

# **SPECIFICATION FOR THE MAINTENANCE AND REPAIR OF TRAFFIC SIGNAL INSTALLATIONS**

## **1. SCOPE**

This specification covers the maintenance and repair of traffic signal installations listed in Schedule A and any illuminated signs forming part of those installations.

To achieve the long term maintenance objectives of the Road Controlling Authority, the following principles shall be followed:

- (a) The Contractor shall undertake preventative maintenance, emergency repair, and the repair of accident damage within the times specified.
- (b) The Contractor shall ensure that the supply of spare parts and back-up equipment is sufficient to maintain the operation of the signals within the times specified.
- (c) The Contractor shall record and schedule all inspections, maintenance and repair work undertaken.

## **2. INSTALLATION IDENTIFICATION**

All work recorded and scheduled by the Contractor shall be in terms of the Installation Number and may include a location description. The State Highway Route Position shall be included where appropriate.

## **3. SCOPE OF WORK**

For the traffic signal installations listed in Schedule A, the Contractor shall carry out:

- (a) Preventative Maintenance on a regular basis of the signal installations which includes repair or replacement of all components of lantern assemblies, posts, mast arms, controllers and cabinets, vehicle detection systems and all interconnecting cabling.

This work shall ensure the continuing efficient operation of the equipment but shall not include the painting of poles and lanterns.

- (b) Prompt emergency repair of any equipment that fails under normal working conditions.
- (c) Prompt repair in the case of accident damage or vandalism.
- (d) Supply of all spare parts as and when required to keep the system in good working order.

#### 4. STANDARDS

All work shall be carried out in accordance with the relevant Acts, Regulations, Standards and other Road Controlling Authority specifications. Work practices and standards shall be in accordance with the National Association of Australian State Road Authorities 1987 publication *Traffic Signals - A Guide to the Design of Traffic Signal Installations*.

Particular references are sections:

9.5.6	Lantern orientation
9.5.7	Modifications for unusual geometry
9.6	Visors (Cowls)
9.7	Louvres
14.3	Maintenance

#### 5. SPARE PARTS AND MATERIALS

The Contractor shall furnish, with their tender, verification of availability of spare parts to maintain and repair all of the equipment installed in the traffic signalling systems as scheduled, and shall also nominate his proposed stockholding for the Contract.

At least one of the following items shall be held by the Contractor:

- (a) Complete signal lantern assembly for each type of lantern.
- (b) Complete pole assembly for the above lantern.
- (c) One complete set of lenses/diffusers in addition to the above for each type of lantern.
- (d) Complete pedestrian control box assembly.
- (e) Pole top connection system and cap.
- (f) Specialised parts and modules for each type of controller listed in the schedule.

**Note:** The above list is minimum stock holding and may be superseded by other Contract Instructions.

The Contractor shall be responsible for the ready-supply and availability of consumables such as replacement lamps. The cost of all consumables shall be included as part of the contract price.

Each lighted optical system of every traffic signal lantern shall appear to be illuminated over its entire surface, without shadows or dark patches, when viewed from the angles usually encountered in service. Only clear glass "traffic signal lamps" shall be used. Selection of these shall be in accordance with the following table:

Lanterns	Lamp Wattages			
	65/67 Watt 230 Volt	90/100 Watt 230 Volt	150 Watt 230 Volt	Quartz Halogen 10 Volt
200mm Vehicle aspects	Suitable	Too large	Too large	35 Watt Suitable
300mm Vehicle aspects	Provides insufficient light output	Preferred where masks are used	Required for extended range lanterns	50 Watt Suitable
Pedestrian Lanterns	Preferred	Too bright	Too bright	Not recommended

All other components used by the Contractor shall be of long life and shall be adequately rated in accordance with their application. All electronic components used shall be computer grade and shall be adequately protected for their operational environment. Other spare parts, particularly those affecting the optical characteristics of lanterns, must be of high quality to ensure continuing high standards of performance.

Spare parts that do not meet these requirements or have been specifically approved by the Engineer shall be rejected.

## 6. MODULE REPLACEMENT OR REPAIR

Where equipment consists of discrete plug-in modules or contains micro-computer based units, any faulty module shall be replaced immediately with a spare. Repairs to the faulty module (or unit) if economic, shall be made in the workshop as soon as possible. The responsibility for workshop repair rests with the Contractor, but tenderers shall indicate their intention to sub-let this work.

## 7. PREVENTATIVE MAINTENANCE

### 7.1 General

Sections 7.2, 7.3 and 7.4 specify the Preventative Maintenance to be carried out under this contract.

Scheduled Preventative Maintenance shall be carried out within 7 days of the programmed date.

Where the Engineer considers that the Contractor has failed to perform their obligations under the contract, the Engineer shall be entitled, after notifying the Contractor in writing, to employ others to carry out such remedial work. The cost of such work shall be deducted from contract progress payments.

The Engineer shall be informed, in writing, of any deterioration of existing equipment. The Contractor shall submit a recommendation to the Engineer suggesting remedial action and giving an estimate of the costs involved for Equipment Replacement and Modification. The Contractor may, however, carry out “MINOR” Equipment Replacement and Modification work, as defined in Schedule A, without prior approval from the Engineer.

## 7.2 13 Week Cycle

Preventative maintenance to ensure continued efficient operation shall be carried out on a pre-arranged programmed basis every 13 weeks and shall cause minimum inconvenience to traffic. Preventative maintenance shall comprise:

- (a) Replacement incandescent lamps in red, green, and pedestrian <WAIT’ aspects.
- (b) Clean lenses, both inside and out, and polish reflectors of all lanterns.
- (c) Clean inside and outside faces of illuminated signs.
- (d) Check condition and operation of vehicle detectors, adjusting and repairing as necessary. This includes checking the following items:
- (e) Ensure detectors are not pulsing, hanging on or giving false detection and:
  - (i) Ensure the mode of operation (either presence or dynamic) is correct.
  - (ii) Ensure the loops are not exposed to traffic or weather.
  - (iii) Ensure the loops are not earthed (in accordance with current acceptable practices).
  - (iv) Ensure that the loop terminals are sealed and that the toby boxes are clean and dry.
  - (v) Ensure that the pole top mounted detector boxes are watertight and in good condition.
  - (vi) Ensure that the tuning voltage is correct and that the sensitivity settings are correct.
- (f) Check function operation of all pedestrian detectors, buzzers and tactile facilities including lamps and light-emitting diodes. Adjust, repair or replace as necessary. Pedestrian call boxes shall be checked for damage and ensure that lenses and covers are watertight.

- (g) Check all signal hardware and wiring with particular attention to gaskets, lens legends, fluorescent tube starters, lantern alignment and wiring terminals (including pole tops), visors, louvres, target boards and all associated equipment. Also examine all load switching relays for contact burning. Adjust, repair and clean as necessary.
- (h) Check the operational functions of the controller to ensure that the phase sequence is correct, all time settings are correct, and all facilities are operating correctly.
- (i) Preventative maintenance on the controller shall be performed in accordance with the manufacturer's instructions. The wiring shall be examined and the earths and output load voltages shall be checked. The Engineer shall be advised of any major change in AC load voltages, taking into account time of day variations in AC input voltages. At the same time as carrying out preventative maintenance on the controller, the Contractor shall inspect and repair any damage or faults to the control cabinet including cabinet body, holding down hinges, locks etc. The Cabinet shall be maintained in a clean and watertight condition. Any contaminants (animal, plant or insect) in the cabinet or ducts shall be removed and measures instigated to prevent reoccurrence.

### **7.3 26 Week Cycle**

As for the 13 week cycle, the replacement of the following lamps and tubes shall be on a programmed basis every 26 weeks.

- (a) Replace incandescent lamps in yellow and pedestrian <CROSS' aspects.
- (b) Replace 20 and 30 watt fluorescent tubes in illuminated signs.

### **7.4 52 Week Cycle**

As for the 13 and 26 week cycles plus the replacement of quartz halogen lamps which shall be on a programmed basis every 52 weeks.

## **8. CONTROLLER TIME SETTING ADJUSTMENT**

Adjustment of Controller Time Setting, by the Contractor, is prohibited except to:

- (a) Facilitate maintenance and operational checks; or
- (b) Temporary repair of an operational fault.

In either case, on completion of work, the controller shall immediately be reset to the values noted on the signal setting chart in the controller cabinet. If settings have to be left different to the chart values the Contractor shall notify the Engineer identifying new settings, reason for change and time until chart values will be restored.

## 9. EMERGENCY REPAIR AND ACCIDENT DAMAGE

Failure of signals, necessitating emergency callout service, may only be reported to the Contractor by:

- (a) The Traffic Safety Service, Ministry of Transport; or
- (b) The Engineer or a nominated representative.

Emergency repair services shall be available on a 24 hour 7 day week basis.

The Contractor shall provide and keep up-to-date telephone numbers on which the Engineer or Traffic Safety Service and Ministry of Transport may contact the Contractor at any time, day or night.

Faults not considered to be Emergency Repair Work are:

- (a) Single lamp failure
- (b) Pedestrian lamp replacement
- (c) Pedestrian call box faults
- (d) Minor visor damage
- (e) Pedestrian lantern damage
- (f) Target board damage.

Signal installations under repair or turned off shall be fitted with "Not in use" signs, placed over at least two lanterns on each approach, as specified in the NAASRA guide (paragraph 11.5.1). The signs shall have a black legend on a reflective orange background.

The Traffic Safety Service of the Ministry of Transport shall be advised immediately whenever signals are non-operational.

Tenderers shall specify the arrangements that have been made with the Suppliers of each type of Controller with respect to emergency repair services during and out of normal working hours.

## 10. EQUIPMENT REPLACEMENT AND MODIFICATIONS

### 10.1 General

The Road Controlling Authority has a programme of modification of traffic signal installations due to changing traffic patterns and/or equipment failure and servicing problems.

**"MINOR"** Equipment Replacement and Modification work, as defined in Schedule A, may be carried out under Preventative Maintenance by the Contractor.

**"MAJOR"** Equipment Replacement and Modification work, as defined in Schedule A, shall be authorised by the Engineer and will generally be at rates negotiated with the Contractor or tendered out separately.

## 10.2 Controller Replacement

If a controller is replaced at an installation, either through obsolescence or accident damage, Controller Preventative Maintenance under this contract for that installation shall be suspended for the controller guarantee period. The period will normally be 52 weeks.

The Contractor shall be informed as soon as a controller is replaced and the costs of controller Preventative Maintenance for that installation, as set out in the Schedule of Rates, shall be deducted from monthly contract progress payments, for the controller guarantee period.

However, if the Contractor has an emergency callout to the installation during the controller guarantee period and the controller is found to be at fault, the Contractor shall be reimbursed for the time taken to isolate the fault at the rates specified in the Schedule of Rates.

When a controller is accident-damaged and cannot be repaired due to obsolescence, the Contractor may propose a replacement controller. Installation of a replacement controller shall be subject to the Engineer's approval.

## 10.3 Detector Replacement

If detectors are replaced at an installation, the Contractor shall be required to maintain the new detectors and their associated loops as specified under Section 7 of this specification. However, if a fault is found with any part of a new detector that is still within its 52 week guarantee period, the Engineer shall be notified so that the fault can be corrected by the supplier.

The Contractor shall be reimbursed for the time taken to isolate the fault at the rates specified in the Schedule of Rates.

## 10.4 Modifications

For "MAJOR" modification work the Modification Contractor shall be required to maintain the modified installation for the Modification work period. This period will normally be between 13 and 52 weeks.

In this event, Preventative Maintenance, Emergency Repair and Accidental Damage work on the installation, as set out in this specification, shall be suspended for the Modification work period. Yearly Preventative Maintenance payments at the rate set out in the Schedule of Rates and paid on a monthly basis, shall be deducted from monthly contract progress payments for the Modification work period.

During the Modification work period any fault calls received by the Contractor shall be passed onto the Modification Contractor by the Engineer.

## 11. TECHNICAL SUPPORT

The tenderer shall specify in their tender if they can provide any technical support. This work may include:

- (a) Modification to lantern displays and wiring.
- (b) Addition and removal of phase modules in the non-microprocessor controllers.
- (c) Personality Generation facilities for the microprocessor controllers.

## 12. SERVICING PROCEDURES

### 12.1 Preventative Maintenance

Preventative maintenance shall be carried out during the off-peak traffic flows, generally between the hours of 9.00am and 4.00pm Monday to Saturday, unless by previous arrangement with the Engineer and the Traffic Safety Service of the Ministry of Transport.

When signals must be turned off for more than a short time to facilitate preventative maintenance, the Traffic Safety Service of the Ministry of Transport shall be given 24 hours advance notice, and the exact time is to be mutually agreed. The fact that the signals were turned off is to be recorded on the report form.

The Contractor shall provide a monthly programme showing all installations scheduled to receive preventative maintenance for the following month.

### 12.2 Emergency Repairs and Accident Damage

Emergency repairs and accident damage shall be attended to within the Response Times specified. A temporary repair is acceptable providing permanent repairs are undertaken within one week.

The Contractor shall submit a weekly report to the Engineer of all emergency repair work undertaken.

### 12.3 Response Times

A Road Group Number has been assigned to each traffic signal installation and these are listed in Schedule A. Emergency Repairs and Accident Damage shall be attended to on site by the Contractor within the Response times given in the following table:

Road Group No.	Response times (hours)	
	Emergency Call	Repair Work
1	1	24
2	4	24
3	8	48
4	24	72



## 12.4 Control Cabinet Documentation

The Contractor shall provide a log book for each installation maintained (unless one already exists). This log book shall become the property of the Road Controlling Authority and shall remain in the control cabinet at all times. Whenever an installation is visited, the log book shall be noted in a legible and accurate manner with:

- (a) the date of the visit
- (b) the time of the visit
- (c) the reason for the visit and any action taken
- (d) the initials of the recorder.

Other documents contained in the control cabinet are a Controller timing sheet showing phase timings, the Road Controlling Authorities' Installation layout plan and a wiring circuit diagram and component schedule.

It shall be the Contractor's responsibility to maintain these documents in a clean and tidy condition in the control cabinet. Any modifications shall be noted on them.

## 13. SERVICE REPORTS

The Contractor shall provide a report on each visit, whether for maintenance or emergency repair, repair of accidental damage, or effecting modifications according to directions from the Engineer.

The report shall include the following details:

- (a) The installation number and the location description as identified in the Contract Schedule.
- (b) The reason for the visit and, if relevant, the source and time of receipt of the information.
- (c) The date and time of the visit.
- (d) The name of the serviceperson.
- (e) The fault (if any) as reported.
- (f) The fault (if any) as found.
- (g) The action taken and additional comments by the serviceperson as required.

The report shall be presented to the Engineer in a neat and tidy manner on an A4 Service Job Sheet Report no later than seven working days after the completion of the work.

## 14. GUARANTEES

### 14.1 Repaired and Reinstalled Equipment

All equipment repaired and reinstalled under this contract shall be guaranteed by the Contractor against defective materials or workmanship for a period of 13 weeks from the time of installation. The guarantee shall also cover the installation of the equipment and the Contractor will be responsible for making good any defects at no charge to the Road Controlling Authority.

## **14.2 New Lamps**

All new lamps supplied under this contract shall be guaranteed for the Preventative Maintenance cycle period. The guarantee shall also cover the installation of the lamps and the Contractor will be responsible for making good any defects at no cost to the Road Controlling Authority.

## **14.3 New Equipment**

All new equipment supplied and installed under this contract shall be guaranteed by the Contractor against defective materials or workmanship for a period of 52 weeks from the time of installation. The guarantee shall also cover the installation of the equipment and the Contractor will be responsible for making good any defects at no cost to the Road Controlling Authority.

## **14.4 Detector Loops**

All detector loops installed under this contract shall be guaranteed by the Contractor for a period of 26 weeks. The guarantee shall cover any damage to the loop caused by other than road works or vandalism. The guarantee may be waived by the Engineer if the Contractor can show, at the time of installation, that the site conditions are below standard.

## **15. ALTERNATIVE PROPOSALS**

Tenderers may submit prices based on alternative proposals, but full details must be provided with the Tender and they must be accompanied with a conforming tender based on this Specification.

Alternatives will be considered on their merits but preference will be given to systems offering the same or a better degree of performance to that specified. However, the basic maintenance cycle shall not be longer than 13 weeks and the Road Controlling Authority must be satisfied that in all cases the service offered will not adversely affect, either through techniques or materials used, the operational performance of the traffic signal equipment.

## **16. PERFORMANCE CRITERIA**

The performance of the Contractor shall be measured by the following criteria:

- (a) That the traffic signal installation is maintained to a high level of service and reliability.
- (b) That all maintenance work is scheduled and carried out within the response times specified, and in accordance with the specification.
- (c) That prompt and appropriate action is taken for all emergency callouts.
- (d) That Emergency calls and Repair Work are attended to within the response time specified and in accordance with the specification.

## 17. BASIS OF PAYMENT

### 17.1 Preventative Maintenance

All Preventative Maintenance as scheduled shall be on the basis of an all-inclusive unit rate per year per installation and paid on a monthly progress payment basis. Rates shall also be given for:

- (a) Controller Preventative Maintenance, as scheduled, on the basis of an all-inclusive unit rate per installation per month; and
- (b) Detector Preventative Maintenance, as scheduled, on the basis of an all-inclusive unit rate per installation per month.

If “**MAJOR**” modification work is carried out on an installation during the Contract period, Preventative Maintenance under this contract is to be suspended for the Modification work period. Monthly Preventative Maintenance payments for that installation shall be deducted from progress contract payments during the Modification work guarantee period.

If a controller is replaced at an installation during the Contract period, Preventative Maintenance on the controller shall be suspended for the controller guarantee period. Monthly Controller Preventative Maintenance payments for that installation shall be deducted from progress contract payments during the detector guarantee period.

### 17.2 Emergency Repair and Accident Damage

Emergency Repair and Accident Damage repair shall be on a reimbursable basis.

Labour shall be paid at the rates tendered in the Schedule of Costs for the actual time involved including travel time.

Materials used shall be paid on the basis of invoices submitted and after these have been verified by the Engineer.

### 17.3 Equipment Replacement and Modifications

“**MINOR**” Equipment Replacement and Modification work carried out under Preventative Maintenance during this contract shall be paid on invoiced item costs. Labour from this work shall be deemed to be included in the Preventative Maintenance rates.

All other authorised Equipment Replacement and Modification work carried out during this contract shall be paid in accordance with the written quotations received and agreed by the Engineer.