psi	Fb'	1020 psi
Fv	150 psi	Fv'	150 psi
Fc perp	405 psi	Fc perp'	405 psi
Emin	0.47 msi	Emin'	0.47 msi

Deflection analysis:

For total load: Allowed deflection criteria, span/ 240

For LL only: Allowed deflection criteria, span/ 360

Max. allowed total defl:	0.3 in	Max LL defl:	0.2 in
Total defl. * I:	10.99 in^4	Required I:	36.64 in^4
LL defl. * I:	7.63 in^4	Required I:	38.13 in^4
Actual deflections:	TOTAL: 0.12 in		0.08 in

Force analysis:

Max. moment:	1823 ft-lb	Max Shear:	1215 lbs

Selected Member:	(2) HF #2	**1.5**	**x**	**7.25**

Member properties:	**Provided:**		**Required:**
Moment of inertia:	95.27 in^4		38.13 in^4
Section Modulus:	26.28 in^3		21.44 in^3
Section Area:	21.75 in^2		12.15 in^2
Bearing Area:			3. in^2
Minimum bearing dimensions:	3. in	x	1. in

John S. Apolis, P.E. **CSES, Inc.** Job number: **2023.102**

Project: **Macintyre** Date: 18-Dec-23

Architect: Page number: M4

BEAM DESIGN (Uniform Load+Concentrated Load)

2018 International Building Code (IBC) **2018 NDS**

Beam Description: ADU Bath Header

Fully Supported:	1	Snow Load:		Wind Load:	
Repetitive Member:		P.T. Lumber:		Wet Use:	

Geometry and Loads:

Span:	2.75 ft	Tributary Width:	15 ft	P Location:	2.75 ft
Add'l uniform DL:	60 lbs/ft	DL unit load:	15 psf	Concentrated DL:	
Add'l uniform LL:		LL unit load:	40 psf	Concentrated LL:	
Add'l uniform SL:	100 lbs/ft	SL unit load:		Concentrated SL:	
Add'l uniform WL:		WL unit load:		Concentrated WL:	

DL Reaction 1:	392 lbs	DL Reaction 2:	392 lbs	Note: Design automatically uses
LL Reaction 1:	825 lbs	LL Reaction 2:	825 lbs	ASD load combinations
SL Reaction 1:	138 lbs	SL Reaction 2:	138 lbs	
WL Reaction 1:	0 lbs	WL Reaction 2:	0 lbs	
Total Reaction 1:	**1217 lbs**	Total Reaction 2:	**1217 lbs**	

Material Properties:

E	1.3 msi	E'	1.3 msi
Fb	850 psi	Fb'	1105 psi
Fv	150 psi	Fv'	150 psi
Fc perp	405 psi	Fc perp'	405 psi
Emin	0.47 msi	Emin'	0.47 msi

Deflection analysis:

For total load: Allowed deflection criteria, span/ 240

For LL only: Allowed deflection criteria, span/ 360

Max. allowed total defl:	0.14 in	Max LL defl:	0.09 in
Total defl. * I:	0.98 in^4	Required I:	7.09 in^4
LL defl. * I:	0.69 in^4	Required I:	7.56 in^4
Actual deflections:	TOTAL: 0.02 in		0.02 in

Force analysis:

Max. moment:	837 ft-lb	Max Shear:	1217 lbs

Selected Member:	(2) HF #2	**1.5**	**x**	**5.5**

Member properties:	**Provided:**		**Required:**
Moment of inertia:	41.59 in^4		7.56 in^4
Section Modulus:	15.13 in^3		9.09 in^3
Section Area:	16.5 in^2		12.17 in^2
Bearing Area:			3. in^2
Minimum bearing dimensions:	3. in	x	1. in

John S. Apolis, P.E. **CSES, Inc.** Job number: **2023.102**

Project: **Macintyre** Date: 18-Dec-23

Architect: Page number: M5

BEAM DESIGN (Uniform Load+Concentrated Load)

2018 International Building Code (IBC) **2018 NDS**

Beam Description: East Header with Post Load From R11

Fully Supported:	1	Snow Load:		Wind Load:	
Repetitive Member:		P.T. Lumber:		Wet Use:	

Geometry and Loads:

Span:	5.75 ft	Tributary Width:	6 ft	P Location:	2.5 ft
Add'l uniform DL:	97.5 lbs/ft	DL unit load:	15 psf	Concentrated DL:	158 lbs
Add'l uniform LL:		LL unit load:	40 psf	Concentrated LL:	
Add'l uniform SL:	162.5 lbs/ft	SL unit load:		Concentrated SL:	267 lbs
Add'l uniform WL:		WL unit load:		Concentrated WL:	

DL Reaction 1:	628 lbs	DL Reaction 2:	608 lbs	Note: Design automatically uses
LL Reaction 1:	690 lbs	LL Reaction 2:	690 lbs	ASD load combinations
SL Reaction 1:	618 lbs	SL Reaction 2:	583 lbs	
WL Reaction 1:	0 lbs	WL Reaction 2:	0 lbs	
Total Reaction 1:	**1609 lbs**	Total Reaction 2:	**1563 lbs**	

Material Properties:

E	1.3 msi	E'	1.3 msi
Fb	850 psi	Fb'	935 psi
Fv	150 psi	Fv'	150 psi
Fc perp	405 psi	Fc perp'	405 psi
Emin	0.47 msi	Emin'	0.47 msi

Deflection analysis:

For total load: Allowed deflection criteria, span/ 240

For LL only: Allowed deflection criteria, span/ 360

Max. allowed total defl:	0.29 in	Max LL defl:	0.19 in
Total defl. * I:	13.35 in^4	Required I:	46.44 in^4
LL defl. * I:	8.99 in^4	Required I:	46.9 in^4
Actual deflections:	TOTAL: 0.07 in		0.05 in

Force analysis:

Max. moment:	2495 ft-lb	Max Shear:	1609 lbs

Selected Member: (2) HF #2 **1.5** **x** **9.25**

Member properties:	**Provided:**		**Required:**
Moment of inertia:	197.86 in^4		46.9 in^4
Section Modulus:	42.78 in^3		32.02 in^3
Section Area:	27.75 in^2		16.09 in^2
Bearing Area:			3.97 in^2
Minimum bearing dimensions:	3. in	x	1.32 in

John S. Apolis, P.E. **CSES, Inc.** Job number: **2023.102**

Project: **Macintyre** Date: 18-Dec-23

Architect: Page number: M6

BEAM DESIGN (Uniform Load+Concentrated Load)

2018 International Building Code (IBC) **2018 NDS**

Beam Description: Southeast Header with R9 Post Load

Fully Supported:	1	Snow Load:		Wind Load:	
Repetitive Member:		P.T. Lumber:		Wet Use:	

Geometry and Loads:

Span:	3 ft	Tributary Width:	1.3333 ft	P Location:	2 ft
Add'l uniform DL:	240 lbs/ft	DL unit load:	15 psf	Concentrated DL:	366 lbs
Add'l uniform LL:		LL unit load:	40 psf	Concentrated LL:	
Add'l uniform SL:	375 lbs/ft	SL unit load:		Concentrated SL:	609 lbs
Add'l uniform WL:		WL unit load:		Concentrated WL:	

DL Reaction 1:	634 lbs	DL Reaction 2:	512 lbs	Note: Design automatically uses
LL Reaction 1:	80 lbs	LL Reaction 2:	80 lbs	ASD load combinations
SL Reaction 1:	969 lbs	SL Reaction 2:	766 lbs	
WL Reaction 1:	0 lbs	WL Reaction 2:	0 lbs	
Total Reaction 1:	**1602 lbs**	Total Reaction 2:	**1277 lbs**	

Material Properties:

E	1.3 msi	E'	1.3 msi
Fb	850 psi	Fb'	1020 psi
Fv	150 psi	Fv'	150 psi
Fc perp	405 psi	Fc perp'	405 psi
Emin	0.47 msi	Emin'	0.47 msi

Deflection analysis:

For total load: Allowed deflection criteria, span/ 240

For LL only: Allowed deflection criteria, span/ 360

Max. allowed total defl:	0.15 in	Max LL defl:	0.1 in
Total defl. * I:	1.59 in^4	Required I:	10.61 in^4
LL defl. * I:	0.99 in^4	Required I:	9.92 in^4
Actual deflections:	TOTAL: 0.02 in		0.01 in

Force analysis:

Max. moment:	1285 ft-lb	Max Shear:	1602 lbs

Selected Member: (2) HF #2 **1.5** **x** **7.25**

Member properties:	**Provided:**		**Required:**
Moment of inertia:	95.27 in^4		10.61 in^4
Section Modulus:	26.28 in^3		15.12 in^3
Section Area:	21.75 in^2		16.02 in^2
Bearing Area:			3.96 in^2
Minimum bearing dimensions:	3. in	x	1.32 in

John S. Apolis, P.E. **CSES, Inc.** Job number: **2023.102**

Project: **Macintyre** Date: 18-Dec-23

Architect: Page number: M7

BEAM DESIGN (Uniform Load+Concentrated Load)

2018 International Building Code (IBC) **2018 NDS**

Beam Description: Southwest Header with R8 Post Load

Fully Supported:	1	Snow Load:		Wind Load:	
Repetitive Member:		P.T. Lumber:		Wet Use:	

Geometry and Loads:

Span:	3 ft	Tributary Width:	1.3333 ft	P Location:	0.5 ft
Add'l uniform DL:	240 lbs/ft	DL unit load:	15 psf	Concentrated DL:	548 lbs
Add'l uniform LL:		LL unit load:	40 psf	Concentrated LL:	
Add'l uniform SL:	375 lbs/ft	SL unit load:		Concentrated SL:	914 lbs
Add'l uniform WL:		WL unit load:		Concentrated WL:	

DL Reaction 1:	847 lbs	DL Reaction 2:	481 lbs	Note: Design automatically uses
LL Reaction 1:	80 lbs	LL Reaction 2:	80 lbs	ASD load combinations
SL Reaction 1:	1324 lbs	SL Reaction 2:	715 lbs	
WL Reaction 1:	0 lbs	WL Reaction 2:	0 lbs	
Total Reaction 1:	**2171 lbs**	Total Reaction 2:	**1196 lbs**	

Material Properties:

E	1.3 msi	E'	1.3 msi
Fb	850 psi	Fb'	935 psi
Fv	150 psi	Fv'	150 psi
Fc perp	405 psi	Fc perp'	405 psi
Emin	0.47 msi	Emin'	0.47 msi

Deflection analysis:

For total load: Allowed deflection criteria, span/			240
For LL only: Allowed deflection criteria, span/			360
Max. allowed total defl:	0.15 in	Max LL defl:	0.1 in
Total defl. * I:	1.5 in^4	Required I:	10.02 in^4
LL defl. * I:	0.94 in^4	Required I:	9.37 in^4
Actual deflections:	TOTAL: 0.01 in		0. in

Force analysis:

Max. moment:	1127 ft-lb	Max Shear:	2171 lbs

Selected Member:	(2) HF #2	**1.5**	**x**	**9.25**

Member properties:	**Provided:**		**Required:**
Moment of inertia:	197.86 in^4		10.02 in^4
Section Modulus:	42.78 in^3		14.46 in^3
Section Area:	27.75 in^2		21.71 in^2
Bearing Area:			5.36 in^2
Minimum bearing dimensions:	3. in	x	1.79 in

John S. Apolis, P.E. **CSES, Inc.** Job number: **2023.102**

Project: **Macintyre** Date: 18-Dec-23

Architect: Page number: M8

BEAM DESIGN (Uniform Load+Concentrated Load)

2018 International Building Code (IBC) **2018 NDS**

Beam Description: North Header with R12 Post Load

Fully Supported:	1	Snow Load:		Wind Load:	
Repetitive Member:		P.T. Lumber:		Wet Use:	

Geometry and Loads:

Span:	8 ft	Tributary Width:	1.3333 ft	P Location:	2 ft
Add'l uniform DL:	240 lbs/ft	DL unit load:	15 psf	Concentrated DL:	731 lbs
Add'l uniform LL:		LL unit load:	40 psf	Concentrated LL:	
Add'l uniform SL:	375 lbs/ft	SL unit load:		Concentrated SL:	1219 lbs
Add'l uniform WL:		WL unit load:		Concentrated WL:	

DL Reaction 1:	1588 lbs	DL Reaction 2:	1223 lbs	Note: Design automatically uses
LL Reaction 1:	213 lbs	LL Reaction 2:	213 lbs	ASD load combinations
SL Reaction 1:	2414 lbs	SL Reaction 2:	1805 lbs	
WL Reaction 1:	0 lbs	WL Reaction 2:	0 lbs	
Total Reaction 1:	**4002 lbs**	Total Reaction 2:	**3027 lbs**	

Material Properties:

E	1.8 msi	E'	1.8 msi
Fb	2400 psi	Fb'	2400 psi
Fv	265 psi	Fv'	265 psi
Fc perp	650 psi	Fc perp'	650 psi
Emin	0.95 msi	Emin'	0.95 msi

Deflection analysis:

For total load: Allowed deflection criteria, span/ 240

For LL only: Allowed deflection criteria, span/ 360

Max. allowed total defl:	0.4 in	Max LL defl:	0.27 in
Total defl. * I:	49.2 in^4	Required I:	122.99 in^4
LL defl. * I:	30.65 in^4	Required I:	114.95 in^4
Actual deflections:	TOTAL: 0.23 in		0.14 in

Force analysis:

Max. moment:	7217 ft-lb	Max Shear:	4002 lbs

Selected Member: (1) GLB **3.5** **x** **9**

Member properties:	**Provided:**		**Required:**
Moment of inertia:	212.63 in^4		122.99 in^4
Section Modulus:	47.25 in^3		36.09 in^3
Section Area:	31.5 in^2		22.66 in^2
Bearing Area:			6.16 in^2
Minimum bearing dimensions:	3.5 in	x	1.76 in

FORTEWEB

MEMBER REPORT

~~FAILED~~

M9

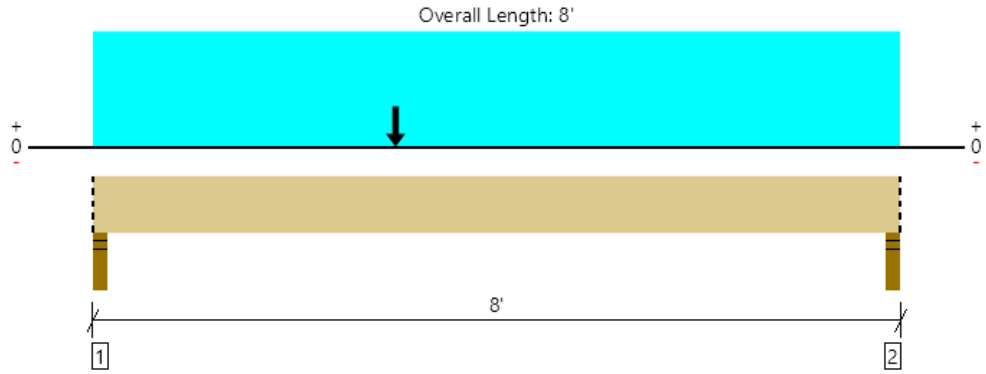
Main, North Header With Strap From Above (Overstrength Loading)

1 piece(s) 5 1/2" x 9" 24F-V4 DF Glulam

~~An excessive uplift of -3312 lbs at support located at 2" failed this product.~~

~~An excessive uplift of -1672 lbs at support located at 7' 10" failed this product.~~

OK PER STRUCTURAL PLANS



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	5053 @ 2"	8181 (3.50")	Passed (62%)	--	1.0 D + 0.7 E (All Spans)
Shear (lbs)	4770 @ 1' 1/2"	13992	Passed (34%)	1.60	1.0 D + 0.7 E (All Spans)
Pos Moment (Ft-lbs)	13097 @ 3'	23760	Passed (55%)	1.60	1.0 D + 0.7 E (All Spans)
Neg Moment (Ft-lbs)	-10117 @ 3'	18315	Passed (55%)	1.60	0.6 D - 0.7 E (All Spans)
Live Load Defl. (in)	0.052 @ 3' 11 15/16"	0.256	Passed (L/999+)	--	1.0 D + 1.0 Lr (All Spans)
Total Load Defl. (in)	0.087 @ 3' 11 15/16"	0.383	Passed (L/999+)	--	1.0 D + 1.0 Lr (All Spans)

System : Floor
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- 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 = 7' 8".
- Critical negative moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 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	Roof Live	Seismic	Factored	
1 - Stud wall - SPF	3.50"	3.50"	2.16"	1088	213	1600	5664/-5664	5053/-3312	Blocking
2 - Stud wall - SPF	3.50"	3.50"	1.50"	1088	213	1600	3321/-3321	3412/-1672	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' o/c	
Bottom Edge (Lu)	8' o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Roof Live (non-snow: 1.25)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	0 to 8'	N/A	12.0	--	--	--	
1 - Uniform (PSF)	0 to 8' (Front)	1' 4"	15.0	40.0	-	-	Floor Load
2 - Point (lb)	3' (Front)	N/A	-	-	-	8985	L2 w/2.5 overstrength Factor
3 - Uniform (PLF)	0 to 8' (Front)	N/A	240.0	-	400.0	-	Roof Framing

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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
Demetri Dalas CSES (425) 736-3569 demetri@cses-engineering.com	

Weyerhaeuser

12/15/2023 7:27:53 PM UTC

ForteWEB v3.6, Engine: V8.3.1.5, Data: V8.1.4.1

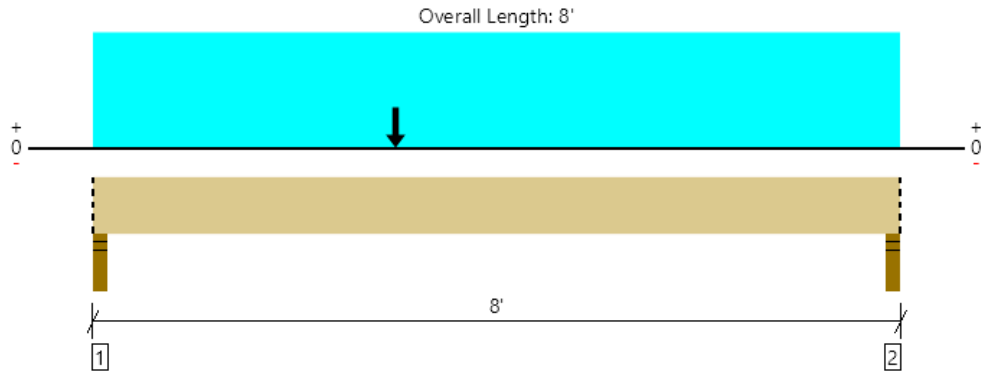
File Name: Macintyre 2023.102

FORTEWEB

MEMBER REPORT

PASSED
M9a

Main, North Header With Strap From Above (w/out Overstrength Loading)
1 piece(s) 5 1/2" x 9" 24F-V4 DF Glulam



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	2688 @ 2"	8181 (3.50")	Passed (33%)	--	1.0 D + 1.0 Lr (All Spans)
Shear (lbs)	1988 @ 1' 1/2"	10931	Passed (18%)	1.25	1.0 D + 1.0 Lr (All Spans)
Pos Moment (Ft-lbs)	6356 @ 3'	23760	Passed (27%)	1.60	1.0 D + 0.7 E (All Spans)
Neg Moment (Ft-lbs)	-3376 @ 3'	18315	Passed (18%)	1.60	0.6 D - 0.7 E (All Spans)
Live Load Defl. (in)	0.052 @ 3' 11 15/16"	0.256	Passed (L/999+)	--	1.0 D + 1.0 Lr (All Spans)
Total Load Defl. (in)	0.087 @ 3' 11 15/16"	0.383	Passed (L/999+)	--	1.0 D + 1.0 Lr (All Spans)

System : Floor
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- 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 = 7' 8".
- Critical negative moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 7' 8".
- -933 lbs uplift at support located at 2". Strapping or other restraint may be required.
- -277 lbs uplift at support located at 7' 10". 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	Floor Live	Roof Live	Seismic	Factored	
1 - Stud wall - SPF	3.50"	3.50"	1.50"	1088	213	1600	2266/-2266	2688/-933	Blocking
2 - Stud wall - SPF	3.50"	3.50"	1.50"	1088	213	1600	1328/-1328	2688/-277	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' o/c	
Bottom Edge (Lu)	8' o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Roof Live (non-snow: 1.25)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	0 to 8'	N/A	12.0	--	--	--	
1 - Uniform (PSF)	0 to 8' (Front)	1' 4"	15.0	40.0	-	-	Floor Load
2 - Point (lb)	3' (Front)	N/A	-	-	-	3594	L2 w/2.5 overstrength Factor
3 - Uniform (PLF)	0 to 8' (Front)	N/A	240.0	-	400.0	-	Roof Framing

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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
Demetri Dalas CSES (425) 736-3569 demetri@cses-engineering.com	

Weyerhaeuser

12/15/2023 7:28:32 PM UTC
ForteWEB v3.6, Engine: V8.3.1.5, Data: V8.1.4.1
File Name: Macintyre 2023.102

FORTEWEB

MEMBER REPORT

~~FAILED~~

M10

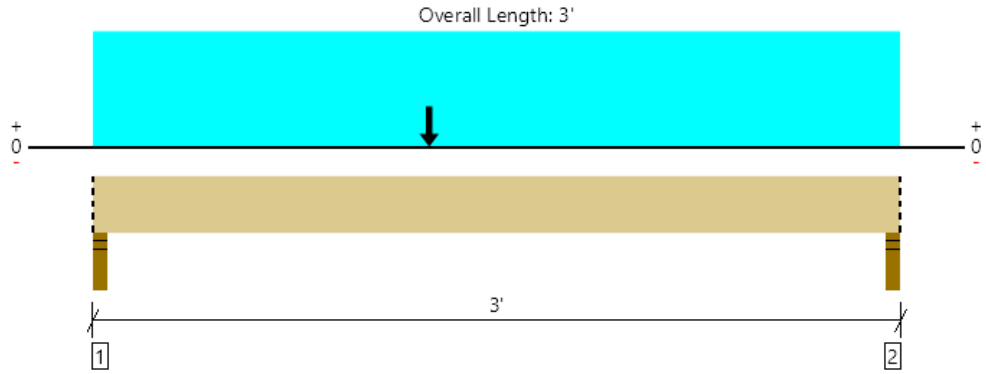
Main, South Header With Strap From Above (Overstrength Loading)

1 piece(s) 4 x 10 DF No.2

~~An excessive uplift of -2883 lbs at support located at 2" failed this product.~~

~~An excessive uplift of -1897 lbs at support located at 2' 10" failed this product.~~

OK PER STRUCTURAL PLANS



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	3527 @ 2"	5206 (3.50")	Passed (68%)	--	1.0 D + 0.7 E (All Spans)
Shear (lbs)	3242 @ 1' 3/4"	6216	Passed (52%)	1.60	1.0 D + 0.7 E (All Spans)
Moment (Ft-lbs)	3615 @ 1' 3"	7187	Passed (50%)	1.60	1.0 D + 0.7 E (All Spans)
Live Load Defl. (in)	0.001 @ 1' 6 1/16"	0.089	Passed (L/999+)	--	1.0 D + 1.0 Lr (All Spans)
Total Load Defl. (in)	0.002 @ 1' 6 1/16"	0.133	Passed (L/999+)	--	1.0 D + 1.0 Lr (All Spans)

System : Floor
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- 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.

Supports	Bearing Length			Loads to Supports (lbs)					Accessories
	Total	Available	Required	Dead	Floor Live	Roof Live	Seismic	Factored	
1 - Stud wall - SPF	3.50"	3.50"	2.37"	402	80	600	4464/-4464	3527/-2883	Blocking
2 - Stud wall - SPF	3.50"	3.50"	1.71"	402	80	600	3054/-3054	2540/-1897	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)	3' o/c	
Bottom Edge (Lu)	3' o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Roof Live (non-snow: 1.25)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	0 to 3'	N/A	8.2	--	--	--	
1 - Uniform (PSF)	0 to 3' (Front)	1' 4"	15.0	40.0	-	-	Floor Load
2 - Point (lb)	1' 3" (Front)	N/A	-	-	-	7518	L3 w/2.5 overstrength Factor
3 - Uniform (PLF)	0 to 3' (Front)	N/A	240.0	-	400.0	-	Roof Framing

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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
Demetri Dalas CSES (425) 736-3569 demetri@cses-engineering.com	

Weyerhaeuser

12/15/2023 7:33:24 PM UTC

ForteWEB v3.6, Engine: V8.3.1.5, Data: V8.1.4.1

File Name: Macintyre 2023.102

FORTEWEB

MEMBER REPORT

~~FAILED~~

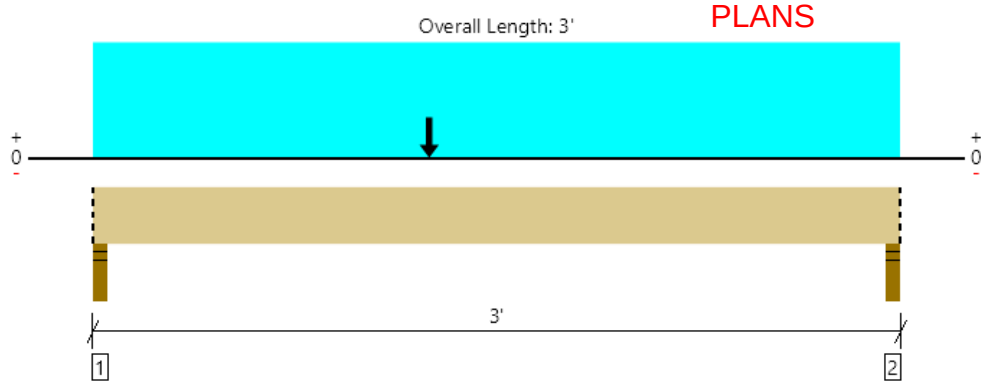
M10a

Main, South Header With Strap From Above (w/out Overstrength Loading)

1 piece(s) 4 x 10 DF No.2

~~An excessive uplift of -1008 lbs at support located at 2" failed this product.~~

OK PER STRUCTURAL PLANS



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1652 @ 2"	5206 (3.50")	Passed (32%)	--	1.0 D + 0.7 E (All Spans)
Shear (lbs)	1367 @ 1' 3/4"	6216	Passed (22%)	1.60	1.0 D + 0.7 E (All Spans)
Moment (Ft-lbs)	1584 @ 1' 3"	7187	Passed (22%)	1.60	1.0 D + 0.7 E (All Spans)
Live Load Defl. (in)	0.001 @ 1' 6 1/16"	0.089	Passed (L/999+)	--	1.0 D + 1.0 Lr (All Spans)
Total Load Defl. (in)	0.002 @ 1' 6 1/16"	0.133	Passed (L/999+)	--	1.0 D + 1.0 Lr (All Spans)

System : Floor
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- -614 lbs uplift at support located at 2' 10". Strapping or other restraint may be required.
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)					Accessories
	Total	Available	Required	Dead	Floor Live	Roof Live	Seismic	Factored	
1 - Stud wall - SPF	3.50"	3.50"	1.50"	402	80	600	1785/-1785	1652/-1008	Blocking
2 - Stud wall - SPF	3.50"	3.50"	1.50"	402	80	600	1222/-1222	1257/-614	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)	3' o/c	
Bottom Edge (Lu)	3' o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Roof Live (non-snow: 1.25)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	0 to 3'	N/A	8.2	--	--	--	
1 - Uniform (PSF)	0 to 3' (Front)	1' 4"	15.0	40.0	-	-	Floor Load
2 - Point (lb)	1' 3" (Front)	N/A	-	-	-	3007	L3
3 - Uniform (PLF)	0 to 3' (Front)	N/A	240.0	-	400.0	-	Roof Framing

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
Demetri Dalas CSES (425) 736-3569 demetri@cses-engineering.com	

Weyerhaeuser

12/15/2023 7:34:34 PM UTC

ForteWEB v3.6, Engine: V8.3.1.5, Data: V8.1.4.1

File Name: Macintyre 2023.102

FORTEWEB

MEMBER REPORT

~~FAILED~~

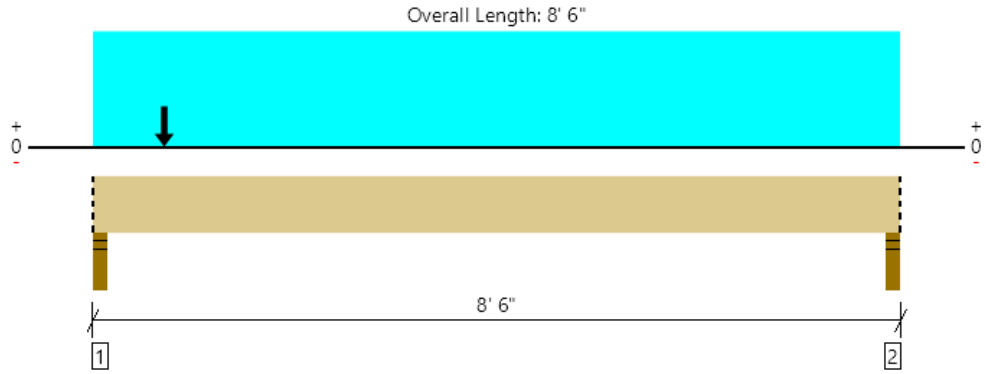
M11

Main, Northernly Garage Door Header w/Strap Overstrength

1 piece(s) 3 1/2" x 10 1/2" 24F-V4 DF Glulam

~~An excessive uplift of -2591 lbs at support located at 2" failed this product.~~

OK PER STRUCTURAL PLANS



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	4944 @ 2"	5206 (3.50")	Passed (95%)	--	1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	2186 @ 1' 2"	6493	Passed (34%)	1.00	1.0 D + 1.0 L (All Spans)
Pos Moment (Ft-lbs)	5910 @ 4' 3"	12863	Passed (46%)	1.00	1.0 D + 1.0 L (All Spans)
Neg Moment (Ft-lbs)	-1551 @ 9"	15864	Passed (10%)	1.60	0.6 D - 0.7 E (All Spans)
Live Load Defl. (in)	0.076 @ 4' 3 1/16"	0.272	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.117 @ 4' 3 1/16"	0.408	Passed (L/839)	--	1.0 D + 1.0 L (All Spans)

System : Floor
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- 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 = 8' 2".
- Critical negative moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 3' 3 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	Roof Live	Seismic	Factored	
1 - Stud wall - SPF	3.50"	3.50"	3.32"	1058	1955	478	4609/-4609	4944/-2591	Blocking
2 - Stud wall - SPF	3.50"	3.50"	2.03"	1058	1955	478	355/-355	3013	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' 6" o/c	
Bottom Edge (Lu)	8' 6" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Roof Live (non-snow: 1.25)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	0 to 8' 6"	N/A	8.9	--	--	--	
1 - Uniform (PSF)	0 to 8' 6" (Front)	11' 6"	15.0	40.0	-	-	Floor Load
2 - Point (lb)	9" (Front)	N/A	-	-	-	4963	L4 w/2.5 Overstrtength Factor
3 - Uniform (PSF)	0 to 8' 6" (Front)	4' 6"	15.0	-	25.0	-	Roof Load

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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
Demetri Dalas CSES (425) 736-3569 demetri@cses-engineering.com	

Weyerhaeuser

12/15/2023 7:43:56 PM UTC

ForteWEB v3.6, Engine: V8.3.1.5, Data: V8.1.4.1

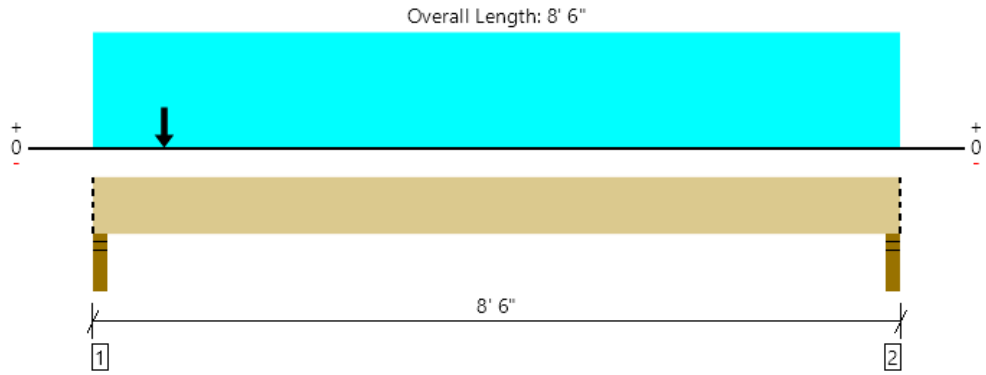
File Name: Macintyre 2023.102

FORTEWEB

MEMBER REPORT

PASSED
M11a

Main, Northernly Garage Door Header w/out Strap Overstrength
1 piece(s) 3 1/2" x 10 1/2" 24F-V4 DF Glulam



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	3492 @ 2"	5206 (3.50")	Passed (67%)	--	1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	2186 @ 1' 2"	6493	Passed (34%)	1.00	1.0 D + 1.0 L (All Spans)
Pos Moment (Ft-lbs)	5910 @ 4' 3"	12863	Passed (46%)	1.00	1.0 D + 1.0 L (All Spans)
Neg Moment (Ft-lbs)	-422 @ 9"	15864	Passed (3%)	1.60	0.6 D - 0.7 E (All Spans)
Live Load Defl. (in)	0.076 @ 4' 3 1/16"	0.272	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.117 @ 4' 3 1/16"	0.408	Passed (L/839)	--	1.0 D + 1.0 L (All Spans)

System : Floor
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- 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 = 8' 2".
- Critical negative moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 1' 3 15/16".
- -655 lbs uplift at support located at 2". 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	Floor Live	Roof Live	Seismic	Factored	
1 - Stud wall - SPF	3.50"	3.50"	2.35"	1058	1955	478	1843/-1843	3492/-655	Blocking
2 - Stud wall - SPF	3.50"	3.50"	2.03"	1058	1955	478	142/-142	3013	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' 6" o/c	
Bottom Edge (Lu)	8' 6" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Roof Live (non-snow: 1.25)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	0 to 8' 6"	N/A	8.9	--	--	--	
1 - Uniform (PSF)	0 to 8' 6" (Front)	11' 6"	15.0	40.0	-	-	Floor Load
2 - Point (lb)	9" (Front)	N/A	-	-	-	1985	L4
3 - Uniform (PSF)	0 to 8' 6" (Front)	4' 6"	15.0	-	25.0	-	Roof Load

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
Demetri Dalas CSES (425) 736-3569 demetri@cses-engineering.com	

Weyerhaeuser

12/15/2023 7:45:13 PM UTC
ForteWEB v3.6, Engine: V8.3.1.5, Data: V8.1.4.1
File Name: Macintyre 2023.102

FORTEWEB

MEMBER REPORT

~~FAILED~~

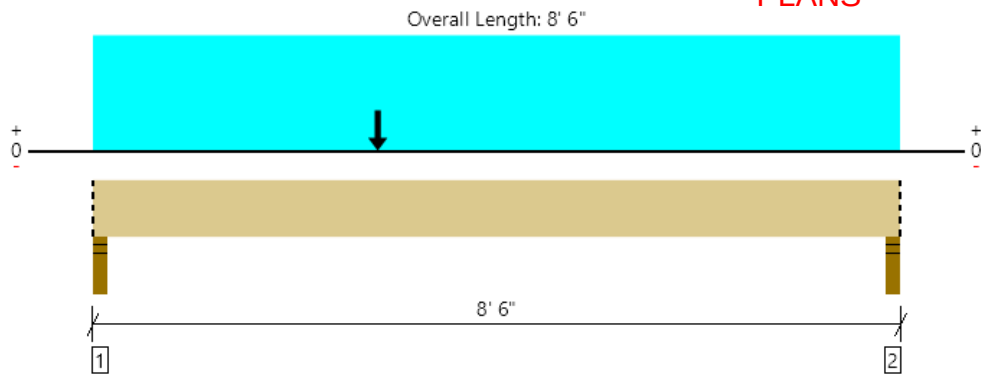
M12

Main, Southernly Garage Door Header w/Strap Overstrength

1 piece(s) 3 1/2" x 10 1/2" 24F-V4 DF Glulam

~~An excessive uplift of -1634 lbs at support located at 2" failed this product.~~

OK PER STRUCTURAL PLANS



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	4226 @ 2"	5206 (3.50")	Passed (81%)	--	1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	3533 @ 1' 2"	10388	Passed (34%)	1.60	1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)
Pos Moment (Ft-lbs)	5910 @ 4' 3"	12863	Passed (46%)	1.00	1.0 D + 1.0 L (All Spans)
Neg Moment (Ft-lbs)	-5300 @ 3'	15864	Passed (33%)	1.60	0.6 D - 0.7 E (All Spans)
Live Load Defl. (in)	0.076 @ 4' 3"	0.272	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.117 @ 4' 3"	0.408	Passed (L/839)	--	1.0 D + 1.0 L (All Spans)

System : Floor
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- 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 = 8' 2".
- Critical negative moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 8' 2".
- -571 lbs uplift at support located at 8' 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	Floor Live	Roof Live	Seismic	Factored	
1 - Stud wall - SPF	3.50"	3.50"	2.84"	1058	1955	478	3241/-3241	4226/-1634	Blocking
2 - Stud wall - SPF	3.50"	3.50"	2.30"	1058	1955	478	1722/-1722	3428/-571	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' 6" o/c	
Bottom Edge (Lu)	8' 6" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Roof Live (non-snow: 1.25)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	0 to 8' 6"	N/A	8.9	--	--	--	
1 - Uniform (PSF)	0 to 8' 6" (Front)	11' 6"	15.0	40.0	-	-	Floor Load
2 - Point (lb)	3' (Front)	N/A	-	-	-	4963	L4 w/2.5 overstrength factor
3 - Uniform (PSF)	0 to 8' 6" (Front)	4' 6"	15.0	-	25.0	-	Roof Load

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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
Demetri Dalas CSES (425) 736-3569 demetri@cses-engineering.com	

Weyerhaeuser

12/15/2023 8:00:22 PM UTC

ForteWEB v3.6, Engine: V8.3.1.5, Data: V8.1.4.1

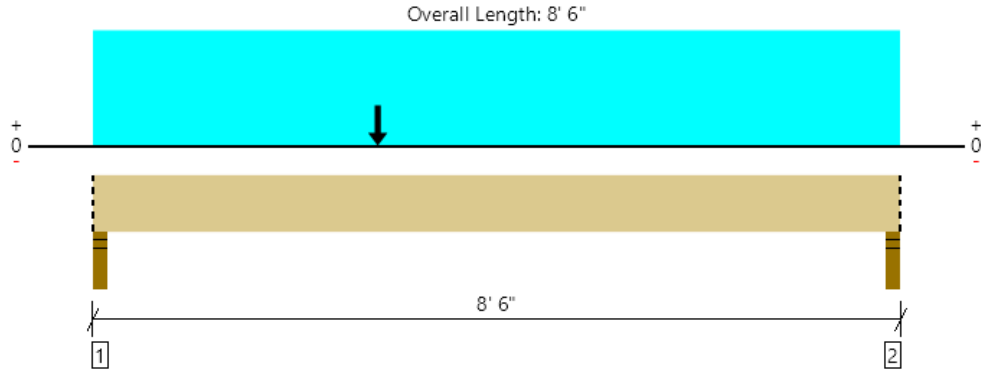
File Name: Macintyre 2023.102

FORTEWEB

MEMBER REPORT

PASSED
M12a

Main, Southernly Garage Door Header w/out Strap Overstrength
1 piece(s) 3 1/2" x 10 1/2" 24F-V4 DF Glulam



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

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	3205 @ 2"	5206 (3.50")	Passed (62%)	--	1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)
Shear (lbs)	2186 @ 1' 2"	6493	Passed (34%)	1.00	1.0 D + 1.0 L (All Spans)
Pos Moment (Ft-lbs)	5910 @ 4' 3"	12863	Passed (46%)	1.00	1.0 D + 1.0 L (All Spans)
Neg Moment (Ft-lbs)	-1443 @ 3'	15864	Passed (9%)	1.60	0.6 D - 0.7 E (All Spans)
Live Load Defl. (in)	0.076 @ 4' 3"	0.272	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.117 @ 4' 3"	0.408	Passed (L/839)	--	1.0 D + 1.0 L (All Spans)

System : Floor
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2018
Design Methodology : ASD

- 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 = 8' 2".
- Critical negative moment adjusted by a volume/size factor of 1.00 that was calculated using length L = 6' 5 7/16".
- -273 lbs uplift at support located at 2". 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	Floor Live	Roof Live	Seismic	Factored	
1 - Stud wall - SPF	3.50"	3.50"	2.15"	1058	1955	478	1296/-1296	3205/-273	Blocking
2 - Stud wall - SPF	3.50"	3.50"	2.03"	1058	1955	478	689/-689	3013	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' 6" o/c	
Bottom Edge (Lu)	8' 6" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Roof Live (non-snow: 1.25)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	0 to 8' 6"	N/A	8.9	--	--	--	
1 - Uniform (PSF)	0 to 8' 6" (Front)	11' 6"	15.0	40.0	-	-	Floor Load
2 - Point (lb)	3' (Front)	N/A	-	-	-	1985	L4
3 - Uniform (PSF)	0 to 8' 6" (Front)	4' 6"	15.0	-	25.0	-	Roof Load

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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
Demetri Dalas CSES (425) 736-3569 demetri@cses-engineering.com	

Weyerhaeuser

12/15/2023 7:58:48 PM UTC
ForteWEB v3.6, Engine: V8.3.1.5, Data: V8.1.4.1
File Name: Macintyre 2023.102

John S. Apolis, P.E. **CSES, Inc.** Job number: **2023.102**

Project: **Macintyre** Date: 18-Dec-23

Architect: Page number: M13

BEAM DESIGN (Uniform Load+Concentrated Load)

2018 International Building Code (IBC) **2018 NDS**

Beam Description: Structure 1 West Header

Fully Supported:	1	Snow Load:		Wind Load:	
Repetitive Member:		P.T. Lumber:		Wet Use:	

Geometry and Loads:

Span:	6.3333 ft	Tributary Width:	6.125 ft	P Location:	6.3333 ft
Add'l uniform DL:		DL unit load:	30 psf	Concentrated DL:	
Add'l uniform LL:		LL unit load:	65 psf	Concentrated LL:	
Add'l uniform SL:		SL unit load:		Concentrated SL:	
Add'l uniform WL:		WL unit load:		Concentrated WL:	

DL Reaction 1:	582 lbs	DL Reaction 2:	582 lbs	Note: Design automatically uses
LL Reaction 1:	1261 lbs	LL Reaction 2:	1261 lbs	ASD load combinations
SL Reaction 1:	0 lbs	SL Reaction 2:	0 lbs	
WL Reaction 1:	0 lbs	WL Reaction 2:	0 lbs	
Total Reaction 1:	**1843 lbs**	Total Reaction 2:	**1843 lbs**	

Material Properties:

E	1.3 msi	E'	1.3 msi
Fb	850 psi	Fb'	935 psi
Fv	150 psi	Fv'	150 psi
Fc perp	405 psi	Fc perp'	405 psi
Emin	0.47 msi	Emin'	0.47 msi

Deflection analysis:

For total load: Allowed deflection criteria, span/ 240

For LL only: Allowed deflection criteria, span/ 360

Max. allowed total defl:	0.32 in	Max LL defl:	0.21 in
Total defl. * I:	16.2 in^4	Required I:	51.17 in^4
LL defl. * I:	11.09 in^4	Required I:	52.51 in^4
Actual deflections:	TOTAL: 0.08 in		0.06 in

Force analysis:

Max. moment:	2917 ft-lb	Max Shear:	1843 lbs

Selected Member:	(2) HF #2	**1.5**	**x**	**9.25**

Member properties:	**Provided:**		**Required:**
Moment of inertia:	197.86 in^4		52.51 in^4
Section Modulus:	42.78 in^3		37.44 in^3
Section Area:	27.75 in^2		18.43 in^2
Bearing Area:			4.55 in^2
Minimum bearing dimensions:	3. in	x	1.52 in

John S. Apolis, P.E. **CSES, Inc.** Job number: **2023.102**

Project: **Macintyre** Date: 18-Dec-23

Architect: Page number: M14

BEAM DESIGN (Uniform Load+Concentrated Load)

2018 International Building Code (IBC) **2018 NDS**

Beam Description: Structure 1 East Headers

Fully Supported:	1	Snow Load:		Wind Load:	
Repetitive Member:		P.T. Lumber:		Wet Use:	

Geometry and Loads:

Span:	11 ft	Tributary Width:	6.125 ft	P Location:	11 ft
Add'l uniform DL:		DL unit load:	30 psf	Concentrated DL:	
Add'l uniform LL:		LL unit load:	65 psf	Concentrated LL:	
Add'l uniform SL:		SL unit load:		Concentrated SL:	
Add'l uniform WL:		WL unit load:		Concentrated WL:	

DL Reaction 1:	1011 lbs	DL Reaction 2:	1011 lbs	Note: Design automatically uses
LL Reaction 1:	2190 lbs	LL Reaction 2:	2190 lbs	ASD load combinations
SL Reaction 1:	0 lbs	SL Reaction 2:	0 lbs	
WL Reaction 1:	0 lbs	WL Reaction 2:	0 lbs	
Total Reaction 1:	**3200 lbs**	Total Reaction 2:	**3200 lbs**	

Material Properties:

E	1.8 msi	E'	1.8 msi
Fb	2400 psi	Fb'	2400 psi
Fv	265 psi	Fv'	265 psi
Fc perp	650 psi	Fc perp'	650 psi
Emin	0.95 msi	Emin'	0.95 msi

Deflection analysis:

For total load: Allowed deflection criteria, span/ 240

For LL only: Allowed deflection criteria, span/ 360

Max. allowed total defl:	0.55 in	Max LL defl:	0.37 in
Total defl. * I:	106.49 in^4	Required I:	193.62 in^4
LL defl. * I:	72.86 in^4	Required I:	198.71 in^4
Actual deflections:	TOTAL: 0.5 in		0.34 in

Force analysis:

Max. moment:	8801 ft-lb	Max Shear:	3200 lbs

Selected Member: (1) GLB **3.5** **x** **9**

Member properties:	**Provided:**		**Required:**
Moment of inertia:	212.63 in^4		198.71 in^4
Section Modulus:	47.25 in^3		44. in^3
Section Area:	31.5 in^2		18.11 in^2
Bearing Area:			4.92 in^2
Minimum bearing dimensions:	3.5 in	x	1.41 in

John S. Apolis, P.E. **CSES, Inc.** Job number: **2023.102**

Project: **Macintyre** Date: 18-Dec-23

Architect: Page number: M15

BEAM DESIGN (Uniform Load+Concentrated Load)

2018 International Building Code (IBC) **2018 NDS**

Beam Description: Main Entrance Header

Fully Supported:	1	Snow Load:		Wind Load:	
Repetitive Member:		P.T. Lumber:		Wet Use:	

Geometry and Loads:

Span:	6.3333 ft	Tributary Width:	6.125 ft	P Location:	3.16665 ft
Add'l uniform DL:		DL unit load:	30 psf	Concentrated DL:	495 lbs
Add'l uniform LL:		LL unit load:	65 psf	Concentrated LL:	
Add'l uniform SL:		SL unit load:		Concentrated SL:	895 lbs
Add'l uniform WL:		WL unit load:		Concentrated WL:	

DL Reaction 1:	829 lbs	DL Reaction 2:	829 lbs	Note: Design automatically uses
LL Reaction 1:	1261 lbs	LL Reaction 2:	1261 lbs	ASD load combinations
SL Reaction 1:	448 lbs	SL Reaction 2:	448 lbs	
WL Reaction 1:	0 lbs	WL Reaction 2:	0 lbs	
Total Reaction 1:	**2111 lbs**	Total Reaction 2:	**2111 lbs**	

Material Properties:

E	1.3 msi	E'	1.3 msi
Fb	850 psi	Fb'	935 psi
Fv	150 psi	Fv'	150 psi
Fc perp	405 psi	Fc perp'	405 psi
Emin	0.47 msi	Emin'	0.47 msi

Deflection analysis:

For total load: Allowed deflection criteria, span/ 240

For LL only: Allowed deflection criteria, span/ 360

Max. allowed total defl:	0.32 in	Max LL defl:	0.21 in
Total defl. * I:	25.98 in^4	Required I:	82.05 in^4
LL defl. * I:	17.38 in^4	Required I:	82.34 in^4
Actual deflections:	TOTAL: 0.06 in		0.04 in

Force analysis:

Max. moment:	4265 ft-lb	Max Shear:	2111 lbs

Selected Member:	(1) HF #2	**3.5**	**x**	**11.25**

Member properties:	**Provided:**		**Required:**
Moment of inertia:	415.28 in^4		82.34 in^4
Section Modulus:	73.83 in^3		54.74 in^3
Section Area:	39.38 in^2		21.11 in^2
Bearing Area:			5.21 in^2
Minimum bearing dimensions:	3.5 in	x	1.49 in

John S. Apolis, P.E. **CSES, Inc.** Job number: **2023.102**

Project: **Macintyre** Date: 20-Dec-23

Architect: Page number: M16

BEAM DESIGN (Uniform Load+Concentrated Load)

2018 International Building Code (IBC) **2018 NDS**

Beam Description: Awning Joists

Fully Supported:	1	Snow Load:		Wind Load:	
Repetitive Member:		P.T. Lumber:		Wet Use:	

Geometry and Loads:

Span:	3.66666 ft	Tributary Width:	2 ft	P Location:	3.66666 ft
Add'l uniform DL:		DL unit load:	15 psf	Concentrated DL:	
Add'l uniform LL:		LL unit load:	25 psf	Concentrated LL:	
Add'l uniform SL:		SL unit load:		Concentrated SL:	
Add'l uniform WL:		WL unit load:		Concentrated WL:	

DL Reaction 1:	55 lbs	DL Reaction 2:	55 lbs	Note: Design automatically uses
LL Reaction 1:	92 lbs	LL Reaction 2:	92 lbs	ASD load combinations
SL Reaction 1:	0 lbs	SL Reaction 2:	0 lbs	
WL Reaction 1:	0 lbs	WL Reaction 2:	0 lbs	
Total Reaction 1:	**147 lbs**	Total Reaction 2:	**147 lbs**	

Material Properties:

E	1.3 msi	E'	1.3 msi
Fb	850 psi	Fb'	1105 psi
Fv	150 psi	Fv'	150 psi
Fc perp	405 psi	Fc perp'	405 psi
Emin	0.47 msi	Emin'	0.47 msi

Deflection analysis:

For total load: Allowed deflection criteria, span/			240		
For LL only: Allowed deflection criteria, span/			360		
Max. allowed total defl:	0.18 in		Max LL defl:	0.12 in	
Total defl. * I:	0.25 in^4		Required I:	1.37 in^4	
LL defl. * I:	0.16 in^4		Required I:	1.28 in^4	
Actual deflections:	TOTAL:	0.01 in		0.01 in	

Force analysis:

Max. moment:	134 ft-lb	Max Shear:	147 lbs

Selected Member:	(1) HF #2	**1.5**	**x**	**5.5**

Member properties:	**Provided:**		**Required:**
Moment of inertia:	20.8 in^4		1.37 in^4
Section Modulus:	7.56 in^3		1.46 in^3
Section Area:	8.25 in^2		1.47 in^2
Bearing Area:			0.36 in^2
Minimum bearing dimensions:	1.5 in	x	0.24 in

John S. Apolis, P.E. **CSES, Inc.** Job number: **2023.102**

Project: **Macintyre** Date: 20-Dec-23

Architect: Page number: M17

BEAM DESIGN (Uniform Load+Concentrated Load)

2018 International Building Code (IBC) **2018 NDS**

Beam Description: Awning Ridge Beam

Fully Supported:	1	Snow Load:		Wind Load:	
Repetitive Member:		P.T. Lumber:		Wet Use:	

Geometry and Loads:

Span:	3.5 ft	Tributary Width:	3.66666 ft	P Location:	3.5 ft
Add'l uniform DL:		DL unit load:	15 psf	Concentrated DL:	
Add'l uniform LL:		LL unit load:	25 psf	Concentrated LL:	
Add'l uniform SL:		SL unit load:		Concentrated SL:	
Add'l uniform WL:		WL unit load:		Concentrated WL:	

DL Reaction 1:	96 lbs	DL Reaction 2:	96 lbs	Note: Design automatically uses
LL Reaction 1:	160 lbs	LL Reaction 2:	160 lbs	ASD load combinations
SL Reaction 1:	0 lbs	SL Reaction 2:	0 lbs	
WL Reaction 1:	0 lbs	WL Reaction 2:	0 lbs	
Total Reaction 1:	**257 lbs**	Total Reaction 2:	**257 lbs**	

Material Properties:

E	1.3 msi	E'	1.3 msi
Fb	850 psi	Fb'	1190 psi
Fv	150 psi	Fv'	150 psi
Fc perp	405 psi	Fc perp'	405 psi
Emin	0.47 msi	Emin'	0.47 msi

Deflection analysis:

For total load: Allowed deflection criteria, span/			240		
For LL only: Allowed deflection criteria, span/			360		
Max. allowed total defl:	0.18 in		Max LL defl:	0.12 in	
Total defl. * I:	0.38 in^4		Required I:	2.18 in^4	
LL defl. * I:	0.24 in^4		Required I:	2.04 in^4	
Actual deflections:	TOTAL:	0.01 in		0. in	

Force analysis:

Max. moment:	225 ft-lb	Max Shear:	257 lbs

Selected Member:	(1) HF #2	**3.5**	**x**	**5.5**

Member properties:	**Provided:**		**Required:**
Moment of inertia:	48.53 in^4		2.18 in^4
Section Modulus:	17.65 in^3		2.26 in^3
Section Area:	19.25 in^2		2.57 in^2
Bearing Area:			0.63 in^2
Minimum bearing dimensions:	3.5 in	x	0.18 in

John S. Apolis, P.E. **CSES, Inc.** Job number: **2023.102**

Project: **Macintyre** Date: 20-Dec-23

Architect: Page number: M18

BEAM DESIGN (Uniform Load+Concentrated Load)

2018 International Building Code (IBC) **2018 NDS**

Beam Description: Awning Beam

Fully Supported:	1	Snow Load:		Wind Load:	
Repetitive Member:		P.T. Lumber:		Wet Use:	

Geometry and Loads:

Span:	7.333332 ft	Tributary Width:	2 ft	P Location:	7.333332 ft
Add'l uniform DL:		DL unit load:	15 psf	Concentrated DL:	
Add'l uniform LL:		LL unit load:	25 psf	Concentrated LL:	
Add'l uniform SL:		SL unit load:		Concentrated SL:	
Add'l uniform WL:		WL unit load:		Concentrated WL:	

DL Reaction 1:	110 lbs	DL Reaction 2:	110 lbs	Note: Design automatically uses
LL Reaction 1:	183 lbs	LL Reaction 2:	183 lbs	ASD load combinations
SL Reaction 1:	0 lbs	SL Reaction 2:	0 lbs	
WL Reaction 1:	0 lbs	WL Reaction 2:	0 lbs	
Total Reaction 1:	**293 lbs**	Total Reaction 2:	**293 lbs**	

Material Properties:

E	1.3 msi	E'	1.3 msi
Fb	850 psi	Fb'	1190 psi
Fv	150 psi	Fv'	150 psi
Fc perp	405 psi	Fc perp'	405 psi
Emin	0.47 msi	Emin'	0.47 msi

Deflection analysis:

For total load: Allowed deflection criteria, span/			240	
For LL only: Allowed deflection criteria, span/			360	
Max. allowed total defl:	0.37 in	Max LL defl:		0.24 in
Total defl. * I:	4. in^4	Required I:		10.92 in^4
LL defl. * I:	2.5 in^4	Required I:		10.24 in^4
Actual deflections:	TOTAL:	0.08 in		0.05 in

Force analysis:

Max. moment:	538 ft-lb	Max Shear:	293 lbs

Selected Member:	(1) HF #2	**3.5**	**x**	**5.5**

Member properties:	**Provided:**		**Required:**
Moment of inertia:	48.53 in^4		10.92 in^4
Section Modulus:	17.65 in^3		5.42 in^3
Section Area:	19.25 in^2		2.93 in^2
Bearing Area:			0.72 in^2
Minimum bearing dimensions:	3.5 in	x	0.21 in

FOOTING SUPPORTING RZ POST:

$\frac{3915\#}{2000 psf} = 1.9875\ ft^2 = 286\ in^2 < 576\ in^2$

USE 24" x 24" x 12" DEEP FOOTING W/ (3) #4 BARS EACH WAY

CONSULTING STRUCTURAL ENGINEERING SERVICES
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Project No. 2023.102 Date 12/15/23
Project Name MACINTYRE
Comments
Revision Page F1

Cantilevered Retaining Wall

Project File: Macintyre East Retaining Wall.ec6

DESCRIPTION: Macintyre East Reatining Wall

Code Reference

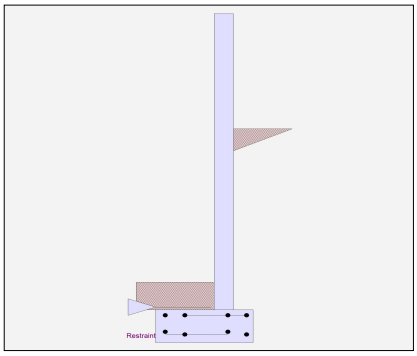
Calculations per IBC 2012 1807.3, CBC 2013, ASCE 7-10

Criteria

Retained Height	=	5.50 ft
Wall height above soil	=	3.50 ft
Slope Behind Wall	=	0.00
Height of Soil over Toe	=	10.00 in
Water table above bottom of footing	=	0.0 ft

Soil Data

Allow Soil Bearing	=	1,500.0 psf
Equivalent Fluid Pressure Method		
Active Heel Pressure	=	35.0 psf/ft
	=	
Passive Pressure	=	250.0 psf/ft
Soil Density, Heel	=	110.00 pcf
Soil Density, Toe	=	110.00 pcf
Footing||Soil Friction	=	0.400
Soil height to ignore for passive pressure	=	12.00 in



Surcharge Loads

Surcharge Over Heel	=	40.0 psf
Used To Resist Sliding & Overturning		
Surcharge Over Toe	=	40.0
Used for Sliding & Overturning		

Axial Load Applied to Stem

Axial Dead Load	=	203.0 lbs
Axial Live Load	=	439.0 lbs
Axial Load Eccentricity	=	0.0 in

Lateral Load Applied to Stem

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

Adjacent Footing Load

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

Cantilevered Retaining Wall

Project File: Macintyre East Retaining Wall.ec6

DESCRIPTION: Macintyre East Reatining Wall

Design Summary

Wall Stability Ratios

Overturning	=	1.98	OK
Slab Resists All Sliding !			
Global Stability	=	1.83	
Total Bearing Load	=	2,538 lbs	
...resultant ecc.	=	0.94 in	
Eccentricity within middle third			
Soil Pressure @ Toe	=	1,051 psf	OK
Soil Pressure @ Heel	=	719 psf	OK
Allowable	=	1,500 psf	
Soil Pressure Less Than Allowable			
ACI Factored @ Toe	=	1,471 psf	
ACI Factored @ Heel	=	1,007 psf	
Footing Shear @ Toe	=	7.8 psi	OK
Footing Shear @ Heel	=	4.2 psi	OK
Allowable	=	75.0 psi	

Sliding Calcs

Lateral Sliding Force	=	822.1 lbs

Vertical component of active lateral soil pressure IS considered in the calculation of soil bearing pressures.

Load Factors

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

Stem Construction

		Bottom				
		Stem OK				
Design Height Above Ftg	ft =	0.00				
Wall Material Above "Ht"	=	Concrete				
Design Method	=	SD	SD	SD	SD	SD
Thickness	=	6.00				
Rebar Size	=	# 4				
Rebar Spacing	=	18.00				
Rebar Placed at	=	Edge				

Design Data

fb/FB + fa/Fa	=	**0.757**
Total Force @ Section		
Service Level	lbs =	
Strength Level	lbs =	959.0
Moment....Actual		
Service Level	ft-# =	
Strength Level	ft-# =	1,860.8
Moment.....Allowable	=	2,455.6
Shear.....Actual		
Service Level	psi =	
Strength Level	psi =	18.8
Shear.....Allowable	psi =	75.0
Anet (Masonry)	in2 =	
Wall Weight	psf =	75.0
Rebar Depth 'd'	in =	4.25

Masonry Data

f'm	psi =	
Fs	psi =	
Solid Grouting	=	
Modular Ratio 'n'	=	
Equiv. Solid Thick.	=	
Masonry Block Type	=	
Masonry Design Method	=	ASD

Concrete Data

f'c	psi =	2,500.0
Fy	psi =	60,000.0

Cantilevered Retaining Wall

DESCRIPTION: Macintyre East Reatining Wall

Concrete Stem Rebar Area Details

Bottom Stem	Vertical Reinforcing	Horizontal Reinforcing	
As (based on applied moment) :	0.1052 in2/ft		
(4/3) * As :	0.1403 in2/ft	Min Stem T&S Reinf Area 1.296 in2	
200bd/fy : 200(12)(4.25)/60000 :	0.17 in2/ft	Min Stem T&S Reinf Area per ft of stem Height : 0.144 in2/ft	
0.0018bh : 0.0018(12)(6) :	0.1296 in2/ft	Horizontal Reinforcing Options :	
	==========	One layer of :	Two layers of :
Required Area :	0.1403 in2/ft	#4@ 16.67 in	#4@ 33.33 in
Provided Area :	0.1333 in2/ft	#5@ 25.83 in	#5@ 51.67 in
Maximum Area :	0.5757 in2/ft	#6@ 36.67 in	#6@ 73.33 in

Footing Data

Toe Width	=	1.50 ft
Heel Width	=	1.00
Total Footing Width	=	2.50
Footing Thickness	=	12.00 in
Key Width	=	0.00 in
Key Depth	=	0.00 in
Key Distance from Toe	=	2.00 ft

f'c = 2,500 psi Fy = 60,000 psi
Footing Concrete Density = 150.00 pcf
Min. As % = 0.0012
Cover @ Top 2.00 @ Btm.= 3.00 in

Footing Design Results

		Toe	Heel	
Factored Pressure	=	1,471	1,007	psf
Mu' : Upward	=	1,550	130	ft-#
Mu' : Downward	=	398	382	ft-#
Mu: Design	=	1,152 OK	253	ft-# OK
phiMn	=	10,125	8,563	ft-#
Actual 1-Way Shear	=	7.81	4.22	psi
Allow 1-Way Shear	=	75.00	75.00	psi

Toe Reinforcing = # 4 @ 9.00 in
Heel Reinforcing = # 4 @ 12.00 in
Key Reinforcing = None Spec'd
Footing Torsion, Tu = 0.00 ft-lbs
Footing Allow. Torsion, phi Tu = 0.00 ft-lbs

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

Other Acceptable Sizes & Spacings

Toe: #4@ 13.88 in, #5@ 21.52 in, #6@ 30.55 in, #7@ 41.66 in, #8@ 54.86 in, #9@ 69.44 in, #10@ 88.19 in

Heel: #4@ 13.88 in, #5@ 21.52 in, #6@ 30.55 in, #7@ 41.66 in, #8@ 54.86 in, #9@ 69.44 in, #10@ 88.19 in

Key: No key defined

Min footing T&S reinf Area 0.65 in2
Min footing T&S reinf Area per foot 0.26 in2 /ft

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

Cantilevered Retaining Wall

DESCRIPTION: Macintyre East Reatining Wall

Summary of Overturning & Resisting Forces & Moments

Item		.....OVERTURNING..... Force lbs	Distance ft	Moment ft-#		.....RESISTING..... Force lbs	Distance ft	Moment ft-#
HL Act Pres (ab water tbl)		739.4	2.17	1,602.0	Soil Over HL (ab. water tbl)	302.5	2.25	680.6
HL Act Pres (be water tbl)					Soil Over HL (bel. water tbl)		2.25	680.6
Hydrostatic Force					Water Table			
Buoyant Force	=				Sloped Soil Over Heel	=		
Surcharge over Heel	=	82.7	3.25	268.9	Surcharge Over Heel	= 20.0	2.25	45.0
Surcharge Over Toe	=				Adjacent Footing Load	=		
Adjacent Footing Load	=				Axial Dead Load on Stem	= 203.0	1.75	355.3
Added Lateral Load	=				* Axial Live Load on Stem	= 439.0	1.75	768.3
Load @ Stem Above Soil	=				Soil Over Toe	= 137.5	0.75	103.1
	=				Surcharge Over Toe	= 60.0	0.75	45.0
					Stem Weight(s)	= 675.0	1.75	1,181.3
					Earth @ Stem Transitions	=		
					Footing Weight	= 375.0	1.25	468.8
					Key Weight	=	2.00	
					Vert. Component	= 326.4	2.50	815.9
Total	=	822.1	**O.T.M.** =	1,870.8	**Total =**	2,099.4 lbs	**R.M.=**	3,694.9

Resisting/Overturning Ratio = **1.98**
Vertical Loads used for Soil Pressure = 2,538.4 lbs

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

Vertical component of active lateral soil pressure IS considered in the calculation of Sliding Resistance.

Vertical component of active lateral soil pressure IS considered in the calculation of Overturning Resistance.

Tilt

Horizontal Deflection at Top of Wall due to settlement of soil

(Deflection due to wall bending not considered)

Soil Spring Reaction Modulus	250.0	pci
Horizontal Defl @ Top of Wall (approximate only)	0.105	in

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

Cantilevered Retaining Wall

DESCRIPTION: Macintyre East Reatining Wall

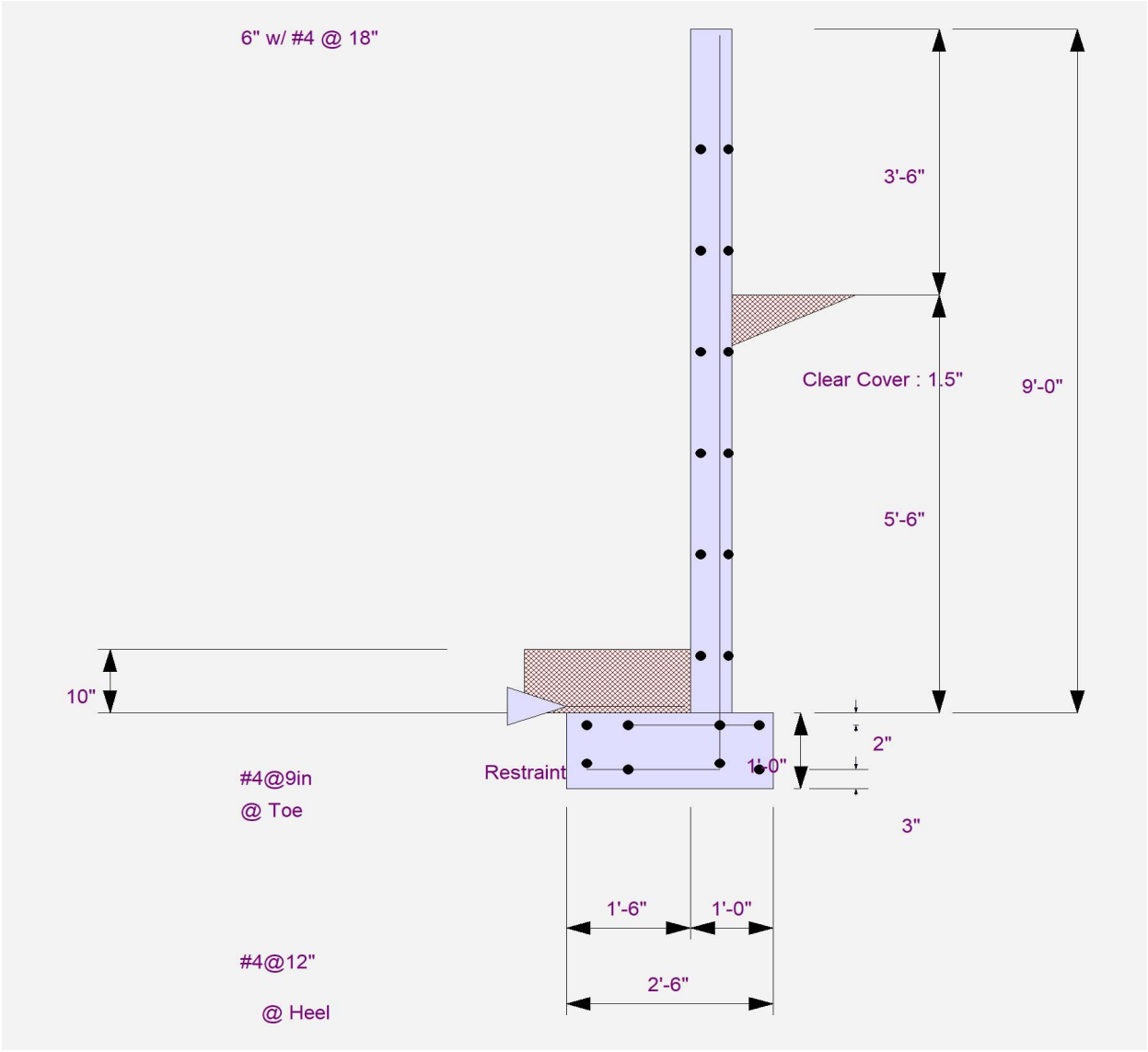
Rebar Lap & Embedment Lengths Information

Stem Design Segment: Bottom
Stem Design Height: 0.00 ft above top of footing

Lap Splice length for #4 bar specified in this stem design segment (25.4.2.3a) =	18.72 in
Development length for #4 bar specified in this stem design segment =	14.40 in
Hooked embedment length into footing for #4 bar specified in this stem design segment =	8.40 in
As Provided =	0.1333 in2/ft
As Required =	0.1403 in2/ft

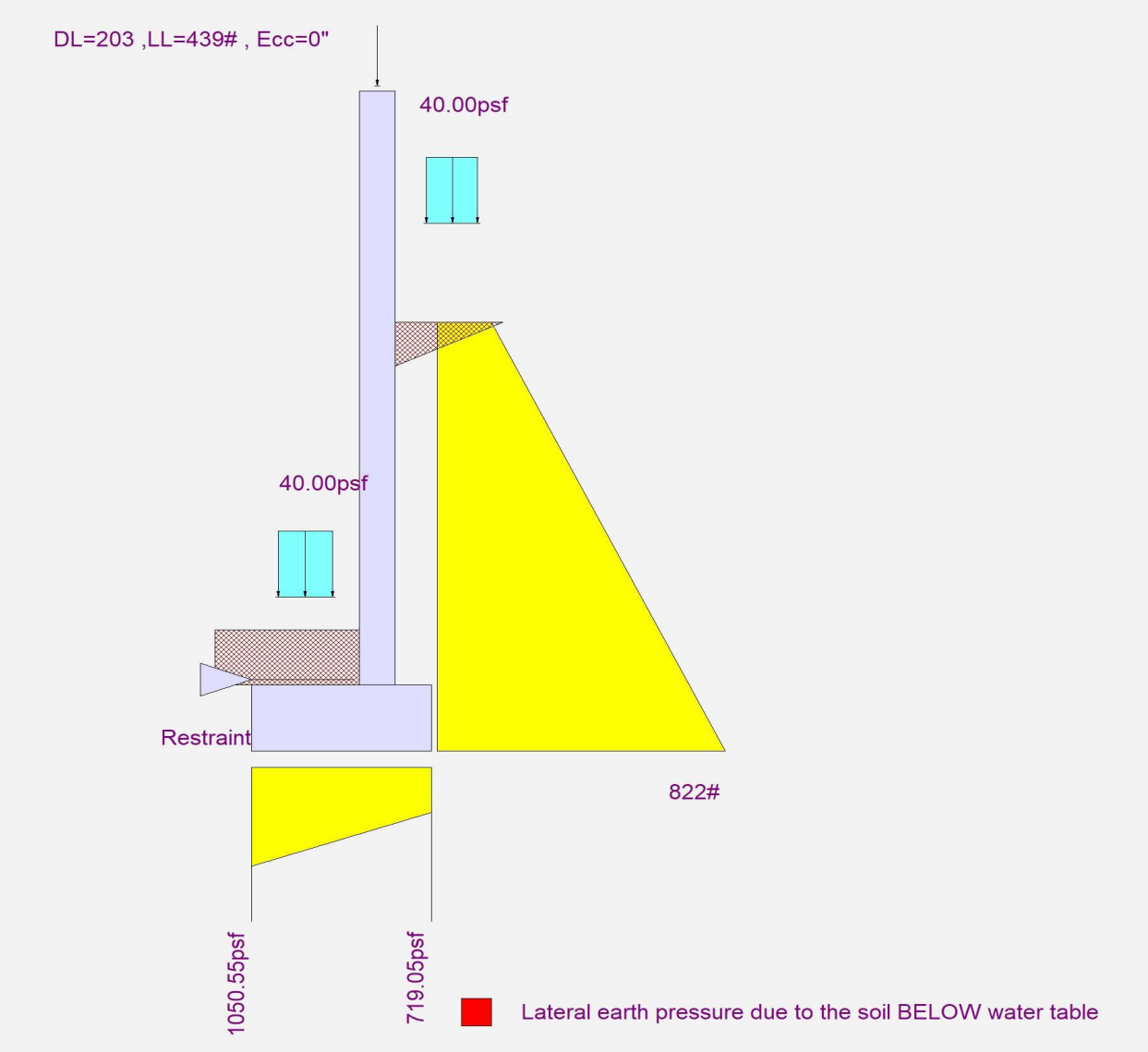
Cantilevered Retaining Wall

DESCRIPTION: Macintyre East Reatining Wall



Cantilevered Retaining Wall

DESCRIPTION: Macintyre East Reatining Wall



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

Macintyre

7520 Mercer Terrace Dr, Mercer Island, WA 98040, USA

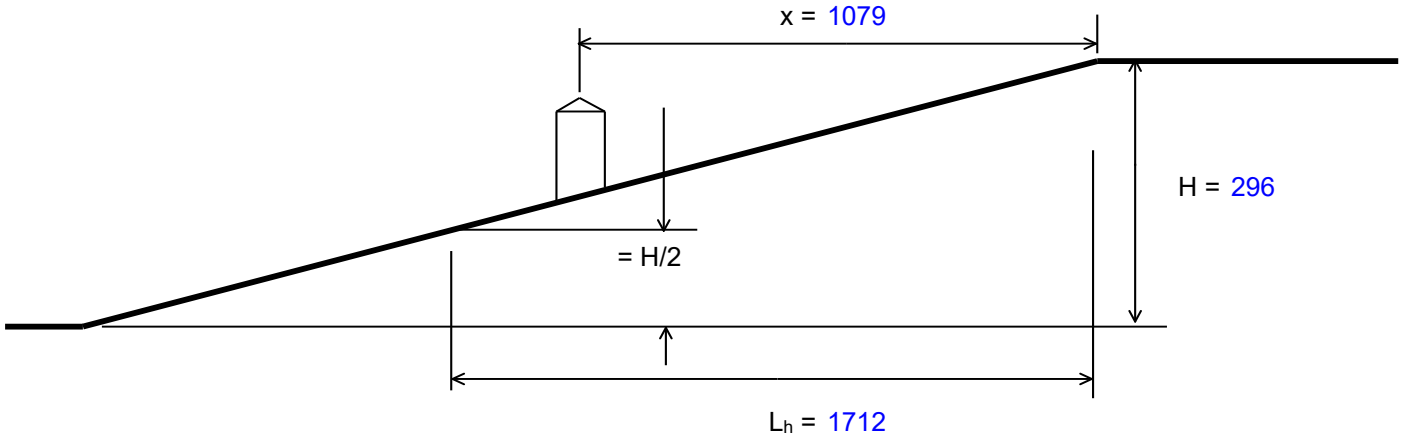
Latitude, Longitude: 47.53499, -122.2360069

Date	12/13/2023, 1:32:47 PM
Design Code Reference Document	ASCE7-16
Risk Category	II
Site Class	D - Default (See Section 11.4.3)

Type	Value	Description
S_S	1.472	MCE_R ground motion. (for 0.2 second period)
S_1	0.508	MCE_R ground motion. (for 1.0s period)
S_{MS}	1.767	Site-modified spectral acceleration value
S_{M1}	null -See Section 11.4.8	Site-modified spectral acceleration value
S_{DS}	1.178	Numeric seismic design value at 0.2 second SA
S_{D1}	null -See Section 11.4.8	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	null -See Section 11.4.8	Seismic design category
F_a	1.2	Site amplification factor at 0.2 second
F_v	null -See Section 11.4.8	Site amplification factor at 1.0 second
PGA	0.63	MCE_G peak ground acceleration
F_{PGA}	1.2	Site amplification factor at PGA
PGA_M	0.756	Site modified peak ground acceleration
T_L	6	Long-period transition period in seconds
SsRT	1.472	Probabilistic risk-targeted ground motion. (0.2 second)
SsUH	1.633	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	4.293	Factored deterministic acceleration value. (0.2 second)
S1RT	0.508	Probabilistic risk-targeted ground motion. (1.0 second)
S1UH	0.566	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S1D	1.636	Factored deterministic acceleration value. (1.0 second)

ASCE7-05, 6.5.7 Topographic Effects



Height above local ground z = 24 ft

Hill Shape: 2-dimensional escarpments

Direction: Upwind of Crest

Exposure C

Height of hill, H= 296 ft

Distance upwind of crest to where the difference in ground elevation is half the height of hill, L_h = 1712 ft

H/L_n = 0.17 < 0.2, Topographic Effects shall not be included

calculate K_1 by using H/L_n = 0.17

Distance from the crest to the building, x = 1079 ft x/L_h = 0.63

Figure 6-4, $K_1/(H/L_h)$ = 0.85 K_1 = 0.15

calculate K_2, K_3 by using L_n = 1712

$K_2 = 1 - x/\mu L_h$ μ = 1.5

K_2 = 0.58

$K_3 = e^{-\gamma z/L_h}$ γ = 2.5

K_3 = 0.97

$K_{zt} = [1 + K_1K_2K_3]^2$ (6-3)

K_{zt} = 1.17

John S. Apolis, P.E. **CSES, Inc.** Job number: **2023.102**
Project: **Macintyre** Date: 18-Dec-23
Designer: Page number: **L 1**

Lateral Loads Design per ASCE 7-16, Wind: Section 28 Seismic: Section 12

(Simplified Envelope Procedure Part 2) 2018 International Building Code (IBC)

WIND LOADS **110** mph Basic Wind Speed 2015 NDS

Ps = lambda * Kzt * Ps(30) * 0.6 Exposure **C** Roof Slope: **5.50** : 12 = 24.6

Least Horizontal Dimension, feet: **53** Mean Roof Ht, feet: **24** (degrees)

lambda = 1.34 a = 5.3 ft, 2a = 10.6 ft

Iw = 1.00 KzT = **1.00**

Tabulated Ps(30): (Refer to ASCE 7-16, Figure 28.6-1)	Zone	Tabulated Wind Pressure		Calc'd Design Pressure (*lambda*KzT*0.6)	Min Design Pressure
(horizontal)	A	24.3	psf	**19.5**	**19.5**
"	B	3.1	psf	**2.5**	**6.4**
"	C	17.4	psf	**14.0**	**14.0**
"	D	3.4	psf	**2.7**	**6.4**
(vertical)	E	-11.7	psf	**-9.4**	
"	F	-14.7	psf	**-11.8**	
"	G	-8.3	psf	**-6.7**	
"	H	-11.7	psf	**-9.4**	
(uplift on overhangs)	E(oh)	-20.8	psf	**-16.7**	
"	G(oh)	-17.6	psf	**-14.1**	

(Per section 28.6.4 minimum wind pressure is 16 PSF for zones A,C, and 8 PSF for zones B, D)

(Equivalent Lateral Force Procedure, Section 12.8)

SEISMIC LOADS Ie 1.0 R = 6.5 ASCE 7-16, Table 12.2.1

Seismic Parameters per ASCE 7-16) Group I Site Class: **D**

PGA (.2 sec) 1.472 Fa = 1.20 ASCE 7-16 Table 11.4-1

PGA (1 sec) 0.508 Fv = 1.50 ASCE 7-16 Table 11.4-2

Seismic Design Categories per ASCE 7-16 Tables 11.6-1, 11.6-2

Based on Sds: **D** Based on Sd1: **D**

PGA's based on peak ground accelerations per latest USGS Hazards Program (based on lat/lon).

Ss = 1.4720 Sms = Fa * Ss = 1.77 Equation 11.4-1

S1 = 0.5080 Sm1 = Fv * S1 = 0.76 Equation 11.4-2

Equations 11.4-3, 11.4-4 Sds = 2/3 * Sms = 1.18 Sd1 = 2/3 * Sm1 = 0.51

Equation 12.14-11 Cs (or %V) = (Sds / (R/I)) = 0.181 **Building period < 0.5 s per IBC eq 12.8-7**

Base Shear = %V * W * 0.7 = 5.83 psf, uniformly distributed over floor area

(0.7 reduction factor per ASCE 7-16, Section 2.4.1, Eq 5) (seismic vertical distribution per IBC eqs 12.8-11 & 12)

Base = top of foundation	Roof or Floor DL (psf)	Wall DL (psf) dist. over floor area	Story Height Above Base (ft)	Lateral Load (psf)
Top Framing	**12**	**12**	**17.5**	**3.96**
Upper Floor	**12**	**10**	**9**	**1.87**
Lower Floor				
Total Seismic DL:	**46**		Sum	**5.83**

WALL ALONG GRIDLINE "B":

ROOF: $L_{TOTAL} = 13.5'$, $(L_{TOTAL} - L_{OPENING}) = 13.5' - 6' = 7.5'$

$P_W = (66.7ft^2)(6.4psf) + (94.66ft^2/2)(14psf) +$
$(16')(9.33')(6.4psf) + (1.5'/2)(16')(14psf) = 2213\#$

$P_E = (4.06psf)(196ft^2 + (1567ft^2/2) + (1017\#/2)) = 6064\#$

$V = 6064\#/7.5' = 806plf < 910plf$ SW5

$UPLIFT = \frac{6064\#}{13.5'} \times 8' = 3594\# < 4690\#$ CMSTC16
$< 4340\#$ HDU5

MAIN FLOOR: L = 12.5' + 3.5' = 16'

$P_W = (9'/2)((32'/2) + (26'/2))(14psf) + (9'/2)(26'/2)(14psf) +$
$(1.5'/2)(32'/2)(14psf) + 2213\# = 5027\#$

$P_E = 6064\# + (1.77psf)((924ft^2 + 1400ft^2)/2) = 8121$

$ARF = 1.25 - .125(9/3.5) = 0.929$

$V =$ 8121# / 16' = 508 plf

$V/ARF =$ 546 plf $< 710plf$ SW3X

$UPLIFT =$ 508 plf x 9' = 4572 # $< 5645\#$ HDU5 w/ DF#2 4x4 Post

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FORTEWEB

MEMBER REPORT

PASSED
L2b

Main, Main Floor Post Supporting roof beam and used in Shear Wall
1 piece(s) 4 x 6 DF No.2

Post Height: 9'

Design Results	Actual	Allowed	Result	LDF	Load: Combination
Slenderness	31	50	Passed (62%)	--	--
Compression (lbs)	4115	9178	Passed (45%)	1.60	1.0 D + 0.7 E
Base Bearing (lbs)	4115	7796	Passed (53%)	--	1.0 D + 0.7 E
Bending/Compression	0.43	1	Passed (43%)	1.25	1.0 D + 1.0 Lr

- Input axial load eccentricity for this design is 16.67% of applicable member side dimension.
- Applicable calculations are based on NDS.

Supports	Type	Material
Base	Plate	Hem Fir

Max Unbraced Length	Comments
Full Member Length	No bracing assumed.

Member Type : Free Standing Post
Building Code : IBC 2018
Design Methodology : ASD

Drawing is Conceptual

Vertical Load	Dead (0.90)	Floor Live (1.00)	Roof Live (non-snow: 1.25)	Seismic (1.60)	Comments
1 - Point (lb)	915	184	3000	4572	Default Load

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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
Demetri Dalas CSES (425) 736-3569 demetri@cses-engineering.com	

Weyerhaeuser

1/26/2024 8:35:23 PM UTC
ForteWEB v3.6, Engine: V8.3.1.5, Data: V8.1.4.1
File Name: Macintyre 2023.102

SOUTH WALL:

ROOF: L = 10.25'

$P_W = (71ft^2)(6.4psf) + (14.66ft^2/2)(19.5psf) = 1397\#$

$P_E = (4.06psf)((1567ft^2/2) + 196ft^2) = 3977\#$

$V = 3977\#/10.25' = 388plf < 550plf$ SW3

$V_{ALEFT} = 388plf \times 7.75' = 3007\# < 4348\#$ HDU5

$< 4690\#$ CMST16

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WEST WALL:

ROOF: $L_{TOTAL} = 11.75'$, $L_{WITHOUT\ OPENINGS} = 11.75' - 3' = 8.75'$

$P_W = (6.4psf)(24ft^2/2) + (19.5psf)(9'/2)(10.6') + (14psf)(9'/2)(16' - 10.6') = 2042\#$

$P_E = (4.06psf)(110ft^2 + 1057ft^2/2) = 2592\#$

$V = 2592\# / 8.75' = 296plf < 350plf$ SW2

$U_{PLYFT} = \left(\frac{2592\#}{11.75'}\right) \times 9' = 1985\# < 4690$ CMSTC16

MAIN: $L = 6.75'$

$P_W = 2042\# + 9' \times [(19.5psf)(10.6') + (14psf)(5.4')] = 4583\#$

$P_E = 2592\# + (1.77psf)(840ft^2/2) = 3335\#$

$V = 4583\# / 6.75' = 679plf < 710plf$ SW3X

$U_{PLYFT} = 679plf \times 7.75' = 5262\# < 5695\#$ HDU5 w/ DFHZ 4x4 POST

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EAST WALL:

ROOF: $L = 4.25'$

$P_W = (6.9\,psf)(157\,ft^2/2) + (19.5\,psf)(9'/2)(10.6') = 1433^{\#}$

$P_E = (4.06\,psf)(110\,ft^2 + (700\,ft^2/2)) = 1868^{\#}$

$V = 1868^{\#}/4.25' = 440\,plf < 550\,plf$ SW3

$U_{PLIFT} = 440\,plf \times 7.75' = 3406^{\#} < 4340^{\#}$ HDU5

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INTERIOR SHEAR WALL:

ROOF: L = 8'

$P_W = (6.4psf)(397ft^2/2) + [(32'/2)(9'/2) + (21.5'/2)(9'/2)] \times (14psf) = 2956^{\#}$

$P_I = (14.06psf)(175ft^2/2) = 3555^{\#}$

$V = 3555^{\#}/8' = 444plf < 550plf$ SW3

$UPLIFT = 444plf \times 7.75' = 3444^{\#} < 4690^{\#}$ CMSTC16

MAIN: L = 8'

$P_W = 2956^{\#} + (9')(14psf)((32'/2) + (21.5'/2)) = 6327^{\#}$

$P_E = (1.71psf)(1400psf/2) + 3444^{\#} = 4683^{\#}$

$V = 6327^{\#}/18' = 791plf < 910plf$ SW5

$UPLIFT = 791plf \times 7.75' = 6129^{\#} < 6580^{\#}$ HDU8 W/ (3) STUD POST

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NORTH WALL: L = 9'

$P_W = (6.4psf)(32'/2)(9.5') + (9'/2)[(10.6')(19.5psf) + (5.4')(14psf)] = 2243\#$

$P_E = (4.06psf)(1017ft^2/2) = 2065\#$

$V = 2243\#/9' = 249$ plf $< 350plf$ SW2

V_{PLYFT} = 249 plf x 15' = 3738 # < 4340 # => HDU5

STRUCTURE 1 EAST WALL: L = 8.25'

$P_W = (14.375')(9' + 9'/2)(14psf) + (117ft^2)(6.4psf) = 3466\#$

$P_E = (4.06psf)(1017ft^2/2) + (5.8psf)(740ft^2/2) = 4222\#$

$V = 4222\#/8.75' = 512plf < 550plf$ SW3

$V_{PLYFT} = 512plf \times 7.75' = 3966\# < 4340\#$ HDU5

STRUCTURE 1 WEST WALL:

$L_f = 130''$, $L_i = 126''$ } $L_f > L_i \Rightarrow$ NO LATERAL DESIGN NEEDED FOR THIS WALL.

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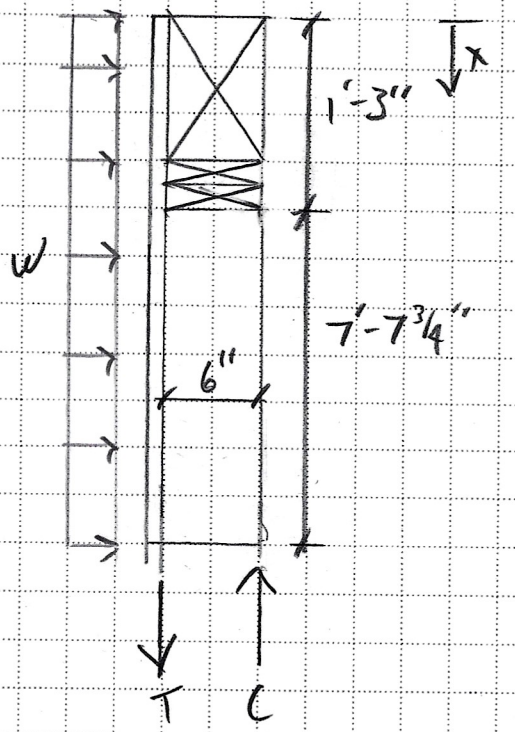
EAST WALL CONNECTION DESIGN:

$w = \frac{8.25'}{2} \times 14 psf = 58 plf$



$M_x = \frac{wx}{2}(\ell - x)$

$M(1') = \frac{58 \times 1}{2}(8.9' - 1')$

$M(1') = 229 \text{ ft-lb}$

$T = C = 229 \text{ ft-lb} / (6")$

$= 458\#$

$\frac{458\#}{ft.} \times 1.33' = 611\#$

0.131" ϕ 8d COMMON WIRE NAIL $V = 73\#$

$73\# \times 17 = 1241\# > 611\#$ ✓OK

USE 8d COMMON WIRE NAIL @ 6" O.C. ALONG EACH STUD IN INDICATED WALL

$1705\# > 611\#$ ✓OK

⇒ USE CS16 @ EACH STUD TO ATTACH BEAMS TO STUD

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