



TRANSPORT ASSET MANAGEMENT PLAN

SPECIFICATION FOR STREETLIGHTING INSTALLATIONS

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Equipment Summary.

1. Street Lighting

1.1 Residential Roads

Column. 5/6m unflanged, tubular steel BS EN ISO 1461: Hot Dip galvanized, straight shaft (no bracket) unpainted.

Lantern. Holophane VMX024 V1 NW 3.92klm, 4000k, with DALI equipped electronic ballast, 6 pin NEMA socket and Mayflower CMS node. Post top mounted maximum tilt 5 degrees, colour light grey.

Label. As specified in Appendix 1.

1.2 Main Roads

Column. 8/10/12m unflanged tubular steel to BS EN ISO 1461 Hot Dip galvanised no bracket, unpainted.

Lantern. 8m column Holopohane VMX V2 NW 8.92klm 4000k, with DALI equipped electronic ballast, 6 pin NEMA socket and Mayflower CMS node, post top mounted with a maximum tilt of 5 degrees, colour - light grey.

10/12m column single carriageway. Philips Luma 1 R3 NW 12.00klm with DALI equipped electronic ballast, 6 pin NEMA socket and Mayflower CMS node, post top mounted with a maximum tilt of 5 degrees, colour - light grey.

10/12m Dual carriageway. Philips luma 3 NW up to 24klm with DALI equipped electronic ballast, 6 pin NEMA socket and Mayflower CMS node, post top mounted with a maximum tilt of 5 degrees, colour - light grey.

1.2 Conservation Areas

Column. 5/6m unflanged tubular steel to BS EN ISO 1461: Hot dip galvanized, no bracket. Painted with 2 part primer and top coat paint system, colour: Black. Complete with suitable embellishment kit, to be agreed with the Highways Manager.

Lantern. CUPhosco P516 LED or DWWindsor 'Strand' with Mayflower mini cell node, post top mounted.

Colour: Black. Alternative LED lanterns will be considered.

2. Illuminated Signs.

Column. Height varies depending on sign type, minimum clearance on footway 2.1m, minimum clearance 2.3m on cycleway), unflanged, tubular steel BS EN ISO 1461: Hot Dip galvanized, steel, straight shaft (no bracket), unpainted.

Lantern. TMP Apollo Albion 4x1W complete with Mayflower node, including termination of cable. Sign - to be Retro-reflective material to BS EN 12899-1:2007 Performance class R3B. Label - as specified in Appendix 1.

3. Beacons

Column: 3.8m to base of globe, un-flanged tubular steel BS EN ISO 1461: Hot Dip galvanized, straight shaft. Simmonsigns Modubel lantern with LED lamp.

4. Reflective Bollards - SPS 3sixty black standard bollard from Sign Post Solutions.
5. Subway - The type of fitting specified will be subject to discussions between the highway authority and the developer but an LED solution controlled by the Mayflower CMS will be required.

A note on lantern type. The speed of the development of LED lanterns is such that any specification of this nature should recognize that a developer may suggest a different lantern type to those detailed above. It will at the discretion of the Street Lighting Engineer to accept any variation.

Street Lighting Specification for Highways

1. General Requirements

- 1.1 This specification is intended as a guide and it must be borne in mind by the developer that any and all proposals put forward are subject to approval by the Highways and Streetcare Manager, Reading Borough Council, DEGNS Directorate. All proposals must conform to this specification.
- 1.2 Prior to site works of any kind the developer must contact the Highways and Streetcare Manager to determine if any works are required to maintain electrical supplies to existing street lighting or illuminated street furniture within or in the vicinity of the site.
- 1.3 The developer shall provide an approved form of street lighting as an integral part of the estate development. Proposals for street lighting must be included with the drawings and specifications and be submitted for approval to the Highways and Streetcare Manager. The proposals shall include the positions of lighting columns, type of columns, lanterns, cables, CMS (central management systems), cable routes and proposed Electricity Company (Scottish and Southern Electricity) service connections;. two copies of each drawing shall be provided. In addition an Auto-cad (DWG) drawing shall be e-mailed to the Highways and Streetcare Manager or appropriate officer together with a copy of the design data showing proposed illumination levels on the roads and footpaths/ footways to be lit, including the cable design calculations where appropriate.
- 1.4 The approved drawings will be used on any subsequent adoption inspections,

therefore, any changes made to road or lighting layout should be re-submitted for approval.

- 1.5 The drawing indicating the proposed lighting and electrical layout should indicate a clear concise boundary line to identify the limit of adoption (footpaths/ footway and roadway).
- 1.6 Where new accesses are formed onto existing highways/ footways, or alterations to existing accesses, a conflict area is created. The developer shall be responsible for the provision of new lighting or alterations to existing lighting to the relevant standards.

1.7 Planning and Programming

The developer shall plan all lighting works in conjunction with Reading Borough Council's Street Lighting Policies (available on RBC Website, <http://www.reading.gov.uk/Pages/Service.aspx?ServiceId=564>), and standards relating to developments. The developer shall provide Reading Borough Council with a copy of the working programme indicating installation works including any revisions thereto.

1.8 Prospective Residents Liaison

The developer shall show all lighting units and other illuminated equipment (signs and bollards) on all construction/layout plans (including sales and legal/ conveyancing literature) in order that prospective residents are aware that there may be equipment placed adjacent to any given plot or property. Reading Borough Council will not involve itself in any dispute between the developer and prospective resident. Neither will Reading Borough Council entertain any request to move or alter any equipment arising from any such dispute arising from the developer not appraising the prospective resident of the proximity of any equipment in relation to a plot or property.

1.9 'Not Adopted' Signs to be Erected

On all lighting units and lit signs erected as part of the development (whether On-site or Off-site), the developer shall attach, via non metallic cable ties, one 'Not Adopted' sign. These signs shall be attached to the lamp columns on erection and remain until such time that the Council adopts the equipment. The signs shall generally face the carriageway. The pattern and legend of this sign shall be approved by Reading Borough Council but the purpose is to advise residents to whom they should refer any lighting defect or any other enquiry. On a large development (consisting of more than one new road) Reading Borough Council would advise the developer to erect an informative sign at the entrance to the site advising residents of contact details for all maintenance purposes. It is essential that the sign shall have accurate contact information for the developer or his agent.

2. Siting of Equipment

- 2.1 All street lighting and associated cable works and ancillary equipment shall only be installed within the area of the estate which it is proposed will be adopted as highway. In exceptional circumstances, and with the prior approval of the Highways and Streetcare Manager, the developer may be permitted to site apparatus outside the highway if appropriate easements are granted to the Council at the developer's expense.

3. Adoption of Lighting

- 3.1 Every lighting unit and underground cable, on completion and before being energised shall be inspected and tested to verify that the requirements of BS 7671 (Current Edition of the IEE Wiring Regulations) have been met. The inspection and the test results shall be submitted to the Highways and Streetcare Manager no later than the time of requesting a Part 2 adoption inspection.
It is the developer's responsibility to obtain an MPAN number from Scottish and Southern Electricity when requesting underground services for the lighting installation from the electricity company. The developer will then be charged for the energy consumed by the street lighting installation from the date of connection up to and including the date of the final adoption certificate.
- 3.2 The developer shall be responsible for the maintenance (including replacement of damaged columns and the like) of the new equipment and any existing equipment affected by the works from the date of commencement of works up to and including the date of the final adoption certificate.
- 3.4 Upon completion of the installation 'as constructed' drawings shall be forwarded to the Highways and Streetcare Manager showing column positions, cable routes, depths, sizes and positions, and service positions and centrally managed systems.
- 3.5 On request from the developer for formal adoption of the development the lighting installation will be inspected and any remedial works shall be highlighted. The developer shall be responsible for any remedial repairs together with a bulk lamp change and clean prior to a final adoption certificate being issued. In addition, dependent upon the age of the installation, the developer may be required to re-test/ re-paint the installation at his own expense. The developer will supply the Highways and Streetcare Manager copies of the electrical test certificates for each piece of electrical equipment that will be adopted.
- 3.6 As soon as possible after the date of the final adoption certificate the developer shall remove 'Not Adopted' signs.
- 3.7 Mayflower Central Management System (CMS). All highways street light and sign lanterns are to be fitted with the Mayflower CMS system. In the case of street lighting lanterns they must incorporate a factory fitted 6 pin NEMA socket and a Mayflower node. Signs must incorporate a Mayflower mini node and associated equipment. Mayflower contact details are as follows:

Mayflower Complete Lighting Control
Unit 1 Royal London Park
Flanders Road

Hedge End
Southampton
SO30 2LG

Tel: 0845 076 7664

Mayflower Commissioning. In order for the Mayflower system to come into operation as soon as possible following the installation and powering of the equipment the following procedure **MUST** be followed:

The Mayflower node is supplied with 2 adhesive bar codes which contain the information relevant to that node. One sticker is stuck to the column inside the column door, allowing operatives to access the information without going up the column. The second bar code sticker is attached to the Mayflower record sheet for that installation which is then sent to the Council's street lighting contractor SSE Contracting at the address below:

SSE Contracting
Arrowhead Road
Theale
RG7 4AH

FAO Jeanette Burton.

A blank record sheet is provided in Appendix 5 and an example of a completed sheet in Appendix 6.

4. Design Standards are shown in Appendix 2

5. Energy Conservation

Reading Borough Council is committed to reducing its carbon footprint and uses low energy LED white light sources, electronic dimming ballasts and the Mayflower Complete Lighting Control CMS for the control and management of all suitably equipped existing lighting systems. It is our intention that all street lighting equipment will be controlled by the Mayflower CMS system as soon as possible. This shall include all residential major and minor roads and footpaths.

6. Siting of Columns

Columns must not obstruct footpaths or vehicular accesses. They shall be sited in accordance with BS5489-1:2003 + A2:2008, Code of Practice for the design of road lighting part 1: Lighting of roads and public amenity areas and generally be planted in the footpath at the rear or in the absence of a footpath, a minimum of 0.8 metres from the kerb edge to the face of the column and within the highway to be adopted. No obstruction or planting shall hinder access to the column base compartment or the light distribution from the lantern. On terraced streets columns should be sited on or as close as possible to the property boundary line to prevent obstruction of views to and from the property.

7. Equipment Labelling

Reading Borough Council requires adhesive labels to be provided by the developer as shown on Drawing No. D103/01 (Appendix 1). NB The developer must approach RBC to gain the correct numbering for the new columns which are now numbered in sequence.

8. Equipment (General)

Where non standard equipment is approved the developer shall supply to Reading Borough Council, at no cost, spare equipment eg lantern, bracket, column etc. The quantity to be supplied shall be 10% (rounded up) of that installed or 1no if fewer than 10 are installed.

Electronic ballasts, lamps, controls etc. shall be approved for use under the Balancing and Settlement Code (BSC) Unmetered Supplies Arrangements and shall have all necessary UMSUG codes.

9. Columns and Brackets

All columns and bracket arms shall be hot dipped galvanised to BS EN 150 1461 1999 and be unpainted unless the development site falls within a Conservation Area when all columns will be painted to the requirements of the Highways and Streetcare Manager.

Lanterns will be post top mounted (no outreach brackets) unless agreed with the Highways and Streetcare Manager after their use is proven by the lighting design to the correct standard.

10. Lanterns

10.1 Every lantern (including sign lanterns) provided by the developer as part of their scheme must include the following control equipment:

DALI compatible electronic ballast
S6000 6 pin NEMA socket,
Mayflower external or internal node.

When the lighting system to be adopted by Reading Borough Council includes more than 25 lanterns (street light or illuminated sign) one lantern provided by the developer will include the following:

DALI compatible electronic ballast
S6000 NEMA socket
Mayflower Sub Master unit

Lanterns must comply with BS EN 60958-2-3 2011 and be light grey in colour.

10.2 Lanterns shall have DALI compatible electronic, dimmable ballasts enabled for connection to the central management system (CMS) components but able to be

connected to standard electronic photocell controls

- 10.3 Ballasts shall be approved for use under the Balancing and Settlement Code (BSC) Unmetered Supplies Arrangements and shall have all necessary UMSUG codes. Ballasts shall comply with BS EN 62356-207:2009.

11. Light Sources

Reading Borough Council requires all lanterns to use an LED- (Light Emitting Diode) light source. The number and light output of LED's included in each unit will be determined by the lighting design for the class of road and BS 5489.

12. Cut Outs and Isolators

- 12.1 All cut-outs shall incorporate a double pole isolation switch complying with BS EN 60947-3:1992 having a rating of 32 amps and of adequate short circuit withstand for the position in the circuit in which it is installed. The isolation switch shall be capable of being positively and visibly locked off by means of a padlock or locking bar and it shall not be possible to remove the outgoing fuse(s) unless the isolation switch is in the off position.
- 12.2 The cut-outs shall be of the all insulated type with drip proof enclosure affording a minimum degree of protection to IP22 and have a high mechanical and dielectric strength. The terminals shall be capable of accepting conductors with crimped lug connectors.
- 12.3 The incoming phase terminals shall be shrouded when all connections have been made, the shroud shall be capable of removal for inspection or disconnection of cable ends, but shall not be capable of accidental detachment or be of a push fit type. Movement of cables shall be prevented by the use of bushes or inserts. Fuse carriers shall utilise HRC fuse links to BS 88-2:2007.
- 12.4 The units shall be provided with separate terminals for phase and neutral conductors manufactured from solid brass and electro-tinned and be entirely suitable for connecting the requisite cables.
- 12.5 Where connection is made into any cut-out for supplying a sub-circuit the cut-out shall incorporate a second fuse link to protect the sub-circuit.
- 12.6 Electricity Service Connections cut-outs shall be manufactured by Tofco or and be double pole or similar approved by DCC.

The cut-outs shall be securely fitted to the baseboard with non-corrodible screw fixings.

13. Fuses

No rewirable fuses shall be used. All fuses to be HRC to BS88-2:2007 operating on 240 volts 50Hz supply. Fuse ratings shall be 6 amps for lamps up to and including 100watt and 10 amps for lamps greater than 100 watts.

14. Cables

- 14.1 Underground cables shall be laid in duct except where they leave the duct to enter the cable slot of the apparatus, and consist of stranded copper conductors, XLPE insulated, PVC extruded bedding, a concentric layer of steel wire armour, overall PVC sheathing suitable for operation in an earthed system and of rated voltage 600/1000 volts at 50HZ, all in accordance with BS 6346 for metric cable, have BASEC approval under the product certification scheme and produced by a manufacturer who has been awarded a Certificate of Assessed Quality Management, to BS 7889:2012 BASEC. 24 All cores shall be of equal cross sectional area of 6sq mm minimum and be of such a size that the requirements of the current IEE Wiring Regulation, BS 7671:2013, are met and allow for a disconnection time not exceeding 5 seconds.

Internal wiring between the terminal block in the lantern and the components in the base of the column shall be PVC insulated and sheathed cable of 300/500 volt grade, have a copper conductor size of not less than 2.5 sq mm.

Where approved, cable to a two part photo electric cell detector unit shall be 1.5 sq mm two core flat with white sheath.

All cores shall be correctly colour coded and cables for continuous earth bonding shall be green/yellow PVC insulated single core copper cable of minimum cross section 6 sq mm 600 volt grade conforming to BS 6004:2012.

All underground cables (except Regional Electricity Company cables) shall be identified as to their origin and destination by permanent markers located over the sheath at the cable ends. An example is shown in Appendix 5.

14.2 Cable Ducts

Cable ducts across roadways shall have internal diameters of 100 mm and average wall thickness of 5.0 mm. Cable ducts in footpaths and verges shall have internal diameters of 50 mm and average wall thickness of 3.5 mm.

Ducts shall be manufactured from low, medium or high density polyethylene and coloured orange with white, 9 mm high lettering "STREET LIGHTING" at intervals of not more than 1m along its length.

Ducts for street lighting cables under carriageways shall be laid with 750 mm minimum cover and laid on 100 mm bed of Acceptable Material Class 8 (Specification of Highway Works) and covered with Acceptable Material Class 8 but containing no material greater than 20 mm within 100 mm of the duct.

14.3 Cable Laying

Joints in underground cables are not permitted and continuous lengths of cable shall be laid and looped in and out of the terminations. Cables shall not be laid in a frozen state or when the ambient temperature is below 0°c.

The internal radius of a cable bend shall be such as not to cause damage to the cable.

For cables not accommodated in 50 mm duct, the trench shall be excavated to 525 mm minimum depth and the cable laid on and surrounded by a 75 mm thickness of sand or equivalent material. The trench to be back filled with acceptable material to within 150 mm of finished level before laying the cable marker tape and completing the backfill and finished surface.

15. Erection of Columns and Brackets

- 15.1 The columns shall be erected in the locations shown on the approved drawings. Columns shall be set on a 450 x 450 x 50 mm paving slab at the level necessary to obtain the required planting depth. The column shall be correctly aligned in the vertical position with the door opening facing away from oncoming traffic. Columns will be sited at the rear of the footway unless otherwise agreed.

The columns shall be placed in a hole allowing a minimum of 150 mm clearance all round the base of the column for the full excavation depth. The column foundation shall be formed as shown in Appendix 6 or as otherwise directed by the Highways Manager.

Concrete used in the backfill shall be grade ST5 as specified in the Specification for Highway Works.

- 15.2 Bracket arms will only be accepted following approval from the Highways Manager. All lanterns are to be post top mounted unless otherwise agreed.

16 . Internal Wiring and Distribution Cables

- 16.1 Columns not directly supplied from Electricity Company supplies shall be supplied on a sub-circuit from the serviced column by means of the public lighting underground cable and looped from column to column. All looped connections shall be made in the bottom terminals of the fused isolator cut-out. The armouring of the underground cables shall be secured onto the gland plate of the cut-out or have a non ferrous sleeve fitted below the armouring and earthing clamps fitted to make a positive grip on the armour wires. The earthing clamps and gland plate shall be bonded to the main column earthing terminal with 10 sq mm single core PVC cable.

- 16.2 Typical wiring diagrams are shown in Appendices

17. Illuminated Road Traffic Signs

- 17.1 Where it is necessary, all illuminated road traffic signs shall be provided by the developer and shall be as prescribed in the Traffic Signs Regulations and General Directions 2002, the Traffic Signs (Speed Limits) Regulations and any amendments.

- 17.2 Posts for Illuminated Traffic Signs

A post with base housing shall be provided for each overhead sign lighting unit and cut out and service connections made in the base housing. All metal posts shall be tubular steel section and supplied in accordance with BS 873 and BSEN 10210. 1 and 2:2006. The corrosion protection for sign posts shall be as that specified for street lighting columns in Clause 11 of this specification.

17.3 Sign Plates

All plates shall be of a size, colour and type prescribed by the Secretary of State as indicated in the Traffic Sign Regulations. All parts of the sign assemblies shall be designed and manufactured to withstand a minimum wind pressure of 1.5 KN/square metre.

Plates shall be manufactured from aluminium or plastic coated steel which shall have a ten year guarantee applicable to the reflective material and substrate. All signs shall have class one retroreflective material (encapsulated lens) fully reflectorised.

17.4 Sign Lanterns

Sign lanterns shall comply in all respects with the requirement of, BS EN ISO 21183-1:2006 where applicable.

The lantern for overhead illumination of plates up to 750mm diameter shall house one LED 3 watt light source. The lamp unit should incorporate a Mayflower Mini-node, DALI compatible ballast and associated equipment.

18. Electricity Supply Services

18.1 The developer shall liaise with the Regional Electricity Company (Southern and Scottish Energy) with regard to provision of electricity supply services to the lighting installation.

18.2 Scottish and Southern advise that where a significant number of services are required, the developer should contact the appropriate Southern and Scottish Energy office 12 weeks prior to the supply being required, and provide the following:-

- (a) A schedule of lamps requiring a new supply or transfer of supply.
- (b) Two plans of the approved lighting scheme.
- (c) An indication of when the work will be required.

Scottish and Southern will return one of the plans, a written quotation and a schedule of the columns that are to receive a new or transferred supply. The developer will be required to confirm acceptance of terms and to give at least four weeks notice of a "site ready date" when work on site can commence. Scottish and Southern will require payment in advance of work commencing and also require the developer to install all service and cross road ducts to their specification.

Where public lighting underground supplies are to be drawn from the Electricity Company fuse unit, the developer shall provide and fix a public lighting cut-out at

that service position.

UNDER NO CIRCUMSTANCES SHALL CONNECTIONS BE MADE TO THE LIVE SIDE OF THE ELECTRICITY COMPANY CUT-OUT.

19. Earthing

The whole of the installation shall be earthed in accordance with the requirements of the current BS 7671:2008+A1, IEE Wiring Regulations, and with the recommendations contained in BS 7430:2011, Earthing. Earthing shall be carried out in PVC insulated copper cable green/yellow in colour. All metallic parts of the ancillary equipment, column, lantern and gear shall be bonded together to form a continuous earth path to the earth stud of the column.

20. Electrical Testing of Equipment and Commissioning

20.1 Prior to being energised, all equipment wiring and cabling of every completed installation shall be tested in accordance with Part 7 of BS7671:2008.

Testing shall be carried out in compliance with the Electricity at Work Regulations 1989 and such that no danger to persons or property or damage to equipment can occur even if the tested circuit is defective.

The columns and underground cables should be tested in the following sequence.

1. Visual Inspection - to verify that the electrical equipment has been correctly installed in accordance with the design with correctly rated protection devices and bonding and that no visible damage exists.
2. Continuity - every protective conductor, including bonding, shall be tested to verify that it is electrically sound.
3. Insulation Resistance - the insulation resistance should be measured between all the conductors and the conductors to earth with a test voltage of 500 volts. The insulation resistance should not be less than 0.5 megohm.
4. Polarity - a polarity test should be made and a check to verify that protective devices are connected correctly and fuses in the phase conductor only.
5. Earth Fault Loop Impedance - measurements should be taken at the point of supply and, where underground cables have been installed, at the most distant point of each circuit. The values should accord with those shown in BS 7671 to ensure the circuit protective device will function within five seconds.
6. Earth Electrode Resistance - tested in accordance with BS 7430 and BS 7671.
7. Operation of Residual Current Device - verify by a test simulating an appropriate fault condition independent of any test facility incorporated in the device. The device shall be tested at 50% and 100% of its rated trip current.

8.Voltage Drop - measured at the most remote point from the supply under full load conditions.

APPENDIX 1 - See drawing

APPENDIX 2

Design Standards

- 2.1 All public lighting provided on the adopted highway shall be designed and installed in accordance with BS5489-1:2013, Code of Practice for the design of road lighting part 1: Lighting of roads and public amenity areas and BS EN 13201-2:2004, BS EN 13201-3:2003 Calculation of Performance, BS EN 13201-4:2003 Methods of Measuring Lighting Performance and BS 5489 Guide to General Principles.

The actual level of public lighting to be provided shall be determined by the methods shown in the European Standard BS EN 13201: 1998, Part 1, Selection of Lighting Classes.

- 2.2 Deviation from Standards shall only be allowed with prior approval by the Highways Manager.
- 2.3 The Institution of Lighting Professionals 'Guidance Notes for the Reduction of Obtrusive Light' recommendation for zoning of areas shall be used when assessing lighting requirements.
- 2.4 Urban Location. Within an urban location all highways shall be lit in accordance with the relevant standard applicable to the type and category of the highway.
- (a) Primary Routes
 - (b) District Distributors
 - (c) Local Distributors
 - (d) Access Roads
 - (e) Shared Access Roads
 - (f) Secondary Access Roads

Category a), b) and c) roads will mainly be classified as traffic routes and shall be lit accordingly. Glare shall be restricted to CEN Luminous Intensity Class G2/3 but Class G4 used if possible.

Category d), e) and f) roads will generally be considered as residential and lit accordingly. Glare shall be restricted to CEN Luminous Intensity Class G2/3.

Consideration will also be given to the lighting of footpaths and cycle tracks with high night time use. However, where a cycle track or footpath is remote from an adjacent highway or properties and an existing alternative lit route exists, regard shall be given to whether it is safe to attract people on to isolated areas by the provision of lighting. Glare shall be restricted to CEN Luminous Intensity Class G2/3.

Areas of special environmental interest in an urban area would normally be lit subject to an individual assessment to determine the benefits or otherwise of providing a system of street lighting at such locations and to assess any environmental restrictions on the type and level of lighting to be provided.

Appendix 3

Legislation, Regulations, Codes and Specifications

- 3.1 All materials used and work done shall comply with all relevant Acts and current Statutory and other Regulations (including those of the Department for Transport), Codes of Practice, British Standards Specifications and European Standard Specifications and particularly the Institution of Electrical Engineers “Regulations for Electrical Installations”, The New Roads and Street Works Act 1991, The Traffic Signs Regulations and Directions 1994, the Traffic Safety Code for Roadwork’s, Chapter 8 of the Traffic Signs Manual
- 3.2 All public lighting systems installed and maintained should fully comply with the following Legislation and Regulations:
- Highways Act 1980
 - Goods and Services Act
 - The Local Government Contract Act
 - The Management of Health and Safety at Work Regulations 1982
 - Electricity at Work Regulations 1989 (in force 1990)
 - Traffic Signs Regulations and General Directions 1991
 - Disabled Persons Act 1981
 - Road Humps Regulations 1990
 - New Roads and Street Works Act 1991
 - BS 7671: Amendment 2 2013 Regulations for Electrical Installations 1992
 - BS 5489: 2013 Parts 1 - 10 ‘Code of Practice for the Design of Road Lighting of roads and amenity lighting’.
 - BS EN 60529: ‘Specification for Clarification of Degrees of Protection provided by Enclosures’
 - BS EN 60598 - 2-3: 2003+A1:2012, Luminaires for Road and Street Lighting
 - BS5649:5 ‘Lighting Columns’
 - BS EN 40-1;1992 Lighting Columns. Definitions and Terms
 - BS EN.40-2: 2004 Lighting Columns. General Requirements
 - BS EN 40-3-1:2000 Design Verification-Specification for characteristic loads.
 - BS.EN 40-3-2:2000 Lighting Columns. Designs and Verification. Verification by Testing
 - BS 40-3-3:2003 Lighting Columns. Design by Verification. Verification by Calculation
 - BS 40-5-2002 Lighting Columns. Requirements for Steel Columns
 - BS 40-6:2002 Lighting Columns. Requirements for Aluminium lighting columns
 - BS 5469-5:2002, en 40-5:1982 Lighting Columns. Specification for base compartments and cableways
 - BS.6547:2004+A1:2009 Guidance for the use of BS 40-3-1 and BS EN 4-3-3
 - BS EN 12697-40:2013 Bitumous Mixtures. Test methods for hot mix asphalt. In situ drain ability

- BS EN 12767 2007 Passively Safe Street Lighting and Sign Posts
- Department of Environment, Transport and the Regions Departmental Standard BS26/99 - 'Design of Lighting Columns'
- The Wildlife & Countryside Act (1981) (as amended)
- the Conservation (Natural Habitats, etc) Regulations 1994 (as amended)
- Department of Environment, Transport and the Regions Advice Note TA 49/07 - 'Appraisal of New and Replacement Lighting on Trunk Roads and Trunk Road Motorways'
- Passively Safe Road BS EN12767 and Institution of Lighting Professionals Technical Report TR30, and Reading Borough Council Street Lighting Policy.

Appendix 4

Column and bracket structural requirements. Columns shall be manufactured from galvanised tubular/ sheet steel, and comply to the following:

- 4.1 The column and bracket manufacturer shall be registered with and accredited under the Quality Assurance Scheme ISO9002 for the manufacture, supply and verification of lighting columns. A copy of the accreditation document shall be supplied to the Engineer on request.
- 4.2 All columns and brackets shall be manufactured, supplied and installed in accordance with the requirements of BS5649 or revision of such. Columns shall be manufactured in accordance with the requirements of BSEN40 and amendments by BD 26/04. The design of all columns shall include for the mounting of a sign plate 5kg x 0.3m² x 1.8 shape co-efficient mounted 2.5 metres above ground and with 300mm eccentricity.

Unless agreed otherwise columns and brackets shall be designed to be capable of accepting lanterns with the following weights and windage of lanterns:

Mounting Height	Lantern Weight (kg)	Windage area (sq m ²)
5m post top/side entry	10	0.15
6m post top/side entry	10	0.15
8m post top/side entry	10	0.19
10m post top/side entry	15	0.19
12m post top/side entry	15	0.27

- 4.3 All columns shall have a root for planting to a depth shown by the middle range listed in Clause 5 of Part 2 of BS 5649 as follows:

5 metre columns 800mm planting depth
6 metre columns 1000mm planting depth
8 metre columns 1200mm planting depth
10 metre columns 1500mm planting depth
12 metre columns 1700mm planting depth

- 4.4 All columns shall have a cable entry slot 75mm x 150mm with the top of the slot 350mm below ground level.
- 4.5 Columns manufactured in galvanised tubular steel shall have shaft and base sections manufactured from continuous lengths of new steel tube and shall not contain any welded or stepped sections.
- 4.6 The base section of columns shall have a minimum wall thickness of 3.2mm and have base compartment openings of a minimum:
- 500 x 100mm for 5 and 6 metre columns
600 x 115mm for 8, 10 and 12 metre columns
- 4.7 The shaft sections shall have minimum diameters of 76mm and 114mm for 5/6 and 8/10 metre columns respectively.
- 4.8 The height above ground of the base sections shall be 1250mm.
- 4.9 Column roots shall be treated with dense bitumen.

Unless agreed otherwise all columns shall be designed for the following conditions:-

- (a) Mean hourly wind speed V_{ref} of 24m/s.
 - (b) Site altitude of 250 metres.
 - (c) Terrain category III for 5 and 6 metre columns.
 - (d) Terrain category II for 8, 10, and 12 metre columns.
 - (d) Topography factor f , shall be 1.0.
 - (e) The Partial Safety Factor on loads shall be Class B, wind load 1.2 and dead load 1.2.
 - (f) The maximum horizontal deflection of the lantern connection shall be Class 3, 0.1 (h+w).
- 4.10 Tubular steel columns shall, where specified, be provided with detachable web type steel brackets and shall have a welded web gusset between the spigot and pipe arm and shall have a welded steel spigot cap. For 8 metre columns, and above, the fixing of the bracket to the column shall be over a reduced diameter spigot to maintain the smooth parallel line between the column and bracket arm. The bracket arm shall be held in position by stainless steel screws allowing fixing in any one of four 90° positions relative to the door opening.
- 4.11 A means of preventing undesired rotational movement of the bracket, once fixed in position, to the column shaft shall be incorporated in the column design.
- 4.12 Bracket arms shall, provide an incline of lantern of 5°, or 0° in Environmental Zone E1 or specified otherwise, when fitted to spigots of:
- (a) 42mm OD x 110mm long for 5 and 6 metre columns
 - (b) 42mm OD x 127mm long for 8, 10 and 12 metre columns.

- 4.13 The method of joining the base section and the shaft shall be by a swage joint with an internal centralising washer. All welding procedures shall be in accordance with the requirements of BS EN288 and all welders approved to the requirements of BS EN287 with welding carried out in accordance with BS 5135.
- 4.14 The same pattern of door lock shall be used throughout all columns. Keys shall be supplied for 10% of all columns supplied. The door fixing bolt shall have a tapered end to facilitate self centering when closing.
- 4.15 An internal full length base board, equivalent to the door size, substantially non-hygroscopic, shall be fitted in each compartment for mounting control gear. Base board fixing studs or bolts shall not protrude beyond the front face of the base board. The base board shall be firmly bolted in position. On delivery, the column door shall come assembled on the column.
- 4.16 All columns shall be fitted with M8 x 30mm brass earth studs, threaded the whole length, with two plain washers and two nuts within the base compartment and that are easily accessible. Column doors shall be provided with an internal lug to enable earthing of the column door with an M8 brass earth stud.
- 4.17 There shall be no sharp edges within columns or bracket arms to damage electrical cables during installation or service. An anti-chafe ring shall be fitted where cable routes change direction from horizontal to vertical within the bracket.
- 4.18 **Raise and Lower columns**
Hinged columns shall be installed at such locations where vehicular access is severely limited, for example, remote footpaths or where the presence of a maintenance vehicle may impede the free flow of traffic. Refuge Island beacon posts may fall within this latter category and shall generally comply with the Clauses above and shall be erected in accordance with manufacturer's instructions and recommendations. The oiling point, provided for the lubrication of the hinged cam, shall be attended to during Routine Maintenance visits.

Mayflower II MS

APPENDIX 6 MAYFLOWER COMMISSIONING RECORD SHEET - COMPLETE

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