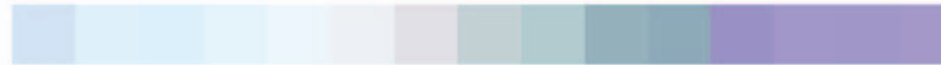


APPROACH PRINCIPLES COLLABORATION DEVELOPMENT



the Kent design guide

making it happen - highways
(street lighting)

Overview

This part of making it happen includes advice, guidance and information about street lighting schemes for residential and industrial developments.



street lighting

GENERAL

We recommend that for all schemes and installations in environmentally sensitive areas, early joint discussions with the local District Planning Authority are essential to achieve good design solutions.

Road lighting must be provided on all new roads, footpaths, cycleways and alternative access links for emergency road closures.

The only exception is in villages and hamlets where the Parish or Town Council want to see it excluded. Alternatively, the Parish or Town Council may wish to have 'footway lighting' installed to their requirements. Such lighting will not be adopted by us, but may become the responsibility of the Parish or Town Council.

This exemption will not be permitted on residential shared surfaces, Home Zones, traffic calming measures or shared cycleway/footpath facilities.

Where the Parish or Town Council do not want to see road lighting implemented, you must not consider residential shared surfaces, Home Zones, traffic calming measures or shared cycleway/footway facilities in your design.

In some instances or situations it may be appropriate to mount or fix lighting to walls and property boundaries. In such cases we will adopt the lighting but you are responsible for arranging any legal easement or wayleave required, and will be expected to obtain written approval from the property owner.

All road lighting must be located within the proposed highway boundary. If, for any reason, you feel this cannot be achieved, you must discuss the reasons and obtain approval from the Divisional Manager. You must make arrangements for legal easements to be in place where the Divisional Manager consents for road lighting to be sited outside the highway boundary.

PROCEDURE

You will be expected to contact the Divisional Manager about road lighting requirements.

You must provide scale plans of the scheme, indicating :

- all existing lighting columns or features in the vicinity;
- the height of these columns and features;
- the light source used; and
- the location of the proposed new columns.

The plan must include, or be accompanied by, a schedule of the equipment proposed. In the case of columns this must include:

- the mounting height;
- all materials;
- bracket details; and
- protective finishes.

Lantern details must include:

- the IP rating;
- the lamps type and wattage;
- the type and location of control gear; and
- the HBC fuse rating and type of photocell control.

Where specific manufacturers' equipment is proposed this must be indicated with relevant catalogue numbers.

LIGHTING DESIGN PARAMETERS

You must comply with the following parameters:

- all new road lighting must be designed in accordance with BS 5489-1:2003 and BS EN 13201-2:2003;
- You must consult the Divisional Manager to agree the appropriate lighting levels;
- all road lighting must operate throughout the hours of darkness;
- our current preferred lighting source is high-pressure sodium, although the use of other light sources may be considered for special applications, but only used with the specific approval of the Divisional Manager. The existence of other light sources in an area where a new system is installed does not preclude the use of high-pressure sodium lighting;
- where, for environmental or other reasons, you wish to use illuminance levels significantly different from those specified in BS 5489, these will only be permitted if the Divisional Manager is satisfied that the standard of lighting proposed is adequate and has given specific approval;
- lighting columns, wherever practicable, must be located at the back of footways, footpaths and verges. All new columns must not be located less than 0.8 m from the edge of the carriageway or hardened edge strip;
- where new columns are erected in service margins or verges, all planting must be kept clear to prevent obstruction of access for maintenance purposes;
- where new columns are located on footways and cycleways they must be of the "raise & lower" variety;
- if you wish to use non-standard equipment, you must obtain permission to do so from the Divisional Manager. We may also require you to pay a commuted sum to cover future maintenance costs; and
- where traffic calming measures are proposed you must ensure that our Code of Practice for Traffic Calming is adhered with.

If you cannot employ a competent person/s to design the street lighting scheme for your development, our consultants will be willing to prepare a design for you at your own cost.

COMMUTED SUMS

Where additional or higher wattage lanterns are used to provide greater lighting levels, or where non-standard equipment is used that leads to significantly increased maintenance costs for us, the Divisional Manager may require you to pay a commuted sum.

Further information regarding commuted sums is included in the technical assessment and adoption - commuted sums section.

HOME ZONES

Road lighting plays a key role in the success of Home Zones, ensuring safety and enjoyment of the area at night. The basic lighting levels for Home Zones is set out in this section.

However, the lighting levels included here should be considered as a starting point rather than the sole criteria for design. For example, in some cases it may not be possible to achieve uniformity levels due to features of the design. This may be more critical in some areas, but of less importance in others.



The location of the lighting columns is only critical in so far that they are clear of the normal traffic route; otherwise there is more flexibility for the location and possibly the siting of lanterns on buildings. Special features may be illuminated for effect by the use of floodlights or ground-mounted uplighters.

Lighting in Home Zones must firstly address any safety issues; secondly provide for any amenity and functional requirements; and finally attempt to deliver a sense of civic pride.

TECHNICAL ASSESSMENT OF THE LIGHTING DESIGN

You must submit two copies of the layout plan to the Divisional Manager, accurately indicating lighting column positions, including the distance of each column from the kerb/carriageway edge and the bracket outreach, together with all necessary calculations.

The plans must also provide details of the proposed column and lantern types as well as the lamp type and wattage.

When approval has been given for your street lighting design, you must provide the Divisional Manager with three copies of the drawings including approved street lighting details.

Any subsequent alterations to the street lighting design, either due to road/footpath realignment or conditions on site, must be agreed with the Divisional Manager.

The exact position of all new lighting columns must be agreed on site with our street lighting representative. Columns must be located within the highway boundary set at the back of the footway, footpath, service margin and verge. Where appropriate lanterns can be mounted on buildings or other structures.

RESPONSIBILITY FOR MAINTENANCE AND ADOPTION

GENERAL

Before a residential dwelling or industrial unit is occupied, the street lighting must be erected and in lighting. We will pay all charges for the supply of electricity as soon as the system is approved and energised. The Distribution Network Operator (DNO), (formerly the Electricity Board) will not enter into an agreement with you for the supply of energy.

You will remain responsible for the electrical and structural integrity of the street lighting installation until formal adoption by us, the Parish or Town Council or any other adoption authority.

Stage 1 POST INSTALLATION

You must supply the Divisional Manager with all street lighting data in order that it can be put into our Management System Inventory. The Divisional Manager will advise you about the correct format to be used.

You must make arrangements to carry out a full check of the street lighting installation with the Divisional Manager. During these checks we will compile a remedial works list (where necessary) for completion by you.

Defects, either electrical or mechanical, which are likely to be a danger to the public, must be fixed within 1 hour and made safe. Defects such as outages, incorrect materials, and workmanship must be remedied within 14 days. Non-urgent works e.g. painting, which cannot be carried out for reasons of inclement weather, must be completed as soon as conditions permit.

In the period leading up to Stage 2 you are responsible for all routine maintenance and 3rd party damage. You must ensure correct operation of the lighting at all times.

Stage 2 ADOPTION

The Divisional Manager will arrange for a final check to be carried out prior to formal adoption.

All outstanding remedials must be completed at this stage.

If the period between installation and adoption by us exceeds 2 years, you will be required to pay for a total bulk lamp change.

Diversion and Protection of Services

You must take any and all measures reasonably required by any Public Authority or Undertaker for the support and full protection of its mains, pipes, cables and other apparatus during the progress of the works.

You must construct and provide to the satisfaction of the Authority or Undertaker concerned, all works necessary for the prevention of damage and interruption of services.

If, in the execution of the works, any damage to any apparatus is sustained or any interruption of or delay to the provision of any service is caused, you will be required to pay the cost reasonably incurred by the Authority or Undertaker in making good such damage.

You must make full compensation to the Authority or Undertaker for any loss incurred by reason of such interruption or delay. You must immediately notify the owner of the service concerned and must afford every facility to the owner in effecting the necessary repairs.

When working in the vicinity of overhead cables or lines you must comply with Engineering Recommendation G39/1. The clearances required by the DNO must be maintained at all times, and 14 days notice in writing must be given by you to such Authority or Undertaker before commencement.

You must, at all times during the progress of works, afford facilities to properly accredited agents of any Public Authority or Undertaker for access to all or any of their apparatus situated in, over or under the site as may be necessary for inspecting, reporting, maintaining, removing, renewing or altering such apparatus, in connection with the construction of the works

or for any other purpose whatsoever.

The positions of Undertakers' mains and services, drains and sewers shown on drawings have been based on information extracted from the records of the various bodies and must be regarded as approximate only. It is your responsibility to ensure that services and apparatus are not damaged in any way. You should proceed with due caution when excavating in the vicinity of Undertaker's mains and services, drains and sewers.

INTERFERENCE WITH TRAFFIC AND ADJOINING PROPERTIES

You must comply with all statutory regulations and local byelaws relating to work on the highway when installing the road lighting.

You must not obstruct or interfere with access and use of publicly maintainable highways, footpaths, cycleways or private dwellings.



CONFLICT WITH TREES

You must observe due care and attention with the design and installation of lighting columns in the vicinity of trees.

As trees mature and grow, their roots can damage underground cables leading to a loss of supply. Conversely cable repairs can damage tree roots which can cause damage or kill trees.

Tree foliage can also affect lighting levels by casting shadows on the highway and large branches can damage lanterns in strong winds. Wherever possible lighting should be sited away from trees.

New tree planting should be carried out once the lighting column positions are known as there are limitations on location and spacing of columns in order to comply with BS 5489-1:2003 and BS EN 13201-2:2003.

If the development has existing mature trees in existence, the lighting must be designed as near as possible to the required standard while avoiding conflict with such trees.

You must advise the Divisional Manager of the anticipated mature height and girth of newly planted trees, if situated near road lighting.

EQUIPMENT AND STORAGE

All road lighting equipment must be supplied in new and unused conditions, except in so far as it has been tested in the course of manufacture.

All materials, other than columns must be stored in weatherproof accommodation. Columns and posts must be stored in accordance with manufacturer's recommendations, clear of the ground and in an area where they will not be exposed to damage.

You must ensure that all equipment and materials supplied are compatible with all other equipment with which it is associated.

ELECTRICITY SERVICES

You are responsible for all wiring other than electricity services, which will be provided by the DNO unless otherwise specified.

It is your responsibility to notify the DNO and us of the earliest date when the installation will be ready for the DNO to make the service connection.

SWITCHING OFF LIGHTING

You must not switch off, dismantle, resite or remove any existing lighting without our prior approval, or before any necessary arrangements have been made with the DNO.

REGULATIONS, CODES AND SPECIFICATION

All road lighting equipment, materials supplied and all work done, must comply with Statutory Regulations, Codes of Practice, Memoranda and British Standard Specifications current at the date of signing the agreement.

IDENTIFICATION NUMBERING

All road lighting columns must be identified using an alpha/numeric combination of up to seven digits in accordance with a schedule that will be provided to you by the Divisional Manager.

The digits must be painted on the columns. They must not be less than 50mm in height and located in a position 1.8m above ground level. They digits must face towards the road or away from properties along footpaths.

Double arm columns must have two sets of digits, one each on both sides of the column.

The Divisional Manager will provide you with a list of column gazetteer references. You should be aware that these cannot be generated until the roads in question have had the street names agreed by the local District Planning Authority.

LANTERNS

Lanterns must be:

- a type agreed with the Divisional Manager;
- to BS EN 60598 – 2.3 International Protection Category I.P 65;
- be fitted with vandal resistant bowls and must be of a uniform pattern from a single manufacturer. Flat glass lanterns may be used in specific areas with the agreement of the Divisional Manager;
- suitable for the lamp type offered and compatible with the columns on which they are to be erected;
- designed for integral, electronic, control gear as agreed with the Divisional Manager. With integral gear, if the control gear compartment is provided with its own cover the latter must be adequately hinged. If a separate cover is not fitted to the control gear compartment the terminal block must be shielded with suitable insulating material to prevent contact during lamp replacement and routine maintenance. The shield is to be captive, in that it must not be necessary to completely detach it from the lantern in order to maintain integral control gear;
- provided with an earth connection in the control gear compartment. When access to this compartment has been attained the earth connection must be visible and easily accessible without removing any components;
- on the same line of the bracket when fixed to brackets providing an uplift, or be mounted horizontally;
- supplied complete with suitable lamp holders ready wired to a connector block, with flexible cord with no less than 0.75mm conductors insulated with non-hygroscopic heat resisting materials;
- supplied with a canopy suitably drilled prior to delivery to receive the two-piece photo-electric control cell unit (where this is to be used), which must be wired to a terminal block secured to the underside of the lantern canopy; and
- provided with a gasket or grommet to make an effective weather seal. When drilled by the manufacturer for fixing photo-electric controls the sockets must be secured to the canopy with not less than 3 screws.

OR have 1 part mini-cells fitted by the manufacturer;

- wired between the socket or control unit and the terminal block with colour-coded cable;
- not fitted to brackets until after the brackets have been fitted to the column and the columns erected at the correct vertical alignment unless otherwise agreed by the Divisional Manager;
- snugly attached to the bracket without any gap between the bracket and the root end of the lantern; and
- be supplied and protected with packing material to enable reasonable stacking.

LAMPS

All lamps must be suitable for use with the lanterns offered and must give the required lumen output of 2000 hours.

High pressure sodium lamps must be of the tubular type unless otherwise specified.

All discharge lamps must be guaranteed by the manufacturer for a minimum of 4000 hours of life.

Lamps must not be fitted until the luminaire has been installed on the column.

All fluorescent or metal halide lamps must have a colour rendering index of greater than 60.

All lamps replaced prior to adoption must be treated as hazardous waste and disposed of by you in accordance with current legal and safety regulations.

Lamps must be dated on the cap with a permanent ink identifying the month and year of installation.

PHOTO-ELECTRIC CONTROLS

Photo-electric control units (PECUS) must be electronic and designed to switch on when the ambient dusk lighting has reached 70 lux and have a differential of 1:0.5.

PECUS must be designed so that in the event of a fault occurring in the unit they must fail safe in the 'ON' position.

PECUS must be either two-piece, one-piece or mini type as specified by the Divisional Manager

CONTROL GEAR

Ballasts

Terminals for lamp and supply connections on electronic ballasts must be shrouded to IP 2X and indelibly marked to permanently indicate their function.

They must provide a power factor of not less than 0.95 lagging and be protected against hot restart loads.

General

Control gear must be suitable for 230 (+10% or -6%) volt operation unless otherwise specified. It must be compatible with other equipment in the circuit and be in accordance with the manufacturer's instructions for the lamp used.

Remote mounted components must be arranged so that the terminals are facing downwards and all such components must be fitted with an earth stud or terminals.

MEANS OF ISOLATION

Each lamp circuit must be protected by one of the following methods:

- for secondary isolation on a DNO supply, a double pole switched isolator unit incorporating a disconnecter and a high breaking capacity type fuse to BS 88, rated in accordance with the lamp manufacturer's recommendations, must be supplied. This unit, which must be capable of being locked in the "off" position, must have shrouding or some other barrier provided, to prevent contact with live parts affording a degree of protection of at least 1P2X and removable only by the use of a tool. If there is a need to provide a second circuit, for example: to a sign, a unit with a disconnecter and 2 fuses, to BS 88 must be provided; or
- cut-outs, provided for private cabling networks owned by us, must consist of a substantial moulded plastic, drip proof enclosure designed primarily for use in street lighting columns. They must provide switched, double pole isolation by a disconnecter and incorporate a high breaking capacity fuse to BS 88, rated in accordance with the lamp manufacturer's recommendations. They must be capable of providing one, two or three separately fused upward circuits or one upward circuit and two dedicated double pole outgoing circuits to each sign etc. Terminals must be large enough to take the steel wire armoured cable specified in straight connections or looped services and have integral brass cable glands.

Our preferred supplier of Isolators and cut-outs is Charles Endirect.



Good quality street lighting can enhance the public realm. It must be appropriate and sympathetic to the surroundings. In some instances, where the streetscene dictates, lighting may be mounted on buildings.

FIXING CONTROL GEAR

All control gear must be securely fixed at all fixing points.

WIRING

Wiring between the terminal block in the lantern and the components in the base of the column, must be insulated with polyvinyl chloride and have sheathed cable of 300/500 volt grade to BS 6004, having a copper conductor size of not less than 2.5mm².

All cables must be correctly colour coded. Unsupported lengths of wiring must be kept to a minimum and not allowed to come into contact with components by their freedom of movement.

For raise & lower columns wiring must be 2.5mm² flexible cable.

Double insulated 6mm² tails with inner and outer sheaths of correct colour coding and of sufficient length to reach from the secondary isolator unit to the service cut-out, must be provided.

EARTHING OF COMPONENT PARTS

All metal work other than that intended to carry current must be earthed using PVC insulated copper cable colour coded green and yellow.

A 1.5mm² circuit protective conductor must connect the earth terminal in each luminaire to the earth terminal associated with the service cut-out unit.

A separate 2.5mm² circuit protective conductor must connect all metal enclosures of all electrical components to the main earth terminal.

All extraneous conductive parts, as described in BS 7671 must be bonded to the main earth terminal using an equipotential bonding conductor of 6mm². Column doors must be bonded using 6mm² flexible cable.

All earth connections must be made by means of a crimped lug type termination.

All terminals are to be shrouded to a value of 1P2X.

FEEDER PILLARS

Feeder pillars must be constructed to our standard detail. Further information is available on request.

For mini-pillars, a minimum wall thickness of 3mm is acceptable. They must comply with IP34 of BS EN 60529 and include a full size backboard of varnished marine plywood at least 15mm thick or other approved non-hygroscopic material.

Alternatively a purpose-designed equipment mounting system may be used. The entry cables must be via the root.

Distribution fuse boards must be provided with an external earth, phase barriered and colour coded. They must be fitted with the same number of live and neutral bus bar terminals as there are outgoing circuits, plus sufficient spare capacity to accommodate at least one extra circuit. (One three phase spare way on a three phase distribution unit and one single phase spare way on a single phase distribution unit).

There must be at least 25% spare space on a backboard.

Pillar doors must be fitted with tamper-proof locks. All locks must be identical in pattern and 2 sets of keys must be provided.

All hinges and locks must be of stainless steel and on larger pillars a staple and clasp suitable for a chubb security lock must be fitted.

Circuit details, on a permanent weatherproof label must be provided in each feeder pillar.

The main earthing terminal in each feeder pillar must be connected to earth.

Feeder pillars must be mounted on a 150mm thick foundation of mix ST2 concrete. After completion of the cabling the feeder pillar base must be filled to 25mm below the door with rounded coarse aggregate (graded 14 to 5mm). A hard standing must be provided in front of any pillar in the verge to enable safe access, the size to be agreed with us.

A durable warning sign indicating 'Danger 415 Volts' or 'Danger 240 Volts'

and “Danger of Death” as appropriate, must be fixed to the front of the pillar together with a cipher to be provided by the Divisional Manager.

POWER CABLES

Power cables must be multi-core of 600/1000 volts grade with stranded copper conductors as specified by the Divisional Manager.

They must be PVC or CPLE insulated and sheathed with steel wire armouring and all conductors must be of equal cross sectional area.

Your contractor must provide the Divisional Manager with satisfactory evidence that each cable length delivered to site has been tested at the place of manufacture and complies with the testing requirements of BS 6346.

CABLE JOINTS

Joints in the power cables must only be made with agreement of the Divisional Manager.

Joints must be made using a jointing product where the manufacturer has received formal approval from the Highways Agency. They must be approved by the cable manufacturer for use on the cables being jointed and must be installed in accordance with the joint manufacturer’s instructions.

You must submit full details of the type, materials and construction of all cable joints to be used, together with copies of full jointing instructions. No joints are to be made without the Divisional Manager’s approval to the type of joint to be used.

You must ensure that the correct phasing is maintained and that jointing is only carried out after all materials used in the jointing are free from visible signs of moisture.

Joints must be adequately supported at all times and backfilling must not take place before the joint is in a fit condition to withstand any stresses which may be imposed upon it.

You must provide our representative with access to inspect the joint before joint filling and backfilling of the trench is carried out.

Cable armour wires must be bonded at all joints without significant increase in resistance compared with that of an unjointed cable run and must form the sole earth continuity circuit.

Cable armour wires must form a bond between adjoining cables.

You must make arrangements with the DNO, for bonding of the armour wires of the street lighting cables with the DNO’s cable system.

DUCTING

All ducts for street lighting installations must be 100mm diameter orange uPVC to BS EN 50086-2-4.

The ducts must be high or medium density and have a wall thickness of not less than 5mm.

Ducts must have “street lighting” printed in 9mm white lettering at intervals of not more than 1m, and the wording must be uppermost when laid.

Each duct must be fitted with a pigmented, stranded polypropylene or equivalent rot-proof material draw rope of 5kN breaking load, the ends of which must project from the duct and be secured to marker posts or blocks. The ends of the duct must be sealed by removable stoppers immediately after it has been laid.

CABLE LAYING

Cables must :

- be laid in ducts under all carriageways, vehicular crossings and driveways;
- be laid elsewhere on a bed of sand or fine materials 75mm deep. They must be covered with 75mm of sand or fine material defined as passing a 2mm B.S. sieve before general reinstatement of the trench. The trench must be free of water when the sand and cables are laid in it;
- not contain joints without prior approval of the Divisional Manager;
- be laid slightly “snaked” in trenches;
- have an adequate length left at each column position to enable connections to be made to the cut-outs in the columns, when columns are erected after the cable has been laid;
- have any ends left temporarily exposed and appropriately sealed;
- only be laid when the ambient temperature is at or above a temperature of 0°C and has been at or above this temperature for the previous 24 hours. You must also ensure that special precautions, approved by the Divisional Manager, have been taken to maintain the cables above this temperature to avoid risk of damage during handling;
- have a yellow PVC marker tape, not less than 1mm thick by 150mm wide, laid above the line of the cable, 150-200mm below the surface. It must be printed in black letters with wording ‘CAUTION STREET LIGHTING CABLE’ at 1m intervals and occupying not less than 75% of its available length;
- be left exposed for inspection after being laid in trenches. The trench must not be backfilled without the permission of our representative; and
- be tested with all test results recorded on a form as required (see tables at the end of this section). You must provide the Divisional Manager with a drawing showing records of the cable installation works as laid.

TERMINATION OF UNDERGROUND CABLE

The cable must be looped in and out of each column and underground jointing is not permitted unless otherwise agreed in writing by the Divisional Manager.

Any wire armouring must be suitably bonded to the earth termination in the base of each column.

Where the Divisional Manager agrees to the jointing of the cables, it must be carried out in dry and clean trenches. You must, if required by the Divisional Manager, provide access for inspection before the joint is filled with compound and before the trench is backfilled.

All aluminium armoured cables must be swaged and covered in ‘Densal’ paste before being connected.

COLUMNS AND BRACKETS

Columns and bracket arms must be suitable for the lanterns required and of a design acceptable to us.

They must be manufactured to BS 5649 in accordance with the Quality Assurance Scheme Document for the Manufacture and Verification of Lighting Columns, (Document reference 5020), in a factory that is Quality Assured to BS EN ISO 9001 or 9002.

Columns and bracket arms must together provide a vertical mounting height measured from the centre of the light source to the carriageway as specified by the Divisional Manager.

The bracket projection measured from the centre line of the column to the back-end of the spigot must be as specified by the Divisional Manager. The uplift of the bracket must be 50mm unless agreed otherwise with the Divisional Manager.

Columns and bracket arms must have no sharp or jagged edges that would foul or chafe internal wiring.

Where columns are mounted behind parapets the bottom of the door must be above the parapet. The door must be hinged or captive.

Where columns are sited on footways, footpaths or cycleways that are inaccessible for vehicular maintenance, they must be of the rise and lower variety. Care must be taken to ensure that there is sufficient room to employ any rise and lower device that is necessary to carry out maintenance functions.

The compartment in the base of each column must be designed to accommodate the control equipment of lamp/s and the opening in it must afford easy access to the equipment.

The compartment must be fitted with weatherproof access doors having tamperproof locks of the same pattern for all columns. A total of six keys for the lock must be supplied to us.

Doors must be fitted with an earth stud to allow bonding to the main earth terminal and each base compartment must have a base-board manufactured from material which is substantially non-hygroscopic, not less than 15mm thick and of suitable size to accommodate the control equipment.

There must be adequate space at the bottom to accommodate cable terminations and service cut-outs and the baseboard must be firmly fixed.

Where columns are to be fitted with a flange plate, you must ensure that the spacing of the flange plate holes and the position of the fixing bolts are compatible.

If manufactured from tubular steel or circular section, circumferential joints must be of the sleeve type and restricted to points where the column is designed with reduced diameters. Joints will not be allowed between designated points of reduced diameter.

WALL/POLE BRACKETS AND CONTROL GEAR BOXES

Wall brackets must be constructed from steel tube and provide a mounting height for the lantern above the carriageway as specified.

Any projection must also be approved. ("Projection" is the distance measured horizontally from the wall to the end of the bracket.)



Brackets must be provided with a back plate of adequate size and strength to permit secure attachment to buildings and to support the lamp and lantern required. They must be secured to the building or wall by rag bolts or other approved fixings.

The brackets must be designed to accept mineral insulated cable glands where required.

Control gear boxes must be constructed of corrosion resistant material and must be large enough to afford easy access to the control equipment.

Doors must be fitted with tamper-proof locks of the same patterns as used for the columns if possible.

A backboard of hardwood or other substantial non-hygroscopic material must be fitted into each control box and be of sufficient size to accommodate all of the control equipment, service cable and cut-outs. They must be of a size compatible with standard brick sizes and recessed into the building wall at a height of 1.2m above ground level.

The wiring to the bracket must be facilitated by a galvanised conduit of minimum 25mm internal diameter mounted in the cavity wall.

Steel wall brackets with integral control gear boxes must be hot dipped galvanised and treated the same as the steel columns, with regard to further corrosion protection.

The steel brackets must be provided with earth terminals.

You must provide all necessary legal way-leaves for the purpose of carrying out repairs or replacement to the Divisional Manager and provide written confirmation from owners regarding such arrangements.

EXCAVATION FOR COLUMNS

Excavations for columns must not be done by mechanical means unless agreed by the Divisional Manager.

The sides of the pits and trenches, must where necessary, be supported adequately at all times and must be kept free of water.

All excavated material from such excavations, not required for refilling, must be disposed of by suitable means.

You must make good, using suitable material or ST2 concrete, as directed by the Divisional Manager:

- any excavation greater than that normally required for the installation of a column or cable; and
- any additional excavation at or below the bottom of foundations where there is unsuitable material.

ERECTION OF COLUMNS AND BRACKETS

You must take all necessary measures to minimise any disturbance and damage to existing trees encountered during erection of columns.

You must obtain prior approval from the Divisional Manager before felling, trimming or cutting roots of trees affected by the installation.

Brackets must be fitted to, and correctly aligned in relation to, columns before the columns are erected.

The columns must be carefully aligned and set vertically with doors facing away from on-coming traffic, except where the columns are mounted behind parapets where the bottom of the door must be above the parapet.

The door must be hinged or captive and face towards the highway unless otherwise directed by the Divisional Manager.

Columns without flanges must be erected in a hole with sides as steep as soil conditions allow. The clearance must be 100mm at the butt end of the column.

The depth must be in accordance with the manufacturer's instructions unless otherwise agreed with the Divisional Manager.

ST5 concrete must be placed and compacted in 150mm layers up to ground level. Cable entry slots must be temporarily plugged to prevent the ingress of any concrete.

A 750mm length of 50mm PVC flexible tubing must be inserted into the column through the cable slot to facilitate insertion of the service cable.

In soft or marshy ground, as determined by the Divisional Manager, the columns must be located on a precast concrete flag.

Bracket arms and lanterns must be fixed and aligned in accordance with the manufacturer's instructions and fixed so that no movement can take place. Ingress of moisture must be prevented.

The lantern must be attached to the bracket arm so that there is no gap between the lantern and the shoulder of the bracket arm. All securing screws must be used.

PROTECTION AGAINST CORROSION

Steel columns and brackets must be hot dipped galvanised to give a coating not less than 0.1mm thick and painted in accordance with our requirements.

FINAL FINISH

Columns must be painted to the G2a 'basic system', or G2b 'marine environment' for coastal locations, as directed by the Divisional Manager.

All coats, except the finish (gloss) coat, must be shop (factory) applied.

Prior to the application of the finish coat any damage caused during erection must be repaired.

When the finish coat is applied on site it must be applied down to ground level and behind the edges of the column doors.

Painting must not be carried out in adverse weather conditions, such as extreme temperatures or during rain, fog etc.

Columns must be coated internally and externally from the butt end to a height 150mm above the ground line, with heavy duty black bituminous coating to BS 3416, not less than 0.25mm thick or other approved heavy duty protective material.

ELECTRICAL INSPECTION AND TESTING

Testing of New Installations

Testing and inspection of new installations must comply fully with Clause 712 and 713 of the 16th Edition of the Wiring Regulations (BS 7671), and must be carried out by a suitably qualified electrician.

A Completion and Inspection Certificate (see Tables at the end of this section) must be completed and submitted to the Divisional Manager.

Fixed Equipment

Fixed equipment includes all lighting columns, illuminated traffic signs, bollards, feeder pillars and any similar electrical equipment on the highway, (described as street furniture and other street located equipment in Section 611 of BS 7671.)

Tests for fixed equipment must be carried out in sequence as follows;

- safety check, polarity test and isolation on incoming supply;
- visual inspection;
- insulation resistance test;
- earth loop impedance test;
- operation of residual current devices; and
- earth electrode resistance.

The tests must be carried out in accordance with the testing procedures for periodic inspection as described in this section.

You must carry out the inspection and testing of the earth bonding and PSCC on feeder pillar and feeder columns, before any inspection is done on the associated lighting columns and signs.

Any bonding defects identified must be rectified and the PSCC level at the feeder pillar raised to an acceptable level, before the inspection and testing of the associated lighting columns and signs is carried out.

You must inspect and test the associated lighting columns and signs before taking measurements of the insulation resistance at the pillar. Insulation resistance of the pillar wiring is measured.

Each outgoing circuit is tested, phase plus neutral to earth, with all loads connected as one unit for insulation resistance. It is only practical to do this after the individual items of street furniture comprising the private 'system' have been tested and any items with low IR have been disconnected.

If the resultant measurement is less than 0.5 megohm this figure must be recorded and notified as a defect.

You must record any comments relevant to each unit and record the Inspectors' identification.

Cable Networks

Cable networks include all underground and overhead cables, which are owned by us for the purposes of providing an electricity supply to fixed equipment on the highway.

Tests for Cable Networks must be carried out in sequence as follows;

- visual inspection;
- insulation resistance test; and
- earth loop impedance test.

Note: Polarity testing of the incoming supply to the network and to each item of fixed equipment is carried out as part of the tests on fixed equipment.

The tests must be carried out in accordance with the testing procedures for periodic inspection as described in this section.

Feeder Pillars

You must make reports that identify feeder pillar types and the details of any distribution board or other protective devices, including the number of ways, protection ratings, details of outgoing circuits and details of the supply.

In addition to the protective devices and bonding requirements, you must check that the pillar access doors are fitted with suitable lock off devices (pillar keys or padlocks) and lubricate all locks and hinges.

A drawing must be included in every pillar identifying the outgoing 'as-built' cable routes and depths. It must also identify all items of equipment connected to each outgoing circuit and each circuit load.

The drawing should also depict the layout of electrical items and the control devices within the pillar. You must report to the Divisional Manager if the drawing is missing or inadequate.

An electrical system associated with a pillar must be measured for its resistance to earth (maximum, 20 Ω)

Testing Procedures for Periodic Inspection and Testing

The tests for fixed equipment must be carried as follows;

- safety check, polarity test and isolation test on incoming supply;
- visually check that it is safe to carry out the tests;
- isolate the internal circuit by removing the fuse carrier/operating isolator;
- test the internal circuit to ensure that it has been isolated from all sources of electrical energy; and
- carry out polarity tests at the incoming terminals to confirm that the incoming supply is energised and that phase, neutral and earth conductors are correctly connected.

Visual Inspection of Fixed Equipment

The electrical installation must be visually checked to verify that:

- an isolating/protective device is fitted and that any single pole devices are connected to the phase pole of the circuit only. (For a simple installation the isolating/protective device may be the electricity company fused cut-out);
- fuses and MCBs are the correct rating;
- all conductors are correctly identified and sleeved accordingly and are of the appropriate size;
- equipment is visibly undamaged;
- terminations, including earth connections and bonding are correctly made and secure;
- the power factor correction capacitors are fitted and match the lamp circuit;
- shrouds, enclosures and doors are securely fitted; and
- labels and danger notices are fitted.

Insulation Resistance of Internal Wiring

An instrument providing a DC test voltage of 500 volts must be used for this test and a minimum value of 0.5 Megohms is required.

Before any test is carried out it must be confirmed that the circuit is isolated from all sources of electrical energy.

Integral Gear Lanterns

The Neutral connection must be disconnected from the incoming supply termination unit/cut-out.

The test must be carried out between L - E and N - E, at the base compartment of the unit. Poor readings will necessitate the disconnection of the lantern and further tests.

Remote Gear Lanterns

The Neutral connection must be disconnected from the incoming supply termination unit/cut-out.

The test must be carried out between L - E and N - E, at the base compartment of the unit on the tails to the cut-out. Poor readings will necessitate the

disconnection of all connections to the ballast and require individual testing of each wiring cable within the column or post.

Earth Loop Impedance Test - DNO Supplies.

The purpose of this test is to ensure that the fuse will operate within its required disconnection time in the event of a fault.

This test is to be carried out at the terminals of the incoming electricity company supply to each item of fixed equipment.

The test should be carried out using a test instrument specifically designed for this purpose.

Operation of Residual Current Devices

This test should be carried out on any such device using a test instrument specifically designed for this purpose.

A test should be applied at the rated tripping current of the device, and the operating time shall not exceed 40ms at a residual current of 150mA.

Earth Electrode Resistance

This test is to be carried out in accordance with BS 7430.

Power Factor Correction Capacitors

Power factor correction capacitors must be checked for their compatibility with the circuit and the capacitance measured. If the resultant measurement has a variance of more than 5% of the rated figure, the measured figure must be recorded and notified as a defect.

Door Continuity Measurement

On metal columns you must measure the continuity, using an ohm-meter, between the access door and the main equipment after the completion of the inspection and testing. If the contact resistance is not less than 0.5 ohm this figure must be recorded and notified as a defect.

Visual Inspection of Cable Networks

The cable network must be visually inspected at each item of fixed equipment to verify that:

- conductors are correctly identified;
- terminations, including earth connections, are correctly made and secure; and
- equipment is visibly undamaged.

Insulation Resistance of Cable Networks

An instrument providing a DC test voltage of 500 volts must be used for this test, and a minimum value of 0.5 Megohms is required.

Before any test on the network is carried out it must be confirmed that the network is isolated from all sources of electrical energy.

The fuse carrier should be removed or the isolator operated, and the neutral disconnected, in each item of fixed equipment serviced by the network.

The tests must be carried out between each conductor and each other conductor in the cable, including neutral and earth branch.

Earth Loop Impedance of Cable Networks

This test should be carried out using a test instrument specifically designed for this purpose.

With the network energised, the earth loop impedance must be measured at the end of each circuit. Where a circuit has more than one branch or spur (other than individual items of fixed equipment fed from a tee joint) the earth loop impedance must be measured at the end of each.

TEST REPORTS

You must complete and submit test reports to the Divisional Manager, prior to adoption, for each item of fixed equipment and each cable network, providing the results in the format as shown in the tables at the end of this section.

Numerical results and details of specific defects will be recorded.

TEST EQUIPMENT

All test equipment must be tested and calibrated at regular planned intervals, and no item of equipment can be used for testing if testing and calibration of the instrument is overdue.

The instrument to be used for polarity and isolation testing must always be checked before use, against a known 230 volt supply.

AS BUILT DRAWINGS

You must provide one set of “as built” drawings for the Divisional Manager on completion of the street lighting installation indicating the final positions of all road lighting installations including existing columns that have been repositioned.

All private underground cables installed or realigned for the works must be accurately recorded on these plans.

TABLE A - TEST AND INSPECTION CERTIFICATE – INTERNAL COLUMN/SIGN WIRING (SINGLE PHASE)

Name(s) of Road(s)

COLUMN / SIGN / BOLLARD	VISUAL INSP.	SYSTEM EARTHING	CIRCUIT CONDUCTOR	CIRCUIT PROTECTION			INSULATIONS RESISTANCE M. Ohms			POLARITY SATISFACTORY	LIVE/EARTH FAULT LOOP	POWER FACTOR CORRECTION		DOOR CONTINUITY	SATISFACTORY
				Fuse BS No.	MCB Class	RATING (Amps)	LIVE TO EARTH	NEUTRAL TO EARTH	LIVE TO NEUTRAL			IMPEDANCE Ohms	Rated μ F		Actual μ F
GAZETTEER REF.	SATIS	TYPE	SIZE mm										Ohms	ANY OTHER COMMENTS	

I CERTIFY THAT TO THE BEST OF MY KNOWLEDGE AND BELIEF THE ROAD LIGHTING/SIGNS/BOLLARDS INDICATED ABOVE HAVE BEEN INSPECTED AND TESTED IN ACCORDANCE WITH THE I.L.E. CODE OF PRACTICE FOR ELECTRICAL SAFETY IN HIGHWAY ELECTRICAL OPERATIONS AND THAT THE RESULTS ARE DETAILED ABOVE.

NAME (BLOCK LETTERS).....Signature.....Date

FOR & ON BEHALF OF:.....

TABLE B - ILE TEST & INSPECTION CERTIFICATE LIGHTING CABLE NETWORK

SITE/CONTRACT:		
SOURCE (F/PILLAR)	CIRCUIT	
CABLE	SYSTEM & EARTHING TYPE:	
CIRCUIT PROTECTION: FUSE BS No.	RATING (A)	LIMITING IMPEDANCE (ohms)
MCB CLASS		

1	VISUAL INSP: SATISFACTORY? YES <input type="checkbox"/> NO <input type="checkbox"/>		Comments							
2	EARTH ELECTRODE RESISTANCE (ohms)									
3	INSULATION RESISTANCE (M ohms)		TEST VOLTS							
	R-B	R-Y	Y-B	R-N	Y-N	B-N	R-E	Y-E	B-E	N-E
4	POLARITY SATISFACTORY? YES <input type="checkbox"/> NO <input type="checkbox"/>									
5	EARTH FAULT LOOP IMPEDANCE (ohms)									
	SOURCE	REMOTE END								
6	RCCB OPERATION (mS):	0.5xlo	lo	5xlo						
7	VOLTAGE DROP (@ FULL LOAD-V):									
	SOURCE VOLTAGE	REMOTE END VOLTAGE	VOLT DROP							
8	COMMENTS									

I CERTIFY THAT TO THE BEST OF MY KNOWLEDGE AND BELIEF THE LIGHTING CABLE NETWORK AT THE ABOVE SITE HAS BEEN INSPECTED AND TESTED IN ACCORDANCE WITH THE ILE CODE OF PRACTICE FOR ELECTRICAL SAFETY IN HIGHWAY ELECTRICAL OPERATIONS AND THAT THE RESULTS ARE DETAILED ABOVE.

SIGNED DATE

For on behalf of

TABLE C - TEST AND INSPECTION CERTIFICATE – FEEDER PILLAR

Road Name
Gaz. Reference
Inspector's Name

Pillar Shell

	Yes	No	Comments
1. Visual Inspection Satisfactory			
2. Locking Device Satisfactory			
3. Warning Sign Satisfactory			

Switch Gear

	Yes	No	Comments
4. Visual Inspection Satisfactory			
5. Number of Circuits			
6. Number of Spare Ways			
7. Fuse Type BS	Fuse Rating Amps		

Circuit Diagram

	Yes	No	Comments
8. Diagram Present			
9. Diagram Condition Satisfactory			
10. Diagram Accurate			

Earth ResistanceOhms.