SPECIAL PROVISIONS
FOR
AESTHETIC LIGHTING

Johnson County
HDP-3715(652)--71-52

Effective Date
April 19, 2016

THE STANDARD SPECIFICATIONS, SERIES 2015, ARE AMENDED BY THE FOLLOWING MODIFICATIONS AND ADDITIONS. THESE ARE SPECIAL PROVISIONS AND THEY SHALL PREVAIL OVER THOSE PUBLISHED IN THE STANDARD SPECIFICATIONS.

PART 1 - GENERAL

1.1 SCOPE

This Specification governs the furnishing of all material, equipment, and labor for the installation and testing of a complete, operational color LED lighting system, including power and data to miscellaneous equipment noted. All material and equipment supplied, and all work performed, shall be in accordance with these Specifications, and as shown on the plans.

1.2 DEFINITIONS

1. Luminaire: Complete lighting unit consisting of housing, optical chamber, lens, lamps, driver, mounting hardware and all parts as required to direct and distribute light.
2. Color System Controller: Electronic unit with hardware, software and memory to store shows and transmit data signal to play the light show.
3. Data Drivers: Electronic unit that combines power and data signal into a single cable.
4. Color Luminaire Cables: Cables with connectors which join luminaires together into a system.

1.3 MATERIALS

1. Unless otherwise specified, all materials and equipment shall be new, unused and undamaged. Materials and equipment shall be the current and standard designs of manufacturers regularly engaged in their production.

2. Where materials and equipment are indicated as furnished by others and installed or connected under this contract, it shall be the Contractor's responsibility to verify installation details.

1.4 OPERATING INSTRUCTIONS

1. Fully and carefully instruct the City of Iowa City representatives, regarding the proper operation, care and maintenance of each system and its equipment.

2. Furnish all keys and special wrenches furnished with equipment under his contract to the City of Iowa City at the completion of the project.

1.5 COORDINATION OF WORK

The electrical contractor shall plan all work so that it proceeds with a minimum of interference with other trades. The electrical contractor shall cooperate with all other contractors in furnishing material and information, in proper sequence, for the correct location of all sleeves, inserts, foundations, wiring, etc. The electrical contractor shall pay for all extra cutting and patching made necessary by his failure to properly direct such work at the correct time.

1.6 SUBMITTALS

A. Product Data.

For each luminaire, and support component, arranged in order of lighting unit designation. Include data on features, accessories, finishes, and LED Fixtures including drivers and all electrical and mechanical parts required for a fully installed and functioning Color LED Light Fixture.

B. Shop Drawings.

Include complete scaled, technical drawings showing all existing and proposed lights, materials, fasteners, wiring, connections, and other parts as indicated in the contract documents.

a. Color LED Fixtures
b. Color System Controller
c. Power Supplies
d. Data Drivers
e. Manufacturer supplied cables
f. Lighting Calculations shall be submitted to show that the color LED luminaires provide a minimum of 8 footcandles on the underside of the arch above the roadway deck and 8 footcandles on the underside of the arch below the roadway deck. The Contractor shall submit point by point computer calculations confirming the minimum proposed footcandles. The calculations shall be done with a maintenance factor of 0.175 (0.25, representing one color LED of the four color LEDs burning times 0.7 light loss factor).

PART 2 - MATERIALS AND EQUIPMENT

2.1 GENERAL

A. The Contractor shall be solely responsible to verify quantities, installation locations and wiring requirements for this work. It is the responsibility of the contractor to verify all control and interface devices with the manufacturer to provide a complete functioning system.

2.2 WIRES AND CABLES

A. DMX CABLE

1. DMX cable shall adhere to ANSI E1.11 – 2008 (r2013) – Entertainment Technology – USITT DMS512-A, Asynchronous Serial Digital Data Transmission Standard for Control Lighting Equipment and Accessories. The DMX Cable shall be two-pair 22 No. AWG, 7 x 32 stranding, twisted a minimum of 4.8 twists per foot, double shielded, minimum of 100 ohms impedance and less than 25 picofarads per foot capacitance.

B. Color Luminaire Cables
   1. Factory constructed power/data cables shall be installed between the data/power drivers and the luminaires.

2.3 DATA/POWER DRIVERS

A. The data driver shall be Lumenpulse CBX-60-240-12V-ETH-SI or approved equal. The driver shall provide power to fixtures and allow bi-directional control capabilities for both DMX and Ethernet based systems. The device shall have a IP66 rated housing with multiple output ports. The electronic compartment shall have indicator lights for troubleshooting and a test button.

2.4 COLOR LED LUMINAIRES

A. The 4 feet long in-ground luminaire shall be Lumenpulse LOI-12V-48-RGBW-DMX 1FX-30x60-TS0 or approved equal. The 2 feet long in-ground luminaire shall be Lumenpulse LOI-12V-24-RGBW-DMX 1FX-30x60-TS0 or approved equal. The spot luminaire shall be Lumenpulse LBX-HO-240-RGBW-DMX 1FX-NF-SI-SY-CRC or approve equal.

B. All fixtures, wiring, and drivers will be UL listed for wet locations and IP67 or greater rating.

C. The fixture shall be an outer housing with an inset optical chamber. The outer housing shall enclose a power supply and wiring compartment.

D. A solid, fully encapsulated LED linear luminaire that is permanently sealed with a solid translucent, UV resistant, covering to evenly emit light, and to keep water out. The fixture will be guaranteed to withstand water, snow, ice, severe hot and cold environmental temperatures, sun, wind, and vibration without damaging its structural, aesthetic, or functional qualities. The luminaire shall produce at least 500 lumens per foot.

E. Translucent or transparent tubes with internal LED light strings will not be acceptable as substitutes. Fixture and driver shall include a 5 year replacement warranty. LEDs shall have a minimum L70 of 80,000 hours and 25ºC. Drivers will have a minimum estimated life of 50,000 hours.

F. Contractor will supply all manufacturer's linear LED lights, wiring, drivers, connectors, custom channels, mounting clips, stainless steel hardware and other materials as required for complete installation of fixtures per contract documents.

2.5 COLOR SYSTEM CONTROLLER

The Controller shall be a Pharos LPC 1 or approved equal.

A. General
   1. The Controller shall be a microprocessor-based system specifically designed for control of lighting in an architectural or entertainment application. A personal computer running emulation software shall not be acceptable.
   2. The Controller shall store show data in non-volatile solid-state memory. This memory shall be removable for purposes of backup or disaster-recovery.
   3. Show data may be downloaded from a remote personal computer over an Ethernet or USB connection.
   4. The Operating Software of the Controller shall be stored in a dedicated non-removable non-volatile solid-state memory. It shall be possible to update the Operating Software by download from a remote personal computer over an Ethernet or USB connection.

5. The Controller shall commence show playback automatically on receiving power without additional external inputs.
6. The Controller shall have an internal real-time clock that continues to operate when external power is absent. It shall be capable of adjusting for Daylight Savings Time automatically and can be updated over the Internet using the Network Time Protocol (NTP).
7. The Controller shall be able to calculate sunrise and sunset times based on longitude and latitude information, and use these as triggers for events.
8. The Controller shall have a capacity of 512 output control channels of either DMX512 with RDM or eDMX protocols, including Art-Net II, KiNet, sACN and Pathport.
9. The Controller shall be able to output DMX512 and multiple eDMX protocols simultaneously, up to the output control channel limit.
10. The Controller shall be able to output eDMX protocols on a different IP network to its management IP network.
11. There shall be visual indicators on the Controller showing status of the controller and its interfaces.
12. The Controller shall operate a web server on its Ethernet interface. This shall allow status information, control and configuration options to be accessed remotely.
13. The appearance and content of the web interface may be customized by the user.
14. The Controller shall allow lighting to be programmed as separate zones, with independent triggering and manual intensity control.
15. The Controller shall support multiple timelines, crossfades and effects running concurrently.
16. The Controller shall support playback of video media with individual pixels mapped to lighting fixtures in an array.
17. The Controller shall support a multi-mode full-duplex RS232/half-duplex RS485 serial port.
18. The Controller shall be capable of receiving DMX512 for triggering.
19. The Controller shall support eight local inputs capable of digital, analogue or contact closure operating modes.
20. The Controller shall support a MIDI input and a MIDI output interface for use in triggers and for MIDI timecode.
21. The Controller shall support multiple remote devices connected via Ethernet for support of additional show control interfaces, such as contact closures, analogue inputs, relay outputs, serial, audio input, linear timecode, MIDI and DALI.
22. The Controller shall support multiple remote button panel stations via Ethernet for use as triggers and for user feedback.
23. The Controller shall support multiple streams of linear timecode and audio data within a single networked system.
24. The Controller shall have a recessed switch for resetting the unit without removal of power.
25. The Controller shall have an internal watchdog feature that will restart the unit in the event of program failure.
26. Multiple Controllers shall automatically synchronize and share triggers when programmed as part of a single show and linked via Ethernet during playback.
27. The Controller shall support conditional logic and execute user-defined Lua scripts to support advanced show control operations.
28. The Controller shall be provided with a 5 year manufacturer warranty.

B. Physical
    1. Enclosure and mounting shall comply with DIN43880 and EN60715(35/7.5) respectively
    2. The unit shall be an eight unit DIN enclosure (5 2/3 inch x 3½ inch x 2¼ inch)

3. The unit shall be entirely solid-state with no moving parts, fans nor hard disc drives
4. The unit shall operate in a temperature range from 32°F to 122°F
5. The unit shall be CE compliant.
6. The unit shall be ETL/cETL listed.

C. Electrical
   1. The Controller shall be designed to support the following wire terminations (Camden Electronics CTB9208 0.20 inch plug-in rising clamp terminals):
      a. 3-pin 9V to 48V DC Power
      b. 3-pin isolated DMX512 Out, RDM-compatible (two)
      c. 16-pin digital/analogue inputs (eight inputs, tri-mode for digital: active high, active low or contact closure)
      d. 3-pin RS232/RS485 serial input/output and the plug-in rising clamp terminals shall be provided.
   2. In addition there shall be the following standard connectors:
      a. RJ45 socket for 10/100Base-TX Ethernet
      b. USB-B Socket for USB 1.1
      c. 5-pin DIN socket for MIDI In
      d. 5-pin DIN socket for MIDI Out
   3. The Controller shall be able to receive power over Ethernet as an alternative to direct DC power (IEEE 802.3af PoE powered device).

D. Software
   1. The Controller shall be supported by programming software running on either a PC or Mac platform. Programming features shall include:
      a. Comprehensive architectural and automated fixture library
      b. Drag and drop placement of fixtures on plan
      c. Drag and drop patching of fixtures to output addresses
      d. Import of any media for mapping to fixture arrays
      e. Timeline-based programming and playback
      f. Extensive range of editable effect presets
      g. Drag and drop placement of effect presets and media on timeline
      h. Variety of triggering options for firing system-wide events
      i. Each trigger event may be configured to initiate one or more lighting or show control action
      j. Each trigger event may be configured to test one or more conditions before executing its actions
      k. Simulation of individual timelines, and entire project with triggers
      l. Live output from software for programming verification purposes
      m. Controller and network management tools
      n. Export TSV reports for all aspects of programming
      o. Tools for remote management of content and show programming

PART 3 - CONSTRUCTION REQUIREMENTS

3.1 GENERAL

A. This section governs the construction of all foundations and the installation of all luminaires, poles, conduits, cables and other material and equipment as required to complete the street lighting system as shown on the plans, the standard drawings, and as specified in the Special Provisions. The Contractor is responsible for verifying the correct line and grade of all concrete foundations and conduits prior to installation.

3.2 INGROUND LED LUMINAIRE INSTALLATION

The Contractor shall comply with the manufacturer's recommendations for installation procedures.

3.3 SURFACE LED FLOODLIGHT

The Contractor shall comply with the manufacturer's recommendations for installation procedures.

3.4 GROUNDING

The Contractor shall comply with the NEC and the manufacturer's recommendations for grounding the lighting system.

3.5 TRAINING

After the Color LED Lighting System is functioning properly, the Contractor shall schedule a training session for City personnel. The training session shall be taught by a factory-trained applications engineer to explain the software program and to aid the City in programing various color changing 'shows' as they desire. The training shall be planned to include a full day, as desired by the City.

3.6 WARRANTY

A. The manufacturer shall warrant the performance and construction of the luminaires to meet the requirements of this special provision, and shall warrant all parts, components and appurtenances against defects due to design, workmanship or material developing within a period of 5 years after the date of manufacture as indicated on the luminaire. This will be interpreted particularly to mean compatible performance of drivers with LED arrays, failure of any component, failure of any of the LED's, and discolorations or fogging of the lens, impairing the transmission of light. Any luminaire or part thereof, not performing as required, or developing defects within this period shall be replaced by the manufacturer without expense to the City.

3.7 METHOD OF MEASUREMENT

Method of Measure for Aesthetic Lighting shall be Lump Sum.

3.8 BASIS OF PAYMENT

Payment for the bid item, Aesthetic Lighting, will be at the contract unit price per lump sum. Payment shall be full compensation for all items required for the system including the aesthetic lighting units, equipment cabinets, cables, connectors, installation and all associated hardware and incidentals, labor, equipment and materials for installation.