

## Summary of Covered Bridge Lighting Project

Originally there were 8 HPS (High Pressure Sodium) lights arranged in a non-uniform pattern across the interior of the bridge. These were controlled by a common Photo Cell, which would turn them off when ambient light was bright. The Original 8 HPS lights were rated for 115 system watts each, which should equal 920 Watts total but readings taken in Nov 2009 showed only 529 to 789 watts were being consumed for all 8 due to the decline in their performance. The light output of each was diminished and most of them constantly cycled on and off leaving only 4 to 5 on at any moment.

After reviewing the CVPS bills it was determined that in 2008 the old lights were consuming nearly 700KWH per month, this steadily declined with the failing lights. In May 2010 the few old lights that were still working consumed 236 KWH.

We replaced the 8 interior lights with Phillips Gardco 121 LED sconces arranged in a uniform pattern. In addition 2 more sconces were installed on the gable ends of the bridge to highlight the entrances and provide lighting at the intersections.

The 4300 K color temperature (Natural light) results in a bright but natural feel as you pass through the bridge far superior to the old HPS lights. The entrances, and intersections are also now well lit. Even the Mirror from camp Arden Road is easier to see through at night. Also for those drivers coming from Camp Arden road, If the lights are all on low, this should be an additional indication that there is no one coming through the bridge.

The LED fixtures are such a new technology that even the manufacturer does not fully understand them. The original system watts for these fixtures were listed at 50W each when the order was placed. However after installation, readings taken showed closer to 70W each. The manufacturer has now updated the rating to 66 watts each. Even with this higher than expected wattage, In high power mode the 10 fixtures use only 700 Watts total, that's less electricity than five 150W par flood lights would consume, and less than the 920 watts the original 8 would have used when they were new.

These new LED fixtures each include a PIR (passive infra-red) motion detector. When no motion is detected for the time period (which can be set individually for each fixture) the lights will slowly dim to LOW power. It takes about 90 seconds for them to gradually dim from High to Low after the time delay has been satisfied. On Low these fixture use only 5W each, that's a total of 50Watts for the entire bridge. These detectors are "networked" together such that if any fixture detects motion, a signal is sent to the others to resume "High" power (70W each). The transition from Low to High is not instantaneous but a smooth ramp up and takes between 1 and 2 seconds to complete.

There is indication of "false triggers" where the motion sensors are detecting the motion of bugs and forcing the lights to high mode needlessly therefore wasting electricity. Attempts were made to reduce the sensitivity of the detectors to prevent this, but that resulted in missing the detection of vehicles. The worst-case scenario of 15 false triggers per night for 365 nights per year was calculated to result in just \$15 per year of wasted

# Summary of Covered Bridge Lighting Project

energy from false triggers. It was determined that correct response to vehicles clearly outweighed any false trigger concerns.

An hour meter was also installed to be able to track daily, weekly, monthly and lifetime operating hours. This combined with the Watt-Hour Meter allowed accurate monitoring of the new LED performance after the installation. A great deal of testing and tweaking was performed after the lights were installed to adjust the time delays and sensitivity of the motion sensors to achieve the optimum balance between performance and energy efficiency.

- The original photocell was relocated to provide a system more responsive to ambient light conditions.
- The new fixtures are set up as follows:
  - Immediately after the last motion the 8 interior fixtures will start to dim but it is not detectable by eye for about 30 seconds.
  - After 90 seconds from last motion the 8 interiors will be at low power (5W each).
  - After 5 minutes from last motion the 2 gable end fixtures start to dim.
  - After an additional 90 seconds from last motion (6 ½ Minutes total) the 2 gable ends will be at low power.
  - With all 10 fixtures in Low power mode the total consumption for the bridge is 50 Watts!

Phillips lists the life expectancy of these fixtures up to 100,000 hours. It is estimated (based on sunrise and sunset times) that the lights will operate about 4828 hrs annually. This would result in 20-year lifetime expectancy or until 2030.

In the month of August 2010, the 10 new lights consumed just 104 KWH (\$15.6 of electricity); this is about 1/7 of the 700KWH the old fixtures used per month in 2008. It is predicted that this will at least double maybe even triple by December as the days get shorter and the nights get colder resulting in 200- 300KWH per month.

Stan Howe