



**Advanced**  
LIGHTING TECHNOLOGIES

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11/05/2024



SOLA LANDSCAPE ARCHITECTS

Dear MIKE

Please see attached the illumination design for 3 PIGEON MOUNTAIN ROAD, this has been Designed to comply with the:

- Auckland Unitary Plan (Operating in Part) Section E24 Lighting-requirements.

Illuminations predictions have been performed on Lighting Analysts Illumination Engineering Software (AGI32) Version 19.9 Please refer to the following.

-Page One for the Executive Summary.

-Page Two- Five for Maintained Illumination Results.

-Page Six for Obtrusive Lighting ISO.

-Page Seven Obtrusive Light Report.

Lighting calculations are subject to the accuracies and tolerances in accordance with AS/NZS 3827.1:1998 & AS/NZS 3827.2:1998. These accuracies and tolerances include variances in the building dimensions and obstructions, surface finishes, luminaire positioning and aiming, ambient temperature, atmospheric conditions, luminaire photometry, lamp output, lighting design software, electrical supply and instrument calibration.

These predictions are offered as accurate calculation of an acceptable lighting design that complies with the above stated standard.

Yours Sincerely.

A handwritten signature in grey ink, appearing to read "Nathan", is positioned above the printed name.

Nathan Gilchrist  
Technical Sales Representative / Illuminations Designer

# Executive Summary

Supply of external lighting is to provide security and functional lighting of sufficient quality to enable the safe circulation of vehicles and personnel at night as required by Unitary Plan Section E27.6.3.7 for a site with more than 10 parking spaces planned.

The external lighting calculation has been developed to meet Unitary Plan Lighting Standard E24 and is suitable for a Domestic Development of this scale while minimising adverse effects for neighbouring residential properties.

The site is in a Residential - Mixed Housing Suburban Building Zone - So Unitary Plan Lighting Category 3 (medium brightness) applies.

External lighting is designed to meet AS/NZS 1158.3.1-2020

Driveways Paths and Carparks subcategories are selected from tables 2.1, 2.2 and 2.5 Respectfully under the following criteria:

- Night-time vehicle or pedestrian movements - low
- Risk of crime - high

Luminaires comprise low level LED bollards and pole mounted LED luminaires for pedestrian, vehicle circulation and car park areas.

## E24.6.1 Compliance items:

1. Lighting limits have been assessed to Standard AS 4282-1997.
2. A Maintenance Factor of 1.0 has been used in all Obtrusive and Spill Calculations.
3. Lighting category 3 (medium brightness) has been used for the site.
4. Noted regarding artificial light from nearby luminaires, this is not available nor considered applicable to this calculation.
5. Lighting Curfew time noted as commencing at 10.00pm each night until 7.00am the next day.
6. Added illuminance does not exceed 10 lux horizontal and vertical on the adjacent residential
7. Luminaires have been selected, located, aimed, and adjusted to be less than the luminous intensity limit of 1,000cd for the neighbouring residences.
8. Calculation methods have been noted and AGi software has been used to simulate conditions in accordance with AS 4282 Control of obtrusive effects of outdoor lighting.
9. Threshold Increment limits are not exceeded for traffic in both directions on Pigeon Mountain Compass Point and Ara Tai Road based on adaption luminance of 15% based on 2 cd/m<sup>2</sup>.

This been calculated with reasonable care and diligence to the required standards and unitary plan.



- GENERAL NOTES:**
- Lighting calculations are based upon initial lamp lumens with a maintenance factor applied & derived in accordance with AS/NZS 1158 as shown below.
  - Obtrusive and spill lighting calculation results are based on a maintenance factor/ LLF of 1.
  - Isolux lines show illuminance values at grade.
  - Luminaires are mounted at the heights as indicated on the drawing. Tilts (upcast) = 0 for all proposed luminaires.
  - The tilt for all luminaires shall be an angle of 0 measured from the horizontal unless otherwise stated. The luminaires shall be installed parallel to the surface that is being lit.
  - Lighting calculations are subject to the accuracies & tolerances in accordance with AS/NZS 3827.1:1998 & AS/NZS 3827.2:1998. These accuracies & tolerances include variances in the building dimensions & obstructions, surface finishes, luminaire positioning & aiming, ambient temperature, atmospheric conditions, luminaire photometry, lamp output, lighting design software, electrical supply & instrument calibration.
  - The contractor shall ensure prior to installation, required clearances are met from underground services, especially high-voltage cables and high pressure gas lines.
  - The software used for the calculations is AGI32 by Lighting Analysts.

**MAINTENANCE FACTOR (MF)**

Lamp Lumen Maintenance Factor (LLMF)  
 \* LED lamp lumen depreciation after 50,000 hours of operation  
 - In accordance with IESNA TM-21-11 & LM-80-08

Luminaire Maintenance Factor (LMF)  
 \* IP6X Luminaire IP rating  
 \* Urban Environmental Zone  
 \* Luminaire cleaning every 72 months  
 - Maximum LMF allowed per table 3.2 of AS/NZS 1158.3.1:2020 is 0.84

Maintenance Factor (LABEL E) = LLMF x LMF = 0.97 x 0.84 = 0.814  
 Maintenance Factor (LABEL BD) = LLMF x LMF = 0.95 x 0.84 = 0.8

Isoline Legend	
Illuminance (Lux)	
Color	Value
Red	0.5
Green	1.5
Blue	3
Black	7

Luminaire Schedule					
Symbol	Label	Qty	LLF	Arrangement	Description
	E2	3	0.800	Single	ADLT Energy UNO 200 Optics 36W 3000K LED Pole Luminaire on 4.5 PS1 Pole - Black
	ES	18	0.814	Single	ADLT Energy UNO SCP Optics 36W 3000K LED Pole Luminaire on 4.5 PS1 Pole - Black
	BD	6	0.800	Single	ADLT Denver ID AY Optics Single Side BLS 6W 3000K LED Bollard - 0.946m - Black

PROJECT NAME <b>3 PIGEON MOUNTAIN ROAD HALF MOON BAY</b>	DRAWING MAINTAINED ISOLINES	REV 1	COMMENTS LAYOUT FOR REVIEW	DATE 27/04/2023
PROJECT ID ADLT-14578	CLIENT SOLA	REV 2	COMMENTS UPDATED LAYOUT FOR REVIEW	DATE 26/09/2023
	TYPE PRIVATE LIGHTING DESIGN	REV 3	COMMENTS <b>UPDATED LAYOUT FOR REVIEW</b>	DATE 10/05/2024



DESIGN N.G.	PURPOSE LAYOUT REVIEW	
CHECK M.R.	SCALE NTS	DATE 11/05/2024
SALES MANAGER N.G.	REV 3	PAGE 1



PROJECT NAME  
**3 PIDGEON MOUNTAIN ROAD  
 HALF MOON BAY**

PROJECT ID  
 ADLT-14578

DRAWING  
 MAINTAINED LOCATIONS

CLIENT  
 SOLA

TYPE  
 PRIVATE LIGHTING DESIGN

REV	COMMENTS	DATE
1	LAYOUT FOR REVIEW	27/04/2023
2	UPDATED LAYOUT FOR REVIEW	26/09/2023
3	<b>UPDATED LAYOUT FOR REVIEW</b>	10/05/2024



DESIGN	PURPOSE	
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Calculation Summary						
Label	CalcType	Units	Avg	Max	Min	Max/Avg
Carpark 1 PC2	Illuminance	Lux	9.83	24.52	2.28	2.49
Carpark 2 PC2	Illuminance	Lux	9.66	31.98	3.73	3.31
Carpark 3 PC2	Illuminance	Lux	9.36	19.36	3.89	2.07
Joal 1 PR3	Illuminance	Lux	5.03	19.93	0.71	3.96
Joal 2 PR3	Illuminance	Lux	5.72	20.21	0.41	3.53
Joal 3 PR3	Illuminance	Lux	17.35	58.02	3.65	3.34
Joal 4 PR3	Illuminance	Lux	7.48	56.91	0.82	7.61
Path 1 PP3	Illuminance	Lux	6.00	30.19	0.88	5.03
Path 2 PP3	Illuminance	Lux	5.32	20.55	1.30	3.86
Path 3 PP3	Illuminance	Lux	10.47	35.90	2.42	3.43

AS/NZS 1158.3.1:2020 - TABLE 3.3				
VALUES OF LIGHT TECHNICAL PARAMETERS FOR ROADS IN LOCAL AREAS				
1	2	3	4	
LIGHT TECHNICAL PARAMETERS (LTP)				
LIGHTING SUBCATEGORY	AVERAGE HORIZONTAL ILLUMINANCE ( $\bar{E}_h$ ) LUX	POINT HORIZONTAL ILLUMINANCE ( $E_{ph}$ ) LUX	ILLUMINANCE (HORIZONTAL) UNIFORMITY ( $U_{Ez}$ )	
PR1	7	2	8	
PR2	3.5	0.7	8	
PR3	1.75	0.3	8	
PR4	1.3	0.22	8	
PR5	0.85	0.14	10	
PR6	0.7	0.07	10	

AS/NZS 1158.3.1:2020 - TABLE 2.1				
LIGHTING SUBCATEGORIES FOR ROAD RESERVES IN LOCAL AREAS - LOCAL ROADS OR STREETS				
1	2	3	4	5
TYPE OF ROAD	SELECTION CRITERIA			APPLICABLE LIGHTING SUBCATEGORY
BASIC OPERATING CHARACTERISTICS	PEDESTRIAN OR CYCLE ACTIVITY	FEAR OF CRIME	NEED TO ENHANCE AMENITY	
LOCAL ROADS OR STREETS - MIXED VEHICLE AND PEDESTRIAN TRAFFIC	N/A	HIGH	N/A	PR1
	HIGH	MEDIUM	HIGH	PR2
	MEDIUM	LOW	MEDIUM	PR3 OR PR4
	LOW	LOW	LOW	PR5
	N/A	N/A	N/A	PR6

LABEL E	LABEL B
	
LABEL A	LABEL A
LABEL A	LABEL A
LABEL A	LABEL A
LABEL A	LABEL A

AS/NZS 1158.3.1:2020 - TABLE 3.4				
VALUES OF LIGHT TECHNICAL PARAMETERS FOR PATHWAYS AND CYCLIST PATHS				
1	2	3	4	5
LIGHT TECHNICAL PARAMETERS (LTP)				
LIGHTING SUBCATEGORY	AVERAGE HORIZONTAL ILLUMINANCE ( $\bar{E}_h$ ) LUX	POINT HORIZONTAL ILLUMINANCE ( $E_{ph}$ ) LUX	ILLUMINANCE (HORIZONTAL) UNIFORMITY ( $U_{Ez}$ )	POINT VERTICAL ILLUMINANCE ( $E_{pv}$ ) LUX
PP1	10	2	5	1
PP2	7	1	5	0.3
PP3	3	0.5	5	0.1
PP4	1.5	0.25	5	0.05
PP5	0.85	0.14	5	0.02

AS/NZS 1158.3.1:2020 - TABLE 2.2				
LIGHTING SUBCATEGORIES FOR PEDESTRIAN AND CYCLIST PATHS				
1	2	3	4	5
TYPE OF ROAD	SELECTION CRITERIA			APPLICABLE LIGHTING SUBCATEGORY
GENERAL DESCRIPTION	BASIC OPERATING CHARACTERISTICS	FEAR OF CRIME	NEED TO ENHANCE AMENITY	
PEDESTRIAN OR CYCLE ORIENTATED PATHWAY, E.G. FOOTPATHS, INCLUDING THOSE ALONG ROADS AND ARTERIAL ROADS, WALKWAYS, LANES, PARK PATHS, CYCLIST PATHS	PEDESTRIAN AND OR CYCLE TRAFFIC ONLY	N/A	HIGH	PP1
		HIGH	MEDIUM	PP2
		MEDIUM	MEDIUM	PP3
		MEDIUM	LOW	PP4
		LOW	LOW	PP5

AS/NZS 1158.3.1:2020 - TABLE 3.5				
VALUES OF LIGHT TECHNICAL PARAMETERS FOR PUBLIC ACTIVITY AREAS (EXCLUDING CAR PARKS)				
1	2	3	4	5
LIGHT TECHNICAL PARAMETERS (LTP)				
LIGHTING SUBCATEGORY	AVERAGE HORIZONTAL ILLUMINANCE ( $\bar{E}_h$ ) LUX	POINT HORIZONTAL ILLUMINANCE ( $E_{ph}$ ) LUX	ILLUMINANCE (HORIZONTAL) UNIFORMITY ( $U_{Ez}$ )	POINT VERTICAL ILLUMINANCE ( $E_{pv}$ )
PA1	21	7	8	7
PA2	14	4	8	4
PA3	7	2	8	2

AS/NZS 1158.3.1:2020 - TABLE 2.3					
LIGHTING SUBCATEGORIES FOR OUTDOOR CARPARKS (INCLUDING ROOF-TOP CARPARKS)					
1	2	3	4		6
TYPE OF AREA	SELECTION CRITERIA				APPLICABLE LIGHTING SUBCATEGORY
GENERAL DESCRIPTION	BASIC OPERATING CHARACTERISTICS	NIGHT TIME VEHICLE MOVEMENTS	FEAR OF CRIME	NEED TO ENHANCE AMENITY	
AREAS PRIMARILY FOR PEDESTRIAN USE, E.G. CITY, TOWN, SUBURBAN CENTRES, INCLUDING OUTDOOR SHOPPING PRECINCTS, MALLS, OPEN ARCADES, TOWN SQUARES, CIVIC CENTRES	GENERALLY PEDESTRIAN MOVEMENT ONLY	N/A	HIGH	HIGH	PA1
		MEDIUM	MEDIUM	MEDIUM	PA2
		LOW	LOW	N/A	PA3
TRANSPORT TERMINALS AND INTERCHANGES, SERVICE AREAS	MIXED PEDESTRIAN AND VEHICLE MOVEMENT	HIGH	HIGH	HIGH	PA1
		MEDIUM	MEDIUM	MEDIUM	PA2
		LOW	LOW	N/A	PA3

AS/NZS 1158.3.1:2020 - TABLE 3.7				
VALUES OF LIGHT TECHNICAL PARAMETERS FOR OUTDOOR CAR PARKS (INCLUDING ROOF-TOP CAR PARKS)				
1	2	3	4	5
LIGHT TECHNICAL PARAMETERS (LTP)				
LIGHTING SUBCATEGORY	AVERAGE HORIZONTAL ILLUMINANCE ( $\bar{E}_h$ ) LUX	POINT HORIZONTAL ILLUMINANCE ( $E_{ph}$ ) LUX	ILLUMINANCE (HORIZONTAL) UNIFORMITY ( $U_{Ez}$ )	POINT VERTICAL ILLUMINANCE ( $E_{pv}$ ) LUX
PC1	14	3	8	3
PC2	7	1.5	8	1
PC3	3.5	0.7	8	--
PCD	--	$\geq 14$ & $\geq (\bar{E}_h)$	--	--
PCX	21	5	8	--

AS/NZS 1158.3.1:2020 - TABLE 2.5			
LIGHTING SUBCATEGORIES FOR OUTDOOR CARPARKS (INCLUDING ROOF-TOP CARPARKS)			
1	2	3	4
TYPE OF AREA	SELECTION CRITERIA		APPLICABLE LIGHTING SUBCATEGORY
	NIGHT TIME VEHICLE AND/OR PEDESTRIAN MOVEMENTS	FEAR OF CRIME	
PARKING SPACES, AISLES AND CALCULATION ROADWAYS	HIGH	HIGH	PC1
	MEDIUM	MEDIUM	PC2
	LOW	LOW	PC3
DESIGNATED PARKING SPACES SPECIFICALLY INTENDED FOR PEOPLE WITH DISABILITIES	N/A	N/A	PCD
FOR ANY DESIGNATED AREAS FOR PEDESTRIANS TO CROSS	N/A	N/A	PPX

PROJECT NAME <b>3 PIDGEON MOUNTAIN ROAD HALF MOON BAY</b>	DRAWING LIGHTING PARAMETERS	REV 1	COMMENTS LAYOUT FOR REVIEW	DATE 27/04/2023
	CLIENT SOLA	2	UPDATED LAYOUT FOR REVIEW	26/09/2023
		3	<b>UPDATED LAYOUT FOR REVIEW</b>	10/05/2024
PROJECT ID ADLT-14578	TYPE PRIVATE LIGHTING DESIGN			



DESIGN N.G.	PURPOSE LAYOUT REVIEW	
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Calculation Summary			
Label	Units	CalcType	Max
Ara Tai Rd Ti E	%	Obtrusive - TI	0
Ara Tai Rd Ti W	%	Obtrusive - TI	0
Compass Point Rd Ti E	%	Obtrusive - TI	0
Compass Point Rd Ti W	%	Obtrusive - TI	0
Obtrusive SEG_Cd_Seg1	N.A.	Obtrusive - Cd	577
Obtrusive SEG_III_Seg1	Lux	Obtrusive - III	3.43
Pidgeon Mountain Rd Ti N	%	Obtrusive - TI	0
Pidgeon Mountain Rd Ti S	%	Obtrusive - TI	0



OBTRUSIVE SEG 1  
Obtrusive SEG 1

Isoline Legend	
Illuminance (Lux)	
Color	Value
Red	0.5
Green	1.5
Blue	3
Black	7

Luminaire Schedule					
Symbol	Label	Qty	LLF	Arrangement	Description
	E2	3	1.000	Single	ADLT Energy UNO 200 Optics 36W 3000K LED Pole Lumianrie on 4.5 PS1 Pole - Black
	ES	18	1.000	Single	ADLT Energy UNO SCP Optics 36W 3000K LED Pole Lumianrie on 4.5 PS1 Pole - Black
	BD	6	1.000	Single	ADLT Denver ID AY Optics Single Side BLS 6W 3000K LED Bollard - 0.946m - Black

PROJECT NAME <b>3 PIDGEON MOUNTAIN ROAD HALF MOON BAY</b>	DRAWING OBTRUSIVE ISOLINES	REV 1	COMMENTS LAYOUT FOR REVIEW	DATE 27/04/2023
	CLIENT SOLA	2	UPDATED LAYOUT FOR REVIEW	26/09/2023
		3	<b>UPDATED LAYOUT FOR REVIEW</b>	10/05/2024
PROJECT ID ADLT-14578	TYPE PRIVATE LIGHTING DESIGN			



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**LIGHTING CATEGORY CLASSIFICATIONS**  
**AUCKLAND UNITARY PLAN TABLE E24.6.1.1**

ZONE	Lighting category 1 (Intrinsically dark)	Lighting category 2 (Low brightness)	Lighting category 3 (Medium brightness)	Lighting category 4 (High brightness)
Residential – Terrace Housing and Apartment Buildings Zone			X	

**Table E24.6.1.2 Horizontal and vertical illuminance at a boundary**

Time	Illuminance
Pre-curfew	100 lux above the background level
Curfew	10 lux above the background level

**Table E24.6.1.3 Vertical illuminance at a window**

Time	Vertical illuminance limit for each lighting category			
	Lighting Category 1	Lighting Category 2	Lighting Category 3	Lighting Category 4
Pre-curfew	2 lux	10 lux	10 lux	25 lux
Curfew	0 lux <small>(Except Public Road Lighting)</small>	1 lux	2 lux	4 lux

**Table E24.6.1.4 Threshold increment**

Light Technical Parameter	Threshold increment limit for each lighting category			
	Lighting Category 1	Lighting Category 2	Lighting Category 3	Lighting Category 4
<b>Threshold Increment (TI)</b>	15 per cent (based on adaption luminance of 0.1 cd/m <sup>2</sup> )	15 per cent (based on adaption luminance of 1 cd/m <sup>2</sup> )	15 per cent (based on adaption luminance of 2 cd/m <sup>2</sup> )	15 per cent (based on adaption luminance of 10 cd/m <sup>2</sup> )

**Table E24.6.1.5 Pre-curfew luminous intensity limits**

Intentionally illuminated area		Pre-curfew luminous intensity limit for each lighting category			
Size of area <small>(based on the controlling dimension)</small>	Controlling dimension <small>(refer to Note 1)</small>	Lighting Category 1	Lighting Category 2	Lighting Category 3	Lighting Category 4
Large	>75m	2,500 cd	7,500 cd	10,000 cd	25,000 cd
Medium	>25-<75	2,500 cd	7,500 cd	10,000 cd	25,000 cd
Small	<25m	2,500 cd	2,500 cd	7,500 cd	25,000 cd

Note 1 The controlling dimension is the maximum dimension from any light source to the furthest point of the intentionally illuminated area in the direction of maximum intensity.

**Table E24.6.6 Curfew luminous intensity limits**

Curfew Luminous Intensity Limit for each lighting category	Lighting Category 1	Lighting Category 2	Lighting Category 3	Lighting Category 4
	0 cd	500 cd	1,000 cd	2,500 cd

The average surface luminance measured in candelas per square metre (cd/m<sup>2</sup>) for an intentionally artificially lit building façade shall not exceed any one of the following:

Luminance Limit	Lighting Category 1	Lighting Category 2	Lighting Category 3	Lighting Category 4
	0 cd/m <sup>2</sup>	5 cd/m <sup>2</sup>	10 cd/m <sup>2</sup>	25 cd/m <sup>2</sup>

TITLE 3 PIGEON MOUNTAIN ROAD HALFMOON BAY

PROJECT #

Designed	N.G.
Checked	M.R.
Date	24-04-2023
Scale	N.T.S

CLIENT SOLA LANDSCAPE ARCHITECT



# Obtrusive Light - Compliance Report

AUP E24 Report - Residential - Mixed Housing Suburban Building Zone Cat 3 Medium Brightness  
Non-Curfew

Filename: ADLT 3 Pigeon Mountain Road Half Moon Bay - NG - REV 3  
10/05/2024 11:18:38 pm

## Illuminance

Maximum Allowable Value: 100 Lux

Calculations Tested (1):

<u>Calculation Label</u>	<u>Test Results</u>	<u>Max. Illum.</u>
Obtrusive SEG_III_Seg1	<b>PASS</b>	3.43

## Luminous Intensity (Cd) Per Luminaire

Maximum Allowable Value: 720 Cd  
Control Angle: 83 Degrees

Luminaire Locations Tested (27)

Test Results: **PASS**

## Luminous Intensity (Cd) At Vertical Planes

Maximum Allowable Value: 7500 Cd

Calculations Tested (1):

<u>Calculation Label</u>	<u>Test Results</u>
Obtrusive SEG_Cd_Seg1	<b>PASS</b>

## Threshold Increment (TI)

Maximum Allowable Value: 15 %

Calculations Tested (6):

<u>Calculation Label</u>	<u>Adaptation Luminance</u>	<u>Test Results</u>
Ara Tai Rd Ti W	2	<b>PASS</b>
Ara Tai Rd Ti E	2	<b>PASS</b>
Pidgeon Mountain Rd Ti N	2	<b>PASS</b>
Pidgeon Mountain Rd Ti S	2	<b>PASS</b>
Compass Point Rd Ti E	2	<b>PASS</b>
Compass Point Rd Ti W	2	<b>PASS</b>

## Upward Waste Light Ratio (UWLR)

Maximum Allowable Value: 5.0 %

Calculated UWLR: 0.3 %  
Test Results: **PASS**

# Obtrusive Light - Compliance Report

AUP E24 Report - Residential - Mixed Housing Suburban Building Zone Cat 3 Medium Brightness Curfew

Filename: ADLT 3 Pigeon Mountain Road Half Moon Bay - NG - REV 3  
10/05/2024 11:18:38 pm

## Illuminance

Maximum Allowable Value: 10 Lux

Calculations Tested (1):

<u>Calculation Label</u>	<u>Test Results</u>	<u>Max. Illum.</u>
Obtrusive SEG_III_Seg1	<b>PASS</b>	3.43

## Luminous Intensity (Cd) Per Luminaire

Maximum Allowable Value: 720 Cd  
Control Angle: 83 Degrees

Luminaire Locations Tested (27)

Test Results: **PASS**

## Luminous Intensity (Cd) At Vertical Planes

Maximum Allowable Value: 1000 Cd

Calculations Tested (1):

<u>Calculation Label</u>	<u>Test Results</u>
Obtrusive SEG_Cd_Seg1	<b>PASS</b>

## Threshold Increment (TI)

Maximum Allowable Value: 15 %

Calculations Tested (6):

<u>Calculation Label</u>	<u>Adaptation Luminance</u>	<u>Test Results</u>
Ara Tai Rd Ti W	2	<b>PASS</b>
Ara Tai Rd Ti E	2	<b>PASS</b>
Pidgeon Mountain Rd Ti N	2	<b>PASS</b>
Pidgeon Mountain Rd Ti S	2	<b>PASS</b>
Compass Point Rd Ti E	2	<b>PASS</b>
Compass Point Rd Ti W	2	<b>PASS</b>

## Upward Waste Light Ratio (UWLR)

Maximum Allowable Value: 5.0 %

Calculated UWLR: 0.3 %  
Test Results: **PASS**

# Denver iD Bollard



The Denver iD: Bollard combines a cohesive family aesthetic with an unrivalled system performance - perfect for creating the ideal design-inspired landscape. Featuring a patented Transition Zone the Denver iD: Bollard offers improved visual comfort; perfect for the unique requirements of pedestrian-friendly amenity spaces.

## PERFORMANCE SUMMARY

- Available in lumen packages of 500 to 3000 (delivered lumens).
- 2 optimised optical distributions including Single or Double-sided optics.
- 2700K, 3000K & 4000 options available.
- CRI > 70.
- Integrated presence detector, controls and emergency options (c.300 lm in emergency mode).
- Enhanced vandal resistance.
- Warranty: 5 Year manufacturer's warranty

## TYPICAL LUMINAIRE PERFORMANCE

Configuration	Delivered lumens	Circuit power (W)	Driver output current (mA)	Luminaire total no. of LEDs	Luminaire efficacy (lm/W)
DBD.LA01X.SU	c.500	6	270	5	85
DBD.LA01X.DO	c.1,000	9	265	10	110
DBD.LA01X.SU	c.1,000	11	585	5	90
DBD.LA02X.DO	c.1,500	14	425	10	106
DBD.LA02X.SU	c.1,500	18	1000	5	85
DBD.LA02X.DO	c.2,000	20	600	10	101
DBD.LA03X.DO	c.3,000	29	850	10	90

- Lumen data is considered to be representative of the configuration shown, and may vary, with a tolerance on flux of +/- 7% (typical of LED manufacturers data) and luminaire power of +/- 5%.

## LUMEN MAINTENANCE FACTORS

Product range:		Denver iD Bollard				
Ambient	"Lamp" Type	Wattage	LMF after.....			
			20000Hrs	50000Hrs	80000Hrs	100000Hrs
25°C	LA01x.SU	6W	0.99	0.96	0.95	0.94
	LA02x.SU	11W	0.98	0.95	0.93	0.92
	LA02x.SU	18W	0.97	0.94	0.91	0.9
	LA01x.DO	9W	0.98	0.96	0.93	0.92
	LA02x.DO	14W	0.975	0.955	0.925	0.91
	LA02x.DO	20W	0.97	0.95	0.92	0.9
	LA03x.DO	29W	0.965	0.93	0.9	0.88



Revision: 20/07/2021

# Denver iD Bollard

## FEATURES & BENEFITS

### Exceptional Performance

- Achieves spacings of up to 12m at 10lux average/2lux minimum.
- Available with both a single or double sided optical distributions. Giving flexibility to put light where it's needed.
- Patented Transition Zone helps to reduce perceived glare of LEDs.

### Easy installation & maintenance

- LED module uses a plug and play system and can be removed from the luminaire as one unit to aid in easy access to the base of the luminaire for installation.
- A removable/upgradeable LED module and easy access to gear compartment ensures that key components can be removed and replaced if required.

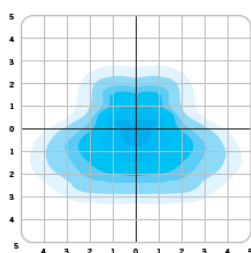
### Fully controllable

- Integrated discrete PIR sensor option for motion sensing capabilities either per luminaire or as a group of luminaires.
- Integrated 1hr & 3hr emergency options.

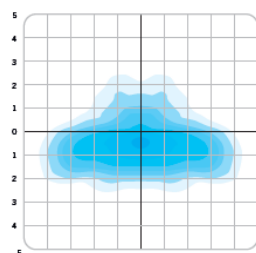
## SPECIFICATION

Holophane Denver iD: Bollard Denver consists of LM6- extruded Aluminium body and a removable LED module manufactured from LM6 marine grade die-cast aluminium with integrated thermal management properties. The LED module optical arrangement consists of LEDs with individual PMMA optical lenses surrounded by a patented white Transition Zone to reduce perceived glare and up light. This is sealed behind high-transparency clear Polycarbonate extrusion. Both luminaire body and LED module are sealed to IP65 and rated IK10. Drivers and LED are mounted separately from each other to promote low operating temperatures and long system life. Mounting of the luminaire is facilitated by using the mounting base of the bollard through specifically drilled points. Cable entry and termination to the luminaire is via an IP65 cable gland. Access to the luminaire is via 2 x nuts.

## OPTICS

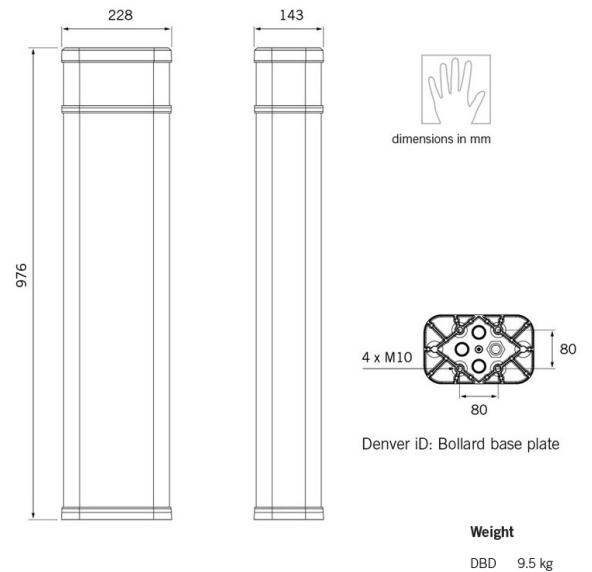


Asymmetric (.AY)



Long & Narrow (.NR)

## DIMENSIONS



## INSTALLATION

Denver iD: Bollard has been designed to facilitate easy installation. With only two nuts needed to remove the bollard LED module and combined gear, this makes it easy to quickly remove the bollard head to access the mounting base of the luminaire.

Installation is achieved either using the standard base or in conjunction with a root spike. The base has 4 x mounting holes to ensure stability.



# Denver iD Bollard

## ORDERING INFORMATION



Code	<b>Luminaire (required)</b>									
DBD	Denver ID Bollard									
Code	<b>Series (required)</b>									
.1	Series 1									
Code	<b>Lamp Type (required)</b>									
.LA012	LED light engine producing c.1,000 lm with a nominal 2700K colour temperature									
.LA022	LED light engine producing c.2,000 lm with a nominal 2700K colour temperature									
.LA013	LED light engine producing c.1,000 lm with a nominal 3000K colour temperature									
.LA023	LED light engine producing c.2,000 lm with a nominal 3000K colour temperature									
.LA014	LED light engine producing c.1,000 lm with a nominal 4000K colour temperature									
.LA024	LED light engine producing c.2,000 lm with a nominal 4000K colour temperature									
Code	<b>Optical Enclosure (required)</b>									
.SU	Single Sided (5LEDs)									
.DO	Double sided (10LEDs)									
Code	<b>Distribution (required)</b>									
.AY	Asymmetric									
.NR	Long and Narrow light distribution									
Code	<b>Head Height (option)</b>									
.H75	750mm high									
.H100	1000mm high									
Code	<b>Colour (required)</b>									
.C1	Smooth White (RAL9016)									
.C4	Graphite (RAL 7011)									
.O6	Smooth Grey (RAL7035)									
.C7	Black (RAL9005)									
.O9	Metallic Silver (RAL9006)									
.RAL****	RAL Colour (Customer choice)									
Code	<b>Shields (option)</b>									
.LS	Internal light shield									
Code	<b>Paint Finish (option)</b>									
.C	Enhanced Paint Finish									
Code	<b>Voltage Electrical Class (option)</b>									
.CII	Class II									
Code	<b>Photocell (option)</b>									
.TSZ	Complete with miniature 70 lux factory fitted photocell									
Code	<b>Controls (option)</b>									
.CA	Internal Controlux Air node									
.PIR1	Passive Infrared Sensor. Switches off luminaire when no occupancy detected after 20 minutes									
.PIR2	Passive Infrared Sensor both sides. Switches off luminaire when no occupancy detected after 20 minutes									
Code	<b>Emergency (option)</b>									
.EM1	1hr maintained integrated emergency. Self-test									
.EM3	3hr maintained integrated emergency. Self-test									
Code	<b>Cut Out (option)</b>									
.MCB	Mini Circuit Breaker									
Code	<b>Dimming Outputs (option)</b>									
.LRD	LED Regulable Dali									
.LRT*****	Customer specified pre-set dimming									
Code	<b>Control Gear - 4 (option)</b>									
.CL7	Programmed to deliver 70% of the initial lumens over the life of the luminaire									
.CL8	Programmed to deliver 80% of the initial lumens over the life of the luminaire									
.CL9	Programmed to deliver 90% of the initial lumens over the life of the luminaire									
Code	<b>Auxiliary Circuits - 14 (option)</b>									
.TW	Through Wiring									
Code	<b>Screws - 21 (option)</b>									
.V1	Vandal-resistant screws									
DBD	.LA012	.SU	.AY	.H75	.C1	.LS	.C	.CII	.TSZ	.CA

Example

### accessories

Code	
DBD.VK	Vandal Key
DBD.ROOT	Root Mounting Spike to fit Flange Base Denver ID Bollard. Includes set of 2 Bolts M10 x 100mm
DBD.FT	Set of 2 Bolts M10 x 100mm for Flange Base Fixing

Note: The specifications of the Holophane luminaire, all descriptions, illustrations, drawings and specifications in the Holophane catalogue and website represent only general particulars of the goods to which they apply and shall not form part of any contract. The company reserves the right to change specifications at its discretion without prior notification or public announcement.



**Advanced**  
LIGHTING TECHNOLOGIES

W: [www.adlt.co.nz](http://www.adlt.co.nz)  
E: [light@adlt.co.nz](mailto:light@adlt.co.nz)  
P: 07 579 0163

# Energy UNO

LED Street/Area Luminaire

Rev. Date: 27 April 2022

## Product Description

Designed as a complete street lighting system and optimized for LED light sources, it is distinguished by its extraordinary efficiency. Energy UNO provides the best lighting solution.

Developed with three product sizes, four lumens package per size, a complete optical range, flux adjustment options and a wide range of light sources together with a comprehensive optical range, stand-alone flow control options and Zhaga connectivity. Energy can be mounted on a pole or bracket with an adjustability of 20° and with 5° increments. Adjustments can be done from outside without having to open the product cover

**Applications:** Urban and internal roads, pedestrian walkways and car parks.



## Performance Summary

**Efficacy:** up to 160lm/W

**Initial Delivered LED Lumens:** up to 8600lm

**Lifetime color consistency:** 4SDM

**Limited Warranty:** 5 years on luminaire

## Ordering Information

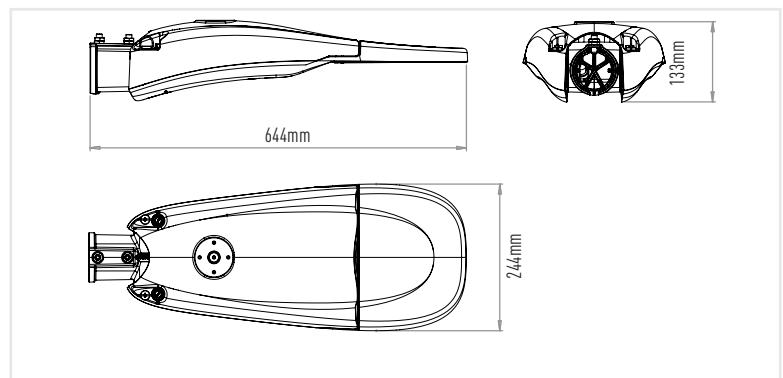
Eg: TRSA-2-075-2L-407-+-A-SG-FX-S-S-00

TRSA	-	2	-	075	-	2L	-	228	-	+	-	A	-	SG	-	FX	-	S	-	S	-	00
Product		Mounting		Optic		Lumen Package		CCT		Insulation Class		Voltage		Finish		Options		Variant		Protection		Cable length
TRSA	-	2 horiz/vert tenon 60mm	-	075 Narrow Street 0.75 (T2S)	-	2L Up to 2100lm	-	228* 2200K CRI80	-	+ Class 1	-	A 220-240V	-	SG Sapphire Gray	-	FX Fixed Output (setting on request)	-	S Standard	-	S Standard	-	00 Standard no cable
				100 Medium Street 1.00 (T2S)		4L Up to 4300lm		278 2700K CRI80		^ Class 2				BK* Black Textured		VM Virtual Midnight		N* Nema Socket 7 pin		SF Standard +Fuse		01 Exit Cable 1 m
		3 horiz/vert tenon 76mm		125 Comfort Street 1.25 (T2S)		6L Up to 6500lm		308 3000K CRI80						WH* White Textured		DL DALI				U 10 kV		03 Exit Cable 3 m
				150 Wide Street 1.50 (T3S)		8L Up to 8600lm		407 4000K CRI170						SV* Silver Textured		CL Constant Lumen				UF 10 kV +Fuse		06 Exit Cable 6 m
				200 Extra Wide Street 2.00(T4S)				577* 5700K CRI170								VMC Virtual Midnight+ Constant Lumen		Z Zhaga Socket/ D4i driver				10 Exit Cable 10 m
				SCP Street & Cycle Path class P(T2S)												FX Fixed Output (setting on request)						
				AFN Area Flood Narrow												VM Virtual Midnight						
				ARS RotoSymmetric Area												CL Constant Lumen						
				PCR Pedestrian Crossing Right												VMC Virtual Midnight+ Constant Lumen						
				PCL Pedestrian Crossing Left																		

\*On request

\*\*Options G and RF are not available for Nema Variant

ADAPTER	
KIT-TRS-LS-42/48-V0	Fitter kit to mount to 42 & 48 mm tenon



**FEATURES**

- Full cut-off optics and PCB LEDs compliant with Zhaga Book 15
- LED Lumen output up to 8600lm
- Zhaga Book 15 compliant LED module efficiency (excluding optical system):  $\geq 185$  lm/W
- Luminaire efficiency (including optical losses): up to 160 lm/W
- CCT: 3000K, 4000K, (2200K, 5700K @Ra80 and 2700K @Ra80 on request per MOQ)
- CRI Standard min. 70, CRI80 @3000K
- Initial Chromatic Selection:  $\leq 4$ -Step MacAdam ellipse or  $\Delta u'v' \leq 0.003$  (LM80:08)
- Luminous flux maintenance factor: L90B10 up to  $>100,000$  hours  $T_a=25^\circ\text{C}$  (According to IESNA TM-21)
- Degree of protection optical compartment and wiring compartment: IP66 (IEC 60529)
- Optical compartment and wiring compartment impact resistance:  $\geq$  IK10 (EN 62262)
- Overvoltage protection: up to 10kV CM/DM according to EN 61000-4-5 and EN 61547
- Driver equipped with over-temperature protection for optimal performance and safety
- Power factor:  $\geq 0.98$  at full load
- Operating temperature:  $-40^\circ\text{C}$  up to  $+50^\circ\text{C}$
- Control options: Virtual Midnight(chronoSTEP
- reprogrammable via mains), DALI 2, Constant Flow, Flow Regulator, Lineswitch, D4i
- Available with fuse and 20mm Zhaga Book 18 connector

**CONSTRUCTION AND MATERIALS**

- Die-cast aluminum body with low copper content
- Power supply compartment accessible without the use of tools
- Removable wiring plate
- Knife disconnecter
- 4mm thick ultra clear transparent glass protection screen
- Replaceable PMMA lenses
- Replaceable LED board equipped with ESD protection
- Cable type H07RN-F (Cable length up to 10m)
- Easy installation: wiring compartment installed on the cover and pre-assembled integrated joint - to install the luminaire it is not necessary to open it if outgoing cable version,
- Practicality in ordinary and extraordinary maintenance: power supply compartment accessible and component holder plate removable without tools; lenses and LEDs easily removable and replaceable using a single tool.
- Luminaire assembled without the use of adhesives, completely disassembled and recyclable

**WARRANTY AND CERTIFICATIONS**

- Warranty: 5 years / 10 years on request
- CE mark/CB mark/ENEC mark/RoHs/RCM mark
- Risk group exempt in accordance with Standard CEI EN 62471 for photobiological safety (Tested IEC/TR62778)
- Compliant to: EN 60598-1; EN 60598-2-3
- Lead-free powder coatings with excellent exterior durability, conforms to the requirements:
  - Adhesion - test comply with ISO 2409
  - Salt spray - test NSS comply with ISO 9227
  - Accelerated Weathering - test UV comply with ISO 16474-2 (ex ISO 11507)
  - Constant humidity - test comply with ISO 6270-1

**ELECTRICAL DATA\***

Lumen Package	System Watts 220-240V	Total Current	Power Factor
		@230V, 50Hz	
2L	15W	0,07	0,94
4L	28W	0,125	0,97
6L	41W	0,181	0,98
8L	54W	0,238	0,98

\* Electrical data at 25°C (77°F)

**WEIGHT**

WEIGHT	6,5 Kg
--------	--------

**LMF LUXEON - RECOMMENDED LUMEN MAINTENANCE FACTORS (LMF)<sup>1</sup>**

Ambient	LMF iniziale	25K hr Projected <sup>2</sup> LMF	50K hr Projected <sup>2</sup> LMF	75K hr Calculated <sup>3</sup> LMF	100K hr Calculated <sup>3</sup> LMF
25°C	1	0,97	0,94	0,92	0,90

**LMF DURIS - RECOMMENDED LUMEN MAINTENANCE FACTORS (LMF)<sup>1</sup>**

Ambient	LMF iniziale	25K hr Projected <sup>2</sup> LMF	50K hr Projected <sup>2</sup> LMF	75K hr Calculated <sup>3</sup> LMF	100K hr Calculated <sup>3</sup> LMF
25°C	1	0,99	0,98	0,98	0,97

<sup>1</sup> Lumen maintenance values calculated at 25°C, with TM-21 based on LM-80 data and on-site testing. DURIS for SCP optic 150 - PCR- PCL and LUXEON for 075, 100, 125 - 200 - AFN - ARS optics

<sup>2</sup> In accordance with IESNA TM-21-11, the values shown in the "projected" column represent interpolated and arc values within six times (6X) the total duration in hours of the tests (performed according to IESNA LM-80-08) to which the device has been subjected ((OUT) e.g. the LED chip).

<sup>3</sup> In accordance with IESNA TM-21-11, the values shown in the column "calculated" are calculated based on a time span greater than six times (6X) the total duration in hours of the tests (performed according to IESNA LM-80-08) to which the device has been subjected ((OUT) e.g. the LED chip).

**NEMAOPTIONS AVAILABLE**

Option	Description	Control
FX-N	NEMA 7 pin combined with FX programs (Fixed Power)	(on-off)
VM-N	NEMA 7 pin combined with VM programs (Virtual Midnight)	(on-off)
DL-N	Nema 7 pin connected to DALI 2.0 driver	(on-off + Dim)
CL-N	Nema 7 pin combined with CL programs (Constant Light Output)	(on-off)
VMC-N	Nema 7 pin combined with VM+CL	(on-off)

-- on-off: Nema allows for on-off control only  
 - on-off + Dim: Nema allows for on-off and dimming control

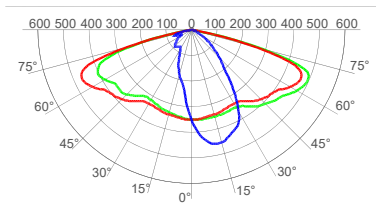
**ZHAGA OPTIONS AVAILABLE**

Option	Description
FX-Z	Zhaga Book 18 connector & D4i driver combined with FX programs (Fixed Power)
VM-Z	Zhaga Book 18 connector & D4i driver combined with VM programs (Virtual Midnight)
CL-Z	Zhaga Book 18 connector & D4i driver combined with CL programs (Constant Light Output)
VMC-Z	Zhaga Book 18 connector & D4i driver combined with VM+CL

### Photometry

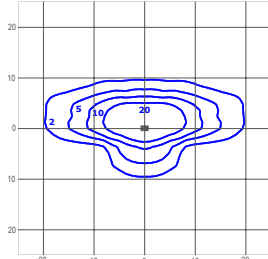
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#### 075 - Type II Short



cd/klm  
 C0 - C180 C90 - C270 C2.5 - C182.5

Test Report #: 1088-QL20-R18



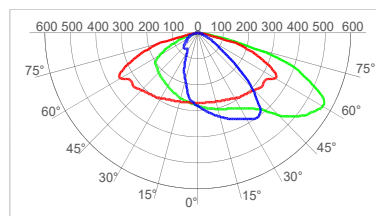
lux  
 TRSA-2-075-8L-407  
 Mounting Height: 6m

#### LUMEN OUTPUT - 075 (Type II Short)

Lumen Package	2700K	3000K	4000K
	Initial Delivered Lumens*	Initial Delivered Lumens*	Initial Delivered Lumens*
2L	1450	1650	1850
4L	2950	3400	3750
6L	4550	5150	5700
8L	5950	6800	7516

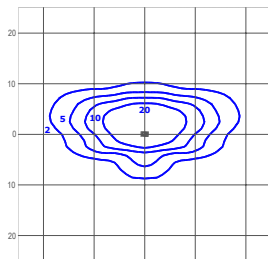
\* Initial delivered lumens at 25°C (77°F). Actual production yield may vary between -4 and +10% of initial delivered lumens

#### 100 - Type II Short



cd/klm  
 C0 - C180 C90 - C270 C20 - C200

Test Report #: 1088-QL20-R12



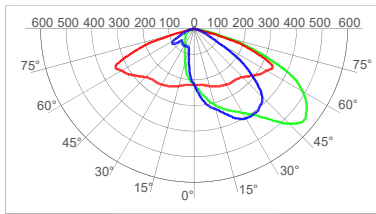
lux  
 TRSA-2-100-8L-407  
 Mounting Height: 6m

#### LUMEN OUTPUT - 100 (Type II Short)

Lumen Package	2700K	3000K	4000K
	Initial Delivered Lumens*	Initial Delivered Lumens*	Initial Delivered Lumens*
2L	1400	1600	1800
4L	2900	3300	3650
6L	4400	5000	5550
8L	5820	6590	7317

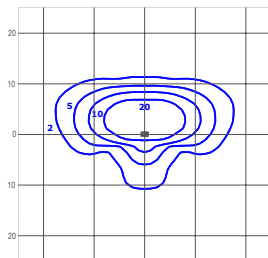
\* Initial delivered lumens at 25°C (77°F). Actual production yield may vary between -4 and +10% of initial delivered lumens

#### 125 - Type II Short



cd/klm  
 C0 - C180 C90 - C270 C35 - C215

Test Report #: 1088-QL20-R19



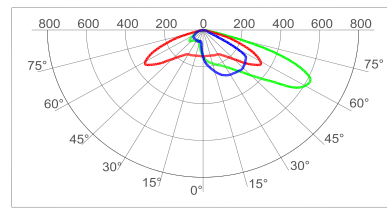
lux  
 TRSA-2-125-8L-407  
 Mounting Height: 6m

#### LUMEN OUTPUT - 125 (Type II Short)

Lumen Package	2700K	3000K	4000K
	Initial Delivered Lumens*	Initial Delivered Lumens*	Initial Delivered Lumens*
2L	1450	1650	1850
4L	2950	3400	3750
6L	4550	5150	5700
8L	5950	6800	7475

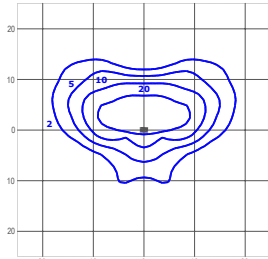
\* Initial delivered lumens at 25°C (77°F). Actual production yield may vary between -4 and +10% of initial delivered lumens

#### 150 - Type III Short



cd/klm  
 C0 - C180 C90 - C270 C27.5 - C207.5

Test Report #: 1088-QL21-S03



lux  
 TRSA-2-150-8L-407  
 Mounting Height: 6m

#### LUMEN OUTPUT - 150 (Type III Short)

Lumen Package	2700K	3000K	4000K
	Initial Delivered Lumens*	Initial Delivered Lumens*	Initial Delivered Lumens*
2L	1590	1625	1912
4L	3219	3289	3871
6L	4901	5006	5893
8L	6452	6591	7758

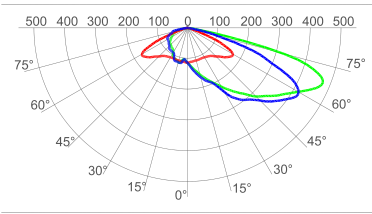
\* Initial delivered lumens at 25°C (77°F). Actual production yield may vary between -4 and +10% of initial delivered lumens



**Photometry**

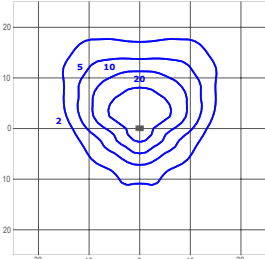
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**200 - Type IV Short**



cd/klm  
 C0 - C180 C90 - C270 C55 - C235

Test Report #: 1088-QL20-S05

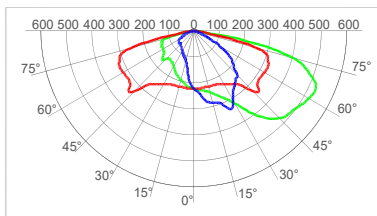


lux  
 TRSA-2-200-8L-407  
 Mounting Height: 6m

LUMEN OUTPUT - 200 (Type II Short)			
Lumen Package	2700K	3000K	4000K
	Initial Delivered Lumens*	Initial Delivered Lumens*	Initial Delivered Lumens*
2L	1439	1629	1809
4L	2913	3299	3662
6L	4435	5021	5575
8L	5838	6611	7340

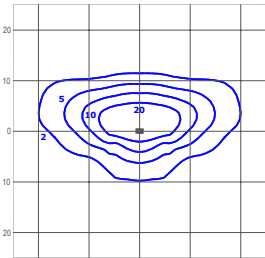
\* Initial delivered lumens at 25°C (77°F). Actual production yield may vary between -4 and +10% of initial delivered lumens

**SCP - Type II Short**



cd/klm  
 C0 - C180 C90 - C270 C20 - C200

Test Report #: 1088-QL20-R15

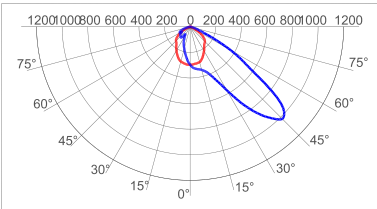


lux  
 TRSA-2-SCP-8L-407  
 Mounting Height: 6m

LUMEN OUTPUT - SCP (Type II Short)			
Lumen Package	2700K	3000K	4000K
	Initial Delivered Lumens*	Initial Delivered Lumens*	Initial Delivered Lumens*
2L	1400	1600	1800
4L	2900	3300	3650
6L	4400	5000	5550
8L	5820	6590	7317

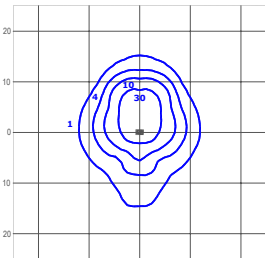
\* Initial delivered lumens at 25°C (77°F). Actual production yield may vary between -4 and +10% of initial delivered lumens

**AFN - Area Flood Narrow**



cd/klm  
 C0 - C180 C90 - C270

Test Report #: 1088-QL21-S04

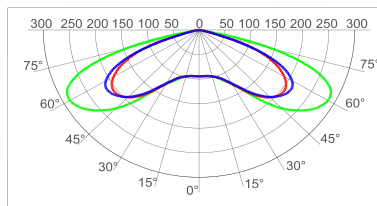


lux  
 TRSA-2-AFN-8L-407  
 Mounting Height: 6m

LUMEN OUTPUT - AFN (Area Flood Narrow)			
Lumen Package	2700K	3000K	4000K
	Initial Delivered Lumens*	Initial Delivered Lumens*	Initial Delivered Lumens*
2L	1463	1656	1839
4L	2961	3353	3723
6L	4508	5104	5667
8L	5935	6720	7461

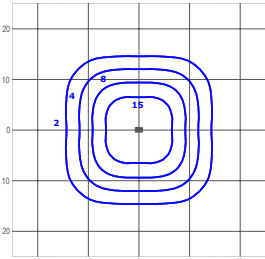
\* Initial delivered lumens at 25°C (77°F). Actual production yield may vary between -4 and +10% of initial delivered lumens

**ARS - Roto-Symmetric Area**



cd/klm  
 C0 - C180 C90 - C270 C135 - C315

Test Report #: 1088-QL21-S05



lux  
 TRSA-2-ARS-8L-407  
 Mounting Height: 6m

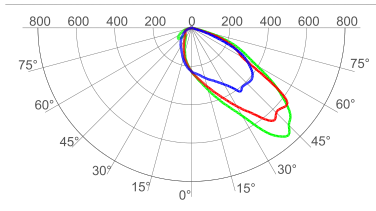
LUMEN OUTPUT - ARS (Roto-Symmetric Area)			
Lumen Package	2700K	3000K	4000K
	Initial Delivered Lumens*	Initial Delivered Lumens*	Initial Delivered Lumens*
2L	1475	1670	1854
4L	2986	3381	3754
6L	4546	5147	5715
8L	5985	6777	7524

\* Initial delivered lumens at 25°C (77°F). Actual production yield may vary between -4 and +10% of initial delivered lumens

### Photometry

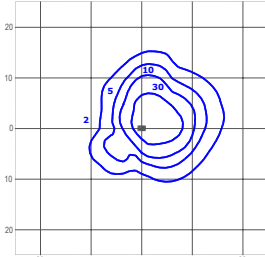
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### PCR - Pedestrian Crossing Right



cd/klm  
 C0 - C180 C90 - C270 C17.5 - C197.5

Test Report #: 1088-QL21-S03



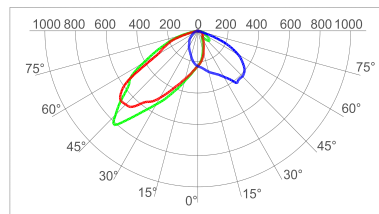
lux  
 TRSA-2-PCR-8L-407  
 Mounting Height: 6m

#### LUMEN OUTPUT - PCR (Pedestrian Crossing Right)

Lumen Package	2700K	3000K	4000K
	Initial Delivered Lumens*	Initial Delivered Lumens*	Initial Delivered Lumens*
2L	1622	1657	1951
4L	3285	3355	3949
6L	5000	5108	6012
8L	6583	6725	7915

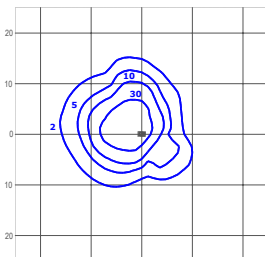
\* Initial delivered lumens at 25°C (77°F). Actual production yield may vary between -4 and +10% of initial delivered lumens

### PCL - Pedestrian Crossing Left



cd/klm  
 C0 - C180 C90 - C270 C160 - C340

Test Report #: 1088-QL21-S04



lux  
 TRSA-2-PCL-8L-407  
 Mounting Height: 6m

#### LUMEN OUTPUT - PCL (Pedestrian Crossing Left)

Lumen Package	2700K	3000K	4000K
	Initial Delivered Lumens*	Initial Delivered Lumens*	Initial Delivered Lumens*
2L	1633	1668	1963
4L	3305	3377	3974
6L	5031	5140	6050
8L	6624	6767	7965

\* Initial delivered lumens at 25°C (77°F). Actual production yield may vary between -4 and +10% of initial delivered lumens

# ADLT Square Poles

4.5m Square Steel Poles Product code: P.100SQBP4.5VT-BK

## Product Description

The ADLT Square steel poles provide outstanding strength and reliability with great value. ADLT Square steel poles set the standard for outstanding strength and reliability. These mild galvanised, black painted, non-tapered poles are available in 4.5m, 6.0m and 7.6m.

Each pole is shipped complete with pole foundation cage and pole base cover.

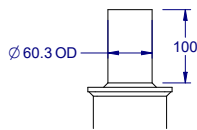
## SPECIFICATIONS

- Square, non-tapered Pole
- 3 Standard Mounting Heights
- Aesthetic Base-Plate Cover
- Multiple Mounting Bracket Options
- Supplied with Foundation Cage
- Square poles weight: 4.5m = 50kg, 6m = 64kg, 7.6m = 117kg, 9.0m = 178kg
- Square Steel PipePaint system: Black DULUX ACRATHANE WET SPRAY – CLASS A SPEC. Specification No: V04/062

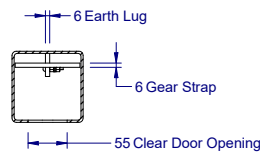
## LIMITED WARRANTY\*

- 7 years warranty on pole
- \*See <https://adlt.co.nz/warranty/> for warranty terms

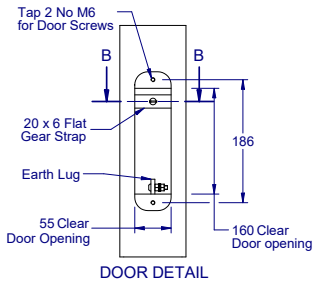
## POLE DRAWINGS



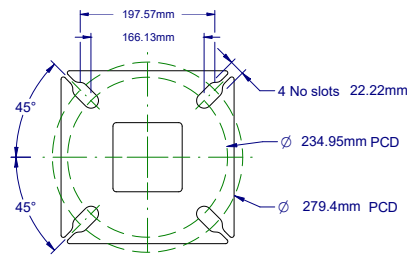
DETAIL A



SECTION B-B



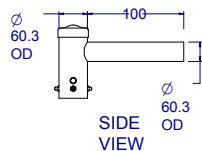
DOOR DETAIL



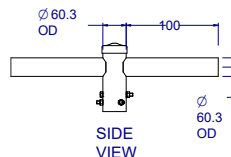
BASEPLATE DETAIL (TOP)

## AVAILABLE MOUNTING OPTIONS:

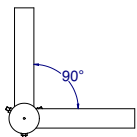
PT-2X60(90)BK - Round 60mm OD Double 90\* HOR Spigot Adapter, Black.



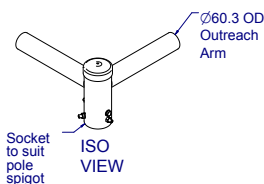
SIDE VIEW



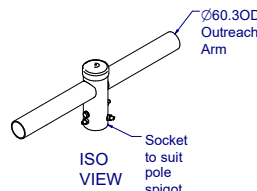
SIDE VIEW



TOP VIEW

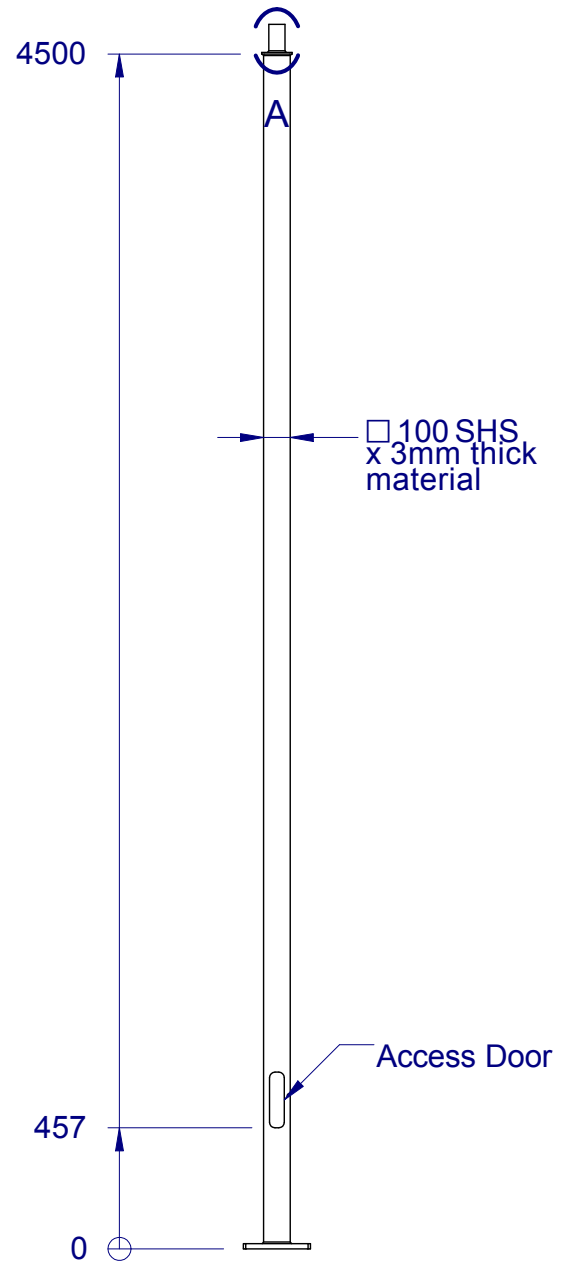


ISO VIEW

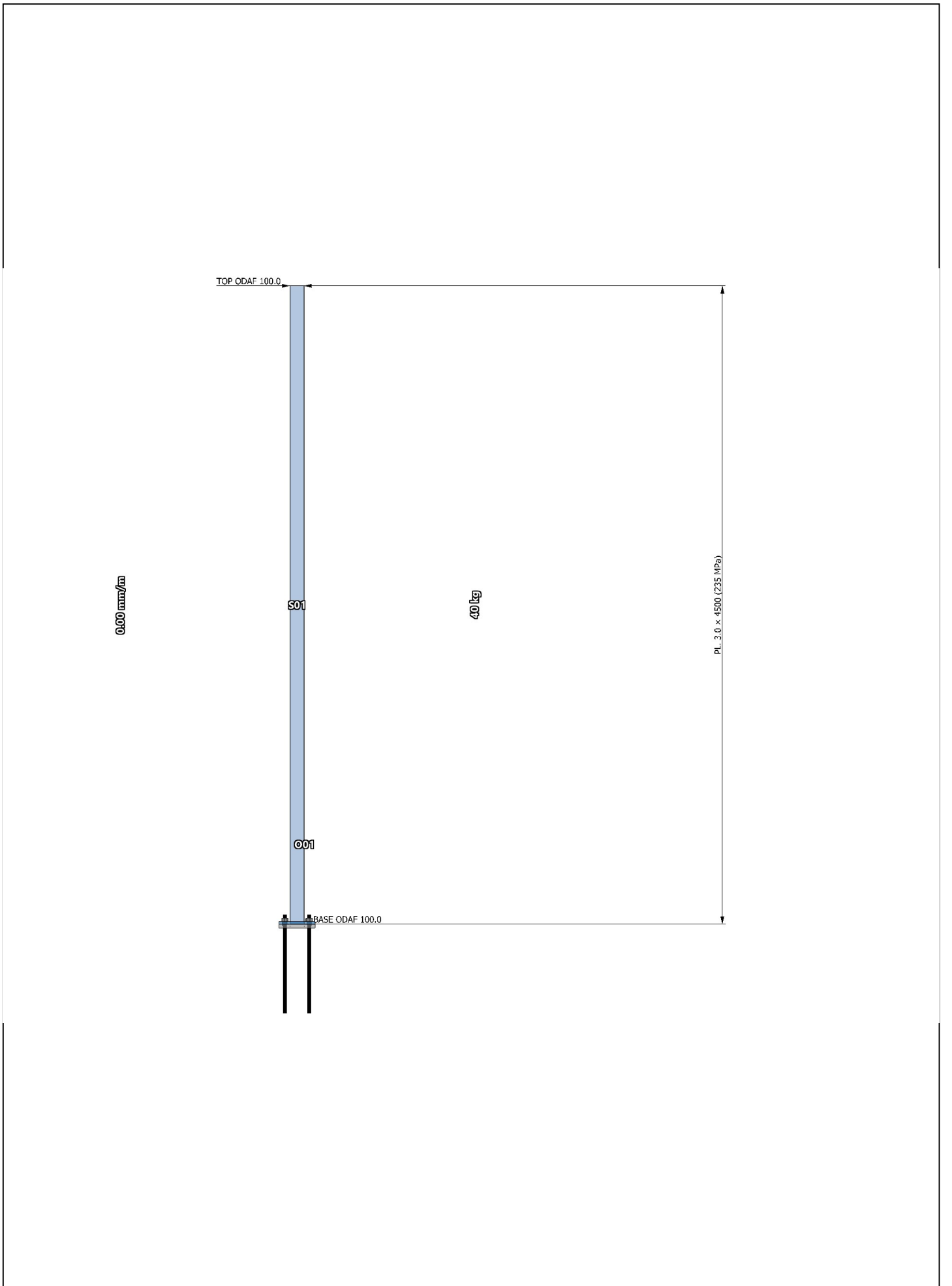


ISO VIEW

## POLE DRAWING



FRONT VIEW



----- MONOPOLE DATA -----

MATERIAL: STEEL  
SHAPE: SQUARE  
SEGMENTS: 1  
SURFACE: GALVANIZED  
ASSEMBLED LENGTH: 4500 mm (TIP RL @ 4528 mm)  
ELASTIC MODULUS: 205000 MPa  
DENSITY (ps): 7850 kg/m<sup>3</sup>  
SHAFT MASS: 40 kg

SHAFT

ID	LENGTH	TOP ODAF	BASE ODAF	t	fy	TAPER	MASS
01	4500 mm	100.0 mm	100.0 mm	3.0 mm	235 MPa	0.00 mm/m	40 kg

< STRUCTURE BASE @ RL 0 mm (GROUND) >

OPENINGS

ID	LOCATION	DOORS	Hd	Wd	Rd	REINFORCEMENT	Hr	Lr	tr	fyr
01	562 mm	90°	210 mm	55 mm	20.0 mm	NONE	-	-	-	-

CONNECTION #01: BASE

ANCHOR BOLTS

PATTERN: SINGLE RING  
DIAMETER: M24  
QUANTITY: 4  
RING DIAMETER: 241 mm  
EMBEDMENT: 600 mm  
YIELD STRESS (fya): 240 MPa  
ULTIMATE STRESS (fua): 400 MPa

BASE PLATE

SHAPE: SQUARE  
VOID: SOCKETED  
WELD: FILLET  
WIDTH (Wp): 254 mm  
THICKNESS (tp): 20 mm  
YIELD STRESS (fyp): 235 MPa  
MASS: 8 kg

GUSSETS

QUANTITY: 0

BEARING

TYPE: GROUT  
GROUT STRESS (f'cb): 32 MPa  
ELASTIC MODULUS (Eb): 26587 MPa (ACI 318-14 Section 19.2.2)  
THICKNESS (tb): 25 mm

----- SITE DATA -----

LOCATION

LATITUDE: -36.923696  
LONGITUDE: 174.827202  
ELEVATION: 3.50 m

DESIGN

REFERENCE: AS/NZS 1170.2-2021  
IMPORTANCE LEVEL: 2  
LIFE: 50 YEARS

WIND

REGION: NZ1  
ULTIMATE ARI: 500 YEARS

REGIONAL WIND SPEED (VR)

• Calculated as per AS/NZS 1170.2-2021 Section 3.2.

ULTIMATE: 45 m/s  
ICE: 37 m/s  
SERVICEABILITY: 39 m/s

DIRECTION MULTIPLIER (Md)

• Calculated for Region NZ1 as per AS/NZS 1170.2-2021 Section 3.3.

WIND	Md
N	1.0
NE	1.0
E	1.0
SE	1.0
S	1.0
SW	1.0
W	1.0
NW	1.0

CLIMATE CHANGE MULTIPLIER (Mc) = 1.0

• Calculated for Region NZ1 as per AS/NZS 1170.2-2021 Table 3.3.

TERRAIN/HEIGHT MULTIPLIER (Mz,cat)

• Calculated using averaging as per AS/NZS 1170.2-2021 Section 4.2.3 and varies with height.

NORTH WIND: Mz,cat = 0.83 (TC 3.0)

ZONE 1: TC 3 to 590.56 m

NORTH EAST WIND:  $Mz_{cat} = 0.8337 \rightarrow 0.8409$  (TC 2.95  $\rightarrow$  TC 2.86)

ZONE 1: TC 3 to 453.71 m  
ZONE 2: TC 2.5 to 590.56 m

EAST WIND:  $Mz_{cat} = 0.83$  (TC 3.0)

ZONE 1: TC 3 to 590.56 m

SOUTH EAST WIND:  $Mz_{cat} = 0.8337 \rightarrow 0.8536$  (TC 2.95  $\rightarrow$  TC 2.71)

ZONE 1: TC 4 to 113.43 m  
ZONE 2: TC 3 to 340.28 m  
ZONE 3: TC 2 to 453.71 m  
ZONE 4: TC 2.5 to 567.13 m  
ZONE 5: TC 3 to 590.56 m

SOUTH WIND:  $Mz_{cat} = 0.8337 \rightarrow 0.8409$  (TC 2.95  $\rightarrow$  TC 2.86)

ZONE 1: TC 3 to 453.71 m  
ZONE 2: TC 2.5 to 590.56 m

SOUTH WEST WIND:  $Mz_{cat} = 0.83 \rightarrow 0.8319$  (TC 3.0  $\rightarrow$  TC 2.98)

ZONE 1: TC 3 to 567.13 m  
ZONE 2: TC 2.5 to 590.56 m

WEST WIND:  $Mz_{cat} = 0.8119 \rightarrow 0.8081$  (TC 3.23  $\rightarrow$  TC 3.27)

ZONE 1: TC 3 to 113.43 m  
ZONE 2: TC 4 to 226.85 m  
ZONE 3: TC 3 to 567.13 m  
ZONE 4: TC 4 to 590.56 m

NORTH WEST WIND:  $Mz_{cat} = 0.8119 \rightarrow 0.8263$  (TC 3.23  $\rightarrow$  TC 3.05)

ZONE 1: TC 4 to 113.43 m  
ZONE 2: TC 3 to 590.56 m

SHIELDING MULTIPLIER (Ms)

- Calculated as per AS/NZS 1170.2-2021 Section 4.3 and varies with height.

NORTH WIND: Ms = 1.0							
ID	HEIGHT	ELEVATION	SLOPE	AREA	BREADTH	LATITUDE	LONGITUDE
003	3.00 m	3.50 m	0.0	2455 m <sup>2</sup>	2.26 m	-36.923201	174.826530
017	3.00 m	4.00 m	0.0052	684 m <sup>2</sup>	12.96 m	-36.922866	174.827527
032	3.00 m	4.00 m	0.0052	80 m <sup>2</sup>	3.47 m	-36.922847	174.827008
NORTH EAST WIND: Ms = 1.0							
ID	HEIGHT	ELEVATION	SLOPE	AREA	BREADTH	LATITUDE	LONGITUDE
006	3.00 m	3.50 m	0.0	1706 m <sup>2</sup>	25.97 m	-36.923414	174.828281
015	3.00 m	3.50 m	0.0	892 m <sup>2</sup>	17.84 m	-36.923644	174.827677
017	3.00 m	4.00 m	0.0052	684 m <sup>2</sup>	7.76 m	-36.922866	174.827527
EAST WIND: Ms = 1.0							
ID	HEIGHT	ELEVATION	SLOPE	AREA	BREADTH	LATITUDE	LONGITUDE
006	3.00 m	3.50 m	0.0	1706 m <sup>2</sup>	11.62 m	-36.923414	174.828281
015	3.00 m	3.50 m	0.0	892 m <sup>2</sup>	40.13 m	-36.923644	174.827677
034	3.00 m	3.50 m	0.0	48 m <sup>2</sup>	8.57 m	-36.923864	174.827878
SOUTH EAST WIND: Ms = 1.0							
ID	HEIGHT	ELEVATION	SLOPE	AREA	BREADTH	LATITUDE	LONGITUDE
015	3.00 m	3.50 m	0.0	892 m <sup>2</sup>	3.91 m	-36.923644	174.827677
SOUTH WIND: Ms = 1.0							
SOUTH WEST WIND: Ms = 1.0							
ID	HEIGHT	ELEVATION	SLOPE	AREA	BREADTH	LATITUDE	LONGITUDE
031	3.00 m	3.50 m	0.0	88 m <sup>2</sup>	14.82 m	-36.923931	174.826673
WEST WIND: Ms = 1.0							
NORTH WEST WIND: Ms = 1.0							
ID	HEIGHT	ELEVATION	SLOPE	AREA	BREADTH	LATITUDE	LONGITUDE
003	3.00 m	3.50 m	0.0	2455 m <sup>2</sup>	66.21 m	-36.923201	174.826530

TOPOGRAPHIC MULTIPLIER (Mt)

- Calculated as per AS/NZS 1170.2-2021 Section 4.4 and varies with height.
- Elevation data based on "DEFAULT" dataset (this can be edited in Settings > Wind).
- Site located outside lee zones as per AS/NZS 1170.2-2021 Section 4.4.3.

WIND	CRITICAL	TOPOGRAPHY	H	Lu	x	Mh	Mt
N	NNW	Flat	6.50 m	364.85 m	2360.81 m	1.0	1.0
NE	NE	Ridge	11.50 m	55.04 m	520.16 m	1.0	1.0
E	EbN	Ridge	47.50 m	103.23 m	599.92 m	1.0	1.0
SE	ESE	Ridge	37.50 m	163.14 m	1999.85 m	1.0	1.0
S	SSW	Flat	11.00 m	156.38 m	519.34 m	1.0	1.0
SW	SW	Ridge	29.50 m	95.26 m	-520.16 m	1.0	1.0
W	WSW	Ridge	50.50 m	292.53 m	-800.10 m	1.0	1.0
NW	NNW	Flat	6.50 m	364.85 m	2360.81 m	1.0	1.0

ICE

REGION: N/A

----- SHAFT DRAG -----

- Monopole Shaft Drag Factor (Cd) has been calculated as per AS/NZS 1170.2 Table C.3.

----- AREA LOADS -----

AREA LOAD #01

RL: 4.50 m  
EPA: 0.07 m<sup>2</sup>  
MASS: 14.50 kg  
OFFSET: 757 mm @ 0°

DESIGN LOADS

WIND	Wu	Ws
N	0.06 kN	0.04 kN
NE	0.06 kN	0.05 kN
E	0.06 kN	0.04 kN
SE	0.06 kN	0.05 kN
S	0.06 kN	0.05 kN
SW	0.06 kN	0.04 kN
W	0.06 kN	0.04 kN
NW	0.06 kN	0.04 kN

----- ANALYSIS -----

- The following load cases have been considered in the analysis:

01: 1.2 G + Wu  
02: 0.9 G + Wu  
03: 1.2 G + 1.5 Q  
04: G + Ws  
05: Wf

- Elastic Critical Buckling Load (Ncr) is 43.14 kN.
- Minimum First Mode Natural Frequency (n1) is 3.7940 Hz for Load Case 1.2 G + Wu.
- Maximum Ultimate Moment (M\*) is 2.30 kN-m @ RL 17.0 mm under South Wind for Load Case 1.2 G + Wu.
- Maximum Ultimate Torsion (T\*) is 0.00 kN-m
- Maximum Ultimate Shear (V\*) is 0.90 kN @ RL 17.0 mm under South Wind for Load Case 1.2 G + Wu.
- Maximum Ultimate Axial (N\*) is 0.64 kN @ RL 17.0 mm for Load Case 1.2 G + Wu.
- Maximum Serviceability Rotation ( $\theta^*$ ) is 0.4904° @ RL 4500.0 mm under South Wind for Load Case G + Ws.
- Maximum Serviceability Deflection ( $\delta^*$ ) is 27 mm @ RL 4500.0 mm under South Wind for Load Case G + Ws.
- Ratio of attachment area to shaft area in top third exceeds 10% (50.00%), such that cross-wind response can be ignored as per CSA S37-18 Annex N.2.1.

----- SHAFT DESIGN (NZS 3404) -----

- Monopole PASSES with a maximum utilisation of [42.18%] @ RL 562.0 mm under South East Wind for Load Case 1.2 G + Wu.

----- CONNECTION DESIGN (NZS 3404) -----

BASE

- Anchor Bolts PASS with a maximum utilisation of [6.19%] @ 315° under South Wind for Load Case 1.2 G + Wu.
- Base Plate PASSES with a maximum utilisation of [8.19%] @ 0° under South Wind for Load Case 1.2 G + Wu.
- Grout PASSES with a maximum utilisation of [6.96%] @ 90° under South Wind for Load Case 1.2 G + Wu.

----- REFERENCES -----

- [1] American Association of State Highway and Transportation Officials (AASHTO) 2020, 'LRFD LTS-1 LRFD Specifications for Structural Supports for Highway Signs, Luminaries, and Traffic Signals (+ Interim Revision 4)'.
- [2] American Society of Civil Engineers (ASCE) 2012, 'ASCE/SEI 48-11 Design of Steel Transmission Pole Structures'.
- [3] American Society of Civil Engineers (ASCE) 2014, 'ASCE/SEI 7-10 Minimum Design Loads and Associated Criteria for Buildings and Other Structures'.
- [4] American Society of Civil Engineers (ASCE) 2017, 'ASCE/SEI 7-16 Minimum Design Loads and Associated Criteria for Buildings and Other Structures'.
- [5] American Institute of Steel Construction (AISC) 2005, 'ANSI/AISC 360-05 Specification for Structural Steel Buildings'.
- [6] Association of Structural Engineers of the Philippines (ASEP) 2016, 'National Structural Code of the Philippines 2015 Volume I: Buildings, Towers and Other Vertical Structures (Seventh Edition)'.
- [7] Australian Institute of Steel Construction (AISC) 2004, 'Design Capacity Tables for Structural Steel Volume 2: Hollow Sections', 2nd edn.
- [8] Australasian Wind Engineering Society (AWES) 2012, 'Wind Loadings Handbook for Australia and New Zealand Background to AS/NZS 1170.2 Wind Actions'.
- [9] British Standards Institute 2009, 'BS EN 1993-1-1:2005 Eurocode 3: Design of steel structures - Part 1-1: General rules and rules for buildings'.
- [10] British Standards Institute 2009, 'BS EN 1993-1-8:2005 Eurocode 3: Design of steel structures - Part 1-8: Design of joints'.
- [11] British Standards Institute 2009, 'BS EN 1993-1-9:2005 Eurocode 3: Design of steel structures - Part 1-9: Fatigue'.
- [12] British Standards Institute 2008, 'BS EN 1993-3-2:2006 Eurocode 3: Design of steel structures - Part 3-2: Towers, masts and chimneys - Chimneys'.
- [13] British Standards Institute 2008, 'BS EN 1991-1-4:2005 Eurocode 1: Actions on structures - Part 1-4: General actions - Wind actions'.
- [14] British Standards Institute 2013, 'BS EN 40-3-3:2013 Lighting columns Part 3-3 Design and verification - Verification by calculation'.

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- [15] CommScope 2018, 'Wind load testing methodology for measuring drag coefficient of aerodynamically efficient base station antenna profiles'.
- [16] CSA Group 2014, 'CSA S16-14 Design of steel structures'.
- [17] CSA Group 2018, 'CSA S37-18 Antennas, towers, and antenna-supporting structures'.
- [18] Environment Canada 2015, 'An Overview of the Procedures Used by Environment Canada for Site-Specific Wind Pressure Recommendations in Support of CSA S37-13'.
- [19] Giosan, I, 'Vortex Shedding Induced Loads on Free Standing Structures'.
- [20] Hansen, S 2007, 'Vortex-induced vibrations of structures'.
- [21] Holmes, JD 2015, 'Wind Loading of Structures', 3rd edn.
- [22] Horn, D 2011, 'Technical Manual 1 - Design of Monopole Bases'.
- [23] International Committee on Industrial Chimneys (CICIND) 2002, 'Model Code for Steel Chimneys'.
- [24] International Committee on Industrial Chimneys (CICIND) 2002, 'Model Code for Steel Chimneys - Commentaries and Appendices'.
- [25] Rocla, 'RocPole™ Version 5.1.3 User Guide'.
- [26] Standards Australia 1985, 'AS 1275-1985 Metric screw threads for fasteners'.
- [27] Standards Australia 1998, 'AS 4100-1998 Steel structures - Commentary'.
- [28] Standards Australia 2010, 'AS 5100.3-2004 Bridge design Part 3: Foundations and soil-supporting structures'.
- [29] Standards Australia 2012, 'AS 4100-1998 Steel structures'.
- [30] Standards Australia 2013, 'AS 3600-2009 Concrete structures'.
- [31] Standards Australia/Standards New Zealand 1998, 'AS/NZS 4600 Supplement 1:1998 Cold-formed steel structures - Commentary'.
- [32] Standards Australia/Standards New Zealand 2000, 'AS/NZS 4676:2000 Structural design requirements for utility service poles'.
- [33] Standards Australia/Standards New Zealand 2003, 'AS/NZS 1170.3:2003 Structural design actions Part 3: Snow and ice actions'.
- [34] Standards Australia/Standards New Zealand 2009, 'AS/NZS 1170.1:2002 Structural design actions Part 1: Permanent, imposed and other actions'.
- [35] Standards Australia/Standards New Zealand 2010, 'AS/NZS 7000:2010 Overhead line design - Detailed procedures'.
- [36] Standards Australia/Standards New Zealand 2011, 'AS/NZS 1170.0:2002 Structural design actions Part 0: General principles'.
- [37] Standards Australia/Standards New Zealand 2011, 'AS/NZS 3678 Structural steel - Hot-rolled plates, floorplates and slabs'.
- [38] Standards Australia/Standards New Zealand 2017, 'AS/NZS 1170.2:2011 Structural design actions Part 2: Wind actions'.
- [39] Standards Australia/Standards New Zealand 2018, 'AS/NZS 4600:2018 Cold-formed steel structures'.
- [40] Standards Australia/Standards New Zealand 2021, 'AS/NZS 1170.2:2021 Structural design actions Part 2: Wind actions'.
- [41] Standards New Zealand 1997, 'NZS 3404:Part 1:1997 Steel Structures Standard'.
- [42] Telecommunications Industry Association 2014, 'TIA-222-G-2 Structural Standard for Antenna Supporting Structures and Antennas'.
- [43] Telecommunications Industry Association 2019, 'TIA-222-H-1 Structural Standard for Antenna Supporting Structures, Antennas and Small Wind Turbine Support Structures'.
- [44] Wilson, K 1997, 'Bearing Pressures for Rectangular Footings with Biaxial Uplift', Journal of Bridge Engineering, Vol. 2, No. 1, pp. 27-33.
- [45] University of Sydney (USYD) 2002, 'Advice on Design of Polygonal Poles for Power Transmission Lines', University of Sydney Centre for Advanced Structural Engineering Investigation Report No. S1356.



# SUMMARY TABLE

## Foundation Depths for Lighting Poles

The table provides the calculated footing depths for light poles with various standard housings and pole heights. Calculations have assumed a 101x3.2 SHS pole with a 500mm-diameter concrete footing. Subsoil can be either: cohesive material with a minimum undrained shear strength  $c_u=50\text{kPa}$ , or cohesionless material with minimum unit weight,  $\gamma = 16\text{kN/m}^3$  and internal friction value  $\phi=25^\circ$  (embedments are based on the worst case)




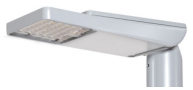




Embedments are the maximum required from either wind or seismic loads. Seismic loads have been calculated assuming: site subsoil Class D, Importance Level 2, natural period  $T_1=0.4\text{s}$ , hazard factor  $Z=0.3$ , structural ductility factor  $\mu=1.25$  and elastic damping of 2%. Wind zones correspond to those adopted by NZS3604:2011, with wind pressures as follows:

Per. NZS3604 : 2011 Table 5.4 : (values are maximums)

WIND ZONE	Low	Medium	High	Very High	Extra High	SED
$V_{(z)}$ ( $\text{ms}^{-1}$ )	32.0	37.0	44.0	50.0	55.0	> 55.0
$q_{(z)}$ (kPa)	0.61	0.82	1.16	1.50	1.82	as above

As an indicative basis for the wind zone applicable to a given address, refer to GIS data prepared by BRANZ:

<https://branz.maps.arcgis.com/apps/webappviewer/index.html?id=e64f302e59f84835b19e99270a305004>

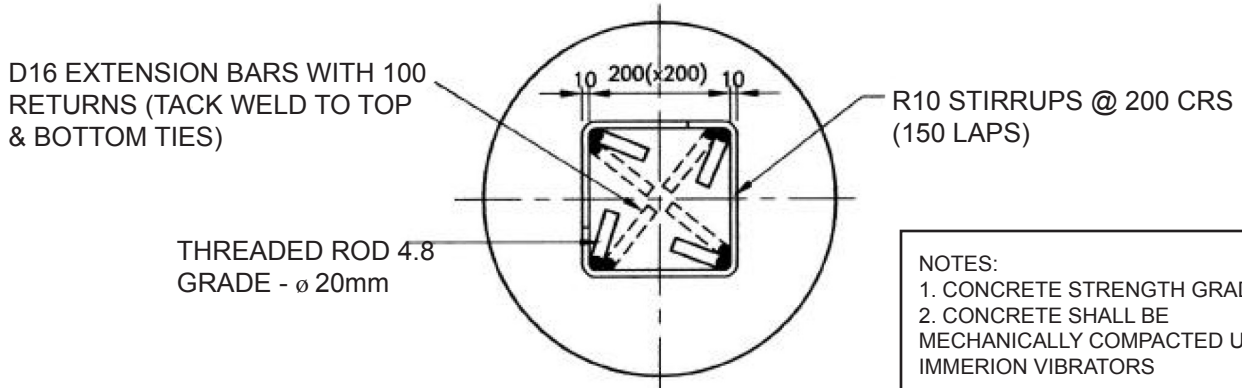
Pole Mounting	Housing Type	Housing Dimensions (mm)	Pole Heights (m)	Req'd Footing Depth by Wind Zone				
				Low + Med	High + Very High	Extra High		
SINGLE, NO TILT	Small		450x196x66	4.5	1.00	1.00	1.00	
			6.0	1.00	1.00	1.30		
			7.6	1.00	1.30	1.30		
	Medium		749x216x100	4.5	1.00	1.00	1.30	
				6.0	1.00	1.30	1.30	
				7.6	1.00	1.30	1.50	
	Large		537x196x66	4.5	1.00	1.00	1.00	
				6.0	1.00	1.30	1.30	
				7.6	1.00	1.30	1.30	
	180° TWIN, NO TILT	Small		450x196x66	4.5	1.00	1.00	1.00
				6.0	1.00	1.30	1.30	
				7.6	1.00	1.30	1.50	
Medium			749x216x100	4.5	1.00	1.30	1.30	
				6.0	1.00	1.30	1.30	
				7.6	1.30	1.50	1.50	
Large			537x196x66	4.5	1.00	1.00	1.30	
				6.0	1.00	1.30	1.30	
				7.6	1.00	1.30	1.50	
Large			757x482x97	4.5	1.00	1.00	1.30	
				6.0	1.00	1.30	1.30	
				7.6	1.30	1.30	1.50	
Large		762x618x101	4.5	1.00	1.00	1.30		
			6.0	1.00	1.30	1.30		
			7.6	1.30	1.30	1.50		

**FOUNDATION DEPTH FOR THIS PROJECT:  
1000mm**

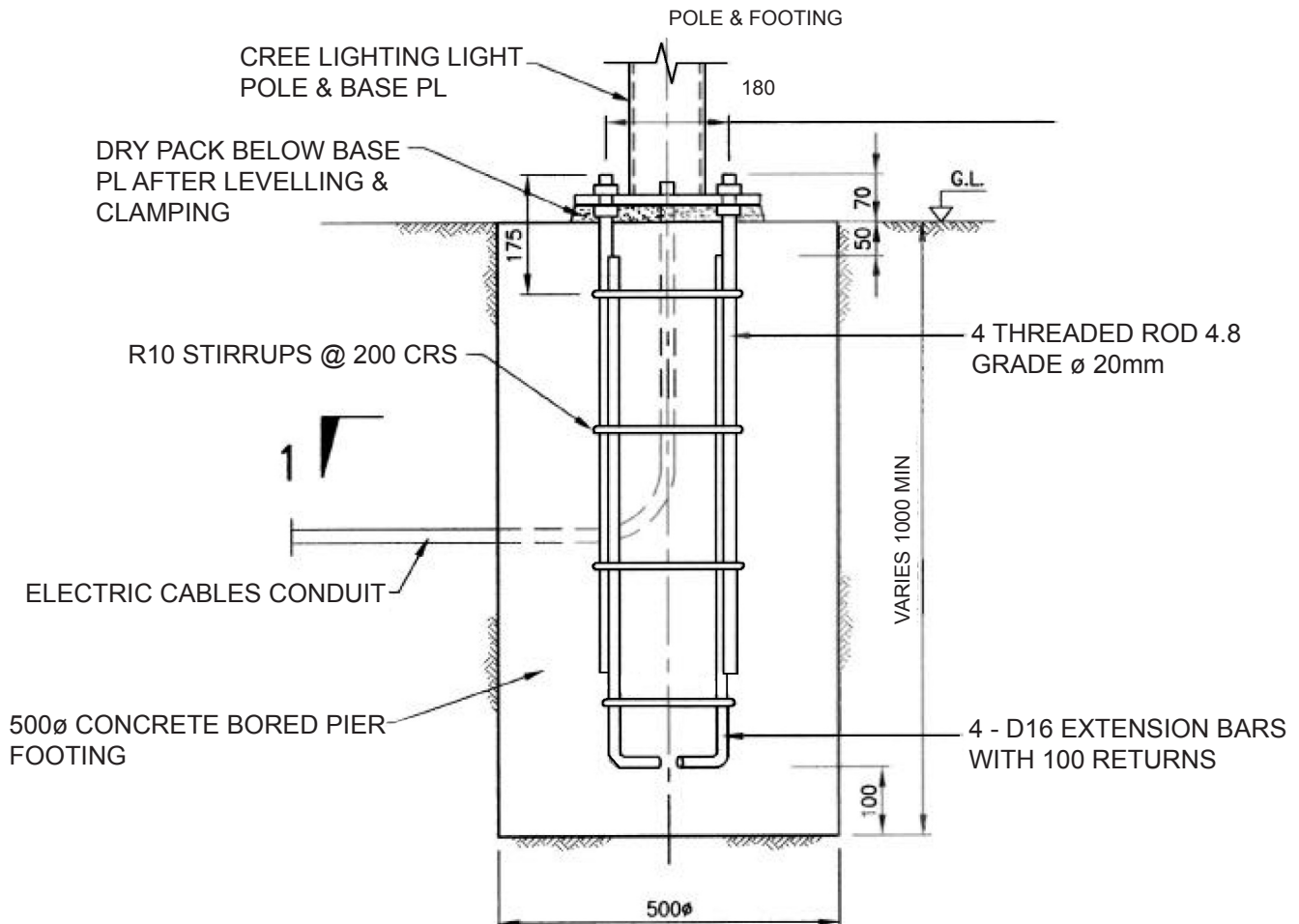


**Advanced**  
LIGHTING TECHNOLOGIES

**SECTION 1**  
SCALE 1:10



**TYPICAL LIGHT POLE & FOOTING DETAIL**  
SCALE 1:10



NOTE: This detail has been supplied as a guide for pole purchasers. Users should contact a Consulting Engineer for site-specific advice if required. Due to variation in site conditions and installation procedures, ADLT NZ Ltd can not accept responsibility for the use of this information



**Advanced**  
LIGHTING TECHNOLOGIES



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