

CLIENT: Morton Buildings
DATE: December 9, 2019
JOB NO: MTBS112519-66
PROJECT: Judy Turlington
137-093754

CODE: ASCE7-10
BUILDING DIMENSIONS: 29'-9" x 48'-9"
ROOF SLOPE: 4/12
GROUND SNOW LOAD: 15psf
WIND LOAD: Vult -120mph, Exp. C
Vasd -93mph, Exp. C
RISK CATEGORY II
SEISMIC DESIGN CATEGORY: C

CALCULATION INDEX

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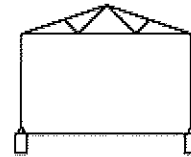
Dec 11, 2019

NOTE: These calculations are applicable only to the structural elements and loading criteria specifically noted herein. These calculations shall not be construed in any way to specify, certify, or design any aspects of the structure not contained herein. Structural elements not contained herein are to be constructed in accordance with the prescriptive requirements of the adopted building code or designed by other registered design professionals, as applicable. Specified design criteria are based solely on information provided by the client and must be verified and approved by the local authority having jurisdiction. NTA, Inc. is not responsible for fabrication or erection. If it is suspected that the calculations listed in this index have been modified, substituted, or altered in any way, contact NTA, Inc. directly to obtain a file copy.

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Design Criteria Summary

Client: Morton Buildings
Job Number: MTBS112519-66
Description: Judy Turlington (B137093754)
Location(s): COATS NC
Framing Type: PF ClearSpan Pinned No Shed



Plan Dimensions:

Ridge Length, B = 48.75 ft
 Main Gable Width = 29.75 ft Main Span Pitch, a = 4.00 /12 pitch
 Main Span Truss Bearing = 14 ft Main Span Peak = 20.17 ft
 Main Truss Heel = 14.5 in Main Span Eave = 15.2083 ft
 Sidewall Overhang, R_{OH} = 12 in. Roof Cavity Insulation, R = 0
 Endwall Overhang, B_{OH} = 12 in. Unheated Structure (Y/N) = Y
 Min. Mean Roof Height, h = 17.69 ft

The Following Data is Ignored

OH = OH =

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OH = OH =

Importance Factors: (IBC Table 1604.5)

Building use: Normal - all others
 Occupancy Category: II
 Snow Load Imp Factor, I_s = 1.00
 Wind Importance Factor, I_w = 1.00
 Seismic Imp Factor, I_e = 1.00

Roofing Material: Metal no snow jacks

Snow Load Criteria:

Ground Snow Load, P_g = 15.0 psf
 G S Load NY¹, P_{gNY} = 16.5 psf
 Snow Exposure Factor, C_e = 1.0
 Thermal Factor, C_t = 1.2

Wind Load Criteria:

Wind Speed Vult = 120 mph
 Wind Speed Vasd = 93 mph
 Wind Exposure = C
 Internal Pressure Coefficient +/- = 0.18

Roof Dead & Live Load:

Top Chord Live Load = 20.0 psf
 Top Chord Dead Load = 4 psf
 Bottom Chord Live Load = 0 psf
 Bottom Chord Dead Load = 0 psf
 Wall Dead Load, D_w = 5 psf

Seismic Loads:

Mapped Coeff: S_s = 0.24 g 0.24
 S_i = 0.09 g
 Response Coeffs: S_{DS} = 0.25 g
 S_{D1} = 0.14 g
 Site Class = D
 IBC Design Category = C
 IRC Design Category = B

Seismic Criteria Selection Options:

Single State or Site Specific:
 State: NC
 County:
 City: COATS
 ZIP:

Multiple States:
 States:
 (two letter abbreviations separated with commas)

General:
 Seismic: BC SDC C

Flood Loads:

Site Specific flood loads have not been assessed in this analysis. For Buildings located in flood hazard areas, as established in Section 1612.3 of the IBC, floods loads must be considered as required by Section 1612 of the IBC. Furthermore, when required, the design information required by IBC section 1603.1.6 must be provided on the construction documents.

NOTES:

1. Equivalent ground snow load at a thermal factor of 1.0 for use with the NYBC/NYRC ground snow load map.

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ANSI/ ASAE EP 486 Table 1 – Presumed soil properties for post foundation design (for use in absence of codes or tests)						
		S	nh	Sy	Phi, Φ	Unit Wt
		psf/ft	lb/ft ⁴	psf	degrees	pcf
		Lateral	'E' soil	Vertical	Frict Ang	
1	Massive crystalline bedrock	1200		4000		
2	Sedimentary & foliated rock	400		2000		
3 firm	Firm sandy gravel	300	40000	2000	38	120
3 loose	Loose sandy gravel	200	10000	2000	32	90
4 firm	Firm silty/ clayey sand	200	10000	1500	30	105
4 loose	Loose silty/ clayey sand	150	7500	1500	26	85
5 medium	Medium clay, sandy clay	130	5000	1000	15	120
5 soft	Soft clay, sandy clay	100	1000	1000	10	90

Soil Type: 3 firm Firm sandy gravel

S: 300 psf/ft allowable lateral pressure per ft/depth
nh: 40000 lb/ft⁴ constant of lateral soil reaction
Sy: 2000 psf allowable vertical pressure, 12" below grade
Phi, Φ : 38 degrees soil friction angle
Unit Wt: 120 pcf soil unit weight

Wind Load Calculation

Client: Morton Buildings
Job Number: MTBS112519-66
Description: Judy Turlington (B137093754)

Building Geometry:		Loading Conditions:		Height Above Grade:	
Ridge Length, B =	48.8 ft	Wind Speed Vasd =	93 mph	Sidewall Eave, z =	15 ft
Total Width, L =	29.8 ft	Exposure Category:	C	Roof Peak, z =	20.2 ft
Eave Height Main, h _e =	15	Topographic Factor, K _{zt} =	1.0	Mean Roof Height, h =	17.7 ft
Roof Slope, a =	4.0 /12 pitch	Height & Exposure, K _h =	0.88	Sidewall/Eave Height, h _e =	0 ft
Roof slope, a =	18.4 deg.	Directionality, K _d =	0.85	Internal Pressure, G _{cpi} =	0.18
Sidewall Overhang, L _{OH} =	0 in.	Wind Pressure, q _h =	16.5 psf		
Endwall Overhang, B _{OH} =	12 in.				

External Pressures (MWFRS) psf:

1	2	3	4	5	6	1E	2E	3E	4E
8.5	-11.4	-7.7	-6.9	-7.4	-7.4	12.9	-17.7	-11.1	-10.2

Positive / Negative Internal Pressure (MWFRS) psf: 3.0

Combined Main Windforce-Resisting System Loads (MWFRS):

Normal to Surface

		1	2	3	4	5	6	1E	2E	3E	4E
Trans	+GC _{pi}	5.6	-14.4	-10.7	-9.8	-10.4	-10.4	9.9	-20.6	-14.1	-13.2
	-GC _{pi}	8.5	-11.4	-7.7	-6.9	-7.4	-7.4	12.9	-17.7	-11.1	-10.2
	Max	8.5	-14.4	-10.7	-9.8	-10.4	-10.4	12.9	-20.6	-14.1	-13.2
Long	+GC _{pi}	3.6	-14.4	-9.1	-7.8	-10.4	-10.4	7.1	-20.6	-11.7	-10.1
	-GC _{pi}	6.6	-11.4	-6.1	-4.8	-7.4	-7.4	10.1	-17.7	-8.7	-7.1
	Max	6.6	-14.4	-9.1	-7.8	-10.4	-10.4	10.1	-20.6	-11.7	-10.1

Summed and Projected

	HORIZONTAL LOADS				VERTICAL LOADS						MAXIMUM HORIZONTAL WALL LOADS			
	End Zone		Interior Zone		End Zone		Interior Zone		Windward Overhang		Zone			
	Wall	Roof	Wall	Roof	WW Roof	LW Roof	WW Roof	LW Roof	End	Interior	1E	4E	1	4
Trans	23.1	-6.5	15.4	-3.7	-20.6	-14.1	-14.4	-10.7	-28.9	-22.6	12.9	-13.2	8.5	-9.8
Long	17.2	-6.5	11.4	-3.7	-20.6	-11.7	-14.4	-9.1	-28.9	-22.6	12.9	-13.2	6.6	-7.8

Components and Cladding Loads (C&C):

C&C End Zone Distance, a = 3.0 ft

Roof Components:	Area (ft ²)	Pressure (psf)	
		Pos	Neg
Zone 1:	Maximum	10	10.0 -17.8
	Minimum	100	10.0 -16.2
	Truss / Rafter	0.0	10.0 -17.8
	Overhang	0.0	n/a -36.3
Zone 2:	Maximum	10	10.0 -31.0
	Minimum	100	10.0 -22.8
	Truss / Rafter	0.0	10.0 -31.0
	Overhang	0.0	n/a -36.3
Zone 3:	Maximum	10	10.0 -45.9
	Minimum	100	10.0 -36.0
	Truss / Rafter	0.0	10.0 -45.9
	Overhang	0.0	n/a -61.1

Wall Components:	Area (ft ²)	Pressure (psf)	
		Pos	Neg
Zone 4:	Maximum	10	16.5 -21.1
	Minimum	100	13.6 -18.2
	Door	17.8	15.8 -20.4
	Main Post	65.3	17.1 -18.7
	Shed Post	0.0	19.5 -21.1
	Zone 5:	Maximum	10
Minimum		100.0	13.6 -20.2
Door		17.8	15.8 -24.6
Main Post		65.3	17.1 -21.3
Shed Post	0.0	19.5 -26.1	

1.3

Snow Load Assessment

Client: Morton Buildings
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Description: Judy Turlington (B137093754)

Roofing Material:
Metal no snow jacks

Design Parameters:

Eave to ridge Distance, $W = 15.875$ ft
Ground Snow Load, $p_g = 15$ psf
Exposure Factor, $C_e = 1.0$
Thermal Factor, $C_t = 1.2$
Importance Factor, $I_s = 1.0$

Sloped Roof Snow Loads Main:

surface	a (deg)	C_s			P_s (psf)
		$C_t = 1.0$	$C_t = 1.1$	$C_t = 1.2$	
non-slip	18.4	1.00	1.00	1.00	11.8
slip	18.4	0.79	0.86	0.94	

PF ClearSpan Pinned No Shed

Snow Density (γ):

$\gamma = 0.13 p_g + 14 = 15.95$ pcf
but not more than 30 pcf

Ice Dams Along Eaves²:

$p_s = 2 p_f = 25.2$ psf

Flat-Roof Snow Load (p_f):

$p_f = 0.7 C_e C_t I_p p_g = 12.6$ psf

Sloped Roof Snow Loads Sheds:

surface	a (deg)	C_s			P_s (psf)
		$C_t = 1.0$	$C_t = 1.1$	$C_t = 1.2$	
non-slip	11.8	1.00	1.00	1.00	12.6
slip	11.8	0.90	0.97	1.00	

Rain on Snow Surcharge:

$a_{max} = 0.3175$ deg
 $p_g \leq 20$ psf $prss = 0.0$ psf
 $pf = 12.6$ psf

Minimum Roof Live Load (L_r): (IBC 1607.11.2.1):

Truss Space, ft	2	4	7
At, Main Span	59.5	119	208.25
$R_1 =$	1.0	1.0	1.0
$R_2 =$	1		
$F =$	4.0		
$L_r = 20 R_1 R_2 =$	20.0	20.0	20.0 psf
$12 \leq L_r \leq 20$			
At, Shed Left	0	0	0
$R_1 =$	1.0	1.0	1.0
$R_2 =$	1		
$F =$	3.0		
$L_r = 20 R_1 R_2 =$	0.0	0.0	0.0 psf
At, Shed Right	0	0	0
$R_1 =$	1.0	1.0	1.0
$R_2 =$	1		
$F =$	2.5		
$L_r = 20 R_1 R_2 =$	0.0	0.0	0.0 psf

Minimum Values for Low-Slope Roofs:

Applicable to roof slopes less than
Monoslope roofs = 15.0 deg
or $a_{min} = 70/W + 0.5 = 4.9$ deg
2.38 deg
 $a_{min} = 15.0$ deg
 $p_g \leq 20$ psf $p_f = I_s p_g = 15.0$ psf
 $p_g > 20$ psf $p_f = 20 I_s = 20.0$ psf
 $pf_{min} = 15.0$ psf
 $p_f = 12.6$ psf

Unbalanced Snow Loads:

Applicable to roof slopes between:
 $a_{max} = 70.00$ deg
 $a_{min} = 70/W + 0.5 = 4.91$ deg
 $a_{min} = 2.38$ deg
governing $a_{min} = 2.38$ deg

Unbalanced Loads:

$S = 3.00$ /1
 $W = l_u = 15.9$ ft
 $h_d = 1.31$ ft

p_{ww} (psf)	p_{LW}		
	Ridge (psf)	Length (ft)	Eave (psf)
3.5	23.9	6.1	11.8

Sliding Snow on Sheds, when off set > 0.95 ft

Shed Left = 0.0 psf length 0.00 ft
Shed Right = 0.0 psf length 0.00 ft

- Notes: 1. Higher loads may apply were sliding snow or drifting occurs due to aerodynamic shade from higher portions of the building.
2. Applies only to unventilated roofs with less than R-30, and ventilated roofs with less than R-20. No other loads, except dead loads shall be present on the roof when this uniformly distributed load is applied.

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Seismic Load Calculation

Client: Morton Buildings
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Description: Judy Turlington (B137093754)
Location: COATS NC

Design Classification:

Seismic Use Group: II
Importance Category, I_E : 1.00
Site Class: D
ASCE 7 Design Category: C
IRC Design Category: B
Seismic Resisting System: *PF 3 Shearwalls designed for 100% of base shear*
Response Factor, R: 4.5
System Overstrength Factor, Ω_o : 2.8
Deflection Amplification Fctor, C_d : 3.5

Response Acceleration: (ASCE 7 Fig 22-1 & 2)

Short Period (S_s) = 23.97 %g
1-Second Period (S_1) = 8.854 %g

Spectral Response Acceleration:

Site		Site Coeff.		Maximum		Design	
S_s	S_1	F_a	F_v	S_{MS}	S_{M1}	S_{DS}	S_{D1}
0.24	0.09	1.60	2.40	0.38	0.21	0.26	0.14

Fundamental Period: (ASCE 7, Sec. 12.8.2)

Period Coefficient, C_T = 0.020
Height to Highest Level, h_n = 15.2 ft
L-trans period, (ASCE 7 Fig 22-15) = 12
 $T_a = C_T h_n^{3/4} = 0.154$ sec

Seismic Response Coefficient: (Lateral Force Procedure, ASCE 7, Sec. 12.8.1.1)

$$C_s = \frac{S_{DS}}{R/I_E} = 0.057 \quad 12.8-2$$

$$C_{s,max} = \frac{S_{D1}}{T(R/I_E)} = 0.204 \quad 12.8-3$$

$$C_{s,max} = \frac{S_{D1} T_L}{(R/I_E) T^2} = 15.92 \quad 12.8-4$$

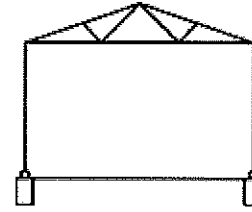
C_s min, ASCE 7 12.8-5 = 0.01 12.8-5

<p>Min. For SDC E of F:</p> $C_{s,min} = \frac{0.5S_1}{R/I_E} = 0.010$	12.8-6
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C_s min = 0.010
 C_s max = 0.204
Sec 12.8.1.1 Design $C_s = 0.057$

Allowable Stress Design (ASD) Load Combinations
Supporting Roof and Ceiling Only--End Zone Wind Loads

Client: Morton Buildings
Job Number: MTBS112519-66
Description: PF/ Judy Turlington (B137093754)
Location: COATS NC



Roof & Ceiling Only
30-ft. Gable Width
93 mph (Exp C/End Zone)
15 psf Ground Snow, 4/12 Pitch

Unit Geometry:	Shed Left	Gable	Shed Right
Shed, 0 = Open:	0	n/a	0
Width (B) =	0	29.75	0 ft
Sidewall Overhang (B _{OH}) =	0	12	0 in.
Endwall Overhang (B _{OHE}) =	0	12	0 in.
Roof Pitch =	0	4	0 /12
Max.Truss Spacing, s =	>>>	84 <<<	in. oc

Roof Loads:

Slope Snow Load (S) =	12.6	11.8	12.6 psf
Unbalanced Snow (S _u) =	n/a	23.9	n/a psf
Drift Length =	n/a	6.1	n/a ft
Roof Live Load (L _r) =	20	20.0	20 psf
TC Dead Load (TCDL) =	4.0	4.0	4.0 psf
BC Live Load (L) =	0.0	0.0	0.0 psf
BC Dead Load (BCDL) =	0.0	0.0	0.0 psf
Sliding Snow =	0.0	n/a	0.0 psf
Sliding Snow Distance =	0.00	n/a	0 ft

Transverse Wind Loads:

	WW _{OH}	WW	LW
End Zone Vertical:	-28.9	-17.7	-11.1
End Zone Horizontal:	n/a	12.9	-10.2
Interior Zone Vertical:	-22.6	-11.4	-7.7
Interior Zone Horizontal:	n/a	8.5	-6.9
Positive Int Pressure	n/a	3.0	
Negative Interior Pressure	n/a	-3.0	
End Zone Width	6.0 ft		
Wall Dead Load	5 psf		

Vertical Load Reactions:

Load Combination	Shed	Sidewall	Sidewall	Shed	Endwall	NDS LDF
1 D	0	64	64	0	18 plf	0.90
2 S	0	188	188	0	53 plf	1.15
3 S _u	0	201	201	0	108 plf	1.15
4 S _{sl}	0	0	0	0	n/a plf	1.15
5 L _r	0	318	318	0	90 plf	1.25
6 L	0	0	0	0	0 plf	1.00
Max 2-6	0	318	318	0	108 plf	

Vertical Load Combinations (Header Deflection):

7 0.75(L+L _r)	0	238	238	0	68 plf	1.25
8 0.75(L+S _{mx})	0	151	151	0	81 plf	1.15

Vertical Load Combinations (Post Design):

9 D+L	0	64	64	0	18 plf	1.00
10 D+L _r	0	381	381	0	108 plf	1.25
11 D+0.75(L+L _r)	0	302	302	0	86 plf	1.25
12 D+S _{max}	0	264	264	0	126 plf	1.15
13 D+0.75(L+S _{mx})	0	214	214	0	99 plf	1.15
Worst Case	9	10	10	9	12	

Wind Vertical Reactions:

14 WW int zone	0	-178	-178	0	n/a plf	1.60
15 LW int zone	0	-136	-136	0	n/a plf	1.60
16 WW end zone	0	-267	-267	0	n/a plf	1.60
17 LW end zone	0	-201	-201	0	n/a plf	1.60
18 Interior Press pos	0	44	44	0	10 plf	1.60
19 Interior Press neg	0	-44	-44	0	-10 plf	1.60

Design Loads for Columns, Worst Case Bending:

Wind L to R:	WW	LW	Wind R to L:	LW	WW
Vertical Interior	0.0	-134.2	-180.5	0.0	plf
Horizontal Interior	0.0	11.5	-9.8	0.0	psf
Vertical Int W + .6DL	0.0	-96.1	-142.4	0.0	plf
Vert Int D+.75(V+W)	0.0	201.0	166.2	0.0	plf
Vertical end zone	0.0	-223.0	-244.9	0.0	plf
Horizontal end zone	0.0	15.8	-13.2	0.0	psf
Vert End W + .6DL	0.0	-184.9	-206.8	0.0	plf
Vert End D+.75(V+W)	0.0	134.4	117.9	0.0	plf

Design Loads for Columns, Worst Case Uplift at Roof:

Vertical Int + .6D	0.0	-184.5	-184.5	0.0	plf
Vert end + .6D	0.0	-273.3	-273.3	0.0	plf
Vertical Interior	0.0	-54.1	-184.5	0.0	plf
Vertical end zone	0.0	-206.8	-184.9	0.0	plf

Design Loads for Columns, Worst Case Uplift at Foundation:

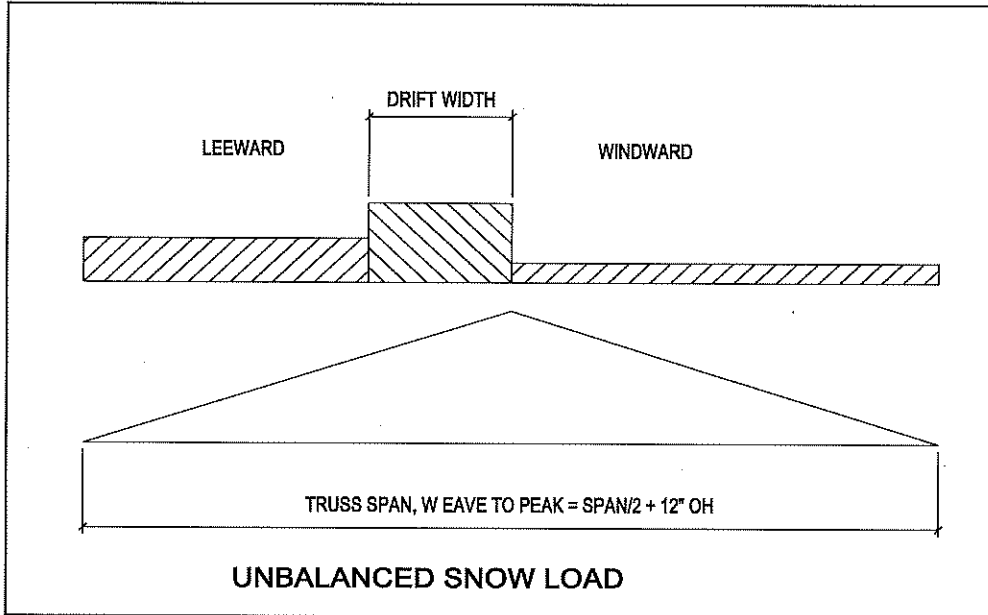
Vertical Int + .6D wall	0.0	-142.5	-142.5	0.0	plf
Vert end + .6D wall	0.0	-231.3	-231.3	0.0	plf

Max Roof Vertical	0	438	438	0	plf
Wall Dead Load	0	70	70	0	plf
Total	0	508	508	0	plf

Purlin Design & Fastening to Truss Chord

Client: Morton Buildings
 Job Number: MTBS112519-66
 Description: PF/: Judy Turlington (B137093754)
 Location(s): COATS NC

ps, sloped roof snow: 11.8 psf
 Drift Length: 6.06 ft
 Unbalanced Snow: 23.9 psf



Purlin Orientation: On Edge

Span: 84 in

Roof Pitch: 4

Condition: Multiple span

Member Properties:

Grade:	#2	plies =	1
Species:	SPF	A =	5.250 in. ²
b =	1.5 in.	Ix edge =	5.359 in. ⁴
d =	3.5 in.	Ix flat =	0.984 in. ⁴
Specific Grav =	0.42	Sx edge =	3.063 in. ³
Weight =	0.96 plf	Sx flat =	1.313 in. ³

Material Properties:

Tabulated	C _D	C _{Fb}	C _r	C _{fu}	Allowable
F _b = 875	1.15	1.00	1.15	1.00	2400 psi
F _b flat = 875	1.15	1.00	1.15	1.00	2400 psi
F _v = 135	1.15	--	--	--	135 psi
F _{cL} = 425	--	--	--	--	425 psi
E = 1400000	--	--	--	--	1800000 psi

Fastening to Truss Chord:

Truss Chord Species: SP

End Connection:

Interior Connection:

.131 PD: 0

.131 PD: 0

.207 RS: 1

.207 RS: 1

Minimum Lateral: 182 lbf

Minimum Lateral: 182 lbf

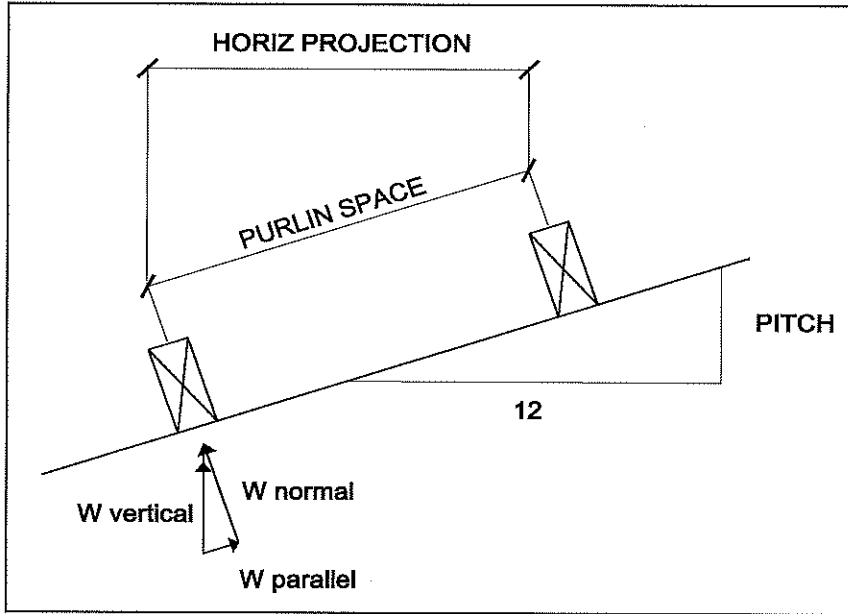
Roofing:

Metal no snow jacks 3 psf

LL Deflection Limit: 120 DL + LL Deflection Limit: 150

Allowable: 0.70 in Allowable: 0.56 in

Purlin Design & Fastening to Truss Chord



Purlin Weight:	0.96 plf	Purlin Wt Parallel:	0.30 plf
Purlin Wt Normal:	0.91 plf	Dead Load Parallel:	0.95 psf
Dead Load Normal:	2.85 psf	Balanced Snow Parallel:	1.18 psf
Balanced Snow Normal:	10.63 psf	Drift Snow Parallel:	2.39 psf
Drift Snow Normal:	21.50 psf		
Allowable Moment:	7350.0 in-lbf	Allowable Shear:	472.5 lbf

Spacing, Balanced Snow:

Wa, Normal Bending:	115.76 plf	Spacing Normal Bending:	2.00 ft
Wa, Normal Shear:	110.27 lbf	Spacing Normal Shear:	2.00 ft
Wa, Normal LL def:	250.40 plf	Spacing LL deflection:	2.00 ft
Wa, Total def:	200.32 plf	Spacing Total deflection:	2.00 ft
Wa, Parallel Conn:	141.78 plf	Spacing Parallel Conn:	2.00 ft

Note: 30% friction included in lateral connection

Allowable Spacing, Balanced Snow Only Zone: 2.00 ft

Spacing, Drifted Snow:

Wa, Normal Bending:	115.76 plf	Spacing Normal Bending:	2.00 ft
Wa, Normal Shear:	110.27 lbf	Spacing Normal Shear:	2.00 ft
Wa, Normal LL def:	250.40 plf	Spacing LL deflection:	2.00 ft
Wa, Total def:	200.32 plf	Spacing Total deflection:	2.00 ft
Wa, Parallel Conn:	141.78 plf	Spacing Parallel Conn:	2.00 ft

Note: 30% friction included in lateral connection

Allowable Spacing, Snow Drift Zone: 2.00 ft

Client: Morton Buildings Job Number: MTBS112519-66
 Description: PF: Judy Turlington (B137093754)
 Building Type: PF ClearSpan Pinned No Shed Post & Foundation Check, Page: 1

Soil Type:	3 firm	Firm sandy gravel			Wt, pcf:	120
nh :	40000	lbf/ft^4			Friction Angle, deg:	38
Isolation Factor:	2	2	2	2		<<<<<<<<
Tab Allow Lat, S:	300	300	300	300	psf	
Adj Allow Lat S:	798	798	798	798	psf	
Tab Allow Vert:	2000	2000	2000	2000	psf	

	Column Ignored	Gable Left	Gable Right	Column Ignored	
Post Height:		14.00	14.00		ft
Braced Height:		0	0		
Post Space:		7	7		ft
Constr'd/Non WW:		Pinned	Pinned		
Constr'd/Non LW:		Pinned	Pinned		
Post Name:		Laminated Structural	Laminated Structural		
Post Species:		SP	SP		
Post Grade:		#1	#1		
Post Classification:		3 Ply 2x6	3 Ply 2x6		
Wall Construction:		Girts/ brace	Girts/ brace		
Section depth:		5.31	5.5		in
Section width:		4.31	4.5		in
B Strength Fctr:		1	1		
B Stiffness Fctr:		1	1		
Effective width, Be:		0.63	0.65		ft
Modulus of Elasticity, E:		1700000	1700000		psi
Elx adjusted:		91.42	106.06		#*in*in*10^6
Sx adjusted:		20.25	22.69		in^3
Total wind/post WW:		835.2	835.2		1507.0
Total wind/post LW:		-671.8	-671.8		1507.0
Minimum Post Space:	7 ft				
Kp Total, min space:	0.0 posts are pinned at base				
Horizontal Roof Diaphragm Load from Posts:					
Wind Left - Right:	0.0	417.6	-335.9	0.0	753.5
Wind Right - Left:	0.0	-335.9	417.6	0.0	-753.5
Governing Load:	753.5				
yx, Max Eave Defl:	0.00 in	< Critical, no point of inflection in non-constrained posts			
yx, Defl at 1st Frame:	0.00 in				
Sup't'd Area, At:		104.125	104.125		0 sf
Red Fctr:		1	1		
Vertical Foundation R:		3557	3557		lbf
Adj Dia for Uplift:		0	0		in
Specified Diameter:		16	16		in
Calculated Soil Press:		2548	2548		psf
Adj SP		3413.333333	3413.333333		psf
Ratio		0.75	0.75		psf
Fnd Uplift Check:					
Rup, End Zone:		-1619	-1619		lbf
Rup, Int Zone:		-997	-997		lbf

Client: Morton Buildings
 Description: PF: Judy Turfington (B137093754)

Job Number: MTBS112519-66
 Building Type: PF ClearSpan Pinned No Shed
 Post & Foundation Check, Page: 2

	Column Ignored	Gable Left	Gable Right	Column Ignored	
Fc, tabulated allow comp		1550	1550		psi
Ft, tabulated allow tens		875	875		psi
Fb, tabulated allow bending		1823	1823		psi
E min tabulated:		580000	580000		psi
Unbraced Length		14	14		ft
L/D:		31.64	30.55		
c:		0.80	0.80		
Cm, Fc base:		0.80	0.80		
Cm, Fb base:		0.85	0.85		
Worst Case Vertical Load, No Wind					
ke, column factor:		1.00	1.00		
Cd, load duration factor		1.25	1.25		
FcE:		476.29	510.98		psi
Cp:		0.23	0.25		
Worst Vert, no Lat:		2667.00	2667.00		lbf
fc, axial stress:		116.53	107.76		psi
CSI index:		0.26	0.22		OK
Wind Left to Right - Interior Zone					
				Cd:	1.6
Horiz on post:		80.45	68.78		plf
V top of post:		563.17	481.46		lbf
V btm of post:		563.17	481.46		lbf
M pos:		1971.10	1685.12		ft-lbf
M base:		0.00	0.00		ft-lbf
FcE:		476.29	510.98		psi
ke, column factor:		1.00	1.00		
Cp:		0.18	0.20		
Wind Left to Right + .6x Dead, Interior Zone					
fa, axial stress:		-29.40	-40.28		psi
fb, pos zone:		1167.82	891.30		psi
fb, base:		0.00	0.00		psi
CSI, pos zone:		0.421	0.334		OK
CSI, base:		0.021	0.029		OK
Wind Left to Right, D + .75x(W + S), Interior Zone					
fa, axial stress:		61.47	47.01		
fb, pos zone:		875.86	668.48		
fb, base:		0.00	0.00		
CSI, pos zone:		0.363	0.262		OK
CSI, base:		0.031	0.024		OK
Wind Left to Right - End Zone					
Horiz on post:		110.92	92.20		plf
V top of post:		776.44	645.37		lbf
V btm of post:		776.44	645.37		lbf
M pos:		2717.55	2258.80		ft-lbf
M base:		0.00	0.00		ft-lbf
Wind Left to Right + .6x Dead, End Zone					
Vert on post:		-977.25	-1217.78		plf
fa, axial stress:		-42.70	-49.20		psi
fb, pos zone:		1610.07	1194.74		psi
fb, base:		0.00	0.00		psi
CSI, pos zone:		0.582	0.445		OK
CSI, base:		0.031	0.035		OK
Wind Left to Right, D + .75x(W + S), End Zone					
fa, axial stress:		41.10	33.35		psi
fb, pos zone:		1207.55	896.05		psi
fb, base:		0.00	0.00		psi
CSI, pos zone:		0.461	0.333		OK
CSI, base:		0.021	0.017		OK

Client: Morton Buildings
 Description: PF: Judy Turlington (B137093754)

Job Number: MTBS112519-66
 Building Type: PF ClearSpan Pinned No Shed
 Post & Foundation Check, Page: 3

	Column Ignored	Gable Left	Gable Right	Column Ignored	
Wind Right to Left - Interior Zone					
Horiz on post:		68.78	80.45		plf
V top of post:		481.46	563.17		lbf
V btm of post:		481.46	563.17		lbf
M pos:		1685.12	1971.10		ft-lbf
M base:		0.00	0.00		ft-lbf
FcE:		476.29	510.98		psi
ke, column factor:		1.00	1.00		
Cp:		0.18	0.20		
Wind Right to Left + .6x Dead, Interior Zone					
fa, axial stress:		-43.56	-27.18		psi
fb, pos zone:		998.38	1042.56		psi
fb, base:		0.00	0.00		psi
CSI, pos zone:		0.373	0.377		OK
CSI, base:		0.031	0.019		OK
Wind Right to Left, D + .75x(W + S), Interior Zone					
fa, axial stress:		50.84	56.84		psi
fb, pos zone:		748.79	781.92		psi
fb, base:		0.00	0.00		psi
CSI, pos zone:		0.300	0.315		OK
CSI, base:		0.026	0.029		OK
Wind Right to Left - End Zone					
Horiz on post:		92.20	110.92		
V top of post:		645.37	776.44		
V btm of post:		645.37	776.44		lbf
M pos:		2258.80	2717.55		
M base:		0.00	0.00		
Wind Right to Left + .6x Dead, End Zone					
fa, axial stress:		-63.26	-52.30		psi
fb, pos zone:		1338.27	1437.38		psi
fb, base:		0.00	0.00		psi
CSI, pos zone:		0.504	0.530		OK
CSI, base:		0.045	0.037		OK
Wind Right to Left, D + .75x(W + S), End Zone					
fa, axial stress:		36.07	38.00		
fb, pos zone:		1003.70	1078.04		
fb, base:		0.00	0.00		
CSI, pos zone:		0.379	0.405		OK
CSI, base:		0.018	0.019		OK

Endwall Post Check

Client: Morton Buildings
 Description: PF: Judy Turlington (B137093754)
 Building Type: PF ClearSpan Pinned No Shed

Job Number: MTBS112519-66

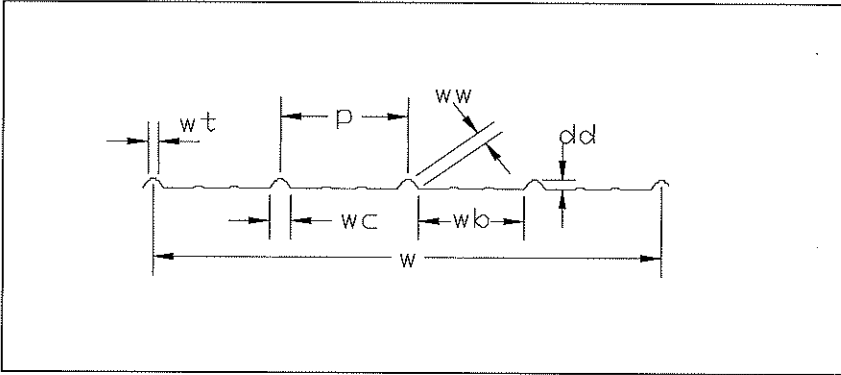
End Post Check, Page: 1

	Column Ignored	Gable Left	Gable Right	Column Ignored	
<i>Post Height:</i>		14.00	14.00		ft
<i>Max Post Trib:</i>		9.25	9.25		
<i>Post Name:</i>					
<i>Post Species:</i>	Laminated Structural		Laminated Structural		
<i>Post Grade:</i>		SP	SP		
<i>Post Classification:</i>		#1	#1		
<i>Section depth:</i>		3 Ply 2x6	3 Ply 2x6		
<i>Section width:</i>		5.31	5.31		in
<i>B Strength Fctr:</i>		4.31	4.31		in
<i>B Stiffness Fctr:</i>		1	1		
<i>Modulus of Elasticity, E:</i>		1	1		
<i>Fb, tab allow bending:</i>		1700000	1700000		psi
<i>Sx adjusted:</i>		1823	1823		psi
<i>lx adjusted:</i>		20.25	20.25		in^3
<i>C&C + int wind press:</i>		53.77	53.77		in^4
<i>Simple Span, Mom:</i>		21.72	21.72		psf
<i>fb, bending stress:</i>		4922.00	4922.00		ft-lbf
<i>fb/Fb/Cd:</i>		2916.14	2916.14		psi
<i>Deflection:</i>		1.00	1.00		OK < 1
<i>Span/Deflection:</i>		1.33	1.33		
		126.35	126.35		OK > 120
<i>Max unbraced Ht:</i>		14.00	14.00		ft

4.4

GABLE DIAPHRAGM STRENGTH & STIFFNESS per MCA & NFBA

Client: Morton Buildings
 Job Number: MTBS112519-66
 Description: PF: Judy Turlington (B137093754)
 Location(s): COATS NC

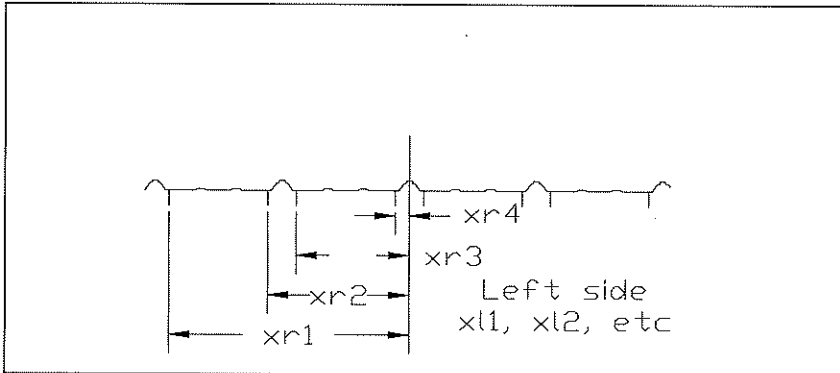


Panel Dimensions Corrugation Geometry

w, Effective Cladding Width:	36 in	wt top rib width:	0.75 in
p, Pitch:	12 in	wb flange width:	7 in
dd, cladding depth:	1 in	wc bottom rib width:	2 in
n, Number of Corrugations per w:	3	ww rib leg length:	1.18 in
s, flat width to form one pitch:	10.23 in		

Geometric & Material Properties

Distance between Rafters:	84 in	Sloped Roof Length:	22.00 ft
Nominal Steel Gauge:	26	t, Steel Thickness:	0.0179 in
Fy, yield strength:	80 ksi	Fu, ultimate strength:	82 ksi
E, elastic modulus:	29500 ksi	min Ix, from Mfg's Data:	0.0053 in ⁴ /ft
Lv, purlin spacing:	23 in	no spans Number of Spans:	11.5
Purlin Species: SPF		nlp, Number of Interior Purlins:	10.5
		G, purlin specific gravity:	0.42



Field Screw Locations

(1 = screw at that location, 0 = no screw at that location)

1	xr1:	16.75 in		1	xl1:	16.75 in	
0	xr2:	10.25 in		0	xl2:	10.25 in	
1	xr3:	7.75 in		1	xl3:	7.75 in	
0	xr4:	1.25 in		0	xl4:	1.25 in	
2		24.5	340.63	2		24.5	340.63

Nf, number of fasteners:

4 aap, diaphragm fact.field screws: 1.36
 aap_sq, dia fact.field screws squared: 0.53

End Screw Locations

(1 = screw at that location, 0 = no screw at that location)

1	xr1:	16.75 in		1	xl1:	16.75 in	
1	xr2:	10.25 in		1	xl2:	10.25 in	
1	xr3:	7.75 in		1	xl3:	7.75 in	
1	xr4:	1.25 in		1	xl4:	1.25 in	
4		36	447.25	4		36	447.25

Nf, number of fasteners:

8 ae, diaphragm fact.end screws: 2
 ae_sq, dia fact.end screws squared: 0.69

Shear Blocks
 0 Number of shear blocks per rafter
 0 Number of screws per shear block
 2.33 Number of panels between rafters
 0 Number of phantom int purlins per avg sheet between rafters

α_{bp} , diaphragm fact.shr block screws: 0.47 α_{bp_sq} , d fact.shr blk screws sqrd: 0.22

Weighted Avg D, Fctr Field & Shr Blk screws

α_p , weighted average: 1.36 α_{p_sq} , weighted average sqrd: 0.53

Purlin & Stitch Screws

0 1= Purlin screws used, 0 = not N_purlin screws: 0
 0 1= Stitch screws used, 0 = not
 1.00 No st screws at purlins Total no stitch screws 0
 0 No st screws between a pair of purlins
 0 ns, Total seam screws in one over lap

Number of screws per unit length at end of panel 8

Screw specifications & strengths	No.	Dia.	Length	Pene. Diams:
Field Screw size, diameter, length:	10	0.187	1	4.68
Stitch Screw size, diameter, length:	10	0.187	0.75	n/a
Purlin Screw size, diameter, length:	12	0.211	2	4.15

Qf, field screws: 0.390 kip Qs, stitch screws: 0.308 kip

α_s , diaphragm factor: 0.789

Fastener Contribution Factor

n_p , real + phantom interior purlins: 10.5 B, factor: 13.80

Corner Fastener Reduction Factor Lambda: 0.94

Strength Controlled by Field Fastener Su_f: 0.242 kif

Strength Controlled by Corner Fastener Su_c: 0.244 kif

Strength Controlled by Sheet Buckling Su_buck: 0.885 kif

Controlling Diaphragm Shear Strength: 0.242 kif

Factor of Safety: 2

Allowable Unit Shear Strength 0.121 kif <<<<<<<<<

DIAPHRAGM STIFFNESS

Field Fastener Flexibility Sf, constant from Anderson: 0.2 in/kip

Purlin Screw Flexibility S_purlin: 0.022 in/kip

Stitch Screw Flexibility S_stitch: 0.030 in/kip

Average Seam/Stitch Screw Flexibility Ss: 0.000 in/kip

Edge Fastener Stiffness Coefficient Lap UP K: 0.5

Coefficient for L/Lv Φ : 0.58

Panel Warping Coefficient Dn: 0.000

Fastener Flexibility Coefficient C: 84.70

In Plane Stiffness, sheathing only G': 3.04

Modified Stiffness for Framing Purlins EDGE Krp, single purlin: 1 kif

Ksb, shear block: 10 kif

Kr, Total Conns: 11.5

Net In Plane Modified Shear Stiffness G' net: 1.14 kif

Cp, Ordinary In Plane Stiffness of Assembly 3.59 kif <<<<<<<<<

Total Allowable Shear: 2.67 kips

Combined Allowable Shear, 2 Gables + Sheds: 5.34 kips

Combined Stiffness, 2 Gables + Sheds: 7.19 kif

Post-Frame Seismic Diaphragm Analysis
Diaphragms & Shearwalls Designed for 100% of Base Shear

Client: Morton Buildings **Job Number:** MTBS112519-66
Description: PF: Judy Turlington (B137093754)

Determine Seismic Weight, W

	Shed Left	Gable	Shed Right	
Width =		29.75		ft
Ridge Length =	48.75	ft	Flat-Roof Snow =	13 psf
Base Shear % =	0.057		Allow Diaph Shear =	97 plf

	Shed	Sidewall	Sidewall	Shed	Endwall	Sum
Dead, plf =	0	64	64	0	18	
Sub Total Dead, lbf =	0	3096	3096	0	1071	7262
Seismic Snow, psf =	0	0	0	0	0	
Sub Total Sn, lbf =	0	0	0	0	0	0
Seismic Weight =	7262 lbf			Base Shear =	289 lbf	

Transverse Diaphragm Shear = 5 plf OK

Longitudinal Diaphragm Shear = 3 plf OK

Post-Frame Diaphragm Analysis

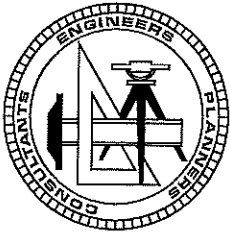
Client: Morton Buildings **Job Number:** MTBS112519-66
Description: PF: Judy Turlington (B137093754)

Roof Diaphragm Strength & Stiffness per MCA

Building Length =	48.75 ft, Length	Truss Brg Ht =	14 ft
Sf =	7 ft, frame spacing	End Zone =	3 ft
Building Width =	29.75 ft, building width	Shed Left =	0 ft
pitch =	4 pitch, rise in 12	Shed Right =	0 ft
Ch =	7185.84 pli, diaphragm stiffness		
ke =	7185.84 pli, approximate endwall stiffness		

Added Shear From End Zone =	161.6 lbf
Total Roof Shear =	2623.9 lbf
Allowable Roof Shear PLF =	121.2 plf
Total Roof Shear PLF	83.7 plf OK
Endwall Deflection =	0.365 in
Maximum Diaphragm Deflection =	0.636 in
Maximum Total Deflection =	1.001 in

Location	Shear	Deflection	PLF
0	2623.9	0.3651	83.7
7	1870.3	0.1563	59.6
14	1116.8	-0.1880	35.6
21	363.3	0.1749	11.6



NIA Simply Certified.

Page ___ of ___

Date: _____

Engineer: _____

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PHONE: 574-773-7975 • FAX: 574-773-2732 • WEB: WWW.NTAINC.COM

MTBS 112519-600

Connections

truss to columns - 3000 lbs

$\frac{3000 \text{ lbs}}{3} = 1022 \text{ lbs}$ to transfer from outer ply.

1/2" x 5 1/2" bolt = 630 lbs

20d (0.200" min) ring shank nail = 191 lb (1.15") = 219 lbs

(2) bolts = 1260 lbs

(4) nails = 876 lbs

total = 2136 lbs OK