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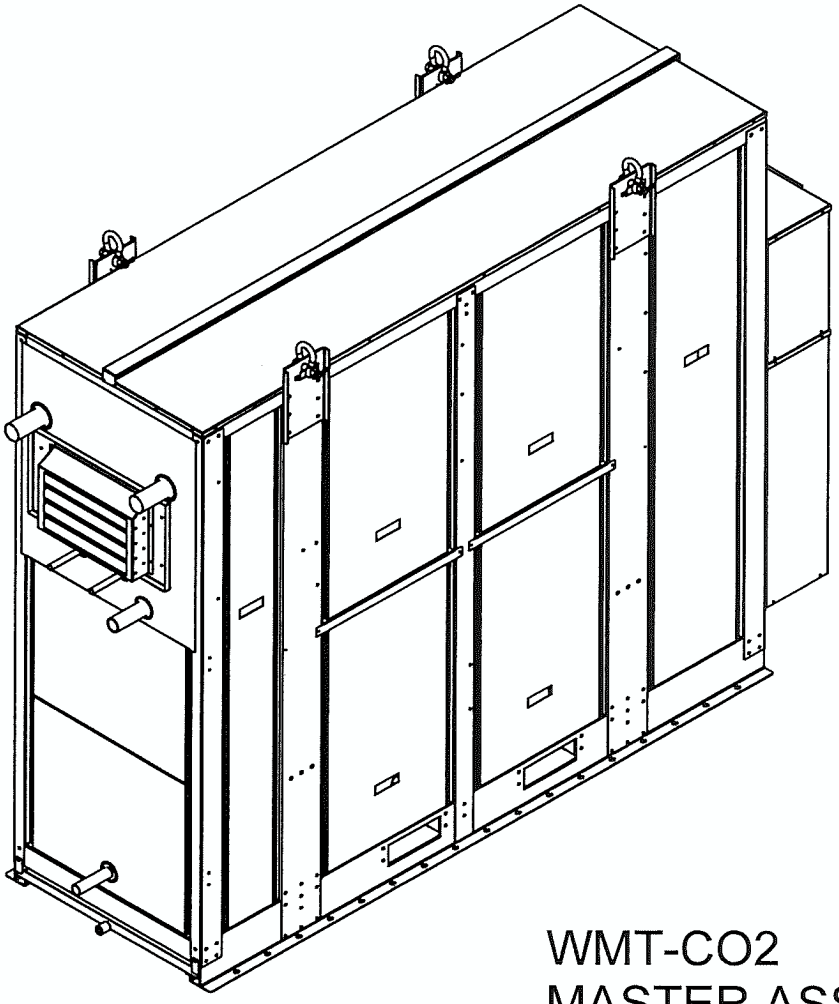
STRUCTURAL FRAMING DESIGN CHECK

WALMART CO2

TRACY S MITCHELL LICENSE No 79115 STATE OF FLORIDA PROFESSIONAL ENGINEER

Feb 29, 2024

PROJECT NO: 241779



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DESCRIPTION

These structural calculations are for the gravity (dead, live, and snow) loads, wind loads, and seismic loads placed on the exterior framing and shell of a stand-alone machine house with house refrigeration equipment. The equipment house will rest upon the roof of an existing building. **It is the responsibility of the building designer or engineer to verify that the new or existing structure can properly support the weight of the new unit and possible snow drifting loads due to the unit's length oF Building**

SCOPE OF WORK

These calculations will be performed for the structural framing of the refrigeration machine house. The structural framing will include the roof sheathing, roof purlins, wall posts, wall sheathing, floor sheathing, and components necessary to support the interior racks and other equipment. These calculations do **NOT** include checking of the existing structure for the weight of the new unit.

CODE & DESIGN REFERENCES

1. International Building Code, 2015.
2. **ASCE 7-16**, Minimum Design Loads for Buildings and Other Structures
3. AISC, Manual of Steel Construction, 14th Edition.
4. AISI, North American Specification for the Design of Cold-Formed Steel, 2007.
5.

GRAVITY LOAD DESIGN

DEAD LOADS

9' LENGTH UNIT

Total Weight:	**~10,000 lbs**
Steel Frame Weight:	1000 lbs
Equipment Weight:	8000 lbs
Misc Items	1000 lbs

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LIVE LOADS

PER ASCE 7-16 ROOF LIVE LOAD = 20 PSF, MINIMUM.

SPECIFIED = 30 PSF

SNOW LOADS

Design for the maximum snow load capacity.

Pf = 100 psf

SNOW DRIFTING LOADS

There are no snow drifting loads on the unit itself, only on the adjacent roof framing of the building.

CHECK 18 GAGE ROOF DECKING

Dead Load:	Self weight		(included in staad)
Live Load	LL	=	30 psf
Snow load	SL	=	100 psf

fb / Fb = Actual Stress / 0.66 fy

= 0.67/ (33ksi/1.67)

= 0.03 < 1.0

Therefore, **18 GAGE STEELS ADEQUATE**

CHECK ROOF CENTER MEMBER

Span = 9'-0" (108")

Roof Center Member= Unistrut with channel Section 2.625" x 0.625" x 18 GA (.05") light gage

(Fy =33 ksi)

Roof Dead Load = 2 psf (Self weight Metal Sheet)

Roof Live Load = 30 psf

Roof Snow Load = 100 psf (Controls)

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Max Moment = 1.42 kip-inches

Max Shear = 225 lbs.

Actual fb = M/ Sx = 1.42 k" / 0.29 in^3 = 4.89 ksi

Allowable Fb = Fy / 1.67 = 33 ksi / 1.67 = 19.8 ksi > 4.89 ksi (25% stressed)

Therefore, Unistrut with channel Section 2.625" x 0.625" x 18 GA (.05") light gage ADEQUATE

CHECK ROOF END BRACKET

Span = 3'-3" (39")

Mx = 1.27 kip-inches ….From Staad

Max Shear = 71 lbs.

Actual fb = Mx/Sx = 1.27 k" / 0.27 in*^3 = 4.7 ksi

Allowable Fb = Fy/1.67 = 19.8 ksi >> 4.7 ksi (ADEQUATE – 23% stressed)

Therefore, End Bracket 2.750" x 1.938"x1.5" x 18 gage Bracket ADEQUATE

CHECK ROOF SIDE BRACKET

Span = 8'-11" (107")

Mx = 0.78 kip-inches ….From Staad

Max Shear = 100 lbs.

Actual fb = Mx/Sx = 0.78 k" / 0.25 in*^3 = 3.12 ksi

Allowable Fb = Fy/1.67 = 19.8 ksi >> 3.12 ksi (ADEQUATE – 0.16% stressed)

Therefore, Roof Side 2.751" x 1.875"x1.5" x 18 gage ADEQUATE

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CHECK FLOOR FRAMING

Mx = 2.11 kip-inches ….From Staad

Max Shear = 234 lbs.

Actual fb = Mx/Sx = 2.11 k" / 1 in*^3 = 2.11 ksi

Allowable Fb = Fy/1.67 = 19.8 ksi >> 2.11 ksi (ADEQUATE – 0.11% stressed)

Therefore, End Rail 4" x 2"x1.0" x 14 gage ADEQUATE

CHECK FLOOR FRAMING

Mx = 1.65 kip-inches ….From Staad

Max Shear = 183 lbs.

Actual fb = Mx/Sx = 1.65 k" / 0.75 in^3 = 2.2 ksi

Allowable Fb = Fy/1.67 = 19.8 ksi >> 2.2 ksi (ADEQUATE – 0.11% stressed)

Therefore, End Rail 3.750" x 2" x 14 gage ADEQUATE

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LATERAL LOADS (WIND)

The lateral load resisting system of the machine house consists of the 18 Gauge roof Metal sheathing acting as a horizontal diaphragm which distributes the lateral loads out to the exterior walls. The vertical wall posts on all sides with the 18 Gauge Metal sheathing act as vertical shear walls which resist any lateral forces and transfer them to the base frame.

The weight of the unit will resist any sliding or overturning moments for the lateral forces as shown in the calculations.

WIND LOADS (MWFRS)

- Wind Exposure "C" (Commercial Area)
- Importance Factor, Iw = 1.0
- **175 mph wind speed**

See attached wind load calculation spreadsheet. For the height of this building the minimum wind load of 16 psf will NOT control the design for exposure C. The end zone distance 2/2E is 2.42', so increase the total wind load by 10% to be conservative.

Pw = (15.1 + 32.3) = 47.4 psf

Wind load at roof edge = ½ x 8.0' x 0.6 x 47.4 psf = 114 plf

Wind load at end shear walls, $V_L = V_R = wL/2$ = (114 plf x 9') / 2 = **513 lbs**.

Roof Diaphragm uniform load = $V_L = V_R$ / B = 513 lbs / (3.25') = **158 plf**

Capacity of 18 Gauge Sheating = 158 plf << 485 plf

CHECK WIND OVERTURNING MOMENT

P = 0.6 x 47.4 psf = 28.44 psf

Total W1 = 28.44 psf x 8.0' x 9' length = 2,048 lbs. (Mech House Unit)

Moment Arm1 = 8.0' / 2 = 4.0'

Overturning Moment = 2,048 x 4.0' = 8,192 ft-lbs

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Unit Weight = 10,000 lbs

Moment Arm = Depth / 2 = 8.0' / 2 = 4.0'

Resisting Moment = 10,000 lbs x 4.0' = 40,000 ft-lbs

SAFETY FACTOR = RM / OTM = 40,000 / 8,192 ft-lbs = 4.88 > 1.50 (ADEQUATE)

(No anchorage required for steel frame base)

Wind Loads Component & Cladding

See wind loads based upon tributary area on wind load calculation spreadsheet and utilizing a wind speed of 175 mph to match MWFRS maximum wind speed.

Check Post

-span = 92" = 7.67'

-tributary area = l x w = 7.67' x 2.08' = 16 sf

Or = l^2 / 3 = (7.67' x 7.67') / 3 = 19.60 sf

Pw = - 92.36 psf (ASCE 7-16, Figure 6-3, Method 1, Comp & Cladding)

Wind load = -92.36 psf x 0.6 = -55.42 plf

Mx = 6.6 kip-inches

Actual bending stress, fb = Mx / Sx = 6.6 k" / 0.55 in^3 = 12.0 ksi

Allowable bending stress = Fy / 1.67 = 33 ksi / 1.67 = **19.8 ksi >> 12.0 ksi (OK)**

-**Maximum Vertical Load** (roof dead load + snow load) = 440 **lbs**

-Kx = Ky = 0.8

-Lx = Ly = 92"

- rx = 1.91, ry = 0.53

-KLx / rx = 0.8 x 92" / 1.91 = 38.53

-Kly / ry = 0.8 x 92" / 0.53 = 148 < 200 (OK) – CONTROLS

-Lamda = SQRT [(Fy / Fe) where Fe = (pi^2) x E / (Kl/r)^2]

Fe = (3.142)^2 x 29,500 / (148)^2 = 13.29

Lamda = (33 / 13.29) ^ ½ = 1.58 > 1.50

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Therefore, Fn = [0.877 / Lambda^2] x Fy = [0.877 / (1.58)^2] x 33 ksi = 11.59 ksi

Pn = Ae x Fn/ Safety Factor = 0.71 in^2 x 11.59 ksi / 1.80 = 4.57 kips allowable

fa / Fa = 0.170 kips / 4.57 kips = ~ 0.04

MAXIMUM UNITY CHECK

fa / Fa + fb/ Fb = 0.04 + 0.61 = 0.65 < 1.0 (OK) (92% STRESSED)

THEREFORE, ALL POST 4" X 1.18" X 1.25"X 10 GAGE ADEQUATE

Check Post

-span = 96" = 8.0'

-tributary area = l x w = 8' x 1.5' = 16 sf

Or = l^2 / 3 = (8' x 8') / 3 = 21.33 sf

Pw = - 92.36 psf (ASCE 7-16, Figure 6-3, Method 1, Comp & Cladding)

Wind load = -92.36 psf x 0.6 = -55.42 plf

Mx = 9.7 kip-inches

Actual bending stress, fb = Mx / Sx = 6.3 k" / 0.90 in^3 = 7 ksi

Allowable bending stress = Fy / 1.67 = 33 ksi / 1.67 = **19.8 ksi >> 7 ksi (OK)**

-**Maximum Vertical Load** (roof dead load + snow load) = 435 **lbs**

-Kx = Ky = 0.8

-Lx = Ly = 96"

- rx = 3.21, ry = 0.46

-KLx / rx = 0.8 x 96" / 3.21 = 23.93

-Kly / ry = 0.8 x 92" / 0.46 = 167 < 200 (OK) – CONTROLS

-Lamda = SQRT [(Fy / Fe) where Fe = (pi^2) x E / (Kl/r)^2]

Fe = (3.142)^2 x 29,500 / (167)^2 = 10.44

Lamda = (33 / 10.44) ^ ½ = 1.78 > 1.50

Therefore, Fn = [0.877 / Lambda^2] x Fy = [0.877 / (1.78)^2] x 33 ksi = 9.13 ksi

Pn = Ae x Fn/ Safety Factor = 1.02 in^2 x 9.13 ksi / 1.80 = 5.28 kips allowable

fa / Fa = 0.170 kips / 5.28 kips = ~ 0.03

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MAXIMUM UNITY CHECK

fa / Fa + fb/ Fb = 0.03 + 0.35 = 0.38 < 1.0 (OK) (54% STRESSED)

THEREFORE, ALL POST 8" X 1.125" X 1.25"X 10 GAGE ADEQUATE

Check Corner Post

-span = 89" = 7.42'

-tributary area = l x w = 8' x 1.5' = 16 sf

Or = l^2 / 3 = (8' x 8') / 3 = 21.33 sf

Pw = - 92.36 psf (ASCE 7-16, Figure 6-3, Method 1, Comp & Cladding)

Wind load = -92.36 psf x 0.6 = -55.42 plf

Mx = 9.7 kip-inches

Actual bending stress, fb = Mx / Sx = 6.3 k" / 0.90 in^3 = 7 ksi

Allowable bending stress = Fy / 1.67 = 33 ksi / 1.67 = **19.8 ksi >> 7 ksi (OK)**

-**Maximum Vertical Load** (roof dead load + snow load) = 435 **lbs**

-Kx = Ky = 0.8

-Lx = Ly = 96"

- rx = 3.21, ry = 0.46

-KLx / rx = 0.8 x 96" / 3.21 = 23.93

-Kly / ry = 0.8 x 92" / 0.46 = 167 < 200 (OK) – CONTROLS

-Lamda = SQRT [(Fy / Fe) where Fe = (pi^2) x E / (Kl/r)^2]

Fe = (3.142)^2 x 29,500 / (167)^2 = 10.44

Lamda = (33 / 10.44) ^ ½ = 1.78 > 1.50

Therefore, Fn = [0.877 / Lambda^2] x Fy = [0.877 / (1.78)^2] x 33 ksi = 9.13 ksi

Pn = Ae x Fn/ Safety Factor = 1.02 in^2 x 9.13 ksi / 1.80 = 5.28 kips allowable

fa / Fa = 0.170 kips / 5.28 kips = ~ 0.03

MAXIMUM UNITY CHECK

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fa / Fa + fb/ Fb = 0.03 + 0.35 = 0.38 < 1.0 (OK) (54% STRESSED)

THEREFORE, ALL POST 8" X 1.125" X 1.25"X 10 GAGE ADEQUATE

WIND LOADING ANALYSIS - Main Wind-Force Resisting System

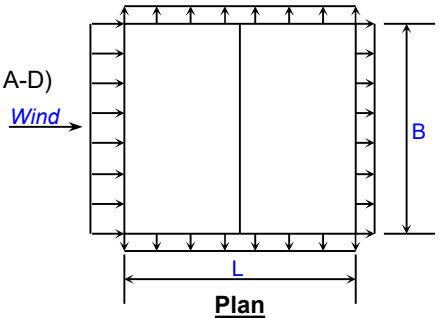
Per ASCE 7-16 Code for Enclosed or Partially Enclosed Buildings

Using Method 2: Analytical Procedure (Section 27 & 28) for Low-Rise Buildings

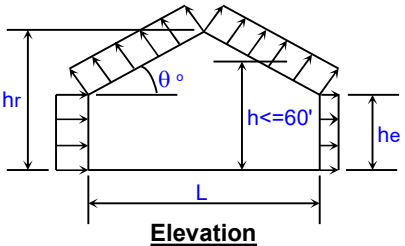
Job Name:	Walmart CO2	Subject:	Equipment House		
Job Number:	241779	Originator:	SR	Checker:	TSM

Input Data:

Wind Speed, V =	175	mph (Wind Map, Figure 26.5-1A-D)
Bldg. Classification =	II	(Table 1.5-1 Risk Category)
Exposure Category =	C	(Sect. 26.7)
Ridge Height, hr =	37.83	ft. (hr >= he)
Eave Height, he =	37.75	ft. (he <= hr)
Building Width =	3.25	ft. (Normal to Building Ridge)
Building Length =	9.00	ft. (Parallel to Building Ridge)
Roof Type =	Monoslope	(Gable or Monoslope)
Topo. Factor, Kzt =	1.00	(Sect. 26.8 & Figure 26.8-1)
Direct. Factor, Kd =	0.85	(Table 26.6)
Enclosed? (Y/N)	Y	(Sect. 26.2 & Table 26.11-1)
Hurricane Region?	Y	



Plan



Elevation

Resulting Parameters and Coefficients:

Roof Angle, θ =	1.41	deg.
Mean Roof Ht., h =	37.75	ft. (h = he, for angle <=10 deg.)

Check Criteria for a Low-Rise Building:

1. Is h <= 60' ? Yes, O.K. 2. Is h <= Lesser of L or B? No, Violation!

External Pressure Coeff's., GCpf (Fig. 28.4-1):
(For values, see following wind load tabulations.)
Positive & Negative Internal Pressure Coefficients, GCpi (Table 26.13-1):

+GCpi Coef. =	0.18	(positive internal pressure)
-GCpi Coef. =	-0.18	(negative internal pressure)

If h < 15 then: Kh = 2.01*(15/zg)^(2/α) (Table 26.10-1)
If h >= 15 then: Kh = 2.01*(z/zg)^(2/α) (Table 26.10-1)

α =	9.50	(Table 26.11-1)
zg =	900	(Table 26.11-1)
Kh =	1.03	(Kh = Kz evaluated at z = h)

Velocity Pressure: qz = 0.00256*Kz*Kzt*Kd*V^2 (Sect. 26.10.1, Eq. 26.10-1)
qh = 68.70 psf qh = 0.00256*Kh*Kzt*Kd*V^2 (qz evaluated at z = h)
Design Net External Wind Pressures (Sect. 28.4.1):
p = qh*[(GCpf) - (+/-GCpi)] (psf, Eq. 28.3-1)

Wall and Roof End Zone Widths 'a' and '2*a' (Fig. 28.3-1):

a =	3.00	ft.
2*a =	6.00	ft.

MWFRS Wind Load for Load Case A				MWFRS Wind Load for Load Case B			
Surface	GCpf	p = Net Pressures (psf)		Surface	*GCpf	p = Net Pressures (psf)	
		(w/ +GCpi)	(w/ -GCpi)			(w/ +GCpi)	(w/ -GCpi)
Zone 1	0.40	15.11	39.85	Zone 1	-0.45	-43.28	-18.55
Zone 2	-0.69	-59.77	-35.04	Zone 2	-0.69	-59.77	-35.04
Zone 3	-0.37	-37.79	-13.05	Zone 3	-0.37	-37.79	-13.05
Zone 4	-0.29	-32.29	-7.56	Zone 4	-0.45	-43.28	-18.55
Zone 5	---	---	---	Zone 5	0.40	15.11	39.85
Zone 6	---	---	---	Zone 6	-0.29	-32.29	-7.56
Zone 1E	0.61	29.54	54.27	Zone 1E	-0.48	-45.34	-20.61
Zone 2E	-1.07	-85.88	-61.14	Zone 2E	-1.07	-85.88	-61.14
Zone 3E	-0.53	-48.78	-24.05	Zone 3E	-0.53	-48.78	-24.05
Zone 4E	-0.43	-41.91	-17.18	Zone 4E	-0.48	-45.34	-20.61
Zone 5E	---	---	---	Zone 5E	0.61	29.54	54.27
Zone 6E	---	---	---	Zone 6E	-0.43	-41.91	-17.18

*Note: Use roof angle θ = 0 degrees for Longitudinal Direction.

For Case A when GCpf is neg. in Zones 2/2E:
Zones 2/2E dist. = 1.63 ft.

For Case B when GCpf is neg. in Zones 2/2E:
Zones 2/2E dist. = 4.50 ft.

Remainder of roof Zones 2/2E extending to ridge line shall use roof Zones 3/3E pressure coefficients.

MWFRS Wind Load for Load Case A, Torsional Case				MWFRS Wind Load for Case B, Torsional Case			
Surface	GCpf	p = Net Pressure (psf)		Surface	GCpf	p = Net Pressure (psf)	
		(w/ +GCpi)	(w/ -GCpi)			(w/ +GCpi)	(w/ -GCpi)
Zone 1T	---	3.78	9.96	Zone 1T	---	-10.82	-4.64
Zone 2T	---	-14.94	-8.76	Zone 2T	---	-14.94	-8.76
Zone 3T	---	-9.45	-3.26	Zone 3T	---	-9.45	-3.26
Zone 4T	---	-8.07	-1.89	Zone 4T	---	-10.82	-4.64
Zone 5T	---	---	---	Zone 5T	---	3.78	9.96
Zone 6T	---	---	---	Zone 6T	---	-8.07	-1.89

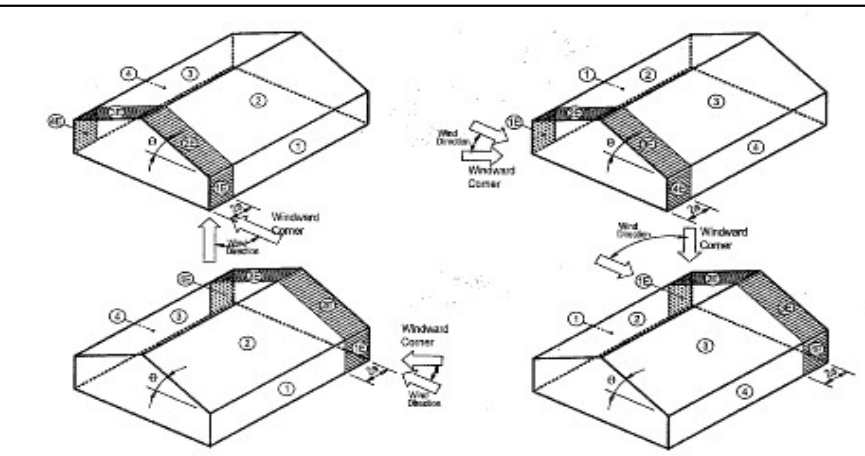
Notes: 1. For Load Case A (Transverse), Load Case B (Longitudinal), and Torsional Cases:

Zone 1 is windward wall for interior zone.	Zone 1E is windward wall for end zone.
Zone 2 is windward roof for interior zone.	Zone 2E is windward roof for end zone.
Zone 3 is leeward roof for interior zone.	Zone 3E is leeward roof for end zone.
Zone 4 is leeward wall for interior zone.	Zone 4E is leeward wall for end zone.
Zones 5 and 6 are sidewalls.	Zone 5E & 6E is sidewalls for end zone.
Zone 1T is windward wall for torsional case	Zone 2T is windward roof for torsional case.
Zone 3T is leeward roof for torsional case	Zone 4T is leeward wall for torsional case.

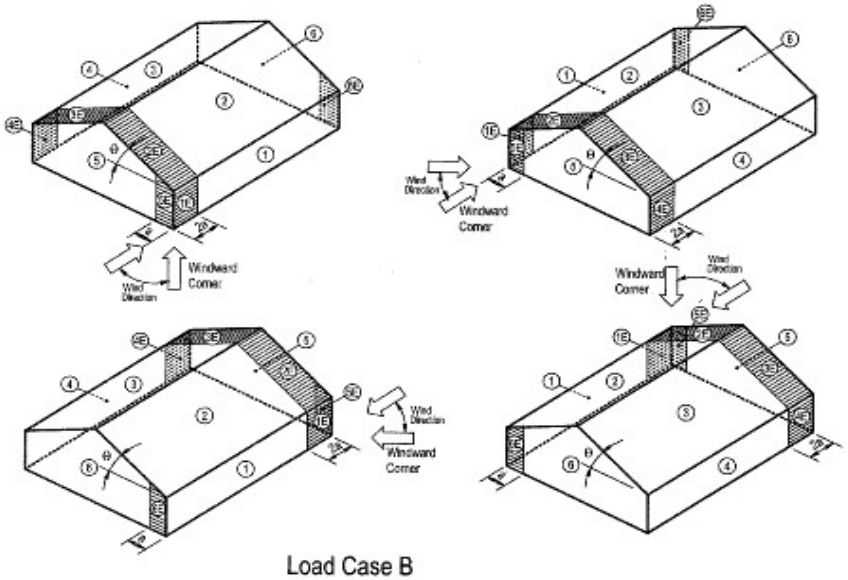
Zones 5T and 6T are sidewalls for torsional case.

2. (+) and (-) signs signify wind pressures acting toward & away from respective surfaces.
3. Building must be designed for all wind directions using the 8 load cases shown below. The load cases are applied to each building corner in turn as the reference corner.
4. Wind loads for torsional cases are 25% of respective transverse or longitudinal zone load values. Torsional loading shall apply to all 8 basic load cases applied at each reference corner.
   Exception: One-story buildings with "h" <= 30', buildings <= 2 stories framed with light frame construction, and buildings <=2 stories designed with flexible diaphragms need not be designed for torsional load cases.
5. Per Code Section 28.4.4, the minimum wind load for MWFRS shall not be less than 16 psf.

Low-Rise Buildings
h <= 60'

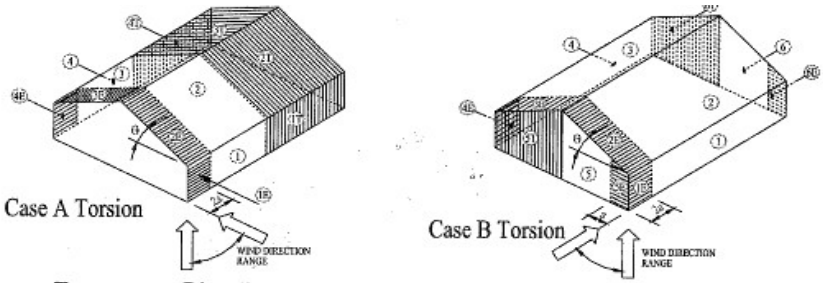


Load Case A



Load Case B

Basic Load Cases



Transverse Direction

Longitudinal Direction

Torsional Load Cases

WIND LOADING ANALYSIS - Wall Components and Cladding

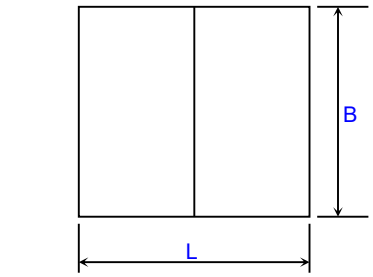
Per ASCE 7-16 Code for Buildings of Any Height

Using Part 1 & 3: Analytical Procedure (Section 30.4 & 30.6)

Job Name:	Publix – Charleston, SC	Subject:	Wind Components		
Job Number:	231070	Originator:	SR	Checker:	TSM

Input Data:

Wind Speed, V =	175	mph (Wind Map, Figure 26.5-1A-D)
Bldg. Classification =	II	(Table 1.5-1 Risk Category)
Exposure Category =	C	(Sect. 26.7)
Ridge Height, hr =	37.83	ft. (hr >= he)
Eave Height, he =	37.75	ft. (he <= hr)
Building Width =	3.25	ft. (Normal to Building Ridge)
Building Length =	9.00	ft. (Parallel to Building Ridge)
Roof Type =	Monoslope	(Gable or Monoslope)
Topo. Factor, Kzt =	1.00	(Sect. 26.8 & Figure 26.8-1)
Direct. Factor, Kd =	0.85	(Table 26.6)
Enclosed? (Y/N)	Y	(Sect. 28.6-1 & Figure 26.11-1)
Hurricane Region?	Y	
Component Name =	Wall	(Girt, Siding, Wall, or Fastener)
Effective Area, Ae =	20	ft.^2 (Area Tributary to C&C)



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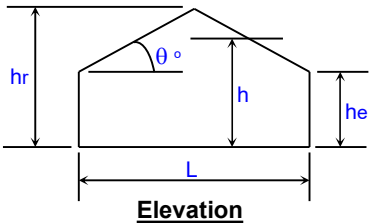


Elevation

Resulting Parameters and Coefficients:

Roof Angle, θ =	1.41	deg.
Mean Roof Ht., h =	37.75	ft. (h = he, for roof angle <=10 deg.)

Wall External Pressure Coefficients, GCp:

GCp Zone 4 Pos. =	0.85	(Fig. 30.3-1, GCp is reduced by 10% for roof angle <=10 deg.)
GCp Zone 5 Pos. =	0.85	(Fig. 30.3-1, GCp is reduced by 10% for roof angle <=10 deg.)
GCp Zone 4 Neg. =	-0.94	(Fig. 30.3-1, GCp is reduced by 10% for roof angle <=10 deg.)
GCp Zone 5 Neg. =	-1.16	(Fig. 30.3-1, GCp is reduced by 10% for roof angle <=10 deg.)

Positive & Negative Internal Pressure Coefficients, GCpi (Figure 26.13-1):

+GCpi Coef. =	0.18	(positive internal pressure)
-GCpi Coef. =	-0.18	(negative internal pressure)

If z <= 15 then: Kz = 2.01*(15/zg)^(2/α) , If z > 15 then: Kz = 2.01*(z/zg)^(2/α) (Table 30.3-1)

α =	9.50	(Table 26.11-1)
zg =	900	(Table 26.11-1)
Kh =	1.03	(Kh = Kz evaluated at z = h)

Velocity Pressure: qz = 0.00256*Kz*Kzt*Kd*V^2 (Sect. 30.3.2, Eq. 30.3-1)

qh = 68.70 psf qh = 0.00256*Kh*Kzt*Kd*V^2 (qz evaluated at z = h)

Design Net External Wind Pressures (Sect. 30.4 & 30.6):

For h <= 60 ft.: p = qh*((GCp) - (+/-GCpi)) (psf)

For h > 60 ft.: p = q*(GCp) - qi*(+/-GCpi) (psf)

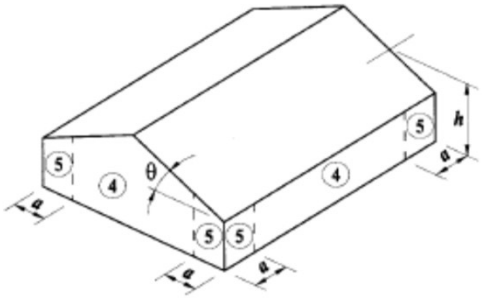
where: q = qz for windward walls, q = qh for leeward walls and side walls

qi = qh for all walls (conservatively assumed per Sect. 30.6)

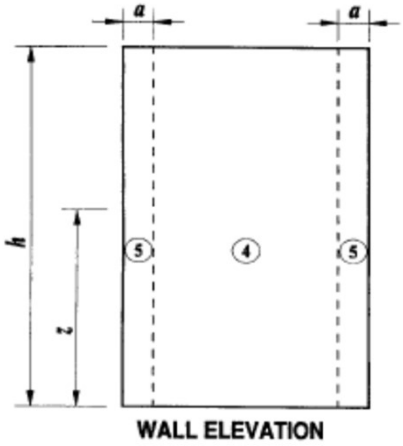
Wind Load Tabulation for Wall Components & Cladding							
Component	z (ft.)	Kh	qh (psf)	p = Net Design Pressures (psf)			
				Zone 4 (+)	Zone 4 (-)	Zone 5 (+)	Zone 5 (-)
Wall	0	1.03	68.70	70.91	-77.09	70.91	-92.36
	15.00	1.03	68.70	70.91	-77.09	70.91	-92.36
	20.00	1.03	68.70	70.91	-77.09	70.91	-92.36
	25.00	1.03	68.70	70.91	-77.09	70.91	-92.36
	30.00	1.03	68.70	70.91	-77.09	70.91	-92.36
	35.00	1.03	68.70	70.91	-77.09	70.91	-92.36
For z = hr:	37.83	1.03	68.70	70.91	-77.09	70.91	-92.36
For z = he:	37.75	1.03	68.70	70.91	-77.09	70.91	-92.36
For z = h:	37.75	1.03	68.70	70.91	-77.09	70.91	-92.36

Notes: 1. (+) and (-) signs signify wind pressures acting toward & away from respective surfaces.
2. Width of Zone 5 (end zones), 'a' = 3.00 ft.
3. Per Code Section 30.2.2, the minimum wind load for C&C shall not be less than 16 psf.
4. References : a. ASCE 7-16, "Minimum Design Loads for Buildings and Other Structures".
b. "Guide to the Use of the Wind Load Provisions of ASCE 7-02"
by: Kishor C. Mehta and James M. Delahay (2004).

Wall Components and Cladding:



Wall Zones for Buildings with h <= 60 ft.



Wall Zones for Buildings with h > 60 ft.

Project Title:
Engineer:
Project ID:
Project Descr:

General Section Property Calculator

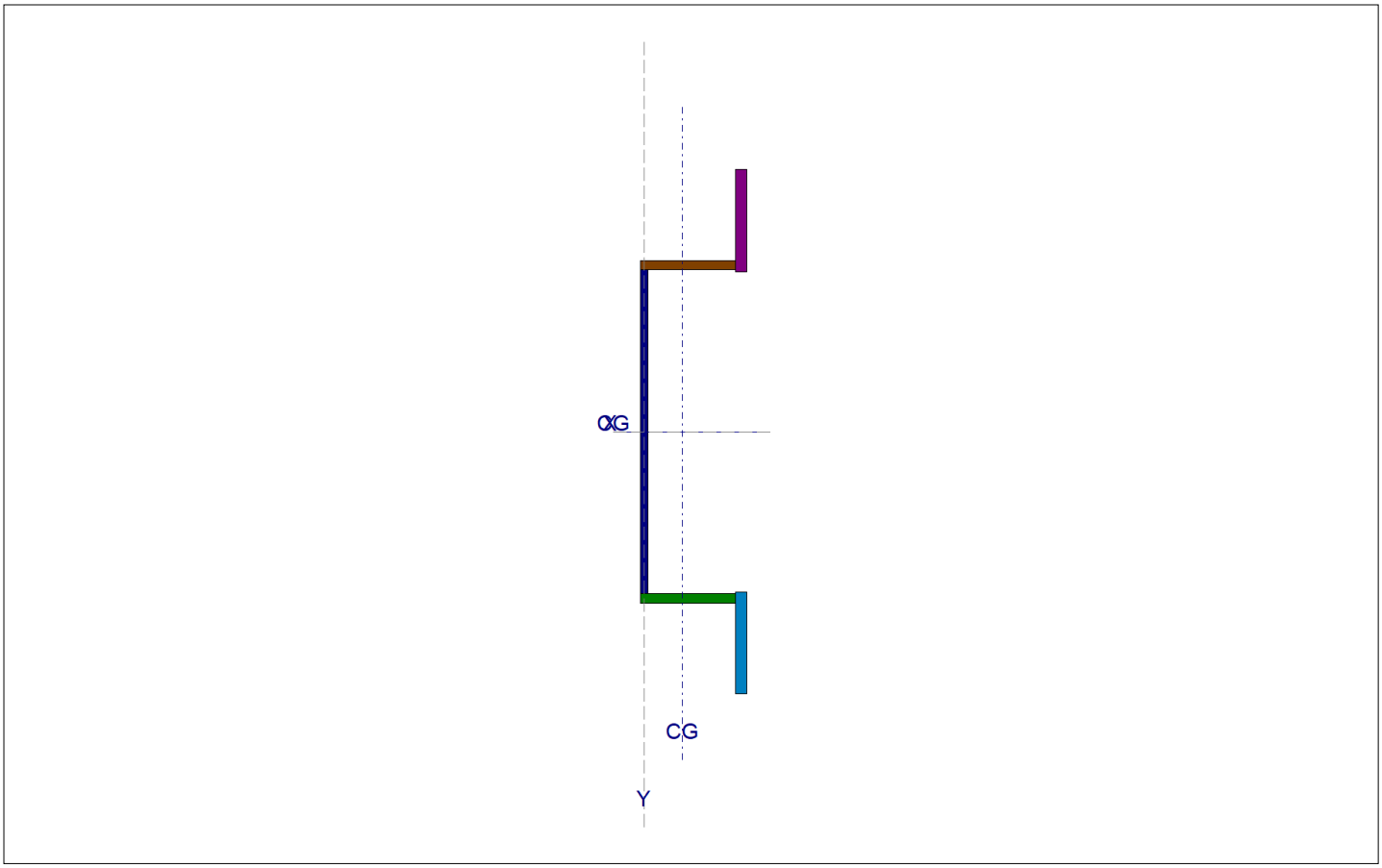
Project File: walmart.ec6

DESCRIPTION: post 122

Final Section Properties

Total Area	:	1.065 in^2	Ixx	:	3.890 in^4	Sxx : - Y	: 1.210 in^3
			Iyy	:	0.2961 in^4	Sxx : +Y	: 1.210 in^3
Calculated final C.G. distance from Datum :						Syy : - X	: 0.5520 in^3
X cg Dist.	:	0.4765 in	Zxx	:	1.842 in^3	Syy : +X	: 0.3838 in^3
Y cg Dist.	:	0.0 in	Zyy	:	0.5027 in^3		
Edge Distances from CG. :						r xx	: 1.911 in
+X	:	0.7715 in	+Y	:	3.215 in	r yy	: 0.5273 in
-X	:	-0.5365 in	-Y	:	-3.215 in		

Rotation of All Components @ 0.00 deg CCW



Rectangular & Circular Shapes

Rectangular Shape : 1	Height =	4.000 in	Width =	0.120 in	Rotation =	0 deg CCW
	Area =	0.480 in^2	Xcg =	0.000 in		
			Ycg =	0.000 in		

Project Title:
Engineer:
Project ID:
Project Descr:

General Section Property Calculator

Project File: walmart.ec6

DESCRIPTION: post 122

Rectangular Shape : 2	Height =	1.188 in	Width =	0.120 in	Rotation =	90 deg CCW	
	Area =	0.143 in^2	Xcg =	0.530 in			
			Ycg =	2.050 in			
Rectangular Shape : 3	Height =	1.188 in	Width =	0.120 in	Rotation =	90 deg CCW	
	Area =	0.143 in^2	Xcg =	0.530 in			
			Ycg =	-2.050 in			
Rectangular Shape : 4	Height =	1.250 in	Width =	0.120 in	Rotation =	0 deg CCW	
	Area =	0.150 in^2	Xcg =	1.188 in			
			Ycg =	2.590 in			
Rectangular Shape : 5	Height =	1.250 in	Width =	0.120 in	Rotation =	0 deg CCW	
	Area =	0.150 in^2	Xcg =	1.188 in			
			Ycg =	-2.590 in			

Project Title:
Engineer:
Project ID:
Project Descr:

General Section Property Calculator

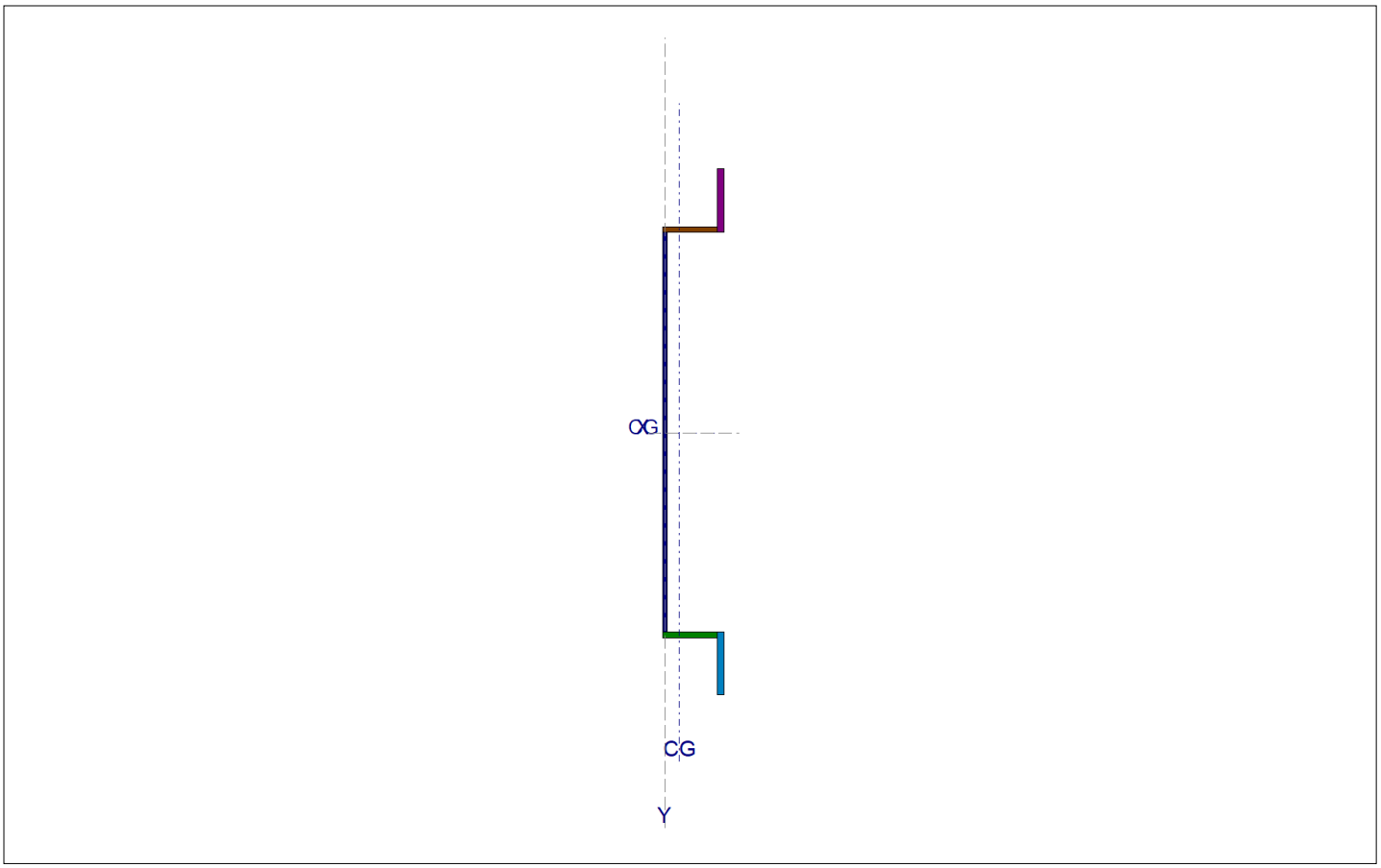
Project File: walmart.ec6

DESCRIPTION: post -119

Final Section Properties

Total Area	:	1.530 in^2	Ixx	:	15.868 in^4	Sxx : - Y	: 3.049 in^3
			Iyy	:	0.3312 in^4	Sxx : +Y	: 3.031 in^3
Calculated final C.G. distance from Datum :						Syy : - X	: 0.8981 in^3
X cg Dist.	:	0.3088 in	Zxx	:	4.385 in^3	Syy : +X	: 0.3781 in^3
Y cg Dist.	:	0.009314 in	Zyy	:	0.4934 in^3		
Edge Distances from CG. :						r xx	: 3.220 in
+X	:	0.8762 in	+Y	:	5.236 in	r yy	: 0.4653 in
-X	:	-0.3688 in	-Y	:	-5.204 in		

Rotation of All Components @ 0.00 deg CCW



Rectangular & Circular Shapes

Rectangular Shape : 1	Height =	8.000 in	Width =	0.120 in	Rotation =	0 deg CCW	
	Area =	0.960 in^2	Xcg =	0.000 in			
			Ycg =	0.000 in			

Project Title:
Engineer:
Project ID:
Project Descr:

General Section Property Calculator

Project File: walmart.ec6

DESCRIPTION: post -119

Rectangular Shape : 2	Height =	1.125 in	Width =	0.120 in	Rotation =	90 deg CCW	
	Area =	0.135 in^2	Xcg =	0.500 in			
			Ycg =	4.050 in			
Rectangular Shape : 3	Height =	1.125 in	Width =	0.120 in	Rotation =	90 deg CCW	
	Area =	0.135 in^2	Xcg =	0.500 in			
			Ycg =	-4.000 in			
Rectangular Shape : 4	Height =	1.250 in	Width =	0.120 in	Rotation =	0 deg CCW	
	Area =	0.150 in^2	Xcg =	1.125 in			
			Ycg =	4.620 in			
Rectangular Shape : 5	Height =	1.250 in	Width =	0.120 in	Rotation =	0 deg CCW	
	Area =	0.150 in^2	Xcg =	1.125 in			
			Ycg =	-4.570 in			

Project Title:
Engineer:
Project ID:
Project Descr:

General Section Property Calculator

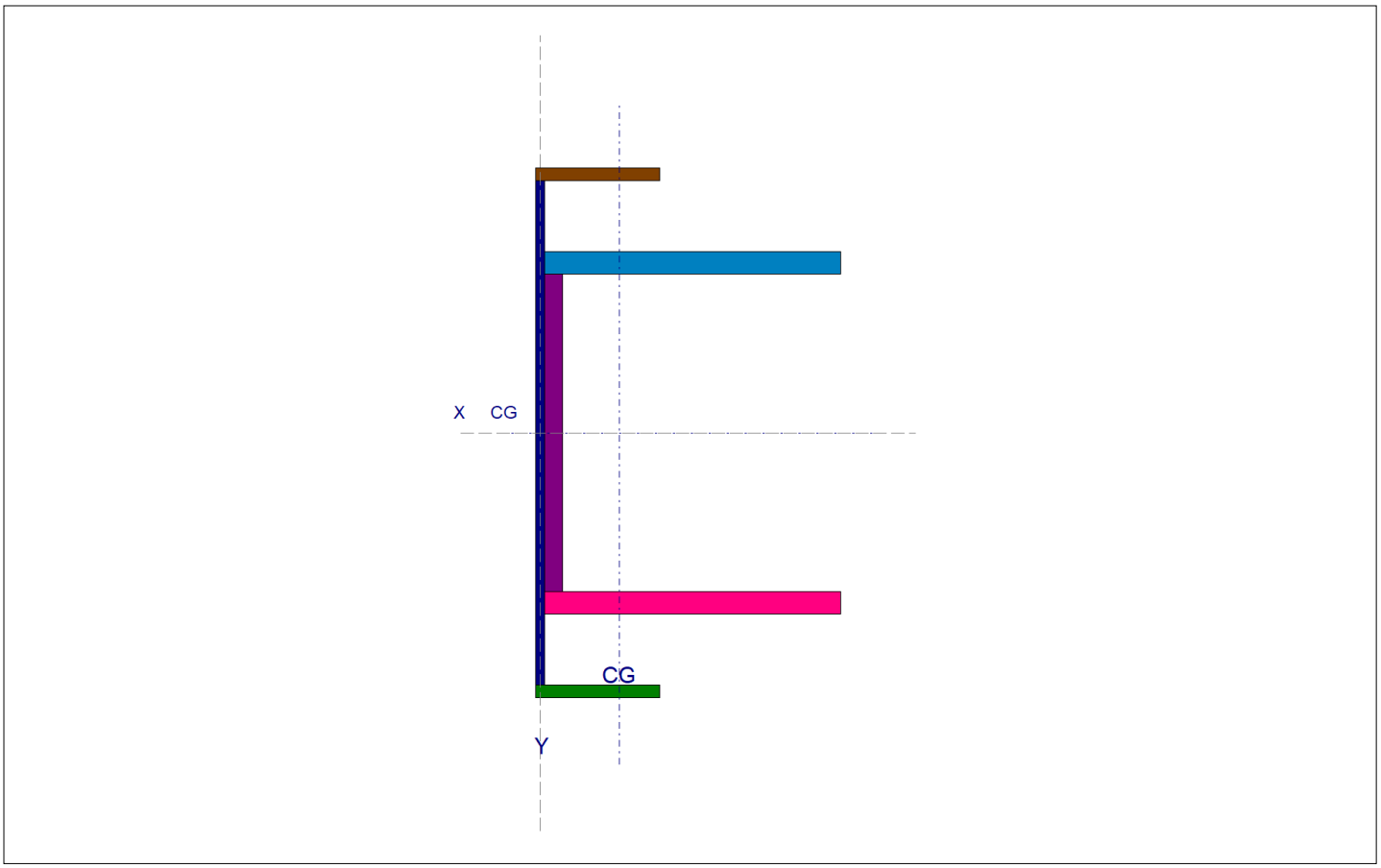
Project File: walmart.ec6

DESCRIPTION: Copy of X503

Final Section Properties

Total Area	:	0.6568 in^2	Ixx	:	0.4432 in^4	Sxx : - Y	: 0.330 in^3
			Iyy	:	0.1402 in^4	Sxx : +Y	: 0.330 in^3
Calculated final C.G. distance from Datum :						Syy : - X	: 0.3271 in^3
X cg Dist.	:	0.4037 in	Zxx	:	0.4936 in^3	Syy : +X	: 0.1258 in^3
Y cg Dist.	:	0.0 in	Zyy	:	0.2346 in^3		
Edge Distances from CG. :						r xx	: 0.8214 in
+X	:	1.115 in	+Y	:	1.343 in	r yy	: 0.4621 in
-X	:	-0.4287 in	-Y	:	-1.343 in		

Rotation of All Components @ 0.00 deg CCW



Rectangular & Circular Shapes

Rectangular Shape : 1	Height =	2.625 in	Width =	0.050 in	Rotation =	0 deg CCW
	Area =	0.131 in^2	Xcg =	0.000 in		
			Ycg =	0.000 in		

Project Title:
Engineer:
Project ID:
Project Descr:

General Section Property Calculator

Project File: walmart.ec6

DESCRIPTION: Copy of X503

Rectangular Shape : 2	Height =	0.630 in	Width =	0.050 in	Rotation =	90 deg CCW	
	Area =	0.032 in^2	Xcg =	0.288 in			
			Ycg =	1.313 in			
Rectangular Shape : 3	Height =	0.630 in	Width =	0.050 in	Rotation =	90 deg CCW	
	Area =	0.032 in^2	Xcg =	0.288 in			
			Ycg =	-1.313 in			
Rectangular Shape : 4	Height =	1.625 in	Width =	0.100 in	Rotation =	0 deg CCW	
	Area =	0.163 in^2	Xcg =	0.080 in			
			Ycg =	0.000 in			
Rectangular Shape : 5	Height =	1.500 in	Width =	0.100 in	Rotation =	90 deg CCW	
	Area =	0.150 in^2	Xcg =	0.780 in			
			Ycg =	0.863 in			
Rectangular Shape : 6	Height =	1.500 in	Width =	0.100 in	Rotation =	90 deg CCW	
	Area =	0.150 in^2	Xcg =	0.780 in			
			Ycg =	-0.863 in			

Project Title:
Engineer:
Project ID:
Project Descr:

General Section Property Calculator

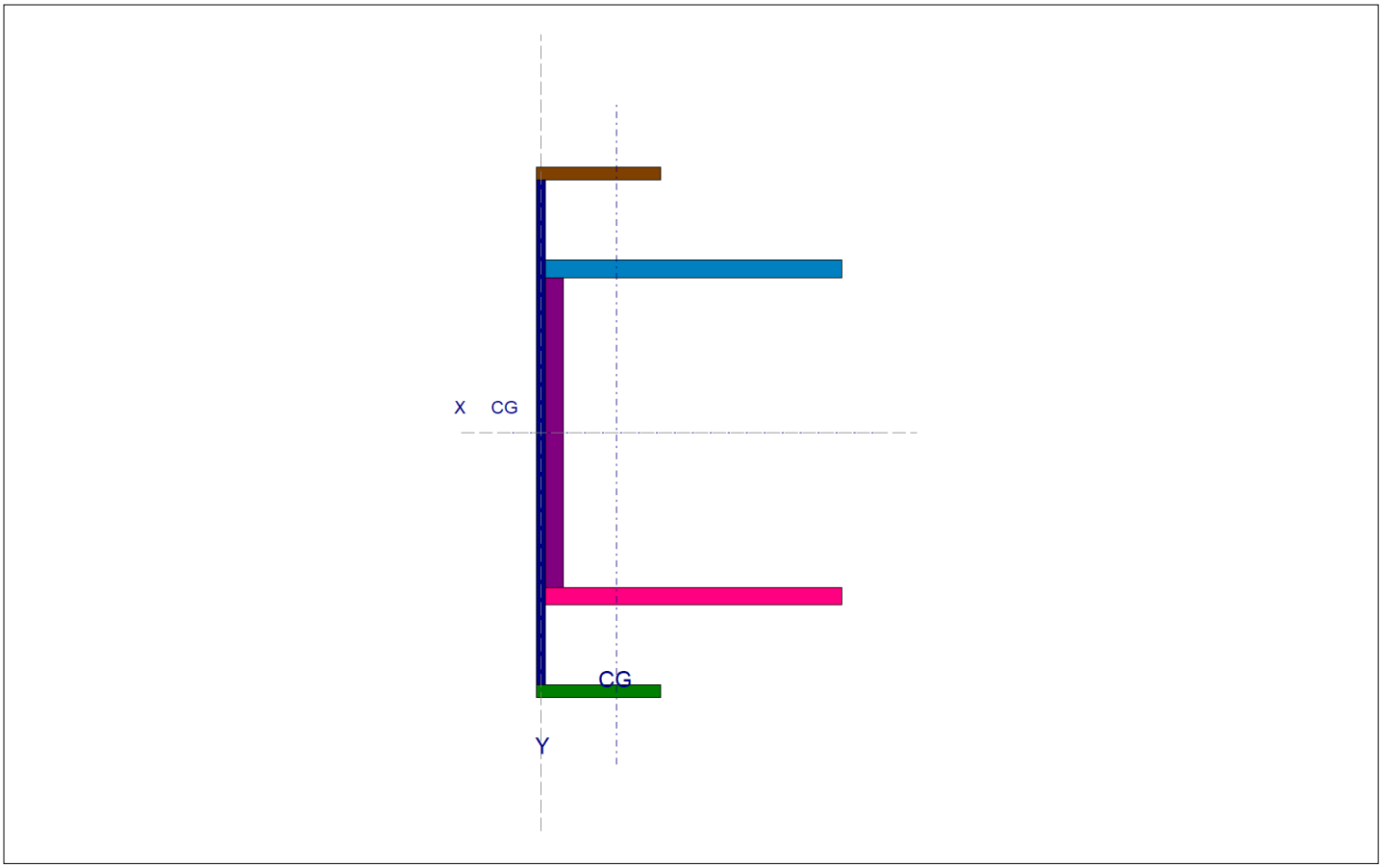
Project File: walmart.ec6

DESCRIPTION: Copy of X503

Final Section Properties

Total Area	:	0.5643 in^2	Ixx	:	0.3780 in^4	Sxx : - Y	: 0.2815 in^3
			Iyy	:	0.1168 in^4	Sxx : +Y	: 0.2815 in^3
Calculated final C.G. distance from Datum :						Syy : - X	: 0.2867 in^3
X cg Dist.	:	0.3823 in	Zxx	:	0.4208 in^3	Syy : +X	: 0.1028 in^3
Y cg Dist.	:	0.0 in	Zyy	:	0.1933 in^3		
Edge Distances from CG. :						r xx	: 0.8185 in
+X	:	1.136 in	+Y	:	1.343 in	r yy	: 0.4549 in
-X	:	-0.4073 in	-Y	:	-1.343 in		

Rotation of All Components @ 0.00 deg CCW



Rectangular & Circular Shapes

Rectangular Shape : 1	Height =	2.625 in	Width =	0.050 in	Rotation =	0 deg CCW
	Area =	0.131 in^2	Xcg =	0.000 in		
			Ycg =	0.000 in		

Project Title:
Engineer:
Project ID:
Project Descr:

General Section Property Calculator

Project File: walmart.ec6

DESCRIPTION: Copy of X503

Rectangular Shape : 2	Height =	0.630 in	Width =	0.050 in	Rotation =	90 deg CCW	
	Area =	0.032 in^2	Xcg =	0.288 in			
			Ycg =	1.313 in			
Rectangular Shape : 3	Height =	0.630 in	Width =	0.050 in	Rotation =	90 deg CCW	
	Area =	0.032 in^2	Xcg =	0.288 in			
			Ycg =	-1.313 in			
Rectangular Shape : 4	Height =	1.625 in	Width =	0.080 in	Rotation =	0 deg CCW	
	Area =	0.130 in^2	Xcg =	0.080 in			
			Ycg =	0.000 in			
Rectangular Shape : 5	Height =	1.500 in	Width =	0.080 in	Rotation =	90 deg CCW	
	Area =	0.120 in^2	Xcg =	0.780 in			
			Ycg =	0.830 in			
Rectangular Shape : 6	Height =	1.500 in	Width =	0.080 in	Rotation =	90 deg CCW	
	Area =	0.120 in^2	Xcg =	0.780 in			
			Ycg =	-0.830 in			

Project Title:
Engineer:
Project ID:
Project Descr:

General Section Property Calculator

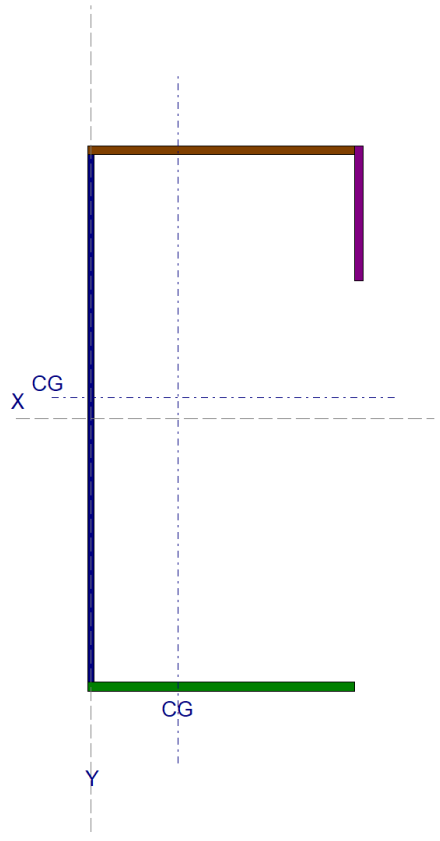
Project File: walmart.ec6

DESCRIPTION: End rail 102

Final Section Properties

Total Area	:	0.720 in^2	Ixx	:	1.882 in^4	Sxx : - Y	: 0.8467 in^3
			Iyy	:	0.4186 in^4	Sxx : +Y	: 1.001 in^3
Calculated final C.G. distance from Datum :						Syy : - X	: 0.6077 in^3
X cg Dist.	:	0.6489 in	Zxx	:	1.063 in^3	Syy : +X	: 0.3009 in^3
Y cg Dist.	:	0.1711 in	Zyy	:	0.4604 in^3		
Edge Distances from CG. :						r xx	: 1.617 in
+X	:	1.391 in	+Y	:	1.881 in	r yy	: 0.7625 in
-X	:	-0.6889 in	-Y	:	-2.223 in		

Rotation of All Components @ 0.00 deg CCW



Rectangular & Circular Shapes

Rectangular Shape : 1	Height =	4.000 in	Width =	0.080 in	Rotation =	0 deg CCW	
	Area =	0.320 in^2	Xcg =	0.000 in			
			Ycg =	0.000 in			

Project Title:
Engineer:
Project ID:
Project Descr:

General Section Property Calculator

Project File: walmart.ec6

DESCRIPTION: End rail 102

Rectangular Shape : 2	Height =	2.000 in	Width =	0.080 in	Rotation =	90 deg CCW	
	Area =	0.160 in^2	Xcg =	0.960 in			
			Ycg =	2.000 in			
Rectangular Shape : 3	Height =	2.000 in	Width =	0.080 in	Rotation =	90 deg CCW	
	Area =	0.160 in^2	Xcg =	0.960 in			
			Ycg =	-2.000 in			
Rectangular Shape : 4	Height =	1.000 in	Width =	0.080 in	Rotation =	0 deg CCW	
	Area =	0.080 in^2	Xcg =	2.000 in			
			Ycg =	1.540 in			

Project Title:
Engineer:
Project ID:
Project Descr:

General Section Property Calculator

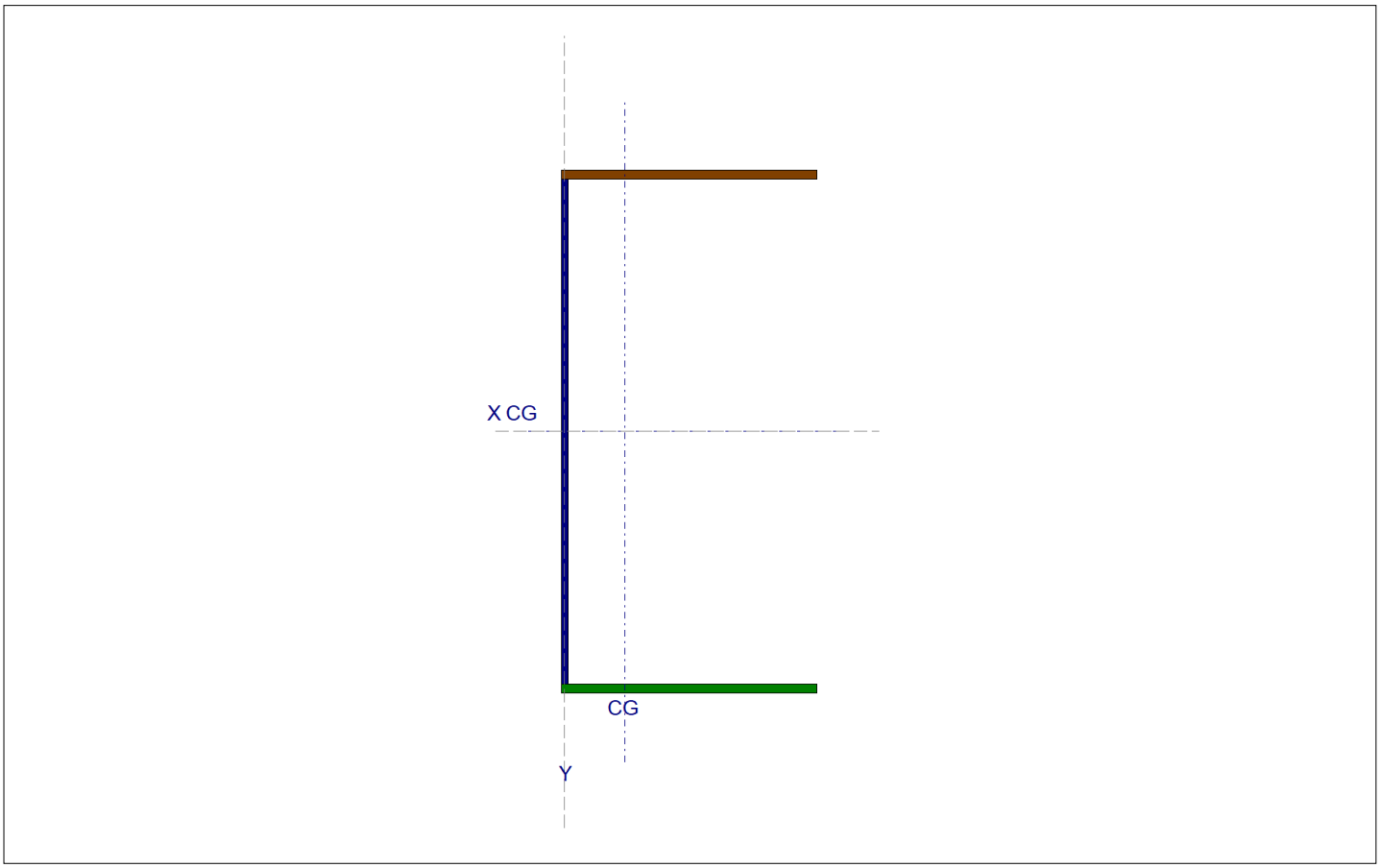
Project File: walmart.ec6

DESCRIPTION: --None--

Final Section Properties

Total Area	:	0.6072 in^2	Ixx	:	1.478 in^4	Sxx : - Y	: 0.7516 in^3
			Iyy	:	0.2230 in^4	Sxx : +Y	: 0.7516 in^3
Calculated final C.G. distance from Datum :						Syy : - X	: 0.4411 in^3
X cg Dist.	:	0.4655 in	Zxx	:	0.8695 in^3	Syy : +X	: 0.1590 in^3
Y cg Dist.	:	0.0 in	Zyy	:	0.2833 in^3		
Edge Distances from CG. :						r xx	: 1.560 in
+X	:	1.403 in	+Y	:	1.967 in	r yy	: 0.6060 in
-X	:	-0.5055 in	-Y	:	-1.967 in		

Rotation of All Components @ 0.00 deg CCW



Rectangular & Circular Shapes

Rectangular Shape : 1	Height =	3.750 in	Width =	0.080 in	Rotation =	0 deg CCW
	Area =	0.300 in^2	Xcg =	0.000 in		
			Ycg =	0.000 in		

Project Title:
Engineer:
Project ID:
Project Descr:

General Section Property Calculator

Project File: walmart.ec6

DESCRIPTION: --None--

Rectangular Shape : 2	Height =	1.920	in	Width =	0.080	in	Rotation = 90 deg CCW
	Area =	0.154	in^2	Xcg =	0.920	in	
				Ycg =	1.915	in	
Rectangular Shape : 3	Height =	1.920	in	Width =	0.080	in	Rotation = 90 deg CCW
	Area =	0.154	in^2	Xcg =	0.920	in	
				Ycg =	-1.915	in	

Project Title:
Engineer:
Project ID:
Project Descr:

General Section Property Calculator

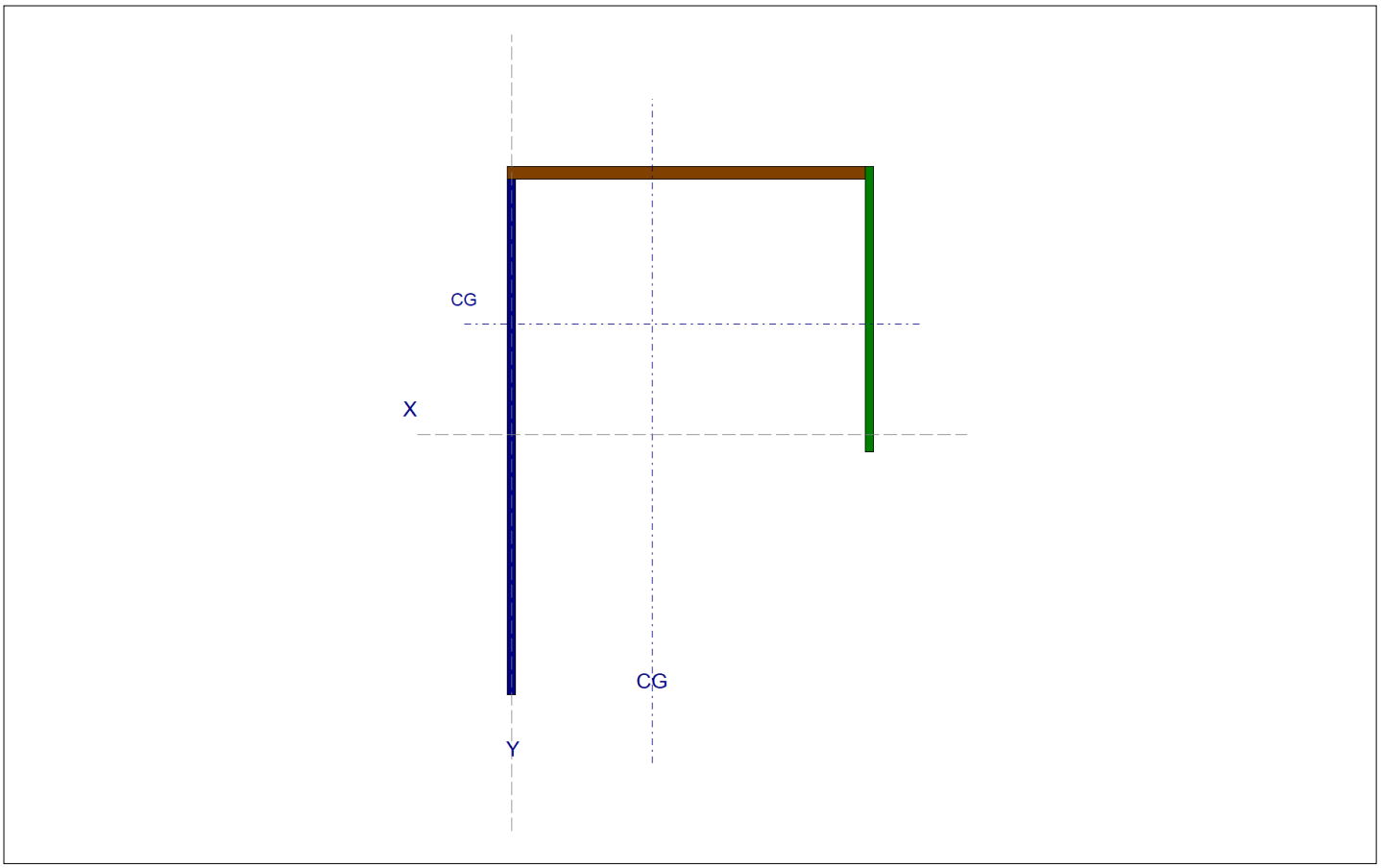
Project File: walmart.ec6

DESCRIPTION: X500

Final Section Properties

Total Area	:	0.3063 in^2	Ixx	:	0.2069 in^4	Sxx : - Y	: 0.1057 in^3
			Iyy	:	0.2020 in^4	Sxx : +Y	: 0.2492 in^3
Calculated final C.G. distance from Datum :						Syy : - X	: 0.2652 in^3
X cg Dist.	:	0.7367 in	Zxx	:	0.2097 in^3	Syy : +X	: 0.1736 in^3
Y cg Dist.	:	0.5827 in	Zyy	:	0.2217 in^3		
Edge Distances from CG. :						r xx	: 0.8220 in
+X	:	1.163 in	+Y	:	0.8303 in	r yy	: 0.8122 in
-X	:	-0.7617 in	-Y	:	-1.958 in		

Rotation of All Components @ 0.00 deg CCW



Rectangular & Circular Shapes

Rectangular Shape : 1	Height =	2.751 in	Width =	0.050 in	Rotation =	0 deg CCW
	Area =	0.138 in^2	Xcg =	0.000 in		
			Ycg =	0.000 in		

Project Title:
Engineer:
Project ID:
Project Descr:

General Section Property Calculator

Project File: walmart.ec6

DESCRIPTION: X500

Rectangular Shape : 2	Height =	1.875 in	Width =	0.050 in	Rotation =	90 deg CCW	
	Area =	0.094 in^2	Xcg =	0.908 in			
			Ycg =	1.376 in			
Rectangular Shape : 3	Height =	1.499 in	Width =	0.050 in	Rotation =	0 deg CCW	
	Area =	0.075 in^2	Xcg =	1.875 in			
			Ycg =	0.660 in			

Project Title:
Engineer:
Project ID:
Project Descr:

General Section Property Calculator

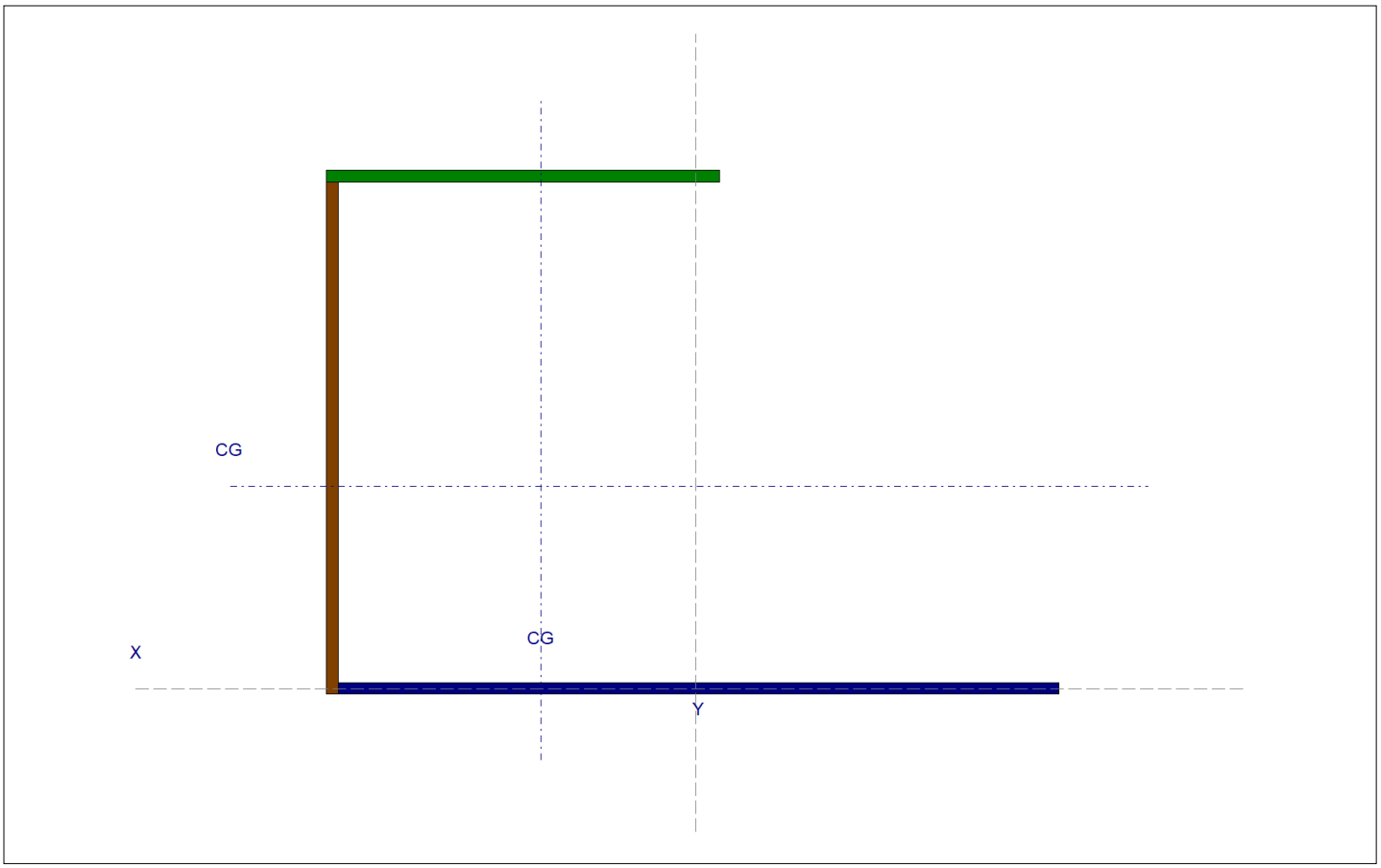
Project File: walmart.ec6

DESCRIPTION: X501

Final Section Properties

Total Area	: 0.3094 in^2	Ixx	: 0.2135 in^4	Sxx : - Y	: 0.2683 in^3
		Iyy	: 0.2086 in^4	Sxx : +Y	: 0.1779 in^3
Calculated final C.G. distance from Datum :				Syy : - X	: 0.2569 in^3
X cg Dist.	: -0.5882 in	Zxx	: 0.2295 in^3	Syy : +X	: 0.1069 in^3
Y cg Dist.	: 0.7567 in	Zyy	: 0.2115 in^3		
Edge Distances from CG. :				r xx	: 0.8307 in
+X	: 1.951 in	+Y	: 1.20 in	r yy	: 0.8210 in
-X	: -0.8118 in	-Y	: -0.7957 in		

Rotation of All Components @ 0.00 deg CCW



Rectangular & Circular Shapes

Rectangular Shape : 1	Height =	2.750 in	Width =	0.050 in	Rotation =	90 deg CCW
	Area =	0.138 in^2	Xcg =	0.000 in		
			Ycg =	0.000 in		

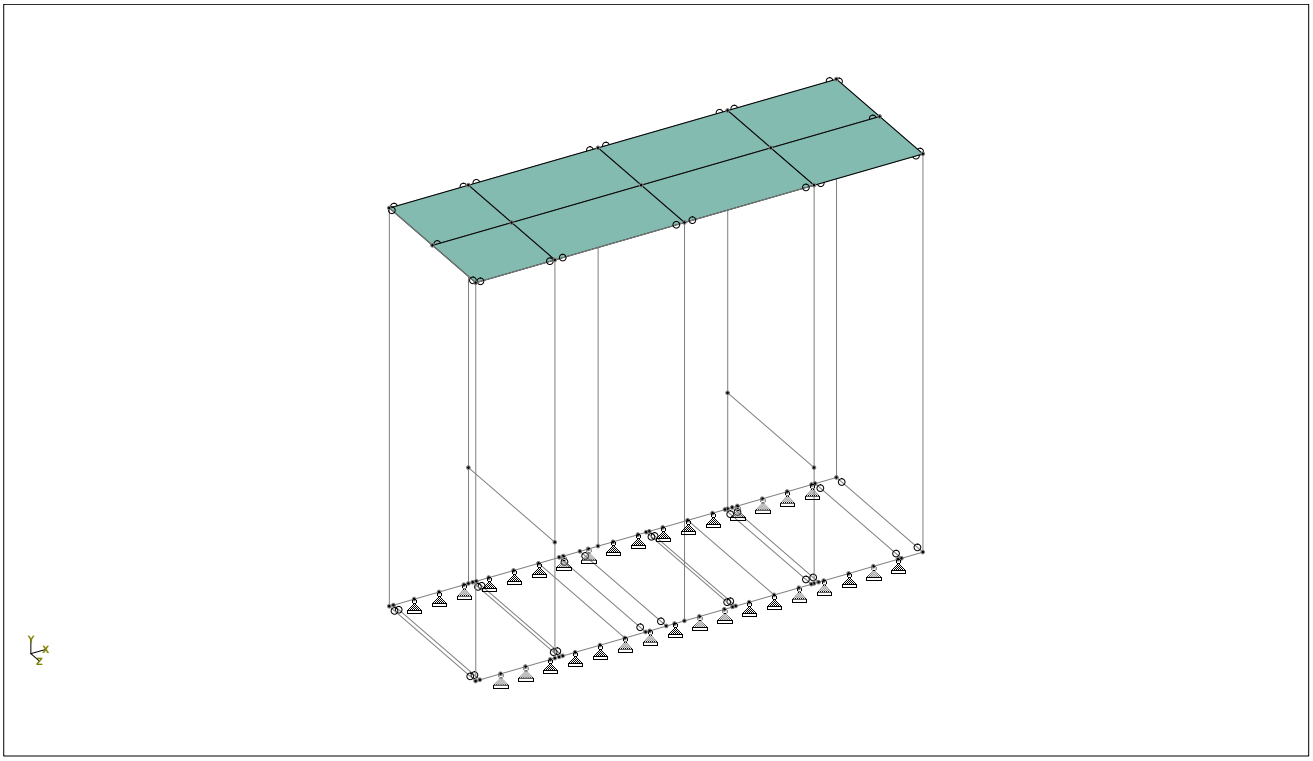
Project Title:
Engineer:
Project ID:
Project Descr:

General Section Property Calculator

Project File: walmart.ec6

DESCRIPTION: X501

Rectangular Shape : 2	Height =	1.938 in	Width =	0.050 in	Rotation =	0 deg CCW	
	Area =	0.097 in^2	Xcg =	-1.375 in			
			Ycg =	0.930 in			
Rectangular Shape : 3	Height =	1.500 in	Width =	0.050 in	Rotation =	90 deg CCW	
	Area =	0.075 in^2	Xcg =	-0.650 in			
			Ycg =	1.920 in			



Whole Structure

Beams

Beam	Node A	Node B	Length (ft)	Property	β (degrees)
1	1	44	0.083	5	0
5	7	45	0.083	5	0
9	1	7	3.008	14	0
13	6	11	3.008	14	0
14	1	12	8.021	2	0
15	3	48	2.333	3	0
16	4	14	8.021	4	0
17	5	49	2.333	3	0
18	6	16	8.021	2	0
19	7	17	8.021	2	0
20	8	50	2.333	3	0
21	9	19	8.021	4	0
22	10	51	2.333	3	0
23	11	21	8.021	2	0
32	22	28	3.008	7	0
34	23	29	3.008	7	0
36	24	30	3.008	7	0
38	25	31	3.008	7	0
40	26	32	3.008	7	0

Beams Cont...

Beam	Node A	Node B	Length (ft)	Property	β (degrees)
42	27	33	3.008	7	0
49	34	39	3.008	8	90
51	35	40	3.008	8	90
53	36	41	3.008	8	90
55	37	42	3.008	8	90
57	38	43	3.008	8	90
61	44	45	3.008	8	90
62	12	46	1.504	13	0
63	16	47	1.504	12	0
64	46	17	1.504	13	0
65	47	21	1.504	12	0
66	46	52	1.592	11	0
67	12	13	1.592	9	0
68	13	14	2.606	9	0
69	14	15	2.607	9	0
70	15	16	2.188	9	0
71	17	18	1.592	10	0
72	18	19	2.606	10	0
73	19	20	2.607	10	0
74	20	21	2.188	10	0
75	48	13	5.688	3	0
76	49	15	5.688	3	0
77	50	18	5.688	3	0
78	51	20	5.688	3	0
79	48	50	3.008	6	0
80	49	51	3.008	6	0
81	52	53	2.606	11	0
82	53	54	2.607	11	0
83	54	47	2.188	11	0
92	55	59	0.500	5	0
93	56	60	0.500	5	0
94	57	43	0.071	5	0
95	58	38	0.071	5	0
96	59	61	0.500	5	0
97	60	62	0.500	5	0
98	61	3	0.092	5	0
99	62	8	0.092	5	0
100	63	65	0.500	5	0
101	64	66	0.500	5	0
102	65	29	0.500	5	0
103	66	23	0.500	5	0
104	67	30	0.333	5	0
105	68	24	0.333	5	0
106	69	4	0.197	5	0
107	70	9	0.197	5	0

Beams Cont...

Beam	Node A	Node B	Length (ft)	Property	β (degrees)
108	71	73	0.500	5	0
109	72	74	0.500	5	0
110	73	31	0.167	5	0
111	74	25	0.167	5	0
112	75	32	0.500	5	0
113	76	26	0.500	5	0
114	77	33	0.250	5	0
115	78	27	0.250	5	0
116	79	81	0.500	5	0
117	80	82	0.500	5	0
118	81	83	0.500	5	0
119	82	84	0.500	5	0
120	83	57	0.492	5	0
121	84	58	0.492	5	0
122	44	55	0.417	5	0
123	45	56	0.417	5	0
124	43	6	0.429	5	0
125	38	11	0.429	5	0
126	39	63	0.250	5	0
127	28	39	0.073	5	0
128	3	28	0.085	5	0
129	34	64	0.250	5	0
130	22	34	0.073	5	0
131	8	22	0.085	5	0
132	40	67	0.083	5	0
133	29	40	0.417	5	0
134	35	68	0.083	5	0
135	23	35	0.417	5	0
136	30	69	0.167	5	0
137	24	70	0.167	5	0
138	4	71	0.303	5	0
139	9	72	0.303	5	0
140	41	75	0.271	5	0
141	31	41	0.062	5	0
142	36	76	0.271	5	0
143	25	36	0.062	5	0
144	32	77	0.500	5	0
145	26	78	0.500	5	0
146	42	79	0.104	5	0
147	5	42	0.092	5	0
148	33	5	0.054	5	0
149	37	80	0.104	5	0
150	10	37	0.092	5	0
151	27	10	0.054	5	0
152	13	52	1.504	11	0

Beams Cont...

Beam	Node A	Node B	Length (ft)	Property	β (degrees)
153	52	18	1.504	11	0
154	14	53	1.504	11	0
155	53	19	1.504	11	0
156	15	54	1.504	11	0
157	54	20	1.504	11	0

Section Properties

Prop	Section	Area (in^2)	I_{yy} (in^4)	I_{zz} (in^4)	J (in^4)	Material
2	109	0.860	0.659	2.622	0.002	STEEL
3	120	1.632	0.291	17.489	0.008	STEEL
4	117	1.136	0.261	4.446	0.006	STEEL
5	103	1.040	0.684	7.389	0.002	STEEL
6	113	1.696	1.444	14.517	0.009	STEEL
7	102	0.720	0.400	1.962	0.001	STEEL
8	100	0.386	0.020	0.947	0.000	STEEL
9	500	0.294	0.123	0.275	0.000	STEEL
10	504	0.294	0.123	0.275	0.000	STEEL
11	503	0.186	0.005	0.180	0.000	STEEL
12	501	0.297	0.128	0.287	0.000	STEEL
13	505	0.297	0.108	0.385	0.000	STEEL
14	104	0.620	0.250	1.525	0.001	STEEL

Plate Thickness

Prop	Node A (in)	Node B (in)	Node C (in)	Node D (in)	Material
1	0.050	0.050	0.050	0.050	STEEL

Materials

Mat	Name	E (kip/in^2)	ν	Density (kip/in^3)	α (/°F)
1	STEEL	29E+3	0.300	0.000	6E -6
2	CONCRETE	3.15E+3	0.170	8.68e-05	5.5E -6
3	ALUMINUM	10E+3	0.330	9.8e-05	12.8E -6
4	STAINLESSSTEEL	28E+3	0.300	0.000	9.9E -6
5	STEEL_36_KSI	29E+3	0.300	0.000	6.5E -6
6	STEEL_50_KSI	29E+3	0.300	0.000	6.5E -6
7	STEEL_275_NMM2	29.7E+3	0.300	0.000	6.67E -6
8	STEEL_355_NMM2	29.7E+3	0.300	0.000	6.67E -6
9	Q235	29.9E+3	0.300	0.000	6.67E -6
10	Q345	29.9E+3	0.300	0.000	6.67E -6
11	Q355	29.9E+3	0.300	0.000	6.67E -6
12	Q390	29.9E+3	0.300	0.000	6.67E -6
13	Q420	29.9E+3	0.300	0.000	6.67E -6
14	Q460	29.9E+3	0.300	0.000	6.67E -6
15	TIMBER	1.5E+3	0.150	0.000	3E -6

Supports

Node	X (kip/in)	Y (kip/in)	Z (kip/in)	rX (kip-ft/deg)	rY (kip-ft/deg)	rZ (kip-ft/deg)
23	Fixed	Fixed	Fixed	-	-	-
26	Fixed	Fixed	Fixed	-	-	-
29	Fixed	Fixed	Fixed	-	-	-
32	Fixed	Fixed	Fixed	-	-	-
55	Fixed	Fixed	Fixed	-	-	-
56	Fixed	Fixed	Fixed	-	-	-
57	Fixed	Fixed	Fixed	-	-	-
58	Fixed	Fixed	Fixed	-	-	-
59	Fixed	Fixed	Fixed	-	-	-
60	Fixed	Fixed	Fixed	-	-	-
61	Fixed	Fixed	Fixed	-	-	-
62	Fixed	Fixed	Fixed	-	-	-
63	Fixed	Fixed	Fixed	-	-	-
64	Fixed	Fixed	Fixed	-	-	-
65	Fixed	Fixed	Fixed	-	-	-
66	Fixed	Fixed	Fixed	-	-	-
67	Fixed	Fixed	Fixed	-	-	-
68	Fixed	Fixed	Fixed	-	-	-
69	Fixed	Fixed	Fixed	-	-	-
70	Fixed	Fixed	Fixed	-	-	-
71	Fixed	Fixed	Fixed	-	-	-
72	Fixed	Fixed	Fixed	-	-	-
73	Fixed	Fixed	Fixed	-	-	-
74	Fixed	Fixed	Fixed	-	-	-

Supports Cont...

Node	X (kip/in)	Y (kip/in)	Z (kip/in)	rX (kip-ft/deg)	rY (kip-ft/deg)	rZ (kip-ft/deg)
75	Fixed	Fixed	Fixed	-	-	-
76	Fixed	Fixed	Fixed	-	-	-
77	Fixed	Fixed	Fixed	-	-	-
78	Fixed	Fixed	Fixed	-	-	-
79	Fixed	Fixed	Fixed	-	-	-
80	Fixed	Fixed	Fixed	-	-	-
81	Fixed	Fixed	Fixed	-	-	-
82	Fixed	Fixed	Fixed	-	-	-
83	Fixed	Fixed	Fixed	-	-	-
84	Fixed	Fixed	Fixed	-	-	-

Primary Load Cases

Number	Name	Type
1	DL	Dead
2	LL	Live
3	WL-X	Wind
4	WL-Z	Wind
5	SL	Snow

Combination Load Cases

Comb.	Combination L/C Name	Primary	Primary L/C Name	Factor
6	COMB - 1 DEAD	1	DL	1.00
7	COMB - 1 DEAD + 1 LIVE	1	DL	1.00
		2	LL	1.00
8	COMB - 1 DEAD + 1 SNOW	1	DL	1.00
		5	SL	1.00
9	COMB - 1 DEAD + 0.75 LIVE	1	DL	1.00
		2	LL	0.75
10	COMB - 1 DEAD + 0.75 LIVE + 0.75 SNO\	1	DL	1.00
		2	LL	0.75
		5	SL	0.75
11	COMB - 1 DEAD + 0.6 WIND (1)	1	DL	1.00
		3	WL-X	0.60
12	COMB - 1 DEAD + 0.6 WIND (2)	1	DL	1.00
		4	WL-Z	0.60
13	COMB - 1 DEAD + 0.75 LIVE + 0.45 WINI	1	DL	1.00
		2	LL	0.75
		3	WL-X	0.45
14	COMB - 1 DEAD + 0.75 LIVE + 0.45 WINI	1	DL	1.00

Combination Load Cases Cont...

Comb.	Combination L/C Name	Primary	Primary L/C Name	Factor
		4	WL-Z	0.45
15	COMB - 1 DEAD + 0.75 LIVE + 0.45 WINI	1	DL	1.00
		2	LL	0.75
		3	WL-X	0.45
		5	SL	0.75
16	COMB - 1 DEAD + 0.75 LIVE + 0.45 WINI	1	DL	1.00
		2	LL	0.75
		4	WL-Z	0.45
		5	SL	0.75
17	COMB - 0.6 DEAD + 0.6 WIND (1)	1	DL	0.60
		3	WL-X	0.60
18	COMB - 0.6 DEAD + 0.6 WIND (2)	1	DL	0.60
		4	WL-Z	0.60
19	COMB - 0.6 DEAD	1	DL	0.60

1 DL : Beam Loads

Beam	Type	Direction	Fa	Da (ft)	Fb	Db	Ecc. (ft)
9	UNI lbf/ft	GY	-1.670	-	-	-	-
13	UNI lbf/ft	GY	-2.500	-	-	-	-
32	UNI lbf/ft	GY	-3.000	-	-	-	-
34	UNI lbf/ft	GY	-2.170	-	-	-	-
36	UNI lbf/ft	GY	-2.170	-	-	-	-
38	UNI lbf/ft	GY	-2.170	-	-	-	-
40	UNI lbf/ft	GY	-1.500	-	-	-	-
42	UNI lbf/ft	GY	-3.000	-	-	-	-

1 DL : Selfweight

Direction	Factor	Assigned Geometry
Y	-1.000	ALL

2 LL : Beam Loads

Beam	Type	Direction	Fa	Da (ft)	Fb	Db	Ecc. (ft)
9	UNI lbf/ft	GY	-84.000	-	-	-	-
13	UNI lbf/ft	GY	-117.000	-	-	-	-
32	UNI lbf/ft	GY	-150.000	-	-	-	-
34	UNI lbf/ft	GY	-109.000	-	-	-	-
36	UNI lbf/ft	GY	-109.000	-	-	-	-
38	UNI lbf/ft	GY	-109.000	-	-	-	-
40	UNI lbf/ft	GY	-75.000	-	-	-	-
42	UNI lbf/ft	GY	-150.000	-	-	-	-

2 LL : One Way Loads

Load (ksi)	Min Ht. (ft)	Max Ht. (ft)	Min X (ft)	Max X (ft)	Min Y (ft)	Max Y (ft)
-0.000	7.500	8.330	-	-	-	-

3 WL-X : Beam Loads

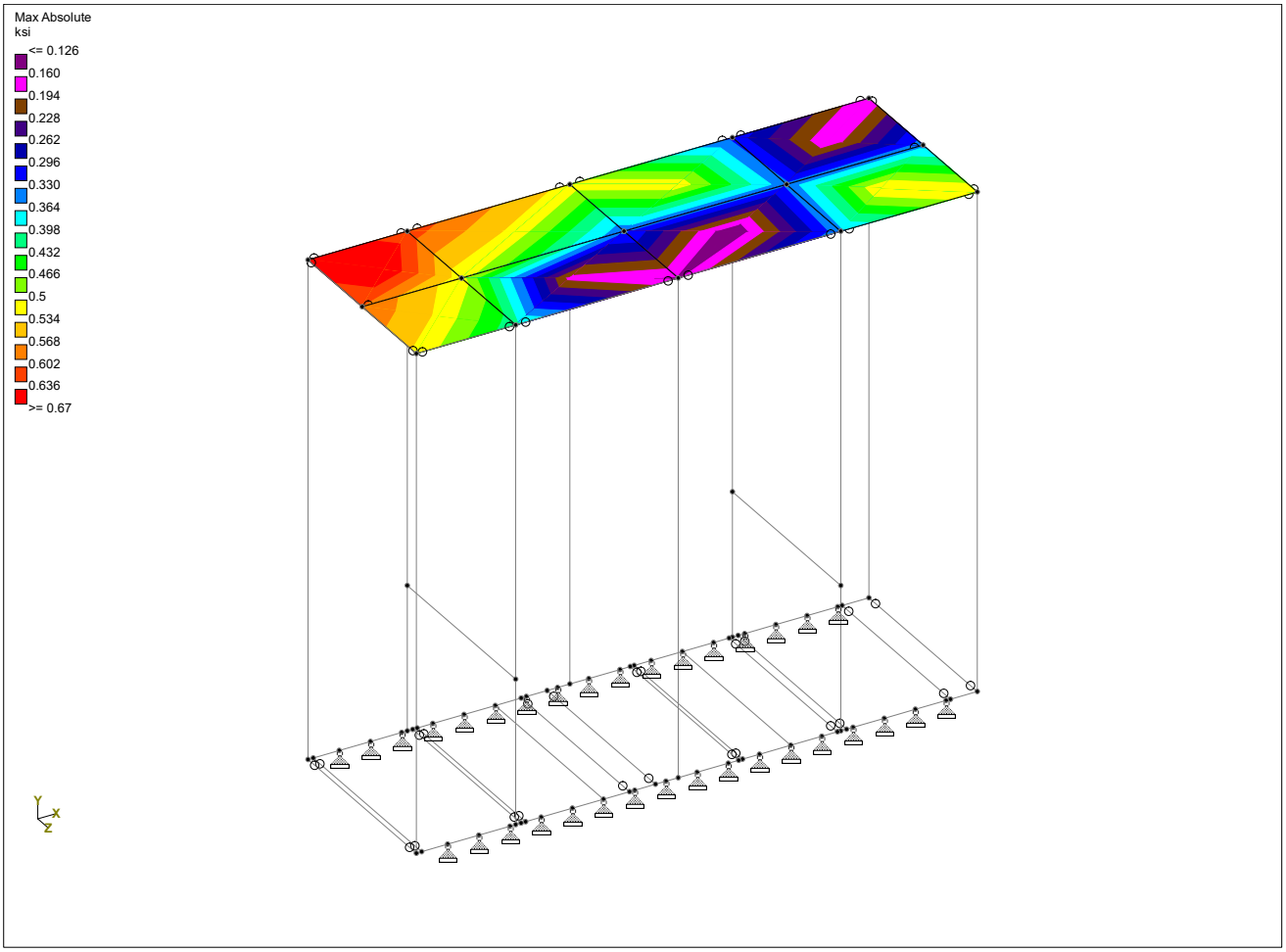
Beam	Type	Direction	Fa	Da (ft)	Fb	Db	Ecc. (ft)
14	UNI lbf/ft	GX	89.000	-	-	-	-
19	UNI lbf/ft	GX	89.000	-	-	-	-

4 WL-Z : Beam Loads

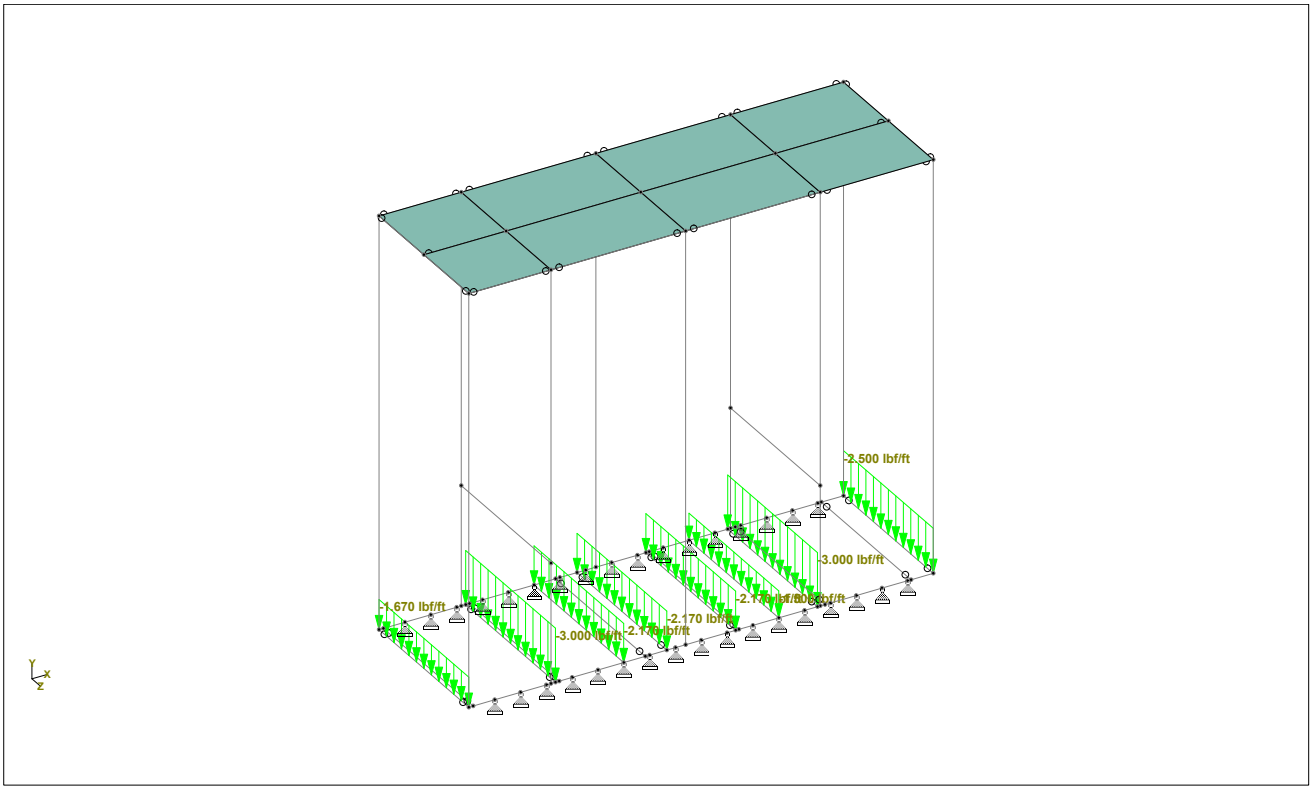
Beam	Type	Direction	Fa	Da (ft)	Fb	Db	Ecc. (ft)
19	UNI lbf/ft	GZ	-28.000	-	-	-	-
20	UNI lbf/ft	GZ	-85.000	-	-	-	-
21	UNI lbf/ft	GZ	-115.000	-	-	-	-
22	UNI lbf/ft	GZ	-99.000	-	-	-	-
23	UNI lbf/ft	GZ	-42.000	-	-	-	-
77	UNI lbf/ft	GZ	-85.000	-	-	-	-
78	UNI lbf/ft	GZ	-99.000	-	-	-	-

5 SL : One Way Loads

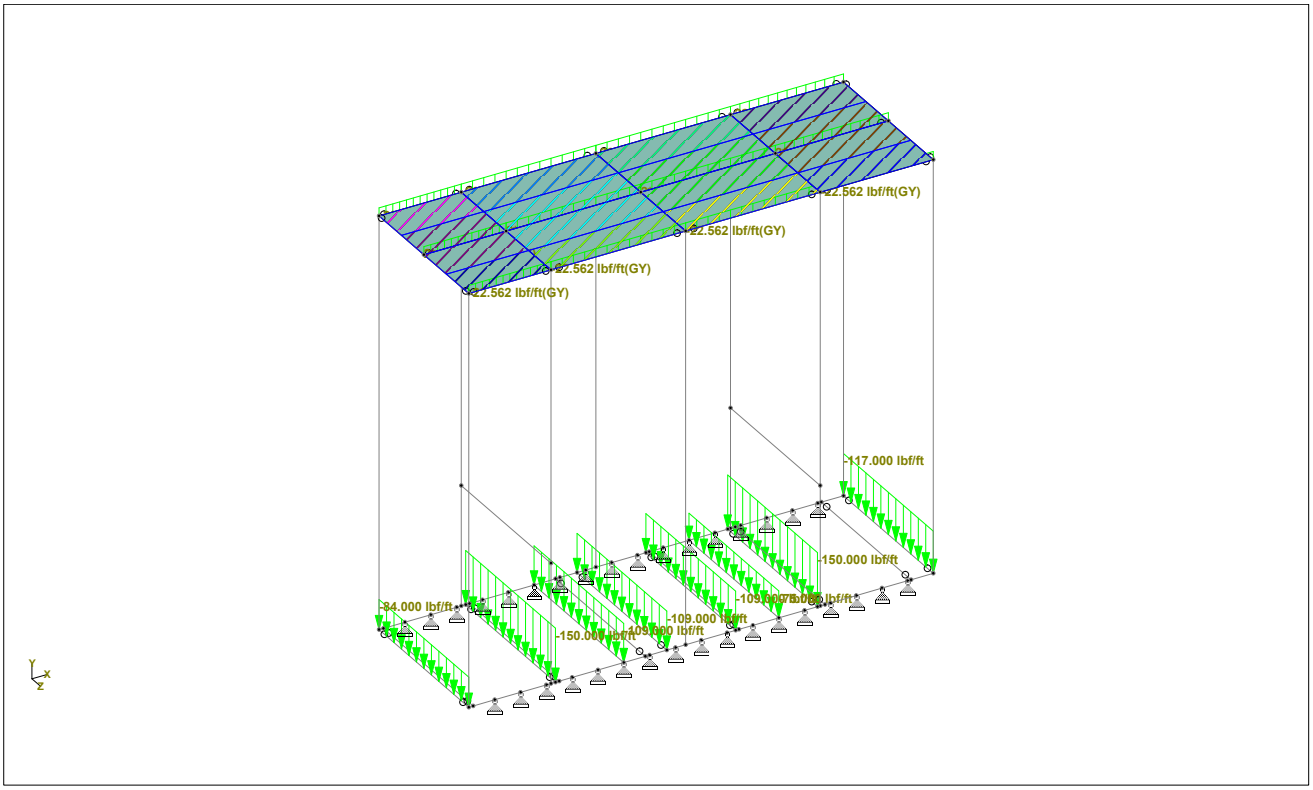
Load (ksi)	Min Ht. (ft)	Max Ht. (ft)	Min X (ft)	Max X (ft)	Min Y (ft)	Max Y (ft)
-0.001	7.500	8.330	-	-	-	-



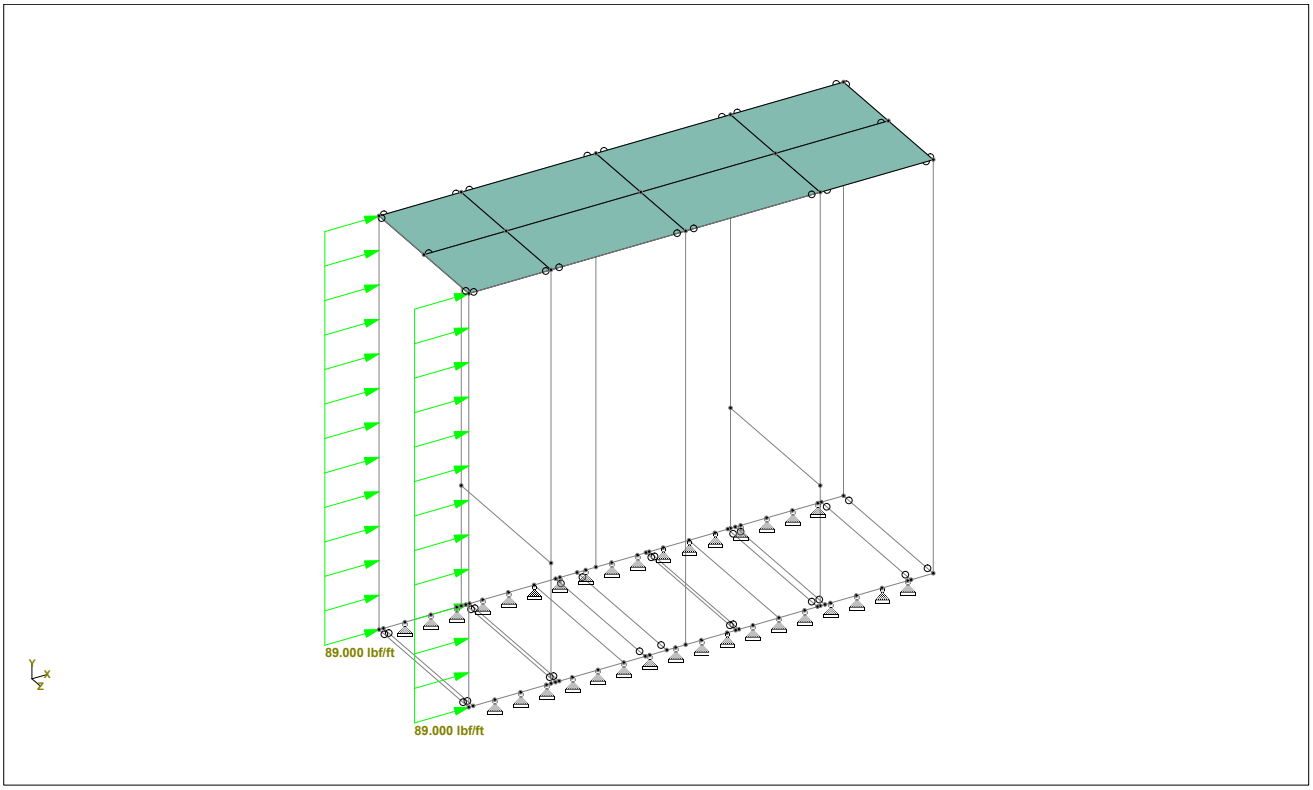
Whole Structure



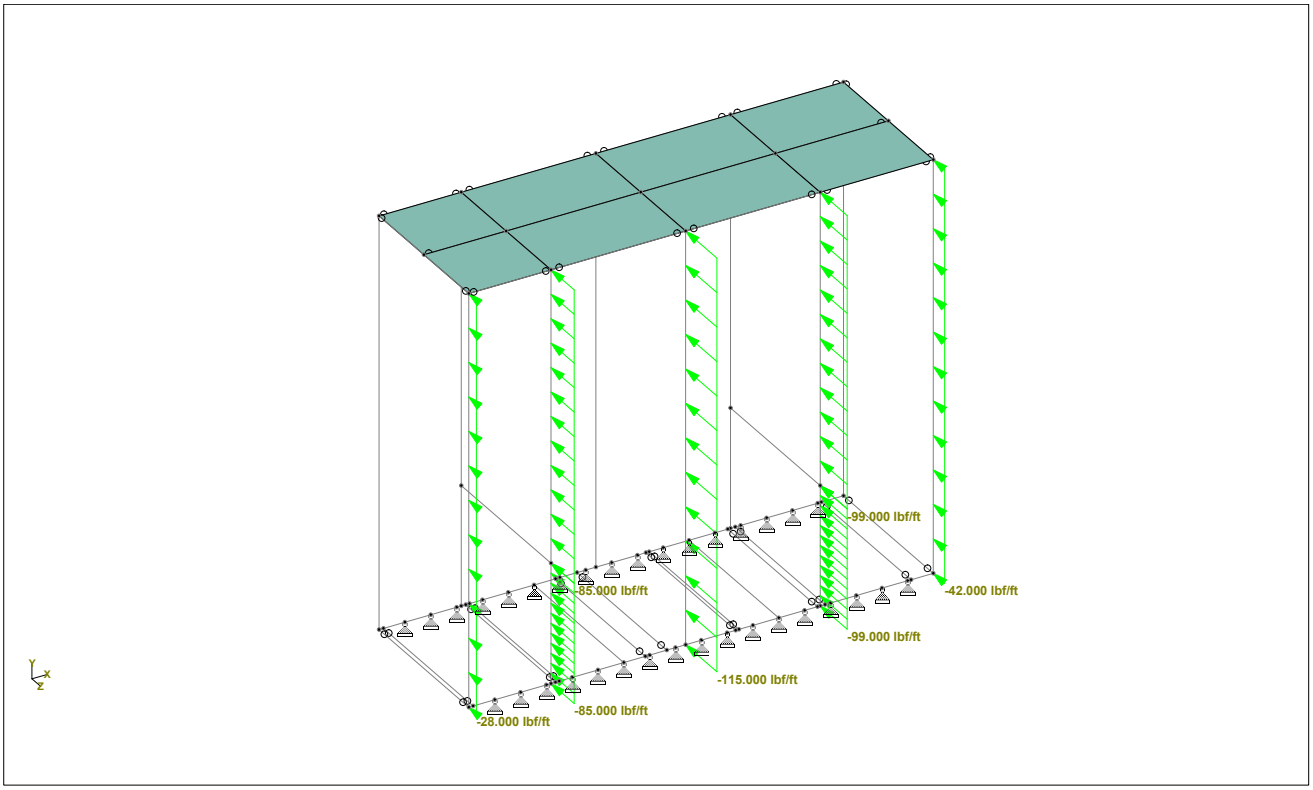
Whole Structure



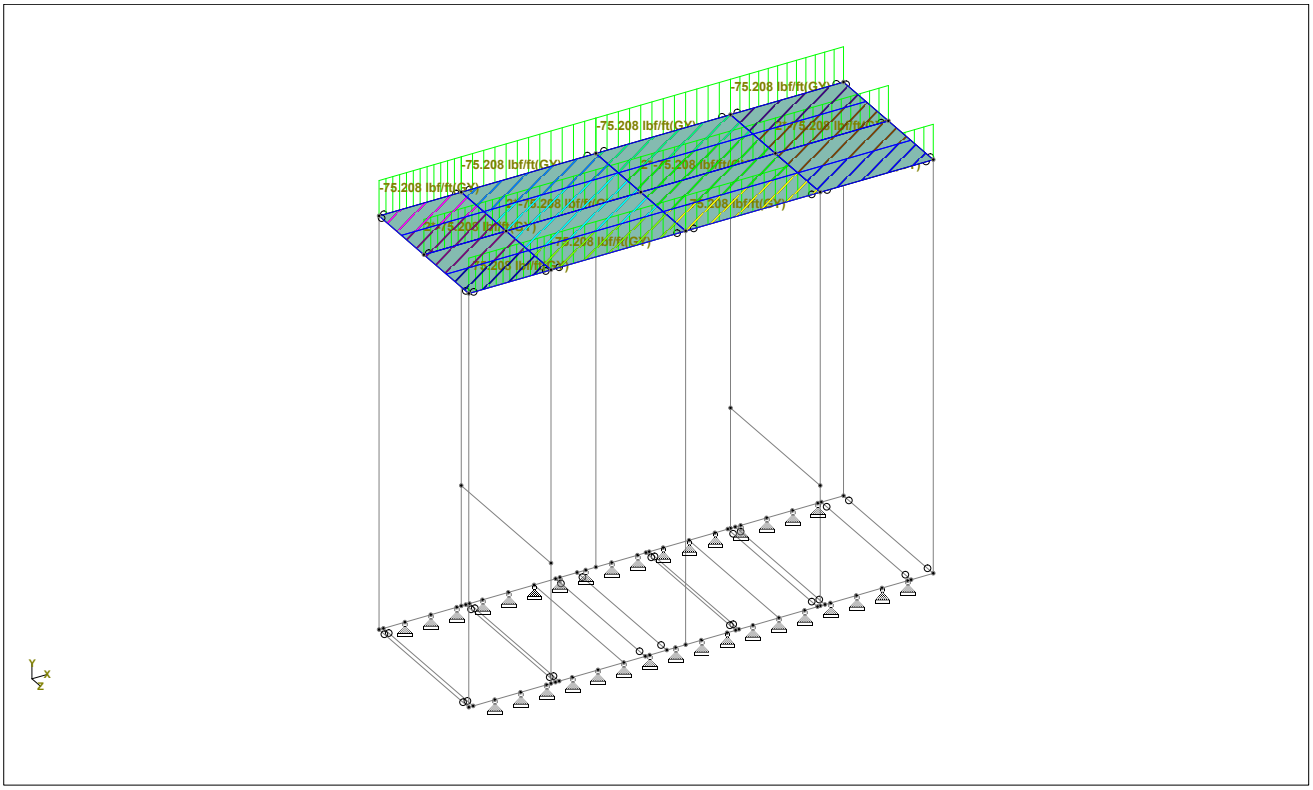
Whole Structure



Whole Structure



Whole Structure



Whole Structure

Beam End Force Summary

The signs of the forces at end B of each beam have been reversed. For example: this means that the Min Fx entry gives the largest tension value for an beam.

				Axial	Shear		Torsion	Bending	
	Beam	Node	L/C	Fx (lb)	Fy (lb)	Fz (lb)	Mx (kip¯in)	My (kip¯in)	Mz (kip¯in)
Max Fx	17	5	4:WL-Z	**2.02E+3**	-46.488	542.946	-0.001	-0.066	-4.467
Min Fx	22	10	4:WL-Z	**-2.09E+3**	46.556	624.780	-0.001	-0.062	4.477
Max Fy	98	61	4:WL-Z	38.524	**2.35E+3**	429.274	0.007	-0.216	-0.207
Min Fy	99	62	4:WL-Z	-38.525	**-2.41E+3**	486.440	0.001	-0.244	0.186
Max Fz	78	51	4:WL-Z	-502.933	46.489	**635.311**	-0.002	-16.114	3.174
Min Fz	21	19	4:WL-Z	98.957	12.282	**-501.957**	-0.001	-4.076	-0.001
Max Mx	105	68	4:WL-Z	0	-9.952	-42.846	**0.092**	0.056	-0.019
Min Mx	109	72	4:WL-Z	0	38.664	36.400	**-0.061**	-0.168	0.204
Max My	17	49	4:WL-Z	2.02E+3	-46.488	542.946	-0.001	**15.136**	-3.165
Min My	78	51	4:WL-Z	-502.933	46.489	635.311	-0.002	**-16.114**	3.174
Max Mz	80	49	4:WL-Z	241.530	1.58E+3	-0.067	0.001	0.001	**26.893**
Min Mz	80	51	4:WL-Z	241.530	1.58E+3	-0.067	0.001	-0.001	**-30.312**

Beam Force Detail Summary

Sign convention as diagrams:- positive above line, negative below line except Fx where positive is compression. Distance d is given from beam end A.

				Axial	Shear		Torsion	Bending	
	Beam	L/C	d (ft)	Fx (lb)	Fy (lb)	Fz (lb)	Mx (kip-in)	My (kip-in)	Mz (kip-in)
Max Fx	17	4:WL-Z	0	**2.02E+3**	-46.488	542.946	-0.001	-0.066	-4.467
Min Fx	22	4:WL-Z	0	**-2.09E+3**	46.556	624.780	-0.001	-0.062	4.477
Max Fy	98	4:WL-Z	0	38.524	**2.35E+3**	429.274	0.007	-0.216	-0.207
Min Fy	99	4:WL-Z	0	-38.525	**-2.41E+3**	486.440	0.001	-0.244	0.186
Max Fz	78	4:WL-Z	0	-502.933	46.489	**635.311**	-0.002	-16.114	3.174
Min Fz	21	4:WL-Z	8.021	98.957	12.282	**-501.957**	-0.001	-4.076	-0.001
Max Mx	105	4:WL-Z	0	0	-9.952	-42.846	**0.092**	0.056	-0.019
Min Mx	109	4:WL-Z	0	0	38.664	36.400	**-0.061**	-0.168	0.204
Max My	17	4:WL-Z	2.333	2.02E+3	-46.488	542.946	-0.001	**15.136**	-3.165
Min My	78	4:WL-Z	0	-502.933	46.489	635.311	-0.002	**-16.114**	3.174
Max Mz	80	4:WL-Z	0	241.530	1.58E+3	-0.067	0.001	0.001	**26.893**
Min Mz	80	4:WL-Z	3.008	241.530	1.58E+3	-0.067	0.001	-0.001	**-30.312**

Plate Center Principal Stress Summary

			Principal		Von Mis		Tresca	
	Plate	L/C	Top (ksi)	Bottom (ksi)	Top (ksi)	Bottom (ksi)	Top (ksi)	Bottom (ksi)
Max (t)	84	4:WL-Z	**0.670**	-0.261	0.610	0.769	0.670	0.865
Max (b)	85	4:WL-Z	-0.086	**0.527**	0.627	0.461	0.665	0.527
Max VM (t)	85	4:WL-Z	-0.086	0.527	**0.627**	0.461	0.665	0.527
Max VM (b)	84	4:WL-Z	0.670	-0.261	0.610	**0.769**	0.670	0.865
Tresca (t)	84	4:WL-Z	0.670	-0.261	0.610	0.769	**0.670**	0.865
Tresca (b)	84	4:WL-Z	0.670	-0.261	0.610	0.769	0.670	**0.865**