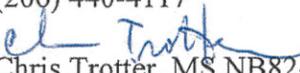


November 20, 2013

TO: Greg Lippincott, ASDE
HQ Design, MS 47329 

THRU:  Jack Schindler, NWR Plan Review
(206) 440-4117

FROM:  Chris Trotter, MS NB82-125
(206) 440-4378

SUBJECT: I-5/116th St NE – Interchange Improvements
Phase 3 – Bridge Replacement
Proprietary Item Request – LED Luminaires

Northwest Region Traffic requests approval to utilize the following proprietary items in the subject project for experimental and research purposes: The Cooper Navion LED Fixture, Model Number: NVN-AA-04-D-U-T3A-10K-4 K U IP66-AP-OA/RA1013.

Project Description

This is a local agency (Tulalip Tribes) project that will rebuild the overcrossing structure at the I-5 / 116th St NE Interchange (MP 202.30). The project will replace the current diamond interchange structure with a new structure that will accommodate a future Single Point Urban Interchange (SPUI) signalized interchange. This project will replace the 4 luminaires at the northbound and southbound interchange terminals and also add 12 new luminaires to provide continuous illumination across the new interchange structure. There will be a total of 16 street light standards and fixtures installed.

History

HQ Traffic Office has been researching LED street lights for the past 5 years to try and capitalize on the energy efficiency and expected maintenance savings of this new technology. During this time WSDOT evaluated a multitude of LED fixtures from numerous manufacturers. However, during those years manufacturers could not meet WSDOT requirements for roadway lighting.

Early in the 5 year research process, the HQ Traffic Office established a LED luminaire evaluation process that evaluates each manufacturer's fixtures for a variety of things, which are outlined below. This ensures that each fixture submitted is evaluated and compared against the same requirements. The evaluation process will be the basis of the LED Research Work Plan.

The biggest hurdles the manufacturers faced in the early phases were (1) providing enough light on the roadway and (2) distributing that light in an efficient manner.

Justification

HQ Traffic would like to pursue a project level research work plan to establish the starting point for a statewide LED research work plan. The information from this project, along with other research projects around the state using other manufacturer's LED products, will help direct WSDOT in the creation of LED performance specifications.

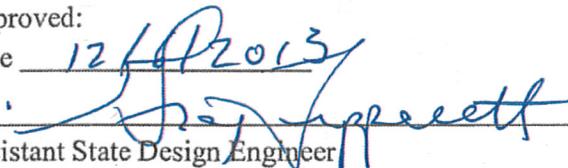
LED luminaires are different in many ways from our traditional High Pressure Sodium (HPS) luminaires currently in use. The biggest difference is the light distribution pattern of each LED luminaire fixture. LED luminaires have different light distribution patterns which typically does not allow for interchangeability between manufacturers. The illumination layout for this project was designed using one of the top performing LED fixtures in regards to light distribution. Currently there is not another fixture with a similar light distribution pattern that could be used without changing luminaire pole locations and possibly adding more luminaires to meet the required illumination levels. WSDOT HQ Traffic is interested in field testing this fixture so that it can be evaluated further, thus the anticipated statewide research work plan.

Recommendation

Using this LED luminaire research work plan and HQ Traffic's recommendation, Northwest Region Traffic Office requests to use the Cooper Navion LED fixture for this project. If you have any questions or comments, please contact Ted Bailey (360)705-7286 or Keith Calais (360)705-6986.

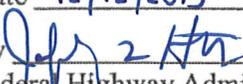
Approved:

Date 12/11/2013

By , P.E.
Assistant State Design Engineer

Approved:

Date 12/12/2013

By 
Federal Highway Administration

Attachments

Light Emitting Diode (LED) Research Work Plan

This project would like research designation to allow WSDOT HQ Traffic to field test this particular fixture. WSDOT HQ Traffic believes it is in the best interest of the public to allow for field testing of specific fixtures as shown in the LED Roadway Lighting Product Evaluation Process below.

The research will consist of the following:

- Examining the fixtures before installation to check for manufacturing flaws.
- Watch the installation process of the fixture to check ease of installation.
- The life expectancy of the LEDs and recording critical components.
- The Warranty length and recording items covered.
- After the fixtures are installed, the system will be monitored to check for any issues like blown fuses/tripped breakers or any other issues that may affect the electrical system.
- The fixtures will be monitored at 6 month intervals to check for product durability.

After approximately 18 months of field testing the information will be compared against other WSDOT research projects that are also testing LED fixtures. After the field testing stage, the three top rated fixtures will be compiled into a General Special Provision for use on projects until such time that a performance specification can be developed.

LED Roadway Lighting Product Evaluation Process

Projects will need to select certain manufacturers on particular projects to ensure that each manufacturer is represented evenly in terms of numbers installed and also the environments in which the fixtures are installed. Some fixtures may do better in the colder environment on the west side of the state than they will on the warmer east side of the state.

Step 1

Using the same criteria, WSDOT will evaluate all manufacturers that approach WSDOT with a LED fixture. WSDOT's evaluation process starts with a computer analysis simulating the capabilities of each manufacturer's fixture. The computer simulation covers a 500' section of roadway, with two 12' lanes (excluding shoulders) in each direction, which are continuously illuminated. In order to proceed to step 2, two different scenarios of typical luminaire layouts will be evaluated. The first is where the lights are installed on opposite sides of the roadway, and the other is where the lights are installed on the same side of the roadway. If the LED products meet the light levels required then the manufacturer is moved on to Step 2.

Step 2

After successful completion of step 1, the manufacturer is invited to discuss their LED fixture at the HQ Materials Laboratory with representatives from HQ Maintenance, Region Design, and HQ Traffic personnel. This includes a significant amount of unscripted questions from the technical experts including but not limited to: company background and references, previous projects, supply chain, economic viability, and

product failure history. After the manufacturer successfully completes Step 2, their product(s) is approved for continued field testing and evaluation.

Step 3

This project will be the first opportunity for WSDOT to evaluate the performance of the Cooper Navion LED fixture in the field under real conditions. HQ Traffic Office working with Region Maintenance personnel will monitor and evaluate the performance of this product and summarize the results after construction is complete. The proposed research methodology would include the evaluation of the following items:

LED Evaluation Metrics

- Ease of installation
- Workmanship of the product
- Durability of the product
- Life expectancy of the driver and LED components
- How the fixture works with existing WSDOT systems
- Components covered under warranty and warranty length
- Ease of maintenance

HQ Traffic will also be researching other manufacturers statewide at the same time as this research project. At the end of the 2013-2015 biennium, the results will be compiled and the top three rated fixtures will be listed in a General Special Provision for use statewide on WSDOT projects and HQ Maintenance until a performance specification is developed.