

## QA SPECIFICATION R306

### MAINTENANCE OF TRAVEL TIME INFORMATION SYSTEMS

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**GUIDE NOTES**  
(Not Part of Contract Document)



**Transport**  
Roads & Maritime  
Services

QA SPECIFICATION **R306**

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# MAINTENANCE OF TRAVEL TIME INFORMATION SYSTEMS

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## RMS QA SPECIFICATION R306

### MAINTENANCE OF TRAVEL TIME INFORMATION SYSTEMS

## 1 GENERAL

### 1.1 SCOPE

This document sets out requirements for the Maintenance of Travel Time Information System (TTIS) (the “Services”). The Specification is formed only when this document is read together with RMS QA R300 ITS Maintenance Services – General Requirements.

TTIS includes vehicle/speed detection sensors and sign for display of travel time information. The system consists of all supporting components to provide the intended function at site. The requirements herein is for Services relevant to a TTIS site, so that they remain in good condition, operate as designed and meet the specified performance requirements.

Major components of a TTIS site are listed below:-

- a) TTIS detection sensor (standalone) with controller, associated communication devices and all auxiliary/mounting equipment.
- b) Sensor could be mounted onto VMS structure, bridge, cross-road gantry or another road side structure. If sensor installed onto a VMS structure, see R302.
- c) Power supply and regulation equipment, surge protection systems;
- d) Power backup equipment when provided (e.g. backup power generator; emergency power supply, un-interruptible power supply, etc)
- e) Controller cabinet;
- f) Cabling, pits and conduits;
- g) Support structures, brackets and fixtures;
- h) Access platforms, gantries, walkways, stairways, ladders;
- i) TTIS enclosure; and
- j) Work site vehicle hardstand.

### 1.2 TERMS AND DEFINITIONS

The following definitions and abbreviations, in combination with those listed in R300, are applicable to this Specification.

Term/Acronym	Definition
<b>Asset Maintenance Plan</b>	Your maintenance plan for the TTIS assets. Defines and agrees the intended longer term strategy for management of the TTIS assets and key issues and constraints.

<b>Cabinet</b>	An approved housing for a controller, control relays, auxiliary equipment, terminal blocks, sockets, flasher units, wiring, etc., which may or may not include vehicle detectors and linking equipment.. Also called Cubicle or Housing
<b>CMCS</b>	Central Management Computer System.
<b>Critical asset/ infrastructure</b>	Those physical facilities, supply chains, information technologies and communication networks, which if destroyed, degraded or rendered unavailable for an extended period, would significantly impact on the social or economic wellbeing of the state (e.g. Traffic Control Signals (TCS); Tidal Flow Systems (TFS); and Variable Speed Limit Signs (VSLs)).
<b>Day</b>	Means calendar day.
<b>Defect</b>	The visible or measurable evidence of failure or other undesirable condition that requires intervention or that is likely to become a Hazard (as reasonably determined by you) before the next scheduled Asset Inspection or Planned Maintenance. The defect may affect the safety, serviceability, structural capacity or appearance of the asset.
<b>Down time</b>	Time the asset is inoperable due to failures or scheduled maintenance. It includes the time between occurrence of fault and fault notification. It is a missing period when the service is unavailable to the road user. It should be stated if this time is excluded from the Repair time and Response time. Accidents damage and/or site function unavailability should not count towards total downtime for the asset. But should be considered for time to restore to service measurements.
<b>Enclosure</b>	A housing providing an appropriate degree of environmental protection and against contact with live parts (AS/NZS 60529).
<b>Fault</b>	Any malfunction or undesirable condition of the TTIS equipment which requires Reactive Maintenance.
<b>Fault-dispatch</b>	On receipt of fault from any source, the action of forwarding that fault to the service crew.
<b>FFA</b>	‘for further attention’ or ‘for further action’.
<b>FMS</b>	Fault Management System(s).
<b>Functional check</b>	The regular inspection of the TTIS to ensure their safety and general operating condition.
<b>FWP</b>	Forward Works Program. Program which defines and agrees a broad range of Services to be performed by you, the timeframe they are to be completed in and the intended outcomes.
<b>Hazard</b>	Any state of the item which could lead to harm. Implicit in this is harm to a human. The definition is frequently expanded to include environmental harm.
<b>ITS</b>	Intelligent Transport Systems.
<b>KRA</b>	Key Result Areas.
<b>KPI</b>	Key Performance Indicators.

<b>Maintain or maintenance</b>	These terms shall include, regardless of cause and in addition to all other work specified, the following: <ul style="list-style-type: none"> <li>a) The repair and/or replacement of all defective, damaged or worn-out components or parts to ensure the proper operation of the TTIS equipment.</li> <li>b) The regular inspection and servicing of all TTIS devices and associated equipment.</li> </ul>
<b>MEN</b>	Multiple Earthed Neutral.
<b>Non-conformance</b>	A non-conformance event occurs when the availability KPI is not met or an event occurs when the fault response time or repair time in relation to a fault is exceeded.
<b>NRDT</b>	Non-reportable down time.
<b>OEM</b>	Original Equipment Manufacturer
<b>PEGA</b>	SCADA Application Server in the TMC Business Solutions Development Environment (Pegasystems) for hosting e.g. the Fault Management System (FMS).
<b>QA</b>	Quality Assurance procedure.
<b>Repair time</b>	The time elapsed from initial attendance at the Work Site to fault rectification or repair completion.
<b>Response time</b>	The time elapsed from fault notification to attendance at the Work Site.
<b>RMS</b>	Roads and Maritime Services of NSW
<b>SMC Service Providers</b>	Stewardship Maintenance Contractors providing road maintenance services to RMS in the Sydney Region
<b>Supply Point (also known as Connection Point)</b>	The junction of the electricity distributor's low voltage network conductors with the consumer's mains, i.e. the point at which the power supply is connected to the Utility network.
<b>Supports</b>	All structural components, brackets, clamps, straps and parts thereof, used to support the TTIS equipment.
<b>TDT</b>	Total down time.
<b>TMC</b>	Transport Management Centre
<b>TTIS</b>	Travel Time Information System
<b>UPS</b>	Uninterrupted Power Supply.
<b>VDCS</b>	Vehicle Detection and Classification Systems: a permanent device for vehicle detection and classification of vehicles.
<b>VMS</b>	Permanent - a programmable message display device for conveying information to drivers.
<b>VPN</b>	Virtual Private Network.
<b>WAE</b>	Work-as-executed.
<b>Work site</b>	TTIS site.
<b>You/Your</b>	the ITS Contractor/the ITS Contractor's.
<b>Zone</b>	The geographical area containing the ITS assets included in your ITS Maintenance Contract.



### **1.3 RELEVANT DOCUMENTS AND ORDER OF PRECEDENCE**

This specification shall be read together with RMS QA Specification [R300] – “ITS Maintenance Services – General Requirements”.

Other relevant RMS specifications and OEM manuals are listed in **Annexure R306/A**.

In absence of specific requirements within this or other RMS Specifications or OEM manuals, the current versions of published Australian Standards shall apply.

In case of conflict the order of precedence shall be:

1. Statutory and legislated requirements;
2. This specification (QA Specification R306) read in conjunction with QA Specification R300;
3. RMS QA Specification;
4. Other relevant RMS specifications;
5. OEM manuals;
6. Australian Standards.

## **2 MAINTENANCE SERVICES**

You must undertake maintenance services of the TTIS system and site components as described in clause 1.1 and in accordance with the approved Asset Maintenance Plan and Forward Works Program.

### **2.1 PLANNED MAINTENANCE**

Planned Maintenance Services must adhere to requirements given in QA Specification R300, ITS Maintenance Services – General Requirements. A combination of inspections/checks and preventative maintenance activities constitute planned maintenance to ensure continued serviceability and availability of the TTIS asset.

Minimum planned maintenance inspection/checks are;

- a) TTIS operation.
- b) Condition of TTIS cabinet, mounting and externally mounted accessories for damage, disfigurement (including vandalism), peeling or damaged galvanizing/paint surface coating and corrosion.
- c) Presence of moisture, dirt, vermin/insects inside TTIS enclosure, Controller cabinet, pits, exposed ducts and steel structure crevices.
- d) Wearing off or damaged site infrastructure i.e. concrete pathways, platforms, retaining walls, safety barriers, handrails, drains, landscaping etc.

**Annexure R306/B** is a sample Planned Maintenance Service checklist for both checks/inspections and preventative maintenance items. TTIS are supplied by a number of Original Equipment Manufacturers (OEMs). The Operation and maintenance manuals of the OEMs will be consulted along with the planned maintenance specs as required.

Planned maintenance frequency will be twelve (12) months.

## **2.2 REACTIVE MAINTENANCE**

### **2.2.1 Fault Attendance Service**

You must provide a fault attendance service on twenty-four (24) hours per day, seven (7) days per week basis for all TTIS faults.

Typical causes of TTIS faults include:

- a) Sensor malfunctions,
- b) Communication malfunctions,
- c) Power failures,
- d) Overheating of electronics,
- e) Moisture or dust ingress,
- f) accident damage,
- g) storm damage, and
- h) Vandalism.

All repair works must be in accordance with RMS specification listed in section 1.3 as amended.

### **2.2.2 Procedure**

You must make arrangements to continually monitor the Fault Management System(s) for VMS.

These systems, hosted by RMS, currently include:

- CMCS FMS web page for fault log on the intranet.
- PEGA Case Manager.
- Telephone call from designated RMS/TMC personnel.

You will be provided with access (e.g. remote login via VPN if provision is available) to these systems. You may also develop your own software interface to read the CMCS “flat file” which is periodically updated with TTIS fault status. In that case you will be provided with access to the CMCS “flat file” and a description of its structure.

Upon fault notification, you must review the nature and urgency of the problem and prioritise your response. You must dispatch appropriately skilled resources to attend the site as soon as possible, but in any case within the specified response time.

Upon arriving on site you must notify the TMC and log the time of attendance in your Fault Management System together with your initial findings and any other relevant information (e.g. estimated time to repair). You must also notify the TMC by phone before leaving the site.

You must assess whether the condition of the site poses any safety hazards to motorists or the public and make the site safe as a matter of priority.

In the event of a power failure, you must first contact the electricity distributor from off-site to ascertain that the cause of the outage is upstream of the TTIS supply point. You must still ascertain from site that there are no other power equipment failures at the TTIS site and then enter the appropriate fault response details in your fault management system.

In the event of a communications failure, you must first contact the service providers i.e. Telstra, Optus etc to ascertain that the failure is external to the TTIS system. Once confirmed, you must log communications faults with the appropriate third party communications service provider and follow-up to expedite rectification of the fault. You must still ascertain from site that there are no other communication equipment failures at the TTIS site and then enter the appropriate fault response details in your fault management system.

### **2.2.3 Response Times for Fault Attendance**

Response time starts from the initial fault occurrence time stamp in the appropriate electronic Fault Management System or from the time of the fault call (whichever is earlier) and is the sum of following;

- Remote investigation time to ascertain nature of defect(s)
- Equipment/parts/materials preparation time, and
- Travel time to the site.

Response times for initial site attendance upon notification of a TTIS fault is guided by the criterion in **Annexure R306/C**.

Service provider to locate maintenance crews to facilitate their travel time to site.

### **2.2.4 Repair Time**

**Repair time** at site is the time taken to trouble-shoot the fault, completely repair the asset and make it available for service. Asset downtime directly effects operational availability. Swift, efficient and well coordinated repairs will bring the asset back into operation quickly and positively affect performance targets.

You must inform RMS as soon as possible of any abnormal delays, reasons for delayed repairs and estimate of the time required to complete the repairs.

### **2.2.5 Repetitive Failures**

Where the same reported fault requires callouts on three (3) occasions within a fourteen (14) day period you must carry out root cause analysis, identify and implement appropriate actions to prevent recurrence.

Where these actions recommend replacement or major renewal of the TTIS asset and these works have not been included in the current Forward Works Program (FWP) you must submit a Business Case to RMS for approval. The Business Case must be based on a life cycle cost comparison of the proposed action against a “business as usual” maintenance approach. If RMS agrees with your recommendations the renewal or replacement works will be included in the next FWP.

Till the recommended and approved replacement works in the FWP are completed, the availability target (%) will be reviewed and a lower KPI may be accepted or under unsustainable operating conditions, the asset excluded from the KPI assessment until replaced.

### **2.2.6 Requests for RMS Assistance**

Where a technical problem cannot be resolved by you, you may request assistance from RMS. When requesting assistance you must be able to demonstrate to RMS that the technical problem is complex and/or outside your scope of services, e.g. system integration issues with RMS or TMC systems.

If the technical problem cannot be resolved by the RMS remotely, a site visit meeting will be arranged by RMS at a mutually agreeable time. You shall attend the site meeting with relevant documents and information related to the technical problem.

### **2.3 INCIDENT SUPPORT**

An Incident Support report should be raised when;

- an incident is known to your team
- or when informed by the TMC
- or by the relevant SMC Service Provider.

In the event of an incident, response time and repair time for Reactive Maintenance applies.

On site attendance, you must assess whether the condition of the site poses any safety hazards to the public and make the site safe as a matter of priority.

You must also prioritise and rectify all other faults and defects as if for Reactive Maintenance.

Upon arriving on site you must inform TMC by phone and log the time of attendance in your fault management system together with your initial findings and any other relevant information (e.g. estimated time to repair). Report form in **Annexure R306/D** may be used on site. You must also notify the TMC by phone before leaving the site.

You must assist RMS with all insurance claims and recovery actions arising from the incident.

Incident Support reports must be submitted as part of your monthly report to RMS.

## **3 PARTS AND EQUIPMENT**

### **3.1 SUPPLY**

You must arrange and manage supply of all parts, equipment, materials and technical services from OEM suppliers for the purpose of making available the TTIS site. Quality of parts, equipment and technical services from OEMs is to be assured.

When supply disruptions occur due to unavailability or obsolescence of a part or equipment, a Replacement part or equipment is to be recommended to RMS as a business case. RMS may approve use of the Replacement part or equipment after necessary technical review and testing.

### **3.2 HOLDING STOCK**

At all times, you must hold in stock adequate minimum levels of parts and equipment to meet Planned and Reactive Maintenance needs.

Service provider is to determine minimum stock levels for parts, equipment and materials based on TTIS maintenance scope.

An inventory of spares for parts, equipment, materials and technical services is to be maintained by the service provider. Inventory is to update minimum stock levels and holding stock periodically to match the TTIS maintenance scope.

Inventory of spares is to be updated for Replacement parts and equipment, on approval by RMS.

### **3.3 DISPOSAL OF DAMAGED, DEFECTIVE, OBSOLETE OR REDUNDANT PARTS & EQUIPMENT**

Due to maintenance or incidents, parts and equipment which are damaged, defective, obsolete or redundant are required to be removed from the Work Site and disposed. Such removal is to be done after formal information and agreement with RMS.

Such parts and equipment are to be distinctly and permanently marked prior to disposal by indicating their condition.

Disposal of parts and equipment is to be done as follows;

- a) Repair or refurbish the parts or equipment and hold them as spares in store for future use. For purposes of quality assurance, repaired or refurbished parts are to be treated the same as Replacement parts & equipment (Clause 3.1). Their repair history is to be maintained and made available to RMS when requested.
- b) Carry out disposal of parts and equipment that are beyond-economical-repair (BER) by recycling. Items being disposed must be physically disfigured prior to recycling at a certified facility. Certificate of disposal must be provided.

## **4 PERFORMANCE REQUIREMENTS (ASSET SPECIFIC)**

You must meet the included KRAs and KPIs for performance of your Services.

Your asset Inspection and Planned Maintenance Services must support a design life for each TTIS asset i.e. site availability should be sustained during design life for different components comprising each TTIS site. Design life of different components varies as follows;

- TTIS electronics and electrical components- Fifteen (15) years.
- Steel fabricated Sign Support Structures, Brackets and Fixtures – Fifty (50) years.
- Concrete & Masonry construction at Site - Thirty (30) years.
- Power back-up system / Batteries – Five (5) years.

As per definitions given in R300 the following performance criteria will be measured:

- a) Availability
- b) Response Time
- c) Repair effectiveness Time

Premature asset failures requiring major renewal or replacement of the asset (other than due to Incidents or Force Majeure events) may reduce your overall Stewardship Performance KPI score.

Performance requirements which are specific to TTIS Equipment are detailed below.

## **4.1 AVAILABILITY (OPERATIONAL)**

RMS QA R300 defines Availability for ITS assets. Performance calculation method is provided in the contract. The performance target for TTIS availability is **95%**.

Availability as defined in R300 will be measured monthly by you across all TTIS assets in your Zone.

Failure to meet the Availability performance targets will impact on your Asset Performance KPI score.

# **5 REPORTING AND RECORD KEEPING**

## **5.1 REPORTING**

You must provide a monthly performance report to RMS on work achievement against the FWP and asset performance statistics by the second week of the following month. The report must include the following items:

- (i) Availability
- (ii) Response Time
- (iii) Repair Effectiveness

See R300 for Availability, Response Time and Repair Effectiveness definitions.

You must report on the status of fault attendance and repairs through the appropriate Fault Management Systems in accordance with Clause 6.3 in R300.

These reports will be included in the KPI assessments by end of every month in accordance with the contract.

## **5.2 RECORD KEEPING**

You must keep and maintain accurate records of all repairs, calibrations, replacements and design alterations made to any TTIS Equipment/site.

All Reactive and Planned Maintenance service attendances must be recorded in the electronic fault management system. Details of each attendance must also be manually recorded with you and should include the date and details of service carried out with the technician's name.

You must maintain all necessary records to support the monthly evaluation of actual performance against the specific performance targets.

You must retain records, including all details for accidents/damages/repairs for a period of at least five (5) years.

**ANNEXURE R306/A – RMS SPECIFICATIONS AND OEM MANUALS**

<b>ITS Document Register</b>	
Specification R300	ITS General Maintenance Requirements
TSI-SP-014	General Requirements for the Design, Supply and Installation of Intelligent Transport Systems
TSI-SP-008	General Requirements for Variable Message Signs
TSI-SP-016	General Requirements for Outdoor Electronic Equipment.
ILC-ITS-REG-001	ITS - Document Register
<b>ITS Handbook</b>	
ILC-ITS-TP0-002	ITS Project Life Cycle Procedure
ILC-ITS-TP0-002-G01	ITS Project Life Cycle Guideline
ILC-ITS-TP0-002-G09	Vehicle Detection Systems
ILC-ITS-TP0-002-G14	Communication Networks
ILC-ITS-TP0-004-G01	Failure Modes & Criticality Analysis
<b>Handover – Consideration of maintenance issues</b>	
ILC-ITS-TP4-001	Testing of ITS Devices
ILC-GEN-TP0-901-G01	Handover of intelligent transport systems – user guide

# ANNEXURE R306/B – SAMPLE PLANNED MAINTENANCE SERVICE REPORT

PILLAR ID: ..... LOCATION: .....

REPORT DATE: .....

1. Mark as actioned for each item with a ✓ in the “ACTIONED” columns.
2. If any item requires further attention, write reasons in comments column and mark that item with a ✓ in the “for further action (FFA)” column.
3. Enter date in dd/mm/yy format and time in 24 hour format.

PREVENTATIVE MAINTENANCE ITEMS	ACTIONED	COMMENTS	FFA
Inspect TTIS for symptoms of electrical or thermal fatigue or degradation			
Inspect sensor and fixtures for signs and symptoms of mechanical fatigue			
Remove any Graffiti on cabinets or sensor surfaces / enclosure			
Inspect for any sign of vermin damage in the sensor enclosure			
Inspect all external surfaces for rust or vehicle damage			
Inspect for damaged or missing covers, doors and inspection hatches			
Inspect calibrations for compliance			



1. Mark condition of each item with a ✓ in “PASSED/FAILED/REPAIRED” columns.
2. Mark condition CF or NCF in the FAILED column to categorize.
3. If any item requires further attention, write reasons in comments column and mark item with a ✓ in the “for further action (FFA)” column.
4. Enter date in dd/mm/yy format and time in 24 hour format.

<b>FUNCTIONAL INSPECTION ITEMS</b>	<b>PASSED</b>	<b>FAILED</b>	<b>REPAIRED</b>	<b>COMMENTS</b>	<b>FFA</b>
Run TTIS Maintenance software if available from OEM.					
Establish communication via TTIS controller’s maintenance port, if access provided.					
Put TTIS ON; visually check and verify ON state					
Disconnect sensor , retrieve TTIS fault log and verify fault log is reporting sensor errors					
Check sensor working with different vehicle types as given in OEM manual and check OSDS Output					
When TTIS is connected to a VMS check for TTIS message displayed on VMS. e.g. Manually or electronically trigger Sensor to simulate presence of Vehicle.					
Inspect for any obstructions to TTIS detectors and sensor and clean or repair in accordance with OEM spec					
Turn all circuit-breakers OFF and reset; TTIS should report a fault log entry and clearance indicating the related power failure					
Check for high resistance joints					
Check for damaged cables					
Clean and lubricate all mechanical components then cover to test functionality					

Check MEN and earthing					
Check labels and markings. Replace if required.					

**TECHNICIAN:** .....**COMPANY:** .....

**SIGNATURE:** .....**DATE SIGNED:** .....

**DATE SENT TO RMS:** .....

## **ANNEXURE R306/C – FAULTS TYPES AND RESPONSE TIMES**

Response times for initial site attendance upon notification of TTIS faults are detailed in R300 (Clause 6.2.1 Response Times and **Annexure D**). R300 categorizes ITS assets as either High Priority or Normal Priority and assigns suitable response times.

**ANNEXURE R306/D – SAMPLE INCIDENT SUPPORT REPORT**

**VMS ID:** ..... **LOCATION:** .....

**INCIDENT DATE:** ..... **REPORT DATE:** .....

Incident Details	
When reported	
Who reported	
Was Incident or fault a dangerous situation? (Y/N)	
Police attendance? (Yes/No) Police Report #:	
Details of any vehicles involved	
Attending supervisor and team at site. Date and time.	
Immediate Safety measures taken. Date & time.	
Power Supply Point / post identification number	

Initial Repair undertaken. Date & time	
Details of long term repair. Whom forwarded to for action.	
Description of replaced equipment and cost of equipment plus materials	
Number of hours claimed for complete repair	
Notes & Comments	

**TECHNICIAN:** ..... **COMPANY:** .....

**SIGNATURE:** ..... **DATE SIGNED:** .....

**DATE SENT TO RMS:** .....