

Master Purchase Order

DO NOT INVOICE TO THIS ADDRESS		Workday™ Supplier Contract No. SC-00007631		
City & County of Denver		Date: 2/3/2023	Revision No.	
Purchasing Division		Payment Terms	NET 30	Resolution (as applicable):
201 West Colfax Avenue, Dept. 304		Freight Terms	FOB DESTINATION	
Denver, CO 80202		Ship Via	Best Way	
United States		Analyst:	Jesse Sitzman	
Phone: 720-913-8100 Fax: 720-913-8101		Phone:	720-913-8151	

Workday SUP-00011186 Phone: 720.348.6925 Email: gale@amsignalinc.com
 Supplier ID:

AM Signal, LLC
 8100 Southpark Way Unit # A10
 Littleton, CO 80120

Ship To: Various City Locations

Colorado Secretary of State ID: 20211240950
 U.S. Federal SAM Registry Verification Date: 2/3/2023

Bill To: As Specified By Agency

1. Goods/Services:

AM Signal, LLC, a Foreign Limited Liability Corporation located in the State of Delaware, (“Vendor”) 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 Master Purchase Order 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/Renewal:

The term of this Master Purchase Order shall be from date of City signature to and including 2/1/2026. The City and the vendor may mutually agree to renew and continue this Master Purchase Order for additional periods at the same pricing structure, terms and conditions. However, no renewal shall surpass 2/1/2028.

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:

Vendor shall perform any services in accordance with the standard of care exercised by highly competent vendors who perform like or similar services. City may inspect all goods/services prior to acceptance. Payment does not constitute acceptance. Vendor 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 Vendor 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 Vendor's expense; or reject and return the goods at Vendor's cost and/or reject the services at Vendor'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 Purchase Order.

7. Shipping, Taxes and Other Credits and Charges:

All pricing is F.O.B. destination unless otherwise specified. Shipments must be marked with Vendor’s name, the Master Purchase Order number, and contain a delivery or packing slip. Vendor shall not impose any charges for boxing, crating, parcel post, insurance, handling, freight, express or other similar charges or fees. Vendor shall notify City in writing of any price decreases immediately, and City shall receive the benefit thereof on all unshipped items. Vendor shall comply with any additional delivery terms specified herein. Vendor 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. Vendor 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. Vendor shall pay all sales and use taxes levied by City on any tangible personal property built into the goods/services. Vendor 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:

Vendor shall bear the risk of loss, injury or destruction of goods prior to delivery to City. Loss, injury or destruction shall not release Vendor 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 in excess of One Million Five Hundred Thousand Dollars (\$1,500,000.00). The Vendor acknowledges that any goods/services provided beyond those specifically described in **Exhibit A** are performed at Vendor'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 Vendor's invoice and paid into the Treasury of City. Vendor 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 setoff against any payments due to Vendor any claims and/or credits it may have against Vendor under this Master Purchase Order.

11. Amendments/Changes:

Only the Executive Director of General Services or his/her 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. Vendor 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 Vendor's risk. The Vendor has no authority to bind City on any contractual matters.

12. Warranty:

Vendor warrants and guarantees to City that all goods furnished under this 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, Vendor 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. Vendor shall be fully responsible for any and all warranty work, regardless of third-party warranty coverage. Vendor shall furnish additional or replacement parts at the same prices, conditions and specifications delineated herein.

13. Indemnification/Limitation of Liability:

Vendor 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 Purchase Order or that are caused by or the result of any act or omission of Vendor, its agents, suppliers, employees, or representatives. Vendor'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 Purchase Order up to the total Master Purchase Order Amount. Notwithstanding anything contained in this 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 Vendor. 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. Vendor 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 Vendor.

15. Interference:

Vendor shall notify the Director of Purchasing immediately of any condition that may interfere with the performance of Vendor'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:

Vendor 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, Vendor 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 Vendor with no third party beneficiaries.

18. Notice:

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

19. Compliance With Laws:

Vendor 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 Vendor 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:

Vendor agrees to secure, at or before the time of execution of this Master Purchase Order, the following insurance covering all operations, goods or services provided pursuant to this Master Purchase Order. Vendor shall keep the required insurance coverage in force at all times during the term of the Master Purchase Order, including any extension thereof, and during any warranty period. The required insurance shall be underwritten by an insurer licensed or authorized to do business in Colorado and rated by A.M. Best Company as "A-VIII" or better. Each policy shall require 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 Master Purchase Order. Such notice shall reference the Master Purchase Order listed on the signature page of this Master Purchase Order. 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, Vendor 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 Master Purchase Order. Vendor shall be responsible for the payment of any deductible or self-insured retention. The insurance coverages specified in this Master Purchase Order are the minimum requirements, and these requirements do not lessen or limit the liability of the Vendor. The Vendor shall maintain, at its own expense, any additional kinds or amounts of insurance that it may deem necessary to cover its obligations and liabilities under this Master Purchase Order.

Vendor may not commence services or work relating to this Master Purchase Order prior to placement of coverages required under this Master Purchase Order. The City requests that the City's contract number be referenced on the certificate of insurance. 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 Master Purchase Order shall not act as a waiver of Vendor's

breach of this Master Purchase Order or of any of the City's rights or remedies under this Master Purchase Order. The City's Risk Management Office may require additional proof of insurance, including but not limited to policies and endorsements. For Commercial General Liability, Auto Liability and Excess Liability/Umbrella (if required), Vendor and sub-contractor's insurer(s) shall include the City and County of Denver, its elected and appointed officials, employees and volunteers as additional insured. For all coverages required under this Master Purchase Order, Vendor's insurer shall waive subrogation rights against the City. Vendor shall confirm and document that all subcontractors and subconsultants (including independent contractors, suppliers or other entities providing goods or services required by this Master Purchase Order) procure and maintain coverage as approved by the Vendor and appropriate to their respective primary business risks considering the nature and scope of services provided. Vendor shall maintain the coverage as required by statute for each work location and shall maintain Employer's Liability insurance with limits of \$100,000 per occurrence for each bodily injury claim, \$100,000 per occurrence for each bodily injury caused by disease claim, and \$500,000 aggregate for all bodily injuries caused by disease claims. Vendor shall maintain a Commercial General Liability insurance policy with minimum limits of \$1,000,000 for each bodily injury and property damage occurrence, \$2,000,000 products and completed operations aggregate (if applicable), and \$2,000,000 policy aggregate. Vendor shall maintain Automobile Liability with minimum limits of \$1,000,000 combined single limit applicable to all owned, hired and non-owned vehicles used in performing services under this Master Purchase Order.

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 Vendor 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, Vendor'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.

23. No Construction Against Drafting Party:

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

24. Status of Vendor/Ownership of Work Product:

Vendor 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. Vendor 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, plans, drawings, reports, submittals and all other documents or things furnished to City by Vendor shall become and are the property of City, without restriction. Ownership rights shall include, but not be limited to the right to copy, publish, display, transfer, prepare derivative works, or otherwise use materials. Software licenses terms may be incorporated herein by an End User License Agreement signed by the Director of Purchasing. Any 'click-wrap' electronic acceptance or other terms and conditions not agreed to in writing by the Director of Purchasing are of no force and effect.

25. Examination of Records and Audits:

Any authorized agent of the City, including the City Auditor or his or her representative, has the right to access, and the right to examine, copy and retain copies, at City's election in paper or electronic form, any pertinent books, documents, papers and records related to Vendor's performance pursuant to this Master Purchase Order, provision of any goods or services to the City, and any other transactions related to this Master Purchase Order. Vendor shall cooperate with City representatives and City representatives shall be granted access to the foregoing documents and information during reasonable business hours and until the latter of three (3) years after the final payment under the Master Purchase Order or expiration of the applicable statute of limitations. When conducting an audit of this Master Purchase Order, the City Auditor shall be subject to government auditing standards issued by the United States Government Accountability Office by the Comptroller General of the United States, including with respect to disclosure of information acquired during the course of an audit. No examination of records and audits pursuant to this paragraph shall require Vendor to make disclosures in violation of state or federal privacy laws. Vendor shall at all times comply with D.R.M.C. 20-276.

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:

In connection with the performance of work under the Master Purchase Order, the Contractor may not refuse to hire, discharge, promote, demote, or discriminate in matters of compensation against any person otherwise qualified, solely because of race, color, religion, national origin, ethnicity, citizenship, immigration status, gender, age, sexual orientation, gender identity, gender expression, marital status, source of income, military status, protective hairstyle, or disability. The Contractor shall insert the foregoing provision in all subcontracts.

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

Vendor shall cooperate and comply with the provisions of Executive Order 94. Violation may result in City terminating this Master Purchase Order or barring Vendor 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 Vendor 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. Advertising and Public Disclosure:

The Vendor shall not include any reference to the Master Purchase Order or to services performed or goods purchased pursuant to the Master Purchase Order in any of the Vendor's advertising or public relations materials without first obtaining the written approval of the Director of Purchasing.

31. No Employment of a Worker without Authorization to Perform work under the Master Purchase Order

- a. This Master Purchase Order 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:
 - i. At the time of its execution of this Master Purchase Order, it does not knowingly employ or contract with a worker without authorization who will perform work under this Master Purchase Order, nor will it knowingly employ or contract with a worker without authorization to perform work under this Master Purchase Order in the future..
 - ii. It will participate in the E-Verify Program, as defined in § 8-17.5-101(3.7), C.R.S., and confirm the employment eligibility of all employees who are newly hired for employment to perform work under this Master Purchase Order.
 - iii. It will 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 a worker without authorization to perform work under this Master Purchase Order.
 - iv. It is prohibited from using the E-Verify Program procedures to undertake pre-employment screening of job applicants while performing its obligations under this Master Purchase Order, and it is required 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.
 - v. If it obtains actual knowledge that a subconsultant or subcontractor performing work under this Master Purchase Order knowingly employs or contracts with a worker without authorization, it will notify such subconsultant or subcontractor and the City within three (3) days. The Contractor shall also 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 worker without authorization, unless

during the three-day period the subconsultant or subcontractor provides information to establish that the subconsultant or subcontractor has not knowingly employed or contracted with a worker without authorization.

- vi. It will comply with a 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.
- c. The Contractor is liable for any violations as provided in the Certification Ordinance. If the Contractor violates any provision of this section or the Certification Ordinance, the City may terminate this Master Purchase Order for a breach of the Master Purchase Order. If this Master Purchase Order is so terminated, the Contractor shall be liable for actual and consequential damages to the City. Any 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 the Contractor from submitting bids or proposals for future contracts with the City.

32. Intellectual Property:

Any research, reports, studies, data, photographs, negatives or other documents, drawings or materials (collectively "materials") delivered by Vendor in performance of its obligations under this Master Purchase Order shall be the exclusive property of City. Ownership rights shall include, but not be limited to the right to copy, publish, display, transfer, prepare derivative works, or otherwise use materials. Software license terms may be incorporated herein by an End User License Agreement signed by the Director of Purchasing. Any 'click-wrap' agreement, terms of use, electronic acceptance or other terms and conditions not agreed to in writing by the Director of Purchasing are of no force and effect.

33. Federal Provisions:

Where the source of the funds, directly or indirectly for this Purchase Order is the Federal Government, the Vendor agrees to the applicable provisions set out below. The Vendor shall be responsible for determining which terms are applicable to its products and/or services.

EQUAL EMPLOYMENT OPPORTUNITY COMPLIANCE Vendor agrees to comply with Executive Order 11246 of September 24, 1965, entitled "Equal Employment Opportunity," as amended by Executive Order 11375 of October 13, 1967, and as supplemented in Department of Labor regulations (41 CFR Part 60).

DAVIS-BACON ACT COMPLIANCE Vendor agrees to comply with the Davis-Bacon Act (40 U.S.C. 3148 to 3148) as supplemented by Department of Labor regulations (29 CFR part 5).

ANTI-KICKBACK ACT COMPLIANCE Vendor agrees to comply with the Copeland "Anti-Kickback" Act (18 U.S.C. 874) as supplemented in Department of Labor regulations (29 CFR Part 3).

CONTRACT WORK HOURS AND SAFETY STANDARDS Vendor agrees to comply with Sections 102 and 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 327-333), as supplemented by Department of Labor regulations (29 CFR part 5)

RIGHTS TO INVENTIONS MADE UNDER A CONTRACT OR AGREEMENT Vendor agrees to comply with 37 CFR part 401, "Rights to Inventions Made by Nonprofit Organizations and Small Business Firms Under Government Grants, Contracts and Cooperative Agreements," and any implementing regulations issued by the awarding agency.

CLEAN AIR AND WATER REQUIREMENTS Vendor agrees to comply with all applicable standards, orders, or requirements issued under the Clean Air Act (42 U.S.C. 7401 et. seq.), and the Clean Water Act (33 U.S.C. 1251 et. seq.).

Vendor agrees to report each violation of these requirements to the City and understands and agrees that the City will, in turn, report each violation as required to the appropriate EPA regional office.

ENERGY CONSERVATION REQUIREMENTS The Vendor agrees to comply with mandatory standards and policies relating to energy efficiency which are contained in the state energy conservation plan issued in compliance with the Energy Policy and Conservation Act. (42 U.S.C. 6201)

NO SUSPENSION OR DEBARMENT Vendor certifies that neither it nor its Principals or any of its subcontractors is presently debarred, suspended, proposed for debarment, declared ineligible, or voluntarily excluded from

participation in this Agreement by any Federal department or agency. **BYRD ANTI-LOBBYING.** If the Maximum Contract Amount exceeds \$100,000, the Vendor must complete and submit to the City a required certification form provided by the City certifying that it will not and has not used Federal appropriated funds to pay any person or organization for influencing or attempting to influence an officer or employee of any agency, a member of Congress in connection with obtaining any Federal contract grant of any other award covered by 31 U.S.C. 1352. Vendor must also disclose any lobbying with non-Federal funds that takes place in connection with obtaining any Federal award.

Purchase pursuant to 3.26(e)-This Master Purchase Order is contingent on Council approval and is void without such action.

This Master Purchase Order is acknowledged and agreed to by:

City & County of Denver, Purchasing Division

Vendor Name: AM Signal, LLC
(Company Name)

By: Alex Undzis
(Authorized Signature)

Print Name: Alex Undzis

Title: Director of Operations

Date: February 16, 2023

By: Jesse Sitzman

Print Name: Jesse Sitzman

Title: Associate Procurement Analyst

Date: 2/16/2023

Procurement Manager:

EXTENSION / 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 with the order. General inquiries, not specific to an individual order, shall reference the above 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 (MPO) 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

Vendor Name: AM Signal, LLC
(Company Name)

By: _____
(Authorized Signature)

Print Name: _____

Title: _____

Date: _____

Note:

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 (MPO) 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

Vendor Name: AM Signal, LLC
(Company Name)

By: _____
(Authorized Signature)

Print Name: _____

Title: _____

Date: _____

Note:

By: _____

Print Name: _____

Title: _____

Date: _____

Extension No. 3 _____

The contract made and entered into by your company and the City and County of Denver pursuant to the above referenced Master Purchase Order (MPO) 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.

Vendor Name: AM Signal, LLC
(Company Name)

City & County of Denver, Purchasing Division

By: _____
(Authorized Signature)

By: _____

Print Name: _____

Print Name: _____

Title: _____

Title: _____

Date: _____

Date: _____

Note:

EXHIBIT "A"

Supplier: AM Signal, LLC
Solicitation/ Award Title: Traffic Signal Control Heads
Solicitation No. /Internal File Reference Location: 01552023

It is recommended that you use your Supplier Contract No. SC-00007631, in all future correspondence and/or other communications.

Description of the goods, and services related thereto, being purchased and pricing:

This Master Purchase Agreement is to provide the City and County of Denver's Department of Transportation and Infrastructure (DOTI) with Traffic Signal Control Heads that are specific for Transportation applications.

A.1 ESTIMATED QUANTITIES:

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

A.2 F.O.B. POINT:

All prices quoted must be quoted at a firm price F.O.B. Denver, Colorado, delivered to:

Public Works Transportation Operations
5440 Roslyn, Building E
Denver, CO 80216

A.3 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.

A.4 WARRANTY GUARANTEE:

Vendor shall be fully responsible for any and all warranty work, regardless of whether or not manufacturers of equipment, and/or its component parts, provide the actual warranty coverage. In addition, vendor shall have or establish a single, local source that will accomplish or coordinate any necessary warranty work. Vendor shall respond to requests for warranty assistance within twenty-four (24) hours.

A.5 WARRANTY:

Specify the vendor or dealership where warranty work will be done:

Vendor: Leotek Electronics USA LLC

Address: 1955 Lundy Ave.

City, State and Zip Code: San Jose, CA 95131

A.6 PRE-DELIVERY:

Prior to delivery, new units of equipment must be completely serviced in accordance with the manufacturer's specifications

A.7 PALLET CHARGE:

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

A.8 VENDOR PERFORMANCE MANAGEMENT:

The Purchasing Department may administer a vendor performance management program as part this Contract. The purpose of this program is to create a method for documenting and advising the Purchasing Department of exceptional performance or any problems related to the purchased goods and services.

FOR GOODS

- Total dollar value of purchases per City Agency
- Total number of transactions per City Agency
- Percentage of items shipped from local stock
- Percentage of items backordered
- Average delivery time for stock material
- Average delivery time for backorders

Supplier may also be required to provide additional specific reporting/data as required.

A.9 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 solicitation that pricing offered herein to the City and County of Denver may be offered by the vendor to any other governmental jurisdiction purchasing the same products.

A.10 PRICING INFORMATION:

All prices quoted shall be firm and fixed for the first year of the contract term. Vendor may adjust pricing in alignment with cost of services and goods; however, price adjustments can only be made after the initial one (1) year contract period has ended and must be received 90 days before contract renewal. Purchasing must be provided with proof of such changes in order for them to take effect. Acceptable proof is a letter from the manufacturer on their letter head with a contact name and signature. Pricing updates must be based upon documented service and material price increases and must be verifiable.

The vendor cannot offer a separate pricing structure or charge an additional fee(s) for credit procurement card purchases.

SECTION B: BID ITEMS and SPECIFICATIONS

See Exhibit B.1 – *Price Sheet* for Product Numbers, Pricing, Lead Times, Warranty Information and ETL Certification Information. (Pages 14-15)

See Exhibit B.2 – *Product Information* for Product information supplied by Vendor. (Pages 16-46)

See Exhibit B.3 - *CCD Technical Specifications* for Product Specifications from IFB 0155A_2023 Traffic Signal Control Heads. (Pages 47-58)

Exhibit B.1 - Price Sheet

Bid	Description	Estimated Quantities	Price Per Unit	Total	Proposed Product (Housing and LED Modules if applicable)	Lead Time	Warranty	ETL Certification (Yes/No)
1	3-Section, 8" Vertical Traffic Signal Head, Left Turn Arrow with all Expanded View LED Indications (per City & County of Denver Specification #EB-TS-1A)	50	\$ 297.00	\$ 14,850.00	Fortran P299510; Leotek TSL-08RA-IL6-A1-P3, TSL-08YA-IL6-A1-P3, TSL-08GA-IL6-A1-P3	8 - 10 weeks	Signals - 2 Years LEDs 5 Year	YES
2	3-Section, 12" Vertical Traffic Signal Head, Left Turn Arrow, with all Expanded View LED Indications (per City & County of Denver Specification #EB-TS-1A)	100	\$ 317.00	\$ 31,700.00	Fortran P399590-CO, VIS043 Leotek TSL-12RA-DT-A1, TSL-12YA-DT-A1, TSL-12GA-DT-A1	8 - 10 weeks	Signals - 2 Years LEDs 15 Year	YES
3	3-Section, 12" Vertical Traffic Signal Head with all Expanded View LED Indications (per City & County of Denver Specification #EB-TS-1)	100	\$ 304.00	\$ 30,400.00	Fortran P399590-CO, VIS043 Leotek TSL-12R-DT-A1, TSL-12Y-DT-A1, TSL-12G-DT-A1	8 - 10 weeks	Signals - 2 Years LEDs 15 Year	YES
4	3-Section, 8" Vertical Traffic Signal Head with all Expanded View LED Indications (per City & County of Denver Specification #EB-TS-1)	50	\$ 288.00	\$ 14,400.00	Fortran P299510 Leotek TSL-08R-DT-A1, TSL-08Y-DT-A1, TSL-08G-DT-A1	8 - 10 weeks	Signals - 2 Years LEDs 15 Year	YES
5	4-Section, 12" Vertical Traffic Signal Head, Left Turn Arrows with all Expanded View LED Indications (per City & County of Denver Specification #EB-TS-1A)	100	\$ 370.53	\$ 37,053.00	Fortran P396510 Leotek TSL-12RA-DT-A1, TSL-12YA-DT-A1, TSL-12Y-DT-A1, TSL-12GA-DT-A1	8 - 10 weeks	Signals - 2 Years LEDs 15 Year	YES
6	Pedestrian Head Housing only with Door, 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 City & County of Denver Specification #EB-PS-1)	100	\$ 308.00	\$ 30,800.00	Fortran PAR380 Leotek TSL-PED-16-SPC-V1	8 - 10 weeks	Ped Housing - 2 Years Countdown - 5 Years	YES
7	Pedestrian Head Housing only with Door, 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 City & County of Denver Specification #EB-PS-1)	100	\$ 190.00	\$ 19,000.00	Fortran PAR380 Leotek TSL-PED-16-SPC-V1	8 - 10 weeks	Ped Housing - 2 Years Countdown - 5 Years	YES
8	Pedestrian Head Housing only with Door, 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 City & County of Denver Specification #EB-PS-1)	100	\$ 190.00	\$ 19,000.00	Fortran PAR380 Leotek TSL-PED-16-SPC-V1	8 - 10 weeks	Ped Housing - 2 Years Countdown - 5 Years	YES
9	LED Ball Signal Modules, 8 inch (200mm) (Red)	50	\$ 43.00	\$ 2,150.00	Leotek TSL-08R-DT-A1, TSL-08Y-DT-A1, TSL-08G-DT-A1	8 - 10 weeks	15 Years	YES
10	LED Ball Signal Modules, 8 inch (200mm) (Yellow)	50	\$ 43.00	\$ 2,150.00	Leotek TSL-08R-DT-A1, TSL-08Y-DT-A1, TSL-08G-DT-A1	8 - 10 weeks	15 Years	YES
11	LED Ball Signal Modules, 8 inch (200mm) (Green)	50	\$ 43.00	\$ 2,150.00	Leotek TSL-08R-DT-A1, TSL-08Y-DT-A1, TSL-08G-DT-A1	8 - 10 weeks	15 Years	YES

12	LED Ball Signal Modules, 12 inch (300mm) (Red)	100	\$ 43.00	\$ 4,300.00	Leotek TSL-12R-DT-A1, TSL-12Y-DT-A1, TSL-12G-DT-A1	6 - 8 weeks	15 Years	YES
13	LED Ball Signal Modules, 12 inch (300mm) (Yellow)	100	\$ 43.00	\$ 4,300.00	Leotek TSL-12R-DT-A1, TSL-12Y-DT-A1, TSL-12G-DT-A1	6 - 8 weeks	15 Years	YES
14	LED Ball Signal Modules, 12 inch (300mm) (Green)	100	\$ 43.00	\$ 4,300.00	Leotek TSL-12R-DT-A1, TSL-12Y-DT-A1, TSL-12G-DT-A1	6 - 8 weeks	15 Years	YES
15	LED 12 inch (300mm) Arrow Signal Modules (Red)	100	\$ 48.00	\$ 4,800.00	Leotek TSL-12RA-DT-A1, TSL-12YA-DT-A1, TSL-12GA-DT-A1	6 - 8 weeks	15 Years	YES
16	LED 12 inch (300mm) Arrow Signal Modules (Yellow)	100	\$ 48.00	\$ 4,800.00	Leotek TSL-12RA-DT-A1, TSL-12YA-DT-A1, TSL-12GA-DT-A1	6 - 8 weeks	15 Years	YES
17	LED 12 inch (300mm) Arrow Signal Modules (Green)	100	\$ 48.00	\$ 4,800.00	Leotek TSL-12RA-DT-A1, TSL-12YA-DT-A1, TSL-12GA-DT-A1	6 - 8 weeks	15 Years	YES
18	LED 16" x 18" Countdown Pedestrian Signal Modules	100	\$ 91.00	\$ 9,100.00	Leotek TSL-PED-16-SPC-V1	6 - 8 weeks	5 Years	YES
19	3-Section, 12" Aluminum Traffic Signal Back Plate Only /Solid or Louvered with 1.5 inch reflective tape on edge (LOUVERED) Thickness .050 or 0.063	350	\$ 80.00	\$ 28,000.00	Crown Metal Louvered w/ 1.5" tape	8 - 10 weeks	2 Years	N/A
20	3-Section, 12" Aluminum Traffic Signal Back Plate Only /Solid or Louvered with 1.5 inch reflective tape on edge (NON-LOUVERED) Thickness .050 or 0.063	350	\$ 74.00	\$ 25,900.00	Crown Metal w/ 1.5" tape	8 - 10 weeks	2 Years	N/A
21	4-Section, 12" Aluminum Traffic Signal Back Plate Only /Solid or Louvered with 1.5 to 2 inch reflective tape on edge (LOUVERED) Thickness .050 or 0.063	125	\$ 102.00	\$ 12,750.00	Crown Metal Louvered w/ 1.5" tape	8 - 10 weeks	2 Years	N/A
22	4-Section, 12" Aluminum Traffic Signal Back Plate Only /Solid or Louvered with 1.5 to 2 inch reflective tape on edge (NON-LOUVERED) Thickness .050 or 0.063	125	\$ 95.00	\$ 11,875.00	Crown Metal w/ 1.5" tape	8 - 10 weeks	2 Years	N/A

Exhibit B.2 - Product Information



Project
Type
Catalog No.

DT Series Extended Life LED 8" and 12" Traffic Signal Module Incandescent Look Ball



Leading the LED Industry Since 1992

With over 7,000,000 units installed globally

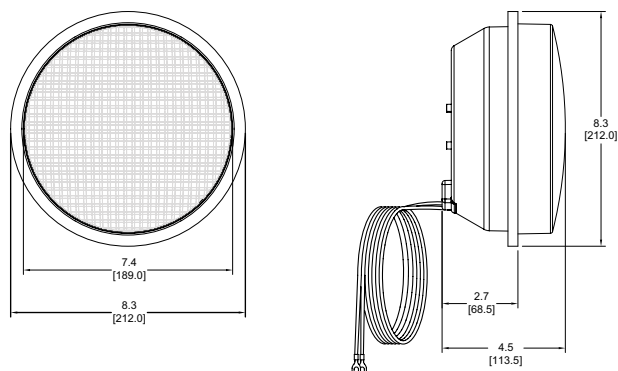


Superior Performance and Reliability

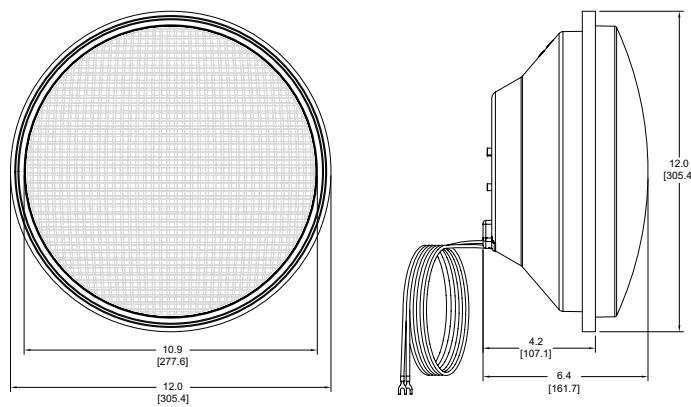
- Special extended life LEDs (LM-80/TM-21)
- Special purpose-built extended life power supply
- Intertek ETL verified
- Meets and/or exceeds all ITE standards ITE VTCSH LED Circular Signal Supplement dated June 27, 2005
- Patented innovative optical technology
- Wider viewing angle and enhanced uniformity
- Overmolded electrical connectors provide fully-weatherized seal
- Excellent moisture and dust resistance
- Utilizes constant current source to maintain consistent light output
- 15-year limited full performance warranty

Mechanical Dimensions [in(mm)]

8 Inch









12 Inch



DT Series Extended Life LED 8” and 12” Traffic Signal Module Incandescent Look Ball

Model Specifications and Ordering Options

Operating Temperature: -40°F to 165°F (-40°C to 74°C)	Turn-On/Turn-Off Time: < 75msec
Operating Voltage: 80 - 135Vac	Turn-Off Voltage: > 35Vac
Power Factor: > 0.90	Total Harmonic Distortion (THD): < 20%

	Model Number and Color	Wattage Drawn	Voltage	Dominant Wavelength	Maintained Intensity (cd) Min.	Standard
DT	8 inch ball					
	TSL-08R-DT-A1 	6.1	80-135Vac	626	165	ITE 2005/ETL
	TSL-08Y-DT-A1 	6.1	80-135Vac	589	410	ITE 2005/ETL
	TSL-08G-DT-A1 	6.2	80-135Vac	500	215	ITE 2005/ETL
	12 inch ball					
	TSL-12R-DT-A1 	6.2	80-135Vac	626	365	ITE 2005/ETL
	TSL-12Y-DT-A1 	7.9	80-135Vac	589	910	ITE 2005/ETL
	TSL-12G-DT-A1 	6.1	80-135Vac	500	475	ITE 2005/ETL

Notes:

1 Tinted lens standard, clear lens optional. When ordering clear lens, please add “-CLR” to model number. Both tinted and clear lens are Intertek ETL Verified.

Standard Conformance

- FCC Compliant for Electrical Noise
- MIL-STD-810F Moisture Resistant
- MIL-STD-883 Mechanical Vibration
- NEMA TS2 Section 2.1.6, 2.1.8, Transient Voltage Protection over 2000V
- IEC 1000-4-5, 3KV, 2 ohm source impedance
- ANSI/IEEE C62.41-2002; IEC 61000-4-12, 6KV, 200A, 100KHz ring wave

ITE VTCSH Compliance - LED Circular Signal Supplement – June 27, 2005

• Conditioning	ITE 6.4.2	• Luminous Intensity	ITE 6.4.4.1-4
• Mechanical Vibration	ITE 6.4.3.1	• Chromaticity	ITE 6.4.4.6
• Temperature Cycling	ITE 6.4.3.2	• Current Consumption	ITE 6.4.6.1

DT Series Extended Life 12" Traffic Signal Module Incandescent Look Arrow



Leading the LED Industry Since 1992

With over 7,000,000 units installed globally

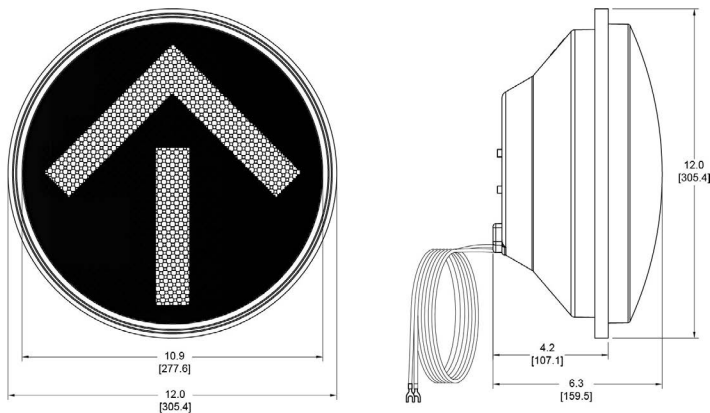
Superior Performance and Reliability

- Special extended life LEDs (LM-80/TM-21)
- Special purpose-built extended life power supply
- Intertek ETL verified
- Meets and/or exceeds all ITE standards ITE VTC SH LED Arrow Signal Supplement dated July 1, 2007
- Patented innovative optical technology
- Wider viewing angle and enhanced uniformity
- Overmolded electrical connectors provide fully-weatherized seal
- Excellent moisture and dust resistance
- Utilizes constant current source to maintain consistent light output
- 15-year limited full performance warranty



Mechanical Dimensions [in(mm)]




12 inch



DT Series Extended Life 12" Traffic Signal Module Incandescent Look Arrow

Model Specifications and Ordering Options

Operating Temperature: -40°F to 165°F (-40°C to 74°C)	Turn-On/Turn-Off Time: < 75msec
Operating Voltage: 80 - 135Vac	Turn-Off Voltage: > 35Vac
Power Factor: > 0.90	Total Harmonic Distortion (THD): < 20%

	Model Number and Color	Wattage Drawn	Voltage	Dominant Wavelength	Maintained Intensity (cd) Min.	Standard
DT	12 inch arrow					
	TSL-12RA-DT-A1 	6	80-135Vac	626	58.4	ITE 2007/ETL
	TSL-12YA-DT-A1 	10	80-135Vac	589	145.6	ITE 2007/ETL
	TSL-12GA-DT-A1 	6.8	80-135Vac	500	76.0	ITE 2007/ETL

Notes:

1 Tinted lens standard, clear lens optional. When ordering clear lens, please add "-CLR" to model number. Both tinted and clear lens are Intertek ETL Verified.

Standard Conformance

- FCC Compliant for Electrical Noise
- MIL-STD-810F Moisture Resistant
- MIL-STD-883 Mechanical Vibration
- NEMA TS2 Section 2.1.6, 2.1.8, Transient Voltage Protection over 2000V
- IEC 1000-4-5, 3KV, 2 ohm source impedance
- ANSI/IEEE C62.41-2002; IEC 61000-4-12, 6KV, 200A, 100KHz ring wave

ITE VTCSH Compliance - LED Arrow Signal Supplement – July 1, 2007

• Conditioning	ITE 6.4.2	• Luminous Intensity	ITE 6.4.4.1-4
• Mechanical Vibration	ITE 6.4.3.1	• Chromaticity	ITE 6.4.4.6
• Temperature Cycling	ITE 6.4.3.2	• Current Consumption	ITE 6.4.6.1

LED 16" Pedestrian Signal Module SPC Superior Performance Countdown Series

Leading the LED Industry Since 1992

With over 7,000,000 units installed globally



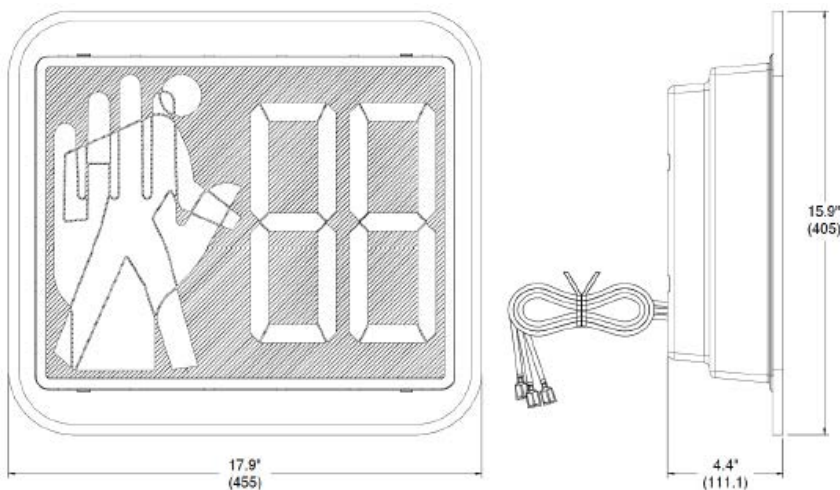
SPC Series

Superior Performance and Reliability

- Intertek ETL verified
- Easy installation into existing signal housings
- Internal conflict monitor prevents simultaneous walk/don't walk indications
- Hand/person monitoring to accommodate up to 8 units connected in parallel
- Patented innovative incandescent optical technology
- Wider viewing angle and enhanced uniformity
- Maintains 70% of the initial lumen intensity after 100,000 hours of operation
- Robust hard-coated and UV-stabilized polycarbonate lens for increased longevity against the elements
- Excellent moisture and dust resistance through complete gasket sealing
- Utilizes constant current source to maintain consistent light output
- Superior thermal management
- Rugged one-piece housing design
- Greater safety and reliability provided by utilizing multiple independent power supplies
- 5-year limited warranty

Mechanical Dimensions [in(mm)]

SPC Digit Height 9"



SPC Series



LED 16" Pedestrian Signal Module SPC Superior Performance Countdown Series

Model Specifications and Ordering Options

LED Color/Type	<input checked="" type="radio"/> Portland Orange/AlInGaP	<input type="radio"/> Lunar White/InGaN
Operating Temperature: -40°F to 165°F (-40°C to 74°C)	Total Harmonic Distortion (THD): < 20%	
Operating Voltage: 80 - 135Vac	Turn-On/Turn-Off Time: < 75msec	
Power Factor: > 0.90	Turn-Off Voltage: > 35Vac	

Model Number	Description	Wattage Drawn	Standard
16-inch Incandescent Look Dual Pedestrian Countdown			
TSL-PED-16-SPC-V1*	Full Symbol	Portland Orange Hand – 8.2W Lunar White Man – 8.6W Portland Orange Countdown –5.1W	ITE PTCSI-LED Signal Modules - Aug 4, 2010/ETL ¹

Please note:

*-SW includes an optional on/off toggle switch allowing users the option to turn on/off the countdown digits.

*-DS includes an accessible dip-switch for the user selectable options.

¹Intertek ETL verified

Standard Conformance

- FCC Compliant for Electrical Noise
- MIL-STD-810F Moisture Resistant
- MIL-STD-883 Mechanical Vibration
- MUTCD Compliant
- NEMA TS2 Section 2.1.6, 2.1.8, Transient Voltage Protection over 2000V
- Exceeds ITE/NEMA Transient Suppression Specification
- Fully Compatible for Preemption



Features

- Exceeds ITE Specifications
- Modular Design
- Lightweight
- Low Maintenance
- Strong and Durable
- Weatherproof Enclosure
- Factory CSA Approval (Optional)



Overview

Fortran's Polycarbonate Traffic Signal Head is a proven winner. Over the past ten years, our signal heads have been installed in thousands of intersections across North America. Polycarbonate signals are replacing aluminum signals because they provide a complete, versatile and reliable product at a significantly lower cost than aluminum signals. The polycarbonate signal is also much lighter to work with and is easier to install.

Our poly signal line has been designed using a "Building Block" approach—individual signal housings can be quickly and easily combined to meet your specific signaling requirements. Fortran's polycarbonate signals are made from a very tough, impact resistant, flame retardant, UV stabilized polycarbonate material.

The colour is uniform throughout the thickness of the material, eliminating the fading and paint peeling associated with the aluminum signals. Poly signals have been tested to withstand severe weather conditions. Stainless steel hardware is used throughout. Each section has a bottom drip shield to prevent water infiltration. Neoprene gaskets on both door and lens, completely seal the interior of the traffic signal head. Dual latches and hinges keep the doors well secured to prevent moisture and dirt from entering.

The polycarbonate signals have top and bottom openings for a standard 1-1 1/2" pipe bracket, which is mounted using a single point hanger, vertical bracket, span wire hanger or plumbizer arm. Poly signals can be mounted vertically or horizontally.



Specifications

- **Material:** UV Stabilized Flame Retardant Polycarbonate
- **Visors:** Cowl (Cap) Also Available Tunnel, Square (12" only)
- **Available LEDs:** ~~Red, Amber Green, Directional Arrows 8" or 12"~~
- **Colour:** Traffic Yellow, Black, Grey and Green (other colours are also available by request) Federal Green per Denver Spec
- **Dimensions:** Dimensions in inches
- **Backboards:** Sold separately Fortran's PolyFlex™ Backboard is recommended. Other backboards are available
- **Power:** ~~120 VAC/12VDC~~

Ordering Information

3-Sec 12" Signal - P399590-CO Poly Signal 3x12, All Green, No Visors c/w Tri-Bolt Joiner
 VIS043 - Visor 12" Round Tunnel Poly Green 134d8143
 3-Sec 8" Signal w/ Visor - P299510 Poly Signal, 3 X 8, Empty, Green, Tunnel Visor

Part #	Configuration	Length (in)	Width (In)	Depth (in)
P1LH_00	Signal, 12-8-8 Hwy Red, Amber, Green w/Cowl Visor	34.00	13.88	7.00
P2LH_00	Signal 8-8-8 Red, Amber, Green w/Cowl Visor	30.19	13.88	7.00
P3LH_00	Signal, 12-12-12 Red, Amber, Green w/Cowl Visor	41.63	13.88	7.00
P3LE_00	Signal, 12-12-12-12 Red, Amber, Green, Green Arrow w/Cowl Visor	55.50	13.88	7.00
P3LE_10	Signal 12-12-12-12 Red, Amber, Green, Green Arrow w/Tunnel Visor	55.50	13.88	7.00
P5LE_00	Signal, 12-8-8-12 Red, Amber, Green, Amber Green Arrow w/Cowl Visor	13.88	13.88	7.00



8100 Southpark Way, Unit A-10
 Littleton, CO 80120
 Ph: 720-348-2925
 Fx: 720-348-6950
www.amsignalinc.com



Features

- Compact Modular Design
- Light Weight
- Low Maintenance
- Strong and Durable
- Weatherproof Enclosure
- CSA/4L Available (Fully Assembly)



Overview

Fortran's Polycarbonate 16x18 Pedestrian Signal is a new addition to our successful line of pedestrian products. Polycarbonate signals are replacing aluminum signals because they provide a complete, versatile and reliable product at a lesser cost than the aluminum signals.

The Polycarbonate signal is also much lighter to work with, and is easier to install. The 16x18 Signal allows for rotation when using a clamshell bracket.

Fortran offers factory CSA/4L special inspection on full assemblies (C/W LED). There are four clips to secure LED onto door. Aircraft cable to secure the door at ninety degrees when performing maintenance and or LED change out.

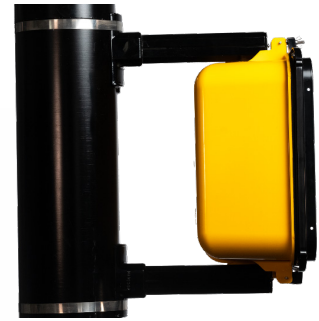
Our poly pedestrian signals are made from very tough, impact resistant, flame retardant, UV stabilized polycarbonate. The colour is uniform throughout the thickness of the material, eliminating the fading and paint peeling associated with aluminum signals.

Poly peds have been tested to withstand the most severe weather and wind conditions. Stainless steel hardware is used throughout.



Specifications

- **Material:** UV Stabilized Polycarbonate
- **Visors:** Optional. Visor Available
- **Lenses/LED:** Hand/Man with Countdown
- **Dimensions:** 18.5"x19"x9"
- **Weight:** 7lbs- 13lbs with LED
- **Colours:** Traffic Yellow, Black, and Green (other colours and combinations available by request)

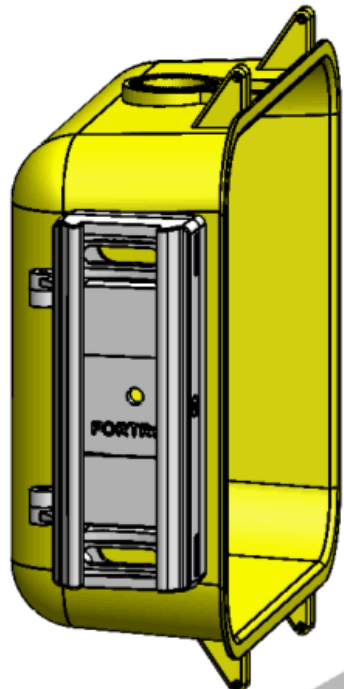
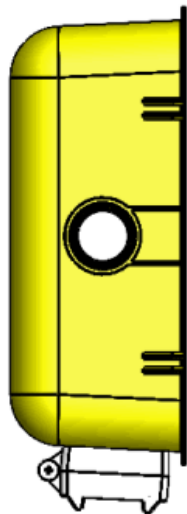
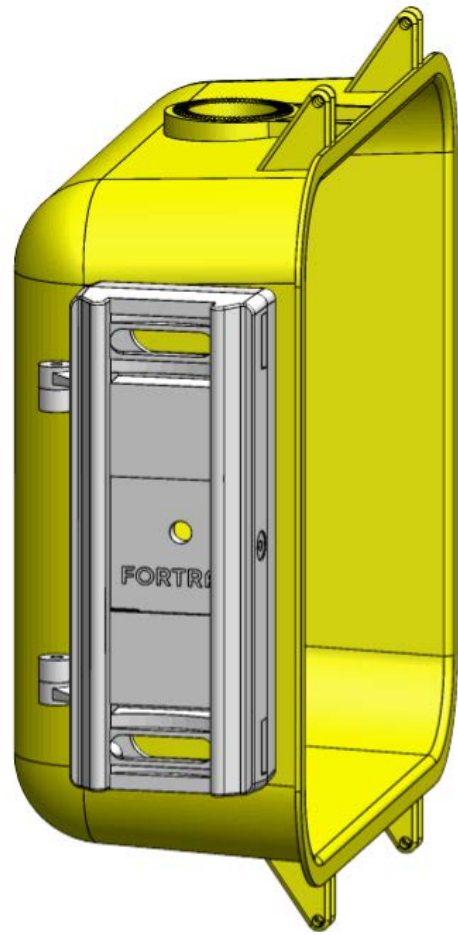
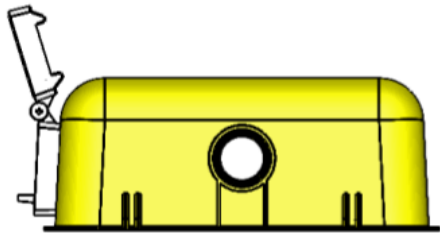
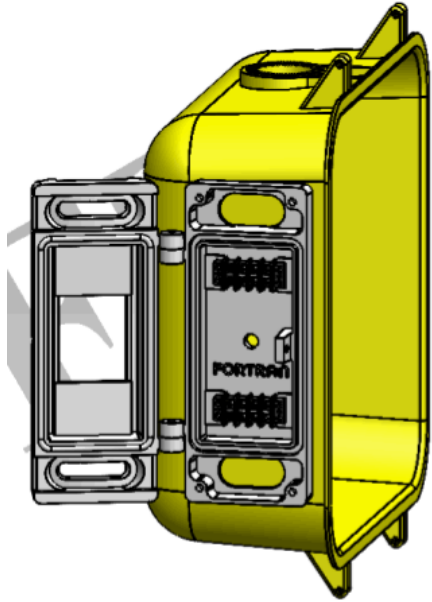


Please contact sales@fortrantraffic.com for further details & ordering information



*shown with 'OUT OF SERVICE' Signal Jacket





VISORS

Overview

Fortran offers a variety of different polycarbonate visors to suit your specific requirements. Fortran visors have been installed on thousands of polycarbonate traffic signals and polycarbonate pedestrian signals across North America.

The visors are strong and durable, made out of a very tough, impact resistant, UV stabilized polycarbonate. Fortran visors are available in cowl (cap), square cut-away, or tunnel. Colours are traffic yellow, green or black. The visors have a solid colour throughout. The traffic yellow and green visor interior surface is painted with a matte black finish to meet ITE specifications.

The stainless steel hardware to install the visor comes attached to the door of the Fortran signal. The visors are easy to install and can be oriented for either vertical or horizontal mounting of the signal head.

The visors have been tested to withstand severe weather and wind conditions when mounted on Fortran Signals.



Features

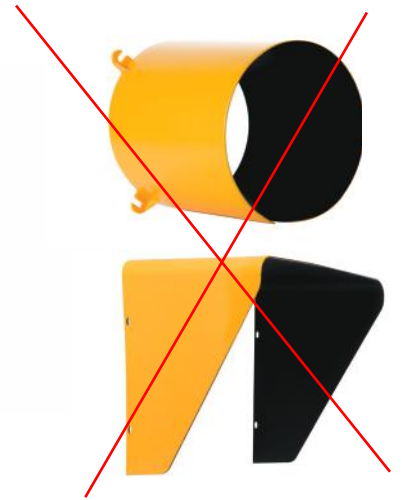
- Exceeds ITE Specifications
- Easy to Install
- Strong & Durable
- Maintenance Free

FORTRAN



Specifications

- Material: UV Stabilized Polycarbonate
- Dimensions: Dimensions in inches (mm)
- Thickness: 0.080" (2mm) min.
- Colours: Traffic Yellow, Black, or Green.
Other colours are available upon request



Ordering Information

Part #	Cowl Cap	Part #	Tunnel	Part #	Square Cutaway
VIS080	8 inch (200mm) Yellow	VIS017	8 inch (200mm) Yellow	VIS305	12 inch (200mm) Yellow
VIS081	8 inch (200mm) Green	VIS018	8 inch (200mm) Green	VIS308	12 inch (200mm) Green
VIS082	8 inch (200mm) Black	VIS019	8 inch (200mm) Black	VIS309	12 inch (200mm) Black
VIS180	12 inch (200mm) Yellow	VIS042	12 inch (200mm) Yellow		
VIS181	12 inch (200mm) Green	VIS043	12 inch (200mm) Green		
VIS182	12 inch (200mm) Black	VIS044	12 inch (200mm) Black		

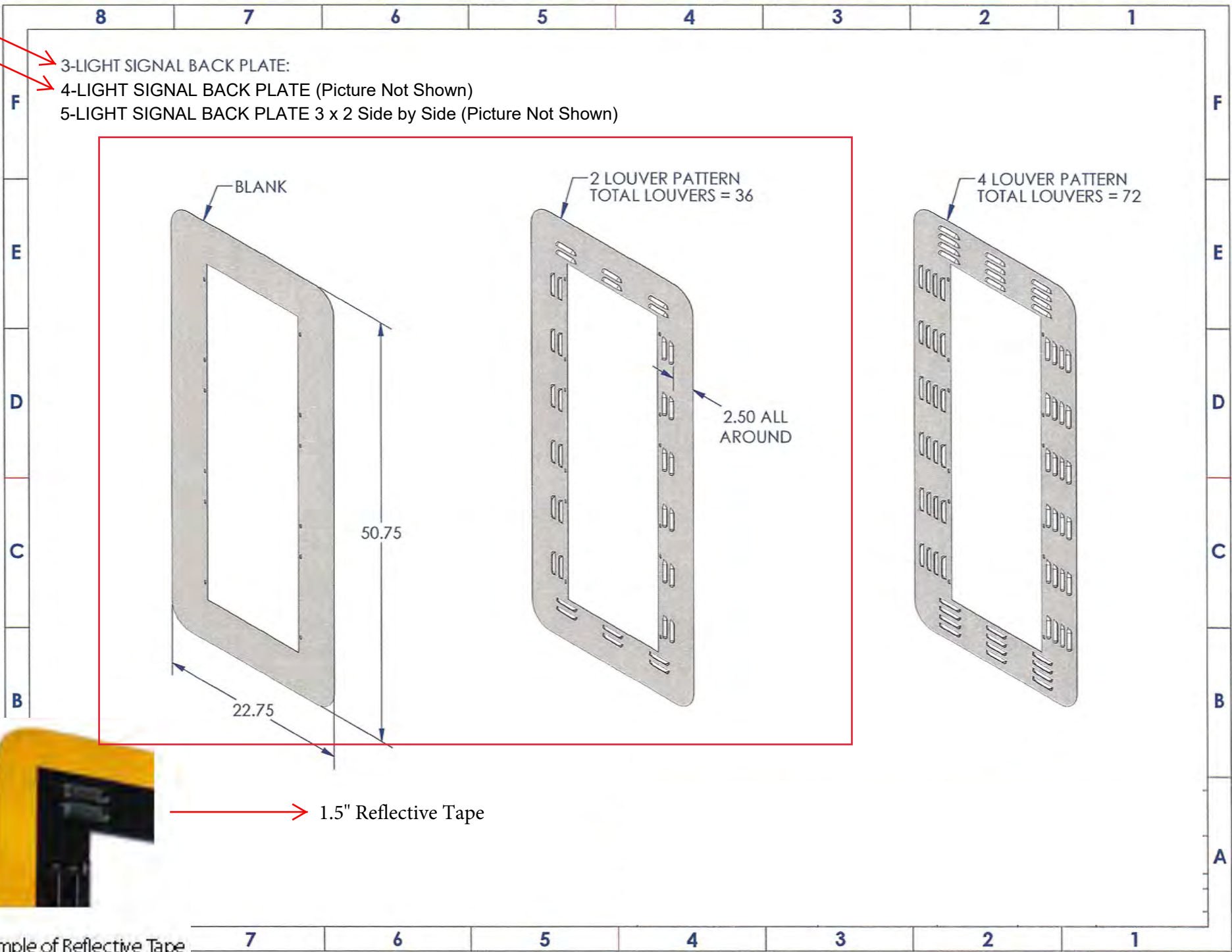
VIS043 Visor 12" Round Tunnel Poly Green 134d8143 (Fed Green)

Fortran has many other configurations to meet your specific requirements, including universal and plumbized options. For other configurations, options, and accessories, please contact the Sales Department at Fortran Traffic Systems Limited.



8100 Southpark Way, Unit A-10
 Littleton, CO 80120
 Ph: 720-348-2925
 Fx: 720-348-6950
www.amsignalinc.com





→ 1.5" Reflective Tape

Example of Reflective Tape
(with louvers)





Directory of LED Traffic Signal Modules Certified Products

Intertek's LED Traffic Signal Modules Certification Program provides manufacturers with independent, third-party test data and Intertek's ETL Verified product labeling for products that comply with the consensus ITE requirements. The ETL Verified mark, a signal of quality and performance, gives manufacturers a means of differentiation in a competitive marketplace, and fortifies consumer confidence in product quality.

8/31/2020

ITE Vehicle Traffic Control Signal Heads: LED Circular Signal Supplement (Adopted June 27, 2005) Continued

<i>Manufacturer</i>	<i>Signal</i>	<i>Size</i>	<i>Color</i>	<i>Lens Type</i>	<i>Catalogue Number</i>	8/31/2020
Leotek	LED Ball	8-inch	Red	Tinted	TSL-08R-LX-IL6-A1-P3	
Leotek	LED Ball	8-inch	Yellow	Tinted	TSL-08Y-LX-IL6-A1-P3	
Leotek	LED Ball	8-inch	Green	Tinted	TSL-08G-LX-IL6-A1-P3	
Leotek	LED Ball	8-inch	Red	Clear	TSL-08R-LX-IL6-A1-P3-CLR	
Leotek	LED Ball	8-inch	Yellow	Clear	TSL-08Y-LX-IL6-A1-P3-CLR	
Leotek	LED Ball	8-inch	Green	Clear	TSL-08G-LX-IL6-A1-P3-CLR	
Leotek	LED Ball	8-inch	Red	Tinted	TSL-08R-DT-A1	
Leotek	LED Ball	8-inch	Yellow	Tinted	TSL-08Y-DT-A1	
Leotek	LED Ball	8-inch	Green	Tinted	TSL-08G-DT-A1	
Leotek	LED Ball	8-inch	Red	Clear	TSL-08R-DT-A1-CLR	
Leotek	LED Ball	8-inch	Yellow	Clear	TSL-08Y-DT-A1-CLR	
Leotek	LED Ball	8-inch	Green	Clear	TSL-08G-DT-A1-CLR	
Leotek	LED Ball	12-inch	Red	Tinted	TSL-12R-LX-IL6-A1-P3	
Leotek	LED Ball	12-inch	Yellow	Tinted	TSL-12Y-LX-IL6-A1-P3	
Leotek	LED Ball	12-inch	Green	Tinted	TSL-12G-LX-IL6-A1-P3	
Leotek	LED Ball	12-inch	Red	Clear	TSL-12R-LX-IL6-A1-P3-CLR	
Leotek	LED Ball	12-inch	Yellow	Clear	TSL-12Y-LX-IL6-A1-P3-CLR	
Leotek	LED Ball	12-inch	Green	Clear	TSL-12G-LX-IL6-A1-P3-CLR	
Leotek	LED Ball	12-inch	Red	Tinted	TSL-12R-DT-A1	
Leotek	LED Ball	12-inch	Yellow	Tinted	TSL-12Y-DT-A1	
Leotek	LED Ball	12-inch	Green	Tinted	TSL-12G-DT-A1	
Leotek	LED Ball	12-inch	Red	Clear	TSL-12R-DT-A1-CLR	
Leotek	LED Ball	12-inch	Yellow	Clear	TSL-12Y-DT-A1-CLR	
Leotek	LED Ball	12-inch	Green	Clear	TSL-12G-DT-A1-CLR	

ITE Vehicle Traffic Control Signal Heads: LED Vehicle Arrow Traffic Signal Supplement (Adopted July 1, 2007) Continued

<i>Manufacturer</i>	<i>Signal</i>	<i>Size</i>	<i>Color</i>	<i>Lens Type</i>	<i>Catalogue Number</i>	8/31/2020
Leotek	LED Omni-Directional Arrow	12-inch	Red	Tinted	TSL-12RA-IL6-A1-P3	
Leotek	LED Omni-Directional Arrow	12-inch	Yellow	Tinted	TSL-12YA-IL6-A1-P3	
Leotek	LED Omni-Directional Arrow	12-inch	Green	Tinted	TSL-12GA-IL6-A1-P3	
Leotek	LED Omni-Directional Arrow	12-inch	Red	Clear	TSL-12RA-IL6-A1-P3-CLR	
Leotek	LED Omni-Directional Arrow	12-inch	Yellow	Clear	TSL-12YA-IL6-A1-P3-CLR	
Leotek	LED Omni-Directional Arrow	12-inch	Green	Clear	TSL-12GA-IL6-A1-P3-CLR	
Leotek	LED Omni-Directional Arrow	12-inch	Red	Tinted	TSL-12RA-DT-A1	
Leotek	LED Omni-Directional Arrow	12-inch	Yellow	Tinted	TSL-12YA-DT-A1	
Leotek	LED Omni-Directional Arrow	12-inch	Green	Tinted	TSL-12GA-DT-A1	
Leotek	LED Omni-Directional Arrow	12-inch	Red	Clear	TSL-12RA-DT-A1-CLR	
Leotek	LED Omni-Directional Arrow	12-inch	Yellow	Clear	TSL-12YA-DT-A1-CLR	
Leotek	LED Omni-Directional Arrow	12-inch	Green	Clear	TSL-12GA-DT-A1-CLR	
TraStar, Inc.	LED Omni-Directional Arrow	12-inch	Red	Tinted	JXJ-300-07TR03	
TraStar, Inc.	LED Omni-Directional Arrow	12-inch	Green	Tinted	JXJ-300-07TG03	
TraStar, Inc.	LED Omni-Directional Arrow	12-inch	Yellow	Tinted	JXJ-300-07TY03	
TraStar, Inc.	LED Omni-Directional Arrow	12-inch	Red	Clear	JXJ-300-07R04	
TraStar, Inc.	LED Omni-Directional Arrow	12-inch	Green	Clear	JXJ-300-07G04	
TraStar, Inc.	LED Omni-Directional Arrow	12-inch	Yellow	Clear	JXJ-300-07Y04	

ITE Pedestrian Traffic Control Signal Indicators: LED Signal Modules (Adopted August 4, 2010)

<i>Manufacturer</i>	<i>Signal</i>	<i>Size</i>	<i>Color</i>	<i>Lens Type</i>	<i>Catalogue Number</i>
Dialight	LED Pedestrian Hand/Person Overlay Countdown	16 x 18 inch	White & Orange	Clear Frosted	430-6479-001X
Dialight	LED Pedestrian Hand/Person Overlay Countdown	16 x 18 inch	White & Orange	Clear Frosted	430-6479-801X

ITE Pedestrian Traffic Control Signal Indicators: LED Signal Modules (Adopted August 4, 2010) Continued

<i>Manufacturer</i>	<i>Signal</i>	<i>Size</i>	<i>Color</i>	<i>Lens Type</i>	<i>Catalogue Number</i>
Dialight	LED Pedestrian Hand/Person Overlay Countdown	16 x 18 inch	White & Orange	Clear Frosted	430-6479-001XF
Dialight	LED Pedestrian Hand/Person Overlay Countdown	16 x 18 inch	White & Orange	Clear Frosted	430-6479-801XNC
Dialight	LED Pedestrian Hand/Person Overlay Countdown	16 x 18 inch	White & Orange	Clear Frosted	430-6479-801X266
Dialight	LED Pedestrian Hand/Person Overlay Countdown	16 x 18 inch	White & Orange	Clear Frosted	430-6479-805XF
Dialight	LED Pedestrian Hand/Person Overlay Countdown	16 x 18 inch	White & Orange	Clear Frosted	430-6479-001XTE
Dialight	LED Pedestrian Hand/Person Overlay Countdown	12 x 12 inch	White & Orange	Clear Frosted	430-6772-001X
Dialight	LED Pedestrian Hand/Person Overlay Countdown	12 x 12 inch	White & Orange	Clear Frosted	430-6772-001XF
Dialight	LED Pedestrian Hand/Person Overlay Countdown	12 x 12 inch	White & Orange	Clear Frosted	430-6772-001XWI
Dialight	LED Pedestrian Hand/Person Overlay Countdown	12 x 12 inch	White & Orange	Clear Frosted	430-6772-801X
Dialight	LED Pedestrian Hand/Person Overlay Countdown	12 x 12 inch	White & Orange	Clear Frosted	430-6772-801XNC
Dialight	LED Countdown Digit	12 x 12 inch	Orange	Clear Frosted	430-7773-001X
Dialight	LED Countdown Digit	12 x 12 inch	Orange	Clear Frosted	430-7773-001XF
Dialight	LED Countdown Digit	12 x 12 inch	Orange	Clear Frosted	430-7773-001XWI
Excellence Opto Inc	LED Pedestrian Hand/Person Overlay Countdown	12-inch	White & Orange	Clear Frosted	TRP-C30D32F2
Excellence Opto Inc	LED Pedestrian Stand Alone Countdown	12-inch	Orange	Clear Frosted	TRP-O30D32E2
Excellence Opto Inc	LED Pedestrian Hand/Person Overlay Countdown	12-inch	White & Orange	Clear Frosted	TRP-C45D3154C10
GE Lighting Solutions	LED Pedestrian Hand/Person Overlay	12-inch	White & Orange	Clear Frosted	PS6-CFL1-26A
GE Lighting Solutions	LED Pedestrian Hand/Person Overlay	12-inch	White & Orange	Clear Frosted	PS6-CFL1-26A-023
GE Lighting Solutions	LED Pedestrian Person	12-inch	White	Clear Frosted	PS6-WFM3-26A
GE Lighting Solutions	LED Pedestrian Hand	12-inch	Orange	Clear Frosted	PS6-PFH1-26A
GE Lighting Solutions	LED Pedestrian Countdown	12-inch	Orange	Clear Frosted	PS6-PFD1-26A
GE Lighting Solutions	LED Pedestrian Countdown	12-inch	Orange	Clear Frosted	PS6-PFD1-26A-023
GE Lighting Solutions	LED Pedestrian Countdown	12-inch	Orange	Clear Frosted	+PS6-PFD1-26A
GE Lighting Solutions	LED Pedestrian Hand/Person Side-by-Side	16-inch	White & Orange	Clear Frosted	PS7-CFC1-26A
GE Lighting Solutions	LED Pedestrian Hand/Person Side-by-Side	16-inch	White & Orange	Clear Frosted	PS7-CFC1-26A-023
GE Lighting Solutions	LED Pedestrian Hand/Person Overlay Countdown	16-inch	White & Orange	Clear Frosted	PS7-CFF1-VLA
GE Lighting Solutions	LED Pedestrian Hand/Person Overlay Countdown	16-inch	White & Orange	Clear Frosted	PS7-CFF1-VLA-023
GE Lighting Solutions	LED Pedestrian Hand/Person Overlay Countdown	16-inch	White & Orange	Clear Frosted	PS7-CFF1-VLA-027
GE Lighting Solutions	LED Pedestrian Hand/Person Overlay Countdown	16-inch	White & Orange	Clear Frosted	PS7-CFF1-VLA-032
GE Lighting Solutions	LED Pedestrian Hand/Person Overlay Countdown	16-inch	White & Orange	Clear Frosted	PS7-CFF1-VLA-037
GE Lighting Solutions	LED Pedestrian Hand/Person Overlay Countdown	16-inch	White & Orange	Clear Frosted	PS7-CFF1-VLA-053
GE Lighting Solutions	LED Pedestrian Hand/Person Side-by-Side	16-inch	White & Orange	Clear Frosted	+PS7-CFC1-26A
Leotek	LED Pedestrian Hand/Person Overlay	12-inch	White & Orange	Clear Frosted	TP12H-HM
Leotek	LED Countdown Digit	12-inch	Orange	Clear Frosted	TP12N-CD
Leotek	LED Pedestrian Hand/Person Overlay Countdown	16-inch	White & Orange	Clear Frosted	TSL-PED-16-CIL-P1

8/31/2020

ITE Pedestrian Traffic Control Signal Indicators: LED Signal Modules (Adopted August 4, 2010) Continued

<i>Manufacturer</i>	<i>Signal</i>	<i>Size</i>	<i>Color</i>	<i>Lens Type</i>	<i>Catalogue Number</i>	8/31/2020
Leotek	LED Pedestrian Hand/Person Side-by-Side	16-inch	White & Orange	Clear Frosted	TSL-PED-16-DIL	
Leotek	LED Pedestrian Hand/Man Overlay with Countdown	16-inch	Clear	Clear Frosted	TSL-PED-16-SPC-V1	
TraStar, Inc.	LED Pedestrian Hand/Person Overlay Countdown	16-inch	White & Orange	Clear Frosted	JXM-400VIEIL01	



Intertek

**LED TRAFFIC SIGNAL MODULES
INTERTEK
3933 US ROUTE 11
CORTLAND, NY 13045-0950**

ISSUE DATE: January 15, 2019

EXPIRATION DATE: March 5, 2023
(5 years from test commencement)

An Activity Sponsored and Administered by
INTERTEK

Leotek
1955 Lundy Ave
San Jose, CA

**INTERTEK LED TRAFFIC SIGNAL
MODULES CERTIFICATION PROGRAM**

CERTIFICATE OF CONFORMANCE

The equipment described below is hereby approved for listing in the Intertek program directory website. The certification is based on successful completion of tests, in accordance with the requirements for Design Qualification Testing in the referenced Specification, and the Intertek Procedural Guide, accompanied by related documents. This Certificate is only confirmable in conjunction with equipment being listed in the current Intertek program directory website at www.intertek.com.

Specification:

**ITE Vehicle Traffic Control Signal Heads: LED Circular Signal Supplement
(Adopted June 27, 2005)**

Manufacturer	Signal	Size	Color	Lens Type	Catalog Number
Leotek Taiwan	LED Ball	12in	Red	Tinted	TSL-12R-DT-A1

1. This Certification requires continuing validation in accordance with the requirements of the Specification noted above and the Intertek LED Traffic Signal Modules Certification Program.
2. Equipment tested and Report issued by Intertek

(A) Report No.: 103411900CRT-001R (4/2018); 103411900MIN-014R (4/2018)

Approved for Certification:

Date

January 15, 2019

Christopher W. Metcalf, Program Administrator



Intertek

**LED TRAFFIC SIGNAL MODULES
INTERTEK
3933 US ROUTE 11
CORTLAND, NY 13045-0950**

ISSUE DATE: January 15, 2019

EXPIRATION DATE: March 5, 2023
(5 years from test commencement)

An Activity Sponsored and Administered by
INTERTEK

Leotek
1955 Lundy Ave
San Jose, CA

**INTERTEK LED TRAFFIC SIGNAL
MODULES CERTIFICATION PROGRAM**

CERTIFICATE OF CONFORMANCE

The equipment described below is hereby approved for listing in the Intertek program directory website. The certification is based on successful completion of tests, in accordance with the requirements for Design Qualification Testing in the referenced Specification, and the Intertek Procedural Guide, accompanied by related documents. This Certificate is only confirmable in conjunction with equipment being listed in the current Intertek program directory website at www.intertek.com.

Specification:

**ITE Vehicle Traffic Control Signal Heads: LED Circular Signal Supplement
(Adopted June 27, 2005)**

Manufacturer	Signal	Size	Color	Lens Type	Catalog Number
Leotek Taiwan	LED Ball	12in	Yellow	Tinted	TSL-12Y-DT-A1

1. This Certification requires continuing validation in accordance with the requirements of the Specification noted above and the Intertek LED Traffic Signal Modules Certification Program.
2. Equipment tested and Report issued by Intertek

(A) Report No.: 103411900CRT-001Y (6/2018); 103411900MIN-014Y (4/2018)

Approved for Certification:

Date

January 15, 2019

Christopher W. Metcalf, Program Administrator



Intertek

**LED TRAFFIC SIGNAL MODULES
INTERTEK
3933 US ROUTE 11
CORTLAND, NY 13045-0950**

ISSUE DATE: January 15, 2019

EXPIRATION DATE: March 5, 2023
(5 years from test commencement)

An Activity Sponsored and Administered by
INTERTEK

Leotek
1955 Lundy Ave
San Jose, CA

**INTERTEK LED TRAFFIC SIGNAL
MODULES CERTIFICATION PROGRAM**

CERTIFICATE OF CONFORMANCE

The equipment described below is hereby approved for listing in the Intertek program directory website. The certification is based on successful completion of tests, in accordance with the requirements for Design Qualification Testing in the referenced Specification, and the Intertek Procedural Guide, accompanied by related documents. This Certificate is only confirmable in conjunction with equipment being listed in the current Intertek program directory website at www.intertek.com.

Specification:

**ITE Vehicle Traffic Control Signal Heads: LED Circular Signal Supplement
(Adopted June 27, 2005)**

Manufacturer	Signal	Size	Color	Lens Type	Catalog Number
Leotek Taiwan	LED Ball	12in	Green	Tinted	TSL-12G-DT-A1

1. This Certification requires continuing validation in accordance with the requirements of the Specification noted above and the Intertek LED Traffic Signal Modules Certification Program.
2. Equipment tested and Report issued by Intertek

(A) Report No.: 103411900MIN-014G (4/2018); 103411900CRT-001G (6/2018)

Approved for Certification:

Date

January 15, 2019

Christopher W. Metcalf, Program Administrator



Intertek

**LED TRAFFIC SIGNAL MODULES
INTERTEK
3933 US ROUTE 11
CORTLAND, NY 13045-0950**

ISSUE DATE: January 15, 2019

EXPIRATION DATE: March 6, 2023
(5 years from test commencement)

An Activity Sponsored and Administered by
INTERTEK

Leotek
1955 Lundy Ave
San Jose, CA

**INTERTEK LED TRAFFIC SIGNAL
MODULES CERTIFICATION PROGRAM**

CERTIFICATE OF CONFORMANCE

The equipment described below is hereby approved for listing in the Intertek program directory website. The certification is based on successful completion of tests, in accordance with the requirements for Design Qualification Testing in the referenced Specification, and the Intertek Procedural Guide, accompanied by related documents. This Certificate is only confirmable in conjunction with equipment being listed in the current Intertek program directory website at www.intertek.com.

Specification:

**ITE Vehicle Traffic Control Signal Heads: LED Vehicle Arrow Traffic Signal Supplement
(Adopted July 1, 2007)**

Manufacturer	Signal	Size	Color	Lens Type	Catalog Number
Leotek Taiwan	LED Omni- Directional Arrow	12in	Yellow	Tinted	TSL-12YA-DT-A1

1. This Certification requires continuing validation in accordance with the requirements of the Specification noted above and the Intertek LED Traffic Signal Modules Certification Program.
2. Equipment tested and Report issued by Intertek

(A) Report No.: 103411864CRT-001Y (5/2018); 103411864MIN-014Y (5/2018)

Approved for Certification:

Date

January 15, 2019

Christopher W. Metcalf, Program Administrator



Intertek

**LED TRAFFIC SIGNAL MODULES
INTERTEK
3933 US ROUTE 11
CORTLAND, NY 13045-0950**

ISSUE DATE: January 15, 2019

EXPIRATION DATE: March 6, 2023
(5 years from test commencement)

An Activity Sponsored and Administered by
INTERTEK

Leotek
1955 Lundy Ave
San Jose, CA

**INTERTEK LED TRAFFIC SIGNAL
MODULES CERTIFICATION PROGRAM**

CERTIFICATE OF CONFORMANCE

The equipment described below is hereby approved for listing in the Intertek program directory website. The certification is based on successful completion of tests, in accordance with the requirements for Design Qualification Testing in the referenced Specification, and the Intertek Procedural Guide, accompanied by related documents. This Certificate is only confirmable in conjunction with equipment being listed in the current Intertek program directory website at www.intertek.com.

Specification:

**ITE Vehicle Traffic Control Signal Heads: LED Vehicle Arrow Traffic Signal Supplement
(Adopted July 1, 2007)**

Manufacturer	Signal	Size	Color	Lens Type	Catalog Number
Leotek Taiwan	LED Omni- Directional Arrow	12in	Red	Tinted	TSL-12RA-DT-A1

1. This Certification requires continuing validation in accordance with the requirements of the Specification noted above and the Intertek LED Traffic Signal Modules Certification Program.
2. Equipment tested and Report issued by Intertek

(A) Report No.: 103411864CRT-001R (5/2018); 103411864MIN-014R (5/2018)

Approved for Certification:

Date

January 15, 2019

Christopher W. Metcalf, Program Administrator



Intertek

**LED TRAFFIC SIGNAL MODULES
INTERTEK
3933 US ROUTE 11
CORTLAND, NY 13045-0950**

ISSUE DATE: January 15, 2019

EXPIRATION DATE: March 5, 2023
(5 years from test commencement)

An Activity Sponsored and Administered by
INTERTEK

Leotek
1955 Lundy Ave
San Jose, CA

**INTERTEK LED TRAFFIC SIGNAL
MODULES CERTIFICATION PROGRAM**

CERTIFICATE OF CONFORMANCE

The equipment described below is hereby approved for listing in the Intertek program directory website. The certification is based on successful completion of tests, in accordance with the requirements for Design Qualification Testing in the referenced Specification, and the Intertek Procedural Guide, accompanied by related documents. This Certificate is only confirmable in conjunction with equipment being listed in the current Intertek program directory website at www.intertek.com.

Specification:

**ITE Vehicle Traffic Control Signal Heads: LED Circular Signal Supplement
(Adopted June 27, 2005)**

Manufacturer	Signal	Size	Color	Lens Type	Catalog Number
Leotek Taiwan	LED Ball	12in	Green	Tinted	TSL-12G-DT-A1

1. This Certification requires continuing validation in accordance with the requirements of the Specification noted above and the Intertek LED Traffic Signal Modules Certification Program.
2. Equipment tested and Report issued by Intertek

(A) Report No.: 103411900MIN-014G (4/2018); 103411900CRT-001G (6/2018)

Approved for Certification:

Date

January 15, 2019

Christopher W. Metcalf, Program Administrator



Intertek

**LED TRAFFIC SIGNAL MODULES
INTERTEK
3933 US ROUTE 11
CORTLAND, NY 13045-0950**

**ISSUE DATE: January 15, 2019
EXPIRATION DATE: March 3, 2023**

(5 years from test commencement)

**An Activity Sponsored and Administered by
INTERTEK**

Leotek
1955 Lundy Ave
San Jose, CA

**INTERTEK LED TRAFFIC SIGNAL
MODULES CERTIFICATION PROGRAM**

CERTIFICATE OF CONFORMANCE

The equipment described below is hereby approved for listing in the Intertek program directory website. The certification is based on successful completion of tests, in accordance with the requirements for Design Qualification Testing in the referenced Specification, and the Intertek Procedural Guide, accompanied by related documents. This Certificate is only confirmable in conjunction with equipment being listed in the current Intertek program directory website at www.intertek.com.

Specification: ITE Vehicle Traffic Control Signal Heads: LED Circular Signal Supplement (Adopted June 27, 2005)					
Manufacturer	Signal	Size	Color	Lens Type	Catalog Number
Leotek Taiwan	LED Ball	8in	Red	Tinted	TSL-08R-DT-A1

1. This Certification requires continuing validation in accordance with the requirements of the Specification noted above and the Intertek LED Traffic Signal Modules Certification Program.
2. Equipment Tested and Report issued by Intertek

(A) Report No.: 103411912CRT-001R (4/2018); 103411912MIN-014R (4/2018)

Approved for Certification:

Date

January 15, 2019

Christopher W. Metcalf, Program Administrator



Intertek

**LED TRAFFIC SIGNAL MODULES
INTERTEK
3933 US ROUTE 11
CORTLAND, NY 13045-0950**

ISSUE DATE: January 15, 2019

EXPIRATION DATE: March 3, 2023

(5 years from test commencement)

An Activity Sponsored and Administered by
INTERTEK

Leotek
1955 Lundy Ave
San Jose, CA

**INTERTEK LED TRAFFIC SIGNAL
MODULES CERTIFICATION PROGRAM**

CERTIFICATE OF CONFORMANCE

The equipment described below is hereby approved for listing in the Intertek program directory website. The certification is based on successful completion of tests, in accordance with the requirements for Design Qualification Testing in the referenced Specification, and the Intertek Procedural Guide, accompanied by related documents. This Certificate is only confirmable in conjunction with equipment being listed in the current Intertek program directory website at www.intertek.com.

Specification:

**ITE Vehicle Traffic Control Signal Heads: LED Circular Signal Supplement
(Adopted June 27, 2005)**

Manufacturer	Signal	Size	Color	Lens Type	Catalog Number
Leotek Taiwan	LED Ball	8in	Yellow	Tinted	TSL-08Y-DT-A1

1. This Certification requires continuing validation in accordance with the requirements of the Specification noted above and the Intertek LED Traffic Signal Modules Certification Program.
2. Equipment Tested and Report issued by Intertek

(A) Report No.: 103411912CRT-001Y (4/2018); 103411912MIN-014Y (4/2018)

Approved for Certification:

Date

January 15, 2019

Christopher W. Metcalf, Program Administrator



Intertek

**LED TRAFFIC SIGNAL MODULES
INTERTEK
3933 US ROUTE 11
CORTLAND, NY 13045-0950**

ISSUE DATE: January 15, 2019

EXPIRATION DATE: March 3, 2023

(5 years from test commencement)

An Activity Sponsored and Administered by
INTERTEK

Leotek
1955 Lundy Ave
San Jose, CA

**INTERTEK LED TRAFFIC SIGNAL
MODULES CERTIFICATION PROGRAM**

CERTIFICATE OF CONFORMANCE

The equipment described below is hereby approved for listing in the Intertek program directory website. The certification is based on successful completion of tests, in accordance with the requirements for Design Qualification Testing in the referenced Specification, and the Intertek Procedural Guide, accompanied by related documents. This Certificate is only confirmable in conjunction with equipment being listed in the current Intertek program directory website at www.intertek.com.

Specification:

**ITE Vehicle Traffic Control Signal Heads: LED Circular Signal Supplement
(Adopted June 27, 2005)**

Manufacturer	Signal	Size	Color	Lens Type	Catalog Number
Leotek Taiwan	LED Ball	8in	Green	Tinted	TSL-08G-DT-A1

1. This Certification requires continuing validation in accordance with the requirements of the Specification noted above and the Intertek LED Traffic Signal Modules Certification Program.
2. Equipment tested and Report issued by Intertek

(A) Report No.: 103411912CRT-001G (4/2018); 103411912MIN-014G (4/2018)

Approved for Certification:

Date

January 15, 2019

Christopher W. Metcalf, Program Administrator



Intertek

**LED TRAFFIC SIGNAL MODULES
INTERTEK
3933 US ROUTE 11
CORTLAND, NY 13045-0950**

ISSUE DATE: December 27, 2018

EXPIRATION DATE: April 2021
(5 years from test commencement)

An Activity Sponsored and Administered by
INTERTEK

Leotek Electronics USA LLC
1955 Lundy Ave
San Jose, CA

**INTERTEK LED TRAFFIC SIGNAL
MODULES CERTIFICATION PROGRAM**

CERTIFICATE OF CONFORMANCE

The equipment described below is hereby approved for listing in the Intertek program directory website. The certification is based on successful completion of tests, in accordance with the requirements for Design Qualification Testing in the referenced Specification, and the Intertek Procedural Guide, accompanied by related documents. This Certificate is only confirmable in conjunction with equipment being listed in the current Intertek program directory website at www.intertek.com.

Specification:

**ITE Pedestrian Traffic Control Signal Indicators: LED Signal Modules
(Adopted August 4, 2010)**

Manufacturer	Signal	Size	Color	Lens Type	Catalog Number
Leotek Taiwan	LED Pedestrian Hand/Man Overlay with Countdown	16 inch	Clear	Clear Frosted	TSL-PED-16-SPC-V1

1. This Certification requires continuing validation in accordance with the requirements of the Specification noted above and the Intertek LED Traffic Signal Modules Certification Program.
2. Equipment Tested and Report issued by Intertek

Report No.: 102558718CRT-001 (6/2016); 102558718MIN-001.1 (6/2016); 103699519CRT-001 (11/2018)

Approved for Certification:

Date:

December 27, 2018

Christopher W. Metcalf, Program Administrator

WARRANTY STATEMENT
Transportation Products

Leotek LED products are covered by a five-year limited warranty from the date of delivery. Leotek warrants these products to be: 1) free of defects in workmanship and/or material; 2) meet the light-emitting requirements as defined in the following Performance Specifications of the Institute of Transportation Engineers (ITE). Leotek Electronics USA LLC will factory repair or replace any units found to be defective, within the terms listed in the Warranty Statement.

Full Balls: ITE VTCSH – LED Circular Signal Supplement - Dated June 27, 2005

Arrows: ITE VTCSH – LED Vehicle Arrow Signal Supplement - Dated July 1, 2007

Pedestrian Signals: ITE PTCSI – LED Pedestrian Traffic Signal Indication - Dated August 4, 2010

Technical Assistance

Please contact your local Sales Representative prior to contacting Leotek direct. Technical assistance is available from our Technical Support Department during the hours of 8:00 AM to 5:00 PM Pacific Standard Time (PST), Monday through Friday, excluding major US holidays. Please provide the Model Number of the product you are inquiring about.

Return Material Authorization

Prior to returning any product for repair or replacement, Leotek requires that a Return Material Authorization (RMA) be issued. The RMA can only be issued by Leotek. When requesting an RMA, the following information must be provided to Leotek; product Model and Serial Numbers, Date of Manufacture, and a detailed description of the reason for return. A Leotek representative will document the issue at hand and make the appropriate arrangement for the return of the unit/product.

When returning the product, the customer must adhere to the following procedure(s):

- Prior to returning, contact customer support at (408) 380-1788 to obtain an RMA number (Return Material Authorization).
- Clearly mark shipment container with RMA number.
- Include a return address and contact information with the shipment.
- RMA's are shipped via customer paid postage to:
 - Leotek Electronics USA LLC - 1955 Lundy Ave., San Jose, CA 95131

Verification of purchase may be required. Leotek will not be held responsible for any damage to the product that occurs during shipment. Failure to exercise the above RMA policy and procedures will void all warranty responsibilities on behalf of Leotek Electronics USA LLC.

Leotek will not be liable for defects due to improper handling, misuse, negligence, accidents, acts of God or nature, exposure to casualty of elements, or unauthorized alteration/repair. In all such cases, the warranty is immediately null and void. Liability under this warranty is limited to factory repair or replacement of the unit purchased.

This warranty is exclusive of all other warranties, expressed or implied, and Leotek hereby specifically disclaims all other warranty claims of any type; including without limitation, a warranty of merchantability of any unit or its fitness for any particular use or purpose. The customer's remedy under this warranty is exclusive. In no event shall Leotek be liable for interruption of business loss, profits or indirect or consequential damages, injury to person or damage to property from any cause whatsoever. Information herein subject to change without notice.

WARRANTY STATEMENT
Transportation Products

Leotek standard LED products are covered by a five-year limited warranty from the date of delivery. Leotek warrants these products to be: 1) free of defects in workmanship and/or material; 2) meet the light-emitting requirements as defined in the following Performance Specifications of the Institute of Transportation Engineers (ITE). Leotek Electronics USA LLC will factory repair or replace any units found to be defective, within the terms listed in the Warranty Statement. **Leotek DT products carry a fifteen-year warranty**

Technical Assistance

Please contact your local Sales Representative prior to contacting Leotek direct. Technical assistance is available from our Technical Support Department during the hours of 8:00 AM to 5:00 PM Pacific Standard Time (PST), Monday through Friday, excluding major US holidays. Please provide the Model Number of the product you are inquiring about.

Return Material Authorization

Prior to returning any product for repair or replacement, Leotek requires that a Return Material Authorization (RMA) be issued. The RMA can only be issued by Leotek. When requesting an RMA, the following information must be provided to Leotek; product Model and Serial Numbers, Date of Manufacture, and a detailed description of the reason for return. A Leotek representative will document the issue at hand and make the appropriate arrangement for the return of the unit/product.

When returning the product, the customer must adhere to the following procedure(s):

- Prior to returning, contact customer support at (408) 380-1788 to obtain an RMA number (Return Material Authorization).
- Clearly mark shipment container with RMA number.
- Include a return address and contact information with the shipment.
- RMA's are shipped via customer paid postage to:
 - Leotek Electronics USA LLC - 1955 Lundy Ave., San Jose, CA 95131

Verification of purchase may be required. Leotek will not be held responsible for any damage to the product that occurs during shipment. Failure to exercise the above RMA policy and procedures will void all warranty responsibilities on behalf of Leotek Electronics USA LLC.

Leotek will not be liable for defects due to improper handling, misuse, negligence, accidents, acts of God or nature, exposure to casualty of elements, or unauthorized alteration/repair. In all such cases, the warranty is immediately null and void. Liability under this warranty is limited to factory repair or replacement of the unit purchased.

Compatibility of Leotek Products is highly dependent on environmental conditions and therefore, in abnormal conditions the Purchaser must undertake a compatibility assessment of their relevant site prior to the installation of the Product. Purchaser shall also retain and present (on request), evidence of a compatibility assessment under actual operating conditions.

No further Liability: Repair, replacement or refund as set forth in this warranty is the sole and exclusive remedy under this warranty or otherwise for Products' defects. Once Leotek has replaced, repaired or refunded defective Products, it shall have no further liability to the Purchaser in respect to the defect in that particular Product.

This warranty is exclusive of all other warranties, expressed or implied, and Leotek hereby specifically disclaims all other warranty claims of any type; including without limitation, a warranty of merchantability of any unit or its fitness for any particular use or purpose. The customer's remedy under this warranty is exclusive. In no event shall Leotek be liable for interruption of business loss, profits or indirect or consequential damages, injury to person or damage to property from any cause whatsoever. Information herein subject to change without notice.

EXHIBIT B.3 - CCD Technical Specifications

B.1 SCOPE OF WORK/ REQUIREMENTS

Specifications included in IFB 0155A2023 Traffic Signal Control Heads.

B.1.a SPECIFICATIONS FOR ADJUSTABLE FACE VEHICLE TRAFFIC CONTROL 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 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 main body assembly of the signal face shall be of enclosed sectional construction. The sections shall be made of polycarbonate. 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. Backplates that are specified in the proposal items 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 polycarbonate 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 polycarbonate 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 polycarbonate 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 LED, as specified.
- 2-8 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. Visor is polycarbonate and dark olive green.
- 2-9 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 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.
- 3-2 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.
- 3-3 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 LED module 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, Transportation Operations, 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, Transportation Operations 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.

B.1.1.b 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 or LED as specified.
- 2-7 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.
- 2-8 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.
- 2-9 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 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.
- 3-3 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.
- 3-4 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.

B.1.c 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 LED type pedestrian signals, continuous neoprene gasket is not required.
- 2.1.6 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.

B.1.d 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 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 5 year

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 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 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 design 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



B.1.e 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 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 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 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.
- 3.1.2.1 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

