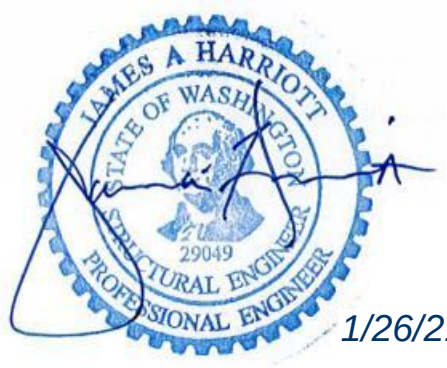
Harriott Valentine Engineers Inc.

STRUCTURAL CALCULATIONS

Project:
Vanderwall Residence
7179 Holly Hill Drive
Mercer Island, WA 98040

Architect:
Conard Romano Architects
518 28th Avenue East
Seattle, WA 98112

Structural Engineer:
Harriott Valentine Engineers, Inc.
1932 First Avenue, Suite 720
Seattle, WA 98101
tel. 206-624-4760



1/26/21

SECTION 1: GENERAL

1932 First Avenue, Suite 720
Seattle, Washington 98101-2447
tel. 206-624-4760 | fax 447-6971

Vanderwall

7179 Holly Hill Dr, Mercer Island, WA 98040, USA

Latitude, Longitude: 47.5386476, -122.243156

Date	10/9/2020, 12:32:27 PM
Design Code Reference Document	ASCE7-10
Risk Category	II
Site Class	D - Stiff Soil

Type	Value	Description
S_S	1.472	MCE_R ground motion. (for 0.2 second period)
S_1	0.563	MCE_R ground motion. (for 1.0s period)
S_{MS}	1.472	Site-modified spectral acceleration value
S_{M1}	0.844	Site-modified spectral acceleration value
S_{DS}	0.981	Numeric seismic design value at 0.2 second SA
S_{D1}	0.563	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	D	Seismic design category
F_a	1	Site amplification factor at 0.2 second
F_v	1.5	Site amplification factor at 1.0 second
PGA	0.613	MCE_G peak ground acceleration
F_{PGA}	1	Site amplification factor at PGA
PGA_M	0.613	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	1.559	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	3.624	Factored deterministic acceleration value. (0.2 second)
S1RT	0.563	Probabilistic risk-targeted ground motion. (1.0 second)
S1UH	0.608	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S1D	1.306	Factored deterministic acceleration value. (1.0 second)
PGAd	1.37	Factored deterministic acceleration value. (Peak Ground Acceleration)
C_{RS}	0.944	Mapped value of the risk coefficient at short periods

Type	Value	Description
C_{R1}	0.925	Mapped value of the risk coefficient at a period of 1 s

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SECTION 2: FRAMING

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Harriott Valentine Engineers Inc.

CRITERIA

FRAMING- Original House built 1967

roof	dead	cedar shingles+ battens	2.5	live snow	25.0	psf
		1/2" plywood	1.5			
		2x8 @ 24"oc-rafter	1.5			
		2x8 @ 24"oc-ceiling	1.5			
		R38 insulation	1.4			
		5/8" gyp. wallboard	2.8			
		slope factor	0.7			
		miscellaneous	2.1 15%			
			14.0 psf			
	total	dead + live	39.0 psf			
deck (NEW)	dead	pavers, pedestals, waterrproof	30.0	live deck	60.0	psf
		3/4" plywood	2.3			
		11-7/8" TJI 230 @ 16"oc	2.3			
		1/2" plywood	1.5			
		finish soffit sheathing	1.1			
	total	miscellaneous	2.8 7%			
			40.0 psf			
	dead	dead + live	100.0 psf			
main floor		3/8" tile + thinset mortar	6.7	live residential	40.0	psf
		3/4" plywood	2.3			
		2x10 @ 16"oc	2.8			
		acoustic insulation	0.8			
		1/2" gyp. wallboard	2.2			
	total	miscellaneous	3.2 18%			
			18.0 psf			
		dead + live	58.0 psf			
walls		3/4" cedar bevel siding	1.4			
		1/2" plywood	1.5			
		2x4 @ 16"oc	1.1			
		R21 insulation	0.8			
		1/2" gyp. wallboard	2.2			
		miscellaneous	1.0 13%			
			8.0 psf			

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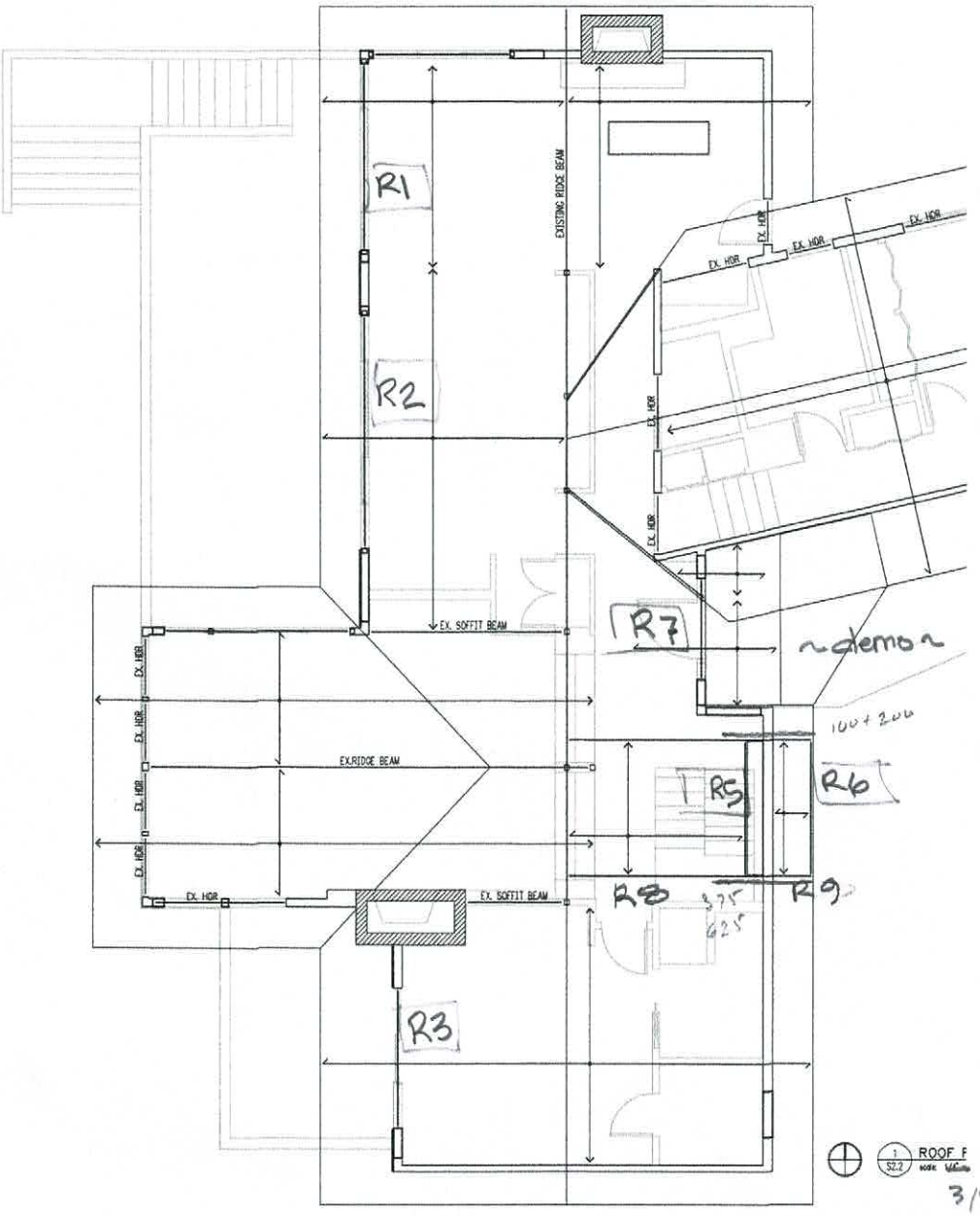
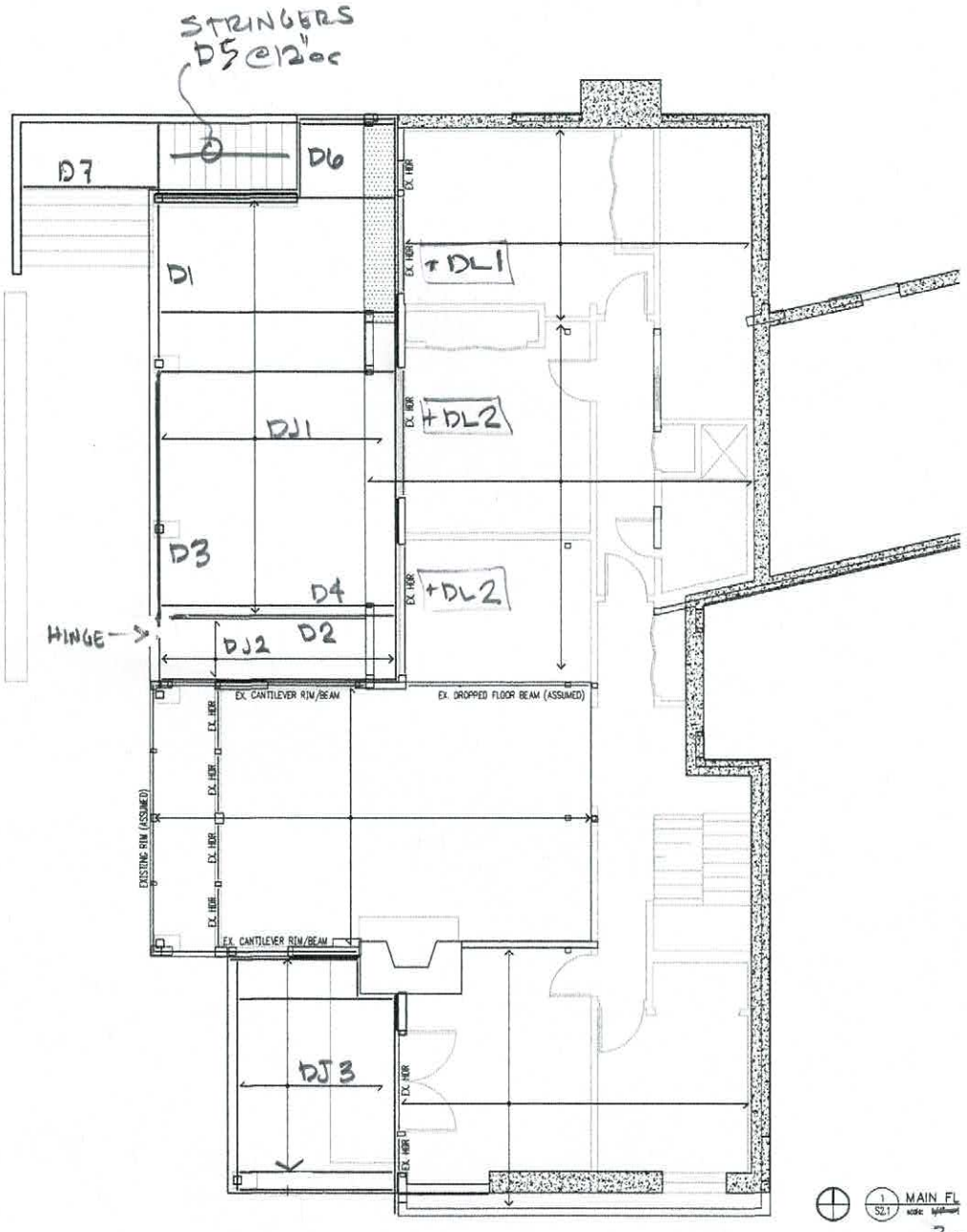


1/S2.2 ROOF F

3/32" = 1'-0"

VANDERWALL
ROOF BEAMS



1 / S2.1 MAIN FL

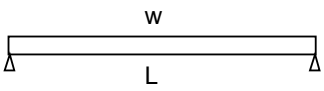
3/32" = 1'-0"

VANDERWALL

FLOOR / DECK BEAMS

BEAMS (SIMPLE SPAN UNIFORM LOAD)

ROOF-EXISTING FRAMING



(ceiling)
total floor = 27 psf
live load = 20 psf

(roof-rafter w/o ceiling)
total roof = 34 psf
snow load = 25 psf

location	criteria		demand		capacity		
xRidge max span	w (total) =	408 plf	V =	2.60 k	Vr =	5.43 k	
	w (live) =	300 plf	M =	8.29 k-ft	Mr =	8.49 k-ft	
	L =	12.75 ft	EI (total) =	3.81E+08 lb-in2	EI =	7.06E+08 lb-in2	
	floor =	0.00 ft	EI (live) =	4.20E+08 lb-in2	d (total) =	0.34 in = L/	445
	roof =	12.00 ft			d (live) =	0.25 in = L/	606
	wall =	0.00 ft					
					existing DF#1 or Btr	**DF 4x12**	

location	criteria		demand		capacity		
xRafter	w (total) =	68 plf	V =	0.41 k	Vr =	1.25 k	
	w (live) =	50 plf	M =	1.22 k-ft	Mr =	1.45 k-ft	
	L =	12.00 ft	EI (total) =	5.29E+07 lb-in2	EI =	8.57E+07 lb-in2	
	floor =	0.00 ft	EI (live) =	5.83E+07 lb-in2	d (total) =	0.37 in = L/	389
	roof =	2.00 ft			d (live) =	0.27 in = L/	529
	wall =	0.00 ft					
					existing DF#1	**DF 2x8**	

location	criteria		demand		capacity		
xCeiling	w (total) =	54 plf	V =	0.43 k	Vr =	1.25 k	
	w (live) =	40 plf	M =	1.73 k-ft	Mr =	1.45 k-ft	
	L =	16.00 ft	EI (total) =	9.95E+07 lb-in2	EI =	8.57E+07 lb-in2	
	floor =	2.00 ft	EI (live) =	1.11E+08 lb-in2	d (total) =	0.93 in = L/	207
	roof =	0.00 ft			d (live) =	0.69 in = L/	279
	wall =	0.00 ft					
					existing DF#1	**DF 2x8**	

location	criteria		demand		capacity		
xRoof Header	w (total) =	204 plf	V =	0.51 k	Vr =	1.90 k	
	w (live) =	150 plf	M =	0.64 k-ft	Mr =	1.84 k-ft	
	L =	5.00 ft	EI (total) =	1.15E+07 lb-in2	EI =	5.41E+07 lb-in2	
	floor =	0.00 ft	EI (live) =	1.27E+07 lb-in2	d (total) =	0.05 in = L/	1132
	roof =	6.00 ft			d (live) =	0.04 in = L/	1539
	wall =	0.00 ft					
					use	**(2)2x6**	

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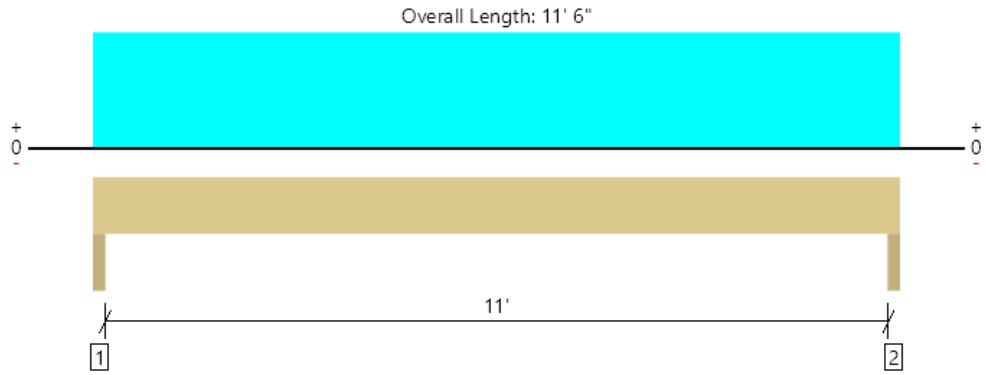
Roof Resupport			
Member Name	Results	Current Solution	Comments
Roof: Drop Beam-R1 Header	Passed	1 piece(s) 3 1/2" x 9 1/4" 2.0E Parallam® PSL	
Roof: Drop Beam-R2 Header	Passed	1 piece(s) 5 1/4" x 9 1/4" 2.0E Parallam® PSL	
Roof: Drop Beam-R3 Header	Passed	1 piece(s) 4 x 8 Hem-Fir No. 1	
Roof: Drop Beam-R4 Header	Passed	1 piece(s) 4 x 10 Hem-Fir No. 1	
Roof: Flush Beam-R5 SKYLIGHT HDR	Passed	2 piece(s) 2 x 8 Hem-Fir No. 2	
Roof: Flush Beam-R6 STR. RIM AT OH	Passed	1 piece(s) 4 x 4 Hem-Fir No. 2	
Roof: Drop Beam-R7 Header	Passed	1 piece(s) 4 x 8 Hem-Fir No. 1	
Roof: Flush Beam-R8	Passed	2 piece(s) 2 x 8 Hem-Fir No. 2	
Roof: Flush Beam-R9	Passed	1 piece(s) 1 3/4" x 5 1/2" 2.0E Microllam® LVL	
Level-Deck			
Member Name	Results	Current Solution	Comments
Floor: Joist-DJ1	Passed	1 piece(s) 11 7/8" TJI® 210 @ 16" OC	
Floor: Joist-DJ2	Passed	1 piece(s) 2 x 4 Hem-Fir No. 2 @ 16" OC	
Floor: Joist-DJ3	Passed	1 piece(s) 11 7/8" TJI® 210 @ 16" OC	
Floor: Flush Beam-D1	Passed	1 piece(s) 5 1/4" x 11 7/8" 2.0E Parallam® PSL	
Floor: Flush Beam-D2 AT STEP	Passed	1 piece(s) 3 1/2" x 11 7/8" 2.0E Parallam® PSL	
Floor: Flush Beam-D3	Passed	1 piece(s) 5 1/4" x 11 7/8" 2.0E Parallam® PSL	
Floor: Flush Beam-D4 at HD straps	Failed	1 piece(s) 3 1/2" x 11 7/8" 2.0E Parallam® PSL	An excessive uplift of -3588 lbs at support located at 14' 8" failed this product.
Floor: Drop Beam-D5 stringers	Passed	1 piece(s) 4 x 6 Hem-Fir No. 2	
Floor: Flush Beam-D6	Passed	1 piece(s) 4 x 12 Hem-Fir No. 2	
Floor: Flush Beam-D7	Passed	1 piece(s) 4 x 12 Hem-Fir No. 2	
Floor: Drop Beam-DL1-ledger span openings	Passed	1 piece(s) 3 1/2" x 9 1/4" 2.0E Parallam® PSL	
Floor: Drop Beam-DL2-ledger span openings	Passed	2 piece(s) 1 3/4" x 7 1/4" 2.0E Microllam® LVL	
Floor: Drop Beam-REPLACE Hdrs	Passed	1 piece(s) 3 1/2" x 9 1/4" 2.0E Parallam® PSL	

ForteWEB Software Operator	Job Notes
Kathryn Warner Harriott Valentine Engineers (206) 624-4760 kwarner@harriottvalentine.com	

Weyerhaeuser

Roof Resupport, Roof: Drop Beam-R1 Header

1 piece(s) 3 1/2" x 9 1/4" 2.0E Parallam® PSL



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)	2188 @ 1 1/2"	6563 (3.00")	Passed (33%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	1800 @ 1' 1/4"	7198	Passed (25%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	6021 @ 5' 9"	14278	Passed (42%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.199 @ 5' 9"	0.563	Passed (L/679)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.319 @ 5' 9"	0.750	Passed (L/424)	--	1.0 D + 1.0 S (All Spans)

- Deflection criteria: LL (L/240) and TL (L/180).

System : Roof
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD
Member Pitch : 0/12

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Trimmer - HF	3.00"	3.00"	1.50"	823	1366	2189	None
2 - Trimmer - HF	3.00"	3.00"	1.50"	823	1366	2189	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	Continuous	
Bottom Edge (Lu)	End Bearing Points	

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 11' 6"	N/A	10.1	--	
1 - Uniform (PSF)	0 to 11' 6" (Top)	9' 6"	14.0	25.0	Default Load

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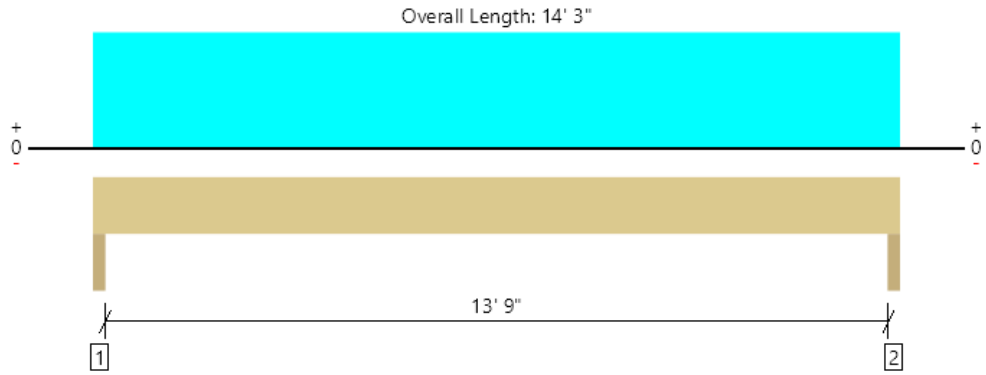
The product application, input design loads, dimensions and support information have been provided by K.Warner

Roof Resupport, Roof: Drop Beam-R2 Header

1 piece(s) 5 1/4" x 9 1/4" 2.0E Parallam® PSL



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)	2748 @ 1 1/2"	9844 (3.00")	Passed (28%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	2354 @ 1' 1/4"	10797	Passed (22%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	9449 @ 7' 1 1/2"	21417	Passed (44%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.310 @ 7' 1 1/2"	0.700	Passed (L/542)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.504 @ 7' 1 1/2"	0.933	Passed (L/333)	--	1.0 D + 1.0 S (All Spans)

System : Roof
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD
Member Pitch : 0/12

- Deflection criteria: LL (L/240) and TL (L/180).

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Trimmer - HF	3.00"	3.00"	1.50"	1056	1692	2748	None
2 - Trimmer - HF	3.00"	3.00"	1.50"	1056	1692	2748	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	Continuous	
Bottom Edge (Lu)	End Bearing Points	

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 14' 3"	N/A	15.2	--	
1 - Uniform (PSF)	0 to 14' 3" (Top)	9' 6"	14.0	25.0	Default Load

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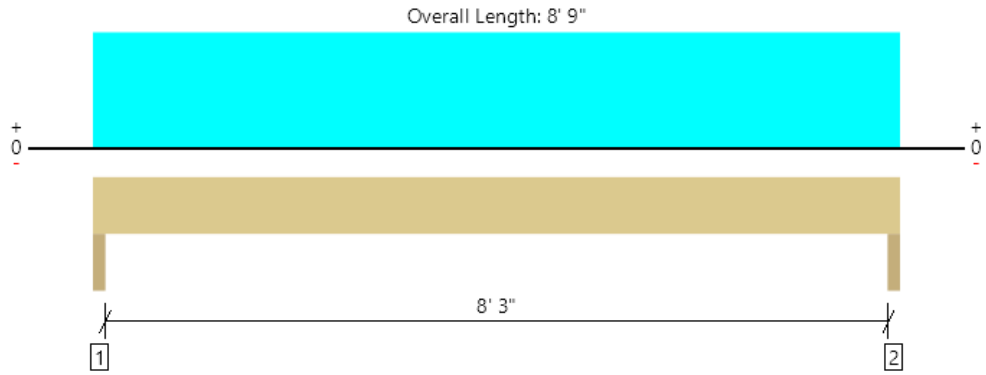
The product application, input design loads, dimensions and support information have been provided by K.Warner

Roof Resupport, Roof: Drop Beam-R3 Header
1 piece(s) 4 x 8 Hem-Fir No. 1



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)	1649 @ 1 1/2"	4253 (3.00")	Passed (39%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	1327 @ 10 1/4"	2918	Passed (45%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	3404 @ 4' 4 1/2"	3724	Passed (91%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.167 @ 4' 4 1/2"	0.425	Passed (L/610)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.266 @ 4' 4 1/2"	0.567	Passed (L/384)	--	1.0 D + 1.0 S (All Spans)

System : Roof
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD
Member Pitch : 0/12

- Deflection criteria: LL (L/240) and TL (L/180).
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Trimmer - HF	3.00"	3.00"	1.50"	610	1039	1649	None
2 - Trimmer - HF	3.00"	3.00"	1.50"	610	1039	1649	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	Continuous	
Bottom Edge (Lu)	End Bearing Points	

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 8' 9"	N/A	6.4	--	
1 - Uniform (PSF)	0 to 8' 9" (Top)	9' 6"	14.0	25.0	Default Load

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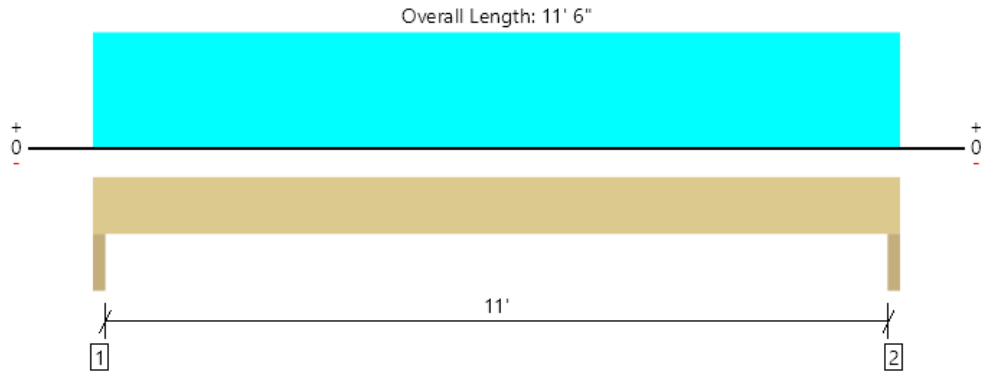
Roof Resupport, Roof: Drop Beam-R4 Header
1 piece(s) 4 x 10 Hem-Fir No. 1



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Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1505 @ 1 1/2"	4253 (3.00")	Passed (35%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	1238 @ 1' 1/4"	3723	Passed (33%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	4140 @ 5' 9"	5596	Passed (74%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.169 @ 5' 9"	0.563	Passed (L/798)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.272 @ 5' 9"	0.750	Passed (L/496)	--	1.0 D + 1.0 S (All Spans)

System : Roof
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD
Member Pitch : 0/12

- Deflection criteria: LL (L/240) and TL (L/180).
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Trimmer - HF	3.00"	3.00"	1.50"	570	934	1504	None
2 - Trimmer - HF	3.00"	3.00"	1.50"	570	934	1504	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	Continuous	
Bottom Edge (Lu)	End Bearing Points	

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 11' 6"	N/A	8.2	--	
1 - Uniform (PSF)	0 to 11' 6" (Top)	6' 6"	14.0	25.0	Default Load

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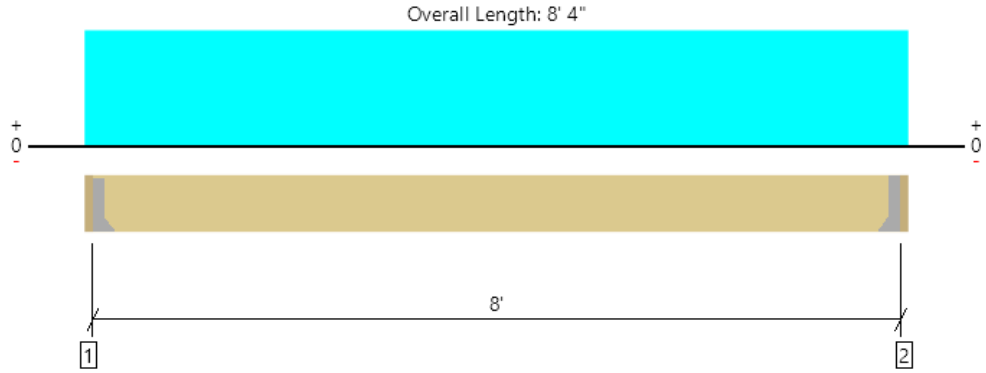
The product application, input design loads, dimensions and support information have been provided by K.Warner

Roof Resupport, Roof: Flush Beam-R5 SKYLIGHT HDR
2 piece(s) 2 x 8 Hem-Fir No. 2



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)	958 @ 2"	1823 (1.50")	Passed (53%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	813 @ 9 1/4"	2501	Passed (33%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	1916 @ 4' 2"	2569	Passed (75%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.112 @ 4' 2"	0.400	Passed (L/860)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.178 @ 4' 2"	0.533	Passed (L/539)	--	1.0 D + 1.0 S (All Spans)

System : Roof
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD
Member Pitch : 0/12

- Deflection criteria: LL (L/240) and TL (L/180).
- 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	Snow	Total	
1 - Hanger on 7 1/4" HF beam	2.00"	Hanger[1]	1.50"	372	625	997	See note [1]
2 - Hanger on 7 1/4" HF beam	2.00"	Hanger[1]	1.50"	372	625	997	See note [1]

- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- [1] See Connector grid below for additional information and/or requirements.

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

•Maximum allowable bracing intervals based on applied load.

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

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

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	2" to 8' 2"	N/A	5.5	--	
1 - Uniform (PSF)	0 to 8' 4" (Front)	6'	14.0	25.0	Default Load

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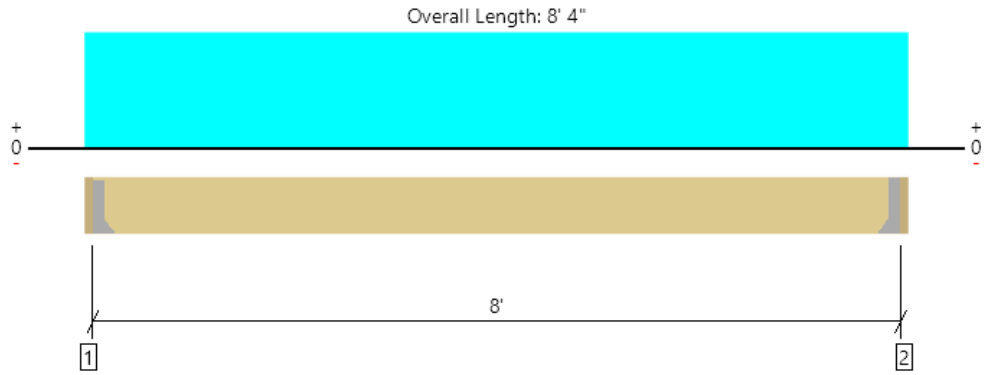
The product application, input design loads, dimensions and support information have been provided by K.Warner

ForteWEB Software Operator	Job Notes
Kathryn Warner Harriott Valentine Engineers (206) 624-4760 kwarner@harriottvalentine.com	

Weyerhaeuser

Roof Resupport, Roof: Flush Beam-R6 STR. RIM AT OH

1 piece(s) 4 x 4 Hem-Fir No. 2



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)	246 @ 2"	2126 (1.50")	Passed (12%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	228 @ 5 1/2"	1409	Passed (16%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	493 @ 4' 2"	873	Passed (56%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.213 @ 4' 2"	0.400	Passed (L/452)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.349 @ 4' 2"	0.533	Passed (L/275)	--	1.0 D + 1.0 S (All Spans)

System : Roof
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD
Member Pitch : 0/12

- Deflection criteria: LL (L/240) and TL (L/180).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- Applicable calculations are based on NDS.
- This product has a square cross section. The analysis engine has checked both edge and plank orientations to allow for either installation.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Hanger on 3 1/2" HF beam	2.00"	Hanger[1]	1.50"	100	156	256	See note [1]
2 - Hanger on 3 1/2" HF beam	2.00"	Hanger[1]	1.50"	100	156	256	See note [1]

- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- [1] See Connector grid below for additional information and/or requirements.

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

•Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
1 - Face Mount Hanger	HUC44	2.50"	N/A	4-10dx1.5	2-10d	
2 - Face Mount Hanger	HUC44	2.50"	N/A	4-10dx1.5	2-10d	

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

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	2" to 8' 2"	N/A	3.1	--	
1 - Uniform (PSF)	0 to 8' 4" (Front)	1' 6"	14.0	25.0	Default Load

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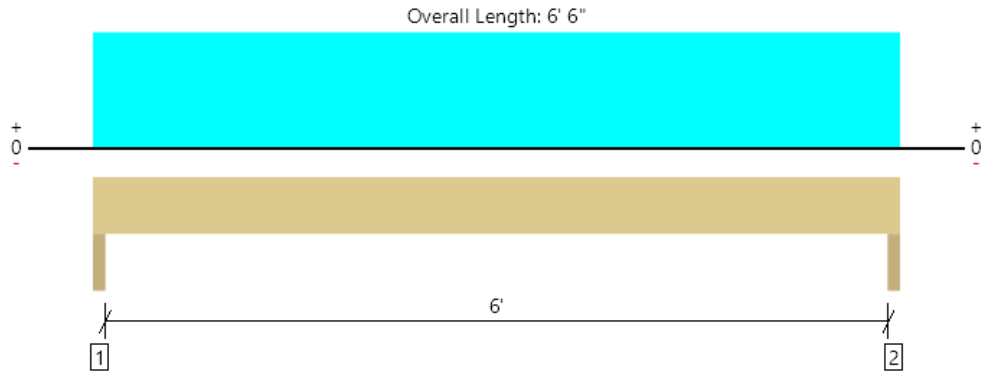
The product application, input design loads, dimensions and support information have been provided by K.Warner

ForteWEB Software Operator	Job Notes
Kathryn Warner Harriott Valentine Engineers (206) 624-4760 kwarner@harriottvalentine.com	

Weyerhaeuser

Roof Resupport, Roof: Drop Beam-R7 Header
1 piece(s) 4 x 8 Hem-Fir No. 1



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)	1035 @ 1 1/2"	4253 (3.00")	Passed (24%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	763 @ 10 1/4"	2918	Passed (26%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	1555 @ 3' 3"	3724	Passed (42%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.041 @ 3' 3"	0.313	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.066 @ 3' 3"	0.417	Passed (L/999+)	--	1.0 D + 1.0 S (All Spans)

System : Roof
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD
Member Pitch : 0/12

- Deflection criteria: LL (L/240) and TL (L/180).
- Applicable calculations are based on NDS.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Trimmer - HF	3.00"	3.00"	1.50"	385	650	1035	None
2 - Trimmer - HF	3.00"	3.00"	1.50"	385	650	1035	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	Continuous	
Bottom Edge (Lu)	End Bearing Points	

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 6' 6"	N/A	6.4	--	
1 - Uniform (PSF)	0 to 6' 6" (Top)	8'	14.0	25.0	Default Load

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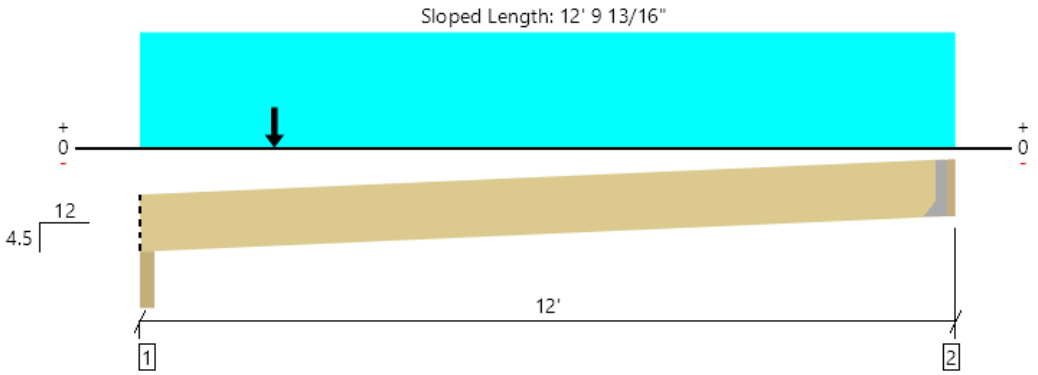
The product application, input design loads, dimensions and support information have been provided by K.Warner

Roof Resupport, Roof: Flush Beam-R8

2 piece(s) 2 x 8 Hem-Fir No. 2



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

Member Length : 12' 10 3/8"

System : Roof
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD
Member Pitch : 4.5/12

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	1082 @ 2"	4253 (3.50")	Passed (25%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	1042 @ 10 5/16"	2501	Passed (42%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	1906 @ 2' 9 13/16"	2569	Passed (74%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.248 @ 5' 6 5/16"	0.415	Passed (L/603)	--	1.0 D + 1.0 S (All Spans)
Total Load Defl. (in)	0.411 @ 5' 6 13/16"	0.623	Passed (L/364)	--	1.0 D + 1.0 S (All Spans)

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

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Beveled Plate - HF	3.50"	3.50"	1.50"	405	677	1082	Blocking
2 - Hanger on 7 1/4" HF beam	2.00"	Hanger[1]	1.50"	181	248	429	See note [1]

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	12' 8" o/c	
Bottom Edge (Lu)	12' 8" o/c	

•Maximum allowable bracing intervals based on applied load.

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

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

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 11' 10"	N/A	5.5	--	
1 - Uniform (PSF)	0 to 12'	1'	15.0	25.0	parallel roof
2 - Point (lb)	2'	N/A	325	625	R5

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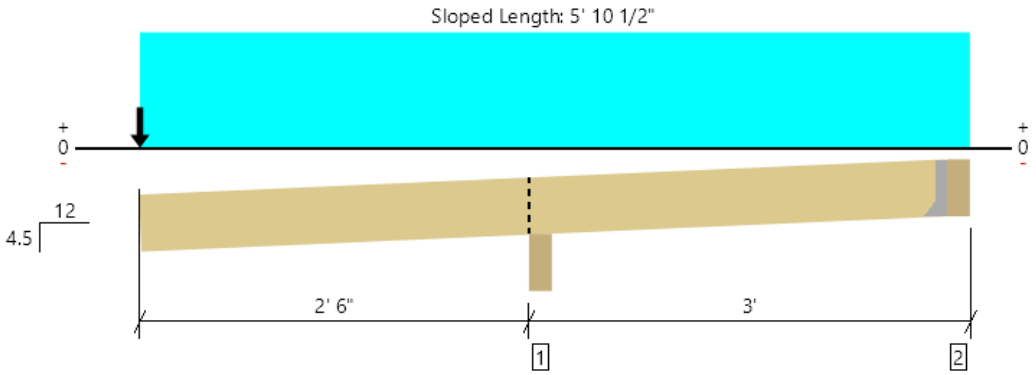
The product application, input design loads, dimensions and support information have been provided by K.Warner

ForteWEB Software Operator	Job Notes
Kathryn Warner Harriott Valentine Engineers (206) 624-4760 kwarner@harriottvalentine.com	

Weyerhaeuser

Roof Resupport, Roof: Flush Beam-R9

1 piece(s) 1 3/4" x 5 1/2" 2.0E Microllam® LVL



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

Member Length : 5' 6 11/16"

System : Roof
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD
Member Pitch : 4.5/12

Design Results	Actual @ Location	Allowed	Result	LDF	Load: Combination (Pattern)
Member Reaction (lbs)	896 @ 2' 8 3/4"	4163 (5.50")	Passed (22%)	--	1.0 D + 1.0 S (All Spans)
Shear (lbs)	447 @ 3' 4 5/8"	2103	Passed (21%)	1.15	1.0 D + 1.0 S (All Spans)
Moment (Ft-lbs)	-983 @ 2' 8 3/4"	2444	Passed (40%)	1.15	1.0 D + 1.0 S (All Spans)
Live Load Defl. (in)	0.124 @ 0	0.200	Passed (2L/566)	--	1.0 D + 1.0 S (Alt Spans)
Total Load Defl. (in)	0.189 @ 0	0.291	Passed (2L/370)	--	1.0 D + 1.0 S (Alt Spans)

- Deflection criteria: LL (L/360) and TL (L/240).
- Overhang deflection criteria: LL (2L/0.2") and TL (2L/240).
- Left cantilever length exceeds 1/3 member length or 1/2 back span length. Additional bracing should be considered.
- Allowed moment does not reflect the adjustment for the beam stability factor.
- -370 lbs uplift at support located at 5' 1/2". Strapping or other restraint may be required.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Snow	Total	
1 - Beveled Plate - HF	5.50"	5.50"	1.50"	323	573	896	Blocking
2 - Hanger on 5 1/2" HF beam	5.50"	Hanger[1]	1.50"	-120	-250	-370	See note [1]

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

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

- Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
2 - Face Mount Hanger	HU1.81/5X SLD20	2.50"	N/A	16-10dx1.5	6-10dx1.5	

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

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 5' 1/2"	N/A	2.8	--	
1 - Uniform (PSF)	0 to 5' 6"	1'	15.0	25.0	parallel
2 - Point (lb)	0	N/A	100	200	R6

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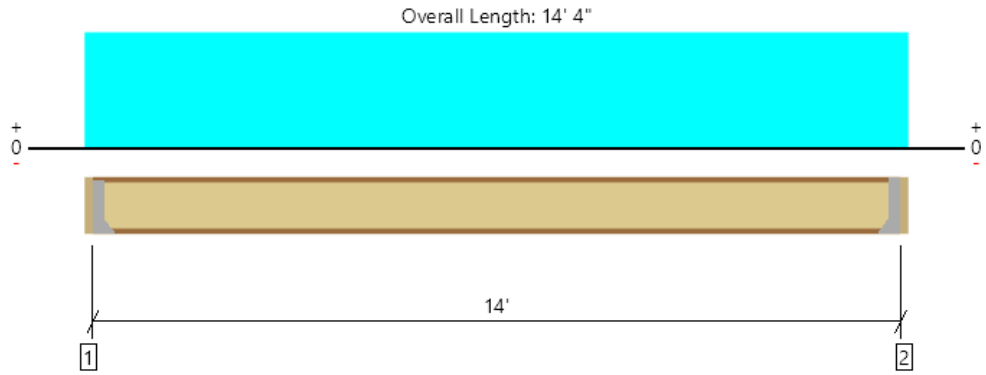
The product application, input design loads, dimensions and support information have been provided by K.Warner

ForteWEB Software Operator	Job Notes
Kathryn Warner Harriott Valentine Engineers (206) 624-4760 kwarner@harriottvalentine.com	

Weyerhaeuser

Level-Deck, Floor: Joist-DJ1
1 piece(s) 11 7/8" TJI® 210 @ 16" OC



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)	933 @ 2"	1005 (1.75")	Passed (93%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	933 @ 2"	1655	Passed (56%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	3267 @ 7' 2"	3795	Passed (86%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.214 @ 7' 2"	0.350	Passed (L/786)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.356 @ 7' 2"	0.700	Passed (L/471)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	48	40	Passed	--	--

System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- A structural analysis of the deck has not been performed.
- Deflection analysis is based on composite action with a single layer of 23/32" Weyerhaeuser Edge™ Panel (24" Span Rating) that is glued and nailed down.
- Additional considerations for the TJ-Pro™ Rating include: None.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Hanger on 11 7/8" HF beam	2.00"	Hanger[1]	1.75" / - [2]	382	573	955	See note [1]
2 - Hanger on 11 7/8" HF beam	2.00"	Hanger[1]	1.75" / - [2]	382	573	955	See note [1]

- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- [1] See Connector grid below for additional information and/or requirements.
- [2] Required Bearing Length / Required Bearing Length with Web Stiffeners

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	3' 11" o/c	
Bottom Edge (Lu)	14' o/c	

- TJI joists are only analyzed using Maximum Allowable bracing solutions.
- Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
1 - Face Mount Hanger	IUS2.06/11.88	2.00"	N/A	10-10d	2-Strong-Grip	
2 - Face Mount Hanger	IUS2.06/11.88	2.00"	N/A	10-10d	2-Strong-Grip	

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

Vertical Load	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 14' 4"	16"	40.0	60.0	Deck with pavers Load

ForteWEB Software Operator	Job Notes
Kathryn Warner Harriott Valentine Engineers (206) 624-4760 kwarner@harriottvalentine.com	

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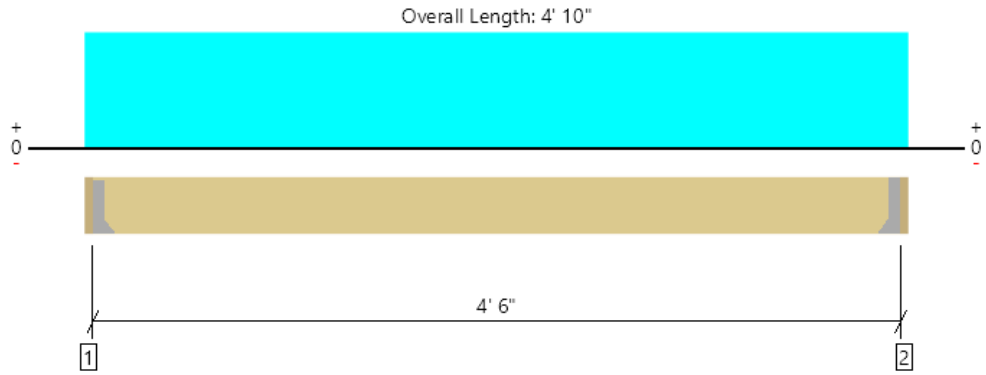
The product application, input design loads, dimensions and support information have been provided by K.Warner

Level-Deck, Floor: Joist-DJ2
1 piece(s) 2 x 4 Hem-Fir No. 2 @ 16" OC



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)	300 @ 2"	911 (1.50")	Passed (33%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	261 @ 5 1/2"	525	Passed (50%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	338 @ 2' 5"	374	Passed (90%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.106 @ 2' 5"	0.112	Passed (L/510)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.177 @ 2' 5"	0.225	Passed (L/306)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	N/A	N/A	N/A	--	N/A

System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- A 15% increase in the moment capacity has been added to account for repetitive member usage.
- Applicable calculations are based on NDS.
- No composite action between deck and joist was considered in analysis.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Hanger on 3 1/2" HF beam	2.00"	Hanger[1]	1.50"	129	193	322	See note [1]
2 - Hanger on 3 1/2" HF beam	2.00"	Hanger[1]	1.50"	129	193	322	See note [1]

- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- [1] See Connector grid below for additional information and/or requirements.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	4' 6" o/c	
Bottom Edge (Lu)	4' 6" o/c	

•Maximum allowable bracing intervals based on applied load.

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

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

Vertical Load	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 4' 10"	16"	40.0	60.0	Deck with pavers Load

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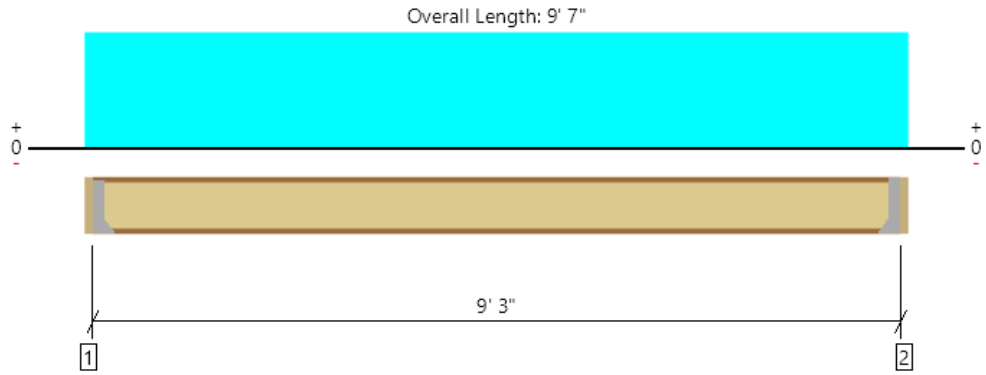
The product application, input design loads, dimensions and support information have been provided by K.Warner

ForteWEB Software Operator	Job Notes
Kathryn Warner Harriott Valentine Engineers (206) 624-4760 kwarner@harriottvalentine.com	

Weyerhaeuser

Level-Deck, Floor: Joist-DJ3
1 piece(s) 11 7/8" TJI® 210 @ 16" OC



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)	617 @ 2"	1005 (1.75")	Passed (61%)	1.00	1.0 D + 1.0 L (All Spans)
Shear (lbs)	617 @ 2"	1655	Passed (37%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	1426 @ 4' 9 1/2"	3795	Passed (38%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.049 @ 4' 9 1/2"	0.231	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.082 @ 4' 9 1/2"	0.463	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
TJ-Pro™ Rating	63	40	Passed	--	--

System : Floor
Member Type : Joist
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/480) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- A structural analysis of the deck has not been performed.
- Deflection analysis is based on composite action with a single layer of 23/32" Weyerhaeuser Edge™ Panel (24" Span Rating) that is glued and nailed down.
- Additional considerations for the TJ-Pro™ Rating include: None.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Hanger on 11 7/8" HF beam	2.00"	Hanger[1]	1.75" / - [2]	256	383	639	See note [1]
2 - Hanger on 11 7/8" HF beam	2.00"	Hanger[1]	1.75" / - [2]	256	383	639	See note [1]

- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- [1] See Connector grid below for additional information and/or requirements.
- [2] Required Bearing Length / Required Bearing Length with Web Stiffeners

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	6' 2" o/c	
Bottom Edge (Lu)	9' 3" o/c	

- TJI joists are only analyzed using Maximum Allowable bracing solutions.
- Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
1 - Face Mount Hanger	IUS2.06/11.88	2.00"	N/A	10-10dx1.5	2-Strong-Grip	
2 - Face Mount Hanger	IUS2.06/11.88	2.00"	N/A	10-10dx1.5	2-Strong-Grip	

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

Vertical Load	Location (Side)	Spacing	Dead (0.90)	Floor Live (1.00)	Comments
1 - Uniform (PSF)	0 to 9' 7"	16"	40.0	60.0	Deck with pavers Load

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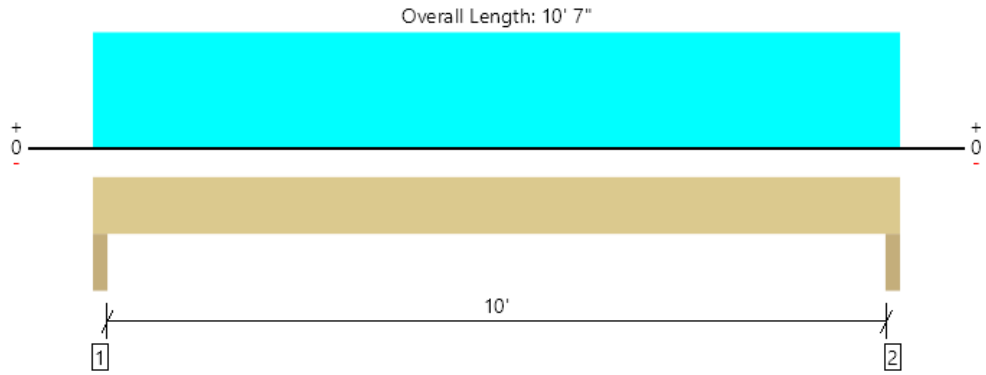
The product application, input design loads, dimensions and support information have been provided by K.Warner

Level-Deck, Floor: Flush Beam-D1

1 piece(s) 5 1/4" x 11 7/8" 2.0E Parallam® PSL



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)	4336 @ 2"	11484 (3.50")	Passed (38%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	3287 @ 1' 3 3/8"	12053	Passed (27%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	10762 @ 5' 3 1/2"	29854	Passed (36%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.093 @ 5' 3 1/2"	0.256	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.159 @ 5' 3 1/2"	0.512	Passed (L/775)	--	1.0 D + 1.0 L (All Spans)

System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

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

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Column - HF	3.50"	3.50"	1.50"	1796	2540	4336	None
2 - Column - HF	3.50"	3.50"	1.50"	1796	2540	4336	None

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	10' 7" o/c	
Bottom Edge (Lu)	10' 7" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 10' 7"	N/A	19.5	--	
1 - Uniform (PSF)	0 to 10' 7" (Top)	8'	40.0	60.0	Deck with pavers

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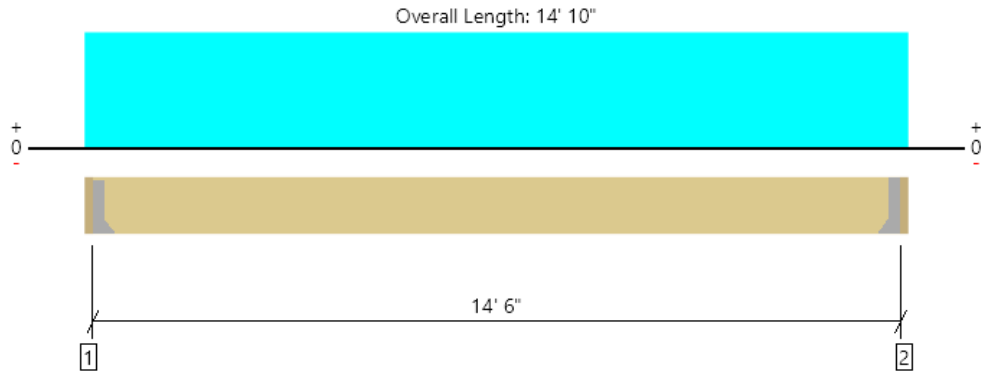
The product application, input design loads, dimensions and support information have been provided by K.Warner

ForteWEB Software Operator	Job Notes
Kathryn Warner Harriott Valentine Engineers (206) 624-4760 kwarner@harriottvalentine.com	

Weyerhaeuser

Level-Deck, Floor: Flush Beam-D2 AT STEP
1 piece(s) 3 1/2" x 11 7/8" 2.0E Parallam® PSL



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)	1544 @ 2"	3281 (1.50")	Passed (47%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	1333 @ 1' 1 7/8"	8035	Passed (17%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	5597 @ 7' 5"	19902	Passed (28%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.131 @ 7' 5"	0.363	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.232 @ 7' 5"	0.725	Passed (L/749)	--	1.0 D + 1.0 L (All Spans)

System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

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

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Hanger on 11 7/8" HF beam	2.00"	Hanger[1]	1.50"	687	890	1577	See note [1]
2 - Hanger on 11 7/8" HF beam	2.00"	Hanger[1]	1.50"	687	890	1577	See note [1]

- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- [1] See Connector grid below for additional information and/or requirements.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	14' 6" o/c	
Bottom Edge (Lu)	14' 6" o/c	

•Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
1 - Face Mount Hanger	LUS410	2.00"	N/A	8-16d	6-16d	
2 - Face Mount Hanger	LUS410	2.00"	N/A	8-16d	6-16d	

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

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	2" to 14' 8"	N/A	13.0	--	
1 - Uniform (PSF)	0 to 14' 10" (Top)	2'	40.0	60.0	Deck with pavers

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The product application, input design loads, dimensions and support information have been provided by K.Warner

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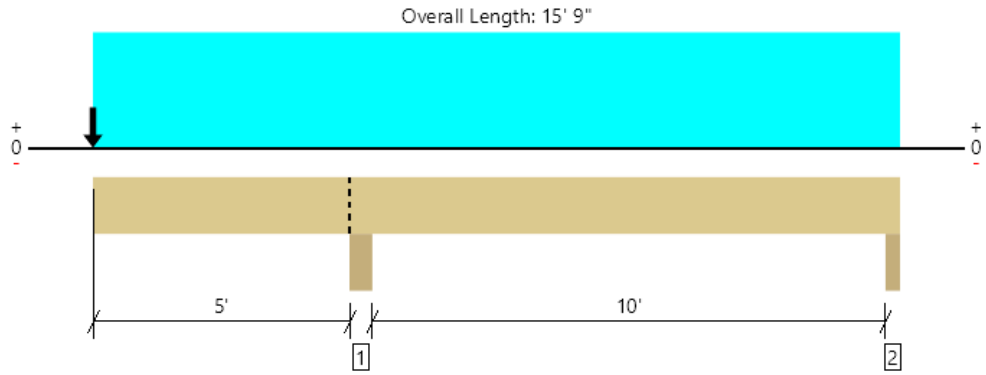
Level-Deck, Floor: Flush Beam-D3
1 piece(s) 5 1/4" x 11 7/8" 2.0E Parallam® PSL



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)	11417 @ 5' 2 3/4"	18047 (5.50")	Passed (63%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	4865 @ 6' 5 3/8"	12053	Passed (40%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	-18835 @ 5' 2 3/4"	29854	Passed (63%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.351 @ 0	0.349	Passed (2L/358)	--	1.0 D + 1.0 L (Alt Spans)
Total Load Defl. (in)	0.519 @ 0	0.523	Passed (2L/242)	--	1.0 D + 1.0 L (Alt Spans)

System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
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.

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Column - HF	5.50"	5.50"	3.48"	4785	6632	11417	Blocking
2 - Column - HF	3.50"	3.50"	1.50"	937	2405/-1049	3342/-1049	None

• 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)	15' 9" o/c	
Bottom Edge (Lu)	15' 9" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 15' 9"	N/A	19.5	--	
1 - Uniform (PSF)	0 to 15' 9" (Top)	7' 6"	40.0	60.0	Deck with pavers
2 - Point (lb)	0 (Front)	N/A	690	900	Drop-in beam W/ FB PSL at step

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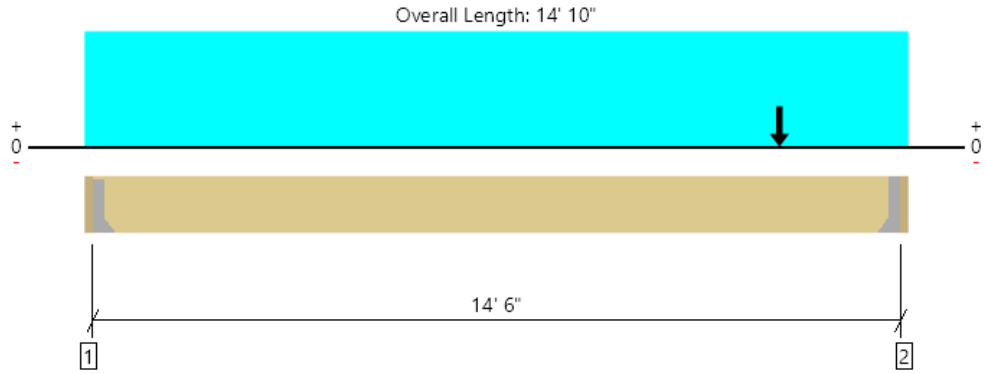
The product application, input design loads, dimensions and support information have been provided by K.Warner

Level-Deck, Floor: Flush Beam-D4 at HD straps
1 piece(s) 3 1/2" x 11 7/8" 2.0E Parallam® PSL

An excessive uplift of -3588 lbs at support located at 14' 8" failed this product.



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)	4674 @ 14' 8"	4674 (2.14")	Passed (100%)	--	1.0 D + 0.7 E (All Spans)
Shear (lbs)	4582 @ 13' 8 1/8"	12857	Passed (36%)	1.60	1.0 D + 0.7 E (All Spans)
Moment (Ft-lbs)	9909 @ 12' 6"	31844	Passed (31%)	1.60	1.0 D + 0.7 E (All Spans)
Live Load Defl. (in)	0.284 @ 8' 5/8"	0.483	Passed (L/612)	--	1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)
Total Load Defl. (in)	0.385 @ 7' 10 9/16"	0.725	Passed (L/452)	--	1.0 D + 0.525 E + 0.75 L + 0.75 S (All Spans)

System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

- Deflection criteria: LL (L/360) and TL (L/240).
- Allowed moment does not reflect the adjustment for the beam stability factor.
- -290 lbs uplift at support located at 2". Strapping or other restraint may be required.

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Seismic	Total	
1 - Hanger on 11 7/8" HF beam	2.00"	Hanger[1]	1.50"	687	890	1004/-1004	2581/-1004	See note [1]
2 - Hanger on 11 7/8" HF beam	2.00"	Hanger[1]	2.14"	687	890	5714/-5714	7291/-5714	See note [1]

- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- [1] See Connector grid below for additional information and/or requirements.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	14' 6" o/c	
Bottom Edge (Lu)	14' 6" o/c	

•Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
1 - Face Mount Hanger	LUS410	2.00"	N/A	8-16d	6-16d	
2 - Face Mount Hanger	HGUS410	4.00"	N/A	46-16d	16-16d	

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

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Seismic (1.60)	Comments
0 - Self Weight (PLF)	2" to 14' 8"	N/A	13.0	--	--	
1 - Uniform (PSF)	0 to 14' 10" (Top)	2'	40.0	60.0	-	Deck with pavers
2 - Point (lb)	12' 6" (Front)	N/A	-	-	6718	HD strap at offset Shear Walls- W/ Omega

ForteWEB Software Operator	Job Notes
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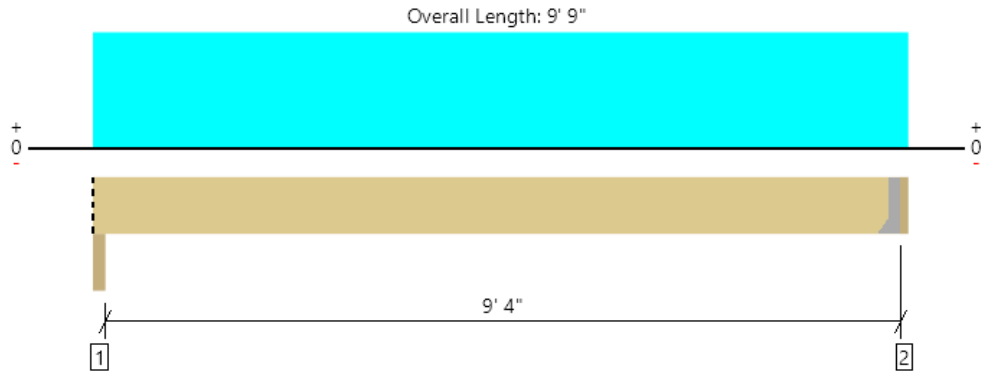
The product application, input design loads, dimensions and support information have been provided by K.Warner

Level-Deck, Floor: Drop Beam-D5 stringers
1 piece(s) 4 x 6 Hem-Fir No. 2



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)	472 @ 9' 7"	2126 (1.50")	Passed (22%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	427 @ 9' 1 1/2"	1925	Passed (22%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	1117 @ 4' 10 1/4"	1625	Passed (69%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.171 @ 4' 10 1/4"	0.315	Passed (L/663)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.285 @ 4' 10 1/4"	0.473	Passed (L/398)	--	1.0 D + 1.0 L (All Spans)

System : Floor
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2015
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	Total	
1 - Beam - HF	3.00"	3.00"	1.50"	194	291	485	Blocking
2 - Hanger on 5 1/2" HF beam	2.00"	Hanger[1]	1.50"	194	294	488	See note [1]

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

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	9' 7" o/c	
Bottom Edge (Lu)	9' 7" o/c	

•Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
2 - Face Mount Hanger	LUS46	2.00"	N/A	4-10dx1.5	4-10d	

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

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	0 to 9' 7"	N/A	4.9	--	
1 - Uniform (PSF)	0 to 9' 9" (Front)	1'	35.0	60.0	Stair w/ minimum residential deck load

Member Notes
Angled span for stair rise 6.75 / Run 11- minimum design depth AFTER notching for treads

ForteWEB Software Operator	Job Notes
Kathryn Warner Harriott Valentine Engineers (206) 624-4760 kwarner@harriottvalentine.com	

Weyerhaeuser

Weyerhaeuser Notes

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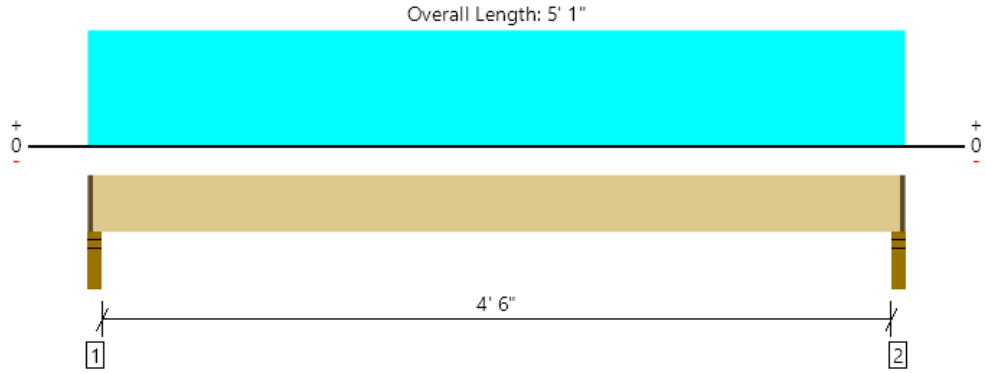
The product application, input design loads, dimensions and support information have been provided by K.Warner

Level-Deck, Floor: Flush Beam-D6
1 piece(s) 4 x 12 Hem-Fir No. 2



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)	1243 @ 2"	3189 (2.25")	Passed (39%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	669 @ 1' 2 3/4"	3938	Passed (17%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	1438 @ 2' 6 1/2"	5752	Passed (25%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.006 @ 2' 6 1/2"	0.119	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.011 @ 2' 6 1/2"	0.237	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)

System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

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

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Stud wall - HF	3.50"	2.25"	1.50"	533	763	1296	1 1/4" Rim Board
2 - Stud wall - HF	3.50"	2.25"	1.50"	533	763	1296	1 1/4" Rim Board

• Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	4' 11" o/c	
Bottom Edge (Lu)	4' 11" o/c	

•Maximum allowable bracing intervals based on applied load.

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	1 1/4" to 4' 11 3/4"	N/A	10.0	--	
1 - Uniform (PLF)	0 to 5' 1" (Top)	N/A	200.0	300.0	STRINGERS AT 12"oc

Member Notes

LANDING UNDER UPPER RUN

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The product application, input design loads, dimensions and support information have been provided by K.Warner

ForteWEB Software Operator	Job Notes
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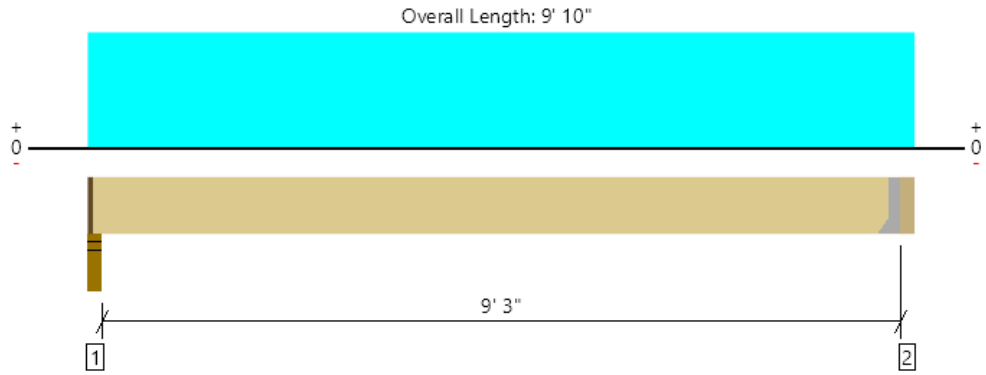
Level-Deck, Floor: Flush Beam-D7
1 piece(s) 4 x 12 Hem-Fir No. 2



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)	2051 @ 9' 6 1/2"	2126 (1.50")	Passed (96%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	1641 @ 8' 7 1/4"	3938	Passed (42%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	4806 @ 4' 10 1/4"	5752	Passed (84%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.087 @ 4' 10 1/4"	0.234	Passed (L/999+)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.141 @ 4' 10 1/4"	0.469	Passed (L/799)	--	1.0 D + 1.0 L (All Spans)

System : Floor
Member Type : Flush Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

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

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Stud wall - HF	3.50"	2.25"	1.50"	812	1311	2123	1 1/4" Rim Board
2 - Hanger on 11 1/4" HF beam	3.50"	Hanger[1]	1.50"	831	1344	2175	See note [1]

- Rim Board is assumed to carry all loads applied directly above it, bypassing the member being designed.
- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- [1] See Connector grid below for additional information and/or requirements.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	9' 5" o/c	
Bottom Edge (Lu)	9' 5" o/c	

•Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
2 - Face Mount Hanger	HHUS48	3.00"	N/A	22-10d	8-10d	

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

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	1 1/4" to 9' 6 1/2"	N/A	10.0	--	
1 - Uniform (PSF)	0 to 9' 10" (Top)	4' 6"	35.0	60.0	DECK LANDING PLUS LOWER RUN STRINGERS

Member Notes
LANDING AT LOWER RUN

ForteWEB Software Operator	Job Notes
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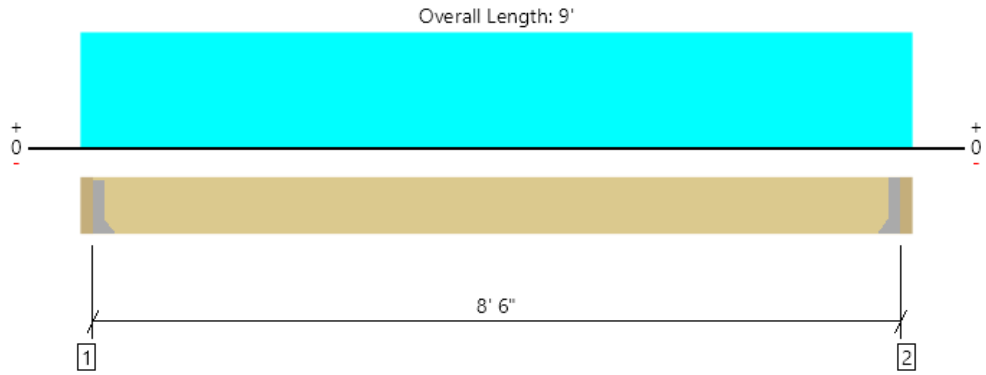
The product application, input design loads, dimensions and support information have been provided by K.Warner

Level-Deck, Floor: Drop Beam-DL1-ledger span openings
1 piece(s) 3 1/2" x 9 1/4" 2.0E Parallam® PSL



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)	3230 @ 3"	3281 (1.50")	Passed (98%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	2645 @ 1' 1/4"	6259	Passed (42%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	6865 @ 4' 6"	12416	Passed (55%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.129 @ 4' 6"	0.283	Passed (L/791)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.218 @ 4' 6"	0.425	Passed (L/468)	--	1.0 D + 1.0 L (All Spans)

System : Floor
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

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

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Hanger on 9 1/4" HF beam	3.00"	Hanger[1]	1.50"	1393	2025	3418	See note [1]
2 - Hanger on 9 1/4" HF beam	3.00"	Hanger[1]	1.50"	1393	2025	3418	See note [1]

- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- [1] See Connector grid below for additional information and/or requirements.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	8' 6" o/c	
Bottom Edge (Lu)	8' 6" o/c	

•Maximum allowable bracing intervals based on applied load.

Connector: Simpson Strong-Tie						
Support	Model	Seat Length	Top Fasteners	Face Fasteners	Member Fasteners	Accessories
1 - Face Mount Hanger	HUCQ410-SDS	3.00"	N/A	12-SDS25212	6-SDS25212	
2 - Face Mount Hanger	HUCQ410-SDS	3.00"	N/A	12-SDS25212	6-SDS25212	

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

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	3" to 8' 9"	N/A	10.1	--	
1 - Uniform (PSF)	0 to 9' (Front)	7' 6"	40.0	60.0	New Deck Loading- overframe additional interior floor adjacent to ledger

Member Notes
ledger taking all new deck loading

ForteWEB Software Operator	Job Notes
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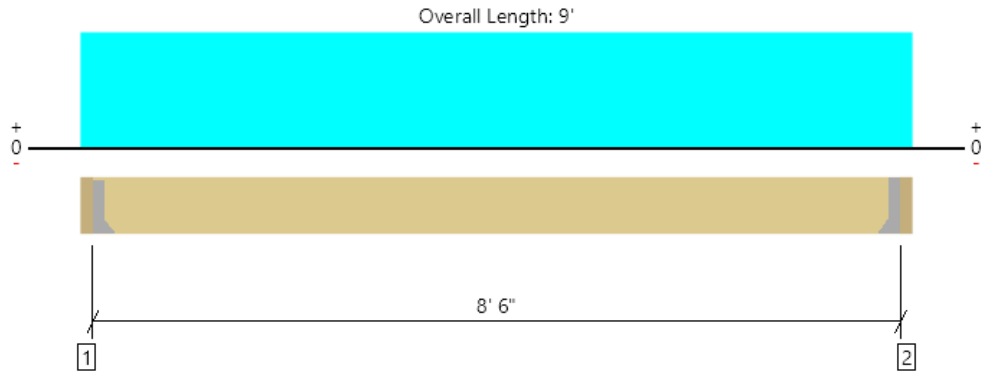
The product application, input design loads, dimensions and support information have been provided by K.Warner

Level-Deck, Floor: Drop Beam-DL2-ledger span openings
2 piece(s) 1 3/4" x 7 1/4" 2.0E Microllam® LVL



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)	2369 @ 3"	3938 (1.50")	Passed (60%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	2032 @ 10 1/4"	4821	Passed (42%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	5034 @ 4' 6"	7115	Passed (71%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.188 @ 4' 6"	0.283	Passed (L/543)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.317 @ 4' 6"	0.425	Passed (L/321)	--	1.0 D + 1.0 L (All Spans)

System : Floor
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

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

Supports	Bearing Length			Loads to Supports (lbs)			Accessories
	Total	Available	Required	Dead	Floor Live	Total	
1 - Hanger on 7 1/4" PSL beam	3.00"	Hanger[1]	1.50"	1021	1485	2506	See note [1]
2 - Hanger on 7 1/4" PSL beam	3.00"	Hanger[1]	1.50"	1021	1485	2506	See note [1]

- At hanger supports, the Total Bearing dimension is equal to the width of the material that is supporting the hanger
- [1] See Connector grid below for additional information and/or requirements.

Lateral Bracing	Bracing Intervals	Comments
Top Edge (Lu)	8' 6" o/c	
Bottom Edge (Lu)	8' 6" o/c	

•Maximum allowable bracing intervals based on applied load.

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

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

Vertical Loads	Location (Side)	Tributary Width	Dead (0.90)	Floor Live (1.00)	Comments
0 - Self Weight (PLF)	3" to 8' 9"	N/A	7.4	--	
1 - Uniform (PSF)	0 to 9' (Front)	5' 6"	40.0	60.0	New Deck Loading- sistered under existing floor - no loading adjacent to ledger

Member Notes
ledger taking all new deck loading

ForteWEB Software Operator	Job Notes
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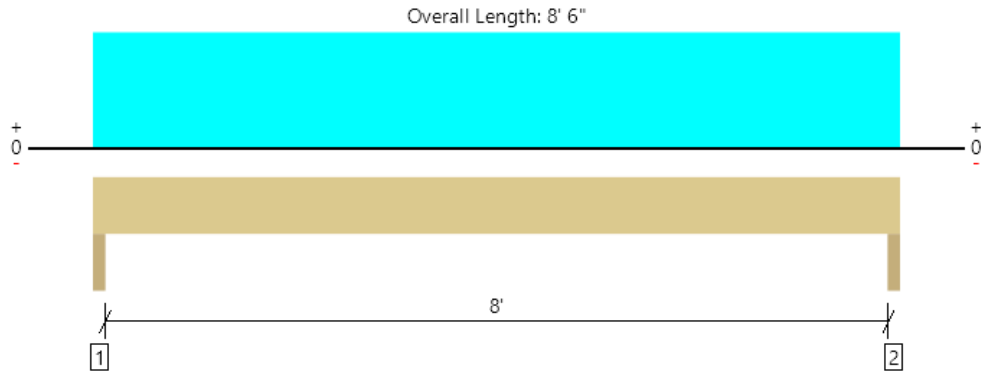
Level-Deck, Floor: Drop Beam-REPLACE Hdrs
1 piece(s) 3 1/2" x 9 1/4" 2.0E Parallam® PSL



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)	4726 @ 1 1/2"	6563 (3.00")	Passed (72%)	--	1.0 D + 1.0 L (All Spans)
Shear (lbs)	3591 @ 1' 1/4"	6259	Passed (57%)	1.00	1.0 D + 1.0 L (All Spans)
Moment (Ft-lbs)	9462 @ 4' 3"	12416	Passed (76%)	1.00	1.0 D + 1.0 L (All Spans)
Live Load Defl. (in)	0.166 @ 4' 3"	0.275	Passed (L/595)	--	1.0 D + 1.0 L (All Spans)
Total Load Defl. (in)	0.285 @ 4' 3"	0.412	Passed (L/348)	--	1.0 D + 1.0 L (All Spans)

System : Floor
Member Type : Drop Beam
Building Use : Residential
Building Code : IBC 2015
Design Methodology : ASD

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

Supports	Bearing Length			Loads to Supports (lbs)				Accessories
	Total	Available	Required	Dead	Floor Live	Snow	Total	
1 - Trimmer - HF	3.00"	3.00"	2.16"	1964	2763	850	5577	None
2 - Trimmer - HF	3.00"	3.00"	2.16"	1964	2763	850	5577	None

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)	Snow (1.15)	Comments
0 - Self Weight (PLF)	0 to 8' 6"	N/A	10.1	--	--	
1 - Uniform (PSF)	0 to 8' 6" (Front)	8'	14.0	-	25.0	ROOF BEARING WALL
2 - Uniform (PSF)	0 to 8' 6" (Front)	8'	15.0	40.0	-	Existing Cantilevered floor loading
3 - Uniform (PSF)	0 to 8' 6" (Front)	5' 6"	40.0	60.0	-	ADD NEW DECKING -Sistered with existing cantilevers

Member Notes

Existing load only - no deck loading

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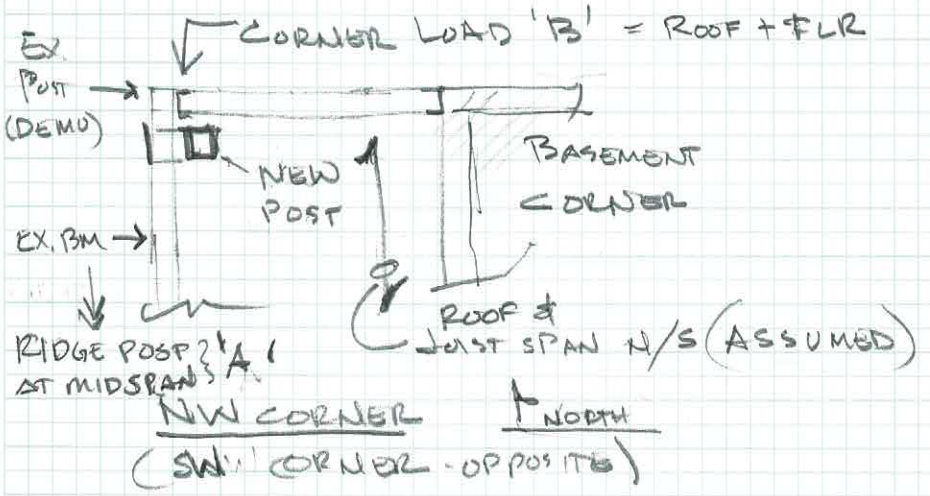
RESUPPORT LIVING ROOM



LOAD 'A' FROM ROOF - 65 ☐ TRIB × 15 PSF DL + 25 PSF LL
(RIDGE BM POST - ½) = 975# D + 1625# SN = 2600# TOT.

LOAD B FROM ROOF - 35 ☐ W/ OVERHANGS × 15 PSF D + 25 SN
(CORNER) = 525# D + 875# Sn

+

LOAD B FROM FLR = 20 ☐ (20 PSF D + 40 PSF LL)
= 400# D + 800# L

⇒ TOTAL 'B' = 925# D + 1675# LL+Sn.

1) HANGER FLR BEAM @ NORTH / SOUTH SIDES

R_{max} = 2600# ⇒ HUCQ ✓

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VANDERVALE Project

Date

Page of

COMBINED STRESSES - WOOD

P =	5200	lb				***New Post-gravity only***
b =	5.50	in				***6x6-DF#1***
d =	5.50	in				
A =	30.25	in2	fc =	172	psi	
le =	84	in				
d =	5.50	in				
c' =	0.8					
Kce =	0.822					
Emin' =	5.8E+05	psi				
Fce =	2044	psi				Fce=0.822*Emin/(le/d)^2
Fc* =	1000	psi	F'c =	871	psi	F'c=Fc*Cp

size, Cf = 1.0; duration, Cd = 1.0

M =	27,300	lb-in									
b =	5.50	in	fb =	985	psi	(fc / F'c)^2	+	(fb/(Fb(1-(fc/Fce)))	<	1.00	
d =	5.50	in									
S =	27.73	in3	F'b =	1200	psi	0.039	+	0.896	=	0.935	o.k.

size, Cf = 1.0 duration, Cd = 1.0

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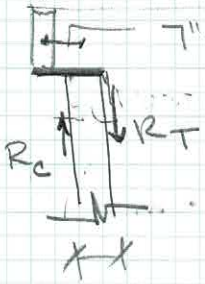
NEW POST / EX. BEAM CONN. @ LIVING ROOM

↓ B - OUTSIDE = 2600#
↓ A - MID BEAM POST = 2600# } TOTAL P = 5200#

7" MAX - 1.75 = 5.25"
℄



5½" POST

$M = 5200^{\#} \times 5.25^{IN} = 27300^{\#\cdot IN}$

6×6 DF#1 - see attached ✓

BEARING PLATE - 3/4" t × B — MINOR AXIS

$Z_y = (.t)^2 \cdot B/4$

$M_{P/\Omega} = Z_y \cdot 36\ ksi / 1.67$

$\therefore B_{MIN} = M_r \cdot 1.67 \cdot 4 / 36\ ksi\ (.t^2)$

$= 27.3^{K\cdot IN}(1.67)(4) / 36(.75)^2 = 9.00^{IN}$

STRAPS TO POST / RESOLVE M

$R_T = 27300^{\#\cdot IN} / 5.5^{IN} = 4964^{\#}$

SDS SCREWS w/ ¼" SIDE PLATE

$Z_{||} = 420^{\#}$

→ MIN SCREWS = 11.8 → USE (12)

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VANDER WALL Project

Date

Page ___ of ___

SECTION 3: LATERAL

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CRITERIA

LATERAL

wind	wind importance factor	1.0		
	basic wind speed	110	mph	
	wind exposure	C	per Mercer Island Wind Map	
	topographical factor (Kzt)	1.00	per Mercer Island Wind Map	
seismic	seismic importance factor	1.0		
	latitude	47.539	°	
	longitude	-122.243	°	
	accel. at short periods (Ss)	1.472	g	(from SEAOC Design Tool)
	accel. at 1-sec period (S1)	0.563	g	
	seismic design category	D		
	response modification factor (R)	6.5		

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SEISMIC DESIGN -Exist House

ASCE 7-10
Equivalent Lateral Force Procedure

Occupancy Category	II		Table 1-1
Seismic Design Category	D		Table 11.6-1
Importance Factor	1.00		Table 11.5-1
Site Class	D		Table 20.3-1
S_S	147.20	%g	(from USGS Seismic Hazard Curves, 2008 data)
S_1	56.30	%g	(from USGS Seismic Hazard Curves, 2008 data)
F_a	1.00		Table 11.4-1
F_v	1.50		Table 11.4-2
C_t	0.02		Table 12.8-2
x	0.75		Table 12.8-2
h_n	20.00	feet	(height to highest level)

$S_{MS} = Fa*Ss$	1.4720		Eq. 11.4-1
$S_{M1} = Fv*S1$	0.8445		Eq. 11.4-2
$S_{DS} = (2/3)*S_{MS}$	0.9813	g	Eq. 11.4-3
$S_{D1} = (2/3)*S_{M1}$	0.5630	g	Eq. 11.4-4
Period $T_a = C_t*h_n\text{^}x$	0.1891	s	Eq. 12.8-7
T_o	0.1147	s	per section 11.4.5
T_S	0.5737	s	per section 11.4.5
S_a	0.9813	g	per section 11.4.5

R	6.5	Table 12.2-1
Ωo	2.5	Table 12.2-1
C_d	4	Table 12.2-1
Section 12.8 (ELFP) ok?	Yes	Table 12.6-1

Equivalent Lateral Force Procedure (section 12.8)

Cs	0.1510		Eq. 12.8-2
W, weight	79,840	lb	per table below
Q_E	12,054	lb	Eq. 12.8-1

Vertical Force Distribution (section 12.8.3)
k = 1.00

Level	Hx	Floor Area	Seismic Dead Ld	Floor Wt.	Wall Length	Wall Wt.	Total Wt.	WxHx	Cvx	(LRFD) Q_E	(ASD) $0.7Q_E$
	(ft)	(ft2)	(psf)	(k)	(ft)	(k)	(k)	(k-ft)	(%)	(k)	(k)
Roof (MRH)	18.00	1586	14	22.2	202	8.1	30.3	545.1	61.3	7.38	5.17
Main Floor	8.00	1586	18	28.5	202	14.5	43.1	344.7	38.7	4.67	3.27
Basement Floor	0.00	1586	0	0.0	202	6.5	6.5	0.0	0.0	0.00	0.00
							79.84	889.85	100.00	12.05	**8.44**

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SEISMIC DESIGN -Kitchen Deck

ASCE 7-10
Equivalent Lateral Force Procedure

Occupancy Category	II		Table 1-1
Seismic Design Category	D		Table 11.6-1
Importance Factor	1.00		Table 11.5-1
Site Class	D		Table 20.3-1
S_S	147.20	%g	(from USGS Seismic Hazard Curves, 2008 data)
S_1	56.30	%g	(from USGS Seismic Hazard Curves, 2008 data)
F_a	1.00		Table 11.4-1
F_v	1.50		Table 11.4-2
C_t	0.02		Table 12.8-2
x	0.75		Table 12.8-2
h_n	20.00	feet	(height to highest level)

$S_{MS} = Fa*Ss$	1.4720		Eq. 11.4-1
$S_{M1} = Fv*S1$	0.8445		Eq. 11.4-2
$S_{DS} = (2/3)*S_{MS}$	0.9813	g	Eq. 11.4-3
$S_{D1} = (2/3)*S_{M1}$	0.5630	g	Eq. 11.4-4
Period $T_a = C_t*h_n\text{^}x$	0.1891	s	Eq. 12.8-7
T_o	0.1147	s	per section 11.4.5
T_S	0.5737	s	per section 11.4.5
S_a	0.9813	g	per section 11.4.5

R	6.5	Table 12.2-1
Ωo	2.5	Table 12.2-1
C_d	4	Table 12.2-1
Section 12.8 (ELFP) ok?	Yes	Table 12.6-1

Equivalent Lateral Force Procedure (section 12.8)

Cs	0.1510		Eq. 12.8-2
W, weight	18,600	lb	per table below
Q_E	2,808	lb	Eq. 12.8-1

Vertical Force Distribution (section 12.8.3)
k = 1.00

Level	Hx	Floor Area	Seismic Dead Ld	Floor Wt.	Wall Length	Wall Wt.	Total Wt.	WxHx	Cvx	(LRFD) Q_E	(ASD) $0.7Q_E$
	(ft)	(ft2)	(psf)	(k)	(ft)	(k)	(k)	(k-ft)	(%)	(k)	(k)
Roof (MRH)	18.00	0	0	0.0	0	0.0	0.0	0.0	0.0	0.00	0.00
Deck 1	8.00	465	40	18.6	0	0.0	18.6	148.8	100.0	2.81	1.97
Basement Floor	0.00	0	0	0.0	0	0.0	0.0	0.0	0.0	0.00	0.00
							18.60	148.80	100.00	2.81	**1.97**

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SEISMIC DESIGN -Master Deck

ASCE 7-10
Equivalent Lateral Force Procedure

Occupancy Category	II		Table 1-1
Seismic Design Category	D		Table 11.6-1
Importance Factor	1.00		Table 11.5-1
Site Class	D		Table 20.3-1
S_S	147.20	%g	(from USGS Seismic Hazard Curves, 2008 data)
S_1	56.30	%g	(from USGS Seismic Hazard Curves, 2008 data)
F_a	1.00		Table 11.4-1
F_v	1.50		Table 11.4-2
C_t	0.02		Table 12.8-2
x	0.75		Table 12.8-2
h_n	20.00	feet	(height to highest level)

$S_{MS} = Fa*Ss$	1.4720		Eq. 11.4-1
$S_{M1} = Fv*S1$	0.8445		Eq. 11.4-2
$S_{DS} = (2/3)*S_{MS}$	0.9813	g	Eq. 11.4-3
$S_{D1} = (2/3)*S_{M1}$	0.5630	g	Eq. 11.4-4
Period $T_a = C_t*h_n\text{^}x$	0.1891	s	Eq. 12.8-7
T_o	0.1147	s	per section 11.4.5
T_S	0.5737	s	per section 11.4.5
S_a	0.9813	g	per section 11.4.5

R	6.5	Table 12.2-1
Ωo	2.5	Table 12.2-1
C_d	4	Table 12.2-1
Section 12.8 (ELFP) ok?	Yes	Table 12.6-1

Equivalent Lateral Force Procedure (section 12.8)

Cs	0.1510		Eq. 12.8-2
W, weight	5,600	lb	per table below
Q_E	845	lb	Eq. 12.8-1

Vertical Force Distribution (section 12.8.3)
k = 1.00

Level	Hx	Floor Area	Seismic Dead Ld	Floor Wt.	Wall Length	Wall Wt.	Total Wt.	WxHx	Cvx	(LRFD) Q_E	(ASD) $0.7Q_E$
	(ft)	(ft2)	(psf)	(k)	(ft)	(k)	(k)	(k-ft)	(%)	(k)	(k)
Roof (MRH)	18.00	0	0	0.0	0	0.0	0.0	0.0	0.0	0.00	0.00
Deck 2	8.00	140	40	5.6	0	0.0	5.6	44.8	100.0	0.85	0.59
Basement Floor	0.00	0	0	0.0	0	0.0	0.0	0.0	0.0	0.00	0.00
							5.60	44.80	100.00	0.85	**0.59**

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WIND DESIGN

ASCE 7-10
Simplified Envelope Method (Chapter 28)

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

λ = adjustment factor = 1.29
I = importance factor = 1.00
K_{zt} = topographic factor = 1.00

Part of Figure 28.6-1 - Adjustment Factor for Building Height and Exposure, λ

Mean Roof Height	Exposure		
(ft)	B	**C**	D
15	1.00	1.21	1.47
16	1.00	1.23	1.49
17	1.00	1.24	1.50
18	1.00	1.26	1.52
19	1.00	1.27	1.53
20	1.00	**1.29**	1.55
21	1.00	1.30	1.56
22	1.00	1.31	1.57
23	1.00	1.33	1.59
24	1.00	1.34	1.60
25	1.00	1.35	1.61
26	1.00	1.36	1.62
27	1.00	1.37	1.63
28	1.00	1.38	1.64
29	1.00	1.39	1.65
30	1.00	1.40	1.66

Zone
Computation

a = 10% of least horizontal dimension or 0.4 x h, whichever is smaller, but not less than either 4% of least horizontal dimension or 3 feet.

w = 37.00 ft x 0.1 = 3.70 ft
h = 20.00 ft x 0.4 = 8.00 ft
w = 37.00 ft x 0.04 = 1.48 ft

a = 3.70 ft
2a = **7.40** ft

Zone B - end zone of roof
Zone A - end zone of wall

Zone D - interior zone of roof
Zone C - interior zone of wall

Part of Figure 28.6-1 - Method 2
Design Wind Pressure, p_{s30}

Basic Speed	Roof Angle	Roof Pitch	Horizontal Pressures (psf)			
			A	B	C	D
110	0 to 5	flat	19.2	-10.0	12.7	-5.9
	10	2	21.6	-9.0	14.4	-5.2
	15	3	24.1	-8.0	16.0	-4.6
	20	4	26.6	-7.0	17.7	-3.9
	25	6	24.1	3.9	17.4	4.0
	30 to 45	7 to 12	21.6	14.8	17.2	11.8

Design Wind Pressure, p_s

Basic Speed	Roof Angle	Roof Pitch	Horizontal Pressures (psf)				
			A	B	C	D	
110	0 to 5	flat	24.8	-12.9	16.4	-7.6	
	10	2	27.9	-11.6	18.6	-6.7	
	15	3	31.1	-10.3	20.6	-5.9	
	20	**4**	**34.3**	**-9.0**	**22.8**	**-5.0**	**<<< 22degrees, LRFD**
	25	6	31.1	5.0	22.4	5.2	
	30 to 45	7 to 12	27.9	19.1	22.2	15.2	

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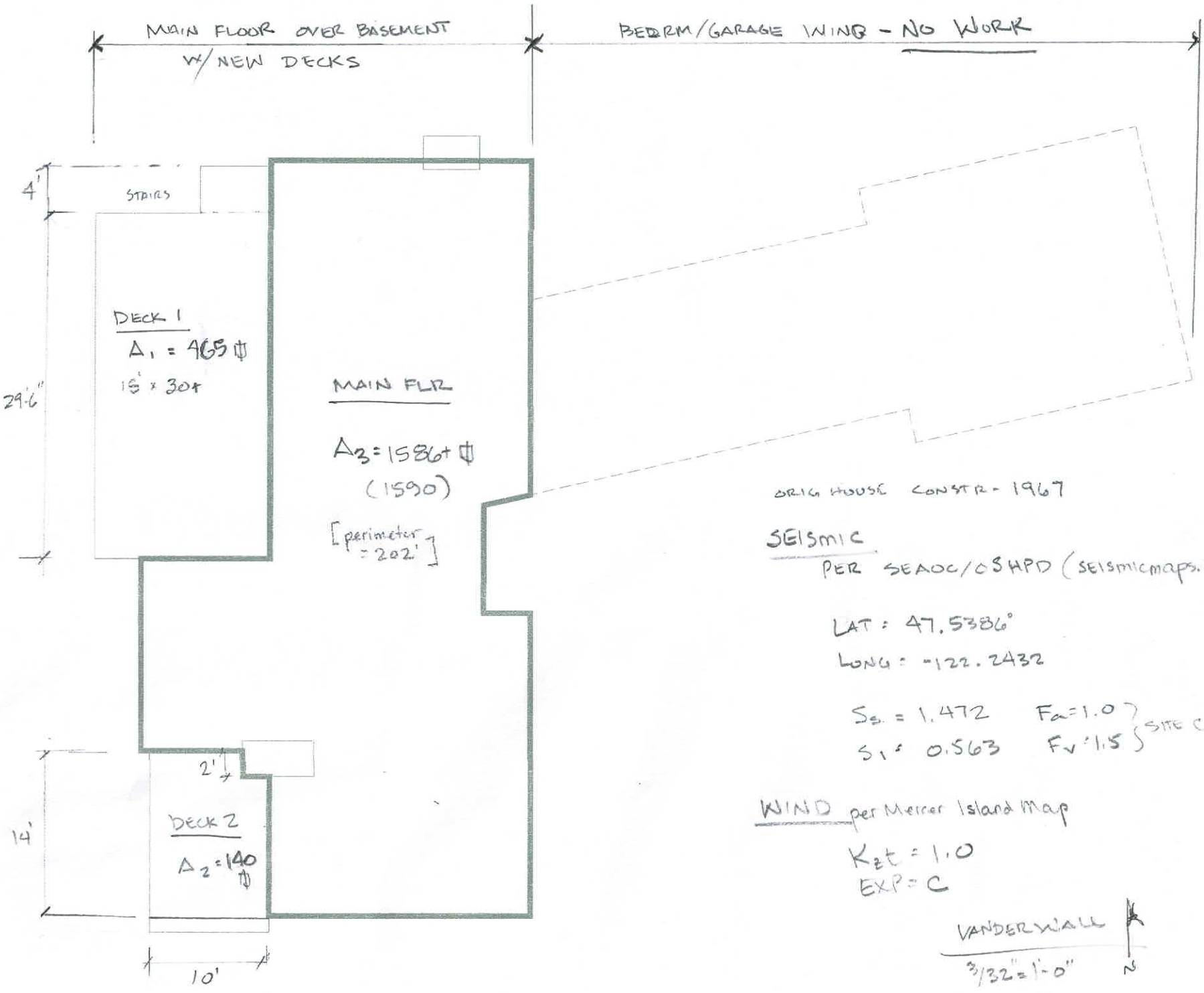


ORIG HOUSE CONSTR - 1967

SEISMIC

PER SEAOC/OSHPD (seismicmaps.org)

LAT : 47.5386°

LONG : -122.2432

S_s = 1.472 F_a = 1.0 } SITE CLASS D

S_1 = 0.563 F_v = 1.5 }

WIND per Mercer Island map

K_{zt} = 1.0

EXP = C

VANDERWALL

3/32" = 1'-0"

N

CHECK FOR $\rho = 1.3$?

$V_{STORY} = 5170^{\#}$

$.33 V_{STORY} = 1706^{\#}$

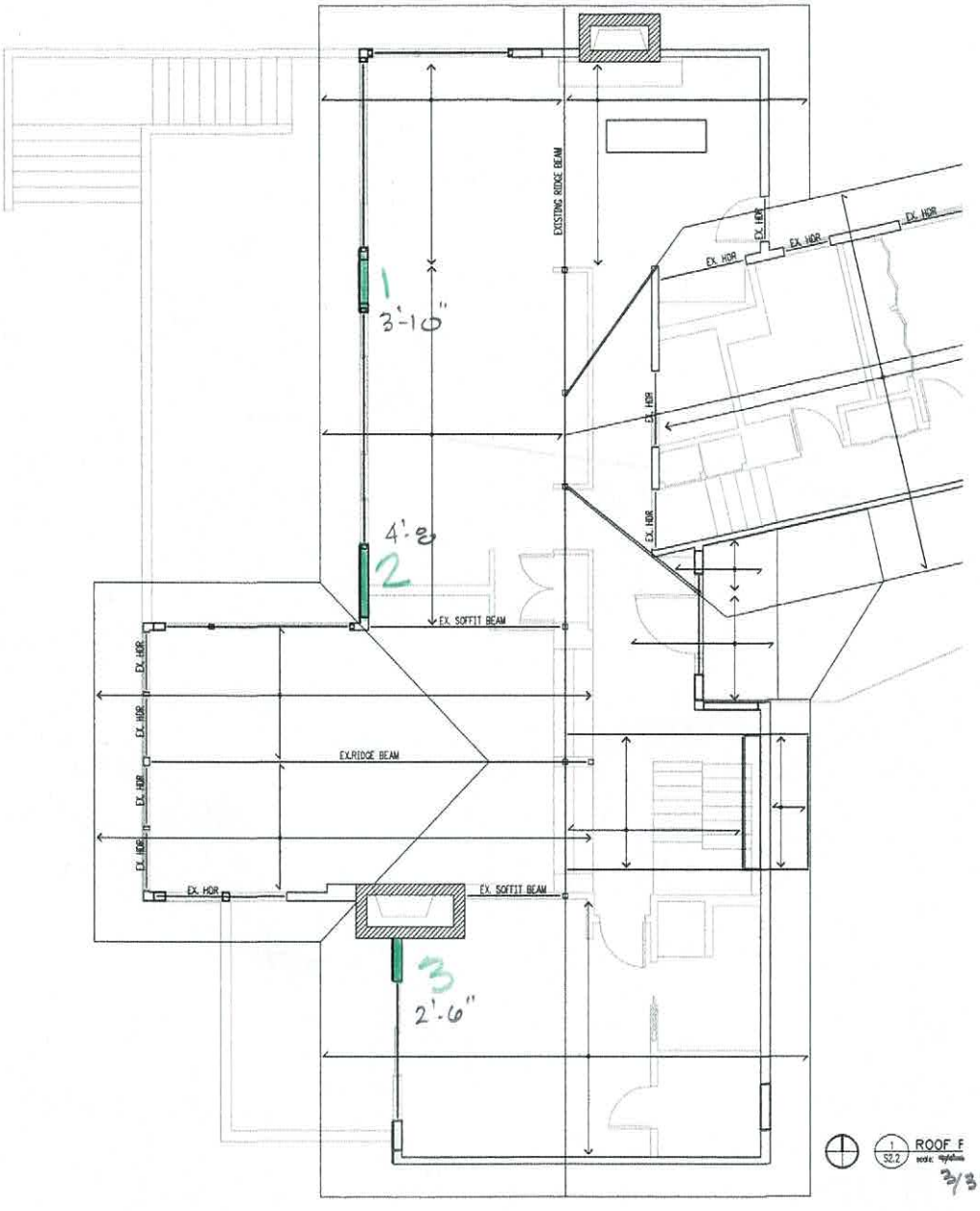
$h = 8'$

$L_{MIN} = 8/3.5 = \underline{2.28'}$

WEST WALL LINE

$V_{ROOF} = 2585^{\#}$

(EXISTING - NO ADDED LOAD)



1 / S2.2 ROOF F

3/32" = 1'-0"

ASSUMED EXIST TRIB. PATH TO EXTERIOR / PERIMETER WALLS

VANDERWALL

WIND ZONE A = 34.3 × 0.6 = 20.6 psf (ASD)
C = 22.8 × 0.6 = 13.7 psf (ASD)

a = 3.7 FT ~ 4 FT

NOTE - NEGLECT ROOF ZONES 2 & 3

TRIB TO ROOF h = 10' upper/2 = 5'
TO MRH (not plate)

2a to EACH END (FIG. 28.6-1)

$Y_{EAST/WEST}$ = 37'/2 = 18.5' TOTAL TRIB

$V_{NORTH/SOUTH}$ = 66'/2 = 33' TOTAL TRIB.

EAST/WEST WALLS

[(8' - 2a) × 5' × 21 psf] + [(10.5' - balance) × 5' × 14 psf] = 1575#
= 1.6K

Σ SEISMIC $V_{1/4}$ = 2.6K

NORTH/SOUTH WALLS

[(8' - 2a) × 5 × 21] + [(25' - balance) × 5' × 14] = 2590#

Σ SEISMIC = 2585#

USE SEISMIC

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VANDER WALL Project

Date

UPPER WALLS (WEST) AT NEW FRAMING

$L_1 = 3'\text{-}10''$; $L_2 = 4'\text{-}8''$; $L_3 = 2'\text{-}6''$ (MIN PIER)

$h = 8'$

$2L/h = 2(2.5)/8 = 0.625$

v west wall = $2585^{\#} / \Sigma L = 11' = 235$ plf

use SW3 (HF cap) - $v_{allow} = 455 \text{ plf} \times 0.625 = 284$ plf ✓

check $\rho = 1.0$

max PIER = $4.67' \times 235 \text{ plf} = 1097^{\#}$

$V_{STORY} = 5170^{\#} \times .33 = 1706^{\#}$ > max pier

∴ meets Table 12.3.3

$\rho = 1.0$

HOLDOWN @ wall ends T/C gross = $vh = 235 \times 8 = 1880^{\#}$

Bearing walls - MIN DL @ jamb

$1' \text{ TRIB} \times 10' \text{ span trib} \times 15 \text{ psf} = 150^{\#}$

$T_{net} = 1880 - .6(150) = 1790^{\#}$

⇒ CS14 STRAP

OR (2) CS 20 = $2060^{\#}$

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ASSUMED EXIST. TRIB PATH

- ROOF TO EXTERIOR WALLS (PERIMETER)
- MAIN FLR INCLUDES INTERIOR BEARING (GYPBD SHEATHED C. 1958) AND EXTERIOR WALLS

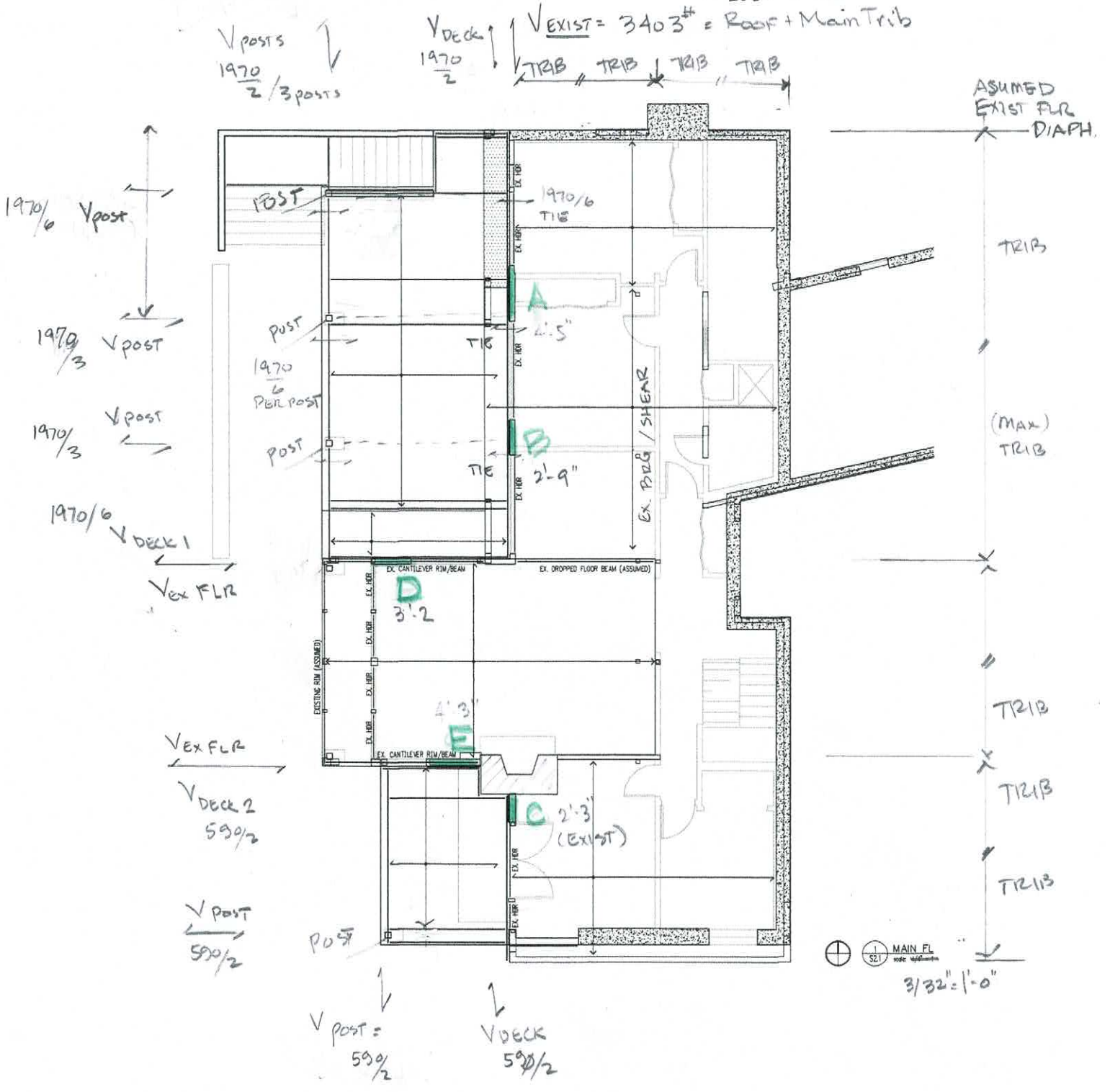
AT BASEMENT TO MAIN

$h = 7'-6"$

$L_{MIN} = 7.5'/3.5 = 2.14'$

(MIN 2'-2" allowed

$V_{EXIST} = 3403^{\#} = 2585^{\#} + 818^{\#}$ = Roof + Main Trib



VANDERWALL

WIND TO MAIN FLR DIAPH. AT FRAMING REVISIONS

NORTH/SOUTH CONC FDN - NO CHANG

TRIB WALL D = 25' USE ZONE C FOR INTERIOR ZONE

TRIB WALL E = 16' DITTO

TRIB TO WALLS A, B & C = 6' USE ZONE A (2a = 8')

TRIB HT = ½ (8' + 8' FLR HTS) = 8' (conserv, actual <)

V WIND WEST WALLS A,B & C = 8' × 20.6 psf × 6' = 990# (ASD)
+ 1575# ROOF
= 2565#

(SEE FOLLOWING FOR SEISMIC)

V WIND LINE D = 8' × 13.7 psf × 25' = 2740# (ASD)
+ Φ ROOF

V WIND LINE E = 8' × 13.7 × 16' = 1754# (ASD)
+ Φ ROOF

VS SEISMIC LINES D & E

V_E LINE D = 25' TRIB / 65' OVERALL × (3270# V STORY ASD) = 1258#
+ DECK 1 TRIB = 328
= 1586 < WIND

V_E LINE E = 16' TRIB / 65' × 3270# = 805#
+ DECK 2 TRIB = 295
= 1100# < WIND

@ D v_{max} = 2740# / 3.17' = 864 plf (WIND) → use SW4 (see following)

T/C gross = 864 × 7.5 = 6483#

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V_{WIND} WALLS A, B & C → Σ = 2565#

4.42 + 2.75' + 2.25' ⟶ N_W = 272 plf

$V_{SEISMIC}$ = ROOF + MAIN TRIB

= 2585# + 818# = 3403#

$N_{main\ house\ only}$ = 3403 / (4.42 + 2.75 + 2.25) = 361 plf

→ Add decks

Walls A & B + (deck 1 = 1970#/2)

= 985#

$N_{deck\ 1}$ = 985 / (4.42 + 2.75) = 137 plf

∴ $\Sigma N_{A\&B}$ = 498+ plf

Wall C + deck 2 = 590#/2

= 295#

$N_{deck\ 2}$ = 295 / 2.25' = 131 plf

∴ N_C = 498 plf

S.W. reduction: 2'L_{min} / h = 2(2.5) / 7.5 = 0.6

$N_{cap\ req'd}$ = 498 / .6 = 830

⇒ SINGLE SIDE (OUTSIDE FACE)

19/32" w/ 10d @ 2" o.c. - Table 4.3A - SW4

Seismic N_{all} = 1740# / 2 = 870 plf ✓

Wind N_{all} = 2435# / 2 = 1215 plf ✓

T/C gross = 498 plf × 7.5' plate = 3735#

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REMEDIATION HOLDOWN STRAPS

EXTERIOR FACE TO STEM

1) E_V (SEISMIC CONTROLED) = 3735# / .7 = 5336#

DL RESIST = 8' TRIB × 15 psf × (1.5' ≈ 4/2) = 180#

T_u = 5336 - .9(180) = **5174#**

EPOXY ½"ϕ - (3) TOTAL

2) W_V (WIND CONTROLED) = 6483# / .6 = 10805#

DL RESIST = 18' TRIB (2 STORY) × (3' WALL + BM + R) × 30 psf ROOF + FLR = 1620#

T_u = 10805 - .9(1620#) = **9347**

EPOXY ½"ϕ

(8) TOTAL

NOTE 10% CLOSE ENOUGH

SDS SCREWS TO WALL STUDS

Z (2 2× STUDS) = 250# (DF) × 1.6 = 400#/SCREW

$T_{gross\ max}$ = 6483# / 400 = 16.2 → 18 MIN SCREWS

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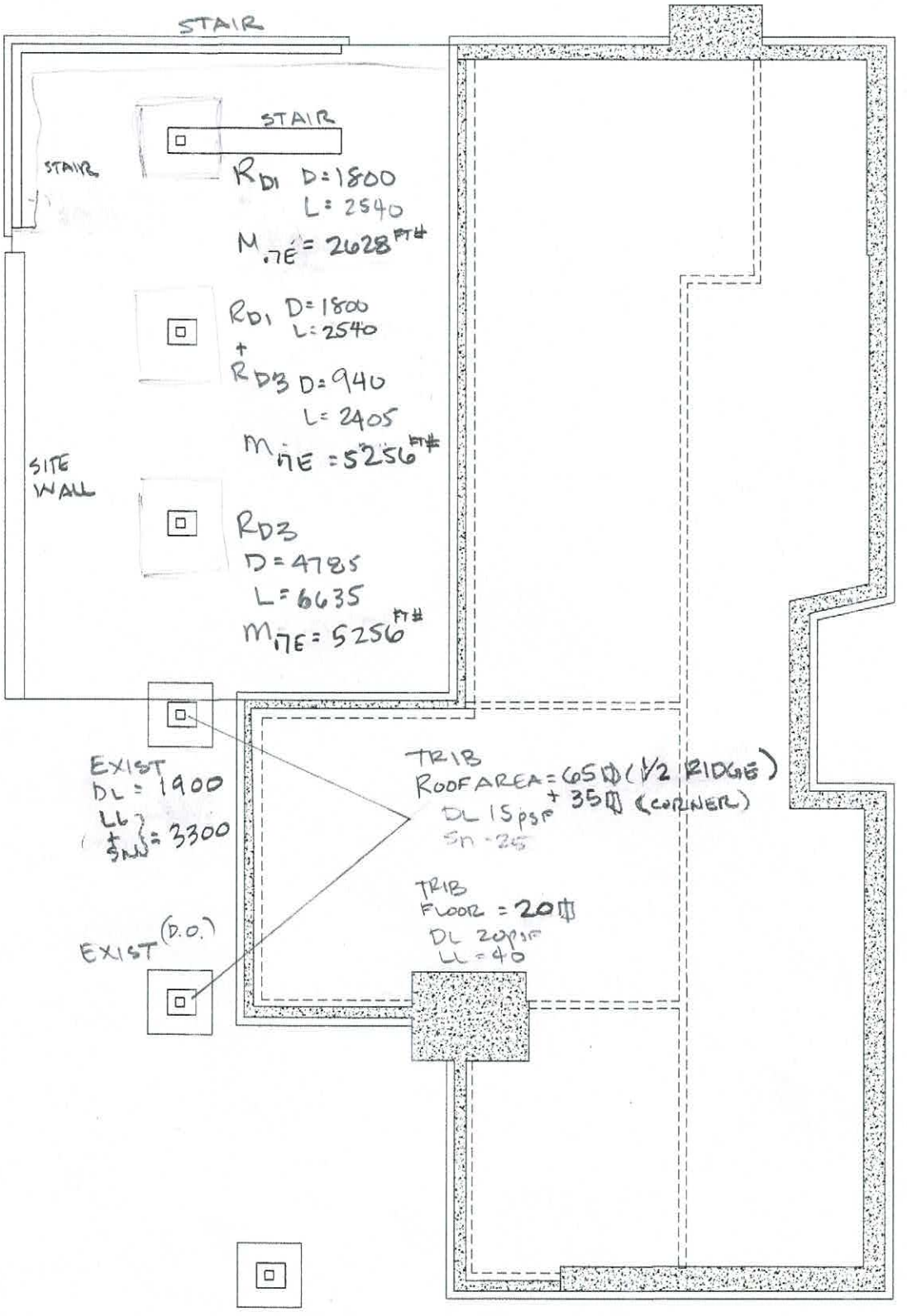

VANDERWALL
LOADS TO POST & PILES

DECK POSTS

MAX F_p/POST = 1970#/3 = 657# @ 8' MAX

MAX AXIAL: D = 4785# } = 11420# D+L
L = 6635# }

$M_{.7E} = 657^{\#} \times 8' = 5256^{FT\#}$

$P_{.7E} = 0.2 S_{DS} \times DL = .2(.98) \times 4785^{\#} = \pm 977^{\#}$
<10% D+L

HSS 3½ × 3½ × ¼

$M_p/\Omega = 8.03^{K\cdot FT}$ $P_n/\Omega = 56^{K}$

COMBINED 5.13K/8KF + 12K/56K = 0.84 < 1.0 ✓

$EI = 29\times10^6 psi \times 5in^4 = 145\times10^6 in^2\cdot lb$

$\Delta = PL^3/3EI = 65T^{\#} \times (8\times12)^3 / 3(145\times10^6) \frac{T}{lb} = 1.34in$

$\delta_{all} = .02H = .02(96") = 1.92 \rightarrow$ NO GOOD for $C_d = 4$

→ HSS 5 × 5 × ¼ $I = 16 in^4$

$\Delta = 657 \times 96in^3 / 3(29\times10^6)(16) = 0.42in$

$\delta = C_d\Delta = 4 \times .42 = 1.67 < 1.94 = .02H$ ✓

Use HSS 5 × 5 × ¼

ANCHORAGE TO FTG

1.0E $M_u = 5256/.7 = 7508^{FT\#}$

$V_u = 657/.7 = 940^{\#}$

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SECTION 4: FOUNDATION

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FOOTING WITH COMBINED AXIAL AND FLEXURAL LOADS

MAX DECK POST MOMENT

Sizes and Loads:

superstructure:

frame	0	lb- neglect any dead load	

footing:

length	5.00	ft	(along same axis as applied moment)
width	5.00	ft	(perpendicular to applied moment)
depth	1.00	ft	
weight	3,625	lb	
soil abv.	1,500	lb	
total R =	5,125	lb	
M =	5,256	lbft	
e =	1.03	ft	
B/6 =	0.83	ft	

Bearing Pressures:

Reaction is OUTSIDE kern.

(Use these results)			(Do not use these results)			
x =	1.47	ft	fa =	205	psf	
			fb =	252	psf	
fp =	463	psf	fp =	457	psf	
Fa =	1,200	psf	Fa =	1,200	psf	EQUIV FOR ONE PILE /5-SQFT

Stability:

Mot =	5,256	lbft	(using 0.7E)
Mr =	7,688	lbft	(using 0.6D, per ASD Load Combinations)

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Company:		Date:	1/4/2021
Engineer:	K.Warner	Page:	1/5
Project:	Moment Post anchors		
Address:			
Phone:			
E-mail:			

1.Project information

Customer company:
Customer contact name:
Customer e-mail:
Comment:

Project description:
Location:
Fastening description:

2. Input Data & Anchor Parameters

General
Design method:ACI 318-11
Units: Imperial units

Anchor Information:
Anchor type: Cast-in-place
Material: F1554 Grade 36
Diameter (inch): 0.750
Effective Embedment depth, h_{ef} (inch): 8.000
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 9.50
C_{min} (inch): 1.22
S_{min} (inch): 3.00

Base Material
Concrete: Normal-weight
Concrete thickness, h (inch): 12.00
State: Cracked
Compressive strength, f'_c (psi): 2500
$\Psi_{c,V}$: 1.0
Reinforcement condition: B tension, B shear
Supplemental reinforcement: Not applicable
Reinforcement provided at corners: No
Ignore concrete breakout in tension: No
Ignore concrete breakout in shear: No
Ignore 6do requirement: Yes
Build-up grout pad: No

Base Plate
Length x Width x Thickness (inch): 11.00 x 11.00 x 0.50

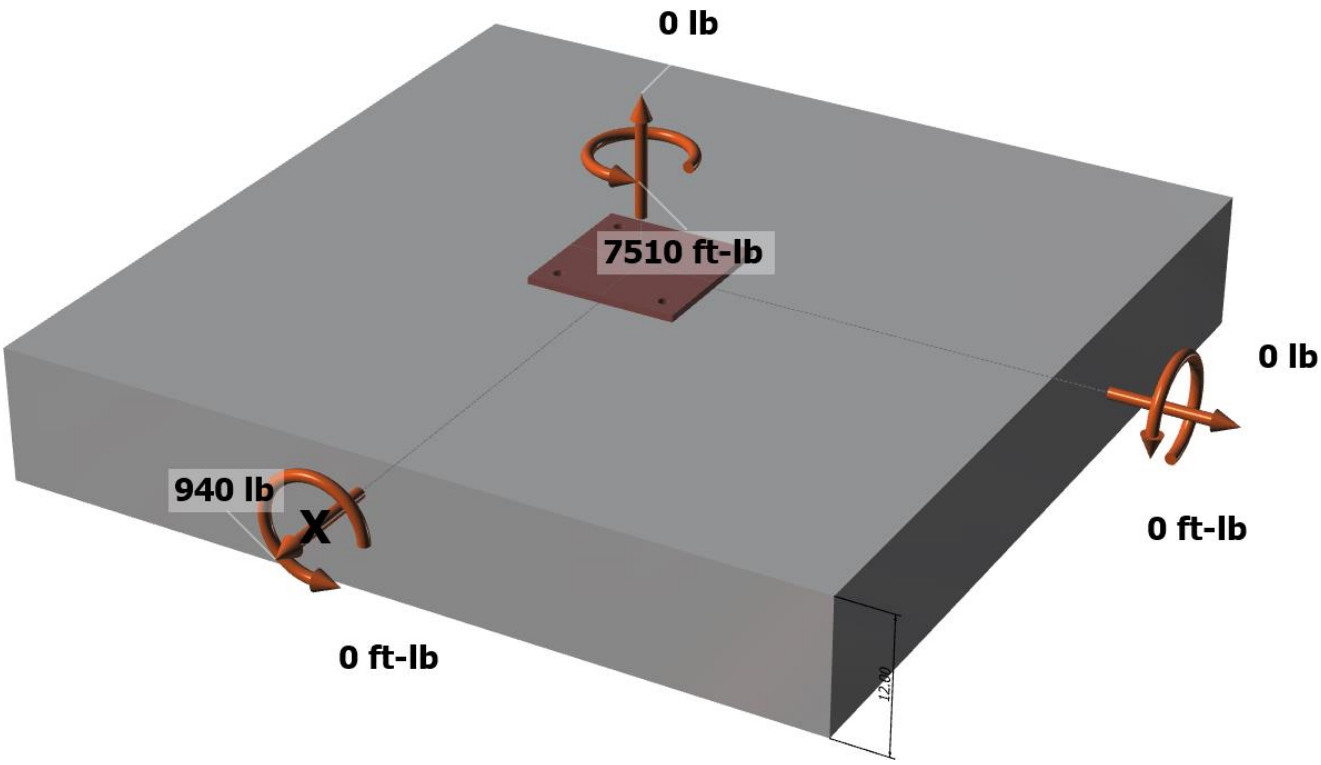
Recommended Anchor
Anchor Name: Heavy Hex Bolt - 3/4"Ø Heavy Hex Bolt, F1554 Gr. 36

Load and Geometry
Load factor source: ACI 318 Section 9.2
Load combination: not set
Seismic design: Yes
Anchors subjected to sustained tension: Not applicable
Ductility section for tension: D.3.3.4.3 (c) is satisfied
Ductility section for shear: D.3.3.5.3 (b) is satisfied
Ω_0 factor: not set
Apply entire shear load at front row: No
Anchors only resisting wind and/or seismic loads: Yes

Strength level loads:

N_{ua} [lb]: 0
V_{uax} [lb]: 940
V_{uay} [lb]: 0
M_{ux} [ft-lb]: 0
M_{uy} [ft-lb]: 0
M_{uz} [ft-lb]: 7510

<Figure 1>



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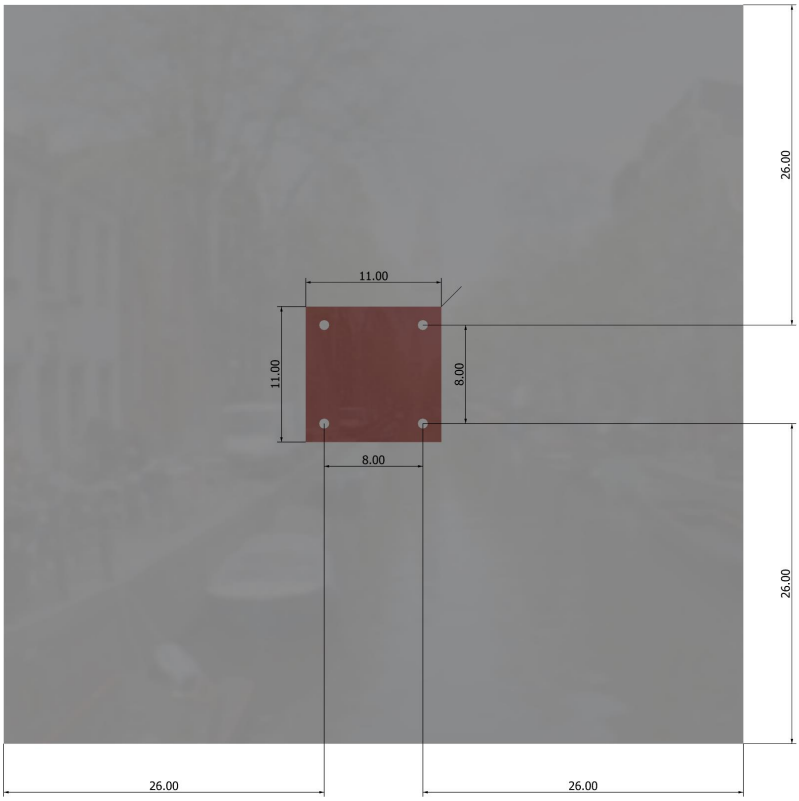
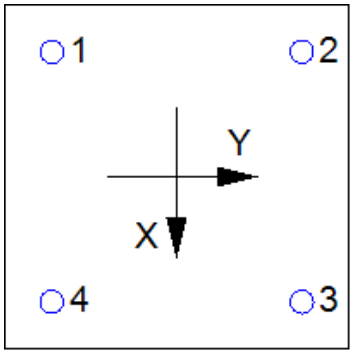


3. Resulting Anchor Forces

Anchor	Tension load, N_{ua} (lb)	Shear load x, V_{uax} (lb)	Shear load y, V_{uay} (lb)	Shear load combined, $\sqrt{(V_{uax})^2+(V_{uay})^2}$ (lb)
1	0.0	3051.2	-2816.2	4152.1
2	0.0	-2581.2	-2816.2	3820.1
3	0.0	-2581.2	2816.2	3820.1
4	0.0	3051.2	2816.2	4152.1
Sum	0.0	940.0	0.0	15944.5

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 0
Resultant compression force (lb): 0
Eccentricity of resultant tension forces in x-axis, e'_{Nx} (inch): 0.00
Eccentricity of resultant tension forces in y-axis, e'_{Ny} (inch): 0.00
Eccentricity of resultant shear forces in x-axis, e'_{Vx} (inch): 0.00
Eccentricity of resultant shear forces in y-axis, e'_{Vy} (inch): 0.00

<Figure 3>



8. Steel Strength of Anchor in Shear (Sec. D.6.1)

V_{sa} (lb)	ϕ_{grout}	ϕ	$\phi_{grout}\phi V_{sa}$ (lb)
11625	1.0	0.65	7556

9. Concrete Breakout Strength of Anchor in Shear (Sec. D.6.2)

Shear perpendicular to edge in y-direction:

$V_{by} = \min|7(l_e / d_a)^{0.2}\sqrt{d_a}\lambda_a\sqrt{f'_c}c_{a1}^{1.5};\ 9\lambda_a\sqrt{f'_c}c_{a1}^{1.5}|$ (Eq. D-33 & Eq. D-34)

l_e (in)	d_a (in)	λ_a	f'_c (psi)	c_{a1} (in)	V_{by} (lb)
6.00	0.750	1.00	2500	22.67	48562

$\phi V_{cbgy} = \phi\,(A_{Vc} / A_{Vco})\,\Psi_{ec,V}\Psi_{ed,V}\Psi_{c,V}\Psi_{h,V}V_{by}$ (Sec. D.4.1 & Eq. D-31)

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ec,V}$	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{by} (lb)	ϕ	ϕV_{cbgy} (lb)
720.00	2312.00	1.000	0.929	1.000	1.683	48562	0.70	16561

Shear perpendicular to edge in x-direction:

$V_{bx} = \min|7(l_e / d_a)^{0.2}\sqrt{d_a}\lambda_a\sqrt{f'_c}c_{a1}^{1.5};\ 9\lambda_a\sqrt{f'_c}c_{a1}^{1.5}|$ (Eq. D-33 & Eq. D-34)

l_e (in)	d_a (in)	λ_a	f'_c (psi)	c_{a1} (in)	V_{bx} (lb)
6.00	0.750	1.00	2500	22.67	48562

$\phi V_{cbgx} = \phi\,(A_{Vc} / A_{Vco})\,\Psi_{ec,V}\Psi_{ed,V}\Psi_{c,V}\Psi_{h,V}V_{bx}$ (Sec. D.4.1 & Eq. D-31)

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ec,V}$	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{bx} (lb)	ϕ	ϕV_{cbgx} (lb)
720.00	2312.00	1.000	0.929	1.000	1.683	48562	0.70	16561

Shear parallel to edge in x-direction:

$V_{by} = \min|7(l_e / d_a)^{0.2}\sqrt{d_a}\lambda_a\sqrt{f'_c}c_{a1}^{1.5};\ 9\lambda_a\sqrt{f'_c}c_{a1}^{1.5}|$ (Eq. D-33 & Eq. D-34)

l_e (in)	d_a (in)	λ_a	f'_c (psi)	c_{a1} (in)	V_{by} (lb)
6.00	0.750	1.00	2500	17.33	32474

$\phi V_{cbgx} = \phi\ (2)(A_{Vc} / A_{Vco})\, \Psi_{ec,V}\, \Psi_{ed,V}\, \Psi_{c,V}\, \Psi_{h,V} V_{by}$ (Sec. D.4.1 & Eq. D-31)

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ec,V}$	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{by} (lb)	ϕ	ϕV_{cbgx} (lb)
720.00	1352.00	1.000	1.000	1.000	1.472	32474	0.70	35638

Shear parallel to edge in y-direction:

$V_{bx} = \min|7(l_e / d_a)^{0.2}\sqrt{d_a}\lambda_a\sqrt{f'_c}c_{a1}^{1.5};\ 9\lambda_a\sqrt{f'_c}c_{a1}^{1.5}|$ (Eq. D-33 & Eq. D-34)

l_e (in)	d_a (in)	λ_a	f'_c (psi)	c_{a1} (in)	V_{bx} (lb)
6.00	0.750	1.00	2500	17.33	32474

$\phi V_{cbgy} = \phi\ (2)(A_{Vc} / A_{Vco})\, \Psi_{ec,V}\, \Psi_{ed,V}\, \Psi_{c,V}\, \Psi_{h,V} V_{bx}$ (Sec. D.4.1 & Eq. D-31)

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ec,V}$	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{bx} (lb)	ϕ	ϕV_{cbgy} (lb)
720.00	1352.00	1.000	1.000	1.000	1.472	32474	0.70	35638

10. Concrete Pryout Strength of Anchor in Shear (Sec. D.6.3)

$\phi V_{cp} = \phi k_{cp} N_{cb} = \phi k_{cp} (A_{Nc} / A_{Nco})\, \Psi_{ed,N}\, \Psi_{c,N}\, \Psi_{cp,N} N_b$ (Sec. D.4.1 & Eq. D-40)

k_{cp}	A_{Nc} (in^2)	A_{Nco} (in^2)	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	ϕ	ϕV_{cp} (lb)
2.0	256.00	576.00	1.000	1.000	1.000	27153	0.70	16895

11. Results

11. Interaction of Tensile and Shear Forces (Sec. D.7)?

Shear	Factored Load, V_{ua} (lb)	Design Strength, øV_n (lb)	Ratio	Status
Steel	**4152**	**7556**	**0.55**	**Pass (Governs)**
T Concrete breakout y+	5632	16561	0.34	Pass
T Concrete breakout x+	6102	16561	0.37	Pass
|| Concrete breakout y-	6102	35638	0.17	Pass
|| Concrete breakout x-	5632	35638	0.16	Pass
Concrete breakout, combined	-	-	0.50	Pass
Pryout	4152	16895	0.25	Pass

3/4"Ø Heavy Hex Bolt, F1554 Gr. 36 with hef = 8.000 inch meets the selected design criteria.

12. Warnings

- Minimum spacing and edge distance requirement of 6da per ACI 318 Sections D.8.1 and D.8.2 for torqued cast-in-place anchor is waived per designer option.

- Per designer input, ductility requirements for tension have been determined to be satisfied – designer to verify.

- Per designer input, ductility requirements for shear have been determined to be satisfied – designer to verify.

- Designer must exercise own judgement to determine if this design is suitable.

Company:	HVE	Date:	11/20/2017
Engineer:	k.warner	Page:	1/5
Project:			
Address:	1932 1st Ave, Suite 720, Seattle, WA		
Phone:			
E-mail:			

1.Project information

Customer company:
Customer contact name:
Customer e-mail:
Comment: Strap Holdown- Walls A, B, C

Project description: Exist 6" stem wall-midwall
Location: Washington
Fastening description: Seismic Anchors-retrofit

2. Input Data & Anchor Parameters

General
Design method:ACI 318-14
Units: Imperial units

Anchor Information:
Anchor type: Bonded anchor
Material: F1554 Grade 36
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 4.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 5.25
c_{ac} (inch): 9.16
C_{min} (inch): 1.75
S_{min} (inch): 3.00

Base Material
Concrete: Normal-weight
Concrete thickness, h (inch): 6.00
State: Cracked
Compressive strength, f'_c (psi): 2500
$\Psi_{c,V}$: 1.0
Reinforcement condition: B tension, B shear
Supplemental reinforcement: Not applicable
Reinforcement provided at corners: No
Ignore concrete breakout in tension: No
Ignore concrete breakout in shear: No
Hole condition: Dry concrete
Inspection: Continuous
Temperature range, Short/Long: 150/110°F
Ignore 6do requirement: Not applicable
Build-up grout pad: No

Base Plate
Length x Width x Thickness (inch): 3.00 x 9.50 x 0.25

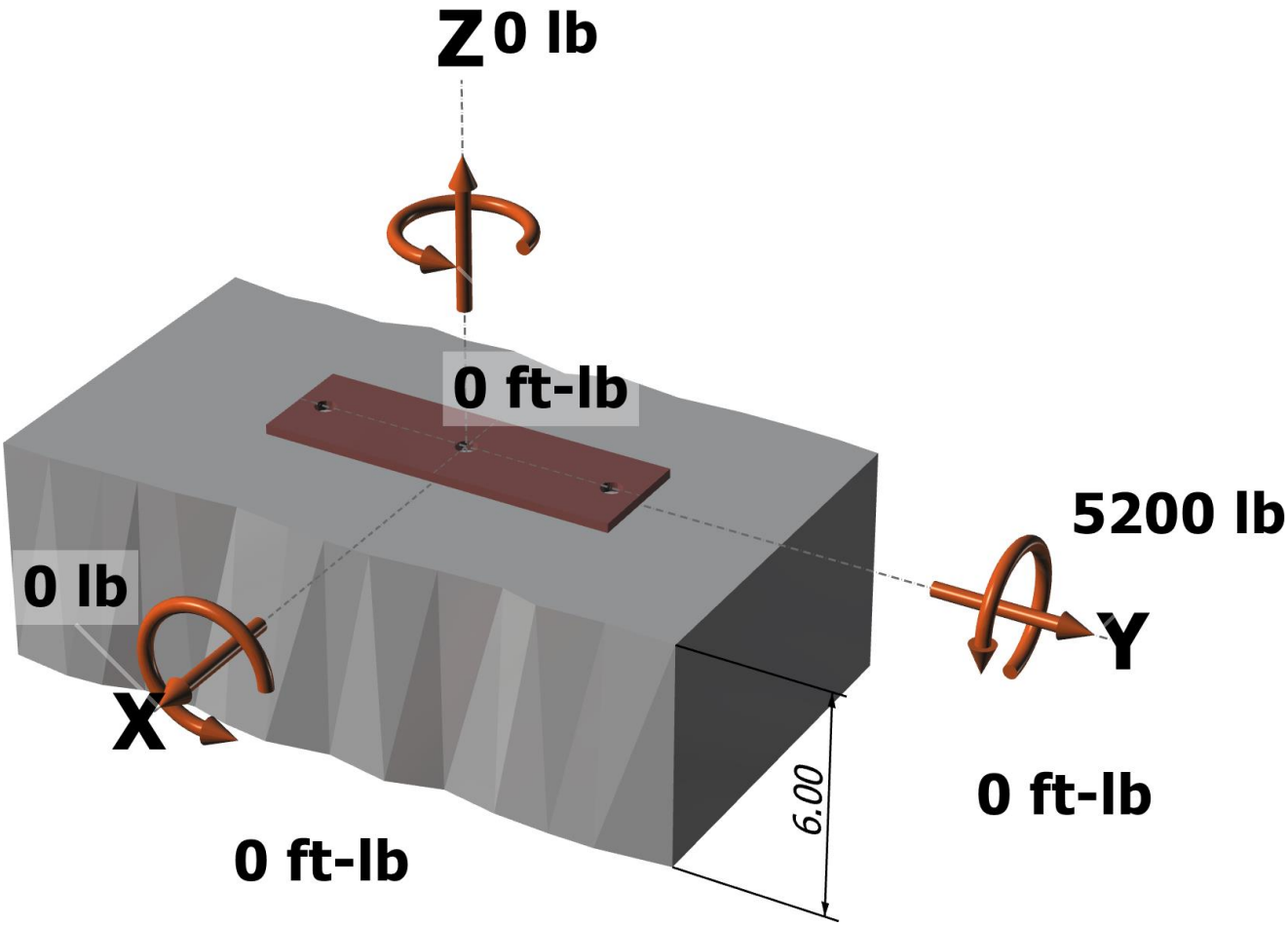
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø F1554 Gr. 36
Code Report: IAPMO UES ER-263

Load and Geometry
Load factor source: ACI 318 Section 5.3
Load combination: not set
Seismic design: Yes
Anchors subjected to sustained tension: No
Ductility section for tension: 17.2.3.4.2 not applicable
Ductility section for shear: 17.2.3.5.3 (b) is satisfied
Ω_0 factor: not set
Apply entire shear load at front row: No
Anchors only resisting wind and/or seismic loads: Yes

Strength level loads:

N_{ua} [lb]: 0
V_{uax} [lb]: 0
V_{uay} [lb]: 5200
M_{ux} [ft-lb]: 0
M_{uy} [ft-lb]: 0
M_{uz} [ft-lb]: 0

<Figure 1>



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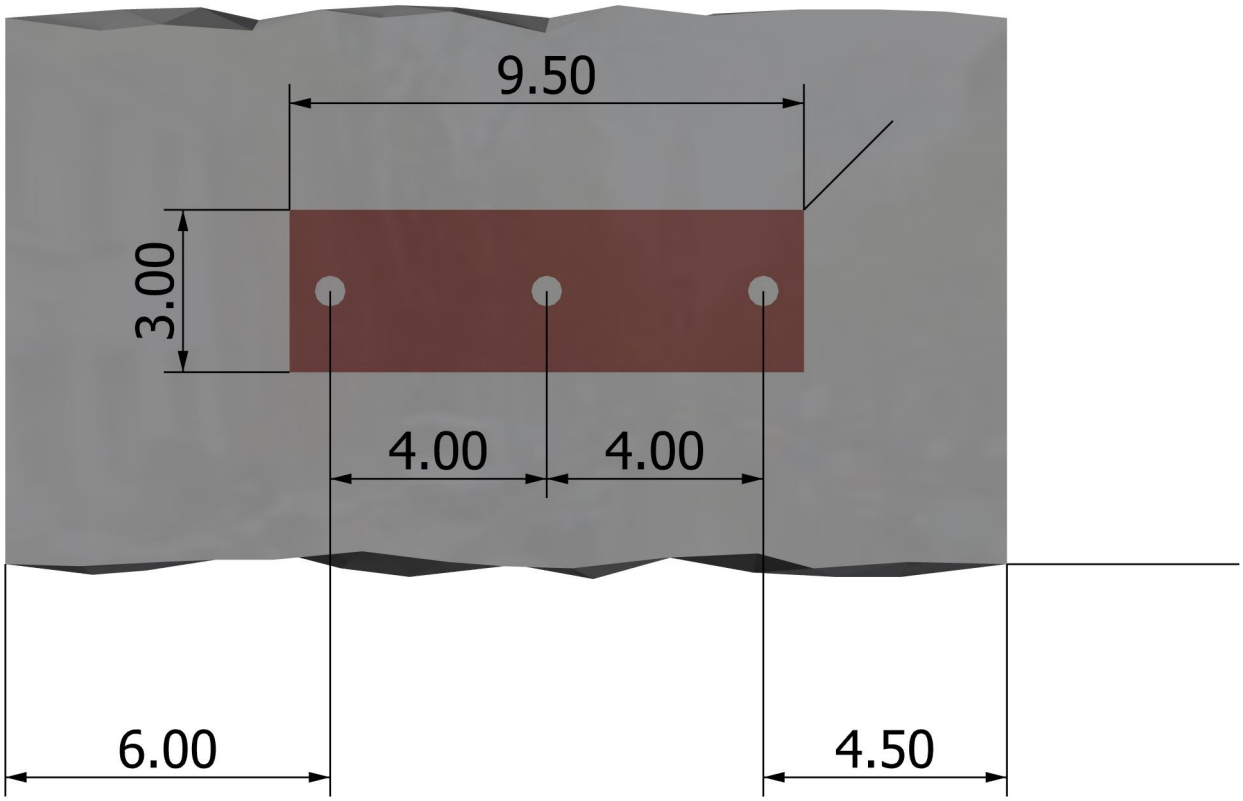
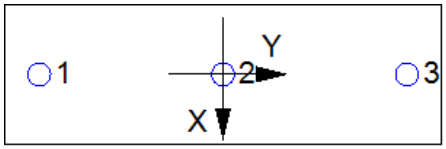


3. Resulting Anchor Forces

Anchor	Tension load, N_{ua} (lb)	Shear load x, V_{uax} (lb)	Shear load y, V_{uay} (lb)	Shear load combined, $\sqrt{(V_{uax})^2+(V_{uay})^2}$ (lb)
1	0.0	0.0	1733.3	1733.3
2	0.0	0.0	1733.3	1733.3
3	0.0	0.0	1733.3	1733.3
Sum	0.0	0.0	5200.0	5200.0

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 0
Resultant compression force (lb): 0
Eccentricity of resultant tension forces in x-axis, e'_{Nx} (inch): 0.00
Eccentricity of resultant tension forces in y-axis, e'_{Ny} (inch): 0.00
Eccentricity of resultant shear forces in x-axis, e'_{Vx} (inch): 0.00
Eccentricity of resultant shear forces in y-axis, e'_{Vy} (inch): 0.00

<Figure 3>



8. Steel Strength of Anchor in Shear (Sec. 17.5.1)

V_{sa} (lb)	ϕ_{grout}	ϕ	$\alpha_{V,seis}$	$\phi_{grout}\alpha_{V,seis}\phi V_{sa}$ (lb)
4940	1.0	0.65	0.85	2729

9. Concrete Breakout Strength of Anchor in Shear (Sec. 17.5.2)

Shear perpendicular to edge in y-direction:

$V_{by} = \min|7(l_e / d_a)^{0.2}\sqrt{d_a}\lambda_a\sqrt{f'_c}c_{a1}^{1.5};\ 9\lambda_a\sqrt{f'_c}c_{a1}^{1.5}|$ (Eq. 17.5.2.2a & Eq. 17.5.2.2b)

l_e (in)	d_a (in)	λ_a	f'_c (psi)	c_{a1} (in)	V_{by} (lb)
4.00	0.500	1.00	2500	12.50	16578

$\phi V_{cby} = \phi\,(A_{Vc} / A_{Vco})\,\Psi_{ed,V}\,\Psi_{c,V}\,\Psi_{h,V}V_{by}$ (Sec. 17.3.1 & Eq. 17.5.2.1a)

A_{Vc} (in^2)	A_{Vco} (in^2)	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{by} (lb)	ϕ	ϕV_{cby} (lb)
225.00	703.13	1.000	1.000	1.768	16578	0.70	6565

10. Concrete Pryout Strength of Anchor in Shear (Sec. 17.5.3)

$\phi V_{cpg} = \phi \min|k_{cp}N_{ag};\ k_{cp}N_{cbg}| = \phi \min|k_{cp}(A_{Na} / A_{Na0})\,\Psi_{ec,Na}\,\Psi_{ed,Na}\,\Psi_{cp,Na}N_{ba};\ k_{cp}(A_{Nc} / A_{Nco})\,\Psi_{ec,N}\,\Psi_{ed,N}\,\Psi_{c,N}\,\Psi_{cp,N}N_b|$ (Sec. 17.3.1 & Eq. 17.5.3.1b)

k_{cp}	A_{Na} (in^2)	A_{Na0} (in^2)	$\Psi_{ed,Na}$	$\Psi_{ec,Na}$	$\Psi_{cp,Na}$	N_{ba} (lb)	N_a (lb)
2.0	222.42	144.55	0.925	1.000	1.000	5528	7864

A_{Nc} (in^2)	A_{Nco} (in^2)	$\Psi_{ec,N}$	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	N_{cb} (lb)	ϕ
222.00	144.00	1.000	0.925	1.000	1.000	6800	9697	0.70

ϕV_{cpg} (lb)
11010

11. Results

11. Interaction of Tensile and Shear Forces (Sec. D.7)?

Shear	Factored Load, V_{ua} (lb)	Design Strength, ϕV_n (lb)	Ratio	Status
Steel	1733	2729	0.64	Pass
T Concrete breakout y+	**5200**	**6565**	**0.79**	**Pass (Governs)**
Pryout	5200	11010	0.47	Pass

AT-XP w/ 1/2"Ø F1554 Gr. 36 with hef = 4.000 inch meets the selected design criteria.

12. Warnings

- Per designer input, the tensile component of the strength-level earthquake force applied to anchors does not exceed 20 percent of the total factored anchor tensile force associated with the same load combination. Therefore the ductility requirements of ACI 318 17.2.3.4.2 for tension need not be satisfied – designer to verify.

- Per designer input, ductility requirements for shear have been determined to be satisfied – designer to verify.

- Designer must exercise own judgement to determine if this design is suitable.

- Refer to manufacturer's product literature for hole cleaning and installation instructions.

Company:	HVE	Date:	11/20/2017
Engineer:	k.warner	Page:	1/5
Project:			
Address:	1932 1st Ave, Suite 720, Seattle, WA		
Phone:			
E-mail:			

1.Project information

Customer company:
Customer contact name:
Customer e-mail:
Comment: Strap Holdown- Wall D

Project description: Exist 6" stem wall-midwall
Location: Washington
Fastening description: Wind Anchors-retrofit

2. Input Data & Anchor Parameters

General
Design method:ACI 318-14
Units: Imperial units

Anchor Information:
Anchor type: Bonded anchor
Material: F1554 Grade 36
Diameter (inch): 0.500
Effective Embedment depth, h_{ef} (inch): 4.000
Code report: IAPMO UES ER-263
Anchor category: -
Anchor ductility: Yes
h_{min} (inch): 5.25
c_{ac} (inch): 9.16
C_{min} (inch): 1.75
S_{min} (inch): 3.00

Base Material
Concrete: Normal-weight
Concrete thickness, h (inch): 6.00
State: Cracked
Compressive strength, f'_c (psi): 2500
$\Psi_{c,V}$: 1.0
Reinforcement condition: B tension, B shear
Supplemental reinforcement: Not applicable
Reinforcement provided at corners: No
Ignore concrete breakout in tension: No
Ignore concrete breakout in shear: No
Hole condition: Dry concrete
Inspection: Continuous
Temperature range, Short/Long: 150/110°F
Ignore 6do requirement: Not applicable
Build-up grout pad: No

Base Plate
Length x Width x Thickness (inch): 4.75 x 14.00 x 0.25

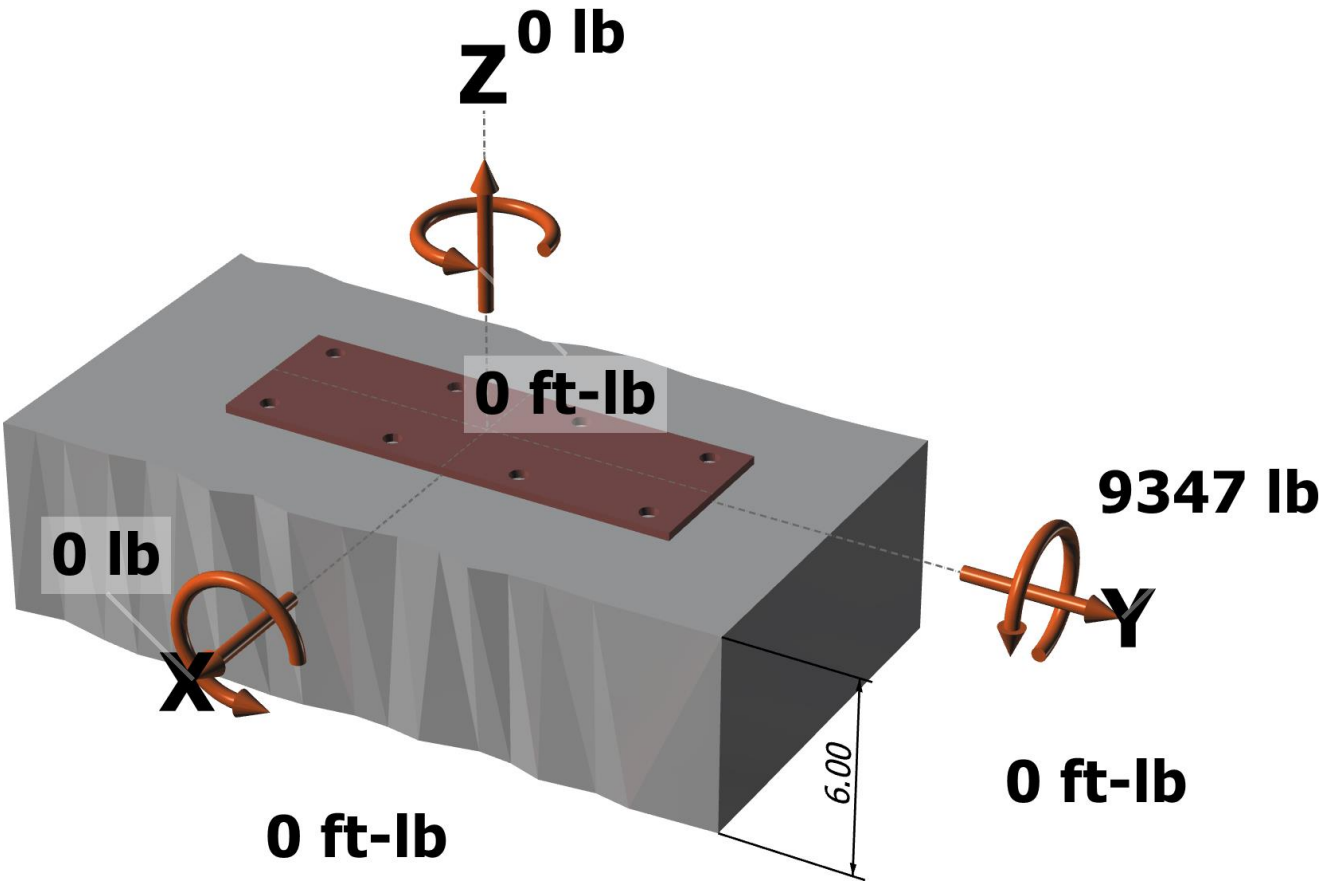
Recommended Anchor
Anchor Name: AT-XP® - AT-XP w/ 1/2"Ø F1554 Gr. 36
Code Report: IAPMO UES ER-263

Load and Geometry
Load factor source: ACI 318 Section 5.3
Load combination: not set
Seismic design: No
Anchors subjected to sustained tension: No
Apply entire shear load at front row: No
Anchors only resisting wind and/or seismic loads: Yes

Strength level loads:

N_{ua} [lb]: 0
V_{uax} [lb]: 0
V_{uay} [lb]: 9347
M_{ux} [ft-lb]: 0
M_{uy} [ft-lb]: 0
M_{uz} [ft-lb]: 0

<Figure 1>



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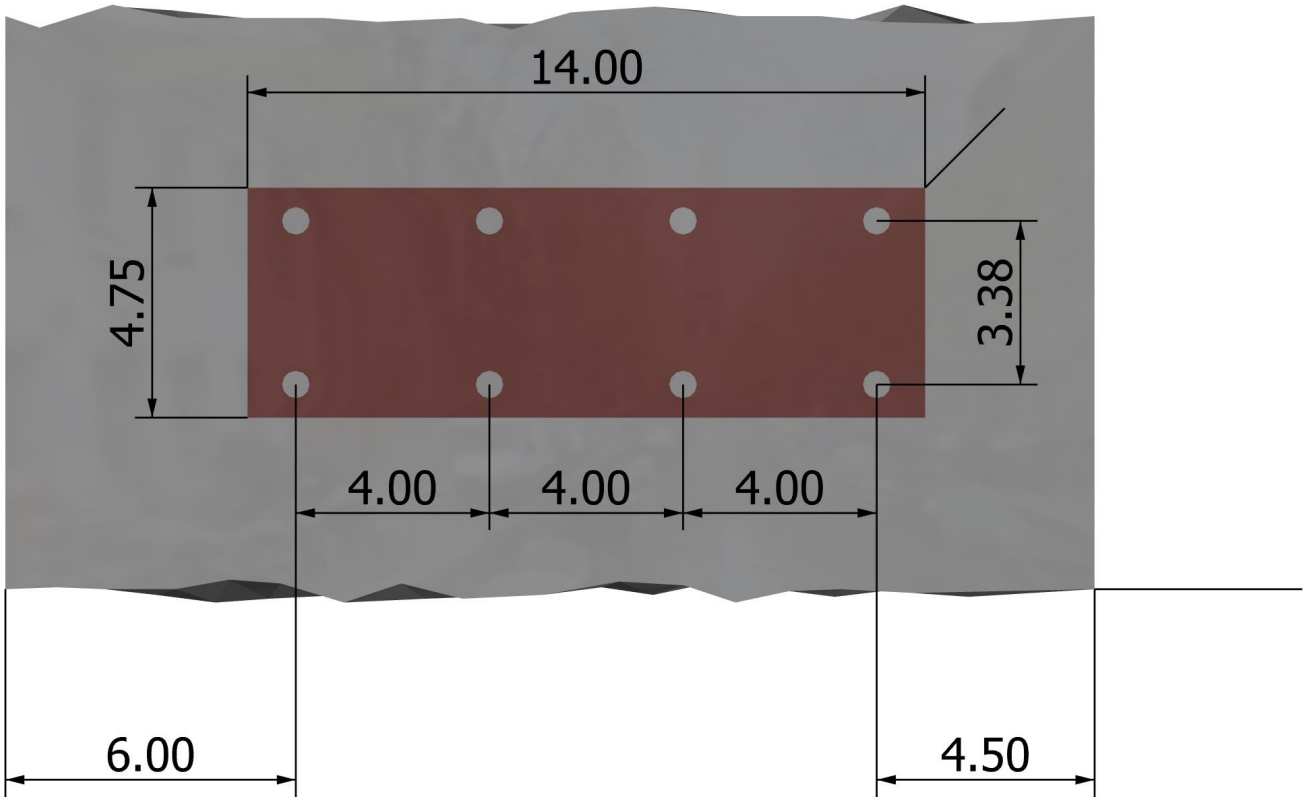
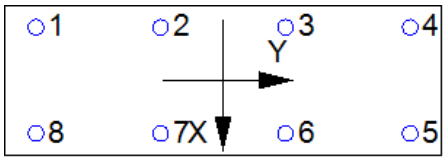


3. Resulting Anchor Forces

Anchor	Tension load, N_{ua} (lb)	Shear load x, V_{uax} (lb)	Shear load y, V_{uay} (lb)	Shear load combined, $\sqrt{(V_{uax})^2+(V_{uay})^2}$ (lb)
1	0.0	0.0	1168.4	1168.4
2	0.0	0.0	1168.4	1168.4
3	0.0	0.0	1168.4	1168.4
4	0.0	0.0	1168.4	1168.4
5	0.0	0.0	1168.4	1168.4
6	0.0	0.0	1168.4	1168.4
7	0.0	0.0	1168.4	1168.4
8	0.0	0.0	1168.4	1168.4
Sum	0.0	0.0	9347.0	9347.0

Maximum concrete compression strain (‰): 0.00
Maximum concrete compression stress (psi): 0
Resultant tension force (lb): 0
Resultant compression force (lb): 0
Eccentricity of resultant tension forces in x-axis, e'_{Nx} (inch): 0.00
Eccentricity of resultant tension forces in y-axis, e'_{Ny} (inch): 0.00
Eccentricity of resultant shear forces in x-axis, e'_{Vx} (inch): 0.00
Eccentricity of resultant shear forces in y-axis, e'_{Vy} (inch): 0.00

<Figure 3>



8. Steel Strength of Anchor in Shear (Sec. 17.5.1)

V_{sa} (lb)	ϕ_{grout}	ϕ	$\phi_{grout}\phi V_{sa}$ (lb)
4940	1.0	0.65	3211

9. Concrete Breakout Strength of Anchor in Shear (Sec. 17.5.2)

Shear perpendicular to edge in y-direction:

$V_{by} = \min|7(l_e / d_a)^{0.2}\sqrt{d_a}\lambda_a\sqrt{f'_c}c_{a1}^{1.5};\ 9\lambda_a\sqrt{f'_c}c_{a1}^{1.5}|$ (Eq. 17.5.2.2a & Eq. 17.5.2.2b)

l_e (in)	d_a (in)	λ_a	f'_c (psi)	c_{a1} (in)	V_{by} (lb)
4.00	0.500	1.00	2500	16.50	25142

$\phi V_{cbgy} = \phi\,(A_{Vc} / A_{Vco})\,\Psi_{ec,V}\,\Psi_{ed,V}\,\Psi_{c,V}\,\Psi_{h,V}\,V_{by}$ (Sec. 17.3.1 & Eq. 17.5.2.1b)

A_{Vc} (in²)	A_{Vco} (in²)	$\Psi_{ec,V}$	$\Psi_{ed,V}$	$\Psi_{c,V}$	$\Psi_{h,V}$	V_{by} (lb)	ϕ	ϕV_{cbgy} (lb)
317.28	1225.13	1.000	1.000	1.000	2.031	25142	0.70	9257

10. Concrete Pryout Strength of Anchor in Shear (Sec. 17.5.3)

$\phi V_{cpg} = \phi \min|k_{cp}N_{ag}\ ;\ k_{cp}N_{cbg}| = \phi \min|k_{cp}(A_{Na} / A_{Na0})\,\Psi_{ec,Na}\,\Psi_{ed,Na}\,\Psi_{cp,Na}N_{ba}\ ;\ k_{cp}(A_{Nc} / A_{Nco})\,\Psi_{ec,N}\,\Psi_{ed,N}\,\Psi_{c,N}\,\Psi_{cp,N}N_b|$ (Sec. 17.3.1 & Eq. 17.5.3.1b)

k_{cp}	A_{Na} (in^2)	A_{Na0} (in^2)	$\Psi_{ed,Na}$	$\Psi_{ec,Na}$	$\Psi_{cp,Na}$	N_{ba} (lb)	N_a (lb)
2.0	346.56	144.55	0.925	1.000	1.000	6503	14416

A_{Nc} (in^2)	A_{Nco} (in^2)	$\Psi_{ec,N}$	$\Psi_{ed,N}$	$\Psi_{c,N}$	$\Psi_{cp,N}$	N_b (lb)	N_{cb} (lb)	ϕ
346.05	144.00	1.000	0.925	1.000	1.000	6800	15116	0.70

ϕV_{cpg} (lb)
20182

11. Results

11. Interaction of Tensile and Shear Forces (Sec. D.7)?

Shear	Factored Load, V_{ua} (lb)	Design Strength, øV_n (lb)	Ratio	Status
Steel	1168	3211	0.36	Pass
T Concrete breakout y+	**9347**	**9257**	**1.01**	**Fail (Governs)**
Pryout	9347	20182	0.46	Pass

FAIL! Selected anchor type and embedment do not meet the selected design criteria.

12. Warnings

- Designer must exercise own judgement to determine if this design is suitable.

- Refer to manufacturer's product literature for hole cleaning and installation instructions.