

Engineering System Integrity
Engineering Instruction
Electrical Distribution Unit

EI D 26-05

Truss Bridge Containment Tunnel

This Engineering Instruction includes urgent engineering information. Adherence to the information in this Instruction is **MANDATORY**.

Date in Force: 27 July 2026

Date of Review: 27 July 2029

Approved by:

Sean Budge
Associate Director
Electrical Distribution Unit

Authorised by:

Bahieya Sipos
A/Engineering Technical
Publications Manager

Audience:

- Network Maintenance
- Engineering System Integrity
- Major Works
- TfNSW

Main Points:

- This EI endorses the use of the containment tunnel for refurbishment work on truss bridges.

Primary Affected Document: PR D 78202 and PR D 78302

Document Control

Version	Date	Summary of change
1.0	27/07/2026	First issue as a Sydney Trains document

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Scope

This Engineering Advice is to provide information on the use of a containment tunnel for refurbishment works on truss bridges.



Background

Steel truss bridges are being refurbished and painted as part of the MPM bridge painting program. As the existing bridges require the removal of the lead-based paint, the environmental and safety requirements make it essential for the work to be undertaken within a fully sealed works containment area with effective control of all waste generated. As it is not feasible to undertake the work within available track possessions, Major Works have designed a containment tunnel to segregate the work area from trains and energised electrical equipment.

The containment tunnel has been designed to comply with bridge design requirements and the wind loads that are created by trains passing through the tunnel. The containment tunnel has been designed to comply with the Asset Standards Authority's [T HR EL 08012 ST Overhead Wiring Standards for Design and Construction](#) for clearance to OHW equipment and [TS 03500_0.00_Transit Space \(1\)](#) for clearances to the kinetic envelope, with a steel frame supporting a durable, weatherproof structural plywood lining, the adjacent standing surfaces will comply with coverage and clearance envelope requirements of [T HR EL 08001 ST Safety Screens and Barriers for 1500 V OHW Equipment](#).

The bridge capacity to support the containment tunnel and scaffold has been thoroughly reviewed and accepted by TAO bridge designers.

Once erected, the containment tunnel provides a solid barrier so that most of the scaffold installation can be undertaken without encroaching on SADs, i.e. greater than 4.0 m from OHW equipment. The remaining scaffold installation at either end of the tunnel will be undertaken during weekend track possession to ensure SAD requirements are not infringed during construction. At the completion of the scaffold construction (and prior to return of the Electrical Permit to Work), solid barriers will be installed to separate the work areas from operating trains and live electrical equipment.

All metallic members of the containment tunnel, as well as the worksite scaffold, will be effectively bonded to the bridge structure and the total structure will be protected by a spark gap bonded to rail to an approved E&B design.

The containment tunnel will be constructed as two parts, being the floor and lower walls, and an upper section which will slide across when moving and secured in place for the duration of the staged work. Weekend track possessions with power outage will be utilised for installation, relocation and removal of the containment tunnel.

The 11 kV aerials supported by the bridge have been replaced with insulated and armoured bundled conductors

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Summary

For electrical purposes, EDU have accepted/endorsed the containment tunnel as a modification of the bridge as a substantial structure, which forms a solid and rigid barrier that can withstand any foreseeable forces. Located between the 1500 V energised equipment and the worksite, and not a temporary structure as described in the ENSRs.

The general design and program may be reviewed in the attached presentation *Hawkesbury River Underbridge Refurbishment*.

Action required

As the containment tunnel is for a worksite, further requirements are as follows:

- a. Construction that forms the tunnel:
 - Gaps in the tunnel construction between the worksite and energised equipment shall not exceed 3 mm.
 - No exposed cut or drilled holes are permitted in the panels.
 - Warning signs shall be affixed to the safe side of the tunnel, warning of the presence of the electrical hazard on the other side of the tunnel and warning that the tunnel panels shall not be penetrated or removed.
 - A competent person with civil expertise shall inspect the containment tunnel after its erection and before its use, to certify that the temporary structure has been erected in compliance with the design drawings. A structure handover certificate is to be provided and kept at the site. Refer to [SMS-06-OP-3026 Work Health and Safety \(WHS\) Risk Management](#) and AS/NZS 4576 *Guidelines for scaffolding* for inspection and recording requirements.
 - The containment tunnel shall include perimeter edge protection to prevent workers, tools, material or objects from falling onto, or infringing the SADs of electrical equipment as specified in [GUI30 Working Near Electrical Equipment](#).
 - These SADs shall be achieved as a taut string distance to the top and side extremities of the edge protection.
- b. A competent person with civil expertise shall visually inspect the tunnel on a daily basis to ensure that the containment tunnel is in a satisfactory condition and remains impenetrable. Records of inspection shall be maintained. Refer to [SMS-06-OP-3026 Work Health and Safety \(WHS\) Risk Management](#) and AS/NZS 4576 for additional inspection and recording requirements, e.g. inspection of scaffold by a competent person at intervals not exceeding 30 days or after repair or modification.
- c. The Earthing/Bonding arrangement shall be inspected following any electrical storms in the area as well as the existing bridge spark gap inspection requirements
- d. Measures shall be maintained to restrict unauthorised access.

Contact

Electrical Distribution Unit
RailElectricalSafety@transport.nsw.gov.au

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TRANSPORT

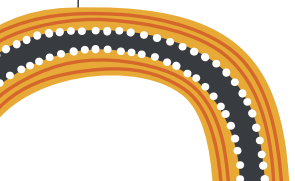
Hawkesbury River Underbridge Refurbishment



Ahmad Samrout – Program Manager, Major Works

Scope of Works

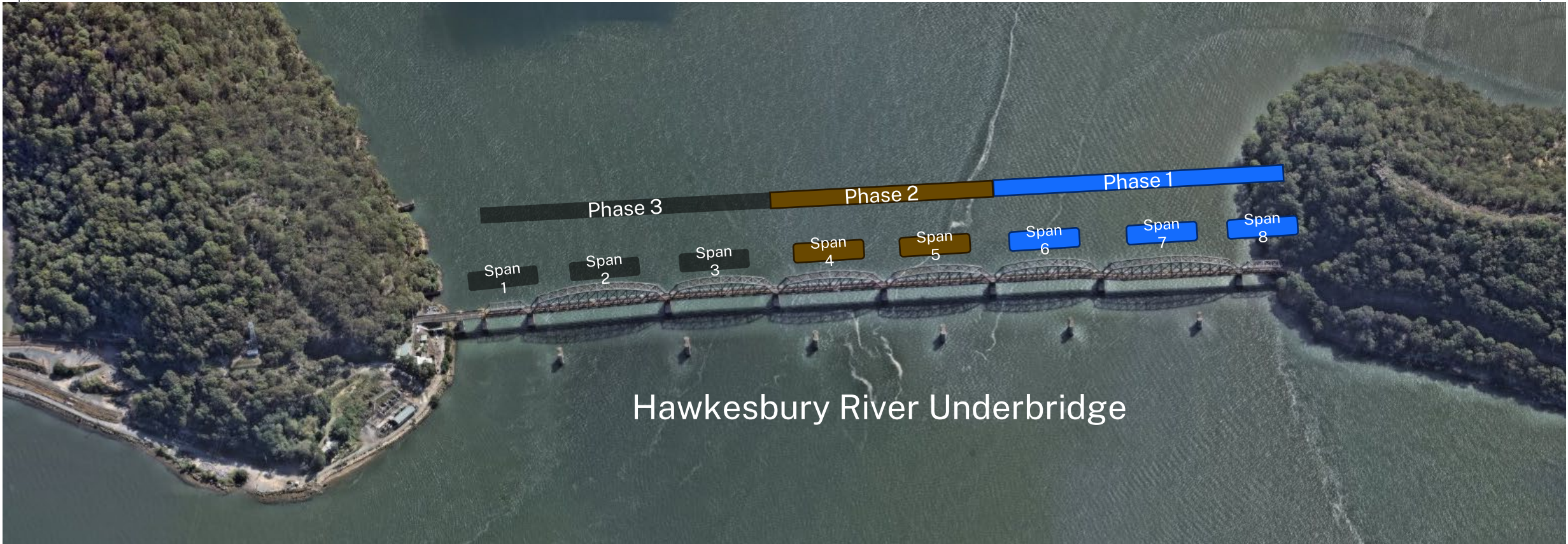
- Sydney Trains Major Works will be undertaking refurbishment works at the Hawkesbury River Rail Bridge commencing in 2026.
- Estimated project completion date – end of 2033/start of 2034.
- Scope of works includes;
 - ❑ Blast and paint of steel structure of all 8 spans
 - ❑ Installation of Up side walkway
 - ❑ Upper walkway repairs
 - ❑ Various steel repairs
 - ❑ Temporary works to enable above work



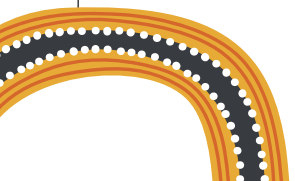
Hawkesbury River Bridge

City End (To Sydney)

Country End (To Newcastle)

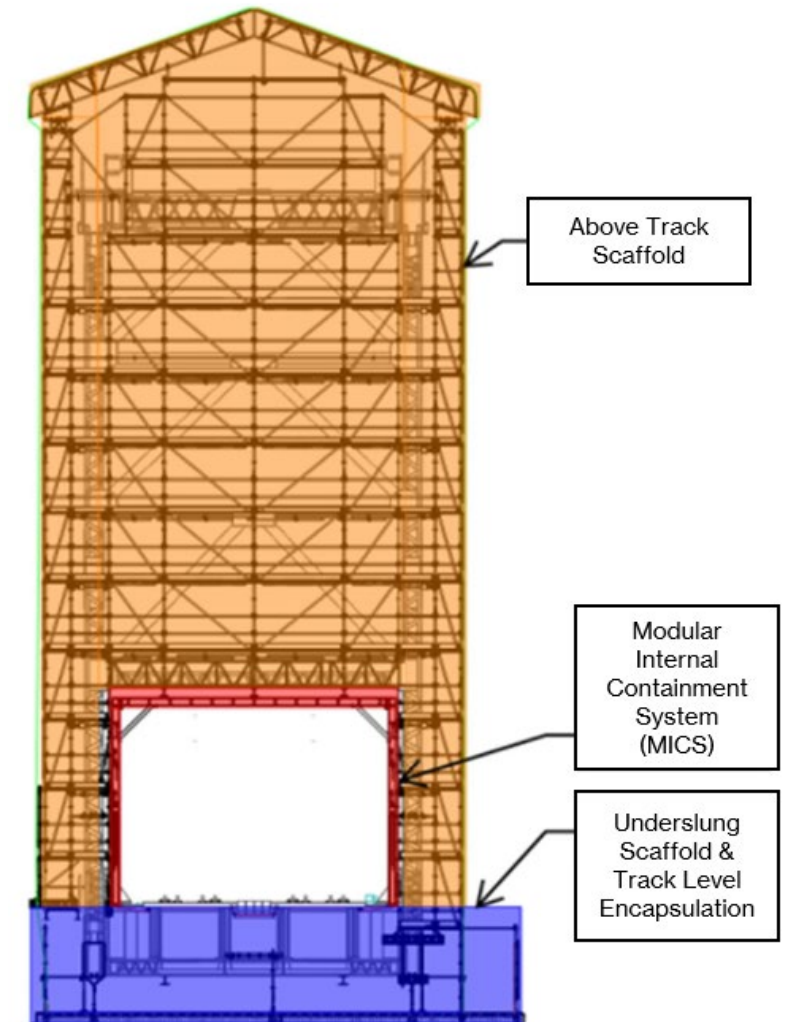
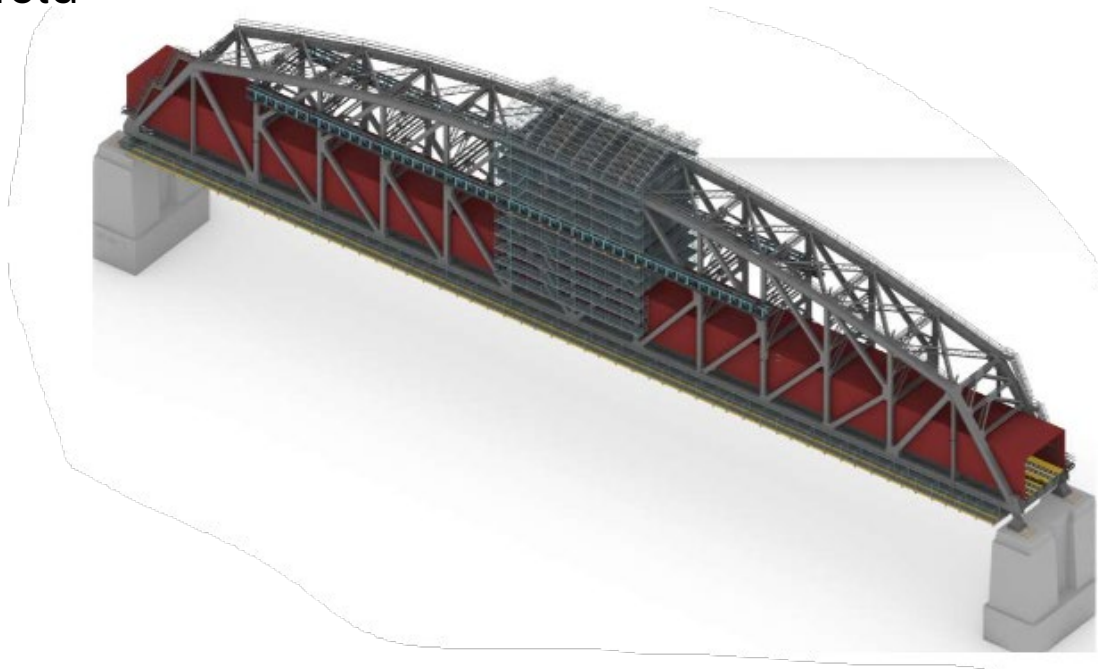


Hawkesbury River Underbridge

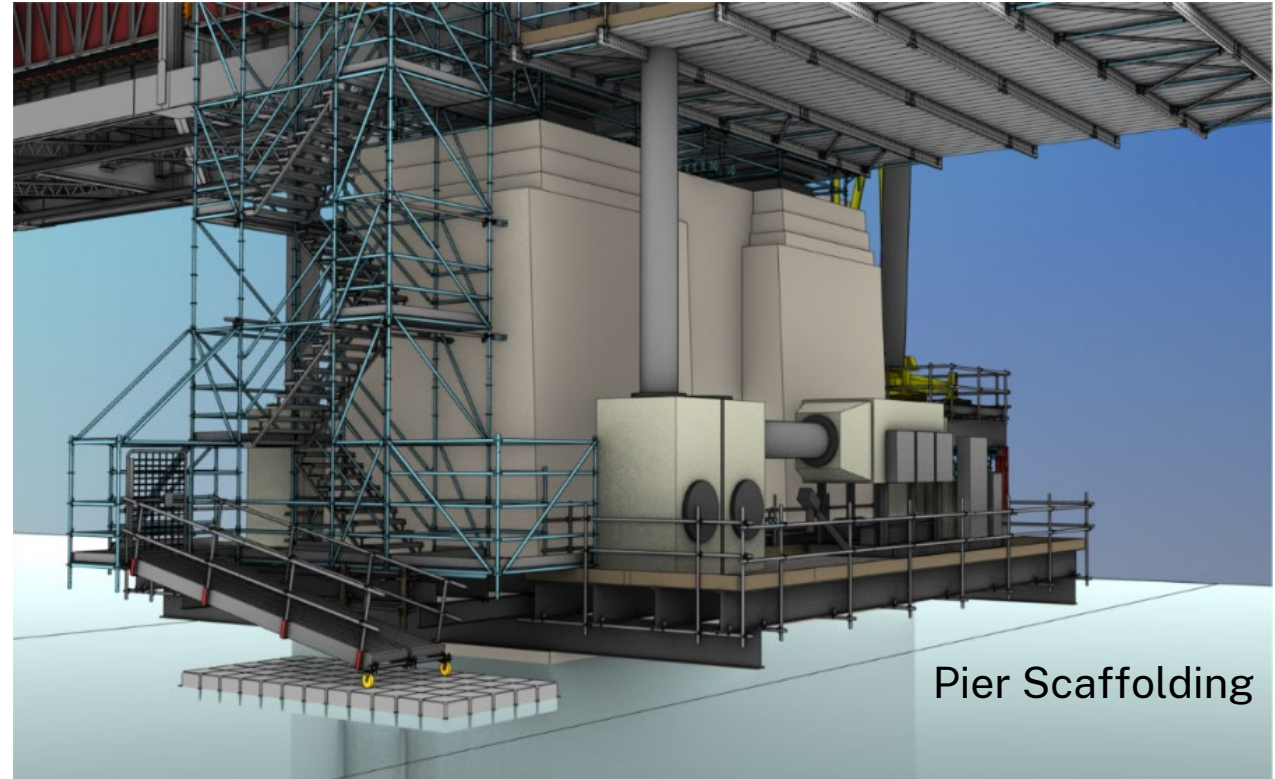
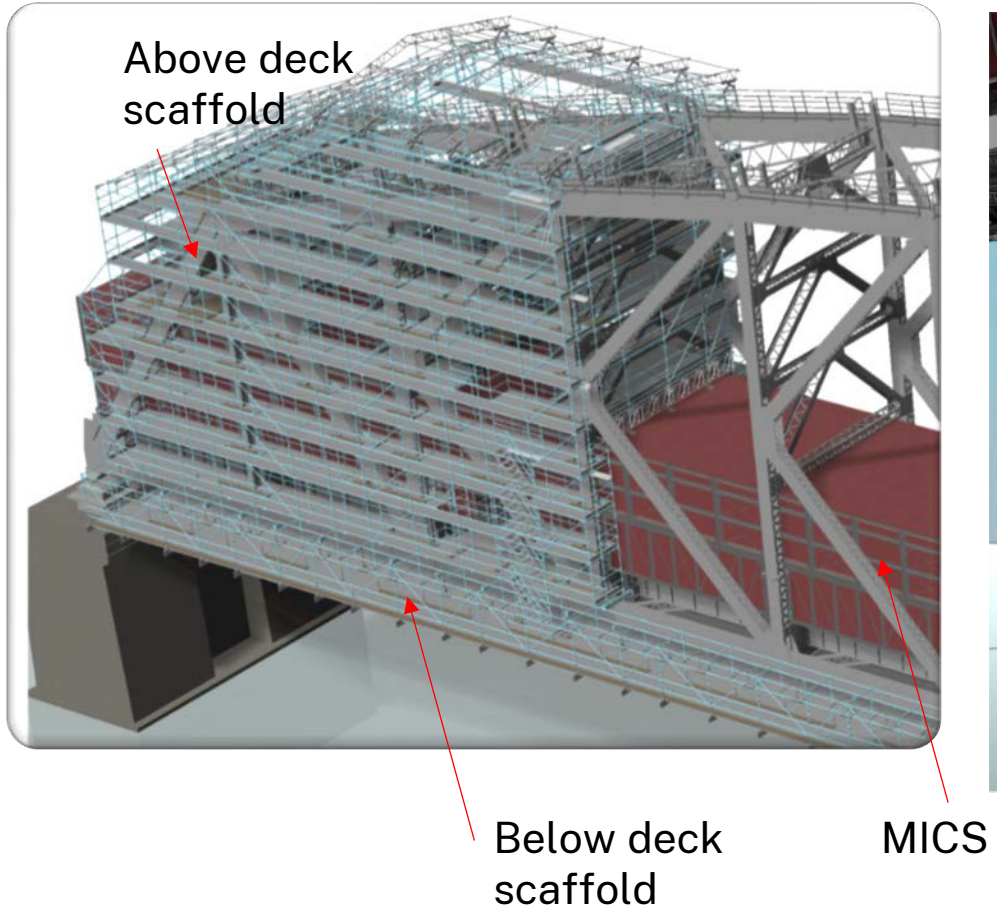


Temporary Works

- **MICS – Modular Internal Containment System**
- Above track scaffold
- Below track scaffold
- Pier scaffold



Temporary Works



Previous Similar Works

- Cockle Creek Bridge – similar internal and external containment system was designed and installed to enable blast and paint works. Works completed in 2021.



Internal containment



External containment

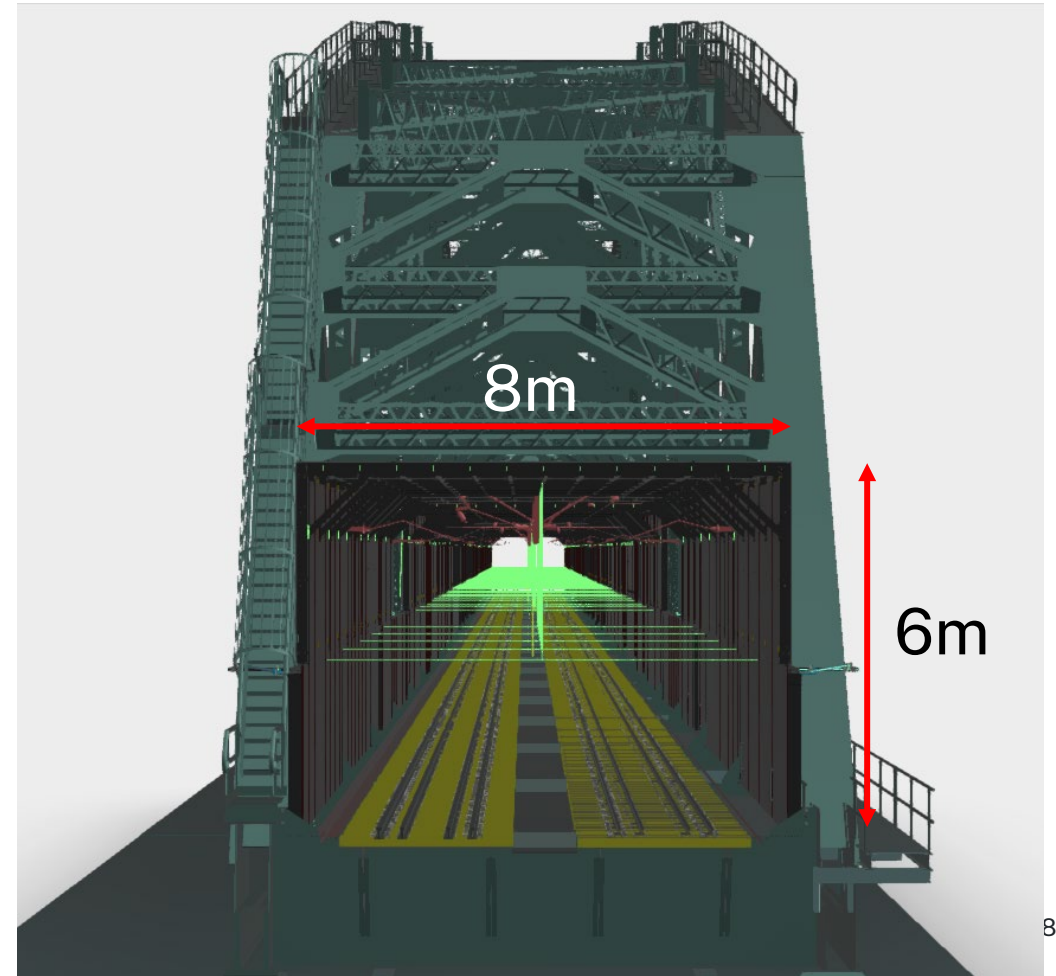
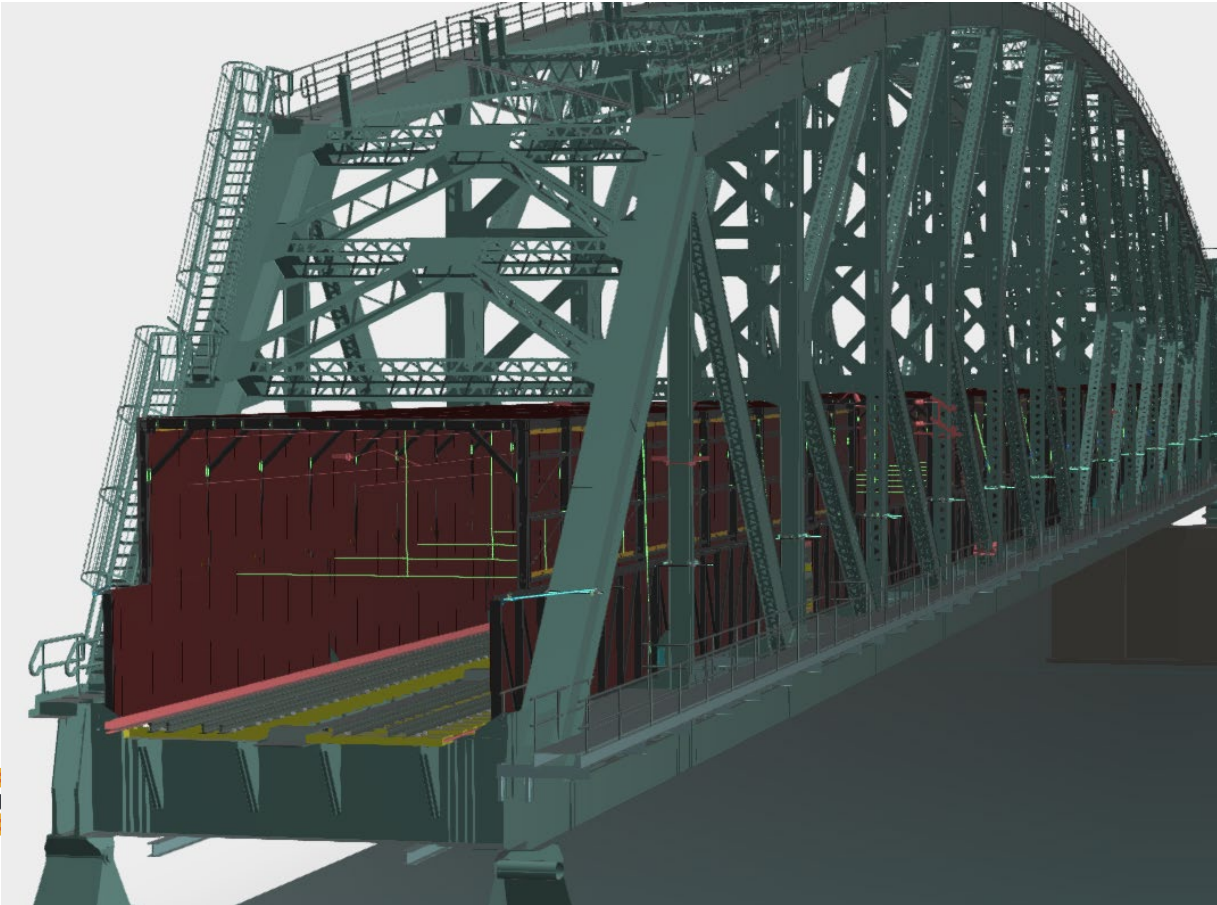
Previous Similar Works

- Peats Ferry Road Bridge – internal and external containment systems built to ensure vehicles can still use the bridge while allowing for work to be conducted safely. Project completed in 2025.

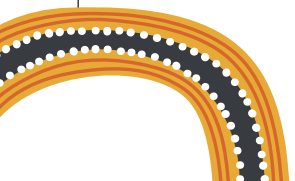
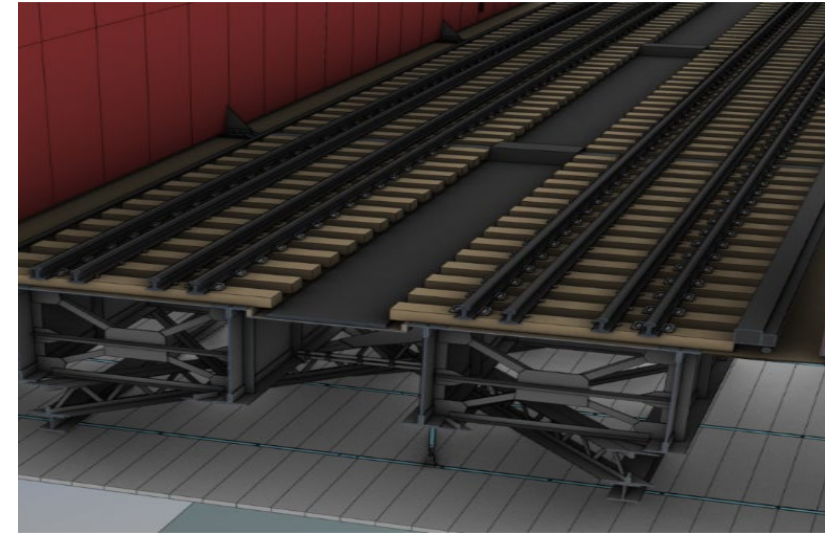


Composition of the MICS

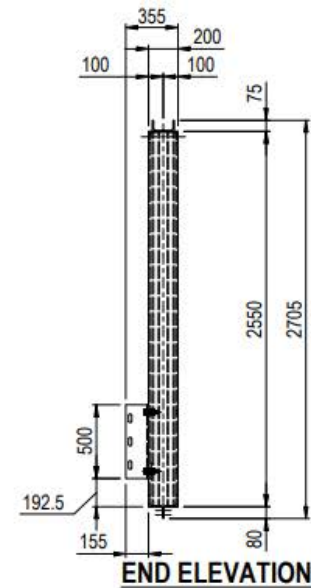
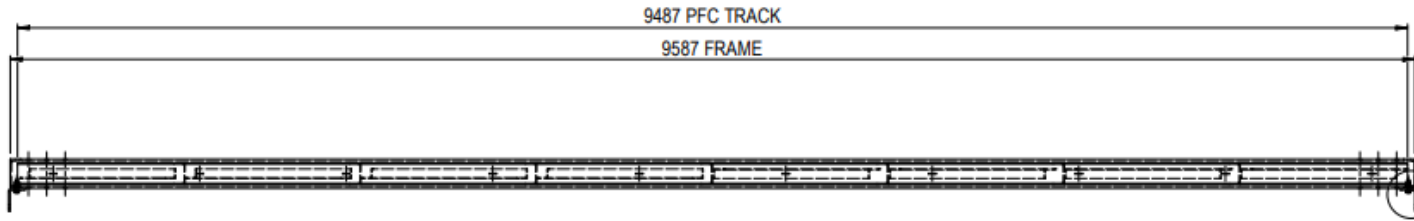
- Consists of a structural steel side-support truss and a tunnel roof structure (knee brace portal frame).



Composition of the MICS

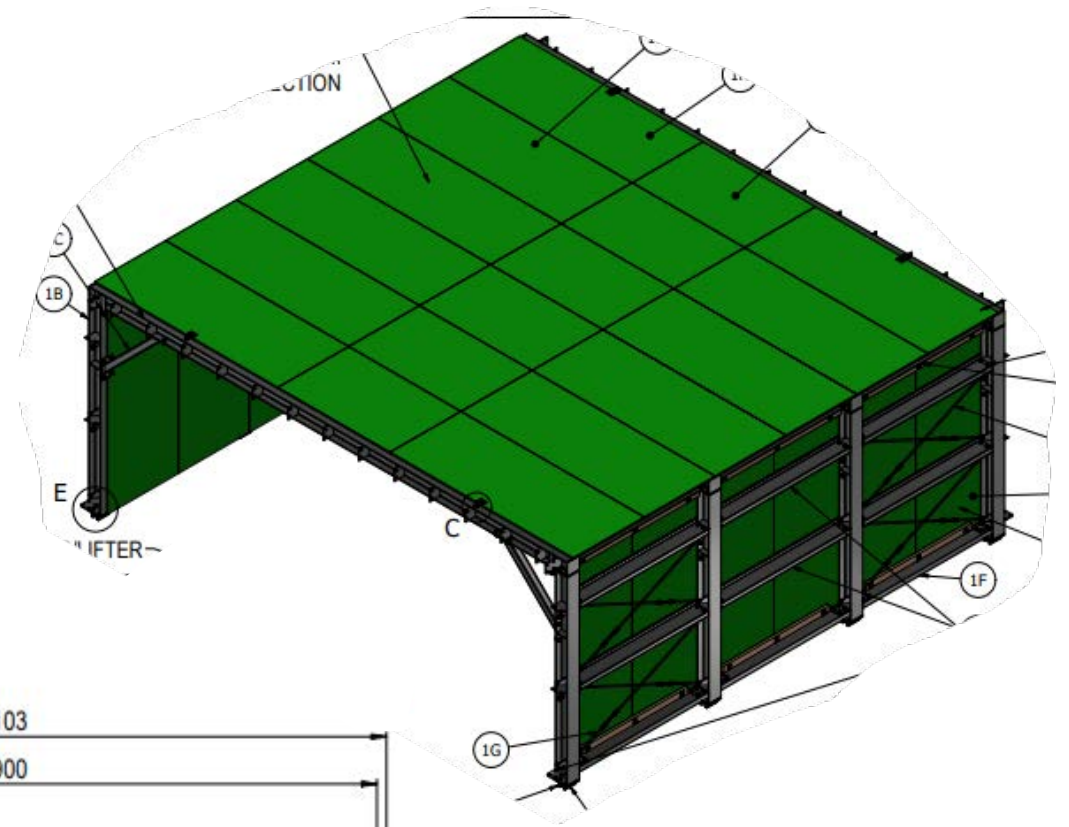
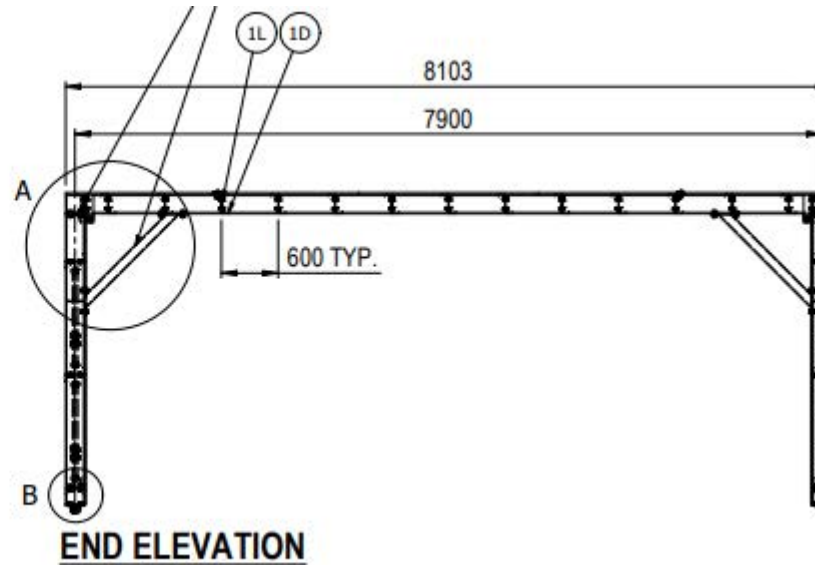
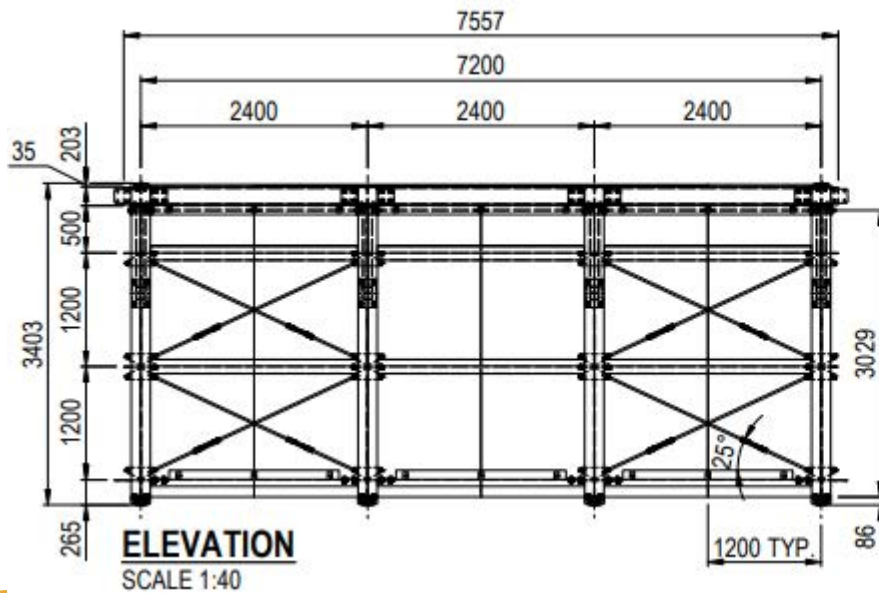


- MICS wall module. Structural steel frame.
- Lower truss section (vertical sheets) to use 17mm F17 form ply.

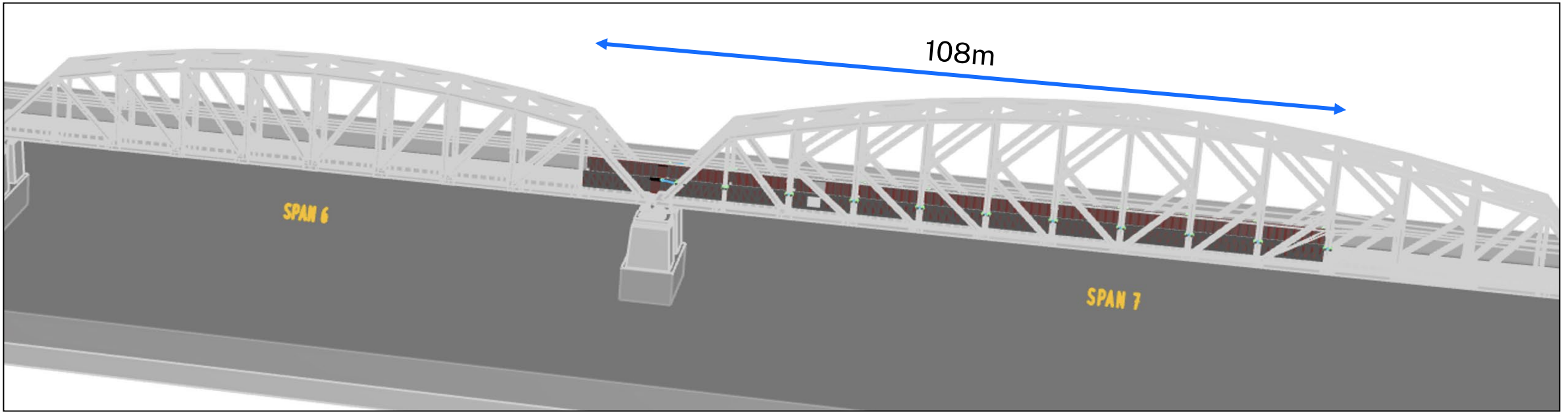


Composition of the MICS

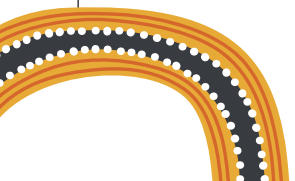
- MICS roof module. Structural steel frame.
- Roof section utilises 20mm antislip plywood from Big River (horizontal sheets).
- Upper truss section (vertical sheets) to use 17mm F17 form ply.



Possession 1: Configuration of MICS



- Possession 1: wall install only on Span 7 bays 1 – 10 and Span 6 bay 14. Approx 108m long. Wall height is 2.7m
- Targeting **WE08 FY2627** (August 2026)

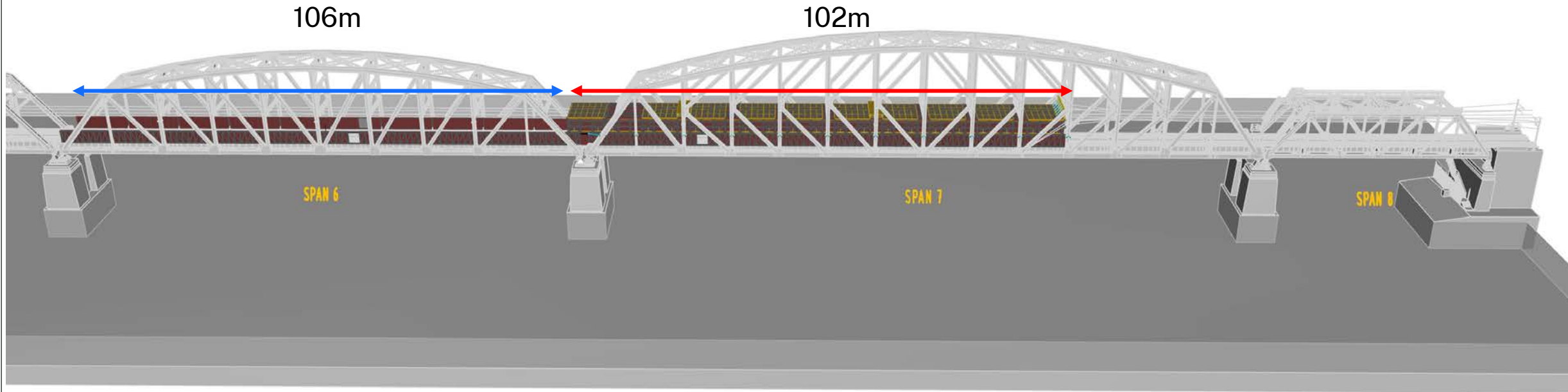


Additional Images

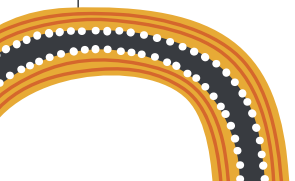


Lower internal containment system walls which will be installed during the first possession

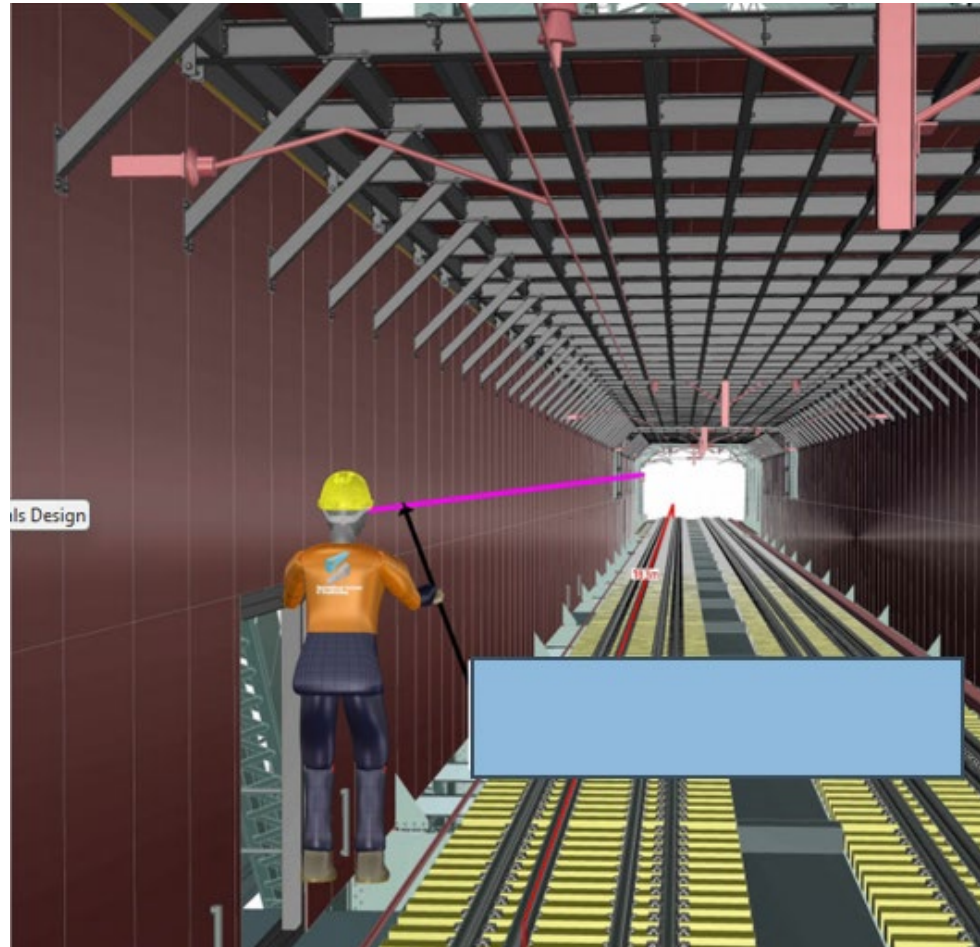
Possession 2: Configuration of MICS



- Possession 2: roof module install on Span 7 bays 1 – 10 (102m long) and wall install Span 6 bays 1 – 13 (106m).
- Following possession will include Span 6 roof install, and stick build of end of span 7 and Span 8.
- **WE18 FY2627**



Additional Images



Upper internal containment system walls and roof which will be installed during in the subsequent possession

OHW Clearances

Clearances

Two main clearance checks were completed as part of the works. The first was the vertical clearance from the catenary to the proposed MICS (indicated by the magenta arrow in the figure below) and the second was the horizontal clearance from the back of the contact registration post insulator to the MICS (indicated by the cyan arrow).

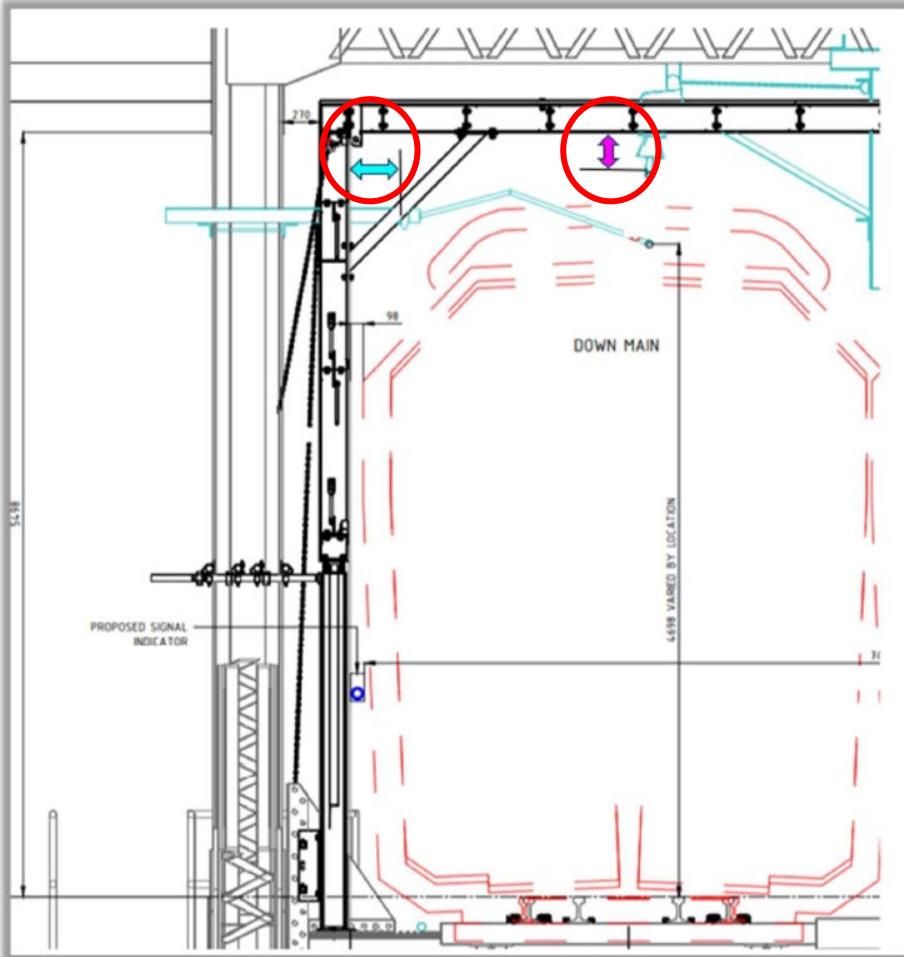


Figure 3-1: Clearance Check Illustration 1

As per Table 6 in TS 03805, the normal static clearance is a minimum of 150mm. The following additional factors were then included:

- Survey tolerance of 10mm for the point cloud
- Measurement tolerance from point cloud of 10mm
- OHW installation tolerance of 50mm
- Tunnel installation tolerance of 5mm from the underside of the tunnel and 20mm for the vertical wall position offset from track
- Maximum tunnel deflection of 30mm (vertical) in the underside of the tunnel
- Maximum tunnel deflection of 15mm (lateral) between supports in the vertical wall
- Reduction in vertical clearance due to effects of along-track movement (calculated specifically for each location)

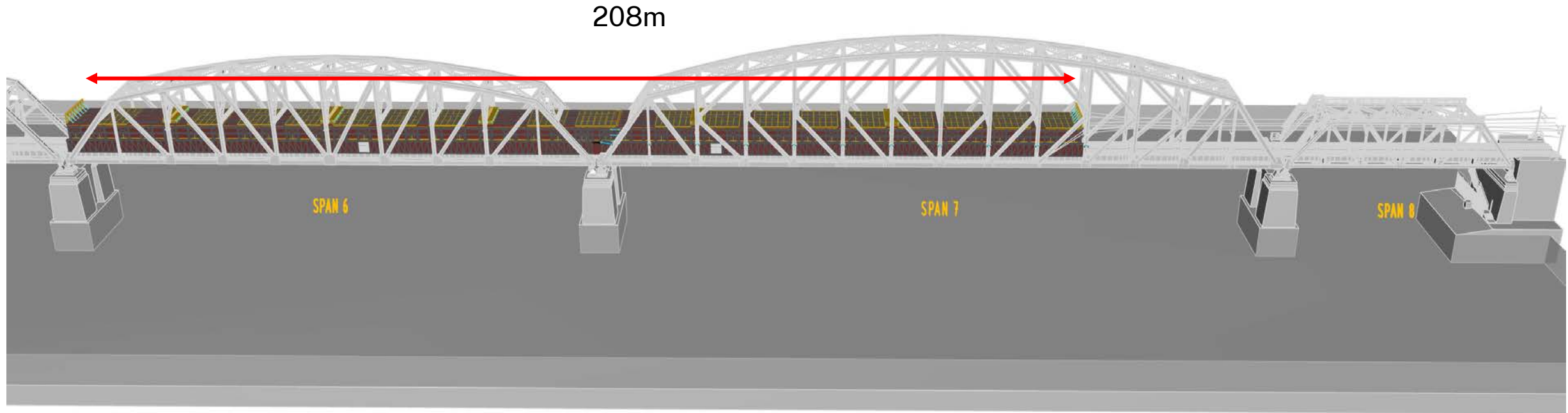
A reduced vertical clearance from catenary to overline bridge is used. The catenary supports are proposed to be “boxed out” in the MICS such that the low section of the MICS starts less than 5m away from the support. As such, it is proposed that a minimum 150mm clearance would sufficiently account for any dynamic considerations. It is presumed that these dynamic considerations also includes an uplifted catenary position.

No additional passing clearance check was therefore produced.

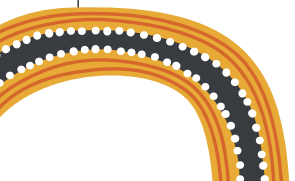
Catenary Clearances

Based on the clearance considerations presented in Section 3.1, the minimum clearance requirement for the catenary to the underside of the MICS is 255mm. The OHW profile example sketch below shows how the clearances achieved were checked at the various locations based on the proposed adjustment design.

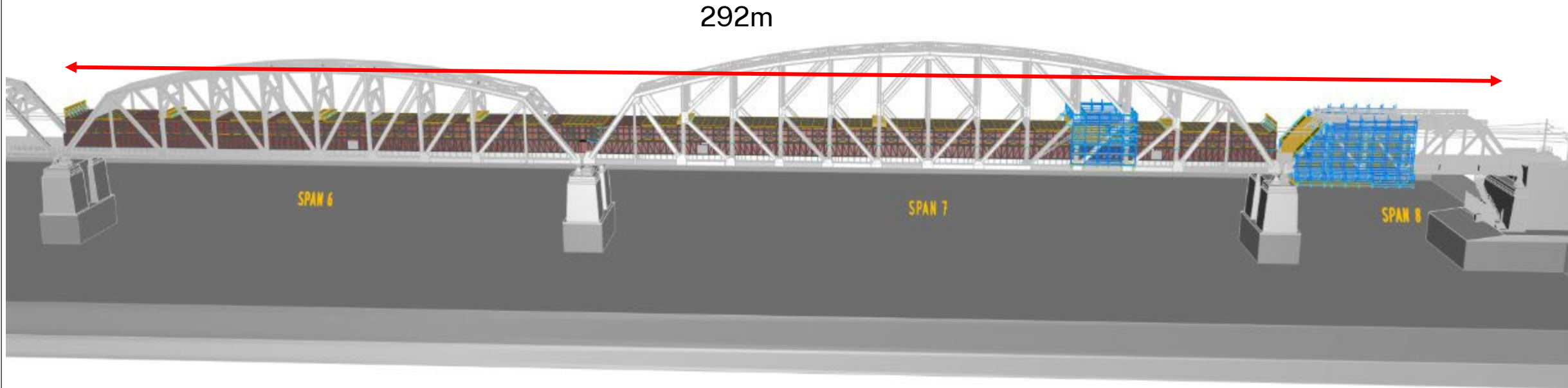
Possession 3: Configuration of MICS



- Possession 3: roof install on Span 6 bays 1 – 10.
- Total MICS configuration 208m.
- WE31 FY2627



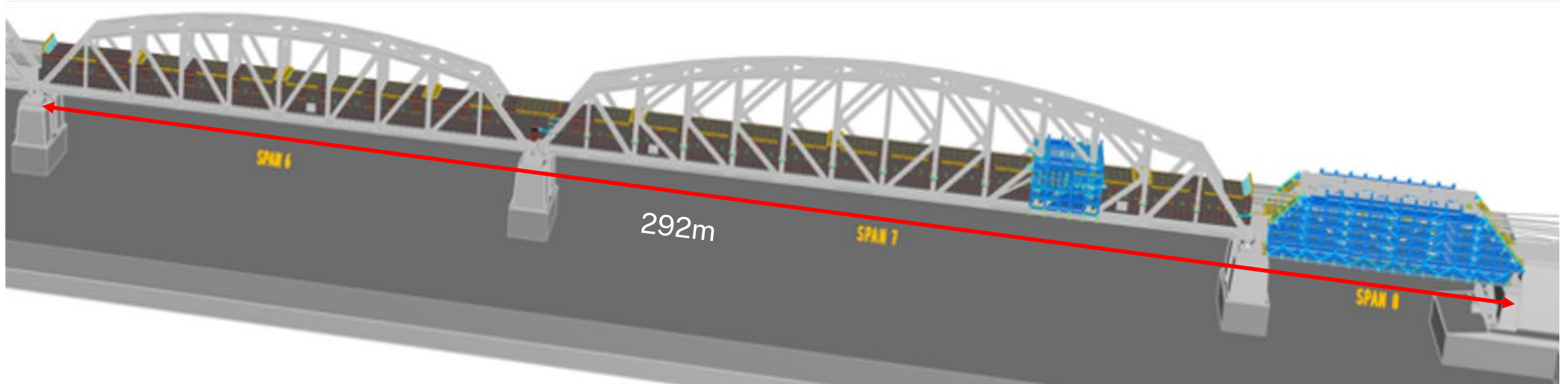
Possession 4: Configuration of MICS



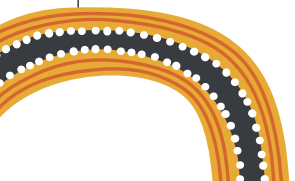
- Span 7 Bay 10 – End of Span 8 tunnel will be built using scaffold and built in-situ over a few possessions.
- Total length of the MICS at most will be 292m.
- WE47 FY2627



Configuration of MICS

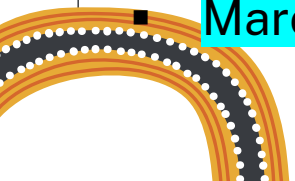


- Span 7 Bay 10 – End of Span 8 will be built using scaffold and built in-situ over a few possessions.
- This configuration will be in place for approx. 18 months.
- **This is the maximum configuration of the MICS/Tunnel for Phase 1. Once Phase one nears completion, project will move to phase 2.**



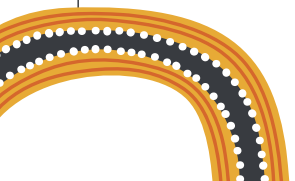
Stakeholder Engagement

- **November 2025** – Hazard Log and Risk Assessment Workshop
 - **Operations:** Drivers (Intercity, NSW Trains, Freight), Guards, SEQR and HSR Reps, Union Reps, IRCs, Ops Readiness, Train Service Delivery Managers,
 - **EMB:** Major Works, Central Coast Network Base, Electrical Distribution Unit, MTP, ESI
 - **AMD**
 - **Human Factors**
- **February 2026** – Central Coast Network Base Hazards and Controls Presentation
 - **Operations:** Drivers (Intercity, NSW Trains, Freight), Guards, SEQR and HSR Reps, Union Reps, IRCs, Ops Readiness, Train Service Delivery Managers,
- **February 2026** – Desktop Signal Sighting Meeting
 - **Signal Sighting Committee**
- **February 2026** – Operations Hazards and Controls Presentation
- **March 2026** - Fire Life Safety Risk Assessment/Workshop



Next Steps

- Works have begun on-site. Sit set-up complete and scaffold currently being built under Span 7.
- Finalising MICS design, Project Hazard Log, EDU approval. Aiming for June approval.
- **WE46** – OHW adjustment works Spans 6 and 7.
 - Multiple points in Span 6 and 7 have a contact wire height less than 4.65m (as low as 4.56m). Adjustments post weekend will ensure contact wire height in the adjusted section is minimum 4.650m.
- **FY2627**
 - **WE08 (Priority)** – installation of MICS wall Span 7
 - **WE18 (Priority)** – installation of MICS Roof Span 7 and MICS wall in Span 6.
 - **WE31 (Priority)** – installation of MICS Roof Span 6
 - **WE47 (non-priority)** shared with retransoming) – stick build of end of Span 7 and 8.



EDU Approval

Sydney Trains
Engineering System Integrity
Engineering Instruction
Electrical Distribution Unit

NSW GOVERNMENT

EI-D-26-05

Truss Bridge Containment Tunnel

This Engineering Instruction includes urgent engineering information. Adherence to the information in this instruction is **MANDATORY**.

Date in Force: XX April 2026

Date of Review: 12 Months

Approved by:
Sean Budge
A/Associate Director
Electrical Distribution Unit

Authorised by:
Bahieya Sipos
Engineering Technical
Publications Manager

Audience:
• Network Maintenance Division
• Engineering System Integrity
• Major Works Division
• JTSW

Main Points:
• This EI endorses the use of the containment tunnel for refurbishment work on truss bridges.

Primary Affected Document: PRD78202 and PRD78302

Document Control

Version	Date	Summary of changes
1.0	17/03/2026	First issue of document

Scope
This Engineering Advice is to provide information on the use of a containment tunnel for refurbishment works on truss bridges.



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- EDU approval to be provided, similar to what was provided for Cockle Creek Bridge.

Action required

As the containment tunnel is for a worksite, further requirements are as follows:

- Construction that forms the tunnel:
 - Gaps in the tunnel construction between the worksite and energised equipment shall not exceed 3mm.
 - No exposed cut or drilled holes are permitted in the panels.
 - Warning signs shall be affixed to the safe side of the tunnel, warning of the presence of the electrical hazard on the other side of the tunnel and warning that the tunnel panels shall not be penetrated or removed.
 - A competent person with civil expertise shall inspect the containment tunnel after its erection and before its use, to certify that the temporary structure has been erected in compliance with the design drawings. A structure handover certificate is to be provided and kept at the site. (Refer to [SMS-06-OP-3026 Work Health and Safety \(WHS\) Risk Management](#) and [AS/NZS-4576 Guidelines for scaffolding](#) for inspection and recording requirements.)
 - The containment tunnel shall include perimeter edge protection to prevent workers, tools, material or objects from falling onto, or infringing the ~~SADs~~ of electrical equipment as specified in [PR D 78700 Working around Electrical Equipment](#).
 - These ~~SADs~~ shall be achieved as a taut string distance to the top and side extremities of the edge protection.

- A competent person with civil expertise shall visually inspect the tunnel on a daily basis to ensure that the containment tunnel is in a satisfactory condition and remains impenetrable. Records of inspection shall be maintained. ([SMS-06-OP-3026 Work Health and Safety \(WHS\) Risk Management](#) and [AS/NZS-4576](#) for additional inspection and recording requirements, e.g. inspection of scaffold by a competent person at intervals not exceeding 30 days or after repair or modification.)

- The Earthing/Bonding arrangement shall be inspected following any electrical storms in the area as well as the existing bridge spark gap inspection requirements.

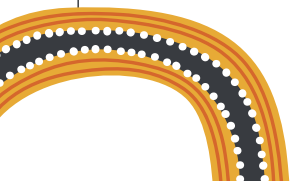
- Measures shall be maintained to restrict unauthorised access.

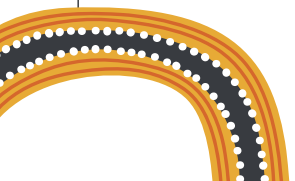
Contact

Electrical Distribution Unit
 E: RailElectricalSafety@transport.nsw.gov.au



Mar 30, 2026
9:31 AM UTC +11:00
SPAN 7 view from the ba...
Sydney Trains
P0045822 Hawkesbury Ri...





Future Works

PIER 8 (BETWEEN SPAN 6 & 7)
STAGE 2



**Engineering System Integrity
Electrical Network Safety Rules**

**Engineering Procedure
Electrical Distribution Unit**

Electrical Distribution Network Management

**PR D 78302
1500 Volt Authority**

Version 1.2

Date in Force: 2 February 2026

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Approved by: Associate Director
Electrical Distribution Unit
Engineering System Integrity

Authorised by: Engineering Technical
Publications Manager
System Integrity

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Document control

Version	Date	Author/Prin. Eng.	Summary of change
1.0	1 February 2022	ENSR Project Team	First issue as Sydney Trains document. Rebranded from SMS-06-EN-0567 V1.3. Reviewed as part of the ENSR Project.
1.1	23 August 2022	W. Halls	Section 4.2 – 7 Day issue requirement re-instated. Section 4.3 – Alterations to Authority
1.2	2 February 2026	Nick Loveday	Periodic review, republished with no change.

Document history (previously SMS-06-EN-0567)

Version	Date	Author/Prin. Eng.	Summary of change
1.3	28 February 2019	-	-

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1 Purpose and scope

To describe the process required for the issuing and cancellation of an Authority for Removal of Supply from 1500 Volt Sections (Authority) form (*PR D 78302 FM01 Authority for Removal of Supply from 1500 V Sections*) for working near or on/within Transport Asset Holding Entity of New South Wales (TAHE) 1500 Volt equipment outside substations.

2 Definitions

Refer to the **Electrical Safety Definitions** page available on the **RailSafe** site.

3 General requirements

An Authority must specify:

- a. The 1500 Volt sections and Subsections required to be isolated by reference to the OHW structure numbers within the limits of the proposed safe work area.
- b. The date and time of isolation.
- c. Any safe working documentation number or notation, which could be either:
 - The Special Train Notice (STN) number in the case of planned work advertised on a STN, or
 - The word “Telegram” in the case of work advertised on short notice on a SAFE Telegram, or
 - The words “Local Arrangement” in the case of Sidings and the like not under the control of a Train Controller or signaller and for which isolation of 1500 Volt supply does not need to be advertised.
- d. Any necessary Special Instructions. These must include:
 - i. Details of TAHE high and low voltage services, for which Electrical Permits must be received to allow work to be carried out at a specific location. Refer to Appendix A Vertical Extent of Electrically Safe Work Area of this document.
 - ii. Reference to any other Authority which may be affected by, or is associated with, this Authority.
 - iii. Details of other Network Operators’ Services for which an Operating Agreement (refer to *PR D 78504 Operating Agreements*) must be received to allow work to be carried out at a specific location.
 - iv. Details of locations which must be excluded from a particular Electrical Permit to Work due to live equipment.

WARNING

Care must be taken to consider live equipment such as a crossing feeder in the vicinity of the electrically safe work area.

- e. All switching operations required to isolate the 1500 Volt equipment.
- f. The area in which Electrical Permits to Work and/or Operating Agreements may be issued.

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- g. All special tests which need to be done before the equipment is returned to service.

4 Issue of Authorities Under Normal Conditions

4.1 Issue of the Authority for Planned Work

Authorities for planned work are issued in accordance with power outage details advertised in a Special Train Notice (STN) and/or Telegram, except for situations where local arrangements apply as per *NPR 706 Removing 1500V supply in Electric Vehicle Maintenance Centres*.

Following on from the requirements defined in Section 3 General Requirements:

- a. The affected 1500 Volt Sections and Subsections (and corresponding tracks) are defined on the STN and/or Telegram.
- b. The date and time of isolation are defined on the STN and/or Telegram.
- c. The Authority shall reference the STN and/or Telegram number, or specify “Local Arrangement” where applicable.
- d. To determine the required Special instructions:
 - i. Check the relevant 1500 V Sectioning Diagrams for any high or low voltage services.
 - ii. Check the STN for any concurrent overlapping power outages, or the 1500 V Sectioning Diagrams for any possible long-term outages in the area.
 - iii. Check the 1500 Volt Sectioning Diagram for any live equipment in the area.
- e. Based on the affected 1500 Volt Sections, switching operations are determined by referencing the relevant Electrical Operating Diagrams.
- f. Based on the affected 1500 Volt Sections, an Authorised Officer (Mains) shall determine the Area In Which Permits May Be Issued.

If the planned duration of an Authority is more than 5 days, an EOD Advice is required as per *PR E 72009 Preparing and Lodging an EOD Advice of Alteration*. The Issuing Officer shall confirm that the relevant Advice has been lodged before issuing the Authority.

Under normal conditions, an Authority must be issued by an Officer authorised to do so by the Electrical Network Manager, referred to in this section as the “Issuing Officer”.

By signing in the “Issued By” field, the Issuing Officer confirms that all the required details mentioned above have been entered correctly onto the Authority.

4.2 Checking and Approval of an Authority

- a. Once an Authority has been issued, an Authorised Officer (Mains) must check the Authority against the STN and any relevant Operating Diagrams.

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This checking must include that:

- i. The area in which Electrical Permits and/or Operating Agreements may be issued is correct and complete
- ii. The electrical equipment (including other Electrical Network Operators' services where required), from which supply is to be removed, fully covers the area in which Electrical Permits and/or Operating Agreements may be issued
- iii. As far as can be determined from the Operating Diagrams or other electrical safety documents available at ICON Electrical, any special instructions are correct and complete, including details of Operating Agreements required from other Electrical Network Operators for work near their services
- iv. The switching operations required to isolate the electrical equipment and to rail connect them where applicable, are correct and complete
- v. The details contained on the Authority are in agreement with the STN and/or Telegram if issued
- vi. The dates and times are correct.

By signing in the "Approved By" field, the Authorised Officer (Mains) confirms that all the details above are correct.

- b. An Electrical System Operator (ESO) must check Section 4.2 (a) Items (i) to (vi) and sign in the "Checked By" field to confirm that the details are correct.

The issuing, approving, and checking of each Authority must be done by separate persons.

If any errors are identified at either the Checking or Approving stages, the Authorised Officer (Mains) or the ESO shall inform the Issuing Officer. Refer to Section 4.3 Alterations to Authorities to determine whether the error may be corrected by amending the Authority, or if it is necessary to re-issue the Authority.

A minimum of seven (7) days prior to the commencement of work, the Issuing Officer will make available the Approved Authority to the:

- Work Group controlling the Authority together with the approved electrical permit to work request forms.
- Electrical System Operator.
- Train Controller.

4.3 Alterations to Authorities

If it becomes necessary to make minor alterations that will not alter the Electrically Safe Work Area of the Authority after it has been Issued, the person making the alteration must ensure that all copies have been amended.

The amendment must be in accordance with any Special Train Notice and/or Telegram advertising the work. If the minor alterations do not affect any details relevant to the Train Controller, i.e. any details on the form above the TRAIN CONTROLLER box, an amended copy need not be sent to the Train Controller.

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- a. The Authority must then be re-checked by both an Authorised Officer (Mains) and an ESO. Each amendment must be initialled and dated by the person checking.

Once an Authority is in force, no alterations may be made to it in relation to the switching required for the isolation, except as below.

- a. The ESO may amend the switching required to maintain supply to allow for changes to the system arrangements.
- b. If it is necessary to alter the special instructions of an Authority which will cause the conditions of an associated Electrical Permit and/or Operating Agreement to be altered:
 - if an Electrical Permit has not been issued, the person issuing the proposed Electrical Permit and the prospective Permit Holder must be informed of the change,
 - or
 - if an Electrical Permit and/or Operating Agreement has been issued, the Electrical Permit and/or Operating Agreement shall be cancelled and re-issued in consideration of the alteration.
- c. If it is necessary to overhaul Isolating Links, Switch Pairs or Three Position Switches at substations which are a point of isolation for the Authority, the procedure described in Section 10 shall be followed.

5 Issue of Authorities Under Emergency Conditions

- a. An Authorised Officer (Mains) on site must communicate verbally with ICON Electrical regarding the sections/subsections of the 1500 Volt overhead wiring system that need to be isolated and rail connected, including other Electrical Network Operators' services, that need to be isolated and earthed for the work to be carried out safely.

Reference shall be made to controlled copies of Operating Diagrams and an appropriate field inspection shall be carried out.

Once agreement has been reached about the sections/subsections to be isolated and the timing of the isolation, the Authorised Officer (Mains) on site must communicate to the ESO the details required to be included on the Authority as set out in Section 3.

- b. The Issuing Officer must issue the Authority verbally to the Authorised Officer (Mains) on site, who must record the details on an Authority form and approve the Authority. Alternatively, the Authority may be issued by fax, an electronic un-editable means such as an email containing a locked PDF document or may be hand delivered. Work must not proceed until any discrepancy has been resolved.
- i. This Authority is deemed an Emergency Authority. The Authority form must be used with the word "EMERGENCY" written in front of the title.
- c. The field and ESO's copies of the emergency Authority must be checked and approved in the same way as for an Authority for planned work. Minor alterations to an emergency Authority after it has been issued must be dealt with in the same way as for an Authority for planned work.

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- d. In the absence of an Authorised Officer (Mains), an Authorised Traction Operator, with knowledge of the electrical equipment in the area, may carry out the procedures in (a) and (b) above when approved by the Electrical Network Manager or the Electrical Engineer having authority over the area concerned.

NOTE

This approval will only be granted on a case by case basis, and is only current for the particular Emergency Authority.

6 Responsibility of the Person in Charge of the Authority

6.1 Responsibilities Relating to Removal of Supply

When given clearance by the ESO to proceed with proving dead, rail connecting and issuing of Electrical Permits or Operating Agreements, the Authorised Person (Mains) in charge of the Authority must:

- a. Print their name and sign on the back of the Authority as the Authorised Person (Mains) in charge of the Authority and enter the date and time.
- b. Where required, ensure that an Operating Agreement is received from other Electrical Network Operators and the working earths have been applied. Check that the equipment listed on the Operating Agreement corresponds with that listed on the Authority, and list the details of the Operating Agreement on the back of the Authority. The Operating Agreement must be kept with the Authority until the Operating Agreement is cancelled. Remove supply as per *PR D 78301 Removal and Restoration of 1500 Volt Supply*.
- c. Arrange for proving dead to be carried out in accordance with the procedure detailed in instruction *PR D 78301*.
- d. Arrange for portable rail connections to be applied in accordance with the procedure detailed in instruction *PR D 78305 1500 Volt Operating Procedures*.

NOTE

Portable earths are to be recorded on the form *PR D 78501 FM02 Portable Rail Connection/Earthing Schedule*, the completed form being attached to the completed Authority.

6.2 Responsibilities Relating to Issue of Electrical Permits and/or Operating Agreements

Upon completion of all the necessary isolation, proving dead and earthing procedures, the person in charge of the Authority must:

- a. Ensure that each Authorised Person (Mains) who will be issuing an Electrical Permit and/or an Operating Agreement has a copy of the approved Authority and the completed *PR D 78501 FM02*.
- b. Where work or access will be within 300m of the limits of the safe work area the instruction of the Person holding the Permit shall be performed onsite.

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- c. Arrange for an Electrical Permit to Work and/or an Operating Agreement to be issued for each separate work party to carry out work near or on/within the specified electrical equipment. Refer to *PR D 78500 Electrical Permits*.
- d. On the back of the Authority form, list the details of all Electrical Permits to Work and/or Operating Agreements issued on the Authority. Print the name of the accredited Permit Holder person to whom the Electrical Permit/Operating Agreement was issued and print the name of the Authorised Person who issued this Electrical Permit/Operating Agreement.

Each Electrical Permit to Work and/or Operating Agreement issued on the Authority must be numbered as a sub-number of the Authority. For example, the first Electrical Permit to Work and/or Operating Agreement issued under Authority number 1234 must be numbered 1234/1, the second 1234/2 and so on, consecutively.

- e. Contact the ESO as soon as practicable after the issue of one or more Electrical Permits and/or Operating Agreements and advise the identifying numbers of the Electrical Permits and/or Operating Agreements issued. This requirement also applies to Operating Agreements, if received.

The Authorised Person (Mains) in charge of the Authority is not required to remain in the vicinity of the work unless holding an Electrical Permit to Work.

NOTE

Where the Authorised Person (Mains) in charge of the Authority is also the Person in charge of a work party, that person will also be the Permit Holder.

If the Authorised Person (Mains) in charge of the Authority becomes aware that work will not be completed in time for supply to be restored by the time stated on the Authority, the ESO is to be immediately informed. The Authority remains in force until all issued Electrical Permits and/or Operating Agreements have been cancelled.

6.3 Transfer of Responsibility

- a. The Authorised Person (Mains) must advise the ESO:
 - before ceasing to be in charge of the Authority
 - where the Authority and any Operating Agreements, if received, will be left for the next shift.

When ceasing duty, the Authorised Person (Mains) in charge of the Authority relinquishes responsibility for holding the Authority and the Operating Agreements if received.

- b. The Authorised Person (Mains) taking over the Authority must:
 - advise the ESO
 - take responsibility for the Authority and the Operating Agreement if received, by printing their name and signing the Authority in the space provided and entering the date and time.

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7 Backup Record of Electrical Permits and/or Operating Agreements

The ESO must record on the reverse side of the ESO's copy of the Authority, the identifying number of the Electrical Permits and/or Operating Agreements issued on the Authority, and Operating Agreements if received, as advised by the Authorised Person (Mains) in charge of the Authority.

NOTE

The ESO copy of the Authority must record all issued Electrical Permit/Operating Agreements.

8 Procedure in Case of the Authority Being Lost

In the event that the original copy of the Authority is lost, the Authorised Person (Mains) in charge of the Authority must contact the ESO immediately and arrange for a replacement Authority.

The replacement may be transmitted verbally and transcribed onto the appropriate form, or may be transmitted by fax or by an electronic un-editable means such as an email containing a locked PDF document. Both sides of the form must be replaced.

The replacement Authority must be endorsed "REPLACEMENT - Original Lost". The date, time and initials of the Authorised Person (Mains) in charge of the Authority must be included with this endorsement.

When completing the reverse side of the replacement form, the identifying numbers of all Electrical Permits and Operating Agreements issued on the lost Authority, and Operating Agreements if received, as recorded on the ESO's copy, must be used to ensure that all Electrical Permits and Operating Agreements that were issued, and Operating Agreements if received, are included on the replacement Authority.

The book copies of the Electrical Permits and Operating Agreements, or other methods, should then be used to establish to whom the individual Electrical Permits and Operating Agreements were issued.

9 Cancellation of Authorities

Before supply is restored, the Authorised Person (Mains) in charge of the Authority must:

- a. Ensure that any special tests which need to be done before the equipment is energised have been completed satisfactorily.
- b. Arrange for all Electrical Permits to Work and Operating Agreements issued on the Authority to be cancelled and for all rail connections to be removed, refer to the completed PR D 78501 FM02.
- c. Enter the time each Electrical Permit or Operating Agreement is cancelled in the space provided on the Authority and print the name of the Authorised Person (Mains) who cancelled the Electrical Permit/Operating Agreement.
- d. Cancel the Authority by printing their name, sign and enter the date and time of cancellation on the back of the Authority.

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- e. Forward a copy of the back of the Cancelled field Authority listing the cancelled Electrical Permits to ICON Electrical.

NOTE

If the Authorised Person (Mains) cannot forward the back of the Cancelled Field Authority listing the cancelled Electrical Permits to ICON Electrical:

- **The APM in charge of the Authority shall contact the ESO and advise of the:**
 - **Authority number**
 - **the individual Electrical Permit and Operating Agreements:**
 - o **number**
 - o **cancelled by**
 - o **time and date.**
 - **The ESO shall record all of the details onto the rear of ICON Electrical copy of the Authority form with a note as to advised by whom and repeat the information back to the APM for confirmation.**
-

- f. Advise ICON Electrical that:
 - all Electrical Permits to Work issued on the Authority have been cancelled
 - all portable Rail Connections have been removed
 - all other issued Network Operators' Operating Agreements have been signed off
 - supply may be restored to the electrical equipment specified on the Authority.
- g. Forward the cancelled Authority to the appropriate Electrical Engineer's Office.
- h. ICON Electrical must:
 - i. Verify the name of the person giving clearance, against the recorded person in charge of the Authority.
 - ii. Verify the advice received by the Authorised Person (Mains) that all Electrical Permits have been cancelled.
 - iii. Accept clearance to restore supply only from the Authorised Person (Mains) in charge of the Authority.
- i. Arrange for supply to be restored per PR D 78301.

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10 Work at the limits of an isolation

10.1 Authorities for Sectionable Overlaps or Section Insulators

When abutting Authorities are issued covering electrically adjacent sections, no work is permitted in the sectionable overlap or on the section insulator as it is excluded from the area in which Electrical Permits to Work may be issued on both Authorities.

Overlapping Authorities may be issued when planned work is required to be performed in sectionable overlaps or on section insulators. In this case, the Authorities must be cross-referenced and a double set of Danger Tags are required at the relevant isolating locations.

Where abutting Authorities have already been planned and the need for work in sectionable overlaps or on section insulators becomes apparent after the work has been advertised, the issuing of a third Covering Authority is permitted. This third Covering Authority must cover the sections either side of the overlaps and/or section insulators in addition to the abutting Authorities for each side. In this case, all three Authorities must be cross-referenced and the Special Instructions on the third Covering Authority must also specify that:

- ii. This Covering Authority must not be implemented until the two Authorities covering the sections adjacent to the overlaps and/or section insulators are in force.
- iii. This Covering Authority must be cancelled before either of the other Authorities can be cancelled.

The Electrical Permits to Work allowing the work in the sectionable overlaps or on the section insulators must be issued from this third Covering Authority.

10.2 Overhaul of Isolating Links, Switch Pairs and Three Position Switches

The following sections apply to the overhaul of Isolating Links, Switch Pairs and Three Position Switches within Substations and Sectioning Huts, but does not apply to field Links or Switches.

NOTE

There are a few locations where Substation Isolating Links, Switch Pairs or Three Position Switches are positioned remotely from the Substation, but are still within the designated boundary of the Substation (shown on the Operating Diagram) and therefore classified as Substation equipment.

10.2.1 Electrical Permit Requirements

Prior to the start of work, the Authorised Person (Substations) must obtain an Electrical Permit to Work. This Electrical Permit to work shall be referenced as portion of the switching requirements of the required Substation Access Permits.

A separate Substation Access Permit must be issued for each 1500 Volt link, Switch Pair or Three Position Switch being overhauled if there are other live links present in the 1500 Volt link area.

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In the case of a complete outage where every 1500 Volt link in the link area is covered by the Electrical Permit to Work and there are no other sources of supply, a single Substation Access Permit may be issued to overhaul the links. However, this concession is only applicable with 1500 Volt links and does not apply to the Switch Pairs and Three Position Switches.

10.2.2 Overhaul of Isolating Links

If it is necessary to overhaul the isolating link which is a point of isolation for the Authority, with the concurrence of the Electrical System Operator an Authorised Person (Substations) is permitted to extend the 1500 Volt isolation to the feeder DCCB, provided the Substation Access Permit is endorsed with the words “Isolating link No(s)._____ is (are) to be checked open and Danger Tagged in accordance with current Authority No._____ prior to the cancellation of this Electrical Permit”.

The Electrical System Operator must authorise the removal of the Danger Tag(s), which was (were) attached to the link(s). The Authorised Person (Substations) holding the Substation Access Permit must replace this (these) Danger Tag(s) before cancelling the Electrical Permit and advise the Electrical System Operator that the Danger Tag(s) for the link(s) has been replaced.

10.2.3 Overhaul of Switch Pairs and Three Position Switches

If it is necessary to overhaul the isolating and/or rail connecting switch which is a point of isolation for the Authority, an Authorised Person (Substations) with the concurrence of the ESO is permitted to extend the 1500 Volt isolation to the feeder DCCB, provided that a separate Substation Access Permit is issued for each switch being overhauled and the Substation Access Permit is endorsed with the words:

- i. “Isolating switch No._____ is to be checked OPEN and Danger Tagged in accordance with current Authority No._____ prior to the cancellation of this Electrical Permit”, and
- ii. “The rail connecting switch shall be checked CLOSED, LOCKED CLOSED (if appropriate) with a special lock and Danger Tagged in accordance with current Authority No._____ prior to the cancellation of this Electrical Permit”.

Portable rail connections must be applied in accordance with PR D 78305, either directly to the overhead wiring, or between the negative rail inside the link area and the feeder side of the isolating switch.

The ESO must authorise the removal of the Danger Tag, which was attached to the switch. The Authorised Person (Substations) holding the Substation Access Permit must replace this Danger Tag before cancelling the Substation Access Permit and advise the ESO that the Danger Tag for the switch has been replaced.

Portable rail connections must not be removed, and rail connecting switches closed for the Authority must not be opened, in connection with work carried out in accordance with the above provisions, unless alternative rail connections are put in place.

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11 Reference documents

NPR 706 Removing 1500 V supply in Electric Vehicle Maintenance Centres

PR D 78202 Working High Voltage Instruction

PR D 78301 Removal and Restoration of 1500 Volt Supply

PR D 78302 FM01 Authority for Removal of Supply from 1500 V Sections

PR D 78305 1500 Volt Operating Procedures

PR D 78500 Electrical Permits

PR D 78501 FM01 Request for Electrical Permit to Work

PR D 78501 FM02 Portable Rail Connection/Earthing Schedule

PR D 78504 Operating Agreements

PR D 78700 Working around Electrical Equipment

PR E 72009 Preparing and Lodging an EOD Advice of Alteration

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Appendix A Vertical Extent of Electrically Safe Work Area

Crossings that comply with Transport for NSW (TfNSW) standards do not normally need to be included (in the Special Instructions) on the Authority.

For Accredited Persons (refer to PR D 78700), the vertical extent of the electrically safe work area is the greater of 7.4 m above rail and 2.3 m above OHW structures.

The table below shows the derivation of these dimensions, for guidance purposes only.

Voltage of Conductors Crossing OHW	Minimum Conductor Height	Clearance (Accredited Persons)	Vertical Extent of Electrically Safe Work Area
Crossing Overhead Wiring Only			
11 kV	8.8 m	1.2 m	7.6 m
33 kV	8.8 m	1.2 m	7.6 m
66 kV	8.8 m	1.4 m	7.4 m
132 kV	10.7 m	1.8 m	8.9 m
Crossing Overhead Wiring Structure			
11 kV	Structure + 3.7 m	1.2 m	Structure + 2.5 m
33 kV	Structure + 3.7 m	1.2 m	Structure + 2.5 m
66 kV	Structure + 3.7 m	1.4 m	Structure + 2.3 m
132 kV	Structure + 4.6 m	1.8 m	Structure + 2.8 m

Where plant which will operate above the height of the catenary is to be used, the presence of crossings will require specific consideration as follows:

- All exposed crossing high voltage aerial conductors must be regarded as LIVE. Appropriate clearances from such conductors must be maintained (in accordance with PR D 78700), unless a Permit has been issued for that crossing circuit.
- The location(s) of these crossings must be shown under 'Special Instructions' on the relevant Authority.

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