



Kildare County Council
TRAFFIC CONTROL EQUIPMENT SPECIFICATION

1. PREAMBLE

- 1.1** This section describes the procedures to be followed and details of equipment to be supplied, installed, configured, commissioned and validated under this contract. All those undertaking such works shall comply with this specification.
- 1.2** This specification details the functional requirements of equipment to be provided from time to time and the duties and services to be carried out to fulfil the obligations of the Contract for the supply, and installation of traffic Control equipment and the commissioning of said equipment to the Kildare Traffic Management Centre.
- 1.3** This specification contains additional advice to Contractors and specific information to be provided by Contractors. Specific civil engineering requirements are additionally given with respect to the erection of traffic signal street furniture and associated service duct systems. These requirements may be additional or supplementary to the any other civil engineering requirements/specifications detailed in the main contract.
- 1.4** The Supply of Traffic Control equipment for the purpose of this Contract shall include but not limited to the design, manufacture or supply, configuration, testing, installation, commissioning, validation documentation for the following:
- New traffic signal equipment including controllers.
 - Access control including bollards and ANPR Access Control Systems
 - Outstation equipment required to provide data transmission including cables and connections to data transmission lines.
 - In-Station equipment to provide data transmission including cables and connections to data transmission lines
 - Vehicle loop detectors and feeder cables.
 - Above ground detection and radar detection
 - Equipment to provide lamp monitoring.
 - Ancillary Equipment.
 - Bus Priority Hardware and Software
 - Zebra Crossing equipment.
- 1.5** Equipment supplied shall be in conformity with the regulations made by the Minister for the Environment, Republic of Ireland, under the provisions of the Road Traffic Acts. Unless otherwise specified, all equipment shall be in conformity with the United Kingdom, Department of Environment specification and comply with the requirements of European Standard IS EN 12368:2000 Traffic Control Equipment - Signal Heads. In case of conflict in

the specification or between the specification and any drawings, Kildare County Council shall decide which provision shall prevail.

1.6 Equipment should comply with the following specifications as appropriate.

TABLE 1 – LIST OF CURRENT STANDARDS	
Standard	Description
IS 12368:2000 EN	Traffic Signal Control Equipment – Signal heads Supersedes BS 505: 1971 - Road Traffic Signals and TR 102A - Standard Traffic Signals. See TR 2206.
IS 12675:2001 EN	Traffic Signal Controllers (referenced in TR 2210)
BS 7987:2001	Road Traffic Signal Systems. (electro-technical standard: electrical supply, safety, testing, electrical interfaces, environmental tests etc.)
BS EN 50293	EMC (electro-magnetic compatibility, replaced TRG 1068)
TR 0100B	Inductive Loop Vehicle Detection equipment.
TR 0111A	Traffic Signal Control Equipment for use at Road Works.
TR 2500	Specification for Microprocessor based Traffic Signal Controller.
TR 2206A	Specification for Road Traffic Signals.
TR 2210A	Traffic Signal Controller.
MCE 0108C	Sighting of Inductive Loops for Vehicle Detecting equipment at Permanent Road Traffic Signal Installations.
MCE 0100	Inductive Loop Detecting Equipment
MCE 0117A	Inductive Loop Vehicle Identification Equipment.
MCE 0152A	Monitoring and Control of Traffic Control Equipment via the Public Switched Telephone Network
4th Edition 2008	National Code of Practice for Customer Interface
	The ESB requirements for work on Public Lighting on ESB's Networks (June 2010)
ET101: 2008	National Rules for Electrical Installations ET101: 2008
UTMC	UTMC Compliance protocol
ET 212: 2004.	Guidelines for Extensions, Additions and Alterations to
ET206: 2009	The Management of Electrical Safety at Work

TABLE 1 – LIST OF CURRENT STANDARDS	
Standard	Description
ET 212: 2004	Guidelines for Extensions, Additions and Alterations to Existing Electrical Installations

- 1.7** If equipment is offered that does not have approval, then evidence must be provided with the Tender that such approval is likely to be issued together with the current approval status. In the event that such equipment fails to gain approval or does not prove satisfactory in Kildare County Council's judgement, the contractor shall provide at his own expense, approved replacement equipment.
- 1.8** Care shall be taken to ensure damage does not occur to control hardware/traffic signal street furniture during the execution of the works. Any suspected or known damage shall be reported immediately to Kildare County Council and rectified by the Contractor in a manner approved by Kildare County Council at the Contractor's expense.
- 1.9** The Contractor shall refer to all relevant site drawings that give information relating to the traffic signal works and the location of the traffic signal equipment.
- 1.10** Work shall not commence until the setting out has been completed and agreed by Kildare County Council. If any additional poles, heads or cables are required for specific locations which could not have reasonably been foreseen these additions shall be agreed in writing by Kildare County Council before work commences.
- 1.11** The procedures defined relate specifically to maintenance and traffic control issues. Requirements and guidance on other design and installation matters, including civil engineering works, environmental issues, health and safety etc, shall be with in accordance with main contract.
- 1.12** Installation shall comply with the requirements of the DETR Local Transport Note (LTN) 1/98, The Installation of Traffic Signals and Associated Equipment and any contract documents prepared for the Scheme. Where the requirements of this document exceed the requirements of LTN 1/98 and the contract documents, this document shall take precedence.
- 1.13** Electro-magnetic compatibility and comprehensive protection against electrical disturbances, transients, surges and interruptions of electrical supply is to be provided to comply fully with the EC directive on all equipment supplied. The level of such protection is to be specified and the relevant standards or certifications to be detailed.

- 1.14** The electronic equipment shall be capable of functioning satisfactorily at 220 volts nominal alternating current and during voltage surges of minus 20 volts to plus 10 volts away from nominal, or shall incorporate an established voltage supply. The equipment shall have suitable filter circuits to eliminate the effects of mains borne interference or "spikey" voltage.
- 1.15** Electrical wiring including earthing shall be in conformity with national rules for electrical installations as published by Electro-Technical Council of Ireland (ECT I).
- 1.16** If Kildare County Council decides to use Traffic Control equipment of a type for which is not included in Volume C Pricing Document., an annual new rate shall be agreed based on existing rates. This rate shall take account of the number of units to be installed, training requirements and the need for any spares/stand-by equipment.
- 1.17** If Kildare County Council decides to use a controller of a type for which there is not included in Appendix C, an annual new rate shall be agreed based on existing rates. This rate shall take account of the number of units to be installed, training requirements and the need for any spares/stand-by equipment.

Controller Power Supply

- 1.18** Power, the supply of which shall be arranged by the Contractor, shall be unmetered, single phase with protection against over current and short circuit terminated in a Mini- pillar located in the proximity of the controller in an agreed position, and ducting shall be installed between the pillar and the controller. The mini pillar size is 730mm height x 365mm width x 220mm depth (above ground dimensions). The mini-pillar shall be constructed in a concrete pad. The supply shall be 230 volts (+/- 6 percent), 50Hz (+/- 1 percent), 30amp minimum. Actual power supply requirements shall be confirmed by the Contractor taking into account the number of heads, length of cable runs etc. Power supplies shall always be terminated in a pillar of an agreed type (such as a 200mm deep by 600mm wide midi/mini pillar or agreed equivalent) not less than 2 metres adjacent to the controller case.
- 1.19** A minimum of one twin 13 amp electricity socket, RCD or equivalent shall be provided within the controller case.
- 1.20** Mains Supply shall **not** be sourced from Public Lighting (PL) poles.
- 1.21** On the user end of the circuit path (traffic controller cabinet/mini pillar), properly rated fused protection shall be employed to protect against over current and act as a form of isolation (Lucy Triton or equivalent). All 13 Amp sockets installed in the unit shall be protected with the use of a Residual Circuit Device.

- 1.22** When connecting to Mini Pillars there shall be two separate and distinct sections, the ESB supply side and the consumer side. The ESB supply side shall incorporate a suitably rated main fuse unit along with an isolator unit (supplied and fitted by the ESB). The consumer side shall incorporate a fused unit isolator (Lucy Triton or equivalent); the proper fusing convention and cable sizing shall be adhered to. Glands, grommets and shrouds should always be used to maintain the IP rating of the electrical equipment.

2. *Traffic Junction Controllers*

- 2.1 All traffic signal junction controllers supplied are to comply with the requirements of the latest edition of the British Highways Agency Specification TR2500 (formerly TR2210 and this technical specification. Where a conflict arises between specifications, Kildare County Council shall determine which shall prevail. The contractor shall provide a compliance statement in accordance with this requirement for all controllers supplied in his contract.
- 2.2 SCOOT / UTC will normally be adopted for all signal installations which relate to existing areas of SCOOT / UTC control, for new installations where proposals to implement the use of SCOOT / UTC exist, or where proposals form part of or create a natural UTC/SCOOT region.
- 2.3 MOVA is the method of control of choice for sites, which do not form part of the UTC network. All sites within a SCOOT /UTC region must be able to use MOVA as a method of control when not working under SCOOT /UTC control.
- 2.4 The contractor is responsible for programming the controller, configuration and validation of all equipment and commissioning the junction to the Kildare County Council's SCOOT UTC system or RMS and STRTOS systems.
- 2.5 The methods of control used for Kildare County Council signalised junctions shall be:
- SCOOT linking to Kildare County Council Siemens SCOOT Traffic Management System;
 - Linked MOVA – latest software specification
 - MOVA – latest software specification
 - VA (Vehicle Actuated) shall be used as a fall back. Where sites are in close proximity or require critical linking then Cableless linking facility (CLF) plans may be utilised.
 - The Contractor shall supply, install, test, validate and commission traffic signal controllers as part of the Traffic Signal Works.
- 2.6 All controllers shall be capable of integrating with the Kildare County Council Urban Traffic Control system at a future date without any loss of functionality.
- 2.7 The contractor shall be present for all switch-on's and undertake modifications to timings in RAM as required to optimise control. **“Switch on” must not occur on a Friday.**
- 2.8 The provision of Speed Discrimination and Speed Assessment which may be required on specific sites at a later date shall be made available as a facility integral to the controller.

- 2.9** Where MOVA control is being adopted a standard 3U rack shall be provided for MOVA/Outstation Monitoring Unit (OMU) to be fitted in the controller cabinet containing a 300mm wide by 300mm deep void space. The MOVA/OMU unit shall be integral to the controller.
- 2.10** Where SCOOT control is being adopted a standard 3U rack shall be provided for UTC/Outstation Transmission Unit (OTU) A UTC interface shall be provided inside the controller. The Contractor shall test the output of all UTC bits at the Site commissioning.
- 2.11** All controller detector inputs shall be capable of being remotely monitored. All control and reply bits shall be wired to the OMU or OTU as required.
- 2.12** The manual panel shall include a 'computer on' LED which shall indicate when the controller is operating under MOVA or UTC control.
- 2.13** All traffic signal controllers shall be approved to the UK specification TR2500 (formerly TR0141C) or latest version and comply with the requirements of this specification.
- 2.14** All controllers shall provide red lamp monitoring.
- 2.15** All controllers shall incorporate a UTC interface for future upgrade to the Traffic Management Centre without loss of functionality;
- 2.16** The manufacture of the controller and cabinet assembly shall provide for easy access to electronics for maintenance purposes and later installation of modified personality or configuration components such as PROMS, PROMS and Gals.
- 2.17** All controllers shall be installed in a concrete hard standing area connected to a chamber by a minimum of 3x100mm ducts. In addition, controllers shall be configured according to the TR2500 Traffic Signal Specification Forms (previously known as „141” forms).
- 2.18** Controllers shall be installed so that they do not mask pedestrians from approaching vehicles or obstruct pedestrian routes, doors shall not open out onto carriageway. In addition, controllers should be located to provide a view of all approaches and not to hinder or disrupt normal activities in the vicinity. The location shall be agreed with the Employer's Representative prior to commencement of any installation works.
- 2.19** The location of controllers on any drawings is indicative and the final location is subject to approval by Kildare County Council. In general, the controller shall be sited at a location that provides the best possible view of traffic on all approaches to the installation.

- 2.20** Traffic signal controllers shall be supplied in a robust weather proof galvanised steel case complete with high security lock and three keys, and shall incorporate a flush-mounted barrel-type key switch for police to switch off/on signals, complete with three keys. The cabinet shall be supplied complete with steel frame or other suitable means for embedding into concrete and shall be fitted with a door stay. Controller cases shall be grey or black. The cabinet shall be fitted with an agreed anti-fly posting system prior to galvanising. After all cables have been connected, the base of the controller case and point of entry of ducts shall be sealed against the ingress of damp, rodents, slugs etc, with a sand filling and pitch based epoxy resin sealant.
- 2.21** The controllers shall be fitted with an RS232 port compatible with a hand held terminal for the monitoring and alteration of timings, CLF plans. It shall include an integrated cable less linking facility and shall provide all the stages of control required for the junction.
- 2.22** The controllers shall fully support the latest UG405 protocol with timestamp data.
- 2.23** The controllers shall be adjusted if necessary to suit the site installation but the circuits needed for full operation shall remain within the controller.
- 2.24** The controllers shall be capable of operating in the following modes:
- Cableless linking facility (CLF);
 - Fixed Time;
 - Semi-vehicle actuated;
 - Fully vehicle actuated;
 - Manually controlled;
 - Hurry Call;
 - Bus Priority; and
 - Dial-Up UTC or RMS
 - Latest version of MOVA
- 2.25** The controller shall revert to a stage if a maximum green change is made from that stage. If no demand, there shall be an automatic reversion to main road or other defined stage.
- 2.26** The controller shall be capable of providing the stages in any order as called by the detectors.
- 2.27** All new controllers supplied shall include a sub-miniature solar switch which shall be fitted to installation for dimming of signals during the hours of darkness and be correctly rated for the anticipated electrical load. The dimming voltage shall be $160V \pm 5\%$. The solar cell shall be carefully sited

to avoid street lighting or overshadowing that would be detrimental to normal operation.

- 2.28** Controllers shall be capable of meeting the following requirements:
- 2.29** The lights shall appear in the following order: Red -> Red Amber -> Green -> Amber (The red amber shall remain dormant until required by Kildare County Council.)
- 2.30** Starting sequence to be agreed with Kildare County Council. On "switch on" the signals shall commence with a minimum of a four second "all red" period, or flashing amber is permitted as an alternative.
- 2.31** The following shall be capable of adjustment on site with a hand held terminal.
- All Phase Timings
 - Vehicle Maximum Green Periods.
 - Time table and calendar details
 - Plan Details
 - Clock
- 2.32** The following timings shall be capable of simple adjustment at site:
- Minimum Green
 - Vehicle Extension Time
 - Maximum Green
 - Variable inter-green
- 2.33** The controller shall revert to a stage if a maximum green change is made from that stage. If no demand, there shall be an automatic reversion to main road or other defined stage.
- 2.34** The fault log and fault history shall be accessible from the hand held terminal.
- 2.35** If a detector fault occurs, permanent demands shall still occur in sequence for that stage / phase. All detectors shall be monitored for both detector permanently active and detector permanently inactive fault conditions. All detector faults and their fault status shall be logged in the controller fault log and this fault log entry shall be time and date stamped.
- 2.36** Safety timings (amber and all red) should be set in a non volatile memory so that there is no danger that these timings are over-written by rebooting of the controller, i.e. Conflict monitoring to be integral to controller and red lamp and all other lamp monitoring to be standard on controller.
- 2.37** The controller shall ensure that green – green, green – amber, red – green, etc conflicts will not occur. Any two red lamps out to traffic on one phase shall be treated in the same manner as a conflict.

- 2.38** The controller shall be capable of providing the stages in any order as called by the detectors.
- 2.39** Provision shall be made for checking of the operation of the detectors.
- 2.40** The provision for up to three I/O cards to cater for a possible maximum 24 input channels and 16 voltage free outputs shall all be provided.
- 2.41** The controller shall, in the event of a conflict (including red lamps out), switch off all lamps on the affected stream and only the affected stream unless otherwise required by the Employer's Representative.
- 2.42** In the event that left-turn slips in a separate stream to the main junction fail, then the main junction should stay running.
- 2.43** If the main junction fails, then all streams should shut down.
- 2.44** If a particular stream is "off" then the electrical power to the push button units that govern that stream shall be turned "off".
- 2.45** The chassis of controllers is to be capable of accommodating additional racks, boards etc. as required by future expansion or additions to the controller. In particular, space shall be left for the installation outstation equipment required for remote monitoring and CCTV interaction.
- 2.46** The controller case and its electrical earth wire shall be connected to ground via an embedded conductor ½" O.D. nominal planted into the ground. Wiring (16mm square nominal) to conductor shall be insulated and in accordance with BS6761. The earth rod and connecting earth wire shall be visible within the controller case.
- 2.47** A corrosion preventative material (denso tape) shall be applied at the point of connection between the earth rod, earth rod clamp and earth conductor cable.
- 2.48** A distance of 2 metres minimum shall be observed when installing adjacent ESB mini pillars, traffic/CCTV mini pillars, traffic/CCTV cabinets.
- 2.49** Separate earth rods (electrodes) shall be installed into mini pillars, traffic control cabinets. This practice shall be carried out regardless of the distance between the two units as each unit is classed as a separated standalone entity with different end users.
- 2.50** Earth rods shall be drove within the unit and not on the soil exterior to the unit.

- 2.51** An earth bar connection block shall be fitted to an internal wall of the traffic controller cabinets. The main conductive earth cable from the earth rod shall be terminated at this point and other earth bound connections (metallic doors, metallic frames) shall terminated at this point.
- 2.52** A minimum of one twin 13 amp electricity socket, RCD, or equivalent shall be provided within the controller case.
- 2.53** Indicator lamps shall be of such intensity that they can be seen lit in sunlight.
- 2.54** Indicator lamps, detector test lamps, detector packs and controls associated with particular traffic streams or direction of traffic shall be neatly marked giving direction of traffic served. Cable sockets and plug in components shall be neatly and clearly marked to indicate their function and/or to what they are connected.
- 2.55** Two no. Copies of each of the following standards / documentation shall be provided with the controllers:
- Maintenance manual;
 - Installation manual;
 - Site schematic drawing;
 - Warranty including conditions of warranty.
- 2.56** A complete controller schedule shall be supplied with controllers. This shall contain full details of the controller configuration for the junction. It shall be suitably bound in a durable cover. This shall be kept in a special shelf or receptacle fitted to the controller cabinet. Two further unbound copies of the schedule shall be provided.
- 2.57** Suitable diagrams, not subject to fading with age, shall be displayed in a prominent position inside the controller housing. A diagram shall give the details of the stages of the particular location and identify and give the purpose of vehicle detectors.
- 2.58** A hardback service notebook in a plastic covering shall be provided with each controller.
- 2.59** Two sets of controller keys shall be provided per controller site.
- 2.60** Working copies of the junction drawing shall be available prior to switch on and two paper copies of the final version of each drawing shall be supplied within two weeks of switch on. An electronic copy in AutoCAD format (version to match that used by the Employer's Representative) shall also be supplied but the Employer's Representative may, in specific circumstances waive this request.
- 2.61** A site logbook of a type agreed with the Employer's Representative shall be provided and this shall be stored together with one of the supplied controller

specifications and one set of Stage phase and controller drawings in a waterproof wallet fixed inside the controller.

- 2.62** The Contractor shall be responsible for supply, installation and commissioning of any equipment or software required for communication between the traffic signal controllers and Kildare County Council UTC and RMS/STRATOS.

3. PEDESTRIAN SIGNAL CONTROLLERS

- 3.1** Pedestrian signal controllers are to be supplied in a robust weatherproof case complete with high security lock and three keys. The cabinet shall be supplied complete with steel frame or other suitable means for embedding into concrete and shall be fitted with a door stay.
- 3.2** The controller shall be sited at a location which provides the best possible view of traffic on all approaches to the installation. This location to be agreed with the Council.
- 3.3** The controller shall be capable of operating under the following conditions:
- SCOOT UTC/MOVA;
 - Fixed time, and
 - Vehicle actuated.
 - Kildare County Council's Remote Monitoring System/STRATOS (where applicable)
- 3.4** The controller shall be adjusted if necessary to suit the site installation but the circuits needed for full operation shall remain within the controller.
- 3.5** Controllers must be capable of meeting the following requirements:
- 3.6** Starting sequence to be agreed with the Council. On "switch on" the signals shall commence with a minimum of a four second "all red" period, or flashing amber is permitted as an alternative.
- 3.7** The following shall be capable of adjustment on site with a hand held terminal.
- All Phase Timings
 - Vehicle Maximum Greens.
 - Time table, Clock and calendar details
 - Plan Details
 - Controller Fault Log and Historic Fault Log.
- 3.8** The controller shall be capable of implementing a mains linking system.
- 3.9** Safety timings (amber and all red) should ideally be set in a non-volatile memory i.e. PROM. Conflict monitoring shall be integral to all controllers.
- 3.10** The controller shall ensure that either 'green – green' or 'green – amber' conflicts will not occur. A facility for red lamp monitoring shall be provided. All red bulbs out in same direction to traffic shall be treated in the same manner as a conflict.

- 3.11** The controller shall switch to fault flashing in the event of a Green to green conflict. On Second Red lamp failure. At Pelican crossings the lights facing vehicular traffic shall appear in the following order :
- Red - Flashing Amber - Green - Amber
 - Flashing amber to vehicular traffic shall commence a minimum of 2 seconds after flashing green man to pedestrians is displayed. This shall be adjustable with a hand held terminal.

At Pelican crossings the light sequence for pedestrians shall be:

- Green Man - Flashing Green Man - Red Man.
- 3.12** A detector fault shall lead to permanent demands for that stage / Phase. All detectors shall be monitored for both detector permanently active and detector permanently inactive fault conditions. All detector faults and their fault state / status shall be logged in the Controller fault log and this Fault Log entry shall be time and date stamped.
- 3.13** Provision shall be made for providing an audible signal. These shall be capable of being controlled by the controller timetable such that the audio signal can be switched off at night. The relevant timetable entries shall be adjustable from the hand held terminal.
- 3.14** Solar switch to be fitted to installation for dimming of signals during the hours of darkness. The dimming voltage shall be $160V \pm 5\%$. The solar cell shall be carefully sited to avoid street lighting or overshadowing that would be detrimental to normal operation.
- 3.15** Stage lamps or similar indicator lamps will be required. Indicator lamps shall be of such intensity that they can be seen lit in sunlight.
- 3.16** Indicator lamps, detector test lamps, detector packs and controls associated with a particular traffic stream or direction shall be neatly marked giving direction of traffic served. Cable sockets and plug components shall be neatly and clearly marked to indicated their function and/or to what they are connected.
- 3.17** Provision shall be made for checking the operation of detectors.
- 3.18** Chassis of controller to be capable of accommodating additional racks, boards etc. as required by future expansion or additions to the controller.
- 3.19** The controller case and its electrical earth wire shall be connected to ground via an appropriate sized embedded conductor planted into the ground. Wiring (16mm square nominal) to conductor shall be insulated and in accordance with BS6761.

- 3.20** The following documentation shall be provided with the controller:
- Maintenance manual
 - User and facilities manual
 - Installation manual
 - Site schematic drawing
 - Warranty including conditions of warranty
 - A complete controller schedule, as provided by The Employer. The contractor shall provide a durable cover, which shall be kept in a special shelf or receptacle fitted to the controller cabinet.
 - Suitable diagrams, not subject to fading with age, shall be displayed in a prominent position inside the controller housing. A diagram, on the inside of the main door, shall give the details of the stages of the particular location and identify and give the purpose of vehicle detectors. A hardback service notebook in a plastic covering shall be provided with each controller.
- 3.21** All controllers shall be capable of supporting an existing pedestrian phase or future pedestrian phase with the following characteristics.
- Pedestrian heads in traffic signal installations shall be three aspect, namely red man, amber man and green man;
 - The electrical supply to push button units shall be not greater than 50 volts AC or 50 Volts DC.
 - All pedestrian push buttons shall be of the PRISMA type and shall be used unless advised otherwise by Kildare County Council.
- 3.22** All pedestrian button units shall be provided with an audible signal and tactile device and shall be operational at locations as directed by Kildare County Council. Audible devices shall be used when appropriate but tactile devices shall always be utilised. cableless linking facility
- 3.23** The cableless linking unit shall be solid state electronic and suitable for installation within a standard controller cabinet.
- 3.24** It shall be synchronised to the mains electricity supply and in the event of power failure shall maintain synchronisation from a crystal oscillator driven by an integral rechargeable battery for at least four hours.
- 3.25** It shall provide a minimum of 8 traffic plans, one of which shall isolate the controller to operate in vehicle actuated or fixed time mode as appropriate to the particular location.

- 3.26** It shall provide for not less than six changes of plan per day.
- 3.27** This unit shall provide for easy adjustment of plans and start/stop timings at site, by use of an RS232 handset port.
- 3.28** Stage and signal group times to be in the range 0 - 120 seconds with step size of 1 second.
- 3.29** It shall be capable of introducing or deleting stages as required by CLF or timetable control.

4. CONNECTING TO URBAN TRAFFIC CONTROL

- 4.1** All SCOOT / UTC installations shall be connected to Kildare County Council's Urban Traffic Control System, with no loss of functionality. The following requirements are to be met.
- 4.2** Where UTC facility and/or connection is specified the Contractor should ensure that the following requirements are met.
- 4.3** The controller is to be modified as necessary for UTC including a UTC interface with a 3U rack including sufficient void space and back wiring to accommodate the Kildare County Siemens SCOOT Outstation Transmission Unit (OTU).
- 4.4** The modification wiring is to include all sockets for connection to the OTU.
- 4.5** The bit pattern shall be as specified in the UTC database sheet(s) of the General Specification forms.
- 4.6** The manual panel is to be fitted with a 'computer on' LED operated by the presence of force bits from the UTC computer and with a remote reconnect switch. The manual panel LED shall be labelled 'UTC on' or as identified within the specification.
- 4.7** The Contractor is to provide self tuning multi-channel detector units for all SCOOT loops which are to be mounted and wired in the OTU detector rack using the power from the OTU detector power pack. The Contractor is to arrange all wiring forms for the detectors, both SCOOT and intersection plus connections to the power supply.
- 4.8** It is the Main Contractor's responsibility to arrange for a telemetry line, where required, to be fitted in the controller cabinet and to liaise with Kildare County Council to determine the exact telephone requirements.
- 4.9** The Contractor shall be responsible for commissioning the SCOOT detection control and reply bits. The Contractor shall be responsible for supplying all necessary equipment for testing purposes.
- 4.10** Any unused data transmission bits shall be strapped out.
- 4.11** The OTU data configuration should be recorded in the controller log book.

5. CONTROLLER UTC INTERFACE

- 5.1** An AUX (auxiliary) lamp shall be labelled and light when the controller is under UTC / MOVA control
- 5.2** The Manual Panel Signal On/Off switch shall be set to “Immediate Signals On”.
- 5.3** On the UTC interface there shall be:
- One “F” bit for each stage, with a “G” bit in a matching position on the reply word.
 - The “DX” bit followed by as many “D” bits as are necessary. The “DF” bit in the reply word shall match the position of the “DX” bit.
 - No bit in the control word, with the “RR” bit in the reply.
 - No bit in the control word, with the “LF1” bit in the reply to denote any lamp fault.
 - No bit in the control word, with the “LF2” bit in the reply to denote a second red lamp fault.
- 5.4** The “TS” bit in the control word, shall be matched by the “CS” bit in the reply
- 5.5** Other bits such as “LL” shall be added as necessary, to suit the needs of the controller.
- 5.6** Separate phase reply bits shall be provided for demand dependant phases, though there may be restrictions on the bit availability. These shall be discussed with Kildare County Council.
- 5.7** For Toucans, the control bits shall be PV, PX, and LL if appropriate, matched by, GV, WC, LO
- 5.8** Where the interface is to be used for more than one controller, the bits of the remote controller shall be marked up on the interface specification of the controller which will house the OTU and the separate controller bit sets marked up with the SCN of each.
- 5.9** The bits should follow the same pattern on the remote interface as on the signal controller interface.
- 5.10** The SCN (System Code Number) will be supplied on request by Kildare County Council.
- 5.11** The contractor shall be responsible for installing all necessary equipment, configuring, validating and commissioning signals to the Kildare UTC system.

- 5.12** The Contractor shall be responsible for installing all required cables including, where necessary, jointing of said cable to commission signals to the UTC or SCOOT/MOVA system.

6. CONNECTING TO REMOTE MONITORING SYSTEM

- 6.1** Unless specified otherwise by Kildare County Council in writing all non SCOOT / UTC installations will be connected to Kildare County Council's Remote Monitoring System/STRATOS, currently Yunex, with no loss of functionality. The following requirements are to be met.
- 6.2** A standard 3U rack is to be provided for a IP-Broadband Outstation Monitoring Unit (OMU) to be fitted in the controller cabinet containing a 300mm wide by 300mm deep void space.
- 6.3** It is the Contractor's responsibility to arrange for a telemetry line connected to the Public Switched Telephone Network to be fitted in the controller cabinet if network coverage will not support a IP unit.
- 6.4** All controller detector inputs shall be capable of being remotely monitored.
- 6.5** A separately fused supply shall be provided solely for use of the OTU/OMU.
- 6.6** The OMU equipment shall be of a type approved by Kildare County Council to ensure compatibility with the Instation operating system.
- 6.7** The OMU shall be connected with phase indications in order, followed by phase wait lamps in order. The detectors shall be connected in the order in which they appear in the controller input.
- 6.8** All outstation monitoring units (OMU) shall conform with the requirements of MCE 0152 Issue A "Monitoring and Control of Traffic Control Equipment via the Public Switched Telephone Network" incorporating all released amendments and references.
- 6.9** In order to ensure full compatibility with the operational Remote Monitoring System in Kildare County Council, all OMU's shall adhere to the manufacturer's dedicated OMU system given as: Yunex STRATOS system. Remote monitoring shall be capable of two-way communication with the Traffic Management Centre, via IP-Broadband or radio links.
- 6.10** The Signal Contractor shall be responsible for installing all necessary equipment and commissioning all signals to the DUSC system.

7. MICROPROCESSOR OPTIMISED VEHICLE ACTUATION (MOVA)

- 7.1** In order to ensure full compatibility with the operational Remote Monitoring System in Kildare County, all MOVA units shall adhere to the manufacturer's dedicated MOVA system given as: Siemens system compatible with the Siemens Outstation Monitoring Unit. The Contractor shall ensure that lead assemblies are of sufficient length to accommodate the installation requirements of the MOVA unit
- 7.2** The MOVA/OMU unit shall be integral to the controller.
- 7.3** A standard 3U rack is to be provided for a MOVA/Outstation Monitoring Unit to be fitted in the controller cabinet containing a 300mm wide by 300mm deep void space.
- 7.4** A UTC interface is provided inside the controller for MOVA control. The Contractor shall test the output of all UTC bits at the Site commissioning.
- 7.5** All controller detector inputs shall be capable of being remotely monitored. All control and reply bits shall be capable of being wired to the MOVA unit.
- 7.6** The manual panel shall include a 'computer on' LED which shall indicate when the controller is operating under MOVA control. The LED shall be labelled 'MOVA online' or as identified within the specification.
- 7.7** The MOVA equipment shall be of a type approved by Kildare County Council to ensure compatibility with the Site interrogation software and Instation operating system.
- 7.8** The latest version of the MOVA software shall be supplied, including all relevant licences to operate MOVA which will be incorporated into the tendered rates.
- 7.9** The Contractor will be required to validate the system post-commissioning and provide Kildare County Council with a validation report and final MOVA dataset. Kildare County Council may, at their discretion, require an independent validation at the Contractor's expense.
- 7.10** The Contractor shall liaise as necessary with a MOVA specialist and review the proposed loop locations and recommend additional or a reduction in the number of loops proposed.
- 7.11** The final proposed loop layout shall be submitted for approval to Kildare County Council at least two weeks in advance of any ducting works to ensure that ducting and chambers are located at the appropriate location.

- 7.12** The MOVA specialist shall have a minimum of 5 years of MOVA experience, on a minimum of 10 junctions, in designing and commissioning MOVA at similar junctions.
- 7.13** Details of the proposed MOVA Specialist shall be submitted for approval by Kildare County Council. The Contractor shall include any associated costs for design and commissioning in the relevant Bill of Quantity Items associated with the provision and installation of MOVA.
- 7.14** The Contractor shall install all Microprocessor Optimised Vehicle Actuation (MOVA) units in their appropriate controller cabinets. The Contractor shall be responsible for carrying out all calibration, validation and commissioning of the MOVA system to the satisfaction of Kildare County Council. The MOVA specialist shall carry out this work.

8. CABLING

- 8.1** All cable, including low voltage, shall be in accordance with the current edition of the BS6346 and shall be suitable for underground unprotected usage in accordance with the code of practice of the Institute of Electrical Engineers and the safety regulations of the Electricity Supply Boards.
- 8.2** All push button units/above ground detection facilities shall be supplied from unique extra low voltage cables with the exception of push buttons on stub poles which may be looped from the nearest relevant tall pole. Adequate spare cores shall be provided at each push button location to facilitate the tactile indicators and audible units.
- 8.3** The nearside primary on each approach shall be separately cabled back to the controller.
- 8.4** The same cable shall not feed the traffic signal heads showing to any one stop-line.
- 8.5** Any phase displayed on multiple signal heads at separate locations shall be cabled such that a minimum of two of the heads are supplied from independent cable runs.
- 8.6** Cables shall be terminated in the controller at the appropriate terminal block and in the correct terminal position.
- 8.7** Detector feeder cables shall be terminated in an appropriate terminal block and "soft wired" to the correct labelled detector unit, using light gauge stranded wire, twisted in pairs.
- 8.8** With stranded conductors or with conductors having a diameter less than 2.5mm sq, a crimped pin or protective leaf shall be used in the terminal.
- 8.9** All cables (LV and ELV) shall be clearly labelled at the controller, tops of poles and in chambers using indelible ink on plastic labels securely fixed to the cable to indicate their function and destination in sufficient detail to facilitate future maintenance and modification.
- 8.10** LV (low voltage) and ELV (extra low voltage) cabling shall be steel wire armoured colour coded except for detector feeder cables that shall be unarmoured single pair. The armouring shall be utilised as the Earth Continuity Conductor and shall have adequate conductivity.
- 8.11** All loop feeders shall be labelled with the detector name or conductor function at both ends as near as is possible to the appropriate terminal or connection.

- 8.12** All loop conductor wire pairs shall be connected together with zip ties or similar, and labelled as close to the point they enter the drawpit as possible.
- 8.13** All cables shall be armoured in multibanded steel and covered in an outer sheath of orange coloured PVC. Cables with a rigid copper core, cross-linked polythene insulating envelope, sheath in PVC, armouring composed of two sheets of spirally wound steel and outer sheath in PVC, may be used. No other cables shall be used without the prior approval in writing of Kildare County Council.
- 8.14** Separate neutrals shall be utilised for signalling, regulatory signs and push buttons.
- 8.15** Traffic signal cables shall not pass through ducts or chambers used by any other service.
- 8.16** All Cables including loop feeder cables shall comply with or exceed the this specification and comply with the requirements of BS 505 as amended by TR0102.
- 8.17** The communications cable shall be 20-pair colour coded 0.6 mm diameter with SWA similar to the existing network. The cable shall be the dry filled type.
- 8.18** Signals from detector loops shall not be brought back on the same cable carrying the supply to signal heads or push buttons.
- 8.19** At least 4 spare cores at the pole cap shall be provided for each LV cable run and each ELV cable run to push buttons. In addition, extra cabling shall be included on all approaches to permit the installation of a pedestrian phase at a later date where existing pedestrian phases are not provided for in the contract plans.
- 8.20** Each signal pole shall be cabled directly to the controller. The looping of any cables between signal poles will not be accepted.
- 8.21** Unused cores at the controller shall be left for future expansion, but isolated to ensure no earth loops can be created.
- 8.22** Unused cores between poles shall be connected to Earth at one pole top.
- 8.23** Unused cores between the pole and the controller shall be connected to Earth at the pole top.
- 8.24** Signal cables shall not pass through ducts or boxes used for any other service and no other services may utilize the traffic signal ducts or boxes.

- 8.25** Duct shall be in accordance with NJUG Standards, Orange 100 mm diameter with 'traffic signals' stamped at regular intervals.
- 8.26** All cables shall be laid in ducts and LV and ELV shall be segregated into different cables and ELV cores shall be terminated on separate terminal blocks to LV in the controller cabinet.
- 8.27** A mixture of extra low voltage (ELV) and low voltage (LV) circuits in multicore cables is not acceptable in any circumstances.
- 8.28** Cables carrying 240v lamp power shall occupy separate ducts from cables carrying extra low voltage (push button/audible, detection etc) although they will use the same chambers. This will not apply to the individual duct directly feeding each pole.
- 8.29** The Contractor shall be responsible for ensuring that a draw-cord is retained in each duct run following the installation of the cables.
- 8.30** All draw ropes shall be replaced in each duct for future maintenance purposes following/during cable installation procedures.
- 8.31** Pulling of cables will be the responsibility of the Contractor. All cabling shall be installed as shown on the relevant site drawing
- 8.32** Cables shall not be bent to a radius of less than 12 times their diameter or less than a radius recommended by the manufacturer, whichever is the greater.
- 8.33** The Contractor shall complete and return to Kildare County Council details of their cabling layout proposals to accommodate the traffic signal installation requirements at least three weeks prior to each specific junction installation. Final installed record sheets shall be submitted for approval at the time of site acceptance.

9. DETECTION

- 9.1** Stages that are not always required shall be demand dependant. It is recommended that all stages are set to appear in Manual mode.
- 9.2** Pedestrian phases shall be demand dependent except in the case of an all round pedestrian stage where all pedestrian phases should appear.
- 9.3** Where “on crossing” detection is provided, each crossing shall be a separate phase and monitored accordingly.
- 9.4** The need for selective detection of vehicles shall be checked at an early stage with, and agreed by, Kildare County Council.
- 9.5** Detection may be by any type of detector. The use of above ground detection is encouraged, providing the detection characteristics are appropriate for the application.
- 9.6** Pedestrian detection shall use the appropriate device for both on crossing and footway detection and shall be agreed with Kildare County Council. It will be necessary to justify the adoption of a specific type or model, if it is not in common use in Kildare.
- 9.7** Footway detection for pedestrians is not mandatory, but omission shall be justified. It is the responsibility of the designer to ensure that the coverage of the detection is appropriate for the width of the crossing.
- 9.8** All Above Ground Detection devices shall be connected using standard plug and sockets and not wired directly.
- 9.9** All detector feeder cables laid in the carriageway, which exceed 5m, shall be armoured.
- 9.10** The joint between the loop cable and the armoured feeder shall be made in a footway chamber.
- 9.11** The requirements for kerbside and on-crossing equipment for the detection of pedestrians shall be agreed with Kildare County Council and supplied as per the relevant site drawings.
- 9.12** Requirements for any test and configuration equipment for programmable devices shall be agreed with Kildare County Council and the appropriate number of test units supplied. Any relevant training shall be part of the training requirements.

10. INDUCTIVE LOOPS

- 10.1** Inductive loop detectors shall be approved to the appropriate UK DETR/HA standard specification for self-tuning detectors. Quad detector packs shall be used.
- 10.2** All detector channels shall be labelled to indicate the detector name. The label shall be waterproof and marked adjacent to the detector channel.

Installation of inductive loops and Loop Feeder Cables

- 10.3** All loops shall be installed in accordance with the appropriate UK DETR/HA specification.
- 10.4** The Contractor shall be deemed to have inspected the site and satisfied himself on all matters relating thereto, particularly with regard to presence of sub-surface ferrous objects, and he shall be expected to liaise with Kildare County Council to identify these.
- 10.5** Joints between loop tails and feeder cables shall normally be in a 615 x 615mm chamber.
- 10.6** Loop tails shall be as short as possible and only exceptionally shall a joint between feeder cable and loop be more than 4 metres from the loop.
- 10.7** Feeder cables shall run under footpaths/verges in ducts.
- 10.8** The installed feeder cable shall not exceed 300 metres in length from the equipment housing to the loop or 100 metres for bus loops.
- 10.9** If armoured feeder cable is used it shall be terminated in the equipment housing using cable connectors approved by Kildare County Council, and each connector shall be bonded to the earth point using 2.5 mm² flexible earthing cable terminated with crimped connection tags. The Contractor shall ensure that no other earth connection exists along the length of the cable.
- 10.10** When installing feeder cables the Contractor shall exercise the utmost care in storing, running-off, drawing into ducts, bending and other processes involved ensuring that the cable is not damaged in any way.
- 10.11** Cables shall not be bent to a radius of less than 12 times their diameter or less than a radius recommended by the manufacturer whichever is the greater.
- 10.12** Feeder cables beneath footpaths are to be laid in approved ducts.

- 10.13** Loop feeder cables shall be kept clear of main switch and maintenance sockets.
- 10.14** Kildare County Council shall approve the cable joint prior to use.
- 10.15** Feeder cables shall be electrically connected to the loop tails with heated insulated crimp connectors using a ratchet type of crimping tool. The Contractor shall ensure that the cable conductor has been correctly crimped by visually checking the cable and also by applying a vigorous pull test to that cable on either side of the joint.
- 10.16** The electrical connectors shall be encased in a joint approved by Kildare County Council staff and the Contractor shall ensure that the connectors are staggered to avoid the possibility of any short circuits.
- 10.17** The Contractor shall ensure that any instructions issued by the cable joint manufacturer are provided in writing to his installation and supervisory staff. These instructions shall form part of this specification.
- 10.18** The Contractor shall ensure that the joint is waterproof prior to backfilling.
- 10.19** With the exception of cable joints between loop and feeder cables, no other joint shall be permitted in the loop/feeder configuration.
- 10.20** Cables shall be terminated in the controller or detector housing using terminal connection blocks which are adequate in size for the diameter of conductors used. Screws shall not bear directly on to conductors; either a protective leaf in the terminal or a crimped pin on the end of the conductor shall be used.

11. LOOP DETECTION INSTALLATION AND WORKING PRACTICE WHEN CUTTING SLOTS

- 11.1** Slots shall be cut at least one metre from any ferrous objects or areas of poor surfacing unless otherwise approved by Kildare County Council.
- 11.2** Slots shall be properly dried and cleared of all debris before laying loop or detector feeder cable and the slots shall be kept clean and dry before the backfill is complete.
- 11.3** The depth of the slot shall be checked with a depth gauge along the whole length of the slot.
- 11.4** All cable shall be dry before laying in slots.
- 11.5** Sharp implements shall not be used to seat cable in slots.
- 11.6** Where the corners of the slot are at an angle of less than 100 degrees then this angle shall be rounded with the use of a cold chisel or the corners of the loop shall be crosscut.
- 11.7** After backfilling, which shall be hot pour bitumen, excessive spillages of bitumen shall be removed from the road surface and loose asphalt shall be swept clear of the road surface and disposed of offsite.
- 11.8** The type of bitumen used shall not embrittle at temperatures above 5 degrees Celsius. The temperature of the 'kettle' shall be in accordance with the supplier's instructions.
- 11.9** Loop cable shall conform to Departmental Specification TR2031.
- 11.10** The Contractor shall be responsible for erecting, maintaining and dismantling all Traffic signing including traffic control required to complete the slot cutting.
- 11.11** Loop cable shall be taken through a length of orange colour plastic ducting marked Traffic Signals with a minimum diameter of 50mm, from the back of the kerb, preferably adjacent to a kerb joint to a chamber situated in the footway/verge where the loop tails and detector feeder cables shall be jointed.
- 11.12** The Contractor shall include for excavation (the minimum necessary) at the channel to access this duct and for reinstatement with bitumen (as used for sealing slots). The holes shall then be backfilled with hot rolled asphalt or cement. The depth of cover for the duct end at back of kerb shall be 50mm.

- 11.13** All slot cutting shall be carried out only once appropriate Chapter traffic control has been put in place.
- 11.14** Where the bitumen backfill is below the road surface, the Contractor shall be responsible for topping up the bitumen backfill to achieve a level finish with the road surface. The Contractor shall be responsible for additional backfilling of the slots should the level of backfill fall below the road surface within 28 days of the issue of the Taking-Over Certificate.
- 11.15** Where the contract drawing indicates the application of new special surfacing on the carriageway, the contractor shall complete all slot cutting and backfilling of cables in these areas prior to the application of the special surfacing.
- 11.16** The standard dimension for the width of the slots shall be 10.0mm (+1mm/-0mm).
- 11.17** The formula for the overall depth of the slots shall be $50+7n$ mm (+10mm/-0mm), where 'n' is the number of layers of cable in the slot. In general the depth shall allow for 50mm of cover above the uppermost cable in the slot.
- 11.18** Where a surface comprises black top overlaying concrete, the installer shall ensure that all loops are laid within one material, subject to a minimum depth of cover.
- 11.19** Detector loops are to be connected via individual pairs of feeder cables.
- 11.20** No feeder cable shall be jointed unless it is to connect a detector loop.
- 11.21** Joints may be chemically sealed or mechanical. They shall be made in accordance with the manufacturer's instructions and recommendations.
- 11.22** Detector feeder cables shall be jointed to the detector loop within the specially provided connection chamber in the footway/verge. No additional joints between the detector loop and detector unit shall be permitted. Individual cores shall be joined by means of insulated crimp connectors using a ratchet type of crimping tool and staggered to avoid the possibility of any short circuits. The joint shall be waterproof and able to withstand a vigorous "pull-test" of approximately 3kg.
- 11.23** Where partial excavation of the footway is required to access stub-duct ends, then the exposed loop tails shall be covered with resin and then bitumen in several layers as necessary, after sealing the end of the stub duct and prior to re- instatement of the footway with cold setting asphalt and sealing with hot pour bitumen.

12. COMMISSIONING OF INDUCTIVE LOOPS

- 12.1** Each feeder cable shall be labelled at its point of entry to the controller with PVC cable markers secured around the cable with cable ties.
- 12.2** Each loop and feeder configuration shall be tested at the controller as follows and the results submitted to Kildare County Council as a test certificate for the loop installation.
- 12.3** The dc series resistance of the loop feeder, with the detector disconnected, shall be measured at a current 10A dc or greater. The resistance shall not exceed 3 ohms.
- 12.4** With the loop circuit disconnected from the detector, the impedance to earth of the two loops and feeder conductors shall be measured at a test voltage of 500V dc applied for at least one minute. This shall not be less than 10 megohms. The two ends of the loop circuit shall be connected together for this test.
- 12.5** Where armoured feeder cable is used, the armouring shall be disconnected from the earth point, and the impedance to earth of the armouring shall be measured at a test voltage of 500V dc applied for one minute. This shall not be less than 10 megohms.
- 12.6** Where armoured feeder cable is used with the armouring connected to the earth point of the equipment housing, the impedance to earth of the armouring shall be measured. This impedance shall not be greater than 0.5 ohms.
- 12.7** The inductance of the loop and feeder circuit shall be measured. This shall be comparable with the theoretical value.
- 12.8** The frequency of operation of each configuration shall be measured. Where two loop circuits share a common feeder cable their frequency of operation shall be separated by at least 5 kilohertz.
- 12.9** The Contractor shall adjust the sensitivity and presence time of each detector to the requirements specified by Kildare County Council. The Contractor shall demonstrate correct operation of the detector at the sensitivity specified.
- 12.10** The Contractor shall ensure that an inductance change caused by vehicles in one loop shall not induce spurious detections in any adjacent loop system.
- 12.11** The Contractor at his own expense shall replace any loop or feeder which fails these tests.

- 12.12** The Contractor shall conduct loop commissioning tests in the presence of Kildare County Council staff.

13. TESTING OF INSTALLED CABLES AND MARKING OF CABLE DRAWINGS

- 13.1** The Contractor shall supply to Kildare County Council at the site commissioning the relevant electrical test certificates. The Contractor's failure to supply these test certificates may cause the switching on of the signals to be delayed. The Contractor shall be liable for all expenses involved with re-attending the subsequent site commissioning.
- 13.2** The Contractor shall notify Kildare County Council prior to tests being undertaken so that they may be present to verify the tests.
- 13.3** Series resistance of loop and feeder. The total resistance shall not exceed 8.5 ohms.
- 13.4** Impedance to earth of the armouring of every feeder cable and connecting cable before the armouring is bonded to earth. The reading shall not be less than 10 megohms.
- 13.5** Impedance to earth of cable armouring after the armouring has been connected to earth. The reading shall not exceed 0.5 ohms.
- 13.6** Impedance to earth of loop and feeder conductors with both feeder conductors connected together, using at least 500v DC applied for at least one minute.
- 13.7** Impedance to earth of connecting cable conductors with all conductors connected together, using at least 500v DC applied for at least one minute. The reading shall not be less than 10 megohms. The cable shall be disconnected at both ends during the taking of this reading. Any loop or feeder or connectable cable which fails any of the tests shall be replaced by the Contractor before the site is commissioned.
- 13.8** The Contractor shall reset the detector card power supply where necessary and shall observe and monitor the LED for the correct operation of each loop connected to the detector card. Any defects or malfunction shall be reported immediately to Kildare County Council. This work shall be carried out for all detectors which have been affected by the Works.
- 13.9** Measurement of linear meterage may be carried out with a measuring wheel that has been calibrated within the previous 12 months. Kildare County Council shall have the right to check any measurement and request that any electrical test be repeated at the contractor's expense during commissioning.

14. SCOOT LOOP DESIGN

- 14.1** SCOOT Loops are to be placed by a suitably qualified engineer following a site survey.
- 14.2** The loop positions should be confirmed by Kildare County Council prior to slot cutting.
- 14.3** SCOOT loop design shall take account of:-
- Adjacent signal installations. (This may include requirements for the modification of adjacent installations, required as a consequence of the addition of the new site.)
 - Sinks and sources between nodes.
 - Lane use and width.
 - Opposing flows, including the need for uni-directional detection link journey time.
 - The need to separately identify vehicles for different phases as necessary.
 - Good reflection of journey times and 'MAX' queues,
- 14.4** Where compromises to the above are necessary, the reasons shall be recorded with any special requirements for system operation.
- 14.5** The use of soft loops to adjust the saturated flow shall be considered at all SCOOT UTC sites and their omission will require justification.

15. PEDESTRIAN DEMAND UNITS

- 15.1** Push button units shall include both an audible and tactile device unless specified. The facility shall exist to adjust the volume of the audible signal and to inhibit it between 22:00 and 07:00 each day or at any other times as required by Kildare County Council.
- 15.2** Pedestrian push button units shall be positioned in accordance with the orientation shown on the Contract drawing.
- 15.3** All entry points into pedestrian demand units for cables shall have a secure and watertight seal.
- 15.4** Push-button units shall not contain cables carrying mains or any other low voltage.
- 15.5** The centre of all push button units shall be positioned between 1.0 and 1.1 metres above the finished ground level. The push button units shall be securely fixed to the signal pole so that no movement occurs.
- 15.6** Where tactile devices are to be installed in pedestrian push-button units as specified on the drawing they shall be of a type approved by Kildare County Council.

16. SIGNAL HEAD SPECIFICATION

- 16.1** All traffic signal heads shall be approved to UK Highways Agency standard/specification TR0102 and the EU EN12368 standards with the requirement for the optical unit to be of high intensity luminance and chromatic type to full compliance of the standards. Regulatory signs where these are required shall conform to Irish Standards and shall be continuously illuminated by fluorescent tubes.
- 16.2** The lowest part of any signal head assembly including brackets shall have a minimum clearance above the finished ground level of 2.1 metres.
- 16.3** There shall be a minimum clearance of 450mm between the edge of the signal head and the edge of the carriageway. Where the minimum clearance cannot be achieved the Contractor shall notify Kildare County Council immediately.
- 16.4** Traffic signal heads shall be fitted with backing boards and appropriate hoods. The signal heads to be supplied are subject to specific approval of Kildare County Council.
- 16.5** The signal heads shall be retrofitted with electrical colour coded flex to ensure reliable terminations and ensure easily identified connections for subsequent maintenance.
- 16.6** Optics shall be nominally 210mm diameter except where otherwise specified. Green arrow optics shall be nominally 210mm diameter except where otherwise agreed.
- 16.7** The signal heads shall be modular and shall be contained within a durable polyethylene housing and integral frame. The hoods shall be riveted to the housing and fixed securely.
- 16.8** Backing boards shall be securely attached to all vehicular signal heads. The composite head including any additional signs shall be bordered on the front by a high intensity white retro-reflective tape between 45mm and 55mm wide.
- 16.9** All entry points into signal heads for cables shall have a secure and permanent watertight seal.
- 16.10** The signal heads shall comprise of discreet components that can be replaced individually where necessary. The lens, for example, shall not be integral with the door.
- 16.11** The body shall have a wide range of adjustment in the horizontal plane and shall be supplied with suitable brackets for lateral mounting to the signal pole.

- 16.12** Unless otherwise agreed and shown on the design, all vehicle signal head hoods shall be Primary, to maximise the angle of view of the optics.
- 16.13** The Contractor shall align all signal heads in accordance with the Contract drawing and as required by Kildare County Council at the site commissioning.
- 16.14** All vehicular signal aspects shall include hoods. The primary signal shall include cut away hoods and the secondary heads shall include full-length hoods. In addition, where specified, the Contractor shall supply and install louvered hoods.
- 16.15** Where signal heads include additional filter or right turn arrow signals or box signs the configurations shall be as specified in the signal head
- 16.16** All signal aspects, unless otherwise agreed, should be monitored LED's.
- 16.17** The Contractor shall be responsible for installing vehicular signal heads on overhead mast arms and tall signal poles (exceeding 4 metres length) including the hiring of lifting equipment and traffic management. The lamp transformers shall be located in the base of the column overhead mast arm, if an ELV controller is not appropriate, and both the door and column shall be earthed to current IEE wiring regulations.
- 16.18** Where two signal heads (twin) are positioned adjacent to each other on the same signal pole the Contractor shall ensure the structural stability of signal pole and provide a base plate where necessary.
- 16.19** The lowest part of any cycle signal head assembly including brackets shall have a minimum clearance of 2.4 metres above the finished ground level.
- 16.20** All entry points into cycle signal heads for cables shall have a secure and watertight seal.
- 16.21** All cycle signals shall be fitted with primary or secondary hoods.

17. LAMP SPECIFICATION – LED SIGNALS HEADS

- 17.1** LED shall be UK Highway Agency approved and be in compliance with the European Standard EN12368 “Traffic Control Equipment”, second edition and meet the electrical wiring standards as laid down by the ETCI National Rules For Electrical Installations.
- 17.2** Where LED signal aspects are required to replace existing signal aspects, the entire signal head, including brackets, lens, tungsten bulb, reflector backing board, hoods and possibly transformer, will be replaced with a new signal head installation housing LED lamps. The new LED signal aspect must be compatible with existing poles and controllers.
- 17.3** The LED signal assembly shall be compatible with the existing controller’s lamp fault monitoring equipment, i.e. be compatible with halogen bulb monitoring equipment.
- 17.4** The proposed LED signal must be compatible with Lamp Dimming as implemented by the existing controllers, i.e. the LED assembly can be operated by the controller in a lamp dimming mode.

18. SIGNAL POLE SPECIFICATION

- 18.1** All poles shall be 114mm diameter of plastic coated galvanised steel, 4000mm, 5000mm or 7000mm long.
- 18.2** Traffic signal poles shall be vertically aligned and stable prior to attachment of any signal equipment.
- 18.3** The pole shall be so designed and constructed as to provide adequate support and stability for up to 4 (3-aspect) traffic signal heads. The pole shall have strength and rigidity at least equivalent to that of a seamless steel tube of 100mm outside diameter and 4.4mm thickness and a tensile strength of + 375MN/m² and a Z-value of 39.3cm³
- 18.4** Holes shall be drilled on four sides of the pole to suit the positions of the signal heads. All holes shall be sealed with grommets, maintaining as far as possible a smooth surface and consistent colour.
- 18.5** A single cable entry hole, 50mm wide and 300mm long shall be provided below ground level, extending to within 170mm of the surface. The position of this slot shall face away from the kerb to match the associated chamber. All rough edges at holes shall be removed.
- 18.6** Pickling or other approved process shall remove all mill scale and rust on the exterior and interior surfaces. The poles shall be protected by hot dip galvanising to the thickness corresponding to a pole thickness of 4.4mm and in accordance with BS729 1971 or current edition.
- 18.7** Where required, fixing holes for a push button unit shall be provided to suit mounting of the unit at a level of 1100mm above the footpath. The orientation of the unit shall face parallel to the kerb on the side adjacent to the kerb dishing or tactile paving so that pedestrians shall face approaching traffic when pressing the button.
- 18.8** Grey coloured plastic cable termination pole cap units shall be fitted at the top of all poles to seal against water ingress. These shall be securely fixed to the pole using a bolt or other mechanism and shall not, without the prior written agreement of Kildare County Council, protrude above the top of a correctly installed traffic signal or pedestrian head.
- 18.9** Stub push button unit poles shall be supplied with hard solid plastic tops securely glued in place.
- 18.10** All poles shall be directly installed into a chamber with retention sockets.
- 18.11** Retention Sockets shall be fitted with reducers sufficient to facilitate the installation of traffic signal poles.
- 18.12** Retention Sockets shall be supplied complete with safety covers.

- 18.13** Where 7000mm traffic signal poles are installed all related electrical equipment shall be housed within an appropriate sized midi pillar at the base of the pole. Within the midi pillar all electrical connections shall be made off within an appropriately IP rated PVC enclosure. Correct glands and shrouds should be employed to maintain the integrity of the IP rating of the enclosure.
- 18.14** The use of 6000mm traffic signal poles shall only be used with prior agreement by Kildare County Council.
- 18.15** Traffic Signal Poles shall be installed so that the pole is not less than 800 mm from the nearest kerb face and no part of any head fixed to the pole shall be within 500mm of the nearest kerb face. The poles shall be installed to allow a minimum clearance of 350mm from the kerb face to the backing board.
- 18.16** Cranked poles shall only be used by agreement with Kildare County Council.
- 18.17** Poles carrying push buttons shall be installed 500mm from the white lines of the crossing to allow pedestrians and cyclists to easily reach the push buttons.
- 18.18** Secondary traffic signal heads at free standing Pedestrians and Toucans shall be fitted with primary hoods and aligned to be visible from vehicles at 50m from the stopline when typical approaching vehicle speeds are less than 60 km/h. Alignment shall be agreed with the Council for higher speed roads.
- 18.19** Compliant with BSEN 12368: 2000 (Traffic Control Equipment - Signal Heads), formerly UK BS 505 (1971), and only in the configurations as specified in the Chapter 9 of the Traffic Signs Manual (DoE – 1996). Heads shall be mounted so that the underside of the head shall be not less than 2.1m above footway or finished surface level and no part of the head is within 500mm of the nearest kerb face. Heads shall be securely fixed so that they are not affected by wind or subject to damage by vehicles - 'D' brackets shall be used for double heads or as required

19. SITE INSTALLATIONS – TESTING AND COMMISSIONING

- 19.1** The Contractor shall completely cover all signal head assemblies including pedestrian heads and push-buttons that are not controlling traffic during installation. The covers shall only be removed by the Contractor when commissioning the signals.
- 19.2** All signal poles shall be numbered, starting with the pole closest to the controller and proceeding in a clockwise direction around the facility.
- 19.3** On completion of the installation the site shall be left clean and tidy and all rubbish shall be removed.
- 19.4** After installation of the equipment, site testing shall be carried out by the Contractor prior to the commissioning in order to demonstrate compliance with the specification.
- 19.5** The Contractor shall test the operation of all lamps, detectors and push buttons.
- 19.6** Only after the tests have proved satisfactory shall Kildare County Council be asked to attend the installation in order that it may be commissioned. The Contractor shall supply all equipment necessary for testing purposes.
- 19.7** The Contractor shall give at least one week's advance notice to Kildare County Council or there designated signals engineer to attend the commissioning tests.
- 19.8** Any non-compliances identified by Kildare County Council or there designated signals engineer shall be resolved at the commissioning by the Contractor. If after taking all reasonable action the Contractor is unable to rectify the outstanding non-compliances and at the commissioning Kildare County Council or there designated signals engineer consider that the non-compliances are such that the signal equipment cannot be switched on the Contractor shall re-attend the site to resolve the non-compliances immediately the following day and each day thereafter until the item is rectified.
- 19.9** Where the non-compliances are not deemed by Kildare County Council or there designated signals engineer to affect the switching on of the signal equipment and the Contractor has taken all reasonable measures at the commissioning, the outstanding non-compliance items must be resolved within 5 working days. All labour, plant and materials required to resolve the non-compliant items shall be provided at the Contractor's own expense.
- 19.10** The maintenance contractor shall be responsible for the site maintenance and in the event of a fault with any of the equipment, other than lamps, shall inform Kildare County Council who will then decide what action is to be taken.
- 19.11** In addition to any faults that occur following site acceptance the maintenance responsibilities and liability for any traffic signal equipment shall not be

- accepted by Kildare County Council until final Taking-Over Certificates have been signed and accepted by Kildare County Council. If during this period a fault develops, Kildare County Council maintenance contractor shall attend the site, to rectify the fault at the Contractor's expense.
- 19.12** The system will not be taken in charge until it has operated successfully for a period of 190 hours within 200 hours of the commencement of the tests for the fixed time system, with the system operating satisfactorily on fixed time for a continuous period of 190 hours (the two periods of 190 hours may run concurrently)
- 19.13** The system shall be deemed to have operated satisfactorily if the system has been free of any fault resulting in the loss of computer control of four or more outstations and the total number of faults whose cause has been attributable to the equipment and software supplied by the Contractor, has been less than five.
- 19.14** The Contractor shall provide equipment to ascertain the time of any failure during unmanned periods. A computer printout is the minimum requirement to satisfy this clause.
- 19.15** Any failure or disruption outside the reasonable control of the Contractor including, but not limited to, failure of the data transmission lines, or any equipment not supplied under this contract, shall not be considered as a system failure.
- 19.16** If re-programming of the system is carried out during the tests of then the tests outlined shall be considered to have failed.
- 19.17** Mains electricity supply failure and restoration simulations shall be made as required by Kildare County Council during the acceptance tests.
- 19.18** The Contractor shall supply all test equipment, programs, special data, and any simulators required for the acceptance tests
- 19.19** The following tests shall be undertaken and copies of appropriate test certificates supplied to Kildare County Council on completion of the relevant tests:
- 19.20** Loop and loop feeder cable tests; and
- 19.21** Site acceptance test of the complete installation.
- 19.22** Kildare County Council, and others as Kildare County Council may consider necessary, shall witness all tests. In the event of the failure of tests necessitating re-testing, the Contractor shall meet all reasonable time and travel and subsistence costs incurred by Kildare County Council or others attending the retest.
- 19.23** Commissioning and switch on will not take place until:
- 19.24** All tests are completed to the satisfaction of Kildare County Council and a Completion Certificate is issued;
- 19.25** All works are completed; and

- 19.26** The final safety audit is satisfactorily completed
- 19.27** Kildare County Council may allow minor works that do not affect safety to be completed after switch on.
- 19.28** New traffic signals or signals incorporating new phasing/staging shall not be switched on a Friday, Saturday or Sunday and between the hours of 07:30 - 09:00 and 16:30 - 18:00 hrs Monday to Thursday unless specifically agreed to by Kildare County Council on a site-by-site basis.
- 19.29** Commissioning of any traffic signal installation shall not be undertaken until all works at the installation, including surfacing, pedestrian and road markings etc are complete.
- 19.30** Premature commissioning of any traffic signal installation may be permitted by the Overseeing Organisation where it can be demonstrated that advantages in working methods can be achieved, provided that:-
- 19.31** The installation has attained a level of completion acceptable to Kildare County Council;
- 19.32** Site acceptance testing as defined in this specification is undertaken as far as possible;
- 19.33** Any site specific requirements of Kildare County Council are met;
- 19.34** Safety is not compromised.
- 19.35** It should be noted that in addition to maintenance responsibilities, liability for any traffic signal equipment shall not be accepted by Kildare County Council until final take over certificates have been signed and accepted.
- 19.36** Once commissioned, the traffic signals shall not be switched off without the prior approval of Kildare County Council. Should any traffic signal installation require to be switched off for any reason following commission, then the Contractor shall erect temporary signs on all approaches to the signal installation before switching the signals off; and also install signs where pedestrian crossings are affected.

20. VANDALISM

- 20.1** In the case of all signal heads, push-button units, solar cells etc, Kildare County Council shall be satisfied that each of these items shall provide a reasonable resistance to vandalism. Where a product has not previously been supplied to Kildare County Council, the Contractor may be required to provide or demonstrate a sample at the Contractor's own cost. Kildare County Council may also require test certificates from an independent body testifying as to the robustness of the item in question.