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# INVITATION TO BID TRAFFIC SIGNAL EQUIPMENT

## SECTION 1

### 1.0 **Purpose:**

Fulton County is soliciting bids from qualified vendors to provide Traffic Signal Equipment to the Department of Public Works during a twelve (12) month calendar period.

### 1.1 **Bid Document**

This document and supporting documents can be downloaded at the Fulton County Website, <http://www.co.fulton.ga.us/> under "Bid Opportunities".

### 1.2 **Term of Contract:**

Any award made as a result of this bid shall be for twelve (12) months from the date of award by the Board of Commissioners. The County reserves the right for an option of one (1) additional twelve (12) month renewal period pending approval by the Board of Commissioners, vendor satisfactory performance and the availability of departmental appropriated funding. Renewal year price increase(s) in this contract, if exercised by Fulton County, shall be limited to the bid prices offered under this solicitation and subsequent contract unless otherwise specifically accepted by Fulton County, but in no instance shall exceed the consumer price index. The term "consumer price index" shall mean the consumer price index published by the Bureau of Labor statistics of the U.S. Department of Labor with particular reference to the average shown on such index for all terms.

### 1.3 **No Contact Provision**

It is the policy of Fulton County that the evaluation and award process for County contracts shall be free from both actual and perceived impropriety, and that contacts between potential vendors and County officials, elected officials and staff regarding pending awards of County contracts shall be prohibited.

- A. No person, firm, or business entity, however situated or composed, obtaining a copy of or responding to this solicitation, shall initiate or continue any verbal or written communication regarding this solicitation with any County officer, elected official, employee, or designated County representative, between the date of the issuance of this solicitation and the date of the County Manager's recommendation to the Board of Commissioners for award of the subject contract, except as may otherwise

be specifically authorized and permitted by the terms and conditions of this solicitation.

- B. All verbal and written communications initiated by such person, firm, or entity regarding this solicitation, if same are authorized and permitted by the terms and conditions of this solicitation, shall be directed to the Purchasing Agent.
- C. Any violation of this prohibition of the initiation or continuation of verbal or written communications with County officers, elected officials, employees, or designated County representatives shall result in a written finding by the Purchasing Agent that the submitted Bid or proposal of the person, firm, or entity in violation is "non-responsive", and same shall not be considered for award.

#### **1.4 Bid Contact**

Information regarding the bid, either procedural or technical, may be obtained by contacting AlMicah Phillips, Assistant Purchasing Agent: [almicah.phillips@co.fulton.ga.us](mailto:almicah.phillips@co.fulton.ga.us), at (404) 730-4214, Fulton County Department of Purchasing. Information regarding the bid requirements may be obtained by using the following procedure. Inquiries must be submitted in writing to;

**Fulton County Purchasing Department  
Attn: Al Micah Phillips  
130 Peachtree Street, S.W. Suite 1168  
Atlanta, GA 30303**

**Phone: (404) 730-4214  
Fax: (404) 893-1736  
Reference Bid # 06ITB54008YC**

#### **1.5 Bid Opening**

Bids will be opened in public and read aloud on **February 1, 2006 at 11:00 A.M., local time** in the Fulton County Purchasing Department's bid room, located at 130 Peachtree Street, S.W., Atlanta, Georgia 30303. Bids received after 11:00 A.M., will be considered late and will be returned to the bidder unopened. Bidders may, at their discretion, attend the bid opening. **Bidders are to submit three (3) copies, one (1) originally signed and two (2) copies.**

#### **1.6 Proposal Due Date**

All Bids are due in the Purchasing Department of Fulton County located in the Public Safety Building, Suite 1168, 130 Peachtree Street, S.W., Atlanta, Georgia 30303 on or before February 1, 2006 at 11:00 A.M., legal prevailing time. All

submitted bids will be time and date stamped according to the clock at the front desk of the Fulton County Purchasing Department. Any bid received after this appointed schedule will be considered late and subject to be returned unopened to the bidder. The bid due date can be changed only by addendum.

Bids shall clearly indicate the legal name, address, and telephone number of the proposer (company, firm, partnership, individual). Bids shall be signed above the typed or printed name and title of the signer. The signer shall have the authority to bind the proposer to the submitted proposal. ***The bid number must be clearly visible on all bid packages submitted.***

### **1.7 Delivery Requirements**

Any bid received after the above stipulated due date and time will not be considered and will be rejected and returned. It shall be the sole responsibility of the bidder to have his/her bid delivered to the Fulton County Department of Purchasing for receipt on or before the above stipulated due date and time. If a bid is sent by U.S. Mail, the bidder shall be responsible for its timely delivery to the Department of Purchasing.

### **1.8 Basis of Award**

The Contract will be awarded to the lowest responsive, responsible bidder(s), if awarded.

All Bids must be made on the Bid forms contained herein. The Bid shall be enclosed in a sealed envelope, addressed to Department of Purchasing, Fulton County Public Safety Building, 130 Peachtree Street, S.W., Suite 1168 Atlanta, Georgia 30303 and labeled "Bid for 06ITB54008YC.

## SECTION 2

### FULTON COUNTY PURCHASING DEPARTMENT

#### BID GENERAL REQUIREMENTS

#### TRAFFIC SIGNAL EQUIPMENT

**2.0** The following information pertains to the submission of a Bid to Fulton County, and contains instructions on how Bids must be presented in order to be considered. Listed below are the requirements for all Bidders interested in doing business with Fulton County.

1. The Bid sheets included in this Invitation to Bid ("Bid") must be fully completed and returned with the Bid unless otherwise specified in writing by the Purchasing Department. Type or neatly print the date, company name, and the full legal name and title of the person(s) signing the Bid in the place provided at the bottom of each Bid sheet. Any additional sheets submitted must contain the same signature and Bidder information.
2. Original signature(s) must appear on each page of the Bid document. All signatures must be executed by person(s) having contracting authority for the Bidder
3. Absolutely no fax Bids or reproduction Bids will be accepted, except that photocopies may be submitted in addition to the original when multiple copies of the Bid are specifically requested in the solicitation
4. The envelope in which the Bid response is submitted must be sealed and clearly labeled with the bid number, project title, due date and time, and the name of the company or individual submitting the proposal. Bids must be received by the opening date and time shown on this Bid in order to be considered. The Purchasing Agent has obligation to consider Bids which are not in properly marked envelopes. Contract Compliance submittals shall be submitted in a separated sealed envelope or package.
5. The original and the required number of copies of the Bid must be returned to:

Fulton County Purchasing Agent  
Fulton County Purchasing Department  
130 Peachtree Street, S.W., Suite 1168  
Atlanta, Georgia 30303

Any inquiries, questions, clarifications or suggestions regarding this solicitation should be submitted in writing to the Purchasing Contact Person. Contact with any other County personnel in regard to a current

solicitation is strictly prohibited in accordance with Fulton County "No Contact" Show information and prices in the format requested. Prices are to be quoted F.O.B. Destination, and must include all costs chargeable to the Contractor executing the Contract, including taxes. Unless otherwise provided in the Contract, Fulton County shall have no liability for any cost not included in the price. The Contractor shall provide Fulton County the benefit through a reduction in price of any decrease in the Contractor's costs by reason of any tax exemption based upon Fulton County's status as a tax-exempt entity.

6. All prices Bid must be audited by the Bidder to ensure correctness before the Bid is submitted. The Bidder is solely responsible for the accuracy of information placed on a Bid sheet, including prices. Clerical or mathematical error is insufficient to void a successful Bid but a Bidder may withdraw a sealed Bid prior to opening without a penalty.
7. All prices must be submitted in the format requested and less all trade discounts. When multiple items are being Bid, Bidder must show both the unit price and the total extended price for each item. When applicable, the Bidder must include an additional lump sum Bid for groups or items. In the event a Bidder is offering an additional discount on groups of items, Bidder must indicate the total lump sum Bid for the particular group of items before any extra discount, the amount of extra discount, and the net total for the particular group. In the event of an extension error, unit pricing shall prevail.
8. By submitting a signed Bid, Bidder agrees to accept an award made as a result of that Bid under the terms and conditions spelled out in the Bid documents. In the event of a conflict between the different Bid documents, the County's cover Contract (if used) shall have precedence, followed in order by the Invitation to Bid Purchase Order, Bid, Contractor's Warranty Agreement, Maintenance Agreement, and/or other Contractor provided agreements.
9. A Bidder may submit only one (1) Bid response for each specific Bid solicitation unless otherwise authorized in the specifications.
10. All prices submitted by the Bidder to Fulton County must be guaranteed by the authorized person(s) against any price increase for the time period designated in the Bid specifications, and Fulton County must be given the benefit of any price decrease occurring during such designated time period.
11. All items Bid must be new. Used, rebuilt and refurbished items will not be considered unless specifically authorized by Fulton County in the written specifications.

12. All Bidders must specify in the Bid response the earliest actual delivery date for each item unless otherwise specified in writing by Fulton County. The delivery date may be a factor in deciding the Bidder's capability to perform.
13. A successful Bidder's delivery ticket(s) and invoice(s) must list each item separately and must show Fulton County's purchase order number as well as the proper department and address to which delivery was made, as listed on the purchase order or in the Bidder's contract with Fulton County.
14. Unless clearly shown as "no substitute" or words to that effect, any items in this invitation to Bid which have been identified, described or referenced by a brand name or trade name are for reference only. Such identification is intended to be descriptive but not restrictive, and is to indicate the general quality and characteristics of products that may be offered. Each item Bid must be individually identified as to whether it is a specified item or an equivalent item by typing or printing after the item(s): The brand name; model or manufacturer's number, or identification regularly used in the trade. Deviations from the specifications must be clearly and fully listed on the Bid sheet, including photographs or cuts, specifications, and dimensions of the proposed "alternate". Fulton County is the sole judge of "exact Equivalent: or " alternate". The factors to be considered are function, design, materials, construction, workmanship, workmanship finishes, operating features, overall quality, local services facilities, warranty terms and service and other relevant features of item(s) Bid.
15. For all Bids, Fulton County reserves the right to request representative samples. If requested, samples must be delivered at the Bidder's cost within three (3) business days. Samples are submitted at the risk of the Bidder and may be subjected to destructive tests by Fulton County. Samples must be plainly tagged with Fulton County's Bid number, item name, manufacturer, and the name of the Bidder.
16. Item(s) Bid must be complete and ready to operate. No obvious omissions of components or necessary parts shall be made even though the specifications may not detail or mention them. Unit(s) must be furnished with factory installed equipment and must be comparable with the basic form, fit, and functional requirements which are all to be included in the base price as well as any other equipment included as standard by the manufacturer or generally provided to the buying public.
17. All successful Bidders must assume full responsibility for all item(s) damaged prior to F.O.B. Destination delivery and agree to hold harmless Fulton County of all responsibility for prosecuting damage claims.

18. All successful Bidders must assume full responsibility for replacement of all defective or damaged goods within thirty (30) days of notice by Fulton County of such defect or damage.
19. All successful Bidders must assume full responsibility for providing or ensuring warranty service on any and all items including goods, materials, or equipment provided to the County with warranty coverage. If a successful Bidder is not the manufacturer, all manufacturer's warranties must be passed through to Fulton County. The Bidder and not Fulton County is responsible for contacting the manufacturer of the warranty service provided during the warranty period and supervising the completion of the warranty service to the satisfaction of Fulton County.
20. As a successful Bidder providing any equipment which requires fitting and assembly the Bidder shall be solely responsible for such installation being performed by a manufacturer's authorized or approved servicer an experienced worker, utilizing workmanship of the highest caliber. The Bidder must verify all dimensions at the site, shall be responsible for their correctness, and shall be responsible for the availability of replacement parts when specified in writing by Fulton County in the specifications, purchase order, or other contract.
21. A successful Bidder is solely responsible for disposing of all wrappings, crating, and other disposable material upon deliver of item(s).
22. All Bidders are required to be authorized distributors or regularly engaged in the sale or distribution of the type of goods, materials, equipment or services for which the Bidder is submitting a Bid response in addition, all Bidders are required to provide Fulton County with three (3) written references documenting the successful completion of Bids or contracts for the types of items including goods, materials, equipment, or services for which the Bidder is submitting a Bid response. In instances where a Bidder has never supplied such goods, material, equipment, or services before, the Bidder must submit with the Bid response a statement and supporting documentation demonstrating such expertise, knowledge, or experience to establish the Bidder as a responsible Bidder, capable of meeting the Bid requirements should an award be made. No exceptions to this provision will be made unless authorized in the Bid specifications.
23. Bidders may be required to furnish evidence that they maintain permanent places of business of a type and nature compatible with their Bid proposal, and are in all respects competent and eligible vendors to fulfill the terms of the specifications. Fulton County may make such investigations as it deems necessary to determine the ability of the Bidder to perform such work, and reserves the right to reject any Bidder if evidence fails to

indicate that the Bidder is qualified to carry out the obligation of the Contract and to complete the work satisfactorily.

24. All Bidders must comply with all Fulton County Purchasing laws, policies, and procedures, non-discrimination in contracting and procurement ordinances, and relevant state and federal laws including but not limited to compliance with EEOC hiring guidelines and requirements under the Americans with Disabilities Act. Successful Bidder must obtain all permits, licenses, and inspections as required and furnish all labor, materials, insurance, equipment, tools, supervision, and incidentals necessary to accomplish the work in these specifications.
25. If a successful Bidder is unable or unwilling to enter into a Contract with Fulton County subsequent to being granted an award, or who fails to perform in accordance with the Bid specifications the Bidder will be subject to damages and all other relief allowed by law.
26. Successful Bidders contract directly with Fulton County and are the party or parties obligated to perform. Contracts may not be assigned and any failure to perform the Contract in accordance with the specifications will constitute a breach of Contract and may result in a Bidder being found to be “non-responsive” in the future.
27. In case of default by the successful Bidder, Fulton County may procure the articles for services from another source and hold the successful Bidder responsible for any resulting excess cost.
28. The County may award any Bid in whole or in part to one or more vendors or reject all Bids and/or waive any technicalities if it is in the best interests of the County to do so. In the event that all Bids are not rejected, Bids for items including goods, materials, equipment, and services will be awarded to the lowest “responsible” Bidder(s) as determined by Fulton County. Submitting the lowest Bid, as published at the Bid opening, does not constitute an award or the mutual expectation of an award of a Contract and purchase order. For purposes of this notice and the attached Bid sheets, a purchase order is a Contract to provide items including goods, materials, equipment, and services and is intended to have the full force and effect of a Contract. A breach of the terms and conditions of a purchase order constitutes a breach of Contract.
29. Bids for projects that are solicited pursuant to the Georgia Local Government Public Works Construction Law ( O.C.G.A 36-91-1 et seq) may withdrawn as follows:

Competitive sealed Bids (Bid) may not be revoked or withdrawn until 60 days after the time set by the governmental entity for opening of Bids. At

the end of this time period the Bid will cease to be valid, unless the Bidder provides written notice to the County prior to the scheduled expiration date that the Bid will be extended for a time period specified by the County.

30. In the evaluation of the Bids, any award will be subject to the Bid being:
  - A. Compliant to the specification – meets form, fit, and function requirements stated or implied in the specification.
  - B. Lowest cost to the County over projected useful life.
  - C. Administratively Compliant – Including all required bonds, insurance, established quality of work and general reputation, financial responsibility, relevant experience, and related criteria.
31. All bids and Bids submitted to Fulton County are subject to the Georgia “Open Records Act”, Official Code of Georgia, Annotated (O.C.G.A.) §50-18-70 et seq.
32. All bids and Bids submitted to Fulton County involving Utility Contracting are subject to the Georgia law governing licensing of Utility Contractors, O.C.G.A. §43-14-8.2(h). The Utility Contractor License number of the person who will perform the utility work shall be written on the face of the Bid envelope.
33. The apparent silence of this specification, and any supplement thereto, as to details, of the omission from it of a detailed description concerning any point, will be regarded as meaning only the best commercial practices are to prevail. Only materials of the highest quality, correct type, size, and design are to be used. All interpretations of this specification will be made upon the basis of this statement, with Fulton County interpretation to prevail.
34. It is the policy of Fulton County that the evaluation and award process for County contracts shall be free from both actual and perceived impropriety, and that contacts between potential vendors and County officials, elected officials and staff regarding pending awards of County contracts shall be prohibited.
  - A. No person, firm, or business entity, however situated or composed, obtaining a copy of or responding to this solicitation, shall initiate or continue any verbal or written communication regarding this solicitation with any County officer, elected official, employee, or designated County representative, between the date of the issuance of this solicitation and the date of the County Manager’s recommendation to the Board of Commissioners for award of the subject contract, except as may otherwise be specifically

authorized and permitted by the terms and conditions of this solicitation.

- B. All verbal and written communications initiated by such person, firm, or entity regarding this solicitation, if same are authorized and permitted by the terms and conditions of this solicitation, shall be directed to the Purchasing Agent.
  - C. Any violation of this prohibition of the initiation or continuation of verbal or written communications with County officers, elected officials, employees, or designated County representatives shall result in a written finding by the Purchasing Agent that the submitted Bid or proposal of the person, firm, or entity in violation is “non-responsive”, and same shall not be considered for award.
35. Any Bidder intending to respond to this solicitation as a Joint Venture must submit an executed Joint Venture Agreement with this Bid. This agreement must designate those persons or entities authorized to execute documents or otherwise bind the Joint Venture in all transactions with Fulton County, or are accompanied by a document, binding upon the Joint Venture and its constituent members, making such designation. Bids from Joint Ventures that do not include these documents will be rejected as being “non-responsive”.
36. Any Bidder intending to respond to this solicitation must complete all of the Procurement Affidavit Forms provided in this solicitation. Bids that do not include these completed documents will be rejected as being “non-responsive”.

## 2.1 **Definition of Purchasing Terms**

**Addenda** - the plural of addendum.

**Addendum** - a written or graphic change to the contract documents issued prior to bid opening which becomes a part of the specifications for the project.

**Advertisement** - public notice inviting bids shall be published for two (2) consecutive weeks. All projects shall be published on the Fulton County's website @ [www.co.fulton.ga.us](http://www.co.fulton.ga.us) , under "Bid Opportunities".

**Amendment** – a change, addition, alteration, correction or revision to a bid or proposal or contract document.

**Award** - approval by the Board of Commissioners, to begin the contracting process with the lowest most responsive and responsible bidder.

**Bid** - the formal process allowing prospective vendors to compete for goods and services sought by the County.

**Bid acceptance** - the acceptance of bids delivered to the Purchasing Agent at the time, place, and under the conditions contained in the invitation for bids and as further stipulated in the specifications document.

**Bid opening** - the public opening of bids received and accepted and the reading aloud of the name of each bidder and the amount of bid in the presence of one (1) or more witnesses at the time and place designated in the invitation to bid. For RFP openings only the name of the proponents are read aloud.

**Brand name or equal specification** – means a specification limited to one or more items by manufacturer's names or catalogue numbers to describe the standard of quality, performance and other salient characteristics needed to meet County requirements and which provides for the submission of equivalent products from any manufacturer.

**Brand name specifications** – means a specification limited to one or more items by manufacturer's names or catalogue numbers.

**Collusion** – a secret agreement, whether expressed or implied, to commit a fraudulent, deceitful, unlawful, or wrongful act.

**Collusive bidding** – a violation of antitrust statutes that consists of a response to a solicitation by two or more persons who have secretly agreed to circumvent laws and rules regarding independent and competitive bidding.

**County** - "County" shall mean the Fulton , Georgia, a political subdivision of the State of Georgia, and shall include all agencies, establishments or officials of the government of the .

**Contractor** - any person or entity having a contract with the County.

**Days** - "Days" shall mean calendar days.

**Debarment** – the exclusion of a person or company from participating in a procurement activity for an extended period of time, as specified by law, because of previous illegal or irresponsible action.

**Designee** - an authorized representative of a person holding superior position of responsibility.

**Invitation to bid (ITB)** - all documents, whether attached or incorporated by reference, utilized for soliciting sealed bids.

**Inspection** - an authorized representative of the County, or of the County's architect/engineer, assigned to make all necessary inspections, test, and reports of the work performed or being performed.

**May** - denotes permissive.

**Offer** - a proposal by an offeror submitted when procurement is made by a source selection method other than competitive sealed bidding.

**Offeror** – a person making an offer.

**Procurement** - buying, purchasing, renting, leasing or otherwise acquiring any supplies, services or construction. Also includes all functions that pertain to the obtaining of any supply, service or construction, including a description of requirements, selection and solicitation of sources, preparation and award of contracts, and all phases of contract administration.

**Purchasing Agent** - the Director of the Fulton County Department of Purchasing the principal purchasing official for the County.

**Responsible bidder or responsible offeror** – means a person or entity that has the capability in all respects to perform fully and reliably the contract requirements.

**Scope of work** - means the work that is required by the contract documents.

**Shall** - denotes imperative.

**Solicitation** - an invitation for bid, a request for proposal, a request for quotation, or any other document issued by the County for the purpose of soliciting bids or bids to perform a County contract.

**Specifications** – means any description of the physical or functional characteristics or of the nature of a supply, service or construction item. It may include a description of any requirement for inspecting, testing or preparing a supply, service or construction item for delivery.

## **2.2 Clarification and Interpretations**

Bidders may submit requests for clarifications or interpretations regarding this ITB. Bidders must prepare such requests in writing for the County's consideration as set forth in this section of this ITB. While the County has not placed an initial limitation on the number of requests which can be submitted, Bidders are cautioned that if Bidders do not request meaningful clarifications or interpretations in an organized manner (e.g., limited frequency of requests), the County will set restrictions on the frequency and number of requests permitted. The County will not respond to requests received after January 20, 2006 **at 5:00 PM**, local prevailing time. Bidders are advised that this section places no obligation on the part of the County to respond to any or all requests for clarification or interpretation, and that the County's failure to respond to any such request will not relieve the bidder of any obligations or conditions required by this ITB.

Request for clarification or interpretation regarding this ITB shall only be submitted in writing (letter, fax or email) to:

Al Micah Phillips, Assistant Purchasing Agent  
Department of Purchasing  
Fulton County Public Safety Building  
130 Peachtree Street, S.W., 1168  
Atlanta, GA 30303  
Fax: (404) 893-1736  
[almicah.phillips@co.fulton.ga.us](mailto:almicah.phillips@co.fulton.ga.us)

All responses to written requests for clarification, interpretation, or additional information will be distributed as addenda to this ITB to all persons registered with the County to have received a copy of the ITB.

No oral interpretation, instruction, or information concerning this ITB given by any employee or agent of the County shall be binding on the County. Bidders who submit a bid in reliance on any such oral information risk having their response to this ITB deemed non-responsive by the County. Only written responses issued by addendum to this ITB should be considered by the bidders.

During the period provided for the preparation of bids, the County may issue addenda to this ITB. These addenda will be numbered consecutively and will be distributed to those who have been issued a copy of this ITB. Additionally, the addenda will be posted on the Fulton County website, [www.co.fulton.ga.us](http://www.co.fulton.ga.us). these addenda will be issued by, or on behalf of, the County and will constitute a part of this ITB. Each bidder is required to acknowledge by submitting an executed acknowledgment form included with this bid. This acknowledgment shall include all addenda distributed prior to the bid submission date. All responses to this ITB shall be prepared with full consideration of the addenda issued prior to the bid submission date.

### **2.3 Right to Reject Bids**

The County reserves the right to reject any or all bids and to waive informalities. No bids will be received after the time set for opening bids. Any unauthorized conditions, limitations or provisions attached to the Bid, except as provided herein, will render it informal and may cause its rejection. Unbalanced bids will be subject to rejection. Any bidder may withdraw his/her bid, either personally or by telegraphic or written request, at any time prior to the scheduled closing time for receipt of bids. Telegraphic or written requests for withdrawal must be in the possession of the County prior to the closing time for receipt of bids.

### **2.4 Disqualification of Bidders**

The submission of more than one (1) bid to the County as the primary Bidder or member of a joint venture for the same bid by an individual firm, partnership or corporation under the same or different names may be considered as sufficient for disqualification of a bidder and the rejection of the bid.

### **2.5 Applicable Laws**

All applicable laws and regulations of the State of Georgia and ordinances and regulations of Fulton County shall apply. Protestors shall seek resolution of their complaints in the manner provided in the Fulton County Code of Laws §2-324, which is incorporated by reference herein.

### **2.6 Examination of Contract Documents**

Prospective bidders shall examine the contract documents and before submitting a bid, shall make a written request to the County for an interpretation or correction of any ambiguity, in consistency or error therein which could be discovered by a bidder. At the bid opening each bidder shall be presumed to have read and be familiar with the contract documents.

## **2.7 Termination**

The County may terminate the contract resulting from this solicitation at any time the vendor fails to carry out the contract provisions, if in the opinion of the County, the performance of the contract is unreasonably delayed, or the vendor is in direct violation of the contract conditions. The County shall provide the vendor with notice of any conditions which violate or endanger the performance of the contract and, if after such notice the contractor fails to remedy such conditions within thirty (30) days, to the satisfaction of the County, the County may exercise their option in writing to terminate the Contract without further notice to the Contractor and order the Contractor to stop work immediately and vacate the premises. Vendor agrees by its bid submission that the County's decision is final and valid.

## **2.8 Indemnification and Hold Harmless Agreement**

Contractor/Vendor hereby agrees to release, indemnify, defend and hold harmless the County, its Commissioners, officers, employees, subcontractors, successors, assigns and agents, from and against any and all losses (including death), claims, damages, liabilities, costs and expenses (including but not limited to all actions, proceedings, or investigations in respect thereof and any costs of judgments, settlements, court costs, attorney's fees or expenses, regardless of the outcome of any such action, proceeding, or investigation), caused by, relating to, based upon or arising out of any act or omission by contractor, its directors, officers, employees, subcontractors, successors, assigns or agents, or otherwise in connection with its acceptance, or the performance, or nonperformance, of its obligations under this agreements.

## **2.9 Irrevocable Offer**

No bid may be modified, withdrawn, or cancelled by the bidder for sixty (60) days following the date and time designated for receipt of bids, and each bidder so agrees in submitting its bid. All adjustment factors shall remain valid during this time period unless noted otherwise.

Prior to the date and time designated for receipt of bids, a bid may be withdrawn on written or facsimile (fax) request, provided that written confirmation of any fax withdrawal over the signature of the bidder must have been mailed and postmarked on or before the date and time set for receipt of bids. A withdrawn bid may be resubmitted up to the date and time designated for receipt of bids, provided that it is then fully in conformance with these Instructions to Bidders.

**SECTION 3**

**PURCHASING FORMS & INSTRUCTIONS**

**3.1 Introduction**

To be deemed responsive to this ITB, Bidders must provide the information requested and complete in detail all Bid Forms. The appropriate individual(s) authorized to commit the Bidder must sign the Bid Forms. Bidders should reproduce each Bid Form, as required, and complete the appropriate portions of the forms provided in this section.

**Procurement Affidavits**

Procurement Affidavit Form 1	Certification Regarding Debarment
Procurement Affidavit Form 2	Form A: Non-Collusion Affidavit (Prime)  Form B: Sub-Contractor Non-Collusion Affidavit
Procurement Affidavit Form 3	Certificate of Acceptance of Invitation to Bid Requirements

## **3.2 Procurement Affidavit Forms Description**

The following paragraphs present an overview of each Procurement Affidavit Form required.

### **3.2.1 Certification Regarding Debarment**

Bidder shall complete and submit Form 1, which certifies that neither it nor its subcontractors are presently debarred, suspended, proposed for debarment, declared ineligible, or otherwise excluded from doing business with any government agency.

### **3.2.2 Non-Collusion Affidavit**

The Bidder shall include a copy of Proposal Form 2A, executed by an authorized officer of the corporation. Bids developed by a joint venture shall be similarly executed by all joint venture participants. Additionally, all sub-contractors shall execute a copy of Bid Form 2B which shall also be submitted with the bid.

### **3.2.3 Certificate of Acceptance of Invitation to Bid Requirements**

Bidder shall complete and submit Form 3, which certifies that Bidder has read the solicitation including all addenda, exhibits, attachments and appendices.

## **CERTIFICATION REGARDING DEBARMENT**

- (1) The Offeror certifies that neither it or its subcontractors is presently debarred, suspended, proposed for debarment, declared ineligible, or otherwise excluded from doing business with any government agency. Any such exclusion may cause prohibition of your firm from participating in any procurement by the Fulton County Government.
- (2) If the Offeror is unable to certify to any of the statements in this certification, such Offeror or subcontractor shall attach an explanation to this bid or proposal.

## **INSTRUCTIONS FOR CERTIFICATION**

By signing and submitting this certification, the Offeror is providing the certification set out below:

- (1) The certification in this clause is a material representation of fact upon which reliance will be placed. If it is later determined that the prospective vendor knowingly rendered a false certification, the Purchasing Agent may pursue all available remedies, including suspension and/or debarment, for withdrawal of award or termination of a contract.
- (2) The prospective Offeror shall provide immediate written notice to the Purchasing Agent if at anytime the Offeror learns that its certification was erroneous when submitted or has become erroneous by reason of changed circumstances.
- (3) Offeror shall be under a continuing duty to immediately inform the Purchasing Agent in writing of any changes, if as a result of such changes, the Offeror certification regarding debarment is affected.

## **DEBARMENT ORDINANCE**

The following SECTION 2-322 of Fulton County Code of Laws establishes the procedure for the debarment of contractors.

- (a) *Authority to suspend.*

After reasonable notice to the entity involved and reasonable opportunity for that entity to be heard, the Purchasing Agent, after consultation with user department, the County Manager and the County Attorney shall have the authority to suspend an entity for cause from consideration for award of county contracts. As used in this SECTION, the term entity means any business entity, individual, firm, contractor, subcontractor or business corporation, partnership, limited liability corporation, firm, contractor, subcontractor or business structured; provided, further, that any such entity shall also

be subject to suspension under this SECTION if any of its constituents, members, subcontractors at any tier of such entity's and the entity, or any constituent or member, knew or should have known of the commission of the act. The suspension shall be for a period not to exceed three (3) years unless cause is based on a felony conviction for an offense related or associated with fraudulent contracting or misappropriation of funds wherein the suspension shall not exceed seven (7) years.

(b) *Causes for Suspension.* The causes for suspension include:

- (1) Conviction for commission of a criminal offense as an incident to obtain or attempting to obtain a public or private contract or subcontract, or in performance of such contract or subcontract;
- (2) Conviction of state or federal statutes of embezzlement, theft, forgery, bribery, falsification or destruction of records, receiving stolen property or other offense indicating a lack of business integrity or business honesty which currently, seriously and directly affects responsibility as a county contractor.
- (3) Conviction of state or federal anti-trust statutes arising out of the solicitation and submission of bids and bids;
- (4) Violation of contract provisions, as set forth below, of a character which is regarded by the Purchasing Agent to be so serious as to justify suspension action:
  - a. Failure to perform in accordance with the specifications within a time limit provided in a county contract;
  - b. A recent record of failure to perform or unsatisfactory performance in accordance with the terms of one or more contracts; provided, that failure to perform or unsatisfactory performance caused by acts beyond the control of the contractor shall not be considered to be a basis for suspension;
  - c. Material representation of the composition of the ownership or workforce or business entity certified to the county as a minority business enterprise; or
  - d. Falsification of any documents.
- (5) For violation of the ethical standards set forth in Fulton County Code Chapter 9, Code of Ethics.
- (6) Knowing misrepresentation to the county, of the use which a majority owned contractor intends to make a minority business enterprise (a

business entity at least 51 percent of which is owned and controlled by minority persons, as defined in Fulton County Code Chapter 6, Article B, Minority Business Enterprise Affirmative Action Program and certified as such by the county), as a sub-contractor or a joint venture partner, in performing work under contract with the county.

Failure to fully and truthfully provide the information required, may result in the disqualification of your bid/proposal from consideration or termination of the Contract, once awarded. This document must be completed and included as a part of the bid/proposal package along with other required documents.

Under penalty of perjury, I declare that I have examined this certification and all attachments hereto, if applicable, to the best of my knowledge and belief, and all statements contained hereto are true, correct, and complete.

On this \_\_\_\_\_ day of \_\_\_\_\_, 2005

\_\_\_\_\_  
(Legal Name of Offeror) (Date)

\_\_\_\_\_  
(Signature of Authorized Representative) (Date)

\_\_\_\_\_  
(Title)

**STATE OF GEORGIA**

**COUNTY OF FULTON**

**NON-COLLUSION AFFIDAVIT OF PRIME BIDDER/OFFEROR**

I, \_\_\_\_\_ certify that pursuant to Fulton County Code SECTION 2-320 (11), this bid or proposal is made without prior understanding, agreement or connection with any corporation, firm or person submitting a bid for the same work, labor or service to be done or the supplies, materials or equipment to be furnished and is in all respects fair and without collusion or fraud. I understand collusive bidding is a violation of state and federal law and can result in fines, prison sentences and civil damages awards. I agree to abide by all conditions of this bid or proposal and certify that I am authorized to sign this bid or proposal for the bidder.

Affiant further states that pursuant to O.C.G.A. SECTION 36-91-21 (d) and (e), \_\_\_\_\_ has not, by itself or with others, directly or indirectly, prevented or attempted to prevent competition in such bidding or bids by any means whatsoever. Affiant further states that (s)he has not prevented or endeavored to prevent anyone from making a bid or offer on the project by any means whatever, nor has Affiant caused or induced another to withdraw a bid or offer for the work.

Affiant further states that the said offer of \_\_\_\_\_ is bona fide, and that no one has gone to any supplier and attempted to get such person or company to furnish the materials to the bidder only, or if furnished to any other bidder, that the material shall be at a higher price.

\_\_\_\_\_  
(COMPANY NAME)

\_\_\_\_\_  
(PRESIDENT/VICE PRESIDENT)

Sworn to and subscribed before me this \_\_\_\_\_ day of \_\_\_\_\_, 200\_\_.

\_\_\_\_\_  
(SECRETARY/ASSISTANT SECRETARY)

(Affix corporate seal here, if a corporation)

Notary Public: \_\_\_\_\_

County: \_\_\_\_\_

Commission Expires: \_\_\_\_\_

**NOTE:**

**IF THE OFFEROR IS A PARTNERSHIP, ALL OF THE PARTNERS AND ANY OFFICER, AGENT, OR OTHER PERSON WHO MAY HAVE REPRESENTED OR ACTED FOR THEM IN BIDDING FOR OR PROCURING THE CONTRACT SHALL ALSO MAKE THIS OATH.**

**IF THE OFFEROR IS A CORPORATION, ALL OFFICERS, AGENTS, OR OTHER PERSONS WHO MAY HAVE ACTED FOR OR REPRESENTED THE CORPORATION IN BIDDING FOR OR PROCURING THE CONTRACT SHALL MAKE THE OATH.**

STATE OF GEORGIA

COUNTY OF FULTON

**NON-COLLUSION AFFIDAVIT OF SUBCONTRACTOR**

I, \_\_\_\_\_ certify that pursuant to Fulton County Code SECTION 2-320 (11), this bid or proposal is made without prior understanding, agreement or connection with any corporation, firm or person submitting a bid for the same work, labor or service to be done or the supplies, materials or equipment to be furnished and is in all respects fair and without collusion or fraud. I understand collusive bidding is a violation of state and federal law and can result in fines, prison sentences and civil damages awards. I agree to abide by all conditions of this bid or proposal and certify that I am authorized to sign this bid or proposal for the bidder.

Affiant further states that pursuant to O.C.G.A. SECTION 36-91-21 (d) and (e), \_\_\_\_\_ has not, by itself or with others, directly or indirectly, prevented or attempted to prevent competition in such bidding or bids by any means whatsoever. Affiant further states that (s)he has not prevented or endeavored to prevent anyone from making a bid or offer on the project by any means whatever, nor has Affiant caused or induced another to withdraw a bid or offer for the work.

Affiant further states that the said offer of \_\_\_\_\_ is bona fide, and that no one has gone to any supplier and attempted to get such person or company to furnish the materials to the bidder only, or if furnished to any other bidder, that the material shall be at a higher price.

\_\_\_\_\_  
(COMPANY NAME)

\_\_\_\_\_  
(PRESIDENT/VICE PRESIDENT)

Sworn to and subscribed before me this \_\_\_\_\_ day of \_\_\_\_\_, 200\_\_.

\_\_\_\_\_  
(SECRETARY/ASSISTANT SECRETARY)

(Affix corporate seal here, if a corporation)

Notary Public: \_\_\_\_\_

County: \_\_\_\_\_

Commission Expires: \_\_\_\_\_

**NOTE:**

**IF THE OFFEROR IS A PARTNERSHIP, ALL OF THE PARTNERS AND ANY OFFICER, AGENT, OR OTHER PERSON WHO MAY HAVE REPRESENTED OR ACTED FOR THEM IN BIDDING FOR OR PROCURING THE CONTRACT SHALL ALSO MAKE THIS OATH.**

**IF THE OFFEROR IS A CORPORATION, ALL OFFICERS, AGENTS, OR OTHER PERSONS WHO MAY HAVE ACTED FOR OR REPRESENTED THE CORPORATION IN BIDDING FOR OR PROCURING THE CONTRACT SHALL MAKE THE OATH.**

**CERTIFICATE OF ACCEPTANCE OF INVITATION TO BID**  
**REQUIREMENTS**

This is to certify that on this day, offeror acknowledges that he/she has read this solicitation document, pages # \_\_\_\_\_ to # \_\_\_\_\_ inclusive, including any addenda # \_\_\_\_\_ to # \_\_\_\_\_ exhibit(s) # \_\_\_\_\_ to # \_\_\_\_\_, attachment(s) # \_\_\_\_\_, and/or appendices # \_\_\_\_\_ to # \_\_\_\_\_ in its entirety, and agrees that no pages or parts of the document have been omitted, that he/she understands, accepts and agrees to fully comply with the requirements therein, and that the undersigned is authorized by the offeror to submit the proposal herein and to legally obligate the offeror thereto.

Company: \_\_\_\_\_

Signature: \_\_\_\_\_

Name: \_\_\_\_\_

Title: \_\_\_\_\_ Date: \_\_\_\_\_

Phone: \_\_\_\_\_

**(Affix Corporate Seal)**

## SECTION 4

### CONTRACT COMPLIANCE REQUIREMENTS

#### 4.1 NON-DISCRIMINATION IN CONTRACTING AND PROCUREMENTS

It is the policy of Fulton County Government that discrimination against businesses by reason of the race, color, gender or national origin of the ownership of any such business is prohibited. Furthermore, it is the policy of the Board of Commissioners ("Board") that Fulton County and all vendors and contractors doing business with Fulton County shall provide to all businesses the opportunity to participate in contracting and procurement paid, in whole or in part, with monetary appropriations of the Board. Similarly, it is the policy of the Board that the contracting and procurement practices of Fulton County should not implicate Fulton County as either an active or passive participant in the discriminatory practices engaged in by private contractors or vendors seeking to obtain contracts with Fulton County.

**Equal Business Opportunity Plan (EBO Plan):** In addition to the proposal submission requirements, each vendor **must** submit an Equal Business Opportunity Plan (EBO Plan) with their bid/proposal. The EBO Plan is designed to enhance the utilization of a particular racial, gender or ethnic group by a bidder/proposer, contractor, or vendor or by Fulton County. The respondent **must** outline a plan of action to encourage and achieve diversity and equality in the available procurement and contracting opportunities with *this solicitation*.

The EBO Plan **must** identify and include:

1. Potential opportunities within the scope of work of *this solicitation* that will allow for participation of racial, gender or ethnic groups.
2. Efforts that will be made by the bidder/proposer to encourage and solicit minority and female business utilization in *this solicitation*.

Fulton County encourages joint ventures, teaming, partnering and mentor-protégé relationships with minority and female businesses in an effort to achieve contracting and procurement diversity.

**Prompt Payment:** The prime contractor **must** certify in writing and **must** document on the Exhibit G Form (Prime Contractor/Subcontractor Utilization Report) that all subcontractors, sub-consultants and suppliers have been promptly paid for work and materials, (less any retainage by the prime contractor prior to receipt of any further progress payments). In the event the prime contractor is unable to pay subcontractors, sub-consultants or suppliers until it has received a progress payment from Fulton County, the prime contractor shall pay all subcontractors, sub-consultants or suppliers funds due from said progress payment within forty-eight (48) hours of receipt of payment from Fulton County. In no event shall a subcontractor, sub-consultant or supplier be paid later than fifteen (15) days as provided for by state law.

## 4.2 REQUIRED FORMS AND EBO PLAN

In order to be compliant with the intent and provisions of the Fulton County Non-Discrimination in Purchasing and Contracting Ordinance (99-0960), bidders/proposers **must** submit the following completed documents. Failure to provide this information **shall** result in the proposal being deemed non-responsive.

- **Exhibit A** – Promise of Non-Discrimination
- **Exhibit B** – Employment Report
- **Exhibit C** – Schedule of Intended Subcontractor Utilization
- **Exhibit D**– Letter of Intent to Perform as a Subcontractor or Provide Materials or Services
- **Exhibit E** – Declaration Regarding Subcontractors Practices
- **Exhibit F** – Joint Venture Disclosure Affidavit
- **Equal Business Opportunity Plan (EBO Plan)** – This document is not a form. It is a statement created by the bidder/proposer on its company letter head addressing the EBO Plan requirements.

All Contract Compliance documents (Exhibits A – F and EBO Plan) are to be placed in a **separate sealed envelope** clearly marked “Contract Compliance”. The EBO Plan must be submitted on company letterhead. These documents are considered part of and should be submitted with the Technical Proposal.

The following document must be completed as instructed if awarded the project:

- **Exhibit G** – Prime Contractor’s Subcontractor Utilization Report

**EXHIBIT A – PROMISE OF NON-DISCRIMINATION**

“Know all persons by these presents, that I/We ( \_\_\_\_\_ ),

Name

\_\_\_\_\_

\_\_\_\_\_ Title

Firm Name

Hereinafter “Company”, in consideration of the privilege to bid on or obtain contracts funded, in whole or in part, by Fulton County, hereby consent, covenant and agree as follows:

- 1) No person shall be excluded from participation in, denied the benefit of, or otherwise discriminated against on the basis of race, color, national origin or gender in connection with any bid submitted to Fulton County for the performance of any resulting there from,
- 2) That it is and shall be the policy of this Company to provide equal opportunity to all businesses seeking to contract or otherwise interested in contracting with this Company without regard to the race, color, gender or national origin of the ownership of this business,
- 3) That the promises of non-discrimination as made and set forth herein shall be continuing in nature and shall remain in full force and effect without interruption,
- 4) That the promise of non-discrimination as made and set forth herein shall be made a part of, and incorporated by reference into, any contract or portion thereof which this Company may hereafter obtain,
- 5) That the failure of this Company to satisfactorily discharge any of the promises of non-discrimination as made and set forth herein shall constitute a material breach of contract entitling the Board to declare the contract in default and to exercise any and all applicable rights and remedies, including but not limited to cancellation of the contract, termination of the contract, suspension and debarment from future contracting opportunities, and withholding and/or forfeiture of compensation due and owing on a contract; and
- 6) That the bidder shall provide such information as may be required by the Director of Contract Compliance pursuant to SECTION 4.4 of the Fulton County Non-Discrimination in Purchasing and Contracting Ordinance.

**SIGNATURE:** \_\_\_\_\_

**ADDRESS:** \_\_\_\_\_

**TELEPHONE NUMBER:** \_\_\_\_\_

## EXHIBIT B – EMPLOYMENT REPORT

The demographic employment make-up for the bidder **must** be identified and submitted with this bid/proposal. In addition, if subcontractors will be utilized by the bidder/proposer to complete this project, then the demographic employment make-up of the subcontractor(s) must be identified and submitted with this bid.

### EMPLOYEES

CATEGORY	NATIVE INDIAN		AFRICAN AMERICAN		ASIAN AMERICAN		HISPANIC AMERICAN		CACUSIAN AMERICAN		OTHER	
	M	F	M	F	M	F	M	F	M	F	M	F
Mgmt/Official												
Professional (Arch., P.E., etc.)												
Supervisors												
Office/ Clerical												
Craftsmen												
Laborers												
Others (Specify)												
<b>TOTALS</b>												

**FIRM'S NAME:** \_\_\_\_\_

**ADDRESS:** \_\_\_\_\_

**TELEPHONE NUMBER:** \_\_\_\_\_

This completed form is for (Check one)  Bidder/Proposer  Subcontractor

**Submitted by:** \_\_\_\_\_

**Date Completed:** \_\_\_\_\_

**EXHIBIT C – SCHEDULE OF INTENDED SUBCONTRACTOR UTILIZATION**

If the bidder/proposer intends to subcontract any portion of this scope of work/service(s), this form **must be** completed and **submitted with the bid/proposal**. All prime bidders/proposers **must** include Letter(s) of Intent (Exhibit D) in the bid document for all subcontractors who will be utilized under the scope of work/services.

**Prime Bidder/Proposer:** \_\_\_\_\_  
\_\_\_\_\_

**ITB/RFP NUMBER:** \_\_\_\_\_  
\_\_\_\_\_

**Project Name or Description of Work/Service(s):** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

1. My firm, as Prime Bidder/Proposer on this scope of work/service(s) is \_\_\_\_\_ is not \_\_\_ a minority or female owned and controlled business. (Please indicate below the portion of work, including, percentage of bid amount that your firm will carry out directly):
- \_\_\_\_\_  
\_\_\_\_\_

If the Prime Bidder/Proposer is a Joint Venture, please complete Exhibit F: Joint Venture Disclosure Affidavit and attach a copy of the executed Joint Venture Agreement.

2. Sub-Contractors (Including suppliers) to be utilized in the performance of this scope of work/service(s), if awarded, are:

SUBCONTRACTOR NAME: \_\_\_\_\_  
\_\_\_\_\_

ADDRESS: \_\_\_\_\_  
\_\_\_\_\_

PHONE: \_\_\_\_\_

CONTACT PERSON: \_\_\_\_\_  
\_\_\_\_\_

ETHNIC GROUP\*: \_\_\_\_\_ COUNTY CERTIFIED\*\* \_\_\_\_\_

WORK TO BE PERFORMED: \_\_\_\_\_  
\_\_\_\_\_

DOLLAR VALUE OF WORK: \$ \_\_\_\_\_ PERCENTAGE VALUE \_\_\_\_\_ %

**\*Ethnic Groups: African American (AABE); Asian American (ABE); Hispanic American (HBE); Native American (NABE); White Female American (WFBE); \*\*If yes, attach copy of recent certification letter.**

**EXHIBIT C – SCHEDULE OF INTENDED SUBCONTRACTOR UTILIZATION**

SUBCONTRACTOR NAME: \_\_\_\_\_

ADDRESS: \_\_\_\_\_

PHONE: \_\_\_\_\_

CONTACT PERSON: \_\_\_\_\_

ETHNIC GROUP\*: \_\_\_\_\_ COUNTY CERTIFIED\*\* \_\_\_\_\_

WORK TO BE PERFORMED: \_\_\_\_\_

DOLLAR VALUE OF WORK: \$ \_\_\_\_\_ PERCENTAGE VALUE \_\_\_\_\_ %

SUBCONTRACTOR NAME: \_\_\_\_\_

ADDRESS: \_\_\_\_\_

PHONE: \_\_\_\_\_

CONTACT PERSON: \_\_\_\_\_

ETHNIC GROUP\*: \_\_\_\_\_ COUNTY CERTIFIED\*\* \_\_\_\_\_

WORK TO BE PERFORMED: \_\_\_\_\_

DOLLAR VALUE OF WORK: \$ \_\_\_\_\_ PERCENTAGE VALUE \_\_\_\_\_ %

SUBCONTRACTOR NAME: \_\_\_\_\_

ADDRESS: \_\_\_\_\_

PHONE: \_\_\_\_\_

CONTACT PERSON: \_\_\_\_\_

ETHNIC GROUP\*: \_\_\_\_\_ COUNTY CERTIFIED\*\* \_\_\_\_\_

WORK TO BE PERFORMED: \_\_\_\_\_

DOLLAR VALUE OF WORK: \$ \_\_\_\_\_ PERCENTAGE VALUE \_\_\_\_\_ %

DOLLAR VALUE OF WORK: \$ \_\_\_\_\_ PERCENTAGE VALUE \_\_\_\_\_ %

PHONE: \_\_\_\_\_

CONTACT PERSON: \_\_\_\_\_

ETHNIC GROUP\*: \_\_\_\_\_

\_\_\_\_\_ COUNTY CERTIFIED\*\* \_\_\_\_\_

WORK TO BE PERFORMED: \_\_\_\_\_

DOLLAR VALUE OF WORK: \$ \_\_\_\_\_ PERCENTAGE VALUE: \_\_\_\_\_  
% \_\_\_\_\_

---

SUBCONTRATOR NAME: \_\_\_\_\_

ADDRESS: \_\_\_\_\_

PHONE: \_\_\_\_\_

CONTACT PERSON: \_\_\_\_\_

ETHNIC GROUP\*: \_\_\_\_\_  
\_\_\_\_\_ COUNTY CERTIFIED\*\* \_\_\_\_\_

WORK TO BE PERFORMED: \_\_\_\_\_

DOLLAR VALUE OF WORK: \$ \_\_\_\_\_ PERCENTAGE VALUE: \_\_\_\_\_ %

---

SUBCONTRATOR NAME: \_\_\_\_\_

ADDRESS: \_\_\_\_\_

PHONE: \_\_\_\_\_

CONTACT PERSON: \_\_\_\_\_

ETHNIC GROUP\*: \_\_\_\_\_  
\_\_\_\_\_ COUNTY CERTIFIED\*\* \_\_\_\_\_

WORK TO BE PERFORMED: \_\_\_\_\_

DOLLAR VALUE OF WORK: \$ \_\_\_\_\_ PERCENTAGE VALUE: \_\_\_\_\_  
%

**EXHIBIT C – SCHEDULE OF INTENDED SUBCONTRACTOR UTILIZATION**

**Total Dollar Value of Subcontractor Agreements: (\$)**

**Total Percentage Value: (%)**

**CERTIFICATION:** The undersigned certifies that he/she has read, understands and agrees to be bound by the Bid provisions, including the accompanying Exhibits and other terms and conditions regarding sub-contractor utilization. The undersigned further certifies that he/she is legally authorized by the Bidder to make the statement and representation in this Exhibit and that said statements and representations are true and correct to the best of his/her knowledge and belief. The undersigned understands and agrees that if any of the statements and representations are made by the Bidder knowing them to be false, or if there is a failure of the intentions, objectives and commitments set forth herein without prior approval of the County, then in any such event the Contractor's acts or failure to act, as the case may be, shall constitute a material breach of the contract, entitling the County to terminate the Contract for default. The right to so terminate shall be in addition to, and in lieu of, any other rights and remedies the County may have for other defaults under the contract.

Signature/Title: \_\_\_\_\_  
\_\_\_\_\_

Firm or Corporate Name: \_\_\_\_\_  
\_\_\_\_\_

Address: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Telephone: (     ) \_\_\_\_\_  
\_\_\_\_\_

Fax Number: (     ) \_\_\_\_\_  
\_\_\_\_\_

Email Address: \_\_\_\_\_  
\_\_\_\_\_

**EXHIBIT D**

**LETTER OF INTENT TO PERFORM AS A SUBCONTRACTOR  
OR  
PROVIDE MATERIALS OR SERVICES**

This form **must** be completed by **ALL** known subcontractor and submitted with the bid/proposal. The Prime Contractor **must** submit Letters of Intent for **ALL** known subcontractors at time of bid submission.

To: \_\_\_\_\_  
(Name of Prime Contractor Firm)

From: \_\_\_\_\_  
(Name of Subcontractor Firm)

ITB/RFP Number: \_\_\_\_\_  
\_\_\_\_\_

Project Name: \_\_\_\_\_  
\_\_\_\_\_

The undersigned is prepared to perform the following described work or provide materials or services in connection with the above project (specify in detail particular work items, materials, or services to be performed or provided):

Description of Work	Project Commence Date	Project Completion Date	Estimated Dollar Amount

\_\_\_\_\_  
(Prime Bidder)

\_\_\_\_\_  
(Subcontractor)

Signature \_\_\_\_\_

Title \_\_\_\_\_

Date \_\_\_\_\_

**EXHIBIT E - DECLARATION REGARDING SUBCONTRACTING PRACTICES**

If the bidder/proposer **does not intend to subcontract** any portion of the scope of work services(s), this form **must be** completed and submitted with the bid/proposal.

\_\_\_\_\_ hereby declares that it is my/our intent to

**(Bidder)**

perform 100% of the work required for \_\_\_\_\_

\_\_\_\_\_  
**(ITB/RFP Number)**

**(Description of Work)**

In making this declaration, the bidder/proposer states the following:

1. That the bidder/proposer does not customarily subcontract elements of this type project, and normally performs and has the capability to perform and will perform **all elements** of the work on this project with his/her own current work forces;
2. If it should become necessary to subcontract some portion of the work at a later date, the bidder/proposer will comply with all requirements of the County's Non-Discrimination Ordinance in providing equal opportunities to all firms to subcontract the work. The determination to subcontract some portion of the work at a later date shall be made in good faith and the County reserves the right to require additional information to substantiate a decision made by the bidder/proposer to subcontract work following the award of the contract. Nothing contained in this provision shall be employed to circumvent the spirit and intent of the County's Non-Discrimination Ordinances;
3. The bidder will provide, upon request, information sufficient for the County to verify Item Number one.

**AUTHORIZED COMPANY REPRESENTATIVE**

**Name:** \_\_\_\_\_

**Title:** \_\_\_\_\_

**Date:** \_\_\_\_\_

**Signature:** \_\_\_\_\_

**Firm:** \_\_\_\_\_

**Address:** \_\_\_\_\_

**Phone Number:** \_\_\_\_\_

**Fax Number:** \_\_\_\_\_

**Email Address:** \_\_\_\_\_

**EXHIBIT F - JOINT VENTURE DISCLOSURE AFFIDAVIT**

**ITB/RFP No.** \_\_\_\_\_

**Project Name** \_\_\_\_\_

This form must be completed and submitted with the bid/proposal if a joint venture approach is to be undertaken.

In order to evaluate the extent of small, minority and female business involvement being proposed by a Bidder/Proposer, certain relevant information must be provided prior to contract award. The information requested below is to clearly identify and explain the extent of small business participation in the proposed joint venture. All items must be properly addressed before the business entity can be evaluated.

**1. Firms:**

**1) Name of Business:** \_\_\_\_\_

**Street Address:** \_\_\_\_\_

**Telephone No.:** \_\_\_\_\_

**Nature of Business:** \_\_\_\_\_

**2) Name of Business:** \_\_\_\_\_

**Street Address:** \_\_\_\_\_

**Telephone No.:** \_\_\_\_\_

**Nature of Business:** \_\_\_\_\_

**3) Name of Business:** \_\_\_\_\_

**Street Address:** \_\_\_\_\_

**Telephone No.:** \_\_\_\_\_

**Nature of Business:** \_\_\_\_\_

**NAME OF JOINT VENTURE (If applicable):** \_\_\_\_\_

**ADDRESS:** \_\_\_\_\_

**PRINCIPAL OFFICE:** \_\_\_\_\_

**OFFICE PHONE:** \_\_\_\_\_

**Note:** Attach additional sheets as required

1. Describe the capital contributions by each joint venturer and accounting thereof.
2. Describe the financial controls of the joint venture, e.g., will a separate cost center be established? Which venturer will be responsible for keeping the books? How will the expense therefore be reimbursed? What is the authority of each joint venture to commit or obligate the order?
3. Describe any ownership, options for ownership, or loans between the joint ventures. Identify terms thereof.
4. Describe the estimated contract cash flow for each joint venturer.
5. To what extent and by whom will the on-site work be supervised?
6. To what extent and by whom will the administrative office be supervised?
7. Which joint venturer will be responsible for material purchases including the estimated cost thereof? How will the purchase be financed?
8. Which joint venturer will provide equipment? What is the estimated cost thereof? How will the equipment be financed?
9. Describe the experience and business qualifications of each joint venturer.
10. Submit a copy of all joint venture agreements and evidence of authority to do business in the State of Georgia as well as locally, to include all necessary business licenses.
11. Percent of Minority/Female Business Enterprises ownership by each joint venture in terms of profit and loss sharing: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
12. The authority of each joint venturer to commit or obligate the other: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
13. Number of personnel to be involved in project, their crafts and positions and whether they are employees of the Minority/Female Business Enterprises enterprise, the majority firm or the joint venture: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

14. Identification of control and participation in venture; list those individuals who are responsible for day-to-day management and policy decision-maker, including, but not limited to, those with prime responsibility for areas designated below; (use additional sheets if necessary)

<u>Name</u>	<u>Race</u>	<u>Sex</u>	<u>Financial Decisions</u>	<u>Supervision Field Operation</u>
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____

In connection with any work that these firms, as a joint venture, might be authorized to perform in connection with above captioned contract, we each do hereby authorize representatives of the Fulton County Department of Contract Compliance, Departments of Purchasing and Finance, under the direction of the County Manger's Office, to examine, from time to time, the books, records and files to the extent that such relate to this County project.

**WE DO SOLEMNLY DECLARE AND AFFIRM UNDER THE PENALTIES OF PERJURY THAT THE CONTENTS OF THE FOREGOING DOCUMENT ARE TRUE AND CORRECT, AND THAT WE ARE AUTHORIZED, ON BEHALF OF THE ABOVE FIRMS, TO MAKE THIS AFFIDAVIT AND GRANT THE ABOVE PRIVILEGE.**

FOR \_\_\_\_\_

(Company)

Date: \_\_\_\_\_

(Signature of Affiant)

\_\_\_\_\_  
(Printed Name)

\_\_\_\_\_  
(Company)

Date: \_\_\_\_\_

(Signature of Affiant)

\_\_\_\_\_

(Printed Name)

State of \_\_\_\_\_:

County of \_\_\_\_\_:

On this \_ day of \_\_\_\_\_, 20\_\_\_\_\_  
\_\_\_\_\_, before me, appeared

\_\_\_\_\_, the undersigned known to me to be the person described in the foregoing Affidavit and acknowledge that he (she) executed the same in the capacity therein stated and for the purpose therein contained.

**EXHIBIT – G PRIME CONTRACTOR/SUB-CONTRACTOR UTILIZATION REPORT**

This report **must** be submitted by the **tenth day** of each month, along with a copy of your monthly invoice (schedule of values/payment application) to Contract Compliance. Failure to comply **shall** result in the County commencing proceedings to impose sanctions to the prime contractor, in addition to pursuing any other available legal remedy. Sanctions may include the suspending of any payment or part thereof, termination or cancellation of the contract, and the denial of participation in any future contracts awarded by Fulton County.

<b>REPORTING PERIOD</b>		<b>PROJECT NAME:</b>				
<b>FROM:</b>		<b>PROJECT NUMBER:</b>				
<b>TO:</b>		<b>PROJECT LOCATION:</b>				
<b>PRIME CONTRACTOR</b>		<b>Contract Award Date</b>	<b>Contract Award Amount</b>	<b>Change Order Amount</b>	<b>Contract Period</b>	<b>% Complete to Date</b>
<b>Name:</b>						
<b>Address:</b>						
<b>Telephone #:</b>						

AMOUNT OF REQUISITION THIS PERIOD: \$ \_\_\_\_\_  
 TOTAL AMOUNT REQUISITION TO DATE: \$ \_\_\_\_\_

**SUBCONTRACTOR UTILIZATION** (add additional rows as necessary)

Name of Sub-Contractor	Description of Work	Contract Amount	Amount Paid To Date	Amount Requisition This Period	Contract Period	
					Starting Date	Ending Date
TOTALS						

Executed By: \_\_\_\_\_

*(Signature)*

*(Printed Name)*

Notary: \_\_\_\_\_

Date: \_\_\_\_\_

My Commission Expires: \_\_\_\_\_

**SPECIFICATIONS**

**TRAFFIC SIGNAL EQUIPMENT**

**GENERAL:**

The following are the minimum acceptable requirements for furnishing the Public Works Department with Traffic Signal Equipment. Unless clearly identified as “no exceptions”, items in the request for bid identified, described, or referenced by a brand name or trade name description, are intended to be descriptive, but not restrictive and are to indicate the quality and characteristics of products that may be offered. Products may be considered for award if such products are clearly identified in the bids and are determined by Fulton County to meet its needs in all respects. If the bidder proposes to furnish another product, such products shall be clearly identified in the bid. The evaluation of the bids and the determination as to equality of the products offered shall be the responsibility of the county.

Award of this bid shall be to one vendor. Award shall be based on compliance with these specifications, delivery period and being the lowest responsive bidder. This area must be completed for the bid to be acceptable. Bidders that check the “no” area are required to reference the page and the item number and state in detail the description including the manufacturer, model number of the alternate on a separate sheet. Bidders must complete, and turn in this package to be considered for award of the bid. Specifications in the manufacturer's format will be accepted in addition to this completed format.

All bidders are required to be manufacturer authorized distributors and regularly engaged in the sale or distribution of the type of goods, materials, equipment or services for which the bidder is submitting a bid response.

The apparent silence of this specification, and any supplement thereto, as to details, or the omission from it of a detailed description concerning any point, will be regarded as meaning only the best commercial practices are to prevail. Only materials of the highest quality, correct type, size, and design are to be used. All interpretations of this specification will be made upon the basis of this statement, with Fulton County interpretation to prevail. All items bid must be new. Used, rebuilt or refurbished items will not be considered or accepted.

The awarded vendor shall deliver Items purchased by the Department of Public Works to the following location:

Fulton County Signal Shop  
3929 Aviation Circle Bldg A  
Atlanta, GA. 30336

# TRAFFIC SIGNAL EQUIPMENT

## Section (A)

### LIGHT EMITTING DIODE (LED) TRAFFIC SIGNAL 12" SPECIFICATION FOR SPAN WIRE AND MAST ARM MOUNTED SIGNALS

#### 1. Purpose

The purpose of this specification is to provide the minimum performance requirements for 300 mm (12 in) LED traffic signal modules. An LED signal module shall be capable of replacing the optical unit of an existing vehicle traffic signal section.

#### 2. Physical and Mechanical

LED traffic signal modules designed as retrofit replacements for existing signal lamps shall not require special tools for installation. Retrofit replacement LED signal modules shall fit into existing traffic signal housings built to the VTCSH "Vehicle Traffic Control Signal Heads" standard without modification to the housing.

Installation of a retrofit replacement LED signal module into an existing signal housing shall only require the removal of the existing optical unit components, i.e., lens, lamp module, and gaskets. The LED retrofit replacement shall not require the removal of the reflector and socket; shall be weather tight and fit securely in the housing.

#### 3. Construction

The LED signal module shall be a single, self-contained device, not requiring on-site assembly for installation into an existing traffic signal housing. The power supply must be designed to fit and mount inside the traffic signal module. The external lens shall be smooth on the outside to prevent excessive dirt/dust buildup.

The assembly and manufacturing process for the LED signal assembly shall be designed to assure all internal LED and electronic components are adequately supported to withstand mechanical shock and vibration from high winds and other sources as per ITE requirements.

#### 4. Environmental Requirements

The LED signal module shall be rated for use in the ambient operating temperature range of -40°C (-40°F) to + 74°C (+165°F).

The LED signal module shall be protected against dust and moisture intrusion per the requirements of NEMA Standard 250-1991, for Type 4 enclosures to protect all internal LED, electronic, and electrical components.

The LED signal module lens shall be UV stabilized.

## **5. LED Signal Module Lens**

Each module shall comprise of a smooth surfaced UV stabilized polycarbonate outer shell.

Red and Green LED indications shall exceed minimum ITE LED luminosity values and meet the minimum luminous intensity values per the attached Table 1, Specifications for Spanwire Mounted Signals. Yellow LED indications shall meet the minimum luminous intensity values per the attached Table 1, Specifications for Spanwire Mounted Signals.

Supply independent lab test results showing the LED indications satisfy ITE Chapter 2a, VTCHS Part 2: Light Emitting Diode (LED) Vehicle Signal Modules, and attached Table 1, Specifications for Spanwire Mounted Signals. Initial intensity of the LED ball indications shall meet or exceed 120% of the values in Table 1, Specifications for Spanwire Mounted Signals. This increased intensity shall be demonstrated on the independent lab reports.

No optical lens shall be used in order to meet these visibility requirements. Photometric, luminous intensity and color measurements for yellow LED signal modules shall be taken immediately after the modules are energized

The LED arrow modules shall have a full, filled profile, without the individual LED's being visible. The arrows shall meet all applicable ITE specifications, and Caltrans specifications on light intensity.

## **6. Materials**

The multiple LED light source should be the latest technology available on the market. Materials used for the lens and signal module construction shall conform to ASTM specifications for the materials where applicable. Enclosures containing either the power supply or electronic components of the signal module shall be made of UL94VO flame retardant materials.

## **7. Chromaticity**

The measured chromaticity coordinates of LED signal modules shall conform to the chromaticity requirements of Section 8.04 and Figure 1 of the VTCSH standard.

## **8. Electrical**

All wiring and terminal blocks shall meet the requirements of Section 13.02 of the VTCSH standard. Two secured, color-coded, 914 mm (36 in) long 600 V, 20 AWG minimum, jacketed wires, conforming to the National Electrical Code, rated for service at +105°C, are to be provided for electrical connection.

The module shall operate on a 60 Hz AC line voltage ranging from 80 volts rms to 135 volts rms with less than 10% light intensity variation. Nominal rated voltage for all measurements shall be  $120 \pm 3$  volts rms. The circuitry shall prevent flickering over this voltage range. The module shall be ETL certified to meet applicable ITE standards (red and green).

**9. LED Drive Circuitry (Power Supply)**

The individual LED light sources shall be wired so that a catastrophic failure of one LED light source will result in the loss of only that one LED light source in the LED signal module. The power supply must current regulated.

**10. Electronic Noise**

The LED signal and associated on-board circuitry must meet Federal Communications Commission (FCC) Title 47, SubPart B, Section 15 regulations concerning the emission of electronic noise.

**11. Power Factor (PF)**

The LED signal module shall provide a power factor of 0.90 or greater at 25°C and at the nominal operating voltage.

**12. AC Harmonics**

Total harmonic distortion (THD), (current and voltage), induced into an ac power line by a signal module shall not exceed 20 percent, over the operating voltage range specified in Section 14 and within the ambient temperature range specified in Section 4.

**13. Transient Voltage Protection**

The signal module on-board circuitry shall include voltage surge protection to withstand high-repetition noise transients and low-repetition high-energy transients as stated in Section 2.1.6, NEMA Standard TS-2, 1992.

**14. Voltage Range**

The LED signal module shall operate from a  $60 \pm 3$  HZ ac line power over a voltage range from 80 Vac rms to 135 Vac rms. The current draw shall be sufficient to ensure compatibility and proper triggering and operation of load current switches and conflict monitors in signal controller units the procuring traffic authority customer has in use.

**15. Signal Module Burn-in**

All LED signal modules shall be energized for a minimum of 24 hours, at 100 percent on-time duty cycle, in an ambient temperature of 60°C (+140°F).

**16. Design Qualification Testing**

Design Qualification testing shall be performed on new LED signal module designs, and when a major design change has been implemented on an existing design.

Testing shall be performed once every 5 years or when the module design or LED technology has been changed. Test data shall be retained by the manufacturer for a minimum period of 5 years.

**17. Quality Assurance**

LED signal modules shall be manufactured in accordance with a vendor quality assurance (QA) program. The QA program shall include two types of quality assurance: (1) design quality assurance and (2) production quality assurance. The production quality assurance includes statistically controlled routine tests to ensure minimum performance levels of LED signal modules built to meet this specification.

QA process and test results documentation shall be kept on file for a minimum period of seven years.

**18. Certificate of Compliance**

Manufacturers shall provide a Certificate of Compliance to this specification for each shipment of LED signal modules to an end user. Each LED signal module shall be identified with a serial number. The manufacturer shall also participate in the ETL traffic control equipment certification program.

**19. Warranty**

Manufacturer will provide the following warranty provisions:

- (1) Replacement or repair of an LED signal module that fails to function as intended due to workmanship or material defects within the first 60 months from the date of delivery.
- (2) Replacement or repair of LED signal modules that exhibit luminous intensity of less than the minimum values specified in ITE specification VTCSH-Part-2 July 1998, within the first 60 months from the date of delivery.

**Table 1.  
Specifications for Span Wire Mounted LED Signals**

**GRID SPECIFICATION FOR 12IN RED**

	27.5	22.5	17.5	12.5	7.5	2.5	-2.5	-7.5	-12.5	-17.5	-22.5	-27.5
22.5U	15	19	36	36	36	36	36	36	36	36	19	15
17.5U	15	19	42	42	42	42	42	42	42	42	19	15
12.5U	15	21	64	83	91	94	94	91	83	64	21	15
7.5U	15	36	84	137	190	213	213	190	137	84	36	15
2.5U	15	36	73	133	236	319	319	236	133	73	36	15
2.5D	19	45	91	166	295	399	399	295	166	91	45	19
7.5D	19	45	105	171	238	266	266	238	171	105	45	19
12.5D	19	26	80	104	114	118	118	114	104	80	26	19



TECHNICAL SPECIFICATION FOR LIGHT EMITTING DIODE (LED) ARROW  
TRAFFIC SIGNAL MODULES

The LED arrows shall meet all applicable ITE specifications such as, Burn In, Chromaticity, and Temperature Cycle. This shall be per the Interim Purchase Specification of the Institute of Transportation Engineers, Vehicle Traffic Control Signal Heads Part 2: Light Emitting Diode (LED) Vehicle Traffic Signal Modules, Version July 1998.

The Led arrows shall also meet California Test 606: Method of Test for Luminance of Traffic Signal Face. Independent laboratory reports shall be supplied to verify modules meet the above requirements. The optical lens should reflect a light distribution look similar to that of an incandescent lamp, without the individual LED's being visible. The individual LED light sources shall be wired so that the catastrophic failure of one LED will result in the loss of the light from only that one LED. The retrofit installation of the LED Arrow Module shall not require removal of the reflector. Bidders shall be required to submit a copy of a test report certified by an independent laboratory (Intertek Testing Services ETL Semko)

The LED arrow wattage shall meet the following requirements:

Retrofit	Wattage
12" Red Arrow	5 or less
12" Yellow Arrow	11 or less
12" Green Arrow	5 or less

**PEDESTRIAN PUSH BUTTON UNIT ASSEMBLY**

**General**

The button shall be a highly vandal resistant button with essentially no moving parts. It shall be pressure activated, and able to withstand an impact from a baseball bat or hammer. Upon switch activation, there shall be a beep, and the LED shall light and stay on during the walk cycle.

Body Material: Aluminum, Powder Coated Yellow

Button Material: 303 stainless, passivated

Piezo Driven Solid State Switch:

Operating Temperature: -30°F to 165°F (-34°C to 74°C)

Operating Voltage: 12-24V AC or DC

Switching Current: .3A fused (auto resetting)

Operating Life: Greater than 20 million operations

Transient Protection: Built in LED:

Operating Mode: Approx. 0.1 sec. flash each time button is pressed.

Luminous Intensity: Greater than 1200 mcd (Ultra Bright Red)

Viewing Angle: 160°

Beeper: Sounds simultaneously with LED flash.

Different tones for press and release, 2.3 kHz & 2.6 kHz.  
Beeper shall use power from existing switch wires.

## **TRAFFIC SIGNAL HEAD (w/LED)**

### **GENERAL**

TMPSPAN signal heads shall be Eagle SIG poly signals with LED SWAY lamps installed as per the LED specifications below. These signals shall have the LED modules installed and ready for field installation. The signal head reflector and socket shall remain in the signal head to assist during catastrophic failures.

### **LED SPECIFICATIONS**

#### **LIGHT EMITTING DIODE (LED) TRAFFIC SIGNAL**

#### **12" SPECIFICATION**

#### **FOR SPAN WIRE (SWAY) AND MAST ARM (FIXED) MOUNTED SIGNALS**

##### **Purpose**

The purpose of this specification is to provide the minimum performance requirements for 300 mm (12 in) LED traffic signal modules. An LED signal module shall be capable of replacing the optical unit of an existing vehicle traffic signal section.

##### **Physical and Mechanical**

LED traffic signal modules designed, as retrofit replacements for existing signal lamps shall not require special tools for installation. Retrofit replacement LED signal modules shall fit into existing traffic signal housings built to the VTCSH "Vehicle Traffic Control Signal Heads" standard without modification to the housing.

Installation of a retrofit replacement LED signal module into an existing signal housing shall only require the removal of the existing optical unit components, i.e., lens, lamp module, and gaskets. The LED retrofit replacement shall not require the removal of the reflector and socket; shall be weather tight and fit securely in the housing.

##### **Construction**

The LED signal module shall be a single, self-contained device, not requiring on-site assembly for installation into an existing traffic signal housing. The power supply must be designed to fit and mount inside the traffic signal module. The external lens shall be smooth on the outside to prevent excessive dirt/dust buildup. The assembly and manufacturing process for the LED signal assembly shall be designed to assure all internal LED and electronic components are adequately supported to withstand mechanical shock and vibration from high winds and other sources as per ITE requirements.

##### **Environmental Requirements**

The LED signal module shall be rated for use in the ambient operating temperature range of -40°C (-40°F) to + 74°C (+165°F).

The LED signal module shall be protected against dust and moisture intrusion per the requirements of NEMA Standard 250-1991, for Type 4 enclosures to protect all internal LED, electronic, and electrical components. The LED signal module lens shall be UV stabilized.

### **LED Signal Module Lens**

Each module shall comprise of a smooth surfaced UV stabilized polycarbonate outer shell. LED's shall be mounted on a polycarbonate positioning plate. A mechanical alignment and assembly mechanism shall ensure that each LED is retained in a pre-determined position.

Red and Green LED indications shall exceed minimum ITE LED luminosity values and meet the minimum luminous intensity values per the attached Table 1, Specifications for Span Wire Mounted Signals.

Supply independent lab test results showing the LED indications satisfy ITE Chapter 2a, VTCHS Part 2: Light Emitting Diode (LED) Vehicle Signal Modules, and attached Table 1, Specifications for Span Wire Mounted Signals. No optical lens shall be used in order to meet these visibility requirements.

Initial intensity of the LED indications shall meet or exceed 120% of the values in Table 1, Specifications for Span Wire Mounted Signals. This increased intensity shall be demonstrated on the independent lab reports.

### **Materials**

The multiple LED light source should be the latest technology available on the market. Materials used for the lens and signal module construction shall conform to ASTM specifications for the materials where applicable. Enclosures containing either the power supply or electronic components of the signal module shall be made of UL94VO flame retardant materials.

### **Chromaticity**

The measured chromaticity coordinates of LED signal modules shall conform to the chromaticity requirements of Section 8.04 and Figure 1 of the VTCSH standard.

### **Electrical**

All wiring and terminal blocks shall meet the requirements of Section 13.02 of the VTCSH standard. Two secured, color-coded, 914 mm (36 in) long 600 V, 20 AWG minimum, jacketed wires, conforming to the National Electrical Code, rated for service at +105°C, are to be provided for electrical connection.

The module shall operate on a 60 Hz AC line voltage ranging from 80 volts rms to 135 volts rms with less than 10% light intensity variation. Nominal rated voltage for all measurements shall be  $120 \pm 3$  volts rms. The circuitry shall prevent flickering over this voltage range. The module shall be ETL certified to meet applicable ITE standards (red and green).

### **LED Drive Circuitry (Power Supply)**

The individual LED light sources shall be wired so that a catastrophic failure of one LED light source will result in the loss of only that one LED light source in the LED signal module. The power supply must current regulated.

### **Electronic Noise**

The LED signal and associated on-board circuitry must meet Federal Communications Commission (FCC) Title 47, SubPart B, Section 15 regulations concerning the emission of electronic noise.

### **Power Factor (PF)**

The LED signal module shall provide a power factor of 0.90 or greater at 25°C and at the nominal operating voltage.

**AC Harmonics**

Total harmonic distortion (THD), (current and voltage), induced into an ac power line by a signal module shall not exceed 20 percent, over the operating voltage range specified in Section 14 and within the ambient temperature range specified in Section 4.

**Transient Voltage Protection**

The signal module on-board circuitry shall include voltage surge protection to withstand high-repetition noise transients and low-repetition high-energy transients as stated in Section 2.1.6, NEMA Standard TS-2, 1992.

**Voltage Range**

The LED signal module shall operate from a  $60 \pm 3$  HZ ac line power over a voltage range from 80 Vac rms to 135 Vac rms. The current draw shall be sufficient to ensure compatibility and proper triggering and operation of load current switches and conflict monitors in signal controller units the procuring traffic authority customer has in use.

**Signal Module Burn-in**

All LED signal modules shall be energized for a minimum of 24 hours, at 100 percent on-time duty cycle, in an ambient temperature of 60°C (+140°F).

**Design Qualification Testing**

Design Qualification testing shall be performed on new LED signal module designs, and when a major design change has been implemented on an existing design.

Testing shall be performed once every 5 years or when the module design or LED technology has been changed. The manufacturer shall retain test data for a minimum period of 5 years.

**Quality Assurance**

LED signal modules shall be manufactured in accordance with a vendor quality assurance (QA) program. The QA program shall include two types of quality assurance: (1) design quality assurance and (2) production quality assurance. The production quality assurance includes statistically controlled routine tests to ensure minimum performance levels of LED signal modules built to meet this specification.

QA process and test results documentation shall be kept on file for a minimum period of seven years.

**Certificate of Compliance**

Manufacturers shall provide a Certificate of Compliance to this specification for each shipment of LED signal modules to an end user. Each LED signal module shall be identified with a serial number. The manufacturer shall also participate in the ETL traffic control equipment certification program.

**Warranty**

Manufacturer will provide the following warranty provisions:

- (1) Replacement or repair of an LED signal module that fails to function as intended due to workmanship or material defects within the first 60 months from the date of delivery.
- (2) Replacement or repair of LED signal modules that exhibit luminous intensity of less than the minimum values specified in ITE specification

VTCSH-Part-2 July 1998, within the first 60 months from the date of delivery.

## Specifications for Span Wire (SWAY) Mounted LED Signals

### GRID SPECIFICATION FOR 12IN RED

	27.5	22.5	17.5	12.5	7.5	2.5	-2.5	-7.5	-12.5	-17.5	-22.5	-27.5
22.5U	15	19	36	36	36	36	36	36	36	36	19	15
17.5U	15	19	42	42	42	42	42	42	42	42	19	15
12.5U	15	21	64	83	91	94	94	91	83	64	21	15
7.5U	15	36	84	137	190	213	213	190	137	84	36	15
2.5U	15	36	73	133	236	319	319	236	133	73	36	15
2.5D	19	45	91	166	295	399	399	295	166	91	45	19
7.5D	19	45	105	171	238	266	266	238	171	105	45	19
12.5D	19	26	80	104	114	118	118	114	104	80	26	19
17.5D	19	24	52	52	52	52	52	52	52	52	24	19
22.5D	19	24	46	46	46	46	46	46	46	46	24	19
27.5D	19	24	39	39	39	39	39	39	39	39	24	19
32.5D	19	24	33	33	33	33	33	33	33	33	24	19
37.5D	19	24	26	26	26	26	26	26	26	26	24	19

### GRID SPECIFICATION FOR 12IN GREEN

	27.5	22.5	17.5	12.5	7.5	2.5	-2.5	-7.5	-12.5	-17.5	-22.5	-27.5
22.5U	30	38	55	73	73	73	73	73	73	55	38	30
17.5U	30	38	70	83	83	83	83	83	83	70	38	30
12.5U	30	42	115	166	182	189	189	182	166	115	42	30
7.5U	30	72	168	274	381	426	426	381	274	168	72	30
2.5U	30	72	146	266	472	638	638	472	266	146	72	30
2.5D	38	90	182	332	590	798	798	590	332	182	90	38
7.5D	38	90	210	342	476	532	532	476	342	210	90	38
12.5D	38	52	160	208	228	236	236	228	208	160	52	38
17.5D	38	48	104	104	104	104	104	104	104	104	48	38
22.5D	38	48	91	91	91	91	91	91	91	91	48	38
27.5D	38	46	60	70	78	78	78	78	70	60	46	38
32.5D	38	44	50	60	65	65	65	65	60	50	44	38
37.5D	38	40	42	45	52	52	52	52	45	42	40	38

### LED ARROW MODULE SPECIFICATIONS

The LED ARROW MODULE shall comprise of a smooth surfaced UV stabilized polycarbonate outer shell and shall have a full, filled profile, without the individual LED's being visible. The arrows shall meet all applicable ITE specifications, and Caltrans specifications on light intensity.

The LED retrofit replacement shall not require the removal of the existing traffic signal reflector and socket; shall be weather tight and fit securely in the housing.

### Eagle SIG POLYCARBONATE Vehicle Traffic Signal

## **Features**

Meets or exceeds ITE specifications.

Design provides minimum weight but maximum rigidity and strength.

**MATERIAL** -- The housing, door and visor shall be injection molded of ultraviolet stabilized, pre-colored opaque polycarbonate.

**HOUSING** – Shall be a one-piece unit with serrations in 5° increments at each end. Each housing shall have provisions for mounting two terminal blocks and attaching back plates. Housings may be fastened together to make multi-section signals. The 8" and 12" housings shall be capable of being intermixed to form combination signals.

**DOOR** – Shall be a one-piece polycarbonate unit equipped with stainless steel hinge pins. Stainless steel thumbscrews shall hold the door against the housing.

**VISOR** -- A removable twist-on visor shall be secured to the door with stainless steel hardware. Visors shall be tunnel type and must be installed on signal prior to shipment. Any visor damaged in the box shall be the responsibility of the supplier to replace.

**REFLECTOR** -- A separately hinged, ALZAK® reflector is standard. Glass shall also be available.

**LENS** – Shall conform to ITE specifications. The standard lens is polycarbonate capable of withstanding illumination by a standard traffic signal lamp without physical distortion. A glass lens meeting all ITE specifications shall be available as an option.

**LENS GASKET** -- A molded one-piece gasket shall be used to seal the lens to the reflector and door to form a sealed unit.

**LAMP SOCKET** – Shall be insulated, pre-focused and may be rotated for positioning the lamp filament without using tools.

**POSITIVE POSITIONING** -- Positive positioning and locking shall be achieved through the use of serrated brackets, mast arm or span wire fittings.

Signal heads shall be composed of an appropriate number of injection molded polycarbonate body sections containing the optical unit, lens, door and visor as required by the item number associated. The basic construction design shall provide minimum weight combined with maximum rigidity and strength. Coloring shall be molded in all the way through; to eliminate peeling, corrosion, and visible scratches. The specified signals shall meet or exceed ITE specifications.

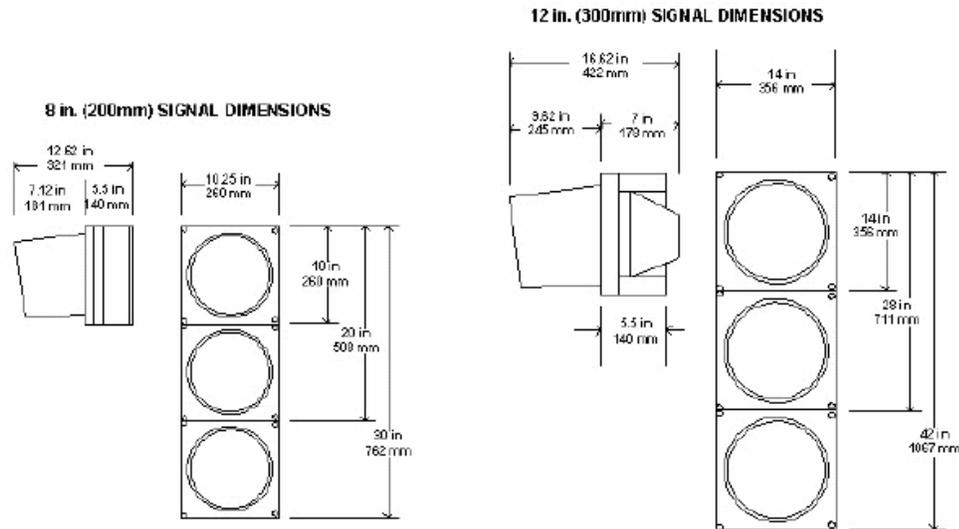
### **Weights 8" (200 mm) 12" (300 mm)**

Single section with visor (approx.) 4 lbs. (1.81 kg) 7 lbs. (3.18 kg)

Housing 1 lbs. 6.4 oz. (.64 kg) 2 lbs. 5.2 oz. (1.05 kg)

Door 7.5 oz. (.21 kg) 15.1 oz. (.43 kg)

Ring 3.5 oz. (.10 kg) 6.6 oz. (.19 kg)



### POLE MOUNTING ASSEMBLY

This equipment is the part that will be visible to the pedestrians. It is commonly referred to as the “Pedestrian Push Button Assembly”. This shall contain the vibro-tactile 2” ADA-compliant Pedestrian Push Button, with directional tactile arrow, the weatherproof speaker, and the appropriate informational sign for each location.

- a) VIBRATOR POWER: 16 VDC pulses typical.
- b) SPEAKER: 8 Ohms, 15-Watt maximum, weatherproof.
- c) PUSH BUTTON: ADA compliant.
- d) CONSTRUCTION:
  - i) FRAME: Cast Aluminum, Powder Coated.
  - ii) MESSAGE SIGN: Aluminum, Powder Coated, Ink Markings.
  - iii) PUSH BUTTON: Aluminum, Powder Coated.
- e) DIMENSIONS: 14.1” L x 5.4” W x 2.2” H  
 MESSAGE MARKING: At the time of order the customer may specify the Message Sign Markings to be the international walking person or the informational explanations for the three (3) distinct pedestrian displays (WALK, DON’T WALK, & PED CLEAR) that an individual would see on an active pedestrian head.

## TRAFFIC CONTROLLER UNIT

**This specification describes an advanced traffic signal controller meeting the latest NEMA specification, as well as providing advanced features for future requirements.**

### Required Standards

Traffic signal controller shall meet or exceed all requirement of the NEMA TS2-1998 specification. Equipment supplier shall provide a letter from an independent testing laboratory certifying controller compliance to the NEMA TS2-1998 specification.

### Standard NEMA Configurations

Two Input / Output configurations shall be provided

- a) NEMA TS-2 Type 1 for serial connection to cabinet Bus Interface Unit
- b) NEMA TS-2 Type 2 for direct parallel connection to load switches and detectors

### **Central Processor Unit (CPU)**

In addition to NEMA requirements, the CPU shall provide the following:

- a) Microware OS-9 Operating System with runtime license
- b) Motorola 68360 microprocessor, 25 Mhz version
- c) 4 Megabytes minimum dynamic random-access memory (DRAM)
- d) 8 Megabytes minimum FLASH memory organized as a disk drive
- e) 512 Kilobytes minimum static random-access memory (SRAM)
- f) Time of Day (TOD) clock with hours, minutes, seconds, month, year, and automatic daylight savings time adjustment. TOD may be implemented in the CPU via electronic circuitry, operating system software, or a combination.
- g) During power failures, the SRAM and TOD shall be powered by STANDBY voltage from the power supply.

### **Power Supply**

In addition to NEMA requirements, the Power Supply shall provide the following:

- a) Line Frequency Reference signal shall be generated by a crystal oscillator, which shall synchronize to the 60-Hz VAC incoming power line at 120 and 300 degrees. A continuous square wave signal shall be +5 VDC amplitude, 8.333 ms half-cycle pulse duration, and 50 +/- 1% duty cycle. The Line Frequency Reference shall compensate for missing pulses and line noise during normal operation. The Line Frequency Reference shall continue through 500 ms power interruptions.

STANDBY voltage via super capacitor for backup power during loss of service voltage shall be provided. Super capacitor shall have a minimum of 15-farad nominal size. No batteries of any type are allowed.

### **Keyboard and Display**

In addition to NEMA requirements, Keyboard and Display shall provide the following:

- Removable by pulling off, installed by pushing on, without use of tools
- Stowed extension cord to allow remote use of keyboard and display
- Emulation of terminal per Joint NEMA/AASHTO/ITE ATC Standard
- Key quantity and function per Joint NEMA/AASHTO/ITE ATC Standard
- Liquid Crystal Display (LCD) with 8 lines of 40 characters
- LCD contrast adjustment accomplished via the keypad, no contrast knob allowed.
- Light-emitting diode backlight for the LCD.
- Audible electronic bell.
- Connector compatible with C60 of Joint NEMA/AASHTO/ITE ATC Standard, with the addition of +5VDC supplied by the controller on C60, Pin 1
- Keyboard and display may be deleted for cost savings by the Agency.

### **Communications**

In addition to NEMA requirements, the controller shall provide the following:

- Built-in 10 Base-T Ethernet with RJ-45 connector on controller front panel
- Built-in Internet Protocol (IP) address assigned by Institute of Electrical and Electronic Engineers (IEEE), one unique IP address for each controller.
- Built-in Infrared (IR) wireless port compatible with Microsoft Windows for Pocket PC Infrared RAW mode.

Built-in 1200 bps Frequency Shift Keying (FSK) modem. Modem is optional per Agency specification. Choice of 2 or 4 wire operation per Agency specification. Both (Single Mode) and (Multi Mode) Fiber Modems are available as well. Built-in EIA-232 port for uploading and downloading applications software, as well as to update the operating system. Built-in C60 connector for use with removable Keyboard and Display, Personal Computer COM1 or Personal Digital Assistant (PDA). C60 protocol per Joint NEMA/AASHTO/ITE ATC standard.

### **Controller Housing**

In addition to NEMA requirements, the controller housing shall provide the following:

Seven slots with card guides for standard 3U size Versa Module Europe expansion modules. The expansion modules and mating back plane board in controller are optional, per Agency specification.

Two slots with card guides for standard Joint NEMA/AASHTO/ITE ATC modems. The modems and mating back plane board in the controller are optional, per Agency specification.

Polycarbonate construction, except back panel, rear mounting tabs and power supply mounting plate shall be aluminum for electrical grounding.

Built-in carrying handle

Two adjustable front mounting feet, used to raise the front cables and vary the display viewing-angle.

### **Traffic Control Software Functions**

In addition to NEMA requirements, the controller shall provide the following:

16 Vehicle Phases

16 Pedestrian Phases

4 Timing Rings

16 Overlaps

80 Detectors

Status: Ring Timers, Coord Timers, Preempt Timers, Time Base, Communication, Detector Diagnostics, Intersection, Input / Output

Reports: Local Alarm Log, Comm Fault Log, Detector Fault Log, System Detector Log, MOE Log, Speed Log, Volume Count Log, Cycle MOE Log

Coordination Modes: Permissive Mode, Yield Mode, Permissive Yield Mode, Permissive Omit Mode, Sequential Omit Mode, Full Actuated Mode.

Adaptive Traffic Control: Adaptive Maximum Routines, Adaptive

Protected / Permissive Routines, Conditional Virtual Split Routines, Coordinated Adaptive Split Routines.

Preemption / Priority Routines

Standard Reports

Built-In Diagnostics

Time Base Control: 99-Day Programs, 10 Week Programs, 250 Events

## **DETECTOR LOOP SEALANT**

### **Scope**

The sealant is intended to provide environmental protection to the wires of a detector loop traffic detection system. The material shall provide compressive

yield strength to withstand normal vehicular traffic as well as sufficient flexibility to withstand normal movement in asphalt and concrete road pavements, while protecting the loop wire from moisture, penetration, fracture, and shear forces.

### **General**

The sealant shall be a one-part elastomeric compound requiring no mixing, measuring or application of heat prior to or during its installation.

The sealant shall, within its stated shelf life and original undamaged packaging, cure only in the presence of moisture. The rate of cure will depend on temperature and relative humidity at the time of installation (cool, dry weather will slow curing while warm, humid weather will accelerate it).

The sealant shall have flow characteristics, which insure complete encapsulation of the wires. The sealant shall not run out of the detector saw cut in sloped roadbed areas during or after application. The uncured sealant shall be designed to permit clean up with a cleaner that will not threaten harm to workers or the environment.

The sealant shall be designed to enable vehicular traffic to pass over the properly filled 1/4 inch to 3/8 inch (63.5mm 95.3mm) wide saw cut immediately after installation without danger of the sealant pulling out of the saw cut during cure. The sealant shall exhibit minimal shrinkage during cure so as not to require any additional material after cure. The sealant shall be designed for roadway installation when surface temperature is 40°F to 100°F (4°C to 38°C). The sealant shall be classified “not regulated for surface transportation” according to U. S. DOT regulations. The cured sealant shall be landfill disposable.

### **Physical Requirements**

The sealant shall have physical properties, which enable the product to meet the General Description (See Table 1) requirements.

The sealant shall not contain solvents incompatible with asphalt (Toluene, Mineral Spirits, other similar hydrocarbons).

### **Environmental Aspects**

Properly installed and cured sealant shall exhibit resistance to effects of weather, vehicular abrasion, motor oils, gasoline, antifreeze solution, brake fluid, deicing chemicals and salt normally encountered in such a manner that the performance of the vehicle detector loop wire is not adversely affected.

The cured sealant shall be temperature stable and exhibit no degradation in performance throughout the ambient temperature ranges experienced within the continental United States, Alaska, Hawaii and Puerto Rico.

### **Dispensing**

The sealant shall be available in metric sized, pliable packaging for dispensing from a commercially available 66 cm air assisted applicator gun and generate less than 65 cc of solid waste per liter of sealant.

The sealant shall be dispensable from bulk containers (five gallon pails or 55 gallon drums) with a commercially available pumping system.

### **Life/Reliability**

The sealant shall have the following shelf life in undamaged containers when stored below 80°F (27°C).

- a) Liter ply packs: Nine months after receipt.
- b) Five-gallon pails (containing 4.5 U.S. gallons): Twelve months after receipt.
- c) Gallon drums (containing 50 U.S. gallons): Twelve months after receipt.

**TABLE I****Physical Properties of the Uncured (wet) Sealant:**

Property	Requirement	Test Procedure	ASTM Reference
A. Density	10.0 - 10.6 lb./gal 1.20-1.27g/cc	A. Weight/Gallon	D-1875
B. Total Solids by Weight	75% minimum	B. Determination of non-volatile content	D-2834
C. Viscosity	5,000-85,000 cps	C. Viscosity	D-1048B
D. Drying Time	Touch: 24 hr. max.	D. Tack-Free Time	D-1640
E. Non-Flow	70% min.	E. Retention Test <sup>1</sup>	---

**Physical Properties of the Cured Encapsulate**

Property	Requirement	Test Procedure	ASTM Reference
A. Hardness (Indentation)	60-85	A. Rex Hardness	D-2240 <sup>3</sup>
B. Tensile Strength	800 psi min .0.563Kg/mm <sup>2</sup>	B. Tensile and Elongation	D-412A <sup>2</sup>
C. Elongation at break	400-700%	C. Tensile and Elongation	D-412A <sup>2</sup>

1. See attached testing procedure.
2. Jaw speed: Ten inch (25.4cm)/minute
3. Maintain measuring pressure for ten seconds and record initial and final value. Final value shall be within five units of the original value.

**Retention Test for Detector Loop Sealant**

TITLE: Percent by Weight Retention Test

SCOPE: To measure the non-flow properties of a one-component sealant.

**EQUIPMENT AND MATERIALS:**

- a) Balance
- b) Tongue depressor
- c) Two ounce ointment cans or equivalent
- d) One inch (2.54cm) wide masking tape
- e) Percent retention test fixture (this is an aluminum fixture--see attached figure)
- f) B-D 10 cc. syringe
- g) Sample of sealant to be tested

**PROCEDURE:**

Put a strip of masking tape on both ends of the test fixture completely covering the slot.

Weigh the fixture with masking tape (a).

Sample of sealant should be tested at 75-79°F (24-26°C) and stirred for one minute prior to testing.

Fill the syringe with the sample and inject the sample into the slot in the test fixture.

Using a tongue depressor, scrape off any excess sealant from the top of the test fixture so that the sealant fills the test fixture slot and is level with the top of the fixture.

Re-weigh the fixture with the sample material filling the slot (b).

Put the fixture on top of the two-ounce ointment cans and remove the masking tape from the sides.

Wipe off and discard any sealant on the pieces of masking tape. Do not discard the pieces of masking tape.

The test period is for five minutes, starting when the two strips of masking tape are removed from the ends of the test fixture. During the test period the sealant may flow out of the slot onto and down the sides of the test fixture.

After the five minute test period, using a tongue depressor, wipe off and discard any sealant that has run out of the slot onto the sides of the test fixture, so that the only remaining sealant is in the slot of the fixture.

Replace the same pieces of masking tape that were removed at the beginning of the test, back onto the fixture.

Re-weigh the test fixture with the residual amount of sealant (c).

$\frac{\text{Final weight of sample}}{\text{Original weight of sample}} \times 100 = \% \text{ Retention}$

Final weight of sample =  
(After test)

(c) Weight of fixture and residual sample - (a) weight of fixture with masking tape

Original weight of sample =  
(Before test)

(b) Weight of fixture and original sample - (a) weight of fixture with masking tape

## **Traffic Signal Cabinet, 8-Phase**

**Note: This specification sets forth the minimum requirements and includes the following quantity of items as specified in the Fulton County Traffic Signal Specification Document.**

- (1) EPAC3808M50 Controller**
- (1) EDI SSM12LEC Conflict Monitor**
- (2) R124A Detector Rack Power supply**
- (1) Opticom Rack, four channel phase selector, auxiliary interface panel.**
- (4) Vantage Edge2-1N Detector OR (2) Vantage Edge2-2N and**
- (2) Vantage Edge-EM4 Extension Module**

## (12) NEMA Load Switch

### **CABINET**

**Basic Construction** - The controller and all associated equipment shall be provided in a weatherproof metal cabinet of clean-cut design and appearance. All exposed edges shall be free of burns and pit marks.

**Construction Material** - The cabinet shall be constructed of ASTM Designation B-209 sheet aluminum alloy 5052, with a minimum thickness of 0.125 inches. The cabinet shall have a smooth natural aluminum finish. Handles and locks shall be rustproof.

**Welds** - All welds shall be neatly formed and free of cracks, blowholes, and other irregularities. All welds shall be made by the Heliarc welding method. Welds on the exterior faces of the cabinet shall be reduced to a minimum. Any exterior welds shall be ground smooth.

**Main Cabinet Door** – Hinged doors, front and back shall be provided permitting complete access to the interior of the cabinet. When closed, the door shall fit closely to a neoprene gasket, making the cabinet weather and dust resistant. The door shall be provided with a strong lock utilizing Corbin No. 2 keys. A minimum of two keys shall be provided and securely attached to the cabinet when delivered. The locking mechanism shall secure the door to the cabinet at three points as follows:

**Door Locking Points** - A 3-point locking system shall be required and shall consist of the following security points:

- a. Center of cabinet (lock);
- b. Top of cabinet (operated by door handle); and
- c. Bottom of cabinet (operated by door handle).

Security points (b) and (c) shall be designed so that they will remain in the locked position until the main cabinet lock is unlocked. Door handle operation shall be such that the handle is vertical when in the locking position, and the opening motion shall swing the handle away from the location where the key is inserted. The handle shall be capable of being padlocked to prevent opening when padlocked.

**Hinges** – The main cabinet door hinge shall be continuous type running the full height of the door. The hinge shall utilize a non-removable 3/16" diameter stainless steel hinge pin for door support. The hinge shall be carriage bolted in place for ease of door removal.

**Door Stops** - All cabinets shall be furnished with at least a two-position doorstop system, which shall hold the main door open at approximately 90 and 180 degrees. The doorstops shall be a sufficient strength and design that when locked into either "open" position they will withstand the force of a 30-mile per hour wind blowing at 90 degrees to the open door.

**Auxiliary Door** – A 2" deep, fabricated switch compartment shall be included on the outside of the main cabinet door. The door of this compartment shall be hinged with a 14-gauge stainless steel hinge with a 3/32" diameter hinge pin riveted in place. The auxiliary door shall be flush to the outside of the main cabinet door. The auxiliary door shall not allow access to the controller, its

associated equipment, or exposed electrical terminals but shall allow access to a small panel and compartment containing switches and/or jacks as follows:

- a. A signal head shutdown switch shall be provided. When in the OFF position all power to the signal heads shall be removed.
- b. A Tech-flash control switch shall be provided. When in the ON position the intersection shall be in flashing operation. All A.C. power shall be removed from the load switches. Stop timing shall be applied to the controller dependent upon the position of the Stop Time Switch. When placed in Normal position "Tech flash" shall be applied via relay wired in cabinet.
- c. An auto-manual (manual enable) switch and jack-mounted manual pushbutton with a 10-foot cord shall be provided.

The auxiliary door shall be equipped with a strong lock utilizing keys of a different design (skeleton type) from those provided for the main cabinet door. Two auxiliary door keys shall be provided and securely attached to the cabinet when delivered.

**Rear Door** A rear door and lock will be provided on all cabinets. This door will be hinged and allow access to the back of the load bay. The door should be in the lower half of the rear wall with a maximum opening height of 21 inches

**Mounting Shelves** - The cabinet shall contain at least two strong mounting shelves to accommodate mounting of the controller unit and all auxiliary equipment. The mounting facilities shall permit the controller and/or all auxiliary equipment to be withdrawn from the cabinet for inspection or maintenance without breaking any electrical connection or interrupting operation for the controller.

**Cabinet Drawer/Shelf** - A 1½" deep drawer shall be provided in the cabinet, mounted directly beneath the controller support shelf. The drawer shall have a hinged top cover and shall be capable of storing documents and miscellaneous equipment. This drawer shall support to 50 pounds in weight when fully extended. Drawer dimensions shall make maximum use of available depth offered by the controller shelf and be a minimum of 35 inches wide.

**Mounting Screws** - Screws used for mounting purposes shall not protrude beyond the outside wall of the cabinet.

**Manufacturer's Identification** - The manufacturer's name shall not appear on the outside of the cabinet, but shall appear on the inside of the cabinet door, with the year and month of manufacture. This can be done by a plate welded to the door, in which the identification is engraved or stamped or other in another manner approved by the Engineer or the Traffic Engineering Division.

### **Size and Mounting**

**Size** - Cabinets shall have the following nominal dimensions plus or minus 2 inches. Any deviations beyond these limits must be approved by the Engineer and/or the County Traffic Engineer before the cabinet is fabricated and/or shipped:

<b><u>Eight Phase "P" Style Cabinet</u></b>	
Width	44"
Depth	25.5"
Height	56"

In all cases, the cabinet shall be of adequate dimensions to properly house the controller, coordinating unit and all required appurtenances and auxiliary equipment intended to be contained therein; all in an upright position, with a clearance of at least 3 inches from the vent fan and filter, to allow for proper air flow. There shall be at least 2 inches of clearance on each side of the shelf between the equipment and sidewalls of the cabinet. Provision shall be made to allow access to the cabinet backboard for maintenance, without requiring its removal from the cabinet. As an option provision can be to allow the backboard to fold down on a hinge to allow access for maintenance.

**Load bay** shall have provisions for a NEMA two-circuit flasher and six flash transfer relays.

**Cabinets** shall contain a minimum load bay capacity of 12 load switch bases wired as follows:

- |                       |                       |
|-----------------------|-----------------------|
| 1 - Phase 1 - R, A, G | 7 - Phase 7 - R, A, G |
| 2 - Phase 2 - R, A, G | 8 - Phase 8 - R, A, G |
| 3 - Phase 3 - R, A, G | 9 - Phase 2 - DW, W   |
| 4 - Phase 4 - R, A, G | 10 - Phase 4 - DW, W  |
| 5 - Phase 5 - R, A, G | 11 - Phase 6 - DW, W  |
| 6 - Phase 6 - R, A, G | 12 - Phase 8 - DW, W  |

### **Mounting**

**Anchor Bolts** - Anchor bolts for base-mounted cabinets shall be 3/4 inch diameter, 16 inch in length, with a 90 degree bend (overall length of 18 inches). The end opposite the leg shall be threaded for a minimum of 3 inches with a 3/4-inch UNC-10 thread. Anchor bolts shall be high-strength steel with hot-dipped galvanized or zinc plate surface treatment. Anchor bolts will be ordered as needed and not included in the price of the cabinet.

**Anchor Bolt, Nuts and Washers** – Each anchor bolt shall be furnished with two, 3/4 inch, UNC-10, high-strength steel nuts with hot-dipped galvanized or zinc plate surface treatment. A 3/4-inch x 1/4 inch x 2 inch high-strength steel, hot-dipped galvanized or zinc Tplate surface treated washer shall be provided with each anchor bolt.

### **Ventilation**

**Vents** The cabinet shall contain suitably designed rain-tight cabinet intake and exhaust vents.

The exhaust vent(s) shall allow the release of excessive heat and any explosive gases, which might enter the cabinet and shall be located under the overhang above the main cabinet door.

A removable dust filter shall be mounted on the inside of the main door completely covering the intake vent. The cabinet air filter shall be a standard size filter and its minimum area shall be 250 square inches. All intake air shall be filtered with no bypassing permitted through cracks, clearance spaces or gaps.

All openings to the cabinet for venting shall be screened.

The intake vent, located on lower main cabinet door, shall be designed so that no water or dust will be drawn into the cabinet.

**Vent Fan** - All cabinets shall have a thermostat controlled vent fan.

The thermostat controlling the fan shall be manually adjustable to turn on between 90 degrees F and 150 degrees F with a differential of not more than 10 degrees F between automatic turn-on and turn-off. The thermostat contact and fan shall be properly noise suppressed with an RC network consisting of a 100 ohm resistor and .1 microfarad capacitor.

The fan shall be located with respect to the vent holes so as to direct the bulk of the airflow over the controller and included auxiliary equipment.

The fan provided shall have capacity of at least 100 cubic feet/minute (cfm). The fan shall be rated for continuous duty and at least three years.

### **Electrical Requirements**

**Connecting Cables** - Electrical connections from the controller unit, conflict monitor, and other included auxiliary devices to outgoing and incoming circuits shall be made in such a manner that each unit or device can be replaced with a similar unit or device, without the necessity of disconnecting and reconnecting the individual wires leading there from.

Connecting cables shall be installed in the cabinet in the amount necessary to provide electrical connection to all controller and/or auxiliary equipment input and output functions needed for the required specific intersection signal sequence(s) and controller operation. The connecting cables shall be installed in the cabinet in such a manner that they do not interfere with the operation of the cabinet shelf/drawer during normal operation.

Each connecting cable shall be clearly marked to indicate its function.

The connector plug of each cable shall be keyed, sized, or otherwise constructed such that it may be connected only to the proper controller or auxiliary device connector jack.

Each connecting cable shall be clearly marked to indicate its function.

Each connecting cable shall be installed in the cabinet in a workmanlike manner. Individual connecting cable and internal cabinet wires (#22 AWG min.) shall be bundled together neatly and lay firmly in place.

Soldering of conductors to terminal lugs may be omitted provided a calibrated ratchet-type crimping tool is used.

**Terminals** - As a minimum, wiring terminals shall be provided and clearly marked for the following:

- a. Terminal with magnetic circuit breaker(s) and integral power line switch (es) for the incoming power line.
- b. Terminal, un-fused, for the neutral side of the incoming power line.
- c. Terminals and bases for signal load switches. Terminals shall accept #12-14 AWG wire.
- d. Terminals and base for signal flasher and outgoing signal field circuits. Cabinet space and terminals provided shall be sufficient to permit the installation of an auxiliary device for the dimming of flashing amber (yellow) indications.
- e. Terminals to accommodate the termination of connecting cables and internal cabinet wiring for all controller inputs and outputs.

- f. Terminals for future incoming and outgoing interconnect lines. Terminals shall accept #14-18 AWG wire.
- g. Terminals for future preemption input lines.
- h. Terminals for connecting cables and incoming loop wires.
- i. Terminals to accommodate the future installation of incoming and outgoing multi-pair voice grade telephone interconnection.
- j. The wiring in the cabinets shall conform to applicable requirements of the National Electrical Code (NEC), NEMA and all of the specifications contained herein. All wiring shall be neat and firm. Wires shall be neatly laced into cables with nylon lacing or nylon tie wraps. Cables shall be secured with nylon cable clamps. The controller equipment and terminals shall be so arranged within the cabinet that they will not conflict with the entrance, training, and connection of the incoming conductors, and shall be easily traceable and without entanglement. All terminal strips and load switches for field wiring shall be exposed for test purposes or maintenance without removal of the controller or its related equipment. MS connectors and wiring harness for the controller unit, conflict monitor and external logic units shall be furnished and wired into the cabinet. All conductors, which are subject to flexing during the opening of cabinet doors, or the removal of equipment, shall be stranded with a minimum of 19 strands. All conductors used in the controller cabinet shall be #22 AWG or larger, shall conform at least to Military Specification: MIL-W-16878D, Type B or D, Vinyl-Nylon jacket, 600 volt, 105 degrees C. Conductors used in controller cabinets shall conform to the following color codes: AC -neutral = white; AC + line = black; Safety Ground = white with green stripe.

Safety ground is to be electrically common to AC - neutral. All wires shall be proper length before assembly. No wire shall be doubled back to take up excessive length. The wire and insulation shall be adequate to handle the current and voltage used in the cabinet. The harnesses shall be neatly arranged and provided with the flexibility for the connectors to reach at least 40 inches from the top of the terminal block panel.

- k. All input and output circuit connections to the controller unit, conflict monitor, external logic units, load switches, loop detectors, coordination units, and all other auxiliary equipment shall be made by the use of terminal strips. Terminal strips shall be provided for connecting the field wires to the output of the load switches. Terminal strips shall be included in cabinets to permit connecting a minimum of 48 field wires (four terminal strips) and loop detector wires (four terminal strips) which shall include wiring for AC + and AC -. Terminal strips shall be provided for connecting the controller outputs to the load switches. All terminal strips shall have their connections numbered. A wiring chart shall be provided on the inside of the main cabinet door, to identify the connections of the terminal strips. It shall be completely legible.

**Clearance Between Terminals** - Adequate electrical clearance shall be provided between terminals. The controller, auxiliary equipment, panel(s), terminals and other accessories shall be arranged within the cabinet so that they will facilitate the entrance and connection of incoming conductors.

**Signal Circuit Polarity** - Outgoing signal circuits and 120 volt AC, 60 Hz interconnect lines shall be of the same polarity as the line side of the power

service and the common return shall be of the same polarity as the grounded side of the power service.

**Grounding Conductor Bus** - An equipment copper grounding conductor bus (es) shall be provided in each cabinet. The bus(as) shall be bonded to the cabinet in an approved manner. Multiple buses shall be interconnected by a minimum of #10 AWG wire. Each bus bar shall have at least two positions when a number 6 AWG standard wire can be attached.

**Over-current Protection** - A magnetic circuit breaker(s) with integral power line switch(es) of suitable size shall be provided on the incoming power service. One circuit breaker shall be rated at 20 amps minimum and control the convenience outlet and cabinet light. The other circuit breaker shall be rated at 50 amps minimum and control the other electrical connections.

**Convenience Outlet** - A three wire 120 volts AC duplex outlet with safety ground shall be provided in the cabinet. Internal cabinet wiring shall permit power to be disconnected from the controller and auxiliary equipment while maintaining power to the convenience outlet. A 15-amp circuit with ground-fault circuit interruption (GFI) breakers shall be provided for this outlet.

**Cabinet Light** - A light shall be mounted in the top of the cabinet, which will illuminate controller, auxiliary equipment and wiring panels. The light shall be a minimum 20-watt fluorescent fixture. A door switch shall be provided which turns off the light when the main cabinet door is closed. Internal cabinet wiring shall permit power to be disconnected from the controller and auxiliary equipment while maintaining power to the cabinet light.

### **SURGE PROTECTORS**

This section of the Specification sets forth the requirements for various types of surge protectors for use in the traffic signal control equipment specified elsewhere in the Specifications. The requirements of Section 2 of the Specifications apply to surge protectors.

### **SURGE PROTECTION:**

Each cabinet shall be provided with devices to protect the control equipment from surges and over voltages. The surge protector panels shall be designed to allow for adequate space for a wire connection and surge protector replacement without removal of terminal blocks or panels. Surge protectors shall be provided for as detailed below and as shown in the Input Terminal and Surge Arrestor Detail. The surge protectors shall meet the following specifications:

### **AC SERVICE INPUT:**

Each cabinet shall include a plug-able surge protection unit on the AC service input that meets or exceeds the following requirement: (EDCO SHA-1250 or equivalent utilizing 16 pin Beau connectors). The surge arrestor shall be a multi stage series hybrid type power line surge device. The surge arrestor shall be installed between the applied line voltage and earth ground. The unit shall have 2 LED indicators for operational display status. The surge arrestor shall be capable of reducing the effect of lightning transient voltages applied to the AC line and provide filtering that conforms to 50kHz with a minimum insertion loss of 50db. The arrestor shall conform to the following:

Peak surge current for an 8 X 20 microsecond waveform; 20,000 A for 20 occurrences.

Clamp voltage at 20,000 A; 280 V max.

Maximum continuous operating current at 120 V/60 Hz: 15 A

Series Inductance: AC Line/AC Neutral 200 micro henries.

Response time: (< a nanosecond) Voltage never exceeds 280V during surge.

Temperature range: -40 to +85 degrees Celsius

Spike suppression for +/- 700V spike: +/- 40 V deviation from sine wave all phase angles between 0 and 180 degrees.

The arrester shall have the following terminals:

- 1) Main Line (AC line first stage terminal)
- 2) Main Neutral (AC neutral input terminal)
- 3) Equipment Line In (AC line second stage input terminal, 10A)
- 4) Equipment Line Out (AC line second stage output terminal, 10A)
- 5) Equipment neutral out (neutral terminal to protected equipment)
- 6) Ground (GND) (earth connection).

The arrester shall be encapsulated in a flame-retardant material.

The equipment line out shall provide power to the controller. The unit shall be a two-stage device that will allow the connection of the radio interference filter in the circuit between the stages.

### **LOOP DETECTOR SURGE PROTECTORS**

This article sets forth the specifications for two types of loop detector surge protectors: one which mounts directly on terminal blocks and one which mounts on a self-contained stud.

#### **General Requirements**

All loop detector surge protectors shall conform to the following requirements. Number of 100-ampere surge current occurrences of a 10 x 700-microsecond waveform:

Common mode: at least 25

Differential mode; at least 25

Clamp characteristics (common and differential modes):

Maximum break-over voltage: 170 volts

Maximum on-state clamping voltage: 3 volts

Response time: less than 5 nanoseconds

Off-state leakage current: less than 10 microamperes

Capacitance (common and differential modes): less than 220 Pico farads

Temperature range: -40 to +85 degrees Celsius

Maximum dimensions: 2"x2"x1.25"

The surge protection shall operate properly with the loop type vehicle detectors specified in Section 5.

#### **Type TB Loop Detector Surge Protectors – EDCO # SRA6LCA- 916, SRA6LCA-716 or equivalent**

Type TB loop detector surge protectors shall conform to all of the requirements of paragraph 6.2.1 The Type TB surge protector shall have three integral spade lugs that shall enable the unit to be mounted and connected directly to a terminal block. The Type TB surge protector shall be furnished for either 7/16-inch or 9/16-inch terminal spacing as required by the bid list or as required to match the terminal blocks to which it is to be connected in each instance.

**Type SC Loop Detector Surge Protectors – EDCO # SRA-6LC or equivalent**

Type SC loop detector surge protectors shall conform to all of the requirements of paragraph 6.2.1. The Type SC surge protector shall have in integral 3/8-inch (minimum) long NO. 10-32 mounting and grounding stud.

**COMMUNICATIONS SURGE PROTECTORS**

This article sets forth the specifications for a communications surge protector.

**General Requirements**

All communications surge protectors shall conform to the following requirements.

Surge current occurrences at:

2000 amperes, 8x20 microsecond waveform: at least 80

400 amperes, 10x700-microsecond waveform: at least 80 Peak surge current for:

10,000 amperes

8x20 microsecond waveform: (2,500 amperes/line)

100x 700-microsecond waveform: 500 amperes/line

Response time: less than 1 nanosecond

Series resistance: 15 ohms, maximum

Capacity, average: 1500 Pico farads

Temperature range: 40 to 85+ degrees Celsius

Clamp Voltage: As specified on bid list or as required to match equipment in application.

This unit shall be a hybrid device with the first stage formed by a 3-element gas tube that will withstand a peak surge current (8x20 microsecond waveform) of 5000 amperes per side. The second stage shall dissipate at least 1.5 kilowatts.

No tools shall be required for the insertion and removal of the surge protector.

**Type SC Communications Surge Protectors – PC642C-Series**

Type SC communications surge protectors shall conform to all of the requirements of paragraph 0.0.1. and shall service up to two communications circuit pairs. The Type SC surge protector shall have a printed circuit board card-edge connector that will mate with a Buchanan PN PCB 1B-10A connector. The contact strips shall be gold-plated. The Type SC surge protector shall be furnished with a mating socket. The maximum size of the Type SC surge protector with its socket shall be 2"x2.75"x 1.25".

**24-VOLT DC SURGE PROTECTORS**

The 24-volt DC surge protector shall conform to the following requirements.

Surge current occurrences at:

2000 amperes, 8x20 microsecond waveform: at least 80

Peak surge current for:

8x20 microsecond waveform: 2,000 amperes

Response time, maximum: 30 nanoseconds

Series resistance, each conductor 15ohms, maximum

Temperature range: -20 to +85 degrees Celsius

Clamp voltage: As specified on bid list or as required to match equipment in application.

The unit shall be a hybrid device with the first stage formed by a 3-element gas tube that will withstand a peak surge current (8x20 microsecond waveform) of 5,000 amperes per side. The second

stage shall dissipate at least 1.5 kilowatts. No tools shall be required for the insertion and removal of the surge protector. The surge protector shall have a printed circuit board card-edge connector that will mate with a Buchanan PN PCB 1B-10A connector. The contact strips shall be gold-plated. The surge protector shall be furnished with a mating socket. The maximum size of the surge protector with its socket shall be 2" x 2.75" x 1.50". **EDCO # PC642C-030**

**LOAD SWITCH SURGE PROTECTORS**

The output of the load switch on the terminal facility hook-up panel shall be protected by metal oxide arrestors (MOV), which are tied from the AC positive field terminal to chassis ground to protect switch packs from surges occurring on the AC output lines.

Surge suppression for the field wiring shall be installed on the back of the output file.

Each protector will have three leads and a ground stud and meet the following general requirements.

Peak Surge Current.....10kA (8x20µs)  
Occurrences.....>100 @ 200 Amps  
Voltage Clamp..... 475 V

**EDCO Part # SPA-303 or equivalent**

**Service Switches** - Service switches shall be required for all cabinets and shall be located on the inside back of the main door and labeled as to their function.

**Signal Head Power** - When in the OFF position, all power to the signal heads shall be removed.

**Flash Switch** - When in the ON position, the intersection shall flash as shown on the plans. A.C. power shall be removed from only the load switches.

**Controller Power Switch** - When in the OFF position, A.C. power shall be removed from the traffic controller.

**Stop Time Switch** - When in the ON position, the Stop Timing feature shall cause cessation of controller timing.

**Detector Input Switches** - A detector call switch shall be installed for each phase and located on the left side of cabinet wall close to pedestrian and detector inputs. Each switch shall be a three-position toggle switch which when activated shall place a call on the associated phase. The three positions shall be designated as follows:

- Center - off
- Up - Positive Contact (On)
- Down - Momentary Contact (Spring Loaded On)

**Signal Bus Relay** - The Signal Bus Relay will be of a solid-state design with heat sync, Gordos 6280A45 or equivalent. Heat sync thermal compound will be used between the relay and heat sync.

**Request for Download Switch** - A momentary switch shall be located on the left hand side of the cabinet wired so when pressed will make a request to the TCC computer for an automatic download of the specified intersection controller data. The switch shall be covered and protected to prevent accidental pressing.

**RS 232 Data Distribution Hub Card** - A data patch hub card will be provided to support RS 232 data transfer from the controller to other RS 232 devices in the cabinet. The hub card shall be installed in the vehicle detector rack. The following cables shall be provided:

- (1) Controller to data distribution hub
- (1) Conflict Monitor to data distribution hub
- (1) Opticom Phase Selector to data distribution hub
- (1) Iteris Vantage Edge2 to data patch panel – this cable shall connect four Edge2 detectors and at the last detector plug into the data distribution hub.

Other cables may be purchased as required. Five male sockets will be provided for other RS 232 devices. RJ 45 connectors will be used for connection to the panel.

**Fiber Optic Patch Panel** - A fiber optic patch panel will be provided consisting of twelve ST/connector/coupler - Bayonet/threaded coupler mounted in a metal panel. Each pair of couplers will be numbered and labeled in and out. The panel will be mounted in a position away from normal cabinet maintenance in such a way that all major components can be removed and serviced without disturbing the field fiber.

**Vehicle Detector Card Rack** – The vehicle detector card rack shall be designed to accept 2 industry standard rack mounted power supplies and 5 four-channel vehicle detectors (inductive loop type or video type). Additionally a slot wired for 1 four-channel detector shall also be wired to accept 2 two-channel detectors. The width of a four-channel slot shall be a minimum of 2.5 inches. The width of a power supply slot shall be a minimum of 2.0 inches and a maximum of 2.5 inches. The edge card connector shall be soldered type and not printed circuit board type.

The slots shall be wired as follows:

**Slot 1 & Slot 2** – Vehicle Power Supply

**Slot 3** - Channel 1 – Phase 1, Channel 2 – Phase 6, Channel 3 –Phase 6, Channel 4 – Phase 6.

**Slot 4** - Channel 1 – Phase 2, Channel 2 – Phase 2, Channel 3 – Phase 2, Channel 4 – Phase 5.

**Slot 5** - Channel 1 – Phase 3, Channel 2 – Phase 8, Channel 3 –Phase 8, Channel 4 – Phase 8.

**Slot 6** - Channel 1 – Phase 4, Channel 2 – Phase 4, Channel 3 –Phase 4, Channel 4 – Phase 7.

**Slot 7** - Channel 1 – Spare, Channel 2 – Spare, Channel 3 – Spare, Channel 4 – Spare.

### **Cabinet Documentation**

**General** - Each cabinet shall be furnished with three copies of the cabinet wiring diagram and field wiring diagram. These prints shall be full size and completely legible. Where possible, diagrams shall be to a scale picture image of the cabinet layout. Electronic files of all wiring diagrams will be provided.

### **Minimum Requirements of Wiring Diagrams**

**Wiring** - Diagrams shall show the complete wiring of all cabinet components, all switches, terminal board connections, connector connections, fan connections, light fixture connections, flash transfer relays, lightning arrestors, surge protectors, load switch panels, terminals, and any other control functions. Each item shall be clearly identified as to its function.

**Components** - All components in the cabinet shall be located according to their function and in such a manner that they may easily be found on the wiring diagram.

**Movement Designations** - Field wiring and cabinet wiring diagrams shall be designated on the diagrams using the traffic movement designations as shown in the plans. Association of phase number with their designated traffic movement shall be clearly indicated on the wiring diagram.

**Sequence Diagrams** - If requested by the County before or after delivery, the supplier shall provide a diagram, with the applicable phasing, for installation inside the main door to be laid out for trouble-shooting purposes. It shall also show detector locations, signal head locations by type, preempts, etc. The diagram shall be completely legible, waterproof and tightly affixed to the door.

**Storage** Diagrams and manuals will be stored in the drawer under the top shelf called for in 7.1.7.

### **QUALITY PROVISIONS**

The local controller unit shall successfully meet the NEMA requirements, as applicable. The controller unit shall have been tested and certified by an independent test laboratory. An "independent test laboratory" shall be defined as one that has no relationship to the controller manufacturer, except as a supplier of services.

All equipment furnished under this specification shall be new, of the latest model and fabricated in a first-class workmanship manner from good quality material.

### **WARRANTY**

The controller unit shall be warranted to be free from defects in workmanship and material for two years from the date of shipment by the manufacturer. Any part(s) found to be defective shall, upon concurrence of the defect by the manufacturer, be replaced or repaired free of charge.

### **SPECIFICATION COMPLIANCE**

At the time of bid, the County shall be furnished with a certificate from the equipment manufacturer stating that the equipment to be furnished under this specification complies with all provisions of this specification. Submittal of appropriate supporting documentation, manufacturer's literature, manuals, etc. is encouraged. The successful low bidder will be contacted to supply one complete cabinet assembly for the County to evaluate for the purposes of ensuring specification compliance. The cabinet will be supplied and picked up by the successful bidder at no cost to the County. The successful bidder shall have 30 days from date of contact to supply the evaluation cabinet assembly. Failure to meet the 30-day time frame will result in the bid being considered as non-responsive and the next low bidder will be contacted.

## **Traffic Signal Cabinet, 8-Phase Eagle ECAB 200301-I**

**Note: This specification sets forth the minimum requirements and includes the following quantity of items as specified in the Fulton County Traffic Signal Specification Document.**

- (1) EPAC3808M50 Controller
- (1) EDI SSM12LEC Conflict Monitor
- (2) R124A Detector Rack Power supply
- (1) Opticom Rack, four channel phase selector, auxiliary interface panel.
- (6) Canoga C824 Detector
- (12) NEMA Load Switch

### **CABINET**

**Basic Construction** - The controller and all associated equipment shall be provided in a weatherproof metal cabinet of clean-cut design and appearance. All exposed edges shall be free of burns and pit marks.

**Construction Material** - The cabinet shall be constructed of ASTM Designation B-209 sheet aluminum alloy 5052, with a minimum thickness of 0.125 inches. The cabinet shall have a smooth natural aluminum finish. Handles and locks shall be rustproof.

**Welds** - All welds shall be neatly formed and free of cracks, blowholes, and other irregularities. All welds shall be made by the Heliarc welding method. Welds on the exterior faces of the cabinet shall be reduced to a minimum. Any exterior welds shall be ground smooth.

**Main Cabinet Door** - Hinged doors, front and back shall be provided permitting complete access to the interior of the cabinet. When closed, the door shall fit closely to a neoprene gasket, making the cabinet weather and dust resistant. The door shall be provided with a strong lock utilizing Corbin No. 2 keys. A minimum of two keys shall be provided and securely attached to the cabinet when delivered. The locking mechanism shall secure the door to the cabinet at three points as follows:

**Door Locking Points** - A 3-point locking system shall be required and shall consist of the following security points:

- a. Center of cabinet (lock);
- b. Top of cabinet (operated by door handle); and
- c. Bottom of cabinet (operated by door handle).

Security points (b) and (c) shall be designed so that they will remain in the locked position until the main cabinet lock is unlocked. Door handle operation shall be such that the handle is vertical when in the locking position, and the opening motion shall swing the handle away from the location where the key is inserted. The handle shall be capable of being padlocked to prevent opening when padlocked.

**Hinges** – The main cabinet door hinge shall be continuous type running the full height of the door. The hinge shall utilize a non-removable 3/16” diameter stainless steel hinge pin for door support. The hinge shall be carriage bolted in place for ease of door removal.

**Door Stops** - All cabinets shall be furnished with at least a two-position doorstop system, which shall hold the main door open at approximately 90 and 180

degrees. The doorstops shall be a sufficient strength and design that when locked into either "open" position they will withstand the force of a 30-mile per hour wind blowing at 90 degrees to the open door.

**Auxiliary Door** – A 2” deep, fabricated switch compartment shall be included on the outside of the main cabinet door. The door of this compartment shall be hinged with a 14-gauge stainless steel hinge with a 3/32” diameter hinge pin riveted in place. The auxiliary door shall be flush to the outside of the main cabinet door. The auxiliary door shall not allow access to the controller, its associated equipment, or exposed electrical terminals but shall allow access to a small panel and compartment containing switches and/or jacks as follows:

- a. A signal head shutdown switch shall be provided. When in the OFF position all power to the signal heads shall be removed.
- b. A Tech-flash control switch shall be provided. When in the ON position the intersection shall be in flashing operation. All A.C. power shall be removed from the load switches. Stop timing shall be applied to the controller dependent upon the position of the Stop Time Switch. When placed in Normal position “Tech flash” shall be applied via relay wired in cabinet.
- c. An auto-manual (manual enable) switch and jack-mounted manual pushbutton with a 10-foot cord shall be provided.

The auxiliary door shall be equipped with a strong lock utilizing keys of a different design (skeleton type) from those provided for the main cabinet door. Two auxiliary door keys shall be provided and securely attached to the cabinet when delivered.

**Rear Door** A rear door and lock will be provided on all cabinets. This door will be hinged and allow access to the back of the load bay. The door should be in the lower half of the rear wall with a maximum opening height of 21 inches

**Mounting Shelves** - The cabinet shall contain at least two strong mounting shelves to accommodate mounting of the controller unit and all auxiliary equipment. The mounting facilities shall permit the controller and/or all auxiliary equipment to be withdrawn from the cabinet for inspection or maintenance without breaking any electrical connection or interrupting operation for the controller.

**Cabinet Drawer/Shelf** - A 1½” deep drawer shall be provided in the cabinet, mounted directly beneath the controller support shelf. The drawer shall have a hinged top cover and shall be capable of storing documents and miscellaneous equipment. This drawer shall support to 50 pounds in weight when fully extended. Drawer dimensions shall make maximum use of available depth offered by the controller shelf and be a minimum of 35 inches wide.

**Mounting Screws** - Screws used for mounting purposes shall not protrude beyond the outside wall of the cabinet.

**Manufacturer's Identification** - The manufacturer's name shall not appear on the outside of the cabinet, but shall appear on the inside of the cabinet door, with the year and month of manufacture. This can be done by a plate welded to the door, in which the identification is engraved or stamped or other in another manner approved by the Engineer or the Traffic Engineering Division.

**Size and Mounting**

**Size** - Cabinets shall have the following nominal dimensions plus or minus 2 inches. Any deviations beyond these limits must be approved by the Engineer and/or the County Traffic Engineer before the cabinet is fabricated and/or shipped:

**Eight Phase “P” Style Cabinet**

Width	44"
Depth	25.5"
Height	56"

In all cases, the cabinet shall be of adequate dimensions to properly house the controller, coordinating unit and all required appurtenances and auxiliary equipment intended to be contained therein; all in an upright position, with a clearance of at least 3 inches from the vent fan and filter, to allow for proper air flow. There shall be at least 2 inches of clearance on each side of the shelf between the equipment and sidewalls of the cabinet. Provision shall be made to allow access to the cabinet backboard for maintenance, without requiring its removal from the cabinet. As an option provision can be to allow the backboard to fold down on a hinge to allow access for maintenance.

**Load bay** shall have provisions for a NEMA two-circuit flasher and six flash transfer relays.

**Cabinets** shall contain a minimum load bay capacity of 12 load switch bases wired as follows:

- |                       |                       |
|-----------------------|-----------------------|
| 1 - Phase 1 - R, A, G | 7 - Phase 7 - R, A, G |
| 2 - Phase 2 - R, A, G | 8 - Phase 8 - R, A, G |
| 3 - Phase 3 - R, A, G | 9 - Phase 2 - DW, W   |
| 4 - Phase 4 - R, A, G | 10 - Phase 4 - DW, W  |
| 5 - Phase 5 - R, A, G | 11 - Phase 6 - DW, W  |
| 6 - Phase 6 - R, A, G | 12 - Phase 8 - DW, W  |

**Mounting**

**Anchor Bolts** - Anchor bolts for base-mounted cabinets shall be 3/4 inch diameter, 16 inch in length, with a 90 degree bend (overall length of 18 inches). The end opposite the leg shall be threaded for a minimum of 3 inches with a 3/4-inch UNC-10 thread. Anchor bolts shall be high-strength steel with hot-dipped galvanized or zinc plate surface treatment. Anchor bolts will be ordered as needed and not included in the price of the cabinet.

**Anchor Bolt, Nuts and Washers** - Each anchor bolt shall be furnished with two, 3/4 inch, UNC-10, high-strength steel nuts with hot-dipped galvanized or zinc plate surface treatment. A 3/4-inch x 1/4 inch x 2 inch high-strength steel, hot-dipped galvanized or zinc Tplate surface treated washer shall be provided with each anchor bolt.

**Ventilation**

**Vents** The cabinet shall contain suitably designed rain-tight cabinet intake and exhaust vents.

The exhaust vent(s) shall allow the release of excessive heat and any explosive gases, which might enter the cabinet and shall be located under the overhang above the main cabinet door.

A removable dust filter shall be mounted on the inside of the main door completely covering the intake vent. The cabinet air filter shall be a standard size filter and its minimum area shall be 250 square inches. All intake air shall be filtered with no bypassing permitted through cracks, clearance spaces or gaps.

All openings to the cabinet for venting shall be screened.

The intake vent, located on lower main cabinet door, shall be designed so that no water or dust will be drawn into the cabinet.

**Vent Fan** - All cabinets shall have a thermostat controlled vent fan.

The thermostat controlling the fan shall be manually adjustable to turn on between 90 degrees F and 150 degrees F with a differential of not more than 10 degrees F between automatic turn-on and turn-off. The thermostat contact and fan shall be properly noise suppressed with an RC network consisting of a 100-ohm resistor and .1 microfarad capacitor.

The fan shall be located with respect to the vent holes so as to direct the bulk of the airflow over the controller and included auxiliary equipment.

The fan provided shall have capacity of at least 100 cubic feet/minute (cam). The fan shall be rated for continuous duty and at least three years.

### **Electrical Requirements**

**Connecting Cables** - Electrical connections from the controller unit, conflict monitor, and other included auxiliary devices to outgoing and incoming circuits shall be made in such a manner that each unit or device can be replaced with a similar unit or device, without the necessity of disconnecting and reconnecting the individual wires leading there from.

Connecting cables shall be installed in the cabinet in the amount necessary to provide electrical connection to all controller and/or auxiliary equipment input and output functions needed for the required specific intersection signal sequence(s) and controller operation. The connecting cables shall be installed in the cabinet in such a manner that they do not interfere with the operation of the cabinet shelf/drawer during normal operation.

Each connecting cable shall be clearly marked to indicate its function.

The connector plug of each cable shall be keyed, sized, or otherwise constructed such that it may be connected only to the proper controller or auxiliary device connector jack.

Each connecting cable shall be clearly marked to indicate its function.

Each connecting cable shall be installed in the cabinet in a workmanlike manner. Individual connecting cable and internal cabinet wires (#22 AWG min.) shall be bundled together neatly and lay firmly in place.

Soldering of conductors to terminal lugs may be omitted provided a calibrated ratchet-type crimping tool is used.

**Terminals** - As a minimum, wiring terminals shall be provided and clearly marked for the following:

- a. Terminal with magnetic circuit breaker(s) and integral power line switch(es) for the incoming power line.
- b. Terminal, un-fused, for the neutral side of the incoming power line.

- c. Terminals and bases for signal load switches. Terminals shall accept #12-14 AWG wire.
- d. Terminals and base for signal flasher and outgoing signal field circuits. Cabinet space and terminals provided shall be sufficient to permit the installation of an auxiliary device for the dimming of flashing amber (yellow) indications.
- e. Terminals to accommodate the termination of connecting cables and internal cabinet wiring for all controller inputs and outputs.
- f. Terminals for future incoming and outgoing interconnect lines. Terminals shall accept #14-18 AWG wire.
- g. Terminals for future preemption input lines.
- h. Terminals for connecting cables and incoming loop wires.
- i. Terminals to accommodate the future installation of incoming and outgoing multi-pair voice grade telephone interconnection.
- j. The wiring in the cabinets shall conform to applicable requirements of the National Electrical Code (NEC), NEMA and all of the specifications contained herein. All wiring shall be neat and firm. Wires shall be neatly laced into cables with nylon lacing or nylon tie wraps. Cables shall be secured with nylon cable clamps. The controller equipment and terminals shall be so arranged within the cabinet that they will not conflict with the entrance, training, and connection of the incoming conductors, and shall be easily traceable and without entanglement. All terminal strips and load switches for field wiring shall be exposed for test purposes or maintenance without removal of the controller or its related equipment. MS connectors and wiring harness for the controller unit, conflict monitor and external logic units shall be furnished and wired into the cabinet. All conductors, which are subject to flexing during the opening of cabinet doors, or the removal of equipment, shall be stranded with a minimum of 19 strands. All conductors used in the controller cabinet shall be #22 AWG or larger, shall conform at least to Military Specification: MIL-W-16878D, Type B or D, Vinyl-Nylon jacket, 600 volt, 105 degrees C. Conductors used in controller cabinets shall conform to the following color codes: AC -neutral = white; AC + line = black; Safety Ground = white with green stripe.

Safety ground is to be electrically common to AC - neutral. All wires shall be proper length before assembly. No wire shall be doubled back to take up excessive length. The wire and insulation shall be adequate to handle the current and voltage used in the cabinet. The harnesses shall be neatly arranged and provided with the flexibility for the connectors to reach at least 40 inches from the top of the terminal block panel.

- k. All input and output circuit connections to the controller unit, conflict monitor, external logic units, load switches, loop detectors, coordination units, and all other auxiliary equipment shall be made by the use of terminal strips. Terminal strips shall be provided for connecting the field wires to the output of the load switches. Terminal strips shall be included in cabinets to permit connecting a minimum of 48 field wires (four terminal strips) and loop detector wires (four terminal strips) which shall include wiring for AC + and AC -. Terminal strips shall be provided for connecting the controller outputs to the load switches. All terminal strips shall have their connections numbered. A wiring chart shall be provided on the inside of the main

cabinet door, to identify the connections of the terminal strips. It shall be completely legible.

**Clearance Between Terminals** - Adequate electrical clearance shall be provided between terminals. The controller, auxiliary equipment, panel(s), terminals and other accessories shall be arranged within the cabinet so that they will facilitate the entrance and connection of incoming conductors.

**Signal Circuit Polarity** - Outgoing signal circuits and 120 volt AC, 60 Hz interconnect lines shall be of the same polarity as the line side of the power service and the common return shall be of the same polarity as the grounded side of the power service.

**Grounding Conductor Bus** - An equipment copper grounding conductor bus (es) shall be provided in each cabinet. The bus(es) shall be bonded to the cabinet in an approved manner. Multiple buses shall be interconnected by a minimum of #10 AWG wire. Each bus bar shall have at least two positions when a number 6 AWG standard wire can be attached.

**Over-current Protection** - A magnetic circuit breaker(s) with integral power line switch (es) of suitable size shall be provided on the incoming power service. One circuit breaker shall be rated at 20 amps minimum and control the convenience outlet and cabinet light. The other circuit breaker shall be rated at 50 amps minimum and control the other electrical connections.

**Convenience Outlet** - A three wire 120 volts AC duplex outlet with safety ground shall be provided in the cabinet. Internal cabinet wiring shall permit power to be disconnected from the controller and auxiliary equipment while maintaining power to the convenience outlet. A 15-amp circuit with ground-fault circuit interruption (GFI) breakers shall be provided for this outlet.

**Cabinet Light** - A light shall be mounted in the top of the cabinet, which will illuminate controller, auxiliary equipment and wiring panels. The light shall be a minimum 20-watt fluorescent fixture. A door switch shall be provided which turns off the light when the main cabinet door is closed. Internal cabinet wiring shall permit power to be disconnected from the controller and auxiliary equipment while maintaining power to the cabinet light.

### **SURGE PROTECTORS**

This section of the Specification sets forth the requirements for various types of surge protectors for use in the traffic signal control equipment specified elsewhere in the Specifications. The requirements of Section 2 of the Specifications apply to surge protectors.

### **SURGE PROTECTION:**

Each cabinet shall be provided with devices to protect the control equipment from surges and over voltages. The surge protector panels shall be designed to allow for adequate space for a wire connection and surge protector replacement without removal of terminal blocks or panels. Surge protectors shall be provided for as detailed below and as shown in the Input Terminal and Surge Arrestor Detail. The surge protectors shall meet the following specifications:

### **AC SERVICE INPUT:**

Each cabinet shall include a plug-able surge protection unit on the AC service input that meets or exceeds the following requirement: (EDCO SHA-1250 or equivalent utilizing 16 pin Beau connectors). The surge arrestor shall be a multi

stage series hybrid type power line surge device. The surge arrester shall be installed between the applied line voltage and earth ground. The unit shall have 2 LED indicators for operational display status. The surge arrester shall be capable of reducing the effect of lightning transient voltages applied to the AC line and provide filtering that conforms to 50kHz with a minimum insertion loss of 50db. The arrester shall conform to the following:

Peak surge current for an 8 X 20 microsecond waveform; 20,000 A for 20 occurrences.

Clamp voltage at 20,000 A; 280 V max.

Maximum continuous operating current at 120 V/60 Hz: 15 A

Series Inductance: AC Line/AC Neutral 00 micro henries.

Response time: (< a nanosecond) Voltage never exceeds 280V during surge.

Temperature range: -40 to +85 degrees Celsius

Spike suppression for +/- 700V spike: +/- 40 V deviation from sine wave all phase angles between 0 and 180 degrees.

The arrester shall have the following terminals:

- 1) Main Line (AC line first stage terminal)
- 2) Main Neutral (AC neutral input terminal)
- 3) Equipment Line In (AC line second stage input terminal, 10A)
- 4) Equipment Line Out (AC line second stage output terminal, 10A)
- 5) Equipment neutral out (neutral terminal to protected equipment)
- 6) Ground (GND) (earth connection).

The arrester shall be encapsulated in a flame-retardant material.

The equipment line out shall provide power to the controller. The unit shall be a two-stage device that will allow the connection of the radio interference filter in the circuit between the stages.

### **LOOP DETECTOR SURGE PROTECTORS**

This article sets forth the specifications for two types of loop detector surge protectors: one, which mounts directly on terminal blocks and one, which mounts on a self-contained stud.

#### **General Requirements**

All loop detector surge protectors shall conform to the following requirements. Number of 100-ampere surge current occurrences of a 10 x 700-microsecond waveform:

Common mode: at least 25

Differential mode; at least 25

Clamp characteristics (common and differential modes):

Maximum break-over voltage: 170 volts

Maximum on-state clamping voltage: 3 volts

Response time: less than 5 nanoseconds

Off-state leakage current: less than 10 microamperes

Capacitance (common and differential modes): less than 220 Pico farads

Temperature range: -40 to +85 degrees Celsius

Maximum dimensions:

2"x2"x1.25"

The surge protection shall operate properly with the loop type vehicle detectors specified in Section 5.

**Type TB Loop Detector Surge Protectors – EDCO # SRA6LCA- 916, SRA6LCA-716 or equivalent**

Type TB loop detector surge protectors shall conform to all of the requirements of paragraph 6.2.1. The Type TB surge protector shall have three integral spade lugs that shall enable the unit to be mounted and connected directly to a terminal block. The Type TB surge protector shall be furnished for either 7/16-inch or 9/16-inch terminal spacing as required by the bid list or as required to match the terminal blocks to which it is to be connected in each instance.

**Type SC Loop Detector Surge Protectors – EDCO # SRA-6LC or equivalent**

Type SC loop detector surge protectors shall conform to all of the requirements of paragraph 6.2.1. The Type SC surge protector shall have in integral 3/8-inch (minimum) long NO. 10-32 mounting and grounding stud.

**COMMUNICATIONS SURGE PROTECTORS**

This article sets forth the specifications for a communications surge protector.

**General Requirements**

All communications surge protectors shall conform to the following requirements.

Surge current occurrences at:

2000 amperes, 8x20 microsecond waveform: at least 80

400 amperes, 10x700-microsecond waveform: at least 80

Peak surge current for: 10,000 amperes

8x20 microsecond waveform: (2,500 amperes/line)

100x 700-microsecond waveform: 500 amperes/line

Response time: less than 1 nanosecond

Series resistance: 15 ohms, maximum

Capacity, average: 1500 Pico farads

Temperature range: -40 to 85+ degrees Celsius

Clamp Voltage: As specified on bid list or as required to match equipment in application.

This unit shall be a hybrid device with the first stage formed by a 3-element gas tube that will withstand a peak surge current (8x20 microsecond waveform) of 5000 amperes per side. The second stage shall dissipate at least 1.5 kilowatts.

No tools shall be required for the insertion and removal of the surge protector.

**Type SC Communications Surge Protectors – PC642C-Series**

Type SC communications surge protectors shall conform to all of the requirements of paragraph 0.0.1. and shall service up to two communications circuit pairs. The Type SC surge protector shall have a printed circuit board card-edge connector that will mate with a Buchanan PN PCB 1B-10A connector. The contact strips shall be gold-plated. The Type SC surge protector shall be furnished with a mating socket. The maximum size of the Type SC surge protector with its socket shall be 2"x2.75"x 1.25".

**24-VOLT DC SURGE PROTECTORS**

The 24-volt DC surge protector shall conform to the following requirements.

Surge current occurrences at:

2000 amperes, 8x20 microsecond waveform: at least 80

Peak surge current for:  
8x20 microsecond waveform: 2,000 amperes  
Response time, maximum: 30 nanoseconds  
Series resistance, each conductor 15ohms, maximum  
Temperature range: -20 to +85 degrees Celsius  
Clamp voltage: As specified on bid list or as required to match equipment in application.

The unit shall be a hybrid device with the first stage formed by a 3-element gas tube that will withstand a peak surge current (8x20 microsecond waveform) of 5,000 amperes per side. The second stage shall dissipate at least 1.5 kilowatts. No tools shall be required for the insertion and removal of the surge protector. The surge protector shall have a printed circuit board card-edge connector that will mate with a Buchanan PN PCB 1B-10A connector. The contact strips shall be gold-plated. The surge protector shall be furnished with a mating socket. The maximum size of the surge protector with its socket shall be 2" x 2.75" x 1.50".

**EDCO # PC642C-030**

**LOAD SWITCH SURGE PROTECTOR**

The output of the load switch on the terminal facility hook-up panel shall be protected by metal oxide arrestors (MOV), which are tied from the AC positive field terminal to chassis ground to protect switch packs from surges occurring on the AC output lines.

Surge suppression for the field wiring shall be installed on the back of the output file.

Each protector will have three leads and a ground stud and meet the following general requirements.

Peak Surge Current.....10kA (8x20µs)  
Occurrences.....>100 @ 200 Amps  
Voltage Clamp..... 475 V

**EDCO Part # SPA-303 or equivalent**

**Service Switches** - Service switches shall be required for all cabinets and shall be located on the inside back of the main door and labeled as to their function.

**Signal Head Power** – When in the OFF position, all power to the signal heads shall be removed.

**Flash Switch** - When in the ON position, the intersection shall flash as shown on the plans. A.C. power shall be removed from only the load switches.

**Controller Power Switch** - When in the OFF position, A.C. power shall be removed from the traffic controller.

**Stop Time Switch** - When in the ON position, the Stop Timing feature shall cause cessation of controller timing.

**Detector Input Switches** - A detector call switch shall be installed for each phase and located on the left side of cabinet wall close to pedestrian and detector inputs. Each switch shall be a three-position toggle switch which when activated shall place a call on the associated phase. The three positions shall be designated as follows:

Center – off

Up - Positive Contact (On)

Down - Momentary Contact (Spring Loaded On)

**Signal Bus Relay** - The Signal Bus Relay will be of a solid-state design with heat sync, Gordos 6280A45 or equivalent. Heat sync thermal compound will be used between the relay and heat sync.

**Request for Download Switch** – A momentary switch shall be located on the left hand side of the cabinet wired so when pressed will make a request to the TCC computer for an automatic download of the specified intersection controller data. The switch shall be covered and protected to prevent accidental pressing.

**RS 232 Data Distribution Hub Card** - A data patch hub card will be provided to support RS 232 data transfer from the controller to other RS 232 devices in the cabinet. The hub card shall be installed in the vehicle detector rack. The following cables shall be provided:

- (1) Controller to data distribution hub
- (1) Conflict Monitor to data distribution hub
- (1) Opticom Phase Selector to data distribution hub
- (1) Canoga to data patch panel – this cable shall daisy chain four Canoga detectors and at the last detector plug into the data distribution hub.

Other cables may be purchased as required. Five male sockets will be provided for other RS 232 devices. RJ 45 connectors will be used for connection to the panel.

**Fiber Optic Patch Panel** - A fiber optic patch panel will be provided consisting of twelve ST/connector/coupler - Bayonet/threaded coupler mounted in a metal panel. Each pair of couplers will be numbered and labeled in and out. The panel will be mounted in a position away from normal cabinet maintenance in such a way that all major components can be removed and serviced without disturbing the field fiber.

**Vehicle Detector Card Rack** – The vehicle detector card rack shall be designed to accept 2 industry standard rack mounted power supplies and 5 four-channel vehicle detectors (inductive loop type or video type). Additionally a slot wired for 1 four-channel detector shall also be wired to accept 2 two-channel detectors. The width of a four-channel slot shall be a minimum of 2.5 inches. The width of a power supply slot shall be a minimum of 2.0 inches and a maximum of 2.5 inches. The edge card connector shall be soldered type and not printed circuit board type.

The slots shall be wired as follows:

**Slot 1 & Slot 2** – Vehicle Power Supply

**Slot 3** - Channel 1 – Phase 1, Channel 2 – Phase 6, Channel 3 – Phase 6, Channel 4 – Phase 6.

**Slot 4** - Channel 1 – Phase 2, Channel 2 – Phase 2, Channel 3 – Phase 2, Channel 4 – Phase 5.

**Slot 5** - Channel 1 – Phase 3, Channel 2 – Phase 8, Channel 3 –Phase 8, Channel 4 – Phase 8.

**Slot 6** - Channel 1 – Phase 4, Channel 2 – Phase 4, Channel 3 – Phase 4, Channel 4 – Phase 7.

**Slot 7** - Channel 1 – Spare, Channel 2 – Spare, Channel 3 – Spare, Channel 4 – Spare.

#### 1.14.16

#### **Cabinet Documentation**

**General** - Each cabinet shall be furnished with three copies of the cabinet wiring diagram and field wiring diagram. These prints shall be full size and completely legible. Where possible, diagrams shall be to a scale picture image of the cabinet layout. Electronic files of all wiring diagrams will be provided.

#### **Minimum Requirements of Wiring Diagrams**

**Wiring** - Diagrams shall show the complete wiring of all cabinet components, all switches, terminal board connections, connector connections, fan connections, light fixture connections, flash transfer relays, lightning arrestors, surge protectors, load switch panels, terminals, and any other control functions. Each item shall be clearly identified as to its function.

**Components** - All components in the cabinet shall be located according to their function and in such a manner that they may easily be found on the wiring diagram.

**Movement Designations** - Field wiring and cabinet wiring diagrams shall be designated on the diagrams using the traffic movement designations as shown in the plans. Association of phase number with their designated traffic movement shall be clearly indicated on the wiring diagram.

**Sequence Diagrams** - If requested by the County before or after delivery, the supplier shall provide a diagram, with the applicable phasing, for installation inside the main door to be laid out for trouble-shooting purposes. It shall also show detector locations, signal head locations by type, preempts, etc. The diagram shall be completely legible, waterproof and tightly affixed to the door.

**Storage** Diagrams and manuals will be stored in the drawer under the top shelf called for in 7.1.7.

#### **QUALITY PROVISIONS**

The local controller unit shall successfully meet the NEMA requirements, as applicable. The controller unit shall have been tested and certified by an independent test laboratory. An "independent test laboratory" shall be defined as one that has no relationship to the controller manufacturer, except as a supplier of services.

All equipment furnished under this specification shall be new, of the latest model and fabricated in a first-class workmanship manner from good quality material.

#### **WARRANTY**

The controller unit shall be warranted to be free from defects in workmanship and material for two years from the date of shipment by the manufacturer. Any part(s) found to be defective shall, upon concurrence of the defect by the manufacturer, be replaced or repaired free of charge.

#### **SPECIFICATION COMPLIANCE**

At the time of bid, the County shall be furnished with a certificate from the equipment manufacturer stating that the equipment to be furnished under this specification complies with all provisions of this specification. Submittal of appropriate supporting documentation, manufacturer's literature, manuals, etc. is

encouraged. The successful low bidder will be contacted to supply one complete cabinet assembly for the County to evaluate for the purposes of ensuring specification compliance. The cabinet will be supplied and picked up by the successful bidder at no cost to the County. The successful bidder shall have 30 days from date of contact to supply the evaluation cabinet assembly. Failure to meet the 30-day time frame will result in the bid being considered as non-responsive and the next low bidder will be contacted.

## **SIGNAL MONITOR**

### **INTRODUCTION**

This specification sets forth the minimum requirements for a shelf-mountable, six, twelve, and eighteen channel, solid-state Signal Monitor for a NEMA TS-1 Traffic Cabinet Assembly. At a minimum, the Signal Monitor shall comply with all specifications outlined in Section 6 of NEMA STANDARD TS-1 1989 (Conflict Monitors). The unit shall also include the enhanced monitoring functions described in Section 1.3.2, hardware functions described in Section 1.3.3, and diagnostic functions described in Section 1.3.4.

The Signal Monitor shall be capable of monitoring six or twelve channels consisting of a Walk input, Green input, Yellow input, and Red input for each channel.

### **MONITOR FUNCTIONS**

All fault timing shall be computed for each channel individually except for Conflict faults.

#### **Conflict Monitoring**

The Signal Monitor shall be able to detect the presence of conflicting Green or Yellow or Walk signal voltages on the AC field terminals between two or more non-compatible channels. A Conflict fault (CONFLICT) shall be a latching fault.

#### **Conflict Recognition Time**

The Signal Monitor shall trigger when voltages on any conflicting channels are present for more than 450 ms. The Signal Monitor shall not trigger when voltages on any conflicting channels are present for less than 200 ms. Conflicting signals sensed for more than 200 ms and less than 450 ms may or may not trigger the unit.

#### **Red Fail Monitoring**

The Signal Monitor shall be able to detect the absence of active signal voltages on the Red and Green and Yellow and Walk AC field terminals. A Red Fail fault (RED FAIL) shall be a latching fault. The Red Fail monitoring function shall be disabled for all selected channels when the Red Enable input is not active.

#### **Red Fail Recognition Time**

The Signal Monitor shall trigger when active voltages on all inputs of a channel /channels are absent for more than 1000 ms. The Signal Monitor shall not trigger when active voltages on all inputs of a channel channels are absent for less than 700 ms.

#### **Walk Disable Option**

A Walk Disable function shall be provided which will modify operation of Red Fail monitoring. If this function is enabled via a front panel DIP switch labeled

“WALK DISABLE”, the unit shall trigger if it senses the absence of active Green, Yellow, and Red inputs of a channel regardless of the state of the Walk input.

### **Voltage Monitoring**

#### **24VDC Monitoring**

The Signal Monitor shall be able to detect that the cabinet +24 Vdc supply has fallen below 18 Vdc. A 24V Monitor function shall be provided which will sense an improper voltage level at either of the +24V Monitor inputs and cause the unit to trigger.

#### **24VDC Recognition Time**

The Signal Monitor shall trigger when the voltage on the +24V input is below 18 Vdc for more than 200 ms. The Signal Monitor shall not trigger when the voltage on the +24V input is below 18 Vdc for less than 100 ms. A voltage level of +22 Vdc shall be required to prevent the unit from triggering.

#### **24VDC Latch**

If the 24V Latch function is enabled via a front panel DIP switch, restoration of the proper voltage levels will not reset the unit. Only a manual reset or external reset will reset the unit.

### **Controller Voltage Monitor (CVM)**

The Signal Monitor shall trigger when the CVM input level goes False. A CVM Monitor function shall be provided which will sense a CVM fault and cause the unit to trigger.

#### **Controller Voltage Monitor Recognition Time**

The Signal Monitor shall trigger when the voltage on the CVM input is False for more than 200 ms. The Signal Monitor shall not trigger when the voltage on the CVM input is False for less than 100 ms.

#### **CVM Latch**

If the CVM Latch function is enabled via a front panel DIP switch, restoration of the CVM input to the True voltage level will not reset the unit. Only a manual reset or external reset will reset the unit.

#### **Controller Voltage Monitor Log Disable**

The Signal Monitor shall provide a front panel DIP switch labeled “CVM LOG DISABLE” which prevents CVM events from being entered into the Previous Fail log.

### **AC Line Brownout Recognition**

The Signal Monitor shall be able to detect that the AC Line has fallen below  $92 \pm 2$  Vac for greater than  $475 \pm 25$  ms. This shall force the Output and Start Delay Relay to the de-energized "fault" state and cause the POWER LED to flash at a 2 Hz rate. The unit shall maintain this state until the AC Line voltage rises above  $96 \pm 2$  Vac for greater than  $120 \pm 25$  ms.

### **Dual Indication Monitoring**

The Signal Monitor shall be able to detect the presence of active voltage on any combination of field signal inputs of a channel except Green and Walk. A Dual Indication fault shall be a latching fault. This function shall be enabled on a per channel basis using DIP switches mounted on the front panel labeled “SSM”. The Dual Indication monitoring function shall be disabled for all selected channels when the Red Enable input is not active.

### **GY Dual Indication Monitoring**

The Signal Monitor shall be able to detect the presence of active voltage on the Yellow and Green field signal inputs of a channel. A GY Dual Indication fault shall be a latching fault. This function shall be enabled with a DIP switch on the front panel labeled "GY ENABLE". When the switch is in the ON position, all channels shall be monitored for simultaneous active Green and Yellow inputs on a channel.

### **Dual Indication Recognition Time**

The Signal Monitor shall trigger when multiple inputs are active on a channel for more than 500 ms. The Signal Monitor shall not trigger when multiple inputs are active on a channel for less than 250 ms. Channels with multiple voltages active for more than 250 ms and less than 500 ms may or may not trigger the unit.

### **Clearance (Short or Absent Yellow) Monitoring**

The Signal Monitor shall be able to detect that a channel has not provided an adequate Yellow Clearance interval during a Green to Yellow to Red sequence. A Clearance failure shall be a latching fault. This function shall be enabled on a per channel basis using DIP switches mounted on the front panel labeled "SSM". The Clearance monitoring function shall be disabled for all selected channels when the Red Enable input is not active.

### **Clearance Recognition Time**

The Yellow Clearance interval shall be 2.7 seconds  $\pm$  0.1 seconds.

### **Recurrent Pulse Monitoring**

The Signal Monitor shall detect Conflict, Red Fail, and Dual Indication faults that result from intermittent or flickering field signal inputs. These recurring pulses shall result in a latching fault with the RP STATUS indicator illuminated along with the resulting Conflict, Red Fail, or Dual Indication indicator. A front panel DIP switch labeled "RP DISABLE" shall be provided to disable the RP detect function for testing purposes.

### **External Watchdog Monitoring**

Absence of a logic input transition from the cabinet controller watchdog circuitry for 1500 msec ( $\pm$ 100 msec) shall cause the unit to trigger. The monitor shall remain in the fault mode until the unit is reset by the Reset button or the External Reset input. A Power Failure shall also reset the CVM/WD fault state of the monitor. This function shall be enabled via a front panel DIP switch labeled "WD ENABLE". The EXTERNAL WATCHDOG input shall be wired to connector MSB-S (12 Channel) or MSA-q (6 Channel).

### **Program Card Ajar**

When the Programming Card is removed or not seated properly, the Signal Monitor shall force the Output Relay to the de-energized fault state and illuminate the PROGRAM CARD indicator. A reset command from the front panel Reset switch or External Reset input shall be required once the Program Card is in place.

## **HARDWARE**

### **LED Indicators**

All LED display indicators shall be mounted on the front panel of the Signal Monitor and shall be water clear, T-1 package, Super Bright type LEDs. All LEDs shall be labeled as follows:

- 1) **POWER**: The POWER indicator shall flash at a rate of 2 Hz when the unit has detected a low voltage condition as described in Section 1.3.2.2. It shall illuminate when the AC Line voltage level is restored above the brownout level. The indicator shall extinguish when the AC Line voltage is less than 75 Vrms.
- 2) **DIAGNOSTIC**: The DIAGNOSTIC indicator shall illuminate when an internal diagnostic test has failed. This indicator is intended to inform the service technician of a monitor hardware or firmware failure.
- 3) **FAULT**: The FAULT indicator shall illuminate when the unit has responded to a fault condition and has transferred the Output relay.

### **LCD Indicators**

- 2) **CONFLICT**: The CONFLICT indicator shall illuminate when a conflicting proceed signal fault is detected.
- 3) **RED FAIL**: The RED FAIL indicator shall illuminate when an absence of signal is detected on a channel(s). If the Red Enable input is not active, the RE OFF indicator shall illuminate.
- 4) **CVM / WD**: The CVM /WD indicator shall illuminate when a Controller Voltage Monitor fault or External Watchdog fault is detected.
- 5) **24V-2**: The 24V-2 indicator shall illuminate when a 24VDC fault condition on the 24V Monitor input #2 is detected.
- 6) **24V-1**: The 24V-1 indicator shall illuminate when a 24VDC fault condition on the 24V Monitor input #1 is detected.
- 7) **RP STATUS**: The RP STATUS indicator shall illuminate when a recurrent pulse Conflict, Dual Indication or Red Fail fault is detected on a channel(s).
- 8) **DUAL INDICATION**: The DUAL INDICATION indicator shall illuminate when a Dual Indication or GY Dual Indication fault is detected on a channel(s).
- 9) **CLEARANCE**: The CLEARANCE indicator shall illuminate when the minimum Yellow Clearance time has not been met on a channel(s).
- 10) **Rx**: The Rx indicator shall illuminate when the RS-232 port has received a character.
- 11) **Tx**: The Tx indicator shall illuminate when the RS-232 port has transmitted a character.
- 12) **CHANNEL STATUS**: A separate indicator for each input of each channel shall display all active signals simultaneously. Additionally, one indicator per channel shall be provided which identifies a channel as being involved in an error condition that has triggered the unit.

### **Front Panel Control**

- 1) **RESET Button**: A momentary SPST Control switch labeled RESET shall be provided on the unit front panel to reset the monitor circuitry to a non-failed state. A reset command issued from either the front panel button or External Reset input shall be a one-time reset input to prevent the unit from constant reset due to a switch failure or constant external input, and shall cause all LED and LCD indicators to illuminate for 500ms.
- 2) **MODE Button**: A momentary SPST Control switch labeled MODE shall be provided on the unit front panel to control the display mode.
- 3) **INC Button**: A momentary SPST Control switch labeled INC shall be provided on the unit front panel to modify the selected display mode.

### **Electronics**

### **Internal MPU Watchdog**

A microprocessor shall be used for all timing and control functions. Continuing operation of the microprocessor shall be verified by an independent monitor circuit, which shall force the OUTPUT RELAY to the de-energized "fault" state and illuminate the DIAGNOSTIC indicator if a pulse is not received from the microprocessor within a defined period not to exceed 500 ms. This shall be a latching function and will require a power-down cycle to clear.

### **AC Input Sampling**

High speed sampling techniques shall be used to determine the true RMS value of the AC field inputs. Each AC input shall be sampled at least 32 times per line cycle. The RMS voltage measurement shall be insensitive to phase, frequency, and waveform distortion.

### **Sockets**

In the interest of reliability, only the PROM memory device for the microprocessor firmware shall be socket mounted. The PROM memory socket shall be a precision screw machine type socket with a gold contact finish providing a reliable gas tight seal. Low insertion force sockets or sockets with "wiper" type contacts shall not be acceptable.

### **Internal Power Supply**

A built-in, high-efficiency switching power supply shall generate all required internal voltages. Failure of the internal power supply to provide proper operating voltages shall force the Output Relay to the de-energized "fault" state and illuminate the DIAGNOSTIC indicator. A user replaceable slow blow fuse shall be provided for the AC Line input. The unit shall be operational over the AC Line voltage range of 75 Vrms to 135 Vrms.

### **Configuration Parameters**

All user programmed configuration settings shall be stored in an electrically erasable programmable read-only memory (EEPROM) or front panel DIP switches. Designs using a battery to maintain configuration data shall not be acceptable.

### **Field Terminal Inputs**

All 120 Vac field terminal inputs shall provide an input impedance of  $150K \pm 50K$  ohms and be terminated with a discrete resistor having a power dissipation rating of 0.5 Watts or greater. In the interest of reliability and repair ability, the front panel MS connectors shall not be directly mounted to the printed circuit board. A wire harness of 22 gauge minimum stranded wire shall be used.

### **RS-232 Communications Port**

The monitor unit shall have an RS-232 serial communications port to provide a means of transferring all monitor status, configuration data, and event log data to a PC. The RS-232 port shall be totally electrically isolated from the monitor unit except for the chassis connection. The connector shall be an AMP 9721A or equivalent 9 pin metal shell D subminiature type with female contacts. Pin assignments shall be as shown in the following table:

<u>PIN</u>	<u>FUNCTION</u>
1	DCD*
2	TX DATA
3	RX DATA
4	DTR (Data Terminal Ready)

5	SIGNAL GROUND
6	DSR*
7	DSR*
8	CTS*
9	NC

\*Jumper options shall be provided to allow the connection of Pin #4 to be made with Pin #7, and the connection of Pin #8 to be made with Pin #1 and/or Pin #6.

### **Component Specifications**

All electrical components used in the unit shall be rated by the component manufacturer to operate beyond the full unit operating temperature range of -34°C to +74°C including the Liquid Crystal displays (LCD).

### **Printed Circuit Boards**

All printed circuit boards shall meet the requirements of the NEMA STANDARD TS-1 1989, plus the following requirements to enhance reliability:

- 1) All plated-through holes and exposed circuit traces shall be plated with solder.
- 2) Both sides of the printed circuit board shall be covered with a solder mask material.
- 3) The circuit reference designation for all components and the polarity of all capacitors and diodes shall be clearly marked adjacent to the component. Pin #1 for all integrated circuit packages shall be designated on both sides of all printed circuit boards.
- 4) All electrical mating surfaces shall be gold plated.
- 5) All printed circuit board assemblies shall be coated on both sides with a clear moisture-proof and fungus-proof sealant.
- 6) All components and wire harnesses shall be mounted to the PCB using plated holes. "Piggy back" connections or jumper wires shall not be acceptable.

### **EVENT LOGGING FUNCTIONS**

In addition to the normal display mode, it shall be possible to review the previous failure (PF) and AC Line (AC) event logs, Program Card permissive programming, SSM switch programming, and set the Real time clock and calendar using the front panel display.

The Signal Monitor shall be capable of storing in non-volatile memory a minimum of 100 events. Each event shall be marked with the time and date of the event. These events shall consist of fault events, AC Line events, reset events, and configuration change events. The capability to assign a four-digit identification number and 30 character description to the unit shall be provided. The event logs shall be uploaded to a PC using the serial port of the Signal Monitor and Windows 9x based software provided by the manufacturer.

Each event log report shall contain the following information:

- a) Monitor ID#: a four-digit (0000-9999) ID number and 30 character description assigned to the monitor.
- b) Time and Date: time and date of occurrence.
- c) Event Number: identifies the record number in the log. Event #1 shall be the most recent event.

### **Current Status Report (CS)**

The Current Status report shall contain the following information:

- a) Fault Type: the fault type description.
- b) Field Status: the current GYRW field status and field RMS voltages if the monitor is not in the fault state, or the latched field status and field RMS voltages and fault channel status at the time of the fault.
- c) Cabinet Temperature: the current temperature if the monitor is not in the fault state, or the latched temperature at the time of the fault.
- d) AC Line Voltage: the current AC Line voltage and frequency at the time of the fault.
- e) Control Input Status: the current state and RMS voltage of the Red Enable input if the monitor is not in the fault state, or the status latched at the time of the fault.

#### **Previous Fault Report (PF)**

The Previous Fault log shall contain the following information:

- a) Fault Type: the fault type description.
- b) Field Status: the latched field status with RMS voltages, fault channel status, and RP Detect status at the time of the fault.
- c) Cabinet Temperature: the latched temperature at the time of the fault.
- d) AC Line Voltage: the AC Line voltage and frequency at the time of the fault.
- e) Control Input Status: the latched state with RMS voltage of the Red Enable input at the time of the fault.

#### **AC Line Event Report (AC)**

The AC Line log shall contain the following information:

- a) Event Type: describes the type of AC Line event that occurred.  
Power-up - AC on, monitor performed a cold start  
Interrupt - AC Line < Brownout level  
Restore - AC restored from AC brownout or AC interruption, no cold start
- b) AC Line Voltage: the AC Line voltage & frequency at the time of the event.

#### **Monitor Reset Report (MR)**

The Monitor Reset log shall contain the following information:

- a) The monitor was reset from a fault by the front panel Reset button, or External Reset input, or a non-latched event clear.

#### **Configuration Change Report (CF)**

The Configuration Change log shall contain the following information:

- a) The status of all configuration programming including the contents of the Program Card, all configuration DIP switches and option switches.
- b) Any configuration programming inputs such as 24V Inhibit.
- c) Configuration Check Value: A unique CRC value which is based on the configuration of items #a, and #b above. The log shall also indicate which items have been changed since the last log entry.

#### **Signal Sequence History Report (SSQ)**

A log shall be provided that graphically displays all field signal and Red Enable states for up to 30 seconds prior to the current fault trigger event. The resolution of the display shall be at least 50 milliseconds.

#### **Controller Unit Communications**

The monitor unit shall also provide a means of uploading the current time and date, current intersection status, previous failure data, compatible channel

configuration, and monitor configuration data to the controller unit. The current time and date shall also be downloaded from the controller unit to the monitor.

Bidder acknowledges that it has read, understands, and agrees to comply with the above statements and that the signature below is that of an individual authorized to sign contracts on behalf of the bidding company.

COMPANY: \_\_\_\_\_

SIGNATURE: \_\_\_\_\_

NAME: \_\_\_\_\_

TITLE: \_\_\_\_\_

DATE: \_\_\_\_\_

TELEPHONE No.: \_\_\_\_\_

FAX No. \_\_\_\_\_

EMAIL ADDRESS: \_\_\_\_\_

**SECTION 6**

**BID PRICING SHEET**

Item	Specification	Quantity	x	Unit Cost	=	Extended
Pedestrian push button unit	A	25	x		=	
Traffic signal head(w/ LED's)	B	32	x		=	
Traffic controller unit	C	30	x		=	
Detector loop sealant (pallet)	D	2	x		=	
Traffic signal cabinet, 8 - phase	E	10	x		=	
Signal monitor	F	10	x		=	
				Total	=	-