

McReaken Engineering

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Structural Calculations Prepared for:

Designer - Vern Hancock

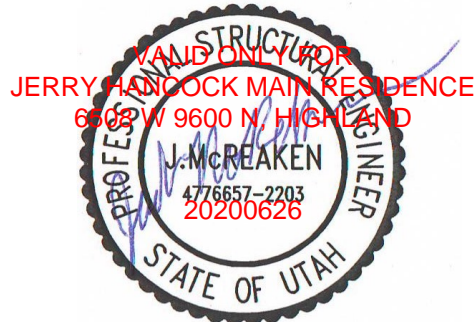
Client / Owner - Jerry Hancock

6508 W 9600 N

Highland, Utah 84003

Project Number: 202005-04

Prepared: 23-Jun-2020



Approved: 26-Jun-2020

Valid only for the project being built on this lot, and when stamped and signed by engineer in blue ink.

Governing Codes and Manuals (as applicable)

International Building Code (IBC), 2018 edition
 International Residential Code (IRC), 2018 edition
 PCA100-2017 Prescriptive Design of Exterior Concrete Walls
 USGS Seismic Response Maps

Loads, Configurations and Specifications

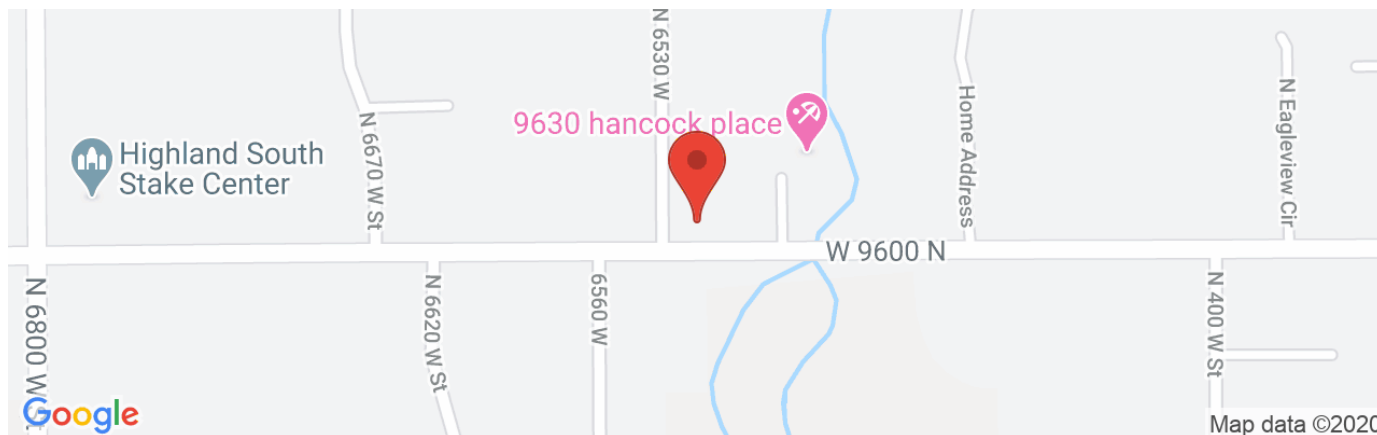
Occupancy Category	II	
Soil Bearing Capacity	1500	psf (assumed)
Depth of Frost Penetration	30	inches
Load Duration Factors (Cd)		
Dead - wood design	0.90	
Snow - wood design	1.15	
Wind - wood design	1.40	
Earthquake - wood design	1.60	
Roof		
Mean Slope ("x" in 12")	7	inches
Mean Slope	30	degrees
Hip Roof	no	
Truss Spacing	2	feet o.c.
Snow Load	30	psf
Snow Load Seismic Reduction (20% over 30 psf)	0	psf
Percent snow load applied to seismic, if required	0%	= 0.20 + 0.025(A - 5)
Ground Snow Load	43	psf
Live Load	< 20	psf
Live Load Reduction	negligible	psf
Dead Load	15	psf
Dead Horizontal Load	not used	psf
Floor & Deck		
Live Load	40	psf
Dead Load	10	psf
Exterior Walls		
Stucco / Siding Weight	87	psf
Rock / Brick Weight	93	psf
Exterior Balcony		
Live Load	60	psf
Dead Load	10	psf
Wind		
Basic Speed (3-second gust)	90	mph
Ultimate Speed	115	mph
Exposure	C	
Occupancy Importance Factor - Wind (Iw)	1.0	
Seismic		
Ss (USGS Charts)	131.40%	gravity
Fa	1.26	
Ra	6.5	
Occupancy Importance Factor - Seismic (Ie)	1	
Sms = Fa * Ss	1.650	
Sds = (2 / 3) Sms	1.100	
Seismic Category (from city/county building official)	D2	
Spectral Response Coefficient	0.203	
Wood Specifications		
Specific Gravity (SG)	0.50	
Modulus of Elasticity (E)	1300000	psi
Species	DF	
Primary framing grade	No. 2	
Fb bending	850	psi
Ft tension	500	psi
Fc parallel to grain	1400	psi
Fc perpendicular to grain	625	psi
Fv shear	95	psi
Concrete Specifications		
Footing (fc')	2500	psi
Foundation (fc')	3000	psi
Density (w)	150	pcf
Steel		
Rebar (fs)	60000	psi



Hancock ICF Residence

6508 W 9600 N, Highland, UT 84003, USA

Latitude, Longitude: 40.4064949, -111.8142322



Date	6/23/2020, 4:33:13 PM
Design Code Reference Document	ASCE7-16
Risk Category	II
Site Class	D - Default (See Section 11.4.3)

Type	Value	Description
S_S	1.314	MCE_R ground motion. (for 0.2 second period)
S_1	0.481	MCE_R ground motion. (for 1.0s period)
S_{MS}	1.577	Site-modified spectral acceleration value
S_{M1}	null -See Section 11.4.8	Site-modified spectral acceleration value
S_{DS}	1.051	Numeric seismic design value at 0.2 second SA
S_{D1}	null -See Section 11.4.8	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	null -See Section 11.4.8	Seismic design category
F_a	1.2	Site amplification factor at 0.2 second
F_v	null -See Section 11.4.8	Site amplification factor at 1.0 second
PGA	0.593	MCE_G peak ground acceleration
F_{PGA}	1.2	Site amplification factor at PGA
PGA_M	0.711	Site modified peak ground acceleration
T_L	8	Long-period transition period in seconds
S_{sRT}	1.314	Probabilistic risk-targeted ground motion. (0.2 second)
S_{sUH}	1.514	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
S_{sD}	3.136	Factored deterministic acceleration value. (0.2 second)
S_{1RT}	0.481	Probabilistic risk-targeted ground motion. (1.0 second)
S_{1UH}	0.545	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S_{1D}	1.266	Factored deterministic acceleration value. (1.0 second)
PGAd	1.224	Factored deterministic acceleration value. (Peak Ground Acceleration)
C_{RS}	0.868	Mapped value of the risk coefficient at short periods

ICF Requirements

Wall Requirements	
Main Level Wall Type and Thickness	6" Flat, 9'-4" Floor to Ceiling
Above Grade Wall Reinforcement - Horizontal	#5 @ 18"
Above Grade Wall Reinforcement - Vertical	#5 @ 18", ALTERNATE #4 @ 12" O.C.
Basement Wall Type and Thickness	8" Flat, 9'-4" Floor to Ledger
Below Grade Wall Reinforcement - Horizontal	#5 @ 18"
Below Grade Wall Reinforcement - Vertical	#5 @ 18"

	Factor	Sidewalls	Endwalls
Solid Walls for Lateral Resistance			
Length of Solid Wall for Wind	TL	4.4	6.0
	R5.2	0.89	0.89
	R5.3	1	1
	R5.4	0.3	0.3
	UL	20.72	28.16
Length of Solid Wall for Seismic	TL	6.6	6.6
	R5.4	0.3	0.3
	R5.6	0.96	0.96
	R5.7	0.94	0.94
	R5.8	1	1
	UL	32.0	32.0

		Sidewalls	Endwalls
Minimum Length of Solid Walls		6.6	6.6
Controlling Load		Seismic	Seismic
Actual Wall Lengths	1	38	
	2	32.5	
	A		22.5
	B		13.67

Wall to Floor Connection		
Maximum Clear Floor Span	21	feet
Floor, Tributary LL	420	lb/ft
Floor, Tributary DL	105	lb/ft
Simpson ICFVL Allowable Download	1940	lb
Simpson ICFVL Required Spacing	44.3	inches
Out of Plane Joist to Wall Anchors	836.5	lb/ft
Simpson PAI28 Anchor Tension	2830	lb
PAI28 Spacing	40.6	inches
Simpson HTT4 Anchor Tension	3610.0	lb
HTT4 Spacing	48.0	inches

Wall to Roof Connection		
Truss Connector	HS24	Simpson
Sill Plate Bolt	3/8"	A307
Sill Plate Bolt Embedment	7	inches
Sill Plate Bolt Spacing	16	inches

Lateral Restraint Analysis

Seismic Coefficient		
Ss (%g)	131.40%	0.2 sec Spectral Response - IBC Figure 1615(5)
Fa	1.26	IBC Table 1615.1.2(2)
Ra	6.5	IBC Table 1617.6.2
le	1	IBC Table 1604.5
Sms = Fa * Ss	1.65	IBC Equation 16-38
Sds = (2 / 3) Sms	1.10	IBC Equation 16-40
Seismic Category	D2	From city or WFCM Table 2.5C
Response Coefficient (Cs)	0.203	IBC 1617.5 / WFCM Table 2.5C

Wind Factors			
Roof wind perpendicular to ridge (plf)	178.000	WFCM Table 2.5A/B	
Wall wind perpendicular to ridge (plf)	259.000	WFCM Table 2.5A/B	
Roof wind parallel to ridge (plf)	115.000	WFCM Table 2.5A/B	
Wall wind parallel to ridge (plf)	175.000	WFCM Table 2.5A/B	

Connections									
Top Plate				Sill Plate - Exterior Foundation Wall					
Wall Index	Uplift (plf)	Shear (plf)	Simpson Connectors		Shear (plf)	DF (lbs/bolt)		Bolt Spacing (inch)	
			Corner	Interior		1/2"	5/8"	1/2"	5/8"
Transverse	N/A	N/A	N/A - Gable	N/A - Gable	864	1050	1312	10	13
Longitudinal	149	67	H1	H1	475			32	32

Perforated Window Connectors	
Maximum opening (feet) - not garage	12
Strap Size (Simpson or equal)	CS16 x 42"
Check	PASS

Shear Wall Selection - Segmented Shear Walls					
Index	Controlling Lateral (lbs)	Length-Li (feet)	v shear (plf)	Selected Configuration	Deflection
A	23720	22	1078	- SW8 - 19/32" OSB, 3"/12" 10d nails, two sides, studs 16" O.C.	PASS
B	23720	19.67	1206	- SW8 - 19/32" OSB, 3"/12" 10d nails, two sides, studs 16" O.C.	PASS
C	#DIV/0!	0	#DIV/0!	N/A	#DIV/0!
D	#DIV/0!	0	#DIV/0!	N/A	#DIV/0!
E	#DIV/0!	0	#DIV/0!	N/A	#DIV/0!
F	#DIV/0!	0	#DIV/0!	N/A	#DIV/0!
1	23720	38	624	- SW8 - 19/32" OSB, 3"/12" 10d nails, two sides, studs 16" O.C.	PASS
2	23720	36.75	645	- SW8 - 19/32" OSB, 3"/12" 10d nails, two sides, studs 16" O.C.	PASS
3	#DIV/0!	0	#DIV/0!	N/A	#DIV/0!
4	#DIV/0!	0	#DIV/0!	N/A	#DIV/0!
5	#DIV/0!	0	#DIV/0!	N/A	#DIV/0!
6	#DIV/0!	0	#DIV/0!	N/A	#DIV/0!

Footing and Foundation Calculations

	W1	W2	W3	W4	W5	W6	W7	W8	W9	W10	W11	W12	W13
Roof Tributary (ft)	3.0	3.0	11.0	11.0	3.0	3.0	12.0	15.0	—	20.0	—	—	—
Roof DL (psf)	15	15	15	15	15	15	15	15	15	15	—	—	—
Roof SL (psf)	30	30	30	30	30	30	30	30	30	30	—	—	—
Roof Uniform Load (plf)	135	135	495	495	135	135	540	675	—	900	—	—	—
2nd Level Wall Height (ft)	—	—	—	—	—	—	—	—	—	—	—	—	—
2nd Level Wall Concrete Thickness (in)	—	—	—	—	—	—	—	—	—	—	—	—	—
2nd Level Wall Weight (psf)	—	—	—	—	—	—	—	—	—	—	—	—	—
2nd Level Wall Uniform Load (plf)	—	—	—	—	—	—	—	—	—	—	—	—	—
2nd Floor Tributary (ft)	—	—	—	12.0	—	—	12.0	7.0	—	24.0	—	—	—
2nd Floor DL (psf)	—	—	—	10	—	—	10	10	—	10	—	—	—
2nd Floor LL (psf)	—	—	—	40	—	—	40	14	—	40	—	—	—
2nd Floor Uniform Load (plf)	—	—	—	600	—	—	600	168	—	1200	—	—	—
1st Level Wall Height (ft)	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	9.3	—	—	—
1st Level Wall Concrete Thickness (in)	6	6	6	6	6	6	6	6	6	—	—	—	—
1st Level Wall Weight (psf)	90	90	90	90	90	90	90	90	15	15	—	—	—
1st Level Wall Uniform Load (plf)	837	837	837	837	837	837	837	837	140	140	—	—	—
1st Floor Tributary (ft)	2.0	2.0	9.0	9.0	2.0	10.0	10.0	2.0	2.0	9.0	—	—	—
1st Floor DL (psf)	10	10	10	10	10	10	10	10	10	10	—	—	—
1st Floor LL (psf)	40	40	40	40	40	40	40	40	40	40	—	—	—
1st Floor Uniform Load (plf)	100	100	450	450	100	500	500	100	100	450	—	—	—
Basement Wall Height (ft)	4.0	10.7	13.3	13.3	10.7	10.7	10.7	4.0	10.7	10.7	—	—	—
Basement Wall Concrete Thickness (in)	8	8	8	8	8	8	8	8	8	8	—	—	—
Basement Level Wall Weight (psf)	112	112	112	112	112	112	112	112	112	112	—	—	—
Basement Wall Uniform Load (plf)	448	1195	1493	1493	1195	1195	1195	448	1198	1198	—	—	—
Footing Thickness (in)	10	10	12	14	10	10	14	10	9	14	—	—	—
Footing Width (in) (assumed)	20	20	30	36	20	24	36	20	18	36	—	—	—
Footing Uniform Load (plf)	208	208	375	525	208	250	525	208	169	525	—	—	—
Total Wall Uniform Load (plf)	1728	2475	3650	4400	2475	2917	4197	2436	1607	4413	—	—	—
Soil Bearing Pressure (psf)	1500	1500	1500	1500	1500	1500	1500	1500	1500	1500	—	—	—
Required Footing Width (in)	13.8	19.8	29.2	35.2	19.8	23.3	33.6	19.5	12.9	35.3	—	—	—
Specified Footing Width (in)	20	20	30	36	20	24	36	20	18	36	—	—	—

Wall Pier Design Based on 2016 CBC & 2018 IBC

INPUT DATA & DESIGN SUMMARY

CONCRETE STRENGTH

$f'_c = 3 \text{ ksi, (21 MPa)}$

REBAR YIELD STRESS

$f_y = 60 \text{ ksi, (414 MPa)}$

WALL PIER LENGTH

$L = 1.25 \text{ ft, (0.38 m)}$

WALL PIER HEIGHT

$H = 8 \text{ ft, (2.44 m)}$

WALL PIER THICKNESS

$t = 6 \text{ in, (152 mm)}$

VERTICAL EDGE BARS, A_s

$1 \text{ # } 5$

TRANSVERSE REINFORCEMENT, A_v

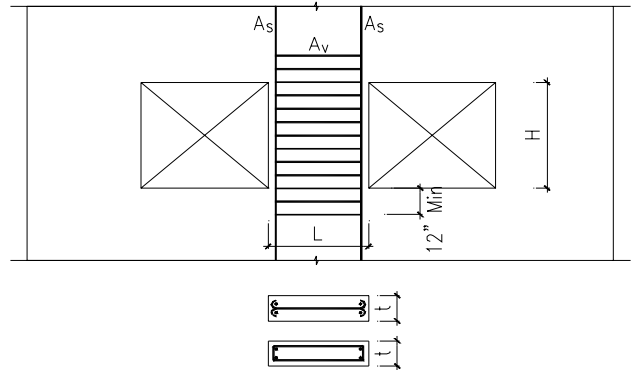
$1 \text{ # } 3 @ 4 \text{ in. (102 mm), o.c. (at middle of wall.)}$

FACTORED AXIAL LOAD

$P_u = 5 \text{ kips, (22 kN)}$

FACTORED SHEAR FORCE

$V_u = 10 \text{ kips, (44 kN), (in plane)}$



THE DESIGN IS ADEQUATE.

ANALYSIS

CHECK WALL PIER DEFINITION (ACI 318-14 Chapter 2)

$L / t = 2.50$ within [2.5, 6] & $H / L = 6.40 > 2$ [Satisfactory]

CHECK SHEAR STRENGTH (IBC/CBC 1905.1 / ACI 318-14 18.7.6.1.1)

$V_e = (M_{pr, \text{left, top}} + M_{pr, \text{right, bot}}) / H + V_u = 16.2 \text{ kips}$
 $< 8\phi(f'_c)^{0.5}bd = 21.4 \text{ kips}$ [Satisfactory]
 $< \phi[V_c + A_v f_y d / s] = 18.8 \text{ kips}$ [Satisfactory]

where $d = 13.56 \text{ in, (ACI 318 25.2, 25.2, \& 5.1)}$
 $\rho_{\text{left}} = 0.004 > \rho_{\text{min}} = \text{MIN}[3(f'_c)^{0.5} / f_y, 200 / f_y] = 0.003$ [Satisfactory]
 $\rho_{\text{right}} = 0.004 > \rho_{\text{min}} = 0.003$ [Satisfactory]

$M_{pr, \text{left, top}} = \rho_{\text{left}} bd^2 f_y (1.25 - 0.919 \rho_{\text{left}} f_y / f'_c) = 25 \text{ ft-kips}$

$M_{pr, \text{right, bot}} = \rho_{\text{right}} bd^2 f_y (1.25 - 0.919 \rho_{\text{right}} f_y / f'_c) = 25 \text{ ft-kips}$

$\phi = 0.6$ (ACI 318 21.2)

$A_v = 0.11 \text{ in}^2$

$V_c = 2(f'_c)^{0.5}bd = 8.9 \text{ kips, (Per ACI 318-14 18.7.6.2.1, } V_c = 0, \text{ if } (V_e - V_u) \geq 50\% V_e \text{ AND } P_u < A_g f'_c / 20)$

Wall Pier Design Based on 2016 CBC & 2018 IBC

INPUT DATA & DESIGN SUMMARY

CONCRETE STRENGTH

$f'_c = 3 \text{ ksi, (21 MPa)}$

REBAR YIELD STRESS

$f_y = 60 \text{ ksi, (414 MPa)}$

WALL PIER LENGTH

$L = 2.4 \text{ ft, (0.73 m)}$

WALL PIER HEIGHT

$H = 8 \text{ ft, (2.44 m)}$

WALL PIER THICKNESS

$t = 6 \text{ in, (152 mm)}$

VERTICAL EDGE BARS, A_s

$2 \text{ # } 5$

TRANSVERSE REINFORCEMENT, A_v

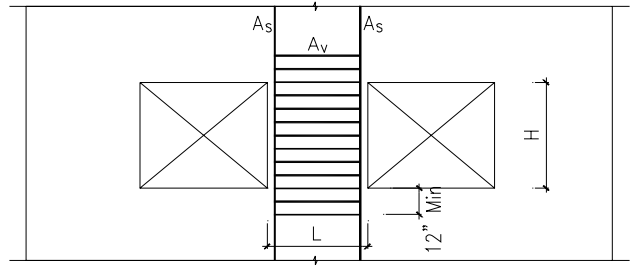
$1 \text{ # } 3 @ 3 \text{ in. (76 mm), o.c. (at middle of wall.)}$

FACTORED AXIAL LOAD

$P_u = 5 \text{ kips, (22 kN)}$

FACTORED SHEAR FORCE

$V_u = 10 \text{ kips, (44 kN), (in plane)}$



THE DESIGN IS ADEQUATE.

ANALYSIS

CHECK WALL PIER DEFINITION (ACI 318-14 Chapter 2)

$L / t = 4.80$ within [2.5, 6] & $H / L = 3.33 > 2$ [Satisfactory]

CHECK SHEAR STRENGTH (IBC/CBC 1905.1 / ACI 318-14 18.7.6.1.1)

$V_e = (M_{pr, \text{left, top}} + M_{pr, \text{right, bot}}) / H + V_u = 35.0 \text{ kips}$
 $< 8\phi(f'_c)^{0.5}bd = 43.2 \text{ kips}$ [Satisfactory]
 $< \phi[V_c + A_v f_y d / s] = 36.1 \text{ kips}$ [Satisfactory]

where $d = 27.36 \text{ in, (ACI 318 25.2, 25.2, \& 5.1)}$
 $\rho_{\text{left}} = 0.004 > \rho_{\text{min}} = \text{MIN}[3(f'_c)^{0.5} / f_y, 200 / f_y] = 0.003$ [Satisfactory]
 $\rho_{\text{right}} = 0.004 > \rho_{\text{min}} = 0.003$ [Satisfactory]

$M_{pr, \text{left, top}} = \rho_{\text{left}} bd^2 f_y (1.25 - 0.919 \rho_{\text{left}} f_y / f'_c) = 100 \text{ ft-kips}$

$M_{pr, \text{right, bot}} = \rho_{\text{right}} bd^2 f_y (1.25 - 0.919 \rho_{\text{right}} f_y / f'_c) = 100 \text{ ft-kips}$

$\phi = 0.6$ (ACI 318 21.2)

$A_v = 0.11 \text{ in}^2$

$V_c = 2(f'_c)^{0.5}bd = 0.0 \text{ kips, (Per ACI 318-14 18.7.6.2.1, } V_c = 0, \text{ if } (V_e - V_u) \geq 50\% V_e \text{ AND } P_u < A_g f'_c / 20)$

RB05(1) (Roof Beam)

Dry | 1 span | No cant.

June 25, 2020 23:18:42

BC CALC® Member Report

Build 7555

Job name:

File name:

Address:

Description:

City, State, Zip:

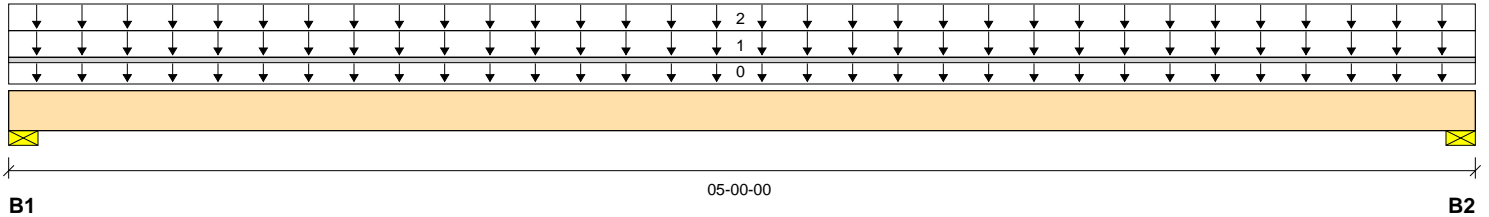
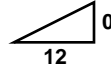
Specifier:

Customer:

Designer: Jacob McReaken

Code reports: ESR-1040

Company: McReaken Engineering



Total Horizontal Product Length = 05-00-00

Reaction Summary (Down / Uplift) (lbs)

Bearing	Live	Dead	Snow	Wind	Roof Live
B1, 3-1/2"	1200 / 0	1085 / 0	1500 / 0		
B2, 3-1/2"	1200 / 0	1085 / 0	1500 / 0		

Load Summary

Tag	Description	Load Type	Ref.	Start	End	Loc.	Live 100%	Dead 90%	Snow 115%	Wind 160%	Roof Live 125%	Tributary
0	Self-Weight	Unf. Lin. (lb/ft)	L	00-00-00	05-00-00	Top		14				00-00-00
1	Roof	Unf. Area (lb/ft²)	L	00-00-00	05-00-00	Top		15	30			20-00-00
2	Attic Floor	Unf. Area (lb/ft²)	L	00-00-00	05-00-00	Top	40	10				12-00-00

Controls Summary

	Value	% Allowable	Duration	Case	Location
Pos. Moment	3208 ft-lbs	14.0%	115%	6	02-06-00
End Shear	1788 lbs	16.9%	115%	6	01-00-12
Total Load Deflection	L/999 (0.017")	n/a	n/a	6	02-06-00
Live Load Deflection	L/999 (0.011")	n/a	n/a	12	02-06-00
Max Defl.	0.017"	n/a	n/a	6	02-06-00
Span / Depth	5.9				

Bearing Supports

	Dim. (LxW)	Value	% Allow Support	% Allow Member	Material
B1	Wall/Plate 3-1/2" x 5-1/4"	3110 lbs	n/a	22.6%	Unspecified
B2	Wall/Plate 3-1/2" x 5-1/4"	3110 lbs	n/a	22.6%	Unspecified

Cautions

For roof members with slope (1/4)/12 or less final design must ensure that ponding instability will not occur.

For roof members with slope (1/2)/12 or less final design must account for Rain-on-Snow surcharge load.

Notes

- Design meets User specified (L/240) Total load deflection criteria.
- Design meets User specified (L/360) Live load deflection criteria.
- Design meets arbitrary (1") Maximum Total load deflection criteria.
- Calculations assume member is fully braced.
- BC CALC® analysis is based on IBC 2009.
- Design based on Dry Service Condition.

Disclosure

Use of the Boise Cascade Software is subject to the terms of the End User License Agreement (EULA). Completeness and accuracy of input must be reviewed and verified by a qualified engineer or other appropriate expert to assure its adequacy, prior to anyone relying on such output as evidence of suitability for a particular application. The output here is based on building code-accepted design properties and analysis methods. Installation of Boise Cascade engineered wood products must be in accordance with current Installation Guide and applicable building codes. To obtain Installation Guide or ask questions, please call (800)232-0788 before installation.

BC CALC®, BC FRAMER®, AJST™, ALLJOIST®, BC RIM BOARD™, BCI®, BOISE GLULAM™, BC FloorValue®, VERSA-LAM®, VERSA-RIM PLUS®,

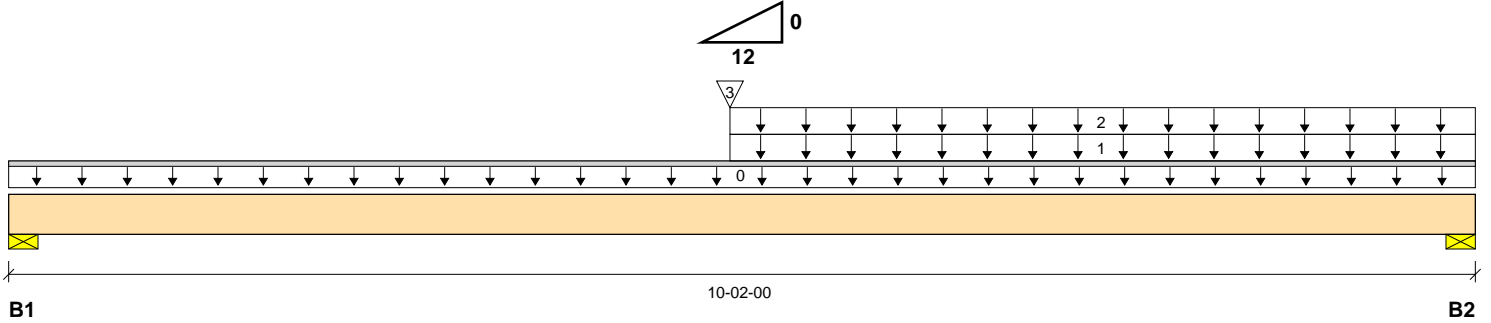
RB05 (Roof Beam)

Dry | 1 span | No cant.

June 25, 2020 23:13:02

BC CALC® Member Report
 Build 7555
 Job name:
 Address:
 City, State, Zip:
 Customer:
 Code reports: ESR-1040

File name:
 Description:
 Specifier:
 Designer: Jacob McReaken
 Company: McReaken Engineering



Total Horizontal Product Length = 10-02-00

Reaction Summary (Down / Uplift) (lbs)

Bearing	Live	Dead	Snow	Wind	Roof Live
B1, 3-1/2"	6172 / 0	623 / 0	753 / 0		
B2, 3-1/2"	7258 / 0	1739 / 0	2347 / 0		

Load Summary

Tag	Description	Load Type	Ref.	Start	End	Loc.	Live	Dead	Snow	Wind	Roof Live	Tributary
							100%	90%	115%	160%	125%	
0	Self-Weight	Unf. Lin. (lb/ft)	L	00-00-00	10-02-00	Top		19				00-00-00
1	Roof	Unf. Area (lb/ft²)	L	05-00-00	10-02-00	Top		15	30			20-00-00
2	Attic Floor	Unf. Area (lb/ft²)	L	05-00-00	10-02-00	Top	40	10				12-00-00
3	Girder	Conc. Pt. (lbs)	L	05-00-00	05-00-00	Top	10950					n/a

Controls Summary

	Value	% Allowable	Duration	Case	Location
Pos. Moment	32181 ft-lbs	73.9%	100%	1	05-00-00
End Shear	7657 lbs	54.8%	100%	1	08-08-08
Total Load Deflection	L/612 (0.19")	39.2%	n/a	1	05-02-00
Live Load Deflection	L/682 (0.171")	52.7%	n/a	7	05-01-00
Max Defl.	0.19"	19.0%	n/a	1	05-02-00
Span / Depth	8.3				

Bearing Supports

	Dim. (LxW)	Value	% Allow Support	% Allow Member	Material
B1	Wall/Plate 3-1/2" x 5-1/4"	6796 lbs	n/a	49.3%	Unspecified
B2	Wall/Plate 3-1/2" x 5-1/4"	8997 lbs	n/a	65.3%	Unspecified

Cautions

For roof members with slope (1/4)/12 or less final design must ensure that ponding instability will not occur.
 For roof members with slope (1/2)/12 or less final design must account for Rain-on-Snow surcharge load.

Notes

Design meets User specified (L/240) Total load deflection criteria.
 Design meets User specified (L/360) Live load deflection criteria.
 Design meets arbitrary (1") Maximum Total load deflection criteria.
 Calculations assume member is fully braced.
 BC CALC® analysis is based on IBC 2009.
 Design based on Dry Service Condition.

Disclosure

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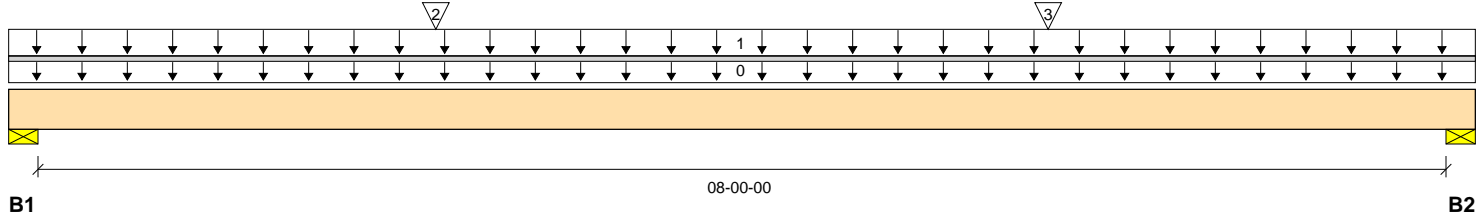
FB02 (Floor Beam)

BC CALC® Member Report
 Build 7555
 Job name:
 Address:
 City, State, Zip:
 Customer:
 Code reports: ESR-1040

Dry | 1 span | No cant.

June 25, 2020 23:52:02

File name:
 Description:
 Specifier:
 Designer: Jacob McReaken
 Company: McReaken Engineering



Total Horizontal Product Length = 08-07-00

Reaction Summary (Down / Uplift) (lbs)

Bearing	Live	Dead	Snow	Wind	Roof Live
B1, 3-1/2"	2917 / 0	1551 / 0			
B2, 3-1/2"	2916 / 0	1551 / 0			

Load Summary

Tag	Description	Load Type	Ref.	Start	End	Loc.	100%	90%	115%	160%	Roof Live 125%	Tributary
0	Self-Weight	Unf. Lin. (lb/ft)	L	00-00-00	08-07-00	Top		9				00-00-00
1	Standard Load	Unf. Area (lb/ft²)	L	00-00-00	08-07-00	Top	40	10				10-00-00
2	Post Above	Conc. Pt. (lbs)	L	02-06-00	02-06-00	Top	1200	1085				n/a
3	Post Above	Conc. Pt. (lbs)	R	02-06-00	02-06-00	Top	1200	1085				n/a

Controls Summary

	Value	% Allowable	Duration	Case	Location
Pos. Moment	9386 ft-lbs	67.2%	100%	1	04-03-08
End Shear	3917 lbs	62.0%	100%	1	01-01-00
Total Load Deflection	L/420 (0.232")	57.2%	n/a	1	04-03-08
Live Load Deflection	L/659 (0.148")	54.7%	n/a	2	04-03-08
Max Defl.	0.232"	23.2%	n/a	1	04-03-08
Span / Depth	10.3				

Bearing Supports

	Dim. (LxW)	Value	% Allow Support	% Allow Member	Material
B1	Wall/Plate 3-1/2" x 3-1/2"	4468 lbs	n/a	48.6%	Unspecified
B2	Wall/Plate 3-1/2" x 3-1/2"	4467 lbs	n/a	48.6%	Unspecified

Notes

Design meets Code minimum (L/240) Total load deflection criteria.
 Design meets Code minimum (L/360) Live load deflection criteria.
 Design meets arbitrary (1") Maximum Total load deflection criteria.
 Calculations assume member is fully braced.
 BC CALC® analysis is based on IBC 2009.
 Design based on Dry Service Condition.

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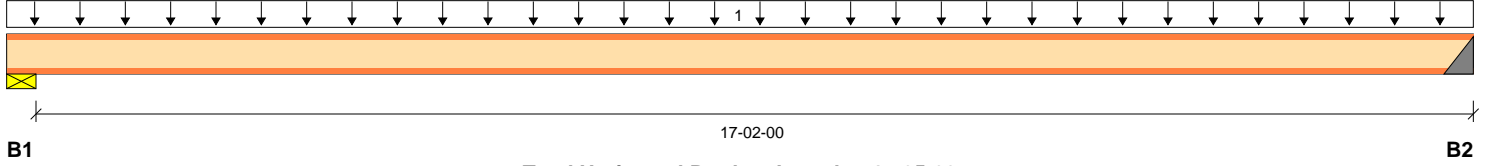
J01 (Joist)

BC CALC® Member Report
 Build 7555
 Job name:
 Address:
 City, State, Zip:
 Customer:
 Code reports: ESR-1336

Dry | 1 span | No cant. | 16 OCS | Repetitive | Glued & nailed

June 25, 2020 17:52:48

File name:
 Description:
 Specifier:
 Designer: Jacob McReaken
 Company: McReaken Engineering



Total Horizontal Product Length = 17-05-08

Reaction Summary (Down / Uplift) (lbs)

Bearing	Live	Dead	Snow	Wind	Roof Live
B1, 3-1/2"	469 / 0	117 / 0			
B2, 2"	462 / 0	116 / 0			

Load Summary

Tag	Description	Load Type	Ref.	Start	End	Loc.	100%	90%	115%	160%	Roof Live 125%	OCS
1	Standard Load	Unf. Area (lb/ft²)	L	00-00-00	17-05-08	Top	40	10				16

Controls Summary

	Value	% Allowable	Duration	Case	Location
Pos. Moment	2444 ft-lbs	77.6%	100%	1	08-09-08
End Reaction	578 lbs	54.1%	100%	1	17-05-08
End Shear	567 lbs	34.9%	100%	1	00-03-08
Total Load Deflection	L/491 (0.418")	48.9%	n/a	1	08-09-08
Live Load Deflection	L/614 (0.335")	78.2%	n/a	2	08-09-08
Max Defl.	0.418"	41.8%	n/a	1	08-09-08
Span / Depth	17.3				

Bearing Supports

	Dim. (LxW)	Value	% Allow Support	% Allow Member	Material
B1	Wall/Plate 3-1/2" x 2"	586 lbs	n/a	41.1%	Unspecified
B2	Hanger 2" x 2"	578 lbs	n/a	54.1%	Hanger

BC FloorValue® Summary

BC FloorValue®: Subfloor: 3/4" OSB, Glue + Nail
 Minimum Enhanced Premium Subfloor Rating: Premium
 Controlling Location: 08-09-08

Notes

Design meets Code minimum (L/240) Total load deflection criteria.
 Design meets User specified (L/480) Live load deflection criteria.
 Design meets arbitrary (1") Maximum Total load deflection criteria.
 Calculations assume member is fully braced.
 Hanger Manufacturer: Simpson Strong-Tie, Inc.
 BC CALC® analysis is based on IBC 2009.
 Composite EI value based on 3/4" thick OSB sheathing glued and nailed to member.
 Design based on Dry Service Condition.

Disclosure

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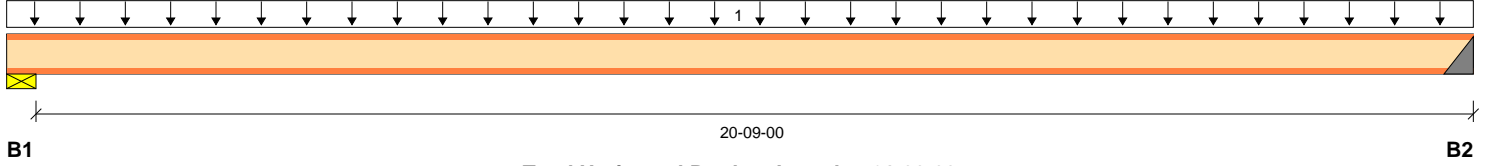
J01 (Joist)

BC CALC® Member Report
 Build 7555
 Job name:
 Address:
 City, State, Zip:
 Customer:
 Code reports: ESR-1336

Dry | 1 span | No cant. | 16 OCS | Repetitive | Glued & nailed

June 25, 2020 17:43:44

File name:
 Description:
 Specifier:
 Designer: Jacob McReaken
 Company: McReaken Engineering



Total Horizontal Product Length = 21-00-08

Reaction Summary (Down / Uplift) (lbs)

Bearing	Live	Dead	Snow	Wind	Roof Live
B1, 3-1/2"	564 / 0	141 / 0			
B2, 2"	558 / 0	139 / 0			

Load Summary

Tag	Description	Load Type	Ref.	Start	End	Loc.	100%	90%	115%	160%	Roof Live 125%	OCS
1	Standard Load	Unf. Area (lb/ft²)	L	00-00-00	21-00-08	Top	40	10				16


Controls Summary

	Value	% Allowable	Duration	Case	Location
Pos. Moment	3574 ft-lbs	57.3%	100%	1	10-07-00
End Reaction	697 lbs	56.3%	100%	1	21-00-08
End Shear	686 lbs	41.0%	100%	1	00-03-08
Total Load Deflection	L/427 (0.581")	56.1%	n/a	1	10-07-00
Live Load Deflection	L/534 (0.465")	89.8%	n/a	2	10-07-00
Max Defl.	0.581"	58.1%	n/a	1	10-07-00
Span / Depth	20.9				

Bearing Supports

	Dim. (LxW)	Value	% Allow Support	% Allow Member	Material
B1	Wall/Plate 3-1/2" x 2-5/16"	706 lbs	n/a	49.5%	Unspecified
B2	Hanger 2" x 2-5/16"	697 lbs	n/a	56.3%	Hanger

BC FloorValue® Summary

BC FloorValue®:  Subfloor: 3/4" OSB, Glue + Nail
 Minimum Enhanced Premium Subfloor Rating: Premium
 Controlling Location: 10-07-00

Notes

Design meets Code minimum (L/240) Total load deflection criteria.
 Design meets User specified (L/480) Live load deflection criteria.
 Design meets arbitrary (1") Maximum Total load deflection criteria.
 Calculations assume member is fully braced.
 Hanger Manufacturer: Simpson Strong-Tie, Inc.
 BC CALC® analysis is based on IBC 2009.
 Composite EI value based on 3/4" thick OSB sheathing glued and nailed to member.
 Design based on Dry Service Condition.

Disclosure

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RB02 (Roof Beam)

Dry | 1 span | No cant.

June 25, 2020 15:25:47

BC CALC® Member Report

Build 7555

Job name:

File name:

Address:

Description:

City, State, Zip:

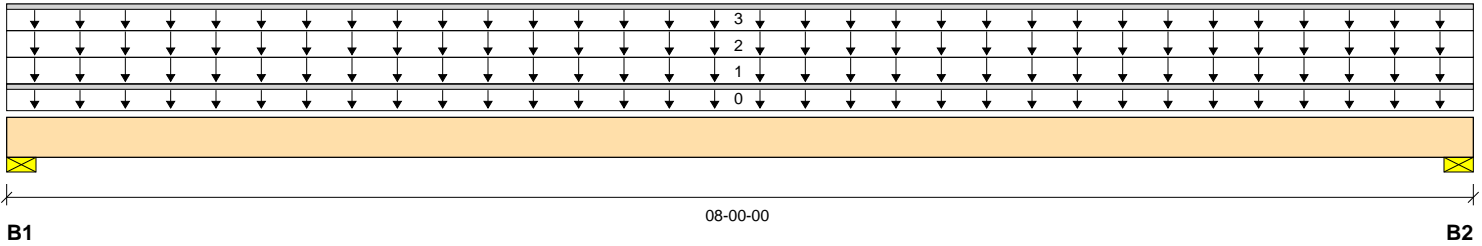
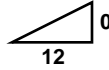
Specifier:

Customer:

Designer: Jacob McReaken

Code reports: PR-L313

Company: McReaken Engineering



Total Horizontal Product Length = 08-00-00

Reaction Summary (Down / Uplift) (lbs)

Bearing	Live	Dead	Snow	Wind	Roof Live
B1, 3-1/2"	1440 / 0	3515 / 0			
B2, 3-1/2"	1440 / 0	3515 / 0			

Load Summary

Tag	Description	Load Type	Ref.	Start	End	Loc.	Live 100%	Dead 90%	Snow 115%	Wind 160%	Roof Live 125%	Tributary
0	Self-Weight	Unf. Lin. (lb/ft)	L	00-00-00	08-00-00	Top		15				00-00-00
1	Porch Load	Unf. Area (lb/ft²)	L	00-00-00	08-00-00	Top	40	100				05-00-00
2	Interior Floor	Unf. Area (lb/ft²)	L	00-00-00	08-00-00	Top	40	10				04-00-00
3	Wall Load	Unf. Lin. (lb/ft)	L	00-00-00	08-00-00	Top		324				n/a

Controls Summary

	Value	% Allowable	Duration	Case	Location
Pos. Moment	8807 ft-lbs	36.6%	100%	1	04-00-00
End Shear	3368 lbs	31.3%	100%	1	01-03-06
Total Load Deflection	L/999 (0.07")	n/a	n/a	1	04-00-00
Live Load Deflection	L/999 (0.02")	n/a	n/a	5	04-00-00
Max Defl.	0.07"	n/a	n/a	1	04-00-00
Span / Depth	7.6				

Bearing Supports

	Dim. (LxW)	Value	% Allow Support	% Allow Member	Material
B1	Wall/Plate 3-1/2" x 5-1/8"	4955 lbs	n/a	42.5%	Unspecified
B2	Wall/Plate 3-1/2" x 5-1/8"	4955 lbs	n/a	42.5%	Unspecified

Cautions

For roof members with slope (1/4)/12 or less final design must ensure that ponding instability will not occur.

For roof members with slope (1/2)/12 or less final design must account for Rain-on-Snow surcharge load.

Notes

- Design meets User specified (L/240) Total load deflection criteria.
- Design meets User specified (L/360) Live load deflection criteria.
- Design meets arbitrary (1") Maximum Total load deflection criteria.
- Calculations assume member is fully braced.
- BC CALC® analysis is based on IBC 2009.
- Design based on Dry Service Condition.

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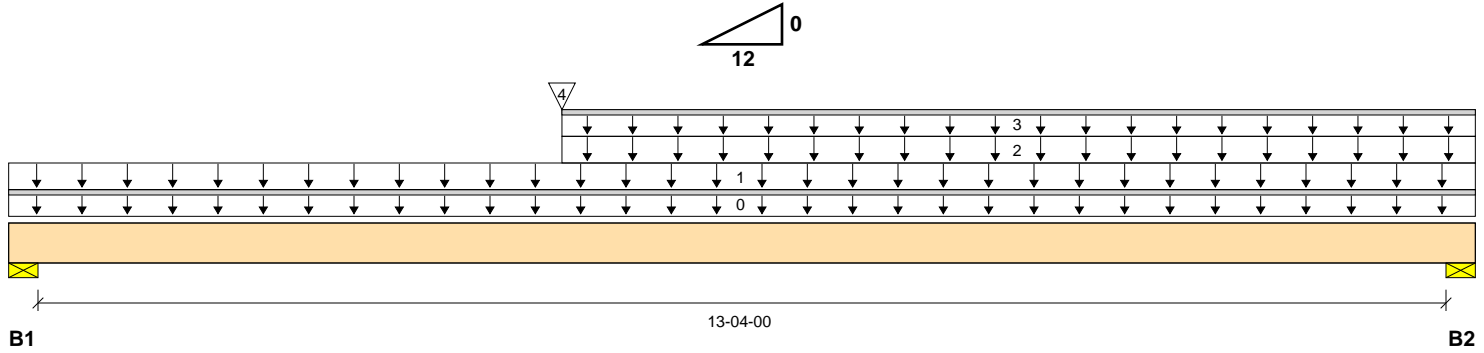
RB03 (Roof Beam)

Dry | 1 span | No cant.

June 25, 2020 17:37:14

BC CALC® Member Report
 Build 7555
 Job name:
 Address:
 City, State, Zip:
 Customer:
 Code reports: PR-L313

File name:
 Description:
 Specifier:
 Designer: Jacob McReaken
 Company: McReaken Engineering



Reaction Summary (Down / Uplift) (lbs)

Bearing	Live	Dead	Snow	Wind	Roof Live
B1, 3-1/2"	1460 / 0	4782 / 0	913 / 0		
B2, 3-1/2"	1094 / 0	5261 / 0	2078 / 0		

Load Summary

Tag	Description	Load Type	Ref.	Start	End	Loc.	100%	90%	115%	160%	Roof Live 125%	Tributary
0	Self-Weight	Unf. Lin. (lb/ft)	L	00-00-00	13-11-00	Top		16				00-00-00
1	Floor	Unf. Area (lb/ft²)	L	00-00-00	13-11-00	Top	40	100				02-00-00
2	Roof	Unf. Area (lb/ft²)	L	05-03-00	13-11-00	Top		15	30			11-06-00
3	Wall	Unf. Lin. (lb/ft)	L	05-03-00	13-11-00	Top		234				n/a
4	Beam	Conc. Pt. (lbs)	L	05-03-00	05-03-00	Top	1440	3515				n/a

Controls Summary

	Value	% Allowable	Duration	Case	Location
Pos. Moment	27260 ft-lbs	84.4%	100%	1	05-03-00
End Shear	5862 lbs	44.9%	100%	1	01-03-06
Total Load Deflection	L/312 (0.517")	76.9%	n/a	6	06-09-11
Live Load Deflection	L/1081 (0.149")	33.3%	n/a	12	06-11-08
Max Defl.	0.517"	51.7%	n/a	6	06-09-11
Span / Depth	13.6				

Bearing Supports

Bearing	Dim. (LxW)	Value	% Allow Support	% Allow Member	Material
B1	Wall/Plate 3-1/2" x 5-1/2"	6561 lbs	n/a	42.3%	Unspecified
B2	Wall/Plate 3-1/2" x 5-1/2"	7640 lbs	n/a	49.3%	Unspecified

Cautions

For roof members with slope (1/4)/12 or less final design must ensure that ponding instability will not occur.
 For roof members with slope (1/2)/12 or less final design must account for Rain-on-Snow surcharge load.

Notes

Design meets User specified (L/240) Total load deflection criteria.
 Design meets User specified (L/360) Live load deflection criteria.
 Design meets arbitrary (1") Maximum Total load deflection criteria.
 Calculations assume member is fully braced.
 BC CALC® analysis is based on IBC 2009.
 Design based on Dry Service Condition.

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