

(a) DESIGN CRITERIA

Maintenance factor of 0.90 (maximum) shall be used in all lighting simulations

- *A1a -** Class A1 Roadway, without Median, for speed limits exceeding 90km/h, and maximum traffic volume of >600 vehicles per hour per lane at night
- *A1d -** Class A1 Roadway, with Median, for speed limits exceeding 90km/h, and maximum traffic volume of >900 vehicles per hour per lane at night
- *A2a -** Class A2 Roadway, without Median, for speed limits not exceeding 90km/h, and maximum traffic volume of >600 vehicles per hour per lane at night
- *A2d -** Class A2 Roadway, with Median, for speed limits not exceeding 90km/h, and maximum traffic volume of >900 vehicles per hour per lane at night
- *A3a -** Class A3 Roadway, without Median, for speed limits not exceeding 60km/h, and maximum traffic volume of >600 vehicles per hour per lane at night
- *A3d -** Class A3 Roadway, with Median, for speed limits not exceeding 60km/h, and maximum traffic volume of >900 vehicles per hour per lane at night

Item No/ Site No.	Site Name	Carriageway Type	Roadway Width [m]	Number Of Lanes	Median Width [m]	Outer Shoulder Width [m]	Pole Spacing [m]	Mounting Height [m]	Max Boom Length [m]	Max Boom Angle [°]	Lighting Arrangement	Distance from Edge of Roadway (Yellow Line) [m]	SANS 10098 lighting values to be achieved*
L1/1	Ventersburg By-pass	Dual Carriageway	14.8	4	4	1 x 2.5 m 1 x 2.5 m	40	10	2	15	Double Row Opposing	4.0	A1d: Ln ≥ 2 Uo ≥ 0.4 UL ≥ 0.7 TI ≤ 15
L2/1	Ventersburg By-pass	Single Carriageway	3.7	1	0	1 x 2.5 m 1 x 2 m	40	10	2	15	Single Row (Top)	3.0	A3a: Ln ≥ 1.0 Uo ≥ 0.4 UL ≥ 0.6 TI ≤ 20

Item No/ Site No.	Site Name	Carriageway Type	Roadway Width [m]	Number Of Lanes	Median Width [m]	Outer Shoulder Width [m]	Pole Spacing [m]	Mounting Height [m]	Max Boom Length [m]	Max Boom Angle [°]	Lighting Arrangement	Distance from Edge of Roadway (Yellow Line) [m]	SANS 10098 Lighting values to be achieved*
L2/2	Paul Roux Bypass	Dual Carriageway	7.4	2	4.5	1 x 2.5 m 1 x 2.5 m	40	10	2	15	Double Row Offset	3.0	A3d: $L_n \geq 1.0$ $U_o \geq 0.4$ $U_L \geq 0.6$ $TI \leq 20$
L1/3	Botshabelo Interchange	Single Carriageway	14.8	4	0	1 x 2.5 m 1 x 2.5 m	50	10	2	15	Double Row Offset	3.5	A3a: $L_n \geq 1$ $U_o \geq 0.4$ $U_L \geq 0.6$ $TI \leq 20$
L2/4	Harrismith to Indusitqwa	Dual Carriageway	14.8	4	2.5	1 x 2.5 m 1 x 2.5 m	40	10	2	15	Double Row Offset	3.0	A2d: $L_n \geq 1.5$ $U_o \geq 0.4$ $U_L \geq 0.7$ $TI \leq 20$
L1/5	Maseru Truck Stop	Single Carriageway	7.4	2	0	1 x 2.5 m 1 x 2.5 m	37	10	2	15	Single Row (Top)	3.0	A3a: $L_n \geq 1$ $U_o \geq 0.4$ $U_L \geq 0.6$ $TI \leq 20$

***NOTE**

- The values apply to straight sections of the road, and to curves and intersections
- The luminance values apply to dry road surfaces of any material
 L_n = Minimum average luminance, cd/m²;
- U_o = Overall luminance uniformity, min;
 U_L = Longitudinal luminance uniformity, min; and
 TI = Threshold increment, %, max.

d) Maintenance Factor

The Maintenance Factor of an LED luminaire is to be derived from the product of light source lumen depreciation (LLD), luminaire survival factor (LSF) and luminaire maintenance factor (LMF) i.e. MF = LLD x LSF x LMF.

LLD - Lamp lumen depreciation factor is information provided by the luminaire supplier.

LSF - lamp survival factor. **A factor of one (1) to be used for tender purposes.**

LMF - luminaire maintenance factor is dependent on the ingress protection of the luminaire, pollution category of the street and the cleaning interval of the luminaire. **A dirty, coastal environment with a twelve (12) month cleaning cycle to be considered for the dirt depreciation factor for tender purposes.**

Maximum maintenance factors referenced are to be adhered to. Note these are maximum values and are **NOT** default values for all luminaires.

Maintenance factor of 0.90 (maximum) shall be used in all lighting simulations issued for tender. Tenderers achieving higher MF values to be submitted for information purposes.

It is intended to standardise luminaires under this project to a maximum of 3 x types.

The following simulations are required to be submitted for tender evaluation:

Item No	Carriageway Type	Roadway Width [m]	Number Of Lanes	Median Width [m]	Shoulder Width [m]	Pole Spacing [m]	Mounting Height [m]	Max Boom Length [m]	Max Boom Angle [°]	Lighting Arrangement	Distance from Edge of Roadway (Yellow Line) [m]	SANS 10098 lighting values to be achieved*
L1	Dual Carriageway	14.8	4	4	1 x 2.5 m 1 x 2.5 m	40	10	2	15	Double Row Opposing	4.0	A1d: Ln ≥ 2 Uo ≥ 0.4 UL ≥ 0.7 TI ≤ 15
L2	Dual Carriageway	14.8	4	2.5	1 x 2.5 m 1 x 2.5 m	40	10	2	15	Double Row Offset	3.0	A2d: Ln ≥ 1.5 Uo ≥ 0.4 UL ≥ 0.7 TI ≤ 20

Item No	Carriageway Type	Roadway Width [m]	Number Of Lanes	Median Width [m]	Shoulder Width [m]	Pole Spacing [m]	Mounting Height [m]	Max Boom Length [m]	Max Boom Angle [°]	Lighting Arrangement	Distance from Edge of Roadway (Yellow Line) [m]	SANS 10098 Lighting values to be achieved*
L3	Under Passes	14.8	4	0	2 x 1 m 2 x 1 m	10	6	2	15	Double Row Opposing	2.5	A1a: Ln ≥ 2.0 Uo ≥ 0.4 UL ≥ 0.7 TI ≤ 15

(b) LUMINAIRE SPECIFICATION SCHEDULE

The minimum specification for luminaires tendered are noted below.

Tenderers are to note that should the luminaires be found to be non-compliant with the requirements, may make the Tender non-responsive.

NO	Requirements	Minimum requirements
NO	Requirements	Minimum requirements
1	Luminaire Type	LED Street light
2	Performance Requirements	CIE 121, The photometry and goniophotometry of luminaires. SANS 9227/ISO 9227:2007, Corrosion tests in artificial atmospheres – Salt spray tests. Amdt 2 SANS 10098-1, Public lighting – Part 1: The lighting of public thoroughfares. SANS 60529/IEC 60529, Degrees of protection provided by enclosures (IP Code). SANS 60598-1/IEC 60598-1, Luminaires – Part 1: General requirements and tests. SANS 60598-2-1/IEC 60598-2-1, Luminaires – Part 2: Particular requirements – Section 1: Fixed general-purpose luminaires. SANS 60598-2-3/IEC 60598-2-3, Luminaires – Part 2-3: Particular requirements – Luminaires for road and street lighting.
3	Luminaire efficacy	>100 lumens/watt
4	Colour Temperature	CCT maximum 4000K Neutral White CRI≥70
5	LED Engine	Modular (Tenderers to state number of LED's per module)
6	LED Driver Current	Maximum 700 mA
7	LMS compatibility	Dimming 1 - 10V (flicker and noise free form 10 - 100%) Luminaires fitted with NEMA/ANSI C136.41 compliant 7-pin socket
8	Operating Voltage	230 V ± 10 %, 50 Hz
9	Frequency	50Hz
10	Electrical class	Class I (SANS 62262)
11	Power Factor	>0.9
12	Harmonic Distortion	THD shall not exceed 5% of the supply voltage and no single harmonic shall exceed 3%.
13	Surge Arrestor	Nominal discharge current: 10kA Voltage protection level: 2kV Response time: ≤25nS Luminaire cut-out
14	Lifetime at 25°C	>50 000 hrs (lumen depreciation not more than 30% - L70)
15	Operating Temperature	-5 °C to +45°C No external part of luminaire shall exceed temperature of 70°C during or after operation
16	Thermal Management	Optimal external heat exchange surface Temperature sensor and cut out to prevent overheating
17	IP Rating: Control gear compartment Optical compartment	IP66 certified (SANS 60598)

NO	Requirements	Minimum requirements
18	Housing	Weather and corrosion proof. Marine grade die cast aluminium alloy grade AC-44300 or better in accordance with DIN EN 1706
19	Front Protector	Heat and Impact resistant. High impact clear glass, with sealed joint in housing
20	Impact resistance	Per SANS 62262 >IK 08
21	Screw, bolts and metal parts	Stainless steel S316
22	Finish	Aluminium

(b) DESIGN RESULTS

Tenderer to provide the design results from the lighting simulation. To match hard copies submitted with tender.

ITEM	L1	L2	L3
Pole Spacing (m)			
Luminance (cd/m ²)			
Overall Uniformity			
Longitudinal Uniformity			
Threshold increment			

(c) LUMINAIRE DATA

Tenderer to provide information used in the simulation to achieve the design results.

ITEM	L1	L2	L3
Luminaire Wattage (W)			
Lamp Output (lm)			
Colour Temperature (K)			
CRI (%)			
Angle of tilt (degrees)			
Light fitting make			
No. of luminaires per pole			
Boom length			
Overhang			
Maintenance factor			
Local manufacturer			
If imported, local support details			
Reference sites in South Africa where luminaires are installed.			

Failure to submit this information may render the Tenderer non-responsive.