

4. Lighting criteria.

4.4 Lighting considerations adjacent to railways

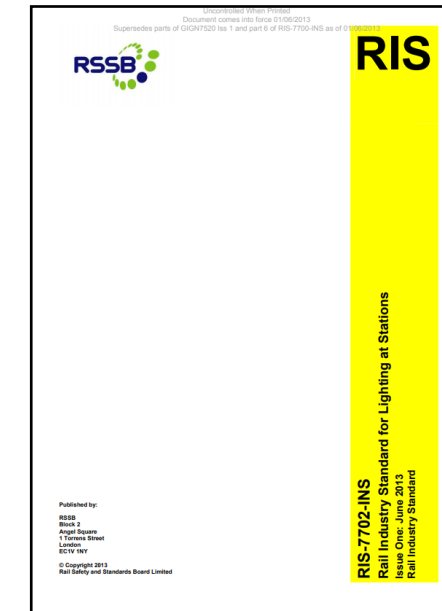
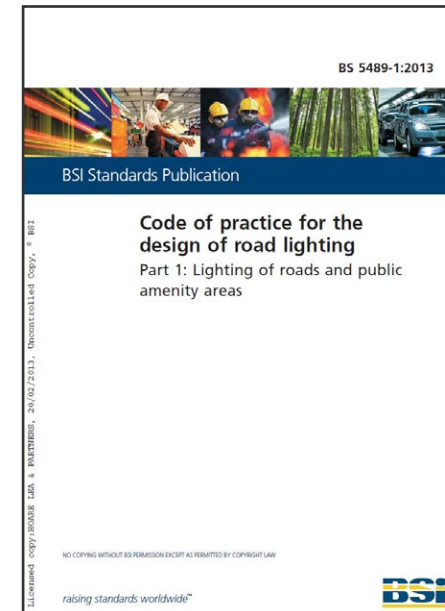
Due to the close proximity of the site to the railway, one must be mindful to not produce a lighting scheme that has a detrimental impact to the safe use of the railway.

A number of standard outline guidances of what to be mindful of when designing lighting schemes adjacent to railways, these include:

- BS 5489-1:2013 (section 7.8.3)
- Rail Safety and Standards Board (RSSB)

These guidances and institutional standards should be consulted when developing the scheme design. Some of the key consideration should be paid to:

- Light trespass
- Glare
- Colours of light



7.8.3 Lighting in the vicinity of railways

NOTE 1 *The area within which a road lighting scheme can affect the safe use of a railway is not defined because of the diversity of fixing locations for signals and curvature of railway lines.*

Lighting close to the field of view of a train driver should be carefully designed to avoid compromising the visibility of signals. In particular:

- light spill should be minimized in the vicinity of a railway bridge crossing/passing above a road;
- columns should be placed as far away as practicable from a rail bridge or the fence line of railway track;
- unwanted glare should be minimized for the train driver by the use of luminaires conforming to an appropriate G class selected from BS EN 13201-2:2003, Table A.1 or shielding.

Where light might spill on to rail property, or luminaires might be mistaken for railway signals by train drivers, or lighting operatives risk falling on to rail property, then the rail authority should be contacted.

NOTE 2 *Further information, related in particular to level crossings, can be found in Part 2, Section E of the HSE publication Railway safety principles and guidance [48].*

It is essential that any lighting scheme does not affect track visibility for railway operatives. It is also essential, when designing the location of lighting columns adjacent to railways, that any likely foreseeable collision with a lighting column by road traffic does not then lead to a hazard on the railway by the lighting column falling onto the railway.

Colours in a lighting scheme should not conflict or cause confusion with colours used for signal lights.

NOTE 3 *Information on colours and colour classes is given in BS 1376.*

4. Lighting criteria.

4.5 Site context - Manor Road

To select the most appropriate lighting classifications for within the site it is important to have an understanding of the surrounding road classifications. This is to ensure illuminance levels do not drop suddenly between one zone and another, creating distinct contrast and the appearance of being dark.

The following lighting classifications have been assumed based on the road characteristics in accordance with the appropriate guidances BS 5489-1:2013

Manor Road - Assumed lighting class (P2):

8.6 lux - Minimum average maintained

1.7 lux - Minimum maintained



Table A.5 Lighting classes for subsidiary roads with a typical speed of main user $v \leq 30$ mph

| Traffic flow | Lighting class | | | |
|----------------------|----------------------------------|-----------------------------|----------------------------------|------------------------------|
| | Ambient luminance: very low (E1) | Ambient luminance: low (E2) | Ambient luminance: moderate (E3) | Ambient luminance: high (E4) |
| Busy ^{A)} | S3 or P3 | S3 or P3 | S2 or P2 | S2 or P2 |
| Normal ^{B)} | S4 or P4 | S4 or P4 | S3 or P3 | S3 or P3 |
| Quiet ^{C)} | S5 or P5 | S5 or P5 | S4 or P4 | S4 or P4 |

NOTE 1 Table A.5 assumes no parked vehicles – see risk assessment in A.3.3.2.

NOTE 2 If facial recognition is important then an ES lighting class from BS EN 13201-2:2003, Table 5, or an E_{sc} lighting class from CIE 115:2010 [N1], Table 7, can be selected as an additional criterion. Good colour rendering contributes to better facial recognition. (The ES lighting class in BS EN 13201-2:2003 is expected to be replaced by SC upon publication of the revised edition.)

NOTE 3 To ensure adequate uniformity, the actual value of the maintained average illuminance is not to exceed 1.5 times the value indicated for the class.

NOTE 4 It is recommended that the actual overall uniformity of illuminance U_o be as high as reasonably practicable.

NOTE 5 Grey highlighting indicates situations that would not usually occur in the UK.

NOTE 6 The ambient luminance descriptions E1 to E4 refer to the environmental zone as defined in ILP GN01 [N5].

^{A)} Busy traffic flow refers to areas where the traffic usage is high and can be associated with local amenities such as clubs, shopping facilities, public houses, etc.

^{B)} Normal traffic flow refers to areas where the traffic usage is of a level equivalent to a housing estate access road.

^{C)} Quiet traffic flow refers to areas where the traffic usage is of a level equivalent to a residential road and mainly associated with the adjacent properties or properties on other equivalent roads accessed from this road.

Table A.7 Variation of maintained lighting level with S/P ratio of light source

| Lighting class | Values in lux | | | | | |
|----------------|-----------------------------------------------------------------------------------------|-----------|---------------------------------------------------------------------------------------------|-----------|--------------------------------------------------------------------------------------------|-----------|
| | Benchmark (e.g. $R_a < 60$ or when S/P ratio of light source is not known or specified) | | S/P ratio = 1.2 and $R_a \geq 60$ (e.g. some types of warm white lamp such as metal halide) | | S/P ratio = 2 and $R_a \geq 60$ (e.g. some types of cool white compact fluorescent or LED) | |
| | \bar{E} | E_{min} | \bar{E} | E_{min} | \bar{E} | E_{min} |
| P1 or S1 | 15.0 | 3.0 | 13.4 | 2.7 | 12.3 | 2.5 |
| P2 or S2 | 10.0 | 2.0 | 8.6 | 1.7 | 7.7 | 1.5 |
| P3 or S3 | 7.5 | 1.5 | 6.3 | 1.3 | 5.5 | 1.1 |
| P4 or S4 | 5.0 | 1.0 | 4.0 | 0.8 | 3.4 | 0.7 |
| P5 or S5 | 3.0 | 0.6 | 2.2 | 0.4 | 1.8 | 0.4 |
| P6 or S6 | 2.0 | 0.4 | 1.4 | 0.4 | 1.1 | 0.4 |

Table extracted from 'BS5489-1:2013 | Code of practice for design of road lighting'.

Table 1 – Environmental Zones




| Zone | Surrounding | Lighting Environment | Examples |
|------|-------------|----------------------------|-----------------------------------------------------------|
| E0 | Protected | Dark | UNESCO Starlight Reserves, IDA Dark Sky Parks |
| E1 | Natural | Intrinsically dark | National Parks, Areas of Outstanding Natural Beauty etc |
| E2 | Rural | Low district brightness | Village or relatively dark outer suburban locations |
| E3 | Suburban | Medium district brightness | Small town centres or suburban locations |
| E4 | Urban | High district brightness | Town/city centres with high levels of night-time activity |

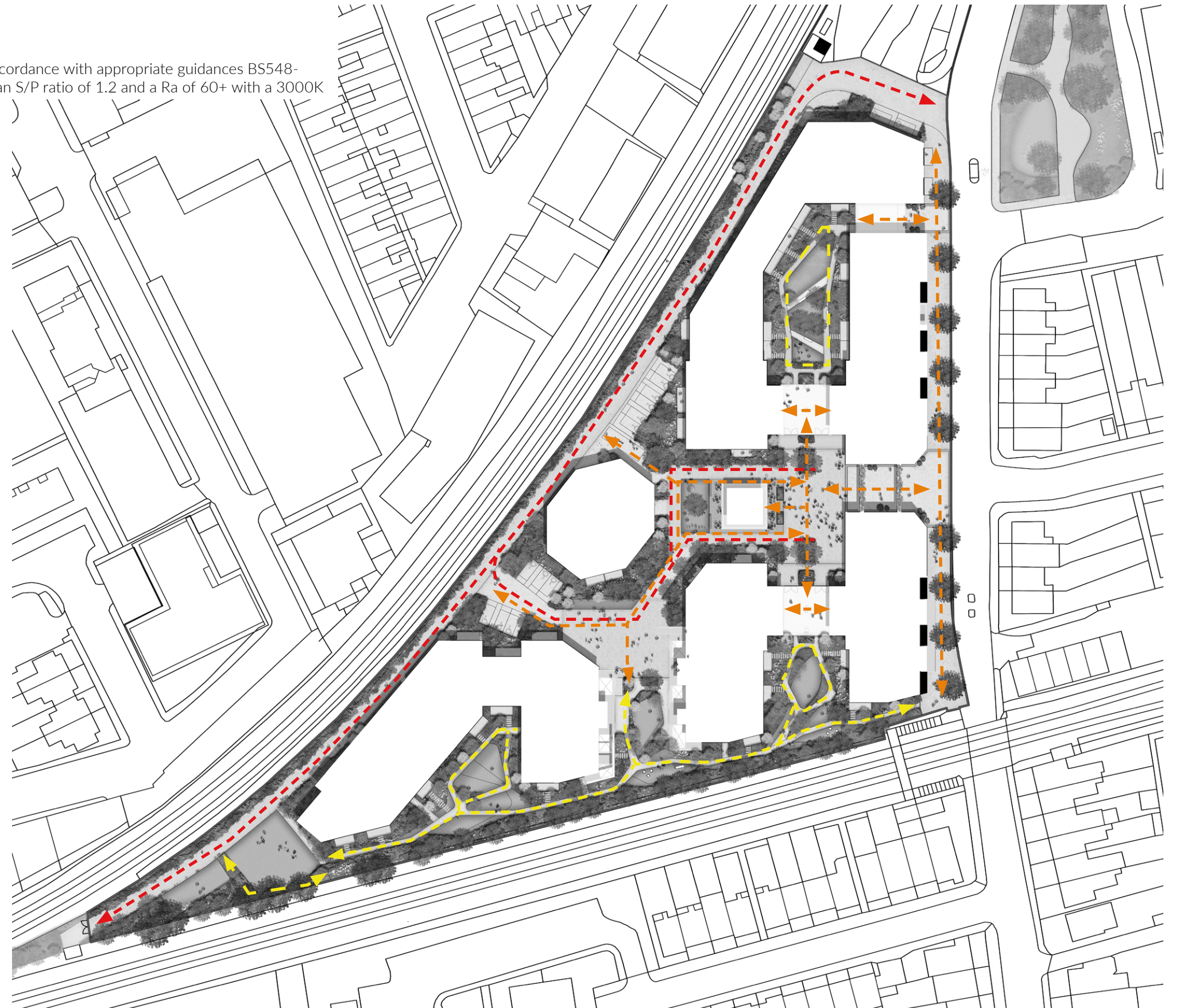
Table extracted from 'Guidance Notes for the Reduction of Obtrusive Light GN01:2011'.

4. Lighting criteria.

4.6 Site thoroughfares.

The following lighting classification have been selected in accordance with appropriate guidances BS548-1:2013. These figures assume the luminaires selected have an S/P ratio of 1.2 and a Ra of 60+ with a 3000K colour temperature.

-  Vehicle Access Route (P4):
 - 4.0 lux - Minimum average maintained
 - 0.8 lux - Minimum maintained
-  Primary Pedestrian Route (P5):
 - 2.2 lux - Minimum average maintained
 - 0.4 lux - minimum uniformity
-  Secondary Pedestrian Route (P6):
 - 1.4 lux - Minimum average maintained
 - 0.4 lux - Minimum maintained



4. Lighting criteria.

4.6 Site thoroughfares

The following lighting classifications have been selected in accordance with the appropriate guidances BS 5489-1:2013

Due to the relatively low levels of slow moving vehicular traffic, based on the percentage of parking space for residents, it is proposed that slightly lower illuminance levels are required.

Vehicle Access Route (P4):

- 4.0 lux - Minimum average maintained
- 0.8 lux - Minimum maintained

Primary Pedestrian Route (P5):

- 2.2 lux - Minimum average maintained
- 0.4 lux - minimum uniformity

Secondary Pedestrian Route (P6):

- 1.4 lux - Minimum average maintained
- 0.4 lux - Minimum maintained

Social & Congregation:

Areas that are for the use as social and congregation spaces, such as open squares gardens, should be treated as such and are not as critical to illuminate to a uniform standard. Feature lighting should be utilised to supplement ambient lighting to create a welcoming environment. As such these areas may not be lit to the BS5489 stated illuminance levels.

Table A.6 Lighting classes for subsidiary roads with mainly slow-moving vehicles, cyclists and pedestrians

| Traffic flow | Lighting class | |
|----------------------|-------------------------------------------------|--------------------------------------------------|
| | Ambient luminance: very low (E1) or low (E2) | Ambient luminance: moderate (E3) or high (E4) |
| Busy ^{A)} | S4 or P4 | S4 or P4 |
| Normal ^{B)} | S5 or P5 | S5 or P5 |
| Quiet ^{C)} | S6 or P6 | S6 or P6 |

NOTE 1 If facial recognition is important then an ES lighting class from BS EN 13201-2:2003, Table 5, or an E_{sc} lighting class from CIE 115:2010 [N1], Table 7, can be selected as an additional criterion. Good colour rendering contributes to a better facial recognition. (The ES lighting class in BS EN 13201-2:2003 is expected to be replaced by SC upon publication of the revised edition.)

NOTE 2 To ensure adequate uniformity, the actual value of the maintained average illuminance is not to exceed 1.5 times the value indicated for the class.

NOTE 3 It is recommended that the actual overall uniformity of illuminance U_o be as high as reasonably practicable.

NOTE 4 Grey highlighting indicates situations that would not usually occur in the UK.

NOTE 5 The ambient luminance descriptions E1 to E4 refer to the environmental zone as defined in ILP GN01 [N5].

^{A)} Busy traffic flow refers to areas where the traffic usage is high and can be associated with local amenities such as clubs, shopping facilities, public houses, etc.

^{B)} Normal traffic flow refers to areas where the traffic usage is of a level equivalent to a housing estate access road.

^{C)} Quiet traffic flow refers to areas where the traffic usage is of a level equivalent to a residential road and mainly associated with the adjacent properties or properties on other equivalent roads accessed from this road.

Table A.7 Variation of maintained lighting level with S/P ratio of light source

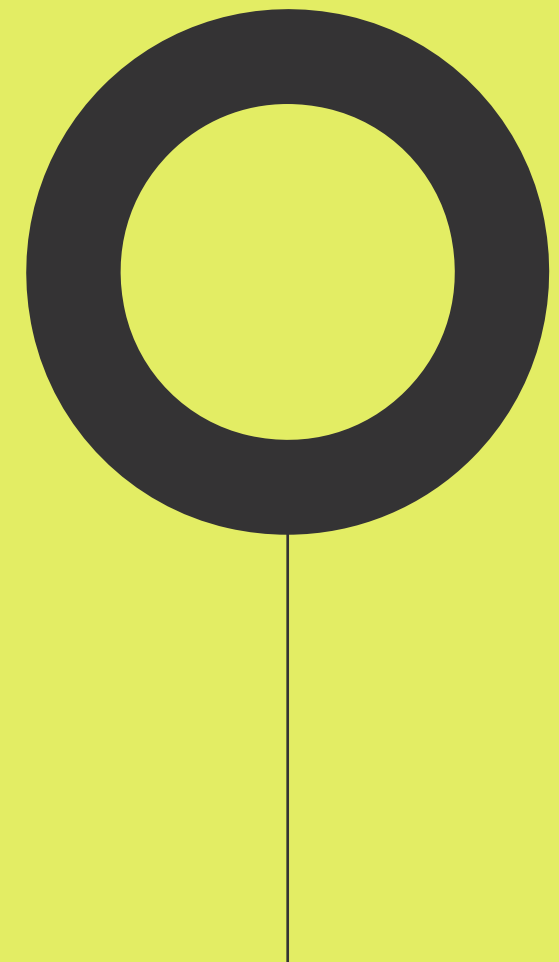
| Lighting class | Values in lux | | | | | |
|----------------|-----------------------------------------------------------------------------------------------------|------------------|------------------------------------------------------------------------------------------------------|------------------|-----------------------------------------------------------------------------------------------------|------------------|
| | Benchmark (e.g. R _a < 60 or when S/P ratio of light source is not known or specified) | | S/P ratio = 1.2 and R _a ≥ 60 (e.g. some types of warm white lamp such as metal halide) | | S/P ratio = 2 and R _a ≥ 60 (e.g. some types of cool white compact fluorescent or LED) | |
| | \bar{E} | E _{min} | \bar{E} | E _{min} | \bar{E} | E _{min} |
| P1 or S1 | 15.0 | 3.0 | 13.4 | 2.7 | 12.3 | 2.5 |
| P2 or S2 | 10.0 | 2.0 | 8.6 | 1.7 | 7.7 | 1.5 |
| P3 or S3 | 7.5 | 1.5 | 6.3 | 1.3 | 5.5 | 1.1 |
| P4 or S4 | 5.0 | 1.0 | 4.0 | 0.8 | 3.4 | 0.7 |
| P5 or S5 | 3.0 | 0.6 | 2.2 | 0.4 | 1.8 | 0.4 |
| P6 or S6 | 2.0 | 0.4 | 1.4 | 0.4 | 1.1 | 0.4 |

Table extracted from 'BS5489-1:2013 | Code of practice for design of road lighting'.

| Zone | Surrounding | Lighting Environment | Examples |
|------|-------------|----------------------------|-----------------------------------------------------------|
| E0 | Protected | Dark | UNESCO Starlight Reserves, IDA Dark Sky Parks |
| E1 | Natural | Intrinsically dark | National Parks, Areas of Outstanding Natural Beauty etc |
| E2 | Rural | Low district brightness | Village or relatively dark outer suburban locations |
| E3 | Suburban | Medium district brightness | Small town centres or suburban locations |
| E4 | Urban | High district brightness | Town/city centres with high levels of night-time activity |

Table extracted from 'Guidance Notes for the Reduction of Obtrusive Light GN01:2011'.

Ambient lighting strategy.



5. Ambient lighting strategy.

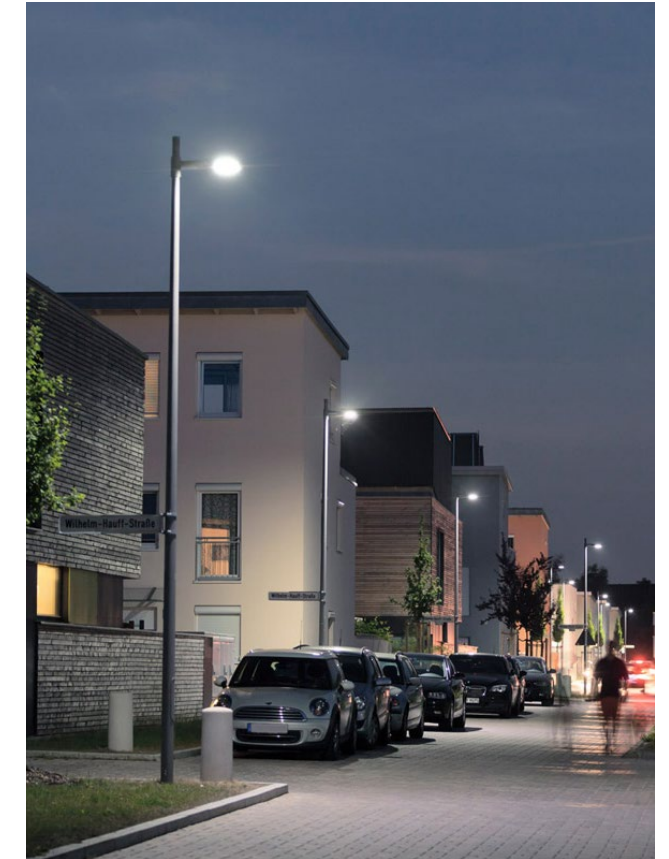
5.1 Vehicular routes.

Purpose of lighting:

- Illuminated to the required illuminance levels.
- Safe movement of vehicles and pedestrians.

Type of lighting:

- Amenity lighting columns.
- 4m-6m in height.
- 3000K warm white colour temperature.
- Good optical control.
- Range of anti glare accessories.
- Colour rendering of 80+ CRI.
- Dimmable





A. Typical Column Mounted Luminaire
Asymmetric street optic. Product and optic may vary
across scheme.
3000K.



Notes
1.0 De
1.1 A
1.2 T
Giles

Man
Ren
PRE
P14

5. Ambient lighting strategy.

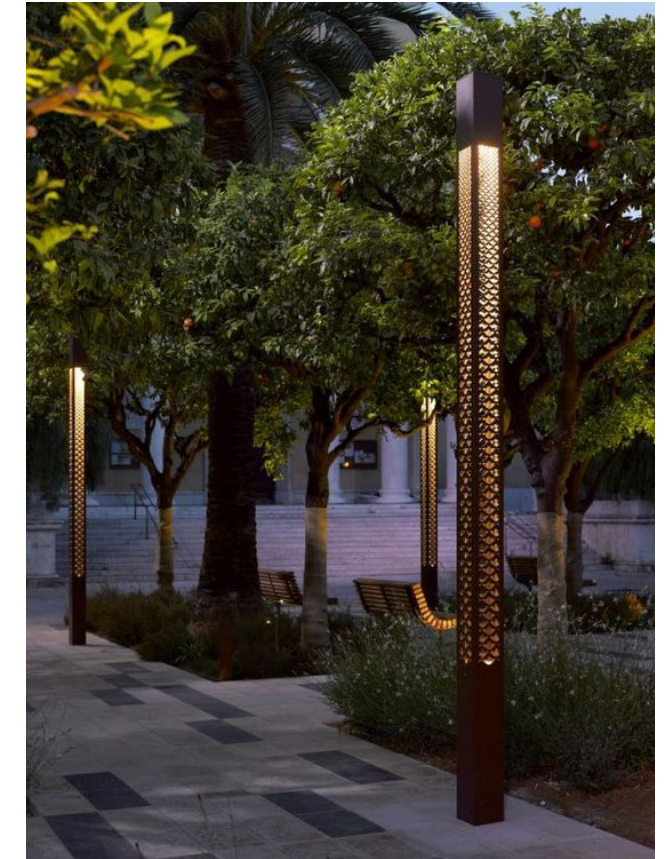
5.2 Primary pedestrian routes.

Purpose for lighting:

- To guide users through the space.
- Safety and security.
 - Illuminate paving and level changes to avoid trips and falls
 - Good facial recognition to increase the appearance of safety.

Type of lighting:

- Low height feature columns
 - Provide both ambient and feature lighting to avoid a uniform flat light pattern.
- 3000K warm white colour temperature.
- Good optical control.
 - Downward directional optic
 - No indirect lighting component to minimise light pollution.
- Colour rendering of 80+ CRI.
- Dimmable



5. Ambient lighting strategy.

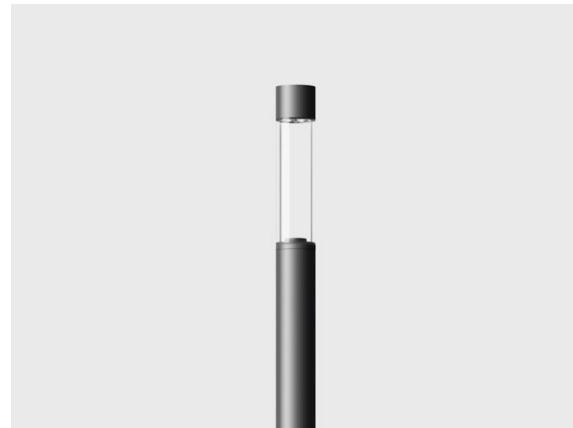
5.3. Event space - ambient lighting.

6-8m multi-optic lighting columns to provide a flexible lighting solution to cater various events

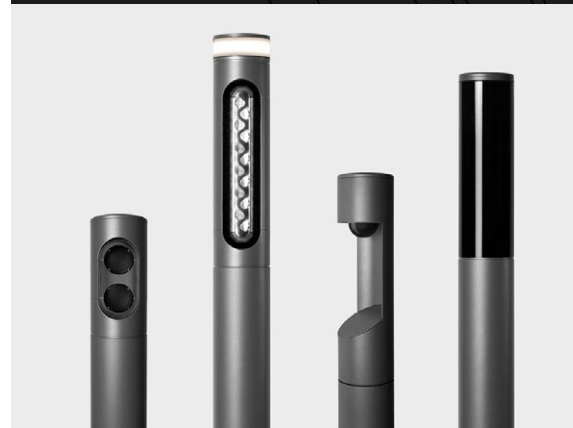
Applicable lighting column:

- Column selection could provide and integrate the following non lighting related elements:
- Security
- Speakers
- Wifi
- Power for market stalls

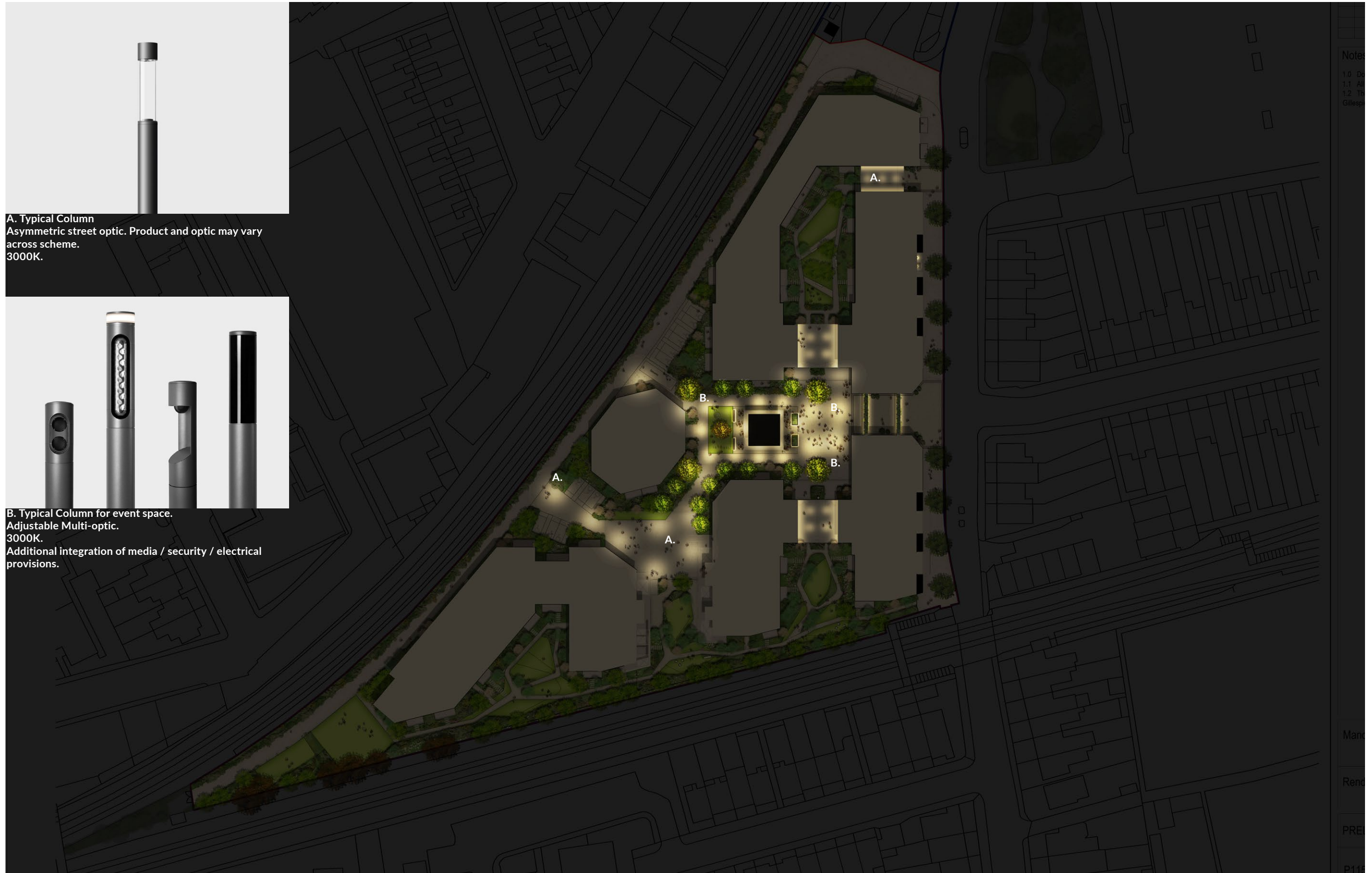




A. Typical Column
Asymmetric street optic. Product and optic may vary across scheme.
3000K.



B. Typical Column for event space.
Adjustable Multi-optic.
3000K.
Additional integration of media / security / electrical provisions.



Notes
1.0 De
1.1 A
1.2 Th
Giles

Man
Ren
PRE
P14

5. Ambient lighting strategy.

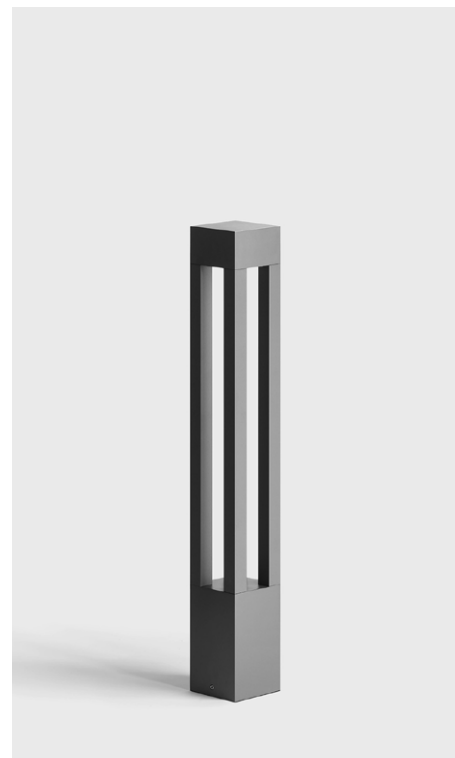
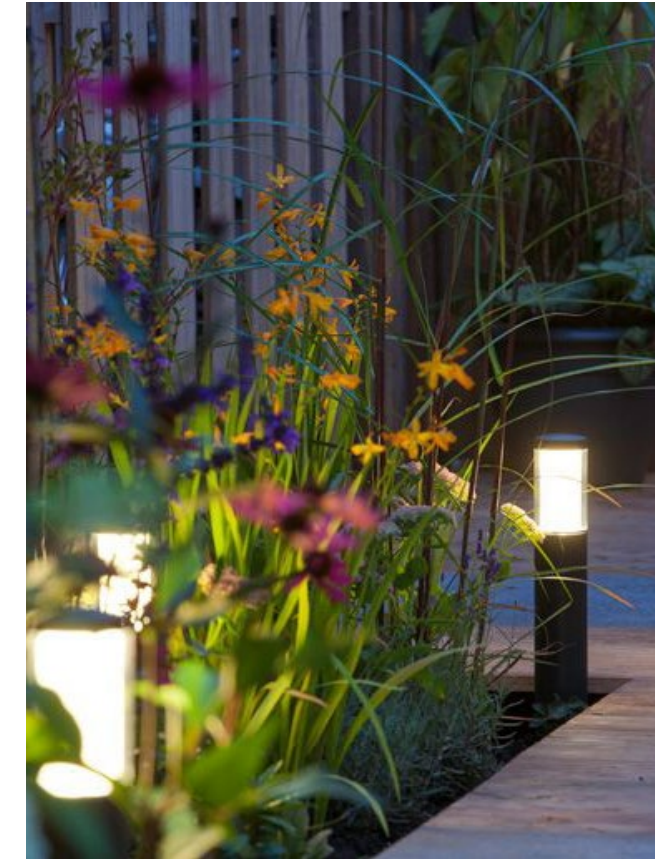
5.4 Secondary pedestrian routes.

Purpose of lighting:

- Creating a relaxing atmosphere to promote use of the space after dark.
- Safety and security.
 - Illuminate paving and level changes to avoid trips and falls.
 - Good facial recognition to increase the appearance of safety.

Lighting characteristics:

- Low level lighting.
- Integrated lighting within landscape features (where possible).
 - Minimise requirement for additional lighting elements.
- 3000K warm white colour temperature.
- Good optical control.
 - Downward directional optic.
 - No indirect lighting component to minimise light pollution.
- Colour rendering of 80+ CRI.
- Dimmable.





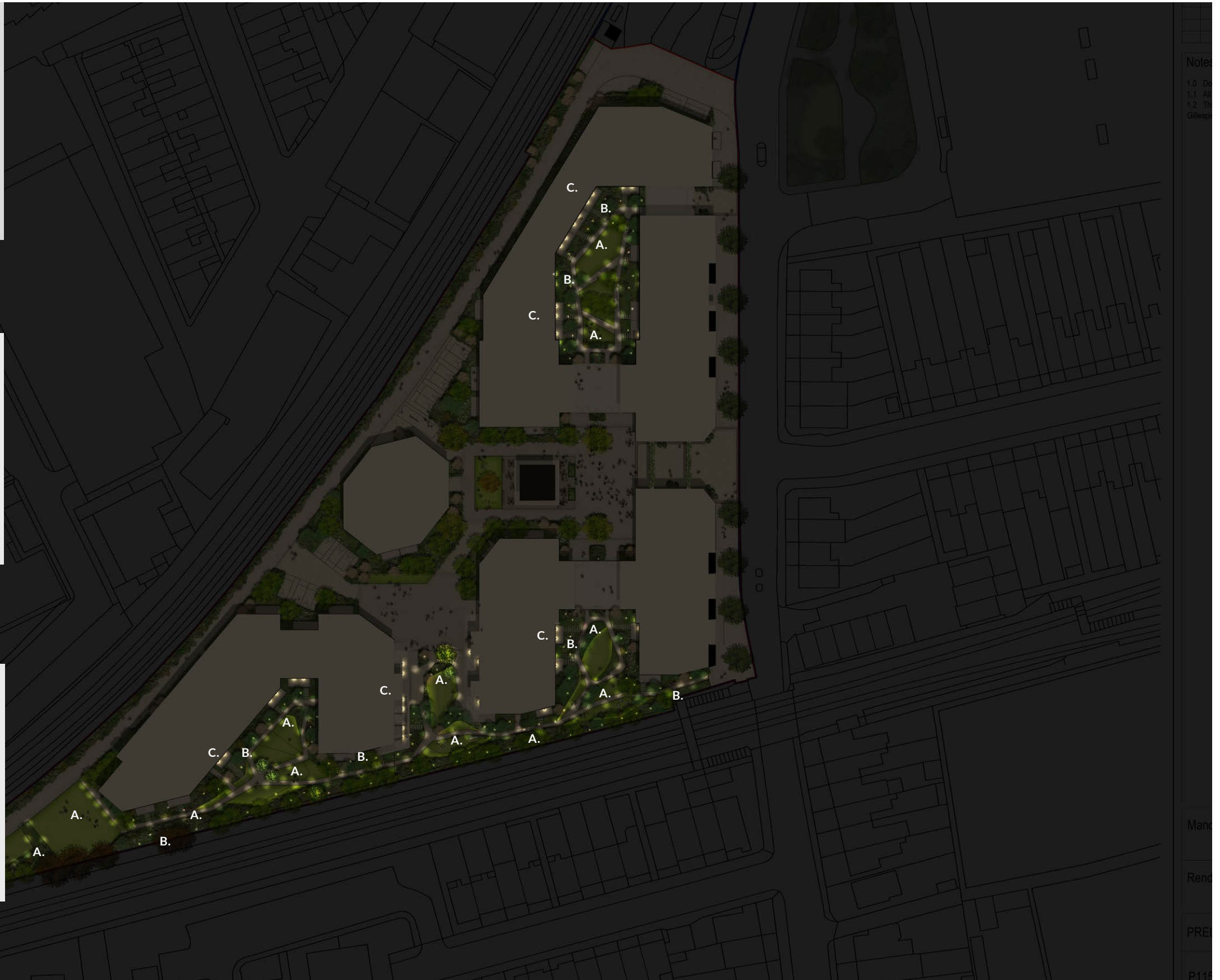
A. Low Level ambient lighting bollard
360 degree illuminated bollard to provide quality illumination to pathways
3000K.



B. Low level feature bollard.
Symmetric 360 degree optic.
3000K.



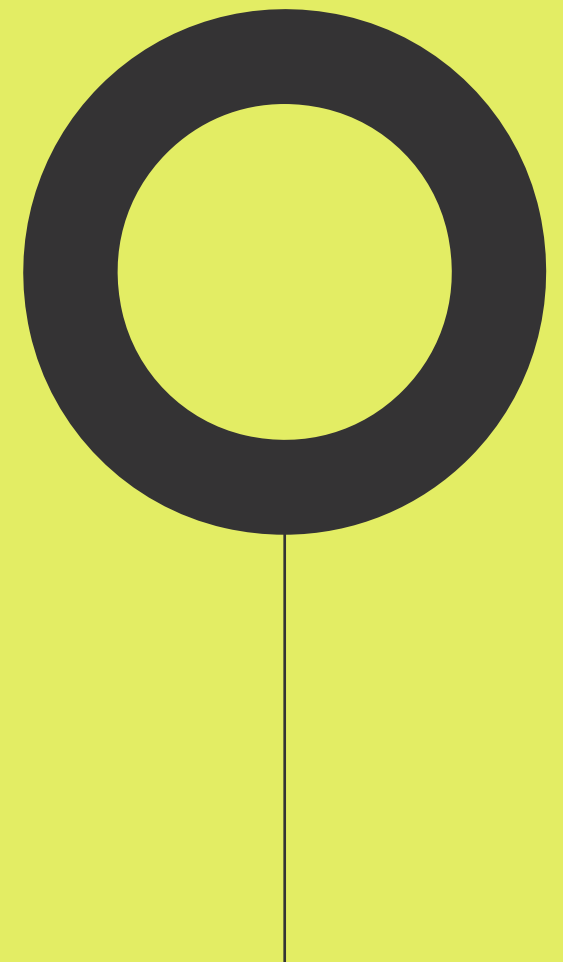
C. Wall mounted external luminaire.
To provide quality diffuse illumination to entrances
High lp and IK rating required
3000K.



Notes
1.0 De
1.1 Ar
1.2 Th
Giles

Man
Ren
PRE
P14

Feature lighting.

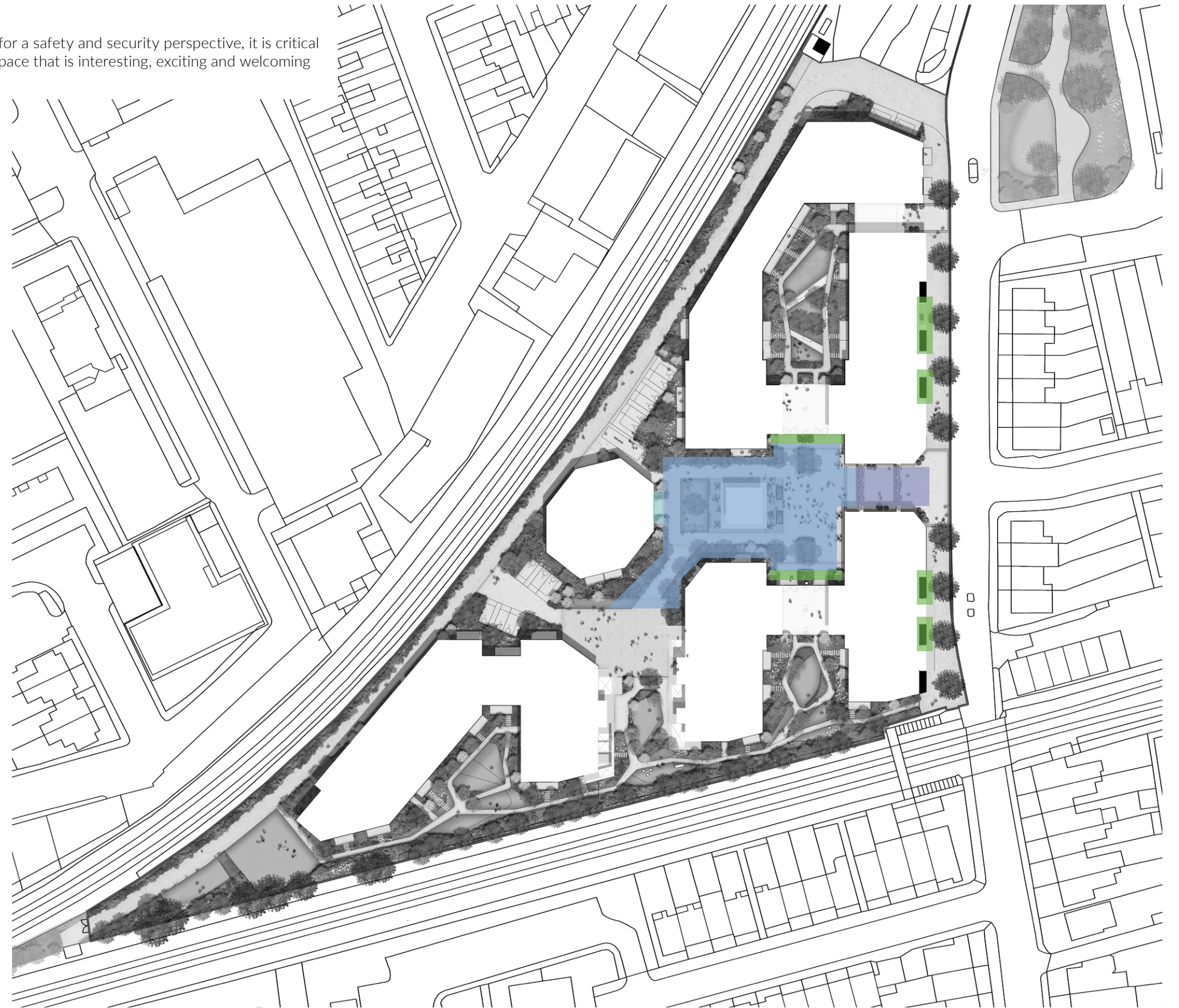


6. Feature lighting.

Although the lighting to the site thoroughfares is important for a safety and security perspective, it is critical to consider the feature lighting opportunities to produce a space that is interesting, exciting and welcoming atmosphere.

Key areas for consideration:

- Main site entrance.
- Public squares.
- Building entrances.



6. Feature lighting.

6.1 Site entrance/feature archways

Purpose of lighting:

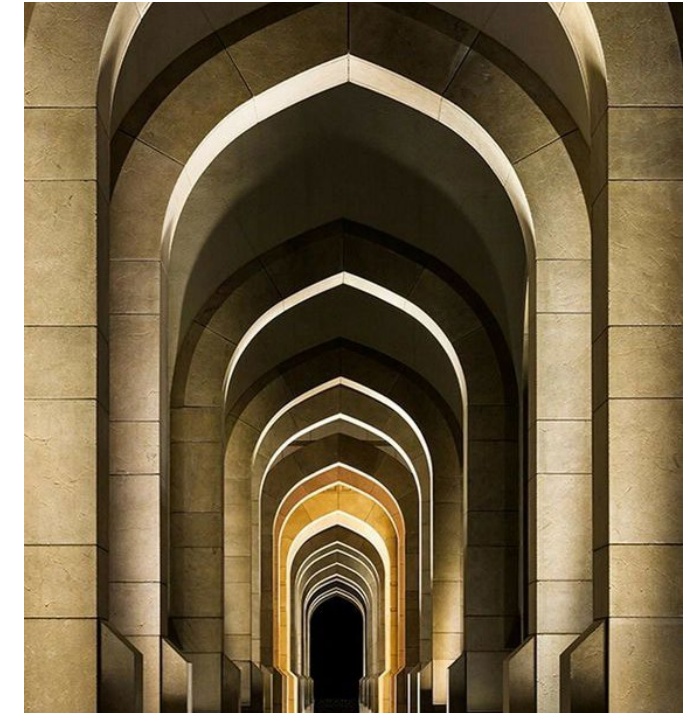
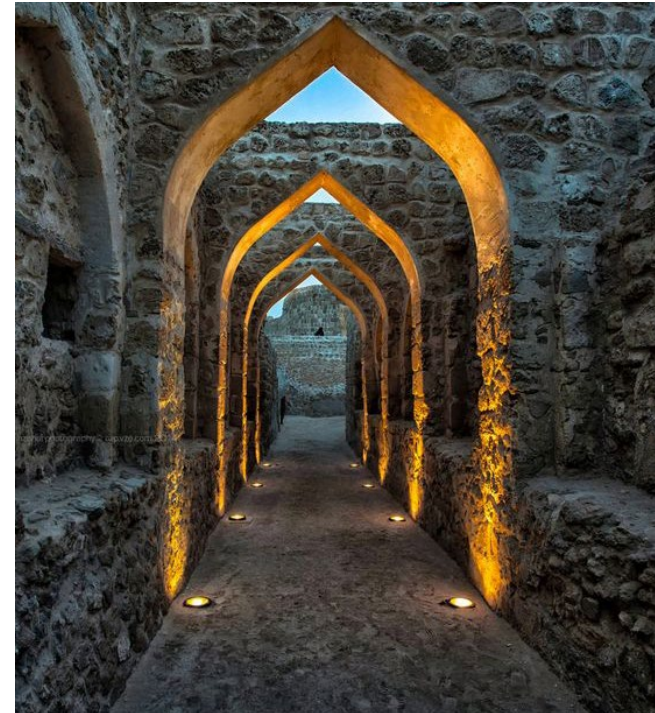
- Creating an introductory focal point.
- Inviting users through into the main site areas.

Revealing structuring in positive :

- Lighting the brick finish of the archways.
- Accentuating texture and material quality.

Luminaire characteristics:

- 3000K warm white colour temperature.
- Good optical control.
- Colour rendering of 80+ CRI.
- Dimmable.



6. Feature lighting.

6.2 Public open squares.

Purpose of lighting:

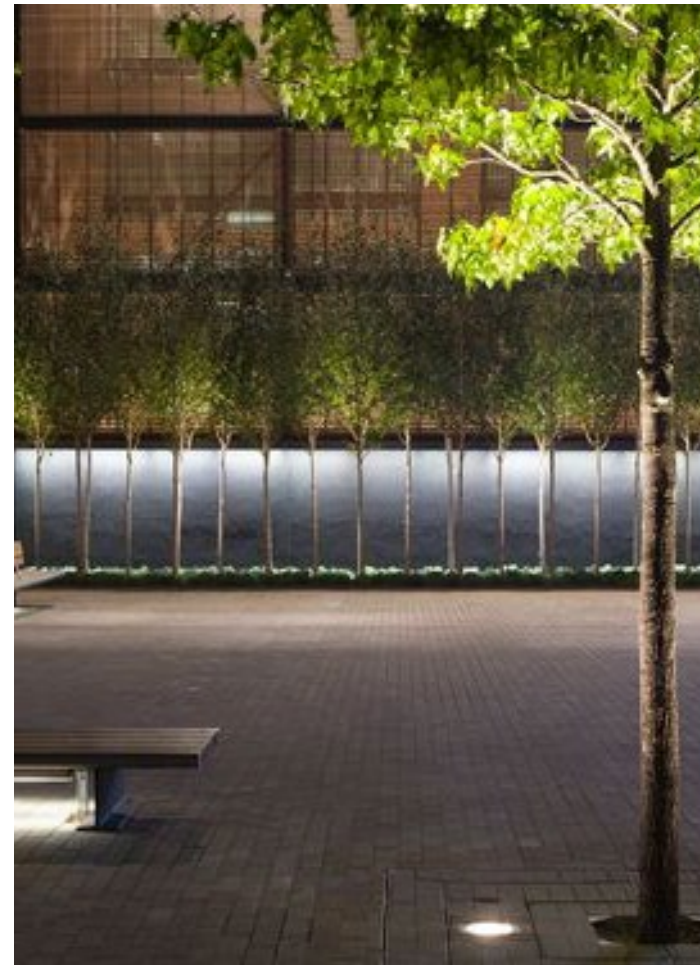
- Creating an inviting atmosphere.
- Promoting use after dark.
- Accentuating architectural and landscape features.

Types of lighting:

- Lighting vertical surfaces.
- Integrated lighting to landscape features.
- Accentuation colour and texture of natural features.
- Event space to have flexible lighting through the inclusion of multi optic lighting columns.

Luminaire characteristics:

- 3000K warm white colour temperature.
- Good optical control.
- Colour rendering of 80+ CRI.
- Dimmable.



Visual brightness.



Highlighting vertical surfaces.

6. Feature lighting.

6.3 Pavilion

Purpose of lighting:

- Creating a main central focal point.
- Inviting users through into the main pavilion area.

Revealing structuring in positive :

- Lighting the front reveals of the external pavilion structure.
- Accentuating texture and material quality.

Luminaire characteristics:

- 3000K warm white colour temperature.
- Good optical control with careful attention to beam angle.
- Colour rendering of 80+ CRI.
- Dimmable.



6. Feature lighting.

6.4 Building entrances.

Purpose of lighting:

- Highlight building entrances.
- Photo-tropic way-finding dictating visual hierarchy
- Creating bright threshold to the building.

Types of lighting:

- Wall mounted lighting.
- Integrated concealed lighting

Luminaire characteristics:

- 3000K warm white colour temperature.
- Good optical control.
- Colour rendering of 80+ CRI.
- Dimmable.



Highlighting threshold.



Bright vertical surfaces.



Illuminated internal walkways

