

REPORT N<sup>o</sup>. 70033775-401 AJL

# A41, OXFORD ROAD, BICESTER GATEWAY, TOUCAN

TRAFFIC SIGNAL INSTALLATION APPENDIX 12/5

JUNE 2018

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## TRAFFIC SIGNAL INSTALLATION APPENDIX 12/5

Atlas Homes Group

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# 1

## TRAFFIC SIGNAL GENERAL REQUIREMENT

### 1.1 GENERAL

- 1.1.1 The signal equipment layout is shown on the signal design drawing in **Appendix A** and shall be installed in accordance with TA 84/06 “Code of Practice for Traffic Control & Information Systems For All Purpose Roads” and LTN 1/98 “Installation of Traffic Signals & Associated Equipment”, the signal design drawing and this specification.
- 1.1.2 The Contractor shall include for the supply and delivery of all equipment within this section, together with the testing and commissioning of the installation and leaving it in working order to the satisfaction of the Engineer. He should also include for any materials and work which may not be expressly specified but which are implied and necessary for the satisfactory completion of the installation.
- 1.1.3 Only workmen who have had experience in the erection of Traffic Signals and associated equipment shall be employed on the associated traffic signal work.
- 1.1.4 Any works relating to the installation of traffic signal cable duct and inspection chambers shall be supervised by a representative of the traffic signal installation company.
- 1.1.5 Any pre-contract meetings where the Signal Company may be requested to attend including any sub-contractors must be allowed for in the contract price. These are to be held on a mutually agreed date with the Engineer, Contractor and Signal Company.
- 1.1.6 Any deviation from the signal design drawing(s) must be agreed in advance by the traffic signal design engineer. All deviations from the signal design drawing shall be documented and include; details of the changes, details of who authorised the changes and the date.
- 1.1.7 **TSRGD 2016 came into force on 22 April. As of this date, statutory type approval will cease and TOPAS product registration will become active for new product registrations.** All equipment shall be fully type-approved in accordance with TOPAS. Where later amendments to these documents are issued, equipment shall comply with their revised requirements in force at the time of site acceptance by the signal design engineer. Where revisions to the documents occur after the tender return date, the successful tenderer (the signal contractor) shall seek written authority from the signal design engineer before modifying the equipment to comply with the new requirements.
- 1.1.8 Where an approved list for a particular type of equipment is incorporated in the technical specification for the individual scheme, only equipment on that list shall be supplied, subject to the requirements of the general specification. Tenders shall be submitted on the basis that approved equipment will be used throughout. Alternative equipment may be submitted for inclusion in the approved lists and alternative quotations may be provided assuming use of that equipment.
- 1.1.9 Traffic signal controllers shall comply with the latest issue of TOPAS 2500 “Specification for Traffic Signal Controllers” including all released amendments. All controllers shall comply with appropriate sections of this general specification as required by the technical specification for the individual scheme.
- 1.1.10 Street furniture shall comply with TOPAS 2206A “Specification for Road Traffic Signals”, and should be used in conjunction with BS EN 12368 and BS 7987 (HD638).

- 1.1.11 Inductive loop detection equipment shall comply with the latest issue of TOPAS 2512 “Performance Specification for Below Ground Vehicle Detection Equipment”. All detector units shall feature the auto-retune facility described in clause 2.3 of TOPAS 2512.
- 1.1.12 Inductive loop detection systems shall comply with the requirements of section 3 of this document. Unless specified otherwise, the location of detector loops shall conform with MCE 0108C “Siting of Inductive Loops for Vehicle Detecting Equipment at Permanent Road Traffic Signal Installations” and shall be installed in accordance with MCH 1540 issue F “Specification for the installation of detector loops on Motorways and All Purpose Trunk Roads” and set out as per Highway Construction Details drawings G27, G28 and G32.
- 1.1.13 Reference should be made to the signal design drawings in **Appendix A** and this document for the proposed arrangement and location of all loops. Carriageway loop connection boxes are to be used to install loops as per the signal design drawing and the Highway Construction Details Drawing G25 unless otherwise agreed with the signal design engineer. Guidance is to be sought from the signal design engineer prior to commencing slot-cutting operations.
- 1.1.14 Above ground detection equipment shall comply with the latest editions of TOPAS 2505 “Specification for Advanced Above Ground Vehicle Detector Systems for use at Permanent Traffic Signal Installations” and TOPAS 2506 “Performance Specification for Above Ground On-Crossing Pedestrian Detection Systems” and additionally any other requirements of this specification.
- 1.1.15 Tactile equipment mounted in pedestrian / toucan push button boxes shall comply with TOPAS 2508A “Performance Specification for Tactile Equipment for use at Pedestrian Crossings”. This equipment will generally be specified for use at traffic signal installations where assistance for the visually impaired is required.
- 1.1.16 One printed copy of the user handbook or guide shall be supplied to the signal design engineer for each type of controller and item of ancillary equipment. The documentation shall include a full list of operator commands and their functions and details of the functions of all switches accessible to the signal design engineer. The signal contractor shall supply the documentation to the signal design engineer at the time of the Site Acceptance Test (S.A.T.).
- 1.1.17 The signal contractor shall co-ordinate with the civil contractor to arrange all necessary traffic management in accordance with the requirements of chapter 8 of “The Traffic Signs Manual” (2006), to carry out all necessary works under this contract.
- 1.1.18 All wiring shall comply with the I.E.E. Wiring Regulations (BS 7671) Edition 17 - 2009, including all amendments.
- 1.1.19 Pole numbers are required and are to be installed prior to the Site Acceptance Test.
- 1.1.20 The site will not be accepted without the appropriate electrical test certificates presented to the local authority, at or prior to the SAT.

## **1.2 LOCATION OF EQUIPMENT**

- 1.2.1 The location of the electrical supply (Haldo feeder pillar), controller, ducting, detection, poles and ancillary equipment shall be generally as detailed on the scheme drawings in **Appendix A**. The exact location of new equipment shall be agreed with the Oxfordshire Highways Traffic Signal Engineer on site prior to installation. Note 1m separation is required between the feeder pillar and controller.

# 2

## EQUIPMENT

### 2.1 GENERAL

- 2.1.1 All equipment including cable shall be supplied in a new and unused condition except insofar as it has been tested in the course of manufacture. Equipment of the most recent pattern and in current production shall be used.
- 2.1.2 This is a new site installation, not a modernisation / upgrade of existing.
- 2.1.3 The Contractor shall confirm in writing that the equipment being offered has HA Type Approval for use on Public Roads.
- 2.1.4 The equipment required is listed at the end of this specification.
- 2.1.5 Following completion of installation the Contractor shall supply an inventory of all equipment installed, including Elexon codes.

### 2.2 SIGNAL POSTS

- 2.2.1 All street furniture shall be installed at the positions shown on the drawing. Where engineering difficulties necessitate alternative positions the Contractor shall inform the Oxfordshire Highways Traffic Signal Engineer in writing.
- 2.2.2 Signal posts shall be suitable for accommodating the equipment specified at the location shown on the drawing.
- 2.2.3 Signal posts are to be **GREY**.
- 2.2.4 All traffic signal poles shall comply with BS EN 12368:2000 and shall be hot-dip-galvanised prior to the application of a plastic coating.
- 2.2.5 Traffic signal posts shall be numbered using weatherproof adhesive labels, in accordance with scheme drawings in **Appendix A**.
- 2.2.6 Poles shall NOT be supplied with pre-drilled holes for pushbutton units. Such holes shall be drilled on site as required **and shall be treated with a suitable Zinc-rich paint** or other suitable rust inhibiting paint as agreed by the Engineer.
- 2.2.7 Signal posts shall be supplied with post caps, post head terminating assemblies including supports for the signal cable, and all necessary mounting brackets and accessories to facilitate the correct alignment of heads. All signal head brackets shall be galvanised before the plastic coating is applied. All signal head fixings are to be made from stainless steel.
- 2.2.8 All unused holes in signal posts shall be covered by a suitable means, approved by the Oxfordshire Highways Traffic Signal Engineer.
- 2.2.9 Signal posts shall be erected in pole retention sockets, ensuring vertical alignment. Posts shall not be cabled or fitted with equipment until such time as the foundation has achieved its design strength.
- 2.2.10 Poles to be rotated 45° where appropriate to achieve maximum clearance between signal head and carriageway.

## 2.3 SIGNAL HEADS

2.3.1 Signal heads shall:

- Be fitted with sighting screens (class 1 reflectivity backing boards). Backing boards shall be securely fitted and form a continuous border around the signal head without any gaps.
- Have a permanent watertight seal at every cable entry point.
- Incorporate LED aspects.
- Have a minimum clearance from the immediate ground level of 2.40 metres.

2.3.2 All new signal heads shall be covered with a purpose-made, opaque, orange tarpaulin cover, which is free from advertising and securely attached to the signal head so that the signals are not visible to motorists or pedestrians during installation and subsequent commissioning. The same shall apply to all pushbutton units and pedestrian / toucan signals, which will also cover any tactile device fitted. These coverings shall be fitted as soon as the signals / pushbuttons are installed, and shall not be removed until the signals are commissioned by the Oxfordshire Highways Traffic Signal Engineer.

2.3.3 All signal aspects shall be 200 mm and shall use LED illuminates. Light emissions shall comply with specification EN12368. All aspects are to be fitted with FIRA type lenses.

## 2.4 PUSH BUTTONS AND DISPLAY UNITS

2.4.1 All push buttons shall be vandal-resistant.

2.4.2 All push buttons and display units shall normally be positioned so that the Wait panel and indication is at 30° to the kerb line, unless otherwise directed by the Oxfordshire Highways Traffic Signal Engineer.

2.4.3 **All** push buttons and display units shall be of an LED type, approved by the Engineer, and shall include a rotating cone tactile device. The tactile device is to be fitted in the right hand side of the push button when looking at the front of the unit. Audible units are to be timetabled, initially set to on = 06.30 / off = 23.00.

2.4.4 All nearside push button and display units are to be combined.

2.4.5 All demand units are to be located so that the push button is 1.1m from the adjacent footway.

## 2.5 CONTROLLER

2.5.1 The new ELV controller is to be configured as per the TOPAS2500 TOUCAN controller timings in **Appendix C**.

2.5.2 The new controller cabinet shall be **GREY** in colour.

2.5.3 The new controller shall be installed on a NAL Controller Cabinet Base, supplied by the signal contractor to the Civils contractor at the start of the works.

2.5.4 The NAL Controller Cabinet Base shall be **GREY** in colour.

2.5.5 Space shall be provided within the cabinet for the installation of an Outstation Monitoring Unit (OTU) or an Outstation Transmission Unit (OTU) (swing frame or equivalent). The unit must be compatible with Oxfordshire's Siemens system..



- 2.5.6 Non-Siemens controllers will require a Siemens Stratos outstation (OTU) for MOVA and integration with the existing UTC system operated by Oxfordshire County Council.
- 2.5.7 Rigidly mounted terminal blocks shall be provided for the termination of all site cables (inclusive of loop feeder cables).
- 2.5.8 Rigidly mounted terminal blocks shall be provided in the controller to enable the Earth Loop Impedance of each pole to be tested from the controller. One terminal shall be provided for each pole and the terminals shall be labelled 'Earth Loop Impedance test point' followed by the pole number
- 2.5.9 All cabinets shall be supplied with one key of each type, including T keys, required to gain access to all parts of the controller / termination cabinet / mini-pillar. The keys shall be given to the signal design engineer prior to site acceptance. Security to access manual facilities shall be provided by the use of a Yale key, 10½ Section, change 900. Security to access the rest of the controller cabinet shall be provided by RKA27c lock(s). Where additional fastenings are required, double "D" Type screw locks shall be used. The bolts of these locks shall be captive. The bolt head dimensions shall be as shown on DfT Drawing No. MCX 0546A.

## **2.6 OUTSTATION MONITORING UNIT (OTU) REQUIREMENTS**

- 2.6.1 All equipment shall be compatible with the current Siemens instation equipment and shall have the latest issue of firmware installed.
- 2.6.2 Non-Siemens controllers will require a Siemens Stratos outstation (OTU) for MOVA and integration with the existing UTC system operated by Oxfordshire County Council, with mobile communications equipment, to be installed by contractor.
- 2.6.3 The signal contractor shall install all necessary cabling/interface leads between the traffic signal controller and the OTU to provide the required control, reply and monitoring facilities.
- 2.6.4 Contractor to commission OTU on street and in Oxfordshire CC office on the Siemens system. Commissioning of the OTU is to be carried out in the presence of the signal design engineer. Interrogation of the OTU shall be demonstrated by the signal contractor to the signal design engineers satisfaction by means of a suitable interrogation device.
- 2.6.5 Commissioning of the OTU should be carried out at the SAT or within one week of the site switch on.**
- 2.6.6 Sim card to be provided by the Oxfordshire County Council.

## **2.7 CABLING**

- 2.7.1 The installation shall comply with the latest edition of BS 7671.
- 2.7.2 No cables shall carry a voltage which exceeds "Extra Low Voltage" as defined in the latest edition of BS 7671 unless otherwise agreed by the County Council or their Agent. On installations where LV cables are permitted, LV and ELV cables shall never be terminated on a common block.
- 2.7.3 On ELV installations, multi-core cables with a core cross sectional area (csa) of 1.0mm shall not exceed 250 m in length and multi-core cables with a core csa of 1.5mm shall not exceed 500 m in length. Individual cores must not feed more than one signal aspect at any one time.

- 2.7.4 All signal cables which are to be installed in ducts, excluding single core loop detector cables, shall be armoured. The outer sheath shall be coloured orange and shall be embossed with the legend "TRAFFIC SIGNALS" in 4 mm high characters generally in accordance with Clause 11.2 of BS 6346: 1987 "Specification for PVC-insulated cables for electricity supply".
- 2.7.5 In the controller (or distribution cabinet) each armoured multi-core cable shall be marked with its destination. This shall be clearly written in indelible ink on a "pull tight" label securely fixed to the cable. Cables carrying ELV shall have yellow "pull tight" labels, loop feeder cables shall have green "pull tight" labels
- 2.7.6 Each 3 aspect signal head shall be connected independently to the controller using 5 cores (red live, amber live, green live, red neutral, amber/green neutral). Two further cores (live and neutral) shall be provided for each additional aspect. Similarly each 2 aspect pedestrian head shall be connected to the controller using 3 cores (red man live, green man live, neutral). Therefore a single core (live or neutral) shall only carry the current of a single aspect at any one time.
- 2.7.7 To enable the Earth Loop Impedance of each pole to be tested from the controller, the "green" core (which is not to be classified as a spare core) of each multi-core cable between the controller and the pole shall be connected to the earth terminal on the pole. The other end of that core shall be connected to the terminal in the controller labelled 'Earth Loop Impedance test point' followed by the appropriate pole number.
- 2.7.8 The armouring of cables shall, at both ends, be fitted with glands which shall be properly bonded to earth terminals and used as an earth conductor. In addition the cables armouring shall be used to support the weight of the cable at each end and shall be properly clamped and supported within the housings. Where loop detector feeder cables terminate in a Loop Chamber the requirements of this clause do not apply
- 2.7.9 Spare cores on each cable shall be gathered together and capped using **self-amalgamating tape**, NOT insulation tape.
- 2.7.10 Every cable is to have a minimum of 4 spare cores or 25% whichever is the greater.**
- 2.7.11 All poles shall be directly cabled from the controller (with the possible exception of 2 m, 2.5 or 3m poles with welded caps) unless otherwise agreed by the County Council or their Agent
- 2.7.12 A schedule detailing the connection, location and function of each terminal block installed within the controller, shall be identified by an annotated diagram or by clear labelling cross-referenced to the schedule. The completed details shall be passed to the Engineer prior to site acceptance.
- 2.7.13 External wiring between signal heads and poles shall be protected by flexible tubing which shall be fixed securely to the back of the signal head using a nylon or plastic gland. Sufficient tubing shall enter the appropriate hole in the signal pole to ensure that it remains in the pole during flexing of the signal head during all weather conditions.
- 2.7.14 Cable Insulation and Earth Loop Impedance Tests complying with the latest edition of BS 7671 "Requirements for Electrical Installation" shall be carried out, using appropriate test equipment. The Earth Loop Impedance of each pole shall be tested from the controller using the terminals labelled 'Earth Loop Impedance test point' in the controller. The earth loop impedance for each pole shall be the impedance measured between the incoming supply and the appropriate Earth Loop Impedance test point. Note that Earth Loop Impedance tests are required on all installations but on ELV installations the Earth Loop Impedance shall be considered satisfactory if the measured impedance of the earth loop is approximately equal to the calculated value of the impedance of the cable plus the impedance of the incoming supply.

- 2.7.15 A "BS7671 Electrical Installation Test Certificate" shall be completed prior to site acceptance when it will be signed by the Engineer. Pole numbers used on the certificate shall be as shown on the site layout drawing. The Engineer should be notified in writing of any precautions that are required to safeguard the controller hardware and software during such tests. A list of these precautions shall be left in the controller following commissioning. A completed certificate shall be forwarded to the Engineer within five working days of site acceptance.

## **2.8 POWER REQUIREMENTS**

### **MAINS SUPPLY**

- 2.8.1 The signal contractor shall be responsible for the installation of the electricity supply and feeder pillar to OCC specification.
- 2.8.2 A 6mm<sup>2</sup> 3 core armoured cable shall be used to link the power supply secondary isolator fuse to the signal controller and termination cabinet(s). The pillar casing, door and earth core of the controller link cable shall be bonded together to a main earth terminal with a 10mm<sup>2</sup> earth cable.
- 2.8.3 The signal contractor shall be responsible for the installation of the connecting cable between the feeder pillar and the Traffic Signal Controller Unit. Including the connection of tails in the Electricity Company's cut-out. They shall also be responsible for connecting any required power feeds to any termination cabinet(s).
- 2.8.4 Fuse sizes between mains supply and controller should show that loading and diversity have been considered.

### **OTU SUPPLY**

- 2.8.5 A 5 amp fused supply shall be provided for an OTU unit power supply. This supply shall not be disconnected by the switch to disconnect the mains supply to the controller equipment.

### **MAINTENANCE SUPPLY**

- 2.8.6 A switched dual 13 amp socket shall be provided, in addition to any other power supplies provided to comply with preceding clauses. Maintenance sockets to be installed in the controller and all termination cabinets.

# 3

## LOOP DETECTOR INSTALLATION

### 3.1 GENERAL

- 3.1.1 All equipment used in conjunction with any loop detector installation shall comply with the requirements of section 1.1.
- 3.1.2 Inductive loop cable shall comply with TOPAS 2029D “Inductive Loop Detector Cable”. The minimum overall cable diameter defined in clause 5 of TR 2029 shall be 1.5mm and shall not exceed 1.8 mm.
- 3.1.3 Feeder cables shall comply with TR 2031E “Feeder Cable for Inductive Loop Detectors”. The cable shall be sheathed in orange polyethylene, not grey as required by clause 5.10.1 of TR 2031E. Only 1 pair feeder cable will be permitted.
- 3.1.4 All loops to be cut as per the MOVA guidance.
- 3.1.5 **Detector pack settings are to be detailed on the installation report.**
- 3.1.6 Working hours for slot cutting are to be agreed with the signal design engineer prior to works commencing. No additional costs incurred for slot cutting operations outside of these times shall be sought by the signal contractor.
- 3.1.7 Slot cutting shall not be conducted if the air temperature falls below 2°C, as required by MCH 1540 issue F.
- 3.1.8 The location and layout of loops shall be in accordance with section 1.1 and the signal design drawing associated with this scheme. In the event that slots are cut at locations not in accordance with the signal design drawing and/or additional information supplied by the signal design engineer, the signal contractor will be liable for all costs associated with the re-installation of the loop detectors at the correct location(s).
- 3.1.9 All adjacent loops are to be installed on the same detector pack.
- 3.1.10 The “Slot Cutting Measurement Certificate” shall be completed prior to site acceptance when it will be signed and handed to the signal design engineer.
- 3.1.11 Tests shall be carried out to record the insulation and series resistance of the components of each loop detector installation in accordance with paragraph 3.6.1 which shall be completed prior to site acceptance when it will be signed and handed to the signal design engineer.

### 3.2 CABLING REQUIREMENTS

- 3.2.1 Feeder cables shall generally not exceed 200 metres in a single direction. Exceptionally this maximum length may be increased to 300 metres in accordance with MCH 1540 Issue F, provided specific authorisation from the signal design engineer is obtained. Where these limits would otherwise be exceeded, a detector haldo pillar shall be installed at an intermediate location, to be agreed by the signal design engineer.
- 3.2.2 No feeder cable shall be jointed unless it is connected to a detector loop.

- 3.2.3 No individual feeder cable shall be connected to more than one physical detector loop. Each loop shall be individually connected to a separate termination point. Where multiple loops are to share the same detector input, soft wire shall be used to connect each termination point to its associated detector channel.
- 3.2.4 Feeder cables shall be terminated in one or more heavy duty termination blocks. The termination block(s) shall be securely and directly bolted to a fixed metal support. Light gauge stranded wire, twisted in pairs, shall be used to connect from the heavy duty block(s) to the detector back-plane(s).
- 3.2.5 Each feeder cable shall have a green "pull tight" label securely fixed to each end and in all associated chambers, with the identity of the loop(s) attached to the cable, as shown on the signal design drawing. This shall be clearly written on each label in indelible ink.
- 3.2.6 All loop detector joints shall be of a re-usable type. Chemical joints shall not be used.

### **3.3 WATER SUPPLY DURING SLOT CUTTING**

- 3.3.1 A mains water supply will be used for cooling saw blades during slot cutting. The signal contractor shall be responsible for the gaining of permission from the appropriate water supply company for the extraction of water required for slot cutting purposes.
- 3.3.2 In order to minimise the possibility of damage to the mains or contamination of the water supply, the signal contractor shall supply and use a double non-return valve assembly on standpipe(s) when connected to a hydrant(s). The water company may stipulate that hoses must not be laid across a carriageway unless it is closed to traffic.
- 3.3.3 Where a hydrant is not available, or when a carriageway crossing is necessary, the signal contractor shall provide a water bowser. A water pump may be connected to the bowser's outlet to supply high pressure water to the slot cutting machine. With respect to permission for the extraction of water from a hydrant to the bowser and the type of standpipe required, the condition in paragraph 3.3.1 and 3.3.2 shall apply.
- 3.3.4 During slot cutting operations only highway drainage shall be used to dispose of contaminated water. Under no circumstances shall open drainage be used to dispose of contaminated water. Advice shall be sought from the civil contractor prior to any slot cutting operations.

### **3.4 SLOT CUTTING**

- 3.4.1 The minimum dimensions for slot cutting in asphalt road surfaces shall be 10.0 mm wide by 3 times the cable diameter + 75mm in depth for the actual loop perimeter. On concrete road surfaces, the depths specified may be reduced to 30 mm.
- 3.4.2 Where the loop cable turns in the slot at an angle of less than 110°, the apex of the corner shall be removed in accordance with Highway Construction Drawing G5.
- 3.4.3 All slots shall be made dry and free of debris before the loop cable is laid, and all efforts shall be made to keep the slots clean and dry before the back fill is complete.

### **3.5 BACK FILL**

- 3.5.1 The back fill for the loop cable shall be a one part process, comprising of hot pour bitumen.
- 3.5.2 In the carriageway any excess back fill will be removed.

## **3.6 DETECTOR PERFORMANCE TEST**

3.6.1 Each loop detector installation shall be checked by means of tests as detailed in section 5 of MCH 1540 F. All insulation measurements to be carried out at a test voltage of 1000 volts DC, for a duration of one minute. The results shall be recorded on a suitable Detector Performance Test Certificate supplied by the signal contractor.

## **3.7 JOINTING**

3.7.1 All loops shall be cut into loop carriageway connection boxes as per Highway Construction Details Drawing G25. Approximately 500 mm of surplus loop cable and 500 mm of surplus feeder cable shall be left at the joint position in the roadside inspection chambers.

3.7.2 All joint connections shall be housed in I.P. 68 rated, re-enterable type joints and subjected to a 'Pull Test' of approximately 3 Kg.

# 4 INSTALLATION REQUIREMENTS

## 4.1 GENERAL

- 4.1.1 For each installation a diagram showing proposed cable runs, types and lengths shall be made available to the signal design engineer not less than one month prior to the installation date in order to demonstrate compliance with the above requirements.
- 4.1.2 The transportation to or from site of all necessary street furniture/equipment required to carry out the signal installation will be the responsibility of the signal contractor.
- 4.1.3 The signal contractor will also be responsible for all necessary on site handling of street furniture in the course of installation works and will be responsible for the safe keeping of all equipment being provided under this contract until full site acceptance by the signal design engineer.
- 4.1.4 No on-site facilities will be provided for storage of signal equipment by the signal design engineer during the contract period unless prior agreement is obtained. Facilities may be provided by the civil contractor at their discretion.
- 4.1.5 All non-working signal heads erected on site shall be covered at the end of each day of installation. Durable waterproof orange coloured covers will be provided by the signal contractor for this purpose. The signal contractor will also be responsible for their fitting and maintenance during the installation period and their removal prior to commissioning.
- 4.1.6 The signal contractor shall ensure that all staff involved in installation are fully aware of all relevant specifications and are supplied with all the information and equipment necessary to comply fully with all the requirements. The signal contractor must also ensure that all staff involved in installation are fully site inducted and must comply at all times with the SHE requirements.
- 4.1.7 **Upon commencing, works shall take place over consecutive days. Any deviation from this shall be agreed beforehand by the signal design engineer.** All installation works shall be planned as part of the construction phase of the works.
- 4.1.8 The signal contractor's nominated representative shall be present on site, whilst any signal installation works are being carried out.
- 4.1.9 The location of all street furniture and alignment of signal heads shall be in accordance with the signal design drawing and/or as instructed by the signal design engineer.
- 4.1.10 The signal contractor shall be responsible for all safe working methods whilst on site. Particular attention shall be paid to chapter 8 of the current Traffic Signs Manual, The Electricity at Work Regulations 1989, HSG47 "Avoiding Danger from Underground Services" and any site specific safety rules or instructions. The signal contractor shall ensure that the site is kept tidy, removing all discarded materials at the end of each working day.
- 4.1.11 The location of all street furniture shall be marked on site prior to works commencing during a site meeting attended by the signal design engineer and a suitable representative of the signal contractor.
- 4.1.12 The signal contractor is to ensure that all draw cords are to remain within the ducts, chambers and all other access points following the installation of cable to facilitate future maintenance or modification requirements.

## 4.2 SAFETY ASPECTS

- 4.2.1 Section 117 states the attention to general safety regulations but the Contractor's staff (and any personnel sub-contracted by him) shall at all times comply with the relevant Health and Safety Regulations and the Code of Practice 'Safety at Street Works and Road Works'.
- 4.2.2 Where it is necessary to have ladders projecting into the footway, signs and cones shall be used to protect and draw attention to the obstruction.
- 4.2.3 All signing and coning shall be to the standard laid down in Chapter 8 of the Traffic Signs Manual published by the Department for Transport.
- 4.2.4 Any chambers with their lids removed shall be protected by at least two cones.
- 4.2.5 A safe route for pedestrians shall be maintained on the footway at all times. No obstructions such as cables or cable drums shall be left unattended on the footway.

# 5 CONFIGURATION

- 5.1.1 Standard Toucan crossing, with MOVA control. On crossing and kerbside detection. See timing sheets for timing details of periods.

# 6 FACTORY ACCEPTANCE TESTS

- 6.1.1 Standard Toucan, MOVA control, FAT not required.

# 7 SITE COMMISSIONING

- 7.1.1 Commissioning tests are as follow:

- Inspections of site layout and equipment location, to check compliance with the requirements of the specification and drawing.
- Electrical tests to demonstrate compliance with electrical requirements. The form 'Traffic Signal Cable Test Certificate' shall have been completed, witnessed and agreed by suitably qualified Oxfordshire Highways Traffic Signal Engineer.
- A successful Site Acceptance Test (SAT) to demonstrate satisfactory and safe signal operation and control, including correct cabling of signal heads and operation of Lamp Monitoring.
- Successful testing of Remote Monitoring, including the reporting of faults to the instation.

- 7.1.2 The Oxfordshire Highways Traffic Signal Engineer shall be given at least 5 working days' notice of the above. Commissioning are not carried out on Fridays or weekends.

The SAT is to be carried out in the presence of / by representatives of the Oxfordshire Highways Traffic Signal Engineer (contact Ben Broughton, tel: 01865 815096).



- 7.1.3 The Contractor shall carry out comprehensive pre-commissioning checks to ensure compliance with the specification and provide written evidence of this prior to requesting a representative of the Oxfordshire Highways Traffic Signal Engineer to attend SAT and commissioning.
- 7.1.4 The Contractor shall put into operation all or part of the traffic signal installation only after the installation and all equipment has been fully tested to the satisfaction of the Oxfordshire Highways Traffic Signal Engineer. However the site will only be deemed to be accepted if the Take Over Certificate is completed and signed with no comments by the Oxfordshire Highways Traffic Signal Engineer.
- 7.1.5 The Contractor may, at the direction of the Oxfordshire Highways Traffic Signal Engineer, temporarily switch on the site. However this does not absolve the Contractor of his responsibilities to complete the works to the full satisfaction of the Oxfordshire Highways Traffic Signal Engineer.
- 7.1.6 Commissioning of the OTU should be carried out at the SAT or within one week of the site switch on.

## 8 MOVA REQUIREMENTS

### 8.1 OUTSTATION EQUIPMENT, CONFIGURATION AND VALIDATION

- 8.1.1 Toucan with MOVA equipment required. Push buttons to be on channels 9 (from Bicester) and 10 (to Bicester).

### 8.2 MOVA FACILITIES

- 8.2.1 Push buttons to be on channels 9 (from Bicester) and 10 (to Bicester).

## 9 MOVA INSTALLATION

### 9.1 DETECTOR LOOP LOCATIONS

- 9.1.1 See drawing for IN and X loop locations. Push buttons to be on channels 9 (from Bicester) and 10 (to Bicester).

## 10 TAKE OVER AND WARRANTY

- 10.1.1 The Contractor shall provide full maintenance to traffic signal equipment falling within the site from the date the final Take Over certificate is signed by the Oxfordshire Highways Traffic Signal Engineer, until such time as 28 consecutive fault free days have passed. Faults and damage resulting from Road Traffic Accidents are excluded from the 28 day qualifying period. The Contractor shall maintain the signals from initial switch on until conclusion of the fault free period.

- 10.1.2 In addition to the 12 month Warranty Period covering all the equipment, the LED aspects shall be covered by a further 4 year Warranty (i.e. a total of 5 years from the date of Commissioning). A specialist Supplier shall be appointed to replace and / or repair faulty aspects during this additional 4 year Warranty Period. Any faulty aspects will be returned to the Supplier by the County Council's Traffic Signal Maintenance Contractor and the aspect shall be repaired / replaced and returned to the Traffic Signal Maintenance Contractor within 3 weeks (including delivery time).
- 10.1.3 During the Warranty Period the County Council's Fault Centre will act as the Fault Centre for all traffic signal faults. All faults or damage affecting the traffic signal equipment shall be reported to the Fault Centre. The Fault Centre will manage the fault reporting / fault clearance process.
- 10.1.4 Fault or damage reports received by the Fault Centre will be reported to the traffic signal sub-contractor for repair. Prior to any work on site the traffic signal sub-contractor will report to the Fault Centre informing the Fault Centre of his intentions. Following any work on site the traffic signal sub-contractor will report to the Fault Centre detailing works carried out, the times of his attendance on site and the operational state of the signals.
- 10.1.5 Faults will be reported by the Fault Centre as "Urgent", "Less Urgent" or "Lamp Fault" and may be reported at any time. If the equipment is operating, or not operating, in such a manner as to cause abnormal delays or there are safety hazards the fault will be reported as Urgent.
- 10.1.6 Following the receipt of a fault the traffic signal sub-contractor shall respond as follows:-
- Urgent faults reported between Midnight and 08.00 hours
    - Attend and Make Safe within 2 hours
    - Urgent Action by 13.00 hours
    - Full Repair within 24 hours
  - Urgent faults reported between 08.00 hours and 13.00 hours
    - Attend and Make Safe within 2 hours
    - Urgent Action by 16.00 hours
    - Full Repair within 24 hours
  - Urgent faults reported between 13.00 and 18.30 hours
    - Attend and Make Safe within 2 hours
    - Urgent Action by 08.00 hours the following day
    - Full Repair within 24 hours
  - Urgent faults reported between 18.30 hours and Midnight
    - Attend and Make Safe within 2 hours
    - Urgent Action by 13.00 hours the following day
    - Full Repair within 24 hours
  - Less Urgent faults
    - Full repair of faults (excluding faults requiring slot cutting work) within 1 week
    - Full repair of faults requiring slot cutting work within 3 weeks
  - Lamp faults
    - Lamp replacement within 24 hours

- 10.1.7 If an Urgent fault has been reported following an equipment failure, Urgent Action is to restore a situation where the signals are operating satisfactorily, where they are not causing abnormal delays and where there are no safety hazards. However if the Urgent fault has been reported following accident / vandal damage then Urgent Action is simply to make the signals safe with the Full Repair being completed within 24 hours.
- 10.1.8 If an Urgent Fault is unlikely to be downgraded to less urgent status within 2 hours of receipt of an Urgent Fault then an Attend and Make Safe action should be carried out. Attend and Make Safe includes erection of warning signs/traffic management, isolation and/or protection of exposed wiring/terminals and removal of equipment/debris from the carriageway.
- 10.1.9 If the equipment is found to have suffered damage by accident or vandal a photographic record of the damage should be made before repairs are carried out.
- 10.1.10 If, as a result of a fault the controller has been without power, then on the restoration of power, checks should be carried out to ensure that no timings have been lost from the controller's volatile memory.
- 10.1.11 The fault record shall include –
- time/date of fault report
  - origin of report / category of fault
  - time of attendance on site
  - time work was completed
  - photographic record of any accident / vandal damage
  - details of work carried out
  - details of further work required / fault repair classification
  - identity of maintenance technician

# 11 METHOD OF MEASUREMENT FOR TRAFFIC SIGNAL WORKS

- 11.1.1 The items in the Bill of Quantities for traffic signal work shall include all the items listed under Series 1200 paragraph 30 in the Method of Measurement for Highways Works.
- 11.1.2 For the purposes of this contract 'control equipment' as indicated in Series 1200 paragraph 30 section L shall include:
- Signal posts installed in NAL RS115 740 Duck Foot Retention Socket (to be installed by Civils contractor).
  - Controller, NAL base, signal heads and brackets, vehicle detection and solar cell.

- 11.1.3 All the quantities in **Appendix B** are indicative and should be used in conjunction with the scheme drawings in **Appendix A**.

# 12 SPECIAL REQUIREMENTS

## 12.1 GENERAL

- 12.1.1 The special instructions are in addition to the requirements of the specification and shall be adhered to in conjunction with the specification.

## 12.2 CONTROLLER CONFIGURATION AND BUILD REQUIREMENTS

- 12.2.1 No special requirements.

## 12.3 OTU/REMOTE COMMUNICATIONS

- 12.3.1 Signal contractor is to arrange with OCC Traffic Signals to supply appropriate files to allow OTUs to be configured and commissioned prior to SAT.
- 12.3.2 Communications will be via GSM, and will be available for the use of the installation.
- 12.3.3 The contractor will install and commission and demonstrate, operationally, that the installation works satisfactorily at the SAT by means of a pre-commission.

# Appendix A

## **SCHEME DRAWINGS**

**GENERAL ARRANGEMENT 3775-WSP-S278-XX-DR-CE-5001 PO1**

**STANDARD DETAILS 3775-WSP-S278-XX-DR-CE-6011 PO1**

# Appendix B

**BILL OF QUANTITIES**

**TRAFFIC SIGNALS – A41, OXFORD ROAD, BICESTER TOUCAN**

Description	Quantity
Supply and install a Microprocessor ELV Controller Unit (grey) to the requirements of TOPAS2500a latest issue, VA and MOVA operation. SAT (Site Acceptance Test) and signing of installation final take over paperwork. Including: - → OCC compatible fully configured and commissioned Siemens GSM OTU incl. Live Update Diagram → NAL Controller Base (grey) → Any other associated equipment required to bring the controller into full working order.	Item
Electrical feeder pillar to OCC specification	1
4m traffic signal pole (grey)	8
ELV LED RAG Traffic Signal head assembly with primary/secondary hoods	8
ELV TOUCAN nearside combined pushbutton unit with tactile unit and audible	4
ELV TOUCAN nearside pushbutton unit only with tactile unit and audible	4
On Crossing Detector (preferably Siemens Hiemdall units)	4
Kerbside Detector (preferably Siemens Hiemdall units) to cover 4m wide area, so 4 or 8 units depending on version used	4 / 8
Photoelectric cell assembly for lamp dimming control	1
Signal Cable	Item
Feeder cable	Item
Slot cutting	Item
Additional Brackets, primary/secondary hoods as required	Item

# Appendix C

**TOUCAN TIMING SHEET**



## **Toucan Crossing Timings – A41, Oxford Road, Bicester.**

**Both crossing widths are 9.3m kerb to kerb**

	Description	Timings
Period 1	Min Green Traffic Peak/Off/Weekend	30/18/18 (Min 7)
Period 2	Amber to Red	3
Period 3	Gap/Forced Change	1/3
Period 4	Min Pedestrian Green	6
Period 5	All Red	3
Period 6	All Red Extension	8
Period 7	All Red Extension Max Change	3
Period 8	All Red Extension Gap Change	0
Period 9	Red to Amber	2

$P6=(9.3/1.2+3)-P5(3) = 7.75$  therefore 8 seconds.

### **Timetable**

Day	Time	Max
Mon – Friday	07:30:00	1
Mon – Friday	09:30:00	2
Mon – Friday	16:00:00	1
Mon – Friday	18:00:00	2
Saturday & Sunday	09:30	3
Saturday & Sunday	18:00	2

### **On Crossing Extension Times – 1 Sec**

**Extensions in VA – IN loop 5 secs, X loop 5 secs**

**Audibles to be timetabled, on at 06.30, off at 23.00**

**PLEASE NOTE: Site is NOT to be installed with pre-timed max. Also to have 3 max sets.**

# Appendix D

## STANDARD DETAILS

1. **STANTX-WSP-HSN-0001-DR-HE-00103** – Traffic Signal Controller Construction Detail

**NB** - All chambers, etc, for signal specific requirements to be installed to manufacturer's details.

# Appendix E

**SUB-CONTRACTOR LIST FOR TRAFFIC SIGNAL WORKS**

For the installation and maintenance of Traffic signals and associated equipment under this Contract the Contractor shall select a sub-contractor from the following list:

Siemens plc  
Mobility Division  
Traffic Solutions  
Sopers Lane  
Poole  
Dorset  
BH17 7ER

Dynniq  
Centurion Way,  
Meridian Business Park,  
Leicester,  
LE19 1WH, UK