Derby City Council - Specification for Traffic Signals

1. Permanent Traffic Signals

1.1 General

1.1.1 Specifications, Standards and advice notes with which the installation shall comply are listed below. The requirements of this specification should be read in conjunction with Department of Transport Standards and Advice Notes which are current at the time of the equipment being commissioned. Should the requirements conflict with the Standards or Advice Notes, the equipment shall be installed in accordance with the Standards or Advice Notes. At present the relevant Department documents are:

TA 02/03	Traffic Signals on high speed roads
TA 82/99	The installation of traffic signals and associated equipment
TAL 05/05	Pedestrian facilities at traffic signal installations
TAL 01/06	General principles for control by traffic signals
TA 24/81	Road safety during installation and maintenance of permanent traffic signals and related equipment on all-purpose roads
TD 7/80	Type approval of traffic control equipment

The installation of electrical components is to comply with the latest issue of the IEE Regulations for Electrical Installations. The requirements of the Electricity at Work Regulations and all subsequent issues shall be complied with.

1.1.2 All traffic signal equipment shall operate on voltages within the ELV range (less than 50Vrms) and no signal poles shall contain equipment operating on mains voltages.

1.1.3 All traffic signal controllers shall be fully type approved. Controllers shall comply with the latest issues or TR 2500 “Microprocessor Based Traffic Signal Controller for Isolated, Linked and Urban Traffic Control Installations” incorporating all released amendments. All controllers must be capable of working in Manual, VA, Fixed Time and CLF modes unless otherwise specified, and in MOVA and UTC modes where required.

1.1.4 All traffic signal street furniture shall be fully type approved and in accordance with the latest issue of TR 0102A Standard Traffic Signals, incorporating all released amendments, which supplement and amend BS 505: 1971 “Road Traffic Signals”. All regulatory signs on traffic signal heads shall comply with BS 8442:2006 “Miscellaneous road traffic signs and devices requirements and test methods”.

1.1.5 Inductive loop detection systems shall conform with the requirements listed in Part 1.4.1. The location of all detector loops shall conform with the latest issues of MCE 0108C “Siting of Inductive Loops for Vehicle Detecting Equipment at Permanent Road Traffic Installations”, incorporating all released amendments. Prior to the installation of detectors the location of detector loops and actual slot cutting dimensions shall be agreed by the Engineer.

1.1.6 The electricity supply pillar shall be black, approximately 300mm x 150mm (Haldo pillar type E2 210 PILLAR or similar) and will have a standard street lighting ‘triangle key’ lock..

1.1.7 The electricity connection to the controller from the incoming supply cut-out shall incorporate a means of isolation and shall be arranged by the Contractor.

1.1.8 The Signal Company shall supply the Engineer with one copy of the facilities manual/engineers handbook for each controller installed.

1.1.9 Responsibility for safe working methods whilst on Site shall lie with the contractor. Particular attention shall be paid to DOT Advice Note TA 24/81 “Road Safety During Installation and Maintenance of Permanent Traffic Signals and Related Equipment on All Purpose Roads” and to the requirements of the current issue of the Electricity at Work Regulations.1.1.10 Maintenance of the traffic signal equipment shall be provided by the

Signal Company for a continuous fault free period of 30 days following the commissioning of the installation. For clarity, this means that if any equipment fault exists within 30 days of commissioning it will be repaired by the Signal Company and the 30 day period will restart from the time of full fix. The traffic signal equipment shall be guaranteed against faulty workmanship or materials for a period of 12 months after commissioning of the installation.

1.2 Traffic Signal Equipment

1.2.1 The Signal Company shall arrange for the supply, transport to Site, storing, installation, testing and commissioning of all traffic signal equipment associated with the Works, as required to satisfy their works programme.

1.2.2 Installation of street furniture and the alignment of signal heads shall be at the positions shown on the Traffic Signal Drawing, all positions shall be agreed on site by the Engineer prior to installation. Signal posts shall have adequate stability before signal heads are fitted to them. There shall be a minimum of 450mm clearance between any part of the street furniture and the edge of the carriageway. All signal heads and integral regulatory signs shall have a minimum vertical clearance of 2.1m from the footway or top of the kerb.

1.2.3 Unless specified in the schedule, all traffic signal posts shall be 4m in length, black with black top caps and be slot-less without pre-drilled holes for push button units or nearside indicators. All poles should be mounted in pole sockets or similar approved and any poles in verge should be surrounded by a concrete pad suitable to place ladders against when servicing the equipment. Steel poles shall have an appropriate black coloured polyester powder coating. Steel poles shall be galvanised in accordance with BS 729: 1971 “Specification for Hot Dip Galvanised Coatings on Iron and Steel Articles” and clearly marked inside to identify them separately from similar, un- galvanised ones. Following galvanising, an appropriate black plastic coating shall be applied.

1.2.4 Traffic signal poles shall be identified by attaching a number to the pole relating to the corresponding number on the traffic signal drawing. Labels shall be manufactured of weatherproof self-adhesive vinyl, and are to be 50mm high, white on black in Transport Medium font. The black backing tile should be at least 10mm wider than the widest part of the number. The number shall be fixed to the pole at 2.0m from the ground (just below bottom bracket level) and facing the controller position or facing the termination cabinet if the pole is fed from there. Short poles shall have the number fixed at the top of the pole.

1.2.5 Push button boxes shall be located so that the pushbutton is 1.0m above the adjacent finished footway level and at 30 degrees away from the carriageway unless otherwise specified. Separate nearside indicator boxes shall be located immediately above the pushbutton unit. Push button boxes and nearside indicator boxes shall operate on 50 volts or less.

1.2.6 All push button boxes shall be supplied with a cover to be used when the signals are not in use. The cover should be made from tear resistant material, coloured red or orange with text in white clearly stating “Crossing not in use”.

1.2.7 Repeater pedestrian displays shall be located so that the lower edge is 1.75m above the adjacent finished footway level and aligned with the lower pedestrian display unit.

1.2.8 All regulatory signs on traffic signal heads shall be LED types.

1.2.9 All signal heads mounted in the upper position of a 5m pole or longer shall be of the LED type.

1.2.10 All pedestrian indicators mounted on central islands and refuges shall be fitted with adjustable narrow field of view shielding.

1.2.11 Signal head mounting brackets shall be long enough to provide at least 120 degrees rotational movement where several signal heads are mounted on one post. Backing boards with high intensity reflective tape surround shall be provided.

1.2.12 All traffic signal controllers and controller roots shall be painted black with an anti-graffiti coating. Controller bases shall be sealed to safeguard against the ingress of moisture or gas. The sealant shall be an approved sealing compound, mixed as specified by the manufacturer, comprising a layer of epoxy resin 6mm thick laid on top of back filled dry fine sand.

1.2.13 All controllers shall be supplied with a thermostatically controlled heater to minimise the risk of condensation. The heater shall be rated at a nominal 100 Watts, be securely mounted within the controller cabinet, and hard wired to a power supply. It shall not be plugged in to one of the controller maintenance sockets. The thermostat shall be set initially so that the heater operates when the temperature falls to 5 degrees centigrade.

1.2.14 All controllers shall be supplied with an external indicator of detector faults (DFM lamp).

1.2.15 All controllers shall have a rack for the mounting of ancillary equipment such as OMUs and OTUs. These racks shall be either 3U or 5U high as specified on the signal drawing or in the quotation letter. Space shall be provided in a 3U rack of not less than 160mm for future equipment installation.

1.2.16 All controllers shall monitor every lamp output (including wait lamps and regulatory signs), detectors as defined in the TR2500 specifications, and dimming operation.

1.2.17 Two sets of keys shall be supplied for all controller cabinet locks including “T” keys.

1.2.18 Controller documentation and site drawings shall be stored in a suitable pocket facility to be provided by the Signal Company within the controller.

1.2.19 Erected signal heads shall be covered, prior to commissioning, with special orange covers supplied by the Signal Company. The Signal Company shall be responsible for fitting the covers and their removal at commissioning and as required during the installation process.

1.2.20 Within the controller there shall be two 13 amp 3 pin electricity outlet sockets protected by a residual current device.

1.2.21 If additional equipment is specified, for example a bus priority unit, which requires a mains connection an additional 13 amp 3 pin socket shall be provided for this purpose.

1.3 Cabling and Ducting

1.3.1 Cables, excluding loop feeder cables and loop cables, shall be armoured with an orange outer sheath. Additionally cables shall be embossed with the legend “TRAFFIC SIGNALS” in 4mm high white characters in accordance with paragraph 11.2 of BS 6346: 1987 “Specification for PVC insulated cables for Electricity Supply”. In all other respects the cables shall comply with the requirements of BS 505and TR 2029 A.

1.3.2 Loop feeder cables shall be unarmoured with an orange sheath and comply with the requirements of TR 2031A.

1.3.3 All signal cables shall have a minimum of four spare cores. On completion of cable installation a draw string shall be left in at least one duct in each duct run.

1.3.4 Cable joints will not be permitted on signal cables. All joints for loop detection shall be made using an approved waterproof reusable joint kit.

1.3.5 Pulling of cables shall be the responsibility of the Signal Company. Cables shall not be bent to a radius of less than 12 times their diameter or the minimum bending radius recommended by their manufacturer, whichever is the greater.

1.3.6. Unused cores in the controller shall be connected to earth. Unused cores between poles shall be connected to earth at one pole top.

1.3.7 All cables shall be identified in the controller using an appropriate tag marked with an indelible ink. It will not be acceptable to mark directly onto the cable sheath. Signal cables shall show the pole number to which they are connected. Detector feeder cables shall show the loop(s) to which they are connected.

1.3.8 All cables shall be identified in the top cap using an appropriate tag marked with an indelible ink. It will not be acceptable to mark directly onto the cable sheath. The tag shall indicate whether the cable is connected to the controller or to another pole.

1.3.9 All communications cables shall be identified at the point of termination using an appropriate tag marked with an indelible ink. It will not be acceptable to mark directly onto the cable sheath. These cables are “daisy-chained” between sites so the tag shall indicate where that cable has come from (incoming) or where that cable connects to (outgoing).

1.4 Detection

1.4.1 Specifications and Advice Notes with which the installation of detection shall comply are the most recent version of the documents below:

TR 0100 A	Inductive Loop Vehicle Detecting Equipment
MCE 0108 B	Siting of inductive loops for vehicle detecting equipment at permanent road traffic signal installations
MCH 1540 B	Specification for the installation of detector loops on motorways and all purpose trunk roads
TR 2029 A	Inductive loop cable for vehicle detection systems
TR 2031 A	Feeder cable for inductive loop systems
TR 2123	Above ground vehicle detector Systems for use at permanent traffic signal installations.

1.4.2 Loop locations are shown approximately on the Traffic Signals Drawing. The exact location of the loops shall be determined by the Engineer before the commencement of any associated works.

1.4.3 Loop cable shall be installed in slots cut into the carriageway of sufficient depth to allow 40mm of cover to the cable. A one part hot pour bitumen type backfill shall be used. Loop cables shall be jointed to the feeder cable in the specially provided access chamber in the footway using an approved joint. The loop tails shall be taken into the carriageway chamber and then via ducting to the footway joint chamber.

1.4.4 A water supply, where feasible, shall be arranged by the Signal Company from a nearby fire hydrant for cooling saw blades during slot cutting. A water bowser will be required where a hydrant is not available.

1.4.5 Overhead detection shall be of the “plug and socket” type and shall not be wired directly into the top cap.

1.5 Operation

1.5.1 The operation of the traffic signal installation shall be in accordance with the Controller Specification Form. The completed forms will be submitted within 28 days of notification of the Signal Company to be employed by the Contractor.

1.5.2 All pedestrian crossings and pedestrian phases on signal junctions shall work with no blackout periods. Where appropriate any on-crossing detectors shall extend an all-red period.

1.6 Commissioning and Testing

1.6.1 The Signal Company shall allow for the costs of all testing and commissioning required by the Engineer prior to the installation being accepted. For new installations, tests will be required on the controller to be used even where PROM configuration is verified on a simulator.

1.6.2 Factory acceptance testing of the controller shall be undertaken at the Signal Company's local depot. The Signal Company shall give the Engineer at least five working days notice of the controller being ready for factory acceptance test. The test shall demonstrate compliance with the Controller Specification. Suitable signal lamp mimics and a means of simulating detector inputs will be required. Where an OTU or MOVA is specified, the equipment shall be fitted into the controller and connected ready for use. DCC staff shall provide the MOVA dataset (with laptop)

1.6.3 Site testing and commissioning, after installation of the equipment, shall be required to demonstrate full compliance with the specification before the traffic signals are brought into operation. The contractor shall supply cabling and top cap details and information of the connections of Remote Monitoring Outstations, bus priority units etc where appropriate.

1.6.4 On junction controllers the Signal Company shall allow for a new site PROM to incorporate any timing changes required within the first two months of operation. This new PROM will not require a Factory Acceptance Test.

1.6.5 The Signal Company shall measure the series resistance, the insulation resistance and the induction of each loop circuit.

The following tests shall be carried out:

(i) Series resistance of loop and feeder. The resistance shall not exceed 2.5 ohms.
(ii) Impedance to earth of loop and feeder conductors with both feeder conductors connected together, using at least 500 volts DC applied until the reading becomes steady. The feeder cable shall be disconnected at both ends during this test.
A report shall be provided to the Engineer giving details of these readings.

1.6.6 The Earth Leakage Impedance Tests shall be carried out, using appropriate test equipment, for the controller and each traffic signal post. A completed "Earth Testing Certificate" shall be given to the Engineer prior to site acceptance.