ONE ORIGINAL AND 2 COPIES OF THIS BID MUST BE SUBMITTED

Bidder submitting this Bid should check the appropriate box.

This is: ☐ The Original

This is: ☐ One of the Copies

Invitation to Bid

City of Columbus, Ohio
Purchasing Office
77 N Front Street
Columbus, Ohio 43215
614/645-8315

SA005441/TRAFFIC SIGNAL CONTROLLER EQUIPMENT UTC
(Solicitation No.) / (Item)

FINANCE AND MANAGEMENT
(Department)

PURCHASING OFFICE
(Division)

Bid Opening Date and Time (due date and time)

JUNE 19, 2014 at 11:00 a.m. local time

Sealed proposals will be received by the Purchasing Office at 77 N. Front Street, 5th Floor, Columbus, Ohio 43215, until this date and time and then will be publicly opened and read. Proposals received after the opening time will be returned to the bidder unopened. The City will not be responsible for late mail or other deliveries.

NOTE: FAILURE TO RETURN THIS BID PROPOSAL INTACT MAY BE CAUSE FOR REJECTION.

Bid Proposal Submitted By:

Company Name

Street Address

City **State** **Zip**

YES / NO (circle one)

Federal I.D. No. **Contract Compliance No.** **E-Mail Address**

Contact Person **Phone No.** **Fax No.**

.

CONTACTS FOR INFORMATION CONCERNING THIS BID PROPOSAL

Solicitation No.: SA005441

Title: **TRAFFIC SIGNAL CONTROLLER EQUIPMENT UTC**

Department/Division or Agency: **FINANCE AND MANAGEMENT/ PURCHASING OFFICE**

CITY OF COLUMBUS PURCHASING OFFICE

Contact the following individuals on questions regarding specifications:

	NAME	E-MAIL.
Senior Procurement Specialist:	**Gail Messineo**	**glmessineo@columbus.gov**
Secondary Contact:	**Fred Myers**	**rfmyers@columbus.gov**

EQUAL BUSINESS OPPORTUNITY COMMISSION OFFICE

Contract Compliance Applications are available online by registering at the City of Columbus Vendor Services website: http://vendorservices.columbus.gov/e-proc/

For assistance with questions regarding ***Contract Compliance,*** telephone ***(614) 645-4764***.

Contact ***(614) 645-4764*** for assistance from an Equal Business Opportunity Specialist.

EQUAL OPPORTUNITY CLAUSE

(1) The contractor will not discriminate against any employee or applicant because of race, color, religion, sex, or national origin. The contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment without regard to their race, color, religion, sex, or national origin. Such action shall include, but not be limited to the following: employment upgrading, demotion, or termination; rates of pay or other forms of compensation; and selection for training. The contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices summarizing the provisions of this Equal Opportunity Clause.

(2) The contractor will, in all solicitations or advertisements for employees placed by or on behalf of the contractor, state that the contractor is an equal opportunity employer.

(3) It is the policy of the City of Columbus that business concerns owned and operated by minority and female persons shall have the maximum practical opportunity to participate in the performance of contracts awarded by the city.

(4) The contractor shall permit access to any relevant and pertinent reports and documents by the Executive Director for the sole purpose of verifying compliance with this article, and with the regulations of the Equal Business Opportunity Commission Office. All such materials provided to the Executive Director by the contractor shall be considered confidential.

(5) The contractor will not obstruct or hinder the Executive Director or her deputies, staff, and assistants in the fulfillment of their duties and responsibilities imposed by Article I, Title 39.

(6) The contractor and each subcontractor will include a summary of this Equal Opportunity Clause in every subcontract. The contractor will take such action with respect to any subcontract as is necessary as a means of enforcing the provisions of the Equal Opportunity Clause.

(7) The contractor agrees to refrain from subcontracting any part of this contract or contract modification thereto to a contractor not holding a valid contract compliance number as provided for in Article I, Title 39.

(8) Failure or refusal of a contractor or subcontractor to comply with the provisions of Article I, Title 39, may result in the cancellation of this contract.

ALL CONTRACTORS MUST HOLD A VALID CONTRACT COMPLIANCE CERTIFICATION NUMBER ISSUED BY THE EBOCO EXECUTIVE DIRECTOR.

For information regarding contract compliance, please contact the Equal Business Opportunity Commission Office at 614.645.4764 or online: http://eboco.ci.columbus.oh.us/

Contract Compliance Applications are available online by registering at the City of Columbus Vendor Services website: http://vendorservices.columbus.gov/e-proc/

City of Columbus Home Page: http://www. columbus.gov

INFORMATION FOR BIDDERS

SPECIAL CONDITIONS
Special conditions included in the specifications, if inconsistent with provisions included in "Information for Bidders", shall take precedence over any provisions in "Information for Bidders" to the extent inconsistent.

SUBMISSION OF PROPOSAL
Bids must be submitted on this proposal form and enclosed in a sealed envelope clearly marked with the bid name and solicitation number. Blank spaces in the proposal must be completed and phraseology of the proposal must not be changed. This document **must** be returned in its entirety and all pages **must** be in proper sequence. Additions must not be made to the items listed in the proposal and any unauthorized conditions, limitations, or provisions attached to the proposal may render the bid nonresponsive and result in its rejection. Bidders are invited to be present at the opening of the proposals.

ACCEPTANCE AND REJECTION
This proposal submitted by the bidder to the City of Columbus will be accepted or rejected within a period of 180 days from bid opening date. The City reserves the right to waive technicalities, and to request a rebid on the required material. If more than one item, prices shall be quoted on the units requested. However, each item shall be considered a separate bid and the City reserves the right to award a contract on each item separately or on all items as a whole or any combination thereof. Bidders whose proposal is made on an "All or None" basis must clearly state such fact in the proposals.

Each Invitation for Bids, Request for Statements of Qualifications, and Request for Proposals issued by the City shall state that the Bid or Request may be cancelled and that any bid or proposal may be rejected in whole or in part when it is for good cause and in the best interests of the City.

WITHDRAWAL OF PROPOSALS
Bidders may withdraw their bids at any time prior to the time specified in the advertisement as the closing time for the receipt of bids. However, no bidder shall withdraw or cancel his proposal for a period of 180 calendar days after said advertised closing time for the receipt of proposals.

DEFAULT PROVISION
In case of default by the bidder or the contractor, the City of Columbus may procure the articles or services from other sources and hold the bidder or contractor responsible for any excess costs occasioned or incurred thereby.

SIGNATURE REQUIRED
The proposal page must be signed in ink. If the bidder is a firm or corporation, insert the corporate name followed by the signature of a person authorized to sign said bid; if a partnership, indicated partnership name followed by the signature of one of the partners; if a sole proprietorship the signature of the owner is required. Where the person signing for a corporation is NOT an officer or Member of the Company, an affidavit or a resolution of the Board of Directors showing the authority of that person to bind the corporation must be furnished.

APPLICABLE LAWS
The Revised Code of the State of Ohio, the Charter of the City of Columbus, and all City ordinances insofar as they apply to the laws of competitive bidding, contracts, and purchases, are made a part hereof.

PRICING
Bidders are to quote firm or fixed prices for the duration of any contract which may be a result of this proposal unless otherwise noted in the specifications. In case of discrepancy in computing the amount of the bid, the **UNIT PRICE** quoted will govern. In the event of a conflict between the price in numbers and the price in words, the price in words will control.

Quotations are requested F.O.B. destination. If quoted F.O.B. Shipping Point include freight estimate and full value insurance cost.

CONTRACT AND BOND
The bidder to whom an award is made will be required to execute a written contract with the City of Columbus, Ohio within ten days after receiving such contract for execution, and if specified in the legal notice, furnish a good and approved bond conditioned upon the faithful performance of the same. The proposal, contract, proposal bond, (if applicable), and performance bond (if applicable) shall be in the form herein specified.

If, at any time during the continuance of the Contract, any surety shall, in the opinion of the Finance & Management Director, become irresponsible, then said Director shall have the right to require additional and sufficient surety or sureties. The Contractor shall furnish the surety or sureties to the satisfaction of the said Director, within ten (10) days after notice. In default thereof the default provision herein shall apply.

LIABILITY, INSURANCE, LICENSES AND PERMITS
Where bidders are required to enter or go onto City of Columbus property to deliver materials or perform work or services as a result of bid award, the bidder will assume full duty, obligation and expense of obtaining all necessary licenses, permits, and insurance when required. The bidder shall be liable for any damages or loss to the City occasioned by negligence of the bidder (or his agent) or any person the bidder has designated in the completion of his contract as a result of his bid.

Particular attention is directed to the statutory requirements of the State of Ohio relative to the licensing of corporation organized under the Laws of any other State.

TAXES
Federal and/or State Taxes are not to be included in prices quoted. The successful bidder will be furnished an exemption certificate if needed.

SAMPLES
Samples, when requested, must be furnished free of expense to the City and if not destroyed, will upon request be returned at the bidder's expense.

DELIVERY
Time will be of the essence for any orders placed as a result of this bid. Purchaser reserves the right to cancel such orders or any part thereof, without obligations if delivery is not made within the time(s) specified. Delivery shall be made during normal working hours and to the destination shown on the proposal.

QUALITY
Unless otherwise stated by the bidder, the proposal will be considered as being in strict accordance with the specifications outlined in the Bid Document.

References to a particular trade, manufacturer's catalog or model number are made for descriptive purposes to guide the bidder in interpreting the requirements of the City. They should not be construed as excluding proposals on other types of materials, equipment and supplies. However, the bidder, if awarded the contract, will be required to furnish the particular item referred to in the specifications or description unless a departure or substitution is clearly noted and described in the proposal.

CHANGES AND ADDENDA TO BID DOCUMENTS
Each change or addenda issued in relation to this bid document will be published on the City's Vendor Services website no less than five (5) working days prior to the scheduled bid opening date. In addition, to the extent possible, notice will be e-mailed to each person registered as having interest in the commodities selected for this bid. Total bid inquiry or specific item cancellations may be issued later than that time specified above.

WITHHOLDING OF INCOME TAX
All bidders are advised that in order for a contract to bind the City, each contract must contain the provisions found in Section 361.34 C.C.C. with regard to income taxes due or payable to the City of Columbus for wages, salaries and commissions paid to the contractor's employees as well as requiring those contractors to ensure that subcontractors withhold in a like manner.

CAMPAIGN CONTRIBUTIONS
Contractor hereby certifies the following: that it is familiar with Ohio Revised Code ("O.R.C.") Section 3517.13; that all applicable parties listed in Division (I)(3) or (J)(3) of O.R.C. Section 3517.13 are in full compliance with Divisions (I)(1) and (J)(1) of that Section; that it is eligible for this contract under the law and will remain in compliance with O.R.C. Section 3517.13 for the duration of this contract and for one year thereafter.

(INFORMATION FOR BIDDERS continued)

IN THE EVENT OF A CONTRACT

1. Where applicable according to the specifications successful seller shall transfer and deliver to City goods which conform to the specifications.
2. The City shall accept from seller goods that conform to the specifications, and shall pay for the goods in accordance with the terms of an agreement, which may result from this proposal.
3. The risk of loss from any causality to the goods regardless of the cause of the casualty shall be on seller until the goods have been delivered at the address designated in the order and are approved after inspection by the City.
4. Seller warrants and represents that seller has absolute and good title to and full right to dispose of the goods, and that there are no liens, claims, or encumbrances of any kind against the goods, and at the time of delivery shall be free from any security interests or other lien or encumbrance.
5. If there is a breach by seller of the warranty against encumbrances granted by seller in an agreement, which may result from this proposal, the City shall have the option to cancel an agreement, which may result from this proposal.
6. Seller shall defend any action brought against the City so far as the action is based on a claim that the goods, or any part of the goods, furnished under an agreement which may result from this proposal constitutes an infringement of any patent of the United States or a trademark. Seller shall be notified promptly in writing of the action and be given authority, information, and assistance, at the expense of seller, for the defense of the action. Seller shall pay all damages and costs awarded in the action. In case the goods or a part thereof are held to constitute infringement and the use of the goods or part thereof is enjoined, seller shall, at the expense of the seller, either procure for the City the rights to continue using the goods, replace the goods or a part hereof with non-infringing goods of equal or better quality, modify the goods so that the goods become non-infringing while continuing to meet or exceed the original specifications, or retake the goods and refund the purchase prices and the transportation and installation costs of the goods at the option of the City.
7. Seller warrants that (1) the goods to be supplied pursuant to an agreement which result from this proposal are fit and sufficient for the purpose intended, (2) the goods are merchantable, of a good quality, and free from defects, whether patent or latent, in material or workmanship and (3) the goods sold to the City pursuant to an agreement which may result from this proposal conform to the specifications. The particular purpose of which the goods are required may be set forth in the specifications.
8. The benefit of any warranty made in an agreement which may result from this proposal by seller shall extend to the City and to the employees of the City, any employee of the City may bring an action directly against seller for damages or injuries sustained by the employee resulting from any breach of warranty by seller.
9. All goods ordered shall be subject to final inspection and approval at the facility of the City designated for delivery. Any goods, which do not conform to the order of the City, may be rejected by the City. The City may hold any goods rejected pending instructions from the seller or the City may return goods to seller at seller's expense.
10. If any tender or delivery by seller is rejected by the City for nonconformity, no notice of intention to cure can be effective unless it is received by the City agency within five (5) days after notice of rejection is sent to seller.
11. The liability of the City for either non-acceptance of conforming goods or repudiation of the agreement which might result from this proposal shall be limited to the difference between the market price at the time and place for tender of the goods and the unpaid sales price together with any incidental damages, but less expenses paid in consequence of the breach by the City.
12. An agreement which may result from this proposal shall not be modified or altered by any subsequent course of performance between parties or by additional terms contained in any subsequent documents unless said additional or differing terms are incorporated by contract modification authorized to be entered into by ordinance.
13. Contractor shall protect, indemnify and save the City harmless from and against any damage, cost, or liability, including reasonable attorneys' fees, resulting from claims for any or all injuries to persons or damage to property arising from intentional, willful or negligent acts or omissions of Contractor, its officers, employees, agents, or Subcontractors.
14. This Contract may not be assigned or otherwise transferred to others by the Contractor without the prior written consent of the City. If this Contract is so assigned, it shall inure to the benefit of and be binding upon any respective successors and assigns (including successive, as well as immediate, successors and assignees) of the Contractor**.**
15. The signatories to this Contract represent that they have the authority to bind themselves and their respective organizations to this Contract.

LOCAL CREDIT

Pursuant to City of Columbus Ordinance # 2607-2012, in determining the lowest bid for a contract the local bidder credit will not be applied.

ENVIRONMENTALLY PREFERABLE PURCHASING

In evaluating bids or offers for materials, supplies, equipment, construction and services, preference will be given to an environmentally preferable bidder who offers a product or service equal to or superior to that of a non-environmentally preferable bidder or offeror and that the environmentally preferable bid or offer does not exceed by more than 5% (up to a maximum of $20,000) the lowest responsive and responsible and best bid from any non-environmentally preferable bid or offer. The environmentally preferable bidder will be required to demonstrate to the city agency procuring the product or service how their bid is equal to or superior to that of a non-environmentally preferable bidder. Where the bidder or offeror is local, the applicable credit for a local bidder or offeror shall be calculated first.

CERTIFICATE OF TITLE ON EQUIPMENT

If applicable to this purchase, all documents required to obtain a State of Ohio Certificate of Title **must** be delivered to:

Fleet Management Administrator
City of Columbus/Fleet Management Div.
4211 Groves Road
Columbus, Ohio 43232

After signature by the Fleet Management Administrator, an original title is to be delivered to the above address within three (3) days. No payment for vehicles requiring a title will be authorized by the Fleet Management Administrator until a valid title is received.

REMEDIES

All claims, counterclaims, disputes and other matters in question between the City, its agents and employees, and the Contractor arising out of or relating to this agreement or its breach will be decided in a court of competent jurisdiction within the County of Franklin, State of Ohio.

OFFERORS TERMS AND CONDITIONS

Terms and conditions, submitted with this proposal, which are contrary to City Code or Charter shall be disregarded for the purpose of any subsequent contract. The successful bidder shall be notified as to which terms and conditions, if any, have been deleted.

SPECIFICATIONS FOR THE CITY OF COLUMBUS
TRAFFIC SIGNAL CONTROLLER EQUIPMENT

1.0 SCOPE AND CLASSIFICATION

1.1 **SCOPE:** The City of Columbus is seeking bids for Traffic Signal Controller Equipment to be installed at traffic signals throughout the City of Columbus. It is the intent of this bid proposal to provide a "firm offer for sale" blanket type contract(s). The contract(s) shall be in effect from and after its execution by the City to and including May 31, 2017.

1.2 **CLASSIFICATION:** The purpose of this specification is to describe minimum, acceptable design and operating requirements for Traffic Signal Controllers, Control Cabinets, and Spread Spectrum Radio Systems. The items must be compatible with, interchangeable with, and functionally identical to the Department of Public Service's Econolite Closed Loop Signal System for Items 1-6, 10, 22, 35, 37, 39, 41, 43, 45, 46, 48-50, and 61-63. It is the intent to award Items 56-60 together and item 61-63 together, and to make the award to the bidder that is overall the low bid for the group of items.

1.2.3. **Specification Questions:** Questions regarding this bid must be sent by in writing via email to vendorservices@columbus.gov no later than 11:00 a.m. (local time) on June 9, 2014. Reponses will be posted as an addendum to this bid on the City's website (vendorservices.columbus.gov) no later than 11:00 a.m. (local time) on June 12, 2014. See section 6.5 for additional details.

2.0 APPLICABLE PUBLICATIONS AND STANDARDS

2.1 City of Columbus Ohio Construction and Material Specifications, current edition.

2.2 National Electrical Manufacturers Association (NEMA) Standards Publication TS-1-1989 (R1994), Parts 1, 2, 5, 6, 8, 13 & 14; TS-2-2003 (R2008).

2.3. Ohio Manual of Uniform Traffic Control Devices (OMUTCD)

2.4. Manual of Uniform Traffic Control Devices (MUTCD

3.0 REQUIREMENTS

3.1 GENERAL REQUIREMENTS

3.1.1 **Term:** The proposed contract shall be in effect from the date of contract execution up to and including May 31, 2017.

3.1.2 **Annual Extension:** Subject to mutual agreement, the period covered by the ensuing contract, under the same terms and conditions stated therein can be extended for two (2) additional one-year periods, or portion thereof, at the same pricing and subject to the escalator clause stated herein.

3.1.3 **Pricing:** The bidders are requested to bid firm or fixed prices. However, the following escalator/de-escalator clauses may be applied:

3.1.3.1 **Escalator Clause:** Price adjustments shall not be granted during the first nine (9) months duration of an awarded contract. No more than two increases may occur within any year of the contract. In the event the supplier receives a general price increase in the cost of the finished product contracted for, due to an increase in the cost of raw materials, labor, freight, etc., upon giving thirty (30) days prior notice and proper documentation as proof, said increase in addition to the unit price quoted herein, may be permitted, subject to the sole discretion of the City of Columbus Finance and Management Director. In the event any such increase is granted, no price adjustment shall be permitted on orders received by supplier, which are in the process or filled but waiting shipment prior to the increase. All price decreases inure to the benefit of the City of Columbus.

3.1.3.2 The supplier shall submit the following documentation with each request for a price increase:

3.1.3.2.1 Copies of the old and current price lists or similar documents which indicate the original base cost of the product to the supplier and the corresponding increase; and

3.1.3.2.2 Copies of correspondence sent by the supplier's supplier explaining the source of the increase in such areas of raw materials, freight, fuel or labor, etc.; and

3.1.3.2.3 Copies of excerpts from business publications, market quotations or trade journals recognized as being representative of their particular trade or industry, that indicate a trend toward an increase in the current market for the commodities under the awarded contract.

3.3.2.4. The written notice and following documentation shall be sent to: City of Columbus, Purchasing Office, Attn: Gail Messineo, 1st Floor, 77 North Front Street, Columbus, Ohio 43215.

3.1.3.3 **De-Escalator Clause:** Should there be any decrease in the cost of finished product due to a general decline in the market or some factor, the City of Columbus, Purchasing Office shall be notified immediately and the resulting adjustment will be incorporated into the awarded contract and made a part thereof.

3.1.4 **Quantity Estimates:** All quantities shown on page 5's of this proposal are estimates of the annual needs of the city and are for bidding purposes only.

These quantity estimates are not to be construed as representing an actual order for the amount or guarantee that any minimum amount will actually be ordered. The city reserves the right to buy up to twice the estimated quantity.

3.1.5 **Right of Cancellation:** If at any time during the term of the contract the supplier's total request(s) for price increase(s) are greater than fifteen percent (15%), the City of Columbus may cancel this agreement with thirty (30) days written notification.

3.2 **Traffic Signal Controller and Cabinet Assembly Equipment**

3.2.1 ITEM 1 - Eight Phase Menu-driven Controller with Time Based Coordination (3.4)

3.2.2 ITEM 2 – Eight Phase Controller Only Ready for Closed Loop System Operation (3.5)

3.2.3 ITEM 3 - Closed Loop System On-Street Master (3.13)

3.2.4 ITEM 4 - Fiber-Optic Modem (3.14)

3.2.5 ITEM 5 – Fiber-Optic Communications Wiring Panel (3.15)

3.2.6 ITEM 6 – Twisted Pair Closed Loop Signal System Telemetry Module (3.16)

3.2.7 ITEM 7 - Conflict Monitor, 3 Channel (3.6)

3.2.8 ITEM 8 - Conflict Monitor, 6 Channel (3.6)

3.2.9 ITEM 9 - Conflict Monitor, 12 Channel (3.6)

3.2.10 ITEM 10 – Controller Item – Internal Ethernet Module ASC 3 (3.10)

3.2.11 ITEM 11 - Control Cabinet Only, Pole-Mount, Size K (3.7)

3.2.12 ITEM 12 - Control Cabinet Only, Pole-Mount, Size M-30 (3.7)

3.2.13 ITEM 13 - Control Cabinet Only, Base-Mount, Size M-30 (3.7)

3.2.14 ITEM 14 - Control Cabinet Only, Pole-Mount, Size M-36 (3.7)

3.2.15 ITEM 15 - Control Cabinet Only, Base-Mount, Size M-36 (3.7)

3.2.16 ITEM 16 - Control Cabinet Only, Base-Mount, Size P-38 (3.7)

3.2.17 ITEM 17 - Control Cabinet Only, Base-Mount, Size P-44 (3.7)

3.2.18 ITEM 18 - Box Extender, 12” for M-30 Base-Mount Cabinet (3.7)

3.2.19 ITEM 19 - Box Extender, 30” for M-30 Base-Mount Cabinet (3.7)

3.2.20 ITEM 20 - Box Extender, 12” for M-36 Base-Mount Cabinet (3.7)

3.2.21 ITEM 21 - Box Extender, 30” for M-36 Base-Mount Cabinet (3.7)

3.2.22 ITEM 22 - Box Extender,12” for P-38 Base-Mount Cabinet (3.7)

3.2.23 ITEM 23 - Box Extender, 30” for P-38 Base-Mount Cabinet (3.7)

3.2.24 ITEM 24 - Box Extender, 12” for P-44 Base-Mount Cabinet (3.7)

3.2.25 ITEM 25 - Box Extender, 30” for P-44 Base-Mount Cabinet (3.7)

3.2.26 ITEM 26 - Pole-Mount Control Cabinet with Four (4) Position Back Panel, Size K (Complete Assembly **without Controller**, including Conflict Monitor and MUTCD Flash Synchronizer Device) (3.6, 3.7, 3.8, 3.9)

3.2.27 ITEM 27 - Pole-Mount Control Cabinet with Eight (8) Position Back Panel, Size M-30 (Complete Assembly **without Controller**, including Conflict Monitor and MUTCD Flash Synchronizer Device) (3.6, 3.7, 3.8, 3.9)

3.2.28 ITEM 28 - Pole-Mount Control Cabinet with Eight (8) Position Back Panel, Size M-36 (Complete Assembly **without Controller**, including Conflict Monitor and MUTCD Flash Synchronizer Device) (3.6, 3.7, 3.8, 3.9)

3.2.29 ITEM 29 - Base-Mount Control Cabinet with Eight (8) Position Back Panel, Size M-30 (Complete Assembly **without Controller**, including Conflict Monitor and MUTCD Flash Synchronizer Device) (3.6, 3.7, 3.8, 3.9)

3.2.30 ITEM 30 - Base-Mount Control Cabinet with Eight (8) Position Back Panel, Size M-36 (Complete Assembly **without Controller**, including Conflict Monitor and MUTCD Flash Synchronizer Device) (3.6, 3.7, 3.8, 3.9)

3.2.31 ITEM 31 - Base-Mount Control Cabinet with Twelve (12) Position Back Panel, Size P-38 (Complete Assembly **without Controller**, including Conflict Monitor and MUTCD Flash Synchronizer Device) (3.6, 3.7, 3.8, 3.9)

3.2.32 ITEM 32 - Base-Mount Control Cabinet with Twelve (12) Position Back Panel, Size P-44 (Complete Assembly **without Controller**, including Conflict Monitor and Flash Synchronizer Device) (3.6, 3.7, 3.8, 3.9)

3.2.33 ITEM 33 - Pole-Mount Control Cabinet with Eight (8) Position Back Panel, Size M-30 (Complete Assembly **without Controller**) Ready for Closed Loop System Operation (3.6, 3.7, 3.8, 3.9)

3.2.34 ITEM 34 - Pole-Mount Control Cabinet with Eight (8) Position Back Panel, Size M-30 (Complete Assembly **without Controller**) Ready for Fiber-Optic Closed Loop System Operation (3.6, 3.7, 3.8, 3.9)

3.2.35 ITEM 35 - Pole-Mount Control Cabinet with Eight (8) Position Back Panel, Size M-36 (Complete Assembly **without Controller**) Ready for Closed Loop System Operation (3.6, 3.7, 3.8, 3.9)

3.2.36 ITEM 36 - Pole-Mount Control Cabinet with Eight (8) Position Back Panel, Size M-36 (Complete Assembly **without Controller**) Ready for Fiber-Optic Closed Loop System Operation (3.6, 3.7, 3.8, 3.9)

3.2.37 ITEM 37 - Base-Mount Control Cabinet with Eight(8) Position Back Panel, Size M-30 (Complete Assembly **without Controller**) Ready for Closed Loop System Operation (3.6, 3.7, 3.8, 3.9)

3.2.38 ITEM 38 - Base-Mount Control Cabinet with Eight (8) Position Back Panel, Size M-30 (Complete Assembly **without Controller**) Ready for Fiber-Optic Closed Loop System Operation (3.6, 3.7, 3.8, 3.9)

3.2.39 ITEM 39 - Base-Mount Control Cabinet with Eight (8) Position Back Panel, Size M-36 (Complete Assembly **without Controller**) Ready for Closed Loop System Operation (3.6, 3.7, 3.8, 3.9)

3.2.40 ITEM 40 - Base-Mount Control Cabinet with Eight (8) Position Back Panel, Size M-36 (Complete Assembly **without Controller**) Ready for Fiber-Optic Closed Loop System Operation (3.6, 3.7, 3.8, 3.9)

3.2.41 ITEM 41 - Base-Mount Control Cabinet with Twelve (12) Position Back Panel, Size P-38 (Complete Assembly **without Controller**) Ready for Closed Loop System Operation (3.6, 3.7, 3.8, 3.9)

3.2.42 ITEM 42 - Base-Mount Control Cabinet with Twelve (12) Position Back Panel, Size P-38 (Complete Assembly **without Controller**) Ready for Fiber-Optic Closed Loop System Operation (3.6, 3.7, 3.8, 3.9)

3.2.43 ITEM 43 - Base-Mount Control Cabinet with Twelve (12) Position Back Panel, Size P-44 (Complete Assembly **without Controller)** Ready for Closed Loop System Operation (3.6, 3.7, 3.8, 3.9)

3.2.44 ITEM 44 - Base-Mount Control Cabinet with Twelve (12) Position Back Panel, Size P-44 (Complete Assembly **without Controller**) Ready for Fiber-Optic Closed Loop System Operation (3.6, 3.7, 3.8, 3.9)

3.2.45 ITEM 45 – Internal Ethernet Module ASC/2 (3.17)

3.2.46 ITEM 46 - Base-Mount Cabinet with Twelve (12) Position Back Panel, Size P-44 (Complete Assembly **without Controller and Master**) Ready for Closed Loop System Operation and Pre-Wired for Closed Loop System Master (3.6, 3.7, 3.8, 3.9)

3.2.47 ITEM 47 - Base-Mount Control Cabinet with Twelve (12) Position Back Panel, Size P-44 (Complete Assembly **without Controller and Master**) Ready for Fiber-Optic Closed Loop System Operation and Pre-Wired for Closed Loop System Master (3.6, 3.7, 3.8, 3.9)

3.2.48 ITEM 48 – Econolite ASC 25 PIN FSK Telemetry Module (3.18)

3.2.49 ITEM 49 - Fiber-Optic Closed Loop Signal System Telemetry Module (3.19)

3.2.50 ITEM 50 – Railroad Pre-emption Interface Panel (3.20)

3.2.51 ITEM 51 – Amplifier Cabinet & Pedestal, 41 in x 25 in x 16 in (3.21)

3.2.52 ITEM 52 - Amplifier Cabinet & Pedestal, 51 in x 25 in x 16 in (3.22)

3.2.53 ITEM 53 – Amplifier Cabinet, base mount, 50 IN x 30 IN x 17 IN (3.23)

3.2.54 ITEM 54 – Amplifier Cabinet, base mount, 50 IN x 36 IN x 17 IN (3.25)

3.2.55 ITEM 55 – Amplifier Cabinet, base mount, 55 IN x 44 IN x 26 IN (3.25)

3.2.56 ITEM 56 – UPS Cabinet large (P-UPS), 8-phase base-mount with UPS System (3.26)

3.2.57 ITEM 57 – External UPS cabinet and system, base-mount (3.26)

3.2.58 ITEM 58 – UPS batteries (3.26)

3.2.59 ITEM 59 – External UPS Cabinet, base-mount, cabinet only (3.26)

3.2.60 ITEM 60 – UPS Cabinet Large (P-UPS), 8-phase base-mount, cabinet only (3.26)

3.2.61 ITEM 61 – GE MDS Transnet Spread Spectrum Radio System (3.27)

3.2.62 ITEM 62 – Intuicom Communicator II Spread Spectrum Radio System (3.27)

3.2.63 ITEM 63 – Omnidirectional Antenna (3.27)

3.2.64 ITEM 64 – Spread Spectrum Radio Training (3.28)

3.3 **Product Requirements**

3.3.1 Service Documentation:

3.3.1.1 The supplier shall provide the following with the first shipment of the awarded item(s), where applicable:

- Wiring diagram – one per unit delivered;
- Service manual – one per unit delivered; and
- Instructional manual – on per unit delivered.

This provision will be satisfied once ten (10) sets of documentation has been provided per awarded bid item(s). All costs associated with these diagrams and manuals shall be incidental to the bid item price. The supplier shall clearly note any variations, changes, additions, or other modifications on the diagram and manuals that are appropriate to reflect exact equipment to be provided.

3.3.1.2 The delivery of each item, which includes a Traffic Signal Cabinet Assembly described in Section 3.8 shall include the documentation described in Section 3.8.43

3.3.1.3 The operation/maintenance manuals shall include the following:

- General Description;
- Installation Procedures;
- Adjustments;
- Theory of Operation:
  - System Description including block diagram;
  - Detailed Circuit Description
- Maintenance:
  - Preventive Maintenance;
  - Field Trouble Analysis;
  - Bench Trouble Analysis;
  - Troubleshooting Analysis Chart;
  - Wave Forms;
  - Voltage Measurements;
  - Voltage Measurement Chart;
  - Alignment;
- Parts List;

- Electrical Interconnection Drawing;
- Schematic and Logic Diagram;
- Assembly Drawings and a Pictorial Diagram showing physical locations and identification of each component.

3.3.2 **Serviceability:** The equipment shall be designed so that it can be easily installed and maintained by the City. Parts shall be labeled on the circuit board, so that they may be easily identified for a cross reference to parts list and schematic drawing (e.g. R1, R2, C1, etc). Fault location, accessibility and serviceability features for simplified maintenance is desired, Modules or components shall be accessible under field maintenance conditions. For ease in troubleshooting the controller unit the rear of each module connector point on the mother board shall be directly accessible. For maintenance purposes it shall be possible to operate the controller unit with the mother board exposed. The bidder shall provide two (2) sets of extender cables or extender cards of sufficient length to allow simultaneous access of each board in the equipment supplied.

3.3.3 **Quality:** The electronic equipment furnished for this contract shall be new, first quality, and of the latest design. All components on any equipment shall be amply de-rated with regard to heat dissipating capacity and rated voltage so that, with maximum ambient temperatures and maximum applies voltage, a material shortening of life or shift in values shall not occur. The design life for all components under 24 hour a day operating conditions in their circuit applications shall exceed ten (10) years. This equipment shall conform with all applicable requirements of good engineering practices for design and construction, and shall utilize the latest available techniques, and shall contain a minimum number of different parts, sub-assemblies, circuits, cards, and modules throughout to maximize commonality.

3.3.4 The control equipment shall be solid-state design using modern integrated circuits and computer technology to the fullest extent feasible.

3.3.5 The supplier shall provide a certified letter from an independent testing laboratory stating that the controller, conflict monitor, load switch units, and AC line filters have been successfully tested according to the NEMA TS-1 and TS-2 standards (as stated within these specifications). Any redesign or changes of any type including any component changes which would make the bid control equipment not identical to the tested control equipment shall require the above equipment to be re-certified.

3.4 Controller Unit Product Requirements (Applies To ITEMS 1 and 2 on the Cost Proposal page and Section 3.2 of these specifications)

3.4.1 All controller units shall be complete units of menu-driven design, complying with the applicable sections of the NEMA Standards Publication No. TS2-2003,R 2008) for TS2-Type 2 (A-2) controllers.

3.4.2 Provide a controller unit with all ports and input/output connectors for complete interchangeability between NEMA TS-1 and TS-2 cabinets. Controller firmware shall be NTCIP compliant and compatible and contain a functional Ethernet port. Include the telemetry module port 3B, 25-pin. All software related to this item is to be pre-installed or be included with this bid item, including all software licenses. All firmware, software and MIBS shall be compatible with the CENTRACS Central System Software (most current version).

3.4.3 Shall be NEMA 8 phase, dual ring capability with four pedestrian movements, 4 overlaps, and the ability to program an exclusive pedestrian movement. Shall be capable of programming for sequential phasing operation.

3.4.4 Controller shall be suitable for shelf mounting

3.4.5 An instruction manual shall be supplied with each controller;

3.4.6 Shall be Solid-state microprocessor design using solid state digital electronic timing circuits;

3.4.7 All printed circuit boards shall be wave soldered, clear of flux, clear coated, and have silk screened component identification. Optionally, the components may be surface-mount attachment, rather than wave-soldered;

3.4.8 Construction shall be modular by function. Modular by function is defined as having more than one printed circuit board (PCB). One of the PCB's shall be the power supply PCB, which supplies various DC voltage required for internal controller circuitry, +24 VDC voltage for controller I/O circuits, a regulated +24 VDC voltage for external use, battery charging and control circuit overload fuses, and monitoring circuits. All other functions may be combined on one board, but not including the power supply. Electrical contact between the various printed circuit boards shall be through edge connectors or other easily disconnected method to facilitate troubleshooting;

3.4.9 Every indicator, keyboard button, switch, MS connector, fuse, module, etc., shall be appropriately labeled. Such labeling shall be on the item or adjacent to its location by silk screen method;

3.4.10 Front Panel and Controller Menu

3.4.10.1 The operator programming and data retrieval shall be made by means of menu-driven display and keyboard located on the front of the unit.

3.4.10.2 Provide at minimum a sixteen-line by 40-character/per line display on front panel. Controller display shall have backlighting by light emitting diodes for ease of viewing. Display contrast shall be adjustable with front panel mounted push buttons. Display shall have a heater option for cold weather environments.

3.4.10.3 The use of user potentiometers for display contrast shall not be acceptable. All parameters displayed on the LCD shall be true units, i.e. 3.5 seconds of passage shall be displayed as “3.5”, not as “35”. The display of “35” would be sufficient if it includes an indication the parameter is divided by ten (10), i.e. the above example would show “PASS/10 alongside the “35”. The display shall operate over the NEMA temperature range of -34° F to 165° F;

3.4.10.4 The keyboard shall be designed to resist the intrusion of moisture and dirt into the keyboard mechanism or any other internal workings of the controller unit. The keyboard shall operate over the NEMA temperature range of -34° F to 165° F. The keyboard keys shall provide tactile feedback (feel a click in the switch when activated). Changing a controller parameter through the keyboard shall be accomplished by the following procedure:

- Position the curser on the datum to be changed;
- Enter the new data on the keyboard;
- Press <ENTER> key at which time the data is checked for validity and entered in EEPROM memory (if Valid)

3.4.10.5 The keyboard shall include necessary keys to facilitate operation of the menu-driven program. Keys shall include curser arrow keys;

3.4.10.6 A serial port shall be provided to allow the transfer of data, printing of data, and uploading/downloading data between the controller and an IBM-compatible computer. In order to facilitate the connection, the supplier shall provide two (2) cables with connectors between the controller and an IBM-type 9 pin serial port. The supplier shall provide one copy of the current software on CD-ROM for an IBM-compatible computer to accommodate the interface with their controller. The software shall operate on VGA displays. This software shall not be copy-protected and the Division of Planning and Operations shall be authorized to freely copy the software for use on any of its computers. The supplier shall automatically supply new versions of this software to the City, if it should be updated during the two (2) year warranty period.

3.4.10.7 Controller shall have a fully functional Ethernet port. Any software required for Ethernet functionality shall be pre-installed or included with the controller.

3.4.10.8 Every front panel connector on the control unit shall be present and fully wired. This includes the MS-A, MS-B, MS-C, D connector, RS-232C serial port(s) and Ethernet port;

3.4.10.9 Minimum requirements for the menu-driven function of the controller are:

3.4.10.10 A base menu that includes the most general category choices (such as program mode and run mode). Once a base menu option has been chosen, a submenu appears listing further choices. As subsequent choices are made, additional submenus shall appear until the user is at the level to view or change particular portions of the unit's data or operating parameters. (Base menu may be represented by separate keys on controller). Multiple layered confusing menus shall not be allowed. The use of shift keys to address menus shall not be allowed; Menus and display shall operate such that a user familiar with traffic terminology, but unfamiliar with the display can successfully operate the display by following menu selections. English language shall be used;

3.4.10.11 Display shall be dynamic to show the operational status of the controller and it shall be possible to move from the status screen to the appropriate programming screen and return after programming is complete.

3.4.10.12 Programming shall be via keyboard entry on the front panel, downloading via telemetry from a system master connected to a host PC and/or downloading from a PC via a serial cable or Ethernet port and from an Econolite Centracs central system from the City Traffic Management Center.

3.4.10.13 Full-vehicular and pedestrian-actuated and volume/density timing functions for each phase;

3.4.10.14 A display(s) to show phase(s) in service, phase(s) next to be serviced, presence of vehicle and pedestrian calls, and vehicular actuation;

3.4.10.15 A display(s) shall show the interval status of the active phase in each ring on the front panel by using indicators or by use of text and/or graphical display;

3.4.10.16 There shall be one display that shows the countdown status of the relevant intervals currently timing. These intervals are MINIMUM GREEN, WALK, WALK II, PEDESTRIAN CLEARANCE, PEDESTRIAN CLEARANCE II, MAX I, MAX II, MAX III, PASSAGE I, PASSAGE II, YELLOW CLEARANCE, and RED CLEARANCE for each ring. Units which simultaneously show these timings for both Ring 1 and Ring 2 are preferred;

3.4.10.17 The reason for phase termination (GAP OUT, FORCE OFF, or MAX OUT) shall be indicated through the yellow change interval;

3.4.10.18 Time setting controls shall have time setting increments programmable in 1.0 seconds or 0.1 second units as applicable to its functional range. Minimum time setting ranges shall be from zero or 1.0 second to 25.5 or 255 seconds as applicable to its function;

3.4.10.19 Dual ring controllers shall be capable of simultaneous gap out. This allows a phase to enter and time the passage interval from a rest state when a vehicular actuation is received even though a call exists on a conflicting phase(s);

3.4.10.20 The walk output shall cause the walk display on a pedestrian signal unit to be continuously illuminated during the walk interval;

3.4.10.21 Max recall shall be capable of being forced off after minimum green and pedestrian intervals have timed out;

3.4.10.22 When the controller is resting in any phase green and the controller receives simultaneous vehicular and/or pedestrian calls on two (2) or more conflicting phases, the phase served next shall be the next in the NEMA phase sequence. For example, if a single ring controller is resting in phase 3 green and simultaneous calls are received on phase 2 and phase 4 (phase 1 skipped), the phase sequence shall be phase 4 then phase 2 not vice versa. If a dual ring controller, resting in phase 2 and phase 6 green, receives simultaneous calls on phase 5, phase 3, and phase 8, then the controller shall advance to phase 3 and phase 8 and not go to phase 2 and phase 5 before phase 3 and phase 8 are serviced;

3.4.10.23 If the controller is resting in green for any phase(s) and if simultaneous calls are received by the phase(s) resting in green and any conflicting phase(s), then the controller shall remain in the phase(s) which was/were resting in green by returning to the passage interval of those resting phase(s). The controller shall not advance to the conflicting phase(s) until the resting (now active) phase(s) gap out or max put;

3.4.10.24 Time Base Coordination (TBC) shall be provided with each controller. This shall be achieved as a built-in feature (internally programmed). It shall be possible to read the TBC timing parameters but not change them unless an access code has been input. The TBC function shall be capable of:

3.4.10.25 Providing local controller coordination via time base methods.

3.4.10.26 Providing coordinated control through the selection of traffic plans using a minimum of 120 coordination patterns. Each pattern shall allow selection of an independent cycle length, offset value and split pattern. The coordination patterns shall be selected using telemetry (system), hardwire, or non-interconnected (TBC) coordination commands. Offset and Split values shall be entered in either seconds or percentage.

3.4.10.27 One cycle length shall be provided for each coordination pattern. The cycle length shall be adjustable over a range of 30-999 seconds in 1-second increments.

3.4.10.28 Providing a minimum of two (2) selectable methods of offset adjustment: dwell and smooth (short way).

3.4.10.29 Providing a gradual transition from free operation to coordinated operation.

3.4.10.30 Automatically adjusting for leap year and shall be programmable to automatically switch to daylight savings time.

3.4.10.31 Display upon demand all RAM data including current time (hours, minutes, seconds), current plan (cycle, split, offset) , day of week or day number, and date (month, day, year) or week number.

3.4.10.32 During normal operation, the TBC clock shall use the power line frequency as its time base. When power is removed, the time shall be maintained by a crystal oscillator for up to 30 days. The oscillator shall have a timing accuracy of +/- 0.005% over the entire NEMA temperature range as compared to the Universal Coordination Time Standard.

3.4.10.33 Calculation of the FORCE OFF's shall not be required.

3.4.10.34 The controller shall have a time reset input. This feature shall reset the TBC clock to midnight = 0000 whenever the time reset input is TRUE.

3.4.10.35 Providing all front panel controls and indicators.

3.4.10.36 Allowing phase coordination via the actuated or non-actuated mode.

3.4.10.37 The controller shall provide a minimum of ten preemption sequences that can be programmed as either railroad –fire-emergency or bus vehicle preemption sequences. Preemption capability shall be standard and shall not require additional modules or software.

3.5 Closed Loop Signal System Controller Unit Product Requirements (ITEM 2 on the Cost Proposal page and Section 3.2 of these specifications)

3.5.1 This item shall meet all the provisions of the above specifications for Controller Units (Section 3.4).

3.5.2 This item shall be functionally identical to and interchangeable with the City of Columbus Econolite Closed Loop Signal System.

3.5.3 Controller shall include the telemetry module for the closed loop system. All applicable software shall be included. Include fully functional Ethernet port and all software related to this item.

3.6 **Conflict Monitor and Conflict Monitor Harnesses Product Requirements (Applies to ITEMS 7, 8, 9, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 46 and 47 on the Cost Proposal page and Section 3.2 of these specifications).** Units shall conform to the provisions of NEMA TS1, Part 6 for conflict monitors. Each conflict monitor shall be provided with appropriate harness(es).

3.6.1.1 Each unit shall also have the following non-selectable features:

3.6.1.2 Remote Flash Input - allows remote flash selection without using controller voltage monitor;

3.6.1.3 DC Red Monitor Inhibit Input - used with soft flash to inhibit red monitor by DC output, without need of a level converting relay.

3.6.1.4 Internal Diagnostics – tests electronics: Display, RAM, PROM, etc.;

3.6.1.5 After a power interruption, as defined by NEMA, the conflict monitor shall cause the intersection signals to flash for 10 seconds (time setting controls shall use digital timing techniques) before the initialized controller unit takes control of the intersection;

3.6.1.6 In addition to indicators required by NEMA, the monitor shall have separate indicators for RED, YELLOW, GREEN, and WALK for each channel and a separate indicator to indicate that a red failure occurred. The channel indicators shall be “on” when the channel is active, involved in a conflict, or involved in a red failure situation;

3.6.1.7 The conflict monitor shall monitor for the absence of voltage on all of the inputs of a channel (output side of load switch);

3.6.1.8 All indications (or lack of indications) at the time of a failure shall be latched and viewable until the conflict monitor unit is reset;

3.6.1.9 All conflict monitor circuit boards shall be wave soldered, clear of flux, coated, and have silk screened component identification;

3.6.1.10 The conflict monitor signal output circuit shall not use a diode bridge for signal conflict detection;

3.6.2.0 The conflict monitor shall have the following “NEMA PLUS” features available as switch selectable options:

3.6.2.1 Minimum Clearance - times the yellow clearance to insure that it is present. The minimum time shall either be fixed internally at some point between 2.6 and 3.0 seconds or be selectable via a front panel digital timing switch with incremental settings of 1/10 second between two (2) and five (5) seconds;

3.6.2.2 Watch Dog Timer - monitors flashing logic to ensure controller processor is running;

3.6.2.3 GREEN or WALK vs. YELLOW Monitor - monitors display within any channel (per unit enable);

3.6.2.4 GREEN or WALK or YELLOW vs. RED Monitor - monitors display within any channel (per channel enable);

3.6.2.5 CVM Fail Latch - Latches controller voltage monitor failures (must reset unit to clear failure);

3.6.2.6 24 Volt DC Latch - latches 24 VDC voltage monitor failures (must reset unit to clear failure);

3.6.2.7 Red Fail GREEN, YELLOW, RED Only - WALK alone cannot prevent a red failure;

3.6.2.8 Fault Re-initialize - monitor automatically re-initializes the controller after a failure has been cleared. Operates on self-correcting failures or latched failures after the reset button has been pushed.

3.6.2.9 LED guard function by selectable dip switch

3.6.3.0 The unit (conflict monitor) shall have the following enhanced logging and reporting features:

3.6.3.1 Internal clock for time keeping and data logging;

3.6.3.2 An Liquid Crystal Display for time, date, messages and unit status;

3.6.3.3 Real time mode shows status of switches, jumper card programming and unit modifiers;

3.6.3.4 Non-volatile storage of at least nine (9) most faults that caused the unit to trigger. Record of the faults shall include the time and date, fault status and the indications present (or absent) at the time of the failure;

3.6.3.5 There must be at least two (2) deliberate steps to clear the message buffer, in order to prevent inadvertent erasure;

3.6.3.6 If an RS-232C port is included for output to an IBM-type personal computer or as a printer port to print intersection identification, time and date of printout, contents of the message log, compatibility jumper card programming and the programming of the option DIP switches, the successful bidder shall provide six (6) cables to facilitate the connectors between the conflict monitor and an IBM-type 25 pin serial port. Two (2) cables shall have the connectors between the conflict monitor and a standard serial printer.

3.7 **Traffic Signal Control Cabinet Product Requirements (Applies to ITEMS 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 46 and 47 on the Cost Proposal page and Section 3.2 of these specifications)** Traffic Signal Control Cabinets shall comply with the following provisions:

3.7.1.0 The main cabinet door shall be keyed to the City of Columbus Master, Corbin Key No. 2 (IR 6380). The police panel door lock shall be keyed to the City of Columbus Master, brass Corbin Police Panel Key No. 0357SG. All key holes shall be covered with a swivel cover;

3.7.2.0 The cabinet shall be made from .125 inch thick aluminum sheeting in its natural color and shall be painted white on the inside. The inside of the cabinet shall be treated with a three (3) stage iron phosphate coating, then a zinc chromate primer coating, then a baked white alkali enamel finish shall be applied. All coatings shall be properly dried and applied such that the inside white paint will not peel for a guaranteed period of two (2) years. All exterior seam welds shall be continuously welded. Exterior seams which have interior welds shall be sealed with a 15 to 20 year silicone sealer. All edges shall be smooth with no sharp edges. The cabinet door shall be hinged using a heavy gauge continuous hinge that has a stainless steel hinge pin. The hinge shall be bolted to the cabinet so the door can be removed. The bolts and nuts shall be made of stainless steel and securely fastened to prevent vibrations from loosening the nuts. The door shall be equipped with a three (3) point latching mechanism, a stainless steel handle which can be padlocked, and sealed with a neoprene gasket. The door frame opening shall be flanged on all four (4) sides.

3.7.3.0 The door shall be designed such that the door can be locked automatically in an open position at 90°, 135°, and 180° to the cabinet face (nominal values). On pole-mount and pedestal-mount cabinets, the mechanism shall be at the bottom of the door.

3.7.4.0 The cabinet shall provide for convection and forced air ventilation. There shall be thermostatically controlled (adjustable control from a range of 70° F to 160° F) fan to exhaust air through screened vent(s) near the top of the cabinet. The fan with roller or ball bearings for a size K or size M cabinet shall be capable of a nominal airflow of 100 cubic feet per minute. The fan system with roller or ball bearings for a size P-38

or size P-44 cabinet shall be capable of a nominal airflow of 200 cubic feet per minute.

3.7.5.0 All inlet openings shall be provided with a frame to hold removable/replaceable air filters. A filter will be provided for each inlet opening. The filter for "K" cabinets shall be 12"x12". The filter for M-size, P38-size, and P44-size shall be 12"x16".

3.7.6.0 The filter shall consist of the three (3) distinct layers of filtering media.

3.7.6.1 The filter shall be U.L. Listed Class 2 under Standard 900.

3.7.6.2 The first, or air-entering stage, shall be composed of dual fiber blend. The 100% non-woven polyester blend shall be arranged in an open fashion to promote the maximum depth loading of large dirt particles.

3.7.6.3 The second stage shall be a dual ply, dual denier, 100% non-woven polyester of graduated density. Both plies of the secondary stage shall be more dense than the air-entering stage to facilitate the retention of fine dirt particles. A non-toxic, non-migratory, odorless tackifier shall be applied to the secondary stage. To ensure complete and uniform coverage, the adhesive shall be incorporated into the media during the raw material manufacturing process. Spray adhesives, applied on the finished product, shall not be acceptable due to the inability to ensure uniform coating.

3.7.6.4 A ten gauge (#10 AWG) wire shall be sandwiched between the air-entering stage and the leaving stage for maximum rigidity during adverse conditions. Sufficient media overlap shall be present about the wire perimeter to ensure positive self-seal.

3.7.7.0 The cabinet must have two (2) lipped and non-vented (solid) shelves [front lip bent down, back lip bent up] spaced at least 9" apart. The mounting technique for shelves and modular panels shall be continuous C-Channel sliding-type.

3.7.8.0 The cabinet size must be large enough to accommodate all equipment as if all equipment were designed to the maximum dimensions allowed by NEMA. This will allow any NEMA equipment to be used to replace any malfunctioning equipment supplied by this contract. For P-38 and P-44 cabinets, the shelves shall be spaced to accommodate a controller as large as 17.5" H x 17.75" W x 14.5" D, which describes the largest NEMA dual-ring controller owned by the City. This requires that the bottom shelf to be a minimum of 13" deep for P-38 and P-44 cabinets.

3.7.9.0 The minimum outside cabinet dimension allowed must be as follows

Control Cabinet Type	Outside Dimensions (W x H x D)	Door Opening (W x H)	Interior Space (cu. ft.)	Industry Size Designation
2-Phase Pole-Mount	25” x 51” x 16”	22.5” x 43”	11.8	K
4-Phase Pole-Mount	30” x 49” x 17”	27.5” x 38”	14.4	M-30
4-Phase Base-Mount	30” x 49” x 17”	27.5” x 38”	14.4	M-30
4-Phase Pole-Mount	36” x 49” x 17”	33.5” x 39”	17.3	M-36
4-Phase Base-Mount	36” x 49” x 17”	33.5” x 39”	17.3	M-36
8-Phase Base-Mount	38” x 54.5” x 26”	35.5” x 42.5”	31.1	P-38
8-Phase Base-Mount	44” x 55” x 26”	41.5” x 42.5”	36.5	P-44
8-Phase Base-Mount with UPS	60” x 55” x 26” or 58” x 57” x 29”	n/a	n/a	P-UPS

3.7.10.0 There must be a minimum of one (1) inch empty space between any item attached to the door and any shelf-mounted device including its connecting harness, load switches, or any side panel mounted item whichever is closest to the door.

3.7.11.0 Box extenders must comply with the material standards and construction methods that apply to controller cabinets, as spelled out in this section (Section 3.6 of these specifications). Each Box Extender shall be in 12” or 30” heights and made to fit either an “M-30”, “M-36”, “p-38”, or “P-44” cabinet, as specified in the particular item bid.

3.8 **Traffic Signal Control Cabinet Assembly Product Requirements (Applies To ITEMS 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 46, 47 and on the Cost Proposal page and Section 3.2 of these specifications)** Cabinet assemblies in addition to compliance with the cabinet only specification above, NEMA Standard Publication TS1-1989 (& current revisions) and the Current Edition of ODOT Construction and Material Specification shall meet the following specifications:

3.8.1.0 There shall be three (3) circuit breakers provided. One (1) 30 amp circuit breaker mounted on the power distribution panel shall be used as the main power distribution breaker. A separate ten (10) amp circuit breaker shall be wired for the pedestrian signal load only and also mounted on the power distribution panel. The pedestrian power breaker shall be wired in series with the main power breaker. The final 15 amp circuit breaker shall be wired for the convenience outlet/lamp and also mounted on the power distribution panel. The convenience outlet/lamp breaker shall be wired in parallel to the main power breaker (convenience outlet/lamp power will be available while the main breaker is off);

3.8.2.0 The power service shall be connected to an accessible terminal strip which shall be located near the bottom of the cabinet and shall be of sufficient size to accept a #6 wire lug over a ¼" stud. The terminal strip shall be covered or shielded to minimize accidental contact during normal servicing operations. The power service connection shall be immediately below the cabinet breakers and shall not be wired directly to the main power distribution breaker. The power distribution panel shall be located at the bottom of the right side of the cabinet (not as part of the back panel). There shall be a minimum of four (4) inches clearance between the power terminal and the bottom of the cabinet. A #6 wire lug shall be provided for attaching a #6 AWG grounding wire from a ground rod. The grounding wire lug shall be attached to the power distribution panel, or if none, to the back panel. The lug shall be bolted to the lower right corner of either panel next to the power service lugs;

3.8.3.0 The 120 VAC convenience outlet shall be located below the bottom shelf. The outlet shall not interfere with the removal or installation of any equipment including the back panel. There shall be sufficient space (at least a 4" cube) available around the face of the outlet so that there is room to install a small power supply on the convenience outlet. The convenience outlet shall not be planned for use in powering the equipment supplied with the cabinet assembly. Any such equipment will have an additional outlet installed in the cabinet. Any outlet shall be protected by a ground fault interrupter;

3.8.4.0 There shall be 2 Light Emitting Diode (LED) panels to illuminate the entire interior of the control cabinet, one (1) located above the door and one (1) located below the lower shelf. The LED panels shall not interfere with the removal or installation of any equipment. The LED panels circuit shall be protected by the convenience outlet's ground fault interrupter;

3.8.5.0 The back panel and power distribution panel shall have silk screened terminal/socket function identification labels such as AC COM, Phase 3 GREEN, 115 VAC, SIGNAL BUS, etc. Reference numbers shall not be acceptable in lieu of function labels but may supplement them. Additional terminal blocks shall use silk screened reference numbers to identify terminal connections;

3.8.6.0 The 30 amp line filter shall be mounted on the power distribution panel;

3.8.7.0 Load switches shall be provided for every load socket;

3.8.8.0 A solid state relay shall be installed which will allow power to be removed from the vehicular and pedestrian power buses. The solid state relay shall be rated at 50 amps and 120 volts. The relay shall be equipped with a plastic cover and screw pattern similar to a Crydom CWA2450.

3.8.9.0 Each load switch socket shall be wired in the back panel (four (4) in a four (4) position back panel, eight (8) in an eight (8) position back panel, or twelve (12) in a twelve (12) position back panel. There shall be room in the cabinet for any load switch that complies with the NEMA size specification;

3.8.10.0 The flasher and load switch sockets shall be wired in the following arrangement in a four (4) position back panel cabinet::

VEH Ø1	VEH Ø2	PED Ø1	PED Ø2	FLASHER

3.8.11.0 The flasher and load switch sockets shall be wired in the following arrangement in an eight (8) position back panel cabinet:

VEH Ø1	VEH Ø2	VEH Ø3	VEH Ø4	OLVP A	OLVP B	PED Ø1	PED Ø3	FLASHER

3.8.12.0 The flasher and load switch sockets shall be wired in the following arrangement in a twelve position back panel cabinet:

VEH Ø1	VEH Ø2	VEH Ø3	VEH Ø4	VEH Ø5	VEH Ø6	VEH Ø7	VEH Ø8	PED Ø2	PED Ø4	PED Ø6	PED Ø8	FLASHER

3.8.13.0 A rack shall be provided to support the load switches in all positions; All wires fastened to the flasher socket, flash transfer relays and load switch sockets shall be soldered in place;

3.8.14.0 Flash transfer relays shall be provided for each flash transfer socket. In a four position back panel, one flash transfer relay socket shall be provided. In eight (8) and twelve (12) position back panel cabinets, there shall be a wired flash transfer socket for each pair of load switch sockets. In an eight (8) position back panel, four (4) flash transfer relay sockets shall be provided. In a twelve (12) position back panel, six (6) flash transfer relay sockets shall be provided. Flash transfer relays shall be sequential (for example: flash transfer relay #1 powers load switch positions 1 & 2);

3.8.15 All flash transfer relays shall be wired for fail safe operation, i.e. energized during normal operation;

3.8.16 A two (2) circuit solid-state flasher rated at 15 amps per circuit shall be provided (NEMA Type III). Flashing power (120 VAC) shall be available from the front of the back panel. The flashing operation shall be wired so that the flashing signal load will be shared by the various phases active in the control cabinet.

3.8.17 Flash programming shall be made from the front of the back panel using jumpers and links with no wires coming from behind the back panel;

3.8.18 Load switch operation shall be programmable for all operations (i.e., overlaps and/or pedestrian displays) from the front of the back panel using jumpers and links with no wires coming from behind the back panel, unless it is marked indicating its source and is color-coded;

3.8.19 Lightning protection devices such as EDCO SHA-1250A with base; or approved equal (as determined by the City of Columbus Division of Planning and Operations) shall be provided;

3.8.20 Thyrector surge protector with RMS input of 150 Volts, input peak of 210 Volts and placed across the input AC power line shall be provided;

3.8.21 Whenever the intersection is in flash operation, the 24 VDC supply to the load switches shall be removed;

3.8.22 The mounting of the back panel shall allow the panel to be “dropped” in order to access wiring on the back without removal of other wiring panels or shelves in the cabinet. This does not apply to easily-removed equipment, such as load switches, flasher module, flash transfer relays or other devices mounted in sockets;

3.8.23 All external relay coils shall have noise suppression devices;

3.8.24 The conflict monitor harness shall be connected directly to the field terminals. Jumpers or links on the back panel to form a circuit for the conflict monitor shall not be accepted. All conflict monitor wires not in use shall be accessible without removing the back panel. All wires shall be labeled with monitor harness pin number every six (6) inches or less;

3.8.25 Each MS connector harness shall have a conductor for each plug pin except the remote reset function for the conflict monitor. The controller and conflict monitor MS harness conductors shall be connected to a back panel terminal strip which is accessible from the front panel. Detector unit MS harness conductors shall be connected to a left side cabinet-mounted terminal strip. Each wire shall be silk screened (or by other indelible marking) with the pin number, every six (6) inches or closer. Other equipment shall be connected as appropriate.

3.8.26 Each connector on load switch sockets, flasher socket and flash transfer relay sockets shall be connected to a back panel terminal strip which is accessible from the front of the panel;

3.8.27 The cabinet assembly shall contain all pedestrian signal circuitry needed for each through phase;

3.8.28 A controller shutdown switch and coordinated/free switch shall be installed inside the cabinet next to the tech switch;

3.8.29 A signal/flash switch located in the police door shall place the signal on flash and stop-time the controller unit. A tech switch located inside the cabinet shall allow the controller unit to time normally but keep the signal on flash. The signal/flash switch shall not return the signal to normal operation unless the tech switch is reset so the signal/flash switch can again stop-time the controller unit. The signal/flash switch shall not remove power to the controller unit or its auxiliary equipment;

3.8.30 An auto/manual switch shall be located in the police door. A barrier terminal strip shall be provided on the inside of the cabinet door, where the pushbutton lead is to be connected. A manual pushbutton shall be installed. The pushbutton shall consist of a momentary contact switch and cable assembly. The cable shall be of sufficient length of standard or coiled wire to have a minimum of ten (10) feet of cable extending outside the police door.

3.8.31 A signal shutdown switch shall be located in the police door that turns the signals off during signal and flash operations;

3.8.32 Wire connections on the back panel shall be made with crimp terminals and threaded fasteners. Wire-wrap or telephone type knife connectors, soldered or otherwise, are not acceptable.

3.8.33 All terminal strips in close proximity of unattached equipment shall be covered to prevent accidental contact with the equipment. All terminal strips shall be readily accessible without disconnection of any equipment, when the unit is set-up to its fullest capacity;

3.8.34 All back panel hardware shall be mounted with screws. Rivets or other non-removable fasteners are not acceptable. The only exception to this provision is that the mounting of load switch sockets, relay sockets, and the flasher socket may be with rivets.

3.8.35 The cabinet shall have adequate spare shelf space to accommodate additional equipment. Minimum additional space of 10” W x 8” H x 13” D shall be provided.

3.8.36 There shall be a minimum of one (1) inch empty space between any item attached to the door and any shelf-mounted device including its connecting harness, load switches, or any side panel-mounted item, whichever is closest to the door;

3.8.37 Optoisolators shall be provided for the pedestrian call input to each phase on 2-phase and 4-phase cabinets. Optoisolators shall be provided for the pedestrian call input to phases 2, 4, 6, and 8 on 8-phase cabinets;

3.8.38 Test switch panels shall be provided to allow for a momentary closure between logic ground and each of the vehicle call lines and the pedestrian call lines. In a four (4) position back panel cabinet, two (2) vehicle and two (2) pedestrian call switches shall be provided. In an eight (8) position back panel cabinet, four (4) vehicle and four (4) pedestrian call switches shall be provided. In a twelve (12) position back panel cabinet, eight (8) vehicle and four (4) pedestrian call switches shall be provided. The preferred location of these test switches are on the door along with the tech switch;

3.8.39 The controller assembly when placed in or coming out of automatic flashing mode shall place a call on all phases and the controller operation shall go to flash at the end of the side-street phase(s) [during or after the red clearance interval of the last side-street phase(s)] just prior to any main street green. The flash transfer logic device shall be external to the controller and be compatible with any NEMA controller. Each cabinet shall be wired with a harness for the City of Columbus standard MUTCD flash synchronizer device, as described in Section 3.6 of these specifications. The back panel shall have a mounting location for the standard MUTCD flash device. Attachments shall be consistent with the mounting points on the standard MUTCD flash device;

MUTCD		Wired to Controller Cabinet Box Function		
I/O Description	Pin Number	2-phase	3 or 4-phase	5, 6, 7 or 8-phase
Cross Street Red	J1-1	Ø2 RED	Ø4 RED	Ø4 RED
Remote Flash	J1-2			
+24 VDC	J1-3	+24 Volt External	+24 Volt External	+24 Volt External
Main Street Red	J1-5	Ø1 RED	Ø1 RED	Ø2 RED
Min Recall	J1-6	Ø2 VEH CALL	EXT MIN RECALL	EXT MIN RECALL
Relay K1 Common	J1-7	+24 Volt 1	+24 Volt 1	+24 Volt 1
Relay K1 (N.O.)	J1-8			
Relay K1 (N.C.)	J1-9			
Keyed on J1-4				

3.8.40 A detector panel shall be provided in all cabinets. The harnesses specified for the cabinet shall be wired directly to the following panel. The detector panel shall have three (3) vertical columns of double row barrier terminal strips on 0.438" terminal centers. Each column shall have a minimum of twenty (20) terminals in order to provide a minimum of 60 terminations per detector panel;

3.8.41 The terminal numbers shall be silk screened to the detector panel and numbered consecutively starting at the top of the left column and moving down to the last terminal. Numbering shall be different from that on any panel installed in the cabinet. The detector panel showing pin outs shall be part of the cabinet prints.

3.8.42 Except as specified in the following diagram, the terminals shall not be dedicated to a particular function:

1			21			41	AC +
2			22			42	AC +
3			23			43	AC +
4			24			44	AC +
5			25	Ø1 VEH CALL		45	AC -
6			26	Ø2 VEH CALL		46	AC -
7			27	Ø3 VEH CALL		47	AC -
8			28	Ø4 VEH CALL		48	AC -
9			29	Ø5 VEH CALL		49	LOGIC GRND
10			30	Ø6 VEH CALL		50	LOGIC GRND
11			31	Ø7 VEH CALL		51	LOGIC GRND
12			32	Ø8 VEH CALL		52	LOGIC GRND
13			33	Ø1 PED CALL		53	Ø1 GREEN
14			34	Ø2 PED CALL		54	Ø2 GREEN
15			35	Ø3 PED CALL		55	Ø3 GREEN
16			36	Ø4 PED CALL		56	Ø4 GREEN
17			37	Ø5 PED CALL		57	Ø5 GREEN
18			38	Ø6 PED CALL		58	Ø6 GREEN
19			39	Ø7 PED CALL		59	Ø7 GREEN
20			40	Ø8 PED CALL		60	Ø8 GREEN

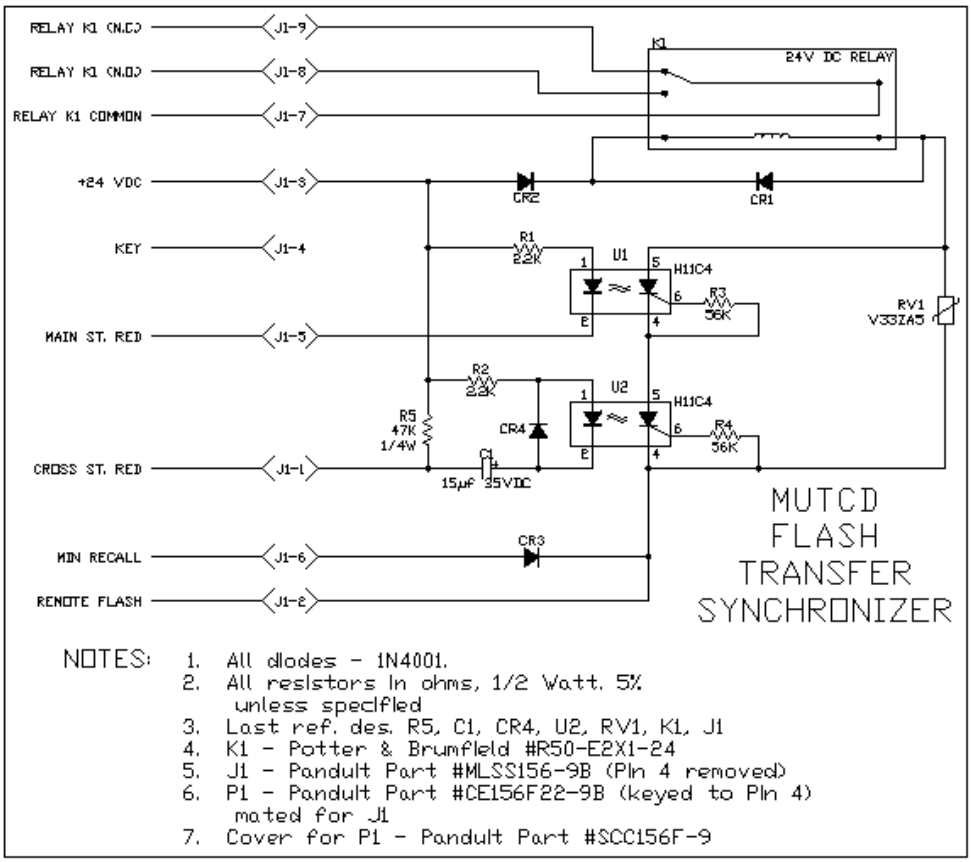
3.8.43 Each cabinet assembly supplied shall have three (3) copies of the cabinet wiring diagrams and any other schematic needed for maintenance and operational understanding. The cabinet wiring diagram shall also be provided in an AutoCAD ’07 readable .DWG file on a CD-ROM. The copies of diagrams and manuals shall be supplied in a sealable polypropylene envelope fastened to the inside of the main cabinet door. The envelope shall be mounted with screws through reinforced bushings and shall not cover either the air filter or any switches.

3.9 **MUTCD Flash Synchronizer Device Product Requirements (Applies to ITEMS 1, 2, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 46, 47 and on the Cost Proposal page and Section 3.2 of these specifications)**

3.9.1 This portion of these specifications describes the electronic circuit board that receives a command (by applying a ground) to go on flash and forces the

controller through a sequence of changes and places the controller on flash. This device is required so that the flash operation of each controller cabinet is accomplished according to the parameters specified in the Ohio Manual of Uniform Traffic Control Devices and is not dependent on the installation of a particular manufacturer's controller. The intent of the specification is to sufficiently describe the operation and physical interface of the device so that items purchased under these specifications would be compatible regardless of the manufacturer.

3.9.2 The overall size of the board shall be approximately 4" x 4 ".



3.9.3 The printed circuit board shall have two (2) permanently mounted metal standoffs spaced 2.75" apart. Each standoff shall be no more than 0.375" diameter nor more than 0.375" high. There shall be a 0.1875" hole through each standoff and the printed circuit board.

3.9.4 The printed circuit board shall have silk screened component identification, shall be wave-soldered, clear of flux and clear-coated. The circuit shall be designed to agree with the above diagram.

3.9.5 A fully assembled harness shall be provided with each MUTCD Flash Synchronizer Device. The harness will consist of a P1 (Panduit Part # CE156F22-9B keyed to Pin 4) and cover for P1 (Panduit Part # SCC156F-9) and the six (6) foot harness. Each wire in the harness shall be numbered on the end of the harness opposite the connector end. The wire numbers shall match the pin/contact numbers on the harness

3.10 **ITEM 10 Controller Item – Internal Ethernet Module for ASC/3-2100**

3.10.1.1 This item is the Internal Ethernet module for installation in existing Econolite ASC/3-2100 traffic signal controllers that are not Ethernet-ready in lieu of using a serial terminal port server for connection to the City of Columbus CTSS communications network.

3.10.1.2 The Internal Ethernet Module for the traffic signal controller shall fully support an IEEE 802.3 compliant Ethernet 10/100Base-T auto sensing port for advanced systems communications. The Ethernet communications port module shall be designed to easily be installed into the existing traffic signal controllers, and allow connectivity to other Ethernet devices in the traffic signal controller cabinet. An industry standard 8P8C type connector shall be included that supports a simple CAT5e patch cable interface. The internal Ethernet port shall be factory pre-configured with a unique private IP address and Class B subnet mask.

3.10.1.3 The internal Ethernet communications module shall be fully compatible physically and in performance with existing City traffic signal controllers.

3.10.1.4 Along with the internal Ethernet modules, the bidder shall provide all firmware and software updates to allow the functionality of the internal Ethernet module with the existing ASC/3-2100 controllers to be maintained and allow it to operate on the new CTSS. The bidder shall provide all information on any additional controller settings or programming changes required to correctly communicate and function with the system.

3.11 **Twisted-Pair Closed Loop System Signal Control Cabinet Product Requirements (Applies to ITEMS 33, 35, 37, 39, 41, 43 and 46 on the Cost Proposal page and Section 3.2 of these specifications)**

3.11.1 These items shall meet all the provisions of the above specifications for Controller Units (Section 3.4), Conflict Monitors (Section 3.6), Traffic Signal Control Cabinets (Section 3.7), Traffic Signal Control Cabinet Assemblies (Section 3.8) and MUTCD Flash Synchronizer Devices (Section 3.9).

3.11.2 These items shall be functionally identical to and interchangeable with the City of Columbus Econolite Twisted-Pair Closed Loop Signal System.

3.12 **Fiber-Optic Closed Loop System Signal Control Cabinet Product Requirements (Applies to ITEMS 34, 36, 38, 40, 42, 44 and 47 on the Cost Proposal page and Section 3.2 of these specifications)**

3.12.1.1 These items shall meet all the provisions of the above specifications for Controller Units (Section 3.4), Conflict Monitors (Section 3.6), Traffic Signal Control Cabinets (Section 3.7), Traffic Signal Control Cabinet Assemblies (Section 3.8) and MUTCD Flash Synchronizer Devices (Section 3.8.43).

3.12.1.2 These items shall be functionally identical to and interchangeable with the City of Columbus Fiber-Optic Closed Loop Signal System.

3.13 **Closed Loop Signal System On-Street Master Product Requirements (ITEM 3 of the Cost Proposal page and Section 3.2 of these specifications)** This item shall be a closed loop signal system master functionally identical to and interchangeable with the City of Columbus Econolite ASC/2M-1000 Closed Loop Signal System Master with two (2) channels of telemetry.

3.14 **Fiber-Optic Closed Loop Signal System Modem Product Requirements (ITEM 4 of the Cost Proposal page and Section 3.2 of these specifications)** This item shall be a Fiber-Optic modem with ST connectors functionally identical to and interchangeable with Econolite Part No. 32725P1.

3.15 **Fiber-Optic Closed Loop Signal System Communications Hook-Up Panel (ITEM 5 of the Cost Proposal page and Section 3.2 of these specifications)** This item shall be a communications hook-up panel with cables for upgrading a standard Econolite signal control cabinet for use in a fiber-optic interconnected Econolite Closed Loop Signal System, identical to and interchangeable with Econolite part number 32380G2 (panel) and 31690G10 (cable).

3.16 **Twisted-Pair Closed Loop Signal System Telemetry Module (ITEM 6 of the Cost Proposal page and Section 3.2 of these specifications)** This item shall be a telemetry card plug-in module for use in a twisted-pair interconnected Econolite Closed Loop Signal System, identical to and interchangeable with Econolite Part No. ASSY 34090G1.

3.17 **Item 45 – Internal Ethernet Module for Econolite ASC/2S**

3.17.1.1 This is the internal Ethernet module for Econolite ASC/2S series controllers.

3.17.1.2 This module is used with the ASC/2S controller standard port communications and occupies the Port 3 slot on the controller. Contains and industry standard Rj-45 type connector located adjacent to the NEMA Port 3 connector on the controller.

3.17.1.3 Ethernet module is to be factory preconfigured with unique private IP address and serial interface on the device is preset to operate with the ASC/2S series controller at 19200 BPS, 8N1 without flow control.

3.17.1.4 The internal Ethernet communications module shall be fully compatible physically and in performance with existing City Econolite traffic signal controllers.

3.17.1.5 Along with the internal Ethernet modules, the vendor shall provide all firmware and software updates to allow the functionality of the internal Ethernet module with the existing Econolite ASC/2-S controllers to be maintained and allow it to operate on the new CTSS. The vendor shall provide all information on any additional controller settings or programming changes required to correctly communicate and function with the system.

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3.18 **Item 48 - Econolite ASC 25 PIN FSK Telemetry Module**

3.18.1.1 This item is a telemetry module for the Econolite ASC/3 controller. ASSY,ASC/3 Telemetry, 25 Pin FSK Module, Econolite Part #100-1084-502.

3.18.1.2 Provide any applicable software, licenses and instructions for this part to be fully functional with the ASC/3 controller when installed.

3.19 **Fiber-Optic Closed Loop Signal System Telemetry Module (ITEM 49 of the Cost Proposal Page and Section 3.2 of these specifications)** This item shall be a telemetry card plug-in module for use in a Fiber-Optic interconnected Econolite Closed Loop Signal System, identical to and interchangeable with Econolite Part No. ASSY 33525.

3.20 **ITEM 50 Railroad Pre-emption interface panel**

3.20.1.1 This item is an in-cabinet relay interface panel for railroad pre-emption. It shall meet Ohio Department of Transportation Supplemental Specification #919 for Railroad Pre-emption Interface. It shall be compatible with Econolite ASC/3 traffic controllers.

3.21 **ITEM 51, Amplifier Cabinet & Pedestal, 41 in x 25 in x 16 in**

3.21.1.1 This is an amplifier cabinet with pedestal, 41 in x 25 in x 16 in

3.21.1.2 This item shall include the amplifier cabinet, pedestal pole, transformer-type pedestal base

3.21.1.3 The amplifier cabinet shall be a NEMA 3R, pedestal-mounted, large single door enclosure. The dimensions of the cabinet shall be 41 in. High x 25 in. Wide x 16 in. Deep. The cabinet shall be supplied with two (2) adjustable “c” mounting channels on each side wall and on the back wall of the cabinet, and cabinet shall be supplied with an aluminum panel kit.

3.21.1.4 A 0.250-in.-thick aluminum base plate shall be welded to the inside bottom of the cabinet. The bottom of the cabinet shall be manufactured to accept a 4-in. Diameter pedestal pole and a pedestal adapter with a 6.5-in. Bolt circle. All bolts and nuts shall be made of stainless steel.

3.21.1.5 The main cabinet door shall have a key cover and shall be keyed to the city of Columbus master, Corbin key no. 2 (1548-1).

3.21.1.6 The amplifier cabinet shall be supplied without a switch compartment and police door on the cabinet door.

3.21.1.7 The amplifier cabinet supplied shall be an APX TECHNOLOGIES, INC. Pedestal-mounted (reinforced bottom) enclosure (APX CATALOG NO. TC412516) with aluminum panel kit option.

3.21.1.8 The pedestal pole shall be a Pelco threaded, spun aluminum pole (Pelco part no. PB-5100-L). The pedestal base shall be a Pelco heat-treated aluminum, square-base assembly with aluminum door (Pelco part no. PB-5336) with a grounding lug and mounting hardware (Pelco part no. Pb-5323). The pedestal adapter shall be a Pelco aluminum pedestal adapter (6.5-in. Diameter bolt circle) with four 3/8-in. – 16 x 3/4-in. Square-head set screws (Pelco part no. SE-3104).

3.22 **ITEM 52 Amplifier Cabinet & Pedestal, 51 in x 25 in x 16 in**

3.22.1.1 This item shall include the amplifier cabinet, pedestal pole, transformer-type pedestal base, and foundation.

3.22.1.2 The amplifier cabinet shall be a NEMA 3R, pedestal-mounted, large single door enclosure. The dimensions of the cabinet shall be 51 in. High x 25 in. Wide x 16 in. Deep. The cabinet shall be supplied with two (2) adjustable “c” mounting channels on each side wall and on the back wall of the cabinet, and cabinet shall be supplied with an aluminum panel kit.

3.22.1.3 A 0.250-in.-thick aluminum base plate shall be welded to the inside bottom of the cabinet. The bottom of the cabinet shall be manufactured to accept a 4-in. Diameter pedestal pole and a pedestal adapter with a 6.5-in. Bolt circle. All bolts and nuts shall be made of stainless steel.

3.22.1.4 The main cabinet door shall have a key cover and shall be keyed to the city of Columbus master, Corbin key no. 2 (1548-1).

3.22.1.5 The amplifier cabinet shall be supplied without a switch compartment and police door on the cabinet door.

3.22.1.6 The amplifier cabinet supplied shall be an APX Technologies, Inc. Pedestal-mounted (reinforced bottom) enclosure (APX catalog no. TC512516) with aluminum panel kit option.

3.22.1.7 The pedestal pole shall be a PELCO threaded, spun aluminum pole (PELCO part no. Pb-5100-l). The pedestal base shall be a PELCO aluminum, square base assembly with aluminum door (PELCO part no. Pb-5334) with a grounding lug and mounting hardware (PELCO part no. Pb-5323). The pedestal adapter shall be a PELCO aluminum pedestal adapter (6.5-in. Diameter bolt circle) with four 3/8-in. – 16 x 3/4-in. Square-head set screws (PELCO part no. Se-3104).

3.22.1.8 The mounting height of the bottom of the amplifier cabinet shall be 36 in. To 40 in. above the sidewalk.

3.23 **ITEM 53 Amplifier Cabinet, base mount, 50 IN x 30 IN x 17 IN**

3.23.1.1 This item shall include the amplifier cabinet

3.23.1.2 The amplifier cabinet shall be a NEMA 3R, base-mounted, large single door enclosure. The dimensions of the cabinet shall be 50 in. High x 30 in. Wide x 17 in. Deep. The cabinet shall be supplied with two (2) adjustable “c” mounting channels on each side wall and on the back wall of the cabinet, and the cabinet shall be supplied with an aluminum panel kit.

3.23.1.3 The cabinet material shall be 5052 marine grade, .125 inch thick aluminum sheeting with a 32 hardness in its natural color. All exterior seams shall be either continuously welded, tack welded, sealed with a 15 to 20 year silicone sealer, and/or overlapped such that water does not enter the cabinet. All cabinet edges shall be smooth (free of any sharp edges). The cabinet door frame opening shall be double-flanged on all four sides. The cabinet door shall be hinged using a heavy gauge continuous hinge that has a stainless steel hinge pin. The hinge shall be bolted to the cabinet so the door can be removed. The bolts and nuts shall be made of stainless steel, tamperproof and securely fastened to prevent vibrations from loosening the nuts. The door, sealed with a neoprene gasket, shall be equipped with a three (3) point latching mechanism and a handle which can be padlocked. The door shall be designed such that the door can be locked in an open position at 90, 135, and 180 degrees (nominal values) to the cabinet face. The cabinet door lock (ccl enclosure lock 15481rs) shall have a lock keyhole cover and shall be keyed to the city of Columbus master, # 2 key (1r 6380). Bolt pattern shall consist of an anchor bolt positioned in each cabinet corner.

3.23.1.4 The amplifier cabinet shall be supplied without a switch compartment and police door on the cabinet door.

3.23.1.5 The amplifier cabinet supplied shall be an APX TECHNOLOGIES, INC. Base-mounted enclosure (APX CATALOG NO. TC503017) WITH ALUMINUM PANEL KIT OPTION.

3.24 **ITEM 54, Amplifier Cabinet, base mount, 50 IN x 36 IN x 17 IN**

3.24.1.1 This item shall include the amplifier cabinet.

3.24.1.2 The amplifier cabinet shall be a NEMA 3R, base-mounted, large single door enclosure. The dimensions of the cabinet shall be 50 in. High x 36 in. Wide x 17 in. Deep. The cabinet shall be supplied with two (2) adjustable “c” mounting channels on each side wall and on the back wall of the cabinet, and the cabinet shall be supplied with an aluminum panel kit.

3.24.1.3 The cabinet material shall be 5052 marine grade, .125 inch thick aluminum sheeting with a 32 hardness in its natural color. All exterior seams shall be either continuously welded, tack welded, sealed with a 15 to 20 year silicone sealer, and/or overlapped such that water does not enter the cabinet. All cabinet edges shall be smooth (free of any sharp edges). The cabinet door frame opening shall be double-flanged on all four sides. The cabinet door shall be hinged using a heavy gauge continuous hinge that has a stainless steel hinge pin. The hinge shall be bolted to the cabinet so the door can be removed. The bolts and nuts shall be made of stainless steel, tamperproof and securely fastened to prevent vibrations from loosening the nuts. The door, sealed with a neoprene gasket, shall be equipped with a three (3) point latching mechanism and a handle which can be padlocked. The door shall be designed such that the door can be locked in an open position at 90, 135, and 180 degrees (nominal values) to the cabinet face. The cabinet door lock (ccl enclosure lock 15481rs) shall have a lock keyhole cover and shall be keyed to the city of COLUMBUS master, # 2 key (1r 6380). Bolt pattern shall consist of an anchor bolt positioned in each cabinet corner.

3.24.1.4 The amplifier cabinet shall be supplied without a switch compartment and police door on the cabinet door.

3.24.1.5 The amplifier cabinet supplied shall be an APX TECHNOLOGIES, INC. Base-mounted enclosure (APX CATALOG NO. TC503617) with aluminum panel kit option.

3.25 **ITEM 55, Amplifier Cabinet, base mount, 55 IN x 44 IN x 26 IN**

3.25.1.1 This item shall include the amplifier cabinet

3.25.1.2 The amplifier cabinet shall be a NEMA 3R, base-mounted, large single door enclosure. The dimensions of the cabinet shall be 55 in. High x 44 in. Wide x 26 in. Deep. The cabinet shall be supplied with two (2) adjustable “c” mounting

channels on each side wall and on the back wall of the cabinet, and the cabinet shall be supplied with an aluminum panel kit.

3.25.1.3 The cabinet material shall be 5052 marine grade, .125 inch thick aluminum sheeting with a 32 hardness in its natural color. All exterior seams shall be either continuously welded, tack welded, sealed with a 15 to 20 year silicone sealer, and/or overlapped such that water does not enter the cabinet. All cabinet edges shall be smooth (free of any sharp edges). The cabinet door frame opening shall be double-flanged on all four sides. The cabinet door shall be hinged using a heavy gauge continuous hinge that has a stainless steel hinge pin. The hinge shall be bolted to the cabinet so the door can be removed. The bolts and nuts shall be made of stainless steel, tamperproof and securely fastened to prevent vibrations from loosening the nuts. The door, sealed with a neoprene gasket, shall be equipped with a three (3) point latching mechanism and a handle which can be padlocked. The door shall be designed such that the door can be locked in an open position at 90, 135, and 180 degrees (nominal values) to the cabinet face. The cabinet door lock (ccl enclosure lock 15481rs) shall have a lock keyhole cover and shall be keyed to the city of Columbus master, # 2 key (1r 6380). Bolt pattern shall consist of an anchor bolt positioned in each cabinet corner.

3.25.1.4 The amplifier cabinet shall be supplied without a switch compartment and police door on the cabinet door.

3.25.1.5 The amplifier cabinet supplied shall be a base-mounted APX ENCLOSURES, INC. NEMA 3R large single door enclosure (APX CATALOG NO. APX554426) WITH ALUMINUM PANEL KIT OPTION.

3.26 **ITEMS 56, 57, 58, 59, 60 – UPS Systems with Enclosures**

3.26.1.1 This is a battery backup uninterruptable power supply system (UPS). The UPS system is to provide uninterruptible, reliable, emergency power to a traffic signal intersection in the event of a power failure or interruption. The transfer from utility power to battery power shall not interfere with the normal operations of the traffic controller, conflict monitor or any other peripheral devices within the traffic control system. The system shall be self-contained including all UPS hardware, the required number of batteries and its own separate ventilated enclosure.

3.26.1.2 Provide a UPS with a minimum two and one half (2.5) hours of full run-time operation for an “LED-only” intersection with 1000 watts of active output power.

3.26.1.3 Provide a UPS compatible with all of the following traffic signal equipment; NEMA TS-1 cabinets and Type TS-2/A2 controllers.

3.26.1.4 Provide for the maximum transfer time, from disruption of normal utility line voltage to stabilized inverter line voltage from batteries, of 65 milliseconds or

less. Apply the same maximum allowable transfer time when switching from inverter line voltage to utility line voltage.

3.26.1.5 Include power line conditioning and noise filtering between the main power line and system equipment and to maintain a continuous regulated output voltage over varying input voltage range from 85 VAC to 175 VAC, without the use of the batteries. This regulation circuitry must be designed for full time operation

3.26.1.6 Provide a battery charge management system that spreads charge equally across the batteries, provides precise voltage to maintain optimum charge, allows for batteries to be replaced individually as they fail, instead of the entire string.

3.26.1.7 Provide at minimum a Five (5) year warranty on all UPS system components and batteries.

3.26.1.8 Include a means to switch the intersection from full-operation to flashing operation after 2-hours of run-time, for the purpose of conserving battery operation during an extended utility power outage.

3.26.1.9 Include standard form C relay contacts to trigger an alarm within the controller assembly, informing a technician the system operates on battery backup.

3.26.1.10 Design for an operating temperature for both the inverter/charger, power transfer relay and manual bypass switch of -35 °F to +165 °F.

3.26.1.11 Use the power transfer relays and manual bypass switches rated at 240VAC/30 amps, minimum.

3.26.1.12 Provide a UPS capable of bypassing the utility line power whenever the utility line voltage is outside the following voltage range: 100VAC to 130 VAC, + 2 VAC.

3.26.1.13 When utilizing battery power, design the UPS output voltage between 110 VAC and 125 VAC, pure sine wave output, 60Hz ± 3Hz.

3.26.1.14 After restoration of utility line power between 100 VAC and 130 VAC for more than 30 seconds, design the UPS to dropout of battery backup mode and return to utility line mode.

3.26.1.15 In the event of inverter/charger failure, battery failure or complete battery discharge, provide the power transfer relay with the capability to revert to the NC (and energized) state, for cabinets connected to utility line power.

3.26.1.16 Do not exceed 10 hours to recharge the battery, from “protective low-cutoff” to 80% or more of full battery charge capacity.

3.26.1.17 Include all necessary wiring and hardware for mounting (shelf angles, rack, etc).

3.26.1.18 Maintenance, Displays, Controls and Diagnostics. Provide a UPS with a backlit LCD display that includes an event counter, hour meter, line and battery voltages/percentages and fault status. Provide the LCD display with touch keys for changing display statuses and to reset counters, hour meter date and time.

3.26.1.19 Provide a UPS with lightning surge protection compliant with IEEE/ANSI C.62.41, having remote access via a RS-232 serial interface for laptop communication through Windows system software or for hyperterminal to monitor for making setting changes, and with status, alarm, and event logging, time and date stamped for up to 50 events. Provide printable logs.

3.26.1.20 Provide one sets of equipment lists, operation and maintenance manuals, and wiring diagrams of the UPS, and the battery data sheets. Provide a manual conforming to TEES 1999, Chapter 1 Section 1.2.4.2. Also provide all information electronically either on CD-ROM or via internet link.

3.26.1.21 **Battery System.** Supply a minimum of four (4) batteries with the UPS system. Use 12VDC batteries rated at 105 Ahrs or better to achieve the 2.5 hour run time requirement.

3.26.1.22 Provide batteries easily replaced and commercially available off the shelf. Provide deep cycle, sealed prismatic lead-calcium based AGM/VRLA (Absorbed Glass Mat/ Valve Regulated Lead Acid) or gel batteries. Provide batteries certified by the manufacturer to operate over a temperature range of -13 °F to +165 °F.

3.26.1.23 Place all batteries on battery heater mats in the enclosure, designed to extend the life of the batteries.

3.26.1.24 Design an integral system to prevent the battery from destructive discharge and overcharge. Do not allow batteries to recharge when battery temperature exceeds 122°F+5°F.

3.26.1.25 **Enclosure(s)** Provide an enclosure mountable to a standard model 332, NEMA TS-1 or TS-2 traffic signal cabinet constructed of natural unpainted aluminum. Provide a cabinet size adequate to house “all” UPS equipment including the controller unit, manual bypass switch and the 4 batteries. Key the enclosure to the City of Columbus master #2 lock (1R 6380) and include 2 keys.

3.26.1.25.1 UPS system shall be installed in either an external cabinet enclosure adjacent to the main traffic controller cabinet and/or in an integrated cabinet (P-UPS).

3.26.1.25.1.1 External enclosure containing the UPS system should have maximum cabinet dimensions of 51 inches height x 30 inches wide x 19 inches deep. Other dimensions may be considered but cabinet needs to fit on a 36 inch x 70 inch concrete pad.

3.26.1.25.1.2 8-phase, base mounted, P-UPS cabinet - This is a specialty cabinet that houses the traffic controller and UPS components. It shall appear as one cabinet from the outside with two internal compartments accessed by separate doors (P-UPS) The main cabinet body contains the traffic controller equipment and the small compartment contains the UPS system. Overall Dimensions of the cabinet should be approximately 55" inches height x 60" inches wide x 26" inches deep OR 57" inches height x 58" wide x 29"inches deep. UPS system compartment cabinet dimensions depending on which overall cabinet size chosen used should be approximately 56.75 inches height x 29 1/8 inch width x 13.5 inches depth OR 55 inches height x 26 inches depth x 16 inches width. Other dimensions may be considered but cabinet needs to fit on a 70 inch x 70 inch concrete pad.

3.26.1.25.1.3 The UPS cabinet shall include a generator power panel with a heavy duty power relay versus the line voltage generator switch. The generator inlet shall be a recessed panel with a door that is flush with the external side of the UPS cabinet. It shall include a recessed plug, automatic transfer switch and a door that securely closed over the power cord. Outlet shall be four prong.

3.26.1.25.1.4 The UPS output notifications for on battery, battery 2 hour timer, and low battery shall be wired into the traffic signal cabinet back panel to provide special status alarms for each output into the signal controller.

3.26.1.25.1.5 This item shall include a red LED status indicator lamp to allow maintenance personnel and law enforcement to quickly assess whether a traffic signal cabinet is being powered by a UPS. The LED housing shall be NEMA 4x, IP65 or IR66, rated for outdoor use and be tamper/shatter resistant. It shall be a domed enclosure containing a red lens with LED that is visible from 100 foot minimum.

3.26.1.25.1.6 The enclosure and LED lamp unit should be placed and centered on the top surface of the UPS cabinet and sealed from water intrusion. It should be wired using minimum 20GA stranded, insulated hookup wire to the status relay outputs of the UPS. The wires shall be terminated lugs at the display end and permanently labeled "Backup power status display" with wire polarity indicated. The red LED shall only illuminate to indicate the cabinet is operating under UPS backup power (The "backup" operating condition). This item also includes programming the UPS Status Relay outputs to produce the lamp status displays. These status displays will be solid 100% duty cycle (not flashing) displays. The operating voltage of the LED lamp shall be 120V AC or less, unless otherwise indicated.

3.26.1.26 Note that ITEMS 56, 57, 58, 59 and 60 shall be awarded to the same vendor.

3.26.1.27 **ITEM 56 – UPS cabinet large (P-UPS), 8 - phase, base-mount, with UPS System** – This is the UPS system installed in the larger P-UPS cabinet

3.26.1.28 **ITEM 57 – External UPS cabinet and system, base-mount** – This is the UPS system installed in the small external cabinet

3.26.1.29 **ITEM 58 – UPS batteries**- This item is for spare batteries for UPS systems. Batteries are to be identical to those included in the UPS systems. AGM, Non-Spillable or gel as stated above.

3.26.1.30 **ITEM 59 – External UPS Cabinet, base-mount**, **cabinet only**- This is the same cabinet used in bid ITEM 57 but without the UPS system (cabinet shell only)

3.26.1.31 **ITEM 60 – UPS Cabinet Large (P-UPS), 8-phase base-mount, cabinet only** – This is the same cabinet (P-UPS) used in bid ITEM 56 but without the UPS system (cabinet shell only)

3.27 **ITEMS 61, 62, 63 – GE MDS Transnet 900 Spread Spectrum Radio System, Intuicom Communicator II Spread Spectrum Radio System & Omnidirectional antenna**

3.27.1.1 **ITEM 61** - GE MDS Transnet 900 radio modem model # MDX9X1AFCSOWN with software capable of: Radio Configuration with Spectrum analyzer, have Remote Diagnostics, have Local and Remote configuration, be Windows based and have a Data Rate of 1200bps to 115,200 bps (adjustable). Software shall have Traffic Application Templates and be compatible with Econolite controllers and compatible for use with Econolite controllers closed loop systems. Include power supply, data supply cable, RF jumper cable, Econolite controller interface cable and antenna surge and lightning suppression (as described below).

3.27.1.2 **ITEM 62** - INTUICOM Communicator II radio modem model # F1P1900C2M-R2, with software capable of: Radio Configuration with Spectrum analyzer, have Remote Diagnostics, have Local and Remote configuration, be Windows based and have a Data Rate of 1200bps to 115,200 bps (adjustable). Software shall have Traffic Application Templates and be compatible with Econolite controllers and compatible for use with Econolite controllers closed loop systems. Include power supply, data supply cable, RF jumper cable, Econolite controller interface cable and antenna surge and lightning suppression (as described below).

3.27.1.3 Include with each spread spectrum radio systems one UL Rated **power supply** unit model # LFZVC36FS12D and cable to connect to a 110 volt outlet. (FOR GE RADIO)

3.27.1.4 Include with each spread spectrum radio systems one UL Rated **power supply** unit model # KA12D120050035U and cable to connect to a 110 volt outlet. (FOR INTUICOM RADIO)

3.27.1.5 Include with each spread spectrum radio systems one **data supply cable** to connect the communication port of the RF modem to the RS232 port of an Econolite controller, and shall be a minimum of 18" in length.

3.27.1.6 Include with each spread spectrum radio systems one **RF jumper cable** to connect the RF modem to the Lightning Arrestor inside the cabinet, the cable shall be constructed out of RG-58 or LMR 400 cable, be a minimum length of 3', and have compression fitted connectors affixed to each end.

3.27.1.7 Include with spread spectrum radio systems one Econolite **controller interface cable**.

3.27.1.8 Include with each spread spectrum radio systems **Antenna Surge and Lightning Suppression**: The Throughput Energy shall be <250 µJ for 3Ka, 8 x 20 µ s waveform, have a Maximum Surge Current of ≥ 5000A,have a Turn on Voltage of 300 to 600 volts, and have a turn on response time of ≤ nanoseconds. The unit shall have N Female connectors on both ends, the housing must be manufactured from aluminum or stainless steel with stainless steel hardware, and have a VSWR of 1.2.

3.27.1.9 **ITEM 63 – Omnidirectional Antenna** - 902-928 MHz Specific – frequency Omnidirectional antennas with a Horizontal Beamwidth of 360 degrees and a vertical Beam width of 16 degrees with 8dBi gain, One dedicated pigtail with an N – Style Jack (F) connector, Outdoor application capable of withstanding sustained 100 mph wind speed and having a Mast/Pole mounting style with stainless steel mounting hardware.

3.28 **ITEM 64 – Spread Spectrum Radio Training**

3.28.1.1 In conjunction with Items **61, 62, 63**: One – eight (8)-hour training session of instructor-led training shall be provided to personnel of the contracting agency in the operation, setup, programming and maintenance of the Spread Spectrum Radios and their compatibility with Econolite closed loop systems. Training shall take place on a date and location determined by the City and agreed upon by the vendor. Instructions and materials shall be provided for a maximum of 10 persons.

4.0 SAMPLING, INSPECTION, AND TESTING

4.1 Inspection - All materials and equipment will be visually inspected after delivery. The Division of Planning and Operations will note any discrepancies and report them to the supplier as soon as possible. The City may, at any time, randomly select any assembly or component for testing. Assemblies and components will be tested for conformity with these specifications and suitability for their intended application.

4.2 Testing - All components and completed assemblies shall be fully tested by the supplier and demonstrated that the items comply with the specifications, if requested. Any discrepancies noted shall be corrected to the satisfaction of the City prior to acceptance. Any item found to be in variance with these specifications will be rejected and returned without payment. These items shall be returned C.O.D. including freight and handling costs to the manufacturer/bidder.

4.3 Certifications – The supplier shall submit appropriate certifications for all materials and components that are required within these specifications to the shop keeper, Todd Wiseman at 1820 East Seventeenth Avenue, Columbus, Ohio 43219. Any material(s) or component(s) delivered without the submission and approval of proper certification(s) shall be returned and replaced with certified material(s) or component(s) at the bidder's expense.

5.0 PACKAGING and DELIVERY

5.1 Packaging:

5.1.1 The bidder shall ensure that all items are protected from damage during shipping.

5.1.2 Shipments of less than fifty (50) pounds shall be shipped by the most effective method. Shipments of greater than fifty (50) pounds shall be palletized. The supplier shall package and clearly label all units shipped to standard shipping pallets and protected by clear shrink-wrap material. All pallets shall be 48" wide by 48" deep. Loaded pallets shall neither exceed two thousand, five hundred pounds (2,500 lbs) gross weight nor forty-eight inches (48") total height, including pallet.

5.1.3 The supplier shall be responsible for proper packaging and safe delivery of all equipment and materials to the City. The bidder shall repair or replace any item or component damaged prior to acceptance by the City at no additional charge.

5.2 Delivery:

5.2.1 Each bidder shall specify a delivery date. Delivery time may be given consideration for contract award.

5.2.2 All items shall be delivered F.O.B. Destination, Freight Prepaid and Allowance to City of Columbus, Ohio

Department of Public Service
James V. Musick Traffic Engineering Facility
1820 East Seventeenth Avenue
Columbus, Ohio 43219-1007

5.2.3 The stock clerk, Todd Wiseman, shall be notified by telephone, at (614) 645-8159 a minimum of 24 hours in advance of delivery. All deliveries shall be made between 8:00 a.m. and 2:00 p.m. Monday through Friday. Late arrivals must unload the following day. No deliveries will be accepted on Saturday, Sunday, or City Holidays.

5.3 Bidder shall insert on Page 5's of the proposal the number of calendar days after receipt of order that the delivery will be made.

6.0 NOTES:

6.1 Each bidder shall, in their proposal, list the model number, and type of equipment that they propose to furnish and attach catalog cuts for each item(s) bid. Failure to furnish this information may be reason for rejection of any bid.

6.2 Universal Term Contract

6.2.1 Proposal. This proposal is the bidder's offer to sell the item(s) set forth on the bid proposal sheet at the price(s) quoted by bidder thereon, under the terms and conditions of these bid documents. An estimate quantity is set forth on the bid quotation sheet. Bidder is to take notice that the City makes no warranties or representations that the estimated quantity, or any quantity at all, will be ordered by the City even though bidder's proposal is accepted by the City and a firm offer for sale is executed. If bidder's proposal is accepted by the City and the firm offer for sale is executed, the bidder is to take further notice that no act, failure to act, of order placed by the City or any other official, employee or agent of the City shall constitute an order or contractually bind the City without the proper certificate by the City Auditor that funds sufficient for full payment due on any order are available. Each order placed under the firm offer for sale shall require execution of a purchase order. Therefore, in consideration of $1.00 (one dollar) received by the awarded bidder, said bidder shall offer to sell buyer, the City of Columbus, who shall have the Contract Term to exercise this option to purchase, at the price on the terms set forth in this bid proposal.

6.2.2 Quantity Estimates. All quantities shown on this proposal are the estimates of the needs of the City during the contract period and are for bidding purposes only. These quantity estimates are not to be construed as representing an actual order for the amount or guarantee that any minimum amount will actually be ordered. The City reserves the right to buy up to twice the estimated quantity.

6.2.3 Ordering Procedure. Blanket order(s) will be established for Columbus Department of Public Service in the form of a written purchase order referencing the terms of the contract and specifying the delivery locations. Actual quantities will be determined at the time orders are placed by the Columbus Department of Public Service (referring their purchase order number) based on the needs of the agency and funds available.

6.2.4 Pricing: Bidders are requested to bid firm or fixed prices through the term of the contract(s).

6.3 Warranty

6.3.1 All items shall carry a guarantee against any imperfections in workmanship for a period of two (2) years from the date of delivery or one (1) year from the date of installation, whichever comes first, or as stated within these specifications for items that require longer warranty periods.

6.3.2 All shipping costs related to warrantee repairs shall be the responsibility of the supplier. This address will be the location of equipment to repair and the delivery point of repaired equipment:

City of Columbus – Department of Public Service
James V. Musick Traffic Engineering Facility
1820 East Seventeenth Avenue
Columbus, Ohio 43219

6.3.3 Correspondence: Copies of all correspondence generated by contract awarded regarding quantity, delivery, pricing, analysis, etc., shall be submitted to:

City of Columbus Purchasing Office
77 N Front St / Columbus, Ohio 43215
Attn: Gail Messineo
Phone: (614) 645-1655; Fax: (614) 645-7051

6.4 **Insurance, Training Only**: The Bidder awarded ITEMS 61-63 to include training (Item 64) will be required to provide proof of Worker's Compensation Insurance and General Liability Insurance with the City named as Additionally Insured at least in the minimums stated below. Proof of the insurance will be required prior to finalizing any contract.

6.4.1. **Worker's Compensation Insurance**: The contractor shall take out and maintain, during the life of this contract, adequate worker's compensation insurance for all his employees employed at the site of the project and, in case any work is sublet, the Contractor shall require the subcontractor similarly to provide worker's compensation insurance for the latter's employees, unless such employees are covered by the protection afforded by the Contractor. The Contractor shall furnish three (3) copies of the worker's compensation certificate showing that the Contractor has paid his industrial insurance premium.

6.4.2. **Public Liability Insurance:** The contractor shall take out and maintain during the life of the contract, such public liability (bodily injury and property damage) Insurance as shall protect him from claims from damages for personal injury, including accidental death, as well as from claims for property damage which may arise from operations under the contract, whether such operation be by himself or any subcontractor or by anyone directly or indirectly employed by either of them. Such insurance policy shall include the City as named insured. The contractor shall maintain coverage of the types and in the amounts specified below. Proof of such insurance coverage shall be evidenced by submitting a certificate of insurance. A contractor's "umbrella" type policy with limits specified below may be submitted for this requirement with the City as named insured.

The amount of such insurance shall be as follows:

Bodily Injury Liability:

Each Person	$500,000.00
Each Accident	1,000,000.00

Property Damage Liability:

Each Person	$500,000.00
All Accidents	1,000,000.00

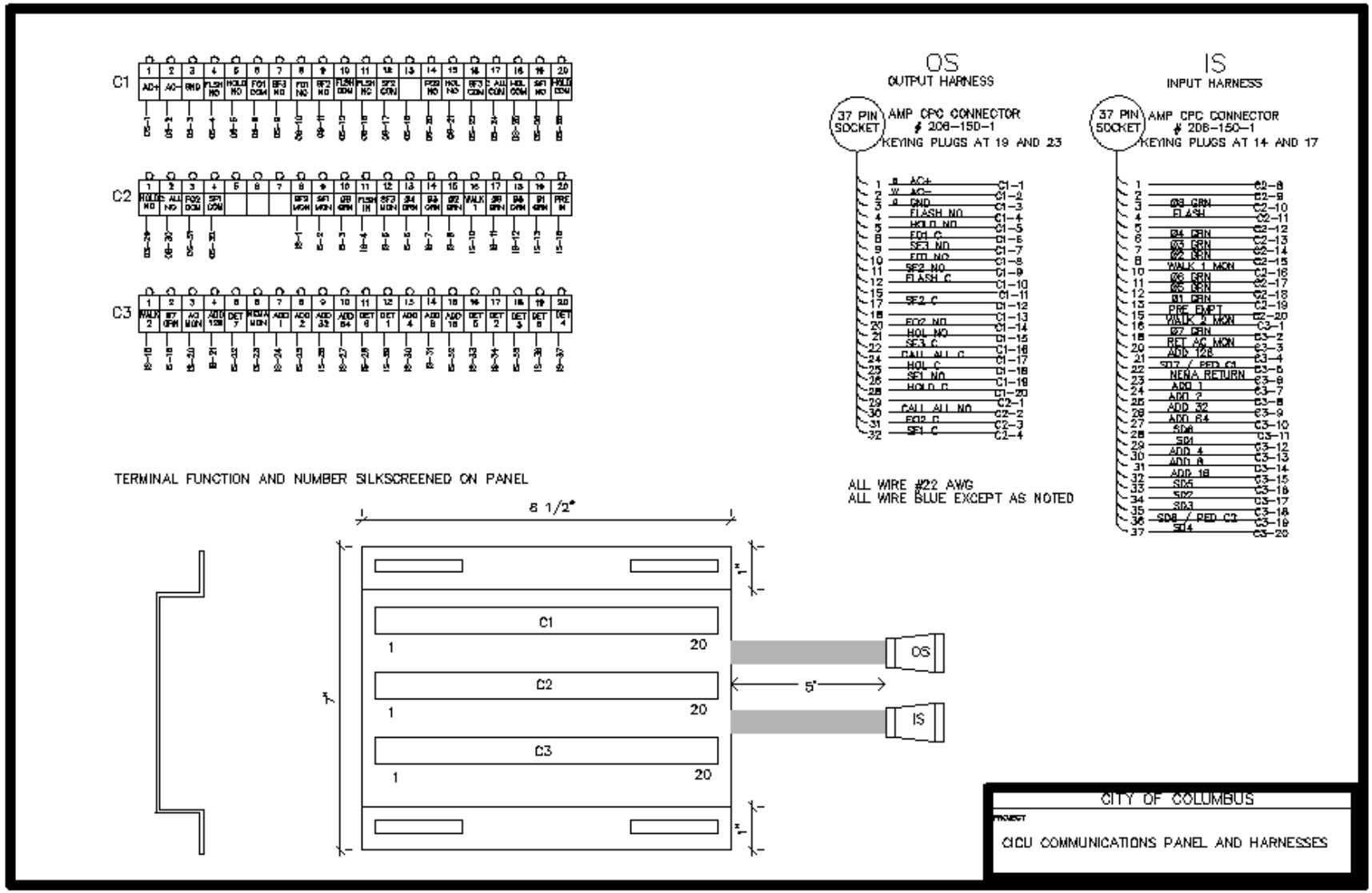
Such insurance shall remain in full force and effect during the life of the contract. Insurance may not be changed or cancelled unless the insured notifies the City in writing not less than thirty days prior to such change or cancellation. If any part of the contract is sublet, the contractor is responsible for the part sublet being adequately covered by insurance hereinabove described.

Contractor assumes all risk of loss and damage to the equipment provided unless loss or damage occurs at the time the operator and equipment are being operated for the purpose designated by the City and such loss or damages is caused by an act of the City or its employee which constitutes gross negligence or wanton misconduct

6.5 Specification Questions: Questions regarding this bid including any exceptions and/or suggested changes to the requirements must be sent by in writing via email to vendorservices@columbus.gov no later than 11:00 a.m. (local time) on June 9, 2014. Reponses and any necessary addenda will be posted as an addenda to this bid on the City's website (vendorservices.columbus.gov) no later than 11:00 a.m. (local time) on June 12, 2014. The City strongly encourages bidders to submit exceptions and/or changes during this stage of the process. Bidders submitting exceptions and/or changes before this date will greatly reduce the likelihood of their bid being rejected as non responsive to the specifications. Bidders whom have not registered and received a login and password from the City's vendorservices.columbus.gov web site are strongly encouraged to do so. Notice of any pre-bid notes and addenda will only be sent to Bidders whom have registered at the site.

SPECIFICATIONS FOR THE CITY OF COLUMBUS
TRAFFIC SIGNAL CONTROLLER EQUIPMENT

Exhibit "A"



SPECIFICATIONS FOR THE CITY OF COLUMBUS
TRAFFIC SIGNAL DETECTOR EQUIPMENT
PROPOSAL

To the Finance and Management Director of the City of Columbus, Ohio:

We (I) propose to furnish the following article(s) and/or service(s) at the price(s) and terms stated subject to all instructions, conditions, specifications and all attachments hereto. We (I) have read all attachments including the specifications and fully understand what is required.

BIDDERS CHECKLIST

A complete bid packet will consist of the items listed below.

Complete this checklist to confirm the items required in your bid. Place a checkmark or "X" next to each item that you are submitting to the City of Columbus. Failure to submit the listed documents may be cause for rejection of your bid. This checklist should be returned with your proposal.

_____ Cover sheet

_____ Contacts / EOC (pages 2, 2A)

_____ Active Contact Compliance Number or on-line application submitted

_____ Information For Bidders (Page 3, 3A)

_____ Specifications (Page 4 through 4QQ)

_____ Checklist / Proposal Page(s) (Page 5 through 5L)

_____ Signature Page (Page 6)

_____ Signature Affidavit (Page 7)

PLEASE COMPLETE AND SIGN PAGE 6

Cost Proposal

Prices are to be quoted F.O.B. Destination, Freight Prepaid and Allowed to the City of Columbus:

Department of Public Service
James V. Musick Traffic Engineering Facility; 1820 East Seventeenth Avenue; Columbus, OH 43219

Item	Est. Qty	Unit		Manufacturer Name and Model	Delivery (days)	Unit Prices (in figures)	Unit Prices (in words)	Extended Prices (in figures)
1	50	each	ITEM 1 - Eight Phase Menu-driven Controller with Time Based Coordination (3.4)					
2	15	each	ITEM 2 – Eight Phase Controller Only Ready for Closed Loop System Operation (3.5)					
3	5	each	ITEM 3 - Closed Loop System On-Street Master (3.13)					
4	10	each	ITEM 4 - Fiber-Optic Modem (3.14)					
5	25	each	ITEM 5 – Fiber-Optic Communications Wiring Panel (3.15)					
6	25	each	ITEM 6 – Twisted Pair Closed Loop Signal System Telemetry Module (3.16)					
7	20	each	ITEM 7 - Conflict Monitor, 3 Channel (3.6)					
8	40	each	ITEM 8 - Conflict Monitor, 6 Channel (3.6)					
9	60	each	ITEM 9 - Conflict Monitor, 12 Channel (3.6)					
10	20	each	ITEM 10 – Controller Item – Internal Ethernet Module ASC 3 (3.10)					

Cost Proposal

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Department of Public Service
James V. Musick Traffic Engineering Facility; 1820 East Seventeenth Avenue; Columbus, OH 43219

Item	Est. Qty	Unit		Manufacturer Name and Model	Delivery (days)	Unit Prices (in figures)	Unit Prices (in words)	Extended Prices (in figures)
11	10	each	ITEM 11 - Control Cabinet Only, Pole-Mount, Size K (3.7)					
12	10	each	ITEM 12 - Control Cabinet Only, Pole-Mount, Size M-30 (3.7)					
13	10	each	ITEM 13 - Control Cabinet Only, Base-Mount, Size M-30 (3.7)					
14	10	each	ITEM 14 - Control Cabinet Only, Pole-Mount, Size M-36 (3.7)					
15	10	each	ITEM 15 - Control Cabinet Only, Base-Mount, Size M-36 (3.7)					
16	15	each	ITEM 16 - Control Cabinet Only, Base-Mount, Size P-38 (3.7)					
17	15	each	ITEM 17 - Control Cabinet Only, Base-Mount, Size P-44 (3.7)					
18	3	each	ITEM 18 - Box Extender, 12” for M-30 Base-Mount Cabinet (3.7)					
19	3	each	ITEM 19 - Box Extender, 30” for M-30 Base-Mount Cabinet (3.7)					

Cost Proposal

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Item	Est. Qty	Unit		Manufacturer Name and Model	Delivery (days)	Unit Prices (in figures)	Unit Prices (in words)	Extended Prices (in figures)
20	2	each	ITEM 20 - Box Extender, 12” for M-36 Base-Mount Cabinet (3.7)					
21	4	each	ITEM 21 - Box Extender, 30” for M-36 Base-Mount Cabinet (3.7)					
22	5	each	ITEM 22 - Box Extender,12” for P-38 Base-Mount Cabinet (3.7)					
23	5	each	ITEM 23 - Box Extender, 30” for P-38 Base-Mount Cabinet (3.7)					
24	6	each	ITEM 24 - Box Extender, 12” for P-44 Base-Mount Cabinet (3.7)					
25	6	each	ITEM 25 - Box Extender, 30” for P-44 Base-Mount Cabinet (3.7)					
26	5	each	ITEM 26 - Pole-Mount Control Cabinet with Four (4) Position Back Panel, Size K (Complete Assembly **without** Controller, including Conflict Monitor and MUTCD Flash Synchronizer Device) (3.6, 3.7, 3.8, 3.9)					

Cost Proposal

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Item	Est. Qty	Unit		Manufacturer Name and Model	Delivery (days)	Unit Prices (in figures)	Unit Prices (in words)	Extended Prices (in figures)
27	5	each	ITEM 27 - Pole-Mount Control Cabinet with Eight (8) Position Back Panel, Size M-30 (Complete Assembly **without** Controller, including Conflict Monitor and MUTCD Flash Synchronizer Device) (3.6, 3.7, 3.8, 3.9)					
28	5	each	ITEM 28 - Pole-Mount Control Cabinet with Eight (8) Position Back Panel, Size M-36 (Complete Assembly **without** Controller, including Conflict Monitor and MUTCD Flash Synchronizer Device) (3.6, 3.7, 3.8, 3.9)					
29	5	each	ITEM 29 - Base-Mount Control Cabinet with Eight (8) Position Back Panel, Size M-30 (Complete **Assembly** without Controller, including Conflict Monitor and MUTCD Flash Synchronizer Device) (3.6,					

Cost Proposal

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Item	Est. Qty	Unit		Manufacturer Name and Model	Delivery (days)	Unit Prices (in figures)	Unit Prices (in words)	Extended Prices (in figures)
			3.7, 3.8, 3.9)					
30	5	each	ITEM 30 - Base-Mount Control Cabinet with Eight (8) Position Back Panel, Size M-36 (Complete Assembly **without** Controller, including Conflict Monitor and MUTCD Flash Synchronizer Device) (3.6, 3.7, 3.8, 3.9)					
31	10	each	ITEM 31 - Base-Mount Control Cabinet with Twelve (12) Position Back Panel, Size P-38 (Complete Assembly **without** Controller, including Conflict Monitor and MUTCD Flash Synchronizer Device) (3.6, 3.7, 3.8, 3.9)					
32	20	each	ITEM 32 - Base-Mount Control Cabinet with Twelve (12) Position Back Panel, Size P-44 (Complete Assembly **without** Controller, including Conflict Monitor and Flash					

Cost Proposal

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Item	Est. Qty	Unit		Manufacturer Name and Model	Delivery (days)	Unit Prices (in figures)	Unit Prices (in words)	Extended Prices (in figures)
			Synchronizer Device) (3.6, 3.7, 3.8, 3.9)					
33	3	each	ITEM 33 - Pole-Mount Control Cabinet with Eight (8) Position Back Panel, Size M-30 (Complete Assembly **without** Controller) Ready for Closed Loop System Operation (3.6, 3.7, 3.8, 3.9)					
34	3	each	ITEM 34 - Pole-Mount Control Cabinet with Eight (8) Position Back Panel, Size M-30 (Complete Assembly **without** Controller) Ready for Fiber-Optic Closed Loop System Operation (3.6, 3.7, 3.8, 3.9)					
35	3	each	ITEM 35 - Pole-Mount Control Cabinet with Eight (8) Position Back Panel, Size M-36 (Complete Assembly **without** Controller) Ready for Closed Loop System Operation (3.6, 3.7, 3.8, 3.9)					

Cost Proposal

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Department of Public Service
James V. Musick Traffic Engineering Facility; 1820 East Seventeenth Avenue; Columbus, OH 43219

Item	Est. Qty	Unit		Manufacturer Name and Model	Delivery (days)	Unit Prices (in figures)	Unit Prices (in words)	Extended Prices (in figures)
36	10	each	ITEM 36 - Pole-Mount Control Cabinet with Eight (8) Position Back Panel, Size M-36 (Complete Assembly **without** Controller) Ready for Fiber-Optic Closed Loop System Operation (3.6, 3.7, 3.8, 3.9)					
37	3	each	ITEM 37 - Base-Mount Control Cabinet with Eight(8) Position Back Panel, Size M-30 (Complete Assembly **without** Controller) Ready for Closed Loop System Operation (3.6, 3.7, 3.8, 3.9)					
38	3	each	ITEM 38 - Base-Mount Control Cabinet with Eight (8) Position Back Panel, Size M-30 (Complete **Assembly** without Controller) Ready for Fiber-Optic Closed Loop System Operation (3.6, 3.7, 3.8, 3.9)					

Cost Proposal

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Department of Public Service
James V. Musick Traffic Engineering Facility; 1820 East Seventeenth Avenue; Columbus, OH 43219

Item	Est. Qty	Unit		Manufacturer Name and Model	Delivery (days)	Unit Prices (in figures)	Unit Prices (in words)	Extended Prices (in figures)
39	3	each	ITEM 39 - Base-Mount Control Cabinet with Eight (8) Position Back Panel, Size M-36 (Complete Assembly **without** Controller) Ready for Closed Loop System Operation (3.6, 3.7, 3.8, 3.9)					
40	3	each	ITEM 40 - Base-Mount Control Cabinet with Eight (8) Position Back Panel, Size M-36 (Complete **Assembly** without Controller) Ready for Fiber-Optic Closed Loop System Operation (3.6, 3.7, 3.8, 3.9)					
41	5	each	ITEM 41 - Base-Mount Control Cabinet with Twelve (12) Position Back Panel, Size P-38 (Complete Assembly **without**					

Cost Proposal

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Department of Public Service
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Item	Est. Qty	Unit		Manufacturer Name and Model	Delivery (days)	Unit Prices (in figures)	Unit Prices (in words)	Extended Prices (in figures)
			Controller) Ready for Closed Loop System Operation (3.6, 3.7, 3.8, 3.9)					
42	10	each	ITEM 42 - Base-Mount Control Cabinet with Twelve (12) Position Back Panel, Size P-38 (Complete **Assembly** without Controller) Ready for Fiber-Optic Closed Loop System Operation (3.6, 3.7, 3.8, 3.9)					
43	5	each	ITEM 43 - Base-Mount Control Cabinet with Twelve (12) Position Back Panel, Size P-44 (Complete Assembly **without** Controller) Ready for Closed Loop System Operation (3.6, 3.7, 3.8, 3.9)					
44	25	each	ITEM 44 - Base-Mount					

Cost Proposal

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Department of Public Service
James V. Musick Traffic Engineering Facility; 1820 East Seventeenth Avenue; Columbus, OH 43219

Item	Est. Qty	Unit		Manufacturer Name and Model	Delivery (days)	Unit Prices (in figures)	Unit Prices (in words)	Extended Prices (in figures)
			Control Cabinet with Twelve (12) Position Back Panel, Size P-44 (Complete Assembly **without** Controller) Ready for Fiber-Optic Closed Loop System Operation (3.6, 3.7, 3.8, 3.9)					
45			ITEM 45 – Internal Ethernet Module ASC/2 (3.17)					
46	8	each	ITEM 46 - Base-Mount Cabinet with Twelve (12) Position Back Panel, Size P-44 (Complete Assembly **without** Controller and Master) Ready for Closed Loop System Operation and Pre-Wired for Closed Loop System Master (3.6, 3.7, 3.8, 3.9)					
47	10	each	ITEM 47 - Base-Mount Control Cabinet with Twelve (12) Position Back Panel, Size P-44 (Complete **Assembly** without Controller and Master) Ready for Fiber-Optic Closed Loop System Operation and Pre-Wired					

Cost Proposal

Prices are to be quoted F.O.B. Destination, Freight Prepaid and Allowed to the City of Columbus:

Department of Public Service
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Item	Est. Qty	Unit		Manufacturer Name and Model	Delivery (days)	Unit Prices (in figures)	Unit Prices (in words)	Extended Prices (in figures)
			for Closed Loop System Master (3.6, 3.7, 3.8, 3.9)					
48	10	each	ITEM 48 – Econolite ASC 25 PIN FSK Telemetry Module (3.18)					
49	25	each	ITEM 49 - Fiber-Optic Closed Loop Signal System Telemetry Module (3.19)					
50	5	each	ITEM 50 – Railroad Pre-emption Interface Panel (3.20)					
51	2	each	ITEM 51 – Amplifier Cabinet & Pedestal, 41 in x 25 in x 16 in (3.21)					
52	2	each	ITEM 52 - Amplifier Cabinet & Pedestal, 51 in x 25 in x 16 in (3.22)					
53	2	each	ITEM 53 – Amplifier Cabinet, base mount, 50 IN x 30 IN x 17 IN (3.23)					
54	2	Each	ITEM 54 – Amplifier Cabinet, base mount, 50 IN x 36 IN x 17 IN (3.25)					
55	2	Each	ITEM 55 – Amplifier Cabinet, base mount, 55 IN x 44 IN x 26 IN (3.25)					
56	2	Each	ITEM 56 – UPS Cabinet large (P-UPS), 8-phase					

Cost Proposal

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Item	Est. Qty	Unit		Manufacturer Name and Model	Delivery (days)	Unit Prices (in figures)	Unit Prices (in words)	Extended Prices (in figures)
			base-mount with UPS System (3.26)					
57	10	Each	ITEM 57 – External UPS cabinet and system, base-mount (3.26)					
58	5	Each	ITEM 58 – UPS batteries (3.26)					
59	5	Each	ITEM 59 – External UPS Cabinet, base-mount, cabinet only (3.26)					
60	5	Each	(3.26) ITEM 60 –					
61	10	Each	ITEM 61 – GE MDS Transnet Spread Spectrum Radio System (3.27)					
62	10	Each	ITEM 62 – Intuicom Communicator II Spread Spectrum Radio System (3.27)					
63	10	Each	ITEM 63 – Omnidirectional Antenna (3.27)					
64	1	Each	ITEM 64 – Spread Spectrum Radio Training (3.28)					

PROPOSAL

To the Finance & Management Director of the City of Columbus, Ohio:

We (I) propose to furnish the following article(s) and/or service(s) at the price(s) and terms stated subject to all instructions, conditions, specifications and all attachments hereto. We (I) have read all attachments including the specifications and fully understand what is required.

Delivery: _____ - calendar day(s) after receipt of order.

Terms:

_____

Company Name or Bidder's Name:

_____

Business Address of Bidder:

_____

REQUIRED Company Employee Information:

Total number of company employees = _____

Total number of company employees working in Columbus = _____

Additional number of employees that will be working in Columbus in the event this contract is awarded to your company = _____

The full name and residence of all persons and parties interested in the foregoing bid are: (If a corporation, give the name and address of the president and secretary; if firm or partnership, the names and address of the Members or partners.)

Name	**Address**

Authorized Signature X _____ **Title:** _____

(SIGNATURE MUST IN WRITING IN OTHER THAN BLACK INK) (TITLE MUST BE GIVEN)

REVISED 10-5-05

SIGNATURE AFFIDAVIT

(Must be completed when the individual signing the contract is NOT an officer or Member of the Company.)

STATE OF:_____

COUNTY OF: _____

_____, being duly sworn, deposes and says that he/she is

_____ of_____, a Corporation, LLC, or LLP organized and existing under
(Title) **(Company Name)**

and by virtue of the laws of the State of _____, and having its principal office at

_____
City, State, Zip Code

Affiant further says that he/she is familiar with the records, minute books and by-laws of

_____
(Company Name)

Affiant further says that _____is_____
(Name of Person Signing Contract) **(Title)**

Of the Company and is duly authorized to sign the Contract for :_____

For said Company by virtue of _____
(State whether the provision of by-laws or a resolution of the Board of Directors. If resolution, give date of adoption.)

_____
Signature of Affiant**

**** AFFIANT MUST BE SOMEONE OTHER THAN THE INDIVIDUAL SIGNING THE CONTRACT.****

Sworn to before me and subscribed in my presence this _____day of _____20____

_____
Notary Public

My Commission Expires: _____