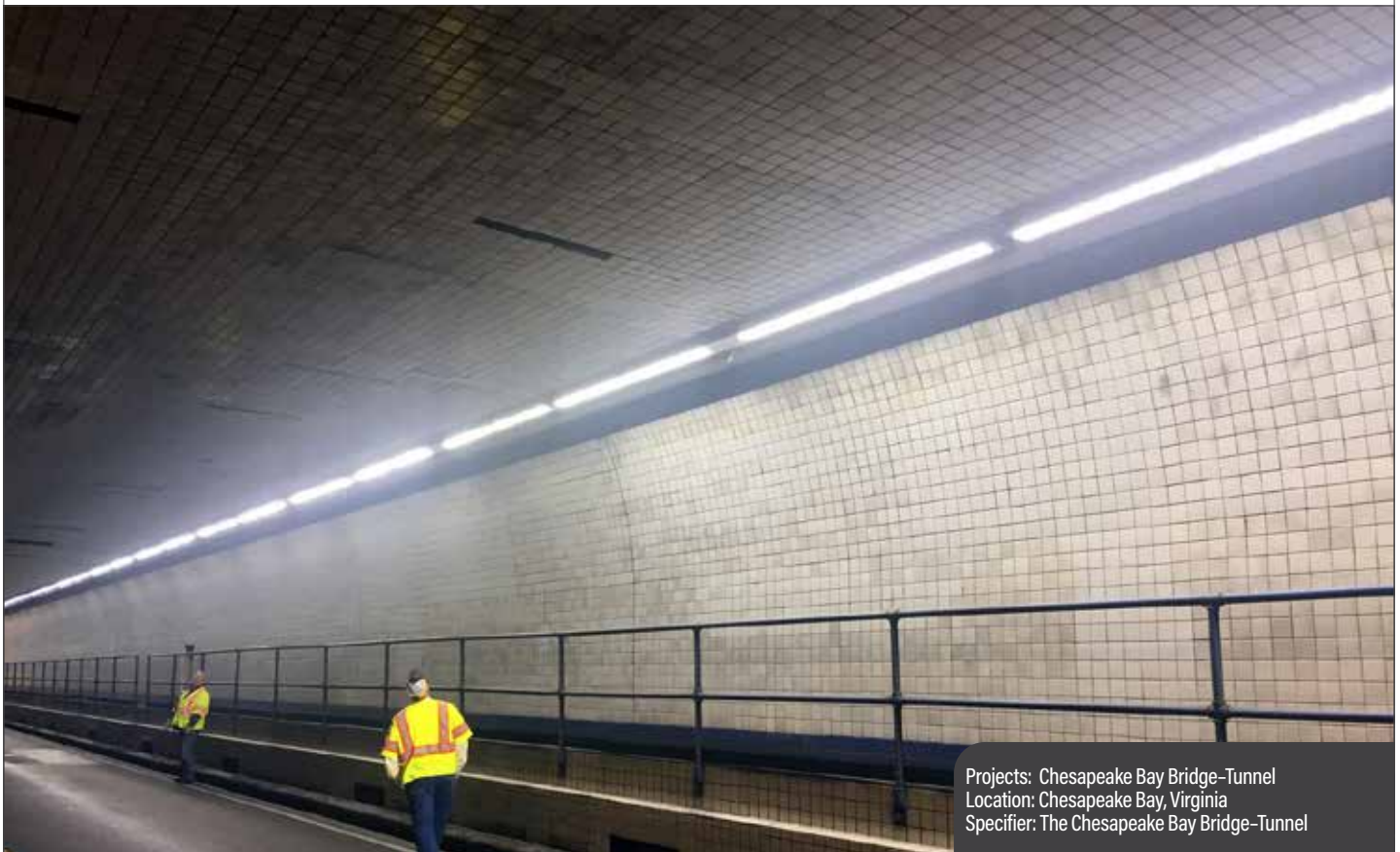


## Upgraded Lighting in “Engineering Wonder” Chesapeake Bay Bridge-Tunnel Results in Unique, New Design Innovations



Projects: Chesapeake Bay Bridge-Tunnel  
Location: Chesapeake Bay, Virginia  
Specifier: The Chesapeake Bay Bridge-Tunnel

*“...a long overdue solution to highly repetitive and costly tunnel re-lamp lane closures, with savings on power consumption being the icing on the cake.”*

– CBBT Director of Maintenance, Tim Holloway

**Project Summary:** The two existing 1-mile-long (1.6 km) vehicle tunnels under Chesapeake Bay needed an equipment overhaul due to aging infrastructure. Consequently, the CBBT updated critical systems and facilities, including lighting.

**Challenge:** The precise product needed for the one-for-one replacement did not exist.

**Solution:** LuxTran LTLI-8 luminaires, customized to fit the existing lighting footprint

**Benefits:**

- LuxTran LTLI-8 LED tunnel luminaires meet or exceed existing light levels and uniformities, and reconfirm compliance with the ANSI/IESNA RP-22-11 Recommended Practice for Tunnel Lighting
- The tunnel visibility is improved, and disability/discomfort glare is minimized
- The CBBT realizes substantial energy savings
- Improved profile, prevents trucks from hitting and damaging the fixtures due to the very low ceiling clearances (as continually happened to the existing fluorescent fixtures.)
- Drastically reduced nightly maintenance details, providing a safer work environment for CBBT employees, as well as the traveling public.

## CBBT and Project Background

Since opening in 1964, the Chesapeake Bay Bridge-Tunnel (CBBT) has not only been regarded as a critical travel route, but also as a modern engineering wonder. A 176-mile (28.3 km) bridge-tunnel crossing connecting Northampton County, Virginia on the eastern shore, with the communities of Virginia Beach, Norfolk, Chesapeake, and Portsmouth on Virginia's western shore, it is the world's second-largest bridge-tunnel complex.

While construction on a new parallel tunnel to ease traffic is underway, the two existing 1-mile-long (1.6 km) tunnels needed an equipment overhaul due to aging infrastructure. Consequently, the CBBT began a three-year project to restore and improve critical systems and facilities, including lighting. The CBBT's Director of Maintenance, Tim Holloway, described the new LED lighting as "a long overdue solution to highly repetitive and costly tunnel re-lamp lane closures, with savings on power consumption being the icing on the cake." Furthermore, Holloway continued, "The product we needed simply did not exist..." All the existing fluorescent luminaires were ceiling-mounted and the adjacent continuous linear wire way needed to be re-used to feed the replacement LEDs. Accordingly, the new fixtures had to physically fit within the existing footprints -- not a standard feature at the time of design -- but a customization Kenall was able to accommodate. "Kenall worked hand in hand with us to develop the product and then further refine it in the field to make sure all our needs were met," Holloway concluded.

### So Long, Fluorescent Lighting

The existing linear fluorescent tunnel luminaires were replaced one-for-one with 2,835 Kenall LuxTran LTLL-8 LED tunnel luminaires. With these new fixtures, the CBBT will save \$500,00 per year in maintenance costs and energy consumption, as well as reduced traffic congestion. Michael Crist, the Deputy Director of Infrastructure for the CBBT, emphasized the important of these savings. "Prior

to installing LED lights, we had a one-week-per-month lighting detail, requiring a tunnel lane closure, with three to four operations personnel, and three or four maintenance personnel, to replace light bulbs. Eliminating this detail is a huge cost savings and a big safety improvement," he said.

### Other Challenges ... Accepted, and Overcome

The LED replacement luminaires had to provide the required light output in all the various tunnel zones, without overheating; Kenall designed custom heat sinks for the LED drivers. This, combined with the new fixture housing's 2.5" profile and linear design for air flow, allowed the fixture to operate at a relatively low temperature, despite its location on the ceiling deck.

Also, in order to be re-fed from the adjacent existing wire way on the ceiling deck, the LED replacement luminaires had to include cord sets to match those currently plugging the existing wire way. These cord sets had to be in a spot on the new LED fixtures that would consistently line up with the plug-in receptacle locations in the existing wire way. Kenall participated in field surveys with the CBBT to discover type, length, and location of all cord sets, and match them.

Finally, the luminaires had to be mounted onto the existing mounting rail, located on one side of the existing wire way. This meant that they all needed to have a completely customized mounting design to fit onto the existing wire way's mounting rail pattern. Exact locations of the LED luminaires' mounting rails and cord set feeds had to be completely coordinated with existing conditions on the tunnel wire way, yielding a plug and play application.

Chase Sturgis, the CBBT's Electrical/Mechanical (E/M) Superintendent, stated: "Replacing the existing fluorescent tunnel lighting fixtures with new LED fixtures manufactured



by Kenall has been a rewarding achievement of the CBBT's Maintenance Division. The collaborative effort, from procurement to commissioning this project, ensures the CBBT is taking steps in the right direction to keep pace with an evolving industry -- all while reducing energy consumption in today's modern world."

### Listings and certification Requirements

- Overall tunnel lighting layout to be designed to ANSI/IES RP-22-11
- UL 1598 rated, for Outdoors/Wet Locations
- Rated as NEMA 4X Enclosures for Outdoor Locations
- Fixtures to be rated, depending on Tunnel Zone, 100,000-150,000 hours to L70, per IES TM-21
- IP66 rated, per IEC 60598
- 100 PSI Water Spray rated, per ANSI C136.27
- 3G Vibration Test rated, per ANSI C136.31
- Class B rated for harmonic emissions, per FCC Title 47, CFR Part 15
- 316 SS or marine-grade aluminum to withstand the highly corrosive tunnel environment

For more information, please visit us on the web at [www.kenall.com](http://www.kenall.com)



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