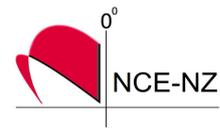


**PROJECT DETAILS**

NAME: SWAT Transfer  
 ADDRESS: FIJI ISLANDS  
 JOB NO: FNZP0054  
 DISTRIBUTOR JOB NUMBER: N/A



**BUILDING GEOMETRY**

SPAN	12.00 m
LENGTH	36.00 m
EAVE HEIGHT	6.00 m
ROOF PITCH	11.00 deg
AVERAGE HEIGHT	6.58 m
NUMBER OF BAYS	7.00
MAX BAY SPACING	5.25 m
MAX FRAME LOAD WIDTH	5.10 m
MULLION SPACING	6.00 m
LEFT LEAN TO SPAN	N/A m
RIGHT LEAN TO SPAN	N/A m
LEFT LEAN TO HEIGHT	N/A m
RIGHT LEAN TO HEIGHT	N/A m

**DESIGN PARAMETERS**

IMPORTANCE LEVEL	2.00
DEAD AND LIVE LOAD	
ROOF DEAD LOAD	0.10 kPa
ROOF LIVE LOAD	0.25 kPa
MEZZANINE DEAD LOAD	0.00 kPa
MEZZANINE LIVE LOAD	0.00 kPa

**EARTHQUAKE CALCULATION**

PROBABILITY OF EXCEEDANCE	500.00
STRUCTURE TYPE	COLD FORMED FRAME
DUCTILITY FACTOR	$\mu$ 1.25
PERIOD OF STRUCTURE	T 0.50 sec
SITE SUBSOIL CLASS	D
SPECTRAL SHAPE FACTOR	CH(T) 3.00
SITE HAZARD FACTOR	(Z) 0.30
RETURN PERIOD	$R_u$ 1.00
NEAR FAULT FACTOR	N(T,D) 1.00
ELASTIC SITE HAZARD SPECTRUM	C(T) 0.90
STRUCTURAL PERFORMANCE FACTOR	$S_p$ 0.93
INELASTIC SPECTRUM SCALING FACTOR	$k_\mu$ 1.18
HORIZONTAL DESIGN ACTION COEFFICIENT	$C_d(T_1)$ 0.71
EAVE POINT LOAD	4.40 kN
MEZZ POINT LOAD	0.00 kN

**SNOW LOAD CALCULATION**

PROBABILITY OF EXCEEDANCE	150.00
SNOW REGION	N0
ALTITUDE	0.00 m
CLASSIFICATION	Sub-Alpine
GROUND SNOW LOAD	$S_g$ 0.00 kPa
PROBABILITY FACTOR	$k_p$ 1.25
ROOF SHAPE COEFFICIENT	$\mu_e$ 0.69
EXPOSURE CLASSIFICATION	$C_e$ 1.00
ROOF SNOW LOAD	$S_g$ 0.00 kPa

**WIND LOAD CALCULATION**

WIND REGION	D				
PROBABILITY OF EXCEEDANCE	ULT 500.00				
PROBABILITY OF EXCEEDANCE	SERV 25.00				
ULTIMATE (CW1&2)      ULTIMATE (CW3&4)      ULTIMATE (LW1 & 2)      ULTIMATE (LW3 & 4)					
REGIONAL WIND SPEED	$V_r$ (m/s)	70.00	70.00	70.00	70.00
TERRAIN CATEGORY	TC	2.00	2.00	2.00	2.00
TERRAIN HEIGHT MULTIPLIER	$M_{z,cat}$	1.00	1.00	1.00	1.00
SHIELDING MULTIPLIER	$M_s$	1.00	1.00	1.00	1.00
TOPOGRAPHY MULTIPLIER	$M_t$	1.00	1.00	1.00	1.00
DIRECTIONAL MULTIPLIER	$M_d$	1.00	1.00	1.00	1.00
SITE BASED WIND SPEED	$V_{sit\beta}$	70.00	70.00	70.00	70.00
WIND PRESSURE -MAJOR STRUCTURAL ELEMENTS	P (kPa)	2.94	2.94	2.94	2.94
INTERNAL PRESSURE COEFFICIENT	$C_{pi}$ 1	0.60	0.60	0.60	0.60
INTERNAL SUCTION COEFFICIENT	$C_{pi}$ 2	-0.60	-0.60	-0.60	-0.60
SERVICE (CW1&2)      SERVICE (CW3&4)      SERVICE (LW1 & LW2)      SERVICE (LW3 & LW4)					
REGIONAL WIND SPEED	$V_r$ (m/s)	47.00	47.00	47.00	47.00
TERRAIN CATEGORY	TC	2.00	2.00	2.00	2.00
TERRAIN HEIGHT MULTIPLIER	$M_{z,cat}$	1.00	1.00	1.00	1.00
SHIELDING MULTIPLIER	$M_s$	1.00	1.00	1.00	1.00
TOPOGRAPHY MULTIPLIER	$M_t$	1.00	1.00	1.00	1.00
DIRECTIONAL MULTIPLIER	$M_d$	1.00	1.00	1.00	1.00
SITE BASED WIND SPEED	$V_{sit\beta}$	47.00	47.00	47.00	47.00
WIND PRESSURE MAJOR STRUCT ELEMENTS	P (kPa)	1.33	1.33	1.33	1.33
INTERNAL PRESSURE COEFFICIENT	$C_{pi}$ 1	0.60	0.60	0.60	0.60
INTERNAL SUCTION COEFFICIENT	$C_{pi}$ 2	-0.60	-0.60	-0.60	-0.60

NAME:  
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**MULLION / FIRST INTERNAL FRAME LOADING**

CROSS WIND EXTERNAL LOAD CASE (CW1)	Ka.Kc	Cpe	W kN/m
WINDWARD COLUMN	0.80	0.70	8.40
LEEWARD COLUMN	0.80	0.30	3.60
MULLIONS	0.85	0.59	8.86
RAFTER UPWIND SLOPE	0.80	0.90	10.76
RAFTER DOWNWIND SLOPE	0.80	0.52	6.21

CROSS WIND EXTERNAL LOAD CASE (CW2)	Ka.Kc	Cpe	W kN/m
WINDWARD COLUMN	0.80	0.70	8.40
LEEWARD COLUMN	0.80	0.30	3.60
MULLIONS	0.85	0.65	8.86
RAFTER UPWIND SLOPE	0.80	0.40	4.79
RAFTER DOWNWIND SLOPE	0.80	0.52	6.21

CROSS WIND EXTERNAL LOAD CASE (CW3)	Ka.Kc	Cpe	W kN/m
WINDWARD COLUMN	0.80	0.70	8.40
LEEWARD COLUMN	0.80	0.30	3.60
MULLIONS	0.85	0.65	8.86
RAFTER UPWIND SLOPE	0.80	0.90	10.76
RAFTER DOWNWIND SLOPE	0.80	0.52	6.21

CROSS WIND EXTERNAL LOAD CASE (CW4)	Ka.Kc	Cpe	W kN/m
WINDWARD COLUMN	0.80	0.70	8.40
LEEWARD COLUMN	0.80	0.30	3.60
MULLIONS	0.85	0.65	8.86
RAFTER UPWIND SLOPE	0.80	0.52	6.21
RAFTER DOWNWIND SLOPE	0.80	0.52	6.21

LONG WIND EXTERNAL LOAD CASE (LW1)	Ka.Kc	Cpe	W kN/m
WINDWARD MULLION	0.90	0.70	11.11
LEEWARD MULLION	0.90	0.25	3.97
RAFTERS	0.80	0.82	9.79
SIDE WALL COLUMNS	0.80	-0.62	-7.42

LONG WIND EXTERNAL LOAD CASE (LW2)	Ka.Kc	Cpe	W kN/m
WINDWARD MULLION	0.90	0.70	11.11
LEEWARD MULLION	0.90	0.25	3.97
RAFTERS	0.80	0.32	3.79
SIDE WALL COLUMNS	0.80	-0.62	-7.42

LONG WIND EXTERNAL LOAD CASE (LW3)	Ka.Kc	Cpe	W kN/m
WINDWARD MULLION	0.90	0.70	11.11
LEEWARD MULLION	0.90	0.25	3.97
RAFTERS	0.80	0.20	2.40
SIDE WALL COLUMNS	0.80	0.20	-2.40

LONG WIND EXTERNAL LOAD CASE (LW4)	Ka.Kc	Cpe	W kN/m
WINDWARD MULLION	0.90	0.70	11.11
LEEWARD MULLION	0.90	0.25	3.97
RAFTERS	0.80	-0.20	-2.40
SIDE WALL COLUMNS	0.80	0.20	2.40

NAME:  
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JOB NO:  
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FIJI ISLANDS  
FNZP0054  
N/A

**FRAME LOADING (CONT.)**

CROSSWIND CW1/CW2 INTERNAL PRESSURE	Ka.Kc	Cpe	W kN/m
MULLION	0.90	0.60	9.53
RAFTERS	0.80	0.60	7.20
COLUMNS	0.80	0.60	7.20
CROSSWIND CW1/CW2 INTERNAL SUCTION	Ka.Kc	Cpe	W kN/m
MULLION	0.90	-0.60	-9.53
RAFTERS	0.80	-0.60	-7.20
COLUMNS	0.80	-0.60	-7.20
CROSSWIND CW3/CW4 INTERNAL PRESSURE	Ka.Kc	Cpe	W kN/m
MULLION	0.90	0.60	9.53
RAFTERS	0.80	0.60	7.20
COLUMNS	0.80	0.60	7.20
CROSSWIND CW3/CW4 INTERNAL SUCTION	Ka.Kc	Cpe	W kN/m
MULLION	0.90	-0.60	-9.53
RAFTERS	0.80	-0.60	-7.20
COLUMNS	0.80	-0.60	-7.20
LONGWIND LW1/LW2 INTERNAL PRESSURE	Ka.Kc	Cpe	W kN/m
MULLION	0.90	0.60	9.53
RAFTERS	0.80	0.60	7.20
COLUMNS	0.80	0.60	7.20
LONGWIND LW1/LW2 INTERNAL SUCTION	Ka.Kc	Cpe	W kN/m
MULLION	0.90	-0.60	-9.53
RAFTERS	0.80	-0.60	-7.20
COLUMNS	0.80	-0.60	-7.20
LONGWIND LW3/LW4 INTERNAL PRESSURE	Ka.Kc	Cpe	W kN/m
MULLION	0.90	0.60	9.53
RAFTERS	0.80	0.60	7.20
COLUMNS	0.80	0.60	7.20
LONGWIND LW3/LW4 INTERNAL SUCTION	Ka.Kc	Cpe	W kN/m
MULLION	0.90	-0.60	-9.53
RAFTERS	0.80	-0.60	-7.20
COLUMNS	0.80	-0.60	-7.20

**NOTE: END FRAMES TO BE DESIGNED FOR HALF THE LOADINGS ON FIRST INTERNAL FRAMES  
THESE LOADS ARE AUTOMATICALLY ENTERED INTO MICROSTRAN  
REFER TO STEEL DESIGN REPORT FOR ANALYSIS RESULTS ON END AND INTERNAL FRAMES**

**CLADDING**

CLADDING PRESSURE	P(kPa)	-6.26
CLADDING TYPE	Super Deck 0.48 BMT	
MAX INTERNAL SPAN		1.10
MAX END SPAN		1.00

NAME:  
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FIJI ISLANDS  
FNZP0054  
N/A

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#### PURLIN DESIGN

##### CROSS WIND BASED ON 1m LOAD WIDTH

LPZ KL=2.0	P	5.12 kPa
LPZ KL=1.5	P	5.12 kPa
LPZ KL=1.0	P	3.92 kPa

##### LONGWIND BASED ON 1m LOAD WIDTH

LPZ KL=2.0	P	4.71 kPa
LPZ KL=1.5	P	4.71 kPa
LPZ KL=1.0	P	3.93 kPa

PURLIN SIZE		Z150-19 (1)
SPAN CONFIGURATION		5 CONTINUOUS
PURLIN CAPACITY	φW	4.21 kN/m
MAX PURLIN SPACING		0.82 m

#### SIDE GIRT DESIGN

##### CROSS WIND BASED ON 1m LOAD WIDTH

LPZ KL=1.5	P	-3.99 kPa
------------	---	-----------

##### LONGWIND BASED ON 1m LOAD WIDTH

LPZ KL=2.0	P	4.60 kPa
LPZ KL=1.5	P	4.08 kPa
LPZ KL=1.0	P	3.31 kPa

SIDE GIRT SIZE		Z150-19 (1)
SPAN CONFIGURATION		5 CONTINUOUS
SIDE GIRT CAPACITY	φW	4.21 kN/m
MAX SIDE GIRT SPACING		0.92 m

#### END GIRT DESIGN

##### CROSS WIND BASED ON 1m LOAD WIDTH

LPZ KL=2.0	P	4.60 kPa
LPZ KL=1.5	P	3.97 kPa
LPZ KL=1.0	P	3.31 kPa

##### LONGWIND BASED ON 1m LOAD WIDTH

LPZ KL=1.5	P	-3.99 kPa
------------	---	-----------

END GIRT SIZE		Z150-19 (1)
SPAN CONFIGURATION		DOUBLE LAPPED
END GIRT CAPACITY	φW	3.70 kN/m
MAX END GIRT SPACING		0.80 m



20 February 2014

**Our Ref: 50259-4**

ROOFING & PROFILES (FIJI) LTD.  
REGISTERED OFFICE – BA-MARKET SUB-DIVISION,  
PO Box 9,  
Ba, FIJI ISLANDS.

Attention: Mr. Bhavesh Kumar

**Re: RPFL Cyclonic Testing of 0.48bmt SuperDek, G550**

Dear Bhavesh,

We have acted as a consultant technical advisor on your behalf and arranged cyclic load testing for Roofing & Profiled (FIJI) LTD, in respect to their SuperDek roofing profile.

Testing on the SuperDek roofing profile has been carried out at The University of Adelaide, EngTest, South Australia, Australia. The cyclic tests have produced the following results refer to Report No's:

- C130901-3-Rev A, dated 19 February 2014
- C130901-5-Rev A, dated 19 February 2014
- C130901-9-Rev A, dated 19 February 2014
- C130901-11-Rev A, dated 19 February 2014

**Low High Low Cyclonic Wind Uplift Resistance - Strength Limit State Test Results**

**Load Span Table**

- 0.48 bmt SuperDek sheeting, G550
- Minimum steel purlin thickness, 1.55mm G450 grade
- Bremick 14-10x65mm screw with 25mm diameter, 1.0mm thick, Aluminium Bonded washer used under the head of each screw and fastened at each crest.

**Strength Limit State Design Pressure:**

Span (mm)	End Span (Trend Line)	Span (mm)	Internal Span (Trend Line)	Screw Force (kN)
	Strength (kPa)		Strength (kPa)	
480	11.28	600	11.28	0.84
600	9.28	750	9.28	0.96
750	7.59	950	7.59	1.07
950	6.18	1200	6.18	1.17

**Note(s):**

- It is recommended that a qualified structural engineer check the suitability of the Limit State Design Wind Pressures for the intended site of use
- It is our opinion that a qualified structural engineer may extrapolate for shorter spans and higher pressures provided that the screw force is not exceeded.
- After exposure of cladding to an extreme wind event, it is recommended that inspection be performed to confirm fixing and cladding integrity.
- Test data was "normalised" by trend line analysis (power equations).

We, Fyfe Pty. Ltd., confirm that the procedures used in carrying out the cyclonic load tests on the product as listed above from for Roofing & Profiled (FIJI) LTD., conform to the structural requirements of the National Construction Code Series 2013 (NCC) and the relevant Australian Standards:

- NCC 2013 (also known as the Building Code of Australia)
  - Volume 1: Specification B1.2 – Class 2 to 9 buildings
  - Volume 2: Part 3.10.1 – Class 1 and 10 buildings.
- AS 1562.1 – 1992 - Design and installation of sheet roof and wall cladding (Amdt 3-2012)
- AS 4040 – 1992 - Methods of testing sheet roof and wall cladding
  - Part 0: Introduction, list of methods and general requirements
  - Method 3: Methods of testing sheet roof and wall cladding - Resistance to wind pressures for cyclone regions, pressure test regime as per BCA Lo-Hi-Lo.



**Trevor John**

Registered on the National Professional Engineers Register (NPER3 106278)

20 February 2014

NAME:  
ADDRESS:  
JOB NO:  
DISTRIBUTOR JOB NUMBER

SWAT Transfer  
FIJI ISLANDS  
FNZP0054  
N/A

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**SERVICEABILITY DEFLECTION**

**MAIN FRAME**

**LATERAL DEFLECTION**

COLUMN SWAY	d	8 mm
DEFLECTION / EAVE HEIGHT		EAVE HEIGHT / 750
ADOPTED LIMIT		EAVE HEIGHT / 100

DIFFERENTIAL SWAY	d	8 mm
DEFLECTION / BAY SPACING		BAY SPACING / 656
ADOPTED LIMIT		BAY SPACING / 100

**RAFTER DEFLECTION**

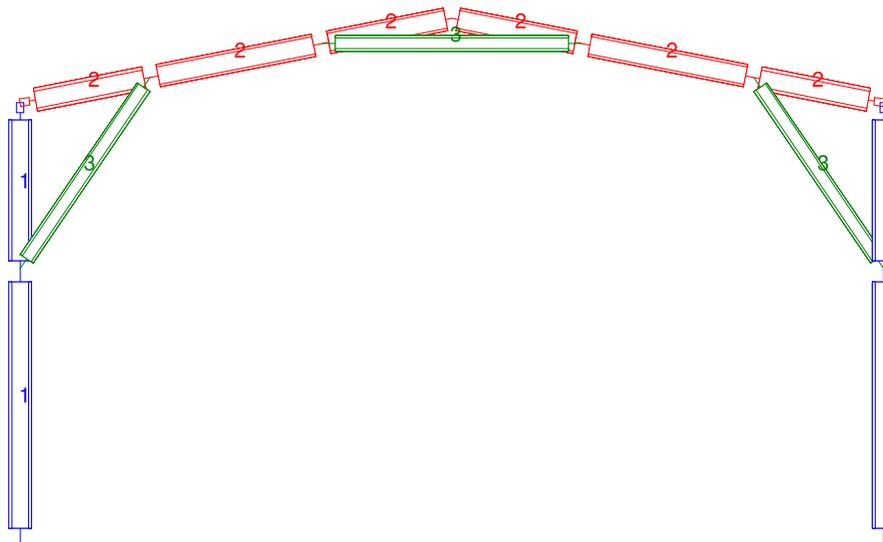
DEAD LOAD	d	1 mm
DEFLECTION / SPAN		SPAN / 6000
ADOPTED LIMIT		SPAN / 360

LIVE LOAD	d	2 mm
DEFLECTION / SPAN		SPAN / 3000
ADOPTED LIMIT		SPAN / 240

WIND LOAD	d	7 mm
DEFLECTION / SPAN		SPAN / 1714
ADOPTED LIMIT		SPAN / 150

Job: FNZP0054

Sections:  
1 DLC30030  
2 DLC30030  
3 DLC20019



Y  
↑  
Z → X  
theta: 270 phi: 0

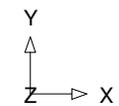
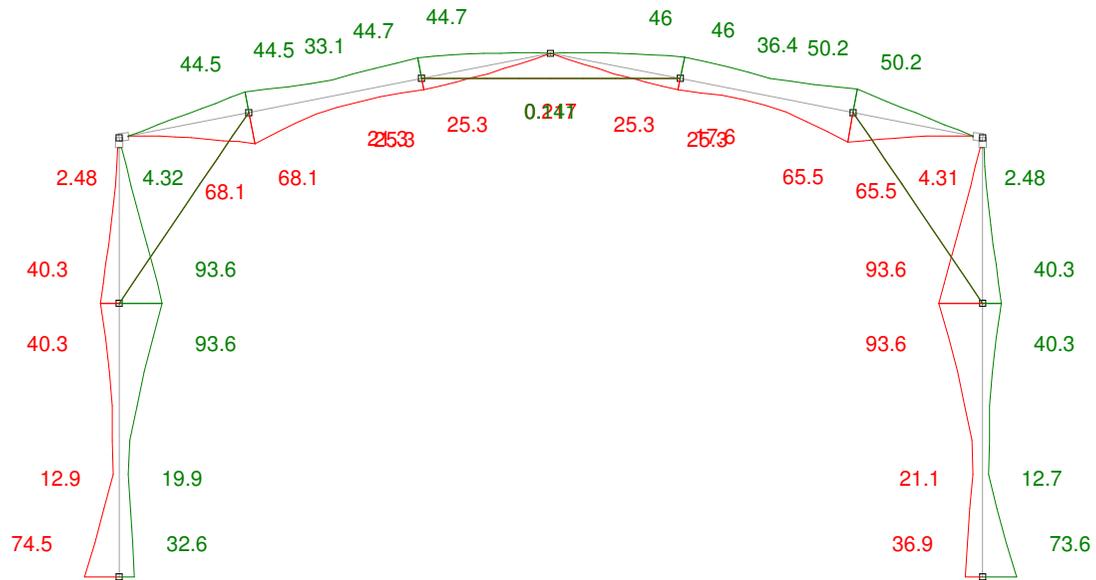
Scale = 1:100

Envelope for Moment Mz

Maximum  
Minimum

Enveloped Cases:

- 32 C DL + LL ult
- 33 C 1.35 DL
- 34 C DL+ CW1
- 35 C DL+ CW2
- 36 C DL+ CW3
- 37 C DL+ CW4
- 38 C DL+ LW1
- 39 C DL+ LW2
- 40 C DL+ LW3
- 41 C DL+ LW4
- 42 C DL + CW1 + CWIP1&2
- 43 C DL+CW1+CWIS1&2
- 44 C DL+CW2+CWIS1&2
- 45 C DL+CW2+CW1&2 IP
- 46 C DL+CW3+CWIP3&4
- 47 C DL+CW3+CWIS3&4
- 48 C DL+CW4+CWIS3&4
- 49 C DL+CW4+CWIP3&4
- 50 C DL + LW1 + LW1&2 IP
- 51 C DL + LW1 + LW1&2 IS
- 52 C DL + LW2 + LW1&2 IS
- 53 C DL + LW2 + LW1&2 IP
- 54 C DL + LW3 + LW3&4 IP
- 55 C DL + LW3 + LW3&4 IS
- 56 C DL + LW4 + LW3&4 IS
- 57 C DL+LW4+LW3&4 IP



theta: 270 phi: 0

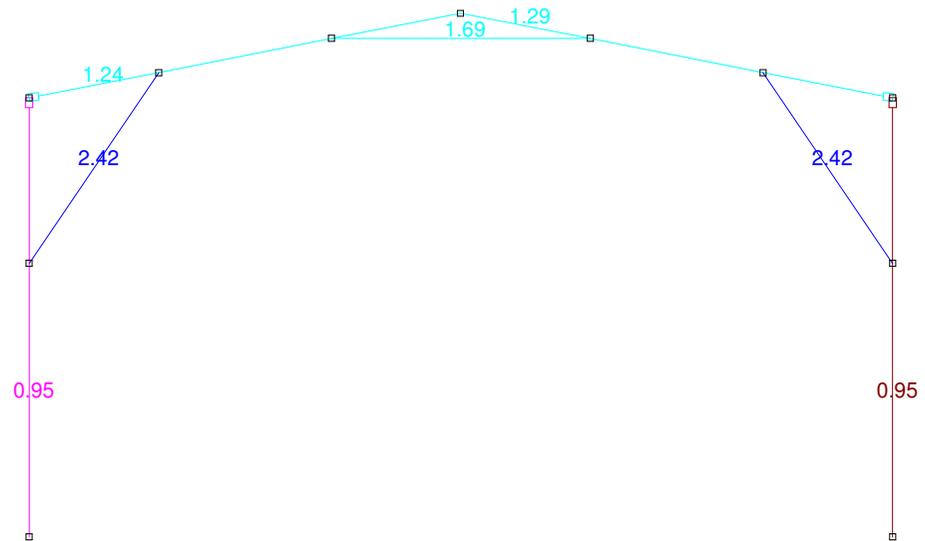
Scale = 1:100

Bending Moment, Mz

Job: FNZP0054

Design Ratios - % of Code Capacity:

- <= 50      —
- <= 95      —
- <= 100     —
- <= 105     —
- <= 110     —
- > 110      —



Y  
↑  
Z → X  
theta: 270 phi: 0

Scale = 1:100

## GABLE HAUNCH BRACKET CONNECTION DESIGN CALCULATOR

### Entries

Rafter Max $N_r$ =	16.1	kN	Column Max $N_c$ =	26.9	kN
Rafter Max $N_c$ =	54.5	kN	Column Max $N_c$ =	36.1	kN
Rafter Max $V$ =	32.8	kN	Column Max $V$ =	46.9	kN
Rafter Section:	2C30030				
Column Section:	2C30030				
Roof Pitch:	1.1				

### Design Information

Bracket:	HB11300-PP				
Bracket Type:	Flat	Plate			
No. Brackets:	Double				
Rafter Bolts:	4	No. Bolt Rows:	3		
Column Bolts:	6	Col Gauge Dist	280 mm		
Bolt Size:	M16				
Bolt Grade:	8.8	Col Pitch Dist	80 mm		
Edge Distance =	35	Conn. Eccentricity	400 mm		
Bracket Thickness =	8	mm			
Bracket $f_y$ =	250	MPa			
Bracket $f_u$ =	320	MPa			
Rafter Thickness =	3	mm	Column Thickness =	3	mm
Rafter $f_y$ =	450	MPa	Column $f_y$ =	450	MPa
Rafter $f_u$ =	480	MPa	Column $f_u$ =	480	MPa

### Checks

Combined Resultant      39.70      kN

		Combined Shear Axial Check			
1)	Tearout Bracket Rafter Side	$\phi V_r = 501.76$ kN	PASS	PASS	
2)	Tearout Bracket Column Side	$\phi V_r = 752.64$ kN	PASS	PASS	
3)	Tearout Column	$\phi V_r = 362.88$ kN	PASS	PASS	
4)	Tearout Rafter	$\phi V_r = 241.92$ kN	PASS	PASS	
5)	Bearing Bracket Rafter Side	$\phi V_b = 579.871$ kN	PASS	PASS	
6)	Bearing Bracket Column Side	$\phi V_b = 869.806$ kN	PASS	PASS	
7)	Bearing Column	$\phi V_b = 489.266$ kN	PASS	PASS	
8)	Bearing Rafter	$\phi V_b = 326.177$ kN	PASS	PASS	
9)	Bolt Shear Rafter Side	$\phi V_{br} = 355.906$ kN	PASS	PASS	
10)	Bolt Shear Column Side	$\phi V_{bc} = 533.859$ kN	PASS	PASS	

### Calculations

<b>1) Tearout Bracket</b> $t = 8$ mm $e = 35$ mm $f_u = 320$ MPa $\phi = 0.7$ $\phi V_r = 125.44$ kN	<b>2) Tearout Column</b> $t = 3$ mm $e = 35$ mm $f_u = 480$ MPa $\phi = 0.6$ $\phi V_r = 60.48$ kN	<b>3) Tearout Rafter</b> $t = 3$ mm $e = 35$ mm $f_u = 480$ MPa $\phi = 0.6$ $\phi V_r = 60.48$ kN	<b>4) Bearing Bracket</b> $\alpha = 1$ $C = 3$ $d_f = 15.73$ mm $t = 8$ mm $f_u = 320$ MPa $\phi = 0.6$ $\phi V_b = 144.968$ kN
<b>5) Bearing Column</b> $\alpha = 1$ $C = 3$ $d_f = 15.73$ mm $t = 3$ mm $f_u = 480$ MPa $\phi = 0.6$ $\phi V_b = 81.54$ kN	<b>6) Bearing Rafter</b> $\alpha = 1$ $C = 3$ $d_f = 15.73$ mm $t = 3$ mm $f_u = 480$ MPa $\phi = 0.6$ $\phi V_b = 81.54$ kN	<b>7) Bolt Shear (Column Side)</b> $f_{uf} = 830$ MPa $n_n = 2$ $A_c = 108.07$ mm <sup>2</sup> $n_x = 0$ $A_g = 194.333$ mm <sup>2</sup> $\phi = 0.8$ $\phi V_{br} = 88.9766$ kN	<b>8) Bolt Shear (Rafter Side)</b> $f_{uf} = 830$ MPa $n_n = 2$ $A_c = 108.07$ mm <sup>2</sup> $n_x = 0$ $A_g = 194.333$ mm <sup>2</sup> $\phi = 0.8$ $\phi V_{br} = 88.9766$ kN

### Check Combined Actions with Bolt Group Eccentricity

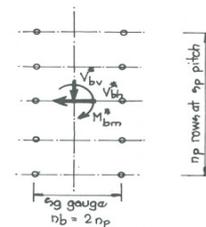
#### Column Check Only

$V_{br}^*$ =	32.80	kN
$V_{bh}^*$ =	16.10	kN
$M_{dm}^*$ =	13.12	kNm
$\phi V_{dv}$ =	533.86	kN
$\phi V_{dh}$ =	533.86	kN
$\phi M_{dm}$ =	79.02	kNm
$S_{pg}$ =	1.75	

#### Interaction Equation

Result      0.05      PASS

(b) Double Bolt Column



3.1.5

4 (p.266) FOR THE SPECIAL CASE  $\sigma_F = n_p = 1$ .

The governing equation is:-

$$\left[ \frac{V_{dv}^*}{\phi V_{dv}} \right]^2 + \frac{2 S_{pg}}{\sqrt{1 + s_p^2}} \left[ \frac{V_{dv}^*}{\phi V_{dv}} \right] \left[ \frac{M_{dm}^*}{\phi M_{dm}} \right] + \left[ \frac{M_{dm}^*}{\phi M_{dm}} \right]^2 + \frac{2}{\sqrt{1 + s_p^2}} \left[ \frac{V_{dh}^*}{\phi V_{dh}} \right] \left[ \frac{M_{dm}^*}{\phi M_{dm}} \right] + \left[ \frac{V_{dh}^*}{\phi V_{dh}} \right]^2 \leq 1.0$$

where  $\phi V_{dv}$ ,  $\phi V_{dh}$ ,  $\phi M_{dm}$  are functions of  $V_{dr}$  as follows: (See Section 5.14).

$$\phi V_{dv} = 2n_p \cdot (\phi V_r)$$

$$\phi V_{dh} = 2n_p \cdot (\phi V_r)$$

$$\phi M_{dm} = \frac{3}{\sqrt{(n_p - 1)^2 + (s_p/s_g)^2}} n_p s_p \cdot (\phi V_r)$$

$$= s_p \cdot (\phi V_r) \quad \text{for } n_p \neq 1$$

$$= s_p \cdot (\phi V_r) \quad \text{for } n_p = 1$$

$$S_{pg} = \frac{s_g}{(n_p - 1) s_p}$$

## GABLE HAUNCH BRACKET CONNECTION DESIGN CALCULATOR

### Entries

Rafter Max $N_t$ =	172	kN
Rafter Max $N_c$ =	123	kN
Rafter Max $V$ =	37.4	kN
Rafter Section:	2C30030	
Roof Pitch:	11	

### Design Information

Bracket: APB11300-PP	
Bracket Type:	Flat Plate
No. Brackets:	Double
Rafter Bolts:	4
Column Bolts:	NA
Bolt Size:	M16
Bolt Grade:	8.8
Edge Distance =	35 mm
Bracket Thickness =	4 mm
Bracket $f_y$ =	300 MPa
Bracket $f_u$ =	320 MPa
Rafter Thickness =	3 mm
Rafter $f_y$ =	450 MPa
Rafter $f_u$ =	480 MPa
No. Bolt Rows:	2
Col Gauge Dist	120 mm
Col Pitch Dist	210 mm
Conn. Eccentricity	180 mm

### Checks

Combined Resultant		128.56	kN
<b>Combined Shear Axial Check</b>			
1) Tearout Bracket Rafter Side	$\phi V_t = 215.04$ kN	PASS	PASS
2) Tearout Rafter	$\phi V_t = 241.92$ kN	PASS	PASS
3) Bearing Bracket Rafter Side	$\phi V_b = 289.935$ kN	PASS	PASS
4) Bearing Rafter	$\phi V_b = 326.177$ kN	PASS	PASS
5) Bolt Shear Rafter Side	$\phi V_{fv} = 355.906$ kN	PASS	PASS

### Calculations

<b>1) Tearout Bracket</b> $t = 4$ mm $e = 35$ mm $f_u = 320$ MPa $\phi = 0.6$ $\phi V_t = 53.76$ kN	<b>2) Tearout Rafter</b> $t = 3$ mm $e = 35$ mm $f_u = 480$ MPa $\phi = 0.6$ $\phi V_t = 60.48$ kN	<b>3) Bearing Bracket</b> $\alpha = 1$ $C = 3$ $d_t = 15.73$ mm $t = 4$ mm $f_u = 320$ MPa $\phi = 0.6$ $\phi V_b = 72.4838$ kN
<b>4) Bearing Rafter</b> $\alpha = 1$ $C = 3$ $d_t = 15.73$ mm $t = 3$ mm $f_u = 480$ MPa $\phi = 0.6$ $\phi V_b = 81.54$ kN	<b>5) Bolt Shear (Rafter Side)</b> $f_{uf} = 830$ MPa $n_n = 2$ $A_c = 108.07$ mm <sup>2</sup> $n_x = 0$ $A_o = 194.333$ mm <sup>2</sup> $\phi = 0.8$ $\phi V_{fv} = 88.9766$ kN	

### Check Combined Actions with Bolt Group Eccentricity

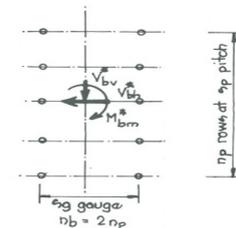
#### Rafter Check Only

$V_{bv}^*$ =	37.40	kN
$V_{bh}^*$ =	123.00	kN
$M_{bm}^*$ =	6.73	kNm
$\phi V_{dv}$ =	355.91	kN
$\phi V_{dh}$ =	355.91	kN
$\phi M_{dm}$ =	43.04	kNm
$S_{pg}$ =	0.57	

#### Interaction Equation

Result	0.27	PASS
--------	------	------

(b) Double Bolt Column



1.3.1.5  
 4 (p.266) FOR THE SPECIAL CASE OF  $n_p = 1$ .

The governing equation is:-

$$\left[ \frac{V_{dv}^*}{\phi V_{dv}} \right]^2 + \frac{2 S_{pg}}{\sqrt{1 + S_{pg}^2}} \cdot \left[ \frac{V_{bh}^*}{\phi V_{dh}} \right] \cdot \left[ \frac{M_{dm}^*}{\phi M_{dm}} \right] + \left[ \frac{M_{dm}^*}{\phi M_{dm}} \right]^2 + \frac{2}{\sqrt{1 + S_{pg}^2}} \cdot \left[ \frac{V_{bh}^*}{\phi V_{dh}} \right] \cdot \left[ \frac{M_{dm}^*}{\phi M_{dm}} \right] + \left[ \frac{V_{bh}^*}{\phi V_{dh}} \right]^2 \leq 1.0$$

where  $\phi V_{dv}$ ,  $\phi V_{dh}$ ,  $\phi M_{dm}$  are functions of  $V_{dv}$  as follows: (See Section 5.14),

$$\phi V_{dv} = 2 n_p \cdot (\phi V_t)$$

$$\phi V_{dh} = 2 n_p \cdot (\phi V_t)$$

$$\phi M_{dm} = \frac{S_g (n_p^2 - 1) + (S_g/S_p)^2 n_p S_p}{\sqrt{(n_p - 1)^2 + (S_g/S_p)^2}} n_p S_p (\phi V_t)$$

$$= S_g \cdot (\phi V_t) \quad \text{for } n_p \neq 1$$

$$= S_p \cdot (\phi V_t) \quad \text{for } n_p = 1$$

$$S_{pg} = \frac{S_g}{(n_p - 1) S_p}$$

## KNEE BRACE CONNECTION DESIGN CALCULATOR

### Entries

Max $N_t$ =	156	kN	Enter Max Tensile Force in Brace
Max $N_c$ =	85.3	kN	Enter Max Compression Force in Brace
Rafter Section:	2C30030		Select Rafter Section
Column Section:	2C30030		Select Column Section
Brace:	2C20019		Select Brace Section
KB Bolts:	M16		Select Bolt Size
Bolt Grade:	8.8		Select Bolt Grade
no. of Bolts p/s =	5		Select Number of Bolts Per End

### Checks

$V^*$ =	156	kN	
1) Tearout Brace	$\phi V_t$ =	191.52 kN	<b>PASS</b>
2) Tearout Column	$\phi V_t$ =	302.40 kN	<b>PASS</b>
3) Tearout Rafter	$\phi V_t$ =	302.40 kN	<b>PASS</b>
4) Bearing Brace	$\phi V_b$ =	258.22 kN	<b>PASS</b>
5) Bearing Column	$\phi V_b$ =	407.72 kN	<b>PASS</b>
6) Bearing Rafter	$\phi V_b$ =	407.72 kN	<b>PASS</b>
7) Bolts in Shear Column	$\phi V_{fv}$ =	444.88 kN	<b>PASS</b>
8) Bolts in Shear Rafter	$\phi V_{fv}$ =	444.88 kN	<b>PASS</b>

### Calculations

<p><b>1) Tearout Brace</b></p> $f_u = 480$ MPa $f_y = 450$ MPa $t = 3.8$ mm $e = 35$ mm $\phi = 0.6$ $V_{t,bolt} = 63.84$ kN $\phi V_t = 191.52$ kN	<p><b>2) Tearout Column</b></p> $f_u = 480$ MPa $f_y = 450$ MPa $t = 6$ mm $e = 35$ mm $\phi = 0.6$ $V_{t,bolt} = 100.8$ kN $\phi V_t = 302.40$ kN	<p><b>3) Tearout Rafter</b></p> $f_u = 480$ MPa $f_y = 450$ MPa $t = 6$ mm $e = 35$ mm $\phi = 0.6$ $V_{t,bolt} = 100.8$ kN $\phi V_t = 302.40$ kN
<p><b>4) Bearing Brace</b></p> $\phi = 0.6$ $\alpha = 1$ $C = 3$ $t = 3.8$ mm $d_t = 15.73$ mm $f_u = 480$ MPa $V_{b,bolt} = 86.07$ kN $\phi V_b = 258.22$ kN	<p><b>5) Bearing Column</b></p> $\phi = 0.6$ $\alpha = 1$ $C = 3$ $t = 6$ mm $d_t = 15.73$ mm $f_u = 480$ MPa $V_{b,bolt} = 135.91$ kN $\phi V_b = 407.72$ kN	<p><b>6) Bearing Rafter</b></p> $\phi = 0.6$ $\alpha = 1$ $C = 3$ $t = 6$ mm $d_t = 15.73$ mm $f_u = 480$ MPa $V_{b,bolt} = 135.91$ kN $\phi V_b = 407.72$ kN
<p><b>7) Bolt Shear Column</b></p> $f_{uf} = 830$ MPa $n_n = 2$ $A_c = 108.07$ mm <sup>2</sup> $n_x = 0$ $A_o = 194.33$ mm <sup>2</sup> $\phi = 0.8$ $V_{fv,bolt} = 111.22$ kN $\phi V_{fv} = 444.88$ kN	<p><b>8) Bolt Shear Rafter</b></p> $f_{uf} = 830$ MPa $n_n = 2$ $A_c = 108.07$ mm <sup>2</sup> $n_x = 0$ $A_o = 194.3$ mm <sup>2</sup> $\phi = 0.8$ $V_{fv,bolt} = 111.22$ kN $\phi V_{fv} = 444.88$ kN	

## APEX BRACE CONNECTION DESIGN CALCULATOR

### Entries

Max $N_t$ =	80.1	kN	Enter Max Tensile Force in Brace
Max $N_c$ =	113	kN	Enter Max Compression Force in Brace
Rafter Section:	2C30030		Select Rafter Section
Brace:	2C20019		Select Brace Section
AB Bolts:	M16		Select Bolt Size
Bolt Grade:	8.8		Select Bolt Grade
no. of Bolts p/s =	3		Select Number of Bolts Per End

### Checks

$V^* = 113$ kN		
1) Tearout Brace	$\phi V_t = 114.91$ kN	<b>PASS</b>
2) Tearout Rafter	$\phi V_t = 181.44$ kN	<b>PASS</b>
3) Bearing Brace	$\phi V_b = 154.93$ kN	<b>PASS</b>
4) Bearing Rafter	$\phi V_b = 244.63$ kN	<b>PASS</b>
5) Bolts in Shear	$\phi V_{iv} = 266.93$ kN	<b>PASS</b>

### Calculations

<p><b>1) Tearout Brace</b></p> <p><math>f_u = 480</math> MPa  <math>f_y = 450</math> MPa  <math>t = 3.8</math> mm  <math>e = 35</math> mm</p> <p><math>\phi = 0.6</math>  <math>V_{t,bolt} = 63.84</math> kN  <math>\phi V_t = 114.91</math> kN</p> <p><b>4) Bearing Brace</b></p> <p><math>\phi = 0.6</math>  <math>\alpha = 1</math>  <math>C = 3</math>  <math>t = 3.8</math> mm  <math>d_t = 15.73</math> mm  <math>f_u = 480</math> MPa</p> <p><math>V_{b,bolt} = 86.07</math> kN  <math>\phi V_b = 154.93</math> kN</p> <p><b>7) Bolt Shear</b></p> <p><math>f_{uf} = 830</math> MPa  <math>n_n = 2</math>  <math>A_c = 108.065</math> mm<sup>2</sup>  <math>n_x = 0</math>  <math>A_o = 194.333</math> mm<sup>2</sup></p> <p><math>\phi = 0.8</math>  <math>V_{iv,bolt} = 111.22</math> kN  <math>\phi V_{iv} = 266.93</math> kN</p>	<p><b>3) Tearout Rafter</b></p> <p><math>f_u = 480</math> MPa  <math>f_y = 450</math> MPa  <math>t = 6</math> mm  <math>e = 35</math> mm</p> <p><math>\phi = 0.6</math>  <math>V_{t,bolt} = 100.8</math> kN  <math>\phi V_t = 181.44</math> kN</p> <p><b>6) Bearing Rafter</b></p> <p><math>\phi = 0.6</math>  <math>\alpha = 1</math>  <math>C = 3</math>  <math>t = 6</math> mm  <math>d_t = 15.73</math> mm  <math>f_u = 480</math> MPa</p> <p><math>V_{b,bolt} = 135.91</math> kN  <math>\phi V_b = 244.63</math> kN</p>
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JOB No. FN2P0054 SECTION SWAT Transfer

Assessment of Lateral Stability

In longitudinal direction frictional drag on roof needs to be considered for roofs or  $q_e = 2.94 kPa$

$C_{eq}$  for ribs across wind direction = 0.04

Area =  $(b+h)(d-4h)$   
=  $178.56 m^2$

Load =  $0.04 \times 178.56 m^2 \times 2.94 kPa$   
=  $21 kN$



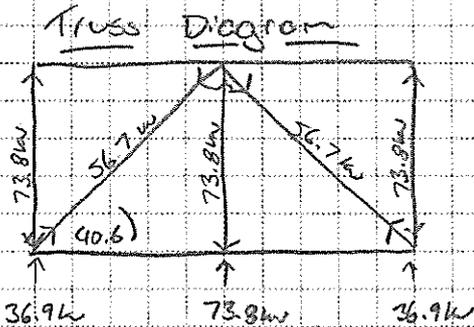
Area of Building =

=  $\frac{6.0m \times 12.0m}{2} + 1.17m \times \frac{12.0m}{2}$   
=  $43.02 m^2$

Load =  $(0.7+0.3) \times 43.02 m^2 \times 2.94 kPa$   
=  $126.5 kN$

Load =  $21 kN + 126.5 kN$   
=  $147.5 kN$

Over 4 points =  $36.9 kN$



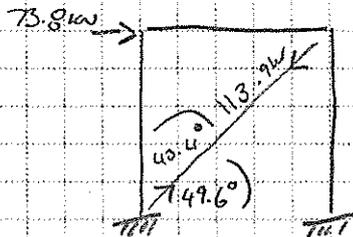
$\frac{56.7kN}{18kN} = 3.15$  bays

(Strop Capacity) Use 3 bays of x-Bracing

$2 \times C150-24 @ 5.1m = 62.5m$   
 $> 24.6 m$

∴ ok

Wall Brace



$\frac{113.9kN}{18kN} = 6.32$  bays

Use 3 bays of double x-Bracing

**STEEL MEMBERS SUMMARY REPORT**

Memb. Code	Length Selected mm Section	Mass kg	Crit. Ratio	Load Critical Case Condition
Section No. 1 - DLC30030 Grade G450 (analysis)				
393* AS4600	5653 DLC30030	142	0.953	42 C+Mx+My
395* AS4600	5653 DLC30030	142	0.952	46 C+Mx+My
	11307	284		
Section No. 2 - DLC30030 Grade G450 (analysis)				
5* AS4600	5705 DLC30030	143	1.290	49 C+Mx+My
2* AS4600	5705 DLC30030	143	1.244	45 C+Mx+My
	11410	287		
Section No. 3 - DLC20019 Grade G450 (analysis)				
390 AS4600	3043 DLC20019	34	2.419	56 C+Mx+My
392 AS4600	3043 DLC20019	34	2.419	56 C+Mx+My
391 AS4600	3435 DLC20019	38	1.685	46 C+Mx+My
	9522	107		
Total mass of selected sections:		677		

**LOAD CASES - DESIGN TO AS/NZS 4600**

Case	Type	Title
32	C	DL + LL ult
33	C	1.35 DL
34	C	DL+ CW1
35	C	DL+ CW2
36	C	DL+ CW3
37	C	DL+ CW4
38	C	DL+ LW1
39	C	DL+ LW2
40	C	DL+ LW3
41	C	DL+ LW4
42	C	DL + CW1 + CWIP1&2
43	C	DL+CW1+CWIS1&2
44	C	DL+CW2+CWIS1&2
45	C	DL+CW2+CW1&2 IP
46	C	DL+CW3+CWIP3&4
47	C	DL+CW3+CWIS3&4
48	C	DL+CW4+CWIS3&4
49	C	DL+CW4+CWIP3&4
50	C	DL + LW1 + LW1&2 IP
51	C	DL + LW1 + LW1&2 IS
52	C	DL + LW2 + LW1&2 IS
53	C	DL + LW2 + LW1&2 IP
54	C	DL + LW3 + LW3&4 IP
55	C	DL + LW3 + LW3&4 IS
56	C	DL + LW4 + LW3&4 IS
57	C	DL+LW4+LW3&4 IP

**STEEL MEMBERS FULL REPORT**

**MEMBER: 2 (Code Check to AS/NZS4600:2005) (3 members, 2-3-4 linked)**

Section: DLC30030 Axis: Y Grade: G450 fy: 450 fu: 490 cold formed

Component dimensions - Back to back cold formed section.

D= 300.0 B= 96.0 T= 3.0

Section properties.

Ag= 3191.0 rx= 115.6 Zx= 2.84E+05  
 ry= 44.4 Zy= 6.55E+04  
 J= 9.57E+03 Iw= 1.42E+11

Effective Properties

Agfy: 1.816E+03 Ixep: 3.948E+07 Zxep: 2.512E+05 Iyep: 5.299E+06 Zyep: 5.321E+04  
 Agfn: 1.816E+03 Ixen: 3.948E+07 Zxen: 2.512E+05 Iyen: 5.299E+06 Zyen: 5.321E+04

Member Restraints

No	Offset	/--Beam--/			Load Ht	/-----Column-----/			
		Top	Btm	Cant		XX	kx	YY	ky
1	0.000	L	L	N	S	Y	1.00	Y	1.00
2	1.000	L	N		S			Y	1.00
3	1.622	N	L		S	Y	1.00		
4	2.000	L	L		S			Y	1.00
5	3.000	L	N		S			Y	1.00
6	3.955	N	L		S	Y	1.00		
7	4.000	L	L		S			Y	1.00
8	5.000	L	N		S			Y	1.00
9	5.705	L	L	N					

Sidesway - about XX axis: N about YY axis: N

Connection: Uniform and concentric

Critical conditions for design load cases:

Case	Ratio	Condition
32	6.414	C+Mx+My
33	16.821	C+Mx+My

34	1.912	C+Mx+My
35	1.605	C+Mx+My
36	2.924	T+Mx+My
37	2.701	Distort. buckling, x-axis
38	3.690	Shear + bending about x
39	10.534	T+Mx+My
40	20.301	Shear + bending about x
41	4.776	C+Mx+My
42	1.413	C+Mx+My
43	3.043	C+Mx+My
44	2.310	C+Mx+My
45	1.244	C+Mx+My
46	2.064	T+Mx+My
47	3.233	C+Mx+My
48	1.902	C+Mx+My
49	2.061	T+Mx+My
50	2.068	Shear + bending about x
51	19.536	T+Mx+My
52	4.308	C+Mx+My
53	3.267	Shear + bending about x
54	3.775	Shear + bending about x
55	4.010	C+Mx+My
56	2.116	C+Mx+My
57	7.966	T+Mx+My

SECTION CHECKS

Case: 45 Off: 1623 Cap/Load= 1.577 Section bending, Mx(3.3.1(a))

Design loads:	N*= 52.65 t	M*x= 68.07	M*y= 0.00
Design capacities:	øNty=1292.37	øMsx+= 107.37	øMsy+= 21.55
	øNtu=1196.16	øMsx-= 107.37	øMsy-= 21.55
	øNs = 694.69		
	øNc = 686.57		

MEMBER/SEGMENT CHECKS

Case: 45 Off: 0/1000 Cap/Load= 1.244 C+Mx+My(3.5.1(a))

Design loads:	N*= 47.59 c	M*x= 68.07	M*y= 0.00
Lx = 1622	Ly = 1000		
Lecx = 1622	Lecy = 1000	Lecz = 1000	
Lebx = 1000	Leby = 1000	Lebz = 1000	
Cbx = 1.736	Cby = 1.000	(3.3.3.2(9))	
Nox = 27507	Noy = 25002	(3.5.1(6))	
Design capacities:	øNty=1292.37	øMsx+ = 107.37	øMsy+ = 21.55
	øNtu=1196.16	øMsx- = 107.37	øMsy- = 21.55
	øNs = 694.69	øMbx+ = 92.74	øMby+ = 21.55
	øNc = 678.53	øMbx- = 92.74	øMby- = 21.55
		øMsfx+ = 121.58	øMsfy+ = 26.55
		øMsfx- = 121.58	øMsfy- = 26.55

SHEAR CHECKS

Case: 45 Off: 1622 Cap/Load= 1.418 Shear + bending about x(3.3.5)

Design loads:	Vx*= 0.00	M*y= 0.00
	Vy*= 51.08	M*x= 68.07
Design capacities:	øVvx= 248.83	
Design capacities:	øVvy= 165.40	

**MEMBER: 5 (Code Check to AS/NZS4600:2005) (3 members, 5-6-7 linked)**

Section: DLC30030 Axis: Y Grade: G450 fy: 450 fu: 490 cold formed

Component dimensions - Back to back cold formed section.

D=	300.0	B=	96.0	T=	3.0
----	-------	----	------	----	-----

Section properties.

Ag=	3191.0	rx=	115.6	Zx=	2.84E+05
		ry=	44.4	Zy=	6.55E+04
		J=	9.57E+03	Iw=	1.42E+11

Effective Properties

Agfy:	1.816E+03	Ixep:	3.948E+07	Zxep:	2.512E+05	Iyep:	5.299E+06	Zyep:	5.321E+04
Agfn:	1.816E+03	Ixen:	3.948E+07	Zxen:	2.512E+05	Iyen:	5.299E+06	Zyen:	5.321E+04

Member Restraints

		/--Beam--/			Load	/-----Column-----/			
No	Offset	Top	Btm	Cant	Ht	XX	kx	YY	ky
1	0.000	L	L	N	S	Y	1.00	Y	1.00
2	0.705	L	N		S			Y	1.00
3	1.705	L	L		S			Y	1.00
4	1.750	N	L		S	Y	1.00		
5	2.750	L	N		S			Y	1.00
6	3.750	L	L		S			Y	1.00
7	4.083	N	L		S	Y	1.00		
8	4.750	L	N		S			Y	1.00

9 5.705 L L N

Sideway - about XX axis: N about YY axis: N

Connection: Uniform and concentric

Critical conditions for design load cases:

Case	Ratio	Condition
32	6.408	C+Mx+My
33	16.807	C+Mx+My
34	2.928	T+Mx+My
35	2.531	Distort. buckling, x-axis
36	1.914	C+Mx+My
37	1.685	C+Mx+My
38	3.690	Shear + bending about x
39	10.534	T+Mx+My
40	20.301	Shear + bending about x
41	4.772	C+Mx+My
42	2.065	T+Mx+My
43	3.225	C+Mx+My
44	1.687	C+Mx+My
45	2.018	Distort. buckling, x-axis
46	1.414	C+Mx+My
47	3.049	C+Mx+My
48	2.487	C+Mx+My
49	1.290	C+Mx+My
50	2.068	Shear + bending about x
51	19.536	T+Mx+My
52	4.304	C+Mx+My
53	3.267	Shear + bending about x
54	3.775	Shear + bending about x
55	4.007	C+Mx+My
56	2.114	C+Mx+My
57	7.966	T+Mx+My

SECTION CHECKS

Case: 49 Off: 4083 Cap/Load= 1.639 Section bending, Mx(3.3.1(a))

Design loads:	N*= 46.66 c	M*x= 65.49	M*y= 0.00
Design capacities:	øNty=1292.37	øMsx+= 107.37	øMsy+= 21.55
	øNtu=1196.16	øMsx-= 107.37	øMsy-= 21.55
	øNs = 694.69		
	øNc = 679.92		

MEMBER/SEGMENT CHECKS

Case: 49 Off: 4750/5705 Cap/Load= 1.290 C+Mx+My(3.5.1(a))

Design loads:	N*= 46.87 c	M*x= 65.49	M*y= 0.00
Lx = 1622	Ly = 955		
Lecx = 1622	Lecy = 955	Lecz = 955	
Lebx = 955	Leby = 955	Lebz = 955	
Cbx = 1.746	Cby = 1.000	(3.3.3.2(9))	
Nox = 31995	Noy = 13623	(3.5.1(6))	
Design capacities:	øNty=1292.37	øMsx+ = 107.37	øMsy+ = 21.55
	øNtu=1196.16	øMsx- = 107.37	øMsy- = 21.55
	øNs = 694.69	øMbx+ = 92.74	øMby+ = 21.55
	øNc = 679.92	øMbx- = 92.74	øMby- = 21.55
		øMsfx+= 121.58	øMsfy+= 26.55
		øMsfx-= 121.58	øMsfy-= 26.55

SHEAR CHECKS

Case: 49 Off: 4083 Cap/Load= 1.465 Shear + bending about x(3.3.5)

Design loads:	Vx*= 0.00	M*y= 0.00
	Vy*= 50.71	M*x= 65.49
Design capacities:	øVvx= 248.83	
Design capacities:	øVvy= 165.40	

MEMBER: 390 (Code Check to AS/NZS4600:2005)

Section: DLC20019 Axis: Y Grade: G450 fy: 450 fu: 490 cold formed

Component dimensions - Back to back cold formed section.

D= 203.0 B= 76.0 T= 1.9

Section properties.

Ag= 1425.7	rx= 79.6	Zx= 8.89E+04
	ry= 34.9	Zy= 2.28E+04
	J= 1.72E+03	Iw= 1.77E+10

Effective Properties

Agfy: 7.543E+02	Ixep: 7.957E+06	Zxep: 7.283E+04	Iyep: 1.281E+06	Zyep: 1.583E+04
Agfn: 7.543E+02	Ixen: 7.957E+06	Zxen: 7.283E+04	Iyen: 1.281E+06	Zyen: 1.583E+04

Member Restraints

No	Offset	/--Beam--/		Load	/-----Column-----/				
		Top	Btm	Cant	Ht	XX	kx	YY	ky
1	0.000	L	L	N	S	Y	1.00	Y	0.80

2 2.570 L L N

Sideway - about XX axis: N about YY axis: N

Connection: Uniform and concentric

Critical conditions for design load cases:

Case	Ratio	Condition
32	8.129	C+Mx+My
33	19.982	C+Mx+My
34	5.209	T+Mx+My
35	6.140	T+Mx+My
36	19.965	T+Mx+My
37	401.964	Distort. buckling, x-axis
38	7.556	T+Mx+My
39	24.277	T+Mx+My
40	40.905	T+Mx+My
41	7.479	C+Mx+My
42	3.418	T+Mx+My
43	11.416	T+Mx+My
44	17.028	T+Mx+My
45	3.798	T+Mx+My
46	6.507	T+Mx+My
47	6.330	C+Mx+My
48	3.538	C+Mx+My
49	9.370	T+Mx+My
50	4.260	T+Mx+My
51	38.459	T+Mx+My
52	5.566	C+Mx+My
53	6.926	T+Mx+My
54	7.838	T+Mx+My
55	4.494	C+Mx+My
56	2.419	C+Mx+My
57	18.281	T+Mx+My

SECTION CHECKS

Case: 56 Off: 0 Cap/Load= 3.382 Section in compression(3.4.1(a))

Design loads:	N*= 85.30 c	M*x= 0.00	M*y= 0.00
Design capacities:	øNty= 577.41	øMsx+= 31.14	øMsy+= 6.41
	øNtu= 534.42	øMsx-= 31.14	øMsy-= 6.41
	øNs = 288.50		
	øNc = 208.11		

MEMBER/SEGMENT CHECKS

Case: 56 Off: 0/3043 Cap/Load= 2.419 C+Mx+My(3.5.1(a))

Design loads:	N*= 85.30 c	M*x= 0.09	M*y= 0.00
Lx = 3043	Ly = 3043		
Lecx = 3043	Lecy = 2435	Lecz = 3043	
Lebx = 3043	Leby = 2435	Lebz = 3043	
Cbx = 1.137	Cby = 1.000	(3.3.3.2(9))	
Nox = 1923	Noy = 577	(3.5.1(6))	
Design capacities:	øNty= 577.41	øMsx+ = 31.14	øMsy+ = 6.41
	øNtu= 534.42	øMsx- = 31.14	øMsy- = 6.41
	øNs = 288.50	øMbx+ = 25.56	øMby+ = 6.41
	øNc = 208.11	øMbx- = 25.56	øMby- = 6.41
		øMsfx+= 38.00	øMsfy+= 9.23
		øMsfx-= 38.00	øMsfy-= 9.23

SHEAR CHECKS

Case: 33 Off: 1522 Cap/Load= > 100 Shear + bending about x(3.3.5)

Design loads:	Vx*= 0.00	M*y= 0.00
	Vy*= 0.00	M*x= 0.10
Design capacities:	øVvx= 122.53	
Design capacities:	øVvy= 63.07	

MEMBER: 391 (Code Check to AS/NZS4600:2005)

Section: DLC20019 Axis: Y Grade: G450 fy: 450 fu: 490 cold formed

Component dimensions - Back to back cold formed section.

D= 203.0 B= 76.0 T= 1.9

Section properties.

Ag= 1425.7	rx= 79.6	Zx= 8.89E+04
	ry= 34.9	Zy= 2.28E+04
	J= 1.72E+03	Iw= 1.77E+10

Effective Properties

Agfy: 7.543E+02	Ixep: 7.957E+06	Zxep: 7.283E+04	Iyep: 1.281E+06	Zyep: 1.583E+04
Agfn: 7.543E+02	Ixen: 7.957E+06	Zxen: 7.283E+04	Iyen: 1.281E+06	Zyen: 1.583E+04

Member Restraints

No	Offset	Top	Btm	Cant	Ht	XX	kx	YY	ky
1	0.000	L	L	N	S	Y	1.00	Y	0.80

2 3.435 L L N

Sideway - about XX axis: N about YY axis: N

Connection: Uniform and concentric

Critical conditions for design load cases:

Case	Ratio	Condition
32	14.897	T+Mx+My
33	34.493	T+Mx+My
34	2.127	C+Mx+My
35	3.110	C+Mx+My
36	2.124	C+Mx+My
37	2.879	C+Mx+My
38	4.475	C+Mx+My
39	28.168	T+Mx+My
40	106.237	C+Mx+My
41	10.678	T+Mx+My
42	1.687	C+Mx+My
43	3.041	C+Mx+My
44	5.711	C+Mx+My
45	2.229	C+Mx+My
46	1.685	C+Mx+My
47	3.035	C+Mx+My
48	4.950	C+Mx+My
49	2.112	C+Mx+My
50	2.858	C+Mx+My
51	12.783	C+Mx+My
52	10.683	T+Mx+My
53	18.692	C+Mx+My
54	6.937	C+Mx+My
55	16.572	T+Mx+My
56	6.465	T+Mx+My
57	23.718	T+Mx+My

SECTION CHECKS

Case: 46 Off: 3435 Cap/Load= 2.548 Section in compression(3.4.1(a))

Design loads:	N*= 113.24 c	M*x= 0.00	M*y= 0.00
Design capacities:	øNty= 577.41	øMsx+= 31.14	øMsy+= 6.41
	øNtu= 534.42	øMsx-= 31.14	øMsy-= 6.41
	øNs = 288.50		
	øNc = 192.90		

MEMBER/SEGMENT CHECKS

Case: 46 Off: 0/3435 Cap/Load= 1.685 C+Mx+My(3.5.1(a))

Design loads:	N*= 113.24 c	M*x= 0.16	M*y= 0.00
Lx = 3435	Ly = 3435		
Lecx = 3435	Lecy = 2748	Lecz = 3435	
Lebx = 3435	Leby = 2748	Lebz = 3435	
Cbx = 1.138	Cby = 1.000	(3.3.3.2(9))	
Nox = 1509	Noy = 452	(3.5.1(6))	
Design capacities:	øNty= 577.41	øMsx+ = 31.14	øMsy+ = 6.41
	øNtu= 534.42	øMsx- = 31.14	øMsy- = 6.41
	øNs = 288.50	øMbx+ = 25.02	øMby+ = 6.41
	øNc = 192.90	øMbx- = 25.02	øMby- = 6.41
		øMsfx+= 38.00	øMsfy+= 9.23
		øMsfx-= 38.00	øMsfy-= 9.23

SHEAR CHECKS

Case: 33 Off: 1718 Cap/Load= > 100 Shear + bending about x(3.3.5)

Design loads:	Vx*= 0.00	M*y= 0.00
	Vy*= 0.00	M*x= 0.22
Design capacities:	øVvx= 122.53	
Design capacities:	øVvy= 63.07	

MEMBER: 392 (Code Check to AS/NZS4600:2005)

Section: DLC20019 Axis: Y Grade: G450 fy: 450 fu: 490 cold formed

Component dimensions - Back to back cold formed section.

D= 203.0 B= 76.0 T= 1.9

Section properties.

Ag= 1425.7	rx= 79.6	Zx= 8.89E+04
	ry= 34.9	Zy= 2.28E+04
	J= 1.72E+03	Iw= 1.77E+10

Effective Properties

Agfy: 7.543E+02	Ixep: 7.957E+06	Zxep: 7.283E+04	Iyep: 1.281E+06	Zyep: 1.583E+04
Agfn: 7.543E+02	Ixen: 7.957E+06	Zxen: 7.283E+04	Iyen: 1.281E+06	Zyen: 1.583E+04

Member Restraints

No	Offset	Top	Btm	Cant	Ht	XX	kx	YY	ky
1	0.000	L	L	N	S	Y	1.00	Y	0.80

2 2.570 L L N

Sideway - about XX axis: N about YY axis: N

Connection: Uniform and concentric

Critical conditions for design load cases:

Case	Ratio	Condition
32	8.129	C+Mx+My
33	19.982	C+Mx+My
34	19.987	T+Mx+My
35	27.896	C+Mx+My
36	5.206	T+Mx+My
37	5.927	T+Mx+My
38	7.556	T+Mx+My
39	24.277	T+Mx+My
40	40.905	T+Mx+My
41	7.479	C+Mx+My
42	6.510	T+Mx+My
43	6.324	C+Mx+My
44	3.146	C+Mx+My
45	10.699	T+Mx+My
46	3.417	T+Mx+My
47	11.403	T+Mx+My
48	15.495	T+Mx+My
49	3.715	T+Mx+My
50	4.259	T+Mx+My
51	38.459	T+Mx+My
52	5.566	C+Mx+My
53	6.926	T+Mx+My
54	7.838	T+Mx+My
55	4.494	C+Mx+My
56	2.419	C+Mx+My
57	18.281	T+Mx+My

SECTION CHECKS

Case: 56 Off: 3043 Cap/Load= 3.382 Section in compression(3.4.1(a))

Design loads:	N*= 85.30 c	M*x= 0.00	M*y= 0.00
Design capacities:	øNty= 577.41	øMsx+= 31.14	øMsy+= 6.41
	øNtu= 534.42	øMsx-= 31.14	øMsy-= 6.41
	øNs = 288.50		
	øNc = 208.11		

MEMBER/SEGMENT CHECKS

Case: 56 Off: 0/3043 Cap/Load= 2.419 C+Mx+My(3.5.1(a))

Design loads:	N*= 85.30 c	M*x= 0.09	M*y= 0.00
Lx = 3043	Ly = 3043		
Lecx = 3043	Lecy = 2435	Lecz = 3043	
Lebx = 3043	Leby = 2435	Lebz = 3043	
Cbx = 1.137	Cby = 1.000	(3.3.3.2(9))	
Nox = 1923	Noy = 577	(3.5.1(6))	
Design capacities:	øNty= 577.41	øMsx+ = 31.14	øMsy+ = 6.41
	øNtu= 534.42	øMsx- = 31.14	øMsy- = 6.41
	øNs = 288.50	øMbx+ = 25.56	øMby+ = 6.41
	øNc = 208.11	øMbx- = 25.56	øMby- = 6.41
		øMsfx+= 38.00	øMsfy+= 9.23
		øMsfx-= 38.00	øMsfy-= 9.23

SHEAR CHECKS

Case: 33 Off: 1522 Cap/Load= > 100 Shear + bending about x(3.3.5)

Design loads:	Vx*= 0.00	M*y= 0.00
	Vy*= 0.00	M*x= 0.10
Design capacities:	øVvx= 122.53	
Design capacities:	øVvy= 63.07	

**MEMBER: 393 (Code Check to AS/NZS4600:2005) (2 members, 393-1 linked)**

Section: DLC30030 Axis: Y Grade: G450 fy: 450 fu: 490 cold formed

Component dimensions - Back to back cold formed section.

D= 300.0 B= 96.0 T= 3.0

Section properties.

Ag= 3191.0	rx= 115.6	Zx= 2.84E+05
	ry= 44.4	Zy= 6.55E+04
	J= 9.57E+03	Iw= 1.42E+11

Effective Properties

Agfy: 1.816E+03	Ixep: 3.948E+07	Zxep: 2.512E+05	Iyep: 5.299E+06	Zyep: 5.321E+04
Agfn: 1.816E+03	Ixen: 3.948E+07	Zxen: 2.512E+05	Iyen: 5.299E+06	Zyen: 5.321E+04

Member Restraints

No	Offset	Top	Btm	Cant	Ht	XX	kx	YY	ky
1	0.000	L	L	N	S	Y	1.00	Y	1.00

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2	0.200	N	L	S		Y	1.00
3	1.200	L	L	S		Y	1.00
4	2.200	N	L	S		Y	1.00
5	3.200	L	L	S		Y	1.00
6	4.200	L	L	S	Y	1.00	
7	5.200	L	L	S		Y	1.00
8	5.653	L	L	N			

Sidesway - about XX axis: N about YY axis: N

Connection: Uniform and concentric

Critical conditions for design load cases:

Case	Ratio	Condition
32	4.896	C+Mx+My
33	11.979	C+Mx+My
34	1.091	C+Mx+My
35	1.176	C+Mx+My
36	5.489	Distort. buckling, x-axis
37	2.988	Distort. buckling, x-axis
38	4.061	C+Mx+My
39	6.257	Shear + bending about x
40	28.896	Shear + bending about x
41	3.351	C+Mx+My
42	0.953	C+Mx+My
43	1.237	C+Mx+My
44	1.165	C+Mx+My
45	1.077	C+Mx+My
46	3.571	Shear + bending about x
47	4.460	C+Mx+My
48	2.552	C+Mx+My
49	3.052	Distort. buckling, x-axis
50	2.513	Shear + bending about x
51	11.910	C+Mx+My
52	3.265	C+Mx+My
53	4.918	Shear + bending about x
54	5.510	Shear + bending about x
55	4.571	C+Mx+My
56	1.855	C+Mx+My
57	4.920	Shear + bending about x

SECTION CHECKS

Case: 42 Off: 3600 Cap/Load= 1.148 Section bending, Mx(3.3.1(a))

Design loads:	N*= 25.93 c	M*x= 93.55	M*y= 0.00
Design capacities:	øNty=1292.37	øMsx+= 107.37	øMsy+= 21.55
	øNtu=1196.16	øMsx-= 107.37	øMsy-= 21.55
	øNs = 694.69		
	øNc = 634.25		

MEMBER/SEGMENT CHECKS

Case: 42 Off: 3200/4200 Cap/Load= 0.953 C+Mx+My(3.5.1(a))

Design loads:	N*= 25.93 c	M*x= 93.55	M*y= 0.00
Lx = 4200	Ly = 2000		
Lecx = 4200	Lecy = 2000	Lecz = 1000	
Lebx = 1000	Leby = 2000	Lebz = 1000	
Cbx = 1.076	Cby = 1.000	(3.3.3.2(9))	
Nox = 39861	Noy = 3105	(3.5.1(6))	
Design capacities:	øNty=1292.37	øMsx+ = 107.37	øMsy+ = 21.55
	øNtu=1196.16	øMsx- = 107.37	øMsy- = 21.55
	øNs = 694.69	øMbx+ = 92.74	øMby+ = 21.55
	øNc = 634.25	øMbx- = 92.74	øMby- = 21.55
		øMsfx+ = 121.58	øMsfy+ = 26.55
		øMsfx- = 121.58	øMsfy- = 26.55

SHEAR CHECKS

Case: 42 Off: 3600 Cap/Load= 1.100 Shear + bending about x(3.3.5)

Design loads:	Vx*= 0.00	M*y= 0.00
	Vy*= 43.06	M*x= 93.55
Design capacities:	øVvx= 248.83	
Design capacities:	øVvy= 165.40	

**MEMBER: 395 (Code Check to AS/NZS4600:2005) (2 members, 395-8 linked)**

Section: DLC30030 Axis: Y Grade: G450 fy: 450 fu: 490 cold formed

Component dimensions - Back to back cold formed section.

D=	300.0	B=	96.0	T=	3.0
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Section properties.

Ag=	3191.0	rx=	115.6	Zx=	2.84E+05
		ry=	44.4	Zy=	6.55E+04
		J=	9.57E+03	Iw=	1.42E+11

Effective Properties

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Agfy: 1.816E+03 Ixep: 3.948E+07 Zxep: 2.512E+05 Iyep: 5.299E+06 Zyep: 5.321E+04  
 Agfn: 1.816E+03 Ixen: 3.948E+07 Zxen: 2.512E+05 Iyen: 5.299E+06 Zyen: 5.321E+04

Member Restraints

No	Offset	/--Beam--/		Cant	Load Ht	/-----Column-----/			
		Top	Btm			XX	kx	YY	ky
1	0.000	L	L	N	S	Y	1.00	Y	1.00
2	0.200	L	N		S			Y	1.00
3	1.200	L	L		S			Y	1.00
4	2.200	L	N		S			Y	1.00
5	3.200	L	L		S			Y	1.00
6	4.200	L	L		S	Y	1.00		
7	5.200	L	L		S			Y	1.00
8	5.653	L	L	N					

Sideway - about XX axis: N about YY axis: N  
 Connection: Uniform and concentric

Critical conditions for design load cases:

Case	Ratio	Condition
32	4.896	C+Mx+My
33	11.979	C+Mx+My
34	5.484	Distort. buckling, x-axis
35	2.633	Distort. buckling, x-axis
36	1.090	C+Mx+My
37	1.195	C+Mx+My
38	4.061	C+Mx+My
39	6.257	Shear + bending about x
40	28.896	Shear + bending about x
41	3.351	C+Mx+My
42	3.573	Shear + bending about x
43	4.455	C+Mx+My
44	2.262	C+Mx+My
45	2.691	Distort. buckling, x-axis
46	0.952	C+Mx+My
47	1.237	C+Mx+My
48	1.185	C+Mx+My
49	1.048	C+Mx+My
50	2.513	Shear + bending about x
51	11.910	C+Mx+My
52	3.265	C+Mx+My
53	4.918	Shear + bending about x
54	5.510	Shear + bending about x
55	4.571	C+Mx+My
56	1.855	C+Mx+My
57	4.920	Shear + bending about x

SECTION CHECKS

Case: 46 Off: 3600 Cap/Load= 1.147 Section bending, Mx(3.3.1(a))

Design loads:	N*= 26.04 c	M*x= 93.58	M*y= 0.00
Design capacities:	øNty=1292.37	øMsx+= 107.37	øMsy+= 21.55
	øNtu=1196.16	øMsx-= 107.37	øMsy-= 21.55
	øNs = 694.69		
	øNc = 634.25		

MEMBER/SEGMENT CHECKS

Case: 46 Off: 3200/4200 Cap/Load= 0.952 C+Mx+My(3.5.1(a))

Design loads:	N*= 26.04 c	M*x= 93.58	M*y= 0.00
Lx = 4200	Ly = 2000		
Lecx = 4200	Lecy = 2000	Lecz = 1000	
Lebx = 1000	Leby = 2000	Lebz = 1000	
Cbx = 1.076	Cby = 1.000	(3.3.3.2(9))	
Nox = 39861	Noy = 3105	(3.5.1(6))	
Design capacities:	øNty=1292.37	øMsx+ = 107.37	øMsy+ = 21.55
	øNtu=1196.16	øMsx- = 107.37	øMsy- = 21.55
	øNs = 694.69	øMbx+ = 92.74	øMby+ = 21.55
	øNc = 634.25	øMbx- = 92.74	øMby- = 21.55
		øMsfx+= 121.58	øMsfy+= 26.55
		øMsfx-= 121.58	øMsfy-= 26.55

SHEAR CHECKS

Case: 46 Off: 3600 Cap/Load= 1.099 Shear + bending about x(3.3.5)

Design loads:	Vx*= 0.00	M*y= 0.00
	Vy*= 43.07	M*x= 93.58
Design capacities:	øVvx= 248.83	
Design capacities:	øVvy= 165.40	