02/1792/ DD/

SPORTS LIGHTING

LiDAC
Lighting Design and
Application Centre

Manufacturer
& Supplier

PHILIPS

02/1792/DD

I trust I have interpreted the project requirements and expectations correctly.

Please do not hesitate to contact me should you require any further information or design assistance with future sports floodlighting projects.

On behalf of Philips Lighting Solutions and Thorwill Ltd, we look forward to working with you further on this project.

Yours sincerely,

Antony Collett
Senior Lighting Design Engineer
Philips Lighting Solutions
www.sportslighting.philips.com

02/1792/DD

OPTIVISION

02/1792/DD

LUMINAIRE DETAILS

Product

02/1792/DD

Luminaire
- Housing
- Reflectors
- Bracket
- Protractor scale
- Front glass
- Connection box
- Safety switch
- Lamp fixation
- Technical data

let's make things better

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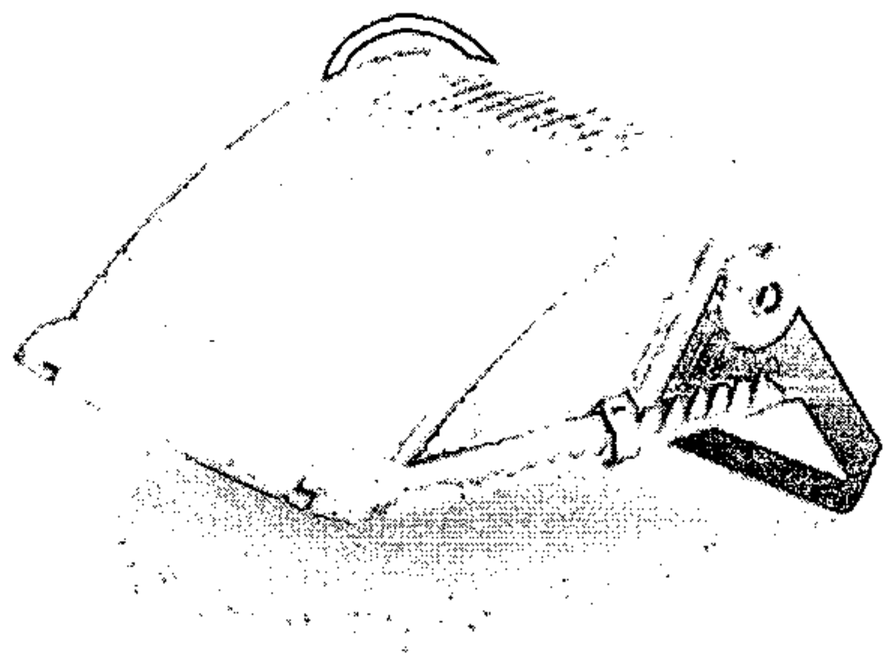
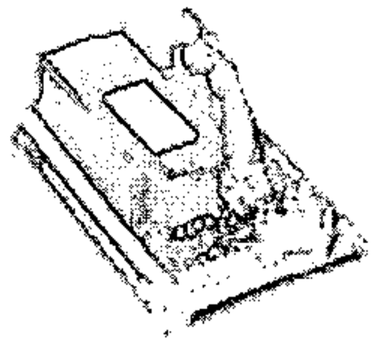
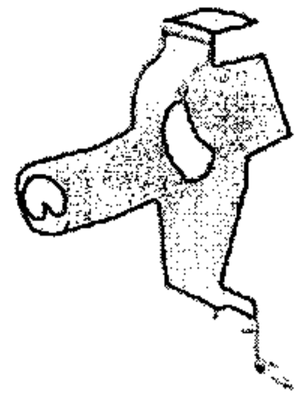
Luminaire

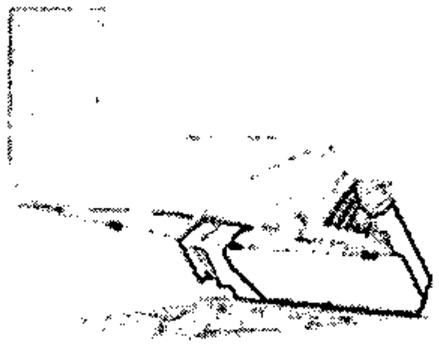
The OptiVision are very compact asymmetric floodlights which can be equipped with MHN-LA 1000 and 2000W or SON-T-P 600W and SON-T 1000W lamps.
The version based on MHN-LA lamps are mainly used for lighting of leisure sports facilities outdoor.
The version based on SON-T lamps are meant for lighting of medium to large areas as parkings, industrial zones etc.

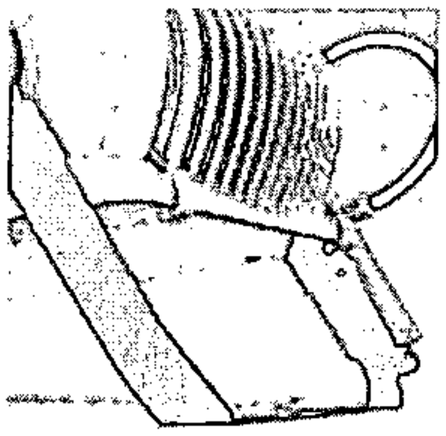
A complete OptiVision system consists of the following basic elements: luminaire, lamp and gear tray.
Some accessories have been developed to facilitate ease of installation.





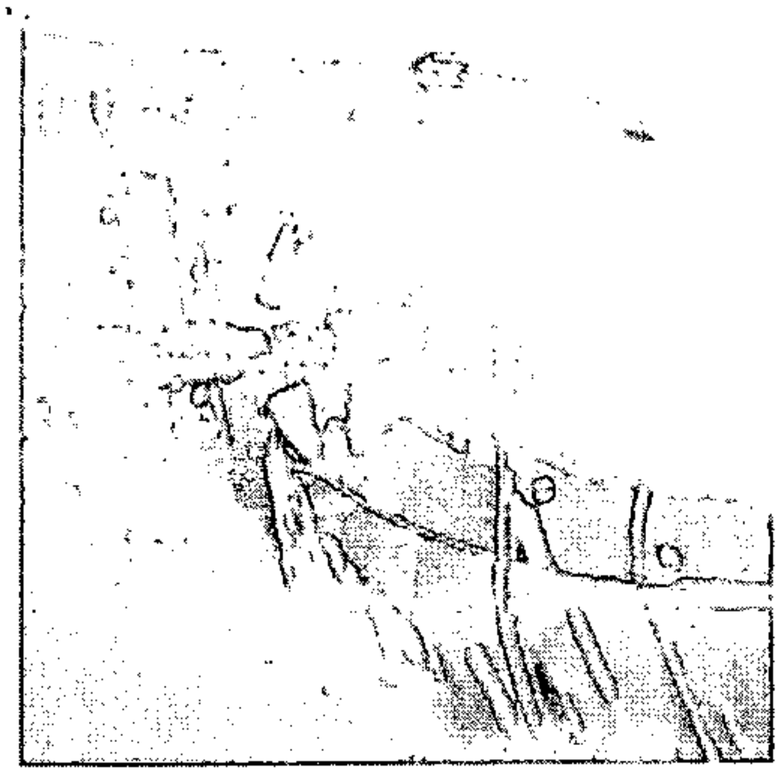






Aluminium housing

The housing of the OptiVision is made of non-corrosive high-pressure die-cast aluminium (AS12Y4).
All versions of OptiVision make use of one and the same type of housing.
The housing is made with greatest care, as it's shape determines the shape of the central reflector inside and so the performance of the optical system.
OptiVision provides optimal working conditions for optics and lamp by cooling the luminaire with a unique, large-finned convector system.



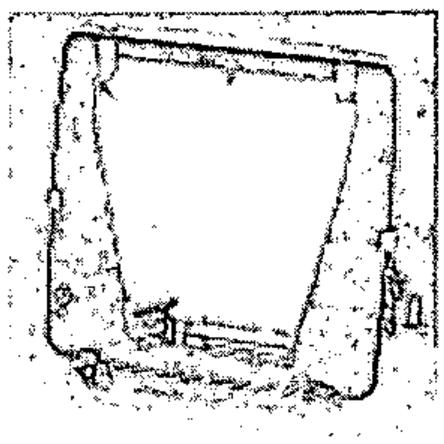
Reflectors

The optical system of each luminaire consists of a central reflector, which follows exactly the shape of the housing, and 2 lateral reflectors.

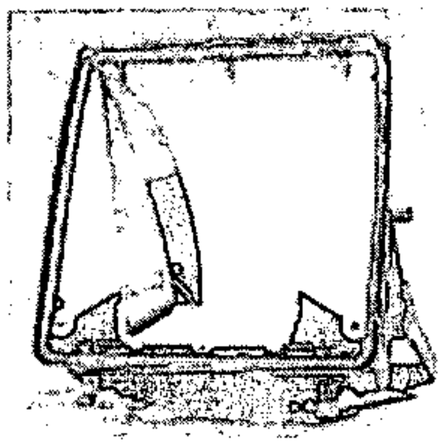
Narrow, medium and wide beams have been created by using different kind of lateral reflectors.

All reflectors are made of high purity aluminium (99.8%) and offer a reflectivity of about 94% to maximise light output.

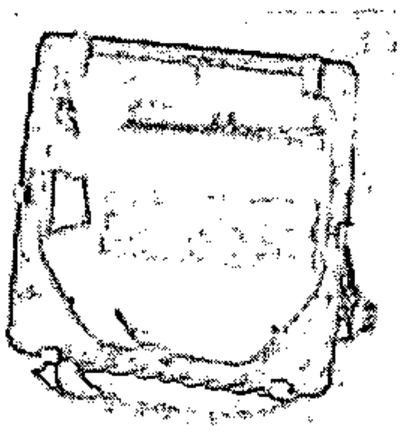
More information about reflectors and photometric data can be found in "Sports Lighting Applications".



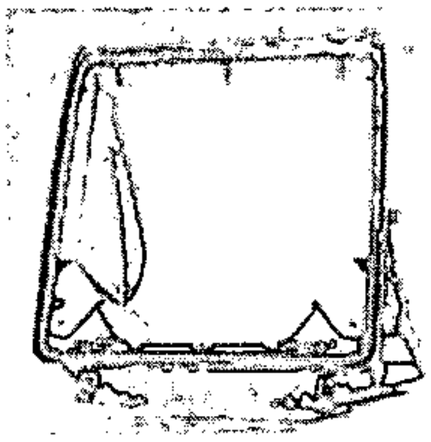
NB narrow beam



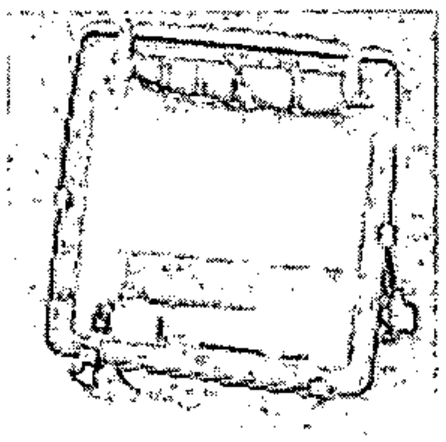
without frontglass



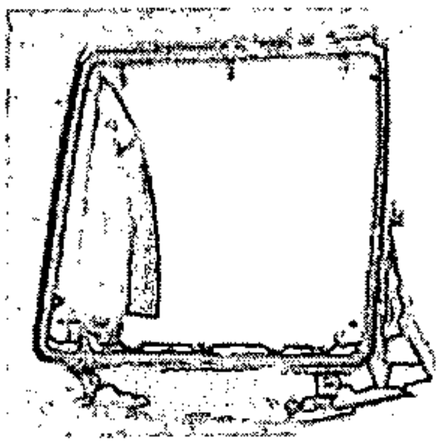
MB medium beam



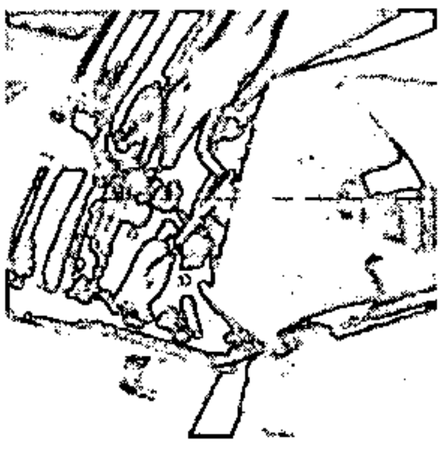
without frontglass



WB wide beam



without frontglass

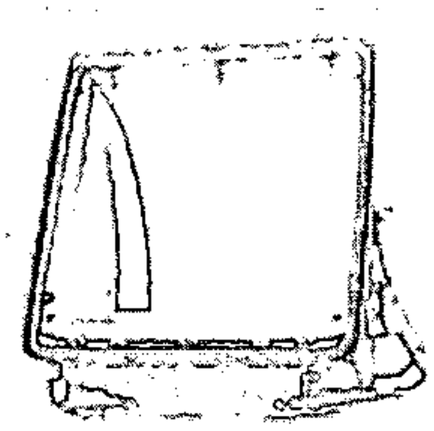


MHN-LA 1000W and 2000W version

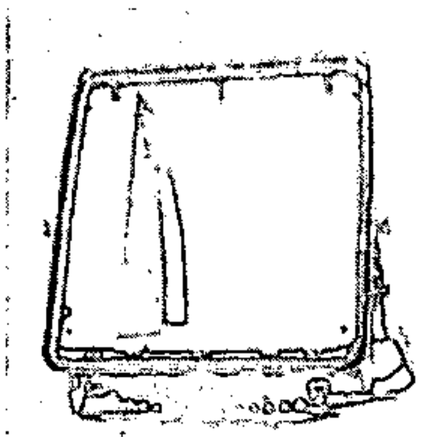
The version accepting a MHN-LA 2000W lamp is available in narrow, medium and wide beam. The other version based on MHN-LA 1000W is available only in wide beam.

Information on performance of each reflector can be found in "Photometric data".

In case of the MHN-LA 2000W version, the lateral reflectors can be hinged to facilitate lamp replacement.



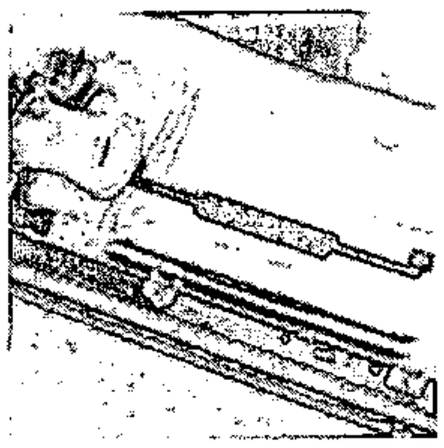
SON-T-P 600W
(without frontglass)



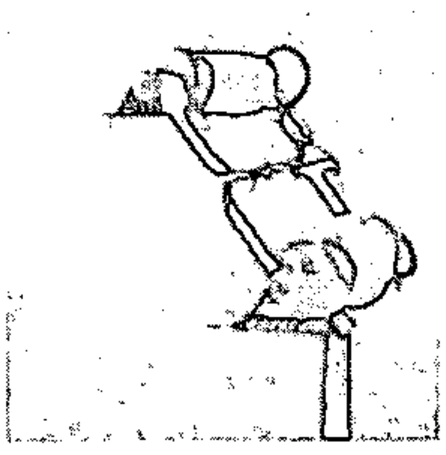
SON-T 1000W
(without frontglass)

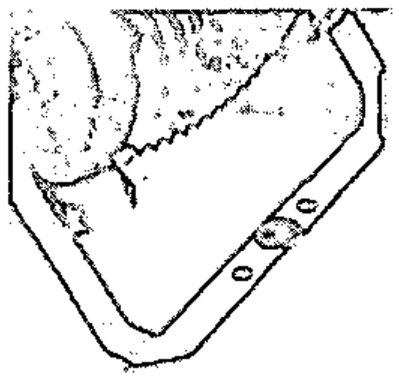
SON-T 600W and 1000W version

Both luminaire versions accepting SON-T lamps are equipped with a black strip on the central reflector.
This purpose of this strip is to minimise direct radiation from the reflector onto the lamp and so to assure the published lifetime of the SON-T lamp.
The versions based on SON-T 600W and 1000W are available only in wide beam.
The SON-T lamps can be placed and removed without the need for hinging the reflectors at both sides.
Information about performance of each reflector can be found in "Photometric data".



Diffusing black element





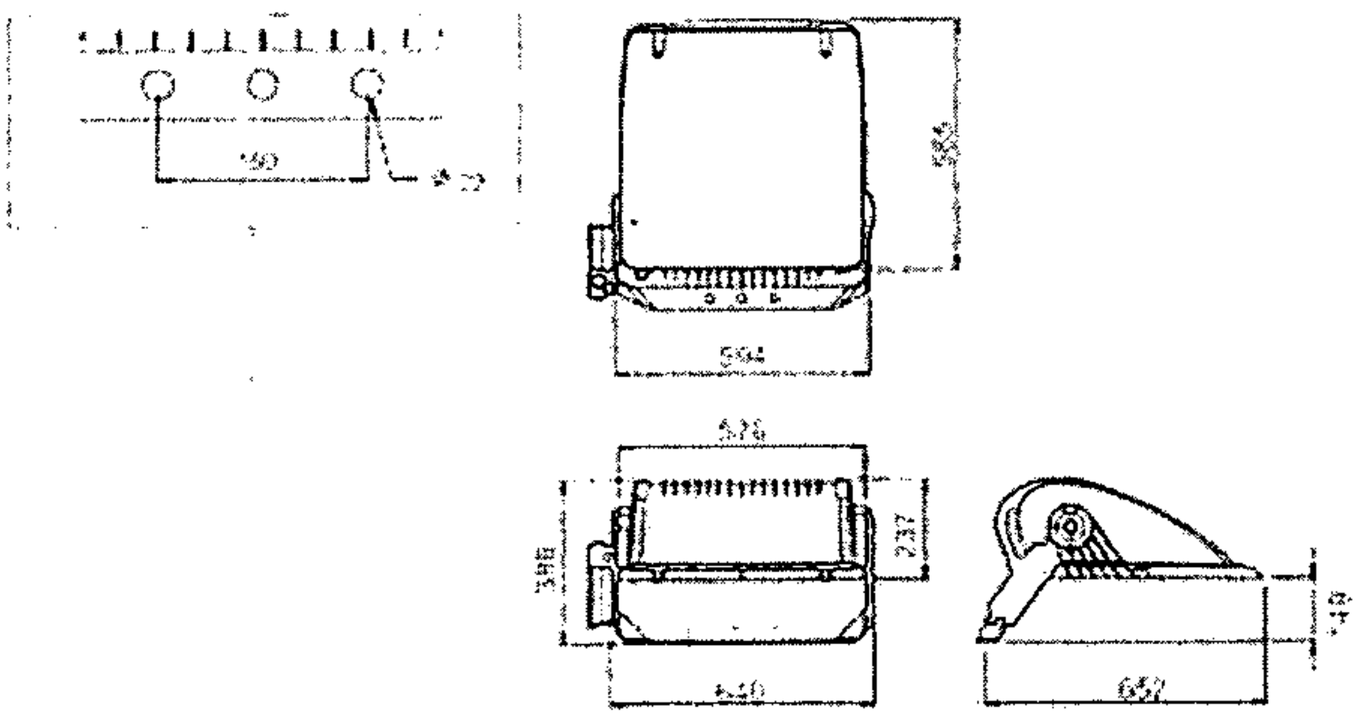
Fixation with M20 bolt and washer

Bracket

The hot dipped galvanized mounting bracket lacquered in black can be mounted above or below the luminaire without the need for detaching it from the luminaire.
The bracket is as standard delivered with a washer attached to it, for secure tightening with a M20 bolt (not delivered with the product).
The bracket has three fixation holes to allow for some flexibility.
In chapter "Installation", you find photo's and illustrations of the different mounting possibilities.

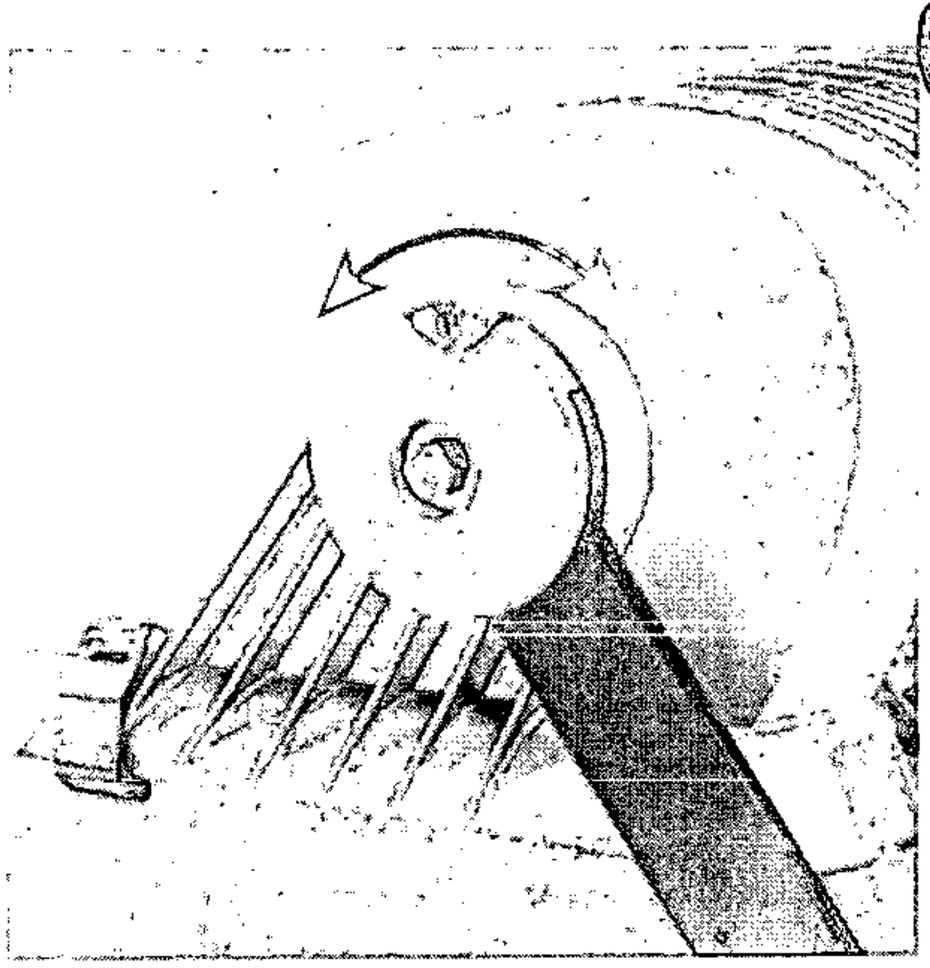
Dimensions

The bracket has three fixation holes to allow for some flexibility over the horizontal axis.



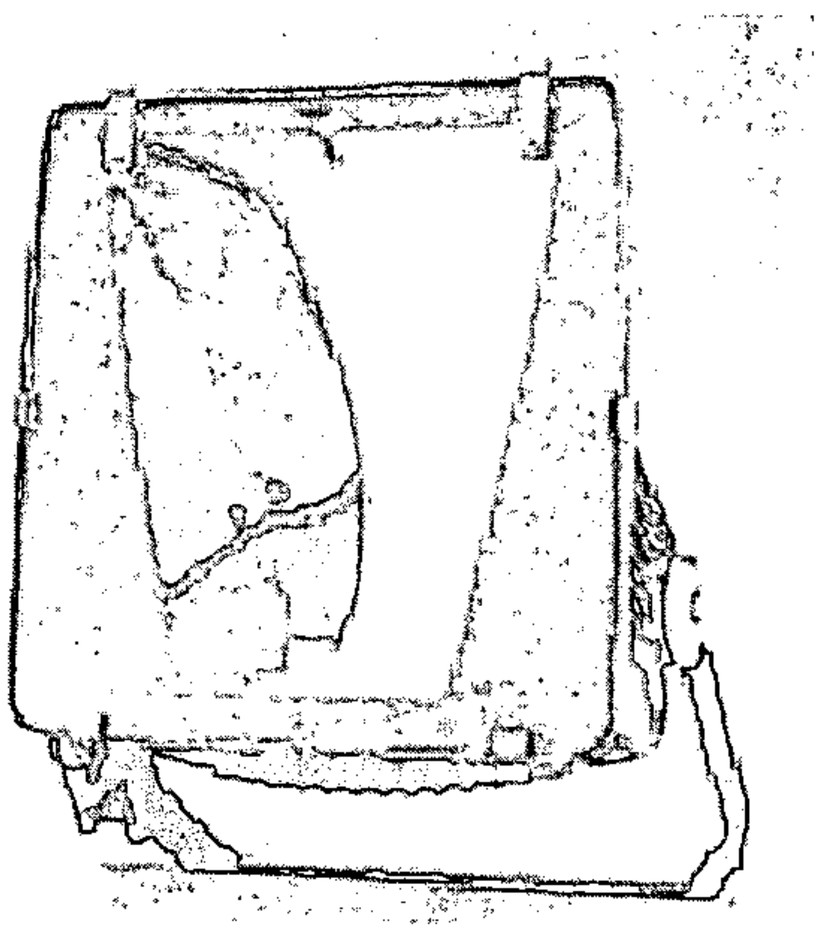
dimensions in mm

PHILIPS

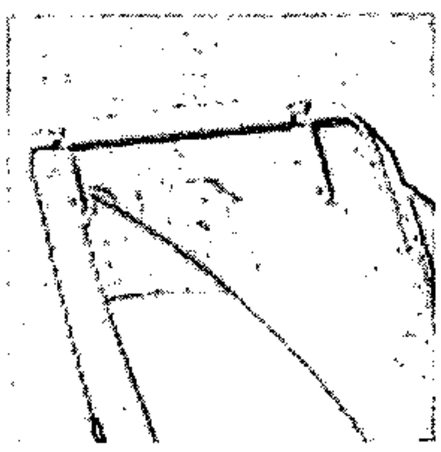


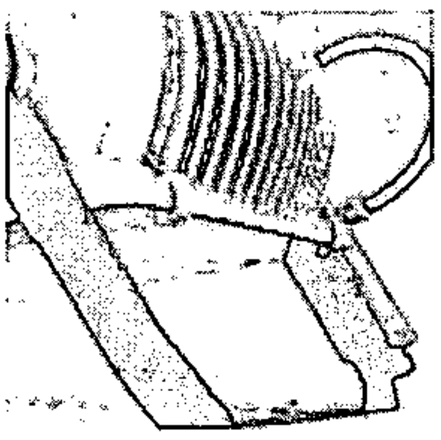
Protractor scale
At both sides of the floodlight housing a protractor scale is integrated in the aluminium housing.
The pointer of the blue cap indicates under which angle with the vertical plane the luminaire is installed.
The angle indications vary between –10 and +10 degrees.

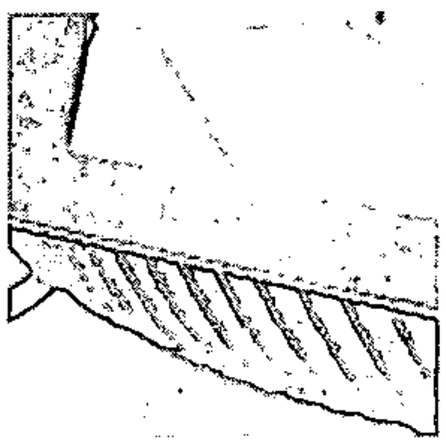
How to aim the floodlight is explained in chapter "Installation".
The specific aiming device is described in "Accessories".



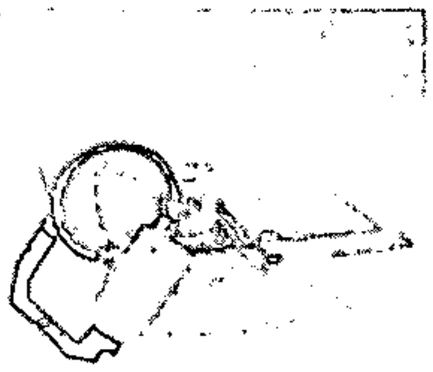
High reliability frontglass
All versions of OptiVision are equipped with a 4mm thick, thermally hardened glass.
It is often called safety-glass as it breaks in many, very small pieces. This type of glass fulfils the regulations as described in 598-2-5,6.8, IEC 2nd edition 1998-01.
The glass is fixed with 2 hinges and 4 stainless steel clips to the luminaire housing.





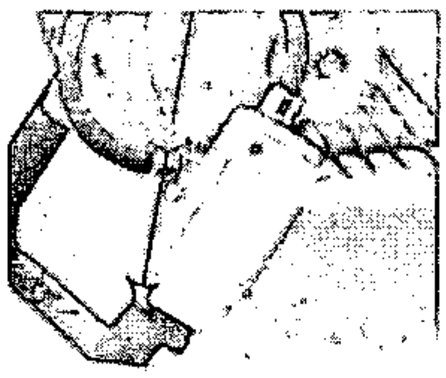


IP 65
A silicone rubber gasket around the glass guarantees a perfect sealing between housing and glass.
The luminaire is rated IP65.

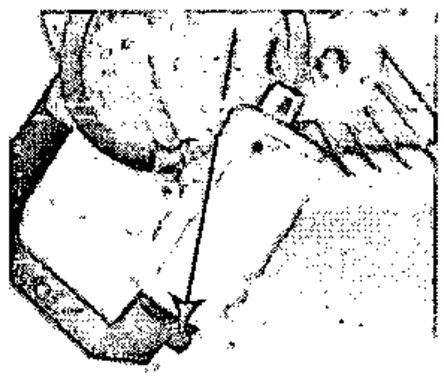


Connection box

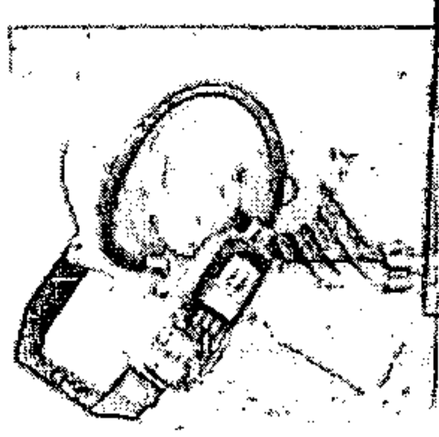
A separate aluminium connection box is permanently fixed to the mounting bracket.
It contains inside a five-or six-way terminal block, a polyamide gland PG16 for the incoming earth and lamp cables and a PG11 gland for the entry of the cable for the safety switch.
A cable gland PG16 can accept cable diameters between 10 and 14mm.
A PG 11 accepts diameters between 5 and 10mm.



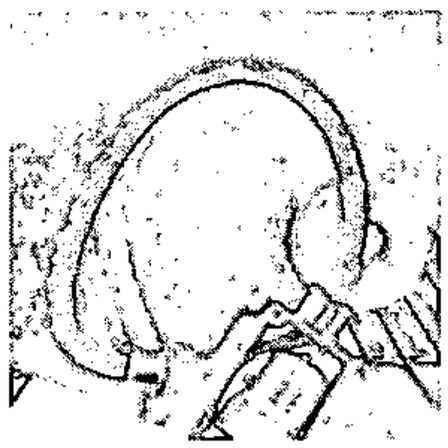
PG16 cable gland



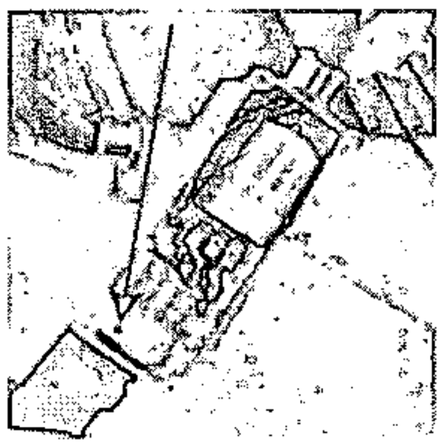
PG11 cable gland



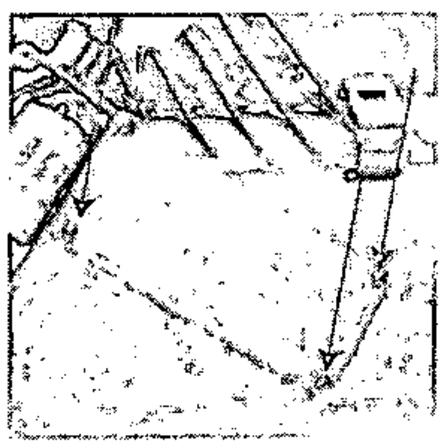
In case of MHN-LA 2000W lamps the connection box contains a series-ignitor.



PVDF hose

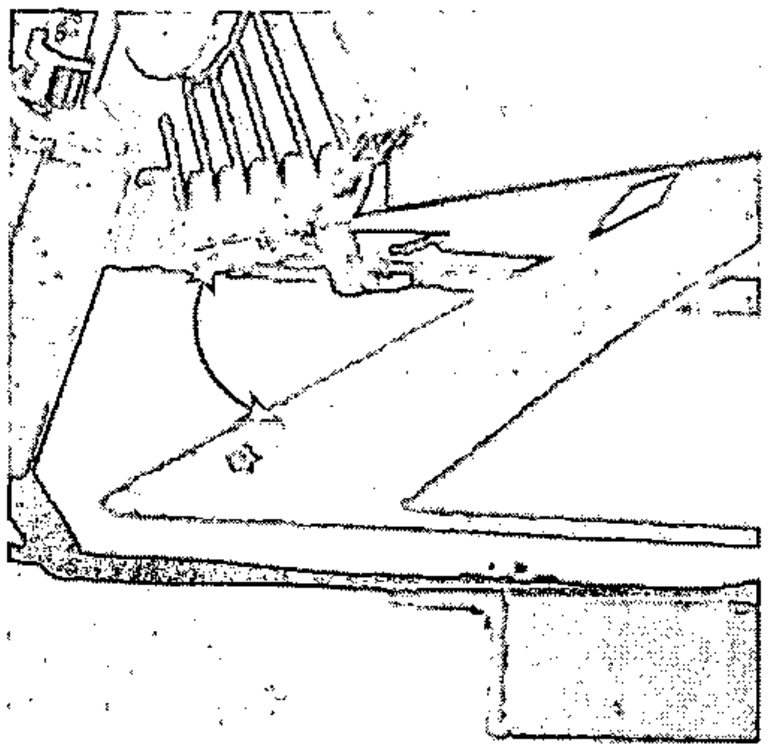


Breathing holes



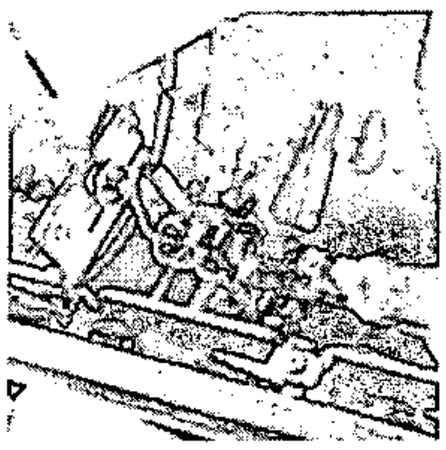
Anti-loss screws

Features
The lamp wires enter the floodlight via a PVDF hose between the connection box and the luminaire and are already connected to the lampholder(s).
The connection box serves as well as a breathing device for the luminaire.
Breathing is ensured by the small holes at the bottom of the connection box. If mounted correctly onto the bracket, the labyrinths around the holes prevent creeping water to come inside the connection box.
Anti-loss screws are used to mount the cover plate of the box to prevent them from falling down during installation work.
The box is classified IP44.

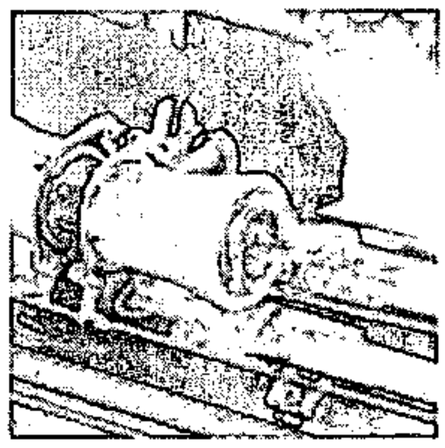


Safety switch

The built-in safety switch ensures – if connected – that the mains current is cut off as soon as the floodlight is opened.
A safety switch is mounted only in versions with MHN-LA lamps.
More information about the installation can be found in chapter "Installation, Cabling".



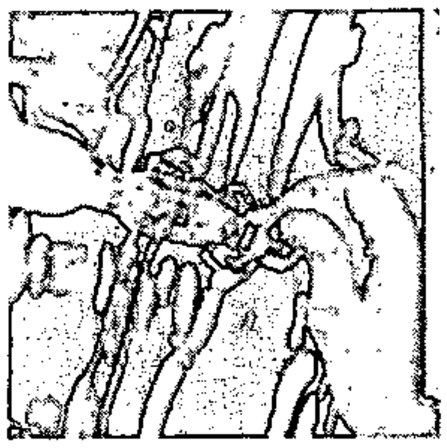
Lampholder MHN LA lamps



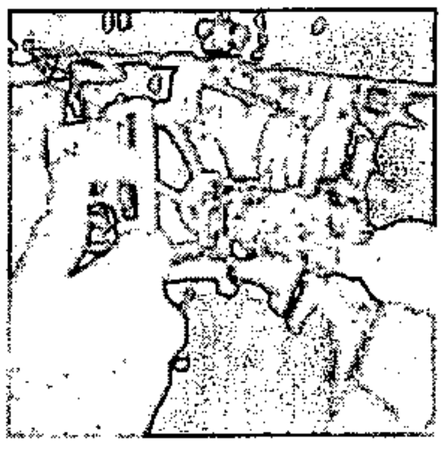
Lampholder SON-T lamps

Lamp fixation

Conceptually MHN-LA and SON-T lamps are completely different which ask for a different mechanical and electrical interface inside a luminaire.
In this chapter you find for each of the two lamps a description of the way they are electrically and mechanically fixed in the luminaire.
More information about Lamps can be found in chapter "Lamps".
More information about lamp replacement can be found in chapter "Installation, Relamping".



Mechanical fixation of MHN-LA lamps



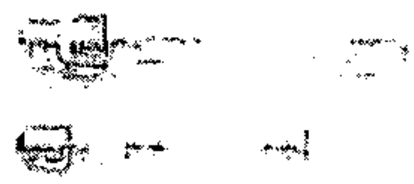
Electrical connection of MHN-LA lamps

MHN-LA

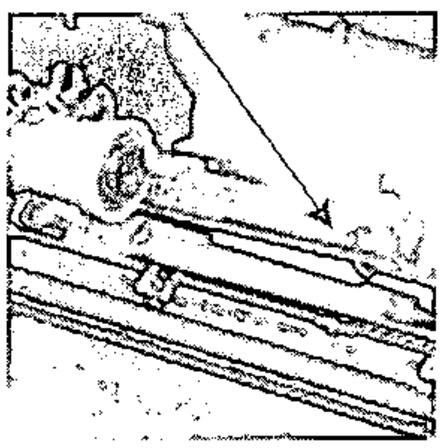
The fixation of both the MHN-LA 1000 W and 2000 W lamps is secured by two stainless steel "snap-in" spring clips. These clips determine the exact position of the lamp towards the reflector.
This ensures maximum profit out of the reflector system in terms of efficiency and beam control.
The electrical connection is made by putting the hooks of the the lamp under the stainless steel screws on the ceramic terminals at the sides. Then the screws must be carefully tightened by hand, and not with tools in order to avoid excessive force on lamp ends and terminals.

SON-T

The mechanical and electrical connection is assured by the Edison E40 lampbase. To ensure a correct lamp positioning towards the reflector an additional lamp support, which holds the outerbulb is added.



E40 lampbase



SON-T lampholder + lamp support

02/1792/DD

Lighting Design and Application Centre (LiDAC)

Project: **ST MARY'S COLLEGE**
- ATHLETICS TRACK FLOODLIGHTING

Project Number: **03-399**

12 March 2004

Dear Sir,

Further to your request to Roy Neale – Thorwill Ltd, I have the pleasure in submitting the Philips Lighting design proposal for the floodlighting of the Margate Athletics Track.

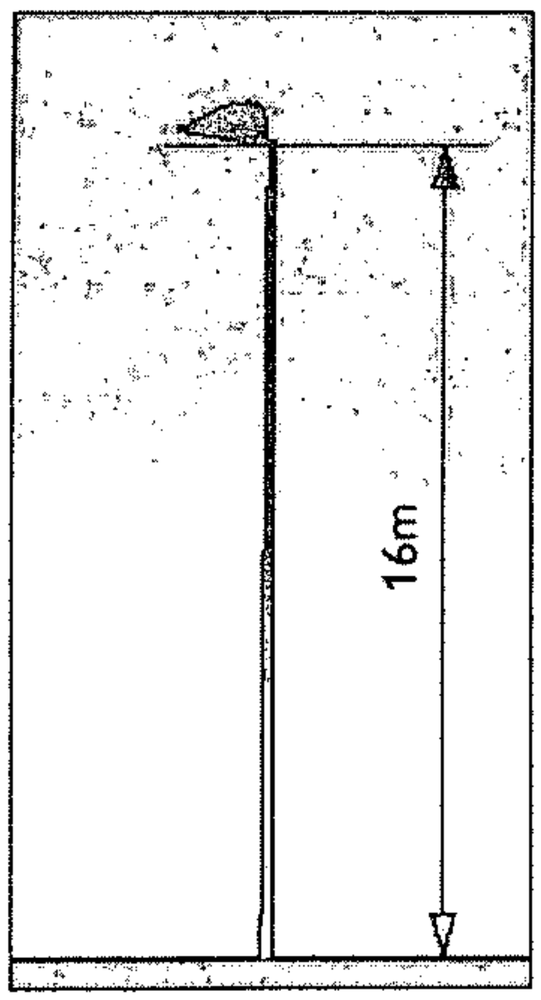
LIGHTING SPECIFICATION

The design has been conducted in accordance with the drawing information supplied. As per Thorwills instruction, an average illumination level of 100 lux to the athletics track has been observed, this being suitable for Class III recreational and school athletics activity.

DESIGN PROPOSAL

Columns

Quantity & height – 6 x 16.0 metre



Technical data

Luminaire data		Optivision MVP507
Ambient temperature °C		-20°C to 35°C outdoor
Classification	luminaire	IP 65
	connection box	IP 44
Complies with		IEC 598
Insulation class		I
Safety switch		yes
Max. vertical projected area (horizontal luminaire)		0,16 m²
Drag factor (Cw)		0,447
Weight luminaire (including lamp)	MHN-LA	17.2kg
	SON-T	17.3kg

only for MHN-LA

The figures about dragfactor are based on measurements with wind coming straight towards the frontside of the luminaire. The luminaire is positioned under an angle of 90 degrees with the vertical plane.

The horizontal force from the wind on a floodlight can be calculated according to following formula:

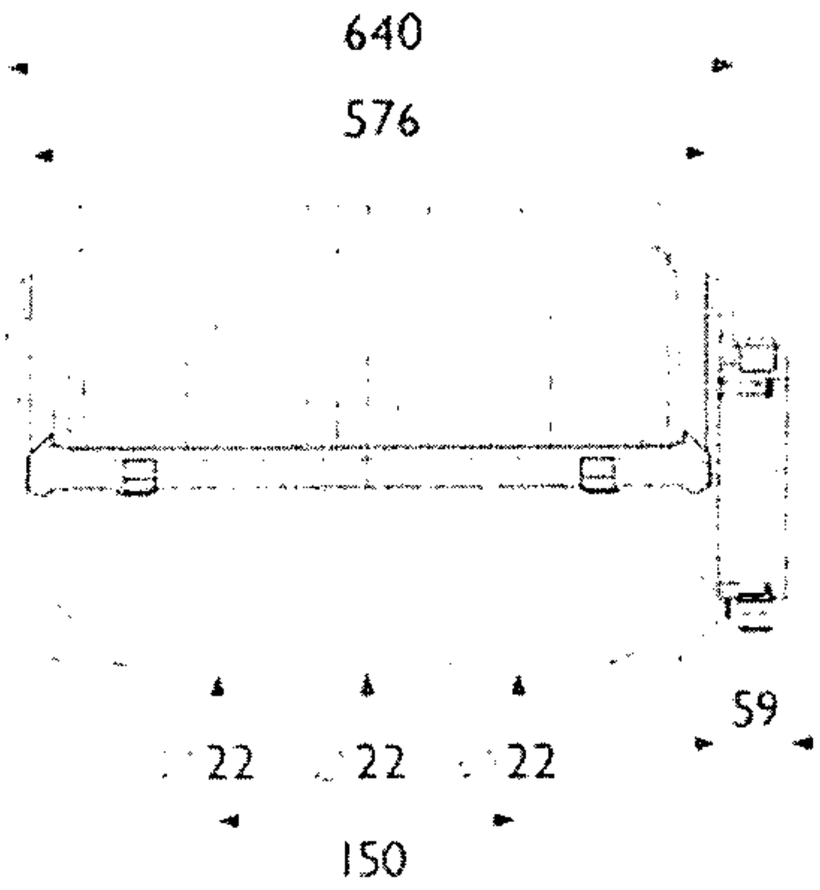
where W = horizontal force on the floodlight (N)
Cw = coefficient of wind resistance, shape factor or dragfactor of the floodlight
A = vertical projected area of the floodlight (m²)
Q = velocity pressure at the mounting height (N/m²)

The velocity pressure Q can be calculated according to following formula:

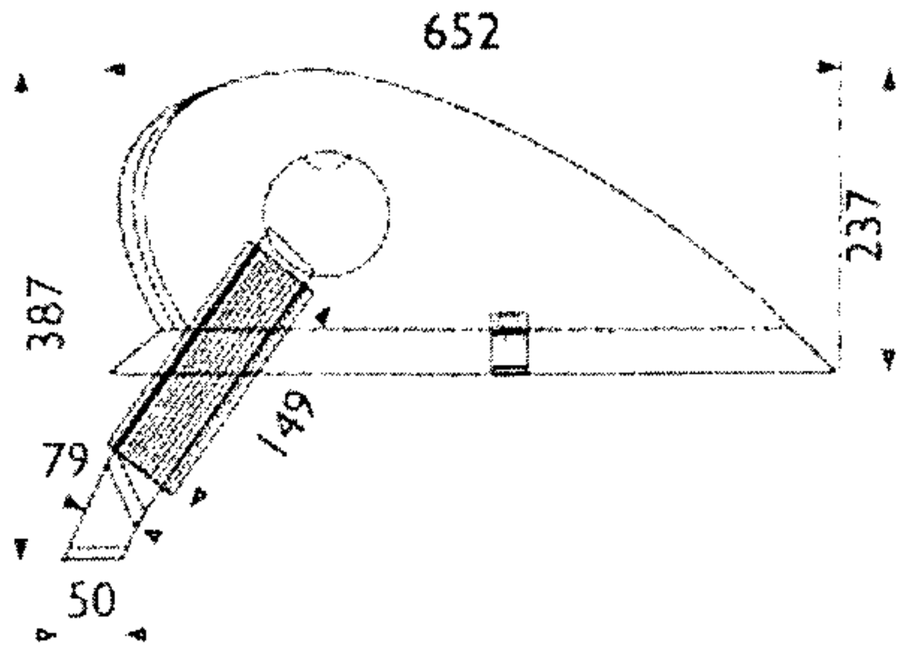
where K = air density (kg/m³)
V = windpsed at mounting height (m/s)

Drawings

OptiVision is the smallest asymmetric luminaire in the market that can accept up to a 2000W metal halide lamp and up to a 1000W SON-T lamp.



MVP507 backview



dimensions in mm

MVP507 sideview

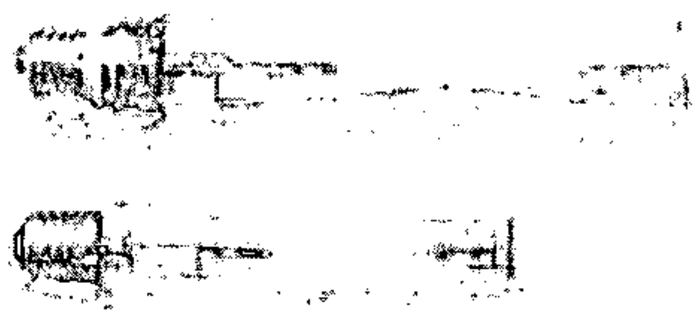
02/1792/DD

LAMP DETAILS

Product 02417921 DD1

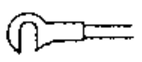
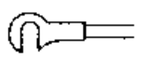
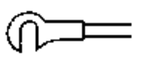
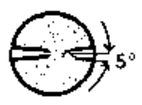
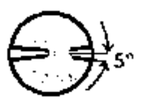
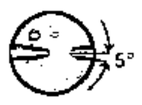
Lamps
- ☐ Technical table
- ☐ Drawings

MHN-LA 2000W
MHN-LA 1000W



SON-T 1000W
SON-T P 600W

The MHN-LA lamps have been specially developed to meet the demanding requirements of sports lighting and floodlighting applications.
Having no outer bulb, the lamps allow the design of more compact luminaire systems.
The prefocussed brackets on the lamp, together with the compact discharge tube and precision optics, create a well defined and controlled beam.
All lamps have a unique double pinch seal construction allowing cool running of the outer pinches and ensuring long lamp life.
SON-T(-P) lamps offer reliable and long-lasting operation. Combined with their very high efficiency, SON lamps are an ideal choice in application with long burning hours and where running costs are of [illegible]

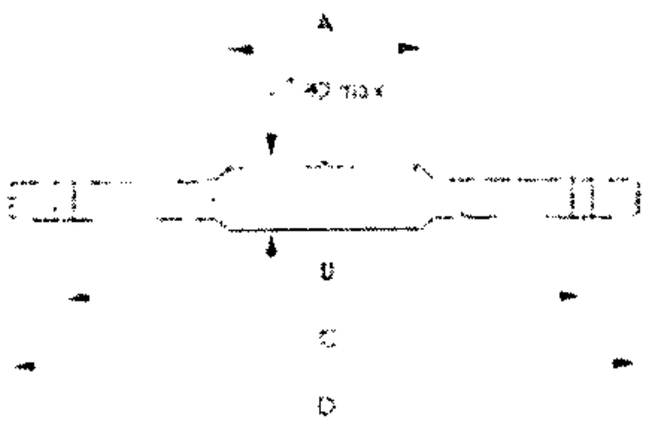
MHN-LA	1000W/842	1000W/956	2000W/842	2000W/956
Light properties				
Luminous flux (Lm)	100.000	90.000	220.000	190.000
Colour temperature (K)	4200	5600	4200	5600
Colour rendering index	80	90	80	90
Electrical data				
Mains voltage	220-240 V	220-240 V	380-415 V	380-415 V
Average lamp watts	1040 W	1040 W	2040 W	2040 W
Average lamp voltage	125 V	125 V	235 V	225 V
Max.current during starting	15 A	15 A	15 A	15 A
Average lamp current	9.3 A	9.3 A	9.6 A	10.3 A
Lifetime				
Life expectancy based on 50 % failures (hrs)	10000	10000	12000	12000
Lamp maintenance (%) at 100 hrs	100	100	100	100
Lamp maintenance (%) at 1500 hrs	80	80	85	85
Mechanical data				
Lamp ends	hooks 	hooks 	hooks 	hooks 
Net weight (g)	140	140	170	170
Burning position	5° 	5° 	5° 	5° 
Starting behavior				
Run-up time (min)	4	4	4	4
Re-ignition time (min)	max 15	max 15	max 15	max 15
Lamp temperature				
Max. permissible bulb temperature (°C)	920	920	920	920
Max. permissible lamp base temp (°C)	350	350	350	350

SON-T-P	SON-T-P 600W	SON-T 1000W
Light properties		
Luminous flux (Lm)	90.000	130.000
Temperature colour (K)	2000	2000
Colour rendering index (Ra)	20	25
Electrical data		
Mains voltage	220-240 V	220-240 V
Average lamp watts	600 W	1000 W
Max.current during starting	8.7 A	14 A
Average lamp current	5.8 A	10.6 A
Lifetime		
Life expectancy at <10% failures (hrs)	16.000	14.000
Lamp maintenance (%) at 100 hrs	100	100
Lamp maintenance (%) at 1500 hrs	95	95
Mechanical data		
Lamp cap/base	E40	E40
Net weight (g)	190	404
Burning position	universal	universal
Starting behavior		
Run-up time (min)	10	6
Re-ignition time (min)	1	4

Drawings

Find here technical drawings and dimensions of MHN-LA lamps 1000W and 2000W lamps, SON-T-P 600W and SON-T 1000W.

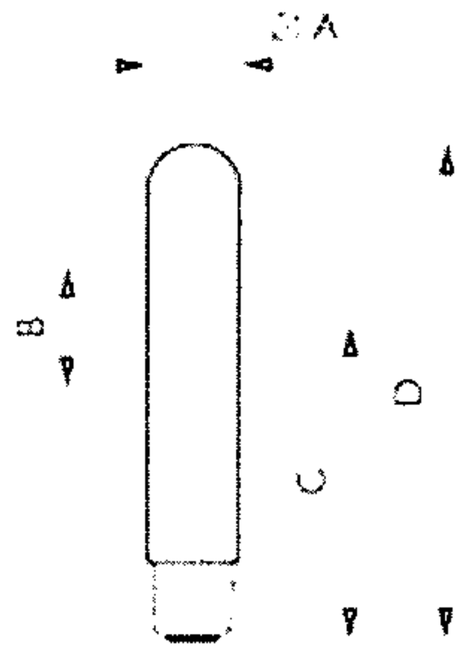
dimensions in mm



Type	A	B	C	D
	mm		max	
MHN-LA 1000W/230V E40 SUPERCAP T	42.5	126.5±1.0	295.0	165.0±3.0
MHN-LA 2000W 400V E40 SUPERCAP T	42.5	126.5±1.0	295.0	165.0±3.0

MHN-LA 1000W and 2000W

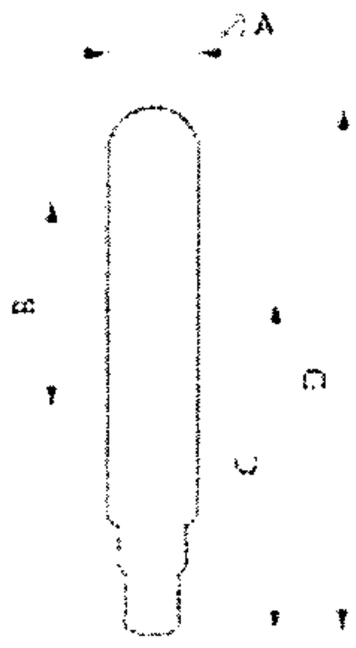
dimensions in mm



Type	A	B	C	D
	max	max		max
MASTER SON-T PIA Plus 600W	47.0	135.0	275.0	165.0

SON-T-P 600W

dimensions in mm



Type	A	B	C	D
	max	max	max	max
SON-T (E40) 1000W E40	46	153	240 +8	390

SON-T 1000W

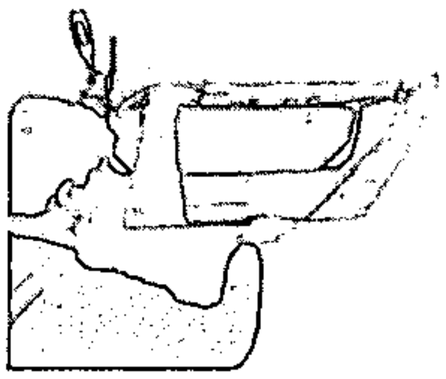
02/1792/DD1

SERVICE & MAINTENANCE

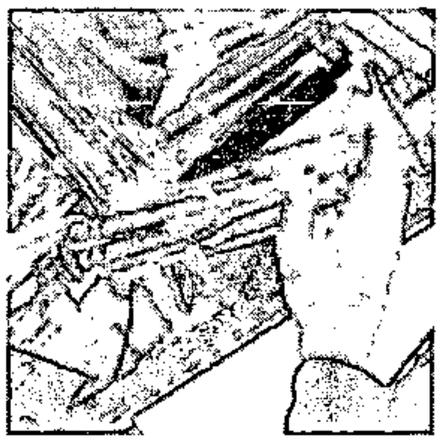
02/1792/DD

Practical guide

- ☐ Relamping
- ☐ Cleaning
- ☐ Spareparts



Although the luminaire is constructed in such a way that the need for service and maintenance is reduced to a minimum, the utmost has been done to facilitate this work: glass-opening with help of clips, well proved method of hinging the frontglass, hingeable side-reflectors, [illegible] lampholders.



Relamping

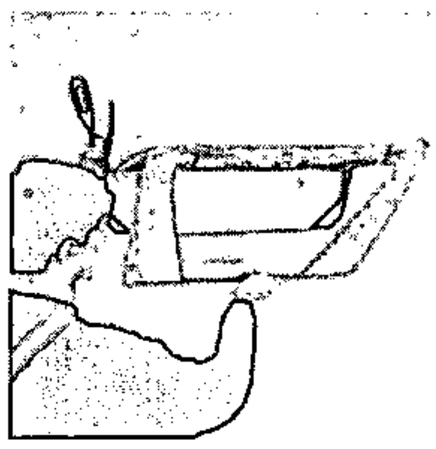
At the moment of relamping the floodlight is normally only accessible by climbing into a mast (or by using a sky worker).

In the remainder of this chapter a step-by-step procedure for replacement of both SON-T and MHN-LA lamps is described.

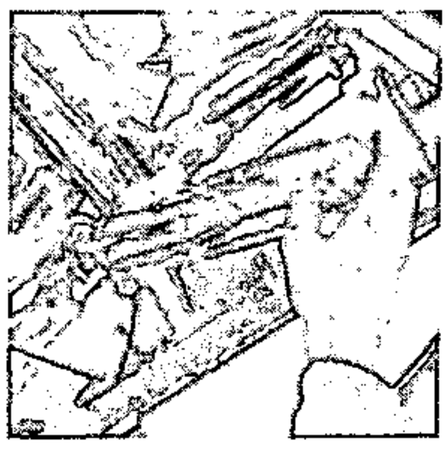
SON-T

How to replace a SON-T lamp is described in the sequence of images below. Do not touch the reflector with bare hands to avoid fingerprints on the reflector.

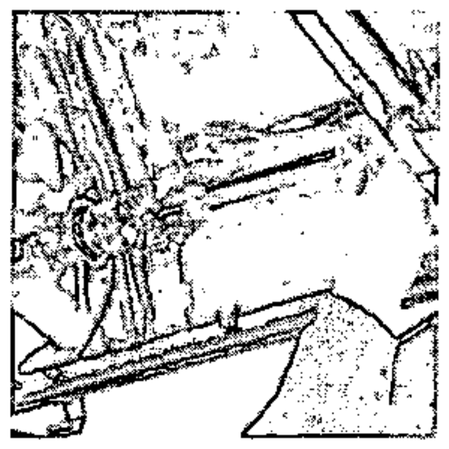
1- Release 4 clips



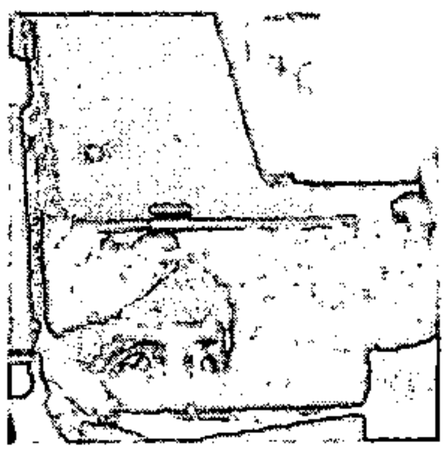
2- Open front glass with aid of hinge



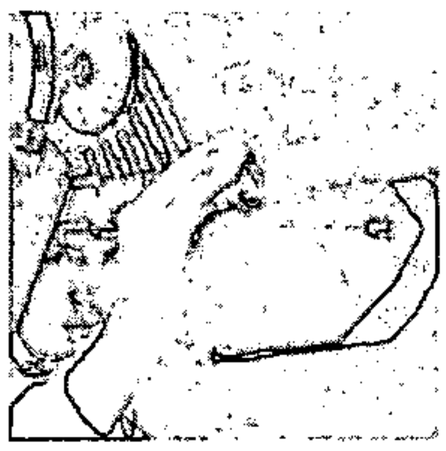
3- Unscrew lamp



4- Place new lamp



5- Close glass with 2 clips at backside

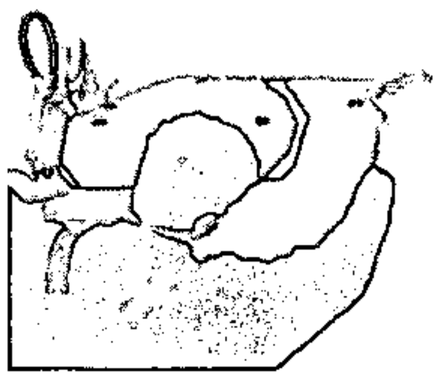


6- Close clips at both sides

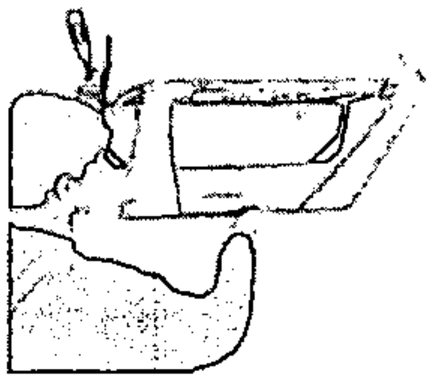
7- Clean front glass

MHN-LA

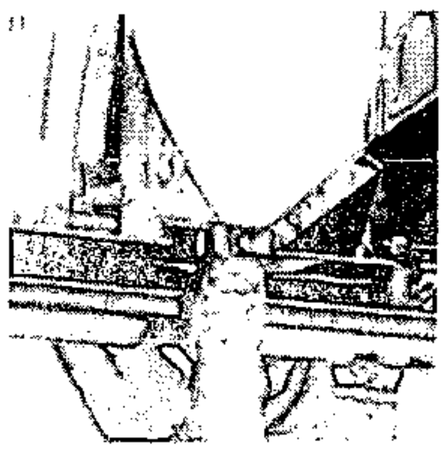
How to replace a MHN-LA lamp is described in the sequence of images below. Do not touch the reflector with bare hands to avoid fingerprints on the reflector.
More information about frontglass and cleaning frontglass are available.



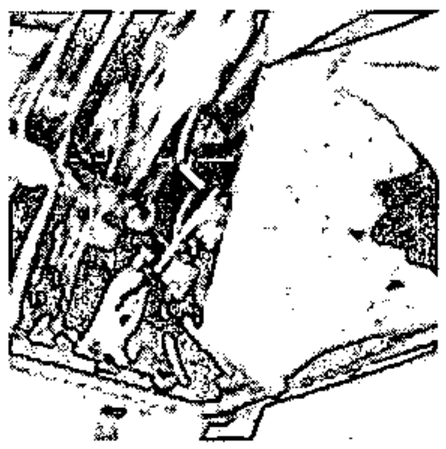
1- Release 4 clips



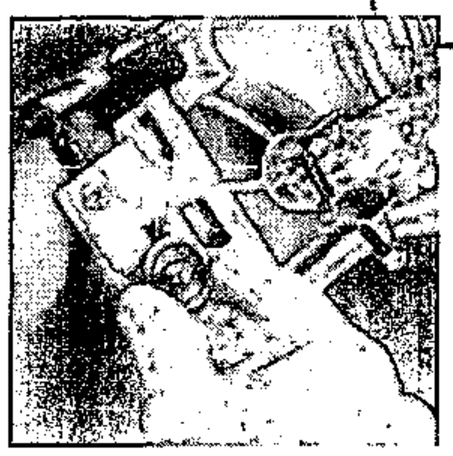
2- Open front glass with aid of hinge



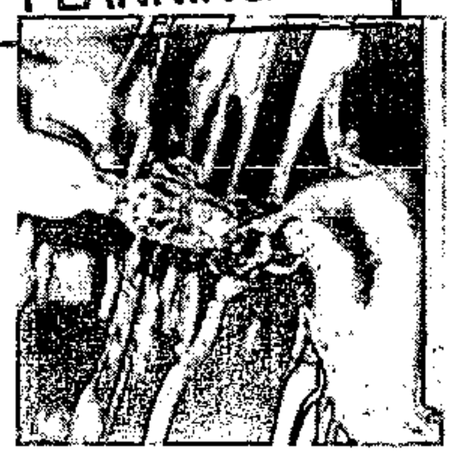
3- Push on reflector clips



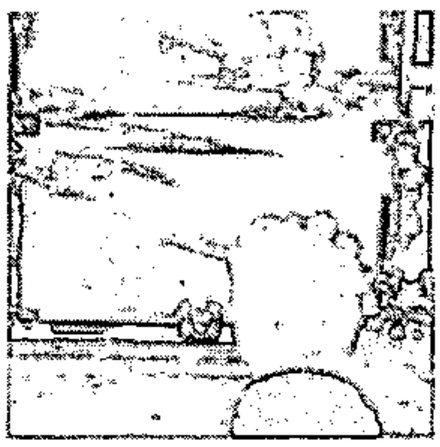
4- Open side reflectors



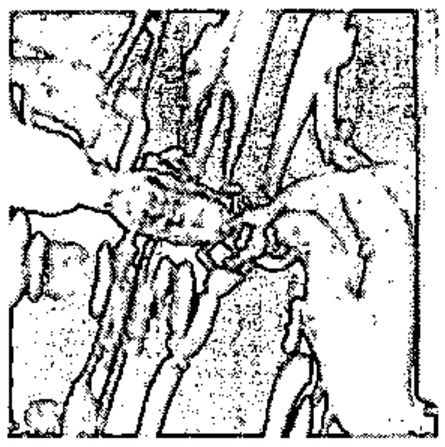
5- Unscrew lamp ends



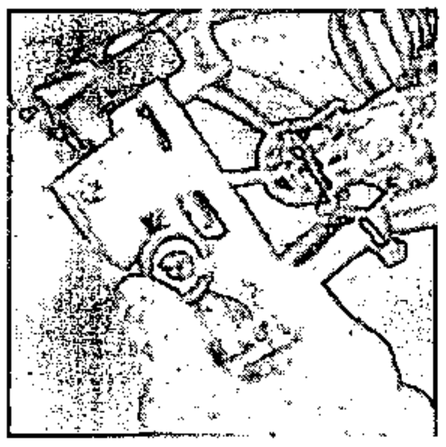
6- Release mechanical clips



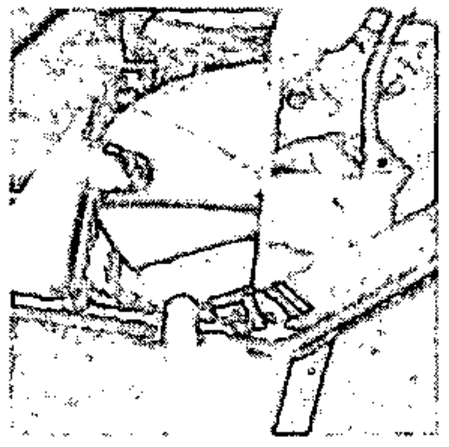
7- Replace lamp
The lamp brackets are designed in such a way that they can hold the lamp without even closing the clips. This allows you to continuously work with two hands.



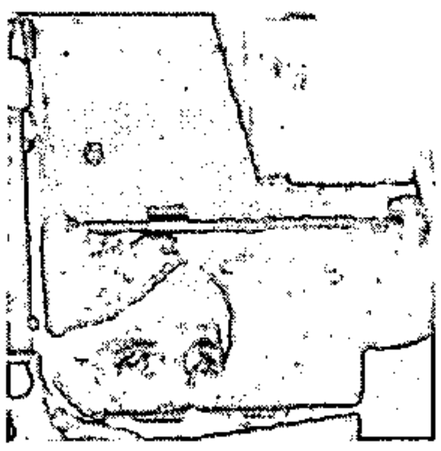
8- Close clips



9- Screw lamp ends

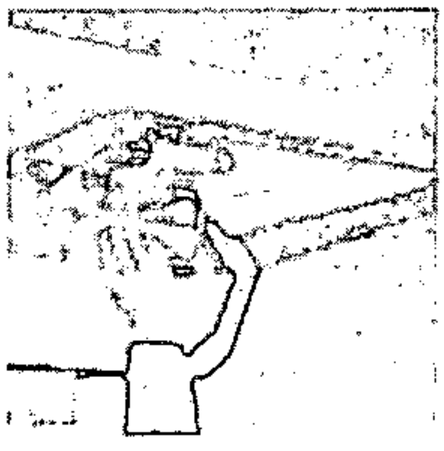


10- Close reflector
Make sure the reflector is hold by its reflector clips (see step 3).



11- Close glass with 2 clips at backside

12- Close clips at both sides



13- Clean front glass

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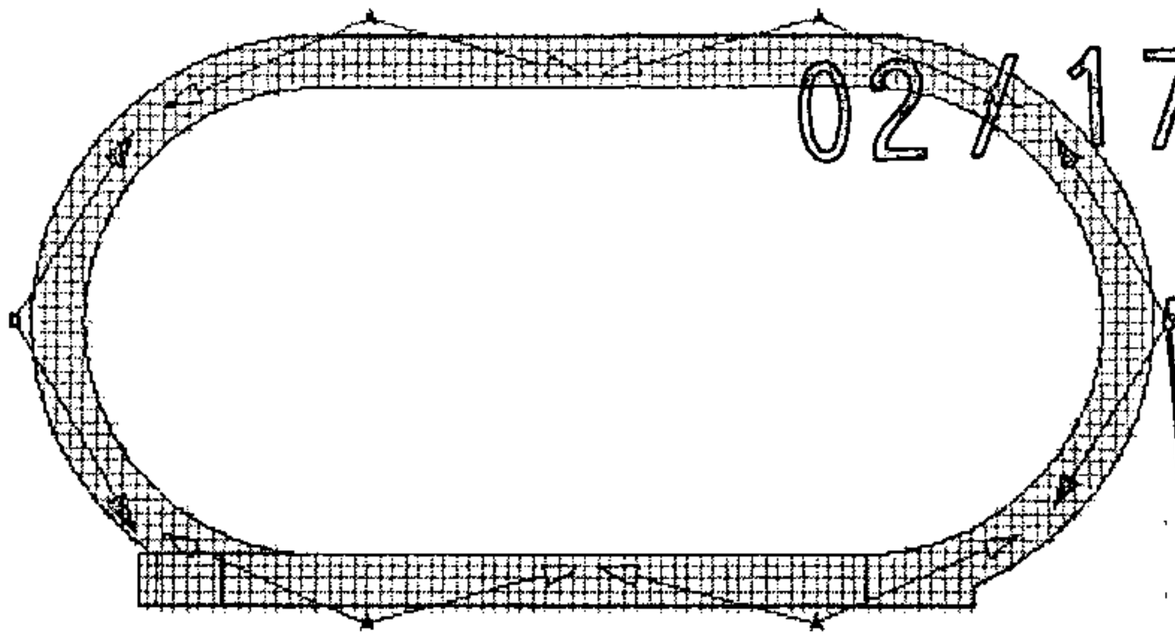
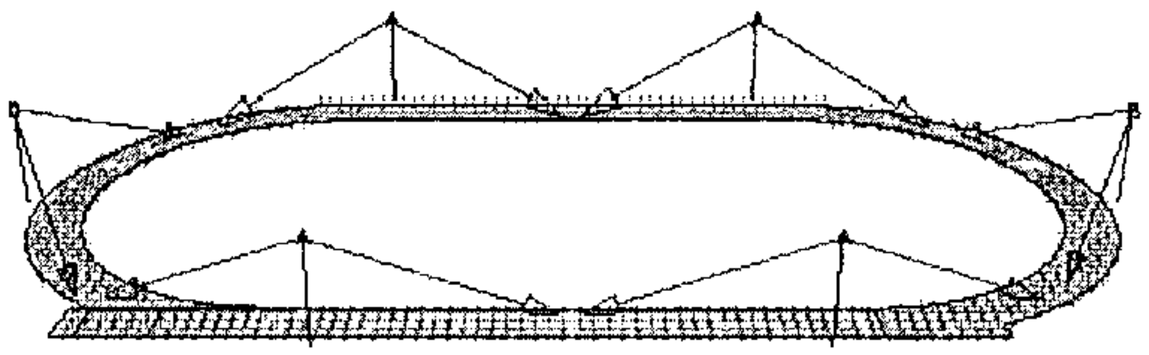
Column locations – Situated around the track as indicated below.

02/1792/ DD





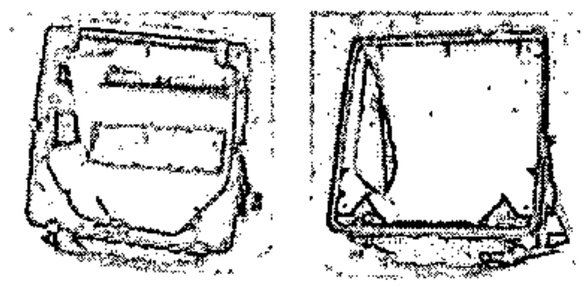
Luminaire

The Philips **'OptiVision' MVP507 MHN-LA2000W/842 400V** asymmetric (Flat glass) floodlight has been utilised. Philips 'OptiVision' is the latest evolution in sports floodlighting technology, its primary development focus in adhering to the European and UK industry guidelines for the reduction of light pollution.

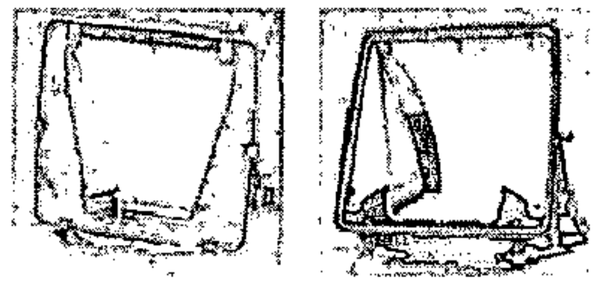
The Philips 'OptiVision' has been specifically developed for sports lighting applications with numerous installations both nationally and internationally. Detailed product information is enclosed for your appraisal.

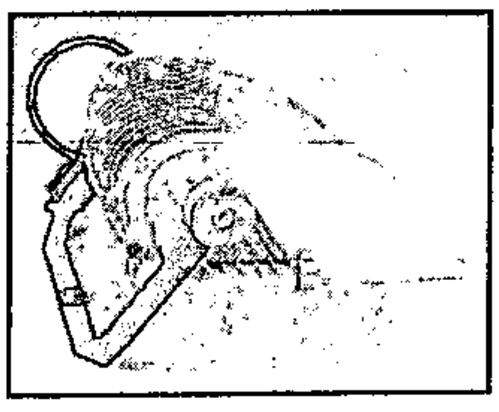
A total of **Twelve (12)** 'OptiVisions' are required for this project in the following beam configurations: -

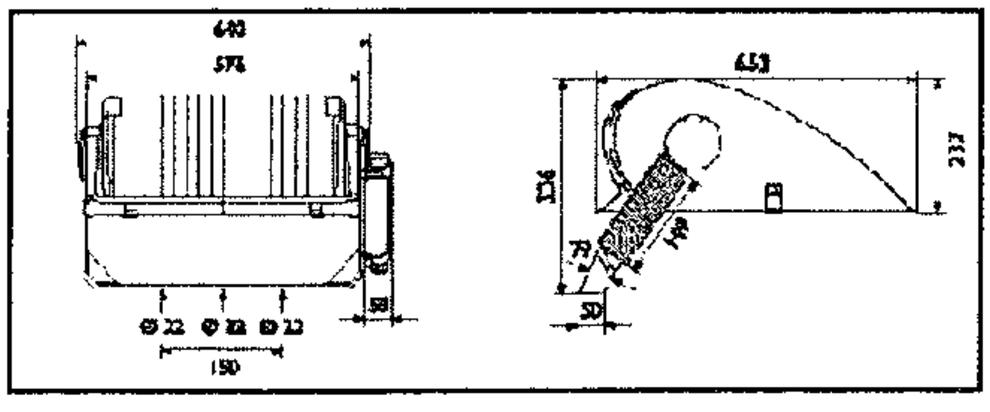
8 x Medium Beam

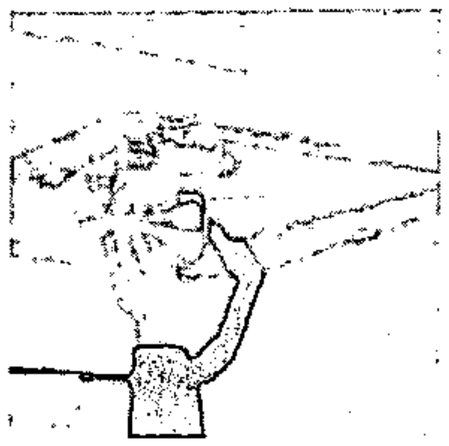


4 x Narrow Beam





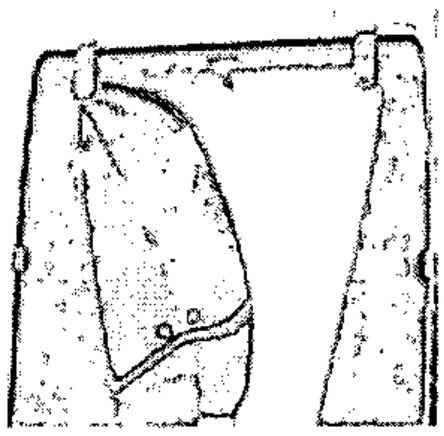




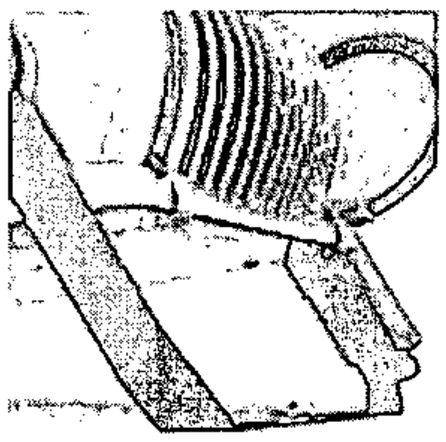
Cleaning inside the luminaire is not necessary as it is sealed to IP65.
Each time a lamp replacement takes place, it is adviced to clean the front glass with water.
The accumulation of dirt is an important facter of reduced light output.

List of spareparts

Spareparts have been predefined so that you can react quickly in case you might encounter problems.
Contact your local Philips representatives to order these spareparts.

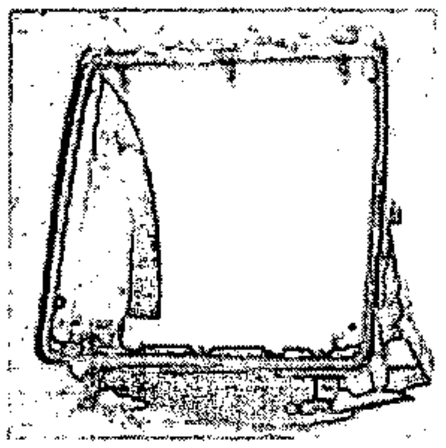


☐ assembly frontglass (glass including hinges and gasket)

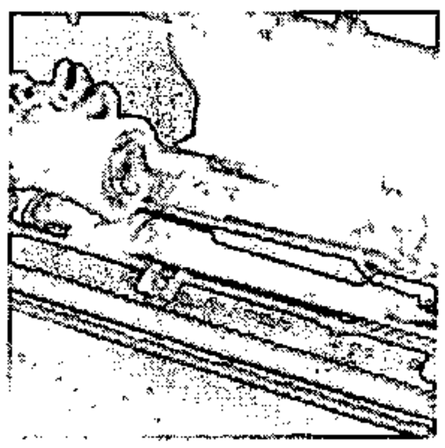


☐ set of clips (glass)

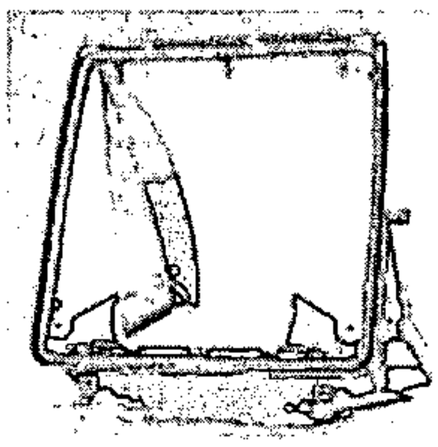
☐ lampholder 1000/2000W



☐ gasket

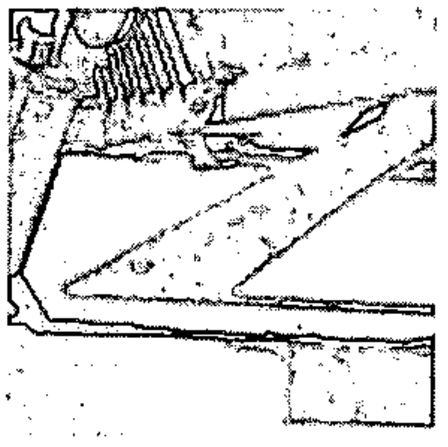


☐ lampholder E40

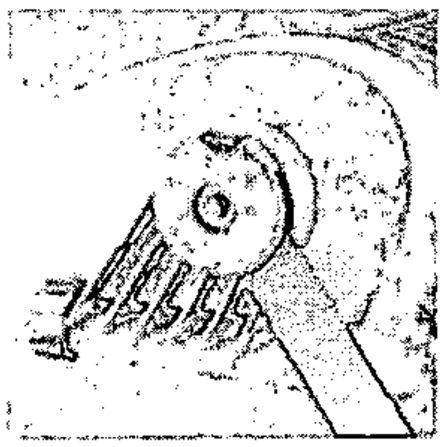


☐ side reflectors for narrow, medium and wide beam

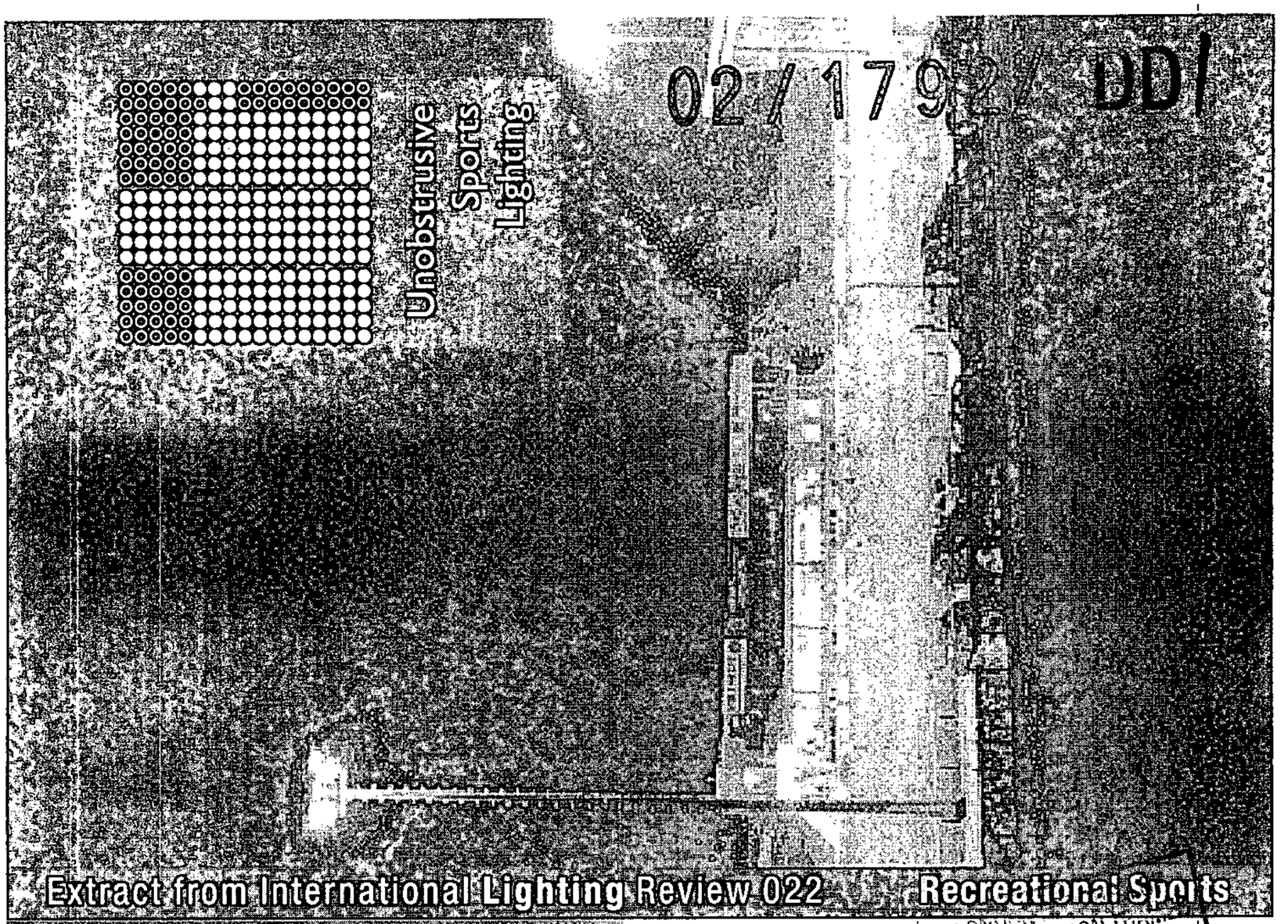
connection box
☐ 2000W 400V
☐ 1000W 230V MHN-LA / SON-T



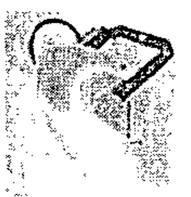
☐ safety switch



☐ Blue cap incl. screw and bolt



Tame your floodlighting with Optivision



Unobtrusive sports lighting

Steve Fotheringham

There is no need for sports-lighting systems to cause disturbance to local residents, provided the right measures are taken during the planning and design stages

Dealing with the problem of obtrusive light from sports-lighting installations is a challenge for lighting engineers. Sensitive areas around the facility must be identified, and the lighting designed to minimise the disturbance, while ensuring the system can meet the needs of players, spectators and broadcasters. Local authority planning departments also have a responsibility to address the issue of obtrusive lighting during the planning process, and installers must be aware of the regulations governing the operation of sports-lighting systems.

Obtrusive light

The term 'obtrusive light' is commonly used to describe the nuisance caused by poorly designed or poorly aimed lighting installations. This is often evidenced by the following: dazzle and reduction in visual performance; the fact that many people feel unsafe in poorly lit areas; and the fact that many people do not want their neighbourhood blighted by unnecessary lighting. Sports-lighting systems have the potential to cause all of these problems, especially if the correct design procedures are not followed. Poorly specified lighting systems have caused considerable annoyance to residents living near sports facilities. The amount of obstrusive light from a sports-lighting installation will depend upon the technical and environmental conditions.

Technical factors that contribute to obtrusive light include the design of the floodlighting system, the installation limitations and the aiming of floodlights.

Environmental factors include the reflectance properties of the surrounding area, the presence of trees and other screening objects, and the distance between the floodlighting system and the nearest sensitive receptor. The latter is particularly important, as the intensity of light from a floodlight decreases with the square of the distance between the floodlight and the point where the light is measured. Therefore, doubling the distance between a floodlight and a window will reduce the amount of light falling on the window to one quarter of its original value.

Types of light

The term 'light trespass' is often used to describe obtrusive light, but it is misleading. What we see is the light that is directly or indirectly being reflected from a surface or object, so the term 'light trespass' implies that the light has travelled through the air unseen. Only when we see the light source itself, or the reflection from a surface, do we realise that light is present. Therefore, a more appropriate term is 'spill light', which describes light that falls outside the area it is intended to illuminate.

Direct light

Light that enters our homes or falls on vertical surfaces outside the sports facility. This results in increased lighting levels both indoors and out.

Upward light or reflection

The glare or brightness we experience when looking in the direction of the light source.

Environmental zones

Lighting should only be used when the light of natural day does not provide enough for the activity. This is why we utilise artificial lighting when it is dark. Sometimes, however, there is a need for, and clear benefit from, lighting in areas that are naturally dark.

Zone E1 *Intrinsically dark areas* – national parks and protected sites

Zone E2 *Low brightness areas* – industrial and mixed residential areas

Zone E3 *Medium brightness areas* – urban industrial and residential suburban areas

Zone E4 *High brightness areas* – urban centres of cities and commercial developments

The ambient lighting found in city centres is higher than that in rural areas or national parks. Therefore the limits placed on obtrusive light are higher for the former (E4) than for the latter (E1), while maintaining the same overall lighting appearance. The consequence of using the environmental zones as part of an obtrusive light control is that local planning departments must consider in which zone the affected property should be placed. The procedure for a conservative method for doing this is as follows:

1. Choose a preset or preexisting the existing environment
2. Classify whole environment area by zones E1 to E4
3. Define a lumen or candela plan for the use of light in the surrounded area

This creates an umbrella under which planning requests can be considered and monitored against clear performance criteria. It is this aspect that will produce one of the greatest challenges for local planning authorities, who are faced with integrating this new definition with existing regulations and dealing with the contradictions it brings.

Other considerations

Time restriction

Another aspect to be considered is that of time restrictions in order that local residents are not disturbed at all hours of the night. Curfew hours can be set, for example, between 2300 and 0700, a common sleep period, during which fewer permitted levels of spill light come into force.

Daytime appearance

And finally, the daytime appearance of the lighting system can be disturbing. This can be the case where large floodlight arrangements are erected, especially if the installation calls for large-diameter columns able to withstand storm and wind loads. Or where mast heights are far greater than those of the houses and buildings around them.

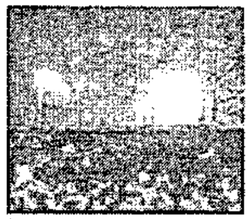
National recommendations

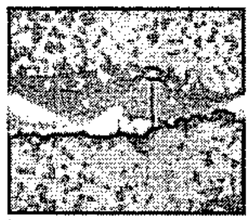
During the past ten years, many countries have developed recommendations for dealing with obtrusive light. While these are all largely in agreement as to how to tackle the problem, the actual values recommended for different zones

1, 2 Obtrusive light is the result of poorly designed floodlighting systems. Here, the floodlights are not correctly aimed, and the lighting is causing disturbance to residents

3 Floodlights should be aimed so that the edge of the beam falls within the boundary of the sports facility

4 Many sports facilities are located close to residential areas (courtesy Sport England)





to local expectations of what is tolerable. The CIE recommendation of TC 5.12, now in the final-draft stage, uses the above framework to provide the incentive for the widespread adoption of this subject in lighting engineering and practice.

Possible solutions

Some solutions to the problem of obtrusive light adopted in past years has been to employ louvres, to reduce column height, and to employ special floodlight types.

Louvres

Louvres, or light cut-off devices, can be employed to exclude light from adjacent properties.

When adding louvres to an existing installation, they will increase the weight and projected area of the floodlight arrangement. It is important from a safety point of view to ensure that columns are not overloaded. This should be verified with the column manufacturer before considering the use of louvres. In some cases louvres will cause a reduction in the lighting level and uniformity on the field of play. A lighting designer will be able to verify if the lighting system will still meet the sports federation's recommended performance after installation of the louvres.

Where new installations are concerned, other solutions are usually available before considering the use of floodlights fitted with louvres.

Reduced column height

Keeping the height of the lighting columns in scale with the size of adjacent properties is one way of improving the daytime appearance of an installation. It will certainly reduce the cost of the installation, provided the lighting specifications for the sport can be met. But it will usually result in increased spill light and upward light, and create an even greater brightness appearance of the installation. This is because the lighting designer is obliged to tilt the floodlights more to produce the required lighting level and uniformity to meet the specified illuminance and uniformity criteria of the sport.

Special floodlight types

In recent years, the term asymmetrical flat glass floodlight (e.g. internally at 65° to the downward vertical) has been used to describe the only type of floodlight capable of dealing with obtrusive light. But in fact any type of floodlight can be employed, provided it produces the required performance against the stated specifications.

Lighting design

A lighting designer will only serve the needs of the users if he/she has the appropriate experience of each type of sport in which the customer has the lighting. The lighting designer will consider the most appropriate location and height for the floodlights in order to distribute light over the playing surface and to limit the amount of obtrusive light. In general, the fewer columns or structures used, the greater the required mounting height. However, in terms of floodlight distance from the nearest sensitive receptor, in general, the floodlights that will produce the lowest lighting uniformity for a maximum number of luminaires for a given specification will also be those that, otherwise, direct spill or stray light in their form, create a higher percentage of their light directly onto the target area – the sports field. These types of lighting systems tend to be specifically designed for sports use, where the performance of the lamp, optical system and floodlight are matched to produce far higher performance than general purpose floodlighting. The lighting designer will require the following information, in addition to the normal specification for the sports field:

1. Obstrusive light parameters required
   - Sky glow
   - Spill light on vertical plane
   - Brightness or reference to installation
2. Location, orientation and height of building to be considered for obtrusive light
3. Any proposed zone to be used
4. Curfew times

The lighting designer's role is to deliver the best performance possible to balance all needs and to verify by measurement that the installed system is adjusted, tested and delivers the intended results. A professional design bureau will be able to provide all the above services.

In some cases, properties to be considered as requiring the obtrusive light requirements may be so close to the lighting installation that a suitable solution cannot be found. In such lighting engineers can also be consulted. Solutions to [illegible] without avoiding obtrusive light can be more than just the proper choice of lighting equipment. All these [illegible] area planners to [illegible] with the [illegible] community in mind.

Design

Introducing a floodlight that neutralizes obtrusive light and has a compact, aerodynamic form for increased efficiency and decreased weight

OptiVision

The refurbishing of recreational sports areas and environmental and public locations requiring visible management of the impact of the floodlighting installation has formulated a set of recommendations regarding optimum use of light. Many local authorities in both Europe and the United States are seeking to reduce the amount of stray light. For this reason, the designers of the new luminaire, OptiVision MVF 307, identified obtrusive light as a pressing environmental issue. OptiVision is specifically for lighting of sports facilities such as football pitches, tennis courts and athletics tracks.

Spill light reduction Philips Lighting's former product manager for Sports Marketing, Martin Beckmann, explains: "Recreational sports facilities are in urban environments, meaning that they will potentially have more people travelling by and living close to the surroundings of the pitch, so limiting the amount of light landscape becomes very important. Spill light is light which comprises stray light falling outside the building and glare – light that is seen through the eyes and that would be felt to have a negative effect on the environment. Light pollution is [illegible] dated August 2000.

In the end we have a solution that produces three times less spill light than other asymmetric floodlights.

Optical system

The challenges to be met by the optical designers for creating an improved asymmetric floodlight were to improve light efficacy (the percentage of lamp flux that falls on the field), different beam widths for a broader application range, and a reduction in overall size for less weight and better aerodynamics. Rene Nelissen, optical designer at Philips, says: "The reflector material is anodic, polished aluminium with a reflection factor of nearly 90%, so it minimizes flux losses and increases the light output ratio. And the cylindrical, rigid reflector shape of the main mirror gives good beam control with the metal halide lamps used in this luminaire, enabling us to focus the light more completely on the field. The main reflector surrounds as much as possible the lamp and reflected stray flux sent in front of the floodlight, so that the stray flux arises only from reflection off the front glass." The rear part of the main mirror is a parabola tilted at 60 degrees, which corresponds to [illegible] the angle of maximum intensity. [illegible] for more than 65 degrees or more gradually diverging back wards for the best performance of asymmetric luminaires. The lower lamp angle of OptiVision and the sharp cut-off characteristics of the beam mean that with the front glass set horizontally or tilted up to 10 degrees, almost no light is directed above 85 degrees.

Another advantage of a continuous smooth mirror shape is that the housing can be more easily moulded to follow the contour of the reflector. This means a smaller, lighter housing and more efficient heat transfer between mirror and housing. Extensive thermal analysis showed that cooling fins had to be added to the outside of the housing to ensure adequate thermal exchange when using 2kW lamps.

To offer flexibility in use, three different sets of deflectors provide narrow, medium and wide beam widths.

Housing design

Max Bembridge of Philips Design: "Weight reduction was emphasized to every component of the system, and the result is a unit that weighs less than any other comparable asymmetric floodlight. The height of the luminaire has also been reduced by over 30% compared to its predecessor, the MVF 307, so it is much more compact and easy to handle. Many of the technical components were redesigned to make the luminaire look less technical and more aesthetic. The emphasis is on smooth outlines and rounded corners, but functionality also remained very important." The overall design of the aluminium housing must protect two parts, shapes: the cylinder that carries through to the luminaire, aiming clamp and the wing shape of the optics.

The cooling fins follow the curve of the housing to enhance the flowing appearance, and the aerodynamic shape and reduced surface make a smaller vertical projected area and low wind resistance (drag coefficient 0.07).

This luminaire's optical system can be mounted on shorter poles than other luminaires of similar lighting power.

Emblazon on [illegible]: "The project began with the development of the optical system, so by the time the exterior designers became involved the shape of the housing was largely determined by the optics. In spite of this limitation they did an excellent job of producing a stylish, functional package." Because of its shape and construction, the luminaire is serviced from below rather than from the rear. The front glass is thinner than that used in the 307, which means additional weight reduction. Hinged at the front, the glass swings down by releasing four stainless steel clips. Special printing around the border of the glass gives the outline of the optics a smooth look, and the printing colour matches the housing for a uniform appearance.

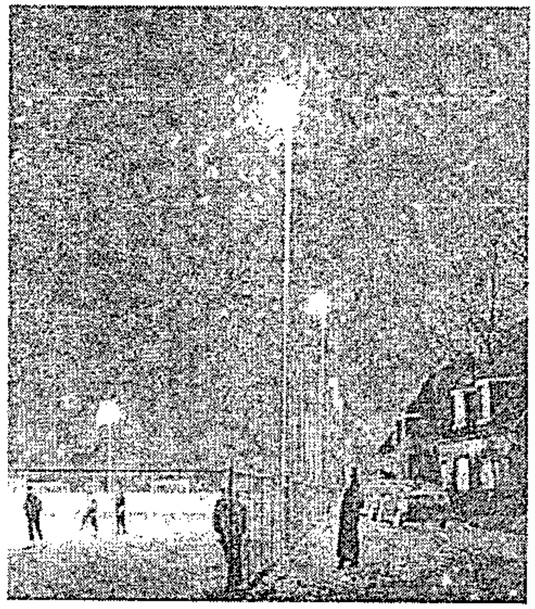
Added features

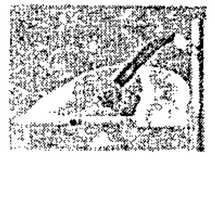
The reversible mounting bracket holds the luminaire from either above or below for quickly set each unit at the proper angle. A simple clamp device snaps on the side of the luminaire.

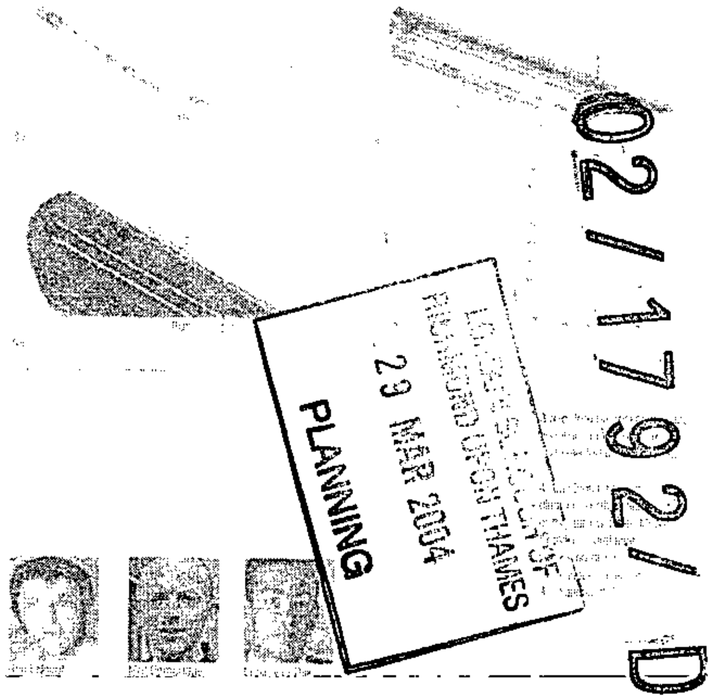
Remote ballast boxes are available. The attachable box mounts to the luminaire bracket and aligns perfectly with the housing for a streamlined appearance.

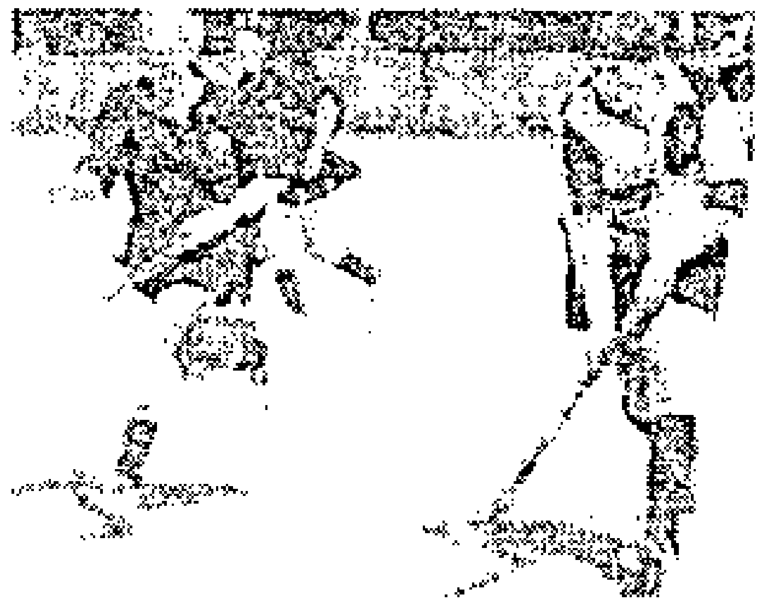
The luminaires fitted with the MBN-LX 2kW lamps for narrow and medium beam models have hinged side mirrors for good access when changing lamps ■

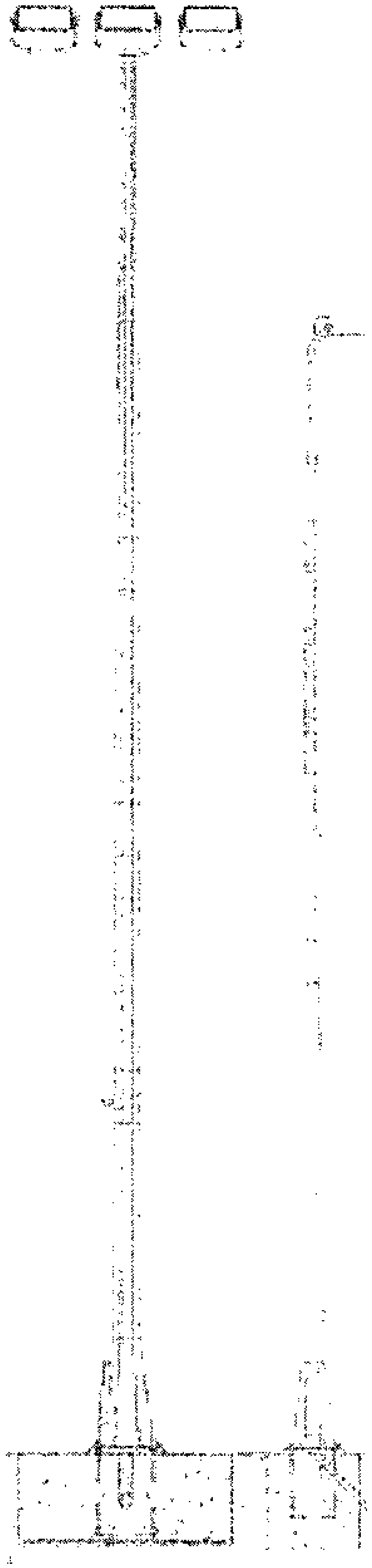
Multiside Options, Development Team: Project Management: [illegible] Optics: [illegible] Mechanical Design: [illegible] Material Development: [illegible] Product Planning: [illegible] Purchasing: [illegible] Production: [illegible]











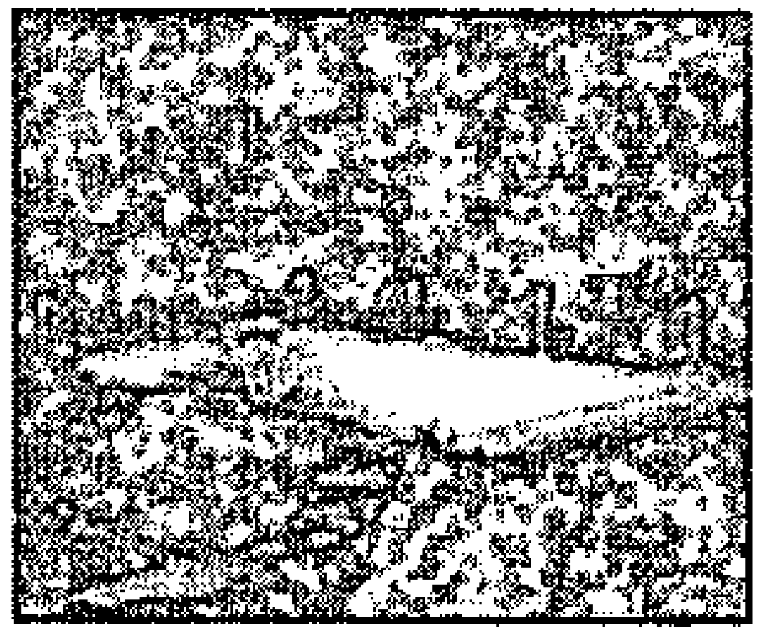
An all-weather sports pitch lit for hockey by a new range of asymmetric floodlights that eliminate wasted upward light and have excellent light cut-off outside the playing area

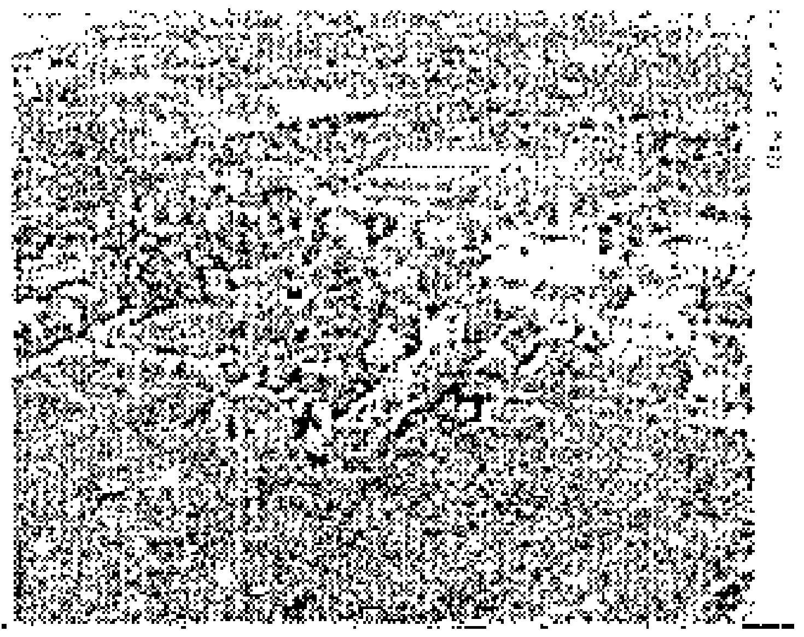
Lighting inside the lines

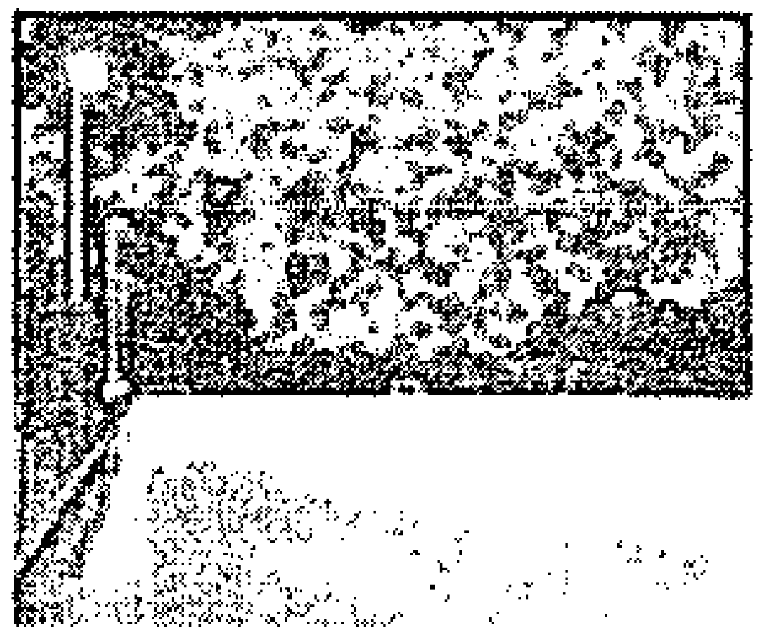
[illegible]

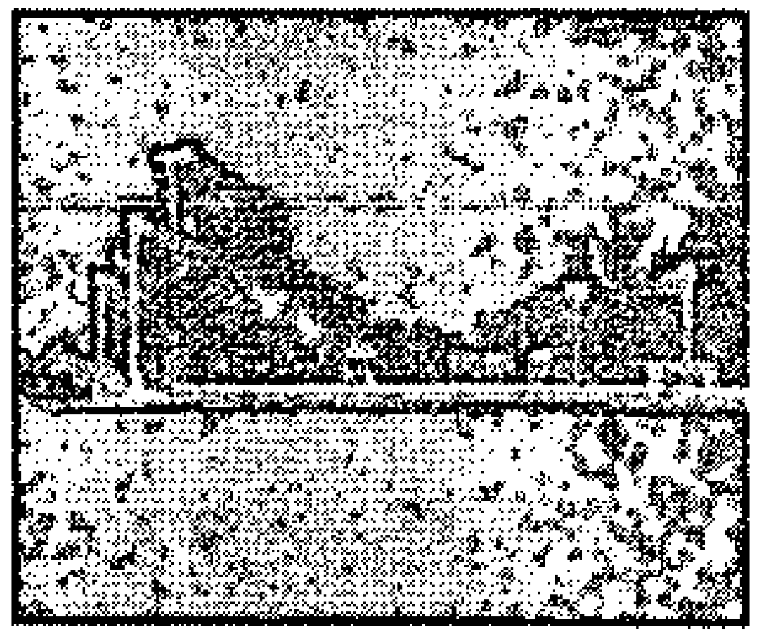
With only 24 floodlights, and 17 metre high poles, the [illegible] [illegible] and visibly less obtrusive

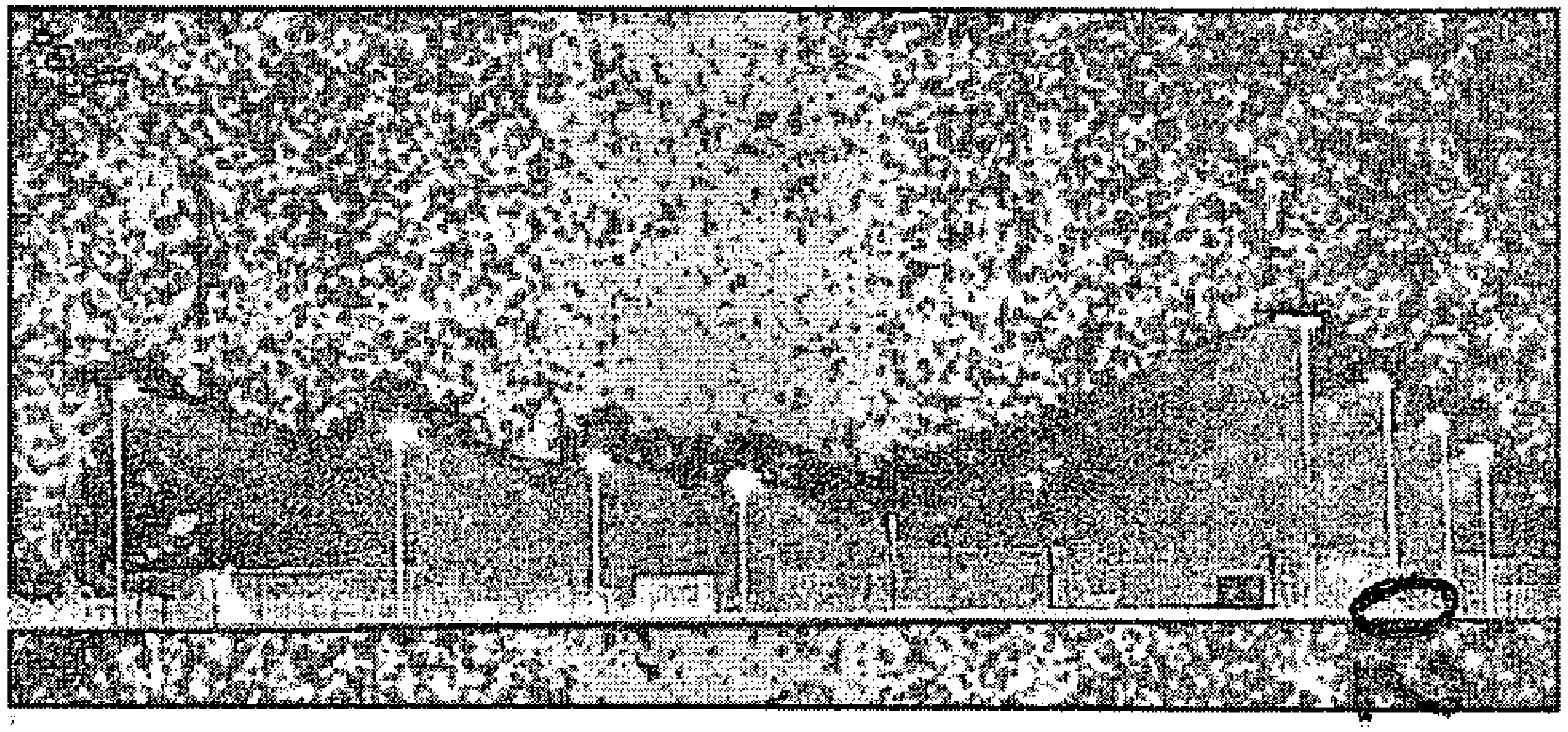
Christ's [illegible] school is a [illegible] leading school and charitable foundation in Hounslow, West [illegible] girls aged 11-18. The school began [illegible] years ago in London [illegible] for poor children; today it provides [illegible] place for [illegible] [illegible] floodlighting formed an integral part. The installation was completed in September 2003.











The Lighting

Because the sports field is in an area of low ambient light, the designer wanted to limit the amount of spill light into both the surrounding area and the night sky. Energy efficiency was also a major concern. In addition, local planning issues called for the total height of the floodlights to be as low as practically possible to minimize daytime visual intrusion.

As for light level, the design brief specified that the installation meet International Hockey Federation standards of 350 lux maintained average horizontal illuminance. The final design achieved the necessary illuminance on the 6000-square-metre field, using 24 medium beam width luminaires from Philips' new OptiVision MVP507 range of floodlights. Each incorporates a 2 kW double ended metal halide lamp (installed load 50.8 kW). Previously such a project would have required 28-30 floodlights to produce the same illumination, but OptiVision's highly efficient reflector system (LGR6064) and precise optical control allowed the design to be met with fewer floodlights, thus saving energy and installation costs. The smaller size, lower weight and reduced wind drag of the luminaire compared to similar asymmetric floodlights can also lead to savings on column structures and a lower visual obtrusiveness.

The floodlights are mounted on eight 17 m-high columns, four on each side of the pitch. With the bracket arrangement the resulting actual working height is 15.5m. Per the guidelines of the International Hockey Federation, the corner floodlight columns are set two metres past the goal lines. This ensures that all floodlights are aimed into the playing area, again curbing the amount of spill light. The main beam's asymmetric shape directs the light such that the luminaire can be installed with the front glass horizontal, eliminating the over spill into the surroundings and gives no direct upward light. For ease of maintenance and lamp replacement, the control gear is located at the base. All floodlight control gear fits into the base compartment of the columns so no need for extra cabinets to hold the equipment.

[illegible] Philips Lighting [illegible] received the Dark Skies award from the British Astronomical Association's Campaign for Dark Skies [illegible] for minimising light pollution from [illegible] installations. ●

[illegible]

LONDON BOROUGH OF RICHMOND UPON THAMES
29 MAR 2004
PLANNING

04/2792/DD1

02/1792/DD

PERFORMANCE CALCULATIONS

02/1792/DD)

ST MARY'S COLLEGE - ATHLETICS TRACK

PERFORMANCE RESULTS - 100 LUX SCHEME

Project code:	03-399
Date:	12-03-2004
Customer:	THORWILL LTD
Customer Representative:	MR ROY NEALE
Designer:	ANTONY COLLETT
Description:	COLUMNS

* 6 X 16.0 METRE

LUMINAIRES - REQUIRE 400V ELECTRICAL SUPPLY

* 4 X PHILIPS 'OPTIVISION' MVP507 NB MHN-LA2000W/842 400V
* 8 X PHILIPS 'OPTIVISION' MVP507 MB MHN-LA2000W/842 400V

The nominal values shown in this report are the result of precision calculations, based upon precisely positioned luminaires in a fixed relationship to each other and to the area under examination. In practice the values may vary due to tolerances on luminaires, luminaire positioning, reflection properties and electrical supply.

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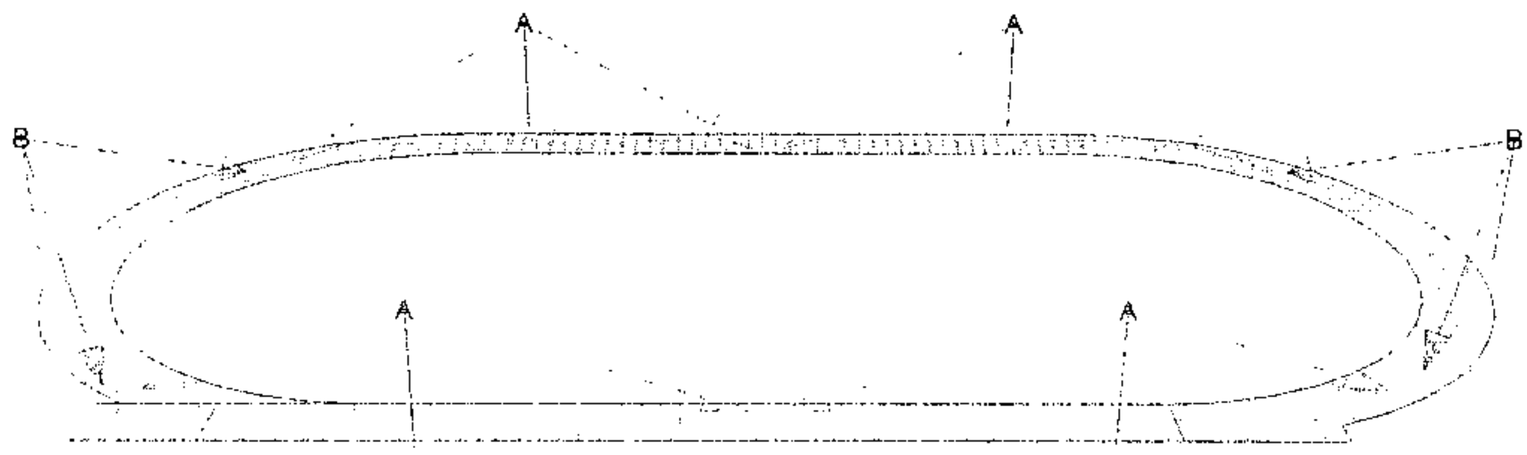
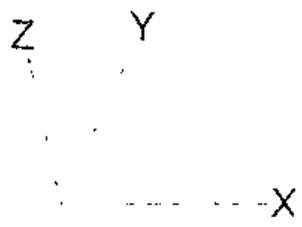
1. Project Description

02/1792/DD

1.1 3-D Project Overview

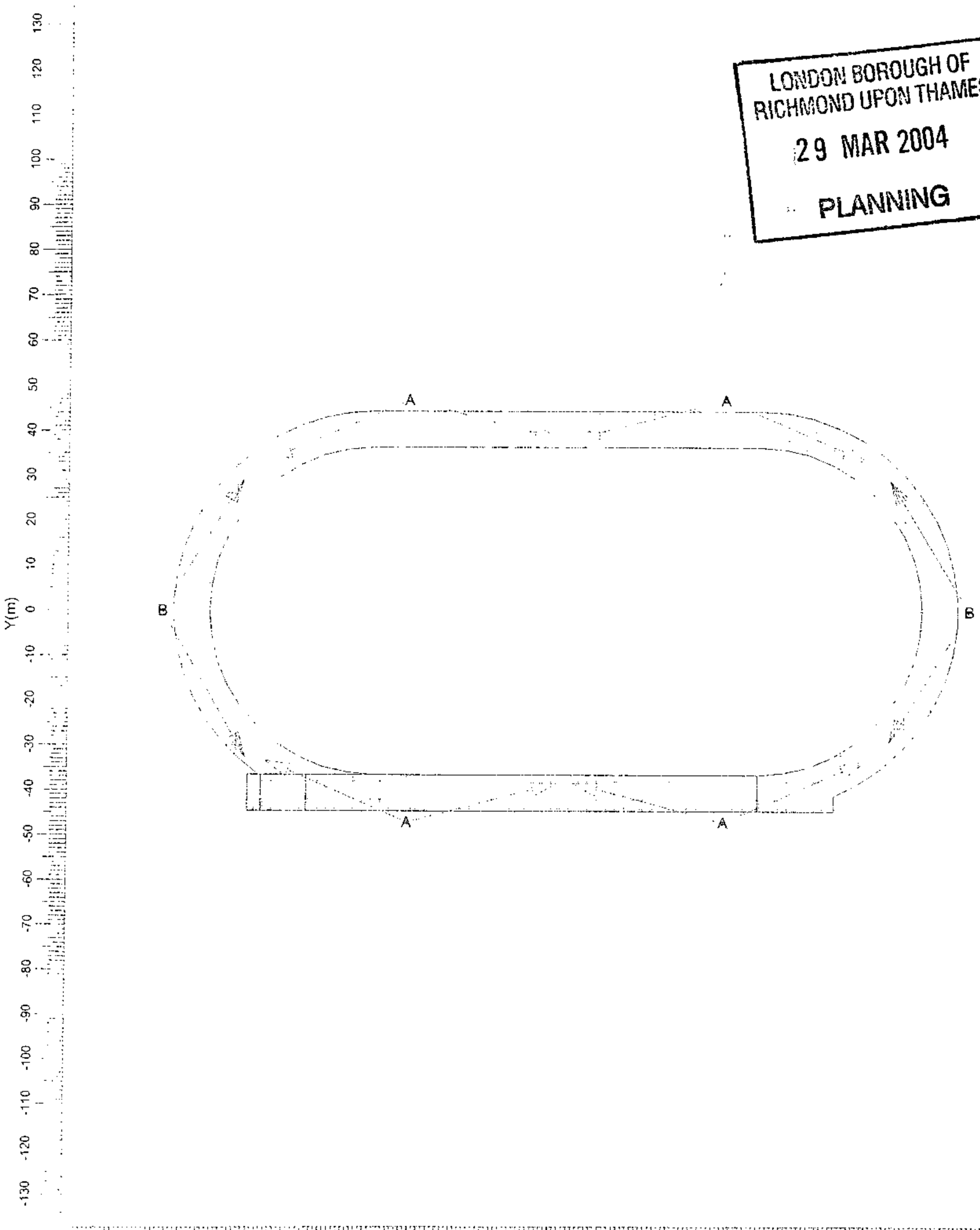




A	MVP507 MB
B	MVP507 NB

02/1792/DD

1.2 Top Project Overview



A MVP507 MB
B MVP507 NB

Scale
1:1250

02/1732/DD

Lamp

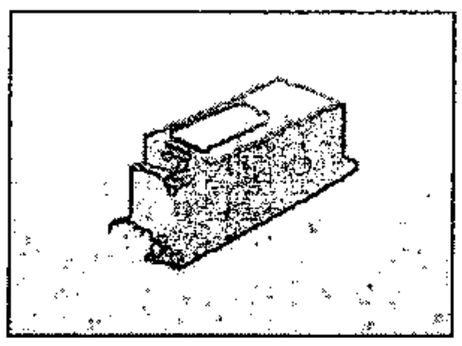
The Philips **MHN-LA 2000W/842 400V** metal halide lamp has excellent colour rendering properties (Ra.80) and a cool white colour appearance of 4200°K. These characteristics allow for a smooth transition between daylight and the artificial lighting and ensure a well-presented visual scene for both players and spectators. The average lamp life is **12,000 hours**, which for sports lighting applications is excellent.

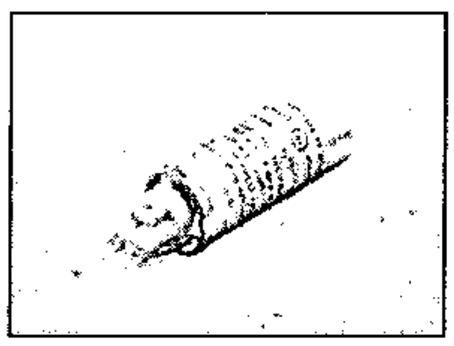
The time at which lamps will require replacement can be simply calculated by dividing the average lamp life (12,000 hrs) by the number of hours that the installation will be used per year. From experience, this time can range from 10-15+ years.

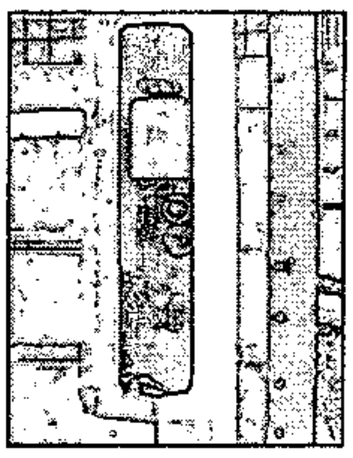
Philips MHN-LA Metal Halide Lamp

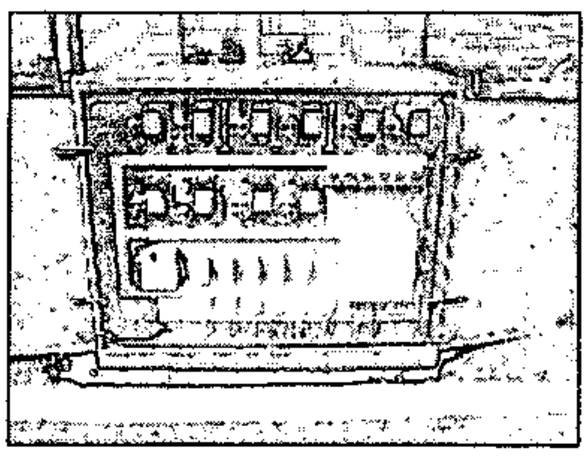
Control Gear

The control gear components, ballast and capacitors are supplied as standard in loose format allowing for fixation into either the base of each column or in to separate control cabinets For the 2kW 'OptiVision' the ignitor is housed next to the floodlight in the connection box.









2. Summary

2.1 General Information

The overall maintenance factor used for this project is 0.79.

2.2 Project Luminaires

Code	Qty	Luminaire Type	Lamp Type	Power (W)	Flux (lm)
A	8	MVP507 MB	1 * MHN-LA2000W/842	2100.0	1 * 220000
B	4	MVP507 NB	1 * MHN-LA2000W/842	2100.0	1 * 220000

The total installed power: 25.20 (kWatt)

Number of Luminaires Per Arrangement:

Arrangement	Luminaire Code A	Luminaire Code B	Power (kWatt)
Bends1	0	1	2.10
Bends2	0	1	2.10
Bends3	0	1	2.10
Bends4	0	1	2.10
Straight	8	0	16.80

2.3 Calculation Results

(Il)luminance Calculations:

Calculation	Type	Unit	Ave	Min/Ave
Athletic Track	Surface Illuminance	lux	111	0.66

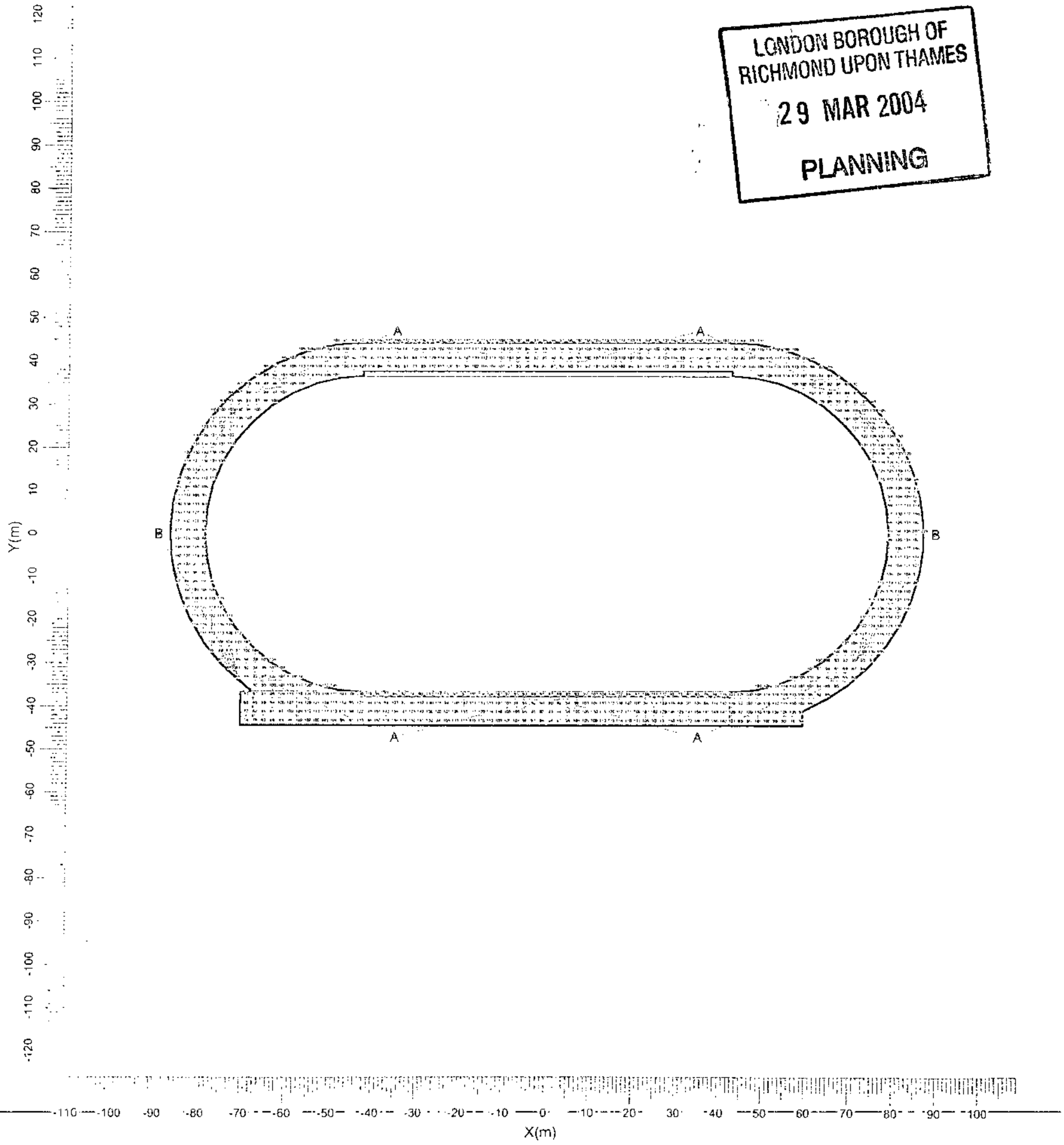
Obtrusive Light Calculations:

The upward light ratio (ULR) is 0.00.

3. Calculation Results

3.1 Athletic Track: Graphical Table

Grid : Athletic Track at Z = 0.00 m
Calculation : Surface Illuminance (lux)

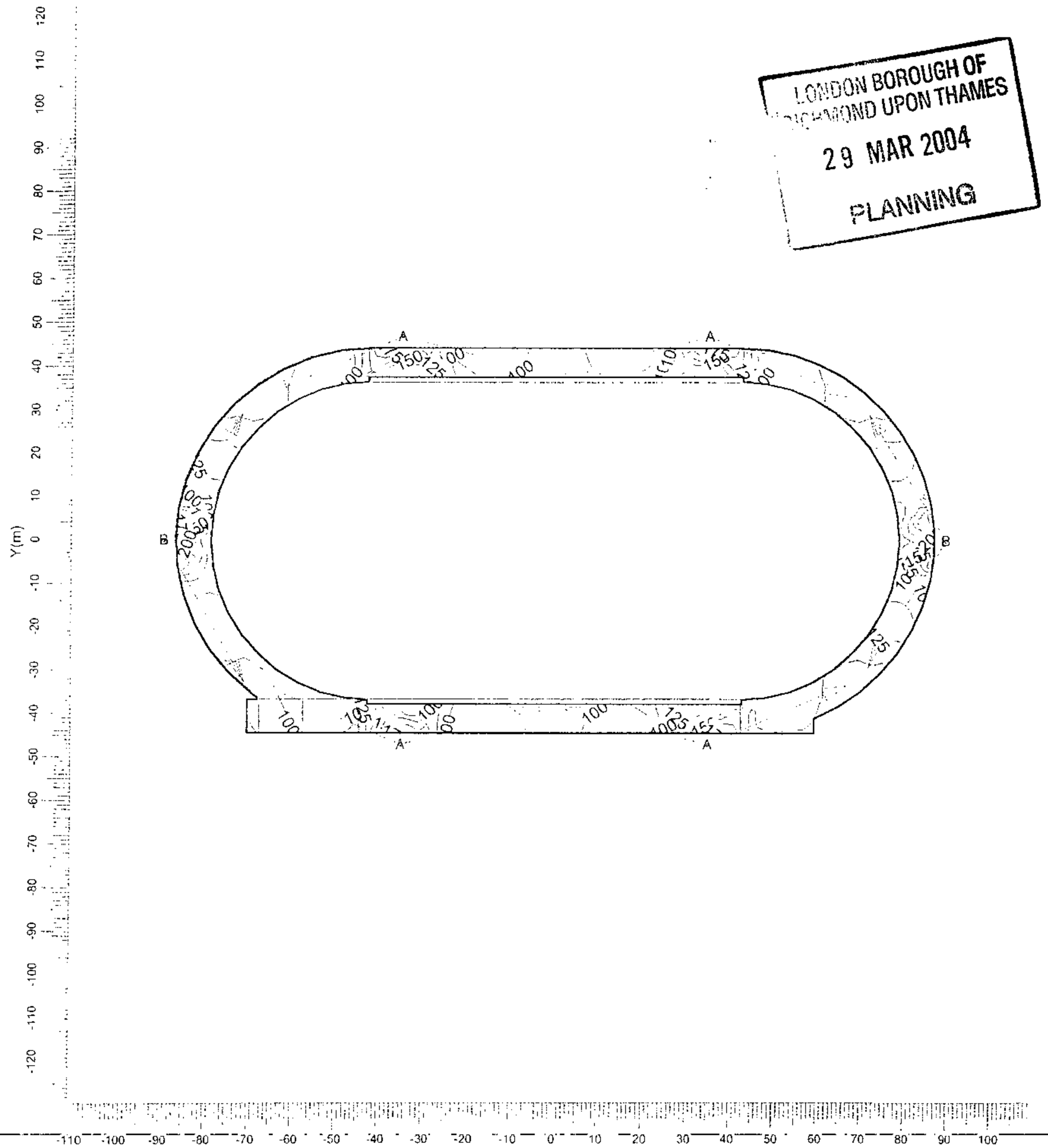


A	MVP507 MB
B	MVP507 NB

Average	Min/Ave	Project maintenance factor	Scale
111	0.66	0.79	1:1250

3.2 Athletic Track: Iso Contour

Grid : Athletic Track at Z = 0.00 m
Calculation : Surface Illuminance (lux)

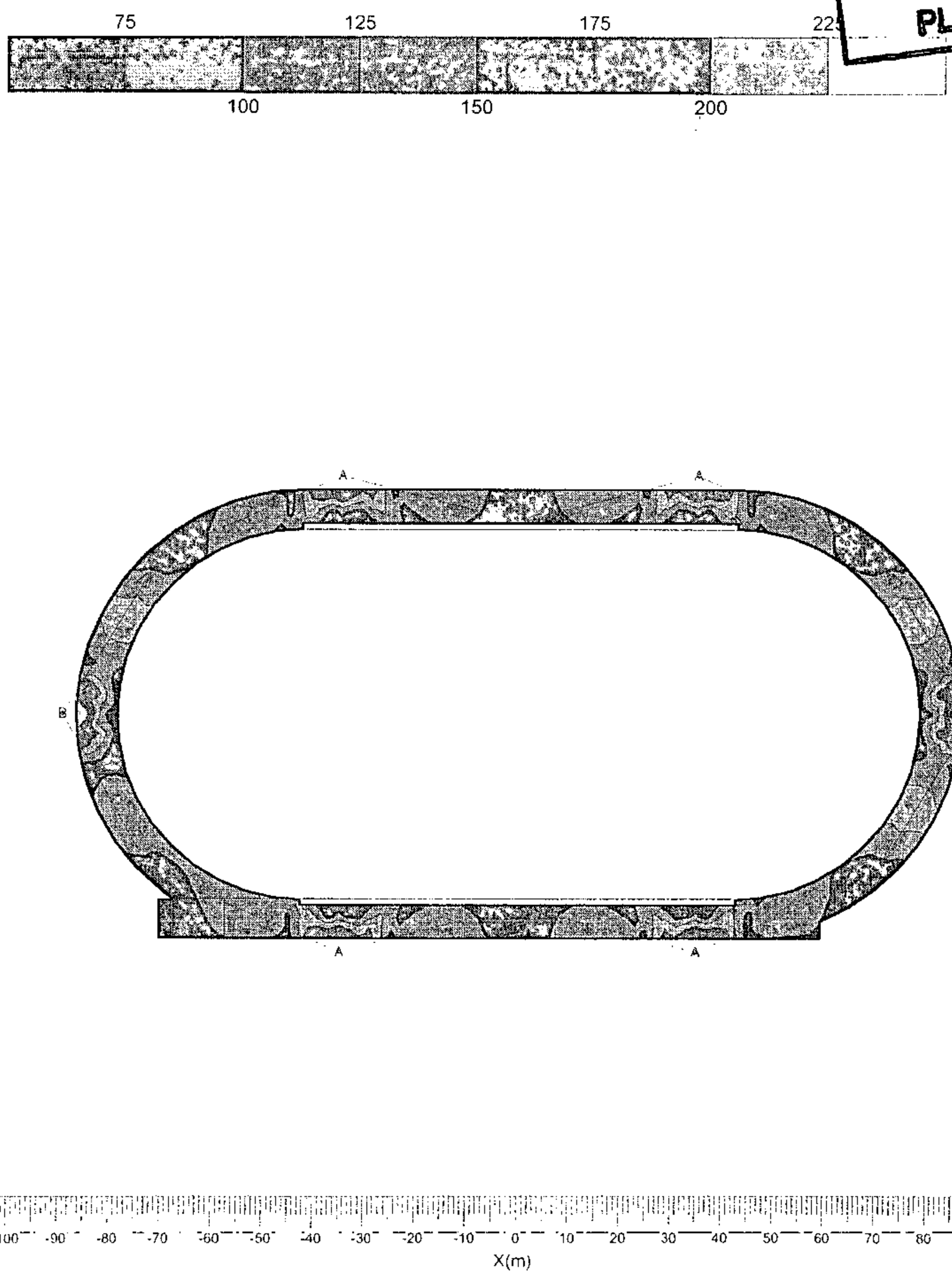


A MVP507 MB
B MVP507 NB

Average	Min/Ave	Project maintenance factor	Scale
111	0.66	0.79	1:1250

3.3 Athletic Track: Filled Iso Contour

Grid : Athletic Track at Z = 0.00 m
Calculation : Surface Illuminance (lux)



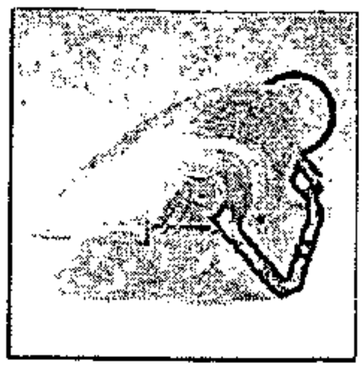
A	MVP507 MB
B	MVP507 NB

Average	Min/Ave	Project maintenance factor	Scale
111	0.66	0.79	1:1250

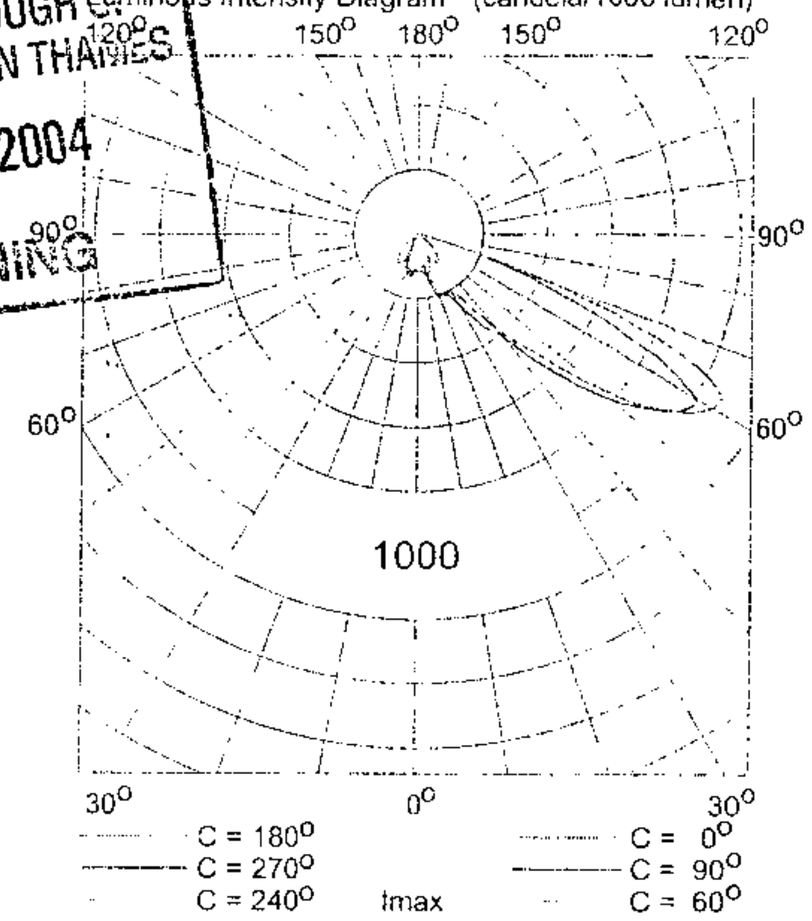
4. Luminaire Details

4.1 Project Luminaires

MVP507 MB 1xMHN-LA2000W/842



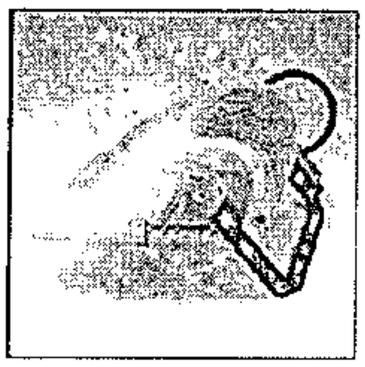
Luminous Intensity Diagram (candela/1000 lumen)



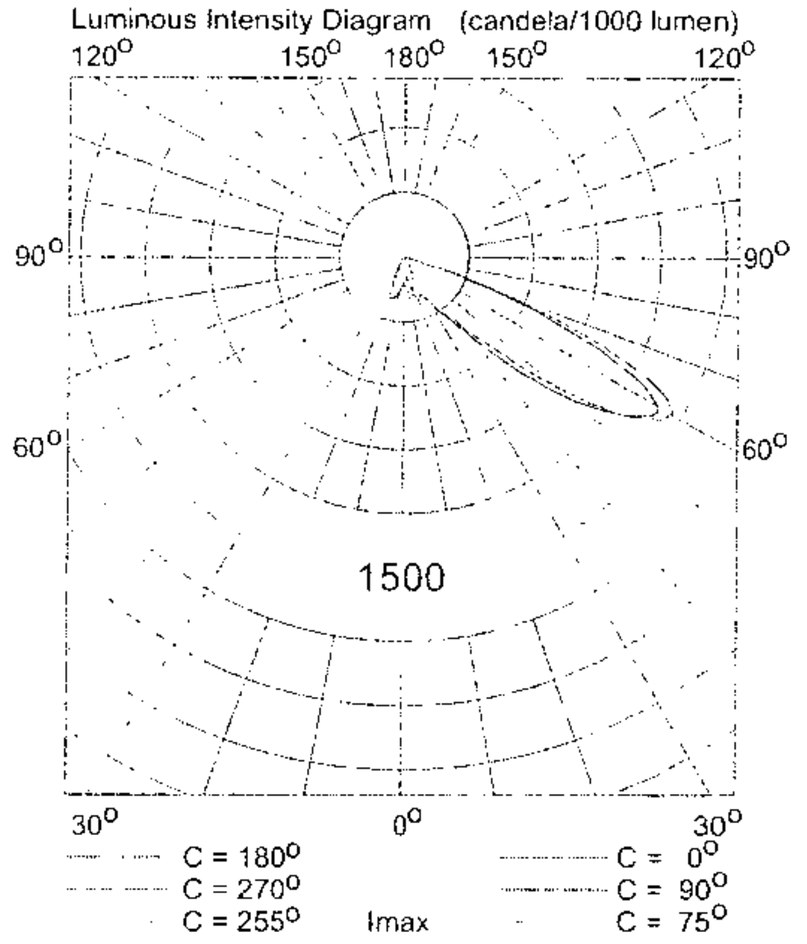
Light output ratios

DLOR	: 0.79
ULOR	: 0.00
TLOR	: 0.79
Ballast	: Standard
Lamp flux	: 220000 lm
Luminaire wattage	: 2100.0 W
Measurement code	: LVMA106900

MVP507 NB 1xMHN-LA2000W/842



Luminous Intensity Diagram (candela/1000 lumen)



Light output ratios

DLOR	: 0.79
ULOR	: 0.00
TLOR	: 0.79
Ballast	: Standard
Lamp flux	: 220000 lm
Luminaire wattage	: 2100.0 W
Measurement code	: LVMA107800

5. Installation Data

5.1 Legends

Project Luminaires:

Code	Qty	Luminaire Type	Lamp Type	Flux (lm)
A	8	MVP507 MB	1 * MHN-LA2000W/842	1 * 220000
B	4	MVP507 NB	1 * MHN-LA2000W/842	1 * 220000

5.2 Luminaire Positioning and Orientation

Qty and Code	Position			Aiming Angles		
	X (m)	Y (m)	Z (m)	Rot.	Tilt90	Tilt0
1 * B	-89.50	0.00	16.00	-60.50	67.00	0.00
1 * B	-89.50	0.00	16.00	58.50	65.00	0.00
1 * A	-35.00	-47.00	16.00	14.50	65.00	0.00
1 * A	-35.00	-47.00	16.00	156.50	65.00	0.00
1 * A	-35.00	47.00	16.00	-14.50	65.00	0.00
1 * A	-35.00	47.00	16.00	-156.50	65.00	0.00
1 * A	35.00	-47.00	16.00	165.50	65.00	0.00
1 * A	35.00	-47.00	16.00	23.50	65.00	0.00
1 * A	35.00	47.00	16.00	-165.50	65.00	0.00
1 * A	35.00	47.00	16.00	-23.50	65.00	0.00
1 * B	89.50	0.00	16.00	121.50	65.00	0.00
1 * B	89.50	0.00	16.00	-121.50	65.00	0.00

02/1792/DD/

HORIZONTAL SPILL LIGHT CALCULATION

ST MARY'S COLLEGE - ATHLETICS TRACK

SPILL LIGHT RESULTS - 100 LUX SCHEME

Project code:	03-399
Date:	12-03-2004
Customer:	THORWILL LTD
Customer Representative:	MR ROY NEALE
Designer:	ANTONY COLLETT
Description:	COLUMNS

* 6 X 16.0 METRE

LUMINAIRES - REQUIRE 400V ELECTRICAL SUPPLY

* 4 X PHILIPS 'OPTIVISION' MVP507 NB MHN-LA2000W/842 400V
* 8 X PHILIPS 'OPTIVISION' MVP507 MB MHN-LA2000W/842 400V

The nominal values shown in this report are the result of precision calculations, based upon precisely positioned luminaires in a fixed relationship to each other and to the area under examination. In practice the values may vary due to tolerances on luminaires, luminaire positioning, reflection properties and electrical supply.

Philips Lighting Solutions
The Philips Centre
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Croydon
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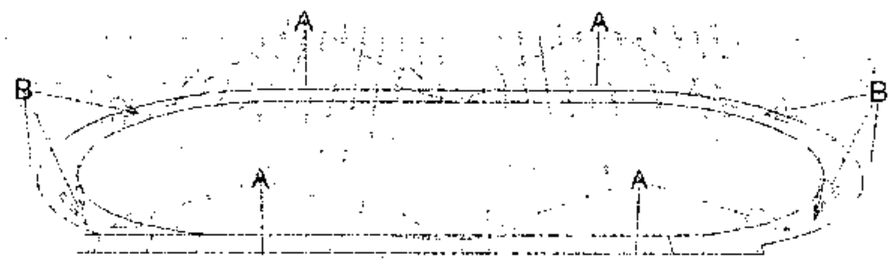
1. Project Description

1.1 3-D Project Overview

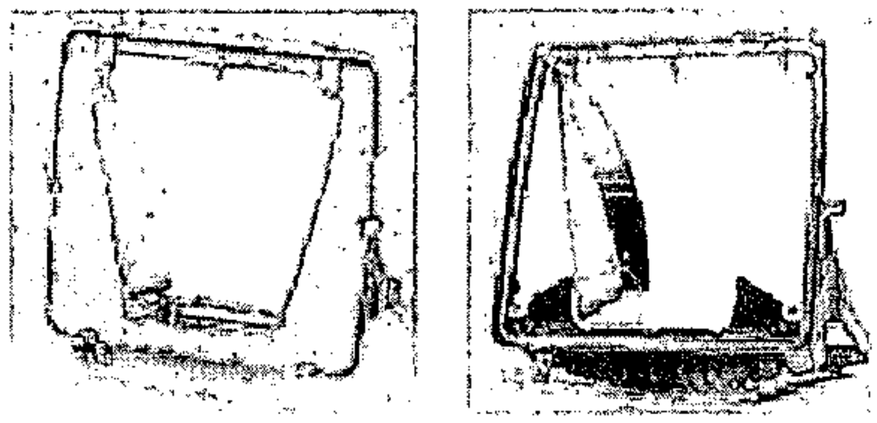


A	MVP507 MB
B	MVP507 NB

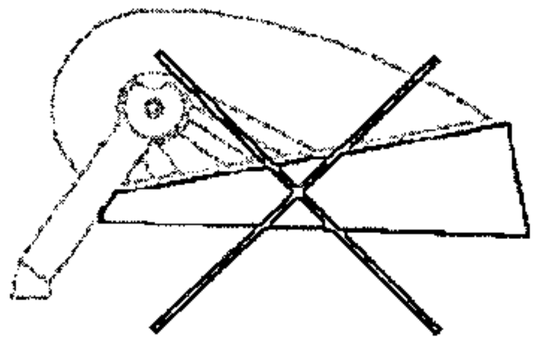
OptiVision Features

Several key features of the Philips 'OptiVision' asymmetric floodlight are as follows:-

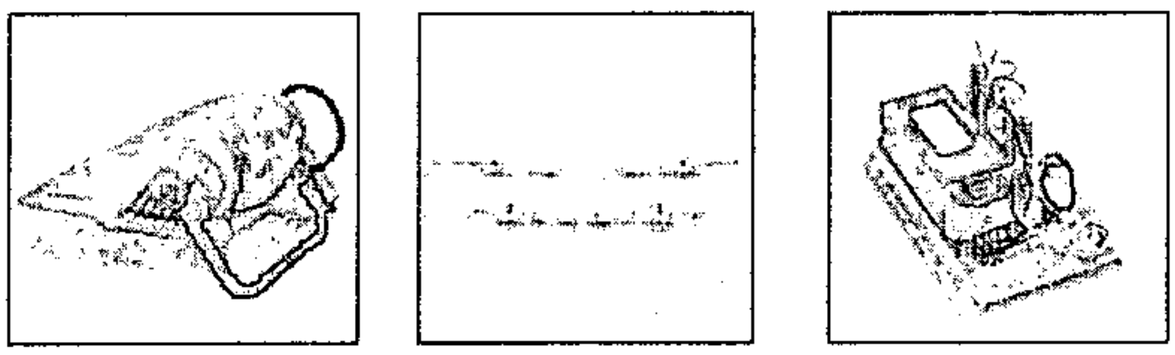
- Highly efficient asymmetric reflector optics designed specifically around the Philips MHN-LA lamp. This results in a high downward light output ratio (79%) and precise spill light and glare control.



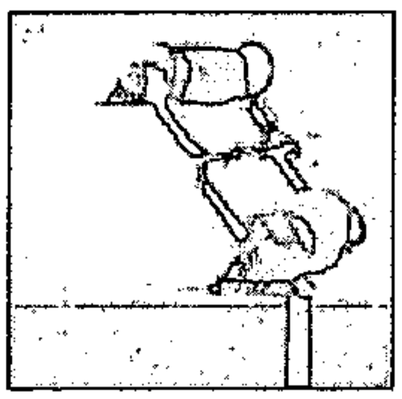
- OptiVision is a true 'flat glass' asymmetric floodlight thus avoiding the use of attachments such as cowls (skirts) and internal baffles to control glare and spill light.



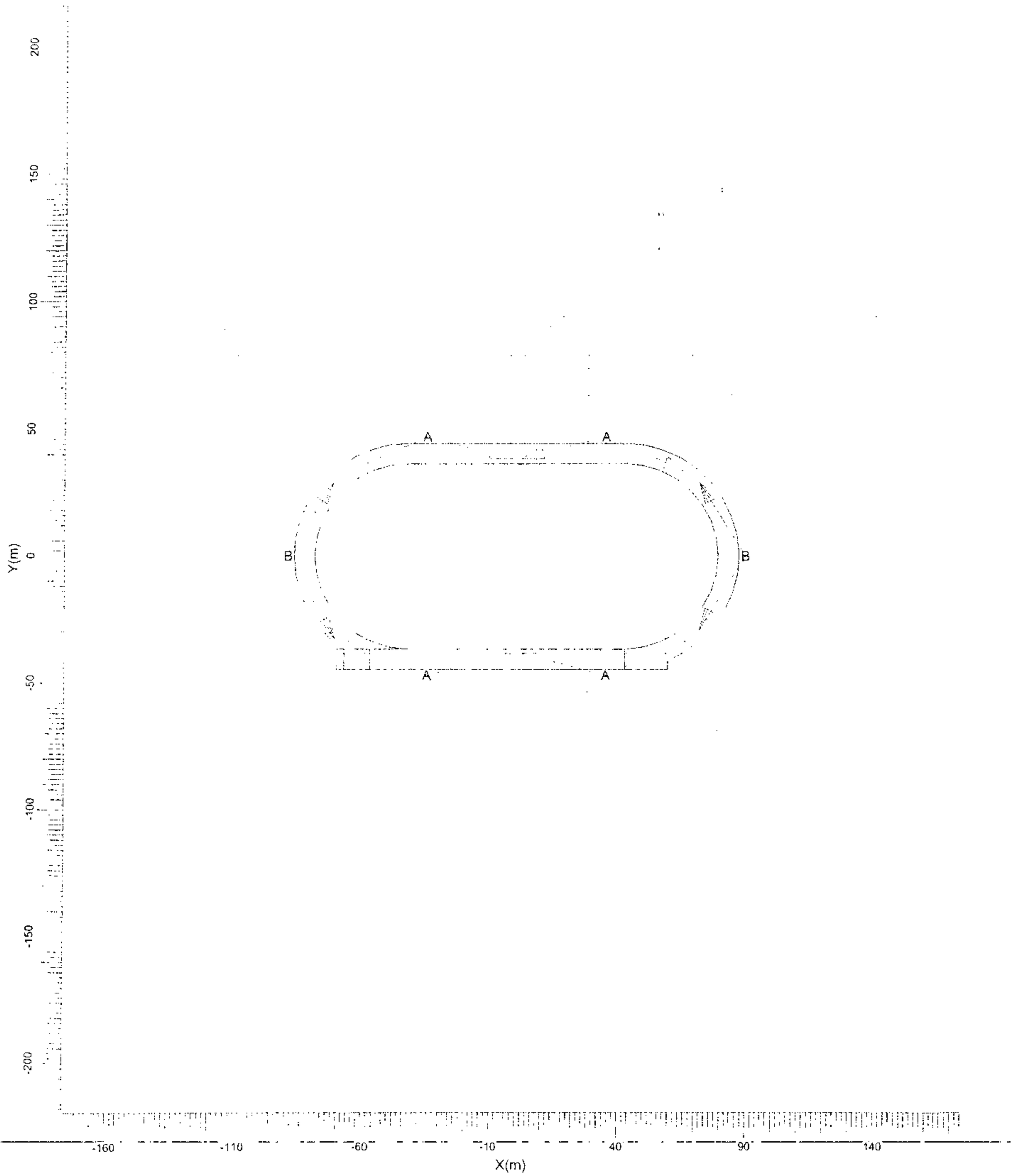
- As a total luminaire, lamp and control gear manufacturer the optimum lighting performance from the floodlight system achieved.



- Compact aerodynamic design with low weight (17.2kg incl lamp) and windage (0.16m²) allowing for improved aesthetics and reduced column costs.



1.2 Top Project Overview



A	-	MVP507 MB
B	-	MVP507 NB

Scale
1:2000

2. Summary

2.1 General Information

The overall maintenance factor used for this project is 1.00.

2.2 Project Luminaires

Code	Qty	Luminaire Type	Lamp Type	Power (W)	Flux (lm)
A	8	MVP507 MB	1 * MHN-LA2000W/842	2100.0	1 * 220000
B	4	MVP507 NB	1 * MHN-LA2000W/842	2100.0	1 * 220000

The total installed power: 25.20 (kWatt)

Number of Luminaires Per Arrangement:

Arrangement	Luminaire Code		Power (kWatt)
	A	B	
Bends1	0	1	2.10
Bends2	0	1	2.10
Bends3	0	1	2.10
Bends4	0	1	2.10
Straight	8	0	16.80

2.3 Calculation Results

(Il)luminance Calculations:

Calculation	Type	Unit
Spill Light @ Ground	Surface Illuminance	lux

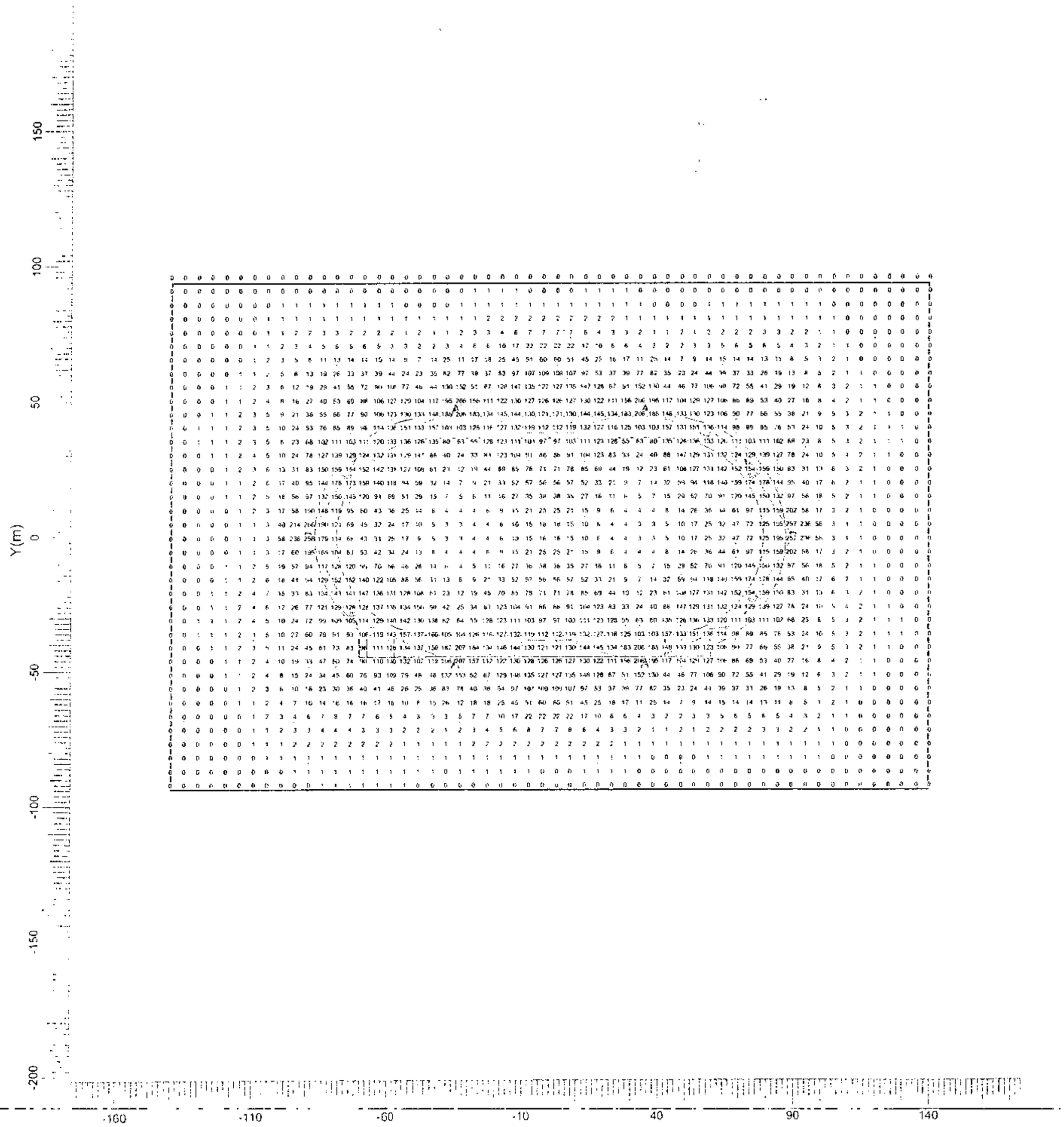
Obtrusive Light Calculations:

The upward light ratio (ULR) is 0.00.

3. Calculation Results

3.1 Spill Light @ Ground: Graphical Table

Grid : Spill Light @ Ground at Z = 0.00 m
Calculation : Surface Illuminance (lux)



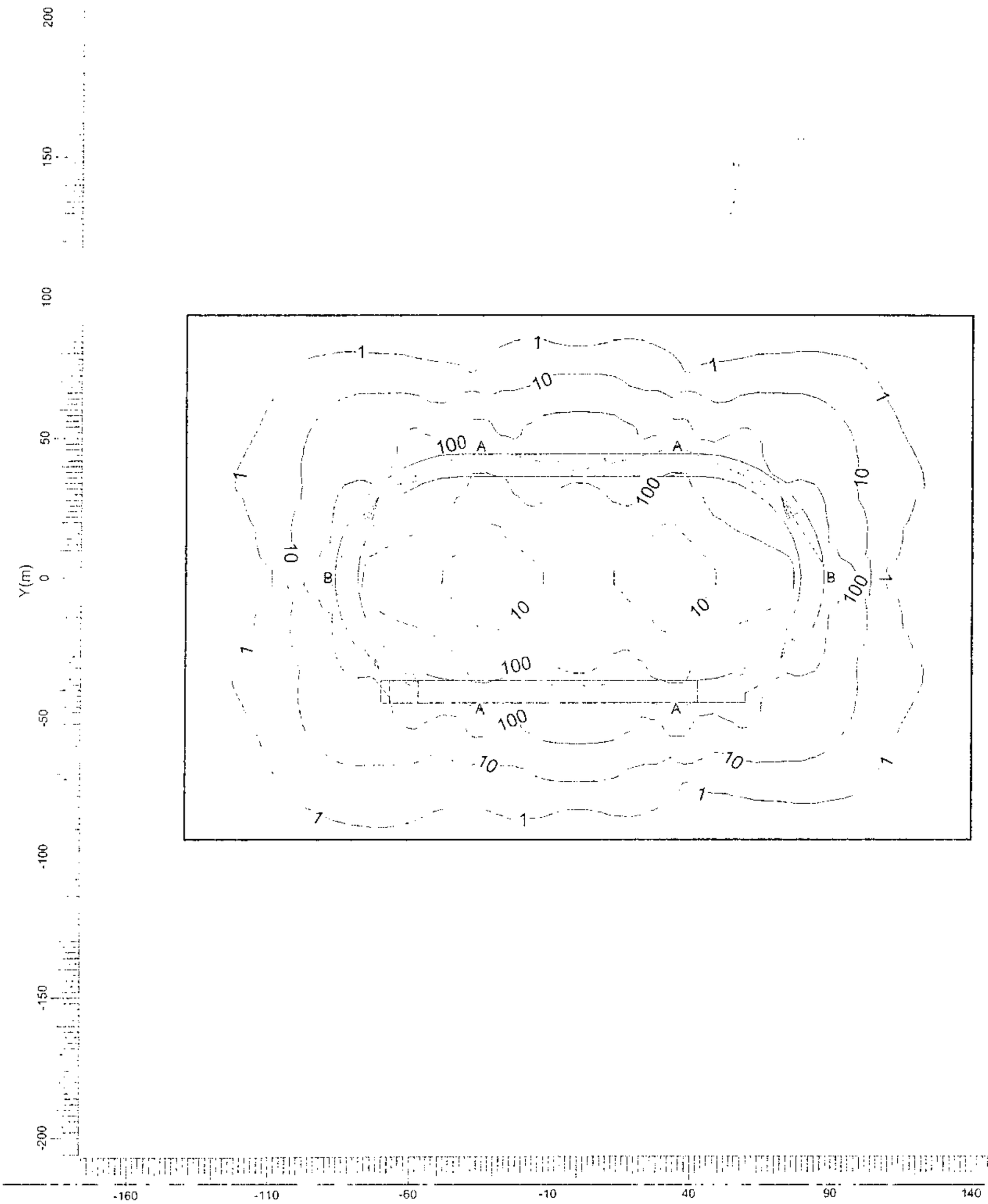
A MVP507 MB
B MVP507 NB

Project maintenance factor
1.00

Scale
1:2000

3.2 Spill Light @ Ground: Iso Contour

Grid : Spill Light @ Ground at Z = 0.00 m
Calculation : Surface Illuminance (lux)



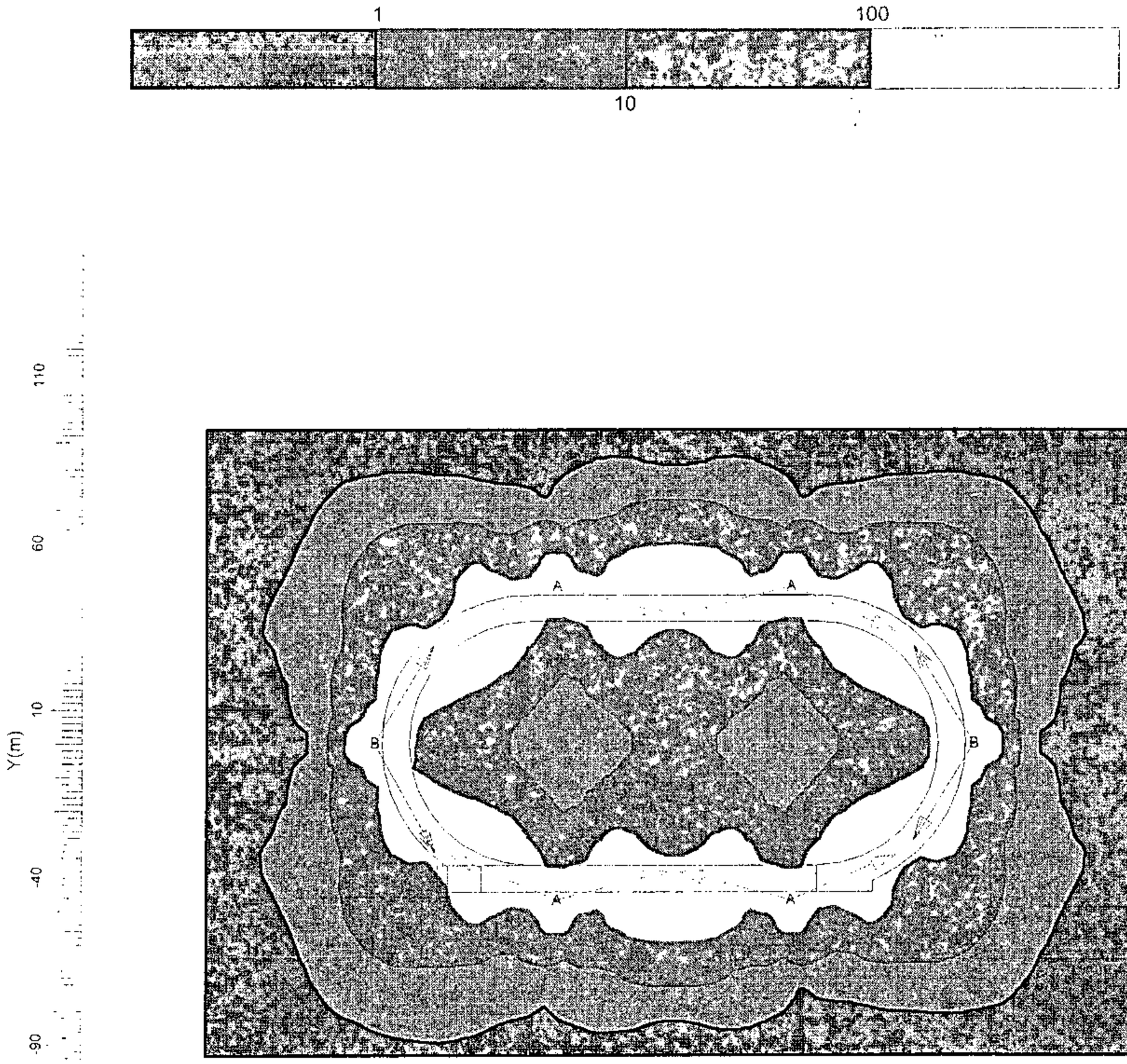
A MVP507 MB
B MVP507 NB

Project maintenance factor
1.00

Scale
1:2000

3.3 Spill Light @ Ground: Filled Iso Contour

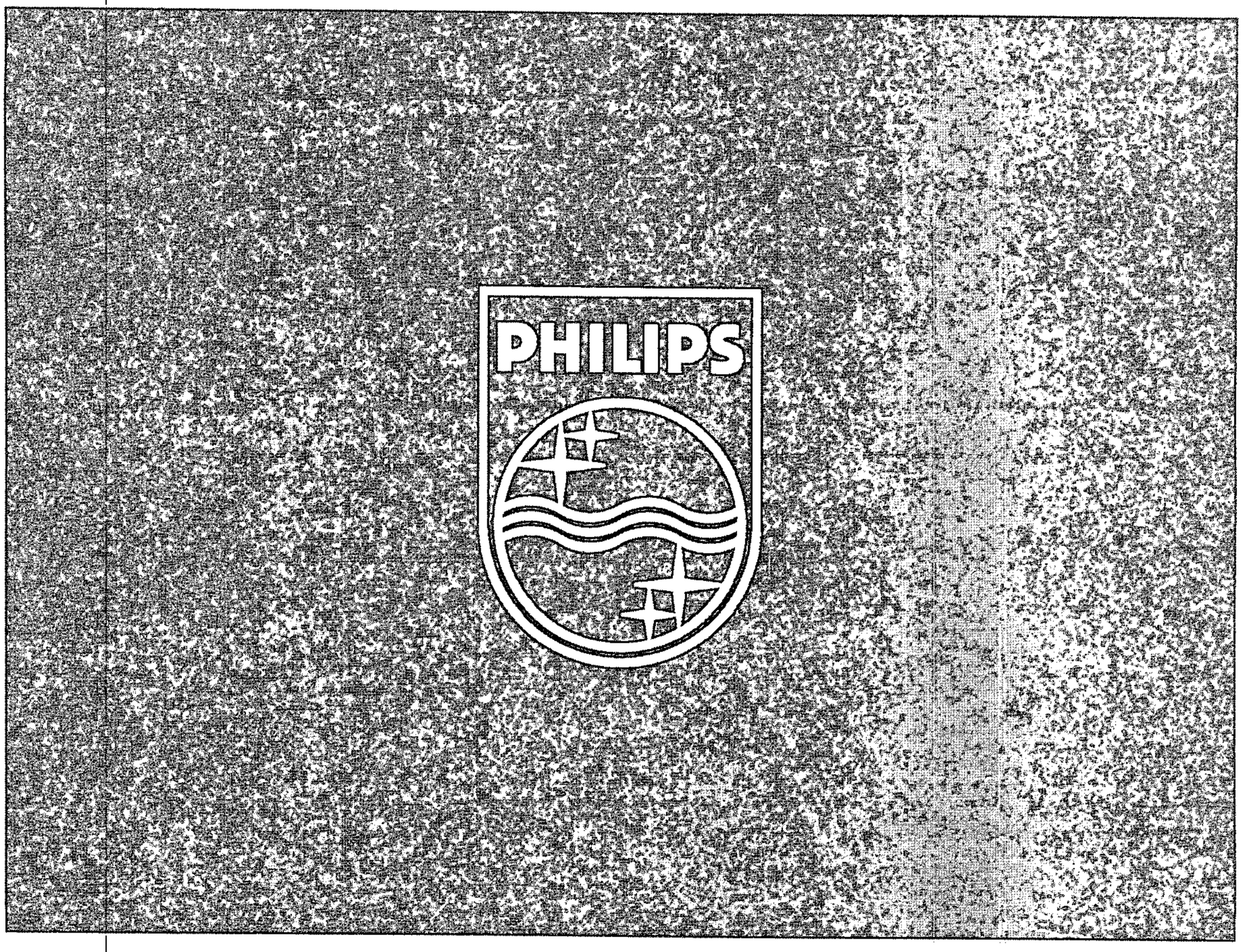
Grid : Spill Light @ Ground at Z = 0.00 m
Calculation : Surface Illuminance (lux)



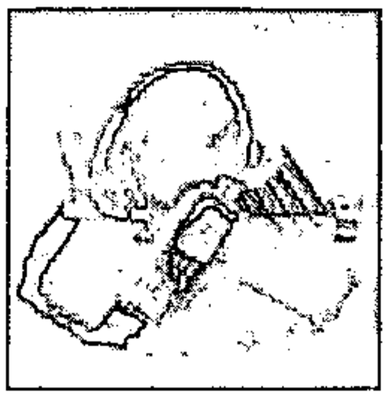
A MVP507 MB
B MVP507 NB

Project maintenance factor
1.00

Scale
1:2000

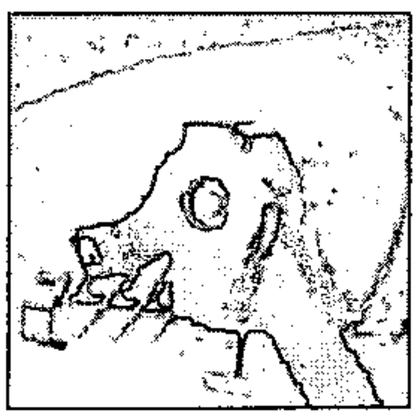

PHILIPS

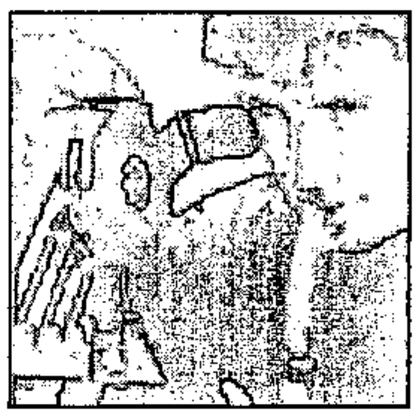
- Ignitor is housed in a separate connection box allowing for the control gear to be remote at a greater distance away from the floodlights.

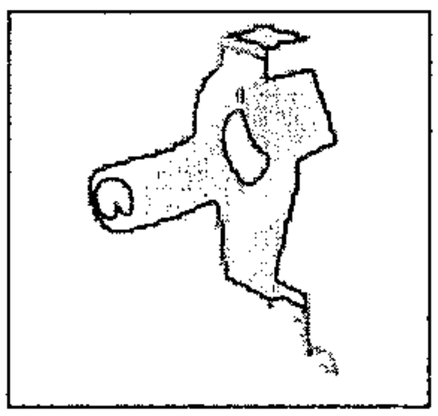


- Easy lamp replacement requiring no tools.

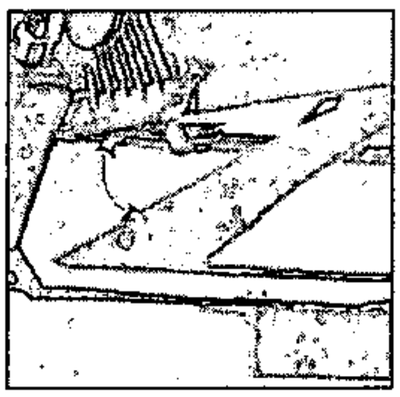
- Precision luminaire aiming via a specifically designed sight.

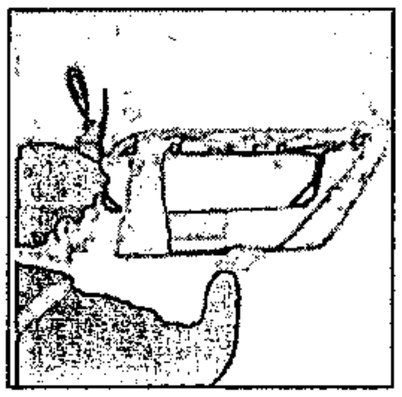






- Safety cutout switch ensuring the mains supply is completely disconnected if the front glass is opened or broken.





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Performance Results

The table below compares the lighting performance criteria as required by the CIBSE LG4 Sports standard for Class III outdoor athletics activity, to the values achieved in this design.

Criteria	CIBSE LG4	Philips Design	Quantity Of Floodlights 'ON'	System Power
Track				
Eave	75 Lux	**111 Lux**	**12**	**16.8 kW**
Emin/Ave	0.50 min	**0.66**		

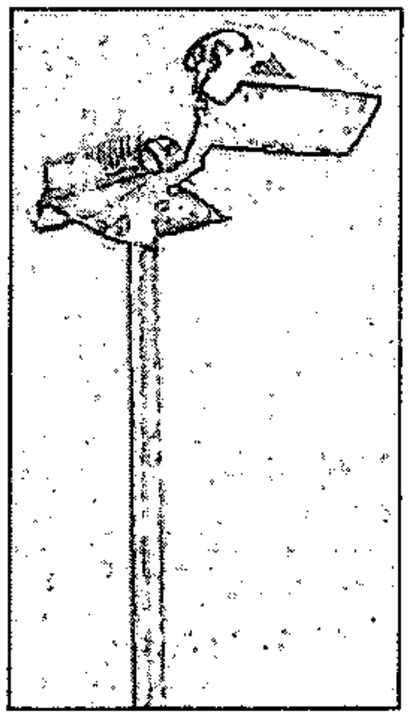
In accordance with correct design practice, the above levels have been calculated as 'Maintained', the maintenance factor derivation as follows: -

- Luminaire dirt depreciation factor for an IP65 luminaire located in a medium pollution area
- 12 monthly cleaning interval i.e. pre-season
- Lamp lumen depreciation @ 2000 hours

OBTRUSIVE LIGHTING EFFECTS – ENVIRONMENTAL IMPACT

Columns

An option to improve the aesthetics of the installation would be to paint the columns a colour, which ties in with the environmental surrounds, e.g. **green** or **black**.



In order to evaluate the proposed floodlighting design in respect to obtrusive light, the following calculations have been generated: -

1. **Horizontal Spill Light (Eh) Lux** –It is typical to provide a calculation indicating the light spill to the installation surrounds. Calculated by placing a horizontal grid at ground level extending beyond the installation perimeter. The spill iso-contour down to 1 lux has been indicated. For case of interpretation for a planning application, this can be overlaid onto an ordinance survey map if available.

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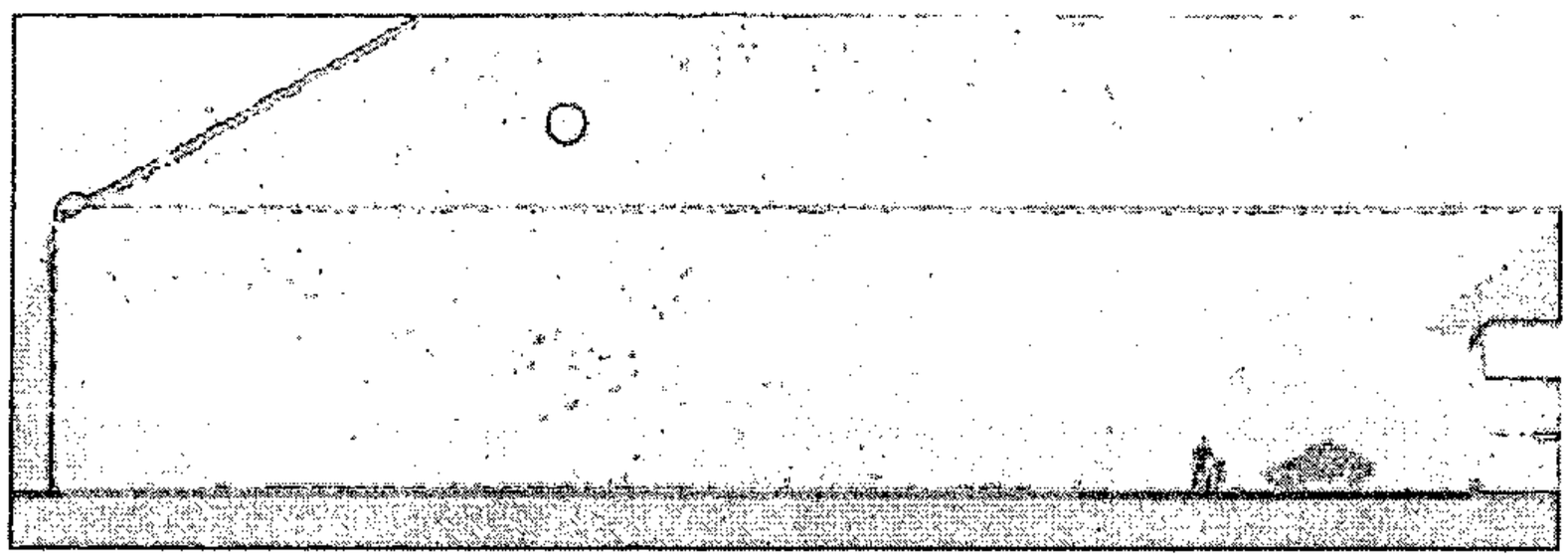
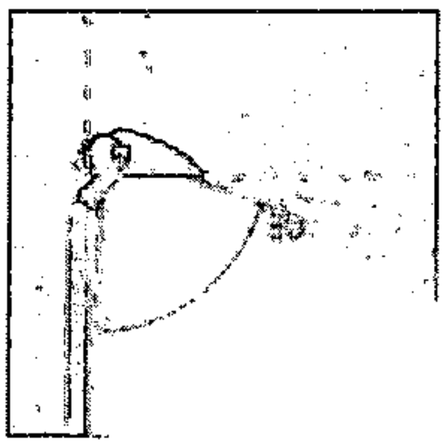
2. **Upward Waste Light Ratio Calculation** (ULR). The maximum upward light ratio (expressed as a percentage) for the overall installation has been calculated.



ULR – Total Installation
0%

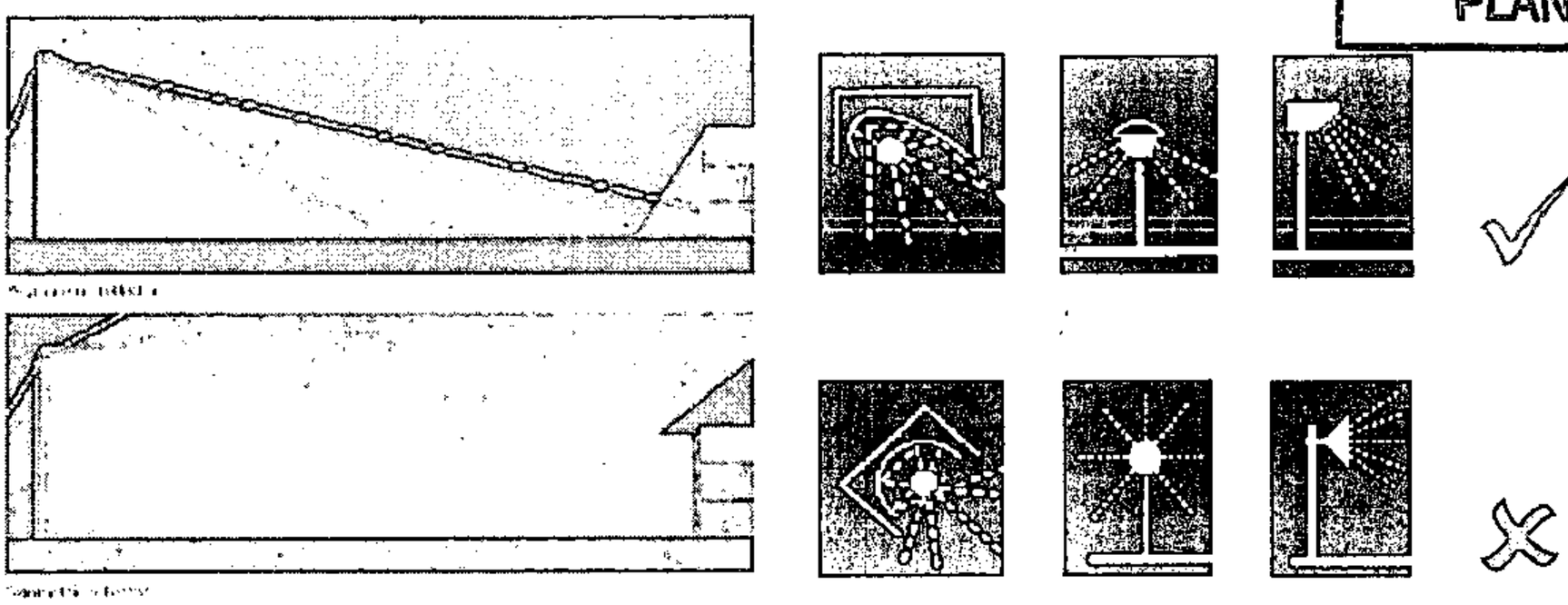
- No light is emitted directly by the floodlights above the horizontal plane, this due to the OptiVision's sharp cutoff at 80° from the vertical. **Please Note:** This does not take into account the amount of light reflected off the pitch surface into the air, this effect is unavoidable no matter what floodlighting technology is employed as relies on the reflective properties of the artificial turf material utilised.



NOTE: All obtrusive light calculations have utilised a maintenance factor of 1.0 i.e. new fittings and full output lamps. No allowance for obstructions such as trees, buildings, fences or the variation in ground contours has been made. In practice, these obstructions may have a dramatic effect in limiting spill light and the viewing of the floodlighting installation from surrounding residents and motorists.

02/1792/DDC

The Philips 'OptiVision' floodlight is asymmetric in it's light distribution and fully complies with the luminaire requirements as recommended in the ILE's ***'Guidance Notes for the Reduction of Light Pollution'***. Below is a comparison between the advanced asymmetric technology of the Philips 'OptiVision' compared to a conventional symmetrical distribution floodlight often associated with excessive glare, sky glow and light trespass.



The Philips 'OptiVision' floodlight generates **3x less** spill light than previous asymmetric floodlights and **10x less** than conventional symmetrical reflector floodlights.

The asymmetric distribution of the 'Philips 'OptiVision' also allows for a lower tilt angle from the horizontal, hiding the lamp therefore reducing glare to not only players and spectators but surrounding residents, motorists and wildlife such as birds.
For this design proposal, **'ALL'** floodlights have been tilted as flat as possible, the maximum tilt angle for any floodlight being 7° above the horizontal plane.