



*Full Snow
and
Wind
Package*

Yurt Analysis Summary

Project Reference: Full Snow and Wind Yurt
Diameters: 16', 20', 24', 27' & 30'

To Whom It May Concern:

We are providing this letter to summarize the results of the analysis of the Full Snow and Wind Yurt with various diameters.

Referring to the truncated structural calculations, appended with this letter, the aforementioned yurts have been found to be capable of supporting the following design loads while meeting the requirements of the 2003 through the 2015 International Building Codes (IBC 2003 - 2015) and the 2002 through the 2010 American Society of Civil Engineers – Minimum Design Loads for Buildings and Other Structures (ASCE 7-02, 7-05, 7-10).

Design Loads:

- Occupancy or Risk Category = II
- Design Wind Speed, $V_{ULT} = 115$ mph ($V_{ASD} = 90$ mph) Exposure C
 - Using Simplified or Directional Design Method (values based on worst case design of 30' Diameter Yurt):
 - Maximum Average Roof Suction = -19.96 psf/-14.57 (WW/LW acting away from surface)
 - Maximum Average Roof Pressure = 0.57 psf (acting towards surface)
 - Maximum Wall Suction = -5.17 psf (acting away from surface)
 - Maximum Wall Pressure = 18.16 psf (acting towards surface)

Standard Features of Engineered Full Snow and Wind Yurts:

- 3/16" Galvanized Aircraft Cable with a 4,200 pound Break Strength.
- 2x6 (2100 F_b -1.8E MSR) Roof Rafters
- 2x4 (2100 F_b -1.8E MSR) Wall Studs
- (2) 2x4 Douglas Fir Compression Ring
- CORR Brackets attached to Compression Ring

Yurt Diameter	Number of Rafters (2100 F_b -1.8E MSR)	Maximum Sloped Roof Snow Load ^{1,2}
30'	48	45 psf
27'	45	65 psf
24'	42	80 psf
20'	36	100 psf
16'	28	115 psf

Notes:

1. Per ASCE 7, "snow loads acting on a sloping surface shall be assumed to act on the horizontal projection of that surface."
2. Equivalent ground snow loads may be reverse calculated from the equations given in ASCE 7.

A full set of stamped calculations and/or drawings are available upon request.

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Structural Design Assumptions

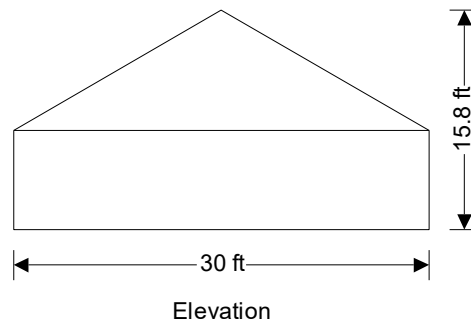
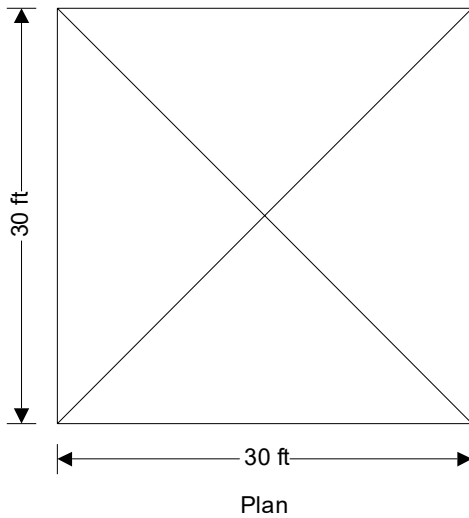
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WIND LOADING (ASCE7-10)

In accordance with ASCE7-10 incorporating Errata No. 1 and Errata No. 2

Using the directional design method

Tedds calculation version 2.0.15



Building data

Type of roof	Hipped	Length of building	b = 30.00 ft
Width of building	d = 30.00 ft	Height to eaves	H = 7.17 ft
Pitch of main slope	$\alpha_0 = 30.0$ deg	Pitch of gable slope	$\alpha_{90} = 30.0$ deg
Mean height	h = 11.50 ft		

General wind load requirements

Basic wind speed	V = 115.0 mph	Risk category	II
Exponent coef (T26.6-1)	$K_d = 0.85$	Exposure category (cl.26.7.3)	C
Enclosure class (cl.26.10)	Enclosed buildings	Int pres coef +ve (T26.11-1)	$GC_{pi_p} = 0.18$
Int pres coef -ve (T26.11-1)	$GC_{pi_n} = -0.18$		
Gust effect factor	$G_f = 0.85$		

Topography

Topo factor not significant $K_{zt} = 1.0$

Velocity pressure equation $q = 0.00221 \times K_z \times K_{zt} \times K_d \times V^2 \times 1\text{psf}/\text{mph}^2$

Velocity pressures table

z (ft)	K_z (Table 27.3-1)	q_z (psf)
7.17	0.85	21.12
11.50	0.85	21.12

Peak velocity pressure for internal pressure

Peak velocity pressure – int $q_i = 21.12$ psf

Pressures and forces

Net pressure $p = q \times G_f \times C_{pe} - q_i \times GC_{pi}$

Net force $F_w = p \times A_{ref}$

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Roof load case 1 - Wind 0, GC_{pi} 0.18, -C_{pe}

CONSERVATIVELY APPLIED TO ENTIRE WINDWARD HALF.

CONSERVATIVELY APPLIED TO ENTIRE LEEWARD HALF.

Zone	Ref. height (ft)	Ext pressure coefficient C _{pe}	Peak velocity pressure q _p , (psf)	Net pressure p (psf)	Area A _{ref} (ft ²)	Net force F _w (kips)
A (-ve)	11.50	-0.20	21.12	-7.39	259.81	-1.92
B (-ve)	11.50	-0.60	21.12	-14.57	259.81	-3.79
C (-ve)	11.50	-0.90	21.12	-19.96	38.16	-0.76
D (-ve)	11.50	-0.90	21.12	-19.96	114.47	-2.28
E (-ve)	11.50	-0.50	21.12	-12.78	310.31	-3.96
F (-ve)	11.50	-0.30	21.12	-9.19	56.67	-0.52

Total vertical net force F_{w,v} = -11.46 kips

Total horizontal net force F_{w,h} = 0.93 kips

Walls load case 1 - Wind 0, GC_{pi} 0.18, -C_{pe}

Zone	Ref. height (ft)	Ext pressure coefficient C _{pe}	Peak velocity pressure q _p , (psf)	Net pressure p (psf)	Area A _{ref} (ft ²)	Net force F _w (kips)
A	7.17	0.80	21.12	10.56	215.10	2.27
B	11.50	-0.50	21.12	-12.78	215.01	-2.75
C	11.50	-0.70	21.12	-16.37	215.01	-3.52
D	11.50	-0.70	21.12	-16.37	215.01	-3.52

Overall loading

Proj vertical plan area of wall A_{vert_w,0} = 215.01 ft²

Projected vertical area of roof A_{vert_r,0} = 194.86 ft²

Min overall horizontal loading F_{w,total_min} = 5.0 kips

Leeward net force F_l = -2.7 kips

Windward net force

F_w = 2.3 kips

Overall horizontal loading F_{w,total} = 6.0 kips

Roof load case 2 - Wind 0, GC_{pi} -0.18, -0C_{pe}

Zone	Ref. height (ft)	Ext pressure coefficient C _{pe}	Peak velocity pressure q _p , (psf)	Net pressure p (psf)	Area A _{ref} (ft ²)	Net force F _w (kips)
A (+ve)	11.50	0.25	21.12	8.23	259.81	2.14
B (+ve)	11.50	-0.60	21.12	-6.97	259.81	-1.81
C (+ve)	11.50	-0.18	21.12	0.57	38.16	0.02
D (+ve)	11.50	-0.18	21.12	0.57	114.47	0.07
E (+ve)	11.50	-0.18	21.12	0.57	310.31	0.18
F (+ve)	11.50	-0.18	21.12	0.57	56.67	0.03

Total vertical net force F_{w,v} = 0.54 kips

Total horizontal net force F_{w,h} = 1.97 kips

Walls load case 2 - Wind 0, GC_{pi} -0.18, -0C_{pe}

Zone	Ref. height (ft)	Ext pressure coefficient C _{pe}	Peak velocity pressure q _p , (psf)	Net pressure p (psf)	Area A _{ref} (ft ²)	Net force F _w (kips)

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Zone	Ref. height (ft)	Ext pressure coefficient C_{pe}	Peak velocity pressure q_p , (psf)	Net pressure p (psf)	Area A_{ref} (ft ²)	Net force F_w (kips)
A	7.17	0.80	21.12	18.16	215.10	3.91
B	11.50	-0.50	21.12	-5.17	215.01	-1.11
C	11.50	-0.70	21.12	-8.76	215.01	-1.88
D	11.50	-0.70	21.12	-8.76	215.01	-1.88

Overall loading

Proj vertical plan area of wall $A_{vert_w_0} = 215.01 \text{ ft}^2$ Projected vertical area of roof $A_{vert_r_0} = 194.86 \text{ ft}^2$
Min overall horizontal loading $F_{w,total_min} = 5.0 \text{ kips}$
Leeward net force $F_l = -1.1 \text{ kips}$ Windward net force $F_w = 3.9 \text{ kips}$
Overall horizontal loading $F_{w,total} = 7.0 \text{ kips}$

Roof load case 3 - Wind 90, $GC_{pi} 0.18$, $-C_{pe}$

Zone	Ref. height (ft)	Ext pressure coefficient C_{pe}	Peak velocity pressure q_p , (psf)	Net pressure p (psf)	Area A_{ref} (ft ²)	Net force F_w (kips)
A (-ve)	11.50	-0.20	21.12	-7.39	259.81	-1.92
B (-ve)	11.50	-0.60	21.12	-14.57	259.81	-3.79
C (-ve)	11.50	-0.90	21.12	-19.96	38.16	-0.76
D (-ve)	11.50	-0.90	21.12	-19.96	114.47	-2.28
E (-ve)	11.50	-0.50	21.12	-12.78	310.31	-3.96
F (-ve)	11.50	-0.30	21.12	-9.19	56.67	-0.52

Total vertical net force $F_{w,v} = -11.46 \text{ kips}$ Total horizontal net force $F_{w,h} = 0.93 \text{ kips}$

Walls load case 3 - Wind 90, $GC_{pi} 0.18$, $-C_{pe}$

Zone	Ref. height (ft)	Ext pressure coefficient C_{pe}	Peak velocity pressure q_p , (psf)	Net pressure p (psf)	Area A_{ref} (ft ²)	Net force F_w (kips)
A	7.17	0.80	21.12	10.56	215.10	2.27
B	11.50	-0.50	21.12	-12.78	215.01	-2.75
C	11.50	-0.70	21.12	-16.37	215.01	-3.52
D	11.50	-0.70	21.12	-16.37	215.01	-3.52

Overall loading

Proj vertical plan area of wall $A_{vert_w_90} = 215.01 \text{ ft}^2$ Projected vertical area of roof $A_{vert_r_90} = 129.90 \text{ ft}^2$
Min overall horizontal loading $F_{w,total_min} = 4.5 \text{ kips}$
Leeward net force $F_l = -2.7 \text{ kips}$ Windward net force $F_w = 2.3 \text{ kips}$
Overall horizontal loading $F_{w,total} = 6.0 \text{ kips}$

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Roof load case 4 - Wind 90, $GC_{pi} -0.18, +C_{pe}$

Zone	Ref. height (ft)	Ext pressure coefficient C_{pe}	Peak velocity pressure q_p , (psf)	Net pressure p (psf)	Area A_{ref} (ft ²)	Net force F_w (kips)
A (+ve)	11.50	0.25	21.12	8.23	259.81	2.14
B (+ve)	11.50	-0.60	21.12	-6.97	259.81	-1.81
C (+ve)	11.50	-0.18	21.12	0.57	38.16	0.02
D (+ve)	11.50	-0.18	21.12	0.57	114.47	0.07
E (+ve)	11.50	-0.18	21.12	0.57	310.31	0.18
F (+ve)	11.50	-0.18	21.12	0.57	56.67	0.03

Total vertical net force $F_{w,v} = 0.54$ kips

Total horizontal net force $F_{w,h} = 1.97$ kips

Walls load case 4 - Wind 90, $GC_{pi} -0.18, +C_{pe}$

Zone	Ref. height (ft)	Ext pressure coefficient C_{pe}	Peak velocity pressure q_p , (psf)	Net pressure p (psf)	Area A_{ref} (ft ²)	Net force F_w (kips)
A	7.17	0.80	21.12	18.16	215.10	3.91
B	11.50	-0.50	21.12	-5.17	215.01	-1.11
C	11.50	-0.70	21.12	-8.76	215.01	-1.88
D	11.50	-0.70	21.12	-8.76	215.01	-1.88

Overall loading

Proj vertical plan area of wall $A_{vert_w_90} = 215.01$ ft²

Projected vertical area of roof $A_{vert_r_90} = 129.90$ ft²

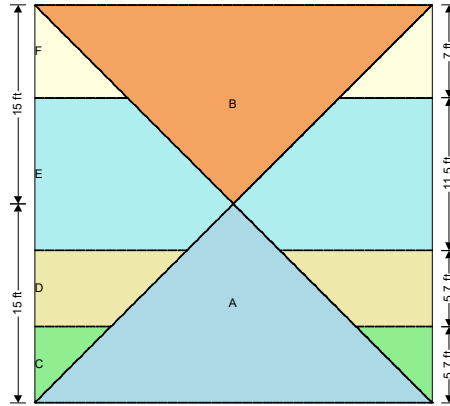
Min overall horizontal loading $F_{w,total_min} = 4.5$ kips

Leeward net force $F_l = -1.1$ kips

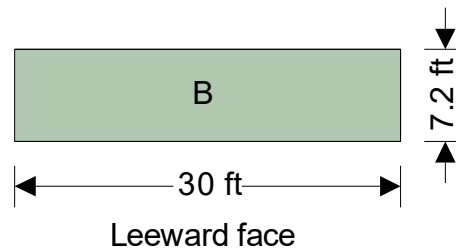
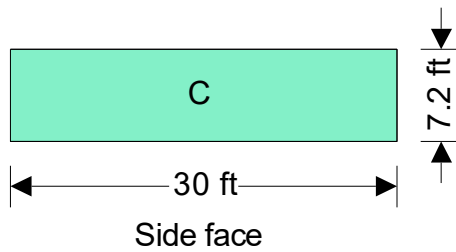
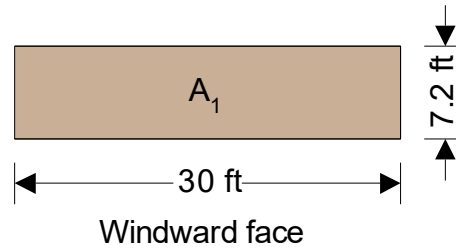
Windward net force $F_w = 3.9$ kips

Overall horizontal loading $F_{w,total} = 7.0$ kips

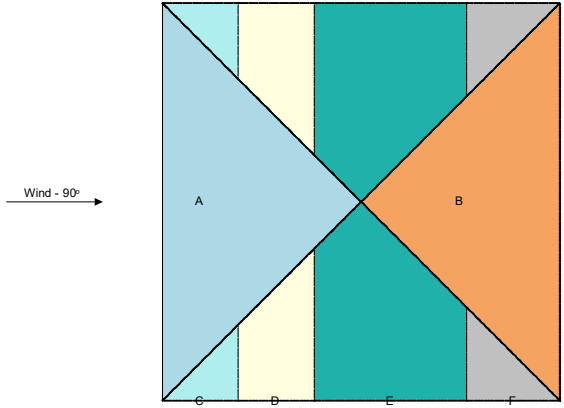
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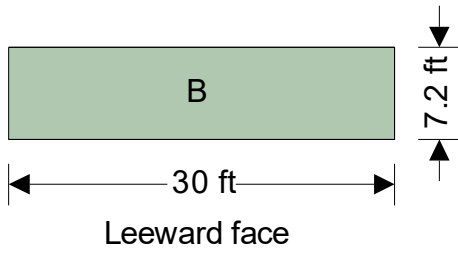
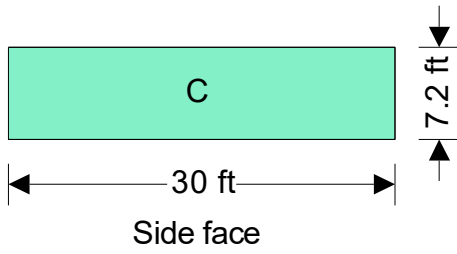
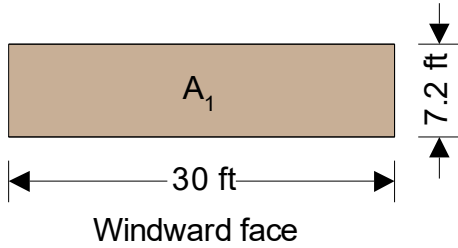
↑
 Wind - 0°
 Plan view - Hipped roof



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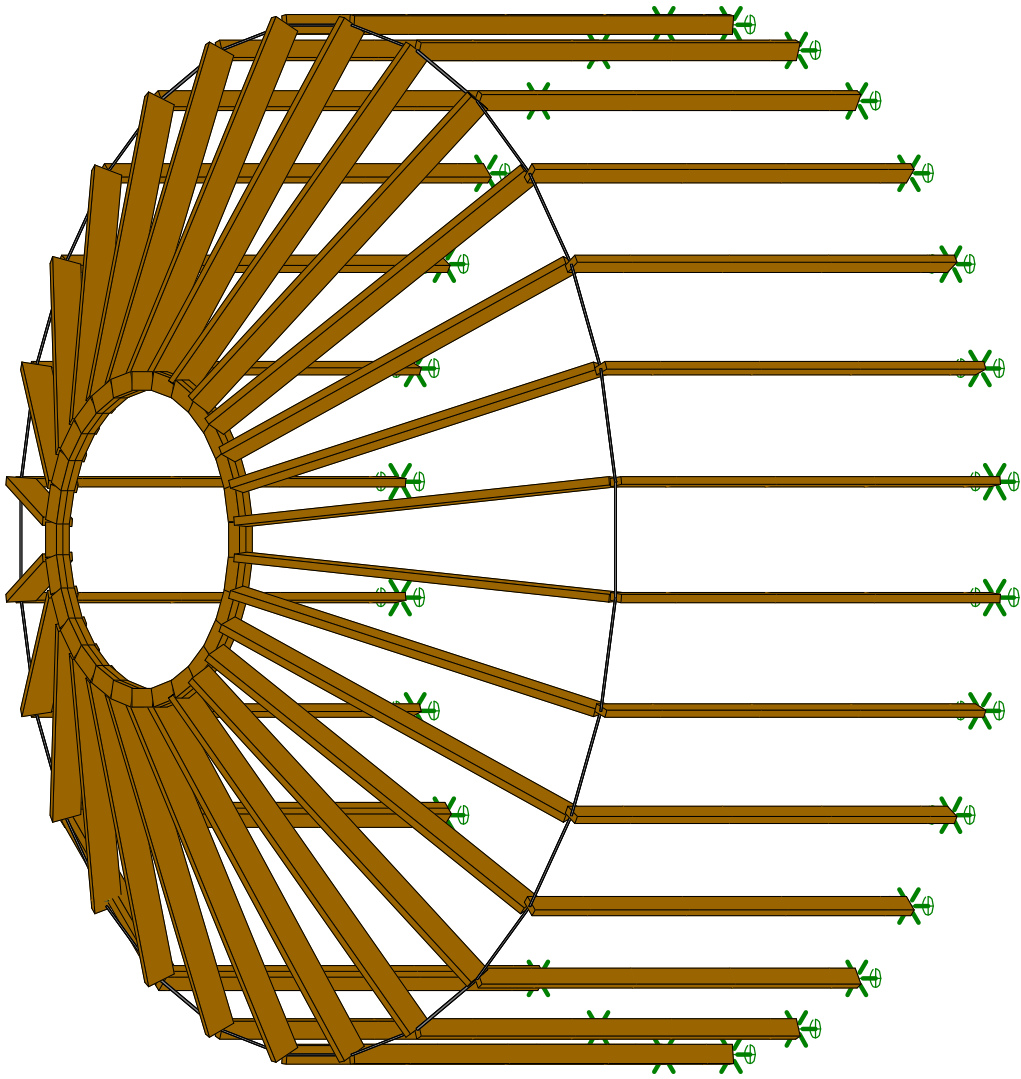
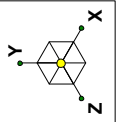


Plan view - Hipped roof



Yurt Calculations

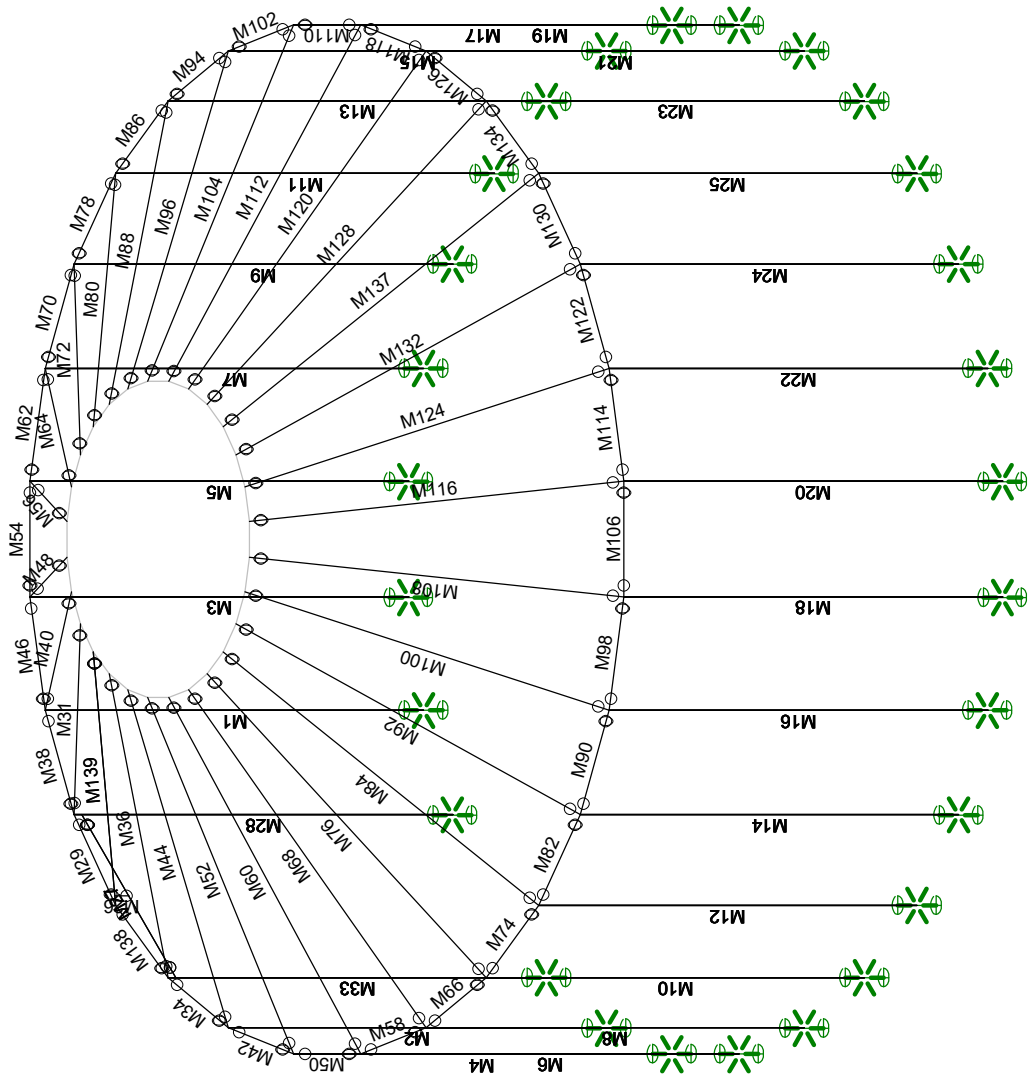
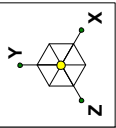
16' Diameter Yurt



16' FULL SNOW & WIND
BASIC MODEL

CO YURT COMPANY

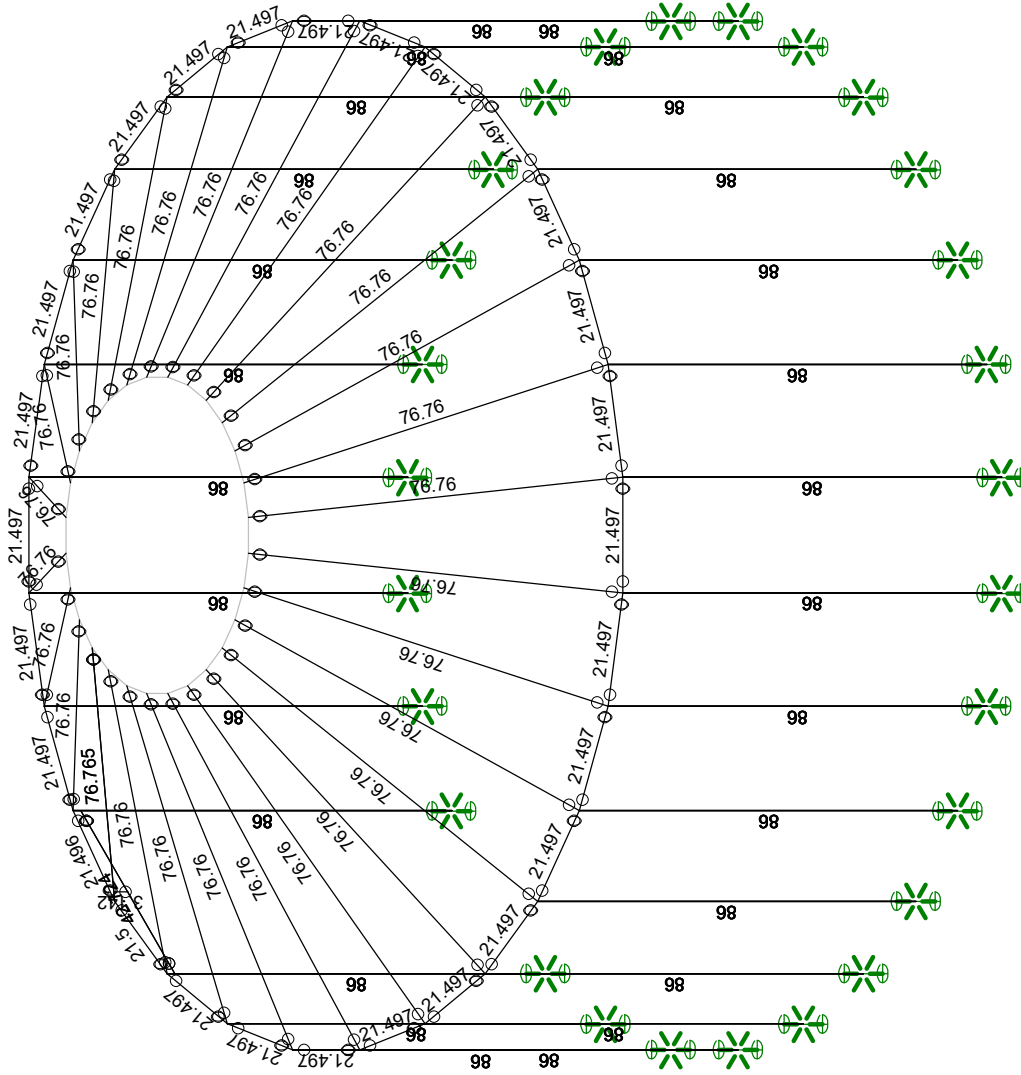
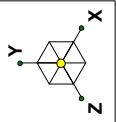
16'.FULL SNOW & WIND.r3d



16' FULL SNOW & WIND
MEMBER LABELS

CO YURT COMPANY

16' FULL SNOW & WIND.r3d

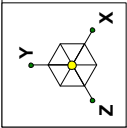


Member Length (in) Displayed

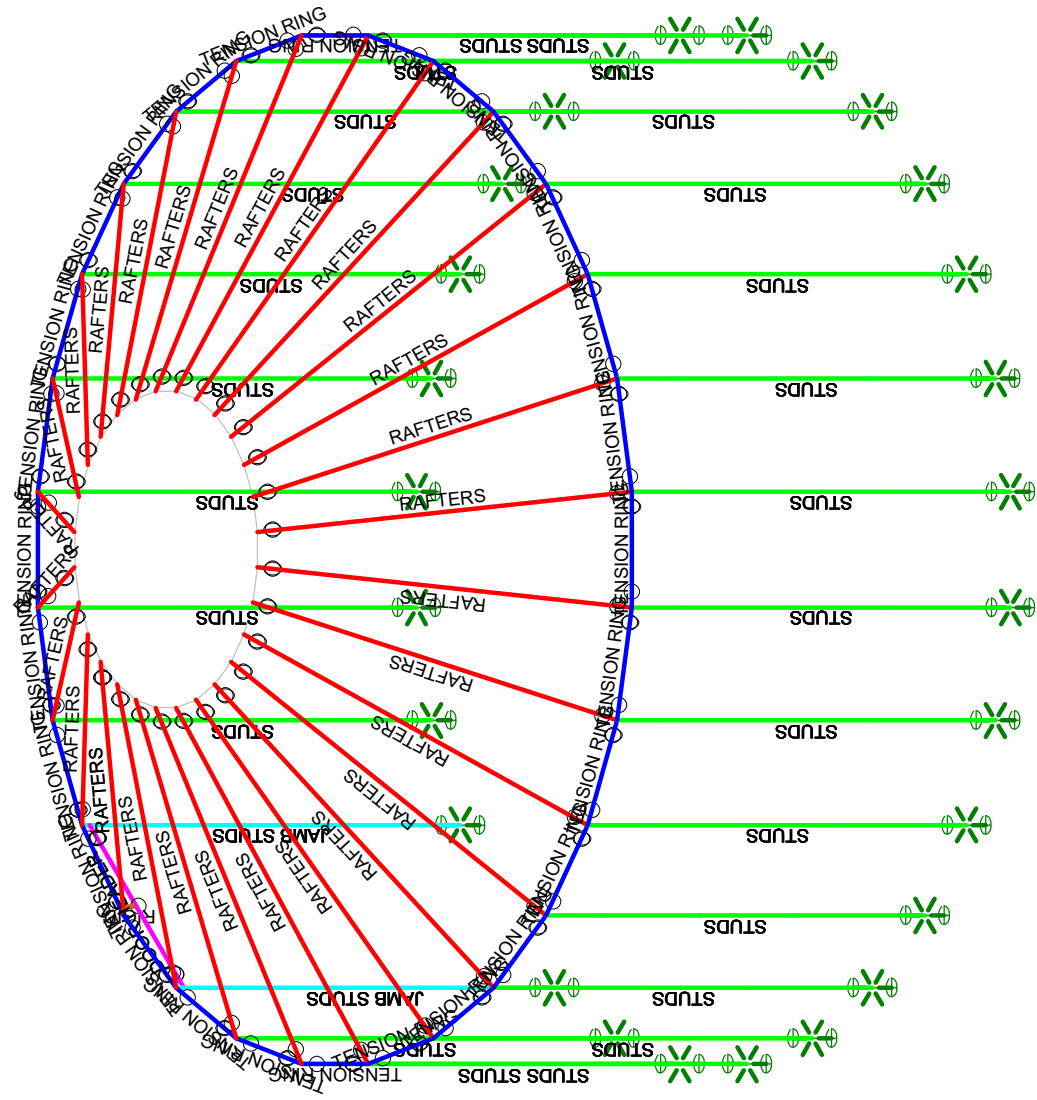
16' FULL SNOW & WIND
MEMBER LENGTHS (INCHES)

CO YURT COMPANY

16' FULL SNOW & WIND.r3d



- Section Sets
- TENSION RING
 - STUDS
 - RAFTERS
 - WD COMP RING
 - DOOR HEADER
 - JAMB STUDS
 - RIGID
 - 40 MIL MEMBRANE

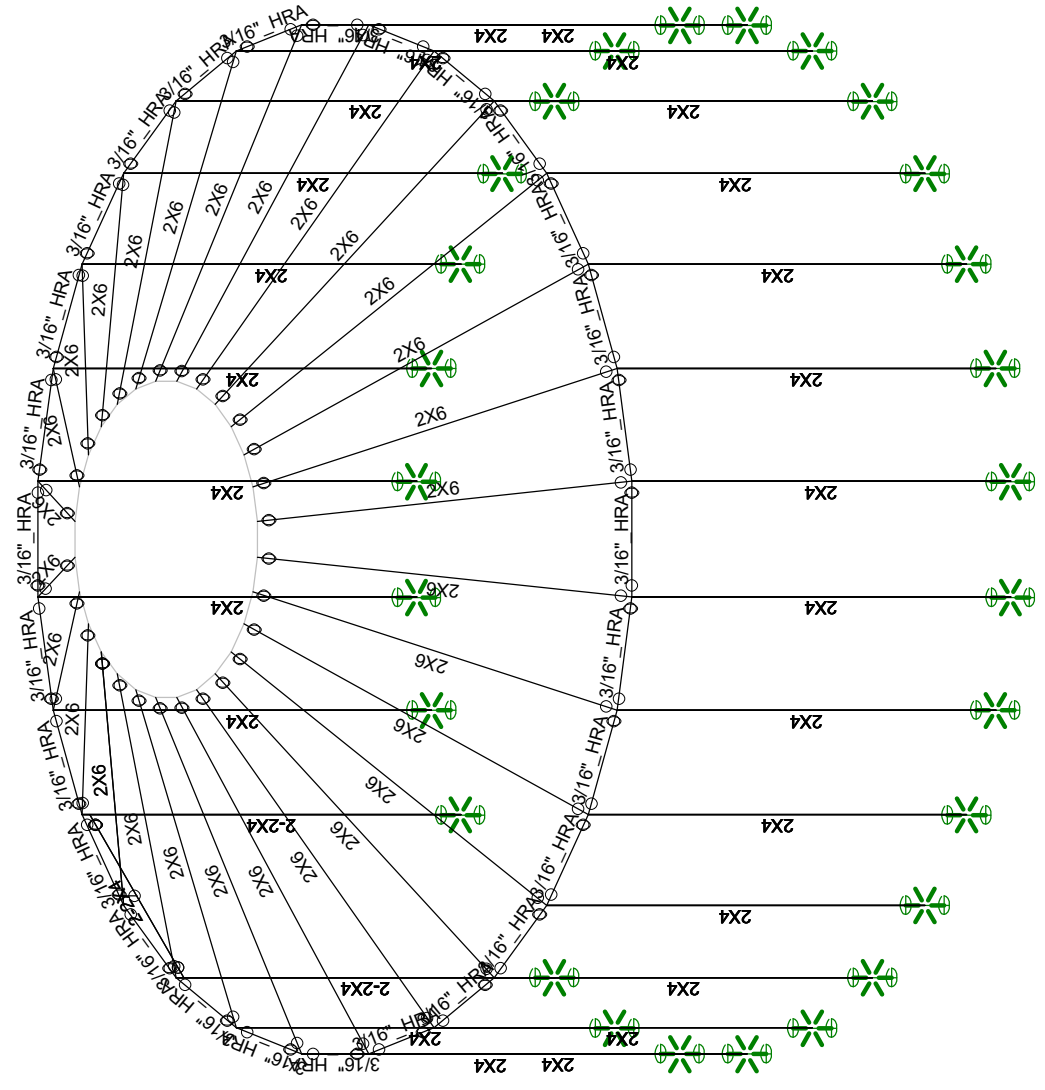
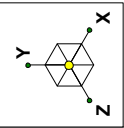


16' FULL SNOW & WIND

SECTION SET

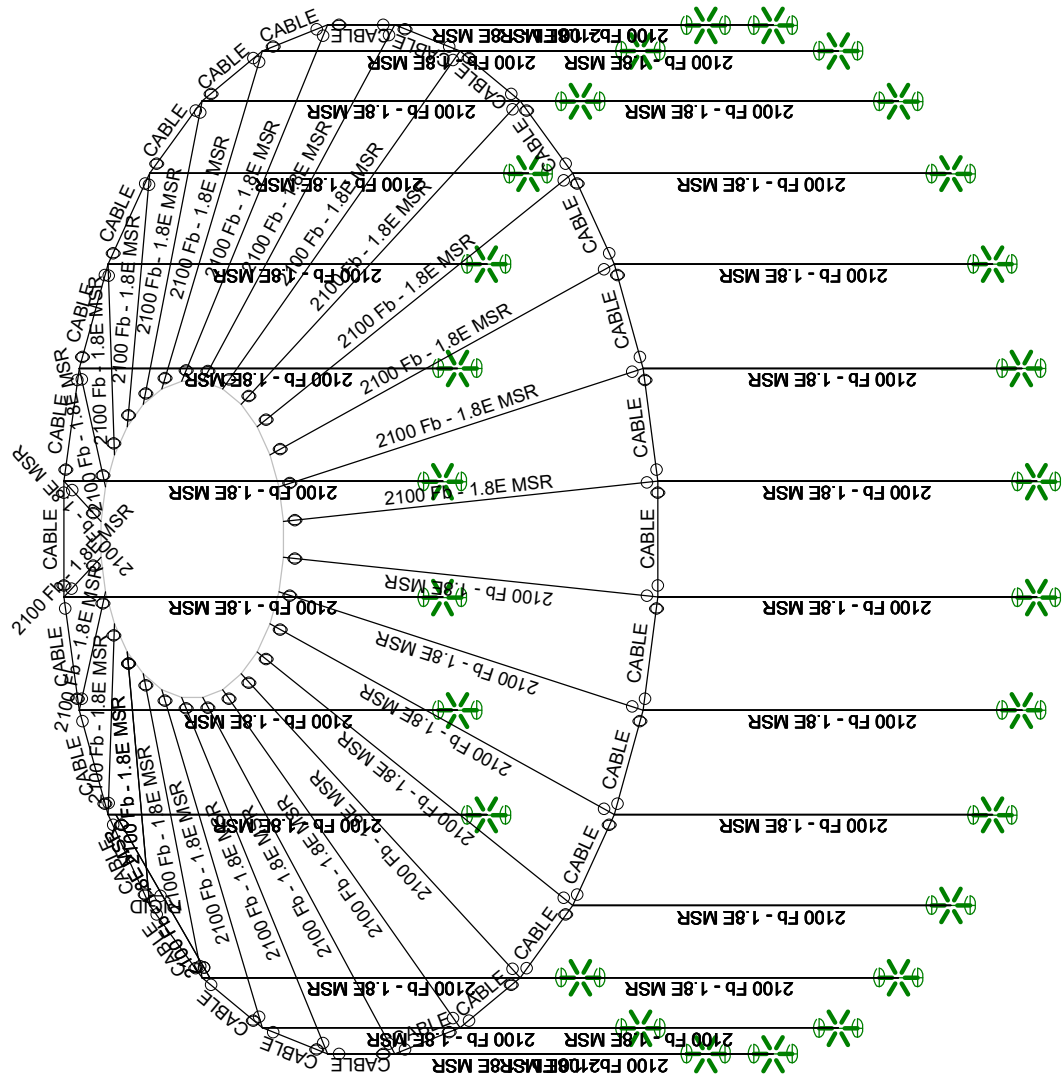
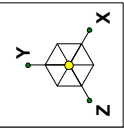
CO YURT COMPANY

16'.FULL SNOW & WIND.r3d



	<p>16' FULL SNOW & WIND MEMBER SHAPES</p>	
		<p>CO YURT COMPANY</p>

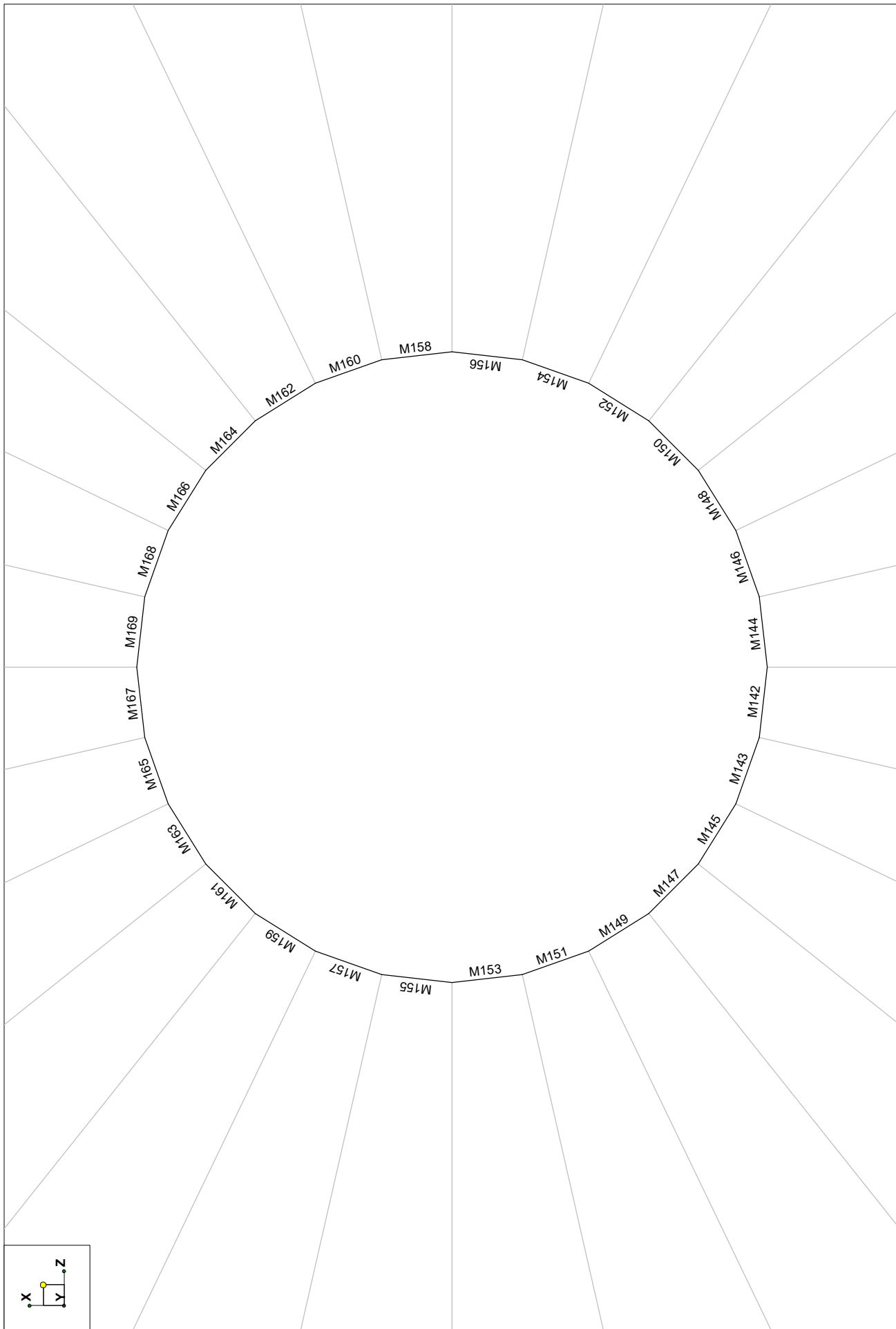
16' FULL SNOW & WIND.r3d



16' FULL SNOW & WIND
MEMBER MATERIALS

CO YURT COMPANY

16' FULL SNOW & WIND.r3d

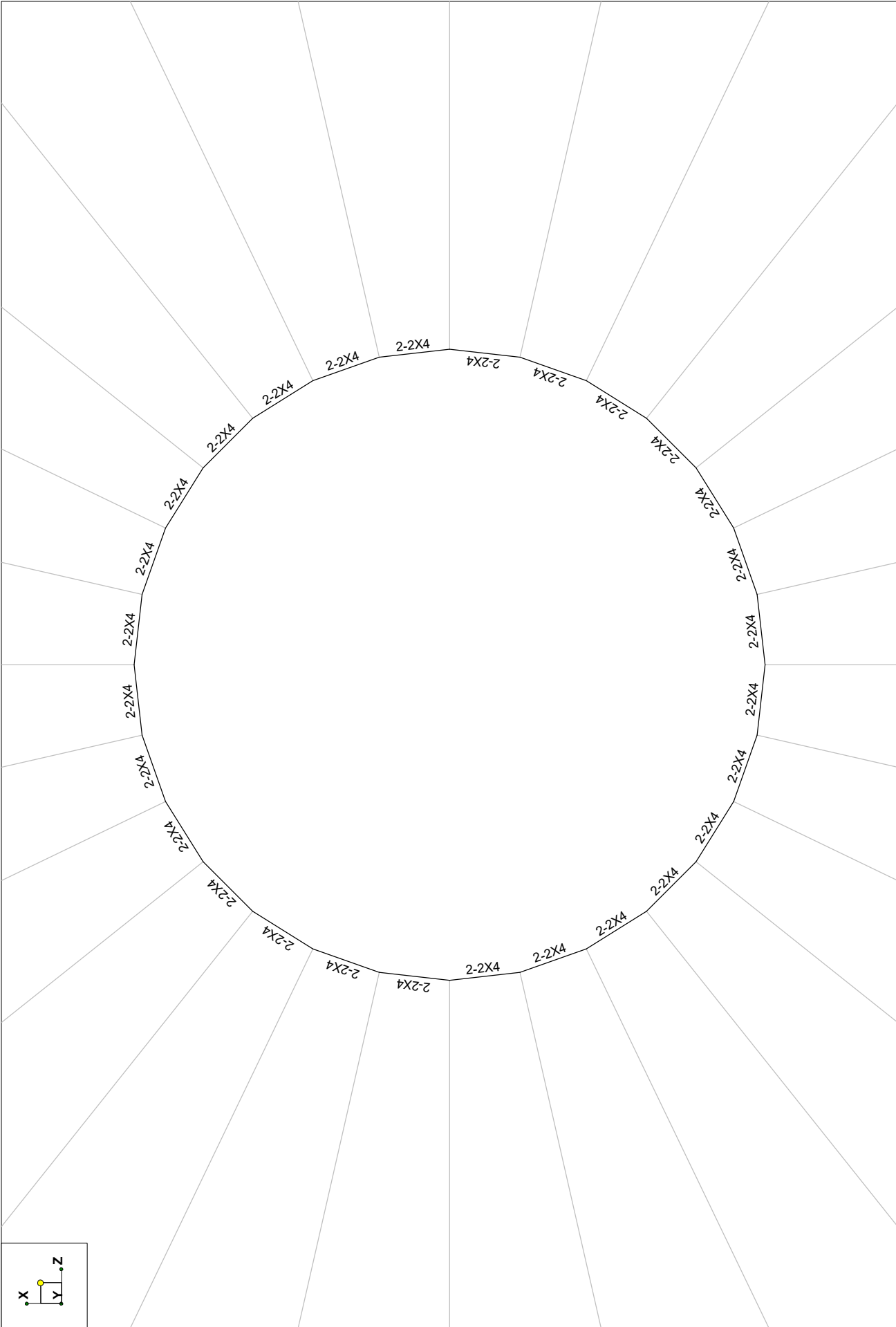


16' FULL SNOW & WIND

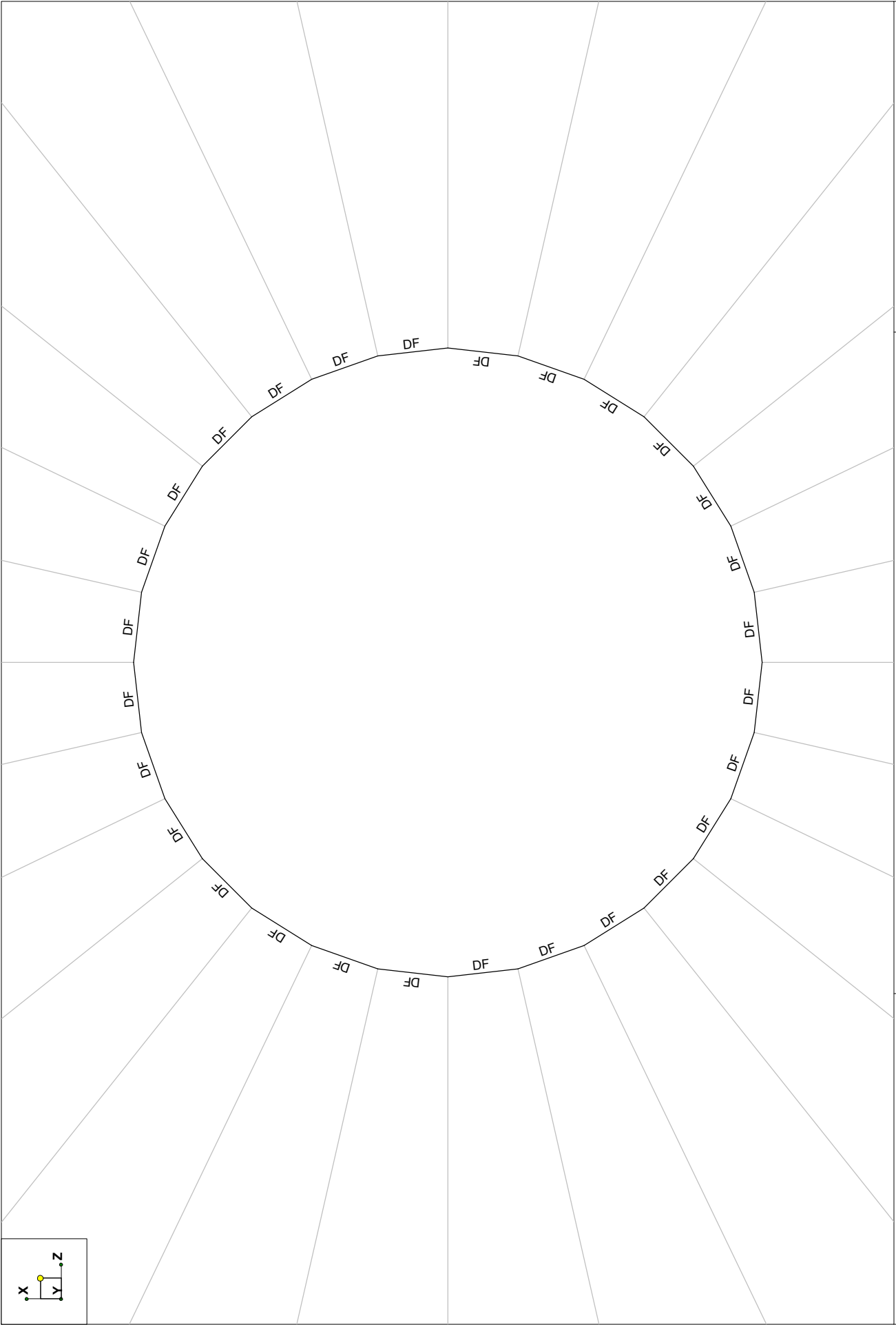
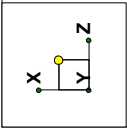
COMPRESSION RING MEMBER LABELS

CO YURT COMPANY

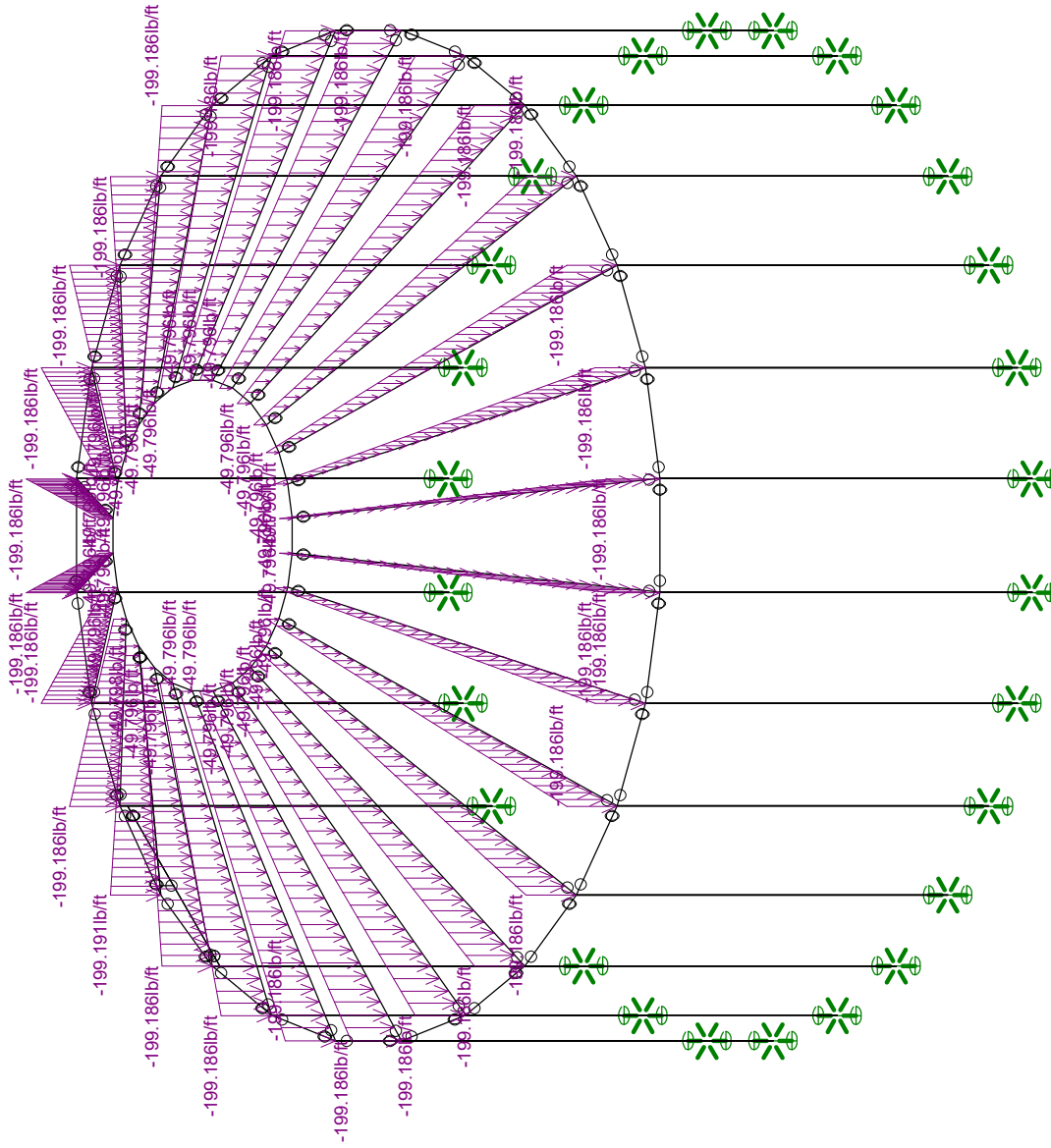
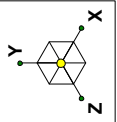
16' FULL SNOW & WIND.r3d



16' FULL SNOW & WIND		16' FULL SNOW & WIND.r3d	
16' FULL SNOW & WIND COMPRESSION RING MEMBER SHAPES			
CO YURT COMPANY			



16' FULL SNOW & WIND		16' FULL SNOW & WIND.r3d	
16' FULL SNOW & WIND COMPRESSION RING MEMBER MATERIALS			
CO YURT COMPANY			

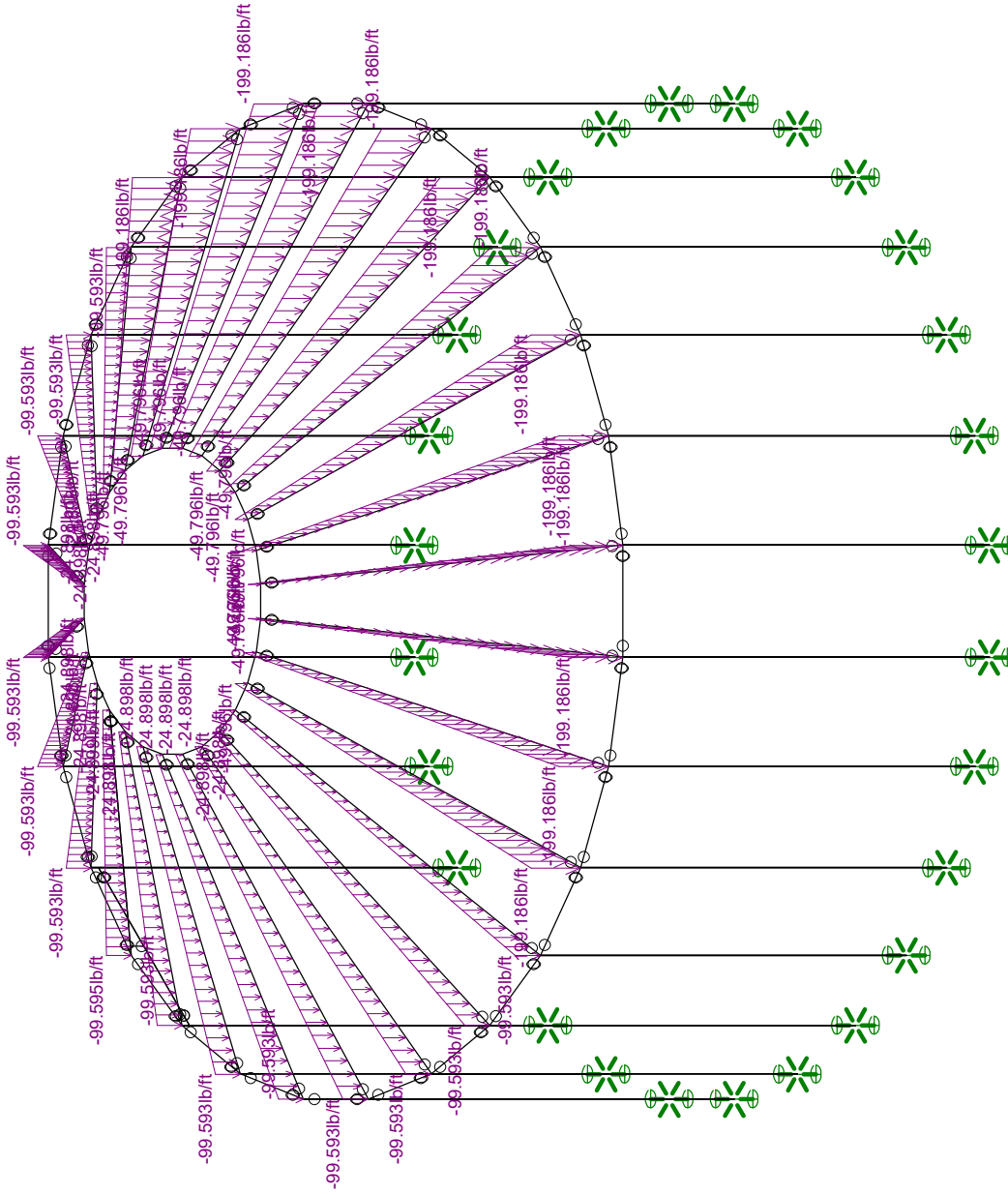
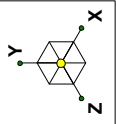


Loads: LC 1, SL BAL

16' FULL SNOW & WIND
SLOPED ROOF SNOW LOAD

CO YURT COMPANY

16' FULL SNOW & WIND.r3d



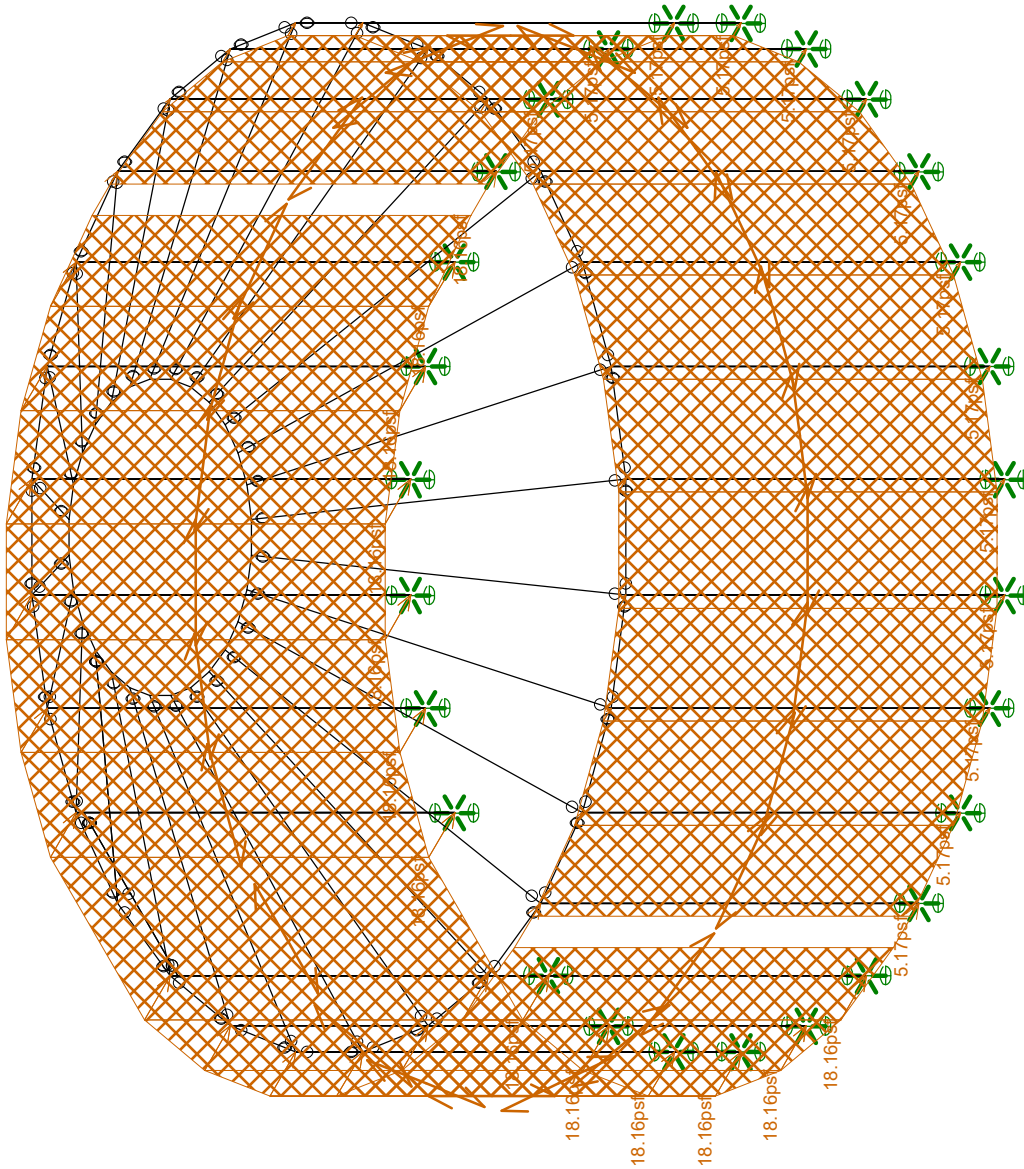
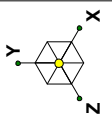
Loads: LC 2, SL UNBAL

16' FULL SNOW & WIND

UNBALANCED SLOPED ROOF SNOW LOAD

CO YURT COMPANY

16' FULL SNOW & WIND.r3d

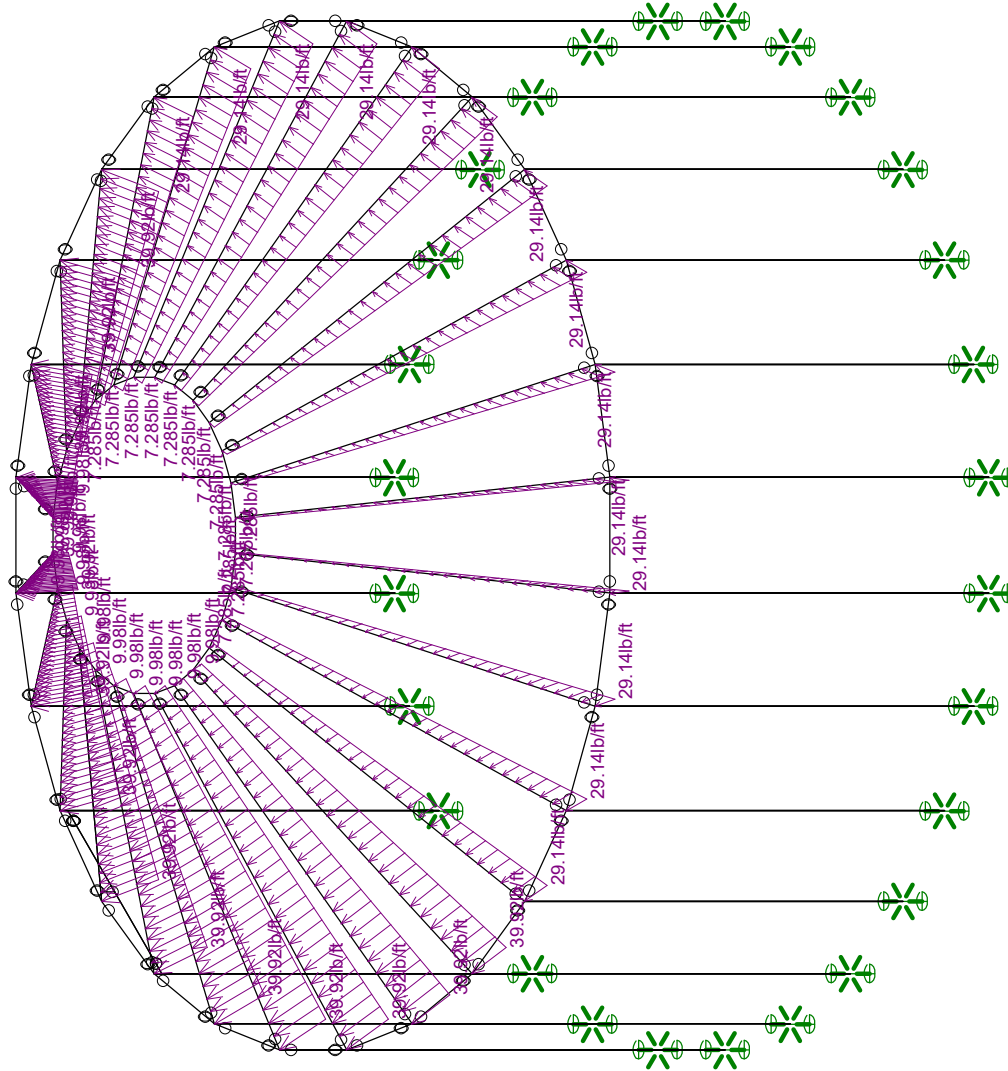
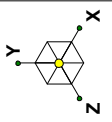


Loads: LC 3, WALL WL

16' FULL SNOW & WIND
WALL WIND LOADS

CO YURT COMPANY

16'.FULL SNOW & WIND.r3d

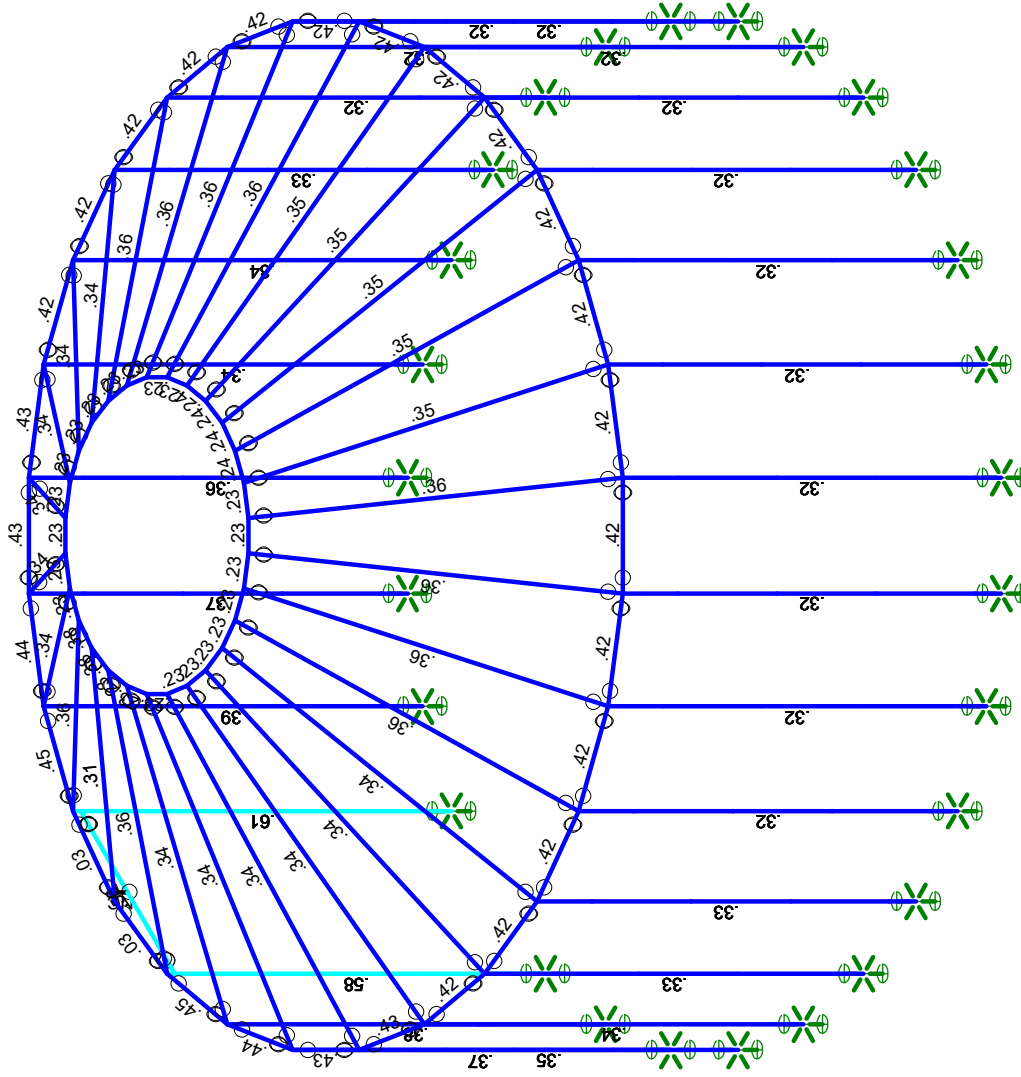
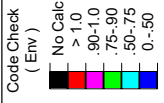
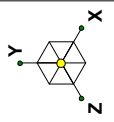


Loads: LC-4, ROOF WL

16' FULL SNOW & WIND
ROOF WIND LOADS

CO YURT COMPANY

16' FULL SNOW & WIND.r3d



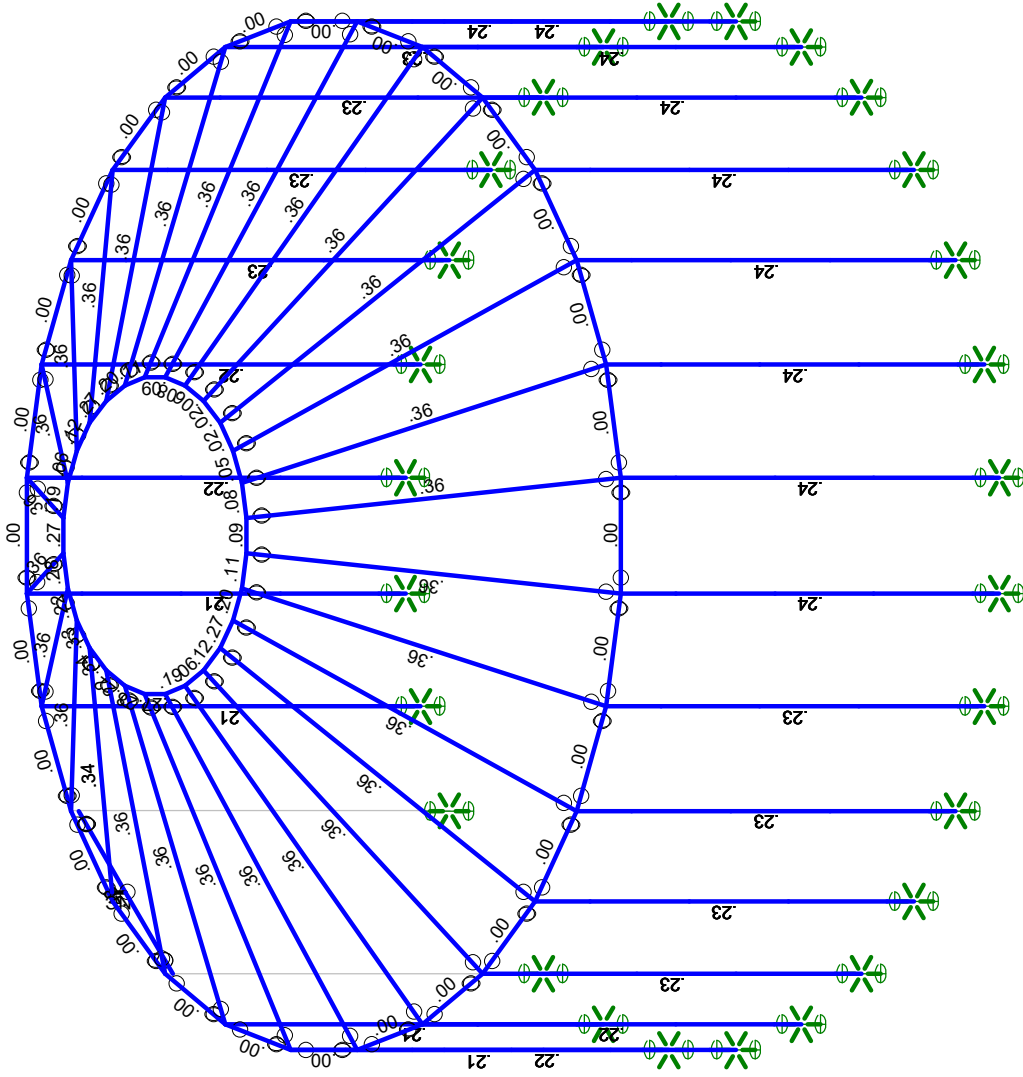
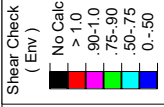
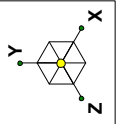
Member Code Checks Displayed (Enveloped)
Envelope Only Solution

16' FULL SNOW & WIND

ENVELOPE CODE CHECK (BENDING)

CO YURT COMPANY

16'.FULL SNOW & WIND.r3d



Member Shear Checks Displayed (Enveloped)
Envelope Only Solution

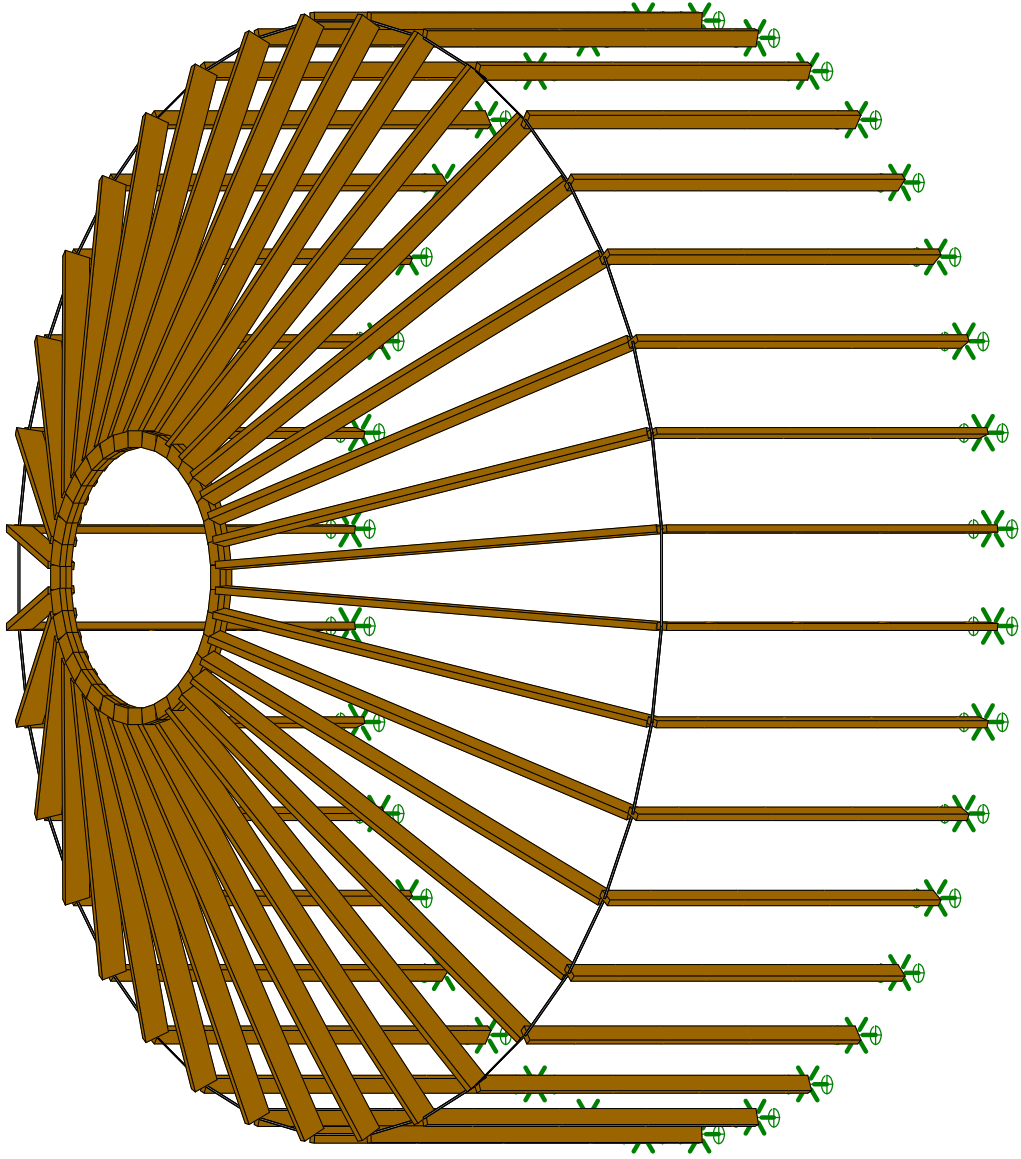
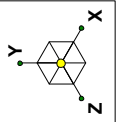
16' FULL SNOW & WIND

ENVELOPE CODE CHECK (SHEAR)

CO YURT COMPANY

16' FULL SNOW & WIND.r3d

20' Diameter Yurt

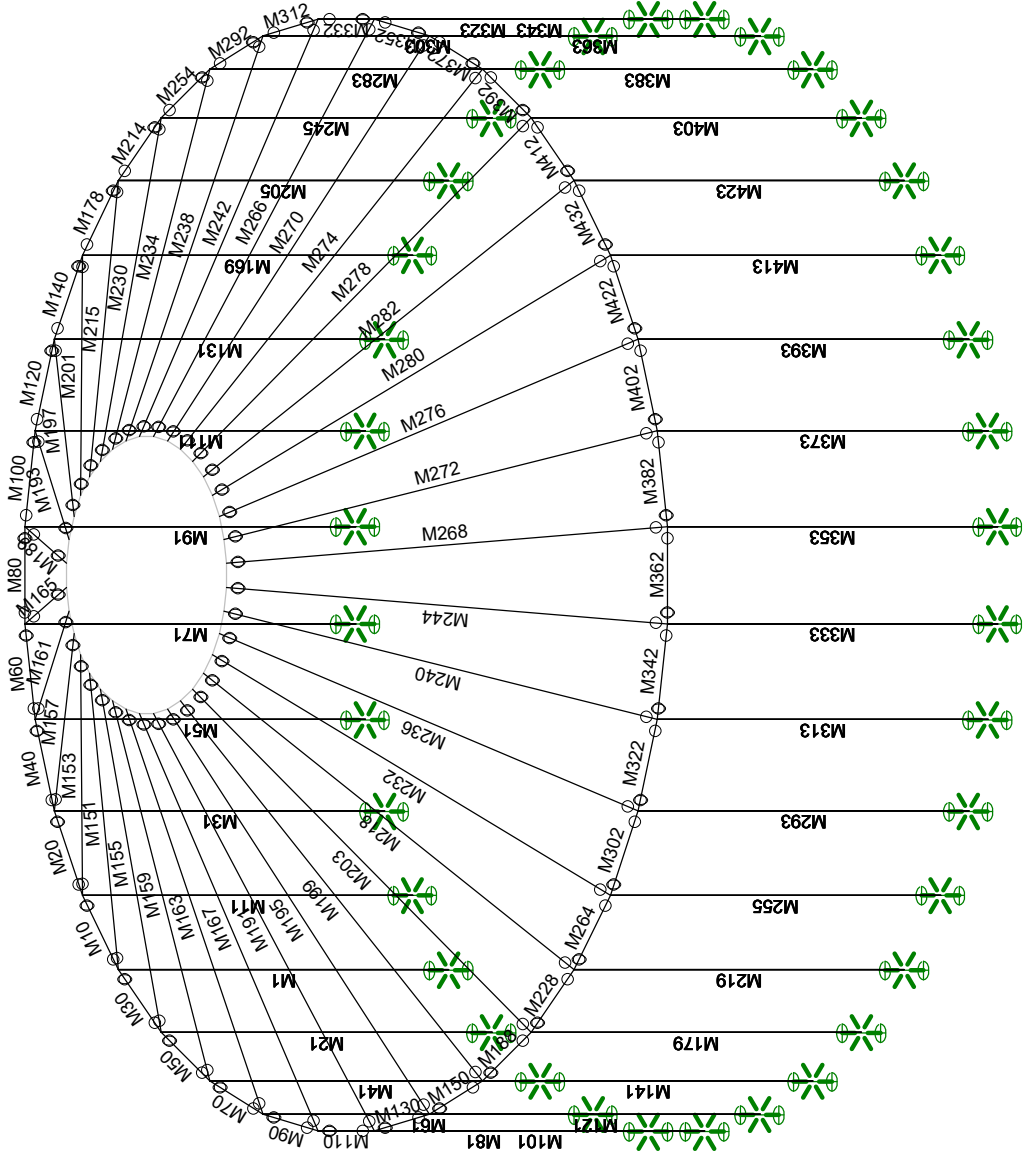
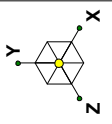


Envelope Only Solution

20' FULL SNOW & WIND
BASIC MODEL

CO YURT COMPANY

20' FULL SNOW & WIND.R3D

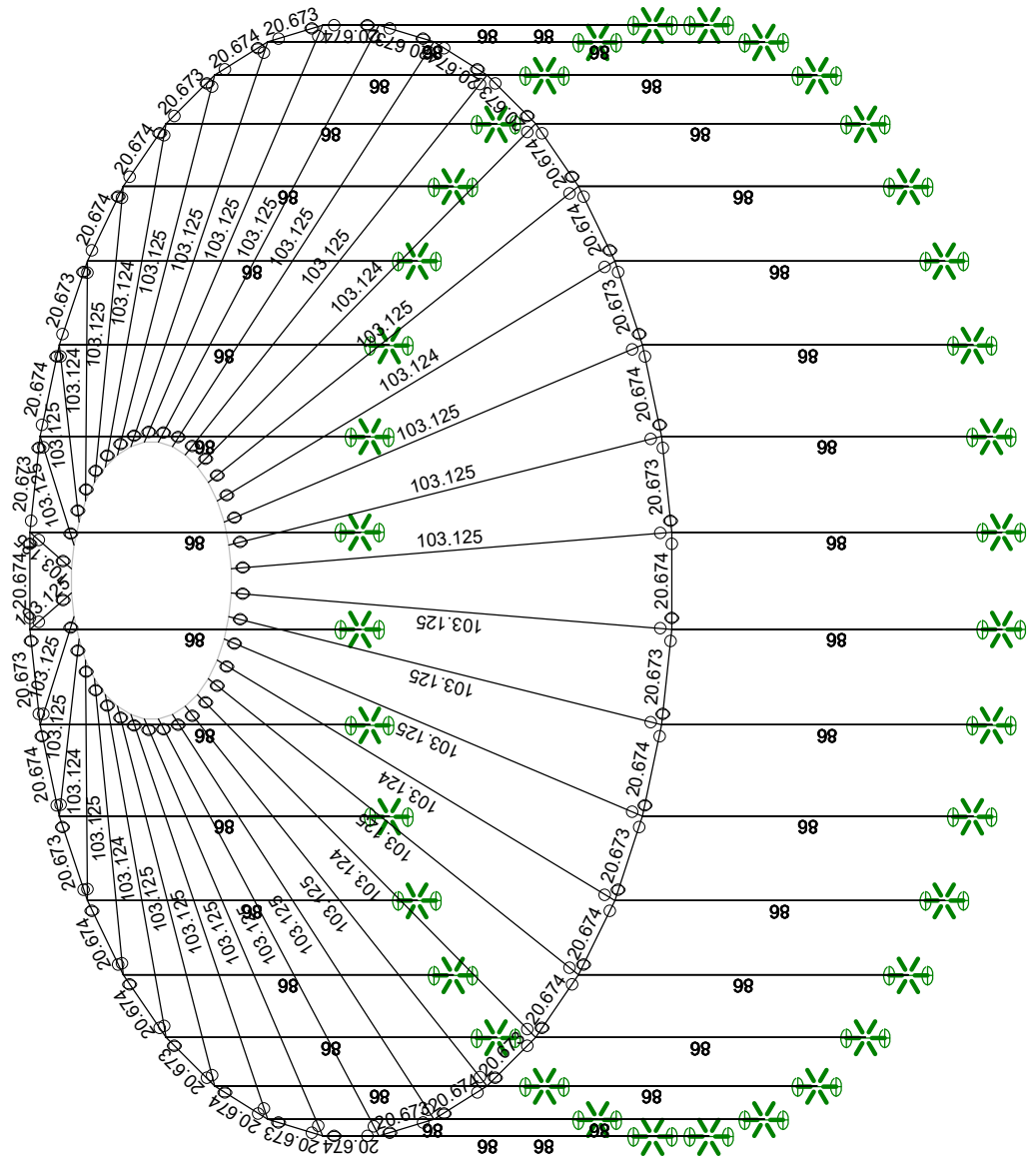
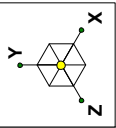


Envelope Only Solution

20' FULL SNOW & WIND
MEMBER LABELS

CO YURT COMPANY

20' FULL SNOW & WIND.R3D

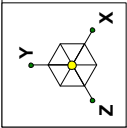


Member Length (in) Displayed
Envelope Only Solution

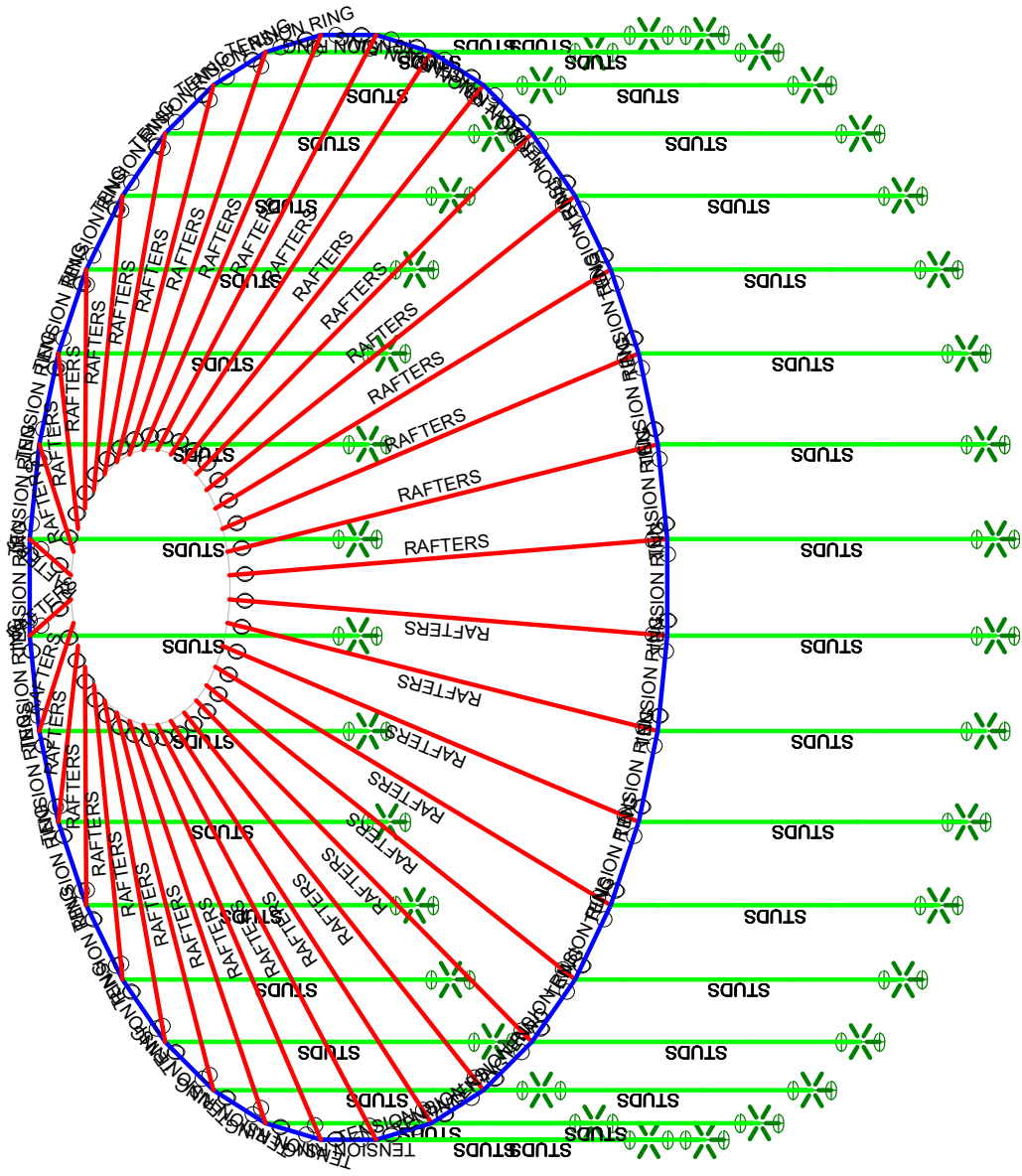
20' FULL SNOW & WIND
MEMBER LENGTHS (INCHES)

CO YURT COMPANY

20' FULL SNOW & WIND.R3D



- Section Sets
- TENSION RING
 - STUDS
 - RAFTERS
 - WD COMP RING
 - 40 MIL MEMBRANE

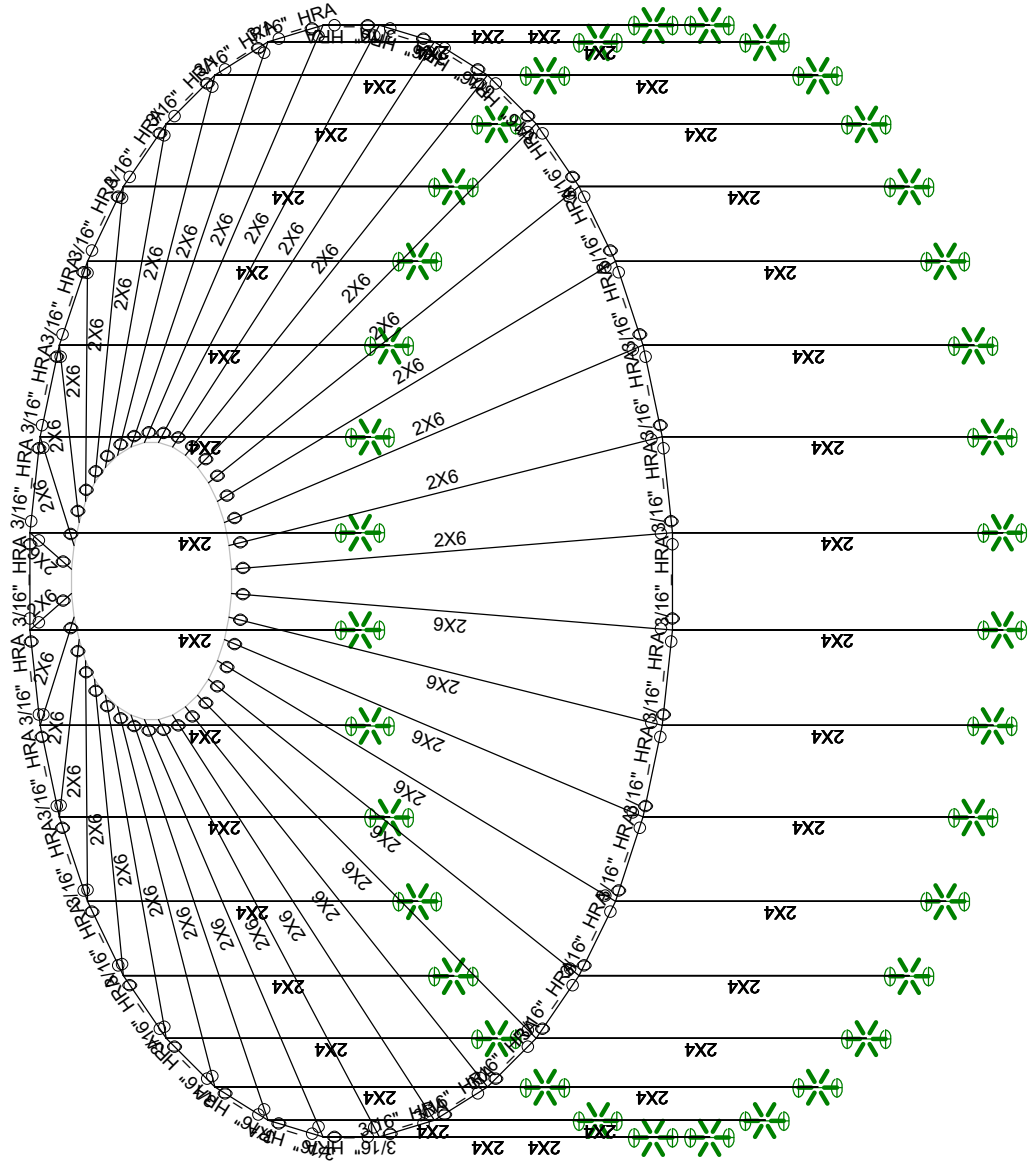
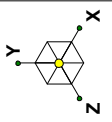


Envelope Only Solution

20' FULL SNOW & WIND
SECTION SET

CO YURT COMPANY

20' FULL SNOW & WIND.R3D

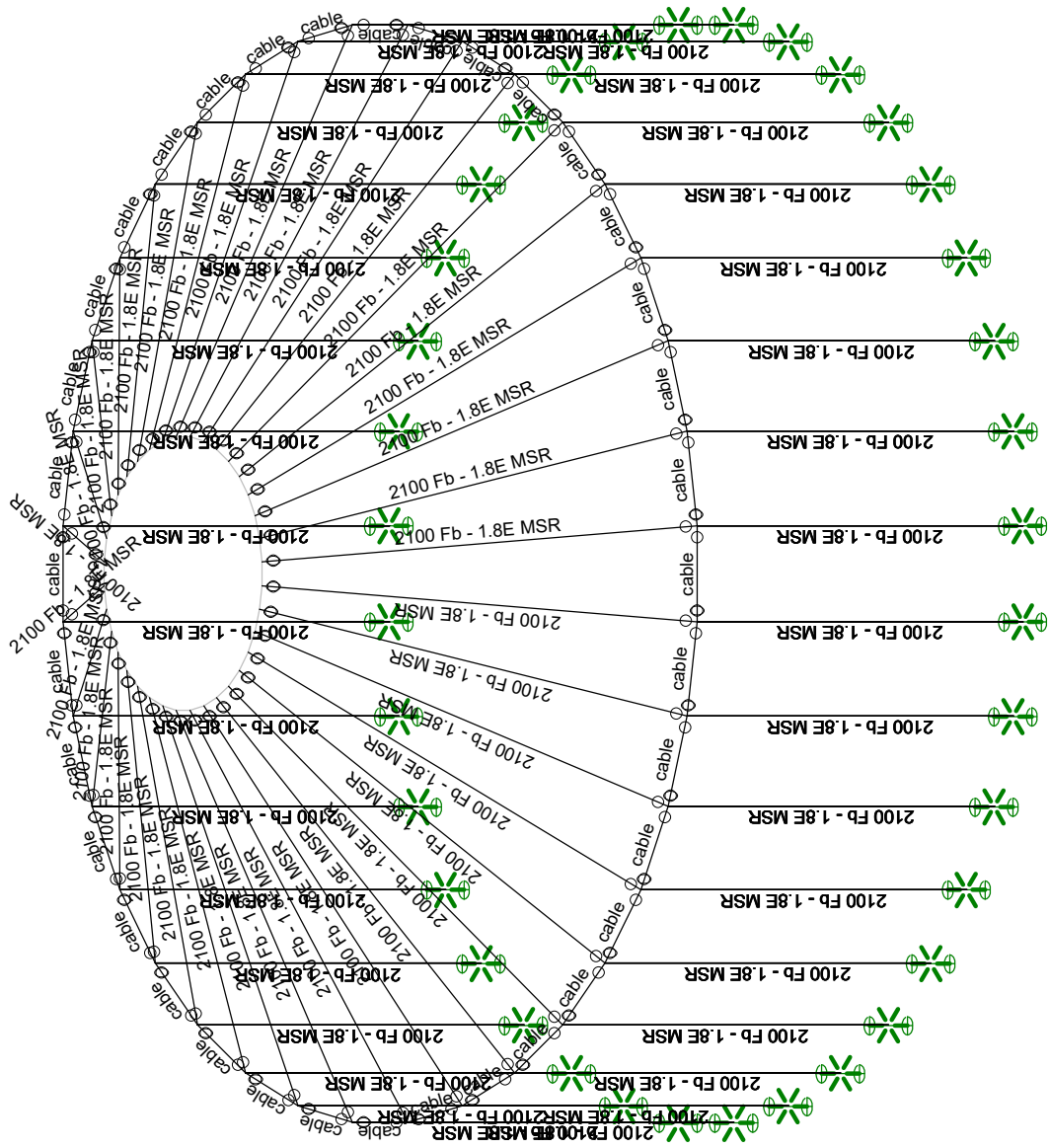
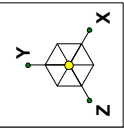


Envelope Only Solution

20' FULL SNOW & WIND
MEMBER SHAPES

CO YURT COMPANY

20' FULL SNOW & WIND.R3D

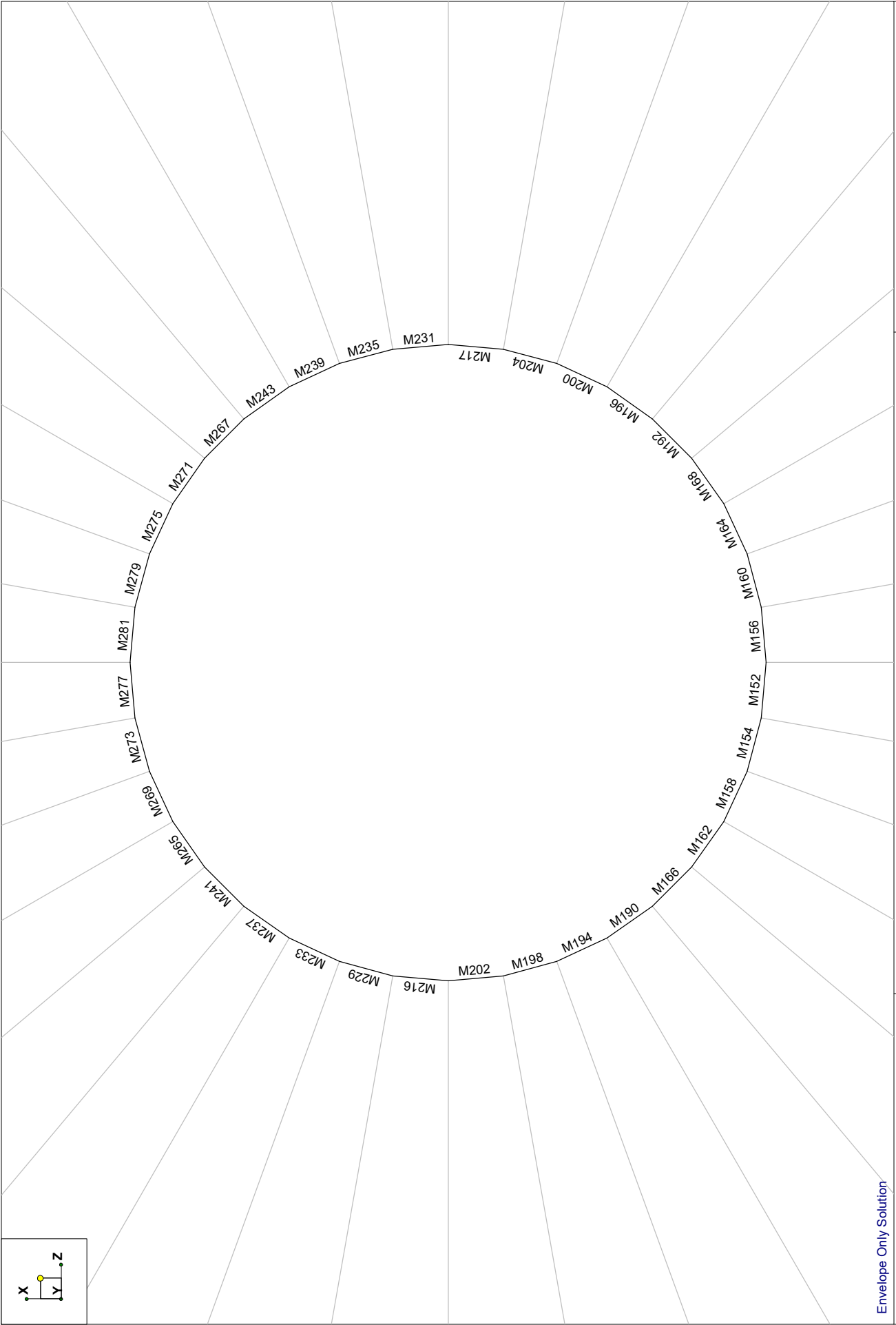
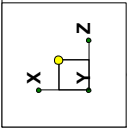


Envelope Only Solution

20' FULL SNOW & WIND
MEMBER MATERIALS

CO YURT COMPANY

20' FULL SNOW & WIND.R3D



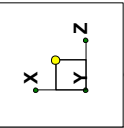
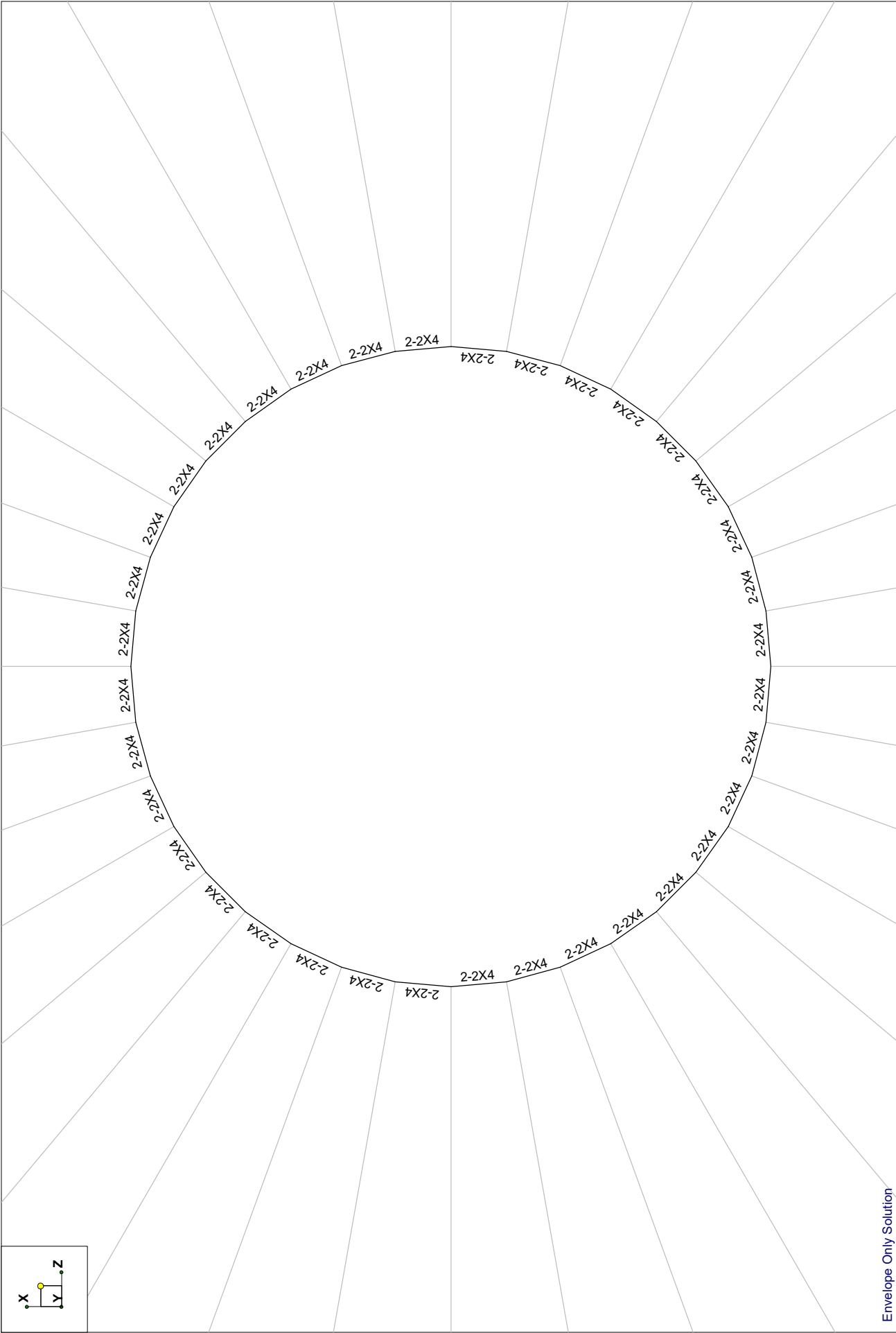
Envelope Only Solution

20' FULL SNOW & WIND

COMPRESSION RING MEMBER LABELS

CO YURT COMPANY

20' FULL SNOW & WIND.R3D

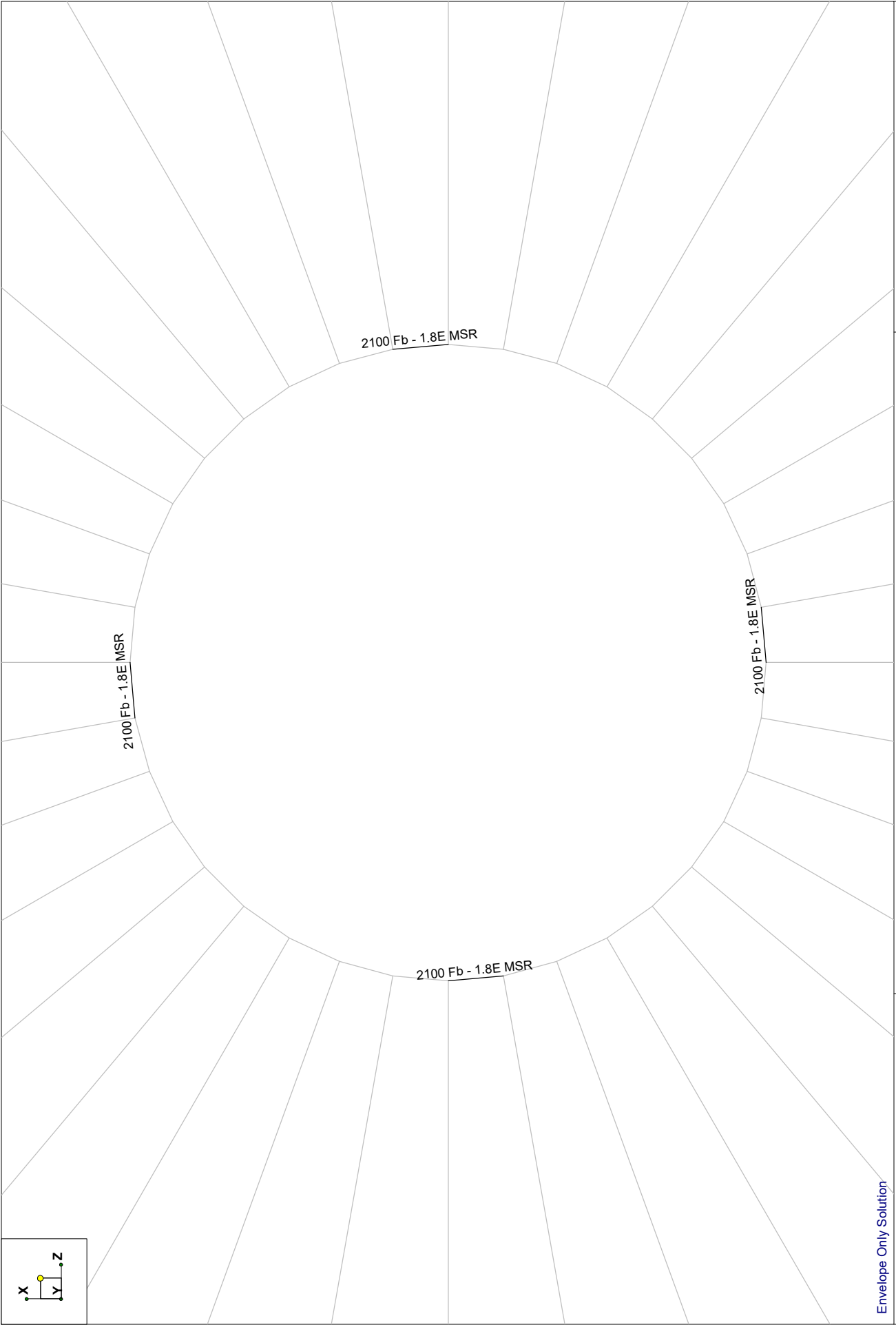
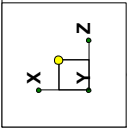


Envelope Only Solution

**20' FULL SNOW & WIND
COMPRESSION RING MEMBER SHAPES**

CO YURT COMPANY

20' FULL SNOW & WIND.R3D



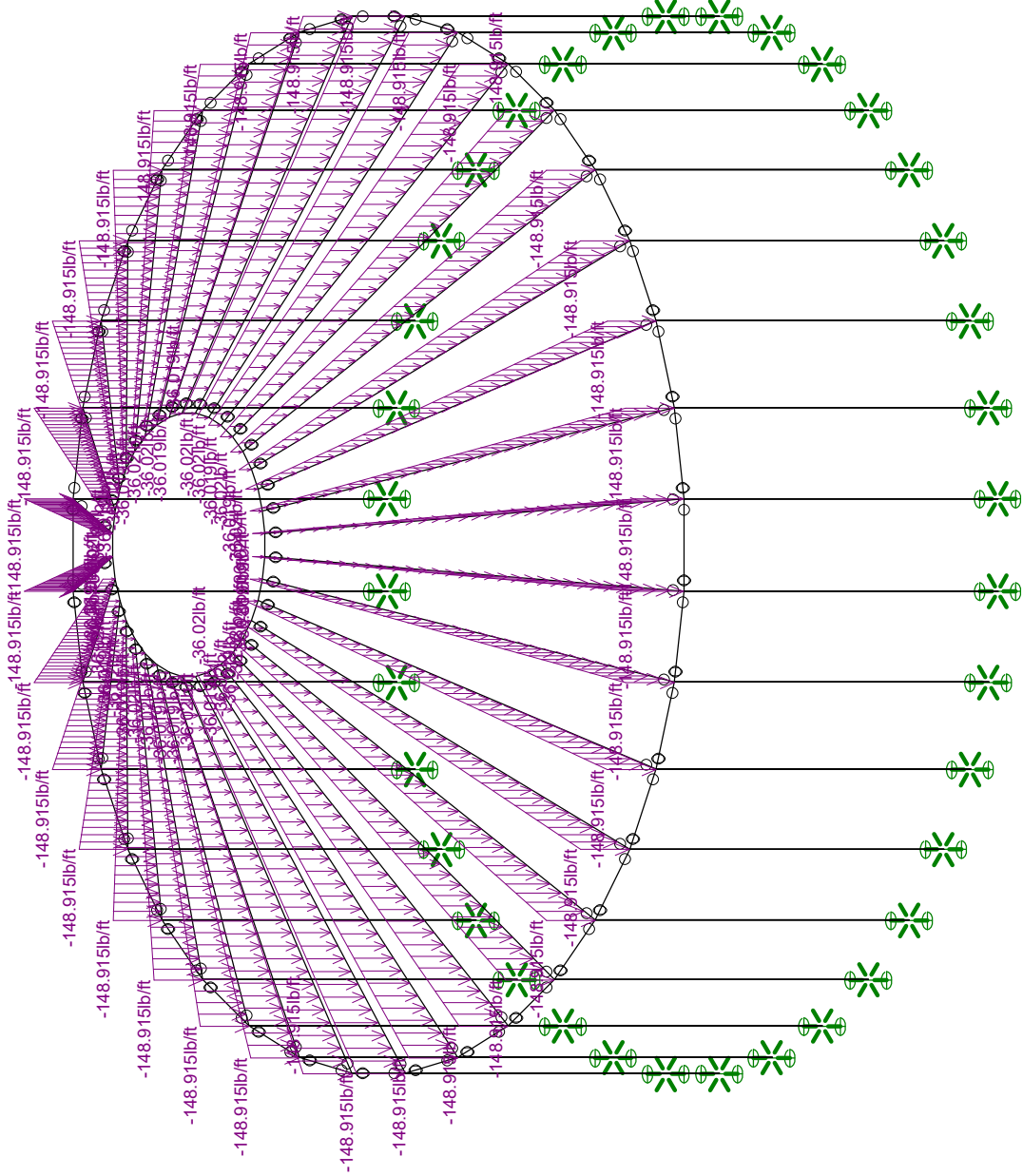
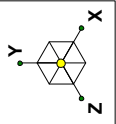
Envelope Only Solution

20' FULL SNOW & WIND

COMPRESSION RING MEMBER MATERIALS

CO YURT COMPANY

20' FULL SNOW & WIND.R3D

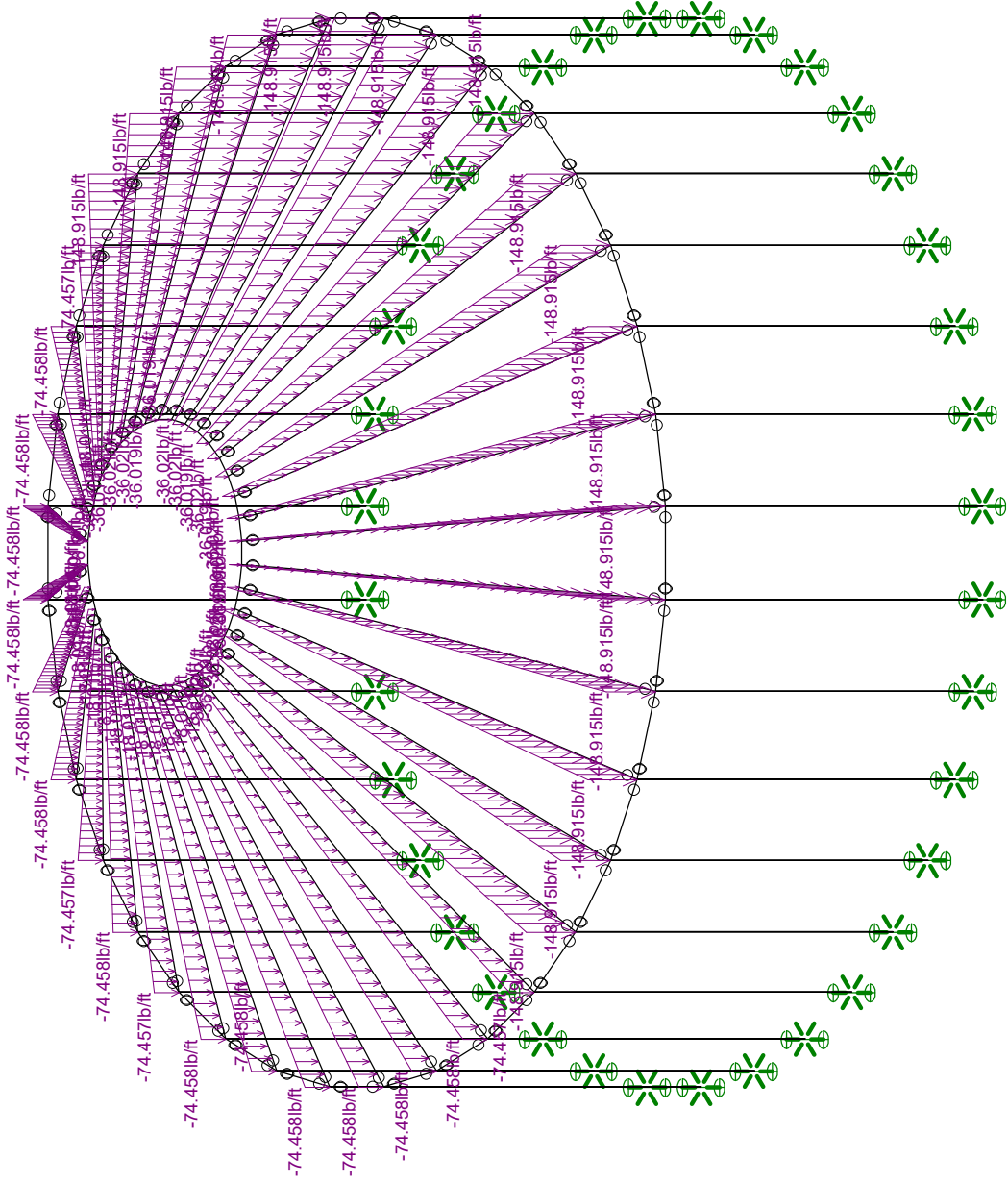
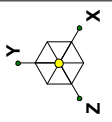


Loads: LC 1, SL BAL
Envelope Only Solution

20' FULL SNOW & WIND
SLOPED ROOF SNOW LOAD

CO YURT COMPANY

20' FULL SNOW & WIND.R3D



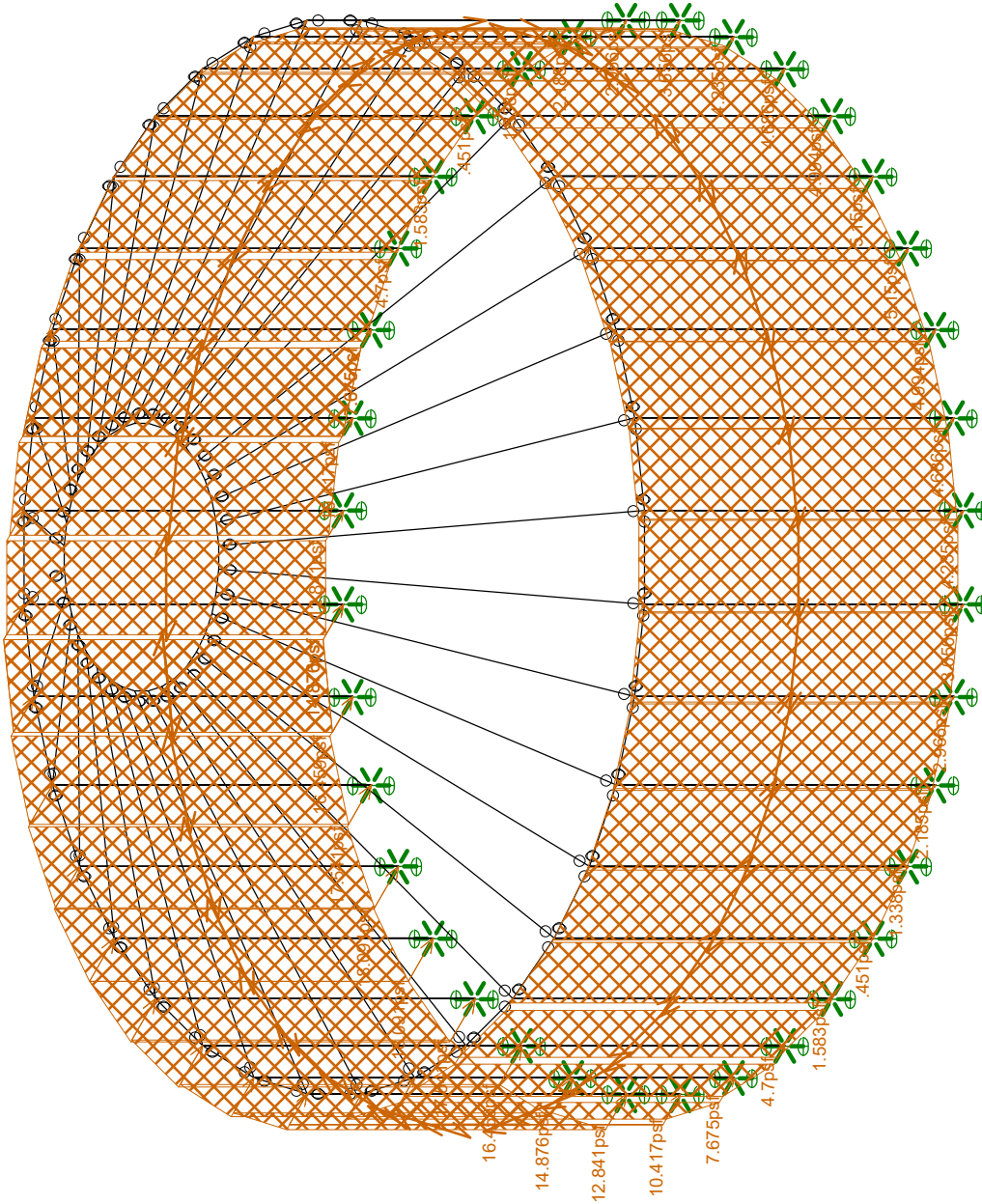
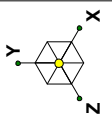
Loads: LC 2, SL UNBAL
Envelope Only Solution

20' FULL SNOW & WIND

UNBALANCED SLOPED ROOF SNOW LOAD

CO YURT COMPANY

20' FULL SNOW & WIND.R3D

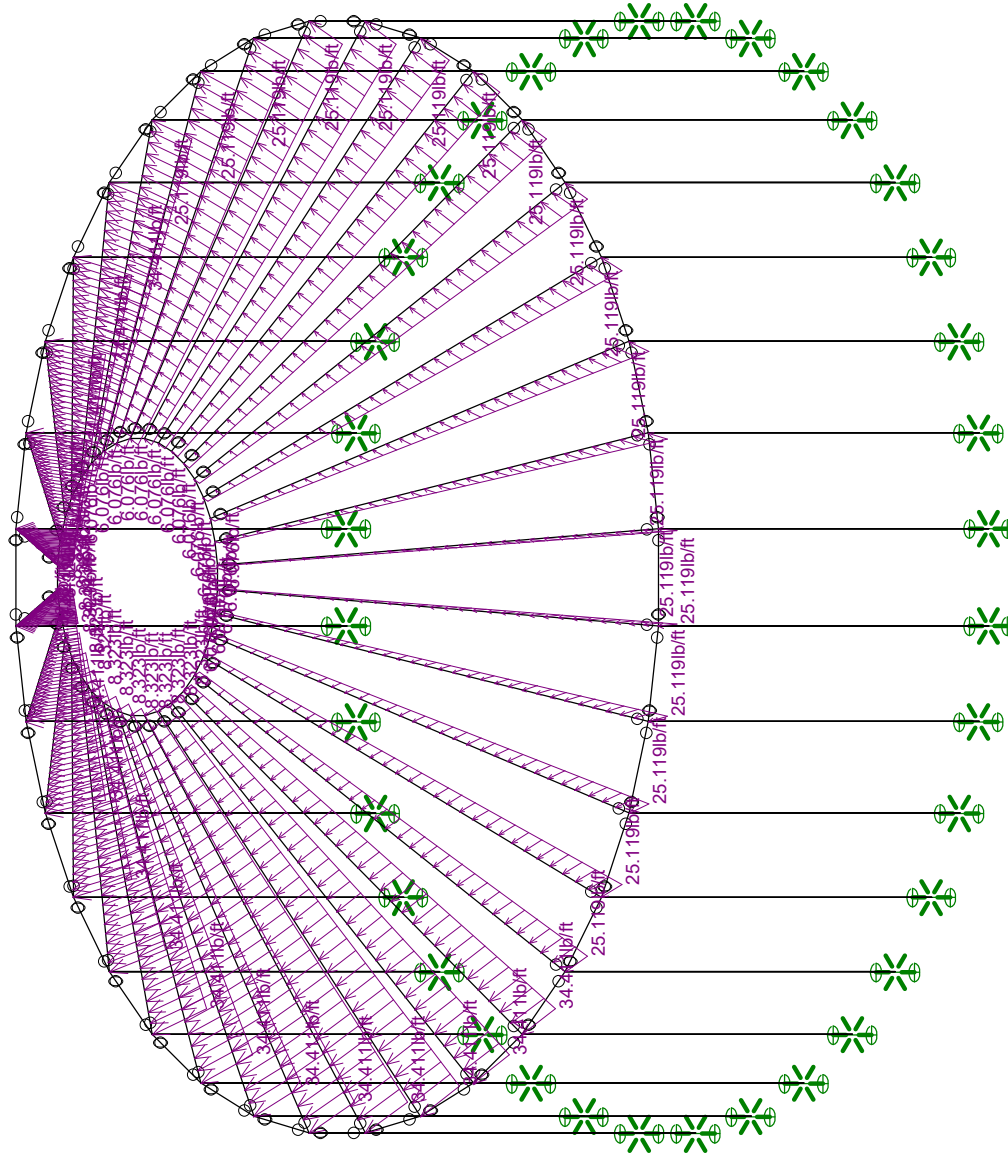
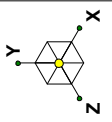


Loads: LC 3, WALL WL
Envelope Only Solution

20' FULL SNOW & WIND
WALL WIND LOADS

CO YURT COMPANY

20' FULL SNOW & WIND.R3D

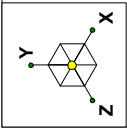
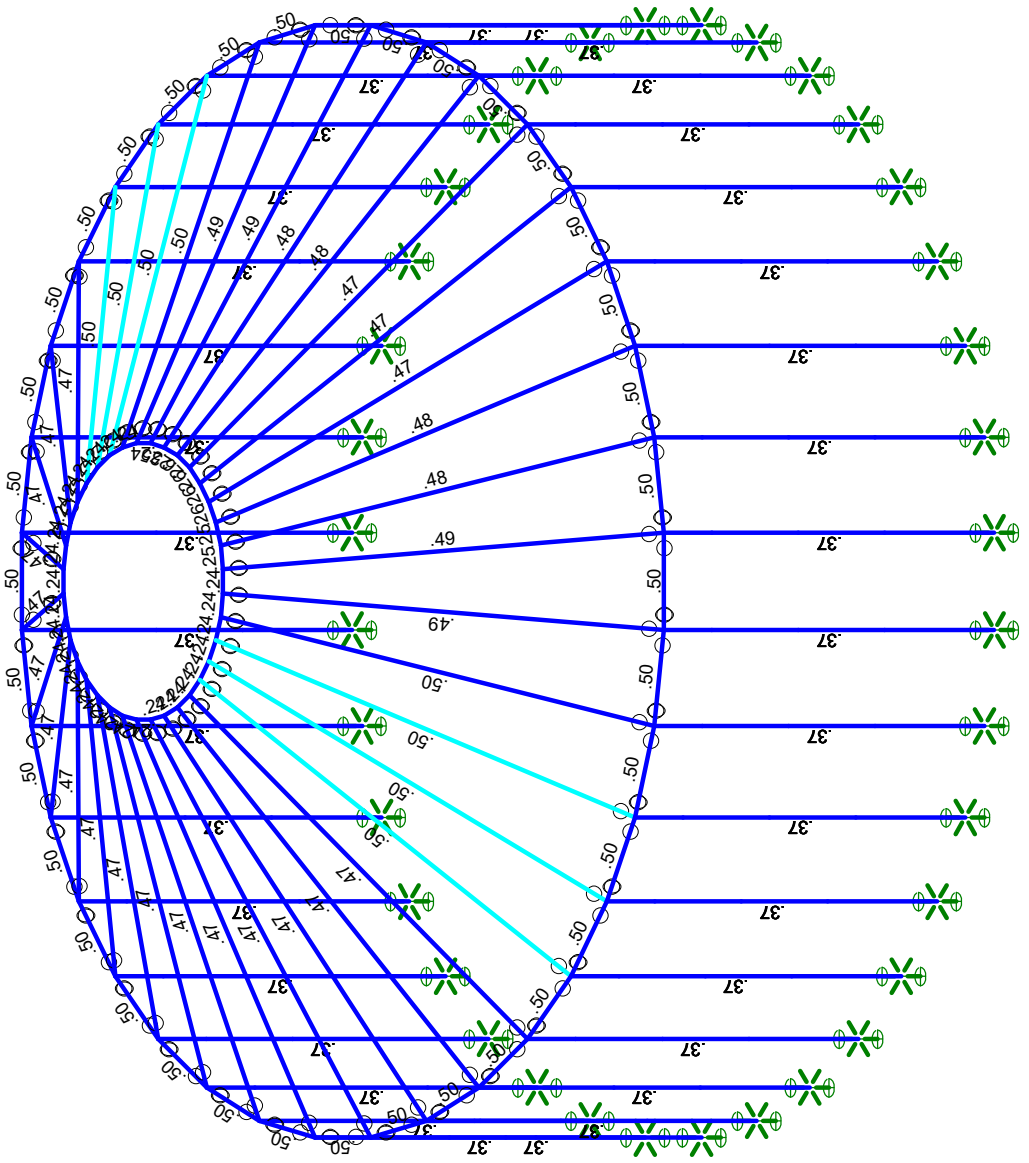
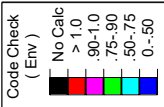


Loads: LC 4, ROOF WL
Envelope Only Solution

20' FULL SNOW & WIND
ROOF WIND LOADS

CO YURT COMPANY

20' FULL SNOW & WIND.R3D



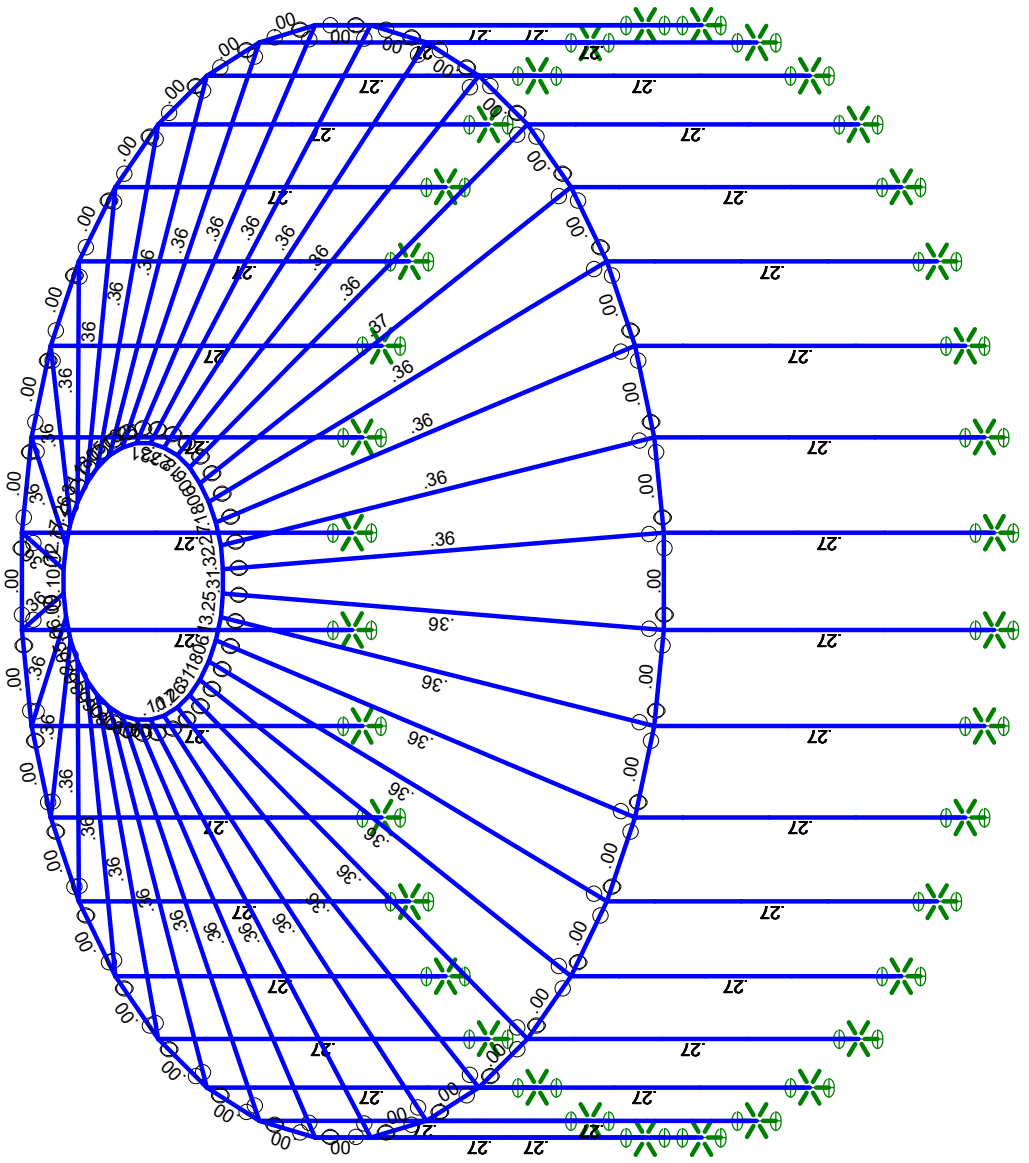
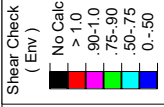
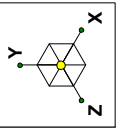
Member Code Checks Displayed (Enveloped)
Envelope Only Solution

20' FULL SNOW & WIND

ENVELOPE CODE CHECK (BENDING)

CO YURT COMPANY

20' FULL SNOW & WIND.R3D



Member Shear Checks Displayed (Enveloped)
Envelope Only Solution

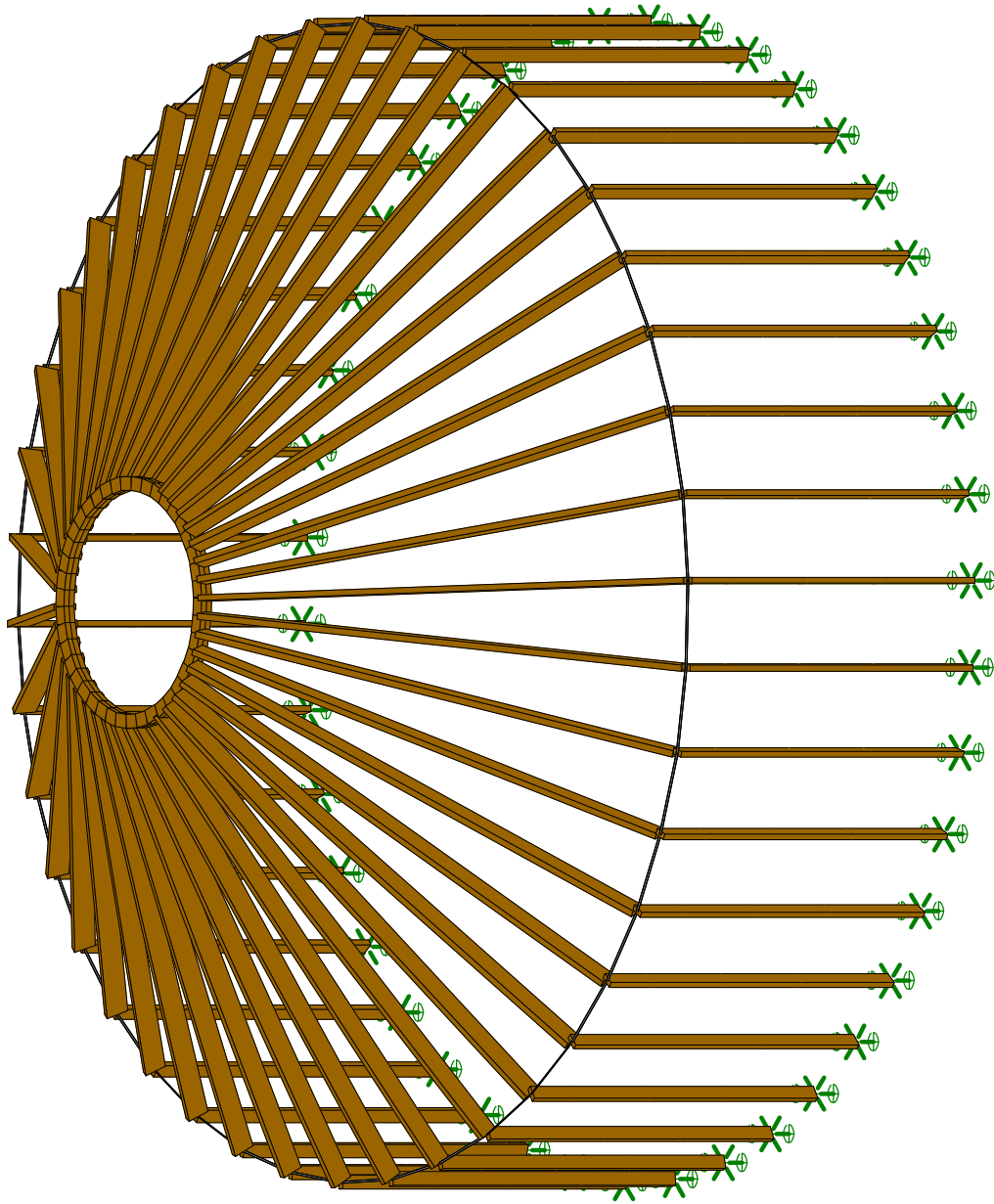
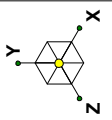
20' FULL SNOW & WIND

ENVELOPE CODE CHECK (SHEAR)

CO YURT COMPANY

20' FULL SNOW & WIND.R3D

24' Diameter Yurt

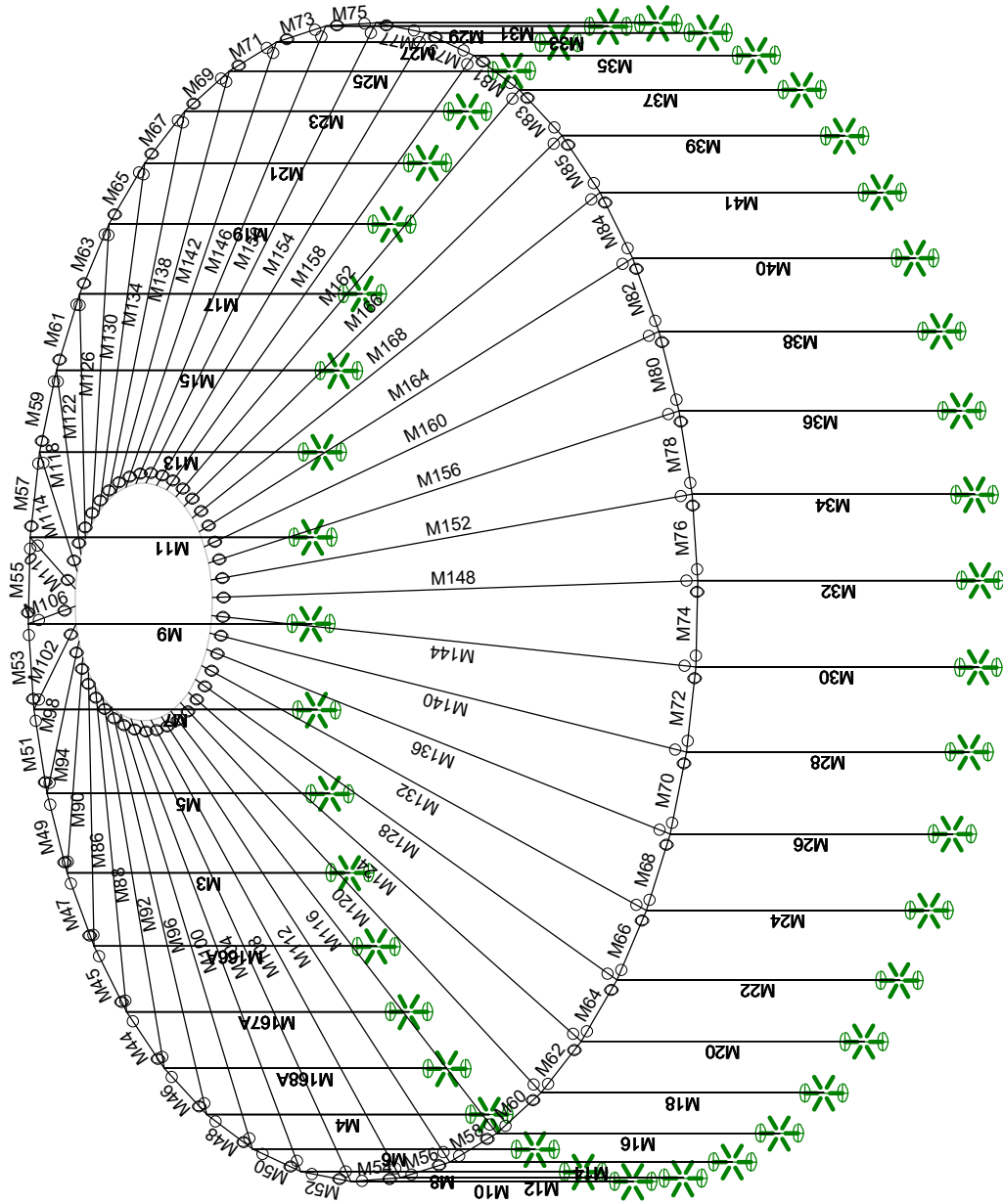
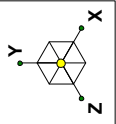


Envelope Only Solution

24' FULL SNOW & WIND
BASIC MODEL

CO YURT COMPANY

24' FULL SNOW & WIND.r3d

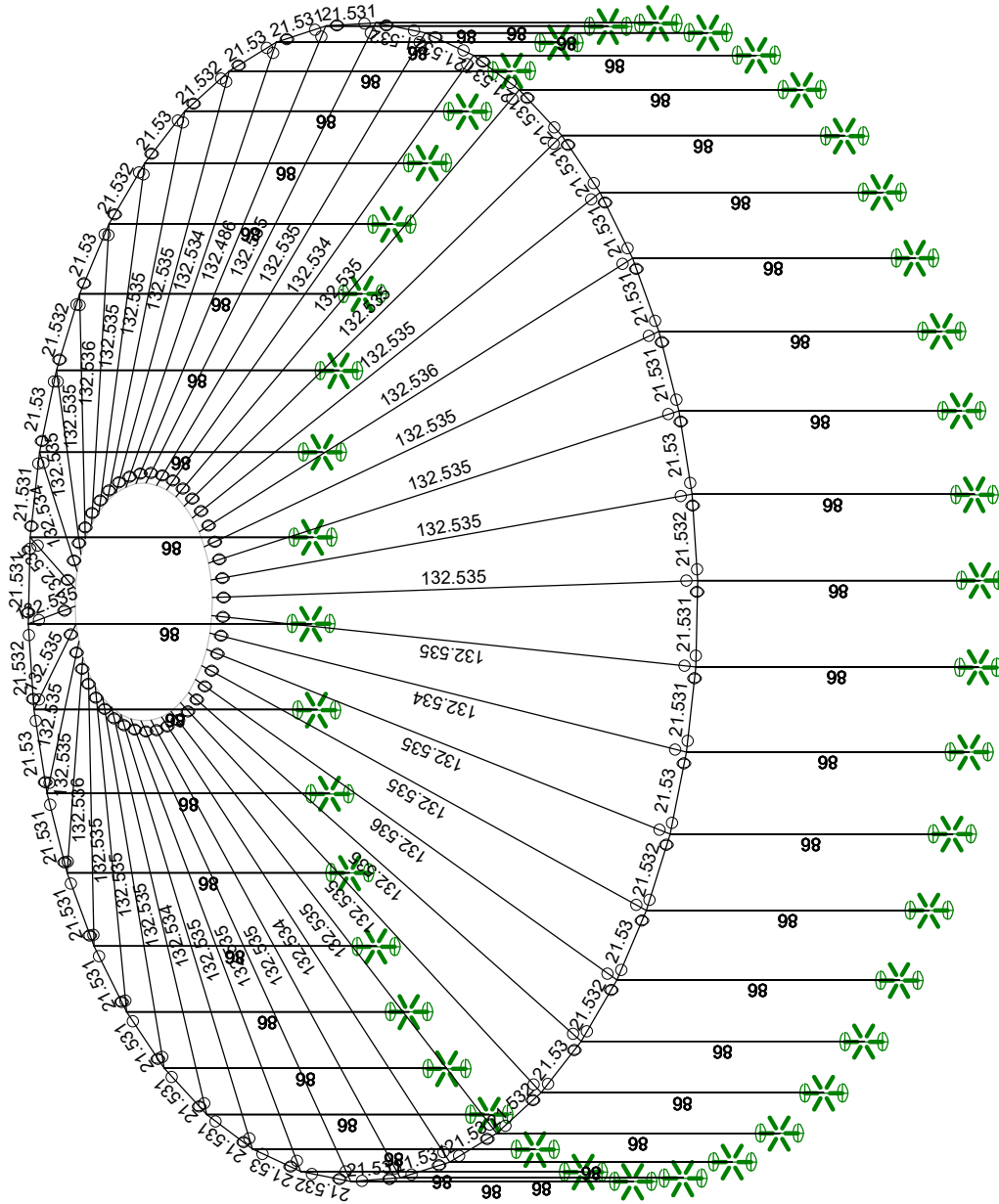
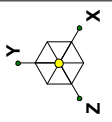


Envelope Only Solution

24' FULL SNOW & WIND
MEMBER LABELS

CO YURT COMPANY

24' FULL SNOW & WIND.r3d

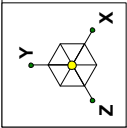


Member Length (in) Displayed
Envelope Only Solution

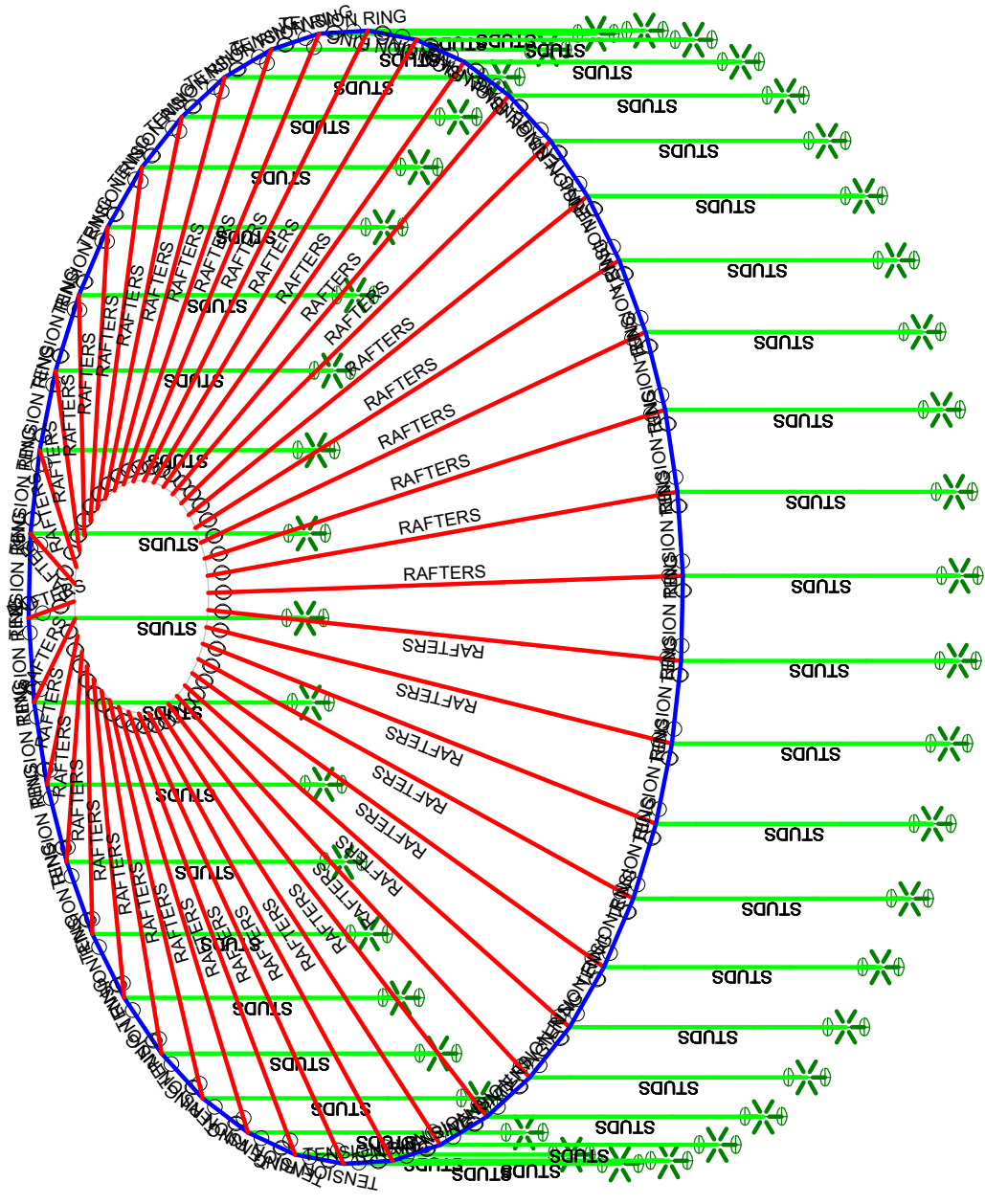
24' FULL SNOW & WIND
MEMBER LENGTHS (INCHES)

CO YURT COMPANY

24' FULL SNOW & WIND.r3d



- Section Sets
- TENSION RING
 - STUDS
 - RAFTERS
 - WD COMP RING
 - 40 MIL MEMBRANE

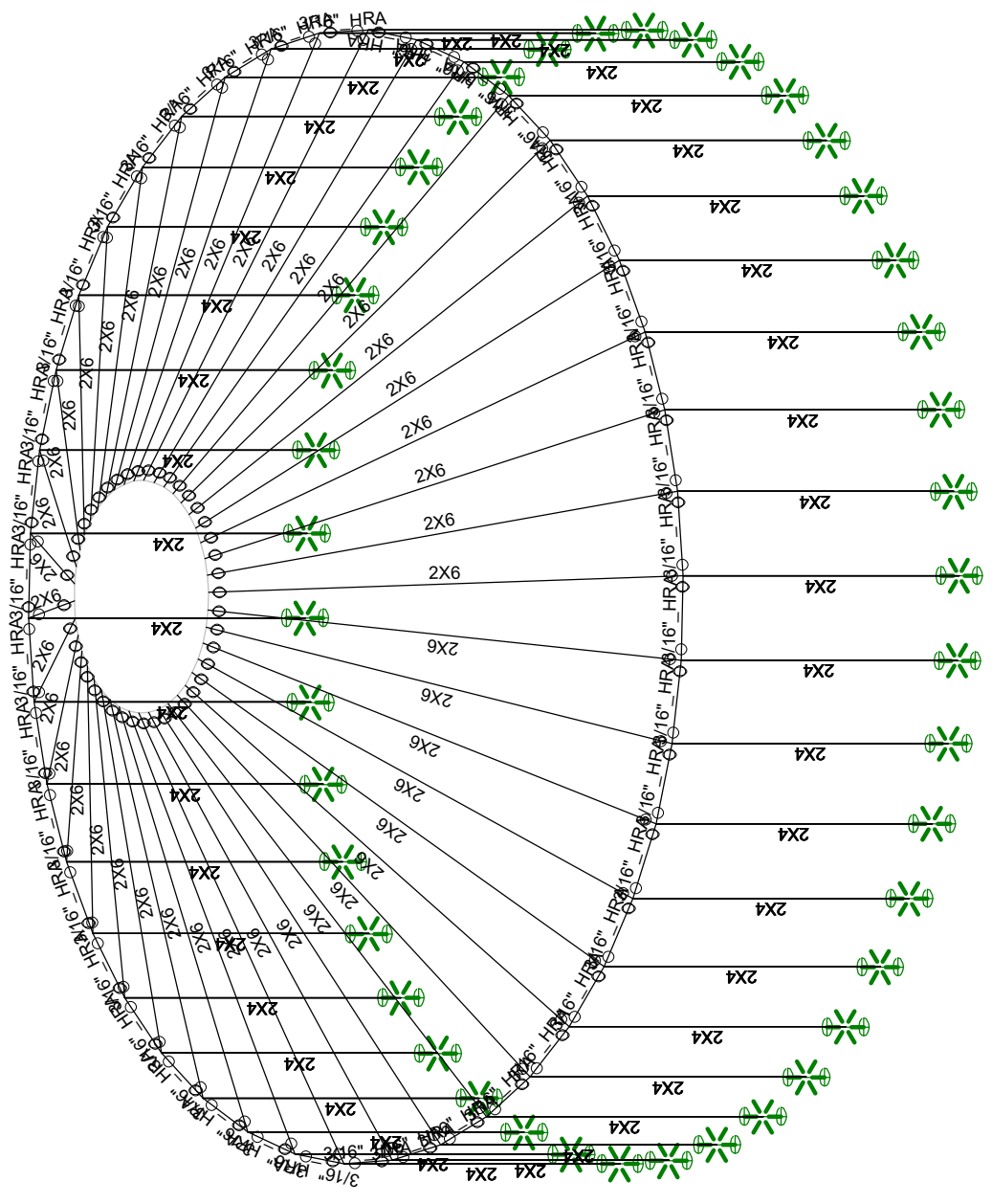
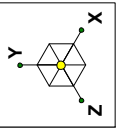


Envelope Only Solution

24' FULL SNOW & WIND
SECTION SET

CO YURT COMPANY

24' FULL SNOW & WIND.r3d

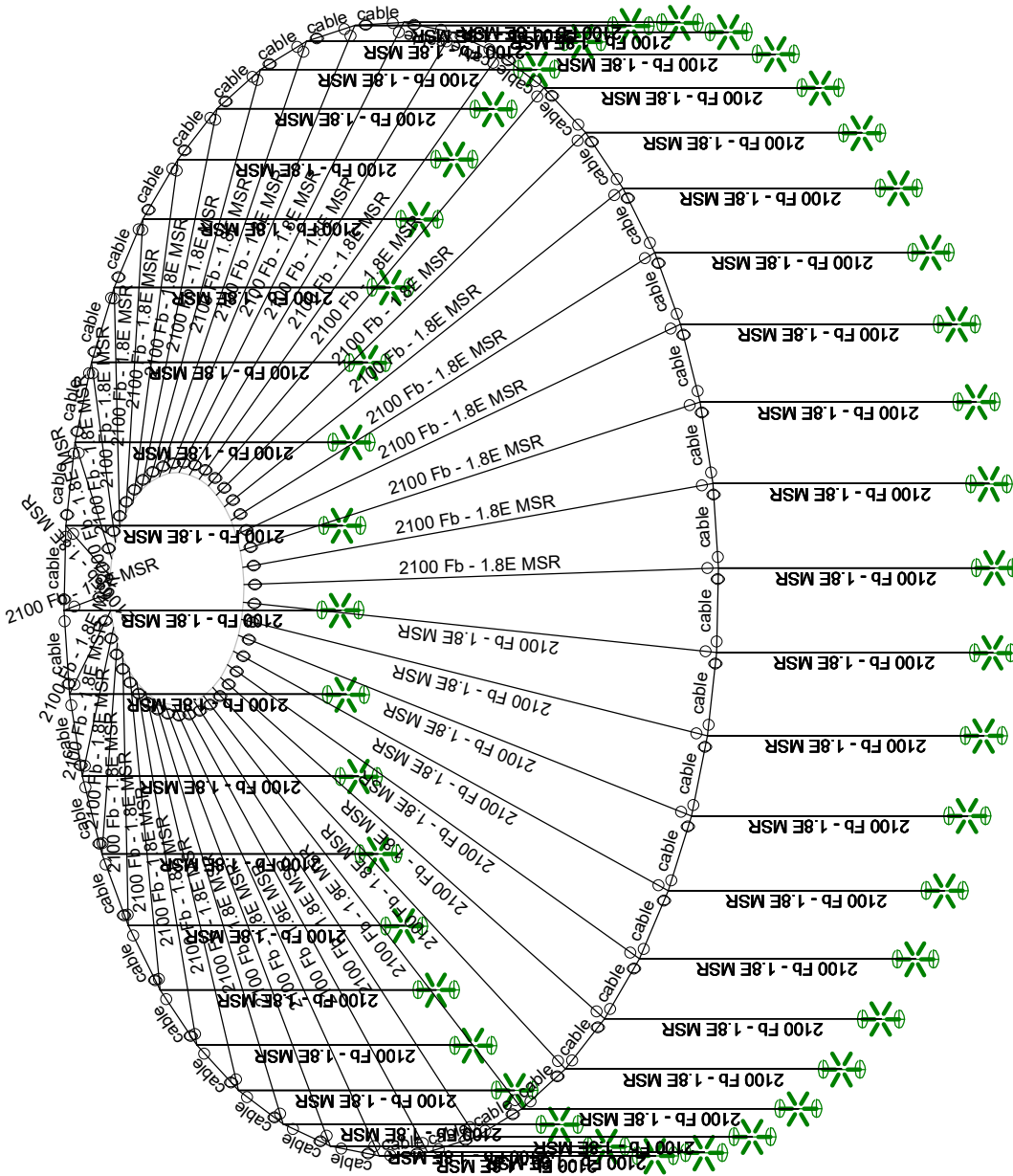
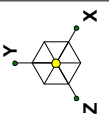


Envelope Only Solution

24' FULL SNOW & WIND
MEMBER SHAPES

CO YURT COMPANY

24' FULL SNOW & WIND.r3d

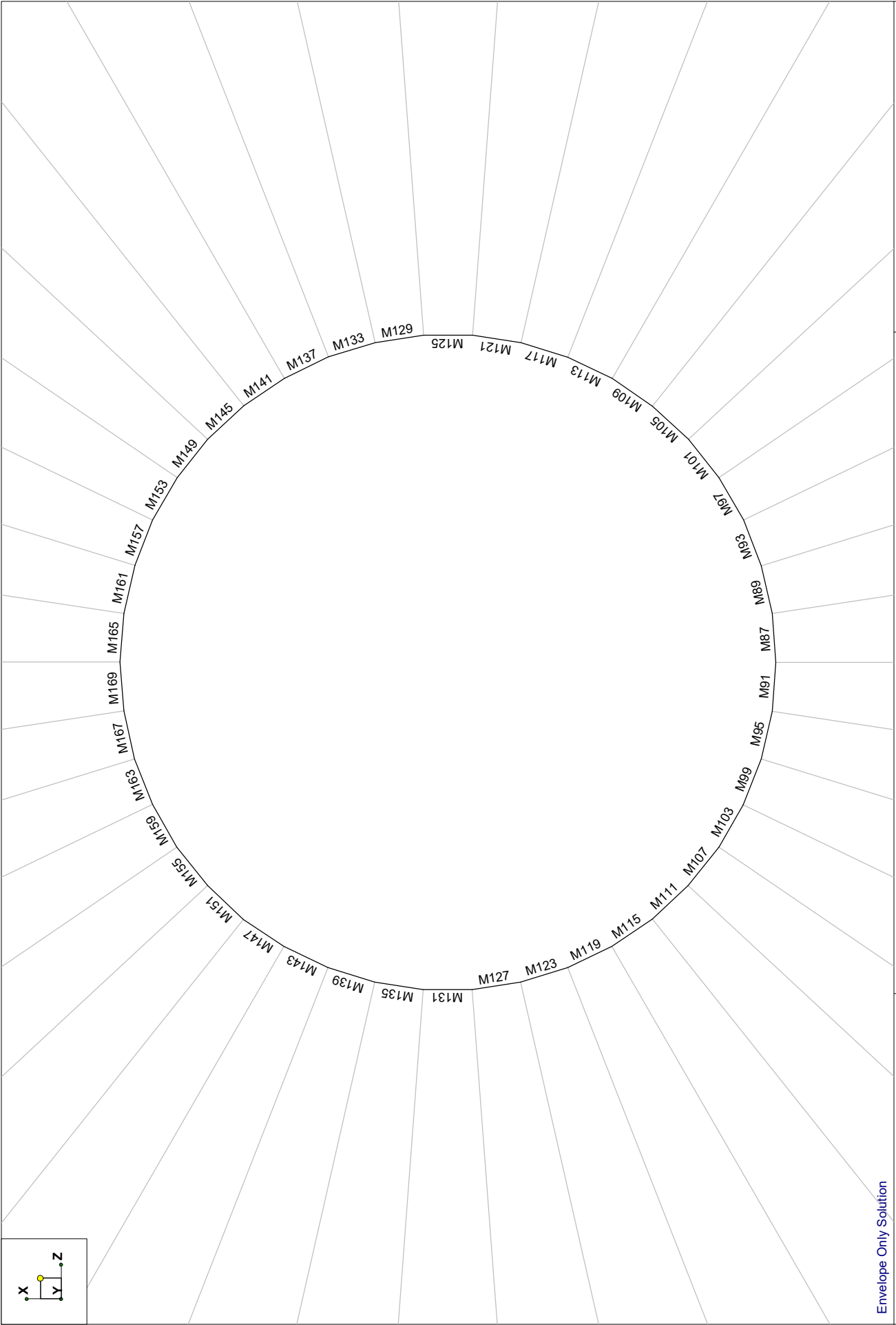
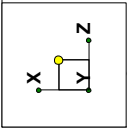


Envelope Only Solution

24' FULL SNOW & WIND
MEMBER MATERIALS

CO YURT COMPANY

24' FULL SNOW & WIND.r3d

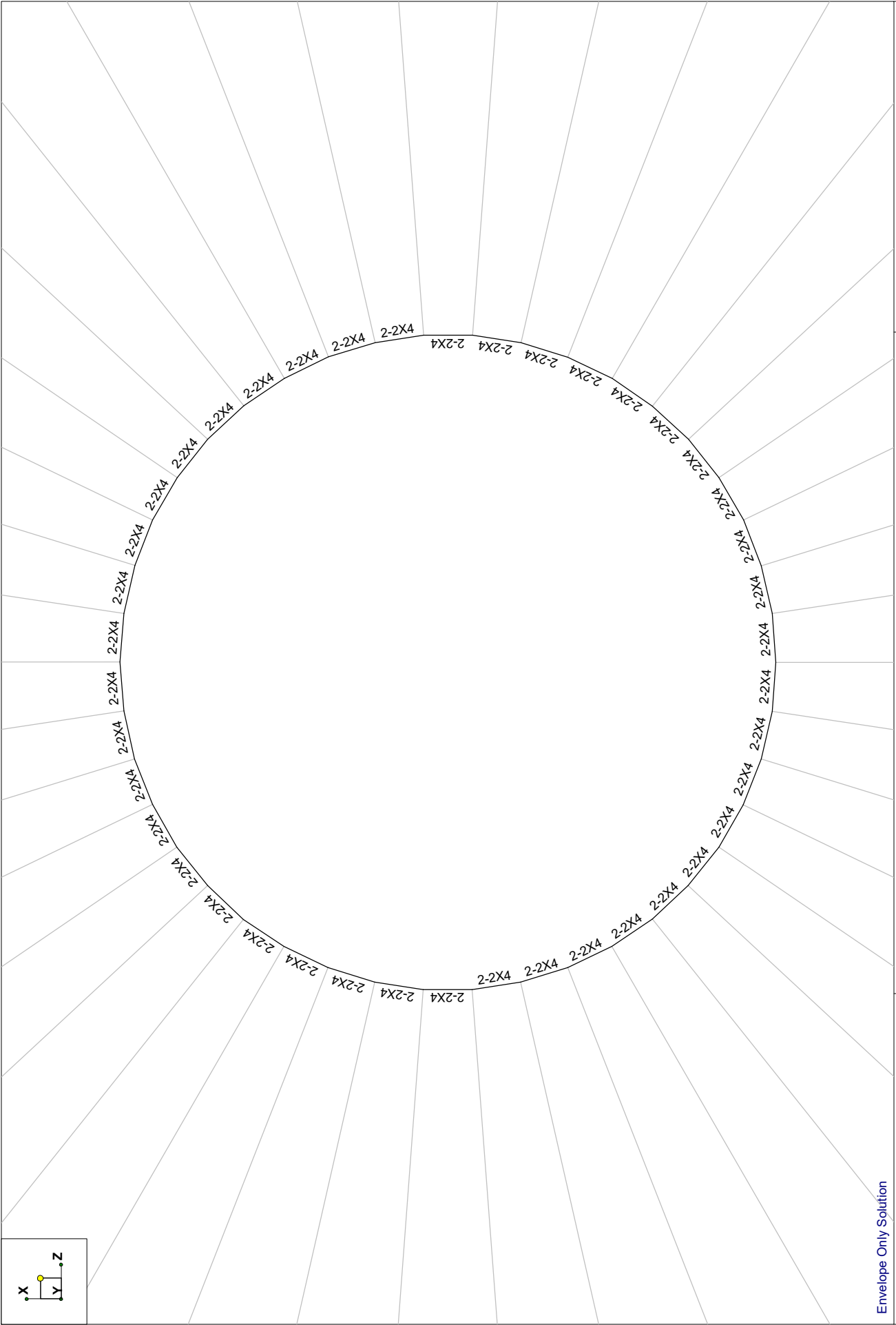
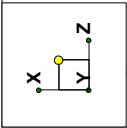


Envelope Only Solution

24' FULL SNOW & WIND
COMPRESSION RING MEMBER LABELS

CO YURT COMPANY

24' FULL SNOW & WIND.r3d

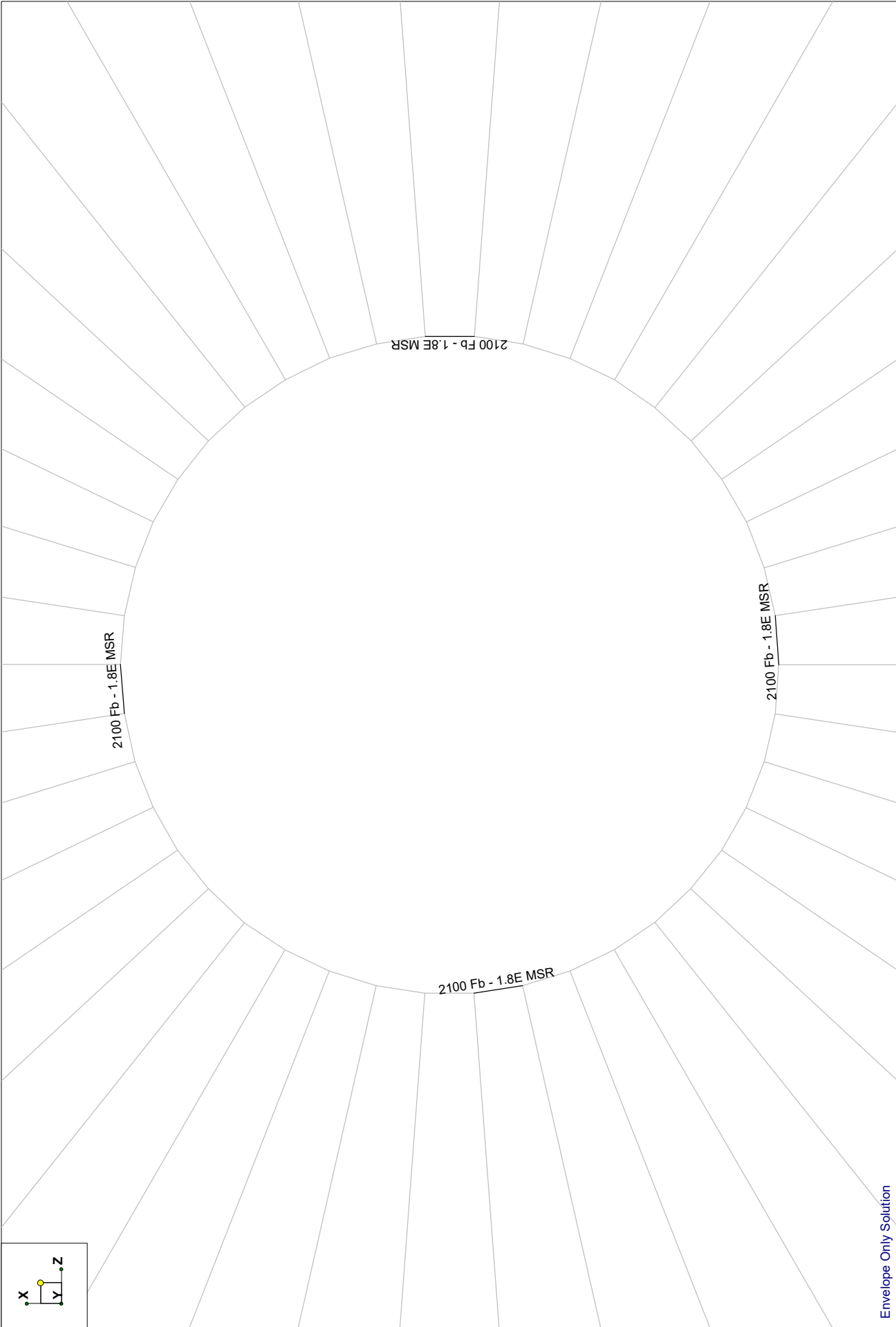


Envelope Only Solution

24' FULL SNOW & WIND
COMPRESSION RING MEMBER SHAPES

CO YURT COMPANY

24' FULL SNOW & WIND.r3d



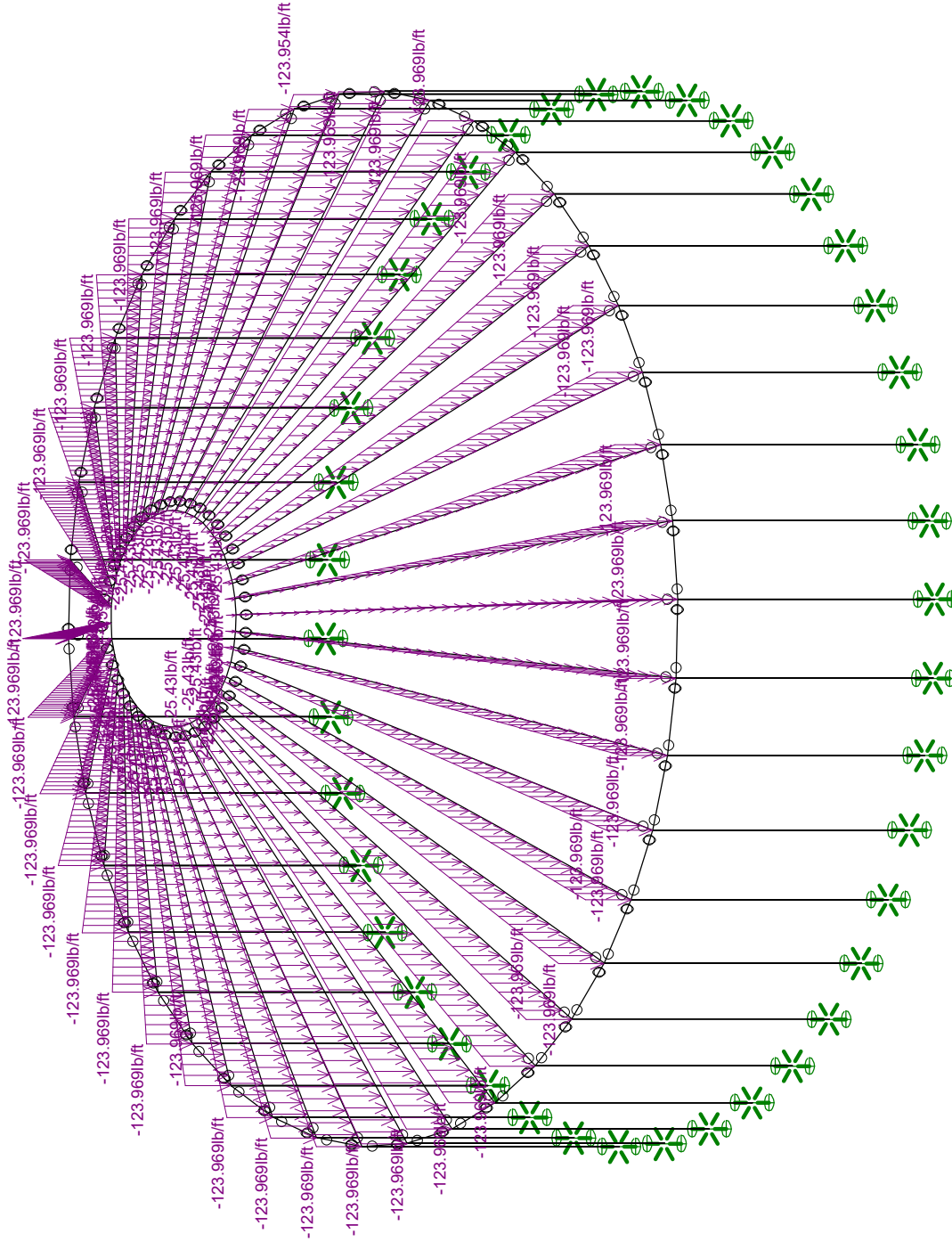
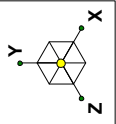
Envelope Only Solution

24' FULL SNOW & WIND

COMPRESSION RING MEMBER MATERIALS

CO YURT COMPANY

24' FULL SNOW & WIND.r3d

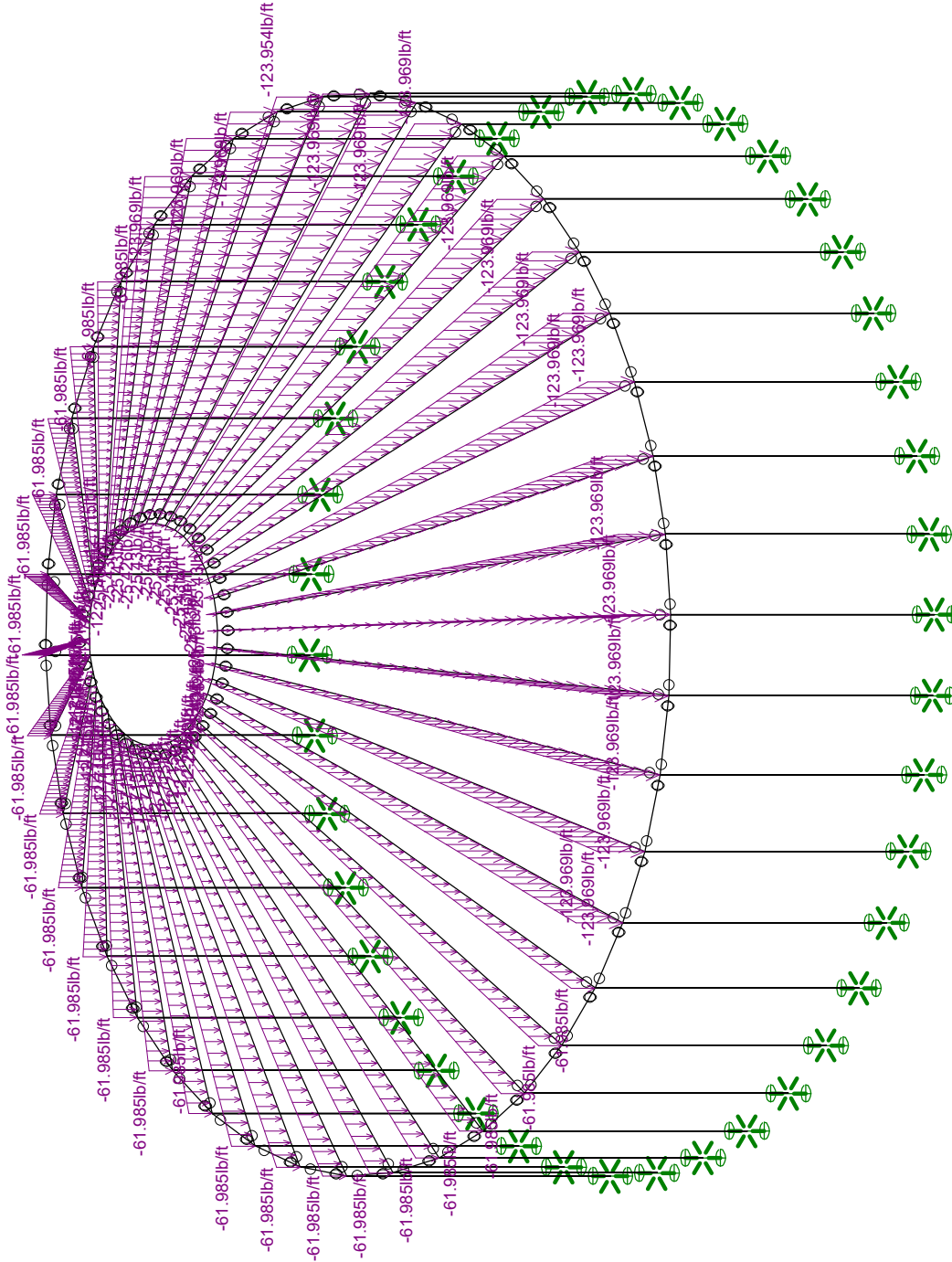
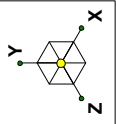


Loads: LC 1, SL BAL
Envelope Only Solution

24' FULL SNOW & WIND
SLOPED ROOF SNOW LOAD

CO YURT COMPANY

24' FULL SNOW & WIND.r3d



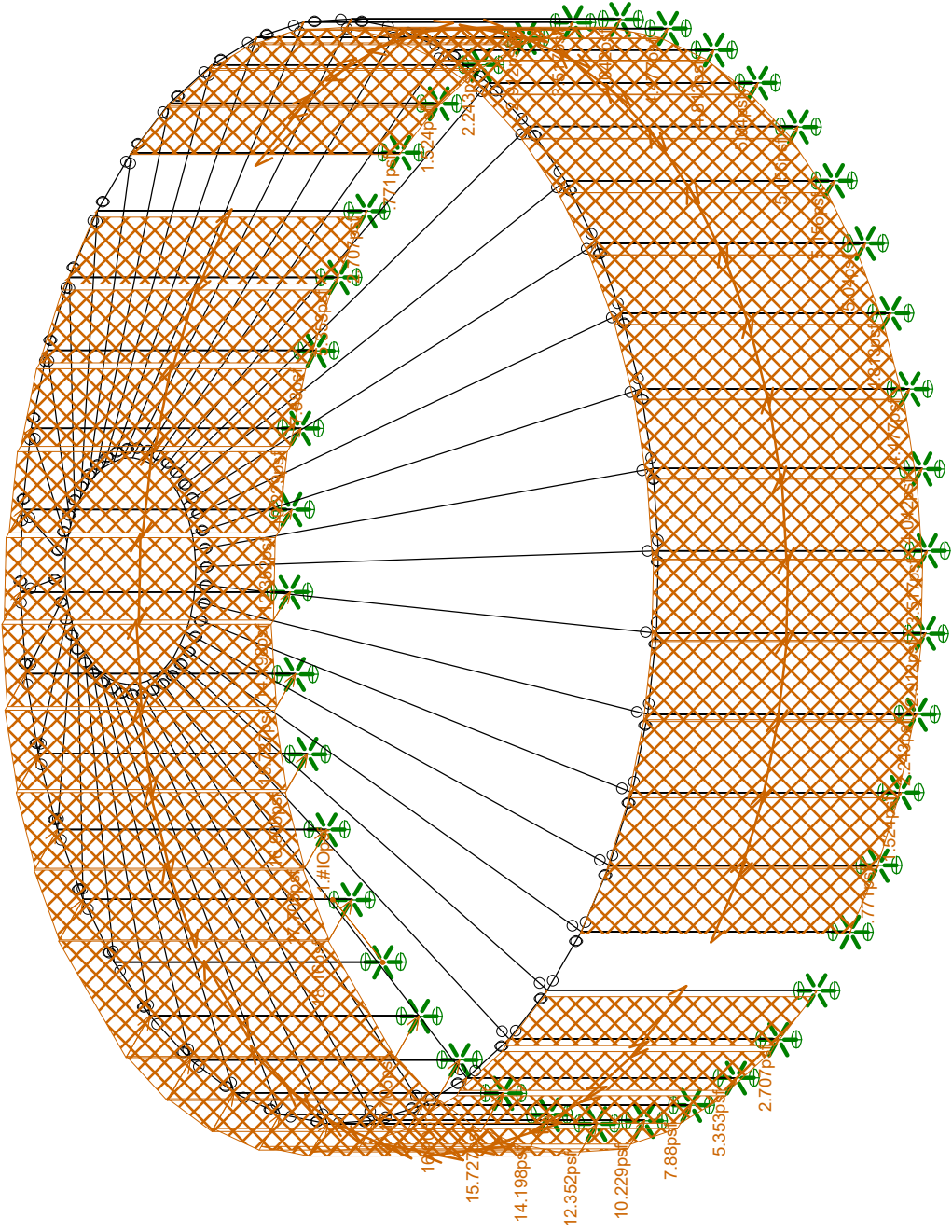
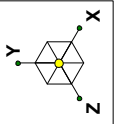
Loads: LC 2, SL UNBAL
Envelope Only Solution

24' FULL SNOW & WIND

UNBALANCED SLOPED ROOF SNOW LOAD

CO YURT COMPANY

24' FULL SNOW & WIND.r3d

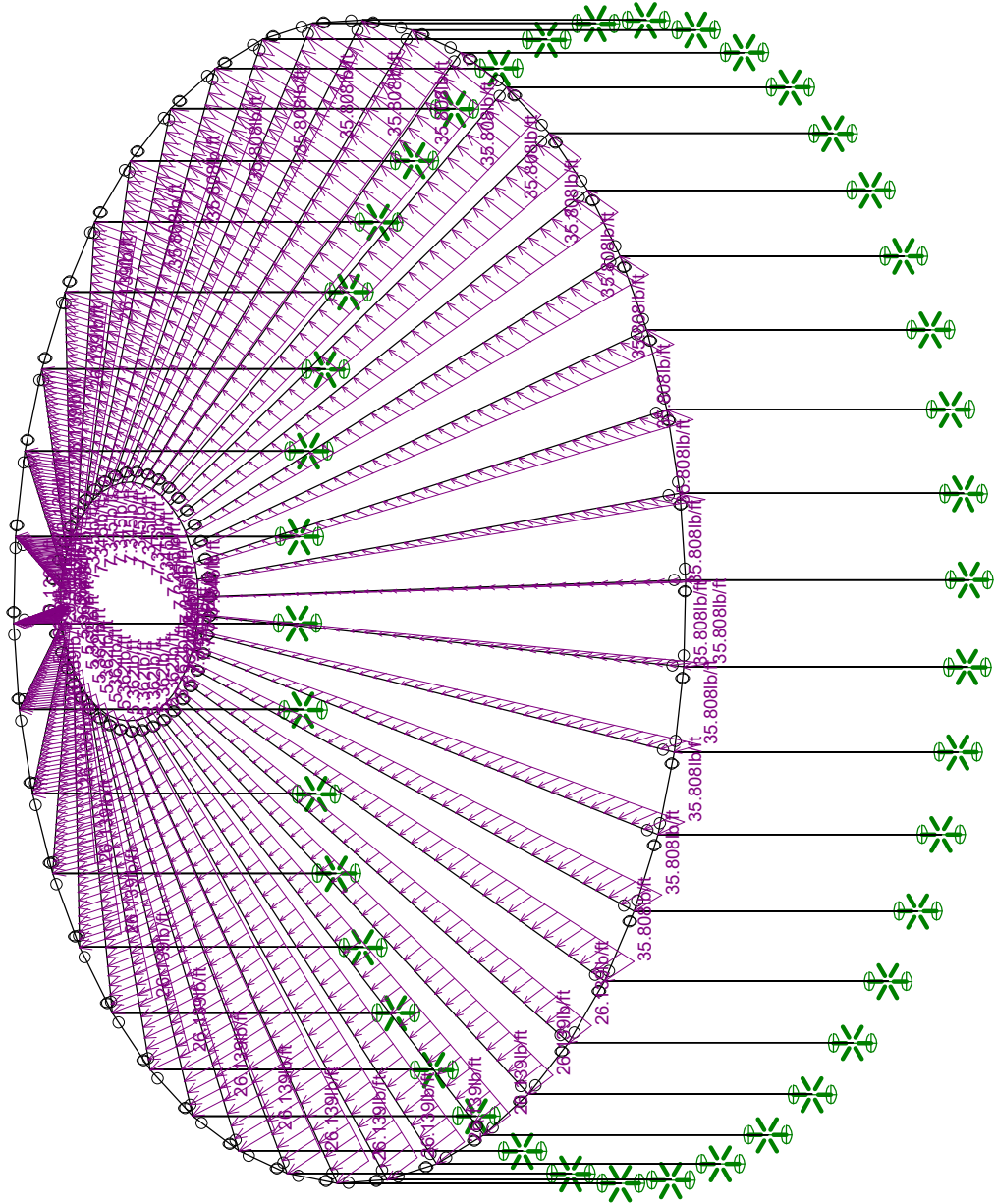
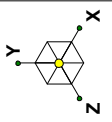


Loads: LC 3, WALL WL
Envelope Only Solution

24' FULL SNOW & WIND
WALL WIND LOADS

CO YURT COMPANY

24' FULL SNOW & WIND.r3d

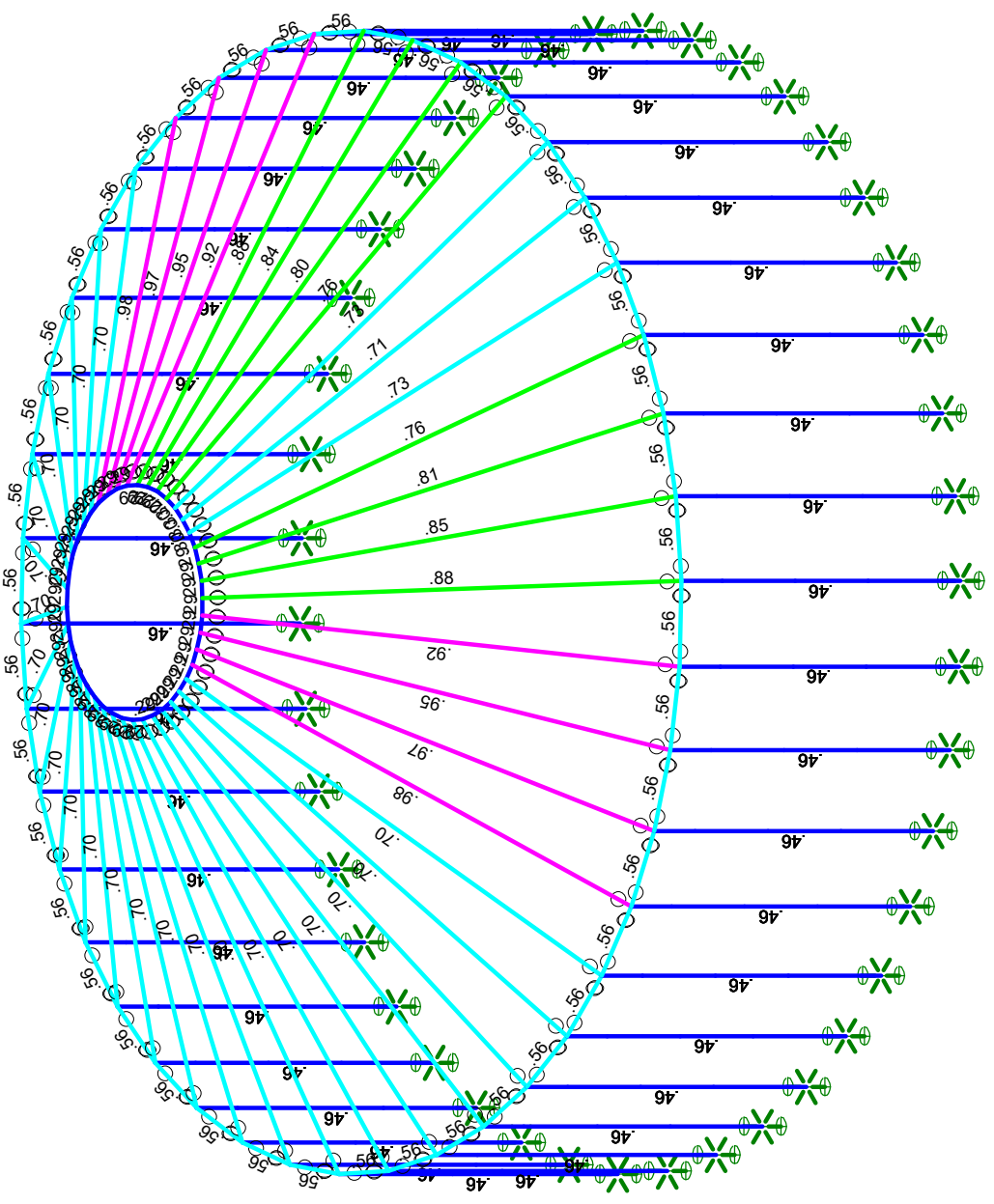
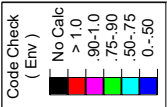
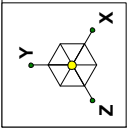


Loads: LC 4, ROOF WL
Envelope Only Solution

24' FULL SNOW & WIND
ROOF WIND LOADS

CO YURT COMPANY

24' FULL SNOW & WIND.r3d

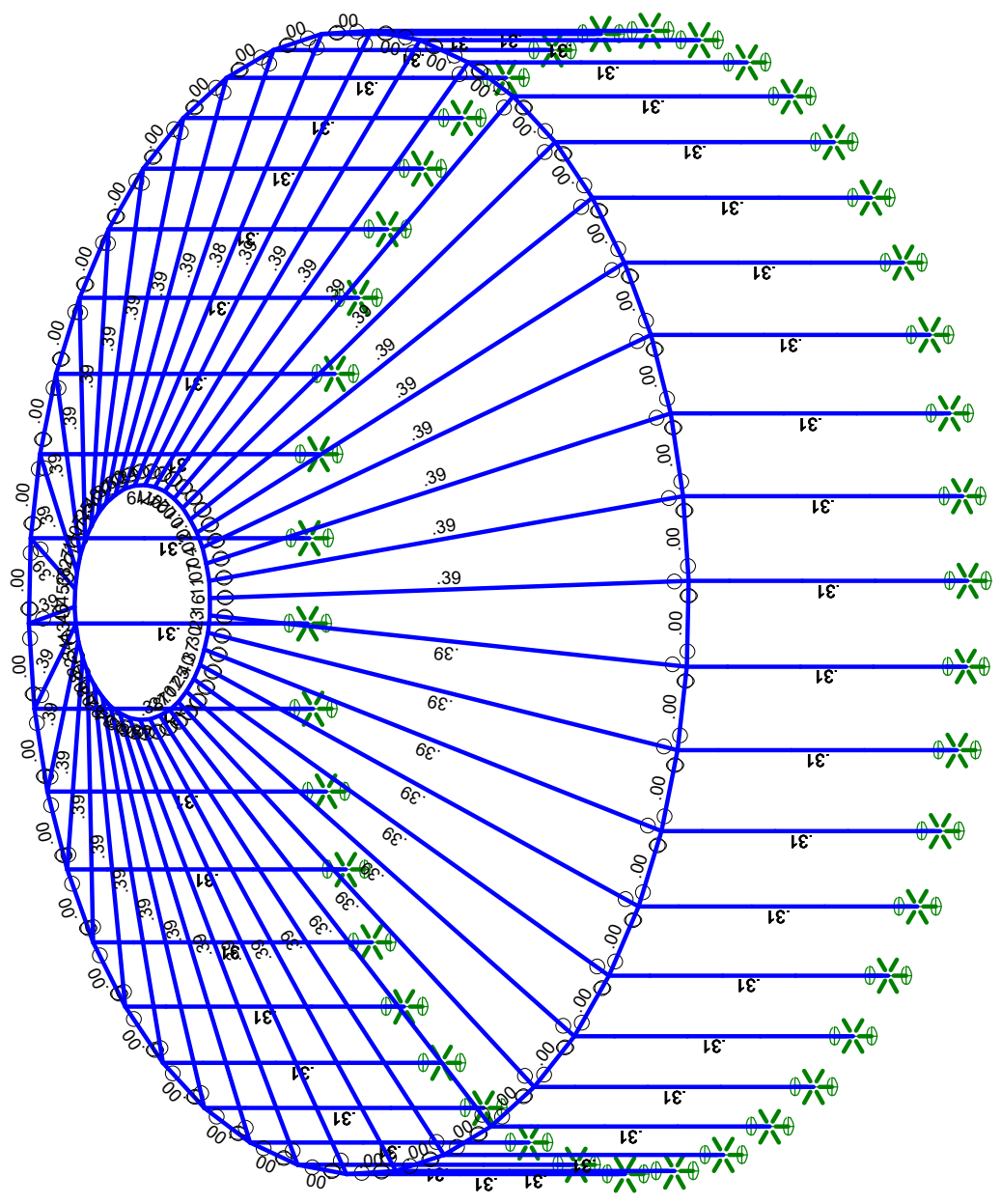
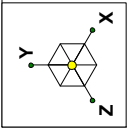
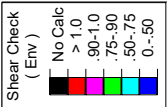


Member Code Checks Displayed (Enveloped)
Envelope Only Solution

24' FULL SNOW & WIND
ENVELOPE CODE CHECK (BENDING)

CO YURT COMPANY

24' FULL SNOW & WIND.r3d



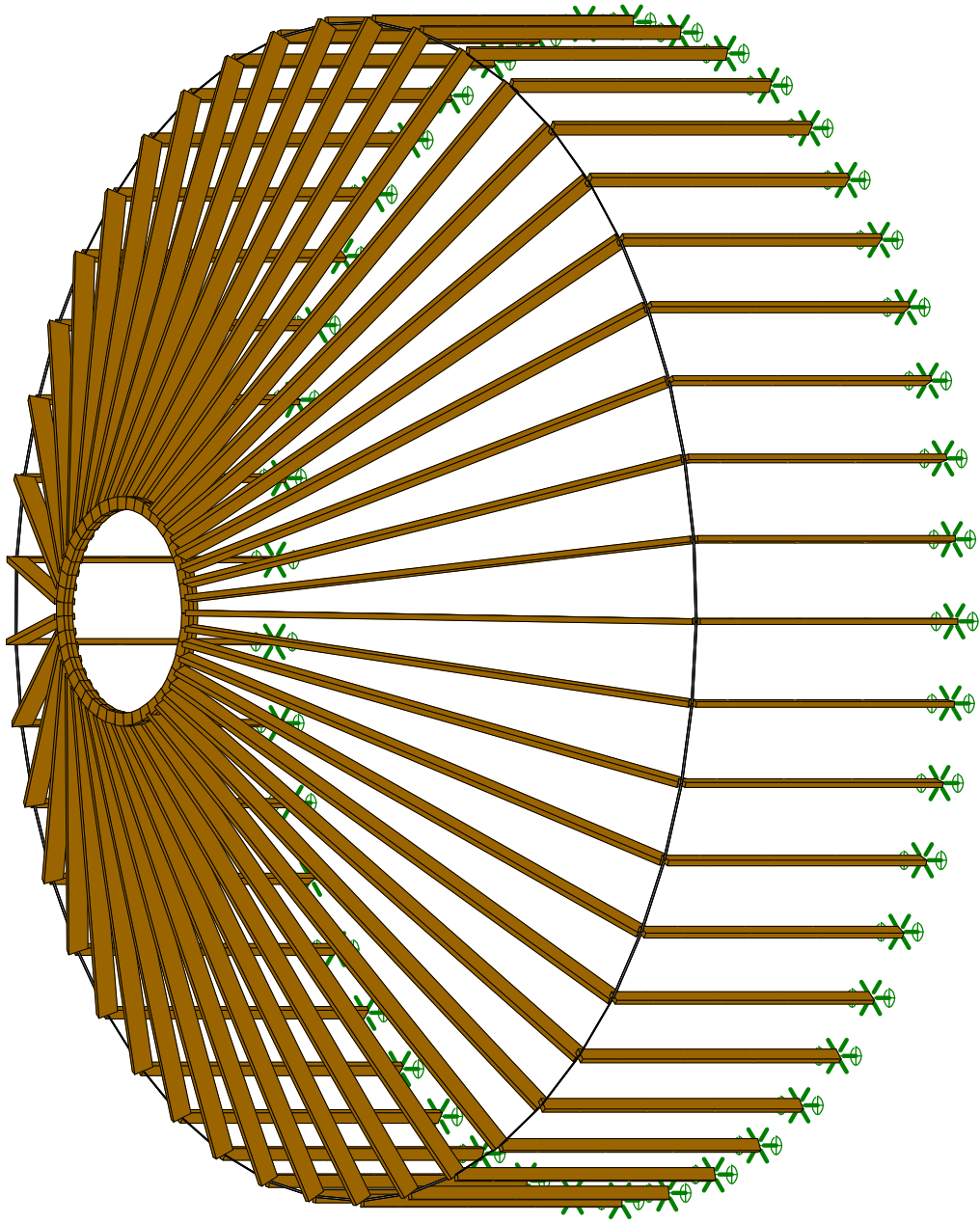
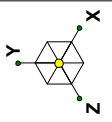
Member Shear Checks Displayed (Enveloped)
Envelope Only Solution

24' FULL SNOW & WIND
ENVELOPE CODE CHECK (SHEAR)

CO YURT COMPANY

24' FULL SNOW & WIND.r3d

27' Diameter Yurt

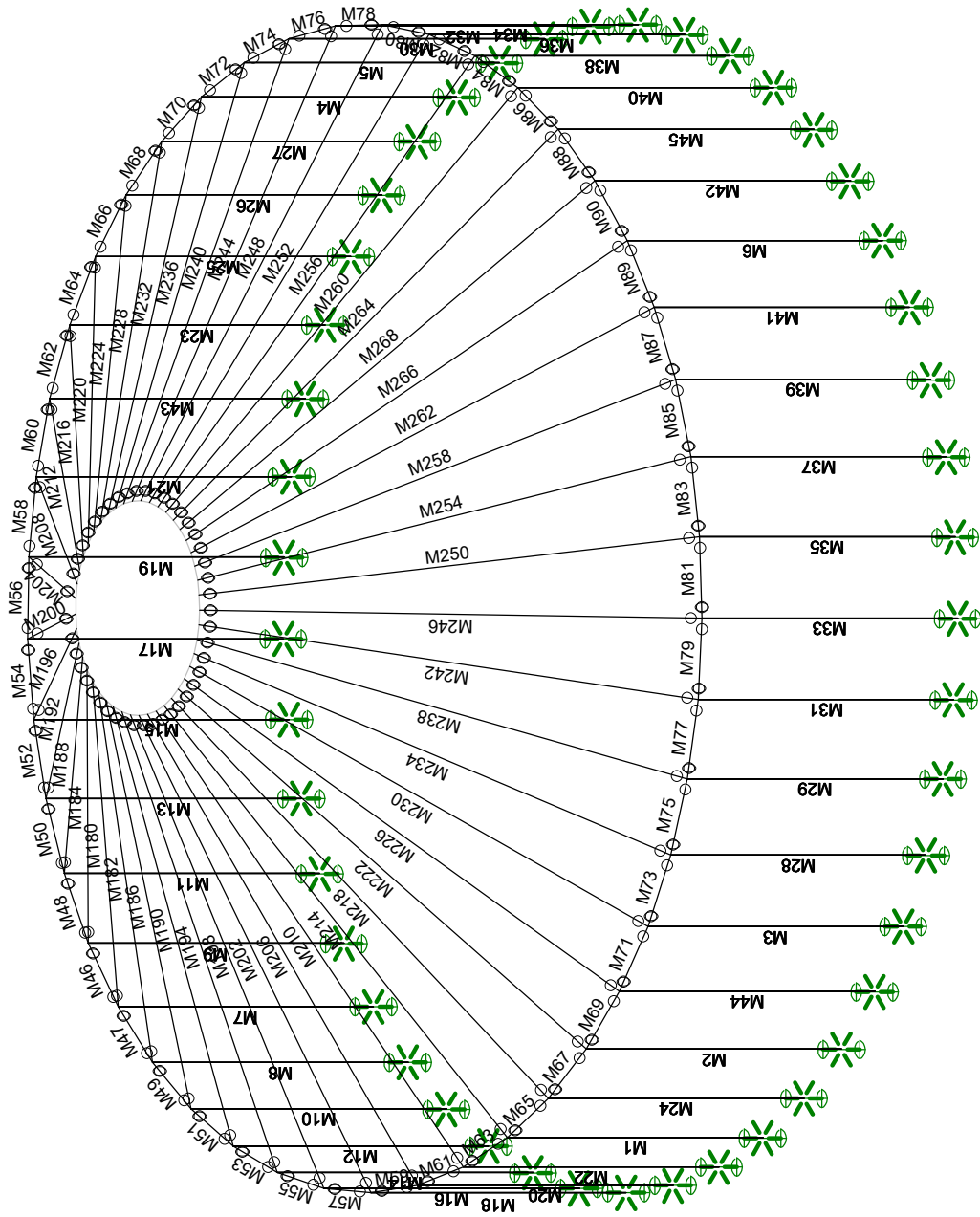
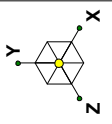


Envelope Only Solution

27' FULL SNOW & WIND
BASIC MODEL

CO YURT COMPANY

27' FULL SNOW & WIND.R3D

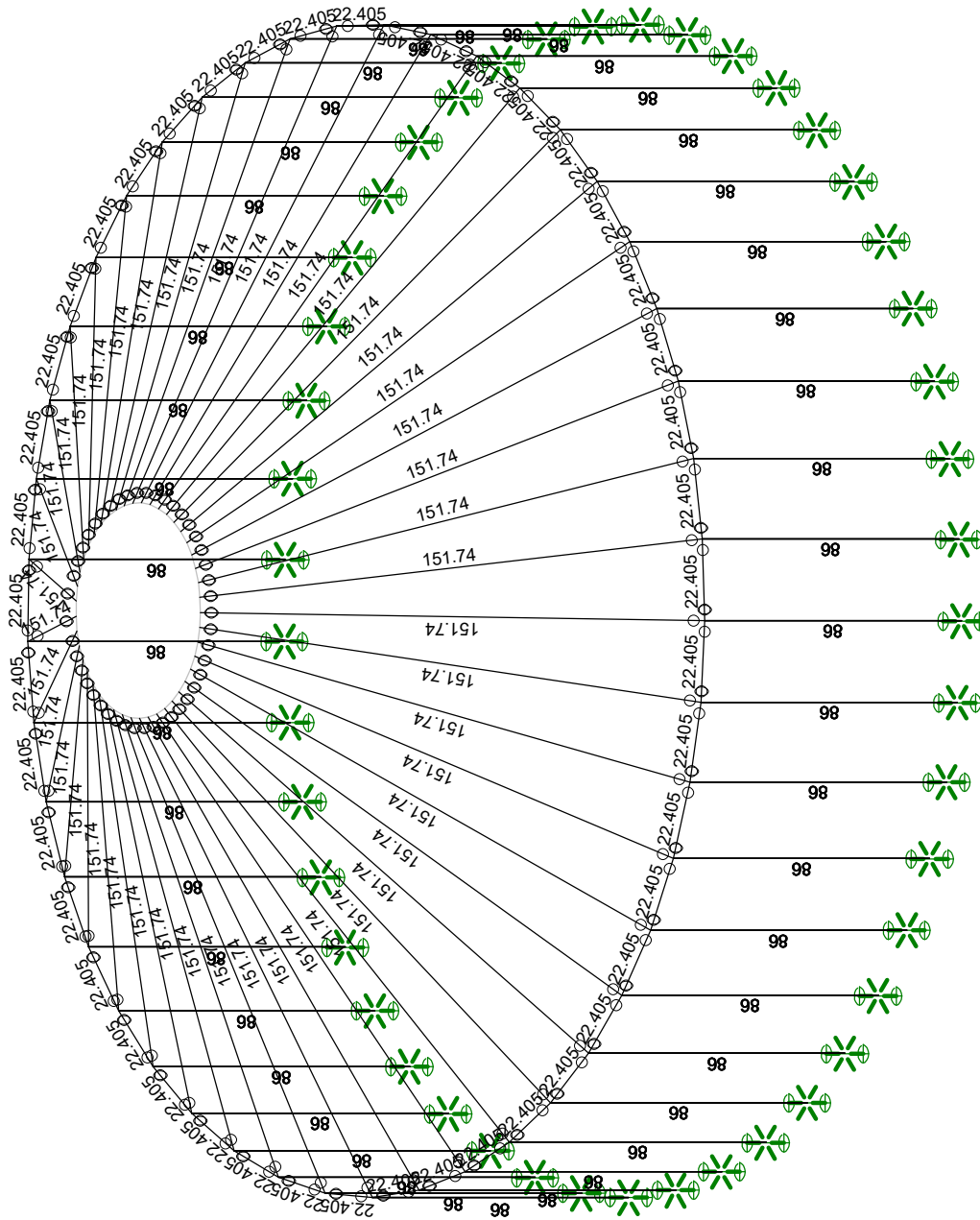
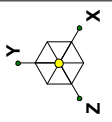


Envelope Only Solution

27' FULL SNOW & WIND
MEMBER LABELS

CO YURT COMPANY

27' FULL SNOW & WIND.R3D

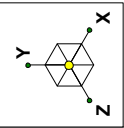


Member Length (in) Displayed
Envelope Only Solution

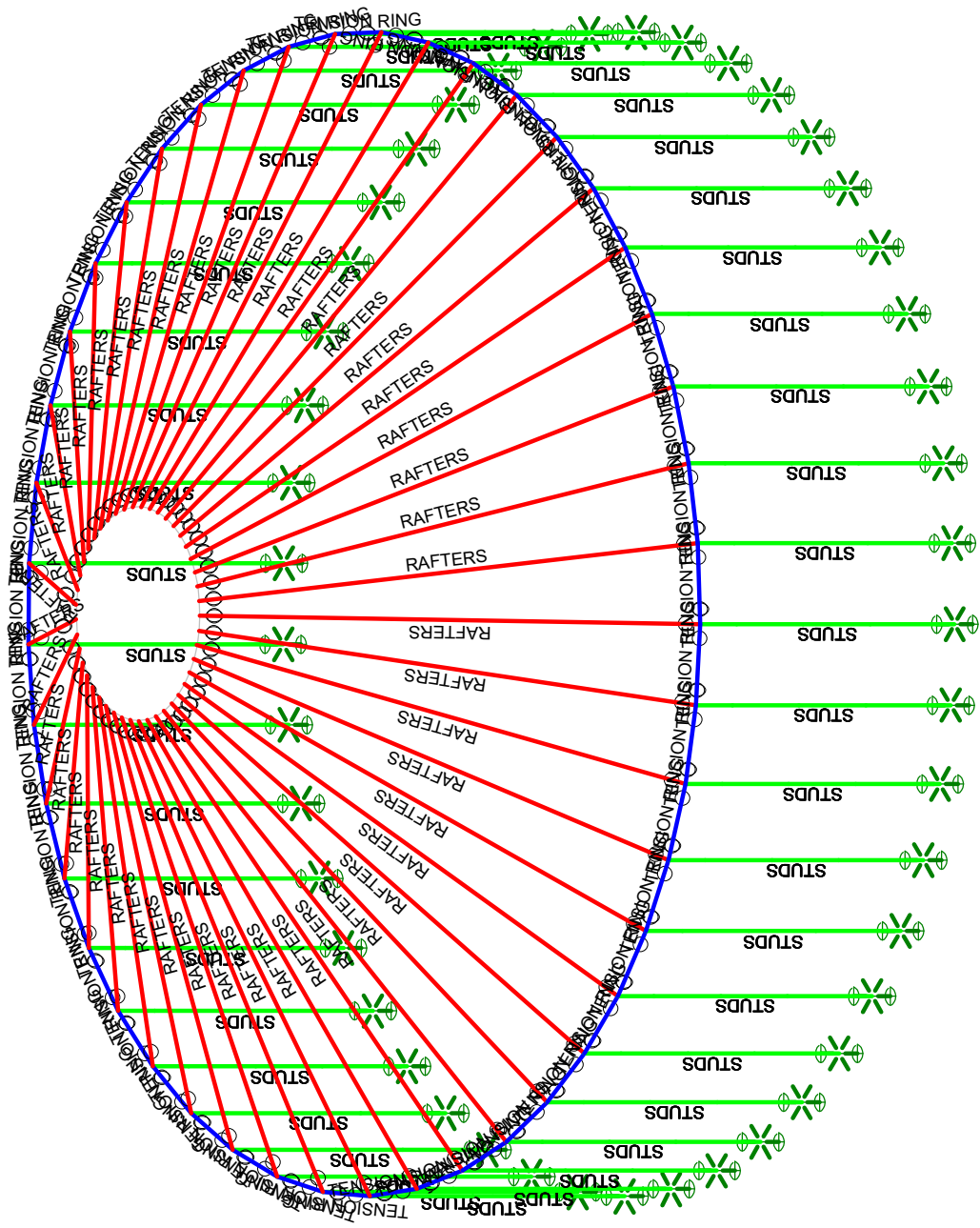
27' FULL SNOW & WIND
MEMBER LENGTHS (INCHES)

CO YURT COMPANY

27' FULL SNOW & WIND.R3D



- Section Sets
- TENSION RING
 - STUDS
 - RAFTERS
 - WD COMP RING
 - 40 MIL MEMBRANE

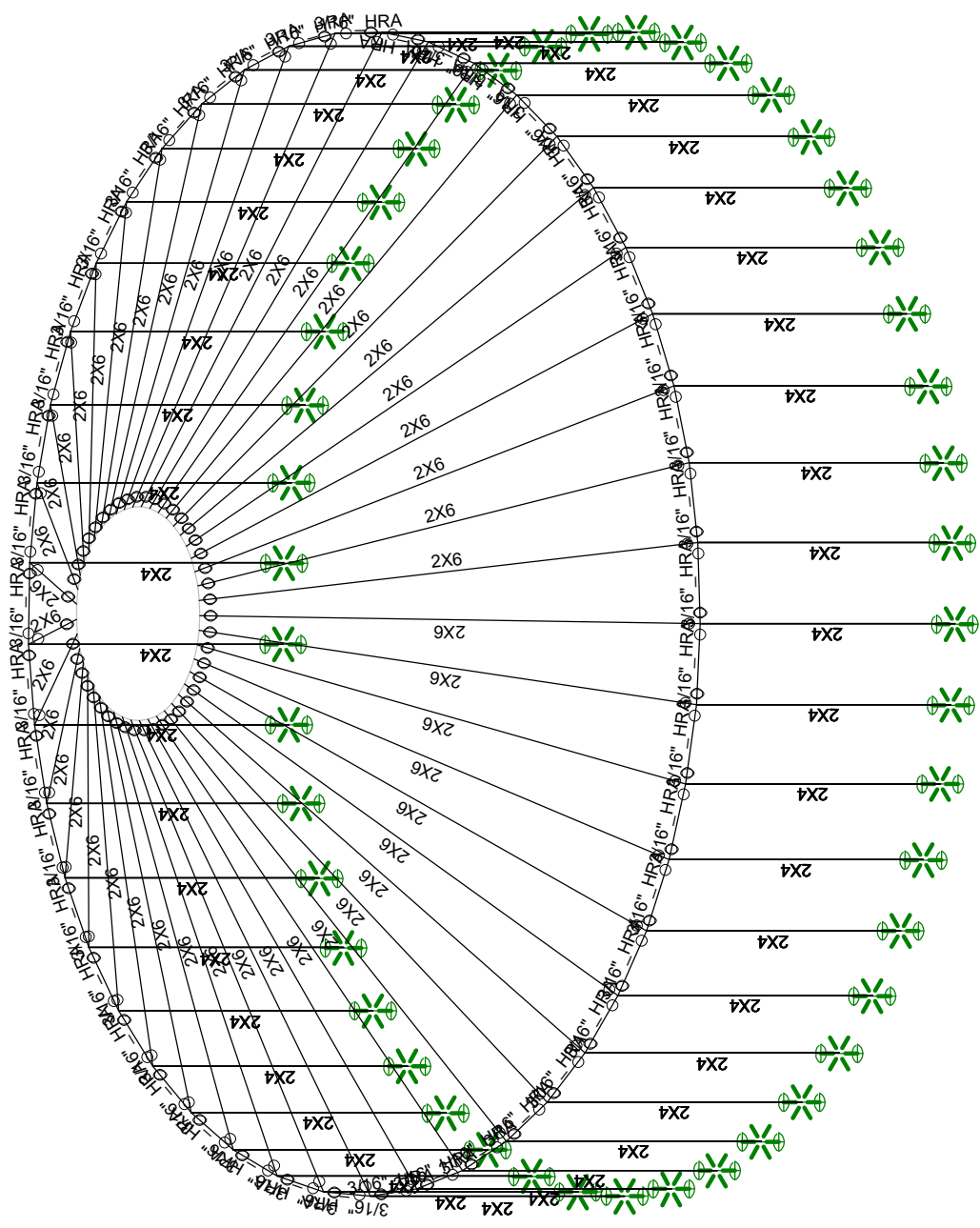
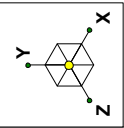


Envelope Only Solution

27' FULL SNOW & WIND
SECTION SET

CO YURT COMPANY

27' FULL SNOW & WIND.R3D

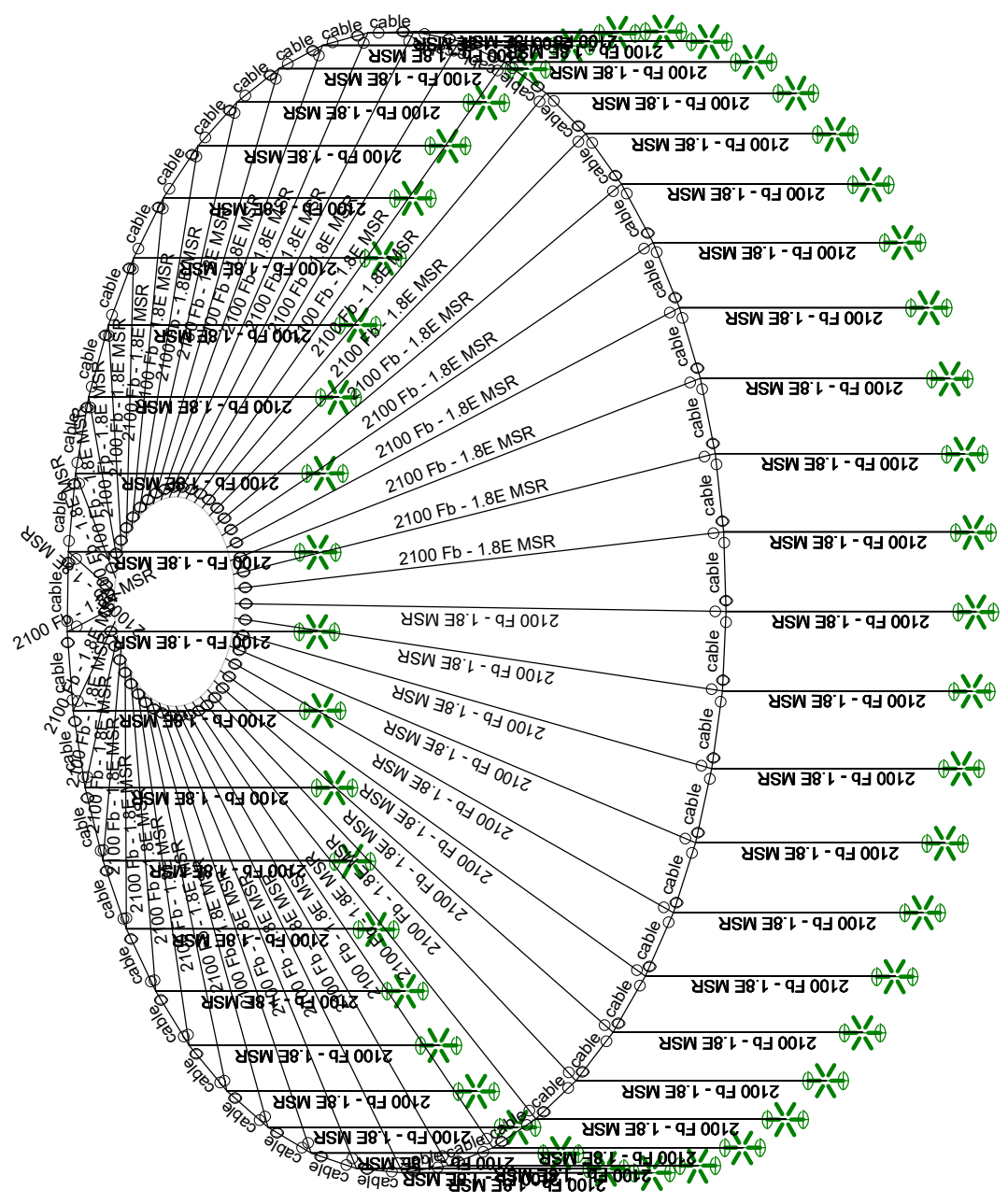
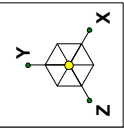


Envelope Only Solution

27' FULL SNOW & WIND
MEMBER SHAPES

CO YURT COMPANY

27' FULL SNOW & WIND.R3D

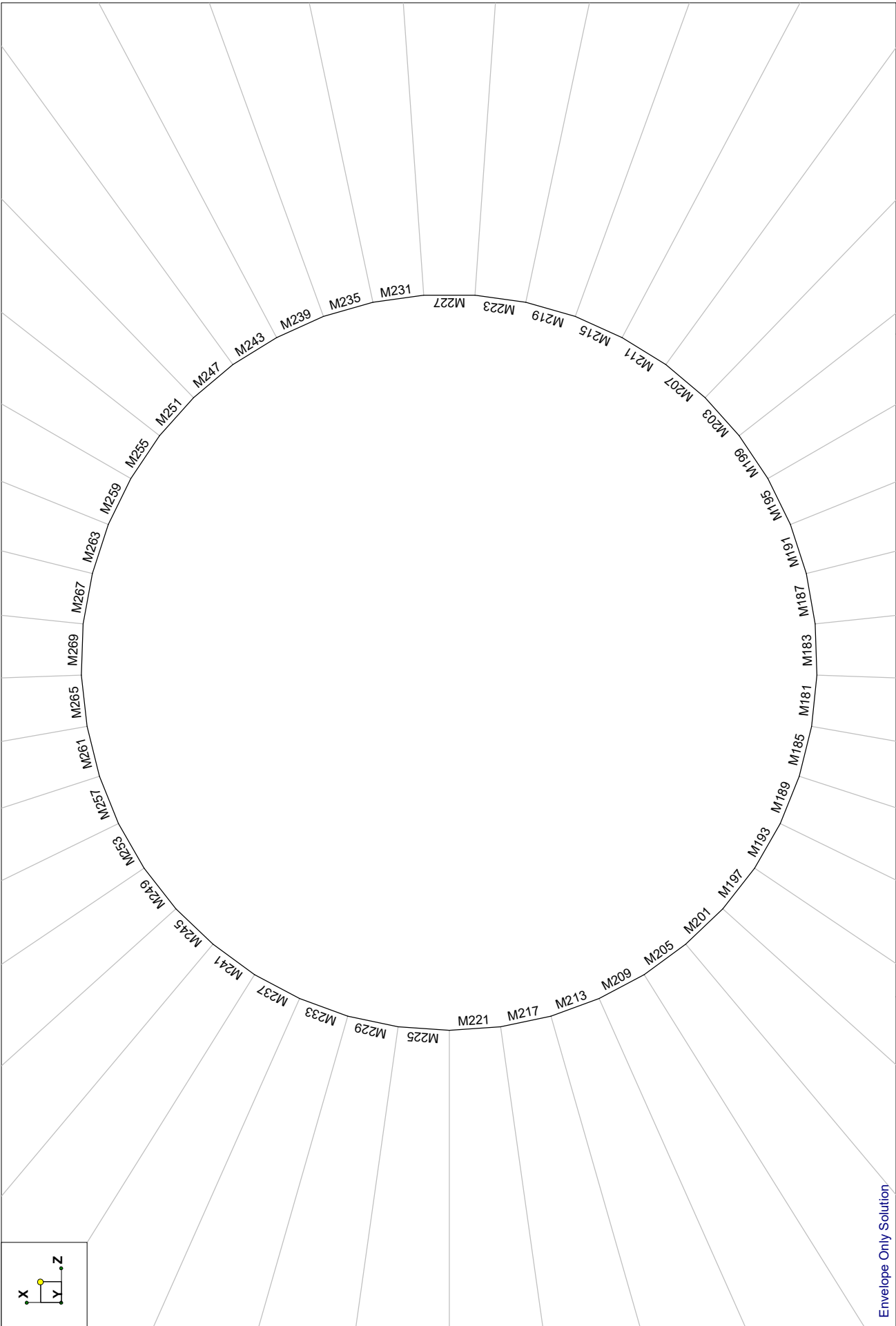
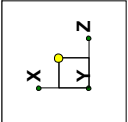


Envelope Only Solution

27' FULL SNOW & WIND
MEMBER MATERIALS

CO YURT COMPANY

27' FULL SNOW & WIND.R3D



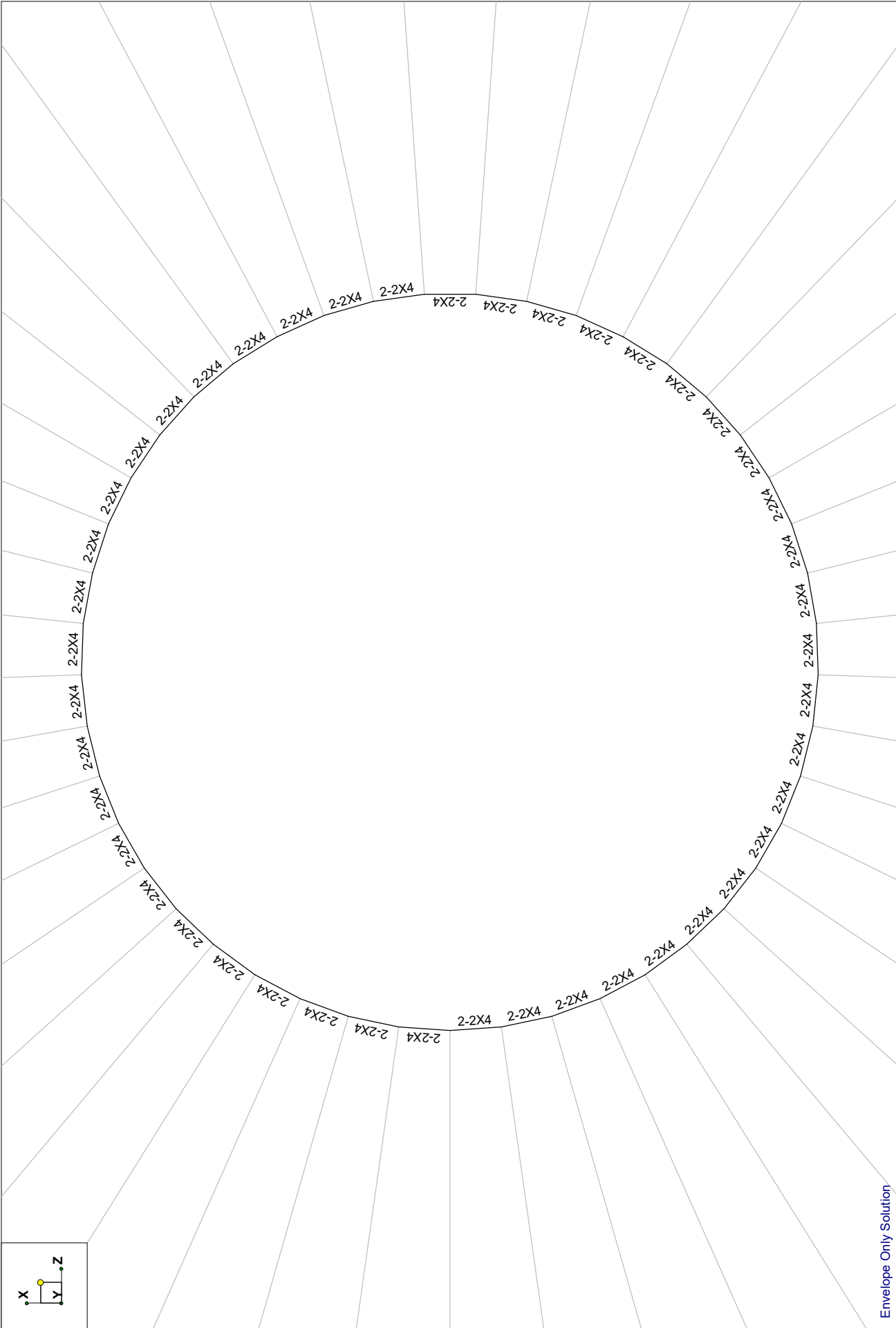
27' FULL SNOW & WIND

COMPRESSION RING MEMBER LABELS

27' FULL SNOW & WIND.R3D

CO YURT COMPANY

Envelope Only Solution



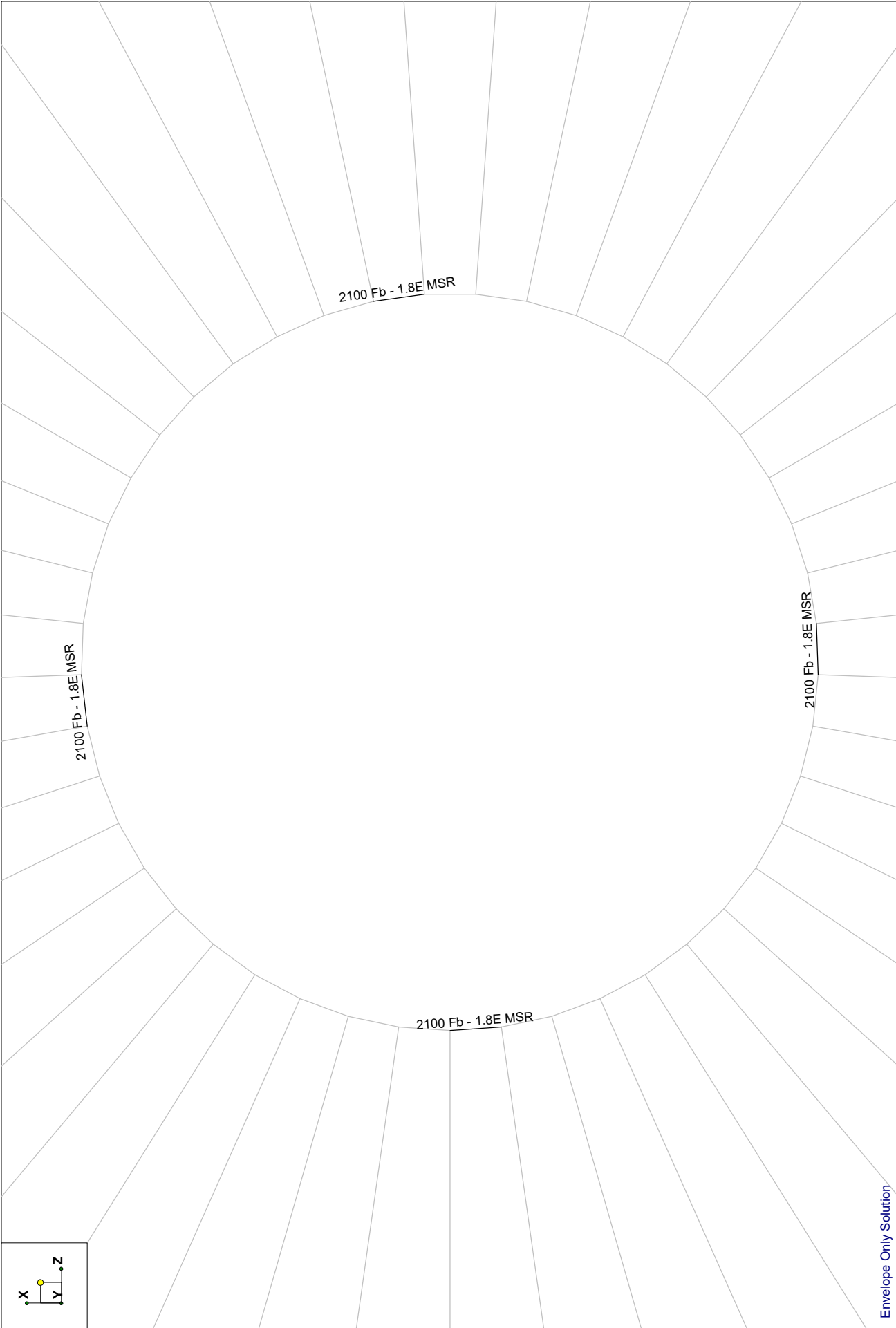
Envelope Only Solution

27' FULL SNOW & WIND

COMPRESSION RING MEMBER SHAPES

CO YURT COMPANY

27' FULL SNOW & WIND.R3D



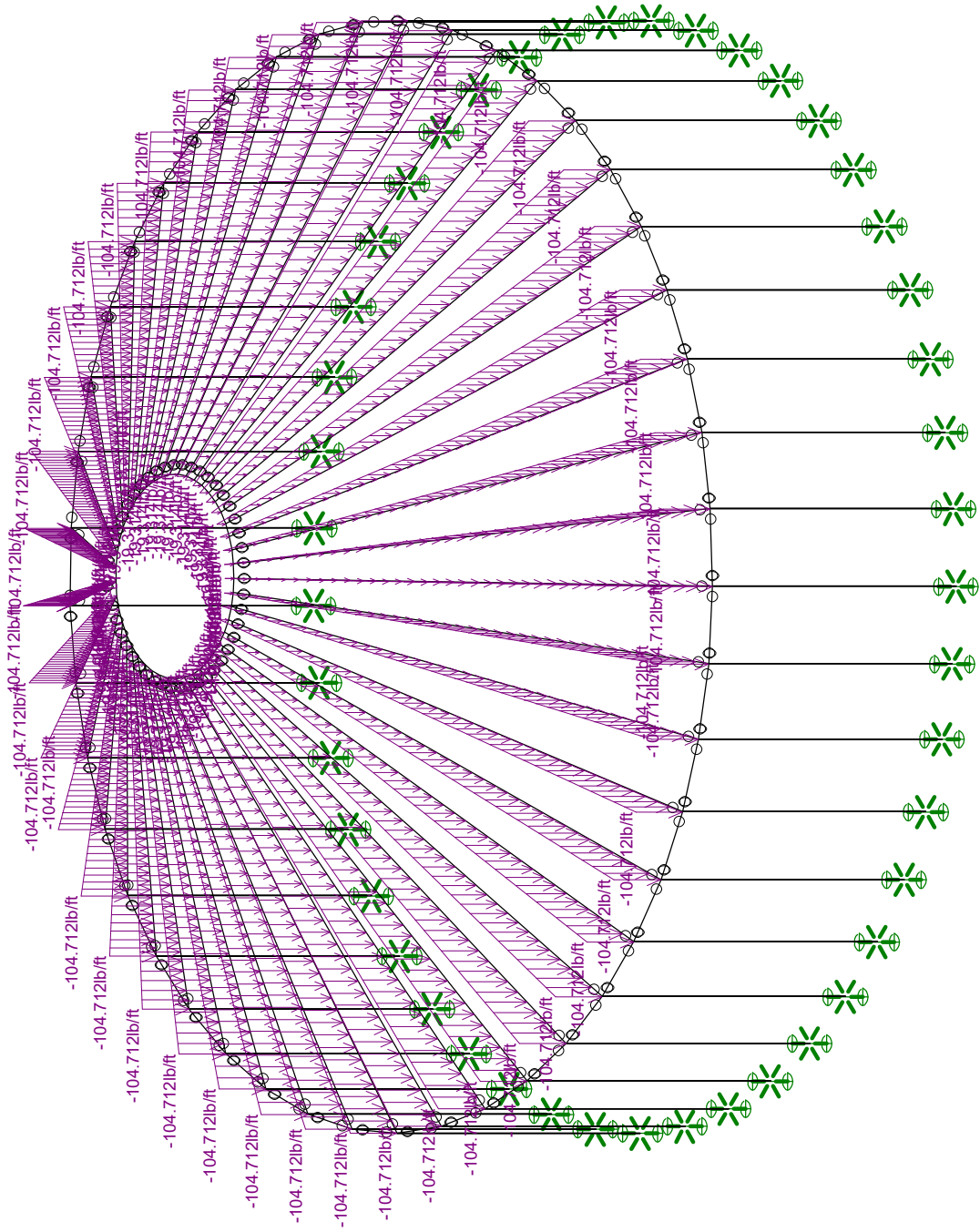
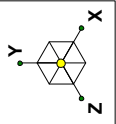
Envelope Only Solution

27' FULL SNOW & WIND

COMPRESSION RING MEMBER MATERIALS

27' FULL SNOW & WIND.R3D

CO YURT COMPANY

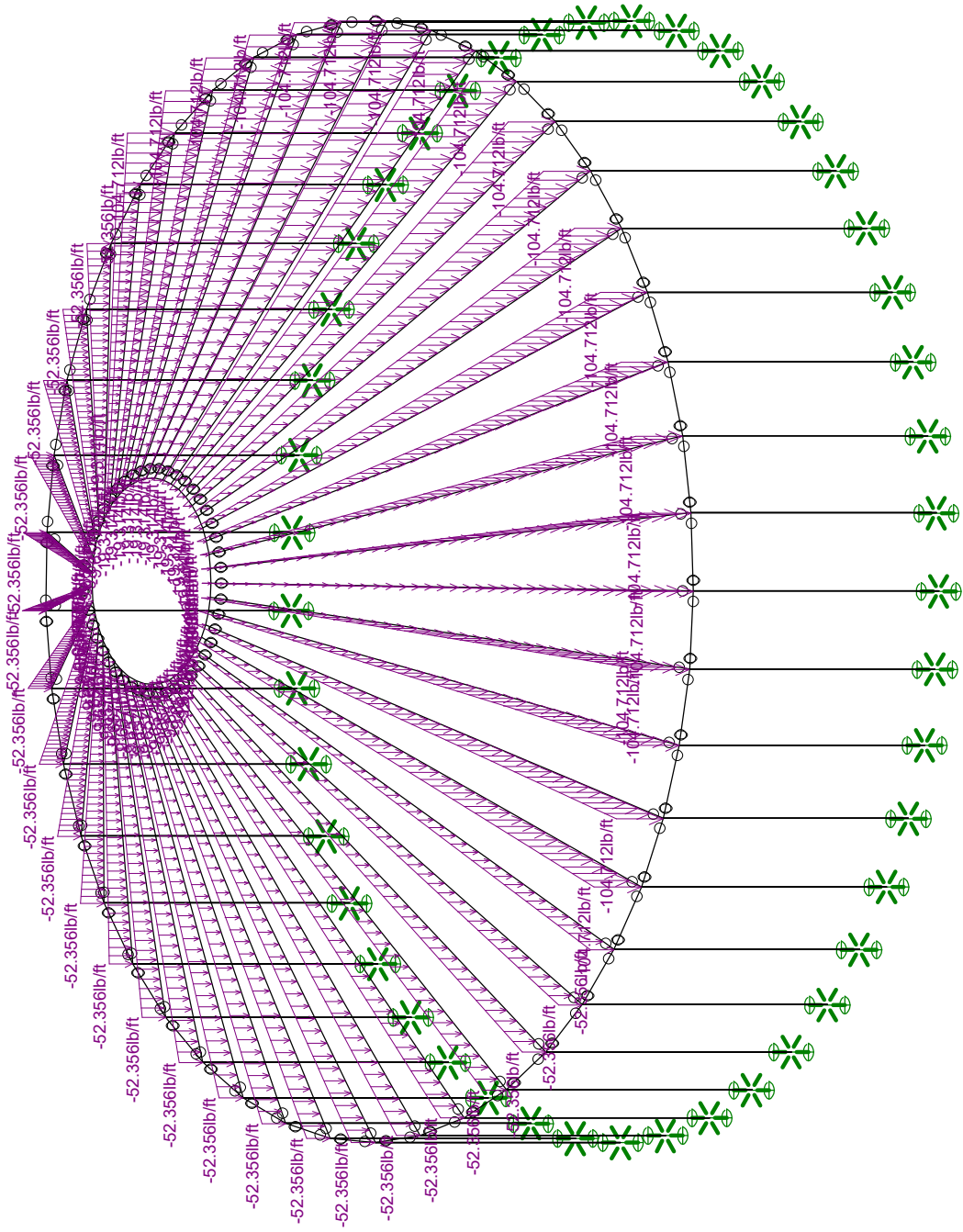
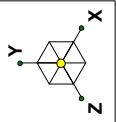


Loads: LC 1, SL BAL
Envelope Only Solution

27' FULL SNOW & WIND
SLOPED ROOF SNOW LOAD

CO YURT COMPANY

27' FULL SNOW & WIND.R3D



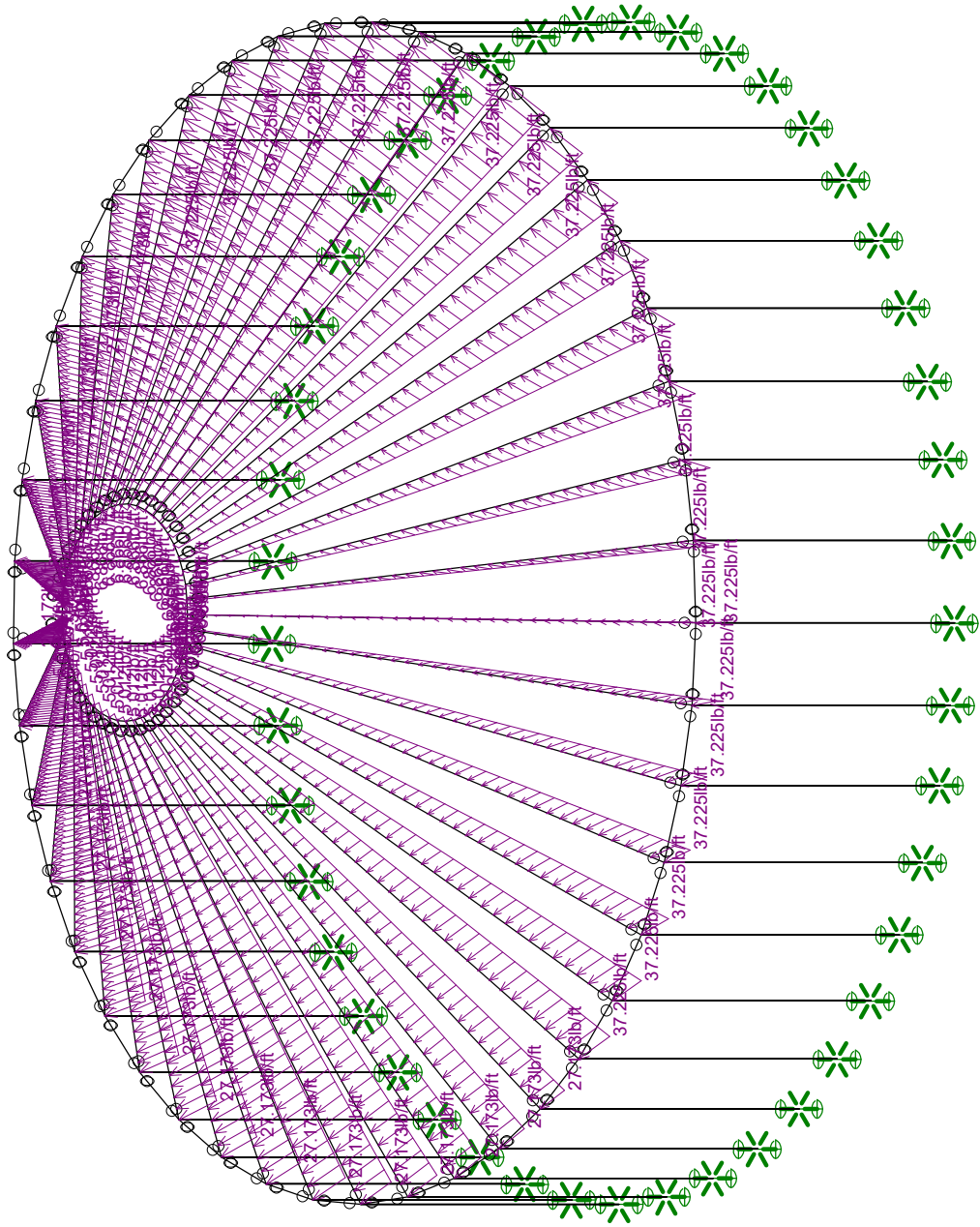
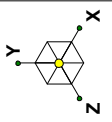
Loads: LC 2, SL UNBAL
Envelope Only Solution

27' FULL SNOW & WIND

UNBALANCED SLOPED ROOF SNOW LOAD

CO YURT COMPANY

27' FULL SNOW & WIND.R3D

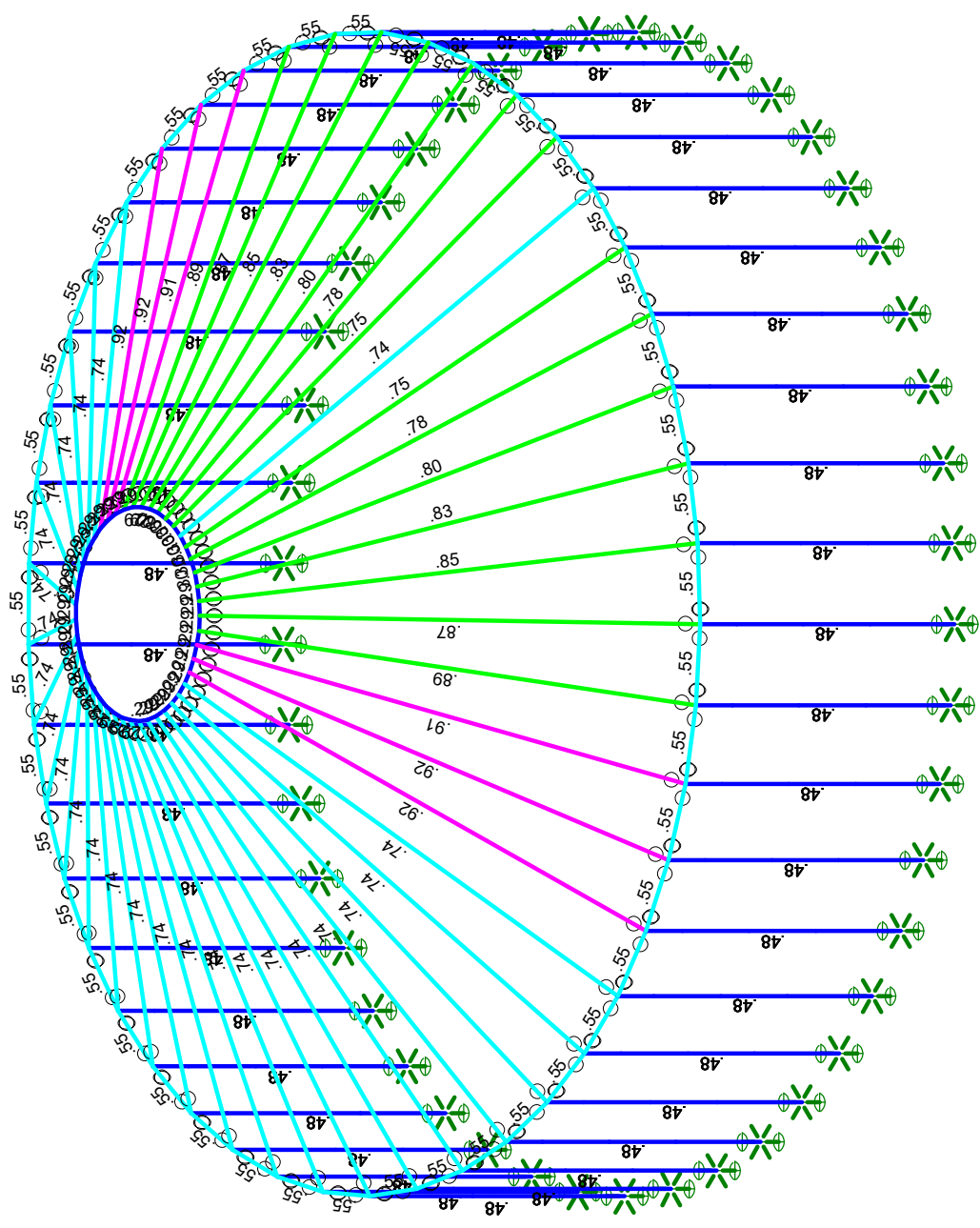
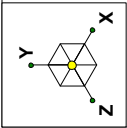
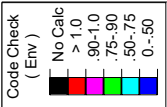


Loads: LC 4, ROOF WL
Envelope Only Solution

27' FULL SNOW & WIND
ROOF WIND LOADS

CO YURT COMPANY

27' FULL SNOW & WIND.R3D

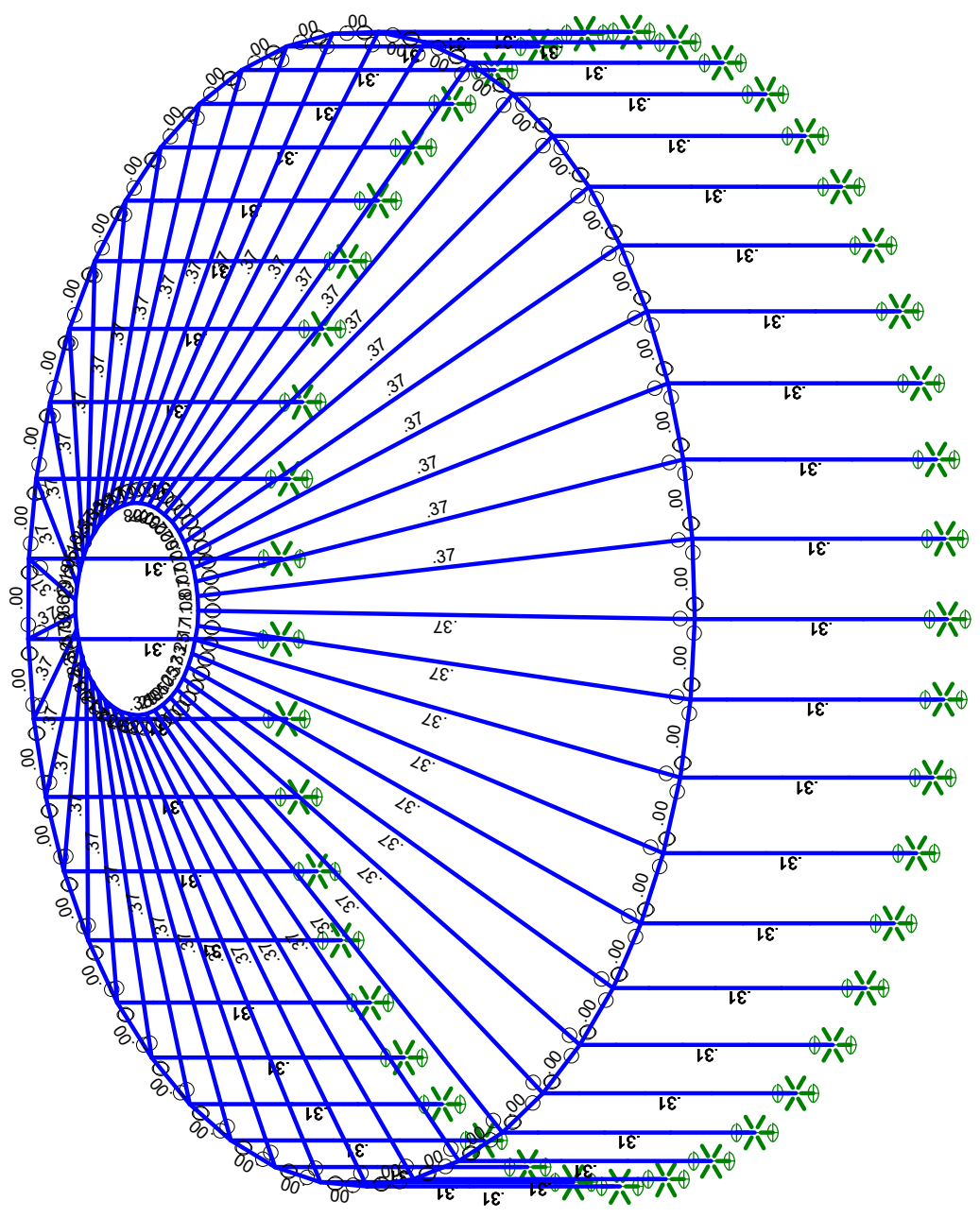
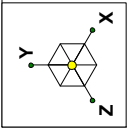
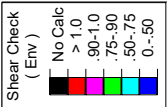


Member Code Checks Displayed (Enveloped)
Envelope Only Solution

27' FULL SNOW & WIND
ENVELOPE CODE CHECK (BENDING)

CO YURT COMPANY

27' FULL SNOW & WIND.R3D



Member Shear Checks Displayed (Enveloped)
Envelope Only Solution

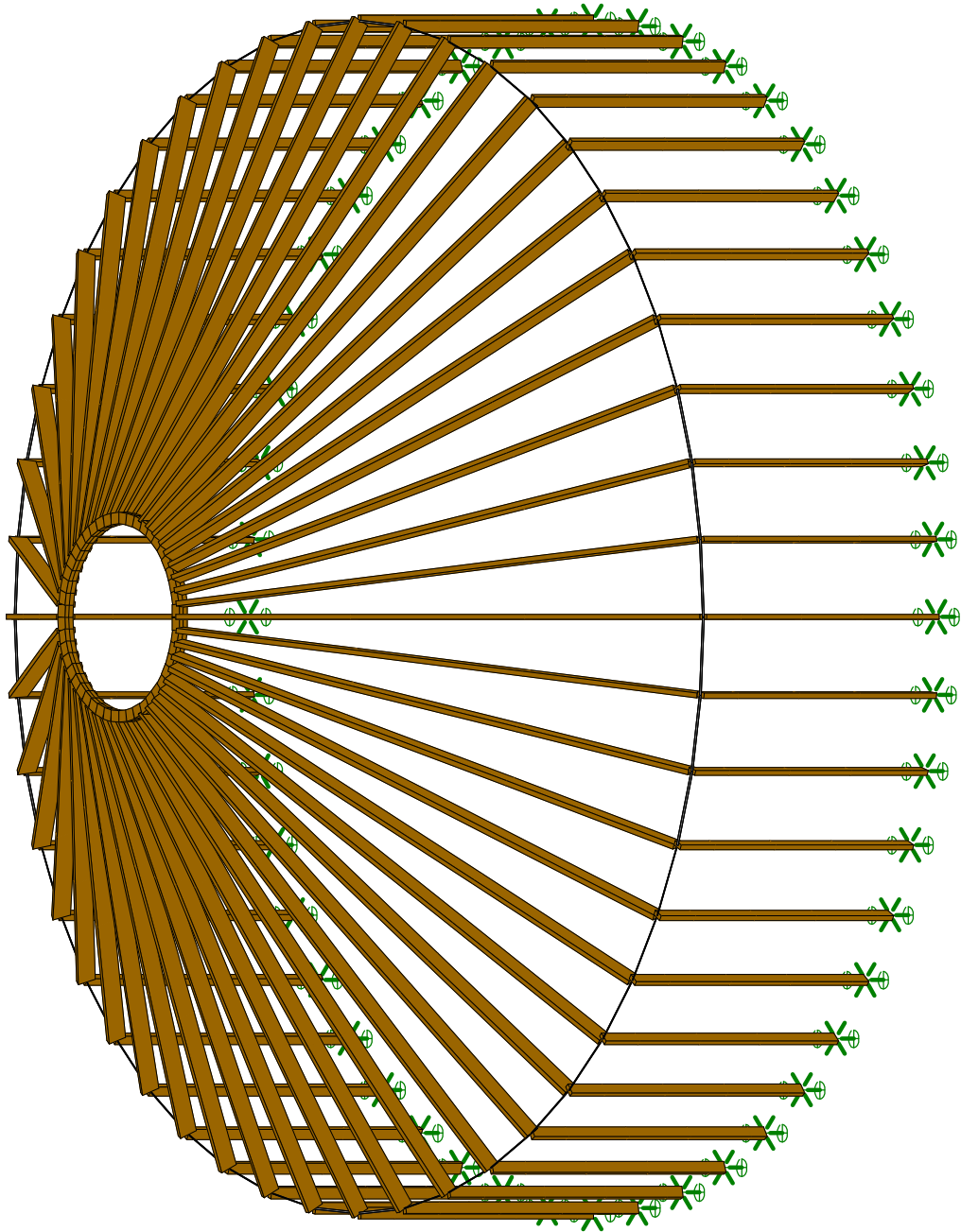
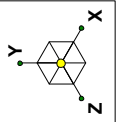
27' FULL SNOW & WIND

ENVELOPE CODE CHECK (SHEAR)

CO YURT COMPANY

27' FULL SNOW & WIND.R3D

30' Diameter Yurt

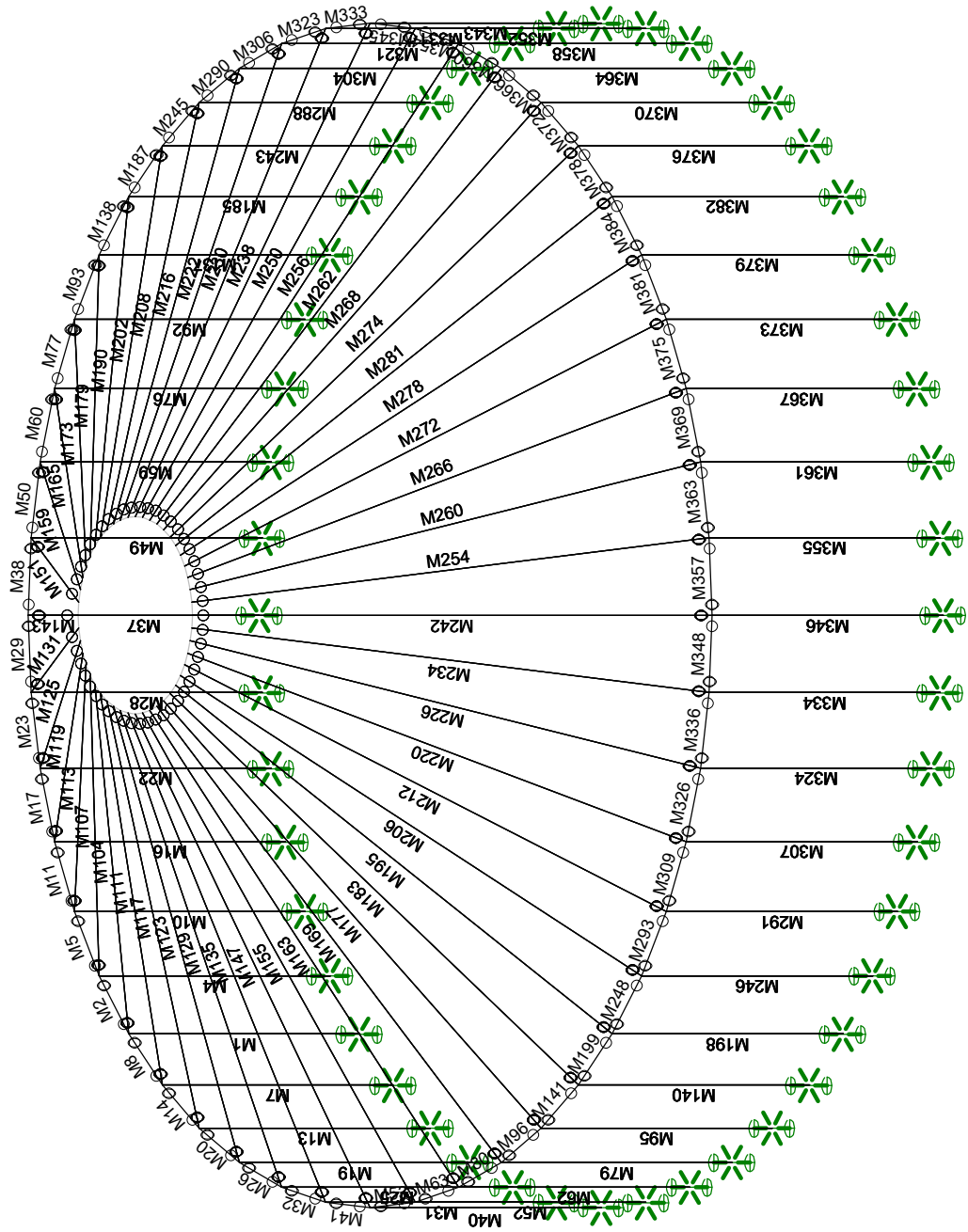
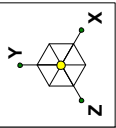


Envelope Only Solution

30' FULL SNOW & WIND
BASIC MODEL

CO YURT COMPANY

30' FULL SNOW & WIND.r3d

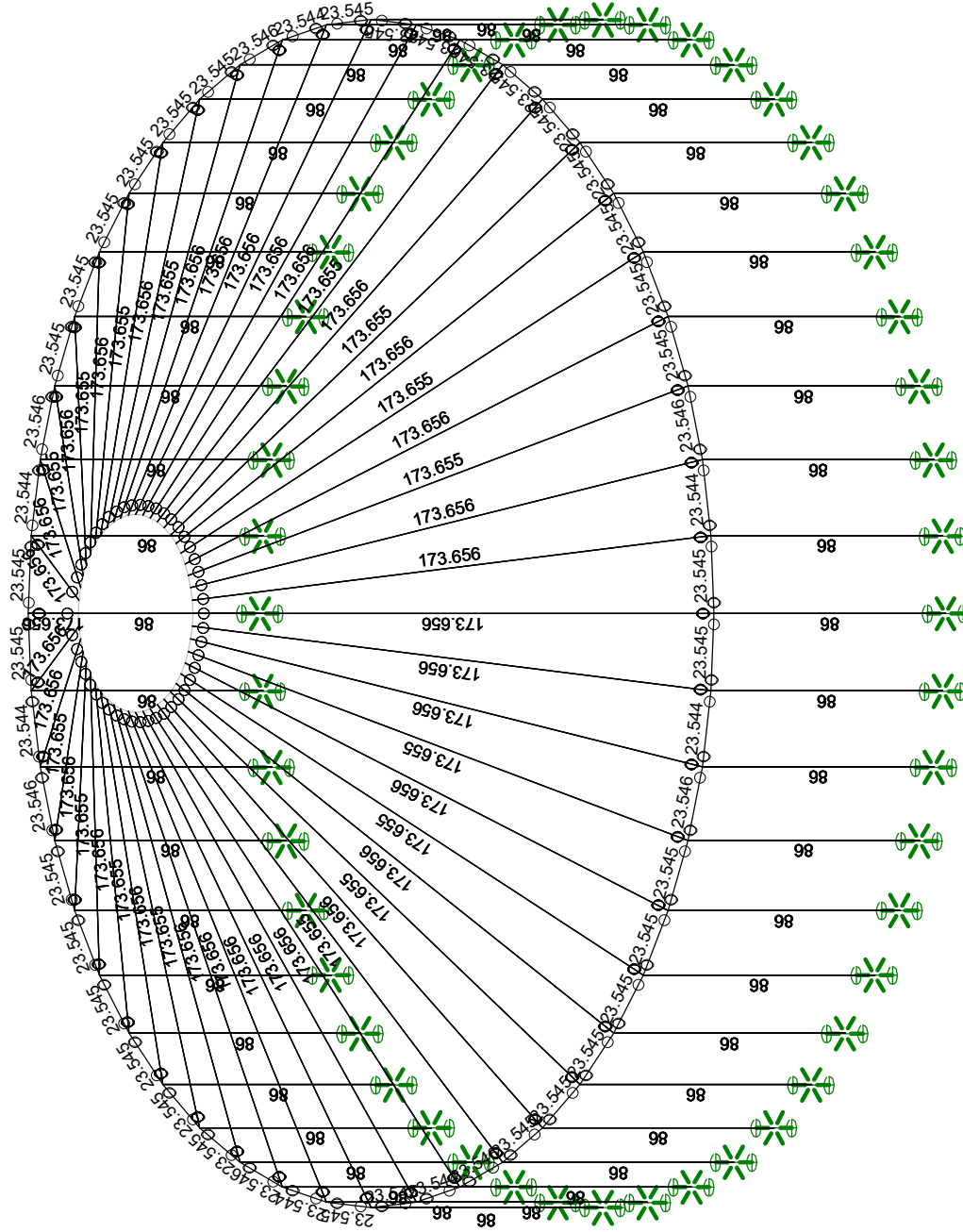
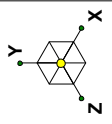


Envelope Only Solution

30' FULL SNOW & WIND
MEMBER LABELS

CO YURT COMPANY

30' FULL SNOW & WIND.r3d

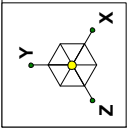


Member Length (in) Displayed
Envelope Only Solution

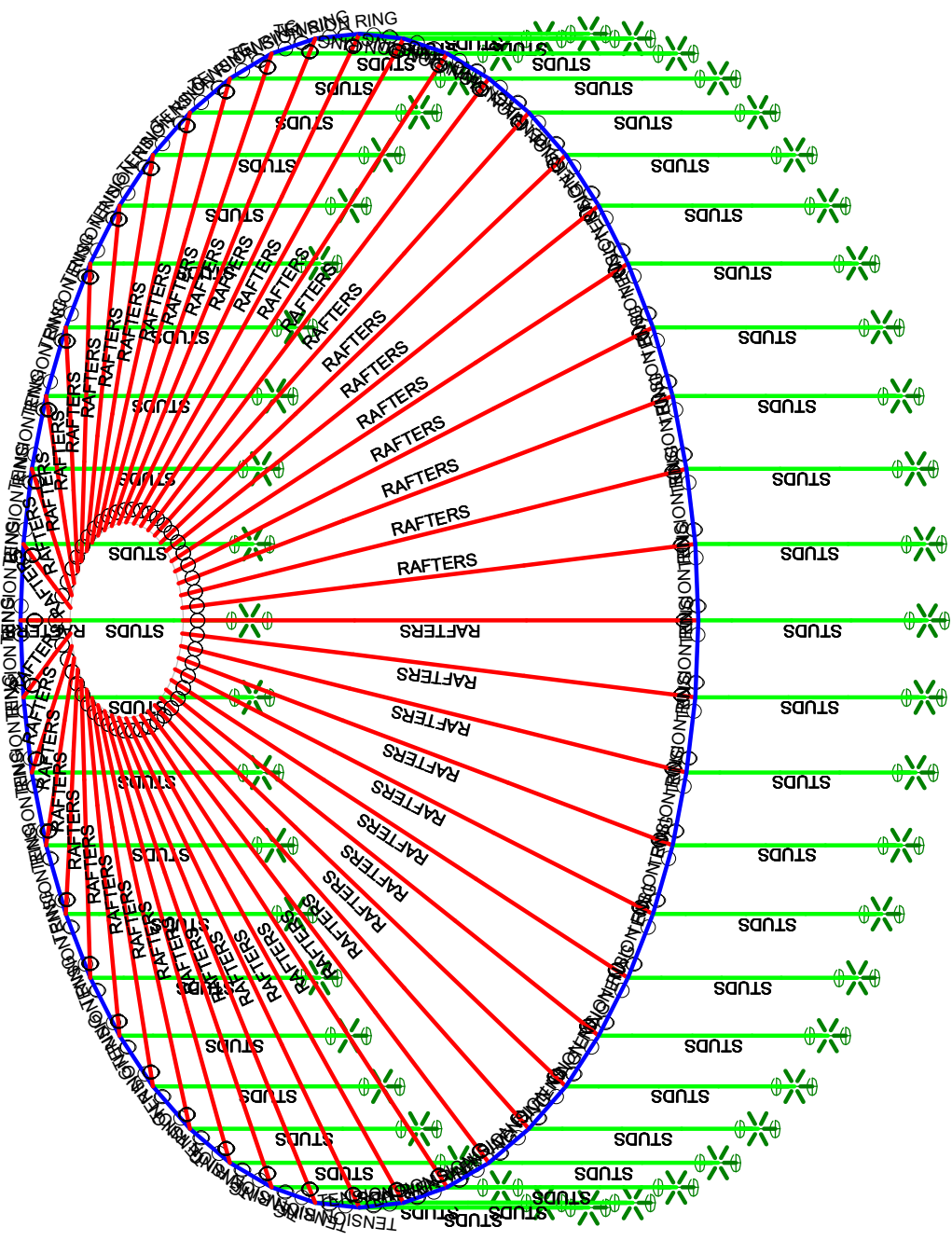
30' FULL SNOW & WIND
MEMBER LENGTHS (INCHES)

CO YURT COMPANY

30' FULL SNOW & WIND.r3d



- Section Sets
- TENSION RING
 - STUDS
 - RAFTERS
 - WD COMP RING
 - RAFTER BLOCKING
 - 40 MIL MEMBRANE

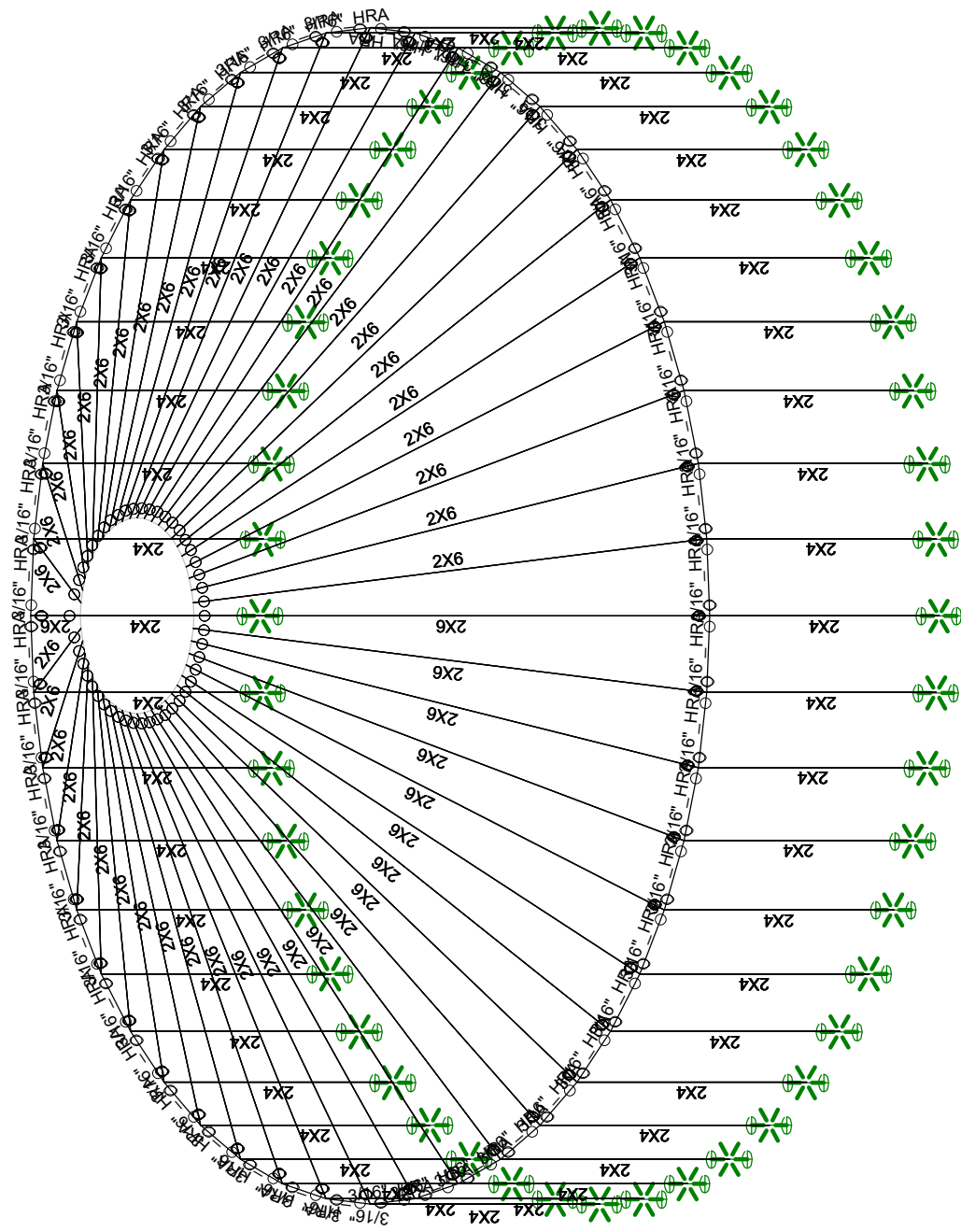
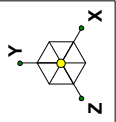


Envelope Only Solution

30' FULL SNOW & WIND
SECTION SET

CO YURT COMPANY

30' FULL SNOW & WIND.r3d

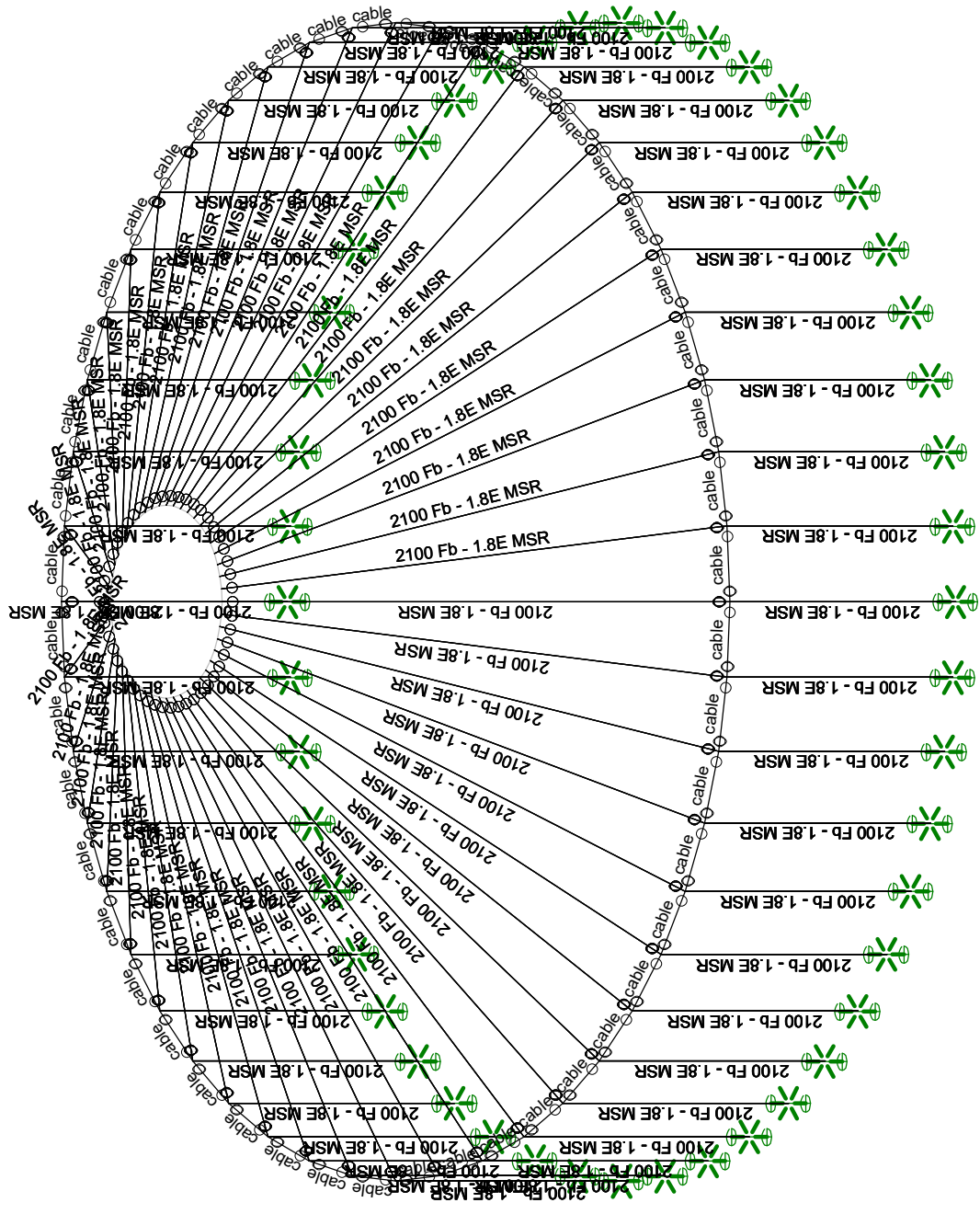
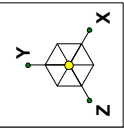


Envelope Only Solution

30' FULL SNOW & WIND
MEMBER SHAPES

CO YURT COMPANY

30' FULL SNOW & WIND.r3d

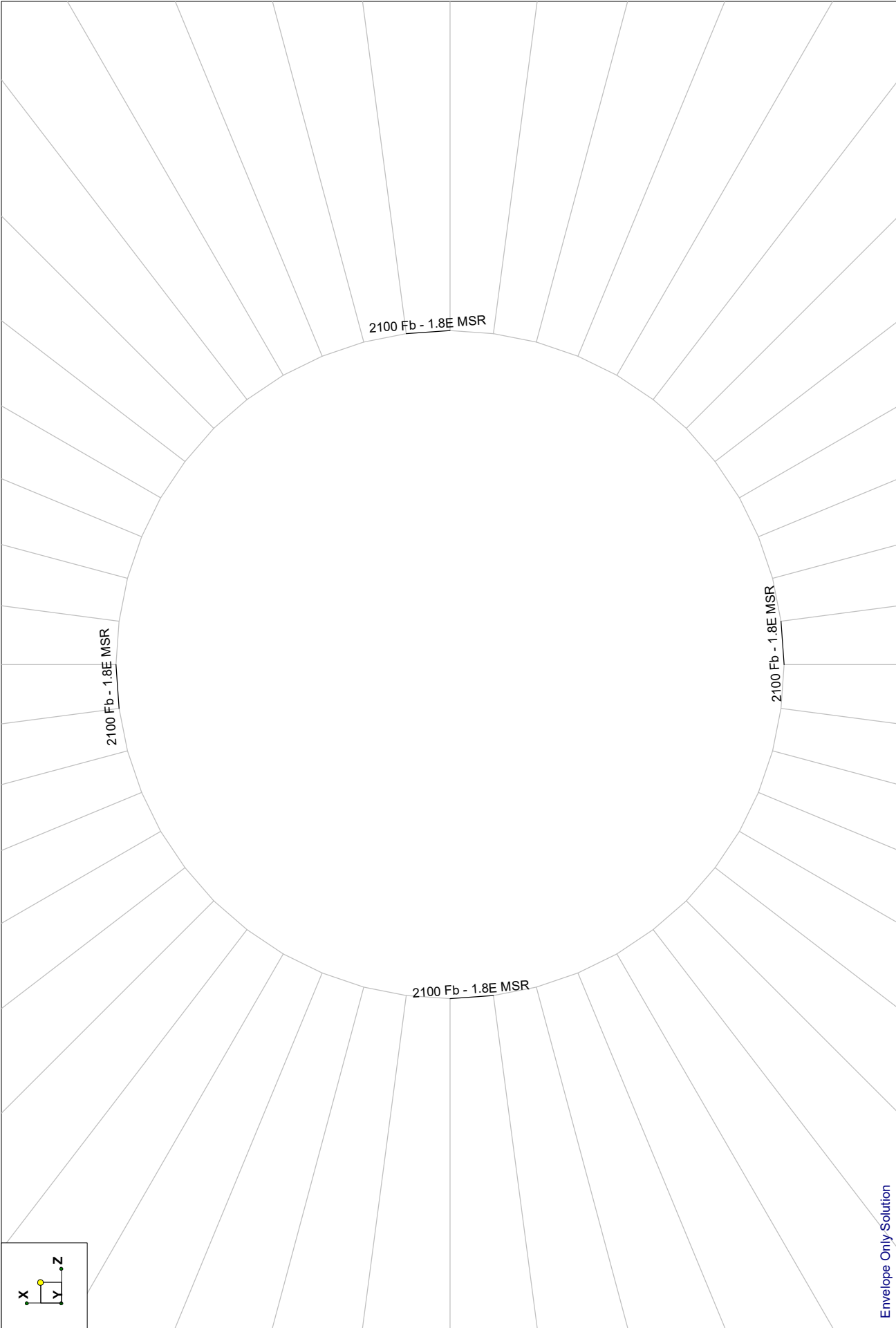


Envelope Only Solution

30' FULL SNOW & WIND
MEMBER MATERIALS

CO YURT COMPANY

30' FULL SNOW & WIND.r3d



Envelope Only Solution

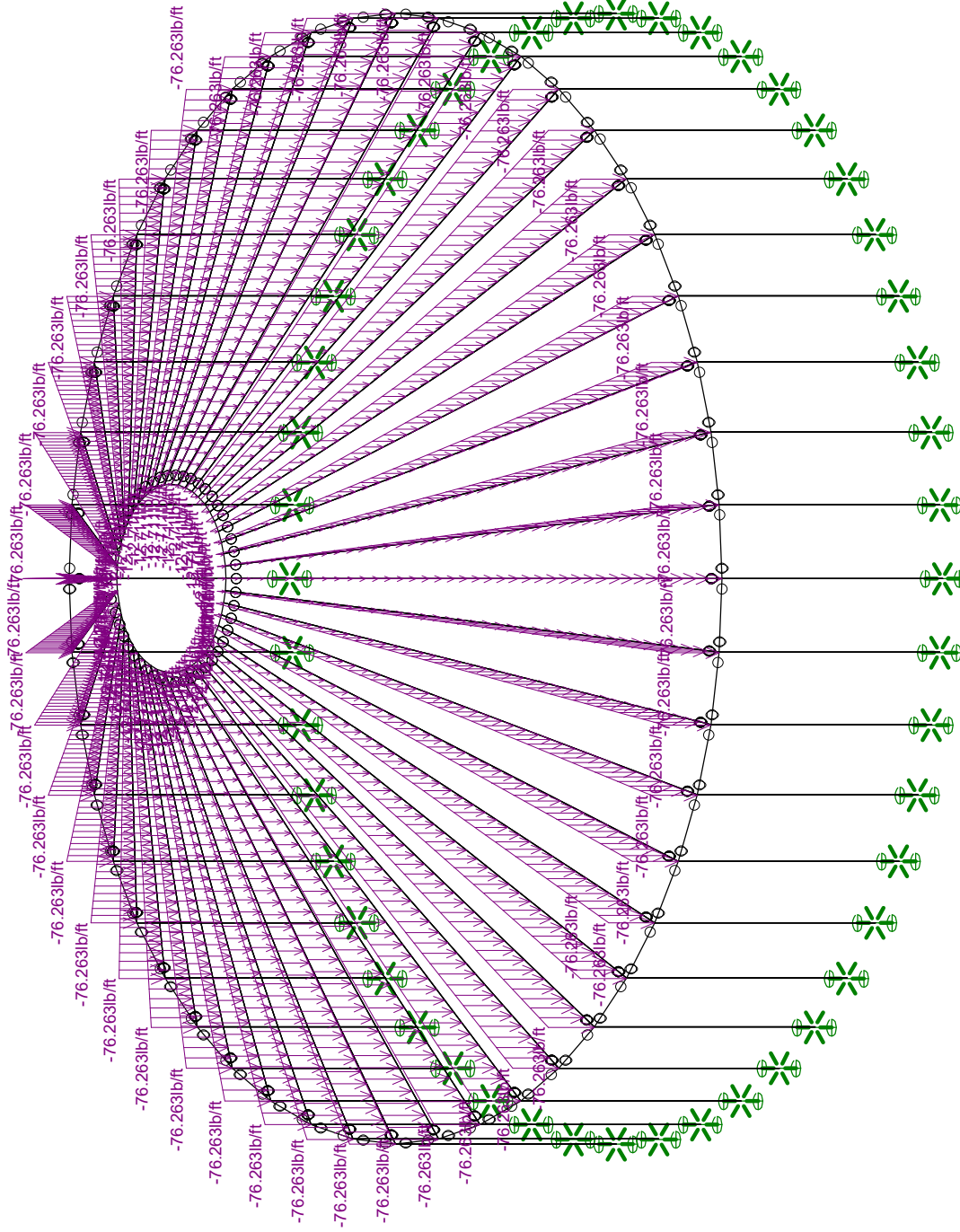
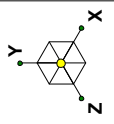
30' FULL SNOW & WIND

COMPRESSION RING MEMBER MATERIALS

30' FULL SNOW & WIND.r3d

CO YURT COMPANY



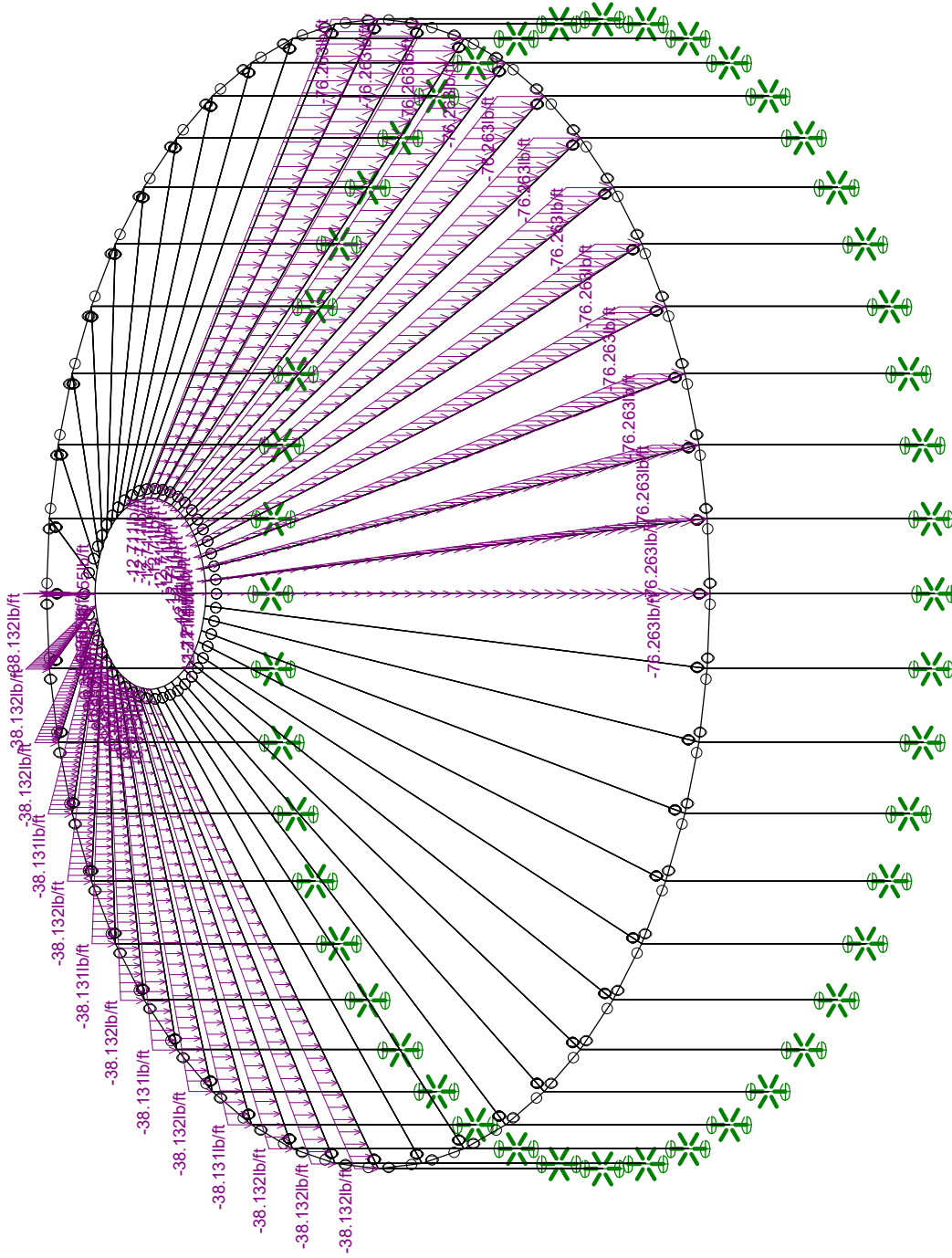
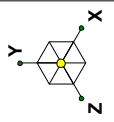


Loads: LC 1, SL BAL
Envelope Only Solution

30' FULL SNOW & WIND
SLOPED ROOF SNOW LOAD

CO YURT COMPANY

30' FULL SNOW & WIND.r3d



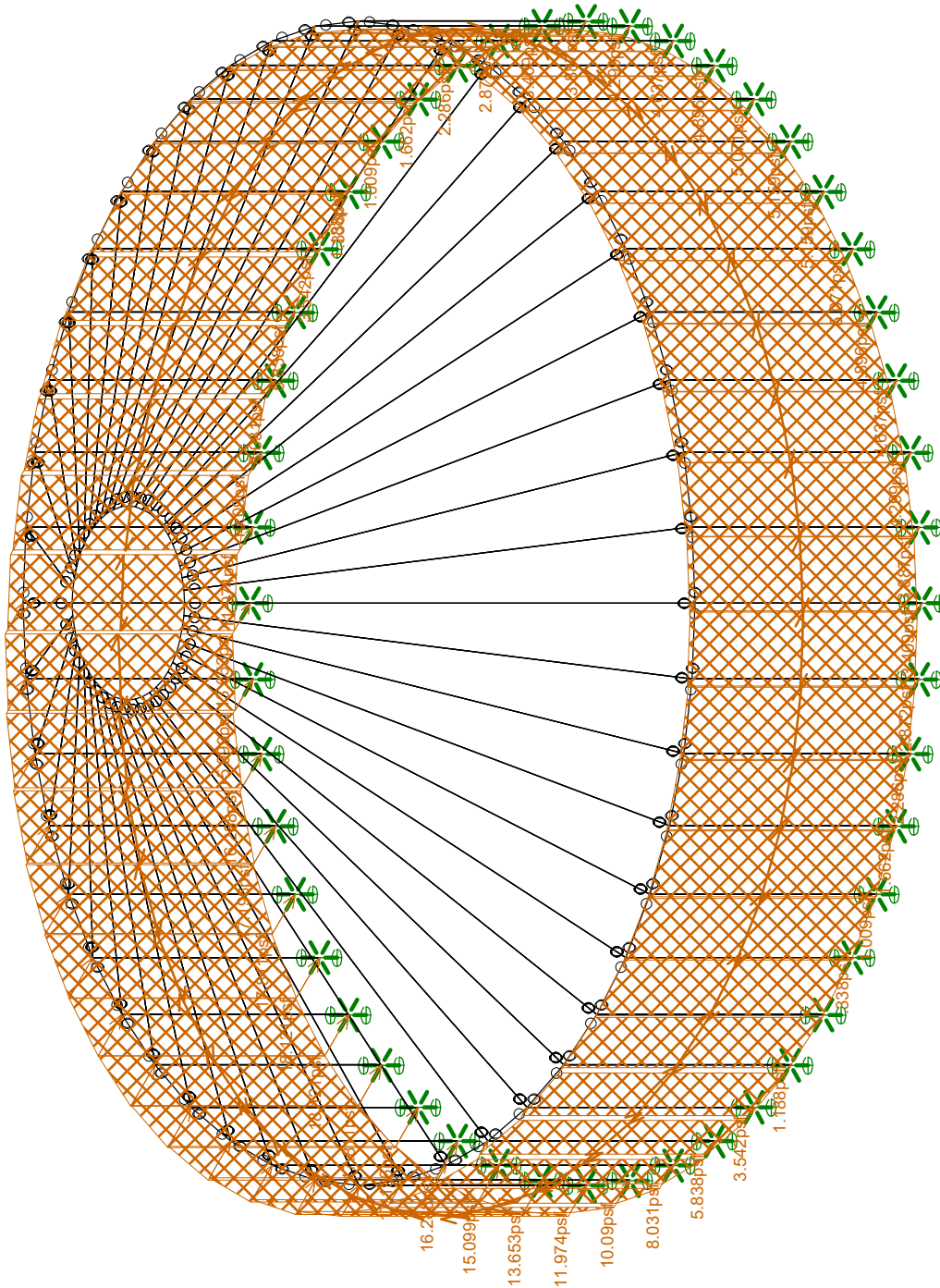
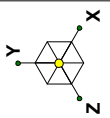
Loads: LC 2, SL UNBAL
Envelope Only Solution

30' FULL SNOW & WIND

UNBALANCED SLOPED ROOF SNOW LOAD

CO YURT COMPANY

30' FULL SNOW & WIND.r3d

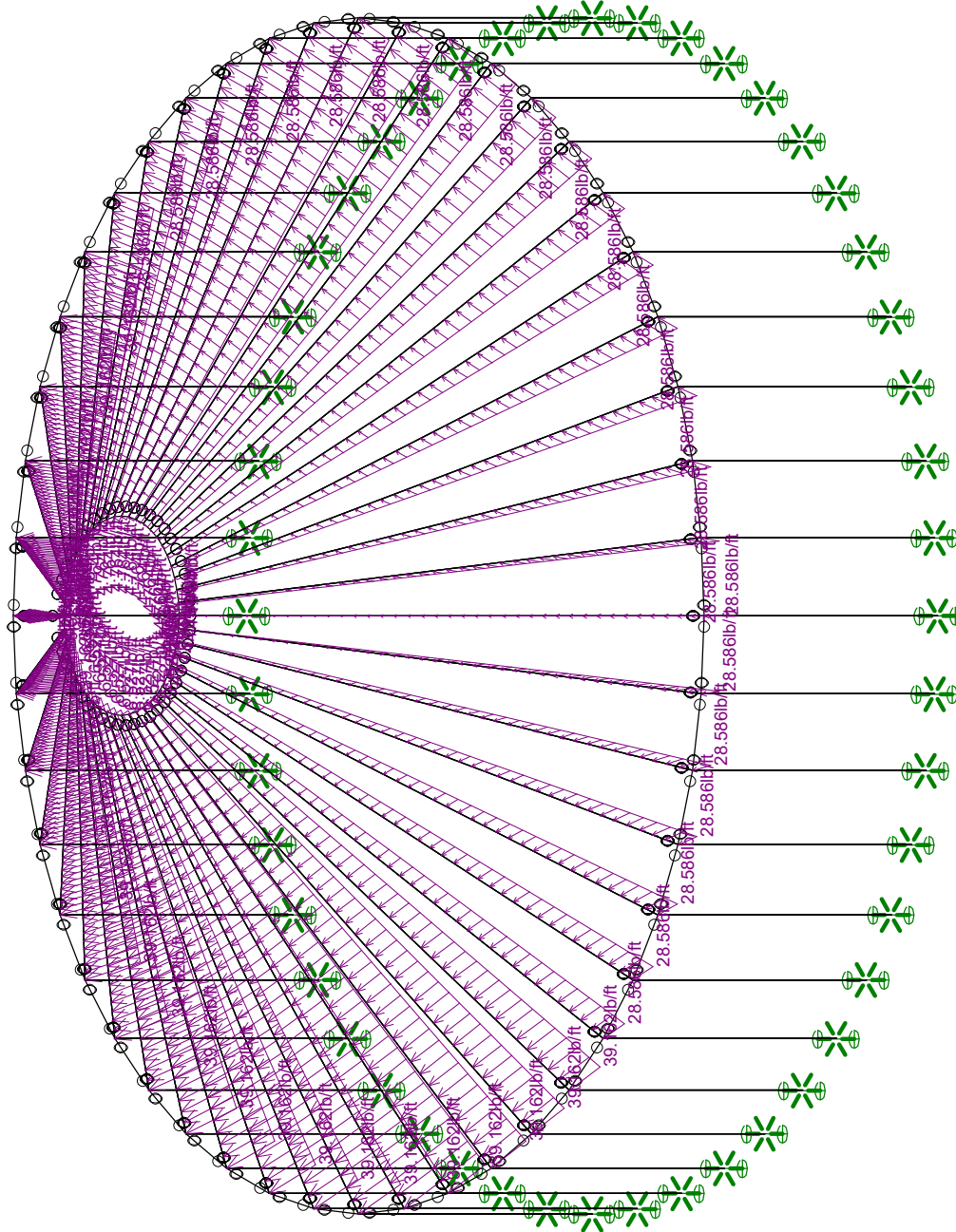
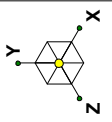


Loads: LC 3, WALL WL
Envelope Only Solution

30' FULL SNOW & WIND
WALL WIND LOADS

CO YURT COMPANY

30' FULL SNOW & WIND.r3d

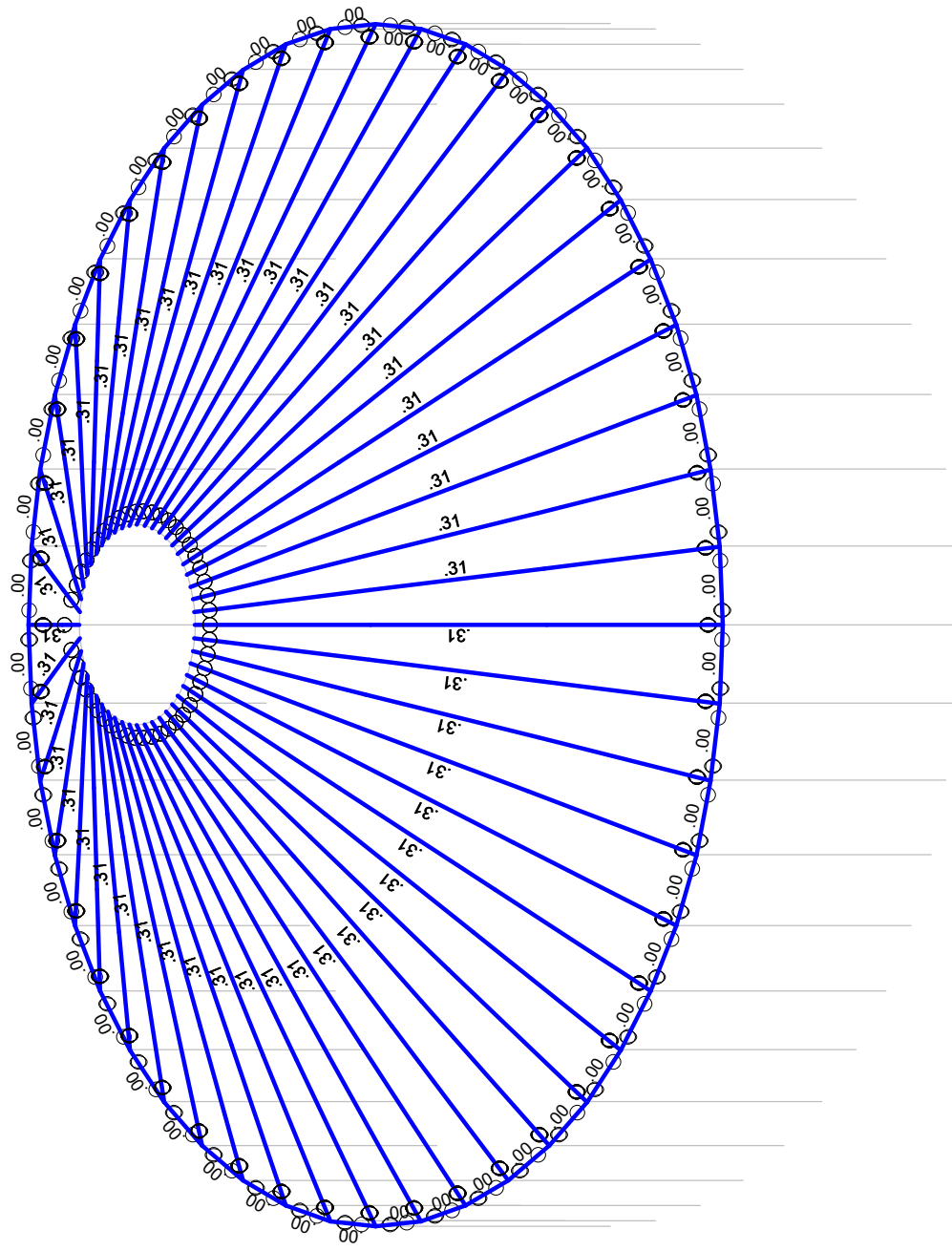
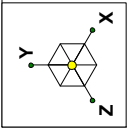
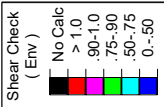


Loads: LC 4, ROOF WL
Envelope Only Solution

30' FULL SNOW & WIND
ROOF WIND LOADS

CO YURT COMPANY

30' FULL SNOW & WIND.r3d



Member Shear Checks Displayed (Enveloped)
Envelope Only Solution

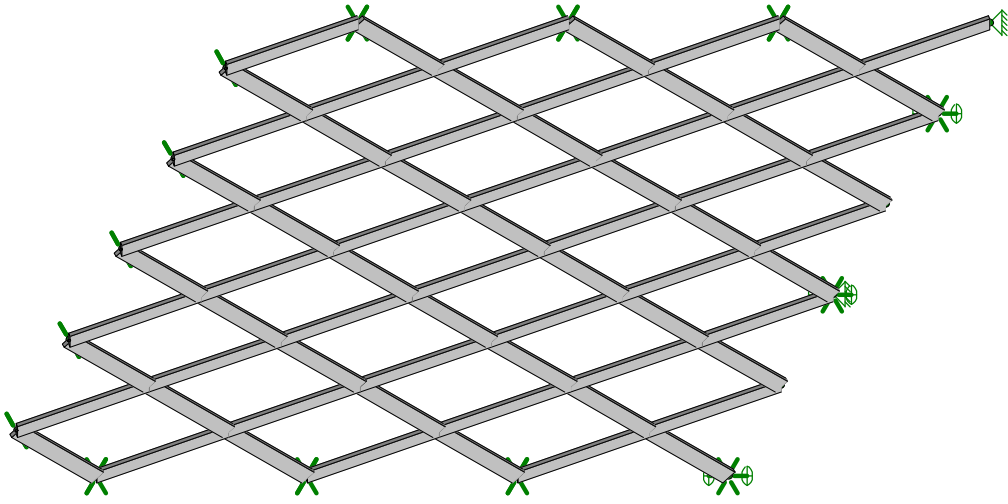
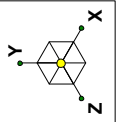
30' FULL SNOW & WIND

ENVELOPE CODE CHECK (SHEAR)

CO YURT COMPANY

30' FULL SNOW & WIND.r3d

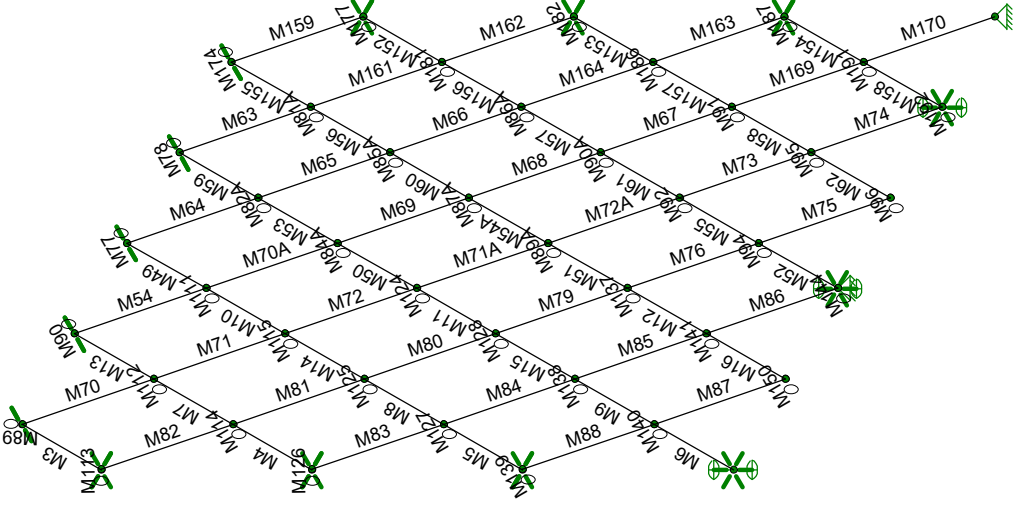
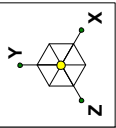
Miscellaneous Calculations



LATERAL LATTICE
BASIC MODEL

CO. YURT COMPANY

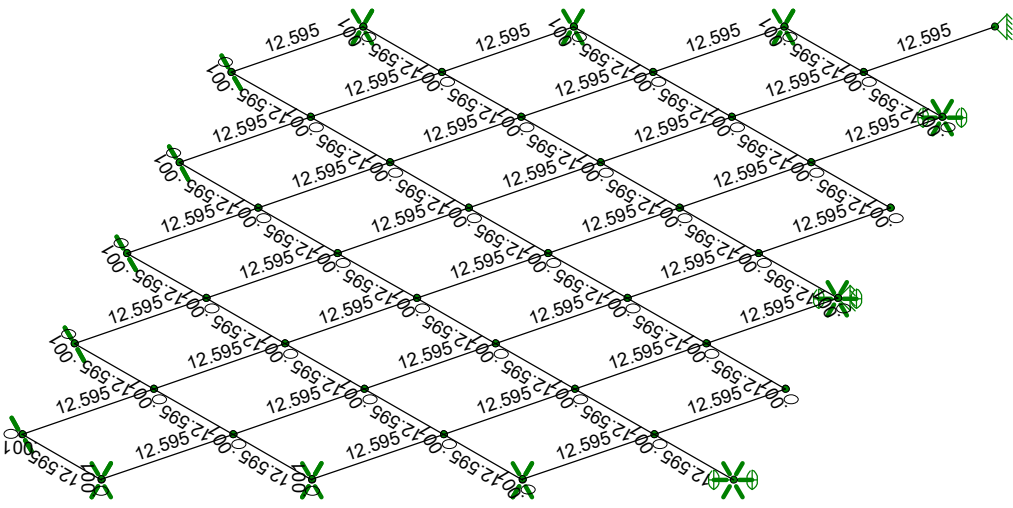
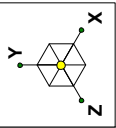
Lattice Yurt Lateral.r3d



LATERAL LATTICE
MEMBER LABELS

CO. YURT COMPANY

Lattice Yurt Lateral.r3d

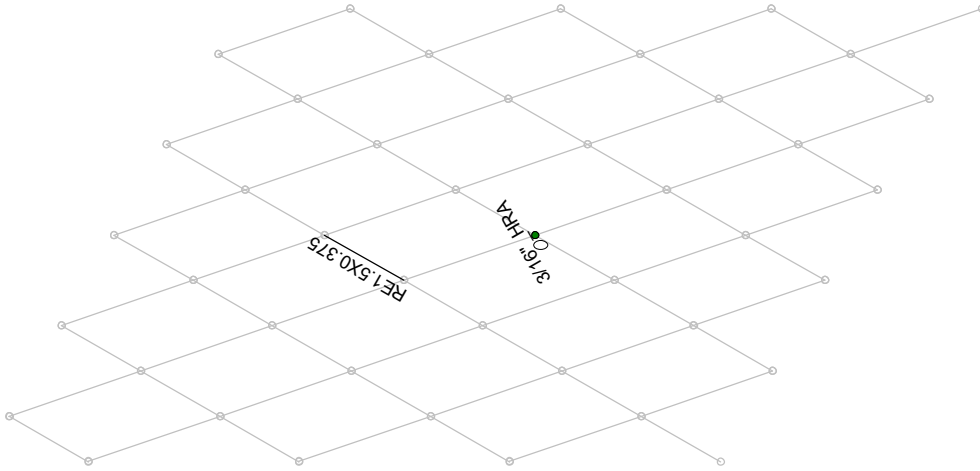
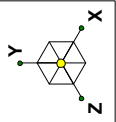


Member Length (in) Displayed

LATERAL LATTICE
MEMBER LENGTHS (INCHES)

CO. YURT COMPANY

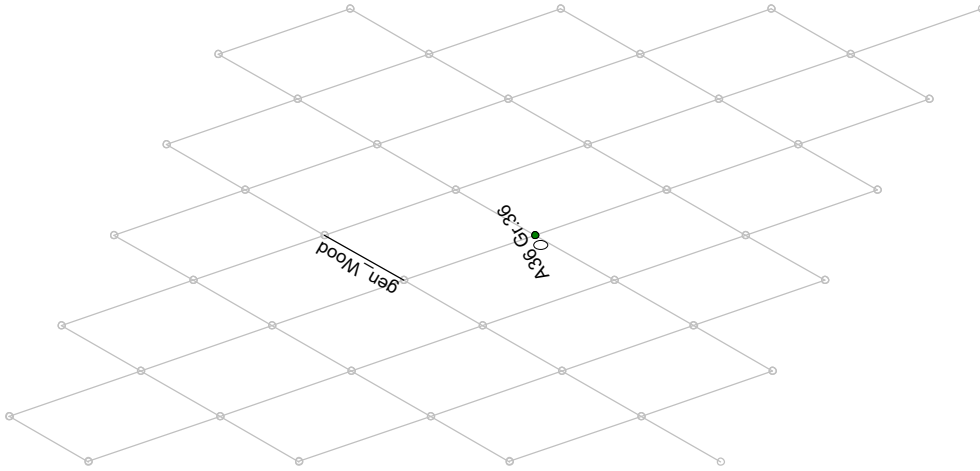
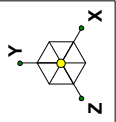
Lattice Yurt Lateral.r3d



**LATERAL LATTICE
MEMBER SHAPES**

CO. YURT COMPANY

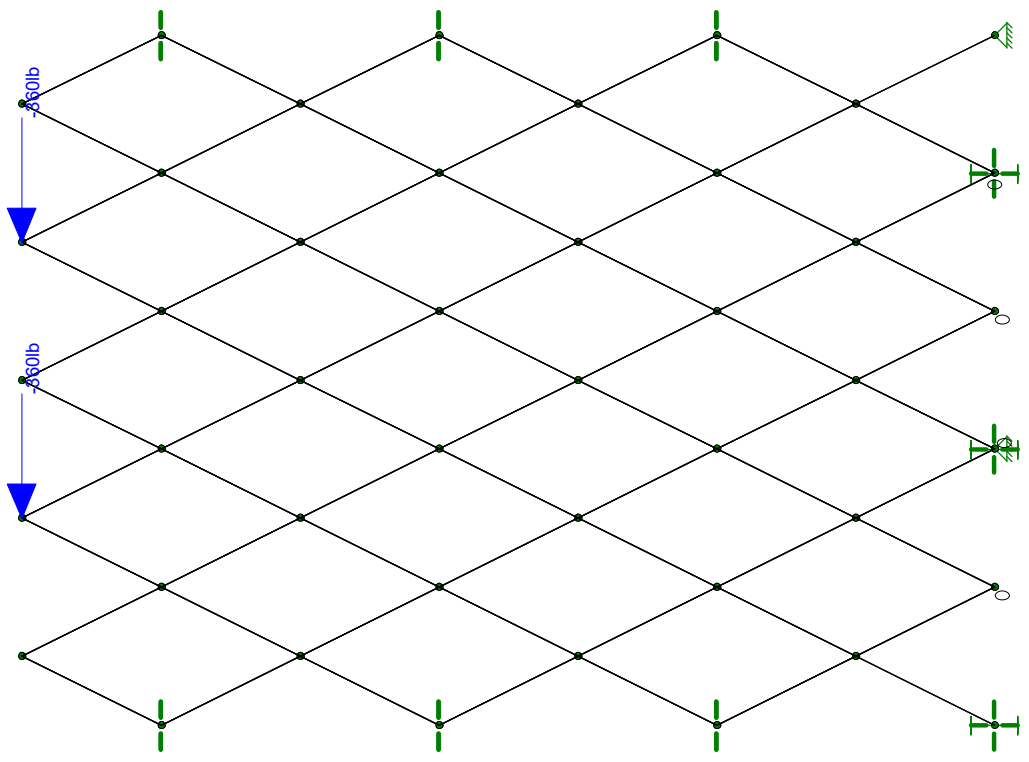
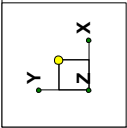
Lattice Yurt Lateral.r3d



LATERAL LATTICE
MEMBER MATERIALS

CO. YURT COMPANY

Lattice Yurt Lateral.r3d

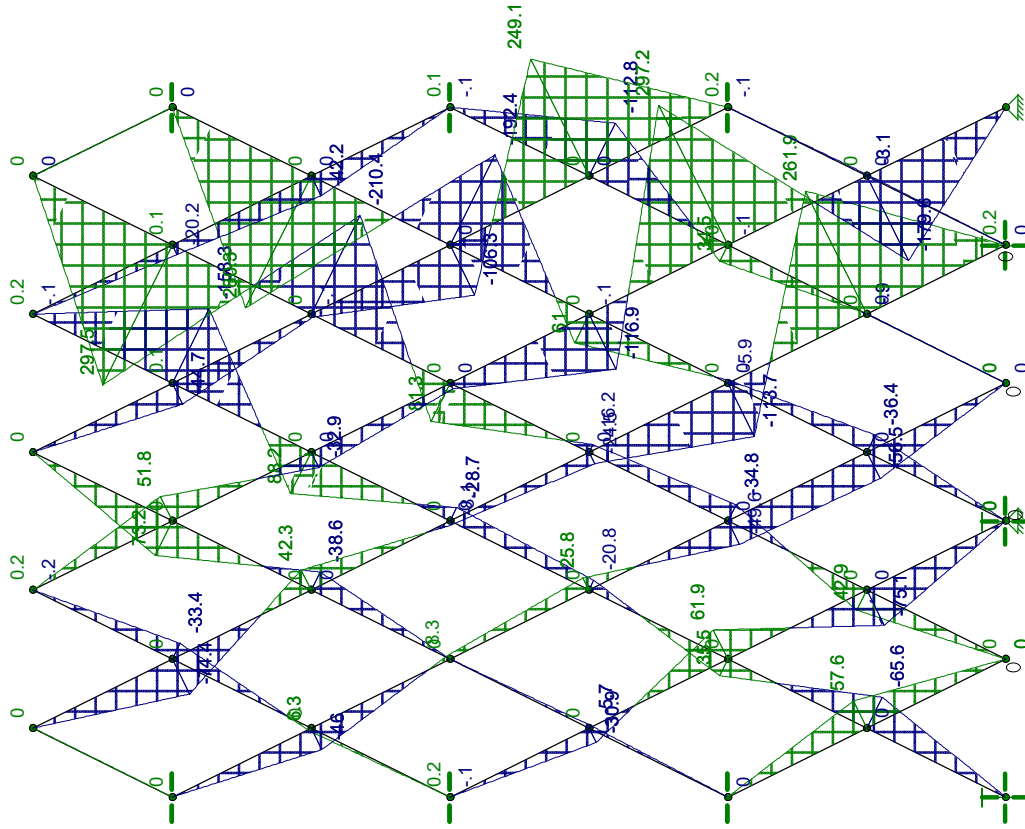


Loads: BLC 1, Lateral

LATERAL LATTICE
WALL WIND LOADS

CO. YURT COMPANY

Lattice Yurt Lateral.r3d

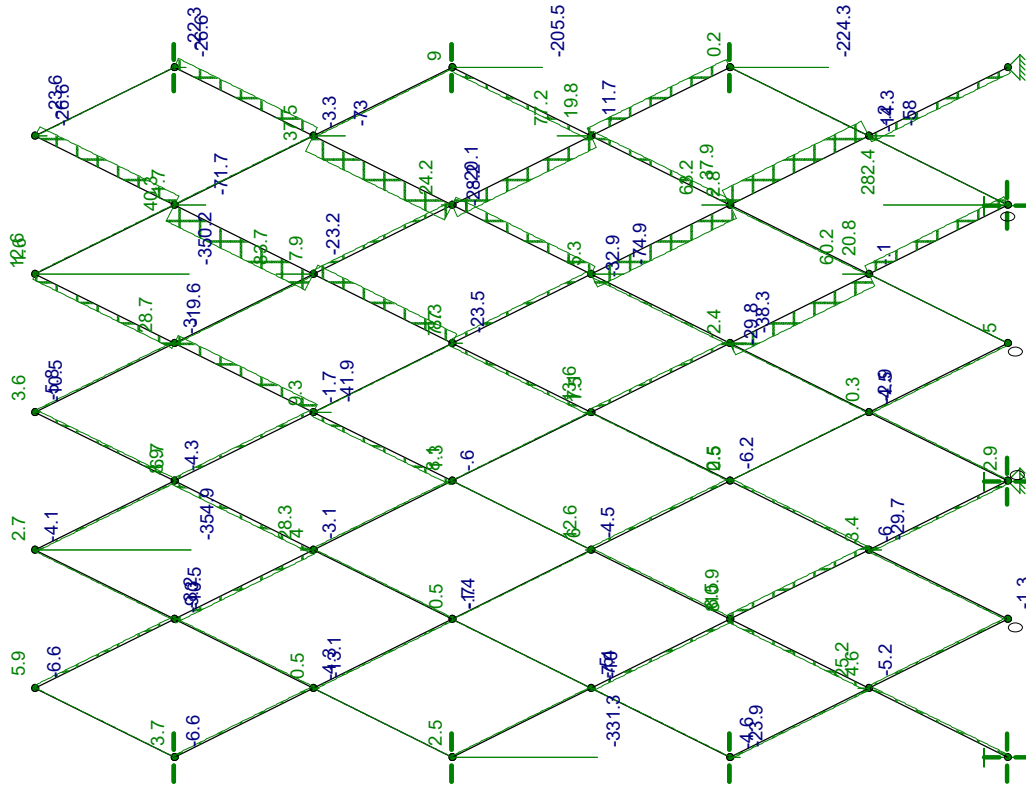


Results for LC 1, Load Case 1
 Member z Bending Moments (lb-in)

LATERAL LATTICE

CO. YURT COMPANY

Lattice Yurt Lateral.r3d

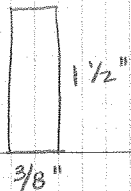


Results for LC 1, Load Case 1
Member y Shear Forces (lb)

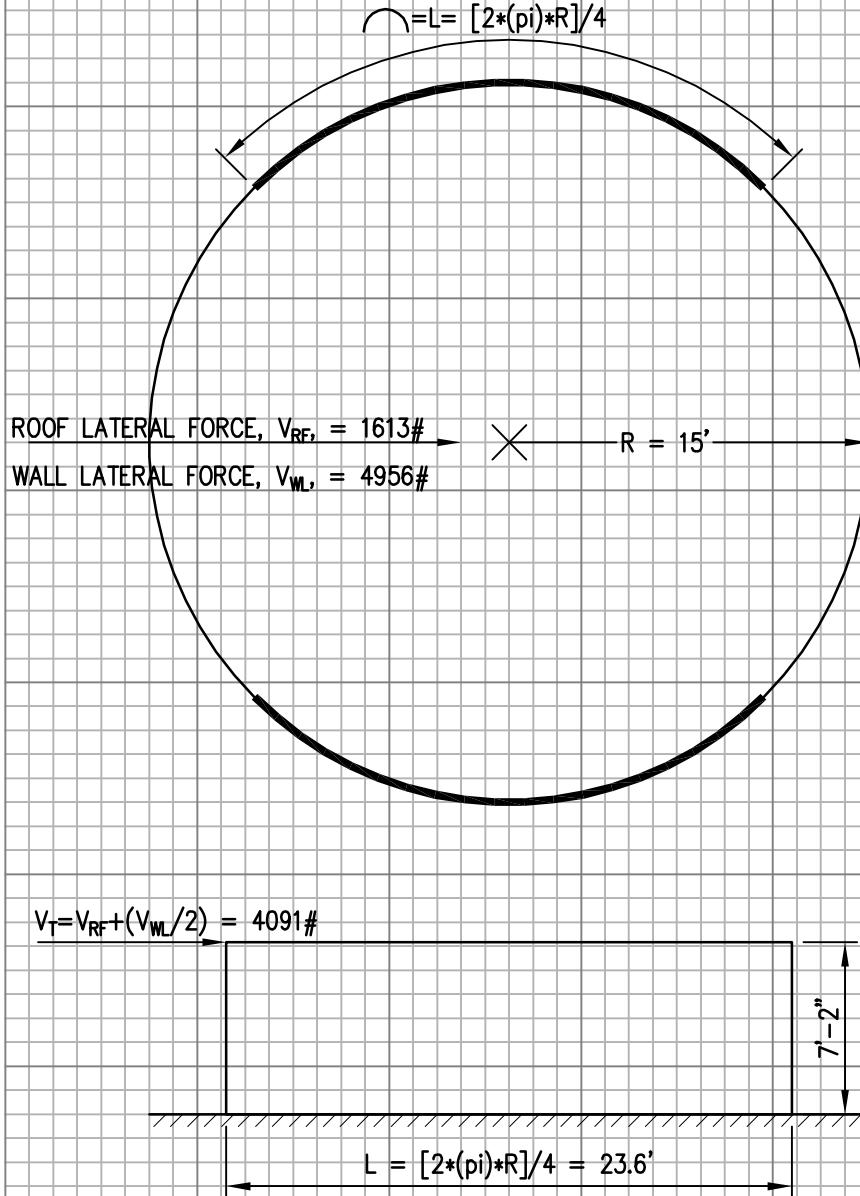
LATERAL LATTICE

CO. YURT COMPANY

Lattice Yurt Lateral.r3d

<u>LATTICE : CHECK BENDING</u>		MODELED AS	1.5" x 3/8"	GEN-WOOD
MSR	1350f-1.3E	$F_b = 1350 \text{ psi}$		
$F'_b = C_D C_M C_L C_C C_F C_{ru} C_i C_r F_b$				
$C_D = 1.0$ (NDS TBL 2.3.2)				
$C_C = 1.0$ (NDS TBL 2.3.3)				
$C_M = 1.0$ (NDS TBL 4B ADJ. FACTOR)				
$C_F = 1.0$				
$C_L = 1.0$	$\frac{d}{b} = 4$	$2 \leq d/b \leq 4$	$S = \frac{bh^2}{6}$	
$C_i = 1.0$			$S = \frac{(3/8") (1.5")^2}{6} = 0.141 \text{ in}^3$	
$C_r = 1.0$				
$C_{ru} = 1.0$				
$F'_b = 1350 \text{ psi} (1.0) = 1350 \text{ psi} = 1.35 \text{ ksi}$				
MAX MOMENT: $F_b = \frac{M}{S}$			$M_{MAX} = F_b S = 1350 \frac{\text{lb}}{\text{in}^2} (0.141 \text{ in}^3) = 190 \text{ lb-in}$	
<u>RIVETS</u>			NOTE: FOR YURTS WITH STUDS LATTICE IS REQ'D TO RESIST LATERAL LOADS ONLY, AND THE LOAD DURATIONAL FACTOR, C_D , MAY BE INCREASED TO 1.6.	
3/16" ϕ ALUMINIUM			$M_{MAX WIND} = 190 (1.6) = 303 \text{ lb-in}$	
$R_n = \frac{\pi D_n^2 F_{su}}{4}$		$0. R_n = \frac{\pi (0.1875 \text{ in})^2 F_{su}}{4}$	$F_{su} = 46 \text{ ksi}$	
$D_n = 0.1875"$		$R_n = 1270 \text{ lbs}$		
		$\frac{R_n}{\Omega} = \frac{1270 \text{ lbs}}{2.34} = 543 \text{ lbs}$		

DETERMINE LATERAL CAPACITY OF LATTICE (30' YURT):



NOTES:

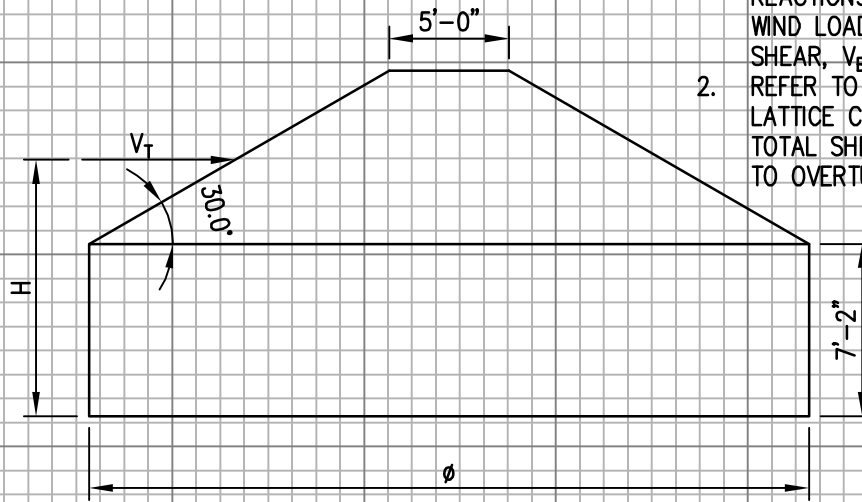
1. LENGTH OF MWFRS SYSTEM, LATTICE SHEAR WALL, ON EACH SIDE OF THE YURT IS ASSUMED TO BE APPROXIMATELY EQUAL TO $\frac{1}{4}$ th OF THE TOTAL CIRCUMFERENCE. REFER TO SKETCH FOR LENGTH DETERMINATION.
2. REFER TO RISA OUTPUT, JOINT REACTIONS, FOR ROOF LATERAL FORCE, V_{RF} .
3. REFER TO RISA OUTPUT JOINT REACTIONS, FOR WALL LATERAL FORCE. NOTE THAT THE PANEL SHEAR FORCE NEED ONLY BE TAKEN AS HALF THE WALL LATERAL FORCE.
4. UPLIFT & OVERTURNING FORCES ARE TO BE RESISTED VIA BRACKET CONNECTIONS OF THE STUDS AND/OR LATTICE, WHERE APPLICABLE, & LATTICE TO THE SUPPORTING SUBSTRATE. REFER TO RISA OUTPUT, JOINT REACTIONS, FOR MAXIMUM UPLIFT FORCES. ENGINEER IN RESPONSIBLE CHARGE FOR THE DESIGN OF THE SUPPORTING SUBSTRATE, i.e. CONCRETE SLAB, WOOD DECK, ETC., TO DESIGN ANCHORAGE FOR SUCH LOADS.

PANEL SHEAR FORCE = $(V_T/2)/P = 341\#$

REFERRING TO "LATERAL ANALYSIS OF LATTICE" RISA OUTPUT, MAXIMUM ALLOWABLE PANEL SHEAR FORCE = 720# WHICH IS GREATER THAN THE APPLIED SHEAR FORCE. THEREFORE, THE LATTICE IS CAPABLE OF RESISTING THE DESIGN LOADS.

YURT SCHEDULE			
TYPE	No. OF RAFTERS	SHEAR WALL LENGTH, L	No. OF PANELS/SHEARWALL, P
30'	48	23.6'	12
27'	45	21.2'	11
24'	42	18.85'	10
20'	36	15.71'	9
16'	28	12.57'	7

DETERMINE BASE SHEAR AND OVERTURNING MOMENT (30' YURT):



NOTES:

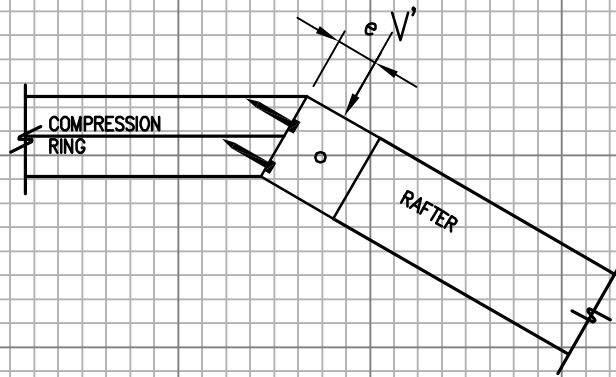
1. REFER TO RISA OUTPUT, SUM OF REACTIONS FOR WALL AND ROOF WIND LOADS, FOR TOTAL BASE SHEAR, V_{BASE} .
2. REFER TO LATERAL CAPACITY OF LATTICE CALCULATION SHEET FOR TOTAL SHEAR, V_T , CONTRIBUTING TO OVERTURNING FORCES

TOTAL BASE SHEAR, $V_{BASE} = 6596\#$

OVERTURNING MOMENT, $OTM = V_T(H) = 43639\#'$

YURT SCHEDULE	
DIAMETER, ϕ	HEIGHT, H
30'	10'-8"
27'	10'-3"
24'	9'-11"
20'	9'-4"
16'	8'-9"

DETERMINE MAXIMUM SHEAR AND TENSION FOR COMPRESSION RING CONNECTION:



NOTES:

1. U-BRACKET IS TO BE MADE UP OF 14 GA. STL
2. (2) 2x4 DF (F_b 2100-1.8 MSR) IS TO BE USED FOR COMPRESSION RING
3. (2) #12x2" WOOD SCREWS. TOP SCREW TO BE DESIGNED TO RESIST FULL TENSION AND HALF THE SHEAR VALUE. BOTTOM SCREW TO BE DESIGNED TO RESIST HALF THE SHEAR VALUE.
4. REFER TO FOLLOWING AWC PRINT OUT FOR LATERAL (Z') AND WITHDRAWAL (W_p) CAPACITIES FOR WOOD SCREWS.

14 GA. U-BRACKET

MAXIMUM ALLOWABLE TENSION, W_p = 205#

MAXIMUM ALLOWABLE SHEAR, Z' = 147#

$$2*Z' = 2*147# = 294#$$

CALCULATE MAXIMUM RAFTER SHEAR AND TENSION:

ASSUME COMPRESSION BLOCK LENGTH, a, IS EQUAL TO 1/4".

$$T' = (2V' * 1.5") / 1.875"$$

SOLVING FOR V',

$$V' = T'(1.875") / (2 * 1.5") = T'(0.625)$$

$$\alpha = \tan^{-1}(V'/T') = \tan^{-1}(T'(0.625)/T') = \tan^{-1}(0.625) = 32^\circ$$

CHECK COMBINED SHEAR AND TENSION:

$$Z'_a = [W'_p(Z')] / (W'_p \cos^2 \alpha + Z' \sin^2 \alpha) = 171# \quad (\text{CONTROLS})$$

$$z' = w'_p(1.875") / (2 * 1.5") = w'_p(0.625)$$

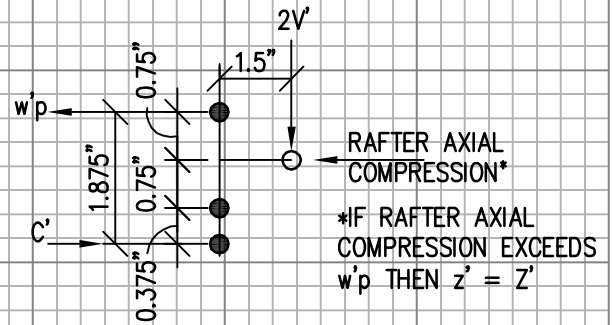
$$Z'_a = [w'_p(z')] / (w'_p \cos^2 \alpha + z' \sin^2 \alpha)$$

SOLVING FOR w_p,

$$w'_p = 145#$$

$$z' = 145#(0.625) = 90.625#$$

$$(2)z' = (2)90.625# = 181#$$



RAFTER AXIAL COMPRESSION*

*IF RAFTER AXIAL COMPRESSION EXCEEDS w_p THEN z' = Z'

Design Method	Allowable Stress Design (ASD) ▼
Connection Type	Lateral loading ▼
Fastener Type	Wood Screw ▼
Loading Scenario	Single Shear ▼

Main Member Type	Douglas Fir-Larch ▼
Main Member Thickness	3.5 in. ▼
Main Member: Angle of Load to Grain	90
Side Member Type	Steel ▼
Side Member Thickness	14 gage ▼
Side Member: Angle of Load to Grain	0
Wood Screw Number	12 (D = 0.216 in.) ▼
Length	2 in. ▼
Load Duration Factor	C _D = 1.0 ▼
Wet Service Factor	C _M = 1.0 ▼
End Grain Factor	C _{eg} = 1.0 ▼
Temperature Factor	C _t = 1.0 ▼

Connection Yield Modes

Im	537 lbs.
Is	359 lbs.
II	219 lbs.
III _m	245 lbs.
III _s	147 lbs.
IV	201 lbs.

Adjusted ASD Capacity	147 lbs.	= Z'
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- Wood Screw bending yield strength of 80000 psi is assumed.
- Dowel bearing strengths for wood screws with nominal diameter greater than 1/4 in. are calculated and rounded to the nearest 50 psi in accordance with NDS Table 11.3.2.
- Length of tapered tip is assumed to be two times the nominal wood screw diameter for calculating dowel bearing length in the main member.
- ASTM A36 Steel is assumed for steel side members 1/4 in. thick, and ASTM A653 Grade 33 Steel is assumed for steel side members less than 1/4 in. thick.

While every effort has been made to insure the accuracy of the information presented, and special effort has been made to assure that the information reflects the state-of-the-art, neither the American Wood Council nor its members assume any responsibility for any particular design prepared from this on-line Connection Calculator. Those using this on-line Connection Calculator assume all liability from its use.

Design Method	Allowable Stress Design (ASD) ▼
Connection Type	Withdrawal loading ▼
Fastener Type	Wood Screw ▼
Loading Scenario	N/A ▼

Main Member Type	Douglas Fir-Larch ▼
Main Member Thickness	3.5 in. ▼
Side Member Type	Steel ▼
Side Member Thickness	14 gage ▼
Wood Screw Number	12 (D = 0.216 in.) ▼
Length	2 in. ▼
Load Duration Factor	C _D = 1.0 ▼
Wet Service Factor	C _M = 1.0 ▼
Temperature Factor	C _t = 1.0 ▼

Adjusted ASD Capacity	205 lbs.	= W' _p
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- The Adjusted ASD Capacity does not apply for wood screws installed in the end grain of wood members.
- The Adjusted ASD Capacity only applies to withdrawal of the fastener from the main member. It does not address head pull-through capacity of the fastener in the side member.

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The Connection Calculator was designed and created by Cameron Knudson, Michael Dodson and David Pollock at Washington State University. Support for development of the Connection Calculator was provided by [American Wood Council](#).