18-002598.03

REPORT

FALL ARREST SYSTEM FOR SIGN STRUCTURE

Prepared for **MULPHA NORWEST**

Document information

GENERAL INFORMATION

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Version	A
Path/file name	File: File: \\sydnas01\Projects\18\18-002598 - OWR Pedestrian Bridge Maintenance\04_DataEx\Out\Client\Signage Fall Arrest Design Statement\18-002598.03-RPT-Signage Fall Arrest Design Statement-20230627.pdf
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Reviewed by	Glen Iseppi
Approved by	Fred Moshiri
Security classification	Commercial-in-Confidence

HISTORY OF CHANGES

Version	Date	Checked by
A	27-Jun-2023	Glen Iseppi

Version	Date	Approved by
A	27-Jun-2023	Fred Moshiri

egis

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1 EXECUTIVE SUMMARY

The pedestrian bridge over Old Windsor Road at the intersection of Old Windsor Road and Norbrik Drive, Bella Vista, spans over 40m and was constructed in 2009.

The two signboards on the bridge are of similar height and length, measuring approximately 12m. They align with the cross-section of the bridge and have subframes with a width of approximately 600mm. It seems that the signboards are clamped onto the bottom truss chords of the bridge using four cantilevered beams. There are two signage boards affixed to each side of the bridge.

MULPHA Norwest Pty Ltd engaged Calibre (Egis) to undertake design of a fall arrest system intended to prevent the sign structure falling on the road in accordance with current TfNSW condition of consent. This structural assessment report represents the findings of the assessment and outlines design assumptions relevant to the design of the fall arrest system.

2 INTRODUCTION AND BACKGROUND

The pedestrian bridge, located at the intersection of Old Windsor Road and Norbrik Drive, Bella Vista serves as a crucial transportation link for pedestrians, providing safe passage over Old Windsor Road as shown in Figures 1 and 2. The bridge consists of steel framed trusses and a Bondek concrete slab deck. The structure is supported at each end by steel piers founded on a concrete footing.

Calibre (Egis) have been engaged by MULPHA Norwest Pty Ltd to undertake design of a fall arrest system intended to prevent the sign structure falling on the road in accordance with current TfNSW condition of consent. The signboards were visually inspected and reported by Van Boma Engineering outlined in the structural investigation report (project No C2202B- Rev 1.0 dated 2 Dec 2022).

This structural assessment report represents the findings of the assessment and outlines design assumptions relevant to the design of the fall arrest system.

The signboards on the bridge are of similar height and length, measuring approximately 12m. They align with the cross-section of the bridge and have subframes with a width of approximately 600mm. It seems that the signboards are clamped onto the bottom truss chords of the bridge using four cantilevered beams. There are two signage boards affixed to each side of the bridge. Our observations indicate that the signboards might also be secured to the top cross members of the bridge truss at six locations using bolts. The signboards and their connections are shown in Figures 3 to 8.

The two signage boards have been connected to the bridge few years after currently attached to either side of the bridge.

The structural details of the signage box designed by O'Hearn are shown in Appendix A.

The adequacy of the bridge to carry additional permanent and temporary loads due to installation of the signboards has been checked by Hyder and a copy of their certificate of the bridge structure for signboard loads are given in Appendix B.

Fred Moshiri and Matt Bozorg from Calibre (Egis) conducted the site inspections on Thursday, 9th March. The signboard and its connection to the bridge was visually inspected to identify the most suitable fall arrest solution. The report focused on the design documentation and visual assessment of the signboards attached to the bridge.

FIGURE 1: PEDESTRIAN BRIDGE ON 20 OCT 2009 (SOURCE: NEARMAP)

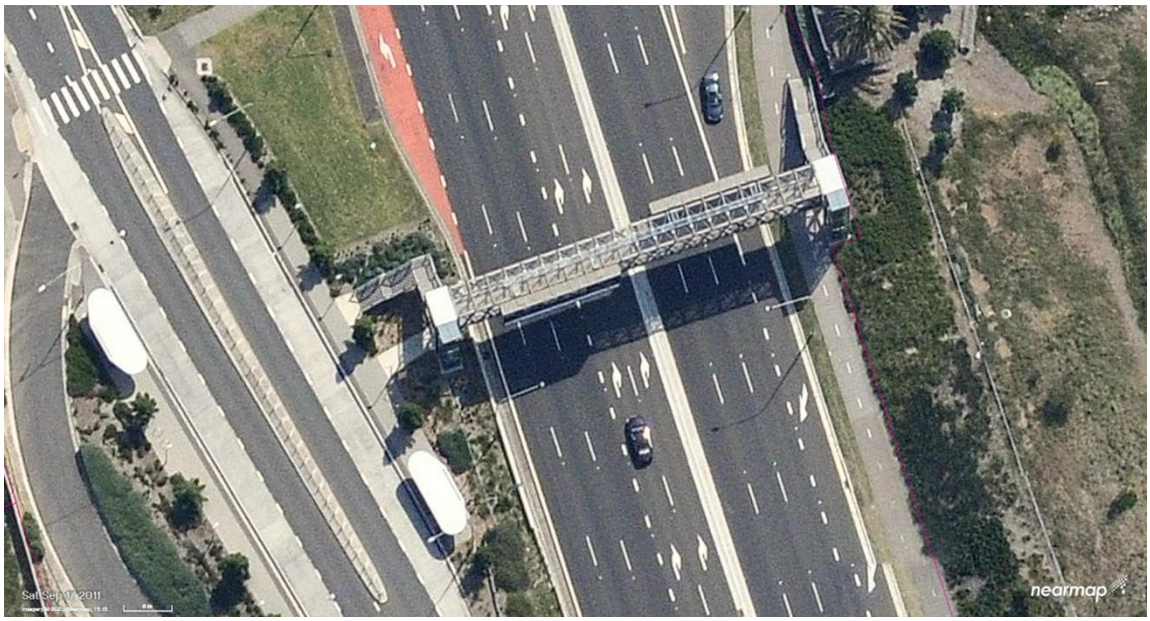


FIGURE 2: PEDESTRIAN BRIDGE ON 30 MARCH 2023 (SOURCE: NEARMAP)

FIGURE 3: SIGN BOARD ATTACHED AT THE EASTERN SIDE OF THE BRIDGE

FIGURE 4: SIGN BOARD ATTACHED AT THE EASTERN SIDE OF THE BRIDGE

FIGURE 5: OUTRIGGERS SUPPORTING THE BOTTOM OF THE EASTERN AND WESTERN SIGNBOARDS

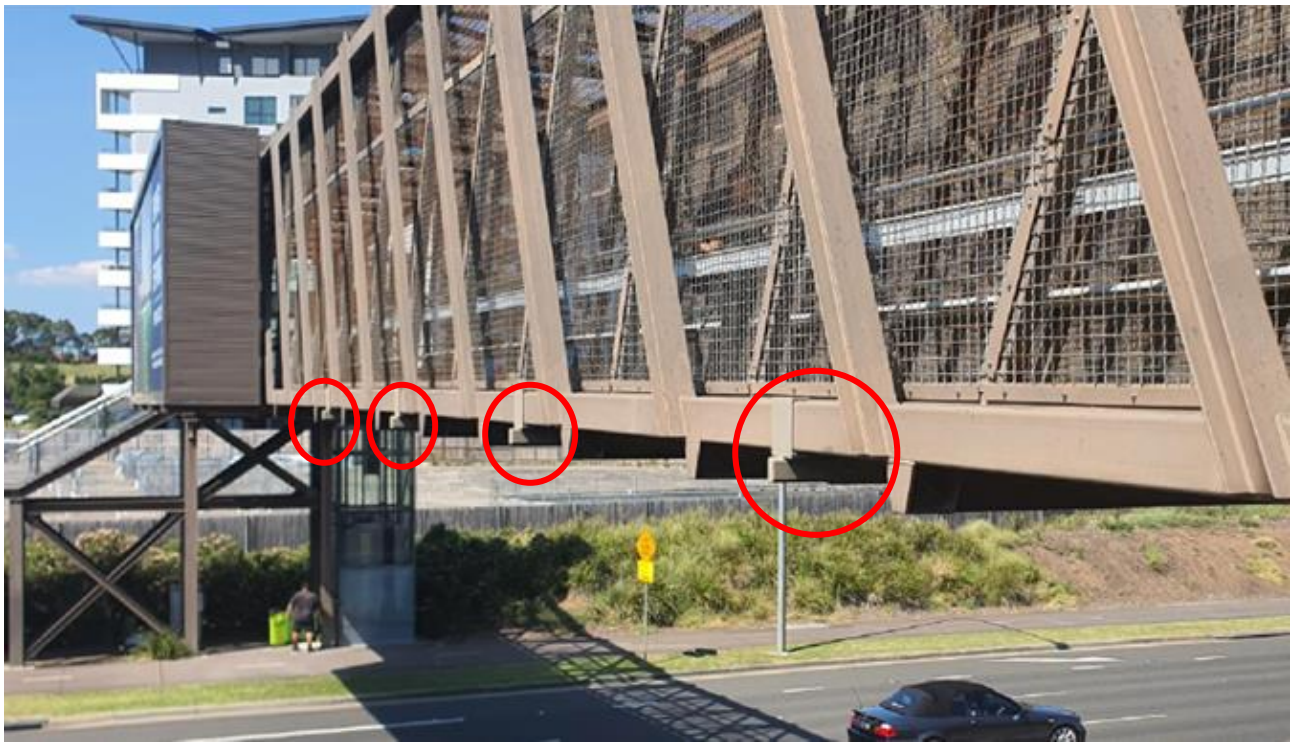


FIGURE 6: OUTRIGGERS SUPPORTING THE BOTTOM OF THE EASTERN AND WESTERN SIGNBOARDS

FIGURE 7: CONNECTION BETWEEN BRIDGE AND SIGNBOARD

FIGURE 8: DECK OF BRIDGE AND BRIDGE FRAMING AT THE BACK OF THE SIGNBOARD

TABLE 1: BRIDGE DETAILS

STRUCTURE NAME	**OLD WINDSOR ROAD PEDESTRIAN BRIDGE**
STRUCTURE ID	**10391**
STRUCTURE TYPE/ DESCRIPTION	A simply supported steel truss bridge, built with a Bondek slab deck. The structure is supported at each end by steel piers founded on a concrete footing. The base fixity of each steel element is a bolted connection. Furthermore, at each support is a steel framed staircase. with steel posted handrails and a glass encased steel framed lift shaft.
ZONE	West Zone (Z3)
LGA	The Hills (031)
LONGITUDE	150.95014
LATITUDE	-33.74788
OVERALL LENGTH	44.19m
OVERALL WIDTH	3.30m

3 ASSESSMENT AND FINDINGS OF SIGNBOARD SUBFRAME

There is a risk of the signs falling to the vehicles. The consequences of a sign board fall are severe.

The following controls will be implemented to reduce the risk of a fall:

- The adequacy of the existing signboard structure has been visually assessed.
- The condition of the visible members of the signboards were assessed and the structural integrity of the signboard, considering factors such as corrosion and wear and tear are checked.

No visible indications of excessive stress were observed, such as significant deformations, distortions, or movement of the signboards in relation to the bridge. The shop drawings for the subframe were provided and examined, and they appear to be satisfactory. The visual assessment of the signboards did not include any components or connections hidden by the cladding. It should be noted that the signboards were lifted during installation and remained intact, leading to the conclusion that the signboard structure is suitable for the concurrent loads.

4 FALL ARREST SYSTEM DESIGN ASSUMPTIONS

The sign structure will be secured to the bridge roofing members with a fall arrest horizontal system being active once the primary sign supports are fully or partially failed.

The fall arrest system is designed to temporarily support the load of the signage if the current support members become degraded over time (possibly due to corrosion) and begin to sag or undergo complete failure. The fall arrest system catches the sign board and prevent it from falling onto the road in the event of partial or full failure of connections.

The sign structure will be supported at 3 points by the fall arrest system, these locations are as shown in Figure 9 below. The supports are located as to avoid clashing with the existing sign lifting points.

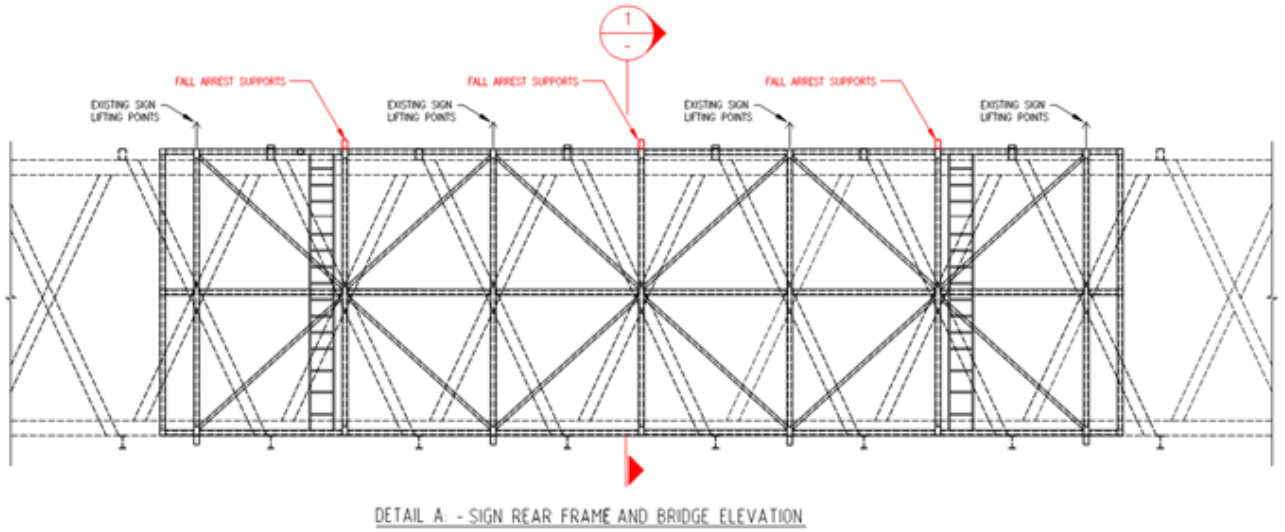


FIGURE 9: SIGNAGE ELEVATION SHOWING THE FALL ARREST SUPPORT LOCATIONS

The support arrangement for the fall arrest system is of a similar design to the current support for the signage. This consists of 3 x 125x75x6.0 RHS frames spanning across the bridge top chords as shown in Figure 10. The frames are telescoping and have 230 PFC segments which are designed to clamp around the bridge top chords.

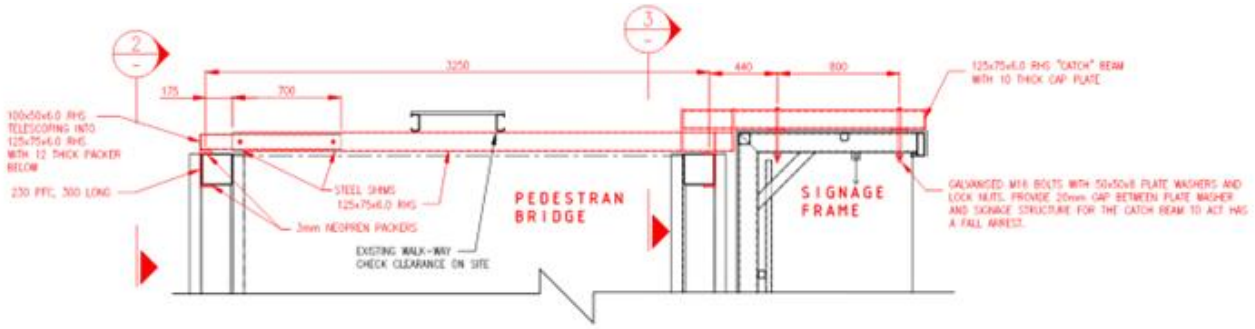


FIGURE 10: SIGNAGE FALL ARREST SUPPORT FRAME

The fall arrest system is attached to the signage framing with bolts passing through the top members. These bolts are left "loose" with 20mm gap between the nut and packer and the bottom of the signage member. Thus, the signage must deflect by 20mm before the fall arrest system is engaged.

The fall arrest system has been designed to support the Dead Load of 50 kN (self-weight) of the sign and a nominal 1.0kPa Live Load totalling 21 kN. These loads are in accordance with the loads provided by O'Hearn Consulting on their drawing 9061-S01 of the signage structure.

The fall arrest system has been designed, to the follow;

- Structural Provisions of the Building Code of Australia,
- Relevant Australian Standards Including:
  - AS/NZS1170.0-2002 General Principles
  - AS/NZS1170.1-2002 Permanent, Imposed & Other Actions
  - AS/NZS 1170.2-2021 Wind actions
  - AS4100-2020 Steel Structures

The fall arrest system will require periodic inspections to ensure the existing signage supports have not become compromised and the fall arrest system has been engaged to support the signage. If the fall arrest is found to be engaged the signage supports should be repair as son as possible.

The construction of the fall arrest system must be inspected by Egis. The fall arrest system will be monitored on a regular basis to ensure that it is in good working order. This includes inspecting the system for damage and ensuring that the components are properly install that the fall arrest system is not structurally engaged.

A copy of the proposed fall arrest system drawing is provided in **Appendix C**.

5 CONCLUSIONS

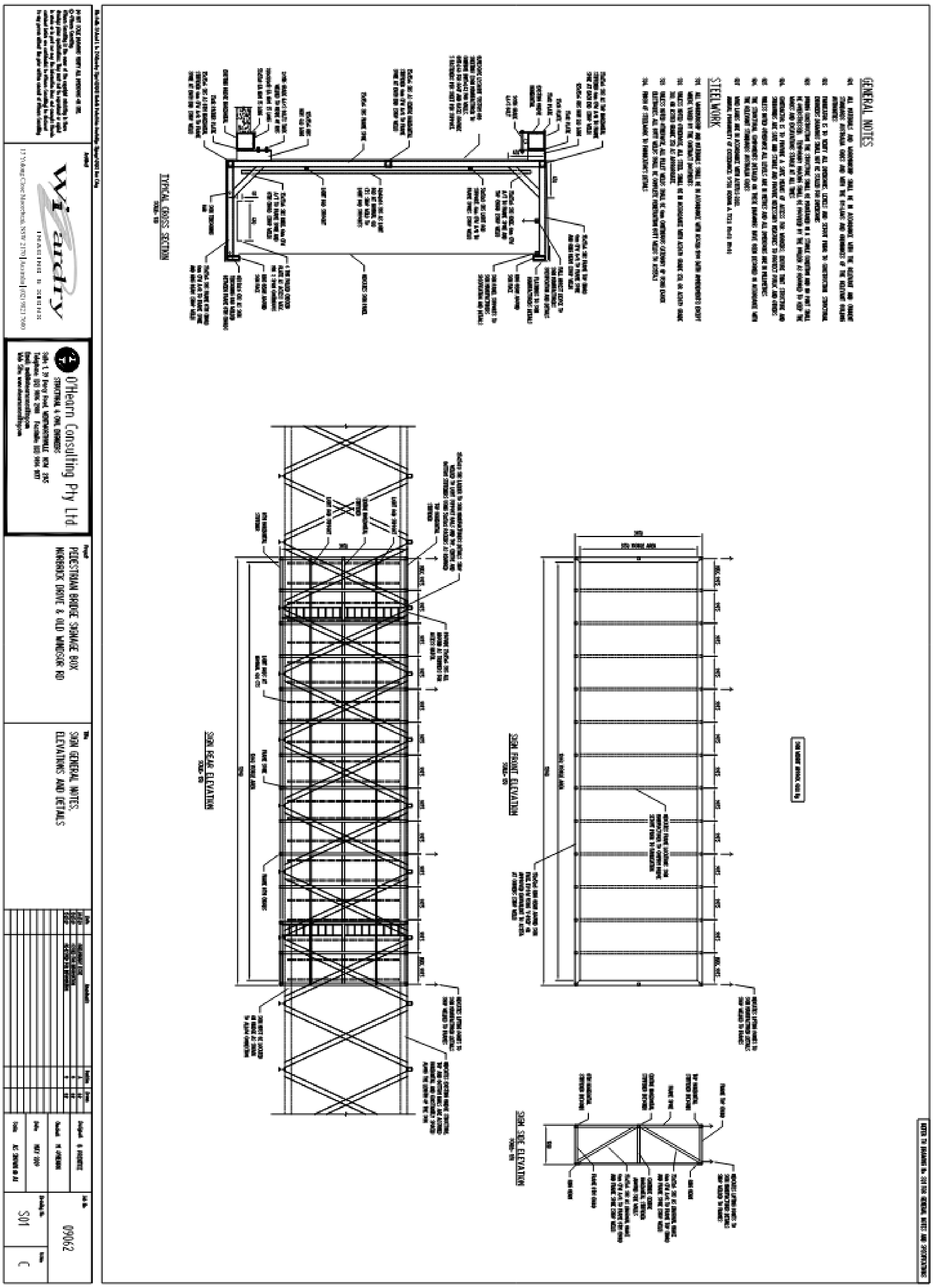
The fall arrest system proposed is designed to support the signage structure as a hanging load to support frames fixed to the bridge top chords. The system is reliant on the signage framing to remain an integral unit which can be supported from above. It the signage framing becomes degraded due to corrosion the ability to support the signage from above could be compromised.

The designed fall arrest system will be temporarily carrying the load of the sign board if partial or full failure of the link members between the bridge and signboard occurred. The fall arrest system catches the sign board and prevent it from falling onto the road in the event of partial or full failure of connections.

The proposed fall arrest system will reduce the risk of a signboard falling from the bridge onto a vehicle passing underneath to an acceptable level. The system was designed with current TfNSW condition of consent and relevant structural standards.

Additional risk management measures such as such as regular inspections monitoring the conditions of signboards, maintenance, and repairs of signboards, particularly focusing on structural integrity ensure ongoing safety.

APPENDIX A:
SIGNBOARD DESIGN DRAWING


GENERAL NOTES
STEELWORK
TYPICAL CROSS SECTION
SIGN REAR ELEVATION
SIGN FRONT ELEVATION
SIGN SIDE ELEVATION
O'Hearn Consulting Pty Ltd
PEDESTRIAN BRIDGE SIGNAGE BOX
SIGN GENERAL NOTES, ELEVATIONS AND DETAILS
09062
S01
C

APPENDIX B:
HYDER CERTIFICATE

Hyder Consulting Pty Ltd
Level 5, 141 Walker Street
Locked Bag 6503
North Sydney NSW 2060
Australia
Tel: +61 2 8907 9000
Fax: +61 2 8907 9001
www.hyderconsulting.com

11 February 2011

FKP
Level 5, 99 Macquarie Street
Sydney, NSW 2000
Australia

Attention: Michael Watt

Certification of Pedestrian Bridge for Sign Structure

Dear Michael

We have reviewed the pedestrian bridge over Old Windsor Road near Norbrik Drive at Bella Vista designed by Hyder for the sign structure detailed on drawing S01 issue G job number 09061 by O'Hearn Consulting Pty Ltd.

We certify that the pedestrian bridge is adequate for the above sign structure with the following conditions.

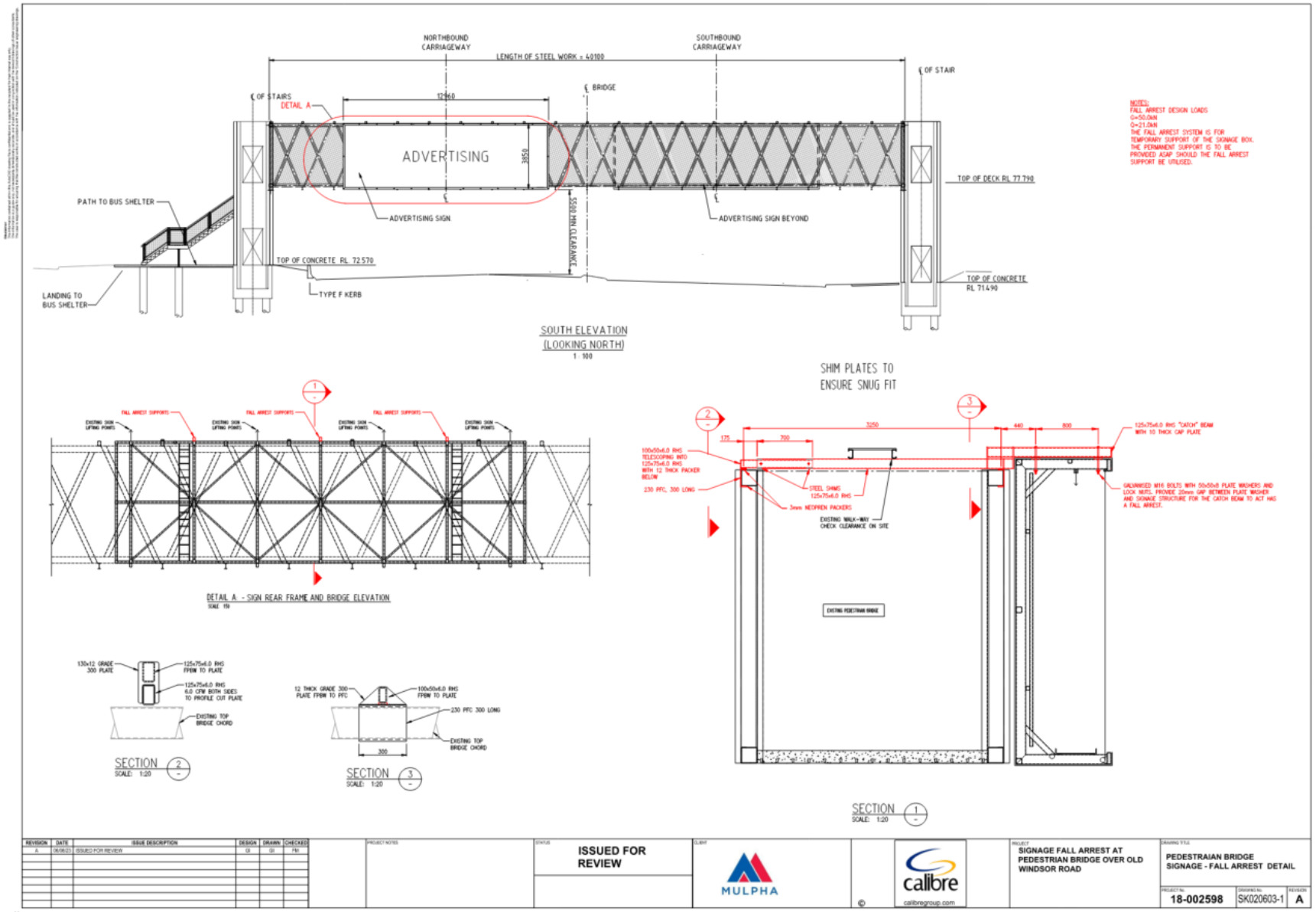
1. The live load (Q) on the sign structure is limited to 1kPa.
2. The erection load is limited to three (3) times the dead load listed on O'Hearn's drawing and the bridge live load is to be limited to 1.0kPa during erection. We believe this to be easily achievable by an experienced crew and adequate pedestrian management

If there are any queries on this certification please contact the undersigned to discuss.

Yours sincerely

Ross Bagot
Engineer Civil Structures
8907 9129

APPENDIX C:
FALL ARREST DESIGN DRAWING


NORTHBOUND CARRIAGEWAY
SOUTHBOUND CARRIAGEWAY
LENGTH OF STEEL WORK = 40100
℄ OF STAIRS
DETAIL A
12160
℄ BRIDGE
℄ OF STAIR
ADVERTISING
3950
PATH TO BUS SHELTER
ADVERTISING SIGN
ADVERTISING SIGN BEYOND
5500 MIN CLEARANCE
TOP OF DECK RL 77.790
TOP OF CONCRETE RL 72.570
TYPE F KERB
LANDING TO BUS SHELTER
TOP OF CONCRETE RL 71.490
NOTES:
FALL ARREST DESIGN LOADS
Q=50.0kN
Q=21.0kN
THE FALL ARREST SYSTEM IS FOR TEMPORARY SUPPORT OF THE SIGNAGE BOX. THE PERMANENT SUPPORT IS TO BE PROVIDED ASAP SHOULD THE FALL ARREST SUPPORT BE UTILISED.
SOUTH ELEVATION
(LOOKING NORTH)
1 : 100
SHIM PLATES TO ENSURE SNUG FIT
DETAIL A - SIGN REAR FRAME AND BRIDGE ELEVATION
SCALE 1:50
SECTION 2
SCALE: 1:20
SECTION 3
SCALE: 1:20
SECTION 1
SCALE: 1:20
EXISTING PEDESTRIAN BRIDGE
EXISTING WALK-WAY CHECK CLEARANCE ON SITE
3mm NEOPRENE PACKERS
STEEL SHIMS 125x75x6.0 RHS
230 PFC, 300 LONG
125x75x6.0 RHS "CATCH" BEAM WITH 10 THICK CAP PLATE
GALVANISED M16 BOLTS WITH 50x50x8 PLATE WASHERS AND LOCK NUTS. PROVIDE 20mm GAP BETWEEN PLATE WASHER AND SIGNAGE STRUCTURE FOR THE CATCH BEAM TO ACT AS A FALL ARREST.
ISSUED FOR REVIEW
MULPHA
calibre
calibregroup.com
SIGNAGE FALL ARREST AT PEDESTRIAN BRIDGE OVER OLD WINDSOR ROAD
PEDESTRAIAN BRIDGE SIGNAGE - FALL ARREST DETAIL
18-002598
SK020603-1
A

Egis Consulting Pty Ltd

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