



# FES

# FLOODLIGHTING GUIDE

## INTRODUCTION

In over thirty years of service we have installed floodlighting schemes and lighting systems all around the UK, encompassing nearly all sports from those played in large stadia to games played on small Multi-Sport areas. Our non-sports installations include car-parks, public spaces and lighting for architecturally interesting buildings, monuments and cenotaphs. We are also the preferred floodlighting installer for both the FAW and WRU and are proud of our long and successful association with these organizations.

Whether you need a new lighting scheme or a floodlighting upgrade, we can offer the skills and knowledge to design, install and maintain a floodlighting system to suit your requirements and budget. Our design engineers will provide you with a detailed computer-aided lighting scheme and our technicians will install it to BS7671 [I.E.T. Regulations] standards, which are mandatory upon us as an NICEIC Registered Contractor, your guarantee of a tested and safe electrical installation.

We pride ourselves on providing lighting solutions using the minimal amount of luminaires to achieve the recommended lighting level for the installation. This not only saves initial costs, but also the on-going running costs and maintenance. We are also advancing our designs into the use of latest LED technology, offering even lower energy costs and near maintenance-free operation. Whatever your floodlighting needs, Floodlighting and Electrical Services can assist you in achieving your requirements with confidence and professionalism second to none. We trust the following Guide will be of assistance and look forward to receiving your enquiry. Thank you.

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# FES FLOODLIGHTING GUIDE

## Section A: DESIGN

1. Ground Layout
2. Local Services
3. Lighting Requirements
4. Planning Consent
5. Floodlight / Column Layout
6. Column Types
7. Maintenance Access
8. Floodlight Types
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### A1. Ground Layout

Pitch dimensions may vary depending on sport rules and listed below are some standard sizes -

- Football Pitch – 105m x 70m (FIFA average size)
- Rugby Pitch – 100m (between Posts) x 68m (typical)
- Tennis Court – 24m x 11m (PPA fixed size)
- Hockey Pitch – 92m x 55m (FIH fixed size)
- MUGA – 20m x 40m (Multi-Use Games Area typical size)
- Bowls Green – 40m x 40m (Bowls England maximum size)

### A2. Local Services

Before any ground excavation is carried out it is advisable to check with local Network Service Providers if they know of any underground power cables \*[WPD – South Wales / Scottish Power – North Wales] telecommunication cables [BT] gas mains [CENTRICA] or drainage / water / sewer pipes [local water authority]. \* See Section J Contacts for more details.

If there are any overhead power transmission lines crossing the field the erection of columns should be discussed either with National Grid [for voltages over 132kV] or the \*Network Service Providers mentioned above, as height and / or distance restrictions may be imposed.

### A3. Lighting Requirements

Lamp output is measured in Lumens; Lighting levels are measured in Lux, which is the basic SI unit of illuminance equating to one lumen per square metre. [1 lumen / m<sup>2</sup> = 1 Lux].

From the table below the required *average* horizontal illuminance should be determined. In technical documents this is often referred to as *Eav*.

The ratio of the minimum illuminance *Emin*. provided by a floodlighting installation to the average illuminance *Eav*. is termed Uniformity *uO*. This is also very important, as a high Uniformity will give improved appearance, even at lower values of average illuminance.

There is also a Glare Rating factor for installations, termed *GR* and calculated by computer. When using modern floodlights mounted at the correct height and aimed correctly, it would be rare for an installation not to achieve a satisfactory Glare Rating. Maximum *GR* should not exceed 50.



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## Schedule of horizontal illuminance lighting levels:

TRAINING	75-100 LUX
FAW MATCH STANDARD	250 LUX
WRU. STANDARD	300 LUX
COLOUR TV BROADCAST MINIMUM STANDARD	350 LUX
FAW PREMIER	
WRU HEINEKEN CUP	500 LUX
HDTV STANDARD	
SKYBET LEAGUE 1 & 2	
SKYBET CHAMPIONSHIP	800 LUX
FA PREMIER LEAGUE 2014>	1650 LUX ( <i>Vertical illuminance to Camera</i> )
UEFA	2000 LUX

## **Surveys and Reports:**

Clubs wishing to compete in Competitions or Leagues where floodlighting is specified, must have floodlighting installations of a particular standard in order to be eligible to compete. A club must therefore have a valid approved Floodlighting Survey Chart and Floodlighting Inspection Report confirming their floodlighting complies with the standard.

## **Floodlighting Survey:**

The club must possess an approved Floodlighting Survey Chart and a Floodlighting Inspection Report completed by an Independent Floodlighting Contractor in order for the club to be accepted for entry into a competition. An approved Chart and Report shall be valid for no more 36 months from the date it is signed by the "approved" contractor completing the inspection. A 24 month inspection regime is preferred as this represents two seasons of floodlighting during which it is likely that some maintenance work on the floodlights will be required.

Illumination levels shall be recorded on a cosine corrected light meter suitable for metal - halide lamps. Details of the light meter used shall be given together with a copy the latest calibration certificate. The light meter shall be subject to an annual calibration check and a copy of the certificate should be included with the inspection report.

## **Independent Floodlighting Contractor:**

An "approved" contractor must complete the Charts and Reports - an "approved" contractor is one in possession of the NICEIC (National Inspection Council for Electrical Installation Contracting) Approved Contractors Award; ISO9001:2000, or is a member of the Electrical Contractors Association. **Clubs should state this requirement when looking for a floodlighting contractor.**



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### A4. Planning Consent

The erection of floodlighting columns comprises an engineering application and therefore only a full planning application can be made. Should the site have Stands of sufficient height for floodlights [usually only major stadia] the planning authority is likely to be concerned only with possible light overspill and any local amenity issues. *[If replacing existing floodlighting with a greatly improved system it would still be wise to advise the planning authority to ensure there are no future issues. They do have legal powers to require anything not meeting approval to be removed].*

A full planning application requires drawings showing the location of the columns, their design and appearance, specification for the luminaires [floodlights] and any switchgear cabinet(s) or feeder-pillar and a lighting design carried out by a competent lighting engineer or sports lighting equipment manufacturer.

The design *must show* the predicted extent of any overspill light. An important consideration for exterior sports is the impact that any floodlighting is going to have on the local environment. Light trespass into surrounding areas must be reduced to an acceptable minimum level. The following guidelines should be observed -

1. Residential areas will usually impose the most stringent requirements as regards overspill light. Restrictions may also apply to adjacent roads, rail-tracks and possibly waterways. If the area is near an airport or flying club then the CAA [Civil Aviation Authority] should also be advised of proposals.
2. Generally, the greater the height and number of columns the easier it should be to control the light overspill, however, this can affect capital costs and daytime appearance.
3. The amount of light overspill can be controlled by sports lighting “low glare” floodlights. The Institute of Lighting Engineers [ILE] Guidance Notes for the Reduction of Light Pollution provides useful recommendations on the control of spill light.
4. Operating hours may need to be varied to suit local circumstances. It is always advisable to have the floodlighting controlled by a Time-Switch to prevent operation during daylight and to set a curfew time, which many local authorities will insist upon as part of planning consent. *[The Time-Switch will have an over-ride facility to allow daylight maintenance].*
5. Efforts should be made to reduce any possible detrimental affects to local residents, as objections often arise which have very little to do with the actual floodlighting and are more concerned with the presence of people, vehicles and noise which was previously absent.
6. Checks may be necessary on any possible adverse ecological or environmental factors, such as the effect on special habitats and wildlife, e. g. Bats.

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Refer also to Section C – Planning Application

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## A5. Floodlight / Column Layout

Careful planning of the location of columns and the mounting height of floodlights is essential. The mounting height of floodlights must be optimised to minimise glare to both players and spectators, maximise uniformity and minimise overspill.

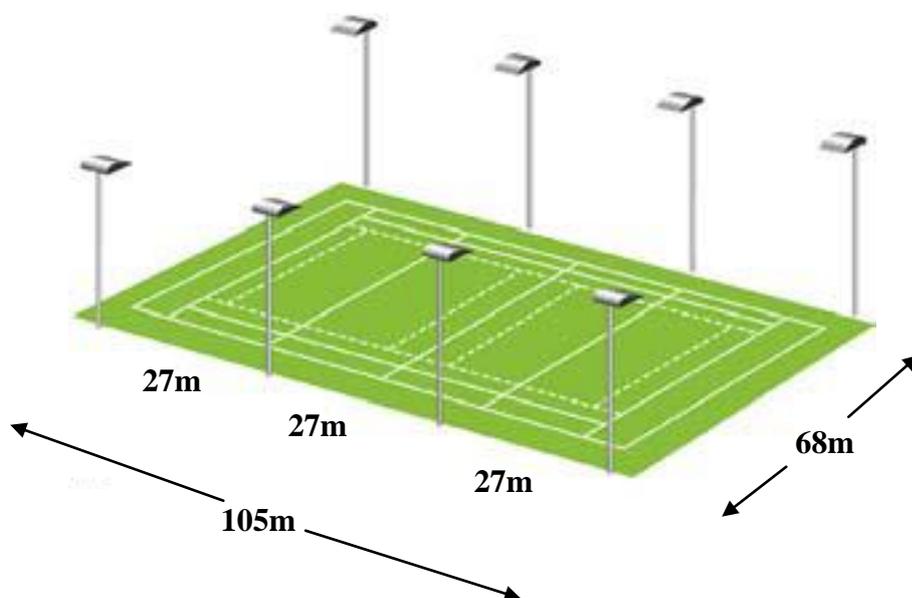
Planning restrictions may limit the height at which floodlights can be mounted, however, as part of the planning process an acceptable mounting height needs to be derived to ensure the lighting design objectives are met. The position of drains, spectator stands, boundaries, etc can limit where columns can be placed and any such information should be provided to designer at the planning stage.

The ideal situation is two continuous rows of floodlights, but this situation is usually only achievable in major stadiums with large Stands each side. Therefore the majority of Club installations will use columns, or occasionally a combination of columns and Stand-Roof mounted floodlights. [In some instances a floodlight mounting frame can be erected on a Stand Roof].

The columns may normally be erected within the ground's total area [which includes a 4 metre perimeter band] both to avoid obstruction to line-outs / throw-ins and for player safety. *Therefore columns must be at least 4 metres from the pitch touch line and 5 metres is usual dimension.*

### STANDARD COLUMN LAYOUTS FOR PITCH FLOODLIGHTING

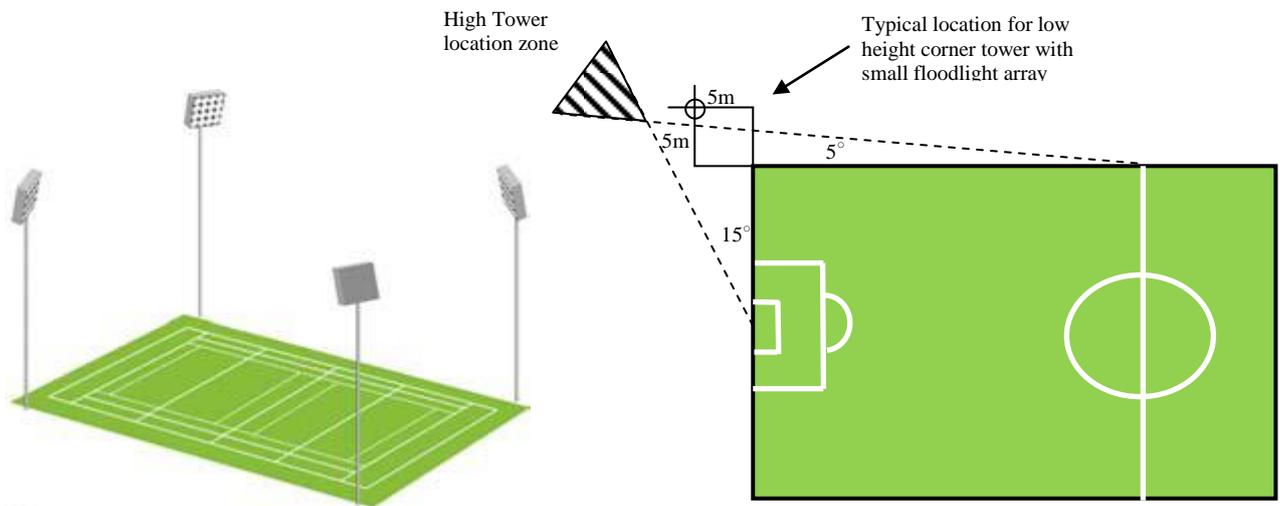
1. Match Standard: Four columns each side – Four columns preferred layout as centre areas are available for locating small Stands or Dug-Out Shelters. Columns would then usually have capacity for future upgrading. Column height is 15m. Typical spacing is 27m between columns.



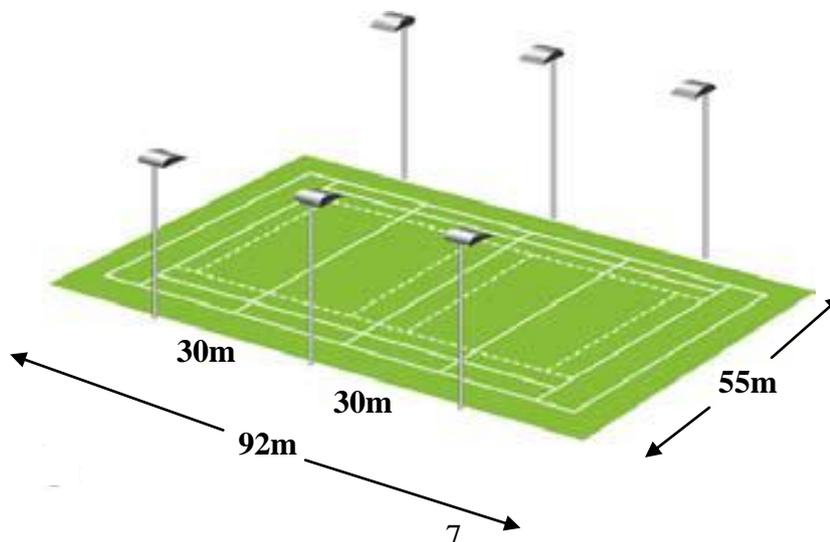
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## A5. Floodlight / Column Layout continued

2. Match Standard: Corners – because each column must carry increased quantity of floodlights compared to side-mounted columns, then corner column systems always require more substantial columns and these would also be higher than for side-mounted systems. Typically 25 metre columns would be required to maintain the required aiming angles for all floodlights to ensure satisfactory uniformity and acceptable glare. The greatest merit of this system is the unobstructed view allowed of the central playing field.



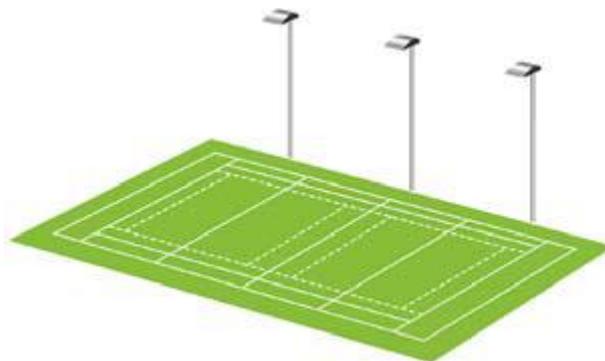
3. Match Standard: Three columns each side – Side-lighting can lead to some fall-off in illuminance towards the goal lines which should be restricted as much as possible. This is usually done by reducing the floodlight spacing towards the end of the touch lines rather than placing additional columns behind the goal lines. *Floodlights should NOT be located directly behind the goals or in line with corner flags if excessive glare to Strikers and Goal-Keepers is to be avoided.*



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## A5. Floodlight / Column Layout continued

4. Training Standard: Three or Four Columns along one side - Four column systems may be used initially to plan for a future move towards a full eight column match floodlighting system. Typical column height is 15m for "Match" size pitches, as this gives flexibility for future upgrades or expanding to a full floodlighting system.



## A6. Column Types

### 1. CONSTRUCTION AND STANDARDS -

Floodlighting columns are usually constructed from galvanised steel formed in multi-sided [usually octagonal] tapered sections. For practical purposes they will have a flange base for erecting onto Anchor-Bolts pre-set into a concrete foundation\*. They must be manufactured to the current applicable British Standard (BS) or Euro Norm (EN). Currently Standards are: BS5649 and EN40. The manufacturer should be Quality Assured to BS EN ISO 9001:2000.

Information required by the column manufacturer will include:-

Type of column (see below)

Height of column

Floodlight type & number per column and aiming pattern [omni or uni-directional] as this establishes the maximum weight and windage area for which column must be suitable.

Terrain (urban, suburban, exposed, coastal) as this again affects column carrying capacity.

Site Address [some sites are not accessible to the large vehicles usually used for delivery].

In practice, Clubs would not be dealing with the column manufacturer, as the nominated Floodlighting Contractor would be arranging for column supply & delivery as part of their installation package and they would provide the above information to their chosen supplier. *\*The column manufacturer will also usually give guidance on recommended concrete foundation size, but care must be taken when using this data as soil conditions can vary from site to site and in some circumstances may even be different on the same site if close to a river, etc.*

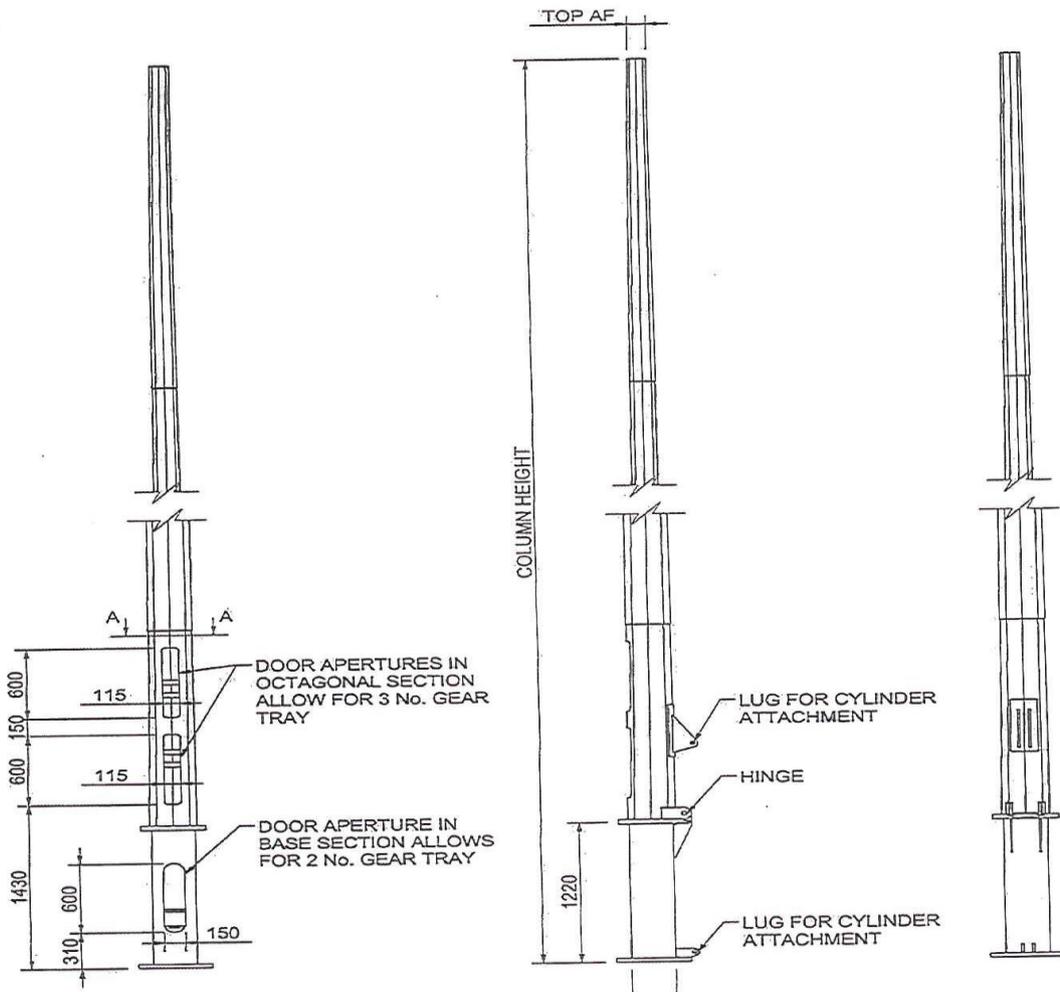
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## 2. HINGED COLUMNS -

For most Clubs Hinged columns would be the preferred choice, as they allow maintenance to be undertaken more quickly and less expensively. Though their initial cost will be higher than for static fixed columns, the through life cost including maintenance will normally be lower with hinged columns of which there are two types:-

**BASE HINGED** – Columns which hinge at or near the ground. These columns vary greatly in construction depending upon the head-load they must carry. Because base-hinged columns are constructed in sections in the horizontal position, often no lifting plant is needed on site with the possible exception of the base section, where some mechanical assistance may be necessary to lower these over the foundation anchor-bolts.

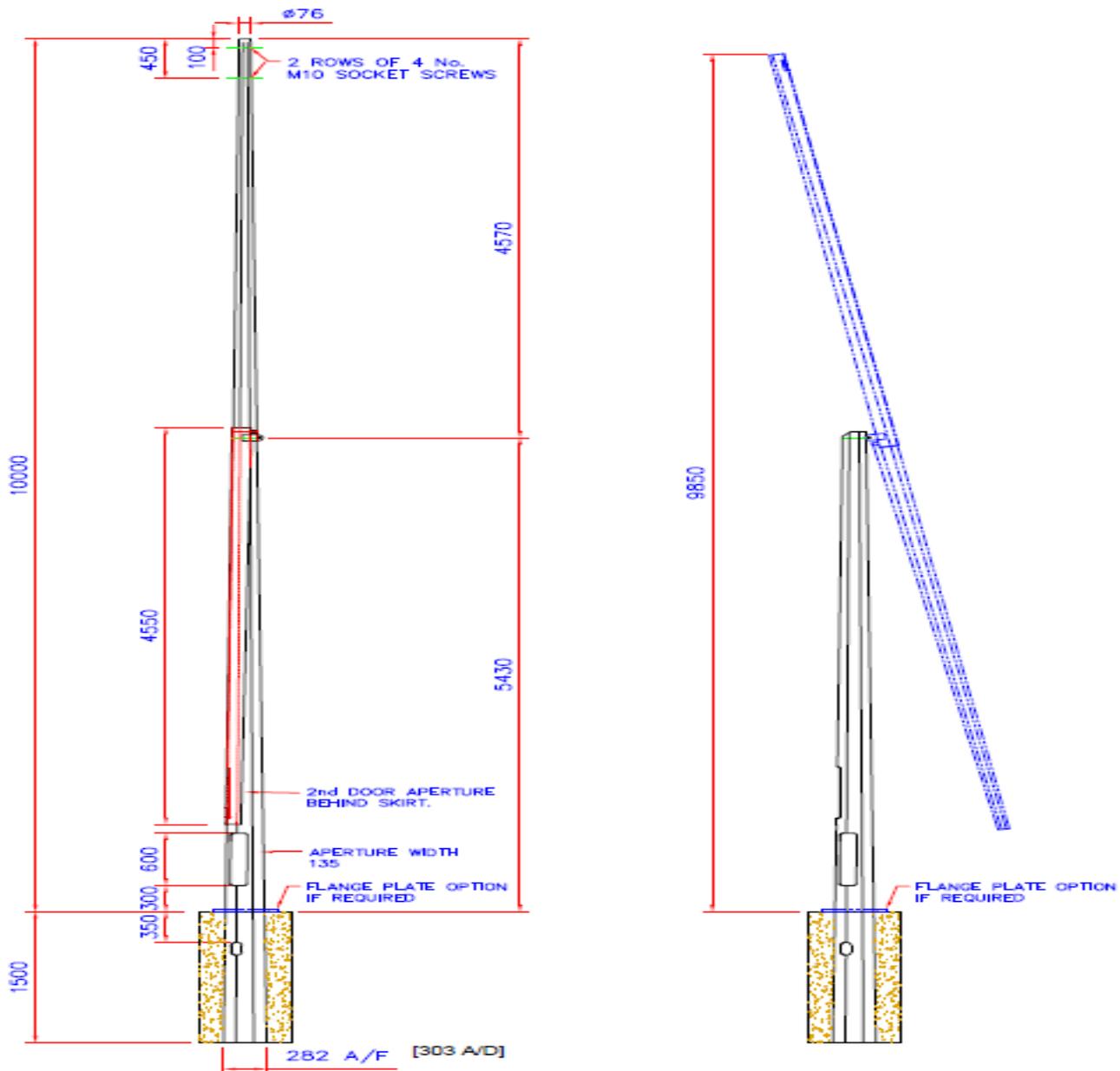
These columns require an operating device, hydraulic or mechanical, usually electrically or petrol-engine powered, to raise & lower them and the device is often used in situ during construction, though trestles can be used for support. *[Power can initially be derived from a mobile Generator, as the floodlighting power supply is often not available during construction].*



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**MID HINGED** – Columns which hinge at their mid-point and are counterbalanced, working on the see-saw principle. They are usually of just two-part construction joined at the hinge-pin and because they must remain balanced to a major extent, these columns can be limited in the top loads for which they are designed. For the column heights typically used for pitch floodlighting, 14-18 metres, it will be necessary to use mechanical handling equipment for installation, usually a vehicle with a hydraulically operated arm [often called a HI-AB] to erect them onto the foundation anchor-bolts.

Depending upon the head-load they can be lowered with just a simple rope to steady descent. For large head-loads it is necessary to use a portable wire-rope winch which clips onto the column under the rising skirt, which is on the opposite side of the column to the direction of lowering. Compared to base-hinged columns mid-hinged columns are usually much faster to lower and raise because of their counter-balanced principle of operation. **NB.** *It is essential to ensure that there will not be any obstructions to the rising skirt when selecting direction in which a column lowers.*





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### A6. Column Types continued

#### 3. FIXED COLUMNS -

Fixed columns are of two types –

Without climbing facility – these are the simplest and cheapest columns to purchase initially, but unless the Club has [cheap] access to the MEWP\* equipment required to reach the columns for maintenance, through life costs can be very high. Maintenance during inclement weather can be impossible. [\*Mobile Elevated Work Platform, often referred to as a Hoist or “Cherry-Picker”]. A Mobile Scaffold Platform could be used, but is likely to prove impractical when trying to reach floodlights mounted higher than 12 metres, as in most installations.

With climbing facility – these columns are usually the basic type as above but with side steps or a hooped ladder fitted. They are often about the same initial cost as hinged columns and when considering that personnel ascending these columns MUST be provided with a suitable Safety-Harness to comply with Health and Safety Legislation and will also probably require special insurance cover, there appears to be little reason to consider their use.

Depending upon the number of sections used to achieve the required height it is possible with some column types to build them vertically in situ on their foundation anchor-bolts. However, this is usually a job for qualified Riggers which will increase installation costs. More commonly for the column heights typically used for pitch floodlighting, 14 -18 metres, the columns will only be in two or three sections assembled horizontally on the ground and then lifted onto their foundation anchor-bolts by mechanical handling equipment, usually a vehicle with a hydraulically operated arm [often called a HI-AB].

*Because of the above factors fixed “static” columns, either with or without climbing facility, do not usually offer any through-life advantage over using raise & lower columns and therefore are generally discounted as being impractical for modern pitch floodlighting systems.*

#### 4. STADIUM MASTS –

The term Stadium Masts or Columns usually refer to corner mounted systems with a tilted array of floodlights, often located at the rear of the stands to allow clear views for spectators.

These systems are used only by the largest Clubs and there are a wide variety of methods available for obtaining access to the floodlights. Very large stadiums will often have floodlights fitted on or under stand roofs where heights permit, sometimes combined with corner located masts if the stand roofs do not extend past the ends of the pitch.



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### 5. GENERAL COMMENT –

Note that as tapered columns and masts increase in height the extra dimension is usually added at the bottom of the column to maintain or increase the head-load capacity and this proportionately affects cost. *[Increasing the length of the upper section means that taper will be getting narrower with correspondingly decreased carrying capacity].*

Telecommunication companies are often looking for suitable sites on which they can locate their equipment masts. Under certain circumstances clubs can obtain revenue for allowing one of their floodlighting columns to carry telecommunication equipment, but due to the large additional weight and windage area this can impose great care must be taken before attaching such equipment to an existing column, as carrying capacity may be exceeded or the concrete foundation may be deemed unacceptable. *If use of equipment such as microwave dishes is to be considered, then the necessary allowance should be made at the planning stage of a new installation.*

The usual small Public-Address speakers often attached to columns at low-level do not usually cause any significant column loading implications, providing the top-load imposed by floodlights is within capacity and columns are maintained in good condition.

## A7. Maintenance Access

When using base-hinged columns it is usual for them to lower parallel to the side of the pitch, as this usually avoids any obstructions such as handrails alongside the pitch. [Lowering over the pitch is still possible when hand-rails are installed by having removable sections or simply by leaving small gaps in hand-rails in front of the columns. *[Columns typically have a square (four) anchor-bolt foundation and thus can be erected to lower in any one of four directions].*

Mid-Hinge columns lower the floodlights in an inverted position close to their bases, but it is still usual to have their lowering direction parallel to the pitch. Any obstruction to the rising half-skirt on the opposite side to which the floodlights lower needs to be considered, e. g. Dug-Out Shelters.

Even when using hinged columns it can still be useful to have access available to an MEWP\* as this can assist in fine-tuning the floodlight aiming. The minimum 4 metre perimeter band which should form part of the pitch layout should be suitable for such a vehicle providing ground conditions permit its use and that entrance gates and fencing do not obstruct access. [\*Mobile Elevated Work Platform, often referred to as a Hoist, Man-Lift or “Cherry-Picker”].

## A8. Floodlight Types

### 1 BS/EN STANDARDS

All floodlights must be manufactured to EN60598.

The manufacturer should be Quality Assured to ISO 9001:2000.

Pitch Floodlights generally fit into one of three categories –

#### 1. FLAT GLASS / ENCLOSURE [DOUBLE ASYMMETRIC LIGHT DISTRIBUTION] -

This type of floodlight is designed to operate with the front glass or enclosure parallel to the ground thereby reducing light spillage and eliminating direct upward light which are usually sensitive issues. They are the preferred option and should be considered as the prime floodlight type for Club Match pitches.



#### 2. PROJECTOR - DOUBLE ASYMMETRIC LIGHT DISTRIBUTION -

This type of floodlight is characterised by having a rectangular reflector system and a linear discharge type lamp. The resultant beam is wide, and strongly asymmetric in the vertical plane. Internal baffles are required to limit light above the beam peak intensity and the addition of an internal baffle provides the double asymmetry required for efficient floodlighting.



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## 3. PROJECTOR -SYMMETRIC LIGHT DISTRIBUTION -

The projector style of floodlight is characterised by having a circular reflector system and a lamp with a compact discharge tube. This type produces a narrow beam of conical shape, suitable for long projections and therefore is mainly used in corner-column applications and in large International stadia.



### Floodlighting optical characteristics

From the point of view of the general pattern of light distribution, floodlights fall into three basic groups. These are identified by the general shape of the intensity contours on a graph with the angles from the beam axis in the vertical (V) and the horizontal planes as coordinates. The figure below shows the general shape of the three groups, which can be described as symmetrical, asymmetrical, and double asymmetrical.

Within each of these patterns there can be varying degrees of spread of light. This is described by some angular measurement of the beam, the beam being defined as embracing all directions where the intensity of the floodlight exceeds 0.1 of the maximum intensity

(a) symmetrical



(b) asymmetrical



(c) double asymmetrical



Types 1 & 2 floodlights in the above list will provide [c] double asymmetrical distribution.

Type 3 floodlight would provide [a] symmetrical distribution [corner column floodlighting].

Type 2 floodlight without the internal baffle can provide [b] asymmetrical distribution but if floodlight is used at high aiming angles there will be a lot of wasted upward light and uncontrolled glare to anyone facing the floodlights.



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### A9. Future Proofing

To keep initial expenditure to the minimum it is often necessary to limit the floodlighting system to providing the lowest illuminance practical, with a view to improving the scheme in future. However, unless sufficient consideration is given to ensuring that columns and power supply cables will accommodate additional floodlights, then the aspiration of improved floodlighting may be very costly to achieve.

This may mean additional initial expenditure is necessary, possibly on columns to ensure they have spare carrying capacity and almost certainly on power supply cabling if the cables are to be directly buried in trenches; ducting cables carries an additional cost but means that the much higher expenditure of larger capacity cabling could be postponed until funding becomes available for more floodlights.

Note that to make a noticeable *visual* improvement [as opposed to just a Lightmeter measured improvement] it will be necessary to increase illuminance by at least 25%, preferably 50%.



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## Section B: INFRASTRUCTURE

1. Column Positions
2. Mains Power and Distribution
3. Cabling Systems
4. Switching Control
5. Upgrading



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## B1. Column Positions

The Design Section [A5] of this document gives details of the preferred column positions. However, there may be instances where it is not possible or practical to use these positions. The majority of schemes can be adapted to use modified column positions to take account of obstructions such as Stands etc.

In some cases a “hybrid” scheme may be necessary, using columns along one side of the pitch and just two corner columns on the opposite side, to leave an unobstructed central area for the playing of other sports such as Cricket.

For best results the key principle is that of obtaining symmetry from end to end of the pitch as far as practical and obtaining the correct height for the columns at their chosen locations. Stand roofs can be used if sufficiently high and where height is insufficient it may be possible to use “stub” towers on the roof or a raised horizontal rail along the roof front edge to obtain required height. More substantial Stands are able to support raise/lower columns on the roof.

Columns can sometimes be mounted behind Stands, but great care has to be taken to ensure the Stand Roof will not produce a shadow over the pitch. Under-roof floodlights can sometimes be used to avoid shadowing and again careful design is essential if satisfactory results are to be achieved.

As with column-mounted floodlights, consideration must be given to safe access for maintenance of any stand-roof mounted floodlights; it should be noted that many roofs may not be safe to walk on, though re-enforcement and the laying of walkways may overcome any limitations and access for MEWP equipment should also be considered.



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## B2. Mains Power and Distribution

For all but small Training floodlighting systems there will be a requirement for the installation to have a Three-Phase 380/415 volt power supply available with appropriate Metering instead of the normal Domestic type Single-Phase 220/240 volt supply with simple Meter.

The provision of a suitable supply would be the responsibility of WPD [Western Power Distribution] who are the Network Service Providers in the southern FAW area, while in the northern area the NSW is Scottish Power, formerly MANWEB. *[Refer to Contacts Section I]*.

A Registered Meter [i. e. one which will be read for Billing] would be arranged with the chosen Electricity Supplier. For installations of up to 70kVA Load [up to 100 amps-per-phase, typically a maximum of thirty 2kW floodlights] the Meter can be direct reading “Whole Current” type. For a load in excess of 70kVA then “CT” [Current Transformer] Metering is necessary, where a proportion of the full current is measured and adjusted accordingly, this method keeps Metering equipment down to a practical size and cost.

The term “Mains Distribution” equipment is commonly used to refer to the MCB [Miniature Circuit Breaker] Board, this being the modern replacement for old style Fuse-Boards and its primary function is to protect the outgoing cables to the floodlighting. *It is not designed to be used as a Switching Device and control of the floodlights is covered in the following sections.*

Consideration needs to be given to the location, capacity and suitability for a specific environment when selecting the Distribution Board, which would be the responsibility of the electrical contractor. *Capacity of the Board is of major importance if future upgrading of the floodlighting is to be considered and this should be discussed at the design stage.*

The Distribution Board may be installed adjacent to the incoming power supply [existing or new] or if this is not practical due to space or cabling limitations, it is common practice to install it in a Feeder-Pillar adjacent to the floodlit area. The Distribution Board may also house other items of control equipment e. g. Contactors [electrical switch] Delay Relays, Time-Switch etc. though these items are often housed in an adjacent enclosure.

As this is High-Voltage equipment it is wise where possible to locate the equipment where it can only be accessed by authorised personnel.



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### B3. Cabling Systems

The design and specification of the cabling system must take into account planned initial load and possible future upgrading, as well as the provision of part-switching the floodlighting to provide a choice of lighting level. The electrical contractor would be responsible for installing suitable cables, as these must be correctly rated for both current carrying capacity and permissible voltage-drop when the maximum [future] load is in operation, in accordance with the current IEE Regulations. In general the cable type used will be XLPE/SWA [Steel Wire Armoured]. In certain instances it may be necessary to use an additional CPC – Circuit Protective Conductor – [single-core XLPE/SWA] to comply with Earthing Regulations.

Depending on type of the main incoming electrical supply, RCD [Residual Current Device] protection may be required to ensure safety and compliance with current IET Regulations.

**In essence there are two systems – Direct Cabling and Power & Control Cabling –**

Direct cabling is the simplest method, typically using just one cable along each side of the pitch from the Distribution Board. This limits floodlighting control to just two switches, one for each side of the pitch.

Power & Control Cabling involves running a power cable and a parallel control cable linking the columns along each side of the pitch. A simple Switch-Panel can then give multi-circuit switching flexibility and the possibility of incorporating additional features.



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### B4. Switching Control

During the design stage system switching positions[s] should be decided, as this will determine the type of switch to be installed, e. g. Standard, Grid-Switch, Key-Switch, Weatherproof [IP Rated]. Switching is often local to the pitch, e. g. in a locking enclosure on the side of a Feeder-Pillar, or near to the power supply point, e. g. Clubhouse, Changing-Rooms etc. These switches would be only 240 volt rated; if preferred, Push-Buttons with Indicators can be used in place of switches, but this would often incur additional cost. *Also, in certain circumstances it may be an operational advantage to use Radio-Signalling equipment to permit complete remote control of the floodlighting, possibly even at some distance to site.*

For direct cabling systems they would operate Contactors [electrical switches] which will apply power on the main cables. When using a Multi-Core Control Cable the switches directly operate the Contactors linked to each floodlight installed with their control gear in column-base compartments or cabinets. *Depending upon how the cores are connected this method offers maximum switching flexibility, as individual and / or groups of floodlights can be switched independently.*

Using a control cable assists with other features which may be of benefit in some installations, such as Egress Lights, where one or more of the floodlights remains ON for a short period after the remainder of floodlights are extinguished to provide some lighting to assist personnel leaving the area safely.

It is usually advisable and in many cases compulsory due to Local Authority requirements, to have the whole system under Time-Switch control to ensure floodlights cannot inadvertently be left ON and will not operate during the majority of daylight hours unless being maintained. A standard digital [BST / GMT Auto-Adjust] two-channel Time-Switch would usually provide all the required control to ensure any curfew requirements are met and that the columns are electrically isolated for safety when the system has fully switched OFF.

### B5. Upgrading

If future upgrading of the floodlighting is likely and suitable columns have been chosen, then initial use of the Power & Control Cabling method is likely to prove the more adaptable for future needs, as additional floodlights could be separately controlled from existing floodlights, offering a choice of illumination level and power loading to suit a specific application, such as Training floodlights.



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## Section C. PLANNING APPLICATION

1. How to apply
2. Application Time-Scale
3. Local Planning Specifications

### C1. How to Apply

The club should obtain the appropriate form from the local planning authority. **[See Section C3]**. It will be necessary to draw up a site plan of the proposed scheme, together with a data pack to illustrate the lighting layout, predicted performance and associated overspill. Sports lighting specialist contractors will be familiar with all requirements and provide a data pack.

The planning department will assess the application and make their own judgment on its effect on local amenities: they will consult local residents and other interested parties and will report to the planning committee which usually comprises of local councillors.

Where proposals are consistent with the council's policies and there are no subsequent objections, applications can be dealt with under delegated procedures without the need to go to committee, saving time. Each authority will have an overall policy and plan for its area and it is wise to seek advice from the appropriate planning officer before completing the application so that, if possible, the application is compliant before submission.



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## C2. Application Time-Scale

Most authorities work on a regular schedule of meetings and it is common that an answer can be obtained within 8 weeks of submission. If a planning officer contacts the club for clarification or to amend an application the decision will take longer. Again it is best to consult the planning officers before formal application so that these matters are already dealt with. There are three possible results:-

1. Permission Granted Outright -this gives permission for the club to start work straight away.
2. Permission Granted Subject to Conditions – the conditions will regulate certain aspects of the development.
3. Refusal – The council must give its reasons for refusing an application.

In obtaining planning permission the most sensitive factors are:-

1. The light spillage onto surrounding residential property and highways, rail-tracks, etc
2. The number and height of the lighting columns
3. The appearance of the floodlights
4. The proposed times of operation
5. The increased use of the sports facility and car-parking created by installing floodlighting
6. Adverse environmental factors [can often be mitigated by floodlighting curfew restriction].

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Reference may also be made to Section A4: Design – Planning Consent

## C3. Local Planning Specifications

Clubs are advised in the first instance to visit the national planning portal website where full information on procedures and specifications can be found by following the appropriate links-

<http://www.planningportal.gov.uk/planning/applications>



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## Section D. INSTALLATION

1. Health and Safety
2. Programme of Works
3. Civil Engineering Works
4. Columns and Floodlights
5. Guarantees

### D1. Health and Safety

When a Club places an Order for a Contractor to carry out work at their premises they effectively become the Employer for the purposes of Health and Safety Regulations. Therefore it is advisable to place the order in writing stipulating that the Contractor MUST comply with all current Health and Safety Regulations when working at the Club's premises.

Some of the items with which Contractors should be complying are:-

1. All personnel on site should have current CSCS Certification.
2. Any Lifting equipment used on site should have current LOLER Certificate, if necessary.
3. Any personnel operating MEWP [Mobile Elevated Work Platform, sometimes termed as a Cherry-Picker, Hoist or Man-Lift] should be IPAF Trained & Certified.
4. All electrical installation personnel should be fully qualified and if working for an Electrical Contractor, the Company should be enrolled with the \*NICEIC [National Inspection Council for Electrical Installation Contracting] or be a Member of the ECA [Electrical Contractors Association]. \*NICEIC Contractors must install equipment in compliance with BS7671 – IET Regulations and are subject to an annual inspection by the NICEIC to ensure that they install equipment in compliance with the current Regulations.



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## FLOODLIGHTING GUIDE

### D2. Programme of Works

This will be the responsibility of the Main Contractor in receipt of the Clubs' formal order and should be agreed by all parties before any work commences on site. This is particularly important in respect of coordination between any Civil Works Contractor and the electrical contractor installing the floodlighting system. *[Refer to following Section D3].*

### D3. Civil Engineering Works

**The Civil Works Contractor will need the following information, usually supplied by the Floodlighting Electrical Contractor if they are acting as the project's Main Contractor:-**

Exact positions of the column locations, shown on a drawing  
Recommended minimum column foundation size\*  
Cable route from Mains power supply point to the columns  
If necessary, cable route to a chosen Remote Switching position [e. g. Changing-Rooms].

\*NB. Column manufacturers only provide foundation data based on assumed Ground Bearing Pressure. The Civil Works Contractor [or other qualified personnel] should assess the site ground conditions and judge if any modification to the published foundation size is required. *[If considered necessary, ground assessment should be carried out in advance of main work commencing and the Civils Contractor may advise that they need to drill test-holes to assess soil conditions. If soil is not very cohesive the use of increased size foundations may be recommended, which may incur additional excavation cost and will require more concrete. Also, should excavation through a large amount of rock and / or tree-roots be necessary, then again additional costs could apply].*

### D4. Columns and Floodlights

The floodlighting contractor will assemble the columns with their floodlights at each column position. Base-Hinged columns will usually be assembled with their lifting device in place, though trestles can be used. Mid-Hinged columns can be erected without floodlights providing top is "roped" to be pulled down after erection to fit floodlights. The floodlights can be locked into their correct aiming angles before column is in its upright position. If possible, it is preferable to carry out any minor adjustments by using an MEWP if access is possible.



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## D5. Guarantees

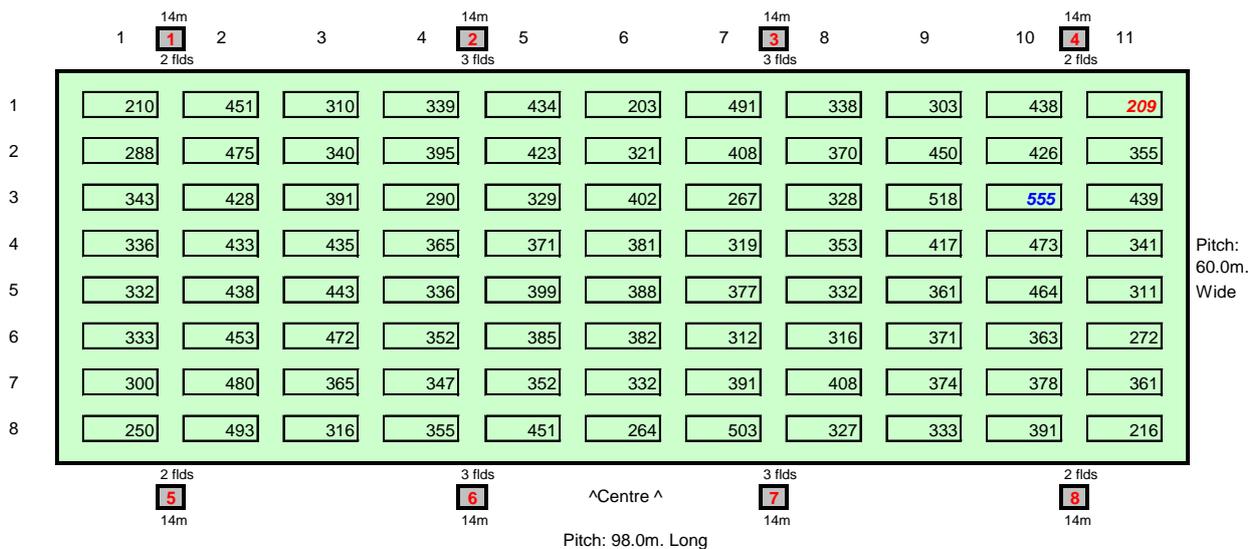
All installation Contractors should give a Written Guarantee of performance on formal completion of the project. This should primarily include an **Electrical Installation Certificate** and an Illuminance Certificate confirming that the [computer predicted] specified performance has been achieved with respect to illumination level, uniformity and light over-spill.

Unless there are any exceptional circumstances [which would need to have been discussed and agreed at the time of receiving the order] the Club should expect to receive a 12 month Guarantee for the complete installation from the Main Contractor. Many companies can offer extended guarantees and may also wish to discuss a Planned Maintenance Programme.

## Section E. CERTIFICATION

All installation Contractors should give a Written Guarantee of performance on formal completion of the project. This should primarily include an Electrical Installation Certificate and an Illuminance Certificate confirming that the [computer predicted] specified performance has been achieved with respect to illumination level, uniformity and light over-spill. On Completion an NICEIC enrolled Contractor will issue an NICEIC Installation Certificate confirming that the electrical installation complies with the latest edition of the IEE Regulations – BS7671.

A Lighting Certificate should also be issued to prove that the floodlighting system is achieving the required average horizontal illuminance [Eav.] and overall uniformity [uO]. The usual method of checking compliance is by conducting an 88 point grid illuminance check, a typical example being;



Scheme uses 20 x Thorn CHAMPION Floodlights fitted with 2kW MH-TS Lamps mounted on 8 x 14 metre Valmont-Stainton TWEED Raise / Lower Columns

TOTALS	>	2392	3651	3072	2779	3144	2673	3068	2772	3127	3488	2504	32670 (~ 88 =)
PN4545	>	Minimum: 209	Maximum: 526	Uniformity: Min / Ave:	0.56	MEASURED AVERAGE ILLUMINANCE :	371.25						



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### Section F. MAINTENANCE

1. Cables and Switchgear
2. Columns
3. Floodlights
4. Lamps

#### F1. Cables and Switchgear

No regular maintenance is needed for these items. However, to ensure compliance with any Local Authority Licensing requirements, Insurance Policy Terms, Health & Safety Legislation and where applicable, the Safety of Sports Grounds Act, it is strongly recommended that all Clubs have their electrical installations checked regularly and obtain a PIR / ICR [Periodic Inspection Report / Installation Condition Report] from an NICEIC Approved Contractor.

#### F2. Columns

Factory produced steel columns [usually manufactured to BS EN40 and Hot-Dip Galvanised to BS EN ISO 1461] should be expected to give a service life of 15 - 20 years without requiring any external treatment in a typical environment.

*When regularly inspected and maintained as necessary, especially with respect to any moving parts, columns could be expected to give a service life of around 50 years. Because of this projected extended life it is crucial to ensure the correct column is initially chosen, especially with consideration to possible upgrading, as while floodlights and even cabling can be altered or replaced without too much difficulty, replacing columns which are matched to their foundations would be extremely costly.*

Column maintenance must also include inspection of their anchor-bolts condition and tightness.



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## F3. Floodlights

High quality floodlights produced by a recognised sports floodlighting manufacturer can be expected to give a service life of at least 10 years. When regularly inspected and maintained as necessary, floodlights could be expected to give a service life of around 15 – 20 years, though of course the photometric performance will slowly reduce as reflectors age and this effect cannot be reversed without component replacement.

Modern floodlights which have an IP [Ingress Protection] Rating of 65 or greater should only require the floodlight front glass to be cleaned externally. *If opening the floodlight to replace lamp it is advisable NOT to try and clean the reflector, as this could actually be detrimental to performance.*

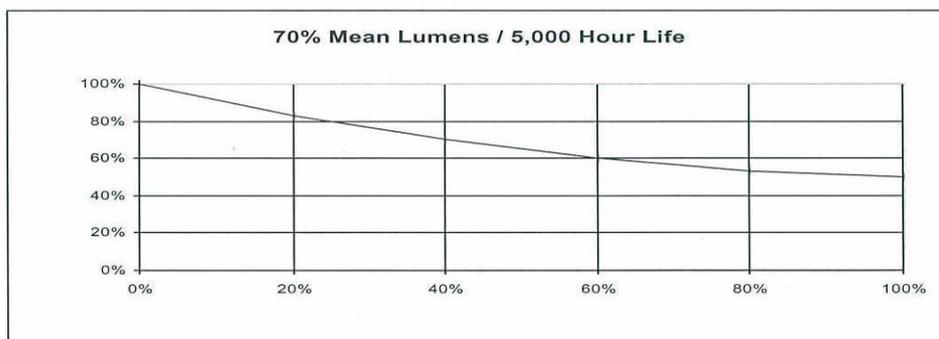
## F4. Lamps

**Lamp Deterioration** – Light output diminishes with time as lamps age and eventually fail. The rate of reduction in output depends upon lamp type, operating conditions and switching cycle [Hours of use per switch-ON and number of operations per year].

Lumen depreciation is normally depicted in graphical form shown as the percentage depreciation against hours of use, typical graphs are below –

LAMP TYPE:   MH-TS 2000W/L/K12/4K    
70% MEAN LUMENS / 5,000 HOUR LIFE

	Hours Operated	% Of Rated Life	% Initial Lumens
	0	0%	100%
	1000	20%	83%
Mean	2000	40%	70%
	3000	60%	60%
	4000	80%	53%
	5000	100%	50%





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**Lamp Replacement Interval** – Lamp survival rates are usually shown graphically as the percentage life expectancy of a large batch of lamps against hours of use for a specific switching cycle. The frequency of lamp replacement is dependant upon the maintenance regime adopted by the Club, which usually fall into one of three categories –

1. Spot Replacement – Failed lamps only are replaced. This method can become very expensive towards end of life for the majority of lamps on an installation due to the increasing frequency of maintenance visits required.

2. Bulk Replacement – All lamps are replaced after a period of years, which would largely depend upon the overall hours of use. This method has the advantage of restoring the system to providing an illuminance close to that of the original installation, allowing for some deterioration of floodlight reflectors.

It is common to use Spot and Bulk Replacement together – i.e. when lamp failure rate starts to increase to an unacceptable level all lamps are replaced. *It is essential to keep accurate records for each floodlight and experienced floodlighting contractors will be able to provide this service.*

3. Planned Maintenance – Because of lumen depreciation with age of lamp, this method is used to ensure that the “Maintained Illuminance” [Lux level] designed for the original installation is kept at a guaranteed agreed level for a set number of years. This is achieved by replacing a certain number of lamps annually [after an initial “new installation” period] and is particularly advantageous if a certain illuminance is constantly required to comply with FAW requirements for certain Divisions. *Again, accurate records are necessary to keep track of which floodlights have been fitted with new lamps and obviously the date of fitting.*

## Section G. UPGRADING

1. Existing Installations
2. New Installations

### G1. Existing Installations

The criteria requiring assessment to upgrade an existing floodlighting system are essentially column carrying capacity, column cabling rating and power supply capacity.

Columns will have a maximum floodlight weight and windage [vertical area] limitations which must first be obtained from existing records or the column manufacturer. Unless originally planned for it is unlikely that columns will have much spare carrying capacity. In some circumstances it may be possible to use lower mounting positions on the columns and this may assist upgrading by imposing less loading on the column.



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## FLOODLIGHTING GUIDE

It should be noted that [disregarding floodlight depreciation] increasing illuminance is directly proportional to the number of floodlights used. i. e. if twenty floodlights are providing an illuminance of 250 Lux, then forty floodlights will be required to provide an illuminance of 500 Lux. As mentioned in Section A9 [future-proofing] to make a noticeable *visual* improvement [as opposed to a Lightmeter measured improvement] it will be necessary to increase illuminance by at least 25%, preferably 50%.

If practical, replacing the existing floodlights for a type with lower weight & windage characteristics may give increased floodlight carrying capacity, but this would usually only be considered if the existing floodlights are beyond their useful service life.

If existing columns are to be retained then the use of additional columns may be considered. e. g. if the existing floodlighting is by side-mounted columns, then supplementing with corner columns may provide a solution.

Should it be decided to replace the existing columns then, because they are matched with their foundations, it is likely that these would have to be abandoned and new foundations prepared. Because this would also affect the cabling to the columns the Club would virtually be starting a new floodlighting system. [Again if practical, selling the existing columns and floodlights could provide some funding towards new floodlighting, but de-mounting the columns, separating their sections [if necessary] and then transporting to the new site would require specialist knowledge. *[New foundation sets would be required by the purchaser].*

## G1. Existing Installations continued

If the SWA cables to the columns do not have sufficient capacity for the increased quantity of floodlights, both in terms of load [current] and volt-drop limitations, then supplementary cabling will be required. This does give the opportunity of installing a more flexible switching system, as the additional floodlights could be on a separate circuit(s) from the existing floodlights. Unless the existing cables were ducted to all the column positions, then it is likely that cable trenching and re-instatement work will be required, possibly involving a Civil Works Contractor to work with the electrical contractor employed to upgrade the system.

As noted in Section B2, Mains Power and Distribution, provision of a suitable power supply would be the responsibility of the regional Network Service Provider – WPD or Scottish Power. If there is already a three-phase [415 volt] supply available then, depending upon the load capacity required, upgrading may be relatively simple. However, it may be possible that a higher capacity incoming cable is required and in certain circumstances the Club may be advised that the local Transformer will not carry the increased load and would require replacement.

If the whole cost of such work was attributed to a Club it would involve the Club with potentially huge costs. There may be methods of overcoming the problem, such as splitting the overall load between different transformers by, for instance, installing a separate supply for the Club buildings, leaving the present supply free for the floodlighting only and it would be wise to ask the electrical contractor employed to upgrade the floodlighting to carry out negotiations with the NSP on the Club's behalf. If the cost of providing increased Mains Power capacity proves to be prohibitive then



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## FLOODLIGHTING GUIDE

the use of a local Generator could be considered, either purchased outright or Hired for matches requiring a higher illuminance. Again, experienced electrical contractors should be able to advise the Club accordingly.

## G2. New Installations

The criteria requiring consideration for the future upgrading of a new installation are the same as for upgrading an existing floodlighting installation, namely column carrying capacity, column cabling rating and power supply capacity, as detailed in Section G1. At the outset of planning the final maximum average illuminance to be provided must be decided and the whole scheme planned on this basis. *Therefore the only initial saving for the original installation compared to the future upgraded installation would be the fewer floodlights required and the marginally reduced time taken to install them.*

As discussed in section B3, Cabling Systems, it is advisable to opt for a Power & Control Cable system as this will facilitate a high degree of circuit flexibility permitting a range lighting levels to be available – for example, one-third, two thirds and all ON floodlighting can be provided for both sides of a pitch with a simple four-gang Switch-Panel.

## Section H. RUNNING COSTS

The installation running costs will comprise mainly of maintenance cost and then the cost of electricity.

The major part of the maintenance costs will be cost of lamp replacement, including fitting – please refer to Maintenance Section F4, Lamps. Because of the many possible variations it is not practical to give estimations of these costs which should be discussed in detail with the installing / maintenance Contractor.

The cost of electricity will depend upon the Tariff by which the Club is charged. Although the electrical load for sports floodlighting is comparatively high, the duration is comparatively short and as it is usually classed as “off-Peak” load, many electricity suppliers offer special Tariffs for Sports Floodlighting. *It should be noted that Clubs can contact an ever increasing choice of electricity suppliers to obtain the Tariff that best suits their needs.*

**An example of electricity cost for a twenty-four 2kW floodlight installation, based on a [nominal] kWh Tariff of 10 pence per kilo-Watt Hour would be –**

**Total Load of \*54kW x £ 0.10 / kWh = £ 5.40 per hour.**

*[\*Load based on 2,250 watts per floodlight, including control gear losses x 24 Floodlights].*

By substituting the exact Load and actual Tariff per kWh the true electricity cost per hour of use would be obtained.



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## Section I. GLOSSARY OF TERMS

### COLOUR RENDERING INDEX [Ra]

Colour rendering is the general terminology for the colour appearance of objects when illuminated by a light from a given source compared with their appearance under light from a reference light source such as daylight.

The colour rendering index (CRI) is a quantitative measure of the ability of a light source to reproduce the colours of various objects faithfully in comparison with a natural light source such as daylight.

Light sources with a high CRI are desirable in colour critical applications.

### CSCS

This scheme was set up to help the Construction Industry to improve quality and reduce accidents. All competent site personnel should carry a relevant CSCS card to prove their occupational competence.

### CLEANING

Depreciation or loss of light happens when dirt accumulates on the inside of and outside of the floodlight lenses. These surfaces should be cleaned on a regular basis as part of the maintenance plan.

Annual cleaning of lenses is recommended.

Reflectors should not be cleaned unless absolutely necessary. If reflector cleaning is unavoidable then it should be undertaken with extreme caution and only in accordance with the floodlight manufacturers' recommendations.

### CONTROL GEAR

Control gear is a collective term for the equipment needed to produce light. Control gear for discharge lamp circuits usually consists of a ballast unit, electronic ignitor and capacitor (s). A lamp and its associated control gear are an integrated unit and form the circuit. Lamps from different manufacturers may not always operate on the same control gear even if the lamps are of a similar wattage and type.

### DIRT DEPRECIATION (ENVIRONMENTAL POLLUTION)

Accumulation of dirt on the floodlight lenses can account for up to 15% light loss. As a guide to pollution categories it can be stated as follows:-

Low Pollution -	Rural Areas
Medium Pollution	Semi-Urban residential and light industrial areas
High Pollution -	Large Urban areas surrounded by heavy industry

If the cleaning interval is 12 months to 24 months the dirt depreciation can be considered as

Low Pollution -	8 -10%
Medium Pollution	10 -14%
High Pollution -	12 -16%



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## **DETERIORATION OF FLOODLIGHTS**

As a luminaire ages there will be gradual loss of performance of reflectors. The light output lost due to luminaire depreciation cannot usually be regained by cleaning. For an exterior floodlight a 1% reduction in light output per year is considered as being the average or very good quality floodlights.

## **GLARE RATING [GR]**

Glare can be described as uncomfortable light as perceived by players or spectators when viewed at certain angles from the playing surface or viewing area.

It is a temporary blinding effect or discomfort. Glare is measured as a figure and should not exceed a certain level.

The Glare Rating (GR) is usually measured between 0-100, the higher the figure denoting the greater glare. A maximum GR value of 50 is required.

Examples can be shown as, 10 – unnoticeable, 30 – noticeable, 50 just admissible, 70 – disturbing, 90 - unbearable

## **IPAF**

The International Powered Access Federation (IPAF) promotes the safe and effective use of powered access equipment. All IPAF certified operators carry a PAL card (Powered Access Licence) as proof of training and competence.

## **ILLUMINANCE / ILLUMINATION LEVEL**

When a ray of light hits a solid surface, the process is known as illumination.

## **LUMEN**

Lumen is the measurement of the rate of flow of the luminous energy or luminous flux as it is often called.

## **LUMINOUS INTENSITY**

The luminous intensity is a measure of how much flux is emitted within a small conical angle in the direction of the surface and the unit is the CANDELA.

## **LUMINOUS EFFICACY**

Luminous efficacy is the ratio of the luminous flux emitted by a lamp to the electrical power consumed by it. The unit is the lumen per watt (lm/w)

## **LUX LEVELS**

Lux is the basic SI unit of illuminance, equal to one lumen per square meter (lm/m<sup>2</sup>). All lighting levels are measured in Lux.



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## LAMP DETERIORATION

The light output of all floodlight installations diminishes with time as the lamps age and eventually fail. The rate of fall in light output depends on the lamp type, operating conditions and switching cycle. As an approximation lamp outputs tend to depreciate at between 9 -11% per year.

## LAMP SURVIVAL

Lamp survival will vary according to lamp type and manufacturer. It is usual to present lamp survival graphically as a percentage of life expectancy against hours of use for a specific switching cycle. These are readily available from the manufacturer of the lamp.

## MAINTENANCE FACTOR

All lighting systems need to be serviced, i.e. failed lamps replaced, equipment faults rectified and lamps and luminaires cleaned. Lamp flux will also depreciate over the age of an installation. Data is produced which enable a maintenance factor to be estimated for an installation with a particular cleaning and maintenance interval

## NICEIC

The National Inspection Council for Electrical Installation Contracting (NICEIC) was created to ensure that consumers are protected from unsafe and unsound electrical work. The NICEIC holds a register of Approved Contractors that undergoes an annual assessment. Their work is checked against the IEE Wiring Regulations BS7671 as well as other standards.

## MOUNTING HEIGHT

The vertical distance between the luminaire and the surface of the Play Area.

## OBTRUSIVE LIGHT (LIGHT POLLUTION)

That light which is projected in any combination of upward and outward path beyond the boundaries of the site being illuminated and by reason of that lights direction, magnitude, duration and presence is contrary to the general environment and those interests of life and livelihood.

Light pollution relating to light into night sky (upward light distribution) can result in "Sky Glow" a term commonly used by astronomers.

## UNIFORMITY

This describes the measurement of light levels to ensure the light is evenly distributed across the playing surface and looks uniform to the eye with no obvious variation. Overall Uniformity is calculated by dividing the Minimum Lux Level by the Average Lux Level and usually expressed as  $uO > Min/Ave$ .

## UTILISATION FACTOR

The Utilisation Factor is the ratio of luminous flux received by the reference surface to the sum of the rated luminous fluxes of all lamps in the installation. i. e. The proportion of total lamp output reaching the surface under consideration, e. g. actual marked pitch.



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# FLOODLIGHTING GUIDE

## MEASURING EQUIPMENT

When measuring lighting levels they must be made by using a calibrated illuminance meter to BS667:1996, the meter should have both colour and cosine connection and be of recognised quality. The meter must have been calibrated to traceable standards within 12 months of the measurement with the certificate being available on request. The meter's serial number and last calibration date must be noted on the measurement report.

## MEASURING POINTS (88 / 96 POINT TEST)

In order to be able to measure the performance of a lighting installation a pitch is divided into a grid of 88 points or 96 points [as specified by User] at which horizontal illuminance measurements are made.

The grid arrangement is that each grid point is spaced at 10 metres this would normally give 8 points between touchlines and 11 points between goal lines making a total of 88 points measured within the field of play.

## Section J. CONTACTS etc.

### ELECTRICITY SUPPLY – NETWORK SERVICE PROVIDERS

#### **NORTH WALES: SCOTTISH POWER [formerly MANWEB]**

New Supplies / Network Alterations – 08452 734444

*[Central Contact Number – advise address and they will refer you to correct local office]*

**Email: [customer.care@sppowersystems.com](mailto:customer.care@sppowersystems.com)**

#### **SOUTH WALES: WPD – Western Power Distribution**

New Supplies / Network Alterations – 08456 013341

*[Central Contact Number – advise address and they will refer you to correct local office]*

**Email: [info@westernpower.co.uk](mailto:info@westernpower.co.uk)**

### Typical Total Power Loading for 2kW Floodlights –

8 floodlights = 18kW / 20kVA > max. 31.18 amps per phase

12 floodlights = 27kW / 30kVA > max. 41.57 amps per phase

16 floodlights = 36kW / 40kVA > max. 62.35 amps per phase

18 floodlights = 41kW / 45kVA > max. 62.35 amps per phase

20 floodlights = 45kW / 50kVA > max. 72.74 amps per phase

24 floodlights = 54kW / 60kVA > max. 83.14 amps per phase

32 floodlights = 72kW / 80kVA > max. 114.31 amps per phase

36 floodlights = 81kW / 90kVA > max. 124.70 amps per phase

40 floodlights = 90kW / 100kVA > max. 145.49 amps per phase

48 floodlights = 108kW / 120kVA > max. 166.27 amps per phase



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## **GAS SUPPLY NETWORK**

**BRITISH GAS EMERGENCY [GAS LEAK] – FREEPHONE: 0800 111 999**  
CENTRICA – British Gas Supply Installations – FREEPHONE: 0800 072 5280  
NATIONAL GRID [South Wales Only] – Email: [plantprotection@uk.ngrid.com](mailto:plantprotection@uk.ngrid.com)

## **WATER SUPPLY NETWORK AND MAIN SEWERAGE**

WELSH WATER – Water Services and Emergencies – FREEPHONE: 0800 052 0130  
Leakage Reporting – FREEPHONE: 0800 281 432

## **OVERHEAD POWER LINES [Up to & including 132kV, see Local Network Service Providers]**

NATIONAL GRID – Email: [plantprotection@uk.ngrid.com](mailto:plantprotection@uk.ngrid.com)

## **PLANNING PORTAL**

<http://www.planningportal.gov.uk/planning/applications>

## **TELECOMMUNICATIONS**

BRITISH TELECOM [Engineers] – FREEPHONE: 0800 800 154

## **I. E. T. [Institution Engineering & Technology, formerly I. E. E.]**

Michael Faraday House, Stevenage Herts. SG1 2AY – Phone: 01438 313 311

## **I. L. P. [Institution of Lighting Professionals, formerly I. L. E.]**

Head Office, Regent House, Regent Place, Rugby. CV21 2PN – Phone: 01788 576 492

## **SLL [The Society of Light and Lighting, a division of the CIBSE]**

222 Balham High Road, London SW12 9BS – Phone: ??????????????????



# FES FLOODLIGHTING GUIDE

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