INVITATION FOR BIDS

IFB NO. 2016-83

TRAFFIC SIGNAL CONTROL EQUIPMENT

OPENING: JUNE 22, 2016 AT 11:00 A.M.

BUYER: Ana K. Cronk
PHONE: 410-313-6384 ▪ EMAIL: acronk@howardcountymd.gov

HOWARD COUNTY, MARYLAND

OFFICE OF PURCHASING

6751 Columbia Gateway Drive, Suite 501, Columbia, MD 21046
www.howardcountymd.gov/purchasing

Outstanding Agency Accreditation Achievement Award NIGP

20th Annual Achievement of Excellence in Procurement npi 2015 Award Winner

Formal IFBs and IFB Results are available on our website

TABLE OF CONTENTS

SECTION H – EQUAL BUSINESS OPPORTUNITY PARTICIPATION

Exhibit I, Sample Invoice

IMPORTANT: ADVISE THE ISSUING OFFICE IMMEDIATELY
IF ANY OF THE ABOVE SECTIONS ARE NOT ENCLOSED IN THIS DOCUMENT.

SECTION A

KEY INFORMATION SUMMARY

IFB Number:	IFB-2016-83
IFB Name:	Traffic Signal Control Equipment
Issue Date:	May 31, 2016
Buyer:	Ana K. Cronk acronk@howardcountymd.gov 410-313-6384
Pre-Bid Date:	N/A
Pre-Bid Location and Registration:	N/A
Questions Due and to Whom:	Questions due no later than June 13, 2016 at 2:00 p.m. Submit questions to: Ana Cronk at acronk@howardcountymd.gov
Bid Due:	June 22, 2016 Prior 11:00 a.m.
Mail/Deliver Bids to the Issuing Office:	Office of Purchasing 6751 Columbia Gateway Dr., Ste. 501 Columbia, MD 21046 410-313-6370
Agreement Term:	One year with five one-year renewals.
Bid Deposit/ Performance Bond:	N/A
EBO Subcontracting Participation:	10% Goal

MINORITY BUSINESS ENTERPRISES are encouraged to respond to this solicitation. For more information, please contact Mr. Mahesh Sabnani, Equal Business Opportunity Coordinator, at 410-313-6370.

IMPORTANT NOTICE REGARDING ADDENDA

Addenda to solicitations often occur prior to bid opening. It is the potential Contractor's responsibility to visit the Office of Purchasing web site for updates to solicitations. www.howardcountymd.gov/purchasing

SECTION B

PURCHASE ORDER TERMS AND CONDITIONS

The following terms and conditions apply to all Purchase Orders issued by Howard County and are applicable to all purchases made as a result of this solicitation.

1 No purchase of materials, supplies, equipment, and/or services will be recognized unless made through the Office of Purchasing.

2 The County may at any time insist upon strict compliance with these terms and conditions, notwithstanding any previous custom, practice or course of dealing to the contrary.

3 The terms and conditions of sale as stated in this Purchase Order govern in the event of conflict with any terms of the Contractor's bid, and are not subject to change by reason of any written or verbal statements by the Contractor or by any terms stated in the Contractor's acknowledgement without prior written authority from the Office of Purchasing.

4 If the price is omitted on the Purchase Order, except where the Purchase Order is given in acceptance of quoted prices, it is agreed that Contractor's price will be the lowest prevailing market price and in no event is this Purchase Order to be filled at higher prices than last previously quoted or charged without prior written authority from the Office of Purchasing.

5 If requested, the Contractor shall acknowledge the order promptly and provide a delivery date.

6 Invoices must show Delivery Address and Purchase Order number, and indicate if it represents partial or complete billing. Separate invoices must be rendered for each Purchase Order. Invoices shall include the following information:

6.1 Contractor's name;
6.2 Address;
6.3 Federal tax identification number;
6.4 Contract number, if applicable (the first two digits are 44XXXXXXXX);
6.5 Purchase Order number (the first digit is 2XXXXXXXXX);
6.6 Contract line number, if applicable;
6.7 Unit price and extended price (if applicable, the unit price must match a line on the Contract); and
6.8 Description of goods provided and/or services performed.

7 The County has the right to refuse to make payment on any invoice unless and until verification of receipt by the County can be determined. The County's payment for any material shall not constitute acceptance of the material or a waiver of any of the County's rights.

8 No freight/delivery/fuel charges will be paid by the County unless specifically provided for in the Purchase Order.

9 The County will not pay for packaging, boxing or cartage. Damage resulting from improperly packaged material will be charged to the Contractor.

10 The County reserves the right to cancel this Purchase Order or, any part thereof, without obligation, if delivery is not made or services completed at the time(s) specified.

11 This Purchase Order shall be governed and construed in accordance with the law of the State of Maryland without regard to any choice of law principles.

12 All deliveries and services furnished under this Purchase Order must be of the quality specified or in the event no quality is specified, must be the best of their respective kinds, and will be subject to inspection and approval of the County within a reasonable time after delivery of goods or completion of services. When manufacturing specifications are referred to in this Purchase Order, such specifications shall be deemed to be

an integral part hereof as if duly set out herein. Goods and services shall be replaced at no additional charge to the County if they prove to be defective and/or not in accordance with specifications. Rejected materials shall be returned at the risk and expense of the Contractor. If the County does not desire replacement, the Contractor shall issue a full credit.

13 Requirement as to Materials, Contractor's Responsibilities and Warranties:

13.1 The Contractor warrants and agrees that all materials supplied hereunder shall be manufactured and produced in compliance with the laws, regulations, codes, terms, standards and/or requirements of all Federal, State and local authorities and all other authorities having jurisdiction, and that performance of this Purchase Order shall be in accordance with the above laws, regulations, codes, terms, standards, and/or requirements, and agrees, upon request, to furnish the County a certificate of compliance in such forms as the County may require.

13.2 The Contractor warrants that there has been no violation of copyrights or patent rights in manufacturing, producing, or selling the goods shipped or ordered and Contractor agrees to indemnify and hold the County harmless from any and all liability, loss or expense occasioned by such a violation.

14 The quantity of materials, and/or services, must not be exceeded without prior written authority from the Office of Purchasing.

15 Substitutions are not allowed without prior written authority from the Office of Purchasing.

16 If required, a sufficient number of shop drawings and/or catalog data shall be furnished to the County within 15 days (unless otherwise specified) for necessary approval.

17 In the event any article sold and delivered hereunder shall be defective in any respect whatsoever, the Contractor will indemnify and save harmless the County from all losses or expenses by reason of all accidents, injuries or damages to persons or property resulting from the use of such article or which are contributed to by said defective condition.

18 The Contractor shall indemnify and hold harmless the County, its employees, agents and officials from any and all claims, losses or expenses resulting from any accidents, injuries or damages to persons or properties, suits or demands including reasonable attorney fees which may be made against the County, its employees, agents or officials resulting from any act or omission committed in the performance of the duties imposed by and performed under the terms of this Purchase Order by the Contractor or anyone under agreement with the Contractor to perform duties under this Purchase Order. The Contractor shall not be responsible for acts of negligence or willful misconduct committed by the County, its employees, agents and officials. Any property or work to be provided by the Contractor under this Purchase Order will remain at the Contractor's risk until written acceptance by the County; and the Contractor will replace, at the Contractor's expense, all property or work damaged or destroyed by any cause whatsoever.

19 Liability for Damage: If this Purchase Order calls for work to be performed upon property owned or controlled by the County it is understood and agreed that:

19.1 Mechanic's Liens: The Contractor will keep the premises and work free and clear of all mechanic's liens, and furnish the County certificate and waiver as provided by law.

19.2 Property and Casualty Losses: The work will remain at the Contractor's risk prior to written acceptance by the County and the Contractor will replace at its own expense all work damaged or destroyed by fire, force or violence of the elements or any cause whatsoever.

19.3 Injury to Contractor's Personnel: The Contractor understands and agrees that they are the sole employer of all persons employed by Contractor to perform services under this Purchase Order and agrees on behalf of itself and its workers' compensation insurer that the County is not a dual employer of such personnel. If Contractor is hiring independent contractors or subcontractors to perform services under this Purchase Order, Contractor shall assure that all such persons are properly covered under Maryland workers' compensation law and will indemnify, save harmless and defend the County from all workers' compensation claims filed by such persons against the County.

19.4 Workers' Compensation Insurance: During the term of this Purchase Order, the Contractor will provide workers' compensation insurance in compliance with Maryland law for its employees and shall be responsible to verify workers' compensation coverage for all independent contractors and subcontractors. Contractor shall indemnify the County for any uninsured losses relating to contractual services under this Purchase Order and subsequent amendments.

20 Bankruptcy: In the event of any proceedings, voluntary or involuntary, in bankruptcy or insolvency by or against the Contractor including any proceedings under the Chandler Act, or in the event of the appointment, with or without the Contractor's consent, of an assignee for the benefit of creditors or of a receiver then the County shall be entitled to cancel any unfilled part of this Purchase Order without any liability whatsoever.

21 Equal Employment Opportunity: The County requires that the Contractor not discriminate against any employee or applicant for employment because of race, creed, religion, physical or mental handicap, color, sex, national origin, age, occupation, marital status, political expression, gender identity/expression, sexual orientation or personal appearance. The Contractor will take affirmative action to ensure that applicants are employed, and the employees are treated fairly and equally during employment with regard to the above. The Contractor warrants that, within the previous 12 months, it has not engaged in unlawful employment practices as set forth in Section 12.208 of the Howard County Code, Section 19 of Article 49B of the annotated Code of Maryland or Sections 703 and 704 of Title VII of the Civil Rights Act of 1964.

22 Material Safety Data Sheet (MSDS): If the work to be performed under this Purchase Order requires the use of any product that contains any ingredient that could be hazardous or injurious to a person's health, a MSDS must be provided to the Office of Purchasing, 6751 Columbia Gateway Drive, Suite 501, Columbia, Maryland 21046.

23 Termination

23.1 Termination for Convenience: The County may terminate this Purchase Order, in whole or in part, if the County determines that such termination is in the best interest of the County, without showing cause, upon giving at least 30 days written notice to the Contractor. The County shall pay all reasonable costs incurred by the Contractor up to the date of termination. However, in no event shall the Contractor be paid an amount which exceeds the price bid for the work performed. The Contractor shall not be reimbursed for any profits which may have been anticipated but which have not been earned up to the date of termination.

23.2 Termination for Default: When the Contractor has not performed or has unsatisfactorily performed one or more material terms of the Purchase Order, the County may terminate the Purchase Order for default. Upon termination for default, payment may be withheld at the discretion of the County. Failure on the part of the Contractor to fulfill the contractual obligations shall be considered just cause for termination of the Purchase Order. If the damages exceed the undisbursed sums available for compensation, the County shall not be obligated to make any further disbursements hereunder. The Contractor will be paid for work satisfactorily performed prior to termination less any excess costs incurred by the County in reprocuring and completing the work.

SECTION C

GENERAL CONDITIONS

1 DEFINITIONS:

1.1 Addenda – Formal alteration of a solicitation or Agreement in writing (When applicable, Addenda are available on the Office of Purchasing website.)
1.2 Alternate Bids – A second bid for a single item that intentionally offers a substitute product or service that varies from the stated specifications
1.3 Bid – All information submitted by the Contractor in response to this solicitation
1.4 Bidder – Any entity that submits a response to this solicitation
1.5 Buyer – The County's Purchasing Representative for the resulting Agreement
1.6 Agreement – The Invitation For Bid documents and any addenda, the Contractor's response to this solicitation, and subsequent Purchase Orders
1.7 County – Howard County, Maryland
1.8 County Purchasing Agent – The Chief Administrative Officer for the County
1.9 Contractor – Any bidder; most often the successful bidder
1.10 Designee – Specifically appointed alternate signatory or decision maker
1.11 Invitation For Bid (IFB) – All documents identified in the Table of Contents, including any addenda
1.12 Equal Business Opportunity (EBO) – The County's minority business enterprise program
1.13 Issuing Office –The Howard County Office of Purchasing
1.14 Purchase Order – The document by which the Contractor receives formal notification to perform work or deliver goods
1.15 Solicitation – The Invitation For Bid
1.16 User Agency – County department or office for which goods and/or services are being purchased

2 RESERVATIONS:

2.1 The County reserves the right to reject any or all bids or parts of bids when, in the County Purchasing Agent's or Designee's reasoned judgment, the public interest will be served thereby.

2.2 The County Purchasing Agent or Designee, with the approval of the County Executive, may waive formalities or technicalities in bids as the interest of the County may require.

2.3 The County Purchasing Agent or Designee reserves the right to increase or decrease the quantities to be purchased at the prices bid. The quantity intended to be purchased and the period and percentage amount of any such reservation will be stated in the solicitation.

2.4 The County Purchasing Agent or Designee reserves the right to award Agreements or place orders on a lump sum or individual item basis, or such combination as shall, in the County Purchasing Agent's or Designee's judgment, be in the best interest of the County.

2.5 The County Purchasing Agent or Designee may waive minor differences in specifications provided these differences do not violate the specification intent nor materially affect the operation for which the item or items are being purchased, nor increase estimated maintenance and repair cost to the County.

2.6 The County Purchasing Agent or Designee may reject any proposal which shows any omission, irregularity, alteration of forms, additions not called for, conditional or unconditional unresponsiveness, or proposals obviously unbalanced.

3 COMPETITION:

3.1 The name of any manufacturer, trade name, or manufacturer or vendor catalog number mentioned in this solicitation is for the purpose of designating a minimum standard of quality and type. Such

references are not intended to be restrictive. Bids will be considered for any brand that meets or exceeds the quality of the specifications unless otherwise stated in the solicitation.

3.2 A Contractor may offer only one price on each item. Submission by a single Contractor of more than one price for a single item shall be sufficient cause for rejection of all prices for that item submitted by the Contractor. Alternate bids are prohibited and will be rejected.

4 UNBALANCED BIDS: A Bid shall be mathematically unbalanced if the Bid contains unit pricing that does not reflect reasonable costs (including actual labor and material cost, overhead and profit) for the performance of the bid item(s) in question. A bid shall be materially unbalanced if there is a reasonable doubt that award of the mathematically unbalanced Bid will result in the lowest ultimate cost to the County. A Bid that is, in the sole discretion of the County Purchasing Agent both mathematically and materially unbalanced, may be rejected as non-responsive.

(An example would be bidding overhead labor rates below regular time rates, or bidding laborer rates above Supervisor or Foreman rates. Another example is bidding a 1 gallon container of a product higher than a 5-gallon container of the same product.)

5 PERIOD OF VALIDITY: Unless otherwise specified, all formal bids submitted shall be irrevocable for 120 days following the bid opening date, unless the Contractor, upon request of the County Purchasing Agent or Designee, agrees to an extension. Bids may not be withdrawn during this period.

6 DELIVERY:

6.1 Contractors shall guarantee delivery of supplies in accordance with such delivery schedule as may be provided in the solicitation.

6.2 All items shall be delivered F.O.B. Destination, Inside Delivery, and delivery costs and charges included in the bid, unless otherwise stated in the solicitation.

6.3 The County Purchasing Agent or Designee reserves the right to charge the Contractor for each day the supplies or services are not delivered in accordance with the delivery schedule. The per diem charge may be invoked at the discretion of the County Purchasing Agent or Designee and said sum to be taken as liquidated damages and deducted from the final payment, or charged back to the Contractor.

6.4 The County Purchasing Agent or Designee reserves the right to procure the supplies/services elsewhere on the open market if delivery is not made as specified, in which event, the extra cost of procuring the supplies/services may be charged against the Contractor and deducted from any monies due or which may become due.

7 GOVERNING LAW:

7.1 This Agreement shall be governed by and construed in accordance with the laws of the State of Maryland without regard to any choice of law principles that would dictate the laws of any other jurisdiction. The parties agree that the exclusive venue for any and all actions related hereto shall be the appropriate Federal or State court located within the State of Maryland.

7.2 The laws of Maryland and Howard County shall govern the resolution of any issue arising in connection with the contract, including, but not limited to, all questions on the validity of the contract, the capacity of the parties to enter therein, any modification or amendment thereto, and the rights and obligations of the parties hereunder.

8 PROTEST: Any protest concerning the award of an Agreement shall be decided by the County. Protests shall be made in writing to the Issuing Office and shall be filed within ten days of issuance of award notification. A protest is considered filed when received by the Issuing Office. The written protest shall include the name and address of the protestor, identification of the procurement, a statement of the specific reason for the protest

and supporting exhibits. The Issuing Office will respond to the written protest within ten days. The County's decision is final.

9 DISPUTES: In cases of disputes as to whether or not an item or service quoted or delivered meets specifications, the decision of the County Purchasing Agent or Designee shall be final and binding on all parties. All other disputes arising under or related to the Agreement will be resolved, to the extent possible, by negotiation and settlement between the parties. Pending resolution, the Contractor shall proceed diligently with performance of the Agreement unless otherwise directed in writing.

10 AUTHORITY: Solicitations are issued pursuant and subject to the provisions of Article VIII, Howard County Charter; Sections 4.100 through 4.123, Howard County Code, 2003; and the rules and regulations as prescribed by the County.

11 FAIR LABOR STANDARDS ACT: All goods against this order must be produced in compliance with the requirements of the Fair Labor Standards Act of 1938, as amended including Section 6, 7 and 12, and regulations and orders issued under Section 14 thereof.

12 CASH DISCOUNTS: If applicable, cash discounts will be taken into consideration in determining the award. However, an offer of a cash discount must allow a reasonable period of not less than 30 days in order to be included in evaluation of bid pricing. A bid offering a cash discount in a period of less than 30 days will be evaluated as a bid without a cash discount offer. If the Contractor obtains an award by reason of their gross price, the County will hold the offer of a cash discount and make every effort to obtain such discount.

13 UNIT PRICES: Unless the Contractor clearly shows that it is the intent that a reduced total price is being offered on the basis of receiving an award of all items covered by the total, any totals should be the actual sum of the extension of unit prices. Otherwise, in the event of any discrepancy between a unit price(s), extended price(s), and/or total price(s), unit prices will govern and the bid will be refigured accordingly.

14 NON-WAIVER: Any waiver of any breach of covenants herein contained to be kept and performed by the Contractor shall not be deemed or considered as a continuing waiver and shall not operate to bar or prevent the County from declaring a forfeiture for any succeeding breach either of the same condition of covenant or otherwise.

15 PATENTS: If applicable, the Contractor shall defend any suit or proceeding brought against the County so far as based on a claim on any equipment, or on any part thereof, furnished under this Agreement which constitutes an infringement of any patent of the United States, if notified promptly in writing and given authority, information and assistance (at the Contractor's expense) for the defense of same, and the Contractor shall pay all damages and costs awarded therein against the County. In case said equipment or any part thereof, in such suit is held to constitute infringement and the use of said equipment or part if enjoined, the Contractor shall, at its own expense, either procure for the County the right to continue using said equipment or part, or replace same with non-infringing equipment or part, or modify so that it becomes non-infringing.

16 MARYLAND REGISTRATION: Contractors must be registered to do business in, and must be in good standing in, the State of Maryland. Contractors not registered must obtain registration information from the Maryland Department of Assessments and Taxation website at: www.dat.state.md.us/ or by calling 410-767-1184 or Toll Free 888-246-5941.

17 AVAILABILITY OF FUNDS: The contractual obligation of the County under this Agreement is contingent upon the availability of appropriated funds from which payment for this Agreement can be made.

18 INTEGRATION AND MODIFICATION: This solicitation, the Contractor's response to this solicitation, subsequent Purchase Order(s), and, if applicable, the legal Agreement represents the entire understanding between the parties. Any additions or modifications shall only be made in writing and executed by both parties.

19 NON-ASSIGNMENT OF AGREEMENT: Neither the County nor the Contractor shall assign, sublet or transfer its interest or obligations under the resulting Agreement to any third party, without the written consent of the other. Nothing herein shall be construed to create any personal or individual liability upon any employee, officer or elected

official of the County, nor shall the resulting Agreement be construed to create any rights hereunder in any person or entity other than the parties to this Agreement.

20 COOPERATIVE PURCHASE:

20.1 The County reserves the right to extend all of the terms, conditions, specifications, and unit or other prices of any Agreement resulting from this solicitation to any and all public bodies, subdivisions, schools districts, community colleges, colleges, and universities including non-public schools. This is conditioned upon mutual agreement of all parties pursuant to special requirements, which may be appended thereto. The Contractor agrees to notify the issuing body of those entities that wish to use any Agreement resulting from this solicitation and will also provide usage information, which may be requested.

20.2 The County assumes no authority, liability or obligation, on behalf of any other public or non-public entity that may use any Agreement resulting from this solicitation. All purchases and payment transactions will be made directly between the Contractor and the requesting entity. Any exceptions to this requirement must be specifically noted in the bid response.

21 AWARD NOTIFICATION:

21.1 Award notification will be by U.S. Mail, e-mail or fax or a combination thereof.

21.2 The awarded Contractor(s) will be required to return a Insurance Certificate naming "Howard County, Maryland, its officials, employees, agents and volunteers" as Certificate Holder and as Additional Insured, the executed Agreement* the completed EBO Schedule of Participation and the Maryland Registration Certificate of Good Standing.

*** As Offerors have had an opportunity to note Exceptions to the Agreement with their bid submission, it is anticipated that execution of the Agreement will require minimal time. PLEASE BE SURE TO READ THE SAMPLE AGREEMENT, EXHIBIT I. PRIOR TO SUBMISSION OF YOUR BID.**

22 TERMINATION:

22.1 Termination for Convenience: The County may terminate this contract, in whole or in part, if the County determines that such termination is in the best interest of the County, without showing cause, upon giving at least 30 days written notice to the Contractor. The County shall pay all reasonable costs incurred by the Contractor up to the date of termination. However, in no event shall the Contractor be paid an amount which exceeds the price bid for the work performed. The Contractor shall not be reimbursed for any profits which may have been anticipated but which have not been earned up to the date of termination.

22.2 Termination for Default: When the Contractor has not performed or has unsatisfactorily performed one or more material terms of the contract, the County may terminate the Purchase Order for default. Upon termination for default, payment may be withheld at the discretion of the County. Failure on the part of the Contractor to fulfill the contractual obligations shall be considered just cause for termination of the contract. If the damages exceed the undisbursed sums available for compensation, the County shall not be obligated to make any further disbursements hereunder. The Contractor will be paid for work satisfactorily performed prior to termination less any excess costs incurred by the County in reprocuring and completing the work.

SECTION D

SPECIFICATIONS

1 SCOPE: Howard County, Maryland, (the "County"), seeks a qualified Contractor (the "Contractor") to furnish and service actuated traffic signal control.

2 INQUIRIES AND ADDENDA:

2.1 The Buyer in the Issuing Office is the sole point of contact for this solicitation. Questions must be addressed in writing to the Buyer and delivered no later than June 13, 2016 at 2:00 p.m.

2.2 Addenda to solicitations often occur prior to bid opening, sometimes within a few hours of the opening. It is the potential Contractor's responsibility to visit the Office of Purchasing website at www.howardcountymd.gov/purchasing to obtain Addenda. Addenda, when issued, must be acknowledged in the bid by signing and returning all addenda with the bid. Addenda must also be acknowledged in the space provided in Section F, Price Page.

3 CONTRACTOR'S QUALIFICATIONS:

3.1 Contractors must be engaged in the sale and service of actuated traffic signal control equipment and must have been actively engaged in this field for a period of no less than five years. The experience of owner(s) may be imputed to a newly formed company/contractor provided the owner(s) has/have at least five years of demonstrated experience of reliability and meets the criteria set forth herein.

3.2 The County reserves the right to inspect the Contractor's equipment and to perform such investigations as may be deemed necessary to insure that competent personnel and management will be utilized in the performance of the Agreement.

3.3 In accordance with Howard County Code Sec. 4.117 (a) (4), the quality of performance of previous contracts or services shall be considered in determining the lowest responsive and responsible bidder. Quality of performance may be determined through contracts or services provided to the County or to other entities. Quality of performance to other entities will be determined from reference checks when references are required. The determination of quality performance includes the Contractor's history of reasonable and cooperative behavior and commitment to customer satisfaction and the Contractor's businesslike concern for the interests of the customer. The County reserves the right to reject any bid deemed not responsible or non-responsive.

4 AGREEMENT PERIOD: The Agreement period shall be for one year commencing on or about July 1, 2016, with a renewal option for five additional years in one-year increments, exercisable at the sole discretion of the County Purchasing Agent or Designee.

5 PRICE ADJUSTMENT:

5.1 Prices offered shall remain firm against any increase for one year(s) from the effective date of this Agreement. Prior to the commencement of subsequent renewal periods, it shall be the Contractor's responsibility to notify the Issuing Office in advance of any requested price changes.

5.2 Requests for price adjustments must be submitted to the Issuing Office, not the User Agency.

5.3 Requests for price adjustments must be accompanied by bona-fide manufacturer's documents or price lists reflecting the changes. Increases shall be limited to the actual cost increase to the Contractor. The County reserves the right to grant or deny the request for price increase and will do so in writing. If the price increase is approved, the price increase will be effective upon written approval and will remain firm through the renewal period.

5.4 If a price increase is requested following Agreement renewal and it has been longer than one year since the last increase, the County may entertain a request for escalation if it is in the County's best interest. If the price increase is granted, the price increase will be effective upon approval and will remain firm through the renewal period, or for one year, at the County's sole discretion.

5.5 In the event of any decrease in price either by the manufacturer or if the Contractor shall charge a lower price to other customers, the County shall be notified promptly and receive such decrease.

6 EXCLUSIVITY:

6.1 The County is obligated during the period stipulated to purchase all of its normal requirements from the Contractor and the Contractor shall be obligated to furnish the goods and/or services as stated.

6.2 Should a need arise for supplies or services which are not available in the timeframe required by the County or are available at a lower cost, the County reserves the right to secure services from other sources to meet its immediate needs without prejudice of the Agreement.

7 ESTIMATED QUANTITIES: The estimated annual quantities stated are provided as a general guide for bidding and are not guaranteed. Actual quantities may be more or less than those estimated. The County reserves the right to add products or services as deemed necessary by the County.

8 INSURANCE: The Contractor will be required to purchase and maintain during the life of the Agreement, including any subsequent renewal terms, Commercial General Liability Insurance, Automobile Liability Insurance, and Worker's Compensation Insurance with limits of not less than those set forth below:

8.1 Commercial General Liability Insurance: Combined Single Liability limits of $1,000,000 each occurrence and $1,000,000 aggregate naming "Howard County, Maryland, its officials, employees, agents and volunteers" as Certificate Holder and as Additional Insured.

8.2 Automobile Liability Insurance: Combined Single Liability limit of $1,000,000 any one accident.

8.3 Worker's Compensation Insurance: Statutory coverage for Maryland jurisdiction, including Employer's Liability coverage, with a limit of at least $100,000.

8.4 The Contractor shall assure that all subcontractors or independent contractors performing services in accordance with this solicitation carry identical insurance coverage as required of the Contractor, either individually or as an Additional Insured on the policies of the Contractor. Exceptions may be made only with the approval of the County. The Contractor shall indemnify the County for any uninsured losses relating to contractual services involving subcontractors, including workers' compensation claims.

8.5 The Contractor shall provide the County with Certificates of Insurance within ten days of bid award notification, evidencing the coverages required above. Such certificates shall provide that the County be given at least 60 days prior written notice of any cancellation of, intention to not renew, or material change in such coverage. The Contractor must provide Certificates of Insurance before commencing work in connection with the Agreement. "Howard County, Maryland, its officials, employees, agents and volunteers" must be shown as the Certificate Holder and an Additional Insured on the certificate.

8.6 The providing of any insurance required herein does not relieve the Contractor of any of the responsibilities or obligations assumed by the Contractor in the Agreement awarded or for which the Contractor may be liable by law or otherwise.

8.7 Failure to provide and continue to enforce such insurance as required above shall be deemed a material breach of the Agreement and shall operate as an immediate termination thereof.

8.8 Failure to comply with this requirement at any time during the initial term and any subsequent renewals may be sufficient cause for termination for default. A violation of this law is a Class A civil

offense and, in addition to a fine, the County Purchasing Agent may suspend or debar the violator under Sec. 4.117.

9 METHOD OF ORDERING:

9.1 Purchase Orders will be issued from time to time for such quantities as may be required by the County. Purchase Orders issued against the Agreement, even if not completed within the term of the Agreement, shall continue to be bound by the terms and conditions until completion.

9.2 Small purchases may also be made by the County's procurement card (currently Visa). The Contractor agrees to accept the card for such quantities as may be required by the County. Contractors are prohibited from charging additional fees over and above their bid prices to process payments on procurement cards.

10 METHOD OF AWARD: The County intends to make a single award to the lowest responsive and responsible Contractor meeting the specifications for the Total Bid Price, Price Page, Bid Section "F".

11 BILLING AND PAYMENT:

11.1 The Contractor shall submit separate invoices for each Purchase Order issued. Invoices shall be sent to Department of Public Works, Capital Projects Administration, Thomas Dorsey Building, 9250 Bendix Road, Columbia, MD 21045.Invoices in the proper form and approved by the County shall be paid by the County within 30 days of receipt. Invoices without the necessary information may be returned for correction prior to payment.

11.2 Each invoice shall include the following information:

11.2.1 Contractor's name;
11.2.2 Address;
11.2.3 Federal tax identification number;
11.2.4 Contract number, if applicable (i.e., 44XXXXXXXX);
11.2.5 Purchase Order number (i.e., 2XXXXXXXXX);
11.2.6 Contract line number;
11.2.7 Unit price and extended price (unit price must match a contract line); and
11.2.8 Description of goods provided and/or services performed.

11.3 The County reserves the right to make payments on Visa procurement cards when orders are placed using procurement cards as indicated in Method of Ordering above. Contractors are not permitted to charge the County additional fees over and above their bid prices to process payments on procurement cards.

11.4 The County reserves the right to make payments via electronic funds transfer (a.k.a. ACH) on Agreements for which this is appropriate.

11.5 Delivery tickets signed by authorized County personnel shall accompany invoice.

11.6 Payment shall be made after delivery and upon receipt of proper invoice from Contractor and authorized by the head of the department or their designee.

11.7 All amounts, costs, or prices referred to herein pursuant to this Agreement shall be United States of America currency.

11.8 Please provide a sample invoice that complies with paragraph "Billing and Payment" with response. See Exhibit II for sample invoice.

11.9 The proper form of County invoices requires that the necessary information be included on all invoices. Invoices without the necessary information may be returned for correction prior to

payment. The County reserves the right to approve invoices, in its sole discretion, and to request such detail and additional information as the County, in its discretion deems appropriate.

12 TECHNICAL SPECIFICATIONS: These specifications describe the minimum functional and physical requirements for the traffic signal control equipment, documentation, training, warranty, and testing with which the Contractor shall be required to comply.

13.1 Organizations:

13.1.1	NEMA	-	National Electrical Manufacturer's Association
13.1.2	MUTCD	-	Manual on Uniform Traffic Control Devices for Streets and Highways, Federal Highway Administration, Washington, D.C., latest edition
13.1.3	IEEE	-	Institute of Electrical and Electronic Engineers
13.1.4	ITE	-	Institute of Transportation Engineers
13.1.5	AASHTO	-	American Association of State Highway and Transportation Officials
13.1.6	ANSI	-	American National Standards Institute

13.2 Definitions

13.2.1 NEMA Standard shall refer to Standard TSI-1983, or latest revision, for traffic control systems, when the context of the specification is dealing with traffic signal . Other NEMA standards shall apply to miscellaneous electrical wiring appliances. All terms used herein are derived from the NEMA Standard.

13.2.2 Future NEMA shall refer to proposed standards pending adoption. The County reserves the right to accept or reject future standards.

13.2.3 MUTCD Flashing Operation (also known as Uniform Code Flash) shall refer to the manner of entering and existing flashing operations as specified by the MUTCD Section 4B-6(7) and 4B-18.

13.3 General Specifications for NEMA Standard Actuated Controllers (Note: Contractor shall provide Eagle Controllers Type EPAC 3608 and Eagle Masters MARC):

13.3.1 Eagle EPAC3608M52 8-phase actuated controller

.

13.3.2 Eagle MARC 360 on street master with D panel & harness – Part No. EPAC 3100-8; with Data Line Surge Protector – Part No. EDOC SRA64C-30D.

13.4 General Specifications for Controller Cabinets:

13.4.1 Purpose:

13.4.1.1 Below are the inimum acceptable general physical and functional requirements for welded aluminum cabinets to house the controller and auxiliary equipment as specified.

13.4.1.2 Unless specified on a per item basis by controller only, each controller shall

be supplied completely wired into a cabinet complying with the following specifications.

13.4.2 Physical Requirements:

13.4.2.1 Size and Design:

13.4.2.1.1 The nominal size of the base mounted cabinet (type P) shall be – height 54", width 44", depth 26". It shall be designed as a base-mounted cabinet.

13.4.2.1.2 The nominal size of the pole mounted cabinet (type M 36) shall be – height 50", width 36", depth 17". It shall be designed so that the bottom panel of the cabinet is removable to allow the cabinet to be used as a base- mounted type or as a pole mounted cabinet.

13.4.2.1.3 All pole-mounting hardware shall be supplied and shall be rustproof. Top and bottom mounting brackets shall be supplied and shall permit the use of 2 bands on each bracket for secure mounting). Mounting straps shall be stainless steel 3.4" wide.

13.4.2.2 Cabinet Materials:

13.4.2.2.1 Material – Aluminum, fabricated from sheet stock of minimum thickness 0.125", or shaped from 5052 stock. Cabinet and door shall be reinforced at points of stress or flexure.

13.4.2.2.2 Seams – All seams for cabinets and doors shall be clean and weatherproof when overlapping or continuous when butt welded. All exterior welds shall be ground and sanded smooth. Excess metal such as gates, fins and flashes shall be removed from inner and outer surfaces of the cabinet.

13.4.2.2.3 Flange – The anchor bolt attachment area shall be strengthened by plates, or shall be made of double- thickness material.

13.4.2.2.4 Reinforcement – The top, back, and sides shall be reinforced with metal runners to prevent flexing of flat surfaces.

13.4.2.2.5 Base Pad – All cabinets shall be supplied with an insulating pad measuring the dimension of the cabinet base.

13.4.2.3 Cabinet Finish: Cabinet finish shall be as specified on each purchase order as follows:

13.4.2.3.1 Unpainted finish – The cabinet (inside and out) shall be natural (bright), unpainted aluminum. Any external hardware used should match this appearance.

13.4.2.3.2 Hardware – All miscellaneous internal or external hardware shall be rustproof. All exterior welds shall be ground smooth. Excess metal shall be removed from internal and external surfaces. The door shall feature a stainless steel hinge.

13.4.2.4 Cabinet Door:

13.4.2.4.1 The cabinet shall have a single-piece front door with a single continuous-hinge, located on the right side of the door, when viewed from the front.

13.4.2.4.2 Each hinge shall have a fixed pin, 1/4" in diameter. Door hinges, pins, and bolts shall be made of stainless steel. The hinges shall be bolted to the cabinet. If bolt heads are accessible from the outside, they shall be the blind head type to prevent vandalism.

13.4.2.4.3 All cabinet doors shall be interchangeable with each other. Hinge locations shall be standardized so as to provide for this interchangeability.

13.4.2.4.4 The door shall be provided with catches to automatically hold the door open at 90 degrees and 150 degrees, plus or minus 10 degrees using a 1/4" minimum diameter, stainless steel rod. The catches shall be capable of holding the door open in a 60 MPH wind perpendicular to the plane of the door. Aluminum rods shall not be acceptable.

13.4.2.4.5 The door shall be reinforced with runners to prevent flexing of flat surfaces (at least one each 4" x 1" channel both vertically and horizontally).

13.4.2.4.6 The cabinet door frame shall be double-flanged out on all four sides and shall provide strikers for nylon rollers.

13.4.2.5 Door Latch and Lock:

13.4.2.5.1 The door shall have a locking handle and latching mechanism.

13.4.2.5.2 The latching mechanism shall be a 3-point draw, nylon roller type manufactured by Eberhard Manufacturing Co. The push rods shall be steel, bent to a "L" shape approximately 3/4" to 1", with upper and lower supports of 12 gauge steel. Rollers shall be nylon of at least 1" diameter.

13.4.2.5.3 The locking handle shall have provisions for additional padlocking in the latched position.

13.4.2.5.4 The locking handle shall be attached to the cabinet door by means of three stainless steel 1/4" x 5/8" blind head bolts and nuts with lock washers.

13.4.2.5.5 The shaft on the lock/handle shall be 3/4" stainless steel for vandal resistance and shall be Eberhard Manufacturing Co. No. 5645.

13.4.2.5.6 When the door is closed and latched, the door shall automatically lock. It shall not be necessary to use a key in order to lock the door when closing the door.

13.4.2.5.7 The lock and associated key shall be standard Maryland No. 2, compatible with those in currently use, by the County, for controller cabinets. Two keys shall be provided per cabinet.

The lock shall be of brass construction and shall have a swing-away cover.

13.4.2.6 Ventilation:

13.4.2.6.1 A thermostatically controlled vent fan shall be provided in the top of the cabinet as specified in paragraph 15.5 General Specifications for Auxiliary Equipment.

13.4.2.6.2 Additionally, louvered vents shall be provided in the lower part of the front door.

13.4.2.6.3 The louvered vents shall be designed and constructed in such that a horizontal stream of water from a pressure head, such as a sprinkler, shall not enter the cabinet. The louvered area shall be less than or equal to the filtered area as required below.

13.4.2.6.4 A removable furnace-type fiberglass filter shall be held firmly in place over the vents on the inside of the cabinet by bottom and side brackets and a spring-loaded upper clamp.

13.4.2.7 Police Panel:

13.4.2.7.1 A police panel with door shall be mounted in the cabinet door with gasket as required (reference paragraph 15.4.2.8, Gaskets). The door shall be typically 14" wide by 7" high and be mounted about 36" high.

13.4.2.7.2 The police panel shall contain a toggle switch labeled SIGNALS ON/OFF (with the up position being ON), and a toggle switch labeled FLASH/NORMAL.

13.4.2.7.3 When the FLASH/NORMAL switch is in the FLASH position, the power supply to the controller and auxiliary equipment shall not be affected and the equipment shall continue to operate except for control of the traffic signal indications.

13.4.2.7.4 It shall be possible to disconnect the controller without interfering with the flashing operation.

13.4.2.7.5 The switches shall have contacts rated at 15 amps, 125VAC.

13.4.2.7.6 No provision shall be made for manual operation by police other than the two switches specified above.

13.4.2.7.7 The police panel shall be enclosed with a rigid metal covering so that no parts having line voltage are exposed.

13.4.2.7.8 The panel door shall be equipped with a lock for a master keyed police key, compatible with those in current use by the County. The lock shall be of brass construction.

13.4.2.7.9 Two keys shall be furnished with each cabinet for the police panel lock. Each key shall have a shaft at least 2" long.

13.4.2.8 Gaskets:

13.4.2.8.1 Dust-tight, permanent-type gaskets shall be provided on all door openings, including the police panel door.

13.4.2.8.2 Gaskets shall be closed cell neoprene and shall be installed with contact cement for a permanent bond. Gaskets shall not peel off or deteriorate.

13.4.2.8.3 The matting surface of the gaskets shall be sprayed with a silicone lubricant to prevent sticking to said matting surface.

13.4.2.9 Shelves:

13.4.2.9.1 Two shelves shall be provided for the positioning of the controller, specified auxiliary equipment, and detectors.

13.4.2.9.2 Shelves shall be at least 10" deep.

13.4.2.9.3 All shelves shall be mounted by the use of U-channels and shall be completely adjustable in height from within 6" of the top of the cabinet to 18" from the bottom of the cabinet.

13.4.2.9.4 A shelf-mounted drawer shall be provided with the cabinet to easily store timing cards, wiring diagrams and schematics. The drawer shall not impede access to any serviceable parts of the cabinet. The drawer shall be without access when in closed position to prevent the entry of rodents. The drawer shall be greater than 1 inch in depth and designed to withstand the high and low temperatures experienced by outdoor traffic signal cabinets.

13.4.3 Additional Requirements:

13.4.3.1 Cabinet Mounting:

13.4.3.1.1 For each 8-phase base-mounted cabinet, a set of four galvanized steel anchor bolts shall be provided, each of which shall be 5/8" diameter by 18" long, for mounting cabinets on a concrete foundation.

13.4.3.1.2 For each M cabinet, two sets of pole mounting hardware shall be provided unless specified by the County as part of plans or purchase documents that the cabinet is intended to be used for a base-mount. For base-mounted M cabinet, a set of four galvanized steel anchor bolts shall be provided, each of which shall be 5/8" diameter by 18" long, for mounting on a concrete foundation.

13.4.3.1.3 All necessary rustproof fastening hardware, including nuts and washers shall be provided.

13.4.3.2 Cabinet Wiring Diagrams:

13.4.3.2.1 Two sets of the cabinet wiring diagrams shall be supplied with each cabinet. These diagrams shall be shipped inside each cabinet at time of delivery, not separately.

13.4.3.2.2 The diagrams shall be non-proprietary and shall identify all circuits in such a manner as to be readily interpreted.

13.4.3.2.3 The diagrams for each cabinet shall reflect actual wiring of that cabinet, including any modifications to standard circuits that are made to comply with these specifications.

13.4.3.2.4 Prior Review – Prior to production, the Contractor shall provide a complete and operational pre-production prototype cabinet and controller with all auxiliary equipment. The prototype shall be provided with a complete cabinet layout drawing and schematic drawings of cabinet wiring. The Contractor's personnel shall bring the prototype into compliance with the County's requirements by either visiting the County Signal Shop or by paying for packing and shipping back to the manufacturer. Review by the County does not lessen the responsibility of the Contractor to meet these specifications.

13.5 General Specifications for Auxiliary Equipment:

13.5.1 Purpose: The purpose of this specification is to describe minimum acceptable general physical, functional, and operational requirements for auxiliary equipment designed to be installed with, and to operate compatibly with, digitally-timed solid-state traffic actuated signal controllers as specified.

13.5.2 Auxiliary Equipment for All Controllers: Unless specified on a per item basis as controller only, the following auxiliary equipment shall be provided and completed wired into the cabinet with all controllers, and shall comply with the following minimum requirements:

13.5.2.1 Solid State Flashers:

13.5.2.1.1 Flashers shall be 2-circuit solid state NEMA standard flashers that shall operate between 50 and 59 flashes per minute with a 50% duty cycle.

13.5.2.1.2 The flasher unit shall be furnished with a NEMA standard plug-in mounting for removal without the use of tools.

13.5.2.1.3 The flasher unit shall contain two alternating flashing circuits and shall draw all of its power from the input AC line.

13.5.2.1.4 The flasher shall be rated at 15 amperes per circuit (minimum).

13.5.2.2 RFI Line Filter:

13.5.2.2.1 Each cabinet shall be equipped with a suitable radio frequency interference suppressor installed in the input AC line.

13.5.2.2.2 The design shall minimize interference in both broadcast and aircraft frequencies and shall provide a minimum attenuation

of 60 decibels over a frequency range of 200 kHz to 75 MHz.

13.5.2.2.3 The interference suppressor shall be hermetically sealed in a substantial metal case filled with a suitable insulating compound.

13.5.2.2.4 The interference suppressors shall be furnished with 50- amp capacity (as an alternate, two each amp suppressors in parallel).

13.5.2.2.5 Terminals shall be nickel-plated, 10-24 or 10-32 brass studs of sufficient external length to provide space for connecting two each No. 8 AWG conductors, and shall be mounted so that the terminals cannot be turned in the case. Grounding terminals shall maintain a surface leakage distance of not less than 1/4" between any exposed current conductor and any other metallic part with an insulation factor of 100-200 megohms dependent on external circuit conditions.

13.5.2.2.6 Suppressor shall meet the standards of the Underwriters Laboratories, Inc. and the Electronic Industries Association.

13.5.2.3 Main AC Power Input Panel: A separate power input panel shall be provided and mounted to the lower right side panel of the cabinet. This panel shall provide a four terminal barrier strip rated at 50 Amps with compression fittings for the termination of the incoming utility service power and ground. This panel shall be a minimum of 0.80 aluminum and shall be configured with top and sides to protect from inadvertent access to the terminal and devices and configured as described as below:

13.5.2.3.1 Transient protection for the AC power shall be connected to the load side of the main AC circuit breaker. The transient protection shall:

13.5.2.3.2 Withstand a 20,000 ampere surge current with an 8x20 microsecond wave form.

13.5.2.3.3 Limit the surge voltage to a 280 volt clamp at 20KA, and Maximum +/- 30 volts of voltage excursion above and below sine wave at all phase angles from 0 to 180 degrees.

13.5.2.3.4 Two each LEDs shall be provided to indicate failure modes. Noise suppression shall be provided over the frequency range of at least 10KHz to 1 MHz. For remote status reporting, the surge suppressor shall provide a dry contact relay output whose status change shall indicate a failure mode. For maintenance purposes, the unit shall be mounted in a panel mount plug-in 12 pin base designed specifically for the application. Wire terminations shall be to the base only and all terminations shall be via threaded studs. The device shall be an ECO SHA 1250 with a SHA-1250-BASE-A base or approved equals.

13.5.2.3.5 A Plexiglas cover shall cover over the entire input panel with easy access to the circuit breakers and visibility to the devices.

13.5.2.3.6 Two circuit breakers shall be provided with one rated at 20 Amps and the other at 15Amps. The 20Amp breaker shall operate all equipment except for the fan, light and convenience receptacle.

The 15Amp breaker shall operate the auxiliary equipment within the cabinet.

13.5.2.3.7 The bus relay shall be a solid state design with adequate heat sink for the 30 Amp rating. An indicator shall be visible to display relay state.

13.5.2.3.8 A minimum of 12 ground terminals on a copper buss bar shall be provided with compression terminals sufficient for #6AWG wire.

13.5.2.3.9 A neutral bus bar shall be provided with a minimum of 24 terminals with compression terminals suitable for #10 AWG wire and shall be electrically isolated from the cabinet shield.

13.5.2.3.10 Power Panel shall provide for the integration of an UPS Battery Backup system without the use of additional circuit breakers or surge suppression and shall only require the use of simple hand tools to implement.

13.5.2.3.11 A convenience duplex receptacle shall be integrated into the power panel for accessory equipment.

13.5.2.3.12 The power panel should have a 12 position terminal block located near or at the bottom of the power panel for battery backup power and generator power distribution. The terminal block shall have the following connections:

13.5.2.3.12.1 Power wires from generator plug wired to power wires connected to pole 2 (switch down) of three position DP/DT power switch including AC+, AC-, and Ground.

13.5.2.3.12.2 Power wires from pole 1 (switch up) of three position switch connected to terminals reserved for Line-in (disconnect/power company feed) AC+, AC-, and Ground.

13.5.2.3.12.3 Terminal spots parallel to disconnect feed for AC+ and AC- for the purpose of installing a line power indicator light.

13.5.2.3.12.4 Power wires from center tap of three position switch connected to terminals reserved for UPS input wires AC+, AC_, and Ground.

13.5.2.3.13 The generator plug shall be stored in a weatherproof aluminum box mounted to the right side of the cabinet as facing the door of the cabinet. The weatherproof box shall open external to the cabinet and be able to be secured through a standard padlock. This box shall be mounted along the centerline of cabinet and about 2/3 distance to the top of the cabinet. There shall be some form of bonding bushing used to prevent chaffing of wires passing between the cabinet and box.

13.5.2.3.14 The generator plug itself shall be a L620-P Turnlok Plug of 20A/ 250V 2P 3W Grdg. The plug shall have enough wire in the box to extend approximately 8 inches out of the box.

13.5.2.3.15 The Power Switch shall be located inside of the cabinet above the power panel and be a 3 Position Maintained Contact 30 A 120 V Double pole, double throw switch. There shall be a safety cover over this switch to prevent switching through accidental contact. The purpose of this switch is to transfer power input to the UPS from the disconnect to a secondary source feed (i.e., generator) without the use of any tools. AC+ and AC- between source feeds shall be isolated from one another.

13.5.2.4 Flash Transfer Relays and Sockets:

13.5.2.4.1 Electromechanical relays shall be used for flash transfer relays.

13.5.2.4.2 Each flash transfer relay shall be enclosed with a removable clear plastic cover.

13.5.2.4.3 All contact points which make, break, and carry current to the signal lamps shall be silver-cadmium coil silver or superior alternative material. Contacts shall be capable of making, breaking, and carrying a current of 20 amperes, 120 volts, without undue pitting. Relay coils shall have a power consumption of 10 volt-amperes or less and shall be designed for continuous duty.

13.5.2.4.4 Each flash transfer relay shall withstand a potential of 1500 volts at 60 hertz between insulated parts and between current carrying parts and grounded and non- current carrying parts.

13.5.2.4.5 Each flash transfer relay shall have a 1-cycle surge rating of 175 amperes RMS (247.5 amperes peak).

13.5.2.4.6 The coil of each flash transfer relay shall be normally energized and shall be de-energized when the signals are in flashing operation (per NEMA Standard for fail-safe operation).

13.5.2.4.7 Flash transfer relays shall transfer from load switch output to flash control. Transfer to flash control shall not prohibit the operation of the controller unit.

13.5.2.4.8 It shall be possible to obtain flash operation by either remote and/or local commands.

13.5.2.4.9 Flash transfer relays and sockets shall be located on the output panel (reference paragraph 17.5.2.19, Detector Panel).

13.5.2.4.10 Six flash transfer relays shall be provided in each cabinet and shall be wired to provide MUTCD (Uniform Code) flash by transferring into and out of flash operation at the proper point in the signal cycle.

13.5.2.4.11 Flasher Sockets: Shall be compatible with the NEMA solid-state flasher as required (reference paragraph 17.5.2.1, Solid State Flashers).

13.5.2.5 Switches: The following single-pole, single throw toggle switches, rated at

15 amps, 120 VAC shall be provided on a panel on the inside of the cabinet door:

13.5.2.5.1 Controller On/Off

13.5.2.5.2 Stop Time/Run (controller operation when conflict occurs)

13.5.2.5.3 Normal Auto/Flash

13.5.2.6 Convenience Receptacle: Each cabinet shall have a NEMA 5 – 15 R duplex type convenience receptacle. It shall have ground-fault circuit interruption (GFI) as defined in the National Electrical Code. Circuit interruption shall occur on six mill amperes of ground-fault current and shall not occur on less than four mill amperes of ground-fault current.

13.5.2.7 Terminal Blocks:

13.5.2.7.1 Terminal blocks of the type specified for signal field terminal blocks shall be mounted on the power distribution assembly.

13.5.2.7.2 Two spare positions shall be provided, in addition to those required for the components of the power distribution assembly.

13.5.2.7.3 Incoming power conductors shall be connected to the terminal blocks on the same physical side (except between the service terminal and the main circuit breaker). Outgoing power conductors shall be connected to the other side of the blocks.

13.5.2.8 Forced Air Fan with Thermostat:

13.5.2.8.1 An electric fan with ball or roller bearings and a capacity of at least 100 CFM shall be mounted on the top of the cabinet.

13.5.2.8.2 The fan shall be thermostatically controlled and shall be manually adjustable to turn on at between 90^{O}F and 150^{O}F, with a differential of not more than 10^{O}F between automatic turn on and turn off.

13.5.2.8.3 The cabinet fan-circuit shall be fused at 125% of the capacity of the fan motor.

13.5.2.9 Cabinet Lights: A 25 watt minimum capacity goose neck halogen light shall be mounted to the door of the cabinet just below the police panel to provide adequate illumination of the control equipment. The lamp shall have at least a 14” long neck and a rotary on/off switch at the back of the lamp head.

13.5.2.10 Terminal Blocks:

13.5.2.10.1 Terminal blocks shall be Type 1000 Series Marathon, with 10-32” x 3/8” N.P.B. pan or binding head screws with a standard screwdriver slot.

13.5.2.10.2 Signal circuit terminals shall be marked for each controller phase with a subscript denoting the particular phase in consecutive order; i.e., R1, Y1, G1, DW1, W1, R2, Y2, G2, DW2, W2; etc.

13.5.2.10.3 Terminal blocks shall be accessible to the extent that it shall not be necessary to remove the controller or other auxiliary equipment in order to make inspection or connection.

13.5.2.10.4 Terminal blocks for interconnection and for detector inputs shall be located on the left side of the cabinet.

13.5.2.10.5 Terminal blocks for 115VAC service connection shall be located on the right side of the cabinet. Lugs on the service terminal block shall be large enough for No. 4 AWG conductors.

13.5.2.10.6 All inputs and outputs for the controller shall be brought out via the MS cables, and terminated on the terminal blocks. Each termination shall be clearly labeled. The terminals shall completely provide for all phases, overlaps, detector circuits, yield circuits, coordination circuits, etc. A "D" connector and related panel with surge protector for an Eagle EPAC 3608 signal controller shall be provided and wired according to County requirements (Part Nos. EPAC 3100-8 and EDCO SRA64C-30D).

13.5.2.10.7 An EDCO PC642C-030D surge unit shall be used for pedestrian pushbutton inputs set up to call phases 2, 4, 6, and 8 but able to be assigned to other phases.

13.5.2.10.8 Back-panel wiring access shall be provided to all connections made to back-panel terminal strips. The County requires this for later modification of signal system operation. Hidden wiring has proven acceptable. The cabinet manufacturer may use two methods.

13.5.2.10.8.1 All wiring connected to the front of the terminal blocks on the front side of the back-panel; or

13.5.2.10.8.2 Where feed-thru terminal strips are used, then to provide access to the wiring there shall be a hinged latching back-panel that can swing out for access.

13.5.2.10.9 Exposed or protruding 120 VAC terminals or screws shall be covered or shielded to prevent shock hazard to personnel.

13.5.2.11 Ground Busses:

13.5.2.11.1 A copper ground buss bar for safety or chassis ground having a minimum of ten terminals shall be provided and grounded to the cabinet. The grounding bar shall be fastened directly to the cabinet wall and shall be capable of accepting one No. 6 copper lead.

13.5.2.11.2 In addition, the insulated neutral buss bar shall be provided for connection of all field wiring neutrals. There shall be a minimum of 24 terminals.

13.5.2.12 Conductors and Cabinet Wiring Requirements:

13.5.2.12.1 All conductors used in cabinet wiring, except those which can be readily traced (i.e., correctly identified on cabinet wiring diagram from pin number to terminal number) shall be identified by the use of insulated pre- printed sleeving slipped over the wire before attachment of lug or making connection. These markers shall be in plain words with sufficient detail that a translation sheet shall not be required. Any conductor that is dead-ended or connected to an unmarked terminal strip shall be considered not readily traced.

13.5.2.12.2 All conductors used in cabinet wiring shall be NO. 22 AWG as a minimum, and shall be adequate for the intended purpose.

13.5.2.12.3 Where signal lamp currents are carried, the minimum wire size shall be No. 16 AWG.

13.5.2.12.4 The neutral (common) side of the 115 VAC service shall be carried throughout the cabinet without a break or splice.

13.5.2.12.5 Wires shall be neatly bundled into cables with nylon lacing. Cables shall be secured with nylon cable clamps. Stick-on type fasteners shall not be allowed.

13.5.2.12.6 All electrical connections in the cabinet including relays, flashers, terminal strips, terminal boards, etc. shall have sufficient clearance between each terminal and the cabinet to provide adequate distance to prevent a leakage path or physical contact under stress. When these distances cannot be maintained, insulating barriers shall be provided.

13.5.2.12.7 All equipment grounds shall run directly to the ground buss bar. The dress of the cables between the components shall be such that when the door is closed it does not press against the cables to force the cables against the various components inside the controller cabinet.

13.5.2.12.8 Within the cabinet wiring, DC logic ground, chassis (earth) ground, the AC Neutral shall each be electrically isolated from each other by 500 megohms when tested at less than 100 volts AC.

13.5.2.12.9 Cabling shall be routed to prevent conductors from being in contact with metal edges. Any cabling susceptible to damage from metal edges shall be protected with nylon spiral-wrap sleeving.

13.5.2.12.10 Cabling shall be arranged so that any removable assembly may be removed without disturbing conductors not associated with that assembly. Each detector amplifier cable shall be assembled and connected so it can be removed without other detector cables.

13.5.2.12.11 All wire connections shall have at least 1-1/2" of service loop (strain relief).

13.5.2.13 Lightning Protection: In addition to the power line sure protector specified above, the following lightning protection shall be provided and installed:

13.5.2.13.1 EDCO – SRA – 16C – 1 for the incoming vehicle detector field wiring, to be installed at the terminal blocks.

13.5.2.14 Interconnect Program Selection Switches:

13.5.2.14.1 Each cabinet shall have a manual switch for system free operation.

13.5.2.14.2 The switch shall be located either on the back of the police panel or inside left of the cabinet and shall be readily visible and accessible.

13.5.2.15 Solid State Load Switches and Output Panel:

13.5.2.15.1 Number of Load Switches – There shall be 16 load switches with 16 sockets.

13.5.2.15.2 Load Switches – The load switches shall be solid-state and shall meet the requirements of the NEMA Standard for 3-circuit solid-state load switches. The input shall be optically isolated from the output. The load switch shall have LED indicator lights, visible through the front of the housing, that display the input and output status of each circuit (R, Y, G).

13.5.2.15.3 The above load switches shall plug into the output load panel which shall be capable of containing and supporting all load switches and flash transfer relays.

13.5.2.15.4 The output load panel shall be accessible without removal of any parts.

13.5.2.15.5 The output load panel shall not contain or use any printed circuit boards.

13.5.2.15.6 Electronic components or devices that could require servicing or replacement (such as capacitors, resistors, etc.) shall not be located on the rear of the output load panels.

13.5.2.15.7 All terminations to the back panel shall be solder type. Push-on, screw, or wire wrap connection shall not be acceptable.

13.5.2.15.8 The output load panel shall be completely wired-in and shall be provided complete with all load switches and flash transfer relays.

13.5.2.15.9 Field terminal blocks for signal lamp circuits shall be mounted horizontally immediately adjacent to or integral with the output load panel. There shall be no internal cabinet wiring on the field wiring terminals (i.e., green output AC + for detector operations).

13.5.2.15.10 The output load panel shall include terminal blocks which allow selection of red or yellow flash outputs to the signal lamps by means of jumpering or buss connections. It shall be possible to flash all vehicular phases and overlaps.

13.5.2.16 Detector Rack Specification:

13.5.2.16.1 Detector Rack: The cabinet shall include a detector rack to accommodate a minimum of 16 channels of detection configured as eight slots of 2-channel detection cross- wired for optional standard 4-channel operation. The rack shall have two slots wired for 2-channel and cross- wired for 4-channel preemption, and shall have an integrated position for the rack power supply on the left end of the rack as viewed from the front. Multiple detector racks shall be capable of being combined to support a quantity of detectors in excess of the configuration listed.

13.5.2.16.2 Dimensions: The rack shall be shelf mounted and shall not exceed 6.00 inches (152.40mm) in height and have a minimum depth of 8.50 inches (215.90 mm). The rack shall be a sturdy aluminum frame designed to mount card guides and edge connectors for all of the cards contained in the rack.

13.5.2.16.3 Configuration: The rack shall be configured with a 2.00 inch (50.8 mm) slot on the left for the power supply and with a minimum of eight slots 1.25 inches (31.75 mm) for 2/4 channel detection and a minimum of two slots 1.25 inches (31.75mm) for 2/4 channel preemption. All card edge connectors shall utilize gold plated mating surfaces and shall be of the solder type. No crimp connections of any type shall be allowed. All loop lead- in wiring from the detector input panel to the detector rack shall utilized shielded tightly twisted conductors to eliminate noise and electrical coupling. The detector rack shall be fully wired to the detector-input panel. This includes a call output and a delay inhibit for each vehicle phase, a common reset input and all necessary power and logic signal conductors. The detector rack slots 1,3,5,and 7 shall have count output wires terminated on edge-connector terminal S and Y which shall be terminated on the TS-1 EPAC “D” Panel positions TS1-1, -6, -7, -8, -4, -5, -2, and -3 respectively. The preemption slots shall be wired to support Opticom and Tomar products with power, preemption detector inputs and, preemption call outputs.

13.5.2.16.4 Power Supply: The power supply shall physically fit into the 2.00 inch (50.8 mm) card slot of the rack. It shall provide 24VDC at a minimum of 1.2 Amp (0.3 Amp per channel) in a minimum of four circuits. Each circuit shall be separately fused with a .3 Amp slow blow fuse. The 120 VAC shall be fused with a .5 Amp slow blow internally mounted fuse. The status of each fused circuit shall be indicated with a front panel LED. A 24 VDC LED shall also be included on the front panel to indicate when the power supply is operating.

13.5.2.17 Detector Field Termination Panel:

13.5.2.17.1 The field detector termination panel shall consist of a removable non-corrosive metal detector panel (13 gauge minimum) at least 35 inches by 6.5 inches with two rows of barrier terminal blocks. Each row shall consist of 48 double-pole terminals rated at 4,000 volts RMS, 30 amps, and be able to accommodate up to a 10gauge solid wire. The panel shall be wired in accordance with the following (beginning upper left terminal and proceeding downward):

13.5.2.17.2 Eight double-pole terminals for 24 VDC phase green inhibit input.

13.5.2.17.2.1 16 double-pole terminals for 24 VDC detector channel delay override.

13.5.2.17.2.2 Two double-pole terminals for detector 115 VAC.

13.5.2.17.2.3 Two double-pole terminals for detector AC Neutral.

13.5.2.17.2.4 Two double-pole terminals for detector ground.

13.5.2.17.2.5 Two double-pole terminals for detector logic common.

13.5.2.17.2.6 16 double-pole terminals for detector channels.

13.5.2.17.2.7. Eight double-pole terminals for phase vehicle call input.

13.5.2.17.2.8 Five double-pole terminals for phase 2, 4, 6, 8, and three pedestrian call inputs.

13.5.2.17.2.9 16 double-pole terminals for detector channels.

13.5.2.17.2.10 Three double-pole terminals – spare.

13.5.2.17.2.11 16 double-pole terminals for detector channels.

15 All phase input wires for calls, inhibit, and delay shall be terminated with sufficient length to be relocated to any of the designated input terminations for any phase configurations required at the intersection.

13.5.2.17.3 Transient suppression for the loop detector lead-in cables shall be installed on all 16-field loop lead-in terminations. The suppressor shall not affect the operation of the inductive vehicle loop detector and shall:

13.5.2.17.3.1 Protect detector unit loop inputs against differential (between the loop lead) surges.

13.5.2.17.3.2 Clamp the surge voltage to 25 volts or less when subjected to repetitive 300-ampere surges, and

13.5.2.17.3.3 Withstand repetitive 400-ampere surges with an 8 x 20 microsecond wave form without damage to the suppressor.

13.5.2.17.4 The suppressor shall be stud mounted and shall use the stud as the electrical path to the ground. The surge suppressor shall be an EDCO SRA16C-1 or approved equal.

13.5.2.17.5 The preemption terminal strip shall consist of 12 double-pole terminals rated at 4,000 volts rms., 30 amps, and be able to accommodate up to 10-gauge solid wire. The terminal strip shall be wired in accordance with the following (beginning at the upper terminal and proceeding downward):

13.5.2.17.5.1 Four double-pole terminals for preempt input to the controller in the order of preempt channel A,B,C, and D.

13.5.2.17.5.2 One double-pole terminals for Preempt Channel A and B 26 VDC power to detector head.

13.5.2.17.5.3 One double-pole terminals for Preempt Channel C and D 26 VDC power to detector heads.

13.5.2.17.5.4 Two double-pole terminals for DC common to the preempt detector heads.

13.5.2.17.5.5 One double-pole terminals for Preempt Channel A preemption output.

13.5.2.17.5.6 One double-pole terminals for Preempt Channel B preemption output.

13.5.2.17.5.7 One double-pole terminals for Preempt Channel C preemption output.

13.5.2.17.5.8 One double-pole terminals for Preempt Channel D preemption output.

13.5.2.18 Detector Simulation Panel: A panel of push buttons to simulate calls on any vehicle detector, pedestrian input, pre-emptor, or other input feature, shall be provided and mounted on the inside left of the cabinet door with proper labeling. This panel is required even if it duplicates switches that are provided on the controller.

13.5.2.19 Detector Amplifiers: 2-channel EDI model LM622 and 2-channel EDI model LM632TM with harness, loop monitors shall be provided with each cabinet if specified by the County Engineer as part of plans or purchase documents.

13.5.2.19.1 Automatic loop tuning through range of 20 to 2,000 micro henries.

13.5.2.19.2 Detection output given for power failure, open detector loop or shorted loop. Under these conditions, a constant detect signal shall be output and the LED flashed at an extra slow rate (except for power failure). When fault is corrected, detector shall resume normal operation.

13.5.2.19.3 Meet or exceed NEMA standards, including those for lightning protection, temperature range, and cable connection.

13.5.2.20 Conflict Monitor/MMU:

13.5.2.20.1 A separate, stand-alone conflict monitor/MMU shall be supplied with each controller. It shall be a MMU-16LE Smart Monitor with SDLC cable or approved equal.

13.5.2.20.2 All connections to the conflict monitor/MMU shall be through an NEMA Standard grounded MS connector. The unit shall be properly fused.

13.5.2.20.3 The conflict monitor/MMU shall be supplied with a cable harness wired into the cabinet. The cable harness shall be of sufficient length to permit placing the conflict monitor on the top of the controller cabinet without disconnecting the conflict monitor.

13.5.2.20.4 A conflict monitor/MMU shall be furnished for each controller ordered with cabinet. Individual conflict monitors with SDLC cable can be supplied separately when specified on a monitor only basis.

13.5.2.21 Spread-spectrum Radio Transceivers: Transceivers shall interface with master and local intersection controllers provided under this contract and conform to the following:

13.5.2.21.1 ECC part 15.247.

13.5.2.21.2 Frequency range 902-928 MHz.

13.5.2.21.3 17.5.2.21.3 Frequency hopping type modulation.

13.5.2.21.4 250-1,000 milliwatt output power, adjustable.

13.5.2.21.5 Seven channel minimum (50 frequencies minimum).

13.5.2.21.6 LED status indicators for transmission.

13.5.2.21.7 Standard RS232C data interface with a DB25 connector on the transceiver.

13.5.2.21.8 Data rate minimum of 4800 bps.

13.5.2.21.9 Antenna connector on transceiver shall be type N.

13.5.2.21.10 Transceivers shall be designed to prevent EMI and RFI interference.

13.5.2.21.11 Maximum bit error rate of 1×10^{-6} at –105 dBm.

13.5.2.21.12 Transceivers shall operate from 120 VAC or shall include power supply for conversion of 120 VAC to the transceiver's voltage requirement.

13.5.2.21.13 Transceivers shall be manufacturer's proven model designed for spread-spectrum communications.

13.5.2.21.14 Transmitter frequency stability shall be 0.00015% from -30^{O} to $+60^{O}$C.

13.5.2.21.15 Transceiver shall operate within a temperature range of -30^{O} to $+60^{O}$C and 95% relative humidity at 40^{O}C.

13.5.2.21.16 Transceivers shall be compatible with those in use within the County and shall be ENCOM EP-5200 series or approved equal.

13.5.2.22 Master/Repeater Antennas: Master/repeater antennas shall conform to Parts 15.247 ad 15.249 of the FCC Telecommunications Manual for field strength of emissions, be the manufacturer's proven model and conform to the following:

13.5.2.22.1 Fiberglass, omni directional type.

13.5.2.22.2 9dBd gain, omni directional pattern.

13.5.2.22.3 Frequency range 902-928 MHz.

13.5.2.22.4 Mountable for vertical polarization.

13.5.2.22.5 "N" type female connector.

13.5.2.22.6 Minimum wind rating of 150 MPH.

13.5.2.22.7 Direct DC grounding system.

13.5.2.22.8 Stainless steel mounting hardware.

13.5.2.23 Transmitting antennas with directional gain greater than 6dBi shall have the power reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

13.5.2.24 Remote Antennas: Remote antennas shall be the manufacturer's proven model and conform to the following requirements:

13.5.2.24.1 Yagi type with a minimum of seven elements, including driven element.

13.5.2.24.2 9dBd gain.

13.5.2.24.3 Frequency range 902-928 MHz.

13.5.2.24.4 Mountable for horizontal and vertical polarization.

13.5.2.24.5 "N" type female connector.

13.5.2.24.6 Stainless steel mounting hardware.

13.5.2.25 Transmitting antennas with directional gain greater than 6dBi shall have the power reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

13.5.2.26 Antenna Cables: Antenna cables shall be ½" foam "Hardline". Feed line loss of the antenna cables shall be no more than 3dB.

13.5.2.27 Lightning Protection: Lightning protection for connection within the coax cable run shall conform to the following:

13.5.2.27.1 Frequency range D.C. 1.5 GHz.

13.5.2.27.2 VSWR 1.5:1 maximum.

13.5.2.27.3 Power capacity 200 watts @ 900 MHz.

13.5.2.27.4 Insertion loss of less than 0.3 dB @ 900 MHz.

13.5.2.27.5 D.C. breakdown voltages 350 VDC 15%.

13.5.2.27.6 Maximum impulse current at 8 x 10 ,microseconds 5000 amps.

13.5.2.27.7 Impulse life at 10 x 1000 microseconds 500 amps, 500 occurrences minimum.

13.5.2.27.7 Insulation resistance at 100 VDC, 100 megohms.

13.5.2.27.8 Connectors "N" type female.

13.5.2.28 Software: Software shall be furnished. The Contractor shall furnish a standard RS232C cable with DB25 connectors for connection to the computer and transceivers. Operation of the software on existing County laptop computers shall be demonstrated by the Contractor and the Contractor, at no expense to the County, shall correct any software and cable problems.

13.5.2.29 Software shall control the following programming and diagnostic parameters:

13.5.2.29.1 Radio system address.

13.5.2.29.2 Radio loop back mode.

13.5.2.29.3 Mode – master remote.

13.5.2.29.4 Channel.

13.5.1.29.5 Hop pattern.

13.5.1.29.6 Data interface rate.

13.5.1.29.7 Radio model number, serial number, and date of manufacture.

13.5.1.29.8 Owners name.

13.5.1.29.9 Link check.

13.5.1.29.10 Polling check.

13.5.1.29.11 Sync check.

13.6 Side-Mount Uninterruptible Power Supply: An Uninterruptible Power Supply (UPS) system to provide power conditioning and battery backup for clean and regulated power to all loads at all times against sags and surges shall be provided to support the traffic signal control equipment and other communication devices. The UPS shall, as a minimum, be comprised of a solid state electronic convertor and inverter for output, battery bank, automatic by-pass transfer circuit, integral maintenance bypass switch and all necessary hardware and connecting wires, and a side-mount cabinet. The UPS system shall include Digital Signal Processing for direct digital control of all UPS control and monitoring functions. The UPS shall be fully power factor corrected while operating in battery backup mode. The UPS, including the batteries and necessary hardware shall be easily installed/replaced without the use of special tools. The UPS inverter/charger shall be UL/CSA listed.

13.6.1 The UPS shall be designed to operate continuously at rated capacity as an on-line automatic system in the following modes:

13.6.1.1 NORMAL – The inverter continuously regulates AC power to the critical load. The converter converts utility AC power to regulated DC power, which then serves as the inverter input and, simultaneously, as a float charge input to the storage battery(ies).

13.6.1.2 EMERGENCY – In the event of a utility AC power failure, the inverter shall derive its input from the system battery(ies), thus providing uninterrupted power to the critical load. This transition shall be accomplished without any switching or coupling, and with no interruption of power to the critical load from either failure or restoration of utility AC power.

13.6.1.3 RECHARGE – Subsequent to restoration of utility AC power, the converter shall automatically reactivate and provide DC power to the inverter, simultaneously recharging the battery system. This shall occur automatically and without interruption to the critical load.

13.6.1.4 BYPASS – In the event that the UPS must be taken off-line due to an overload condition or UPS failure, the critical load shall be transferred to the bypass source without interruption of power to the critical load. A paralleling wrap-around contactor shall be used to maintain the bypass source. This bypass switch shall only be utilized for automatic emergency transfers. Retransfer from bypass to inverter shall be performed automatically in overload conditions. Retransfer shall be inhibited if satisfactory synchronization of the inverter and bypass is not accomplished. The use of the bypass switch shall not be required during the manual or automatic retransfer process.

13.6.1.5 MAINTENANCE BYPASS – The UPS system shall be equipped with an external maintenance bypass switch (MBS) to allow safe and reliable maintenance of the UPS system. The bypass shall be of the break-before-make, zero-energy type to ensure maximum load reliability and personnel safety.

13.6.2 Operating temperature range for the entire UPS system, including liquid crystal displays, shall be -40 degrees C to +70 degrees C, 5 to 95 percent relative humidity, non-condensing.

13.6.3 The UPS shall use a temperature-compensated, variable charging rate based on battery charge status battery charging system. The charging system shall compensate over a range of 2.5 – 4.0 mV/ C per cell. The temperature sensor shall come with sufficient connecting wire to monitor the battery temperature. Batteries shall not be recharged when battery temperature exceeds 50 degrees C plus or minus 3 degrees C. An integral system to prevent battery from destructive discharge and/or overcharge shall be provided. Charging shall be a three step method and shall result in complete recharge of the basic 4-battery configuration in less than six hours from a minimal state. Battery charging rates shall be user adjustable at the unit to provide maximum flexibility in matching the unit and the type and size of batteries installed.

13.6.4 The UPS shall have lightning surge protection compliant with IEEE/ANSI C.62.41.

13.6.5 The UPS shall provide a minimum of six programmable alarm contact outputs. As a minimum, the following conditions/alarms shall be communicated to the traffic signal controller:

13.6.5.1 ON BATTERY – When the UPS switches from AC line voltage to battery power.

13.6.5.2 TIMER – When the UPS has been operating on battery power for a user programmable period of time.

13.6.5.3 LOW BATTERY – When the batteries approach a user programmable percent of their remaining useful capacity.

13.6.6 The UPS shall include displays to indicate current battery charge status and conditions, and a battery capacity indicator with readings from 0 to 100 percent. Front panel display(s) shall be provided that indicates the number of times the UPS has been activated and the total number of hours the unit has operated since last being reset. Both the displays shall have a reset function. UPS shall have a DB-9 connector mounted on the front panel for RS232 interface. The system shall come complete with the manufacturer's software installed and connecting cable. Upon request an additional copy of the UPS software shall be provided to the Engineer at no additional cost.

13.6.7 A minimum of three user inputs shall be provided for Emergency Power Off, Intrusion Alarms, and External Self-Test.

13.6.8 The UPS shall have the capability to provide Ethernet and IP addressing communications for inclusion in systems with the capability for remote monitoring and programming. This capability shall be provided internal to the unit. External communications devices shall not be acceptable.

13.6.8.1 Contractor shall provide Alpha Technologies FXM/Micro Communication Module.

13.6.9 The UPS shall have the following operational capabilities:

13.6.9.1 UPS shall be sized with a minimum load of 1000 watts and sized to provide a minimum of eight hours of full run-time operation for an intersection comprised of a traffic signal controller cabinet, LED traffic signal indications and LED pedestrian signal indications.

13.6.9.2 The maximum transfer time between the disruption of normal utility line voltage and providing a stabilized inverter line voltage from batteries shall

be less than 15 milliseconds. A 15 millisecond maximum allowable transfer time shall apply when switching from inverter line voltage to utility line voltage.

13.6.9.3 UPS shall bypass utility line power whenever the utility line voltage is outside of 85 VAC to 175 VAC (2 VAC). While operating on battery power the output voltage from the system shall be between 110 VAC and 125 VAC, inclusive; pure sine wave output, ≤ 3 percent THD, 60 Hz 3Hz.

13.6.9.4 In situations where the utility line voltage drops below 80 VAC or is absent, the UPS shall transfer from utility line power mode to battery backup mode. Once the utility line voltage has been restored to 105 VAC 2 VAC for more than 30 seconds the UPS shall transfer from battery backup mode back to utility line mode.

13.6.9.5 In situations where the utility line voltage exceeds 185 VAC, the UPS shall transfer from utility line power mode to battery backup mode. Once the utility line voltage has been restored at below 125 VAC 2 VAC for more than 30 seconds the UPS shall transfer from battery backup mode back to utility line mode.

13.6.9.6 In situations where the line voltage is within the range of 80 VAC – 185 VAC, commonly called "Brown-out Conditions", the UPS shall regulate the output voltage to the critical load to 120 VAC plus or minus 10% variance. This voltage regulation shall be accomplished without the use of UPS batteries, so that a low battery condition or no battery condition shall not cause a loss of voltage regulation. This also insures that all battery energy shall be retained for use during power outages or extreme line power variances. The UPS system shall operate at better than 95% efficiency in the conversion process. Automatic Voltage Regulation as described above shall a multi-stage design to minimize input voltage fluctuations over the control range.

13.6.9.7 The UPS shall be equipped to prevent a malfunction feedback to the cabinet or from feedback to the utility service. In the event of converter/inverter/charger failure, battery failure or complete battery discharge, the power transfer relay shall revert to the NC (de- energized) state, when the utility line power is connected to the cabinet.

13.6.9.8 The UPS shall be equipped with an input contact that can be defined as Emergency Power Off. This input shall cause the UPS to immediately turn off regardless of power source in use. This is a safety feature that shall, as an example, protect the unit from engaging battery backup if the line power is removed by an accident, such as striking and dislodging the traffic control cabinet that could create a hazardous condition if power is not interrupted.

13.6.9.9 Battery charging by the UPS shall be a temperature compensated multi-stage process providing for the most efficient re-charge based on battery temperature and discharge state, providing a high charge when the battery is near-fully discharged and tapering off as the battery charge state reaches 80 percent or more fully charged. Battery charging rate shall be user programmable at the unit to accommodate different size and types of batteries. As a minimum three rates shall be provided.

13.6.9.10 The UPS shall have the capability to provide active battery charging balancing to insure that the charge is going to the appropriate batteries within the battery string and at the most desirable rates to maintain and extend the life of the

batteries.

13.6.9.11 The battery supply voltage shall be consistent with the load to minimize the current demands on the battery system to improve the efficiency of the system and maintain and extend the life of the batteries while providing the safest electrical environment possible for maintenance and service. To high of a DC voltage can create a more dangerous environment and to low of a DC voltage level means lower system efficiency. For a typical 1000 watt load, a supply voltage of 48 VDC is desired.

13.6.10 The battery system shall consist of the following:

13.6.10.1 The battery system shall be shelf-mount type. Shelves and vertical mounting channels shall be heavy duty and have sufficient strength to hold the batteries without deforming, bending or breaking. Shelves shall be mounted so there is sufficient room above stored batteries to give proper clearance from any above shelf, structure, or device. Batteries shall be easily replaced and commercially available as "off the shelf" items. Batteries shall be 12 VDC, deep cycle, sealed prismatic lead-calcium based AGM/VRLA (Absorbed Glass Mat/Valve Regulated Lead Acid). Battery housing shall be a lightweight, non-metal, non-corrosive material. Batteries shall be certified by the manufacturer to operate over a temperature range of 25 degrees C to + 74 degrees C. Batteries shall indicate maximum recharge data and recharging cycles. Battery recharge time from protective low cutoff to 80 percent or more of full charge capacity shall not exceed six hours. Batteries shall be provided with appropriate interconnect wiring and corrosion resistant mounting trays and or brackets.

13.6.10.2 The number and amp-hour rating for the batteries shall be determined by the manufacturer of the system to provide the required voltage/wattage while on battery power for the time period referenced (eight-hours) but shall not be rated at less than 80Ahr at 12V DC.

13.6.11 Battery Harness:

13.6.11.1 Battery interconnect wiring shall be via a two-part modular harness.
The battery cable system shall be provided with a cable management center that will insure the batteries are connected in the proper polarity and parallel/serial configuration appropriate for the system. There shall be no direct cable to cable connections that may result in improper connections and cable connections shall not require the use of any hand tools.

13.6.11.1.1 Part I shall be equipped with red (+) and black (-) 12 inch cabling that can be permanently connected to the positive and negative posts of each battery. Each red and black pair shall be terminated into an Anderson- type power connector or equivalent.

13.6.11.1.2 Part II shall be equipped with the mating Anderson-type power connector for the batteries and a single, insulated power pole style connection to the inverter/charger unit.

13.6.11.1.3 Part III shall be a connection point to which all cables are connected that will provide the proper configuration. Harnesses shall be fully insulated and constructed to allow batteries to be quickly and easily connected in any order to ensure proper polarity and circuit configuration

13.6.11.2 Power connectors shall be one piece.

13.6.11.3 The lateral length of the harness between battery connectors shall be a minimum of 24 inches.

13.6.11.4 All battery interconnect harness wiring shall be UL Style 1015 CSA TEW or Welding Style Cable or equivalent, and shall be of the proper gauge with respect to design current and have a sufficient strand count for flexibility and ease of handling.

13.6.11.5 All battery terminals shall be covered and insulated with molded boots to prevent accidental shorting.

13.6.12 UPS Cabinet: Cabinet for UPS shall be weatherproof and constructed of welded sheet aluminum, 0.125-inch minimum. Cabinet mounting attachments shall be durable, corrosion resistant, compatible with the aluminum of the cabinet or isolated from it and of heavy-duty construction. Cabinets shall be at least 48 inches in height, 20 inches in width, and 14 inches in depth and shall provide adequate room for a minimum of four batteries.

13.6.12.1 Cabinet doors shall provide full access to the cabinet interior and shall have gaskets to ensure weatherproofing. The door shall be equipped with the Agency's standard tumbler lock. Two keys for each cabinet shall be provided to the Engineer. Hinges shall be stainless steel and continuous. Doors shall have a doorstop arrangement that will allow it to be firmly positioned at 90 and 135 degrees, $\pm$ 10 degrees. The locking system for cabinets shall be a three-point draw roller system. Rollers shall be fabricated from nylon with a diameter of at least 8/10 inch. The door opening shall be double flanged on all four sides.

13.6.12.2 The door shall have a screened and louvered vent design to prevent rain entry, with a standard size furnace vent filter. The filter tray shall be sized to house and secure the filter in place. The screen shall be constructed from at least 0.031-inch aluminum with 1/8-inch diameter openings positioned on 3/16 inch staggered centers. The screen shall be placed on the inlet side of the filter and held in place by the filter or silicone adhesive.

13.6.12.3 The interior of the cabinet shall be of sufficient size to provide adequate ventilation of the equipment housed therein. Cabinet shall contain at least two adjustable shelves or equivalent supports, with enough space to hold batteries, wiring and related equipment. Vertical mounting channels for the shelves shall allow for adjustable shelf placement ranging from five inches from the bottom to five inches from the top of the cabinet. Shelves and vertical mounting channels shall be heavy duty and have sufficient strength to hold the batteries without deforming, bending or breaking. Wiring panels and terminal blocks shall be neatly finished and clearly and permanently marked. Conductors shall be neatly arranged and bundled in groups with cable ties. The bundled conductors shall not obstruct access to other circuits and terminals in the cabinet.

13.6.12.4 A water resistant enclosure to store documentation shall be securely attached to the UPS cabinet with studs welded to the cabinet and nuts. The enclosure shall have non-corrosive metal grommets for use with the studs.

13.6.12.5 A listing, indicating terminal numbers with a description of their use, shall be attached to the UPS cabinet door and overlaid with a clear, plastic covering. Edges of the plastic overlay shall be sealed with a clear waterproofing

compound. Unless cable is passing through the cabinet uninterrupted, incoming and outgoing conductors shall have each wire connected to terminal post positions.

13.6.12.6 A screened air exhaust opening under the top overhang shall be provided. One thermostatically controlled vent fan with a screened guard in the top section of the cabinet each with a capacity of exhausting at least 100 CFM shall be provided. The thermostat shall be adjustable from 80 degrees F to 130 degrees F. Degree markings shall be indicated on the thermostat in 10-degree increments. The fan shall be AC operated from the same line output of the Manual Bypass Switch that supplies power to the Traffic Signal Control Cabinet. A two position terminal block shall be provided on the fan panel. Proper over current protection shall be provided for the fan circuit.

13.6.12.7 If required by plans, a fluorescent lamp receptacle, fluorescent lamp, and an ON/OFF door switch shall be located in the cabinet so that it provides unobstructed illumination of the interior of the cabinet. A momentary switch operated by the door shall be connected in line for operation of the lamp. The fluorescent lamp and switches shall be AC operated from the same line output of the Manual Bypass Switch that supplies power to the Traffic Signal Control Cabinet. Proper over current protection shall be provided for the fluorescent lamp circuit.

13.6.12.8 Wiring for the lamp, fans and other auxiliary equipment shall be connected via terminal blocks.

13.6.13 Interface to Traffic Control Cabinet (Power and Status Alarm)

13.6.13.1 Power: The AC power interface shall be a fully integrated design with the traffic control power panel. The Integrated Design shall be primarily used for new cabinets in which the traffic control cabinet power panel shall be wired such that the incoming utility electric service is controlled by a properly rated circuit breaker and that the controller equipment is protected from electrical noise and voltage surge that may be injected from utility line or signal display sources connected to the cabinet. Such protection and rejection shall be equal to that required by the Agency's standard specification for traffic control cabinets. The wiring to the Manual Bypass Switch shall be integrated into the power panel such that all wires are accessible within the power panel on identified terminal stripes that will allow for the maintenance of the equipment using only standard hand tools. It shall be possible to remove all power, including battery backup, from the traffic control cabinet at the power panel by the use of co-located circuit breakers. A separate power interface for the integration of the cabinet and the UPS shall be unacceptable.

13.6.13.2 Status Alarms: The Status/Alarms outputs of the UPS shall be interfaced into the traffic controller through appropriately defined status inputs to report the conditions required above. Logic Common from the traffic controller shall be provided to the common side of the status/alarm terminations and the status/alarm output shall be returned to the controller. No other interface shall be required.

13.7 General Specifications for Alternating Flashing Beacon/Sign Assembly

12.7.1 Purpose: The purpose of this specification is to describe minimum acceptable general physical and functional requirements for a solar powered and AC powered alternating flashing beacon/sign assembly and parts for installation along roadways at County schools.

12.7.2 Technical Specifications - The County requires the following equipment to be furnished, F.O.B. Destination:

12.7.2.1 Solar Powered Alternating Flashing Beacon Assembly consisting of:

12.7.2.1.1 One Each School Zone Pole Unit.

12.7.2.1.2 One Each Electronic Cabinet Assembly, pre-wired with, and consisting of:

12.7.2.1.2.1 One Each Digital Programmable Clock with Harness (DC).

12.7.2.1.2.2 One Each Flasher Unit (Eltec), FS-2 12/24 VDC Flasher with 24" harness.

12.7.2.1.2.3 One Each Solar Voltage Regulator.

13.7.2.1.2.4 One Each Battery.

12.7.2.1.3 Two 12 inch Yellow 12VDC LED (DR6-YTFB-23B).

12.7.2.1.4 Two 1-Section poly signal head (yellow) with yellow 12" poly lens and tunnel visor.

12.7.2.1.5 Mounting parts: Two sets of SE-3131-P29 Upper and Lower Arm Assembly, painted yellow, each consisting of two SE-0381-P29 extended hubs, two SE- 0309-2.12 all thread nipple 2 1/8", 1 SE-0457- P29 serrated elbow, 1 SE-0458-P29 serrated tee, 1 SE-0304-P29 cap, two SE-0354 gaskets, and two SE-0443 cast nipples.

12.7.2.1.6 One Each Solar Panel.

12.7.2.1.7 One Each Solar Bracket.

12.7.2.2 AC Utility Powered Flashing Beacon Assembly consisting of:

12.7.2.2.1 One Each School Zone Pole Unit.

12.7.2.2.2 One Each Electronics Cabinet Assembly, pre-wired with, and consisting of:

12.7.2.2.2.1 One Each AC Surge Suppressor.

12.7.2.2.2.2 One Each 15 AMP Circuit Breaker.

12.7.2.2.2.3 One Each NEMA Plug-in Flasher with Wired Base.

12.7.2.2.2.4 One Each Digital Programmable Clock with Harness (AC)

12.7.2.2.3 Two 1-section poly signal head (yellow) with yellow 12" poly lens and tunnel visor.

12.7.2.2.4 Two sets of SE-3131-P29 Upper and Lower Arm Assembly, painted yellow, each consisting of two SE- 0381-P29 extended hubs, two (2) SE-0309-2.12 all thread nipple 2 1/8", 1 SE-0457-P29 serrated elbow, one SE-0458-P29 serrated tee, one SE-0304-P29 cap, two SE-0354 gaskets, and two SE-0443 cast nipples.

12.7.2.3 Descriptions: The following describes the equipment listed in paragraphs 13.7.1:

12.7.2.3.1 School Zone Pole Unit:

12.7.2.3.1.1 Aluminum pedestal pole must be extruded 6063- T6 aluminum alloy with a minimum tensile strength of 30 KSI, minimum yield strength of 25 KSI, elongation not to exceed 10%, minimum wall thickness .237", outside diameter 4.5", and length of 14'. One end shall be threaded 4" NPT (ANSI B2.1). Pole outside surface shall be texture finished with a grain profile of at least two, but not more than four, times the roughness average, which shall be 250 micro inches. Mill certifications shall be supplied on request.

12.7.2.3.1.2 Four high-strength steel anchor bolts, each fitted with hex nut and flat washer, with diameter of .75", length of 18", and L shaped leg at the bottom turned at 90 degrees from vertical and 3" length. The top of the bolt shall be threaded at the top end for a minimum of 3". The bolts shall be galvanized per ASTM-A-572. Yield strength and ultimate tensile strength shall be as specified for the application.

12.7.2.3.1.3 Square aluminum transformer base shall be cast aluminum of 319 aluminum alloy, with a minimum tensile strength of 34 KSI, minimum yield strength of 19 KSI, maximum clongation of 2.5%(% in 2"), minimum Brinell hardness of 85, minimum shearing strength of 23 KSI, natural finish, and minimum weight of 20lbs. Upper end shall be treaded to receive a 4" NPT pipe thread. Design shall be such that the base may be fastened to a foundation by means of four each .75" diameter anchor bolts located 60 degrees apart on the bottom of the base. There shall be slots in the bottom of the base 1.5" wide and 2.5" long measured along the circumference of the bolt circle, allowing a proper fit for construction error. The bolt circle shall be a minimum of 12" and a maximum of 14.5". The base shall be equipped with an aluminum access door. The door shall be cast aluminum and shall be free of burrs and natural finished with attachment to prevent unauthorized entry.

12.7.2.3.1.4 A pole cap shall be provided to weatherproof the interior of the pole. The cap shall be mounted and secured to avoid unauthorized entry.

12.7.2.3.1.5 A reinforced collar designed for the square base shall

be provided. The collar shall be a three- segment assembly designed to fit a cast aluminum square base. It shall be constructed of 713 aluminum alloy, minimum tensile strength of 32 KSI, minimum yield strength of 22 KSI, maximum elongation of 3% (% in 2"), minimum Brinell hardness of 70, minimum wall thickness of .625", and minimum overall height of 4.375". Hardware shall be minimum 6 socket head cap screws .3125" – 18 x 1.5" with minimum of three each .3125" x .75" roll pins. Finish of collar shall be alodine 1200 and fasteners shall be zinc with yellow Di-Chromate.

12.7.2.3.2 Electronics Cabinet Assembly (Solar):

12.7.2.3.2.1 The solar electronics cabinet assembly must consist of an aluminum cabinet of minimum 20" x 17" x 15" (h x w x d). The cabinet shall be constructed of .125 thick aluminum alloy 5052- H32 with all joints weatherproofed. The hinge shall be a continuous stainless steel and shall be welded or mechanically joined to the door and wall. The lock shall be a tumbler type keyed to the County's standard. Vents shall be provided on the lower left and upper right sides to adequately vent the enclosure. The vents shall be covered with screen or wire mesh to prevent bugs and varmints from entry. The cabinet shall be provided with a .125 thick back panel mounted on standoffs. There shall be no external holes allowed except for the entry of electrical wiring.

12.7.2.3.2.2 The cabinet shall be provided with two each cast aluminum mounting brackets designed to fit a 4.5" diameter pole and provide approximately 1" diameter internal path for electrical wiring. The bracket shall provide a flat mounting surface in the cabinet with gasket and a rounded mounting surface for the pole. The cabinet shall be assembled to the bracket with 4 each .3125 – 18 x .75" hex bolts with flat washer and nut. Each pole bracket shall mount to the pole with a minimum of 1 each .1875"- 16 x 4.9375" x 4.625" x 1.1875 u-bolt. Finish of the brackets shall be Alodine 1200 and fasteners shall be a minimum of zinc with yellow Di-Chromate.

12.7.2.3.3 Electronics Cabinet Assembly (AC):

12.7.2.3.3.1 The unit shall consist of an Electronics Cabinet manufactured from .125 thick aluminum alloy 5052-H32 approximately 14" x 10" x 7" (h x w x d). The cabinet shall be provided with a Corbin#2 lock with two keys per cabinet. The door area shall include the entire front area of the cabinet and shall be fully gasketed. The door shall be attached with a full-length hinge with a stainless steel hinge pin. One mounting bracket (refer to 15.7.2.3.2.2 for description of bracket) shall be provided on the cabinet back to

secure the cabinet to a pole and shall be of sufficient design to support the weight of the cabinet. A back panel of the same material as the cabinet shall be mounted within the cabinet on stand-offs for the installation of electrical devices. It shall be approximately the same size as the door opening. There shall be no mounting holes allowed in the cabinet other than on the back panel.

12.7.2.3.3.2 The cabinet shall be provided with a 15 Amp single pole circuit breaker, a NEMA design two- circuit flasher plug-in base with flasher unit, an AC power surge protector, a radio frequency interference filter, ground and a terminal strip to accept power input and power outputs to the flashing beacons.

12.7.2.3.3.3 A digital timing device shall be installed to control the flasher outputs. The unit shall be an Electrotechnic's model ELTEC NTC- 17E/861510 120V AC/12v DC powered unit with one output relay, or approved equal. It shall be connected via wire harness with twist- on connector to the cabinet circuitry.

12.7.2.3.4 AC Surge Suppressor: The AC service arrester shall be of a solid-state design. It shall handle a repetitive peak surge current of 15,000 amps (8 x 20 us waveform) at a peak surge voltage of 680 volts (at 10 KA). The response time shall not exceed 40 nanoseconds and recovery shall be automatic. The circuitry shall be encapsulated in flame retardant epoxy. All connectors shall be #10:24 stud (brass).

13.7.2.3.5 AMP Circuit Breaker: The cabinet shall be equipped with a circuit breaker of sufficient rating to protect the equipment in the cabinet. The circuit breaker shall be panel mount miniature cable in/cable out thermal magnetic design. It shall be a type QC single pole 120/240 volts AC with a continuous 15-ampere rating at 40 degrees C.

13.7.2.3.6 Digital Programmable Clock with Harness: The digital programmable clock shall provide a time-based control for a minimum of one circuit. The clock shall operate on12VDC or 120 volt AC (as ordered), and shall control up to 10 amps at 115 VAC. The clock shall be programmed via a numeric and function key keyboard. It shall also be able to transfer the programs from one clock to another via a plug in cable. The clock shall have as a minimum a seven digit, seven segment display with the ability to blank the display when not needed to conserve energy. The clock shall be provided with a minimum of 48 hour backup when the unit is not powered. All connections shall be by a circular connector wiring harness and shall provide for ease of maintenance and replacement. Accuracy of the clock shall be crystal-controlled +/- 0.005%. Functionally, the clock shall:

13.7.2.3.6.1 Automatically support daylight savings time.

13.7.2.3.6.2 Provide a minimum of 100 control steps per program.

13.7.2.3.6.3 Provide a minimum of 20 holiday periods entered as a specific start and end date.

13.7.2.3.6.4 Provide a minimum of 20 programs.

13.7.2.3.7 Solar Voltage Regulator: The solar voltage regulator shall be a solid-state battery charge regulator for use in photovoltaic energy systems. The unit shall be capable of operating at 12 volts and up to eight amps. The design shall be a negative shunt regulator housed in an anodized aluminum chassis and encapsulated in a hard epoxy resin. Connection shall be by integral terminal block. An indicating light shall be provided to illuminate when charging is active. A blocking diode shall be standard. The voltage regulator must be a temperature compensated version.

13.7.2.3.8 Battery: The battery shall be designed for photovoltaic energy systems. It shall be of the sealed lead acid design that utilizes immobilized electrolyte in a non-spillable design. It shall be rechargeable, maintenance free, and capable of deep cycle operation. The battery shall provide a minimum of 90-amp hours capacity at 12 volts. The battery must not exceed 10.5" x 7.1" x 11.25" (l x w x h).

13.7.2.3.9 Solar Panel: The solar panel shall be self-contained photovoltaic unit capable of a minimum of 40 watts output. The solar panel shall be capable of providing a 12 VDC output and shall be constructed of a laminated design with an extruded aluminum frame and tempered glass superstrate that is self-cleaning and high impact resistant with high performance semi crystalline solar cells terminated in an easy to access weatherproof junction box. The solar panel shall be nominal 48" x 20" x 2" (l x w x h) and nominal 16 lbs in weight.

13.7.2.3.10 Solar Bracket: The solar panel bracket shall be designed for the specified panel and shall provide for mounting to a pole of 2" to 6" in diameter. The bracket shall be constructed of a minimum of .025 aluminum channels and shall provide a means to adjust the horizontal angle to properly tilt the solar panel. All hardware shall be zinc plated or stainless steel. All hardware (u-bolts, washers, and nuts) to secure bracket to specified pole shall be furnished with the bracket.

13.8 General Specifications for Audio Pedestrian Signal Equipment (Note: Contractor shall provide Polara Central Control Units and Polara 2 Wire Pushbutton Stations):

13.8.1 Polara CCU2EN EZCommunicator Central Control Unit with Ethernet

13.8.2 Polara EN2 – EZ Communicator Navigator 2 Wire Push Button Station – Part No. EN25DB1-B

13.9 Newest Model: Through the life of the contract newer models, manufacturers, styles, etc. may become available or models and/or styles may change. In order to have the most current equipment and styles available, the County reserves the right to purchase the newest or most updated models as they become available, as well as similar or like equipment meeting the intent of this solicitation, and items may be added as necessary to meet this requirement.

13.10 Review by the County does not lessen the responsibility of the Contractor to meet the specifications.

13.11 Documentation and Training:

13.11.1 Documentation to Accompany Delivery: The following documents shall be supplied with each controller and cabinet at the time of delivery to the County.

13.11.1.1 Complete and actual wiring diagrams of the controller cabinet wiring (two copies with each cabinet). These diagrams shall be shipped inside each cabinet, at the time of delivery, not separately.

13.11.1.2 Complete instructions and schematics for field connections (two copies with each cabinet).

13.11.1.3 Complete operational troubleshooting, maintenance guide (i.e., manual), and schematics on all components (controller and all auxiliary equipment), including circuit description of all circuits (one copy with each cabinet).

13.11.2 Training:

13.11.2.1.1.1 At the County's option, the Contractor shall furnish, to County personnel, training in the operation and maintenance of the controller and/or auxiliary equipment.

13.11.2.2 Payment for training shall be considered to be included in the unit price bid paid for each item.

13.11.2.3 Training shall be on-the-job at facilities provided by the County, for a minimum of three and a maximum of 10 students.

13.11.2.4 The training program shall be of sufficient scope, detail, and duration for the attendees to gain the knowledge to program, operate, troubleshoot, and maintain the equipment. Two duplicate series of sessions shall be provided. Each series of sessions shall be a minimum of 16 classroom hours on a mutually acceptable schedule.

13.11.2.5 The training program shall be conducted no later than one week after the date on which delivery of 10% of the first order of controllers has been accomplished.

13.11.2.6 Invoices for controllers delivered after the above date shall not be processed for payment until the training requirements have been complied with.

13.11.3 Performance Testing: The County reserves the right to receive, on demand, a test report from a mutually acceptable test laboratory certifying that the equipment supplied meets the foregoing specifications, at no cost to the County. When such testing is called for, the County shall conduct the tests on a minimum of 20%, randomly selected, of the controllers ordered. The County may call for this testing at any time, either before delivery has begun or after delivery has started, prior to completion of the order.

13.11.4 Rejection: The County reserves the right to reject an entire shipment of devices covered by this specification and purchase order if 10% or more prove to be defective within a 30 day period after shipment, or fail the above performance test.

13.12 Warranty:

13.12.1 The Contractor shall provide warranty service and support for the equipment supplied in a timely and competent manner. The Contractor shall agree to act as sole point of contact for all matters affecting the maintenance, repair, or modification of all the equipment supplied (including cabinets and auxiliary equipment), as long as the equipment is under warranty.

13.12.2 All devices and components are to be fully guaranteed against defects in materials and workmanship for a period of one year from the time the equipment is delivered at no cost and to the satisfaction of the County.

13.12.3 An additional one-year warranty (for a total of two years) shall be provided for the controller unit, conflict monitor, load switches, loop amplifiers, and relays including all components thereof.

13.12.4 All costs of labor, parts, and transportation to and from bidder shall be borne by the Contractor for the duration of the warranty period.

13.12.5 The warranty period for any device or component that is repaired or replaced under warranty shall be extended for an additional period of one year from the time of the Contractor's repair or replacement of said equipment and return to the County.

13.12.6 The Contractor shall be fully responsible for extending manufacturer's warranties on the cabinet and all equipment contained therein. The Contractor shall be responsible for obtaining service on all warranted equipment.

13.13 Equipment Repair Service and Support Requirements: The Contractor shall provide repair service and support after warranties have expired (reference paragraph 11), for all manufacturer's equipment supplied in a timely and competent manner. Service on existing County equipment of the same manufacture as provided by the Contractor shall be available at time of contract award. The Contractor shall agree to act as sole point of contact for all matters affecting the repair of equipment.

SECTION E

SUBMISSION REQUIREMENTS

1 INSTRUCTIONS:

1.1 All bids must be clearly identified on the front of the envelope or top of the carton with the solicitation number, title of the solicitation and the due date and time. Faxed or emailed bids in response to this formal Invitation for Bid are not acceptable.

1.2 All bids must be signed by an authorized officer or agent of the Contractor submitting the bid and delivered in sealed envelopes or cartons to the Issuing Office no later than the time and date indicated. Bids received after the time and date indicated will not be accepted or considered.

1.3 The submission of a bid shall be considered an agreement to all the terms, conditions, and specifications provided herein and in the various bid documents, unless specifically noted otherwise in the bid.

1.4 Each bid shall be accompanied by the Affidavit regarding price fixing, gratuities, bribery, and discriminatory employment practices in accordance with Section E.1.c. (3)(b) of the Howard County Purchasing Manual. When the Contractor is a corporation, a duly authorized representative of said corporation shall execute the Affidavit. The Affidavit is provided in the solicitation package.

1.5 The Foreign Services Disclosure Form must accompany bids for construction-related services, architectural services, engineering services and energy performance contract services of $2 million or more. Section 12-111 of the Maryland State Finance and Procurement Article requires bidders to local governments to make certain disclosures regarding plans, at the time the bid is submitted, to perform any services under the contract outside the United States. When applicable, the Foreign Services Disclosure form is provided in the solicitation package.

1.6 If a discrepancy in or omission from the specifications is found, or if a Contractor is in doubt as to their meaning, or feels that the specifications are discriminatory, the Contractor shall notify the Buyer in writing not later than ten days prior to the scheduled opening of bids. Exceptions taken do not obligate the County to change the specifications. The Issuing Office will notify all Contractors of any changes, additions or deletions to the specifications by addenda posted on the Office of Purchasing web site (www.howardcountymd.gov/purchasing).

1.7 The County will assume no responsibility for oral instructions or suggestions. All official correspondence in regard to the specifications shall be directed to and will be issued by the Issuing Office.

2 BID DOCUMENTS: The required documents shall be submitted, in duplicate (original and one copy), to the Issuing Office no later than the opening date and time specified in Section A. Failure to return required documents may be cause for rejection of the bid. This solicitation requires the return of the following documents:

2.1 Section “F”, (Price Pages, Contractor’s Qualification Information)

2.2 Section “G” (Affidavit)

2.3 Section “H” (Equal Business Opportunity Participation)

3 SAMPLE INVOICE: Contractors are required to provide a sample invoice with the bid response. The sample invoice shall contain the details enumerated in Section D, Paragraph 11.2.

4 EXCEPTIONS: If the Contractor cannot meet the terms, conditions and/or specifications of the solicitation, the Contractor must furnish a statement on company letterhead giving a complete description of any exceptions to the terms, conditions, and specifications. Failure to furnish the statement means that the Contractor agrees to all terms, conditions and specifications. Exceptions taken do not obligate the County to change the terms, conditions and/or specifications. Exceptions to the terms and/or conditions and/or to the County's standard Agreement may be sufficient cause for rejection of the bid.

SECTION F

PRICE PAGE NO. 1

Traffic Signal Control Equipment

The undersigned agrees to furnish and deliver the above goods and/or services in accordance with the specifications issued for same, and subject to all terms, conditions, and requirements in the solicitation, and in the various bid documents:

COMPANY NAME:_____

FEDERAL TAX IDENTIFICATION NO./SOCIAL SECURITY NO.:_____

ADDRESS:_____
(Street) (City) (State) (Zip)

TELEPHONE: _____ FAX:_____

EMAIL ADDRESS: _____

REPRESENTATIVE'S NAME: _____

TITLE: _____

Howard County prefers to email Purchase Orders when possible, please provide an **EMAIL ADDRESS FOR RECEIPT OF PURCHASE ORDERS**: _____

Is the company a Minority-, Women-, or Disabled-Owned Business Enterprise? ☐ YES ☐NO
If yes, indicate the type of minority ownership:

☐ African American ☐ Asian American ☐ Disabled ☐ Eskimo
☐ Female ☐ Hispanic ☐ Native American

Is the company certified? If yes, indicate the certification(s) held:

☐ Howard County Government ☐ MD Dept. of Transportation
☐ City of Baltimore ☐ Other

Certification Number(s) and Expiration Date(s): _____

Does the company have a written non-discrimination policy (i.e.: race, creed, religion, handicap, color, sex, national origin, age, occupation, marital status, political opinion, sexual orientation, gender identity/expression, personal appearance, familial status, source of income)? ☐ YES ☐ NO

The County reserves the right to request such documentation, if desired, at a later date.

Delivery Time After Receipt of Order:_____

The company accepts Visa cards: ☐Yes ☐ No

Contractors are not permitted to charge the County any additional fees over and above their bid prices to process payments on procurements cards.

SECTION F

PRICE PAGE NO. 2

COMPANY NAME:_____

Delivery Terms: F.O.B. Destination, Inside Delivery.

Payment Terms: (The payment terms shall be considered net 30 days unless otherwise indicated.) _____

_____

Howard County is exempt from all local, state, and federal taxes, and prices stipulated by the Contractor are considered maximum and are not subject to any increase due to any taxes, or any other reason. The County's Tax Exemption Number is 30001219.

☐ We wish to submit a "NO BID" at this time, but request that our company remain on the Contractors list for future solicitations.

TOTAL BID PRICE $_____

ACKNOWLEDGEMENT OF ADDENDA: The company shall identify by number and date the following addenda and agree that the prices shown in the bid reflect all changes made by addenda. To check for addenda go to: www.howardcountymd.gov/purchasing

Number: _____ Date: _____ Number: _____ Date: _____
Number: _____ Date: _____ Number: _____ Date: _____

THE PERSON SIGNING THE PRICE PAGE MUST INITIAL ANY ALTERATIONS IN FIGURES IN INK.

SIGNATURE: _____ DATE:_____

PRINTED NAME: _____ TITLE:_____

SECTION F

PRICE PAGE NO. 3

COMPANY NAME:_____

TITLE: **Traffic Signal Equipment**

NIGP CODE/PRODUCT CODE: 55088-Markers, Plaques and Traffic Control Devices- Traffic Signal and Equipment, Electric System.

Item No.	Commodity/Services	Estimated Annual Quantity	Unit Of Measure	Unit Price (2 Decimal Places Only **)	Extended Price
1	Traffic Signal, Controller, With Base-Mounted Cabinet& Auxiliary Equipment, 8-Phase , Cabinet Unpainted, Eagle EPAC 3608M52, or County approved equal Manufacturer:_____ Model No.:_____	6	Each	$_____	$_____
2	Traffic Signal, Controller, With Pole-Mounted Cabinet & Auxiliary Equipment, 8-Phase, Cabinet Unpainted, Eagle EPAC 3608M52 or County approved equal Manufacturer:_____ Model No.:_____	1	Each	$_____	$_____
3	Traffic Signal, Controller, With Internal Modem , 8-Phase "Controller Only" Eagle EPAC 3608M52 or County approved equal Manufacturer:_____ Model No.:_____	4	Each	$_____	$_____
4	Traffic Signal, Monitor , Smart, With ADLC Cable, MMU- 16LE or County approved equal Manufacturer:_____ Model No.:_____	10	Each	$_____	$_____
5	Traffic Signal, Monitor , Loop , Two-Channel EDI, Model LM622 or County approved equal Manufacturer:_____ Model No.:_____	25	Each	$_____	$_____
6	Traffic Signal, Monitor, Loop, Two-Channel EDI Model LM632tm or County approved equal Manufacturer:_____ Model No.:_____	25	Each	$_____	$_____

PRICE PAGE NO. 4

Item No.	Commodity/Services	Estimated Annual Quantity	Unit Of Measure	Unit Price (2 Decimal Places Only **)	Extended Price
7	Traffic Signal, Power Supply, Detector Rack Manufacturer:_____ Model No.:_____	5	Each	$_____	$_____
8	Traffic Signal, Detector , Loop, Single Channel, "Detector Only" Manufacturer:_____ Model No.:_____	10	Each	$_____	$_____
9	Traffic Signal, Street Master, Eagle MARC 360 or County approved equal Manufacturer:_____ Model No.:_____	5	Each	$_____	$_____
10	Traffic Signal, Radio Transceiver (Type), Spread-Spectrum Manufacturer:_____ Model No.:_____	3	Each	$_____	$_____
11	Traffic Signal, Cable, Antenna Manufacturer:_____ Model No.:_____	3	Each	$_____	$_____
12	Traffic Signal, Antenna, Master Manufacturer:_____ Model No.:_____	3	Each	$_____	$_____
13	Traffic Signal, Antenna, Remote Manufacturer:_____ Model No.:_____	3	Each	$_____	$_____
14	Traffic Signal, Flasher, NEMA, Model SSF 86-3 or County approved equal Manufacturer:_____ Model No.:_____	20	Each	$_____	$_____
15	Traffic Signal, Switch, Solid State Load, Model SSS 86 or County approved equal Manufacturer:_____ Model No.:_____	20	Each	$_____	$_____

PRICE PAGE NO. 5

Item No.	Commodity/Services	Estimated Annual Quantity	Unit Of Measure	Unit Price (2 Decimal Places Only **)	Extended Price
16	Traffic Signal, UPS System consisting of 50X20X15 Cabinet with Four Shelves, Power Panel with 20A Circuit Breaker, Plug-in Surge Suppressor and Terminal Strip with Cover, Fan, Thermostat, and Light, One Manual. Bypass Switch, One NOVUS 1100 FXM GEN UPS, One Cable Set for Four Batteries with Quick Connect Terminals and Post Covers, and 4 160AGM-3 12V DC Batteries, UPS-SM-01, AlphaFXM/Micro Communication Module	6	Each	$_____	$_____
17	Traffic Signal, UPS System Consisting of 50X20X15 Cabinet with Four Shelves Power Panel with 20A Circuit Breaker Plug-in surge Suppressor and Terminal Strip with Cover Fan, Thermostat, and Light, One Manual Bypass Switch, One NOVUS 1100 FXM GEN UPS, One Cable Set for Four Batteries with Quick Connect Terminals and Post covers (Batteries not Included), UPS-SM-01, Alpha FMX/Micro Communication Module.	5	Each	$_____	$_____
18	Traffic Signal, Battery, Alpha AGM with Three Year Warranty	60	Each	$_____	$_____
19	Traffic Signal, UPS, Novus 1100 FXM GEN 3	10	Each	$_____	$_____
20	Traffic Signal, Switch, Manual Bypass 20A	10	Each	$_____	$_____
21	Traffic Signal, Surge Suppressor, AC 15A	10	Each	$_____	$_____
22	Traffic Signal, Battery Testing Kit, Celltron CTE-2200 AT	1	Each	$_____	$_____
23	Traffic Signal, Beacon Assembly, Solar Powered 12VDC Alternating Flashing, Consisting of One School Zone Pole Unit, One Electronic Cabinet Assembly, One Digital Programmable Clock with Harness, Two Yellow 12 VDC LED DR-6YTFB-23B, One Flasher Unit (Eltec) FS2 12/24 VDC Flasher with 24" Harness, One Solar Voltage Regulator, One Battery, One Solar Panel, One Solar Bracket, Two 1-Section Poly Signal Head (Yellow) with Yellow 12" Poly Lens and Tunnel Visor, and Mounting Parts	6	Each	$_____	$_____

PRICE PAGE NO. 6

Item No.	Commodity/Services	Estimated Annual Quantity	Unit Of Measure	Unit Price (2 Decimal Places Only **)	Extended Price
24	Traffic Signal, Beacon Assembly, AC Utility Consisting of One School Zone Pole Unit, One Electronic Cabinet Assembly, One AC Surge Suppressor, 15 AMP Circuit Breaker, One NEMA Plug-in Flasher with Wired Base, One digital Programmable Clock with Harness, Two 1-Section Poly Signal Head (Yellow) with Yellow 12"Ppoly Lens and Tunnel Visor, and Mounting Parts	6	Each	$_____	$_____
25	Traffic Signal, Polara Central Control Unit, CCU2N	10	Each	$_____	$_____
26	Traffic Signal, Polara 2 Wire Pushbutton Station, EN25DB1-B	40	Each	$_____	$_____
27	Traffic Signal, Battery 120 AHR 12V DC, PVX1040T	10	Each	$_____	$_____

TOTAL BID PRICE* $_____

The Following Pricing is for informational purposes only and is not included in total bid price.

1. Percentage Discount Off Manufacture's Parts Price list: _____%
2. Labor Rates: Repair service hourly rates, rates shall begin and end at the County's job site. All travel fees to and from the County's job site shall be incorporated into the hourly rates.

Straight Time $_____ per hour
(Weekdays 7:30 A.M. To 4:00 P.M.)

Overtime $_____ per hour
(Weekdays 4:00 P.M. To 7:30 A.M. And Saturdays)

Sundays/County Holidays $_____per hour

* This figure should appear as Total Bid Price, Price Page No. 2

** Please note that prices shall only have **TWO DECIMAL PLACES.** The County's financial system will not allow more than two decimal places, adjust responses accordingly.

INVOICE PROCEDURE FOR SUCCESSFUL CONTRACTORS:

In order to facilitate prompt payment, invoices must contain the above commodity and/or service descriptions and pricing. Invoices failing to contain the required line item detail, including contract line number and unit pricing, may be returned for correction. Please submit a sample invoice with the response.

SECTION G

AFFIDAVIT

Must be completed, signed by an officer of the company (President, CEO, Vice President, etc), and submitted with the bid.

Contractor _____

Address _____

I, _____, the undersigned, _____ of the above named
(Print Signer's Name) (Print Office Held)

Contractor does declare and affirm this _____ day of _____, _____, that I hold the aforementioned office
(Month) (Year)
in the above named Contractor and I affirm the following:

AFFIDAVIT I

The Contractor, his Agent, servants and/or employees, have not in any way colluded with anyone for and on behalf of the Contractor or themselves, to obtain information that would give the Contractor an unfair advantage over others, nor have they colluded with anyone for and on behalf of the Contractor, or themselves, to gain any favoritism in the award of the contract herein.

AFFIDAVIT II

No officer or employee of Howard County, whether elected or appointed, has in any manner whatsoever, any interest in or has received prior hereto or will receive subsequent hereto any benefit, monetary or material, or consideration from the profits or emoluments of this contract, job, work or service for the County, and that no officer or employee has accepted or received or will receive in the future a service or thing of value, directly or indirectly, upon more favorable terms than those granted to the public generally, nor has any such officer or employee of the County received or will receive, directly or indirectly, any part of any fee, commission or other compensation paid or payable to the County in connection with this contract, job, work, or service for the County, excepting, however, the receipt of dividends on corporation stock.

AFFIDAVIT III

Neither I, nor the Contractor, nor any officer, director, or partners, or any of its employees who are directly involved in obtaining contracts with Howard County have been convicted of bribery, attempted bribery, or conspiracy to bribe under the laws of any state, or of the federal government for acts of omissions committed after July 1, 1977.

AFFIDAVIT IV

Neither I, nor the Contractor, nor any of our agents, partners, or employees who are directly involved in obtaining contracts with Howard County have been convicted within the past 12 months of discrimination against any employee or applicant for employment, nor have we engaged in unlawful employment practices as set forth in Section 12.200 of the Howard County Code, or of Section 16 of Article 49B of the Annotated Code of Maryland or, of Sections 703 and 704 of Title VII of the Civil Rights Act of 1964.

AFFIDAVIT V

The Contractor:

i. Is not currently identified on the list created by the Maryland State Board of Public Works as a person engaging in investment activities in Iran as described in Section 17-702 of the *Maryland State Finance and Procurement Article* ; or

ii. Is not currently engaging in investment activities in Iran as described in Section 17-702 of the *Maryland State Finance and Procurement Article*.

If the person is unable to make the certification, it will provide the County, a detailed description of the Contractor's investment activities in Iran.

I do solemnly declare and affirm under the penalties of perjury that the contents of the foregoing affidavits are true and correct to the best of my knowledge, information and belief.

_____
Signature

_____
Printed Name

_____
Title

Rev. 09/25/2013

SECTION H

EQUAL BUSINESS OPPORTUNITY PARTICIPATION

NOTICE TO PRIME CONTRACTORS
10% SUBCONTRACTING GOAL ON CONTRACTS
VALUED AT $50,000 OR MORE

Howard County Code Section 4.122 established an Equal Business Opportunity program to foster overall equity and fairness to all citizens in relation to business enterprises conducting business with the County.

If a contract is $50,000 or more, the Prime Contractor shall make a good faith effort to comply with the Howard County Equal Business Opportunity (EBO) program's 10% subcontracting goal. The Prime Contractor shall make a good faith effort to obtain minority subcontractor participation even if the Prime Contractor has the capability to complete the work with its own workforce. This is also applicable to Prime Contractors that are minority-owned firms. The percentage requirement may vary. Prime Contractors should submit the following completed *Equal Business Opportunity Subcontractor Participation Form* with the bid. Identify subcontractors prior to submitting the proposal. After contract award, changes in subcontractors require the written approval of the EBO Coordinator.

Possible areas of obtaining subcontracting participation include, but are not limited to, flagging services, hauling, copying and printing, and the purchase of materials used in performing the contract. Contractors may use minority, women or disabled business enterprises certified by Howard County, Maryland; the Maryland Department of Transportation; the City of Baltimore, Maryland; or another certifying entity in order to satisfy the 10% subcontracting goal. The website addresses for lists of minority businesses are:

Howard County - Equal Business Opportunity List of Firms A-Z
http://www.mdot.state.md.us/MBE_Program/index.html
http://cityservices.baltimorecity.gov/mwboo

Contractors should submit a completed *Equal Business Opportunity Subcontractor Participation Form* with the bid identifying each certified EBO firm they intend to use on the contract. However, if the EBO Subcontractor Participation Form is not submitted with the bid, the County may request EBO subcontractor participation of the successful contractor.

Contractors failing to achieve the Equal Business Opportunity Program goal following a good faith effort to obtain participation must complete the *Equal Business Opportunity Program Request for Subcontracting Waiver* and provide documentation of its good faith attempts to obtain EBO participation. The County will determine if the efforts made satisfy a good faith attempt. A waiver will only be considered in rare contracts after a determination that the Contractor has made a good faith effort and thoroughly documented the efforts. Contractors should submit the *Equal Business Opportunity Program Request for Subcontracting Waiver* with the bid. However, if the request for waiver form is not submitted with the bid, the County may obtain the request for waiver of the successful contractor.

If the County exercises its option to renew the contract, it is expected that the EBO subcontracting goal will be met for each subsequent contract year when the contract amount is $50,000.00 or more. Questions relating to the EBO program shall be directed to the EBO Coordinator 410-313-6370.

PRIME CONTRACTORS' COMPLIANCE OF EBO SUBCONTRACTOR PARTICIPATION

Prime Contractors that are awarded County contracts shall maintain adequate records of EBO participation on County contracts. The County may require that prime contractors report whether or not they met the proposed EBO subcontracting goal, so that the County can track compliance of EBO participation on County contracts.

Revised 12/20/2013

HOWARD COUNTY, MARYLAND
EQUAL BUSINESS OPPORTUNITY (EBO)
SUBCONTRACTOR PARTICIPATION FORM

COUNTY USE ONLY

EBO APPROVAL

CONTRACT TITLE: TRAFFIC SIGNAL CONTROL EQUIPMENT		
SOLICITATION # IFB-2016-83	**CAPITAL PROJECT #**	**CONTRACT / PO #**
TERM:	**RENEWAL #**	**AMOUNT $**

PRIME CONTRACTOR NAME:			
ADDRESS:			**PHONE:**
EBO STATUS (Y/N):	***EBO TYPE:**	**CERTIFYING AGENCY:**	**CERTIFICATION #**

PRIME CONTRACTOR SHOULD LIST ALL EBO SUBCONTRACTORS / SUBCONSULTANTS / SUPPLIERS

INSTRUCTIONS FOR COMPLETING THIS FORM

- Complete the section below identifying each certified EBO firm (Minority (MBE), Woman (WBE), and Disabled (DBE) Business Enterprises) you intend to use on this project. Attach additional sheets if more than two (2) subcontractors.
- This form represents the contractor's commitment to utilize the named EBO firms at the percentages indicated should the contract be awarded to the contractor. This form should accompany your bid or proposal.
- ***EBO Types:** AA (African American), ASA (Asian American), HIS (Hispanic American), NA (Native American), FEM (Female), DIS (Disabled)

SUBCONTRACTOR NAME:						
ADDRESS:						**PHONE:**
CONTACT REPRESENTATIVE:					**EMAIL:**	
***EBO TYPE (**Check One)	☐ **AA**	☐ **ASA**	☐ **HIS**	☐ **NA**	☐ **FEM**	☐ **DIS**
CERTIFYING AGENCY:		**CERTIFICATION #**			**EBO PARTICIPATION %**	
DESCRIPTION OF WORK:					**EBO PARTICIPATION $**	

SUBCONTRACTOR NAME:						
ADDRESS:						**PHONE:**
CONTACT REPRESENTATIVE:					**EMAIL:**	
***EBO TYPE (**Check One)	☐ **AA**	☐ **ASA**	☐ **HIS**	☐ **NA**	☐ **FEM**	☐ **DIS**
CERTIFYING AGENCY:		**CERTIFICATION #**			**EBO PARTICIPATION %**	
DESCRIPTION OF WORK:					**EBO PARTICIPATION $**	

PRINTED NAME

EMAIL

SIGNATURE (VENDOR OFFICIAL)

TITLE

DATE

EXHIBIT I
SAMPLE INVOICE

Your Company's Name
Address
Email address
Telephone/Fax Nos.
Mail Invoice To:
Howard County Government
Department/Office Name
Address (From the Purchase Order)
Address

Invoice No.:
Date:

FEIN:

Contract #: 44XXXXXXXX
Purchase Order #: 2XXXXXXXXX

Performance Period: __/__13-__/__/14
(For Services)

Cont. Line #	PO Item #	Goods/Services Description	List Price	% Discount	Net Price	Quantity	Extended Price
Total							

Payment Terms:

Please make check payable to ***Your Company's Name*** and remit payment to:

Your Company's Name
Address
Address

If you have any questions regarding this invoice, please contact
Your Company's Contact Person's Name at ***Telephone No.*** and ***Email Address***.