GUIDANCE NOTE 12/21

THE SMART LIGHTING COLUMN

Guidance Note

GN12/21

Multi-function ‘Smart’ Lighting Columns

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2 Foreword

The acceleration in roll-out of new communications equipment and smart-cities infrastructure is happening in many towns and cities. Equipment is being deployed that can tell you when litter bins or roadside drainage gullies need emptying rather than having a pre-set maintenance cycle. Sensors can be used to direct people to either on-street parking or car parks, where live information indicates spaces, or take you on a walking tour of the city. These are just a few examples of how demand for better communications and smart applications is driving development and the need for suitable deployment sites. These facilities can deliver economies of scope and scale in service delivery, driving costs down whilst improving the service user experience. Similarly, the roll-out of communications services such as 5G mobile phone infrastructure, or city centre Wi-Fi networks will enhance the worker and visitor experience at a time when city centre retail is under pressure from on-line retailers.

All this infrastructure needs a power supply and height for the transmission and receipt of radio signals, sending information to and from this apparatus. So, what better way of hosting this than using the humble street light? It's plentiful, they are spaced every 40m or so in the road, they have an electrical supply and they have height.

Having two different organisations on the same infrastructure shouldn't be an issue if there is careful planning to ensure the lighting columns have sufficient structural capacity and, where required, electrical supplies can be safety obtained without affecting the structural capacity of the column or causing an electrical hazard. Access arrangements and compensation for use of the equipment will be developed through agreements between the lighting asset owner and the third-party equipment owner. However, the initial position must be that these are street lights, with other equipment attached.

The third-party equipment owner must, therefore, provide sufficient information to the reasonable satisfaction of the lighting asset owner that their proposals meet the recommendations contained in this document. It should not be the case for the lighting asset owner to demonstrate this capability, as in most cases they may not have sufficient information or competence to make those assessments.

Haydn Yeo,
Vice-President Technical
Institution of Lighting Professionals

3 Introduction

Over the past few years there has been an increase in the digitisation of society and of online service delivery, by both governments and business at both local and national levels. This technological shift has meant a range of technologies are being installed within the public and private realm including:

- 'Internet of Things' (IoT) / SMART devices providing sensors and monitoring for environmental data collection, including air and road surface temperatures and air quality parameters
- External Wi-Fi and mobile telecommunications antennae for business activities including both selling of services, for home-working and in future to assist the control of autonomous vehicles
- Increases in CCTV camera installations monitoring traffic and pedestrian movements
- The installation of radar vehicle counting technology to manage traffic mix and flows

These technologies help to manage and improve air quality and the environment, aid the delivery of local authority services, create local interest and improve the experience of residents, workers, businesses, tourists and other people passing through the area.

Whether installing this equipment on highways, the rail network, in ports, airports, industrial or retail facilities, the necessary hardware may be conveniently and most economically mounted on existing lighting columns[1], illuminated sign posts, traffic signal poles, advertising signage and shelters. These and similar structures provide a combination of structural support with sufficient height to place the equipment out of reach for good security and an existing electrical supply, minimising installation costs. This introduction of any new devices and equipment onto existing structures will change the applied loads and electrical requirements, so confirmation must be sought to ensure the suitability, integrity and stability of structures before the proposed equipment is installed. The effective management of applications, approvals, licensing, installation, maintenance and removal of attachments by the asset owner will ensure that these structures remain safe throughout the deployment.

This document focuses on providing guidance on the use of lighting columns. Stakeholders must be mindful that lighting columns are classed as minor structures, being specifically designed to support a luminaire and bracket, and occasionally a sign or other attachments. It is important to assess the applied loads due to the weight and wind area of new attachments, in addition to the existing loading. The structural capacity of the lighting column should be confirmed to be satisfactory before making any changes by adding or removing attachments.

[1] For street lighting, the Highway Code of Practice 'Well managed highway infrastructure' requires authorities to consider de-cluttering their streets. Strategies put in place by Local Authorities and other streetworks asset owners generally aim to minimise the number of different structures within an area.

Acceptance for installation will depend upon the design and details of the attachment proposed, and it may be that an existing column can facilitate such additions without exceeding its structural capacity. However, it is also possible that the column is already fully loaded, and any additional attachment may cause it to fail the structural design checks and, in the worst scenario, potentially cause it to collapse, as has been the case in various parts of the UK.

Within the UK, even apparently similar lighting columns are not necessarily the same. Some will not be suitable for additional attachments due to their design, age, base materials, construction, and existing loading.

4 Purpose and Scope

The purpose of this document is to outline the important considerations for all stakeholders and to provide a strategy for local authorities, telecommunications network operators and asset owners to follow when applying for, assessing and managing this process now and for the future. It also highlights the key considerations and issues to address when considering designing, manufacturing, installing, maintaining and removing devices and equipment onto or within lighting columns.

The guidance is applicable across all uses of lighting columns including but not limited to:

- Road and street lighting
- Car parks
- Recreation areas
- Sports facilities
- Tourism-generating interest areas and public spaces
- Ports
- Airports
- Rail networks
- Retail parks
- Industrial facilities

The equipment, be it a temporary or permanent installation, may provide amongst others:

- Telecommunications infrastructure
- Safety and security in public spaces
- Environmental monitoring
- Electric vehicle infrastructure
- Traffic monitoring and control
- Smart space technologies

This document outlines a proposed application, assessment and approval process for any local authority department or organisation wishing to install, operate and remove any attachment on a lighting column. The process may also be adopted by private companies and asset owners to manage the approval and attachment of new equipment to lighting columns within their own premises.

The document discusses both structural and electrical aspects of the integration of attachments with the lighting column.

The guidance includes a proposed asset management table for the recording and control of approved attachments on a lighting column.

5 Definitions

Attachment	Any device or piece of equipment to be mounted on a lighting column.
Base section	The section of the lighting column immediately above the ground level, which includes the base compartment and in parallel-sided stepped lighting columns, finishes at the level of the swage.
Base compartment	The electrical equipment enclosure typically in the base of the lighting column, accessed through the door cutout by removing the door cover.
Bracket	An extension piece to the lighting column consisting of a bracket upstand and a bracket projection used to mount the luminaire in the required position relative to the column shaft. Brackets may be single arm, double arm or have multiple arms, and the arms may be straight or curved.
Cable slot	The cable access hole in the lighting column root.
DNO	Distribution Network Operator, the electricity company responsible for the electrical connection to the supply point, this is not the same as the electricity provider.
DNO supply	The electrical supply cable, usually routed through underground ducts, that connects the lighting column to the electricity grid. It enters the lighting column root through the cable slot.
Door cover	A non-structural cover to the base compartment providing ingress protection.
Door opening	An opening, often cut out of the structural section of the lighting column, providing access to the base compartment.
Equipment	Any supporting device or equipment that is to be mounted within the lighting column, either as a device on its own to support the operation of an attachment.
HERS	Highway Electrical Registration Scheme. A competency based registration scheme for those involved in the installation, operation and inspection of highway related electrical systems.
Knock-down	An incident where a lighting column is damaged or collapses to the ground, for example, in a vehicle collision.
Lamp	The light source in the luminaire, typically a high intensity discharge, fluorescent, halogen, induction or incandescent type.
LED	Light Emitting Diode. A semi-conductor light source typically providing good energy efficiency and useful life. LEDs are usually installed on a printed circuit board (PCB or board) and require an LED driver to operate.
LED driver	Electrical transformer to convert mains power into a suitable electrical supply for the LEDs in the luminaire.
Lighting column	A structure of typical height between 3m and 20m primarily designed to support a luminaire but which may be used to

	carry other attachments or equipment. Lighting columns are manufactured from a variety of materials and in a range of cross-sectional shapes. In the UK these are primarily steel or aluminium stepped tubular columns, steel or aluminium tapered tubular columns, or steel octagonal columns. There are some historical materials such as concrete and cast iron for which use is declining, and other less widely used materials such as fibre reinforced polymer composite and timber/steel composite.
Luminaire	A lantern enclosure including its light source. The electrical equipment (lamp control gear / LED driver) is often integral to the luminaire but occasionally is mounted remotely in the lighting column base compartment.
Luminaire supply cable	The electrical cable between the fused cutout and the luminaire that passes internally up the lighting column shaft and along the bracket, when present.
Mounting height	The distance between the ground level and the centre of area of the equipment being attached to the lighting column.
Mounting offset	The horizontal distance between the centreline of the lighting column and the centre of area of the equipment being attached to the lighting column.
NHSS	National Highways Sector Scheme for Quality Management in Highways. A series of schemes published by UKAS.
Root	For planted lighting columns, the section of the column below ground level that provides the lighting column stability.
Shaft	The above-ground section of the lighting column. In parallel-sided stepped lighting columns, the section of the lighting column above the swage that extends up to the bracket or luminaire.
Shape co-efficient	The drag factor representing the increase / decrease in wind load due to the shape of an attachment, and the way the wind blows around it.
Solidity	The proportion, expressed as a percentage, of the effective wind area of an attachment to the area defined by the overall dimensions of the attachment.
Spigot	Luminaire spigot is the connection tube on the bracket or lighting column for mounting the luminaire. A bracket spigot is provided on the lighting column for mounting a bracket.
Swage	The change in cross section diameter between the larger base section and the narrower shaft of the lighting column.
Third party	An organisation / company wishing to attach their products / systems onto an other organisation / asset owner's equipment.
Weight	The weight of the attachment or component being added, including any brackets, shields, enclosures or other accessories that will be installed.
Wind area	The silhouette area of the equipment including any brackets, shields, enclosures or other accessories that will be installed.

6 References

References in this document are generally provided undated, and the current version published should be used. Where the text refers to specific clauses or sections of a document, dated references are used to avoid links being lost as documents are revised.

ADEPT	The Association of Directors of Environment, Economy Planning and Transport street lighting group, notes for guidance on the specification of street lighting columns
BS EN 40	Lighting Columns for circulation areas
BS EN 60529	Degrees of protection provided by enclosures (IP Code)
BS 7671	Requirements for electrical installations, IET wiring regulations
CD 354	Design of minor structures, design manual for roads and bridges
CDM	Construction (Design and Management) Regulations 2015
CPR	Construction Product Regulations 2011
GN22	Institution of Lighting Professionals (ILP) Guidance Note GN22 Asset Management Toolkit: Minor Structures
HCP	Highway Code of Practice - well managed highway infrastructure
HSAWA	Health and Safety at Work Act 1974
NHSS 6	UKAS National Highways Sector Scheme 6 - Particular Requirements for the Application of ISO 9001:2015 for Minor Structures
NHSS 8	UKAS National Highways Sector Scheme 8 - Particular Requirements for the Application of ISO 9001: 2015 for The Overseeing and/or Installation and/or Maintenance of Highway Electrical equipment and supporting works
PD 6547	Guidance on the use of BS EN 40-3-1 and BS EN 40-3-3
Series 1300	Section of Specification for Highway Works referencing lighting columns
Series 1900	Section of Specification for Highway Works referencing corrosion protection of steel

7 Responsibilities

7.1 The Client

When applying for approval for attachments on lighting columns, it is important to know who is responsible for these works and the end result of the installation.

The person or body that instigates the requirement for the attachments (for convenience referred to hereafter as the *Client*), be it the asset owner or a third party, assumes the primary responsibility for health and safety.

The Client is required to ensure that the application is submitted in accordance with the asset owner's application process and is responsible for ensuring that the attachments:

- Are safe to use in the environment
- Are adequately fixed to the column
- Are electrically safe
- Have cabling suitably routed and protected
- Do not cause the lighting column to exceed its structural capacity and when appropriate, fatigue capacity
- Do not cause excessive movement of the column under the wind loads

For the last two items above, the design checks must take account of all existing attachments and the times of the year these are approved to be attached.

Ultimately, it is the Client who is responsible for ensuring that the attachments and the work to install, operate, inspect, maintain and remove them, does not present a potential hazard to the public under the *Health and Safety at Work Act*.

In addition, attachment to a column is a design process under CDM. Therefore, the Client must understand and carry out their duties under CDM, including ensuring that competent designers are appointed when considering the suitability of any lighting column for the additional attachment loading. For large or complex projects with more than one contractor, the Client may need to appoint a Principal Designer and Principal Contractor to co-ordinate health and safety for the design and construction work, respectively.

7.2 Competency

7.2.1 General

Those accepting commissions to consider attachments to columns are reminded that no duty-holder must accept an appointment unless they are competent to undertake the work, and evidence of competency will be required.

7.2.2 Designers

The competency of staff carrying out design shall be assessed against the relevant professional organisation and Engineering Council requirements for the roles they are undertaking.

Structural design checks on the lighting column typically need to be completed or overseen by a Chartered Civil or Structural Engineer registered with the Institution of Civil Engineers or the Institution of Structural Engineers.

The design or modification of the electrical circuits shall be carried out or overseen by a competent Electrical Engineer / Designer registered with an appropriate professional body, such as the Institution of Engineering and Technology (IET).

7.2.3 Surveyors

Competency of those undertaking site surveys on highways shall be taken as registration with the Construction Skills Certification Scheme (CSCS). Surveyors accessing electrical equipment in the base compartment shall register the organisation and staff to the Highway Electrical Registration Scheme (HERS). Organisations not registered to HERS and NHSS8 shall not undertake any electrical work in relation to attachments requiring an electrical connection on the highway.

Non-highway asset owners may have their own competency requirements which will need to be complied with, such as the Rail Sector and the Personal Track Safety (PTS) qualification. For those asset owners who have no recognized competency system, then HERS should be taken as good practice and be required.

7.2.4 Installation and maintenance contractors

Contractor's installation or maintenance personnel, who will access electrical equipment and/or install new highway electrical equipment, shall have the Contractor's organisation and staff registered under the Highway Electrical Registration Scheme (HERS). Organisations not registered to HERS and NHSS8 shall not undertake any electrical work in relation to attachments requiring an electrical connection on the highway.

Non-highway asset owners may have their own competency requirements which will need to be complied with, such as the Rail Sector and the Personal Track Safety (PTS) qualification. For those asset owners who have no recognized competency system, then HERS should be taken as good practice and be required.

8 Attachments and Equipment

8.1 Types of attachment

Attachments and equipment considered by this guidance are typically installed to improve services, promote security or to provide a benefit to residents, businesses and tourism alike.

Figure 7.1 shows a range of possible attachments that may be fixed to a lighting column, individually or in combinations. The list is not exhaustive, and this guidance can be used for attachments of any type.

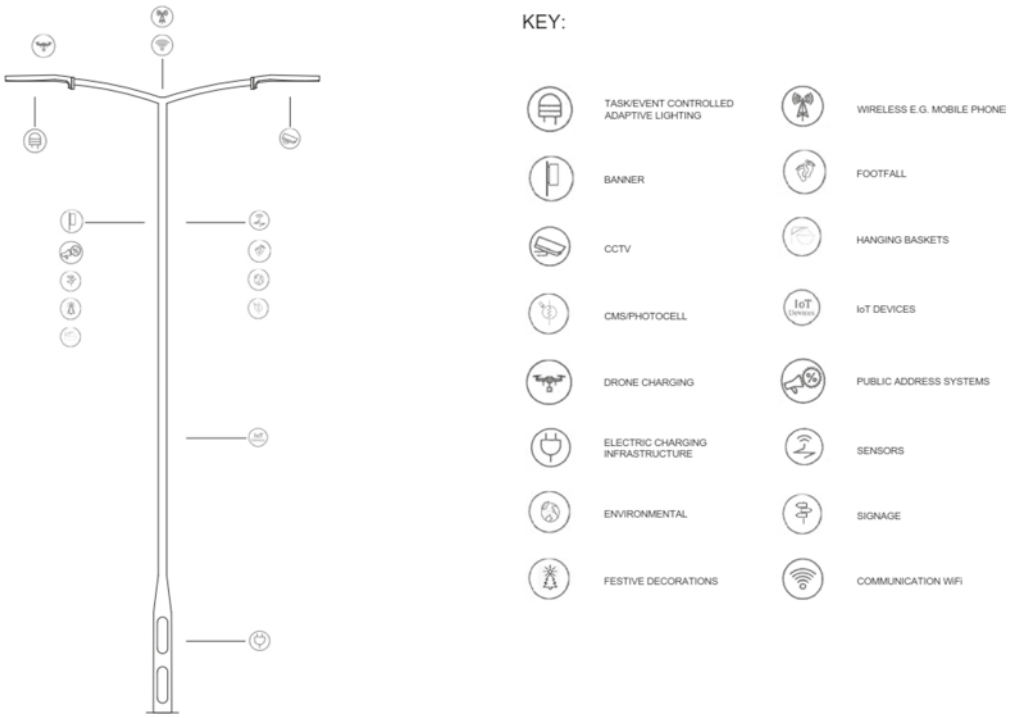

Figure 7.1 – Types of attachment

8.2 Structural impacts of attachments

Whilst recognising the service, pleasure and/or economic benefits that an attachment may bring, the owners, organisers and installers of these must keep in mind that lighting columns are designated as Minor Structures and each is design checked for the loads applied to it, to confirm that they are structurally adequate for the applied loads. New attachments apply additional loads to the lighting column (self-weight and wind loads) and so with each change, the lighting column design must be revisited to assess the impact of the change on the structural design and to ensure the design check requirements are still met.

8.3 Mounting combinations

It is not expected that one column will need or be able to support all the attachments all of the time, and each lighting column would need to be checked with the limited selection of attachments that specifically apply to it throughout the year. Some attachments may be seasonal being attached only in the winter (e.g. Christmas lights) and some only in the spring and summer (e.g. flower baskets). Others may only be in place temporarily during specific events and for short periods of time (e.g. CCTV cameras, banners, temporary signs, etc.).

8.4 Selecting mounting locations

When selecting which lighting columns to use for attachments, there is a need to be realistic. One column may not support everything, and some columns will not be able to support any additional attachments.

Time can be saved during the design phase by identifying a first, second and, if possible, a third choice location, providing flexibility and resilience in the planning process, in case the favoured lighting column is not structurally suitable or is rejected due to its condition.

In some cases, and where the attachments and equipment allow it, consideration may have to be given to distributing the attachments across a number of lighting columns within an area. This helps to reduce the additional loads on any individual lighting column meaning each individual lighting column will be more likely to be suitable.

Finally, it is worth considering the combinations of existing attachments the lighting columns already support at different times of the year. A lighting column that appears unloaded during the autumn may be subject to seasonal decorations in the winter and flower baskets in the summer, or temporary advertising banners around the time of specific events. Sufficient information on attachments and timings shall be collected to enable the lighting column design checks to consider each of the possible combinations of attachments for each different period in the year.

8.5 Lighting column variability

An asset owner is likely to have many different types and designs of lighting column within their inventory. It cannot be assumed that one or all columns, even within the same street can accommodate the integration of attachments physically, structurally, or electrically and the properties of each lighting column must be assessed to ensure they are sufficient and likely to remain so for the life of the installation.

8.6 Inventory records

With such variability in the type of each lighting column and the complexity of the attachments that may be approved for use on it, it is essential to have accurate and up to date inventory records. As well as the lighting column and luminaire information, inventories should detail attachments that are currently approved for mounting on each lighting column, as well as the time of the year they are installed and removed where relevant, including fields for:

- Attachment type/reference
- Approved installation date
- Required removal date
- For temporary or seasonal attachments, the months of installation and removal
- Emergency contact details in case of knock-downs
- Attachment dimensions (H x W x D)
- Attachment solidity and/or shape co-efficient
- Maximum allowable mounting height to centre of area
- Maximum allowable offset from column centreline to centre of area
- Attachment weight

Where there is more than one component to the attachment, a drawing may assist to show the arrangement of the attachment components on the lighting column. The various components may be detailed individually, or be combined to give a single representative attachment. Specialist engineering advice may be required to calculate these representative attachment parameters.

The process for approving new attachments, in combination with the existing attachments on a lighting column, will be necessary to manage and record each change to the inventory, ensuring it is maintained up to date.

8.7 Inspection, maintenance and removal

Inspection and maintenance of lighting columns and attachments should be carried out periodically in line with manufacturer's instructions and/or asset owner's processes. *The Institution of Lighting Professionals Guidance Note 22* gives advice on how this may be undertaken[2]. The asset inventory records shall record inspection and maintenance activities.

Before installing new attachments, consideration should be given to carrying out inspection and maintenance activities, ensuring that defects are not covered up, or exacerbated.

[2] Institution of Lighting Professionals (ILP) Guidance Note GN22 Asset management Toolkit: Minor Structures

Before a new attachment is installed, the removal of existing attachments may be required, and this should be managed and actioned as part of the installation process.

When a lighting column reaches the end of its useful life and needs to be replaced, the asset inventory information may be provided to a lighting column manufacturer who will be able to provide compliant designed and manufactured lighting columns suitable for all existing attachments, without needing any third-party design checks.

8.8 Emergency response

Processes need to be put in place, and information needs to be collated, for communication to the emergency services in the event of a knock-down. Some equipment and attachments may need auto-disconnection of the electrical supply to eliminate safety hazards and minimise the risk of injury where attachments become accessible to touch by the general public. With other attachments and equipment, it may be satisfactory for the column to be electrically isolated by the emergency services.

8.9 Ingress Protection for attachments

Special attention is required for attachments that require power connections or cabling to equipment installed within the lighting column. The attachments on the outside of the column and the equipment inside the column are both subject to adverse weather conditions, especially in winter. Poorly designed / installed attachments or equipment can often be a cause of early failure or, in the worst case, can lead to electrocution of people or animals walking close by.

9 Lighting Columns

9.1 Specification and design

New lighting columns are designed to *BS EN 40: Lighting columns for circulation areas*, where 'circulation areas' means places where there is movement of pedestrians, or any type of vehicle traffic through the lit area. It makes this standard applicable to the lighting in all industries and applications.

To aid the specifier in understanding the information they need to supply to the lighting column manufacturer / designer, *PD6547: 2009 Guidance on the use of BS EN 40-3-1 and BS EN 40-3-3* was published.

As a check list the designer needs to advise the following information for the design of a new column:

- Location of lighting column(s) in terms of district, street name and column ID no. It is also to provide the grid co-ordinates or address of the nearest property to assist with locating the column. This allows the column designer to determine
  - Site specific parameters for individual columns, including:
    - Mean hourly wind speed V_{ref}
    - Site altitude (over 250m seek expert advice)
    - Site altitude
    - Topography factor
    - Terrain category
  - Or for a group of columns in the same area
    - Rationalized Wind-loading Factor (RWF)
- Partial safety factors for loads (default is Class B)
- Deflection class (default is Class 3)
- Foundation type (rooted or flanged)
- Where flanged, the foundation structure and holding down bolt connection details
- Existing attachments and schedule of when these are to be attached
  - Include attachments to be taken from a removed column which will be transferred on to the replacement column
- Bracket type and projection length, along with diameter and thickness, if available
- Luminaire details including weight and wind area

- Photos of each column including:
  - Lighting column ID number
  - Full lighting column photo including the lantern and bracket at the top, clearly showing existing attachments and showing right down to the ground at the base of the column
  - Photo of the ground to the top of the door opening with door cover removed (note: there are minimum competency requirements for this removing column doors safely)
  - Photo showing the position of the attachments on the lighting column taken face on to the largest face

In addition, the details of any new attachments to be added to the lighting column.

For mounting equipment onto existing lighting columns, the same information needs to be provided, so that the existing lighting column loading can be calculated. In addition, the design engineer will need details of:

- Make, model number and date of manufacture from the label on the backboard (if visible)
- Overall dimensions including nominal height
- Diameter(s) and height above ground level of each cross-section change, including for tapered and octagonal columns the top and bottom diameter, and the top of any parallel section of tapered columns
- Thickness of each section between the above positions
- Material grade (may be provided on original lighting column manufacturer's calculations or drawings)
- Bracket projection length, diameter and if available thickness, and any gusset dimensions
- For each door opening, its height, width and distance from ground to the bottom edge of the opening in the main column
- Details and dimensions of any door reinforcement around, or to the side of the door opening.

9.2 Attachment information

The following attachment details need to be provided to the column design engineer:

- Type of attachment
- Weight (kg)
- Overall dimensions (height, width and depth)
- Solidity (percentage of silhouette area) / drag co-efficient
- Mounting height to underside

- Eccentricity (offset) of the centre of area to column centreline
- Proposed mounting or cabling holes – number, size, position in azimuth relative to the door centreline and height to centre above ground level of each hole
- Electrical requirements and loading (W)

9.3 Attachment design considerations

The designer of any attachment or equipment needs to carefully consider the impact it will have on mounting to the lighting column. The first questions must be:

1. Does it need to be attached to the column?
2. If so, how can its impact be minimised?

This may be by:

- Careful design of the attachment to minimise weight and wind area
- Consideration if only part, say an antenna, needs to be on the column and the associated equipment located in the base section (this may require a double door column) or remote from the column within a suitable housing, whilst ensuring that street clutter is minimised
- The silhouette wind area, drag co-efficient, weight and mounting position (height above ground level and offset from the column centre line) which to be minimised as far as possible given the operational requirements of the attachment
- Equipment mounted inside the column should be designed to be as compact as possible, with maximum width and depth of 100mm if it is to be mounted on the backboard inside the base compartment

It is also important that the designer understands the design and nature of different lighting columns, especially if there is a requirement to drill the column for cabling, and how this can affect the structural integrity of the column, see Section 11.

9.4 Attachment location

The location of the attachment should be chosen to not affect maintenance operations and access to the lighting column door, for example, banding around the door cover should be avoided. In addition, any attachment must be installed so that it does not interfere with the performance of the luminaires or any other highway / public realm systems / users. For example, CCTV cameras must not have their range of movement restricted or monitoring areas obscured, taking account of any movement that is likely in the lighting column under the serviceability design loads.

Attachments should not project into the highway /trafficked area,or within 0.5m of a kerb edge, as this would likely obscure the sight lines of visibility for any road user, as well as potentially being a projectile if struck by a passing vehicle. The lowest part of an attachment should not be lower than 2.5m from a pavement surface to ensure adequate clearances are achieved for pedestrians and cyclists, this may be increased to 2.6m if equestrians are likely to use the route.

Equipment inside the column will need to be arranged on the backboard and secured so that the electrical cut-out is still operational, and the door can be correctly fitted. Where equipment does not fit inside the base compartment due to the cut-out size and position, double door columns can be used to increase the available space, see section 12.4.

9.5 Variations in lighting columns

As previously mentioned, lighting columns come in many different types / sizes and their construction methods vary. Steel and aluminium are the most widely used materials in UK, but columns are also manufactured from cast iron, reinforced concrete, fibre reinforced polymer composites and timber in various forms.

Generally, steel columns will be most suitable for many attachments, particularly as many non-steel columns were installed to provide a passive safety function, and so are located where they are likely to be struck by vehicles. It should be noted that equipment attached to passive safe columns should be designed to meet the passive safety requirements.

Some lighting columns have cast iron or aluminium embellishment kits to give a heritage style. Suitability assessments of these structures will need a site visit to inspect and record details of the structure, and any additional challenges these embellishment kits may create.

A limited number of lighting columns are Listed Structures under the *Planning (Listed Buildings and Conservation Areas) Act 1990*. In some cases, the attachment may not be considered aesthetically suitable for the lighting column. As a result, the attachment may not be approved for reasons which are not immediately obvious.

9.6 Multi-function 'Smart' lighting columns

In more public communal, retail and leisure areas, due consideration could be given to specialist columns where many of the attachments are integrated into the column, see Figure 9.1.

Figure 9.1 - Typical integrated column

10 Application Process

10.1 General

The following section outlines an application process which can be used to assess lighting columns for suitability to take new attachments. A flow chart of the process is shown in *Figure 10.1*.

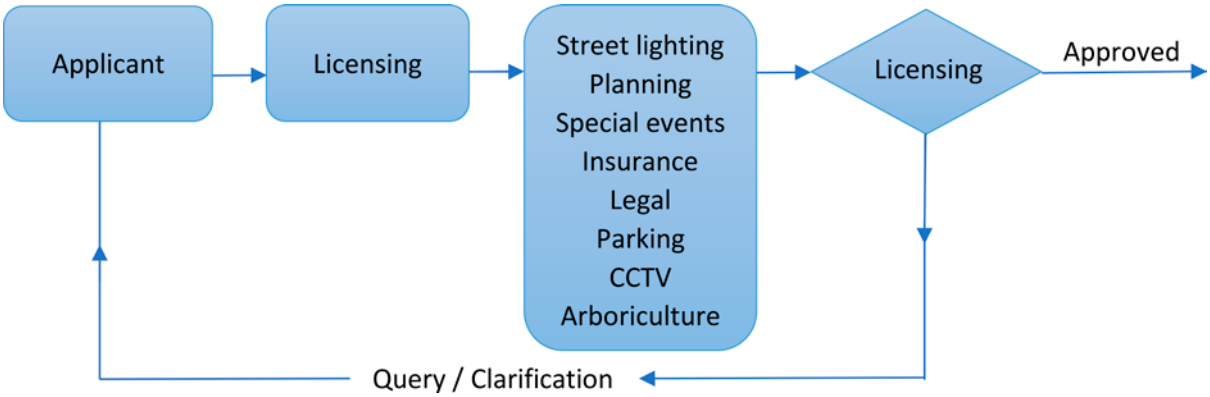

Figure 10.1 – Application process flowchart

10.2 Stage 1 – Go / No Go assessment

The initial step in the application process for adding attachments to an existing column is to contact the local authority's or the asset owner's Lighting Manager. The Lighting Manager should be able to advise on the initial feasibility and suitability of the column(s) concerned for supporting the attachments and equipment. They will also be able to provide details of the application process they use for obtaining the required consents to proceed.

If the Lighting Manager indicates that the lighting columns might be suitable, then the applicant can move to Stage 2 of the application process. Otherwise, there are two options, either new lighting columns will need to be installed to replace the existing unsuitable columns, or if there is flexibility in the attachment position, alternative lighting column locations may be selected.

10.3 Stage 2 – Condition survey

The second stage will be to work with the asset owner to collect evidence of the current condition of the lighting columns. This is typically carried out by specialist testing companies who carry out a close visual inspection and Non-Destructive Testing (NDT) to identify the extent and severity of any defects. *The ILP's Guidance Note GN22* provides information on how this may be undertaken, and condition determined[3]

[3] Institution of Lighting Professionals (ILP) Guidance Note GN22 Asset management Toolkit: Minor Structures

Depending on the asset owner's application process, it may be sufficient to provide the attachment details and pay a fee to cover the condition survey, which will be commissioned by the asset owner. In other cases, the asset owner may require the Client to commission the condition survey and present this evidence with the application.

The condition survey shall inspect and test both structural and electrical condition, and document defects.

Where there the attachment and equipment has specific physical or electrical requirements for installation, some testing companies will offer the service of an assessment of the physical fit and feasibility of the proposed electrical installation.

Additionally, it is economic to have the same inspector measure the lighting column dimensions that will be required for carrying out the structural design calculations in Stage 3.

10.4 Stage 3 – structural design checks

10.4.1 Purpose

Structural design checks of the lighting columns are required to confirm that the additional loads created by the attachments do not overload the structural capacity of the lighting column.

10.4.2 Engineering resources

The structural design checks must be carried out by a competent engineer, see section 7.2.2. However, this service is most often provided by the same testing companies that provide the condition survey. This provides a convenient and cost-effective approach to getting a full column suitability assessment, covering both Stages 2 and 3 together.

10.4.3 Lighting column critical sections

The structural design checks will calculate and compare the applied loads and the resulting member forces that these induce in the structure, with the structural capacity of the lighting column at each critical section e.g.:

- Bracket arm / luminaire support
- Bracket / column shaft connection
- Shaft
- Swage joint(s)
- Door opening (top and bottom)
- Column base at ground level
- If applicable, the flange plate and foundation connection

10.4.4 Foundation checks

Following completion of the lighting column design, and where significant structural load changes are made as a result of any new attachment, an assessment of the foundation stability is recommended.

10.4.5 Information required

Information that is required to carry out the structural design checks should partly be contained within an asset inventory and include:

- The column specification / design calculations or manufacturer's drawings
- Date of column installation
- Condition survey (inspection and non-destructive testing results and dimensions)
- Existing attachment details, see section 9.2
- Proposed attachment details, see section 9.2

10.4.6 Column specifications

The structural design check will follow the loading requirements and structural capacity checks in *BS EN 40* and, where appropriate, the guidance in *PD 6547*.

Where the asset owner specifies, the lighting columns may also need to comply with additional requirements of the local and/or national highways authority. For example, in UK, the requirements of *Manual of Contract Documents For Highway Works - Specification for Highway Works Series 1300* and *Design Manual for Roads and Bridges – CD 354 Design of Minor Structures*[4].

10.4.7 Column condition

The lighting columns design standards and specifications assume that the lighting column is in an as-new condition. The Stage 3 structural design checks must take account of any defects or deterioration in condition of the lighting column e.g. dents caused by impacts, weld cracking, damage to corrosion protection system, or physical loss of section due to corrosion.

10.4.8 Structural Design Checks

10.4.8.1 Ultimate Limit State (ULS)

ULS considers the lighting column design for the worst-case combination of self-weight and wind loads.

The ULS calculation includes partial safety factors for loads and materials which act to increase the loads slightly and decrease the material strength slightly, to compensate

[4] CD 354 superseded BD 94/17

for uncertainties in the loads and natural variations in the production.

The applied loads are calculated to determine the internal forces on the lighting column at each critical section. The internal forces are calculated as bending moments, torsion moments (twisting) and shear forces. These internal forces are compared to the bending moment, torsion and shear capacities at each section, and then combined to find the worst-case load combination for the ULS assessment.

Figure 10.2 shows a typical Bending Moment Diagram for a 10m column. The blue line shows the moments with a single arm bracket and luminaire, whereas the red line in this case shows slightly reduced moments[5] associated with a double arm bracket and two luminaires. The green line shows the bending moment capacity, and since both red and blue lines lay to the left of the green line, the internal forces are less than the capacity of the column at each critical section, and so the column is acceptable for the bending moments[6].

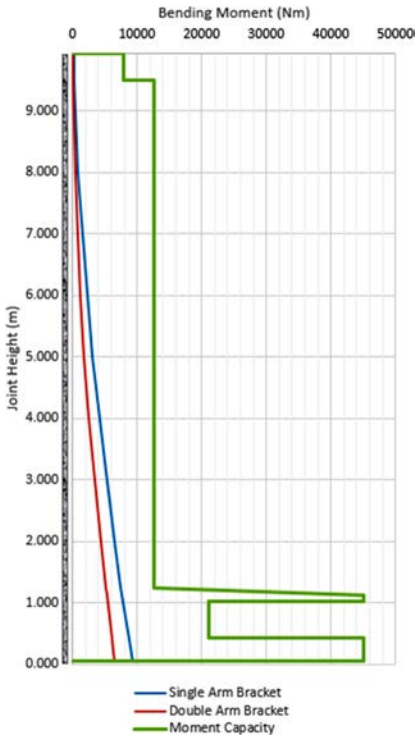

Figure 10.2 – ULS Bending Moment diagram

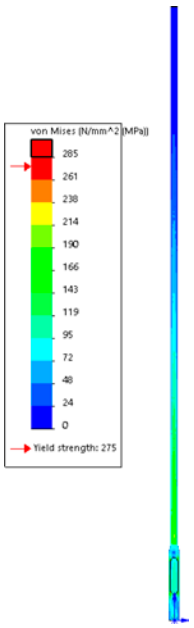

Figure 10.3 – Finite Element Analysis showing the material stress for a steel lighting column

Figure 10.3 shows a different analysis method, Finite Element Analysis (FEA), where the internal forces are expressed as the stress in each part of the column. The stress shown in the FEA diagram is multiplied by partial factor of safety for loads and then compared with the yield stress[7] for the material type divided by the partial factor of safety for materials. Both methods of expressing the results are acceptable, but have different benefits in terms of clarity and accuracy.

[5] This counter intuitive effect is due to the reduction in bending moment resulting from the balancing of the two bracket arms.

[6] A combined bending, torsion and shear check is also required but not shown here.

[7] For materials that don't have a clear yield point, the 0.2% proof stress is used instead.

Where the lighting column structure is to be modified by, for example, drilling holes, the selection of the location of holes should be considered carefully, see section 11. Typically, adding a hole will increase the stress in the material adjacent to the hole. However, the bending moment, torsion, and shear capacities at the position of each hole (the open section) will usually reduce from those without the hole (the closed section). As a result, the internal forces and capacities need to be calculated at each hole position as part of the ULS analysis. The advantage of FEA is that the increased section stress and reduced section capacities at the hole position are calculated as part of the analysis, and so no additional effort is required after adding the hole to the 3D model.

Passing the ULS design checks confirms that the lighting column will not collapse in wind speeds lower than the design storm conditions.

10.4.8.2 Serviceability Limit State (SLS)

SLS considers the movement of the column and sets limits for the deflection or rotation from the unloaded position of the installed column. The deflection classes are defined in *BS EN 40,* and *PD 6547* recommends use of Class 3 allowing a movement of 10% (H+W) from the centreline of the static column, where H is the column height and W is the bracket projection.

More stringent deflection limits are applied by highways authorities. Highways England specifies Class 2 (6% H+W) and this requirement would supersede the minimum deflection class in *PD 6547*.

The SLS case ensures that in normal operating conditions, the movement of the lighting column is not so severe that it would cause undue concern to a watching member of the public, and that it would remain functional.

Where CCTV cameras are installed, the movement of the lighting column needs to be limited to reduce the camera shake seen by the operator. Similarly, for directional telecommunications antennae, the movement of the antenna should not be so great as to cause the antennae signal to drop out more than is acceptable.

10.4.8.3 Vibration and fatigue

BS EN 40 does not include fatigue requirements, however they are included in the highways authority specification *CD 354* used in UK, see section 10.4.6.

Fatigue typically occurs due to variations in the wind forces on the lighting column, causing it to shake. This is known as gust buffeting. Over time, and usually many millions of vibrations, the effects of gust buffeting build up to cause fatigue damage (initially material hardening, then micro-fractures and eventually cracking of the column material) at susceptible locations within the column structure.

Fatigue is checked at these susceptible locations which are usually at or adjacent to the location of welds, and near sharp corners that create stress concentrations. For

example, at flange plate connections, around welded stiffeners, at door opening with sharp corners, and at the shoulder joint(s), where present.

Normal fatigue calculations do not take account of other types of wind induced vibration, for example, vortex induced vibrations, galloping vibrations or flutter. Assessment of whether a lighting column is likely to be susceptible to these types of movement requires additional structural analyses not included in *BS EN 40,* and specialist engineering assistance should be sought.

10.4.9 Outcomes and comments

The outcomes from the structural design checks are typically indicated using *PASS* or *FAIL* criteria, indicating whether adding the attachment causes the design checks to be met, or not.

Columns that *PASS* the design checks may have the attachment installed with the column in its existing condition. Care must be taken to ensure that the attachment is mounted within the height and offset limits used in the design checks, to prevent the structural checks being invalidated.

Columns that *FAIL* the design checks must not have the attachment added without making additional changes and rechecking the structural design checks, or by replacing the lighting column with a stronger one suitable for the applied loads.

With columns that only just fail the design checks, the engineer completing the work may provide commentary on the result. For example, comments may suggest the removal of one or more of the existing lower importance attachments to free up structural capacity for the new attachment. Alternatively, the commentary may propose lowering the mounting height of the proposed or existing attachments, to reduce the effect of the wind loads on the lighting column.

10.5 Stage 4 Application submission and review

Following the completion of the condition survey and structural design checks, the asset owner should be in a position to assess whether or not the proposed attachments can be added to the existing lighting columns.

The asset owner will typically issue written permission to the Client to confirm approval.

Where permission is denied, the asset owner may accept an offer to replace the lighting column(s) at the Client's cost.

10.6 Insurance

The asset owner will require certificates of:

- Professional Indemnity Insurance obtained by the Operator indemnifying against any third-party claims relating to the installation, removal or operation of the decorations and any damage to the asset owner's property or users of the space. The value will need to be agreed but may be in the region of £5,000,000.
- Public Liability Insurance. The value will need to be agreed, but may be in the region of £10,000,000

10.7 Replacement of lighting columns

Where lighting columns need to be replaced to allow attachments to be added, a column of the same style as that being replaced should be proposed, to ensure it fits in with the local area. The new column design will need to meet the requirements of *BS EN 40*, and where specified *PD6547*, and should include all existing and proposed attachments.

The costs of doing this vary depending on the column type, but must account for the lighting column, bracket, lantern, installation and electrical connection costs. Decorative or heritage columns would be more expensive than standard function lighting columns. Special lighting columns, for example, those with either telecoms antennae, CCTV cameras, catenary wires or festoon lighting would also be more expensive than normal lighting columns, due to their additional structural requirements.

The costs to transfer any existing attachments would need to be considered separately.

In addition, and depending on the location of the lighting columns to be replaced, the replacement may require traffic management which would add to costs.

When replacing lighting columns, it is also worth reviewing whether additional spare capacity should be added to the lighting column design, to enable future attachments to be added beyond those already included.

When considering spare capacity, it would be worth reviewing the space in the base compartment of the column to facilitate additional equipment or circuits. Where such a situation is likely, a column with a larger base compartment with two doors could be considered. This issue is further discussed in section 12.4.

11 Installing Attachments and Equipment

11.1 Cable holes

11.1.1 Requirement for holes

Many attachments will require either a power supply cable, a data cable, or both. The design of the electrical circuits needs to be carried out by a competent electrical engineer who should establish the routing and length of cables required. The routing of these cables usually requires at least one hole to be drilled in the face of the column to pass the cable from the equipment inside the column to the attachment outside it.

11.1.2 Hole positions

As discussed briefly in section 10.4.8.1, drilling holes in the lighting column will affect its structural strength at the location of the hole and, consequently, this location should be treated as a critical section for the structural design checks.

The size, position and number of holes influence the results of the structural design checks. *Table 11.1* outlines the selection and influence of holes on the lighting column structural design checks.

Table 11.1 – Influence of hole position on structural design checks

Criteria	Selection	Influence
Size of hole	Selected to ensure the minimum bend radius of the cable is not exceeded as the cable exits the column	Larger holes likely to be worse than smaller holes
Position of the hole above ground level	Hole typically located level with the attachment	Wind loads mean that holes closer to the ground are typically subject to higher bending moments. However, raising the attachment height will increase the overall forces on the column and so a balance is required
Position of the hole above any sudden change in cross-section diameter	Typically required where the attachment needs to be located within easy access of pedestrians	Bending moments immediately above a change in section diameter are much higher and this area should be avoided. FEA required to assess the impact
Holes in proximity to any connection or structural joint	e.g. the Shoulder (swage joint) above the base section of the lighting column	This is the main structural joint between the base and the shaft sections and is often the highest stress location in the column. Do not drill holes in connections or joints
Position of the hole relative to the door opening and ground level	Typically required where the attachment needs to be located within easy access of pedestrians, or for small bolt-on equipment housings	Door sections are susceptible torsion and an FEA should be used to assess the influence of the hole on the door opening strength in torsion and bending. Holes should be placed towards the rear face opposite the door. Avoid aligning the hole directly behind the back-board inside the door compartment. Avoid holes close to the DNO / electrical service head, due to the risk of damage to the protection of the permanently live cables

Criteria	Selection	Influence
Relative position of multiple holes around the column	Where two or more cable exit points are required close together	Drilling two or more holes at the same horizontal section should be avoided. FEA required to assess the impact
Relative position of multiple holes vertically	Where two or more cable exit points are required close together	This is the preferred arrangement for multiple holes. Hole spacing should be greater than 3 hole diameters apart vertically

As an illustration of the effect of retrofitting holes in a parallel-sided stepped tubular column, the table below shows the heights of a hole above the swage, where the stress in the steel around the hole is equivalent to stress at the swage given the reduction in wind bending moment with the height. Unfortunately, these figures only consider one specific wind condition, structural form, nominal height, material type, diameter and thickness combination, door opening size, and do not include any attachments. However, it clearly shows that holes placed within 3m of the swage should be properly checked by a structural engineer using the appropriate site-specific details.

Warning: The values provided in the table in Figure 11.1 are for example only and should not be used to justify that retrofitting of a proposed hole is safe. Always seek guidance from a qualified civil or structural engineer.

Column Height	27mm hole Min. height above swage
6m	2.2m
8m	1.7m
10m	2.9m
12m	2.7m

Figure 11.1 – Hole position analysis

11.1.3 Corrosion protection of cut edges

When a hole is drilled in a galvanised steel column, the corrosion protection to the cut edge of the hole will need to be repaired to prevent rust staining. Apply a zinc-rich spray or paste to the cut edge in accordance with the coating manufacturer's instructions. For painted columns care will be needed to avoid over-spraying the paint coating.

For columns of other materials, specialist advice should be sought.

11.1.4 Protection of cables

The edge of a cut hole will be sharp and so the holes should be deburred (before addressing the corrosion protection repair, where required) to prevent sharp edges that may cut fingers.

Once deburred, the cable holes should, as a minimum, be protected by using a rubber grommet to prevent damage to the cable insulation. Attachments, equipment, or sockets should not be allowed to hang freely from the cable. These should be attached directly to the lighting column with the cable unloaded.

Figure 11.2 - Unacceptable cable entry in column – provide grommet and affix the socket to the column

11.1.5 Ingress Protection

Where holes are drilled into areas of the column that are accessible to humans or animals, or where there is a need for some degree of water tightness to protect the existing or new electrical equipment, the hole will need an IP rated cable gland or gromet. This should meet the minimum required IP rating for the equipment but where this is not specified should provide IP 33 to *BS EN 60529 Degrees of protection provided by enclosures (IP Code)*.

The height of the holes relative to the equipment should be positioned to ensure suitable drip loops are provided in the equipment cables to minimise water ingress problems through the glands into the equipment.

Equipment will normally need to be mounted with the cable entry glands pointing downwards to minimise water ingress risks.

11.2 Protecting the column protective coating

Attachments by their very nature, need to be secured to the outside of the column. The attachment method and installation work should ensure the corrosion protection coating is not damaged.

Many attachments may be attached using metal bands or large jubilee clips as they are both UV resistant and durable. Placing a UV-resistant membrane between the column and band will act to prevent coating damage.

Plastic cable ties should not be used for attaching equipment and only UV stabilised cable ties bought from a reputable source should be used for securing cables, as otherwise these embrittle and fail, allowing the cables to become loose. This will often need a maintenance operation to rectify the cable security, which far offsets any saving from using uncontrolled cable ties.

Asset owners may have developed a standard electrical socket to power all electrical attachments, which could be column or wall mounted and enable the operation of the attachment through time clock, photocell, or the Central Management System (CMS). Such an arrangement is illustrated in Figure 11.3.

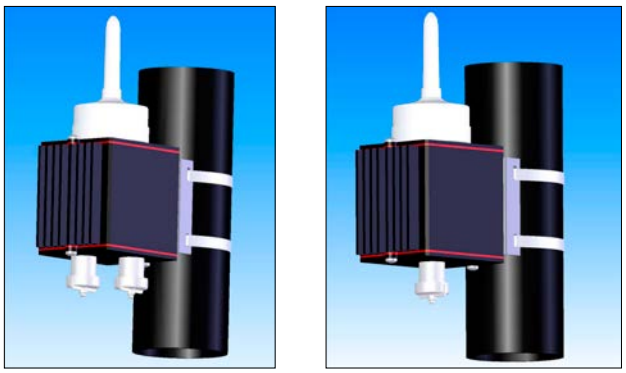

Figure 11.3 - Example standard electrical output unit

12 Electrical

12.1 General considerations

Those wishing to make use of the column's existing electrical supply need to discuss their requirements with the asset owner to ensure that the attachment is suitable for the electrical circuits, i.e. does not overload the electrical system, and that the network still operates and performs within the required parameters, i.e. isolation and disconnection.

In addition, the base compartments of lighting columns have limited space and this must be a consideration where additional circuits and cable need to be installed. This point is discussed further in sections 10.7 and 12.4.

12.2 Electrical supply

It is not the intention to discuss the requirements for highway electrical supplies in detail, these are fully described and advised in the *IET "Guide to highway electrical street furniture"*[8], which can be downloaded free from the IET's web site.

What should be noted is that the *Energy Networks Association (ENA) Engineering Recommendation G12*[9] permit public lighting to have TN-C-S electrical supply with a PME (Protective Multiple Earthing) termination (the neutral and earth are combined). All other equipment within the highway requires a TT supply, where only the live and neutral are provided, and the customer must provide their own earth connection local to the equipment and suitable RCD protection. The earth electrodes local to the equipment must provide less than 100Ω resistance (a maximum of 200Ω is permitted, but anything above 100Ω is considered unstable).

This includes lighting columns when attachments that require power are located on them, such as electric vehicle charging points, communication systems and so forth.

This requirement does not just extend to the specific lighting column, but to any other item of highway electrical equipment located within 2.5m of the column, or anything electrical connected to the column, such as a vehicle under charge, illustrated in Figure 12.1.

[8] https://www.theiet.org/media/2735/guide-to-highway-electrical-street-furniture.pdf
[9] http://www.dcode.org.uk/assets/uploads/ENA_EREC_G12_Issue_4_Amendment _12015_.pdf

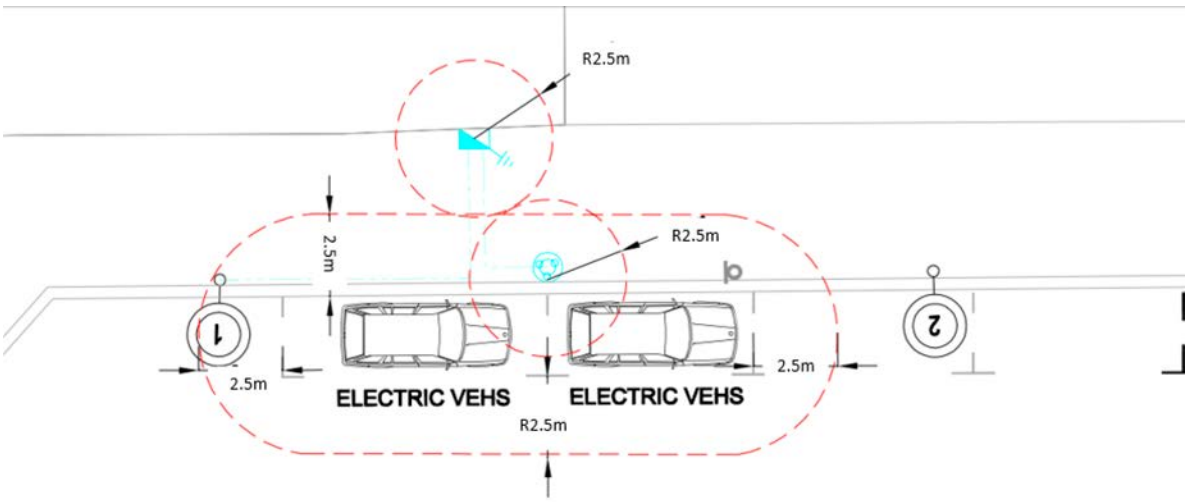

Figure 12.1 - Electrical connection requirements with a TT supply[10]

It should be noted that at the time of writing this guide (March 2021), the IET's *Code of Practice for electric vehicle charging equipment installations 4th edition,* discusses the application of electronic devices that will operate in the event of an open-circuit fault to the neutral (PEN conductor) of a TN-C-S (PME) system. These may permit the use of a PME supply for EVCP connections, which could reduce installation costs. Whist these are currently permissible for domestic applications the G12 recommendations do not recognise them for highway applications. The industry regulator Ofgem have raised this issue with the ENA, and an industry response from the ENA is awaited. Work on the ENA EREC G12 amendment is progressing to bring a closer alignment within the various DNO's and news on this is expected shortly. It is understood that ENA EREC G12 has recently been updated to provide further guidance on the use of broken PEN devices and it is now in the ENA approval process.

Until such times as the ENA report, it is good practice to contact the applicable DNO to confirm their preferred safe method for such installations, and a TT system may be advised as their proven safe method for such installations.

12.3 Electrical safety

The primary purpose of the electrical supply to a lighting column is to power the luminaire and to provide lighting. Each attachment that requires an additional electrical connection will have its own specific requirements, but the supply will usually need to be taken from the same incoming mains supply at the Supply Distribution Protector ('fused cut-out') within the column base compartment. These ancillary circuits supplying the attachments shall be designed in compliance with the Electrical Regulations (BS 7671) ensuring that the primary circuit for lighting supply, and any existing circuits for secondary equipment, are not compromised.

[10] Extract from IET "Guide to highway electrical street furniture"

In the event of an incident where the column is damaged due to a traffic impact or similar, due consideration shall be given to ensuring the equipment will fail-safe. This should be both electrically safe and that, where present, the transmitting antennae are automatically isolated.

12.4 Base compartment

Any electrical attachments normally require additional equipment to be located within the base of the column, generally the base compartment is an enclosed area and is already fairly full with the main cut out and other required equipment. It should be noted that:

- The Association of Directors of Environment, Economy Planning and Transport (ADEPT)[11] advises that the door aperture should be at least 500 x 100mm for columns under 8m nominal height, and 600 x 115mm for columns 8m and above
- The Highways Design Manual for Roads and Bridges (DMRB) advises that there shall be at least 25% usable spare space on the back board
- BS7671 section 513.1 accessibility states that every item of equipment shall be arranged so as to facilitate its operation, inspection and maintenance, and access to each connection. Such facility shall not be significantly impaired by mounting equipment in an enclosure or a compartment

All equipment must be suitably spaced and fully visible for inspection purposes.

Often this may not be possible, so considerations should be made for a remote small pillar, or replacing the column with a double door version, to accommodate the equipment required.

12.5 Testing

Attachments must be subject to a regular electrical inspection and test regime, as required under BS7671. Copies of all test and inspection certificates shall be provided to the asset owner within a reasonable time period, normally within five working days of any test / inspection being carried out. It should be noted that some electrical protective devices required for attachments, such as RCDs, require a regular operational check, and this should be included within the cost and maintenance regime for the attachment.

[11] ADEPT Street lighting group, Notes for guidance on the specification of street lighting columns

12.6 Privately owned and group switched supplies

Some asset owners have their own private cable networks supplying equipment from a feeder pillar or interface point from the Distribution Network Operator supply. These will either be a continuous 24 hours supply, or a group switched supply that only energises the equipment during the hours of operation.

Any lighting columns supplied from group switched supplies will have no live power available during the non-operational period for any third-party equipment. The asset owner may have their operational reasons for maintaining group switched supplies, and perhaps may also alter existing 24-hour supplies to group switched control as part of any renewals works in future.

In such circumstances either:

- The applicant in agreement with the asset owner may have to convert the installation to 24-hour operation, this will require extensive work, converting all luminaires to photocell or CMS (perhaps having to replace all luminaires where retrofitting of these control is not practicable) and upgrading the feeder pillars
- The third-party applicant will have to obtain their own electrical supply to operate their own equipment. This then presents a range of electrical difficulties, as the supplies will have to be on the same phase and from the same DNO supply point (to prevent the possibility of dissimilar phases within the column), as well as operational requirements for the safe isolation of the column by any party undertaking works upon it

13 Energy

The electrical consumption of electrical attachments requires due consideration, and it should be a given that they use energy and carbon responsibility. Those wishing to make use of the columns' existing electrical supply need to discuss their requirements with the asset owner, to ensure that suitable arrangements are in place for the provision and payment of energy.

All attachments that consume mains electricity need to be designed and specified to meet the following core requirements:

1. The asset owner will be mindful of all environmental factors and require all such attachments to use energy and carbon responsibility, minimising the electrical load through design and choice of equipment, as well as giving due consideration to times when the equipment will be used.
2. Energy consumption will depend upon the existing arrangements in place for the asset owner.
    (a) The majority of highway located lighting columns / structures will have a direct Distribution Network Operator (DNO) electrical connection. These are normally unmetered supplies, and the electricity cost is calculated based upon an agreed electrical load (using an Elexon Un-Metered operational charge code) and operational times. It may be possible for the attachment to be considered under this arrangement and this will require the applicant to provide the following information:
        i. Details of energy measurement (using Elexon Un-Metered Supply operational charge codes and switch regimes[12])
        ii. Operational hours
        iii. Full inventory list of proposed attachments for council service provider to submit to the applicable DNO / energy supplier
        iv. Copy of notification and written energy agreement with the relevant energy provider (MPAN Certificate)

        Should it not be possible to use an unmetered connection, then a metered connection (physical or Smart meter) may need to be considered. This is likely to be difficult as the space available within the base of a column is limited and might not accommodate the equipment that may be required.

    (b) Where columns are on metered supplies, be they individual or on a cable network supplied from a feeder pillar, an agreement for the payment of energy needs to be agreed with the asset owner. The data required will be similar to that laid out in (a) above.

[12] https://www.elexon.co.uk/operations-settlement/unmetered-supplies/

14 Installation, Operation and Maintenance

14.1 General

Under the CDM Regulations, the designer and contractor have responsibilities to manage the health and safety aspects related to the works. The responsibilities include the need to identify, eliminate, minimize, control, and communicate the hazards and risks associated with the installation, operation, inspection, maintenance, and removal of the works. This includes installing and removing third party attachments and equipment from lighting columns, and consideration of any additional hazards and risks that may arise when operating, inspecting, maintaining, or removing the lighting column while the attachments are still in position.

It is also necessary to consider likely fault conditions, including vehicle impact incidents, and how repairs would be carried out to the lighting column and / or attachments.

14.2 Installation

Those undertaking such work shall be competent for the roles and duties they are undertaking and, where applicable, hold the required sector registrations, certificates, and operative portfolios. Such aspects may include, but not be limited to, highway traffic management, working at height (the use of ladders will not be permitted), and electrical works.

Within the highway sector, only organisations and workers registered with the Highway Electrical Registration Scheme (HERS) shall undertake any kind of electrical work relating to either the lighting column or attachment. Similar sector schemes apply within other industries, such as rail, but where they do not then the HERS scheme is recommended and established by the HSE as an exemplar for such work.

All installation, inspection and maintenance works shall be described under applicable risk assessments, including detailed method statements.

14.3 Operation, inspection and maintenance

The attachment should not hinder the required routine and reactive maintenance operations, and where special procedures may be required, such as isolation of a transmitter located on the column when the luminaire needs to be accessed, then a detailed procedure shall be agreed and followed.

The applicant should manage the attachments maintenance and emergency cover and should be mindful that if the asset owner’s service provider is required to attend a site to undertake standard or emergency maintenance caused by the attachment, then the asset owner may look to the applicant to recover the cost of the maintenance.

All attachments should have indelible labels that will remain permanent and legible for the life of the attachment. The label may be text or a QR code, or similar suitable format and should be affixed to the attachment and to the inside the column door cover, and on the backboard inside the column. The label shall contain or link to the following information as a minimum:

- Owner / operator
- Emergency procedures and contacts to be advised
- Any H&S information that may affect those accessing the column for normal operations
- H&S considerations for surrounding residents, property owners, or workers

Where safety labels are required to prevent harm or damage, these warning labels and information shall be affixed in a location that is clear to those accessing and maintaining lighting column and luminaire, as well as any other existing attachments. This is to ensure workers are aware of any access restrictions resulting from each attachment on the column, e.g. the need to arrange an 'outage' - to turn off telecommunications antennae - before proceeding.

Copies of Installation, Operation and Maintenance Instructions including all warnings and safety information shall be provided to the asset owner in an agreed format, to be included within the inventory of the lighting installation.

The operator should provide a 24-hour emergency contact number to cover the event of any fault or failure of any attachments or equipment.

When adding attachments to lighting columns that provide a hinging, or raise and lower operation to access the luminaires, particular care should be taken not to impede the hinging or lowering operations.

If columns on which attachments are mounted lose their electrical supply due to a DNO service fault, the standard procedure for electrical fault repair will be employed by the maintenance service providers.

The attachment shall not affect the primary lighting function in any way, for example, correct operation of street lighting will take priority over festive lighting on load requirement and operational hours. If the attachment impedes the asset owner undertaking any of its duties, or causes a failure of the lighting system, then it shall be removed.

15 Attachment Consent

15.1 General

The following process sets out an application and consent process.

15.2 Application Process

The application process will require co-ordination across a range of the asset owners' disciplines and departments. Early engagement with the asset owner and appropriate internal departments by an applicant is advised, it should be noted that the application and approval process can be time consuming and even if straight forward can take approximately eight weeks.

Typically, the first point of call when starting to consider any attachment for a lighting column should be the asset owner's Lighting Manager.

The Lighting Manager will be able to advise you on the details of the lighting column(s) involved, and may provide initial information on aspects that would affect whether it is practical and operationally safe to install additional attachments, e.g.:

- Whether lighting columns have been specified and procured with additional structural capacity to take signs or other attachments
- Details of existing attachments
- Whether the lighting columns are of a style and type where additional attachments may be acceptable aesthetically
- Whether attachments are likely to cause operational or maintenance difficulties

Where concerns are raised, the Lighting Manager may be able to advise on more suitable locations in the vicinity of the first-choice lighting columns.

Following initial consultations with the asset owner, and confirmation that an application is worthwhile, then with respect to highway authority related installations third parties should apply for a license (or for non-public assets, for a permit) for the installation of their equipment within a highway. The application for consent should be directed to the public Authority's licensing department.

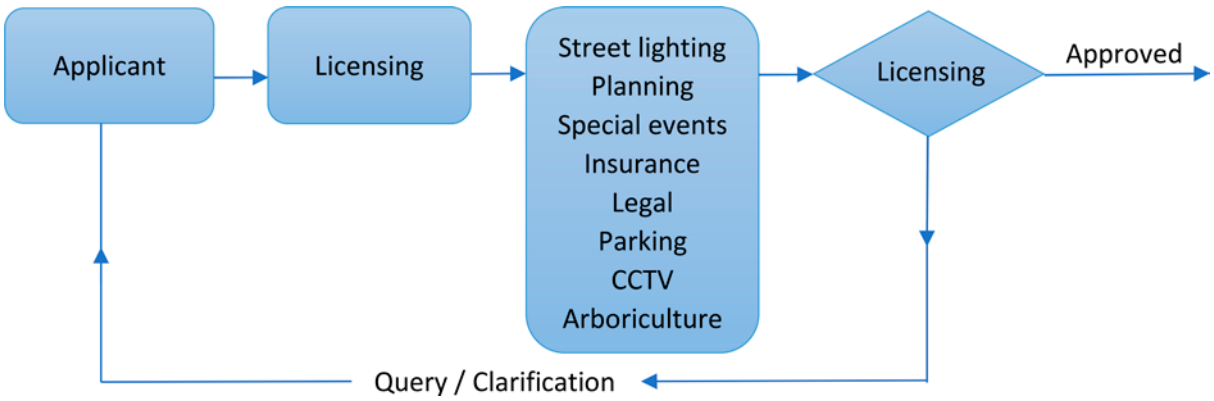

Figure 15.1 – Application Process Flowchart

Licensing would then co-ordinate and gain sign-off from the following departments:

- Planning (where the attachment does not have deemed consent)
- Lighting
- Arboriculture
- Insurance
- Legal
- Special events
- Parking
- CCTV
- Highways - regarding assets located adjacent to the highway
- Highways - regarding access
- Additional departments

Depending on the specific details of any application, a range of different departments within an Authority may be involved in considering the application to erect an attachment on its assets. Certain requests may require a combination of statutory consents to be sought before a Licence can be issued (for example, planning permission, listed building consent, advertisement consent, building regulations approval, or authorisation to close a road). In these cases, it may take longer to process an application.

Where the asset owner is looking to install additional attachments themselves, then some of the consultation parties listed above will not be applicable.

15.3 Application requirements

A full checklist of application details covering the various stages of enquiry through to installation, operation and disposal is included within Appendix 1. The following list is for indication purposes and is not exhaustive.

- Insurance details
- Site specific risk assessments / Health & Safety plan
- Equipment details / specification
- Duration
- Location & mounting details on column
- Location plans
- Emergency plans / contact details
- Contractor competency statement
- Operational plan
- Decommissioning plan
- Maintenance plan
- Additional departments
- Structural report and calculations

16 Bibliography

16.1 Column design specification

BS EN 40 Lighting column

PD 6547 Guidance on the use of BS EN 40-3-1 and BS EN 40-3-3

16.2 Electrical connections

IET Guidance on highway electrical street furniture

Code of practice for electrical safety in highway electrical operations

16.3 Asset management

Well-managed highway infrastructure

ILP GN22 ATOMS Asset Management Toolkit: Minor Structures

16.4 Attachments

ILP PLG06 Guidance on installation and maintaining of seasonal decorations and lighting column attachments

DIN Spec 91347: 2018-03 Integrated multi-function humble lamp post (imHLa)

16.5 Acknowledgements

Allan Howard WSP

David Lodge CU Phosco / UK Lighting Column Technical Forum

17 Appendix 1 – Application Checklist

17.1 Application Submission

Prior to application the operator shall use the following check list to confirm that all required details are available within the submission.

Design / licence submission requirements, will be checked and comment would be expected within four (4) working weeks, should the application be rejected then any application fee may be re-payable.

- Copy of the Public Liability Insurance certificate, indicating the minimum requirements of the council have been met
- Health & Safety
    - Health & Safety plan
    - Name of contractor / installer with copies of HERS / NHSS8 registration certificates and names of operatives who will be undertaking the work
    - Traffic management plan / proposals
    - Operational plan
    - Decommissioning plan
    - Maintenance plan
    - Emergency plan
    - 24 hour contact details
- Details of attachment, including
    - Type of attachment
    - Weight (kg)
    - Overall dimensions (height, width and depth (m))
    - Solidity (percentage) / drag factor
    - Mounting height to underside
    - Eccentricity (offset) to column centre line
    - Electrical requirements and loading (W)
- Detailed location plans illustrating
    - Attachment locations
    - Fixing points and attachment details
    - Details of attachment electrical supply, if required
    - Circuit protection details

    - Isolation points
    - Switching arrangements
- Energy consumption
    - Details of energy measurement (metered, Elexon unmetered supplies coding etc)
    - Operational hours
    - Full inventory list of proposed equipment for council service provider to submit to the applicable DNO / energy supplier
    - Where an electrical connection is to be made to an unmetered supply, approved ELEXON charge codes must be provided
    - For unmetered supplies, a copy of notification and written energy agreement with the applicable DNO / energy supplier (MPAN Certificate)
- Summary of any consultations undertaken with
    - Police CCTV operations
    - Local Authority CCTV operations, Community Protection & Parking approval
    - Building owners
    - Commissioner of Transport, Development Planning
- Application fee

17.2 Approval stage

- Review of design submission data
- Consultation
    - Permission under Town Planning, Historic Buildings and Advertisement Regulations
    - Tree Team
    - Special Events authorisation
    - Police CCTV
    - Local Authority CCTV operations, Community Protection & Parking approval
- Public lighting approval / comment
    - Structural integrity of columns, a record check, and advise if any specific structural testing will be required, including estimate of costs
    - Visual inspection, site check

- The applicable DNO / energy supplier review regarding network loading
- Suitability of existing electrical equipment for loading, or cost estimates if work is required

17.3 Permission to continue

- Asset owner licence or permit for the erection, maintenance, operation and removal of attachments on or above the highway certificate sign off

17.4 Construction stage

- Site supervision
- Installation acceptance following supply of
  - Structural certification
  - Electrical certification
- 'Switch on' ceremony arrangements

17.5 Operational stage

- Submission of routine inspection certificates
- Details of any maintenance operations undertaken

17.6 Decommissioning stage

- Site clearance sign off