

## Tauranga Transport Operations Centre

### TTOC-01 Requirements for Traffic Signal Works

#### Document History and Status

	Revision	Date	Prepared By	Authorised By	Description
Requirements for Traffic Signal Works	Final	May 2014	Haydn Wardley	Haydn Wardley	Final
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Every attempt was made to ensure that the information in these documents was correct at the time of publication. Any errors should be reported as soon as possible so that corrections can be issued. Comments and suggestions for future editions are welcome and periodical reviews are undertaken on a regular basis. Users of these documents must ascertain themselves that they obtain the latest versions as valid references.

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# 1. Introduction

The Tauranga Transport Operations Centre (TTOC) is responsible for all traffic signals operations in the Bay of Plenty region from installation through to maintenance.

This document is designed to assist all interested parties to understand how the TTOC functions and the standards that have been adopted to ensure a consistent approach is maintained when designing and installing traffic signals and associated equipment.

## 1.1 Purpose

The purpose of this document is to give an understanding of the TTOC requirements when undertaking the design of traffic signal installations in the TTOC regions, whether they are completely new installations or existing sites that are being upgraded

## 1.2 Who Should Use This Document?

This document should be used by all consultants, contractors and project managers (referred to as “**applicant**” in this document) involved in the design of traffic signals within the Bay of Plenty. Where, for example, an upgrade is being carried out by a Road Controlling Authority (RCA) the applicant shall be the assigned.

TTOC has prepared this document to assist designers and more specifically project contract managers so they can understand, and assist further prior to engaging the TTOC. This document provides:

- Non-specialist understanding of TTOC’s requirements.
- Assist is project programming.
- Scope for consultants.
- Contractual requirements.
- Responsibilities and expectations.

For more specialist details in their content and specific design parameters on areas like software, modelling, drawing details and requirements the applicant must read in conjunction with this document TTOC-02 Requirements for Traffic Signal Design.

Signal designs are to be developed in consultation with the TTOC. Some elements, such as provision of SCATS communication lines, mains power and software preparation require significant time to implement, so early liaison with these parties is critical. Similar lead in times may be required for changes to the operation of existing intersections or for temporary signal installations for traffic management purposes. Therefore, this aspect of signal planning requires special attention.

Figure 1 shows how this document fits with the general progression of a project involving traffic signals.

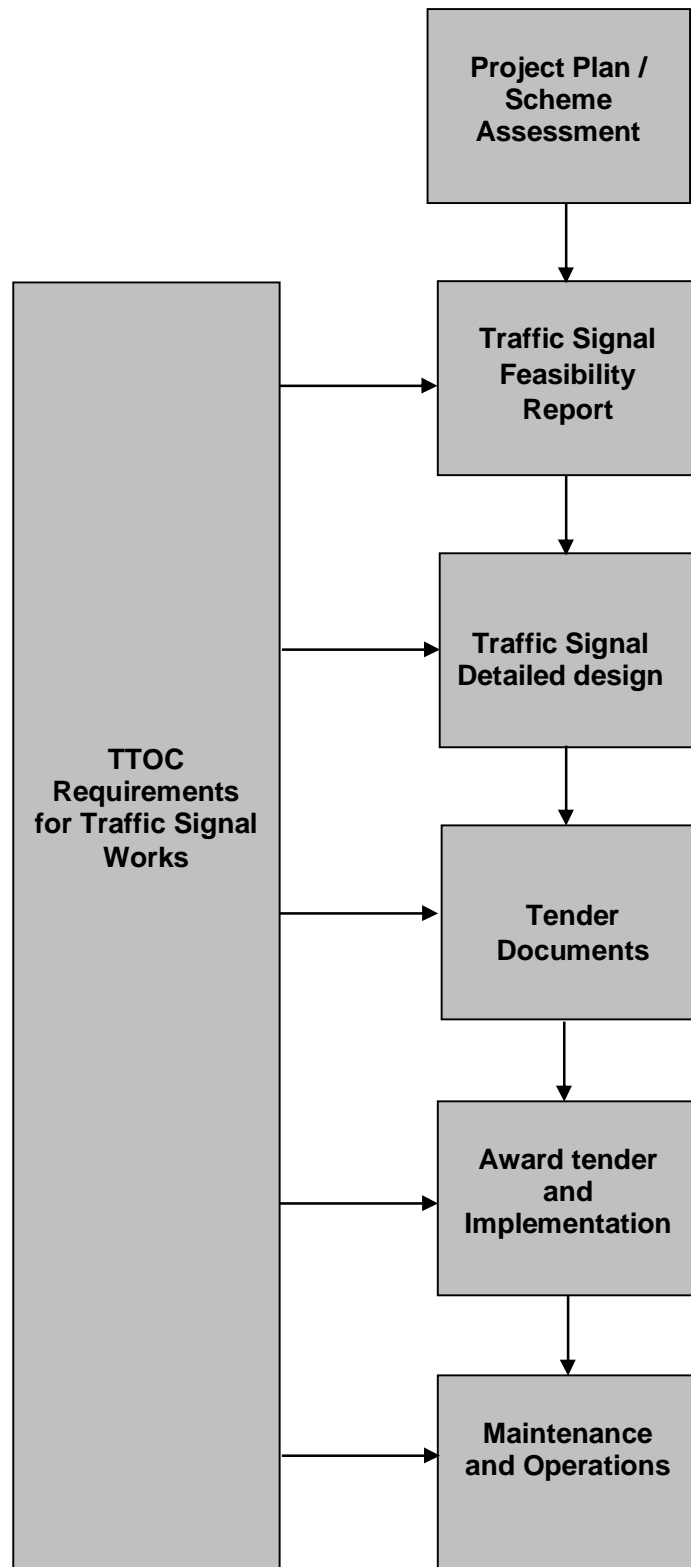


Figure 1 : Project Procedure Flow Chart

### 1.3 Glossary of Terms

<b>AS / NZ</b>	Australian Standard / New Zealand Standard
Active Traffic Management System ( <b>ATMS</b> )	Technology that provides information to road users by means of Variable Message Signage.
<b>Controller</b>	The equipment (including the housing) that switches power to signal lanterns and controls the duration and sequence of signal displays as defined by the controller personality.
Controller Information Sheets ( <b>CIS</b> )	A hard copy of the information used to make a Controller Personality that is contained within the PROM.
Controller Personality	The unique program stored in the PROM, which configures the controller to the specific operational design of the intersection.
<b>CCTV</b>	Closed Circuit Television.
<b>DP Number</b>	Distribution Point for telecommunications.
<b>FSL</b>	From Stop Line, measurement used for distance from start of detector loop.
<b>ICP Number</b>	Installation Connection Point Number (for electricity power meter).
<b>IDC</b>	Infrastructure Development Code
Intelligent Transport Systems ( <b>ITS</b> )	Refers to various systems like SCATS, CCTV, VMS and ATMS systems that provide and add information and communications technology to transport infrastructure.
<b>JUMA, JUSP</b>	Joint Use Mast Arm, Joint Use Service Pole
<b>KJB</b>	Kerbside Junction Box to access services, for example detector loop feeders.
<b>NZTA</b>	New Zealand Transport Agency.
<b>NGEN</b>	Software product developed by RMS to produce .SFT and .M68 files.
<b>PCMCIA Card</b>	A computer card containing the controller personality information housed in the TSC4 / AS 2578 compliant controller.
<b>PROM</b>	A computer chip containing the controller personality information housed in the TSC/3 compliant controller. In this document PROM refers to either a PROM, a PCMCIA card or similar software storage device.
Road Asset and Maintenance Management ( <b>RAMM</b> )	An Internet accessible system that stores the Traffic Signal assets. Also records the activity of the Maintenance Contractors by the logging of faults as Dispatches and their completion by the Contractors. Contractors' claims are generated from the system at each month end.
<b>RCA</b>	Road Controlling Authority.
Roads and Marine Services ( <b>RMS</b> ) of New South Wales ( <b>NSW</b> )	The Authority that is accepted as the basis for the TTOC standards and for product approval. RMS also develop and own SCATS traffic signal software and other products related to SCATS and their output files.
<b>SAT</b>	Site Acceptance Test, commissioning check list.
<b>.SFT / .M68</b>	File formats for traffic signal software TRAFF

Sydney Coordinated Adaptive Traffic System ( <b>SCATS</b> )	A fully adaptive area wide control system for traffic signals that is linked to the traffic signal controllers running TRAFF software via telecommunication lines.
<b>TCC</b>	Tauranga City Council
<b>TRAFF</b>	Traffic signal base software inside traffic controllers on site running the signals.
Tauranga Transport Operations Centre ( <b>TTOC</b> )	Organisation tasked with managing the traffic signals and the ITS systems for local roads and State Highways Bay of Plenty by monitoring SCATS and CCTV.
Vehicle Activated Sign ( <b>VAS</b> )	VAS is a generic term for a type of road traffic sign which displays a message conditional upon the presence, or speed, of a road vehicle.
Variable Message Sign ( <b>VMS</b> )	An electronic traffic sign often used to display a message or picture, often the sign display is changeable and dynamic.
<b>Win Traff</b>	A software programme used to check the controller information by testing the software of the controller personality.

## 2. The Process for Traffic Signal Design

The expected time scales for approval are given in Table 1. From submission to the TTOC from the applicant, it is advised to include any deadlines or contract requirements so the TTOC can prioritise accordingly. For further technical details and requirements read TTOC-02 Requirements for Traffic Signal Design.

PROCESS	COMMENTS
Traffic Signal Feasibility Report	Brief traffic signal report, includes modelling, practical assessments, buildability, costs, future proof, services the users.
Traffic Signal Detailed Design	In depth detail resulting in no surprises during construction, design report showing judgement and considerations evaluated. Drawings and documents at a high standard, minimising risk and unexpected construction costs.

**Table 1. Traffic Signal Design – Expected time for approvals for project management**

All documents are to be supplied in electronic format including original files from various software applications. For example; SIDRA .sip, AutoCAD .dwg files. This is to ensure that the plans are clear and concise for reviewers, safety auditors and contractors.

Modelling forms part of the traffic signal feasibility report, generally SIDRA is an industry known standard for modelling traffic signals however, other software may be considered. Refer to TTOC-06 Traffic Signals Modelling Guidelines.

It is expected that the applicant project team members have the experience and knowledge to provide the relevant details, especially in the production of software, CIS and traffic signal design. It is not the job of the TTOC to provide training or resources for designers who are new to the industry as there are suitable courses and consultants who can provide this level of expertise.

### 3. Road Safety Audits

In addition to any general project safety audits that include signalised intersections, the applicant shall allow for two specific signal audits. The primary objective of a road safety audit is to help ensure a project achieves an outcome consistent with Safer Journeys and the Safe System approach. That is; minimisation of death and serious injury.

These audits are:

- A signal design (and safety) peer review. A post construction installation (and safety) audit, TTOC will assign an experienced signals practitioner to the Road Safety Audit team.

Copies of both safety audits to be retained by the TTOC.

The audits are required for temporary and permanent installations. The audits are considered 'hold points' in the construction programme and the applicant shall make provisions in their programme for:

- Undertaking the audits
- Response to the audits, and
- RCA representatives to close off the audits.

The applicant is responsible for addressing all issues raised by the auditors or RCA, and for rectifying any defects identified.

As recommended in the NZTA Road Safety Audits Procedures, the safety audit team must consist of members that have specific experience in the project subject. The minimum criteria for the team members is as follows:

- Member of the IPENZ SNUG user group.
- At least 3 years traffic signal design experience.
- Traffic signal performance modelling experience.



## 4. TTOC Standards and Specifications

### 4.1 Technical Criteria

The design of the traffic signals must be carried out in accordance with the standards and guidelines listed below and their revised / subsequent replacements:

- TTOC-00 Standard Traffic Signal Documents Index.
- TTOC-01 Requirements for Traffic Signal Works.
- TTOC-02 Requirements for Traffic Signal Design.
- TTOC-03 Regional Special Conditions to the National Specifications.
- TTOC-04 National Traffic Signal Specification.
- TTOC-06 Traffic Signals Modelling Guidelines.
- AUSTRROADS Traffic Management Guides.
- Road Traffic Standards (RTS) 14.
- NZTA Pedestrian Planning and Design Guidelines.
- NZTA Road Safety Audits Procedures.
- NZS1158 Public Lighting Standards

### 4.2 Software Development Procedure

The following table outlines the process for the development of software. The applicant manages the software development process and will provide the software including independent testing. The times in Table 2 are guidelines.

During software / .SFT testing process, the time frames may be extended if software requires reworking due to a fault during testing. The applicant must consider this and plan the process accordingly.

PROCESS	DAYS	ACTIONED BY	APPROVED BY
Create CIS	5 Working days	Applicant	N/A
Peer review CIS	5 working days	Applicant	auditor
TTOC approval of CIS	5 working days	N/A	TTOC
.SFT Generation	5 working days	Applicant	N/A
.SFT test Report (Win Traff)	5 working days	Applicant	TTOC
.SFT test in SCATS and Test Rig	5 working days	Contractor	TTOC
<b>Total</b>	<b>6 weeks</b>		

**Table 2: CIS and SFT Development Flow Chart**

### 4.3 Traffic Signal Installation Specification

The applicant shall use the TTOC Traffic Signals Hardware Specification in conjunction with TTOC-04 National Traffic Signal Specification and TTOC-03 Regional Special Conditions to the National Traffic Signal Specifications and other requirements. The applicant shall provide details of any deviations from the content of this specification for acceptance by the TTOC.

### 4.4 Drawings

The applicant shall provide construction drawings to the TTOC for peer review and acceptance. The drawings shall conform to the standards required by the TTOC. The signal layout drawing is to comply with the current version TTOC-02 Requirements for Traffic Signal Design.

## 5. Associated Equipment

In addition to traffic signals the project need to consider the following.

### 5.1 Closed Circuit Television (CCTV)

The particular requirements to accommodate CCTV are to be determined on an individual site basis in conjunction with the TTOC. Contact the TTOC in the first instance and we can assist with the specialist input to specifications and requirements for CCTV.

It is desirable to have CCTV in place and running at the commencement of a major project to aid monitoring of the site during the various phases of construction. This is of particular importance if temporary traffic arrangements are to be implemented during construction.

### 5.2 Street Lighting

Please refer to the TCC Infrastructure Development Code - DS8 – Public Lighting. Engagement with the TTOC street light manager is required.

Street lighting design to be submitted as per documents TTOC-02, TTOC-03 and TTOC-04 for review.

The lighting design that is proposed for the intersection shall be peer reviewed by TTOC or their nominated consultant.

### 5.3 Power supply

The Electrical Supply Authority (ESA) power supply termination and High Rupturing Capacity (HRC) fuse should be positioned within close proximity of the controller cabinet. Preferably within 10m and shown in traffic signals as built drawings. Original Electrical Certificate of Compliance to be submitted as part of the commissioning process.

The traffic signal contractor shall:

- Arrange for local power connection using a smart meter from the local electrical supplier
- Submit the appropriate forms and documentation, and
- Consult with the TTOC for the site address and account billing information before the application is submitted.

All costs associated with planning are to be paid by the applicant including installation costs for the smart meter box, reader units, cabling and ducting, as required.

The traffic signal contractor shall record the mains power supply location and direction of source and this detail is to be shown in the traffic signal as-built drawings.

### 5.4 Uninterrupted Power Supply (UPS)

When traffic signals at an intersection are blacked out due to loss of power supply, police are notified to perform point duty. at complex intersections. Emergency power must be provided for..

Portable generators can be used to provide emergency power. . However, an uninterrupted power supply must also be installed where one or more of the following conditions apply:

- Conflicting, opposing and parallel through approaches cannot be seen from any approach stop line.
- More than one Police officer is required to work the point.
- There are five or more approaches.
- Sites with significant number of Heavy Goods Vehicles (HGV)
- UPS is required at the direction of the TTOC due to complex geometric design and inadequate sight distance factors.

Where a UPS is required the applicant shall be responsible for all additional costs. To house the UPS an additional cabinet may be required. The TTOC can advise on the required specifications.

## 5.5 Communication System

Communications at traffic signals are a vital part of their operations and are required to be operational for commissioning / switching on traffic signals.

If a permanent communications line is not able to be provided prior to commissioning then a temporary 3G connection can be provisioned. The applicant shall be responsible for all costs in relation to communications, until commissioning is complete and the permanent communication line is operational.

Contact the TTOC for information on communication providers. The application for connection can be submitted once the traffic signal controller location has been approved.

## 6. Commissioning

TTOC-07 Site Acceptance Test (SAT) process ensures all documentation and processes are understood before the traffic signals are switched on.

The installation contractor as part of their pre-commissioning and final testing, using the TTOC-07 Site Acceptance Test, shall audit the hardware and operations of the signals prior to switching on the traffic signals live on street. The traffic signals must be run on site without the lanterns on for at least 24 hours prior to switching on to validate operations in SCATS.

Fully completed and approved TTOC 07 document (pre commissioning version) needs to be submitted three days prior to the proposed traffic signal commissioning switch on date. If this document is not submitted the TTOC reserves the right to extend the commissioning / switch on date until the pre commissioning document is received and approved.

### 6.1 Site Acceptance Testing (SAT).

Prior to commissioning, the applicant is to contact the TTOC with a minimum of three working days' notice, to propose switch on and commissioning.

The applicant is responsible for liaising with the TTOC to ensure that all parties are kept up-to-date with proposed commissioning dates and times for each new or modified signal installation.

Commissioning is to be timed to occur:

- At least 2 hours outside any recognised peak traffic periods
- Only during weekdays, and
- Not Friday, Saturday, Sunday or public holidays, unless there is agreement from the TTOC.

The applicant, the construction signal contractor are required to attend the commissioning and to continue to monitor the site throughout the first am and pm peak period and any time required thereafter to ensure the integrity of the software and hardware and to identify and rectify any operational problems.

Correct operation under isolated control is to be verified prior to connecting the Telecom line for SCATS operation. The site must be connected to the SCATS system 24 hours prior to the switch on of the installation as this allows time for setting up the SCATS data and graphics and means the site can be monitored when it is switched on.

All comments to be recorded in TTOC-07 Site Acceptance Test (SAT). Once switched on and the signed original TTOC-07 Site Acceptance Test (SAT) has been completed by all required parties, the TTOC will take over operations and the applicant can progress practical completion.

## 7. Maintenance and Upgrades

The applicant will remain responsible for maintenance and any faults throughout the construction period. For upgrade works the site history and asset information of the intersection can be requested from the TTOC to assist in evaluating costs when tendering. The TTOC will invite their maintenance contractor and all parties shall inspect, following successful Site Acceptance Test, refer to TTOC-07, the TTOC will take over maintenance of the traffic signals following the audit.

Equipment warranty and guarantees shall remain as detailed in TTOC-04 National Traffic Signal Specifications and TTOC-03 Regional Special Conditions to the National Specifications.

Where upgrade works are required on an existing traffic signal intersection the traffic signal installation contractor (unless otherwise detailed in the contract conditions) shall be responsible for the operations and maintenance of the traffic signal installation.

### 7.1 Response Times

The TTOC will inform the applicant / traffic signal installer to any reported faults under the priority requirements as defined below. The TTOC engineer may add conditions to the priority as required for each fault. Maximum permitted response of priority is measured from the time the fault was reported.

All requests for Emergency Maintenance, Accidental or Vandal Damage, and Minor Repairs shall be attended to promptly, emphasis should be placed on resolution time in preference to response times.

If any of the priorities below cannot be met the TTOC shall arrange for their maintenance contractor to attend the fault. Any costs incurred shall be claimed from the applicant by the TTOC.

#### 7.1.1 Priority 1 Faults (on a 24hrs per day, 7 days per week basis)

The target of maximum Response Time for the Contractor to arrive at the location of the fault and commence remedial work is **60 minutes** from the time that the fault was first reported to the Contractor. Faults shall be attended as soon as practicable within the 60-minute period however, it is expected and understood that due to distance, some call outs may not be able to meet these response requirements..

Priority 1 Faults are defined as:

- Failures affecting the safe operation of the signals or safe display of signals, eg: Conflicting signals, No display on one or more approaches, Non appearance of any phase when demanded,
- All lights out, BO or FY conditions,
- Other conditions may be added at the Engineer's discretion.
- Damage caused by accident or vandalism affecting the safe operation of the signals or safe display of signals, eg.
  - Cabinet damaged that has the potential to cause the controller to not functioning correctly, or
  - be protected from the elements,
  - Signal pole no longer being within 10° of vertical or protruding into the carriageway,
  - Signals misaligned so that conflicting signals are visible and/or signals are no longer visible to approaching traffic, and
  - Wiring or terminals exposed to the elements (eg. Lantern doors open, finial cap off etc).

### 7.1.2 Priority 2 Faults (on a 06:00 to 23:00, 7 days a week basis)

The maximum permitted Response Time for the Contractor to arrive at the location of the fault and to commence remedial work is **4 hours** from the time that the fault was first reported to the Contractor.

Priority 2 Faults are defined as:

- Failures affecting local Controllers ability to communicate with SCATS system:
- Eg SCATS alarms, and faults with push buttons and also tactile/vibrating indicators for blind pedestrians.

The Response Time for Priority 2 faults, as defined above, which are outside the hours above shall be prioritised for response by 10:00 am next day.

### 7.1.3 Priority 3 Faults (on a 7 days a week basis)

Maximum **24-hour** response

- Failures or damage not affecting safe operation or display.

The maximum permitted Response Time for the Contractor to arrive at the location of the fault and to commence remedial work is **24 hours** from the time that the fault was first reported to the Contractor.

Priority 3 Faults are defined as:

- Failures or damage not affecting safe operation or display:

Depending on weather and TMP requirements, display replacement on mast arms may be extended to a maximum of 5 days for priority 3 faults only.

**Note:** The logging in the Dispatch in RAMM of the Time Arrived on site and the Time Completed is the responsibility of the Contractor. By the Technician phoning TTOC operator / Database Administrator to enter the information in the Dispatch and must be completed real time.