PRINCES HIGHWAY HEATHCOTE NSW - EXISTING ADVERTISING SIGNS - STRUCTURAL ASSESSMENT

Structural Assessment

Structural Consulting Engineering Services

Prepared for
oOh! Media Operations Pty Ltd

Prepared by
JMP Consulting Engineers

A	01/03/2024	For Information	EVL		EVL		MB	
REV	DATE	STATUS	INIT	SIGN	INIT	SIGN	INIT	SIGN
			PREPARED BY		PROJECT LEADER		DESIGN REVIEWER	

Table of Contents

Introduction

This report has been commissioned by oOh! Media for JMP to appraise the structural design and strength of the existing monopole advertising signage structure located on the eastern side of the Princess Highway, Heathcote in NSW.

The purpose of this appraisal is to evaluate the structure for compliance as part of the oOh! Media development application to the Department of Planning, Housing and Infrastructure (DPHI) in NSW. DPHI requested oOh! Media to confirm that the specifications of the original structural design of the sign are compliant with current Design Standards and whether the "as built" structure conforms to the current relevant standards to be undertaken by a suitably registered structural engineer.

Our appraisal has been based upon information provided in the form of extracts from the original structural design drawings and a Structural Condition Report included within Appendix 1 and Appendix 2 respectively.

This report is not intended to be a dilapidation survey of the condition of the existing steel structure and that JMP has not witnessed the structure in person.

We have excluded from this appraisal fitness for purpose aspects as well as OH & S, and maintenance access provisions, for conformance with the current BCA/NCC or other relevant Australian Standards.

This report has been prepared by a Qualified Structural Engineer.

Description

The signage structure is commonly referred to as a double-sided "V" shaped front-lit "Supersite" monopole having a nominal display size of 12,660mm long x 3,350mm high.

The signage structure comprises a freestanding galvanised monopole with a bolted connection for attaching a galvanized torsion beam. A series of trussed frames, six in total, are attached to the top of the torsional beam. The main top, bottom, and vertical truss frame members are fully welded to each other while the diagonal members are connected to the top and bottom with bolts. The trussed frames comprise of steel channels and steel circular hollow section members for bracing.

The structural steel framed V-shape sign has upper and lower maintenance access catwalks on each side which provide the sign installers access to the top and bottom of the sign for each face.

The monopole is connected to a 1250mm X 1250mm pilaster with bolts built into a reinforced concrete footing, 900mm deep by 4000mm wide x 4000mm long on screw piles.

Design Methodology and Design Parameters

This report details the structural assessment of the existing steel framed box sign structure supporting the static screen for the Ultimate Limit State and Serviceability Limit State Loading Cases.

Wind loading used in the assessment is as per AS1170.2:2021 with the appropriate factors and wind speed particular for the region.

The weight of the advertising fixed banner skin, 12.66m x 3.35m applied on the structure is 15kgs each side. This load is equivalent to 0.35kg /m^2. Other accessories such as access catwalks are added as super imposed dead loads on the structure. Live loads on the walkways are also considered in accordance with AS1657.

The design evaluation of the signage framing members was undertaken using Space Gass and Toolkit software. The existing pile cap was checked using ETABS and Inducta SLABS. Steel member connections were evaluated using in-house design procedures using simplified methods.

Checking of the existing screw piles was only performed by comparing the results of the piles reactions against the nominated safe performance pile loads specified on the existing drawings.

Steel Parameters

E = 200,000 MPa

Yield strength of plates = 300 MPa

Yield strength of hollow sections = 350 MPa

Yield strength of all other members = 250 MPa

Weld yield strength = 480 MPa

Design Codes and References

AS/NZS 1170.0:2002 Structural Design Actions – Part 0: General Principles.

AS/NZS 1170.1:2002 Structural Design Actions – Part 1: Permanent, Imposed and other actions.

AS/NZS 1170.2:2021 Structural Design Actions – Part 2: Wind Loads.

AS1657:2018 Fixed Platforms, Walkways, Stairways and Ladders – Design, Construction and Installation.

AS2312.1:2014 Guide to the Protection of Structural Steel against Atmospheric Corrosion by the Use of Protective Coatings.

AS4100:2020 Steel Structures

AASHTO LRFD Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals.

Load Combinations

Load Combinations are based on the requirements of AS1170.0. Refer to Space Gass Input (Section D.2) for load combinations used in this assessment.

Summary of Results

Based upon our analysis, we have found that all steel members are adequate for Ultimate Limit State Load Case.

All steel connections shown on the design drawings and depicted in the photos are adequate to resist the design forces.

All predicted displacements of the frame are within the normal industry-accepted Serviceability Limit State specified in AS1170.0.

The ULS support reactions from the Spacegass model were used in ETABS and Inducta SLABS. The results show that the pile loads are lower than the specified performance design loads per drawings. The results also show that the required thickness and reinforcement of the pile cap are lower than the indicative sizes per drawings, therefore the footings have sufficient strength.

Those recommendations nominated in the structural conditions report prepared by Arcadis should be implemented in the short term to prolong the longevity of the structure and be more serviceable.

The above-mentioned results and implementation of the recommendations ensure the structural viability of the signage structure and compliance with relevant Building Code of Australia (BCA) requirements and Australian Standards.

Site Location

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Project: PRINCESS HIGHWAY, HEATCOTE- EXISTING ADVERTISING SIGNAGE STRUCTURE

COMPUTATION SHEET

Designer: EL Date: 28.02.2024 Project No: 4980 01

Project Leader: EL Reviewer: MB Date: 28.02.2024 Sheet of

Level 7, 400 Collins Street
Melbourne 3000
Telephone (03) 9600 0366
jmpmelb@jmp.com.au

SITE (APPROXIMATE LOCATION)

N

AERIAL VIEW
SCALE: NOT TO SCALE

Existing Structure Geometry and Sizes

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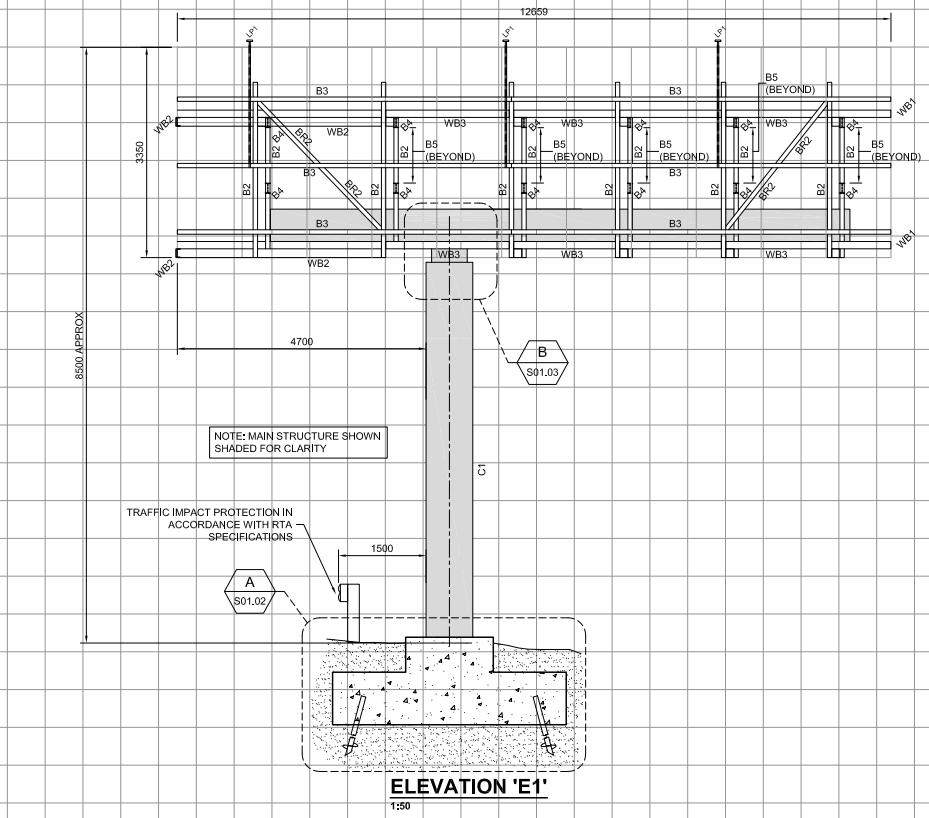
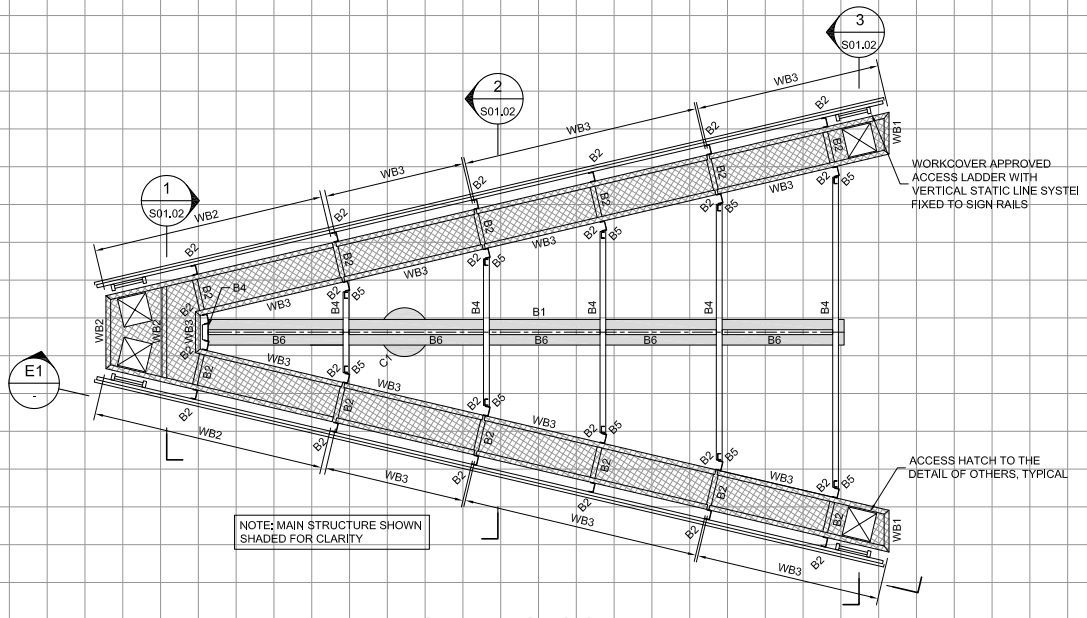


ELEVATION 'E1'
1:50



TOP VIEW OF SIGN

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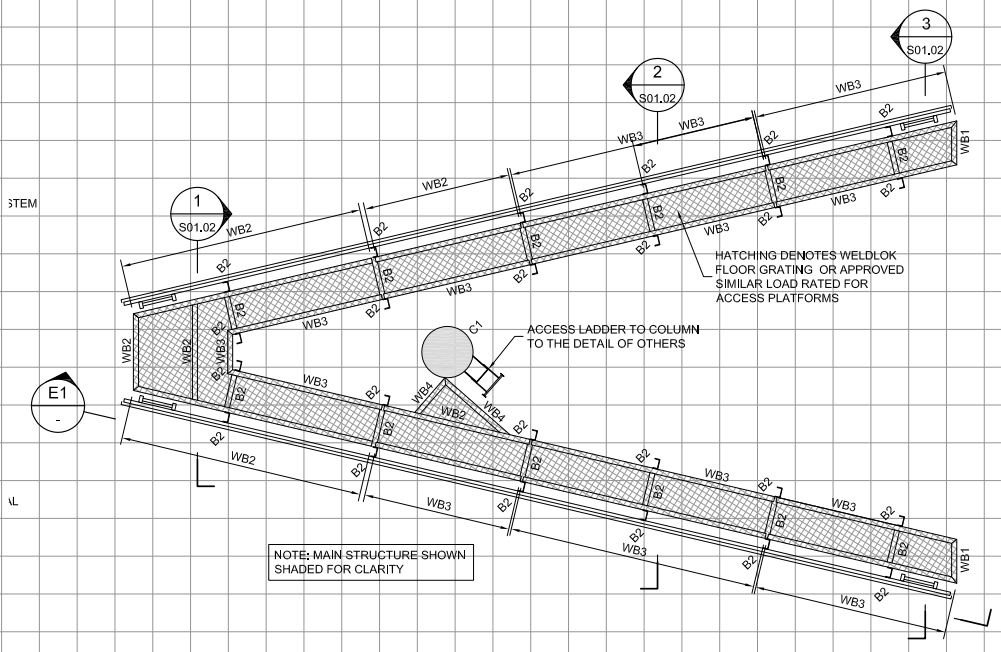

VIEW OF SIGN WALKWAY AT LOWER LEVEL
1:50

STRUCTURAL MEMBER SCHEDULE

MARK	DESCRIPTION	SIZE	COMMENTS
C1	COLUMN	Ø700 x 12mm	GRADE 300 PLUS
B1	BEAM	508 x 12.7 CHS	GRADE C250L0
B2	BEAM	150 PFC	GRADE 300 PLUS
B3	BEAM	75 x 50 x 4.0 RHS	GRADE C350L0
B4	BEAM	180 UB 18.1	GRADE 300 PLUS
B5	BEAM	100 PFC	GRADE 300 PLUS
B6	BEAM	75 x 8 EA	GRADE 300 PLUS
WB1	WALKWAY BEAM	125 x 75 x 8 UA	GRADE 300 PLUS
WB2	WALKWAY BEAM	150 PFC + 125 x 75 x 8 UA	GRADE 300 PLUS
WB3	WALKWAY BEAM	125 x 75 x 8 UA	GRADE 300 PLUS
WB4	WALKWAY BEAM	125 x 75 x 8 UA	GRADE 300 PLUS
BR1	BRACE	76.1 x 4.0 CHS	GRADE C350L0
BR2	BRACE	75 x 4.5 SHS	GRADE C250L0
LP1	LIGHT POST	48.3x2.9 CHS	GRADE C350L0

NOTE: ALL EXTERNAL STEEL TO BE HOT DIPPED GALVANISED

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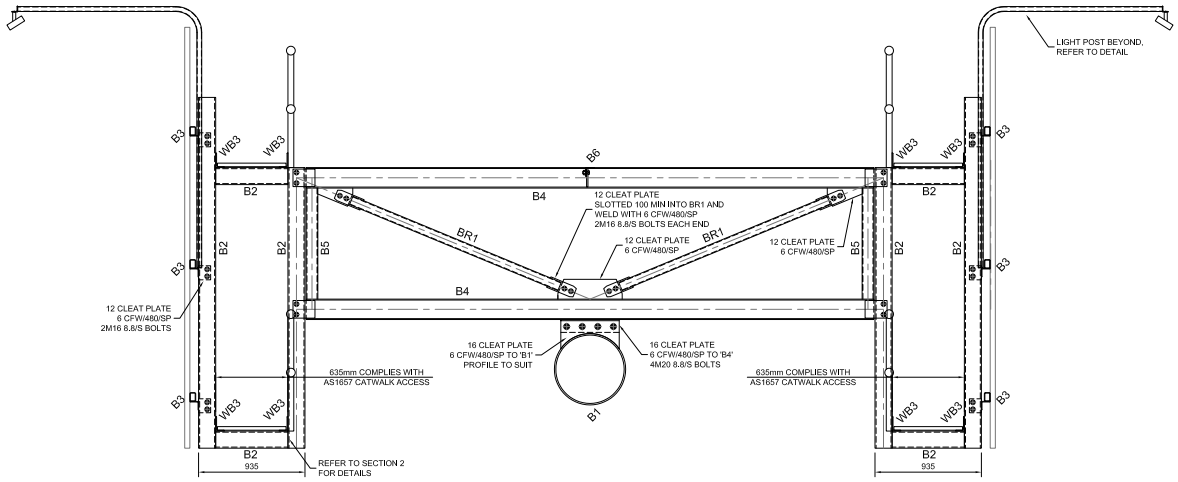
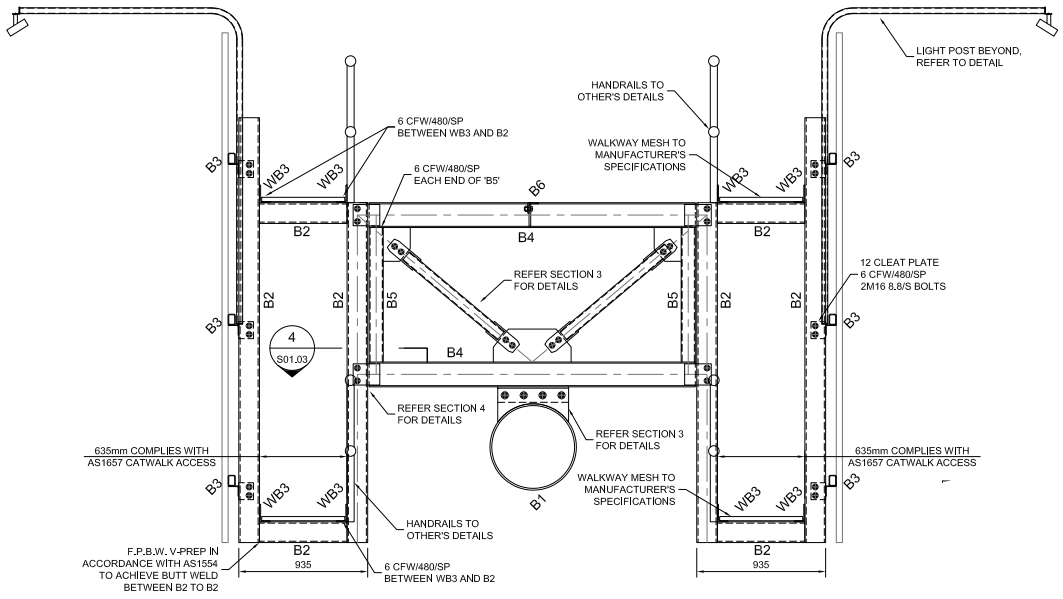


SECTION 3 S01.01 1:20



SECTION 2 S01.01 1:20

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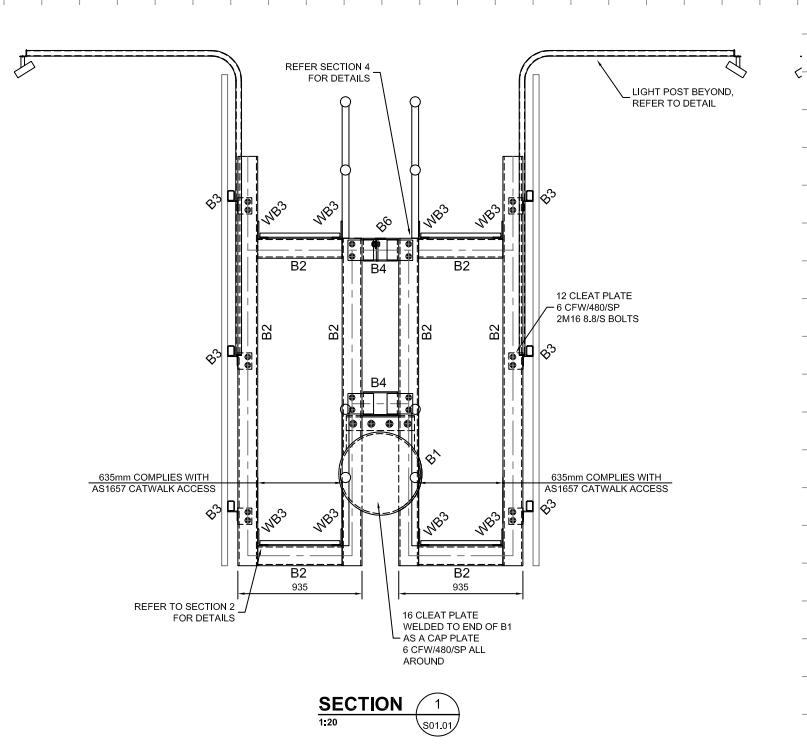

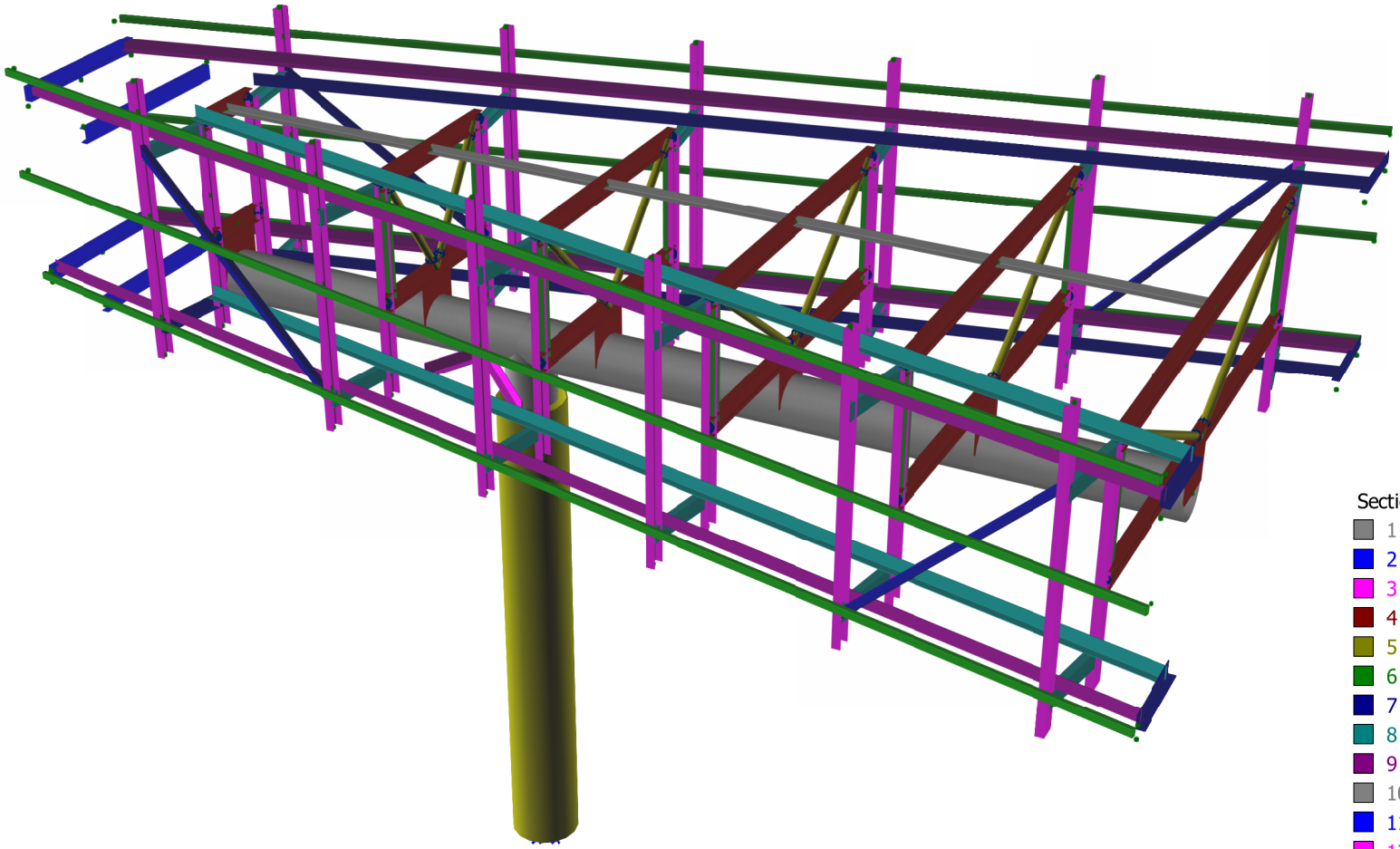

Sections:
- 1 B1=508*12.7 CHS
- 2 WB2=150 PFC
- 3 B2=150 PFC
- 4 B4=180 UB 18.1
- 5 C1= 700diax12 CHS
- 6 B3=75*50*4 RHS
- 7 WB3= 125*75*8 UA
- 8 B2=150 PFC
- 9 125*75*8 UA
- 10 B6=75*8 EA
- 11 WB2=150 PFC + EA
- 12 WB4=125*75*8 UA
- 13 16thk plate
- 14 BR1= 76.1x3.2 CHS
- 15 B5=100 PFC
- 16 BR2=75*4 SHS
- 17 WB3=125*75*8 UA
- 18 WB3=125*75*8 UA

Materials:
- 1 STEEL

Viewpoint (27,29)

Signage Weight and Wind Loading

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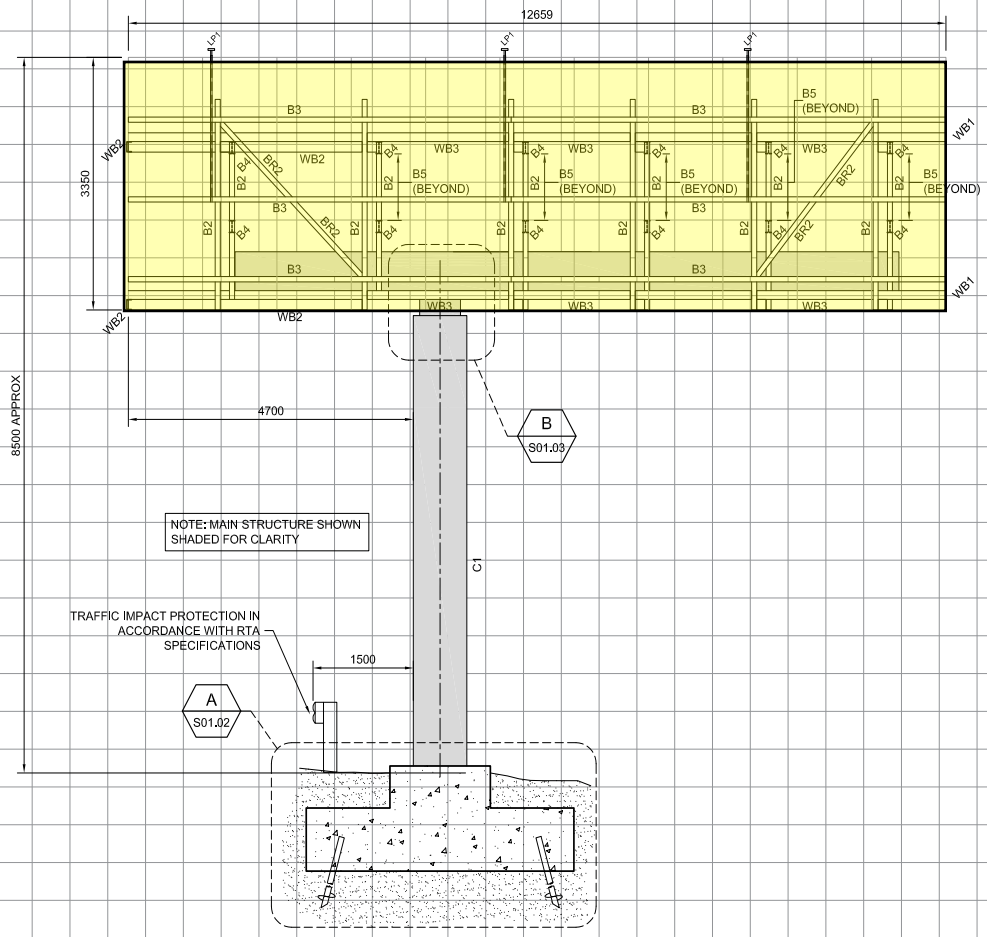

WEIGHT OF SUPERSITE STATIC SCREEN = 0.035KN/m^2

STEEL WEIGHT DENSITY =7,800 KG/M

PLATFORM LIVE LOAD=2.5kPa

REFER SPACEGASS OUTPUT.

Project: EXISTING ADVERTISING SIGNAGE , COWPASTURE ROAD, BOSSLEY PARK.

COMPUTATION SHEET

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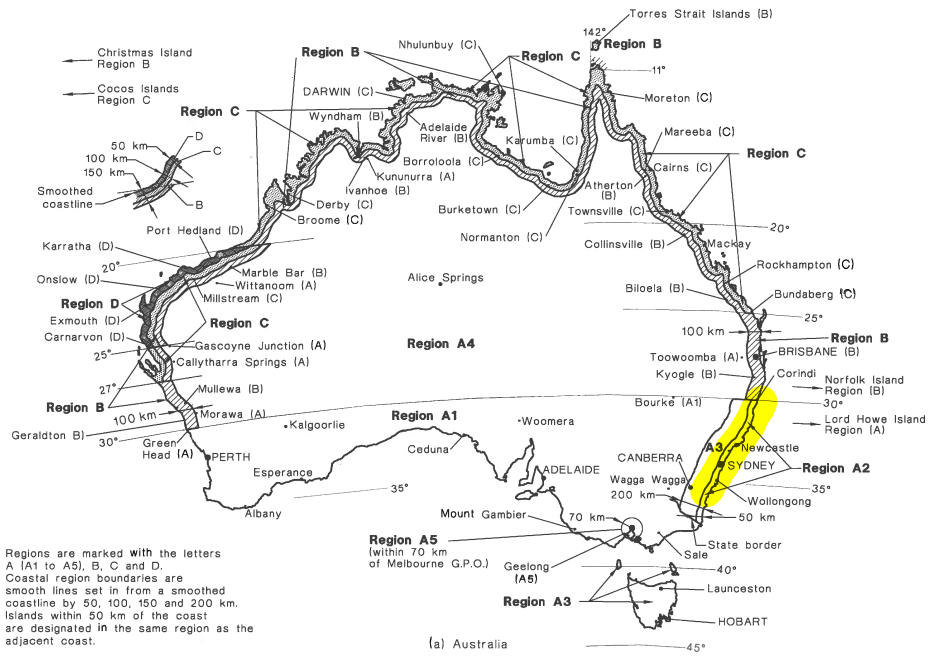


FIGURE 3.1(A) WIND REGIONS

Wind Actions

Wind Loads shall be calculated in accordance with AS1170.2:2021 Structural design actions - Wind Actions as specified below.

Parameters	ULS (1/500)	SLS (1/25)
Importance Level	IL2	
Wind Region	A2 (Sydney)	
Regional Gust Wind Speed, V_R	45 m/s	37 m/s
Terrain category	2	
Terrain/height multiplier, $M_{z,cat}$	As per Table 4.1 of AS/NZS 1170.2	
Directional multiplier, M_d	As per Table 3.2 of AS/NZS 1170.2	
Shielding multiplier, M_s	1.0	
Topographic multiplier, M_t	1.0	
Net pressure coefficient, $C_{p,n}$	As per Table B.2 of AS/NZS 1170.2	
Net porosity factor, K_p	1.0	
Aerodynamic shape factor, C_{shp}	$C_{p,n} \times K_p$	

WIND V5.03

JMP

Design: **(Wind Analysis WA01) Sydney, Non-temporary structure**
Importance: **All other structures not included in 1,3 or 4, Life = 50 years, Non-Cyclonic, APE = 500 years, APE.Serv = 25 years**
Pressures: **Wu.max = 1.29kPa, Ws/Wu =0.68**

Location - Fig 3.1(A), 3.1(B)

Location =	Sydney		
Region =	A	Figure 3.1(A)	
Sub region =	2	Figure 3.1(A)	
Cyclonic =	N	(Y)es, (N)o	Table 3.2(A)

Importance

All other structures not included in 1,3 or 4

Importance level =	2	1,2,3,4,(C)ustom	
Design working life =	50	Years	
Annual prob. of exceedance (APE) = 1/	500	years	AS1170.0 - Table F2
Annual prob. of exceed. Serv. (APE.s) = 1/	25	years	AS1170.0 - Appendix C

Design wind speed (Vdes,q) - Cl 2.3

Ultimate regional wind speed (VR) =	45	m/s	For a 1/500 APE - Table 3.1
Serv. regional wind speed (VR.s) =	37	m/s	For a 1/25 APE.s - Table 3.1
Climate change multiplier(Mc) =	1.00	Table 3.3	
Minimum ultimate speed (Vdes,θ) =	30	m/s - Cl 2.3	
Ratio VR.s / VR =	0.82		
Ratio Ws / Wu =	0.68		

Design wind data for non-cyclonic areas with APE of 1:500 years

Dir (b)	Vdes,θ m/s	Wu kPa	Ws kPa	Dir (b)	Vdes.θ m/s	Wu kPa	Ws kPa
N	44.1	1.17	0.79	**NE**	39.5	0.93	0.63
S	44.1	1.17	0.79	**SW**	46.4	1.29	0.87
E	44.1	1.17	0.79	**SE**	44.1	1.17	0.79
W	46.4	1.29	0.87	**NW**	46.4	1.29	0.87

Site wind data for non-cyclonic areas with APE of 1:500 years

Dir (b)	Md (*1)	VR*Mc*Md m/s	Ave. Ht (z) m	Cat	Mz,cat	Ms	Mt	Vsit,β m/s	Wu.sit kPa
N	0.85	38.3	13.2	2	1.03	1.00	1.00	39.5	0.93
NE	0.75	33.8	13.2	2	1.03	1.00	1.00	34.8	0.73
E	0.85	38.3	13.2	2	1.03	1.00	1.00	39.5	0.93
SE	0.95	42.8	13.2	2	1.03	1.00	1.00	44.1	1.17
S	0.95	42.8	13.2	2	1.03	1.00	1.00	44.1	1.17
SW	0.95	42.8	13.2	2	1.03	1.00	1.00	44.1	1.17
W	1.00	45.0	13.2	2	1.03	1.00	1.00	46.4	1.29
NW	0.95	42.8	13.2	2	1.03	1.00	1.00	44.1	1.17

*1 - Refer to Table 3.2 and Cl 3.3, TC interpolated

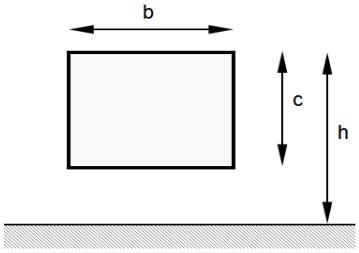
HOARDINGS V5.01

JMP

Member: **(Hoarding H01) 12.7m wide x 3.4m high, 13.2m to top (9.9m gap under)**
Normal: **Cp,n = 1.54**
Wind at θ=45: **Cp,n = 1.54**
Wind at θ=90: **Cp,n = ±1.2 - 0 to 2c, ±0.6 - 2c to 4c, then ±0.3**

Freestanding hoardings and walls - Appendix B.2

Breadth (b) =	12660	mm
Element height (c) =	3350	mm
Total height (h) =	13200	mm
Ratio (b/c) =	3.78	
Ratio (c/h) =	0.25	



Aerodynamic shape factor (Cshp) = Cp,n*Kp Equ B.2
Cp,n = Net pressure coefficient - Cl B.2.1
Kp = Net porosity factor - Cl B.1.4

Wind normal to hoarding or wall θ = 0° - Table B.2(A)

Ratio (b/c) =	3.78	
Ratio (c/h) =	0.25	
Cp,n = 1.3 + 0.5(0.3+log10(b/c))*(0.8-c/h) =	1.54	
Vertical height of resultant (h-c/2) =	11525	mm above the surface
Horizontal eccentricity of resultant (e = 0) =	0	mm (No eccentricity)

Wind at θ = 45° to hoarding or wall - Table B.2(B) & B.2(C)

Ratio (b/c) =	3.78	
Ratio (c/h) =	0.25	
Cp,n = 1.3 + 0.5(0.3+log10(b/c))*(0.8-c/h) =	1.54	
Vertical height of resultant (h-c/2) =	11525	mm above the surface
Horizontal eccentricity of resultant (e = 0.2*b) =	2532	mm

From Table B.2(B)

Wind parallel to hoarding or wall θ = 90° - Table B.2(D)

Ratio (b/c) =	3.78	
Ratio (c/h) =	0.25	
Cp,n =	±1.2 - 0 to 2c, ±0.6 - 2c to 4c, then ±0.3	

Net porosity factor - B.1.4

Solidity factor (δ) =	1.000	ratio of solid area to total area of structure
Net porosity factor Kp = 1-(1-δ)² =	1.000	

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wu= 0.89kPa
ws= 0.60kPa

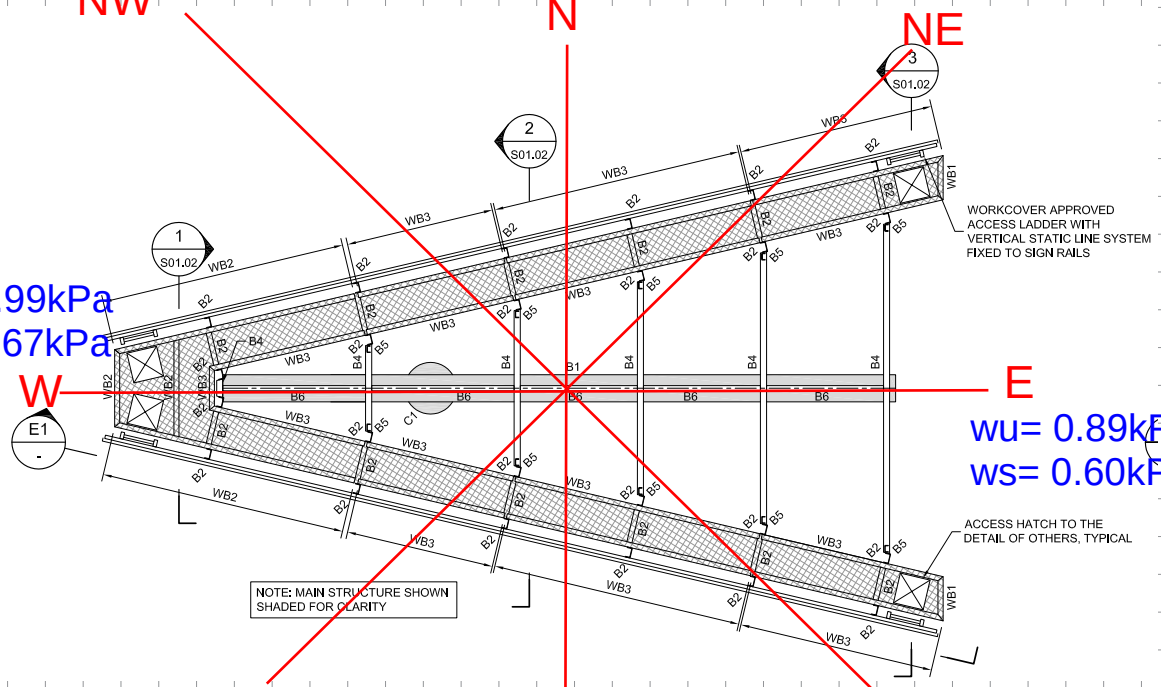
NW

wu= 0.89kPa
ws= 0.60kPa

N

wu= 0.71kPa
ws= 0.48kPa

NE



wu= 0.99kPa
ws= 0.67kPa

W

E

wu= 0.89kPa
ws= 0.60kPa

SW

SE

wu= 0.99kPa
ws= 0.67kPa

S

wu= 0.89kPa
ws= 0.60kPa

wu= 0.89kPa
ws= 0.60kPa

N

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WIND PRESSURES ON THE SIGNAGE STRUCTURE ARE CALCULATED AS FOLLOWS:

W = wu x Cshp

OPTION 1-CONSIDER AS HOARDING,

FOR NORTHERLY AND SOUTHERLY WIND:
Cshp = 1.54
HENCE,
WIND PRESSURE = 0.89 kPa x 1.54 = 1.37kPa

THE OVERALL DIMENSIONS OF THE SIGNAGE ARE APPROX. 12.66m LONG x 3.35m HIGH EACH SIDE

THEREFORE
WIND LOADING
TOP HOR MEMBER= 1.37 kPa x 1.3 = 1.781 kN/m
MIDDLE HOR MEMBER =1.37 x 1.0 =1.37 kN/m
BOTTOM HOR MEMBER =1.37 x 0.90 =1.233kN/m

FOR WESTERLY/EASTERLY WIND:
Cshp = 2.0
HENCE,
WIND PRESSURE = 1.37 kPa x 2.0 = 2.74 kPa

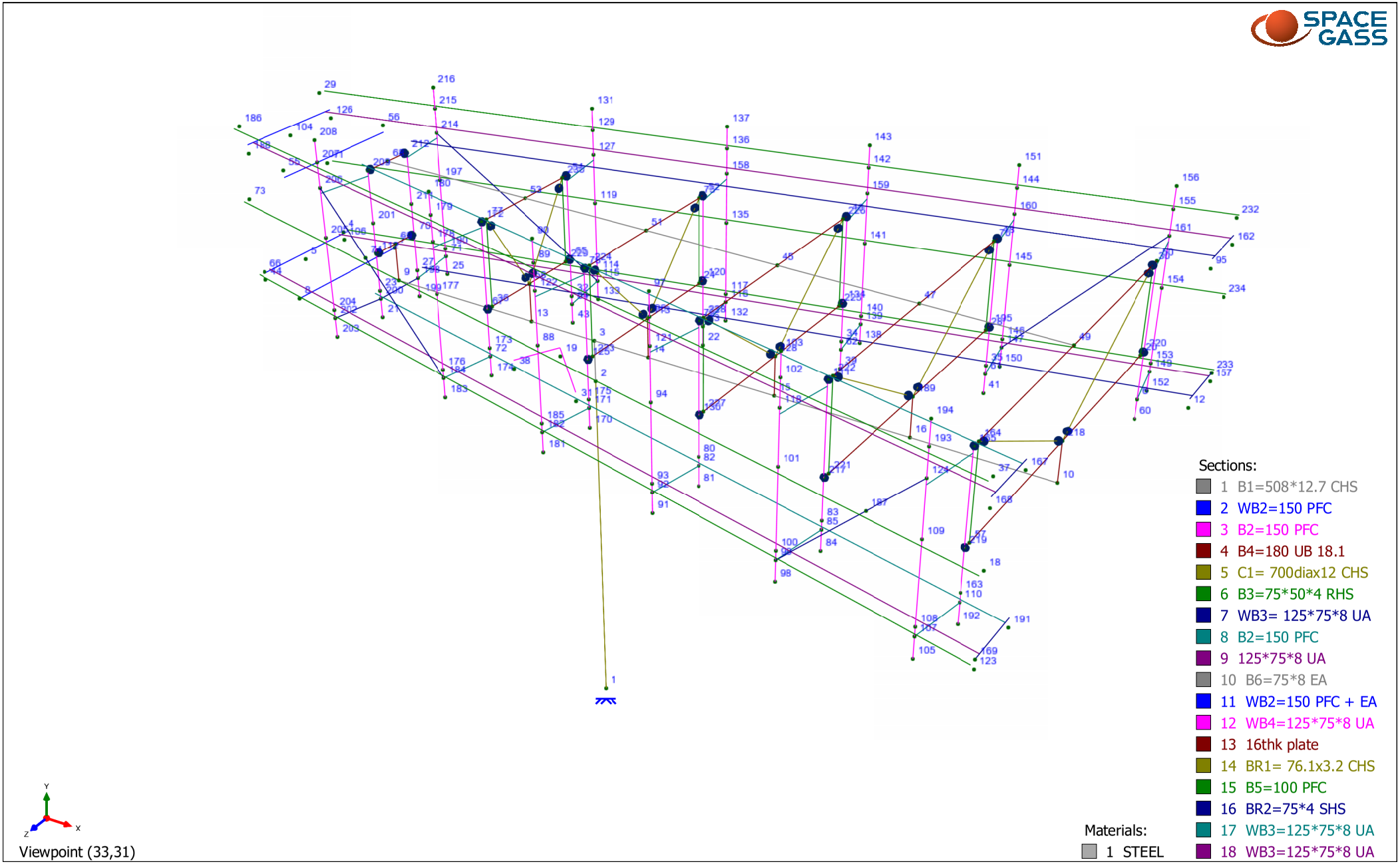
THIS DIRECTION IS NOT CRITICAL. THE FRAMING IS OPEN.

CONSIDER WIND ON THE POST =2.74x0.7= 1.918kN/m
WIND ON FRAME (INT) =1x2.74 =2.74kN/m; EXT =1x0.5x2.74=1.37kN/m

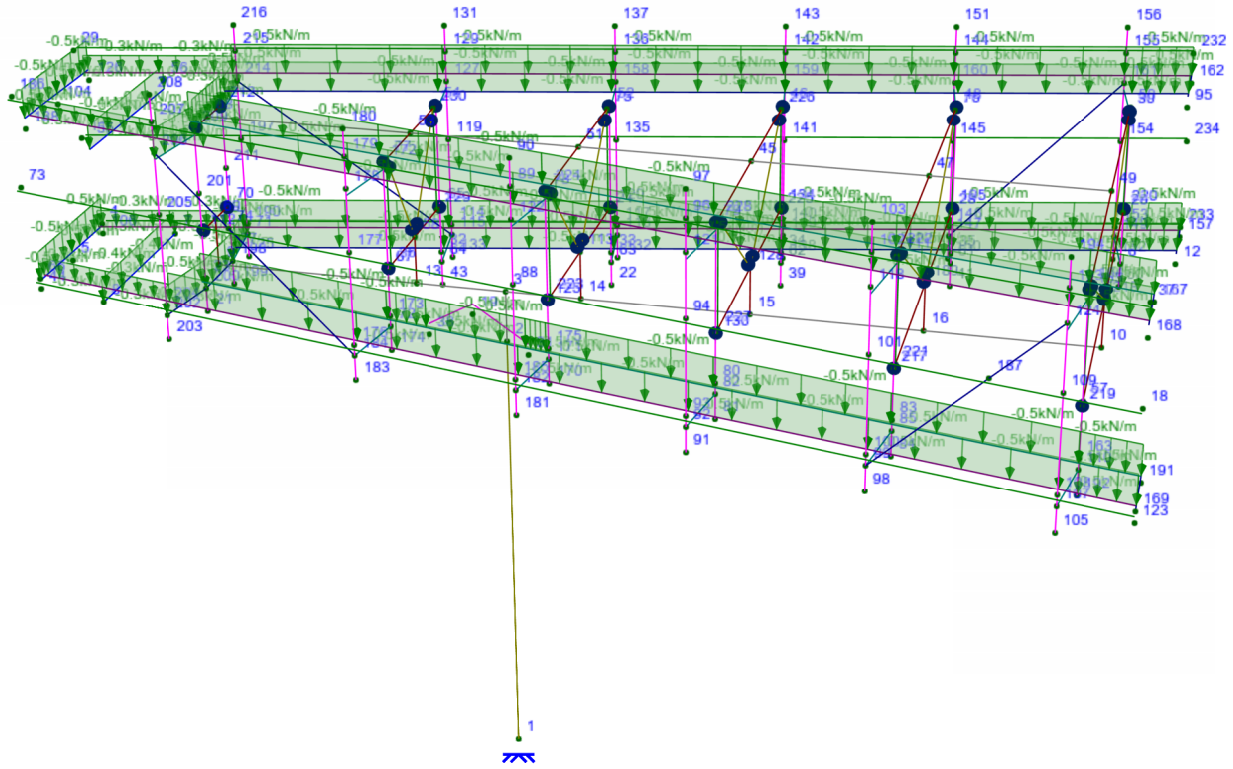
FOR NORTHERLY AND SOUTHERLY WIND:
Cpe = 0.8; wu = 0.89kPa; Cpl =0.3

OPTION 1-CONSIDER AS ELEVATED STRUCTURE

THEREFORE
WIND LOADING SOUTH WALL
TOP HOR MEMBER= 0.89 kPa x(0.8+0.3)x1.3 = 1.2727 kN/m
MIDDLE HOR MEMBER =0.89 x(0.8+0.3)x 1.0 =0.979 kN/m
BOTTOM HOR MEMBER =0.89x(0.8+0.3)x 0.90 =0.88kN/m
WIND LOADING NORTH WALL
TOP HOR MEMBER= 0.89 kPa x(0.5+0.3)x1.3 = -0.9256 kN/m
MIDDLE HOR MEMBER =0.89 x(0.5+0.3)x 1.0 =-0.712 kN/m
BOTTOM HOR MEMBER =0.89x(0.5+0.3)x 0.90 =-0.64kN/m


SPACE GASS
Sections:
1 B1=508*12.7 CHS
2 WB2=150 PFC
3 B2=150 PFC
4 B4=180 UB 18.1
5 C1= 700diax12 CHS
6 B3=75*50*4 RHS
7 WB3= 125*75*8 UA
8 B2=150 PFC
9 125*75*8 UA
10 B6=75*8 EA
11 WB2=150 PFC + EA
12 WB4=125*75*8 UA
13 16thk plate
14 BR1= 76.1x3.2 CHS
15 B5=100 PFC
16 BR2=75*4 SHS
17 WB3=125*75*8 UA
18 WB3=125*75*8 UA
Materials:
1 STEEL
Y
X
Z
Viewpoint (33,31)

Load case 2
2 Dead Load

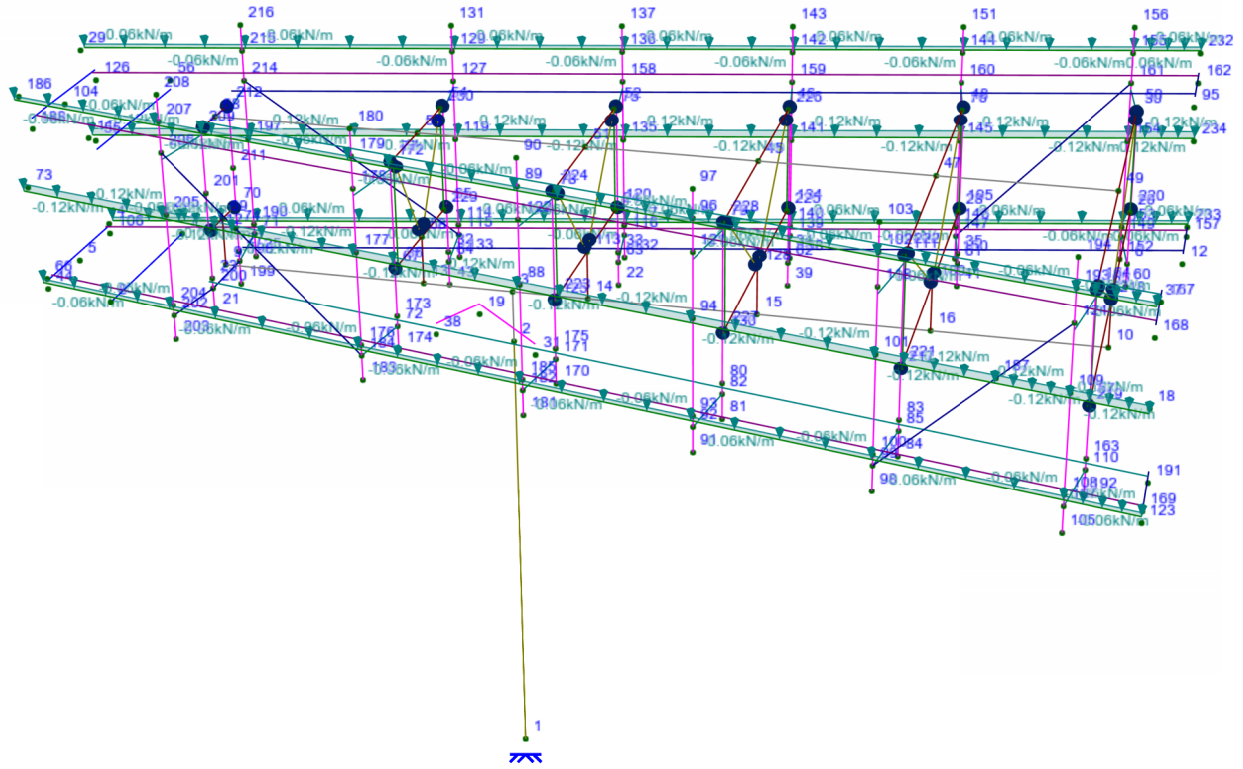


Viewpoint (13,22), Loads

Materials:
1 STEEL

Sections:
1 B1=508*12.7 CHS
2 WB2=150 PFC
3 B2=150 PFC
4 B4=180 UB 18.1
5 C1= 700diax12 CHS
6 B3=75*50*4 RHS
7 WB3= 125*75*8 UA
8 B2=150 PFC
9 125*75*8 UA
10 B6=75*8 EA
11 WB2=150 PFC + EA
12 WB4=125*75*8 UA
13 16thk plate
14 BR1= 76.1x3.2 CHS
15 B5=100 PFC
16 BR2=75*4 SHS
17 WB3=125*75*8 UA
18 WB3=125*75*8 UA

Load case 3
3 Screen Load

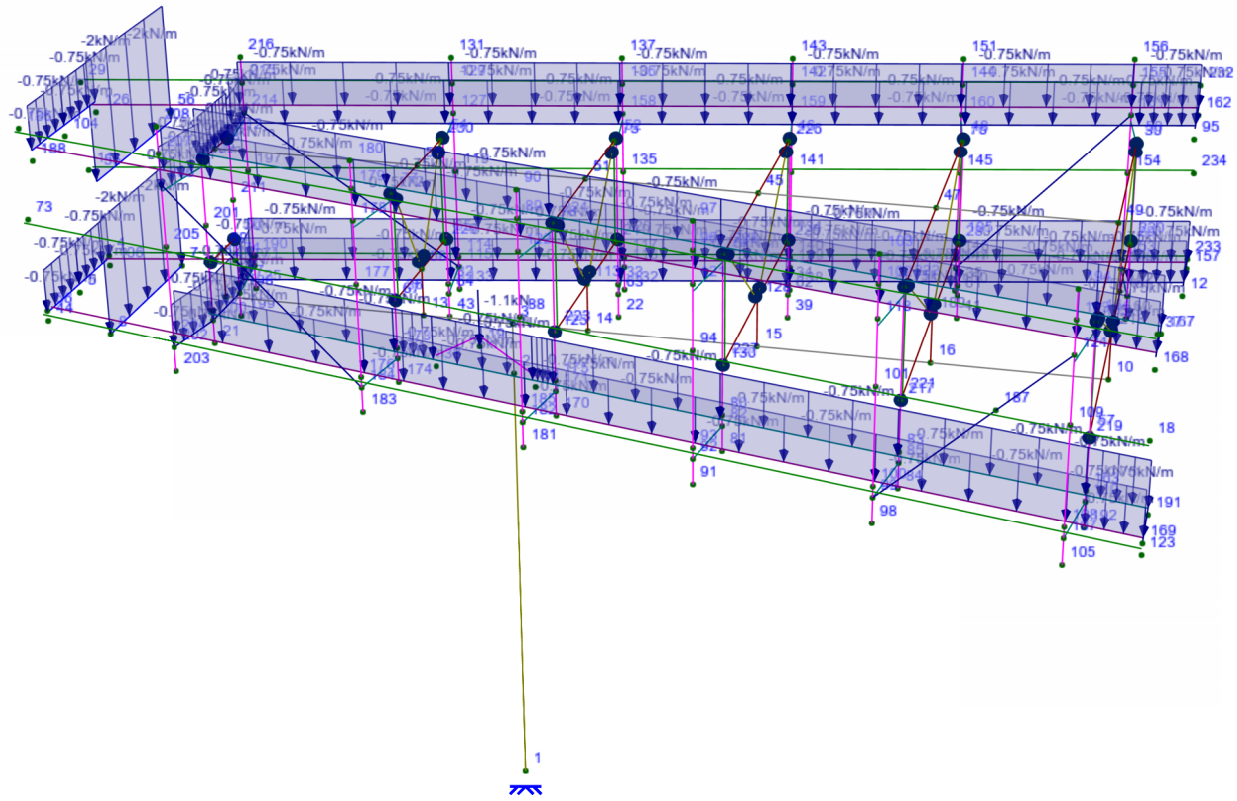


Sections:
1 B1=508*12.7 CHS
2 WB2=150 PFC
3 B2=150 PFC
4 B4=180 UB 18.1
5 C1= 700diax12 CHS
6 B3=75*50*4 RHS
7 WB3= 125*75*8 UA
8 B2=150 PFC
9 125*75*8 UA
10 B6=75*8 EA
11 WB2=150 PFC + EA
12 WB4=125*75*8 UA
13 16thk plate
14 BR1= 76.1x3.2 CHS
15 B5=100 PFC
16 BR2=75*4 SHS
17 WB3=125*75*8 UA
18 WB3=125*75*8 UA

Materials:
1 STEEL

Viewpoint (13,22), Loads

Load case 4
4 Live Load

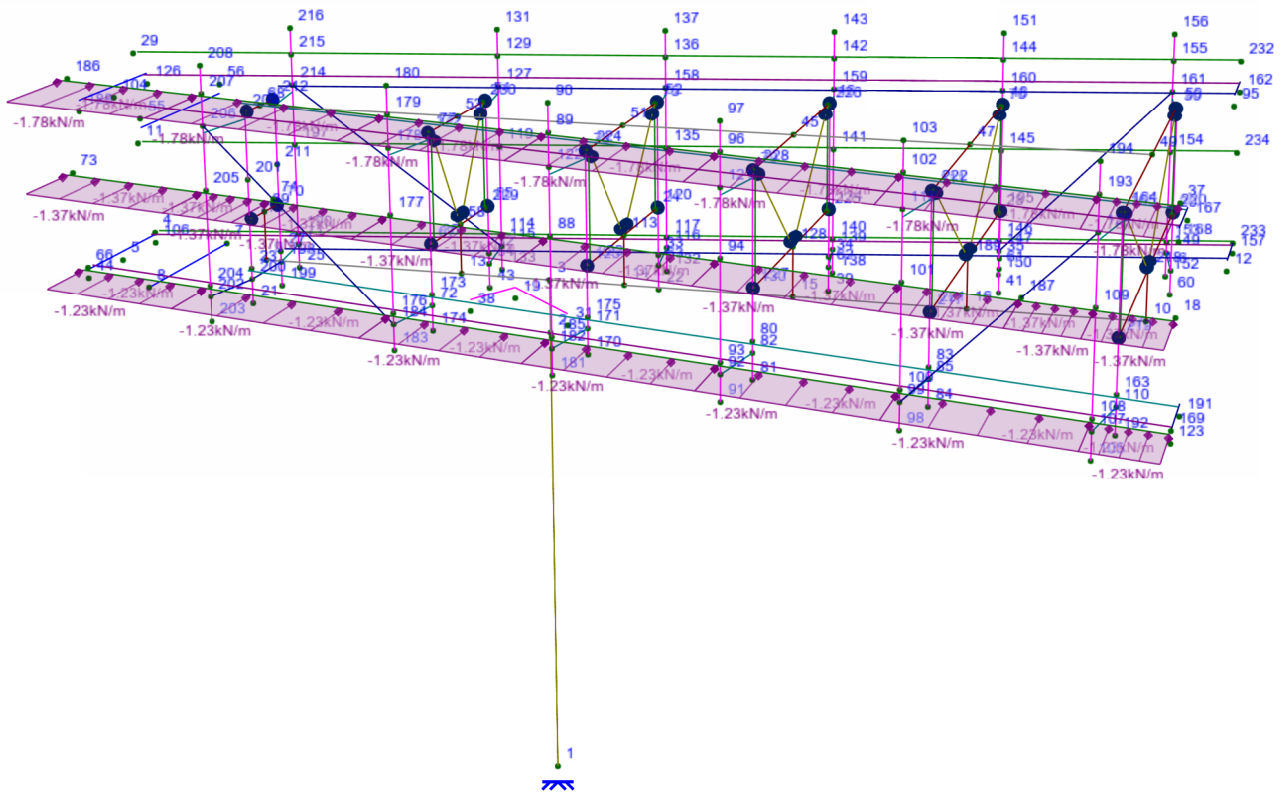


Sections:
1 B1=508*12.7 CHS
2 WB2=150 PFC
3 B2=150 PFC
4 B4=180 UB 18.1
5 C1= 700diax12 CHS
6 B3=75*50*4 RHS
7 WB3= 125*75*8 UA
8 B2=150 PFC
9 125*75*8 UA
10 B6=75*8 EA
11 WB2=150 PFC + EA
12 WB4=125*75*8 UA
13 16thk plate
14 BR1= 76.1x3.2 CHS
15 B5=100 PFC
16 BR2=75*4 SHS
17 WB3=125*75*8 UA
18 WB3=125*75*8 UA

Materials:
1 STEEL

Viewpoint (13,22), Loads

Load case 5
5 Wu(N-S)-Hoarding

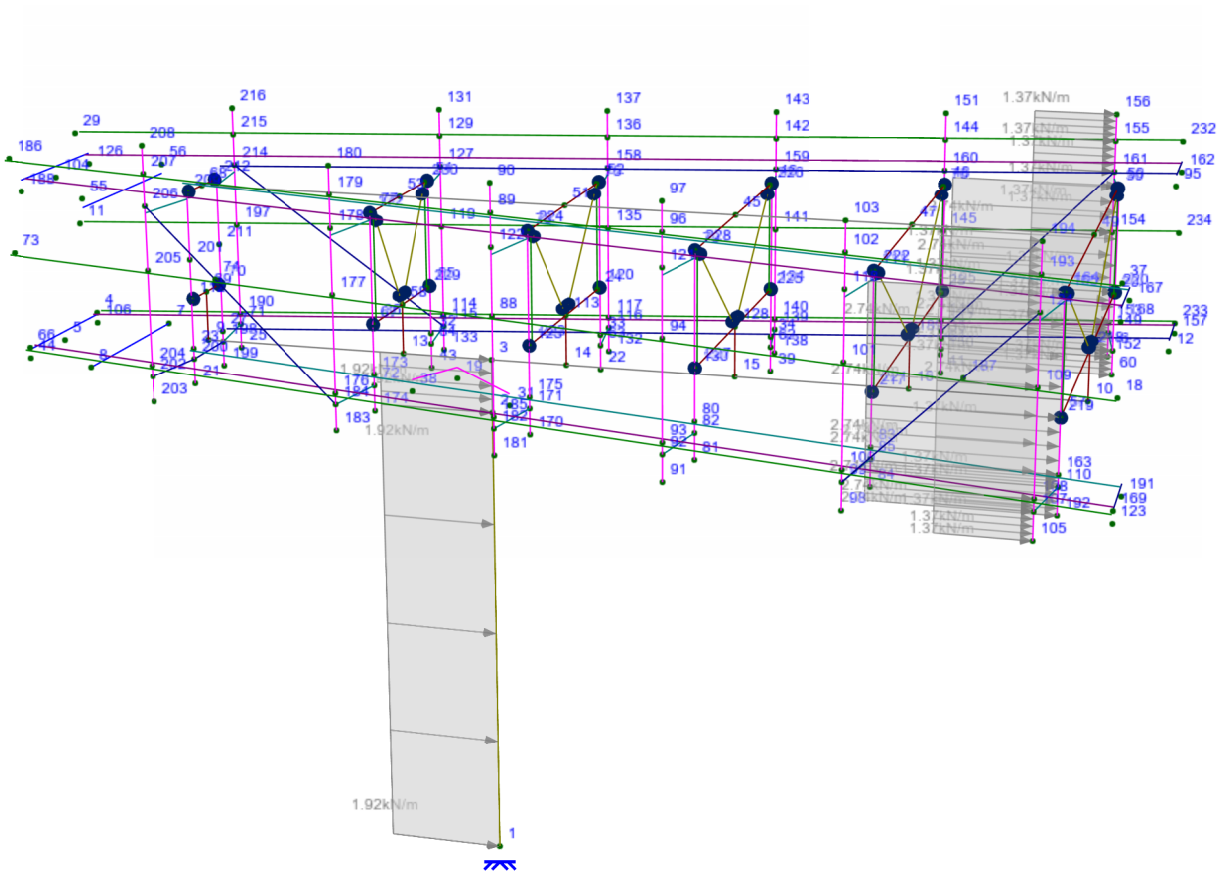


Sections:
1 B1=508*12.7 CHS
2 WB2=150 PFC
3 B2=150 PFC
4 B4=180 UB 18.1
5 C1= 700diax12 CHS
6 B3=75*50*4 RHS
7 WB3= 125*75*8 UA
8 B2=150 PFC
9 125*75*8 UA
10 B6=75*8 EA
11 WB2=150 PFC + EA
12 WB4=125*75*8 UA
13 16thk plate
14 BR1= 76.1x3.2 CHS
15 B5=100 PFC
16 BR2=75*4 SHS
17 WB3=125*75*8 UA
18 WB3=125*75*8 UA

Materials:
1 STEEL

Viewpoint (15,14), Loads

Load case 6
6 WU(W-E)-Hoarding

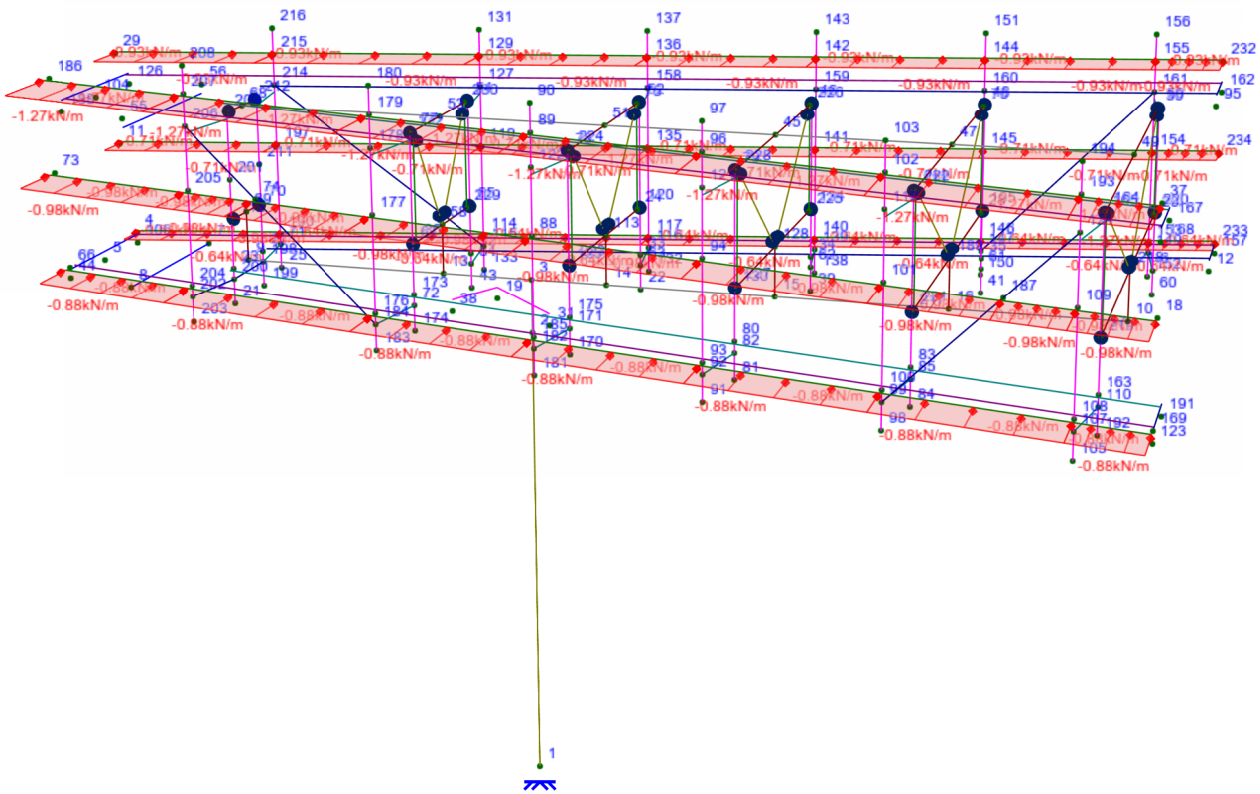


Sections:
1 B1=508*12.7 CHS
2 WB2=150 PFC
3 B2=150 PFC
4 B4=180 UB 18.1
5 C1= 700diax12 CHS
6 B3=75*50*4 RHS
7 WB3= 125*75*8 UA
8 B2=150 PFC
9 125*75*8 UA
10 B6=75*8 EA
11 WB2=150 PFC + EA
12 WB4=125*75*8 UA
13 16thk plate
14 BR1= 76.1x3.2 CHS
15 B5=100 PFC
16 BR2=75*4 SHS
17 WB3=125*75*8 UA
18 WB3=125*75*8 UA

Materials:
1 STEEL

Viewpoint (15,14), Loads

Load case 7
7 Wu(N-S)- Elevated Structure



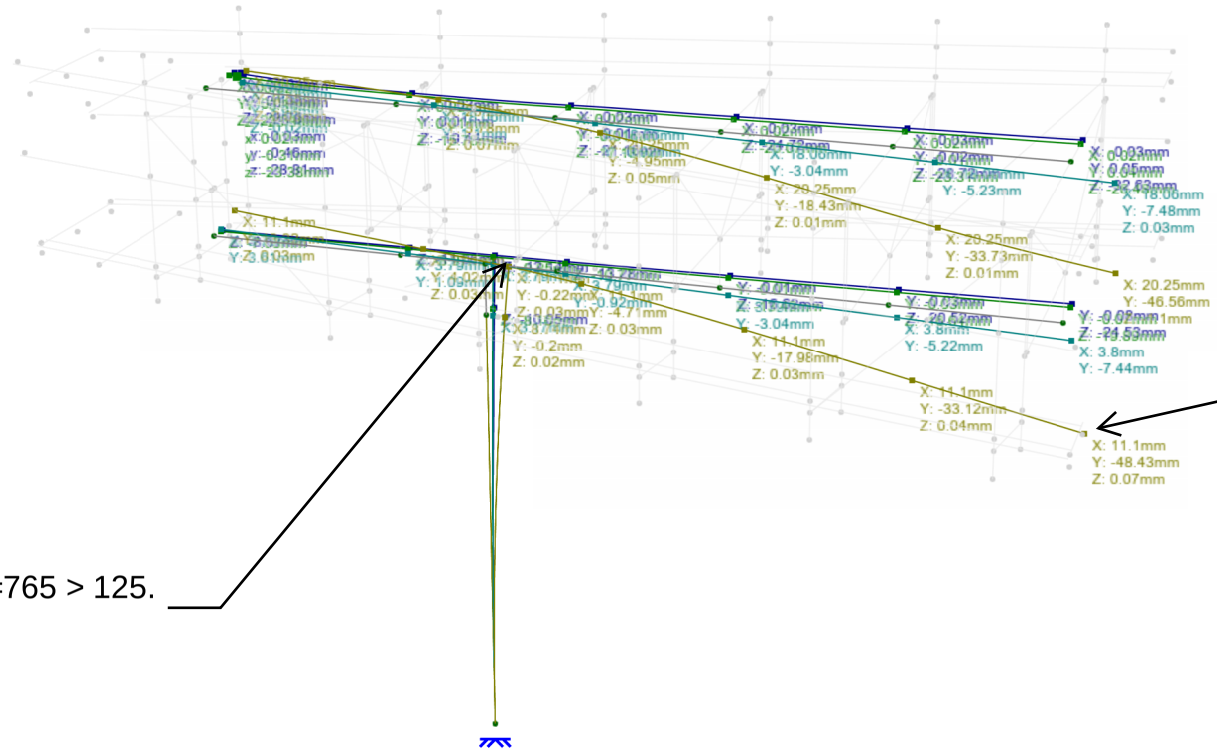
Viewpoint (15,14), Loads

Sections:
1 B1=508*12.7 CHS
2 WB2=150 PFC
3 B2=150 PFC
4 B4=180 UB 18.1
5 C1= 700diax12 CHS
6 B3=75*50*4 RHS
7 WB3= 125*75*8 UA
8 B2=150 PFC
9 125*75*8 UA
10 B6=75*8 EA
11 WB2=150 PFC + EA
12 WB4=125*75*8 UA
13 16thk plate
14 BR1= 76.1x3.2 CHS
15 B5=100 PFC
16 BR2=75*4 SHS
17 WB3=125*75*8 UA
18 WB3=125*75*8 UA

Materials:
1 STEEL

Serviceability Assessment

Load cases 21-24
(2) Servieability
21 (SW) G+Q
22 0.68W1
23 0.68W2
24 0.68W3



8500/11.1=765 > 125.
Acceptable

6400/48=133 > 125.
Acceptable

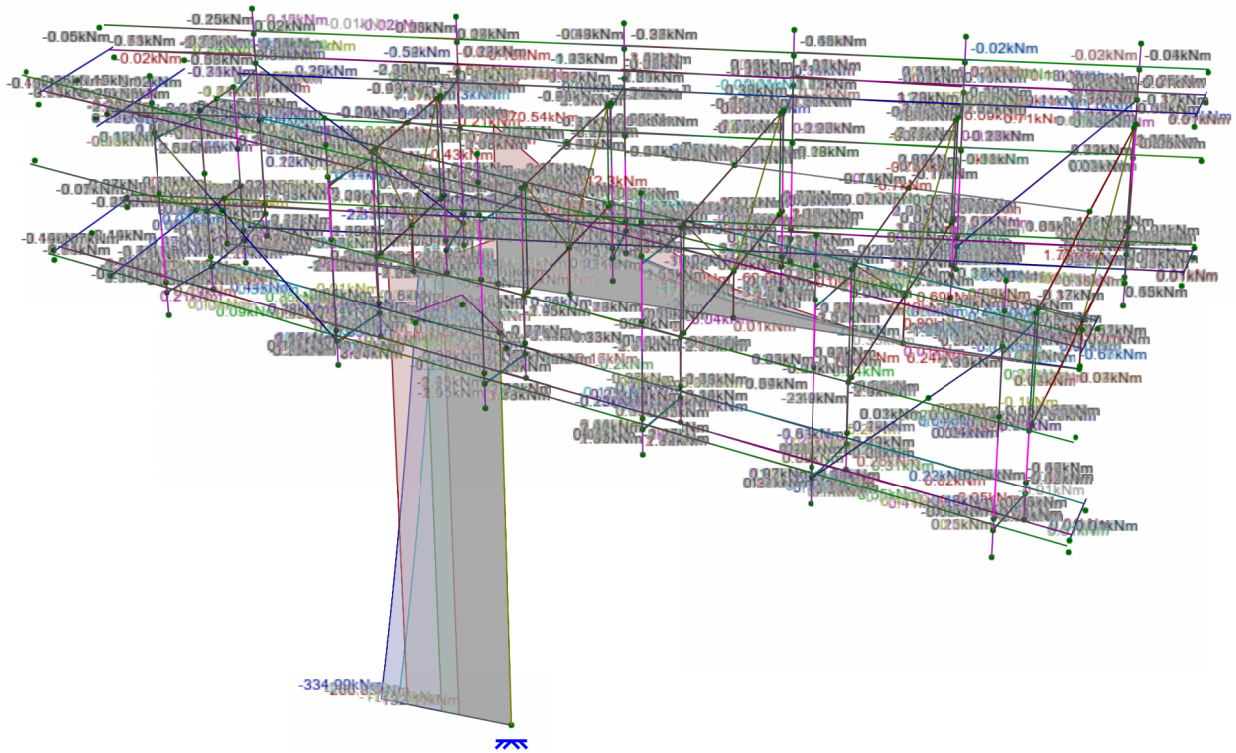
Viewpoint (17,17), Displacements

Materials:
1 STEEL

Sections:
1 B1=508*12.7 CHS
5 C1= 700diax12 CHS
10 B6=75*8 EA

Strength Assessment

Load cases 10-16
(1) Strength
- 10 (SW) 1.2DL+1.5LL
- 11 (SW) 0.9G + Wu(N-S)-Hoarding
- 12 (SW) 1.2G+Wu(N-S)-Hoarding
- 13 (SW) 0.9G+Wu(W-E)-Hoarding
- 14 (SW) 1.2G+Wu(W-E)-Hoarding
- 15 (SW) 0.9G+Wu(N-S) -Elevated Structure
- 16 (SW) 1.2G+Wu(N-S) -Elevated Structure

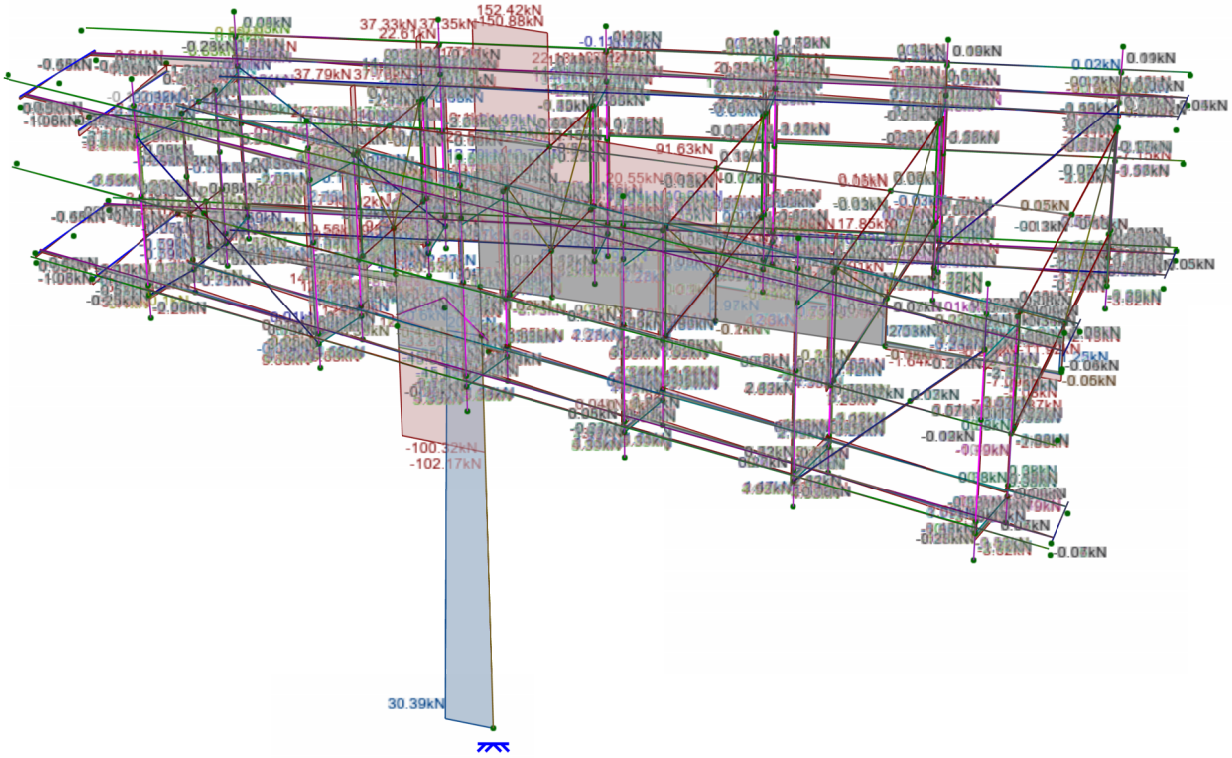


Sections:
- 1 B1=508*12.7 CHS
- 2 WB2=150 PFC
- 3 B2=150 PFC
- 4 B4=180 UB 18.1
- 5 C1= 700diax12 CHS
- 6 B3=75*50*4 RHS
- 7 WB3= 125*75*8 UA
- 8 B2=150 PFC
- 9 125*75*8 UA
- 10 B6=75*8 EA
- 11 WB2=150 PFC + EA
- 12 WB4=125*75*8 UA
- 13 16thk plate
- 14 BR1= 76.1x3.2 CHS
- 15 B5=100 PFC
- 16 BR2=75*4 SHS
- 17 WB3=125*75*8 UA
- 18 WB3=125*75*8 UA

Materials:
- 1 STEEL

Viewpoint (19,23), Moments

Load cases 10-16
(1) Strength
- 10 (SW) 1.2DL+1.5LL
- 11 (SW) 0.9G + Wu(N-S)-Hoarding
- 12 (SW) 1.2G+Wu(N-S)-Hoarding
- 13 (SW) 0.9G+Wu(W-E)-Hoarding
- 14 (SW) 1.2G+Wu(W-E)-Hoarding
- 15 (SW) 0.9G+Wu(N-S) -Elevated Structure
- 16 (SW) 1.2G+Wu(N-S) -Elevated Structure

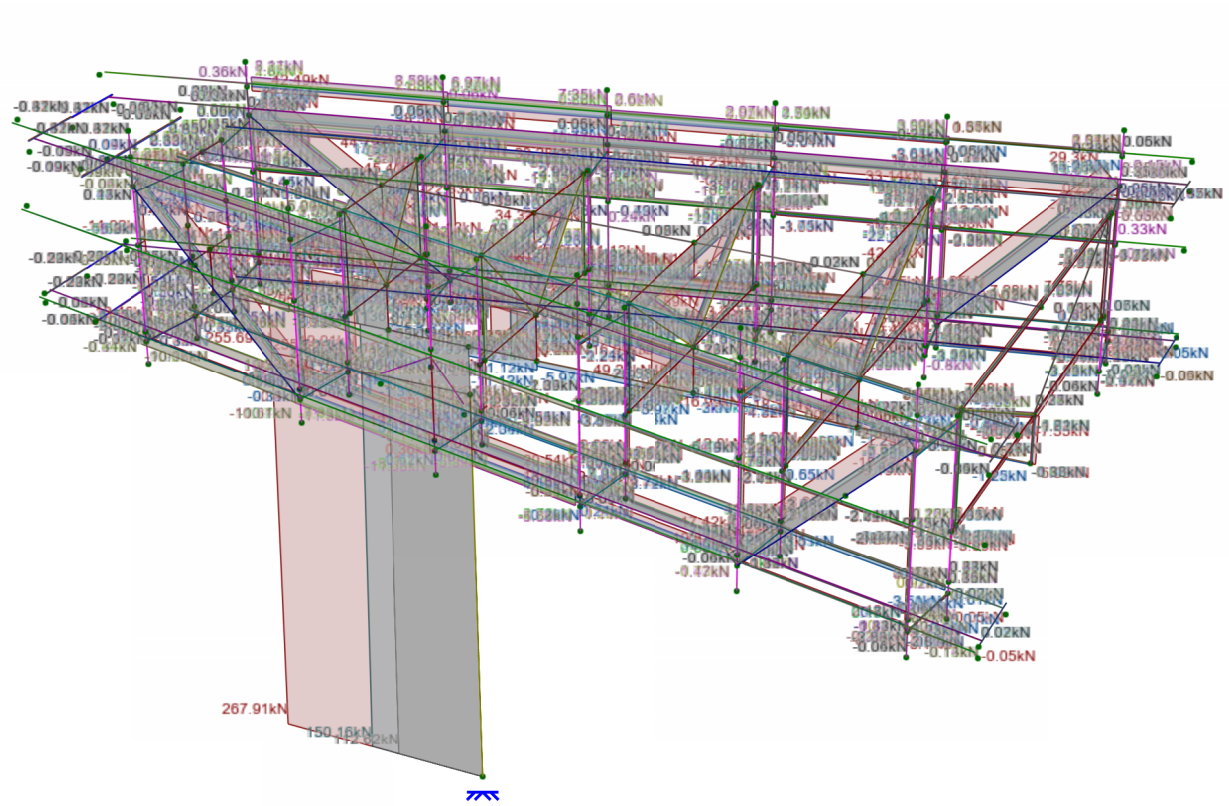


Sections:
- 1 B1=508*12.7 CHS
- 2 WB2=150 PFC
- 3 B2=150 PFC
- 4 B4=180 UB 18.1
- 5 C1= 700diax12 CHS
- 6 B3=75*50*4 RHS
- 7 WB3= 125*75*8 UA
- 8 B2=150 PFC
- 9 125*75*8 UA
- 10 B6=75*8 EA
- 11 WB2=150 PFC + EA
- 12 WB4=125*75*8 UA
- 13 16thk plate
- 14 BR1= 76.1x3.2 CHS
- 15 B5=100 PFC
- 16 BR2=75*4 SHS
- 17 WB3=125*75*8 UA
- 18 WB3=125*75*8 UA

Materials:
- 1 STEEL

Viewpoint (19,23), Shears

Load cases 10-16
(1) Strength
- 10 (SW) 1.2DL+1.5LL
- 11 (SW) 0.9G + Wu(N-S)-Hoarding
- 12 (SW) 1.2G+Wu(N-S)-Hoarding
- 13 (SW) 0.9G+Wu(W-E)-Hoarding
- 14 (SW) 1.2G+Wu(W-E)-Hoarding
- 15 (SW) 0.9G+Wu(N-S) -Elevated Structure
- 16 (SW) 1.2G+Wu(N-S) -Elevated Structure



Sections:
- 1 B1=508*12.7 CHS
- 2 WB2=150 PFC
- 3 B2=150 PFC
- 4 B4=180 UB 18.1
- 5 C1= 700diax12 CHS
- 6 B3=75*50*4 RHS
- 7 WB3= 125*75*8 UA
- 8 B2=150 PFC
- 9 125*75*8 UA
- 10 B6=75*8 EA
- 11 WB2=150 PFC + EA
- 12 WB4=125*75*8 UA
- 13 16thk plate
- 14 BR1= 76.1x3.2 CHS
- 15 B5=100 PFC
- 16 BR2=75*4 SHS
- 17 WB3=125*75*8 UA
- 18 WB3=125*75*8 UA

Materials:
- 1 STEEL

Viewpoint (25,25), Axial forces

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J M P

A SPECIALIST PRACTICE

SPACE GASS 14.12 (64-bit) - JOHN MULLEN && PARTNERS PTY LTD
Path: Z:__Projects\4980-01 Princes Highway...\X Computations\Model Heatcote
Designer: Date: Thursday, February 29, 2024 8:07 PM, Page: 1

Envelope = Load Cases 10-16
and Nodes 1

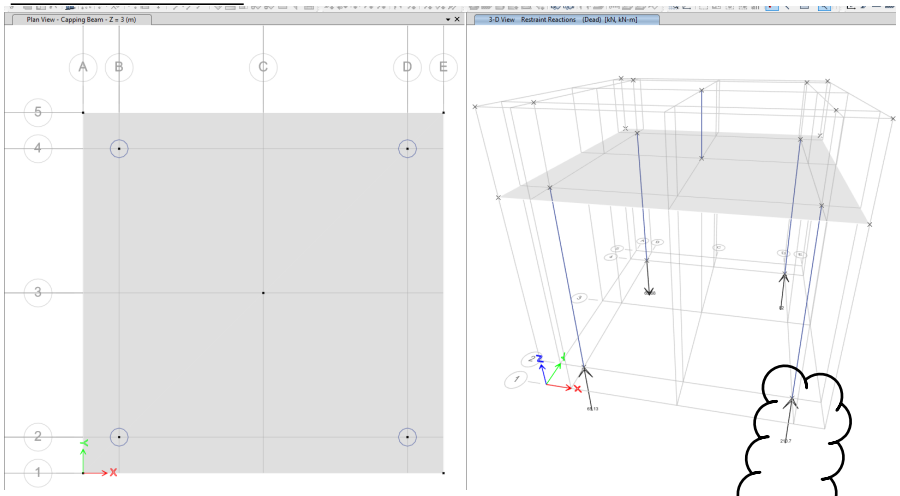
DISPLACEMENTS (mm,rad) (*=Maximum, #=Minimum)

Node	Case	Tx	Ty	Tz	Rx	Ry	Rz
1	10	0.00*#	0.00*#	0.00*#	0.00*#	0.00*#	0.00*#

REACTIONS (kN,kNm) (*=Maximum, #=Minimum)

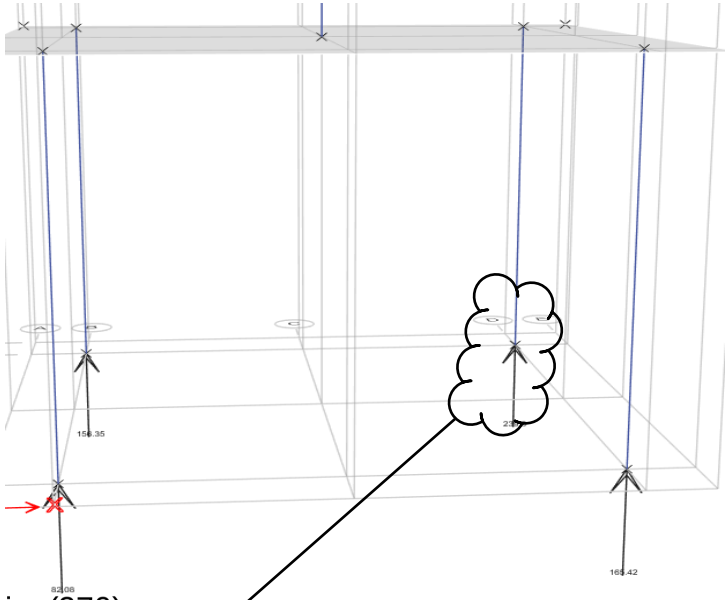
Node	Case	Fx	Fy	Fz	Mx	My	Mz
1	10	0.00	267.91*	0.00#	-0.78#	-0.01	266.83
1	11	0.00	112.62#	54.54	377.18	-50.39	132.09#
1	13	-30.39#	112.62	0.00	-0.09	0.00	290.30
1	14	-30.39	150.16	0.00	-0.12	0.00*	334.99*
1	15	0.00	112.62	67.30*	464.79	-62.16#	132.11
1	16	0.00*	150.16	67.30	465.23*	-62.15	176.52

LOAD CASE 15



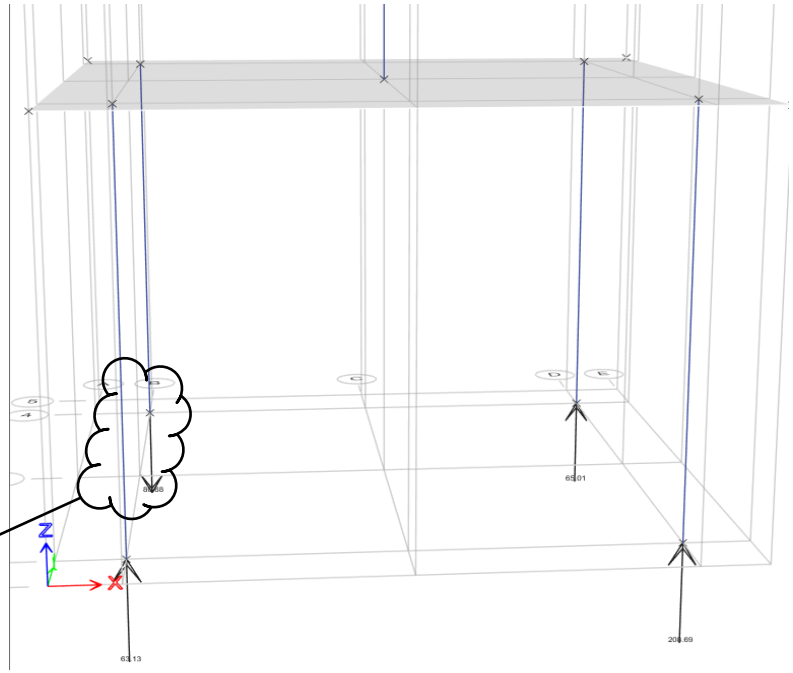
Max
Compression(270) >
210kN design load

LOAD CASE 10

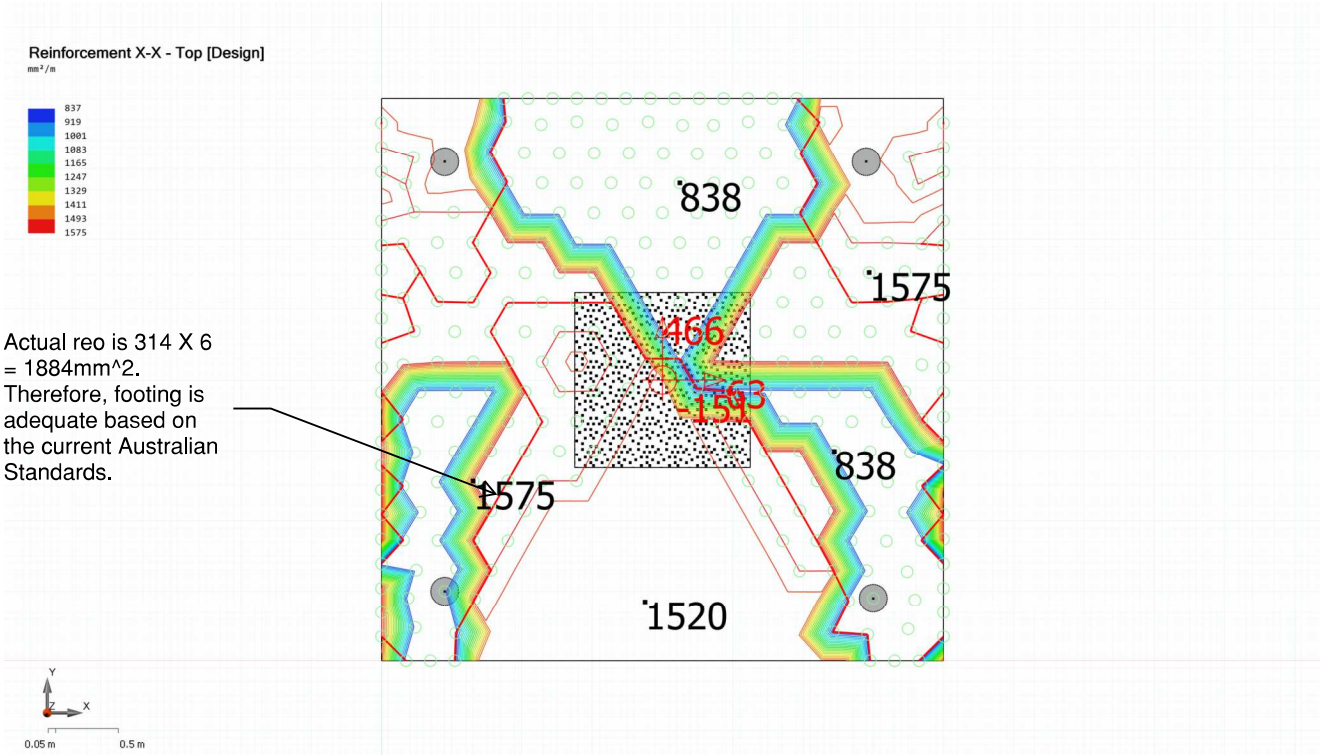


Max
Compression(270) >
240kN design load

LOAD CASE 16



Max
Tension(150KN) >
81kN design load



Actual reo is 314 X 6 = 1884mm^2. Therefore, footing is adequate based on the current Australian Standards.

Model Info

File	Z:__Projects\4980-01 Princes Highway Heathcote NSW\Engineering\X Computations\footing.slbx
Company	JMP
Client	Ooh Media
Project Name	North Boondall Advertising Signage
Job	4848 02
Location	Queensland
Notes	Pile Cap Design

Image Info

NOT CURRENT

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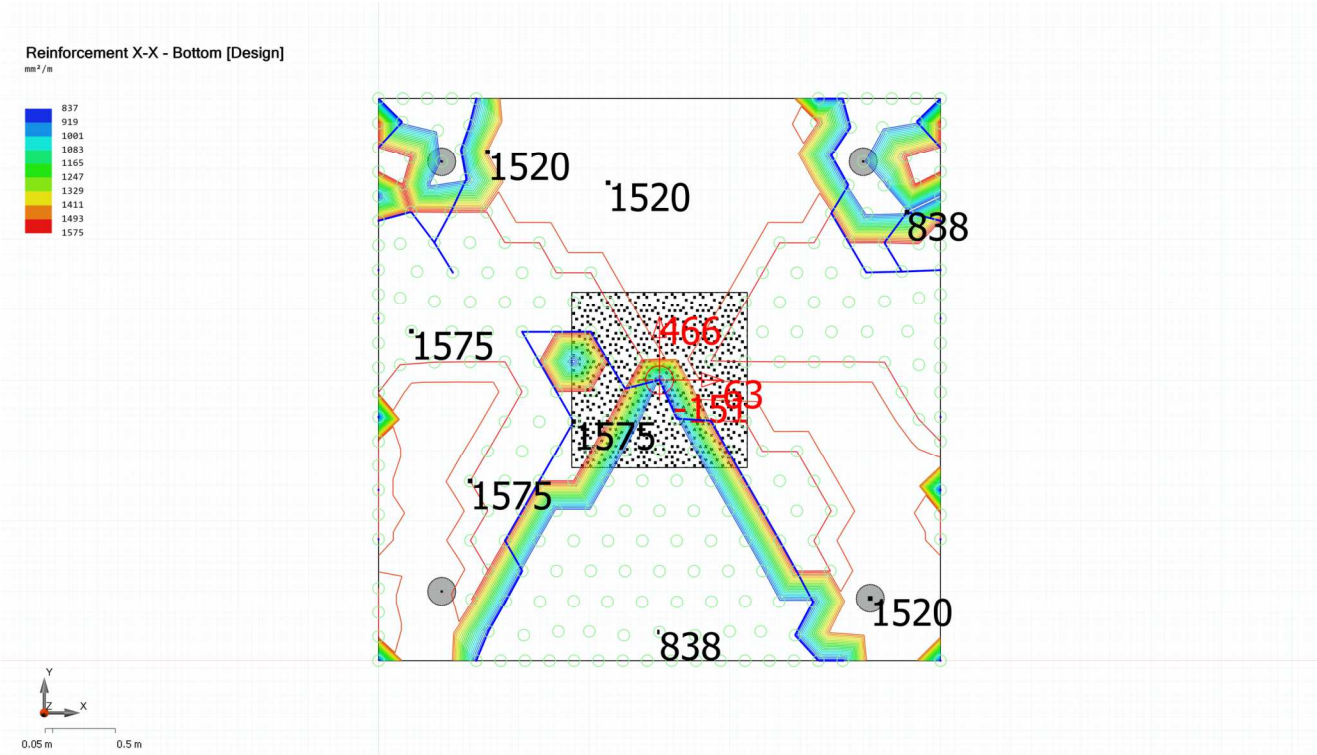
Scale	Fit to Page @ A3
View	2D
Result	ReoTopX



Model Info

File	Z:__Projects\4980-01 Princes Highway Heathcote NSW\Engineering\X Computations\footing.slbx
Company	JMP
Client	Ooh Media
Project Name	North Boondall Advertising Signage
Job	4848 02
Location	Queensland
Notes	Pile Cap Design

Image Info

NOT CURRENT

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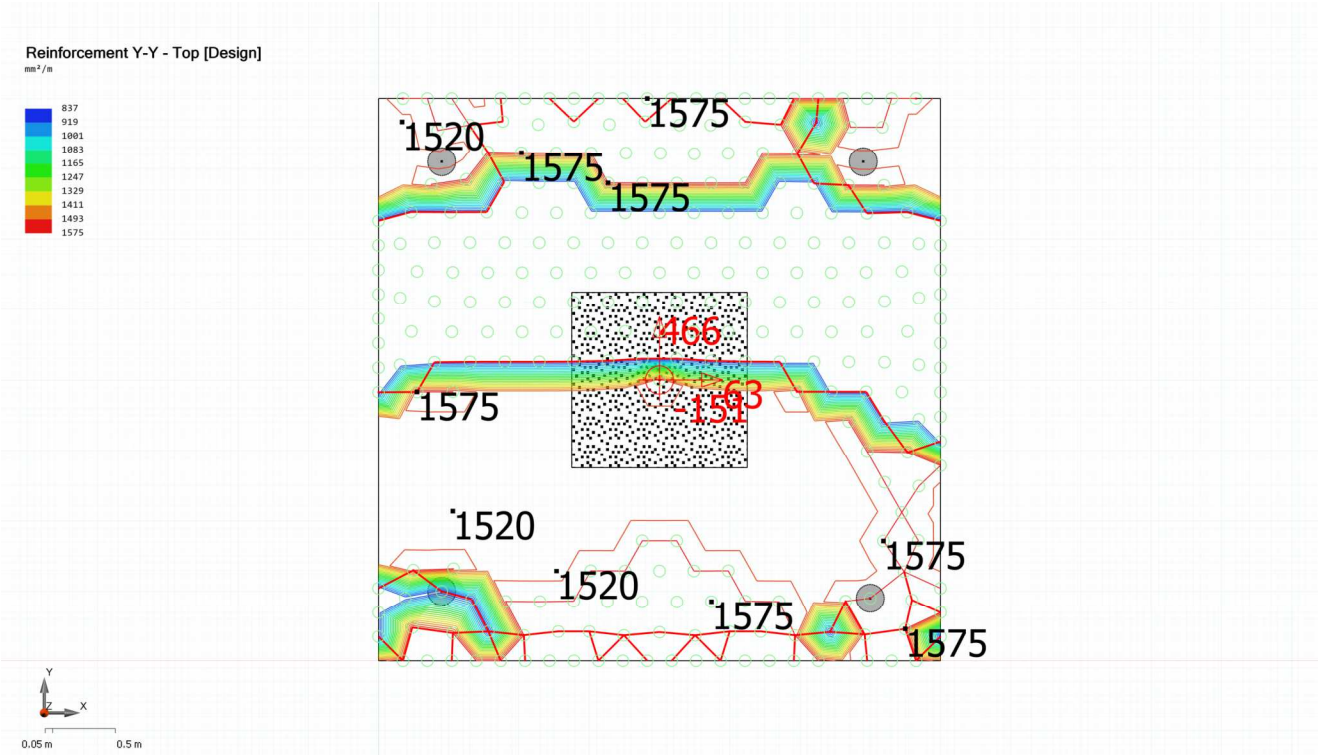
View	2D
Result	ReoBtmX



Model Info

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Company	JMP
Client	Ooh Media
Project Name	North Boondall Advertising Signage
Job	4848 02
Location	Queensland
Notes	Pile Cap Design

Image Info

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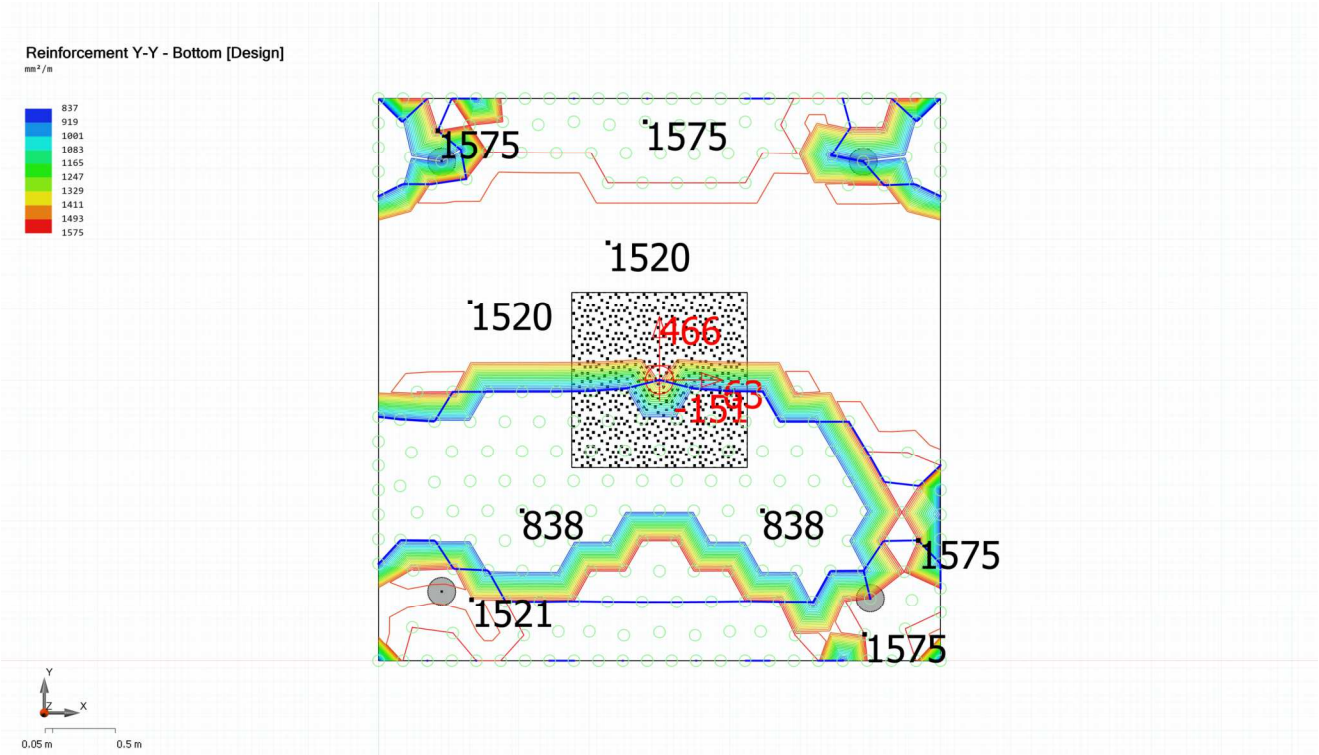
Dimensions	9.37m x 5.36m
Scale	Fit to Page @ A3
View	2D
Result	ReoTopY



Model Info

File	Z:__Projects\4980-01 Princes Highway Heathcote NSW\Engineering\X Computations\footing.slbx
Company	JMP
Client	Ooh Media
Project Name	North Boondall Advertising Signage
Job	4848 02
Location	Queensland
Notes	Pile Cap Design

Image Info

NOT CURRENT

Date taken	4/03/2024 10:55:09 AM
Dimensions	9.37m x 5.36m
Scale	Fit to Page @ A3
View	2D
Result	ReoBtmY

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J M P

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SPACE GASS 14.12 (64-bit) - JOHN MULLEN && PARTNERS PTY LTD
Path: Z:__Projects\4980-01 Princes Highway...\X Computations\Model Heatcote
Designer: Date: Monday, March 4, 2024 11:00 AM, Page: 1

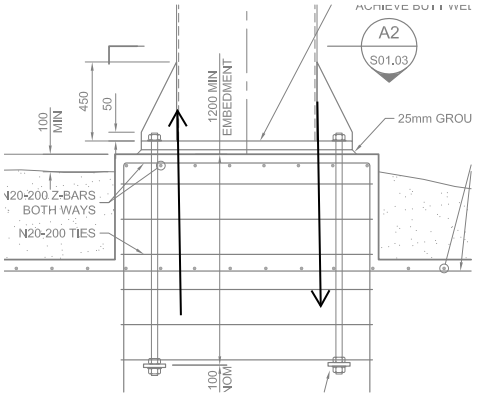
Envelope = Load Cases 10-16
and Nodes 1

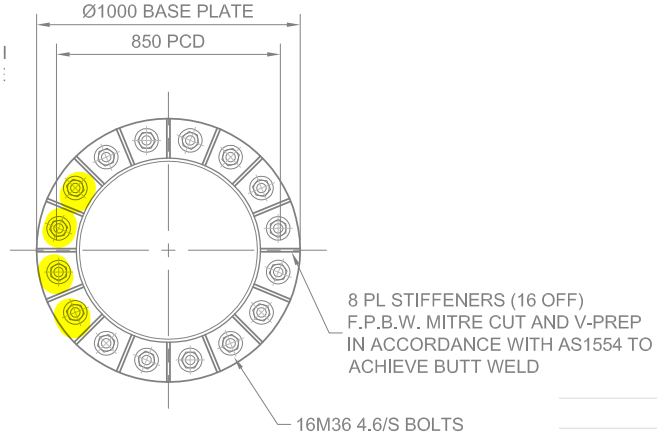
DISPLACEMENTS (mm,rad) (*=Maximum, #=Minimum)

Node	Case	Tx	Ty	Tz	Rx	Ry	Rz
1	10	0.00*#	0.00*#	0.00*#	0.00*#	0.00*#	0.00*#

REACTIONS (kN,kNm) (*=Maximum, #=Minimum)

Node	Case	Fx	Fy	Fz	Mx	My	Mz
1	10	0.00	267.91*	0.00#	-0.78#	-0.01	266.83
1	11	0.00	112.62#	54.54	377.18	-50.39	132.09#
1	13	-30.39#	112.62	0.00	-0.09	0.00	290.30
1	14	-30.39	150.16	0.00	-0.12	0.00*	334.99*
1	15	0.00	112.62	67.30*	464.79	-62.16#	132.11
1	16	0.00*	150.16	67.30	465.23*	-62.15	176.52





M* = 466kN-m

T*=C* = 466/0.7 =655kN consider 4 bolts therefore 655/4 =166kN per bolts

Axial Tension capacity of M36 bolts 4.6/S = 261kN
Shear Capacity = 151 kN

By inspection, baseplate thickness is adequate. The stiffener helps to reduced the thickness required.

	d_b	36	mm		F_{sy}	500 MPa
	f'c	32	MPa	(Must be Less than 65 MPa)		
	Cover	50	mm			
Clear Distance Between Bars		165	mm			
	k1	1		= 1.3 if horizontal bar with more than 300mm of concrete cast below) = 1.0 for all other bars		
	k2	0.96				
	k3	0.941667				
	$L_{sy.tb}$	1561	≥	1044		
	Bar Tension	166	kN	Min Bar area	415	mm^2
				Okay		
	δ_{st}	163	MPa			
Cl13.1.2.2 AS3600	L_{st}	510	mm	OK		

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Path: Z:__Projects\4980-01 Princes Highway...\X Computations\Model Heatcote
Designer: Date: Monday, March 4, 2024 11:17 AM, Page: 1

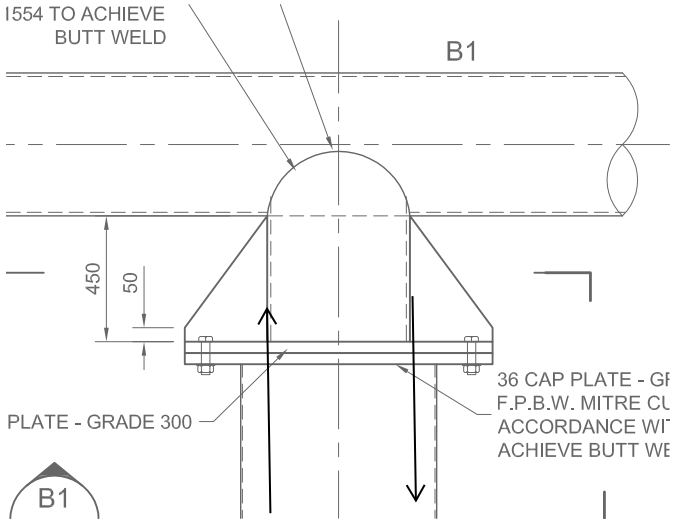
Envelope = Load Cases 10-16
and Members 2

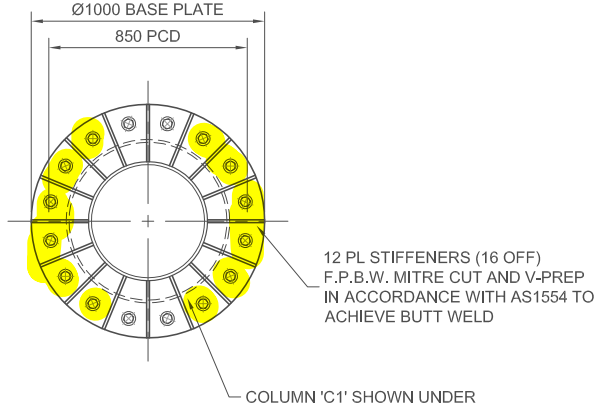
INTERMEDIATE FORCES AND MOMENTS (m,kN,kNm) (*=Maximum, #=Minimum)

Case	Member	Position Along Member	Fx	Fy	Fz	Mx	My	Mz
10	2	0.00	255.69*	0.00	0.00#	-0.01	0.78*	-263.80#
13	2	0.00	103.46	20.60*	0.00	0.00	0.09	-159.11
14	2	0.00	137.94	20.60	0.00	0.00*	0.12	-203.13
15	2	0.00	103.46	0.00	67.30*	-62.16#	-119.91#	-131.48
16	2	0.00	137.94	0.00#	67.30	-62.15	-119.79	-175.39
11	2	0.60	102.63#	0.00	54.54	-50.39	-64.69	-131.31*

INTERMEDIATE DISPLACEMENTS (m,mm) (*=Maximum, #=Minimum)

Case	Member	Position Along Member	Global X Transl'n	Global Y Transl'n	Global Z Transl'n	Local X Transl'n	Local Y Transl'n	Local Z Transl'n
11	2	0.00	5.59#	-0.11*	-12.04	-0.11*	-5.59*	-12.04
10	2	0.60	14.32	-0.30#	0.04*	-0.30#	-14.32	0.04*
14	2	0.60	15.10*	-0.16	0.01	-0.16	-15.10#	0.01
16	2	0.60	9.48	-0.16	-17.92#	-0.16	-9.48	-17.92#





M* = 265kN-m

T*=C* = 265/0.5 =530kN consider 6 bolts therefore 530/6 =88kN per bolts

Axial Tension capacity of M24 bolts 8.8/S = 234kN
Shear Capacity = 133 kN

Bending on Cap plate = 88 x .070=6.16kN-m

t= 36mm
fy=300
b=150

ϕM =0.9 x (150x36^2/6*1000000) *300= 8.748kN-m OK!

Appendices

Appendix 1 Original Structural Design Drawings

PROPOSED SIGN
PRINCESS HIGHWAY, HEATHCOTE

GENERAL

G1 These drawings shall be read in conjunction with all architectural and other consultants drawings and specifications and with such other written instructions and sketches as may be issued during the course of the Contract. Any discrepancies shall be referred to the Superintendent before proceeding with any related work. Construction from these drawings, and their associated consultants drawings is not to commence until approved by the Local Authorities.

G2 All materials and workmanship shall be in accordance with the relevant and current Standards Australia codes and with the By-Laws and Ordinances of the relevant building authorities except where varied by the project specification.

G3 All set out dimensions shall be obtained from Architect's and Engineer's details. All discrepancies shall be referred to the Architect and Engineer for decision before proceeding with related work.

G4 During construction the structure shall be maintained in a stable condition and no part shall be overstressed. Temporary bracing shall be provided by the Builder/subcontractor to keep the works and excavations stable at all times.

G5 Unless noted otherwise levels are in metres and dimensions are in millimetres.

G6 During Construction a minimum of one (1) floor shall remain fully backpropped at all times. At no time shall concrete be poured unless the floor below is fully backpropped.

G7 Any substitution of materials shall be approved by the Engineer and included in any tender.

G8 The structural components detailed on these drawings have been designed in accordance with the relevant Standards Australia codes and Local Government Ordinances for the following loadings. Refer to the Architectural drawings for proposed floor usage. Refer to drawings for live loads and superimposed dead loads.

FOUNDATION

F1 Refer to the notes on the foundation drawing for minimum allowable bearing capacity. The foundation material shall be approved by the Geotechnical Engineer for this bearing capacity before placing membrane, reinforcement or concrete.

F2 Refer to Geotechnical Report prepared by: Geotech

F3 Footings shall be located centrally under walls/columns unless noted otherwise.

F4 Do not exceed a rise of 1 in a run of 2 for the line of slope between adjacent footings or excavations.

F5 Do not backfill retaining walls (other than cantilever walls) until floor construction at top and bottom is completed. Ensure free draining backfill and drainage is in place.

F6 Footings to be constructed and backfilled as soon as possible following excavation to avoid softening or drying out by exposure. Refer to drawings for backfill requirements.

REINFORCED CONCRETE

RC1 All workmanship and materials shall be in accordance with AS 3600 current edition with amendments, except where varied by the contract documents.

RC2 Readymix concrete supply shall comply with AS 1379.

RC3 Minimum concrete quality noted on relevant drawings. All the requirements of the ACSE Concrete Specification Document 1 (latest edition) shall apply to the formwork, reinforcement and concrete unless noted otherwise.

Compressive Strength.
Sample, test, and assess to AS 1379. All testing to be conducted by a NATA registered laboratory.

The minimum frequency of sampling of the concrete at each stage shall be in accordance with the following:

No of batches supplied:	No. of samples taken:
1	1
2 to 5	2
6 to 10	3
11 to 30	4
For Each additional 10 batches	1

A sample shall consist of four cylinders, two of which shall be tested at 28 days, one at 7 days and one at 4 days. If the contractor requires early strength results, additional cylinders shall be taken in the sample as required and at the cost of the contractor.
Other quality parameters
Sample Test and assess to AS 1379 Section 5.
Slump: Test not less than one sample for each batch before placing concrete from that batch in the work. Take the samples at the point of discharge on site.
Drying Shrinkage: The maximum total drying shrinkage limit for the concrete shall be an average of 0.070% at 56 days and no single result shall exceed 0.075%. Measurement shall be in accordance with AS1012 Part 13 and be conducted by a NATA registered laboratory.
Rejection: Remove the concrete from the site.

RC4 No admixtures shall be used in concrete unless approved in writing.

RC5 Depth of beams are given first and include slab thicknesses. Slabs and beams shall be cast together unless noted otherwise.

RC6 Concrete sizes do not include thicknesses of applied finishes.

RC7 No holes, chases or embedments other than those shown on the drawings shall be made in concrete elements without the Project Engineers approval.

RC8 Concrete shall be kept free of supporting masonry with a pre-greased galvanised steel slip joint, vertical faces shall be separated by 10mm Jointex (or equal).

RC9 Construction joints shall be located to the satisfaction of the Project Engineer. The Builder shall allow for all necessary construction joints.

RC10 Conduits and pipes when cast in slabs or walls are to be placed between the reinforcement layers. Where there is only one layer of reinforcement, provide 50mm cover to conduit minimum.

RC11 Provide upward camber to formwork of reinforced concrete cantilevers of L/200 where L is the projection beyond column or wall face, and to formwork of slabs where noted on plans. Maintain slab and beam depths as shown. Provide 6mm precamber to post tensioned slabs U.N.O. on plans.

RC12 The finished concrete shall be a dense homogeneous mass, completely filling the formwork thoroughly embedding the reinforcement and free of stone pockets. All concrete including slabs on ground and footings shall be compacted with mechanical vibrators.

RC13 Slabs and beams shall be constructed to bear only on the beams, columns, walls etc. shown on the drawings. All other building elements shall be kept 12mm minimum clear from soffits of structure.

RC14 Curing of all concrete is to be achieved by keeping surfaces continuously wet for a period of 3 days, and prevention of loss of moisture for a total of 7 days followed by a gradual drying out. Approved sprayed on curing compounds that comply with AS 3799 may be used where floor finishes will not be affected. (refer Manufacturers Specification). Polythene sheeting or wet hessian may be used to retain moisture where protected from wind and traffic.

RC15 Construction support propping is to be left in place where needed to avoid overstressing the structure due to construction loading. No brickwork or partition walls are to be constructed on suspended levels until all propping is removed and the slab has absorbed its dead load deflection.

REINFORCEMENT

R1 Minimum clear concrete cover to reinforcement including ties and stirrups shall be as follows uno.

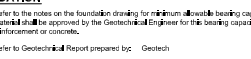
Exposure Classification	Minimum Cover (mm)				
	Concrete Strength (fc)				
	20 MPa	25 MPa	32 MPa	40 MPa	> 50 MPa
A1	20	20	20	20	20
A2	(50)	30	25	20	20
B1	•	(60)	40	30	25
B1	•	•	(65)	45	35
C	•	•	•	(70)	50

R2 All reinforcement shall be firmly supported on mild steel plastic tipped chairs, plastic chairs or concrete chairs at not more than 1 metre centre both ways. Bars shall be tied at alternate intersections. In exposure conditions greater than B1 use only plastic chairs.

R3 The Engineer shall be given 24 hours notice for reinforcement inspection.

R4 Reinforcement is shown diagrammatically and is not necessarily in true projection. Splices to reinforcement shall be made only at the locations shown, or otherwise approved by the Project Engineer.

R5 Reinforcement Symbols:
S • Denotes Grade 230 S Hot Rolled Deformed Bars to AS 1302
Y • Denotes Grade 410 Y Bars to AS 1302 Grade Y
N • Denotes Grade 500 N Bars to AS 1302
R • Denotes Grade 230 R Hot Rolled Plain Bars to AS 1302
F • Denotes Grade 450 F Hard-Drawn Wire Reinforcing Fabric to AS 1304
W • Denotes Grade 450 W Hard-Drawn High Wire to AS 1303



The figures following the symbol "F" is the reference no. for fabric to AS 1304.
Reinforcement Notation.
T • Denotes top reinforcement.
B • Denotes bottom reinforcement.
NF • Denotes near face.
FF • Denotes far face.
EF • Denotes each face.

R6 Laps in reinforcement shall be U.N.O.

	N12	N16	N20	N24	N28	N32
Top	600	800	1000	1200	1440	1600
All Other Bars	500	650	800	950	1150	1300

* • Denotes horizontal bars with 300mm or more concrete cast below.
Laps in Fabric shall be U.N.O.

Do not lap over slab supports.
Fabric cross rod to be located at cover distance from form edges.

R7 Slab reinforcement shall extend minimum 65mm onto masonry support walls and minimum 50 percent of bottom reinforcement to be cogged, to achieve anchorage at simply supported ends. Terminate all top bars with standard cogs at form edges.

R8 Site bending of deformed reinforcing bars shall be done without heating using mechanical bending tools.

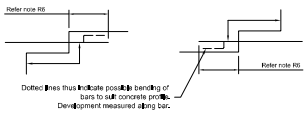
R9 Welding of reinforcement shall not be permitted unless shown on the structural drawings or approved by the Project Engineer.

R10 Joggles to bars shall be 1 bar diameter over a length of 12 bar diameters.

R11 Distribution reinforcement and tying steel shall be N12-400 minimum for conventional slabs, or N12-600 minimum for post tensioned slabs where necessary unless noted otherwise on plan. Lap with main bars 400mm U.N.O.

R12 Reinforcement crossing penetrations shall be displaced as necessary, no reinf't shall be cut without the prior written approval of the Project Engineer.

R13 Typical reinforcement lapping at steps. Refer to note R6 for development past intersection measured along bar.



TOP REINFORCEMENT BOTTOM REINFORCEMENT

STRUCTURAL STEEL

SS1 All workmanship and materials shall be in accordance with AS 4100 except where varied by the contract documents.

SS2 Unless noted otherwise, all steel shall be in accordance with AS 3678 Grade 250 or AS 3679 Grade 300, or AS 1163 Grade 350 as appropriate.

SS3 Three (3) copies or 1 transparency of workshop drawings shall be submitted to the Engineer for review at least 7 days prior to commencement of fabrication. Fabrication shall not commence without Engineers approval of workshop drawings. All dimensions and setouts to be obtained from the Architects drawings where not indicated on the Structural drawings.

SS4 The bolting procedure is designated as follows: 4.6/S Commercial bolts of grade 4.6 to AS 1111 • snug tightened 8.8/S High strength bolts of grade 8.8 to AS 1252 • snug tightened 8.8/TB High strength bolts of grade 8.8 to AS 1252 fully tensioned to AS 4100 as a bearing type Faint 8.8/TF High strength bolts of grade 8.8 to AS 1252 fully tensioned to AS 4100 as a friction type Faint with faying surfaces left uncoated.

SS5 Unless noted otherwise all fillet welds shall be 6mm continuous category SP using E41XX electrodes. All butt welds shall be complete penetration butt welds SP to AS 1554.1. All gusset plates shall be 12 mm thick. All bolts shall be M20 8.8/S in 22 mm diameter holes, minimum 2 bolts to each connection. All washers and bolts shall be galvanised.

SS6 Fabrication shall comply with AS 4100 • Section 14. Erection shall comply with AS 4100 • Section 15. /TB and /TF bolts to be installed in accordance with AS 4100 • Section 15, using either the part-turn method or the direct-tension indicator method.

SS7 Where connection forces (ie. Reactions) are shown on the drawings, connections shall be provided to transmit these forces. Connections shall provide for a minimum force of 25 kN.

SS8 Steelwork intending to be concrete encased shall be unpainted. Encasing concrete to be grade N25 providing cover adequate to suit the rating or exposure conditions. Concrete encasement shall be centrally reinforced with 5mm wire to AS 1303 or 6mm structural grade bars to AS 1302 at 150 mm pitch.

SS9 All steelwork below ground shall be encased by 75 mm of concrete, steel wrapped with FGW41 placed 25 mm clear of steel. Provide 50 mm minimum encasing.

SS10 Steelwork not to be concrete encased shall be given one shop coat of an approved primer unless noted otherwise. Faces of friction grip connections shall not be painted. Refer to architectural specifications for coatings schedule.

SS11 The builder shall provide all cleats and drill all holes necessary for fixing steel to steel and timber and other elements to steel whether or not detailed in the drawings.

SS12 Unless noted otherwise camber shall be provided to all roof beams, trusses, portals etc. At 5 mm per 2000mm of span. No member shall be erected with negative camber.

SS13 Provide seal plates to the plates to the ends of all hollow sections, with "breather" holes if members to be hot dip galvanised.

SS14 All steelwork shall be securely temporarily braced by the erector as necessary to stabilise the structure during erection. Design of all temporary bracing is the responsibility of the erector. Specific design details are to be forwarded onto the project engineer upon request.

SS15 All bolts shall be of such length that at least one full thread is exposed beyond the nut after the nut has been tightened.

SS16 Minimum one washer shall be used under the nut in all situations. If tightening is carried out at the head, and additional washer is to be used under the head. For slotted holes use hardened washer under the nut and bolt head.

SS17 Unless noted otherwise all material to be: Grade 250 Hot Rolled Plates, Flats, Angles (100 x 100 or 125 x 75 and smaller) Grade 300 •All WB's and WC's Grade 300 Plus •All UB's, UC's, PFC's and larger angles. Grade 350 •All RHS's, and CHS's.

SS18 All galvanizing of structural steelwork to AS 1650. The continuous average zinc coating mass to be 600 g/ m2 (550 g/m2 minimum)

SS19 The fabrication and erection of the structural steelwork shall be supervised by a qualified engineer, experienced in such supervision, to ensure that all requirements of the design are met.

SS20 Surface finishes for all structural steelwork to be in accordance with the Architectural specification.

FORMWORK

FW1 The design certification, construction and performance of the formwork and false work shall be the responsibility of the builder/subcontractor, unless specific design requirements are shown on the engineering drawings.

FW2 Formwork design, construction tolerances and striking times shall comply with AS 3610 and AS 3600 unless otherwise approved by the Project Structural Engineer.

FW3 During construction, support propping will be required where loads from stacked materials, formwork and other supported slabs induce loads in a slab or beam which exceed the design load for strength or serviceability at that age. Once the nominated 28 day strength has been attained, these loads shall not exceed the design superimposed loads set out in the general notes.

FW4 Stripping of formwork and backpropping details shall be in accordance with AS 3600 clause 17.6 , and shall be carried out by a suitably qualified and experienced person. Refer to the project engineer for any specific requirements which may be specified. Refer to note G6.

FW5 The formwork shall not be designed to rely on restraint or support from the permanent structure without prior approval from the Project Structural Engineer.

FW6 The formwork shall be designed to accommodate movements and load redistribution due to post tensioning.

FW7 Concrete formed surfaces shall have finishes in accordance with AS 3610, as specified by the Project Architect.

FW8 Do not place permanent loads, including masonry walls and the like, on the concrete structure until after the formwork and backpropping has been removed. Refer to note RC15.

FW9 Design information concerning the foundation formwork shall be determined from the conditions existing on site at the time of construction. Also refer Geotechnical Report where available for further details.

FW10 Refer to Architects drawings for test panel details. Reinforcement for test panels shall be similar to that in the permanent structure being represented.

FW11 Formwork and scaffolding shall be extended beyond tendon anchorage point to provide space for stressing operations where required. Safety hoarding for stressing shall be provided as necessary.

FW12 Provide independent third party certification of adequacy of all formwork prior to pouring any concrete. Certification shall be by a suitably qualified structural engineer registered on the National Professional Engineers register.

FW13 The contractor shall develop a written construction procedure for the placing of concrete in tall members. This may require the provision of inspection and pouring openings in formwork, or construction joints at locations approved by the architect. The construction procedure shall be submitted to the engineer for acceptance with respect to compliance with the design intent.FW14 All slabs, beams, columns, walls etc have been designed for their final design loads when acting as a part of a total structure. Propping and temporary supports that may be required to maintain the temporary structural adequacy during construction shall be the responsibility of the contractor.

NOTE: DO NOT SCALE OFF DRAWINGS. REFER TO ARCHITECTURAL PLANS. VERIFY DIMENSIONS ON SITE

REV	DATE	DESCRIPTION
B	08.02.10	ISSUED FOR APPROVAL
A	02.02.10	ISSUED FOR CONSTRUCTION

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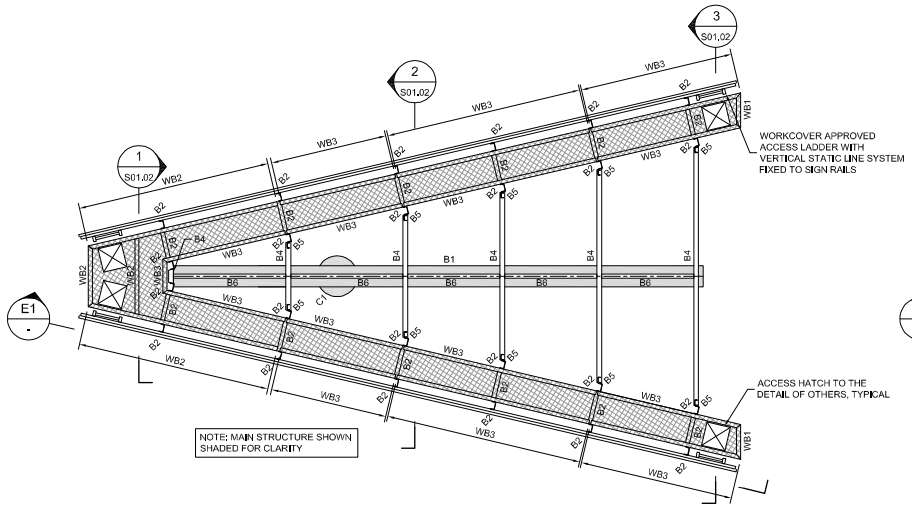
PROPOSED SIGN
PRINCESS HIGHWAY, HEATHCOTE
FOR OUTDOOR FABRICATIONS

GENERAL NOTES

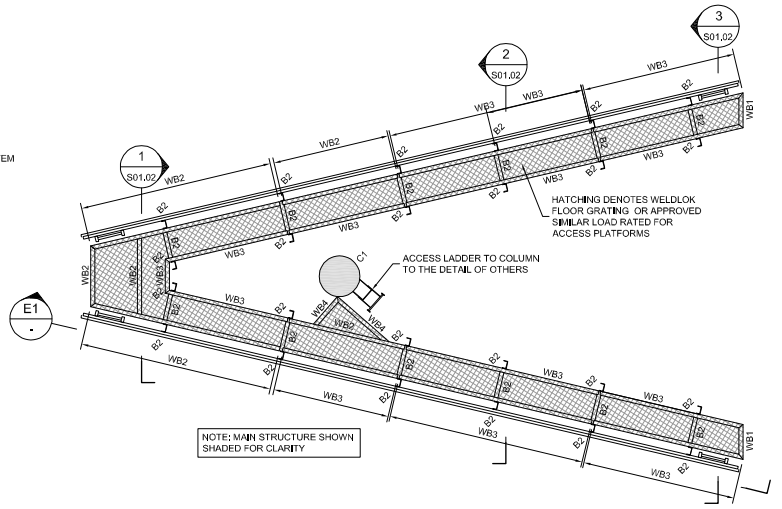
JOB NUMBER:	DWG NUMBER:	ORIGINAL SIZE:
10004	S01.00	A1
DESIGNED BY:	DATE:	
A.M.	JANUARY 2010	
DRAWN BY:	SCALE:	
A.P.		

ELEMENT CONCRETE QUALITY	STRENGTH f'c	MAX SIZE AGG, mm	SLUMP mm	CEMENT TYPE	ADMIXTURE
FOOTING	40	20	80	GP	-

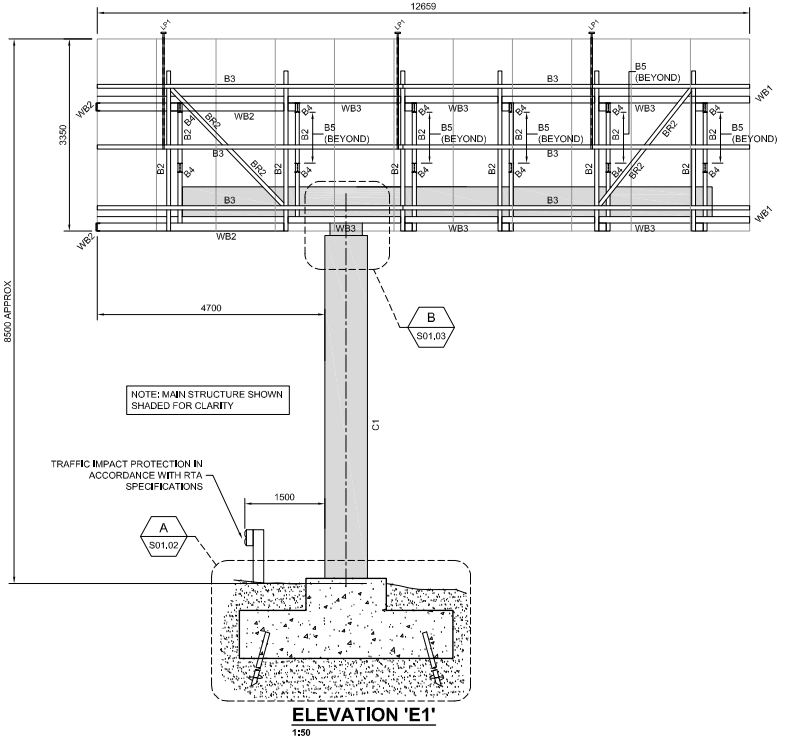
REFER TO GENERAL NOTES FOR REINFORCEMENT COVER



TOP VIEW OF SIGN



VIEW OF SIGN WALKWAY AT LOWER LEVEL
1:50



ELEVATION 'E1'
1:50

STRUCTURAL MEMBER SCHEDULE

MARK	DESCRIPTION	SIZE	COMMENTS
C1	COLUMN	Ø700 x 12mm	GRADE 300 PLUS
B1	BEAM	508 x 12,7 CHS	GRADE C250L0
B2	BEAM	150 PFC	GRADE 300 PLUS
B3	BEAM	75 x 50 x 4,0 RHS	GRADE C350L0
B4	BEAM	180 UB 18,1	GRADE 300 PLUS
B5	BEAM	100 PFC	GRADE 300 PLUS
B6	BEAM	75 x 8 EA	GRADE 300 PLUS
WB1	WALKWAY BEAM	125 x 75 x 8 UA	GRADE 300 PLUS
WB2	WALKWAY BEAM	150 PFC + 125 x 75 x 8 UA	GRADE 300 PLUS
WB3	WALKWAY BEAM	125 x 75 x 8 UA	GRADE 300 PLUS
WB4	WALKWAY BEAM	125 x 75 x 8 UA	GRADE 300 PLUS
BR1	BRACE	76,1 x 4,0 CHS	GRADE C350L0
BR2	BRACE	75 x 4,5 SHS	GRADE C250L0
LP1	LIGHT POST	48,3x2,9 CHS	GRADE C350L0

NOTE: ALL EXTERNAL STEEL TO BE HOT DIPPED GALVANISED

NOTE: DO NOT SCALE OFF DRAWINGS. REFER TO ARCHITECTURAL PLANS, VERIFY DIMENSIONS ON SITE

REV.	DATE	DESCRIPTION
C	09.02.10	MINOR AMENDMENTS
B	08.02.10	ISSUED FOR APPROVAL
A	02.02.10	ISSUED FOR CONSTRUCTION

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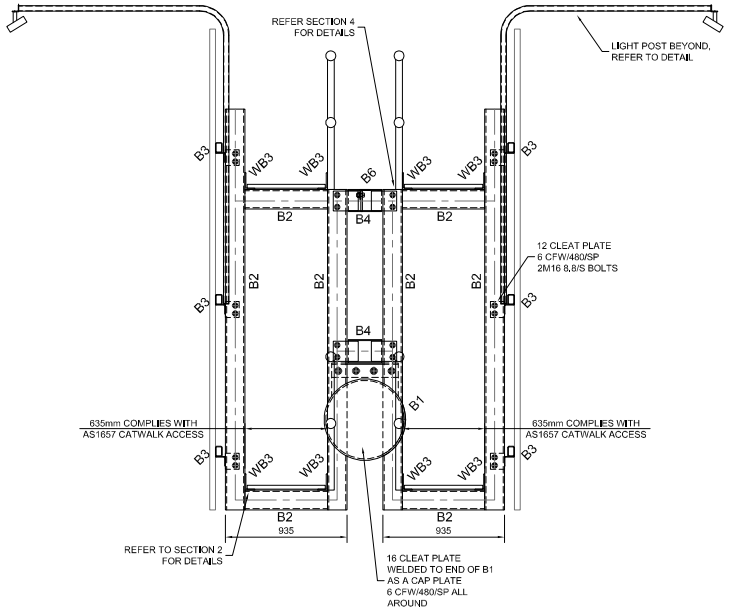
PROPOSED SIGN

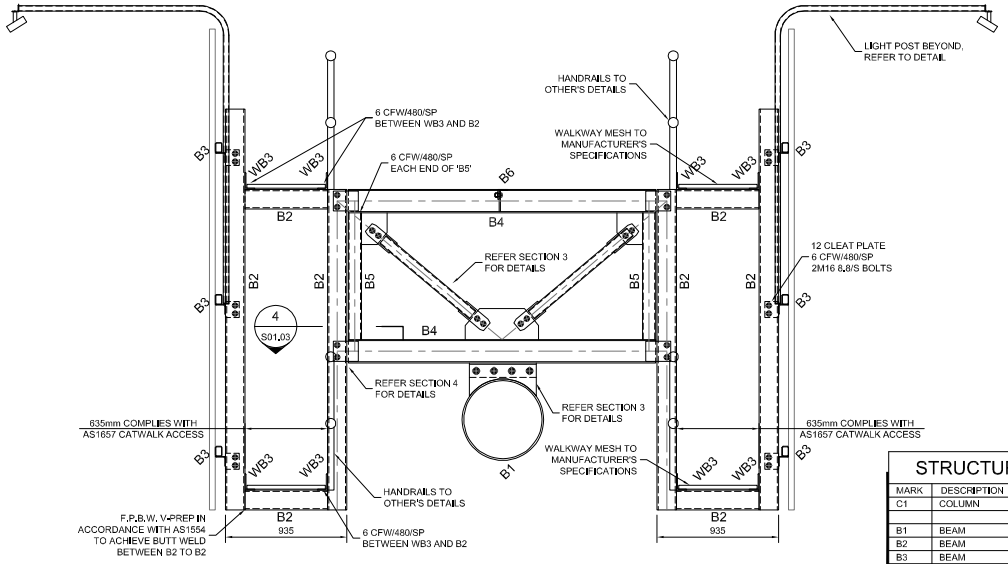
PRINCESS HIGHWAY, HEATHCOTE
FOR OUTDOOR FABRICATIONS

SIGN PLANS & ELEVATIONS

JOB NUMBER:	DWG NUMBER:	ORIGINAL SIZE:
10004	S01.01	A1
DESIGNED BY:	DATE:	
A.M.	JANUARY 2010	
DRAWN BY:	SCALE:	
A.P.	1:50	



SECTION 1 — S01.01 — 1:20

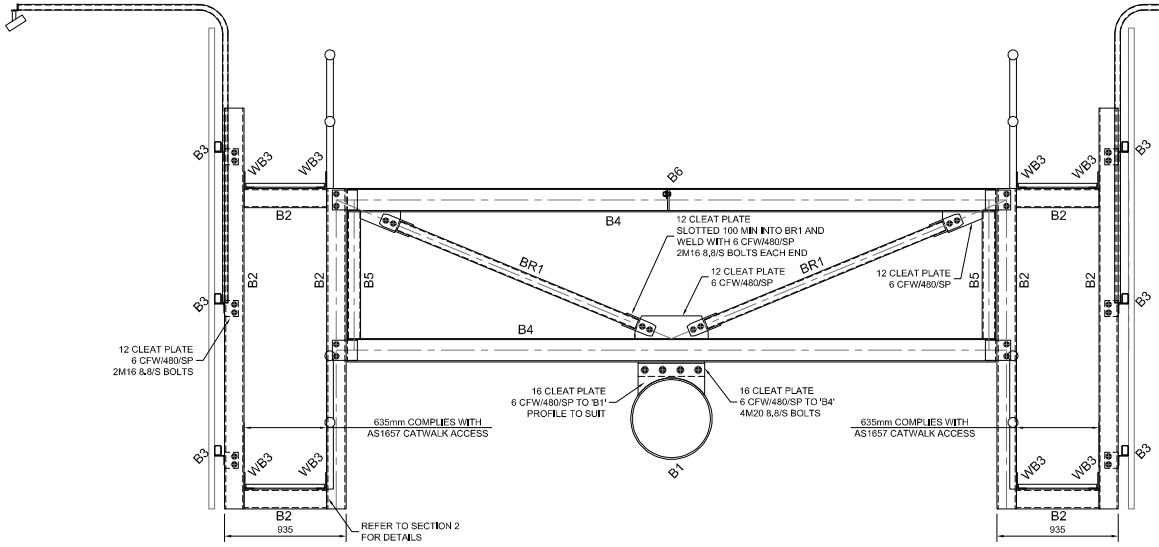


SECTION 2 — S01.01 — 1:20

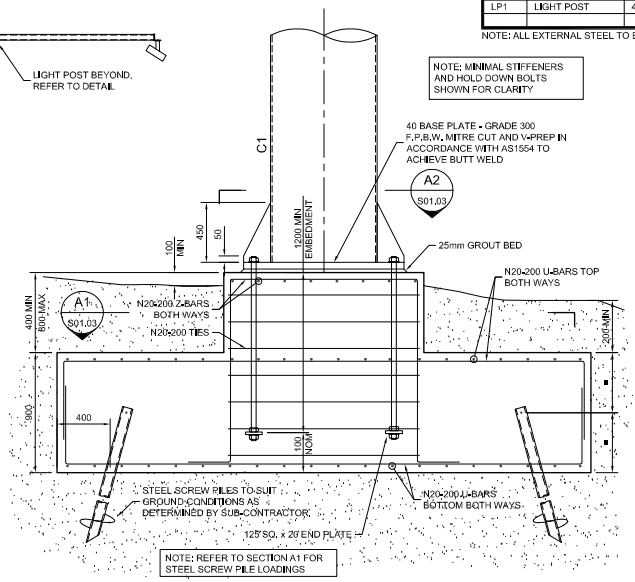
STRUCTURAL MEMBER SCHEDULE

MARK	DESCRIPTION	SIZE	COMMENTS
C1	COLUMN	Ø700 x 12mm	GRADE 300 PLUS
B1	BEAM	508 x 12.7 CHS	GRADE C250L0
B2	BEAM	150 PFC	GRADE 300 PLUS
B3	BEAM	75 x 50 x 4.0 RHS	GRADE C350L0
B4	BEAM	180 UB 18.1	GRADE 300 PLUS
B5	BEAM	100 PFC	GRADE 300 PLUS
B6	BEAM	75 x 8 EA	GRADE 300 PLUS
WB1	WALKWAY BEAM	125 x 75 x 8 UA	GRADE 300 PLUS
WB2	WALKWAY BEAM	150 PFC + 125 x 75 x 8 UA	GRADE 300 PLUS
WB3	WALKWAY BEAM	125 x 75 x 8 UA	GRADE 300 PLUS
WB4	WALKWAY BEAM	125 x 75 x 8 UA	GRADE 300 PLUS
BR1	BRACE	76.1 x 4.0 CHS	GRADE C350L0
BR2	BRACE	75 x 4.5 SHS	GRADE C250L0
LP1	LIGHT POST	48.3x2.9 CHS	GRADE C350L0

NOTE: ALL EXTERNAL STEEL TO BE HOT DIPPED GALVANISED



SECTION 3 — S01.01 — 1:20



DETAIL A — S01.01 — 1:20

NOTE: DO NOT SCALE OFF DRAWINGS. REFER TO ARCHITECTURAL PLANS, VERIFY DIMENSIONS ON SITE

REV.	DATE	DESCRIPTION
C	09.02.10	MINOR AMENDMENTS
B	08.02.10	ISSUED FOR APPROVAL
A	02.02.10	ISSUED FOR CONSTRUCTION

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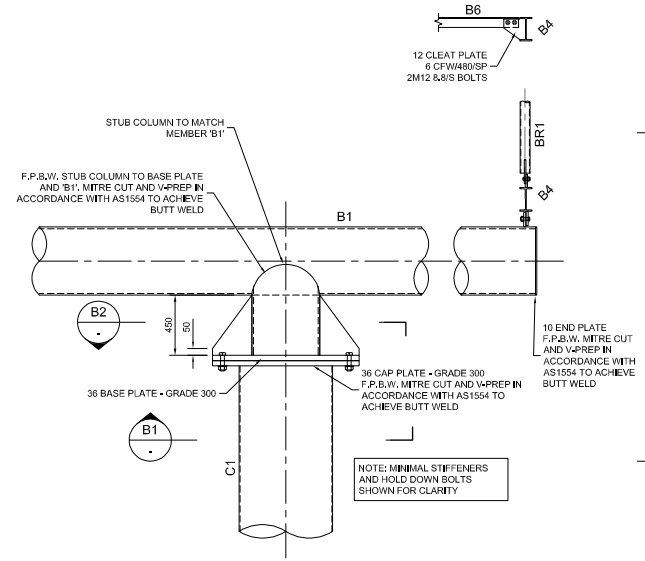
PROPOSED SIGN

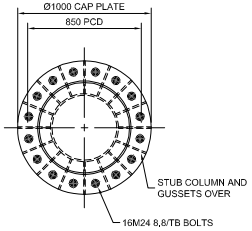
PRINCESS HIGHWAY, HEATHCOTE
FOR OUTDOOR FABRICATIONS

SIGN SECTIONS & DETAILS

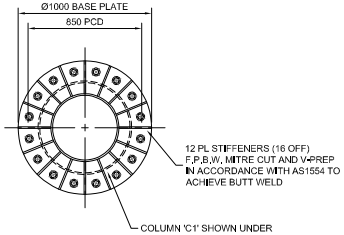
JOB NUMBER:	DWG NUMBER:	ORIGINAL SIZE:
10004	S01.02	A1
DESIGNED BY:	DATE:	
A.M.	JANUARY 2010	
DRAWN BY:	SCALE:	
A.P.	1:20	



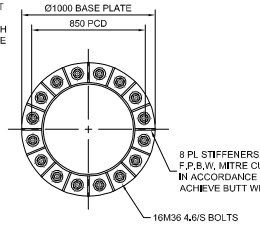
DETAIL B — 1:20 — S01.01



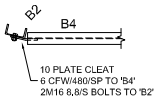
SECTION B1 — 1:20



SECTION B1 — 1:20



SECTION A2 — 1:20 — S01.02



SECTION 4 — 1:20 — S01.02

STRUCTURAL MEMBER SCHEDULE

MARK	DESCRIPTION	SIZE	COMMENTS
C1	COLUMN	Ø700 x 12mm	GRADE 300 PLUS
B1	BEAM	508 x 12.7 CHS	GRADE C250L0
B2	BEAM	150 PFC	GRADE 300 PLUS
B3	BEAM	75 x 50 x 4.0 RHS	GRADE C350L0
B4	BEAM	180 UB 18.1	GRADE 300 PLUS
B5	BEAM	100 PFC	GRADE 300 PLUS
B6	BEAM	75 x 8 EA	GRADE 300 PLUS
WB1	WALKWAY BEAM	125 x 75 x 8 UA	GRADE 300 PLUS
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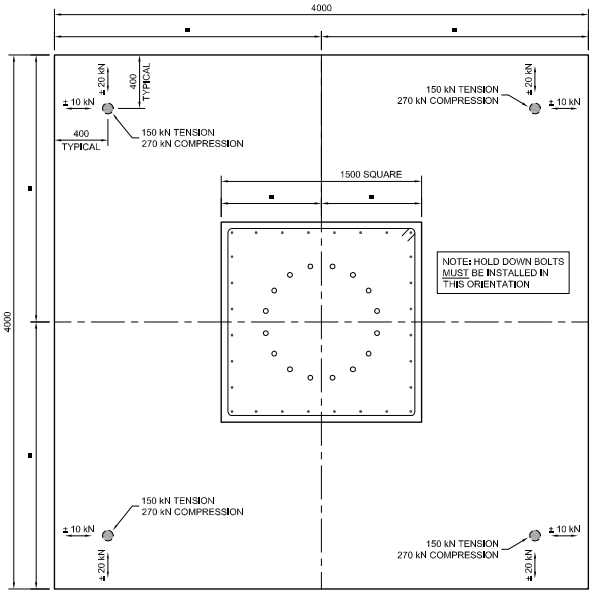
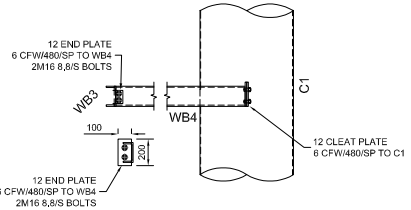
BR2	BRACE	75 x 4.5 SHS	GRADE C250L0
LP1	LIGHT POST	48.3x2.9 CHS	GRADE C350L0

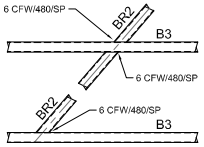
NOTE: ALL EXTERNAL STEEL TO BE HOT DIPPED GALVANISED



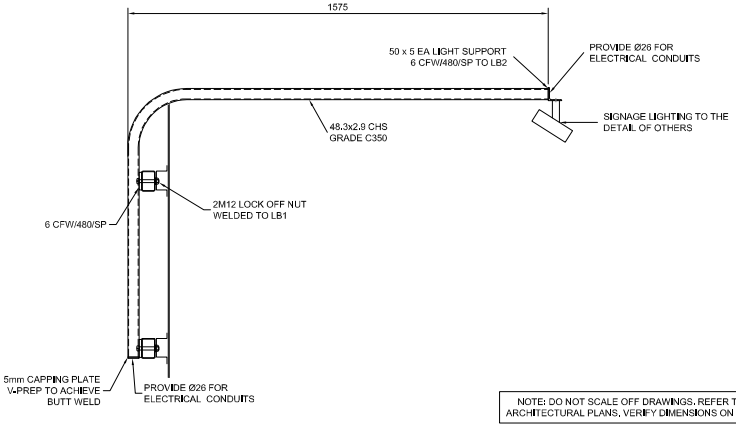
SECTION A1 — 1:20 — S01.02



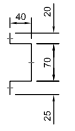
WALKWAY BEAM 'WB4' DETAILS — 1:20



BRACING BR2 DETAIL — 1:20



LIGHT POST DETAIL — 1:10

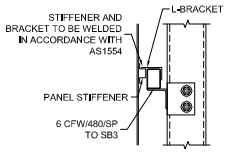


MATERIAL: 1.1mm ZINCANNEAL

PANEL STIFFENER DETAIL — 1:5

MATERIAL: 4mm GALVANISED
STEEL L-SECTION

BRACKET 'B' DETAIL — 1:5



HANGER BRACKET DETAIL — 1:10

NOTE: DO NOT SCALE OFF DRAWINGS. REFER TO ARCHITECTURAL PLANS, VERIFY DIMENSIONS ON SITE

REV.	DATE	DESCRIPTION
C	09.02.10	MINOR AMENDMENTS
B	08.02.10	ISSUED FOR APPROVAL
A	02.02.10	ISSUED FOR CONSTRUCTION

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PROPOSED SIGN

PRINCESS HIGHWAY, HEATHCOTE
FOR OUTDOOR FABRICATIONS

SIGN DETAILS

JOB NUMBER:	DWG NUMBER:	ORIGINAL SIZE:
10004	S01.03	A1
DESIGNED BY:	DATE:	
A.M.	JANUARY 2010	
DRAWN BY:	SCALE:	
A.P.	1:20, 1:10, 1:5	

Appendix 2 Structural Condition Report

ARCADIS Design & Consultancy for natural and built assets

ADVERTISING SIGNAGE STRUCTURE

Princes Highway, Heathcote – Inbound & Outbound

Structural Condition Report

06 OCTOBER 2023

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OOH! MEDIA
ADVERTISING SIGNAGE STRUCTURE

Princes Highway, Heathcote – Inbound & Outbound - Structural Condition Report

Author	Chris Slater	
Checker	Michael Cheng	
Approver	Michael Cheng	
Report No	30110779	
Date	6/10/2023	
Revision Text	1	

REVISIONS

Revision	Date	Description	Prepared by	Approved by
1	06/10/23	First issue	CS	MC

CONTENTS

1 INTRODUCTION

1.1 General

Arcadis Australia Pacific Pty Ltd (Arcadis) was engaged by oOh! Media to conduct a structural condition report on the monopole advertising signage structure located on the eastern side of the Princes Highway, Heathcote.

Figure 1 Locality Plan

1.2 Site Visit

Chris Slater of Arcadis visited the site on Thursday 5th October 2023. The purpose of this visit was to undertake a detailed inspection of the advertising signage structure from all accessible areas. The inspection was achieved using a safety harness and working at height precautions in accordance with Work Health and Safety Regulations 2017.

The weather at the time of the inspection was fine and sunny.

During this visit, information and photographs were recorded regarding the condition of the fixing components, framing members, protective surfacing, and other relevant material with respect to the performance of the signage structure. All caption comments are indicative, with the true condition record being the photographic record.

2 DESCRIPTION

The signage structure is commonly referred to as a double sided ‘V’ shaped front lit ‘Supersite’ monopole, having a nominal display size of 12.660m long x 3.350m high.

The signage structure comprises a freestanding galvanised monopole with a flanged connection for attaching a galvanised torsion beam. A series of trussed frames (6 in total) are attached to the top of the torsion beam. These trussed frames are a fully welded assembly comprising channels with circular hollow section members for bracing.

Photo 1 – Monopole to torsion beam flanged connection.

Photo 2 – Typical trussed frame connected to top of torsion beam.

Cantilevering from the end of each trussed frame is a twin-level gantry. Like the trussed frames, the gantry elements (channels with angle members for bracing) are fully welded, and support and upper and lower catwalk.

Both catwalks are nominally 600mm wide, and are equipped with compliant handrails and kick rails, and have a permanent fixed ladder located at each end, providing access between the gantry levels. The ends of the upper catwalk are fitted with self-closing gates that allow the user to pass from the fixed ladder onto the catwalk, with the gate closing behind them, thus providing adequate fall protection.

Three horizontal rails (75 x 50 RHS) are connected to the front face of each gantry frame via fully welded seating angles. These rails support the respective sign faces, which comprise folded sheet metal segments, commonly referred to as `signage pans`.

The `signage pans` are separate entities, nominally 1200mm wide for the full height of the advertising sign, providing a flat backing for the vinyl advertising skin to be attached. As mentioned previously the `signage pans` are fabricated from sheet metal that has been folded to provide rigidity/stiffness, together with additional spot welded girts at the horizontal rail locations. These elements are fixed to the horizontal rails via angle brackets, and `Tek` screws.

The signage structure is also equipped with three cantilever floodlights that illuminate the front of the advertising sign.

Access to the lower catwalk is gained by a fixed vertical ladder attached to the monopole.

Photo 3 – Vertical access ladder viewed from above.

During the inspection no other obvious defects that might warrant further investigation were noticed. However, that does not preclude the possibility that other less obvious defects may exist and were concealed.

For the intent of this report Arcadis has assumed that the existing signage structure, has been designed and constructed in accordance with relevant Australian codes/standards, and is structurally adequate for its purpose.

Photo 4 – General view of outbound advertising signage structure.

Photo 5 – General view of inbound advertising signage structure.

3 STRUCTURAL CONDITION & OBSERVATIONS

Generally, the signage structure, including the monopole and superstructure, is in a satisfactory condition (refer photos 6 to 9).

Photo 6 – General base view

Photo 7 – General view from underside

Photo 8 – General view of bottom gantry

Photo 9 – General view of top gantry

However, there are some issues that need to be addressed.

The issues observed were:

- Minor surface corrosion to hold down bolts.

Photo 10 – Minor surface corrosion to hold down bolts.

- Minor surface corrosion to monopole vertical ladder support brackets.

Photo 11 – Minor surface corrosion to vertical ladder support brackets.

- Surface corrosion to gantry vertical ladder framing.

Photo 12 – Surface corrosion to gantry vertical ladder.

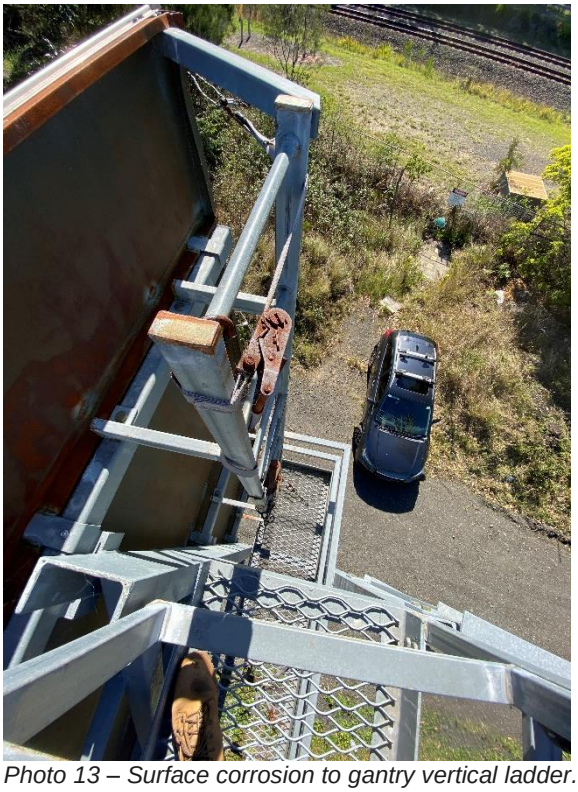

Photo 13 – Surface corrosion to gantry vertical ladder.

- Surface corrosion to signage pans.

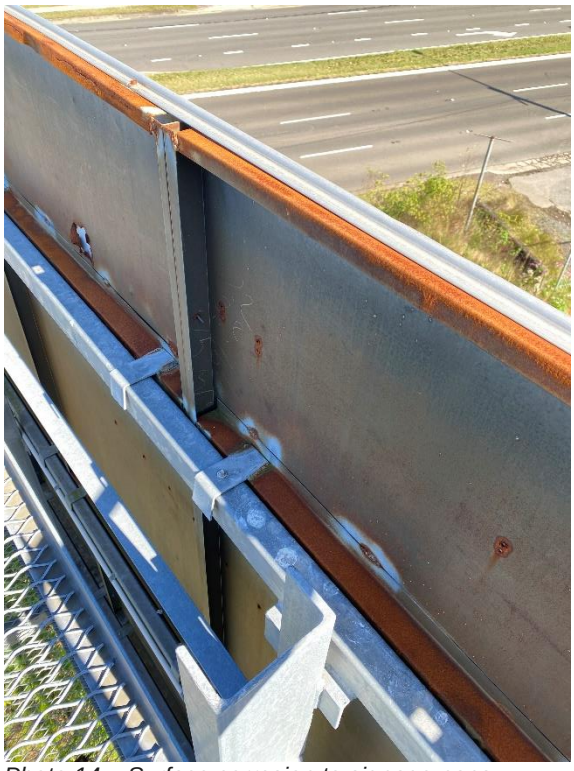

Photo 14 – Surface corrosion to signage pans.

Photo 15 – Surface corrosion to signage pans.

- Surface corrosion to handrailing.

Photo 16 – Surface corrosion to handrailing (outbound side).

Photo 17 - Surface corrosion to handrailing (outbound side).

Photo 18 - Surface corrosion to handrailing (western end).

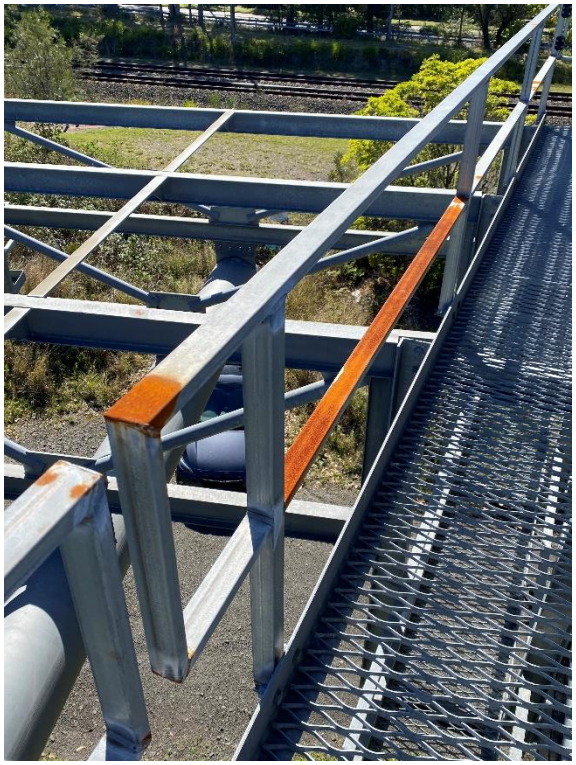

Photo 19 - Surface corrosion to handrailing (inbound side).

- Deformation/buckling of the signage pans located at the top right of the inbound-facing sign, which has likely resulted from a combination of the cantilever distance of the pan from the horizontal rail, and the amount of tension applied to the ratchet straps during the vinyl advertising skin installation. The deformation observed is not structurally significant, although it may impact on the appearance of the advertisement.

Photo 20 – Deformation to signage pan.

- Corrosion to electrical conduit saddle brackets (typical).

Photo 21 – Typical corroding conduit saddle brackets.

4 RECOMMENDATIONS

We would recommend that the surface corrosion be wire brush cleaned and treated with a proprietary cold galvanising paint at the next scheduled maintenance programme, to avoid further corrosion developing and potentially more costly remediation. This may involve the complete replacement of bolts, conduit saddle brackets, and signage pans.

The deformed/damaged signage pan does not affect the overall structural performance of the signage structure. However, should the aesthetics of the advertisement be unacceptable, the signage pans could either be repaired or replaced, and a permanent strut member introduced to prevent the signage pan buckling under the tension load of the ratchet strap.

Arcadis would recommend that the signage structure be re-inspected every three (3) years from the date of this report.

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