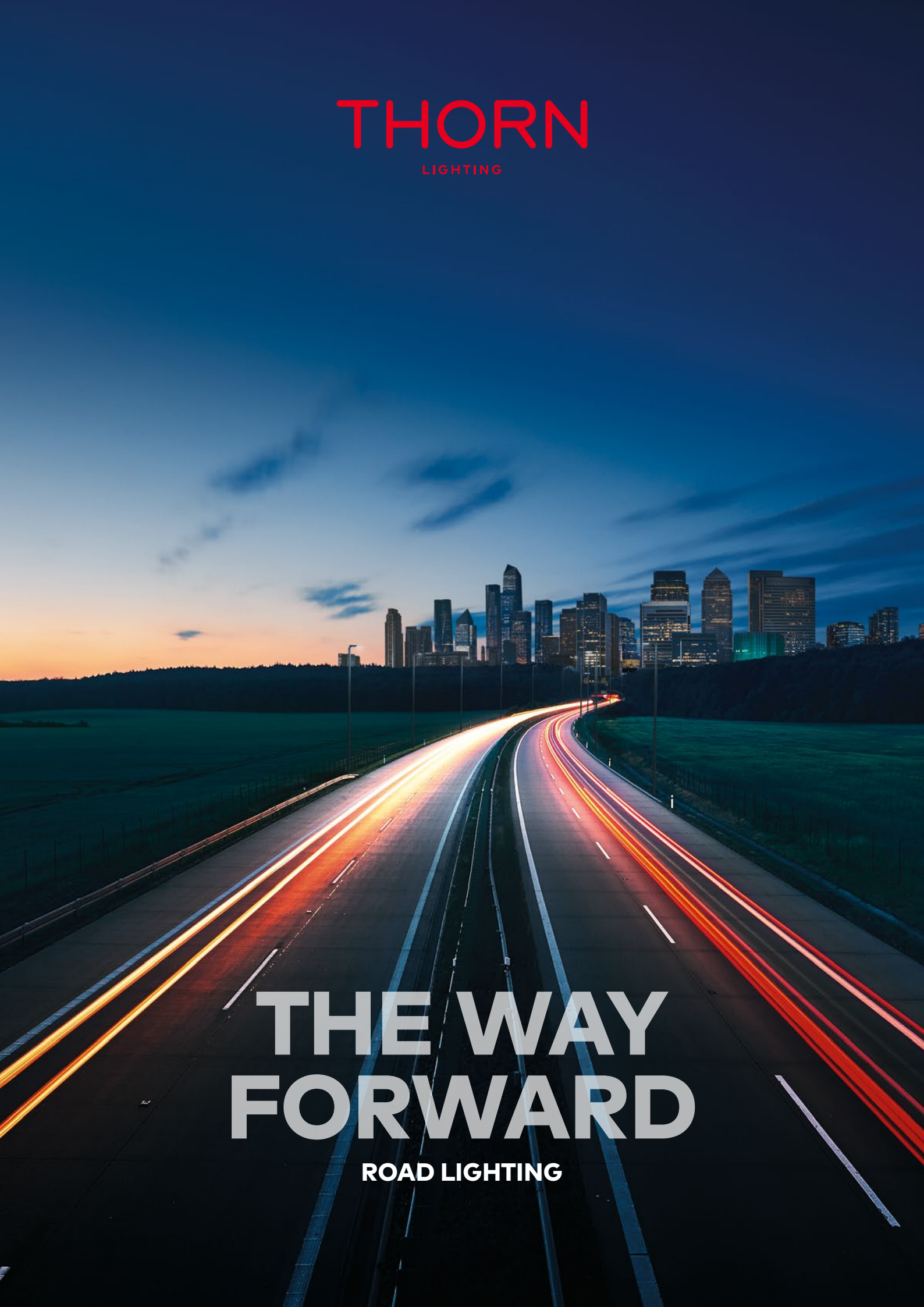
THORN
LIGHTING



THE WAY FORWARD

ROAD LIGHTING

BETTER LIGHT BETTER ORIENTATION

WE MAKE LIGHT WORK

THE WAY FORWARD

Correctly lit roads are safer roads. They can reduce the number of accidents, make areas more accessible at night and deter crime.

This guide provides an overview of the key points to consider when planning and designing road lighting installations.

We follow European Standard EN 13201 recommendations, the guidance on lighting requirements and environmental aspects for all road users.

CITY OF NENZING, AUSTRIA

NICE TO MEET YOU

INSIDE

SAFETY FIRST

Correct road lighting is crucial for safely guiding people to their destinations, protecting the environment, and creating a sense of security whilst operating cost effectively.

LIGHT FOR PEOPLE

Luminaires are carefully designed to provide comfort and safety so drivers, cyclists and pedestrians can navigate roads clearly and easily.

LIGHT FOR PLACES

Correct road lighting increases uniformity and balance. Thorn has the expertise to identify the right solution for each specific road type, and this best practice means places are suitably enhanced.

LIGHT FOR THE ENVIRONMENT

Thorn creates lighting that protects nature and the environment and respects the night sky. Energy efficiency, cutting-edge design and smart control make sure light is only used when and where it is needed.

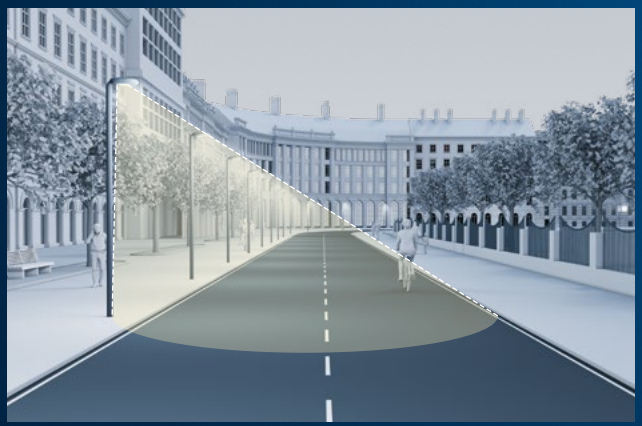
KEY FACTS

IN ROAD LIGHTING

Road systems are designed to allow the transport of people and goods from place to place at all times. Thorn Lighting assesses the most important elements to get right when considering lighting these spaces.

01
HAZARD DETECTION

For vehicle users the addition of road lighting helps with hazard detection preventing accidents.



02
DECREASE LIGHT POLLUTION

Quality lighting from luminaires with well-designed optics and good beam control helps prevent spill light, protecting the environment and nature.

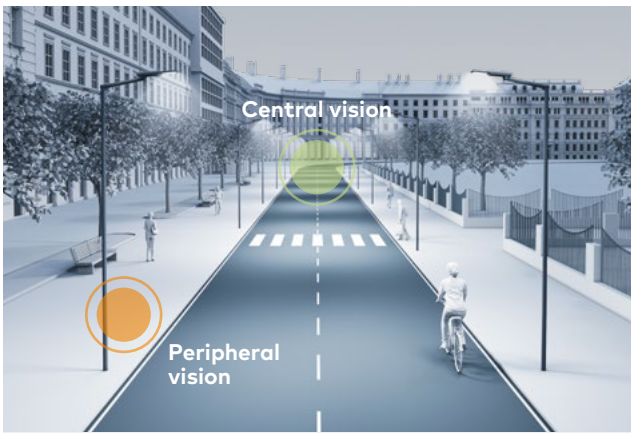
03
ABILITY TO NAVIGATE

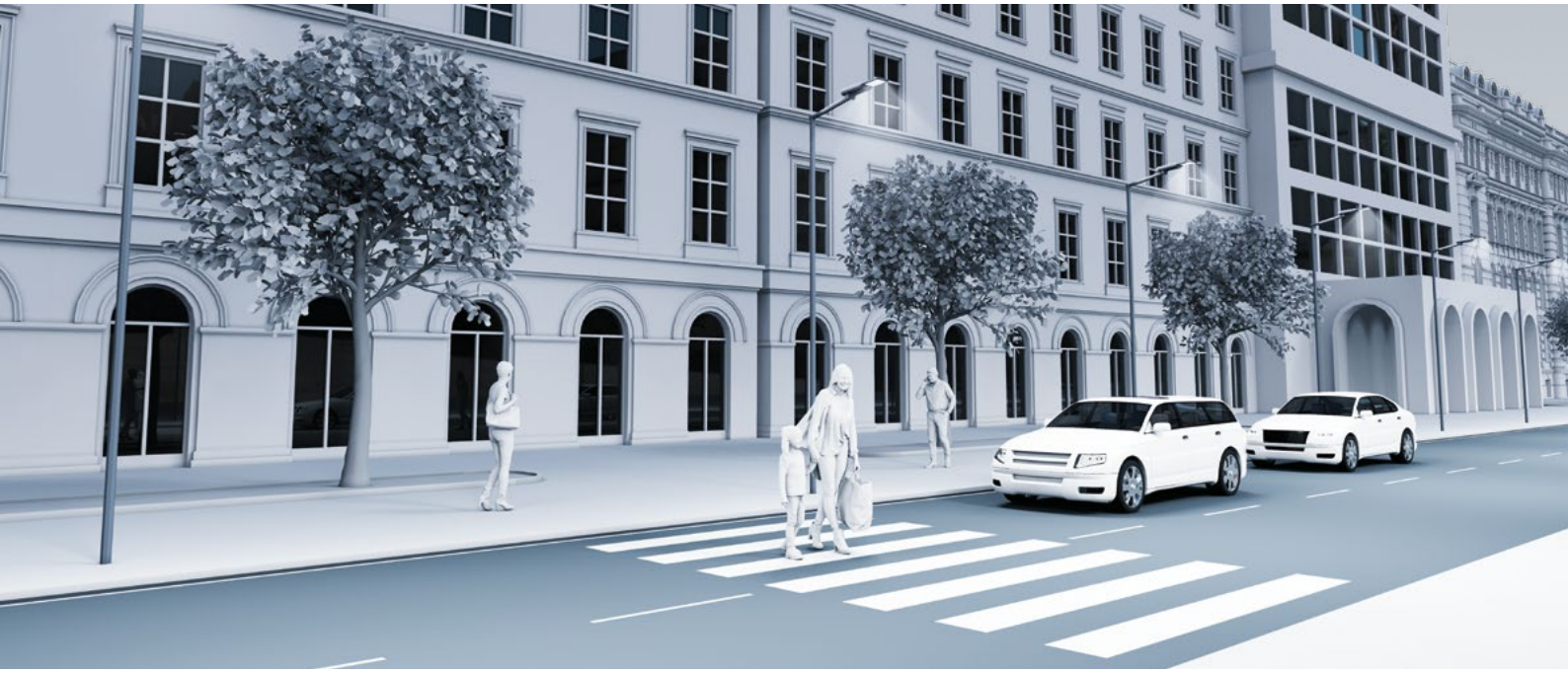
Street lighting can help show drivers the layout of the road ahead, slip roads, roundabouts, bridges and other features.

04

PERIPHERAL VISION

Peripheral is all that is visible around the edges of view, outside the central area of focus. With just headlights alone a driver will tend to concentrate on the road ahead, but most risk comes from the peripheral areas. Correct road lighting helps to light these areas and minimise danger.





05

SAFETY FOR USERS AND WORKERS

In a 24hr society there is the need to create spaces that allow people to feel safe during the night.

Fast ROI

Eco-friendly products

Reduced energy consumption

06

COST SAVING AND SUSTAINABILITY

Cities have the responsibility to control harmful emissions and to reduce energy consumption and waste.

With Thorn LED lighting and controls cities reduce CO_2 emissions, save costs, operate efficiently and see faster returns on investment.

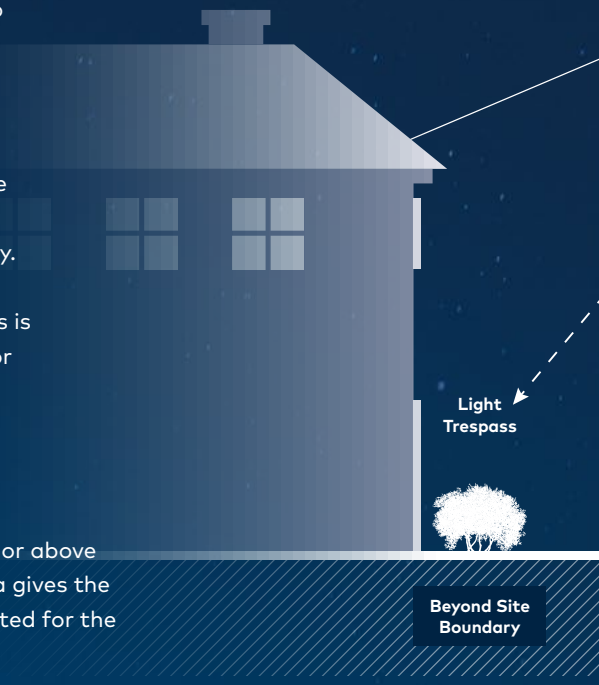
OBTRUSIVE LIGHT

IDENTIFY IT AND MINIMISE IT

Unwanted light that spills onto unrelated areas is known as obtrusive light. It reduces the efficiency of lighting installations as light is being wasted. It also causes inconvenience or damage in the surrounding areas.

There are three main forms of obtrusive light:

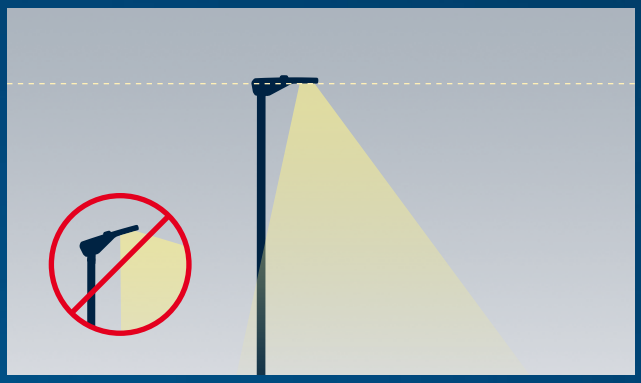
- Spill light, which is light emitted by a lighting installation that falls outside the boundaries of the property for which the lighting is designed.
- Sky glow, which is light that contributes to the brightening of the night sky.
- Light trespass, is when light spills onto surrounding properties causing annoyance, distraction, or discomfort. An additional form of light trespass is when the direct view of bright luminaires causes annoyance, distraction, or discomfort.



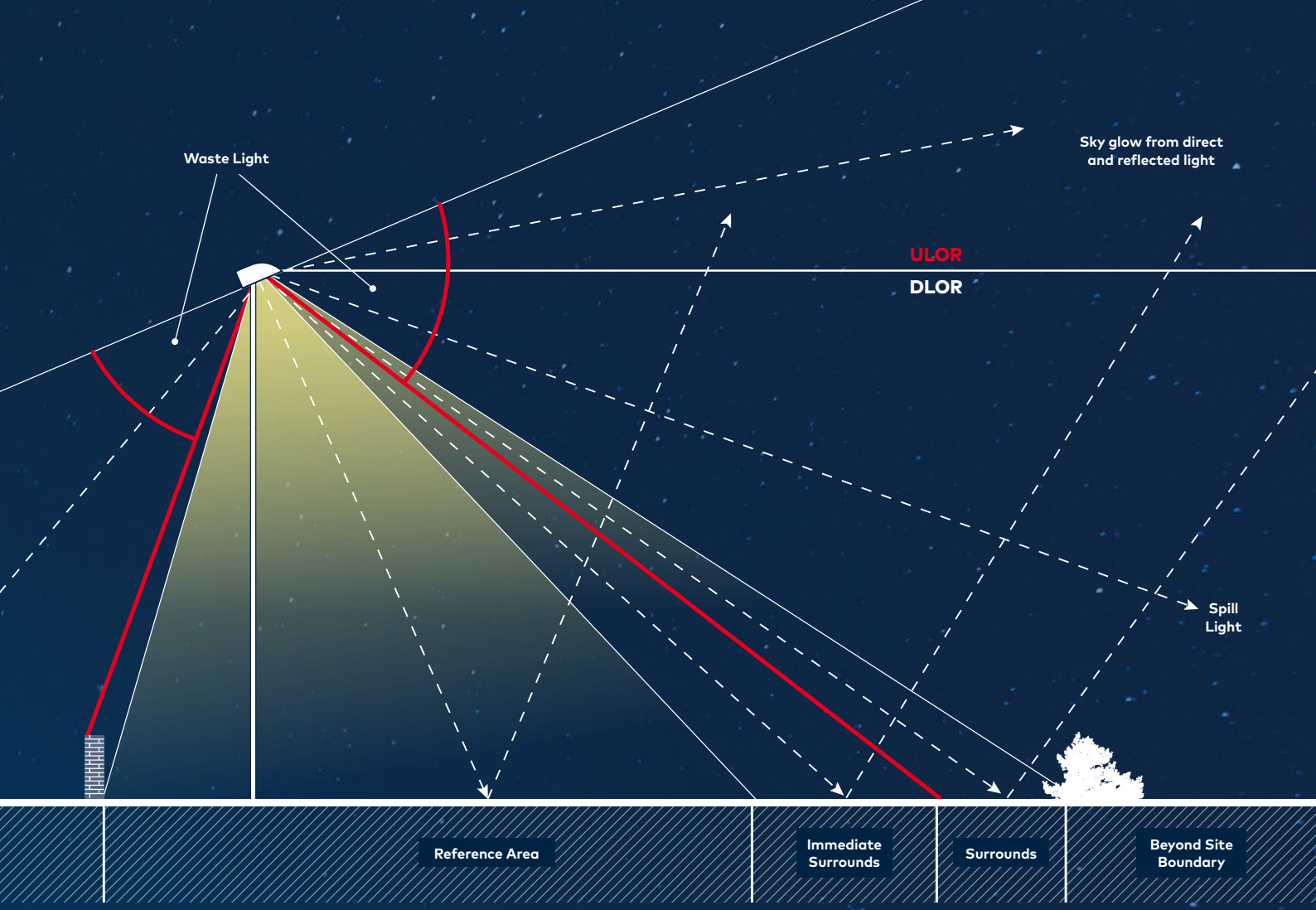
ULR: the upward light ratio. This is the proportion of light that is emitted at or above the horizontal when a luminaire is mounted in its installed position. This data gives the proportion of light directly contributing to sky glow and can easily be calculated for the entire lighting scheme.

SPECIFIC TECHNIQUES TO AVOID OBTRUSIVE LIGHT

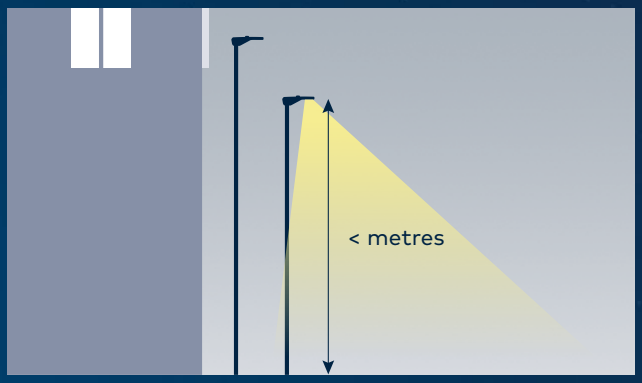
TIGHT CONTROLLED BEAM
Using luminaires that have a good optical control enables light precision.



AVOID TILTING
Mounting luminaires horizontal reduces the impact on sky glow due to reduced upward light.

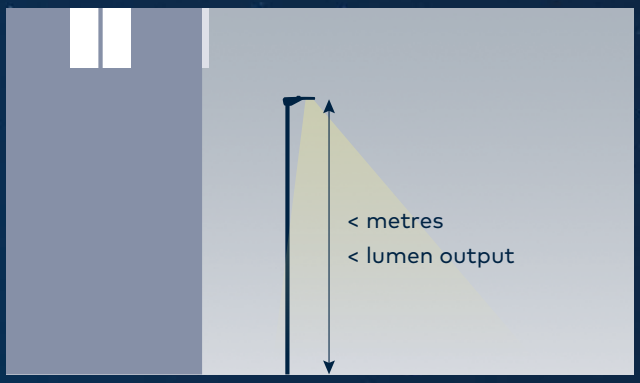


Relevant publications for further reading are CIE S 015/E:2005 Lighting of Outdoor Work Places; EN 12464-2:2014 Lighting of workplaces – part 2: outdoor work places; CIE 150: Guide on the limitation of the effects of obtrusive light from outdoor lighting installations.



LOWER HEIGHTS

The closer a column is to the area to be lit the better the control and efficiency of the lighting.



LESS LUMEN OUTPUT

Using more luminaires that have a lower lumen output leads to a reduced mounting height, which helps reduce spill light.

THE WHOLE LIGHTING PICTURE

KEY ROAD APPLICATIONS

Correct lighting is essential for orientation and safety after dark on all road types. Our comprehensive range brings efficiency and visual performance to every kind of road, with easy maintenance, installation, and smart controls. The following pages provide an overview of some of the highly efficient, durable and future-proof technologies we offer for key applications.


06 PEDESTRIAN CROSSING
03 MINOR ROADS
05 CONFLICT AREAS
01 MOTORWAYS
07 BRIDGES

ENSURING SAFER HIGH SPEED TRAVEL


RWAYS

GREATER SPEEDS, GREATER SAFETY

CITY OF NUREMBERG, GERMANY

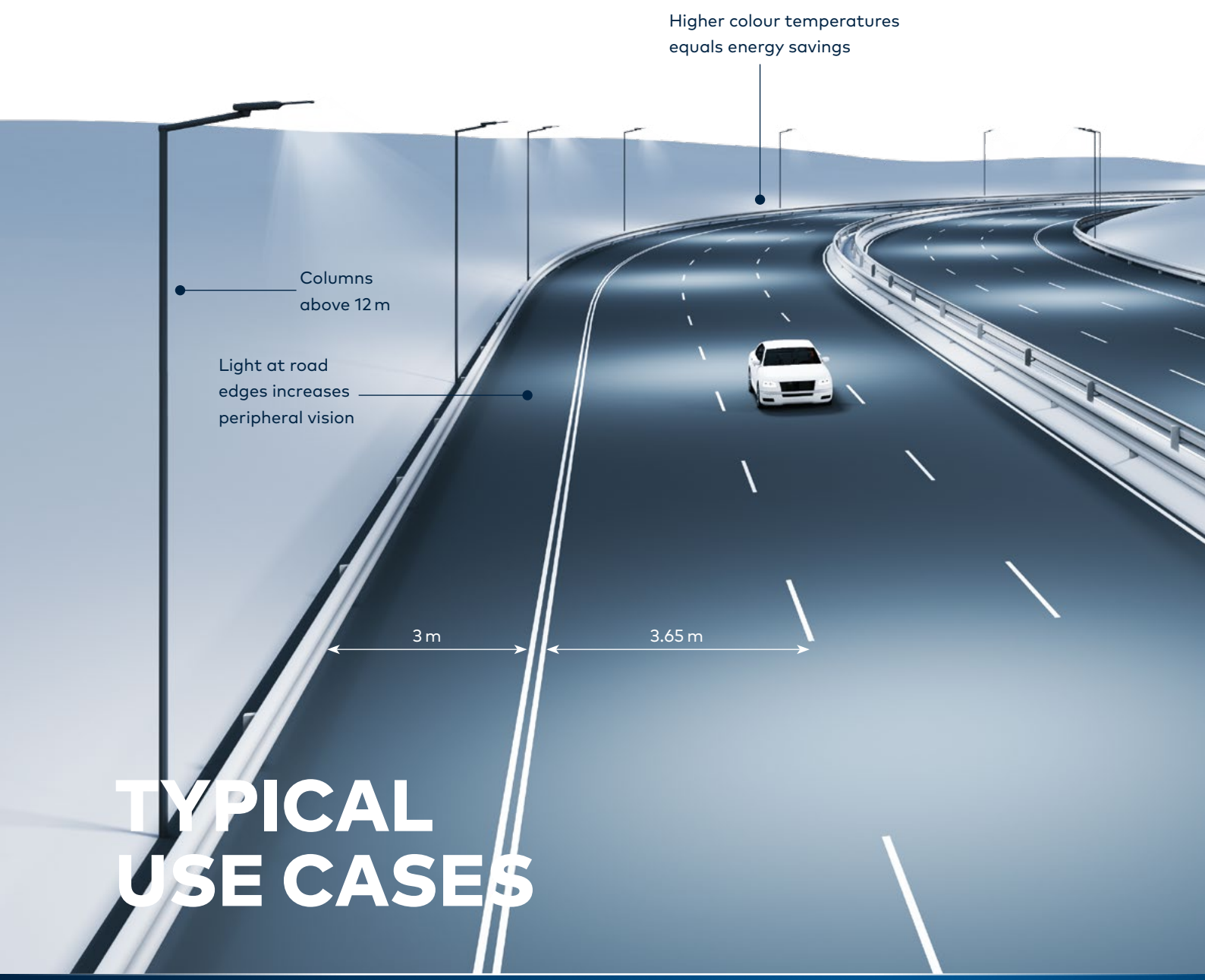
Motorways are the high-speed links connecting cities and countries around the world. Relied on by millions every day, they enable people, freight and services to quickly reach their destinations.

At night and in adverse conditions the lighting of these roads becomes critical for the safety of the users. The correct lighting is vital to increase visibility, help reduce fatigue and minimise glare.

Uniformity, balanced brightness, and reduced glare in motorway lighting allows people to navigate well and delivers drivers safely to their destinations.

ENTRANCE TO STATE ROAD SS13, ITALY

CITY OF NUREMBERG, GERMANY



TYPICAL USE CASES

Thorn products for motorways

ISARO
A cost-effective, sustainable and customer friendly luminaire.

ISARO PRO
High-performance LED street lantern providing safety and comfort along roads.

R2L2
A complete lantern family for roads and streets.

BEST PRACTICE

HIGH SPEEDS
Motorways are designed for high speeds. No pedestrians, cyclists or slow-moving vehicles are present.

GLARE
Glare is a major concern. Optimally designed optics and/or the use of flat glass enclosures are essential.

12M+ COLUMN HEIGHT
Mounting heights of 12 m+ correctly light a twin carriageway with 3 or 4 lanes. Brackets can additionally optimise performance.

CONTROL
Lower light levels during reduced traffic to save energy and reduce light pollution.

MARINE SUITABILITY
Near coastal areas luminaires and masts with marine coatings extend product life.

CRITERIA
Lighting class selection is given in PD CEN/TR 13201-1 with the criteria defined in EN 13201-2, M for dry roads and MW for wet conditions.

MAJO
ROA

OR
DS

SAFETY FOR MULTIPLE ROAD USERS

ULMER STREET IN GÖPPINGEN, GERMANY

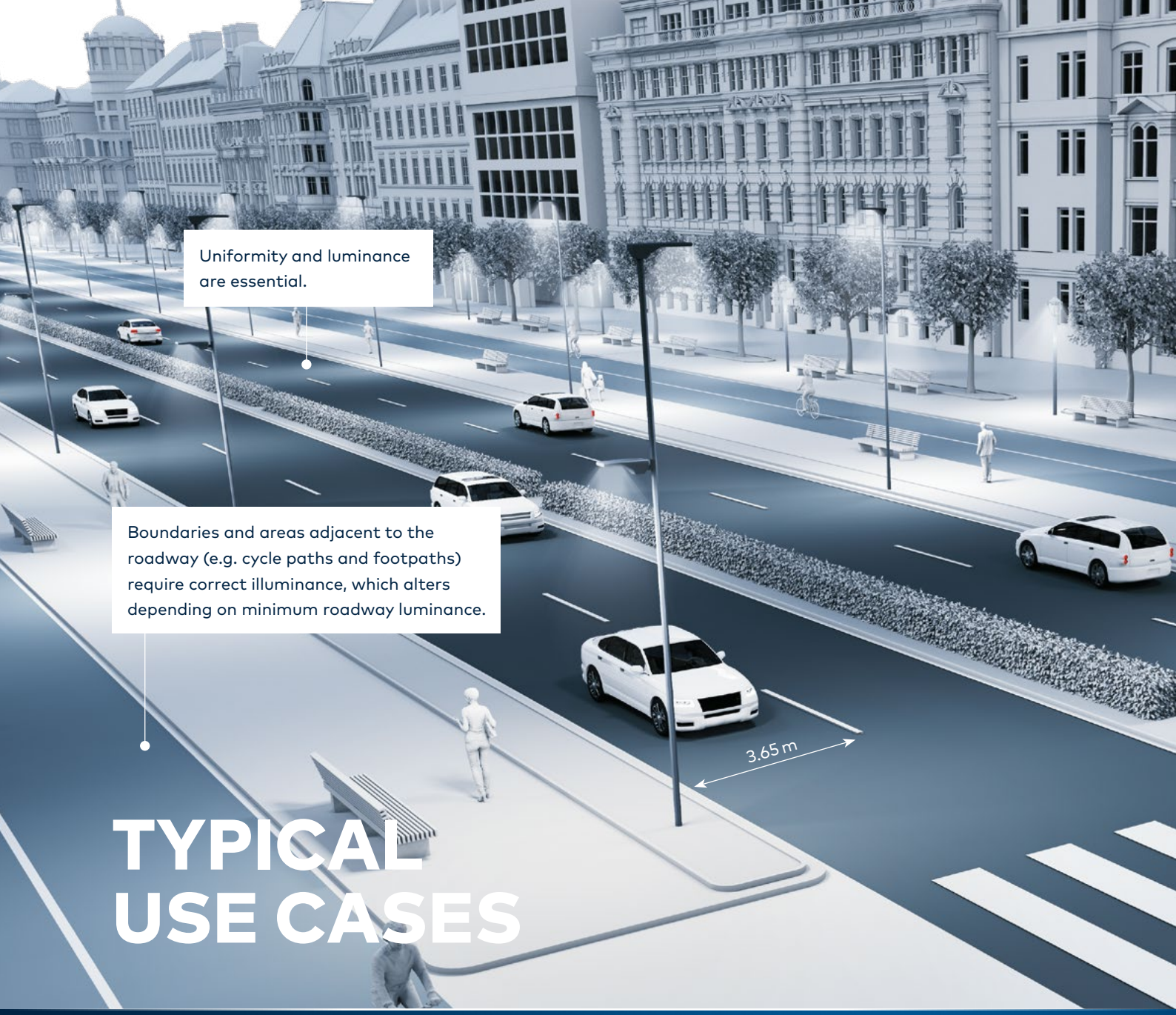
CREATING SAFE ROAD NETWORKS FOR EVERYONE

SOUTH TYNESIDE, UK

A network of interlinked major roads envelops the countryside and our cities. On a major road there is a wide variety of road users, increasing the need for visual clarity.
Pedestrians' waiting at a crossing, cyclists commuting to work or truck drivers looking for delivery addresses, everyone requires the correct lighting. It provides safety, an aid for navigation and orientation of the user on the road, albeit at a more moderate speed.
Every special feature of a major road network must be considered, and exacting criteria evaluated to make sure that the lighting meets the needs of all road users.

CITY OF CORDOBA, SPAIN

CITY OF NUREMBERG, GERMANY



TYPICAL USE CASES

Thorn products for major roads

ISARO PRO
High-performance LED street lantern providing safety and comfort along roads.

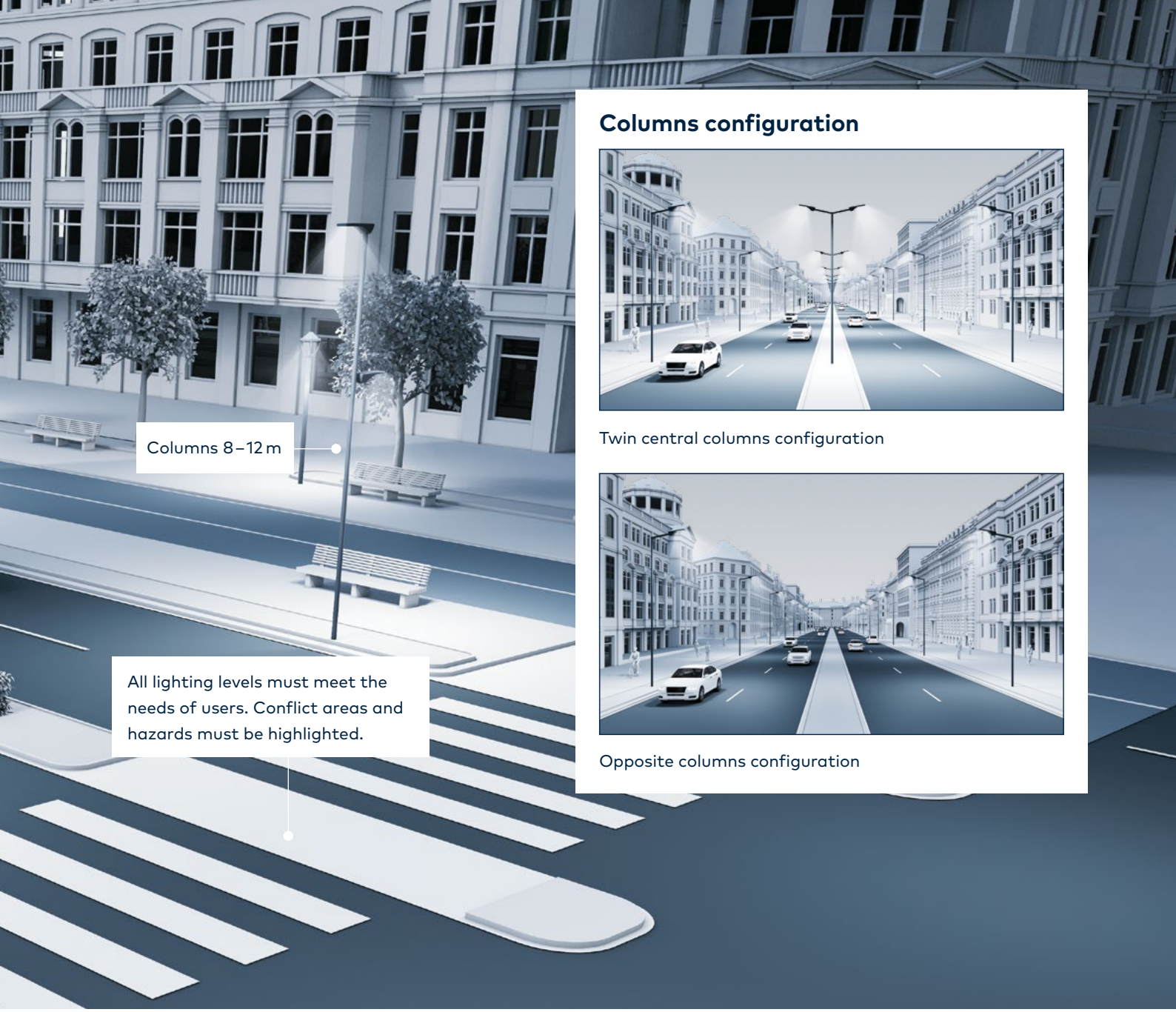
R2L2
A complete lantern family for roads and streets.

ISARO
A cost-effective, sustainable and customer friendly luminaire.

CARAT
A long-lasting product with an outstanding useful economic life and sustainable end of life qualities.

THOR
An LED smart urban lantern providing high user comfort and easy integration of connectivity and sensors.

VICTOR
Road lantern combining advanced performance with modern and timeless styling.



Columns configuration

Twin central columns configuration

Opposite columns configuration

BEST PRACTICE

MIXED TRAFFIC
Consider that vehicles at high speed (>60 km/h), pedestrians, cyclists and slow vehicles may all be present on major roads.

8 – 12 M COLUMNS
Use 8 – 12m high columns in an opposite or twin central configuration.

PATHWAYS
For cycle and pathways use different luminaire types on the same column to help comply with requirements and correctly light the pathways.

ENERGY SAVINGS
Use controls to save energy by controlling the light when there are reduced number of users.

HIGHER IP RATING
A high IP rating should be considered to extend maintenance periods.

LIGHTING CRITERIA
The lighting criteria are chosen using the guidance given in PD CEN/TR 13201-1 from the classes defined in EN 13201-2, M for dry roads and MW for wet conditions.

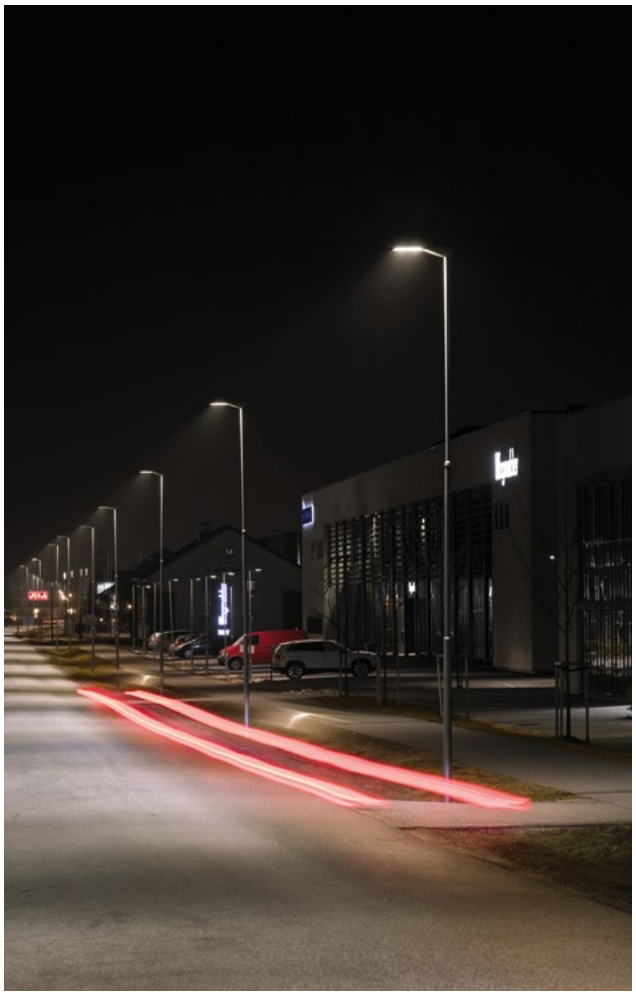

SLOW


LANCASHIRE COUNTY COUNCIL, UK
LOWER SPEEDS WITH
INCREASED SECURITY
NOR
OADS

LIT TO BENEFIT ALL USERS

Motor vehicles, cyclists and pedestrians are all users of minor roads, travelling to their destinations at reduced speeds. Each one requires the correct road lighting to travel safely and with a sense of security, without impacting on the surrounding environment, or on fellow road users.

The lighting levels are generally set at lower levels than for major roads as road users should have longer reaction times.



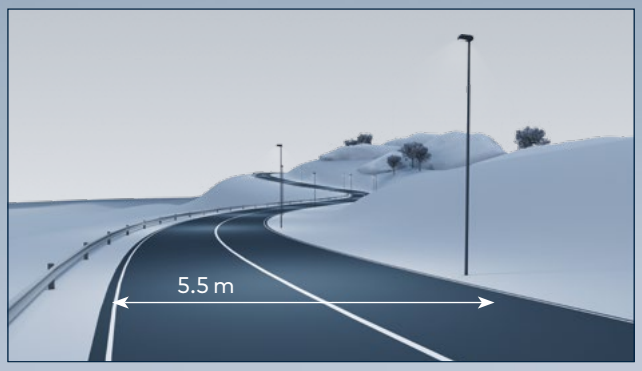
FREDRIKSTAD, NORWAY

DIAMANTE, ITALY

LANCASHIRE COUNTY COUNCIL, UK

TYPICAL USE CASES

Rural areas



In rural areas, the use of controls is essential to guarantee energy savings once there are no vehicles passing by.

Consider using dedicated pedestrian luminaires.

Single sided arrangements help to reduce installation costs.

Lower lighting levels for low speed mixed traffic.

Single carriageway road widths with two lanes.

Thorn products for minor roads

ISARO PRO
High-performance LED street lantern providing safety and comfort along roads.

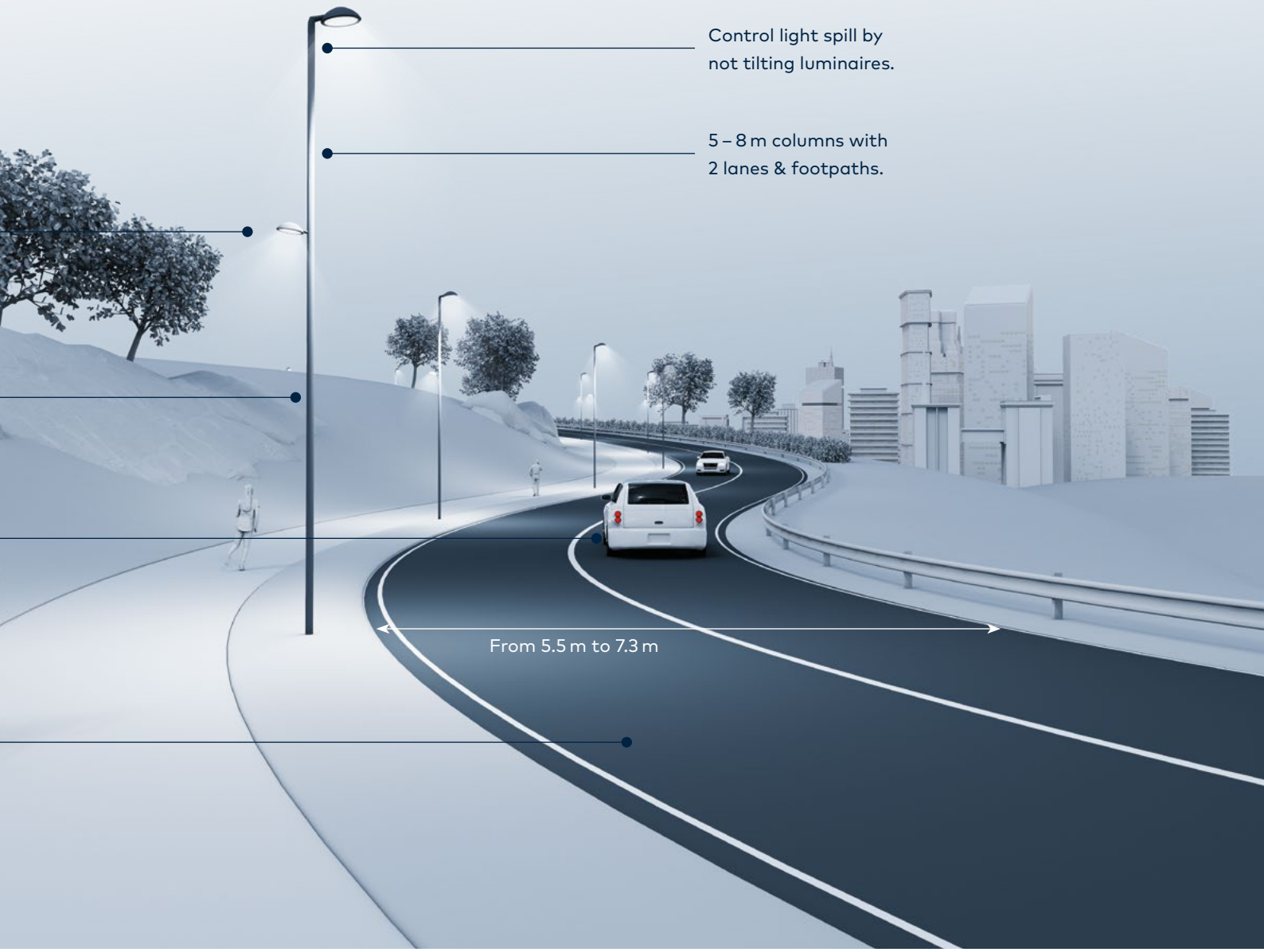
R2L2
A complete lantern family for roads and streets.

ISARO
A cost-effective, sustainable and customer friendly luminaire.

FLOW POST TOP
Highly versatile LED solution for people in the urban environment.

THOR
An LED smart urban lantern providing high user comfort and easy integration of connectivity and sensors.

VICTOR
Road lantern combining advanced performance with a modern and timeless styling.



BEST PRACTICE

VISUAL COMFORT
Visual comfort is achieved with good uniformity, low glare and fittings with good colour rendering.

5 – 8 M COLUMNS
5 – 8 m columns are used in a single sided or staggered layout. Column positions must minimise risk of vehicle impact and pedestrian obstruction.

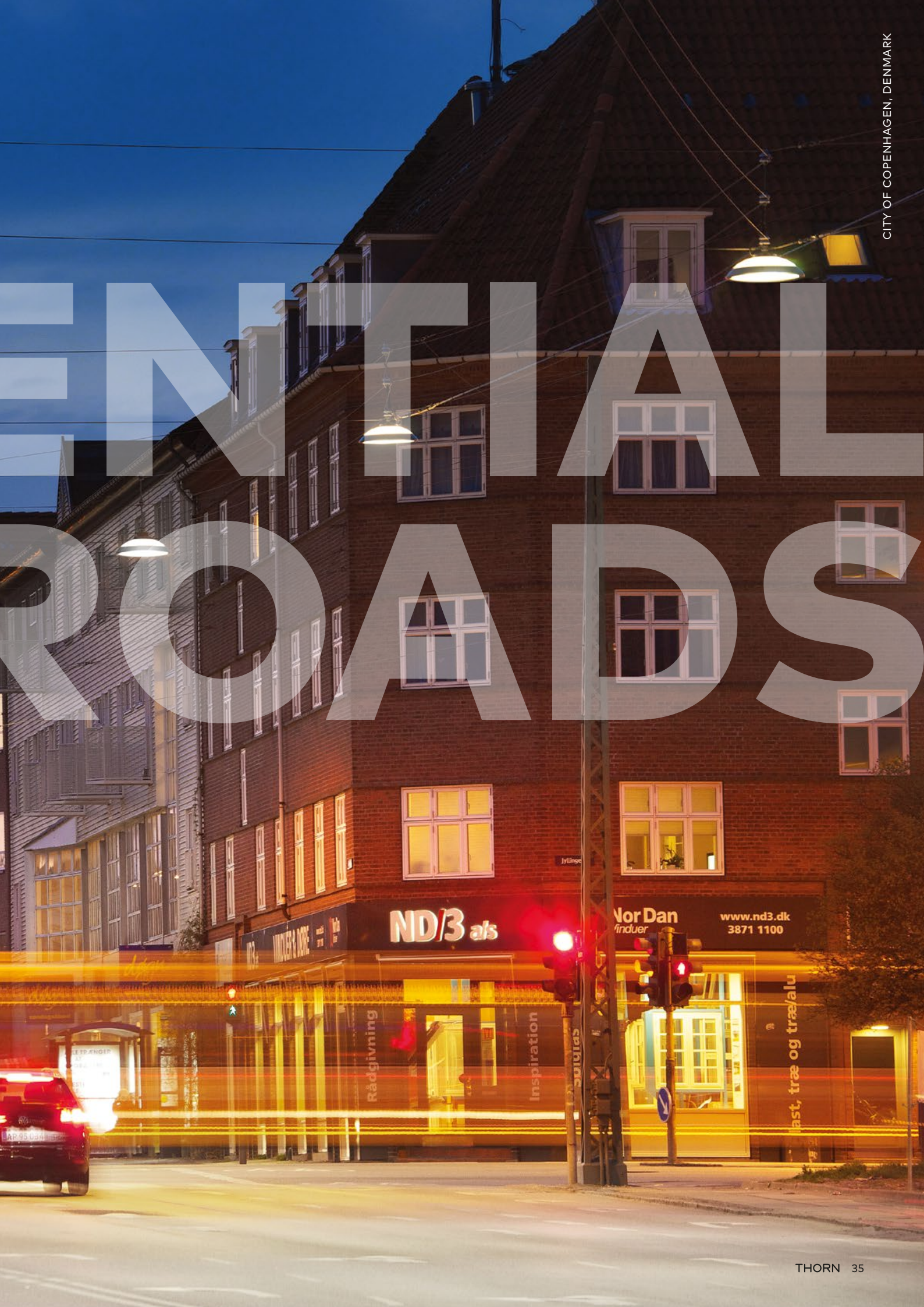
SECURITY
Good vertical lighting distribution will help with facial recognition, reducing the fear of crime and also allow drivers and pedestrians to read body language and understand intent.

SPILL LIGHT
Minor roads may sit within rural environments and spill light should be minimised.

ENERGY SAVINGS
Linked detection and control systems can detect oncoming traffic and maximise energy saving.

LIGHTING CRITERIA
Lighting is generally in accordance with the M classes defined in EN 13201-1 but the needs of pedestrians must also be taken in to account using the guidance given in PD CEN/TR 13201-1.


RESIDE
LIGHTING THE STREETS
WHERE PEOPLE LIVE



CITY OF COPENHAGEN, DENMARK

ENTIAL ROADS

CAREFULLY BALANCED LIGHT FOR LIVING

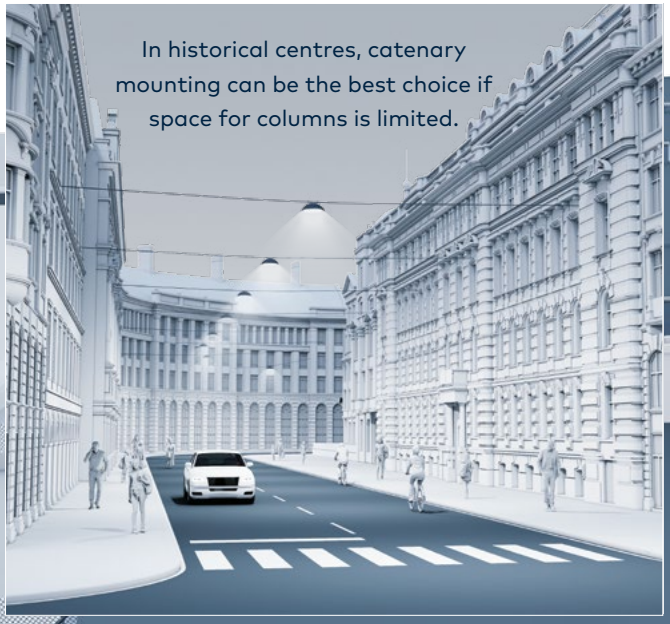
All life happens on residential roads. Children play, joggers run, pets dart across roads and there are many obstructions to consider, such as parked cars. These roads are normally used by low-speed mixed traffic. To correctly light these roads light colour, controls, security and light trespass must all be considered. The same applies to pedestrian areas. Inner city developments, traditional towns, suburban housing estates and all residential areas with streets must also be lit at night to help protect the population.

DERBYSHIRE COUNTY COUNCIL, UK

AVENIDA NAFARROA, SAN SEBASTIAN, SPAIN

CITY OF OSLO, NORWAY

Historical centres



In historical centres, catenary mounting can be the best choice if space for columns is limited.

Lower colour temperatures and good colour rendering.

6 m mounting.

TYPICAL USE CASES

Thorn products for residential roads

FLOW AMENITY
Decorative post top luminaire for urban spaces.

R2L2 XS
A complete lantern family for roads and streets.

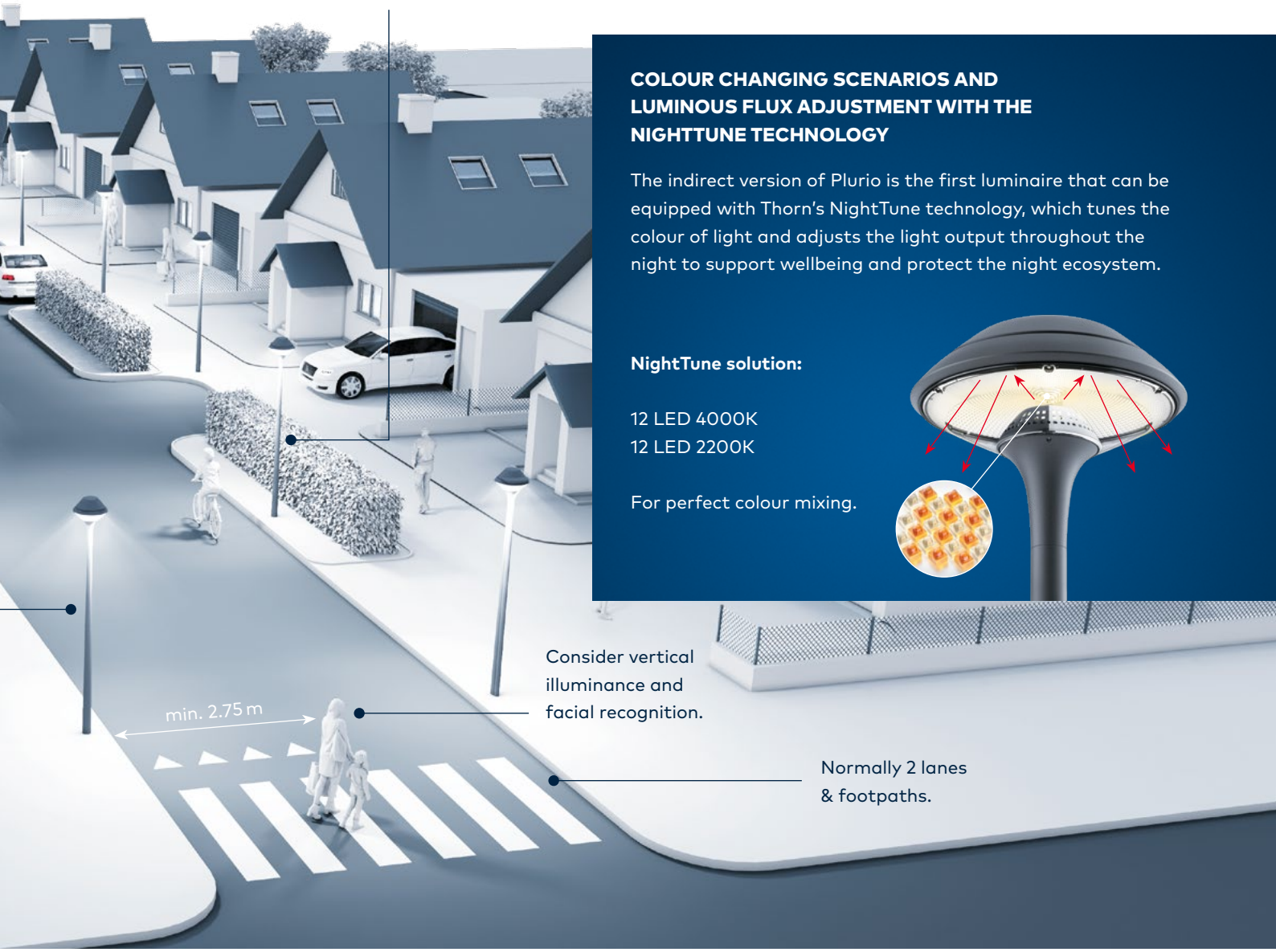
URBA
For sophistication and comfort in urban life.

LEGEND
A modern heritage post-top or suspended lantern upgraded with a high performance light engine.

THOR CATENARY
An LED smart urban lantern providing high user comfort and easy integration of connectivity and sensors.

PLURIO INDIRECT
Post top LED lantern combining no obtrusive light and a perfect mix of two LED colour temperatures with the NightTune technology.

Single sided positioning reduces installation costs. Double sided or staggered are more decorative and increase light quality.



COLOUR CHANGING SCENARIOS AND LUMINOUS FLUX ADJUSTMENT WITH THE NIGHTTUNE TECHNOLOGY

The indirect version of Plurio is the first luminaire that can be equipped with Thorn's NightTune technology, which tunes the colour of light and adjusts the light output throughout the night to support wellbeing and protect the night ecosystem.

NightTune solution:

12 LED 4000K
12 LED 2200K

For perfect colour mixing.

BEST PRACTICE

GOOD COLOUR RENDITION
White light with good colour rendering properties enhances the ability to recognise other people.

AVOID LIGHT TRESPASS
Carefully positioned and orientated low glare luminaires reduce light trespass onto adjacent residential housing.

LIGHTING THE VERTICALS
Where facial recognition is required semi-cylindrical illuminance classes should be applied.

LOW MOUNTING HEIGHT
Low mounting of under 6 m is common. Single sided layouts may be used to reduce costs. A staggered layout is used when parking lanes and wide footpaths are present.

EFFICIENT CONTROL
Lower light levels during reduced traffic times save energy and reduce light pollution.

LIGHTING CRITERIA
The lighting criteria for residential roads are chosen using the guidance given in PD CEN/TR 13201-1 from the P, HS or SC classes defined in EN 13201-2.


BRID

VIADUCT E39, NORWAY

CREATING SAFETY WHERE IT MATTERS

PROVIDING A SAFE LIT ENVIRONMENT

The main objective of bridge lighting is to provide a safe environment for traffic and/or pedestrians. Road users need to be able to navigate on and off bridges without glare impacting on their safety.

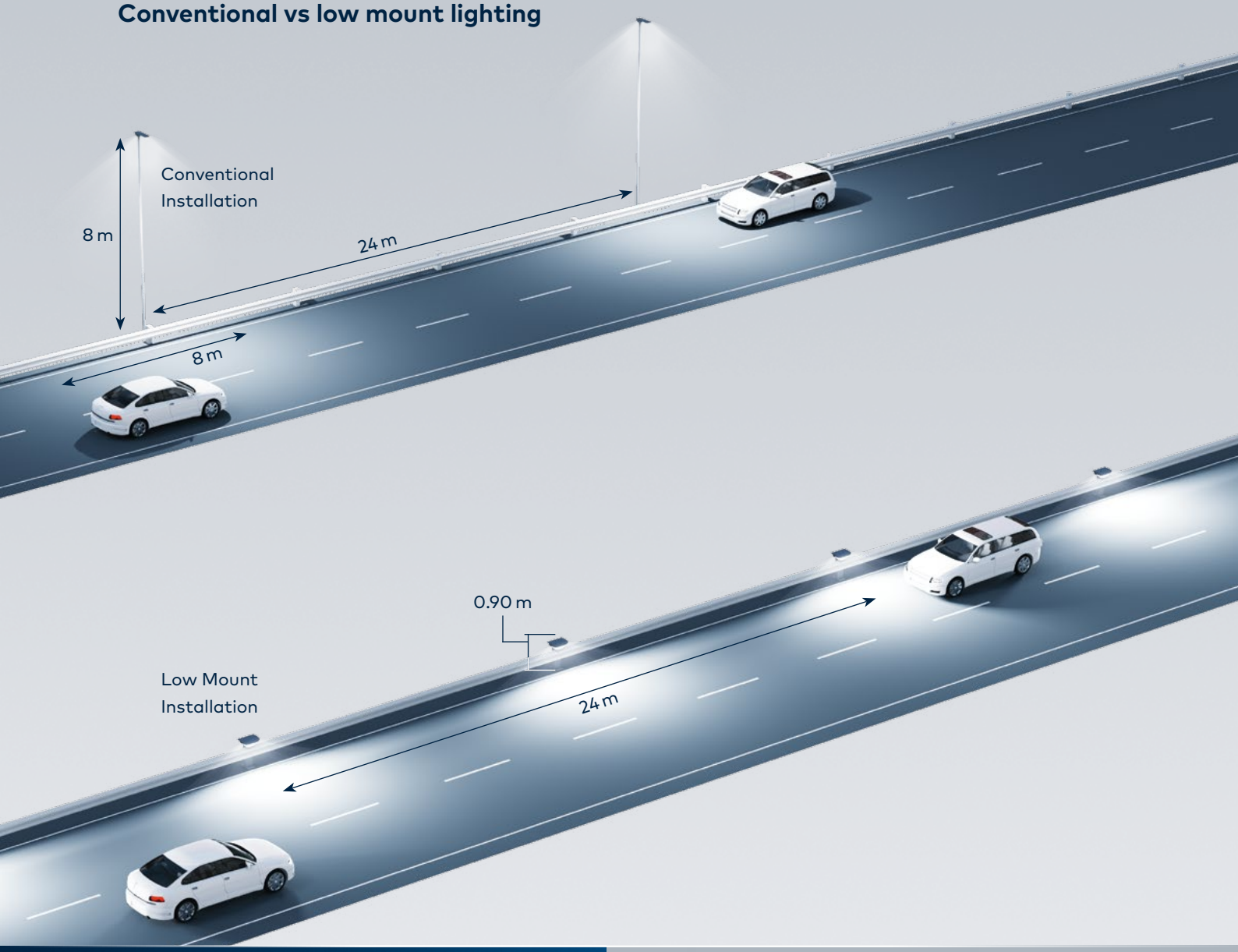
The lighting should highlight the direction of traffic flow and also the form of the bridge. It must clearly identify the limits of width or any height restrictions too. All lighting solutions must be easy and quick to install and maintain.

AUTOPONT DE NICE, NICE, FRANCE

ENTRANCE TO CHARLES DE GAULLE AIRPORT, PARIS, FRANCE

RANDE BRIDGE, VIGO, SPAIN

Conventional vs low mount lighting



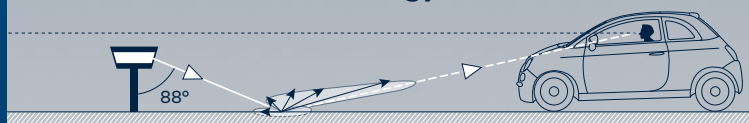
Thorn highlights for bridges:

ORUS
Innovative road lantern with flat beam technology for low level mounting.

ORUS BOLLARD

ORUS STIRRUP

The flat beam technology:

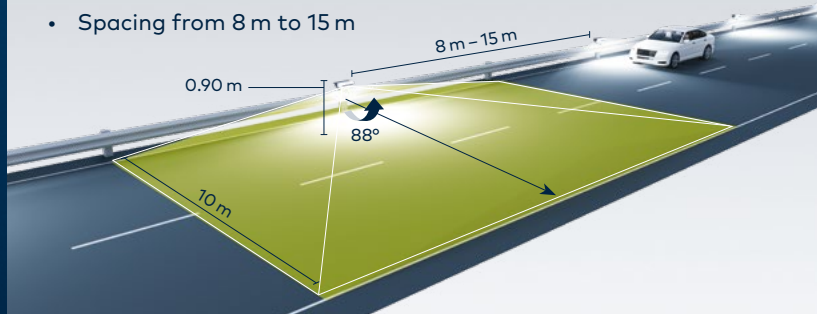


UNIQUE CONCEPT:
GRAZING LIGHT AND HIGHER LUMINANCE

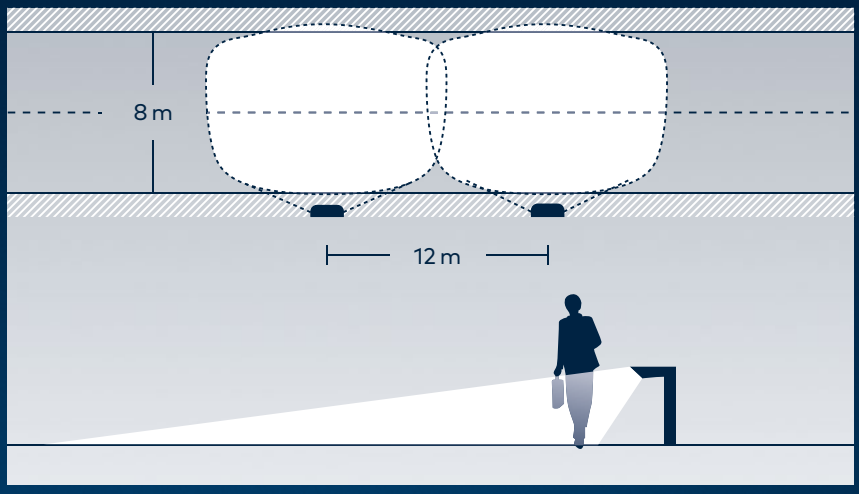
- Limited Contribution to sky glow
- Restriction of obtrusive light
- TI (threshold increment) <10 % (low glare)

INNOVATIVE CHARACTERISTICS:

- Single or dual carriageways
- Up to 10 m width in single sided
- Low mounting height
- Spacing from 8 m to 15 m

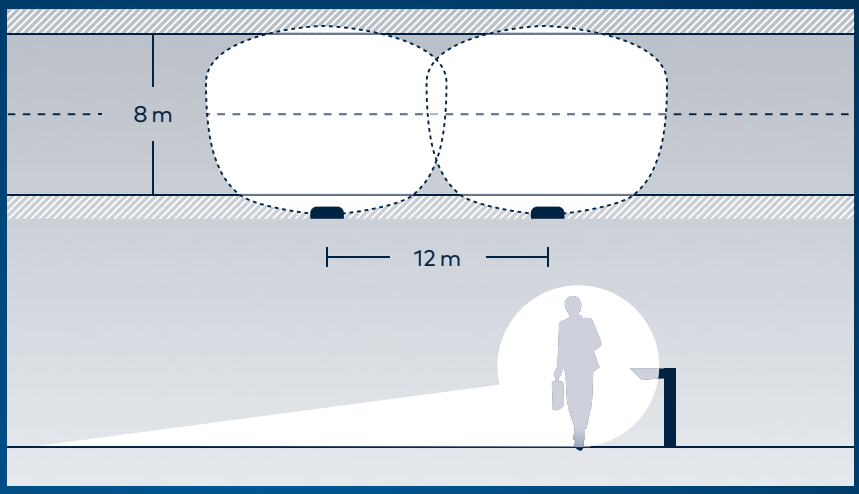


Different optics



Road performance optic:
Provides light efficiently on the road.

Road comfort optic:
Cut-off to reduce back light.



Street comfort optic:
Diffused side lighting to create an ambiance for pedestrians.

BEST PRACTICE

FLAT BEAM TECHNOLOGY – LOW MOUNT
Where the use of high columns or other structures is an issue, flat beam lanterns can deliver optimised performance.

OBTRUSIVE LIGHT
Choose solutions with efficient, controlled light distributions, maximising performance.

SYSTEM SELECTION
Consider the common viewing directions before choosing the system (column or low mount).

NAVIGATE SAFELY
Entrance roads leading to the bridge should be lit to enable drivers to see any hazards or restrictions.

EASE OF MAINTENANCE
Maintenance should have easy access and remember that maintenance will have to be completed quickly.

LIGHTING LEVELS
Dependant on connecting roads.

CONFI
ARE AS

ABANO TERME, ITALY

LICT S

LIGHT THAT MITIGATES RISK

LIGHTING FOR INCREASED AWARENESS AND GUIDANCE

At conflict areas, places where special visual attention is required such as roundabouts, T-junctions, and crossroads, vehicles from many directions, travelling at different speeds can often converge.

These are critical points where risk mitigation is crucial. High levels of lighting to increase awareness and guidance are vital to reduce the risk of potential accidents, maintain traffic flow and increase road user safety, both motorised and non-motorised.

A careful balance must be found between increased levels of light without increasing the risk of glare.

STATE ROAD ACCESS – SS13, ITALY

CITY OF OSLO, NORWAY


CITY OF OSLO, NORWAY
ST. OLAVS GT. 12

TYPICAL USE CASES

Thorn products for conflict areas

ISARO PRO
High-performance LED street lantern providing safety and comfort along roads.

R2L2
A complete lantern family for roads and streets.

ISARO
A cost-effective, sustainable and customer friendly luminaire.

URBA
For sophistication and comfort in urban life.

CARAT
A long-lasting product with an outstanding useful economic life and sustainable end of life qualities.

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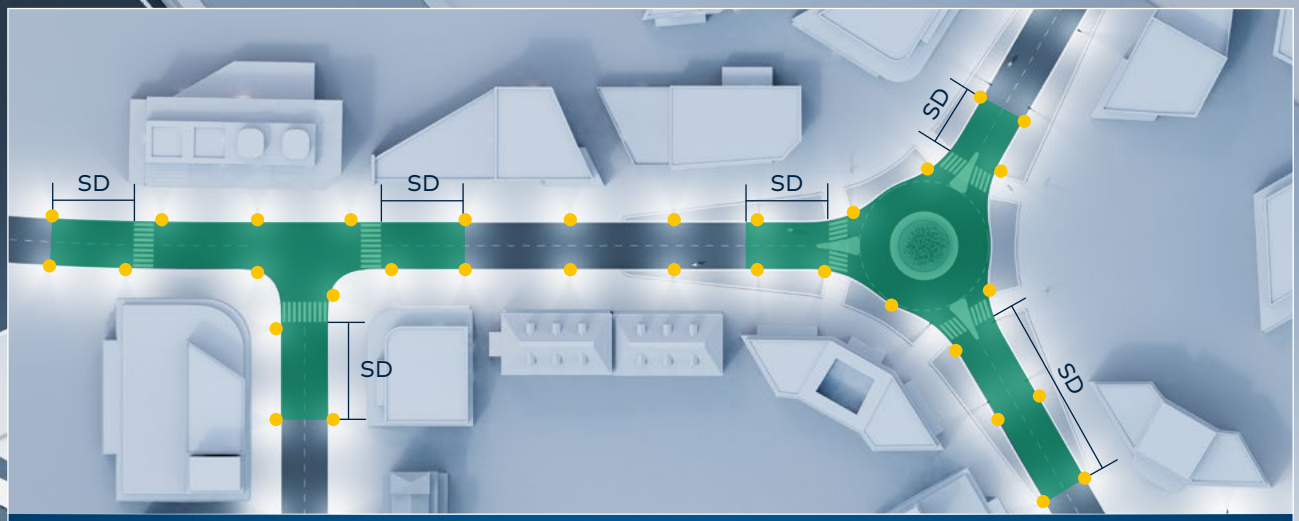


Risk of conflict and collision at T-junctions and pedestrian crossings can be mitigated by a higher lighting level. The closer spaced conflict areas are, the better they need to be illuminated.

SD: stopping distance

BEST PRACTICE

INCREASE VISUAL GUIDANCE

Strategic positioning of luminaires will increase visual guidance.

HIGHLIGHT LANES

Access and exit lanes should be highlighted.

EARLY AWARENESS

Positioning and height should minimise glare, whilst an increase in lighting level, mounting height, a change in colour temperature, can all aid early awareness.

A COMMON TECHNIQUE

Place columns and luminaires around the outside of the roundabout, at spacing no greater to that used for the approaches.

EASY TO INSTALL AND MAINTAIN

Lanterns should be easy to install, maintain and clean. They should also have a high IP rating to maximise durability.

LIGHTING CRITERIA

The highest applicable CE class should be used on roundabouts, based upon the highest class of the incoming roads.


CREATING ALERTNESS AND
INCREASED SAFETY
PEDES
CROSS

CITY OF CORDOBA, SPAIN

RTRIAN SINGS

PROVIDING A SAFE ROUTE

SAN VITO, ITALY

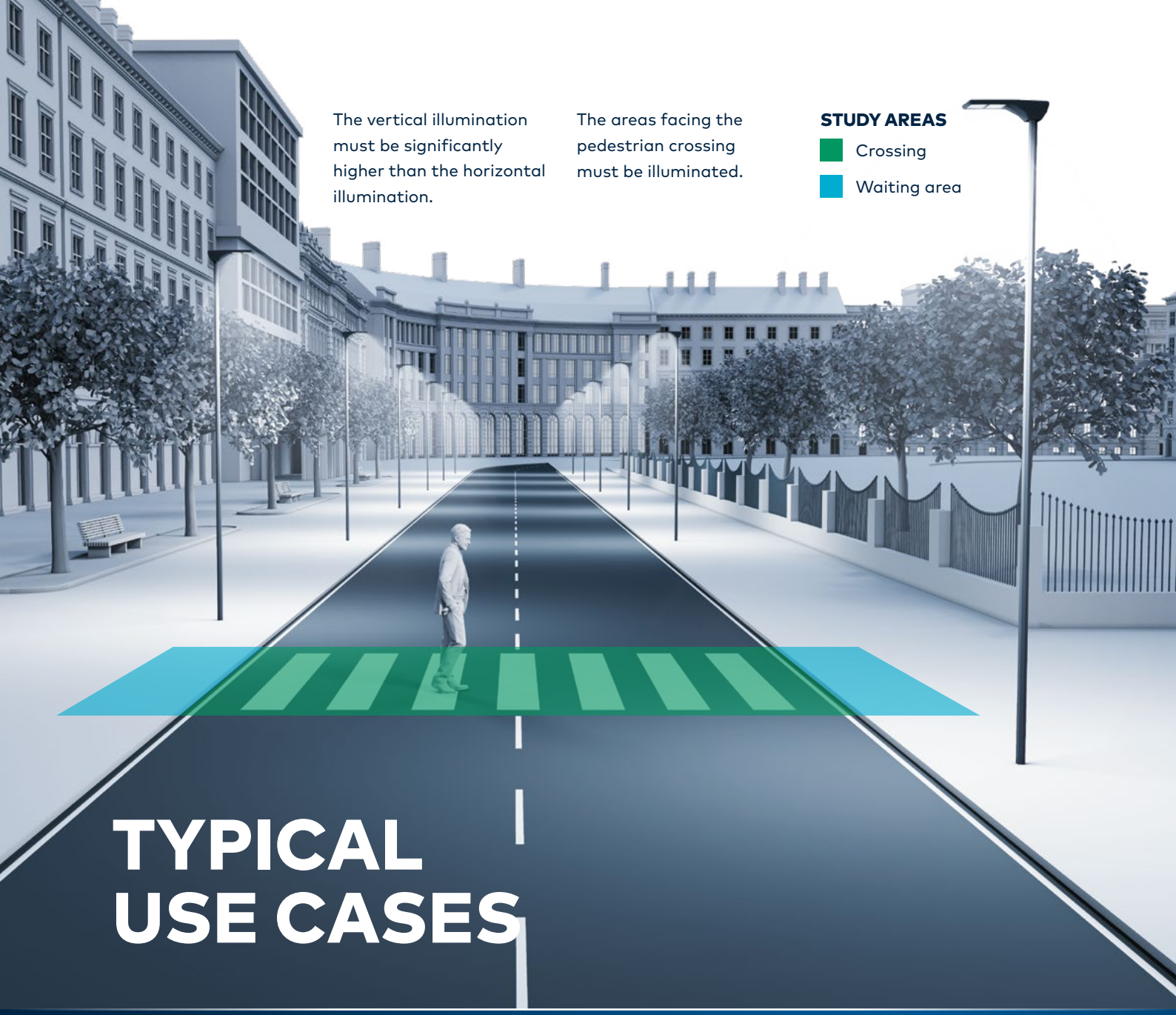
It is important to ensure that all pedestrian crossings are lit to provide a safe route for users, across all traffic routes.

Whether they are routes with heavy volumes of traffic, or relatively rural areas where traffic density is much lower, all crossings must be visible, alerting drivers and road users to their presence.

In the dark or in adverse weather, crossings must be as safe as during the daytime.

THURROCK COUNCIL, UK

CITY OF OSLO, NORWAY



TYPICAL USE CASES

Thorn products for conflict areas

ISARO PRO
High-performance LED street lantern providing safety and comfort along roads.

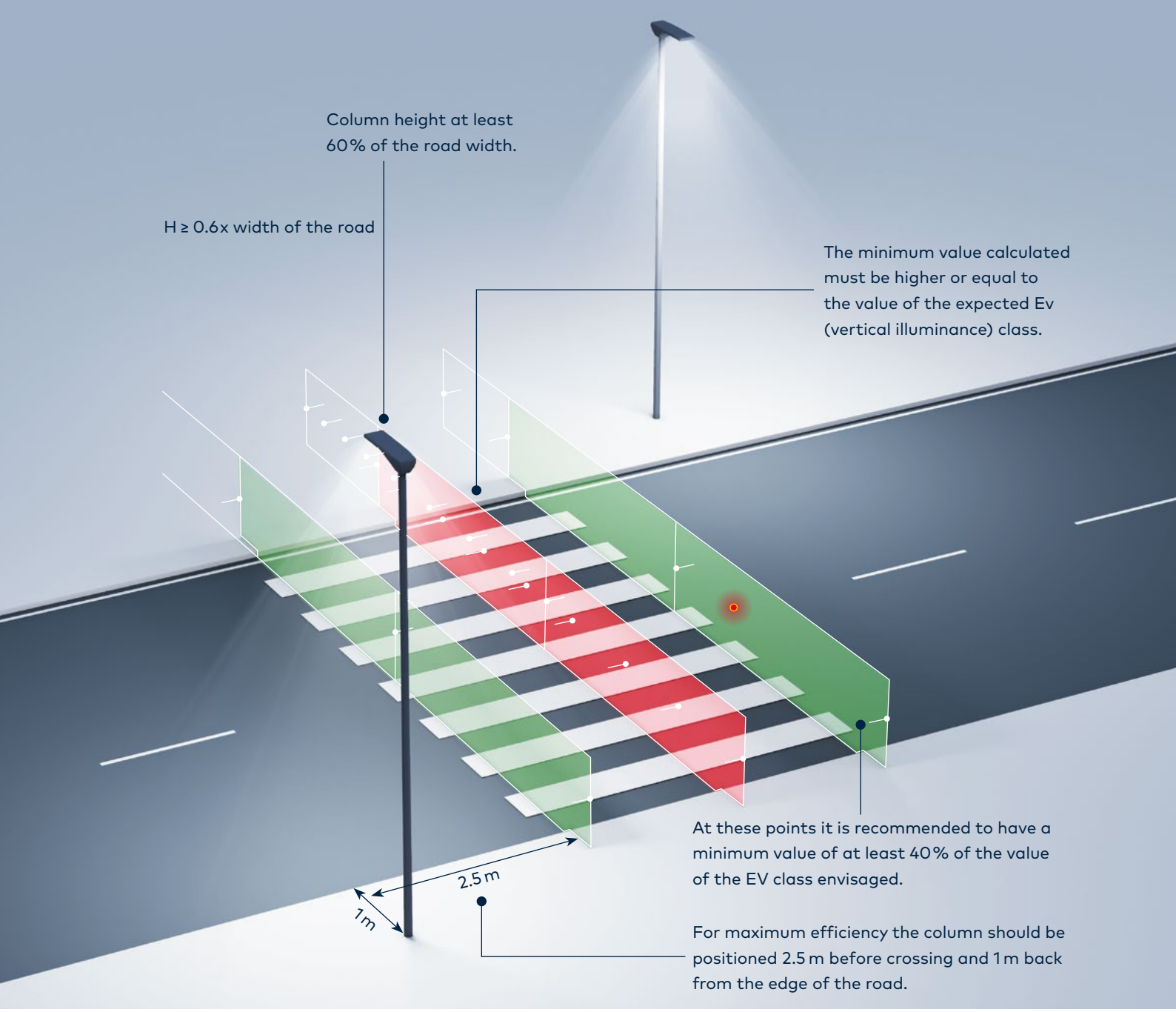
R2L2
A complete lantern family for roads and streets.

ISARO
A cost-effective, sustainable and customer friendly luminaire.

URBA
For sophistication and comfort in urban life.

THOR
An LED smart urban lantern providing high user comfort and easy integration of connectivity and sensors.

IVS
Innovative pedestrian crossing lighting concept, with optional LED blinker, designed for standard road lanterns.



BEST PRACTICE

ALERTNESS
Safety is enhanced by the use of additional signalling and different colour temperatures.

LIGHTING LEVELS
Lighting levels should be increased compared to those of the approach roads.

LIGHT DISTRIBUTION
The lighting distribution should be narrow along the road axis and wider along the axis of the pedestrian crossing.

POSITIONING
Positioning lighting columns at 0.5 – 1.0 times the mounting height each side of the pedestrian crossing creates a positive contrast.

COLUMNS 5 – 6M
Lanterns are normally mounted at 5 – 6m and need to have a double asymmetric light distribution with good glare control.

VERTICAL ILLUMINANCE
There should be a lot of vertical lighting to highlight pedestrians.

SUCCESS PROJECT

SUNDERLAND COUNTY COUNCIL, UK

Thousands of street lanterns in Sunderland had to be replaced. The R2L2 lantern was selected because the product met the criteria including improved lighting levels, increased energy efficiency, and the ability to be dimmed.

The lantern is suitable for all road applications including motorways and is designed to create no waste light and can be controlled.
Sunderland City Council is set to save £2.4 million a year and expects to reduce its carbon emissions by 9000 tonnes a year as a result of the project.

Full LED refurbishment – more than 27000 sodium street lamps replaced.

9000 tonnes a year savings.

additional 25% energy savings with pre-set dimming.

R-PEC optics with precise light placement and no wasted light.

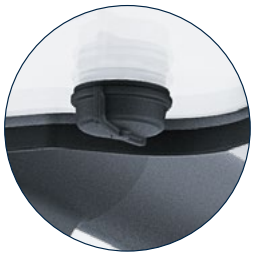
Savings of £ 2.4 million a year thanks to lower bills and less maintenance.

Luminaire solutions used in the project:

"Everyone wants to save money on their energy bills and, given the significant savings we have to make because of continued reductions in government funding, the City Council is no different. As well as financial savings, the new lights can bring other benefits to highway users. The 'white light' makes it easier for pedestrians, cyclists and motorists to see and this helps in reducing night time road traffic accidents and the fear of crime. The first installation phase is seeing the conversion of almost half of the city's street lighting stock."

Councillor Michael Mordey, Sunderland City Council

ENVIRONMENTALLY RESPECTFUL IN 3 STEPS

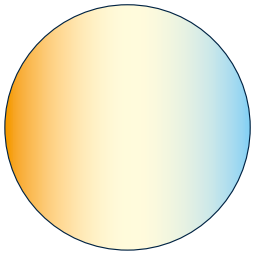


1 CONTROL

Excessive light is not only a waste of energy, but it can be a source of pollution leading to a range of negative effects on the natural environment and ecosystem. Variable Light Distribution programming can significantly reduce the risk of pollution. Control systems adjust light levels based on time of day or night and detect the presence of people or vehicles. Thorn luminaires are equipped with the latest control technologies using NEMA and Zhaga compliant components, meeting Zhaga-D4i certification, or other advanced controls, to reduce light pollution and save energy.

2 SHIELD

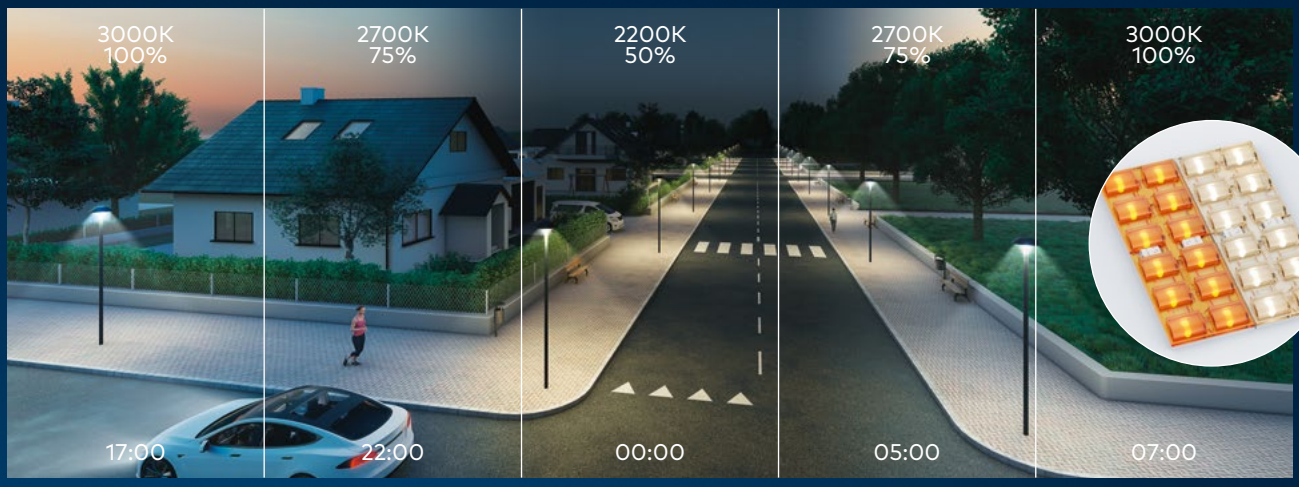
Thorn's optical system is designed for ULOR at 0% so that light is not emitted upwards into the sky. It can also have an additional internal louvre that ensures a perfect cut-off. This feature minimises spill light and avoids obtrusive light towards buildings.



3 COLOUR TEMPERATURE

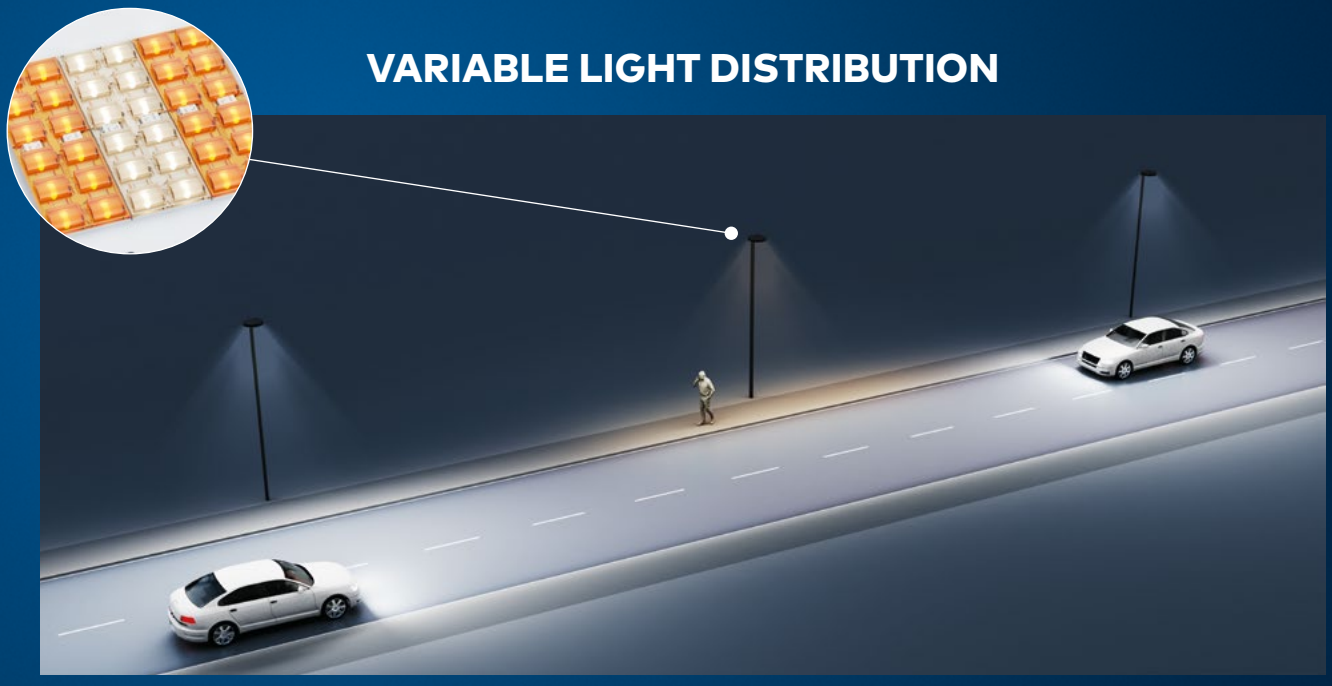
Warm colour temperatures (up to 3000K) minimise disruption to the nocturnal ecosystem and create a comfortable atmosphere. Carat has been equipped with our latest NightTune and Variable Light Distribution technologies, designed to create the perfect balance of lighting the night.

NIGHTTUNE TECHNOLOGY



NightTune creates the perfect balance in lighting at night. It gives a sense of security and wellbeing for people whilst conserving energy and protecting eco-systems. NightTune automatically adjusts the level of light emitted from a light fitting, mixing dimmable light from warm and cool LEDs. Cooler LEDs dim when night falls and increase when traffic levels rise in the morning, leaving warmer LEDs on throughout the night.

VARIABLE LIGHT DISTRIBUTION



Thorn Variable Light Distribution adapts both its performance and ambience to each project configuration.
By mixing 2 lighting distributions and 2 colour temperatures into one luminaire, the Variable Light Distribution optimizes the comfort and security for each user in one common area, should they be pedestrians, cyclists or motorists. It delivers the most appropriate lighting level and colour depending on where the user actually needs it. Adding a sensor into the lantern also enables optimisation of energy use as it will then only light the required area when necessary.

NightTune, our Variable Lighting Distribution and detection sensors can be used together to create different lighting scenarios that protect the environment, support visual comfort and increase safety.

CONTROL SOLUTIONS

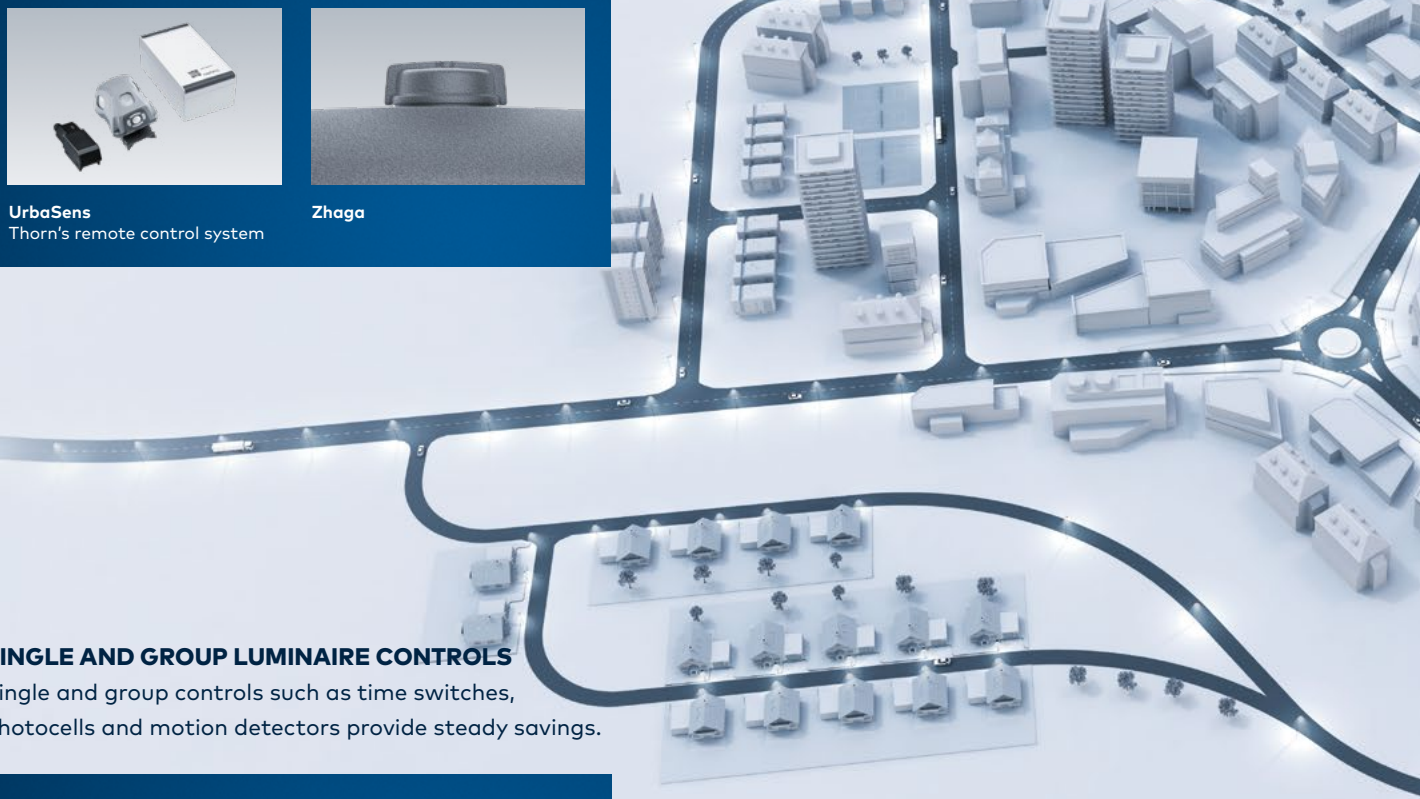
ADJUSTING LIGHT TO SUIT YOUR NEEDS

Thorn offers a wide range of lighting control solutions. These are selected depending on the scale and complexity of the lighting management task.

REMOTE AND WIRELESS CONTROL

Smart lighting solutions available today use RF-based wireless remote-control systems. Conveniently manage individual luminaires or groups of luminaires, troubleshoot, access system status monitoring and analysis data, manipulate the time, calendar and more – without having to physically visit installations.

With the antenna, ambient light sensor and sensor interface (LSI) Zhaga provides ready access to a wide choice of control solutions making it easy to connect our luminaires to the digital world at any time.



UrbaSens
Thorn's remote control system

Zhaga

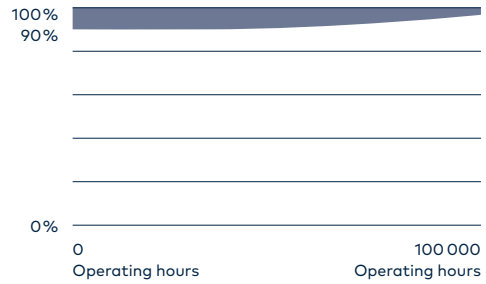
SINGLE AND GROUP LUMINAIRE CONTROLS

Single and group controls such as time switches, photocells and motion detectors provide steady savings.

MovU lateral or post top
External motion sensor with Radio Frequency (RF) and with Master / Slave possibility.

Bi-power switch (BPS)
requires no external control wiring, and can be easily customised or turned off.

CLO – CONSTANT LIGHT OUTPUT

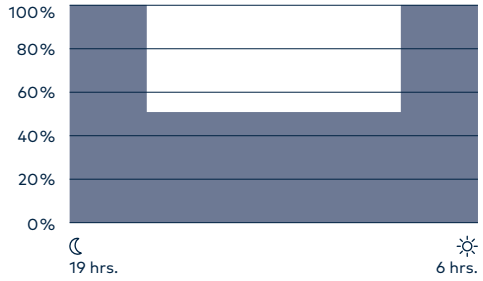


The luminous flux of an LED naturally decreases over the course of its life time. This must be taken into account during the planning phase and the lighting system must be designed so that it provides excess luminous flux. The CLO function counteracts this reduction in luminous flux as it continuously readjusts the output of the luminaire system.

ALO – ADJUSTABLE LIGHT OUTPUT

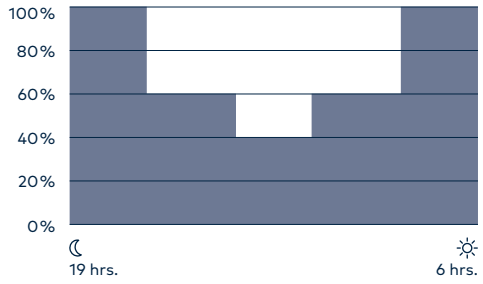
This function can be used to set the rated luminous flux of the luminaire to exactly the value that is needed. The programming can be carried out in the factory if required or on-site using a programming device.

LRT – LIGHT REDUCTION TWIN-PHASE



LRT is used in installations in which a special control line is available in addition to the power line. The electronic ballast detects the switching off of this control phase and reduces the light output of the luminaire to a programmed value (usually 50 % of the light current).

BP – AUTONOMOUS LIGHT REDUCTION (BI-POWER)



Bi-Power function does not require any external controller wiring in the network for operation, which means that BP is suitable for any kind of new building or modernisation. With BP the ballast of the luminaire execute a pre-set dimming profile. The electronics create an artificial "midnight" using the on and off switching times from the previous nights by using a time recording facility integrated in the ballast. The luminaire then reduces the power autonomously using the programmed dimming profile.

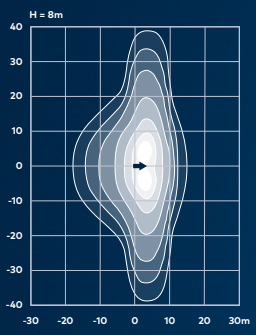
THORN R-PEC

HIGHLY EFFICIENT LED LIGHT DISTRIBUTION OPTIONS

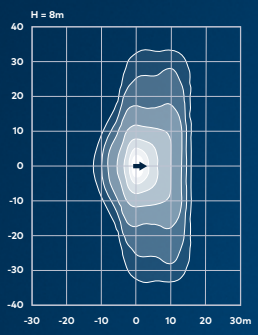
The Thorn R-PEC LED light distribution options are based on a multi-layer lens system, providing light distribution options for any requirements in street and outdoor lighting.

- In-house development
- Flexible case options to meet specific project requirements
- Reduces light pollution, spill light
- Increases energy efficiency

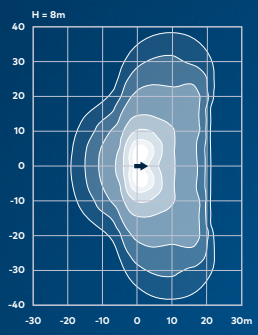
SOME OF OUR OPTICS:



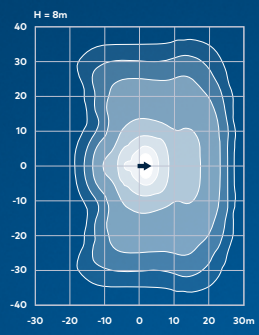
ENR: Extra-narrow road
Recommended for P- & M classes.



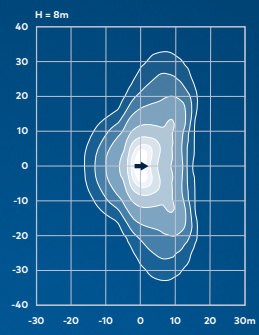
ES: Extensive Street
Recommended for P- & C classes.



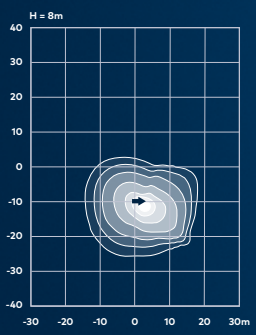
EWC: Extra-wide side road
Recommended for comfort P classes.



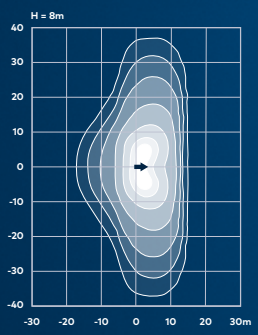
EWR: Extra-wide road
Recommended for C- & M classes.



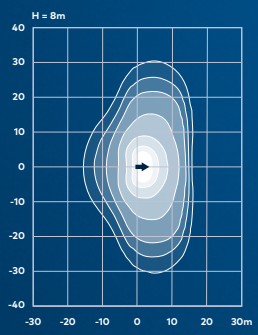
EWS: Extra-wide side road
Recommended for P classes.



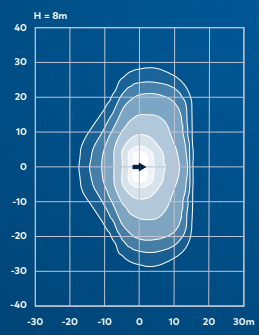
IVS: Identification, visibility, safety
Pedestrian crossing optic.



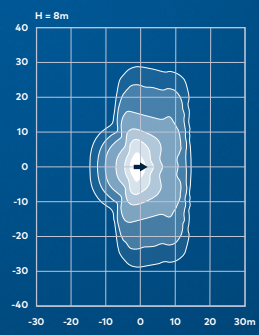
NR: Narrow road
Recommended for P- & M classes.



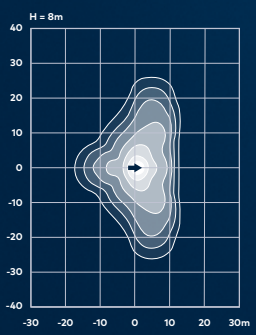
RC: Road, comfort
Recommended for P- & M classes.



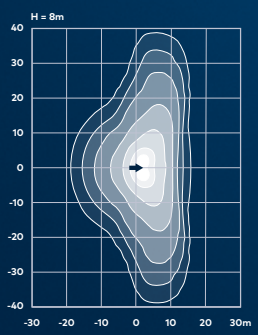
SC: Side road, comfort
Recommended for P- & M classes.



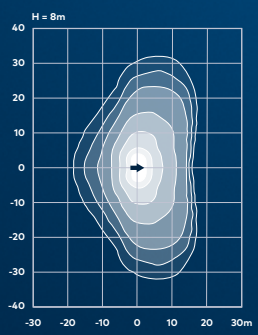
SES: super extensive street
Recommended for P- & C classes.



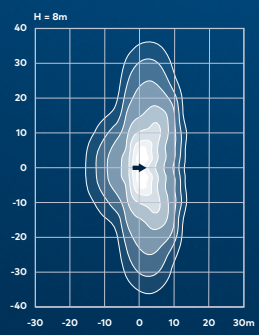
SR: Staggered road
Recommended for M classes.



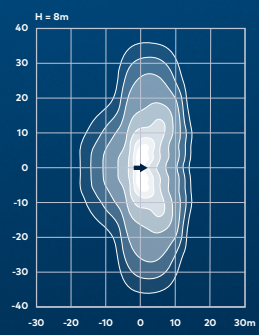
TSR: Tight staggered road
Recommended for M classes.



WR: Wide road
Recommended for M classes.



WS: Wide side road
Recommended for P classes.



WSC: Wide side road, comfort
Recommended for P- & C classes.

CORROSION RESISTANCE

DEPENDABLE ATMOSPHERIC RESILIENCE

For areas near the sea all Thorn outdoor products and applications are reliable and resilient as standard.

The materials employed in the construction of the Thorn outdoor luminaires have been selected specifically for their suitability in corrosive environments and comply with C5 class according to ISO 9223 (Corrosion of metals and alloys – Corrosivity of atmospheres).

ISARO PRO

BUILT TO LAST

A high performance and versatile LED street lantern suitable for major roads and residential streets. Made of top-quality alloy, Isaro Pro is built to withstand all conditions, and to cope with physical impact and corrosion.

SMART LIGHTING

Isaro Pro incorporates many control solutions such as UrbaSens, our state-of-the-art intelligent outdoor lighting system: save energy, provide light only when and where it is required and control the whole system from a simple dashboard. Combine it with our expert service team, and you'll get revolutionary lighting without risk.

MAIN APPLICATION AREAS

CONTRACTOR FRIENDLY
Isaro Pro is designed to make life easy for contractors. With internal components easily accessed from above without the need for tools, maintenance couldn't be simpler. It is available pre-wired and its automatic disconnect function means maintenance is safe.

R-PEC OPTIC
Isaro Pro features the best in class optical performance of the R-PEC optic. R-PEC offers several precision light distributions, achieving wide column spacing, excellent uniformity plus no waste or obtrusive light.

TILTING TECHNOLOGY
Versatile installation thanks to our tilting technology where using the same spigot you can achieve lateral (–15°/+15°) and top (0°/+20°) mounting with a wide choice of angles, by steps of 5°.

ISARO

FUTURE PROOFED RELIABILITY

Available in two sizes and with the latest LED generation, Isaro is designed to maximize lighting performances, optimize circular economy strategies, while limiting its carbon footprint.

Combined with Zhaga socket connection, project owners get the intelligent luminaire that is ready for a smart future to cope with their invest-to-save replacement schemes.

READY TO CONNECT
Both sizes can be configured with a NEMA or Zhaga interface, Zhaga-D4i certified.

ISARO S

UNIVERSAL SPIGOT
Delivered pre-equipped, Isaro's spigot can be reversed and used as post-top or as a lateral mounted option. Different diameters are available (T60 / T76 / L42 / L60 / L34 with adapter).

ISARO XS

R2L2

A COMPREHENSIVE RANGE

A complete lantern family at the forefront of LED technology that offers excellent lighting performance and covers all road applications.

MOUNTING OPTIONS

Universal and integrated spigot, offers flexibility with top and side entry as well as tilt adjustment.

SIDE

TOP

TILT ADJUSTMENTS

ROAD STANDARDS

For road lighting the lighting criteria is selected dependent upon the class of road being lit. The class has a range of sub-classes, from the strictest to the most relaxed. These are chosen dependent upon factors such as typical speed of users, typical volumes of traffic flow, difficulty of the navigational task, the function of the overall layout of the road, and the environmental conditions.

The European Standard EN 13201 gives guidance on lighting requirements and environmental aspects for all road users.

ROAD LIGHTING IS DEALT WITH BY CEN AS FOLLOWS:

CEN/TR 13201-1	Road lighting – Part 1: Guidelines on selection of lighting classes
EN 13201-2	Road lighting – Part 2: Performance requirements
EN 13201-3	Road lighting – Part 3: Calculation of performance
EN 13201-4	Road lighting – Part 4: Methods of measuring lighting performance
EN 13201-5	Road lighting – Part 5: Energy performance indicators

REMARKS

In addition to EN Standards, there are further considerations:

CIE 150:	Guide on the limitation of the effects of obtrusive light from outdoor lighting installations
CIE 115:	Recommendations for the lighting of roads for motor and pedestrian traffic
CIE 132:	Design methods for lighting of roads
EN 40:	Lighting columns
EN 12767:	Passive safety of support structures for road equipment. Requirements and test method
EN 12464-2:	Light and Lighting – Lighting of Work Places – Part 2: Outdoor work places

CITY OF NUREMBERG, GERMANY

THORN

LIGHTING

GET IN TOUCH

www.thornlighting.com/contacts

WE MAKE LIGHT WORK

09/2021