MIDLOTHIAN COUNCIL STANDARDS FOR DEVELOPMENT ROADS

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ROAD LIGHTING AND ILLUMINATED TRAFFIC SIGNS

29 SPECIFICATION

29.1 Applications

This specification shall apply to any road lighting system and illuminated traffic signs being installed as part of a new road that is to be adopted for the purpose of road lighting maintenance by the Roads Authority.

29.2 Lighting Requirements

The developer is required to provide a system of road lighting where this is a condition of the road consent.

29.3 Maintenance Period

The Roads Authority is prepared to accept lighting units and illuminated signs from the date of commissioning for the supply of energy only.

Any work carried out or material supplied by the developer will be maintained by him for a period of 6 years from the date of commissioning as certified in writing by the Engineer. The six year maintenance period will include for the replacement of any faulty equipment supplied by the developer and the restoration of any faulty workmanship found during this period or at the final inspection prior to issuing the final certificate.

Any expense incurred by the Roads Authority during the maintenance period as a result of the developer failure to carry out the requirements above will be fully charged to him.

29.4 Lighting Installation – Design

The proposed lighting installation shall be designed to the requirements of the Engineer and are in accordance with the appropriate parts of the British Standards BS 5489-1:2013 Road Lighting.

Road lighting design may need adjustment as the exact lighting need cannot always be appreciated until the construction stage and therefore the Engineer reserves the right to amend the approved layout following discussions with the developer.

Cable conductor cross sectional areas shall be marked on the site design plans for each circuit.

Category to be agreed by Council Engineer.

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29.5 Record Drawings

During progress of the works the developer shall prepare record drawings showing the electrical work as installed indicating actual cable routes and ducted road crossing as well as lighting columns and supply pillar positions.

The drawings shall be prepared to a scale of 1:500.

The above drawings shall be provided before or at the time of final commissioning.

Where available plans are held electronically these will also be requested.

29.6 Overhead Power Line Conductors

The Developer shall ensure strict observation of clearances required by Scottish Power between their overhead power line conductors and road lighting equipment. In particular the Developer shall indicate on all site drawings submitted to the Engineer the proposed or actual position of all overhead power line conductors.

29.7 Compliance with Regulations

Work on the installation will be to the satisfaction of the Engineer. Facilities will be given to him during the progress of the work to carry out any inspection, check, or test he may deem necessary at the developer expense.

The developer shall be responsible for notifying the Engineer when ducting is being installed, (prior to backfill), or columns erected, so that depths may be checked. Failure to notify the Engineer may result in the excavation of trial pits to confirm depth, at the developer expense.

The whole of the works shall be carried out in accordance with the approved drawings unless otherwise agreed in writing by the Engineer.

The Developer shall be responsible for ensuring that only suitably qualified personnel carry out the installation. Personnel shall be authorised in writing as competent under G39 (see below).

The Developer shall ensure that all work is carried out in compliance with the Health and Safety at Work Act 1974, the Electricity at Work Regulations 1989 and the Electricity Association Engineering Recommendation G39

The whole of the works shall comply with British Standard BS 7671:2008 Requirements for Electrical Installations (IEE Wiring Regulations Seventeenth Edition), BS 7430:1991 Code of practice for Earthing. A PVC covered green/yellow earth wire (cable size to be specified by the Engineer) shall be connected to the earth block ready for connection to the Regional Electricity Companies service cut-out at any new or upgraded supply points.

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29.8 Materials

All material supplied by the Developer shall comply with the relevant British Standard Specification unless otherwise required by this document and be in new (unused) condition.

A list of manufacturers for all material to be used on the works shall be submitted for approval by the Engineer prior to work commencing. The Engineer may request samples of materials being considered.

The developer shall be responsible for the supply, delivery and correct storage of all material required for the complete lighting installation.

29.9 Electrical Supply

The Developer shall be responsible for the cost of any new electrical supplies or variations to existing supplies or cable networks as well as the cost of any alterations required to existing lighting column positions. Where the road lighting installation requires to be connected to any existing Roads Authority lighting column or supply point only the Engineer is authorised to make the necessary connections at the developer's expense unless otherwise agreed in writing.

29.10 Installation Testing

The Developer shall be responsible for the testing of the installation as described in Part 7 of BS 7671:2008.

Tests to be carried out by the developer.

1 Visual inspection
2 Continuity
3 Insulation resistance
4 Polarity
5 Earth fault loop impedance
6 Earth electrode resistance (If required by the Engineer)
7 Load and operational test

The above test shall be witnessed by the Engineer’s representative at the developers cost unless otherwise approved by the Engineer in writing. The Developer shall provide all labour, instruments and apparatus that may be required and pay for the cost of any electrical connections required for the test. Where satisfactory test results are obtained the Developer shall commission and leave in service such parts of the installation as the Engineer directs.

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A copy of the test results shall be provided as well as notification of each individual unit or section of the installation as it is commissioned in such a form as to be easily identifiable in relation to the original drawings. Upon satisfactory completion of the tests, the Contractor shall issue a signed Completion and Inspection Certificate to the Engineer within three working days. The installation will not be accepted as complete until such Certificates are issued. The final test and inspection shall include the submission of the as fitted drawings for the installation, providing the appropriate number of keys for columns and control cabinets as well as the final Completion and Inspection Certificate.

29.11 Road Openings

Any work carried out on a public road, as part of the road lighting installation will require the Developer to obtain the necessary road-opening permit from the appropriate Roads Authority.

The Developer is responsible for ensuring the safety of any services, pipes, culverts or other plant belonging to the statutory authorities whether on public or private roads or within the development. Any damage or consequential costs shall be the responsibility of the Developer.

The Developer is responsible for the immediate permanent reinstatement of any existing road surfaces excavated as part of the lighting installation.

Where works obstruct a footway the Developer shall provide a safe alternative route, properly signed, guarded and lit.

Materials Supplied by Contractors

29.12 Supply Pillars

The supply pillar shall consist of two parts, an outer shell (Pillar) constructed from a minimum 3mm sheet steel (hot dip galvanised to BS729) and an inner housing (Enclosure) containing the electrical control gear constructed from G.R.P. or other similar material acceptable to the Engineer, and comply with the following:-

Pillar

(a) The Pillar shall be protected against corrosion.

(b) The Pillar shall be designed to prevent the ingress of water, snow or foreign bodies and shall have a minimum ingress protection as specified in BS5490 of IP54.

(c) The top of the Pillar shall be angled to shed water to the rear of the enclosure.

(d) Access to the Pillar shall be by means of a hinged door opening to a full 180° at the front.

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(e) The Pillar shall be lockable with a minimum of two locks of a vandal resistant type covered for protection when not in use. At least one key per installed pillar shall be provided to the Engineer.

(f) Earthing provision will be provided on both the door and body of the cabinet. The earth shall have a minimum 8mm diameter brass earth bolt with 2 brass washers and 2 half nuts.

(g) The Pillar shall have a root with adequate allowance for cabling and have a planting depth of 300mm ± 50mm.

(h) A full size back board of varnished marine plywood at least 12mm thick or other approved non-hygroscopic material or purpose designed equipment mounting system shall be provided.

(i) Feeder pillar external dimensions above ground shall not exceed WIDTH 610mm, HEIGHT 1000mm, DEPTH 350mm, unless otherwise approved by the Engineer in writing.

Enclosure

(j) The Enclosure shall have such dimensions as to allow it to be installed within the Pillar without obstruction to the Pillar door. The Enclosure shall have a hinged door locked in a suitable manner that requires the use of a screwdriver to gain access.

(k) The enclosure door shall be suitably marked with a durable warning sign indicating "**DANGER ELECTRICITY**".

(l) Electrical components shall be mounted on a backplate using standard DIN rail Symmetrical profile to BS 5825:1980.

(m) The bottom face of the enclosure should have a detachable plate with Ferrules, or be plains suitable for drilling and glanding to accommodate all outgoing 2 core and earth PVC.SWA.PVC. Steel wire armour cables and the incoming supply cables from the Regional Electricity Company cut-out.

(n) Suitable glands shall be provided for each installation to suit the particular number and type of cable being used. Unused gland positions shall be suitably sealed.

(o) The enclosure and its components shall be suitable for use on a 230 volt single phase 50HZ supply for use with inductive discharge lighting loads operating at 0.85pf.

(p) The double pole switch isolator and contactor, shall be suitable for use in switching discharge lighting loads up to 63A unless otherwise agreed by the Engineer in writing.

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(q) No diversity factors shall be applied and all conductors and insulation shall be suitable for maximum loading, the neutral conductor being the same cross-sectional area as the phase throughout. The minimum size of the main conductor shall be 16mm².

(r) Contactors shall be silent in operation and shall be of the electromagnetically operated electrically maintained type with arc control devices and neutral link. The contactor shall be rated with an AC 3 utilisation Category and also have readily replaceable contacts. Auxiliary coil circuits shall be separately fused and suitable for operation at 230V 50Hz.

(s) The fused distribution board shall be capable of providing 4 x 230v x 50hz single phase and neutral outgoing circuits with 1 auxiliary circuits and 2 blank ways for additional circuits where required. The actual type and rating of protective devices shall be indicated on the Lighting drawings submitted for Road Construction Consent.

(t) All outgoing main circuits shall be wired to a marshalling area where the panel main earth termination shall also be located and provision of an earth bar is required.

(u) The auxiliary control circuit shall be suitable for operation on 230V 50Hz supply. Automatic control shall be achieved by means of a Time Switch as specified by the Engineer.

(v) Labelling shall be provided to enable ready identification of all protective, switching and isolating devices and all outgoing circuit terminals, with warning notices regarding isolation, and the presence of voltage, appropriately positioned. Outgoing fuses and their respective outgoing terminals in the marshalling chamber shall be labelled with numbers appropriate to the number of circuits.

(w) Internal wiring between the Regional Electricity Company Cut-out, contactor and outgoing or fuses shall be single core PVC double insulated at least $16mm^2$ unless otherwise specified.

(x) The earth continuity conductor linking the Scottish Power earth terminal, supply pillar earth terminal and outgoing cable earth conductor shall be at least 16mm² PVC insulated or sheathed green and yellow.

(y) Other internal wiring for control purposes shall be at least $1.5mm^2$ copper conductor PVC double insulated single core cable.

(z) Drawing No. LTG007 shows a wiring diagram for a Feeder Pillar with Time Switch Control.

(aa) Drawing No LTG006 shows a Feeder Pillar foundation detail.

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29.13 Underground Ducted Cable

The cable shall have copper conductors, PVC insulation, with steel wire armour and PVC sheathed, 600/1000 volt grade and conform with BS 6346, unless otherwise specified by the Engineer. Cables larger than 16mm² shall be to BS 5467:1989.

Cables shall be 3 core (2 core and earth) with all conductors of equal cross sectional area. The cores shall be colour coded in accordance with BS 7671:2008 for single phase installations **Brown, Blue, Green/Yellow.**

The outer cable sheath shall be **Violet** in colour unless otherwise approved in writing by the Engineer.

Note: Sleeving cable ends to indicate cable colours is not acceptable

29.14 Internal Wiring Lighting Columns

Internal wiring from the Cut-out to the lantern control gear shall be single or multi core copper cable, 300/500 volt grade, PVC insulated PVC sheathed and shall comply with BS 6004.

All cables shall be a minimum 1.5mm^2 unless otherwise specified.

All separate earth wiring shall be a minimum 1.5mm² copper conductors PVC insulated or sheathed and coloured green and yellow.

The earth continuity conductor between the Cut-out and column earth terminal shall be a copper conductor of at least 6mm² PVC insulated or sheathed coloured green and yellow.

1.5mm² flexi cable shall be used on all units.

29.15 Earth Rods

The Material used and the construction of the Earth Electrode shall be such as to withstand damage due to corrosion.

The rod shall be copper covered (not sheathed) High Carbon Steel.

Rods shall have a nominal dimension of 9.5 mm diameter and minimum length of 1200 mm.

Earth Road clamps shall have high corrosion resistance and good mechanical strength capable of clamping a copper earth conductor up to 35mm² cross section. Earth rods shall only be installed in areas to be adopted as part of the public highway network such as footways or service strips.

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29.16 Fused Cut-outs

Fused Cut-outs shall have a vandal resistant moulded case with phase, neutral and earth terminal provided and be suitable for loop in loop out 3 way cabling systems as appropriate using three core wire armoured cable (2 core and earth). The top of the Cut-out shall be such that there can be no ingress of moisture. With the fuse in position no live metal work shall be exposed and when removed the phase terminal shall be shrouded.

Incoming and outgoing cable terminals shall be capable of accepting up to 16mm² conductors unless otherwise specified.

Fused Cut-outs shall comply with BS7654 and be CE marked, with Ingress protection to IP4X. The Cut-out shall be supplied with a fuse, BS88, of the correct rating for the circuit.

All Cut-out parts must be fully interchangeable.

Where special tools are required for cable terminals then at least 10 tools, and no less than 1 tool per 10 Cut-outs installed, shall be supplied to the Engineer.

29.17 Time Switches

Time switches shall be electronic in operation with a battery reserve of 10 days in the event of power supply failure.

Be capable of switching 5A inductive load at 230V 50Hz.

Be suitable for the geographic location of use 56º N.

29.18 Underground Cable Ducts for Footways, Service Strips, Road Crossings Etc

Ducts shall be PVC 100mm internal diameter colour violet twin walled.

Ducts shall be a twin wall corrugated conduit with high crush resistance and flexibility. The inner surface shall have a low coefficient of friction and be free from burr, which could damage cable sheaths. Colour shall be UV stabilised for colour stability and weathering properties. Pigments shall be of a high purity resistant to soil acids. The duct material shall not become brittle at low temperatures.

Ducts shall generally comply with British Standard DD200:1991 "Draft Development for Pliable Non-Rigid Conduit and Fittings for Direct Burial Underground (type DB)".

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29.19 Fuses and Neutral Connector Blocks

Fuse bases and holders shall be provided suitable for use with fuses to BS 88.

Fuses shall be attached to the bridge assembly so as to resist vibration. Fuse blades shall not form part of the Electrical contact of the fuse bridge.

Neutral connector blocks shall have separate terminals for all incoming and outgoing cables.

29.20 Aluminium Lighting Columns

The lighting column manufacturer shall be registered with and certified by either British Standards Institute Quality Assurance Service or Lloyd's Register Quality Ltd for the manufacture, supply and verification of lighting columns under their Quality Assessment Schedule to BS 5649 Part 2. Columns shall comply with the following:-

(a) All columns shall be in accordance with BS EN40-3-3.

(b) The design factors relative to the loading of lighting columns for use in the Roads Authority area shall be applied in accordance with BS EN 40-3-1:2000, 1982.

(c) For lighting columns of 8m nominal height and under, K values relative to exposure class 3 shall be applied. For Roads Authority this value = 1.8.

(d) For lighting columns of 10m and 12m nominal height, K values relative to exposure class 1 shall be applied. For Roads Authority this value = 2.5.

(e) For the purpose of design calculation, Clause 3.1.3 BS5649 part 6, 1982, "Forces on the Lantern" the following maximum windage areas shall be included relative to nominal height of column as detailed in Table 15.

(f) All lighting columns must have strimmer guards fitted.

TABLE 15 Maximum Windage Areas

Nominal Height (m)	Effective Windage Area (m sq)
5	0.1
6	0.1
8	0.15
10	0.225

(g) For the purpose of design calculation, Clause 2.1, BS EN 40-3-1:2000, 1982, “Dead Loads” the following maximum lantern masses shall be included relative to nominal height of column as detailed in Table 16.

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TABLE 16 Maximum Lantern Masses

Nominal Height (m)	Mass (Kg)
5	7
6	7
8	10
10	15

(h) In addition to the above, columns of 4m nominal height and above shall be designed to support a traffic sign mounted at a clearance height of 3m above ground level with a surface area 0.6m square.

(i) The structural design of lighting columns shall also be verified by testing in accordance with the criteria detailed BS5649 Part 8, 1982.

(j) A type test certificate as detailed in appendix 'C' of BS5649 Part 8, 1982, shall be supplied on request.

(k) Lighting columns shall be protected against corrosion.

(l) A chain of 2mm nominal diameter shall be fitted internally between the door and column. The chain shall be sufficiently long to allow the door to rest freely on the ground and against the column in an upright position with the column correctly planted allowing unrestricted access to the base compartment. The chain shall be securely fixed to the metalwork of the column.

(m) Brass earthing terminals shall be provided on the column and column door, size M8 x 30mm long complete with two brass hexagon nuts and two plain brass washers. These shall be welded or brazed to the access door and inside walls of the base compartment and shall be fitted with a distinctive and durable metal label marked **SAFETY ELECTRICAL CONNECTION - DO NOT REMOVE.**

(n) The base compartment(s) shall be fitted with hardwood or other substantially non- hygroscopic material baseboard not less than 90mm wide and 15mm thick securely fixed internally to accommodate the cut-out assemblies, control equipment, service cables etc.

(o) The base compartment shall have weatherproof access doors fitted with tamper-proof and corrosion resistant locks of similar pattern. The door arrangement shall be such that it can only be opened by releasing a single equilateral triangular headed (with 10mm diameter rounded corners) captive stainless steel bolt screwing into a door locking bar which shall form an integral part of the column. When the door is secured the bolt head shall be completely recessed into a 16mm diameter access hole. Doors shall be interchangeable for similar columns without adaptation and be to the following dimensions where applicable: 8m mounting height and above - 600mm x 115mm.

(p) Door keys shall be provided on the basis of one per twenty columns.

(q) The cable way shall be located below the base compartment door opening.

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(r) The column planting depth shall be indicated on the column by a white line, as indicated in Table 17.

TABLE 17 - Column Planting Depths

Nominal Height (m)	Planting Depth (m)
5	0.8
6	1.0
8	1.2
10	1.5

(s) The door position should be at right angles to the bracket outreach and sited such that an operator working at the door is facing oncoming traffic on the nearside of the road.

(t) On 8m and 10m columns an anti-rotating device shall be provided additional to the bracket clamping screws. Two rows each of four 12.5mm minimum OD Stainless Steel Allan screws equally spaced shall clamp the bracket.

(u) The double bracket column shall have a base compartment with two doors to house two sets of control gear, time switch and service Cut-out. An anti-rotating device shall be provided additional to the bracket clamping screws. Two rows each of four 12.5mm minimum OD stainless steel Allan screws equally spaced shall clamp the bracket.

(v) The 10m mounting height twin bracket column shall have a base compartment with 2 doors to house 3 sets of control gear, timeswitch and service cut-out.

(w) The Engineer will specify the type of column required by reference to Section 29 and Drawing No. LTG004.

(x) Lanterns shall have minimum performance as specified in Appendix L2.

29.21 Lanterns Complete with Lamps and Control Gear

All equipment must be in accordance with BS 4533 and the appropriate part of BS5489 and comply with the following:-

(a) The upwardly wasted light ratio of all lanterns shall be < 0.15. All lanterns shall have a minimum degree of protection as specified by BS EN 60529 category IP65.

(b) Lanterns for group B side entry mounting shall have an entry suitable for a spigot size of 34mm OD x 80mm length. Lanterns for Group B spiggot mounting shall be suitable for 76mm dia. spiggot. Lanterns for group A side entry mounting shall have an entry suitable for a spigot size of 43mm OD x 100mm length.

(c) For Group B lighting the preferred method is spiggot mounting, (76mm dia) use of side entry shall be agreed by the Engineer prior to installation.

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(d) The lanterns offered shall be of a type acceptable to the Engineer and if applicable by the Department of Transport.

(e) The developer shall supply to the Engineer drawings of the lanterns offered together with its full specification including the IP rating.

(f) Photometric design data for each type of lantern proposed suitable for use with computer aided road lighting design software may be requested by the Engineer.

29.22 One Part Photo-Electric Control Unit for Road Lighting

The unit shall be in accordance with BS 5972:1980 Specification for photoelectric control units for road lighting and comply with the following:-

(a) The unit shall be suitable for use with NEMA sockets and shall be capable of satisfactory operation on a nominal 230V +/- 10% 50HZ supply.

(b) The unit must be covered by a minimum 5 year in service guarantee offering free replacement in the event of failure.

(c) The control circuit shall be of the electronic type, rated for a 1 kw/0.85pf lagging discharge lighting load.

(d) The unit shall be calibrated to switch ON at 35 lux and switch OFF at 18 lux ie negative ratio 2:1. A time delay to avoid spurious switching shall be incorporated in the circuit.

(e) The unit base shall have the facility to record the month and year of installation.

(g) The unit shall be suitable for mounting on a surface with a temperature of 120°C.

29.23 All lanterns must be able to incorporate agreed a CMS system agreed by Council engineer.

INSTALLATION

All operations including existing lighting equipment must be supervised by Roads Authority Lighting Section. All costs incurred in such supervision shall be charged to the Developer.

29.24 Column Erection

The Engineer may indicate the exact location of columns on site. Columns shall be erected in a true vertical position, seated on a stone flag, rock or other hard material. Concrete backfill shall be used to support the column well rammed and compacted around the root up to the cable entry port.

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The column shall be placed in a hole excavated with steep sides leaving a minimum of 100mm clearance all round the root for the full depth of the excavation. Column excavation depths will be provided for the particular columns to be used on individual sites by the Engineer. (See Table 17.)

Columns erected in areas which are not to be surfaced such as grass verges shall have concrete installed for the full planting depth of the column with a ducted entry provided to the cable entry slot. Concrete at the finished surface level shall be formed into a square 900mm x 900mm x 80mm deep with the surface sloping away from the column at a 1:40 gradient.

Where columns have separate bracket arms then these shall be fitted prior to erection. Brackets shall be at right angles to the door opening such that when erected the door faces away from oncoming traffic. Fixing screws shall be greased prior to installation and then tightened with a suitable tool to ensure a firm grip of the bracket but not so far as to damage the screw threads in the column.

Post top columns shall be erected so that the door faces away from oncoming traffic.

Columns shall be erected with the bracket at right angles to the kerb or footpath edge unless otherwise specified by the Engineer. The developer shall ensure that all columns are in a true vertical position on completion of the Development.

Drawing No LTG005 shows steel column foundation detail, backfill shall be to the HAUC specification for openings in Highways as published by HMSO (1992).

29.25 Column Removal or Re-Siting

No existing column shall be removed or repositioned without the agreement in writing of the Engineer.

No columns shall be removed or repositioned without verification that the supply cables are properly disconnected and the service is dead.

Metal columns, which are removed and not required on site, shall be conveyed to a Depot or disposal agent as directed by the Engineer. Any scrap value of disposed columns shall be to the credit of the Roads Authority.

Concrete columns, which are removed and not required on site, shall be conveyed to a Depot or disposed of by the Developer at his expense, as directed by the Engineer.

Columns shall be removed completely with no part of the column left in the ground. Holes left by column removal will be backfilled and reinstated as per the HAUC Specification for openings in Highways as published by HMSO (1992).

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29.26 Supply Pillar Erection

The Engineer may indicate the exact location of supply pillars on site.

Prior to erection any separate supports provided shall be correctly fixed to the pillar.

The pillar shall be erected in a true vertical position and at the correct ground level for the particular pillar in use. A minimum 100mm clearance is required between the bottom of the door and finished ground level No cables must be exposed when the pillar is in its finished position at ground level.

The pillar shall be placed in a hole excavated with steep sides leaving a minimum clearance of 150mm all round the base of the pillar for the full depth of the excavation. Concrete mix shall be used to bed the pillar ensuring access for all cables. (See Section 28).

Supply pillars shall have clear access with the door opening within the footway or service strip area without swinging into carriageway or private areas.

Where supply pillars are erected in soft areas such as service strip then a hard standing shall be provided with minimum dimensions of 1200mm wide by 900mm deep directly in front of the pillar. Hard standings shall be constructed to footway standards.

Drawing No. LGT006 shows Feeder Pillar foundation detail, backfill shall comply with the HAUC Specification for openings; Highways as published by HMSO (1992).

29.27 Wall Mounted Road Lighting Installation

Wall brackets shall be mounted on a flat sound wall at a height indicated by the Engineer and fixed with suitable stainless steel wall fixings.

A wall mounted supply box shall be installed no less than 1.9 metre and no more than 2.1 metre above finished surface level adjacent to the wall. The supply box shall have a hinged lid and a tamper proof key to allow access. This box may be mounted on the surface or recessed. Where the supply box is wall mounted then an MICC black plastic sheathed cable shall be installed properly clipped and glanded between the box and the wall bracket. A galvanised conduit of at least 32mm diameter shall be installed between the box and to 50mm below ground level, and where the box is recessed also between the box and the wall bracket.

Drawing No LGT002 shows detail for a wall mounted supply box.

All wall-mounted units shall be protected against corrosion as detailed in Appendix L1.

Wall brackets for luminaires shall be submitted for approval by the Engineer prior to installation.

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29.28 Underpass and Pend Installation

Due to the individual requirements of underpass and pend lighting, arrangements will be made with the developer in each case where it is required.

Following agreement regarding the style and nature of the lighting cross sectional elevations will be required showing the positions and means employed to service the units.

29.29 Ducting and Cable Installation within Development

All cabling shall be installed in 100mm dia. Violet duct unless otherwise specified by the Engineer.

Duct trenches shall be excavated to the lines on the drawings or as arranged on site. The depth of excavation shall be such that ducts laid under verges, footways, paths on open ground shall have a cover of 450 mm and under carriageway of 800mm. Normally excavation depths will be 600mm in footways etc, and 1000mm in carriageway.

The duct shall be bedded and covered by a 100 mm thickness of lightly compacted graded sand in carriageway, (50mm in footways). Drawing No LGT005 shows reinstatement detail.

Any ducts installed for future use not having a cable pulled through it shall be corded and easily identifiable on site.

Cable shall be looped in and out of each column. Tails shall be left 1 metre long measured from the bottom of the column door opening. No underground jointing will be permitted.

All cables shall be laid in footways, footpaths or service strips unless otherwise approved by the Engineer in writing. Cables must not be laid in private property e.g. house gardens. Cable routes should be at the rear of the footway or service strip in line with and just to the front of the lighting columns.

Duct tracks shall be left open for inspection by the Engineer prior to backfilling.

29.30 Not used.

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29.31 Looped Cable Terminals

Cables terminated in columns or wall bracket supply boxes, shall be fitted with a fused. Cut-out. Adequate means shall be provided for clamping the cable armour of the incoming and where appropriate outgoing cables for maintaining continuity of earthing using the Cut-out brass earth plate ferrules or compression gland. The brass earth plate shall be connected to the column or supply box earth stud and the internal Cut-out earth terminal using 6mm² earth continuity conductor. The three cores of the looped cable shall be connected to the appropriate terminals within the Cut-out Cables terminating in supply pillars shall have the cable armouring adequately clamped to maintain continuity of earthing and be earthed to the earth stud inside the supply pillar.

Where cable loops have no column base in which to terminate at the time of installation then sufficient length shall be coiled underground to make the connection later. The cable shall be capped and sealed in an approved manner with the position clearly marked for future identification.

Where any of the three cable entries of the Cut-out are not used, these shall be sealed so as to maintain the IP rating of the cut-out.

Cut-outs shall be installed at the highest position suitable on the backboard.

29.32 Internal Wiring of Columns

1.5mm² minimum cable shall be used to connect between the Cut-out and the control gear and lanterns. The cable shall be taken from the top of the Cut-out and will include an earth wire from the Cut-out to the lantern body earth terminal.

Cables shall only be stripped back enough to allow termination without excess bare copper being exposed. All interconnections must be made at terminals and no joint shall be allowed in the wiring. All separate metal work shall be earthed and taken to the earth stud inside the column base. An earth continuity conductor at least 6mm² shall be provided between the cable armour/cut-out earth terminal and column earth. Separate control gear shall be connected as per the manufacturer's instructions unless otherwise directed by the Engineer. Capacitors will be mounted in clips and sited below the ballast.

29.33 Lantern Attachment to Columns

Lanterns shall be attached to the column spigot using the screws provided. Screws shall be tightened uniformly and without undue strain to ensure a good fixing.

Side entry lanterns shall be mounted in line with the spigot. Spigot mounted lanterns shall be mounted in a true vertical position. Lanterns shall not be fitted to columns prior to erection.

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29.34 Earthing

The earthing of the installation shall comply with BS 7671:2008.

The developer shall ensure that throughout the installation all metallic parts other than the current carrying conductors are bonded to form a continuous path by way of the armouring to the Regional Electricity Company earth connection.

An earth rod is required at the last or penultimate lighting column on each separate cable run where there are more than three lighting columns.

The earth rod shall be driven vertically into the ground no closer than 0.5 metres from the column within the confines of the cable track adjacent to the column until it is at least 300 mm below the finished surface level.

A suitable earth clamp shall be used to attach a 16 mm² earth cable from the rod to the earth stud within the lighting column through the cable entry slot. Earth rods must be left exposed until approved by the Engineer.

29.35 Not Used

29.36 Not Used

29.37 Traffic Sign External Light Units

All external lighting units shall comply with BS 873 and Chapter 11 of the "Traffic Signs Manual".

All units shall in addition be:-

(a) Constructed aluminium.

(b) Fitted with polycarbonate light panels.

(c) The aluminium body casting shall incorporate the outreach arm and have an outreach of 300mm ± 50mm.

(d) Fitted with stainless steel screws, nuts and washers.

(e) Fitted complete with LED X lights.

(f) Capable of being fitted with photo-electric control if required.

(g) The units shall be inconspicuously marked with the name/ trademark of the manufacturer, BS 873, month and year of manufacture.

(h) Have ingress protection to IP65.

(i) Have a detachable gear tray.

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29.38 Traffic Bollards to be Agreed by Council Engineer

29.39 Traffic Sign Pole

The Aluminium Traffic Sign Pole is to be manufactured in accordance with BS EN40-3-3 and supplied with the following detail;

(a) A height of 3.25m from ground level to the top of the shaft and a planting depth of 600mm. Door aperture and cable entry hole to be dimensioned and positioned in accordance with BS EN40-3-3.

(b) The column shall be protected against corrosion.

(c) A chain of 2 mm nominal diameter shall be fitted internally between the door and column. The chain shall be sufficiently long to allow the door to rest on the ground with the column in its operational position.

(d) Earthing terminals shall be provided on the column and door. The earth shall have a minimum 8mm diameter brass earth bolt with 2 brass washers and 2 half nuts and fitted with a distinctly and durably marked metal label marked: -

SAFETY ELECTRICAL CONNECTION - DO NOT REMOVE.

(e) All steel fixings including chains, locks and associated bolts shall be approved stainless steel or galvanised.

(f) Post Caps shall be manufactured from, steel, plastics and steel caps shall be finished as specified in BS873: Part 6. All open-ended posts shall be provided with post caps. Post caps shall be shaped to shed water to the outside of the post end shall be provided with a means for securing the post cap to the post.

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DESIGN CERTIFICATE FOR ROAD LIGHTING
Details of New Road Lighting Installation **Figure 8**

(To be completed by the designer and sent to Midlothian Council Lighting Manager prior to work commencing)

Location:

Schematic Drawing Number:

Designed By: Position

Lighting Design Parameters

	Calculation 1	Calculation 2
BS 5489 Category:		
Column Numbers:	to	to
Column Arrangement:		
Mounting Height:	m	m
Lantern Overhang:	m	m
Effective Width:	m	m
Lantern Type:		
Reflector Setting:		
Lamp Type:		
Lamp Wattage:	W	W
Lamp Design Lumens:	KLm	KLm
Maintenance Factor:		

Design Results

Software Used:		
Calculated Eav/Lav:	lux/cdm²	lux/cdm
Calculated Emin::	lux	Lux
Calculated Uo:		
Calculated UI:		
Calculated TI:		
Surround Ratio:		

Sheet of

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Lighting Column Specification Guide
Alloy Specification

International alloy designation according to EN 573-3
Alloy used: EN AW - 6063
Temper: T5/6

Chemical symbols: EN AW - AlMg0, 7Si

All columns must comply to current EN40 standards and demonstrate a 50 year design life through appropriate calculations that comply to BS EN40-3-3. The design and production of the columns and brackets will be manufactured by a supplier certified to the highways sector scheme 6.

Column General Specification:

- The lighting column will be manufactured from 6063 or 6005; 6000 series aluminium alloys.
- It will be equipped with a dual locking flush mounted door, complete with separate earthing connection.
- The column will be extruded in one piece to form a continuously tapered or conical shape, above the door area, and shall not have any welds or joins within the construction.
- The **only** material strengths/properties to be used in **ALL** column calculations (including the proof strengths Rp0.2 / *f*0 / *fy*) will be taken as the minimum values laid down in the ENV 1999-1-1:2007 paragraph 3.2.

Rp0.2 / *f*0 / *fy* values taken from the 1999-1-1are laid down below for the following aluminium material grades:

6063 T6 160 N/mm2 (under 25mm in wall thickness)
6060 T6 140 N/mm2 (under 15mm in wall thickness)
6005A T6 215 N/mm2 (under 5mm in wall thickness)

Cable entry:

- The cable entry will be a minimum size of 175 x 75 mm.
- The cable inlet duct will be fitted with a subterranean cable protection sleeve to prevent cable chaffing.

Root Protection:

- The root section will be protected with a grey thermoplastic co polymer, which will be applied via a heat system to ensure bonding occurs to the outer and the lower inner surfaces of the column root section and should cause no ground or water course pollution.

- A heavy-duty plastic base protector will be fitted to the end of the root section to ensure that no damage is caused to either the column or root protection during installation.

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Inner tube:

- An internal door opening strengthening tube (not shield) will be fitted to ensure that the door area is sufficiently strengthened.

- This inner tube must be a fully compliant Type 5 re-enforcement as per BS EN 40-3-3 classification.

  BS EN 40-3-3, Para 5.6.2.3.3 further states:

  "**Calculation for reinforcement type 5 (with inner tube)** For type 5 reinforcement, where an inner tube is expanded into the lighting column, the bending strength of the section shall be the algebraic sum of the bending strength of the inner tube and the bending strength of the outer tube provided that the inner tube fits snugly (press stress) in the outer shell. Formulae (4) and (5), section 5.6.2.2, shall be used for this type. **If the fit is not press-stress then the contribution of the inner tube shall be disregarded.**

  -

  The torsional strength shall be the strength of the outer lighting column cross-section alone. Here formula (6) shall be used **"**

- This inner tube will be fitted using a "press stressed" expansion method along the entire length of the inner tube.

- As per the definition of tube, the inner tube must be complete, seamless drawn cylinder and vertically uncut in any form other than for the door aperture.

- The inner tube to column wall must be both free from mechanical fixings/ attachments and vertically/horizontally weld free to ensure no weak points are present or caused during manufacture.

- The inner tube, integral mounting rail and vertical door stiffeners will be extruded in one piece to form a single component without fabrication or welding.

Mounting Rail:

- A2/A4 stainless steel captive slip nuts will be fixed in the mounting rail to enable the adjustment of the hardwood backboard.
- The mounting rail will also have a separate earth connection located below the adjustable slip nuts.

Backboard:

- The board will be manufactured from a solid non hydroscopic hardwood (not plywood).

- This backboard is to be vertically adjustable.

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Aluminium Brackets:

- All brackets, attachments and connections to be manufactured from either 6063 or 6082 T5 alloy or A2/A4 stainless steel. All components are to be brushed to match the column finish.

- The weld fillet between bracket arm and column body must be backed up with a set of weld calculations, which must be provided along with the load calculations at time of enquiry.

- All welding must be undertaken in accordance to BS EN ISO 15614-2:2005.

- All welding must be carried out by welders certified to BS EN ISO 9606-2:2004, proof of welders certification will be provided along with load calculations at time of enquiry.

- Welding materials and consumables will comply with BS EN ISO 18273:2004.

- Any welded lantern bracketry or attachment components must have a **secondary mechanical** safety device.

Calculations & Documentation:

- Specified columns will be calculated and clearly documented on the supplied load calculation to 50 years to verify a 50 year design life.

- Calculations will be carried out to correctly reflect the site terrain categories.

- The load calculations are to be provided to customer at time of enquiry.

- The specified terrain categories in all loading calculations will correctly reflect those of the site location and not to be taken as the non specific generalisation/recommendation of the EN40 or PD6547. To cover all possible scenarios where columns are supplied to local authorities etc containing multiple terrain categories, a set of calculations will be provided for each terrain category where the column might possibly be located.

- NHSS 6 accreditation is a **condition precedent** for highways work/ specification; quotations will not be accepted without documented proof of NHSS 6 accreditation. Both manufacturer and distributer must be NHSS 6 accredited for aluminium lighting columns, CE marking will not be taken as an acceptable alternative to NHSS 6. NHSS 6 certification for both manufacturer and distributer is to be presented along with calculations at time of enquiry.

- If column requirements include “passive safety” then a copy of the columns passively safe test certificate must be supplied to customer at time of enquiry.

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Passively Safe Columns

- Computer simulations **will not** be accepted as an approved testing method, physical crash testing must be carried out by an approved testing centre to be recognised as a passively safe column.

- Supplier must supply the following information with regards to the passively tested columns:

    1. What brackets types if any were attached to column during passive testing eg Single/dual arm. If the column was not tested with brackets then only a post top version will be accepted as passively safe.

    2. If brackets were attached during testing, supplier must supply details of tested bracket lengths. This value must be used as a maximum length with regards to column being classified as passively safe.

Columns on Highways/Motorways

- Columns specified for installation on or alongside carriageways etc must be calculated to the BD94/07 with all relevant values clearly indicated/displayed in the loading calculations. Relating BD94 values that should be used include:

Signage

1 Offset from centre of column by: 300mm
2 Dragfactor / Co-efficient of: 1.8

Column

1 Horizontal deflection factor of: 0.06
2 Loadfactor (Gamma f.g & f.q) of: 1.2

- Column calculations should be accompanied by a completed Appendix 13/2 (MMCHW Vol2 Series NG 1300) which must correctly reflect all the relevant data above.

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