ROADS AND MARITIME SERVICES (RMS)

QA SPECIFICATION R319

MAINTENANCE OF ENFORCEMENT SYSTEMS

REVISION REGISTER

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GUIDE NOTES

(Not Part of Contract Document)

Transport Roads & Maritime Services

QA SPECIFICATION R319

MAINTENANCE OF ENFORCEMENT SYSTEMS

RNIC-QA-R319

VERSION FOR: DATE:

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RMS QA SPECIFICATION R319

MAINTENANCE OF ENFORCEMENT SYSTEMS

1 GENERAL

1.1 SCOPE

This document sets out requirements for the Maintenance of Enforcement Systems (EFS) (the "Services"). The Specification is formed only when this document is read together with RMS QA R300 ITS Maintenance Services – General Requirements.

RMS operates a number of enforcement systems (EFS) to manage compliance with speed limits and traffic signals. These include:

- Fixed speed cameras (including school zone speed cameras);
- Safety (red light / speed) cameras;
- Safe-T-Cam (heavy vehicle driver fatigue) systems; and
- Point-to-Point Average Speed systems.
- Over-height and over-length programs.
- Bus Priority Enforcement
- Mobile Speed camera program

EFS assets include all devices and supporting components of the system and site. The requirements herein is for Services relevant to an EFS site, so that they remain in good condition, operate as designed and meet the specified performance requirements.

Calibration and verification of EFS assets is excluded from the scope.

EFS Major components of an EFS site are listed below:-

a) Camera units;
b) Sensors (assorted) with power and communication systems;
c) Controller, related communication equipment and all auxiliary equipment;
d) Over height & over length systems for isolated sites, tunnel and bridge portals.
e) Power supply and regulation equipment, surge protection systems;
f) Power backup equipment (e.g. backup power generator; emergency power supply, un-interruptible power supply, etc);
g) Controller cabinet;
h) EFS enclosures;
i) Steel support structures; Access platforms, gantries, walkways, stairways, ladders etc.

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
Asset Maintenance Plan	Your maintenance plan for the EFS assets. Defines and agrees the intended longer term strategy for management of the EFS assets and key issues and constraints.
Availability	A dimension in the assessment of the Technical Condition of an Application or Technology Asset. It measures absolute availability (the proportion of time a system is up and running).
Cabinet	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
CMCS	Central Management Computer System.
Critical asset/ infrastructure	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)).
Day	Means calendar day.
Defect	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.
Down time	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 in 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.
Enclosure	A housing providing an appropriate degree of environmental protection and against contact with live parts (AS/NZS 60529).
Failure	Any fault which results in the loss of an item to perform its function.
EFS	Enforcement Systems are used for legislation (law) enforcement. The system may include technology to detect, identify, record and report.
Fault	Any malfunction or undesirable condition of the EFS equipment which requires Reactive Maintenance.
Fault-dispatch	On receipt of fault from any source, the action of forwarding that fault to the service crew.
FFA	'for further attention' or 'for further action'.

FMS	Fault Management System(s).
Functional check	The regular inspection of the EFS to ensure their safety and general operating condition.
FWP	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.
Hazard	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.
ITS	Intelligent Transport Systems.
KPA	Key Result Areas.
KPI	Key Performance Indicators.
Maintain or maintenance	These terms shall include, regardless of cause and in addition to all other work specified, the following: a) The repair and/or replacement of all defective, damaged or worn-out components or parts to ensure the proper operation of the EFS equipment. b) The regular inspection and servicing of all EFS devices and associated equipment.
MEN	Multiple Earthed Neutral.
NDT	Non Destructive Testing
Non-conformance	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.
NRDT	Non-reportable down time.
OEM	Original Equipment Manufacturer
PEGA	SCADA Application Server in the TMC Business Solutions Development Environment (Pegasystems) for hosting e.g. the Fault Management System (FMS).
QA	Quality Assurance procedure.
Repair time	The time elapsed from initial attendance at the Work Site to fault rectification or repair completion.
Response time	The time elapsed from fault notification to attendance at the Work Site.
RMS	Roads and Maritime Services of NSW
SMC Service Providers	Stewardship Maintenance Contractors providing road maintenance services to RMS in the Sydney Region
Supply Point (also known as Connection Point)	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.
Supports	All structural components, brackets, clamps, straps and parts thereof, used to support the EFS equipment.
TDT	Total down time.

Tidal Flow Scheme	Tidal Flow Systems are a site specific system developed so the directional flow in one or more lanes can be safely reversed according to traffic flow needs (ILC-ITS-TP0-002-G02). A Tidal Flow Systems may consist of various devices, systems and components (e.g. Changeable Message Signs (CMS -Prism); In Pavement Lights (IPL); Lane Usage Signs (LUS); Shutter Message Signs (SMS); Variable Message Signs VMS); LED Lanterns Signs (LLS); Candy bars; Movable medians (MM); Close Circuit Television (CCTV) Systems; Tidal Flow Controller (TFC)).
TMC	Transport Management Centre
UPS	Uninterrupted Power Supply.
VMS	Permanent - a programmable message display device for conveying information to drivers.
VPN	Virtual Private Network.
WAE	Work-as-executed.
Work site	EFS site.
You/Your	the ITS Contractor/the ITS Contractor's.
Zone	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 R319/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 R319) 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 EFS 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 a EFS asset. Calibration and verification of EFS assets is excluded from planned maintenance.

Minimum planned maintenance inspection/checks are;

a) EFS operation.

b) Condition of EFS enclosure, support structure, controller cabinet and other externally mounted accessories for damage, disfigurement (including vandalism), pealing or damaged galvanizing/paint surface coating and corrosion.

c) Presence of moisture, dirt, vermin/insects inside EFS 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 R319/B is a sample Planned Maintenance Service checklist for both checks/inspections and preventative maintenance items. EFS 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 six (6) 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 EFS faults.

Typical causes of EFS faults include:

a) Camera malfunction
b) Sensors malfunctions,
c) Communication system malfunction
d) Power breakdowns,
e) overheating,
f) moisture or dust ingress,
g) accident damage,
h) storm damage, and
i) 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 EFS.

The current sources of information on EFS systems and their current status is available from:

- All camera infrastructure is monitored online 24/7 by the Compliance Operation Branch of RMS (COB). The Camera Enforcement System (CEB) is used which is a device monitoring

and control, data retrieval, adjudication and reporting system and is the core of the maintenance management system.

- A maintenance and Certification Management System CEBDB also works to manage the maintenance of the cameras and certification requirements and is the intelligence source in respect to all operations at the camera sites.

In addition the fault notification maybe received via a telephone call from designated RMS/TMC personnel.

You will be provided with access (e.g. remote login via VPN) to these systems. You may also develop your own software interface to these systems.

Upon fault notification, you shall 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 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). 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.

You must carry out the necessary repairs within the specified repair times. You must enter the repair completion date/time and the repair details in the relevant FMS.

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 EFS supply point. You must still ascertain from site that there are no other power equipment failures at the EFS site and then enter the appropriate fault response details in the relevant FMS.

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 EFS 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 EFS site and then enter the appropriate fault response details in the relevant FMS.

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 EFS fault is guided by the criterion in **Annexure R319/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 EFS 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.

You must record the Incident Support details in the relevant FMS. If a FMS is unavailable or inaccessible, the report form in **Annexure R319/D** may be used on site. FMS should be updated on first available opportunity.

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 EFS 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 EFS 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 EFS 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 EFS asset i.e. site availability should be sustained during design life for different components comprising each EFS site. Design life of different components varies as follows;

- EFS 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.

4.1 AVAILABILITY (OPERATIONAL)

RMS QA R300 defines Availability for ITS assets. Performance calculation method is provided in the contract. The performance target for EFS availability is at least **95.0%**.

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

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

4.2 RESPONSE TIME AND REPAIR EFFECTIVENESS

The measure of Response Time and Repair Effectiveness is defined in R300.

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 currency, replacements and design alterations made to any EFS 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 R319/A – RMS SPECIFICATIONS AND OEM MANUALS

ITS Document Register	
ILC-ITS-TP0-006	Installation of ITS Devices Procedure
TSI-SP-005	Microwave Reader for Vehicle Travel Time Measuring Systems
TSI-SP-019	General Requirements for the Design Supply and Installation of Vehicle Detector Systems
TSI-SP-025	SRMS Protocol Specification for Detector Data
TSI-SP-026	Communications Protocol for Vehicle Detection Systems
ITP001 -	Piezo Installation Procedure
ITP009 -	Piezo Test Procedure
ITP017 -	Loop Test Procedure
	Installation Manual for Fibre Optic Traffic Sensor in SL Cast-90
	Revision 4 of BL Roadtrax Traffic Sensor Installation Instructions 1005974-1 MSI:
AS/NZS 2276.3:	Cables for Traffic Signal Installations
AS/NZS 2276.2: Part 2	Cables for Traffic Signal Installations
	Site Design Manual TIRTL (CEOS)
	Cables for Traffic Signal Installations AS/NZS 2276.3:
	Cables for Traffic Signal Installations Part 2 AS/NZS 2276.2:
TSI-SP-014	General Requirements for the Design, Supply and Installation of Intelligent Transport Systems
TSI-SP-016	General Requirements for Outdoor Electronic Equipment.
ILC-ITS-REG-001	ITS - Document Register
ITS Handbook	
ILC-ITS-M-001	Intelligent Transport System Document Planning Manual
ILC-ITS-TP0-002	ITS Project Life Cycle Procedure
ILC-ITS-TP0-002-G01	ITS Project Life Cycle Guideline
ILC-ITS-TP0-002-G02	Tidal Flow Schemes
ILC-ITS-TP0-002-G14	Communication Networks
ILC-ITS-TP0-004-G01	Failure Modes & Criticality Analysis
Handover – Consideration of maintenance issues	
ILC-ITS-TP4-001	Testing of ITS Devices
ILC-GEN-TP0-901-G01	Handover of intelligent transport systems – user guide

ANNEXURE R319/B – SAMPLE PLANNED MAINTENANCE SERVICE REPORT

EFS 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 Power in ON/OFF modes.			
Inspect equipment integrity and connection as per OEM manual.			
Inspect settings. Reset and clean as required.			
Inspect communications cable and connectivity.			
Inspect alignment of equipment to point of view and realign if necessary.			
Inspect support structures, brackets and attachments.			
Inspect controller cabinets, and enclosure for ingress of vermin, dust or moisture. Clean as required.			
Inspect Door Locks, Hinges and Seals. Replace if found defective.			
Inspect all cables and switches for any damage and report to next maintenance level if required.			

Inspect pits for water or vermin damage and report to next level of maintenance level if required.			
Inspect and records all serial numbers, asset numbers of equipment installed at site for asset register purposes.			
Check calibration are current.			
Document Routine check results.			

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.

FUNCTIONAL INSPECTION ITEMS	PASSED	FAILED	REPAIRED	COMMENTS	FFA
Check Power can be turned ON/OFF.					
When power ON check principle equipment is working within OEM specifications.					
Check communications link in working order.					
Check equipment in local mode.					
Check equipment in remote mode.					
Check operational latency/delays are acceptable.					
Check fault reporting.					
Check data logging.					
Check safe operations.					
Retrieve fault log. Clear fault log. Disconnect power and Comms one by one Check fault log to confirm faults are being logged.					

Check safety of installation and operations. Any protrusions in the traffic lane must be removed and equipment made safe.					
Check supplementary and auxiliary devices such as solar panels, battery, UPS for operation where available.					
Check UPS (Battery Backup) and Alarms (**if with EFS**)					
Check MEN and earthing.					

TECHNICIAN: …… COMPANY: ……..……

SIGNATURE: …… DATE SIGNED: …….....

DATE SENT TO RMS: ……

ANNEXURE R319/C – FAULT TYPES AND RESPONSE TIMES

Response times for initial site attendance upon notification of EFS 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 R319/D – SAMPLE INCIDENT SUPPORT REPORT

EFS 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: ……..