

Master Purchase Order

DO NOT INVOICE TO THIS ADDRESS		Master Purchase Order No. SC-00004170	
City & County of Denver		Date: August 1, 2019	Revision No.
Purchasing Division		Payment Terms: Net 30	Ordinance:
201 West Colfax Avenue, Dept. 304		Freight Terms: DESTINATION	
Denver, CO 80202		Ship Via: Supplier's Choice	
United States		Buyer: Jeff Wylde, CPPB	
Phone: 720-913-8100 Fax: 720-913-8101		Phone: 720-913-8157	

Supplier ID: DENVR0000002299 Phone: 303-772-2787 Fax: 303-776-1270 Email: dtenkely@trafsig.com

Traffic Signal Controls, Inc.
255 Weaver Park Road, Suite 100
Longmont, CO 80504
Attn: David Tenkely

Ship To: Denver Public Works Traffic Engineering
5440 Roslyn St.
Denver, CO 80216

Bill To: Accounts Payable
201 West Colfax Department 908
Denver, Colorado 80202
or
As Specified By Agency

Colorado Secretary of State ID: 19871640311
SAMS 7/15/2019

1. Goods/Services:

Traffic Signal Controls, Inc., a Corporation in the State of Colorado, ("Supplier") shall provide the goods, and any services related thereto, identified and described on attached Exhibit A, to the City and County of Denver, a Colorado municipal corporation (the "City"), all in accordance with the terms and conditions of this Master Purchase Order.

2. Ordering:

The City shall purchase one or more of the goods/services by issuing a written purchase order(s) or similar appropriate written document ("Order"), each of which will be deemed incorporated into this Agreement for purposes of such Order only.

3. Pricing:

The pricing/rates for the goods/services is contained on Exhibit A and shall be held firm for the term of this Master Purchase Order.

4. Term and Renewal:

The effective period of this agreement shall be from date of City signature to and including June 30, 2022. It is also a specific provision of this agreement that the City and the Supplier may mutually agree to renew and continue for additional one (1) year periods at the same prices, terms and conditions. However, no extension or renewal (as applicable) shall surpass June 30, 2022

5. Non-Exclusive:

This Master Purchase Order is non-exclusive. City does not guarantee any minimum purchase other than as provided herein.

6. Inspection and Acceptance:

City may inspect all goods/services prior to acceptance. Payment does not constitute acceptance. Supplier shall bear the cost of any inspection/testing that reveal goods/services that are defective or do not meet specifications. City's failure to accept or reject goods/services shall not relieve Supplier from its responsibility for such goods/services that are defective or do not meet specifications nor impose liability on City for such goods/services. If any part of the goods/services are not acceptable to City, City may, in addition to any other rights it may have at law or in equity: (1) make a warranty claim; (2) repair and/or replace the goods or substitute other services at Supplier's expense; or (3) reject and return the goods at Supplier's cost and/or reject the services at Supplier's expense for full credit. Any rejected goods/services are not to be replaced without written authorization from City, and any such replacement shall be on the same terms and conditions contained in this Master Purchase Order. Supplier shall perform all services in accordance with the standard of care exercised by highly competent Suppliers who perform like or similar services.

7. Shipping, Taxes and Other Credits and Charges:

All pricing is F.O.B. destination unless otherwise specified. Shipments must be marked with Supplier's name, the Master Purchase Order number, and contain a delivery or packing slip. Supplier shall not impose any charges for boxing, crating, parcel post, insurance, handling, freight, express or other similar charges or fees. Supplier shall notify City in writing of any price decreases immediately, and City shall receive the benefit thereof on all unshipped items. Supplier shall comply with any additional delivery terms specified herein. Supplier shall be responsible for the cleanup and reporting of any contamination (environmental or otherwise) or spillage resulting from the delivery and/or unloading of goods within twenty-four (24) hours of the contamination or spillage or sooner if required by law. Supplier shall procure all permits and licenses; pay all charges, taxes and fees; and give all notices necessary and incidental to the fulfillment of this Master Purchase Order and all cost thereof have been included in the prices contained herein. City shall not be liable for the payment of taxes, late charges or penalties of any nature, except as required by D.R.M.C. § 20-107, et seq. The price of all goods/services shall reflect all applicable tax exemptions. City's Federal Registration No. is 84-6000580 and its State Registration No. is 98-02890. Supplier shall pay all sales and use taxes levied by City on any tangible personal property built into the goods/services. Supplier shall obtain a Certificate of Exemption from the State of Colorado Department of Revenue prior to the purchase of any materials to be built into the goods/services and provide a copy of the Certificate to City prior to final payment.

8. Risk of Loss:

Supplier shall bear the risk of loss, injury or destruction of goods prior to delivery to City. Loss, injury or destruction shall not release Supplier from any obligation hereunder.

9. Invoice:

Each invoice shall include: (i) the Purchase Order number; (ii) individual itemization of the goods/services; (iii) per unit price, extended and totaled; (iv) quantity ordered, back ordered and shipped; (v) an invoice number and date; (vi) ordering department's name and "ship to" address; and (vii) agreed upon payment terms set forth herein.

10. Payment:

Payment shall be subject to City's Prompt Payment Ordinance D.R.M.C. § 20-107, et-seq. after City accepts the goods/services. Any other provision of this Agreement notwithstanding, in no event shall the City be liable for aggregate payments under this Master Purchase Order exceeding two million five hundred dollars (\$2,500,000.00). The Supplier acknowledges that any goods/services provided beyond those specifically described in Exhibit A are performed at Contractor's risk and without authorization from the City. City's payment obligations hereunder, whether direct or contingent, shall extend only to funds appropriated by the Denver City Council for the purpose of this Master Purchase Order, encumbered by the City after receipt of Supplier's invoice and paid into the Treasury of City. Supplier acknowledges that: (i) City does not by this Master Purchase Order, irrevocably pledge present cash reserves for payments in future fiscal years; and (ii) this Master Purchase Order is not intended to create a multiple-fiscal year direct or indirect debt or financial obligation of City. City may set off against any payments due to Supplier any claims and/or credits it may have against Supplier under this Master Purchase Order.

11. Amendments/Changes:

Only the Manager of General Services or his delegate is authorized to change or amend this Master Purchase Order by a formal written change order. Any change or amendment that would cause the aggregate payable under this Master Purchase Order to exceed the amount appropriated and encumbered for this Master Purchase Order is expressly prohibited and of no effect. Supplier shall verify that the amount appropriated and encumbered is sufficient to cover any increase in cost due to changes or amendments. Goods/services provided without such verification are provided at Supplier's risk. The Supplier has no authority to bind City on any contractual matters.

12. Warranty:

Supplier warrants and guarantees to City that all goods furnished under this Master Purchase Order are free from defects in workmanship and materials, are merchantable, and fit for the purposes for which they are to be used. For any goods furnished under this Master Purchase Order which become defective within twelve (12) months (unless otherwise specified) after date of receipt by City, Supplier shall either, at City's election and to City's satisfaction, remedy any and all defects or replace the defective goods at no expense to City within seven (7) days of receipt of the defective goods or accept the defective goods for full credit and payment of any return shipping charges. Supplier shall be fully responsible for any and all warranty work, regardless of third-party warranty coverage. Supplier shall furnish additional or replacement parts at the same prices, conditions and specifications delineated herein.

13. Indemnification/Limitation of Liability:

Supplier shall indemnify and hold harmless City (including but not limited to its employees, elected and appointed officials, agents and representatives) against any and all losses (including without limitation, loss of use and costs of cover), liability, damage, claims, demands, actions and/or proceedings and all costs and expenses connected therewith (including without limitation attorneys' fees) that arise out of or relate to any claim of infringement of patent, trademark, copyright, trade secret or other intellectual property right related to this Master Purchase Order or that are caused by or the result of any act or omission of Supplier, its agents, suppliers, employees, or representatives. Supplier's obligation shall not apply to any liability or damages which result solely from the negligence of City. City shall not be liable for any consequential, incidental, indirect, special, reliance, or punitive damages or for any lost profits or revenues, regardless of the legal theory under which such liability is asserted. In no event shall City's aggregate liability exceed the agreed upon cost for those goods/services that have been accepted by City under this Master Purchase Order. Notwithstanding anything contained in this Master Purchase Order to the contrary, City in no way limits or waives the rights, immunities and protections provided by C.R.S. § 24-10-101, et seq.

14. Termination:

City may terminate this Master Purchase Order, in whole or in part, at any time and for any reason immediately upon written notice to Supplier. In the event of such a termination, City's sole liability shall be limited to payment of the amount due for the goods/services accepted by City. Supplier acknowledges the risks inherent in this termination for convenience and expressly accepts them. Termination by City shall not constitute a waiver of any claims City may have against Supplier.

15. Interference:

Supplier shall notify the Director of Purchasing immediately of any condition that may interfere with the performance of Supplier's obligations under this Master Purchase Order and confirm such notification in writing within twenty-four (24) hours. City's failure to respond to any such notice shall in no way act as a waiver of any rights or remedies City may possess.

16. Venue, Choice of Law and Disputes:

Venue for all legal actions shall lie in the District Court in and for City and County of Denver, State of Colorado, and shall be governed by the laws of the State of Colorado as well as the Charter and Revised Municipal Code, rules, regulations, Executive Orders, and fiscal rules of City. All disputes shall be resolved by administrative hearing, pursuant to the procedure established by D.R.M.C. § 56-106. Director of Purchasing shall render the final determination.

17. Assignment/No Third Party Beneficiary:

Supplier shall not assign or subcontract any of its rights or obligations under this Master Purchase Order without the written consent of City. In the event City permits an assignment or subcontract, Supplier shall continue to be liable under this Master Purchase Order and any permitted assignee or subcontractor shall be bound by the terms and conditions contained herein. This Master Purchase Order is intended solely for the benefit of City and Supplier with no third-party beneficiaries

18. Notice:

Notices shall be made by Supplier to the Director of Purchasing and by City to Supplier at the addresses provided herein, in writing sent registered, return receipt requested.

19. Compliance With Laws:

Supplier shall observe and comply with all federal, state, county, city and other laws, codes, ordinances, rules, regulations and executive orders related to its performance under this Master Purchase Order. City may immediately terminate this Master Purchase Order, in whole or in part, if Supplier or an employee is convicted, plead nolo contendere, or admits culpability to a criminal offense of bribery, kickbacks, collusive bidding, bid-rigging, antitrust, fraud, undue influence, theft, racketeering, extortion or any offense of a similar nature.

20. Insurance:

Supplier shall secure, before delivery of any goods/services, the following insurance covering all operations, goods and services provided to City. Supplier shall keep the required insurance coverage in force at all times during the term of the Purchase Order, or any extension thereof, during any warranty period, and for three (3) years after termination of this Purchase Order. The required insurance shall be underwritten by an insurer licensed to do business in Colorado and rated by A.M. Best Company as "A-"VIII or better. Each policy shall contain a valid provision or endorsement requiring notification to the City in the event any of the required policies be canceled or non-renewed before the expiration date thereof. Such written notice shall be sent to the parties identified in the Notices section of this Agreement. Such notice shall reference the City contract number listed on the signature page of this Agreement. Said notice shall be sent thirty (30) days prior to such cancellation or non-renewal unless due to non-payment of premiums for which notice shall be sent ten (10) days prior. If such written notice is unavailable from the insurer, contractor shall provide written notice of cancellation, non-renewal and any reduction in coverage to the parties identified in the Notices section by certified mail, return receipt requested within three (3) business days of such notice by its insurer(s) and referencing the City's contract number. If any policy is in excess of a deductible or self-insured retention, City must be notified by Supplier. Supplier shall be responsible for the payment of any deductible or self-insured retention. The insurance coverages specified in this Purchase Order are the minimum requirements, and these requirements do not lessen or limit the liability of Supplier. Risk Management reserves the right to require additional policies and/or limits based on agreement scope of work. Supplier shall provide a copy of this Purchase Order to its insurance agent or broker. Supplier may not commence services or work relating to the Purchase Order prior to placement of coverage. Contractor certifies that the attached certificate of insurance attached to the Purchase Order documents, preferably an ACORD certificate, complies with all insurance requirements of this Purchase Order. The City's acceptance of a certificate of insurance or other proof of insurance that does not comply with all insurance requirements set forth in this Purchase Order shall not act as a waiver of Supplier's breach of this Purchase Order or any of the City's rights or remedies under this Agreement. The City's Risk Management Office may require additional proof of insurance, including but not limited to policies and endorsements. Supplier's insurer shall name as Additional Insured to its Commercial General Liability and Business Auto Liability policies the City and County of Denver, its elected and appointed officials, employees and volunteers. Supplier's insurer shall waive subrogation rights against the City. All sub-contractors and sub-consultants (including independent contractors, suppliers or other entities providing goods/services required by this Purchase Order) shall be subject to all of the requirements herein and shall procure and maintain the same coverages required of Supplier. Supplier shall include all such entities as insureds under its policies or shall ensure that they all maintain the required coverages. Supplier shall provide proof of insurance for all such entities upon request by City. For Worker's Compensation Insurance, Supplier shall maintain the coverage as required by statute for each work location and shall maintain Employer's Liability insurance with limits of \$100,000 for each bodily injury occurrence claim, \$100,000 for each bodily injury caused by disease claim, and \$500,000 aggregate for all bodily injuries caused by disease claims. Supplier expressly represents to City, as a material representation upon which City is relying, that none of the Supplier's officers or employees who may be eligible under any statute or law to reject Workers' Compensation Insurance shall effect such rejection during any part of the term of this Purchase Order, and that any such rejections previously effected, have been revoked. Supplier shall maintain Commercial General Liability coverage with limits of \$1,000,000 for each occurrence, \$1,000,000 for each personal and advertising injury claim, \$2,000,000 products and completed operations aggregate, and \$2,000,000 policy aggregate. Supplier shall maintain Business Auto Liability coverage with limits of \$1,000,000 combined single limit applicable to all owned, hired and non-hired vehicles used in performing services under this Purchase Order. For Commercial General Liability coverage, the policy must provide the following: (i) That this Purchase Order is an Insured Contract under the policy; (ii) Defense costs in excess of policy limits; (iii) A severability of interests, separation of insureds or cross liability provision; and (iv) A provision that coverage is non-contributory with other coverage or self-insurance provided by City. For claims-made coverage, the retroactive date must be on or before the first date when any goods or services were provided to City. Supplier must advise the City in the event any general aggregate or other aggregate limits are reduced below the required per occurrence limits. At their own expense, and where such general aggregate or other aggregate limits have been reduced below the required per occurrence limit, the Contractor will procure such per occurrence limits and furnish a new certificate of insurance showing such coverage is in force.

21. Severability:

If any provision of this Master Purchase Order, except for the provisions requiring appropriation and encumbering of funds and limiting the total amount payable by City, is held to be invalid, illegal or unenforceable by a court of competent jurisdiction, the validity of the remaining portions or provisions shall not be affected if the intent of City and Supplier can be fulfilled.

22. Survival:

All terms and conditions of this Master Purchase Order which by their nature must survive termination/expiration shall so survive. Without limiting the foregoing, Supplier's insurance, warranty and indemnity obligations shall survive for the relevant warranty or statutes of limitation period plus the time necessary to fully resolve any claims, matters or actions begun within that period. Bonds shall survive as long as any warranty period.

23. No Construction Against Drafting Party:

No provision of this Master Purchase Order shall be construed against the drafter.

24. Status of Supplier/Ownership of Work Product:

Supplier is an independent contractor retained on a contractual basis to perform services for a limited period of time as described in Section 9.1.1E(x) of the Charter of City. Supplier and its employees are not employees or officers of City under Chapter 18 of the D.R.M.C. for any purpose whatsoever. All goods, deliverables, hardware, software, plans, drawings, reports, submittals and all other documents or things furnished to City by Supplier shall become and are the property of City, without restriction.

25. Records and Audits:

Supplier shall maintain for three (3) years after final payment hereunder, all pertinent books, documents, papers and records of Supplier involving transactions related to this Master Purchase Order, and City shall have the right to inspect and copy the same.

26. Remedies/Waiver:

No remedy specified herein shall limit any other rights and remedies of City at law or in equity. No waiver of any breach shall be construed as a waiver of any other breach.

27. No Discrimination in Employment:

Supplier shall not refuse to hire, discharge, promote or demote, or to discriminate in matters of compensation against any person otherwise qualified, solely because of race, color, religion, national origin, gender, age, military status, sexual orientation, marital status, or physical or mental disability; and Supplier shall insert the foregoing provision in any subcontracts hereunder.

28. Use, Possession or Sale of Alcohol or Drugs:

Supplier shall cooperate and comply with the provisions of Executive Order 94. Violation may result in City terminating this Master Purchase Order or barring Supplier from City facilities or from participating in City operations.

29. Conflict of Interest:

No employee of City shall have any personal or beneficial interest in the goods/services described in this Master Purchase Order; and Supplier shall not hire or contract for services any employee or officer of City which would be in violation of City's Code of Ethics, D.R.M.C. §2-51, et seq. or the Charter §§ 1.2.8, 1.2.9, and 1.2.12.

30. No Employment of Illegal Aliens to Perform Work Under The Agreement:

a. This Agreement is subject to Division 5 of Article IV of Chapter 20 of the Denver Revised Municipal Code, and any amendments (the "Certification Ordinance").

b. The Contractor certifies that:

- (1) At the time of its execution of this Agreement, it does not knowingly employ or contract with an illegal alien who will perform work under this Agreement.
- (2) It will participate in the E-Verify Program, as defined in § 8-17.5-101(3.7), C.R.S., to confirm the employment eligibility of all employees who are newly hired for employment to perform work under this Agreement.

c. The Contractor also agrees and represents that:

- (1) It shall not knowingly employ or contract with an illegal alien to perform work under the Agreement.
- (2) It shall not enter into a contract with a subconsultant or subcontractor that fails to certify to the Contractor that it shall not knowingly employ or contract with an illegal alien to perform work under the Agreement.
- (3) It has confirmed the employment eligibility of all employees who are newly hired for employment to perform work under this Agreement, through participation in the E-Verify Program.
- (4) It is prohibited from using the E-Verify Program procedures to undertake pre-employment screening of job applicants while performing its obligations under the Agreement, and that otherwise requires the Contractor to comply with any and all federal requirements related to use of the E-Verify Program including, by way of example, all program requirements related to employee notification and preservation of employee rights.
- (5) If it obtains actual knowledge that a subconsultant or subcontractor performing work under the Agreement knowingly employs or contracts with an illegal alien, it will notify such subconsultant or subcontractor and the City within three (3) days. The Contractor will also then terminate such subconsultant or subcontractor if within three (3) days after such notice the subconsultant or subcontractor does not stop employing or contracting with the illegal alien, unless during such three-day period the subconsultant or

subcontractor provides information to establish that the subconsultant or subcontractor has not knowingly employed or contracted with an illegal alien.

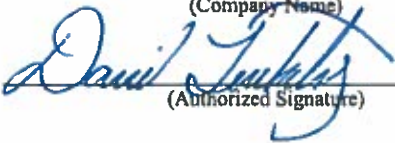
- (6) It will comply with any reasonable request made in the course of an investigation by the Colorado Department of Labor and Employment under authority of § 8-17.5-102(5), C.R.S. or the City Auditor, under authority of D.R.M.C. 20-90.3.


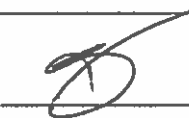
d. The Contractor is liable for any violations as provided in the Certification Ordinance. If Contractor violates any provision of this section or the Certification Ordinance, the City may terminate this Agreement for a breach of the Agreement. If the Agreement is so terminated, the Contractor shall be liable for actual and consequential damages to the City. Any such termination of a contract due to a violation of this section or the Certification Ordinance may also, at the discretion of the City, constitute grounds for disqualifying Contractor from submitting bids or proposals for future contracts with the City.

NOTE: This Master Purchase Order results from 2019 formal solicitation 0155; it is contingent upon City Council Action in accordance with 3.2.6(e) of the City Charter and is void without such action.

This Master Purchase Order is acknowledged and agreed to by:

City & County of Denver, Purchasing Division

Supplier Name: Traffic Signal Controls, Inc.
(Company Name)
By: 
(Authorized Signature)
Print Name: David Tenkely
Title: Estimator
Date: 7/25/19

By:  CPAB
Print Name: JEFF WILDE
Title: SENIOR BUYER
Date: 7/25/2019

Supervisor Initial

EXTENSIONS/RENEWALS:

Upon renewal, City procurements shall be made via Purchase Order (PO) under the pricing, terms and conditions of this MPO. Invoicing must contain the individual PO number that corresponds to the order. General inquiries, not specific to an individual order, shall reference the MPO #.

Extension No. 1.

The contract made and entered into by your company and the City and County of Denver pursuant to the above referenced Master Purchase Order expires on _____;
Should you desire to extend this contract to and including _____ and revise the aggregate amount to \$_____, please return this page with your signature.

City & County of Denver, Purchasing Division

**Supplier
Name:** _____

(Company Name)

By: _____
(Authorized Signature)

By: _____

Print Name: _____

Print Name: _____

Title: _____

Title: Buyer

Date: _____

Date: _____

Extension No. 2

The contract made and entered into by your company and the City and County of Denver pursuant to the above referenced Master Purchase Order expires on _____.
Should you desire to extend this contract to and including _____, and revise the aggregate amount to \$_____, please return this page with your signature.

City & County of Denver, Purchasing Division

**Supplier
Name:** _____

(Company Name)

By: _____
(Authorized Signature)

By: _____

Print Name: _____

Print Name: _____

Title: _____

Title: _____

Date: _____

Date: _____

EXHIBIT "A"

Supplier: Traffic Signal Controls, Inc.
Title: Traffic Signal Control Heads
Master Purchase Order No.: 0155A0119 / SC-00004170

It is recommended that you reference the Purchase Order No. SC-00004170, in all future correspondence, billing, invoicing or other communications.

ESTIMATED QUANTITIES:

Quantities listed are the City and County of Denver's best estimate and do not obligate the Buyer to order or accept more than City and County of Denver's actual requirements during the period of this agreement, as determined by actual needs and availability of appropriated funds. It is expressly understood and agreed that the resulting contract is to supply the City with its complete actual requirement of the materials specified in this proposal for the contract period.

F.O.B. POINT:

All prices quoted must be quoted at a firm price F.O.B. Denver, Colorado, delivered to:
Public Works Traffic Operations
5440 Roslyn, Building E
Denver, CO 80216

DELIVERY CONSIDERATIONS:

Deliveries are to be made as soon as possible after orders are placed. All deliveries shall be made between the hours of 8:00 A.M. and 4:00 P.M., Monday through Friday, excluding holidays.

COOPERATIVE PURCHASING:

The City and County of Denver encourages and participates in cooperative purchasing endeavors undertaken by or on behalf of other governmental jurisdictions, pursuant to Denver Revised Municipal Code Sec. 20-64.5. To the extent other governmental jurisdictions are legally able to participate in cooperative purchasing endeavors, the City and County of Denver supports such cooperative activities. Further, it is a specific requirement of this proposal or Request for Proposal that pricing offered herein to the City and County of Denver may be offered by the Traffic Signal Controls, Inc. to any other governmental jurisdiction purchasing the same products.

The Traffic Signal Controls, Inc. must deal directly with any governmental agency concerning the placement of purchase orders, freight charges for destinations outside of the Denver Metro area, contractual disputes, invoicing, and payment. The City and County of Denver shall not be liable for any costs, damages incurred by any other entity.

PALLET CHARGE:

All pallets supplied shall be non-returnable, no deposit.

SCOPE OF WORK AND TECHNICAL REQUIREMENTS:

SPECIFICATIONS FOR ADJUSTABLE FACE VEHICLE TRAFFIC CONTROL ALUMINUM SIGNAL HEAD

CCD Specification No. EB-TS-1A

Effective Date: July 1, 2001

The purpose of these specifications is to describe minimum acceptable requirements for *Adjustable Face Vehicle Traffic Control Aluminum Signal Head*.

GENERAL - I

- 1-1 Vehicle traffic control heads shall conform to the following:
 - A. Manual on Uniform Traffic Control Devices (MUTCD)
 - B. Adjustable Face Vehicle Traffic Control Head Standard Institute of Transportation Engineers (ITE)
 - C. Standard Publication No. TS 1
National Electrical Manufacturer's Association (NEMA)

CONSTRUCTION - II

- 2-1 Traffic signals shall be adjustable face type with 8-inch or 12-inch diameter lenses. All signal sections of the same make and type shall be interchangeable. A signal face includes housing, visors, optical units, wiring and mounting assembly.
- 2-2 The main body assembly of the signal face shall be of enclosed sectional construction. The sections shall be made of high-grade die-cast silicon aluminum alloy. All sections shall be identical and interchangeable with each other and shall be so designed that they interlock with each other forming a weatherproof assembly. Hinges or lugs shall be located inside each section for attaching the reflector assembly. If backplates are specified, they shall be mounted in a manner that will not interfere with the door operation. On each twelve-inch section, four mounting points shall be provided for backplate attachment. On each eight-inch section, three mounting points shall be provided for backplate attachment. Backplates shall be constructed of U.V. stabilized polycarbonate materials or metal materials.
- 2-3 The signal section shall be dust-tight and shall consist of one lens, lamp, reflector and housing. The distribution and intensity of the light, produced by the entire signal section shall conform to the requirements of Technical Report No. 1 of ITE.
- 2-4 The top and bottom of the die-cast section shall be provided with positive interlocking and indexing ring integral with the section. The integral locking ring shall consist of a single solid or double ring with 72 teeth and a minimum width of 1/4 inch. Openings in top and bottom of the section(s) shall accommodate 1-1/2 inch standard pipe nipples.
- 2-5 The housing door of each section shall be die-cast of silicon aluminum with an opening of sufficient diameter to accommodate the lens. On one side of the door, at top and bottom, there shall be a hinge so as to insure perfect alignment of the door. On the opposite side of the door, there shall be a wing nut assembly locking device to insure even gasket pressure. Twelve-inch signal sections shall be secured with two wing nut assemblies. Eight-inch signal sections shall be secured with one wing nut assembly. Hinge pins and locking device shall be stainless steel.
- 2-6 The aluminum visors shall be twist or screw-on type. The rear of the visor shall have four tabs, notches or holes for attaching the visor to the door. The mounting method of the visor to the door shall be designed in such a manner as to permit the visor to be rotated and mounted to 90 degrees for horizontal signal head arrangements. All visors shall have a minimum downward tilt of 3.5 degrees measured from the center of the lens. Visors for twelve-inch signals shall have a length of not less

than 9.5 inches. Visors for eight-inch signals shall have a length of not less than 7 inches. Tunnel visors shall encircle and shield the lens from 300 degrees, plus or minus 10 degrees.

- 2-7 The prisms traffic signal lens shall be standard red, yellow, or green and shall conform to the latest revision of the ITE standard specifications. The lens shall fit into a specially designed, slotted, extruded, and bonded full-circle lens gasket designed to fit the housing door in such a manner so as to exclude moisture, dust, and road film. The lens and gasket shall be secured to the door with four aluminum lens clips and stainless steel screws. The lenses shall be polycarbonate, glass, or LED, as specified.
- 2-8 The reflector shall be ALZAK® process polished aluminum and shall be held in place by the reflector support ring. The support ring shall be constructed of aluminum or glass filled polycarbonate and be hinged to the signal section body.
- 2-9 The lamp socket shall be molded Bakelite or a heat stabilized nylon with a UL flammability rating of V-2. It shall be gasketed and provided with a serrated base to permit positive locking and adjustable positioning by rotating the lamp filament without using tools. Socket shall be secured by the reflector bail. The bail shall be a corrosion resistant piano wire assembly.
- 2-10 The entire signal section, with the exception of the inside surface of the visor, shall be finished with one coat of primer and one of enamel baked after application. The color shall be Dark Olive Green matching to FED-STD-595A color #14056. The inside surface of the visor shall be a dull non-reflective black.
- 2-11 All screws, washers, nuts and bolts shall be stainless steel. All components shall be readily accessible when the door is opened. Maintenance and/or replacement of components shall be done using standard tools.

ELECTRICAL – III

- 3-1 Traffic signals shall be rated for 120 volt, 60-hertz operation.
- 3-2 Traffic signal lamps shall be 120/125 volt clear. The 150-watt lamp rated for 10,000 hours of life and the 69-watt lamp rated for 12,000 hours of life. The lamps shall meet or exceed the beam candlepower requirements of the Institute of Transportation Engineers Signal Lamp Standard. The lamps shall also comply with the following:

<u>Indication Size</u>	<u>Wattage</u>	<u>Rated Initial Lumens</u>	<u>Center length</u>
8 inches	69	630	2-7/16 inches
12 inches	150	1750	3 inches

- 3-3 All light emitting diode (LED) indications shall comply with the Institute of Transportation Engineers (ITE) interim LED Purchase Specification Part 2 Standards for LED signals, including color, intensity, candlepower distribution, and beam spread.
- 3-4 Each signal head shall be equipped with a barrier-type terminal block providing separate screws for each signal section and neutral wires. For all multi-section signal heads, the terminal block shall be installed in the section with the yellow lens. Each signal section shall be wired complete to the terminal block using spade lugs.
- 3-5 Fixture wire shall be 19 stranded (Class C) No. 18 AWG thermoplastic-covered, copper wire, 2 feet (600 mm) long, with a 600 volt rating, color-coded to provide section identification of the head assembly. The fixture wires shall be securely fastened to the lamp receptacle socket and capable of withstanding all adverse effects of moisture corrosive atmosphere and temperatures associated with the operation of the signal head.

INSTRUCTIONS AND GUARANTEE – IV

- 4-1 Upon request, one wiring diagram and installation manual shall be provided with each signal face.
- 4-2 Each Traffic signal head shall be delivered completely assembled. Each signal head shall be ready for immediate installation.
- 4-3 Each traffic signal shall be packed separately in such a manner that there will be no injury or defacement to the signal and mounting assembly during transportation to the project site. Each carton shall be legibly marked with the signal and mounting assembly description and supplier's name.
- 4-4 No changes or substitutions in these requirements will be accepted unless authorized in writing. Inquiries regarding this specification shall be addressed to the Director, Traffic Engineering Services, City and County of Denver, 5440 Roslyn Street Denver, Colorado 80216
- 4-5 The signal face shall carry a two-year guarantee from the date of delivery against any imperfections in workmanship and material.
- 4-6 The company agrees upon the request of the Director, Traffic Engineering Services to deliver to the Office, a sample of the signal face to be supplied in compliance with these specifications and test before acceptance. After completion of the test, the sample shall be returned.

SPECIFICATIONS FOR ADJUSTABLE FACE VEHICLE TRAFFIC CONTROL POLYCARBONATE SIGNAL HEAD

CCD Specification No. EB-TS-1

Effective Date: July 1, 2005

The purpose of these specifications is to describe minimum acceptable requirements for *Adjustable Face Vehicle Traffic Control Polycarbonate Signal Head*.

GENERAL – I

- 1-1 Vehicle traffic control heads shall conform to the following:
 - A. Manual on Uniform Traffic Control Devices (MUTCD)
 - B. Adjustable Face Vehicle Traffic Control Head Standard
Institute of Transportation Engineers (ITE)
 - C. Standard Publication No. TS 1
National Electrical Manufacturer's Association (NEMA)

CONSTRUCTION - II

- 2-1 Traffic signals shall be adjustable face type with 8-inch or 12-inch diameter lenses. All signal sections of the same make and type shall be interchangeable. A signal face includes housing, visors, optical units, wiring, and mounting assembly.
- 2-2 The housing of each section shall be a one-piece molded, ultraviolet and heat stabilized, flame retardant, permanently colored polycarbonate unit. The thickness of the housing shall be a minimum of .090 inches thick. All sections shall be identical and interchangeable with each other and shall be so designed that they interlock with each other forming a weatherproof assembly. Hinges or lugs shall be located inside each section for attaching the reflector assembly.

- 2-3 The signal section shall be dust-tight and shall consist of one lens, lamp, reflector and housing. The distribution and intensity of the light, produced by the entire signal section shall conform to the requirements of Technical Report No. 1 of ITE.
- 2-4 The housing door of each section shall be a one-piece, molded, ultraviolet and heat stabilized, flame retardant, permanently colored polycarbonate unit with an opening of sufficient diameter to accommodate the lens. On one side of the door, at top and bottom, there shall be a hinge so as to insure perfect alignment of the door. On the opposite side of the door, there shall be a wing nut assembly locking device to insure even gasket pressure. Twelve (12) inch signal sections shall be secured with two wing nut assemblies. Hinge pins and locking device shall be stainless steel.
- 2-5 The polycarbonate visors shall be twist or screw-on type and shall be 8 inch long open-bottom tunnel type for 8 inch heads and 10 inch long open-bottom, tunnel type for 12 inch heads. Visor shall be tilted downward 7 degrees from horizontal.
- 2-6 The prisms traffic signal lens shall be standard red, yellow, or green and shall conform to the latest revision of the ITE standard specifications. The lens shall fit into a specially designed, slotted, extruded, and bonded full-circle lens gasket designed to fit the housing door in such a manner so as to exclude moisture, dust, and road film. The lens and gasket shall be secured to the door with four aluminum lens clips and stainless steel screws. The lenses shall be polycarbonate, glass, or LED, as specified.
- 2-7 The reflector shall be polished ALZAK® aluminum and shall be held in place by the reflector support ring. The support ring shall be constructed of aluminum or glass filled polycarbonate and be hinged to the signal section body.
- 2-8 The lamp socket shall be molded Bakelite or a heat stabilized nylon with a U.L. flammability rating of V-2. It shall be gasketed and provided with a lamp grip that may be rotated for positioning the lamp filament without using tools.
- 2-9 The color shall be Dark Olive Green matching to FED-STD-595A color #14056. The inside surface of the visor shall be a dull non-reflective black.
- 2-10 The top and bottom of the section shall be provided with positive interlocking and indexing ring integral with the section. The integral locking ring shall consist of a single solid or double ring with 72 teeth and a minimum width of 1/4 inch. Openings in top and bottom of the section(s) shall accommodate 1-1/2 inch standard pipe nipples.
- 2-11 All screws, washers, nuts and bolts shall be stainless steel. All components shall be readily accessible when the door is opened. Maintenance and/or replacement of components shall be done using standard tools.

ELECTRICAL - III

- 3-1 Traffic signals shall be rated for 120 volt, 60-hertz operation.
- 3-2 Traffic signal lamps shall be 120/125 volt clear. The 150-watt lamp rated for 10,000 hours of life and the 69-watt lamp rated for 12,000 hours of life. The lamps shall meet or exceed the beam candlepower requirements of the Institute of Transportation Engineers Signal Lamp Standard. The lamps shall also comply with the following:

<u>Indication Size</u>	<u>Wattage</u>	<u>Rated Initial Lumens</u>	<u>Center length</u>
8 inches	69	630	2-7/16 inches
12 inches	150	1750	3 inches

- 3-6 All light emitting diode (LED) indications shall comply with the Institute of Transportation Engineers (ITE) interim LED Purchase Specification Part 2 Standards for LED signals, including color, intensity, candlepower distribution, and beam spread.
- 3-7 Each signal head shall be equipped with a barrier-type terminal block providing separate screws for each signal section and neutral wires. For all multisection signal heads, the terminal block shall be installed in the section with the yellow lens. Each signal section shall be wired complete to the terminal block using spade lugs.
- 3-8 Fixture wire shall be 19 stranded (Class C) No. 18 AWG thermoplastic-covered, copper wire, 2 feet (600 mm) long, with a 600 volt rating, color-coded to provide section identification of the head assembly. The fixture wires shall be securely fastened to the lamp receptacle socket and capable of withstanding all adverse effects of moisture, corrosive atmosphere and temperatures associated with the operation of the signal head.

INSTRUCTIONS AND GUARANTEE - IV

- 4-1 Upon request, one wiring diagram and installation manual shall be provided with each signal face.
- 4-2 Each Traffic signal head shall be delivered completely assembled. Each signal head shall be ready for immediate installation.
- 4-3 Each traffic signal shall be packed separately in such a manner that there will be no injury or defacement to the signal and mounting assembly during transportation to the project site. Each carton shall be legibly marked with the signal and mounting assembly description and supplier's name.
- 4-4 No changes or substitutions in these requirements will be accepted unless authorized in writing. Inquiries regarding this specification shall be addressed to the Director, Traffic Engineering Services, City and County of Denver, 5440 Roslyn Street Denver, Colorado 80216.
- 4-5 The signal face shall carry a two-year guarantee from the date of delivery against any imperfections in workmanship and material.
- 4-6 The company agrees upon the request of the Director, Traffic Engineering Services to deliver to the Office, a sample of the signal face to be supplied in compliance with these specifications and test before acceptance. After completion of the test, the sample shall be returned.

SPECIFICATIONS FOR POLYCARBONATE PEDESTRIAN SIGNAL HEAD

CCD Specification No. EB-PS-1

Effective Date: July 1, 2005

The purpose of these specifications is to describe minimum acceptable requirements for *Polycarbonate Pedestrian Signal Head*.

GENERAL - I

- 1-1 This specification describes the minimum acceptable requirements for a pedestrian signal head with housing and doors made of molded, ultraviolet and heat stabilized, flame retardant, permanently colored polycarbonate unit. The thickness of the housing shall be a minimum of .090 inches thick.
- 1.2 The design, material, and construction of the pedestrian signal heads shall be in accordance with the requirements for the signal set forth in the latest "Adjustable Face Pedestrian Signal Head Standard" of the Institute of Traffic Engineers.
- 1.3 These signals may be used alone or in conjunction with traffic signals in a complete assembly.

DESIGN REQUIREMENTS - 2

2.1 Housing Case and Door

- 2.1.1 The front of the signal shall be approximately square and no larger than necessary to accommodate the message.
- 2.1.2 The signal head shall be a one piece assembly constructed of molded, ultraviolet and heat stabilized, flame retardant, permanently colored polycarbonate unit. The thickness of the housing shall be a minimum of .090 inches thick. Openings in the top and bottom of the signal head shall accommodate a standard 1 1/2 in. bracket arm.
- 2.1.3 The electrical system of the signal head shall be designed to operate from a 115 volt, single phase, 60 Hz alternating current power.
- 2.1.4 The signal head shall contain one (1) three point terminal with the two common points wired together by the supplier. The terminal block shall accommodate AWG 12 field wires.
- 2.1.5 For incandescent type, the assembly shall provide a dustproof and weatherproof enclosure and shall provide easy access to all components. All gaskets shall be continuous neoprene gaskets.
- 2.1.6 For LED type pedestrian signals, continuous neoprene gasket is not required.
- 2.1.7 Polycarbonate doors shall be a one-piece with two hinged lugs molded at the bottom and two latch slots molded at the top of each door. Two stainless steel wing screws or wing nuts shall be used to open and close the door. Latching or unlatching the door shall not require tools.

2.2 Environmental

- 2.2.1 The Pedestrian Signal Head and all components shall be rated for use in the ambient operating temperature range of -40 degrees C to +74 degrees C.

MOUNTING ATTACHMENTS - 3

3.1 The Type Of Mounting Attachments Shall Be Hinged Unless Otherwise Specified.

3.2 Hinged Mounting Assembly

- 3.2.1 Mounting hardware shall be a two piece cast aluminum alloy assembly which shall be joined in the final assembly by stainless steel hinge pins on the back of the unit and a tamper proof bolt on the front of the unit.
- 3.2.2 The pole half of the assembly shall have two spring pins which shall act as a hinge for the assembly and be capable of being mounted banded on a steel or wood strain pole, lag screwing into a wood pole, or bolted directly to a 4 in. steel pole.
- 3.2.3 The head half of the assembly shall contain a terminal compartment and shall have hinged ears for mating with the pole half. It shall have provisions for mounting to the side of the pedestrian signal head with all necessary wiring with a weatherproof and dustproof seal. The terminal block shall accommodate AWG 12 field wires.
- 3.2.4 When pedestrian heads and hinged mounting assemblies are ordered together, the mounting assembly shall be attached and wired to the signal head on the left side (when viewed from the front). If top and bottom holes exist on the signal head, they shall be plugged as part of the hinged mounting assembly installation.
- 3.2.5 The mating surfaces of the two halves shall have a gasket to provide a weatherproof and dustproof assembly. The assembly must have provisions to minimize the chance of vandalism.

PAINT / PAINTING - 4

4.1 All exposed metal surfaces of the assembled pedestrian traffic signal head with mounting attachments shall be given two (2) coats of high grade green enamel as used by the manufacturer of the signal equipment. Each coat shall be separately baked. Powder coating is acceptable.

INSTRUCTIONS AND GUARANTEE - 5

5-1 Upon request, one wiring diagram and installation manual shall be provided with each pedestrian signal.

5-2 Each pedestrian signal shall be delivered completely assembled. Each pedestrian signal head shall be ready for immediate installation.

5-3 Each pedestrian signal shall be packed separately in such a manner that there will be no injury or defacement to the signal and mounting assembly during transportation to the project site. Each carton shall be legibly marked with the signal and mounting assembly description and supplier's name.

5-4 No changes or substitutions in these requirements will be accepted unless authorized in writing. Inquiries regarding this specification shall be addressed to the Director, Traffic Engineering Services, City and County of Denver, 5440 Roslyn Street Denver, Colorado 80216.

5-5 The pedestrian signal shall carry a two-year guarantee from the date of delivery against any imperfections in workmanship and material.

5-6 The company agrees upon the request of the Director, Traffic Engineering Services to deliver to the Office, a sample of the pedestrian signal to be supplied in compliance with these specifications and test before acceptance. After completion of the test, the sample shall be returned.

SPECIFICATIONS FOR LONG LIFE LED CIRCULAR SIGNAL MODULE 8" (200mm) & 12" (300 mm) BALLS

OVERVIEW - 1

1.1 Purpose

1.1.1 The purpose of this specification is to provide the minimum performance requirements for 300 mm (12 in) Light Emitting Diode (LED) vehicle traffic signal. This specification refers to procedures and definitions as described in the **Vehicle Traffic Control Signal Heads- Light Emitting Diode (LED) Circular Supplement (VTCSH), adopted June 27, 2005**, and Published by the Institute of Transportation Engineers (ITE). All products supplied to this specification shall comply with the VTCSH requirements and the additional requirements listed herein.

1.2 Manufacturer Requirements and Approvals

1.2.1 The manufacturer supplying product to this specification shall have a minimum of 13 years of experience in the manufacture of LED Traffic Signals with High Flux LEDs used in the North American market.

1.2.2 Manufacturers supplying products to this specification shall be a registered participant and have the unique long life module part numbers being provided certified and listed on the **Intertek-ETL LED Traffic Signal Modules Certification Program** approved products website prior to bid opening.

- 1.2.3 Manufacturers supplying products to this specification shall manufacture and assemble product on an *Intertek ETL* audited line located in the USA.
- 1.2.4 Unique part number shall be listed on manufacturers label proving difference between standard modules and long life modules.
- 1.2.5 If requested, documentation shall be provided by manufacturer demonstrating the changes made to their standard product that allows for ITE specification compliance over 15 year warranty period

PHYSICAL & MECHANICAL REQUIREMENTS - 2

2.1 General

- 2.1.1 Tinted or Non-Tinted Lens. Unless designated otherwise in the below table the standard lens color shall be tinted with a color similar to the colors required in paragraph 4.2 of the ITE specification. The products shall be available with non-tinted lenses as an option.
- 2.1.2 The LED module shall utilize high flux LEDs rated at 1 watt or higher and have an incandescent, non-pixelated appearance when illuminated.
- 2.1.3 The external lens shall have a smooth outer surface to prevent the buildup of dirt/dust and shall be designed to minimize the potential for sun phantom signals.
- 2.1.4 All LEDs utilized to illuminate circular signal modules, shall be LEDs that have been manufactured utilizing materials that have industry acceptance as being suitable for uses in outdoor applications. At no time is the use of LEDs that utilize AlGaAs technology acceptable.
- 2.1.5 The thermal management system used in the traffic ball must be self-contained and internal to the traffic module. At no time shall the thermal management system used for the power supply or LEDs form any part of the external surface of the LED module.
- 2.1.6 Manufacturer supplying products to this specification must provide a minimum of three references/referrals from agencies with installation of the long-life modules for a complete season (12 months)
- 2.1.7 Manufacture shall provide documentation verifying the housing, lenses and power supply are all manufactured by the manufacturer and not a third party.

2.2 Module Identification

- 2.2.1 In addition to the required ITE labeling all modules must be labeled with the ETL Verified label shown in Figure 1. This label designates the compliance and listing with the Intertek-ETL Traffic Signal Certification Program.

ELECTRICAL - 3

3.1 General

- 3.1.1 The following color scheme shall be used for all modules AC power leads: White for Common, Red for the Red ball signal, Yellow for the Yellow ball signal, and Brown for the Green ball signal.
- 3.1.2 The AC power leads shall exit the module via a rubber grommited strain relief and shall be terminated with insulated female quick connect terminals with spade / tab adapters. The leads shall be separate at the point at which they leave the module.
- 3.1.3 All external wiring utilized in the LED traffic signal module shall be anti-capillary type wire to prevent wicking of moisture to the interior of the module.

3.1.4 LED Module and power supply shall be designed to remain ITE compliant over a 15-year life.

3.1.5 To minimize the temperature exposure of the power supply all power supplies should be located at the bottom of the module

3.1.6 For additional protection from moisture, all power supplies shall be conformal coated for additional protection.

3.2 Transient Voltage Protection

3.2.1 In addition to the transient test requirements defined in the Design Qualification Testing section of ITE VTCSH specification all power supplies used in the circular signals supplied to this specification shall be capable of passing an additional ring-wave surge testing in accordance with the IEEE Recommended Practice on Characterization of Surges in Low-Voltage (1000V and less) AC Power Circuits, ANSI/IEEE C62.41.2-2002, 6KV, 100 kHz ring-wave with an output impedance of 30 ohms. The short circuit current shall be 200 Amps.

3.3 Power

3.3.1 Typical wattages at 25° C for the LED traffic Signal Modules for the 300 mm (12") balls shall be; Red 7 watts, Yellow 11 watts, and Green 7 watts. Typical wattages at 25° C for the LED traffic Signal Modules for the 200 mm (8") balls shall not exceed; Red 8 watts, Yellow 10 watts, and Green 8 watts.

QUALITY ASSURANCE - 4

4.1 General

4.1.1 Upon Request, the supplier must provide an Intertek-ETL test report for the base model being supplied to this specification.

4.1.2 The base products must be listed in the Intertek Directory of LED Traffic Signal Modules Certified Products listing at the time of bid. Upon request the supplier must provide a copy of the listing in the bid package.

WARRANTY REQUIREMENT - 5

5.1 Warranty

5.1.1 Manufacturers shall provide a detailed written warranty issued by the factory of module origin with the following minimum provisions:

5.1.2 Modules shall, at the manufacturer's option, be repaired or replaced if the module fails to function as intended due to workmanship or material defects within the first 15 years from the date of delivery.

5.1.3 Modules shall, at the manufacturer's option, be repaired or replaced if the module exhibit luminous intensities less than the minimum specified values within the first 15 years of the date of delivery.

5.1.4 Upon request, the LED lamp module manufacturer shall provide written documentation of its ability to satisfy a worst-case, catastrophic warranty claim.

5.1.4.1 A current corporate annual report duly-certified by an independent auditing firm, containing financial statements illustrating sufficient cash-on-hand and net worth to satisfy a worst-case, catastrophic warranty claim is an example of suitable documentation.

5.1.4.2 The documentation shall clearly disclose:

- a) The country in which the factory of module origin is located
- b) The name of the company or organization that owns the factory of module origin including any and all of its parent companies and/or organizations, and their respective country of corporate citizenship

5.1.4.3 For firms with business and/or corporate citizenship in the United States of less than fifteen years, the process by which the end-users/owners of the modules will be able to obtain worst-case, catastrophic warranty service in the event of bankruptcy or cessation-of-operations by the firm supplying the modules within North America, or in the event of bankruptcy or cessation-of-operations by the owner of the factory of origin, shall be clearly disclosed.

Figure 1.

Intertek- ETL Verified Label



LED Traffic Signal Modules
Certification Program

Intertek Testing Services, N.A., Inc.
Corland, New York 13045

**SPECIFICATIONS FOR LONG LIFE LED OMNI-DIRECTIONAL ARROW SIGNAL
MODULE 12" (300 mm) ARROWS**

OVERVIEW - 1

1.1 Purpose

1.1.1 The purpose of this specification is to provide the minimum performance requirements for 300 mm (12 in) Light Emitting Diode (LED) vehicle traffic signal. This specification refers to procedures and definitions as described in the **Vehicle Traffic Control Signal Heads- Light Emitting Diode (LED) Vehicle Arrow Traffic Signal Supplement Dated July 1, 2007**, and Published by the Institute of Transportation Engineers (ITE). All products supplied to this specification shall comply with the VTCSH requirements and the additional requirements listed herein.

1.2 Manufacturer Requirements and Approvals

1.2.1 The manufacturer supplying product to this specification shall have a minimum of 13 years of experience in the manufacture of LED Traffic Signals with High Flux LEDs used in the North American market.

1.2.2 Manufacturers supplying products to this specification must be a registered participant and have the unique long life module part numbers being provided certified and listed on the *Intertek-ETL LED Traffic Signal Modules Certification Program* approved products website prior to bid opening.

1.2.3 Manufacturers supplying products to this specification shall manufacture and assemble product on an *Intertek ETL* audited line located in the USA.

1.2.4 Unique part number shall be listed on manufacturers label proving difference between standard modules and long life modules.

1.2.5 If requested, documentation shall be provided by manufacturer demonstrating the changes made to their standard product that allows for ITE specification compliance over 15 year warranty period.

PHYSICAL & MECHANICAL REQUIREMENTS - 2

2.1 General

2.1.1 Tinted or Non-Tinted Lens. Unless designated otherwise in the below table the standard lens color shall be tinted with a color meeting the colors required in paragraph 4.2 of the ITE specification. The products shall be available with non-tinted lenses as an option.

- 2.1.2 The LED module shall utilize high flux LEDs rated at 1 watt or higher and have an incandescent, non-pixelated appearance when illuminated. The use of low power LEDs, for example 5 mm LEDs, is not permissible in the design and production of long life arrow products.
- 2.1.3 The external lens shall have a smooth outer surface to prevent the build up of dirt/dust and shall be designed to minimize the potential for sun phantom signals.
- 2.1.4 All LEDs utilized to illuminate circular signal modules, shall be LEDs that have been manufactured utilizing materials that have industry acceptance as being suitable for uses in outdoor applications. At no time is the use of LEDs that utilize AlGaAs technology acceptable.
- 2.1.5 The thermal management system used in the traffic ball must be self-contained and internal to the traffic module. At no time shall the thermal management system used for the power supply or LEDs form any part of the external surface of the LED module.
- 2.1.6 All plastic components shall be molded and assembled in the USA. This includes: back housing, spreading lens and front lens. Certificate of manufacturing location must be available and supplied at time of bid requested.
- 2.1.7 All lenses shall be hard coated in the USA. Certificate of manufacturing location must be available and supplied at time of bid requested.
- 2.1.8 All reflectors shall be metalized in the USA. Certificate of manufacturing location must be available and supplied at time of bid requested.

2.2 Module Identification

- 2.2.1 In addition to the required ITE labeling all modules must be labeled with the ETL Verified label shown in Figure 1. This label designates the compliance and listing with the Intertek-ETL Traffic Signal Certification Program.

ELECTRICAL - 3

3.1 General

- 3.1.1 The following color scheme shall be used for all modules AC power leads: White for Common, Red for the Red ball signal, Yellow for the Yellow ball signal, and Brown for the Green ball signal.
- 3.1.2 The AC power leads shall exit the module via a rubber grommetted strain relief, and shall be terminated with insulated female quick connect terminals with spade / tab adapters. The leads shall be separate at the point at which they leave the module.
- 3.1.2.1 All external wiring utilized in the LED traffic signal module shall be anti-capillary type wire to prevent the wicking of moisture to the interior of the module.
- 3.1.3 LED Module and power supply shall be design to remain ITE compliant over a 15 year life.
- 3.1.4 To minimize the temperature exposure of the power supply all power supplies should be located at the bottom of the module when the arrow is facing left.
- 3.1.5 For additional protection from moisture, all power supplies shall be conformal coated for additional protection.

3.2 Transient Voltage Protection

- 3.2.1 In addition to the transient test requirements defined in the Design Qualification Testing section of ITE VTCSH specification all power supplies used in the circular signals supplied to this specification shall be capable of passing an additional ring-wave surge testing in accordance with the IEEE Recommended Practice on Characterization of Surges in Low-Voltage (1000V and less) AC Power Circuits, ANSI/IEEE C62.41.2-2002, 6KV, 100 kHz ring-wave with an output impedance of 30 ohms. The short circuit current shall be 200 Amps.

3.3 Power

3.3.1 Typical wattages at 25° C for the LED traffic Signal Modules for the 300 mm (12") balls the typical wattage at 25° C shall be; Red 8 watts, Yellow 13 watts, and Green 8 watts.

QUALITY ASSURANCE - 4

4.1 General

- 4.1 Upon Request, the supplier must provide an Intertek-ETL test report for the base model being supplied to this specification.
- 4.1.2 The base products must be listed in the Intertek Directory of LED Traffic Signal Modules Certified Products listing at the time of bid. Upon request the supplier must provide a copy of the listing in the bid package.

WARRANTY REQUIREMENT - 5

5.1 Warranty

- 5.1.1 Manufacturers shall provide a detailed written warranty issued by the factory of module origin with the following minimum provisions:
 - 5.1.2 Modules shall, at the manufacturer's option, be repaired or replaced if the module fails to function as intended due to workmanship or material defects within the first 15 years from the date of delivery.
 - 5.1.3 Modules shall, at the manufacturer's option, be repaired or replaced if the module exhibit luminous intensities less than the minimum specified values within the first 15 years of the date of delivery.
 - 5.1.4 Upon request, the LED lamp module manufacturer shall provide written documentation of its ability to satisfy a worst-case, catastrophic warranty claim.
 - 5.1.4.1 A current corporate annual report duly-certified by an independent auditing firm, containing financial statements illustrating sufficient cash-on-hand and net worth to satisfy a worst-case, catastrophic warranty claim is an example of suitable documentation.
 - 5.1.4.2 The documentation shall clearly disclose:
 - a) The country in which the factory of module origin is located
 - b) The name of the company or organization that owns the factory of module origin including any and all of its parent companies and/or organizations, and their respective country of corporate citizenship
 - 5.1.4.3 For firms with business and/or corporate citizenship in the United States of less than fifteen years, the process by which the end-users/owners of the modules will be able to obtain worst-case, catastrophic warranty service in the event of bankruptcy or cessation-of-operations by the firm supplying the modules within North America, or in the event of bankruptcy or cessation-of-operations by the owner of the factory of origin, shall be clearly disclosed.

Figure 2
Intertek- ETL Verified Label



XXXXX

<p>LED Traffic Signal Modules Certification Program</p> <p>Intertek Testing Services, N.A., Inc. Cortland, New York 13045</p>

PROPOSAL ITEMS: All products provided must meet or exceed the City specifications.
 All prices quoted shall be firm and fixed for the specified contract period.

Item No.	Estimated Annual Qty	Description	Price / Each
1	100	3-Section, 12" Vertical Traffic Signal Head with <i>all</i> Expanded View LED Indications (per above City & County of Denver Specification #EB-TS-1A) Indicate Warranty: LEDs 15 Year, Signal Heads 1 Year If proposing an alternative product indicate: Manufacturer: McCain/ Dialight Part Number: D15-3GA12RGYGT Specifications Attached: YES LEAD TIME: Stock to 60 Days	\$245.00
2	100	3-Section, 8" Vertical Traffic Signal Head with <i>all</i> Expanded View LED Indications (per above City & County of Denver Specification #EB-TS-1A) Indicate Warranty: LEDs 15 Year, Signal Heads 1 Year If proposing an alternative product indicate: Manufacturer: McCain/ Dialight Part Number: D15-3GA08RYGT Specifications Attached: YES LEAD TIME: Stock to 60 Days	\$205.05
3	100	3-Section, 12" Vertical Traffic Signal Head, Left Turn Arrow, with <i>all</i> Expanded View LED Indications (per above City & County of Denver Specification #EB-TS-1A) Indicate Warranty: LEDs 15 Year, Signal Heads 1 Year If proposing an alternative product indicate: Manufacturer: McCain/ Dialight Part Number: D15-3GA12<R<Y<G Specifications Attached: YES LEAD TIME: Stock to 60 Days	\$251.86
4	100	3-Section, 12" Vertical Traffic Signal Head with <i>all</i> Expanded View LED Indications (per above City & County of Denver Specification #EB-TS-1) Indicate Warranty: LEDs 15 Year, Signal Heads 1 Year If proposing an alternative product indicate: Manufacturer: McCain/ Dialight Part Number: D15-3GP12RYGT Specifications Attached: YES LEAD TIME: Stock to 60 Days	\$242.80

Item No.	Estimated Annual Qty	Description	Price / Each
5	100	3-Section, 8" Vertical Traffic Signal Head with <i>all</i> Expanded View LED Indications (per above City & County of Denver Specification #EB-TS-1) Indicate Warranty: LEDs 15 Year, Signal Heads 1 Year If proposing an alternative product indicate: Manufacturer: McCain/ Dialight Part Number: D15-3GP08RYGT Specifications Attached: YES LEAD TIME: Stock to 60 Days	\$181.00
6	25	3-Section, 12" Vertical Traffic Signal Head, Left Turn Arrow, with <i>all</i> Expanded View LED Indications (per above City & County of Denver Specification #EB-TS-1) Indicate Warranty: LEDs 15 Year, Signal Heads 1 Year If proposing an alternative product indicate: Manufacturer: McCain/ Dialight Part Number: D15-3GP12<R<Y<GT Specifications Attached: YES LEAD TIME: Stock to 60 Days	\$249.94
7	100	Pedestrian Head Housing only with Door, Z-Crate Visor, Left Clamshell , with LED module that shall display a solid Portland orange hand and lunar white man and two seven inch minimum Portland orange countdown numbers and 3 Position Terminal Block. (Per above City & County of Denver Specification #EB-PS-1) Indicate Warranty: LEDs 5 Year, Signal Heads 1 Year If proposing an alternative product indicate: Manufacturer: McCain/ Dialight Part Number: D-PEDS-9 SIG/CLAM Specifications Attached: YES LEAD TIME: Stock to 60 Days	\$217.86
8	100	Pedestrian Head Housing only with Door, Z-Crate Visor, Right Clamshell , with LED module that shall display a solid Portland orange hand and lunar white man and two seven inch minimum Portland orange countdown numbers and 3 Position Terminal Block. (Per above City & County of Denver Specification #EB-PS-1) Indicate Warranty: LEDs 5 Year, Signal Heads 1 Year If proposing an alternative product indicate: Manufacturer: McCain/ Dialight Part Number: D-PEDS-9 SIG/CLAM Specifications Attached: YES LEAD TIME: Stock to 60 Days	\$217.86

Item No.	Estimated Annual Qty	Description	Price / Each
9	100	<p>Pedestrian Head Housing only with Door, Z-Crate Visor, No Clamshell, with LED module that shall display a solid Portland orange hand and lunar white man and two seven inch minimum Portland orange countdown numbers / Man, 3 Position Terminal Block, and Drilled Top and Bottom with 1-1/2" Holes (Per above City & County of Denver Specification #EB-PS-1) Indicate Warranty: LEDs 5 Year, Signal Heads 1 Year If proposing an alternative product indicate: Manufacturer: McCain/ Dialight Part Number: D-PEDS-9 G CD 2019 Specifications Attached: YES LEAD TIME: Stock to 60 Days</p>	\$165.48
10a 10b 10c	500	<p>LED Ball Signal Modules, 8 inch (200mm) (Per above City & County of Denver Specification) Indicate Warranty: 15 Years If proposing an alternative product indicate: Manufacturer: Dialight Part Number: See Data Sheets Specifications Attached: YES LEAD TIME: Stock to 60 Days</p>	<p>10a Red LED Ball \$33.63 10b Yellow LED Ball \$38.10 10c Green LED Ball \$35.12</p>
11a 11b 11c	500	<p>LED Ball Signal Modules, 12 inch (300mm) (Per above City & County of Denver Specification) Indicate Warranty: 15 Years If proposing an alternative product indicate: Manufacturer: Dialight Part Number: See Data Sheets Specifications Attached: YES LEAD TIME: Stock to 60 Days</p>	<p>11a Red LED Ball \$39.29 11b Yellow LED Ball \$42.86 11c Green LED Ball \$41.67</p>
12a 12b 12c	375	<p>LED 12 inch (300mm) Arrow Signal Modules (Per above City & County of Denver Specification) Indicate Warranty: 15 Years If proposing an alternative product indicate: Manufacturer: Dialight Part Number: See Data Sheets Specifications Attached: YES LEAD TIME: Stock to 60 Days</p>	<p>12a Red LED Ball \$41.67 12b Yellow LED Ball \$45.24 12c Green LED Ball \$44.05</p>

Item No.	Estimated Annual Qty	Description	Price / Each
13	100	LED 16" x 18" Countdown Pedestrian Signal Modules (Per above City & County of Denver Specification) Indicate Warranty: 5 Years If proposing an alternative product indicate: Manufacturer: Dialight Part Number: See Data Sheets Specifications Attached: YES LEAD TIME: Stock to 60 Days	\$103.25

