

**CITY OF CONWAY**  
**CITY OF CONWAY STREET DEPARTMENT**  
**BID INVITATION**

Bid Number: 2007-22

**BID OPENING LOCATION:**  
 City of Conway Mayo's Office  
 1201 Oak Street

**MAIL TO:**  
 City of Conway Mayor's Office  
 1201 Oak Street

**DELIVER TO:**  
 City of Conway Mayor's Office  
 1201 Oak Street

Bid Opening Date: March 13, 2007 Time: 10:00AM Conway, AR 72032 Conway, AR 72032 Conway, AR 72032

Sealed bids for furnishing the commodities and/or services described below, subject to the Conditions on the reverse hereof and as may be attached hereto will be received at the above-noted mail and delivery locations until the above-noted bid opening date and time, and then publicly opened at the above-noted bid opening location. **Bids must be submitted on this form, with attachments when appropriate, or bids will be rejected. Late bids and unsigned bids will not be considered.**

In compliance with this Bid Invitation and subject to all the Conditions thereof, the undersigned offers and agrees to furnish any and all items upon which prices are quoted, at the price set opposite each item.

Company Name: \_\_\_\_\_

Name (Type or Print): \_\_\_\_\_

Address: \_\_\_\_\_

Title: \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_

Phone: \_\_\_\_\_ Fax: \_\_\_\_\_

E-mail Address: \_\_\_\_\_

Federal Tax ID or Social Security No.: \_\_\_\_\_

**Signature:** \_\_\_\_\_

Signature must be original (not photocopied) and in ink. Unsigned bids will be rejected.

Item No.	Description	Quantity	Unit	Unit Price	Amount
1.	Twelve Inch Red Traffic Signal Module	77	ea.		
2	Twelve Inch Yellow Traffic Signal Module	77	ea.		
3	Twelve Inch Green Traffic Signal Module	77	ea.		
4	Twelve Inch Yellow Turn Arrow Traffic Signal Module	24	ea.		
5	Twelve Inch Green Turn Arrow Traffic Signal Module	24	ea.		
6	Twelve Inch Hand & Man Walk Signal Insert	56	ea.		
7	Twelve Inch Walk Signal Countdown Timer	56	ea.		
8	Sixteen Inch Hand & Man Walk Signal w/ Countdown Insert	4	ea.		
	Units shall conform to the attached "General Purchase Specification for Expanded View LED Traffic Signal Modules" .				
			TOTAL BID		

The successful bidder will be required to complete delivery within 45 days after award.

**All freight, tax and fees shall be included in the bid price**

Bid prices are FOB Conway Street Department, 100 East Robins Street, Conway, Arkansas

Any additional information and clarifications may be obtained by contacting  
 Mr. Alan Alvey, Traffic Systems Manager  
 Street Department  
 City of Conway  
 100 East Robins  
 Conway Arkansas 72032  
 Or by calling 501-513-3550

**Unsigned bids will not be considered**

## City of Conway TERMS AND CONDITIONS

### Important – Read Carefully

By Submission of quote, bidder certifies that he has read all terms and conditions and that quote is submitted in accordance therewith.

1. Prices quoted will be considered to be net prices unless otherwise stated by the bidder. Cash discounts requiring payments in less than 30 days will not be considered in making awards.
2. Prices quoted shall be FOB Conway unless otherwise specifically stated on proposal. In either case, delivery charges must be prepaid.
3. All fees and taxes shall be included in prices quoted.
4. Bidder certifies that he will make delivery of items for which he bids within 90 days after receipt of award – unless otherwise specifically stated. Time of delivery in excess of 90 days may be considered a factor in making awards.
5. In case of default of contractor in making deliveries as per contract, the City may procure the articles or services from other sources and hold the contractor responsible for all excess costs occasioned thereby. Bidder's record as to satisfactory performance under previous contracts will be considered a factor in making awards and retention on bid lists.
6. The City reserves the right to reject any or all quotes, in part or in whole and to waive information in quotes received.
7. If not otherwise specified, bidder must furnish brand names with catalog number, if any, on items which are offered as "equal." In all such cases the burden of establishing equality is upon the bidder and failure to do so within a reasonable time may result in rejection. Alternative bids will not be considered unless no other type bid for the item is received.
8. In the case of equal or tie bids, preference will be given to Arkansas bidders. Other than as stated in the first sentence, awards on tie bids will be made at the discretion of the purchasing official. In such cases, "splitting" will be avoided and awards of previous contract(s) to one or more of the bidders will not be a factor.
9. In the event that bidder is unable to furnish all of an item, bids on portions thereof may be considered.
10. Final inspections and acceptance or rejection will be made after delivery. Items rejected because of non-conformance shall be removed and replaced immediately with those which meet specifications, all at the expense of the contractor. In the event that necessity requires the use of non-conforming items, payment therefore will be made at a proper reduction in price which shall be not greater than contractor's actual cost by purchase, fabrication, manufacture or other production method plus transportation paid to carriers. All costs in connection with testing items that do not meet specifications shall be paid by contractor.
11. Quality, time of performance, probability of performance, and location of bidder will be factors in awards of all contracts.
12. The City reserves the right to purchase any, all or none of the items listed, in combinations thereof that may be in the best interest of the City of Conway.
13. The City reserves the right to change any specifications, terms and/or conditions at any time, with adequate notice in writing to bid invitees of those changes, if any.
14. The City is qualified for "GSA" pricing schedules, if available and applicable.
15. The City reserves the right to waive any informalities or minor defects, but this shall not be construed to indicate waiver of any specification, term and/or condition unless in the best interest of the City in the judgment of the City.
16. **CONSTRUCTION / INSTALLATION:** Any construction work that is worth \$20,000 or more must comply with Arkansas Code Annotated § 22-9-204.
17. **PROHIBITED INTEREST CONDITION:** No official of the City authorized on behalf of the City to specify, plan, design, negotiate, make, accept or approve, or take part in specifying, planning, negotiating, making, accepting or approving any construction or material purchase contract or any subcontract in connection with any purchase made by the City of Conway shall become directly or indirectly interested personally in the purchase in the purchase or any part thereof.
18. **EQUAL OPPORTUNITY IN EMPLOYMENT:** All qualified bidders will receive consideration without regard to race, color, religion, sex, age, disability or national origin.

# **General Purchase Specification Expanded View LED Traffic Signal Modules 300mm (12 in.) and 200mm (8 in.)**

## **1.0 PURPOSE**

This specification provides the minimum performance requirements for 300 mm (12 in) and 200 mm (8 in) LED traffic signal modules with expanded view. It is not intended to impose restrictions upon specific designs and materials that conform to the purpose and the intent of this specification. This specification refers to definitions and practices described in "Vehicle Traffic Control Signal Heads" published in the *Equipment and Materials Standards of the Institute of Transportation Engineers*, referred to in this document as "VTCSH". The multiple LED light source should be the latest technology available on the market. The LEDs utilized shall be AlInGaP technology for red, amber and yellow indications, or InGaN for green indications.

## **2.0 PHYSICAL AND MECHANICAL REQUIREMENTS**

### **2.1 General**

LED traffic signal modules with expanded view (the module) designed as retrofit replacements for existing signal lamps shall not require special tools for installation. Retrofit replacement LED modules shall fit into existing traffic signal housings built to the VTCSH Standard without modification to the housing.

Installation of a retrofit replacement LED signal module into an existing signal housing shall only require the removal of the following existing components: i.e., lens, lamp module and gaskets. It shall be weather tight and fit securely in the housing; and shall connect directly to existing electrical wiring.

The installation of the signal module shall not require the removal of the incandescent lamp reflector.

### **2.2 LED Signal Module**

**2.2.1** The retrofit LED module shall be capable of replacing the optical unit.

**2.2.2** Tinting (Optional) -The lens shall be tinted or shall use transparent film or materials with similar characteristics.

**2.2.3** The LED module lens may be a replaceable part without the need to replace the complete LED module.

### **2.3 Environmental Requirements**

**2.3.1** The LED module shall be rated for use in the ambient operating temperature range of -40°C (-40°F) to +74°C (+165°F).

**2.3.2** The LED module shall be protected against dust and moisture intrusion as per NEMA Standard 250-1991 requirements, for Type 4 enclosures to protect all internal LED, electronic, and electrical components.

**2.3.3** The LED signal module lens shall be UV stabilized.

**2.3.4** The lens shall be smooth on the outside and be specifically designed to reduce sun reflections (Sun Phantom).

**2.3.5** The LED module must be supplied with an installed gasket.

## **2.4 Construction**

**2.4.1** The LED module shall be a single, self-contained device, not requiring on-site assembly for installation into an existing traffic signal housing. The power supply must fit and mount inside the LED module.

**2.4.2** The assembly and manufacturing process for the LED assembly shall be designed to assure all internal LED and electronic components are adequately supported to withstand mechanical shock and vibration from high winds and other sources.

## **2.5 Materials**

**2.5.1** Materials used for the lens and LED module construction shall conform to ASTM specifications where applicable.

**2.5.2** Enclosures containing the power supply and electronic components of the LED module shall be made of UL94VO flame retardant materials. The lens of the LED module is excluded from this requirement.

## **2.6 Module Identification**

**2.6.1** Each LED module shall be identified on the backside with the manufacturer's name and serial number.

**2.6.2** The following operating characteristics shall be identified: nominal operating voltage, power consumption, and Volt-Ampere.

**2.6.3** LED modules shall have a prominent and permanent vertical indexing indicator, i.e., UP ARROW or the word UP or TOP, for correct indexing and orientation inside a signal housing.

## **3.0 PHOTOMETRIC REQUIREMENTS**

### **3.1 Luminous Intensity & Distribution**

**3.1.1** The maintained minimum luminous intensity values for LED modules throughout the warranty period, under the operating conditions defined in Sections 2.3.1, 4.2.1 and 5.4.2, and at the end of the warranty period, shall not be less than the values shown in Table 1.

**3.1.2** When operating within the temperature range specified in Section 2.3.1 during the warranty period, the maximum luminous intensity for the 8-inch or 12-inch signals shall not exceed 800 candelas for the Red, 1,600 candelas for the Green, and 1,600 candelas for the Yellow.

**3.1.3** The optical lens should reflect a light distribution look similar to that of an incandescent lamp with expanded view for special applications.

## **3.2 Chromaticity**

The measured chromaticity coordinates of LED modules shall be between 500 nm and 650 nm, conforming to the chromaticity requirements of Section 8.04 and Figure 1 of the VTCSH standard.

**Table 1. Maintained Minimum Luminous Intensity for Expanded View LED Signal Modules  
Candlepower Values (candelas (cd))**

Vertical Angle	Horiz. Angle (Left & right)	8-inch Signal			12-inch Signal		
		Red	Yellow	Green	Red	Yellow	Green
17.5	17.5°	1	3	3	3	7	7
	2.5°	4	8	8	10	20	20
12.5	17.5°	6	11	11	14	27	27
	2.5°	8	16	16	20	41	41
7.5	17.5°	8	16	16	20	41	41
	2.5°	22	43	43	54	108	108
2.5	17.5°	23	46	46	58	115	115
	2.5°	88	132	132	220	441	441
-2.5°	2.5°	133	267	267	339	678	678
	7.5°	97	194	194	251	501	501
	12.5°	57	113	113	141	283	283
	17.5°	25	48	48	77	154	154
-7.5°	2.5°	101	202	202	226	452	452
	7.5°	89	178	178	202	404	404
	12.5°	65	129	129	145	291	291
	17.5°	41	81	81	89	178	178
	22.5°	18	37	37	38	77	77
	27.5°	10	20	20	16	32	32
-12.5°	2.5°	37	73	73	50	101	101
	7.5°	32	65	65	48	97	97
	12.5°	28	57	57	44	89	89
	17.5°	20	41	41	34	69	69
	22.5°	12	25	25	22	44	44
	27.5°	9	16	16	16	32	32
-17.5°	2.5°	16	32	32	22	44	44
	7.5°	14	28	28	22	44	44
	12.5°	10	20	20	22	44	44
	17.5°	9	16	16	22	44	44
	22.5°	6	12	12	20	41	41
	27.5°	4	9	9	16	32	32
-22.5	2.5°	4	8	8	10	20	20
	7.5°	3	6	6	7	14	14

#### 4.0 ELECTRICAL

##### 4.1 General

All wiring and terminal blocks shall meet the requirements of Section 13.02 of the VTCSH Standard. Two secured, color coded, 914 mm (36 in) long 600 V, 20 AWG minimum, jacketed wires, conforming to the National Electrical Code, rated for service at +105°C, are to be provided for electrical connection.

##### 4.2 Voltage Range

**4.2.1** LED modules shall operate from a  $60 \pm 3$  cycle ac line power over a voltage range from 80 Vac rms to 135Vac rms. The current draw shall be sufficient to ensure compatibility and proper triggering and operation of load current switches and conflict monitors in the signal controller that the procuring traffic authority customer has in use.

**4.2.2** Nominal operating voltage for all measurements shall be  $120 \pm 3$  Volts rms.

**4.2.3** Fluctuations in line voltage over the range of 80Vac to 135Vac shall not affect luminous intensity by more than  $\pm 10$  percent.

**4.2.4** The LED circuitry shall prevent flickering at less than 100 Hz over the voltage range specified in Section 4.2.1.

**4.2.5 Low Voltage Turn Off**

There shall be no illumination from the module when the applied voltage is less than 45 volts AC. To test for this condition the unit must first be fully illuminated at the nominal operating voltage. The applied voltage is then reduced to the point that there is no illumination. This point must be greater than 45 volts AC. The same requirement should apply in rising voltage from 0 to 45 with no visible illumination.

**4.2.6 Turn-On and Turn-Off Time:**

The modules shall reach 90% of their full illumination (turn-on) within 100 msec (+ or - 10%) after the application of the nominal operating voltage. The LED modules shall not be illuminated (turn-off) within 100 msec (+ or - 10%) after the removal of the nominal operating voltage.

**4.3 Transient Voltage Protection**

**4.3.1** The LED module on-board circuitry shall include voltage surge protection to withstand high-repetition noise transients and low-repetition, high-energy transients as stated in Section 2.1.6, NEMA Standard TS-2, 1992.

**4.4 LED Drive Circuitry**

**4.4.1** The individual LED light sources shall be wired so that the catastrophic failure of one LED, will result in the loss of the light from only that one LED.

**4.4.2** The power supply must be current regulated.

**4.5 Electronic Noise**

The LED module and the associated on-board circuitry must meet Federal Communications Commission (FCC) Title 47, SubPart B, Section 15 regulations concerning the emission of electronic noise.

**4.6 Power Factor (PF) and AC Harmonics**

**4.6.1** LED modules shall provide a power factor of 0.90 or greater when operated at nominal operating voltage, and 25°C (77°F).

**4.6.2** Total harmonic distortion induced into an ac power line by an LED signal module, operated at nominal operating voltage, at 25°C (77°F) shall not exceed 20 percent.

## **5.0 QUALITY ASSURANCE**

### **5.1 General**

#### **5.1.1 Quality Assurance Program**

LED modules shall be manufactured in accordance with a vendor quality assurance (QA) program. The QA program shall include two types of quality assurance: (1) design quality assurance, and (2) production quality assurance. The production quality assurance shall include statistically controlled routine tests to ensure minimum performance levels of LED modules built to meet this specification.

#### **5.1.2 Record Keeping**

QA process and test result documentation shall be kept on file for a minimum period of seven years.

#### **5.1.3 Conformance**

LED module designs not satisfying design qualification testing and the production quality assurance testing performance requirements in Sections 5.3 and 5.4 shall not be labeled, advertised, or sold as conforming to this specification.

### **5.2 Manufacturers' Serial Numbers**

Each LED module shall be identified by a manufacturer's serial number for warranty purposes.

### **5.3 Production Quality Assurance (QA) Testing**

All new LED modules shall undergo the following Production Quality Assurance testing prior to shipment. Failure of any LED module to meet requirements of these QA tests shall be cause for rejection. QA test results shall be maintained per the requirement of Section 5.1.2.

#### **5.3.1 Module Burn-in**

All LED modules or the electronic circuitry sub-assemblies, including all LEDs, shall be energized for a minimum of 24 hours, at 100 percent on-time duty cycle, in an ambient temperature of 60°C (+140°F).

#### **5.3.2 Maintained Minimum Luminous Intensity**

All LED modules shall be tested for maintained minimum luminous intensity after burn-in. A single point measurement with a correlation to the intensity requirements of Table 1 in Section 3.0 may be used. The LED module shall be operated at nominal operating voltage and at an ambient temperature of 25°C (77°F).

#### **5.3.3. Power Factor**

All LED modules shall be tested for power factor after burn-in per the requirements of Section 4.6.1. A commercially available power factor meter may be used to perform this measurement.

#### **5.3.4 Current**

All LED modules shall be measured for current flow in Amperes after burn-in. The measured current values shall be compared against current values resulting from design qualification measurements in Section 5.4.4.1. Measured current values in excess of 120 percent of the design qualification current values shall be cause for rejection.

#### **5.3.5 Visual Inspection**

All LED modules shall be visually inspected for any exterior physical damage or assembly anomalies.

### **5.4 Design Qualification Testing**

Design qualification testing shall be performed on new LED module designs, and when a major design change has been implemented on an existing design. The minimum sample quantity of LED modules shall be as stated for each test. Failure to meet requirements of any of these tests shall be cause for rejection.

Testing shall be performed once every 5 years or when the module design or LED technology has been changed. Test data shall be retained by the testing laboratory and the LED module manufacturer for a minimum period of 5 years.

#### **5.4.1 Burn-in**

LED modules shall be energized for a minimum of 24 hours, at 100 percent on-time duty cycle, in an ambient temperature of +60°C (+140°F) before performing any design qualification testing.

#### **5.4.2 Maintained Minimum Luminous Intensity**

**5.4.2.1** After burn-in, a random sample of six LED modules shall be tested for maintained minimum luminous intensity at each of the 44 points indicated in Table 1, Section 3.0. These measurements shall be recorded at an ambient temperature of 25°C after the signal has been operated for 60 min.

**5.4.2.2** After burn-in, a random sample of six LED modules shall be tested for maintained minimum luminous intensity. Signals to be tested shall be mounted in a temperature testing chamber so that the lensed portion of the signal is outside the chamber and all portions behind the lens are within the chamber at a temperature of 74°C (165°F). The air temperature in front of the lens of the signal lens shall be maintained at a minimum of 49°C (120°F) during all tests.

Red and green LED modules shall be tested for luminous output at 74°C, allowing the modules to achieve thermal equilibrium for 60 minutes, while the modules are

energized at nominal operating voltage, at a 100% duty cycle, a single luminous intensity measurement shall be recorded.

Yellow LED modules shall be tested for luminous output at 25°C, allowing the modules to achieve thermal equilibrium for 60 minutes, while the modules are energized at nominal operating voltage, at a 8.3% (or 1/12) duty cycle or (5 sec On/55 sec Off).

A single point correlation measurement, accounting for measurement variables, shall be made at 25°C (77°F). For Red and green a measurement shall be made at 74°C (165°F) (lens at 49°C (120°F)). The 74°C measurement factored to the 25°C measurement shall be able to be correlated to the requirements of Table 1, Section 3.0. LED modules not meeting this correlation shall be cause for rejection.

#### **5.4.3 Chromaticity**

A sample of two LED modules shall be measured for chromaticity per the requirements of Section 3.4.2. A spectroradiometer shall be used for this measurement. The ambient temperature for this measurement shall be +25°C (+77°F).

#### **5.4.4 Electrical**

##### **5.4.4.1 Current.**

A sample of six LED modules shall be measured for current flow in Amperes. The measured current values shall be used for quality comparison of Production Quality Assurance current measurements on production modules.

##### **5.4.4.2 Power Factor (PF).**

A sample of six LED modules shall be measured for power factor per the requirements of Section 4.6.1. A commercially available power factor meter may be used to perform this measurement.

**5.4.4.3 Total Harmonic Distortion (THD).** A sample of six LED modules shall be measured for total harmonic distortion per the requirements of Section 4.6.2. A commercially available total harmonic distortion meter may be used to perform this measurement.

**5.4.4.4 Electronic Noise.** A sample of one LED modules shall be tested per the requirements of Section 4.6, with reference to Class A emission limits referenced in Federal Communications Commission (FCC) Title 47, SubPart B, Section 15.

**5.4.4.5 Controller Assembly Compatibility.** Due to the low load current draw and high off-state impedance of LED modules, the following design qualification tests shall be performed to ensure the module design is compatible and operates properly with load current switches and conflict monitors in NEMA and Type 170 traffic signal control units.

**5.4.4.5.1 Load Switch Compatibility.** A sample of six LED modules shall be tested for compatibility and proper operation with load current switches. Each LED module shall be connected to a variable AC voltage supply. The AC line current into the LED module shall be monitored for sufficient current draw to ensure proper load switch operation while the voltage is varied from 80 V rms to 135 V rms. Failure of the current draw to ensure proper load current switch operation shall be cause for rejection.

**5.4.4.5.2 Signal Conflict Monitor Compatibility.** A sample of six LED modules shall be tested for compatibility and proper operation with signal conflict monitors. Each LED module shall be operated from a 135 V ac voltage supply. A 19.5 k $\Omega$  resistor shall be wired in series in the hot line between the LED module monitor and the ac power supply. A single-pole-single-throw switch shall be wired in parallel across the 19.5 k $\Omega$  resistor. A 220 k $\Omega$  shunt resistor shall be wired between the hot line connection and the neutral line connection and the neutral line connection on the LED module. Conflict monitor compatibility shall be tested by measuring the voltage decay across the 200 k $\Omega$  shunt resistor as follows: The single-pole-single-throw switch shall be closed, shorting out the 19.5 k $\Omega$  resistor, allowing the AC power supply to illuminate the LED module. Next, the switch shall be opened and the voltage across the 220 k $\Omega$  shunt resistor shall be measured for a decay to a value equal to or less than 10V rms within a time period equal to or less than 100 milliseconds. This test shall be repeated a sufficient number of times to ensure testing occurs at the peak of the AC line voltage cycle.

**5.4.4.6 Nondestruct Transient Immunity.** A sample of six LED modules shall be tested for transient immunity using the procedure described in Section 2.1.8, NEMA Standard TS 2-1992.

#### **5.4.5 Environmental**

**5.4.5.1 Temperature Cycling.** Temperature cycling shall be performed on a sample of three LED modules per MIL-STD-883, Test method 1010. The temperature range shall be per Section 2.3. A minimum of 20 cycles shall be performed with a 30-minute transfer time between temperature extremes and a 30-minute dwell time at each temperature. LED modules under test shall be non-operating. Failure of a LED module to function properly or any evidence of cracking of the LED module lens or housing after temperature cycling shall be cause for rejection.

**5.4.5.2 Moisture Resistance.** Moisture resistance testing shall be performed on a sample of three LED modules per NEMA Standard 250-1991 requirements for Type 4 enclosures.

#### **5.4.5.3 Mechanical Vibration**

Mechanical vibration testing shall be performed on a sample of three LED modules per MIL-STD-883, Test Method 2007, using three 4-minute cycles along each x, y, and z axis, at a force of 2.5 Gs, with a frequency sweep from 2 Hz to 120 Hz. The loosening of the lens, of any internal components, or other physical damage shall be cause for rejection.

## **6.0 WARRANTY**

## **6.1 Warranty**

**6.1.1** LED modules shall be replaced or repaired if an LED module fails to function as intended due to workmanship or material defects within the first 60 months from the date of delivery.

**6.1.2** LED modules which exhibit luminous intensities less than the minimum values specified in Table 1 Section 3.0 within the first 60 months of the date of delivery shall be replaced or repaired.