OBTRUSIVE LIGHTING ANALYSIS

Obtrusive Light Analysis

The purpose of this section is to provide an analysis of the proposed external lighting design for the Chancery Court Hotel in relation to its compliance with the Institute of Lighting Engineers (ILE) Guidance notes for the reduction of obtrusive light (2005).

The limiting design factor for the exterior lighting is the Institute of Lighting Engineers (ILE) 'Guidance Notes for the Reduction of Obtrusive Light'. The Chancery Court Hotel is defined as being in an 'E4 – High district brightness area' and therefore the figures to achieve are as follows:

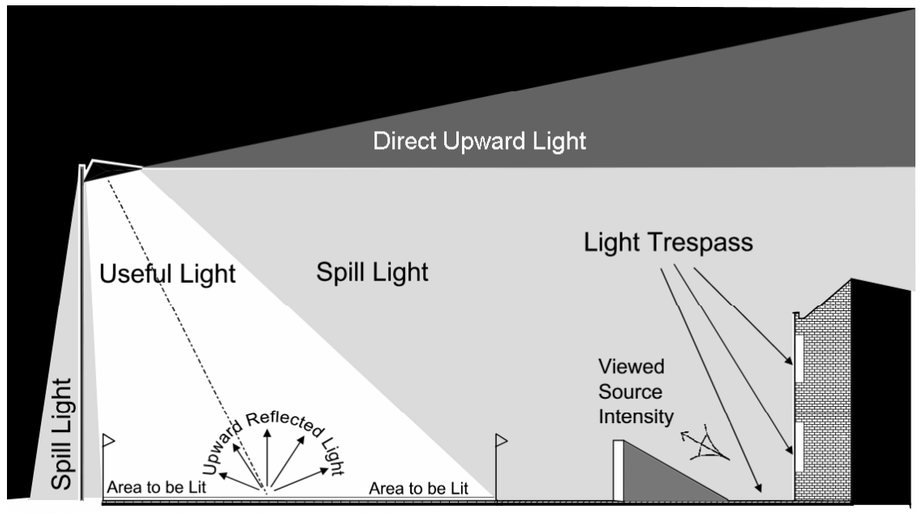
Sky Glow – Upward Light Ratio (ULR) not to exceed 15% of the luminaire flux for the total installation
Light Trespass – Pre-Curfew 25 lux average, Post-Curfew 5 lux average (into neighbouring windows)
Source Intensity – Pre-Curfew 25 kcd, Post-Curfew 2.5 kcd
Building Luminance – 25 cd/m^2 average (pre-curfew operation only)

The document provides evidence that the design ensures the following:

- all night-time lighting is concentrated in the appropriate areas
- upward lighting is minimised
- light pollution is minimised
- energy consumption is minimised.

The external building and hardscape lighting is designed in accordance with the following guidance documents:

- BS EN 12464-2 Outdoor work places
- BS 5489-1:2003 (rev 2006) Code for practice for the design of road lighting Part 1: Lighting of roads and public amenity areas.
- CIBSE Lighting Guide 6 - The Outdoor environment



ILE diagram explaining obstructive lighting

Table 1 – Obtrusive Light Limitations for Exterior Lighting Installations

Environmental Zone	Sky Glow ULR [Max %] (1)	Light Trespass (into Windows) Ev [Lux] (2)		Source Intensity I [kcd] (3)		Building Luminance Pre-curfew (4)
		Pre- curfew	Post- curfew	Pre- curfew	Post- curfew	Average, L [cd/m2]
E1	0	2	1*	2.5	0	0
E2	2.5	5	1	7.5	0.5	5
E3	5.0	10	2	10	1.0	10
E4	15.0	25	5	25	2.5	25

ULR – Upward Light Ratio of the Installation is the maximum permitted percentage of luminaire flux for the total installation that goes directly into the sky.
Ev – Vertical Illuminance in Lux and is measured flat on the glazing at the centre of the window
I – Light Intensity in Cd
L – Luminance in Cd/m2
Curfew – The time after which stricter requirements (for the control of obtrusive light) will apply; often a condition of use of lighting applied by the local planning authority. If not otherwise stated - 23.00hrs is suggested.
* – From Public road lighting installations only

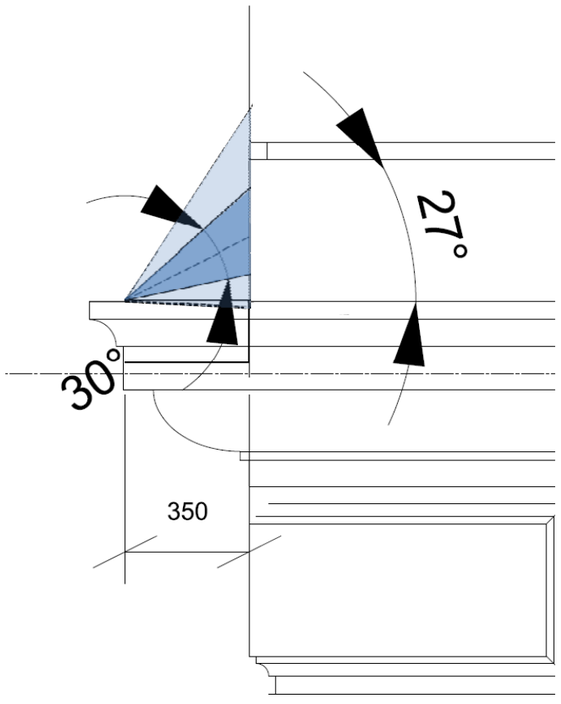
Category	Examples	
E1:	Intrinsically dark landscapes	National Parks, Areas of Outstanding Natural Beauty, etc
E2:	Low district brightness areas	Rural, small village, or relatively dark urban locations
E3:	Medium district brightness areas	Small town centres or urban locations
E4:	High district brightness areas	Town/city centres with high levels of night-time activity

Methodology

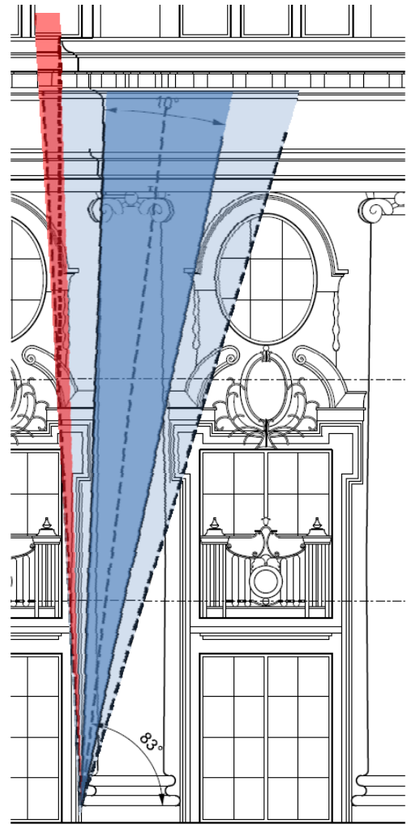
A study was carried out to establish the Upward Light Ratio in proposed lighting scheme.

Each proposed lighting treatment was assessed individually. The amount of ULR was estimated by taking into account following criteria:

1. Type of light fitting
2. Quantity of the fittings
3. Lighting performance of luminaire
   - Lumen output
   - Beam angle of the luminaire
4. Position of light fitting
   - Existing architectural obstruction for light distribution
   - Rotation of the fitting towards the facade



Example of luminaire's complete distribution aimed at facade.



Example os estimated blockage of light from architectural details, luminaire beam, and aiming.

Examples of facade treatments analysis undertaken.

Analysis of High Holborn Facade Treatments

Elevation	Description	Obstruction for up light	Fitting type	quantity	Lumen output or [lm/m]	angle beam [deg]	angle of projection	TOTAL [lm]	ULR [%]	ULR [lm]	[lm] not ULR	Treatment
High Holborn	LED line 7.5W/m	YES	LF - X	85	60	30	27	5100	0	0	5100	A1
	LED line 7.5W/m	YES	LF - X	85	60	60	52	5100	0	0	5100	A2
	LED line 7.5W/m	YES	LF - X	8.5	60	60	19	510	0	0	510	A3
	LED line 7.5W/m	YES	LF - X	8	60	30	27	480	0	0	480	A4
	LED line 7.5W/m	YES/NO	LF - X	2	60	30	90	120	50	60	60	A5
	Removed LED tape dot effect 28W/m											B1
	Removed LED tape dot effect 28W/m											B2
	Removed LED tape dot effect 28W/m											B3
	LED uplight adj. 20W (10deg)	YES	LD-X	24	1904	10	83	45696	5	2284.8	43411.2	C1
	LED uplight adj. 20W (10deg)	YES	LD-X-1	4	1904	10	83	7616	5	380.8	7235.2	C2
	LED uplight adj. 3W (30deg)	YES	LE-X	16	180	30	15	2880	0	0	2880	C3
	LED uplight adj. 20W (10deg)	YES	LD-X-1	2	1904	10	83	3808	5	190.4	3617.6	C4
	LED uplight adj. 20W (10deg)	YES	LD-X	4	1904	10	83	7616	5	380.8	7235.2	C5
	Gas lantern	NO	CB-X	12	1000	360	360	12000	75	9000	3000	E1
	Existing decorative wall fitting	NO	not spec	6	3200	180	180	19200	25	4800	14400	E2
	LED uplights 18W	YES/NO	LA-X	2	1668	45	90	3336	5	166.8	3169.2	H5
	Planter lighting	NO/YES	TBC	14	300	30	80	4200	15	630	3570	G1
	Wall fitting	NO	CE-X	4	1800	30/30	30/30	7200	50	3600	3600	F1

Analysis of Courtyard Facade Treatments

Elevation	Description	Obstruction for up light	Fitting type	quantity	Lumen output or [lm/m]	angle beam [deg]	angle of projection	TOTAL [lm]	ULR [%]	ULR [lm]	[lm] not ULR	Treatment
Courtyard East Elevation	LED tape dot effect 7.5W/m	YES	LF - X	17	60	30	27	1020	0	0	1020	A1
	LED tape dot effect 7.5W/m	YES	LF - X	17	60	60	52	1020	0	0	1020	A2
Elevation	**Description**	**Obstruction for up light**	**Fitting type**	**quantity**	**Lumen output or [lm/m]**	**angle beam [deg]**	**angle of projection**	**TOTAL [lm]**	**ULR [%]**	**ULR [lm]**	**[lm] not ULR**	**Treatment**
Courtyard North Elevation	LED line 7.5W/m	YES	LF - X	32	60	30	27	1920	0	0	1920	A1
	LED line 7.5W/m	YES	LF - X	26	60	60	52	1560	0	0	1560	A2
	LED line 7.5W/m	YES	LF - X	8.5	60	60	19	510	0	0	510	A3
	LED line 7.5W/m	YES	LF - X	8	60	30	27	480	0	0	480	A4
	LED line 7.5W/m	YES/NO	LF - X	2	60	30	90	120	50	60	60	A5
	LED uplight adj. 20W (10deg)	YES	LD-X	14	1904	10	83	26656	5	1332.8	25323.2	C1
	LED uplight adj. 3W (30deg)	YES	LE-X	14	180	30	15	2520	0	0	2520	C3
	LED uplight adj. 20W (10deg)	YES	LD-X	4	1904	10	83	7616	5	380.8	7235.2	C5
	Planter lighting	NO/YES	TBC	4	300	30	80	1200	80	960	240	G1
Elevation	**Description**	**Obstruction for up light**	**Fitting type**	**quantity**	**Lumen output or [lm/m]**	**angle beam [deg]**	**angle of projection**	**TOTAL [lm]**	**ULR [%]**	**ULR [lm]**	**[lm] not ULR**	**Treatment**
Courtyard South Elevation	LED tape dot effect 7.5W/m	YES	LF - X	30	60	30	27	1800	0	0	1800	A1
	LED tape dot effect 7.5W/m	YES	LF - X	30	60	60	52	1800	0	0	1800	A2
	LED uplight adj. 20W (10deg)	YES	LD-X	12	1904	10	83	22848	5	1142.4	21705.6	C1
	LED uplight adj. 3W (30deg)	YES	LE-X	12	180	30	15	2160	0	0	2160	C3
	Planter lighting	NO/YES	TBC	6	300	30	80	1800	80	1440	360	G1

Analysis of Courtyard Facade and Entrance Passage Treatments

Elevation	Description	Obstruction for up light	Fitting type	quantity	Lumen output or [lm/m]	angle beam [deg]	angle of projection	TOTAL [lm]	ULR [%]	ULR [lm]	[lm] not ULR	Treatment
Courtyard West Elevation	LED tape dot effect 7.5W/m	YES	LF - X	17	60	30	27	1020	0	0	1020	A1
	LED tape dot effect 7.5W/m	YES	LF - X	17	60	60	52	1020	0	0	1020	A2
	LED uplight adj. 20W (10deg)	YES	LD-X	12	1904	10	83	22848	5	1142.4	21705.6	C1
	LED uplight adj. 3W (30deg)	YES	LE-X	8	180	30	15	1440	0	0	1440	C3
	LED uplight adj. 20W (10deg)	YES	LD-X-2	2	1904	30	83	3808	5	190.4	3617.6	C6
	Decorative wall fittings	NO	CC-X	3	1200	360	360	3600	50	1800	1800	E4
	Planter lighting	NO/YES	TBC	6	300	30	80	1800	80	1440	360	G1
Elevation	**Description**	**Obstruction for up light**	**Fitting type**	**quantity**	**Lumen output or [lm/m]**	**angle beam [deg]**	**angle of projection**	**TOTAL [lm]**	**ULR [%]**	**ULR [lm]**	**[lm] not ULR**	**Treatment**
Entrance passage	Marker lights	YES (under canopy)	LC-X	18	200	30	180	3600	0	0	3600	H1
	Uplights in the passage	YES (under canopy)	LB-X	18	850	30	90	15300	0	0	15300	H3
	Uplights in the passage	YES (under canopy)	LB-X-1	4	1600	30	90	6400	0	0	6400	H4
	LED tape dot effect 7.5W/m	YES (under canopy)	LF - X	22.5	60	60	27	1350	0	0	1350	A2
	Decorative pendant	YES (under canopy)	CA-X	1	1000	180	180	1000	0	0	1000	E5

Analysis of Courtyard and Rear Service Area Treatments

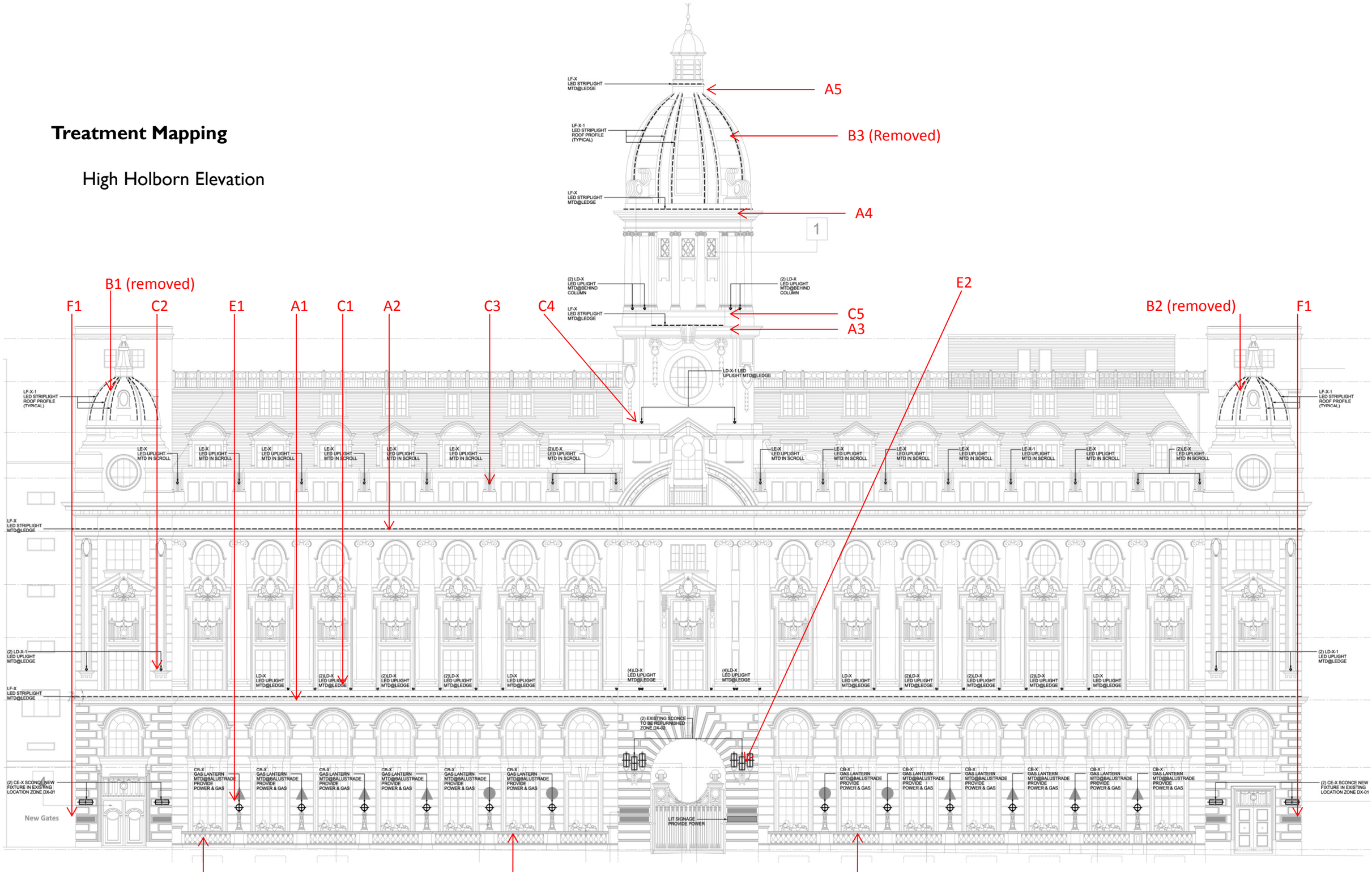
Elevation	Description	Obstruction for up light	Fitting type	quantity	Lumen output or [lm/m]	angle beam [deg]	angle of projection	TOTAL [lm]	ULR [%]	ULR [lm]	[lm] not ULR	Treatment
Internal Courtyard	LED uplights 18W	YES/NO	LA-X	8	1668	45	90	13344	30	4003.2	9340.8	H5
	Uplights passage	YES (under canopy)	LB-X	2	850	30	90	1700	30	510	1190	H6
	Marker lights	YES (under canopy)	LC-X	2	200	30	180	400	100	400	0	H2
	Planter lighting	NO/YES	TBC	12	300	30	80	3600	80	2880	720	G1
Elevation	**Description**	**Obstruction for up light**	**Fitting type**	**quantity**	**Lumen output or [lm/m]**	**angle beam [deg]**	**angle of projection**	**TOTAL [lm]**	**ULR [%]**	**ULR [lm]**	**[lm] not ULR**	**Treatment**
Access Road	existing sconce	YES (under canopy)		11	1800	180	180	19800	0	0	19800	E6
	Planter lighting	NO/YES	TBC	3	300	30	80	900	15	135	765	G1
	Wall fitting	NO	CF-X	3	1800	30/30	30/30	5400	0	0	5400	E7

Total lm	Total lumens not ULR	ULR [%]
308422	39100.6	**12.7**

ILE E4 Zone allows 15%, Therefore the current proposed lighting scheme is compliant

Treatment Mapping

High Holborn Elevation



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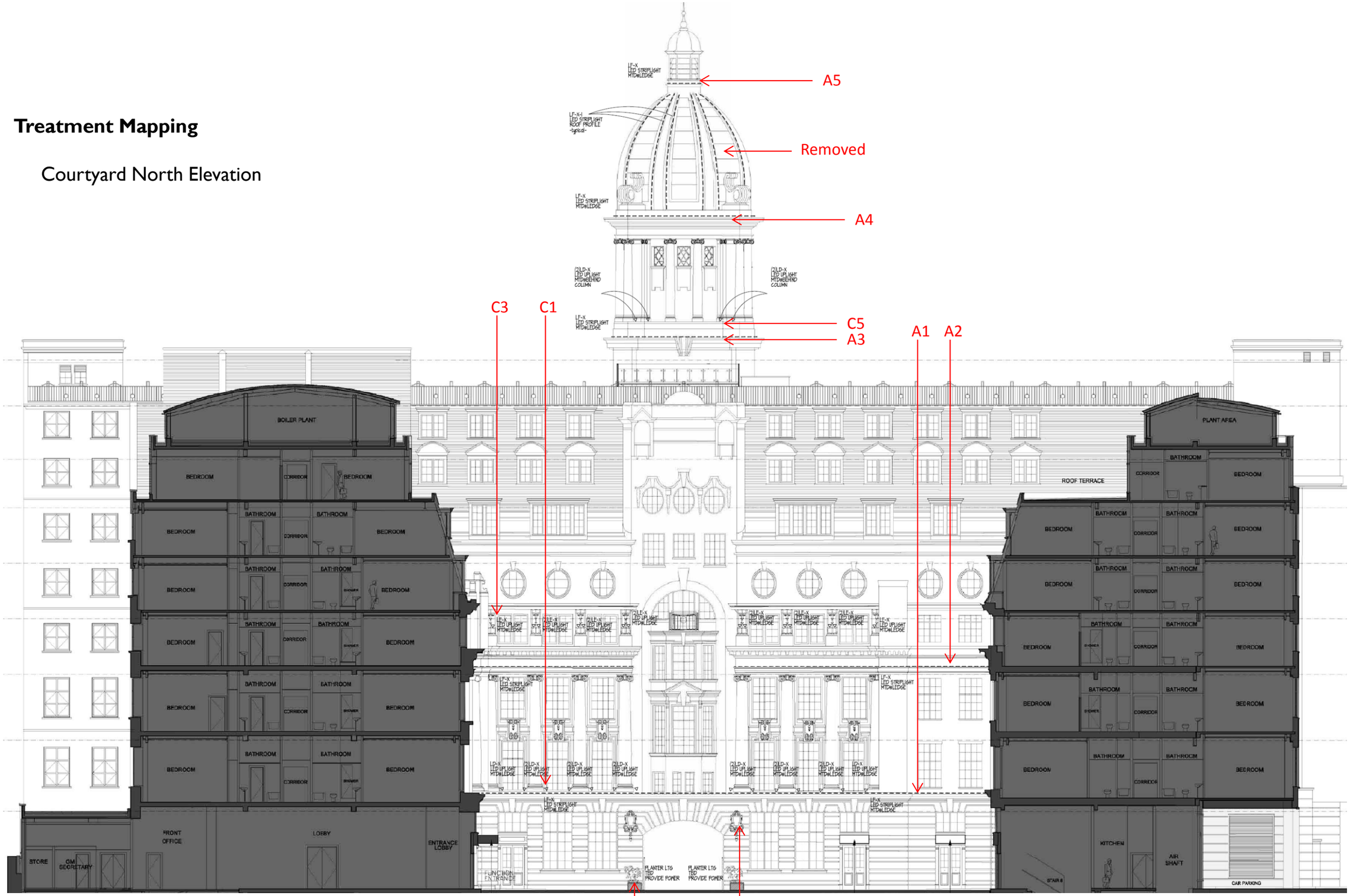
Treatment Mapping

Courtyard East Elevation

Treatment Mapping

Courtyard North Elevation



Treatment Mapping

Courtyard South Elevation