

9/7/11

To: Council Members, City of Muscatine

Fr: Jim Berns, Musco Lighting

Re: Color Changing LED Light Fixtures / Highway 92 Bridge Across Mississippi River

As you are likely aware, the color changing LED lights on the Highway 92 Bridge have been in disrepair and inoperative for the past several months.

Toward the end of 2010, staff at Muscatine Power & Water (MP&W) gathered representatives from Stanley Consultants, Musco Lighting, and the City of Muscatine to apprise us of the higher than anticipated cost of maintenance and repair to the lighting system. MP&W indicated there were a high number of fixture outages (21) and had additionally worked with an area contractor to assess the condition of the system. From a report received from that contractor it was discovered that:

1. Both of the main conduit runs had separated in many locations allowing moisture to enter the conduits. The conduit separation was due to the placement of an insufficient number of expansion fittings during the original installation.
2. The lack of expansion fittings also resulted in the breaking of several electrical junction boxes.
3. Conduits were not appropriately supported.
4. Moisture was either present or had been present but dried in many of the fixtures.
5. There were 21 inoperative fixtures, but the cause of failure was not able to be determined.

Staff with MP&W, Stanley, & Musco continued to meet to develop a plan for repairs / replacement to return the system to its original design. The group performed additional inspections and developed solutions to resolve and mitigate the potential for future failures. What was determined includes:

1. The conduit system must be repaired as one component to addressing future failures.
  - a. The failure of the conduit system due to insufficient expansion fittings allows moisture to enter into the conduits. This conceivably allows moisture to filter down the conduits and be potentially 'wicked' into the lighting fixture when it is energized. When the fixture is energized, it heats up and draws moisture/vapor into the fixture. When the fixture is de-energized and cools, the moisture is then trapped in the fixture and condensates within the fixture.
2. The fixtures themselves may be leaking and we would need to determine the cause of this.
  - a. To date, we have not been able to confirm the fixtures leak, but it remains a possibility.
3. Surge protection should be installed near the fixtures to reduce failures due to electrical surges and/or lightning strikes on the bridge.
4. A viable replacement for the fixtures must be selected.
  - a. Since the original installation, the fixture manufacturer was purchased by another firm, and that firm subsequently has discontinued the sale and repair of our fixtures.

In June, 2011, after the comprehensive list of recommended repairs had been agreed upon, Musco technicians began repair of the conduit system while an alternate fixture solution was determined. To date the repairs include:

1. Installation of appropriate quantities of expansion fittings to protect the integrity of the conduit system.
2. Repair / replacement of junction boxes as needed.
3. Repair / replacement of conduits as needed and installing appropriate support straps.
4. Relocation of 3 of the 4 DMX Repeaters to locations accessible from the bridge deck without the need for expensive service equipment. The last repeater will be relocated when we replace the inoperative fixtures.
5. We have selected two fixtures that are viable alternatives to the existing fixtures and that will integrate into the system. Both fixtures have been thoroughly evaluated for mechanical construction, gasketing, and corrosion protection.

The labor and materials for these improvements was donated by Musco and MP&W agreed to cover the costs of equipment and traffic control.

We are now to the point that we are ready to perform repairs / replacement to the fixtures themselves, but are in need of funding to move forward. To do so requires approximately \$59,500 broken down as follows:

- a. Acquisition of 25 new / alternate fixtures at a cost of appx. \$50,000
- b. Rental of a bridge inspection trailer for 1 week to access fixtures below the bridge deck at a cost of \$3,000
- c. Rental of an aerial lift for 1 week (maximum) to access fixtures above the bridge deck at a cost of \$3,000
- d. Two weeks of traffic control at an estimated cost of \$3,500
- e. Additional labor & materials will be donated by Musco.