



STEWART

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NC 147 Pedestrian Bridge Sign Issues

The R. Kelly Bryant Downtown Gateway Bridge has been experiencing lighting outages on the arch sign and with one marker light along the bottom of the bridge. This report will provide background on the project with respect to the sign and the other lighting and outline the approach for resolving the issues.

Background

Design Team

- Stewart Engineering – Prime Consultant, Bridge Designer
- Colorlume Inc. – Lighting Designer
- Lighthouse – Electrical Engineering

Contractor Team

- ST Wooten – General Contractor
- Coulter Electric – Electrical Contractor
- Rodney Signs – Sign Manufacturer / Installer



The design team’s lighting designer, Jeff Brown of Colorlume Inc. developed the overall concept for the bridge lighting. Jeff also designed the lighting for the Raleigh Wade Avenue Pedestrian Bridge with similar LED accent and uplighting.

The lighting elements for the Durham project include an LED arch sign, LED marker lights across the bottom of the bridge LED pedestrian pathway lighting and LED uplights on the brick columns. LEDs were selected for their long life and low power consumption. The contract specifications were put together in such a way that the marker lights and up-lights were specified by make, model and vendor. The approach to the arch effect was different in that the contract specified the conceptual design and materials for the sign and deferred to the sign manufacturer’s expertise for fabrication and installation.

Why LEDs?

We see similar LED signs every day. LED systems work well in these applications because their life span, when installed per manufacturer’s recommendations, is 50,000 hours or about 12 years (@ 4,000 operating hours per year). The lighting element is similar in concept to LED rope lighting that we all use at Christmas time. However, for commercial applications a more robust version is used that is designed for long, continuous outdoor use. The signs are also easier to maintain because if one 18 inch section fails the rest of the sign should not be affected. With other



RDU Airport Sculpture



Common Gas Station Detail



Architectural Lighting



products such as fiber optics, the entire string would have to be replaced if

damaged. For any repairs or maintenance of the arch sign and central marker lights, brief overnight lane closures are required.

Arch Sign Components

The arch sign consists of three strands of LED rope lights on each side of the bridge. The rope lighting sits in channels in the PVC sign. The entire PVC sign is attached to brackets on the outside of the bridge, much like a sign is attached to a building façade or other structure.

Current Performance Problems

The arch sign and lighting were first turned on in August a few weeks prior to the bridge dedication on September 16th. The systems functioned well until the first failures on the arch sign were noted around Oct 5th. Upon investigation, ST Wooten / Rodney Signs discovered what appeared to be a lightning strike that affected the sign on the Durham side of the bridge. There was also an unrelated issue of a circuit breaker in the main panel tripping which cut off all of the lights on the bridge. Repairs were made in December, 2010 and the bridge again functioned properly for a few weeks. Then, intermittent outages of the arch sign began to occur on the Durham side of the bridge.

The design team and contractors held several meetings to determine a course of action to repair the problems. During these deliberations a new series of arch sign failures have occurred on the Raleigh side of the bridge, where there are no indications of a lightning strike occurring. These are also intermittent failures that do not seem to hold to a predictable pattern. Because both sides of the arch signs are experiencing intermittent failures it appears that a potential lightning strike may not be the direct and / or only cause of the sign's performance history.

Was the Bridge Properly Protected From Lightning?

The Public Works Department requested that Stewart Engineering provide their justification for their approach to dealing with potential lightning strikes on the bridge. We have responded that because there are no NCDOT or AASHTO standards for lightning protection on bridges the Design Team consulted with a lightning protection expert, Mr. Robert Hill of Quality Lighting Protection during the design phase. Mr. Hill advised there is very little to be gained by installing additional lightning protection since the bridge itself is steel and would be grounded, so it would conduct any lightning strike very well on its own. Stewart did increase the size of the grounding wire at Mr. Hill's recommendation.

The arch sign appears to be adequately separated from the bridge to avoid damage from a lightning strike for several reasons:

- the sign is made of thick PVC, a non-conductive material,
- the LED lights attached to the PVC are housed in a flexible plastic material and encased in a plastic sheath, both non-conductive materials, and
- the sign is not mounted directly to the steel arch, rather they are mounted on a series of 4-inch brackets every 4-feet.

Is There a Warranty?

There is a one year warranty on the entire bridge that began on Aug 30, 2010.

Next Steps

Publics Works and Stewart will be drafting a letter to the contractor articulating our concern with the performance of the arch sign, requesting their proposed course of action and a schedule for repair.