

# Appendix I

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# Information Pack

## Traffic Signal Installation

### Content Amendment Record

Issue	Revision	Description	Date	Signed
July 2015	1	TOPAS Registration	7/7/2015	Andrew Parfitt
Sept 2015	2	Cable Jointing	27/9/2015	Andrew Parfitt
Oct 2015	3	Concrete surrounds for pit covers & frames	02/10/2015	Andrew Parfitt
Dec 2015	4	Maintenance callout requirement	11/12/2015	Andrew Parfitt
Jan 2016	5	Requirement for pole sockets and sufficient cable slack for maintenance	25/1/2016	Andrew Parfitt

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## 1.1 Aim of the Information Pack

- 1.1.1 This document sets the standards and requirements for the supply, installation and maintenance of traffic signal equipment and associated minor civil engineering works. It is the intention that Developers should use the document as an aid to meeting the required standards. The document is not a design guide and should be read in conjunction with the latest edition of Swindon Borough Council Transport Requirements for Development.
- 1.1.2 Swindon Borough Council Highways and Transport Department (SBC) or its Agents reserve the right to amend the requirements defined in this document in line with any new legislation, amendment to current working practices or modifications in performance specifications, at any time. It is the responsibility of Developers or their Agents to contact the Highway Authority regarding amendments to this document.
- 1.1.3 For further information the Traffic Signals Engineer can be contacted on 01793 466389.

## 2.1 Approvals And Procedures

- 2.1.1 All new equipment provided shall comply with the latest Traffic Signs Regulations and General Directions,  
  
All new equipment provided shall comply with the latest issued TOPAS technical specification and be registered with TOPAS Ltd.  
  
All designs shall be approved by Swindon Borough Council Highways and Transport Department or its Agents, and may be the subject of a Highways Agreement.
- 2.1.2 Submissions for junction control must be accompanied by a full Transport Assessment in accordance with IHT guidelines. Submissions will be either subject to a Section 106 Legal Agreement pursuant to the Town and Country Planning Act 1990, or a Section 38/278 Legal Agreement pursuant to the Highways Act 1980.
- 2.1.3 Designs for traffic signal junctions must take into account both capacity and safety. Developers shall ensure that Design Organisations follow design procedures defined in TA 84/06 (Code of Practice for Traffic Control and Information Systems for all purpose roads). Submissions shall also include an assessment of pedestrian, cycle and mobility impaired facilities.
- 2.1.4 Submissions and works are required to be checked and safety audited at three or four stages. The level of information to be supplied at each stage is defined in 2.1.7 below.
- 2.1.5 Developers shall contact Swindon Borough Council for an approved list of Contractors.
- 2.1.6 Fees owed to the Swindon Borough Council Highways and Transport Department under Highway Agreements shall include commuted sums for maintenance and operation of signal installations. The commuted sum value shall be calculated from the Swindon Borough Council maintenance and power consumption costs factored over the life expectancy of the signal installation, estimated at 15 years. For further details contact Development Control on 01793466336.
  - 2.1.6a Signalled sites shall either be fitted with an inline electricity consumer meter (in the feeder pillar), or where approved by the engineer, a list of all electrical equipment fitted with the manufacturer's Elexon charge code for each component and a calculation of the power consumption using these codes to suit the requirement of the District Network Operator for un-metered supplies.

## 2.1.7 Safety Audits

- 2.1.7.1 The Developer is required to arrange safety audits at Preliminary Design (Stage 1) Detailed Design (Stage 2) and Pre-Opening (Stage 3) and possibly at stage 4 after a period of operation. Safety audits shall be undertaken in accordance with the best guidance from I.H.T. publication 'Guidelines for Safety Audit of Highways' and HD19/03 and HD42/05.
- 2.1.7.2 Asignal specialist shall form part of the safety audit team.
- 2.1.7.3 Design submissions shall also include the designer's safety audit exemption report.

## 2.1.8 Design Checks

- 2.1.8.1 Stage 1 The following information shall be submitted as a minimum for comment/ approval at stage 1 design.
  - General Arrangement layout(s) presented at a scale of 1:500 indicating proposals for:
    - a) Changes to alignment, levels and structures.
    - b) Traffic lanes, stop lines and island positions.
    - c) Signal equipment positions to TR 2206.
    - d) Outline of pedestrian/cycle/special facilities.
    - e) Capacity calculations including method of control with full input/output data.
  - Approved assessment programmes are Linsig or Oscady for isolated junctions and Transyt for linked systems. A link node diagram as defined in the Transyt user guide manual must accompany Transyt assessments. Linsig / Oscady assessments shall be accompanied by stage diagrams, traffic flow diagrams and ascale plan.
  - Transyt and FlowRound assessments of Signalised Gyratory or Roundabout Control must be accompanied by full lane flow data assessments.
- 2.1.8.2 Stage 2 The following information shall be submitted for comment/approval at stage 2 design.
  - Contract specifications for both Civil Engineering and Traffic Signal installation works. The Civil Engineering details shall include all relevant appendices as defined in the Highway Works Specification.
  - The Traffic Signal details shall include TR2500A data forms, MOVA data forms and SCOOT details where applicable.
  - Designers notes, safety case and approved conformity to TD50/04 shall be submitted.
  - Detailed design layout(s) presented at a scale of either 1:200 / 1:250 showing the following:
    - a) All civil engineering construction works.
    - b) Duct runs, drawpit types and locations.
    - c) Road restraint systems, guard railing drop kerbs and tactile slab positions.

- d) Carriageway and footway surface treatments.
- e) Road markings, studs and signs conforming to the latest edition of the Traffic Signs Regulations and General Directions and the Traffic Signs Manual.
- f) Street Lighting.
- g) Inter-visibility zones.
- f) Power supply details, including isolation and fuse discrimination details.
- g) Signal head and pole positions to TR 2206.
- h) Controller position and maintenance bay area.
- i) Detection proposals.
- j) Telemetry facilities and connections.
- k) Special features and facilities.
- l) Standard Construction Details.

#### 2.1.8.3 Stage 3

The following documents shall be included in the Design File in accordance with TA84/06 provided within onemonth of substantial completion or commission of installations. Scheme CDM details to be included in the Health and Safety File.

- As built drawings and records. (Hard and Electronic amendable copies).
- Electrical safety test records and completion certificates.
- Controller configuration forms.
- Equipment settings.
- Cable layouts.
- Power Supply Details.
- MOVA data. (Hard and Disk Copies)
- OMCU configuration data.

2.1.9 The information to be supplied under section 2.1.8 is in addition to that required to conform to the Construction (Design and Management) Regulations.

2.1.10 Where proposals either affect, or are required to form a linked signal system, all relevant information shall accompany details supplied under section 2.1.8. This additional information shall include:

- a) Method of control and translation strategy for SCOOT control.
- b) Control and reply word data.
- c) Instation system configuration data.
- d) Data transmission system details.
- e) SCOOT loop details.
- f) Linked MOVA design strategies.

- 2.1.11 Current minimum standards for signal control in the Borough of Swindon include the MOVA control strategy and Remote Monitoring (including live update diagram).

### 3.1 Standards for Signal Design

- 3.1.1 In addition to the guidelines and standard details contained in this document, all signal designs shall conform to the latest Department of Transport Specifications, Technical Directives / Advice notes and TR 2206 and Statutory Instruments. Particular attention shall be given to the design requirements for the visually and mobility impaired, pedestrians and cyclists.
- 3.1.2 The Developer is the Client for the purposes of and in accordance with the definition set out in the Construction (Design and Management) Regulations, or any amendment or variation of the same.
- 3.1.3 Designs shall conform to the Construction (Design and Management) Regulations and TA 84/06.
- 3.1.4 The Developer shall note that all controlled pedestrian / cycle facilities shall utilise near-side displays, and unless otherwise agreed with the Director of Highways and Transport or his Agent, shall incorporate all detection facilities as defined in TA 82/99 and TR2500.

### 3.2 Standards for Supply and Installation of Traffic Signal Equipment

- 3.2.1 The Developer shall ensure that contracts conform with and refer to all Regulations, Acts and Specifications appropriate to the works, and that Contractors and Suppliers are fully approved to work on the Highway and are accredited to ISO 9000, have CITB CSCS and Sector 8 accreditations.
- 3.2.2 Installation works shall conform to the Construction (Design and Management) Regulations, TA 84/06 "Code of Practice for Traffic Control and Information Systems for All-Purpose Roads" and LTN 1/98 "The Installation of Traffic Signals and Associated Equipment".
- 3.2.3 Installation shall include Swindon Borough Council approved signal pole retention sockets. Installation of cable shall include sufficient slack in the duct network to allow the pole to be removed / installed for maintenance whilst the cabling is connected.
- 3.2.4 Factory and site acceptance tests shall be carried out in accordance with the test schedules contained in Appendix D. All electrical safety tests shall be carried out in accordance with and satisfy the requirements of the current Electricity at Work Act 1991. The Developer shall give a minimum of 14 days notice to the Director of Highways and Transport or his Agent of the test dates.
- 3.2.5 The Developer shall ensure that all construction works and activities on the Highway conform to the latest release of the New Roads and Street Works Act.
- 3.2.6 During the works, the Developer shall be responsible for providing information board signs. The signs shall advise the public both vehicular and pedestrian of:
- a) The reason for the works
  - b) The anticipated start and end dates
  - c) Emergency telephone number
- 3.2.7 A list of contract clauses and standard details are contained in the attached appendices, these shall be used to form the basis of the installation specification.

- 3.2.8 Where the Developer is proposing equipment new to the Authority or the equipment is requested by Swindon Borough Council, all necessary test equipment shall be supplied free of charge to the Swindon Borough Council Highways and Transport Department.

### 3.3 Standards for Maintenance of Traffic Signals

- 3.3.1 The Developer shall maintain the traffic signal installation for a period of either 3 months or 12 months with a minimum of 28 days fault free for electrical equipment (as required by the Director of Highways and Transport); the level of maintenance shall be as defined in Appendix B.

## 4.1 Control and Communications Systems

### 4.1.1 UTC SCOOT

- 4.1.1.1 Swindon Borough Council is currently investigating the need for UTC. Where Developments interface with potential UTC regions, SBC reserves the right to specify that the Developer supplies appropriate components such as Outstation Transmission Units and data wires compatible with such future systems as part of the Development works. In the event that proposals are of a scale and density, the Developer shall be responsible for the supply and installation of complete systems including the Instation Computer or enhancement thereof.
- 4.1.1.2 New junctions to be added to the Urban Traffic Control system will require appropriate hardware/local end connections at the Outstation and Instation. The provision of multi-point circuits may also be required. Outstation local end connections shall be terminated in the controller.
- 4.1.1.3 The whole cost of line provision shall be paid for by the Developer; this shall also include the first years rental and 'Total Care' maintenance.

### 4.1.2 MOVA

- 4.1.2.1 MOVA control at isolated signal junctions is mandatory for Trunk Road sites. The local authority reserves the right to stipulate MOVA control at Junctions where it considers this method of operation appropriate. It is standard practice for isolated signals in the Borough to incorporate the MOVA and or Linked MOVA strategies. Only consultants with proven experience in MOVA design will be approved by this authority for carrying out design and validation activities.
- 4.1.2.2 The existing MOVA Instation system is located at Wat Tyler House, it being an integral part of a Siemens Remote Monitoring system.
- 4.1.2.3 Any new MOVA controlled junctions shall be fully compatible with the Instation system in terms of operation and fault monitoring.

### 4.1.3 Remote Monitoring

- 4.1.3.1 SBC currently operates a Siemens version 42 remote monitoring system. Unless specified otherwise, all new junctions and controlled crossings shall be connected to the remote monitoring system. Site configuration data and live update diagram shall be supplied, installed and tested on the Remote Monitoring system within one week of works completion.

### 4.1.4 Bus and Emergency Vehicle Priority



- 4.1.4.1 As part of ongoing commitment to improved public transport systems, SBC promotes the use of Bus Priority at traffic signal junctions. The Developer shall consider the effect of any proposals on both bus and emergency vehicle routes. Where the local authority considers it necessary the Developer will be directed to provide systems as part of the works. The system shall be compatible with existing Bus Priority systems.

## 5.1 Testing and Commissioning Procedures

- 5.1.1 The Director of Highways and Transport reserves the right to attend Factory and Site Acceptance Testing. Fourteen days notice shall be given to the Director of Highways and Transport or his Agent of Factory and Site Acceptance tests.
- 5.1.2 Factory Acceptance Tests shall be carried out on the signal controller, detection system and monitoring systems at least one week prior to the date for installation on site. The Developer shall demonstrate to the Director of Highways and Transport or his Agent that the controller and any peripheral equipment conforms to Highway Agency specifications and standards, the TR 2500 specification forms and the test schedule.
- 5.1.3 Site Acceptance Tests shall be performed on a date agreed between the Developer, and the Director of Highways and Transport or his Agent upon completion of the whole of the works as identified in the specification. The Developer shall have satisfied himself that the site is complete and safe, for test purposes. Tests shall be demonstrated in accordance with the site acceptance test schedule. If any Factory Tests are to be repeated as part of site testing then these shall be administered in accordance with appropriate schedules.
- 5.1.4 As well as tests on the controller as identified above;; electrical safety and earthing site installation tests shall be carried out and documented on the appropriate forms. The results of all tests shall be submitted to the Director of Highways and Transport or his Agent for approval within one week of works completion.
- 5.1.5 The Developer shall ensure that the requirements of the current edition of BS7671, the Electricity at Work Act Regulations (SI 1989/635) and the Building Regulations 1991 (SI 1991/2768) amended by (SI 1992/1180) are complied with. Upon the completion of the installation, the Developer shall issue to the Director of Highways and Transport or his Agent an electrical completion certificate as identified in Appendix D.

## 6.1 Civil Engineering

- 6.1.1 All Civil Engineering works associated with the installation of traffic signals shall be undertaken in accordance with the Highway Agency's Design Manual for Roads and Bridges, Department for Transport Inclusive Mobility, the Swindon Borough Council document Transport Requirements for Development, the works specification the latest advice on good working practice and standard details contained in Appendix G.
- 6.1.2 The Developer shall ensure that Contractors undertaking works on the Highway conform to the conditions of current Health and Safety legislation and Chapter 8 traffic safety and management requirements.
- 6.1.3 All traffic management proposals shall be subject to approval by The Director of Highways and Transport or his Agent.
- 6.1.4 Notice periods for Applications for Consent are defined in Appendix F.
- 6.1.5 Civil Engineering works shall be subject to a 52-week maintenance period.

- 6.1.6 All works shall conform to the latest revision of the New Roads and Street Works Act.
- 6.1.7 Temporary warning signs shall be provided for a 3-month period following completion. Proposals for type and position shall accompany Stage 2 design submissions. These signs, with the agreement of the Director of Highways and Transport or his Agent, will then be removed by the developer.
- 6.1.8 SBC currently adopts a policy of full duct and drawpit systems at all signal installations. Standard construction drawings refer. Purpose made pole boxes / Retention Sockets shall be used as shown on standard details at each pole location. Carriage way loop boxes with under kerb ducting to the detector box shall be used. Detector boxes and main drawpits shall be supplied as per standard drawings. All frames in soft material shall be surrounded with a minimum 200mm wide concrete surround to prevent damage by grounds maintenance vehicles. All road crossings will include a minimum of 3 ducts. Road crossing and controller duct boxes will be at least 600mm x 600mm unless variations are agreed with the Director of Highways and Transport or his Agent.
- 6.1.9 All drawpit footway covers shall be non-slip with a minimum average SRV of 84 wet and 50 dry.
- 6.1.10 All duct systems shall have enough capacity for enough cable to allow for pole to be lifted for maintenance without disconnection.

## Appendix A

### A.1 Junction Controller Facilities

- a) All signal installations will be Extra Low Voltage sites unless variations are agreed with the Director of Highways and Transport or his Agent.
- b) Controllers shall be capable of providing alternative modes of control appropriate to the site and in agreement with the Director of Highways and Transport or his Agent.
  - 1) Manual 7) Puffin
  - 2) Fixed 8) Toucan
  - 3) Cableless Linking
  - 4) Urban Traffic Control
  - 5) Vehicle Actuation
  - 6) Mova
- c) A full I06 UTC interface shall be provided.
- d) Manual panel stage led indicators shall be operative in all modes.
- e) A dimming system with photocell located on the nearest appropriate pole to the signal controller.
- f) The detector fault monitor lamp shall be visible from outside of the controller case.
- g) Where MOVA is to be provided as an active mode of control the outstation equipment shall be capable of full communication with the Director of Highways and Transport MOVA/RMS in-station.
- h) Where UTC/SCOOT is to be provided as an active mode of control, the outstation shall be

capable of full communication (including the supply and installation of OTU) with the UTC/SCOOT instation.

- i) Where provision of a telephone/data line is required for UTC or MOVA/remote monitoring operation, the detail of the line must be agreed with the Director of Highways and Transport or his Agent. All installation charges associated with line provision together with the first year's line rental shall be the responsibility of the Developer. GSM modules may be specified by the Authority during design checks.
- j) Where UTC/SCOOT control is required, the outstation shall be capable of reporting Red/Non Red lamp failures to the in-station.
- k) Time synchronisation shall be provided for UTC installations.
- l) Traffic counting facilities may be required on UTC installations;; this shall be agreed with the Director of Highways and Transport or his Agent.
- m) All detectors housed in the control cabinet shall be soft wired to the detector back plane.
- n) Locks to control cabinets shall be approved and shall be suitable for external conditions. Locks and keys shall be common and compatible with all other controller cabinets. Individual and unique locks shall not be accepted.

## A.2 Puffin / Toucan Controller Facilities

- a) All signal installations will be Extra Low Voltage sites unless variations are agreed with the Director of Highways and Transport or his Agent.
- b) Controllers shall be capable of providing alternative modes of control appropriate to this site and in agreement with the Director of Highways and Transport or his Agent. The Developer shall note that Pelican crossings are no longer approved for use in Swindon Borough.
  - 1) Vehicle Actuation
  - 2) Permanent Demands and Extensions
  - 3) Cableless Linking
  - 4) Urban Traffic Control
  - 5) Puffin
  - 6) Toucan
- c) A full 106 UTC interface shall be provided.
- d) A dimming system with photocell located on the nearest appropriate pole to the signal controller.
- e) For UTC/SCOOT requirements see section A1.
- f) For B.T. requirements see Section A1.
- g) For additional lamp monitoring see Section A1.
- h) Locks to control cabinets shall be approved and shall be suitable for external conditions. Locks and keys shall be common and compatible with all other controller cabinets. Individual and unique locks shall not be accepted

### A.3 Cable and Slot Cutting Requirements

- a) All new installations will be Extra Low Voltage
- b) Standards for supply and installation of cable shall conform to sections 12 and 14 of the Specification for Highway Works, MCH1540 F and BS7671.
- c) Cable joints unless otherwise agreed in writing by the Traffic Signal Engineer shall only be allowed when connecting feeder and loop cable. These joints shall be of the re-usable bottle joint type or exceptionally, the crimp and heatshrink type. This joint shall be made in accordance with the manufacturers instruction a copy to be made available to the Traffic Signal Engineer on request. Each heatshrink joint shall be crimped and subject to a vigorous 'pull test' of approximately 3 kg before the heatshrink tubing is applied. Joints shall normally be housed in a footway box provided as part of Civil Engineering works, or as directed in the specification
- d) Cable identification shall be provided in all drawpits and conform to the details provided in Appendix E.
- e) Multi-core cabling shall have a minimum of 16 cores and a minimum of 4 spare cores available on all cable runs. Low voltage (exceeding extra low voltage but not exceeding 1000v) and extra low voltage (not exceeding 50v) power supplies shall have separate multi-core cables and shall be run in separate ducts. Available duct space shall be fully utilised before using spare duct ways. Draw ropes shall be replaced following laying of cables in ducts.
- f) A spare one pair feeder cable shall be provided to each 'X' loop position
- g) Carriageway loop boxes will be used to provide ducted (under kerb) access to verge boxes
- h) Armoured cable earth clamps shall be terminated with purpose made glands. The use of Jubilee Clips and Ferules on Castellated bars is not acceptable.

### A.4 Street Furniture and Optical Equipment

- a) All new installations will be Extra Low Voltage.
- b) All street furniture and optical equipment shall be located in the positions shown on the scheme drawings and referred to in contract appendices. All details are subject to approval by the Director of Highways and Transport or his Agent. The Director of Highways and Transport reserves the right to request black or other approved colour poles and controller cases and anti-graffiti coatings to cabinets.
- c) The optical equipment shall be in accordance with the latest edition of Highways Agency specifications and British Standard EN 12368 and BS 7987 (HD638). All signal aspects shall be of high intensity design class 3/2 or latest equivalent standard. All three-aspect traffic signal head roundels are to be configured with LED aspects, unless variations are agreed with the Director of Highways and Transport or his Agent.. Where heads are mounted on mast arms or as over height signals on tall poles, all aspects shall be LED configured.
- d) Where signal heads are mounted on either lamp column or mast arm shafts, only one hole shall be drilled for cable entry. Heads shall be mounted by using purpose made clamp brackets. Any holes drilled in columns for cable entry shall be deburred and a rubber grommet used to seal the edge prior to cabling. Where cables are required to be looped from one head to another, protective tubing such as 'kopex' shall be used, securely fixed and glanded at each end entering the head. Cable terminations shall be fixed in weatherproof housings. Where lamp columns are used the power supply to the column must be connected to the same mains phase as the traffic signal controller.

- e) Tactile rotating cones shall be provided on push button demand units. The tactile kit provided shall include the use of baffles for muting audible signals where appropriate. All pedestrian / cycle indicators and demand units shall be near side design. Near side indicators and demand units shall have anti-vandal legend panels and shall be mounted at a height of 1050 mm from finished pavement level to the button. The power supply shall be extra low voltage (48 volts maximum) transformed at the signal controller. Plastic push button units shall not be permitted.
- f) The Signal Company shall erect and maintain covers over all signal optical equipment as it is installed and shall uncover and recover as required for testing. Covers for traffic signal heads and push button units shall be of suitable durable material. Where push button covers are required the legend 'pedestrian crossing not in use' shall be printed on the cover.
- g) Cranked signal poles shall be utilised where appropriate.

## A.5 Detection Systems -VA Operation

- a) Detector packs shall be 4-channel self-tune microprocessor type approved by the Director of Highways and Transport or his Agent.
- b) All feeder cables shall be terminated in blocks and 'soft wired' to the detector packs.
- c) Detection cable systems shall be configured so as to prevent 'cross-talk'.
- d) MOVA
  - i) Each MOVA loop shall be jointed onto its own feeder cable and taken back to its own detector channel on the detector pack.
  - ii) All detector inputs shall be of the same polarity including pedestrian push button detectors. All detectors shall be open circuit for detect.
  - iii) All MOVA detectors shall be set to a sensitivity of 0.1% with the exception of stop line (Z) detectors which should have a high sensitivity setting of 0.02% in order to detect cycles.
  - iv) All MOVA loop inputs shall be connected direct to the detector pack which in turn shall be connected to the MOVA unit either directly or via suitable terminal blocks, all connections and cables must be clearly referenced.
- e) The Tenderers shall give details of proposals for the installation and fixing of the MOVA unit within the controller case, together with proposals for a separate fused power supply.
- f) The MOVA equipment shall comprise auto dial auto answer modem, led displays and all connection ports and interfaces required for a fully workable system. The MOVA unit shall be capable of communicating with the Director of Highways and Transport's laptop. An appropriate earthing lead shall be provided to connect between the earth point of MOVA equipment and a suitable ground point within the controller cabinet. All other cabling associated with the MOVA unit shall be clearly referenced and scheduled for operation and maintenance purposes.
- g) The MOVA unit shall also be capable of full and complete communication with the existing Director of Highways and Transport's in-station PC and associated equipment. Any amendment required either to existing installation Hardware, Firmware or Software shall be clearly identified and supplied under the contract.

- h) MOVA Installation specifications will be given on request from the Director of Highways and Transport or his Agent;; currently the Installation is a Siemens version 42 remote monitoring system.
- i) Vehicle Actuation (System D)
- i) Detector packs shall be of the 4-channel self-tuning microprocessor type. Unless the Authority specifies otherwise the detector sensitivity shall be set to 0.02% and the presence time to four minutes. As far as possible, detectors on the same site shall be set to operate at different frequencies. The operating frequency when the detector is commissioned shall be checked using a frequency meter provided by the Signal Company.
- ii) Detector packs shall be housed within the controller unless specified otherwise. The function of each channel shall be clearly and permanently marked on the adjacent rack.
- iii) A spare 1 pair feeder cable shall be provided at each 'X' loop position.
- iv) Vehicle detection may also be specified as above ground detectors, of either digital view, image processed, microwave or infrared technology. These detectors shall conform to the Highway Agency Specification TR2505A. Power supplies to above ground detection shall be 24 volts and located in controller.
- v) Where above ground detectors are used in place of 'D' system loops then a stop line loop shall be used unless agreed otherwise with the Director of Highways and Transport or his Agent.
- vi) Infra red stop line detectors shall not be permitted.

## Appendix B

### B.1 Maintenance Normal Service

- a) This section covers the Highways and Transport Department's maintenance requirements in addition to the Defects Liability or Warranty period commencing from the Take-Over of the traffic signal equipment. The Maintenance Period may be 3 months, 12 months and 28 days fault free for electrical equipment at the discretion of the Director of Highways and Transport and will be stipulated in the Highways Agreement and or during design checks and approvals. When the Maintenance Period is identified as being 28 days, this must be a 28 day fault free period, this period re-starting after replacement or repair of defective components having been completed and reported in writing to the Director of Highways and Transport as defined in Section's below. This does not relieve the Contractor of his obligations under the Defects Liability Clause.
- b) All goods and materials used by the Contractor in carrying out his obligations under the Contract shall be in accordance with the technical specification of the Highway Agency appropriate to the equipment and in accordance with TR 2206.
- c) The Contractor shall execute the works from a designated maintenance facility adequate for receiving fault reports and shall maintain the equipment supplied under the contract throughout the Defects Liability Period or other agreed duration. The Contractor shall provide all the necessary labour and equipment including spares to provide the maintenance service set out below.

- d) An attended service to receive and record faults notified in respect of the equipment supplied and installed under the Development contract, covering 24 hours a day, 7 days a week (inclusive of Public Holidays) must be in place. Contact details of this attended service must be submitted to the Council prior to the signals being switched on.  
The contractor shall be responsible for locating the cause of all faults (including software and system faults where applicable) and identifying these to the Director of Highways and Transport.
- e) An on call fault repair service shall be provided 24 hours, 7 days a week including Bank and Public holidays except Christmas Day. Attendance on site is to be within 2 hours for notification of Urgent faults. The response time shall commence immediately the fault is notified to the contractor's attended fault-reporting centre.
- f) An on call fault repair service shall be provided 24 hours, 7 days a week including Bank and Public holidays except Christmas Day. Attendance on site is to be within 72 hours of notification of Non-Urgent faults. The response time shall commence immediately the fault is notified to the contractor's fault-reporting centre.
- g) A temporary repair to all faults within 4 hours of attendance on site. A full repair is required within 24 hours attendance on site, unless a longer period is agreed with the director of Highways and transport.
- h) Notification of arrival on site and departure shall be made verbally by telephone and recorded in the controller log book. Written confirmation of clearance shall be made within 24 hours by fax, e-mail or Fault Management System if applicable.

## Fault Classification

- a) Urgent Fault

The following events shall be classified as Urgent Faults:

- All Signals Unlit
- Signals failing to change
- Defective signals that are likely to cause excessive queues or danger and have caused abnormal traffic conditions that warrant urgent attention
- Equipment damaged and in a dangerous condition
- Red lamp and tactile device failures
- b) Non-Urgent Fault
- All other faults not covered by the above

## Appendix C

### C.1 Documentation

- a) The Contractor shall provide at commissioning the documentation listed in the following clauses and as required in TA 84/06.
- b) A copy of the Certificate of TOPAS Registration for relevant equipment.
- c) One copy of the operations manual for the controller and any other component equipment or 'addon' equipment supplied under the Contract.

- d) One copy of the maintenance manual for the controller and any other component equipment or 'addon' equipment supplied under the Contract. The maintenance manual shall give enough information to enable Contractors/Engineers carrying out maintenance functions on behalf of the Director of Highways and Transport to properly maintain the equipment supplied.
- e) Two hard copies and one e-copy (AutoCAD) of 'as installed' of plans indicating the following.
  - i) All street furniture positions and types including pits, poles, controller and optical equipment.
  - ii) All cable runs including size and type number of cores used and numbers of spare cores available for future use.
  - iii) Position of joints and sub-surface equipment.
  - iv) Dimensions and number of turns in each loop.
  - v) Location of loops shown with sufficient accuracy for loops to be cut in the same place, following re-surfacing. This may be done by referring the leading edge of the loop to a permanent piece of street furniture.
  - vi) Any special facilities.
  - vii) Completed test schedules as identified in Appendix D.
  - viii) Power supply details.
- f) Two copies of the configuration specification of the controller.
- g) An electronic copy of the controller configuration.
- h) OMCU electronic configuration.
- i) The appropriate energy companies Electrical Test Certificate.
- j) Two sets of controller keys (including 'T' keys).
- k) Elexon Codes and calculations for un-metered supplies



## Appendix DI

### Forms of Completion and Inspection Factory Acceptance Test Certificate

the best of my/our knowledge in accordance with the Regulations for Electrical Installations published by the Institution of Electrical Engineers latest edition and the attached Factory Acceptance Test Schedule as demonstrated on this day ..... except for departures, if any, stated below.

The following tests have failed to comply with either the TR 2500A forms as completed by the Designer or the Specification or Highway Agency Specifications.

List of departures/test failures.

.....  
.....

The above tests shall be demonstrated at a subsequent FAT to be arranged within one week

.....  
.....

The above tests shall be demonstrated at SAT in addition to the SAT test schedule.

(Delete as appropriate).

This equipment may be delivered to site for installation and further testing as detailed above and in accordance with the SAT test schedule.

Designers signature ..... Purchasers signature .....

Signal Company Engineers Signature .....

# Factory Acceptance Test Schedule

Date ..... Time.....

Venue .....

Signal Company Representative.....

Purchasers Representative .....

Designer for the Works .....

Intersection Address .....

Contract Works Order No. ....

Type of Controller .....

Controller Ident/Serial No. ....

Prom Ident/Sum Check Ref. ....

Item	Test	Pass	Fail	Comments
1	VISUAL PRECHECK Safety of electrical connections for testing. Damage of case/ components during transit.			
2	Start up sequence			
3	Stage phase allocation, including parallel stage streams			
4	Modes of control manual ...fixed time ..VA. CLF .. UTC. Check on hand held unit mode displays and Police (maintenance facilities). Check function of stage Led's in all modes.			

a. Manual Control Stage Transitions (*Test and Tick as appropriate*)

	1	2	3	4	5	6	7	8	9	10
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										

Comments .....

b) Fixed time -check specified cyclic order with TR 2500A forms and note

Comments .....

c) Vehicle actuated -check stage transitions with Designers special conditions in specification.

Comments .....

d) CLF -check timing and timetable entries any special conditions and test cyclic order as necessary.

Comments .....

e) UTC -check stage transitions including force and demand functions as specified. Check ancillary bit functions (bits such as RR and DF/CF to be generated by actual controller conditions).

Comments .....

Tests a -eto include pedestrian demands.

Item	Test	Pass	Fail	Comments
5	Lamps on/off (including fuse)			
6	Dimming			
7	Lamp monitoring -additional a) Lamp monitor fitted yes/no Type ..... b) Test 1st and 2nd red lamp fail. DFM functions and stage inhibit/switch off. c) Green monitors and conflicts with the aid of suitable test equipment drive conflicting green phases and note controller trip, fault log entries, andreset procedures.			

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
A	X															
B		X														
C			X													
D				X												
E					X											
F						X										
G							X									
H								X								
I									X							
J										X						
K											X					
L												X				
M													X			
N														X		
O															X	
P																X

Enter stage running in phase combination matrix conflicting green phases must trip controller.

Comments .....

Item	Test	Pass	Fail	Comments
8	Scheduled timings -check that Signal Company spec conforms to TR 2500A forms or use handheld unit to display. Minimums Maximums (plus alt sets) Intergreens Extensions All red timings SD/SA timings Delay call cancel Hurry call.			
9	Check detector card settings Note Type ..... a) Check labelling of channel functions b) Soundmark or SD/SA test facilities			
10	Special Facilities i.e. Pelican or signal links, hurry call/special detection above ground detection connections -list as required			
11	Test on MOVA detection system Test MOVA detector inputs, links and timers. Test download of data.			
12	Test on part time facilities			
13	Test on pedestrian audible/ tactile facilities.			
14	Additional tests demonstrated list below.			

## Appendix D2

### Forms of Completion and Inspection Site Acceptance Test Certificate

I/We being the person(s) responsible (as indicated by my/our signatures below) for the Inspection and Test of the installation as indicated on page I of the test schedule CERTIFY that the said installation is to the best of my/our knowledge in accordance with the Regulations for Electrical Installations published by the Institution of Electrical Engineers 17th edition and the attached Site Acceptance Test Schedule as demonstrated on this day

Works not completed in accordance with the specification and SAT schedule attached to be listed below.

Where outstanding works are listed as not completed, these shall where possible be rectified within 48 hours and a retest of specific parts of the test schedule undertaken. The installation may only be taken-over if no items, or only items of a very minor nature are outstanding.

Designers signature .....

Purchasers signature .....

Signal Company Engineers signature.....

### Site Acceptance Test Schedule

Date ..... Time .....

Site Address .....

New scheme/refurbishment scheme Site open to traffic Yes/No

Weather conditions .....

Contract Works Order No. ....

Type of controller .....

Controller ident/serial no. ....

Prom ident/serial no. ....

As built site drawing ref ..... (2 copies - one to remain in the controller).

As configured controller specification ref ..... (2 copies - one to remain in the controller).

Item	Test	Pass	Fail	Comments
1	Dimming via photo cell			
2	Function of lamps and orientation of heads including 'see through'. Check on fibre optic arrows and any other special head requirements			
3	Low voltage push button units			
4	Cable identification in all drawpits.			
5	Low/extra low cables in separate multi-cores and separate ducts. Draw ropes retained in ducts			
6	Controller functioning in various modes. Controller left in ..... mode			
7	Red lamp monitoring including removal of red lamps to mimic failures, function of DFM and stage inhibit			
8	UTC test with outstation test set. Connection to OTU as required.			
9	Time of day set in controller.			
10	Visual check of earth straps etc			
11	Base seal.			
12	Other special site specific tests such as local link etc ....list as appropriate. ..... .....			
13	Tests to be reproduced from FAT as agreed with the Designer. ..... ..... ..... ..... .....			

# Appendix D3

## Electrical Installation Certificates

### ELECTRICAL INSTALLATION CERTIFICATE (notes 1 and 2)

#### REQUIREMENTS FOR ELECTRICAL INSTALLATIONS - BS 7671 (IEE WIRING REGULATIONS)

##### DETAILS OF THE CLIENT (note 1)

##### INSTALLATION ADDRESS

##### DESCRIPTION AND EXTENT OF THE INSTALLATION Tick boxes as appropriate (note 1)

Description of installation:

Extent of installation covered by this Certificate:

New installation ☐

Addition to an existing installation ☐

Alteration to an existing installation ☐

##### FOR DESIGN

I/We being the person(s) responsible for the design of the electrical installation (as indicated by my/our signatures below), particulars of which are described above, having exercised reasonable skill and care when carrying out the design hereby CERTIFY that the design work for which I/we have been responsible is to the best of my/our knowledge and belief in accordance with BS 7671 : ....., amended to .....(date) except for the departures, if any, detailed as follows:

Details of departures from BS 7671 (Regulations 120-01-03, 120-02):

The extent of liability of the signatory or the signatories is limited to the work described above as the subject of this Certificate.

For the DESIGN of the installation:

\*\* (Where there is mutual responsibility for the design)

Signature: ..... Date: .....

Name (BLOCK LETTERS): ..... Designer No 1

Signature: ..... Date: .....

Name (BLOCK LETTERS): ..... Designer No 2\*\*

##### FOR CONSTRUCTION

I/We being the person(s) responsible for the construction of the electrical installation (as indicated by my/our signatures below), particulars of which are described above, having exercised reasonable skill and care when carrying out the construction hereby CERTIFY that the construction work for which I/we have been responsible is to the best of my/our knowledge and belief in accordance with BS 7671 : ....., amended to .....(date) except for the departures, if any, detailed as follows:

Details of departures from BS 7671 (Regulations 120-01-03, 120-02):

The extent of liability of the signatory is limited to the work described above as the subject of this Certificate.

For CONSTRUCTION of the installation:

Signature: .....

Date: .....

Name (BLOCK LETTERS): .....

Constructor

##### FOR INSPECTION & TESTING

I/We being the person(s) responsible for the inspection & testing of the electrical installation (as indicated by my/our signatures below), particulars of which are described above, having exercised reasonable skill and care when carrying out the inspection & testing hereby CERTIFY that the work for which I/we have been responsible is to the best of my/our knowledge and belief in accordance with BS 7671 : ....., amended to .....(date) except for the departures, if any, detailed as follows:

Details of departures from BS 7671 (Regulations 120-01-03, 120-02):

The extent of liability of the signatory is limited to the work described above as the subject of this Certificate.

For INSPECTION AND TEST of the installation:

Signature: .....

Date: .....

Name (BLOCK LETTERS): .....

Inspector

##### NEXT INSPECTION (notes 4 and 7)

I/We the designer(s), recommend that this installation is further inspected and tested after an interval of not more than ..... years/months.



# Appendix E

## Schedule of Inspections

Methods of protection against electric shock	Prevention of mutual detrimental influence
<b>(a) Protection against both direct and indirect contact:</b> <input type="checkbox"/> (i) SELV (note 1) <input type="checkbox"/> (ii) Limitation of discharge of energy	<input type="checkbox"/> (a) Proximity of non-electrical services and other influences <input type="checkbox"/> (b) Segregation of band I and band II circuits or band II insulation used <input type="checkbox"/> (c) Segregation of safety circuits
<b>(b) Protection against direct contact: (note 2)</b> <input type="checkbox"/> (i) Insulation of live parts <input type="checkbox"/> (ii) Barriers or enclosures <input type="checkbox"/> (iii) Obstacles (note 3) <input type="checkbox"/> (iv) Placing out of reach (note 4) <input type="checkbox"/> (v) PELV <input type="checkbox"/> (vi) Presence of RCD for supplementary protection	<b>Identification</b> <input type="checkbox"/> (a) Presence of diagrams, instructions, circuit charts and similar information <input type="checkbox"/> (b) Presence of danger notices and other warning notices <input type="checkbox"/> (c) Labelling of protective devices, switches and terminals <input type="checkbox"/> (d) Identification of conductors
<b>(c) Protection against indirect contact:</b> (i) EEBADS including: <input type="checkbox"/> Presence of earthing conductor <input type="checkbox"/> Presence of circuit protective conductors <input type="checkbox"/> Presence of main equipotential bonding conductors <input type="checkbox"/> Presence of supplementary equipotential bonding conductors <input type="checkbox"/> Presence of earthing arrangements for combined protective and functional purposes <input type="checkbox"/> Presence of adequate arrangements for alternative source(s), where applicable <input type="checkbox"/> Presence of residual current device(s) <input type="checkbox"/> (ii) Use of Class II equipment or equivalent insulation (note 5) <input type="checkbox"/> (iii) Non-conducting location: (note 6) Absence of protective conductors <input type="checkbox"/> (iv) Earth-free equipotential bonding: (note 8) Presence of earth-free equipotential bonding conductors <input type="checkbox"/> (v) Electrical separation (note 8)	<b>Cables and conductors</b> <input type="checkbox"/> (a) Routing of cables in prescribed zones or within mechanical protection <input type="checkbox"/> (b) Connection of conductors <input type="checkbox"/> (c) Erection methods <input type="checkbox"/> (d) Selection of conductors for current-carrying capacity and voltage drop <input type="checkbox"/> (e) Presence of fire barriers, suitable seals and protection against thermal effects
Inspected by .....	<b>General</b> <input type="checkbox"/> (a) Presence and correct location of appropriate devices for isolation and switching <input type="checkbox"/> (b) Adequacy of access to switchgear and other equipment <input type="checkbox"/> (c) Particular protective measures for special installations and locations <input type="checkbox"/> (d) Connection of single-pole devices for protection or switching in phase conductors only <input type="checkbox"/> (e) Correct connection of accessories and equipment <input type="checkbox"/> (f) Presence of undervoltage protective devices <input type="checkbox"/> (g) Choice and setting of protective and monitoring devices for protection against indirect contact and/or overcurrent <input type="checkbox"/> (h) Selection of equipment and protective measures appropriate to external influences <input type="checkbox"/> (i) Selection of appropriate functional switching devices Date .....

### Notes:

- ✓ to indicate an inspection has been carried out and the result is satisfactory  
 X to indicate an inspection has been carried out and the result was unsatisfactory  
 N/A to indicate the inspection is not applicable

- |   |   |
|---|---|
| 1. SELV An extra-low voltage system which is electrically separated from Earth and from other systems. The particular requirements of the Regulations must be checked (see Regulations 411-02 and 471-02) | 5. Use of Class II equipment - infrequently adopted and only when the installation is to be supervised (see Regulations 413-03 and 471-09)              |
| 2. Method of protection against direct contact - will include measurement of distances where appropriate  | 6. Non-conducting locations - not applicable in domestic premises and requiring special precautions (see Regulations 413-04 and 471-10)                 |
| 3. Obstacles - only adopted in special circumstances (see Regulations 412-04 and 471-06)  | 7. Earth-free local equipotential bonding - not applicable in domestic premises, only used in special circumstances (see Regulations 413-05 and 471-11) |
| 4. Placing out of reach - only adopted in special circumstances (see Regulations 412-05 and 471-07)   | 8. Electrical separation (see Regulations 413-06 and 471-12)  |

PARTICULARS OF SIGNATORIES TO THE ELECTRICAL INSTALLATION CERTIFICATE (note 3)												
<b>Designer (No 1)</b> Name: ..... Company: ..... Address: ..... Postcode: ..... Tel No: .....												
<b>Designer (No 2)</b> (if applicable) Name: ..... Company: ..... Address: ..... Postcode: ..... Tel No: .....												
<b>Constructor</b> Name: ..... Company: ..... Address: ..... Postcode: ..... Tel No: .....												
<b>Inspector</b> Name: ..... Company: ..... Address: ..... Postcode: ..... Tel No: .....												
SUPPLY CHARACTERISTICS AND EARTHING ARRANGEMENTS <small>Tick boxes and enter details, as appropriate</small>												
<b>Earthing arrangements</b>  TN-C <input type="checkbox"/> TN-S <input type="checkbox"/> TN-C-S <input type="checkbox"/> TT <input type="checkbox"/> IT <input type="checkbox"/>  Alternative source <input type="checkbox"/> of supply (to be detailed on attached schedules)	<b>Number and Type of Live Conductors</b>  a.c. <input type="checkbox"/> d.c. <input type="checkbox"/> 1-phase, 2-wire <input type="checkbox"/> 2-pole <input type="checkbox"/> 1-phase, 3-wire <input type="checkbox"/> 3-pole <input type="checkbox"/> 2-phase, 3-wire <input type="checkbox"/> other <input type="checkbox"/> 3-phase, 3-wire <input type="checkbox"/> 3-phase, 4-wire <input type="checkbox"/>	<b>Nature of Supply Parameters</b>  Nominal voltage, $U/U_0^{(1)}$ ..... V Nominal frequency, $f^{(1)}$ ..... Hz Prospective fault current, $I_{pf}^{(2)}$ ..... kA (note 6) External loop impedance, $Z_0^{(2)}$ ..... $\Omega$  <small>(Note: (1) by enquiry; (2) by enquiry or by measurement)</small>	<b>Supply Protective Device Characteristics</b>  Type: ..... Nominal current rating ..... A									
PARTICULARS OF INSTALLATION REFERRED TO IN THE CERTIFICATE <small>Tick boxes and enter details, as appropriate</small>												
<b>Means of Earthing</b>  Supplier's facility <input type="checkbox"/>  Installation earth electrode <input type="checkbox"/>	<b>Maximum Demand</b> Maximum demand (load) ..... Amps per phase  <b>Details of Installation Earth Electrode (where applicable)</b> <table style="width: 100%; border: none;"> <tr> <td style="width: 33%; text-align: center;">Type</td> <td style="width: 33%; text-align: center;">Location</td> <td style="width: 33%; text-align: center;">Electrode resistance to earth</td> </tr> <tr> <td style="text-align: center;">(e.g. rod(s), tape etc)</td> <td></td> <td></td> </tr> <tr> <td style="text-align: center;">.....</td> <td style="text-align: center;">.....</td> <td style="text-align: center;">..... <math>\Omega</math></td> </tr> </table>			Type	Location	Electrode resistance to earth	(e.g. rod(s), tape etc)			.....	.....	..... $\Omega$
Type	Location	Electrode resistance to earth										
(e.g. rod(s), tape etc)												
.....	.....	..... $\Omega$										
<b>Main Protective Conductors</b> Earthing conductor: material ..... csa ..... mm <sup>2</sup> connection verified <input type="checkbox"/> Main equipotential bonding conductors material ..... csa ..... mm <sup>2</sup> connection verified <input type="checkbox"/> To incoming water and/or gas service <input type="checkbox"/> To other elements .....												
<b>Main Switch or Circuit-breaker</b> BS, Type ..... No. of poles ..... Current rating ..... A Voltage rating ..... V Location ..... Fuse rating or setting ..... A Rated residual operating current $I_{\Delta n}$ = ..... mA, and operating time of ..... ms (at $I_{\Delta n}$ ) <small>(applicable only where an RCD is suitable and is used as a main circuit-breaker)</small>												
<b>COMMENTS ON EXISTING INSTALLATION:</b> <small>(in the case of an alteration or additions see Section 743)</small> ..... ..... ..... .....												
<b>SCHEDULES (note 2)</b> The attached Schedules are part of this document and this Certificate is valid only when they are attached to it. ..... Schedule(s) of Inspections and ..... Schedule(s) of Test Results are attached. <small>(Enter quantities of schedules attached).</small>												



## Appendix Cable Identification System

- a) All cables in all drawpits shall be marked in accordance with standard drawing details referred to in Appendix G.

# Appendix F

## Application For Consent For Activities On The Highway Associated With Civil Engineering Works

The Contractor shall apply in writing to the Director of Highways and Transport or his Agent, in advance of the minimum notice period stated, for consent to the following:

	Minimum Notice Period
<b>Major Works:</b>	
Works of eleven or more days duration =	3 months
<b>Standard Works</b>	
Works of between four and ten days duration=	10 days
<b>Minor Works</b>	
Works up to three days duration=	3 days
<b>Immediate works</b>	
Emergency works	Not more than 2 hours after works commence

Applications shall state the proposed start date and anticipated duration and where applicable be accompanied by plans, profiles and details of construction.

Work that affects any public highway shall not commence until consent has been given by the Director of Highways and Transport and until the relevant temporary diversions and/or traffic safety measures are fully operational.

Notwithstanding any consent given by the Director of Highways and Transport, work which affects access to private properties shall not be commenced until the Contractor has given 3working days notice in writing to the occupier(s) of the property.

All works on the public highway shall be notified to SBC Street Works.

## Appendix G

### Standard Drawings

PDF or Auto-Cad drawings will be issued on request.

## Relevant Documentation

TA 84/06 (Code of Practice for Traffic Control and Information Systems for all purpose roads).

I.H.T. publication 'Guidelines for Safety Audit of Highways' HD19/03 Road Safety Audit HD42/05. Non-motorised User Audits TR 2206. Specification for Road Traffic Signals TR2500A. Specification for Traffic Signal Controller TD50/04. The Geometric Layout of Signal-controlled Junctions and Signalised Roundabouts TA 82/99 The installation of traffic signals and associated equipment Construction (Design and Management) Regulations BS7671, the Electricity at Work Act Regulations (SI 1989/635) Building Regulations 1991 (SI 1991/2768) amended by (SI 1992/1180) 12 and 14 of the Highway Works Specification BS7671. Requirements for electrical installations. IEE Wiring Regulations. Seventeenth edition (Corrigendum 2008)

British Standard EN 12368: 2006 Traffic control equipment. Signal heads BS7987 (HD638). Road traffic signal systems TR2505A Performance Specification for Above Ground Vehicle Detector Systems for use at Permanent Traffic Signal Installations Department for Transport Inclusive Mobility – A Guide to Best Practice on Access to Pedestrian and Transport Infrastructure.