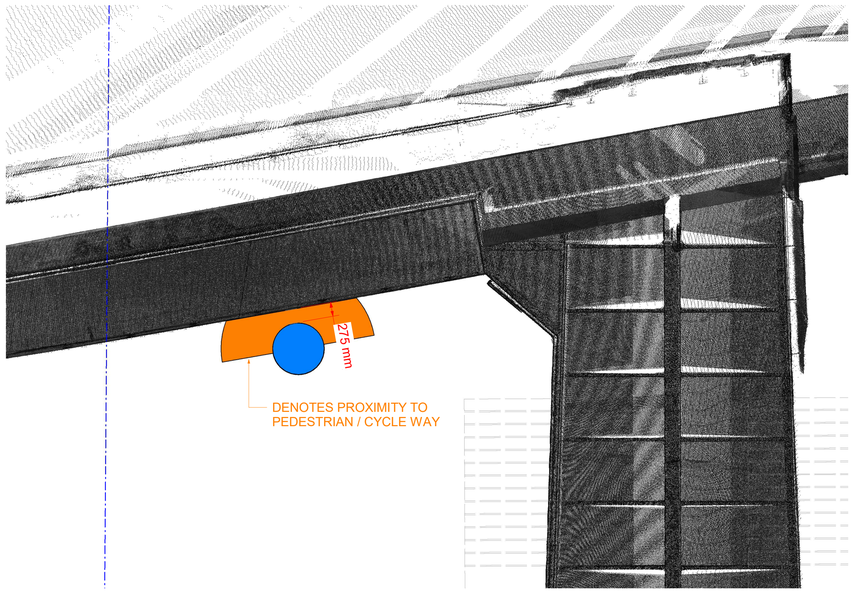


STRUCTURAL
enstruct
enstruct group pty ltd
Level 4, 2 Glen Street, Milsons Point NSW 2061
Telephone (02) 8904 1444
http: //www.enstruct.com.au

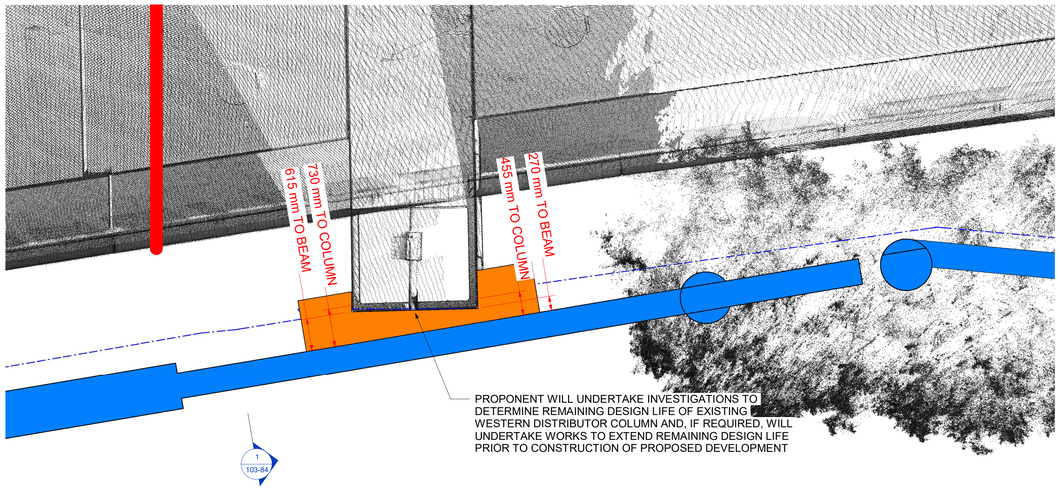
CLIENT
The GPT Group
AMP CAPITAL

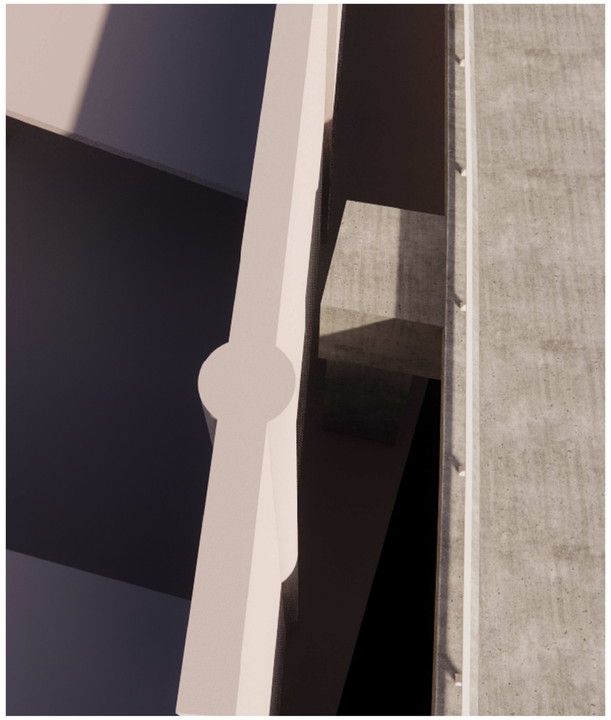
Rev.	Date	Description
A	16.07.20	ISSUED FOR INFORMATION
B	05.08.20	ISSUED FOR INFORMATION
C	25.02.21	ISSUED FOR INFORMATION
D	03.03.21	ISSUED FOR INFORMATION
E	12.05.21	ISSUED FOR INFORMATION

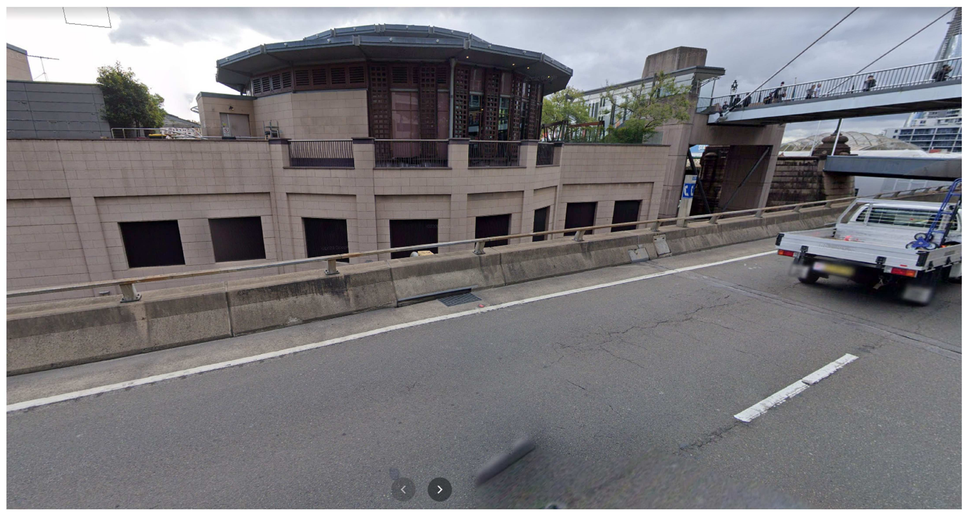
PROJECT NAME
COCKLE BAY PARK
PROJECT NUMBER: 6054

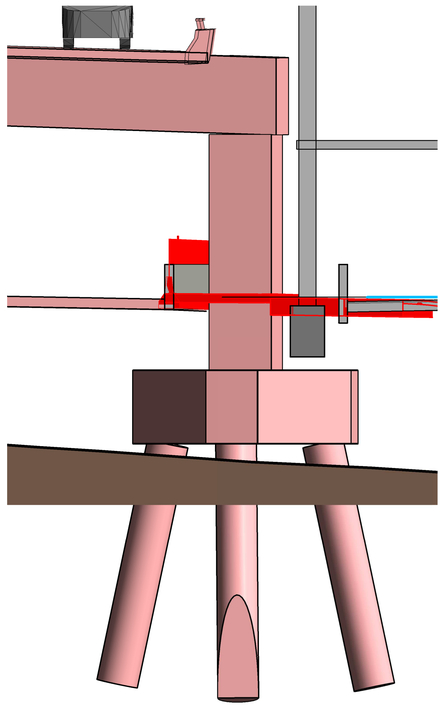
DRAWING TITLE
LAND BRIDGE - COLUMN CLEARANCE 3
SCALE AT B1: 1 : 50
DRAWN BY: Author
CHECKED BY: Checker

DRAWING STATUS
FOR INFORMATION
DRAWING NUMBER
CBP-SK-ENS-STR-DRW-103-83
REV.
E









SECTION 1
1 : 75
1
103-22

STRUCTURAL
enstruct
enstruct group pty ltd
Level 4, 2 Glen Street, Milsons Point NSW 2061
Telephone (02) 8904 1444
http: //www.enstruct.com.au

CLIENT
The GPT Group
AMP CAPITAL

Rev.	Date	Description
A	16.07.20	ISSUED FOR INFORMATION
B	05.08.20	ISSUED FOR INFORMATION
C	25.02.21	ISSUED FOR INFORMATION
D	03.03.21	ISSUED FOR INFORMATION
E	12.05.21	ISSUED FOR INFORMATION

PROJECT NAME
COCKLE BAY PARK

PROJECT NUMBER: 6054

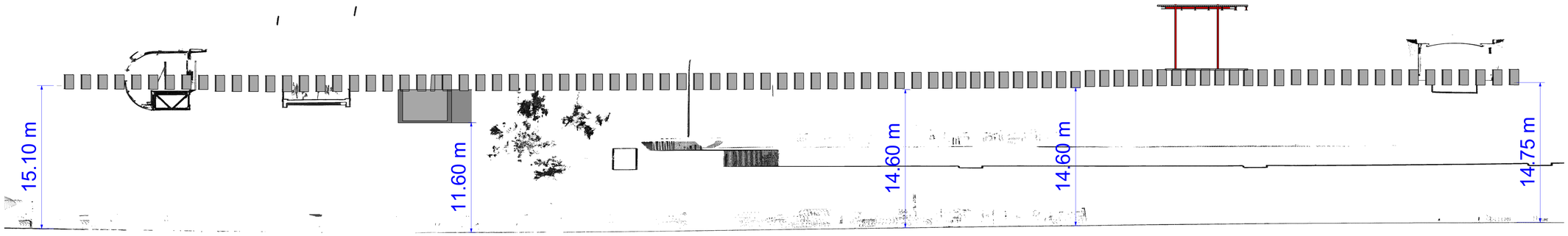
DRAWING TITLE
LAND BRIDGE - COLUMN CLEARANCE 4

SCALE AT B1: As indicated
DRAWN BY: Author
CHECKED BY: Checker

DRAWING STATUS
FOR INFORMATION

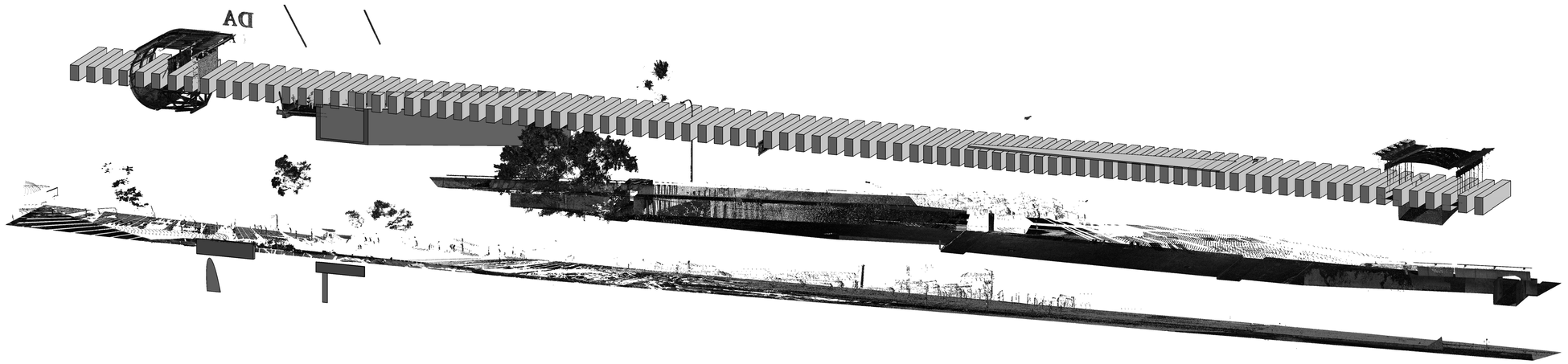
DRAWING NUMBER
CBP-SK-ENS-STR-DRW-103-84

REV.
E



Landbridge Long Section

SCALE: 1 : 200



STRUCTURAL

enstruct

enstruct group pty ltd
Level 4, 2 Glen Street, Milsons Point NSW 2061
Telephone (02) 8904 1444
http: //www.enstruct.com.au

CLIENT

The GPT Group

AMP CAPITAL

Rev.	Date	Description
A	16.07.20	ISSUED FOR INFORMATION
B	03.03.21	ISSUED FOR INFORMATION
C	12.05.21	ISSUED FOR INFORMATION
D	03.09.21	ISSUED FOR INFORMATION

PROJECT NAME
COCKLE BAY PARK

PROJECT NUMBER: 6054

DRAWING TITLE
LAND BRIDGE - LONG SECTION

SCALE AT B1: 1 : 200

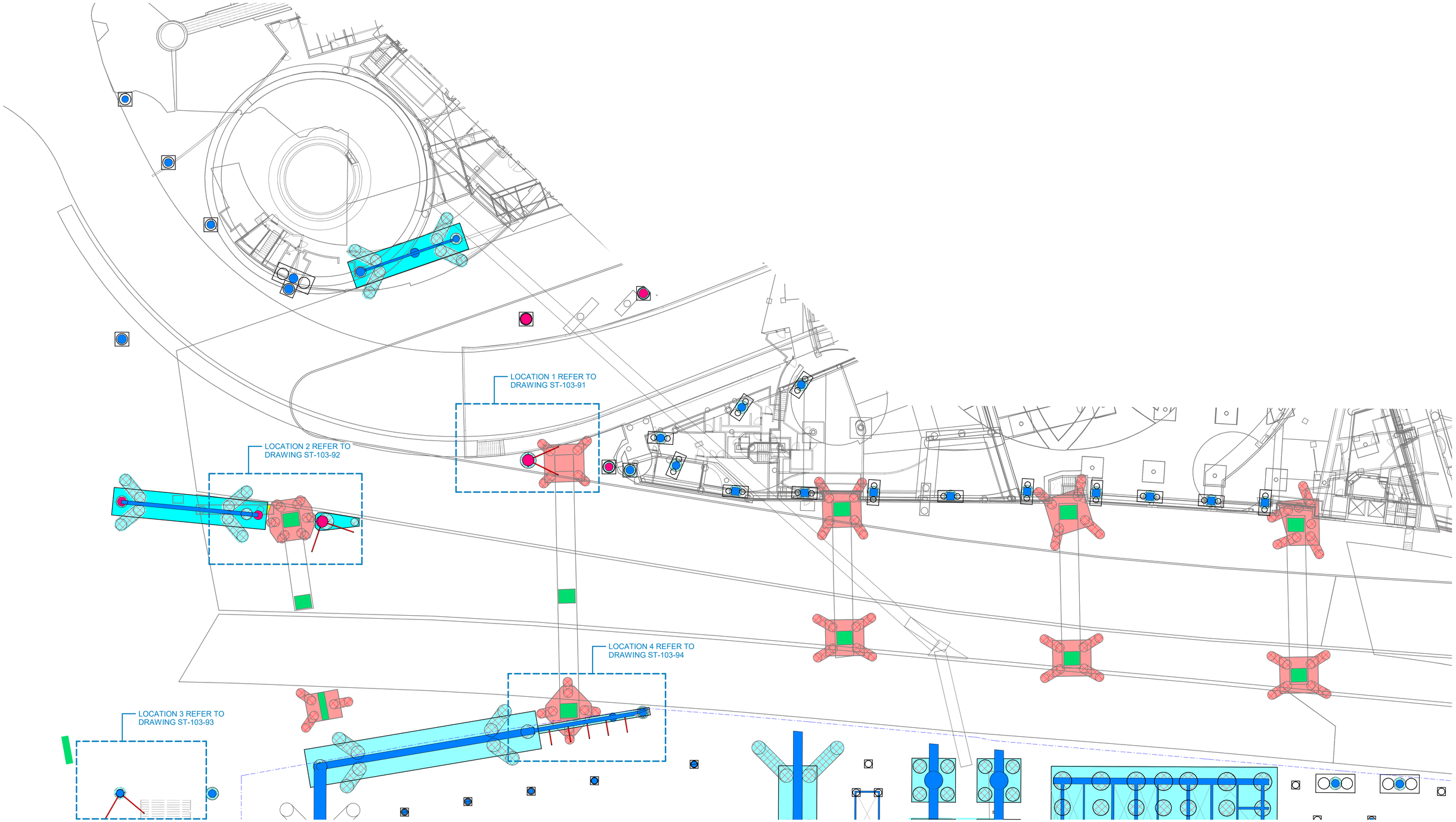
DRAWN BY: Author

CHECKED BY: Checker

DRAWING STATUS
FOR INFORMATION

DRAWING NUMBER
CBP-SK-ENS-STR-DRW-103-85

REV.
D



TEMPORARY FORMWORK PROPS

EXISTING STRUCTURE TO BE DEMOLISHED

EXISTING FOUNDATIONS

EXISTING PILES

EXISTING COLUMNS

NEW FOUNDATIONS

NEW PILES

NEW COLUMNS/WALLS (ON SITE)

NEW COLUMNS (WITHIN WESTERN DISTRIBUTOR CORRIDOR SITE)

ELEMENT LEGEND

STRUCTURAL
enstruct
enstruct group pty ltd
Level 4, 2 Glen Street, Milsons Point NSW 2061
Telephone (02) 8904 1444
http: //www.enstruct.com.au

CLIENT
The GPT Group
AMP CAPITAL

Rev.	Date	Description
A	03.03.21	ISSUED FOR INFORMATION
B	12.05.21	ISSUED FOR INFORMATION
C	03.09.21	ISSUED FOR INFORMATION

PROJECT NAME
COCKLE BAY PARK

PROJECT NUMBER: 6054

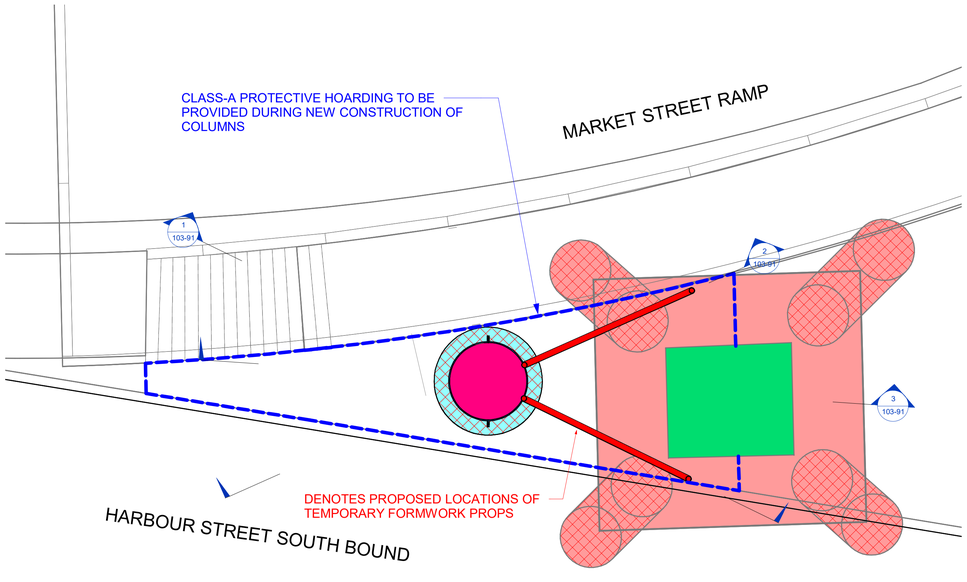
DRAWING TITLE
LAND BRIDGE - COLUMN CONSTRUCTION OVERALL

SCALE AT B1: 1 : 200 | DRAWN BY: Author | CHECKED BY: Checker

DRAWING STATUS
FOR INFORMATION

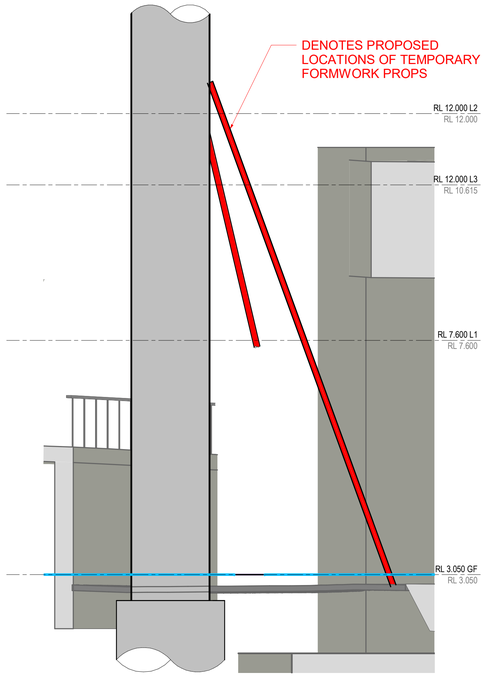
DRAWING NUMBER
CBP-SK-ENS-STR-DRW-103-90

REV.
C



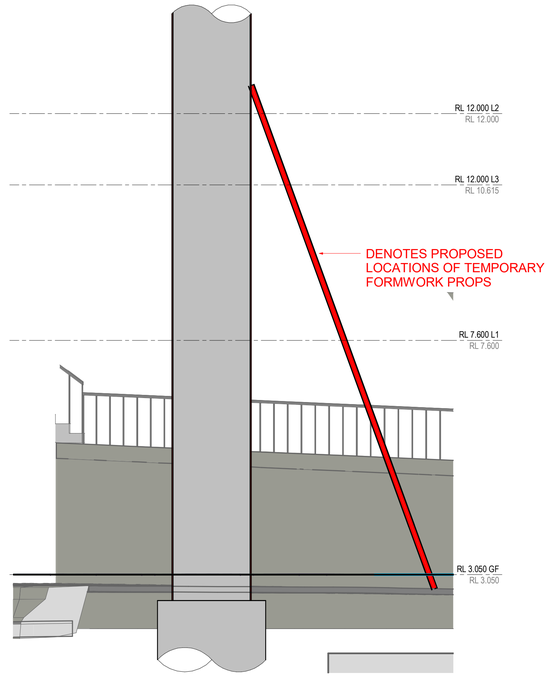
COLUMN LOCATION 1 LB CONSTRUCTION PHASE

SCALE: 1 : 50



SECTION 1 / 103-91

1 : 50



SECTION 2 / 103-91

1 : 50

TEMPORARY FORMWORK PROPS

EXISTING STRUCTURE TO BE DEMOLISHED

EXISTING FOUNDATIONS

EXISTING PILES

EXISTING COLUMNS

NEW FOUNDATIONS

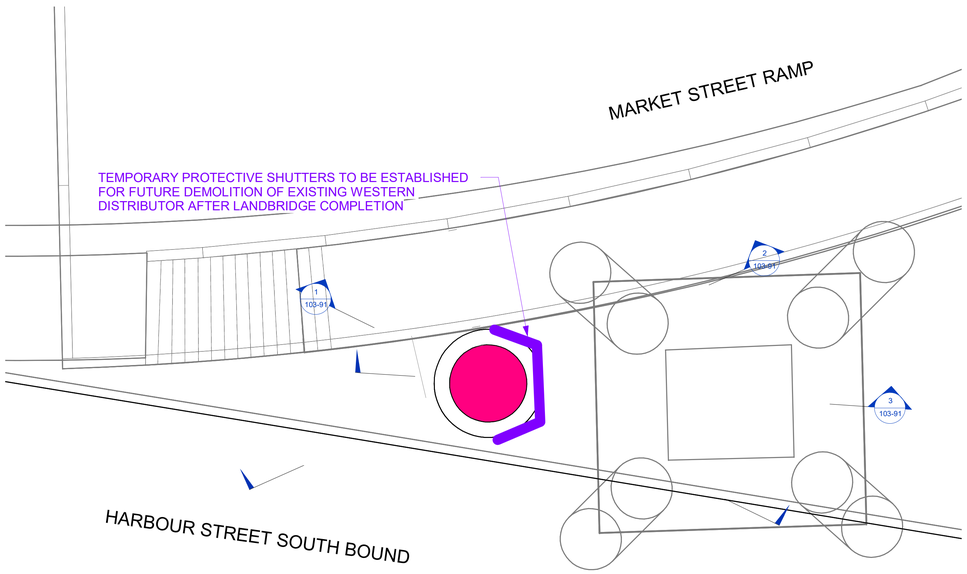
NEW PILES

NEW COLUMNS/WALLS (ON SITE)

NEW COLUMNS (WITHIN WESTERN DISTRIBUTOR CORRIDOR SITE)

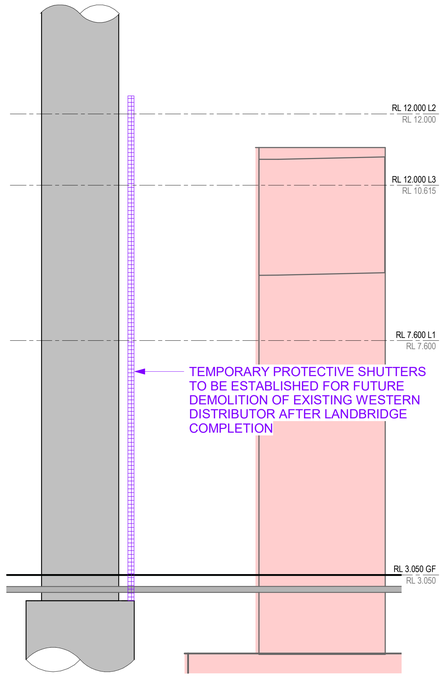
ELEMENT LEGEND

SCALE: 1 : 200



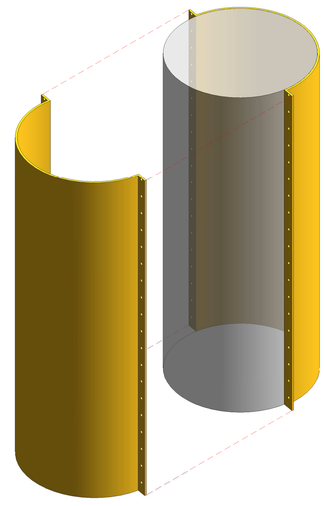
COLUMN LOCATION 1 WD DEMOLITION PHASE

SCALE: 1 : 50



SECTION 3 / 103-91

1 : 50



TYPICAL COLUMN FORMWORK ISOMETRIC

SCALE:

STRUCTURAL
enstruct
enstruct group pty ltd
Level 4, 2 Glen Street, Milsons Point NSW 2061
Telephone (02) 8904 1444
http: //www.enstruct.com.au

CLIENT
The GPT Group
AMP CAPITAL

Rev.	Date	Description
A	03.03.21	ISSUED FOR INFORMATION
B	08.03.21	ISSUED FOR INFORMATION
C	12.05.21	ISSUED FOR INFORMATION

PROJECT NAME
COCKLE BAY PARK

PROJECT NUMBER: 6054

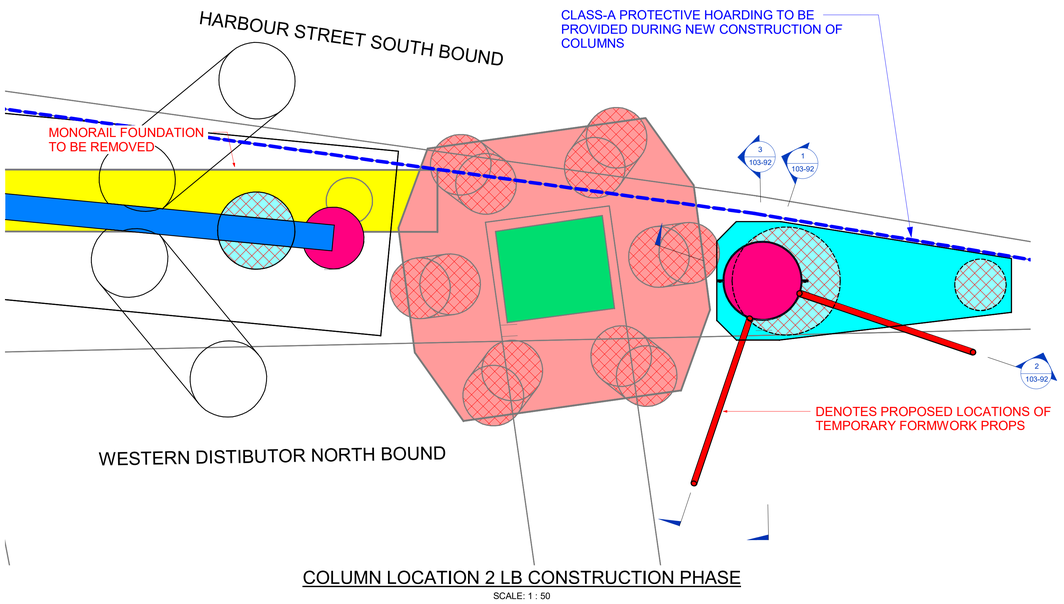
DRAWING TITLE
LAND BRIDGE - COLUMN CONSTRUCTION LOCATION 1

SCALE AT B1: As indicated
DRAWN BY: Author
CHECKED BY: Checker

DRAWING STATUS
FOR INFORMATION

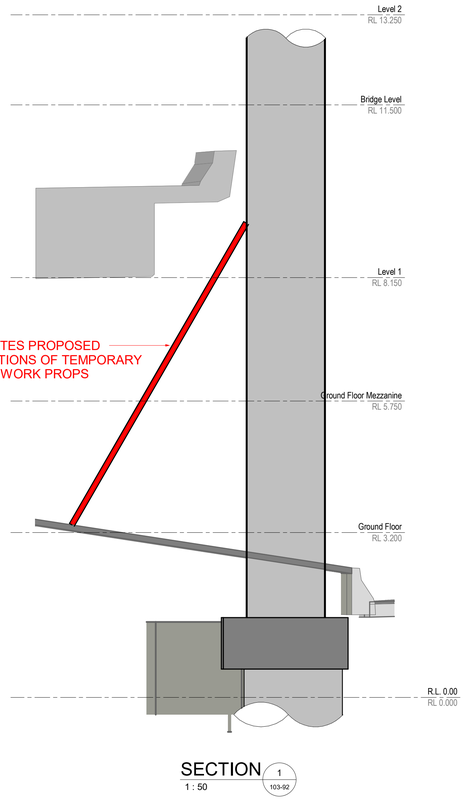
DRAWING NUMBER
CBP-SK-ENS-STR-DRW-103-91

REV.
C



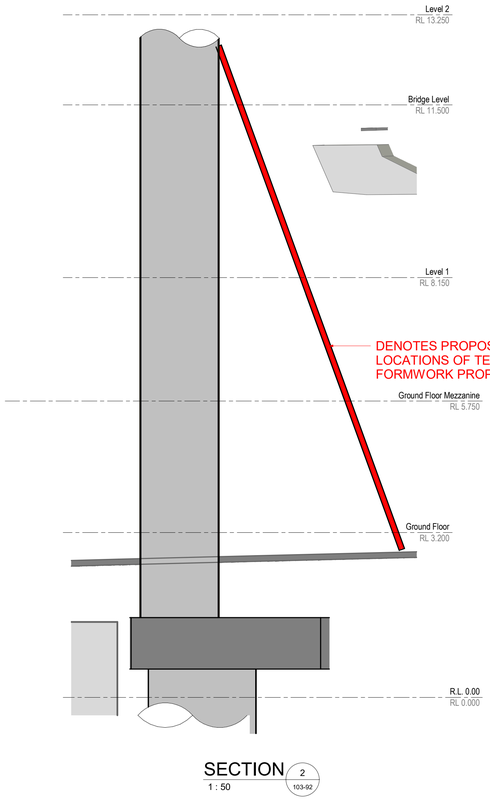
COLUMN LOCATION 2 LB CONSTRUCTION PHASE

SCALE: 1 : 50



SECTION 1 103-92

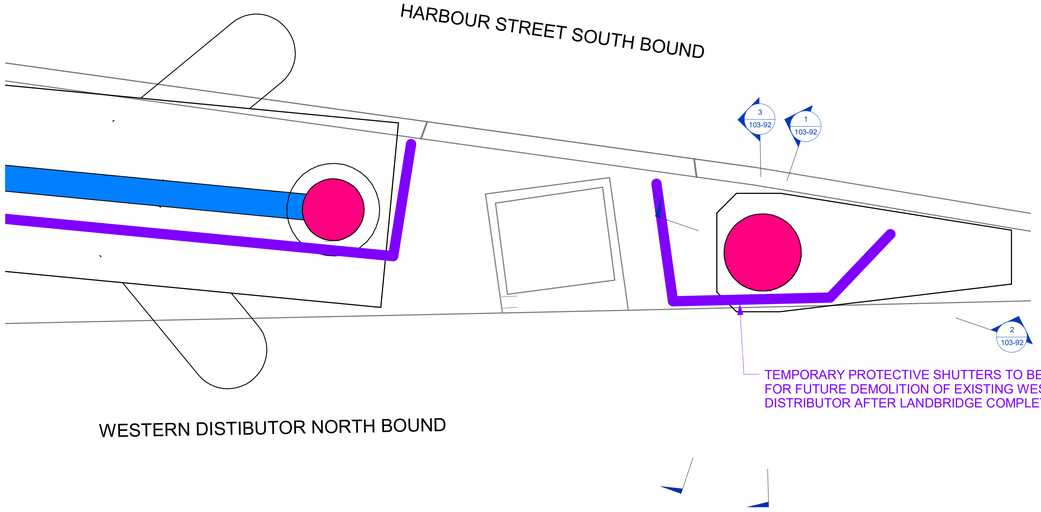
1 : 50



SECTION 2 103-92

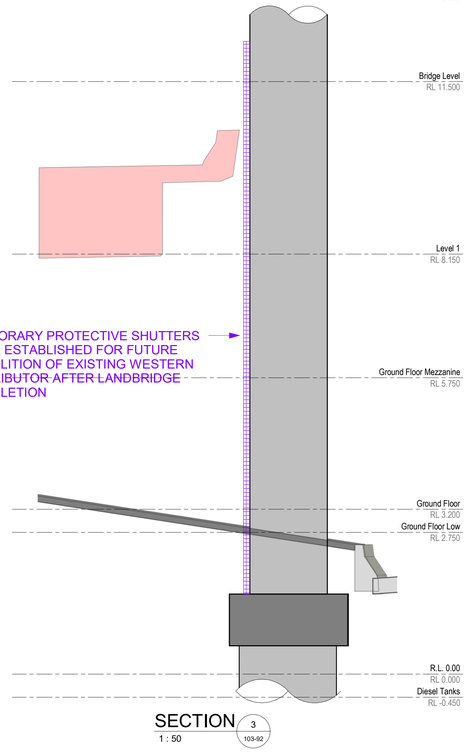
1 : 50

ELEMENT LEGEND



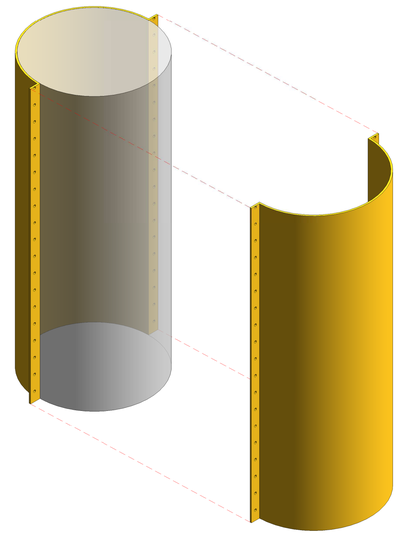
COLUMN LOCATION 2 WD DEMOLITION PHASE

SCALE: 1 : 50



SECTION 3 103-92

1 : 50



TYPICAL COLUMN FORMWORK ISOMETRIC

SCALE:

STRUCTURAL
enstruct
enstruct group pty ltd
Level 4, 2 Glen Street, Milsons Point NSW 2061
Telephone (02) 8904 1444
http: //www.enstruct.com.au

CLIENT
The GPT Group
AMP CAPITAL

Rev.	Date	Description
A	03.03.21	ISSUED FOR INFORMATION
B	08.03.21	ISSUED FOR INFORMATION
C	12.05.21	ISSUED FOR INFORMATION
D	03.09.21	ISSUED FOR INFORMATION

PROJECT NAME
COCKLE BAY PARK

PROJECT NUMBER: 6054

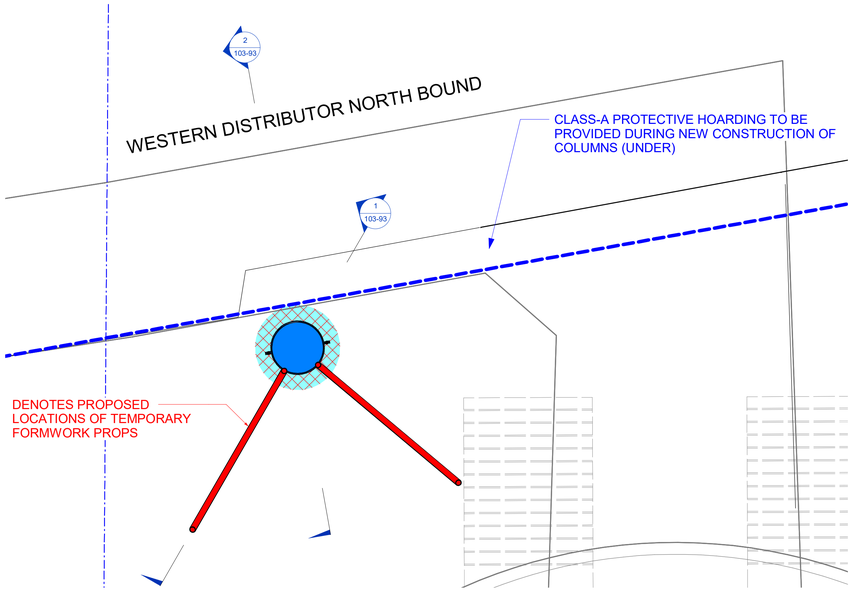
DRAWING TITLE
LAND BRIDGE - COLUMN CONSTRUCTION LOCATION 2

SCALE AT B1: As indicated
DRAWN BY: Author
CHECKED BY: Checker

DRAWING STATUS
FOR INFORMATION

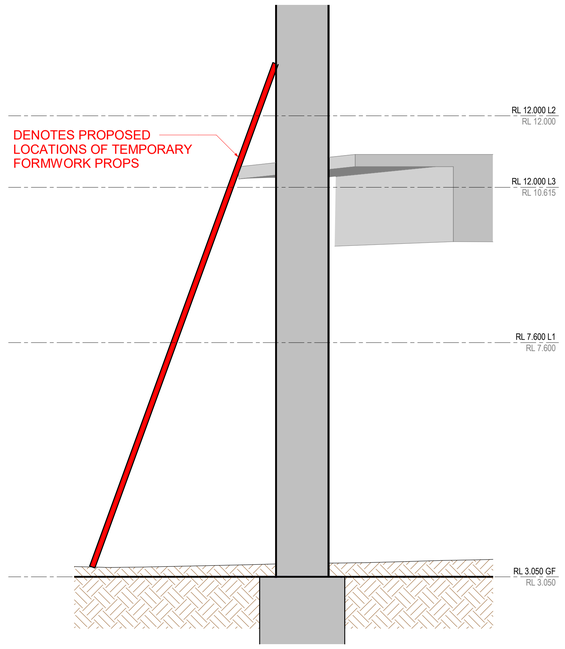
DRAWING NUMBER
CBP-SK-ENS-STR-DRW-103-92

REV.
D



COLUMN LOCATION 3 CONSTRUCTION PHASE

SCALE: 1 : 50

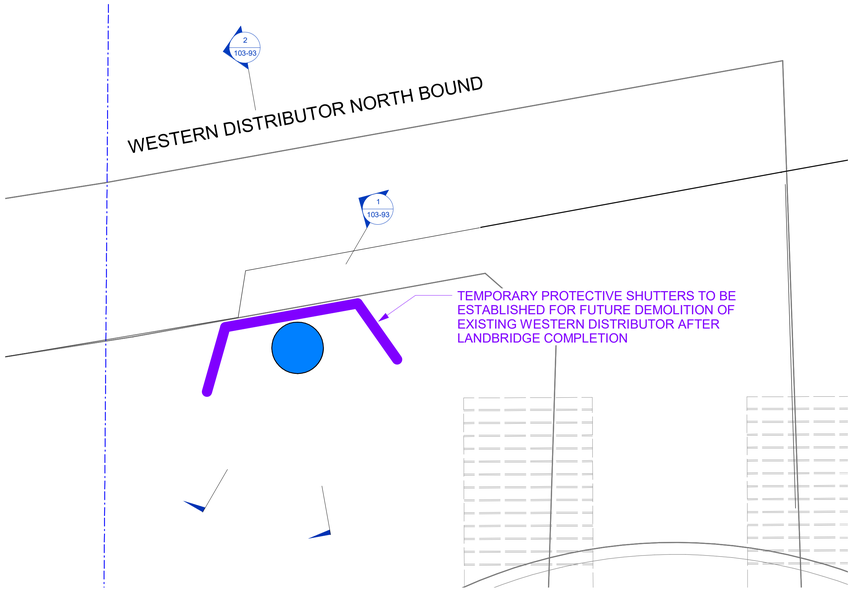


SECTION 1/103-93

1 : 50

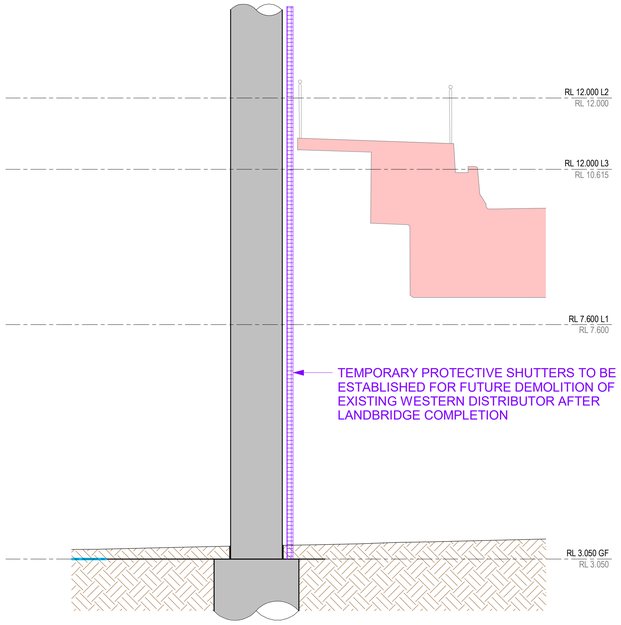
TEMPORARY FORMWORK PROPS
EXISTING STRUCTURE TO BE DEMOLISHED
EXISTING FOUNDATIONS
EXISTING PILES
EXISTING COLUMNS
NEW FOUNDATIONS
NEW PILES
NEW COLUMNS/WALLS (ON SITE)
NEW COLUMNS (WITHIN WESTERN DISTRIBUTOR CORRIDOR SITE)

ELEMENT LEGEND



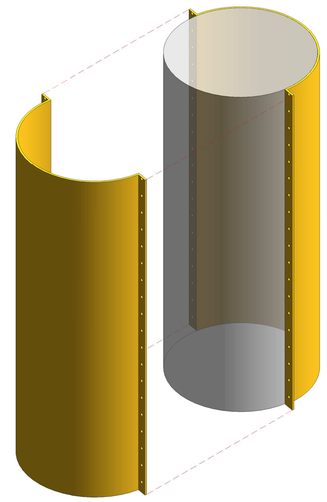
COLUMN LOCATION 3 - WD DEMOLITION PHASE

SCALE: 1 : 50



SECTION 2/103-93

1 : 50



TYPICAL COLUMN FORMWORK ISOMETRIC

SCALE:

STRUCTURAL
enstruct
enstruct group pty ltd
Level 4, 2 Glen Street, Milsons Point NSW 2061
Telephone (02) 8904 1444
http: //www.enstruct.com.au

CLIENT
The GPT Group
AMP CAPITAL

Rev.	Date	Description
A	03.03.21	ISSUED FOR INFORMATION
B	08.03.21	ISSUED FOR INFORMATION
C	12.05.21	ISSUED FOR INFORMATION

PROJECT NAME
COCKLE BAY PARK

PROJECT NUMBER: 6054

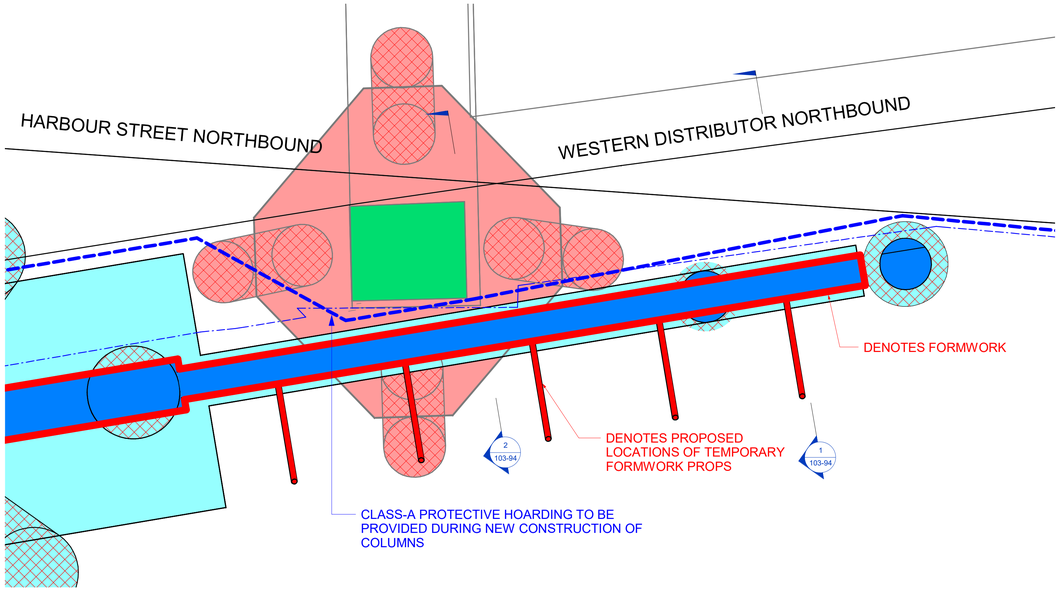
DRAWING TITLE
LAND BRIDGE - COLUMN CONSTRUCTION LOCATION 3

SCALE AT B1: As indicated
DRAWN BY: Author
CHECKED BY: Checker

DRAWING STATUS
FOR INFORMATION

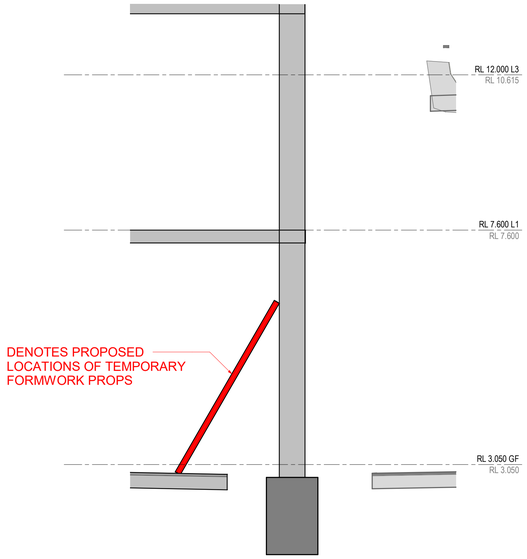
DRAWING NUMBER
CBP-SK-ENS-STR-DRW-103-93

REV.
C



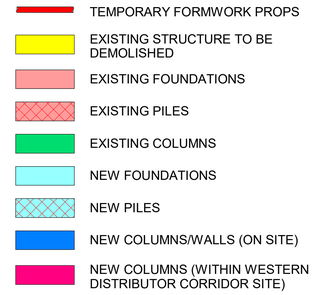
COLUMN LOCATION 4 LB CONSTRUCTION PHASE

SCALE: 1 : 50

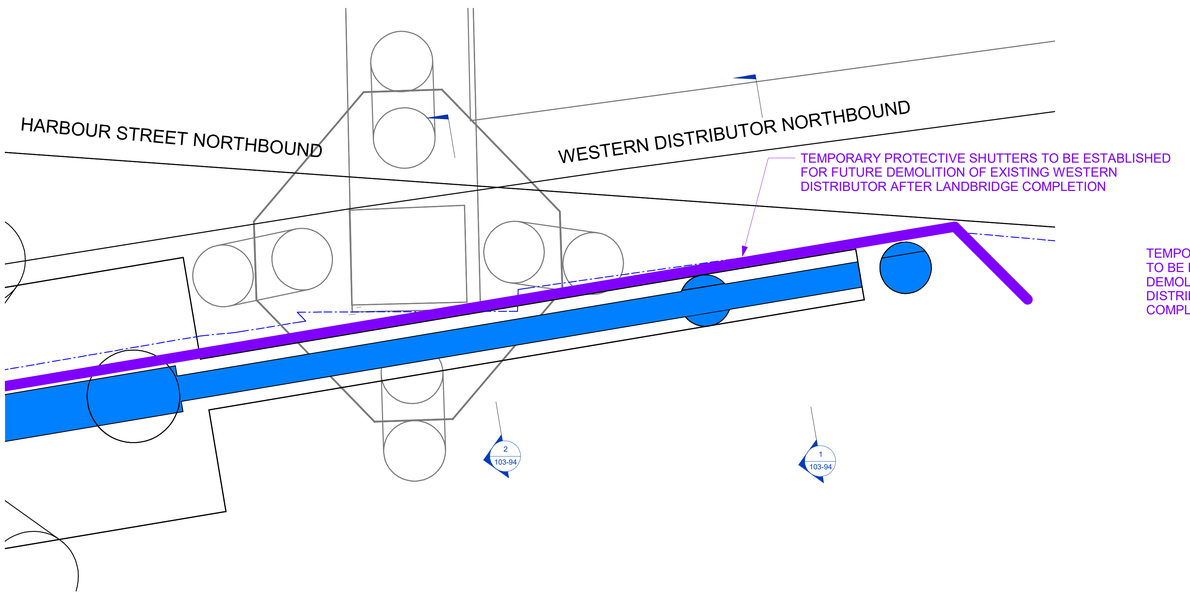


SECTION 1 / 103-94

1 : 50

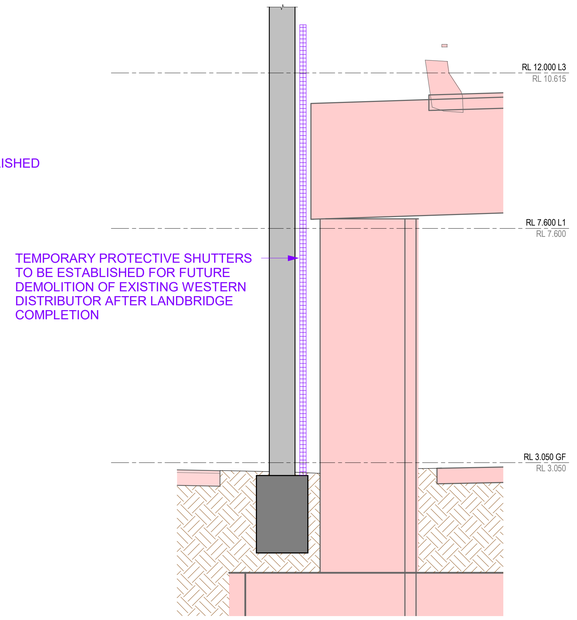


ELEMENT LEGEND



COLUMN LOCATION 4 WD DEMOLITION PHASE

SCALE: 1 : 50



SECTION 2 / 103-94

1 : 50

STRUCTURAL
enstruct
enstruct group pty ltd
Level 4, 2 Glen Street, Milsons Point NSW 2061
Telephone (02) 8904 1444
http: //www.enstruct.com.au

CLIENT
The GPT Group
AMP CAPITAL

Rev.	Date	Description
A	03.03.21	ISSUED FOR INFORMATION
B	08.03.21	ISSUED FOR INFORMATION
C	12.05.21	ISSUED FOR INFORMATION

PROJECT NAME
COCKLE BAY PARK

PROJECT NUMBER: 6054

DRAWING TITLE
LAND BRIDGE - COLUMN CONSTRUCTION LOCATION 4

SCALE AT B1: As indicated
DRAWN BY: Author
CHECKED BY: Checker

DRAWING STATUS
FOR INFORMATION

DRAWING NUMBER
CBP-SK-ENS-STR-DRW-103-94

REV.
C

APPENDIX B

Appendix J of WDIA Submission – John Holland Group Presentation

Cockle Bay Park – The Proposed Land Bridge and Western Distributor

Planning Condition 23, response to subclause (g), (i) and (k)

19 August 2021

Revision 4

COCKLE BAY PARK
SYDNEY

Presenters

Koby Boer - Senior Project Manager – John Holland

James Lithgow - Senior Project Manager – John Holland

Manji Chhabhadia- Principal Bridges and Structures Engineer – John Holland

JOHN HOLLAND

COCKLE BAY PARK
SYDNEY

Purpose

Demonstrate our response to the maintenance requirements to be met for the **Western Distributor** as defined in **Condition 23** of the Conditions of Planning Approval, namely**:**

(g) maintenance of the road reserve / corridor width
(i) access for maintenance and repair
(k) maintenance of appropriate clearance in accordance with RMS requirements

Plus some further requests by TfNSW recently.

JOHN HOLLAND

Agenda

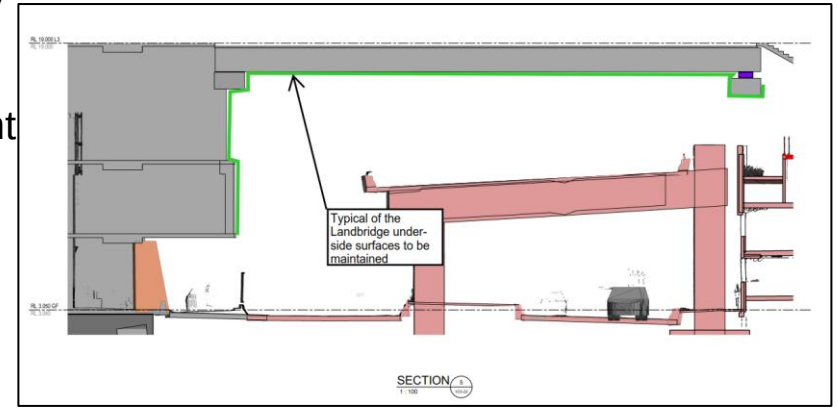
1. Maintenance of Landbridge (Light, Sprinklers, Bearings, Facades) – C23. (g), (i)
2. Maintenance of Western Distributor (topside surfaces) – C23. (g), (i)
3. Access for maintenance of Western Distributor Surfaces near the Land Bridge – C23. (g), (i), (k)
4. Access for maintenance of Land Bridge Columns / Blade Walls near the Western Distributor – C23. (g), (i), (k)
5. Access for repair (strengthening) of Western Distributor Column / Headstock after Land Bridge – C23. (g), (i)
6. Access for repair (demolition) of the Western Distributor after completion of Land Bridge – C23. (g), (i)
7. Access for repair (construction) of the Western Distributor after completion of Land Bridge – C23. (g), (i)

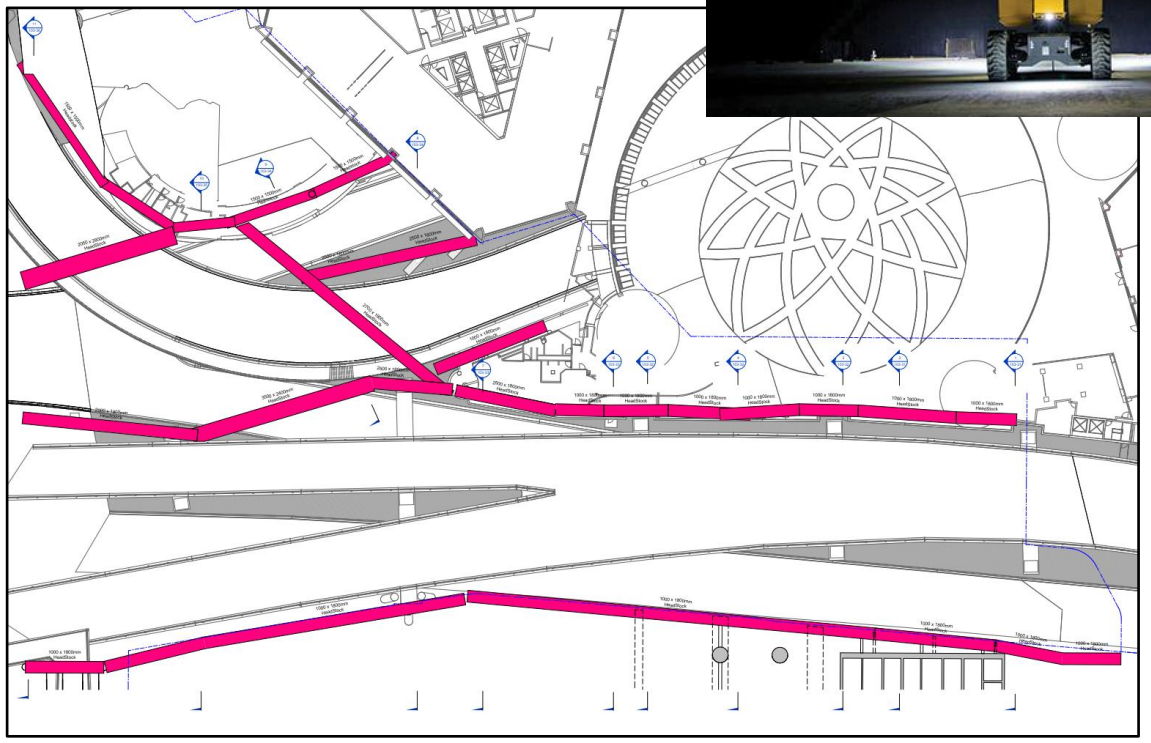
1. Maintenance of Landbridge

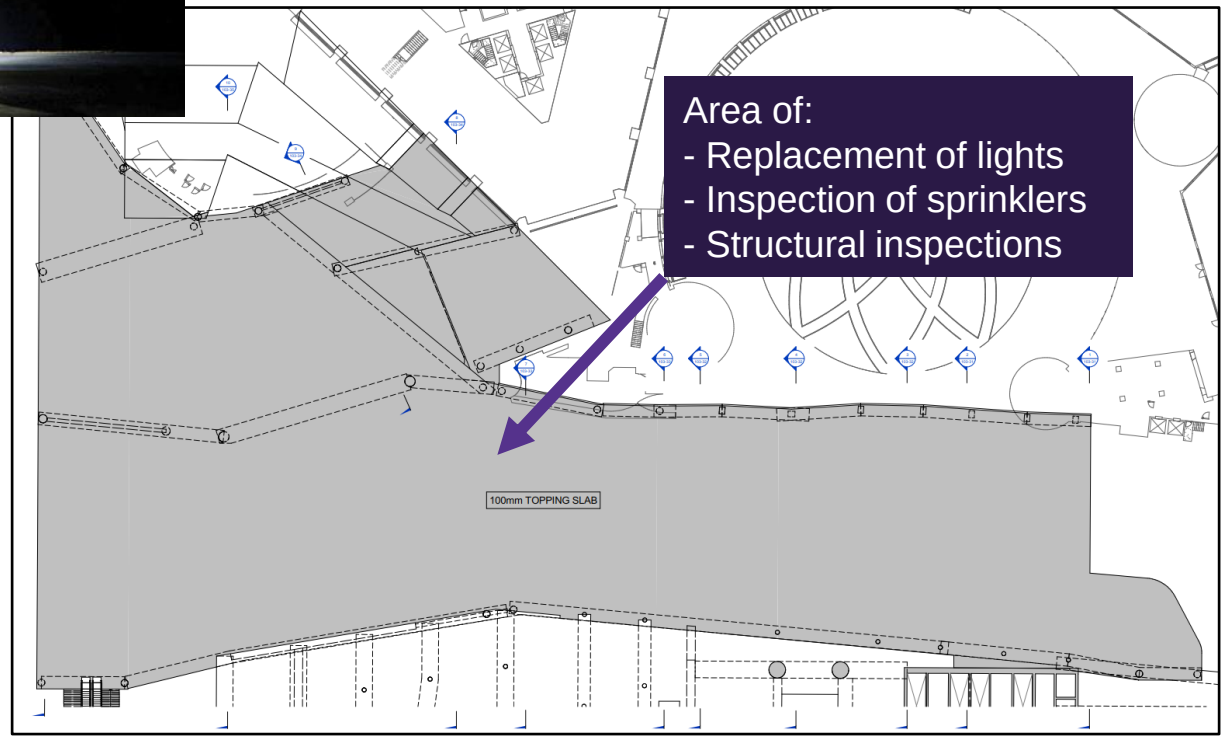
- Underside Lights and Sprinklers
- Darling Park Girder Bearings
- Structural Concrete Facades

1.Maintenance of Landbridge – Underside (Lighting, sprinklers, inspections)

- Maintenance would occur under a night-works lane closure ROL approved by TfNSW's Customer Journey Planning branch and appropriate stakeholders.
- Maintenance of underside of Landbridge can be carried out using typical plant and equipment such as an elevating working platform (EWP) to permit:
  - Replacement of lights
  - Inspection of sprinklers.
  - Structural inspections

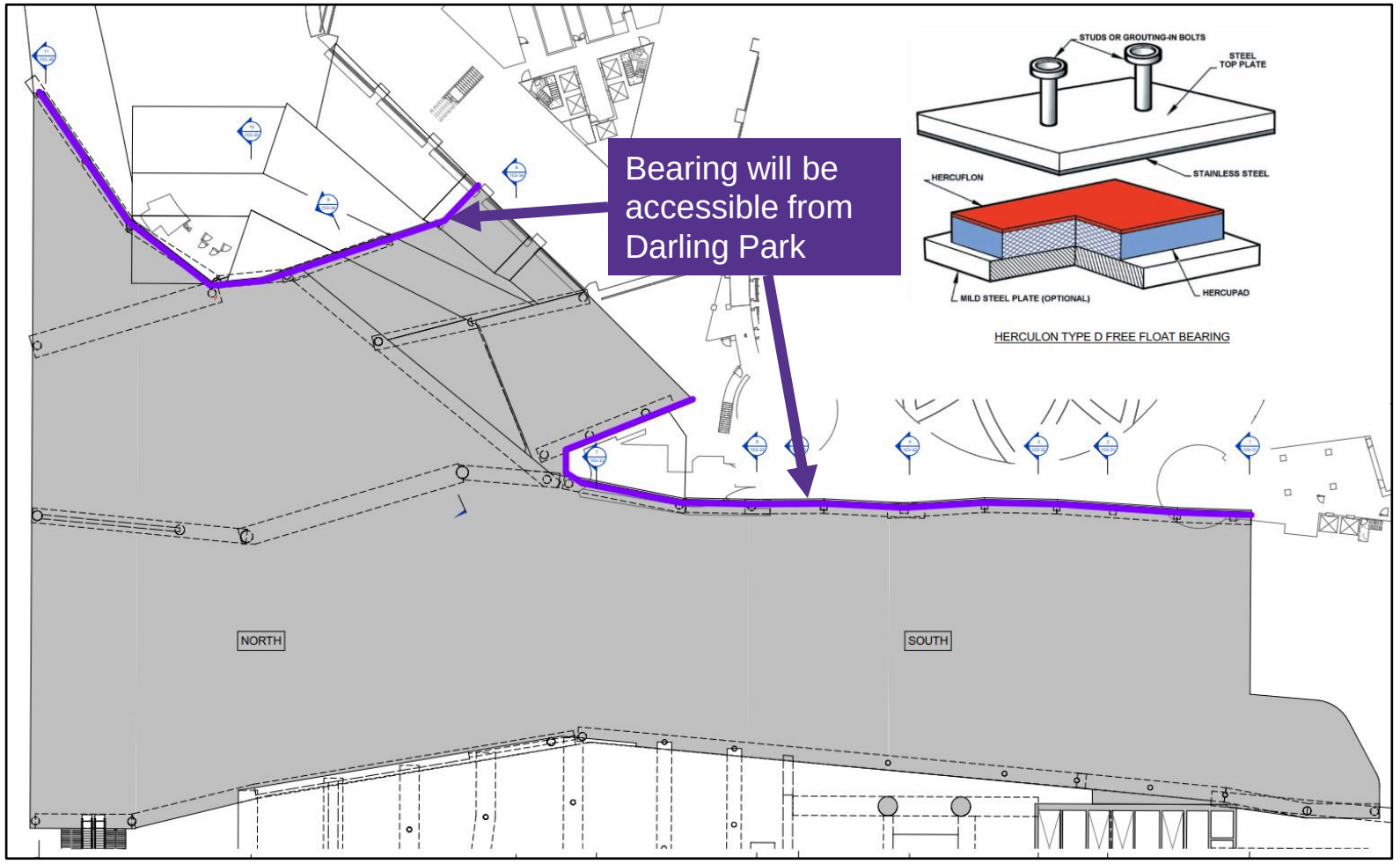




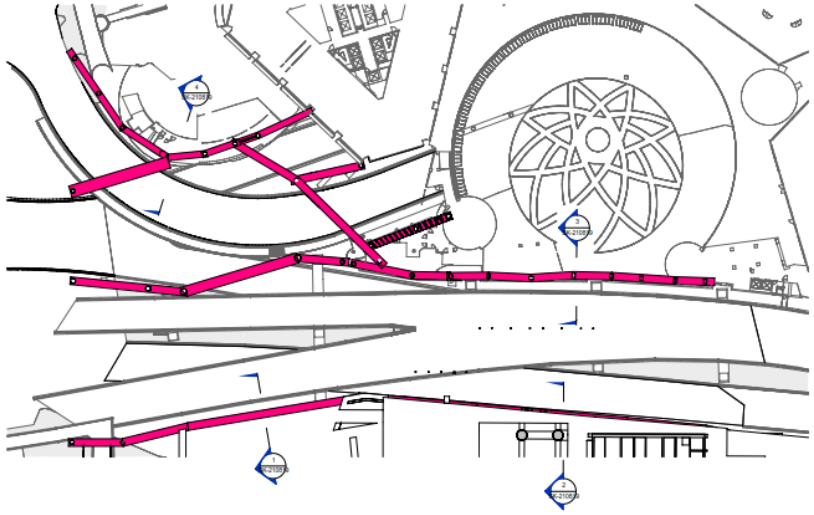


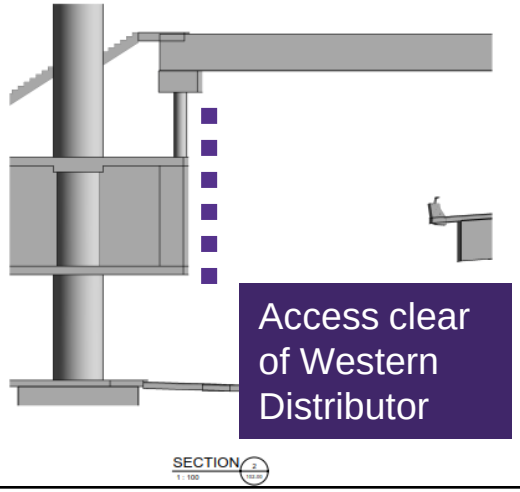
1.Maintenance of the Landbridge – Bearings (Inspections & Replacement)

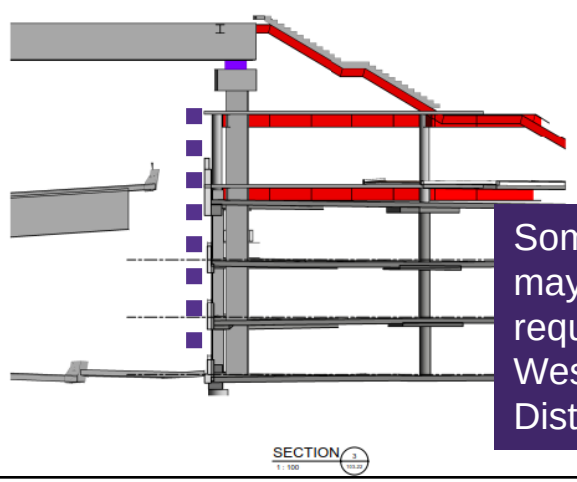
- Bearing Maintenance (inspections and replacement) can occur at any time as access is available from Darling Park.

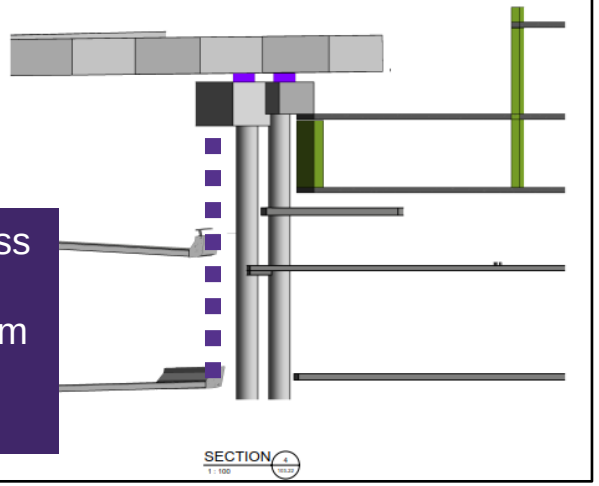


1.Maintenance of the Landbridge – Façade (inspections & repairs)

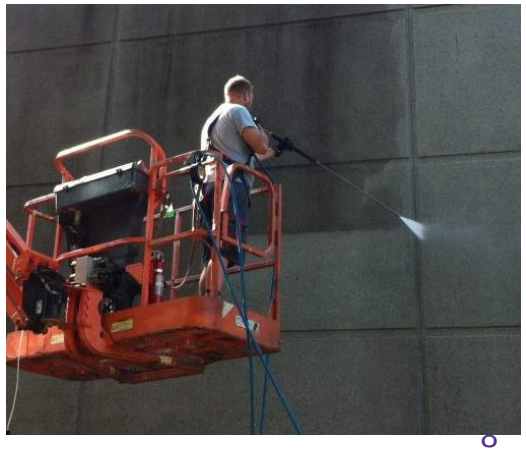








- Maintenance requiring access on the western Distributor or Harbour Road will occur under a night-works lane closure ROL approved by TfNSW's Customer Journey Planning branch and appropriate stakeholders.
- Maintenance, inspection and repairs of concrete facade:
  - Pressure cleaning
  - Crack and spalling repairs.



2. Maintenance of Western Distributor (topside surfaces)

2. Maintenance of the Western Distributor (topside surfaces)

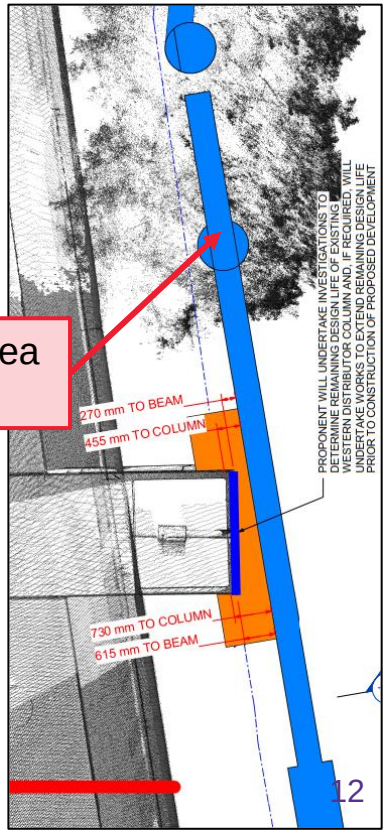
- Maintenance of the top-side surfaces of the Western Distributor can be carried out using typical plant and equipment to undertake:
  - Asphalt resurfacing
  - Repainting of handrailing
  - Pavement patching, and the like.

3. Access for maintenance of Western Distributor Surfaces near the Land Bridge

3. Access for maintenance of Western Distributor Surfaces

- Following completion of the Landbridge, column 4 of Western Distributor reinforced concrete surfaces will be left with reduced access for routine maintenance. Refer to deep blue highlight areas on diagrams .
- To understand the durability of the existing concrete structure and whether any protective coatings may be required, investigations can be undertaken by coring into specific Western Distributor reinforced concrete surfaces locations beneath the Landbridge.
- A similar approach was taken in 2014, where cores were taken on Western Distributor columns as part of the Four Seasons Hotel Development. It was discovered that minimal chloride penetration had occurred and similar can be expected here.
- The cores will provide clear direction on the remaining life of the columns and will indicate whether any protective coatings are required.
- Coatings can be simply undertaken (using wand for instance) before, or after, construction of the Landbridge.
- If necessary, installation of cathodic protection measures can be considered.

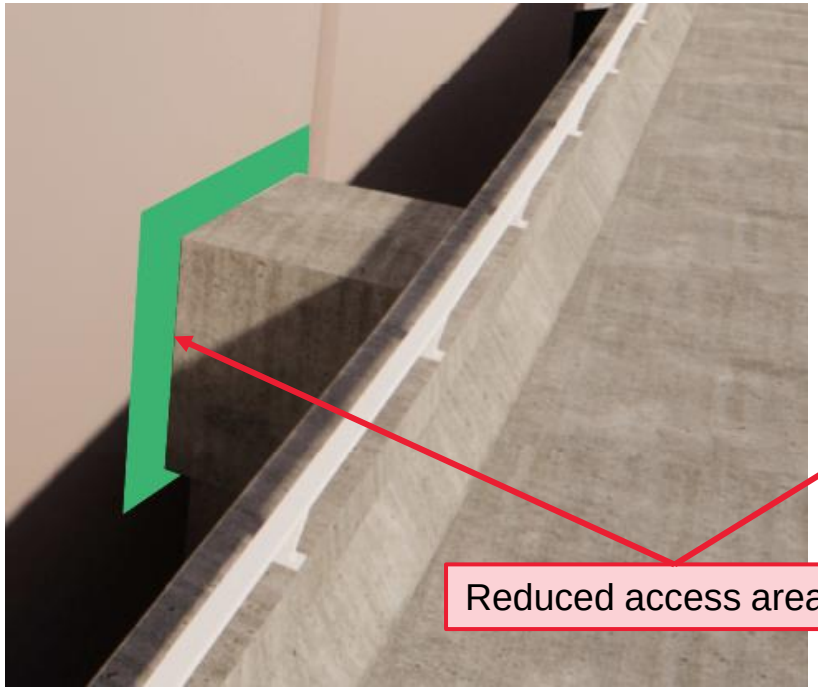
Reduced access area at Column 4

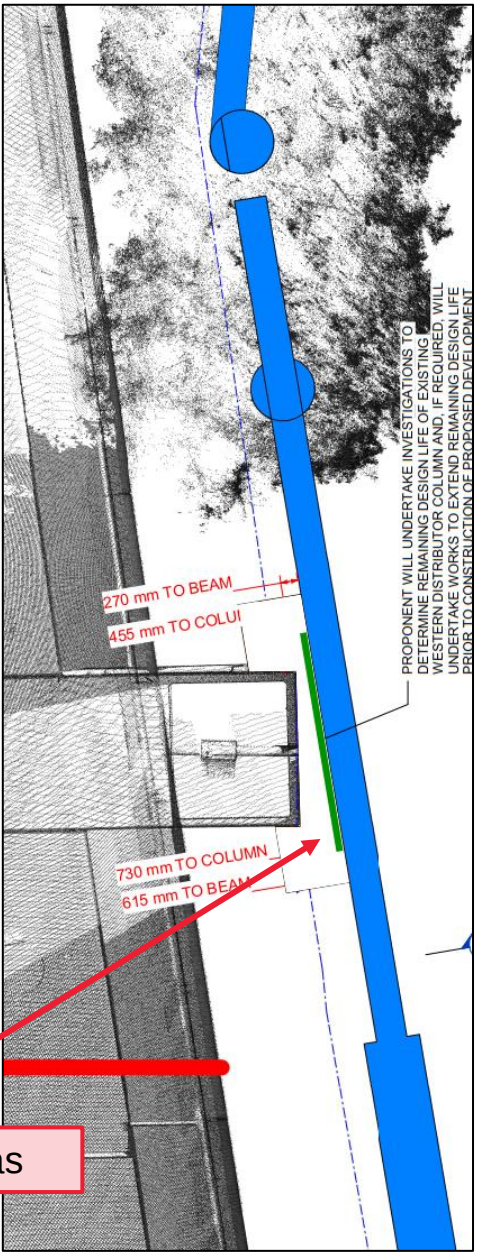


4. Access for maintenance of Land Bridge Columns / Blade Walls near the Western Distributor

4. Access for maintenance of Land Bridge Columns / Blade Walls

- Following completion of the Land bridge, a few Land bridge reinforced concrete surfaces (blade wall), will have reduced widths for routine maintenance (inspect, assess and repair). Refer green highlight areas on diagrams .
- Concrete placed in specific blade walls can have either:
  1. An additive included with the concrete matrix to reduce the permeability (and the risk of chloride penetration), or
  2. An high strength (such as 50MPa) concrete added to reduce permeability.





5. Access for repair (strengthening) of Western Distributor Column / Headstock after Land Bridge

5. Access for repair (strengthening) of Western Distributor Column / Headstock

- **Headstock strengthening**
  a. Install support under deck & remove existing bearings.
  b. **Option 1 -** Install PT cables on both sides of headstock. Establish PT dead end nearest Landbridge wall; stress PT,
  c. **Option 2** - Demolish headstock (hammer, concrete cutting etc); install new headstock via standard FRP with PT cable internally; stress PT from end furthest from Landbridge
  d. Replace new bearings.

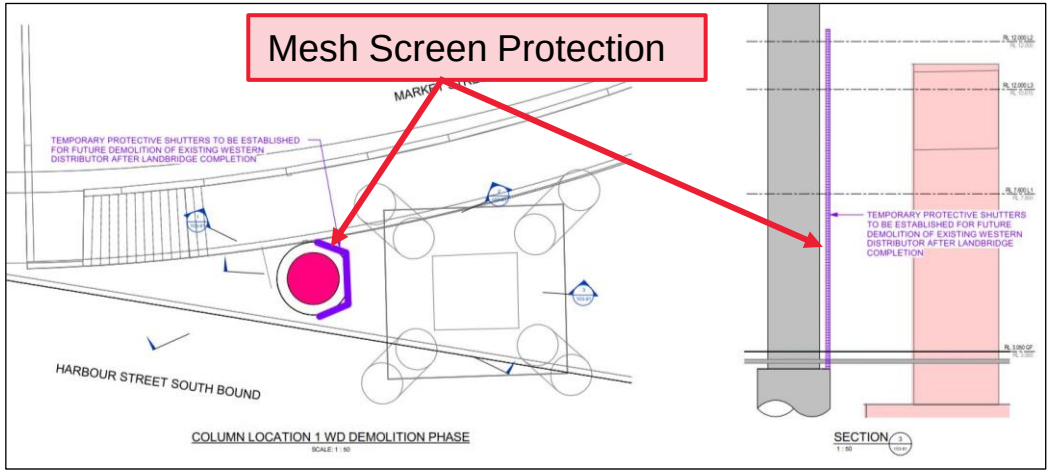
- **Column strengthening**:
  a. Install support under headstock.
  b. **Option 1** - install vertical post-tensioning around the column, OR,
  c. **Option 2** - Demolish/remove column and install new column via formwork, reo place and concrete place, OR
  d. Remove headstock supports.

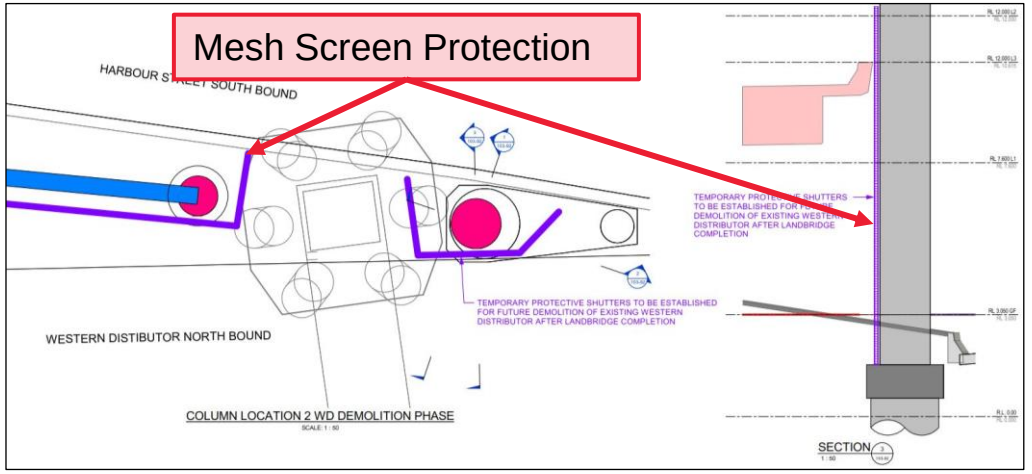
6. Access for repair (demolition) of the Western Distributor after completion of Land Bridge

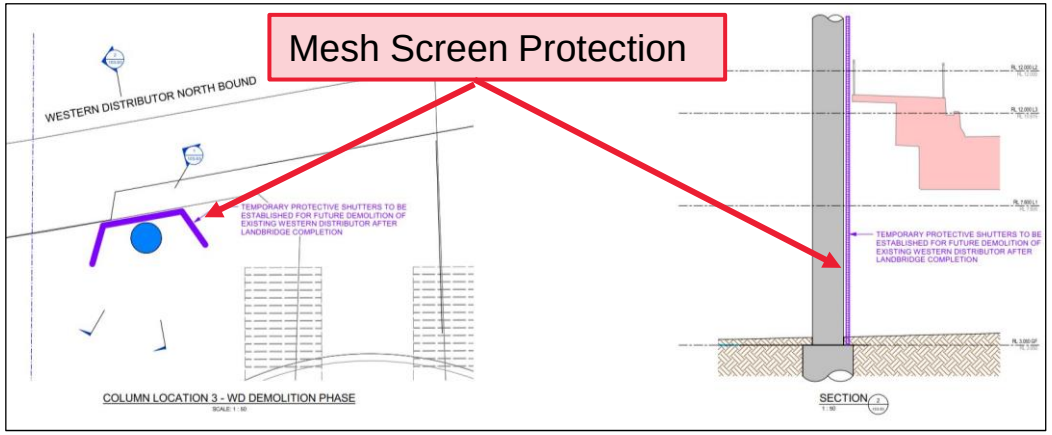
6. Access for repair (demolition) of the Western Distributor

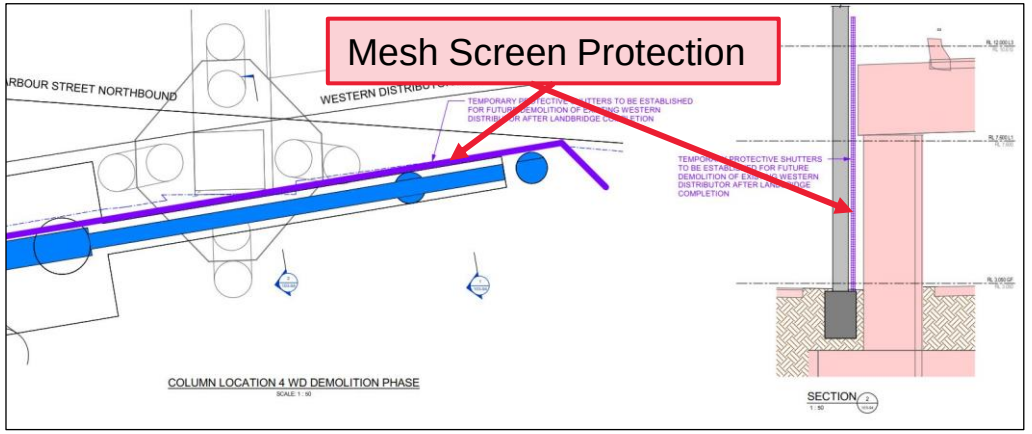
Step 1 – Protection of the Land Bridge

- In the event the Western Distributor is to be demolished, temporary heavy duty mesh shall be fixed around the at-risk columns and blade walls of The Landbridge.





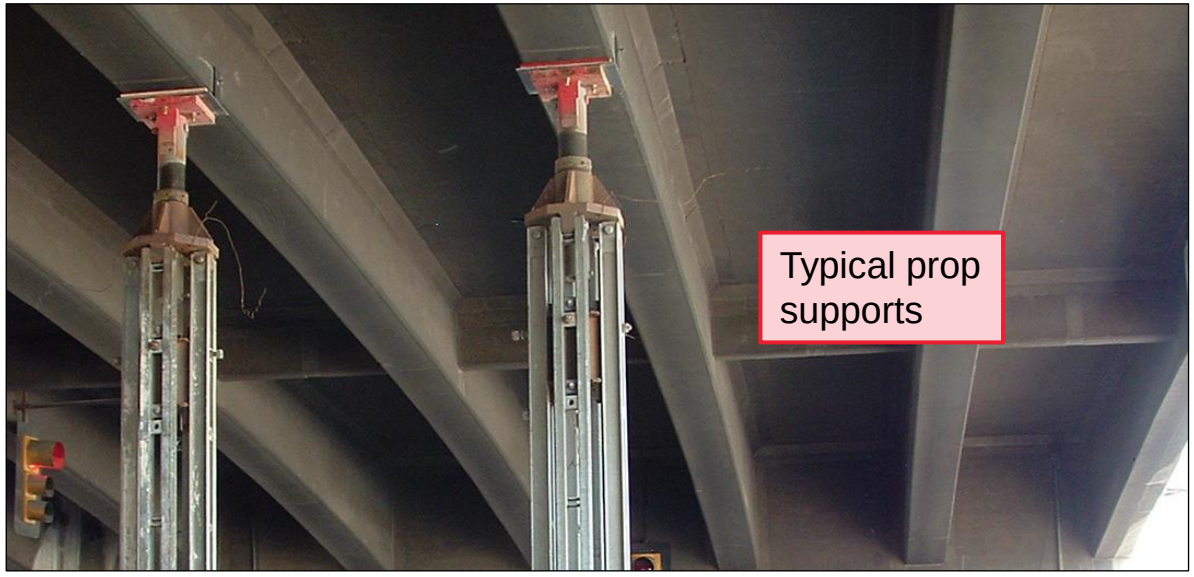




6. Access for repair (demolition) of the Western Distributor

Step 2 – Temporary Support of Superstructure

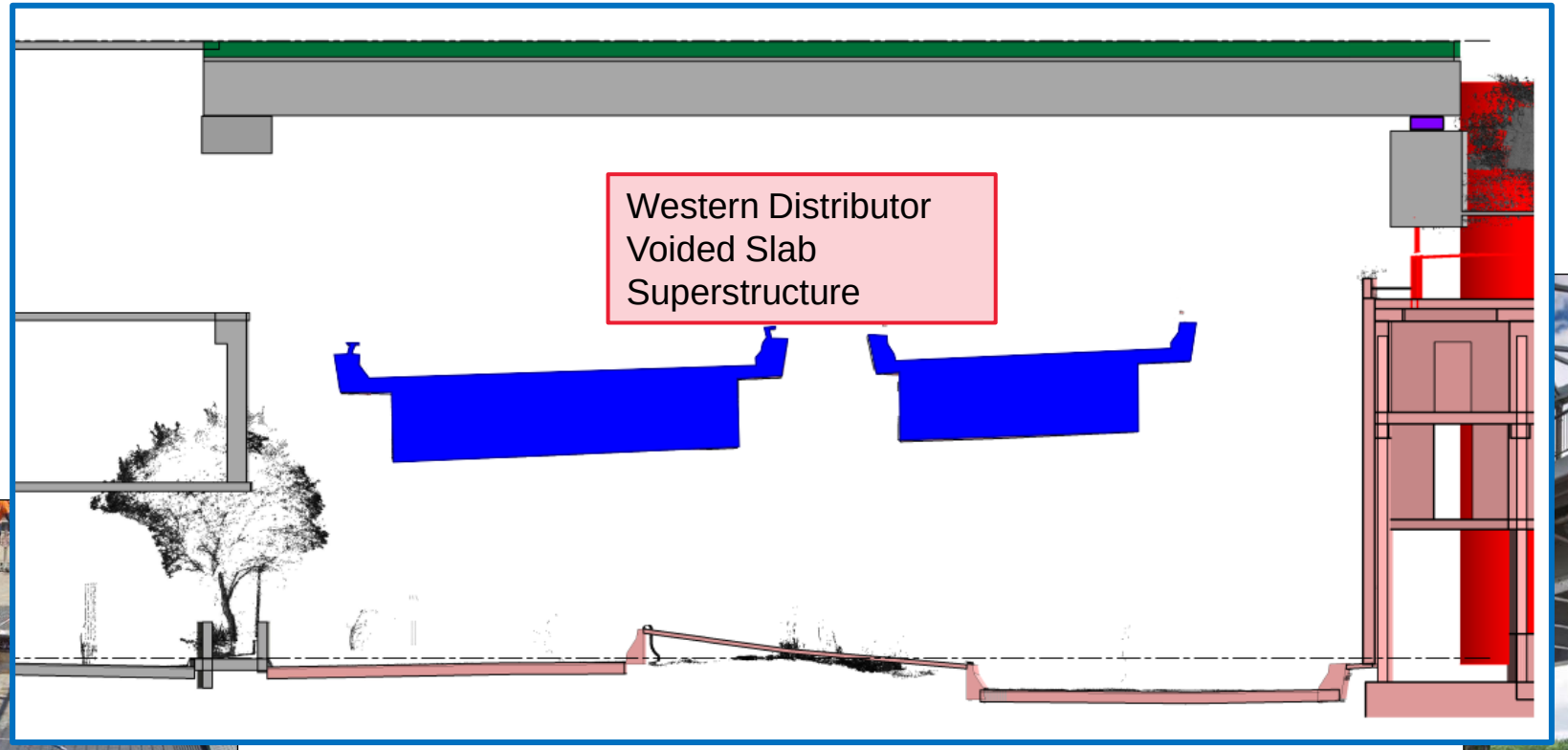
- Coordinate with TfNSW Customer Journey Planning and stakeholders for TMP approval of detours required for a major arterial road closure
- Undertake preliminary preparation of the site including hardstands capable of supporting:
  - WD superstructure supports and
  - Heavy lift, jacking and/or SPMT plant and equipment.
- Install prop support beneath the existing Western Distributor Superstructure in preparation of saw-cutting the Superstructure into sections.



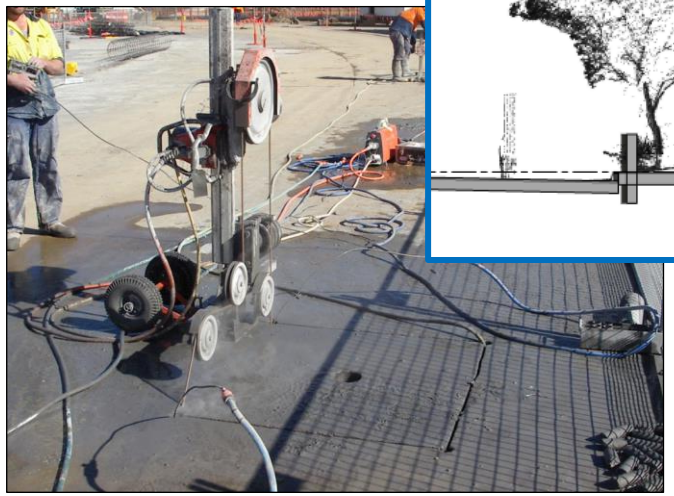
6. Access for repair (demolition) of the Western Distributor

Step 3 – Cutting & Lowering of Superstructure

- Use a diamond wire saw to cut the superstructure into sections ready to be lowered to ground level
- Use a proprietary jacking system to lower the superstructure sections onto SPMT's or similar, and break down for loading into trucks (or crushing on-site) and removal offsite

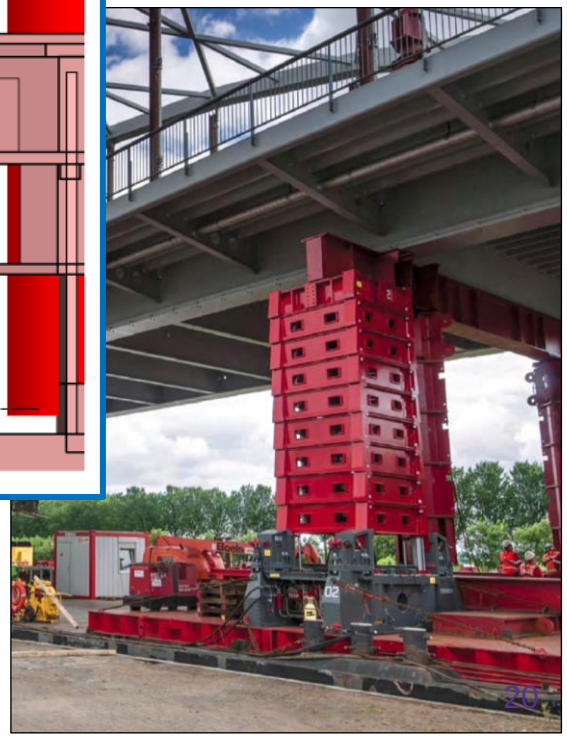


Diamond Wire Saw cutting a bridge section



Self-propelled modular transporter (SPMT)

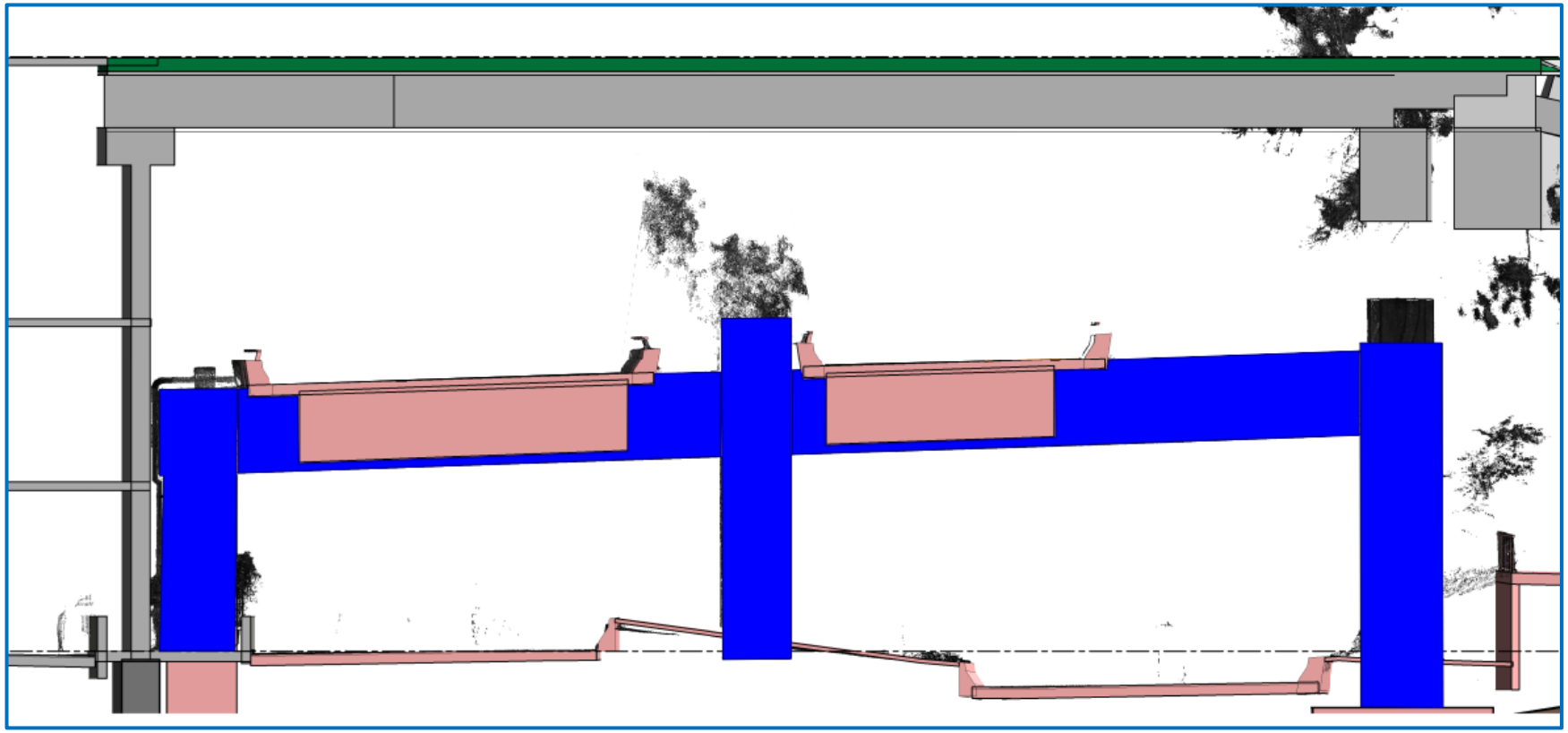
Jacking system for lowering cut bridge sections

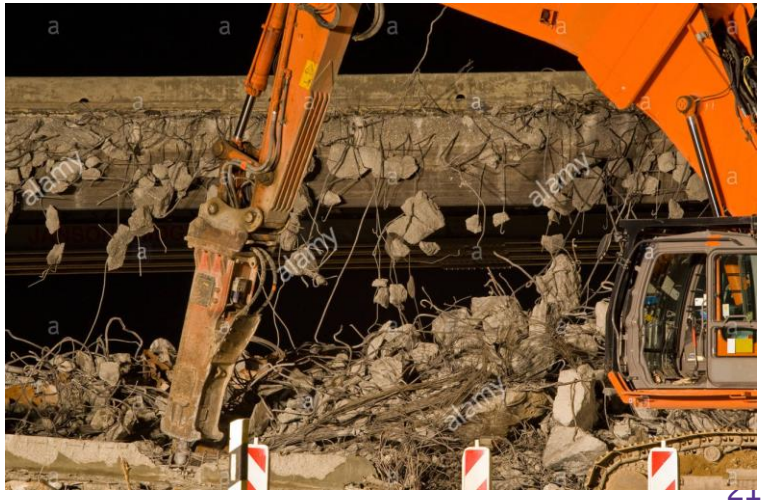


6. Access for repair (demolition) of the Western Distributor

Step 4 – Removal of Columns & Pile-cap

- Use a demolition hammer to **remove** the **concrete** in sections down the column, exposing the reinforcement, then cut the reinforcement and progress down to the pile cap. Hammer the pile cap concrete away to the required depth below the pile cap





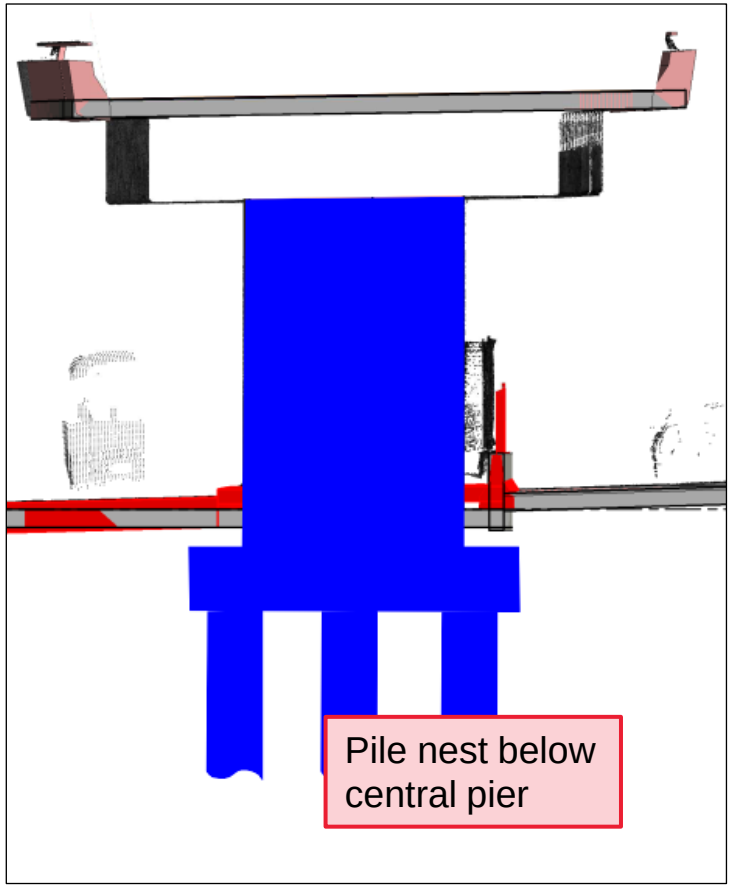
7. Access for repair (construction) of the Western Distributor after completion of Land Bridge

Access for repair (construction) of the Western Distributor

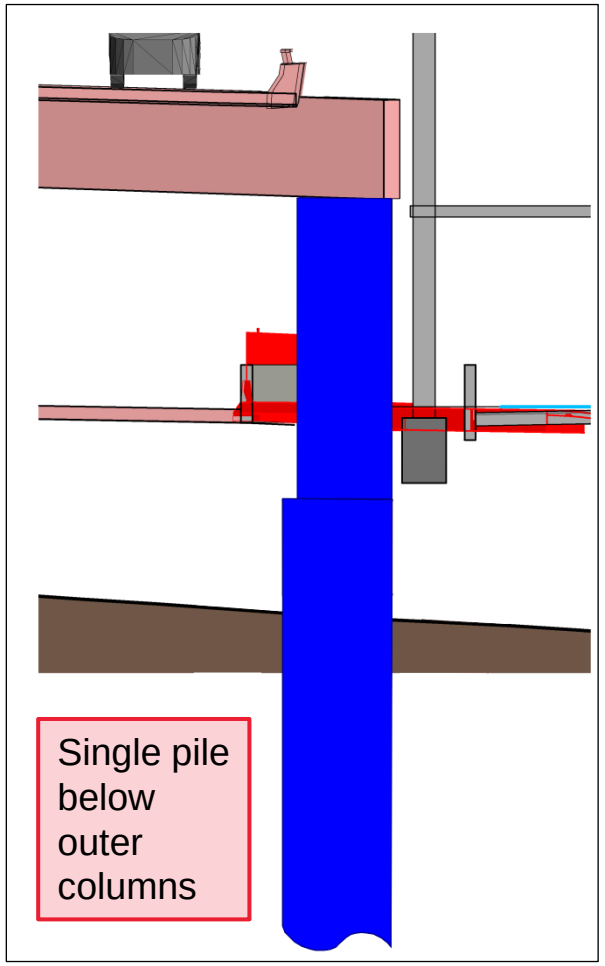
Step 1 – Piling and Column Construction

- Install piles using a height restricted “stumpy” piling rig capable of piles to 2m dia and 50m deep.
- Install single piles below the outer columns
- Install nest of piles under pile cap for blade columns
- Construct columns using standard FRP systems
- Craneage size and lift sizes will be geared to the available head clearance (11.6m – 15.10m) indicated below

“Stumpy” piling rig to be used

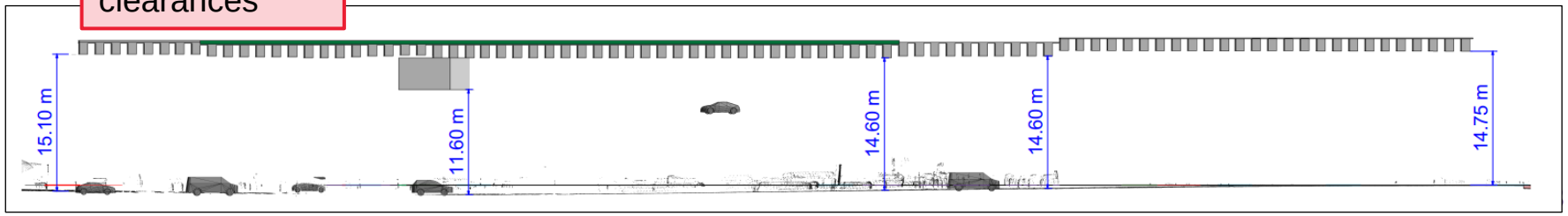


Pile nest below central pier



Single pile below outer columns

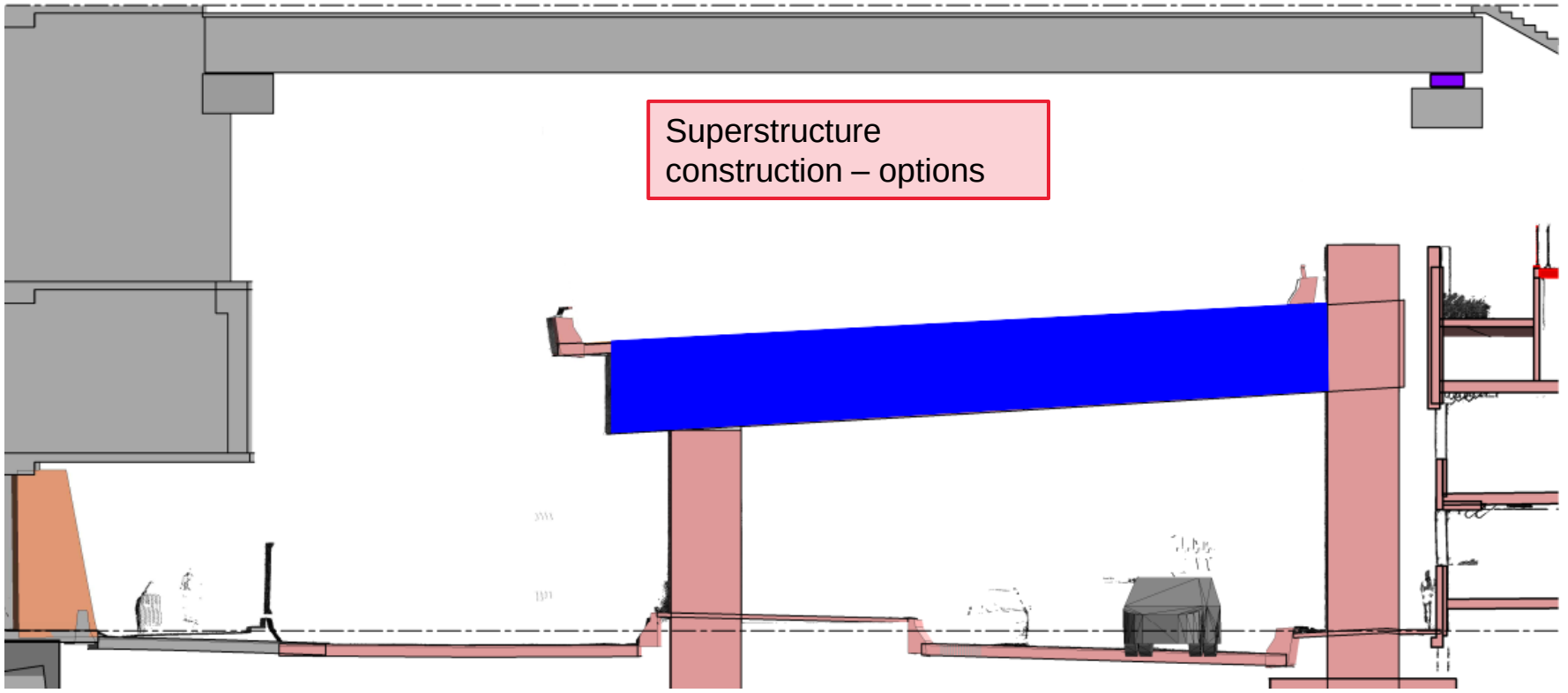
Pile & craneage clearances

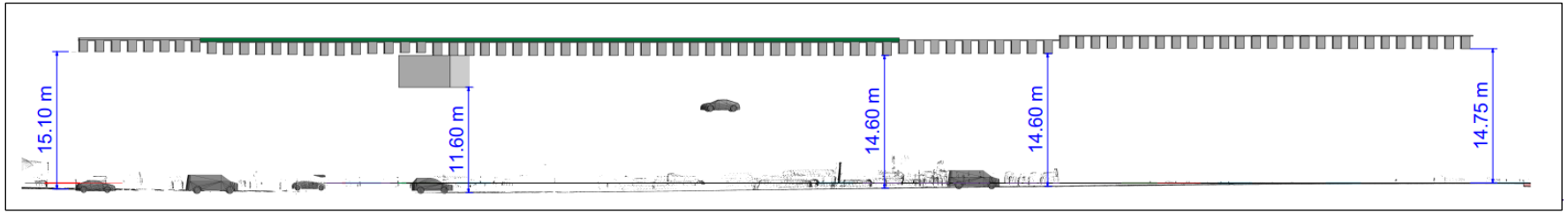


Access for repair (construction) of the Western Distributor

Step 2 – Superstructure Construction

- Construction undertaken within clearances (min 5.5m)
- **Option 1 - Voided slab** - will require falsework for full length. Craneage size and lift sizes will be geared to the available head clearance . Longitudinal PT is not restricted. Lateral PT will stress from ‘free’ end
- **Option 2** - **Precast** – will require fabrication on site and jacked into position, and supported. Craneage not possible. Longitudinal PT not restricted. Lateral PT will stress from ‘free’ end





COCKLE BAY PARK
SYDNEY

Thank you

johnholland.com.au

AMP CAPITAL

GPT
The GPT Group

JOHN HOLLAND

Cockle Bay Park – The Proposed Land Bridge and Western Distributor

Maintenance of Cockle Bay Assets adjacent to Landbridge and Western Distributor

19 August 2021

Revision 1

COCKLE BAY PARK
SYDNEY

Presenters

Koby Boer - Senior Project Manager – John Holland

JOHN HOLLAND

Purpose

Response to TfNSW request to demonstrate the maintenance of Cockle Bay Assets adjacent to the **Western Distributor and Landbridge**

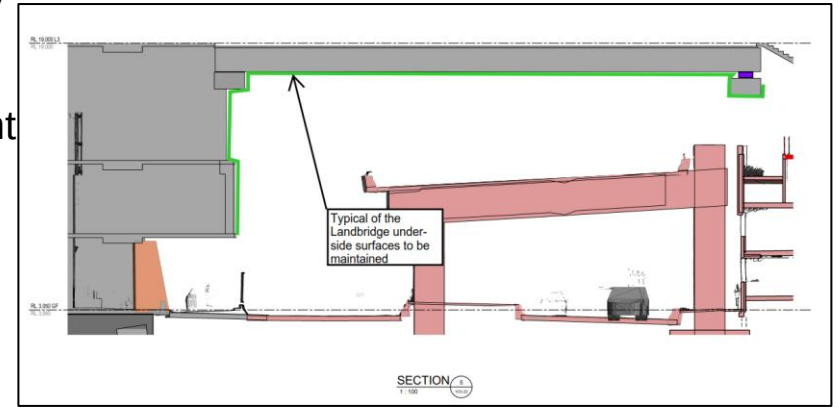
Agenda

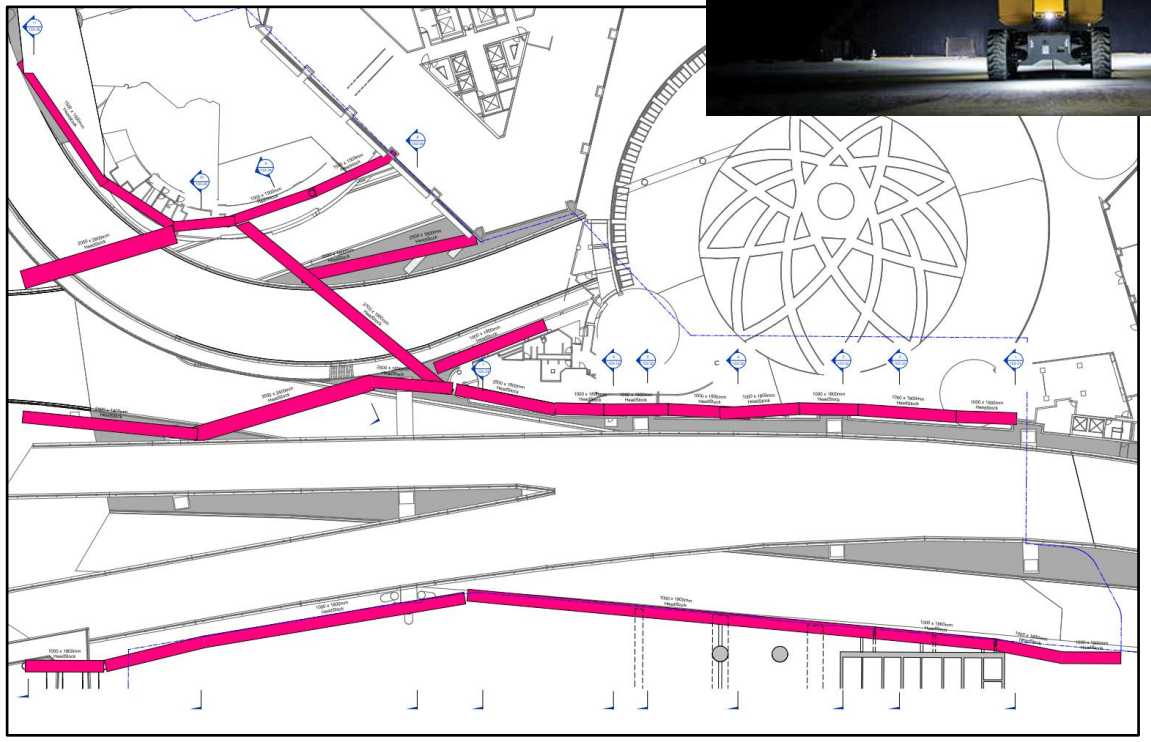
1. Maintenance of Landbridge

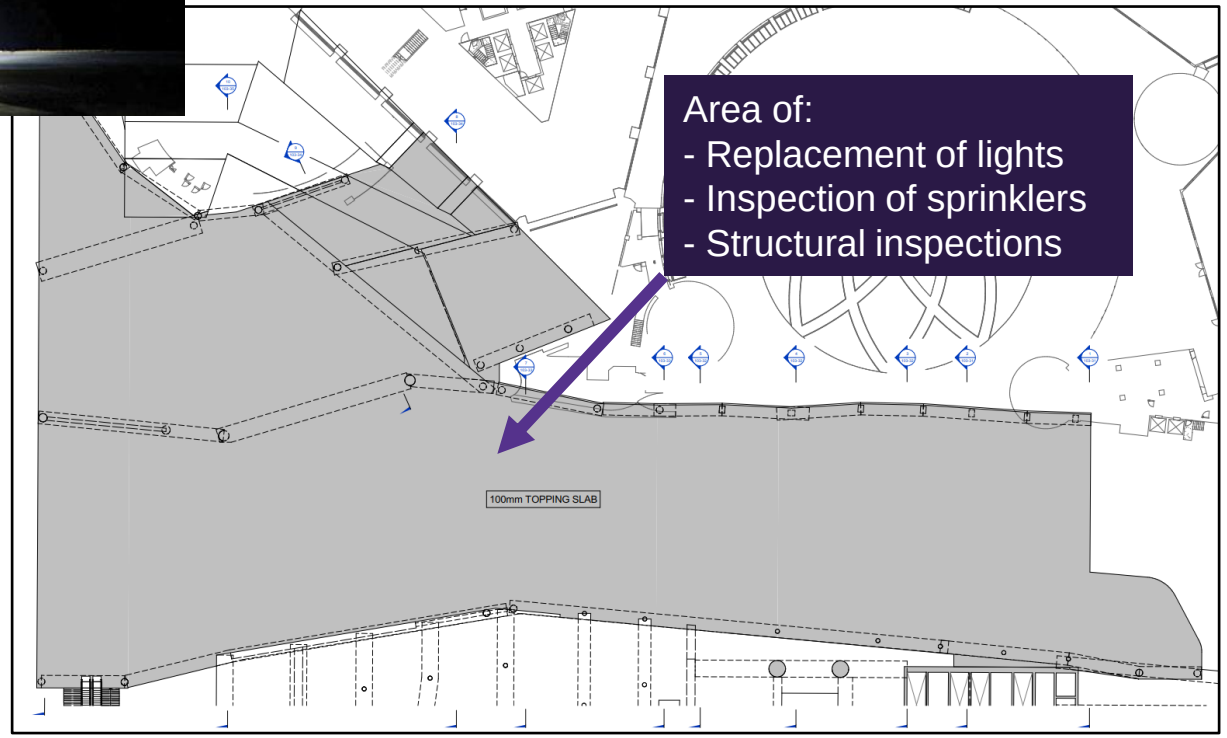
- Underside Lights and Sprinklers
- Darling Park Girder Bearings
- Structural Concrete Facades

1.Maintenance of Landbridge – Underside (Lighting, sprinklers, inspections)

- Maintenance would occur under a night-works lane closure ROL approved by TfNSW's Customer Journey Planning branch and appropriate stakeholders.
- Maintenance of underside of Landbridge can be carried out using typical plant and equipment such as an elevating working platform (EWP) to permit:
  - Replacement of lights
  - Inspection of sprinklers.
  - Structural inspections

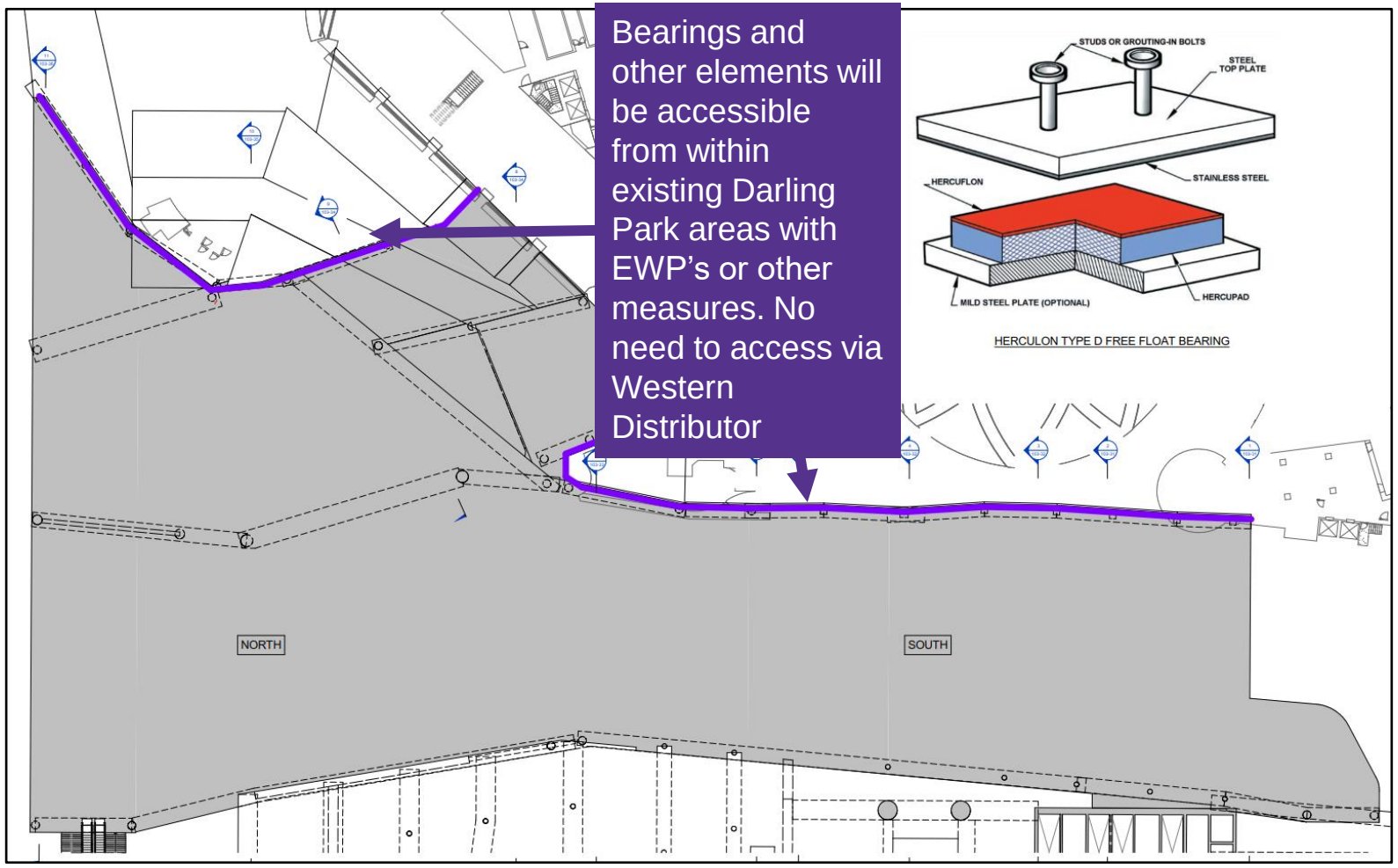




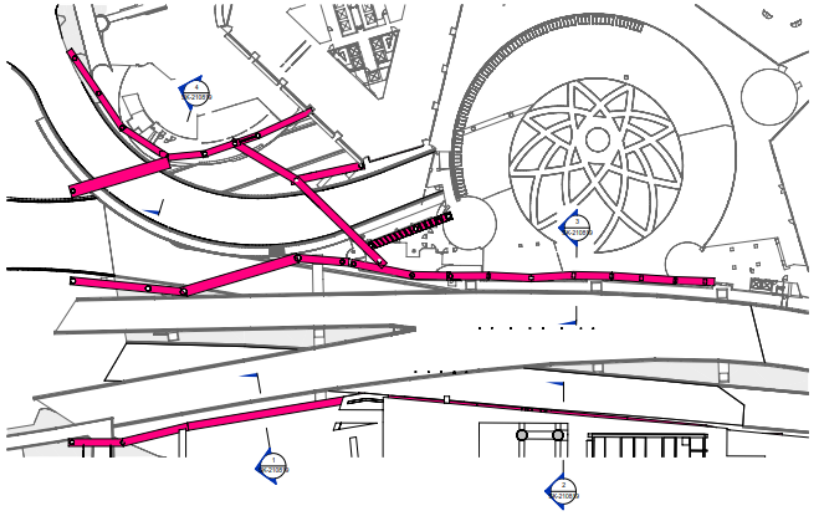


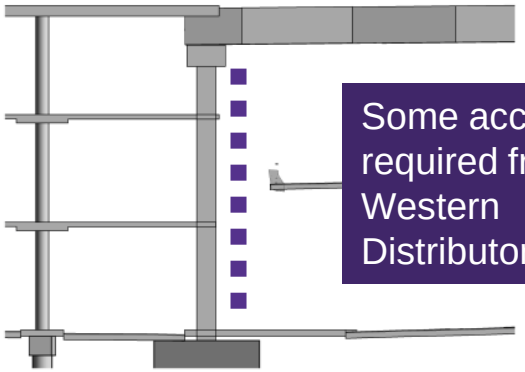
1.Maintenance of the Landbridge – Bearings (Inspections & Replacement)

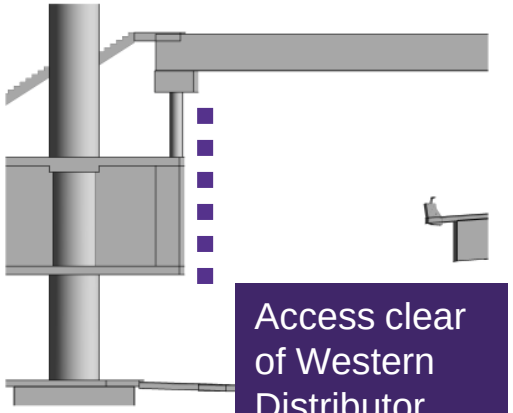
- Bearing Maintenance (inspections and replacement) can occur at any time as access is available from Darling Park.

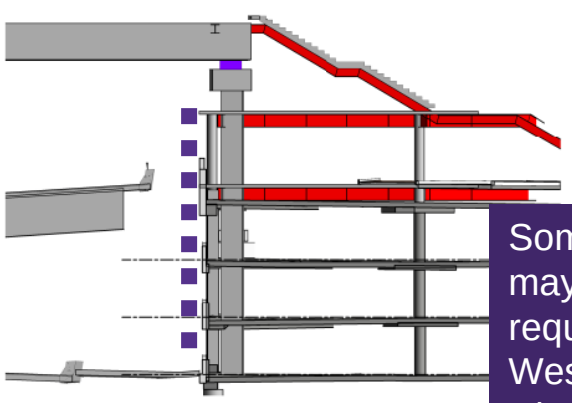


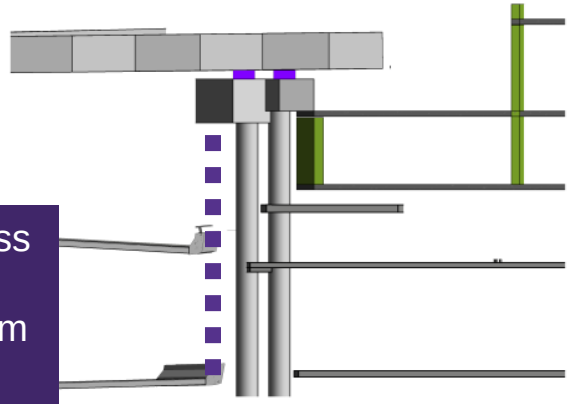
1.Maintenance of the Landbridge – Façade (inspections & repairs)



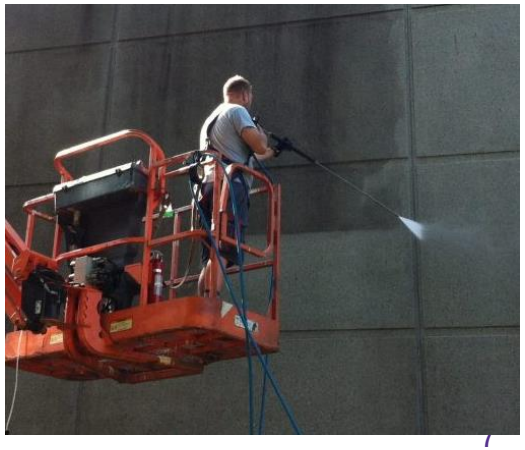








- Maintenance requiring access on the western Distributor or Harbour Road will occur under a night-works lane closure ROL approved by TfNSW's Customer Journey Planning branch and appropriate stakeholders.
- Maintenance, inspection and repairs of concrete facade:
  - Pressure cleaning
  - Crack and spalling repairs.



COCKLE BAY PARK
SYDNEY

Thank you

johnholland.com.au

AMP CAPITAL

GPT
The GPT Group

JOHN HOLLAND

APPENDIX C

TfNSW Technical Note – TN 016 (2020)

Transport Asset Standards Authority

For queries regarding this document
standards@transport.nsw.gov.au
www.transport.nsw.gov.au

Technical Note – TN 016: 2020

Issue date: 21 August 2020

Effective date: 21 August 2020

Subject: Request for latest risk assessment criteria, categories and matrix

This technical note is issued by the Asset Standards Authority (ASA) as an update to T MU MD 20002 ST *Risk Criteria for Use by Organisations Providing Engineering Services,* v1.0.

The risk assessment consequence criteria and the likelihood criteria provided in T MU MD 20002 ST is aligned with Transport for NSW (TfNSW) enterprise risk management. The TfNSW enterprise risk management was recently updated and the currently published version of T MU MD 20002 ST is not up to date.

T MU MD 20002 ST is currently being updated to align with latest TfNSW enterprise risk management and will be published shortly.

In the interim, for those undertaking risk management activities for or on behalf of TfNSW, access to the latest information on risk criteria, categories and matrix can be requested to ASA by means of an email to standards@transport.nsw.gov.au stating the following:

- reason for the request
- the work being carried out, for which the content is required and applied

Authorisation:

Checked and approved by	Interdisciplinary coordination checked by	Authorised for release
A/Manager Safety and Risk Assurance	Director Safety, Quality, Environment and Risk	Director Network Standards and Services

Standard

Risk Criteria for Use by Organisations Providing Engineering Services

Version 1.0

Issued date: 21 December 2016

Important warning

Standard governance

Owner: Manager Safety and Risk Assurance, Asset Standards Authority

Authoriser: Principal Manager Safety, Quality, Environment and Risk, Asset Standards Authority

Approver: Executive Director, Asset Standards Authority on behalf of the ASA Configuration Control Board

Document history

Version	Summary of changes
1.0	First issue.

For queries regarding this document,
please email the ASA at
standards@transport.nsw.gov.au
or visit www.asa.transport.nsw.gov.au

Transport Asset Standards Authority

Preface

The Asset Standards Authority (ASA) is a key strategic branch of Transport for NSW (TfNSW). As the network design and standards authority for NSW Transport Assets, as specified in the *ASA Charter*, the ASA identifies, selects, develops, publishes, maintains and controls a suite of requirements documents on behalf of TfNSW, the asset owner.

The ASA deploys TfNSW requirements for asset and safety assurance by creating and managing TfNSW's governance models, documents and processes. To achieve this, the ASA focuses on four primary tasks:

- publishing and managing TfNSW's process and requirements documents including TfNSW plans, standards, manuals and guides
- deploying TfNSW's Authorised Engineering Organisation (AEO) framework
- continuously improving TfNSW's Asset Management Framework
- collaborating with the Transport cluster and industry through open engagement

The AEO framework authorises engineering organisations to supply and provide asset related products and services to TfNSW. It works to assure the safety, quality and fitness for purpose of those products and services over the asset's whole of life. AEOs are expected to demonstrate how they have applied the requirements of ASA documents, including TfNSW plans, standards and guides, when delivering assets and related services for TfNSW.

Compliance with ASA requirements by itself is not sufficient to ensure satisfactory outcomes for NSW Transport Assets. The ASA expects that professional judgement be used by competent personnel when using ASA requirements to produce those outcomes.

About this document

This document presents the risk criteria to be used by organisations providing engineering services when assuring TfNSW assets or assessing risks for which TfNSW will be the owner or part owner.

This document has been approved by the ASA configuration control board and is a first issue.

Table of contents

1. Introduction

Organisations providing engineering services to TfNSW, either AEOs or non-AEOs for transport modes where AEO is not applicable, involved in the supply and assurance of assets for TfNSW undertake risk assessments as part of the assurance of those assets. A number of TfNSW standards require such risk assessments to be conducted against the TfNSW risk criteria.

This document presents the risk criteria to be used when assuring TfNSW assets or assessing risks for which TfNSW is or will be the owner or part owner. Additional risk criteria may also be provided through a contract for delivery of new or altered assets to TfNSW.

2. Purpose

The purpose of this document is to define the risk criteria to enable the AEO or organisations providing engineering services to assure TfNSW assets and assess risks for which TfNSW is or will be the owner or part owner.

2.1. Scope

This document covers only the risk criteria to be used by AEO or organisations providing engineering services when assuring TfNSW assets or assessing risks for which TfNSW is or will be the owner or part owner.

T MU MD 20001 ST *System Safety Standard for New or Altered Assets* sets the minimum requirements for assuring new and altered assets on behalf of TfNSW.

2.2. Application

This document is applicable to all AEO or organisations providing engineering services of TfNSW that conduct risk assessments as part of the assurance of TfNSW assets or as required by TfNSW standards.

3. Reference documents

The following documents are cited in the text. For dated references, only the cited edition applies. For undated references, the latest edition of the referenced document applies.

Transport for NSW standards

T MU MD 20001 ST System Safety Standard for New or Altered Assets

4. Terms and definitions

The following terms and definitions apply in this document:

RAM reliability, availability and maintainability

Transport mode means by which people and freight achieve mobility

5. General information on risk criteria

This document sets the risk criteria against which risks shall be reported to TfNSW.

AEO or organisations providing engineering services may use their own processes for the management of risk.

The risk criteria presented in Section 6 shall be used by the AEO or organisations providing engineering services in the following situations:

- When providing assurance to new or altered assets that are supplied to TfNSW. This includes all aspects of that assurance including but not limited to safety, reliability, availability and maintainability (RAM), human factors and operability.
- When conducting risk assessments required by TfNSW standards.
- When assessing risks that may be fully or partly owned by TfNSW.

6. Risk criteria

Table 1 provides the risk assessment consequence criteria and Table 2 provides the risk assessment of likelihood criteria, respectively.

Table 1 – Risk assessment consequence criteria

Descriptor / Impact area	Insignificant (rating – C6)	Minor (rating – C5)	Moderate (rating – C4)	Major (rating – C3)	Severe (rating – C2)	Catastrophic (rating – C1)
Health and safety (injury and disease)	Illness, first aid or injury not requiring medical treatment.	Illness or minor injuries requiring medical treatment.	Single recoverable lost time injury or illness, alternate or restricted duties injury or short-term occupational illness.	1-10 major injuries requiring hospitalisation and numerous days lost, or medium-term occupational illness.	Single fatality or 10-20 major injuries/permanent disabilities/chronic diseases, or both.	Multiple fatalities or >20 major injuries/permanent disabilities/chronic diseases, or both.
Environment	No appreciable changes to environment or highly localised event or both.	Change from normal conditions within environmental regulatory limits and environmental effects are within site boundaries.	Short term or well-contained environmental effects or both. Minor remedial actions probably required.	Impacts external ecosystem and considerable remediation is required.	Long term environmental impairment in neighbouring or valued ecosystems. Extensive remediation required.	Irreversible large scale environmental impact with loss of valued ecosystems.
Customer experience and operational reliability	Short duration disruptions affecting part of one transport mode.	Minor disruptions affecting several parts of one transport mode.	Serious disruptions affecting operation of one complete transport mode.	Major disruptions affecting operations of one transport mode with network-wide effects on one or more modes of transport.	Short duration shutdowns or substantial disruptions affecting multiple transport modes with sector wide cascading effects.	Extensive shutdowns or extended disruptions with economy wide effects.

Table 2 – Risk assessment – Likelihood criteria

Descriptor / Impact area	Almost unprecedented (rating – L6)	Very unlikely (rating – L5)	Unlikely (rating – L4)	Likely (rating – L3)	Very likely (rating – L2)	Almost certain (rating – L1)
Qualitative Expectation	Not expected to ever occur during time of activity or project.	Not expected to occur during the time of activity or project.	More likely not to occur than occur during time of activity or project.	More likely to occur than not occur during time of activity or project.	Expected to occur occasionally during time of activity or project.	Expected to occur frequently during time of activity or project.
Quantitative Frequency	Less than once every 100 years.	Once every 10 to 100 years.	Once every 1 to 10 years.	Once each year.	1-10 times every year.	10 times or more every year.

Note: When assessing risks associated with new or altered assets the term 'activity' in the above table should be considered to represent the intended operational life of the asset.

Table 3 presents the risk levels based on the assessed consequence and likelihood.

Table 3 – Risk matrix evaluation table

Likelihood	Insignificant consequence C6	Minor consequence C5	Moderate consequence C4	Major consequence C3	Severe consequence C2	Catastrophic consequence C1
Almost certain - L1	C	B	B	A	A	A
Very likely - L2	C	C	B	B	A	A
Likely - L3	D	C	C	B	B	A
Unlikely - L4	D	D	C	C	B	B
Very unlikely - L5	D	D	D	C	C	B

Likelihood	Insignificant consequence C6	Minor consequence C5	Moderate consequence C4	Major consequence C3	Severe consequence C2	Catastrophic consequence C1
Almost unprecedented - L6	D	D	D	D	C	C

Risk Ratings - A – Very high, B – High, C – Medium, D – Low

Table 4 describes the risk tolerability requirements with respect to new or altered assets.

Table 4 – Risk tolerance and responses

Risk rating	Risk description	Response
A	Very high - generally intolerable	Very high risks are generally intolerable and should be avoided except in extraordinary circumstances. A very high risk would not be acceptable when related to the operation or maintenance of a new or altered asset as the activity would not be permitted. An alternative solution shall be found and all necessary steps shall be taken to reduce the risk below this level.
B	High – undesirable	High risks are undesirable. It is highly unlikely that an undesirable risk would be accepted when related to the operation or maintenance of a new or altered asset. They can only be tolerated if it is not reasonably practicable to reduce the risk further, that is that SFAIRP is demonstrated and the risk is agreed as acceptable to TfNSW. High risks are considered to be on the verge of being unacceptable and all credible options to reduce or eliminate the risk shall be explicitly considered.
C	Medium – tolerable	Medium risks are tolerable if it is not reasonably practicable to reduce the risk further. It is essential that where a risk has health, safety or environmental consequences the activity should be reviewed to determine if the risk can be reduced further and whether all reasonable and practicable controls have been considered or applied, or both and a demonstration of SFAIRP is provided. Additional treatment measures should be sought if significant benefit can be demonstrated and/or there is an additional treatment measure which is recognised as good practice in other like environments.
D	Low – broadly acceptable	Low risks are considered to be broadly acceptable. Where the risk has health, safety or environmental consequences control measures should be effective, reliable and subject to appropriate monitoring. If options for further risk reduction exist and costs are proportionate to the benefits, then implementation of such measures should be considered. The risk and its treatments should be subject to appropriate degrees and forms of monitoring to ensure that it remains at this level.