WRU

Facilities Guidance Note 8

FLOODLIGHTING

INTRODUCTION

There are a number of key facility issues affecting clubs and restricting the growth of the game. One of these issues is the lack of, or poor quality of floodlighting. Accordingly, the installation of floodlighting for training is one of the facility improvements which are eligible under the Sport Wales Development Grant Scheme providing that "Value for Money" in terms of increased membership and participation can be shown.

This guide has been designed to provide comprehensive coverage of virtually all aspects relating to the floodlighting of WRU rugby pitches and training areas but should not detract from the fact that a floodlighting expert should be commissioned to design and install a system appropriate to your requirements.

For ease of reference it has been prepared in sections progressing from concept to completed installation, maintenance and possible future upgrading:

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Section A: DESIGN

1. Ground Layout
2. Local Services
3. Lighting Requirements
4. Planning Consent
5. Floodlight / Column Layout
6. Column Types
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8. Floodlight Types
9. Future Proofing

A1. GROUND LAYOUT

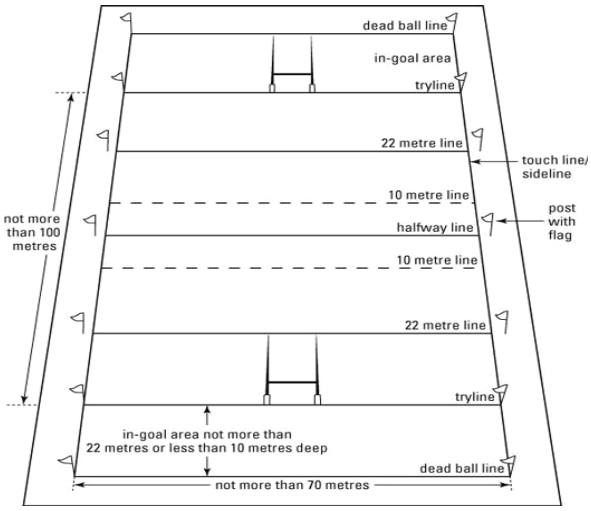
IRB Laws of the Games
Law 1.2: Required Dimensions for the Playing Enclosure

(a) Dimensions: The field of play does not exceed 100 metres in length and 70 metres in width. Each in-goal does not exceed 22 metres in length and 70 metres in width.

(b) The length and breadth of the playing area are to be as near as possible to the dimensions indicated. All the areas are rectangular.

(c) The distance from the goal line to the dead ball line should be not less than 10 metres where practicable.

The playing enclosure is the playing area and a space around it, not less than 5m where practicable, which is known as the perimeter area. Lighting columns should be installed beyond the playing enclosure.



A2. LOCAL SERVICES

Before any ground excavation is carried out it is advisable to check with main 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).

If there are any overhead power transmission lines crossing the field the erection of lighting columns should be discussed with National Grid, as height 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^2 = 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.

Typical Main Pitch Layout with Training Floodlights on the Reverse

MATCH AND TRAINING STANDARDS (also refer to WRU licence criteria)

Class 1: Match Play Competition, Premier Cups, HDTV Minimum Requirement.	500 Lux
Class 2: Match Play Competition, WRU Premier.	300 Lux
Class 3: Match Play Competition, General Requirement.	250 Lux
Class 4: Match Play Competition, Minimum Acceptable Level.	200 Lux
Class 5: General Training	100 Lux

Schedule of Lighting Levels:

Horizontal Illuminance, Lux [*Eav.*]	Uniformity uO [*Emin. / Eav.*]	Glare Rating [*GR*]
Class 1: 500	0.7	<50
Class 2: 300	0.6	<50
Class 3: 250	0.6	<50
Class 4: 140	0.5	<55
Class 5: 75-100	0.5	<55

Special consideration should be given for television transmission. A horizontal illuminance of 500 lux would be recommended for the minimum HDTV requirement, though some satellite broadcasters have a minimum illuminance requirement of 800 lux horizontal. Uniformity is of increased importance as panning cameras cannot adjust quickly to large variations in illuminance. If necessary, discussion with the relevant TV broadcasting authority prior to installation is recommended to ensure minimum illuminance and uniformity requirements are met and that camera positions can be accommodated.

Clubs competing in the WRU Premiership Division should refer to the WRU A and B licence criteria. These standards are currently:

- A licence: 300 lux with the ability to increase lux to 500
- B licence: 300 lux.

FLOODLIGHTING SURVEY AND REPORTS:

A club must have a valid approved Floodlighting Survey Chart and Floodlighting Inspection Report, completed by an independent floodlighting contractor, confirming their floodlighting complies with the standard in order for the club to be accepted for entry into a competition or division. An approved Chart and Report shall be valid for 24 months from the date it is signed by the "approved" contractor completing the inspection.

(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 of the latest calibration certificate. The light meter shall be subject to an annual calibration check.)

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.

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 cabinets 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 light overspill. 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 with regards light overspill. 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 environmental factors, such as the affect on special habitats and wildlife, e.g. Bats.

Refer also to Section C – Planning Application

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. In practice, floodlight mounting height for a typical rugby match pitch would not be less than 14 metres but 15 or 16 metres is more common, depending upon exact pitch width and illuminance requirements.

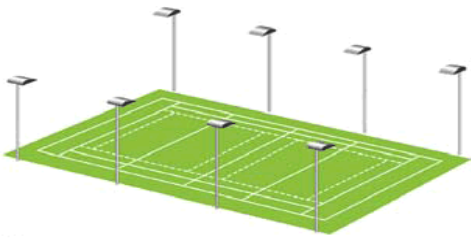
Planning restrictions may limit the height at which floodlights can be mounted, however, as part of the planning process an acceptable mounting height needs to be derived to ensure the lighting design objectives are met. The position of drains, spectator stands, boundaries, etc can limit where columns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

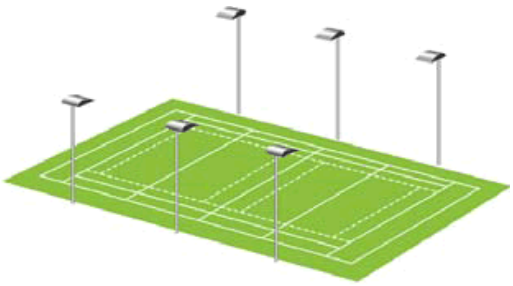
Columns may not normally be erected within the Playing Enclosure both to avoid obstruction to throw-ins and for player safety. Therefore columns must be at least 5 metres from the pitch touch lines.

STANDARD COLUMN LAYOUTS FOR RUGBY PITCH FLOODLIGHTING

1. Match Standard: Four columns each side - preferred layout as centre areas are available for locating small Stands or Dug-Out Shelters. Columns would then usually have capacity for future upgrading.

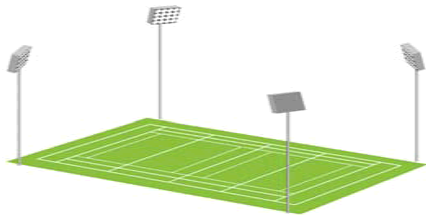


2. Match Standard: Three columns each side - fewer columns may mean that each column has to carry more floodlights to achieve the required illuminance and this could increase cost of each column. It may also restrict the flexibility of the system for future upgrading.

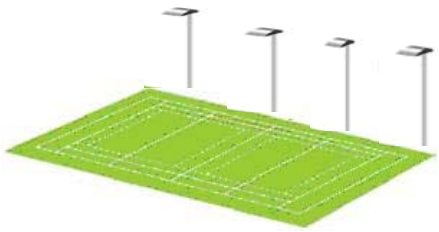


3. Match Standard: Four corner columns - because each column must carry increased quantity of floodlights compared to side-mounted columns, then corner column systems always require more substantial columns and these would also be higher than for side-mounted systems. Depending on column off-set distance, typically 25

metre columns would be required (20 metres absolute minimum height necessary) to maintain the required aiming angles for all floodlights to ensure satisfactory uniformity and acceptable glare. Using the fewest possible columns may also restrict the flexibility of the system for future upgrading.



4. Training Standard: 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.



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)
- 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.

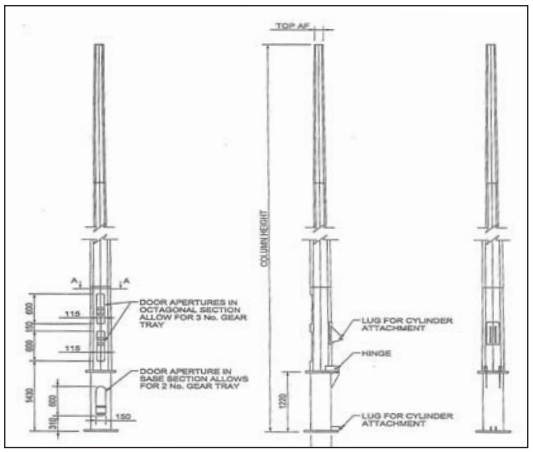
**The column manufacturer will also usually give guidance on recommended concrete foundation size, but care must be taken when using this data as soil conditions can vary from site to site and in some circumstances may even be different on the same site if close to a river, etc.*

A TYPICAL FOUNDATION

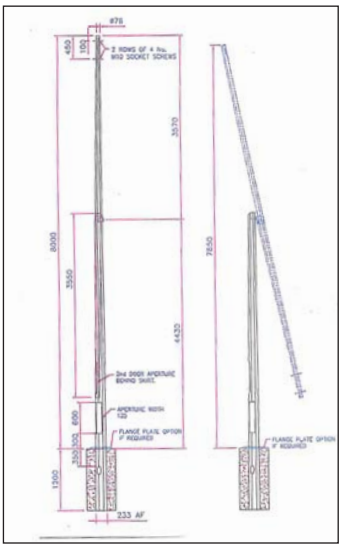
2. HINGED COLUMNS

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 be derived from a mobile Generator as the floodlighting power supply is not usually available during construction).



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 these columns are usually much faster to lower and raise because of their counterbalancing.

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. 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.

*Mobile Elevated Work Platform, often referred to as a Hoist or "Cherry-Picker".

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.

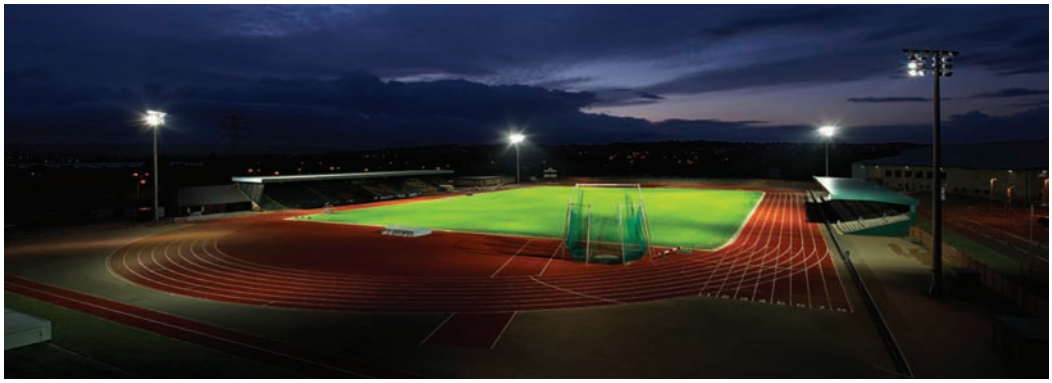
Depending upon the number of sections used to achieve the required height it is possible with some column types to build them vertically in situ on their foundation anchor-bolts. However, this is usually a job for qualified Riggers which will increase installation costs. More commonly for the column 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 (HI-AB vehicle).

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.



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 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 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.

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 5 metre perimeter band which should form part of the playing enclosure should be suitable for such a vehicle providing ground conditions permit its use and that entrance gates and fencing do not obstruct access.

A8. FLOODLIGHT TYPES

BS/EN STANDARDS

All floodlights must be manufactured to EN60598.

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

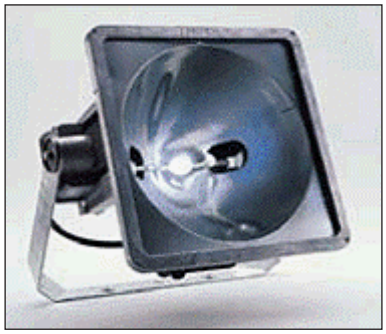
Pitch Floodlights generally fit into one of three categories –

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.

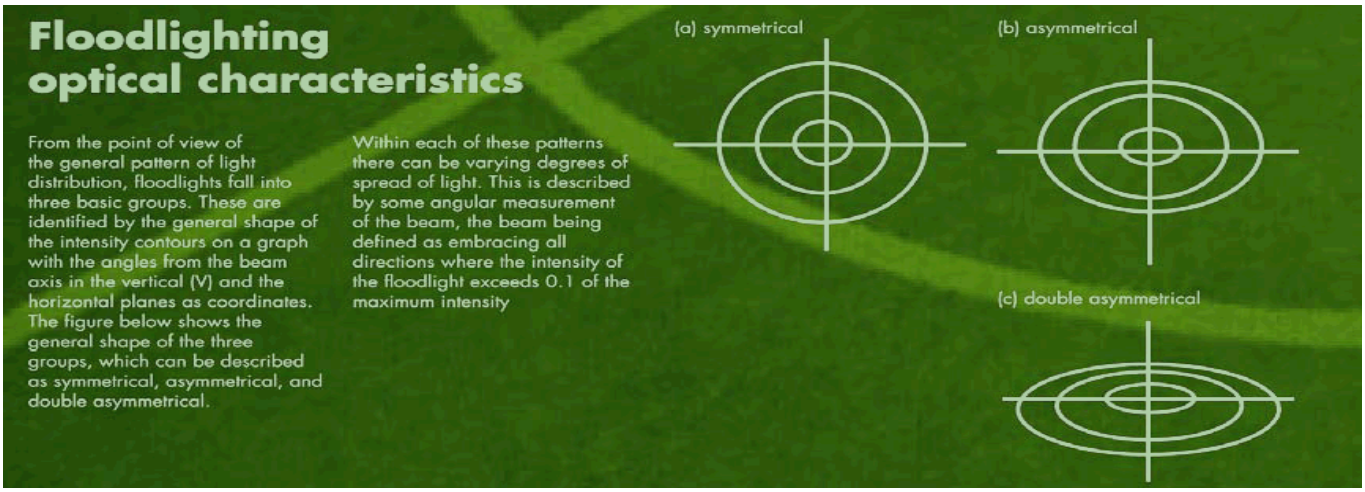
2. PROJECTOR - DOUBLE ASYMMETRIC LIGHT DISTRIBUTION

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



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.



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

Type 3 floodlight would provide: [a] symmetrical distribution (suitable for corner column floodlighting).

Type 2 floodlights 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.

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 a Lightmeter measured improvement) it will be necessary to increase illuminance by at least 25%, preferably 50%.

Section B: INFRASTRUCTURE

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

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.

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 WRU area, while in the northern area the NSW is Scottish Power, formerly MANWEB. *(Refer to Contacts Section K).*

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.

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 IEE 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.

B4. SWITCHING CONTROL

During the design stage system switching positions 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 the switches would operate contactors (electrical switches) which will apply power on the main cables. When using a 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, offering a choice of illumination level and power loading to suit a specific application, such as training floodlights.

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, the 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.

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]

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

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 advisable to place the order in writing stipulating that 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
3. Any personnel operating MEWP 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 – IEE regulations and are subject to an annual inspection by the NICEIC to ensure that they install equipment in compliance with the current Regulations.

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 civil 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 practical, it is preferable to carry out any minor adjustments by using an MEWP if access is possible.

D5. GUARANTEES AND 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.

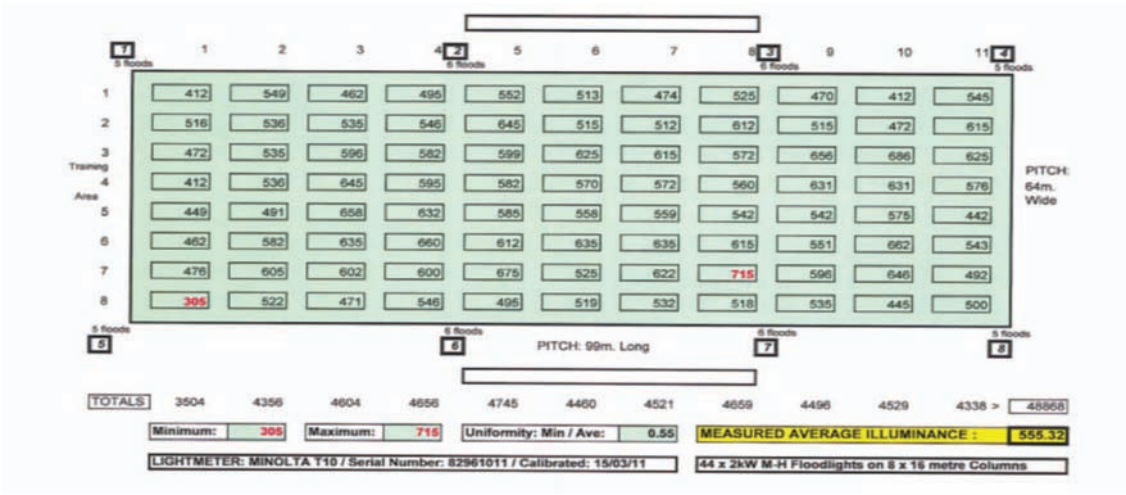
Unless there are any exceptional circumstances, which would need to have been discussed and agreed at the time of receiving the order, the club should expect to receive a 12 month guarantee for the complete installation from the main contractor. Many companies can offer extended guarantees and may also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

Section E. CERTIFICATION

The main contractor should give an Electrical Installation Certificate and 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.

The Lighting Certificate issued should 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 -



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.

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 of 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

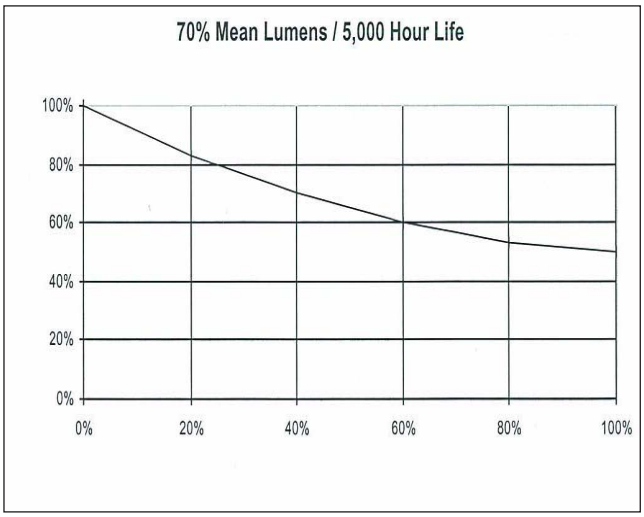
Lamp Deterioration – Light output diminishes with time as lamps age and eventually fail. The rate of reduction in output depends upon lamp type, operating conditions and switching cycle (hours of use per switch-ON and number of operations per year).

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%



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 WRU 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.

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 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.

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 to 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, formerly MANWEB. 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 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 15 pence per kilo-Watt Hour would be:

Total Load of *54kW x £ 0.15 / kWh = £8.10 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.

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 quantitive 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 and outside of the floodlight front glass. These surfaces should be cleaned on a regular basis as part of the maintenance plan.

Annual cleaning of front glasses 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 operate a floodlight. Control gear for discharge lamp circuits usually consists of a ballast unit, electronic ignitor and capacitors. 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 glass 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%

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 for 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 measure 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. The amount of light rays determines the illumination level / illuminance - see Lux Levels.

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 metre (lm/m²). All lighting levels are measured in Lux.

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.

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 correction 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 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 at which horizontal illuminance measurements are taken.

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.

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.

MOUNTING HEIGHT

The vertical distance between the luminaire and the surface of the play area, e.g. typically column height.

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.

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 average Lux level by the minimum Lux level.

UTILISATION FACTOR

The utilisation factor is the ratio of luminous flux received by the reference surface to the sum of the rated lamp luminous fluxes of the lamps in the installation

COSTS

Each floodlighting system consists of many different factors that effect costs depending on the site conditions and requirements of the club.

When considering costs the following schedule needs to be addressed.

1. **Mains Power.** - This element may need to be discussed with WPD/ Scottish Power with regard to the size of the incoming supply to the ground. If the size of the existing supply is insufficient they will need to upgrade and will provide a cost for this service.

2. **Civil Works.** - These are the excavations for columns bases, trenching, pouring of concrete etc. These works are usually costed separately by a specialist contractor but sometimes are included in an overall package for the complete installation.

3. **Floodlighting Installation** - A specialist contractor will supply and install the whole system, columns, cables, floodlights, wiring and distribution. Their responsibility is to provide a fully operational system that achieves the designed lighting levels together with all necessary certification and guarantees.

4. **Maintenance.** - This element is usually optional and can be taken up at the end of the guarantee period.

5. **Running Costs.** - Your floodlighting contractor will provide you with a Total Load for the system in kw. This figure can then be multiplied by the cost of 1 electrical unit (kilo-Watt/Hour) at your normal cost, e.g. if the system has total load of say 36kw and your normal cost of electricity is say 14 pence per unit, the calculation would be 36 x £0.14 = £5.04 electricity running cost per hour of use.

Typical installation costs can be shown as follows:-

Training Lights	> 100 Lux	Approximately £18-23k
Match Play	> 230 Lux	Approximately £39-44k
Match Play	> 500 Lux	Approximately £50-55k

The figures shown **exclude** Civil Works, Mains Power Supplies and VAT

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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

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

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

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

National Grid – Email: plantprotection@uk.ngrid.com

PLANNING PORTAL

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

TELECOMMUNICATIONS

British Telecom [Engineers] – Freephone: 0800 800 154

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The WRU shall not be liable for any loss or damage whatsoever arising from the use of or reliance on the information contained in this Guidance Note.

The WRU reserves the right to amend or withdraw the information contained in this Guidance Note. Clubs should also refer to WRU entry and license criteria where appropriate.

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