



TRAFFIC MANAGEMENT UNIT
AUCKLAND

Auckland Traffic Management Unit

TMU Requirements for Traffic Signal Works

Version 1.0 October 2007

Report Number: 2007/01

October 2007

File Ref: 6/32/1/20

AN INTEGRATED TRAFFIC MANAGEMENT PARTNERSHIP



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Document History and Status

Revision	Date	Prepared By	Authorised By	Description
Draft	January 2007	Janette Underwood / Andrew Hunter / Peter Evans	Stephen Burnett	Initial Draft
Final Draft	April 2007	Janette Underwood / Andrew Hunter / Peter Evans	Stephen Burnett	Final Draft
Final	October 2007	Janette Underwood / Andrew Hunter	Stephen Burnett	Final

Distribution of Copies:

Copy No.	Quantity and Format	Issued To
1	1 – Electronic	
2	1 – Hardcopy, 1-- Electronic	
3	1 – Electronic	Stephen Burnett, Andrew Hunter
4	1 – Electronic - PDF	Stephen Burnett, Andrew Hunter

Document Title:		Client:	
TMU Requirements for Traffic Signal Work		Traffic Management Unit	
Document Subtitle:		Document Type:	
		<input type="checkbox"/> Policy <input checked="" type="checkbox"/> Manual <input type="checkbox"/> Guideline <input type="checkbox"/> Procedure <input type="checkbox"/> Work Instruction <input type="checkbox"/> Others (Please identify)	
Document Status:	Publication Date:	Version No:	Sub Version No:
<input type="checkbox"/> Draft <input checked="" type="checkbox"/> Final	October 2007	1.0	
Document Location:	Document Hyperlink:	Current Version	Document Security:
TMU Files		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Confidential <input checked="" type="checkbox"/> Open
Client's Details:		Contact Details of Client:	
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Abstract:			
Details of the design requirements for traffic signal works undertaken on sites within the TMU jurisdiction.			
Key words:			
Traffic signals, requirements			
Published by:	TMU	TMU Contact:	Stephen Burnett
Document No:	2007/01	Priority if hasn't been completed:	<input type="checkbox"/> High <input type="checkbox"/> Medium <input type="checkbox"/> Low
Report ID:	N/A		<input type="checkbox"/> Other (please identify)

Contents

1.	Introduction	1
2.	The Process	4
3.	Traffic Signal Audits	8
4.	Technical Criteria	9
5.	Traffic Analysis	10
6.	Design Documentation and Drawings	11
7.	CCTV	13
8.	Commissioning	14
9.	As-built and Traffic Signal RAMM Data	15
10.	Signal Maintenance	16
11.	Costs	17
12.	Hardware Standards	18

Table Index

Table 1	CIS and SFT Development Flow Chart	7
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Figure Index

Figure 1	Project Procedure Flow Chart	2
Figure 2	Design Procedure Flow Chart	4
Figure 3	TMU Procedure Flow Chart	5

1. Introduction

The Traffic Management Unit (TMU) is responsible for all traffic signals operations in the Auckland region from installation through to maintenance. All the Road Controlling Authorities (RCAs) including Transit New Zealand and Councils from Papakura in the south to Rodney in the North and all those in between are a party to the TMU via Memorandums of Understanding.

The detail for the provision of services is clarified under service level agreements negotiated with each Road Controlling Authority.

Transit New Zealand (TNZ) intersections are managed via the Councils regional computers, which were set up to assist with coordination between TNZ sites and the Council intersections.

There are currently a number of projects underway or planned which will impact upon the Auckland roading network. These projects will not deliver the expected benefits unless the arterial functionality and signal optimisation are maintained. To achieve this the TMU needs time to work through any issues and plan for anticipated works whilst still addressing unexpected events.

The TMU will liaise with the relevant parties to ensure that the disruption to the network is minimised. This document is designed to assist all interested parties to understand how the TMU functions and the standards that have been adopted to ensure a consistent approach is maintained when designing and installing traffic signals.

Purpose

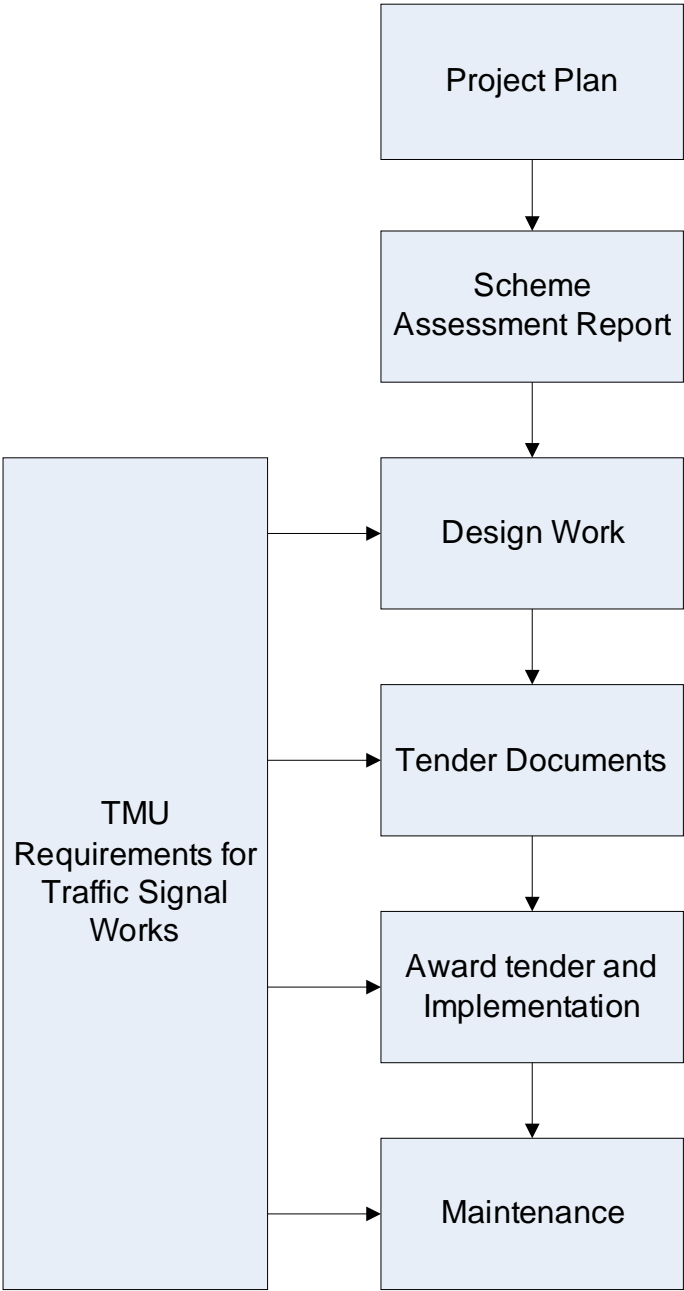
The purpose of this document is to give an understanding of the TMU requirements when undertaking the design, installation or maintenance of traffic signal installations in the Auckland region. The guidelines and requirements have been developed and agreed with the RCAs in order to assist the TMU in delivering the appropriate level of service to meet its commitments under the service level agreements it has negotiated with each RCA.

Who should use this document?

This document should be used by all consultants and contractors involved in the design, installation and maintenance of traffic signals on behalf of Councils or Transit New Zealand in the Auckland Region.

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

Figure 1 Project Procedure Flow Chart



Glossary of terms

AS	Australian Standard
C & I	Cabling and Intersection Diagram
CCTV	Closed Circuit Television
CIS	Controller Information Sheets
DP Number	Data Private Number (Prefix assigned to phone line number)
ICP Number	Installation Connection Point Number
NMO	Network Management Operations
RAMM	Road Asset Maintenance Management
RCA	Road Controlling Authority (Councils and Transit New Zealand)
RTA	Road and Traffic Authority (Australia)
SCATS	Sydney Coordinated Adaptive Traffic System
SFT	Controller Personality File
SNUG	SCATS New Zealand User Group
TLA	Territorial Local Authority (Councils)
TMU	Traffic Management Unit
TNZ	Transit New Zealand

2. The Process

2.1 Design Procedure

Figure 2 Design Procedure Flow Chart

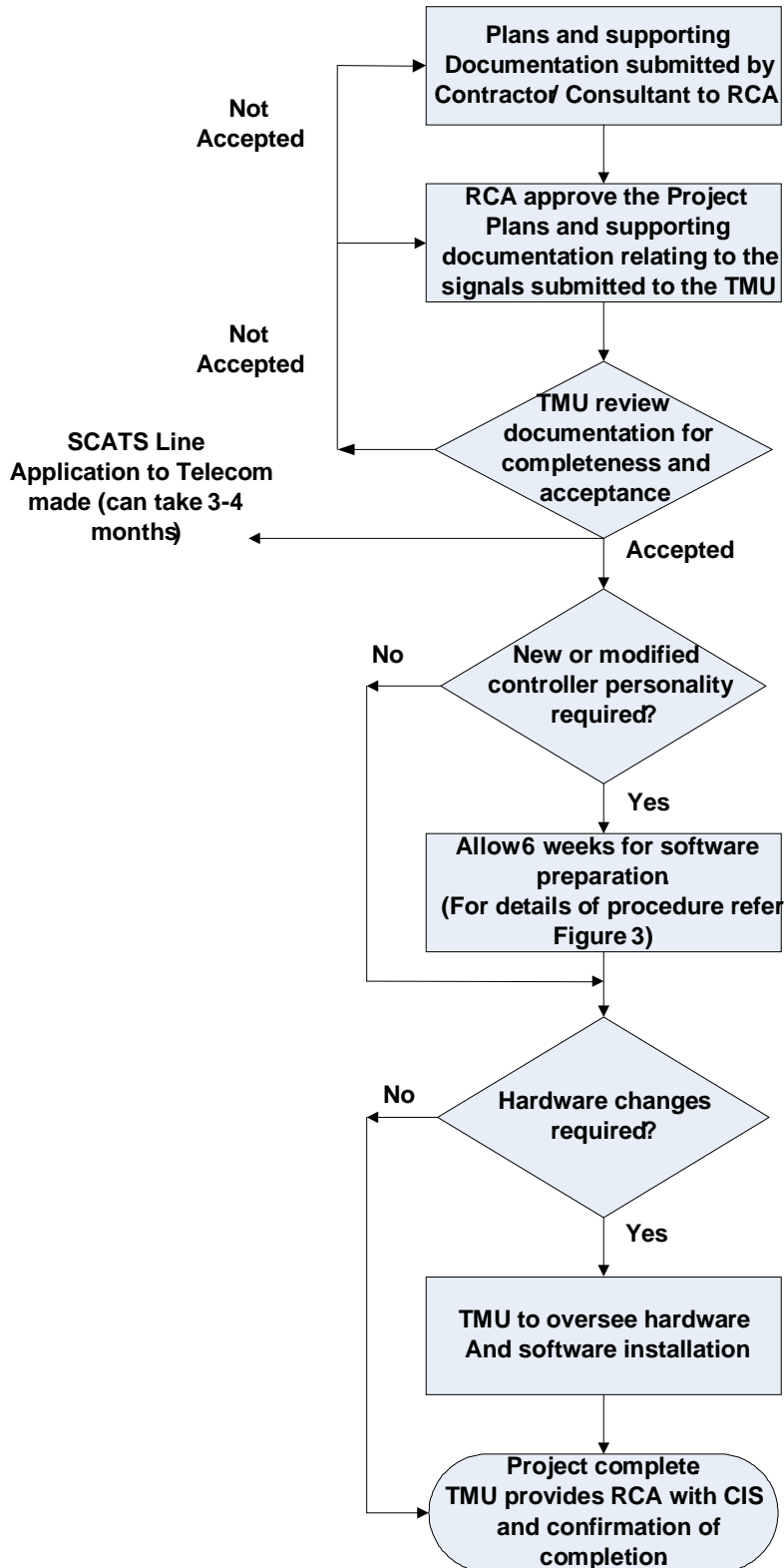
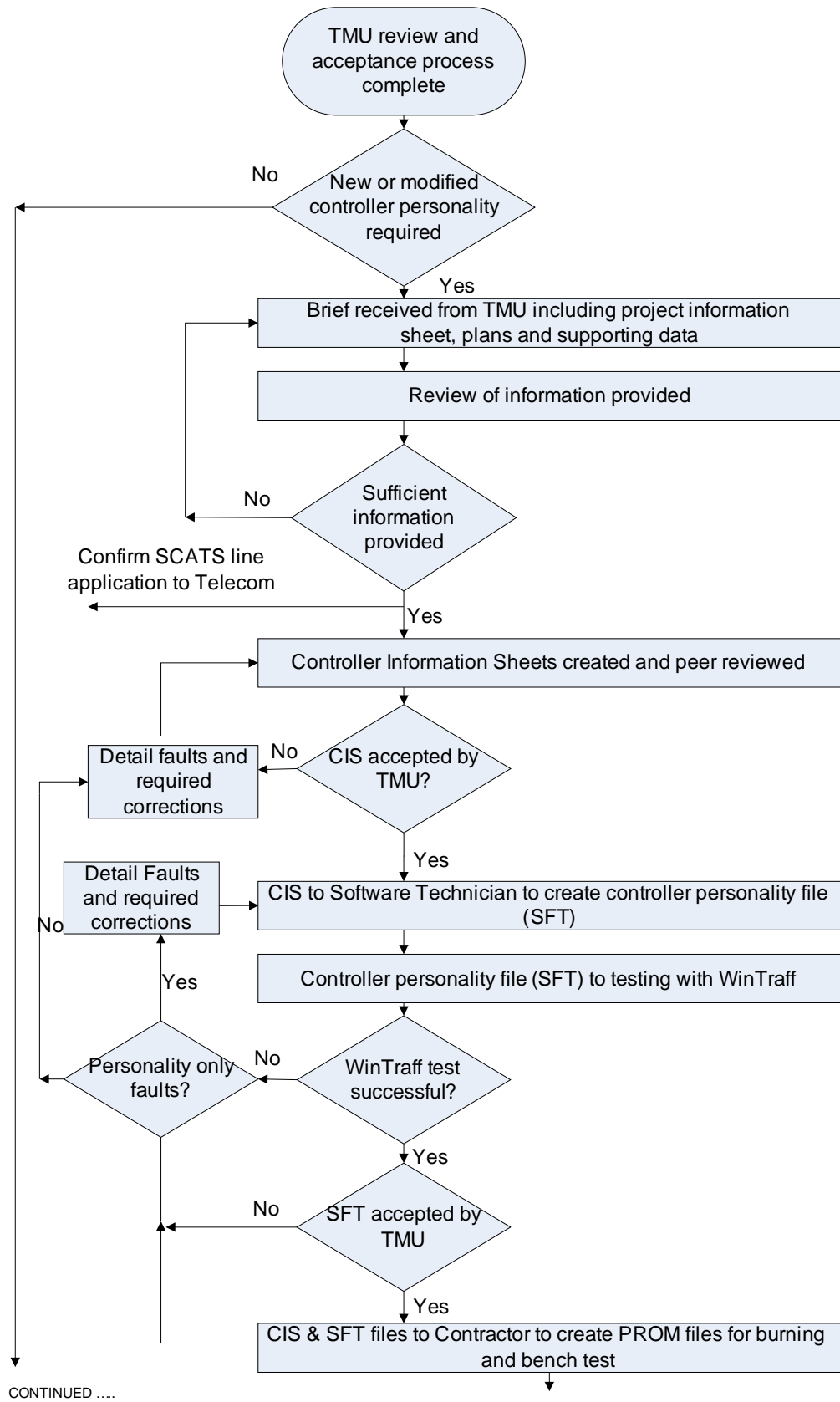
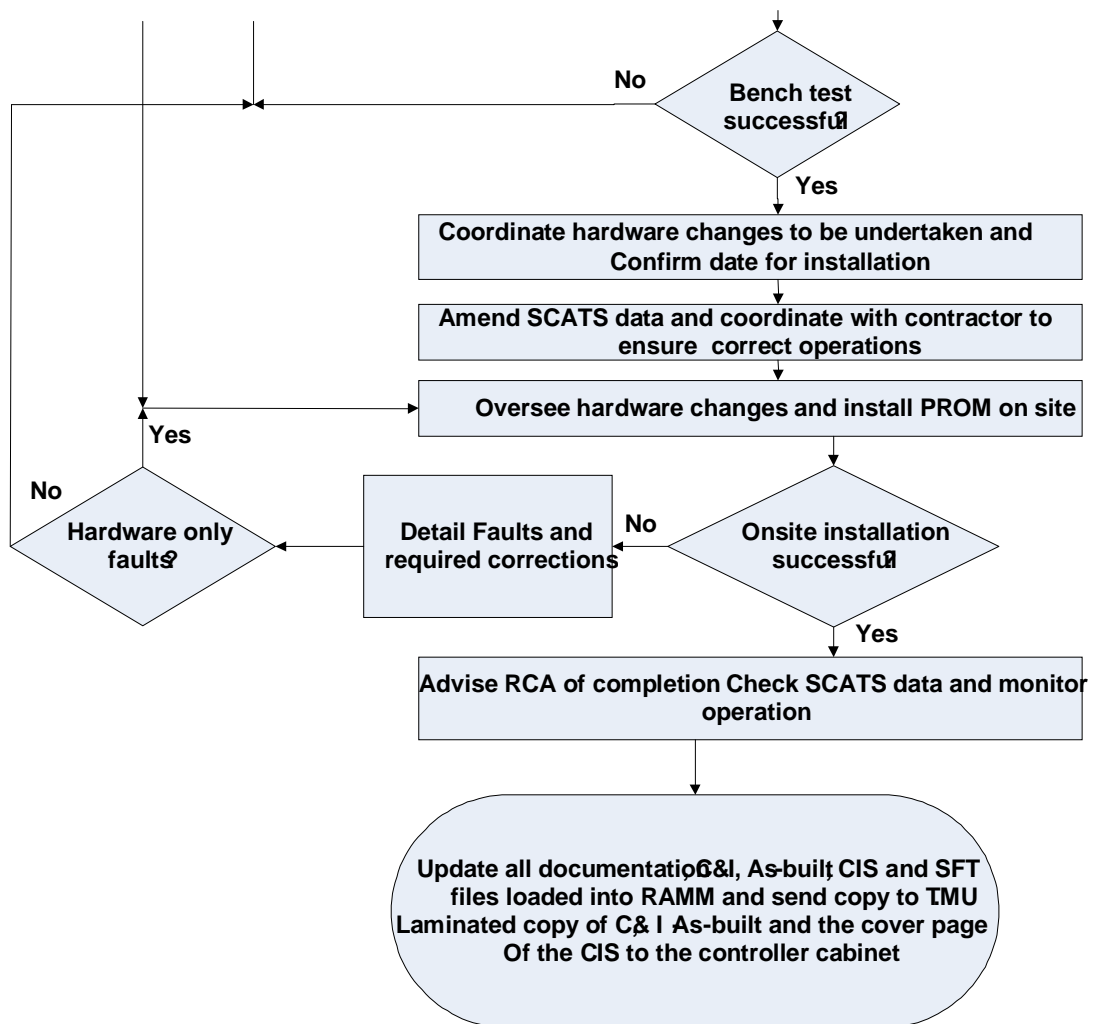


Figure 3 TMU Procedure Flow Chart





2.2 Software Development Procedure

The following table outlines the process for the development of software. The NMO Software Development Coordinator manages the software development process. This ensures that the coordination of the relevant parties is maintained. As the process develops and all parties agree on standards the timeliness of this procedure will improve and these times are only guidelines.

Table 1 CIS and SFT Development Flow Chart

Process	Time Frame	Actioned by Whom
Create CIS	4 working days	TMU - NMO
Peer review and recycle CIS	7 working days	TMU - NMO
TMU acceptance of CIS	4 working days	TMU
SFT Generation	4 working days	TMU - NMO
SFT test (Wintraff) and recycle SFT	7 working days	NMO (not the one who wrote the software)
TMU acceptance of SFT	4 working days	TMU
Total	30 working days	

3. Traffic Signal Audits

In addition to any general project safety audits that include signalised intersections, the consultant / contractor shall allow for two specific signal audits. These audits are:

- » A signal design (and safety) peer review by a recognised and experienced signal practitioner. This shall be completed prior to submission of the design to the TMU.
- » A post construction installation (and safety) audit by an experienced signals practitioner.

The audits are required for both temporary and permanent installations. The audits are considered 'hold points' in the construction programme and the consultant / contractor shall make provisions in their programme for undertaking the audits, response to the audits, and for RCA representatives to close off the audits. The consultant / contractor is responsible for addressing all issues raised by the auditors or RCA, and for rectifying any defects identified.

4. Technical Criteria

The design of the traffic signals must be carried out in accordance with:

- » AUSTRROADS Guide to Traffic Engineering Practice – Traffic Signals – Part 7,
- » TMU Traffic Signal Hardware Specification, October 2007 or later version.
- » TMU's Traffic Signals Intersection Design Requirements.
- » TMU's Traffic Signals Controller Personality Information.
- » National Traffic Signal specification (available from the IPENZ website).
- » Other TNZ, RTA, AS, NZ standards as agreed from time to time.

Signal designs are to be developed in consultation with the RCA and the TMU. Some elements, such as provision of SCATS communication lines and software preparation require significant time to implement (up to 4 months for Telecom lines and 6 weeks for software), 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.

5. Traffic Analysis

The RCA or consultant shall provide the basic analysis undertaken for each design to the TMU with the design plans. The minimum amount of information required is the volume data for each movement for the am, interpeak and pm peak periods. If modelling has been carried out a copy of the input and output files showing the phasing and time settings used in the evaluation must also be provided.

All traffic models must be calibrated and validated with the current site observations and will be reviewed in liaison with the RCAs and TMU. The consultant / contractor must obtain all traffic data deemed necessary to complete the validation.

Consultants shall demonstrate to the client that any temporary works, layouts or configurations proposed for the construction process can maintain traffic operation at a level acceptable to the RCA and TMU. As a guide, any work likely to increase normal operation delays by over 60 seconds to any individual vehicle affected by the works, will require critical examination and will only be approved where no reasonable alternatives can be found.

6. Design Documentation and Drawings

6.1 Signal Design Report

The signal design report shall summarise the results of the signal timing, capacity and performance calculations from the analysis and confirm compliance with the TMU's Requirements. Any deviations from the TMU's Requirements and the reasons for the deviations must be summarised in a separate section in the report. This is required to assist the TMU in delivering the requirements of the SLAs it has with the RCAs.

6.2 Controller Software Specification

The consultant / contractor shall supply the controller phasing and logic specification for each signalised intersection in liaison with the RCA for final acceptance by the TMU. Phasing for signalised intersections is to be confirmed in conjunction with the TMU. The approved software specification must then be submitted to the TMU for preparation of the controller personality software. The TMU Traffic Signal Design Guidelines and Controller Personality Information will provide the base information necessary for this aspect of the design phase.

6.3 Signal Installation Specification

The consultant / contractor / RCA shall use the TMU Traffic Signals Hardware Specification in conjunction with the "National Traffic Signal Specification" and other requirements as defined under Section 3 'Technical Criteria'. The consultant / contractor is to provide details of any deviations from the content of this specification for acceptance by the TMU.

6.4 Construction Drawings

Under the agreed SLAs between the TMU and the RCAs the RCAs shall provide construction drawings to the TMU for peer review and acceptance. The RCAs accept that the TMU is providing the service to them and not consultants and therefore the procedure needs to be adhered to ensure that the appropriate person in the RCA is informed and up to date with the current status of each project. The drawings shall conform to the standards required by the TMU. The signal layout drawing is to comply with the current version TMU Traffic Signals design guidelines. The consultant / contractor may consult with the TMU for the conventions and notations to use for loop and signal group numbering.

6.5 Post Construction Drawings

Following completion of the works, the following documents are to be provided to the TMU by the installing contractor:

- » A CAD as-built of the entire signal layout for the intersection or interchange. This shall include detailing the location and depth of all new traffic signals ducting, all cabling, chambers, toby boxes, poles and signal aspects.
- » A copy of the wiring plan (C&I).
- » An asset data capture document listing all of the assets installed, for inputting into RAMM by the Maintenance Contractor. This is to include power meter number, the ICP number and the SCATS line DP number.

This will allow the Maintenance Contractor to enter the intersection assets into RAMM and to gather the geospatial position of the assets using Pocket RAMM.

A laminated copy of the C& I, as-built and the cover page of the CIS are to be installed in the controller at the time of commissioning of the intersection.

6.6 Signal Contractors Quality Assurance Plan

The consultant / contractor / RCA is to provide a copy of the signal contractor's quality assurance plan indicating the measures to be taken to ensure the integrity of the installation prior to commissioning, for acceptance by the TMU.

7. CCTV

The particular requirements to accommodate CCTV are to be determined on an individual site basis in conjunction with the RCA and the TMU.

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.

The preferred communications method (ie fibre optic, telecom copper cable or radio frequency) shall be determined on an individual site basis and is dependent on site location and what method is in use at nearby sites.

The design of the CCTV system shall take into consideration placement of signal hardware and where practical existing hardware shall be utilised in the design.

All overhead traffic signal poles are to have a Joint Use Mast Arm (JUMA) spigot fitted to facilitate future street lighting or CCTV equipment if required. A waterproof cap shall be fitted to all spigots not used for lighting or CCTV equipment.

If practicable a small diameter duct for cabling to support the CCTV system may be incorporated with the traffic signal ducting.

It is desirable to have a separate concrete base for the CCTV controller cabinet located near to the signal controller cabinet. In some circumstances, the strapping of the CCTV cabinet to the signal controller cabinet may be permitted.

8. Commissioning

The consultant / contractor is to liaise with the TMU and RCA as necessary to ensure that all parties are kept up-to-date with proposed commissioning dates and times for each new or modified signal installation. Prior to commissioning, the consultant / contractor is to contact the TMU to undertake a pre-commissioning check and audit of the hardware and operations of the signals for approval before final testing.

Commissioning is to be timed to occur at least 2 hours prior to any recognised peak traffic periods. The consultant / contractor, the signal contractor and their software provider, if deemed necessary, are required to attend the commissioning and 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. It is desirable to have the site connected to the SCATS system 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.

Once connected, the TMU will take over operation of the signals. The consultant / contractor will remain responsible for any problems directly relating to contractual deficiencies throughout the contract defect maintenance period.

9. As-built and Traffic Signal RAMM Data

Prior to commissioning, the consultant / contractor is to provide the TMU with sufficient details of the signal installation to allow for updating of the Traffic Signal RAMM database. There are standard TMU forms available for submission of the required data. If the signal contractor is not familiar with the requirements they will need to liaise with the TMU to determine the database requirements.

The contractor installing the software for the site shall supply the completed and signed form verifying that the E Prom has been bench tested in a similar controller to that which is to be installed and that the conflict matrix is the same as that in the CIS. The completed forms shall be returned to the TMU 5 days prior to switch on of the controller.

If the traffic signal construction contractor is the contractor who has the maintenance contract for that particular area then the traffic signal construction contractor shall enter the data into the RAMM database directly and notify the TMU on completion of the data entry.

If the contractor does not have the maintenance contract for the area then the contractor shall collect the data on the appropriate forms and submit the completed forms to the TMU/NMO consultant who will enter the data into the RAMM database.

The following documents are to be laminated, and stored in the controller cabinet:

- » Controller timing sheet showing phase timings (cover page of CIS);
- » Installation layout plan (As built);
- » Wiring diagram (C & I); and
- » Log Book.

The C&I and As built plans are to be provided in electronic format to the NMO Consultant who will load the relevant data into RAMM along with the CIS and SFT Files.

10. Signal Maintenance

Within one month after commissioning, the consultant / contractor is to provide the client and TMU with hardware guarantees and as-built drawings of all signal installations, and to request inclusion of these installations within the appropriate TMU signal maintenance contract.

Following the successful commissioning of the new installation the maintenance contractor for the area will be responsible for the normal maintenance items including accident damage. The installing contractor shall be responsible and liable for all equipment covered by warranty for a duration of 1 calendar year from date of switch on, except for LED lanterns, which have a 5 year warranty for parts and labour.

11. Costs

The service level agreements between the RCA's and TMU provides for many items under these requirements. The NMO generally provide the on site assistance to the contractor during construction, the commissioning phase and as built data entry in the RAMM database. The NMO fees are charged to each RCA on a monthly basis.

Software changes to existing sites that are modified and to new installations are also charged to the relevant RCA on a monthly basis.

The contractor / consultant shall liaise with the RCA to determine what TMU costs are charged to the project or contract.

Where developers or other authorities are proposing changes that require these services it is the responsibility of the RCA to recover any costs it deems appropriate from the developer or other party. The TMU will advise each RCA of the costs incurred via the monthly invoicing system.

12. Hardware Standards

The specification of traffic signals equipment shall comply with the current version of the **TMU Traffic Signal Hardware Specification**. If there is any conflict then this document shall prevail. All equipment shall be either RTA approved or an agreement with the TMU and or RCA for the use of specific components shall be obtained. The contractor is responsible for ensuring that all equipment that is installed meets the minimum standards. If there is any doubt the contractor shall be required to provide evidence that the product meets the TMU requirements.

12.1 Traffic Detection

All loop positions are to be determined early in the design. Where there are a high number of cyclists the type and style of loops shall be clearly shown. Cyclists have special needs that require special attention and these shall be considered on a site by site basis.

All controlled lanes must have detector loops installed including left turn lanes under Give Way control if there are sufficient detector inputs available. Advance loops may be required in some instances to optimise signal operation and enhance safety in high speed environments. If controller capacity allows, detector loops are to be included in uncontrolled slip lanes for traffic counting purposes. Loops on bridge decks or approach slabs should be avoided where practical.

All detectors shall be numbered in accordance with the TMU's Traffic Signal Design Guidelines.

Preformed loops installed prior to the final asphalt surface being applied to the road surface are preferred where practical. Special care is required to ensure that the placement of the loop is in the correct position within the lane. Failure to confirm positions prior to sealing can mean that another loop may be required to be saw cut into the new seal.

12.2 Signal Controllers

All signal controllers shall be connected to the SCATS control system at the earliest possible time. The TMU will make the applications for a telecom connection on behalf of the RCA. The TMU will liaise with Telecom and the contractor to ensure that each new site is connected to the regional computer and ensure that the SCATS data is set up and operational. The contractor is to install the necessary ducting to accommodate the Telecom line. The TMU must be advised at least **4 months** in advance of the date the signals are to be operational in order to arrange this.

All signal controllers are to be TSC/4 compliant and comply with the current RTA specifications.

Where a new controller is the first of its type to be installed in the Client's area and the controller requires a unique Hand Held Terminal (HHT) to interrogate and setup the controller, the installation shall come complete with two units for use by the RCA. Alternatively two copies of the appropriate software for use in a PDA or laptop shall be provided.

12.3 Controller Cabinets

Controller cabinets shall comply with the RTA specification in all respects. The national specification does permit some item to be manufactured locally however this has been carried out in a hap hazard manner an frequently with no reference back to the RCA or TMU. In order to ensure consistency and appropriate materials are used it has been deemed necessary to insist that the RTA specifications are followed unless the supplier can provide sufficient proof that their product complies with TMU specifications.

12.4 Posts / Poles

All overhead mast arm poles are to have a JUMA spigot fitted to facilitate future street lighting or CCTV equipment if required. The diameter of the spigot is to be confirmed with the TMU and shall be of an approved type.

The same rational applies to poles that applies to the controller cabinets. Due to the range of sizes and inconsistent manufacturing standards it is appropriate that the TMU sets the specification for the manufacture of traffic signal poles.

12.5 Lanterns

All new signal installations shall have LED lanterns. The LED Lanterns shall have a 5 year warranty provided to cover parts and labour. Unless specified otherwise by the RCA in specific cases:

- » In areas with a posted speed limit of 60 km/h or lower, 200 mm diameter LED lanterns are to be used on both low level and overhead signal displays.
- » In areas with a posted speed limit of 70 km/h or higher, 300 mm diameter LED lanterns are to be used on overhead signal displays and 200 mm diameter LED lanterns be used on low level displays.
- » All pedestrian, bus and cycle displays shall have LED lanterns.

Special types of lanterns for bus priority or countdown timers shall be RTA approved or submitted to the TMU for approval to install.

The notable exception is the ACC where it has decreed that all overhead LED lanterns shall be 300mm diameter.

12.6 Lantern Body Construction

All new lantern bodies shall be aluminium.

12.7 Lantern Visors

All visors are to be made from an appropriate grade of aluminium painted black. **Plastic visors are not permitted.**

All primary lanterns and other stop line lanterns are to be fitted with open visors. All secondary and tertiary lanterns shall be fitted with closed visors.

12.8 Target Boards (Backing Boards)

All vehicle lanterns are to be fitted with target boards to suit the particular display. The complete range of displays permitted in New Zealand is shown in the appendix of the Traffic Signal Design Guidelines.

Target boards are to be made from appropriate grade aluminium painted black and shall have a solid white painted boarder surround, not stuck on plastic tape. Plastic or fibreglass materials are not acceptable for target board construction.

12.9 Pedestrian Push Button Assemblies

The push button assembly shall be a die cast aluminium body with a black powder coated finish and the audio tactile driver housing shall be made of sheet Aluminium and powder coated. The power supply wiring and driver units shall comply with the appropriate RTA standards.

12.10 Signal Duct Access Chambers

The Signal duct access chamber shall consist of a heavy-duty material either concrete or PVC (of an appropriate grade for the purpose) with a minimum diameter of 600mm. Any chamber in the carriageway shall be made of concrete with a heavy duty cast lid. The design of the chambers shall be submitted to the TMU for confirmation of acceptability.

12.11 Kerbside Junction Boxes

The kerb side junction box shall be a minimum of 300 x 200 as described in the TMU Traffic Signal Hardware specification section 3.8.

12.12 Electrical

Combined traffic signal and streetlighting poles shall be of an approved type and the oclyte style poles are not to be used.

The streetlight is to source its power from the controller cabinet and be controlled by a photocell or ripple control mounted in the controller cabinet.

The Electrical Supply Authority (ESA) power supply termination should be positioned within close proximity of the controller cabinet, preferably within 10m.

End of Document