

Doc. Ref.	21412_CALC_0301
Sheet	1 of 20
Engineer	Nathan Allen
Date	08.01.2023
Revision	-

DESIGN CALCULATIONS FRONT SHEET

SCHEME	Gaul Road, March
CLIENT	Burmor Construction
ASPECTS OF SCHEME TO BE DESIGNED	Section 278 Lighting Design
CODES OF PRACTICE, DESIGN SPECIFICATIONS & BRITISH STANDARDS	BS 5489-1:2020 & BS EN 13201-2:2015
DESIGN CONSIDERATION NOTES	<p>Making sure design meets CCC Street Lighting Design Brief SF278-840 11th December 2023</p> <ul style="list-style-type: none"> • Lighting colour 3K for the main road. • Ensure existing column locations retained where possible and column numbers are kept to a minimum to enhance sustainability. • No illuminated signs or bollards specified. • Design constraints included <ul style="list-style-type: none"> - Ensuring no driveways are block - Retaining existing columns where possible. - Overhead cables on site. (Mid-Hinged Fold Columns specified in the vicinity) • Lighting to class M4 and Conflict Area C4 around junction *Note the Brief stated C5 but this was not possible to achieve while keeping the existing lighting onsite in place so C4 was used Eav 10-15lux Uniformity 0.40 • Utilise DW WINDSOR column height 8m • (0-degree tilt, 0.3m outreach) • Street lighting layout shown on engineering drawing ref. 21412_03_100_01 • Using Lighting Reality design software

INDEX

Pages	Calculations	Checked by	Date
2-8	C4 Lighting Reality Design Calculation – Area	AW	08.01.2024
9-18	M4 Lighting Reality Design Calculation – Road	AW	08.01.2024
19-20	Design Risk Assessment	AW	08.01.2024

DATE: 10 January 2024
DESIGNER: Nathan Allen
PROJECT No: 21412
PROJECT NAME: Gaul Road, March



SCHEME DESIGNED IN ACCORDANCE WITH BS5489-1:2020 &
BS EN 13201-2:2015

Gaul Road March

S278 Street Lighting Layout

M4 and C4 Eav 10lux - 15.0Lux Uniformity 0.40.

Outdoor Lighting Report

Layout Report

General Data

Dimensions in Metres Angles in Degrees

Calculation Grids

ID	Grid Name	X	Y	X' Length	Y' Length	X' Spacing	Y' Spacing
1	Grid 1	540544.13	296604.90	277.49	130.84	1.50	1.50
2	Grid 2	540640.30	296670.90	55.39	39.05	1.50	1.50

Luminaires

Luminaire A Data



Supplier	D W Windsor
Type	KIRIUM PRO1 32LED 4k A2 450mA UMSU G 42 0037 0000 100
Lamp(s)	32 x 4k LED
Lamp Flux (klm)	6.72
File Name	KIRIUM PRO1 32LED 4k A2_450mA UMSU G 42 0037 0000 100.ies
Maintenance Factor	0.86
Imax70,80,90(cd/klm)	629.3, 57.7, 0.0
No. in Project	9

Luminaire B Data



Supplier	D W Windsor
Type	KIRIUM PRO MINI 16LED 3k A1 300mA UM SUG 42 0013 0000 100
Lamp(s)	16 x 3k LED
Lamp Flux (klm)	2.04
File Name	KIRIUM PRO MINI 16LED 3k A1_300mA U MSUG 42 0013 0000 100.ies
Maintenance Factor	0.86
Imax70,80,90(cd/klm)	741.2, 276.2, 0.0
No. in Project	1

Luminaire D Data



Supplier	Philips
Type	BGP704 DW10
Lamp(s)	LED-HB 5.2S 740
Lamp Flux (klm)	18.00
File Name	Luma Gen2 Medium_BGP704_DW10_1800 0_80LED_5.2S_CLO_L90_740.ies
Maintenance Factor	0.86
Imax70,80,90(cd/klm)	438.8, 62.1, 0.0
No. in Project	1

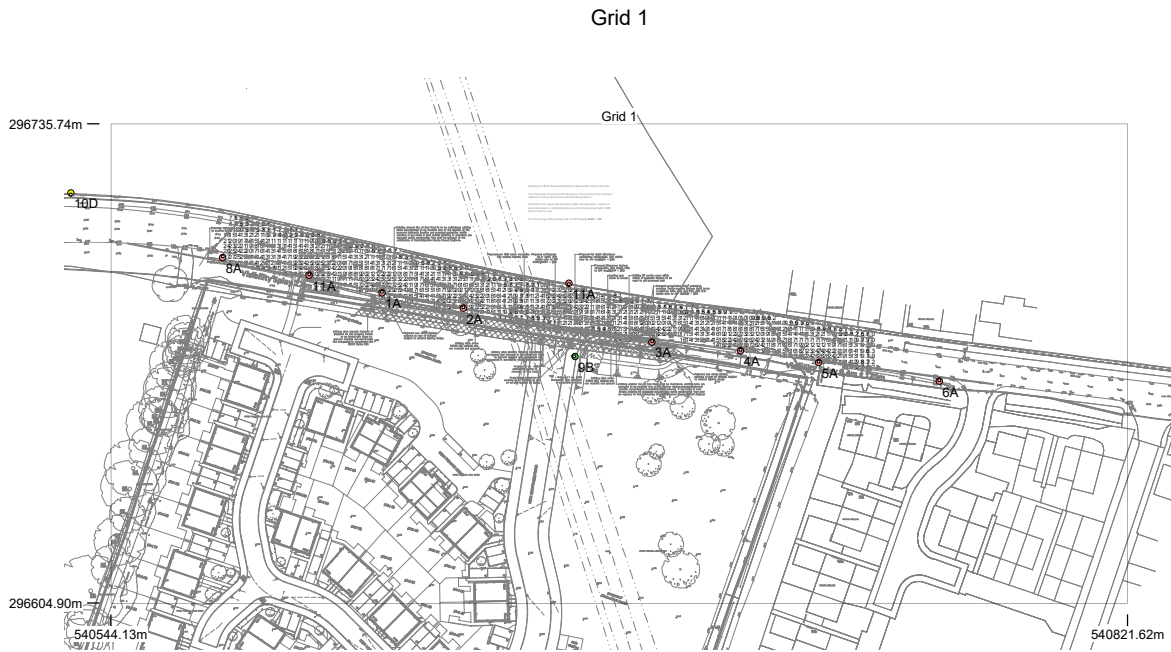
Layout

ID	Type	X	Y	Height	Angle	Tilt	Cant	Out-reach	Target X	Target Y	Target Z
1	A	540618.09	296689.59	8.00	81.00	0.00	0.00	0.30			
2	A	540640.29	296685.40	8.00	82.00	0.00	0.00	0.30			
3	A	540691.76	296676.17	8.00	83.00	0.00	0.00	0.30			
4	A	540715.93	296673.80	8.00	83.00	0.00	0.00	0.30			
5	A	540737.21	296670.54	8.00	84.00	0.00	0.00	0.30			
6	A	540770.17	296665.48	8.00	84.00	0.00	0.00	0.30			
8	A	540574.65	296699.27	8.00	77.00	0.00	0.00	0.30			
9	B	540670.80	296672.25	6.00	169.00	0.00	0.00	0.30			
10	D	540533.25	296716.84	8.00	270.00	0.00	0.00	0.40			

Layout Continued

ID	Type	X	Y	Height	Angle	Tilt	Cant	Out-reach	Target X	Target Y	Target Z
11	A	540669.16	296692.25	8.00	264.00	0.00	0.00	0.30			
11	A	540598.24	296694.43	8.00	77.00	0.00	0.00	0.30			

Horizontal Illuminance (lux)

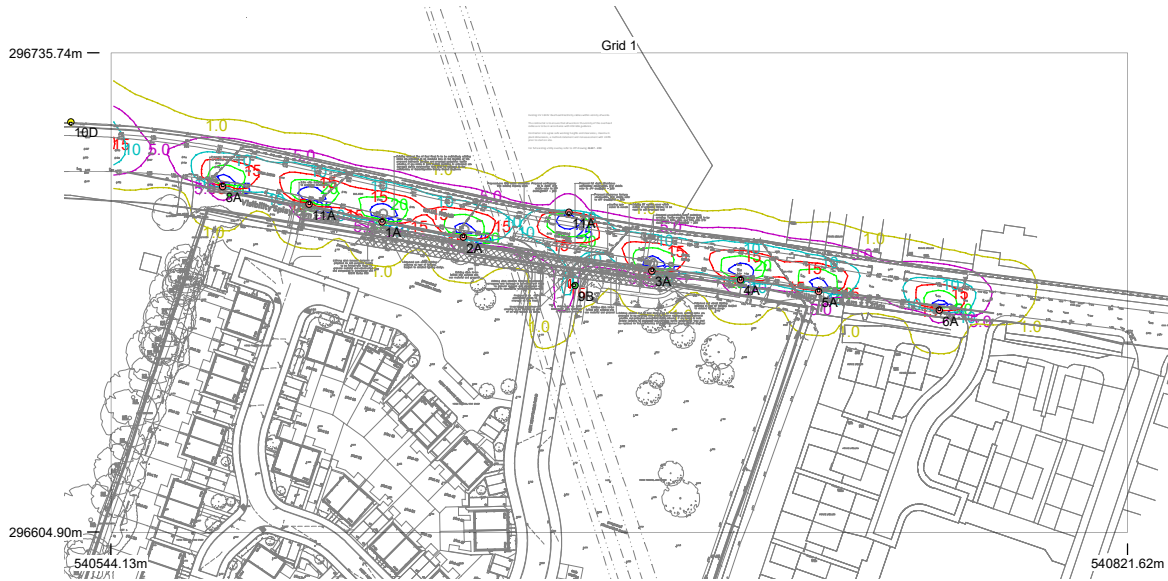


Results

Eav	14.90
Emin	5.90
Emax	30.21
Emin/Emax	0.20
Emin/Eav	0.40

Horizontal Illuminance (lux)

Grid 1

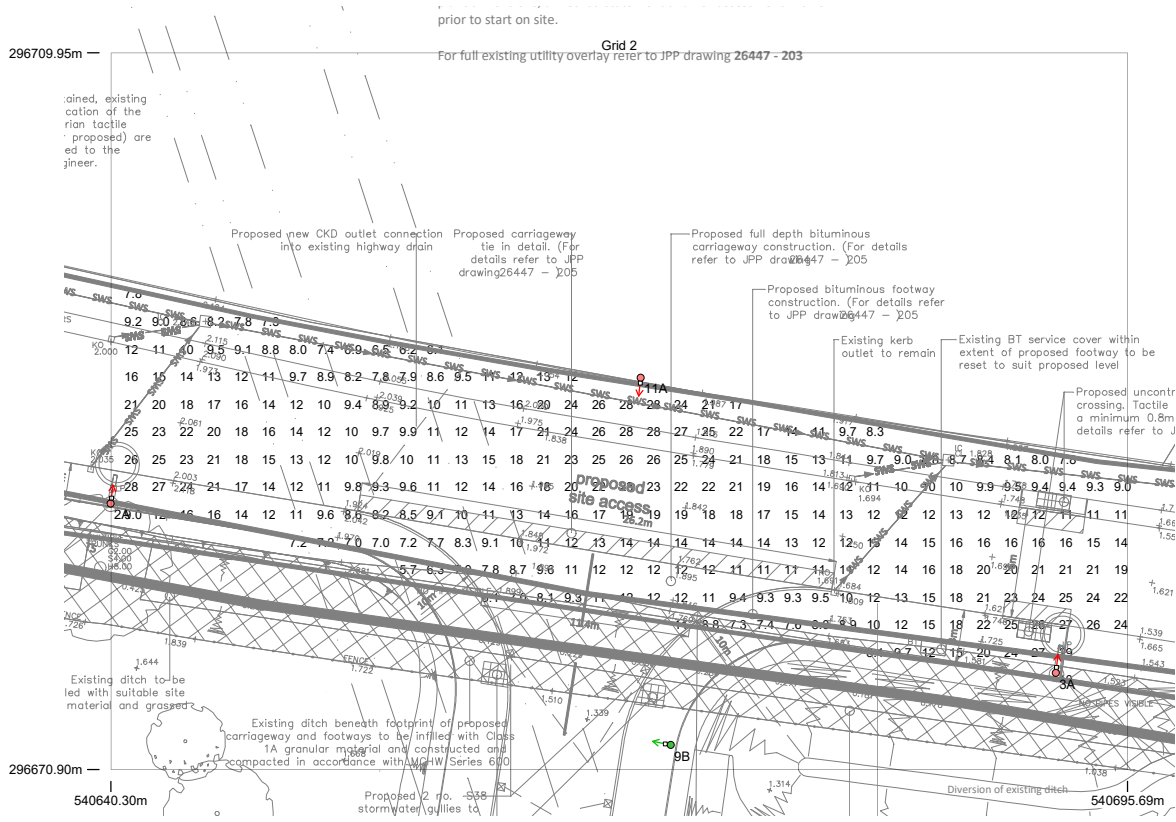


Results

Eav	14.90
Emin	5.90
E _{max}	30.21
E _{min} /E _{max}	0.20
E _{min} /E _{av}	0.40

Horizontal Illuminance (lux)

Grid 2

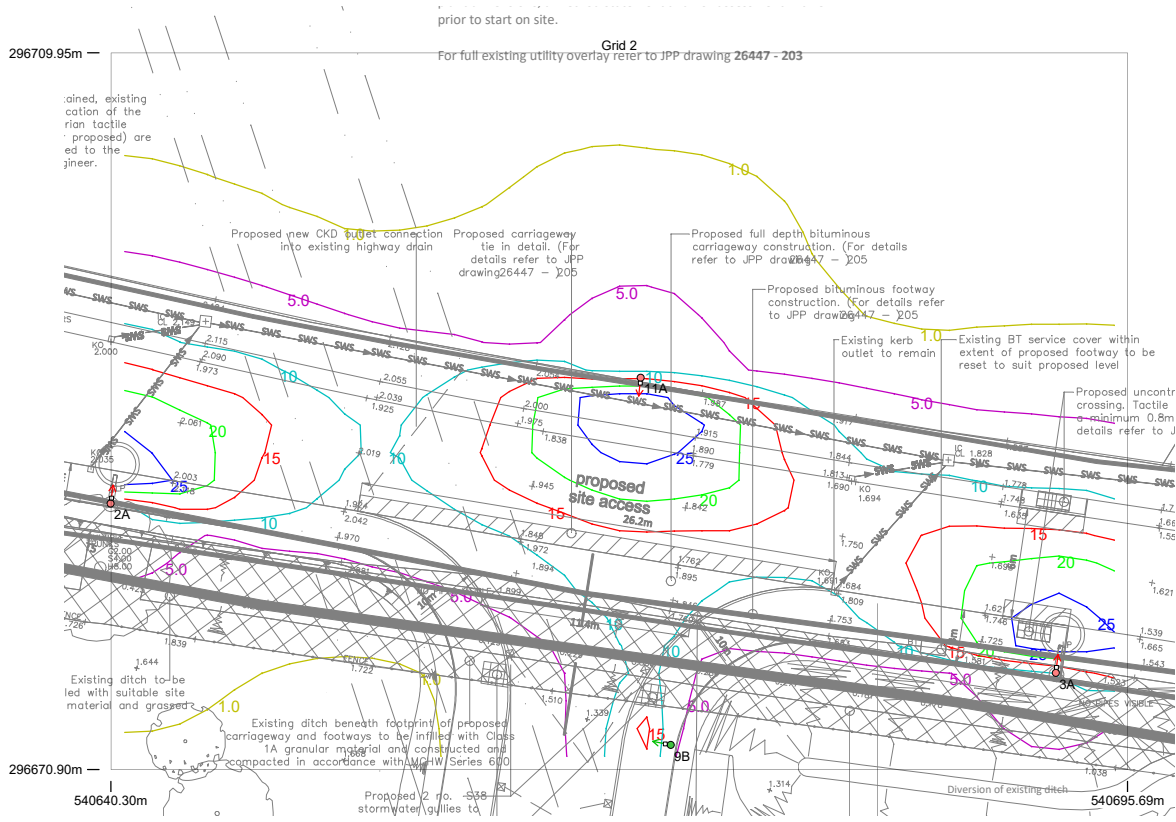


Results

Eav	14.24
Emin	5.73
Emax	29.04
Emin/Emax	0.20
Emin/Eav	0.40

Horizontal Illuminance (lux)

Grid 2



Results

Eav	14.24
Emin	5.73
Emax	29.04
Emin/Emax	0.20
Emin/Eav	0.40

DATE: 3 January 2024
DESIGNER: Nathan Allen
PROJECT No: 21412
PROJECT NAME: Gaul Road, March



SCHEME DESIGNED IN ACCORDANCE WITH BS5489-1:2020 &
BS EN 13201-2:2015

Gaul Road March

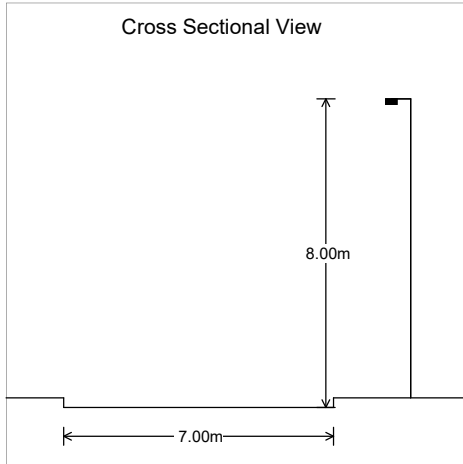
S278 Street Lighting Road Calc - Lane width 3.5m single sided right

M4
Optimum spacing - 31.50m

Roadway Lighting Report

Roadway Report Summary

Layout



Road Data

Calculation Grid	EN13201 Luminance
Width (m)	7.00
No. of Lanes	2
Road Surface	C2
Q0	0.07
Lane Width (m)	3.50
Rei Width (m)	3.50

Main Lighting



Column Data

Configuration	Single Sided Right
Spacing (m)	31.50
Height (m)	8.00
Tilt (deg)	0.00
Setback (m)	2.00
Outreach (m)	0.50
Overhang (m)	-1.50

Luminaire Data

Supplier	D W Windsor
Type	KIRIUM PRO1 32LED 4k A2 450mA UMSU G 42 0037 0000 100
Lamp(s)	32 x 4k LED
Lamp Flux (klm)	6.72
File Name	KIRIUM PRO1 32LED 4k A2_450mA UMSU G 42 0037 0000 100.ies
Maintenance Factor	0.86
Lum. Int. Class	G3

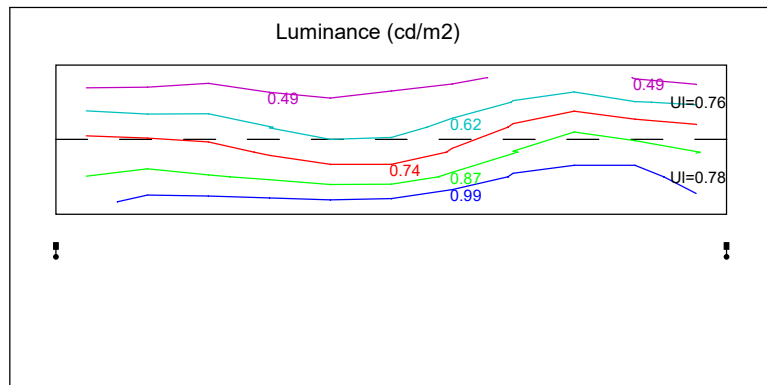
Results

Main

Complies with M4

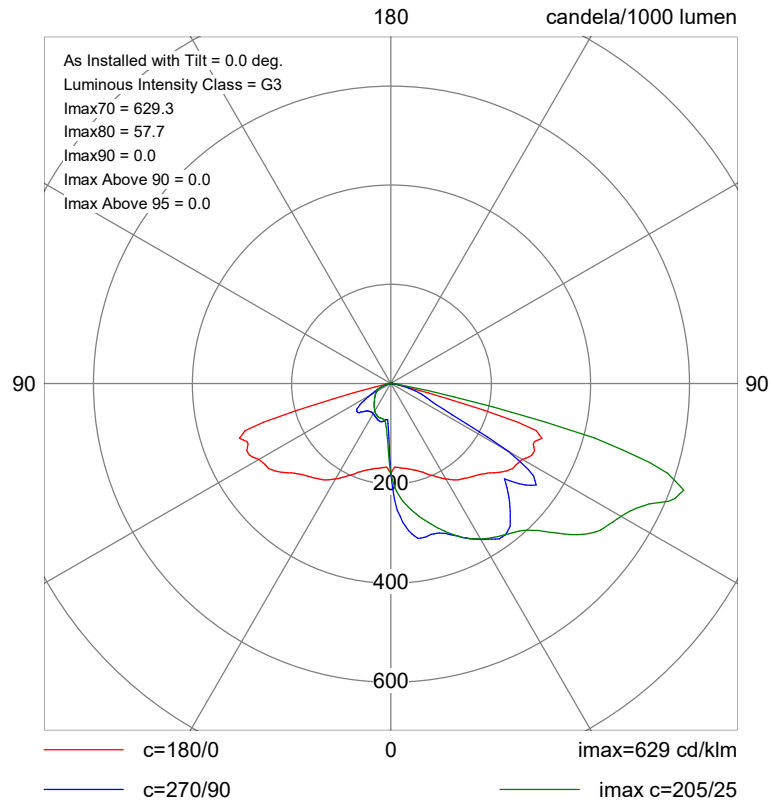
Lavmin	0.75 (1)
Lmin	0.43 (1)
Lmax	1.26 (2)
U0min	0.54 (2)
Ulmin	0.76 (2)
TI(%)	10.78 (1)
Rei	0.59

Number in brackets is the Observer Lane for Result shown.



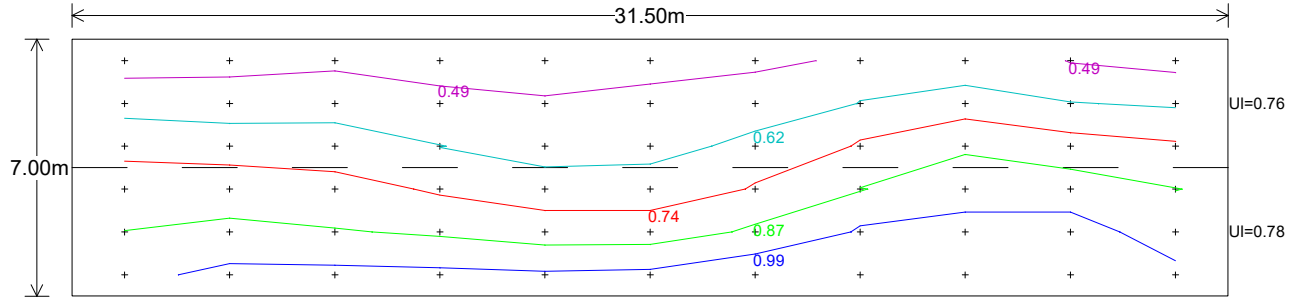
Polar Diagram

Main Luminaire KIRIUM PRO1 32LED 4k A2 450mA UMSUG 42 0037 0000 100



Luminance (cd/m²)

Observer in Lane 1



Main Results

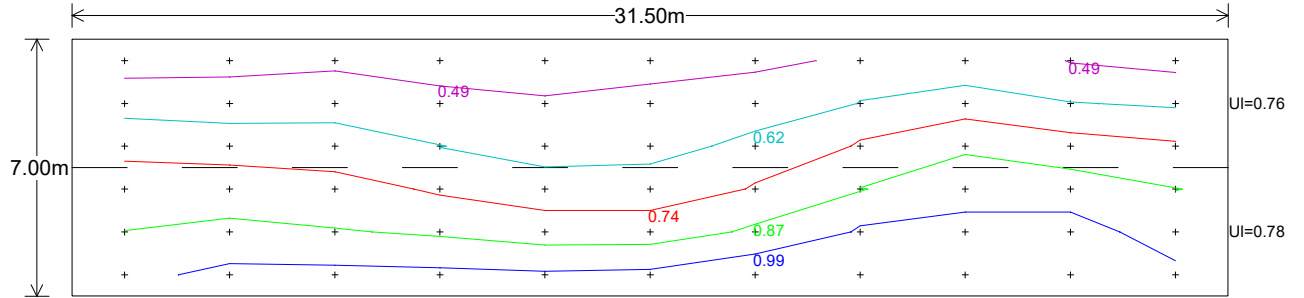
Observers in all Lanes

Lavmin	0.75 (1)
Lmin	0.43 (1)
Lmax	1.26 (2)
U0min	0.54 (2)
Ulmin	0.76 (2)
Tlmax(%)	10.78 (1)
Rei	0.59

Number in brackets is the
Observer Lane for Result shown.

Luminance (cd/m²)

Observer in Lane 1



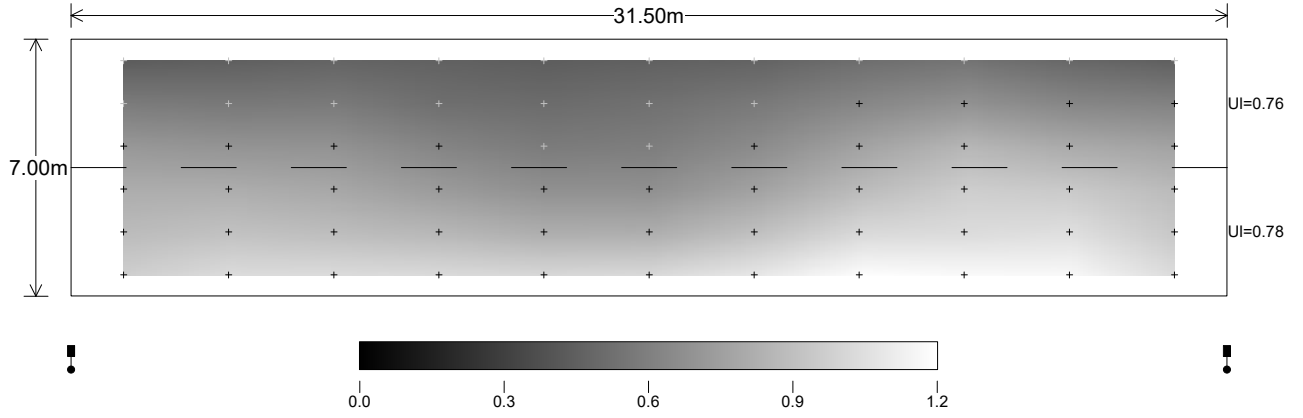
Main Results

Observer in Lane 1

Lav	0.75
Lmin	0.43
Lmax	1.18
U0	0.57
UI	0.78
TI(%)	10.78

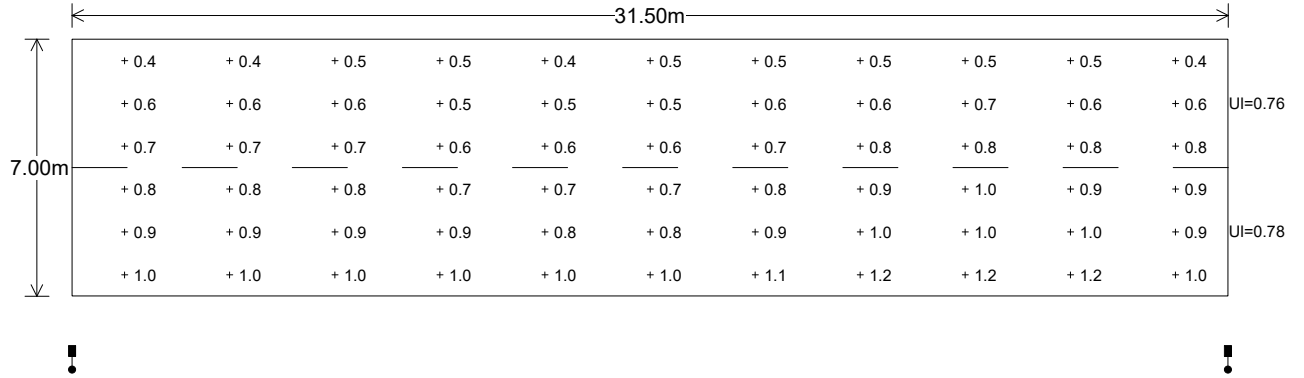
Luminance (cd/m²)

Observer in Lane 1



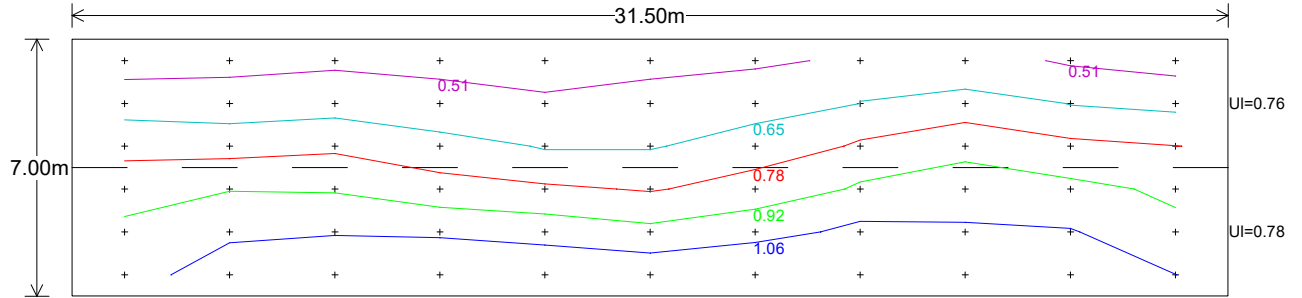
Luminance (cd/m²)

Observer in Lane 1



Luminance (cd/m²)

Observer in Lane 2

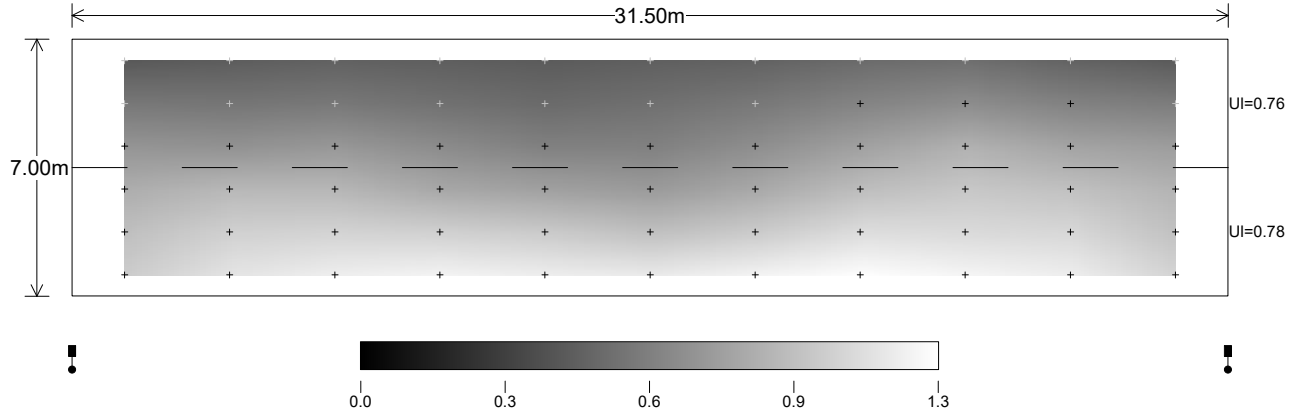


Main Results

Observer in Lane 2

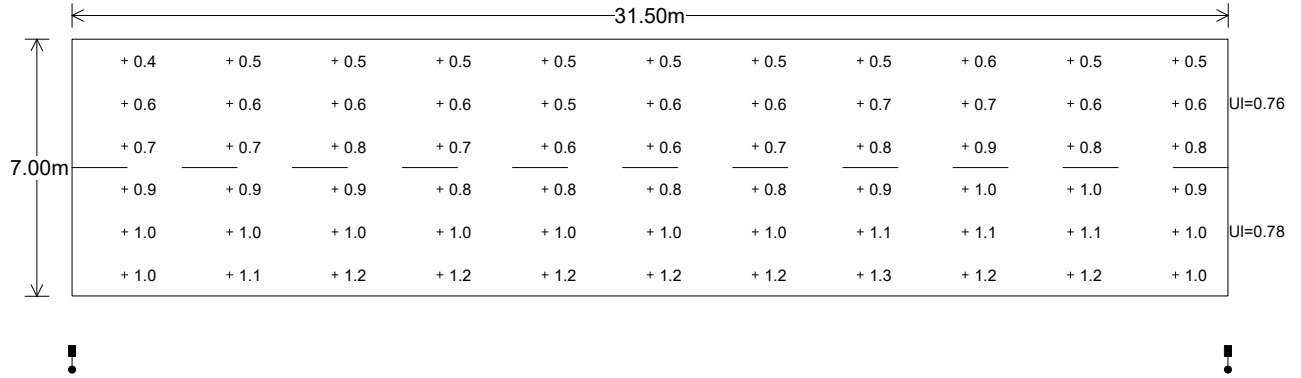
Lav	0.82
Lmin	0.44
Lmax	1.26
U0	0.54
UI	0.76
TI(%)	7.46

Luminance (cd/m²) Observer in Lane 2



Luminance (cd/m²)

Observer in Lane 2



STREET LIGHTING DESIGN RISK ASSESSMENT



MEC

Development Technical
Consultants

Project		Gaul Road, March				
Ref.	21412	Client	Burmor Construction			
Engineer	N. Allen	Date	03.01.2024			
Site Specific Hazards	The following are considered major risks to those working on site: <ul style="list-style-type: none"> Proximity to Overhead Electrical cables Site is on a bus route and near a playground but does not interfere with existing bus stops Road Speed limit 40mph – fast moving traffic The locations of these hazards are shown on lighting drawing 21412_03_100_01 					
Ref. No	Activity/ Element	Potential Hazards	Those at Risk	Risk Rating LOW/ MED/ HIGH	Elimination Or Reduction Through Design	Possible Control Options (Contractors)
1.1	Installation and removal of street lighting	Erection and removal of lighting columns and signs	Contractor Visitors Public	MED	Works cannot be eliminated through design. Number of required columns minimised to reduce extent of works, existing columns retained where possible.	Safety zone to be maintained between column erection and other site users/pedestrians. Comply with Well-maintained Highways Code of Practice and all requirements for manual handling of columns, refer to The Manual Handling Operations Regulations 1992. Reflective jackets and safety equipment to be worn at all times. Traffic management to be carried out in accordance with Chapter 8. When removing existing apparatus carry out appropriate safety checks to ensure supply is disconnected. Existing street lighting to be maintained in accordance with appropriate BS EN 13201:2015 (BS 5489) Code of practice or as specified by engineer, during construction process. Maintained minimum 0.5m safety zone from overhead lines at all times. The use of impact tools must be limited. For the installation of raise/lower columns, the contractor should consider the use of a carrying cradle. Due to the proximity of the bus route and nearby playground safe pedestrian routes around the works should be provided.
1.2	Excavation for the Installation and removal of street lighting	Buried services may exist that have not been identified on the record and survey information resulting in risk of potential electrocution, damage to cables, damage to ducting system and damage to gas mains/water mains.	Site operatives and persons permitted within site. Public	MED	Lighting design has taken into account a combined services survey drawing to reduce this risk but risk cannot be eliminated through design. Utilities information to be provided to contractor	Collate service records from ALL major utility companies with equipment within the vicinity before starting work. All holes to be excavated by hand digging to minimise risks. CT scan to locate buried obstructions. Safety zone to be maintained between other site users / pedestrians. Comply with HSG47 – Avoiding danger from underground services and all requirements for manual handling of equipment (Manual Handling Techniques). Reflective jackets and safety equipment to be worn at all times. Traffic management to be carried out in accordance with Chapter 8. When removing existing apparatus carry out appropriate safety checks to ensure supply is disconnected. The use of impact tools must be limited or appropriate road closure/diversions set up. All works involved with the removal and disconnection of column S15 should follow the HSE work near electricity guidelines.

1.3	Electrical Installation /Testing	Electrocution	Contractor	MED	Design has minimised the number of required connections.	All electrical work to be carried out in accordance with the latest BS 7671:2018 18th Edition, The electricity at work regulations, Health and safety at work Act and CDM. Reflective jackets and safety equipment to be worn at all times. Traffic management to be carried out in accordance with Chapter 8. Existing street lighting to be maintained in accordance with appropriate BS EN 13201:2015 (BS 5489) Code of practice or as specified by engineer, during construction process. When removing existing apparatus carry out appropriate safety checks to ensure supply is disconnected.
1.5	Working at heights	People falling and objects falling	Contractor Visitors Public	MED	Risk Reduced as lighting columns designed to be low as practically possible at 6m.	Avoid working at heights where it's reasonably practicable to do so. Minimise the distance and consequences of a fall, by using the right type of equipment where the risk cannot be eliminated. Keep loose materials and stacking or storing materials well back from edges. Contractor to comply with work place regulations and also the personal protective equipment at work regulations 1992
1.6	Lifting operations near live carriageway	Objects falling	Contractor Visitors Public	MED	Works cannot be eliminated through design; however, the height of columns has been minimised.	Contractor to provide method statements and detailed risk assessment to cover this operation. Ensure clear working area is provided by using barriers to prevent public being in close proximity to the works.
1.7	Working in the vicinity of LV or HV overhead power lines	Coming into contact with live power lines	Contractor Visitors Public	HIGH	Risk has been reduced as lighting columns have been designed with the combined services survey drawing in mind.	Operative to be G39 trained and have knowledge of identification of overhead line voltage cables. Work in accordance with the ILP document GP10 – safety during the installation and removal of lighting columns and similar street furniture in the proximity of overhead lines.
1.8	Removal of DNO fuse carriers	Electrocution	Contractor	MED	Works cannot be eliminated through design, however the number of required connections have been minimised.	Only electricians holding a G39 certificate allowed to perform this task