FELTENGROUP
ARCHITECTURE | ENGINEERING | FORENSICS

Studio Shed

1500 Cherry Street
Louisville, Colorado 80027

Do Residence - 24x36

EXPIRES: 10/25/2027

INDEX TO STRUCTURAL CALCULATIONS

CO-FE24-008262
125899

18325 N. ALLIED WAY, SUITE #200 * PHOENIX, AZ 85054 * PHONE: 602.867.2500 * FAX: 602.867.2503

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CLIENT:	STUDIO SHED	SHEET	1	OF	
PROJECT:	DO RESIDENCE	BY	DMS		

GOVERNING CODE AND LATERAL LOAD CRITERIA:

MUNICIPALITY:	**MERCER ISLAND, WA**	**SEISMIC SITE CLASSIFICATION:**	**D**
BUILDING CODE:	**2018 IBC/IRC**	**EXPOSURE AT MWFRS:**	**C**
3 SEC GUST (MPH):	**100**	**EXPOSURE AT C & C:**	**C**
RISK CATEGORY:	**II**		
MCE SHORT PERIOD, S_s:	**1.439**	**MCE 1 SECOND PERIOD, S_1:**	**0.500**

ROOF LOADS:

ROOF FRAMING DEAD LOAD

TOTAL ROOF DL (PSF) =	**15.00**

ROOF FRAMING LIVE LOAD

4:12 SLOPE AND GREATER TOTAL ROOF LL (PSF) =	**20.00**

SNOW LOAD

TOTAL GROUND SNOW LOAD (PSF) =	**16.00**
TOTAL FLAT (SEE SHEET 2) ROOF SNOW LOAD (PSF) =	**16.00**

FLOOR LOADS:

FLOOR FRAMING DEAD LOAD

TOTAL FLOOR DL (PSF) =	**15.00**

FLOOR FRAMING LIVE LOAD

TOTAL FLOOR LL (PSF) =	**40.00**

WALL DEAD LOADS:

EXTERIOR WALL DEAD LOAD

TOTAL WALL DL (PSF) =	**10.00**

INTERIOR WALL DEAD LOAD

TOTAL WALL DL (PSF) =	**7.00**

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CLIENT: STUDIO SHED | SHEET 2 OF

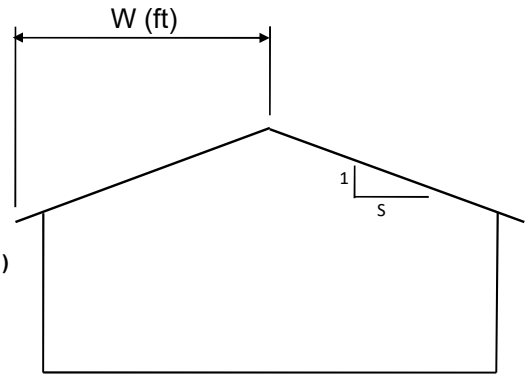
PROJECT: DO RESIDENCE | BY DMS

ROOF SNOW LOADS PER ASCE 7-10 CHAPTER 7

$p_f = 0.7C_eC_tI_sp_g$	FLAT ROOF SNOW LOAD PER EQUATION 7.3-1
C_e	EXPOSURE FACTOR PER TABLE 7-2
C_t	THERMAL FACTOR PER TABLE 7-3
C_s	SLOPE FACTOR PER FIGURE 7-2
I_s	IMPORTANCE FACTOR PER TABLE 1.5-2
p_g	GROUND SNOW LOAD PER SECTION 7.2 AND/OR FIGURE 7-1
$p_s = C_sp_f$	SLOPED ROOF SNOW LOAD PER EQUATION 7.4-1
$p_m = I_sp_g$	MINIMUM SNOW LOAD FOR LOW SLOPE ROOFS PER SECTION 7.3.4

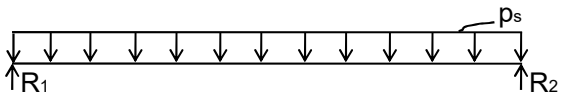
RISK CATEGORY =	II	PER TABLE 1.5-1
TERRAIN CATEGORY =	C	PER SECTION 26.7
EXPOSURE OF ROOF =	PARTIALLY	PER FOOTNOTE a OF TABLE 7-2
PITCH OF ROOF =	2.000 /12	THETA (θ) = 9.46 DEGREES
TYPE OF ROOF SURFACE =	OTHER	
C_e =	1.000	TABLE 7-2
C_t =	1.100	TABLE 7-3
C_s =	1.000	FIGURE 7-2
I_s =	1.000	TABLE 1.5-2
ps =	16.000	psf, DEFINED BY THE JURISDICTION
pf =	16.000	psf, pf = ps/Cs (EQN 7.4-1)
pg =	20.779	psf, pg = pf/(0.7*Ce*Ct*Is) (EQN 7.3-1)
pm =	20.000	psf, SECTION 7.3.4
W =	28.000	ft (W = L_u FOR DRIFT)
S =	6.000	
h_d =	1.576	PER FIGURE 7-9
γ =	16.701	pcf, γ = 0.13pg+14 <= 30 pcf (EQN 7.7-1)
$^8/_3*h_d*\sqrt{S}$ =	10.291	ft
$h_d*\gamma/\sqrt{S}$ =	10.742	psf

FIGURE 7-5



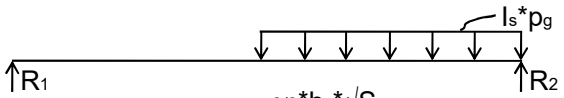
NOTE: IN ORDER TO COMPARE THE BALANCED AND UNBALANCED SNOW LOADS, WE SOLVE THE DIAGRAMS IN FIGURE 7-5 TO THE RIGHT FOR R_2 AND THEN FIND AN EQUIVALENT p_s BY TAKING R_2 / W.

p_s = 16.00 psf * BALANCED

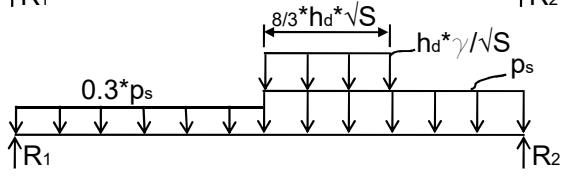


* 5 psf RAIN-ON-SNOW SURCHARGE OMITTED PER SECTION 7.10

EQUIVALENT p_s = 15.58 psf UNBALANCED W<=20ft



EQUIVALENT p_s = 15.54 psf UNBALANCED W>20ft



THEREFORE, THE BALANCED SNOW LOAD OF 16.00psf SHOULD BE USED FOR W <= 20 AND W > 20

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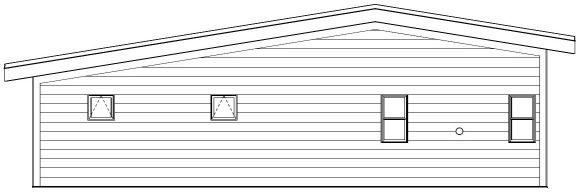
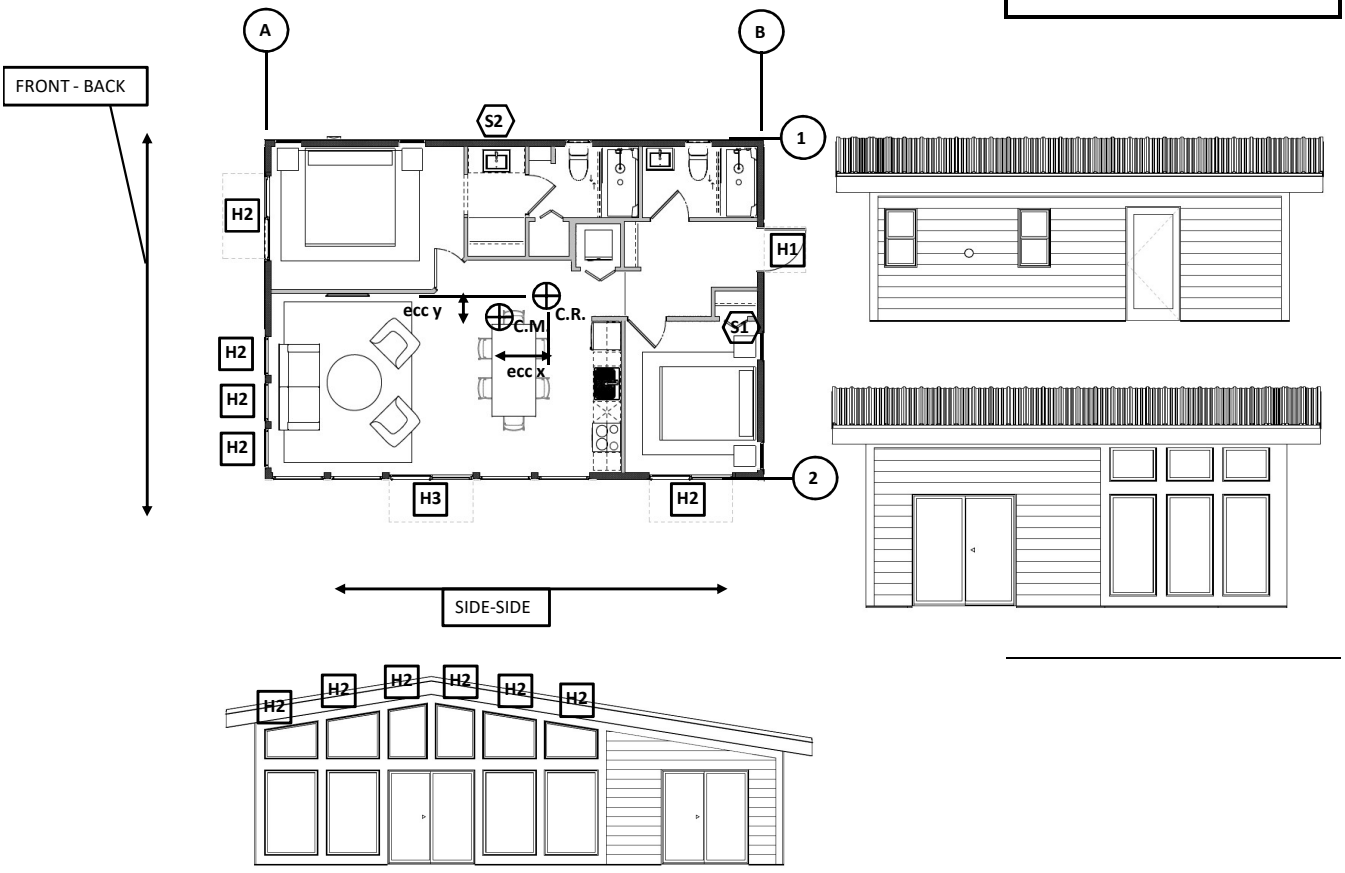
CLIENT: STUDIO SHED SHEET 3 OF

PROJECT: DO RESIDENCE BY DMS

H = HEADER
S = STUD
# = SHEAR LINE
R = RAFTER

DIAPHRAGM ASPECT RATIO		
L =	24.000	ft
B =	36.000	ft
RIGHT SIDE O.H. =	2.000	ft
LEFT SIDE O.H. =	2.000	ft
REAR O.H. =	2.000	ft
FRONT O.H. =	2.000	ft





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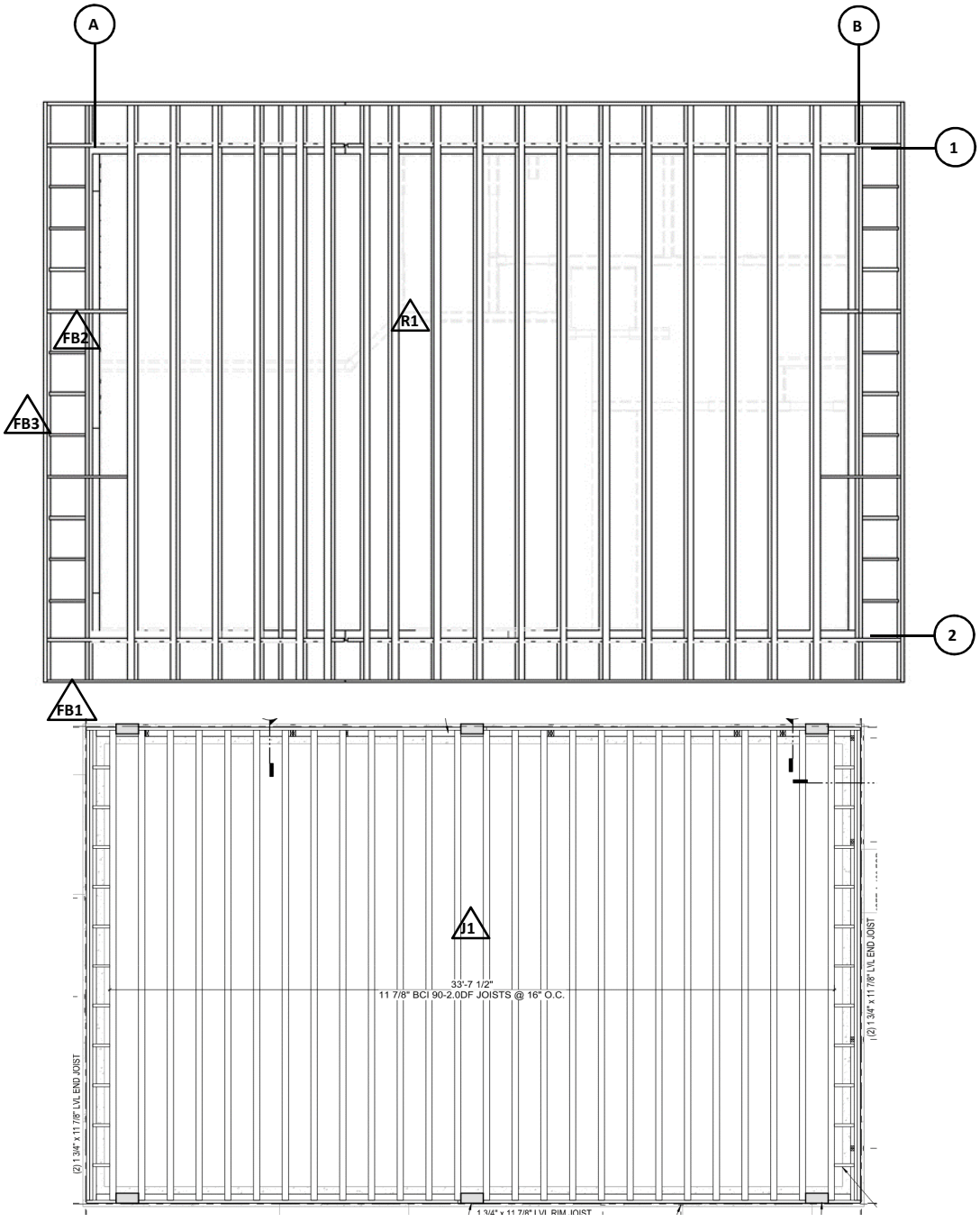
CLIENT:	STUDIO SHED		SHEET	4	OF
PROJECT:	DO RESIDENCE		BY	DMS	

H = HEADER
S = STUD
# = SHEAR LINE
R = RAFTER



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CLIENT: STUDIO SHED SHEET 5 OF

PROJECT: DO RESIDENCE BY DMS

	Header/Beam Loading							Unbraced Lengths	Deflection Data		Results	Load Combo	Actual Stress	Allowable Stress
		Point Loads		Uniform Loads										
Id	Load Type	P (lb)	x (ft)	w_{start} (plf)	w_{stop} (plf)	x_{start} (ft)	x_{stop} (ft)	$L_{ub,top}$ (ft)	TL (L/x)	DL Creep Factor	V_{max} (lb)	V	fv (psi)	F'v (psi)
Span 1 (ft)								$L_{ub,bot}$ (ft)	LL (L/x)					
Span 2 (ft)								NDS Factors	Cantilever Data		$M+_{max}$ (lb-ft)	M+	fb+ (psi)	F'b+ (psi)
Span 3 (ft)								C_r	Left	Δ_{TL} Limit	$M-_{max}$ (lb-ft)	M-	fb- (psi)	F'b- (psi)
Span 4 (ft)								C_i	Right	Δ_{LL} Limit	Deflections			
								C_M			Δ_{max} (in)	Δ_{TL}		
								C_T	Scarf Cut Data		Δ_{cant} (in)	Δ_{TL}		
								C_{Ltop}	Left	d_n (in)	Δ_{max} (in)	Δ_{LL}	Total Length, L (ft)	
								C_{Lbot}	Right	d_n (in)	Δ_{cant} (in)	Δ_{LL}		
								C_F/C_{vtop}	Material Type		Member Size			
								C_F/C_{vbot}						

Header/ Beam Support Design										
Max/Min Reaction R1 (lb)	Load Combo	Max/Min Reaction R2 (lb)	Load Combo	Max/Min Reaction R3 (lb)	Load Combo	Max/Min Reaction R4 (lb)	Load Combo	Max/Min Reaction R5 (lb)	Load Combo
Bearing Length (in)/Hanger		Bearing Length (in)/Hanger		Bearing Length (in)/Hanger		Bearing Length (in)/Hanger		Bearing Length (in)/Hanger	
Trimmer or Post Height		Trimmer or Post Height		Trimmer or Post Height		Trimmer or Post Height		Trimmer or Post Height	
King Stud Height		King Stud Height		King Stud Height		King Stud Height		King Stud Height	
Support Material Type		Support Material Type		Support Material Type		Support Material Type		Support Material Type	
Trimmers / Hanger		Trimmers / Hanger		Trimmers / Hanger		Trimmers / Hanger		Trimmers / Hanger	
King Studs		King Studs		King Studs		King Studs		King Studs	

Foundation Support Design										
Support Condition		Support Condition		Support Condition		Support Condition		Support Condition	
Support Location		Support Location		Support Location		Support Location		Support Location	
Slab Thickness (in)		Slab Thickness (in)		Slab Thickness (in)		Slab Thickness (in)		Slab Thickness (in)	
Bearing Pressure (psf)		Bearing Pressure (psf)		Bearing Pressure (psf)		Bearing Pressure (psf)		Bearing Pressure (psf)	
Support Width (in)		Support Width (in)		Support Width (in)		Support Width (in)		Support Width (in)	
Support Depth (in)		Support Depth (in)		Support Depth (in)		Support Depth (in)		Support Depth (in)	
Point Load at Support (lb)		Point Load at Support (lb)		Point Load at Support (lb)		Point Load at Support (lb)		Point Load at Support (lb)	
Uniform Load at Support (plf)		Uniform Load at Support (plf)		Uniform Load at Support (plf)		Uniform Load at Support (plf)		Uniform Load at Support (plf)	
Support Size		Support Size		Support Size		Support Size		Support Size	

Beam/Header Diagram

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CLIENT: SHEET 6 OF

PROJECT: BY

FB1	D			30	30	1.000	14.000	0.000	240	1.000	95	D + Lr	7	356
	Lr			40	40	1.000	14.000		360					
4.000								Factors	Cantilever Data		85	D + Lr	25	3255
								No	No					
								1.000			-102	D + Lr	30	3052
2.000								No	No					
								MC<=19%			Deflections			
								T<=100			0.000	D + Lr		
2.000								1.000	Scarf Cut Data		0.000			
								0.938	No		0.000	Lr	14.000	
								1.001	No		0.000			
2.000								1.001	Micro-Lam 2.0E		1 3/4" x 11 7/8" LVL			
									Select Material					
2.000														
2.000														

Header/ Beam Support Design

65	D + Lr	293	D + Lr	90	D + Lr	170	D + Lr	142	D + Lr
34	D	140	D	42	D	81	D	67	D
Hanger		Hanger		Hanger		Hanger		Hanger	
LUS210Z		ITS3.56/11.88		A23		A23		A23	

Foundation Support Design

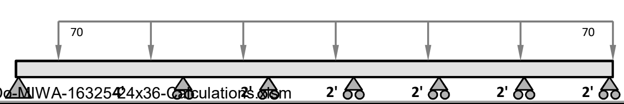
To Hanger	To Hanger	To Hanger	To Hanger	To Hanger
To Hanger	To Hanger	To Hanger	To Hanger	To Hanger

Header/ Beam Support Design

174	D + Lr	60	D + Lr						
82	D	28	D						
Hanger		Hanger							
A23		A23							

Foundation Support Design

To Hanger	To Hanger			
To Hanger	To Hanger			



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CLIENT: SHEET 7 OF

PROJECT: BY

FB2	D	169	0.000	30	30	0.000	4.000	0.000	240	1.000	428	D + S	31	328
	S	126	0.000	32	32	0.000	4.000		360					
2.000								Factors	Cantilever Data		0	D	0	2340
								No	Yes	120				
								1.000			-726	D + S	212	2868
2.000								No	No	180				
								MC<=19%			Deflections			
								T<=100			0.001	D + S		
								1.000	Scarf Cut Data		-0.007	D + S		
								0.958	No		0.000	S	4.000	
								1.000	No		-0.003	S		
								1.001	Micro-Lam 2.0E		1 3/4" x 11 7/8" LVL			
									Select Material					

Header/ Beam Support Design				862	D + S	-169	D							
				482	D	-295	D + S							
				3.125		Hanger								
						BA1.81/11.88								
				To Framing Below										
Foundation Support Design				To Framing Below		To Hanger								
				To Framing Below		To Hanger								
Header/ Beam Support Design														
Foundation Support Design														

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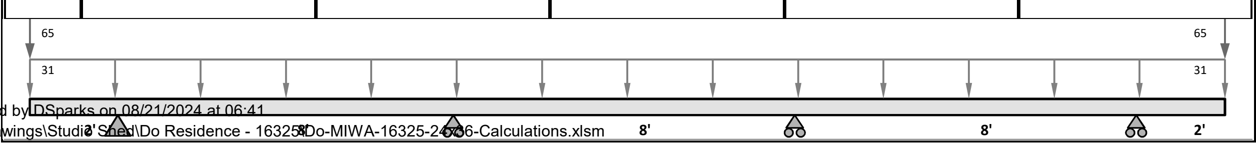
CLIENT: SHEET 8 OF

PROJECT: BY

FB3	D	34	0.000	15	15	0.000	28.000	0.000	240	1.000	140	D + S	10	328
	S	32	0.000	16	16	0.000	28.000		360					
2.000	D	34	28.000					Factors	Cantilever Data		100	D + S	29	2994
	S	32	28.000					No	Yes	60				
								1.000			-206	D + S	60	2534
8.000								No	Yes	90				
								MC<=19%			Deflections			
								T<=100			-0.001	D + S		
8.000								1.000	Scarf Cut Data		-0.001	D + S		
								0.846	No		-0.001	S	28.000	
								1.001	No		-0.001	S		
8.000								1.001	Micro-Lam 2.0E		1 3/4" x 11 7/8" LVL			
									Select Material					
2.000														

Header/ Beam Support Design			289	D + S	295	D + S	295	D + S	289	D + S
			160	D	169	D	169	D	160	D
			Hanger		Hanger		Hanger		Hanger	
			BA1.81/11.88		BA1.81/11.88		BA1.81/11.88		BA1.81/11.88	
Foundation Support Design			To Hanger		To Hanger		To Hanger		To Hanger	
			To Hanger		To Hanger		To Hanger		To Hanger	
Header/ Beam Support Design										
Foundation Support Design										



Boise Cascade® ENGINEERED WOOD PRODUCTS

Single 11-7/8" BCI® 90s-2.0

R01 (Rafter)

BC CALC® Engineering Report | Dry | 3 spans | L & R cant. | 24" OCS | Non-Repetitive | 0/12 | August 20, 2024 14:39:12

Build 8892

Factored Product Data

E = 2.00 x 10^6 psi
K = 7.00 x 10^6 lbs
EI = 675.00 x 10^6 lb-in²
EI_c = 0.00 x 10^6 lb-in²
Shear = 2150 lbs
Moment = 9550 ft-lbs
Vibration limited span = 0

	End Reaction (lbs)			Intermediate Reaction (lbs)		
	Length	No WS	With WS	Length	No WS	With WS
	1-1/2"	1425	1850	3"	3196	3529
	3-1/2"	1800	1950	5-1/2"	4000	4300
				5-1/4"	4000	4300

Reactions between min. and max. bearing lengths shown are interpolated

Modification Factors

Factor	Moment	Neg. Moment	Shear	End Reaction	Int. Reaction	Bearing
Load Duration	115%	125%	115%		115%	115%
Moisture Content	1.00	1.00	1.00		1.00	1.00
Lateral Stability						
Unbraced Length	00-00-00	00-00-00				
Repetitive Member						

Maximum Values

		02-02-12	Δ	23-06-08	Δ	02-02-12	
Moment (ft-lbs)		0	-312	5374	-312	0	
Shear (lbs)	0		253 -336		926 -60		0
Shear Red. (lbs)	0		0 0		0 0		0
Reaction (lbs)			1123		1123		
Uplift (lbs)			0		0		
Total Defl. (in)		0"		0.861"		0"	
Live Defl. (in)		0.015"		0.54"		0.015"	
Neg. Defl. (in)		-0.235"		0"		-0.235"	
Live Neg. Defl. (in)		-0.149"		-0.022"		-0.149"	

Load cases

Loadcase #0: (1.00D)
1.00 Dead Load

Load Type	Component	Start Pos	End Pos	Start Value	End Value
Point Load	Dead Load	28-00-00	----	0.00 lbs	----
Uniform Linear Load	Dead Load	00-00-00	28-00-00	30.00 lb/ft	----

		02-02-12	Δ	23-06-08	Δ	02-02-12	
Moment (ft-lbs)		0	-75	2004	-75	0	
Shear (lbs)	0		60 -346		346 -60		0
Shear Red. (lbs)	0		0 0		0 0		0
Reaction (lbs)			420		420		
Uplift (lbs)			0		0		
Total Defl. (in)		0"		0.321"		0"	
Neg. Defl. (in)		-0.087"		0"		-0.087"	

Loadcase #1: (1.00D+1.00LP_1)
1.00 Dead Load + 1.00 Live Point Load at center of span #1

Load Type	Component	Start Pos	End Pos	Start Value	End Value
Point Load	Dead Load	28-00-00	----	0.00 lbs	----
Uniform Linear Load	Construction Load	00-00-00	02-00-00	96.54 lb/ft	----
Uniform Linear Load	Dead Load	00-00-00	28-00-00	30.00 lb/ft	----

		02-02-12	Δ	23-06-08	Δ	02-02-12	
Moment (ft-lbs)		0	**-312**	1887	-75	0	
Shear (lbs)	**0**		**253** -356		336 **-60**		0
Shear Red. (lbs)	0		0 0		0 0		0
Reaction (lbs)			623		410		
Uplift (lbs)			0		0		
Total Defl. (in)		0"		0.3"		0"	
Neg. Defl. (in)		-0.072"		0"		-0.082"	

Loadcase #2: (1.00D+1.00LP_2)

1.00 Dead Load + 1.00 Live Point Load on left side of span #2

Load Type	Component	Start Pos	End Pos	Start Value	End Value
Point Load	Dead Load	28-00-00	----	0.00 lbs	----
Uniform Linear Load	Dead Load	00-00-00	28-00-00	30.00 lb/ft	----
Uniform Linear Load	Construction Load	02-05-08	04-11-00	96.54 lb/ft	----

		02-02-12	Δ	23-06-08	Δ	02-02-12	
Moment (ft-lbs)		0	-75	2181	-75	0	
Shear (lbs)	0		60 -569		361 -60		0
Shear Red. (lbs)	0		0 0		0 0		0
Reaction (lbs)			643		435		
Uplift (lbs)			0		0		
Total Defl. (in)		0"		0.354"		0"	
Neg. Defl. (in)		-0.101"		0"		-0.095"	

Loadcase #3: (1.00D+1.00LP_3)

1.00 Dead Load + 1.00 Live Point Load at center of span #2

Load Type	Component	Start Pos	End Pos	Start Value	End Value
Point Load	Dead Load	28-00-00	----	0.00 lbs	----
Uniform Linear Load	Dead Load	00-00-00	28-00-00	30.00 lb/ft	----
Uniform Linear Load	Construction Load	12-09-04	15-02-12	96.54 lb/ft	----

		02-02-12	Δ	23-06-08	Δ	02-02-12	
Moment (ft-lbs)		0	-75	3329	-75	0	
Shear (lbs)	0		60 -465		465 -60		0
Shear Red. (lbs)	0		0 0		0 0		0
Reaction (lbs)			539		539		
Uplift (lbs)			0		0		
Total Defl. (in)		0"		0.502"		0"	
Neg. Defl. (in)		-0.134"		0"		-0.134"	

Loadcase #4: (1.00D+1.00LP_4)

1.00 Dead Load + 1.00 Live Point Load on right side of span #2

Load Type	Component	Start Pos	End Pos	Start Value	End Value
Point Load	Dead Load	28-00-00	----	0.00 lbs	----
Uniform Linear Load	Dead Load	00-00-00	28-00-00	30.00 lb/ft	----
Uniform Linear Load	Construction Load	23-01-00	25-06-08	96.54 lb/ft	----

		02-02-12	Δ	23-06-08	Δ	02-02-12	
Moment (ft-lbs)		0	-75	2180	-75	0	
Shear (lbs)	0		60 -361		569 -60		0
Shear Red. (lbs)	0		0 0		0 0		0
Reaction (lbs)			435		643		
Uplift (lbs)			0		0		
Total Defl. (in)		0"		0.354"		0"	
Neg. Defl. (in)		-0.095"		0"		-0.101"	

Loadcase #5: (1.00D+1.00LP_5)

1.00 Dead Load + 1.00 Live Point Load at center of span #3

Load Type	Component	Start Pos	End Pos	Start Value	End Value
Point Load	Dead Load	28-00-00	----	0.00 lbs	----
Uniform Linear Load	Dead Load	00-00-00	28-00-00	30.00 lb/ft	----
Uniform Linear Load	Construction Load	26-00-00	28-00-00	96.54 lb/ft	----

		02-02-12	Δ	23-06-08	Δ	02-02-12	
Moment (ft-lbs)		0	-75	1887	**-312**	0	
Shear (lbs)	0	60	**-336**	356	-253		**0**
Shear Red. (lbs)	0	0	0	0	0		0
Reaction (lbs)		410		623			
Uplift (lbs)		0		0			
Total Defl. (in)		0"		0.3"		0"	
Neg. Defl. (in)		-0.082"		0"		-0.072"	

Loadcase #6: (1.00D+1.00SLeft full)

1.00 Dead Load + 1.00 Snow Load on span #1 + 0.50 Snow Load on span #3 + 0.50 Snow Load on span #2

Load Type	Component	Start Pos	End Pos	Start Value	End Value
Point Load	Dead Load	28-00-00	----	0.00 lbs	----
Point Load	Snow Load	28-00-00	----	0.00 lbs	----
Uniform Linear Load	Dead Load	00-00-00	28-00-00	30.00 lb/ft	----
Uniform Linear Load	Snow Load	00-00-00	28-00-00	50.00 lb/ft	----

		02-02-12	Δ	23-06-08	Δ	02-02-12	
Moment (ft-lbs)		0	-199	3642	-137	0	
Shear (lbs)	0	160	-637	632	-110		0
Shear Red. (lbs)	0	0	0	0	0		0
Reaction (lbs)		828		767			
Uplift (lbs)		0		0			
Total Defl. (in)		0"		0.583"		0"	
Neg. Defl. (in)		-0.155"		0"		-0.158"	

Loadcase #7: (1.00D+1.00SRight full)

1.00 Dead Load + 0.50 Snow Load on span #1 + 1.00 Snow Load on span #3 + 0.50 Snow Load on span #2

Load Type	Component	Start Pos	End Pos	Start Value	End Value
Point Load	Dead Load	28-00-00	----	0.00 lbs	----
Point Load	Snow Load	28-00-00	----	0.00 lbs	----
Uniform Linear Load	Dead Load	00-00-00	28-00-00	30.00 lb/ft	----
Uniform Linear Load	Snow Load	00-00-00	28-00-00	50.00 lb/ft	----

		02-02-12	Δ	23-06-08	Δ	02-02-12	
Moment (ft-lbs)		0	-137	3642	-199	0	
Shear (lbs)	0	110	-632	637	-160		0
Shear Red. (lbs)	0	0	0	0	0		0
Reaction (lbs)		767		828			
Uplift (lbs)		0		0			
Total Defl. (in)		0"		0.583"		0"	
Neg. Defl. (in)		-0.158"		0"		-0.155"	

Loadcase #8: (1.00D+1.00SLeft half)

1.00 Dead Load + 0.50 Snow Load on span #1 + 1.00 Snow Load on span #3 + 1.00 Snow Load on span #2

Load Type	Component	Start Pos	End Pos	Start Value	End Value
Point Load	Dead Load	28-00-00	----	0.00 lbs	----
Point Load	Snow Load	28-00-00	----	0.00 lbs	----
Uniform Linear Load	Dead Load	00-00-00	28-00-00	30.00 lb/ft	----
Uniform Linear Load	Snow Load	00-00-00	28-00-00	50.00 lb/ft	----

		02-02-12	Δ	23-06-08	Δ	02-02-12	
Moment (ft-lbs)		0	-137	**5374**	-199	0	
Shear (lbs)	0		110 -921		**926** -160		0
Shear Red. (lbs)	0		0 0		0 0		0
Reaction (lbs)			1062		**1123**		
Uplift (lbs)			0		0		
Total Defl. (in)		0"		**0.861"**		**0"**	
Neg. Defl. (in)		**-0.235"**		0"		-0.233"	

Loadcase #9: (1.00D+1.00SRight half)

1.00 Dead Load + 1.00 Snow Load on span #1 + 0.50 Snow Load on span #3 + 1.00 Snow Load on span #2

Load Type	Component	Start Pos	End Pos	Start Value	End Value
Point Load	Dead Load	28-00-00	----	0.00 lbs	----
Point Load	Snow Load	28-00-00	----	0.00 lbs	----
Uniform Linear Load	Dead Load	00-00-00	28-00-00	30.00 lb/ft	----
Uniform Linear Load	Snow Load	00-00-00	28-00-00	50.00 lb/ft	----

		02-02-12	Δ	23-06-08	Δ	02-02-12	
Moment (ft-lbs)		0	-199	**5374**	-137	**0**	
Shear (lbs)	0		160 -926		921 -110		0
Shear Red. (lbs)	0		0 0		0 0		0
Reaction (lbs)			**1123**		1062		
Uplift (lbs)			0		0		
Total Defl. (in)		**0"**		**0.861"**		0"	
Neg. Defl. (in)		-0.233"		0"		**-0.235"**	

Loadcase #10: (1.00D+1.00S)

1.00 Dead Load + 1.00 Snow Load on span #1 + 1.00 Snow Load on span #2 + 1.00 Snow Load on span #3

Load Type	Component	Start Pos	End Pos	Start Value	End Value
Point Load	Dead Load	28-00-00	----	0.00 lbs	----
Point Load	Snow Load	28-00-00	----	0.00 lbs	----
Uniform Linear Load	Dead Load	00-00-00	28-00-00	30.00 lb/ft	----
Uniform Linear Load	Snow Load	00-00-00	28-00-00	50.00 lb/ft	----

		02-02-12	Δ	23-06-08	Δ	02-02-12	
Moment (ft-lbs)		0	-199	5343	-199	0	
Shear (lbs)	0		160 -923		923 -160		0
Shear Red. (lbs)	0		0 0		0 0		0
Reaction (lbs)			1120		1120		
Uplift (lbs)			0		0		
Total Defl. (in)		0"		0.856"		0"	
Neg. Defl. (in)		-0.232"		0"		-0.232"	

Loadcase #11: (1.00SLeft full)

1.00 Snow Load on span #1 + 0.50 Snow Load on span #3 + 0.50 Snow Load on span #2

Load Type	Component	Start Pos	End Pos	Start Value	End Value
Point Load	Snow Load	28-00-00	----	0.00 lbs	----
Uniform Linear Load	Snow Load	00-00-00	28-00-00	50.00 lb/ft	----

	02-02-12	Δ	23-06-08	Δ	02-02-12
Live Defl. (in)	0"		0.262"		0"
Live Neg. Defl. (in)	-0.069"		0"		-0.071"

Loadcase #12: (1.00SRight full)

0.50 Snow Load on span #1 + 1.00 Snow Load on span #3 + 0.50 Snow Load on span #2

Load Type	Component	Start Pos	End Pos	Start Value	End Value
Point Load	Snow Load	28-00-00	----	0.00 lbs	----
Uniform Linear Load	Snow Load	00-00-00	28-00-00	50.00 lb/ft	----

	02-02-12	Δ	23-06-08	Δ	02-02-12
Live Defl. (in)	0"		0.262"		0"
Live Neg. Defl. (in)	-0.071"		0"		-0.069"

Loadcase #13: (1.00SLeft half)

0.50 Snow Load on span #1 + 1.00 Snow Load on span #3 + 1.00 Snow Load on span #2

Load Type	Component	Start Pos	End Pos	Start Value	End Value
Point Load	Snow Load	28-00-00	----	0.00 lbs	----
Uniform Linear Load	Snow Load	00-00-00	28-00-00	50.00 lb/ft	----

	02-02-12	Δ	23-06-08	Δ	02-02-12
Live Defl. (in)	0"		**0.54"**		0"
Live Neg. Defl. (in)	**-0.149"**		0"		-0.146"

Loadcase #14: (1.00SRight half)

1.00 Snow Load on span #1 + 0.50 Snow Load on span #3 + 1.00 Snow Load on span #2

Load Type	Component	Start Pos	End Pos	Start Value	End Value
Point Load	Snow Load	28-00-00	----	0.00 lbs	----
Uniform Linear Load	Snow Load	00-00-00	28-00-00	50.00 lb/ft	----

	02-02-12	Δ	23-06-08	Δ	02-02-12
Live Defl. (in)	0"		**0.54"**		0"
Live Neg. Defl. (in)	-0.146"		0"		**-0.149"**

Loadcase #15: (1.00S)

1.00 Snow Load on span #1 + 1.00 Snow Load on span #2 + 1.00 Snow Load on span #3

Load Type	Component	Start Pos	End Pos	Start Value	End Value
Point Load	Snow Load	28-00-00	----	0.00 lbs	----
Uniform Linear Load	Snow Load	00-00-00	28-00-00	50.00 lb/ft	----

	02-02-12	Δ	23-06-08	Δ	02-02-12
Live Defl. (in)	0"		0.535"		0"
Live Neg. Defl. (in)	-0.145"		0"		-0.145"

Loadcase #16: (1.00LP_1)

1.00 Live Point Load at center of span #1

Load Type	Component	Start Pos	End Pos	Start Value	End Value
Uniform Linear Load	Construction Load	00-00-00	02-00-00	96.54 lb/ft	----

	02-02-12	Δ	23-06-08	Δ	02-02-12
Live Defl. (in)	**0.015"**		0"		0.005"
Live Neg. Defl. (in)	0"		**-0.022"**		0"

Loadcase #17: (1.00LP_2)

1.00 Live Point Load on left side of span #2

Load Type	Component	Start Pos	End Pos	Start Value	End Value
Uniform Linear Load	Construction Load	02-05-08	04-11-00	96.54 lb/ft	----

	02-02-12	Δ	23-06-08	Δ	02-02-12
Live Defl. (in)	0"		0.034"		0"
Live Neg. Defl. (in)	-0.014"		0"		-0.008"

Loadcase #18: (1.00LP_3)

1.00 Live Point Load at center of span #2

Load Type	Component	Start Pos	End Pos	Start Value	End Value
Uniform Linear Load	Construction Load	12-09-04	15-02-12	96.54 lb/ft	----

	02-02-12	Δ	23-06-08	Δ	02-02-12
Live Defl. (in)	0"		0.182"		0"
Live Neg. Defl. (in)	-0.047"		0"		-0.047"

Loadcase #19: (1.00LP_4)

1.00 Live Point Load on right side of span #2

Load Type	Component	Start Pos	End Pos	Start Value	End Value
Uniform Linear Load	Construction Load	23-01-00	25-06-08	96.54 lb/ft	----

	02-02-12	Δ	23-06-08	Δ	02-02-12
Live Defl. (in)	0"		0.034"		0"
Live Neg. Defl. (in)	-0.008"		0"		-0.014"

Loadcase #20: (1.00LP_5)

1.00 Live Point Load at center of span #3

Load Type	Component	Start Pos	End Pos	Start Value	End Value
Uniform Linear Load	Construction Load	26-00-00	28-00-00	96.54 lb/ft	----

	02-02-12	Δ	23-06-08	Δ	02-02-12
Live Defl. (in)	0.005"		0"		**0.015"**
Live Neg. Defl. (in)	0"		-0.022"		0"

Boise Cascade® ENGINEERED WOOD PRODUCTS

Single 11-7/8" BCI® 90s-2.0

40 Floor (Joist)

BC CALC® Engineering Report | Dry | 1 span | No cant. | 16" OCS | Repetitive | Glued & nailed | August 20, 2024 14:41:20

Build 8892

Factored Product Data

E = 2.00 x 10^6 psi

K = 7.00 x 10^6 lbs

EI = 675.00 x 10^6 lb-in²

EI_c = 768.87 x 10^6 lb-in²

Shear = 2150 lbs

Moment = 9550 ft-lbs

Vibration limited span = 0

End Reaction (lbs)			Intermediate Reaction (lbs)		
Length	No WS	With WS	Length	No WS	With WS
1-1/2"	1425	1850	3"	3196	3529
3-1/2"	1800	1950	5-1/4"	4000	4300

Reactions between min. and max. bearing lengths shown are interpolated

Modification Factors

Factor	Moment	Neg. Moment	Shear	End Reaction	Int. Reaction	Bearing
Load Duration	100%		100%	100%		100%
Moisture Content	1.00		1.00	1.00		1.00
Lateral Stability						
Unbraced Length	00-00-00					
Repetitive Member	1.00					
Notch/Bevel			1.00			

Maximum Values

	Δ	23-02-00	Δ
Moment (ft-lbs)	0	4472	0
Shear (lbs)	-154		768
Shear Red. (lbs)	0		0
Reaction (lbs)	788		788
Uplift (lbs)	0		0
Total Defl. (in)		0.62"	
Live Defl. (in)		0.496"	
Neg. Defl. (in)		0"	
Live Neg. Defl. (in)		0"	

Load cases

Loadcase #0: (1.00D)

1.00 Dead Load

Load Type	Component	Start Pos	End Pos	Start Value	End Value
Point Load	Dead Load	00-00-00	----	3.06 lbs	----
Point Load	Dead Load	23-07-08	----	3.06 lbs	----
Uniform Linear Load	Dead Load	00-02-12	23-04-12	13.33 lb/ft	----

	Δ	23-02-00	Δ
Moment (ft-lbs)	0	894	0
Shear (lbs)	**-154**		154
Shear Red. (lbs)	0		0
Reaction (lbs)	158		158
Uplift (lbs)	0		0
Total Defl. (in)		0.124"	
Neg. Defl. (in)		0"	

Loadcase #1: (1.00D+1.00L)

1.00 Dead Load + 1.00 Live Load on span #1

Load Type	Component	Start Pos	End Pos	Start Value	End Value
Point Load	Live Load	00-00-00	----	12.22 lbs	----
Point Load	Dead Load	00-00-00	----	3.06 lbs	----
Point Load	Live Load	23-07-08	----	12.22 lbs	----

Point Load		Dead Load	23-07-08	----	3.06 lbs	----
Uniform Linear Load		Live Load	00-02-12	23-04-12	53.33 lb/ft	----
Uniform Linear Load		Dead Load	00-02-12	23-04-12	13.33 lb/ft	----

	Δ	23-02-00	Δ
Moment (ft-lbs)	0	**4472**	**0**
Shear (lbs)	-768		**768**
Shear Red. (lbs)	0		0
Reaction (lbs)	**788**		**788**
Uplift (lbs)	0		0
Total Defl. (in)		**0.62"**	
Neg. Defl. (in)		0"	

Loadcase #2: (1.00L)

1.00 Live Load on span #1

Load Type	Component	Start Pos	End Pos	Start Value	End Value
Point Load	Live Load	00-00-00	----	12.22 lbs	----
Point Load	Live Load	23-07-08	----	12.22 lbs	----
Uniform Linear Load	Live Load	00-02-12	23-04-12	53.33 lb/ft	----

	Δ	23-02-00	Δ
Live Defl. (in)		**0.496"**	
Live Neg. Defl. (in)		0"	

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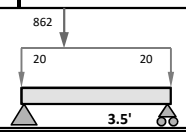
CLIENT: STUDIO SHED SHEET 17 OF

PROJECT: DO RESIDENCE BY DMS

H1	D	482	1.000	20	20	0.000	3.500		240	1.500	649	D + S	79	328
	S	380	1.000						360					
3.500								Factors	Cantilever Data		644	D + S	1082	3165
								No	No					
								1.000			0	D	0	2160
								No	No					
								MC<=19%			Deflections			
								T<=100			-0.067	D + S		
								1.000	Scarf Cut Data		0.000			
								1.000	No		-0.021	S	3.500	
								1.147	No		0.000			
								1.000						
									Versa-Lam 1.7E			3 1/2" x 3 1/2" LVL		

Header/ Beam Support Design															
	655	D + S		286	D + S										
	384	D		177	D										
	5.5			5.5											
	7.5			7.5											
	8			8											
	SPF Stud (2" to 4" wide)			SPF Stud (2" to 4" wide)											
	(1) 2x6 TRIMMERS			(1) 2x6 TRIMMERS											
	(1) 2x6 KING STUDS			(1) 2x6 KING STUDS											

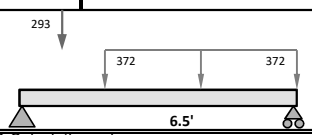
Foundation Support Design		
	To Framing Below	To Framing Below
	To Framing Below	To Framing Below



H2	D	140	1.000	180	180	2.000	6.500		240	1.500	999	D + S	52	328
	S	154	1.000	192	192	2.000	6.500		360					
6.500								Factors	Cantilever Data		1790	D + S	812	3445
								No	No					
								1.040			0	D	0	2434
								No	No					
								MC<=19%			Deflections			
								T<=100			-0.115	D + S		
								0.996	Scarf Cut Data		0.000			
								1.000	No		-0.046	S	6.500	
								1.112	No		0.000			
								1.000						
									Micro-Lam 2.0E			(3) 1 3/4" x 5 1/2" LVL		

Header/ Beam Support Design															
	855	D + S		1167	D + S										
	426	D		578	D										
	5.5			5.5											
	11.5			11.5											
	12			12											
	SPF Stud (2" to 4" wide)			SPF Stud (2" to 4" wide)											
	(1) 2x6 TRIMMERS			(1) 2x6 TRIMMERS											
	(1) 2x6 KING STUDS			(1) 2x6 KING STUDS											

Foundation Support Design		
	To Framing Below	To Framing Below
	To Framing Below	To Framing Below



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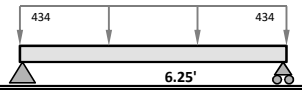
PROJECT: DO RESIDENCE BY DMS

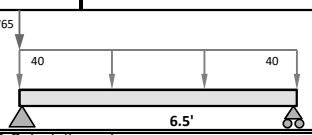
H2	D			210	210	0.000	6.250		240	1.500	1180	D + S	61	328
	S			224	224	0.000	6.250		360					
6.250								Factors	Cantilever Data		2160	D + S	979	3445
								No	No					
								1.040			0	D	0	2434
								No	No					
								MC<=19%			Deflections			
								T<=100			-0.130	D + S		
								0.996	Scarf Cut Data		0.000			
								1.000	No		-0.053	S	6.250	
								1.112	No		0.000			
								1.000						
									Micro-Lam 2.0E			(3) 1 3/4" x 5 1/2" LVL		

Header/ Beam Support Design	1382	D + S		1382	D + S										
	682	D		682	D										
	5.5			5.5											
	6.75			6.75											
	9.75			9.75											
	SPF Stud (2" to 4" wide)			SPF Stud (2" to 4" wide)											
	(1) 2x6 TRIMMERS			(1) 2x6 TRIMMERS											
	(1) 2x6 KING STUDS			(1) 2x6 KING STUDS											
Foundation Support Design	To Framing Below			To Framing Below											
	To Framing Below			To Framing Below											



H3	D	1365		40	40	0.000	6.500		240	1.500	135	D	5	257
	S	1400							360					
6.500								Factors	Cantilever Data		270	D	70	2596
								No	No					
								1.040			0	D	0	2434
								No	No					
								MC<=19%			Deflections			
								T<=100			-0.009	D		
								0.996	Scarf Cut Data		0.000			
								1.000	No		0.000		6.500	
								1.071	No		0.000			
								1.000						
									Micro-Lam 2.0E			(3) 1 3/4" x 7 1/4" LVL		

Header/ Beam Support Design	166	D		166	D										
	166	D		166	D										
	5.5			5.5											
	7			7											
	8.5			8.5											
	SPF Stud (2" to 4" wide)			SPF Stud (2" to 4" wide)											
	(1) 2x6 TRIMMERS			(1) 2x6 TRIMMERS											
	(1) 2x6 KING STUDS			(1) 2x6 KING STUDS											
Foundation Support Design	Conventional			Conventional											
	Edge			Edge											
	1500			1500											
	12			12											
	24			24											
	200			200											
	NO FTNG. REQUIRED			NO FTNG. REQUIRED											



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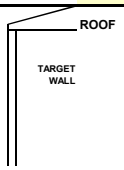
CLIENT: STUDIO SHED SHEET 19 OF

PROJECT: DO RESIDENCE BY DMS

WALL NUMBER:	S1	STUD LOCATION:	1	(1 = ROOF, 2 = FIRST FLOOR BELOW ROOF, 3 = SECOND FLOOR BELOW ROOF)			
TOP PLATE THICKNESS (IN)	3.00	WALL HAS CONTINUOUS SHEATHING ON ONE SIDE	YES	ROOF ASSEMBLY TYPE	$C\&C_{WIND}$ DEFLECTION, L/ 180	GYP COMP.	NO
SOLE PLATE THICKNESS (IN)	1.50			PRE-FAB TRUSSES	$C\&C_{WIND}$ FACTOR = 0.7	GYP + WOOD COMP.	NO

ROOF SPAN (FT)		ROOF LOADS (PSF)		SUPPORTING WALL	
TYPE:	SIMPLE	D	15.00	HEIGHT (FT)	10.00
MAIN SPAN	12.00	L_R	20.00	WEIGHT (PSF)	10.00
OVERHANG	2.00	S	16.00		
TOTAL TRIB.	10.00	R			
SIMPLE		$0.6*W_{UPLIFT}$	10.47		



TARGET WALL			
0.6*C&C (PSF)	17.51	HEIGHT (FT)	10.00
0.6*W (PSF)	9.53	WEIGHT (PSF)	10.00
0.7*E (PSF)	5.00	PARTIAL LOADING (WIND)	
		STOP (FT)	9.63
WALL WIDTH (IN)	5.50	START (FT)	0.00

STUD MATERIAL					
SPECIES	SPF #2 (2" to 4" wide)	TITLE	2x6 SPF #2 GRADE STUDS		
SCANT	NO	C_{FB}	1.30	b (IN)	1.50
F_B (PSI)	875	C_{FC}	1.10	d (IN)	5.50
F_C (PSI)	1150	C_R	1.15	A (IN^2)	8.250
E_{MIN} (PSI)	510000	c	0.80	S_x (IN^3)	7.563
E_x (PSI)	1400000				20.797

C & C LOADING

BENDING (NDS Section 3.3)

Le = 10.00ft - (3.00in + 1.50in)(1ft/12in) = 9.63ft
M = 405.56#-ft
F'b = Fb(Cd)(Cr)(Cfb) = 875(1.60)(1.15)(1.30) = 2093.00psi
fb = (12in/1ft)(405.56#-ft)/7.56in^3 = 643.54psi

DEFLECTION (NDS Section 3.5.1)

DELTA = 0.16in

BENDING AND DEFLECTION CAPACITY CHECK

643.54psi/2093.00psi = 0.307 < 1.000 O.K.
0.16in < 0.64in O.K.

THEREFORE, USE 2x6 SPF #2 GRADE STUDS AT 24in O.C.

ASCE7 LOAD COMBINATIONS	C_D			
D	0.90	407.58	" o.c.	
D + L	1.00	428.14	" o.c.	
D + L_R	1.25	232.99	" o.c.	
D + S	1.15	251.56	" o.c.	
D + R	1.25	465.97	" o.c.	
D + 0.75L + 0.75L_R	1.25	266.27	" o.c.	
D + 0.75L + 0.75S	1.15	283.00	" o.c.	
D + 0.75L + 0.75R	1.25	465.97	" o.c.	
D + 0.6W	1.60	131.64	" o.c.	
D + 0.7E	1.60	173.28	" o.c.	
D + 0.75(0.6W) + 0.75L + 0.75L_R	1.60	123.96	" o.c.	
D + 0.75(0.6W) + 0.75L + 0.75S	1.60	129.84	" o.c.	
D + 0.75(0.6W) + 0.75L + 0.75R	1.60	159.60	" o.c.	
D + 0.75(0.7E) + 0.75L + 0.75L_R	1.60	147.96	" o.c.	
D + 0.75(0.7E) + 0.75L + 0.75S	1.60	156.24	" o.c.	
D + 0.75(0.7E) + 0.75L + 0.75R	1.60	202.44	" o.c.	
0.6C&C	1.60	81.96	" o.c.	GOVERNS

D + L (NON-CONCURRENT)	1.00		" o.c.	

DESIRED SPACING FOR CALCULATIONS:	24	" o.c.

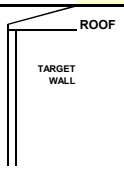
FELTENGROUP
ARCHITECTURE | ENGINEERING | FORENSICS

CLIENT: STUDIO SHED SHEET 20 OF

PROJECT: DO RESIDENCE BY DMS

WALL NUMBER:	S2	STUD LOCATION:	1	(1 = ROOF, 2 = FIRST FLOOR BELOW ROOF, 3 = SECOND FLOOR BELOW ROOF)			
TOP PLATE THICKNESS (IN)	3.00	WALL HAS CONTINUOUS SHEATHING ON ONE SIDE	YES	ROOF ASSEMBLY TYPE	$C\&C_{WIND}$ DEFLECTION, L/ 180	GYP COMP.	NO
SOLE PLATE THICKNESS (IN)	1.50			PRE-FAB TRUSSES	$C\&C_{WIND}$ FACTOR = 0.7	GYP + WOOD COMP.	NO

ROOF SPAN (FT)		ROOF LOADS (PSF)		SUPPORTING WALL	
TYPE:	SIMPLE	D	15.00	HEIGHT (FT)	12.00
MAIN SPAN	12.00	L_R	20.00	WEIGHT (PSF)	10.00
OVERHANG	2.00	S	16.00		
TOTAL TRIB.	10.00	R			
SIMPLE		$0.6*W_{UPLIFT}$	10.47		



TARGET WALL			
0.6*C&C (PSF)	17.51	HEIGHT (FT)	12.00
0.6*W (PSF)	9.53	WEIGHT (PSF)	10.00
0.7*E (PSF)	5.00	PARTIAL LOADING (WIND)	
		STOP (FT)	11.63
WALL WIDTH (IN)	5.50	START (FT)	0.00

STUD MATERIAL					
SPECIES	SPF #2 (2" to 4" wide)	TITLE	2x6 SPF #2 GRADE STUDS		
SCANT	NO	C_{FB}	1.30	b (IN)	1.50
F_B (PSI)	875	C_{FC}	1.10	d (IN)	5.50
F_C (PSI)	1150	C_R	1.15	A (IN^2)	8.250
E_{MIN} (PSI)	510000	c	0.80	S_x (IN^3)	7.563
E_x (PSI)	1400000				20.797

C & C LOADING

BENDING (NDS Section 3.3)

Le = 12.00ft - (3.00in + 1.50in)(1ft/12in) = 11.63ft
M = 591.62#-ft
F'b = Fb(Cd)(Cr)(Cfb) = 875(1.60)(1.15)(1.30) = 2093.00psi
fb = (12in/1ft)(591.62#-ft)/7.56in^3 = 938.77psi

DEFLECTION (NDS Section 3.5.1)

DELTA = 0.35in

BENDING AND DEFLECTION CAPACITY CHECK

938.77psi/2093.00psi = 0.449 < 1.000 O.K.
0.35in < 0.78in O.K.

THEREFORE, USE 2x6 SPF #2 GRADE STUDS AT 24in O.C.

ASCE7 LOAD COMBINATIONS	C_D			
D	0.90	308.93	" o.c.	
D + L	1.00	318.16	" o.c.	
D + L_R	1.25	171.13	" o.c.	
D + S	1.15	186.55	" o.c.	
D + R	1.25	334.12	" o.c.	
D + 0.75L + 0.75L_R	1.25	194.90	" o.c.	
D + 0.75L + 0.75S	1.15	209.16	" o.c.	
D + 0.75L + 0.75R	1.25	334.12	" o.c.	
D + 0.6W	1.60	89.28	" o.c.	
D + 0.7E	1.60	117.60	" o.c.	
D + 0.75(0.6W) + 0.75L + 0.75L_R	1.60	84.60	" o.c.	
D + 0.75(0.6W) + 0.75L + 0.75S	1.60	88.44	" o.c.	
D + 0.75(0.6W) + 0.75L + 0.75R	1.60	108.00	" o.c.	
D + 0.75(0.7E) + 0.75L + 0.75L_R	1.60	101.52	" o.c.	
D + 0.75(0.7E) + 0.75L + 0.75S	1.60	107.04	" o.c.	
D + 0.75(0.7E) + 0.75L + 0.75R	1.60	137.28	" o.c.	
0.6C&C	1.60	56.18	" o.c.	GOVERNS

D + L (NON-CONCURRENT)	1.00		" o.c.	

DESIRED SPACING FOR CALCULATIONS:	24	" o.c.

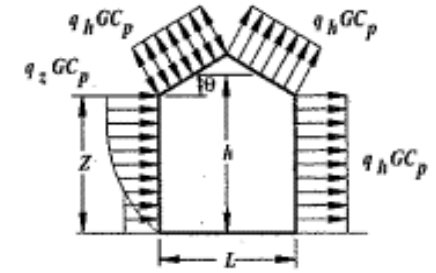
FELTENGROUP
ARCHITECTURE | ENGINEERING | FORENSICS

CLIENT:	**STUDIO SHED**		**SHEET**	**L1**	**OF**
PROJECT:	**DO RESIDENCE**		**BY**	**DMS**	

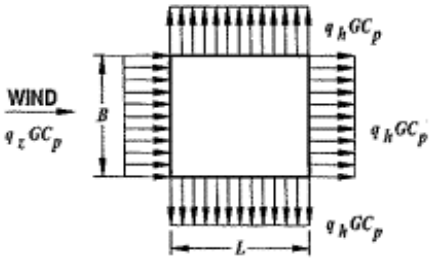
WIND LOAD CALCULATIONS PER ASCE 7-16

MWFRS (SECTION 27.3 - ALL HEIGHTS)

PLATE =	10.000	ft
PITCH =	2.000	/ 12
ROOF THICKNES, t =	0.990	ft
L =	36.000	ft
B =	24.000	ft
L/B =	0.000	
O.H. =	2.000	ft
Θ =	9.462	deg
Z =	10.990	ft
RIDGE =	12.990	ft
h =	11.990	ft
h / L =	0.333	
EXPOSURE =	C	
RISK CATEGORY =	II	
3 SEC GUST (Vult) =	100.00	mph
GUST-EFFECT (G) =	0.850	(26.11)
K_d =	0.850	(26.6)
Kzt =	1.000	(26.8)
Elevation Above MSL (ft) =	0	
K_e =	1.000	(26.9)
K_z =	0.849	(Table 26.10-1)
K_h =	0.849	(Table 26.10-1)
q_z =	18.472	psf (Eq 27.3-1)
q_h =	18.472	psf (Eq 27.3-1)
GC_{pi} =	0.180	



ELEVATION



PLAN

MWFRS:WALLS			GCpi = +0.18	GCpi = -0.18
Windward Wall	$C_{p\,WW}$ = 0.800		P_{WW} = 9.236 psf (27.3-1)	15.886 psf (27.3-1)
Leeward Wall	$C_{p\,LW}$ = -0.500		P_{LW} = -11.175 psf (27.3-1)	-4.526 psf (27.3-1)
Side Wall	$C_{p\,SW}$ = -0.700		P_{SW} = -14.316 psf (27.3-1)	-7.666 psf (27.3-1)

MWFRS:ROOFS NORMAL TO RIDGE Θ >= 10°			GCpi = +0.18	GCpi = -0.18
Windward -	$C_{p\,R}$ = 0.000		P_{WW-} = 0.000 psf (27.3-1)	0.000 psf (27.3-1)
Windward +	$C_{p\,R}$ = 0.000		P_{WW+} = 0.000 psf (27.3-1)	0.000 psf (27.3-1)
Leeward	$C_{p\,R}$ = 0.000		P_{LW} = 0.000 psf (27.3-1)	0.000 psf (27.3-1)
NORMAL TO RIDGE Θ < 10° and PARALLEL TO RIDGE ALL Θ			GCpi = +0.18	GCpi = -0.18
	$C_{p\,R}$ = -0.900	(Table 27.3-1) for 0 to 5.99ft	P = -17.456 psf (27.3-1)	-10.806 psf (27.3-1)
	$C_{p\,R}$ = -0.900	(Table 27.3-1) for 5.99 to 11.99ft	P = -17.456 psf (27.3-1)	-10.806 psf (27.3-1)
	$C_{p\,R}$ = -0.500	(Table 27.3-1) for 11.99 to 23.98ft	P = -11.175 psf (27.3-1)	-4.526 psf (27.3-1)
	$C_{p\,R}$ = -0.300	(Table 27.3-1) greater than 23.98ft	P = -8.035 psf (27.3-1)	-1.385 psf (27.3-1)

WINDWARD ROOF OVERHANG (27.3.3)		$q_h G(C_{pmin} - C_{pOH})$
	C_p = 0.800	P = -26.692

C & C (SECTION 30.3 - LOW RISE MONOSLOPE)

C & C:WALLS (EQN & FIG 30.3-1)			a = 3.000 ft
4	GC_{p+} = 1.000		P_{WW} = 21.797 psf
	GC_{p-} = -1.100		P_{LW} = -23.644 psf
5	GC_{p+} = 1.000		P_{WW} = 21.797 psf
	GC_{p-} = -1.400		P_{LW} = -29.185 psf

C & C:ROOF (EQN 30.3-1 & FIG 30.3-5A)			a = 3.000 ft		
3	GC_{p-} = -2.600		P_3 = -51.351 psf	OVERHANGS	-62.804 psf
2	GC_{p-} = -1.700		P_2 = -34.727 psf		-46.179 psf
1	GC_{p-} = -0.900		P_1 = -19.949 psf		
ALL	GC_{p+} = 0.500		$P_{+\,ALL}$ = 12.561 psf		

FELTENGROUP
ARCHITECTURE | ENGINEERING | FORENSICS

CLIENT: STUDIO SHED | SHEET L2 OF
PROJECT: DO RESIDENCE | BY DMS

SEISMIC LOAD CALCULATIONS PER ASCE 7-16

USING BASIC LOAD COMBINATIONS PER SECTION 2.4.1
ALL LOAD COMBINATIONS USE: 0.7*E

$E = E_h + E_v$ (EQN 12.4-1 and EQN 12.4-3)
$E_h = \rho Q_E$ (EQN 12.4-3)
#REF! (SECTION 12.3.4.2.a)
$Q_E = V$ (SECTION 12.4.2.1)
$E_v = 0.2 S_{DS} D$ ($E_V = 0$ IF $S_{DS} <= 0.125$) (EQN 12.4-4)

RISK CATEGORY =	II	(TABLE 1.5-1)
SITE CLASS =	D	(PER PROJECT SOILS REPORT OR TABLE 20.3-1) DEFAULT
h_n (ft) =	11.990	(MEAN ROOF HEIGHT OF STRUCTURE)
S_s =	1.439	(MAPPED MCE SPECTRAL RESPONSE ACCELERATION AT SHORT PERIODS)
S_1 =	0.500	(MAPPED MCE SPECTRAL RESPONSE ACCELERATION AT A PERIOD OF 1 s)
F_a =	1.200	(TABLE 11.4-1)
F_v =	1.800	(TABLE 11.4-2)
$S_{MS} = F_a S_s$ =	1.727	(EQN 11.4-1)
$S_{M1} = F_v S_1$ =	0.900	(EQN 11.4-2)
$S_{DS} = {}^2/_3 S_{MS}$ =	1.151	(EQN 11.4-3)
$S_{D1} = {}^2/_3 S_{M1}$ =	0.600	(EQN 11.4-4)
I_E=	1.000	(TABLE 1.5-2)
T_s=	0.521	(SECTION 11.4.5)
SDC BASED ON S_{DS} =	D	(TABLE 11.6-1)
SDC BASED ON S_{D1} =	N/A	(TABLE 11.6-2)
DESIGN SDC =	D	(SECTION 11.6)
Front-Back R=	6.500	Side-Side R= 6.500 (TABLE 12.2-1 (A.15))
C_t=	0.020	(TABLE 12.8-2)
x =	0.750	(TABLE 12.8-2)
$T_a = C_t h_n^x$ =	0.129	(EQN 12.8-7)
T_L =	12.000	(TABLE 22-12)

**EXCEPTION IN SECTION 11.6 CAN BE CHECKED S1<0.75 AND Ta<0.8Ts
**USE TABLE 11.6-1 ALONE IF RIGID DIAPHRAGM AND T<Ts OR WHEN USING BRACING TABLES FOR IRC DESIGN

$V = C_S W$ (EQN 12.8-1)
C_S = SEISMIC RESPONSE COEFFICIENT (SECTION 12.8.1.1)
W = EFFECTIVE SEISMIC WEIGHT (SECTION 12.7.2)

FRONT-BACK						SIDE-SIDE					
	C_S =	$S_{DS}/(R/I_E)$ =	0.177				C_S =	$S_{DS}/(R/I_E)$ =	0.177		(EQN 12.8-2)
GOVERNS	$C_s$max =	$S_{D1}/(T(R/I_E))$ =	0.716	}	0.716	GOVERNS	$C_s$max =	$S_{D1}/(T(R/I_E))$ =	0.716	} 0.716	(EQN 12.8-3)
	$C_s$max =	$S_{D1}T_L/(T^2(R/I_E))$ =	66.70				$C_s$max =	$S_{D1}T_L/(T^2(R/I_E))$ =	66.70		(EQN 12.8-4)
GOVERNS	$C_s$min =	$0.044*S_{DS}*I_E>=0.01$	0.051	}	0.051	GOVERNS	$C_s$min =	$0.044*S_{DS}*I_E>=0.01$	0.051	} 0.051	(EQN 12.8-5)
	$C_s$min =	$0.5S_1/(R/I_E)$ =	0.038				$C_s$min =	$0.5S_1/(R/I_E)$ =	0.038		(EQN 12.8-6)

EQN 12.8-2 GOVERNS AND QE = V=	0.177 *W	EQN 12.8-2 GOVERNS AND QE = V=	0.177 *W
S_{DS} > 0.125, THEREFORE		S_{DS} > 0.125, THEREFORE	
E_V = 0.230 *D	0.7*E_V = 0.161 *D	E_V = 0.230 *D	0.7*E_V = 0.161 *D

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ARCHITECTURE | ENGINEERING | FORENSICS

CLIENT: STUDIO SHED SHEET L3 OF

PROJECT: DO RESIDENCE

Mass Calculations

TOTAL MASS											
Level	Plate Height (ft)	Diaphram			Exterior Walls			Interior Walls			Total Weight (lb)
		Area (ft^2)	Load (psf)	Weight (lb)	Total Length (ft)	Load (psf)	Weight (lb)	Total Length (ft)	Load (psf)	Weight (lb)	
Roof	10	1124	15.00	16860	120	10.00	6000	110	7.00	3850	26710
				16860			6000			3850	26710

Redundancy	Base Shear	ASD	Vertical Distribution of Seismic Forces for Front-Back Direction						
ρ_{F-B}	E_{hF-B} (lb)	E_{hF-B}* 0.7 (lb)	Level	w_x (lb)	h_x (ft)	$w_x h_x$ (lb-ft)	$\frac{w_x h_x^k}{\sum w_i h_i^k}$ (%)	$F_{x\,F-B}$ (lb)	$\frac{F_{x\,F-B}}{Ax}$ (psf)
1.30	6150	4305	Roof	26710	10.0	267100	1.000	4305	3.83
				26710		267100		4305	

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CLIENT: STUDIO SHED **SHEET** L4 **OF**

PROJECT: DO RESIDENCE **BY** DMS

WIND LOAD CALCULATIONS (MWFRS) FIGURE 27.4-8 & 27.4.6 EXCEPTION CASES 1 & 3

CASE 1: FRONT-BACK (INTO GABLE)

V_{FB} = (15.89psf - -4.53psf) *(0.5*(11ft/2+13ft/2) * 36ft)= 4409 # (ULT)

(A) = 1160 # (ULT)

(B) = 3249 # (ULT)

CASE 1: SIDE-SIDE (INTO RIDGE)

V_{SS} = (15.89psf - -4.53psf) *((10ft/2+3ft)*24ft)= 3674 # (ULT)

(1) = 3360 # (ULT)

(2) = 314 # (ULT)

SEISMIC LOAD CALCULATIONS EQUIVALENT LATERAL FORCE (ELF) 12.8

FRONT-BACK

V_{FB} = 1.30 * 26710# * (0.177) = 6150 # (ULT)

SIDE-SIDE

V_{SS} = 1.30 * 26710# * (0.177) = 6150 # (ULT)

WALL STIFFNESSES (SDPWS EQ 4.3-1)

FRONT-BACK

$K_{FB\ A}$ =	3862 #/in	Relative Rigidity =	3.458	ORIGIN - LOWER LEFT	X= 0.000	Y= 0.000
	#/in	Relative Rigidity =	0.000	CENTER OF MASS	X= 18.000	Y= 12.000
$K_{FB\ B}$ =	5596 #/in	Relative Rigidity =	5.011	CENTER OF RIGIDITY	X= 26.420	Y= 21.760
	5222 #/in	Relative Rigidity =	4.676			

SIDE-SIDE

$K_{SS\ 1}$ =	3364 #/in	Relative Rigidity =	3.012
	5472 #/in	Relative Rigidity =	4.899
	3123 #/in	Relative Rigidity =	2.796
$K_{SS\ 2}$ =	1117 #/in	Relative Rigidity =	1.000
	#/in	Relative Rigidity =	0.000

SEISMIC DISTRIBUTION

WALL	X_{START} ft	Y_{START} ft	X_{STOP} ft	Y_{STOP} ft	L ft	X_{CENTER} ft	Y_{CENTER} ft	R_{FB}	R_{SS}	X e_{ECC} ft	Y e_{ECC} ft	X e_{ACC} ft	Y e_{ACC} ft
(A)	0.229	10.188	0.229	15.417	5.229	0.229	12.802	3.458	0.000	8.420	9.760	1.800	1.200
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000				
(B)	35.771	2.583	35.771	8.292	5.708	35.771	5.438	5.011	0.000				
	35.771	18.000	35.771	23.458	5.458	35.771	20.729	4.676	0.000				
(1)	2.583	23.771	9.667	23.771	7.083	6.125	23.771	0.000	3.012				
	11.833	23.771	21.646	23.771	9.813	16.740	23.771	0.000	4.899				
	23.521	23.771	30.271	23.771	6.750	26.896	23.771	0.000	2.796				
(2)	23.917	0.229	27.667	0.229	3.750	25.792	0.229	0.000	1.000				
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000				
								13.145	11.707				

WALL	R_{FB}*X ft	R_{SS}*Y ft	X_B ft	Y_B ft	R_{FB}*X_B^2 ft	R_{SS}*Y_B^2 ft	V_{DIRECT} FB (#)	V_{ECC} FB (#)	V_{ACC} FB (#)	V_{DIRECT} SS (#)	V_{ECC} SS (#)	V_{ACC} SS (#)	V_{TOTAL} FB (#)	V_{TOTAL} SS (#)
(A)	0.793	0.000	-26.191	8.958	2372.22	0.000	1133	881	188	0	1021	126	2014	1021
	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0
(B)	179.233	0.000	9.351	16.322	438.097	0.000	1641	456	97	0	528	65	2097	528
	167.257	0.000	9.351	1.031	408.824	0.000	1531	425	91	0	493	61	1957	493
(1)	0.000	71.592	-20.295	-2.011	0.000	12.178	0	0	0	1107	68	8	0	1176
	0.000	116.456	-9.681	-2.011	0.000	19.810	0	0	0	1801	111	14	0	1913
	0.000	66.471	0.476	-2.011	0.000	11.307	0	0	0	1028	63	8	0	1092
(2)	0.000	0.229	-0.629	21.531	0.000	463.575	0	0	0	368	243	30	0	610
	0.000	0.000	0.000	0.000	0.000	0.000	0	0	0	0	0	0	0	0
	347.283	254.748		J =	3726.015									

FELTENGROUP
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CLIENT: STUDIO SHED SHEET L5 OF

PROJECT: DO RESIDENCE BY DMS

SHEAR WALL ANALYSES

A

☑ FRONT-BACK ☐ SIDE-SIDE
☐ BASEMENT ☑ 1st FLOOR ☐ 2nd FLOOR ☐ 3rd FLOOR 28.99786462

V = PER WIND LOAD CALCULATIONS * 0.6 = 696 #

WALL n	Wall Type	Studs (in o.c.)	2 SIDED	L_n (ft)	h_n (ft)	Wall Width	Chord E_n (psi)	Ga_n (k/in)	Δa_n (in)	Δ (in)	V_{design} (#)	C_{WSP}	v_{design} (plf)	v_{allow} (plf)	$A_{TRIB.}$ (ft)	W_{WALL} (psf)	DL (psf)	$0.6W_{UPLIFT}$ (psf)
1	5	24		5.23	10.00	2x6	1.4E+06	17.00	0.035	0.152	701	1.000	134	609	2.00	10.00	15.00	5.24
2																		
										V_{TOTAL} (#) =	701							

			LEFT END								RIGHT END							
WALL n	$\sum M_{OT}$ (#-ft)	$\sum M_R$ (#-ft)	WOOD/ CONC	LOCATION OR NAME	POSITION	$W_{INT.WALL}$ (#)	$T_{2nd\ FLOOR}$ (#)	T_{DESIGN} (#)	HOLDOWN	Δa_n (in)	WOOD/ CONC	LOCATION OR NAME	POSITION	$W_{INT.WALL}$ (#)	$T_{2nd\ FLOOR}$ (#)	T_{DESIGN} (#)	HOLDOWN	Δa_n (in)
1	7153	1777	CONC	EXT	MIDWALL			1164	F	0.164	CONC	EXT	MIDWALL			1164	F	0.164
2																		

B

☑ FRONT-BACK ☐ SIDE-SIDE
☐ BASEMENT ☑ 1st FLOOR ☐ 2nd FLOOR ☐ 3rd FLOOR 81.22288354

V = PER WIND LOAD CALCULATIONS * 0.6 = 1949 #

WALL n	Wall Type	Studs (in o.c.)	2 SIDED	L_n (ft)	h_n (ft)	Wall Width	Chord E_n (psi)	Ga_n (k/in)	Δa_n (in)	Δ (in)	V_{design} (#)	C_{WSP}	v_{design} (plf)	v_{allow} (plf)	$A_{TRIB.}$ (ft)	W_{WALL} (psf)	DL (psf)	$0.6W_{UPLIFT}$ (psf)
1	5	24		5.71	8.00	2x6	1.4E+06	17.00	0.038	0.140	1010	1.000	177	609	2.00	10.00	15.00	5.24
2	5	24		5.46	8.00	2x6	1.4E+06	17.00	0.037		944	1.000	173	609	2.00	10.00	15.00	5.24
										V_{TOTAL} (#) =	1954							

			LEFT END								RIGHT END							
WALL n	$\sum M_{OT}$ (#-ft)	$\sum M_R$ (#-ft)	WOOD/ CONC	LOCATION OR NAME	POSITION	$W_{INT.WALL}$ (#)	$T_{2nd\ FLOOR}$ (#)	T_{DESIGN} (#)	HOLDOWN	Δa_n (in)	WOOD/ CONC	LOCATION OR NAME	POSITION	$W_{INT.WALL}$ (#)	$T_{2nd\ FLOOR}$ (#)	T_{DESIGN} (#)	HOLDOWN	Δa_n (in)
1	8251	1792	CONC	EXT	MIDWALL			1257	F	0.164	CONC	EXT	MIDWALL			1257	F	0.164
2	7708	1639	CONC	EXT	MIDWALL			1232	F	0.164	CONC	EXT	CORNER			1232	F	0.164

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CLIENT: STUDIO SHED SHEET L6 OF

PROJECT: DO RESIDENCE BY DMS

SHEAR WALL ANALYSES

1 ☐ FRONT-BACK ☑ SIDE-SIDE
☐ BASEMENT ☑ 1st FLOOR ☐ 2nd FLOOR ☐ 3rd FLOOR 56.00330841

V = PER WIND LOAD CALCULATIONS * 0.6 = 2016 #

WALL n	Wall Type	Studs (in o.c.)	2 SIDED	L_n (ft)	h_n (ft)	Wall Width	Chord E_n (psi)	Ga_n (k/in)	Δa_n (in)	Δ (in)	V_{design} (#)	C_{WSP}	v_{design} (plf)	v_{allow} (plf)	$A_{TRIB.}$ (ft)	W_{WALL} (psf)	DL (psf)	$0.6W_{UPLIFT}$ (psf)
1	3	24		7.08	10.81	2x6	1.4E+06	11.00	0.013	0.100	545	1.000	77	324	12.00	10.00	15.00	5.24
2	3	24		9.81	10.81	2x6	1.4E+06	11.00	0.005		913	1.000	93	324	12.00	10.00	15.00	
3	3	24		6.75	10.81	2x6	1.4E+06	11.00	0.009		560	1.000	83	324	12.00	10.00	15.00	
										V_{TOTAL} (#) =	2018							

			LEFT END								RIGHT END							
WALL n	$\sum M_{OT}$ (#-ft)	$\sum M_R$ (#-ft)	WOOD/ CONC	LOCATION OR NAME	POSITION	$W_{INT.WALL}$ (#)	$T_{2nd\ FLOOR}$ (#)	T_{DESIGN} (#)	HOLDOWN	Δa_n (in)	WOOD/ CONC	LOCATION OR NAME	POSITION	$W_{INT.WALL}$ (#)	$T_{2nd\ FLOOR}$ (#)	T_{DESIGN} (#)	HOLDOWN	Δa_n (in)
1	7466	7226	CONC	EXT	MIDWALL			442	F	0.164	CONC	EXT	MIDWALL			442	F	0.164
2	9865	13868	CONC	EXT	MIDWALL			157	F	0.164	CONC	EXT	MIDWALL			157	F	0.164
3	6051	6562	CONC	EXT	MIDWALL			313	F	0.164	CONC	EXT	MIDWALL			313	F	0.164

2 ☐ FRONT-BACK ☐ SIDE-SIDE
☐ BASEMENT ☐ 1st FLOOR ☐ 2nd FLOOR ☐ 3rd FLOOR 5.230440571

V = PER WIND LOAD CALCULATIONS * 0.6 = 188 #

WALL n	Wall Type	Studs (in o.c.)	2 SIDED	L_n (ft)	h_n (ft)	Wall Width	Chord E_n (psi)	Ga_n (k/in)	Δa_n (in)	Δ (in)	V_{design} (#)	C_{WSP}	v_{design} (plf)	v_{allow} (plf)	$A_{TRIB.}$ (ft)	W_{WALL} (psf)	DL (psf)	$0.6W_{UPLIFT}$ (psf)
1	3	24		3.75	10.81	2x6	1.4E+06	11.00	0.010	0.082	188	0.890	50	288	12.00	10.00	15.00	5.24
2																		
										V_{TOTAL} (#) =	188							

			LEFT END								RIGHT END							
WALL n	$\sum M_{OT}$ (#-ft)	$\sum M_R$ (#-ft)	WOOD/ CONC	LOCATION OR NAME	POSITION	$W_{INT.WALL}$ (#)	$T_{2nd\ FLOOR}$ (#)	T_{DESIGN} (#)	HOLDOWN	Δa_n (in)	WOOD/ CONC	LOCATION OR NAME	POSITION	$W_{INT.WALL}$ (#)	$T_{2nd\ FLOOR}$ (#)	T_{DESIGN} (#)	HOLDOWN	Δa_n (in)
1	2473	2025	CONC	EXT	MIDWALL			335	F	0.164	CONC	EXT	MIDWALL			335	F	0.164
2																		

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CLIENT: STUDIO SHED SHEET L7 OF

PROJECT: DO RESIDENCE BY DMS

SHEAR WALL ANALYSES

A

☑ FRONT-BACK ☐ SIDE-SIDE
☐ BASEMENT ☑ 1st FLOOR ☐ 2nd FLOOR ☐ 3rd FLOOR

83.90259067

V = PER SEISMIC DISTRIBUTION CALCULATIONS = 2014 #

WALL n	Wall Type	Studs (in o.c.)	L_n (ft)	h_n (ft)	Wall Width	Chord E_n (psi)	Ga_n (k/in)	Δa_n (in)	Δ (in)	V_{design} (#)	C_{WSP}	v_{design} (plf)	v_{allow} (plf)	$A_{TRIB.}$ (ft)	W_{WALL} (psf)	DL (psf)	0.7* 0.2*S_{DS}
1	5	24	5.23	10.00	2x6	1.4E+06	17.00	0.157	0.543	2018	1.000	386	435	2.00	10.00	15.00	0.16
2																	
									V_{TOTAL} (#) =	2018							

			LEFT END								RIGHT END							
WALL n	$\sum M_{OT}$ (#-ft)	$\sum M_R$ (#-ft)	WOOD/ CONC	LOCATION	POSITION	$W_{INT.WALL}$ (#)	$T_{2nd\ FLOOR}$ (#)	T_{DESIGN} (#)	HOLDOWN	Δa_n (in)	WOOD/ CONC	LOCATION	POSITION	$W_{INT.WALL}$ (#)	$T_{2nd\ FLOOR}$ (#)	T_{DESIGN} (#)	HOLDOWN	Δa_n (in)
1	20180	1777	CONC	EXT	MIDWALL			3710	F	0.164	CONC	EXT	MIDWALL			3710	F	0.164
2																		

B

☑ FRONT-BACK ☐ SIDE-SIDE
☐ BASEMENT ☑ 1st FLOOR ☐ 2nd FLOOR ☐ 3rd FLOOR

V = PER SEISMIC DISTRIBUTION CALCULATIONS = 4053 #

WALL n	Wall Type	Studs (in o.c.)	L_n (ft)	h_n (ft)	Wall Width	Chord E_n (psi)	Ga_n (k/in)	Δa_n (in)	Δ (in)	V_{design} (#)	C_{WSP}	v_{design} (plf)	v_{allow} (plf)	$A_{TRIB.}$ (ft)	W_{WALL} (psf)	DL (psf)	0.7* 0.2*S_{DS}
1	5	24	5.71	8.00	2x6	1.4E+06	17.00	0.118	0.346	2095	1.000	367	435	2.00	10.00	15.00	0.16
2	5	24	5.46	8.00	2x6	1.4E+06	17.00	0.116		1960	1.000	359	435	2.00	10.00	15.00	0.16
									V_{TOTAL} (#) =	4055							

			LEFT END								RIGHT END							
WALL n	$\sum M_{OT}$ (#-ft)	$\sum M_R$ (#-ft)	WOOD/ CONC	LOCATION	POSITION	$W_{INT.WALL}$ (#)	$T_{2nd\ FLOOR}$ (#)	T_{DESIGN} (#)	HOLDOWN	Δa_n (in)	WOOD/ CONC	LOCATION	POSITION	$W_{INT.WALL}$ (#)	$T_{2nd\ FLOOR}$ (#)	T_{DESIGN} (#)	HOLDOWN	Δa_n (in)
1	16765	1792	CONC	EXT	MIDWALL			2799	F	0.164	CONC	EXT	MIDWALL			2799	F	0.164
2	15685	1639	CONC	EXT	MIDWALL			2742	F	0.164	CONC	EXT	CORNER			2742	F	0.164

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PROJECT: DO RESIDENCE BY DMS

SHEAR WALL ANALYSES

1

☐ FRONT-BACK ☑ SIDE-SIDE
☐ BASEMENT ☑ 1st FLOOR ☐ 2nd FLOOR ☐ 3rd FLOOR

V = PER SEISMIC DISTRIBUTION CALCULATIONS = 4180 #

WALL n	Wall Type	Studs (in o.c.)	L_n (ft)	h_n (ft)	Wall Width	Chord E_n (psi)	Ga_n (k/in)	Δa_n (in)	Δ (in)	V_{design} (#)	C_{WSP}	v_{design} (plf)	v_{allow} (plf)	$A_{TRIB.}$ (ft)	W_{WALL} (psf)	DL (psf)	0.7* 0.2*S_{DS}
1	3	24	7.08	10.81	2x6	1.4E+06	11.00	0.058	0.261	1197	1.000	169	231	12.00	10.00	15.00	0.16
2	3	24	9.81	10.81	2x6	1.4E+06	11.00	0.061		1874	1.000	191	231	12.00	10.00	15.00	0.16
3	3	24	6.75	10.81	2x6	1.4E+06	11.00	0.058		1114	1.000	165	231	12.00	10.00	15.00	0.16
									V_{TOTAL} (#) =	4185							

			LEFT END								RIGHT END							
WALL n	$\sum M_{OT}$ (#-ft)	$\sum M_R$ (#-ft)	WOOD/ CONC	LOCATION	POSITION	$W_{INT.WALL}$ (#)	$T_{2nd\ FLOOR}$ (#)	T_{DESIGN} (#)	HOLDOWN	Δa_n (in)	WOOD/ CONC	LOCATION	POSITION	$W_{INT.WALL}$ (#)	$T_{2nd\ FLOOR}$ (#)	T_{DESIGN} (#)	HOLDOWN	Δa_n (in)
1	12934	7226	CONC	EXT	MIDWALL			1378	F	0.164	CONC	EXT	MIDWALL			1378	F	0.164
2	20343	13868	CONC	EXT	MIDWALL			1453	F	0.164	CONC	EXT	MIDWALL			1453	F	0.164
3	12081	6562	CONC	EXT	MIDWALL			1363	F	0.164	CONC	EXT	MIDWALL			1363	F	0.164

2

V = PER SEISMIC DISTRIBUTION CALCULATIONS = 610 #

WALL n	Wall Type	Studs (in o.c.)	L_n (ft)	h_n (ft)	Wall Width	Chord E_n (psi)	Ga_n (k/in)	Δa_n (in)	Δ (in)	V_{design} (#)	C_{WSP}	v_{design} (plf)	v_{allow} (plf)	$A_{TRIB.}$ (ft)	W_{WALL} (psf)	DL (psf)	0.7* 0.2*S_{DS}
1	3	24	3.75	10.81	2x6	1.4E+06	11.00	0.065	0.357	611	0.890	163	206	12.00	10.00	15.00	0.16
2																	
									V_{TOTAL} (#) =	611							

			LEFT END								RIGHT END							
WALL n	$\sum M_{OT}$ (#-ft)	$\sum M_R$ (#-ft)	WOOD/ CONC	LOCATION	POSITION	$W_{INT.WALL}$ (#)	$T_{2nd\ FLOOR}$ (#)	T_{DESIGN} (#)	HOLDOWN	Δa_n (in)	WOOD/ CONC	LOCATION	POSITION	$W_{INT.WALL}$ (#)	$T_{2nd\ FLOOR}$ (#)	T_{DESIGN} (#)	HOLDOWN	Δa_n (in)
1	6616	2025	CONC	EXT	MIDWALL			1527	F	0.164	CONC	EXT	MIDWALL			1527	F	0.164
2																		

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CLIENT: STUDIO SHED SHEET F1 OF

PROJECT: DO RESIDENCE BY DMS

PILES SUPPORTING STEMWALL

BEARING EDGE			NON-BEARING EDGE		
STEMWALL DL =	300	PLF	STEMWALL DL =	300	PLF
FLOOR DL =	180	PLF	FLOOR DL =	20	PLF
FLOOR LL =	480	PLF	FLOOR LL =	53	PLF
ROOF DL =	180	PLF	ROOF DL =	45	PLF
ROOF LL =	240	PLF	ROOF LL =	60	PLF
WALL DL =	110	PLF	WALL DL =	100	PLF
TOTAL LOAD =	1490	PLF	TOTAL LOAD =	578	PLF

MAX SPACING BASED ON CAPACITY			MAX SPACING BASED ON CAPACITY		
PIER CAPACITY =	6000	# / PIER	PIER CAPACITY =	6000	# / PIER
PIER SPACING =	4	FT / PIER	PIER SPACING =	10	FT / PIER
USE 4FT SPACING ON BEARING			USE 8FT SPACING ON NON-BEARING		

CONCRETE STEMWALL 3FT TALL OK FOR SPANS BY INSPECTION BASED ON LOADS ABOVE

BATTERED PILES EACH DIRECTION AT EACH CORNER 6000# > 4180# AT MAX LATERAL LOAD

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CLIENT:	STUDIO SHED	SHEET	F2	OF	
PROJECT:	DO RESIDENCE	BY	DMS		

Concrete Beam Capacity Determination

beam width b = 16 in.
beam height h = 12 in. Rebar Count 2
depth to reinf. d = 9 in. (measured from top of slab) Rebar Size 4

f_c' = 2500 psi f_y = 60000 psi A_s = 0.39 $in.^2$ / bar

1. Unreinforced beam capacity $\Phi M_N = \Phi \times F_b \times S$ $\Phi = 0.65$

$F_b = 5(f_c')^{1/2}$ $S = b \times (h)^2 / 6$

ΦM_N = **62400** lb.-in. **5200** lb.-ft.

2. Reinforced beam capacity $\Phi M_N = \Phi \times R_u \times b \times d^2$ $\Phi = 0.90$

$R_u = \rho f_y \times (1 - 1/2 \times \rho \times m)$ $\rho = A_s / (b \times d)$

$m = f_y / (0.85 \times f_c')$ m = 28.2

ρ 0.002727 R_u = 157 psi ΦM_N = **183504** lb.-in. **15292** lb.-ft.

DL	LL	Lr	ACI LRFD	SPAN (L)	$wL^2/8$	
770	**480**	**240**	**1078**	**4**	**2156**	lb.-ft.
			1812	**4**	**3624**	lb.-ft.
			1788	**4**	**3576**	lb.-ft.

NOTE: 1. The *larger* of the unreinforced and reinforced moments controls

2 *Positive* moment corresponds to tension on the top
negative moment corresponds to tension on the bottom.