CITY OF BENTON CITY

CONTRACT DOCUMENTS

FOR

TIB LOW ENERGY LIGHTING IMPLEMENTATION PROJECT

CITY OF BENTON CITY
TIB PROJECT NO. S-E-922 (001)-1
November 2013

SCOPE OF WORK:

The City of Benton City, Benton PUD, and the Benton Rural Electric Association in conjunction with the Washington State Transportation Improvement Board (TIB) invites bids to provide 183 new energy efficient and sustainable light-emitting diode (LED) street lights as a part of a TIB funded LED feasibility and implementation project.

The goal of this implementation project is to provide lighting improvements that will lower energy consumption and maintenance costs while providing light levels along the roadway that, at a minimum, meet current levels. Therefore, both the obtained light levels and the operating wattages of the luminaires are important. All the cobra head style high pressure sodium (HPS) roadway luminaires within the city limits will be replaced.

The City of Benton City is seeking bids from manufacturers to supply LED luminaires. The LED street lights must be sufficient to light streets to the standards specified in the request for proposal. The contract will be issued to the successful Proposers under a Price Agreement.

A copy of the plans and the standard specification requirements for this project will be available at the following locations:

- City of Benton City, City Hall, 708 9th Street, Benton City, WA 99320
- TIB FTP site: http://www.tib.wa.gov/downloads/BentonCityLED/

Questions and requests for additional information regarding this request for bids should be submitted in writing (via email) or via phone to the Transportation Improvement Board, Attention Clint Ritter, at ClintR@TIB.wa.gov, phone (360) 586-1151 or DKS Associates, Attention Dana Beckwith, at dmb@dksassociates.com, phone (503) 243-3500.

BID FORM

City of Benton City

TIB LOW ENERGY LIGHTING IMPLEMENTATION

TIB PROJECT NO. S-E-922 (001)-1

LED Roadway Luminaires

Bid Due Date: 11:00 a.m., December 6, 2013
Submit Written Bids to:

City of Benton City
City Hall
708 9th Street
Benton City, WA 99320

Payment Item	Model #	Unit	Unit Price	Estimated Number of Units	Total Price
Luminaire: Options 1 Collector Streets		EA		147	
Luminaire: Options 2 Collector Streets		EA		18	
Luminaire: Option 3 WSDOT Collector		EA		7	
Luminaire: Option 4 WSDOT Collector		EA		11	
				Total Price	

Bid Item Schedule (See Note 1)

Notes:

(1) ***Manufacturer must include all items included in the Luminaire Submittal Checklist with their Bid.***

(2) ***Manufacturer must be able to deliver all luminaires four weeks after receipt of a purchase order for luminaires is received. Submit letter of manufacturer capability with authorized signature.***

(3) ***No Washington State Sales Tax will be paid by the City of Benton City on Street related items of work. The Contractor is liable for Use Tax payable to the State for materials used on the job.***

The bids will be open and read aloud at 11:00 a.m. (local time), December 6, 2013 at Benton City Hall located at 708 9th Street, Benton City, WA 99320.

Sealed bids will be received by the City of Benton City, herein called the "Owner, at City Hall, 708 9th Street, Benton City, WA 99320 until **11:00 a.m. (local time), December 6, 2013**, and then at said office publicly opened and read aloud.

Each bid shall be submitted in a sealed envelope, addressed to the City of Benton City by the date and time specified above. Each sealed envelope containing a bid shall be plainly marked on the outside as bid for the TIB Low Energy Lighting Implementation, and the envelope shall bear on the outside the name of the Bidder and address. If forwarded by mail, the sealed envelope containing the bid shall be enclosed in another envelope addressed to the City of Benton City, 708 9th Street, Benton City, WA 99320. E-mailed or faxed Bid packages will be disqualified.

All bids shall be made on the required bid form. All blank spaces for bid prices shall be filled in, in ink or typewritten, and the bid form shall be fully completed and executed when submitted. Only one copy of the bid form is required. A conditional or qualified Bid will not be accepted.

Once submitted, bids may be modified in writing prior to the time and date set for bid closing. Any modifications shall be prepared on the company letterhead, signed by an authorized officer, state that the new document supersedes or modifies the prior bid and be submitted in a sealed envelope, appropriately marked. The Owner will not accept telegraphic modification, telephonic facsimile, or similar modification.

Any bid may be withdrawn prior to the above scheduled time for the opening of bids or authorized postponement thereof. Any bid received after the time and date specified shall not be considered. No bidder may withdraw a bid within 60 days after the actual date of the opening thereof. Should there be reasons why the contract cannot be awarded within the specified period, the time may be extended by mutual agreement between the Owner and the bidder.

Each bidder shall inform himself/herself fully of the conditions relating to the project and the employment of labor thereon. At the time of the opening of bids, each bidder will be presumed to have read and to be thoroughly familiar with the drawings and contract documents (including all addenda).

Each bidder shall satisfy himself/herself of the accuracy of the estimated quantities in the bid schedule. After bids have been submitted, the bidder shall not assert that there was a misunderstanding concerning the quantities of work or of the nature of the work to be performed. A successful bidder shall not be relieved of the obligation to furnish all material and labor necessary to carry out the provisions of the contract. The failure or omission of the bidder to examine any form, instrument or document shall in no way relieve the bidder from any obligation in respect to the bid.

Information obtained from an officer, agent, or employee of the Owner or any other person shall not affect the risks or obligations assumed by the bidder or relieve the Contractor from fulfilling any of the conditions of the contract. Any supplemental instructions shall be in the form of written addenda to the specifications which, if issued, will be mailed to all prospective bidders

(at the respective addresses furnished for such purposes), not later than three days prior to the date fixed for the opening of bids. Failure of any bidder to receive any such addenda or interpretation shall not relieve such bidder from any obligation under the bid as submitted. All addenda so issued shall become part of the contract documents.

Bid items calling for unit prices show estimated quantities of items to be installed. These quantities, although shown with as much accuracy as possible, are approximate only and are for BIDDING purposes only. The Owner reserves the right to increase or decrease by one hundred percent (100%) the amount of these quantities on bid items amounting to less than ten percent (10%) of the total Bid Amount as may be deemed necessary and by so doing will not invalidate the unit prices as listed in the Bid. In addition, if either the total cost of the work, using original bid quantities and unit prices, or the total quantity of any bid item amounting to more than ten percent (10%) of the total bid changes by more than twenty-five percent (25%), then the part of the increase or decrease exceeding twenty-five percent (25%) shall be adjusted as the parties agree.

Award of the contract, should it be made, will go to the lowest responsive bidder. The Owner may reject any bid not in compliance with the prescribed requirements and, however, may waive any informalities and minor defects in any and all bids and may reject any and all bids upon finding by the Owner it is in the public interest to do so.

The bid and other forms as required at the bid opening are bound in these contract documents for the convenience of the bidder.

BID PROPOSAL

Proposal of _____ (hereinafter called "BIDDER"), organized and existing under the laws of the State of _____ doing business as _____ _____* to the City of Benton City (hereinafter called "OWNER").

In compliance with your Advertisement for Bids, BIDDER hereby proposes to perform all WORK for the construction of City of Benton City **TIB Low Energy Lighting Implementation** in strict accordance with the CONTRACT DOCUMENTS, within the time set forth therein, and at the prices stated below.

By submission of this BID, BIDDER certifies, and in the case of a joint BID each party thereto certifies as to his own organization, that this BID has been arrived at independently, without consultation, communication, or agreement as to any matter relating to this BID with any other BIDDER or with any competitor.

The BIDDER is hereby advised that by signature of this proposal he is deemed to have signed the NON-COLLUSION AFFIDAVIT included in the Bidding Documents and also certifies that RCW 39.12 (Prevailing Wage Law) will be complied with.

Respectfully Submitted:

_____	_____
Signature	Address
_____	_____
Title	
_____	_____
Contractor's Registration Number	Date

(SEAL - if BID is by a corporation)

Attest _____

NON-COLLUSION DECLARATION

I, by signing the proposal, hereby declare, under penalty of perjury under the laws of the United States that the following statements are true and correct:

1. That the undersigned person(s), firm, association or corporation has (have) not, either directly or indirectly, entered into any agreement, participated in any collusion, or otherwise taken any action in restraint of free competitive bidding in connection with the project for which this proposal is submitted.

2. That by signing this signature page of this proposal, I am deemed to have signed and have agreed to the provisions of this declaration.

NOTICE TO ALL BIDDERS

To report bid rigging activities call:

1-800-424-9071

The U.S. Department of Transportation (USDOT) operates the above toll-free "hotline" Monday through Friday, 8:00 a.m. to 5:00 p.m., Eastern Time. Anyone with knowledge of possible bid rigging, bidder collusion, or other fraudulent activities should use the "hotline" to report such activities.

The "hotline" is part of USDOT's continuing effort to identify and investigate highway construction contract fraud and abuse and is operated under the direction of the USDOT Inspector General. All information will be treated confidentially and caller anonymity will be respected.

Proposal Submitted By:

_____
Company Name

_____
Signature Date

Address:_____

_____
City State Zip Code Phone No.

WA State Contractors License Number:_____ Expiration_____

Unified Business Number:_____

Labor & Industries Worker Compensation Number: _____

Employment Security Department Number: _____

Excise Tax Registration Number: _____

Bidder: Sign and date this sheet and submit with your bid for bid to be valid. If any of the required information is incomplete, the bid may be rejected at the City's discretion.

A copy of the plans and the standard specification requirements for this project will be available at the following locations:

- City of Benton City, City Hall, 708 9th Street, Benton City, WA 99320
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TIB LOW ENERGY LIGHTING IMPLEMENTATION

TIB PROJECT NO. S-E-922 (001)-1

LUMINAIRE SUBMITTAL CHECK LIST

- ☐ Appendix B Sumittal Form
- ☐ Luminaire Cutsheets
- ☐ Cut Sheets for LED Driver(s), Dimming Curves, and Reliability Data
- ☐ Instructions for Installation and Maintenance
- ☐ LM-79 Luminaire Photometric Report(s)
- ☐ TM-21 Calculations and Support Test Data at the luminaire level. Must include Energy Start Spreadsheet
- ☐ LM-80 Report for Each Unique LED Light Source Used
- ☐ Computer-Generated Point-by-Point Photometric Analysis of Maintained Photopic Light Levels as per Appendix A and Section 1.4E
- ☐ Written Product Warranty as per Section 1.5
- ☐ Listing and Labeling by applicable testing bodies as determined by the US Occupational Safety Health Administration (OSHA) as Nationally Recognized Testing Laboratories (NRTL) which include: CSA (Canadian Standards Association), ETL (Edison Testing Laboratory), and UL (Underwriters Laboratory).
- ☐ Estimated storage container size

CITY OF BENTON CITY

Specification for
LED Roadway Luminaires

November 2013

PART 1 – GENERAL

1.0. SCOPE OF WORK

The City of Benton City, Benton PUD, and the Benton Rural Electric Association in conjunction with the Washington State Transportation Improvement Board (TIB) will be replacing 183 utility grade high pressure sodium cobra head style street lights with new energy efficient and sustainable LED street lights as part of a TIB funded feasibility and implementation project.

The goal of this implementation project is to provide lighting improvements that will lower energy consumption and maintenance costs while providing light levels along the roadway that at a minimum meet current levels. Therefore not only are the obtained light levels important, but so are the operating wattages of the luminaires. All the cobra head style high pressure sodium (HPS) luminaires within the city limits will be replaced.

The City of Benton City is seeking bids from manufacturers to supply LED luminaires. The LED street lights must be sufficient to light streets to the standards specified in Appendix A. The contract will be issued to the successful Proposers under a Price Agreement.

1.1. REFERENCES

The publications listed below form a part of this specification to the extent referenced. Publications are referenced within the text by their basic designation only. Versions listed shall be superseded by updated versions as they become available.

A. American National Standards Institute (ANSI)
    1. C136.2-2004 (or latest), American National Standard for Roadway and Area Lighting Equipment—Luminaire Voltage Classification
    2. C136.10-2010 (or latest), American National Standard for Roadway and Area Lighting Equipment - Locking-Type Photocontrol Devices and Mating Receptacle Physical and Electrical Interchangeability and Testing
    3. C136.15-2011 (or latest), American National Standard for Roadway and Area Lighting Equipment – Luminaire Field Identification
    4. C136.22-2004 (R2009 or latest), American National Standard for Roadway and Area Lighting Equipment – Internal Labeling of Luminaires
    5. C136.31-2010 (or latest), American National Standard for Roadway Lighting Equipment – Luminaire Vibration
    6. C136.37-2011 (or latest), American National Standard for Roadway and Area Lighting Equipment - Solid State Light Sources Used in Roadway and Area Lighting
    7. C136.41-20XX (Draft), American National Standard for Roadway and Area Lighting Equipment - Dimming Control
B. American Society for Testing and Materials International (ASTM)
    1. B117-09 (or latest), Standard Practice for Operating Salt Spray (Fog) Apparatus
    2. D1654-08 (or latest), Standard Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments
    3. D523-08 (or latest), Standard Test Method for Specular Gloss
    4. G154-06 (or latest), Standard Practice for Operating Fluorescent Light Apparatus for UV Exposure of Nonmetallic Materials

C. Federal Trade Commission (FTC)
    1. Green Guides, 16 CFR Part 260, Guides for the Use of Environmental Marketing Claims
D. Illuminating Engineering Society of North America (IESNA or IES)
    1. DG-4-03 (or latest), Design Guide for Roadway Lighting Maintenance
    2. HB-10-11 (or latest), IES Lighting Handbook, 10th Edition
    3. LM-50-99 (or latest), IESNA Guide for Photometric Measurement of Roadway Lighting Installations
    4. LM-79-08 (or latest), IESNA Approved Method for the Electrical and Photometric Measurements of Solid-Sate Lighting Products
    5. LM-80-08 (or latest), IESNA Approved Method for Measuring Lumen Maintenance of LED Light Sources
    6. RP-8-00 (or latest), ANSI / IESNA American National Standard Practice for Roadway Lighting
    7. RP-16-10 (or latest), ANSI/IES Nomenclature and Definitions for Illuminating Engineering
    8. TM-3-95 (or latest), A Discussion of Appendix E - "Classification of Luminaire Lighting Distribution," from ANSI/IESNA RP-8-83
    9. TM-15-11 (or latest), Luminaire Classification System for Outdoor Luminaires
    10. TM-21-11 (or latest), Projecting Long Term Lumen Maintenance of LED Light Sources
E. Institute of Electrical and Electronics Engineers (IEEE)
    1. IEEE C62.41.2-2002 (or latest), IEEE Recommended Practice on Characterization of Surges in Low-Voltage (1000 V and less) AC Power Circuits
    2. ANSI/IEEE C62.45-2002 (or latest), IEEE Recommended Practice on Surge Testing for Equipment Connected to Low-Voltage (1000 V and Less) AC Power Circuits
F. National Electrical Manufacturers Association (NEMA)
    1. ANSI/NEMA/ANSLG C78.377-2008 (or latest), American National Standard for the Chromaticity of Solid State Lighting Products
G. National Fire Protection Association (NFPA)
    1. National Electrical Code (NEC)
H. Underwriters Laboratories (UL)
    1. 1598, Luminaires
    2. 8750, Light Emitting Diode (LED) Equipment for Use in Lighting Products
I. International Electrotechnical Commission (IEC)
    1. 60529, Degrees of Protection Provided by Enclosures (IP Code)
J. Federal Communications Commission
    1. FCC 47 CFR part 15 non-consumer RFI/EMI Standards

1.2. DEFINITIONS

A. Lighting terminology used herein is defined in IES RP-16. See referenced documents for additional definitions.
    1. Exception: The term “driver” is used herein to broadly cover both drivers and power supplies, where applicable.
    2. Clarification: The term “LED light source(s)” is used herein per IES LM-80 to broadly cover LED package(s), module(s), and array(s).

1.3. QUALITY ASSURANCE

A. Before approval and purchase, Owner may request luminaire sample(s) for inspection. Luminaire shall be identical to product configuration(s). Owner may request IES LM-79 testing of luminaire sample(s) to verify performance is within manufacturer-reported tolerances.

1.4. REQUIRED SUBMITTALS FOR EACH LUMINAIRE TYPE DEFINED IN APPENDIX A

A. General submittal content shall include:
    1. Completed Appendix B submittal form
    2. Luminaire cutsheets
    3. Cut sheets for LED driver(s), dimming curve, and reliability data. This shall include the In Situ case temperature of the LED driver within the fixture operating at an ambient temperature of 40°C.
    4. Instructions for installation and maintenance
B. LM-79 luminaire photometric report(s) shall be produced by the test laboratory and include:
    1. The test laboratory must hold National Voluntary Laboratory Accreditation Program (NVLAP) accreditation for the IES LM-79 test procedure. For more information, see http://ts.nist.gov/standards/scopes/eelit.htm.
    2. Complete luminaire catalog number
        a. Provide explanation if catalog number in test report(s) does not match catalog number of luminaire submitted
            1. Clarify whether discrepancy does not affect performance, e.g., in the case of differing luminaire housing color.
            2. If the particular luminaire configuration submitted has not been tested, the performance may be conservatively represented by test data for another luminaire configuration having:
                a. The same intensity distribution
                b. The same or lower nominal CCT
                c. The same or higher nominal drive current
                d. The same or greater number of LED light source(s)
                e. The same or lower percentage driver loading and efficiency
                f. The same or smaller size luminaire housing.
    3. Goniophotometry
    4. Colorimetry
        a. If a scotopic/photopic (S/P) ratio is not reported, a spectral power distribution table adequate for accurate calculation of the ratio shall be included.
C. TM-21 calculations and supporting test data per the following:
    1. The applicant must submit calculations per TM-21 predicting lumen maintenance at the luminaire level using In Situ Temperature Measurement Testing (ISTMT) and LM-80 data. To be eligible, ALL of the conditions below must be met.
        a. The LED light source(s) have been tested according to LM-80.
        b. The LED drive current specified by the luminaire manufacturer is less than or equal to the drive current specified in the LM-80 test report.
        c. The LED light source(s) manufacturer prescribes/indicates a temperature measurement point (T_S) on the light source(s).
        d. The T_S is accessible to allow temporary attachment of a thermocouple for measurement of in situ temperature. Access via a temporary hole in the housing, tightly resealed during testing with putty or other flexible sealant is allowable.

e. For the hottest LED light source in the luminaire, the temperature measured at the T_S during ISTMT is less than or equal to the temperature specified in the LM-80 test report for the corresponding drive current or higher, within the manufacturer's specified operating current range.
    1. The ISTMT laboratory must be approved by OSHA as a Nationally Recognized Testing Lab (NRTL), must be qualified, verified, and recognized through DOE's CALiPER program, or must be recognized through UL's Data Acceptance Program.
    2. The ISTMT must be conducted with the luminaire installed in the appropriate application as defined by ANSI/UL 1598 (hardwired luminaires), with bird-fouling appropriately simulated (and documented by photograph) as determined by the manufacturer.
2. Submit a completed Energy Start Spreadsheet, see www.energystar.gov/TM-21calculator

D. LM-80 report for each unique LED light source used.

E. Computer-generated point-by-point photometric analysis of maintained photopic light levels as per Appendix A
    1. Calculations shall be for maintained values, i.e. Light Loss Factor (LLF) < 1.0, where LLF = LLD x LDD x LATF, and
        a. Lamp Lumen Depreciation (LLD) shall be based on TM-21 data and 100,000 hours of operation at 25°C.
        b. Luminaire Dirt Depreciation (LDD) = 0.90
        c. Luminaire Ambient Temperature Factor (LATF) = 1.00
    2. Calculation/measurement points shall be per IES RP-8.

F. Written product warranty as per section 1.5 below

G. Listing and Labeling by applicable testing bodies as determined by the US Occupational Safety Health Administration (OSHA) as Nationally Recognized Testing Laboratories (NRTL) which include: CSA (Canadian Standards Association), ETL (Edison Testing Laboratory), and UL (Underwriters Laboratory).

1.5. WARRANTY

A. Provide a minimum ten-year warranty covering maintained integrity and functionality of:
    1. Luminaire housing, wiring, and connections
    2. LED light source(s)
        a. Negligible light output from more than 10 percent of the LED packages constitutes luminaire failure.
    3. LED driver(s)

B. Warranty period shall begin 90 days after date of invoice, or as negotiated by owner such as in the case of an auditable asset management system.

PART 2 – PRODUCTS

2.1. LUMINAIRE REQUIREMENTS

A. Luminaires their components shall be as specified for each type listed in Appendix A and as indicated in the following Sections B through H.

B. General Requirements
    1. Luminaire shall have an external label per ANSI C136.15.2011.

2. Luminaire shall have an internal label per ANSI C136.22.
3. Nominal luminaire input wattage shall account for nominal applied voltage and any reduction in driver efficiency due to sub-optimal driver loading.
4. Electrically test fully assembled luminaires before shipment from factory.
5. Luminaires shall be designed for ease of component replacement and end-of-life disassembly. Tool less entry and quick connect/disconnects shall be provided.
6. Transmissive optical components shall be applied in accordance with OEM design guidelines to ensure suitability for the thermal/mechanical/chemical environment.
7. Luminaire shall be included on the Design Lighting Consortium List (DLC)

C. Driver
   1. Rated case temperature shall be suitable for operation in the luminaire operating in the ambient temperatures indicated in Appendix A.
   2. Shall be rated for 100,000 hours

D. Photocontrol receptacle and Long Life Photocell:
   1. Photocontrol Receptacle Requirements
      a. An individual locking-type receptacle shall be incorporated into the luminaire which meets the requirements of ANSI C136.10.
   2. Long Life Photocell Requirements (to be supplied with luminaires)
      a. Shall meet the requirements of ANSI C136.10
      b. Primary surge protection rated 640 Joule MOV rated at 40kA
      c. Photocells shall have solid brass contact blades
      d. Fail Mode: “On”
      e. Nominal Voltage 50/60 Hz: 120/208/240/277
      f. Voltage Range: 105 to 305 Volts AC
      g. Load Rating: 1000 Watt Tungsten/1800 VA Ballast
      h. 1.5 fc Turn-On/1800 VA Ballast
      i. Time Delay Off: 3 to 5 seconds
      j. 1.5:1 Turn off/on ratio
      k. Conformal coated circuit boards
      l. Minimum 10 year warranty and a minimum 20 year life expectancy.

E. Luminaire Housing
   1. Shall be made from cast aluminum
   2. Shall have tool-less entry
   3. Shall be provided with easily viewable, internal level bubble to facilitate installation.

F. Painted or finished luminaire components exposed to the environment
   1. Shall exceed a rating of six per ASTM D1654 after 1000hrs of testing per ASTM B117.
   2. The coating shall exhibit no greater than 30% reduction of gloss per ASTM D523, after 500 hours of QUV testing at ASTM G154 Cycle 6.

G. Thermal management
   1. Mechanical design of protruding external surfaces (heat sink fins) shall facilitate hose-down cleaning and discourage debris accumulation.
   2. No liquids or other moving parts will be accepted.

H. IES TM-15 limits for Backlight, Uplight, and Glare (BUG Ratings)
   1. Calculation of BUG Ratings shall be for initial (worst-case) values, i.e., Light Loss Factor (LLF) = 1.0.

2. If luminaires are tilted upward for calculations in section 1.4.E, BUG Ratings shall be calculated for the same angle(s) of tilt.

I. The following shall be in accordance with corresponding sections of ANSI C136.37 unless otherwise noted:
   1. Wiring and grounding
      a. All internal components shall be assembled and pre-wired using modular electrical connections.
   2. Terminal blocks for incoming AC lines
   3. Latching and hinging

J. Ingress protection shall be in accordance with IEC 60529 unless otherwise noted.

2.2. PRODUCT MANUFACTURERS

A. The following cobra head style luminaire manufacturers are preapproved to bid on this project:
- American Electric Lighting (AEL)
- Cree
- Cooper Lighting
- GE Lighting Solutions
- Leotek
- Phillips

B. Any of the preapproved manufacturers offering products that comply with the required product performance and operation criteria may be considered.

2.3. MANUFACTURER SERVICES

A. Manufacturer or local representative shall provide installation and troubleshooting support via telephone and/or email within 24 hours.

B. The Manufacturer shall be able to provide shipment of the requested quantity of luminaires within 4 weeks of receipt of a purchase order for luminaires.

PART 4 – MEASUREMENT AND PAYMENT

4.1. MEASUREMENT

A. The quantities of luminaires will be measured on the unit basis, for each type of luminaire.

4.2 PAYMENT

A. The accepted quantities of work performed under this Section will be paid for at the Contract unit price, per unit of measurement, for the following items:

Pay Item	**Unit of Measurement**
(a) Luminaire: Options 1 Collector Streets	Each
(b) Luminaire: Options 2 Collector Streets	Each
(c) Luminaire: Option 3 WSDOT Collector	Each
(d) Luminaire: Option 4 WSDOT Collector	Each

Payment will be payment in full for furnishing all materials and incidentals necessary to complete the work.

PART 5 – DELIVERY

The luminaires must be delivered to the Benton PUD warehouse located at 1500 S Ely Kennewick, WA, 99336. Contact Patty Glines, Benton PUD at 509-582-1257 to coordinate time and delivery location.

END OF SECTION

Appendix A: City of Benton, Washington – Application-Based Specification for LED Roadway Lighting

Option 1: Collector Streets – One Side			
ROADWAY DATA:	Road width (Curb to Curb)		38ft
	Number of lanes, total on both sides of median		2
	Median width		None
	IES pavement class:	☐ R1 ☐ R2 ☑ R3 ☐ R4	
LIGHT POLE DATA:	Luminaire mounting height		28ft
	Arm length, horizontal		6ft
	Luminaires per pole		1
	Pole set-back from curb		7ft
	In-line pole spacing (one pole cycle)		150ft
PHOTOMETRIC PERFORMANCE CRITERIA: APPLICATION			
ROADWAY			
PHOTOPIC ILLUMINANCE:	**Maintained Average:**	Horizontal at pavement	0.4 fc
	Uniformity Ratio:	Average : Minimum (horizontal)	4.0
VEILING LUMINANCE:	Max. veiling luminance ratio		0.3
HARDWARE PERFORMANCE CRITERIA			
LED LUMINAIRE:	**Operating Range:**	Degrees Celsius	-20 to +40
	Input Power:	On-state power consumption (Max.)	71W
	CCT:	Rated correlated color temperature (Nominal)	4100K (±200 K)
	LLD:	Lamp Lumen Depreciation per TM-21 @ 100,000 hrs. and 25°C Ambient (Min. Lumen Maintenance)	0.85
	BUG Rating:	Nominal backlight-uplight-glare ratings per TM-15, Addendum A (Max.)	B1-U0-G1
	Color:	Luminaire housing finish	Gray
	IP Rating:	External Housing per IEC 60529	Wet
		Optical Chamber per IEC 60529	IP66
	Weight:	Total Luminaire weight (lb.) (Max.)	30
	EPA:	Effective projected area (ft^2) (Max.)	0.9
	Mounting Method:	☐ Post-top ☑ Side-arm 4 bolt or 2 bolt (luminaires under 20lbs)	
	Tenon:	Nominal pipe size (NPS)	1.66" to 2.375" O.D.
	ANSI C136.31 Vibration Test:	☑ Level 1 (normal) ☐ Level 2 (bridge/overpass)	
DRIVER:	**Input Voltage:**	Nominal (50Hz/60 Hz, Vac)	120 to 277 (±10%)
	Power Factor:	Minimum	0.90
	Output current (mA)		300 to 1050
	Dimming Protocol		N/A
	Field Adjustable Output Current with three or more settings		☑ Yes ☐ No
	Interference:	FCC 47 CFR part 15 non-consumer RFI/EMI Standards	
		Total Harmonic Distortion (THD) of 20% at full input power and across specified voltage range.	
	Control Signal Interface:	☑ Not required ☐ Required	

Appendix A: City of Benton, Washington – Application-Based Specification for LED Roadway Lighting

Option 2: Collector Streets – Staggered			
ROADWAY DATA:	Road width (Curb to Curb)		38ft
	Number of lanes, total on both sides of median		2
	Median width		None
	IES pavement class:	☐ R1 ☐ R2 ☑ R3 ☐ R4	
LIGHT POLE DATA:	Luminaire mounting height		35ft
	Arm length, horizontal		6ft
	Luminaires per pole		1
	Pole set-back from curb		7ft
	In-line pole spacing (one pole cycle)		150ft
PHOTOMETRIC PERFORMANCE CRITERIA: APPLICATION			
ROADWAY			
PHOTOPIC ILLUMINANCE:	**Maintained Average:**	Horizontal at pavement	0.8 fc
	Uniformity Ratio:	Average : Minimum (horizontal)	4.0
VEILING LUMINANCE:	Max. veiling luminance ratio		0.3
HARDWARE PERFORMANCE CRITERIA			
LED LUMINAIRE:	**Operating Range:**	Degrees Celsius	-20 to +40
	Input Power:	On-state power consumption (Max.)	154W
	CCT:	Rated correlated color temperature (Nominal)	4100K (±200 K)
	LLD:	Lamp Lumen Depreciation per TM-21 @ 100,000 hrs. and 25°C Ambient (Min. Lumen Maintenance)	0.85
	BUG Rating:	Nominal backlight-uplight-glare ratings per TM-15, Addendum A (Max.)	B2-U0-G2
	Color:	Luminaire housing finish	Gray
	IP Rating:	External Housing per IEC 60529	Wet
		Optical Chamber per IEC 60529	IP66
	Weight:	Total Luminaire weight (lb.) (Max.)	30
	EPA:	Effective projected area (ft^2) (Max.)	1.2
	Mounting Method:	☐ Post-top ☑ Side-arm 4 bolt or 2 bolt (luminaires under 20lbs)	
	Tenon:	Nominal pipe size (NPS)	1.66” to 2.375” O.D.
	ANSI Vibration Test:	☑ Level 1 (normal) ☐ Level 2 (bridge/overpass)	
DRIVER:	**Input Voltage:**	Nominal (50Hz/60 Hz, Vac)	120 to 277 (±10%)
	Power Factor:	Minimum	0.90
	Output current (mA)		300 to 1050
	Dimming Protocol		N/A
	Field Adjustable Output Current with three or more settings		☑ Yes ☐ No
	Interference:	FCC 47 CFR part 15 non-consumer RFI/EMI Standards	
		Total Harmonic Distortion (THD) of 20% at full input power and across specified voltage range.	
	Control Signal Interface:	☑ Not required ☐ Required	

Appendix A: City of Benton, Washington – Application-Based Specification for LED Roadway Lighting

Option 3: WSDOT Collector – One Side			
ROADWAY DATA:	Road width (Curb to Curb)		46ft
	Number of lanes, total on both sides of median		2
	Median width		None
	IES pavement class:	☐ R1 ☐ R2 ☑ R3 ☐ R4	
LIGHT POLE DATA:	Luminaire mounting height		30ft
	Arm length, horizontal		8ft
	Luminaires per pole		1
	Pole set-back from curb		8ft
	In-line pole spacing (one pole cycle)		250ft
PHOTOMETRIC PERFORMANCE CRITERIA: APPLICATION			
ROADWAY			
PHOTOPIC ILLUMINANCE:	**Maintained Average:**	Horizontal at pavement	1.1 fc
	Uniformity Ratio:	Average : Minimum (horizontal)	NA
VEILING LUMINANCE:	Max. veiling luminance ratio		0.4
HARDWARE PERFORMANCE CRITERIA			
LED LUMINAIRE:	**Operating Range:**	Degrees Celsius	-20 to +40
	Input Power:	On-state power consumption (Max.)	310W
	CCT:	Rated correlated color temperature (Nominal)	4100K (±200 K)
	LLD:	Lamp Lumen Depreciation per TM-21 @ 100,000 hrs. and 25°C Ambient (Min. Lumen Maintenance)	0.85
	BUG Rating:	Nominal backlight-uplight-glare ratings per TM-15, Addendum A (Max.)	B3-U0-G3
	Color:	Luminaire housing finish	Gray
	IP Rating:	External Housing per IEC 60529	Wet
		Optical Chamber per IEC 60529	IP66
	Weight:	Total Luminaire weight (lb.) (Max.)	46
	EPA:	Effective projected area (ft^2) (Max.)	1.4
	Mounting Method:	☐ Post-top ☑ Side-arm 4 bolt or 2 bolt (luminaires under 20lbs)	
	Tenon:	Nominal pipe size (NPS)	1.66” to 2.375” O.D.
	ANSI Vibration Test:	☑ Level 1 (normal) ☐ Level 2 (bridge/overpass)	
DRIVER:	**Input Voltage:**	Nominal (50Hz/60 Hz, Vac)	120 to 277 (±10%)
	Power Factor:	Minimum	0.90
	Output current (mA)		300 to 1050
	Dimming Protocol		N/A
	Field Adjustable Output Current with three or more settings		☑ Yes ☐ No
	Interference:	FCC 47 CFR part 15 non-consumer RFI/EMI Standards	
		Total Harmonic Distortion (THD) of 20% at full input power and across specified voltage range.	
	Control Signal Interface:	☑ Not required ☐ Required	

Appendix A: City of Benton, Washington – Application-Based Specification for LED Roadway Lighting

Option 4: WSDOT Collector – One Side			
ROADWAY DATA:	Road width (Curb to Curb)		66ft
	Number of lanes, total on both sides of median		2
	Median width		None
	IES pavement class:	☐ R1 ☐ R2 ☑ R3 ☐ R4	
LIGHT POLE DATA:	Luminaire mounting height		30ft
	Arm length, horizontal		6ft
	Luminaires per pole		1
	Pole set-back from curb		2ft
	In-line pole spacing (one pole cycle)		125ft
PHOTOMETRIC PERFORMANCE CRITERIA: APPLICATION			
ROADWAY			
PHOTOPIC ILLUMINANCE:	**Maintained Average:**	Horizontal at pavement	1.1 fc
	Uniformity Ratio:	Average : Minimum (horizontal)	4.0
VEILING LUMINANCE:	Max. veiling luminance ratio		0.3
HARDWARE PERFORMANCE CRITERIA			
LED LUMINAIRE:	**Operating Range:**	Degrees Celsius	-20 to +40
	Input Power:	On-state power consumption (Max.)	238W
	CCT:	Rated correlated color temperature (Nominal)	4100K (±200 K)
	LLD:	Lamp Lumen Depreciation per TM-21 @ 100,000 hrs. and 25°C Ambient (Min. Lumen Maintenance)	0.85
	BUG Rating:	Nominal backlight-uplight-glare ratings per TM-15, Addendum A (Max.)	B3-U0-G2
	Color:	Luminaire housing finish	Gray
	IP Rating:	External Housing per IEC 60529	Wet
		Optical Chamber per IEC 60529	IP66
	Weight:	Total Luminaire weight (lb.) (Max.)	34
	EPA:	Effective projected area (ft^2) (Max.)	1.2
	Mounting Method:	☐ Post-top ☑ Side-arm 4 bolt or 2 bolt (luminaires under 20lbs)	
	Tenon:	Nominal pipe size (NPS)	1.66” to 2.375” O.D.
	ANSI Vibration Test:	☑ Level 1 (normal) ☐ Level 2 (bridge/overpass)	
DRIVER:	**Input Voltage:**	Nominal (50Hz/60 Hz, Vac)	120 to 277 (±10%)
	Power Factor:	Minimum	0.90
	Output current (mA)		300 to 1050
	Dimming Protocol		N/A
	Field Adjustable Output Current with three or more settings		☑ Yes ☐ No
	Interference:	FCC 47 CFR part 15 non-consumer RFI/EMI Standards	
		Total Harmonic Distortion (THD) of 20% at full input power and across specified voltage range.	
	Control Signal Interface:	☑ Not required ☐ Required	

APPENDIX B
PRODUCT SUBMITTAL FORM

Luminaire Designation [1] (e.g., "Option 1")		
Manufacturer		
Model number		
Housing finish color		
Tenon nominal pipe size (inches)		
Nominal luminaire weight (lb)		
Nominal luminaire EPA (ft^2)		
Nominal input voltage (V)		
ANSI vibration test level	☑ Level 1 (Normal)	☐ Level 2 (bridge/overpass)
Nominal BUG Ratings		
Make/model of LED light source(s)		
Make/model of LED driver(s)		
Dimmability	☐ Dimmable	☑ Not dimmable
Upon electrical immunity system failure	☐ Possible disconnect	☐ No possible disconnect
Thermal management	☐ Moving parts	☑ No moving parts
Lumen maintenance testing duration (hr)		
Warranty period (yr)		
Rated life of LED driver(s)		
In Situ driver case temperature @ 40°C ambient temperature		
Parameter	Nominal value	Tolerance (%)
Initial photopic output (lm)		
Maintained photopic output (lm)		
Lamp lumen depreciation [2]		
Initial input power (W)		
Maintained input power (W)		
Initial LED drive current (mA)		
Maintained LED drive current (mA)		
Drive current used		
In situ LED T_s (°C)		
CCT (K)		
Additional product description		
List any exceptions taken from specified requirements		

[1] See Appendix A, and attach supporting documentation as required.
[2] Value shall be as specified in section 1.4.E, and shall not exceed six times the testing duration indicated in the row above. Value shall be consistent with values submitted in the rows below for maintained light output, maintained input power, and maintained drive current.