

**PART M12C**  
**ELECTRICAL AND MECHANICAL**  
**HEYSEN TUNNELS**

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**1. DESCRIPTION OF WORKS AND WORK REQUIREMENTS****1.1 General**

Heysen Tunnels ("the Tunnels") are equipped with a wide range of complex equipment and systems to address two main functional requirements:

- a) Traffic and Incident Management - predominantly lighting control, Lane Use Control, Video Incident Detection, CCTV Surveillance, communications systems comprising Roadside Telephony, Public Address (PA) and Radio Rebroadcast (RRB); and
- b) Safety - predominantly comprising the tunnel lighting level to enable the posting of a relatively high 90 km/h posted speed limit through the tunnel during daylight hours, ventilation (primary safety function being fire incident smoke management), air quality monitoring (for automated ventilation control purposes during congested periods) & control, fire safety systems, and safe refuge/egress for emergency evacuation.

The Heysen Tunnel control system monitors approximately 1,700 safety critical and safety related items within the Tunnels, as outlined above. Mandated safety systems required for the tunnel require regular statutory inspections, calibration or preventive maintenance, which necessitates strategic tunnel lane restrictions or complete tunnel closures.

Services to be provided include, the provision of routine preventative maintenance for:

- a) all electrical and mechanical systems of the Tunnels and the two tunnel portal buildings (buildings excluded); and
- b) cleaning of Tunnel walls and lights, and drainage system.

In addition the Contractor shall:

- a) provide assistance in undertaking Emergency Services response exercise, as required by the Principal;
- b) communicate and coordinate with other contractors engaged by the Principal to undertake other works during the same tunnel maintenance closure;
- c) perform corrective maintenance, replacement of non-critical components which are permitted to run to failure (e.g. lamps). It also includes repair of defects through wear and tear in the various components of the tunnel infrastructure;
- d) perform SMS as requested by the Superintendent in accordance with the specifications;

- e) facilitate effective 24/7/365 fault response to system malfunction, rectification of equipment damaged by incidents or unexpected failure and minimise interruption to tunnel operation; and
- f) develop inspection / test sheets as required.

Programmed Routine Maintenance activities are to be inclusive of required consumables. No additional payment will be made for consumables such as oil, grease, fuel etc.

## **1.2 Site Requirements**

The Traffic Management Centre (TMC) is responsible for the overall operation of the Heysen Tunnels. The Contractor shall report to the TMC prior to work being undertaken and maintain constant communication.

The Contractor shall ensure as a minimum that both prior to and when working on the Heysen Tunnels that the Traffic Management Centre and the Superintendent are advised of the Contractor's work.

## **1.3 Restrictions**

For any planned work, the Contractor shall not work on hours outside of the approved Annual Tunnel Lane Restriction/Closure program, (similar to Appendix 4), without the prior approval of the Superintendent.

The Contractor shall obtain TMC approval before undertaking any emergency repair work. Refer to Clause 9 *Emergency Breakdown Services* for details.

## **2. CONTRACTORS NOMINATED REPRESENTATIVE**

The Contractor shall nominate a Site Representative for routine inspections and maintenance who shall have the authority to make decisions on behalf of the Contractor. The Contractor shall nominate an Emergency Response Representative to respond to emergency and fault breakdowns, who shall be competent to make recommendations to the Superintendent to return the tunnels to a safe operational condition.

The Site Representative shall attend desktop/real-life emergency response exercises as requested by Principal.

The Contractor shall advise the Superintendent of any changes to the Contractor's nominated Site Representative or Emergency Response Representative.

## **3. DRAWINGS/ SYSTEMS OPERATION AND MAINTENANCE MANUALS**

Electrical/Mechanical systems and maintenance manuals and drawings are provided in Appendix 5. Hardcopy manuals and drawings are located in the Northern Portal Switch Room.

The accuracy and completeness of the drawings is not guaranteed. The Contractor must maintain a current and accurate set of drawings and manuals for all Assets under the Contract and must provide to the Superintendent within 28 days a copy of any document updated as a result of the Works or discovery of an error or omission.

## **4. ASSET CONSTRAINTS**

The Contractor must get the Principal's approval for any planned tunnel lane restrictions/closure in advance. Permits must be obtained from the TMC and approval given before any road works can commence.

Tunnel closures must be minimised as far as reasonably practical. If any works cannot be undertaken within an approved tunnel maintenance lane restrictions/closure, the Superintendent and TMC must be notified as early as possible to discuss alternatives or additional closures.

The Work Zone Traffic Management shall comply with the approved Heysen Tunnels Lane Restriction/Closure Work Zone Traffic Management plans (Appendix 4b). If a situation arises requiring a Traffic Management Plan different than the standard tunnel lane restrictions/closures, the Contractor must prepare and submit a Traffic Management Plan to comply with Australian and DPTI standards.

## **5. RISK ANALYSIS AND HAZARDS**

The Contractor shall conduct and document a site specific risk and safe work analysis prior to any work taking place. Where required, equipment lock-out procedures shall be documented including the removal of lock outs left in place by others. The initial analysis should cover inspections and Routine Maintenance (minor repairs).

The Contractor shall report in writing any observed issues on site which are outside the scope of works, but which may present a risk to maintenance personnel or the public.

The Contractor shall immediately advise the Superintendent and provide a proposal to replace any parts that are showing wear or damage that could be expected to fail before the next closure.

## **6. INSPECTION REQUIREMENTS**

### **6.1 Programmed Inspections and Maintenance**

The programmed inspections and maintenance schedule is as detailed in Appendix 1. The Contractor shall plan, conduct and co-ordinate all inspections and programmed maintenance activities to all equipment/systems as listed in the Maintenance Register (Appendix 3) and schedule.

The Contractor shall submit a schedule of inspections to the Superintendent during the Mobilisation Period. The Contractor shall update the schedule when new systems are installed and commissioned or if the required timing of tasks change.

The Superintendent reserves the right to be present for inspections. The Contractor must provide a minimum of 48 hours' notice to the Superintendent for any change to scheduled inspection dates or planned maintenance works.

Inspections must be undertaken in accordance with all relevant Australian Standards and Austroads Guidelines.

## **7. EMERGENCY BREAKDOWN SERVICES**

In the event of the Contractor being notified and requested to attend site to rectify emergency breakdown the Contractor shall ensure that the Superintendent and the TMC are advised of the event.

This will allow for notifications to be given to other stakeholders of the structure and enable the on call program to be cancelled during the period of any emergency repair works.

The Contractor shall provide a highly responsive and complete 24 hour, 7 days a week, mechanical, and electrical/electronic emergency break-down repair service for the Heysen Tunnels operations. Response times are critical and following notification the Contractor must respond within the times given in Appendix 2.

If a temporary repair has been undertaken to restore service, future permanent repairs to equipment may need to be approved and authorised by the Superintendent in writing prior to proceeding with the Works.

## **8. REPORTING REQUIREMENTS**

### **8.1 Programmed Inspection Reports**

The Contractor shall submit a report to the Superintendent within 14 days of completing each scheduled inspection.

The reports shall include the following:

- a) summary of any visible signs of damage, loss, corrosion and excessive wear to the items/components listed to be inspected/maintained;
- b) listing of Works completed and required repairs, including recommendations and methodologies to retain operational service of the Tunnels, for all associated items/components inspected;
- c) estimates for any required repairs or maintenance, including the timeframe to repair and any materials, component and labour to return listed items back to operational service;
- d) the risk profile and criticality of any Asset that requires maintenance; and
- e) Inspection and Test Sheets recording the inspections, test results, lubrication, adjustments and any repairs undertaken for each of the items/components listed to be inspected/maintained.

The Superintendent has no obligation to award any additional works from inspections undertaken by the Contractor. Any additional Works may be instructed through a Work Order.

## **8.2 Programmed Maintenance Reports**

The Contractor shall submit a report to the Superintendent within 14 days of completing any maintenance works. The reports shall be inclusive of the following:

- a) summary of any works undertaken to repair/replace items/components/equipment that required servicing/replacement, including dates and times spent making undertaken making them good;
- b) any findings or conclusions associated with failure of items/components/equipment required to be serviced or replaced;
- c) any operations and maintenance manuals relevant to replaced items/components/equipment; and
- d) any certifications required in accordance with statutory and regulatory requirements.

## **8.3 Emergency Breakdown Reports**

The Contractor shall submit a report to the Superintendent within 14 days of completing emergency repair work undertaken to make the bridge operational. The reports shall be inclusive of the following:

- a) summary of any works undertaken to repair/replace items/components/equipment that required servicing/replacement, including dates and times spent making good;
- b) any findings or conclusions associated with failure of items/components/equipment required to be serviced or replaced;
- c) any operations and maintenance manuals relevant to replaced items/components/equipment; and
- d) any certifications required in accordance with statutory and regulatory requirements.

## **9. EQUIPMENT RENDERED IDLE**

Equipment rendered isolated/inoperative during the inspection for any reason shall be locked off and safety information warning tagged with information clearly printed stating the following:

- a) detailed reason for the isolation;
- b) the full name of person responsible for rendering the isolation;
- c) the name of the company the person represents;
- d) the date of the isolation; and

- e) the date of estimated return to service.

The Contractor shall have a documented procedure for isolating/locking off of equipment and for the removal off the isolation.

The Superintendent and TMC shall be notified immediately and in writing of any such isolation and the possible effect it may have on tunnel operations and their safety.

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**APPENDIX 1**

**HEYSEN TUNNELS INSPECTION SCHEDULE**

*(Refer Separate File)*

**APPENDIX 2****HEYSEN TUNNELS FAULT AND REPAIR RESPONSE TIMES**

<b>Device Failure</b>	<b>Response time required A/H</b>	<b>Response time required during normal working hours</b>	<b>Time for fault to be permanently repaired</b>
CCTV fault - single camera	No	Same Day	48 hours
CCTV fault - multiple cameras	90 Minutes	90 minutes	24 hours
VIDS fault with no redundant VIDS or CCTV coverage of area	90 Minutes	90 Minutes	12 hours
VIDS fault with redundant VIDS or CCTV coverage of area	No	Same Day	48 hours
Jet Fan fault resulting in loss of use of single jet fan	No	Same Day	24 hours (unless catastrophic fault, and/or no spares available)
Jet Fan fault resulting in loss of use of more than one jet fan	90 Minutes	90 minutes	12 hours (unless catastrophic fault, and/or no spares available)
Cross Passenger Way pressurisation fan fault resulting in loss of use of single fan	No	Same Day	24 hours (unless catastrophic fault, and/or no spares available)
Cross Passenger Way pressurisation fan fault resulting in loss of use of both fans per CPW	90 Minutes	90 minutes	12 hours (unless catastrophic fault, and/or no spares available)
Tunnel supply power failure - ATS has operated ensuring continuity of power	No	90 minutes	12 hours to restore redundancy, 48 hours for permanent repairs
Main power failure - ATS has failed as well (operating on UPS)	90 minutes	90 minutes	2 hours to restore power, 48 hours for permanent repairs
Main switch has tripped	90 minutes	90 minutes	24 hours (unless catastrophic fault, and/or no spares available)
Generator failure	1 hour	1 hour	24 hours (unless catastrophic fault, and/or no spares available)
PLC/SCADA fault, negligible impact on Tunnel operation, Tunnel remains open	No	Same Day	48 hours
PLC/SCADA fault, significant impact on Tunnel operation requiring tunnel closure	90 Minutes	90 Minutes	6 hours
RRB/PA system failure	90 Minutes	90 Minutes	24 hours (unless catastrophic fault, and/or no spares available)
Help Phone faulty	No	72 hours	Next Maintenance closure
Fire Safety System	90 Minutes	90 Minutes	24 hours (unless catastrophic fault, and/or no spares available)
Fire door open	90 Minutes	90 Minutes	24 hours
Minor lighting fault within the Tunnel	No	Same Day	72 hours

<b>Device Failure</b>	<b>Response time required A/H</b>	<b>Response time required during normal working hours</b>	<b>Time for fault to be permanently repaired</b>
Major lighting fault within the Tunnel - significant areas unlit	90 minutes	90 minutes	6 hours
Over height detection failure	No	90 minutes	Next working day
Single UPS Failure	No	Same Day	Next Working Day
Both UPS Failure	90 minutes	90 minutes	2 hours to restore power, 48 hours for permanent repairs
Communications backbone failure - redundant path OK	No	Same Day	48 hours
Communications backbone failure - redundant path failure as well	90 Minutes	90 Minutes	6 hours
Lane Use Signal failure which affects operation of Tunnel	90 Minutes	90 Minutes	6 hours
Fog Detection System failure for the control of Road lighting	No	Same Day	24 hours (unless no spares available)
Any accident damage affecting tunnel operation	90 Minutes	90 Minutes	6 hours (unless catastrophic fault, and/or no spares available)
General Public Safety Issue (confirmed)	90 Minutes	90 Minutes	2 hours to make safe

For faults not listed above which result in a tunnel closure/lane restriction, 90 minutes response time is required 24/7/365.

For faults not listed above which do not result in a tunnel closure/lane restriction, same working day attendance or first working day attendance during working hours.



**APPENDIX 3**

**HEYSEN TUNNELS ASSET INVENTORY REGISTER**  
*(Refer Separate file)*

**APPENDIX 4**

**HEYSEN TUNNELS APPROVED LANE RESTRICTIONS/CLOSURES**  
*(Refer Separate file)*

**APPENDIX 5**

**HEYSEN TUNNELS OPERATIONAL AND MAINTENANCE MANUALS**

*(Refer Separate file)*