

OUTDOOR CAR PARKS

AS/NZS 1158.3.1:2020



OUTDOOR CAR PARKS

AS/NZS 1158.3.1:2020

Urban outdoor environments such as car parks, must balance security, safety and energy efficiency while creating attractive facilities that enhance both the architecture of the surrounding area and user experience.

At Light Culture we offer a range of energy efficient outdoor lighting solutions that meets code compliance, functionality, durability, safety, and security while creating great places for people. Some of the principle design objectives when creating outdoor carparks include:

- Facilitation of safe movement
- Reduction of the fear of crime at night
- Contributing to the amenity of an area through increase aesthetic appeal
- Limitation of discomfort glare
- Control of stray and obtrusive lighting to the surrounding environment
- Minimisation of energy consumption
- Provide a sufficient level of illuminance and uniformity

LIGHTING CONSIDERATIONS

DISCOMFORT GLARE:

To ensure the carpark is visually comfortable and safe for all users, the lighting design needs to consider all factors which contribute to the presence of discomfort glare. Luminaire mounting height, tilt and optics all contribute to how glary an installation will be. Only luminaires which comply with AS/NZS 1168.3.1 2020 Discomfort Glare Index, limitation of luminous intensity requirements and luminaires with low luminous intensity values in the high critical angles of 80° to 90° should be considered.

PEDESTRIAN SAFETY:

A car park's lighting system should work to eliminate dark places, which can pose a threat to both vehicle and personal security. This can be achieved by providing sufficient illumination for pedestrians entering, exiting and orientating throughout the carpark.

CONTROLS:

AS/NZS 1158.3.1 2020 allows for the use of switching and dimming controls to ensure the carpark is never excessively illuminated when the use of the area changes. For example, early in the evening subcategory PC1 may be required when vehicle and pedestrian movement is high. Then late at night when the use of the car park decreases a subcategory of PC2 or PC3 may only be required. This can be achieved through adaptive lighting control to reduce the overall illuminance levels and energy consumption.

POLE LOCATIONS:

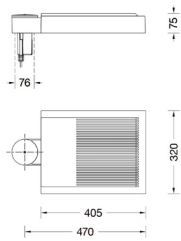
Pole heights and locations should be considered carefully to avoid obtrusive spill light into adjacent property boundaries and glare to surrounding transport systems. When placing poles ensure that no significant obstructions such as tree canopies or buildings will inhibit the full luminous flux output and optic of the luminaire. They should also be located outside of pedestrian pathways such as in landscaped areas and away from turning points and emergency vehicle access areas.



SUBCATEGORY SELECTION

TYPE OF AREA	Selection Criteria		
	Night time vehicle and/or pedestrian movements	Fear of crime	Applicable lighting subcategory
PARKING SPACE, AISLES & CIRCULATION ROADWAYS	High Medium Low	High Medium Low	PC1 PC2 PC3
DESIGNATED PARKING SPACES SPECIFICALLY INTENDED FOR PEOPLE WITH DISABILITIES	N/A	N/A	PCD
FOR ANY DESIGNATED AREA FOR PEDESTRIANS TO CROSS	N/A	N/A	PCX

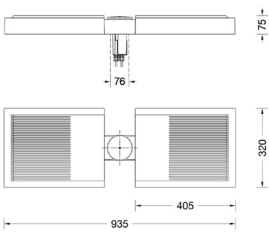
RECOMMEND PRODUCTS



BEGA 84 581 POLE TOP LUMINAIRE



LUMINAIRE OPTIC	Asymmetrical Flat Beam
LIGHT SOURCE	LED
CCT	4000K
CRI	≥ 80
IP RATING	IP66
IK RATING	IK08
HORIZONTAL WINDAGE	0.032m ²
RECOMMENDED POLE HEIGHT	6m - 9m



BEGA 84 583 DOUBLE POLE TOP LUMINAIRE



LUMINAIRE OPTIC	Asymmetrical Flat Beam
LIGHT SOURCE	LED
CCT	4000K
CRI	≥ 80
IP RATING	IP66
IK RATING	IK08
HORIZONTAL WINDAGE	0.032m ²
RECOMMENDED POLE HEIGHT	6m - 9m

TECHNICAL PARAMETERS

AS/NZS 1158.3.1:2020

SUBCATEGORY: PC1

PC1

LUMINAIRE CONNECTED WATTAGE											
LIGHTING SUBCATEGORY	Average Horizontal Illuminance (E _h)	Point Horizontal Illuminance (E _{ph})	Illuminance Uniformity (U _{E2})	Point Vertical Illuminance (E _{pv})	Maximum UWLR SSL	DGI _p Max		Limitation of Luminous Intensity			
						MH ≤ 6m	MH ≥ 6m	Luminaire Lumens ≤ 4000lm		Luminaire Lumens ≥ 4000lm	
								Cd 80° to 90°	Cd @ 90°	Cd 80° to 90°	Cd @ 90°
PC1 - CAR PARK AISLE	≥ 14	≥ 3	≤ 8	≥ 3							
PC1 - CIRCULATION ROADWAY/RAMP	≥ 14	≥ 3	≤ 8	n/a							
PC1 - ACCESS DRIVEWAY/ROAD	≥ 7	≥ 1.5	≤ 8	n/a	≤ 1%	≤ 42000	≤ 50000	≤ 2700 cd	≤ 300 cd	≤ 2700 cd /1000lm	
PCD - DISABLED CAR PARK	n/a	≥ 14 & ≥ E _h	n/a	n/a							
PCX - PEDESTRIAN CROSSING	≥ 21	≥ 5	≤ 8	n/a							

REFERENCE MAP

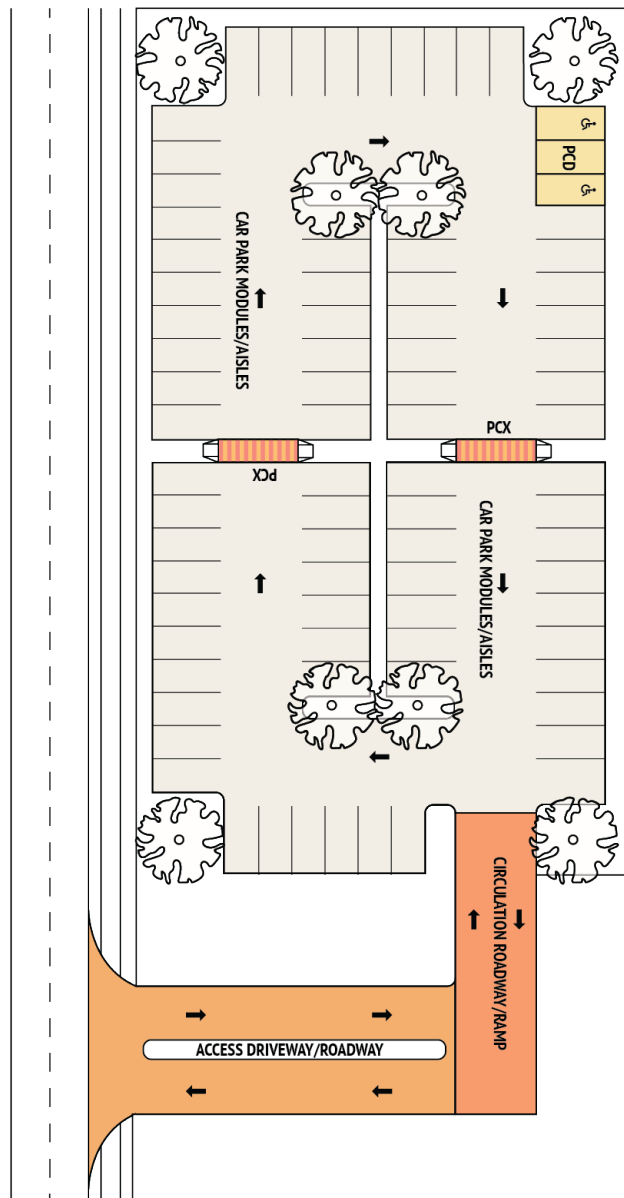
PARKING AISLE: A roadway or an area of pavement used by vehicles to gain access to, and to manoeuvre into and out of parking spaces.

PARKING MODULE: A parking aisle together with a single row of parking spaces on one or both sides, but excluding ramps or circulation roadways which take off within the module.

CIRCULATION ROADWAY: A roadway within an off-street car park which is used solely for circulation and to gain access to parking aisle, and on which there is no parking.

CIRCULATION RAMP: A circulation roadway which connects an access driveway to an off-street car park on a substantially different level, or which connects two levels in a multi-level car park.

ACCESS DRIVEWAY / ROADWAY: A roadway extending from the edge of the frontage roadway to the property boundary to connect with the first ramp, circulation roadway, parking aisle or domestic driveway encountered, and carrying one, or two-way traffic.



TYPICAL DESIGN

AS/NZS 1158.3.1:2020



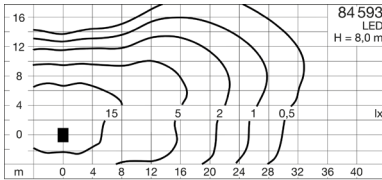
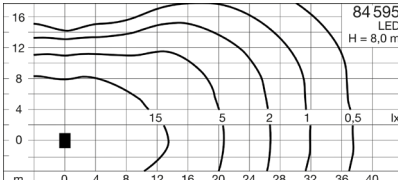
SUBCATEGORY: PC1

PC1

UWLR	DGI _p MAX	LIMITATIONS OF LUMINOUS INTENSITY	
		80° to 90°	@ 90°
0%	28437	1569 cd	0.8 cd

LUMINAIRE SERVICE LIFE		
Service Life - Ambient Temperature		
	Rated Temperature $t_a=25^\circ\text{C}$	Ambient Temperature $t_a=65^\circ\text{C}$ 100%
LED PSU	≥ 50,000 hrs	50,000 hrs
LED MODULE	≥ 200,000 hrs (L80 B50) ≥ 100,000 hrs (L90 B50)	49,000 hrs (L80 B50) 75,000 hrs (L70 B50)

LUMINAIRE SELECTION

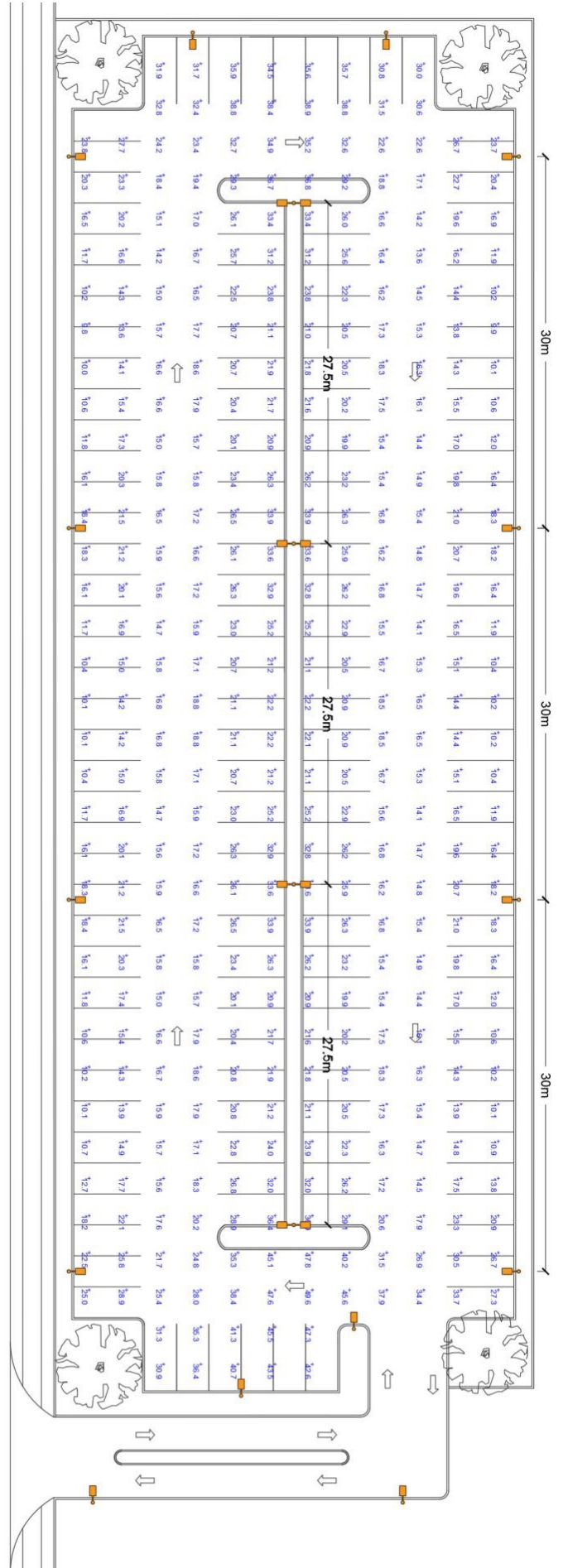
CODE	84 593 K4	84 595 K4
IMAGE		
DISTRIBUTION		
LUMINAIRE CONNECTED WATTAGE	51.2W	102.4W
LUMINAIRE LUMINOUS FLUX	7200lm	14400lm
LUMINOUS EFFICIENCY	140.6lm/W	140.6lm/W
LUMINAIRE OPTIC	Asymmetrical Flat Beam	Asymmetrical Flat Beam
LIGHT SOURCE	LED	LED
CCT	4000K	4000K
CRI	≥ 80	≥ 80
IP RATING	IP66	IP66
IK RATING	IK08	IK08
WEIGHT	8.2kg	15.6kg
HORIZONTAL WINDAGE	0.032m ²	0.032m ²
RECOMMENDED POLE HEIGHT	6m - 9m	6m - 9m

TYPICAL DESIGN

AS/NZS 1158.3.1:2020

SUBCATEGORY: PC1

PC1



TYPICAL DESIGN PARAMETERS

SUBCATEGORY	PC1
POLE HEIGHT	8m
LUMINAIRE TILT	0°
POLE SET BACK	500mm
LIGHT LOSS FACTOR	0.8
LUMINAIRE CODE	Single 84 593K4
	Double 84 595K4

TECHNICAL PARAMETERS

AS/NZS 1158.3.1:2020

SUBCATEGORY: PC2

PC2

LUMINAIRE CONNECTED WATTAGE														
LIGHTING SUBCATEGORY	Average Horizontal Illuminance (E_h)	Point Horizontal Illuminance (E_{pv})	Illuminance Uniformity (U_{E2})	Point Vertical Illuminance (E_{pv})	Maximum UWLR SSL	DGI _p Max		Limitation of Luminous Intensity						
						MH ≤ 6m	MH ≥ 6m	Luminaire Lumens ≤ 4000lm		Luminaire Lumens ≥ 4000lm				
								Cd 80° to 90°	Cd @ 90°	Cd 80° to 90°	Cd @ 90°			
PC2 - CAR PARK AISLE	≥ 7	≥ 1.5	≤ 8	≥ 1										
PC2 - CIRCULATION ROADWAY/RAMP	≥ 7	≥ 1.5	≤ 8	n/a										
PC2 - ACCESS DRIVEWAY/ROAD	≥ 3.5	≥ 0.75	≤ 8	n/a	≤ 1%	≤ 42000	≤ 50000	≤ 2700 cd	≤ 300 cd	≤ 2700 cd	≤ 80 cd /1000lm			
PCD - DISABLED CAR PARK	n/a	≥ 14 & ≥ E_h	n/a	n/a										
PCX - PEDESTRIAN CROSSING	≥ 21	≥ 5	≤ 8	n/a										

REFERENCE MAP

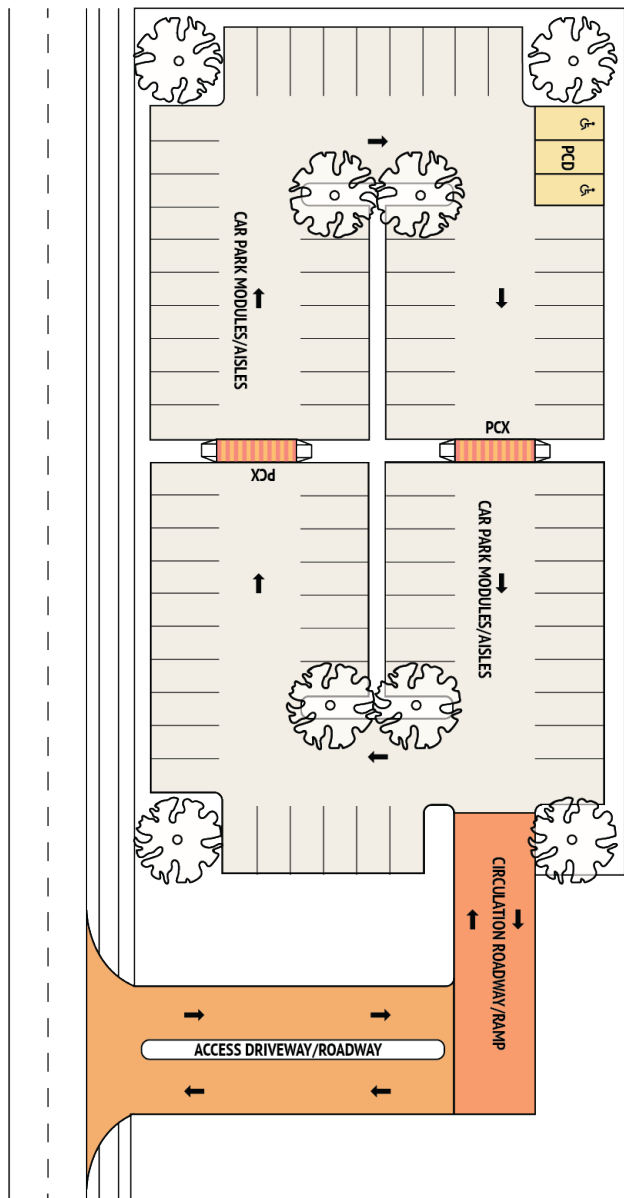
PARKING AISLE: A roadway or an area of pavement used by vehicles to gain access to, and to manoeuvre into and out of parking spaces.

PARKING MODULE: A parking aisle together with a single row of parking spaces on one or both sides, but excluding ramps or circulation roadways which take off within the module.

CIRCULATION ROADWAY: A roadway within an off-street car park which is used solely for circulation and to gain access to parking aisle, and on which there is no parking.

CIRCULATION RAMP: A circulation roadway which connects an access driveway to an off-street car park on a substantially different level, or which connects two levels in a multi-level car park.

ACCESS DRIVEWAY / ROADWAY: A roadway extending from the edge of the frontage roadway to the property boundary to connect with the first ramp, circulation roadway, parking aisle or domestic driveway encountered, and carrying one, or two-way traffic.



TYPICAL DESIGN

AS/NZS 1158.3.1:2020

SUBCATEGORY: PC2

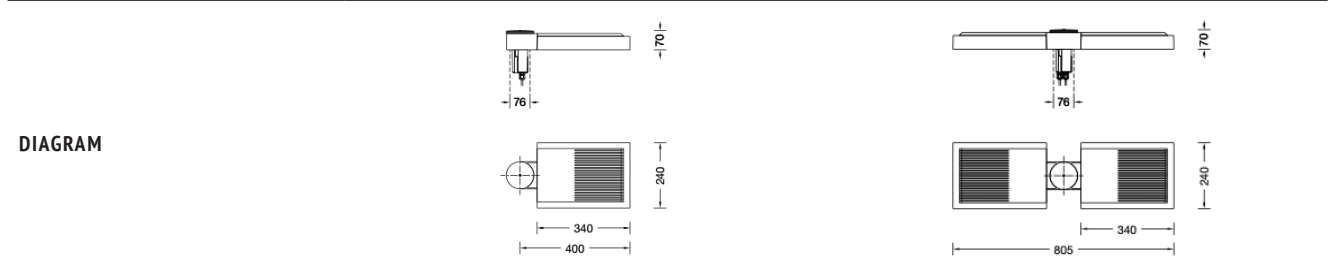
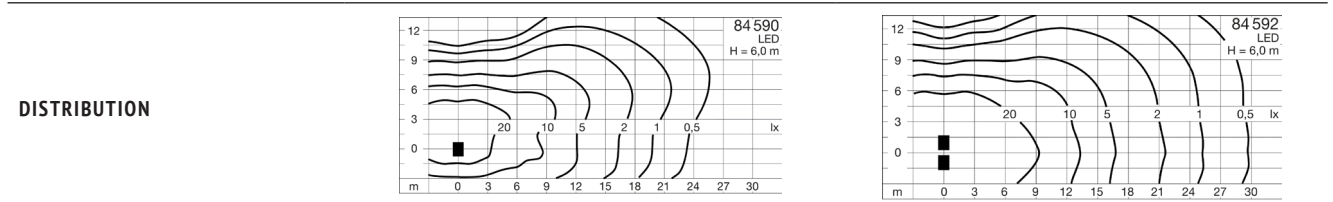
PC2

UWLR	DGI _p MAX	LIMITATIONS OF LUMINOUS INTENSITY	
		80° to 90°	@ 90°
0%	21124	1046 cd	0.5 cd

LUMINAIRE SERVICE LIFE		
Service Life - Ambient Temperature		
	Rated Temperature $t_a=25^\circ\text{C}$	Ambient Temperature $t_a=65^\circ\text{C}$ 100%
LED PSU	$\geq 50,000$ hrs	50,000 hrs
LED MODULE	$\geq 200,000$ hrs (L80 B50) $\geq 100,000$ hrs (L90 B50)	49,000 hrs (L80 B50) 75,000 hrs (L70 B50)

LUMINAIRE SELECTION

CODE	84 590 K4	84 592 K4
		



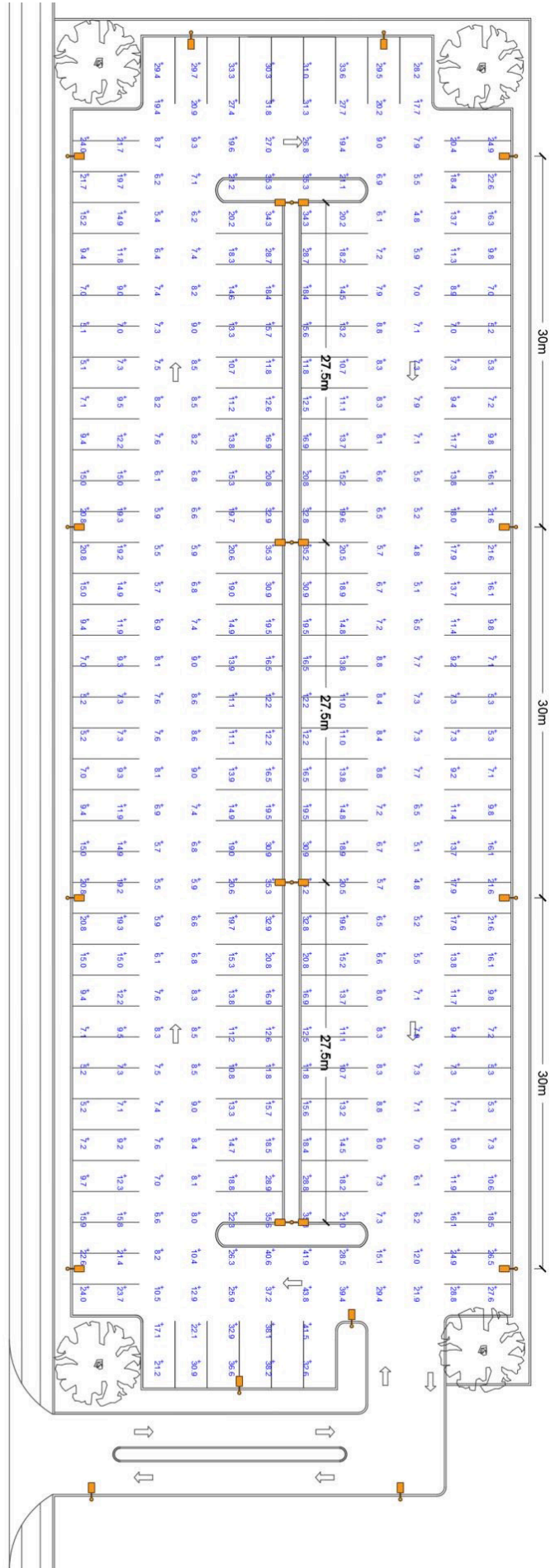
LUMINAIRE CONNECTED WATTAGE	33.5W	67.0W
LUMINAIRE LUMINOUS FLUX	4800lm	9600lm
LUMINOUS EFFICIENCY	142.2lm/W	143.3lm/W
LUMINAIRE OPTIC	Asymmetrical Flat Beam	Asymmetrical Flat Beam
LIGHT SOURCE	LED	LED
CCT	4000K	4000K
CRI	≥ 80	≥ 80
IP RATING	IP66	IP66
IK RATING	IK07	IK07
WEIGHT	5.6kg	10.4kg
HORIZONTAL WINDAGE	0.03m ²	0.03m ²
RECOMMENDED POLE HEIGHT	5m - 8m	5m - 8m

TYPICAL DESIGN

AS/NZS 1158.3.1:2020

SUBCATEGORY: PC2

PC2



TYPICAL DESIGN PARAMETERS

SUBCATEGORY	PC2
POLE HEIGHT	6m
LUMINAIRE TILT	0°
POLE SET BACK	500mm
LIGHT LOSS FACTOR	0.8
LUMINAIRE CODE	Single 84 590K4
	Double 84 592K4

TECHNICAL PARAMETERS

AS/NZS 1158.3.1:2020

SUBCATEGORY: PC3

LUMINAIRE CONNECTED WATTAGE											
LIGHTING SUBCATEGORY	Average Horizontal Illuminance (E _h)	Point Horizontal Illuminance (E _{ph})	Illuminance Uniformity (U _{e2})	Point Vertical Illuminance (E _{pv})	Maximum UWLR SSL	DGI _p Max		Limitation of Luminous Intensity			
						MH ≤ 6m	MH ≥ 6m	Luminaire Lumens ≤ 4000lm		Luminaire Lumens ≥ 4000lm	
								Cd 80° to 90°	Cd @ 90°	Cd 80° to 90°	Cd @ 90°
PC3 - CAR PARK AISLE	≥ 3.5	≥ 0.7	≤ 8	n/a							
PC3 - CIRCULATION ROADWAY/RAMP	≥ 3.5	≥ 0.7	≤ 8	n/a							
PC3 - ACCESS DRIVEWAY/ROAD	≥ 1.75	≥ 0.35	≤ 8	n/a	≤ 1%	≤ 42000	≤ 50000	≤ 2700 cd	≤ 300 cd	≤ 2700 cd / 1000lm	
PCD - DISABLED CAR PARK	n/a	≥ 14 & ≥ E _h	n/a	n/a							
PCX - PEDESTRIAN CROSSING	≥ 21	≥ 5	≤ 8	n/a							

REFERENCE MAP

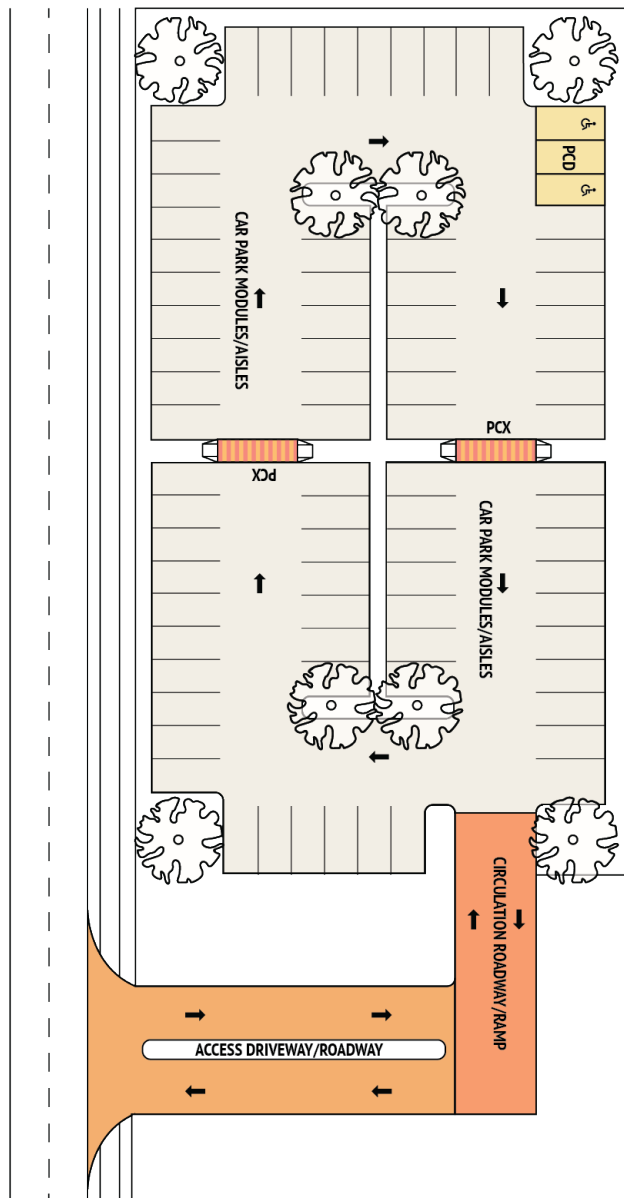
PARKING AISLE: A roadway or an area of pavement used by vehicles to gain access to, and to manoeuvre into and out of parking spaces.

PARKING MODULE: A parking aisle together with a single row of parking spaces on one or both sides, but excluding ramps or circulation roadways which take off within the module.

CIRCULATION ROADWAY: A roadway within an off-street car park which is used solely for circulation and to gain access to parking aisle, and on which there is no parking.

CIRCULATION RAMP: A circulation roadway which connects an access driveway to an off-street car park on a substantially different level, or which connects two levels in a multi-level car park.

ACCESS DRIVEWAY / ROADWAY: A roadway extending from the edge of the frontage roadway to the property boundary to connect with the first ramp, circulation roadway, parking aisle or domestic driveway encountered, and carrying one, or two-way traffic.



TYPICAL DESIGN

AS/NZS 1158.3.1:2020

SUBCATEGORY: PC3

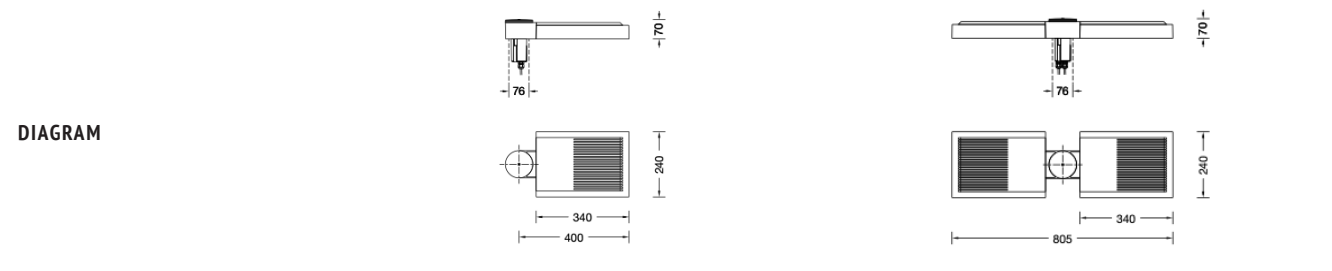
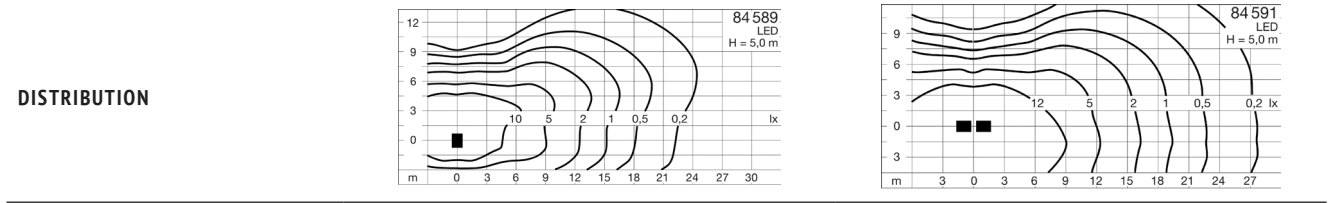
PC3

UWLR	DGI _p MAX	LIMITATIONS OF LUMINOUS INTENSITY	
		80° to 90°	@ 90°
0%	13062	523 cd	0.3 cd

LUMINAIRE SERVICE LIFE		
Service Life - Ambient Temperature		
	Rated Temperature $t_a=25^\circ\text{C}$	Ambient Temperature $t_a=65^\circ\text{C}$ 100%
LED PSU	≥ 50,000 hrs	50,000 hrs
LED MODULE	≥ 200,000 hrs (L80 B50) ≥ 100,000 hrs (L90 B50)	49,000 hrs (L80 B50) 75,000 hrs (L70 B50)

LUMINAIRE SELECTION

CODE	84 589 K4	84 591 K4
		



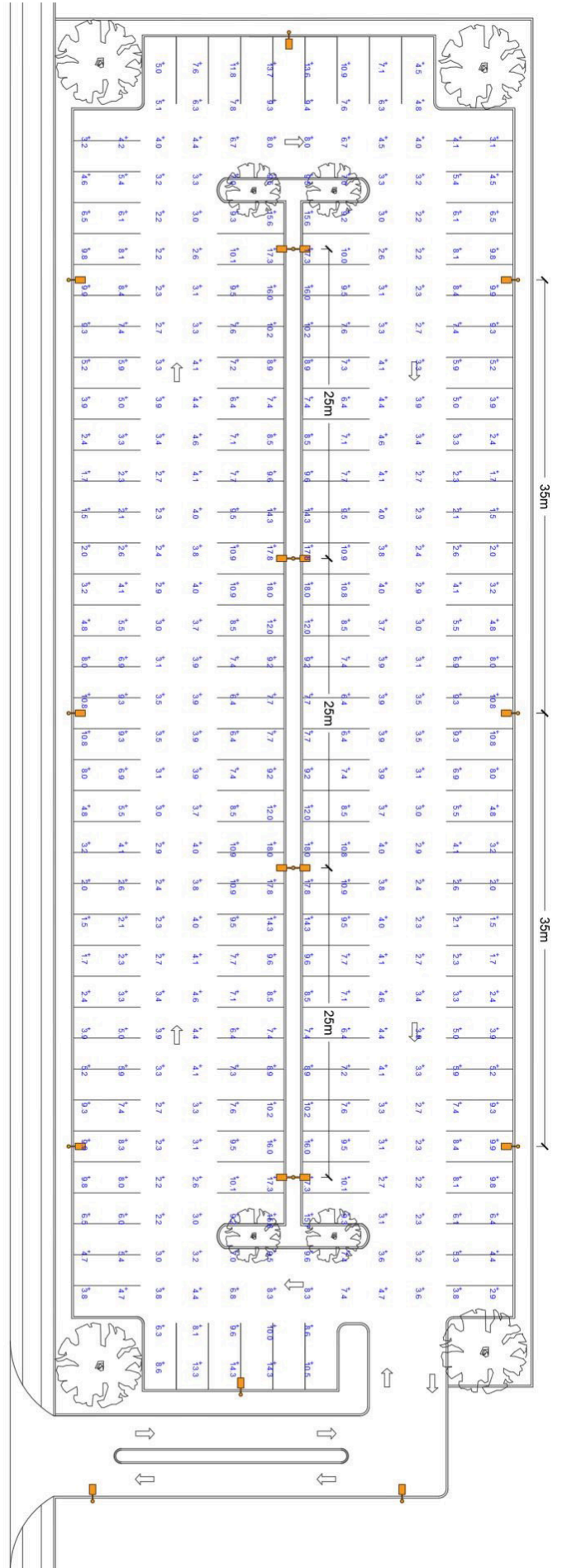
LUMINAIRE CONNECTED WATTAGE	17.8W	35.6W
LUMINAIRE LUMINOUS FLUX	2400lm	4800lm
LUMINOUS EFFICIENCY	134.8lm/W	134.8lm/W
LUMINAIRE OPTIC	Asymmetrical Flat Beam	Asymmetrical Flat Beam
LIGHT SOURCE	LED	LED
CCT	4000K	4000K
CRI	≥ 80	≥ 80
IP RATING	IP66	IP66
IK RATING	IK08	IK08
WEIGHT	5.4kg	10.0kg
HORIZONTAL WINDAGE	0.03m ²	0.03m ²
RECOMMENDED POLE HEIGHT	4m - 6m	4m - 6m

TYPICAL DESIGN

AS/NZS 1158.3.1:2020

SUBCATEGORY: PC3

PC3



TYPICAL DESIGN PARAMETERS

SUBCATEGORY	PC3
POLE HEIGHT	6m
LUMINAIRE TILT	0°
POLE SET BACK	500mm
LIGHT LOSS FACTOR	0.8
LUMINAIRE CODE	Single 84 589K4
	Double 84 591K4

TYPICAL DESIGN

AS/NZS 1158.3.1:2020

SUBCATEGORY: PCD & PCX

PCD & PCX

UWLR	DGI _p MAX	LIMITATIONS OF LUMINOUS INTENSITY	
		80° to 90°	@ 90°
0%	28437	1569 cd	0.8 cd

LUMINAIRE SERVICE LIFE

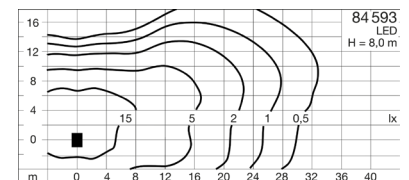
	Service Life - Ambient Temperature	
	Rated Temperature $t_a=25^\circ\text{C}$	Ambient Temperature $t_a=65^\circ\text{C}$ 100%
LED PSU	≥ 50,000 hrs	50,000 hrs
LED MODULE	≥ 200,000 hrs (L80 B50) ≥ 100,000 hrs (L90 B50)	49,000 hrs (L80 B50) 75,000 hrs (L70 B50)

LUMINAIRE SELECTION

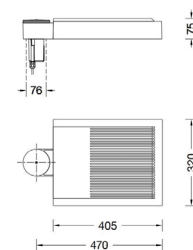
CODE	84 593 K4
------	-----------



DISTRIBUTION



DIAGRAM



LUMINAIRE CONNECTED WATTAGE	51.2W
LUMINAIRE LUMINOUS FLUX	7200lm
LUMINOUS EFFICIENCY	140.6lm/W
LUMINAIRE OPTIC	Asymmetrical Flat Beam
LIGHT SOURCE	LED
CCT	4000K
CRI	≥ 80
IP RATING	IP66
IK RATING	IK08
WEIGHT	8.2kg
HORIZONTAL WINDAGE	0.035m ²
RECOMMENDED POLE HEIGHT	6m - 9m

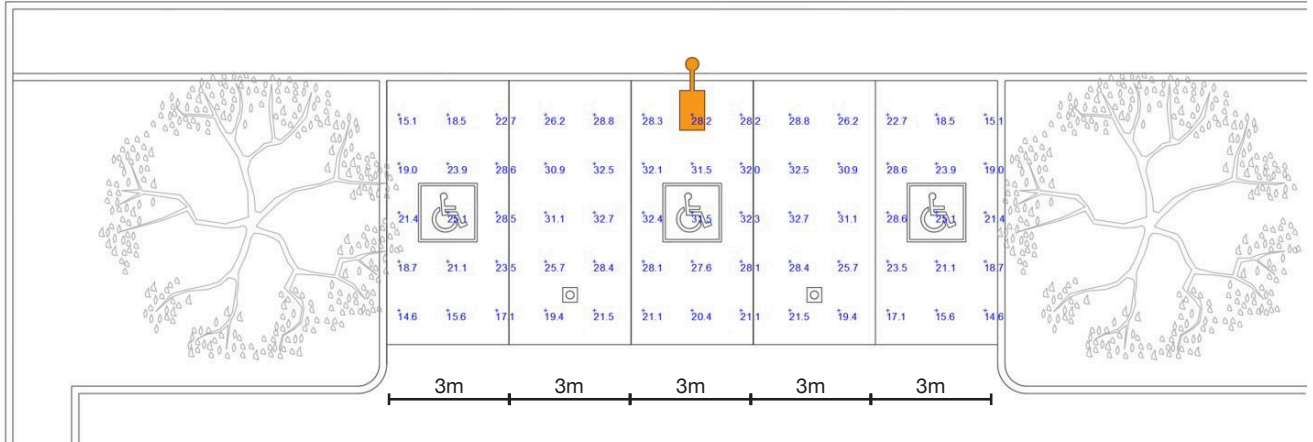
TYPICAL DESIGN

AS/NZS 1158.3.1:2020

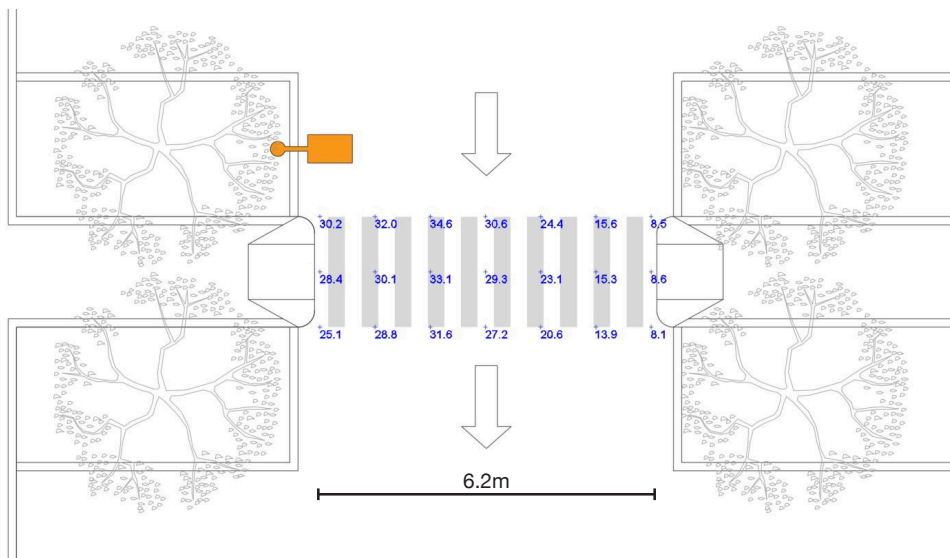
SUBCATEGORY: PCD & PCX

PCD & PCX

PCD



PCX



TYPICAL DESIGN PARAMETERS

SUBCATEGORY	PCD & PCX
POLE HEIGHT	6m
LUMINAIRE TILT	0°
POLE SET BACK	500mm
LIGHT LOSS FACTOR	0.8
LUMINAIRE CODE	84 593K4

TYPICAL DESIGN CALCULATION RESULTS				
LIGHTING SUBCATEGORY	AVERAGE HORIZONTAL ILLUMINANCE (E _h)	POINT HORIZONTAL ILLUMINANCE (E _{ph})	ILLUMINANCE UNIFORMITY (U _{E2})	POINT VERTICAL ILLUMINANCE (E _{pv})
PCD - DISABLED CAR PARK	n/a	14.6lx	n/a	n/a
PCX - PEDESTRIAN CROSSING	23.7lx	8.1lx	1.46	n/a