

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 Master 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 Dollars (\$1,000,000.00). The Vendor acknowledges that any goods/services provided beyond those specifically described in **Exhibit A** are performed at Contractor's risk and without authorization from the City. City's payment obligations hereunder, whether direct or contingent, shall extend only to funds appropriated by the Denver City Council for the purpose of this Master Purchase Order, encumbered by the City after receipt of 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 Manager of General Services or his delegate is authorized to change or amend this Master Purchase Order by a formal written change order. Any change or amendment that would cause the aggregate payable under this Master Purchase Order to exceed the amount appropriated and encumbered for this Master Purchase Order is expressly prohibited and of no effect. 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 Master Purchase Order are free from defects in workmanship and materials, are merchantable, and fit for the purposes for which they are to be used. For any goods furnished under this Master Purchase Order which become defective within twelve (12) months (unless otherwise specified) after date of receipt by City, 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 Master 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 Master Purchase Order. Notwithstanding anything contained in this Master Purchase Order to the contrary, City in no way limits or waives the rights, immunities and protections provided by C.R.S. § 24-10-101, et seq.

14. Termination:

City may terminate this Master Purchase Order, in whole or in part, at any time and for any reason immediately upon written notice to 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 shall secure, before delivery of any goods/services, the following insurance covering all operations, goods and services provided to City. Vendor shall keep the required insurance coverage in force at all times during the term of the Purchase Order, or any extension thereof, during any warranty period, and for three (3) years after termination of this Purchase Order. The required insurance shall be underwritten by an insurer licensed to do business in Colorado and rated by A.M. Best Company as "A-"VIII or better. Each policy shall contain a valid provision stating "Should any of the above-described policies be canceled or non-renewed before the expiration date thereof, the issuing company shall send written notice to the Denver Risk Management, 201 West Colfax Avenue, Dept. 1105, Denver, Colorado 80202. Such written 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." Additionally, Vendor shall provide written notice of cancellation, non-renewal and any reduction in coverage to the address above by certified mail, return receipt requested. If any policy is in excess of a deductible or self-insured retention, City must be notified by Vendor. Vendor shall be responsible for the payment of any deductible or self-insured retention. The insurance coverages specified in this Purchase Order are the minimum requirements, and these requirements do not lessen or limit the liability of Vendor. Vendor shall provide a copy of this Purchase Order to its insurance agent or broker. Vendor may not commence services or work relating to the Purchase Order prior to placement of coverage. Contractor certifies that the attached certificate of insurance attached to the Purchase Order documents, preferably an ACORD certificate, complies with all insurance requirements of this Purchase Order. The City's acceptance of a certificate of insurance or other proof of insurance that does not comply with all insurance requirements set forth in this Purchase Order shall not act as a waiver of Vendor's breach of this Purchase Order or any of the City's rights or remedies under this Agreement. The City's Risk Management Office may require additional proof of insurance, including but not limited to policies and endorsements. Vendor's insurer shall name as Additional Insured to its Commercial General Liability and Business Auto Liability policies the City and County of Denver, its elected and appointed officials, employees and volunteers. Vendor's insurer shall waive subrogation rights against the City. All sub-contractors and sub-consultants (including independent contractors, suppliers or other entities providing goods/services required by this Purchase Order) shall be subject to all of the requirements herein and shall procure and maintain the same coverages required of Vendor. Vendor shall include all such entities as insureds under its policies or shall ensure that they all maintain the required coverages. Vendor shall provide proof of insurance for all such entities upon request by City. For Worker's Compensation Insurance, 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 for each bodily injury occurrence claim, \$100,000 for each bodily injury caused by disease claim, and \$500,000 aggregate for all bodily injuries caused by disease claims. Vendor expressly represents to City, as a material representation upon which City is relying, that none of the Vendor's officers or employees who may be eligible under any statute or law to reject Workers' Compensation Insurance shall effect such rejection during any part of the term of this Purchase Order, and that any such rejections previously effected, have been revoked. Vendor shall maintain Commercial General Liability coverage with limits of \$1,000,000 for each occurrence, \$1,000,000 for each personal and advertising injury claim, \$2,000,000 products and completed operations aggregate, and \$2,000,000 policy aggregate. Vendor shall maintain Business Auto Liability coverage with limits of \$1,000,000 combined single limit applicable to all owned, hired and non-hired vehicles used in performing services under this Purchase Order. For Commercial General Liability coverage, the policy must provide the following: (i) That this Purchase Order is an Insured Contract under the policy; (ii) Defense costs in excess of policy limits; (iii) A severability of interests, separation of insureds or cross liability provision; and (iv) A provision that coverage is non-contributory with other coverage or self-insurance provided by City. For claims-made coverage, the retroactive date must be on or before the first date when any goods or services were provided to City. Vendor must advise the City in the event any general aggregate or other aggregate limits are reduced below the required per occurrence limits. At their own expense, and where such general aggregate or other aggregate limits have been reduced below the required per occurrence limit, the Contractor will procure such per occurrence limits and furnish a new certificate of insurance showing such coverage is in force.

21. Severability:

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

23. No Construction Against Drafting Party:

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

24. Status of 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, software, 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.

25. Records and Audits:

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

26. Remedies/Waiver:

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

27. No Discrimination in Employment:

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

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.

This Master Purchase Order is acknowledged and agreed to by:

City & County of Denver, Purchasing Division

Vendor Name: Econolite
(Company Name)

By: Daniel Schoenecke
(Authorized Signature)

Print Name: Daniel Schoenecke

Title: Account Manager

Date: 4-18-13

By: Megan deGroot

Print Name: Megan deGroot

Title: Buyer

Date: 4/18/2013

EXHIBIT "A"

Vendor: Econolite Control Products, Inc.
 Title: Traffic Signal Controller Cabinets
 Master Purchase Order No.: 0264A0111

It is recommended that you use your Master Purchase Order No. – 0264A0111, in all future correspondence, billing, invoicing or other communications.

1.1 PRODUCT SPECIFICATIONS:

PUBLIC WORKS, TRAFFIC OPERATIONS - TRAFFIC SIGNAL CONTROLLER CABINET SPECIFICATION(S)

Traffic signal cabinets are to comply with NEMA TS2 specifications and shall be compatible with the ICONS distributed traffic signal system. Unless otherwise noted, all components, connections, and cables shall be supplied with the cabinet.

A. Cabinets

- (1) General – Traffic signal controller cabinets are to conform to the requirements for NEMA 3R rating, NEMA TS2-2003 v2.06 Section 7, and this specification. Where differences occur, this specification shall govern. Unless noted otherwise, size 6 cabinets shall be furnished.
- (2) Materials – Cabinets are to be fabricated from sheet aluminum alloy, 0.125 inch thick, meeting the requirements of ASTM 5052-H32.
- (3) Dimensions – Size "5" cabinets outside dimensions are to nominally be 60 inches high, 18 inches deep, and 30 inches wide. Size "6" cabinets shall be 60 inches high, 24 inches deep and 44 inches wide. Unless noted otherwise, cabinets shall be size 6.
- (4) Construction – The cabinet top is to be constructed with a one inch slope from front to back. Cabinet seams are to meet all requirements for NEMA Type 4 enclosures. All seams are to be sealed with an approved sealant on the interior of the cabinet. The main door opening is to be double flanged on all four sides.
- (5) Doors – Cabinet main doors to be full width, hinged on the right side when facing the cabinet. The main door opening to be a minimum of 90% of the width and 80% of the height of the front surface of the cabinet. A stiffener plate, at least 15 inches long, 6 inches high and one-half inch deep, is to be welded across the inside of the main door. (The bottom of the door opening shall be at least 3 inches above the bottom of the cabinet.)

The main door hinge shall be continuous and bolted to the cabinet door using 1/4-20 stainless steel carriage bolts and ny-lock nuts. The hinge is to be attached so that no bolts or rivets are exposed. The hinges shall have a 0.120 inch diameter stainless steel hinge pin, capped top and bottom to render it tamper proof. The main door shall include a door restraint capable of holding the door open at approximately 90, 120, and 150 degrees under windy conditions. The door restraint shall be attached to the main door and pivot to placement holes in the bottom flange of the door opening.

A three-point draw-roller type door latch is to be provided with push rods of at least 0.25 inch by 0.75 inch steel. Rollers to be a minimum of 0.875 inches in diameter, be made of nylon, and have a 0.150 inch steel center. The handle on the main door is to be stainless steel with a three-quarter inch diameter shank. The handle shall rotate clockwise to open. The handle is to include a hasp for

attachment of a padlock. The main door shall be equipped with a Corbin lock, No. 1548-1, or equivalent, and shall be provided with two keys. The lock shall be positioned so that the key shall not interfere with operation of the handle. The key shall turn counter-clockwise to unlock the door. The hinged police door compartment is to be provided with a Corbin lock, No. R357SGS, provided with one key.

The main door and the police door is to close against weatherproof and dustproof closed-cell neoprene gasket seals. The gasket material for doors is to be a minimum of 0.250 inches thick. The main door gasket is to be a minimum of 1.00 inch wide; the police door gasket is to be a minimum of 0.50 inch wide. Both gaskets are to be permanently bonded to the cabinet.

- (6) Shelves – Unless noted otherwise, cabinets to be provided with two adjustable “C” channels mounted vertically on the interior of the back and both side walls. All channel nuts used in the cabinet shall be the spring-loaded type. Mounting channels are to extend at least 3 inches from bottom to at least 3 inches from the cabinet top.

Cabinets are to be provided with two adjustable shelves, fabricated of 5052-H32 aluminum. Shelves are to be at least 11 inches deep and extend the full width of the cabinet.

The top shelf is to be mounted as high as possible in the cabinet with the Detector Rack attached to the top of the shelf. There shall be 13.75 inches between the bottom shelf and the mounting flange of the top shelf.

- (7) Finish & Surface Preparation – Cabinets shall be provided with a natural aluminum finish meeting Federal Specification QQA-250/18. All surfaces are to be free from weld flash. Welds shall be smooth, neatly formed, and free from cracks, blow holes, and other irregularities. Any sharp edges or burrs shall be ground smooth. Care shall be taken during handling to prevent scratches or dents.
- (8) Mounting – Cabinets are to be provided with internal mounting flanges for mounting on a base. All walls of the cabinet shall be folded under the cabinet at the base and each flange created shall be equal to or greater than 4”.
- (9) Ventilation – The lower portion of the main cabinet door is to be louvered for ventilation intake. The air inlet shall be large enough to accommodate the air flow of the rated fan. Louvers must meet the NEMA rod entry test for 3R ventilated enclosures. A heavy duty, non-corrosive, vermin and insect proof, air filter is to be mounted on the inside of the main door. The air filter must be held firmly in place by a fixed bottom bracket and a spring loaded top bracket that allow easy removal for cleaning. The top of the cabinet is to include an exhaust air plenum with a vent screen having perforations no greater than 0.125 inches in diameter. A removable fan plate is to be mounted in the top of the cabinet.
- (10) Equipment Outlet – An eight (8) Position outlet strip is to be mounted to the left wall of the cabinet above the upper shelf. At least four (4) of the outlets must be positioned to allow connection of power transformers without obstructing other outlets on the strip. The outlet strip should be wired after the 15 amp breaker and may contain it’s own surge protection or be wired after the EDCO surge arrester but it must have surge protection. If it contains it’s own surge protection it shall be equal to or greater than the protection provided by the EDCO model SHA 1210. The outlet strip may be alternatively mounted to a back wall of the cabinet above the upper shelf.
- (11) Pull Out Drawer - A pull-out, hinged-top drawer, having sliding tracks, with lockout and quick-disconnect feature, such as a Vent-Rak Retractable Writing Shelf, #D-4090-13 or equivalent – is to be installed under the lower shelf. It shall be possible to lift this hinged platform in order to gain access to the interior of the drawer. Minimum interior dimensions of the drawer shall be 1 inch high, 11 inches deep and 13 inches wide. Drawer shall be mounted in the center of the lower shelf.

B. Terminals and Facilities

- (1) General – Cabinets are to be assembled and wired to accommodate the following:

Main panel with 12/16 load switches, 6/8 flash transfer relays, 1 flashers, and 2 bus interface units.

- Power distribution panel on lower right side panel
- Detector rack for 8 channels of detection, 4 channels of preemption, and 1 bus interface unit mounted on the top right side of the upper shelf
- Power supply for bus interface units mounted on the top left side of the upper shelf
- One TS2 Type 2 controller and Type 16 malfunction management unit on lower shelf
- Police switch compartment on inside of main door
- Detector I/O panel mounted on the lower left side
- A ventilation fan mounted in the cabinet top with an adjustable thermostat (The size 6 cabinet must have two (2) ventilation fans mounted in the cabinet top)
- An incandescent lamp with a 15 inch arm mounted on the door of the cabinet
- A fluorescent light mounted on the inside top of the cabinet
- Loading capacitor/resistor circuit
- Equipment outlet strip

- (2) Main Panel – The main panel is to be constructed from 5052-H32 brushed aluminum of 0.090 inches minimum thickness and formed so as to minimize any flexing when plug-in components are installed.

Main panels are to be hinged at the bottom to allow easy access to all wiring on the rear of the panel. The panel is to be designed so it can easily be moved from vertical to a minimum of 60 degrees of vertical. The bottom of the panel is to be five to eight inches above the base of the cabinet. The exact distance will depend on the spacing of other cabinet components.

The main panel is to be fully wired in the following configuration:

Twelve/sixteen load switch sockets, (6/8) flash transfer relay sockets, one flasher socket, two main panel BIU rack slots, one detector rack each with one BIU, and one Type-16 MMU. Power to flashers are to be terminated on a separate easily accessible terminal strip mounted on front of the panel.

Loadswitches 1, 3, 5, & 7 – green, yellow & red outputs and load switch 9, 10, 11, & 12 or 13, 14, 15 & 16 yellow outputs shall be loaded with 2.2 microfarad 400VDC (275VAC) Metallized Polypropylene capacitors with a 100k 2 watt resistor in parallel. The capacitor/resistor circuit is to be mounted on the back of the load switch connectors. They are to be secured to the harness with cable ties.

All load switch and flash transfer relay socket shall be labeled on the front of the main panel to match drawing designations.

All load switches are to be supported by a bracket extending at least half the length of the load switch.

Rack style mounting is to be provided to accommodate the required BIUs per the configuration listed. A dual-row, 64-pin female DIN 41612 Type B connector shall be provided for each BIU rack position. Card guides are to be provided for both edges of the BIU. Terminal and facilities BIU mounting is to be an integral part of the main panel. Detector rack BIU mounting is to be an integral part of the detector rack.

All BIU rack connectors are to have prewired address pins corresponding to the requirements of the TS2 specification. The address pins shall control the BIU mode of operation. BIUs shall be capable of being interchanged with no additional programming.

Main panels should have all field wires contained on two rows of horizontally mounted terminal blocks. The upper row should be wired for the phase 9-12 vehicle 02, 4, 6, 8 pedestrian field terminations. The lower row shall be reserved for phase one through phase eight vehicle field terminations.

All field output circuits are to be terminated on an unfused screw type (#10 screw) terminal block with a minimum rating of 10 amps.

All field input/output (I/O) terminals shall be accomplished at the field terminals with the use of a screwdriver only. It shall also be possible to program which flasher circuit the phase shall be programmed to. It shall not be necessary to debus field terminal blocks for flash programming.

The main panel is to contain one (1) labeled flasher socket capable of operating 25-amp, 2-pole, NEMA solid-state flashers. The flasher is to be supported by a bracket that extends at least half its length.

One RC network is to be wired in parallel with each group of three flash-transfer relays and any other relay coils.

All logic-level, NEMA-controller and Malfunction Management Unit input and output terminations on the main panel shall be permanently labeled. Cabinet prints are to identify the function of each terminal position.

At a minimum, five 20-position terminal blocks are to be provided at the top of the main panel to provide access to the BIU/controller unit's programmable and non programmable I/O. Terminal blocks for DC signal interfacing shall have a number 6-32 x 7/32 inch screw as a minimum. All twelve or sixteen green/yellow/red load switch inputs, vehicle detector channel outputs one through twelve or sixteen and pedestrian detector inputs one through eight shall be terminated on the terminals and facilities panel. They shall be easily accessible.

The main panel is to incorporate a relay to remove +24 VDC from the common side of the load switches when the intersection is placed into flash. The relay is to have a momentary push-button to apply power to the load switch inputs for ease of troubleshooting.

- (3) Wiring and Cables – All main panel wiring shall be the size indicated below and is to be color-coded. As a minimum, colors shall be used to distinguish between different equipment. The following color code is provided as an example:

| | |
|-------------------------------------|------------------------|
| Green/Walk load switch output | Brown wire (14 gauge) |
| Yellow load switch output | Yellow wire (14 gauge) |
| Red/Don't Walk load switch output | Red wire (14 gauge) |
| MM (other than AC power) | Violet wire (22 gauge) |
| AC Line (power panel to main panel) | Black wire (8gauge) |
| AC Line (main panel) | Black wire (10 gauge) |

| | |
|--|--|
| AC Neutral (power panel to main panel) | White wire (8 gauge) |
| AC Neutral (main panel) | White wire (10 gauge) |
| Earth ground (power panel) | Green wire (8 gauge) |
| Logic ground | Gray wire (22 gauge) |
| Flash programming | Orange wire to flasher terminal, black wire to red or yellow field terminal (14 gauge) |

All wiring 14 AWG and smaller, shall conform to MIL-W-16878/1, type B/N, 600V, 19-strand tinned copper. The wire is to have a minimum of 0.010 inches thick PVC insulation with clear nylon jacket and rated to 105 degrees Celsius. All 12 AWG and larger wire is to have UL listed THHN/THWN 90 degrees Celsius, 600 V, 0.020 inches thick PVC insulation and clear nylon jacketed.

Both “A” and TS2 controller power harnesses and connectors shall be included.

All cabinet configurations shall be provided with enough RS-485 Port 1 communication cables to allow full capabilities of that cabinet. One additional RS-485 port cable, capable of reaching any RS 485 device, shall be supplied for testing. Each communication cable connector shall be a 15-pin metal shell D subminiature type. The cable is to be shielded cable suitable for RS-485 communications. The additional port cable connector is to be coupled to prevent dirt or moisture contamination. The RS-485 port cables shall be as small as possible and remain flexible throughout the NEMA temperature range of operation.

All main panels are to be prewired for a Type-16 Malfunction Management Unit.

Standard soldering and termination practices shall be followed. Wires soldered to .025 inch square posts are to be wrapped 270 degrees around the post. It is recommended that printed circuit boards or connectors be used with .025 inch squared posts. Great care shall be taken to prevent cold solder joints, solder bridges or shorts. Soldering shall be of the highest quality obtainable.

All wire (size 16 AWG or smaller) at solder joints shall be hooked or looped around the eyelet or terminal block post prior to soldering to ensure circuit integrity. Lap joint soldering is not acceptable.

All wiring is to be neat in appearance. All cabinet wiring shall be continuous from its point of origin to its termination point. Butt type connections/splices are not acceptable.

All connecting cables and wire runs shall be secured by mechanical clamps. Stick-on type clamps are not acceptable.

The grounding system in the cabinet is to be divided into three separate circuits (AC Neutral, Earth Ground, and Logic Ground). These ground circuits are to be connected together at a single point, using removable jumpers, as outlined in the NEMA TS2 Standard.

All pedestrian push-button inputs from the field to the controller shall be optoisolated through the BIU and operate at 12 VAC.

- (4) Power Panel – The power panel shall consist of a separate, wholly enclosed module, securely fastened to the right side wall of the cabinet. The power panel shall be wired to provide the necessary power to the cabinet, controller, Malfunction Management Unit, cabinet power supply and auxiliary equipment. It shall be manufactured from 0.090-inch, 5052-H32 aluminum with a removable plastic front cover. The panel shall be of such design so as to allow a technician to access the main and auxiliary breakers without removing the front cover.

The power panel shall house the following components:

- (a) 5-amp equipment breaker which also functions as an on/off switch. This breaker shall supply power to the controller, MMU, cabinet power supply and auxiliary panels. The equipment breaker shall be wired after the main breaker, transient protection and filtering.
 - (b) A 30 amp main breaker, which shuts off all power to the equipment breaker and all signal lights.
 - (c) A 15-amp auxiliary breaker. This breaker shall supply power to the fan, light and GFI outlet and shall be wired directly to the incoming power.
 - (d) All breakers shall be thermal magnetic type, UL listed for HACR service, with a minimum of 10,000 amp interrupting capacity.
 - (e) An EDCO model SHA 1210 or exact approved equivalent surge arrester.
 - (f) A 50 amp, 125 VAC radio interference line filter.
 - (g) A normally-open, 60-amp, mercury connector Struthers-Dunn model 418AXXL-120VAC or exact equivalent.
 - (h) A 15-position neutral bus bar capable of connecting three #12 wires per position. There shall be at least 13 positions, with no wires connected, available for field connections.
 - (i) A 7-position ground bus bar capable of connecting three #12 wires per position.
 - (j) A NEMA type 5-15GFI convenience outlet.
 - (k) A four position power connector wired such that incoming power from the utility can be routed to a UPS unit and then back to the main power input circuitry for the cabinet.
- (5) Auxiliary Cabinet Equipment – The cabinet is to be provided with a thermostatically controlled (adjustable between 80-150 degrees Fahrenheit) ventilation fan in the top of the cabinet plenum. The fan is to be a ball bearing type fan and shall be capable of drawing a minimum of 100 cubic feet of air per minute. In the case of the size 6 cabinet two (2) ventilation fans of the above specifications are to be provided.

A R14 intermediate screw base (E17) 25 watt lamp protected in a metal housing and connected to a 15 inch flexible arm. Arm shall be attached to the door of the cabinet at an optimum location for lighting the controller and other panels. A fluorescent lighting fixture is to be mounted on the inside top of the cabinet near the front. The lamps shall be wired to a door activated switch mounted near the top of the door.

An eight (8) Position outlet strip is to be mounted to the left wall of the cabinet above the upper shelf. At least four (4) of the outlets must be positioned to allow connection of power transformers without obstructing other outlets on the strip. The outlet strip should be wired after the 15amp breaker and may contain its own surge protection or be wired after the EDCO surge arrester but it must have surge protection. If it contains its own surge protection it shall be equal to or greater than the protection provided by the EDCO model SHA 1210. The outlet strip may be alternatively mounted to the back wall of the cabinet above the upper shelf.

Two sets of complete and accurate non-fading cabinet drawings are to be supplied with each cabinet.

All equipment supplied with the cabinet shall include one (1) set of operating and service manuals per unit up to a maximum of ten (10) sets per order.

- (6) Vehicle Detection Rack – A vehicle detector amplifier rack is to be provided in each cabinet. Detector racks are to support up to 8 channels of loop detection, two 2-channel preemption devices and one BIU and mounted on top of the upper shelf. The detector rack is to be mounted on the top right side of the top shelf.

Each cabinet is to contain detector interface panels for the purpose of connecting field loops and vehicle detector amplifiers. One 8-position interface panel shall be provided. The interface panel is to be secured to a mounting plate and attached to the left sidewall of the cabinet.

Interface panels shall allow for the connection of eight independent field loops. A ground bus terminal shall be provided between each loop pair terminal to provide a termination for the loop lead-in cable ground wire.

Interface panels are to provide a 10-position terminal block to terminate the field wires for up to two 2-channel preemption devices.

Lightning protection devices are to be provided (EDCO SRA-16C; EDCO SRA-6; EDCO LCA-6; EDCO SRA 6LCA, or equivalent lightning protection device).

A cable consisting of 20 - 22 AWG twisted pair wires are to be provided to enable connection to and from the panel to a detector rack. All termination points shall be identified by a unique number and labeled on the panel.

Each detector rack is to accommodate rack mountable preemption devices such as Opticom™.

The detector rack shall be mounted as high as possible in the cabinet.

- (7) Cabinet Test Switches and Police Panel – The police door switch panel is to contain the following:
- (a) SIGNALS ON/OFF SWITCH. In the OFF position, power shall be removed from signal heads in the intersection. The controller shall continue to operate. When in the OFF position, the MMU shall not conflict or require reset.
 - (b) b. AUTO/FLASH SWITCH. In the flash position, power shall not be removed from the controller and stop time is to not be applied. When the switch is returned to the Auto position the controller is to restart.
 - (c) c. AUTO/MANUAL SWITCH. Cabinet wiring is to include an AUTO/MANUAL switch and a terminal strip with a momentary push-button and 24” coiled hard cord, which is extendable to 12 feet. Terminal strip is to be accessible only from the inside of the cabinet.
 - (d) d. MANUAL PUSH BUTTON SWITCH. An additional manual advance momentary push button switch mounted on and accessible through the police panel door is to operate with the Auto/Manual switch.
 - (e) e. MANUAL OPERATION SWITCH. A manual operation interlock switch is to be mounted in the police panel in such a manner as to return the controller to AUTO operation in the case that the AUTO/MANUAL switch is left in the Manual position and the police panel door is closed.
 - (f) f. A door open/closed switch, connected to the BIU on Alarm 1, is to be provided. All toggle type switches are to be rated 5 amps. Single-(all the time) or double-pole switches may be provided, as required.

Any exposed terminals or switch solder points are to be covered with a non-flexible shield to prevent accidental contact.

All switch functions must be permanently and clearly labeled.

All wire routed to the police door-in-door switch panel is to be adequately protected against damage from repetitive opening and closing of the main door.

All test switch panel wiring is to be connected to the main panel via a 15-pin AMP type connector.

C. Auxiliary Devices

- (1) Load Switches – Load switches are to be solid state and shall conform to the requirements of Section 6.2 of the NEMA TS2 Standard.

Signal load switches are to have a minimum rating of 20 amperes at 120 VAC for an incandescent lamp load. They shall be capable of handling a one cycle surge of 250 amperes at 125 degrees centigrade.

The front of the load switch is to be provided with three LED indicators to show the input signal from the controller to the load switch.

Load switches are to be dedicated per phase. The use of load switches for other partial phases is not acceptable.

The full complement of load switches to be supplied with each cabinet to allow for maximum phase utilization for which the cabinet is designed.

- (2) Flashers – The flashers are to be solid state and shall conform to the requirements of section 6.3 of the NEMA TS2 Standard.

Flashing of field circuits for the purpose of intersection flash is to be accomplished by a separate flasher.

The flasher is to be rated at 25 amperes, double pole with a nominal flash rate of 60 FPM.

- (3) Flash Transfer Relays – All flash transfer relays are to meet the requirements of Section 6.4 of the NEMA TS2 Standard.

The coil of the flash transfer relay must be de-energized for flash operation. Contacts is to be rated at 30 amps resistive.

The full complement of relays is to be supplied with each cabinet to allow for maximum phase utilization for which the cabinet is designed.

Flash Transfer Relays are to be a Struthers Dunn 21XBP-120VAC or an approved equal.

- (4) Cabinet Power Supply – The cabinet power supply is to meet the requirements of Section 5.3.5 of the NEMA TS2 Standard. The power supply is to be a stand alone type. The power supply is to be mounted on top of the upper shelf at the left end.

The cabinet power supply is to provide LED indicators for the line frequency, 12 VDC, 12 VAC, and 24 VDC outputs.

The cabinet power supply is to provide (on the front panel) jack plugs for access to the +24 VDC for test purposes.

- (5) 24V Load Switch Control Relay – The relay used to control the 24VDC to the load switcher is to have a push button, which allows it to be mechanically energized.

D. Testing and Warranty

- (1) Testing – Each controller and cabinet assembly is to be tested as a complete entity under signal load for a minimum of 48 hours.

Each assembly is to be delivered with a signed document detailing the cabinet final tests performed.

The cabinet is to be assembled and tested by the controller manufacturer or authorized local distributor to ensure proper component integration and operation.

- (2) Warranty – The controller and Malfunction Management Unit is to be warranted by the manufacturer against mechanical and electrical defects for a period of five (5) years. The manufacturer's warranty is to be supplied in writing with each cabinet and controller. Second party extended warranties are not acceptable.

The cabinet assembly and all other components are to be warranted for a period of one (1) year.

Any defects are to be corrected by the manufacturer or supplier at no cost to the owner.

1.2 ESTIMATED QUANTITIES:

The City does not guarantee any quantity of item listed herein to be ordered during the coming year. However, for information only, consumption between June 2008 and December 2010 amounted to approximately \$741,479.00.

1.3 F.O.B. POINT:

All prices quoted must be quoted at a firm price F.O.B. Denver, Colorado, delivered to Public Works Traffic Division and other locations as needed by using agency(s).

1.4 DELIVERY CONSIDERATIONS:

All deliveries shall be made during the normal business hours of the requesting Agency, Monday through Friday, excluding holidays. Agencies may request alternate delivery days and times.

When a date is set for the delivery of merchandise or the performance of work, said merchandise must be delivered or work performed in accordance with the specifications or description herein contained on or before said date, or the order to the delinquent party may be cancelled and awarded to the next lowest vendor. In such case, the City and County will have the right to buy such articles at market prices for immediate delivery, and an excess in cost of same over price named hereon is to be paid by the vendor under this contract, or deducted from any money due or hereafter coming to him.

1.5 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.

1.6 EMERGENCY PURCHASES:

The City and County of Denver reserves the right to purchase from other sources those items which are required on an emergency basis and cannot be supplied immediately from stock by the vendor.

1.7 COOPERATIVE PURCHASING:

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

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

1.8 PALLET CHARGE:

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

1.9 LABORATORY TESTING:

In the event materials shipped to the City as outlined herein indicate substandard specifications in a qualitative or quantitative manner, the City reserves the right to have a laboratory test made. If material is found to be deficient, the vendor shall be required to pay all costs of testing. If found to meet specifications, the City shall pay all costs.

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

Traffic Controller Cabinet Assemblies and Components in Accordance with Section 1.1

For ITEMS 1A, 1B and 1C, Mill Test Reports and supporting documentation for recycled content MUST BE FURNISHED WITH SHIPMENT FOR ALL HEAT LOTS PROVIDED.

| ITEM NO. | DESCRIPTION | UNIT PRICE DELIVERED |
|----------|--|---|
| 1A | <p>Base Price of NEMA Size 5 "MSX" Cabinet (60" High, 18" Deep, 30" Wide) per specifications</p> <p>Mfg. Offered: <u>ECONOLITE</u></p> <p>Model #: <u>CAB 10225</u></p> <p>EXCLUDING any and all of the following options: OPTICOM Detector Cards TS2 Type 2 Controller Twelve (12) Load Switches Six (6) Flash Transfer Relays Four (4) Loop Detectors One (1) Type 16 Malfunction Management Unit One (1) Flasher Three (3) BIU</p> <p>Per Section A.14 Indicate the percentage amount of recycled Aluminum content in this line item. <u>0</u> % recycled (AL) content</p> <p>Attach and reference support documentation for recycled content: <u>N/A</u></p> | <p>\$ <u>4,389.00</u> /Unit</p> <p>Multiple Unit Pricing: (if offered) Example: 10 to 20 =\$\$\$ /Unit 21 to 49 =\$\$\$ /Unit 50 to 99 =\$\$\$ /Unit 100+ =\$\$\$ /Unit</p> <p>NOT OFFERED</p> |

| ITEM NO. | DESCRIPTION | UNIT PRICE DELIVERED |
|----------|--|--|
| 1B | <p>Base Price of NEMA Size 6 “P” Cabinet (57” High, 27” Deep, 38” Wide) per specifications</p> <p>Mfg. Offered: <u>ECONOLITE</u></p> <p>Model #: <u>CAB 13599</u></p> <p>EXCLUDING any and all of the following options: OPTICOM Detector Cards TS2 Type 2 Controller Twelve (12) Load Switches Six (6) Flash Transfer Relays Four (4) Loop Detectors One (1) Type 16 Malfunction Management Unit One (1) Flasher Three (3) BIU</p> <p>Per Section A.14 Indicate the percentage amount of recycled Aluminum content in this line item. <u>0</u> % recycled (AL) content</p> <p>Attach and reference support documentation for recycled content:</p> <p><u>N/A</u></p> | <p>\$ <u>4,895.00</u> /Unit</p> <p>Multiple Unit Pricing: (if offered) Example 10 to 20 =\$\$\$\$/Unit 21 to 49 =\$\$\$\$/Unit 50 to 99 =\$\$\$\$/Unit 100+ =\$\$\$\$/Unit</p> <p>NOT OFFERED</p> |
| 1C | <p>Base Price of NEMA Size 5 “MSX” Cabinet (60” High, 18” Deep, 30” Wide) per specifications, with provisions for 16 Load Switches.</p> <p>Mfg. Offered: <u>ECONOLITE</u></p> <p>Model #: <u>CAB 10225</u></p> <p>EXCLUDING any and all of the following options: OPTICOM Detector Cards TS2 Type 2 Controller Twelve (16) Load Switches Six (8) Flash Transfer Relays Four (4) Loop Detectors One (1) Type 16 Malfunction Management Unit One (1) Flasher Three (3) BIU</p> <p>Per Section A.14 Indicate the percentage amount of recycled Aluminum content in this line item. <u>0</u> % recycled (AL) content</p> <p>Attach and reference support documentation for recycled content:</p> <p><u>N/A</u></p> | <p>\$ <u>\$4,448.00</u> /Unit</p> <p>Multiple Unit Pricing: (if offered) Example 10 to 20 =\$\$\$\$/Unit 21 to 49 =\$\$\$\$/Unit 50 to 99 =\$\$\$\$/Unit 100+ =\$\$\$\$/Unit</p> <p>NOT OFFERED</p> |

| | | |
|----|--|-----------------------|
| 2A | <p>Adder PER INDIVIDUAL LOAD SWITCH to NEMA TS2 specifications, Rated 20 Amp, 120 VAC for an incandescent lamp load.</p> <p>Mfg. Offered: <u>EDI</u></p> <p>Model #: <u>510 E</u></p> | \$ <u>24.00 EACH</u> |
| 2B | <p>Adder PER INDIVIDUAL FLASH TRANSFER RELAY to specification.</p> <p>Mfg. Offered: <u>RENO</u></p> <p>Model #: <u>TR200</u></p> | \$ <u>28.00 EACH</u> |
| 2C | <p>Adder PER INDIVIDUAL LOOP DETECTOR CARD</p> <p>Mfg. Offered: <u>EDI</u></p> <p>Model #: <u>LM 622</u></p> | \$ <u>99.00 EACH</u> |
| 2D | <p>Adder PER Type 16 Channel Malfunction Management Unit per NEMA TS2 Specification</p> <p>Mfg. Offered: <u>EDI</u></p> <p>Model #: <u>MMU 16E</u></p> | \$ <u>670.00 EACH</u> |
| 2E | <p>Adder Per NEMA TS2 Flasher, Rated 25 Amp, Double Pole, with a nominal flash rate of 60 FPM</p> <p>Mfg. Offered: <u>EDI</u></p> <p>Model #: <u>EDI 810</u></p> | \$ <u>25.00 EACH</u> |
| 2F | <p>Adder Per BIU per NEMA TS2 specifications</p> <p>Mfg. Offered: <u>ECONOLITE</u></p> <p>Model #: <u>160-1003-501</u></p> | \$ <u>148.00 EACH</u> |
| 3A | <p>ALL POWER PANELS MUST INCLUDE AN EDCO #SHA-1210 (OR APPROVED EQUAL) SURGE PROTECTOR</p> <p>Mfg. Offered: <u>EDCO</u></p> <p>Model #: <u>SHA-1210</u></p> | \$ <u>49.00 EACH</u> |

| | | |
|-----------|---|-----------------------------|
| <p>3B</p> | <p>ALL POWER PANELS MUST INCLUDE A STRUTHERS-DUNN MODEL #418AXXL-120VAC (OR APPROVED EQUAL) NORMALLY OPEN 60-AMP MERCURY RELAY</p> <p>Mfg. Offered: <u>STRUTHERS-DUNN</u></p> <p>Model # <u>418AXXL</u></p> | <p>\$ <u>47.00 EACH</u></p> |
|-----------|---|-----------------------------|

| | |
|--|---|
| <p>GUARANTEED DELIVERY IN <u>60</u> CALENDAR DAYS AFTER RECEIPT OF ORDER FROM AGENCY</p> | <p>Attach and Reference Warranty Information:</p> <hr/> <p><u>SEE ATTACHED</u></p> |
|--|---|