

Response to Questions from prospective bidders

Question

1. As this is an indefinite quantity contract, would a change in quantities affect the installation order of the intersections identified in the schedule of replacement, assuming no intersections had been recently upgraded?

Response 1: No, we will start with the list and complete as many locations as possible with the funds available

2. The second column on the schedule of replacement, labeled “D+1/N+2” – what does this information convey?

Response 2: This does not mean anything and should be ignored.

3. Is there a current list of optically programmable vehicular or pedestrian heads that corresponds to the intersections listed on the schedule of replacement?

Response 3: See Attachment A

4. Pages 22 and 23 reference technical specifications “contained in Appendix A”, however Appendix A is related to EEO responsibilities. Is there another Appendix?

Response 4: See Attachment B

5. Regarding the testing labs mentioned on page 7 of the LED specifications, is there a list of approved manufacturers? What would be the turnaround time for approval of a module?

Response 5:

DDOT does not have approved list. All equipment must meet or exceed the ITS Specifications. However, we have the following manufacturers in our stock:

- Dialight
- Gelcore
- EOI
- GE
- Leotek

6. Has the DBE requirement been removed? Why is there not a DBE requirement in this bid?

Response 6: While no specific contract goal has been established, prime contractors are encouraged to utilize certified DBE firms certified in accordance with 49CFR Part 26 to perform work on this project.

7. It appears as though the specifications are quite old, will the contracting officer accept products based upon the most recent ITE compliant LED's?

Response 7: Yes, the latest version of the ITE LED Specifications. See Attachment C

8. Is the color for the housing black or battleship gray?

Response 8: Color of the LED Module can be either.

9. Who shall I contact to get a manufacturer "approved"? What is the process?

Response 9: The first step is to get the unit tested at the one of the tested laboratory and verify that it meets the ITE Specifications. Then the unit should be submitted to DDOT for compatibility with our existing Traffic Signal Housings.

10. NHS Routes

Response 10: See Attachment D

Amendment No. 4
DCKA-2012-B-0112
LED Bulb Replacement Contract

ATTACHMENT A

**CURRENT LIST OF OPTICALLY PRGOGRAMMABLE VEHICULAR OR PEDESTRIAN
HEADS THAT CORRESPONDS TO THE INTERSECTIONS LISTED ON THE SCHEDULE
OF REPLACEMENT**

(2 PAGES)

Intersections with Optical Programmable Signal Heads
SOUTH DAKOTA AVE & 14TH ST & WEBSTER ST, NE
MICHIGAN AVE & SOUTH DAKOTA AVE & 16TH ST, NE
MICHIGAN AVE & ALLISON ST, NE
MICHIGAN AVE & 18TH ST & VARNUM ST, NE
17TH ST & BLADENSBURG RD, NE
14th & CONSTITUTION & NORTH CAROLINA AVENUE
PENNSYLVANNIA AVE & BRANCH AVE SE
RIDGE RD & BOWEN RD & 44TH PL SE
SOUTHERN AVE & BOWEN RD & 46TH ST SE
MLK & CHICAGO ST & MORRIS RD SE
HOWARD RD & ANACOSTIA FREEWAY & RAMP 13 SE
SOUTH CAPITOL & PORTLAND AVE
29TH & PENNSYLVANNIA AVE & P ST & FIRE STATION SE
BARNEY CIRCLE
FIRST & CONSTITUTION AVE NE
2ND & MARYLAND & CONSTITUTION AVE NE
3rd & MARYLAND & CONSTITUTION AVE NE
FIRST & INDIANA & C ST NW
NORTH CAPITOL & LOUISIANA & D ST
NORTH CAPITOL & MASS AVE & F ST
FIRST & MASS AVE & E ST WEST
LOUISIANA AVE & MASS AVE NE
FIRST & MASS AVE EAST
3RD & MASS AVE & D ST NE
6TH & MASS AVE & MARYLAND AVE & C ST NE
12TH & NEW YORK & H ST NW
GEORGIA AVE & FAIRMONT ST NW
14TH & KENYON ST & PARK RD NW
15TH & NEW HAMPSHIRE & FLORIDA & W ST NW
9TH ST & MARYLAND AVE & E ST, NE
7TH ST & 8TH ST & MASSACHUSETTS AVE & CONSTITUTION, NE
7TH ST & 8TH ST & INDEPENDENCE AVE & NORTH CAROLINA AVE, SE
SOUTH CAPITOL ST & CANAL ST & E ST
SOUTH CAPITOL ST & I ST
SOUTH CAPITOL ST & M ST
7TH ST & FRONTAGE RD, SW
12TH ST & EXPRESSWAY AT RAMP G, SW
W. BOUND INDEP AVE & W. BOUND MAINE AVE, SW
17TH ST S. BOUND & W. BOUND INDEP AVE, SW
E. BOUND INDEPENDENCE AVE AT DANIEL FRENCH DR, SW
W. BOUND INDEPENDENCE AVE AT DANIEL FRENCH DR, SW
23RD ST & INDEPENDENCE AVE, SW
24th ST & INDEPENDENCE AVE, SW
E. BOUND INDEPENDENCE AVE & WEST TIDAL BASIN RD, SW
6TH ST & PENNSYLVANIA AVE, NW
10TH ST & D ST & PENNSYLVANIA AVE, NW
10TH ST & D ST & PENNSYLVANIA AVE, NW
10TH ST & D ST & PENNSYLVANIA AVE, NW
12TH ST & PENNSYLVANIA AVE, NW
13TH ST & LOWER E ST & PENNSYLVANIA AVE, NW
KANSAS AVE & MISSOURI AVE & KENNEDY ST, NW
HAWAII AVE & ALLISON ST & CLERMONT DR, NE
ROCK CREEK CHURCH RD & ALLISON ST NW
NORTH CAPITOL ST & HAWAII AVE & BUCHANAN ST & ROCK CREEK CHURCH
MICHIGAN AVE & EASTERN AVE, NE
RIGGS RD & SOUTH DAKOTA AVE, NE
NEW HAMPSHIRE AVE & RITTENHOUSE & 3RD ST, NE
16TH ST & KENNEDY ST & MORROW DR, NW
WARD CIRCLE, NW
CANAL RD & FOXHALL RD, NW
36TH ST & M ST & CANAL RD & WHITEHURST FRWY, NW
MASSACHUSETTS AVE & Q ST, NW
23RD ST & Q ST & WATERSIDE DR, NW
22ND ST & L ST & NEW HAMPSHIRE AVE, NW
18TH ST & CONNECTICUT AVE & JEFFERSON PLACE, NW
24TH ST & CONNECTICUT AVE, NW
CONNECTICUT AVE & ORDWAY ST, NW
PORTER ST. & QUEBEC ST., NW
34TH ST & PORTER ST, NW
29TH ST & CALVERT ST & CLEVELAND AVE, NW
17TH ST & CONNECTICUT AVE & K ST, NW
21ST ST & I ST & PENNSYLVANIA AVE, NW
NEW HAMPSHIRE AVE & M ST, NW
19TH ST & C ST & VIRGINIA AVE, NW
H ST & STATION PL, NE
H ST & UNION STATION, NE
4TH ST & H ST & MASSACHUSETTS AVE, NW
3RD ST & H ST & MASSACHUSETTS AVE, NW
4TH ST & PENNSYLVANIA AVE, NW
14TH ST & LOWER E ST, NW
14TH ST & THOMAS CIRCLE, NW
14TH ST & THOMAS CIRCLE, NW
THOMAS CIRCLE NORTH SIDE
LOGAN CIRCLE, NW
FLORIDA AVE & P ST, NE
BENNING RD & 36TH ST (EAST), NE
EAST CAPITOL ST & MINNESOTA AVE & RIDGE RD
EAST CAPITOL ST & BENNING RD & TEXAS AVE
22ND ST & EAST CAPITOL ST, NE (SOUTH SIDE)

Amendment No. 4
DCKA-2012-B-0112
LED Bulb Replacement Contract

ATTACHMENT B
TECHNICAL SPECIFICATIONS
(16 PAGES)

- scratches (abrasions), cracks chips, discoloration, or other defects. Any such defect shall be cause for rejection.
- 9.6 The manufacturer shall be required to undertake Design Qualification and Production Quality Control testing as specified in Section 9.4 and 9.5 of these specifications and report all results to the District of Columbia through the contractor. Procurement and installation of LED modules prior to the receipt and acceptance of test results by the District of Columbia is done at the contractors risk.
10. WARRANTY
- 10.1 The manufacturer shall provide a written warranty against defects in materials and workmanship for a minimum period of 60 months after acceptance of the modules.
- 10.2 Replacement LED modules shall be provided on a one for one basis promptly after receipt of LED modules that have failed at no cost to the District of Columbia.
- 10.3 All warranty documentation shall be submitted to the District of Columbia prior to the random sample testing.
- 10.4 The warranty period shall begin on the date the LED module is energized and placed into service at the intersection, or ninety (90) days after delivery of the module to the District of Columbia, whichever occurs first.

TECHNICAL SPECIFICATION Conventional Polycarbonate Pedestrian Signal Head

1. The purpose of this specification is to describe the minimum acceptable design and operating requirements for pedestrian signal heads. The pedestrian signal head shall feature two (2) sections mounted one above the other. Each section shall be capable of accepting a 12 inch LED (Light Emitting Diode) module insert with legends to control pedestrian traffic.
 2. SIGNAL HEAD HOUSING
 - 2.1 As a minimum, the signal heads shall meet or exceed the requirements set forth in the latest standard of the Institute of Transportation Engineers (ITE).
 - 2.2 The signal heads shall be constructed from ultraviolet stabilized virgin polycarbonate resin.
 - 2.3 The signal heads shall have a minimum thickness of 0.100 inches.
 - 2.4 The signal head shall feature two (2) sections mounted one above the other with an opening between the two sections capable of accommodating at least three 0.75 diameter cables.
 - 2.5 Unless otherwise specified, the color of the signal head shall be the battleship grey, MVC 1417, GE LEXAN Number 70402. This color shall be impregnated throughout the body of the signal head. Federal black may be required in certain specified applications.
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- 2.6 The signal head shall be nominal 12 inch square for both the upper and the lower sections. The upper section will feature the "RAISED HAND" LED insert and the bottom section will feature the "WALKING PERSON" LED insert.
- 2.7 The upper section of the signal head will feature a terminal block with capacity to accommodate internal and external wires to ensure proper operation. The terminal block shall be capable of securing conductors at least 12 AWG in diameter.
- 2.8 The signal head shall feature stainless steel hardware, where appropriate.
- 2.9 The signal head will be equipped with plastic serrated locking rings to enable field installation and connection with metallic upper and lower mounting hardware.
- 2.10 Each signal head section shall feature a mechanism for attaching the slotted mounting tabs from the tunnel visor.
- 2.11 Each signal head section shall be manufactured and reinforced to withstand winds up to 80 miles per hour without showing any deflection in the vertical plane or obvious structural failure.
- 2.12 PRE-FABRICATION: Submittal: Prior approval from the District of Columbia is required before signal housings are fabricated. Color chips shall be submitted at least one week prior to the start of the manufacturing process.
- 2.13 WARRANTY: The manufacturer shall warrant the housing to be free from defects in material and workmanship for a period of two (2) years from the date of shipment. Any failure of the device within this period will be repaired by the manufacturer at no cost to the District of Columbia.
- 2.14 PERFORMANCE TESTING: The District of Columbia reserves the right to receive on demand a test report from an independent laboratory certifying that the equipment supplied meets all technical specifications at no cost to the District of Columbia.
- 2.15 REJECTION: The District of Columbia reserves the right to reject an entire shipment if ten percent (10%) or more of the devices prove to be defective within 30 days of receipt.

- 2.16 The vehicle signal head shall be capable of being mounted on a span wire, on a pole, on a post top, or on a mast arm.

3. SIGNAL HEAD VISORS

- 3.1 A signal head visor shall be provided for each section.
- 3.2 Each visor shall enclose the entire face of the signal section except the bottom. A tunnel visor shall be provided.
- 3.3 Each visor shall be constructed from ultraviolet stabilized virgin polycarbonate resin.
- 3.4 Unless otherwise specified, the exterior color of the visor shall be battleship gray, as described in Section 2.5. The inside of the visor shall be dull black. A federal black exterior may be required in certain specified applications.

- 3.5 Each visor shall feature slotted mounting tabs for easy attachment to the signal head housing. Stainless steel screws shall be used to affix the visor to the signal head housing.
- 3.6 The tunnel visor for each pedestrian signal head section shall be minimum 8 inches long.
- 3.7 Each pedestrian signal section ordered shall contain two (2) tunnel visors; one to be attached to the housing and the other to be packaged separately with all mounting hardware.

TECHNICAL SPECIFICATION Conventional Polycarbonate Vehicle Signal Head

1. The purpose of this specification is to describe the minimum acceptable design and operating requirements for 12 inch conventional vehicle signal heads. Each signal head section shall be capable of being joined together to form a vehicle signal head featuring two to five sections. Each section shall be capable of accepting a 12 inch LED (Light Emitting Diode) module insert with legends to control vehicle traffic.
 2. SIGNAL HEAD HOUSING
 - 2.1 As a minimum, the signal heads shall meet or exceed the requirements set forth in the latest standard of the Institute of Transportation Engineers (ITE).
 - 2.2 The signal heads shall be constructed from ultraviolet stabilized virgin polycarbonate resin.
 - 2.3 The signal heads shall have a minimum thickness of 0.100 inches.
 - 2.4 Unless otherwise specified, the color of the signal head shall be battleship grey, MVCL 14187, GE LEXAN Number 70402. This color shall be impregnated throughout the body of the signal head. Federal black may be required in certain specified applications.
 - 2.5 Each signal head section shall be capable of being joined together to form a vehicle signal head featuring 2 to 5 sections arrayed as defined in the Manual on Uniform Traffic Control Devices (MUTCD). Each signal section shall feature an opening on the top and bottom of the section capable of accommodating at least three 0.75 inch diameter cables.
 - 2.6 Each signal head section shall feature stainless steel hardware, where appropriate.
 - 2.7 A terminal block with capacity to accommodate a minimum of eight (8) wires shall be provided in the middle section of the signal head assembly. The terminal block shall be capable of securing conductors at least 12 AWG in diameter.
 - 2.8 Each section of the signal head shall be manufactured and reinforced to withstand winds up to 80 miles per hour without showing any deflection in the vertical plane or obvious structural failure.
 - 2.9 The signal heads will be equipped with plastic serrated locking rings to enable field installation and connection with metallic upper and lower mounting hardware.
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- 2.10 Each signal head section shall feature a mechanism for attaching the slotted mounting tabs from the tunnel visor.
 - 2.11 Each signal head section shall feature cored holes for back plate mounting.
 - 2.12 PRE-FABRICATION SUBMITTAL: Prior approval from the District of Columbia is required before signal housing are fabricated. Color chips shall be submitted at least one week prior to the start of the manufacturing process.
 - 2.13 WARRANTY: The manufacturer shall warrant the housing to be free from defects in material and workmanship for a period of two (2) years from the date of shipment. Any failure of the device within this period will be repaired by the manufacturer at no cost to the District of Columbia.
 - 2.14 PERFORMANCE TESTING: The District of Columbia reserves the right to receive on demand a test report from an independent laboratory certifying that the equipment supplied meets all technical specifications at no cost to the District of Columbia.
 - 2.15 REJECTION: The District of Columbia reserves the right to reject an entire shipment if ten percent (10%) or more of the devices prove to be defective within 30 days of receipt.
3. SIGNAL HEAD VISOR
- 3.1 A Signal head visor shall provided for each signal section
 - 3.2 Each visor shall enclose the entire face of the signal section except the bottom. A tunnel visor shall be provided.
 - 3.3 Each visor shall be constructed from ultraviolet, stabilized virgin polycarbonate resin.
 - 3.4 Unless otherwise specified, the exterior color of the visor shall be battleship grey, as described in Section 2.4. The inside of the visor shall be dull black. A federal black exterior color may be required in certain specified applications.
 - 3.5 Each visor shall feature slotted mounting tables for easy attachment to the signal head housing. Stainless steel screws shall be used to affix the visor to the signal head housing.
 - 3.6 The tunnel visor for each vehicle signal head section shall be a minimum of 10 inches long.
 - 3.7 Each vehicle signal section ordered shall contain two (2) tunnel visors; one to be attached to the housing and the other to be packaged separately with all mounting hardware.
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TECHINAL SPECIFICATION Vehicle Signal Backplate

1. The purpose of this specification is to describe the minimum acceptable design and functional requirements for backplates for vehicle signal heads. Backplates complying to these specifications shall be available for Section 3, 4 Section, and 5 Section 12 inch traffic signal heads in arrays approved

by and shown in the latest edition of the Manual on Uniform Traffic Control Devices (MUTCD).

2. MATERIAL

- 2.1 The backplate shall be manufactured from polycarbonate materials. Specifically, the backplate shall be produced from virgin ABS containing 60% styrene, 20% rubber and 20% acrylic. It shall contain ultraviolet inhibitors and stabilizers for protection against ultraviolet degradation.
- 2.2 The backplate shall have a minimum thickness of 0.125 inches and must meet a falling dart impact test of 16ft/lb.
- 2.3 The backplate shall meet or exceed Underwriters Laboratories UL94 Test H.B.
- 2.4 The backplate shall have a minimum tensile stress of 5300 psi at 73 degrees Fahrenheit.
- 2.5 The backplate shall be fabricated for cold weather applications. It shall have a haircell finish on one side and a smooth finish on the other side.
- 2.6 The backplate shall be colored dull black. This color shall be impregnated throughout the entire backplate so as to prevent varying shades and tones.

3. FABRICATION

- 3.1 The backplate shall be one piece, vacuum formed with a haircell finish on the front side. All surfaces shall be flat and straight without blisters, buckling or warping.
- 3.2 All outside and inside edges shall be formed with a 0.50 to 0.625 inch flange (inside dimension) turned away from the front surface. Flanges shall be straight, uniform and have a consistent flange dimension throughout.
- 3.3 The backplate shall be designated to fit each manufacturer's vehicle signal head, and it shall be contoured to the signal head to eliminate gaps between the backplate and the signal housing and to allow for attachment to the signal head.
- 3.4 There shall be a minimum 5 inch border beyond both sides, the top bottom of the signal head. Each exterior corner shall be constructed with a 3 inch radius.
- 3.5 The finished back plate shall be pre-drilled to fit the vehicle signal head for which it is designated, or it shall contain drill starts for field drilling.
- 3.6 Each back plate shall be designated to properly fit manufacturer's vehicle signal heads.

4. HARDWARE

- 4.1 Each back plate shall include all necessary nuts, bolts, and washers for assembling the back plate and attaching it to the signal head.
- 4.2 All hardware shall be stainless steel with a permanent dull black finish.

4.3 When mounted on bases provided on the signal head, self tapping screws and applicable washers shall be provided. When mounting the back plate by drilling through the signal head body, the proper quantity of the following shall be provided: #8-32 x 0.75 inch pan head screw, 0.625 inch x 1 inch elongated washer, and #8 Hex, locknut with nylon insert.

TECHNICAL SPECIFICATION Mast Arm Mount Signal Bracket

1. The purpose of this specification is to describe the minimum acceptable design and operating requirements for brackets used to mount conventional and optically programmable traffic signal heads to mast arms. The brackets shall be capable of supporting all vertical traffic signal configurations permitted by the Manual on Uniform Traffic Control Devices (MUTCD) and they shall be adaptable to fit all mast arms currently in use within the District of Columbia.
2. GENERAL
 - 2.1 The bracket shall consist of upper and lower arms, a vertical support tube, a mast arm clamp screws, and all necessary hardware including bolts, washers, gaskets, etc. to allow for assembly of the signal to the bracket and the bracket to the mast arm.
 - 2.2 The bracket shall attach to the signal in a clamping manner holding the signal both top and bottom in order to ensure maximum rigidity. A standard bracket shall accommodate vehicle signal heads from all major signal manufacturers.
 - 2.3 The bracket shall be capable of accommodating all vertical traffic signal configurations permitted for 12 inch vehicle signal heads by MUTCD. This shall include 3 Section 12 inch signals, 4 Section 12 inch signals and 5 Section 12 inch signals. All signals are stacked in a vertical plane with one section mounted above the other except the 5 Section 12 inch signal which features two adjacent columns of two sections mounted one above the other with one section mounted directly above the other two so that the total assembly is three sections tall and two sections wide and so that the center of the top section coincides with the line vertically dividing the two columns.
 - 2.4 The bracket shall be completely adjustable and capable of being adjusted at least in the following four manners: (1) vertically to adjust height of signal above the roadway, (2) rotational around the bracket axis, (3) rotational about the mast arm, and (4) rotational right and left from a vertical plane.
 - 2.5 The bracket shall feature Type 201 stainless steel band to fasten the bracket to the supporting arm or structure. The bracket shall be easily adjustable to fit all sizes of round, octagonal, elliptical or other similar shaped mast arms without special tools or equipment.
 - 2.6 All electrical wiring shall be completely concealed within the bracket. The vertical support shall be a gusseted "C" shaped extruded aluminum tube to accommodate the signal cable regardless of vertical positioning of the tube.

3. MATERIAL AND DESIGN

- 3.1 The upper and lower arms shall be cast from 319 aluminum or equivalent. The lower bracket arm shall be internally threaded to accommodate the threaded vertical support tube. The lower arm shall be furnished with ABS plastic covers which will slide and snap into position without the use of fasteners or tools. Upper and lower arms shall have 72 tooth serrations cast into the arm to assure a positive lock with the signal housing and shall be secured about their rotational axis with stainless steel set screws. Both upper and lower arms shall have tri-bolt arrangement for attachment to the signal housing. The opening in the lower arm shall accommodate a minimum 1-7 conductor 14 AWG signal cable conforming to IMSA Specifications 19-1 with accommodations for minimum cable bending radius.
- 3.2 The vertical support tube shall be a double gusseted tube extended from 6063-T6 aluminum alloy and have a cross section in the shape of the letter C. The minimum exterior diameter of the tube shall be 1 ½ inches and the wall thickness shall be adequate to structurally accommodate all vehicle signal heads currently in use in the District of Columbia. The interior of the tube shall be of sufficient capacity to accommodate 1-7 conductor 14 AWG signal cable conforming to IMSA Specification 19-1 with accommodations for minimum cable bending radius. Each tube shall be complete with a vinyl closure strip and shall be threaded on one end to accommodate the lower arm assembly.
- 3.3 The mast arm clamp assembly shall feature male and female halves. Both halves shall be cast from 356-T6 aluminum alloy or equivalent. The male clamp half shall be secured with the female half, utilizing a spring steel retainer ring. This assembly shall provide an unobstructed center of 2 3/8 inch minimum diameter, allowing for 360 degree rotation of the clamp assembly. There shall be no internal cross bracing assembly obstructing the center opening.
- 3.4 The mast arm clamp assembly shall be equipped with two (2) stainless steel bands, 5/8" wide, 0.045" thick, and 29" long. The stainless steel bands shall have a minimum tensile strength of 100,000 psi. A setscrew secured buckle shall be utilized in securing the band.
- 3.5 A clamp screw shall be used to attach the stainless steel bands to the clamp kit. The clamp screw shall be 7/16"-14 x 3" one piece unit drop forged from C-1045 carbon steel or 410 stainless steel with a minimum tensile strength of 80 KSI. The clamp screw shall be formed with a slot sized to accept a 5/8" band.
- 3.6 Each bracket shall include all necessary hardware to accomplish a complete, secure installation. All necessary bolts, washers, gaskets, etc. shall be provided to allow the assembly of the signal to the bracket and the bracket to the mast arm.

4. FINISH

- 4.1 All aluminum parts shall have an Alodine 1200, or equivalent, finish.
- 4.2 All steel parts shall have a yellow zinc di-chromate finish.

TECHNICAL SPECIFICATION
Light Emitting Diode (LED) Countdown Pedestrian Signal Modules

1. The purpose of this specification is to describe the minimum acceptable design and operating requirements for 12-inch (300-mm) Light Emitting Diode (LED) pedestrian signal modules intended for use where countdown displays are required. The specific items included in this specification include the 12-inch overlay lunar white walking person and Portland orange raised hand LED module and the 12-inch lunar white countdown LED module.
2. GENERAL DESCRIPTION
 - 2.1 This specification covers two separate LED Modules. The first type features the Portland orange raised hand overlaid on the lunar white walking person arrayed in a module. The second type features the lunar white countdown display.
 - 2.2 Each module is to be used in place of the incandescent lamp, reflector, socket, gasket, and lens assembly of the standard 12-inch (300mm) pedestrian signal section. Each LED module shall consist of an assembly that utilizes LED's as the light source in lieu of an incandescent lamp for use in pedestrian signal sections.
 - 2.3 Pedestrian LED modules shall be engineered to fit in all ITE compliant conventional pedestrian signal housings. They shall fit in the conventional polycarbonate pedestrian signal head housing, as used in the District of Columbia, and as described in detail in an accompanying technical specification. Unless otherwise noted, pedestrian signal sections are 12 inch square.
 - 2.4 Each LED Module shall utilize appropriate technology to achieve the required color and shall be the ultra bright type rated for 100,000 hours of continuous operation from -40°C to +74°C.
 - 2.5 Each LED module shall be rated for a minimum useful life of 48 months. All modules shall meet all parameters of this specification during this period.
 - 2.6 Each individual LED module shall be wired such that a catastrophic loss or failure of one LED will result in the loss of not more than 5 percent of the signal module light output.
 - 2.7 The WALKING PERSON and the RAISED HAND symbols shall conform to all applicable requirements of the Manual on Uniform Traffic Control Devices (MUTCD).
 - 2.8 The WALKING PERSON and the RAISED HAND shall be overlaid in a special configuration which centers both within the module and provides clear and distinct illumination when either symbol is in use.
 - 2.9 The Walking PERSON and the RAISED HAND overlaid module shall feature internal circuitry and wiring which prevent both from being illuminated at the same time.

- 2.10 The countdown module shall conform to the following minimum requirements
- 2.10.1 The countdown numbers shall feature 2 digits. Two rows of LED's shall be provided for each digit.
 - 2.10.2 Countdown logic circuitry uses A.C. power to derive timing data from the intersection traffic signal controller. The timer shall be microprocessor based
 - 2.10.3 The unit shall feature a mechanism such as a multiposition dip switch to enable the user to select specific modes for countdown functions. The unit shall be capable of displaying countdown numbers during the WALK and pedestrian clearance intervals and/or during the pedestrian clearance interval only.
 - 2.10.4 The unit shall feature a test switch which displays "8" for 2 seconds before going blank.
 - 2.10.5 The unit shall automatically adjust to the programmed intervals of the traffic signal controller. During transition between timing plans, the unit shall be dark for NO MORE than two (2) signal cycles while the unit adjusts to the new timing patterns. The WALK and DON'T WALK displays in the adjacent module shall continue to operate during this transition.
 - 2.10.6 The unit shall be capable of displaying numbers ranging from 00 to 99. Each number shall be 7 inches tall.
- 2.11 The WALKING PERSON, RAISED HAND and countdown displays shall be designed to be clearly visible and legible under any lighting conditions from a distance of 200 feet anywhere within a 15 degree cone centered about optical axis.

3. ELECTRICAL REQUIREMENTS

3.1 Power Consumption

- 3.1. The maximum power consumption requirements measured in watts for each module display are as follows

<u>MODULE</u>	<u>25°C</u>	<u>74°C</u>
"RAISED HAND"	10.0W	12.0W
"WALKING PERSON"	12.0W	15.0W
"COUNTDOWN"	12.0W	15.0W

3.2 Operation Voltage

- 3.2.1 Each module shall operate from a 60MH±3HZ AC line over a voltage ranging from 95 volts to 135 volts. Fluctuations of line voltage shall have no visible effect upon the luminous intensity of the indications.

- 3.2.2 The operating voltage of the modules shall be 120 Volts AC. All operating parameters shall be measured at this voltage.
- 3.2.3 LED circuitry shall prevent perceptible flicker to the unaided eye over the 95 to 135 voltage range.
- 3.3 The LED signal module shall have a power factor of 0.90 or greater at a nominal rated voltage at 25° C after 60 minutes of operation.
- 3.4 Total harmonic distortion (current and voltage) induced into an AC power line by an LED signal shall not exceed 20 percent at the rated voltage at 25°
- 3.5 The signal module on-board circuitry shall include voltage surge protection to withstand high-repetition noise transients as stated in Section 2.1.6 of the NEMA Standard TS-2 dated 1992.
- 3.6 Each LED module and associated on-board circuitry shall be in compliance with Federal Communications Commission (FCC) noise regulations and must meet FCC Title 47, Subpart B, Section 15 regulations concerning the emission of electronic noise.
- 3.7 The LED modules shall be U.S. EPA-Energy Star compliant. Power consumption of these LED modules shall not exceed the maximum allowed by the EPA.
- 3.8 All wiring and terminal blocks must meet the requirements of Section 13.02 of the ITE Publication Equipment And Material Standards, Chapter 2 (Vehicle Traffic Control Signal Heads).
- 3.9 Each LED module shall be operationally compatible with controller assemblies and peripheral equipment including solid state load switches, flashers, and conflict monitors currently used in the District of Columbia. Current controller specifications are available for review at the specific request of the contractor or vendor.
 - 3.9.1 When a current of 20mA AC or less is applied to the unit, the voltage read across the two leads shall be 15 VAC or less.
- 3.10 Each LED module shall feature control circuitry to prevent current flow through the LED module in the off state to avoid any false indication as may be perceived by the human eye during daylight and evening hours.

4. ENVIRONMENTAL REQUIREMENTS

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- 4.1 Each LED module shall be rated for use in operating temperatures in the range of -40°C (-40°F) to +74°C (+165°F). Each LED module shall meet all specifications throughout this temperature range.
 - 4.2 Each LED module shall be protected against dust and moisture intrusion in conformance with NEMA Moisture Resistant Standard 250-1991 for Type 4 enclosures to protect all internal components.

5. CONSTRUCTION

- 5.1 Each LED Module shall be a single, self-contained device, not requiring on-site assembly for installation into an existing pedestrian signal housing.
- 5.2 The power supply for the LED module shall be integral to the unit.
- 5.3 The circuit board and the power supply shall be contained inside the module.

- 5.4 Each LED module shall incorporate a printed circuit board containing all required LEDs and circuit components. The LEDs shall be mounted and soldered to the printed circuit board.
- 5.5 Each LED module shall feature two 39-inch long 20AWG minimum wire lead with strain relief and spade terminals for connection to the terminal block of the signal heads. One of the conductors shall contain white insulation to signify neutral. The color of other conductor shall be different and shall be used to differentiate between the "RAISED HAND" and the "WALKING PERSON" LED modules. The two conductors shall be 600 Volt, 20 AWG minimum, jacketed wires conforming to the National Electric Code, rated for service at +105°C.
- 5.6 Each LED module shall feature a rigid housing for protection in shipping, handling and installation and a one-piece neoprene gasket. Screw-in type products are expressly prohibited for LED modules.
- 5.7 The assembly and manufacturing process for the LED signal assembly shall be designed to ensure that all internal components are adequately supported to withstand mechanical shock and vibration from high winds and other sources.
- 5.8 Each LED module shall be watertight when properly installed in a pedestrian signal housing. Each LED module shall utilize the same mounting hardware used to secure the incandescent lens and gasket assembly, and shall only require a screwdriver or a standard installation tool to complete the mounting.
- 5.9 Each LED module shall weigh less than 5 pound

6. MATERIALS

- 6.1 Materials used for the lens and signal module shall conform to the appropriate ASTM specification for the materials.
- 6.2 Enclosures containing either the power supply or electronic components of the signal module shall be made of UL94VO flame retardant materials. The module lens does not need to comply with this requirement.
- 6.3 The lens for the "RAISED HAND" LED Module and the "WALKING PERSON" LED module shall be clear with a textured surface to reduce glare.
- 6.4 Each LED module lens shall be UV stabilized plastic capable of withstanding ultra violet direct sunlight for a minimum period of 5 years without exhibiting evidence of deterioration.
- 6.5 The external lens surface shall be smooth with no raised features, so as to minimize the collection of dirt, debris, and other particulate contaminants, which may impact luminous intensity, and to facilitate periodic cleaning. External lens facets are prohibited.

7. MODULE IDENTIFICATION

- 7.1 Each LED module shall have the manufacturers name, trademark, model number, serial number, date of manufacture (month and year) and lot number as identification permanently marked on the back of the module. This

identification is required, and is in addition to any other identification that may be required in contract special provisions by the District of Columbia.

- 7.2 Rated voltage and rated power in Watts and Volt Amperes shall also be permanently marked on the back of each LED module.
- 7.3 Each LED module shall have prominent and permanent markings for correct indexing and orientation within a signal head housing. The markings shall consist of an up arrow, or the word "UP" or "TOP" to ensure that the LED module is inserted into the signal head housing with the correct orientation.
- 7.4 As detailed in Section 5.5 of this specification, conductors connecting the LED module to the signal head housing terminal block shall be color coded to differentiate between the "RAISED HAND", the "WALKING PERSON", and the "COUNTDOWN" LED module.

8. PHOTOMETRIC REQUIREMENTS

- 8.1 Each "RAISED HAND" LED module shall provide an average luminous intensity of 3,750 candela per square meter throughout the useful life and over the operating temperature range.
- 8.2 Each "WALKING PERSON" LED module shall provide an average luminous intensity of 5,300 candela per square meter throughout the useful life and over the operating temperature range.
- 8.3 Each "Countdown" LED module shall provide an average luminous intensity of 5300 candela per square meter throughout the useful life and over the operating temperature range.
- 8.4 The uniformity ratio of an illuminated symbol shall not exceed 4 to 1 between the highest luminance area and the lowest luminance area in the LED module.
- 8.5 The color output of each LED module shall conform to the requirements of Section 5.3 in the ITE Publication Equipment and Material Standards, Chapter 3, (Pedestrian Traffic Control Signal Indications).
 - 8.5.1 The "RAISED HAND" within the LED module shall be Portland orange. Not greater than 0.390, not less than 0.331, nor less than 0.997 -x
 - 8.5.2 The "WALKING PERSON" and the "Countdown" LED shall be lunar white.

X: not less than 0.290 nor greater than 0.330

Y: not less than $1.5x-0.175$, or greater than $1.5x-0.130$

- 8.5 Both the "RAISED HAND" and the "WALKING PERSON" LED modules shall be filled with LED's to give the appearance that the entire image is illuminated when energized. Outlined images will not be permitted.
 - 8.6 The height of the "RAISED HAND" and the "WALKING PERSON" images on the module shall not be less than 250 mm and the width of each image shall not be less than 165 mm.
- ## 9. QUALITY ASSURANCE

- 9.1 The modules shall be manufactured in accordance with a manufacturer 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 the modules built to meet this specification, and a documented process of how problems are to be resolved.
- 9.2 QA process and test results documentation shall be kept on file for a minimum period of seven years.
- 9.3 LED signal module designs not satisfying design qualification testing and the production quality assurance testing performance requirements described below shall not be labeled, advertised, or sold as conforming to this specification.
- 9.4 Design Qualification Testing
- 9.4.1 Design Qualification testing shall be performed by the manufacturer or an independent testing lab hired by the manufacturer on new LED module designs, and when a major design change has been implemented on an existing design.
- 9.4.2 A major design change is defined as design change (electrical or physical) which changes any of the performance characteristics of the module, results in a different circuit configuration for the power supply, or changes the layout of the individual LED's in the module.
- 9.4.3 A quantity of two units for each design shall be submitted for Design Qualification Testing.
- 9.4.3.1 Test units shall be submitted to the District of Columbia after the manufacturer's testing is complete.
- 9.4.3.2 Manufacturer's testing data shall be submitted with test units for the District of Columbia verification of Design Qualification Testing data.
- 9.4.4 Burn In.
- 9.4.4.1 The sample modules shall be energized for a minimum of 24 hours, at 100 percent on-time duty cycle, at a temperature of +74°C (+165°F) before performing any design qualification testing.
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- 9.4.4.2 Any failure of the module, which renders the unit non-compliant with the specification after burn-in, shall be cause for rejection.
- 9.4.5 For Design Qualification Testing, all specifications will be measured including, but not limited to:
- 9.4.5.1 Rated Initial Luminous Intensity. Measured over the operating temperature range.
- 9.4.5.2 Chromaticity (Color). Measured over the operating temperature range.
- 9.4.5.3 Electrical.
- All specified parameters shall be measured and used for quality comparison of production quality assurance on production modules (rated power, etc.)
- 9.4.5.4 Equipment Compatibility.

Modules shall be tested for compatibility with the controller unit, conflict unit, conflict monitor, and load switch. Each signal module shall be connected to the output of a standard load switch connected to an AC voltage supply between the values of 95 and 135 VAC with the input to the load switch in the "off" position. The AC voltage developed across each LED signal module so connected shall not exceed 10 Vrms as the input AC voltage is varied from 95 Vrms to 135 Vrms.

9.4.5.5 Mechanical vibration testing shall be as per MIL-STD-883, Test Method 2007, using 3-four-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.

9.4.5.6 Temperature cycling shall be performed as MIL-STD-883, Test method 1010. The temperature range shall be per "Environment Requirements". 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. Module(s) being tested shall be energized and functioning throughout the duration of the test. Failure of a module to function properly or any evidence of cracking of the module lens or housing after temperature cycling shall be cause for rejection.

9.4.5.7 Moisture resistance testing shall be performed on all modules mounted in a standard type "A" pedestrian housing per NEMA Standard 250-1991 for Type 4 enclosures. Any evidence of internal moisture after testing shall be cause for rejection.

9.5 Production Quality Control Testing

9.5.1 The following Production Quality Assurance shall be performed on each new module prior to shipment. Failure to meet requirements of any of these tests shall be cause of rejection. Test results shall be retained by the manufacturer for seven years.

9.5.2 Burn-in period shall consist of each signal module being energized at rated voltage of a 30 minute stabilization period before the measurement is made.

9.5.3 Each module shall be tested for rated initial intensity after burn-in.

9.5.3.1 A single point measurement, with a correlation to the intensity requirements of Section 1.04 of the VTSCH for circular modules, may be used.

9.5.3.2 The ambient temperature for this measurement shall be +25°C (+77°F).

9.5.3.3 Each module not meeting minimum luminous intensity requirements of 3,750 cd/m² for the raised hand symbol and 5,300 cd/m² for the walking person symbol shall be cause for rejection

9.5.4 Each module shall be tested for required power factor after burn-in.

- 9.5.5 Each module shall be measured for current flow in amperes after burn-in. The measured current values shall be compared against rated values resulting from design qualification measurements under "Design Qualification Testing". The current flow shall not exceed the rated value.
- 9.5.6 Each module shall be visually inspected for any exterior physical damage or assembly anomalies. Careful attention shall be paid to the surface of the lens to ensure there are no scratches (abrasions), cracks chips, discoloration, or other defects. Any such defect shall be cause for rejection.
- 9.6 The manufacturer shall be required to undertake Design Qualification and Production Quality Control testing as specified in Section 9.4 and 9.5 of these specifications and report all results to the District of Columbia through the contractor. Procurement and installation of LED modules prior to the receipt and acceptance of test results by the District of Columbia is done at the contractors risk.

10. WARRANTY

- 10.1 The manufacturer shall provide a written warranty against defects in materials and workmanship for a minimum period of 60 months after acceptance of the modules.
- 10.2 Replacement LED modules shall be provided on a one for one basis promptly after receipt of LED modules that have failed at no cost to the District of Columbia.
- 10.3 All warranty documentation shall be submitted to the District of Columbia prior to the random sample testing.
- 10.4 The warranty period shall begin on the date the LED module is energized and placed into service at the intersection, or ninety (90) days after delivery of the module to the District of Columbia, whichever occurs first.

TECHNICAL SPECIFICATION Model 200 Switch Packs

1. The purpose of this specification is to describe the minimum acceptable design and operating requirements for the Model 200 Switch Packs.
2. signal light circuits shall be controlled externally to each controller unit by 3-circuit solid-state switches, which conform to the specifications for Model 200 Switch Packs as detailed in Chapter 8, Specification FHWA-IP-78-16 and CALTRANS Traffic Signal Control Equipment Specification (TSCES); except as noted herein. Each switch shall have the capability of switching any current from 0.05 to 20.0 amperes of tungsten lamp load at 120 volts 60 Hertz, or 20 amperes at a power factor of 0.85 and a temperature of 70° C.
3. The Model 200 Switch Packs shall be fully compatible with the Type 170, Type 170 E and Type 2070 L Traffic Signal Controller units currently in service and proposed for future service in the District of Columbia.

4. the Model 200 Switch Packs shall be fully compatible with the Model 336-5 and the Model 336-ss Traffic Signal Controller Cabinets currently in service and proposed for future service in the District of Columbia.
 5. The Model 200 Switch Packs shall be capable of operating without noticeable distortion of service all standard incandescent traffic signal bulbs and all models and varieties of Light Emitting Diode (LED) module when current is applied through the switch pack. The switch pack shall fully complement the operation of the LED module, and shall contribute in no way to the degradation, distortion or otherwise faulty operation of the LD module.
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Amendment No. 4
DCKA-2012-B-0112
LED Bulb Replacement Contract

ATTACHMENT C

ITE SPECIFICATION WEB ADDRESSES

(1 PAGES)

ITE

Specification

Web addresses

<http://www.ite.org/councils/LEDFinal.pdf>

<https://www.ite.org/standards/led/signals.asp>

Amendment No. 4
DCKA-2012-B-0112
LED Bulb Replacement Contract

ATTACHMENT D

NATIONAL HIGHWAY SYSTEM ROUTES
(2 PAGES)

Routes in the National Highway System

1. Chain Bridge
2. Clara Barton Parkway NW – Full length in DC
3. Arizona Ave. NW – Full length
4. Loughboro Rd. NW - From Arizona Ave. NW to Foxhall Rd. NW
5. Nebraska Ave. NW – From Foxhall Rd. NW to Military Rd. NW
6. Ward Circle
7. Canal Rd. NW – Full length in DC
8. Key Bridge
9. Wisconsin Ave. NW – From M St. NW to Maryland State Line
10. Tenley Circle
11. M St. NW – From Canal Rd. NW to 29th St. NW
12. MacArthur Boulevard NW – Full length in DC
13. Foxhall Rd. – From MacArthur Boulevard NW to Canal Rd. NW. NW
14. Massachusetts Ave. NW – From North Capitol St. NW to Maryland State Line
15. Sheridan Circle
16. Scott Circle
17. Thomas Circle
18. Whitehurst Freeway
19. Rock Creek Parkway - From Ohio Dr. SW until it turns into Beach Dr. NW
20. 23rd St. NW – From Independence Ave. SW to Massachusetts Ave. NW
21. Washington Circle
22. Ohio Dr. SW – From Arlington Memorial Bridge to Constitution Ave. NW
23. Memorial Dr. From Arlington Memorial Bridge to Virginia State Line
24. Arlington Memorial Bridge
25. George Washington Parkway – Full Length in DC
26. Pennsylvania Ave. NW – From M St. NW to 17th St. NW
27. Pennsylvania Ave. NW – From 15th St. NW to 3rd St. NW
28. K. St. NW – From Whitehurst Freeway to Mount Vernon Sq.
29. I St. NW – From 23rd St. NW to New York Ave. NW
30. E St. Expressway
31. E St. NW – From E St. Expressway to 17th St. NW
32. Constitution Ave. NW – From I-66 to Pennsylvania Ave. NW
33. Independence Ave. – From Ohio Dr. SW to East Capitol St.
34. Connecticut Ave. NW – From K St. NW to Maryland State Line
35. Chevy Chase Circle
36. Dupont Circle
37. 17th St. – From Independence Ave. SW to K St. NW
38. H St. NW – From Pennsylvania Ave. NW to 14th St. NW
39. H St. – From Massachusetts Ave. NW to Bladensburg Rd. NE
40. Military Rd. NW – From Nebraska Ave. NW to Missouri Ave. NW
41. Missouri Ave. NW – From Military Rd. NW to North Capitol St.

42. 16th St. NW – From K St. NW to Maryland State Line
43. Maine Ave. SW – From 14th St. SW to Independence Ave. SW
44. 15th St.– From Maine Ave. SW to I St. NW
45. 14th St. (Including Bridge) – From Virginia St. Line to U St. NW
46. U St. – From 16th St. NW 9th St. NW
47. Rhode Island Ave. – From 16th St. NW to Maryland State Line
48. Logan Circle
49. 12th St. – From I-395 to Pennsylvania Ave. NW
50. 9th St. – From I-395 to Pennsylvania Ave. NW
51. New York Ave.– From I St. NW to Maryland State Line
52. Mount Vernon Square
53. Georgia Ave. NW – Full length
54. 7th St. NW – From Florida Ave. NW to Independence Ave. SW
55. 3rd St. NW – From Independence Ave. SW to Pennsylvania Ave. NW
56. Florida Ave. – From 9th St. NW to H St. NE
57. North Capitol St. – From Louisiana Ave. NW to Harewood Rd. NW
58. Clermont Dr. NE – From Harewood Rd. NW to Hawaii Ave. NW
59. Hawaii Ave. NE – From Clermont Dr. NE to North Capitol St.
60. North Capitol St.– From Hawaii Ave. NE to New Hampshire Ave. NE
61. New Hampshire Ave. NE – From North Capitol St. to Maryland State Line
62. Riggs Rd. NE – From North Capitol St. to South Dakota Ave. NE
63. South Dakota Ave. NE – From Riggs Road NE to New York Ave. NE
64. East Capitol St. NE – From Independence Ave. SE to Maryland State Line
65. Benning Road NE – From Bladensburg Rd. NE to East Capitol St. NE
66. Washington Ave. SW – From Independence Ave. to South Capitol St.
67. South Capitol St. (Including Bridge) – From Washington Ave. SW to Firth Sterling Ave. SE
68. Suitland Parkway – Full Length
69. Pennsylvania Ave. SE – From 2nd St. SE to Maryland State Line
70. Anacostia Freeway – Full Length
71. Branch Ave. SE – From Pennsylvania Ave. SE to Maryland State Line