

Transportation
Product Selector
Guide

TR





James Hawkins, President
Kenall Manufacturing

Letter from the President

When specifying lighting for transportation, the overall goal is to safely support the users' comfort and visual perceptions. Transportation fixtures are also subject to harsh environmental conditions, requiring compliance with relevant testing standards to ensure optimal performance. Therefore, key considerations when specifying transportation lighting include durable construction, corrosion- and vibration-resistance, ease of installation and maintenance, intelligent optics and thoughtful use of controls.

From platform to tunnel lighting, each sector of the transportation market requires fixtures that have been designed, engineered and built to address application specific challenges. A strong tunnel lighting solution, for example, must consider the visual adjustments upon entering or exiting the tunnel. Similarly, parking garage luminaires must provide glare-free illumination and deliver even uniformity, while successfully integrating daylighting and occupancy controls to reduce energy consumption.

And because transportation lighting systems must endure some of the most challenging physical and environmental conditions, it is critical that they be built to certified performance standards. Kenall has applied its 50 years of designing, developing, testing, and manufacturing luminaires to meet, and often exceed, such standards. We take our commitment to industry 'best practices' very seriously, resulting in one of the most highly sought after transportation lighting series on the market today.

From platforms to parking structures—and everything in between—you have my personal assurance that Kenall transportation fixtures can be specified with confidence.

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The requirements of a successful transportation lighting project are critical to the safety of its users. As our roadway, transit and tunnel systems become more complex, lighting systems are increasingly challenged to facilitate the flow of traffic—whether pedestrian or driver—efficiently and effectively. Additionally, heavy usage patterns, corrosive laden environments and limited access necessitate transportation lighting systems that support quick but minimal maintenance. Kenall delivers tough transportation lighting systems that are designed and manufactured in the USA and built to withstand even the most challenging transportation environments.



Underpass Lighting

The most effective underpass lighting is specifically designed to promote smooth flow of traffic for driver safety. Lighting in this space must provide adequate light levels, with a special emphasis on the disabling contrast at the point of exit.



Tunnel Lighting

Designed to meet the visual perceptions of drivers, effective tunnel lighting systems must address a variety of concerns, including traffic density and speed, glare, spatial and visual adaptation, contrast between potential obstacles and their background, and ingress protection.



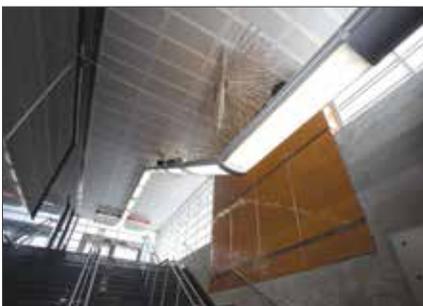
Transit Lighting

Effective transit lighting must be durable enough to withstand harsh environmental conditions, while simultaneously supporting the safety and security of transit system patrons. Special considerations include the delivery of adequate light levels, mitigation of visual annoyances and vibration, and ease of installation and maintenance.



Platform/General Area Lighting

The main concern in platform and general area lighting is the safety and security of transit system patrons, making light levels and uniformity key. Due to their exposure to the elements, corrosion- and vibration-resistance should also be addressed.



Corridor/Stairwell Lighting

Corridor and stairwell illumination must support effective wayfinding—especially in emergency situations. The use of occupancy and daylight controls is also encouraged as it can result in significant cost and energy savings.



Parking/Surface Lot Lighting

Within most parking structures and lots, the elimination of the 'cave effect' and glare reduction are significant contributors to pedestrian and vehicular safety. Kenall offers best-in-class LED parking systems with advanced optical design for enhanced light distribution.





Lighting Performance Requirements

Kenall's engineering and design processes focus on performance criteria—such as UL Listings, ingress protection ratings and vibration testing—to ensure our transportation lighting products deliver outstanding performance. Illuminance criteria for transportation applications must also consider factors such as task and activity levels, target planes, surface reflectances, energy usage, daylight input, surveillance needs and visual adaptation. To ensure optimal performance, Kenall's transportation products align with industry best practices, including:

- Supporting driver and patron visual perceptions both day and night
- Maintaining appropriate light levels for the designated application
- Testing to appropriate performance standards
- Illuminating potential obstacles
- Promoting the safety and security of drivers/patrons
- Durable, sealed construction for corrosion-, shock- and vibration-resistance
- Ingress protection rated to prevent the infiltration of water and dust
- Ease of installation and maintenance



Buy American Act Compliant

Kenall's luminaires are expertly designed in our state-of-the-art, vertically integrated, static-controlled manufacturing facility in Wisconsin. This enables us to provide tight control over the entire development process from fixture design and engineering to full-fledged metal fabrication, paint, assembly and shipping. We also take great care in sourcing only the highest-quality components to assure optimal product performance.

Our products comply with the Buy American Act, which is your best assurance of quality, consistent delivery and protection for United States jobs.



Custom Design and Manufacturing Capabilities

To address the varied lighting requirements of the transportation sector, Kenall is poised to deliver application specific customizations. Our extensive in-house capabilities enable us to respond nimbly to even the most complex transportation lighting projects, controlling the entire development process from fixture design and engineering, to full-fledged metal fabrication, paint, and testing. In fact, we're confident you'll find our custom capabilities make us the ideal solution provider for even the most challenging transportation lighting projects.



Testing for Ingress Protection and Vibration

Due to the rigorous environmental challenges of transportation applications, testing for ingress protection and vibration resistance are best practices. The repeated vibration caused by vehicles traveling at a high rate of speed can cause significant damage to fixtures that are not built to withstand such stress. In addition, exposure to the elements and the need for routine maintenance—typically with high-pressure hoses—require that the fixtures be protected from the ingress of water, bugs, dirt and debris. Kenall's state-of-the-art certified safety laboratory and affiliation with independent testing facilities ensure that our transportation fixtures will withstand the rigors of even the most challenging transportation environments.

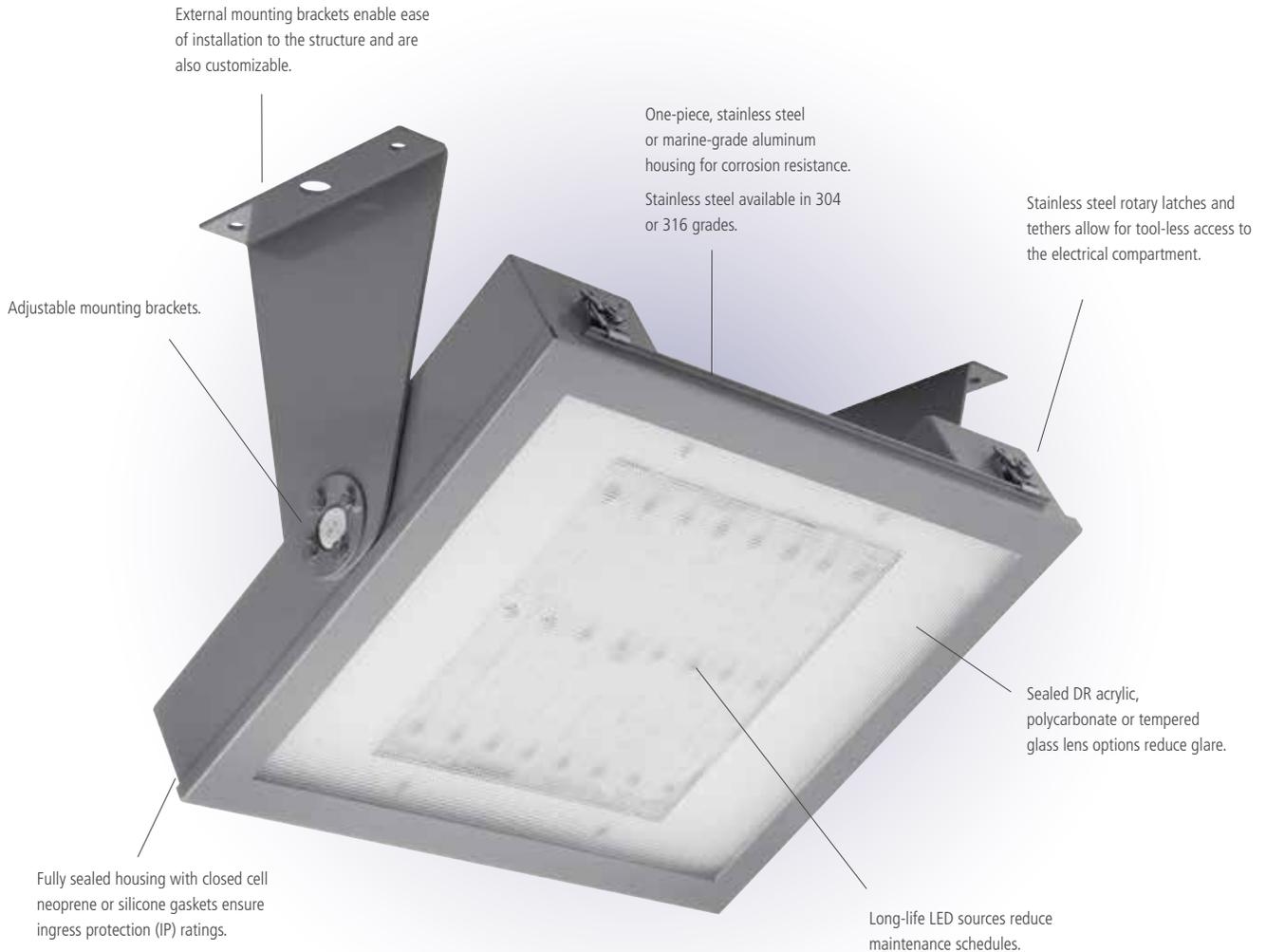


Delivering Appropriate Light Levels

Photometric considerations for transportation lighting can be as diverse and complex as the applications themselves. Kenall addresses the varied concerns of each application by providing luminaires that are intelligently designed and engineered to deliver specific light levels. Through the thoughtful use of optics, distribution patterns and lamp sources, Kenall has been able to balance contrast and shadows, support video surveillance, and address issues of uniformity and discomfort glare. By delivering vertical and horizontal light levels that meet or exceed IES recommendations, Kenall's luminaires enhance the safety and security of pedestrians and patrons.



Kenall's legendary durability is a signature of the LuxTran™ line. These construction features not only provide ease of installation and maintenance, but they also lend themselves to meeting the stringent performance standards critical to transportation environments.



Ease of Installation and Maintenance



Stainless steel rotary latches and hinges allow tool-less access to the electrical compartment.



Quick electrical disconnects facilitate ease of maintenance—particularly important in areas where access is challenging.



External mounting brackets allow for a variety of mounting configurations, including ceiling, wall and sloped surfaces.

Committed to LED Technology

LED sources present an ideal solution for a variety of transportation projects. Low energy consumption and high efficacy, in concert with a 60,000-hour or better lamp life and low heat output, create the ideal source for many applications. The substantial lamp life of an LED also reduces its maintenance requirements, which limits the fixture's exposure to the elements as well as the potential risk of damage during routine maintenance. In addition, LED sources contain no toxic mercury and emit no harmful, insect attracting UV radiation, creating a truly green source. Its modular design facilitates product upgrades, reducing the material that ends up in landfills, further increasing its sustainability.

LED Product Warranty

In addition to the standard product warranty, Kenall warrants LED lamps and internal power regulation components, for a minimum of five years from the date of the invoice, against defects in materials and workmanship that result in a fixture lumen depreciation of 30% or greater. Lumen depreciation is compared to the published lumen output of the product on the date of manufacture per IESNA LM-79-08 reporting procedures. Normal accumulation of particulates on the optical surfaces shall not be factored into the lumen depreciation.



Kenall Manufacturing is a registered Lighting Facts Product Partner. For more information about this program or for copies of our Lighting Fact Labels please contact Kenall at info@kenall.com, or visit us on the web at www.kenall.com



Kenall's state-of-the-art photometric lab is ISO/IEC 17025 accredited. This provides us with the necessary credentials for the Department of Energy's Lighting Facts listings and Design Light Consortium approvals; enabling us to submit multiple LED listings in multiple colors with the benefit of shortened lead times.

Kenall Sophistication in Testing

Whether testing for Ingress Protection required in a parking garage, or stringent electromagnetic interference testing for a surgical suite, Kenall is equipped, with a state-of-the-art certified safety laboratory, to provide the following testing capabilities:

- Certified for safety testing by Underwriters Laboratory and Intertek Testing Laboratories for Incandescent, Fluorescent and HID Luminaires (UL 1598), LED Luminaires (UL 8750) Hazardous Locations (UL 844, Class I Div II, Class II Div II, Class III), and Emergency Lighting (UL 924)
- Ingress Protection testing (dust and water chambers)
- MIL-STD-461F – Conducted electromagnetic interference (EMI)
- Highly Accelerated Stress Screening (-50°C to 150°C Environmental Chamber)
- 25°C and 40°C thermal testing rooms
- LM-79 photometric laboratory including a Type C goniophotometer as well as a 2-meter integrating sphere with spectroradiometer

Many Kenall transportation luminaires undergo independent vibration testing per ANSI C136.31-2001 standards, ensuring a strong solution for rugged transportation environments.



TPD Series **LED**

- Ideal for parking structure and surface lot applications
- Ready for mounting on round or square poles (poles by others); corrosion resistant
- Field rotatable optics for enhanced distribution flexibility
- Textured lens for unprecedented glare reduction
- Patent pending concealed heat sink and flow through design for effective thermal management
- Patent pending sealed optics
- Removable gear tray for ease of installation
- IESNA full-cutoff
- ETL Certified IP65 per IEC 60598
- 10-year limited warranty



TopDek™ Series
Pg. 59



TD17 Series **LED**

- Ideal for parking garage applications
- Die-cast, marine-grade aluminum housing; corrosion resistant
- Textured lens for unprecedented glare reduction
- Patent pending sealed optics with uplight feature
- Patent pending concealed heat sink and flow through design for effective thermal management
- Type II, III, IV, IV-Narrow and V-Square distributions
- ETL Certified IP65 per IEC 60598
- 10-year limited warranty



TekDek™ Series
Pg. 60



With polycarbonate lens & direct-to-surface mount



DLD Series **LED**

- Ideal for underpass applications
- One-piece, seam welded, marine-grade aluminum alloy housing; polyester powder coat finish; corrosion resistant
- Mounting brackets allow 360° adjustment
- Stainless steel rotary latches with tool-less access to lamp/ballast compartment
- Prismatic tempered glass lens
- Standard 0-10% dimming capability
- UL/CUL Certified IP65 per IEC 60598



LuxTran™ Series
Pg. 16



Note: LED sources are available in multiple wattages and color temperatures.



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SLR Series LED

- Ideal for transit and tunnel applications
- Die-formed, stainless steel housing; seam welded construction; corrosion resistant
- Stainless steel doorframe secured to housing with stainless steel rotary latches
- High-impact polycarbonate lens
- Standard 0-10% dimming capability
- ETL Certified IP65 per IEC 60598



LuxTran™ Series
Pg. 34



TMLHA Series LED

- Ideal for transit and stairwell/corridor applications
- Die-cast extruded, marine-grade aluminum housing; corrosion resistant
- Available in ceiling, wall, corner or optional pendant mount
- Polycarbonate lens standard
- Patented modular system; continuous row mounting
- Shock-resistant sockets for positive lamp retention
- UL Certified IP64 per IEC 60598



Millenium Stretch™ Series
Pg. 34/41



TES Series LED

- Ideal for tunnel, transit, stairwell and platform applications
- One-piece, cold rolled steel or stainless steel housing; corrosion resistant
- Available for ceiling or wall installations
- Continuous 1" open leaf steel hinge secured to door and housing
- Clear or pearlescent polycarbonate or DR acrylic lens option
- Continuous row mounting option for multiple luminaires
- Symmetrical transverse distribution
- UL Certified IP65 per IEC 60598

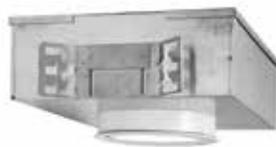


EnviroSeal™ Series
Pg. 35/42



TDL6 Series LED

- Ideal for platform and general area applications
- Seam welded aluminum housing with external, extruded aluminum heat sink; corrosion resistant
- Recessed ceiling mount with 6" aperture
- High-impact acrylic, polycarbonate or tempered glass outer lens
- High-efficiency symmetric diffusion inner lens
- Adjustable mounting brackets for ease of installation
- TDL Series also available in HID, CFL, INC; and 8" aperture
- ETL Certified IP65 per IEC 60598



LuxTran™ Series
Pg. 45



Note: LED sources are available in multiple wattages and color temperatures.

LTD2424

- Ideal for tunnel applications
- One-piece, stainless steel housing; seam welded construction; corrosion resistant
- Doorframe secured to housing with stainless steel cam latches for ease of maintenance
- Clear tempered glass lens sealed to doorframe
- Probeam and counter beam asymmetric distribution
- Vibration tested
- UL Certified IP66 per IEC 60598



LuxTran™ Series
Pg. 28



LTD14

- Ideal for tunnel applications
- One-piece, stainless steel housing; seam welded construction; corrosion resistant
- Doorframe secured to housing with stainless steel cam latches for ease of maintenance
- Clear tempered glass lens sealed to doorframe
- Symmetrical transverse distribution
- Vibration tested
- UL Certified IP66 per IEC 60598



LuxTran™ Series
Pg. 28

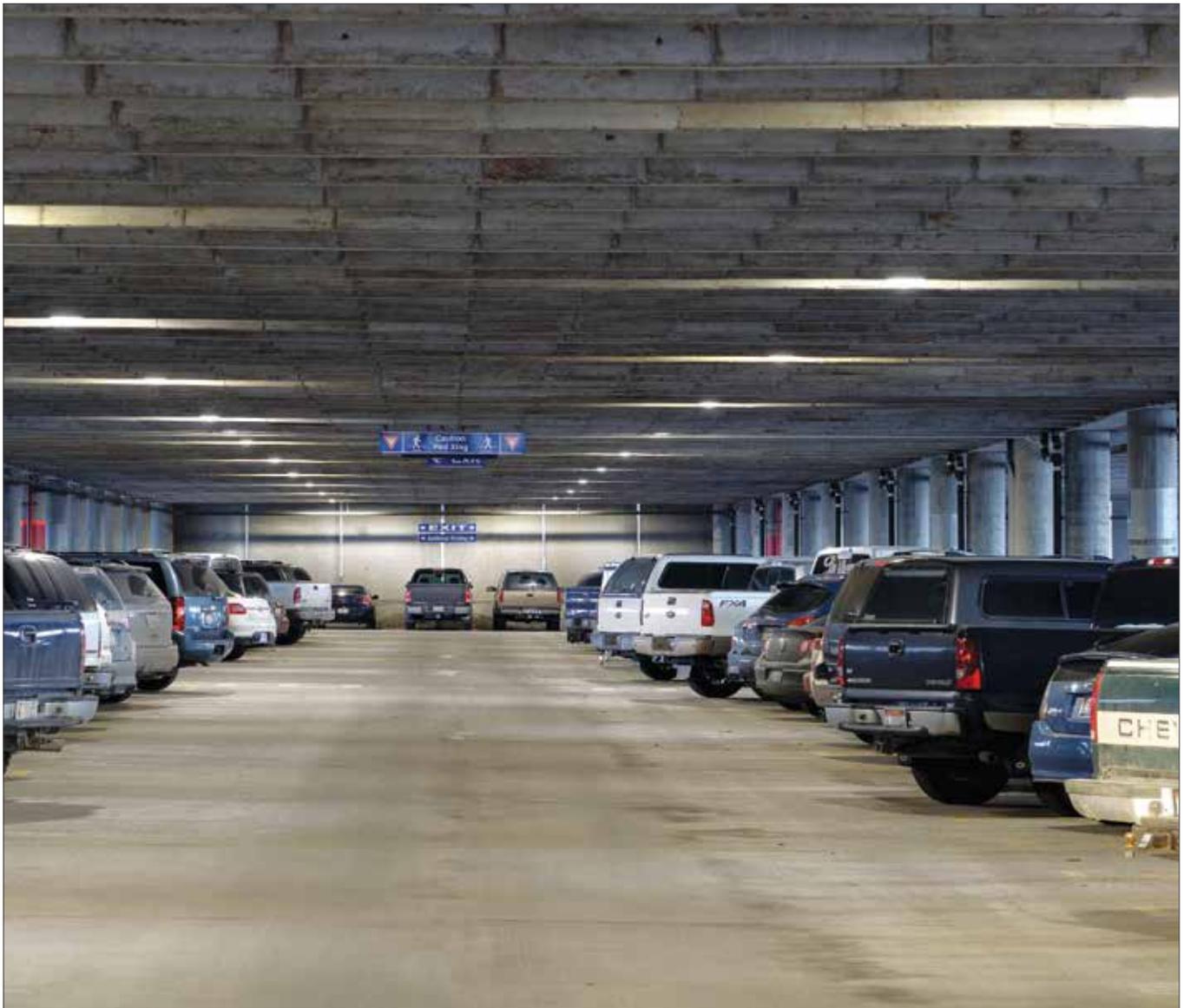


LTD1224

- Ideal for tunnel applications
- Aluminum alloy housing; anodized finish
- Isolated, external stainless steel hardware for corrosion protection
- One-piece, seam-welded doorframe with rotary pull latches for ease of maintenance
- Clear tempered glass lens
- Symmetrical axial distribution
- Vibration tested
- UL Certified IP65 per IEC 60598



LuxTran™ Series
Pg. 27







PROJECT: Lower Wacker Drive
LOCATION: Chicago, IL
PRODUCT SPECIFIED: DLD1220



Best Practices in Underpass Lighting

Effective lighting for underpass applications must deliver consistent light levels throughout the space. Of particular concern is the dark void that drivers face when approaching a bright exit, which may interfere with their ability to see an obstacle from a distance—defined as a ‘safe Stopping Distance’ (SSD).

In addition, vertical illumination and uplight are important for pedestrian walkways to enhance the perception of safety and discourage criminal activity.

Kenall's LuxTran™ underpass fixtures are available in a variety of LED, HID and induction lamp sources, with reflector/flat lens or drop dish refractor optical systems to ensure that optimal light levels are maintained throughout the structure.

Best practices in underpass lighting include:

- Maintaining optimal light levels
- Illuminating pedestrian walkways
- Durable, sealed construction for corrosion-, shock- and vibration-resistance
- Ingress protection ratings to prevent the infiltration of water and dust
- Ease of installation and maintenance

Optimal Light Levels

As defined by ANSI/IES RP-22-11, underpasses are structures with lengths and physical configurations that “do not substantially limit the driver’s ability to see objects ahead.” Additionally, underpasses less than 80 feet in length require no supplemental daytime lighting.

When identifying nighttime illumination needs, underpasses are classified as either short or long. While short underpasses can be illuminated with conventional roadway lighting, if the light levels or uniformity are impacted by the structure, the underpass is considered long and requires additional lighting.

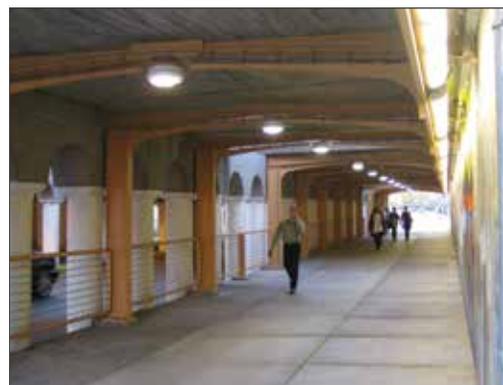
Due to their extended life, reduced maintenance and potential for cost and energy savings, there is a growing trend toward the use of LED sources in underpass lighting applications.



Illuminated Pedestrian Walkways/Bikeways

Pedestrian lighting must be considered whenever an underpass contains pedestrian walkways or bikeways. Effective illumination in these areas is dependent upon activity level, proximity to vehicular traffic and the presence of nighttime lighting, but must support emergency egress. Surface reflectances of perimeter walls and/or key landscape features must also be considered.

The IES recommends the use of illuminance values because surface reflectances can vary widely and are often unknown when designing walkways and bikeways. Suggested luminances are dependent upon the class of roadway and the degree of driver and pedestrian interaction. See ANSI/IESNA’s *American National Standard Practice for Roadway Lighting* for recommended pedestrian walkway and bikeway luminances and uniformity ratios.



Vibration-Resistance

Vehicles traveling at a high rate of speed through or above an underpass cause repeated vibration that can negatively impact lighting fixtures. As a result, luminaires specified for this environment must be tested to ensure that the integrity of the fixture is maintained when subject to repeated vibration. Select Kenall transportation luminaires are vibration tested to ANSI C136.31-2001 standards, ensuring that they are a durable lighting solution for underpass applications.



ANSI 136.31-2001 details the American National Standard for Roadway Lighting Equipment- Luminaire Vibration. Test criteria, designed to simulate wind- and traffic-induced vibration, recommends that luminaires with die-cast aluminum housings used in bridge and overpass applications be tested at an acceleration intensity of 3.0G (29.4 m/s²). Kenall’s LuxTran™ luminaires are independently tested for vibration and shock according to this ANSI standard, ensuring their ability to withstand the challenges of these potentially damaging environments.

Ease of Installation and Maintenance

Due to the inherent challenges of maintaining underpass fixtures, Kenall luminaires are specifically designed for ease of maintenance. Tool-less access, spring-loaded sockets, and quick electrical disconnects are signature features of Kenall’s underpass lighting series.

In addition, long-life LED luminaires are an ideal solution for underpass installations where maintenance can present a significant challenge. New LED options offer rapid payback via attractive cost and energy savings, which can also be further enhanced by the creative use of tax incentives and rebates.





DLD Series **LED**

- One-piece, seam welded, marine-grade aluminum alloy housing; polyester powder coat finish; corrosion resistant
- Mounting brackets allow 360° adjustment
- Stainless steel rotary latches with tool-less access to electrical compartment
- Prismatic tempered glass
- Standard 0-10% dimming capability



Nominal Size	12" x 20" (DLD1220)
Nominal Size	16" x 22" (DLD1622)
Installation Types	Surface ceiling wall mount
Lamp Types	LED



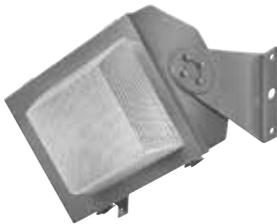
The image above illustrates the sharp contrast in light levels and color between the existing high-pressure sodium luminaire on the left and the Kenall LED retrofit fixtures on the right. Additionally, solid-state lighting is more robust; capable of withstanding the repeated vibration resulting from trucks and trains traveling overhead.





DLD Series

- One-piece, seam welded, marine-grade aluminum alloy housing; polyester powder coat finish; corrosion resistant
- Mounting brackets allow 360° adjustment
- Stainless steel latches allow for tool-less access to lamp/ballast compartment
- Polycarbonate deep dish lens—internal prisms with smooth exterior
- Removable, tool-less power tray for ease of maintenance



Nominal Size	12" × 20" (DLD1220) 16" × 22" (DLD1622)
Installation Types	Surface ceiling mount
Lamp Types	HPS



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WFT Series

- One-piece, stainless steel housing; seam welded construction; corrosion resistant
- Detachable doorframe with stainless steel spring loaded release hinges and stainless steel latches
- Clear tempered glass lens sealed to doorframe
- Type III or IV distribution options
- Removable gear tray for ease of maintenance
- UL Certified IP66 per IEC 60598



Nominal Size	12.5" × 21"
Installation Types	Surface wall mount
Lamp Types	HPS, MH

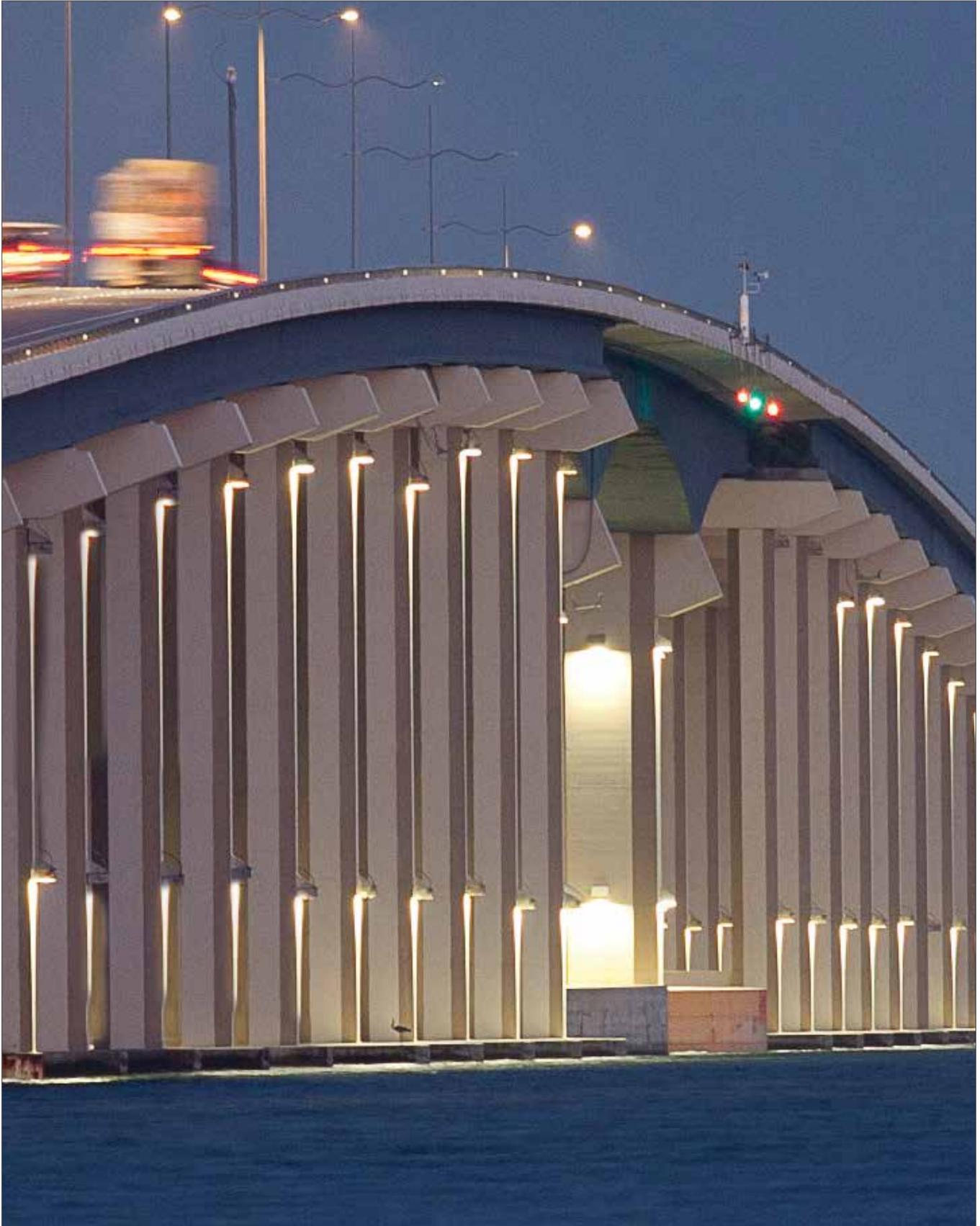
**TSQD Series**

- One-piece, cold rolled steel, stainless steel or marine-grade, aluminum housing available; corrosion resistant
- One-piece doorframe sealed to housing with closed cell neoprene gasket and fasteners
- Type V distribution
- External mounting brackets for ease of installation
- Vibration tested



Nominal Size	20" × 20"
Installation Types	Surface ceiling mount
Lamp Types	HPS, MH, Induction Fluorescent





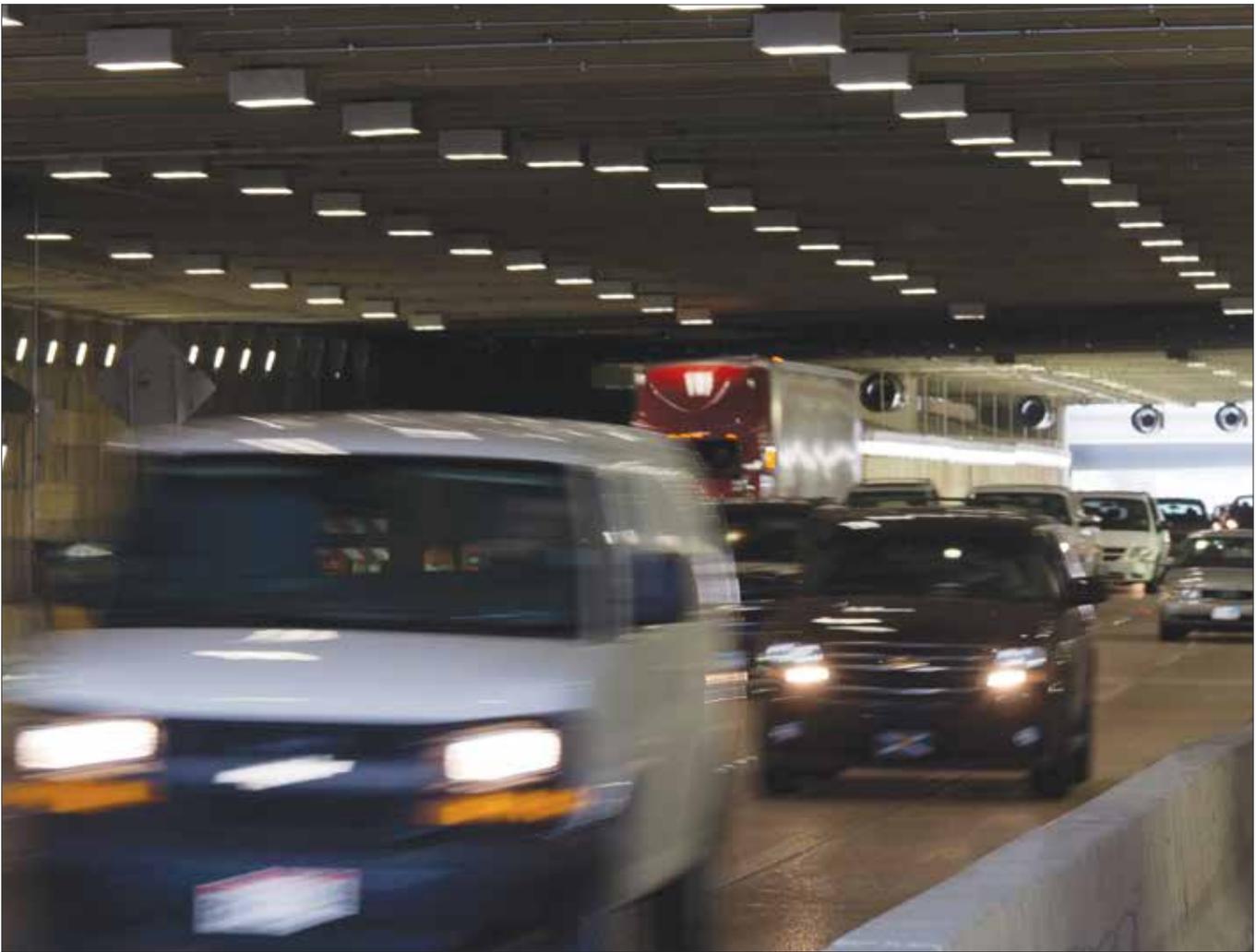
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PROJECT: Woodall Rodgers Tunnel
LOCATION: Dallas, TX
PRODUCT SPECIFIED: CFT Series



Best Practices in Tunnel Lighting

Tunnels are defined as structures over 80 feet in length that can accommodate either vehicular or transit traffic. The goal of tunnel lighting is to ensure the safe flow of traffic from the tunnel's entrance through to its exit. Tunnel lighting must enable the driver to quickly adjust to differing light levels throughout the tunnel and maintain a consistent speed, while still being able to identify potential obstacles.

An effective tunnel lighting solution must compensate for variables such as outside light levels, speed, density of traffic and time of day. Additional factors to be considered include the degree of driving complexity, tunnel orientation, risk of dangers within the zone, and the potential of converting the exit into an entrance during an emergency or routine maintenance.

Kenall's LuxTran™ family of luminaires offers variable lamp sources, flexible mounting configurations, compatibility with controls (by others), and specially designed optical systems to address the complex and highly specialized needs of tunnel lighting as follows:

- Support driver's visual perceptions both day and night by addressing:
 - Temporal visual adaptation- the eye's ability to adapt when moving from brightness to darkness
 - Spatial adaptation- the eye's ability to adapt from a very wide to a very narrow field of vision
 - Variable needs of the distinct tunnel zones
- Zone appropriate contrast via the use of various distribution types, including:
 - Symmetric lighting
 - Asymmetric, counter-beam lighting creating negative contrast
 - Asymmetric, pro-beam lighting creating positive contrast
- Critical emergency lighting
- Corrosion-resistance via durable, sealed construction
- Water and dust infiltration via ingress protection ratings
- Shock- and vibration-resistance
- Redundant circuitry
- Ease of installation and maintenance

Supporting The Driver's Visual Perceptions

Given the complex nature of lighting a tunnel application, one of the greatest challenges presented is the ability to support drivers' visual perceptions—both day and night—from the point of entry through to the point of exit. The lighting must allow vehicles to travel the length of the tunnel safely without impeding traffic flow, while providing maximum comfort. Once the driver's eye reaches the adaptation point—where the tunnel opening occupies their primary field of vision—it begins to adjust incrementally to the changing luminance levels via spatial adaptation and temporal visual adaptation. It is essential that the lighting layout support this adaptation.



Spatial Adaptation

The initial challenge presented to the driver when entering a tunnel is a narrowing field of vision, which correlates to the angle of the tunnel's entrance. Hence the driver's eyesight must quickly adapt from a very wide field of vision to a very limited one. This need for spatial adaptation dictates that the light levels within the tunnel be matched to the adaptation level of the drivers' eyes.



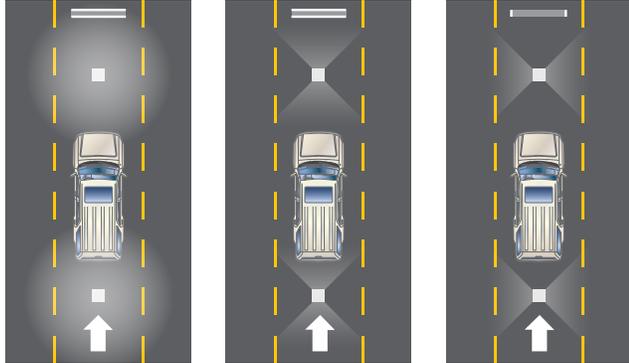
Temporal Visual Adaptation

An effective tunnel lighting system must account for the fact that the human eye needs greater adaptation time to move from brightness to darkness than vice versa. The distance traveled during this adaptive phase must be considered when configuring a tunnel's lighting layout.

Light Distributions For Tunnel Lighting

Tunnel lighting is available in a variety of distribution types—both symmetric and asymmetric—each with specific benefits and applications. When specifying tunnel lighting, thoughtful consideration should be given to the variety of distribution types available. The goal is to maximize the driver’s visual experience and illuminate potential obstacles, thereby optimizing their safety and comfort.

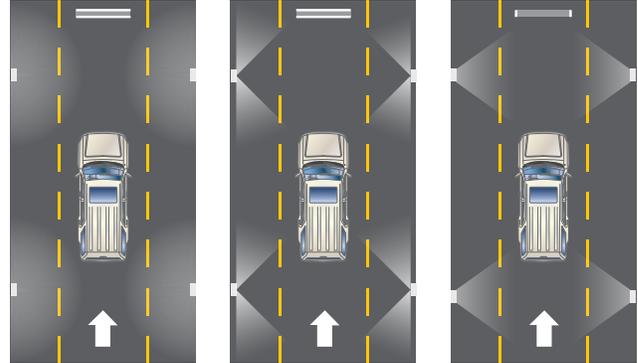
Symmetrical-Transverse Lighting



Light that radiates at right angles to the axis of the tunnel, directing it evenly to the walls

- Uniform luminance throughout tunnel interior
- Generally low contrast values
- Maximizes wall luminances
- Maximizes candlepower to walls

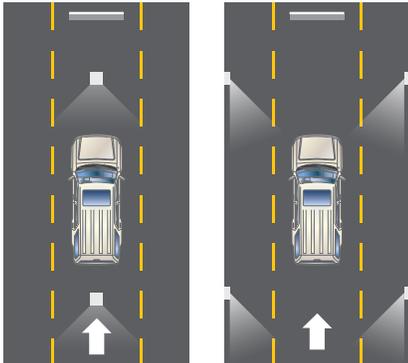
Symmetrical-Axial Lighting



Light that radiates parallel to the axis of the tunnel, distributing it parallel to the traffic flow

- Uniform luminance throughout tunnel interior
- Generally low contrast values
- Maximizes flux parallel to traffic flow
- Maximizes candlepower to vehicle

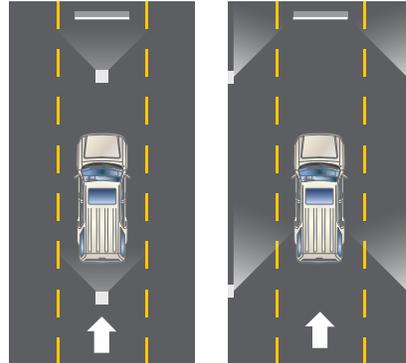
Asymmetric– Negative Contrast (Counter-Beam)



Light that radiates parallel to the tunnel axis and against the directional flow of traffic

- Predominantly distributed towards the driver, but in a controlled manner to reduce glare
- Provides high pavement luminance, and low object luminance to enhance negative contrast
- Light above 45° must be strictly controlled

Asymmetric– Positive Contrast (Pro-Beam)

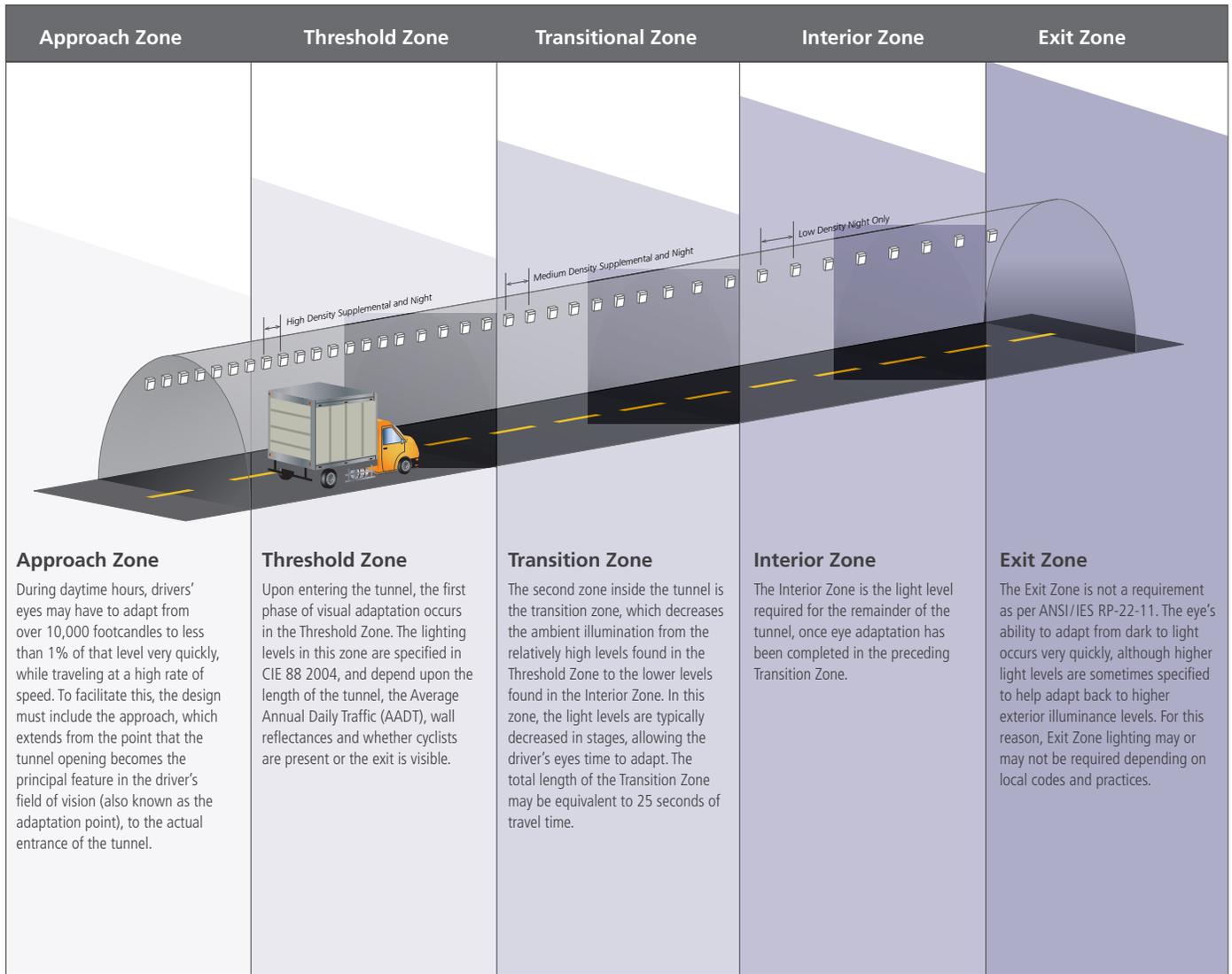


Light that radiates parallel to the tunnel axis with the directional flow of traffic

- Minimal glare towards the driver
- Primary disruption is in direction of traffic flow
- Provides high object luminance, and low pavement luminance to create positive contrast

Tunnel Lighting Zones

The human eye requires more time to adapt from brightness to darkness than the reverse. For this reason, tunnel lighting must gradually transition to interior light levels. During nighttime hours, the area outside the tunnel is dark, whereas interior levels are similar to those of an illuminated open roadway, making the transition minimal. Tunnel lighting is comprised of distinct zones, each with unique lighting needs:



Tunnel Lighting: Additional Considerations

Flicker Effect

In addition to lighting each zone of the tunnel appropriately, the lighting design must mitigate the flicker effect caused by the interaction of vehicular speed and luminaire spacing. Flicker frequencies of 10 to 60 flashes per second can cause headaches, eye strain and seizures.

Redundant Circuitry

Kenall's tunnel luminaires are also engineered with redundant circuitry to ensure that if a circuit or transformer fails, there will be an adequate amount of light delivered to the space. In addition, a specified number of fixtures can be dedicated to an emergency circuit, enabling them to remain on should more than one circuit or transformer fail.

Vibration Testing

Vehicles traveling at a high rate of speed also cause repeated vibration that can negatively impact luminaires. As a result, fixtures specified for this environment must be tested to ensure the integrity of the fixture is maintained when subject to repeated vibration. Select Kenall transportation luminaires are tested to ANSI C136.31-2001 standards, ensuring that they are a strong tunnel lighting solution.



WFT Series

- One-piece, stainless steel, seam welded housing; corrosion resistant
- Detachable doorframe with stainless steel spring loaded release hinges and stainless steel latches
- Clear tempered glass lens sealed to doorframe
- Type III or IV distribution options
- Removable gear tray for ease of maintenance
- UL Certified IP66 per IEC 60598



Nominal Size | 12.5" x 21"
 Installation Types | Surface wall mount
 Lamp Types | HPS, MH

**CFT Series**

- One-piece, stainless steel housing; seam welded construction; corrosion resistant
- Detachable doorframe with stainless steel spring loaded release hinges and stainless steel latches
- Clear tempered glass lens sealed to doorframe
- Type III or IV distributions; forward throw option
- Tool-less access to ballast compartment for ease of maintenance
- External mounting brackets for ease of installation
- UL Certified IP66 per IEC 60598



Nominal Size | 12.5" x 21", 12" x 28"
 Installation Types | Surface wall ceiling mount (wall mount vertical)
 Lamp Types | HPS, MH



TSQD Series

- One-piece, cold rolled steel, stainless steel or marine-grade, aluminum housing available; corrosion resistant
- One-piece doorframe sealed to housing with closed cell neoprene gasket and fasteners
- Type V distribution
- External mounting brackets for ease of installation
- Available in a variety of lens types
- Vibration tested



Nominal Size	20" x 20"
Installation Types	Surface ceiling mount
Lamp Types	HPS, MH, Induction Fluorescent



LTD1224 Series

- Aluminum alloy housing; anodized finish
- Isolated, external stainless steel hardware for corrosion resistance
- One-piece, seam-welded doorframe with rotary pull latches for ease of maintenance
- Clear tempered glass lens
- Symmetrical axial distribution
- Vibration tested
- UL Certified IP65 per IEC 60598



Nominal Size	12" x 24"
Installation Types	Surface wall ceiling mount
Lamp Types	250S, 400S



LTD2424

- One-piece, stainless steel housing; seam welded construction; corrosion resistant
- Doorframe secured to housing with stainless steel cam latches for ease of maintenance
- Clear tempered glass lens sealed to doorframe
- Probeam and counter beam asymmetric distribution
- Vibration tested
- UL Certified IP66 per IEC 60598



Nominal size | 24" x 24"
 Installation types | Surface ceiling or wall mount
 Lamp types | HPS, MH

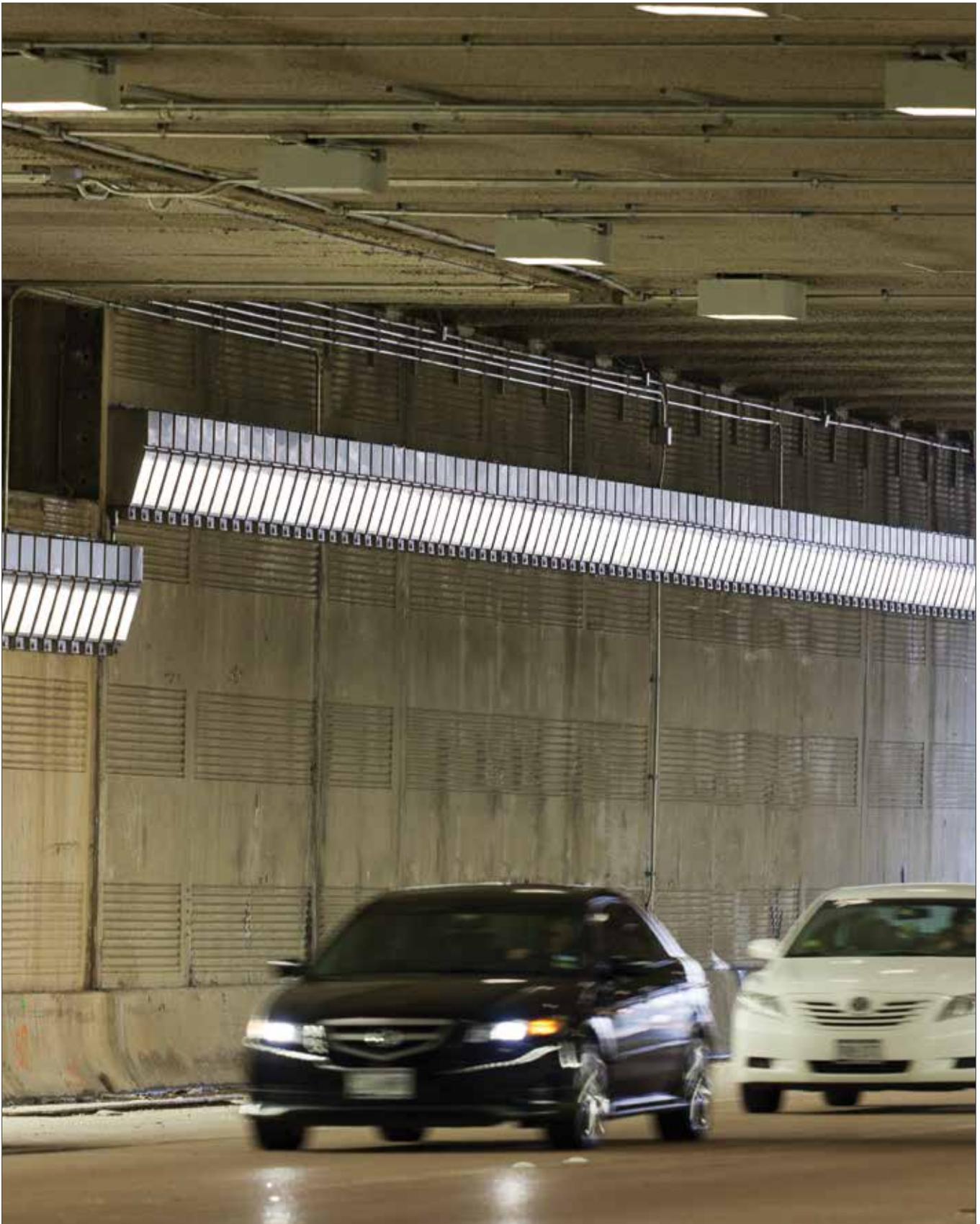
**LTD14**

- One piece, stainless steel housing; seam welded construction; corrosion resistant
- Doorframe secured to housing with stainless steel cam latches for ease of maintenance
- Clear tempered glass lens sealed to doorframe
- Symmetrical transverse distribution
- Vibration tested
- UL Certified IP65 per IEC 60598



Nominal size | 12" x 48"
 Installation types | Surface ceiling or wall mount
 Lamp types | T5, T5HO





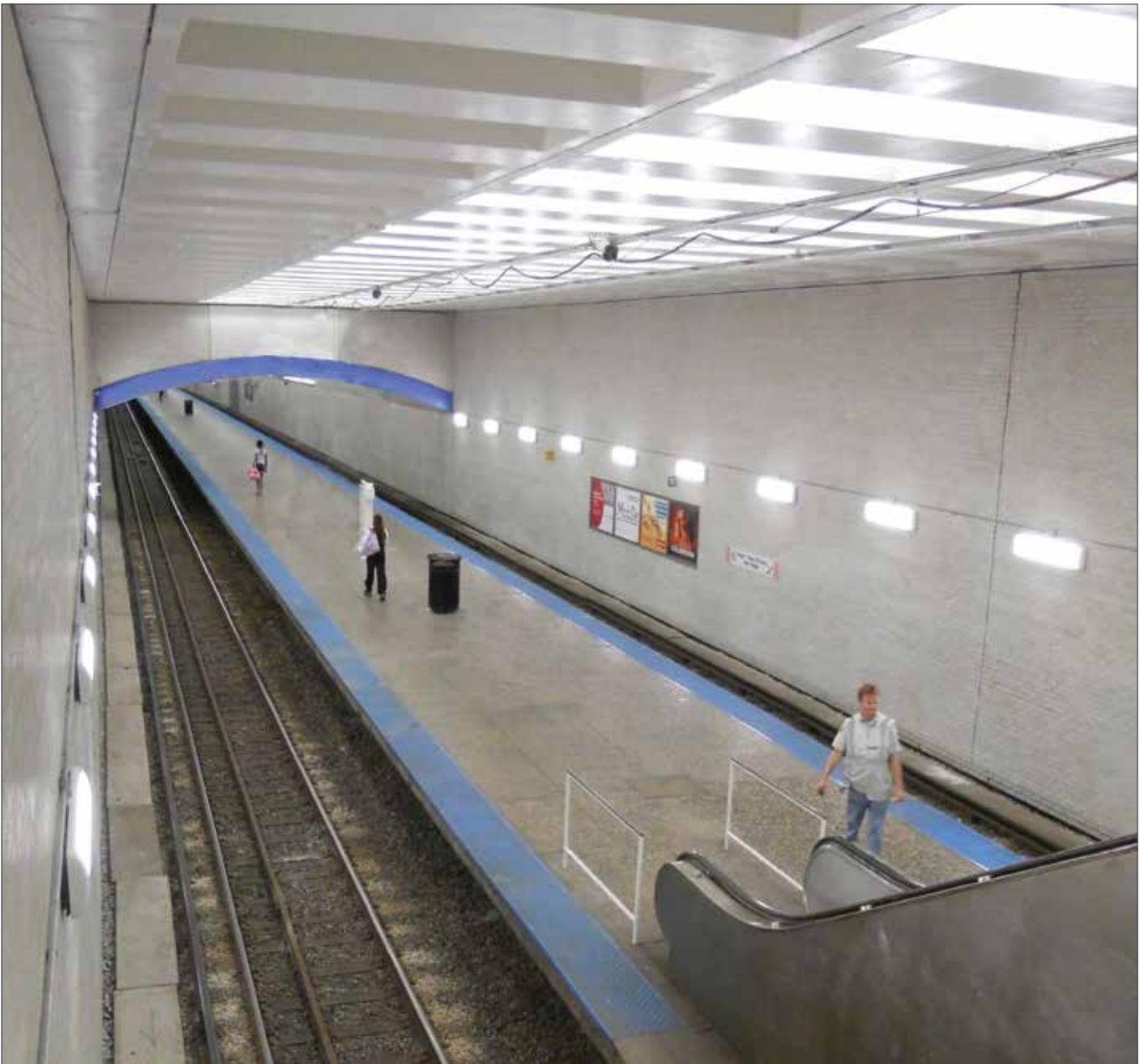
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PROJECT: Logan Square Station
LOCATION: Chicago, IL
PRODUCT SPECIFIED: MLHA12 Series



Best Practices in Transit Lighting

Effective transit lighting is critical to ensuring the safety and security of its patrons. As such, it must support the train operator's visibility of pedestrians and obstructions, evenly illuminate stairwells and platforms, and facilitate monitoring and surveillance efforts. The fixtures must also be vandal resistant when installed in unsupervised public areas.

Kenall transit luminaires follow industry best practices, including:

- Mitigation of visual annoyances, including the stroboscopic effect of passing trains
- Delivering appropriate light levels for:
 - Transit tunnels
 - Transit maintenance platforms
 - Platforms
- Redundant / dual circuitry
- Available long-life LED lamp sources
- Durable, sealed construction for corrosion-, shock- and vibration-resistance
- Ingress protection ratings to prevent the infiltration of water and dust
- Ease of installation and maintenance

Visual Annoyances

Transit stations servicing commuter trains require luminaires that mitigate the disturbing 'stroboscopic effect' created by passing trains. In addition, because glare can be problematic, the lighting selected must support the operator's ability to identify obstacles on the track as well as pedestrians boarding and exiting the train.

The impact of the strobe effect on the operator's visual acuity is dependent upon:

1. **Frequency**—the number of luminance changes per second
2. **Duration**—the length of time the experience lasts
3. **Modulation depth and intensity**—the ratio of light to dark luminance within a designated period of time

Kenall offers a variety of lighting products that minimize visual annoyances, including the stroboscopic effect, while maintaining adequate light levels in the station.



Vibration Resistance

High-speed trains typically produce significant vibration as they travel the rails, which can be felt throughout the station from the ticket counter to the platform. In addition, the vacuum created from trains passing each other at a high rate of speed can negatively impact improperly designed and engineered lighting fixtures. As a result, luminaires specified for this environment must be tested to ensure that the integrity of the fixture is maintained when subject to repeated suction and/or vibration. Select Kenall LuxTran™ luminaires are tested to ANSI C136.31-2001 standards, ensuring that they are a strong lighting solution for all areas of the transit station.



ANSI 136.31-2001 details the American National Standard for Roadway Lighting Equipment- Luminaire Vibration. Test criteria, designed to simulate wind- and traffic-induced vibration, recommends that luminaires with die-cast, marine-grade aluminum housings used in bridge and overpass applications be tested at an acceleration intensity of 3.0G (29.4 m/s²). Select Kenall LuxTran™ luminaires are independently tested for vibration and shock according to this ANSI standard, ensuring their ability to withstand the challenges of these potentially damaging environments.

Durable, Sealed Construction

Kenall's legendary durability is a signature of our LuxTran platform and general area luminaires. Features of the LuxTran series include tempered glass, polycarbonate or high-impact acrylic lenses, seam welded stainless steel or marine-grade aluminum housing, ingress protection ratings to prevent the infiltration of water and dust, tool-less entry or tamper-resistant fasteners, spring-loaded sockets and quick electrical disconnects. Such features are particularly desirable on transit platforms or in heavy use waiting areas where routine maintenance can present significant challenges.





TMLHA Series **LED**

- Die-cast extruded, marine-grade aluminum housing; corrosion resistant
- Available in surface, ceiling, wall, corner or optional pendant mount
- Polycarbonate lens standard
- Patented modular system; continuous row mounting
- Shock-resistant sockets for positive lamp retention
- UL Certified IP64 per IEC 60598



Nominal Size | 12" widths (5", 8" width available in MLHA series)
 Installation Types | Ceiling, wall, corner or optional pendant mount
 Lamp Types | T5, T5HO, T8, T8HO, LED



SLR Series **LED**

- Stainless steel housing; passivated, seam welded construction; corrosion resistant
- Stainless steel doorframe secured to housing with stainless steel rotary latches
- High-impact polycarbonate lens
- Standard 0-10% dimming capability
- ETL Certified IP65 per IEC 60598



Nominal Size | 6" x 20"
 Installation Types | Surface wall mount
 Lamp Types | LED



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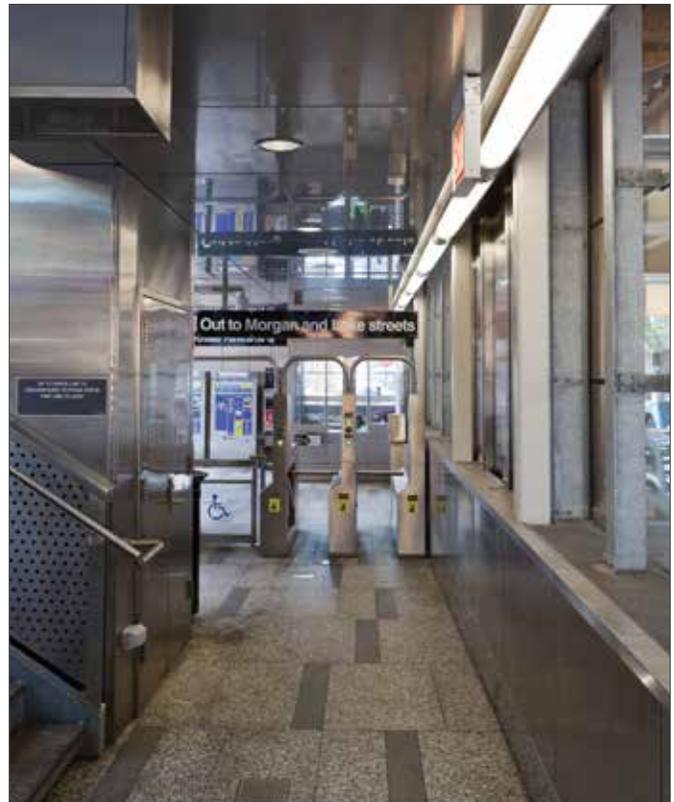


TES Series **LED**

- One-piece, cold rolled steel or stainless steel housing; corrosion resistant
- Available for ceiling or wall installations
- Continuous 1" open leaf steel hinge secured to doorframe
- Clear or pearlescent polycarbonate or DR acrylic lens option
- Continuous row mounting option for multiple luminaires
- Symmetrical transverse distribution
- UL Certified IP65 per IEC 60598



Nominal Size	5" x 48"
Installation Types	Surface ceiling or wall mount
Lamp Types	T5, T5HO, T8, T8HO, LED





Morgan

1000W
200N

IF YOU SEE SOMETHING, SAY SOMETHING.

- Unattended packages
- Noxious smells or smoke
- Someone acting suspiciously

Tell a _____ employee immediately or **CALL 911** for emergencies. Learn more about safety and security basics at transitchicago.com/safety.

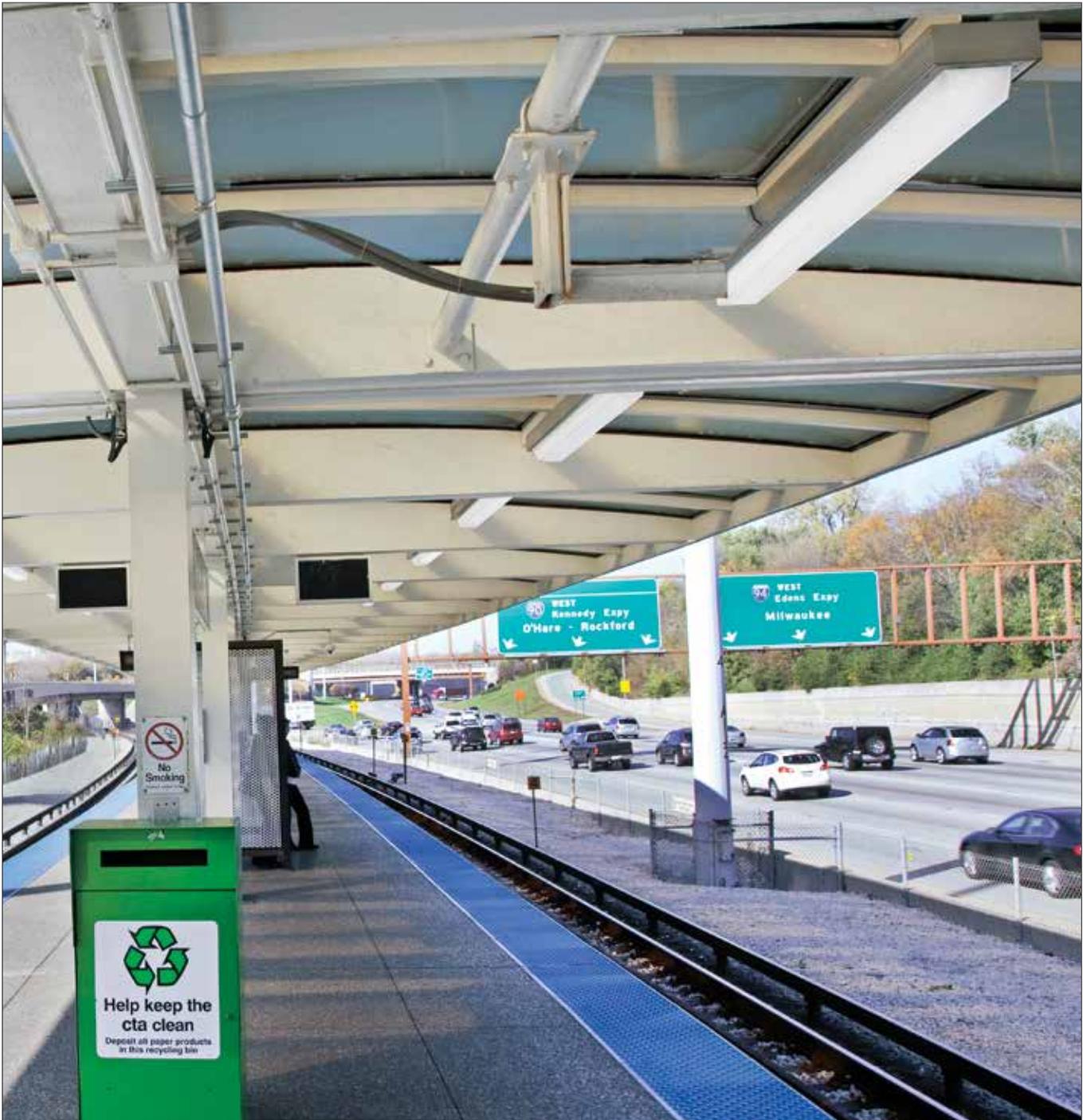
Photo courtesy of Chicago Police Department, Homeland Security.

STYLISH OR SUSPICIOUS? CTA is Committed to Safety

PUSH FOR
CUSTOMER
ASSISTANT

Authorized
personnel only

PROJECT: Morgan Street Station (CTA)
LOCATION: Chicago, IL
PRODUCTS SPECIFIED: EnviroSeal™ (TE55), LuxTran 6" Downlight (TDL6VF)



Best Practices in Platform and General Area Lighting

One of the most important requirements of platform lighting is an ability to create a safe and secure environment for transit patrons in unsupervised public areas. Light levels must be bright enough to promote wayfinding, spatial orientation and visual clarity, while simultaneously avoiding disability glare and the annoying “strobe effect” created by the passing of high speed trains. Platform and general area lighting best practices include:

- Emergency lighting
- Durable, sealed construction for corrosion-, shock- and vibration-resistance
- Ingress protection rated to prevent the infiltration of water and dust
- Ability to deliver appropriate light levels to ensure traffic flow
- Ease of installation and maintenance

Appropriate Light Levels

Of primary concern when lighting transportation platforms and general areas is the safety and security of the patrons awaiting or exiting trains. Lighting must provide even illumination in support of:

- Surveillance cameras
- Patrons entering and exiting trains safely
- Proper observation of signage to ensure traffic flow

The IES recommended light levels for platform queuing areas are five horizontal footcandles and two vertical footcandles, with a 3:1 uniformity ratio. Recommended light levels for the platform to car threshold—which may require localized lighting at the embark and disembark areas due to hazard markings, steps and curbs—are ten horizontal footcandles and three vertical footcandles, with a 2:1 uniformity ratio.



Sealed for Vibration-Resistance and Ingress Protection

High-speed trains produce significant vibration as they travel the rails, which can be felt throughout the station. The vacuum created from trains passing each other at a high rate of speed can also have a negative impact on improperly designed light fixtures. Kenall LuxTran™ luminaires are tested to ANSI C136.31-2001 standards, ensuring that the integrity of the fixture is maintained when subjected to repeated vibration.

In addition, exposure to the elements and the need for routine maintenance—typically with high pressure hoses—require that the fixtures be protected from the ingress of water, bugs, dirt and debris. Select Kenall state-of-the-art certified safety laboratory and affiliation with independent testing facilities ensure that our transportation fixtures will withstand the rigors of even the most challenging transportation environments.



Emergency Lighting

Transportation platforms and general areas depend on exit and emergency lighting and signage to address patron flow. Kenall's Millennium Metrex™ offers an extensive array of signage and exit and emergency products that meet life safety codes. By combining Kenall's signature durability with long-life LED lamp sources, our comprehensive selection of exit and emergency lighting and signage will safely guide patrons around the station—particularly in the event of an emergency.



Ease of Installation and Maintenance

Kenall's LuxTran platform and general area luminaires have been specifically designed with ease of maintenance in mind. Offering options such as tool-less entry or tamper-resistant fasteners, spring loaded sockets and quick electrical disconnects, Kenall transportation luminaires facilitate routine maintenance in applications where it often presents a real challenge.





TSDA Series

- One-piece, stainless steel housing; corrosion resistant
- Doorframe secured to housing with tamper-resistant fasteners and heavy-gauge stainless steel piano hinge
- Available in a variety of lens types

TSDD Series

- One-piece, stainless steel housing; corrosion resistant
- Doorframe secured to housing with heavy-gauge stainless steel piano hinge
- Available in a variety of lens types



Nominal Size | 12" x 48", 12" x 96"
 Installation Types | Surface ceiling mount
 Lamp Types | T8, T8HO

Nominal Size | 24" x 24", 24" x 48"
 Installation Types | Surface ceiling mount
 Lamp Types | T8, T8HO



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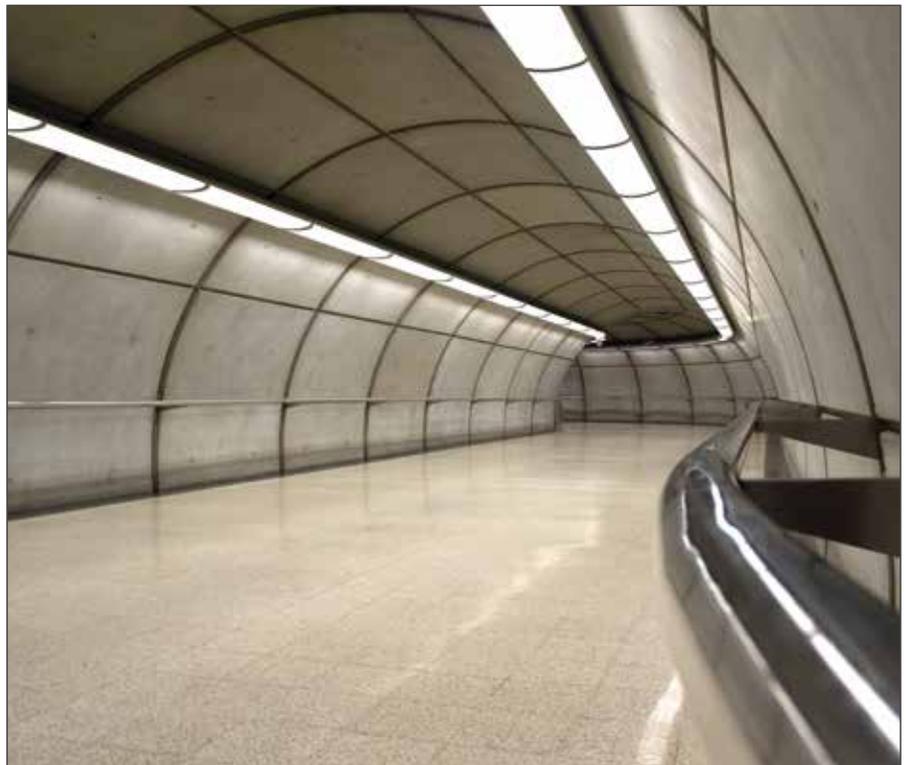
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TMLHA Series LED

- Die-cast extruded, marine-grade aluminum housing; corrosion resistant
- Available in surface, ceiling, wall, corner or optional pendant mount
- Polycarbonate lens standard
- Patented modular system; continuous row mounting
- Shock-resistant sockets for positive lamp retention
- UL Certified IP64 per IEC 60598



Nominal Size | 12" x 24", 12" x 48", 12" x 96"
 Installation Types | Surface – ceiling or wall mount
 Lamp Types | T5, T5HO, T8, T8HO, LED



TCD Series LED

- One-piece, stainless steel housing; corrosion resistant
- Corner mount
- Continuous stainless steel hinge
- Sealed lens with continuous retention
- Available in a variety of lens types



Nominal Size | 8" x 24", 8" x 48"
 Installation Types | Corner mount
 Lamp Types | T8, T8HO, LED



DLL Series

- Stainless steel housing construction; corrosion resistant
- Doorframe with continuous stainless steel piano hinge for ease of maintenance
- Drop dish, clear polycarbonate lens silicone sealed to doorframe



Nominal Size	9" x 48", 9" x 96"
Installation Types	Surface ceiling mount
Lamp Types	T8HO, T8 w/ 48"

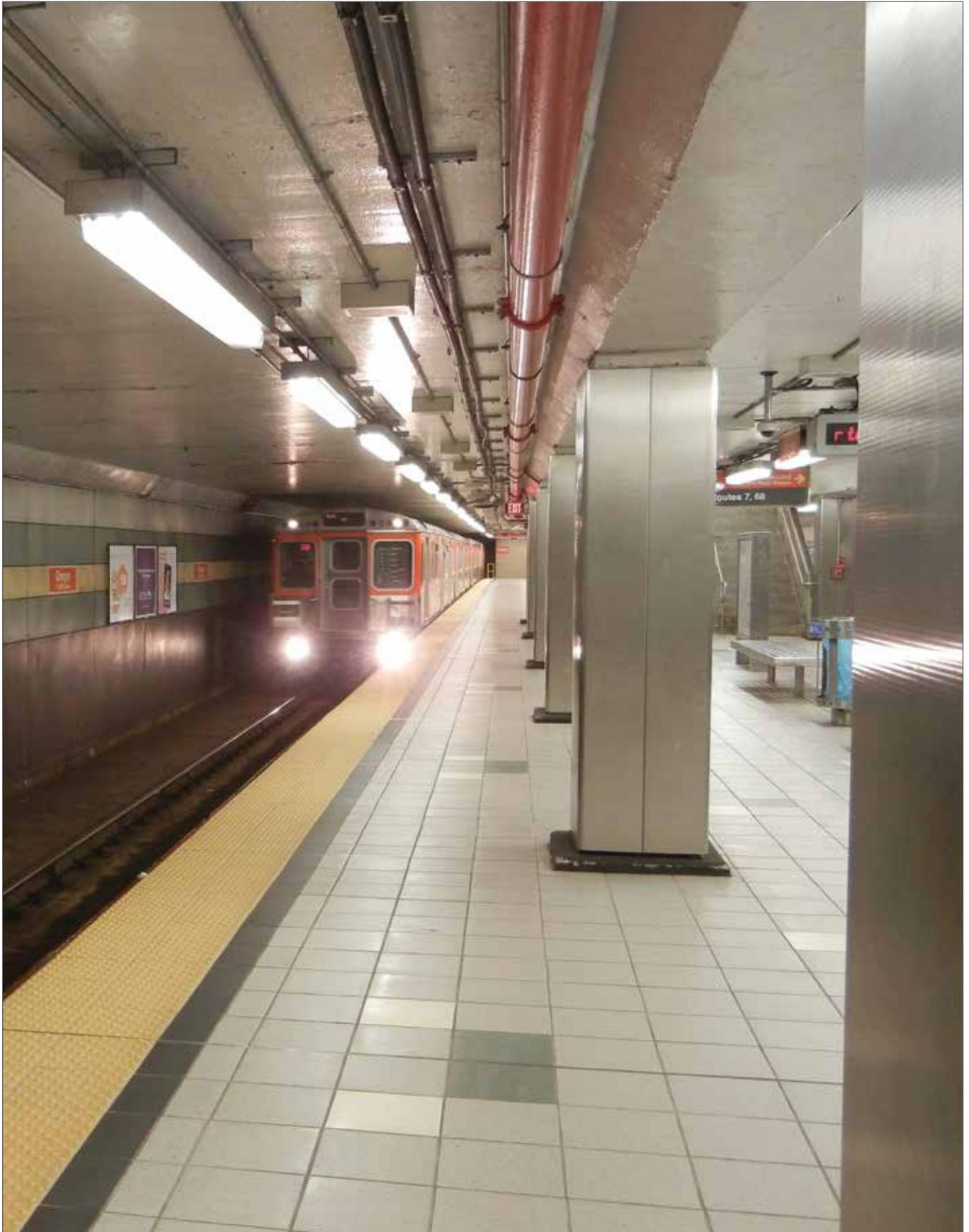
**TES Series** LED

- One-piece cold rolled steel or stainless steel housing; corrosion resistant
- Available for ceiling or wall installations
- Continuous 1" open leaf steel hinge secured to doorframe
- Clear or pearlescent polycarbonate or DR acrylic lens options
- Continuous row mounting option for multiple luminaires
- Symmetrical transverse distribution
- UL Certified IP65 per IEC 60598



Nominal Size	5" x 48"
Installation Types	Surface mount – ceiling or wall
Lamp Types	T5, T5HO, T8, T8HO, LED







TRCA Series

- One-piece, stainless steel housing; seam welded construction; corrosion resistant
- Recessed ceiling mount
- Continuous piano hinge for ease of maintenance
- Available in a variety of lens types



Nominal Size | 12" × 24", 12" × 48"
 Installation Types | Recessed ceiling mount-flange
 Lamp Types | T8, T8HO



TRCD Series

- One-piece, stainless steel housing; seam welded construction; corrosion resistant
- Recessed ceiling mount
- Continuous piano hinge for ease of maintenance
- Available in a variety of lens types



Nominal Size | 24" × 24", 24" × 48"
 Installation Types | Recessed ceiling mount-flange
 Lamp Types | T8, T8HO



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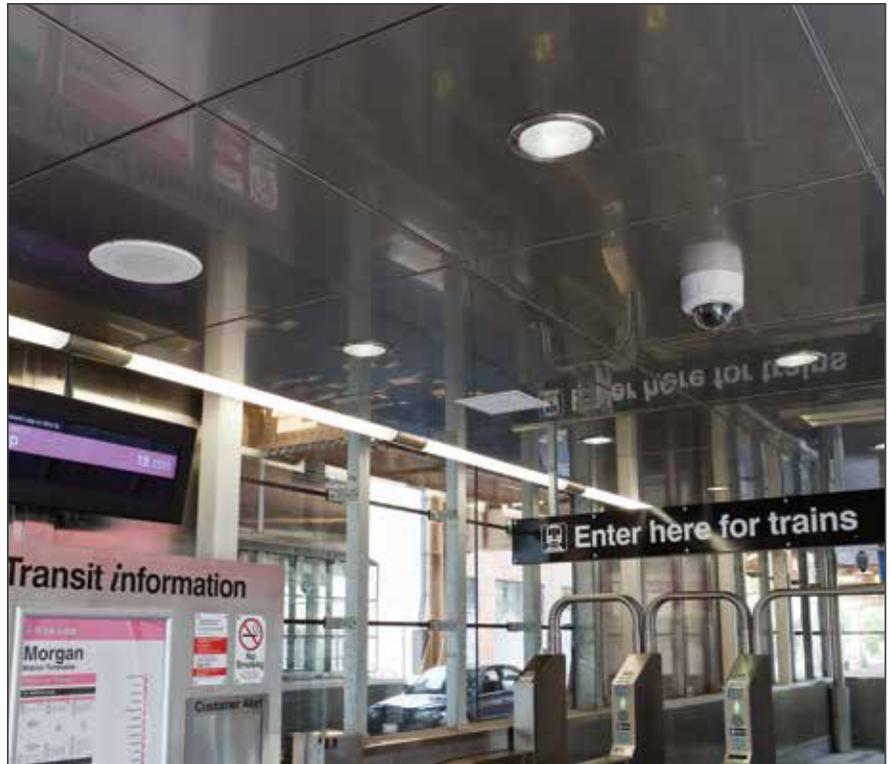
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TDL6 Series LED

- Seam-welded, marine-grade aluminum housing with external, extruded, marine-grade aluminum heat sink; corrosion resistant
- Recessed ceiling mount with 6" aperture
- High impact acrylic, polycarbonate or tempered glass outer lens
- High-efficiency symmetric diffusion inner lens
- Adjustable mounting brackets for ease of installation
- UL Certified IP65 per IEC 60598



Nominal Size | 6" aperture
 Installation Types | Recessed ceiling mount
 Lamp Types | LED



TDL Series

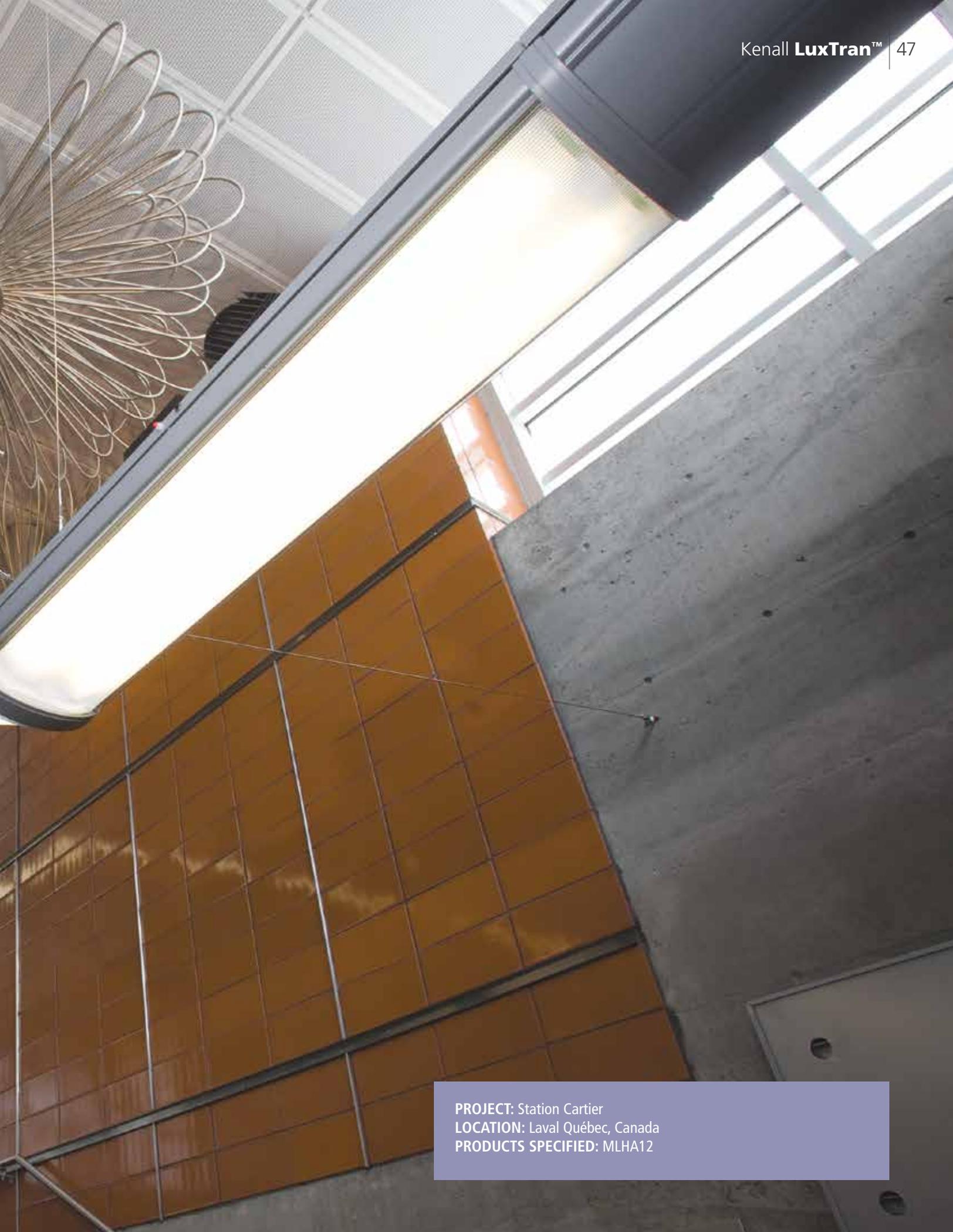
- Fully enclosed and sealed, marine-grade aluminum housing; corrosion resistant
- Corrosion-resistant, stainless steel trim
- Flush lens available in high impact acrylic, polycarbonate or tempered glass
- Adjustable mounting brackets for ease of installation
- UL Certified IP65 per IEC 60598



Nominal Size | 6" & 8" aperture, vertical and horizontal lamp position
 Installation Types | Recessed ceiling mount
 Lamp Types | CFL, Incandescent, HID







PROJECT: Station Cartier
LOCATION: Laval Québec, Canada
PRODUCTS SPECIFIED: MLHA12



Best Practices in Corridor and Stairwell Lighting

Transit station corridors and stairwells require proper illumination in support of patron safety and security. Often located in unsupervised settings, these fixtures are particularly prone to attempts at vandalism and abuse. Corridor and stairwell lighting best practices include:

- Durable, sealed housing construction
- Ingress protection from water, dirt and debris
- Impact resistant lensing
- Occupancy sensing for energy savings
- Ease of installation and maintenance
- Emergency lighting

PEACE OF MIND
Guarantee®

Kenall's high abuse lighting products for corridors and stairwell carry our exclusive Peace of Mind Guarantee® against breakage for the life of the installation.

Lighting Requirements

According to the IESNA, corridor and stairwells are transitional spaces with lighting requirements based upon both activity level and the need for surveillance. IES recommended light levels for this space are as follows:

- **High activity and live surveillance stairwells**—ten horizontal footcandles, five vertical footcandles and a 2:1 uniformity ratio.
- **Typical stairwells**—five horizontal footcandles, three vertical footcandles and a 2:1 uniformity ratio.
- **Escalators**—five horizontal footcandles, three vertical footcandles and a 2:1 uniformity ratio.
- **Public circulation corridors**—five horizontal footcandles, three vertical footcandles and a 2:1 uniformity ratio.



Dependable Signage, Exit & Emergency Lighting

Corridors and stairwells depend on signage and exit and emergency lighting to address patron and station flow. The Millenium Metrex™ series offers an extensive array of signage and exit and emergency products. Offering long life LED options in combination with Kenall's signature durability, this comprehensive selection of signage and exit and emergency lighting will safely guide patrons around the station—particularly in the event of an emergency. Whether your emergency lighting needs call for a 3' or 6' wide path of egress, Kenall's Metrex Series offers systems capable of exceeding Life Safety Code requirements for a wide variety of spatial configurations.

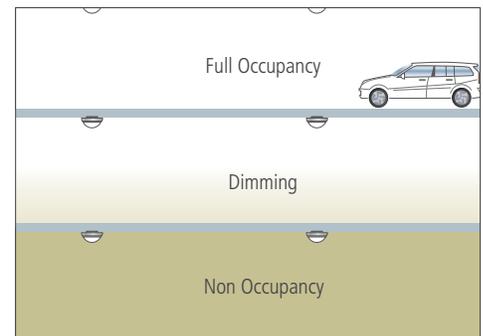


Lighting Controls

As maintenance and operational expenses escalate, facility managers are continuously challenged to find ways of reducing costs by controlling energy. Public transportation facilities must have adequate light levels for proper safety and ingress/egress. Lighting in intermittently occupied areas, when properly controlled, poses the greatest potential for cost savings without sacrificing safety or performance.

An Integrated Solution

For optimal luminaire control and flexibility, Kenall utilizes an integrated, super high-frequency, occupancy sensing feature. In addition to its sensitivity and available control options, the module also features daylighting control that provides additional savings when the sensor detects ambient light levels greater than its daylighting set-point.



Energy Savings

Stand-by dimming level adjustable from 50% to 90% for additional energy savings over bi-level linear fluorescent.



ES Series **LED**

- One-piece, cold-rolled steel or stainless steel housing with welded ends caps; corrosion resistant
- Slide-in-place lock lens
- Shock-resistant sockets
- Integral occupancy sensor available (ES548MS Series)
- UL Certified IP65 per IEC 60598 optional



Nominal Size | 3", 5", 8", 12" widths
 Installation Types | Surface ceiling, wall, or optional pendant mount
 Lamp Types | T5, T5HO, T8, T8HO, Biax, LED



PEACE OF MIND
 Guarantee®

Optional

TMLHA Series **LED**

- Extruded, marine-grade aluminum housing; corrosion resistant
- Die-cast, marine-grade aluminum end caps in flat or round styles
- Stainless steel, tamper-resistant fasteners
- Integral occupancy sensor available (MLHA1248MS and MLHA 1224MS Series)
- UL Certified IP64 per IEC 60598



Nominal Size | 5", 8", 12" widths
 Installation Types | Surface ceiling or wall mount
 Lamp Types | T5, T5HO, T8, T8HO, LED



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N Series LED

- Cold rolled steel backplate; corrosion resistant
- One-piece wraparound, high impact polycarbonate lens
- Shock resistant sockets
- Integral occupancy sensor available (N1048MS Series)

SH Series

- Cold rolled steel backplate with seam welded end caps; corrosion resistant
- Cold formed polycarbonate lens
- Integral occupancy sensor available (SH524MS and SH548MS Series)
- Shock-resistant sockets



Nominal Size | 5", 10" widths
 Installation Types | Surface ceiling or wall mount
 Lamp Types | T5, T5HO, T8, Biax, LED

Nominal Size | 5", 8" and 12" widths
 Installation Types | Surface ceiling or wall mount
 Lamp Types | T5, T8



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TCD Series **LED**

- One-piece, stainless steel housing; corrosion resistant
- Corner mount
- Continuous stainless steel hinge
- Sealed lens with continuous retention
- Available in a variety of lens types



Nominal Size | 8" x 24", 8" x 48"
 Installation Types | Corner mount
 Lamp Types | T8, T8HO, LED

MR Series **LED**

- Die-cast, marine-grade, aluminum baseplate; corrosion resistant
- Pearlescent polycarbonate lens
- Polycarbonate lens base
- Integral motion sensor available (MR17FLMS Series)
- ETL Certified IP64 per IEC 60598

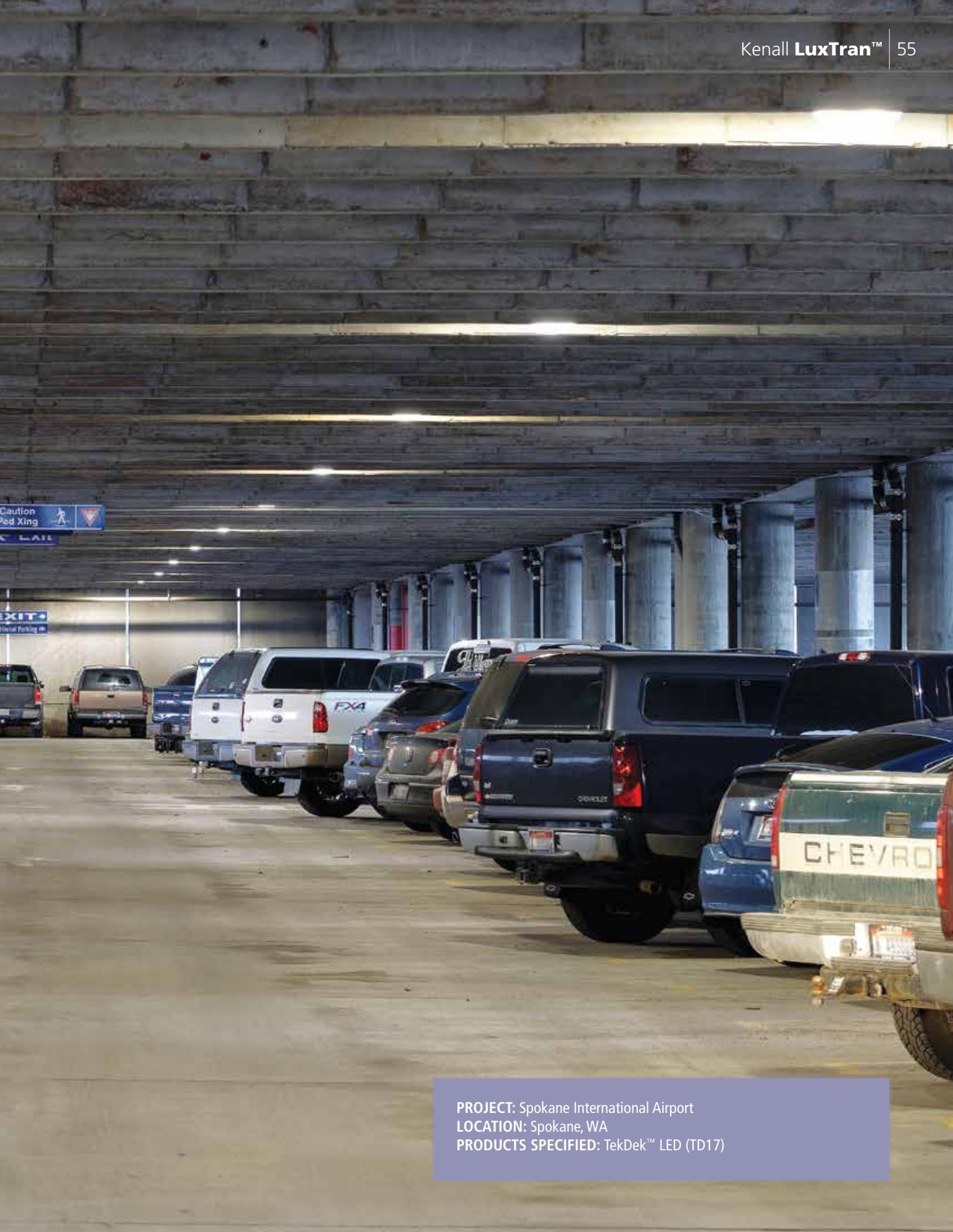


Nominal Size | 13", 17" Diameters
 Installation Types | Ceiling, wall mount
 Lamp Types | CFL, HID, LED

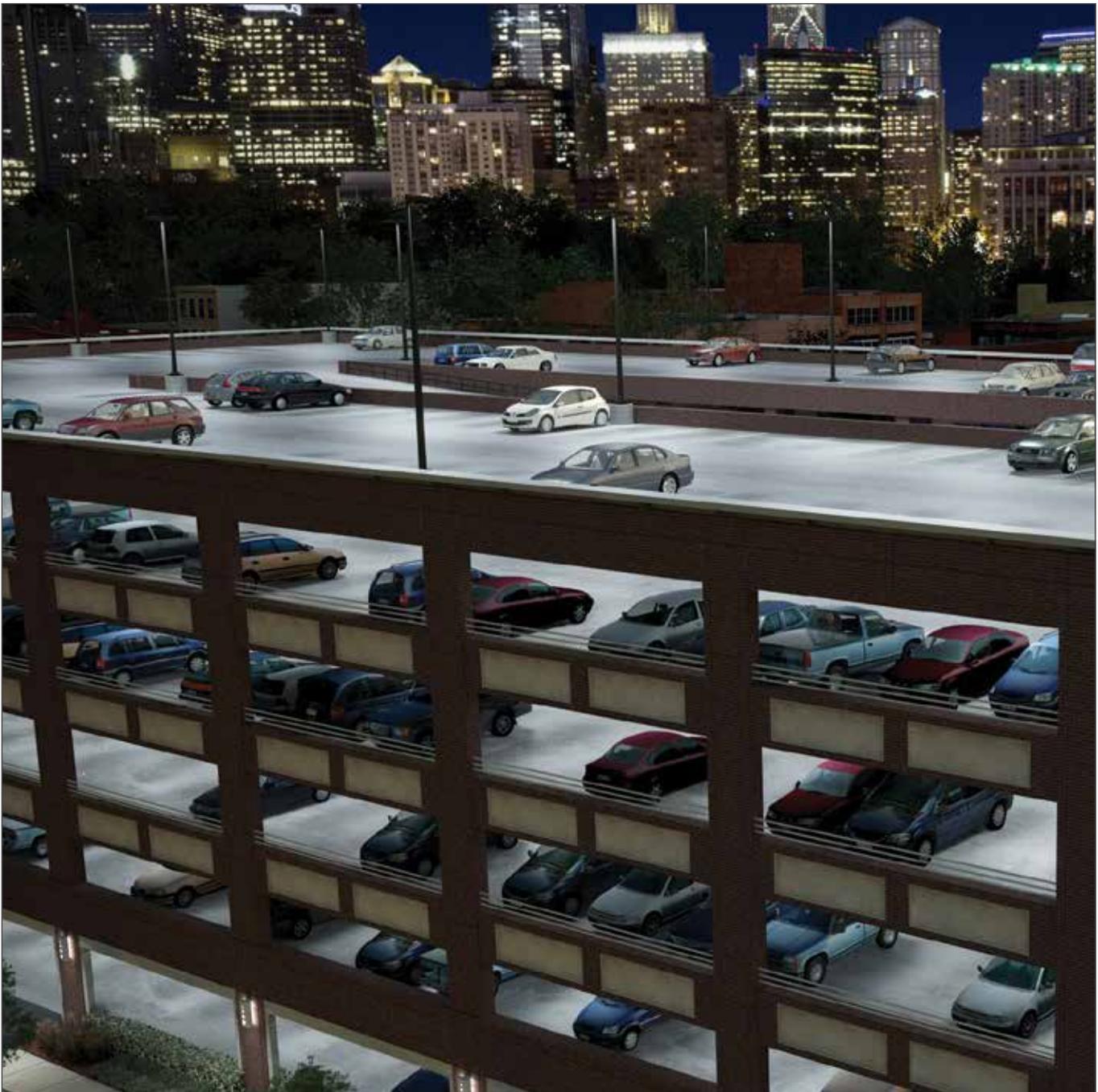








PROJECT: Spokane International Airport
LOCATION: Spokane, WA
PRODUCTS SPECIFIED: TekDek™ LED (TD17)



Best Practices in Parking Structure and Surface Lot Lighting

Kenall follows industry best practices to ensure vehicular and pedestrian safety when lighting the parking environment, with a particular emphasis on glare reduction, durability, uniformity, energy efficiency and ease of maintenance.

When lighting parking environments, industry best practices recommend the following be taken into consideration:

- Activities and tasks
- Daylighting and surface reflectances
- Horizontal illuminance criteria, including uniformities
- Vertical illuminance criteria, including uniformities
- Accenting: define and establish criteria
- Durability of construction for vibration-resistance
- Lighting controls



Activities and Tasks

According to the IESNA, activities and tasks should be clearly defined when addressing the lighting needs of a parking structure. The IES recommends one footcandle minimum within the parking deck, with a max-to-min ratio not to exceed 10:1. For active ramps and transition areas, a minimum of two maintained footcandles is recommended.

Consistent nighttime illuminances throughout the structure are considered baseline. Parking entries and exits are key to drivers' visual adaptation, and should be adjusted to baseline levels through the use of switching or dimming. According to the IES, while ramps and corners can be illuminated to two times baseline during the day, entries and exits can be illuminated to ten times baseline during that same period.



Daylighting and Surface Reflectances

When designing lighting layouts for parking structures, the impact of daylighting and surface reflectances should be considered.

The IESNA recommends light reflectance values (LRVs) of 50% on most columns and walls and a minimum of 65% on ceilings. When floors are color coded to assist patron guidance, LRV's should be a minimum of 30%. The combination of high LRVs and appropriate luminaire light distributions greatly enhances luminances and patron perception.

While the impact of daylighting is generally fractional, it should be considered during the design phase of a parking garage project.



Illuminance Criteria

According to the IESNA, illuminance recommendations are based on the assumption that visual adaptation is photopic, or made in the presence of bright light. However, in low-light situations with moderate-to-low reflectances or in very low-light situation with moderate-to-high reflectances, visual adaptation is mesopic. Under mesopic adaptation the use of lamps with spectra exhibiting shorter wavelengths is recommended to enhance efficacy.

The IES also suggests the use of mesopic multipliers during the project planning phase to adjust the illuminance criteria of a space. These multipliers are based upon a combination of the anticipated photopic background luminance and the lamp spectra under consideration. Refer to the IES Lighting Handbook for additional details, including a sample parking deck mesopic multiplier worksheet.



SmartSense™ Control System Sensing Occupancy and Daylight for Dramatic Energy Savings

A majority of the lighting control systems currently available for parking structures rely on individual occupancy control sensors per luminaire that ‘cascade on’ one after the other, which can make the driving experience hazardous. More complex systems are typically expensive and are often accompanied by a significant field-commissioning fee.

Kenall’s SmartSense™ control system meets these challenges head-on by utilizing an innovative new design concept. The control system intelligently monitors both motion and daylight, providing flexible dimming capabilities when the space is unoccupied and/or when ambient daylight levels are detected. Yielding an impressive return on investment, effective use of tax incentives and rebates can further reduce costs—a winning proposition for parking structure owners and facility managers.



Sensor

The SmartSense sensor serves as both a daylight sensing photosensor and a passive infrared occupancy sensor.



Control Module

The SmartSense control module receives input from one daylight sensor and up to 6 total occupancy sensors. Each control module can service up to 32 luminaires using 0-10 volt dimming, but can be linked with additional control modules to control an unlimited number of luminaires even if only one sensor is used. The control module can be placed up to 3000 feet away from the sensor.



Luminaire

This LED-driven luminaire, specifically designed for use with the SmartSense control system, will quickly achieve full brightness upon detecting motion in the space, and will slowly dim back to stand-by mode once occupancy is no longer detected.



TPD23 Series **LED**

- Pole-mounted LED luminaire; ready for mounting on round or square poles (poles by others); corrosion resistant
- Field rotatable optics for enhanced distribution flexibility
- Textured lens for unprecedented glare reduction
- Patent pending concealed heat sink and flow through design for effective thermal management
- Patent pending sealed optics
- LED source in multiple wattages and color temperatures
- Removable gear tray for ease of installation
- IESNA full-cutoff
- ETL Certified IP65 per IEC 60598
- 10-year limited warranty

SmartSense™ Micro for TPD23 Series

- Die-cast, aluminum housing construction; corrosion resistant
- Integral passive infrared occupancy and closed-loop daylighting controls
- Laser pointer self-commissioning
- End-of-life monitoring with automated L70 indication
- Ability to connect to other luminaires
- Integrated sweep-off feature
- Also available for TD17



Nominal Size | 23" Diameter
 Installation Types | Pole mounted (pole by others)
 Lamp Type | LED



Optional Sensor

TopDek offers an integrated SmartSense Micro option, which is removed from the heat source, sensing motion and daylight at the individual luminaire level.



TD17 Series **LED**

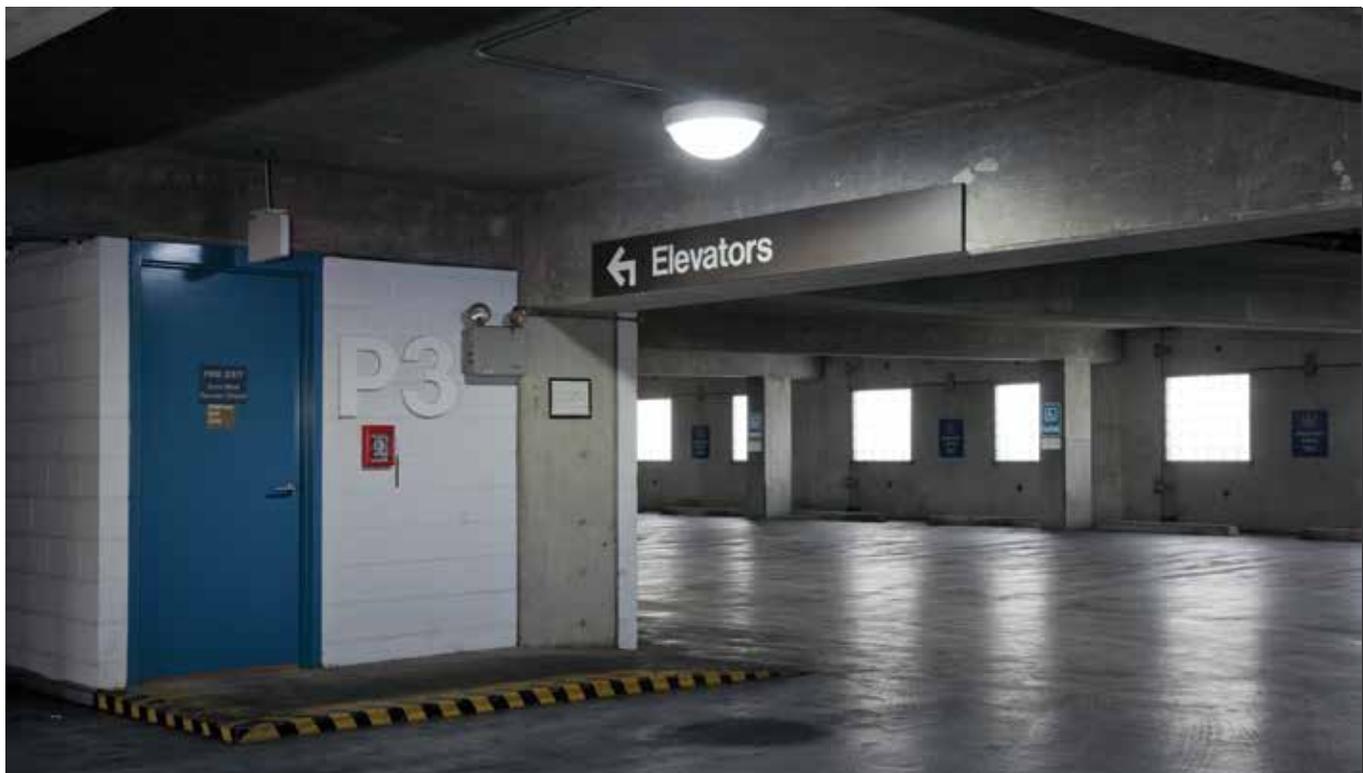
- Die-cast, marine-grade aluminum housing; corrosion resistant
- Textured lens for unprecedented glare reduction
- Patent pending sealed optics with uplight feature
- Patent pending concealed heat sink and flow through design for effective thermal management
- LED source in multiple wattages and color temperatures
- Type II, III, IV, IV-Narrow and V-Square distributions
- 10-year limited warranty
- ETL Certified IP65 per IEC 60598



Nominal Size | 17" diameter
 Installation Types | Ceiling mount
 Lamp Types | LED



PEACE OF MIND
 Guarantee®
 With polycarbonate lens
 & direct-to-surface mount



SmartSense™ Micro for TD17 Series

- Die-cast, aluminum housing construction; corrosion resistant
- Integral passive infrared occupancy and closed-loop daylighting controls
- Laser pointer self-commissioning
- End-of-life monitoring with automated L70 indication
- Ability to connect to other luminaires
- Integrated sweep-off feature
- Also available for TPD23



Nominal Size | 17" diameter
 Installation Types | Ceiling mount

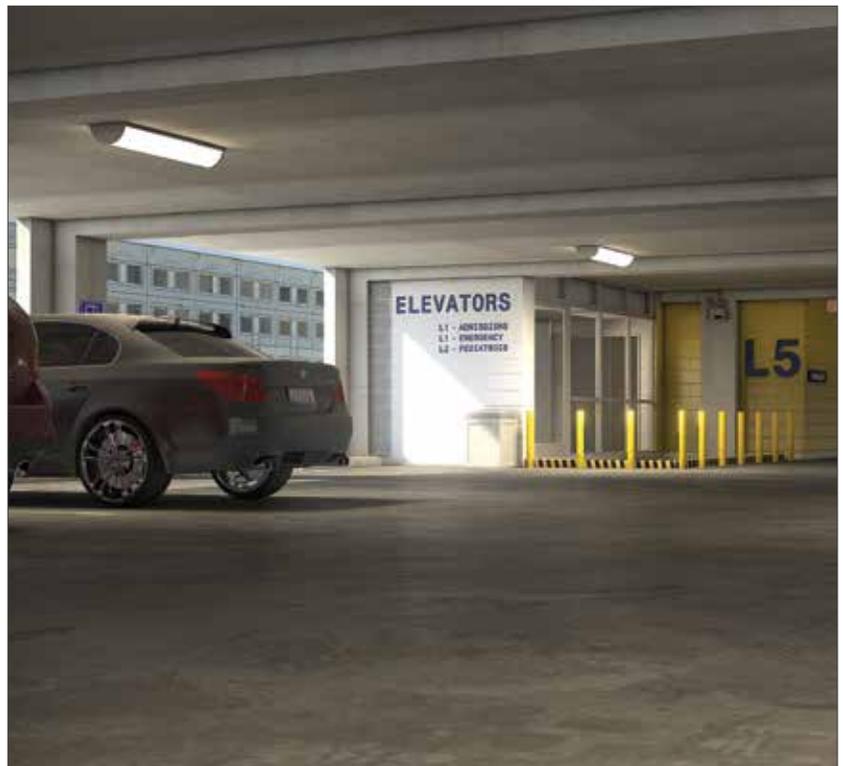


TD13 Series

- Cold rolled steel housing; sealed construction with removable steel end caps; corrosion resistant
- Batwing distribution for uniform illumination
- UV-stabilized prismatic polycarbonate lens
- ETL Certified IP65 per IEC 60598



Nominal Size | 13" x 48", 13" x 96"
 Installation Types | Ceiling mount
 Lamp Types | T8, T5HO





TMR17 Series (SP/RP) High Performance

- Die-cast, marine-grade aluminum housing; corrosion resistant
- SP-Type V square optics; RP-Type V rectangular optics
- High-efficiency lens enhances appearance without beam scatter
- Refractor designed to limit high-angle glare, minimize light directly below the fixture and reduce surface brightness
- UL Certified IP64 per IEC 60598



Nominal Size	17" Diameter
Installation Types	Surface ceiling mount
Lamp Types	HPS, MH



PEACE OF MIND
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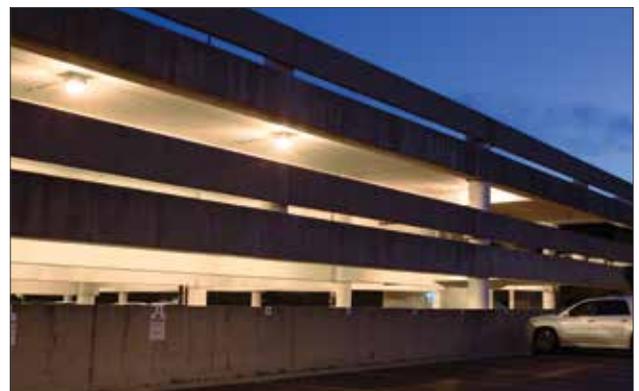
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P1212/P1212B Series

- Die-cast, marine-grade aluminum housing; polyester powder finish; corrosion resistant
- One-piece, UV-stabilized, high impact polycarbonate lens
- Bayspan™ reflector directs light into bisymmetrical distribution on P1212B



Nominal Size	12" x 12"
Installation Types	Surface ceiling mount
Lamp Types	HPS, MH, Induction



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Millenium Metrex™ (METDU/METEDU/METMDU METSU Series) LED

- Indirect LED exit and signage
- High-impact polycarbonate housing, baseplate and mounting components
- Red or green polycarbonate diffuser panel
- Remote exit ready can power one Kenall METSS satellite exit
- UL Certified IP64 per IEC 60598



METDU Series



METEDU Series

Millenium Metrex™ Combo (METEC Series) LED

- Remote powered indirect LED exit and emergency sign
- High-impact polycarbonate housing, baseplate and mounting components
- Remote exit ready can power one Kenall METSS satellite exit
- Remote emergency capability can power up to 67 watts of remote lamps
- No filament—ideal for high vibration areas
- UL Certified IP64 per IEC 60598



METEC Series

Installation Types | Surface ceiling or wall mount double face
Lamp Types | LED



Installation Types | Surface wall mount single face
Lamp Types | Halogen, LED



Mighty Mac™ (MMEX Series) LED

- Tamper-resistant, indirect LED exit and signage
- One-piece, die-cast, cold-rolled steel or stainless steel housing; corrosion resistant
- Impact-resistant clear polycarbonate lens sealed inside lens frame
- Remote exit ready can power one Kenall METSS satellite exit
- All electrical components feature quick electrical disconnects for ease of servicing
- UL Certified IP65 per IEC 60598



MMEX Series

Millenium Metrex™ (METSRS Series) LED

- Indirect LED exit and signage
- One-piece, stainless steel housing; seam welded construction; corrosion resistant
- External panel, clear polycarbonate lens
- Red or green polycarbonate diffuser panels
- Remote exit ready can power one Kenall METSS satellite exit
- UL Certified IP65 per IEC 60598



METSRS Series

Installation Types | Surface ceiling or wall mount
Lamp Types | LED



Installation Types | Semi-recessed wall mount single face
Lamp Types | LED



Millenium Metrex™ (METEL Series) LED

- Self-contained emergency egress luminaires
- High-impact polycarbonate housing, baseplate and mounting components
- Two or four lamp, high capacity units featuring the most advanced battery technology available
- Remote emergency capability can power up to 67 watts of remote lamps
- No filament—ideal for high vibration areas
- UL Certified IP64 per IEC 60598



METEL Series

Installation Types | Surface wall mount
Lamp Types | Halogen, LED



Millenium Metrex™ (METER Series) LED

- Remote powered emergency egress luminaire
- High-impact polycarbonate housing, baseplate and mounting components
- Die-cut, closed cell neoprene gasket seals lens/housing to mounting surface
- No filament—ideal for high vibration areas



METER Series

Installation Types | Surface ceiling or wall mount
Lamp Types | Halogen, LED



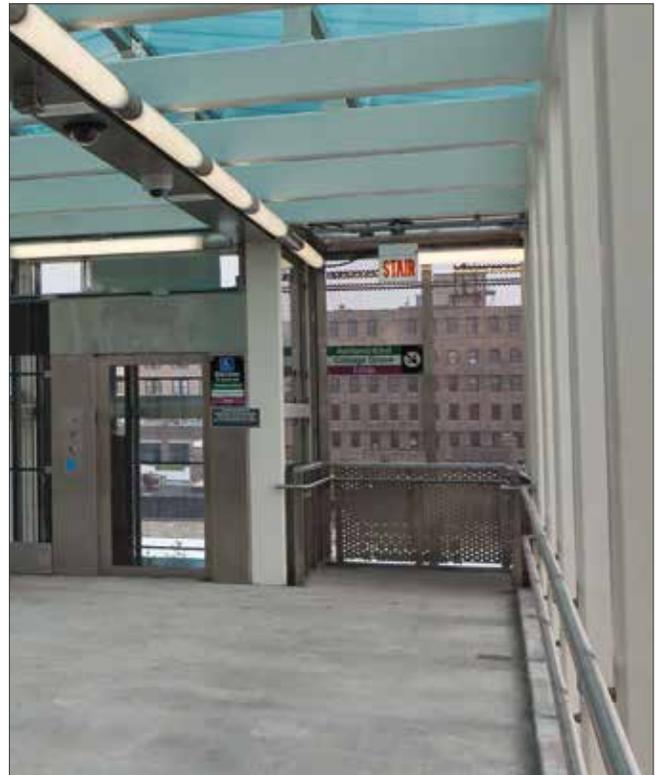
Millenium Metrex™ (METELHC Series) LED

- Self-contained emergency egress luminaires
- High-impact polycarbonate housing, baseplate and mounting components
- Impact-resistant clear polycarbonate lens
- Two or four lamp, high capacity units featuring the most advanced battery technology available
- Remote emergency capability can power up to 67 watts of remote lamps
- No filament—ideal for high vibration areas
- UL Certified IP64 per IEC 60598



METELHC Series

Installation Types | Surface ceiling or wall mount
Lamp Types | Halogen, LED



Fixtures designed for use in transportation settings must satisfy a large number of demanding lighting and environmental requirements. Listings applicable to transportation luminaires are shown below. Please refer to the 'Product Universe' within each section of this guide to determine specific product listings.



UL/CUL Listed—The UL symbol signifies that Underwriter's Laboratory (UL) has determined that a manufacturer has demonstrated the ability to produce a product complying with UL's requirements with respect to specific risk, performance under specific conditions, compliance with regulatory codes and specified standards, or any other conditions as determined by UL.



ETL—A product bearing the ETL Listed mark is determined to have met the minimum requirements of prescribed product safety standards as certified by a Nationally Recognized Testing Laboratory (NRTL). The mark also indicates that the manufacturer's production site conforms to a range of compliance measures and is subject to periodic follow-up inspections to verify continued conformance.



IP64—UL Certified IP64 per IEC 60598 ensures that the enclosure is dust-tight and protected against splashing water without any harmful effects.



IP65—UL Certified IP65 per IEC 60598 ensures that the enclosure is dust-tight and protected against jet streams of water from any direction without any harmful effects.



IP66—UL Certified IP66 per IEC 60598 ensures that the enclosure is dust-tight and protected against water projected in powerful jets without any harmful effects.



ADA Compliant—Although ADA is not specific to lighting, it does impact fixture design by creating standards for wall sconce projection space and hanging light clearance. Section 4.4 of the ADA states that "objects projecting from walls with their leading edges between 27" and 80" above the finished floor shall protrude no more than 4" into walks, halls, corridors, passageways or aisles."



UL 924—UL 924 is UL's Standard for Safety of Emergency Lighting and Power Equipment. UL 924 listed electrical exit signs are tested and given a visibility rating of at least 100 feet, requiring them to be legible from a 100-foot viewing distance in total darkness. The battery backup is tested by UL and must provide at least 90 minutes of emergency operation. Letters must be red or green and at least 6" in height with a 3/4" letter stroke.



NFPA101—This National Fire Protection Agency (NFPA) Life Safety Code pertains to egress facilities. The code establishes minimum criteria for the design of egress facilities so as to allow prompt escape of occupants from buildings or, where desirable, into safe areas within buildings.

LED Warranty

Kenall's LED products are warranted by Kenall to be free of defects in workmanship and materials for a period of one (1) year from the date of invoice. Kenall warrants LED lamps and internal power regulation components for a minimum of five (5) years from the date of invoice against defects in materials and workmanship that result in a fixture depreciation of 30% or greater. Lumen depreciation is compared to the published lumen output of the product on the date of manufacture per IESNA LM-79 reporting procedures. Normal accumulation of particulates on the optical surfaces shall not be factored into the lumen depreciation. Kenall's Peace of Mind Guarantee® is available on select LED products.

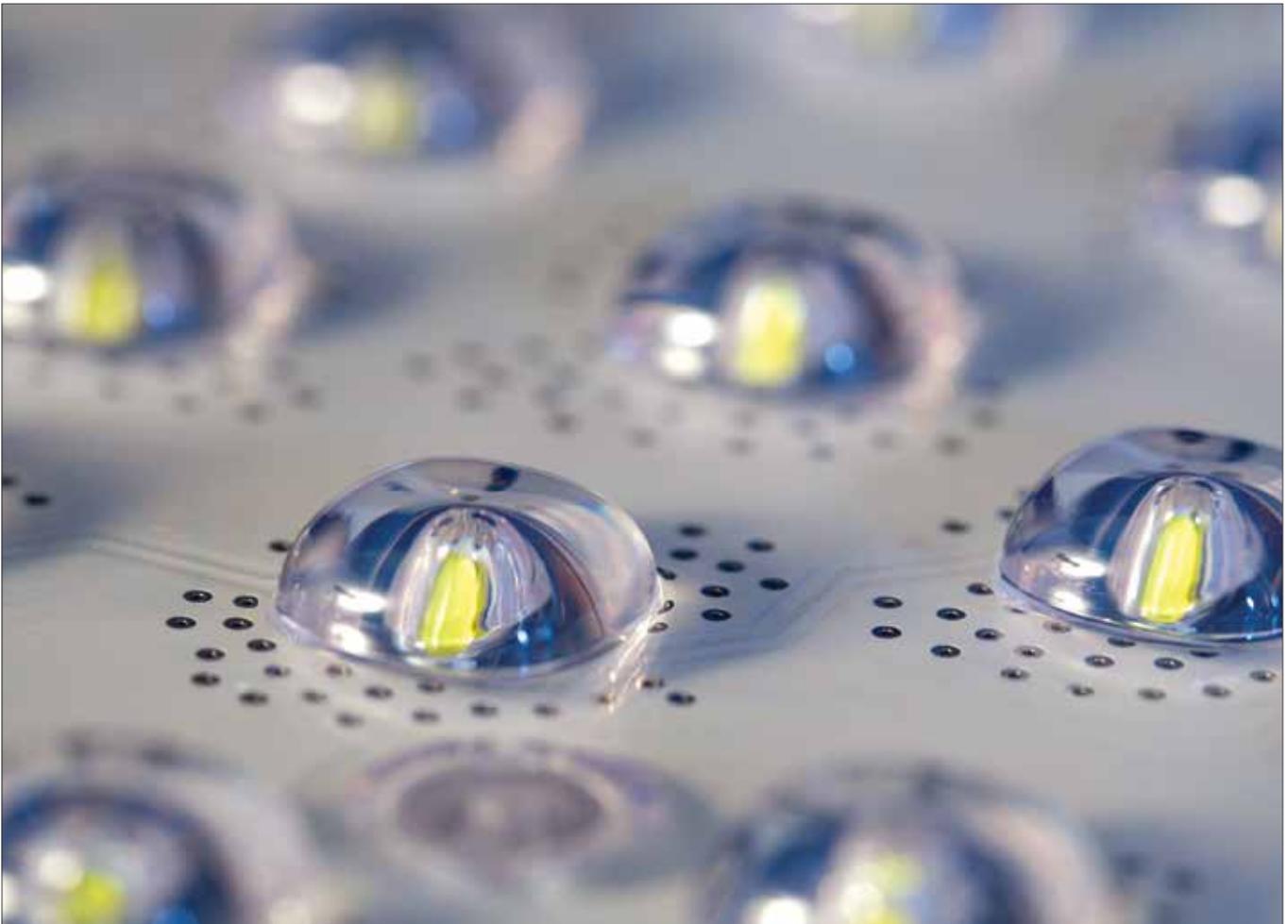
Kenall reserves the right to issue credit, repair, or replace the defective merchandise, at its discretion, upon notification and confirmation by its local representative of the defect. Kenall also reserves the right to test and examine the defective product if the defect is questionable, and to deny the warranty herein for any product altered, improperly installed, or installed in applications for which it is not intended. This includes operation in ambient temperatures above stated limits for any length of time. Failure by electrical surge shall not be covered under warranty.

Kenall assumes no responsibility for labor or freight costs incurred in connection with the installation, removal, or replacement of products determined to be defective, or any other consequential or incidental damages arising from the use of the product. Kenall's entire liability on any claim of loss or damage resulting from a defective product is limited to the replacement price of the product.

High Abuse Peace of Mind Guarantee®

Kenall's High Abuse luminaires are designed and built to withstand exceptional physical punishment. When installed according to our instructions, Kenall will repair or replace any unit rendered inoperable due to physical abuse for the life of the product installation.

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Guarantee®



Limitations of Wet and Hosedown Ratings – UL Standards

UL standards for wet location ratings simulate an outdoor rain condition. UL standards for type 4 or NEMA 4 "hosedown" ratings use a 1-inch diameter fire hose nozzle delivering 65 gallons of water per minute. Various conditions might dictate that a fixture requires a rating better than a wet location label, but not NEMA 4. These conditions typically exist in washdown applications where hosed water or cleaning agents will be directed at the fixture.

Benefits of Ingress Protection Ratings – IEC standards

The IP water rating of "5," described in IEC Standard 598, provides an intermediate step between the rain rating and the NEMA 4 rating. It also provides an internationally accepted standard which can be used to evaluate fixtures or any other electrical equipment, and the test can be performed by an independent third-party testing agency for verification. Underwriters Laboratories in Northbrook, Illinois tests to the IEC standard.

Dust-tight Protection

An additional test criteria that can be applied to fixtures is the ability to exclude solid matter. The IP solid rating of "6" (IP6_) means the fixture will be dust tight. The specified test requires that the fixture be placed in a circulating talc atmosphere for 3 hours. The particle size of the talc ranges from one to 75 microns, and the fixture is placed under negative pressure in an attempt to draw the talc into the fixture. No talc should be found inside the fixture after this test.

The Importance of Recognized Standards & Independent Testing

Lighting manufacturers that claim a hosedown rating other than NEMA or IP are not testing to recognized standards and have not had the tests confirmed or audited by an independent testing agency.

Beware of statements such as "Tested to 75psi at 1 inch." No reference is made to the volume of water that is leaving the nozzle and impacting the product. In fact, high nozzle pressures typically have low water volumes because the nozzle is restricting the flow of water, causing the pressure in the hose to increase and minimizing the amount of water leaving the nozzle.

Regardless of the hose pressure, any water volume less than 3.3 gal/minute is less severe than the IP_5 test. The most relevant characteristics of hosedown ratings are the diameter of the nozzle and the flow rate of the water. The following chart shows the test characteristics for various Standards.

What are IEC Standards?

IEC Standards are international standards that many European countries adopt as their national standard. North America has traditionally adopted UL standards. U.S. product manufacturers initially designed their products to IEC standards for sale overseas, but are finding them increasingly useful in North America.

Measurement	IP_4	IP_5	IP_6	NEMA4	Marine
Standard	IEC 60598	IEC 60598	IEC 60598	NEMA250	UL 595
Nozzle diameter	.016" (.4 mm)	.25" (6.3 mm)	.5" (12.5 mm)	1.0 inches	1.0 inches
Flow rate	2.65 gal/min (.7 l/min)	3.3 gal/min (12.49 l/min)	26.4 gal/min (100 l/min)	65 gal/min	115 gal/min
Nozzle pressure	—	30 kN/sq m	100 kN/sq m	—	15 psi
Distance	Semi circular apparatus	8-10 ft	8-10 ft	10-12 ft	10 ft
Duration	20 min	15 min	3 min	5 min	5 min

Vibration Testing

ANSI 136.31-2001 details the American National Standard for Roadway Lighting Equipment- Luminaire Vibration. Test criteria, designed to simulate wind- and traffic-induced vibration, recommends that luminaires with die-cast, marine-grade aluminum housings used in bridge and overpass applications be tested at specific acceleration intensities. Select Kenall LuxTran™ luminaires are independently tested for vibration and shock according to ANSI standards, ensuring their ability to withstand the challenges of these potentially damaging environments.



Example:

IP65

DEGREES OF PROTECTION INDICATED BY THE FIRST CHARACTERISTIC NUMERAL

Numeral	Short Description	Brief details of objects which will be "excluded" from the enclosure
0	Non-protected	No special protection
1	Protected against solid objects greater than 50 mm	A large surface of the body, such as a hand (but no protection against deliberate access). Solid objects exceeding 50 mm in diameter.
2	Protected against solid objects greater than 12 mm	Fingers or similar objects not exceeding 80 mm in length. Solid objects exceeding 12 mm in diameter.
3	Protected against solid objects greater than 2.5 mm	Tools, wires, etc. in diameter or thickness greater than 2.5 mm. Solid objects exceeding 2.5 mm in diameter.
4	Protected against solid objects greater than 1.0 mm	Wires or strips of thickness greater than 1.0 mm. Solid objects exceeding 1.0 mm in diameter.
5	Dust-protected	Ingress of dust is not totally prevented but dust does not enter in sufficient quantity to interfere with satisfactory operation of the equipment.
6	Dust-tight	No ingress of dust

IP6

DEGREES OF PROTECTION INDICATED BY THE SECOND CHARACTERISTIC NUMERAL

Numeral	Short Description	Brief details of objects which will be "excluded" from the enclosure
0	Non-protected	No special protection
1	Protected against dripping water	Dripping water (vertically falling drops) shall have no harmful effect.
2	Protected against dripping water when tilted up to 15°	Vertically dripping water shall have no harmful effect when tilted up to 15° when the enclosure is tilted at any angle up to 15° from its normal position.
3	Protected against spraying water	Water falling as a spray at an angle up to 60° from the vertical shall have no harmful effect.
4	Protected against splashing water	Water splashed against the enclosure from any direction shall have no harmful effect.
5	Protected against water jets	Water projected by a nozzle against the enclosure from any direction shall have no harmful effects.
6	Protected against heavy seas	Water from heavy seas or water projected in powerful jets shall not enter the enclosure in harmful quantities.
7	Protected against the effects of immersion	Ingress of water in a harmful quantity shall not be possible when the enclosure is immersed in water under defined conditions of pressure and time.
8	Protected against submersion	The equipment is suitable for continuous submersion in water under conditions which shall be specified by the manufacturer. NOTE – Normally, this will mean that the equipment is hermetically sealed. However with certain types of equipment it can mean that water can enter but only in such a manner that it produces no harmful effects.

NOTE: The author thanks the Internal Electrotechnical Commission (IEC) for permission to reproduce definitions for IP65 from its International Standard IEC 60598. All such extracts are copyright of IEC, Geneva, Switzerland. All rights reserved. Further information on the IEC is available from www.iec.ch. IEC has no responsibility for the placement and context in which the extracts and contents are reproduced by the author; nor is IEC in any way responsible for the other content or accuracy therein.



When you see these symbols you will know the Kenall luminaire has been tested and certified to either the IP64, IP65 or IP66 standard respectively.



70 | Lighting Challenging Environments

Kenall offers luminaires designed according to industry best practices and certified performance standards in each market segment we serve. From high abuse fixtures with an exclusive 'Peace of Mind' Guarantee® against breakage and healthcare fixtures sealed for infection control, to sealed enclosure fixtures that comply with stringent military standards for RF/EMI and food processing fixtures that carry mission critical NSF, NEMA and IP ratings, our fixtures are designed with your specific needs in mind.

High Abuse

HA

Guaranteed against breakage for the life of the installation.

Main Applications

- Schools & Universities
- Public environments
- Military
- Restrooms & Stairwells



Healthcare

HC

Engineered to the specialized demands of healthcare environments with an attention to cleanability and infectious control.

Main Applications

- Patient rooms
- Surgical suites
- MRI
- Labs



Sealed Enclosure

SE

One piece, seam welded enclosures for containment, controlled and sealed spaces.

Main Applications

- Pharmaceutical & Research labs
- Cleanrooms
- Corrosive environments
- Hazardous locations



Food Processing

FP

Sealed NSF listed, high efficiency lighting for food processing and preparation.

Main Applications

- Food processing & preparation
- Freezers
- Hosedown environments
- Hazardous locations



Lighting Challenging Environments

Whether you're lighting a healthcare facility and need fixtures that support effective infection control and cleanability, or a tunnel, transit platform or parking facility that calls for features like corrosion-, shock- and vibration-resistance, Kenall can help at every turn. And for dependable task lighting that requires environmental integrity and versatility, or emergency exit lighting that meets life safety codes, you can depend on Kenall.

Correctional

COR

Leader in heavy gauge, welded enclosures to deter even the most determined attempts to destroy, enter or scavenge.

Main Applications

- Cells
- Common areas
- Behavioral health
- Dayrooms



Transportation

TR

Meeting the specialized demands of transportation related structures for high performance, corrosion resistance and serviceability.

Main Applications

- Tunnel & Underpass
- Platform & Depot
- Parking deck & Surface lot
- Bridges



Task Lighting

TL

High efficiency LED, modular undercabinet lighting for professional spaces.

Main Applications

- Nurses stations
- Labs/MRI suites
- University dorms & Administration areas
- Military/Government



Emergency

EE

High abuse, extreme environment LED exit and emergency egress lighting.

Main Applications

- Schools & Universities
- Recreational
- Sealed & Correctional environments
- Outdoor/cold weather/extreme conditions





10200 55th Street
Kenosha, WI 53144
Tel: 262-891-9700
www.kenall.com

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