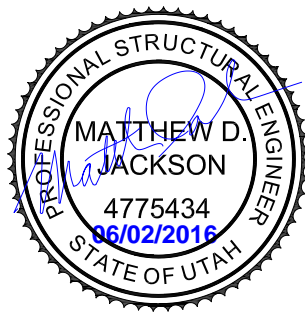




STRUCTURAL CALCULATIONS

Powder Mountain Lot 37

Weber County, UT

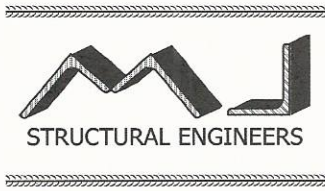


PREPARED FOR:

UPWALL DESIGN

1025 East Hollywood Ave,
Salt Lake City, Utah 84105

May 31, 2016



SHEET NUMBER: _____

JOB NUMBER: _____

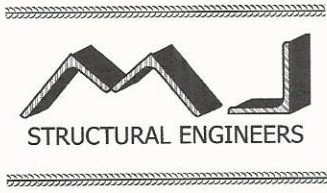
DATE: _____

BY: _____

Powder Mountain Lot 37

TITLE:

DL	ROOF	12 psf	
	FLOOR	12 psf	FRAMING / SHEATHING / MCE
		13 psf	1/2" GYPCRETE
		<u>25 psf</u>	
	SOIL	SEE ATTACHED	
LL	ROOF	20 psf	
	FLOOR / DECKS	40 psf	
SNOW		167 psf + DRIFT	
		SEE ATTACHED	



SHEET NUMBER: _____

JOB NUMBER: _____

DATE: _____

BY: _____

TITLE: _____

SOIL LOADS ON GREEN ROOFS

$$\gamma_{\text{soil}} = 130 \text{ pcf}$$

$$4'' \text{ SOIL} = \frac{4}{12}(130) = 43 \text{ pcf}$$

$$6'' \text{ SOIL} = \frac{6}{12}(130) = 65 \text{ pcf}$$

$$8'' \text{ SOIL} = \frac{8}{12}(130) = 87 \text{ pcf}$$

$$12'' \text{ SOIL} = 130 \text{ pcf}$$

SNOW LOAD

$$P_g = \sqrt{P_o^2 + S^2(A - A_o)^2}$$

$$P_o = 43 \text{ WEEBEC COUNTY}$$

$$S = 63$$

$$A = 8.6$$

$$A_o = 4.5$$

$$= \sqrt{43^2 + 63^2(8.6 - 4.5)^2}$$

$$P_g = 265 \text{ psf}$$

$$P_s = 0.7 C_e C_t I_s P_g$$

$$C_e = 0.9 \text{ (EXPOSURE C, FULLY EXPOSED)}$$

$$C_t = 1.0$$

$$I_s = 1.0$$

$$= 0.7(0.9)(1.0)(1.0)(265)$$

$$= \underline{167 \text{ psf}}$$

DRAFTING ON LOWER ROOFS

$$h_d = 0.43 \sqrt[3]{L_u' + \sqrt{P_g + 10}} - 1.5$$

$$0.43 \sqrt[3]{23' + \sqrt{275}} - 1.5$$

$$= 3.48 \text{ ft}$$

$$P_d = L_u \gamma = 3.48 \overset{< 30}{(0.13 \times 265 + 14)} = 104 \text{ psf}$$

$$\text{WIDTH} = 4h_d = 4(3.48) = 13.9 \rightarrow 14 \text{ ft}$$

TITLE: _____

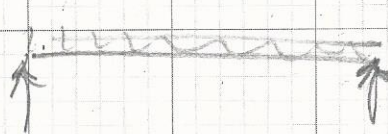
THIRD LEVEL GREEN ROOF

GRID C.1

EDGE BEAM

$l = 17'$ $TRIB = 1'$

$W = 60 \text{ psf DL}$
 167 psf SL

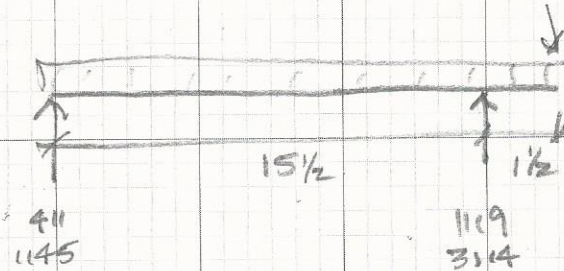


$P = \frac{60(17)}{2} = 510 \text{ lb DL}$
 $\frac{167(17)}{2} = 1420 \text{ lb SL}$

GRID 1.2

EDGE BEAM

$W = 60 \text{ psf DL}$
 167 psf SL



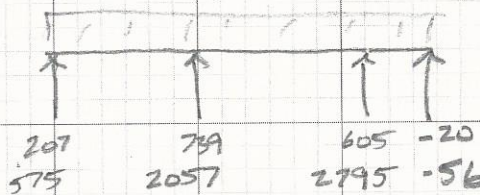
$P = 510 \text{ DL}$
 1420 SL

GRID 0.9

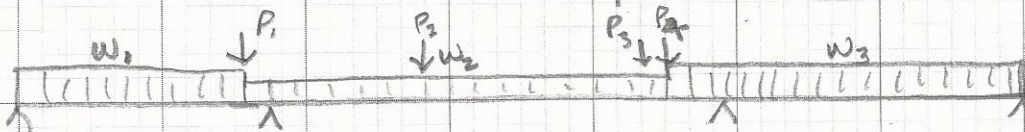
EDGE BEAM

$W = 60 \text{ psf DL}$
 167 psf SL

$TRIB = 1'$



THIRD LEVEL MAIN BEAM LINE N/S ON LINE 2.5



$W_1 = \text{DL } 25 \times 6 + 60 \times 1 + 12 \times 11 = 342 \text{ plf}$
 $\text{LL } 40 \times 6 + 40 \times 1 = 280 \text{ plf}$

$W_2 = \text{DL } 25 \times 3 + 60 \times 1 + 12 \times 11 = 267 \text{ plf}$
 $\text{LL } 40 \times 3 + 40 \times 1 = 160 \text{ plf}$

$W_3 = \text{DL } 25 \times 7\frac{1}{2} + 60 \times 1 + 12 \times 11 = 380 \text{ plf}$
 $\text{LL } 40 \times 8\frac{1}{2} = 340 \text{ plf}$

TITLE: _____

MASTER BEAM WALL LINE A

ROOF LOAD $12 \text{ psf} \times 1 \text{ ft TRIB} = 12 \text{ plf}$

WALL LOAD $12 \text{ psf} \times 11 \text{ ft TALL} = 132 \text{ plf}$

SNOW LOAD $167 \times 1 \text{ ft TRIB} = 167 \text{ plf}$

$DL = 144 \text{ plf} \times 16'' = 192 \text{ lb}$

$SL = 167 \text{ plf} \times 16'' = 223 \text{ lb}$

BEAM @ 3RD FLOOR

$DL = 25 \text{ psf} \times \frac{5'}{2} = 63 \text{ plf}$

$LL = 40 \text{ psf} \times \frac{5'}{2} = 100 \text{ plf}$

MASTER BEAM WALL LINE A.2

ROOF LOAD $12 \text{ psf} \times 1 \text{ ft TRIB}$

WALL LOAD $12 \text{ psf} \times 11 \text{ ft TALL}$

$DL = 144 \text{ plf}$

$SL = 167 \text{ plf}$

GREEN ROOF LOAD $142 \text{ psf} \times 1 \text{ ft TRIB}$

SNOW LOAD $167 + 104 = 271 \text{ psf ft}$

FORM LOAD $DL = 25 \text{ psf} \times 3 \text{ ft TRIB} = 75 \text{ plf}$

$LL = 40 \text{ psf} \times 3 = 120 \text{ plf}$

$DL = 351 \text{ plf}$

$LL = 120$

$SL = 438 \text{ plf}$

DHS
CONTROLS



SHEET NUMBER: _____

JOB NUMBER: _____

DATE: _____

BY: _____

TITLE: _____

MASTER BEDROOM WALL LINE 3.5		$l = 14'-6"$	
HIGH ROOF LOAD	$12 \text{ psf} \times 5/2 \text{ ft TRIB}$	$= 66 \text{ plf}$	
WALL LOAD	$12 \text{ psf} \times 1 \text{ ft TALL}$	$= 12 \text{ plf}$	
LOW ROOF LOAD	$142 \text{ psf} \times 2 \text{ ft TRIB}$	$= 284 \text{ plf}$	
FLOOR LOAD	$25 \text{ psf} \times 1 \text{ ft TRIB}$	$= 25 \text{ plf}$	DL = 507 plf 0'-8'-6"
LIVE LOAD	$40 \text{ psf} \times 3 \text{ ft TRIB}$	$= 120 \text{ plf}$	
SNOW LOAD HIGH	$167 \text{ psf} \times 5/2 \text{ ft}$	$= 919 \text{ plf}$	
	$271 \text{ psf} \times 2 \text{ ft}$	$= 542 \text{ plf}$	SL = 1461 plf 0'-8'-6"
FLOOR LOAD -	$25 \text{ psf} \times 16' = 33 \text{ plf}$	} 8'-6" - 14'-6"	
LIVE	$40 \text{ psf} \times 16' = 53 \text{ plf}$		
POINT LOAD	DL = 702 lb	} @ 8'-6"	
	SL = 876 lb		
MASTER BDRM WALL LINE 4.7		$l = 14'-6"$	
HIGH ROOF LOAD	$12 \text{ psf} \times 1 \text{ ft TRIB}$	$= 12 \text{ plf}$	
WALL LOAD	$12 \text{ psf} \times 11 \text{ ft TALL}$	$= 132 \text{ plf}$	
LOW ROOF LOAD	$142 \text{ psf} \times 1 \text{ ft TRIB}$	$= 142 \text{ plf}$	
FLOOR LOAD	$25 \text{ psf} \times 7'-6" \text{ TRIB}$	$= 188 \text{ plf}$	DL = 474 plf
LINE ROOF	$20 \text{ psf} \times 1 \text{ ft TRIB}$	$= 20$	LL = 320 plf } 0.75 SL 568.5
LIVE FLOOR	$40 \text{ psf} \times 7'-6" \text{ TRIB}$	$= 300$	
SNOW ROOF	$167 \times 1' \text{ TRIB}$	$= 167$	SL = 438 plf
SNOW GR ROOF	$271 \times 1' \text{ TRIB}$	$= 271$	



SHEET NUMBER: _____

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TITLE: _____

<p>MASTER FORM WALL GRADE 3.5 FROM A-B 23'-0" w/ 5' CANT.</p>	
0'-8'	$ROOF\ DL = 142\ psf \times 13\frac{1}{2}'\ TAB = 1917\ plf\ DL$ $SL = 167\ psf \times 6' + 271\ psf \times 7\frac{1}{2}' = 3035\ plf\ SL$ $LL = 20 \times 13\frac{1}{2} = 270\ plf\ LL$
8'-16'6"	$ROOF\ DL = 142\ psf \times 8'\ TAB = 1136\ plf\ DL$ $SL = 1825\ plf + 271 \times 2' = 2367\ plf\ SL$ $LL = 20\ psf \times 8' = 160\ plf\ LL$
16'-6" - 23'	$\frac{1}{2}\ ROOF\ DL = 12\ psf \times 7\frac{1}{2}'\ TAB = 90\ plf$ $WALL\ DL = 12\ psf \times 11'\ TALL = 132\ plf$ $L.\ ROOF\ DL = 142 + 6'\ TAB = 852\ plf$ $FLOOR\ DL = 25\ psf \times 1'\ TAB = 25\ plf$ $DL = 1099\ plf$
	$SL\ ROOF = 167\ psf \times 7\frac{1}{2}'\ TAB = 1253\ plf$ $SL\ L.\ ROOF = 1825\ plf$ $SL = 3078\ plf$
	$LL\ ROOF = 20\ psf \times 7\frac{1}{2}'\ TAB = 150\ plf$ $LL\ L.\ ROOF = 20\ psf \times 6'\ TAB = 120\ plf$ $LL\ FLOOR = 40\ psf \times 1'\ TAB = 40$ $LL = 310\ plf$
23'-23'	$ROOF\ DL = 90\ plf$ $WALL\ DL = 132\ plf$ $FLOOR\ DL = 25\ plf$ $DL = 247\ plf$
	$SL\ ROOF = 1253\ plf$ $SL = 1253\ plf$
	$LL\ ROOF = 150\ plf$ $LL\ FLOOR = 40\ plf$ $LL = 190\ plf$



SHEET NUMBER: _____

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TITLE: _____

POINT LOADS

8' DL = 3270 lb
 UL = 2400 lb
 SL = 3285 lb

16'-6" DL = 692 lb
 UL = 240 lb
 SL = 876 lb

28' DL = 132 lb

MASTER BEAM BEAM @ GRID 3 5'-0" CANTILEVER

ROOF DL → 1' POINT LOAD
 ROOF SL →

WALL DL → 12 psf × 11' TAIL = 132 plf
 FLOOR DL 25 psf × 1 ft TRIS = 25 plf } 157 plf DL
 LL 40 psf × 1 = 40 plf

POINT LOADS

DL: ROOF: $77 \text{ psf} \times 1' \times 8\frac{1}{2}' = 308$
 $77 \text{ psf} \times 7\frac{1}{2}' \times 4\frac{1}{2}' = 1299$
 $12 \text{ psf} \times 11' = 132$
 DL = 1739 lb

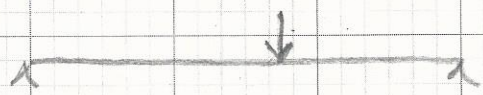
SL ROOF: $167 \times 1 \times 8\frac{1}{2} = 668$
 $167 \times 7\frac{1}{2} \times 2\frac{1}{2} = 2828$
 SL = 3486 lb



SHEET NUMBER: _____
JOB NUMBER: _____
DATE: _____
BY: _____

TITLE: _____

GARAGE DOOR HEADER 18' long



$$P = 42351b \text{ DL}$$
$$339971b \text{ SL}$$

$$W = 142 \times 1 = 142 \text{ plf DL}$$
$$167 \times 1 = 167 \text{ plf SL}$$

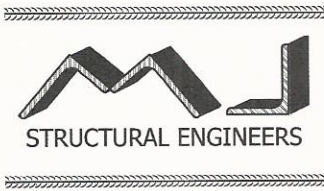
CONC BEAM 27" TALL 8" THICK

$$d = 25"$$

$$W_D = \frac{150(27 \times 8)}{144} = 225 \text{ plf}$$

$$M = 289.98 \text{ k-ft}$$

$$A_s = \frac{M}{4d} = \frac{289.98}{4(25)} = 2.9 \text{ in}^2 \rightarrow (3) \#4$$



SHEET NUMBER: _____

JOB NUMBER: _____

DATE: _____

BY: _____

TITLE: _____

$P_1 = 2732 \text{ lb DL}$
 33404 lb SL
 4000 lb LL

$P_3 = 3071 \text{ lb DL}$
 11533 lb SL
 4613 lb LL

$P_2 = 3670 \text{ lb DL}$
 13783 lb SL
 5513 lb LL

$P_4 = 3019 \text{ lb DL}$
 37358 lb SL
 4474 lb LL

↑
 2189
 1845
 3181

↑
 $4333 \quad 6502$
 $4975 \quad 6585$
 $30223 \quad 16108$

10835 DL
 11560 LL
 46331 SL

D+S CONTROLS

↑
 $9508 \quad 2453$
 $11055 \quad 2125$
 46566

11961 DL
 13180 LL
 46566 SL

D+S CONTROLS

↑
 2453
 2125

2ND LEVEL - GRID A.4

ROOF LOAD: $DL = 55 \text{ psf} \times 8' \text{ TRB} = 440 \text{ plf}$

$LL = 20 \text{ psf} \times 8' \text{ TRB} = 160 \text{ plf}$

$SL = (271 \rightarrow 167) \text{ psf} \times 8' \text{ TRB} = 2168 \text{ plf} - 1336 \text{ plf}$

WALL LOAD $DL = 150 \left(\frac{8}{12}\right) \times 11' \text{ TALL} = 1100 \text{ plf}$

FLOOR LOAD $DL = 25 \text{ psf} \times 5\frac{1}{2}' \text{ TRB} = 137.5 \text{ plf}$

$LL = 40 \text{ psf} \times 5\frac{1}{2}' \text{ TRB} = 220 \text{ plf}$

$SL = 167 \times 5\frac{1}{2}' \text{ TRB} = 918.5 \text{ plf}$

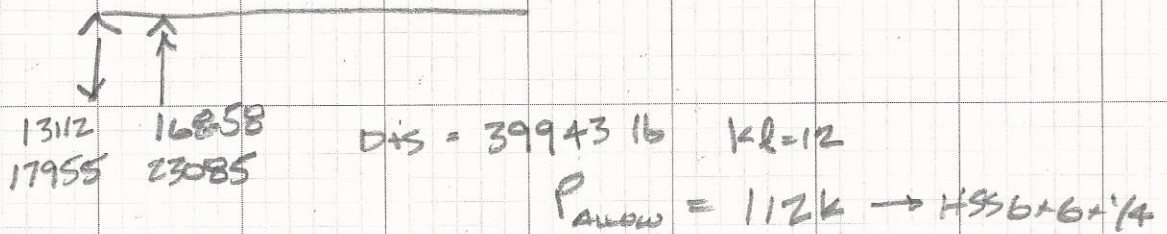
$DL = 1678 \text{ plf}$

$LL = 380 \text{ plf}$

$SL = 3087 - 2255 \text{ plf}$

TITLE: _____

CANTILEVERED BEAM ON GRID E - 2ND LEVEL



$$1.2D + 1.6S$$

$$= 1.2(13112) + 1.6(17955) = 44462 \text{ lb}$$

BOLTS: USE 4 A325 $7/8" \phi$

$$V = 4(24.3) = 97.2k > 44.5k$$

WELD: $0.75(6.6)(70)(1/4)(\sqrt{2})(12") = 66.82k > 44.5$

NELSON STUDS:

51000 psi

$$\frac{44462}{51000} = 0.87 \text{ in}^2 \text{ REQ'D}$$

$$6 \text{ STUDS} = \frac{0.87}{6} = 0.145 \quad 1/2" \phi \text{ STUDS OK}$$

USE (8) $1/2" \phi$ HSSA'S

SUPPLEMENTARY REINF

$$0.9(60 \text{ ksi}) = 54000 \text{ lb}$$

$$A_s = \frac{44462}{54000} = 0.82 \text{ in}^2 \quad \text{No. of BARS} = \frac{0.82}{0.2} = 4.11 \rightarrow 5 \#$$

MJ STRUCTURAL ENGINEERS

ASD Design

Design of Wood Beams Based on the NDS
Design of Steel Beams Based on AISC 360

Sht Number:	
Job Number:	14123
Date:	5/31/2016
By:	BH

Blue Cells Must be Entered Manually

WOOD BEAMS	WOOD	WOOD	WOOD	WOOD	WOOD	STEEL BEAMS
Species Designation	11½" BCI 90 BCI I-Joist Beam 1	(3) 1¾" x 11½" LVL LVL 1.9E Fb:2600 Beam 2	(2) 1¾" x 11½" LVL LVL 1.9E Fb:2600 Beam 3	11½" BCI 90 BCI I-Joist Beam 4	11½" BCI 90 BCI I-Joist Beam 5	Section Type Designation
Description	Roof Level - Main Bldg - North Green Roof	Roof Level - Main Bldg - North Green Roof Long Headers	Roof Level - Main Bldg - North Green Roof Short Headers	Roof Level - Main Bldg - North Green Roof - North Span Joists	Roof Level - Main Bldg - North Green Roof - Center Span Joists	Description
L _{Left_Span} (ft) L _{Center_Span} (ft) L _{Right_Cant} (ft) L _u (ft) Auto (ft) Beam Slope α	14.50 1.0 0:12 0.0°	6.00 1.0 0:12 0.0°	3.50 1.0 0:12 0.0°	14.50 1.0 0:12 0.0°	17.50 1.0 0:12 0.0°	L _{Left_Span} (ft) L _{Center_Span} (ft) L _{Right_Cant} (ft) L _b (ft) Auto Beam Slope α
Include Self Wt. γ _{wood} (lb/ft³) w _{Self} (lb/ft)	No	No	No	No	No	Include Self Wt. γ _{Steel} (lb/ft³) w _{Self} (lb/ft)
PSF _{DL} PSF _{LL} (lb/ft²) Trib Width (ft) Auto Factored PLF _{DL} PLF _{LL}	77.0 167.0 1.00 77.0 167.0	77.0 167.0 7.25 558.3 1210.8	77.0 167.0 7.25 558.3 1210.8	12.0 167.0 1.33 16.0 222.6	12.0 167.0 1.00 12.0 167.0	PSF _{DL} PSF _{LL} (lb/ft²) Trib Width (ft) Auto Factored PSF _{DL} PSF _{LL}
PSF _{DL} PSF _{LL} (lb/ft²) Trib Width (ft) Auto Start End Dist frm Left Factored PLF _{DL} PLF _{LL}						PSF _{DL} PSF _{LL} (lb/ft²) Trib Width (ft) Auto Start End Dist frm Left Factored PSF _{DL} PSF _{LL}
PSF _{DL} PSF _{LL} (lb/ft²) Trib Width (ft) Auto Start End Dist frm Left Factored PLF _{DL} PLF _{LL}						PSF _{DL} PSF _{LL} (lb/ft²) Trib Width (ft) Auto Start Dist frm Left Factored PSF _{DL} PSF _{LL}
Incr PSF _{DL} PSF _{LL} (lb/ft²) Trib Width (ft) Auto Max at L or R Auto Start End Dist frm Left Factored Incr _{DL} Incr _{LL}						Incr PSF _{DL} PSF _{LL} (lb/ft²) Trib Width (ft) Auto Max at L or R Auto Start End Dist frm Left Factored Incr _{DL} Incr _{LL}
Incr PSF _{DL} PSF _{LL} (lb/ft²) Trib Width (ft) Auto Max at L or R Auto Start End Dist frm Left Factored Incr _{DL} Incr _{LL}						Incr PSF _{DL} PSF _{LL} (lb/ft²) Trib Width (ft) Auto Max at L or R Auto Start End Dist frm Left Factored Incr _{DL} Incr _{LL}
Pt 1 Dead Live (lbs) Dist from Left Auto Factored PT _{DL} PT _{LL}					38.0 2.25 38.0 0.0	Pt 1 Dead Live (lbs) Dist from Left Auto Factored PT _{DL} PT _{LL}
Pt 2 Dead Live (lbs) Dist from Left Auto Factored PT _{DL} PT _{LL}						Pt 2 Dead Live (lbs) Dist from Left Auto Factored PT _{DL} PT _{LL}
Pt 3 Dead Live (lbs) Dist from Left Auto Factored PT _{DL} PT _{LL}						Pt 3 Dead Live (lbs) Dist from Left Auto Factored PT _{DL} PT _{LL}
C _D C _r C _t C _i Wet Use (Y/N)?	1.15 1.00 1.00 1.00	1.15 1.00 1.00 1.00	1.15 1.00 1.00 1.00	1.15 1.00 1.00 1.00	1.15 1.00 1.00 1.00	C _b D.N.A. D.N.A. D.N.A.
F _v (psi) f _v (psi) V _{ALL} 1.5V _{max} (kip) Shear Chk	268.20 191.89 3.71 2.65 71.5%	327.75 127.69 20.43 7.96 39.0%	327.75 111.73 13.62 4.64 34.1%	268.20 187.65 3.71 2.59 70.0%	268.20 173.49 3.71 2.40 64.7%	A _w (in²) Ω _v V _r /Ω V _{max} (kip) Shear Check
F _{b,TT} F _{b,CT} (psi) S (in²) I _x (in⁴) M _{ALL} (k*ftft) + - M _{max} (k*ftft) + - Bending Chk	2554 2554.11 51.60 306.4 10.98 10.98 6.41 0.00 58.4% 0.0%	2990 2990.06 123.39 732.6 30.74 30.74 7.96 0.00 25.9% 0.0%	2984 2984.49 82.26 488.4 20.46 20.46 2.71 0.00 13.2% 0.0%	2554 2554.11 51.60 306.4 10.98 10.98 6.27 0.00 57.1% 0.0%	2554 2554.11 51.60 306.4 10.98 10.98 6.90 0.00 62.8% 0.0%	F _y (ksi) Ω _b Z _x (in³) I _x (in⁴) M _r /Ω (k*ftft) + - M _{max} (k*ftft) + - Bending Check
Max LL TL Δ Ratio Allowable LL TL Δ Δ _{Live_Left} Δ _{Tot_Left} (in) Δ _{Live_Cntr} Δ _{Tot_Cntr} (in) Δ _{Live_Cant} Δ _{Tot_Cant} (in) Actual LL TL Δ Ratio	L/ 360 L/ 240 0.32 0.46	L/ 360 L/ 240 0.03 0.04	L/ 360 L/ 240 0.00 0.01	L/ 360 L/ 240 0.42 0.45	L/ 240 L/ 240 0.63 0.68	Max LL TL Δ Ratio Allowable LL TL Δ Δ _{Live_Left} Δ _{Tot_Left} (in) Δ _{Live_Cntr} Δ _{Tot_Cntr} (in) Δ _{Live_Cant} Δ _{Tot_Cant} (in) Actual LL TL Δ Ratio
R _L (lbs) R _C (lbs) R _R (lbs)	1769 558 1211 5307 1675 3632 1769 558 1211	5307 1675 3632 3096 977 2119 5307 1675 3632	3096 977 2119 1730 116 1614 3096 977 2119	1730 116 1614 1599 138 1461 1730 116 1614	1599 138 1461 1571 110 1461	R _L (lbs) R _C (lbs) R _R (lbs)
F _{C-Perp} (psi) Brg Chk Req'd Brg L Brg Cap Req'd Brg C Brg Cap Req'd Brg R Brg Cap	0 95.6% 1¾" & WS 1850.0	750 DNA 1 1/2 " DNA	750 DNA 1 1/4 " DNA	0 93.5% 1¾" & WS 1850.0	0 86.5% 1¾" & WS 1850.0	D.N.A. D.N.A. D.N.A. D.N.A.

Reactions are Service Level # Plys Span/Depth	1 14.65	3 6.06	2 3.54	1 14.65	1 17.68	Reactions are Service Level Shape Span/Depth
Nailing Requirements (If More Than 1 PLY) Or Bearing Requirements (I-Joist Only)	LT: 1¾" Min End Brg & Web Stiffeners. RT: 1¾" Min End Brg & Web Stiffeners. Web Stiffnr's Req'd at All Conc Loads	(4) Rows of 12d or 16d (0.128" x 3" Min) Nails @ 12" O.C. 4" Edge Distance. Alternate Rows Through Both Outside Faces.	Must be Bolted or Screwed if Side-Loaded (w/Hangers, etc.). Custom Design Standard Nailing Otherwise	LT: 1¾" Min End Brg & Web Stiffeners. RT: 1¾" Min End Brg & Web Stiffeners. Web Stiffnr's Req'd at All Conc Loads	LT: 1¾" Min End Brg & Web Stiffeners. RT: 1¾" Min End Brg & Web Stiffeners. Web Stiffnr's Req'd at All Conc Loads	D.N.A.

Query Location Type Query Result	DESIGN	DESIGN	DESIGN	DESIGN	DESIGN	Location Type Query Result

MJ STRUCTURAL ENGINEERS

ASD Design

Design of Wood Beams Based on the NDS
Design of Steel Beams Based on AISC 360

Sht Number:	
Job Number:	14123
Date:	5/31/2016
By:	BH

Blue Cells Must be Entered Manually

WOOD BEAMS	STEEL		STEEL		STEEL		WOOD		WOOD		STEEL BEAMS
Species Designation	W10X22 W-FLANGE Beam 6		W10X22 W-FLANGE Beam 7		W10X22 W-FLANGE Beam 8		1 1/8" TJI 360 TJI Res I-Joist Beam 9		(1) 1 3/4" x 1 1/8" LVL LVL 1.9E Fb:2600 Beam 10		Section Type Designation
Description	Roof level - North Section - North Cantilevered Beam		Roof level - North Section - South Cantilevered Beam		Roof level - North Section - South Cantilevered Beam - on Grid C		Roof Level - Main Bldg - South Span Joists		Roof Level - Guest House - Joists		Description
L _{Left_Span} (ft) L _{Center_Span} (ft) L _{Right_Cant} (ft) L _u (ft) Auto (ft) Beam Slope α	13.25 6.75 1.0 0 : 12 0.0°		13.25 6.75 1.0 0 : 12 0.0°		4.75 6.75 1.0 0 : 12 0.0°		9.00 1.0 0 : 12 0.0°		15.50 1.25 1.0 0 : 12 0.0°		L _{Left_Span} (ft) L _{Center_Span} (ft) L _{Right_Cant} (ft) L _b (ft) Auto Beam Slope α
Include Self Wt.	Yes		Yes		Yes		No		No		Include Self Wt.
γ _{wood} (lb/ft ³) w _{Self} (lb/ft)	488.1 22.0		488.1 22.0		488.1 22.0						γ _{Steel} (lb/ft ³) w _{Self} (lb/ft)
PSF _{DL} PSF _{LL} (lb/ft ²) Trib Width (ft) Auto Factored PLF _{DL} PLF _{LL}	178.0 2475.0 1.00 178.0 2475.0		159.0 2213.0 1.00 159.0 2213.0		54.0 752.0 1.00 54.0 752.0		12.0 167.0 1.33 16.0 222.6		12.0 167.0 1.00 12.0 167.0		PSF _{DL} PSF _{LL} (lb/ft ²) Trib Width (ft) Auto Factored PSF _{DL} PSF _{LL}
PSF _{DL} PSF _{LL} (lb/ft ²) Trib Width (ft) Auto Start End Dist frm Left Factored PLF _{DL} PLF _{LL}											PSF _{DL} PSF _{LL} (lb/ft ²) Trib Width (ft) Auto Start End Dist frm Left Factored PSF _{DL} PSF _{LL}
PSF _{DL} PSF _{LL} (lb/ft ²) Trib Width (ft) Auto Start End Dist frm Left Factored PLF _{DL} PLF _{LL}											PSF _{DL} PSF _{LL} (lb/ft ²) Trib Width (ft) Auto Start Dist frm Left Factored PSF _{DL} PSF _{LL}
Incr PSF _{DL} PSF _{LL} (lb/ft ²) Trib Width (ft) Auto Max at L or R Auto Start End Dist frm Left Factored Incr _{DL} Incr _{LL}											Incr PSF _{DL} PSF _{LL} (lb/ft ²) Trib Width (ft) Auto Max at L or R Auto Start End Dist frm Left Factored Incr _{DL} Incr _{LL}
Incr PSF _{DL} PSF _{LL} (lb/ft ²) Trib Width (ft) Auto Max at L or R Auto Start End Dist frm Left Factored Incr _{DL} Incr _{LL}											Incr PSF _{DL} PSF _{LL} (lb/ft ²) Trib Width (ft) Auto Max at L or R Auto Start End Dist frm Left Factored Incr _{DL} Incr _{LL}
Pt 1 Dead Live (lbs) Dist from Left Auto Factored PT _{DL} PT _{LL}											Pt 1 Dead Live (lbs) Dist from Left Auto Factored PT _{DL} PT _{LL}
Pt 2 Dead Live (lbs) Dist from Left Auto Factored PT _{DL} PT _{LL}											Pt 2 Dead Live (lbs) Dist from Left Auto Factored PT _{DL} PT _{LL}
Pt 3 Dead Live (lbs) Dist from Left Auto Factored PT _{DL} PT _{LL}											Pt 3 Dead Live (lbs) Dist from Left Auto Factored PT _{DL} PT _{LL}
C _D C _r C _t C _i	1.00 1.00 1.00 1.00		1.00 1.00 1.00 1.00		1.00 1.00 1.00 1.00		1.15 1.00 1.00 1.00		1.15 1.00 1.00 1.00		C _b D.N.A. D.N.A. D.N.A.
Wet Use (Y/N)?							No		No		
F _v (psi) f _v (psi) V _{ALL} 1.5V _{max} (kip) Shear Chk	2.45 1.50 48.96 22.32 45.6%		2.45 1.50 48.96 19.98 40.8%		2.45 1.50 48.96 5.94 12.1%		300.69 164.66 2.94 1.61 54.8%		327.75 100.78 6.81 2.09 30.8%		A _w (in ²) Ω _v V _r /Ω V _{max} (kip) Shear Check
F _{b,TT} F _{b,CT} (psi) S (in ³) I _x (in ⁴) M _{ALL} (k*fft) + - M _{max} (k*fft) + - Bending Chk	50 1.67 26.00 118.0 64.87 64.87 32.19 60.94 49.6% 93.9%		50 1.67 26.00 118.0 64.87 64.87 28.81 54.54 44.4% 84.1%		50 1.67 26.00 118.0 64.87 64.87 0.00 18.86 0.0% 29.1%		2532 2531.54 33.69 200.0 7.11 7.11 2.42 0.00 34.0% 0.0%		2947 2947.04 41.13 244.2 10.10 10.10 5.31 0.14 52.5% 1.4%		F _y (ksi) Ω _b Z _x (in ³) I _x (in ⁴) M _r /Ω (k*fft) + - M _{max} (k*fft) + - Bending Check
Max LL TL Δ Ratio Allowable LL TL Δ	L/ 360 L/ 240		L/ 360 L/ 240		L/ 360 L/ 240		L/ 360 L/ 240		L/ 240 L/ 238		Max LL TL Δ Ratio Allowable LL TL Δ
Δ _{Live_Left} Δ _{Tot_Left} (in) Δ _{Live_Cntr} Δ _{Tot_Cntr} (in) Δ _{Live_Cant} Δ _{Tot_Cant} (in) Actual LL TL Δ Ratio	0.20 0.21 0.36 0.38 L/ 456 L/ 422		0.18 0.19 0.32 0.34 L/ 510 L/ 471		0.01 0.01 0.18 0.20 L/ 902 L/ 819		0.12 0.13 0.12 0.13 L/ 908 L/ 847		0.46 0.49 0.12 0.13 L/ 256 L/ 239		Δ _{Live_Left} Δ _{Tot_Left} (in) Δ _{Live_Cntr} Δ _{Tot_Cntr} (in) Δ _{Live_Cant} Δ _{Tot_Cant} (in) Actual LL TL Δ Ratio
R _L (lbs) R _C (lbs) R _R (lbs)	13123 981 R _{LL} 12142 R _{CL} R _{CL} R _{RL} 40377 R _{RL} 3019 R _{LL} 37358		11744 888 R _{LL} 10856 R _{CL} R _{CL} R _{RL} 36136 R _{RL} 2732 R _{LL} 33404		-2005 -184 R _{LL} -1821 R _{CL} R _{CL} R _{RL} 11527 R _{RL} 1058 R _{LL} 10469		1074 72 R _{LL} 1002 R _{CL} R _{CL} R _{RL} 1074 R _{RL} 72 R _{LL} 1002		1378 92 R _{LL} 1286 R _{CL} R _{CL} R _{RL} 1620 R _{RL} 109 R _{LL} 1511		R _L (lbs) R _C (lbs) R _R (lbs)
F _{C-Perp} (psi) Brg Chk Req'd Brg L Brg Cap Req'd Brg C Brg Cap Req'd Brg R Brg Cap	DNA DNA DNA DNA DNA DNA DNA DNA		DNA DNA DNA DNA DNA DNA DNA DNA		DNA DNA DNA DNA DNA DNA DNA DNA		0 99.4% 1 3/4" 1080.0 1 1/4" 1080.0 1 1/4" 1080.0		750 DNA 1 1/4" DNA 1 1/4" DNA 1 1/4" DNA		D.N.A. D.N.A. D.N.A. D.N.A.

Reactions are Service Level
Plys | Span/Depth

Adequate	Adequate	Adequate	Adequate	Adequate
I 15.88	I 15.88	I 15.88	1 9.09	1 15.66

Reactions are Service Level
Shape | Span/Depth

Nailing Requirements
(If More Than 1 PLY)
Or Bearing Requirements
(I-Joist Only)

DNA	DNA	DNA	DNA	LT: 1 3/4" Min End Brg. RT: 1 3/4" Min End Brg. Web Stiffn's Req'd at All Conc Loads	None Required	D.N.A.
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Query

DESIGN	DESIGN	DESIGN	DESIGN	DESIGN
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Location | Type
Query Result

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Location | Type
Query Result

MJ STRUCTURAL ENGINEERS

ASD Design

Design of Wood Beams Based on the NDS
Design of Steel Beams Based on AISC 360

Sht Number:	
Job Number:	14123
Date:	5/31/2016
By:	BH

Blue Cells Must be Entered Manually

	WOOD		STEEL		WOOD		WOOD		WOOD		STEEL BEAMS
WOOD BEAMS	(1) 2x8		C15X33.9		(2) 1 3/4" x 1 7/8" LVL		(1) 1 3/4" x 14" LVL		(1) 1 3/4" x 14" LVL		Section Type
Species	DF # 2 or Better		CHANNEL		LVL 1.9E Fb:2600		LVL 1.9E Fb:2600		LVL 1.9E Fb:2600		Designation
Designation	Beam 11		Beam 12		Beam 13		Beam 14		Beam 15		
Description	Roof Level - Walkway roof joists		Roof Level - Walkway edge roof beams		Roof Level - Guest House - N/S headers		Third Level - North East Green Roof Joists		Third Level - Northeast Green Roof - South of Master Suite		Description
L_{Left_Span} (ft)	5.50		24.25		5.50		12.50		14.50		L_{Left_Span} (ft)
L_{Center_Span} (ft)	5.50		24.25		5.50		12.50		14.50		L_{Center_Span} (ft)
L_{Right_Cant} (ft)	1.0		1.0		1.0		1.0		1.0		L_{Right_Cant} (ft)
L_u (ft) $Auto$ (ft)	1.0		1.0		1.0		1.0		1.0		L_b (ft) $Auto$
Beam Slope α	0 : 12 0.0°		0 : 12 0.0°		0 : 12 0.0°		0 : 12 0.0°		0 : 12 0.0°		Beam Slope α
Include Self Wt.	No		Yes		No		No		No		Include Self Wt.
γ_{wood} (lb/ft ²) w_{Self} (lb/ft)	12.0 167.0		488.2 33.9		12.0 167.0		142.0 167.0		142.0 271.0		γ_{Steel} (lb/ft ²) w_{Self} (lb/ft)
PSF _{DL} PSF _{LL} (lb/ft ²)	12.0 167.0		12.0 167.0		12.0 167.0		142.0 167.0		142.0 271.0		PSF _{DL} PSF _{LL} (lb/ft ²)
Trib Width (ft) $Auto$	1.33		2.75		9.00		1.33		1.00		Trib Width (ft) $Auto$
Factored PLF _{DL} PLF _{LL}	16.0 222.7		33.0 459.3		108.0 1503.0		189.3 222.6		142.0 271.0		Factored PSF _{DL} PSF _{LL}
PSF _{DL} PSF _{LL} (lb/ft ²)											PSF _{DL} PSF _{LL} (lb/ft ²)
Trib Width (ft) $Auto$											Trib Width (ft) $Auto$
Start End Dist frm Left											Start End Dist frm Left
Factored PLF _{DL} PLF _{LL}											Factored PSF _{DL} PSF _{LL}
PSF _{DL} PSF _{LL} (lb/ft ²)											PSF _{DL} PSF _{LL} (lb/ft ²)
Trib Width (ft) $Auto$											Trib Width (ft) $Auto$
Start End Dist frm Left											Start Dist frm Left
Factored PLF _{DL} PLF _{LL}											Factored PSF _{DL} PSF _{LL}
Incr PSF _{DL} PSF _{LL} (lb/ft ²)							104.0				Incr PSF _{DL} PSF _{LL} (lb/ft ²)
Trib Width (ft) $Auto$							1.0				Trib Width (ft) $Auto$
Max at L or R $Auto$							Left				Max at L or R $Auto$
Start End Dist frm Left							0.0 12.5				Start End Dist frm Left
Factored Incr _{DL} Incr _{LL}							0.0 104.0				Factored Incr _{DL} Incr _{LL}
Incr PSF _{DL} PSF _{LL} (lb/ft ²)											Incr PSF _{DL} PSF _{LL} (lb/ft ²)
Trib Width (ft) $Auto$											Trib Width (ft) $Auto$
Max at L or R $Auto$											Max at L or R $Auto$
Start End Dist frm Left											Start End Dist frm Left
Factored Incr _{DL} Incr _{LL}											Factored Incr _{DL} Incr _{LL}
Pt 1 Dead Live (lbs)											Pt 1 Dead Live (lbs)
Dist from Left $Auto$											Dist from Left $Auto$
Factored PT _{DL} PT _{LL}											Factored PT _{DL} PT _{LL}
Pt 2 Dead Live (lbs)											Pt 2 Dead Live (lbs)
Dist from Left $Auto$											Dist from Left $Auto$
Factored PT _{DL} PT _{LL}											Factored PT _{DL} PT _{LL}
Pt 3 Dead Live (lbs)											Pt 3 Dead Live (lbs)
Dist from Left $Auto$											Dist from Left $Auto$
Factored PT _{DL} PT _{LL}											Factored PT _{DL} PT _{LL}
C_D C_r	1.15 1.15		1.00 1.00		1.15 1.00		1.15 1.00		1.15 1.00		C_b D.N.A.
C_t C_i	1.00 1.00		1.00 1.00		1.00 1.00		1.00 1.00		1.00 1.00		D.N.A.
Wet Use (Y/N)?	No				No						D.N.A.
F'_v (psi) f_v (psi)	207.00 90.53		6.00 1.67		327.75 159.89		327.75 184.14		327.75 183.32		A_w (in ²) Ω_v
V_{ALL} 1.5 V_{max} (kip)	2.25 0.98		77.60 6.38		13.62 6.65		8.03 4.51		8.03 4.49		V_u/Ω V_{max} (kip)
Shear Chk	43.7%		8.2%		48.8%		56.2%		55.9%		Shear Check
F'_{b_TT} F'_{b_CT} (psi)	1298 1297.95		36 1.67		2984 2984.49		2872 2872.43		2872 2872.43		F_y (ksi) Ω_b
S (in ³) I_x (in ⁴)	13.14 47.6		50.80 315.0		82.26 488.4		57.17 400.2		57.17 400.2		Z_x (in ³) I_x (in ⁴)
M_{ALL} (k*ft) + -	1.42 1.42		91.26 91.26		20.46 20.46		13.68 13.68		13.68 13.68		M_u/Ω (k*ft) + -
M_{max} (k*ft) + -	0.90 0.00		38.68 0.00		6.09 0.00		9.06 0.00		10.85 0.00		M_{max} (k*ft) + -
Bending Chk	63.5% 0.0%		42.4% 0.0%		29.8% 0.0%		66.2% 0.0%		79.3% 0.0%		Bending Check
Max LL TL Δ Ratio	L/ 360 L/ 240		L/ 360 L/ 240		L/ 360 L/ 240		L/ 360 L/ 240		L/ 360 L/ 240		Max LL TL Δ Ratio
Allowable LL TL Δ											Allowable LL TL Δ
Δ_{Live_Left} Δ_{Tot_Left} (in)	0.06 0.06		0.39 0.45		0.03 0.04		0.20 0.34		0.35 0.54		Δ_{Live_Left} Δ_{Tot_Left} (in)
Δ_{Live_Cntr} Δ_{Tot_Cntr} (in)											Δ_{Live_Cntr} Δ_{Tot_Cntr} (in)
Δ_{Live_Cant} Δ_{Tot_Cant} (in)											Δ_{Live_Cant} Δ_{Tot_Cant} (in)
Actual LL TL Δ Ratio	L/ 1097 L/ 1024		L/ 744 L/ 649		L/ 1979 L/ 1847		L/ 756 L/ 448		L/ 491 L/ 322		Actual LL TL Δ Ratio
R_L (lbs)	656 44 612		6380 811 5568		4430 297 4133		3008 1183 1825		2994 1030 1965		R_L (lbs)
R_C (lbs)											R_C (lbs)
R_R (lbs)	656 44 612		6380 811 5568		4430 297 4133		2791 1183 1608		2994 1030 1965		R_R (lbs)
F'_{C_Perp} (psi) Brg Chk	625 DNA		DNA DNA		750 DNA		750 DNA		750 DNA		D.N.A.
Req'd Brg L Brg Cap	3/4 " DNA		DNA DNA		1 3/4 " DNA		2 1/2 " DNA		2 1/2 " DNA		D.N.A.
Req'd Brg C Brg Cap											D.N.A.
Req'd Brg R Brg Cap	3/4 " DNA		DNA DNA		1 3/4 " DNA		2 1/4 " DNA		2 1/2 " DNA		D.N.A.

Reactions are Service Level	Adequate		Adequate		Adequate		Adequate		Adequate		Reactions are Service Level
# Plys Span/Depth	1 9.10	C 19.40	2 5.56	1 10.71	1 12.43						Shape Span/Depth
Nailing Requirements (If More Than 1 PLY) Or Bearing Requirements (I-Joist Only)	None Required		DNA		Must be Bolted or Screwed if Side-Loaded (w/Hangers, etc.). Custom Design Standard Nailing Otherwise		None Required		None Required		D.N.A.

Query	DESIGN	DESIGN	DESIGN	DESIGN	DESIGN
Location Type					
Query Result					

MJ STRUCTURAL ENGINEERS

ASD Design

Design of Wood Beams Based on the NDS
Design of Steel Beams Based on AISC 360

Sht Number:	
Job Number:	14123
Date:	5/31/2016
By:	BH

Blue Cells Must be Entered Manually

	WOOD	WOOD	WOOD	WOOD	WOOD	WOOD	WOOD			
WOOD BEAMS	14" BCI 5000	(2) 1 3/4" x 14" LVL	(3) 1 3/4" x 14" LVL	(3) 1 3/4" x 14" LVL	(3) 1 3/4" x 14" LVL	(3) 1 3/4" x 14" LVL	14" BCI 5000	STEEL BEAMS		
Species	BCI I-Joist	LVL 2.0E Fb:2800	LVL 1.9E Fb:2600	LVL 1.9E Fb:2600	LVL 1.9E Fb:2600	LVL 1.9E Fb:2600	BCI I-Joist	Section Type		
Designation	Beam 16	Beam 17	Beam 18	Beam 19	Beam 19	Beam 19	Beam 20	Designation		
Description	Third Level - Main Bldg - Master Cantilevered Joists	Third Level - Main Bldg - Master Bdrn - E/W short wall support beam	Third Level - Main Bldg - Master Bdrn - N/S wall support beam	Third Level - Main Bldg - Master Bdrn - E/W long wall support beam	Third Level - Main Bldg - Master Bdrn - E/W long wall support beam	Third Level - Main Bldg - Master Bdrn - E/W long wall support beam	Third Level - Main Bldg - Floor joists North of Stairs	Description		
L_{Left_Span} (ft)								L_{Left_Span} (ft)		
L_{Center_Span} (ft)	15.00	4.00	15.00	15.00	15.00	15.00	15.00	L_{Center_Span} (ft)		
L_{Right_Cant} (ft)	5.00							L_{Right_Cant} (ft)		
L_u (ft) Auto (ft)	1.0	1.0	1.0	1.0	1.0	1.0	1.0	L_b (ft) Auto		
Beam Slope α	0 : 12	0 : 12	0 : 12	0 : 12	0 : 12	0 : 12	0 : 12	Beam Slope α		
Include Self Wt.	No	No	No	No	No	No	No	Include Self Wt.		
W_{wood} (lb/ft ²) w_{Self} (lb/ft)								W_{Steel} (lb/ft ²) w_{Self} (lb/ft)		
PSF _{DL} PSF _{LL} (lb/ft ²)	25.0	40.0	351.0	438.0	473.5	568.5	20.0	40.0	PSF _{DL} PSF _{LL} (lb/ft ²)	
Trib Width (ft) Auto	1.33	1.00	1.00	1.00	1.00	1.00	1.33	1.33	Trib Width (ft) Auto	
Factored PLF _{DL} PLF _{LL}	33.3	53.3	351.0	438.0	473.5	568.5	26.7	53.3	Factored PSF _{DL} PSF _{LL}	
PSF _{DL} PSF _{LL} (lb/ft ²)			507.0	1461.0					PSF _{DL} PSF _{LL} (lb/ft ²)	
Trib Width (ft) Auto				1.0					Trib Width (ft) Auto	
Start End Dist frm Left				0.00					Start End Dist frm Left	
Factored PLF _{DL} PLF _{LL}				507.0					Factored PSF _{DL} PSF _{LL}	
PSF _{DL} PSF _{LL} (lb/ft ²)				33.3					PSF _{DL} PSF _{LL} (lb/ft ²)	
Trib Width (ft) Auto					1.0				Trib Width (ft) Auto	
Start End Dist frm Left					8.5				Start End Dist frm Left	
Factored PLF _{DL} PLF _{LL}					33.3				Factored PSF _{DL} PSF _{LL}	
Incr PSF _{DL} PSF _{LL} (lb/ft ²)									Incr PSF _{DL} PSF _{LL} (lb/ft ²)	
Trib Width (ft) Auto									Trib Width (ft) Auto	
Max at L or R Auto									Max at L or R Auto	
Start End Dist frm Left									Start End Dist frm Left	
Factored Incr _{DL} Incr _{LL}									Factored Incr _{DL} Incr _{LL}	
Incr PSF _{DL} PSF _{LL} (lb/ft ²)									Incr PSF _{DL} PSF _{LL} (lb/ft ²)	
Trib Width (ft) Auto									Trib Width (ft) Auto	
Max at L or R Auto									Max at L or R Auto	
Start End Dist frm Left									Start End Dist frm Left	
Factored Incr _{DL} Incr _{LL}									Factored Incr _{DL} Incr _{LL}	
Pt 1 Dead Live (lbs)	192.0	233.0			702.0	876.0			Pt 1 Dead Live (lbs)	
Dist from Left Auto	20.00				8.50				Dist from Left Auto	
Factored PT _{DL} PT _{LL}	192.0	233.0			702.0	876.0			Factored PT _{DL} PT _{LL}	
Pt 2 Dead Live (lbs)									Pt 2 Dead Live (lbs)	
Dist from Left Auto									Dist from Left Auto	
Factored PT _{DL} PT _{LL}									Factored PT _{DL} PT _{LL}	
Pt 3 Dead Live (lbs)									Pt 3 Dead Live (lbs)	
Dist from Left Auto									Dist from Left Auto	
Factored PT _{DL} PT _{LL}									Factored PT _{DL} PT _{LL}	
C_D C_r	1.15	1.00	1.15	1.00	1.15	1.00	1.00	1.00	C_b D.N.A.	
C_t C_i	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	D.N.A.	
Wet Use (Y/N)?									D.N.A.	
F'_v (psi) f_v (psi)	353.47	145.47	327.75	48.31	327.75	261.10	285.00	159.49	307.37	101.03
V_{ALL} 1.5V _{max} (kip)	3.15	1.30	16.06	2.37	24.09	19.19	20.95	11.72	2.74	0.90
Shear Chk	41.2%		14.7%		79.7%		56.0%		32.9%	
F'_{b_TT} F'_{b_CT} (psi)	1518	1518.17	3153	3152.94	2923	2923.21	2542	2542.47	1320	1320.14
S (in ³) I_x (in ⁴)	33.95	237.7	114.33	800.3	171.50	1200.5	171.50	1200.5	33.95	237.7
M_{ALL} (k*ft) + -	4.30	4.30	30.04	30.04	41.78	41.78	36.34	36.34	3.74	3.74
M_{max} (k*ft) + -	1.10	3.21	1.58	0.00	41.59	0.00	29.31	0.00	2.25	0.00
Bending Chk	25.5%	74.7%	5.3%	0.0%	99.5%	0.0%	80.7%	0.0%	60.2%	0.0%
Max LL TL Δ Ratio	L/ 360	L/ 240	L/ 360	L/ 240	L/ 360	L/ 240	L/ 360	L/ 240	L/ 360	L/ 240
Allowable LL TL Δ										
Δ_{Live_Left} Δ_{Tot_Left} (in)										
Δ_{Live_Cntr} Δ_{Tot_Cntr} (in)	0.05	0.07	0.00	0.00	0.50	0.70	0.28	0.52	0.17	0.26
Δ_{Live_Cant} Δ_{Tot_Cant} (in)	0.12	0.24								
Actual LL TL Δ Ratio	L/ 970	L/ 491	L/ 30454	L/ 16906	L/ 360	L/ 259	L/ 634	L/ 346	L/ 1036	L/ 691
Actual LL TL Δ Ratio										
R_L (lbs)	436	158	1578	702	12794	3440	7815	3551	600	200
R_C (lbs)		278		876		9354		4264		400
R_R (lbs)										
R_{R_DL} R_{R_LL}	1722	700	1578	702	6073	1789	7815	3551	600	200
R_{R_DL} R_{R_LL}		1022		876		4285		4264		400
F'_{C_Perp} (psi) Brg Chk	0	99.8%	750	DNA	750	DNA	750	DNA	0	63.1%
Req'd Brg L Brg Cap	1 3/4"	950.0	3/4 "	DNA	3 1/4 "	DNA	2 "	DNA	1 3/4"	950.0
Req'd Brg C Brg Cap										
Req'd Brg R Brg Cap	3 1/2" & WS	1725.0	3/4 "	DNA	1 3/4 "	DNA	2 "	DNA	1 3/4"	950.0

Reactions are Service Level
Plys | Span/Depth

1	12.86	2	3.43	3	12.86	3	12.86	1	12.86
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Nailing Requirements (If More Than 1 PLY) Or Bearing Requirements (I-Joist Only)

LT: 1 3/4" Min End Brg. RT: 3 1/2" Min End Brg & Web Stiffeners. Web Stiffn'r's Req'd at All Conc Loads

(3) Rows of 12d or 16d (0.128" x 3" Min) Nails @ 12" O.C. 4" Edge Distance

(4) Rows of 12d or 16d (0.128" x 3" Min) Nails @ 12" O.C. 4" Edge Distance. Alternate Rows Through Both Outside Faces.

(3) Rows of 12d or 16d (0.128" x 3" Min) Nails @ 12" O.C. 4" Edge Distance. Alternate Rows Through Both Outside Faces.

LT: 1 3/4" Min End Brg. RT: 1 3/4" Min End Brg. Web Stiffn'r's Req'd at All Conc Loads

D.N.A.

Query	DESIGN	DESIGN	DESIGN	DESIGN	DESIGN
Location Type					
Query Result					

MJ STRUCTURAL ENGINEERS

ASD Design

Design of Wood Beams Based on the NDS
Design of Steel Beams Based on AISC 360

Sht Number:	
Job Number:	14123
Date:	5/31/2016
By:	BH

Blue Cells Must be Entered Manually

	WOOD		WOOD		WOOD		WOOD		STEEL		
WOOD BEAMS	(1) 2x8		(1) 2x8		(2) 2x8 Nailed		(2) 1 3/4" x 11 7/8" LVL		C15X33.9		STEEL BEAMS
Species	DF # 2 or Better		DF # 2 or Better		DF # 2 or Better		LVL 1.9E Fb:2600		CHANNEL		Section Type
Designation	Beam 21		Beam 22		Beam 23		Beam 24		Beam 25		Designation
Description	Third Floor - Main Bldg - Floor joists West of Stairs		Third Floor - Main Bldg - Stair Landing		Third Floor - Main Bldg - Stair Header		Third Floor - Main Bldg - Stair Framing Beam - West of Stairs		Third Floor - Bridge Beams		Description
L_{Left_Span} (ft)	5.50		9.50		9.50		17.00		22.50		L_{Left_Span} (ft)
L_{Center_Span} (ft)	5.50		9.50		9.50		17.00		22.50		L_{Center_Span} (ft)
L_{Right_Cant} (ft)	1.0		1.0		1.0		1.0		1.0		L_{Right_Cant} (ft)
L_u (ft) Auto (ft)	1.0		1.0		1.0		1.0		1.0		L_b (ft) Auto
Beam Slope α	0 : 12 0.0°		0 : 12 0.0°		0 : 12 0.0°		0 : 12 0.0°		0 : 12 0.0°		Beam Slope α
Include Self Wt.	No		No		No		No		Yes		Include Self Wt.
γ_{wood} (lb/ft ³) w_{Self} (lb/ft)	20.0		20.0		20.0		55.0		488.2		γ_{Steel} (lb/ft ³) w_{Self} (lb/ft)
PSF _{DL} PSF _{LL} (lb/ft ²)	20.0 40.0		20.0 40.0		20.0 40.0		55.0 110.0		20.0 40.0		PSF _{DL} PSF _{LL} (lb/ft ²)
Trib Width (ft) Auto	1.33		1.33		1.00		1.00		2.50		Trib Width (ft) Auto
Factored PLF _{DL} PLF _{LL}	26.7 53.3		26.7 53.3		20.0 40.0		55.0 110.0		50.0 100.0		Factored PSF _{DL} PSF _{LL}
PSF _{DL} PSF _{LL} (lb/ft ²)					105.0 180.0				132.0		PSF _{DL} PSF _{LL} (lb/ft ²)
Trib Width (ft) Auto					1.0				1.0		Trib Width (ft) Auto
Start End Dist frm Left					0.00 4.8				0.0 22.5		Start End Dist frm Left
Factored PLF _{DL} PLF _{LL}					105.0 180.0				132.0 0.0		Factored PSF _{DL} PSF _{LL}
PSF _{DL} PSF _{LL} (lb/ft ²)											PSF _{DL} PSF _{LL} (lb/ft ²)
Trib Width (ft) Auto											Trib Width (ft) Auto
Start End Dist frm Left											Start Dist frm Left
Factored PSF _{DL} PSF _{LL}											Factored PSF _{DL} PSF _{LL}
Incr PSF _{DL} PSF _{LL} (lb/ft ²)											Incr PSF _{DL} PSF _{LL} (lb/ft ²)
Trib Width (ft) Auto											Trib Width (ft) Auto
Max at L or R Auto											Max at L or R Auto
Start End Dist frm Left											Start End Dist frm Left
Factored Incr _{DL} Incr _{LL}											Factored Incr _{DL} Incr _{LL}
Incr PSF _{DL} PSF _{LL} (lb/ft ²)											Incr PSF _{DL} PSF _{LL} (lb/ft ²)
Trib Width (ft) Auto											Trib Width (ft) Auto
Max at L or R Auto											Max at L or R Auto
Start End Dist frm Left											Start End Dist frm Left
Factored Incr _{DL} Incr _{LL}											Factored Incr _{DL} Incr _{LL}
Pt 1 Dead Live (lbs)							469.0 831.0		1739.0 3486.0		Pt 1 Dead Live (lbs)
Dist from Left Auto							4.00		6.00		Dist from Left Auto
Factored PT _{DL} PT _{LL}							469.0 831.0		1739.0 3486.0		Factored PT _{DL} PT _{LL}
Pt 2 Dead Live (lbs)											Pt 2 Dead Live (lbs)
Dist from Left Auto											Dist from Left Auto
Factored PT _{DL} PT _{LL}											Factored PT _{DL} PT _{LL}
Pt 3 Dead Live (lbs)											Pt 3 Dead Live (lbs)
Dist from Left Auto											Dist from Left Auto
Factored PT _{DL} PT _{LL}											Factored PT _{DL} PT _{LL}
C_D C_r	1.00 1.15		1.00 1.00		1.15 1.00		1.00 1.00		1.00 1.00		C_b D.N.A.
C_t C_i	1.00 1.00		1.00 1.00		1.00 1.00		1.00 1.00		1.00 1.00		D.N.A.
Wet Use (Y/N)?											D.N.A.
F'_v (psi) f_v (psi)	180.00 30.34		180.00 52.40		207.00 89.68		285.00 86.49		6.00 1.67		A_w (in ²) Ω_v
V_{ALL} 1.5 V_{max} (kip)	1.96 0.33		1.96 0.57		4.50 1.95		11.85 3.59		77.60 7.39		V_n/Ω V_{max} (kip)
Shear Chk	16.9%		29.1%		43.3%		30.3%		9.5%		Shear Check
F'_{b_TT} F'_{b_CT} (psi)	1130 1130.11		984 983.76		1137 1136.59		2596 2596.37		36 1.67		F_y (ksi) Ω_b
S (in ³) I_x (in ⁴)	13.14 47.6		13.14 47.6		26.28 95.3		82.26 488.4		50.80 315.0		Z_x (in ³) I_x (in ⁴)
M_{ALL} (k*ft) + -	1.24 1.24		1.08 1.08		2.49 2.49		17.80 17.80		91.26 91.26		M_n/Ω (k*ft) + -
M_{max} (k*ft) + -	0.30 0.00		0.90 0.00		2.45 0.00		8.84 0.00		38.74 0.00		M_{max} (k*ft) + -
Bending Chk	24.4% 0.0%		83.8% 0.0%		98.4% 0.0%		49.7% 0.0%		42.4% 0.0%		Bending Check
Max LL TL Δ Ratio	L/ 360 L/ 240		L/ 360 L/ 240		L/ 360 L/ 240		L/ 360 L/ 240		L/ 360 L/ 240		Max LL TL Δ Ratio
Allowable LL TL Δ											Allowable LL TL Δ
Δ_{Live_Left} Δ_{Tot_Left} (in)											Δ_{Live_Left} Δ_{Tot_Left} (in)
Δ_{Live_Cntr} Δ_{Tot_Cntr} (in)	0.01 0.02		0.13 0.19		0.16 0.24		0.33 0.50		0.18 0.37		Δ_{Live_Cntr} Δ_{Tot_Cntr} (in)
Δ_{Live_Cant} Δ_{Tot_Cant} (in)											Δ_{Live_Cant} Δ_{Tot_Cant} (in)
Actual LL TL Δ Ratio	L/ 4582 L/ 3055		L/ 889 L/ 593		L/ 727 L/ 466		L/ 624 L/ 410		L/ 1521 L/ 729		Actual LL TL Δ Ratio
R_L (lbs)	220 73		380 127		1300 469		2397 826		7386 3704		R_L (lbs)
R_C (lbs)	147		253		831		1570		3681		R_C (lbs)
R_R (lbs)	220 73		380 127		623 220		1708 578		4947 2893		R_R (lbs)
R_{LL}	147		253		404		1131		2055		R_{LL}
F'_{C_Perp} (psi) Brg Chk	625 DNA		625 DNA		625 DNA		750 DNA		DNA DNA		D.N.A.
Req'd Brg L Brg Cap	1/4 " DNA		1/2 " DNA		3/4 " DNA		1 " DNA		DNA DNA		D.N.A.
Req'd Brg C Brg Cap											D.N.A.
Req'd Brg R Brg Cap	1/4 " DNA		1/2 " DNA		1/2 " DNA		3/4 " DNA		DNA DNA		D.N.A.

Reactions are Service Level
Plys | Span/Depth

Adequate	Adequate	Adequate	Adequate	Adequate
1 9.10	1 15.72	2 15.72	2 17.18	C 18.00

Reactions are Service Level
Shape | Span/Depth

Nailing Requirements
(If More Than 1 PLY)
Or Bearing Requirements
(I-Joist Only)

None Required	None Required	(2) Rows of 16d Nails @ 16" O.C. 4" Edge Distance	(3) Rows of 12d or 16d (0.128" x 3" Min) Nails @ 12" O.C. 4" Edge Distance	DNA
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D.N.A.

Query

DESIGN	DESIGN	DESIGN	DESIGN	DESIGN
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Location | Type
Query Result

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Location | Type
Query Result

MJ STRUCTURAL ENGINEERS

ASD Design

Design of Wood Beams Based on the NDS
Design of Steel Beams Based on AISC 360

Sht Number:	
Job Number:	14123
Date:	5/31/2016
By:	BH

Blue Cells Must be Entered Manually

	WOOD		WOOD		WOOD		WOOD		WOOD		STEEL BEAMS
WOOD BEAMS	14" BCI 5000		14" BCI 60		14" BCI 90		(2) 1 3/4" x 14" LVL		16" BCI 90		STEEL BEAMS
Species	BCI I-Joist		BCI I-Joist		BCI I-Joist		LVL 2.0E Fb:2800		BCI I-Joist		Section Type
Designation	Beam 26		Beam 27		Beam 28		Beam 29		Beam 30		Designation
Description	Third Level - Guest House - Interior Floor Joists		Third Level - Guest House - Exterior Floor Joists		Third Level - Guest House - Exterior Floor Joists with max snow drift		Third Level - Guest House - Header near grid 2		Third Level - Main Bldg - Exterior Floor Joists - 4" soil		Description
L _{Left_Span} (ft)											L _{Left_Span} (ft)
L _{Center_Span} (ft)	15.00		15.00		15.00		15.00		15.50		L _{Center_Span} (ft)
L _{Right_Cant} (ft)											L _{Right_Cant} (ft)
L _u (ft) Auto (ft)	1.0		1.0		1.0		1.0		1.0		L _b (ft) Auto
Beam Slope α	0 : 12 0.0°		0 : 12 0.0°		0 : 12 0.0°		0 : 12 0.0°		0.0°		Beam Slope α
Include Self Wt.	Y _{wood} (lb/ft ³) w _{Self} (lb/ft)										Include Self Wt.
PSF _{DL} PSF _{LL} (lb/ft ²)	20.0 40.0		50.0 167.0		50.0 271.0		50.0 197.0		60.0 167.0		PSF _{DL} PSF _{LL} (lb/ft ²)
Trib Width (ft) Auto	1.33		1.00		0.75		0.75		1.33		Trib Width (ft) Auto
Factored PLF _{DL} PLF _{LL}	26.7 53.3		50.0 167.0		37.5 203.3		37.5 147.8		80.0 222.6		Factored PSF _{DL} PSF _{LL}
PSF _{DL} PSF _{LL} (lb/ft ²)											PSF _{DL} PSF _{LL} (lb/ft ²)
Trib Width (ft) Auto											Trib Width (ft) Auto
Start End Dist frm Left											Start End Dist frm Left
Factored PLF _{DL} PLF _{LL}											Factored PSF _{DL} PSF _{LL}
PSF _{DL} PSF _{LL} (lb/ft ²)											PSF _{DL} PSF _{LL} (lb/ft ²)
Trib Width (ft) Auto											Trib Width (ft) Auto
Start End Dist frm Left											Start Dist frm Left
Factored PLF _{DL} PLF _{LL}											Factored PSF _{DL} PSF _{LL}
Incr PSF _{DL} PSF _{LL} (lb/ft ²)											Incr PSF _{DL} PSF _{LL} (lb/ft ²)
Trib Width (ft) Auto											Trib Width (ft) Auto
Max at L or R Auto											Max at L or R Auto
Start End Dist frm Left											Start End Dist frm Left
Factored Incr _{DL} Incr _{LL}											Factored Incr _{DL} Incr _{LL}
Incr PSF _{DL} PSF _{LL} (lb/ft ²)											Incr PSF _{DL} PSF _{LL} (lb/ft ²)
Trib Width (ft) Auto											Trib Width (ft) Auto
Max at L or R Auto											Max at L or R Auto
Start End Dist frm Left											Start End Dist frm Left
Factored Incr _{DL} Incr _{LL}											Factored Incr _{DL} Incr _{LL}
Pt 1 Dead Live (lbs)											Pt 1 Dead Live (lbs)
Dist from Left Auto											Dist from Left Auto
Factored PT _{DL} PT _{LL}											Factored PT _{DL} PT _{LL}
Pt 2 Dead Live (lbs)											Pt 2 Dead Live (lbs)
Dist from Left Auto											Dist from Left Auto
Factored PT _{DL} PT _{LL}											Factored PT _{DL} PT _{LL}
Pt 3 Dead Live (lbs)											Pt 3 Dead Live (lbs)
Dist from Left Auto											Dist from Left Auto
Factored PT _{DL} PT _{LL}											Factored PT _{DL} PT _{LL}
C _D C _r	1.00 1.00		1.15 1.00		1.15 1.00		1.00 1.00		1.00 1.00		C _b D.N.A.
C _t C _i	1.00 1.00		1.00 1.00		1.00 1.00		1.00 1.00		1.00 1.00		D.N.A.
Wet Use (Y/N)?											D.N.A.
F _v (psi) f _v (psi)	307.37 101.03		300.17 220.68		277.18 185.19		285.00 42.53		248.78 228.79		A _w (in ²) Ω _v
V _{ALL} 1.5V _{max} (kip)	2.74 0.90		3.32 2.44		4.05 2.71		13.97 2.08		3.83 3.52		V _n /Ω V _{max} (kip)
Shear Chk	32.9%		73.5%		66.8%		14.9%		92.0%		Shear Check
F _{b,TT} F _{b,CT} (psi)	1320 1320.14		2290 2289.66		2425 2425.01		2743 2743.18		2012 2012.43		F _v (ksi) Ω _b
S (in ²) I _x (in ⁴)	33.95 237.7		44.84 313.9		64.82 453.7		114.33 800.3		77.82 622.5		Z _x (in ³) I _x (in ⁴)
M _{ALL} (k*fft) + -	3.74 3.74		8.56 8.56		13.10 13.10		26.14 26.14		13.05 13.05		M _n /Ω (k*fft) + -
M _{max} (k*fft) + -	2.25 0.00		6.10 0.00		6.77 0.00		5.21 0.00		9.09 0.00		M _{max} (k*fft) + -
Bending Chk	60.2% 0.0%		71.3% 0.0%		51.7% 0.0%		19.9% 0.0%		69.6% 0.0%		Bending Check
Max LL TL Δ Ratio	L/ 360 L/ 240		L/ 360 L/ 240		L/ 360 L/ 240		L/ 360 L/ 240		L/ 240 L/ 240		Max LL TL Δ Ratio
Allowable LL TL Δ											Allowable LL TL Δ
Δ _{Live_Left} Δ _{Tot_Left} (in)											Δ _{Live_Left} Δ _{Tot_Left} (in)
Δ _{Live_Cntr} Δ _{Tot_Cntr} (in)	0.17 0.26		0.36 0.46		0.31 0.37		0.11 0.13		0.30 0.41		Δ _{Live_Cntr} Δ _{Tot_Cntr} (in)
Δ _{Live_Cant} Δ _{Tot_Cant} (in)											Δ _{Live_Cant} Δ _{Tot_Cant} (in)
Actual LL TL Δ Ratio	L/ 1036 L/ 691		L/ 506 L/ 389		L/ 572 L/ 483		L/ 1712 L/ 1365		L/ 624 L/ 459		Actual LL TL Δ Ratio
R _L (lbs)	600 200 400		1628 375 1253		1806 281 1524		1389 281 1108		2345 620 1725		R _L (lbs)
R _C (lbs)											R _C (lbs)
R _R (lbs)	600 200 400		1628 375 1253		1806 281 1524		1389 281 1108		2345 620 1725		R _R (lbs)
F _{C-Perp} (psi) Brg Chk	0 63.1%		0 94.3%		0 92.6%		750 DNA		0 99.8%		D.N.A.
Req'd Brg L Brg Cap	1 3/4" 950.0		3 1/2" & WS 1725.0		1 3/4" & WS 1950.0		3/4 " DNA		3 1/2" & WS 2350.0		D.N.A.
Req'd Brg C Brg Cap											D.N.A.
Req'd Brg R Brg Cap	1 3/4" 950.0		3 1/2" & WS 1725.0		1 3/4" & WS 1950.0		3/4 " DNA		3 1/2" & WS 2350.0		D.N.A.

Reactions are Service Level

Reactions are Service Level

Plys | Span/Depth

Shape | Span/Depth

Nailing Requirements
(If More Than 1 PLY)
Or Bearing Requirements
(I-Joist Only)

LT: 1 3/4" Min End Brg. RT: 1 3/4" Min End Brg. Web Stiffn'r's Req'd at All Conc Loads
 LT: 3 1/2" Min End Brg & Web Stiffeners. RT: 3 1/2" Min End Brg & Web Stiffeners. Web Stiffn'r's Req'd at All Conc Loads
 LT: 1 3/4" Min End Brg & Web Stiffeners. RT: 1 3/4" Min End Brg & Web Stiffeners. Web Stiffn'r's Req'd at All Conc Loads
 (3) Rows of 12d or 16d (0.128" x 3" Min) Nails @ 12" O.C. 4" Edge Distance
 LT: 3 1/2" Min End Brg & Web Stiffeners. RT: 3 1/2" Min End Brg & Web Stiffeners. Web Stiffn'r's Req'd at All Conc Loads

D.N.A.

Query
Location | Type
Query Result

DESIGN	DESIGN	DESIGN	DESIGN	DESIGN

Location | Type
Query Result

MJ STRUCTURAL ENGINEERS

ASD Design

Design of Wood Beams Based on the NDS
Design of Steel Beams Based on AISC 360

Sht Number:	
Job Number:	14123
Date:	5/31/2016
By:	BH

Blue Cells Must be Entered Manually

WOOD BEAMS	WOOD		WOOD		WOOD		WOOD		WOOD		STEEL BEAMS
Species Designation	16" BCI 90 BCI I-Joist Beam 31		14" BCI 90 BCI I-Joist Beam 32		14" BCI 60 BCI I-Joist Beam 33		(1) 2x8 DF # 2 or Better Beam 34		(1) 1 3/4" x 16" LVL LVL 1.9E Fb:2600 Beam 35		Section Type Designation
Description	Third Level - Main Bldg - Exterior Floor Joists - 4" soil and Snow Drift Load		Third Level - Main Bldg - Exterior Floor Joists - 4" soil and Snow Drift Load		Third Level - Main Bldg - Exterior Floor Joists - 4" soil		Third Level - Main Bldg - Exterior Floor Joists - 4" soil		Third Level - Main Bldg - Edge beam at Grid 1.2		Description
L _{Left_Span} (ft) L _{Center_Span} (ft) L _{Right_Cant} (ft) L _u (ft) Auto (ft) Beam Slope α	15.50 1.0 0 : 12 0.0°		9.00 1.0 0 : 12 0.0°		9.00 1.0 0 : 12 0.0°		4.00 1.0 0 : 12 0.0°		15.50 1.50 1.0 0 : 12 0.0°		L _{Left_Span} (ft) L _{Center_Span} (ft) L _{Right_Cant} (ft) L _b (ft) Auto Beam Slope α
Include Self Wt. γ _{wood} (lb/ft ³) w _{Self} (lb/ft)	No		No		No		No		No		Include Self Wt. γ _{Steel} (lb/ft ³) w _{Self} (lb/ft)
PSF _{DL} PSF _{LL} (lb/ft ²) Trib Width (ft) Auto Factored PLF _{DL} PLF _{LL}	60.0 271.0 0.75 45.0 203.3		60.0 271.0 1.33 80.0 361.2		60.0 167.0 1.33 80.0 222.6		60.0 271.0 1.33 80.0 361.2		60.0 167.0 1.00 60.0 167.0		PSF _{DL} PSF _{LL} (lb/ft ²) Trib Width (ft) Auto Factored PSF _{DL} PSF _{LL}
PSF _{DL} PSF _{LL} (lb/ft ²) Trib Width (ft) Auto Start End Dist frm Left Factored PLF _{DL} PLF _{LL}											PSF _{DL} PSF _{LL} (lb/ft ²) Trib Width (ft) Auto Start End Dist frm Left Factored PSF _{DL} PSF _{LL}
PSF _{DL} PSF _{LL} (lb/ft ²) Trib Width (ft) Auto Start End Dist frm Left Factored PLF _{DL} PLF _{LL}											PSF _{DL} PSF _{LL} (lb/ft ²) Trib Width (ft) Auto Start Dist frm Left Factored PSF _{DL} PSF _{LL}
Incr PSF _{DL} PSF _{LL} (lb/ft ²) Trib Width (ft) Auto Max at L or R Auto Start End Dist frm Left Factored Incr _{DL} Incr _{LL}											Incr PSF _{DL} PSF _{LL} (lb/ft ²) Trib Width (ft) Auto Max at L or R Auto Start End Dist frm Left Factored Incr _{DL} Incr _{LL}
Incr PSF _{DL} PSF _{LL} (lb/ft ²) Trib Width (ft) Auto Max at L or R Auto Start End Dist frm Left Factored Incr _{DL} Incr _{LL}											Incr PSF _{DL} PSF _{LL} (lb/ft ²) Trib Width (ft) Auto Max at L or R Auto Start End Dist frm Left Factored Incr _{DL} Incr _{LL}
Pt 1 Dead Live (lbs) Dist from Left Auto Factored PT _{DL} PT _{LL}									510.0 1420.0 17.00 510.0 1420.0		Pt 1 Dead Live (lbs) Dist from Left Auto Factored PT _{DL} PT _{LL}
Pt 2 Dead Live (lbs) Dist from Left Auto Factored PT _{DL} PT _{LL}											Pt 2 Dead Live (lbs) Dist from Left Auto Factored PT _{DL} PT _{LL}
Pt 3 Dead Live (lbs) Dist from Left Auto Factored PT _{DL} PT _{LL}											Pt 3 Dead Live (lbs) Dist from Left Auto Factored PT _{DL} PT _{LL}
C _D C _r C _t C _i	1.00 1.15 1.00 1.00		1.00 1.00 1.00 1.00		1.00 1.00 1.00 1.00		1.00 1.00 1.00 1.00		1.00 1.15 1.00 1.00		C _b D.N.A. D.N.A. D.N.A.
Wet Use (Y/N)?	No		No		No		No		No		
F _v (psi) f _v (psi) V _{ALL} 1.5V _{max} (kip) Shear Chk	248.78 187.70 3.83 2.89 75.4%		241.03 203.64 3.53 2.98 84.5%		261.02 184.63 2.89 2.04 70.7%		180.00 121.72 1.96 1.32 67.6%		285.00 121.59 7.98 3.40 42.7%		A _w (in ²) Ω _v V _u /Ω V _{max} (kip) Shear Check
F _{b,TT} F _{b,CT} (psi) S (in ²) I _x (in ⁴) M _{ALL} (k*ft) + - M _{max} (k*ft) + - Bending Chk	2314 2314.29 77.82 622.5 15.01 15.01 7.46 0.00 49.7% 0.0%		2109 2108.71 64.82 453.7 11.39 11.39 4.47 0.00 39.2% 0.0%		1991 1991.01 44.84 313.9 7.44 7.44 3.06 0.00 41.2% 0.0%		984 983.76 13.14 47.6 1.08 1.08 0.88 0.00 81.9% 0.0%		2812 2811.54 74.67 597.3 17.49 17.49 5.33 3.15 30.5% 18.0%		F _y (ksi) Ω _b Z _x (in ³) I _x (in ⁴) M _u /Ω (k*ft) + - M _{max} (k*ft) + - Bending Check
Max LL TL Δ Ratio Allowable LL TL Δ Δ _{Live_Left} Δ _{Tot_Left} (in) Δ _{Live_Cntr} Δ _{Tot_Cntr} (in) Δ _{Live_Cant} Δ _{Tot_Cant} (in) Actual LL TL Δ Ratio	L/ 360 L/ 240 0.27 0.33		L/ 360 L/ 240 0.10 0.12		L/ 360 L/ 240 0.08 0.11		L/ 360 L/ 240 0.03 0.03		L/ 360 L/ 240 0.14 0.19 0.03 0.04		Max LL TL Δ Ratio Allowable LL TL Δ Δ _{Live_Left} Δ _{Tot_Left} (in) Δ _{Live_Cntr} Δ _{Tot_Cntr} (in) Δ _{Live_Cant} Δ _{Tot_Cant} (in) Actual LL TL Δ Ratio
R _L (lbs) R _C (lbs) R _R (lbs)	1924 349 1575 1575		1986 360 1626 1626		1362 360 1002 1002		882 160 722 722		1556 411 1145 1145		R _L (lbs) R _C (lbs) R _R (lbs)
F _{C-Perp} (psi) Brg Chk Req'd Brg L Brg Cap Req'd Brg C Brg Cap Req'd Brg R Brg Cap	0 89.5% 1 3/4" & WS 2150.0		0 92.3% 3 1/2" & WS 2150.0		0 89.3% 1 3/4" & WS 1525.0		625 DNA 1 " DNA		750 DNA 1 1/4 " DNA		D.N.A. D.N.A. D.N.A. D.N.A.

Reactions are Service Level # Plys | Span/Depth 1 11.63 1 7.71 1 7.71 1 6.62 1 11.63

Nailing Requirements (If More Than 1 PLY) Or Bearing Requirements (I-Joist Only) LT: 1 3/4" Min End Brg & Web Stiffeners. RT: 1 3/4" Min End Brg & Web Stiffeners. Web Stiffnr's Req'd at All Conc Loads LT: 3 1/2" Min End Brg & Web Stiffeners. RT: 3 1/2" Min End Brg & Web Stiffeners. Web Stiffnr's Req'd at All Conc Loads LT: 1 3/4" Min End Brg & Web Stiffeners. RT: 1 3/4" Min End Brg & Web Stiffeners. Web Stiffnr's Req'd at All Conc Loads None Required None Required D.N.A.

Query	DESIGN	DESIGN	DESIGN	DESIGN	DESIGN
Location Type					
Query Result					

MJ STRUCTURAL ENGINEERS

ASD Design

Design of Wood Beams Based on the NDS
Design of Steel Beams Based on AISC 360

Sht Number:	
Job Number:	14123
Date:	5/31/2016
By:	BH

Blue Cells Must be Entered Manually

	STEEL	STEEL	STEEL	WOOD	STEEL	
WOOD BEAMS Species Designation	W18X60 W-FLANGE Beam 36	W21X132 W-FLANGE Beam 37	W18X40 W-FLANGE Beam 38	14" BCI 5000 BCI I-Joist Beam 39	W16X40 W-FLANGE Beam 40	STEEL BEAMS Section Type Designation
Description	Third Level - Main Bldg - Cantilever of Grid C	Third Level - Main Bldg - Cantilever on Grid B	Third Level - Main Bldg - Cantilevered edge beam at Grid A.2	Second Level - Guest House - Floor Joists	Second Level - Guest House - Cantilevered edge beam at Grid E	Description
L_{Left_Span} (ft) L_{Center_Span} (ft) L_{Right_Cant} (ft) L_u (ft) $Auto$ (ft) Beam Slope α	6.50 10.25 1.0 0 : 12 0.0°	22.50 16.50 1.0 0 : 12 0.0°	18.50 16.50 16.5 0 : 12 0.0°	16.50 1.0 0 : 12 0.0°	1.50 12.00 13.5 0 : 12 0.0°	L_{Left_Span} (ft) L_{Center_Span} (ft) L_{Right_Cant} (ft) L_b (ft) $Auto$ Beam Slope α
Include Self Wt. γ_{wood} (lb/ft ³) w_{Self} (lb/ft)	No	No	Yes 488.1 40.0	No	Yes 488.1 40.0	Include Self Wt. γ_{Steel} (lb/ft ³) w_{Self} (lb/ft)
PSF _{DL} PSF _{LL} (lb/ft ²) Trib Width (ft) $Auto$ Factored PLF _{DL} PLF _{LL}	60.0 167.0 8.50 510.0 1419.5	60.0 167.0 12.25 735.0 2045.8	60.0 167.0 2.00 120.0 334.0	25.0 40.0 1.33 33.3 53.3	25.0 40.0 9.50 237.5 380.0	PSF _{DL} PSF _{LL} (lb/ft ²) Trib Width (ft) $Auto$ Factored PSF _{DL} PSF _{LL}
PSF _{DL} PSF _{LL} (lb/ft ²) Trib Width (ft) $Auto$ Start End Dist frm Left Factored PLF _{DL} PLF _{LL}		12.25 6.5 20.5 0.0 637.0	2.00 2.50 16.5 0.0 104.0			PSF _{DL} PSF _{LL} (lb/ft ²) Trib Width (ft) $Auto$ Start End Dist frm Left Factored PSF _{DL} PSF _{LL}
PSF _{DL} PSF _{LL} (lb/ft ²) Trib Width (ft) $Auto$ Start End Dist frm Left Factored PLF _{DL} PLF _{LL}						PSF _{DL} PSF _{LL} (lb/ft ²) Trib Width (ft) $Auto$ Start Dist frm Left Factored PSF _{DL} PSF _{LL}
Incr PSF _{DL} PSF _{LL} (lb/ft ²) Trib Width (ft) $Auto$ Max at L or R $Auto$ Start End Dist frm Left Factored Incr _{DL} Incr _{LL}						Incr PSF _{DL} PSF _{LL} (lb/ft ²) Trib Width (ft) $Auto$ Max at L or R $Auto$ Start End Dist frm Left Factored Incr _{DL} Incr _{LL}
Incr PSF _{DL} PSF _{LL} (lb/ft ²) Trib Width (ft) $Auto$ Max at L or R $Auto$ Start End Dist frm Left Factored Incr _{DL} Incr _{LL}						Incr PSF _{DL} PSF _{LL} (lb/ft ²) Trib Width (ft) $Auto$ Max at L or R $Auto$ Start End Dist frm Left Factored Incr _{DL} Incr _{LL}
Pt 1 Dead Live (lbs) Dist from Left $Auto$ Factored PT _{DL} PT _{LL}	1119.0 3114.0 16.75 1119.0 3114.0	207.0 575.0 39.00 207.0 575.0	-20.0 -56.0 35.00 -20.0 -56.0			Pt 1 Dead Live (lbs) Dist from Left $Auto$ Factored PT _{DL} PT _{LL}
Pt 2 Dead Live (lbs) Dist from Left $Auto$ Factored PT _{DL} PT _{LL}						Pt 2 Dead Live (lbs) Dist from Left $Auto$ Factored PT _{DL} PT _{LL}
Pt 3 Dead Live (lbs) Dist from Left $Auto$ Factored PT _{DL} PT _{LL}						Pt 3 Dead Live (lbs) Dist from Left $Auto$ Factored PT _{DL} PT _{LL}
C_D C_r C_t C_i	1.00 1.00 1.00 1.00	1.00 1.00 1.00 1.00	1.00 1.00 1.00 1.00	1.00 1.00 1.00 1.00	1.00 1.00 1.00 1.00	C_b D.N.A. D.N.A. D.N.A.
Wet Use (Y/N)? F'_v (psi) f_v (psi) V_{ALL} 1.5 V_{max} (kip) Shear Chk	7.55 1.50 151.06 28.54 18.9%	14.17 1.50 283.40 54.03 19.1%	5.64 1.50 112.77 8.88 7.9%	307.37 120.39 2.74 1.07 39.2%	4.88 1.50 97.60 32.05 32.8%	A_w (in ²) Ω_v V_n/Ω V_{max} (kip) Shear Chk
F'_{b_TT} F'_{b_CT} (psi) S (in ³) I_x (in ⁴) M_{ALL} (k*ftft) + - M_{max} (k*ftft) + - Bending Chk	50 1.67 123.00 984.0 306.89 306.89 0.00 144.75 0.0% 47.2%	50 1.67 333.00 3220.0 830.84 830.84 54.77 391.43 6.6% 47.1%	50 1.67 78.40 612.0 82.39 82.39 2.92 65.99 3.5% 80.1%	1320 1320.14 33.95 237.7 3.74 3.74 2.95 0.00 78.9% 0.0%	50 1.67 73.00 518.0 128.95 128.95 0.00 47.34 0.0% 36.7%	F_y (ksi) Ω_b Z_x (in ³) I_x (in ⁴) M_n/Ω (k*ftft) + - M_{max} (k*ftft) + - Bending Check
Max LL TL Δ Ratio Allowable LL TL Δ Δ_{Live_Left} Δ_{Tot_Left} (in) Δ_{Live_Cntr} Δ_{Tot_Cntr} (in) Δ_{Live_Cant} Δ_{Tot_Cant} (in) Actual LL TL Δ Ratio	L/ 360 L/ 240 0.02 0.02 0.32 0.43 L/ 770 L/ 567	L/ 360 L/ 240 0.04 0.06 0.65 0.92 L/ 605 L/ 432	L/ 360 L/ 240 0.04 0.06 0.55 0.84 L/ 717 L/ 472	L/ 360 L/ 240 0.25 0.41 0.13 0.23 L/ 793 L/ 488	L/ 360 L/ 240 0.00 0.00 0.13 0.23 L/ 2180 L/ 1260	Max LL TL Δ Ratio Allowable LL TL Δ Δ_{Live_Left} Δ_{Tot_Left} (in) Δ_{Live_Cntr} Δ_{Tot_Cntr} (in) Δ_{Live_Cant} Δ_{Tot_Cant} (in) Actual LL TL Δ Ratio
R_L (lbs) R_C (lbs) R_R (lbs)	-15998 -4229 -11769 52550 13890 38660	17454 3670 13783 100696 25202 75494	1711 321 1390 16959 5259 11700	715 275 440 715 275 440	-31067 -13112 -17955 39943 16858 23085	R_L (lbs) R_C (lbs) R_R (lbs)
F'_{C_Perp} (psi) Brg Chk Req'd Brg L Brg Cap Req'd Brg C Brg Cap Req'd Brg R Brg Cap	DNA DNA DNA DNA DNA DNA DNA DNA	DNA DNA DNA DNA DNA DNA DNA DNA	DNA DNA DNA DNA DNA DNA DNA DNA	0 75.2% 1 3/4" 950.0 1 3/4" 950.0	DNA DNA DNA DNA DNA DNA DNA DNA	D.N.A. D.N.A. D.N.A. D.N.A.
Reactions are Service Level # Plys Span/Depth Nailing Requirements (If More Than 1 PLY) Or Bearing Requirements (I-Joist Only)	Adequate I 13.52 DNA	Adequate I 18.17 DNA	Adequate I 22.12 DNA	Adequate I 14.14 DNA	Adequate I 18.00 DNA	Reactions are Service Level Shape Span/Depth D.N.A.

Query

Location | Type
Query Result

DESIGN	DESIGN	DESIGN	DESIGN	DESIGN

Location | Type
Query Result

MJ STRUCTURAL ENGINEERS

ASD Design

Design of Wood Beams Based on the NDS
Design of Steel Beams Based on AISC 360

Sht Number:	
Job Number:	14123
Date:	5/31/2016
By:	BH

Blue Cells Must be Entered Manually

	WOOD		WOOD		WOOD		STEEL		STEEL		
WOOD BEAMS	14" BCI 60		14" BCI 90		14" BCI 5000		W21X93		W16X40		STEEL BEAMS
Species	BCI I-Joist		BCI I-Joist		BCI I-Joist		W-FLANGE		W-FLANGE		Section Type
Designation	Beam 41		Beam 42		Beam 43		Beam 44		Beam 45		Designation
Description	Second Level - Main Bldg - Long Floor Joists Running E/W Btwn A and B		Second Level - Main Bldg - Exterior Floor Joists with Snow Load		Second Level - Main Bldg - Exterior Floor Joists with Snow Load		Second Level - Main Bldg - Main N/S beam along Grid 2.5 - South Span		Second Level - Main Bldg - Main N/S beam along Grid 2.5 - North Span		Description
L_{Left_Span} (ft)	21.00		15.00		9.00		25.00		14.50		L_{Left_Span} (ft)
L_{Center_Span} (ft)	21.00		15.00		9.00		25.00		14.50		L_{Center_Span} (ft)
L_{Right_Cant} (ft)	1.0		1.0		1.0		16.5		12.0		L_{Right_Cant} (ft)
L_u (ft) $Auto$ (ft)	1.0		1.0		1.0		16.5		12.0		L_u (ft) $Auto$ (ft)
Beam Slope α	0 : 12 0.0°		0 : 12 0.0°		0 : 12 0.0°		0 : 12 0.0°		0 : 12 0.0°		Beam Slope α
Include Self Wt.	No		No		No		Yes		Yes		Include Self Wt.
γ_{wood} (lb/ft ²) w_{Self} (lb/ft)	No		No		No		490.5 93.0		488.1 40.0		γ_{Steel} (lb/ft ²) w_{Self} (lb/ft)
PSF _{DL} PSF _{LL} (lb/ft ²)	25.0 40.0		25.0 167.0		25.0 167.0		25.0 40.0		25.0 40.0		PSF _{DL} PSF _{LL} (lb/ft ²)
Trib Width (ft) $Auto$	1.33		1.33		1.33		9.00		9.25		Trib Width (ft) $Auto$
Factored PLF _{DL} PLF _{LL}	33.3 53.3		33.3 222.6		33.3 222.6		225.0 360.0		231.3 370.0		Factored PSF _{DL} PSF _{LL}
PSF _{DL} PSF _{LL} (lb/ft ²)											PSF _{DL} PSF _{LL} (lb/ft ²)
Trib Width (ft) $Auto$											Trib Width (ft) $Auto$
Start End Dist frm Left											Start End Dist frm Left
Factored PLF _{DL} PLF _{LL}											Factored PSF _{DL} PSF _{LL}
PSF _{DL} PSF _{LL} (lb/ft ²)											PSF _{DL} PSF _{LL} (lb/ft ²)
Trib Width (ft) $Auto$											Trib Width (ft) $Auto$
Start End Dist frm Left											Start Dist frm Left
Factored PSF _{DL} PSF _{LL}											Factored PSF _{DL} PSF _{LL}
Incr PSF _{DL} PSF _{LL} (lb/ft ²)											Incr PSF _{DL} PSF _{LL} (lb/ft ²)
Trib Width (ft) $Auto$											Trib Width (ft) $Auto$
Max at L or R $Auto$											Max at L or R $Auto$
Start End Dist frm Left											Start End Dist frm Left
Factored Incr _{DL} Incr _{LL}											Factored Incr _{DL} Incr _{LL}
Incr PSF _{DL} PSF _{LL} (lb/ft ²)											Incr PSF _{DL} PSF _{LL} (lb/ft ²)
Trib Width (ft) $Auto$											Trib Width (ft) $Auto$
Max at L or R $Auto$											Max at L or R $Auto$
Start End Dist frm Left											Start End Dist frm Left
Factored Incr _{DL} Incr _{LL}											Factored Incr _{DL} Incr _{LL}
Pt 1 Dead Live (lbs)							10835.0 46331.0		11961.0 46566.0		Pt 1 Dead Live (lbs)
Dist from Left $Auto$							8.50		2.50		Dist from Left $Auto$
Factored PT _{DL} PT _{LL}							10835.0 46331.0		11961.0 46566.0		Factored PT _{DL} PT _{LL}
Pt 2 Dead Live (lbs)											Pt 2 Dead Live (lbs)
Dist from Left $Auto$											Dist from Left $Auto$
Factored PT _{DL} PT _{LL}											Factored PT _{DL} PT _{LL}
Pt 3 Dead Live (lbs)											Pt 3 Dead Live (lbs)
Dist from Left $Auto$											Dist from Left $Auto$
Factored PT _{DL} PT _{LL}											Factored PT _{DL} PT _{LL}
C_D C_r	1.00 1.00		1.00 1.00		1.00 1.00		1.00 1.00		1.00 1.00		C_b D.N.A.
C_t C_i	1.00 1.00		1.00 1.00		1.00 1.00		1.00 1.00		1.00 1.00		D.N.A.
Wet Use (Y/N)?											D.N.A.
F'_v (psi) f_v (psi)	261.02 123.36		241.03 196.87		307.37 193.97		12.53 1.50		4.88 1.50		A_w (in ²) Ω_v
V_{ALL} 1.5 V_{max} (kip)	2.89 1.36		3.53 2.88		2.74 1.73		250.56 46.20		97.60 53.09		V_n/Ω V_{max} (kip)
Shear Chk	47.3%		81.7%		63.1%		18.4%		54.4%		Shear Check
F'_{b_TT} F'_{b_CT} (psi)	1991 1991.01		2109 2108.71		1320 1320.14		50 1.67		50 1.67		F_y (ksi) Ω_b
S (in ³) I_x (in ⁴)	44.84 313.9		64.82 453.7		33.95 237.7		221.00 2070.0		73.00 518.0		Z_x (in ³) I_x (in ⁴)
M_{ALL} (k* ft) + -	7.44 7.44		11.39 11.39		3.74 3.74		405.52 405.52		138.98 138.98		M_n/Ω (k* ft) + -
M_{max} (k* ft) + -	4.78 0.00		7.20 0.00		2.59 0.00		368.25 0.00		130.40 0.00		M_{max} (k* ft) + -
Bending Chk	64.2% 0.0%		63.2% 0.0%		69.4% 0.0%		90.8% 0.0%		93.8% 0.0%		Bending Check
Max LL TL Δ Ratio	L/ 360 L/ 240		L/ 360 L/ 240		L/ 360 L/ 240		L/ 360 L/ 240		L/ 360 L/ 240		Max LL TL Δ Ratio
Allowable LL TL Δ											Allowable LL TL Δ
Δ_{Live_Left} Δ_{Tot_Left} (in)											Δ_{Live_Left} Δ_{Tot_Left} (in)
Δ_{Live_Cntr} Δ_{Tot_Cntr} (in)	0.40 0.65		0.34 0.40		0.11 0.13		0.43 0.56		0.20 0.26		Δ_{Live_Cntr} Δ_{Tot_Cntr} (in)
Δ_{Live_Cant} Δ_{Tot_Cant} (in)											Δ_{Live_Cant} Δ_{Tot_Cant} (in)
Actual LL TL Δ Ratio	L/ 626 L/ 385		L/ 522 L/ 454		L/ 970 L/ 844		L/ 697 L/ 531		L/ 885 L/ 673		Actual LL TL Δ Ratio
R_L (lbs)	910 350 560		1920 250 1670		1152 150 1002		46205 11126 35078		53085 11865 41220		R_L (lbs)
R_C (lbs)											R_C (lbs)
R_R (lbs)	910 350 560		1920 250 1670		1152 150 1002		27911 7659 20253		14740 4029 10711		R_R (lbs)
F'_{C_Perp} (psi) Brg Chk	0 77.4%		0 98.4%		0 75.5%		DNA DNA		DNA DNA		D.N.A.
Req'd Brg L Brg Cap	1 3/4" 1175.0		1 3/4" & WS 1950.0		1 3/4" & WS 1525.0		DNA DNA		DNA DNA		D.N.A.
Req'd Brg C Brg Cap											D.N.A.
Req'd Brg R Brg Cap	1 3/4" 1175.0		1 3/4" & WS 1950.0		1 3/4" & WS 1525.0		DNA DNA		DNA DNA		D.N.A.

Reactions are Service Level # Plys | Span/Depth

Nailing Requirements (If More Than 1 PLY) Or Bearing Requirements (I-Joist Only)

LT: 1 3/4" Min End Brg, RT: 1 3/4" Min End Brg. Web Stiffn'r's Req'd at All Conc Loads

LT: 1 3/4" Min End Brg & Web Stiffeners. RT: 1 3/4" Min End Brg & Web Stiffeners. Web Stiffn'r's Req'd at All Conc Loads

LT: 1 3/4" Min End Brg & Web Stiffeners. RT: 1 3/4" Min End Brg & Web Stiffeners. Web Stiffn'r's Req'd at All Conc Loads

DNA D.N.A.

Query	DESIGN	DESIGN	DESIGN	DESIGN	DESIGN
Location Type					
Query Result					

MJ STRUCTURAL ENGINEERS

ASD Design

Design of Wood Beams Based on the NDS
Design of Steel Beams Based on AISC 360

Sht Number:	
Job Number:	14123
Date:	5/31/2016
By:	BH

Blue Cells Must be Entered Manually

	STEEL		STEEL		STEEL		STEEL		STEEL		
WOOD BEAMS	W12X65		W21X44		W21X44		W12X40		W21X73		STEEL BEAMS
Species	W-FLANGE		W-FLANGE		W-FLANGE		W-FLANGE		W-FLANGE		Section Type
Designation	Beam 46		Beam 47		Beam 48		Beam 49		Beam 50		Designation
Description	Second Level - Main Bldg - Beam Running E/W at grid A.4		Second Level - Main Bldg - North Beam at Grid 1.6		Second Level - Main Bldg - Beam running N/S at Grid 2.4		Second Level - Main Bldg - N/S beam along Grid 2.1 -		Second Level - Main Bldg - Main E/W beam along Grid A.7		Description
L_{Left_Span} (ft)	18.50		10.50		15.50		23.50		20.50		L_{Left_Span} (ft)
L_{Center_Span} (ft)	18.50		10.50		15.50		23.50		20.50		L_{Center_Span} (ft)
L_{Right_Cant} (ft)	17.0		9.0		11.5		1.3		8.0		L_{Right_Cant} (ft)
L_u (ft) $Auto$ (ft)	17.0		9.0		11.5		1.3		8.0		L_u (ft) $Auto$ (ft)
Beam Slope α	0 : 12 0.0°		0 : 12 0.0°		0 : 12 0.0°		0 : 12 0.0°		0 : 12 0.0°		Beam Slope α
Include Self Wt.	Yes		Yes		Yes		Yes		Yes		Include Self Wt.
γ_{wood} (lb/ft ²) w_{Self} (lb/ft)	490.1 65.0		487.4 44.0		487.4 44.0		492.3 40.0		488.9 73.0		γ_{Steel} (lb/ft ²) w_{Self} (lb/ft)
PSF _{DL} PSF _{LL} (lb/ft ²)	1678.0 2255.0		1125.0 167.0		25.0 40.0		25.0 40.0		25.0 40.0		PSF _{DL} PSF _{LL} (lb/ft ²)
Trib Width (ft) $Auto$	1.00		1.33		12.50		11.25		1.33		Trib Width (ft) $Auto$
Factored PLF _{DL} PLF _{LL}	1678.0 2255.0		1499.6 222.6		312.5 500.0		281.3 450.0		33.3 53.3		Factored PSF _{DL} PSF _{LL}
PSF _{DL} PSF _{LL} (lb/ft ²)											PSF _{DL} PSF _{LL} (lb/ft ²)
Trib Width (ft) $Auto$											Trib Width (ft) $Auto$
Start End Dist frm Left											Start End Dist frm Left
Factored PLF _{DL} PLF _{LL}											Factored PSF _{DL} PSF _{LL}
PSF _{DL} PSF _{LL} (lb/ft ²)											PSF _{DL} PSF _{LL} (lb/ft ²)
Trib Width (ft) $Auto$											Trib Width (ft) $Auto$
Start End Dist frm Left											Start End Dist frm Left
Factored PLF _{DL} PLF _{LL}											Factored PSF _{DL} PSF _{LL}
Incr PSF _{DL} PSF _{LL} (lb/ft ²)	832.0										Incr PSF _{DL} PSF _{LL} (lb/ft ²)
Trib Width (ft) $Auto$	1.0										Trib Width (ft) $Auto$
Max at L or R $Auto$	Left										Max at L or R $Auto$
Start End Dist frm Left	3.0 17.0										Start End Dist frm Left
Factored Incr _{DL} Incr _{LL}	0.0 832.0										Factored Incr _{DL} Incr _{LL}
Incr PSF _{DL} PSF _{LL} (lb/ft ²)											Incr PSF _{DL} PSF _{LL} (lb/ft ²)
Trib Width (ft) $Auto$											Trib Width (ft) $Auto$
Max at L or R $Auto$											Max at L or R $Auto$
Start End Dist frm Left											Start End Dist frm Left
Factored Incr _{DL} Incr _{LL}											Factored Incr _{DL} Incr _{LL}
Pt 1 Dead Live (lbs)			16123.0 24269.0		16123.0 23272.0				19524.0 61473.0		Pt 1 Dead Live (lbs)
Dist from Left $Auto$			1.50		11.50				5.50		Dist from Left $Auto$
Factored PT _{DL} PT _{LL}			16123.0 24269.0		16123.0 23272.0				19524.0 61473.0		Factored PT _{DL} PT _{LL}
Pt 2 Dead Live (lbs)									6970.0 9881.0		Pt 2 Dead Live (lbs)
Dist from Left $Auto$									9.50		Dist from Left $Auto$
Factored PT _{DL} PT _{LL}									6970.0 9881.0		Factored PT _{DL} PT _{LL}
Pt 3 Dead Live (lbs)									3657.0 5288.0		Pt 3 Dead Live (lbs)
Dist from Left $Auto$									17.75		Dist from Left $Auto$
Factored PT _{DL} PT _{LL}									3657.0 5288.0		Factored PT _{DL} PT _{LL}
C_D C_r	1.00 1.00		1.00 1.00		1.00 1.00		1.00 1.00		1.00 1.00		C_b D.N.A.
C_t C_i	1.00 1.00		1.00 1.00		1.00 1.00		1.00 1.00		1.00 1.00		D.N.A.
Wet Use (Y/N)?											D.N.A.
F'_v (psi) f_v (psi)	4.72 1.50		7.25 1.50		7.25 1.50		3.51 1.50		9.65 1.50		A_w (in ²) Ω_v
V_{ALL} 1.5 V_{max} (kip)	94.38 40.39		144.90 43.89		144.90 35.87		70.21 9.06		192.92 71.14		V_n/Ω V_{max} (kip)
Shear Chk	42.8%		30.3%		24.8%		12.9%		36.9%		Shear Chk
F'_{b_TT} F'_{b_CT} (psi)	50 1.67		50 1.67		50 1.67		50 1.67		50 1.67		F_y (ksi) Ω_b
S (in ³) I_x (in ⁴)	96.80 533.0		95.40 843.0		95.40 843.0		57.00 307.0		172.00 1600.0		Z_x (in ³) I_x (in ⁴)
M_{ALL} (k*fft) -	218.73 218.73		187.18 187.18		159.25 159.25		142.22 142.22		408.46 408.46		M_n/Ω (k*fft) + -
M_{max} (k*fft) + -	188.80 0.00		64.06 0.00		136.40 0.00		53.24 0.00		388.46 0.00		M_{max} (k*fft) + -
Bending Chk	86.3% 0.0%		34.2% 0.0%		85.7% 0.0%		37.4% 0.0%		95.1% 0.0%		Bending Check
Max LL TL Δ Ratio	L/ 360 L/ 240		L/ 360 L/ 240		L/ 360 L/ 240		L/ 360 L/ 240		L/ 360 L/ 240		Max LL TL Δ Ratio
Allowable LL TL Δ											Allowable LL TL Δ
Δ_{Live_Left} Δ_{Tot_Left} (in)											Δ_{Live_Left} Δ_{Tot_Left} (in)
Δ_{Live_Cntr} Δ_{Tot_Cntr} (in)	0.45 0.75		0.02 0.05		0.12 0.20		0.35 0.59		0.39 0.55		Δ_{Live_Cntr} Δ_{Tot_Cntr} (in)
Δ_{Live_Cant} Δ_{Tot_Cant} (in)											Δ_{Live_Cant} Δ_{Tot_Cant} (in)
Actual LL TL Δ Ratio	L/ 489 L/ 296		L/ 6274 L/ 2580		L/ 1581 L/ 931		L/ 813 L/ 474		L/ 637 L/ 450		Actual LL TL Δ Ratio
R_L (lbs)	40392 16123 24269		43894 21924 21971		16804 6924 9881		9062 3775 5288		71144 19606 51538		R_L (lbs)
R_C (lbs)											R_C (lbs)
R_R (lbs)	39395 16123 23272		15043 10407 4636		35866 14725 21141		9062 3775 5288		38921 12724 26197		R_R (lbs)
F_{C_Perp} (psi) Brg Chk	DNA DNA		DNA DNA		DNA DNA		DNA DNA		DNA DNA		D.N.A.
Req'd Brg L Brg Cap	DNA DNA		DNA DNA		DNA DNA		DNA DNA		DNA DNA		D.N.A.
Req'd Brg C Brg Cap	DNA DNA		DNA DNA		DNA DNA		DNA DNA		DNA DNA		D.N.A.
Req'd Brg R Brg Cap	DNA DNA		DNA DNA		DNA DNA		DNA DNA		DNA DNA		D.N.A.

Reactions are Service Level

Plys | Span/Depth

Nailing Requirements
(If More Than 1 PLY)
Or Bearing Requirements
(I-Joist Only)

Reactions are Service Level

Shape | Span/Depth

Query

Location | Type
Query Result

DESIGN	DESIGN	DESIGN	DESIGN	DESIGN

Location | Type
Query Result

MJ STRUCTURAL ENGINEERS

ASD Design

Design of Wood Beams Based on the NDS
Design of Steel Beams Based on AISC 360

Sht Number:	
Job Number:	14123
Date:	5/31/2016
By:	BH

Blue Cells Must be Entered Manually

	WOOD		WOOD		WOOD		STEEL		WOOD		
WOOD BEAMS	(2) 1 3/4" x 14" LVL		(2) 1 3/4" x 14" LVL		(1) 1 3/4" x 14" LVL		W16X31		(3) 1 3/4" x 14" LVL		STEEL BEAMS
Species	LVL 2.0E Fb:2800		LVL 2.0E Fb:2800		LVL 1.9E Fb:2600		W-FLANGE		LVL 1.9E Fb:2600		Section Type
Designation	Beam 51		Beam 52		Beam 53		Beam 54		Beam 55		Designation
Description	Second Level - Main Bldg - Beam Running N/S at grid 1.5 - North Span		Second Level - Main Bldg - Beam Running N/S at grid 1.5 - South Span		Second Level - Main Bldg - Edge Beam at Grid 1.2		Second Level - Main Bldg - Cantilevered Beam Grid C		Second Level - Main Bldg - Cantilevered beam on Grid B		Description
L _{Left_Span} (ft)									4.00		L _{Left_Span} (ft)
L _{Center_Span} (ft)	8.00		16.50		16.50		6.50		11.00		L _{Center_Span} (ft)
L _{Right_Cant} (ft)					2.00		10.00		1.50		L _{Right_Cant} (ft)
L _u (ft) Auto (ft)	1.0		1.0		1.0		1.3		1.3		L _b (ft) Auto
Beam Slope α	0 : 12 0.0°		0 : 12 0.0°		0 : 12 0.0°		0 : 12 0.0°		0 : 12 0.0°		Beam Slope α
Include Self Wt.							Yes		Yes		Include Self Wt.
γ _{wood} (lb/ft ³) w _{Self} (lb/ft)							488.9 31.0		42.0 21.4		γ _{Steel} (lb/ft ³) w _{Self} (lb/ft)
PSF _{DL} PSF _{LL} (lb/ft ²)	25.0 40.0		25.0 40.0		25.0 40.0		25.0 40.0		25.0 40.0		PSF _{DL} PSF _{LL} (lb/ft ²)
Trib Width (ft) Auto	6.50		6.50		1.00		1.33		7.00		Trib Width (ft) Auto
Factored PLF _{DL} PLF _{LL}	162.5 260.0		162.5 260.0		25.0 40.0		33.3 53.2		175.0 280.0		Factored PSF _{DL} PSF _{LL}
PSF _{DL} PSF _{LL} (lb/ft ²)	132.0		132.0				25.0 40.0		25.0 40.0		PSF _{DL} PSF _{LL} (lb/ft ²)
Trib Width (ft) Auto			1.0				9.25		8.25		Trib Width (ft) Auto
Start End Dist frm Left	0.0 8.0		0.0 8.0				6.5 16.5		0.0 15.0		Start End Dist frm Left
Factored PLF _{DL} PLF _{LL}	132.0 0.0		132.0 0.0				231.3 370.0		206.3 330.0		Factored PSF _{DL} PSF _{LL}
PSF _{DL} PSF _{LL} (lb/ft ²)											PSF _{DL} PSF _{LL} (lb/ft ²)
Trib Width (ft) Auto											Trib Width (ft) Auto
Start End Dist frm Left											Start Dist frm Left
Factored PSF _{DL} PSF _{LL}											Factored PSF _{DL} PSF _{LL}
Incr PSF _{DL} PSF _{LL} (lb/ft ²)											Incr PSF _{DL} PSF _{LL} (lb/ft ²)
Trib Width (ft) Auto											Trib Width (ft) Auto
Max at L or R Auto											Max at L or R Auto
Start End Dist frm Left											Start End Dist frm Left
Factored Incr _{DL} Incr _{LL}											Factored Incr _{DL} Incr _{LL}
Incr PSF _{DL} PSF _{LL} (lb/ft ²)											Incr PSF _{DL} PSF _{LL} (lb/ft ²)
Trib Width (ft) Auto											Trib Width (ft) Auto
Max at L or R Auto											Max at L or R Auto
Start End Dist frm Left											Start End Dist frm Left
Factored Incr _{DL} Incr _{LL}											Factored Incr _{DL} Incr _{LL}
Pt 1 Dead Live (lbs)					206.0 330.0		490.0 785.0		490.0 785.0		Pt 1 Dead Live (lbs)
Dist from Left Auto					18.50		16.50		16.50		Dist from Left Auto
Factored PT _{DL} PT _{LL}					206.0 330.0		490.0 785.0		490.0 785.0		Factored PT _{DL} PT _{LL}
Pt 2 Dead Live (lbs)											Pt 2 Dead Live (lbs)
Dist from Left Auto											Dist from Left Auto
Factored PT _{DL} PT _{LL}											Factored PT _{DL} PT _{LL}
Pt 3 Dead Live (lbs)											Pt 3 Dead Live (lbs)
Dist from Left Auto											Dist from Left Auto
Factored PT _{DL} PT _{LL}											Factored PT _{DL} PT _{LL}
C _D C _r	1.00 1.00		1.00 1.00		1.00 1.00		1.00 1.00		1.00 1.00		C _b D.N.A.
C _t C _i	1.00 1.00		1.00 1.00		1.00 1.00		1.00 1.00		1.00 1.00		D.N.A.
Wet Use (Y/N)?											D.N.A.
F _v (psi) f _v (psi)	285.00 67.90		285.00 131.19		285.00 40.77		4.37 1.50		285.00 128.76		A _w (in ²) Ω _v
V _{ALL} 1.5V _{max} (kip)	13.97 3.33		13.97 6.43		6.98 1.00		87.45 8.44		20.95 9.46		V _n /Ω V _{max} (kip)
Shear Chk	23.8%		46.0%		14.3%		9.6%		45.2%		Shear Check
F _{b,TT} F _{b,CT} (psi)	2743 2743.18		2743 2743.18		2506 2505.78		50 1.67		2541 2541.25		F _y (ksi) Ω _b
S (in ²) I _x (in ⁴)	114.33 800.3		114.33 800.3		57.17 400.2		54.00 375.0		171.50 1200.5		Z _x (in ³) I _x (in ⁴)
M _{ALL} (k*fft) + -	26.14 26.14		26.14 26.14		11.94 11.94		134.73 134.73		36.32 36.32		M _n /Ω (k*fft) + -
M _{max} (k*fft) + -	4.44 0.00		16.56 0.00		1.65 1.20		0.00 48.68		8.94 10.87		M _{max} (k*fft) + -
Bending Chk	17.0% 0.0%		63.4% 0.0%		13.8% 10.1%		0.0% 36.1%		24.6% 29.9%		Bending Check
Max LL TL Δ Ratio	L/ 360 L/ 240		L/ 360 L/ 240		L/ 360 L/ 240		L/ 360 L/ 240		L/ 360 L/ 240		Max LL TL Δ Ratio
Allowable LL TL Δ											Allowable LL TL Δ
Δ _{Live_Left} Δ _{Tot_Left} (in)									0.00 0.01		Δ _{Live_Left} Δ _{Tot_Left} (in)
Δ _{Live_Cnt} Δ _{Tot_Cnt} (in)	0.01 0.03		0.27 0.51		0.06 0.10		0.01 0.02		0.04 0.07		Δ _{Live_Cnt} Δ _{Tot_Cnt} (in)
Δ _{Live_Cant} Δ _{Tot_Cant} (in)					0.01 0.02		0.22 0.38		0.02 0.03		Δ _{Live_Cant} Δ _{Tot_Cant} (in)
Actual LL TL Δ Ratio	L/ 6413 L/ 3007		L/ 731 L/ 392		L/ 3333 L/ 2050		L/ 1069 L/ 639		L/ 2024 L/ 1214		Actual LL TL Δ Ratio
R _L (lbs)	2218 1178		4286 2141		463 178		-7108 -2818		-693 -277		R _L (lbs)
R _C (lbs)	1040		2145		285		-4290		-416		R _L (lbs)
R _R (lbs)	2218 1178		3742 1597		1275 490		16334 6681		6793 2693		R _C (lbs)
	1040		2145		785		9653		4101		R _C (lbs)
F _{C-Perp} (psi) Brg Chk	750 DNA		750 DNA		750 DNA		DNA DNA		750 DNA		D.N.A.
Req'd Brg L Brg Cap	1 " DNA		1 3/4 " DNA		1/2 " DNA		DNA DNA		0 " DNA		D.N.A.
Req'd Brg C Brg Cap	1 " DNA		1 1/2 " DNA		1 " DNA		DNA DNA		3 " DNA		D.N.A.
Req'd Brg R Brg Cap	1 " DNA		1 1/2 " DNA		1 " DNA		DNA DNA		1 3/4 " DNA		D.N.A.

Reactions are Service Level # Plys | Span/Depth

Nailing Requirements (If More Than 1 PLY) Or Bearing Requirements (I-Joist Only)

Query	DESIGN	DESIGN	DESIGN	DESIGN	DESIGN
Location Type					
Query Result					

2006 NDS Wood AISC Steel Beam Design v 5.13

MJ STRUCTURAL ENGINEERS

ASD Design

Design of Wood Beams Based on the NDS
Design of Steel Beams Based on AISC 360

Sht Number:	
Job Number:	14123
Date:	5/31/2016
By:	BH

Blue Cells Must be Entered Manually

	STEEL	WOOD	WOOD	STEEL	WOOD	
WOOD BEAMS	HSS14X6X5/16					STEEL BEAMS
Species	HSS RECT					Section Type
Designation	Beam 56					Designation
Description	Second Level - Main Bldg - Moment Frame support beam		Beam 57 Second Level - Main Bldg - Beam Running N/S at grid 1.5 - South Span		Beam 58 Second Level - Main Bldg - Edge Beam at Grid 1.2	
	Beam 59 Second Level - Main Bldg - Cantilevered Beam Grid C		Beam 60 Second Level - Main Bldg - Cantilevered beam on Grid B		Description	
L_{Left_Span} (ft)	4.50					L_{Left_Span} (ft)
L_{Center_Span} (ft)						L_{Center_Span} (ft)
L_{Right_Cant} (ft)						L_{Right_Cant} (ft)
L_u (ft) Auto (ft)	1.0					L_b (ft) Auto
Beam Slope α	0 : 12 0.0°					Beam Slope α
Include Self Wt.						Include Self Wt.
w_{wood} (lb/ft²) w_{self} (lb/ft)						w_{steel} (lb/ft²) w_{self} (lb/ft)
PSF_{DL} PSF_{LL} (lb/ft²)						PSF_{DL} PSF_{LL} (lb/ft²)
Trib Width (ft) Auto						Trib Width (ft) Auto
Factored PLF_{DL} PLF_{LL}						Factored PSF_{DL} PSF_{LL}
PSF_{DL} PSF_{LL} (lb/ft²)						PSF_{DL} PSF_{LL} (lb/ft²)
Trib Width (ft) Auto						Trib Width (ft) Auto
Start End Dist frm Left						Start End Dist frm Left
Factored PLF_{DL} PLF_{LL}						Factored PSF_{DL} PSF_{LL}
PSF_{DL} PSF_{LL} (lb/ft²)						PSF_{DL} PSF_{LL} (lb/ft²)
Trib Width (ft) Auto						Trib Width (ft) Auto
Start End Dist frm Left						Start Dist frm Left
Factored PLF_{DL} PLF_{LL}						Factored PSF_{DL} PSF_{LL}
Incr PSF_{DL} PSF_{LL} (lb/ft²)						Incr PSF_{DL} PSF_{LL} (lb/ft²)
Trib Width (ft) Auto						Trib Width (ft) Auto
Max at L or R Auto						Max at L or R Auto
Start End Dist frm Left						Start End Dist frm Left
Factored Incr_{DL} Incr_{LL}						Factored Incr_{DL} Incr_{LL}
Incr PSF_{DL} PSF_{LL} (lb/ft²)						Incr PSF_{DL} PSF_{LL} (lb/ft²)
Trib Width (ft) Auto						Trib Width (ft) Auto
Max at L or R Auto						Max at L or R Auto
Start End Dist frm Left						Start End Dist frm Left
Factored Incr_{DL} Incr_{LL}						Factored Incr_{DL} Incr_{LL}
Pt 1 Dead Live (lbs)	67.8	11.2				Pt 1 Dead Live (lbs)
Dist from Left Auto	2.25					Dist from Left Auto
Factored PT_{DL} PT_{LL}	67.8	11.2				Factored PT_{DL} PT_{LL}
Pt 2 Dead Live (lbs)						Pt 2 Dead Live (lbs)
Dist from Left Auto						Dist from Left Auto
Factored PT_{DL} PT_{LL}						Factored PT_{DL} PT_{LL}
Pt 3 Dead Live (lbs)						Pt 3 Dead Live (lbs)
Dist from Left Auto						Dist from Left Auto
Factored PT_{DL} PT_{LL}						Factored PT_{DL} PT_{LL}
C_D C_r	1.00	1.00				C_b D.N.A.
C_t C_i	1.00	1.00				D.N.A.
Wet Use (Y/N)?						D.N.A.
F'_v (psi) f_v (psi)	8.15	1.67				A_w (in²) Ω_v
V_{ALL} 1.5V_{max} (kip)	134.66	0.04				V_n/Ω V_{max} (kip)
Shear Chk	0.0%					Shear Check
F'_{b,TT} F'_{b,CT} (psi)	46	1.67				F_y (ksi) Ω_b
S (in³) I_x (in⁴)	48.60	271.0				Z_x (in³) I_x (in⁴)
M_{ALL} (k*ft) + -	111.56	111.56				M_n/Ω (k*ft) + -
M_{max} (k*ft) + -	0.09	0.00				M_{max} (k*ft) + -
Bending Chk	0.1%	0.0%				Bending Check
Max LL TL Δ Ratio	L/ 360	L/ 240				Max LL TL Δ Ratio
Allowable LL TL Δ						Allowable LL TL Δ
Δ_{Live_Left} Δ_{Tot_Left} (in)						Δ_{Live_Left} Δ_{Tot_Left} (in)
Δ_{Live_Cntr} Δ_{Tot_Cntr} (in)	0.00	0.00				Δ_{Live_Cntr} Δ_{Tot_Cntr} (in)
Δ_{Live_Cant} Δ_{Tot_Cant} (in)						Δ_{Live_Cant} Δ_{Tot_Cant} (in)
Actual LL TL Δ Ratio	#####	L/ 1638543				Actual LL TL Δ Ratio
R_L (lbs)	39	34 6				R_L (lbs)
R_C (lbs)						R_C (lbs)
R_R (lbs)	39	34 6				R_R (lbs)
F_{C-Perp} (psi) Brg Chk	DNA	DNA				D.N.A.
Req'd Brg L Brg Cap	DNA	DNA				D.N.A.
Req'd Brg C Brg Cap	DNA	DNA				D.N.A.
Req'd Brg R Brg Cap	DNA	DNA				D.N.A.
Reactions are Service Level	Adequate					Reactions are Service Level
# Plys Span/Depth	HSS	3.86				Shape Span/Depth
Nailing Requirements (If More Than 1 PLY) Or Bearing Requirements (I-Joist Only)	DNA					D.N.A.

Query

DESIGN

DESIGN

DESIGN

DESIGN

DESIGN

Location | Type
Query Result

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Location | Type
Query Result

Powder Mtn Lot 37

TITLE:

Seismic Design

$$S_s = 0.816$$

Soil site class B so $S_{M_s} = 0.816$

$$S_{D_s} = 0.544$$

$$R = 5.0$$

(Special concrete shear walls)

$$C_s = \frac{0.544(1.0)}{5} = 0.109$$

Main House

	Area	w	W	h	wh	%
Roof	42×22 $+ 20 \times 11$ $+ 12 \times 4 = 1192$	$\frac{15 + 56.9}{2}$ $= 35.9$	85.7 k	11' 35"	2299.5	34
Upper/Low Roof	$(42 \times 16) + (20 \times 11) \times 2.5$ $(42 \times 32) + (25 \times 6) \times (60 + 56.9)$	22.3 k 195.6 197.9		12' 24"	4749.6	5:
Main	$(38 \times 40) + (5 \times 19)$ $+ (10 \times 40) + (6 \times 30)$ $= 2259$	25 $\frac{73.5 \times 56.9}{2}$	56.4 41.8 98.2 k	12' 12"	1178.4 8927.5	$\frac{13}{100}$

$$\text{Total W } 381.8 \text{ k}$$

$$V = 0.109(381.8) = 41.6 \text{ k}$$

$$V_{\text{Roof}} = 14.1 \text{ k}$$

$$V_{\text{UP}} = 22.0$$

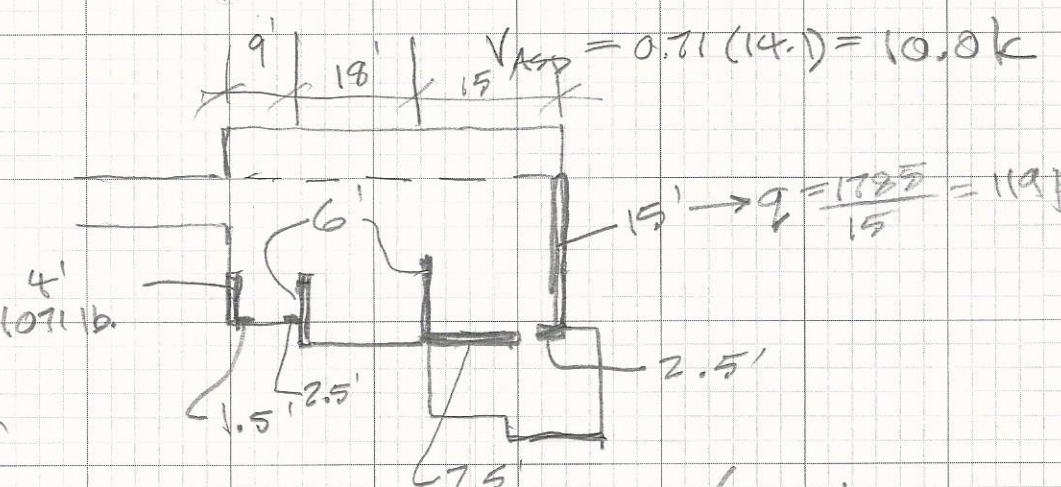
$$V_{\text{main}} = \underline{5.4}$$

Seismic Main House

TITLE:

ROOF : $V = 14.1 \text{ k}$

$V_{\text{ass}} = 0.71 (14.1) = 10.0 \text{ k}$



$q = \frac{1785}{15} = 119 \text{ plf}$

E/W dir

$\frac{10,000}{42} = 238 \text{ plf}$

N/S dir

$1.5 + 2.5 + 2.5 + 2.5 = 14'$

$V = 238 (16.5) = \frac{3928 \text{ lbs}}{6} = 655 \text{ plf}$

$V = \frac{10}{14} = 719 \text{ plf}$

HD force = 7.9 k

UPPER FLOOR / LOW ROOF

N/S

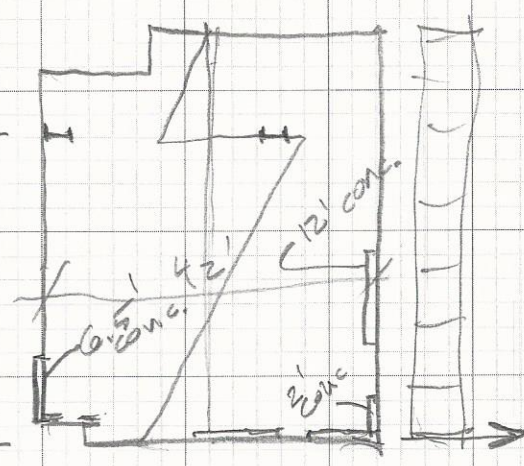
Depth V

$= 6695 - (38 + 4.5)$

$= -9075$

$q = \frac{9075}{42}$

$= 216 \text{ plf}$



$V = 32 \text{ kips}$

$\frac{22000}{53} = 415 \text{ plf}$

$V_{\text{mf}} = \frac{415 (53)^2}{2(36)}$

$= 15.3 \text{ k} \times 0.71 = 10,863 \text{ lb.}$

$V_{\text{wall}} = 6695 \text{ lbs}$

$\times 0.71$

4753 lb

$+ V_{\text{upper}} \frac{10,000}{19}$

$V_{\text{wall}} 14,753 \text{ lb}$

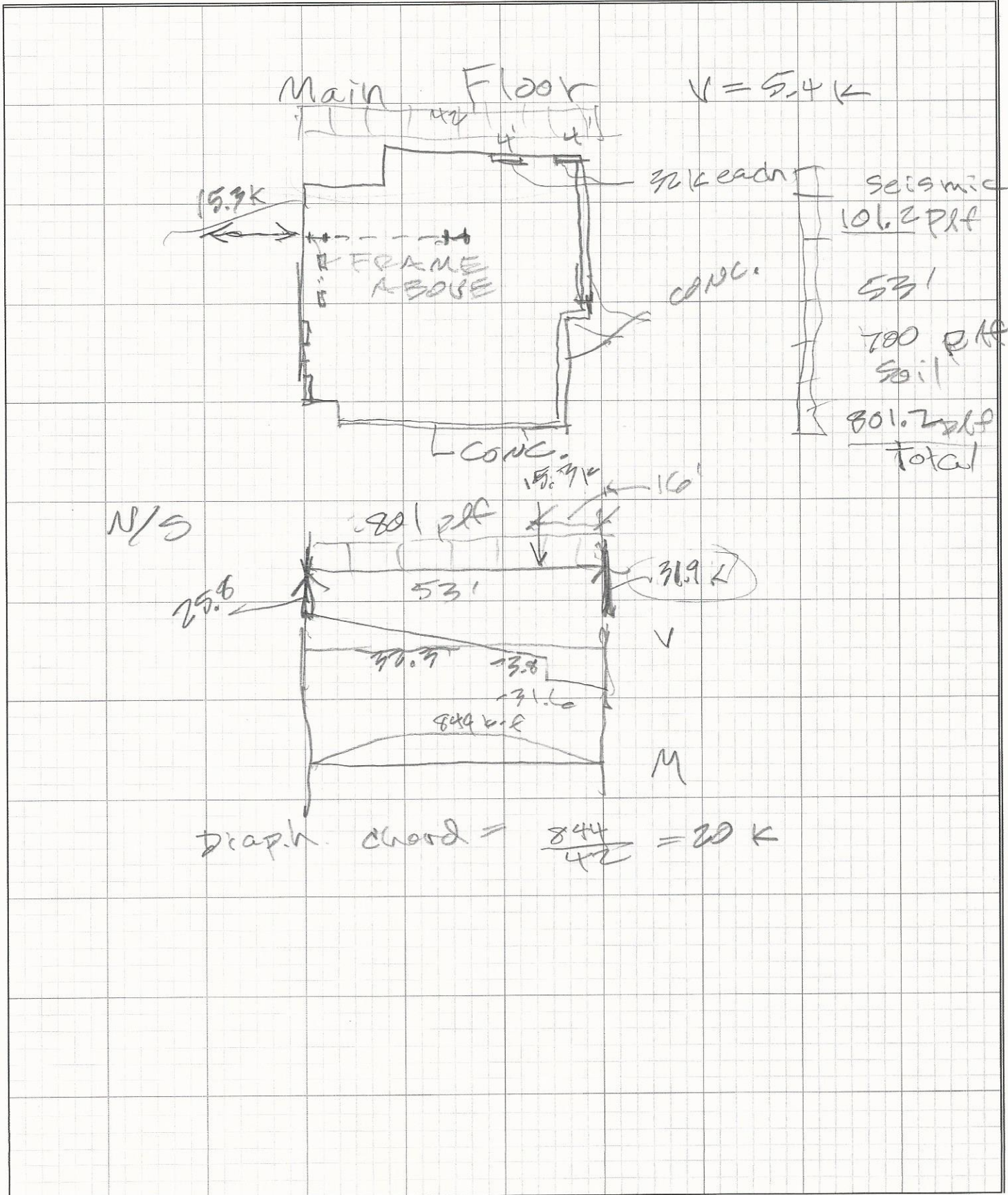
$11' + 8' = 19'$

$V = 776 \text{ plf}$

E/W

$V = \frac{22}{2} = 11 \text{ k} + \left(\frac{1700 \times 1.4}{1000} \right) = 13.3 \text{ k}$

TITLE: _____



Title Block Line 1
 You can change this area
 using the "Settings" menu item
 and then using the "Printing &
 Title Block" selection.
 Title Block Line 6

Project Title:
 Engineer:
 Project Descr:

Project ID:

Printed: 31 MAY 2016, 4:08PM

2-D Frame

File = K:\2014\14123P~1\BRENDO~1.EC6
 ENERCALC, INC. 1983-2016, Build:6.16.4.15, Ver:6.16.4.15
 Licensee : MJ Structural Engineers

Lic. # : KW-06009804



Joints...

Joint Label	Joint Coordinates X ft Y ft	X Translational Restraint	Y Translational Restraint	Z Rotational Restraint	Joint Temp deg F
1	0.0 0.0	Fixed	Fixed	Fixed	0
2	0.0 12.0				0
3	24.50 12.0				0
4	24.50 0.0	Fixed	Fixed	Fixed	0

Members...

Member Label	Property Label	Endpoint Joints		Member Length ft	Releases Specify Connectivity of Member Ends to Joints					
		I Joint	J Joint		I End			J End		
					x	y	z (rotation)	x	y	z (rotation)
A	Column	1	2	12.000	Fixed	Fixed	Pinned	Fixed	Fixed	Fixed
B	Beam	2	3	24.500	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
C	Column	3	4	12.000	Fixed	Fixed	Fixed	Fixed	Fixed	Pinned

Member Stress Check Data...

Member Label	Unbraced Lengths		Slenderness Factors		AISC Bending & Stability Factors	
	Lu : z ft	Lu : y	K : z	K : y	Cm	Cb
A	12.000	12.000	1.00	1.00	Internal	Internal
B	24.500	24.500	1.00	1.00	Internal	Internal
C	12.000	12.000	1.00	1.00	Internal	Internal

Materials...

Member Label	Youngs ksi	Density kcf	Thermal in/deg	Yield ksi
Default	1.00	0.000	0.000000	1.00
Steel	29,000.00	0.490	0.000007	50.00
Wood	1,800.00	0.035	0.000000	0.00

Wood Material Data...

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Wood Material Data...

Wood, Not Defined, Density= 0.035pci, FbT= 1000psi, FbC= 1000psi, Fv= 1000psi, Ft= 1000, Fc= 400psi, E Bend XX= 1800ksi, E BendMin XX= 1800ksi, E Beny YY= 1800ksi, E BendMin YY= 1800ksi, E Axial= 1800ksi, Species=, Grade= Any, Class=

Member Sections...

Prop Label	Group Tag	Material	Area	Depth	Width	Ixx	Iyy
Default	Group	Default	1.0 in^2	0.0 in	0.0 in	1.0 in^4	1.0 in^4
W12x50	Column	Steel	14.60 in^2	12.20 in	8.080 in	391.0 in^4	56.30 in^4
W21x122	Beam	Steel	35.90 in^2	21.70 in	12.40 in	2.960.0 in^4	305.0 in^4

Member Point Loads....

Note: Loads labeled "Global Y" act downward (in "-Y" direction)

Member Label	Load Direction	Distance from "I" Joint	Load Magnitude							
			Dead	Roof Live	Live	Snow	Seismic	Wind	Earth	
B	Global Y	15.5 ft	25.202			75.494				k

Member Distributed Loads....

Note: Loads labeled "Global Y" act downward (in "-Y" direction)

Member Label	Load Direction	Load Extents		Load Magnitude						
		Start	ft	Dead	Roof Live	Live	Snow	Seismic	Wind	Earth
B	Global Y	0.0	Start Mag :	0.050			0.1670			k/ft
		24.50	End Mag :	0.050			0.1670			k/ft
B	Global X	0.0	Start Mag :					0.6330		k/ft
		24.50	End Mag :					0.6330		k/ft

Strength/Stress Load Combinations

ASCE 7-10

Load Combination Description	Cd	Load Combination Factors					
		Dead	Roof Live	Live	Snow	Seismic	Wind
+D+H	0.9	1.0					1.0
+D+L+H	1	1.0		1.0			1.0
+D+Lr+H	1.25	1.0	1.0				1.0
+D+S+H	1.15	1.0			1.0		1.0
+D+0.750Lr+0.750L+H	1.25	1.0	0.750	0.750			1.0
+D+0.750L+0.750S+H	1.15	1.0		0.750	0.750		1.0
+D+0.60W+H	1.6	1.0				0.60	1.0
+D+H	0.9	1.0					1.0
+D+0.750Lr+0.750L+0.450W+H	1.6	1.0	0.750	0.750		0.450	1.0
+D+0.750L+0.750S+0.450W+H	1.6	1.0		0.750	0.750	0.450	1.0
+D+0.750L+0.750S+H	1.15	1.0		0.750	0.750		1.0
+0.60D+0.60W+0.60H	1.6	0.60				0.60	0.60
+0.60D+0.60H	0.9	0.60					0.60

Reaction Load Combinations

ASCE 7-10

Load Combination Description	Load Combination Factors						
	Dead	Roof Live	Live	Snow	Seismic	Wind	Earth
+D+H	1.0						1.0
+D+L+H	1.0		1.0				1.0
+D+Lr+H	1.0	1.0					1.0
+D+S+H	1.0			1.0			1.0
+D+0.750Lr+0.750L+H	1.0	0.750	0.750				1.0
+D+0.750L+0.750S+H	1.0		0.750	0.750			1.0
+D+0.60W+H	1.0					0.60	1.0
+D+0.70E+H	1.0				0.70		1.0
+D+0.750Lr+0.750L+0.450W+H	1.0	0.750	0.750			0.450	1.0
+D+0.750L+0.750S+0.450W+H	1.0		0.750	0.750		0.450	1.0
+D+0.750L+0.750S+0.5250E+H	1.0		0.750	0.750	0.5250		1.0
+0.60D+0.60W+0.60H	0.60					0.60	0.60
+0.60D+0.70E+0.60H	0.60				0.70		0.60
D Only	1.0						
Lr Only		1.0					
L Only			1.0				
S Only				1.0			

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W Only								1.0	1.0
E Only								1.0	
H Only									1.0

Deflection Load Combinations ASCE 7-10

Load Combination Description	Load Combination Factors						
	Dead	Roof Live	Live	Snow	Seismic	Wind	Earth
+D+H	1.0						1.0
+D+L+H	1.0		1.0				1.0
+D+Lr+H	1.0	1.0					1.0
+D+S+H	1.0			1.0			1.0

Deflection Load Combinations ASCE 7-10

Load Combination Description	Load Combination Factors						
	Dead	Roof Live	Live	Snow	Seismic	Wind	Earth
+D+0.750Lr+0.750L+H	1.0	0.750	0.750				1.0
+D+0.750L+0.750S+H	1.0		0.750	0.750			1.0
+D+0.60W+H	1.0					0.60	1.0
+D+0.70E+H	1.0				0.70		1.0
+D+0.750Lr+0.750L+0.450W+H	1.0	0.750	0.750			0.450	1.0
+D+0.750L+0.750S+0.450W+H	1.0		0.750	0.750		0.450	1.0
+D+0.750L+0.750S+0.5250E+H	1.0		0.750	0.750	0.5250		1.0
+0.60D+0.60W+0.60H	0.60					0.60	0.60
+0.60D+0.70E+0.60H	0.60				0.70		0.60
D Only	1.0						
Lr Only		1.0					
L Only			1.0				
S Only				1.0			
W Only						1.0	
E Only					1.0		
H Only							1.0

Extreme Joint Displacements Only Load Combinations giving maximum values are listed

Joint Label	Joint Displacements		
	X in	Y in	Z Radians
1 Max	0.0 E Only	0.0 E Only	0.0
1 Min	0.0 +D+S+H	0.0 +D+S+H	0.0
2 Max	0.7750 E Only	0.002583 E Only	0.0
2 Min	-0.06956 +D+S+H	-0.01349 +D+S+H	-0.003865 +D+S+H
3 Max	0.7750 E Only	0.0 +D+S+H	0.004845 +D+S+H
3 Min	-0.07158 +D+S+H	-0.02257 +D+S+H	-0.000655 E Only
4 Max	0.0 +D+0.750L+0.750S+0.5250E	0.0	0.0
4 Min	0.0	0.0 +D+S+H	0.0

Extreme Joint Reactions Only Load Combinations giving maximum values are listed

Joint Label	Joint Reactions		
	X k	Y k	Z k-ft
1 Max	7.133 +D+S+H	39.649 +D+S+H	
1 Min	-7.754 E Only	-7.596 E Only	
2 Max			
2 Min			

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3	Max		
	Min		
4	Max	66.364	+D+S+H
	Min	-9.866	+D+0.750L+0.750S+0.5250E

Extreme Member End Forces Only Load Combinations giving maximum values are listed

Member Label	Member " I " End Forces			Member " J " End Forces		
	Axial k	Shear k	Moment k-ft	Axial k	Shear k	Moment k-ft
A Max	39.649 +D+S+H	-1.068 +0.60D+0.60W+0.60H	0.0 +D+H	-5.922 +0.60D+0.60W+0.60H	7.133 +D+S+H	-12.817 +0.60D+0.60W+0.60H
A Min	5.922 +0.60D+0.60W+0.60H	-7.133 +D+S+H	0.0 +D+H	-39.649 +D+S+H	1.068 +0.60D+0.60W+0.60H	-85.597 +D+S+H
B Max	7.133 +D+S+H	39.649 +D+S+H	85.597 +D+S+H	-1.068 +0.60D+0.60W+0.60H	66.364 +D+S+H	-12.817 +0.60D+0.60W+0.60H
B Min	1.068 +0.60D+0.60W+0.60H	5.922 +0.60D+0.60W+0.60H	12.817 +0.60D+0.60W+0.60H	-7.133 +D+S+H	9.934 +0.60D+0.60W+0.60H	-85.597 +D+S+H
C Max	66.364 +D+S+H	7.133 +D+S+H	85.597 +D+S+H	-9.934 +0.60D+0.60W+0.60H	-1.068 +0.60D+0.60W+0.60H	0.0 +D+H
C Min	9.934 +0.60D+0.60W+0.60H	1.068 +0.60D+0.60W+0.60H	12.817 +0.60D+0.60W+0.60H	-66.364 +D+S+H	-7.133 +D+S+H	0.0 +D+H

Extreme Member Forces Only Load Combinations giving maximum values are listed

Mmbr Label	Axial	Dist from "I" Joint	Moment	Dist from "I" Joint	Shear	Dist from "I" Joint
A Max	-5.922k +0.60D+0.60W+0.60H	0.0 ft	85.597 k-ft +D+S+H	12.0 ft	-1.068 k +0.60D+0.60W+0.60H	0.0 ft
A Min	-39.649k +D+S+H	0.0 ft	0.0 k-ft +D+H	0.0 ft	-7.133 k +D+S+H	0.0 ft
B Max	-1.068k +0.60D+0.60W+0.60H	0.0 ft	85.597 k-ft +D+S+H	24.50 ft	39.649 k +D+S+H	0.0 ft
B Min	-7.133k +D+S+H	0.0 ft	-502.89 k-ft +D+S+H	15.50 ft	-66.364 k +D+S+H	24.50 ft
C Max	-9.934k +0.60D+0.60W+0.60H	0.0 ft	85.597 k-ft +D+S+H	0.0 ft	7.133 k +D+S+H	0.0 ft
C Min	-66.364k +D+S+H	0.0 ft	0.0 k-ft +D+H	12.0 ft	1.068 k +0.60D+0.60W+0.60H	0.0 ft

Member Stress Checks... Stress Checks per AISC 360-10 & NDS 2012

Member Label	Section Label	Material	Max. Axial + Bending Stress Ratios				Max. Shear Stress Ratios			
			Load Combination	Ratio	Status	Dist (ft)	Load Combination	Ratio	Status	Dist (ft)
A	Column	Steel	+D+S+H	0.605	PASS	12.00	+D+S+H	0.079	PASS	0.00
B	Beam	Steel	+D+S+H	0.870	PASS	15.50	+D+S+H	0.255	PASS	24.50
C	Column	Steel	+D+S+H	0.703	PASS	0.00	+D+S+H	0.079	PASS	0.00

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