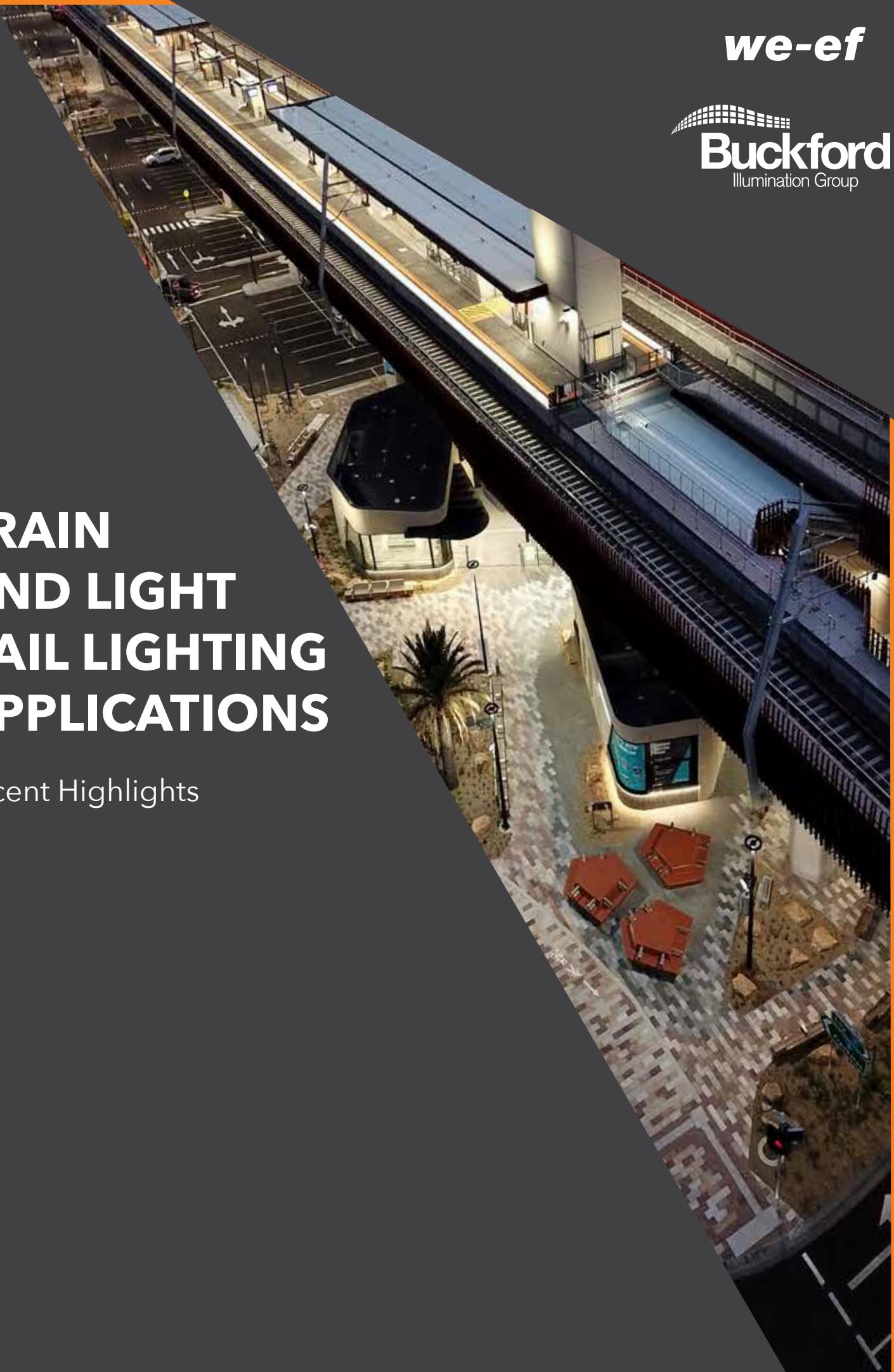


we-ef



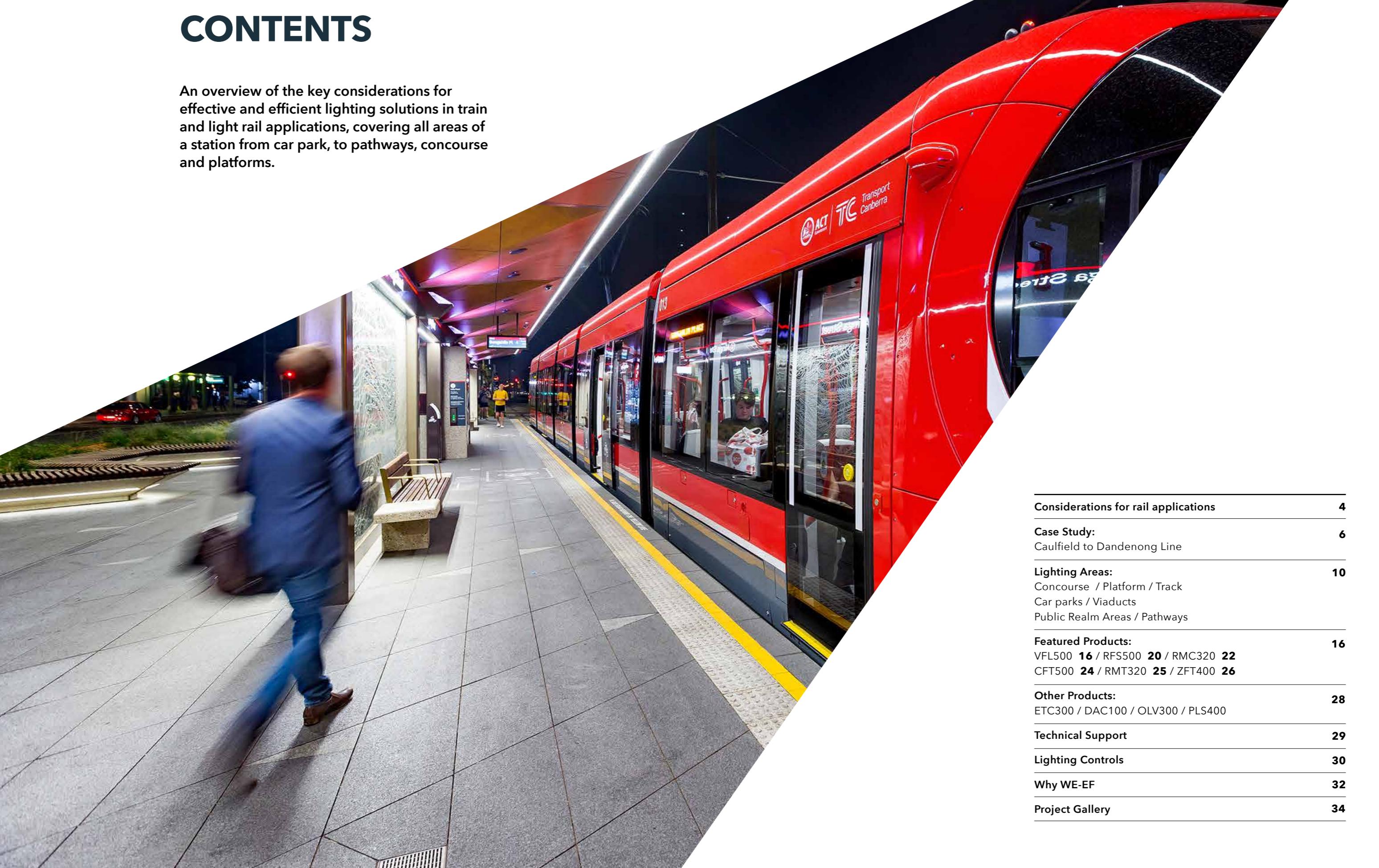
TRAIN AND LIGHT RAIL LIGHTING APPLICATIONS

Recent Highlights



CONTENTS

An overview of the key considerations for effective and efficient lighting solutions in train and light rail applications, covering all areas of a station from car park, to pathways, concourse and platforms.



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SAFETY. SUSTAINABILITY. SPACES.

Minimisation of Obtrusive Light Spill

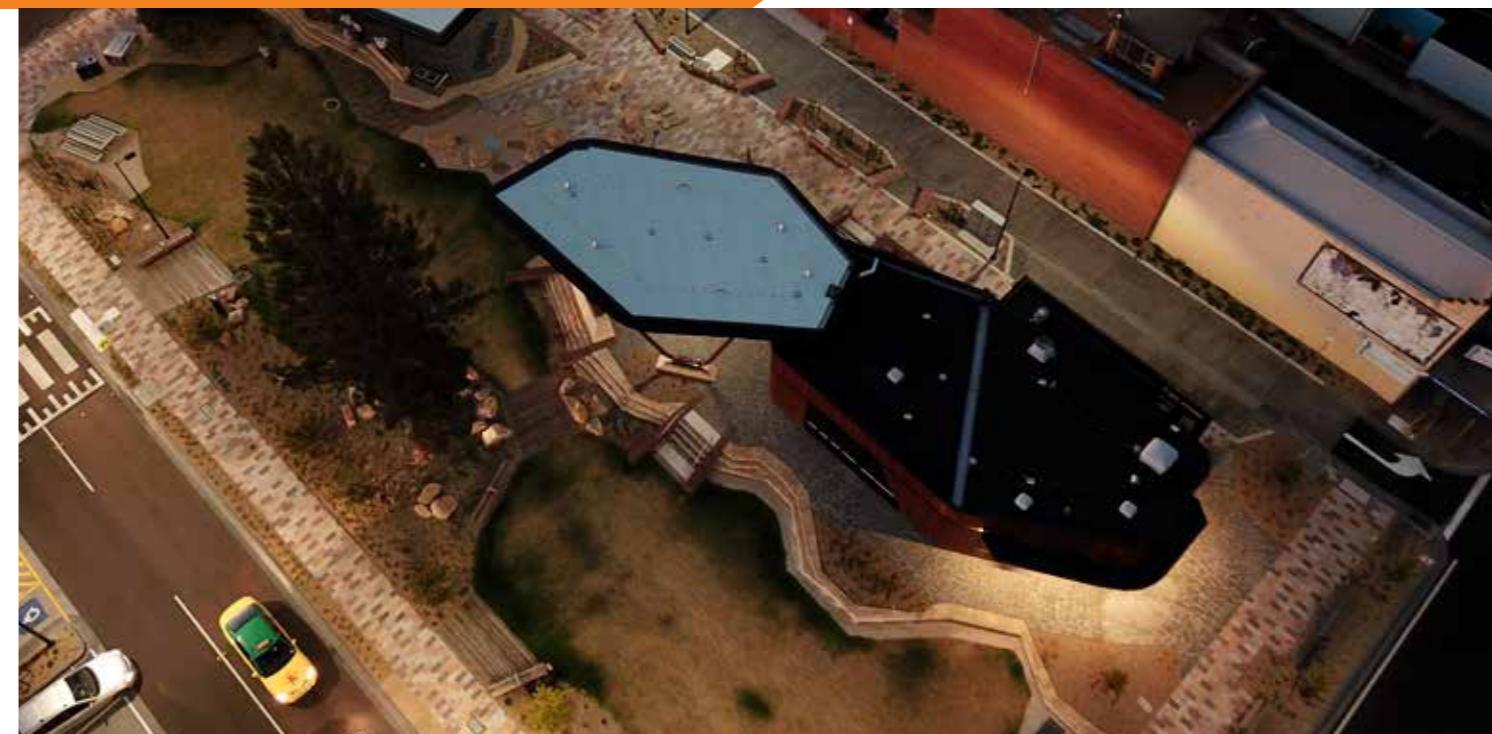
Stations are often existing within close proximity to neighbouring properties, wherein which AS4282 obtrusive light spill must be considered and complied with to avoid disrupting the local community.



Environmental Sustainability and Safety

Energy efficient lighting that meets the Infrastructure Sustainability Council of Australia (ISCA) requirements and is built from materials that are both longlasting and recyclable to reduce the carbon footprint and minimise light pollution.

In addition, products must not contain toxic/corrosive substances like halogens (during a fire they must not create dark smoke to ensure people can find their way from the burning station easily). As such, PVC-free cable with the labelling LSZH (Low Smoke Zero Halogen) should be utilised.



Creating Ambience for Community

With the elevation of several stations in railway crossing removal projects, areas that once were simply conduits for train lines unavailable for public use, become hubs for communities with walking and cycling paths, parks and activity spaces.



Longevity, Robustness, Reliability and Maintenance

Conducting repairs or maintenance on luminaires in public settings like platforms is a costly exercise due to strong protocols around public safety, as such it is important to utilise luminaires that need minimal maintenance and downtime. This improves long term cost efficiency and reduces unnecessary outages and labour. Vandalism can present a challenge at many railway stations, demanding light fittings that are robust, durable, built to last and backed by a comprehensive warranty.

Class II Specification Where Required

All products for rail and stabling yard projects wherein luminaires are directly at or close to powerlines require class II specification (double insulation) to ensure long term durability and service life.

Rail powerlines are only live when a train is in the area. This means they constantly are powered up and down causing massive electromagnetic fields when switched. Class I setups (standard luminaire design) can carry these pulses via the earth cable into the LED driver potentially reducing the life span of the driver and can carry the safety risk for the parts becoming live.

Double insulation of all components carrying voltage renders the earthing conductor obsolete. This absence of the earthing conductor mitigates the risk of electromagnetic interference induced via earthing.

CAULFIELD TO DANDENONG LINE

The Caulfield to Dandenong line is Victoria's busiest train line. At the time of the works in late 2018, this level crossing removal project also represented Victoria's biggest infrastructure spend at an estimated 1.6 billion dollars, covering 9 level crossing removals and 5 brand new elevated stations.



For decades, this rail corridor was a major barrier to urban permeability, adding to road congestion, limiting links between suburbs and restricting the introduction of new rail services.

Winning an IES Award of Commendation for their work the CTD project, Adrian Sterritt Associate Director and Kim Straatemeier, Senior Lighting Designer of WSP Specialist Lighting oversaw the lighting for 5 new elevated train stations, all surrounding public realms, car parks and the 17 km of new pedestrian and cyclist paths along the rail corridor.



The Lighting Brief

- Provide a suitable level of lighting for road and rail users across the project
- Provide appropriate illumination to aid in the facilitation of safe and functional pedestrian and transport movement in accordance with the relevant Metro Trains Melbourne (MTM) Engineering and Australian Standards
- Provide lighting that encourages activity and improves urban and visual amenity for all users
- Deliver an energy efficient lighting solution that meets Green Star and Infrastructure Sustainability Council of Australia (ISCA) energy requirements
- Provide easily maintainable lighting infrastructure.

The lighting design must consider the users' overall journey to ensure a visually comfortable and consistent experience throughout.

"Living locally, since its installation, I've noticed many couples out taking their dogs for walks, kids playing table tennis on the new public table tennis tables, games of heated basketball all under our lighting and its really highlighted to me what a great project this has been for the local area, bringing the community together and great for Victoria."

Kim Straatemeier, Senior Lighting Designer, WSP.

Concourse

Working closely with the architectural team on the design, WSP sought to

"Seamlessly integrate the lighting within the architecture, creating a communal space that meets the requirements of safety and design as well as highlighting the striking architectural features."

Adrian Sterritt, Associate Director, WSP.

Platform and Train Tracks

Noble Park, Clayton, Carnegie, Hughesdale and Murrumbeena stations as well as the shared use path in between became the first stage of Victoria's elevated rail system. WSP worked closely with all stakeholders to meet each of their individual needs, including 3 different councils, LXRA (Level Crossing Removal Authority), Metro Trains Melbourne (MTM) and Victrack.

KEY CONSIDERATIONS:

- MTM Lighting Standards - higher than Australian lighting standards, all areas of the project that belong to MTM are bound by the MTM lighting standards, while the general Australian lighting standards apply to some areas (such as footpaths) beyond the train line. Key MTM standards included:
 - > Platform lighting to be on 24/7 to ensure safety of all commuters
 - > 80 lux minimum requirement
 - > Double insulated (class II luminaires) required for luminaires connected to a building or a structure on the platform where there is a voltage change (to prevent earthing and bonding issues)
 - > Luminaires that are robust and durable when it comes to impact and vandalism (IK rating)
- Minimum Colour Rendering Index (CRI) > 70
- Obtrusive light spill management - many local residents were concerned about the ramifications of the new elevated stations. As such, it was important to comply with AS4282 ensuring wherever possible that neighbouring properties wouldn't be affected by the new lighting infrastructure.
- A common key architectural feature element for all stations is the canopy roof structure. The interplay of daylight, shadow and artificial light of these is pivotal to the design. At night, the lighting complements and enhances the architecture with neutral white up-lighting to highlight the ceiling.
- Minimising glare by design, both onto the tracks and into the visual line of train drivers was also important.



CAR PARKS

- The schemes adopted for each precinct embrace best practice Crime Prevention Through Environmental Design (CPTED) principles and are cognisant of the need for compliance with the recommendations to manage spill lighting within acceptable levels.
- In order to meet these obtrusive lighting requirements a few innovations were developed in conjunction with the lighting suppliers on the project, include the development of special 'hybrid' LED optics.

VIADUCT

- Electrical isolation was required for lights mounted to the viaduct. In order to avoid earthing and bonding issues, WSP Specialist Lighting worked in conjunction with the Architects and Electrical team to design a special bracket to mount the lights - resulting in a clean, ceiling mounted solution.

PUBLIC REALM AREA AND PATHWAYS

- The level crossing removal project in Victoria for the Caulfield to Dandenong line involved the removal of the nine level crossings along the rail corridor and elevating the rail line, which unlocked new space for public realm (11 MCGs worth of open space). This area includes large expanses of open space, parklands, community areas and pathways.
- 17 km of new pedestrian and cyclist paths were incorporated in the Caulfield to Dandenong project.

DRIVE. WALK. WAIT.



Car Parks

- Uniformity and adherence to Australian standards (or local operator standards if specified; e.g. MTM Standard specifies minimum 15 lux average 1 metre above ground level with a 0.4 uniformity)
- Minimisation of obtrusiveness is key; AS4282 ensuring that neighbouring properties are not adversely affected by the new infrastructure
- Generally no minimum requirements for height of poles; however from a cost optimisation and spacing perspective, 6 m is recommended. Noting however that if a car park is next to train lines, poles should not be > 6 m (for risk of falling over the lines)

FEATURED PRODUCTS:

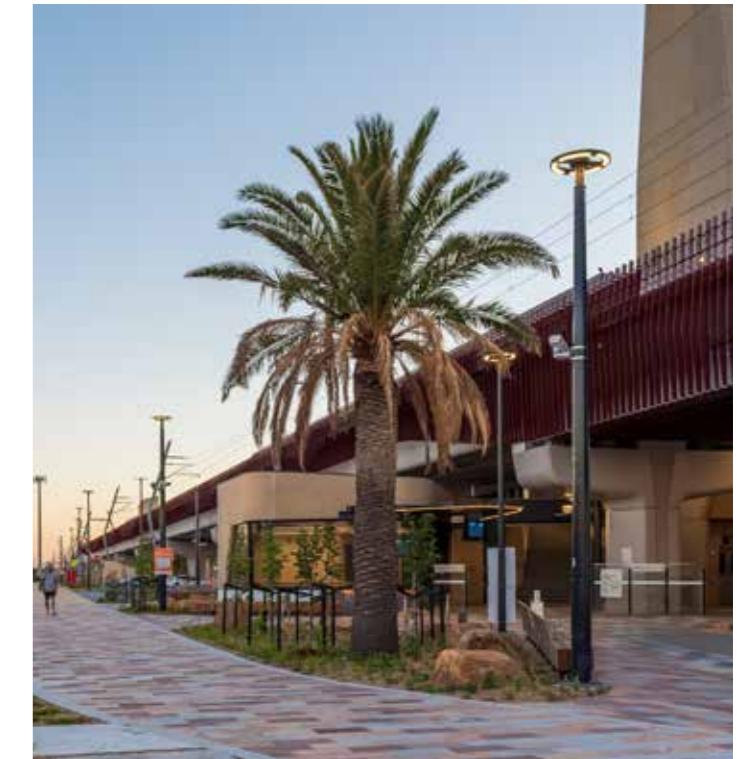
- VFL500, VFL500-SE
- Backlight shields

Public Realm Areas and Pathways

- Pathways to P4 lighting standards, minimum 40-60 lux
- Stakeholders / ownership of pathways can vary depending on the location of pathways in proximity to the station (some owned by the station network, some council owned)
- FLC100 projectors are used in premium public realm areas that enhance ambience and encourage safe community use of these areas day and night

FEATURED PRODUCTS:

- VFL500, VFL500-SE
- RMC320
- CFT540
- FLC100
- Backlight shields

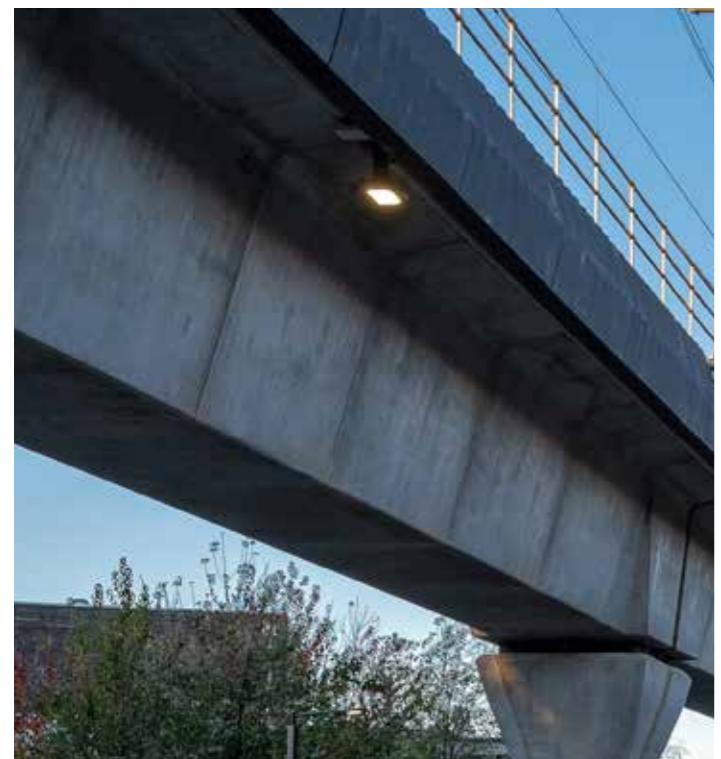
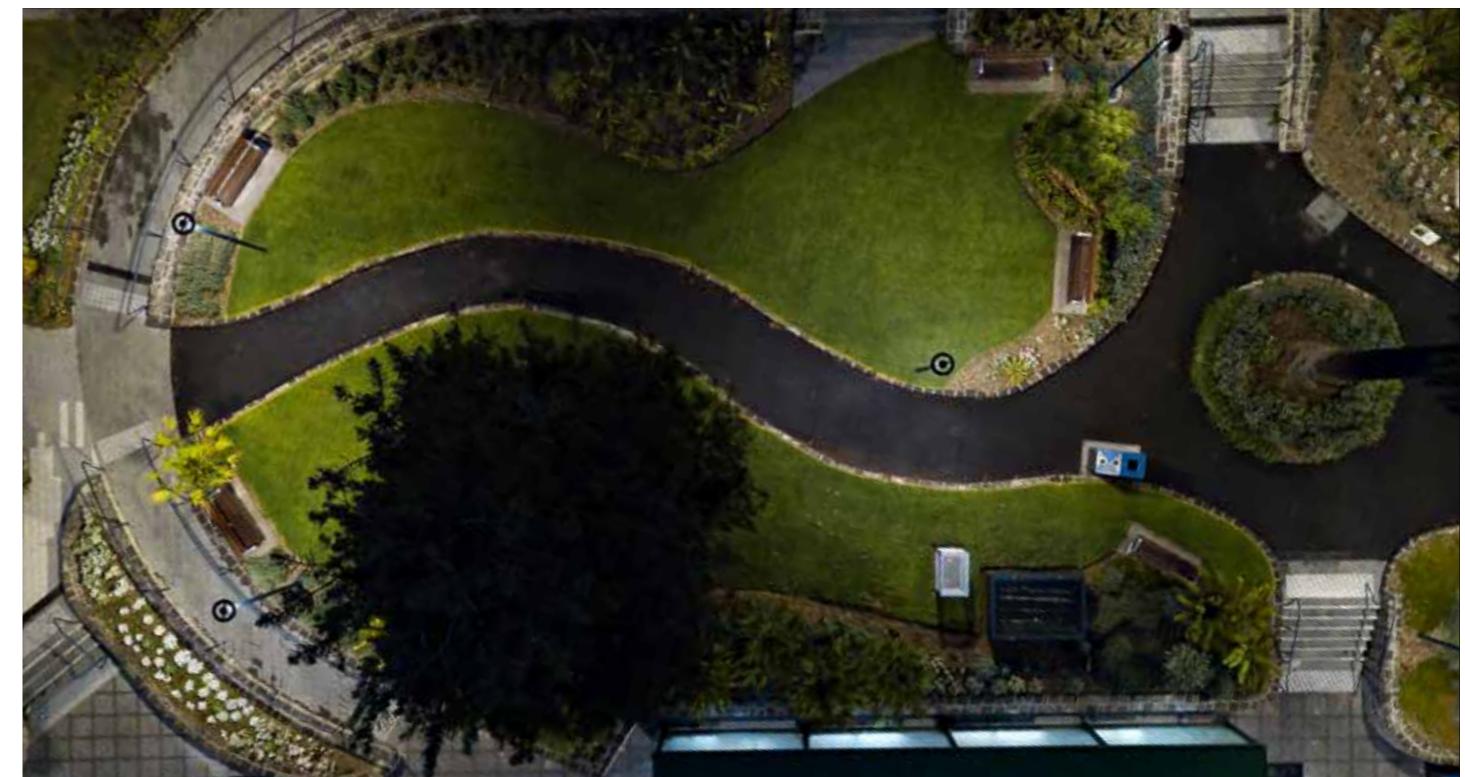


Viaduct

- Mounting underneath the railway requires electrical isolation due to high vibration and to avoid earthing and bonding issues.
- Lighting the viaducts via custom mounted luminaires with electrical isolation ensures a uniformly lit space below to meet Australian standards and ensure safety, without the need to add additional light poles.

FEATURED PRODUCTS:

- RFS540



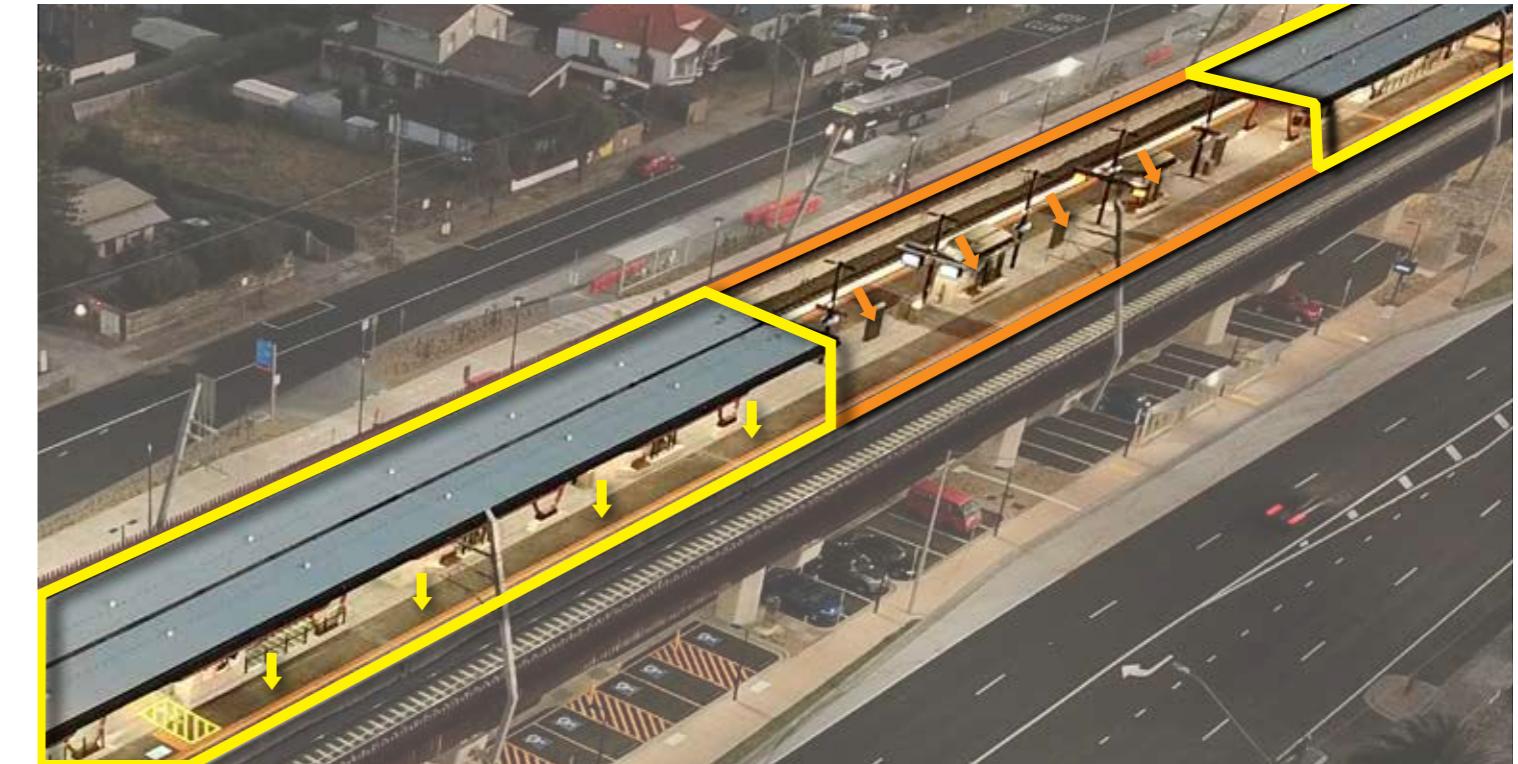
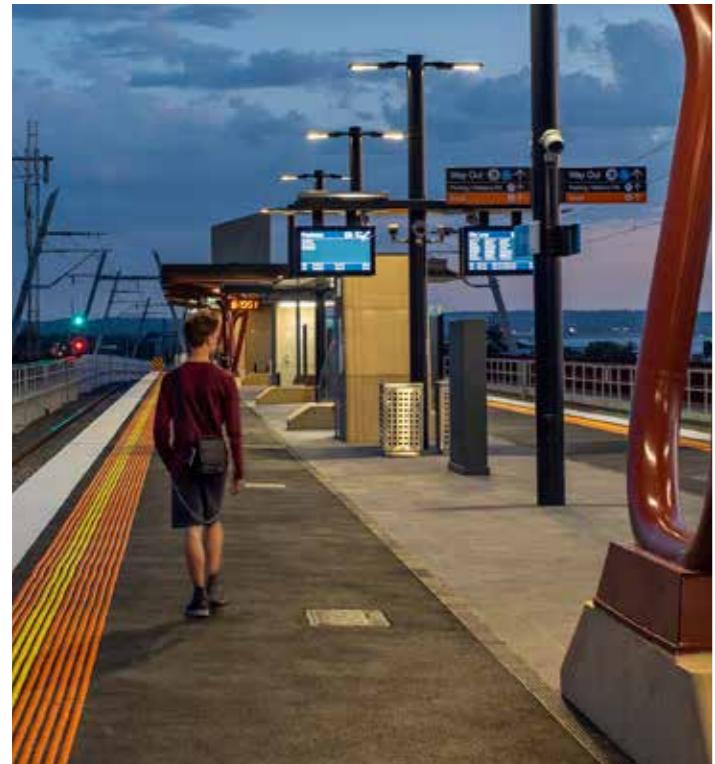
DRIVE. WALK. WAIT.

Concourse

- As the entry to the station, this area is designed for both function and aesthetics, it is to be well illuminated
- Undercover areas must comply with the DDA (Disability Discrimination Act), lighting to a minimum of 150 lux
- Clever options such as the use of wall lights can be incorporated into the lighting design to light up ceilings while avoiding unnecessary poles in a busy area with high foot traffic
- Counters are commonly illuminated to 200 lux

FEATURED PRODUCTS:

- VFL500



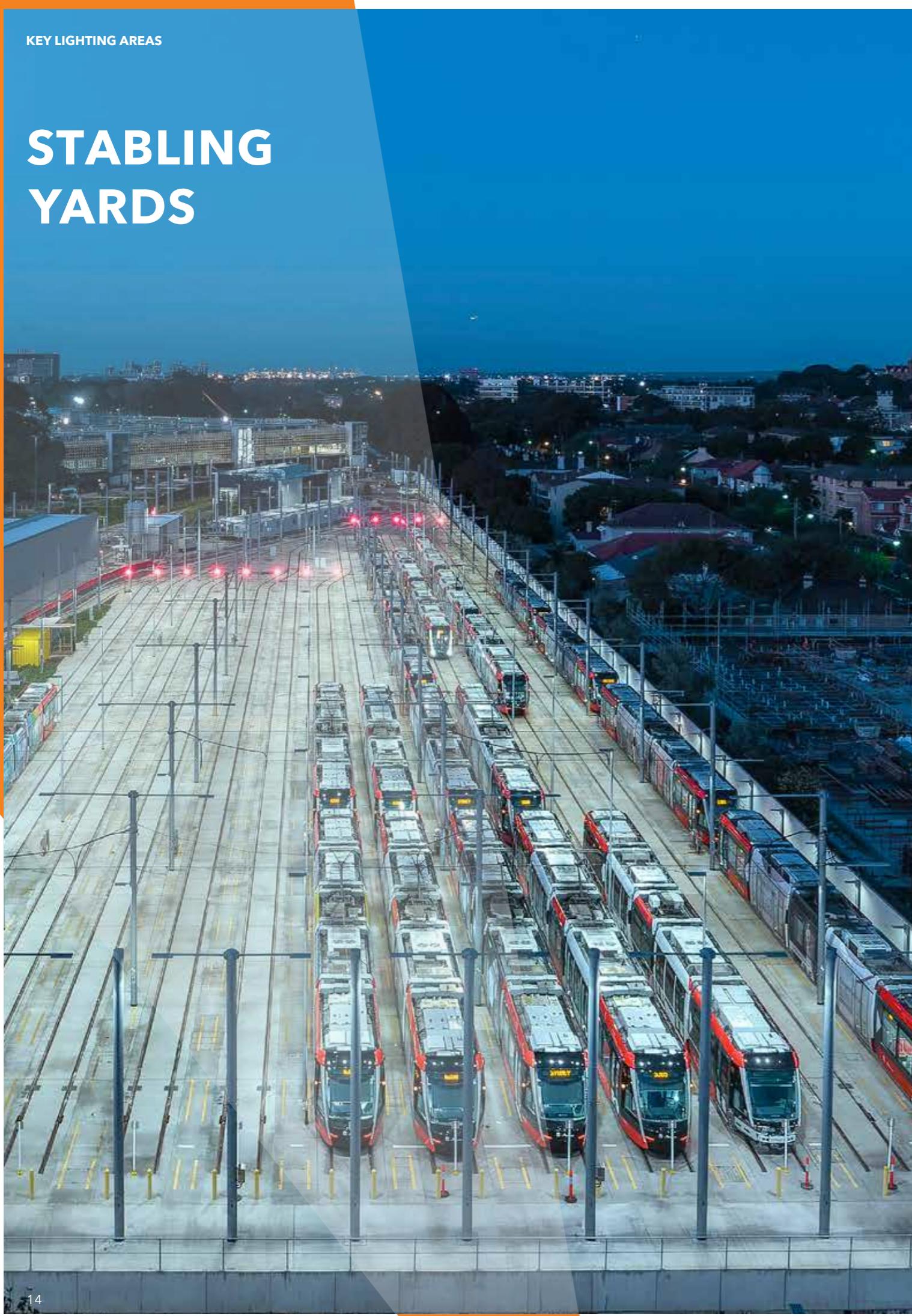
Platform (Open and Covered)

- Whether an elevated platform or not, due consideration to the standards of the local rail operator owning each project is needed
- Commuter safety with 24/7 platform lighting, at an 80 lux minimum for open areas
- 150 lux minimum for enclosed / undercover areas (DDA compliance)
- In many cases, there are two platforms side by side that must mirror each other in design
- Double insulated (class II luminaires) required for luminaires coming off a building on the platform where there is a voltage change (to prevent earthing and bonding issues)
- Robust and durable fittings that will withstand impact and vandalism (IK rating)
- Obtrusive light spill – essential to comply with AS4282 ensuring that neighbouring properties are not affected by elevated infrastructure

FEATURED PRODUCTS:

- VFL530-SE, VFL540-SE
- Backlight shields

STABLING YARDS



Stabling Yards

- Given these are locations at which works are carried out on trains, vertical illumination between the tracks is of critical importance
- High horizontal illuminance level for CCTV along the fence line is also required for security, with minimal pole heights and wide spacing
- Fitting installation between the tracks with spacing (30 m)
- Versatile fixing options; with installations requiring a combination of pole mounted, rigid (attached to buildings) or catenary

FEATURED PRODUCTS:

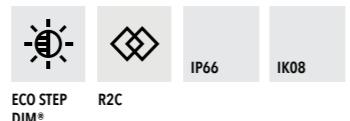
- VFL500
- RFS500
- OLV300



VFL500



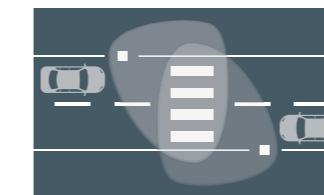
Luminaire housing:	Marine-grade, die-cast aluminium alloy
Corrosion protection:	5CE, including PCS hardware
Driver:	Integral EC electronic converter in thermally-shielded compartment
Main lens:	RFC™ Reflection Free Contour Polycarbonate, UV stabilised
Gasketing:	Silicone CCG® Controlled Compression Gasket
Optics:	IOS® Innovative Optical System CAD-optimised for superior illumination and glare control
OLC® One LED Concept	
Installation:	Modular optical system allows for unparalleled customisation versatility
Control options:	FS Factory-sealed luminaire does not need to be opened during installation ON/OFF WE-EF Eco Step Dim®; refer to page 30 R2C Ready to Connect; refer to page 30



[P45L] Pedestrian crossing, for left-hand traffic

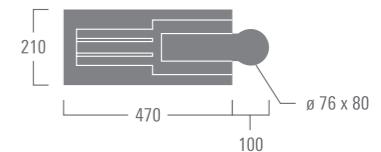


[P65] Pedestrian/bicycle lane
 [S60][S65][S70] Streetlighting
 [A60] Asymmetric 'forward throw'
 [R65] Rectangular 'side throw'

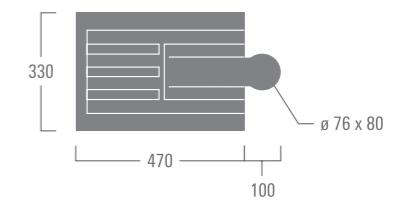


[P45L]

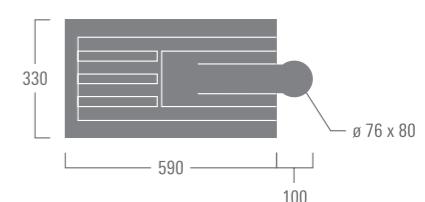
VFL520 [P65][S60][S65][S70][A60][R65]
 12-24 W
 1512 - 2951 lm



VFL530 [P45L][P65][S60][S65][S70][A60][R65]
 12-72 W
 1512 - 10800 lm



VFL540 [P45L][P65][S60][S65][S70][A60][R65]
 24-126 W
 2951 - 18900 lm



Available distributions:
 [P45R][P45L]
 [P65][S60][S65][S70][A60][R65]

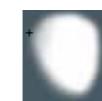
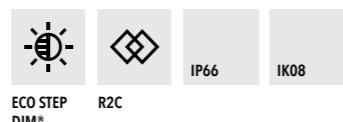
Standard colours - AU/NZ



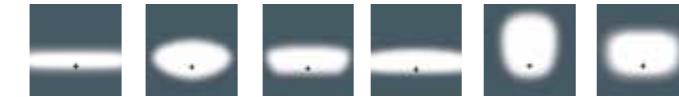
VFL500-SE



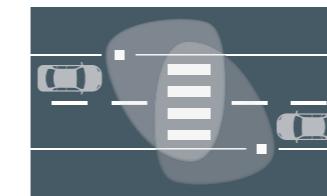
Luminaire housing:	Marine-grade, die-cast aluminium alloy
Corrosion protection:	5CE, including PCS hardware
Driver:	Integral EC electronic converter in thermally-shielded compartment
Main lens:	RFC™ Reflection Free Contour Polycarbonate, UV stabilised
Gasketing:	Silicone CCG® Controlled Compression Gasket
Optics:	IOS® Innovative Optical System CAD-optimised for superior illumination and glare control OLC® One LED Concept
Installation:	Modular optical system allows for unparalleled customisation versatility
Control options:	FS Factory-sealed luminaire does not need to be opened during installation ON/OFF WE-EF Eco Step Dim®; refer to page 30 R2C Ready to Connect; refer to page 30



[P45L] Pedestrian crossing, for left-hand traffic

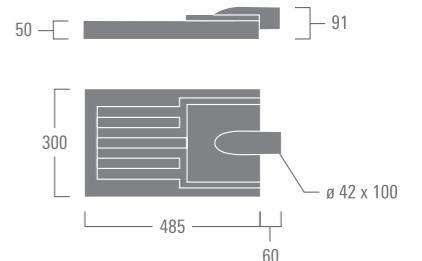


- [P65] Pedestrian/bicycle lane
- [S60] [S65] [S70] Streetlighting
- [A60] Asymmetric 'forward throw'
- [R65] Rectangular 'side throw'

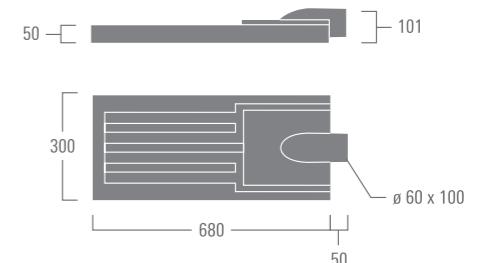


[P45L]

VFL530-SE [P45L][P65][S60][S65][S70][A60][R65]
12.72 W
1512 - 10800 lm



VFL540-SE [P45L][P65][S60][S65][S70][A60][R65]
36-144 W
4526-21600 lm



Available distributions:
[P45R][P45L]
[P65][S60][S65][S70][A60][R65]

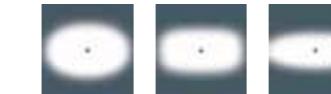
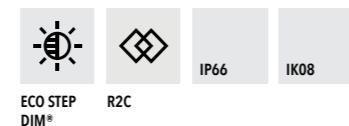
Standard colours - AU/NZ



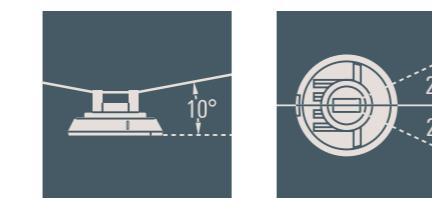
RFS500



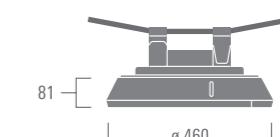
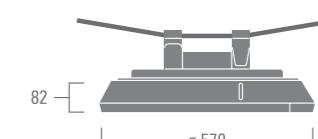
Luminaire housing: Marine-grade, die-cast aluminium alloy
Corrosion protection: 5CE, including PCS hardware
Driver: Integral EC electronic converter in thermally-shielded compartment
Main lens: Non-reflecting safety glass, hinged
Gasketing: Silicone CCG® Controlled Compression Gasket
Optics: IOS® Innovative Optical System
CAD-optimised for superior illumination and glare control
OLC® One LED Concept.
Installation: FS Factory-sealed luminaire does not need to be opened during installation
Control options: ON/OFF
WE-EF Eco Step Dim®; refer to page 30
R2C Ready to Connect; refer to page 30



[S60][S65][S70] Streetlighting



+/- 10° levelling bracket +/- 25° rotatable

RFS530 [S60][S65][S70]12.48 W
1512 - 5903 lm**VFL540-SE** [S60][S65][S70]36.96 W
4536 - 11805 lm

Available distributions:
[S60][S65][S70]

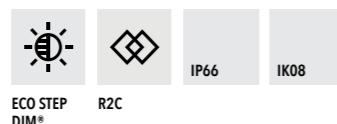
Standard colours - AU/NZ



RMC320



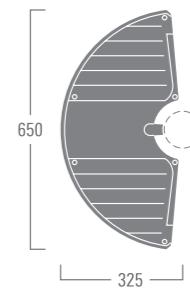
Luminaire housing:	Marine-grade, die-cast aluminium alloy
Corrosion protection:	5CE, including PCS hardware
Driver:	Integral EC electronic converter
Main lens:	RFC™ Reflection Free Contour Polycarbonate, UV stabilised
Gasketing:	Silicone CCG® Controlled Compression Gasket
Optics:	IOS® Innovative Optical System CAD-optimised for superior illumination and glare control OLC® One LED Concept.
Installation:	FS Factory-sealed luminaire does not need to be opened during installation
Control options:	ON/OFF WE-EF Eco Step Dim®; refer to page 30 R2C Ready to Connect; refer to page 30



- [P65] Pedestrian/bicycle lane
- [S60][S65][S70] Streetlighting
- [A60] Asymmetric 'forward throw'
- [R65] Rectangular 'side throw'

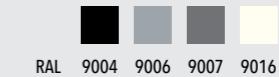


RMC320 [P65][S60][S65][S70][A60][R65]
18.78 W
2268 - 10360 lm



Available distributions:
[P65][S60][S65][S70][A60][R65]

Standard colours - AU/NZ

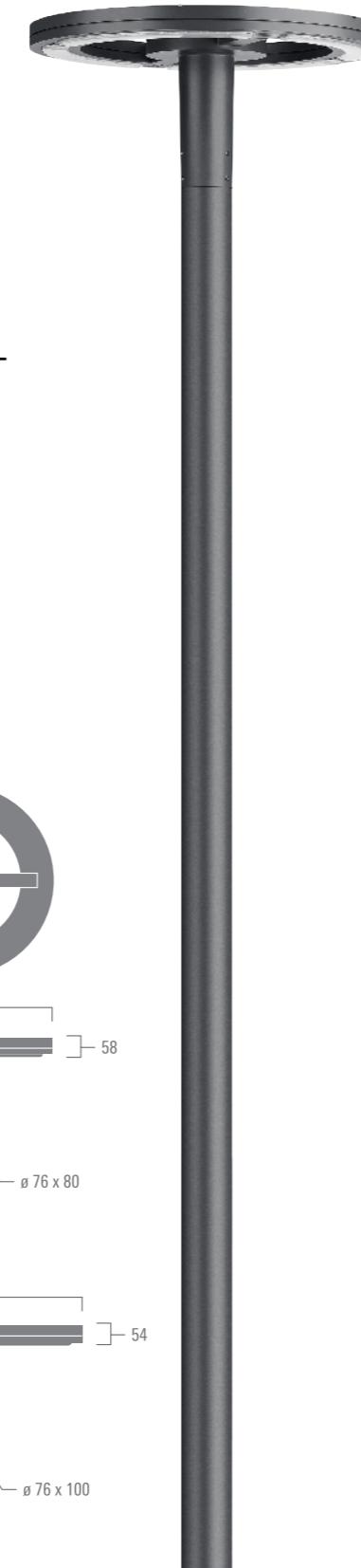


CFT500



[C50] Symmetric, controlled

[R] Rectangular



CFT500 [C50][R]

24-48 W
3024 - 5903 lmCFT540 [C50][R]
36-108 W
4536 - 16200 lmStandard colours - AU/NZ
RAL 9004 9006 9007 9016

RMT320



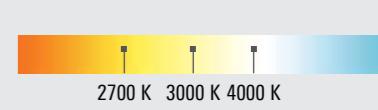
[P65] Pedestrian/bicycle lane

[S65][S70] Streetlighting

[R65] Rectangular 'side throw'



RMT320 One-sided [P65][S65][S70][R65]

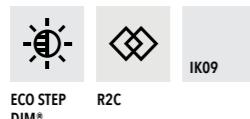
6-52 W
756 - 6907 lmRMT320 Two-sided – one circuit [P65][S65][S70][R65]
12-104 W 24-104 W
1512 - 13813 lm 2800-10500 lm
Two-sided – two circuits [P65][S65][S70][R65]Available distributions:
[S60][S65][S70]Standard colours - AU/NZ
RAL 9004 9006 9007 9016

ZFT400

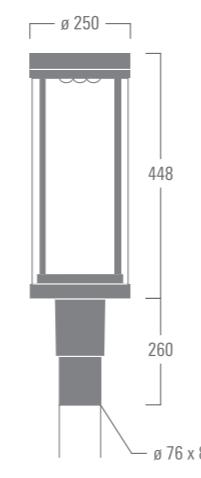


[S65] Streetlighting
[R65] Rectangular 'side throw'

Luminaire housing: Marine-grade, die-cast aluminium alloy
Corrosion protection: 5CE, including PCS hardware
Driver: Integral EC electronic converter
Main lens: PMMA
Gasketing: Silicone CCG® Controlled Compression Gasket
Optics: IOS® Innovative Optical System
 CAD-optimised for superior illumination and glare control
 OLC® One LED Concept
Installation: FS Factory-sealed luminaire does not need to be opened during installation
Control options: ON/OFF
 WE-EF Eco Step Dim®, refer to page 30



ZFT444 [S65][R65]
9.27 W
1134 - 4050 lm

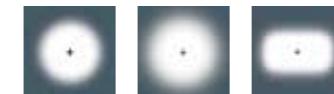


ZFT474 [S65][R65]
36.54 W
4194 - 8100 lm

ZFT474



ZFT400-FT



[S65] Streetlighting
[R50] Rectangular
[R65] Rectangular 'side throw'

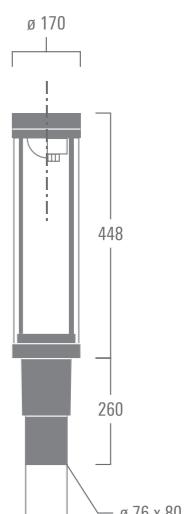
Luminaire housing: Marine-grade, die-cast aluminium alloy
Corrosion protection: 5CE, including PCS hardware
Driver: Integral EC electronic converter
Main lens: PMMA
Gasketing: Silicone CCG® Controlled Compression Gasket
Optics: IOS® Innovative Optical System
 CAD-optimised for superior illumination and glare control
Installation: FS Factory-sealed luminaire does not need to be opened during installation
Control options: ON/OFF
 WE-EF Eco Step Dim®, refer to page 30



ZFT440-FT
IP66
IK09
ECO STEP
DIM*

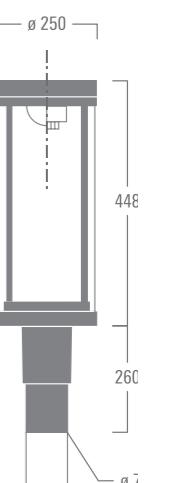


ZFT470-FT



ZFT440-FT

ZFT440-FT [C50][C60]
12.37 W
1920 - 6695 lm
Max. 1 internal accessory



RMT320

RMT320 [C50][C60]
24.37 W
4050 - 6695 lm
Max. 1 internal accessory

Available distributions:
[S65][R65]

Standard colours - AU/NZ
RAL 9004 9006 9007 9016



Available distributions:
[C50][C60]

Standard colours - AU/NZ
RAL 9004 9006 9007 9016



OTHER PRODUCTS



ETC309-FS
(flush with surface)



EVC309-FS
(proud of surface)

Available distribution:
Diffused



ETC300-FS
(flush with surface)



EVC300-FS
(proud of surface)

[B] Symmetric, wide beam
[M] Symmetric, medium beam
[E] Symmetric, narrow beam
[EE] Symmetric, very narrow beam
[EES] Symmetric, very narrow beam, 'sharp cut-off'

Available distributions:
[B] [M] [E] [EE] [EES]



ETC300-GB



[B] Symmetric, wide beam
[M] Symmetric, medium beam
[EE] Symmetric, very narrow beam
[EES] Symmetric, very narrow beam, 'sharp cut-off'

Available distributions:
[B] [M] [EE] [EES]



DAC100



OLV300



PLS400

For the latest on
products see:
www.we-ef.com

TECHNICAL SUPPORT

With a wealth of experience and in-house lighting design and engineers, the WE-EF LIGHTING team is here to help provide solutions for challenging rail lighting applications.

Our technical team can model your rail applications virtually and recommend products to suit your needs.

SERVICES INCLUDE:

- Site visits and support
- Best practice recommendations
- Bespoke and custom locally made solutions
- Providing lighting designs from industry standard platforms such as AGi32 and Dialux
- Providing Revit files for luminaires and poles as required for our products
- Supplying technical and photometric performance details

For technical support contact:

TECHNICAL TEAM

03 8587 0433

INSTALLER HOTLINE

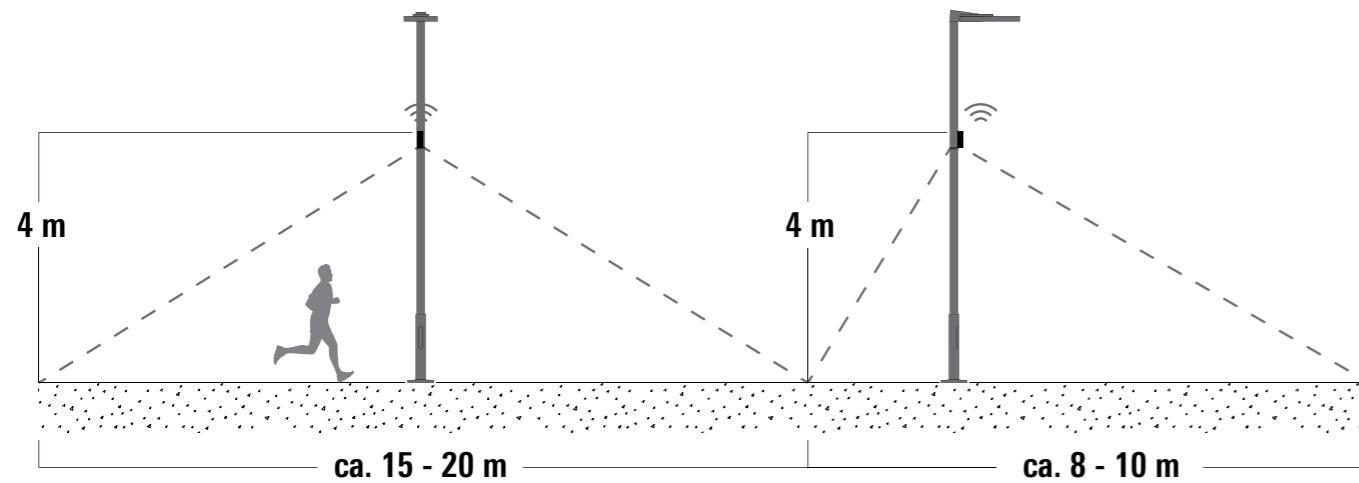
0458 933 399



LIGHTING CONTROLS

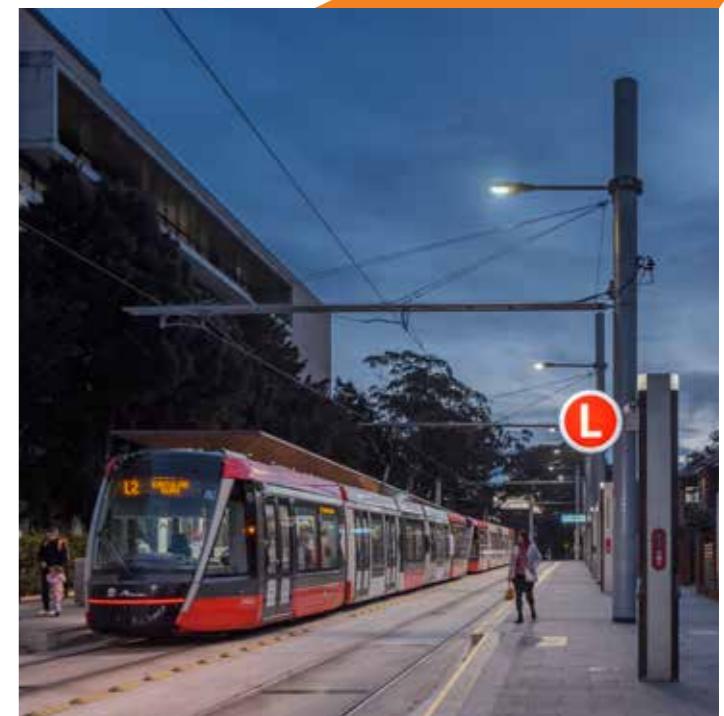
Eco Step Dim®

- The only lighting solution on the market with direction sensing capability
- Enables on-demand dimming up and down (for additional electricity savings during low travel times)
- This can be used as an accessory to any DALI capable luminaire to enhance prestigious projects with on-demand dimming up and additional electricity savings during low travel times.



Smart Solutions

- Options to add NEMA or Zhaga sockets to future-proof the luminaires: upgrading to 'smart luminaires' is possible by choosing a node that suits the client (for example, dimming, creating a mesh to build a 'smart city' lighting concept etc.)
- WE-EF provides Ready To Connect (R2C) products equipped with interfaces, ready for integration into a light management system
- A Zhaga Book 18 interface is factory installed. The interface is covered with a robust protective cap, and protection class IPX6 is maintained.



FEATURED PRODUCTS:



ZFS400



RFS500



CFS500



RMT320



RMM320



RMC320



CFT500



RFL500-SE



VFL500

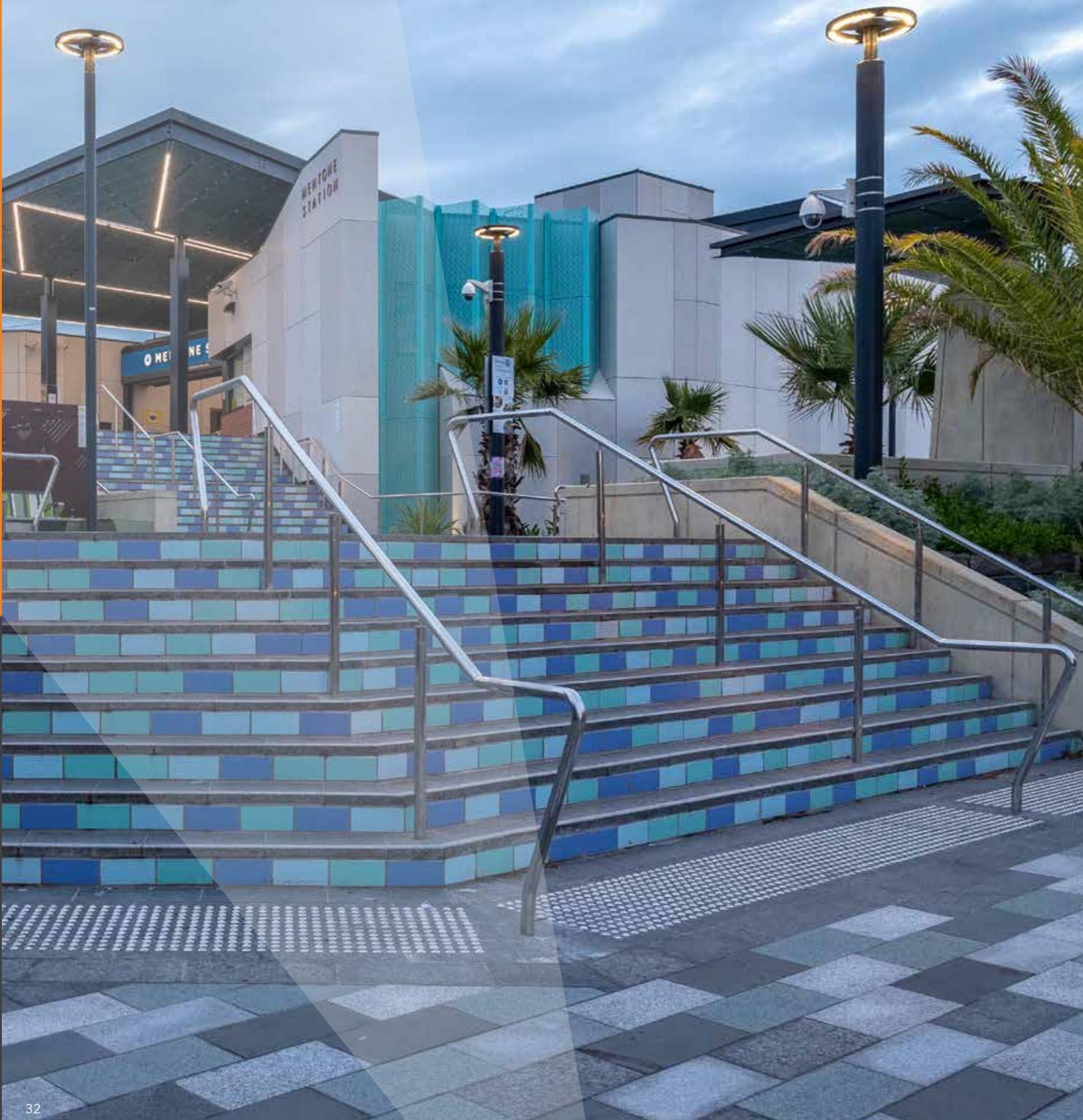


VFL500-SE



PFL500





WHY WE-EF

10 Year Warranty

When it comes to both aesthetics and technology, longevity is at the core of our products' DNA, so much so that it is backed by a fully supported 10 year warranty in Australia and New Zealand. This applies to all electrical components and includes an L70 or better performance with WE-EF LEDs, which means a maintenance free lighting fixture for at least the period of the warranty.

Durability

A strong German engineering heritage focused on manufacturing premium quality products. High pressure die-casting manufacturing technique, marine grade materials, factory sealing of luminaires for worry-free installation and our proven 5CE+ Primer corrosion resistance system ensure componentry that is built to withstand the toughest conditions, such as tough coastal weather.

High Performance

WE-EF designs, engineers and manufactures its products to achieve the required lighting levels for the lowest possible electrical load; ensuring performance and efficiency. With its own LED optics OLC® (One LED Concept) uniformity is consistently maintained and with our IOS® (Innovative Optical System), there is zero light emission above 90 degree horizontal, WE-EF takes pride in building best in class performing luminaires and is renowned for industry leading optics.

Locally Made

WE-EF assembles all its products for the Australian and New Zealand markets in Australia. Local manufacturing ensures compliance with local standards and IP/IK ratings and enables customisation to solve application challenges and meet client needs, as well as the ability to create 'hybrid' optic and control solutions that distribute light tactfully and uniformly where it is needed.

For example, WE-EF provides the option to supply all luminaires for rail applications using PVC-free cable with the labelling LSZH (Low Smoke Zero Halogen).



Ringwood Station, Melbourne (AU)



Mentone Station, Melbourne (AU)



Reservoir Station, Melbourne (AU)



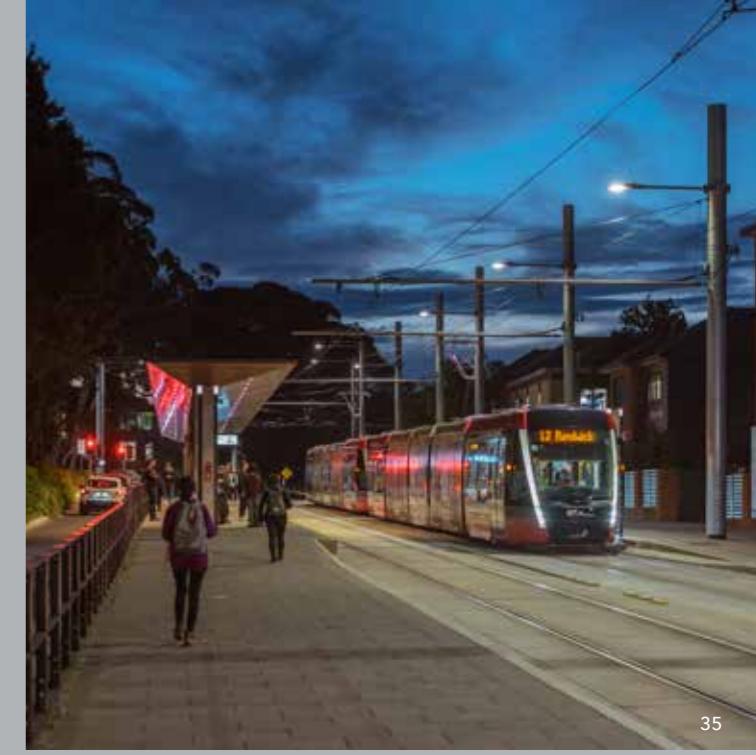
Carrum Station, Melbourne (AU)



Sydney Light Rail, Sydney (AU)



Mentone Station, Melbourne (AU)



Carnegie Station, Melbourne (AU)



VIC:
Unit 3, 473 Williamstown,
Road, Port Melbourne VIC
3207
Tel +61 3 9646 8201

NSW:
31–33 Dickson Avenue,
Atarmon, NSW 2064
Tel+61 2 9437 6557

SA:
Unit 3, 169 Goodwood
Road, Millswood SA 5034
Tel +61 3 9646 8201
www.buckford.com.au

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