

SHEFFIELD CITY COUNCIL
TRAFFIC SIGNALS SPECIFICATION

1. General Requirements

- 1.1. The signal equipment layout is shown on the signal design drawing and shall be installed in accordance with TA 84/06 "Code of Practice for Traffic Control & Information Systems for All Purpose Roads", LTN 1/98 "Installation of Traffic Signals & Associated Equipment", MCHW. Highway Construction Details, signal design drawings, and this specification.
- 1.2. Ducting and access chamber layout is shown on the signal design drawing and shall be installed in accordance with the joint SCC / Amey Standard details.
- 1.3. Ducting for traffic signal installations shall be 100mm nominal internal diameter HDPE twin wall smooth bore, orange in colour and marked ' Traffic Signals'
- 1.4. All equipment shall be type approved and comply with BS EN 12675:2001 and any other appropriate Department for Transport specifications. It shall be constructed in accordance with the relevant Highways Agency Directions and Advice, Department for Transport Advice Notes, the current IEE regulations, and the Electricity at Work Regulations, 1989.
- 1.5. In addition to the Appendix 12/5 specification the designer shall supply, as a complete package, all associated documentation which shall include, where applicable, locations of all poles, chambers, ducting, traffic signal heads, pole mounted equipment, above ground detectors, controller cabinets inductive loop detection, shown on the specific scheme drawings, the MCH1827b controller configuration data and any other configuration data required to complete the installation (e.g. MOVA data sets, UTC bit patterns), to the contractor.
- 1.6. If required the contractor may request for the designer and/or a representative of the Overseeing Organisation to be present when the contractor is marking out the location of the equipment on site prior to construction. If this is a requirement, the contractor shall give a minimum notification of 7 days to the Overseeing Organisation.
- 1.7. The installation and erection of poles, controllers, detectors, cables and ancillary equipment for traffic signals shall be carried out by an experienced specialist company accredited with ISO9001 and HERS for the installation of Traffic Signals.
- 1.8. The Contractor shall supply all equipment and materials comprising part of, or required to complete, the traffic signal installation, unless otherwise specified.
- 1.9. Storage of equipment (including controller) shall be the responsibility of the Contractor until required on site.
- 1.10. The Controller shall not be installed on site until there is operable electricity board power supply installed within the Traffic Signal services pillars.
- 1.11. The developer must ensure that their contractor obtains a temporary MPAN number for any unmetered supply for their signal installation. Once the works are complete and have been handed over to Sheffield City Council's traffic signal maintenance contractor, the temporary MPAN will be cancelled and transferred to SCC's MPAN.

2. Location of Equipment

- 2.1. The location of signal heads, controllers, ducting, electrical supplies, detection, poles, cable routes and inspection chambers shall be generally as detailed on the drawing. The exact location of equipment shall be agreed with a representative of the Overseeing Organisation on site prior to installation.

Title: APPENDIX 12/5 Traffic Signal Specification

- 2.2. The signal posts shall be located such that the minimum horizontal clearance between the signal head, including backing board, and the edge of carriageway is 0.45 metres. This will usually mean that poles should be positioned 0.7 metre from the kerb edge, or in narrow footway conditions 0.5 metres with the traffic signal heads offset away from the carriageway to maintain the clearance. Primary poles shall generally be located 2.5 metres from their associated stop line.
- 2.3. All poles with PBUs attached shall be no more than 0.5m from its associated tactile paved area.
- 2.4. The Traffic Signal Service Pillar shall be located adjacent to the controller approximately or as shown on the scheme drawings.

3. Equipment Requirements

- 3.1. All equipment including cable shall be supplied in a new and unused condition except in so far as it has been tested in the course of manufacture. Equipment of the most recent pattern and in current production shall be used. All poles, above ground detection and controller cabinet must be finished in black.
- 3.2. All street furniture shall be installed at the positions shown on the drawings. Where engineering difficulties necessitate alternative positions the Contractor shall liaise and agree positions with the Designer and a representative of the Overseeing Organisation before installation.
- 3.3. Signal posts shall be suitable for accommodating the signal equipment specified at the locations shown on the drawings.
- 3.4. All Signal poles shall comply with current British Standard and shall be hot-dipped galvanised and powder coated in a protective material black in colour that matches the colour of the controller unless otherwise specified by the Overseeing Organisation. All holes either pre-drilled or drilled on site shall be treated using a suitable cold galvanize spray paint. All unused holes shall be blanked off by a suitable means to stop the ingress of water.
- 3.5. All signal poles shall be installed into a NAL style pole retention sockets unless otherwise specified by the Overseeing Organisation. The appropriate pole type / size shall be used depending on the NAL socket depth. The sockets shall be so installed as to give a clearance of 2.3m from finished ground level to the bottom edge of the traffic signal head backing board or bracket, with the top of the pole not exceeding 3.4 m above finished ground level.
- 3.6. Where specified the contractor must ONLY use formed "Swan necked" Poles. The use of welded crank poles will not be accepted under any circumstances.
- 3.7. Signal poles shall be supplied complete with suitable pole caps and all necessary mounting brackets and accessories.
- 3.8. Signal posts shall be erected ensuring that they are plumb. The poles shall not be cabled or fitted with equipment until such time as the foundation has achieved its design strength (where applicable).
- 3.9. Signal cabling for signal heads mounted on wide base poles shall be suitably terminated in a NAL – Traffic Signal Termination Enclosure

Title: APPENDIX 12/5 Traffic Signal Specification

- 3.10. Following installation the Contractor shall supply and affix self-adhesive numbers to each signal pole and phase identification letters to each traffic signal head. The numbers shall be as shown on the drawing. The numbers shall be to the following specification:-
- Tile size: 75 mm x 75 mm
Character Height: 50 mm
Colour: Black character on white background
Material: Non reflective, self-adhesive
- The pole number shall be affixed 200 mm below the bottom signal head bracket and positioned at 90 degrees to the kerb facing the oncoming traffic. The phase identification letters shall be affixed to the back of the traffic signal head.
- 3.11. All signal heads shall comply with BS EN 12368:2015 'Traffic Control Equipment: Signal Heads', and be of the LED type compatible with the Traffic Signal controller being used.
- 3.12. LED Aspects must be of the latest CLS type. The use of LED arrays will not be accepted.
- 3.13. LED Aspects shall be supplied with a minimum of a five year return to base warranty.
- 3.14. Backing boards shall be supplied and installed by the Contractor (where they are not an integral part of the signal head) and fitted using the correct number and type of fixings.
- 3.15. All primary and secondary traffic signal heads are to have a white, high intensity reflective border
- 3.16. All aspects shall be supplied and fitted with the appropriate hood as per the site layout drawing
- 3.17. All new signals heads shall be covered with a purpose made heavy duty orange tarpaulin / canvas cover. This should be securely attached to the signal head as soon as the new signal heads are positions and shall not be removed until the commissioning of the signals has been completed to the satisfaction of Amey.
- 3.18. All signal heads shall be provided with a locking mechanism to prevent the head being rotated following installation.
- 3.19. All pedestrian signals shall be of the LED type and shall conform to the latest TR2511 documentation.
- 3.20. The use of combined type nearside indicators incorporating the pushbutton will not be permitted,
- 3.21. Where nearside pushbuttons and indicators are specified these shall be of the separate unit type. E.g. AGD 940 (Puffin) and AGD942 (Toucan) and AGD941 (Demand unit)
- 3.22. Where conventional pushbutton units are specified at far sided crossings these shall be of the LED type. e.g. AGD924
- 3.23. All pushbutton units must be fitted with a mechanical action switch. The use of touch sensitive units will not be accepted.
- 3.24. Pushbuttons units are to be installed with a TR2508 compliant tactile device and where applicable, audible devices that comply with the latest TR2509 documentation are also to be installed.
- 3.25. Where fitted audible units must be of the adjustable type fitted with a volume adjustment selector.
- 3.26. Pushbuttons shall be mounted so that the centre of the pushbutton is no more than 1.0m ± 25mm from ground level.
- 3.27. Nearside indicators shall be positioned 250mm from the top of the pushbutton unit.

Title: APPENDIX 12/5 Traffic Signal Specification

- 3.28. Pushbutton / Nearside indicator orientation shall be agreed on site with a representative of the Overseeing Organisation.
- 3.29. All new PBUs and nearside indicators shall be covered with a red tarpaulin/canvas cover etched, in white with the wording "crossing not in use". It shall be securely attached to the unit body as soon as the unit is installed. This cover shall not be removed until the commissioning of the signals has been completed to the satisfaction of the Overseeing Organisation. The use of plastic bags / cardboard is not acceptable.
- 3.30. The Contractor shall supply a controller which conforms to the latest relevant sections of the TR2500 documentation and it shall be built to conform to the approved MCH1827b data sheets supplied by the designer. It shall have sufficient racking installed to house all of the relevant equipment (detector packs, OMCU, MOVA etc.)
- 3.31. All Traffic signals controllers shall be of the ELV type.
- 3.32. Where MOVA operation has been specified this shall be an integral function of the controller and shall not utilise an external unit.
- 3.33. The traffic signal controller cabinet shall be installed in accordance with the manufacturer's instructions.
- 3.34. The location of the Traffic Signal Controller shall be approximately as shown on the drawings. The final locations shall be agreed with the Overseeing Organisation.
- 3.35. The controller cabinets shall be located on a foundation and sealed as detailed by the manufacturer. They shall not be installed until mains power is available.
- 3.36. The controller cabinets shall each have a DFM lamp fitted so that it can be seen readily from the road. This should be covered with a protective lens.
- 3.37. The controller cabinets shall each be fitted with a minimum of 2 X 13 amp 3 pin sockets to BS1363 inside the controller cabinet. These should be protected by a residual current device maximum rating of 30ma. The sockets shall be marked for maintenance use only.
- 3.38. The controller cabinet shall be fitted with a Type RKA 27C lock on the main door in addition to the 2 locking "T" Bolts. The contractor shall supply 2 sets of key for each lock fitted including "T bolt key"
- 3.39. The controller cabinets shall have a staging diagram (similar to that provided in the TR2500 specification) secured to the inside of the manual panel, with clearly labelled road names, stages and phases. This label shall be waterproof
- 3.40. The controller shall have all detector units permanently labelled to indicate the detector name.
- 3.41. The controllers shall be supplied with sufficient channels of detection to allow for each loop to be monitored separately. This includes MOVA detection.
- 3.42. Where two or more controllers and/or termination cabinets are used on individual junctions, they shall all have remote access to each other (Controller or OMCU) using a RS232/RS485 remote handset link or similar. Cable connection is also required to pass the MOVA linking bits and detector data to the downstream controller.
- 3.43. Where a controller cabinet's base seal has been broken for removal or installation of cables, the sand backfill shall be reinstated and a base seal repair shall be made within 72 hours. This repair shall comply with the controller manufacturer's specification

Title: APPENDIX 12/5 Traffic Signal Specification

- 3.44. Following Commissioning the Contractor shall supply and affix self-adhesive numbers to the controller cabinet forming the site reference number. These numbers shall be visible from the carriageway and to the following specification:-
- Tile Size: 75 mm x 75 mm
Character Height: 50 mm
Colour: Black Character on White Background
Material: Non reflective, Self –adhesive, Weatherproof
- 3.45. Allowance shall be made for a consolidation EPROM to be blown (or configuration file to be created), tested, and commissioned with information supplied by the Overseeing Organisation once the installation has been commissioned. The time period between commissioning and the consolidation EPROM/final configuration file being requested could be in the region of up to 12 months.
- 3.46. A spare EPROM is to be supplied to Sheffield City Council's traffic signal maintenance contractor upon completion of the SAT.
- 3.47. All above ground detectors are to be installed in accordance with the manufacturer's specifications.
- 3.48. All above ground detectors shall be fitted with a suitable plug, with matching socket mounted to signal head. Detectors should not be hardwired to the pole cap.
- 3.49. Vehicle detection supplied in the form of above ground detection must comply with the latest TR2505 documentation. The exact type and amount of above ground detection required should be documented in the equipment list supplied at the end of the appendix.
- 3.50. Pedestrian detection in the form of On Crossing detectors shall be either the AGD 226 or TELENT MPD type or similar approved.
- 3.51. Pedestrian detection in the form of Kerbside detection shall be AGD 640 or similar approved.
- 3.52. Where above ground stop line detection is specified this should be Flir's Traficam or similar approved.
- 3.53. Where an above ground detector is mounted on a pole with no signal heads the detector socket shall be mounted in a suitable pole mounted housing (PMH) enclosure fixed to the pole. It will not be acceptable for the connections to be removed and the detector hard wired directly into the pole cap assembly.
- 3.54. Lamp dimming facilities shall be provided within the controller and a suitable photoelectric cell shall be installed on the nearest pole to the controller away from any street lighting.

4. Cable Requirements

- 4.1. All lamp cables and conductors shall be armoured and be provided in accordance with Clause 1217 MCHW, sub clauses 7 to 11. Detector loop cables and detector feeder cables shall be non-armoured and provided in accordance with Clause 1218 MCHW.
- 4.2. Prior to commencement of installation the Contractor shall supply, on request, full details and samples of all cables to be used. Only cables approved by the Overseeing Organisation shall be used.
- 4.3. Ducting shall be used between the Controller joint box and the Controller base to protect all cables into the Controller base and shall be sealed with expanding foam. The direct burying of cables close to the Controller is prohibited.

Title: **APPENDIX 12/5 Traffic Signal Specification**

- 4.4. All cables shall comply with requirements of BS 7671:2008+A3:2015 and shall be of adequate size and rating to meet the electrical current carrying requirements, the voltage drop requirements and provide the necessary electrical protection to the system.
- 4.5. A mixture of extra low voltage (ELV) and low voltage (LV) circuits in multicore cables is not permitted in any circumstances.
- 4.6. Calculations predicting the value of earth loop impedance, voltage drop and maximum current loading per core shall be provided by the Contractor. The calculations shall conform to BS 7671 and shall be compared to the empirical values obtained at the pre-commissioning electrical test as a measure of the quality of installation and materials used.
- 4.7. The Contractor shall provide the calculated values for the worst case permitted by BS 7671 for each loop impedance and voltage drop using the maximum permitted current per core.
- 4.8. Lamp supply cables between each signal pole and controller shall have 20 cores. Detection cables shall have 16 cores. A maximum of 1 no. 20 core and 1 no. 16 core shall be the requirement at any one pole.
- 4.9. Electrical cable design for traffic signal installations and core allocation within cables shall be the responsibility of the traffic signal contractor. However, in order to be able to assess the duct requirement needs in the design process the following assumptions have been made to aid design.
 - A limit of 1 no. 20 core and 1 no. 16 core armoured cable shall be used as the maximum requirement at any one pole;
 - Maximum usable (40%) cross sectional area cable capacity for a single new 100 mm I/D MDPE duct shall be taken as 3140 mm²;

Sheffield City Council - Traffic Signals Specification

Title: **APPENDIX 12/5 Traffic Signal Specification**

- Nominal cross sectional areas for multicore signal cables (1.5 mm² core size) to be used:

Table 1 - Multicore Signal Cables - Cross Sectional Areas (1.5 mm² core)			
Cable	Nominal Diameter (mm)	Armoured	CSA (mm²)
20-core	21.5	Yes	363
16-core	19.8	Yes	308
12-core	18.1	Yes	257
8-core	15.2	Yes	181
4-core	12.7	Yes	127
2-core	11.3	Yes	100
4-core	9.1	No	65
2-core	7.9	No	49

Basic Cable Core Allocation

- 4.10. The following basic cable core allocation shall be used as a guide to determining the cable usage within ducting and the capacity available for above ground detection at a pole. The allocation is based on the worst case requirement dictated by a 2-pole Puffin crossing.

Table 2 - Basic Cable Core Allocation				
Comments	Lamp Supply 20 Core	Core No.	Detection 16 Core	Comments
phase 1 RED	R₁	1	24V+	agd power supply
phase 1 AMBER	A₁	2	24V-	agd power supply
phase 1 GREEN	G₁	3	MVD	microwave vehicle detector
phase 2 RED	R₂	4	PBU	push button input
phase 2 AMBER	A₂	5	KSD	kerb-side detector
phase 2 GREEN	G₂	6	OCD	on-crossing detector
phase 3 RED	R₃	7	SLD	stop-line (a/g) detector
phase 3 AMBER	A₃	8	Common	agd/pbu common
phase 3 GREEN	G₃	9	Beeper	bleeper driver
photocell	PEC	10	Beeper 0 Volts	bleeper 0 volts
regulatory box sign supply 48 V+	Reg. Sign +	11	Spare₁	spare core 1
regulatory box sign supply 48 V-	Reg. Sign -	12	Spare₂	spare core 2
lamp neutral	Neutral	13	Spare₃	spare core 3
spare core 1	Spare₁	14	Spare₄	spare core 4
spare core 2	Spare₂	15	Test₁	test core
spare core 3	Spare₃	16	Test₂	test core
spare core 4	Spare₄	17		
spare core 5	Spare₅	18		
test core	Test₁	19		
test core	Test₂	20		

- 4.11. The use of cable linking between poles is prohibited with the exception of ELV link cables to stubby poles.
- 4.12. Multi cored cables excluding loop feeder cables but including linking cables to all other equipment housings shall have a spare capacity of at least 25% or 4 spare cores at the time of the installation. Where this is not possible a second cable shall be provided which is terminated correctly at each end.
- 4.13. No one cable shall serve more than one post. No one traffic signal phase shall be dependent on a single cable run.

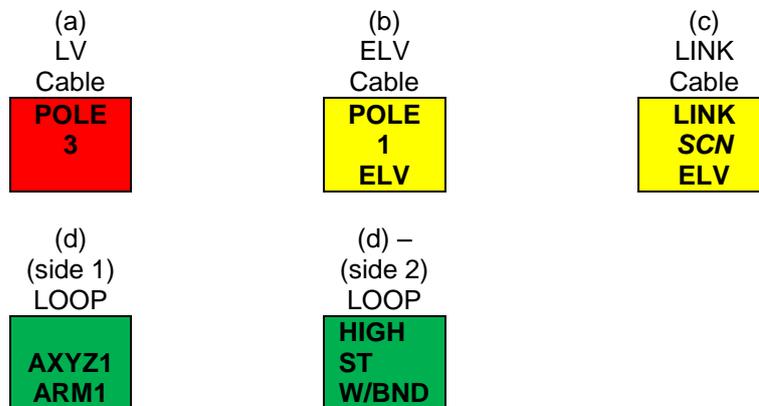
Title: APPENDIX 12/5 Traffic Signal Specification

- 4.14. **Two** separate test cores per lamp supply cable shall be provided to each pole. These shall be terminated in a separate terminal block within the controller and identified as a test pair. This should ideally be the violet and grey core. The other end of this test pair shall be connected to earth within the pole cap assembly.
- 4.15. All spare cores other than specified test cores shall be neatly formed at both the controller and pole cap and ends taped with self-amalgamating tape.
- 4.16. All detector unit outputs shall be individual cabled back to the controller using separate twisted pairs or conductor plus common to enable each output to be monitored separately by the controller.
- 4.17. Signal cabling for signal heads mounted on wide base poles shall be terminated in a NAL Traffic Signal Termination Enclosure.
- 4.18. After cabling has been completed to the controller the controller shall be correctly re-secured to its base and resealed using sand and epoxy resin base sealant.
- 4.19. Joints in signal cables will not be allowed.
- 4.20. Cables shall be terminated in the controller at the appropriate terminal block and in the correct terminal position.
- 4.21. Detector feeder cables shall be terminated in an appropriate terminal block and "soft wired" to the correct labelled detector unit.
- 4.22. All stranded conductors or with conductors having a diameter less than 2.5mm² stranded cables to be terminated shall be fitted with the appropriate size and type of insulated crimp terminals (e.g. flat tap for connecting to terminal strips, eyelet for connecting to earth screws etc.). Solder tags are not acceptable.
- 4.23. No more than 4 cores shall be terminated in any termination block, with the exception of spare cores.
- 4.24. Loop conductors and connecting cable conductors shall be labelled with the detector name or conductor function near the appropriate terminal.
- 4.25. Spare cables shall be left at a length 300mm greater than that required to reach the furthest termination in the control cabinet and shall be neatly looped and cable tied to the side of the controller with the ends insulated with self-amalgamation tape.
- 4.26. Armoured cables shall be terminated in no more than two rows on any more than two earth termination bars, unless the termination bars are mounted in such a fashion as to enable easy access to more than two rows. Cables shall not be mounted on opposing sides of the same termination bar. It shall be the responsibility of the Installation Contractor to determine the maximum number of cables that may be terminated into any controller case for the proposed cabling at the time of tender.
- 4.27. Where this maximum is exceeded, a separate termination cabinet shall be provided either adjacent to the controller, or at some other point agreed by Amey. The provision and installation of this termination cabinet shall be the responsibility of the Contractor. Amey Highway Technology Team must approve the type of cabinet used in writing. The responsibility for wiring between the two cabinets shall rest with the contractor.
- 4.28. Where a termination cabinet is required to be installed this should be fitted with an additional 2 x 13 amp sockets for maintenance use.

5. Cable and Cable Core Identification

- 5.1. This Schedule is issued to ensure that all cable and cable cores in traffic signal installations are identified by the same method and code.
- 5.2. Traffic Signals Cable Identification.
 - a) All cables entering any equipment housing shall be identified by a 'Pull-Tite' tag fixed around the inner sheath immediately above the Steel Wire Armouring (SWA) termination gland.
 - b) The tag shall be marked, using an approved waterproof, indelible black marker pen, in the following manner:-
 - c) Low Voltage Signal Cables - The tag shall be red and shall be marked with the numbers of the post, serviced by the cable.
 - d) Extra Low Voltage Cables (Pedestrian Push Buttons, etc) - The tag shall be yellow and shall be clearly marked with the post number serviced by the cable, in addition the letters ELV shall be added.
 - e) Extra Low Voltage Cables (Linking Cables) - The tag shall be yellow and shall be marked with the site reference number of the linked equipment and in addition the letters ELV shall be added.
 - f) Loop Feeder Cables – The tag shall be green and marked with the detector and arm designation on one side. The other side of the tag shall give the location of the loop.

Examples:



Note: The post numbers referred to above are as shown on the Site Layout Drawing (SLD)

- 5.3. All individual cable cores in cables used in a traffic signal installation shall be identified using coloured PVC grip type markers as shown below. The markers shall be positioned on the core adjacent to the termination point in such a way that they can be read easily. The markers shall be of a type that cannot be removed without the removal of the core from its terminal.

The three identification markers used shall be:-

- a) First Marker - Numbered markers indicating posts numbers. These will be colour coded in accordance with the international resistor colour code. The numbers shall indicate the post fed by that cable, i.e. the next post to which the cable runs.

Sheffield City Council - Traffic Signals Specification

Title: APPENDIX 12/5 Traffic Signal Specification

- b) Second Marker - Legend markers indicating the function of the core as shown below. These shall be colour coded as follows:

LV Live conductor - Red with Black Text
LV Neutral conductor - Black with white text
LV Spare conductors - Brown with black text
ELV All conductors - Yellow with Black text

- c) Lettered markers indicating the phase of the core (White with black text)

Notes

1. Where the address of the other end of a cable is the controller the first marker shall be omitted.
2. Functions not covered by the above shall be written onto blank markers with an approved pen.

Example of standard pre-printed markers

First marker

1	Brown	2	Red	3	Orange	4	Yellow	5	Green
6	Blue	7	Violet	8	Grey	9	White	0	Black

Second marker for LV cables

RED	AMBER	GREEN
R/MAN	G/MAN	WAIT
I.G/A	F.G/A	SIGN
PE/L	PE/N	PE/SW
SIG/N	SIGN/N	SPARE

Sheffield City Council - Traffic Signals Specification

Title: **APPENDIX 12/5 Traffic Signal Specification**

Second marker for ELV cables

RED	AMBER	GREEN
R/MAN	G/MAN	WAIT
I.G/A	F.G/A	SIGN
PE/L	PE/N	PE/SW
SIG/N	SIGN/N	SPARE
PUSH/B+	BLEEP+	TACT+
PUSH/B-	BLEEP-	TACT-
COMM	INHIB	LINK
DET+	SPARE	T/O
DET-	MVD	IRD

Third marker

A	B	C	D	E	Etc. All White
---	---	---	---	---	----------------

- 5.4. All traffic signal cables to be identified in the cable and loop boxes that the cable enters / passes through with permanent black marker.

6. Earthing Requirements

- 6.1. Earthing arrangements for controllers, cabling and other equipment and enclosures shall comply fully with the requirements of BS 7671:2008+A3:2015, and the requirements of the Regional Electricity Company.
- 6.2. The controller cabinets shall each be equipped with a main Earthing terminal to which all other leads shall be connected either directly or via earth blocks. A copper conductor of 16mm² minimum cross section shall bond this termination to the incoming supply earth terminal block. It shall be labelled and indelibly marked with the words "Safety Electrical Earth - Do Not Remove", in legible type not less than 2mm high.
- 6.3. For earth conductors that are part of a multi-core cable and where a green/yellow stripe colour coded core is not available, the Contractor shall ensure that a protective conductor is adequately identified as such by sleeving or marking tape of the correct colouring. The selected core shall comply with the Earthing requirements of BS 7671.
- 6.4. The steel wire armoring of all cables shall be earthed.

7. Electrical and Telecommunications Equipment

- 7.1. The Contractor shall supply and install the internal components to traffic signal service pillars.
- 7.2. The Contractor shall provide all necessary connections and cables from the feeder pillars to the Controllers to permit safe and reliable operation of the traffic signal equipment.
- 7.3. Earth conductors shall comply with section 543 of BS 7671 and shall not be less than 16mm².
- 7.4. The supply cables to the controllers shall be treated as a power cable for testing as described in the specification.
- 7.5. Feeder pillars shall have an environmental base seal of kiln dried sand and 6mm of epoxy resin. The internal arrangement of the feeder pillars shall be fit for purpose and it shall be equipped internally with the following:-
 - Regional Electricity Board cut out (Supplied by REC) or private supply cut out.
 - Double pole fused isolator.
 - Cable gland to BS6121 fixed to backboard.
 - Earth Block.
- 7.6. A 50mm orange duct shall be provided for the electrical cables between the controllers and feeder pillars. The duct shall be sealed at the controller and feeder pillar ends as directed below.
- 7.7. On completion of any works to the Traffic Signals Services Pillars involving breaking the environmental seal, the seal will be reapplied using an approved sealant within 72 hours. All ducts or pipes entering the cabinet base shall be plugged using expanding foam to maintain the environmental climate within the case.
- 7.8. The Contractor shall install a suitable sized steel wire armoured 3 core cable with copper conductors (not less than 6mm²) between the controller cabinets and the supply in the feeder pillars.
- 7.9. The circuit conductors shall be connected to the switched fused isolator via a compression gland and double insulated tails of not less than 10mm². The Earthing conductors shall be connected to the earth block.
- 7.10. The input supply cut out in the controllers shall incorporate a high breaking capacity fuse carrier and fuse to BS HD 60269-2:2013, BS 88-2:2013 or BS HD 60269-3:2010+A1:2013, BS 88-3:2010 of the correct rating (normally 40 Amps). The rating shall be specified by the Contractor to comply with the type requirements of Regulation 413-5 of BS 7671. The maximum earth loop impedance shall be as stated in Table 4.1A1 of BS 7671.
- 7.11. The supply cut out fuse shall provide adequate discrimination under fault conditions to ensure that the controller input fuse ruptures before the cut out fuse.
- 7.12. The cases of all fuses shall be labelled to show the correct fuse rating. Rewireable fuses shall not be used.

8. Loop Detection

- 8.1. The contractor will be responsible for the supply & installation of all loops, joints, loop feeder cable and termination in the controller.

Title: APPENDIX 12/5 Traffic Signal Specification

- 8.2. Loops shall be cut back through the nearest kerb joint to a joint box located in the footway as close to the back of kerb as possible. The use of metal (stop-tap type) covers within the carriageway to terminate the slot cut shall not be used.
- 8.3. All loop joints from the loop cable tails on to the feeder cables shall utilise re-usable bottle-joint type units.

9. Urban Traffic Control Requirements

- 9.1. Where Urban Traffic Control facilities have been specified the following shall be applicable.
- 9.2. The controller is to be modified for UTC including a UTC interface with a 3U rack with sufficient void space to accommodate an Outstation Transmission unit (OTU) and networking equipment.
- 9.3. The OTU shall be of Dynniq (ex-Imtech/Peek) manufacture, to the latest specification and fully UTMC compliant.
- 9.4. Full UTC connectivity is essential before the site is commissioned.

10. Site Commissioning

- 10.1. Commissioning tests are as follows ;
 - A successful Factory Acceptance Test (FAT) of the controllers before site installation. This test shall be carried out on the actual controllers that will be installed at the site.
 - Inspections of site layout, equipment location, traffic signs and road markings to check compliance with the requirements of the specification and drawings
 - Electrical tests to demonstrate compliance with electrical requirements. The forms 'Traffic Signal Cable Test Certificate' and 'Inductive Loop Test Certificate' (located at the end of this Appendix) need to have been witnessed and agreed by Amey Traffic Signal Design Engineer.
 - A successful Site Acceptance Test (SAT) to demonstrate satisfactory and safe signal operation and control including correct cabling of signal heads. This part also includes tests to commission the OTU and subsequently validate MOVA.
- 10.2. The FAT is to be carried out by a competent configuration engineer. Representatives of the Overseeing Organisation and Traffic Signal Designer shall witness these tests.
- 10.3. The test shall demonstrate compliance with the operational specification, including necessary green conflict monitoring.
- 10.4. The SAT is to be carried out in the presence of / by representatives of the Installation Contractor and the Overseeing Organisation. The Installation Contractor's configuration engineer may also be required to attend site during validation of MOVA and may be required to produce revised/corrected configuration files/EPROMs at this time.
- 10.5. The installation contractor shall carry out comprehensive pre-commissioning checks to ensure compliance with the specification, prior to requesting a representative of the Overseeing Organisation to attend Site Acceptance Testing and commissioning. In particular, the operation of MOVA and correct wiring of all detection shall be checked.
- 10.6. Commissioning shall be carried out between the hours of 09:30 and 15:30 weekdays unless otherwise dictated by the Highways Coordinator.

- 10.7. Representatives of the Overseeing Organisation will provide a commissioning sheet to the contractor at the Site Acceptance Test or within two weeks of the SAT. The commissioning sheet will contain any items that require rectifying. Once the commissioning sheet has been issued the contractor will have two weeks to rectify the outstanding items noted. This is in line with the existing performance requirement in place. If the items cannot be rectified in the specified time then the Overseeing Organisation require informing of the reason why and the date when the all the outstanding items will be completed
- 10.8. Documentation shall include all necessary information for the subsequent maintenance and upgrading including any dismantling and re-assembly. Once the site has been commissioned two copies of the controller specification and two copies of the as-built site drawings will be handed over to the Overseeing Organisation and one copy of each will be left in the controller case. Once commissioned, as built drawings are required in AutoCAD and PDF format. A copy of the configuration file is also to be provided to the Overseeing Organisation.
- 10.9. 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 a representative of the Overseeing Organisation. The site will only be deemed to be accepted if the traffic signals Take Over form is completed and signed with no comments by a representative of the Overseeing Organisation.
- 10.10. The Contractor, at the direction of a representative of the Overseeing Organisation, may 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 Overseeing Organisation.

11. Take Over and Warranty

- 11.1. The TRAFFIC SIGNAL CONTRACTOR shall warrant the following equipment for a period of two (2) years:
- LED aspects
 - Traffic signal controller – all components contained within the controller cabinet
 - Above ground detection
- 11.2. The warranty period will commence from the date on the Site Acceptance Test Certificate and will be on a return to base basis. It is anticipated that maintenance staff will return faulty items to the TRAFFIC SIGNAL CONTRACTOR's local depot where they are to be exchanged for a replacement item.
- 11.3. Once the SAT has taken place and the site has been commissioned the maintenance of the site will be taken over by Sheffield City Council's traffic signal maintenance contractor. An agreed sum of money shall be set aside from the commuted sum / bond and an order will be raised and sent to Sheffield City Council's Traffic Signal contractor to facilitate any repairs to faults that is required. No Contractual performance requirements will be implemented, however Sheffield City Council's traffic Signal contractor will endeavour to meet existing performance requirements currently in place. This arrangement will be in place until the traffic signals have been accrued by Sheffield City Council.
- 11.4. If the developer chooses not to have Sheffield City Council's traffic signal contractor undertake the maintenance of the traffic signals then the developer and their appointed traffic signals contractor are to provide Sheffield City Council written method statements as to how the traffic signals are to be maintained in the period before they are accrued by Sheffield City Council. The statements are to include how the contractor will meet the performance indicators that are listed below.
- | | |
|--|------------------|
| Ensure that each item of Traffic Signal / Control Infrastructure is free from urgent faults | 3 hours |
| Ensure that each item of Traffic Signal / Control Infrastructure is free from non-urgent faults | 7 days |
| Ensure that each item of Intelligent Transport System (ITS) Infrastructure free from urgent faults | 45 minutes |
| Ensure that each item of Intelligent Transport System (ITS) Infrastructure free from non-urgent faults | 1 day |
| Ensure that each loop detector or item of detector equipment is in operation at all times | 10 business days |