Milton Keynes City Council

Code of Practice

Highway Electrical Maintenance

Document Control

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Introduction

Milton Keynes City Council Highways Electrical Maintenance Code of Practice has been fundamentally reviewed with maintenance engineers, inspectors and other practitioners to take account of the recommendations and best practice set out in the October 2016 “Well-managed Highway Infrastructure: A Code of Practice” and any other relevant guidance documents. The Code of Practice is designed to promote the adoption of an integrated asset management approach to highway infrastructure based on the establishment of local levels of service through risk-based assessment.

This document supports the overarching Milton Keynes City Council Highways Infrastructure Asset Management Policy, Strategy and Plan which sets out and describes the service levels relating to our risk-based approach to managing how it organises and maintains the highways electrical assets on our network it is responsible for.

This code is part of a suite of documents for each of our key asset groups and where necessary cross references to these other documents will be made that sets down the process & procedures to be operated.

This code is divided into 2 sections to covers the overall plans for the capital maintenance / upgrades of the highway electrical assets and the service delivery plans covering emergency, reactive and routine maintenance details to ensure that the assets are both well maintained and where necessary upgraded to prolong lifecycles and minimise whole life costs.

This code covers the following key areas of

1. Network Hierarchies
2. Lifecycle Planning,
3. Scheme Selection
4. Condition Surveys
5. Network Performance
6. Service Delivery Plan
7. Operational Requirements
8. Fault Risk Matrices
9. Standard Detail Drawings

Lifecycle Management Planning

Street Lighting and Other Illuminated Assets

Asset Stock and Usage

As of February 2025, there are 63,250 illuminated assets in the city, including 57,900 streetlights, 2,852 illuminated traffic signs and 626 illuminated bollards (incl. Solar Powered), as well as feeder pillars, Porte Cochere lighting, Traffic Signals, School Warning signs. The council is also responsible for the approval of seasonal and decorative lighting.

As with other assets, there is a distinction between the older towns, which contain historic and aged infrastructure and the Designated New Town areas that are up to 50-years old. The distribution of lighting columns on different part of the network is shown below:

Column Location	Number
Grid Roads	7,100
Redways	11,790
CMK	3,500
Industrial Estates	1,500
Estates and Rural	30,510
Underpasses	3,500
TOTAL	57,900

Asset Groupings and Hierarchy

For the purpose's asset management, street lighting is categorised into the following groups and components:

Asset Group	Components
• Lighting columns • Central Management System (CMS) • Lighting unit attached to wall/wooden pole • Heritage columns • Illuminated bollards • Illuminated traffic signs	• Column and foundations • Network unit / Nodes • Bracket • Luminaires • Control equipment, cables • Control gear, switching, internal wiring cabling (within ownership)

Lighting columns are further categorised by type and location on the network. The types of column present in MK are shown below:

Column Type	Number
Mild steel painted	25,282
Mild steel galvanised	750
Mild steel painted and galvanised	25,848
Stainless steel	570
Concrete	50
Other (including aluminium, cast iron, wood)	1,900
TOTAL	54,400

Currently (February 2025), the following types and numbers of luminaire are used:

- 18 Mercury (MBFU)
- 2,813 High Pressure Sodium
- 235 Low Pressure Sodium
- 50810 LED
- 425 Other

MKCC are currently replacing all non-LED luminaires with LED units which will be complete by 2025.

MKCC also installing 50,749 CMS Nodes and 27 base stations in 2023/24

Other illuminated furniture is categorised as follows:

Type	Number
Bollards – Reflective Only	460
Bollards Solar	65
Bollards Fluorescent	440
Bollards LED	121
Lit Signs – LED	165
Lit Signs – Fluorescent	2,687
TOTAL	3,913

Finally, feeder Pillars, underpass lighting units and cabling is categorised as follows:

Type	Number
Grid Road Feeder Pillars – Large	96
Grid Road Feeder Pillars – Small	370

CMK Consumer Units	65
Underpass Lighting Units (LED Converted)	3,500
MKC Private Cable Network	400,000 Linear metres

Asset History

As with other assets, the narrow age profile of street lighting and other illuminated assets in Milton Keynes, having been constructed over a relatively short period of time, has created a backlog of maintenance as these assets started to reach the end of their working life at the same time.
For street lighting the major maintenance issue has been the structural deterioration of the lighting columns; the vast majority being galvanised mild steel which had corroded below ground level making visual detection of any corrosion almost impossible. In 2012, it was estimated that 40,000 columns would need replacing over a 25-year period. Continued use of the thickness loss Structural test has led to a reduction in the number of columns requiring replacement. Continued monitoring will highlight when these columns actually need replacing. The secondary main issue is the private cable network on the grid roads and redways again these are suffering from an 'end of life' issue resulting in increasing number of faults and the requirement to replace sections, the current asset is unducted. An annual testing regime has identified through a RAG status principal area in need of replacement. This work continues through a planned programme and responsive if sudden failure is experienced.

In 2012, a case was made for prudential borrowing to start to address this backlog. The investment programme was originally based on replacing all columns and luminaires, from early test results it became apparent that all columns did not need to be replaced, therefore the council decision was to only replace columns scoring RED or HIGH AMBER and upgrade the luminaire to LED, this has continued on a rolling programme and also provided a structured programme for column retests and replacements. This also has allowed capital investment to be directed to cable upgrades on the private supply network again on a rolling programme.

All underpass lighting units were converted from fluorescent tubes to LED tube technology in 2012 but needs further updating to accommodate the recent changes to British Standards, when major works are undertaken, or additional funding becomes available.

Asset Value and Risk Profile

The Gross Replacement Cost of the street lighting is estimated to be £156M.

Particular risks for the management of street lighting are:

a. Narrow age profile of lighting columns leading to 'bow wave' of structural deterioration
b. Accurate drawings of cable network are minimal & out of date.
c. Street lighting assets being used to support new 'SMART City' technology
d. Condition of private cable network is deteriorating and past design life leading to sectional failures

Asset performance

Levels of Service

Contractor Performance levels are measured in accordance with Service and Key Performance Indicators in the Contract Scope

Surveys and Inspections

All street lighting assets are inspected to the following cycle:

Structural test	6-year cycle. This programme has been accelerated ahead of the LED replacement programme
Electrical test	6-year testing cycle carried out in accordance with IEE regulations. This has been accelerated in line with the LED replacement programme
Visual safety check	Every visit
Scouting checks	Ad-hoc visits in response to public comments.
Network street lighting asset inventory survey	5-years (note: the CMS project will provide GPS tagged assets and a permanent 'real time' inventory)

All inspections and maintenance are carried out by MK Highways Contractor under the highway's maintenance contract.

Scenario evaluation

Maintenance and Funding Strategies

The primary maintenance objective for street lighting and other illuminated assets is to minimise safety risk on the network and this is managed through safety inspections and reactive maintenance.
The strategy for street lighting and other illuminated assets is to replace existing High Intensity Discharge (HID) luminaires with LED technology to achieve maintenance and energy savings. Some of this can be done by replacing the gear tray rather than the whole luminaire.

Where structural testing indicates that it is necessary existing columns, which in general have a 30-year design life, will be replaced with higher specification, galvanised mild steel painted columns that have a 40-year design life.

Estate roads bollards and signs have been replaced with reflective non-illuminated versions where possible. On Grid Roads, illuminated assets are being replaced with LEDs, controlled by photocells, as road closures allow.

All new Led luminaires will be fitted with a CMS node to allow for remote fault reporting and lighting control. All CMS hardware carries a 10-year warranty from commissioning.

Lifecycle Options

Potential maintenance interventions for street lighting and other illuminated assets include:

Reactive and emergency	Emergency work to ensure the asset is in a safe condition. For example, following a vehicle collision.
Routine maintenance	Minor work that must be carried out in a regular or cyclic basis to help maintain the condition and functionality of the asset. For example, luminaire or bollard cleaning or column painting.
Luminaire replacement	Replacement of the luminaire is normally carried out when it gets to its end of life; however, there is a current programme to replace all non-LED luminaires, with LEDs and new gear trays.
Column replacement	Columns are replaced where structural testing indicates that there is structural deterioration.
Cable Upgrade	MK is responsible for 400 kms of private cabling (unducted – aluminium core) this is replaced following cable testing programme or failure identification testing/tracing.
Feeder Pillars/Consumer Units	Feeder Pillars/Consumer Units have been following an upgrade programme to bring into current regulations based on survey assessments

Central Management System	Installation of circa 54,400 nodes and 27 Base stations (10-year warranty) to existing assets to allow for additional strategies to manage the lighting in Milton Keynes

Option Appraisal

Reactive and routine maintenance of street lighting and other illuminated assets is managed using our asset maintenance management system. This system is AMX and has been developed over the last 18 months as a bespoke system for MK, this will include the addition of a Central Management System to assist with fault management.

With respect to major maintenance, a 10-year indicative capital upgrade programme for street lighting was developed in 2012 as part of the successful Prudential Borrowing submission which included a programme of column replacement and conversion to LED luminaires. The last phase of this work started in 2023 and was substantionaly completed in 2024.

The LED replacement programme has been prioritised according to the age profile of the assets and the results of previous structural testing carried out to support the Prudential Borrowing submission.
Further structural testing and any necessary column replacement, as well as routine maintenance activities, have been aligned to the LED replacement programme so that, where structural testing indicates that it is necessary, existing columns will be replaced at the same time as replacing the luminaire.

As part of the LED upgrade programme, electrical testing is carried out to all feeder pillars and, where necessary, the existing cable network will be upgraded as well.

In 2022 the authority has made a strategic decision to convert the rest of its street lighting stock to LED (20,000 units) and to install a Central Management System (CMS) to all 54,400 luminaires. This project was substantionaly completed in 2024. This will lead to developing future lighting strategies to manage this asset.

Bollards on estate roads are kept clean and are more closely inspected now they are unlit.

The above realises a number of benefits, namely.

- Reducing energy costs
- Reducing maintenance costs/self-reporting technology
- Reducing Carbon outputs
- Improve lighting outputs for highway users
- Improve asset management lifecycle planning
- Reduce risk of column failure
- Rationalise existing variations in asset stock
- Programme lighting levels to suit specific demands

Improvement actions

The following improvement actions have been identified for electrical assets:

- Implement the new asset management system AMX – 'a system for the 21st century' this will allow energy submissions to be made in real time, update inventory records
- Upgrade PECU array to allow for more accurate energy recording and maximise savings with greater accuracy on data
- Develop risk-based approach to inspection and maintenance beyond the current capital replacement programme and tools to provide graphical representations providing business cases for future capital works
- Produce monthly Power BI reports on all aspects of maintenance activity for monitoring and reporting purposes.
- Develop maintenance strategies for new 'SMART City' technology in conjunction with MKCC smart city team
- Implement new Central Management System (CMS) to allow for greater control of assets, reduce number of public queries regarding lighting by improving service provided within current budgets
- Develop future lighting strategies for CMS system
- De-illuminate more residential lighting sign assets
- Utilise "Smart Assets" to determine energy use and assist in the capture of traffic data

Service Delivery Plan

Introduction

Milton Keynes City Council as the Highway Authority is not required by law to provide street lighting, however, under the Highways Act 1980, Section 97 –

1.) ".... every local highway authority may provide lighting for the purposes of any highway or proposed highway for which they are or will be the highway authority, and may for that purpose -

a.) contract with any persons for the supply of gas, electricity, or other means of lighting;"

Highway Authorities have a duty of care to the road user. This duty of care does not imply any duty on the Highway Authority to keep the public lighting lit. However, an authority responsible for the maintenance of public lighting should be able to demonstrate that they have systems in place to maintain the public lighting equipment in a safe condition, including the detection of dangerous equipment.

This Code of Practice has therefore been developed with the primary aim of providing assistance to those Officers, involved in the management of the Street Lighting service in Milton Keynes and to give operational guidance to the 'Term' maintenance contractor undertaking the delivery of this service so that they may carry out their duties with consistency, to clear recognised and understood criteria. Thus, ensuring full compliance with the HEA HERS competency scheme for all staff involved in delivering the service.

This code has been developed by a working group of officers who are directly involved at varying levels of responsibility in the function of Street Lighting related to maintenance.

This code gives due regard to the Council's duties and has taken reference from other good codes of practice and appropriate legislation.

Milton Keynes City Council's code is primarily based on the "UK Roads Liaison Group Well Managed Highways Infrastructure (2004 – updated October 2016).

Reference should also be made to the IET Guide to Highway Electrical Street Furniture along with reference to the ILP guides GN22 Asset Management Toolkit Minor Structures (ATOMS) and GP03 Code of Practice for Electrical Safety in Highway Electrical Operations, BS671 18th Edition IEE Wire and Regulations. Any future amendments to these documents will supersede.

This code sets out risk-based management and operational processes that are considered to be appropriate and reasonable, taking into account the safety of highway users, the specific considerations in Milton Keynes and the constraints placed upon the Council to manage public funds responsibly within defined budgets.

Partnership Delivery

Milton Keynes City Council has undertaken a procurement exercise to engage an external partner to deliver its contractual Street Lighting operational functions, including Street Lighting maintenance.

As part of the tender process a comprehensive contract document was produced which outlines specifications for all aspects of street lighting. However, in the short time since letting the contract technology and energy costs have determined that a revision of the street lighting specification needed to take place in order to maximise the benefits of this technology and innovation. As a result, this Code of Practice has been produced to reflect these changes.

The Highways Contractor will adhere to this Code of Practice for highways electrical maintenance with regards to its principles and guidelines, they will also apply their quality assurance management of this process in accordance with their own workflows in order that the repair process will be maintained.

Reference to either the Highways Contractor's manuals and or workflows may be made within this document, they are not included.

Milton Keynes Code of Practice

The Highways Contractor will be provided with this document and any in year amendments that take place to ensure that the most current version is being used for inspections. This document will form the basis of highway electrical maintenance for Milton Keynes.

Team Meetings

Regular team meetings between Milton Keynes Officers and Highway Contractor staff are held to discuss budgets, priorities, workload, software issues and problems within the service area. Relevant new street lighting staff will be expected to attend and eventually participate in these meetings, both to update themselves with new procedures and to involve themselves in any new methodology/processes.

Code of Practice Reviews

An annual review of Milton Keynes City Council Code of Practice for highway electrical maintenance is held each year, both to provide Milton Keynes City Council officers and the Highways Contractor staff with an opportunity to discuss any developmental needs or problems, and for the Highways Service Manager to review any issues related to work, performance and hierarchy definitions. This will also enable a review of the Key Performance Indicators attached to this stream of the service. The review will be undertaken by the Senior Street Lighting Engineer and signed off by the Highways Service Manager.

Service/Key Performance Indicators (SPI/KPI)

The partnership arrangement attaches several Service/Key Performance Indicators to the Street Lighting and maintenance performance of the Highways Contractor. Failure to attain the targets set can have an impact on the duration of the contract, it also provides for a pain/gain mechanism which will have a financial impact on non-performance.

Details of SPI/KPIs are contained in Contract Scope – Performance Model.

Maintenance Resources and Budgets

To deliver on its 'duty of care' to users of the highway, the Council provides financial resources, this allows operations to be carried out in both a planned, routine, and reactive manner in maintaining its electrical assets in a safe condition. Each year the Council determines the allocation of its financial resources with due consideration to its strategic aims

and priorities. The Street Lighting maintenance budget is one area of allocation, which is split into a number of service delivery areas, each with its dedicated budgets. An allocation of budget is specifically set aside for undertaking urgent repairs. In addition to this, funds are also available to undertake 14 and 28 (calendar days) day defect repairs, which might pose a potential hazard to users within the allocated priority timescale.

Street Lighting Provision Network Specific Details

Milton Keynes is improving their network by converting existing asset stock to LED on the Grid Road network, Redways, Industrial Estates and Residential Estates/Towns and we will continue this program onto the rest of the existing network in line with its capital program linked to 'Prudential Borrowing' investment.

The general appearance of the street scene shall be improved by moving away from monochromatic lighting (High Pressure Sodium and Low-Pressure Sodium) and implementing light sources which will provide good colour rendition i.e., LED (presenting colours as they should appear). It is widely accepted that a road illuminated by white light sources such as LED is generally perceived as brighter and safer than that lit by HPS lamps. Some studies have also indicated that white light sources can almost double drivers' peripheral vision and increase drivers braking reactions.

Specific designs and units will be detailed based on standards being met for design guidance. Road lighting designs will be completed by a competent lighting designer and be in accordance with BS5489 2020 and BSEN13201 2016.

For the purposes of determining what lighting level should be provided at a particular location or on a particular length of highway, Milton Keynes is divided into six different categories. These are listed below with a brief indication of the approach to lighting provision in each case. The actual lighting levels will be determined by the risk-based analysis outlined in BS5489 2020 and BSEN13201 2016: -

Grid Roads
All 'H' and 'V' roads designated on the Grid. These roads are all lit except 2 sections where road safety without lighting can be demonstrated. Columns are 10 and 12m units.

Estate Roads (Rural and Urban)
All roads in both general rural (older towns) and urban (grid squares). These roads are generally all lit. Mixture of 5 and 6m columns. Mix of LED and unconverted SON lighting.

Industrial Estates
All commercial areas within grid squares only. 6m, 8m and 10m columns. Mix of LED and

unconverted SON lighting.

Rural Roads
All roads in rural areas within the countryside, are generally not lit except where road safety is an issue.

Redways (incl. Underpasses)
All cycleways known as 'Redways' within the designated area, including all underpasses acting as links to estates. Generally, are all lit to MK specification. Mix of 5 and 6m columns and LED and unconverted SON lighting.

Central Milton Keynes
All Boulevards/Gates/Parking Areas and Underpass links within the Central Milton Keynes designated area. All lit to MK specifications. Mix of 4m, 5m, 6m, 8m and 10m columns. Mix of LED and unconverted SON lighting.

Motorways and Trunk Roads
These roads are maintained by National Highways. The Agency's policy with regards to the lighting of these roads is separate from that of Milton Keynes City Council.

Special Sites or Assets

Tickford Bridge, Newport Pagnell (Grade 1 Scheduled Monument)
Maintenance of the bridge lanterns (other than routine cleansing of the lenses) or cabling attached to or within ducting in the bridge will require Scheduled Monument Consent. The Structures Team manage the asset and the Contractor must seek prior approval from MKCC Structures team in advance of any works.

Street Lighting Design

All street lighting design will be carried out in accordance with current national design standards. Particular consideration shall be given to the specification matrices in Appendix A and Milton Keynes specific considerations in Appendix C of this document.

Please note that designs will also need to take into account the CMS strategies developed over the next 2 years.

Adoptions

Under Sections 278 and 38 of the Highways Act 1980 private developers may carry out works on the highway or create new highway which is to be adopted by the Highway Authority. Lighting and signs will normally be provided by developers on new housing developments. **All scheme designs for these not designed by Milton Keynes City Council must be approved by the Authority before installation commences.** Milton Keynes City Council adoption team will issue a Developers Information Pack to any proposed developer and liaise with developers/installers of lighting equipment prior to any alterations to existing equipment or additional equipment being installed to ensure that appropriate standards are followed. The cost of checking and approving scheme designs shall be borne by the developer. **Regarding any equipment upgraded or installed as part of the development after initial approval full details shall be provided to Milton Keynes City Council by the developer including test certificates etc. Any equipment which has less than 2 years left on the existing test certificates shall be re-tested and any faulty lanterns are to be replaced with LED Lanterns exchanged prior to adoption and the cost borne by the developer.**

The maintenance and energy costs of the installed street lighting remain the responsibility of the developer until the roads are adopted and become part of the highway network.

The necessary NICEIC certificates and as-installed drawings in agreed electronic format must be completed and forwarded to Milton Keynes City Council, Asset Manager, before the legal completion of the adoption process.

All developers should either attach one 'Not Adopted' sign to all lamp columns and lit signs that are erected as part of the development. These should be attached using non-metallic cable ties and will remain in place until such time as Milton Keynes City Council adopts the equipment. The signs will provide the contact details of the developer or other relevant person to be contacted regarding any lighting defect or an information sign is erected at each entrance to the site advising residents of accurate contact details for all maintenance purposes. The style and format of these signs shall be agreed with Head of Highways (or approved delegate) for Milton Keynes City Council prior to installation.

Asset Inspections

To reduce the risk to the public from falling debris or items of highway electrical equipment, regular visual inspection of all items of highway electrical equipment are carried out as a structural inspection.

A visual inspection of the structural condition of the column or signpost is carried out at each cyclic maintenance visit. In addition to this, where appropriate, hammer testing will be carried out with a condition survey to provide TR22 data superseded by ILP Guidance Note

GN22.

Each time a lighting column is removed from service the opportunity is taken to inspect and analyse its condition and this information can be used to help develop further inspection and testing programmes. This data shall be supplied to MKCC in a digital format and/or uploaded into its asset system against the specific electrical asset to maintain a full maintenance history. This condition data is used to develop future maintenance programmes.

Additional non-destructive testing, such as ultra-sonic testing or dynamic testing may be used to ensure the structural integrity of lighting columns and signposts vested in the Council. This testing may be arranged to verify the condition of columns following a visual inspection where there are concerns or where an additional attachment may be needed. All results will be populated within AMX and the units will become part of the structural testing annual program as appropriate.

Street Light Scouting

Any scouting operations to be undertaken by the Contractor/Client, with the implementation of the Central Management System reporting will be carried out from this system, once operational.
Ad hoc scouting may be instructed for validation purposes.

Training

All Highway Contractor Operatives are trained in accordance with their own manual of competence training and have individual Highway Electrical Association portfolio's ensuring full compliance required with HERS Scheme.

Road Traffic Collisions (RTCs)

Street lighting columns damaged in road traffic collisions that require removal and complete replacement are generally replaced with standard equipment. The replacement may be different from the rest of the columns in the road and could be, for example:

- A different light source
- A 6.0m column rather than a 5.0m column (typically the standard mounting height currently used on residential roads in Milton Keynes).
- A steel column rather than concrete or cast iron
- replaced in a different location, for example moved from the kerb edge to the back of footway

- Attached signage removed and reinstalled or replaced dependent upon regulations or Traffic Regulation Orders

In the event of Illuminated signs and or Illuminated bollards being damaged or destroyed in an RTC removal and complete replacement are generally replaced with standard equipment.

The process to be followed is as detailed below: -

Emergency Attendance Process Street Light Columns

- Obtain any Green Claim details
- Attend site and Isolate supply (either call DNO or Isolate the feeder Pillar)
- If possible and where required cut the column at the swage, stump to be left vertical, if unable to then remove the whole unit from site
- If stumped apply cover or warning tape identifying as a hazard
- Remove debris.
- Leave site in safe condition
- Advise of further works

Illuminated Traffic sign /Centre Island column

- Obtain any Green claim details
- Isolate supply
- If possible and where required cut the column at the swage, stump to be left vertical, if unable to then remove the whole unit from site
- If stumped apply cover or warning tape identifying as a hazard
- Advise of further works

Illuminated Bollards

- If Bollard shell can be refitted do so
- If Base and shell are damaged beyond repair Isolate and make safe
- Remove debris from site
- Place cone and KL arrow on site and advise of further works

Categorising Fault Priorities

Actionable repairs identified either from CMS, during scouting inspections and/or service requests from the public received via Highways Maintenance Management System and fall into four categories (see Table 1 – Appendix B) and each fault will be assessed and given a category in accordance with the 'Risk Matrices' for each fault type (see Tables 2, 3, and 4 – Appendix B)

The categories directly relate to the degree of hazard presented by a fault in consideration with the fault type and location.

This is defined in more detail in Prioritisation of Faults - Appendix B - Intervention Levels.

Highways Maintenance Management System

Management of faults shall be via the Highways Maintenance Management System; this database shall keep a permanent record of all routine and capital street lighting works carried out on the network. All lighting is managed at an asset level.

Assets/Inventory/Records

All Street Lighting metadata shall be retained on Milton Keynes City Councils Highways Maintenance Management computerised database and updated as necessary. As per requirement in the scope and contract data of the term contract.

Asset information shall be imported into the same system in the prescribed format within 2 weeks of completion of the works.

From the information entered on to the Highways Maintenance Management system (AMX) a unique charge code is created for each electrical asset, for example: -

45/345/678/nmx/999/99 (UMSUG code)????

This number is unique to all electrical assets and shall be used as part of the energy submission utilising the Smart Asset functionality within the Highways Maintenance Management System.

The inventory is also used to identify future capital replacement schemes, energy saving schemes, dimming, electrical & structural testing programs therefore all the relevant fields need to be regularly checked and updated.

The Asset Management register includes: -

1. street lighting
2. illuminated and non-illuminated traffic signs
3. illuminated traffic bollards
4. feeder pillars
5. highway power supplies including feeder pillars, cables, joints & other components
6. electrical connections on lighting columns for festive decorations
7. interactive speed signs or School safety signs
8. speed cameras

Milton Keynes, Street lighting and all other unmetered highway electrical equipment including signs, bollards and traffic signals etc, energy consumption is managed via a half hourly metering and data collection system.

The switching information is recorded on a PECU array, this is a device which has 30 proportionately allocated photocells (according to our inventory) installed on it. Our meter administrator dials into the unit to collect the information, with this information the monthly figures are submitted to our energy provider to generate our energy invoice.

An energy submission is sent through to the distributor each month and invoices raised accordingly. It is therefore essential that the system is updated regularly to ensure Milton Keynes City Council is charged the right amount based on what equipment is actually installed.

Audits are carried out by the electrical distributor to check equipment on the highway and relevant penalties will be given if we are incorrectly declaring our usage.

Competent Persons

Only competent persons will be allowed to work on street lighting installations and all contractors must be registered as follows:

- Engineering Council Recommendation – G.39 & Safe Isolation
- NICEIC (or similar).
- Approved Quality Assurance Systems.
- HEA_ HERS competency scheme

The contractor shall submit a list of all employees working on electrical assets to give assurance that this is the case in advance of any works being undertaken.

Test Certificate Drawings

As per BS 7671 test certificates for all new works and minor work.

On completion of an electrical installation (street lighting, bollards, signs, etc) the following documents must be completed and forwarded in a digital format compatible with MKCC asset system to Milton Keynes City Council, Asset Manager within 2 weeks of the completion of the installation. The requirements are as follows: -

- NICEIC Test Certificate.
- A laminated A4 cable schematic for placement in each feeder pillar.
- As-installed drawings including grid references

Festive Decorations

The ILP's Professional Lighting Guide - PLG06 GUIDANCE ON INSTALLATION AND MAINTENANCE OF FESTIVE DECORATIONS AND LIGHTING COLUMN ATTACHMENTS shall be used for reference. Also refer to Appendix G within this document

Promoters shall use Milton Keynes City Council 'Application Pack' for Festive Decorations which gives detailed guidance for Promoters on how to make an application in accordance to obtain a Section 178 licence for consent to install their equipment in the public highway. This application form is available on the Milton Keynes City Council website: - https://www.milton-keynes.gov.uk/highways-and-transport-hub/street-lighting-and-traffic-signals/street-lighting

Smart Devices

Smart technology is currently evolving at great speed as a solution to traditional monitoring data collectors such as traffic centres, signal controllers, weather stations, pollution monitoring etc. The medium being utilised both to power and mount these devices is naturally lighting columns.

Any such devices must go through a technical approval process to ensure that the lighting asset is neither compromised or the safety of the public is put at risk. All installations shall be required to submit full diagrams and mounting details to the Service Manager for approvals. Assessment of proposed locations where such equipment will be sited should be attended by Milton Keynes City Council Electrical Contractor before equipment is installed. All installations shall be carried out by an approved Milton Keynes City Council provider.

Appendix A - Specification Selection Matrices

Column Type	Octagonal 12 metre / 1 metre bracket	Conical 12 metre / 1 metre bracket	Octagonal 10 metre / 1 metre bracket	Conical 10 metre / 1 metre bracket	Tubular 5 metre S/E (Brown)
Road Classification					
Grid Road Roundabout – Dual C/W		X			
Grid Road Straight section – Dual C/W	X		X		
Grid Road Roundabout – Single C/W				X	
Grid Road Straight section – Single C/W			X		
Classified Roads – Rural	X		X		
Redways - All					X

Lantern Type	Signify Lumistreet Gen 2 U Lantern or agreed equivalent LED Lantern	Signify Lumistreet Gen 2 A Lantern or agreed equivalent LED Lantern	Signify Lumistreet Gen 2 E Lantern or agreed equivalent LED	Signify Lumistreet Gen 2 I (Residential Areas) Lantern or agreed equivalent
Road Classification				
Grid Road Roundabout – Dual C/W	X			
Grid Road Straight section – Dual C/W	X			
Grid Road Roundabout – Single C/W	X			
Grid Road Straight section – Single C/W	X			
Classified Roads – Rural	X	X		
Redways - All			X	X

Bollard Type	Signature – Merlin Shell various types (white body) / 6w LED Ground	Signature – Trueflex shell various types (black body)	Signature – Solar Trueflex	Bollard Base Lite units 5-watt LED
Road Classification				
Grid Road Roundabout	X		X *	X
Grid Road Straight section	X		X *	X
All Roads – Non-Grid Road Over 40mph	X		X *	X
All Roads – 40mph & below		X		

Bollards

Sign Type	1200mm signs – various types	Simmonsigns – LED Floodlight – LUA Signlight system various sizes
Road Classification		
Grid Road Roundabout	X	X
Grid Road Straight section	X	X
All Roads – Non-Grid Road Over 40mph	X	X
All Roads – 40mph & below		X

*** No Power Service** – If unable to provide permanent power supply or if economically unviable to do so

Illuminated Signs

This asset is a mix of historical assets – where possible signs will be de-illuminated, otherwise details of new standard specification will be determined at point of instruction

Appendix B - Reactive Fault Priority Matrix

TABLE 1

Key	Timescale for Fault Repair
Planned Works **See Table 2,3, & 4 – Appendix B for Matrix**	All Electrical Assets: Faults identified as planned in accordance with the respective matrix table, it may be necessary to carry out an assessment prior to assigning into the planned category. Once identified as planned works these faults will be stored in the system and repairs will be carried out as and when revenue budgets allow.
28-day (28 days shall be defined as 28 calendar days) **See Table 2, 3 & 4 – Appendix B for Matrix**	All Electrical Assets: A fault that should be included in the 28 day works program for repair.
14– Day (14 days shall be defined as 14 calendar days) **See Table 2,3, & 4 – Appendix B for Matrix**	All Electrical Assets: A fault that should be included in the 14 day works program for repair. **Note:** Faults in the amber category will be designated as a 14-day priority, however the Street Lighting Engineer will have the discretion to increase this priority should he deem that other circumstances increase the fault as a greater hazard to users of the highway. For example, an access to a facility that is frequented by vulnerable users. If the fault falls into this category the Street Lighting Engineer MUST record the reasoning behind his decision.
Cat-1 (2 hours) or Cat 1A (24 hours) **See Table 2,3, & 4 – Appendix B for Matrix**	**All Electrical Assets:** Faults are to be assessed and repaired within either 2 hours (CAT 1) or 24 hours (CAT 1A) **Note:** Faults that are only made safe are to be made permanent by inclusion in the 7 or 28 day works program.

Faults not under the ownership of the Council

During an inspection/attendance to a fault it may be determined that the responsibility is not with the Council to repair. The Council does however have a duty of care to the users of the highway. The staff involved in this activity shall therefore take steps to ensure that the party responsible for the repair are made aware of the fault and if necessary, take interim action to make the fault temporarily safe if appropriate/possible.

Statutory Undertakers / National Grid Apparatus

Defective apparatus
The network operator for the Majority of Milton Keynes area is National Grid and attendance to a fault may determine that defective apparatus causing the fault belongs to the Statutory Utility, the investigating officer/crew shall record the defect and contact the utility in line with the procedures agreed by the New Roads and Streetworks Act (NRSWA) section, by the serving of a Section 81 notice.

Defective reinstatements
Where an attendance to a fault identifies a defective reinstatement belonging to a Statutory Undertaker (National Grid) that is still within the guarantee, this must be recorded. This information must be passed on to the NRSWA team who will serve the undertaker with a defect notice requiring them to take remedial action. A photograph may assist the NRSWA team.

It should be noted Milton Keynes also has a number of IDNO's the above also applies to these operators

Unknown parties

Any emergency fault/apparatus attended where the owner is unknown shall be recorded and action taken to make the fault/apparatus safe if possible. Information shall be passed to the relevant section within the highways team and investigations shall then be undertaken to locate the responsible party.

Vulnerable Road Users

Milton Keynes Council recognises the needs of vulnerable road users, i.e., wheelchair users, cyclists, people with prams/buggies and the visually impaired. Wherever possible these needs should be taken into account when prioritising faults for repair (see Table 1). However, works can only be carried out within current budget guidelines.

Fault Priorities

Table 2 - Lamp Columns/Luminaire

Location / Fault	Grid Road	All Other Roads (Estates, Rural & Industrials)	Redways	Underpasses	CMK
Lamp Out (single)	28 Days	14 Days	14 Days	14 Days	14 Days
Lamp Out (3 or more adjacent or single on R'about)	14 Days	14 Days	14 Days	14 Days	14 Days
Damaged/Faulty CMS node or Base station (warranty)	14 Days	14 Days	14 Days	14 Days	14 Days
Column Leaning **(see note 1)**	Visual Assessment	Visual Assessment	Visual Assessment	Visual Assessment	Visual Assessment
Day burner (see note 3b)	14 Days	14 Days	14 Days	14 Days	14 Days
Damaged Lantern **(see note 2)**	Visual Assessment	Visual Assessment	Visual Assessment	Visual Assessment	Visual Assessment
Bowl Hanging	CAT 1A	CAT 1A	CAT 1A	N/A	CAT 1A

Location / Fault	Grid Road	All Other Roads (Estates, Rural & Industrials)	Redways	Underpasses	CMK
Water in Bowl	No Action	No Action	No Action	No Action	No Action
Request for Deflector Shield (**see note 3)**	Visual Assessment	Visual Assessment	Visual Assessment	Visual Assessment	Visual Assessment
Exposed Wires	CAT 1	CAT 1	CAT 1	CAT 1	CAT 1
RTC (damage) / Column Failure (**note 3a)**	CAT 1	CAT 1	CAT 1	CAT 1	CAT 1

Lamp Columns Notes

Note 1: Columns to be inspected to determine stability, if column is not loose or less than 30 degrees from the perpendicular, otherwise job to be categorised as either CAT 1,1A,14 or 28 Day in accordance with inspectors' assessment.

Note 2: Lanterns to be inspected to determine damage, if any immediate hazard is presented job to be categorised as either CAT 1,1A,14 or 28 Day in accordance with inspectors' assessment.

Note 3: Deflector shields are only to be fitted if the location is appropriate and the requestor pays the fee for materials and installation as per 'Fees and Charges' agreed by Cabinet. Suitability assessment to be provided by Contractor's Street Lighting Engineer. The priority then becomes 'Planned'.

Note 3a: Following RTC or a structural failure the initial attendance shall be CAT1 to make safe. A job shall be raised to then replace the column on a 28-day priority. Specification as per Appendix A

Note 3b: Day burner caused by faulty CMS node, replace CMS node under warranty (10Years)

Location / Fault	Grid Road	All Other Roads (Estates, Rural & Industrials)	Redways	Underpasses	CMK
Damaged Bollard **(see note 4)**	28 Days	14 Days	14 Days	14 Days	14 Days
Missing Bollard (**see note 5)**	CAT 1A	CAT 1A	N/A	N/A	CAT 1A
Bollard Unlit	14 Days	14 Days	N/A	N/A	14 Days
Sign Unlit	14 Days	14 Days	14 Days	14 Days	14 Days
Day-burning Bollard or Sign	Planned	Planned	Planned	Planned	Planned
Damaged Electrical Sign **(See note 6)**	Visual Assessment	Visual Assessment	Visual Assessment	Visual Assessment	Visual Assessment
Exposed Wires	CAT 1	CAT 1	CAT 1	CAT 1	CAT 1
RTC (damage)	CAT 1	CAT 1	CAT 1	CAT 1	CAT 1

Table 3 - Illuminated Street Furniture

Electrical Street Furniture Notes

Note 4: Bollards to be inspected to determine damage, if bollard has only minor damage and presents no hazard to highway user, if any immediate hazard is presented job to be categorised as either CAT 1,1A to make safe or 14 or 28 Day to replace in accordance with inspectors' assessment. Also note that there is a program of replacement of lit bollards to either LED or reflective. If it is necessary to replace the bollard this shall be done using the bollard unit identified in the electrical street furniture matrix table in Appendix A

Note 5: Bollards that are missing shall be made safe under a CAT1 or 1A. Note that there is a program of replacement of lit bollards to either LED or reflective. If it is necessary to replace the bollard with a new unit a new job raised under either 14 or 28 days shall be done specifying the bollard unit identified in the electrical street furniture matrix table in Appendix A

Note 6: Damaged electrical signs to be inspected to determine damage, if electrical sign has only minor damage and presents no hazard to highway user, if any immediate hazard is presented job to be categorised as either CAT 1,1A,14 or 28 Day in accordance with Inspectors assessment. Note that there is a program of replacement of lit signs to either LED or reflective signs. If it is necessary to replace the lit sign with a new unit a new job raised under either 14 or 28 days shall be done specifying the sign unit identified in the electrical street furniture matrix table in Appendix A

Table 4 - Non-Electrical Street Furniture

Location / Fault	Grid Road	All Other Roads (Estates, Rural & Industrials)	Redways	Underpasses	CMK
Damaged SNP **(See note 7)**	Visual Assessment	Visual Assessment	Visual Assessment	Visual Assessment	Visual Assessment
Missing SNP **(See note 8)**	Planned	Planned	Planned	Planned	Planned
Directional Sign damaged **(See note 9)**	Visual Assessment	Visual Assessment	Visual Assessment	Visual Assessment	Visual Assessment
Directional Sign missing **(see note 10)**	Planned	Planned	Planned	Planned	Planned
Chevron Sign damaged **(see note 11)**	Visual Assessment	Visual Assessment	Visual Assessment	Visual Assessment	Visual Assessment
Chevron Sign missing **(see note 12)**	28 Day	28 Day	28 Day	28 Day	28 Day

Non-Electrical Street Furniture Notes

Note 7: Street Name Plates (SNP) shall be assessed first by a highways inspector to determine condition prior to any action. If the SNP is damaged to the point that it is a hazard to the public a CAT 1A response shall be raised. Otherwise, a job raised as 'Planned' category.

Note 8: Raise job as 'Planned' category

Note 9: Directional signs shall be assessed first by a highways inspector to determine condition prior to any action. If the sign is damaged to the point that it is a hazard to the public a CAT 1A response shall be raised. Otherwise, jobs are raised as 'Planned' category.

Note 10: Raise job as 'Planned' category

Note 11: Chevron signs shall be assessed first by a highways inspector to determine condition prior to any action. If the sign is damaged to the point that it is a hazard to the public a CAT 1A response shall be raised. Otherwise, 28 Day.

Note 12: Place 1030 '610' arrow in place and close cone to warn motorists as CAT 1. Raise job as '28 Day' category for permanent replacement

Prioritisation of Faults

CAT – 1 (2 Hours)  see Table 1 – Appendix. B

Faults presenting an immediate and imminent hazard or risk to highway users. Immediately make safe or repair within 2 hours. Such faults will include:

Carriageway

1. RTC's involving damage to electrical furniture or signs
2. Exposed Wires
3. Lantern Hanging that may imminently fall
4. Damaged Column that may imminently fail
5. Cat 1 column as determined by Structural Testing Programme 24hr or planned
6. Seriously damaged traffic signals
7. Bowl Hanging

Footways / Redways

1. Exposed electrical wiring on street furniture
2. Any aspect of a column that may imminently fail

CAT – 1A (24 Hours) see Table 1 – Appendix. B

Faults presenting a potential hazard or risk to risk users. Make safe or repair within 24 hours. Such faults will include:

Carriageway

Missing Lit Sign

1. Missing Lit or Reflective Bollard
2. Any aspect of damaged electrical furniture or signs that have been visually assessed and in the opinion of the officer the repair can be prioritised for a 24-hour response priority

Footways/Redways

Any aspect of damaged electrical furniture or signs that have been visually assessed and in the opinion of the officer the repair can be prioritised for a 24-hour response priority.

CAT – 14 Days (14 days) see Table 1 – Appendix. B

Faults presenting a moderate level of hazard or risk. Repair within 14 days. Such faults will include:

Carriageways

1. Single Lamp Out (see exception in 28-day category)
2. 3 or more Lamps Out on a Grid Road i.e., 'block of lights'

3. Unlit Sign or Electrical Bollard
4. Damaged Lit or Reflective Bollard

Footways/Redways

1. Single Lamp Out
2. Unlit Lighting – Underpass (apply vulnerable user test i.e., if next to school, under grid road, priority may be increased)

CAT – 28 Days (28 days)  see Table 1 – Appendix. B

Faults presenting a lower level of service or hazard or risk. Repair within small works programme. Such faults will include:

Carriageways

1. Single Lamp Out on Grid Road
2. Missing Numbers on lighting asset
3. Missing Chevron
4. Where works have been made safe any follow up works may fall into this category
5. Day burners (all)
6. Replacement Lanterns

Footways/Redways

1. Where works have been made safe any follow up works may fall into this category

CAT – Planned Works (Various)  see Table 1 – Appendix. B

Faults presenting no hazard or risk. Repair within small works programme as and when budgets allow this work to be completed. Such faults will include:

Carriageways

1. Peeling Paint on Lighting Columns
2. Request for Deflector Shields (note: These are no longer funded by the authority – any request shall be funded by the requestor in accordance with 'fees and charges' agreed at Cabinet 2015).
3. Water in bowl
4. Missing SNP
5. Missing Directional Sign

Footways / Redways

1. Peeling Paint on Lighting Columns
2. Request for Deflector Shields (note: These are no longer funded by the authority – any request shall be funded by the requestor in accordance with 'fees and charges' agreed at Cabinet 2015).
3. Water in bowl
4. Missing SNP
5. Missing Directional Sign

Appendix C – Street Lighting Key Performance Indicators (KPI's)

See Contract Scope – Performance Model

Appendix D - Street Lighting Operational Requirements/Design Considerations for Milton Keynes

Siting of Street Lighting Columns

Replacement lighting schemes, where possible, incorporate columns being positioned in original column locations, but may need re-alignment due to site factors. This provides a cost-effective solution regarding electrical service connections by the DNO (Distribution Network Operator)

The BS 5489-1:2020 (British Standard) 'Code of Practice for the design of road lighting' recommends that street lighting columns should be set back from the kerb edge of a highway, a minimum dimension of 0.450 metre on roads with a 30 mile per hour speed restriction, and 1.2 metre minimum setback for roads with a 70 mile per hour speed restriction.

Particular

Where, due to design requirements, replacement columns may require siting in new positions i.e., not in the existing lighting column locations, the new columns' positions shall preferably be located on the dividing line between household properties or business premises, or level with the gable-end of properties and to the back of the footpath but in positioning replacement columns consideration must be given to the need for illumination to be projected onto the adjacent carriageway. This may require that any replacement lighting columns would require siting in the same position as the original. (For example, in those streets which are heavily lined with trees). There may be other circumstances when positioning the replacement lighting column to the rear of an existing footpath is also inconvenient to householders or business premises as they can be used as climbing accessories which can be a nuisance or an aid to vandalism or indeed can be used to illegally gain access to these properties.

In these circumstances the siting of a replacement column in this situation should not involve repositioning to the rear of the footpath.

Care should be taken to avoid siting columns directly outside property windows to avoid potential light pollution towards adjacent properties. Columns should not be sited in drop crossings or immediately adjacent to telegraph poles. Columns should not be sited close to privately owned trees or trees within the adopted highway, which, due to foliage may cause obstruction of the light emitted from the particular column mounted luminaire.

The positioning of columns adjacent to existing trees is particularly relevant with regard to the installation of new columns which, in the act of installation, may cause damage to existing tree roots and must be avoided.

Requests for the provision of a shield, baffle or louvre be fitted to a luminaire will normally

be resisted except in exceptional circumstances due to the cost of installation and the fact that shields affect the lighting distribution on the road and are somewhat unsightly. However, we will not allow FRONT SHIELDS.

The illumination falling on a property frontage should not exceed the limits shown in Table 1 in the 'ILP Guidance Notes for the reduction of Obtrusive Light 2021'. Therefore, when replacing columns towards the rear of the footpath which were originally sited towards the front of footway the illumination falling on properties should be reassessed.

The setback of replacement columns should be limited to footpaths which are up to a maximum width of 3.0 metres. Careful attention should be given to providing enough room for prams or wheelchairs to pass replacement lighting columns newly sited on footways.

Lanterns

The preferred light source is LED across Milton Keynes Area. For a list of approved LED units and approved designation please refer to matrices in Appendix A

All lanterns used in street lighting shall contain an acceptable optical system to direct light onto the highway within the limits set within the table Light Intensity Classes (from EN13201-1) and should ensure the minimum environmental pollution to the 'night sky' the amount of downward light from the lantern should be better than 80%.

All lanterns should be manufactured to a minimum of IP (Ingress Protection) 65 and BS 5490 for the lamp containment area, all lanterns should be manufactured from vandal-resistant material. Lanterns should be sufficiently robust to give a normal operating life of 25 years.

Central Management System (CMS)

Milton Keynes City Council has installed a Central Management System (CMS) in 2023/24, this comprises of 27 no. base stations that are mounted on individual columns at pre-set locations across the Area Network that creates a low frequency 'Mesh' network to provide a comprehensive data network for connecting columns with a management control system. Each base station controls up to 5,000 columns. This will allow visibility of not only energy but also faults on assets and drive a more efficient, reactive service.

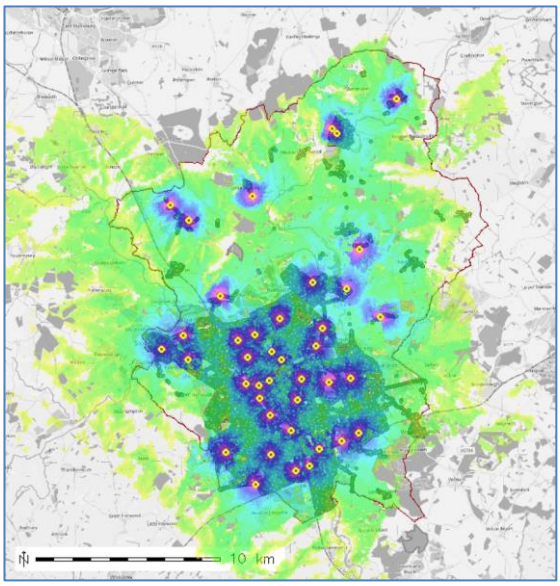


Fig – Showing ‘Mesh’ network coverage of base stations

As part of the installation each of the 54,400 luminaires will be fitted with a telecell (node) that connects the luminaire to the ‘Mesh’ network.

The units installed are as follows.

Base Station – Telensa Base station B4 (27 no.)

Telecell (Node) – Telensa (54,400 no.)

- 7 pin GPS Nema - this will be the 'standard' node that fits into a 7 Pin Nema socket. This should now be the developer standard except for special applications (see 2-part below)
- Conduit GPS - these will be used to retrofit into standard LED that previously had a photocell control
- 2 -part GPS - used for special applications such as heritage lighting, belisha beacons, school flashers, subway lights.
- Cellular - We will get a small number of these for 'IoT pilots' to partner with the multi-sensor for concepts such as automatic switching on Redways

Control System – Telensa PLANet (1 no.)

Underground Cable and Cable Duct

Underground Cable

Road lighting service cable shall consist of B.A.S.E.C. approved XLPE/PVC/SWA/XLPE cable with copper conductors, the outer sheath being black in colour.

The cable will consist of 2, 3 or 4 cores, and the conductors shall be identified by the appropriate colours specified in BS7671 'Requirements for Electrical Installations'.

Underground Cable Duct

Where road lighting service ducts are specified, they shall be thick-walled high-density polythene with smooth bore of 50/100/150mm in diameter, orange in colour and printed with "STREET LIGHTING" lettering at intervals of not more than one metre throughout its length. A draw wire/rope shall also be contained within.

Ducts shall be impervious to water, capable of being laid in temperatures down to -10 degrees Celsius and sufficiently flexible to follow any undulations in a trench bottom and be supplied in 3 or 6 metre lengths, each length shall be supplied with a welded collar.

Cable duct laid in verges and footways shall have a minimum cover of 450mm and shall have a covering of acceptable material.

Cable laid under driveways shall have a minimum cover of 450mm and shall be protected by a concrete surround of mix ST2 concrete or similar as directed by the Authority.

Cable duct laid under carriageways shall be 100mm in diameter and have a minimum cover of 750mm and shall be protected by a concrete surround of mix ST2 or similar as directed by the Authority.

At least 75mm minimum clearance shall be given between the cable duct and the sides of the trench and between ducts sharing the same trench. At least 150mm minimum clearance shall be given between the cable ducts and service pipes belonging to other Statutory Undertakers.

Milton Keynes Cable Networks

Within Milton Keynes there are street lighting columns which are presently electrically supplied through underground cable systems which as they grow older are becoming maintenance liabilities. These cable systems, generally feed older lighting columns, this is termed 'Private Cabling Network System.'

Private Cabling Network System

This cabling system, again generally in established older parts of the highway network (including Grid Roads), consists of old underground aluminium cable of varying configurations, but fundamentally belongs to and is the responsibility of Milton Keynes City Council.

This existing cable can be jointed underground or can be looped direct from column to column. As a general principal rather than jointing the cable it is preferable to lay a new length of cable to eliminate excessive joints.

Private cable networks belonging to Milton Keynes City Council are controlled and maintainable by Milton Keynes City Council.

When unscheduled 'failure of supply', or individual 'dead services' occur on these types of cable systems supplying older lighting column installations, it becomes cost effective to design and install a new street lighting scheme which would be jointed direct onto the WPD mains underground cable via the feeder pillar.

This kind of underground cable fault development creates differing priorities for street lighting budgetary management in that the fault may require immediate revenue funding to relight a particular highway, or if the fault can be temporarily repaired may allow the relighting of that particular highway to be incorporated into the annual rolling program of street lighting capital schemes to be carried out within a given time period, subject to availability of funds.

The nature of underground cable faults, not being predictable, requires that occasionally the relighting of various highways have to be incorporated into the rolling program and may require immediate prioritisation over other schemes.

Feeder Pillars

The feeder pillars shall not rely on the earth provided by the electrical supply company but shall be earthed separately by means of an earth rod. Earthing shall conform to BS 7430.

The isolation equipment shall be a distribution board complete with isolator switch and appropriate fuse/circuit breakers.

Type 1 – 150mm x 700mm sub circuit pillars (mini pillar)

Type 2 – 600mm x 700mm Small single-phase pillar (Midi Pillar)

Type 3 – 750mm x 1.0m Single Phase / Three phase pillar (Standard)

Type 4 – 1.2m x 1.2m Three Phase Pillar (large)

DNO (Distributor Network Operator) & IDNO (Independent Distributor Network Operator)

For the avoidance of doubt, the term "local Electricity Board" and any associated form of words used in this Contract means National Grid.

Street lighting columns are served by a supply of electricity, which is split across, the local DNO, IDNO and private cable networks, this is especially relevant to the lighting on the Grid Roads which are all on private cable networks. The Board's service cable will terminate in the base compartment of each column with a single pole and neutral, fused cut out. It should be noted that there are some street lighting installations in the city which are fed by a lateral supply.

Signposts may either have a supply of electricity provided by National Grid or, alternatively, by a lateral supply taken from a local street lighting column or feeder pillar. During periodic testing these cables if not already identified should be labelled in accordance with current IEE Regulations.

In all new lighting units having a National Grid service, the Contractor shall supply and install a double pole fuse unit for means of isolating the circuit wiring other than by the Board's cut out.

The Contractor shall provide and install all new lateral supplies, as directed by the Project Manager, and double pole fuse units shall be provided and installed at the point of supply to protect the lateral supply. Fusing shall also be provided in the item of equipment being supplied for protection of the sub-circuits.

The Contractor must, under no circumstances whatsoever, interfere with Electricity Board equipment without their prior agreement. Only duly authorised, and certificated (G39) by National Grid as competent, personnel shall connect new or modified installations to an unmetered supply point or have access to the Board's equipment. This certification must be to the requirements of National Grid in this area. Such certification shall be available for inspection by the Project Manager or the Board's representatives at all times.

The Contractor shall immediately notify the Project Manager of any failure of supply points, to ensure that the failure is rectified by National Grid.

In the event of the Contractor notifying the Project Manager of a supply failure that proves, on examination by National Grid not to be the case (i.e., an abortive call by National Grid), then the Project Manager shall deduct the cost of an abortive site visit as charged at the time by National Grid.

The responsibility for placing all instructions with National Grid lies with the Contractor, including supply failures. Upon receipt of a relevant order from the Project Manager, the Contractor shall liaise with National Grid, as necessary, to determine whether or not National Grid have completed their works. Upon such determination, the Contractor shall undertake and complete the remainder of the required works without delay.

Where Emergency Works or Work undertaken by the Emergency Call-Out Service requires the immediate attention of National Grid, the Contractor shall forthwith make all necessary arrangements for National Grid to attend the site and undertake the required works within normal working hours.

Installation Certificates are required by the Project Manager prior to the Boards connection. All costs and charges in connection with this Clause are deemed to be included in the Rates contained in the Schedule.

Earth Stakes

The earth rod must be installed at “end of circuit” is to reduce the Earth Fault Loop Impedance reading and to provide a separate earth in case of failure.

An Earth Matrix should be installed at the feeder pillar - install an earth rod – test, install a second earth rod – test, install third Earth Rod – test until a satisfactory reading is attained. A copper tape is then used to connect these up and a 25mm Earth Cable taken into the feeder pillar and connected to the main earth Bar, this then provides a subsidiary Earth “in case of failure”.

Street Lighting Cut Outs

Cut outs shall be complete with an integral 32amp double pole isolator and dependent upon the number of outgoing circuits, 1,2 or 3 HRC fuses complying with the requirements of BS88 category of duty 230v AC 16 rating Class Q1. Fuse ratings shall be in accordance with the manufacturer’s recommendations.

Interlocking shall insure that the fuse carrier cannot be inserted or withdrawn under load conditions.

A clear “OFF” indication shall be provided when the unit has been isolated and a locking off facility shall be provided in the OFF position only.

The design of the cut-out shall be such that it is possible to incorporate facilities, integral within the unit, for the termination of an additional Local Authority outgoing fused circuit.

A gland plate shall form an integral part of the unit that shall be capable of terminating up to 3 cables with cross sectional areas (CSA) of up to 10.0 sq.mm (25mm).

Terminals shall be sufficient to allow the termination of conductors with a CSA of up to 25.0 sq.mm.

The design of the cut-out shall be such that there is no possibility of contact with live parts during electrical testing.

Secondary double pole Isolation devices shall be installed in all items of electrical equipment situated on and off the highway this is a mandatory requirement of Milton Keynes City Council. Refer to Appendix E for standard detail information

Column Painting

See Contract Specification

Illuminated Bollards & Street Furniture

All new illuminated bollards are to be LED, these bollards will also be base lit.

When the bollard is within 5m of a traffic signal and any sign on the bollard is facing in the same direction as the signal head and where the speed limit is 40mph or below, then it is preferred to use non-illuminated bollards with all round reflectivity.

Bollards should only be fed by private cable via sub-circuit fuse units from the nearest lighting position or feeder pillar. Where a central beacon is installed along with bollards on a refuge, the beacon shall be the first radial point of the sub-circuit.

Flat, self-righting, retro-reflective bollards, complying with BS 8442, may be erected so long as they do not incorporate a traffic sign.

If a traffic bollard incorporates a sign – i.e., diagrams 610 or 611 arrow – certain circumstances dictate that they be illuminated.

Illuminated signs should no longer be attached to Lighting columns, the signs should have a dedicated broad base post. Where existing signs are attached to a column these should be given a dedicated post when being replaced at the end of their lifespan. Alternatively, the structural strength of the column will be tested by carrying out an EN40 inspection to see if it is adequate to support such a sign. Unless the column has been designed specifically to accommodate the sign.

Signs that are currently internally lit should be replaced when either damaged or requiring replacement through fair wear and tear by either non-illuminated signs or externally illuminated as prescribed under the Traffic Signs Regulations and General Directions 2016 (TSRGD 2016). Consideration should be given to the installation of 3D Diamond Graded or solar powered signs where appropriate and when the technology and cost prove to be financially viable.

For any supplementary equipment on columns use a steel 20mm compression gland with a tapped 20mm hole in column

Photo Electric Cells

All new lanterns will be supplied with 7 pin NEMA sockets unless instructed otherwise & fitted with a Telensa Mode.

Other cells are out on site and will be replace like of like until the lanterns are replaced typically SS12 min cells & Westire Acro NEMA cells are used 35/18.

Traffic Signals

Refer to Code of Practice for Traffic Signals Maintenance

Glossary

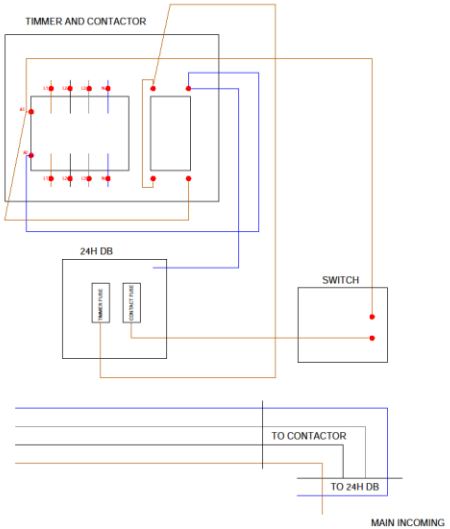
1. Authorised Officers – An officer employed by MKC/Contractor within the respective Street Lighting teams directly involved with street lighting operations.
2. MK Code of Practice for Highways Electrical Maintenance – The Code of Practice, which prescribes the operations and scope of street lighting in Milton Keynes.
3. Service Team Plan – A working document issued by Highways Services management, which sets targets and deadlines for work areas under its management.
4. Procedures – Specifies safe-working practices associated with undertaking street lighting.
5. Fault Database – Computerised database for storing the Street Lighting data and organising repair works.

Appendix E - Street Lighting – Code of Practice Standard Details Milton Keynes

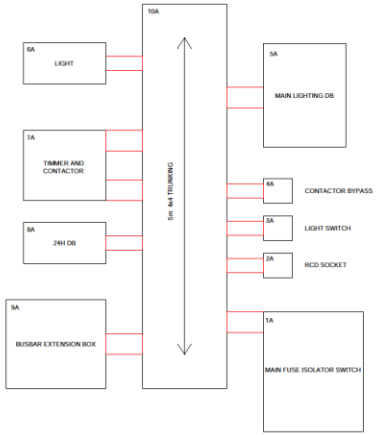
NOTES (CONTINUED):

8. ERECTION AND INSTALLATION WORKS SHALL COMPLY WITH THE CURRENT ISSUE AND AMENDMENTS OF BS7671: 18TH EDITION IET WIRING REGULATIONS 2018 REQUIREMENTS FOR ELECTRICAL INSTALLATIONS. THE CURRENT EDITIONS OF THE ILP CODE OF PRACTICE FORELECTRICAL SAFETY IN PUBLIC LIGHTING OPERATIONS AND THE CODE OF PRACTICE FOR THE ERECTION OF STREET LIGHTING PUBLISHED BY THE ASSOCIATION OF STREET LIGHTING ELECTRICAL CONTRACTORS.

9. ALL MATERIALS SHALL BE TO THE RELEVANT BRITISH STANDARD. SITE WORKS SHALL COMPLY IN GENERAL WITH DEPARTMENT OF TRANSPORT SPECIFICATION FOR HIGHWAY WORKS, AND SHALL ALSO CONFORM TO:
-THE ELECTRICITY AT WORK REGULATIONS (1989)
-THE HEALTH AND SAFETY AT WORK ACT
-CHAPTER 8 OF THE TRAFFIC SIGNS MANUAL
-THE CONTROL OF SUBSTANCES HAZARDOUS TO HEALTH REGULATIONS 1988
-THE CONSTRUCTION (DESIGN AND MANAGEMENT) (CDM) REGULATIONS 2015



FEEDER PILLAR SCHEMATIC
NTS



MATERIAL DESCRIPTION	QTY	ID
L6F200PNLME 200A TP&N ENCLOSED SWITCHED FUSE ISOLATOR	1	1A
BTC42V100 50-00S-01/100A TC BS88 B1 100A FUSE	3	
1mtr LENGTH 4X4 GALVANISED TRUNKING	1	10A
HAGER 500 X 485 X 91 METAL BUSBAR EXTENSION BOX	1	9A
HAGER 4 WAY TP&N DISTRIBUTION BOARD	1	8A
HAGER JK112535 S 3 PHASE 125A SWITCH DISCONNECTOR INCOMER KIT	1	
C14 CA.G ENCLUSURE 376 X 300 X 180 METAL	1	7A
ROBUS LED LIGHT	1	6A
METAL CLAD SINGLE RCD SOCKET	1	2A
METAL CLAD 1 GANG SWITCH & BACKBOX	1	3A
METAL CLAD 20amp DOUBLE POLE SWITCH WITH BACK BOX	1	4A

FEEDER PILLAR EXTERNAL LAYOUT
NTS

DWG. No. SD/1400/02 REV. 0

NOTES:

1. THE WORKS SHALL BE INSTALLED, TESTED AND COMMISSIONED IN ACCORDANCE WITH THE REQUIREMENTS OF THE OF BS 7671:2018 "REQUIREMENTS FOR ELECTRICAL INSTALLATIONS - IET WIRING REGULATIONS 18TH EDITION".

2. EARTHING TO BE IN ACCORDANCE WITH THE LATEST AMENDMENT OF BS 7430 "CODE OF PRACTICE FOR EARTHING".

3. DUE TO THE NATURE OF THE LOADS SUPPLIED IT IS A REQUIREMENT OF ESQCR THAT THE DNO SUPPLY SHALL BE A TT SUPPLY. A LOCAL EARTH ELECTRODE SHALL BE INSTALLED IN THE FORM OF A ROD OR PREFERABLY A COPPER LATTICE MATT . THE RESISTANCE OF THE INSTALLATION EARTH ELECTRODE SHOULD BE AS LOW AS PRACTICABLE - A VALUE EXCEEDING 200 OHMS IS NOT PERMITTED.

4. NEUTRAL AND CIRCUIT PROTECTIVE CONDUCTORS (CPC) HAVE BEEN OMITTED FOR CLARITY. ALL NEUTRAL AND CPC CONDUCTORS ARE TO BE THE SAME CROSS SECTIONAL AREA AS THEIR CORRESPONDING LINE CONDUCTOR.

5. NEUTRAL AND CIRCUIT PROTECTIVE CONDUCTORS TO BE CONNECTED TO THE CORRECT POSITION ON THE NEUTRAL OR EARTH BAR. THE CORRECT POSITION WILL CORRESPOND TO THE WAY IN WHICH THE CORRESPONDING LINE CONDUCTOR AND OVER-CURRENT PROTECTIVE DEVICE IS POSITIONED WITHIN THE DISTRIBUTION BOARD.

6. ALL STRANDED/FLEXIBLE CONDUCTORS (AS PER BS EN 60228) SHALL BE TERMINATED VIA A SUITABLY SIZED CRIMPED PIN TERMINAL.

7. ALL CABLE LENGTHS HAVE BEEN TAKEN FROM CAD MODELS AND WILL REQUIRE ON SITE VERIFICATION PRIOR TO INSTALLATION. ALL CABLES LESS THAN 100M IN LENGTH HAVE BEEN AFFORDED +10% ALLOWANCE FOR VARIATIONS IN DUCT ROUTES. AN ADDITIONAL 6M HAS BEEN ALLOWED FOR TERMINATIONS.

REV	AMENDMENTS	DATE
0	FOR REVIEW	05/07/22

milton keynes council

Stuart Proffitt
Service Director for Public Realm
Service Group
Civic Offices,
1 Saxon Gate East,
CENTRAL MILTON KEYNES
MK9 3EJ

Project

STANDARD DRAWINGS

Drawing

FEEDER PILLAR SCHEMATIC

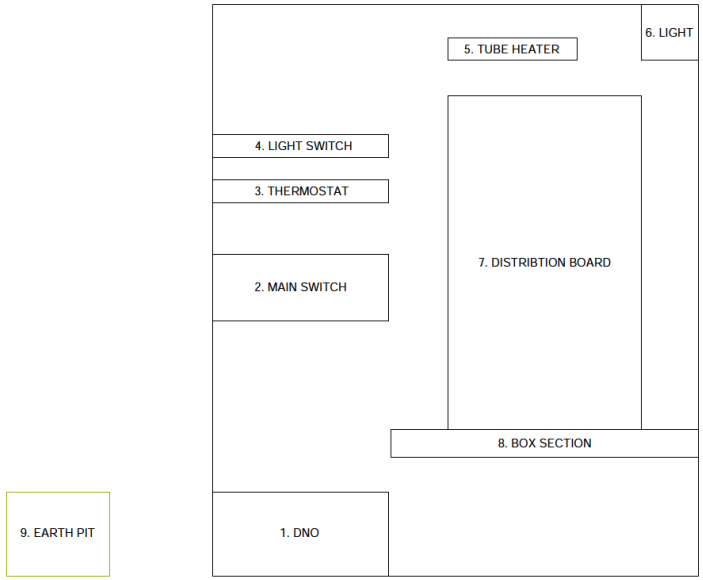
Scale: NTS	Date: 05/07/22
Drawn By: JA	Checked By: SS
Rev 0	Approved By: FJ

Drawing No: SD/1400/2

NOTES (CONTINUED):

8. ERECTION AND INSTALLATION WORKS SHALL COMPLY WITH THE CURRENT ISSUE AND AMENDMENTS OF BS7671: 18TH EDITION IET WIRING REGULATIONS 2018 REQUIREMENTS FOR ELECTRICAL INSTALLATIONS, THE CURRENT EDITIONS OF THE ILP CODE OF PRACTICE FORELECTRICAL SAFETY IN PUBLIC LIGHTING OPERATIONS AND THE CODE OF PRACTICE FOR THE ERECTION OF STREET LIGHTING PUBLISHED BY THE ASSOCIATION OF STREET LIGHTING ELECTRICAL CONTRACTORS.

9. ALL MATERIALS SHALL BE TO THE RELEVANT BRITISH STANDARD. SITE WORKS SHALL COMPLY IN GENERAL WITH DEPARTMENT OF TRANSPORT SPECIFICATION FOR HIGHWAY WORKS, AND SHALL ALSO CONFORM TO:
-THE ELECTRICITY AT WORK REGULATIONS (1989)
-THE HEALTH AND SAFETY AT WORK ACT
-CHAPTER 8 OF THE TRAFFIC SIGNS MANUAL
-THE CONTROL OF SUBSTANCES HAZARDOUS TO HEALTH REGULATIONS 1988
-THE CONSTRUCTION (DESIGN AND MANAGEMENT) (CDM) REGULATIONS 2015



FEEDAR PILLAR CONFIGURATION
NTS

DWG. No.	REV.
SD/1400/1	0

NOTES:

1. THE WORKS SHALL BE INSTALLED, TESTED AND COMMISSIONED IN ACCORDANCE WITH THE REQUIREMENTS OF THE OF BS 7671:2018 "REQUIREMENTS FOR ELECTRICAL INSTALLATIONS - IET WIRING REGULATIONS 18TH EDITION".

2. EARTHING TO BE IN ACCORDANCE WITH THE LATEST AMENDMENT OF BS 7430 "CODE OF PRACTICE FOR EARTHING".

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6. ALL STRANDED/FLEXIBLE CONDUCTORS (AS PER BS EN 60228) SHALL BE TERMINATED VIA A SUITABLY SIZED CRIMPED PIN TERMINAL.

7. ALL CABLE LENGTHS HAVE BEEN TAKEN FROM CAD MODELS AND WILL REQUIRE ON SITE VERIFICATION PRIOR TO INSTALLATION. ALL CABLES LESS THAN 100M IN LENGTH HAVE BEEN AFFORDED +10% ALLOWANCE FOR VARIATIONS IN DUCT ROUTES. AN ADDITIONAL 6M HAS BEEN ALLOWED FOR TERMINATIONS.

REV	AMENDMENTS	DATE
0	FOR REVIEW	05/07/22

milton keynes council

Stuart Proffitt
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MK9 3EJ

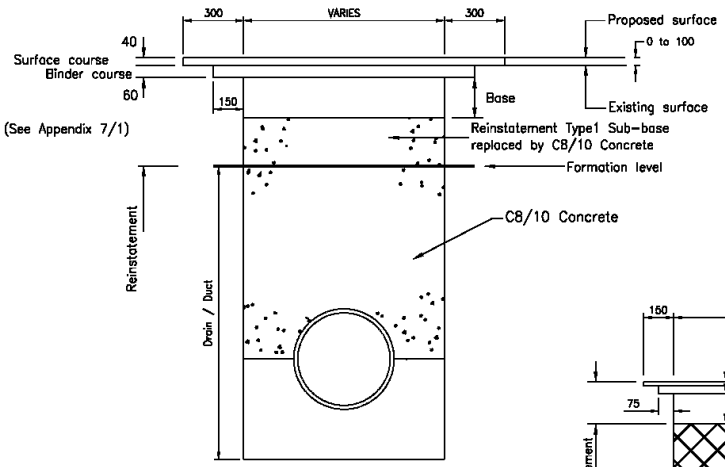
Project

STANDARD DRAWINGS

Drawing

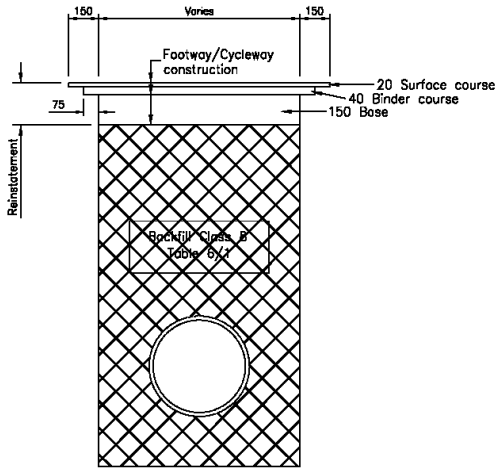
FEEDAR PILLAR CONFIGURATION

Scale: NTS	Date: 05/07/2022
Drawn By: JA	Checked By: SS
Rev 0	Approved By: FJ
Drawing No: SD/1400/1	



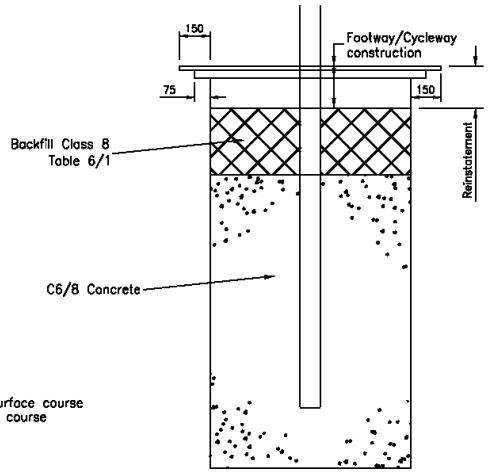
TYPE R1

For use where ducts and drains are laid in existing carriageway.
Proposed carriageway level between 0 to 100mm above existing carriageway level.



TYPE R2

For use where drains and ducts are laid in existing paved footways.
(For ducts see SD/500/3)



TYPE R3

For use where traffic signs are erected in existing paved footways.

Note:
Where trench reinstatement is in the carriageway area which will be finally reconstructed or resurfaced, dense bitmac material can be used for temporary reinstatement as approved by the Engineer.

DWG. No. SD/700/1 REV. 0

Notes

1. All dimensions are in millimetres
2. Refer to Appendix 7/2: Excavation and Reinstatement of Existing Surfaces, for details.

REV	AMENDMENTS	DATE
0	FOR REVIEW	17/01/2022

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Project

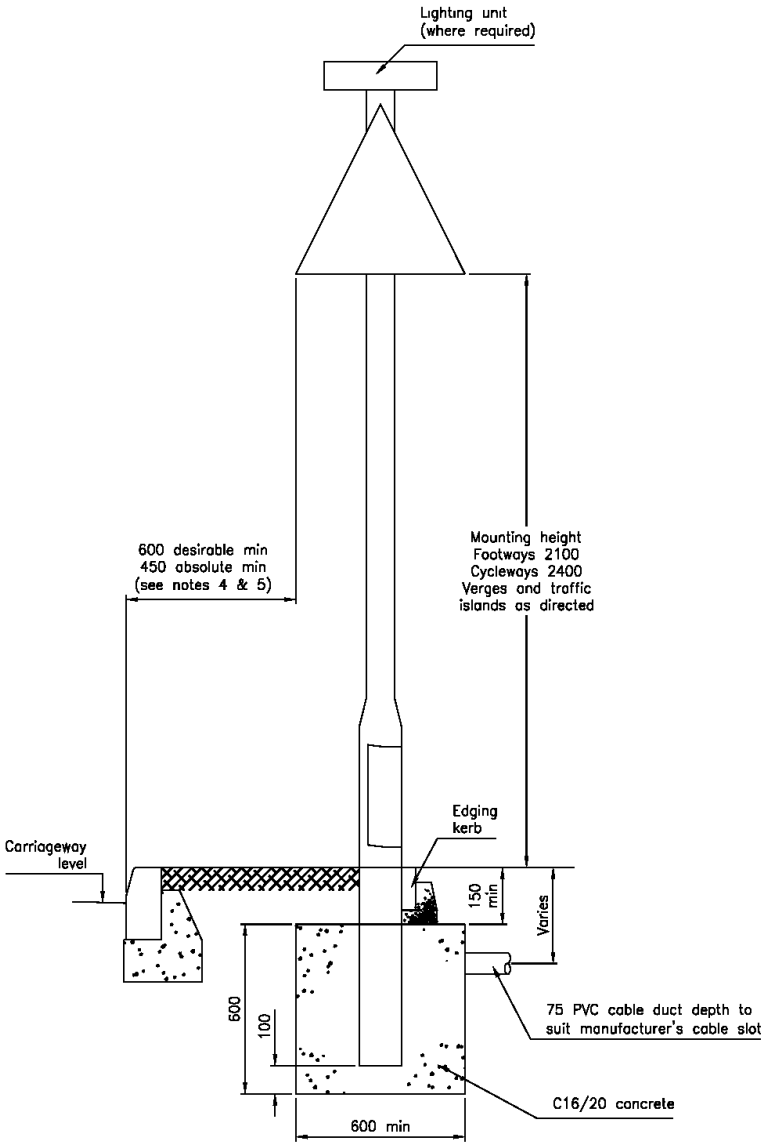
STANDARD DRAWINGS

Drawing

REINSTATEMENT OF EXISTING PAVEMENTS TYPE R1, R2 & R3

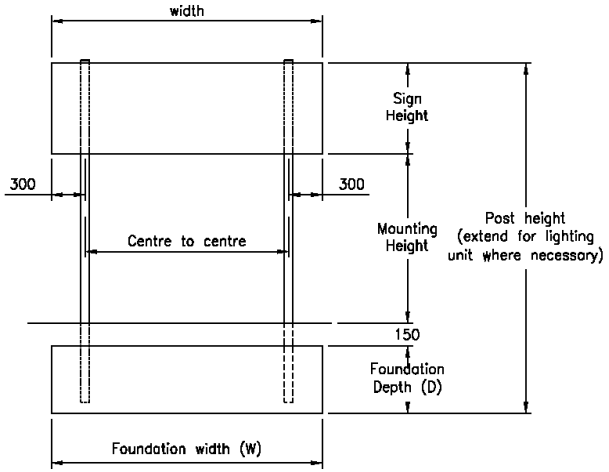
Scale: NTS	Date: 17/01/2022
Drawn By: AW	Checked By: BC
Rev 0	Approved By: FJ

Drawing No: SD/700/1

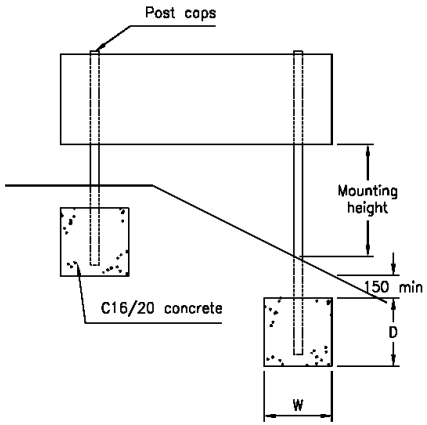


FOUNDATION FOR SIGN POST WITH ELECTRICAL BASE HOUSING

(Straight post similar – duct omitted)



FOUNDATION DETAIL FOR TWO POSTS



TYPICAL FOUNDATION DETAIL ON EMBANKMENT

DWG. No. SD/1200/1 REV. 0

Notes

1. All dimensions in millimetres.
2. All signs to comply with the Traffic Signs regulations and General Directions 1994.
3. Sign positions to comply with the requirements of the Engineer.
4. Single posts will normally be sited at the back of footway or highway verge.
5. Clearance to the edge of signs must be increased where there is a severe camber or crossfall or sign is in a central reservation.
6. Traffic signal poles must be set back 1000 from edge of carriageway. The Engineer must be consulted if a pole in this position will affect a footway or is otherwise impractical.
7. Mounting heights of all signs to be to the approval of the Engineer.
8. Not more than two signs are to be mounted on one post.
9. Illuminated signs or signs greater than 600 wide shall not be fitted to lamp columns.
10. Post height must allow for sloping ground.
11. Posts shall be steel and comply with BS 873.
12. Standard signs to be mounted on a 76 diameter post with a wall thickness of 3.2.
13. Open ended poles must be provided with sealed caps.
14. Foundation depth D must be 600 min.
15. Overdig to be backfilled with Type 1 sub-base material in paved areas.
16. Min. 150 deep topsoil required over foundations in verges.
17. Posts with electrical housing shall be sited so that the door faces away from oncoming traffic.
18. For illuminated signs supported on more than one post the electrical housing must be in the post farthest from the carriageway.
19. Lighting units must be approved and will be dependant on size of sign.
20. All illuminated signs must be identified by a unique number which will be provided by the Engineer.

REV	AMENDMENTS	DATE
0	FOR REVIEW	17/01/2022

Stuart Proffitt
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1 Saxon Gate East,
CENTRAL MILTON KEYNES
MK9 3EJ

Project

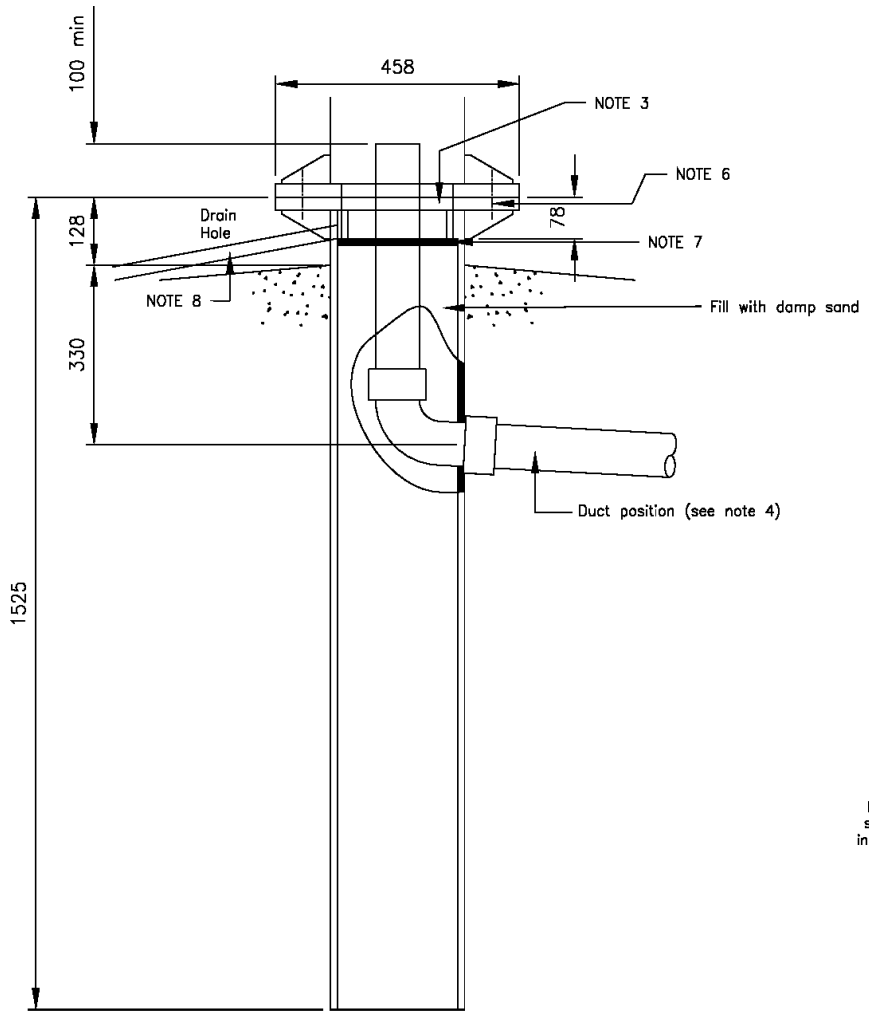
STANDARD DRAWINGS

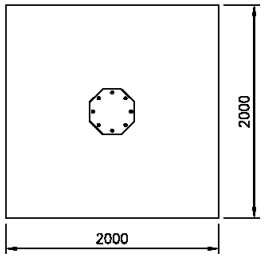
Drawing

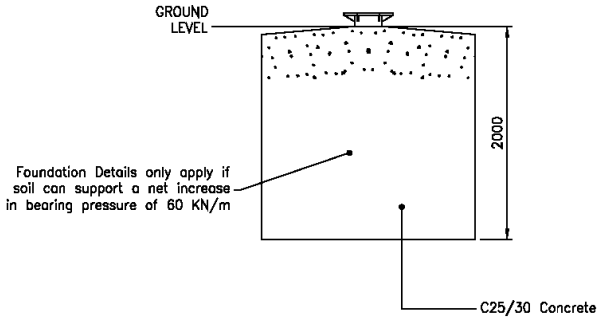
TRAFFIC SIGN FOUNDATION DETAIL

Scale:	Date:
NTS	17/01/2022
Drawn By: AW	Checked By: BC
Rev 0	Approved By: FJ

Drawing No: SD/1200/1







Tightening Procedure
Torque Lock Nut – (Torque settings as directed by manufacturer)
Torque Full Nut "
Threads to be lightly oiled before assembly

Bolt assembly to consist of the following :-
8 (M24 x 90) long hex bolts , Grade 8.8 to B.S 3692
8 (M24) Full nut , Grade 8 to B.S 3692
8 (M24) Lock nut , Grade 8 to B.S 3692
8 (24) large plain washer to B.S 4320

DWG. No. SD/1200/2 REV. 0

Notes

1. All dimensions in millimetres.
2. Pole shall be mounted in concrete. Typical size in undisturbed soil as shown. If soil has been disturbed or if any doubt exists, the Engineer shall be contacted before installation proceeds.
3. Top face shall be level to 0.25°
4. Cable entry shall be by 100mm uPVC duct. The duct shall align with hole in base and shall slope down to prevent water ingress.
5. Concrete surface shall have 5° taper to act as water shed.
6. Protect nuts, bolt heads and threads of base fixing and wrap around edge of root and mast flange to produce a watertight seal with the following materials:
   1 coat Denso paste
   1 coat Denso tape (30mm wide)
7. Top of damp sand sealed with C.I.B.A. Geigy XD 4133 Resin and hardener to level of drain hole, min. thickness 6mm.
8. Drain duct (25 dia.) positioned in root drain hole and sealed with Denso paste and tape (see note 6). Length of duct to suit site and drainage conditions.
9. Camera pole shall be supplied by the Employer and shall be delivered to site and stored by the Contractor.
10. The Contractor shall erect the pole using a suitable crane for a 15m pole.
    a) Approx weight of 15m pole = 1149kg
    b) Approx weight of the root = 130kg

REV	AMENDMENTS	DATE
0	FOR REVIEW	17/01/2022

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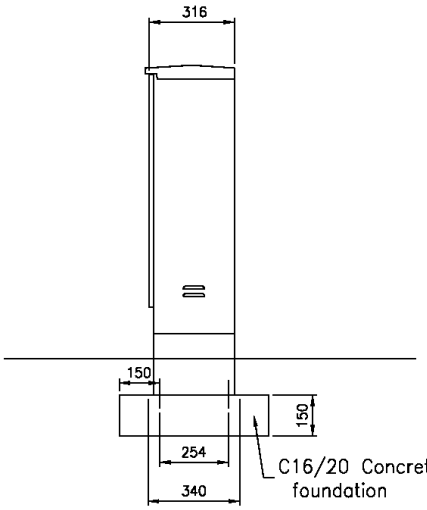
Civic Offices,
1 Saxon Gate East,
CENTRAL MILTON KEYNES
MK9 3EJ

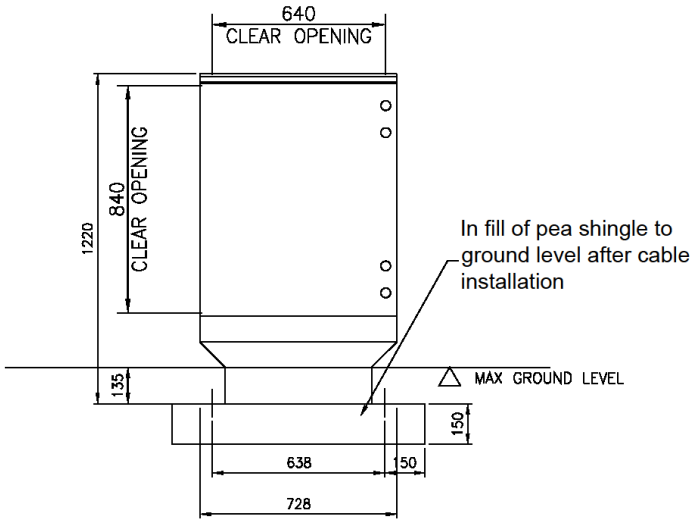
Project
STANDARD DRAWINGS

Drawing
CAMERA POLE FOUNDATION DETAIL

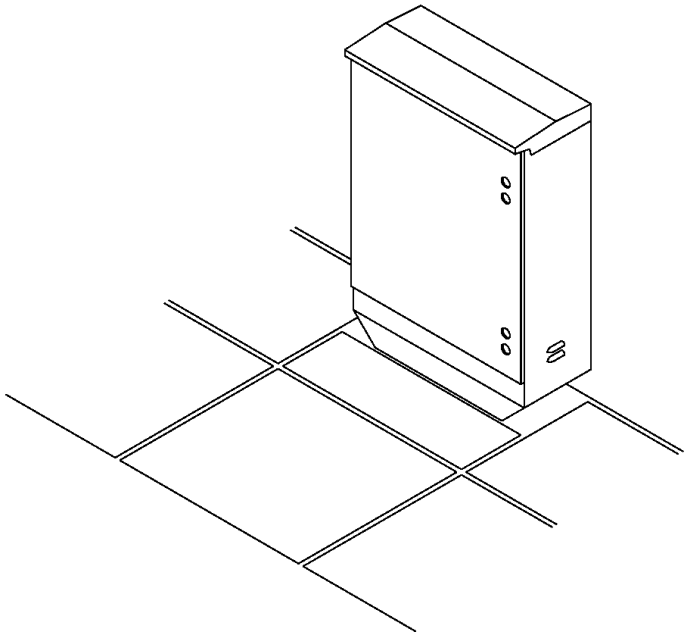
Scale:	Date:
NTS	17/01/2022
Drawn By: AW	Checked By: BC
Rev 0	Approved By: FJ

Drawing No: SD/1200/2





Cabinet to be bolted to foundation
using 4No.12 x 100 Ragbolts or rawbolts.



DWG. No. SD/1200/3 REV. 0

Notes.
1. All dimensions in millimetres.
2. Cabinet shall be mounted in concrete/ NAL socket.
3. Cable ent ry shall be by 100mm dia.uPVC duct.
4. All equipment to be to the specificationand/ or app roval of the Engineer.
5. All equipment to be sited within the highway boundary.
6. Top of damp sand sealed with Pea shingle, minimum thickness 6mm.
7. Reinstatement to excavations in pavedareas to be Type 1 Sub base mate rial up to formation level.
8. Galvanized cabinet and painted to MK specification.

REV	AMENDMENTS	DATE
0	FOR REVIEW	17/01/2022

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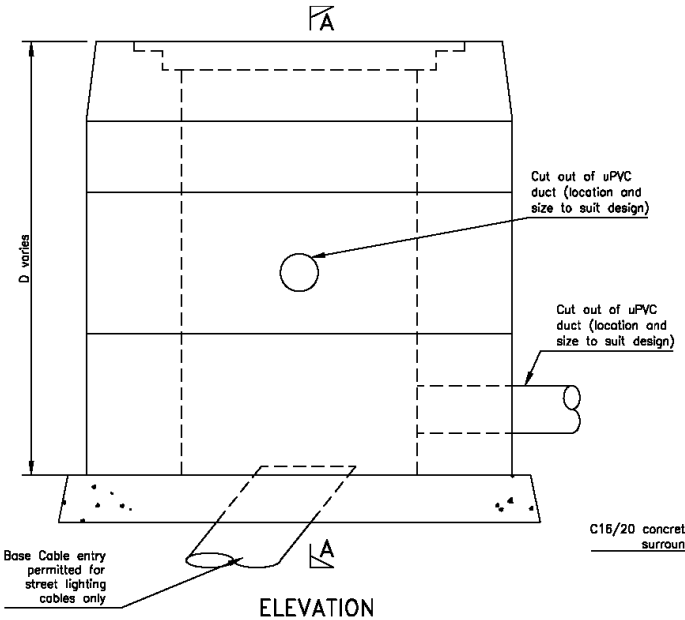
Civic Offices,
1 Saxon Gate East,
CENTRAL MILTON KEYNES
MK9 3EJ

Project
STANDARD DRAWINGS

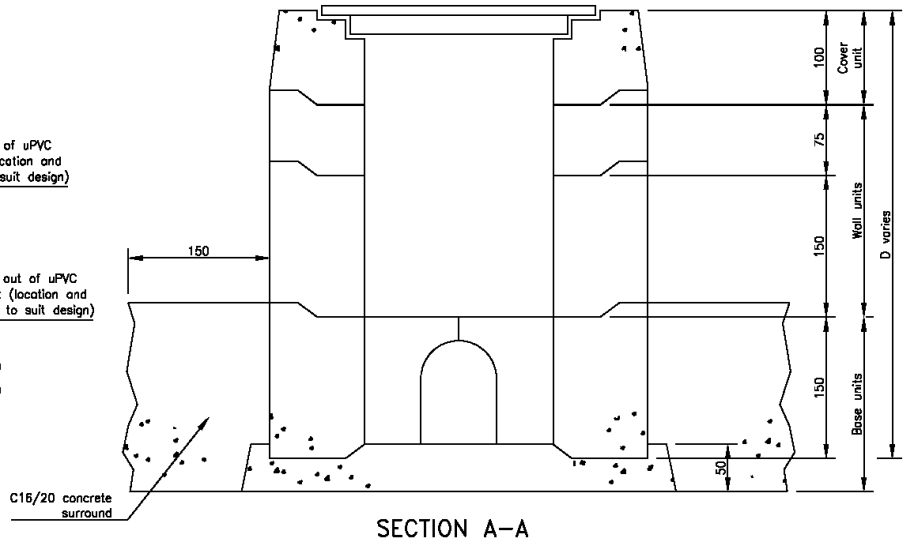
Drawing
STD STREET CABINET

Scale:	Date:
NTS	17/01/2022
Drawn By: AW	Checked By: BC
Rev 0	Approved By: FJ

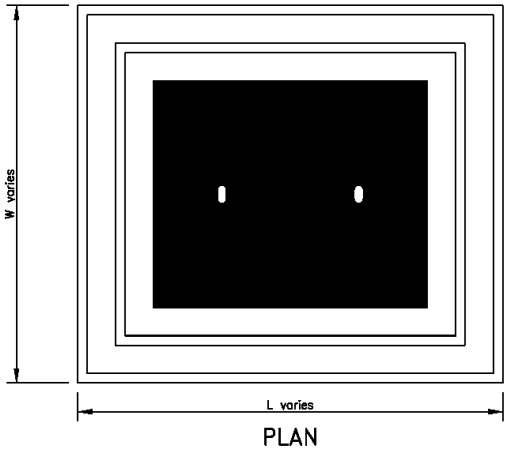
Drawing No: SD/1200/3



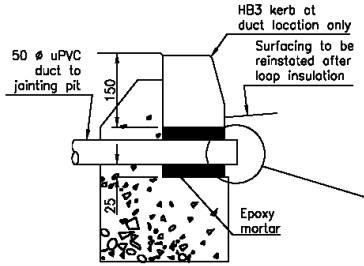
ELEVATION



SECTION A–A



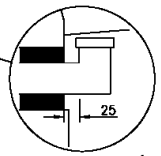
PLAN



DUCT CONNECTION TO TRAFFIC LOOP

CHAMBER TYPE		INTERNAL DIMENSIONS L	W	D	CONSTRUCTION (Codes of Glandel Units) Wall	Base	Cover and Frame	BADGE MARK
Street Lighting	D(1)	430	280	475	H/W/75 H/W/100 H/W/150	V/B3/D or V/B4/D V/B5/D	V/C1/D 10T L/L	Street Lighting
	D(2)	430	280	800				
Traffic Signals	E	610	455	750	V/W/E75 V/W/E100 V/W/E150	V/B2/E	V/C1/E 10T L/L	Toffic Loop or Traffic Signals
	F	685	455	850	V/W/F75 V/W/F100 V/W/F150	V/B2/F	V/C1/F	
	Sp	1300	1000	To suit	Brickwork see Note 4	C16/20 Concrete	HD 11.5 Ton	

CHAMBER TYPES



DETAIL
(See Notes 9, 10 & 11)

DWG. No. SD/1200/4 REV. 0

Notes

1. All dimensions are in millimetres
2. All chambers to be located in footway, traffic island, verge. The position of all chambers and ducts to be agreed with the Engineer.
3. Size of chamber used will depend on the depth and number of ducts to be accommodated.
4. Standard Units shall be as manufactured by Glandel Ltd, or similar approved.
5. Chamber Type Sp shall be constructed in English Bond Class B Engineering bricks to BS 3921. The courses shall be horizontal and perpends in vertical alignment. Joints shall not exceed 10 and shall be flush pointed internally as work proceeds.
6. Base units for all chambers may be replaced with cast-insitu C16/20 concrete 150 thick. Formed surfaces to be Class F1. Unformed surfaces to be Class U2 plain finish.
7. All joints between chamber and ducts shall be made good with Class 1 mortar. The duct shall be surrounded by 150 thick min ST4 concrete.
8. Covers to be galvanised with an unlock and lift device and badgemarked Traffic Loop or Street Lighting as appropriate.
9. See SD/500/3 for cable duct details.
10. Duct and box for traffic signal loops shall be manufactured and installed to the approval of the Engineer.
11. Where channel blocks are used the ducts shall extend to 25 in front of the face of the channel block.

REV	AMENDMENTS	DATE
0	FOR REVIEW	17/01/2022

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CENTRAL MILTON KEYNES
MK9 3EJ

Project

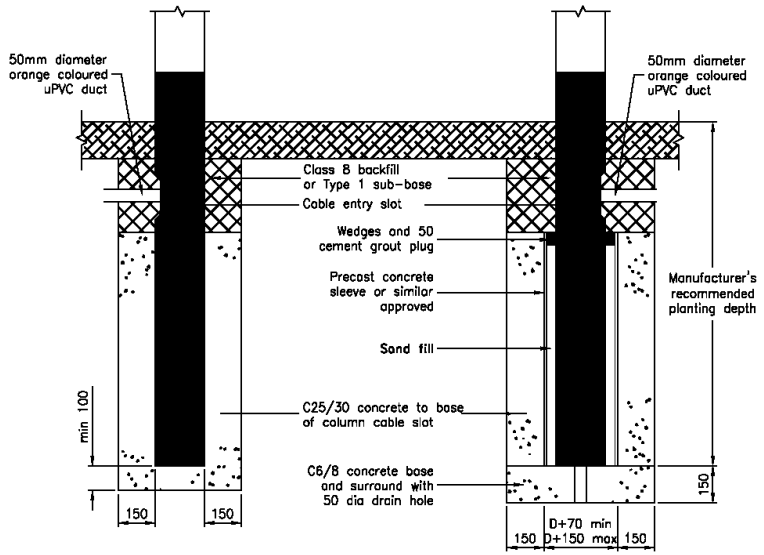
STANDARD DRAWINGS

Drawing

JOINTING CHAMBERS FOR TRAFFIC SIGNAL & STREET LIGHTING CABLES

Scale:	NTS	Date:	17/01/2022
Drawn By:	AW	Checked By:	BC
Rev	0	Approved By:	FJ

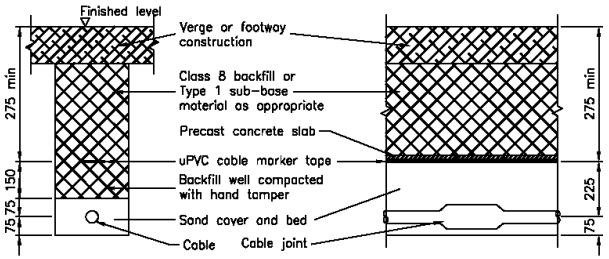
Drawing No: SD/1200/4



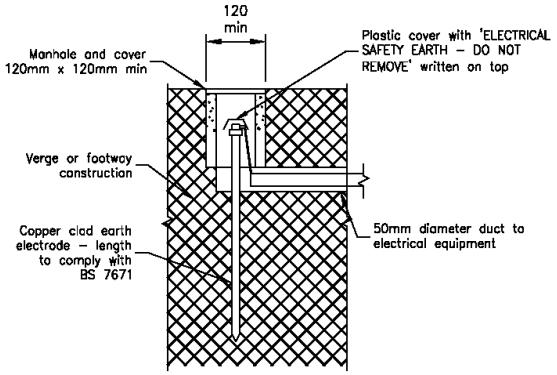
Standard Foundation

Sleeved Foundation

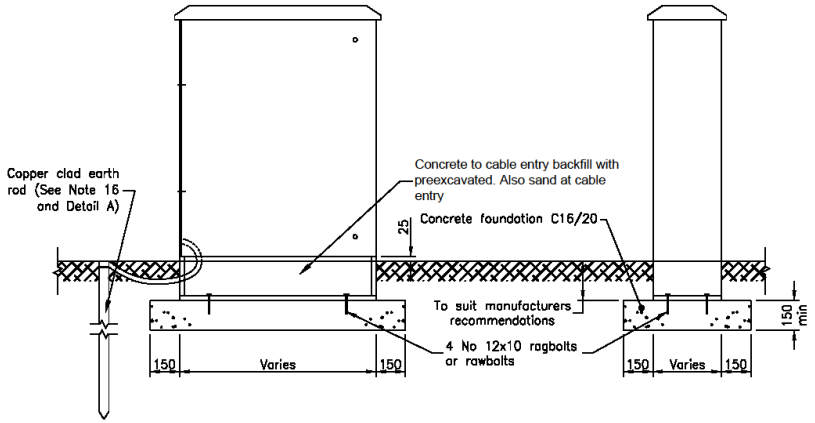
COLUMN FOUNDATION DETAILS



TYPICAL SECTIONS CABLE TRENCH (See Note 14)



Detail A EARTH ELECTRODE DETAIL



FEEDER PILLAR FOUNDATION DETAIL

DWG. No. SD/1200/5 REV. 0

Notes

1. All dimensions in millimeters.
2. All equipment to be to the specification and/ or approval of the Engineer.
3. All equipment to be sited within the highway boundary.
4. Lighting columns must be sited to suit the design of the system and will normally be erect ed at the back of footway, cycleway or highway verge. A minimum clearance of 1800 from the face of kerb is required.
5. All columns to be painted with two coats of gloss paint to BS4800 colour as specified.
6. Galvanized columns to be painted with etching primer prior to gloss painting
7. Columns to be painted to 250 above GL with black bitumastic paint and glass flake root.
8. Special foundations are required for certain types of columns and the Engineer should be consulted for details.
9. All columns shall be planted so the door is safely accessible.
10. Backfill to excavations in paved areas must be Type sub-base material.
11. Class 8 lower trench fill to be to Clause 503.
12. A hard standing of concrete paving slobs is required in front of feeder pillar doors in verges.
13. Where possible all cables must be laid in 100 dia. orange uPVC duct. See SD/500/.3 for cable duct details.
14. An earth electrode must be fitted on the lost column of each run.
15. Earth rods to comply with IEE regulati ons. Min length 1500
16. All columns must be identified by unique number stencilled in white paint. The numbers will be provided by the Engineer.

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Service Group
Civic Offices,
1 Saxon Gate East,
CENTRAL MILTON KEYNES
MK9 3EJ

Project

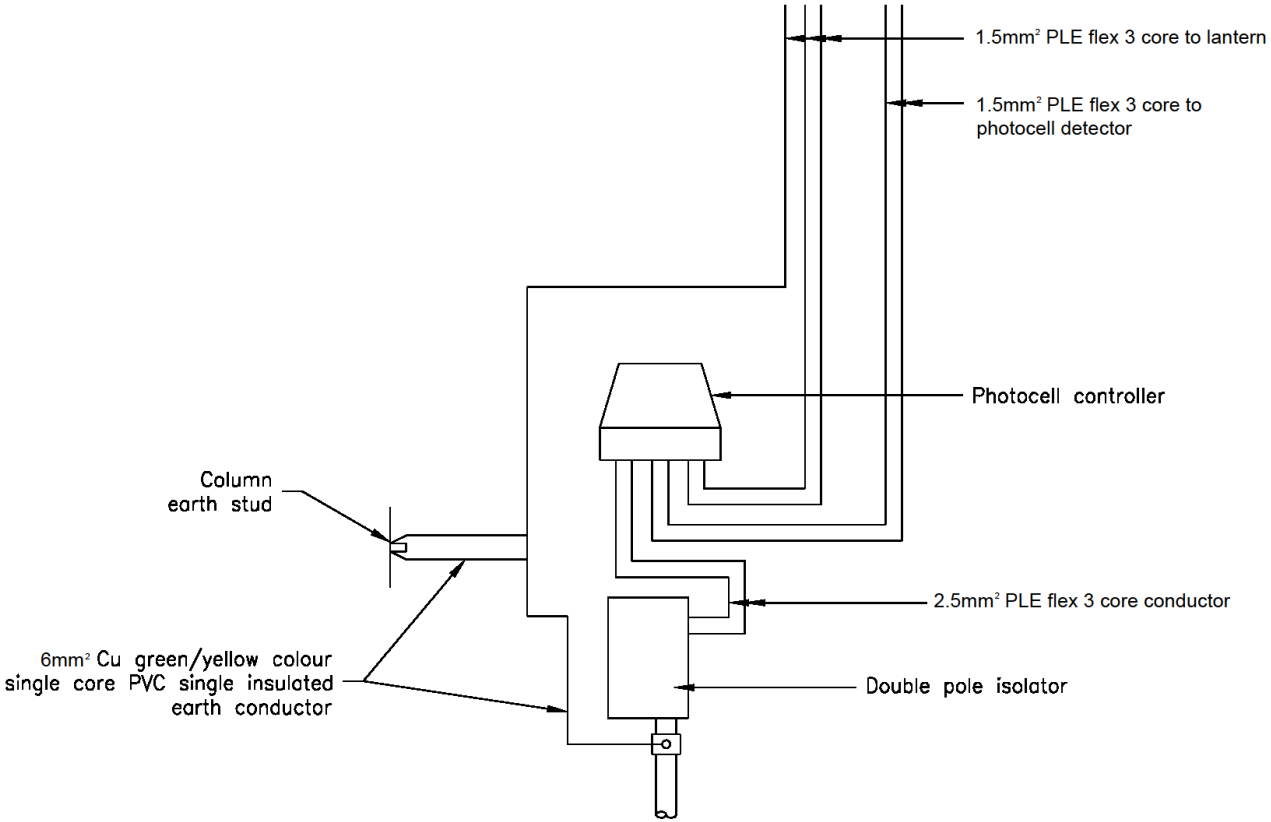
STANDARD DRAWINGS

Drawing

COLUMN AND FEEDER FOUNDATION DETAIL

Scale:	NTS	Date:	17/01/2022
Drawn By:	AW	Checked By:	BC
Rev	0	Approved By:	FJ

Drawing No: SD/1200/5



DWG. No. SD/1200/7 REV. 0

Notes

1. All electrical equipment must be to the approval of the Engineer.
2. Fuse discrimination must be applied.
3. Size of earth conductor from column earth bolt to door to be 6mm² copper 56/0.30 flexible cord PVC insulated colour code green yellow.

REV	AMENDMENTS	DATE
0	FOR REVIEW	17/01/2022

Stuart Proffitt
Service Director for Public Realm
Service Group
Civic Offices,
1 Saxon Gate East,
CENTRAL MILTON KEYNES
MK9 3EJ

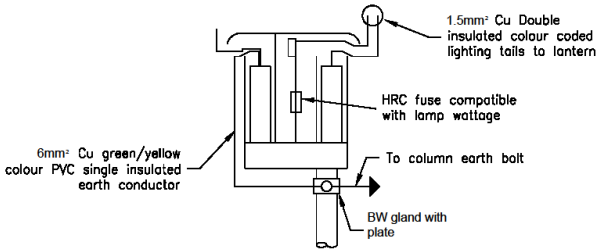
Project

STANDARD DRAWINGS

Drawing

TYPICAL COLUMN/SIGN WIRING DETAILS

Scale: NTS	Date: 17/01/2022
Drawn By: AW	Checked By: BC
Rev 0	Approved By: FJ
Drawing No: SD/1200/7	



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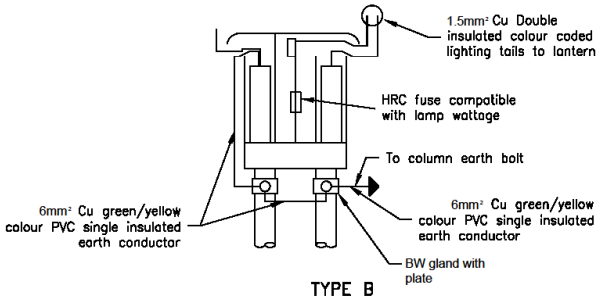

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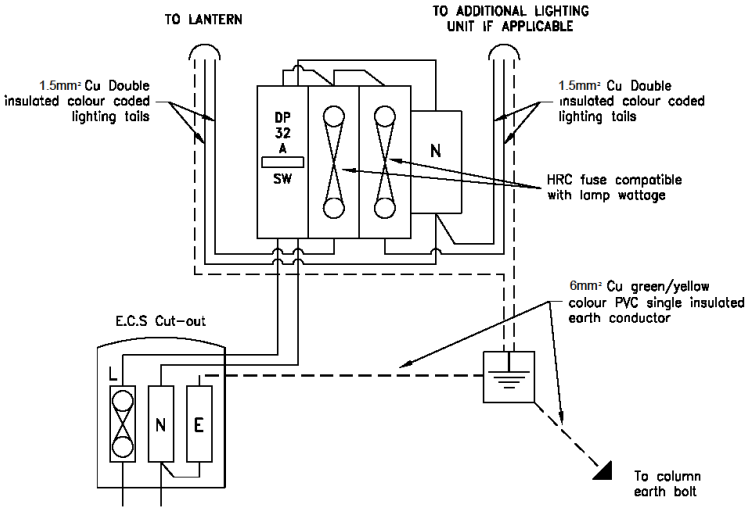

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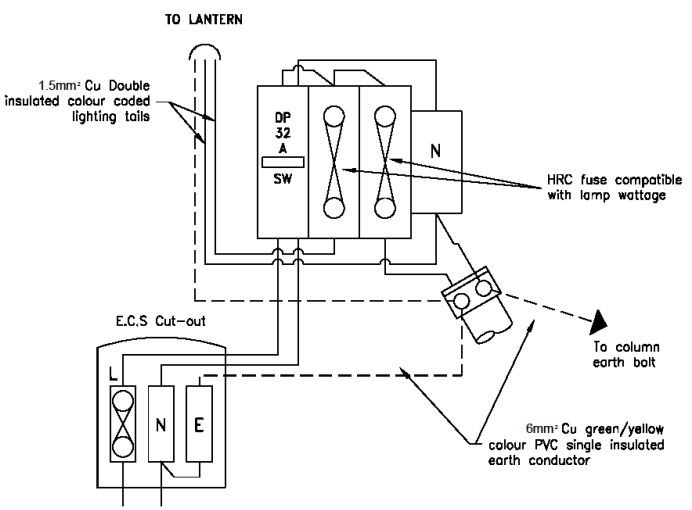

TYPE D

DWG. No. SD/1200/8 REV. 0

Notes

1. All electrical equipment must be to the approval of the Engineer.
2. Fuse discrimination must be applied.
3. Size of earth conductor from column earth bolt to door to be 6mm sq. copper 56/0.30 flexible cord PVC insulated colour code green/yellow.
4. Isolator to be phase identified.
5. All terminations to be made using crimped lugs.
6. Outgoing fused cables to be labelled to indicate identification numbers or other items of electrical equipment it supplies.
7. All electrical equipment with a type D, C or H termination to be labelled with the letter F prefixing the number on the outside of the column.
8. Termination type D(2) is type D with three way fused isolator.
9. Termination type C(2) is type C with three way fused isolator.

REV	AMENDMENTS	DATE
0	FOR REVIEW	17/01/2022

Stuart Proffitt
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Project

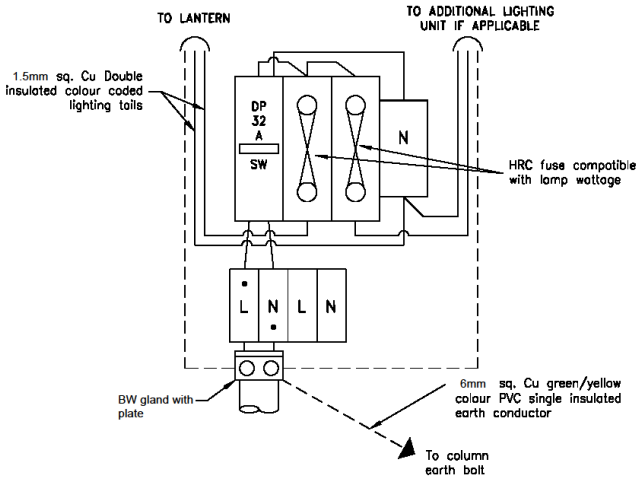
STANDARD DRAWINGS

Drawing

TERMINATION TYPES A, B, C & D

Scale:	Date:
NTS	17/01/2022
Drawn By: AW	Checked By: BC
Rev 0	Approved By: FJ

Drawing No: SD/1200/8



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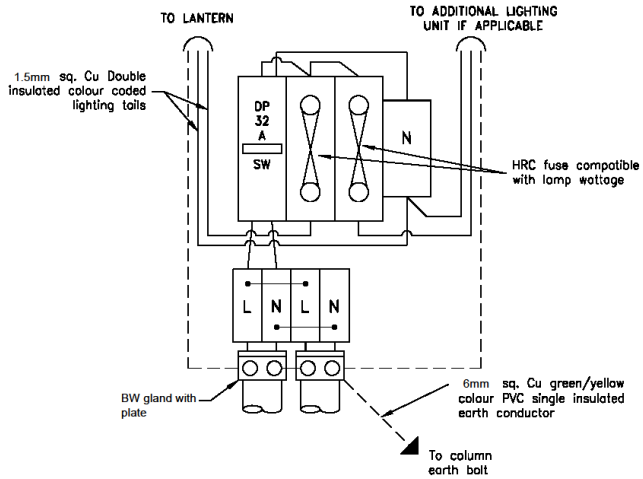

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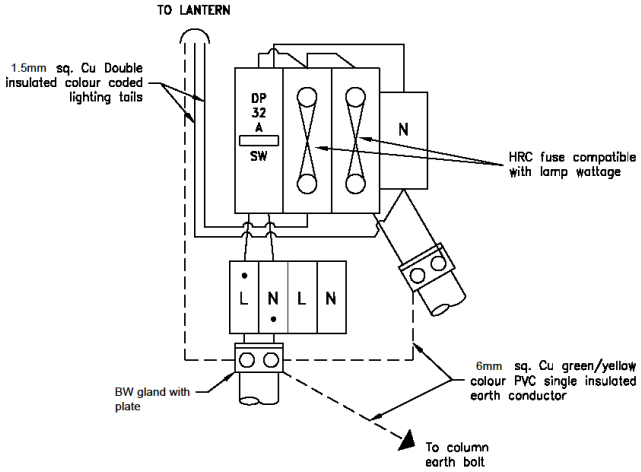

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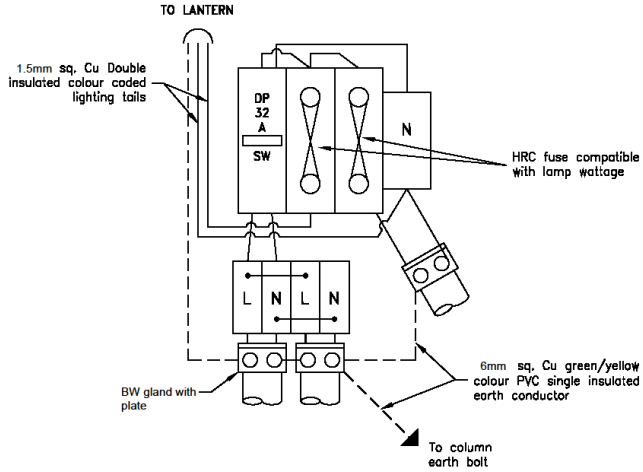


TYPE H

DWG. No. SD/1200/9 REV. 0

Notes

1. All electrical equipment must be to the approval of the Engineer.
2. Fuse discrimination must be applied.
3. Size of earth conductor from column earth bolt to door to be 6mm sq. copper 56/0.30 flexible cord PVC insulated colour code green/yellow.
4. Isolator to be phase identified.
5. All terminations to be made using crimped lugs.
6. Outgoing fused cables to be labelled to indicate identification numbers or other items of electrical equipment it supplies.
7. All electrical equipment with a type D, C or H termination to be labelled with the letter F prefixing the number on the outside of the column.
8. Termination type D(2) is type D with three way fused isolator.
9. Termination type C(2) is type C with three way fused isolator.

REV	AMENDMENTS	DATE
0	FOR REVIEW	17/01/2022

Stuart Proffitt
Service Director for Public Realm Service Group
Civic Offices,
1 Saxon Gate East,
CENTRAL MILTON KEYNES
MK9 3EJ

Project

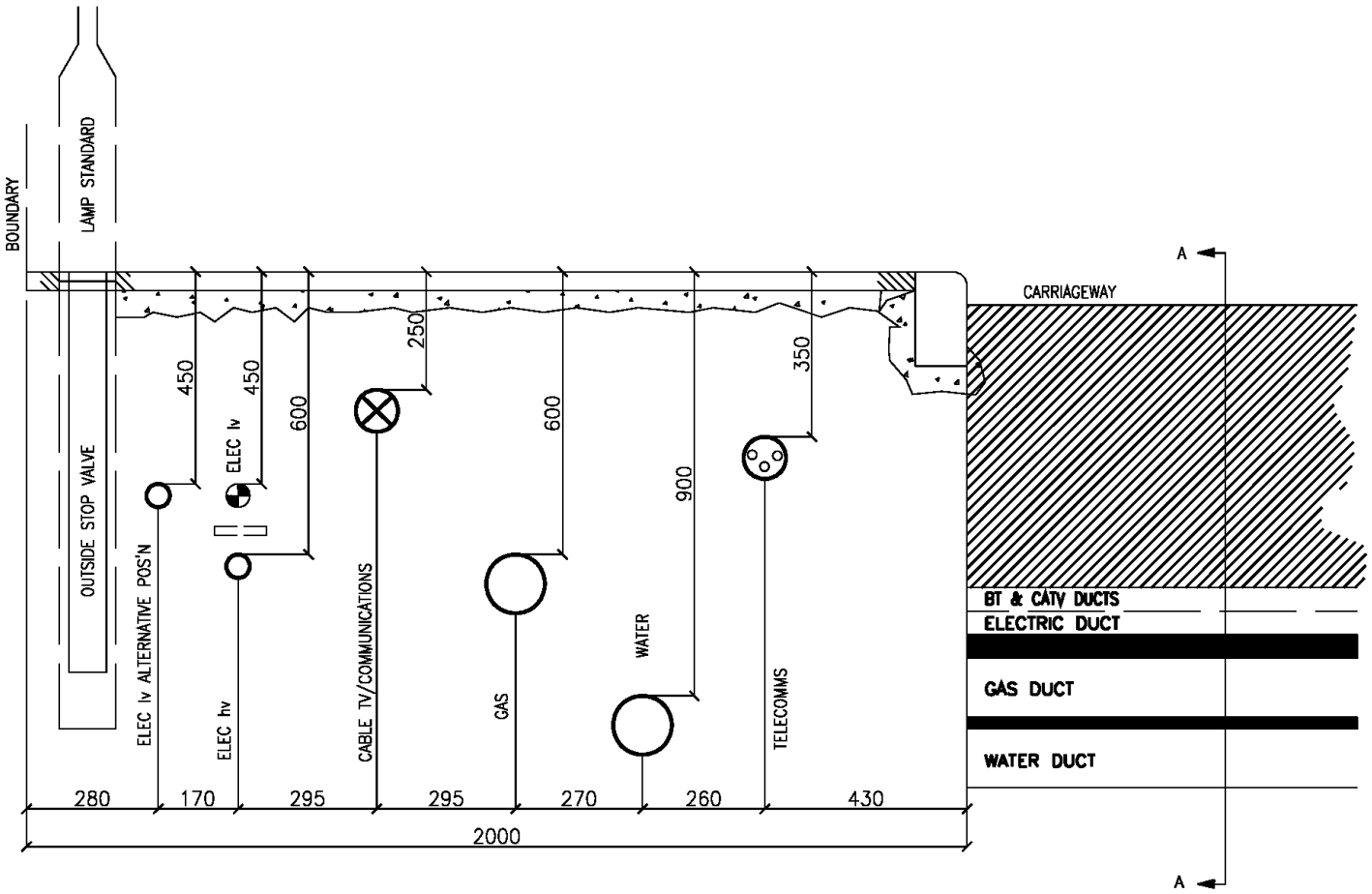
STANDARD DRAWINGS

Drawing

TERMINATION TYPES E, F, G & H

Scale:	Date:
NTS	17/01/2022
Drawn By: AW	Checked By: BC
Rev 0	Approved By: FJ

Drawing No: SD/1200/9



DWG. No. SD/1200/10 REV. 0

Notes

REV	AMENDMENTS	DATE
0	FOR REVIEW	17/01/2022

Stuart Proffitt
Service Director for Public Realm
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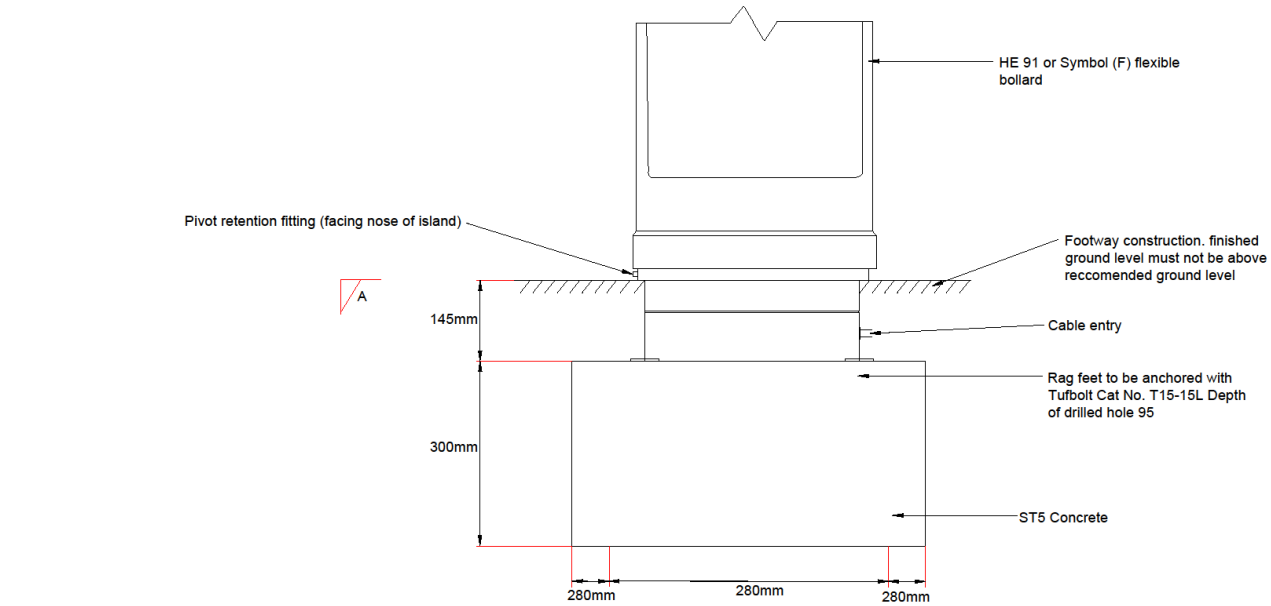
Civic Offices,
1 Saxon Gate East,
CENTRAL MILTON KEYNES
MK9 3EJ

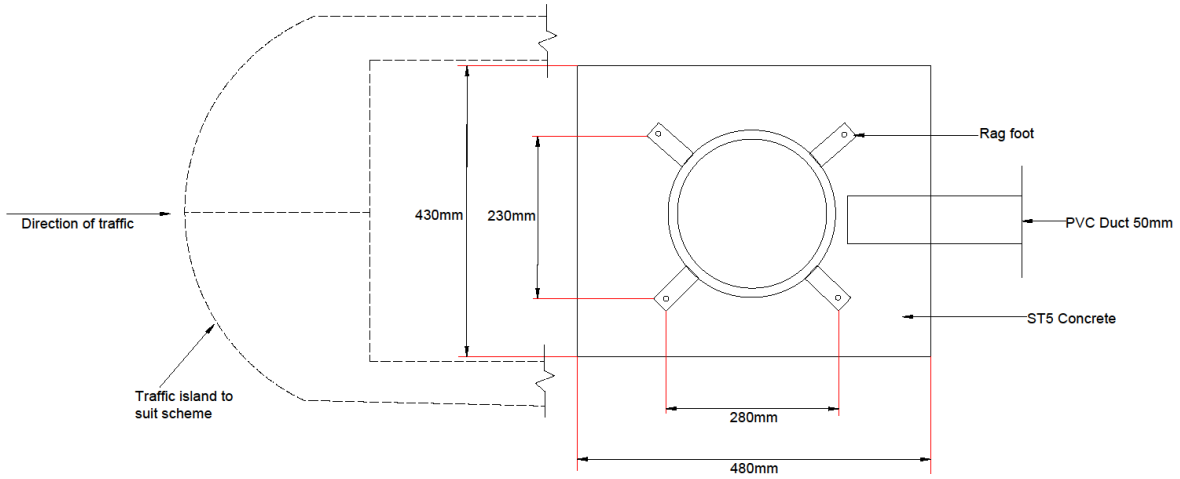
Project
STANDARD DRAWINGS

Drawing
SERVICES LAYOUT
(NATIONAL JOINT UTILITIES GROUP REQUIREMENTS)

Scale: NTS	Date: 17/01/2022
Drawn By: AW	Checked By: BC
Rev 0	Approved By: FJ

Drawing No: SD/1200/10





PLAN

SIMMONSIGNS SBL1 BASELIGHT BOLLARD
Foundation similar but 600 x 600 x 150 deep
To be fitted with symbol (F) BOLLARD

DWG. No. SD/1300/2 REV. 0

Notes

1. All Dimensions are in milimetres.
2. All equipment to be to the specification and/or approval of the engineer.
3. Bollards must be Baselight. Simmonsigns symbol (F) with SBL2 base unless otherwise approved by the engineer.
4. Bollards must be fitted with M8 x 20 stainless steel set pins and nuts.
5. Bollards must be sited with the retainer bolts in line with the traffic flow.
6. Bollards must be sited with the hinged side facing the approaching traffic.
7. Bollards must be fitted according to the manufacturers instrictions.
8. All illuminated signs must be identified by an unique number stencilled in black paint on the rear. The numbers will be provided by the engineer.

REV	AMENDMENTS	DATE
0	FOR REVIEW	17/01/2022

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MK9 3EJ

Project

STANDARD DRAWINGS

Drawing

ILLUMINATED BOLLARD
FOUNDATION DETAILS

Scale: NTS	Date: 17/01/2022
Drawn By: AW	Checked By: BC
Rev 0	Approved By: FJ

Drawing No: SD/1300/2

Appendix F - Street Lighting – Code of Practice Attachments to Columns and Other Highway Electrical Devices

Code of Practice for attachments to lamp columns granted under the Highways Act, 1980 Section 178

Contents

1. Introduction

This document applies to both temporary and permanent items which are proposed to be attached to lamp columns.

Accidents have happened where inappropriate attachments or fixing methods have been used on lamp columns. It is the legal duty of the person organising attachments (the applicant) to ensure competent people are used for these works.

The purpose of this document is to highlight the issues that must be addressed when putting attachments or seasonal decorations on lighting columns. Ignorance is unlikely to be an acceptable defence if something goes wrong in the public realm and nobody wants to suffer the reputational damage or possible criminal proceedings if it does.

This document has been written in the spirit of and refers to the Institution of Lighting Professionals 'Guidance on installation and Maintenance of Seasonal Decorations and Lighting Column attachments. Milton Keynes City Council and its Contractor require that the contents of this document are adhered to as a basis for making an application to attach items to lamp columns.

Construction, Design and Management (CDM) Regulations

Works in the public domain must be compliant with Construction, Design and Management (CDM) Regulations. This document places the responsibility and a legal duty on the person organising or project managing these works for ensuring the right people are engaged on the various aspects of the work.

The emphasis of CDM is on ensuring:

1. The people engaged are competent.
2. There is sufficient time to undertake their work.
3. Information about risks, hazards and special arrangements are shared with all parties.
4. Risk assessments and method statements are in place before works commence.
5. Where necessary a CDM co-ordinator is appointed.

Structural Considerations

Festive decorations and attachments such as signs, hanging baskets, banners, radio equipment, CCTV and public transport information are invariably installed at places with maximum exposure to users and lighting columns are the most common form of support chosen to display these. Older lighting columns which may be in less than prime condition can suffer sudden and catastrophic failures, sometimes with tragic results. The risk of personal injury following failure of a lighting column is intrinsically linked to numbers of people using the space and any additional load imposed on a lighting column increases the risk of failure.

This document consequently calls for the applicant to declare accurately the nature of any proposed attachment in order that Milton Keynes City Council/Highways Contractor may judge that any attachments made to a lamp column will not compromise its structural integrity.

Though an application to make an attachment onto the lighting column may appear to be within structural limits to a layman, Milton Keynes City Council/Highways Contractor will make a final decision regarding this.

Catenary installations (items from one lamp column to another) will only be permitted if.

1. no straining wire is used
2. the lamp columns are designed to take additional loading

For Banners, only mesh material will be permitted.

It may also be a pre-requisite that if deemed required the applicant will need to pay for a structural test of the column in question before any works are undertaken, should the unit not have been structurally tested by Milton Keynes City Council.

Electrical Considerations

Electrical equipment used for temporary installations must be to the same safety standards as those on a permanent installation and every person undertaking the

work must be competent and not cause danger to themselves or others. Any person who instructs work from incompetent persons or any person undertaking the work without proper skills and experience could become subject to criminal proceedings and this document contains specific guidance on the various standards, including BS 7671 which must be adhered to.

Consideration needs to be given to the use and the circumstances where the use of low voltage equipment is appropriate together with the standards for electrical protection. The usual method of supplying electrical energy to street lighting is via an unmetered supply, where energy is accounted for by calculating use from the electrical load and operating hours. Powering electrical items from the lamp columns' unmetered supply is permissible, but only if properly accounted for via unmetered supply arrangements.

If applicants propose to draw electricity from street lighting columns, they must be able to provide comprehensive details of the electrical load together with dates and times of operation. The authority or the applicant must also be able to declare these within their unmetered supply arrangements which will involve holding an appropriate Estimated Annual Consumption certificate with the Unmetered Supplies Operator, as failure to do so could be construed as theft of electrical energy exposing the applicant and the council to penalty or prosecution. Applicants must allow sufficient time within their plans for these matters to be completed, which could take several months.

1. Traffic Management Considerations

The industry standards for the safety of operatives and the travelling public when undertaking works on the highway is by reference to Chapter 8 of the Traffic Signs Manual and Safety at Street Works and Road Works etc.

The Traffic Management Act has come into effect. Depending on the specific location there may be a requirement to obtain a Permit to work on the highway, so that activity is coordinated to ensure no clashes between roadworks, or Lane Rental provisions, where the applicant is charged for any occupation of the road during restricted hours.

Milton Keynes City Council will be able to advise what provisions apply in each case. In the busiest of locations applicants may need to allow three months or more for Permit applications to be processed and road space allocated.

2. Highways Act 1980 and Indemnity

Section 178 of the Highways Act 198 enables the highway authority to control the erection of apparatus on or over the highway, including seasonal decorations, by way of a license. Charges for the consideration of licence applications are authorised by the Local Authorities Transport Charges Regulations of 1998, but those Regulations make no provision for charges to be levied for section 178 licenses.

The applicant is required to indemnify the authority against any/and all claims which may arise as a consequence of the installation, in which case liability is unlimited. Milton Keynes City Council require that liability is to be supported by evidence of Public Liability insurance to a value of at least £10m.

Applicants should appreciate that they are potentially exposed to claims beyond that value.

3. Competency

A competent person is someone with the skill, knowledge and/or experience of the particular type of work to be undertaken, and other qualities, so as to be able to identify and avoid danger. Training provides under-pinning knowledge to support competency.

It is important that all installers are conversant with hazards and risks, whether directly employed or employed by contractors or sub-contractors. Therefore, they should receive comprehensive training, training updating and instruction on relevant aspects related to the assembly, installation, commissioning and on-going operation and maintenance of masts.

It is also necessary to re-examine periodically the scope of work, equipment employed, procedures and standards of workmanship.

The following advice is best practice guidance in the United Kingdom. Similar or equivalent competency and training requirements should be considered for schemes being installed outside the UK.

The competence of a person should be supported by underpinning training. Persons involved with site works should work only within the scope of their evidenced

competence. Both organisational and employee competence should meet the key principles of CDM.

4. Competency Assessment and Training

The industry standard for training and assessment of competence for Highway electrical equipment on or near the Highway in the UK is the Highway Electrical Registration Scheme (HERS), also called the National Highways Sector Scheme 8 (NHSS 8).

If electrical work is to be undertaken on site, the installation contractor as named on the application must be HERS registered. All operational staff carrying out electrical work on site must be HERS approved and in possession of valid Electrotechnical Certification Scheme (ECS HERS) Cards at all times whilst on site.

A list of all registered organisations can be viewed on the Highways Electrical Associations website.:

https://thehea.org.uk/registers/hea-register/

As part of HERS, all operatives shall be assessed for competency and shall undertake a recognised course or system of training as appropriate leading to a Competence Based Qualification (CBQ) such as a National Vocational Qualification (NVQ) to agreed national occupational standards. The assessment of competence on site and training certificates shall be valid for a maximum of 5 years and shall be reviewed thereafter, with repeat assessments and refresher training being instituted as appropriate.

For non-electrical work such as event signing, HERS Registration is not required, but all operational staff must still be in possession of valid relevant training and proof of satisfactory assessment i.e., New Roads and Street Works Act units for Traffic Management as well as operator licences for mechanical or hydraulic plant.

A licence will not be issued if an installer is not qualified to undertake the required work, please note checks may and will be undertaken on the nominated installer.

5. Electricity and legal provisions

Whilst recognising the pleasure a well-designed lighting display gives to the public, organisers and installers of festive lighting (and other approved items) must keep in mind that such installations, when powered by mains electricity, are, because of their temporary nature, potentially hazardous. It must be remembered that outdoor lighting is subject to adverse weather conditions, especially in winter, and a hastily erected display could easily bring tragedy instead of joy.

All work must be carried out to the requirements of BS 7671: 2018 IEE Wiring Regulations 18th edition and it should be noted that the Electricity at Work Regulations 4, 5, 6, 7, 8, 9,10, 11, 12 and 15 are particularly relevant to such installations. Due reference should also be given to the requirements within the ILP Electrical Safety, document 'Code of practice for electrical safety in highway electrical operations. In addition, HERS registration includes a qualification to G39/1

(Working in the vicinity of DNO equipment); any person or persons who is engaged in the attachment or removal of electrical attachments MUST hold a current G39/1 safe isolation certificate.

It is a legal requirement that everyone undertaking electrical work is a competent person (as described under the Competency Assessment and Training section (section 8 above). This ensures they do not cause danger to themselves or others. If anyone knowingly employ staff to undertake works that is beyond their level of knowledge and competence, then that person could be liable for any danger or damage that occurs.

Only attachments and power use can be licensed, any lamp column that is currently not facilitated to require the use of a 230 Volt supply cannot be utilised. If a new power supply is required from a lamp column, only Milton Keynes City Council/Highways Contractor can undertake this work at the full cost of the applicant.

Bearing in mind the expected short temporary nature of festive installations they should be treated, routinely inspected and tested as special temporary installations. Equipment used for temporary installations must be of the same standards as a permanent installation although it is appreciated that for installations of this nature, cables may be installed temporarily.

In most situations, highway electrical equipment is supplied unmetered direct from the Distribution Network Operator (DNO) cables in the Highway. Only an authorised

competent person will be allowed to remove inspection covers, doors or panels affording access to their apparatus to make connections from Highway Authority and DNO equipment.

Milton Keynes/Contractor have made or can make power supplies available where Festive decorations are regularly installed but neither Milton Keynes City Council nor Highways Contractor are responsible for consumption of energy.

Where lamp column base compartment doors have been removed for inspection by the applicant's installer, they must be replaced securely to prevent unauthorised access. The attaching of access doors with tape or banding is not permissible. Where it is not possible to secure the access door with the locking mechanism, it must be reported to Milton Keynes City Council/Contractor immediately.

6. Structural Safety

All information relating to the additional loading request must be accurate and provided in advance to Milton Keynes City Council by submission of a completed temporary attachments application before any structural assessments by Milton Keynes City Council/Highways Contractor can begin. If Milton Keynes City Council/Highways Contractor judge that a lamp column will not be able to support the weight/wind loading of a particular attachment item, a licence will not be issued for that item.

7. Height of attachments

Milton Keynes City Council and Highways Contractor must ensure that the height of any attachment is not in conflict with/or pose a hazard to pedestrians or other Highway users. Although signs and other items may be attached to lamp columns with a minimum 'above ground height' of 2.1M (2.4M if within a cycle route), items which require a power supply (Festive lighting, CCTV etc.) must be placed higher to avoid contact (either accidental or deliberate) with electrical components. To this end, Festive lighting, CCTV and possible other items which require a 230V supply will not generally be permitted to be attached to any lamp column under 5M tall (illuminated traffic signs do not fall into this category as these do not require an external power socket). The applicant must indicate the size and weight of all proposed attachments.

8. Testing of Electrical Attachments

Installations (attachments) must be inspected and tested before being commissioned. Testing of temporary attachments shall be carried out in accordance with the IEE inspection and testing guidance note 3 on installation and for periodic testing at no greater than three monthly intervals.

Each individual item should be subject to an electrical conformance (PAT) test which forms part of the documentation submitted to Milton Keynes Highways. Where any attachment is found to be defective, the installation may be disconnected without notice.

9. Type of Festive Display

All Festive decorations should be designed to be fit for purpose and have an Ingress Protection (IP) if at least IP66.

No decorations that contain flashing red, yellow or green lamps will be allowed within 10 metres or within the motorist's sight lines of a set of traffic signals, light controlled pedestrian crossing facility or zebra crossing.

Only Festive lighting that is attached to lamp columns can be licensed unless specifically through historic precedent. No new remote power can be licensed.

Please refer to appendix G

10. Maintenance of attachment

14.a. Temporary attachment

The licensee must ensure that the fixings used for the attachment are suitable and appropriate to support the attachment for its whole life cycle. The licensee must, at their own expense, maintain the temporary attachment and infrastructure in good repair throughout the period of operation, including its installation and removal. The Applicant should make arrangements for a weekly visual inspection of the attachment and to keep a log of such inspections. Any damage caused to lamp columns or any associated equipment, including damage to the protective coatings by the licensee, his agents or Contractors will be repaired by Milton Keynes/Highways Contractor. The licensee will be rendered an invoice and be responsible for payment of the repair costs.

14.b. Permanent attachment

The licensee must ensure that the fixings used for the attachment are suitable and appropriate to support the attachment for its whole life cycle. Any damage caused to lamp columns or any associated equipment, including damage to the protective coatings by the licensee, his agents or Contractors will be repaired by Milton Keynes City Council/Highways Contractor. The licensee will be rendered an invoice and be responsible for payment of the repair costs.

11. Emergency situations

The applicant **MUST** ensure that adequate Competent Persons are available at all times for Emergency attendance within two hours of being so requested.

Milton Keynes City Council/Highways Contractor reserves the right to disconnect and remove any or all equipment that, in the opinion of the Highway Authority, is unsafe or dangerous. The cost of this work will be recharged to the applicant.

Neither Milton Keynes City Council or the Highways Contractor will accept any responsibility for vandalism or accident damage. Where equipment is removed by Milton Keynes City Council/Highways Contractor or another approved Milton Keynes Council agent following an accident, damage or vandalism, Milton Keynes City Council/Highways Contractor will endeavour to recover any equipment attached but will not be responsible for any consequential loss.

The applicant will be responsible for the immediate removal of their equipment when requested to do so by the Highway Authority at their own expense.

12. Use of electricity

The Distribution Network Operators (DNO's) in the Milton Keynes area must be advised of all powered equipment being installed on unmetered supplies. Details relating to the electrical load, burning hours and duration of the installation must be provided to enable a tariff to be agreed. This agreement needs to be signed prior to energising of the electricity supply to the festive decorations.

The applicant is responsible for arrangements with the DNO for electrical supplies and the payment of charges in relation to energy consumption. No supply is to be taken from any lamp column for powered equipment without prior written approval in the form of an attachment licence.

13. Timing Devices

Although a large number of lamp columns have been fitted with timers as an integral part of the protective equipment within the base compartment of a lamp column which has been facilitated for Festive lighting, it is the responsibility of the installer to set and maintain the switched settings of the timer. Any Festive display which is to be attached to a lamp column that does not have an integral timer should ideally be fitted with a timer mounted on the display to avoid the unnecessary use of power during daylight hours.

14. CCTV

Applications for any type of CCTV whether the equipment has a moveable camera or is in a fixed position will not be approved unless the applicant:

1. Is a member of the Information Commissioners' Office and provides evidence of their licence as part of the application.
2. Provides their policy regarding Data Protection.
3. As with all other applications, evidence of the current Public Liability insurance certificate must be provided.

Applicants should be aware that cameras and recording equipment in public areas can generate concern so are sensitive items within local communities.

Due to the sensitive nature of CCTV, if an Officer or representative of Milton Keynes City Council requests that the equipment is removed, the applicant must make arrangements to remove the equipment within one working day. If this request goes unheeded or if any unauthorised recording and/or transmission equipment is found attached to lamp columns, the equipment will be removed without notice and retained securely by Milton Keynes City Council.

Applicants for any type of CCTV equipment are reminded that this application process and Code of Practice applies for items to be attached to lamp columns only. A suitable information notice must be attached to each lamp column where CCTV equipment is to be used. The notice shall show an image representing temporary CCTV and must give the Information Officer's Office licence number, Milton Keynes City Council's attachment licence number and date of intended date of removal.

The notice should ideally be A4 lightweight plastic Corex, laminated or similar non-metallic material and affixed to the lamp column via cable tie. When the CCTV equipment is removed, the notice and fixing must also be removed. The notice design must be submitted as part of the overall attachment application.

4. Traffic Counters and similar equipment

Temporary devices that utilise carriageway tubes, cables or loops will require an attachment licence even though these are not weight-bearing as these devices use a security measure wrapped around a lamp column against theft. Protection of the lamp column base must be achieved using suitable material such as a rot-proof textile outer sleeve for chains or the use of plastic-coated braided steel.

Data Boxes or any associated component part of the data recording installation must not cause an obstruction or unduly affect Highway users.

5. References

1. Highway Electrical Academy (Telephone: 01903 705140)
2. PD 6547:2004+A1: 2009. Guidance on the use of BS EN 40-3-1 and BS EN40-3-3.
3. ILP GN22 Asset Management Toolkit Minor Structures (ATOMS)
4. ILP GP03: Code of Practice for Electrical Safety in Highway Electrical Operations.
5. PLG06 Guidance on Installation and maintenance of Seasonal Decorations and Lighting Column Attachments
6. IET Guide to Highway Electrical Street Furniture
7. ILP BS7671: Requirements for Electrical Installations
8. Traffic Management Act 2004
9. The Construction (Design and Management) Act 2015
10. Health and Safety at Work etc Act 1974
11. Electricity at Work Regulations 1989
12. New Roads and Street Works Act 1991
13. Electricity Supply Regulations 1988
14. Highways Act 1980
15. Information Commissioner's Office
16. BS7671 18th Edition i.e., Wiring Regulations

Appendix G - Festive Decorations Code of Practice

1. Introduction

1. This Code of Practice (CoP) is intended to provide essential guidance to any person/s engaged in or associated with the installation, operation, and maintenance of illuminated festive decorations on or above the public highway or MKC owned landscape land.

2. The CoP does not constitute a comprehensive specification and as such does not cover all associated operations and activities. It serves to identify only those operations and activities, that may, directly or indirectly affect electrical safety it is a supplement to existing Codes of Practice, Safe Working Methods, and Statutory/Regulatory requirements.

3. It is assumed that the CoP and those recommendations contained herein, will be used as a basic template for the application of good, sound engineering judgement and practice.

4. This CoP provides advice in a consistent, positive, and practicable manner. It attempts to ensure that the health and safety of all persons engaged in the associated works and members of the public, is protected as far as is practicable.

5. The CoP is primarily concerned with the electrical safety aspects of associated works; however, related matters of a mechanical nature are referred to.

2. Preparation

1. In recognition of varying approaches to the requirements of individual organisations and constantly changing legislation and engineering practices, the CoP has been reviewed and amended by the Milton Keynes Council Street Lighting Engineer. Reference is made to the following documents however this is not an exhaustive list

    - ILP PLG06 and GN22 Guidance notes and Technical Reports.
    - BS 7671:2018 – 18th Edition, IEE Wiring Regulations
    - Electricity at Work Regulations 1989
    - Health and Safety at Work Act 1974
    - Highways Electrical Association (HERS registration scheme)
    - BS EN 40-3-2:2013

3. Structural Requirements

1. Decorations and/or their supports will not project within 0.5m of the kerb edge and at no less a height than 5.7m above the carriageway. Where roads within the

MKC area have been designated 'Wide Load Route', a minimum clearance of 7.5m above the carriageway surface must be maintained at all times.

2. Decorations and/or their supports erected over footway/s and any other pedestrian areas, must have a minimum clearance of 2.5m from the footway surface which must be maintained at all times.

3. No permanent fixtures are to be fitted in or attached to any Highway or Landscape Assets without the prior written consent of the Highway Authority.

4. The drilling of access holes in existing lamp/lighting columns will not be permitted except as in 3.5. All such existing access holes must be suitably sealed and weatherproofed against corrosion.

5. For egress of cables from lighting columns, it is generally acceptable to drill a 20mm dia. hole in a column shaft for the exit/entry of cables providing it is located away from the points of maximum stress i.e., at connection points for the brackets, and transition from shaft to base. Where facilities for the egress of cables from a lighting column or similar are made, they should be threaded, and a nylon or similar stuffing gland used to seal the column from water ingress. Ideally, the drilling of columns for the egress of cables should be completed during manufacture. However, if drilling is carried out post fabrication, then a finishing operation to protect the exposed edges of the hole should be carried out using a cold galvanising product and, if other protective systems are used, then a suitable reinstatement of the original paint system.

6. Where access to an electricity supply within a steel galvanised column is required, the access hole must be drilled into the rear of the bracket arm. The hole will be tapped to16/20mm and a suitable brass bush fitted. A prefabricated fixing bracket and Lewden flanged socket, to minimum IP66 rating, may then be fitted. The brass bush and retaining screws threads shall be coated in 'Belzona' or similar compound for security of fixtures and to protect and maintain the integrity of the column against corrosion and water ingress. All associated materials shall be supplied and installed by the Highway Authority's Approved Street Lighting Contractor. Connections shall only be made to the sockets using matched Lewden plugs, minimum IP66 rating

7. The integrity of the weatherproofing of the column and bracket arm must be fully maintained at all times

8. No attachments other than as detailed in 3.5, shall be fitted to any bracket arm on any column

9. No decoration/s shall interfere with or obstruct access to the column or lantern in the course of general/cyclic maintenance activities

10. No decoration/s shall be fitted to lighting columns that already support traffic signs, other than restriction plates/repeater plates and a structural test has been undertaken in accordance with EN40.

4. Catenary Installations

1. **Catenary installation between columns will not be permitted within Milton Keynes unless the columns have been specifically designed for the purpose**

2. Any cable spans greater than 3m are to be supported by means of a high-tensile galvanised/stainless steel, multi strand, catenary wire, of minimum diameter 6mm. The cable may be either continuously interwoven with the catenary wire, or secured to the catenary wire, by means of suitable clips/cable ties at no greater than 250mm centres throughout its' length. Catenary wire may also be integral to the cable as part of the production process.

3. The catenary wire must be securely attached to tested and approved anchor points. No span shall exceed a maximum of 15m.

4. Certification of annual test for the anchor points either on buildings or columns must be supplied with the application. Failure to do so will make the application null and void or lead to the application being refused.

5. Catenary structures are generally steel columns manufactured from tubular, conical or multi-faceted sections that have been designed specifically for the purpose. They support the catenary wires, electrical supply cables and either festoon lighting, fairy lights, decorations, or banners etc.

6. The forces on the steel column or other structure, resulting from a catenary system which is designed to take this type of loading, is obtained by completing sag and tension calculations.

7. There is a relationship between the sag of the wire, the loading applied, and the tension within the wire. It is also possible, if the system is installed in one season and retained for subsequent seasons, to calculate the effect due to changes in temperature.

8. If the tension is too great at the time of erection and the wire contracts due to a reduction in temperature or the applied load increases due to wind, the resultant forces in the catenary system may exceed the safe working load of the wire, the capacity of the connection or the structure supporting the arrangement.

9. In some instances, the actual catenary wires may be installed prior to the erection of the festoon lighting, decoration, banner, or other such load. In this case it is essential that the appropriate sag and tension are calculated to ensure that neither of the controlling conditions is exceeded when the load is subsequently applied.

10. In general, the following should be taken into consideration and discussed with the senior street lighting engineer prior to installation:

    - The time of year that the system is installed and for how long it is to be used under full load.
    - The time of day the work is likely to be carried out.
    - Whether the cables are to be erected prior to the installation of the lighting, decoration, or banner etc.
    - If necessary, additional calculations should be carried out to determine the installation criteria.

5. Catenary Wire Selection

1. It is recommended that the catenary system should use Marine Grade flexible stranded stainless steel wire ropes to BS EN 12385-4:2002+A1:2008 with a minimum diameter of 6mm for simple festoon lighting fairy lights or bunting and a minimum of 8mm for cross street systems supporting decorations, banners or similar.

2. The termination of the wire rope shall be by stainless steel compression crimp type joints, or by grips in conjunction with stainless steel thimbles or eyes. The introduction of a stainless-steel turnbuckle, rigging screw or similar can be used to fine tune the tension and sag after installation. As a rule of thumb, the thread diameter of the associated equipment should be two times that of the catenary wire being used i.e., M16 for 8mm wire. The safe working load for all the equipment should be comparable and shall have a minimum factor of safety of five against the minimum breaking load of the component or wire and be greater than the calculated maximum tension in the system.

6. Inspections

The catenary system should be inspected at least once each year and also prior to mounting the equipment onto the wires that are left in position permanently, or, before the wires and equipment are re-installed. The inspection should include the following but not be limited to:

1. Inspect the wire rope anchorage point on the wall or structure for signs of wear or corrosion.
2. Inspect the wire rope terminations.
3. Inspect the wire rope for frays, kinks, corrosion damage or deterioration.
4. Inspect the wire rope attachments to the turnbuckle, rigging screw or similar for wear, deterioration, corrosion, and security.
5. Tighten all connections as necessary, for example the wire rope grips.
6. Check the electrical cable.

7. Check the connections of the supported equipment to the catenary wire
8. Visually inspect the support structure in line with the requirements of GN22 - competency and training

Under no circumstances are spans more than 3.0m to be attached to street lighting columns/wall-brackets unless those columns/wall- brackets are specifically designed for this purpose. Spans may be attached securely to adjacent buildings (fixings MUST be tested annually).

All anchor, points, bolts, hooks, brackets, clips, cable tensioners must be made of non-corrosive material such as galvanised/stainless steel and must be designed for the purpose and to BS5649 -pt1 classification. All brackets/clips shall be fitted with a neoprene rubber insert of minimum 5mm thickness, between the column and the fixing.

The Operator shall ensure that the design, and construction of any street lighting column/s and/or anchor points, complies fully with the requirements of BD26/99 when under fully laden conditions. There must be no undue stress/tension applied to street lighting columns that may lead to bending or bowing. Street lighting columns must retain vertical alignment at all times. Under no circumstances shall decoration/s be permitted to be attached to glass reinforced plastic, concrete or aluminium street lighting columns or to illuminated traffic signposts.

Any anchor points fixed to buildings will require a wayleave agreement to be in place before approval will be given

Note: The street lighting engineer reserves the right to refuse permission to fit any decoration/s to any street lighting column considered unfit/unsuitable for that purpose

9. Electrical Requirements

Whilst recognising the pleasure a well-designed lighting display gives to the public, organisers and installers of festive lighting must keep in mind that such installations, when powered by mains electricity, are, because of their temporary nature, potentially hazardous.

It must be remembered that outdoor lighting is subject to adverse weather conditions, especially in winter, and a hastily erected display could easily bring tragedy instead of joy. As festive installations are meant to be temporary, an annual test will need to be carried out.

Equipment used for temporary installations must be of the same standards as a permanent installation although it is appreciated that for installations of this nature, cables may be installed temporarily. Cable supports must be arranged so that no appreciable mechanical strain is placed on any cable termination or joint.

All work must be carried out to the requirements of BS 7671: 2011 IEE Wiring Regulations.18th Edition and it should be noted that the Electricity at Work Regulations 4, 5, 6, 7, 8, 9, 10, 11, 12 and 15 are particularly relevant to such installations. Due reference should also be given to the requirements within the ILP document 'GP03: Code of Practice for Electrical Safety in Highway Electrical Operations'.

1. It is a legal requirement that everyone undertaking electrical work is a competent person, as described in the Health and Safety section of this document and does not cause danger to themselves or others. If you knowingly employ staff to undertake work that is beyond their level of knowledge and competence, then you could be liable for any danger or damage that occurs. Where the operator does not have persons approved to the correct level of competency, connections to Highway Authority apparatus must only be undertaken by the Highway Authority, its approved contractor or agent. The cost of this work will be charged to the operator.

2. The Highway Authority and Distribution Network Operator (DNO) must be fully consulted regarding the location, type, and suitability of the cubicle / feeder pillar before any work is started to install or construct the cubicle/feeder pillar; and under no circumstances should the works be undertaken without the prior written approval of the Highway Authority. The details of the supply cubicle/feeder pillar owner and contact details should be displayed on permanent exterior labels.

3. To prevent accidental contact with all live parts within columns/supply pillars an intermediate barrier to minimum IPXX (BS5490) must be fitted and shall only be removable by the use of a tool.

4. All festoon lamp-holders shall be moulded into the outer sheathing of the cable, as part of the manufacturing process and shall be suitable for the use of Edison Screw Lamps. No 'pin prick' lamps are to be used unless fitted to the cable during the manufacturing process.

5. The Operator/Installer shall ensure, at all times that any replacement lamps are of the recommended type and wattage for the installation.

6. All/any associated electrical cable/s, above ground level, shall be fully enclosed within a heavy-duty galvanised conduit of minimum 25mm diameter to a

minimum height of 3.0m above ground level, securely attached to an adjoining building by means of galvanised saddle clamps.

7. All electrical equipment mounted on or above the public highway shall incorporate circuit protection via an RCD of maximum 30 milliamps rating.

8. Due to the possibility of dangerous situations occurring, large ground-mounted Christmas trees and Tableau, shall only be supplied via 24/25V PELV/SELV systems.

9. Where an electrical supply is to be taken from an existing service within a street lighting column, a separate sub-circuit shall be provided by means of a fused two-way DPI unit. There must be sufficient discrimination to ensure that, under fault conditions, the street lighting circuit is not affected. Under no circumstances will the existing control equipment within the street lighting column be dismounted, disconnected, or otherwise removed

10. Under no circumstance shall the PECU/Clock Timer be used as a control for festive decoration/s. A suitable timing device shall be incorporated to provide for the burning hours duration of the festive decorations

11. Where there is insufficient room within the street lighting column base compartment to house the control gear for the festive decoration/s, it will be necessary to convert the existing lantern to a modern unit, in order to create the required space. Costs for such works will be borne by the applicant wishing to install festive decorations on the column. Under no circumstances shall control gear be fitted to or within the lantern or its' canopy

12. Under no circumstances shall any associated equipment be installed within a street lighting column without that equipment being fully secured.

13. Under no circumstances shall any associated equipment be attached to/installed within illuminated traffic signs

14. All festive lighting supplies will be treated as permanent, temporary supplies will not be permitted. It is preferred festive lighting supplies are not taken from street lighting columns and that where such supplies are required, they are derived from a purpose-built service pillar/wall box with its own DNO service. Supply pillars should where possible be installed off the public highway to minimise clutter, the preferred option being a wall box which is also less prone to accidental damage/vandalism.

15. Any associated control equipment shall be installed within the supply pillar/wall box

16. Power supplies in most situations for highway electrical equipment, is supplied unmetered, direct from the DNO cables in the Highway. Within the highway electrical equipment is a fuse known as a cut-out. This is the interface where the supply responsibility changes from the DNO to the Highway Authority and is the point of electrical isolation.

17. Only an authorised competent person will be allowed to remove inspection covers, doors or panels affording access to their apparatus to make connections from Highway Authority and DNO equipment.

18. Where supplies are privately generated or where the supply authority does not provide an earth terminal, earth electrodes are to be installed according to BS 7430:2011+A1:2015 to ensure a disconnection time not greater than 0.2 seconds for TN supplies and 0.07 seconds for TT supplies. Earth bonding should also be provided in all areas where electrical supplies are introduced e.g., stages, marquees, stalls, and scaffolding. Protective earthing of the equipment must be maintained at all times. The Highway Authority and Local Electricity Company shall always be consulted

19. Only competent and authorised persons shall be employed to carry out any/all associated installation works.

20. Person/s employed on installation works shall provide copies of all relevant certification, qualification, and sector scheme card as evidence of suitability

Note: The senior street lighting engineer retains the right to refuse permission for any person/s not deemed competent to carry out any associated electrical works on the public highway

10. Trees

Any equipment/lighting should only be attached on a temporary basis and should not involve any damage to the main stem or any other part of the tree. Nothing should be screwed or nailed to the tree. Banding round the tree is acceptable but this will have to be removed after the event /festival.

11. Maintenance Arrangements

The owners of the decorations must, at their own expense, maintain the decorations and infrastructure in good repair throughout the period of operation, including its installation and removal. The promoter MUST make arrangements for a weekly visual inspection of the decorations and to keep a log of such inspections. This requirement is in addition to other structural or electrical inspections.

An electrical test must be undertaken annually to ensure all electrical safety equipment is functioning as per manufacturers' instructions

Any damage caused to Highway Authority equipment, including damage to the protective coatings, by the promoter or his agents or contractors, will be repaired by the Highway Authority. The promoter will be rendered an invoice and be responsible for payment of the repair costs.

The promoter must ensure that adequate competent persons are available at all times for emergency attendance within two hours of being so requested.

The Highway Authority reserves the right to disconnect and remove any or all equipment that, in the opinion of the Highway Authority, is unsafe or dangerous. The cost of this work will be recharged to the promoter. The Highway Authority will not accept any responsibility for vandalism or accident damage. Where equipment is removed by the Highway Authority following accident damage or vandalism, the Highway Authority will endeavour to recover any equipment attached but will not be responsible for any consequential loss. The promoter will be responsible for the immediate removal of their equipment when requested to do so by the Highway Authority at their own expense.

12. Decorations

All festive decorations should be designed to be fit for purpose and have an Ingress Protection (IP) of at least IP66.

No decorations that contain flashing red, yellow or green lamps will be allowed within 10 metres or within the motorist's sight lines of a set of traffic signals, light controlled pedestrian crossing facility or zebra crossing.

13. Competency

A competent person is someone with the skill, knowledge and/or experience of the particular type of work to be undertaken, and other qualities, so as to be able to identify and avoid danger. Training provides under-pinning knowledge to support competency. It is important that employees are conversant with hazards and risks, whether directly employed or employed by contractors or sub-contractors. Therefore, they should receive comprehensive training, instruction and updating on relevant aspects related to the assembly, installation, commissioning and on-going operation and maintenance of masts. It is also necessary to re-examine periodically the scope of work, equipment employed, procedures and standards of workmanship.

The competence of a person should be supported by underpinning training. Persons involved with site works should work only within the scope of their evidenced competence. Both organisational and employee competence should meet the key principles of CDM.

Typically, the industry standard for training and assessment of competence on or near the highway in the UK is the Highway Electrical Registration Scheme (HERS), which is a requirement of the National Highways Sector Scheme 8 (NHSS 8). There may be other similar organisations likely to be suitable for competency assessment and registration; the Operator needs to be satisfied that the alternative scheme covers the same range of works and operations.

All operational staff carrying out work on site should be registered to HERS and in possession of valid ECS HERS Cards at all times whilst on site.

As part of HERS, all operatives shall be assessed for competency and shall undertake a recognised course or system of training as appropriate leading to a Competence Based Qualification (CBQ) such as a National Vocational Qualification (NVQ)

14. Local Electricity Supply Company Requirements

1. The DNO has the responsibility as a Statutory Authority to ensure that all electrical installations comply fully with the Electricity Supply Regulations 1988 and the current edition of BS7671 IEE Wiring Regulations

2. The Regional Electricity Companies (RECs) (DNO)/Distribution License Holders (DLHs) must be advised of all festive decorations being installed on unmetered supplies. Details relating to the electrical load, burning hours and duration of the installation must be provided to enable a tariff to be agreed. This agreement needs to be signed prior to energising of the electricity supply to the festive decorations. The Operator shall also supply their name, address and a contact number

3. Any festive electrical installation must be installed to the same standards as if permanent. Cable supports shall be so arranged as to place no significant mechanical strain on cable terminations or joints

4. Where an electricity supply is requested, if this can be made readily available from an existing street lighting column service.

5. Written consent must be obtained from the Highway Authority and arranged for that Authority to carry out any necessary works. Only the Highway Authority shall carry out any works associated with connection/disconnection to/from the Local Electricity Company cut-out

6. The Local Electricity Company must be provided with written certification that any works carried out by them or their Contractor/s, complies with the current edition of BS7671 IEE wiring Regulations, the Health and Safety at Work Act 1974 and the Electricity at Work Regulations 1989

7. The operator is responsible for arrangements with the DNO for electrical supplies and the payment of charges in relation to energy consumption. No supply is to be taken from any Highway Authority apparatus without its prior written approval.

15. General Requirements

An application to install festive decorations must be made in writing to the Highway Authority, prior to the commencement of any installation works. Detailed plans indicating the proposed locations together with street lighting column numbers/locations and the prospective load of the installation/s must be included within the application. Under no circumstances will approval be granted retrospectively.

A visual inspection by the authorities lighting contractor will be required prior to the issuing of the applicants switch on date. This will be no less than 2 weeks before the proposed switch on.

A copy of a current Public Liability Insurance Certificate must be supplied, indemnifying the Highway Authority against any 3rd party claims due to consequential personal injury, or Highway Authority claim/s for damage caused to Authority property, to the sum of a minimum £5,000,000 in respect of any one incident/occurrence

Any damage caused to Highway Authority property will be repaired by the Authority's appointed Street Lighting Contractor and the subsequent invoice will be submitted to the Operator for settlement.

Under no circumstances are flashing festive decorations to be installed within 10 metres of any light controlled junction/pedestrian crossing.

All associated equipment must be erected and removed from the street lighting column/s within the dates specified on the application.

The operator shall ensure that all equipment is bench-tested prior to installation and shall ensure that the equipment remains in good repair until such time as it is removed from site/s

The Operator must provide a 24-hour emergency contact number for the Highway Authority Engineer and if requested shall remove their equipment. The Highway Authority retains the right to remove any/all equipment deemed as unsafe or potentially dangerous to the general public or it has caused damage to Authority property. The Authority Engineer will endeavour to retain any/all equipment so removed but will not be held responsible for its' loss. Any/all costs involved will be invoiced to the operator.

The Operator shall ensure that all installation and maintenance works are carried out in a safe manner. Where required traffic management plans must be supplied and be in accordance with Chapter 8 of the Traffic Signs Manual which shall be strictly adhered to. Under no circumstances are ladders to be used during installation/maintenance works. e Operator for settlement

Where catenaries are requested to be installed, the Operator must also consult with the Police and Health and Safety Executive to agree suitably safe method of working and suitable time for installation works. Adherence to this code of practice does not absolve the Operator of his/her contractual obligations or Common Law duties to protect the health and safety of his operatives and the general public.

Appendix G - Street Lighting Cable Repair Prioritisation in Milton Keynes

Street Lighting Cable Repair Prioritisation in Milton Keynes

Document Control

Version	Date	Author	Description
1.0	2023-10-27	AD	Initial Draft

1. Introduction

This document outlines the methodology used by Milton Keynes to prioritise street lighting cable repairs, ensuring that resources are allocated effectively to address the most critical issues first. The prioritisation process is based on a risk assessment that considers both the potential impact of a lighting failure and the probability of negative consequences.

2. Risk Assessment Methodology

2.1 Impact Assessment

The impact of a street lighting cable failure is assessed based on the following primary factor:

- **Road Hierarchy:** The category of the road directly correlates to the potential impact of a cable failure.
    - **Category 2:** Major roads with high traffic volume and speed. Considered **Critical Impact (4)**.
    - **Category 3a:** Main roads with moderate traffic. Considered **Moderate Impact (2)**.
    - **Category 3b:** Minor roads with lower traffic. Considered **Low Impact (1)**.
    - **Category 4:** Unclassified roads (rural lanes, residential streets) with very low traffic. Considered **Low Impact (1)**.

2.2 Probability Assessment

The probability of negative consequences due to a cable failure is assessed based on the following factors:

- **Hi-Speed Road:** Roads designated as "hi-speed" increase the likelihood of accidents. (Yes: **High Probability (3)**, No: **Medium Probability (2)**)
- **Junction:** Junctions are inherently more complex and prone to accidents. (Yes: **High Probability (3)**, No: **Medium Probability (2)**)
- **Dual Carriageway:** Dual carriageways typically have higher traffic flow and speed. (Yes: **High Probability (3)**, No: **Medium Probability (2)**)
- **Town Centre:** Town centres have higher pedestrian and vehicle traffic. (Yes: **High Probability (3)**, No: **Medium Probability (2)**)
- **Number of Lights Affected:** More lights out mean a bigger area is affected, increasing the risk.
    - <3 lights: **Low Probability (1)**
    - 4 to 10 lights: **Medium Probability (2)**

- >10 lights: **High Probability (3)**

3. Prioritisation Process

Street lighting cable repairs are prioritised based on their total risk score:

- **Urgent Action (Risk Score 15 and above):** Requires immediate attention.
- **High Priority (Risk Score 11 - 14):** Needs to be addressed quickly.
- **Medium Priority (Risk Score 7 – 10):** Should be scheduled for repair soon.
- **Low Priority (Risk Score less than 7):** Can be monitored, but repairs should be scheduled.

4. Example

Let's consider the following street lighting cable repair schemes:

Site	Road Hierarchy	Hi-Speed	Junction	Dual Carriageway	Town Centre	No. of Lights	Impact	Probability	Risk Score
1	Category 3b	No	No	No	No	3	1	2	2
2	Category 3a	Yes	No	Yes	Yes	13	2	3	6
3	Category 4	Yes	Yes	Yes	No	12	1	3	3
4	Category 2	Yes	No	Yes	No	10	4	3	12

Based on the risk scores:

- **Site 4** would be prioritised as **Urgent Action** due to its high impact and probability.
- **Site 2** would be prioritised as **High Priority**.
- **Site 3** would be prioritised as **Medium Priority**.
- **Site 1** would be categorised as **Low Priority**.

5. Reporting and Monitoring

- **Reporting:** The public can report street lighting cable failures through various channels, including online forms, phone calls, and mobile apps.
- **Monitoring:** The council monitors the status of all reported cable failures and tracks the progress of repairs.
- **Review:** The risk assessment and prioritisation process is reviewed periodically to ensure it remains effective and aligned with the council's objectives.

6. Conclusion

This risk-based approach ensures that street lighting cable repairs in Milton Keynes are prioritised effectively, focusing on the most critical issues that pose the greatest risk to public safety and infrastructure. The process is transparent, objective, and regularly reviewed to ensure its ongoing effectiveness.

7. Example Scoring of actual Grid Road Sites

- **Site 1: Fulmer Street V3 H7-H8**
  - Road Hierarchy: Category 3b (Impact 1)
  - Hi-Speed: No (Probability 2)
  - Junction: No (Probability 2)
  - Dual Carriageway: No (Probability 2)
  - Town Centre: No (Probability 2)
  - Number of Lights: 3 (Probability 1)
  - **Impact: 1**
  - **Probability: 2** (Highest probability score used)
  - **Risk Score: 1 * 2 = 2**

- **Site 2: Tongwell Street V11-2 to 15-PM**
  - Road Hierarchy: Category 3a (Impact 2)
  - Hi-Speed: Yes (Probability 3)
  - Junction: No (Probability 2)
  - Dual Carriageway: Yes (Probability 3)
  - Town Centre: Yes (Probability 3)
  - Number of Lights: 13 (Probability 3)
  - **Impact: 2**
  - **Probability: 3** (Highest probability score used)
  - **Risk Score: 2 * 3 = 6**

- **Site 3: Grafton Street V6-V4 Roundabout**
  - Road Hierarchy: Category 4 (Impact 1)
  - Hi-Speed: Yes (Probability 3)
  - Junction: Yes (Probability 3)
  - Dual Carriageway: Yes (Probability 3)
  - Town Centre: No (Probability 2)
  - Number of Lights: 12 (Probability 3)
  - **Impact: 1**
  - **Probability: 3** (Highest probability score used)
  - **Risk Score: 1 * 3 = 3**

- **Site 4: Portway H5-1 to 7-GR**
  - Road Hierarchy: Category 2 (Impact 4)
  - Hi-Speed: Yes (Probability 3)
  - Junction: No (Probability 2)
  - Dual Carriageway: Yes (Probability 3)
  - Town Centre: No (Probability 2)
  - Number of Lights: 10 (Probability 2)
  - **Impact: 4**
  - **Probability: 3** (Highest probability score used)
  - **Risk Score: 4 * 3 = 12**

Revised Prioritisation:

- **Site 4: Portway H5-1to7-GR (Risk Score 12) - Highest Priority**
- **Site 2: Tongwell Street V11-2to15-PM (Risk Score 6) - High Priority**
- **Site 3: Grafton Street V6-V4 Roundabout (Risk Score 3) - Medium Priority**
- **Site 1: Fulmer Street V3 H7-H8 (Risk Score 2) - Low Priority**

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