

<b>AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT</b>			1. Contract Number	Page of Pages 1   158	
2. Amendment/Modification Number <b>No. 4</b>		3. Effective Date See Block 16C	4. Requisition/Purchase Request No.		5. Solicitation Caption: Rehab. of 11th St Bridge over D St Railroad
6. Issued By: District Department of Transportation Construction Contract Branch 2000 14th Street, NW, 6th Floor Washington, DC 20009			7. Administered By (If other than line 6) Procurement Support Branch 2000 14th Street, NW, 3rd Floor, Bid Room Washington, DC 20009		
8. Name and Address of Contractor (No. Street, city, country, state and ZIP Code)			(X)	9A. Amendment of Solicitation No. <b>POKA-2006-B-0012-JJ</b>	
				9B. Dated (See Item 11) 4/17/2007	
				10A. Modification of Contract/Order No.	
				10B. Dated (See Item 13)	
Code			Facility		
<b>11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS</b>					
X The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offers <input type="checkbox"/> is extended. <input checked="" type="checkbox"/> is not extended. Offers must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended, by one of the following methods: (a) By completing Items 8 and 15, and returning <u>2</u> copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or fax which includes a reference to the solicitation and amendment number. FAILURE OF YOUR ACKNOWLEDGEMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by letter or fax, provided each letter or telegram makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.					
12. Accounting and Appropriation Data (If Required)					
<b>13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS, IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14</b>					
A. This change order is issued pursuant to: (Specify Authority) The changes set forth in Item 14 are made in the contract/order no. in item 10A.					
B. The above numbered contract/order is modified to reflect the administrative changes (such as changes in paying office, appropriation date, etc.) set forth in item 14, pursuant to the authority of 27 DCMR, Chapter 36, Section 3601.2.					
C. This supplemental agreement is entered into pursuant to authority of:					
D. Other (Specify type of modification and authority)					
<b>E. IMPORTANT:</b> Contractor <input type="checkbox"/> is not, <input checked="" type="checkbox"/> is required to sign this document and return <u>2</u> copies to the issuing office.					
14. Description of amendment/modification (Organized by UCF Section headings, including solicitation/contract subject matter where feasible.)  The Current Bid Opening Date of June 15, 2007 is not extended <b>The purpose of this Amendment is to address the following:</b> <b>1. Respond to questions from prospective bidders. 2. Update the Wage Decision</b> <b>3. Update the Pay Item Schedule</b>  <b>This amendment No. 4 consists of this page and 157 pages attached hereto</b>  <b>NO ADDITIONAL QUESTIONS WILL BE ACCEPTED PER ISSUANCE OF THIS AMENDMENT.</b>					
Except as provided herein, all terms and conditions of the document referenced in Item (9A or 10A) remain unchanged and in full force and effect					
15A. Name and Title of Signer (Type or print)			16A. Name of Contracting Officer Jerry M. Carter		
15B. Name of Contractor		15C. Date Signed	16B. District of Columbia		16C. Date Signed 6/8/2007
(Signature of person authorized to sign)			(Signature of Contracting Officer)		

Government of the District of Columbia  
Department of Transportation  
Office of Contracting and Procurement  
2000-14th Street, N.W. 6th Floor  
Washington, D.C. 20009

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**AMENDMENT NUMBER 4**                      **ISSUED**    **June 8, 2007**    **157 pages**

Invitation No.                      **POKA-2006-B-0012-JJ**  
Federal Aid Project Nos.:        **BH-2112 (003) and STP-2112 (004)**  
Title:                                    **Rehabilitation of 11<sup>th</sup> Street SW Bridge over  
D Street Railroad and Approach Roadways**

**BIDDERS** shall acknowledge receipt of this addendum on official Bid Form.  
Failure to do so may result in rejection of your bid.

**CURRENT BID OPENING DATE:**                      **June 15, 2007**

**BIDDERS** are informed that the above named project is modified as follows:

**QUESTIONS AND RESPONSES**

Attached are responses to questions raised by prospective bidders. **(15 pages - this includes document labeled "ATTACHMENT 1" attached as part of this amendment)**

**BID FORMS AND PROPOSAL**

**DELETE** Pay Item pages 1 THRU 23 in their entirety and **REPLACE** with Pay Item pages 1R THRU 23R **(23 pages attached as part of this amendment)**

**DELETE** page e Attachment to Bid Form and **REPLACE** with page eR Attachment to Bid Form **(1 page attached as part of this amendment)**

**DELETE** page 32 Tax Affidavit Certification and **REPLACE** with page 32R Tax Certification Affidavit **(1 page attached as part of this amendment)**

## **SPECIFICATIONS**

**DELETE** Special Provision No. 16 entitled “Construction Scheduling” in its entirety and **REPLACE** with the revised Special Provision No. 16 entitled “Construction Scheduling” included with the responses to bidder questions that are included with this Addendum.

**ADD** to the Special Provision No. 28 entitled “Contractor Work near CSXT Facilities” at the end of the first complete paragraph the following:

The Contractor shall include with his bid a signed copy of Schedule I from the CSX Construction Agreement in the Appendix of these Special Provisions.

**DELETE** from Special Provision Number 42 entitled “Clear and Grub” the following sentence: “Supplementing 201.01, Clearing and Grubbing shall include the reset or replacement of existing fence or rails as specified on the contract drawing or as directed by the engineer.”

**ADD** to Special Provision Number 42 entitled “Clear and Grub” the following:

Supplementing 201.01, Clearing and Grubbing shall include the reset or replacement of existing rails as specified on the contract drawing or as directed by the engineer. Replacement of existing fence shall be per the Special Provision entitled “Decorative Fence” of these Special Provisions and shall be paid for per the provisions of that Special Provision.

**DELETE** to Special Provision No. 76 the following title **“FURNISH AND INSTALL 400 Watt HPS Luminaire and Photocell, Item 617 004”** and **REPLACE** with the following title **“FURNISH AND INSTALL 400 Watt HPS Tear Drop Luminaire and photo cell, Item 618 778”**

**DELETE** to Special Provision No. 76 Sec. B the following title **“COBRA HEAD LUMINAIRE, High PRESSURE SODIUM”** and **REPLACE** with the following title **“TEAR DROP, High PRESSURE SODIUM”**

**DELETE** to Special Provision No. 76 Section B the entire first and second paragraph and **Replace** with the following paragraph “The ballast shall be a 120-Volt magnetic regulator type for all 400W luminaries and a magnetic

regulator multi tap 120/208/240/277 Volt for all 250 through 400W luminaries. The ballast shall start and operate the lamp in ambient temperatures down to -40 F. The ballast shall be in full compliance with lamp-ballast specifications from the lamp manufacturer at the time of manufacture.

**ADD** to Special Provision No. 78 entitled “Splice Control and Communication Cable (FOC), Item 617 007; Furnish and Install Control and Communication Cable (FOC), Item 618 005” the Attachment 1 entitled “Fiber Optic Cable Acceptance Testing Requirements” provided with the responses to bidder questions included with this Addendum (3 pages).

ADD to Special Provision No. 79 the following **“FURNISH AND INSTALL #0000 STRANDED WIRE,** Item 618 250”

**DELETE** to Special Provision No. 94 the following title **“FURNISH AND INSTALL 28’-6” PENDANT POLE WITH UP TO 8’ ARM,** Item 618 542” and **REPLACE** with the following title **“FURNISH AND INSTALL 28’-6” STEEL PENDANT POLE WITH TRUSS ARM,** Item 618 548”

**INSERT NEW** Special Provision entitled “Decorative Fence” to the Special Provisions **(2 pages attached as part of this amendment).**

**INSERT NEW** Special Provision entitled “Wheel Stops” to the Special Provisions **(1 page attached as part of this amendment).**

**INSERT NEW** Special Provision entitled “Adjustment of Price for Asphalt Binder” attached to this Addendum **(1 page attached as part of this amendment).**

### **APPENDICES**

**INSERT NEW** Titled Tear Drops and 8’ Truss Arm **(2 pages attached as part of this amendment).**

**DELETE** General Wage Decision DC070001 Modification Number 0 dated 2/9/2007 and **REPLACE** with General Wage Decision DC070001 Modification Number 3 dated 5/18/2007 **(12 pages attached as part of this amendment)**

**DELETE** in its entirety the Appendix “Traffic Signal System Division Specifications” **REPLACE** with the following new Appendices:

- “Specifications for Type 170 Microprocessor-Based Traffic Signal Controller and Cabinet Assemblies” (59 pages)
- Drawing No. 336SS-FLR (1 page)
- “Specifications for District Department of Transportation Electronic Security Lock” (16 pages)
- “Ultrapower PR1500 UPS” (3 pages)
- “50 A Transfer Switch Manual for Traffic Control Cabinets” (13 pages)
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### **PLANS**

**CHANGE** on Sheet 4, the quantity of Item Number 617 128 entitled “Remove Street Light Pole & Street Light Equipment” from 1 each to 11 each.

**DELETE** on Sheet 4, Item 618 948 entitled “Cathodic Protection.”

**CHANGE** on Sheet 4, Item 617 054 entitled “Furnish and Install 12 Pair 19 AWG Underground Communication Cable” to Item 617 058 entitled “Furnish and Install 25 Pair 19 AWG Underground Communication Cable.”

**CHANGE** on Sheet 3, Item 617 022 entitled “Furnish and Install No. 6 AWG Stranded Wire” to Item 618 250 entitled “Furnish and Install #0000 Stranded Wire.” Also **CHANGE** the quantity to 4628 LF.

**CHANGE** on Sheet 3, the quantity of Item 617 018 entitled “Furnish & Install No. 10 AWG Stranded Wire” to 1589 LF.

**CHANGE** on Sheet 3, the quantity of Item 617 020 entitled “Furnish & Install No. 8 AWG Stranded Wire” to 5493 LF.

**CHANGE** on Sheet 4, the quantity of Item 618 292 entitled “Furnish and Install #8 Stranded Ground Wire” to 3435 LF.

**DELETE** the following items on Sheet 3 or 4:

- 617 004 F & I 400 Watt High Sodium Luminaire, Lamp & photocell
- 618 542 Furnish & Install 28’-6” Steel Pendant Pole with up to 8’ arm

- 617 090 Furnish & Install 3 Section Conventional Traffic Signal Head on a Pole (All Lenses 12")
- 617 092 Furnish & Install 4 Section Conventional Traffic Signal Head on a Pole (All Lenses 12")
- 617 096 Furnish & Install 3 Section Conventinoal Traffic Signal Head on a Mast Arm (All Lenses 12")
- 617 098 Furnisih & Install 4 Section Conventional Traffic Signal Head on a Mast Arm (All Lenses 12")
- 617 114 Furnish & Install 2 Section Conventional Pedestrian Signal Head on a pole (12")

**ADD** the following items on Sheet 4:

- 617 068 Furnish Red Ball LED Module, Quantity = 9 EA
- 617 070 Furnish Yellow Ball LED Module, Quantity = 9 EA
- 617 072 Furnish Green Ball LED Module, Quantity = 9 EA
- 617 078 Furnish Green Arrow LED Module, Quantity = 1
- 617 084 Furnish 12 Inch Overlay Lunar White Walking Person and Portland Orange Raised Hand LED Module, Quantity = 6 EA
- 617 086 Furnish 12 Inch Portland Orange Countdown LED Module, Quantity = 6 EA
- 617 048 F&I 8 Foot Long Mast Arm With Clamp and Removable End Cap, Quantity = 2 each.
- 618 548 Furnish & Install 28'-6" Steel Pendant Pole with Truss Arm Quantity = 16 each.
- 618 778 Furnish & Install 400 Watt HPS Tear Drop Luminaire, Quantity = 16 each

**REPLACE** on Sheet 97 the lower three tables entitled "Cable Summary" with the three revised tables entitled "Cable Summary" (**2 pages attached as part of this amendment**)

**POKA-2006-B-0012-JJ  
REHABILITATION OF 11<sup>TH</sup> STREET BRIDGE OVER D STREET  
RAILROAD AND APPROACH ROADWAYS**

**RESPONSES TO QUESTIONS FROM PROSPECTIVE BIDDERS**

1. Is there any particular pouring sequence or longitudinal joint layout for the bridge deck (in particular phase #3)?

**There is no required pouring sequence for the bridge deck in any of the phases of construction. There are no longitudinal joints. There is a construction joint to be placed between the Phase 2 and Phase 3 construction. Additional construction joints may be proposed by the contractor and submitted for approval as part of the proposed pouring sequence.**

2. The framing plan shown on drawing #S-14 is said to be in a 1"=10' scale for a full size drawing. However, when actually scaling measurements on the drawing it appears as though that scale is incorrect. Since certain members on this drawing do not have dimensions labeled on them, could you please provide a drawing that is accurately to scale. For example, the dimension detailed for the width of the deck at the north abutment is noted as being 129'-11 1/2". However, when scaled it shows to be 128'.

**We recommend that contractors not scale off the half-size drawings. Adequate information is provided on the framing plan to calculate all girder lengths. The aforementioned dimension is measured at skew.**

3. On sheet #2 of the drawings it notes that the minimum construction clearances above the rail are to be 19'-4". On sheet #55 of the drawings it shows the existing clearance to be 20'-6 7/8" and the proposed to be 23'-3". Both of these clearances are shown over the third rail from the north abutment on the drawing. Are these the minimum clearances? Since false work and shoring will most likely have to be placed below the bottom flange of the beams, has DDOT considered the constructability of this project within these clearance tolerances?

**The minimum existing and proposed structure clearances over the railroad are measured from the south rail of the first set of tracks south of the North Abutment. See the call out on the plan view of the Bridge Plan and Elevation, Sheet S-1.**

**Constructability has been considered and we believe that suitable clearance can be obtained from the railroad for all required work.**

4. It does not appear to be any more than 5' of clearance from the North Abutment and the closest rail. Will this rail be active during the construction of the north abutment? What are the clearances that the contractor has to maintain with respect to this rail? The contractor will have to install demolition shields in this area, as well as install formwork for the new abutment in this area. 5' is not much room to work in. Could the DDOT please provide some information as to what their expectations are for the work in this area from both CSX and the contractor?

**It is our understanding that the set of tracks closest to the North Abutment is not used and will remain inactive for the duration of construction. It is anticipated that this track can be encroached upon for the construction of demolition shields/railroad protective shields. However, it is also anticipated that all work on the North Abutment will be done from behind the abutment, so as to minimize work on CSX property.**

5. The contract drawings do not provide much information on the existing structure. Since this project involves demolition of the existing structure, could it be possible to get a set of as-built drawings for the existing structure. The project's special provisions directs you to go to 64 New York Avenue to obtain as-built information, but it does not tell you where in the building to go, or who to see about it. Since this information is critical in providing DDOT with a price for this work, could you please inform us as who to see and when a copy of the drawings will be available for pick up.

**The half size as-built drawings are only available for review at DDOT's office (64 New York Ave., NE) by appointment only. Please contact Ms. Anita Barnes for appointment (202) 671-4600. DDOT cannot guarantee accuracy of as-built drawings. The drawings cannot be removed from DDOT office, and review of as-built drawings will have no bearing on bid opening date.**

6. Since it is required to be removed by the contractor under this contract, could DDOT provide some information on the existing temporary support beam and the temporary repair done on this bridge?

**The temporary support beam is in place to carry the load of a deteriorating prestressed box beam. The prestressed beam is cradled by angles which are hung by 1" +/- diameter hanger rods from the flanges of the support beam. Dimensions of the support beam are approximately as follows: bf = 16.5", tf = 1", d = 35.5", tw = 0.75", length = 58 feet.**

7. On sheet #55 of the drawings it shows in lightly dashed lines across the existing bridge the presence of existing temporary barrier. Is this barrier going to be removed by DDOT prior to the start of construction? If not, could DDOT provide us with information on this barrier as to the size and type that it is, what the limits of it are (looks like it's continued past what is shown on sheet #55), if it is bolted down, and if there any other MOT devices in place? If the barrier is to be removed by the contractor, will those barriers become the property of the contractor or DDOT? Could the barrier be re-used for MOT for the new construction?

**The barrier will not be removed by DDOT prior to construction. It is portable precast "alligator" style barrier (approximately 4' long concrete segments with steel linkages to allow easy horizontal movement for lane reconfigurations). It is not bolted down. There are no other MOT devices in place. The limits of the barrier are shown on Sheets 6 and 7.**

**The purpose of the barrier is to protect the temporary beam. Therefore, the temporary barrier must remain in place until the beam is removed or alternative protection is provided. It may be used for maintenance of traffic provided it is in satisfactory condition, subject to DDOT approval.**

**The barrier is to remain DDOT property, and the contractor shall remove and deliver barrier as directed to site specified by Engineer. Payment is incidental to demolition pay item 205-008.**

8. In the Special Provisions, page # 121 and #122, it states that the modification of the existing rail will be paid under Item # 709 013. There is not an item for this work in the Bid Proposal Form.

**Item 709 013 Modify Existing Railing can be found on the Bid Proposal Form on line 0200.**

9. For obtaining Railroad Protective Insurance the train count of passenger and freight trains in a 24 hour period are required by the insurance companies in order to obtain a quote. Could DDOT please provide us with this information so that we could obtain a quote for the RR Insurance?

**There are approximately 27 freight trains that travel at 40 MPH and 48 passenger trains that travel at 50 MPH.**

10. Is SP #16 directing the contractors to submit an electronic and paper copy of a Primavera project schedule with the bid? It is quite ambiguous since it says that the schedule is to be submitted in accordance with spec 108 where it states that the contractor is to submit the schedule at least 7 days before the start of construction. Since this is a A + B contract where the contractor has to specify the number of days required for construction with its bid. DDOT can hold the contractor to that schedule. Also, if a schedule should have to be submitted with the bid it will most likely not be entirely accurate since most of the contractors will not have consulted with the subcontractors and suppliers as to their input into the schedule. Please take it under advisement and remove the project schedule from being required to be submitted with the bid.

**Delete Special Provision 16. Construction Scheduling in its entirety and insert new Special Provision 16. Construction Scheduling to read as follows:**

16. **CONSTRUCTION SCHEDULING**

**This Special Provision supplement 108.03 of the Standard Specifications is referenced to the Special Provision entitled CONSTRUCTION COMPLETION TIME BY adding:**

**The lowest bidder shall submit both electronic and paper copies of the construction schedule within ten calendar days of bid opening. C.P.M. Scheduling shall be required, as described in 108.06 (B), for this project. CPM computer software shall be Primavera or equivalent. A CD diskette shall be provided with each submittal. Construction sequencing must be accomplished in accordance with the stages as shown in the contract plans. Scheduling shall include ordering of materials, preparation of shop, and working drawings and all other work as indicated on the contract drawings and as directed by the Engineer.**

**Contractor shall submit monthly fragnets to the CPM schedule which reflect both the progress of the project and the impact caused by issues as the work progressed, for DDOT review.**

**In addition, the following shall be added to 108.03:**

**A. ORDER OF WORK – The contractor shall schedule his work so that the requirements of MAINTENANCE OF HIGHWAY TRAFFIC are satisfied.**

11. (Item 0210) specs along with drawings (E-10/sht 101) call for replacement of FO control cables from manholes (MH-F) near 12<sup>th</sup> Street Control Room to (MH-C) near CMS-A6 and to (MH-A) Serving VMS-A2 and VMS-B2, splicing to existing FO cables from the equipment to the manholes, whereas these remaining existing cables are probed and tested and may (or may not) be replaced by (Item 1390). Would it be more prudent to replace the FO Cables entirely from the Control Room to the equipment Local Control Cabinets?

**Proceed with work as described in the bid document.**

12. The drawings (E-10/sht 101) show reusing existing power cables feeding the Local Control Cabinets for CMS-A6, VMS-A2, & VMS-B2. Spec section 85 suggests these cables are rated for 15kv, but do not identify the size and number of wires. Are any of these power circuits to be replaced? If so can the size and number of circuit wires be clarified?

**The design assumes that all power circuits are fully functional and adequate. No replacement is assumed.**

13. The drawings and specs offer general descriptions for replacement of CMS-A6, VMS-A2, VMS-B2 and their control panels (Items 0030, 0080, 0090), but provide no detailed wiring diagrams, or any as-built information about the equipment being replaced. Can the schematics, wiring diagrams, equipment identifications, and manufacturers be provided?

**Furnish and Install equipment as described in the contract document. Replacement of equipment in kind is not a requirement.**

14. The specs for the replacement of CMS-A6, VMS-A2, VMS-B2 and their control panels (Items 0030, 0080, 0090) require the equipment to be provided with control computer software compatible with currently used software, but does not identify what the software is. Can this information be provided to the bidders?

**DDOT' s Traffic Safety Administration is not specifying a software. Provide software recommended by the equipment manufacturer. Equipment must meet all requirements described in the contract documents.**

15. Clarify the requirements of Special Provision 16 which state that a construction schedule is to be submitted with the bid - this has not normally been required. Also, Special Provision 17 makes reference to the requirement that the Contractor submit a schedule 7 calendar days prior to the start of construction. Would the District

consider waiving this requirement at the time of bid, and instead require the construction schedule only from the apparent low bidder within 5 days after bid opening (similar to the requirement for the DBE Plan). This change would benefit both the Contractor and DDOT; unsuccessful bidders would not be required to expend the additional effort to prepare a formal schedule, and DDOT would receive the schedule prior to awarding the contract.

**See the response to Question No. 10 above**

16. Clarify the flagging requirement in Special Provision 28.J.5.b – the information appears to be contradictory. The first part of the paragraph states that DDOT is responsible for all costs associated with work shown on the plans or by approved plan revision, but then goes on to state that DDOT may require the Contractor to be responsible for reimbursing the Railroad for flagging service.

**Cost for flagging is described in the Special Provision. If DDOT desires that the contractor pays the flagging fees, flagging cost to the contractor will be reimbursed by DDOT on a direct cost basis.**

17. What will be the procedure for answering questions, specifically:
- When does DDOT anticipate responding to bidding questions?
  - How much time will be given to the Contractors after responses are issued? Since there is currently the requirement to submit the schedule at time of the bid, please consider revising the Bid Date to two weeks after issuance of the responses to bidding questions.

**Written questions will be answered in writing. Any changes to the contract document will be issued by addendum as described in the Standard Specification.**

18. When does DDOT anticipate responding to bidding questions and how much time will be given to the contractor after responses are issued.

**DDOT will review questions and determine if the question requires a response. However, DDOT will not accept any questions within 10 days of bid opening date.**

19. There is no bid item for traffic signal mast arms that are shown on the drawings.

**Add Item No. 617 048 F&I 8 Foot Long Mast Arm With Clamp and Removable End Cap, 2 each.**

20. The D.C. Traffic Signal Division has usually preferred LED Traffic Signal Heads, but none are offered for this project. Will you want to include LED type Traffic Signal Heads?

**Provide LED Signal Heads per DDOT Standard Specifications (Blue Book) Revised August 2005 Special Provision 617.10. See Revised Summary of Quantities. All requirements are as shown on plan.**

21. There are no special provision specifications offered in the contract documents for traffic signal work. Was this intentional?

**Yes, this is intentional. See the DDOT Standard Specifications (Blue Book) Revised August 2005 Special Provision 617 for Traffic Signal Specification.**

22. Are there any special requirements for pedestrian signals?

**DDOT-TSA have approved the traffic signal plans as they are, all requirements are as shown on contract documents. The Pedestrian Signals shall consist of countdown pedestrian LED modules, combination orange raised hand and white walking person LED modules, and pedestrian push buttons as indicated in the DDOT Standard Specifications (Blue Book) Revised August 2005.**

23. Must the 20 Temporary Traffic Signal Poles be new, or can used poles be used?

**New or Used temporary traffic signal poles are acceptable, as long as all requirements are met or described on contract documents.**

24. Are Xformer Bases for Traffic Signal Poles to be included as integral with the pole bid items, or should that be dealt with separately?

**Transformer bases are paid for separately from the corresponding poles. 6 each- Item No. 617024- F&I Galvanized Steel Transformer Base.**

25. Line Item 1360 calls for removal of one pole, while line item 1470 calls for removal of eleven Xformer Bases. Shouldn't these quantities be complimentary?

**Yes, both items should be a quantity of 11 each.**

26. Should there be a requirement for fiber optic cable work certification? There are no specifications for this.

**Requirement listed in contract document Section 617.07 as described in Sp.78. Fiber Optic Cable work shall be performed by Certified Technicians. Prior to acceptance, all fiber optic cable shall comply with the fiber optic cable testing requirements listed herein as Attachment 1. ( 3 pages attached and made a part of this amendment)**

27. Dwg E10 calls for replacement of CMS-A6 and its controls, while line item 0030 provides for furnish and install these items. There is no line item for removal of existing and no wiring diagrams for new or existing. Should removal of existing be listed as a bid item? There is no separate control cabinet in the field for the existing cast pole mounted CMS unit.

**See bid item #620 031. The CMS unit is an all conclusive unit, its source of power is through bid item #617 039, and its control information is handled through bid item #618 005 & # 617 007.**

28. There are existing electrical devices at the west end of the underpass that are not identified on the contract documents. Are these devices affected by the work in this contract?

**If these are the devices recessed in the abutment & mounted on the wing wall, they are replaced by the appropriate bid items included in the contract documents. If they are the devices mounted on the pier & within the cast in place structure, they are to be removed and paid for under the appropriate bid item.**

29. The specifications for the bid items for the three new replacement signs do not mention removal of the existing signs, nor are there any bid items listed for that purpose. Are the existing message signs to be removed?

**The existing message signs are to be removed per pay item 620029 & 620031.**

30. The "Cable Summary" on (dwg E-6/sht 97) indicates that the #6 AWG Wire is used exclusively for power wiring from PEPCO connections to the 17 Pendant Pole Luminaries. The use of #6 AWG Wire appears to be at odds with DDOT Street Light circuiting commonly used on most contracts, where 3#4/0 AWG Wires + Grd are routed between manholes from service connections, with 2#10 AWG Wires + Grd tapped from these circuit feeders to each luminaire. Is it the contract intention to diverge from this normal practice?

**The Cable Summary shall be revised to read 3 #4/0 AWG Wires with #2 ground between manholes and 2 # 10 AWG Wires with # 8 ground tapped from # 4/0 circuit feeders to luminaire.**

31. Line No. 1250, Bid Item No. 617042 "Furnish Temporary, Portable, Concrete Base for 20 Foot Steel Traffic Signal Pole Mounted On A Transformer Base". There are no bid items addressing the installation of poles, signal devices (traffic or pedestrian) or transformer bases associated with this item. Is it the owner's intent that these elements of the equipment be included in this bid item?

**Yes. All the signal elements for the temporary phase should be included.**

32. Re: Drawing S-2272-A (Sheet 106 of 1530) "TS1- Phase 1" Installation note "C" indicates the installation of a 28' 6" pendant post with 8 foot arm and luminaire on a temporary PCC base. This is in contradiction with historically accepted practices of the DDOT. Putting a 30' (w/t-base) pole with an arm and luminaire on a temporary base would result in a very unstable situation. Please address this concern.

**Street lighting must be maintained throughout the project. DDOT may at its option allow the elimination of the traffic signal mast arm for the temporary phase.**

33. Re: Drawings S-2272-A,B,C (Sheets 106, -7, -8 of 1530) These drawings contradict one another in the numerical designation of various signal devices. While, in actual

installation, this problem would probably be handled effectively it seems to be one that should not have existed in the first place.

**Sheets numbered 106 & 107 represent existing & temporary traffic signal conditions based on signal head numbering from the TS sheets on file with DDOT. Sheet 109 represents the proposed permanent traffic signal design where the signal heads are numbered differently than the existing signal heads. This difference is intentional.**

34. The specifications indicate that the contractor is required to obtain all permits. Please indicate what are the required permits, what steps are involved in obtaining each permit, and reasonable processing times involved for obtaining each permit.

**Some permits are provided as appendices to the contract specifications. The process for obtaining all other permits is reasonable and standard for the District of Columbia.**

35. When is the anticipated Notice to Proceed date relative to the bid opening date? Will the Notice to Proceed date be held back until such time all permits have been secured?

**No. However, certain affected work activities will not be permitted to commence until the associated permit is secured.**

36. The standard DDOT road and bridge specifications limit the mobilization amount to ½% of the total bid amount plus \$23,000.00. Would DDOT consider revising the mobilization specification for this project to make it similar to other regional entities such as VDOT, MSHA, and FHWA?

**Mobilization description measure and payment shall comply with Special Provision 612 of the DC Department of Transportation Standard Specifications from Highways and Structures revised August 2005.**

37. Several of the reputable concrete suppliers in the area have indicated that they are not willing to supply concrete for DDOT bridge projects until such time that the Department revises its specifications to bring it more in line with other local entities such as VDOT, MSHA, and FHWA. The main concern seems to be surrounding what the suppliers feel is an unreasonable penalty clause in the DDOT specifications where the engineer is given the authority/discretion to outright reject any placed concrete due to low breaks. Other entities utilize a graduated penalty clause to address low-break scenarios. This condition has resulted in a limited availability of suppliers – Aggregate Industries being the only supplier that we are aware of that is willing to supply concrete for DDOT bridge projects – and highly elevated prices for the concrete. Would the Department consider revising the concrete specifications for this project to allow more competitive prices from the available concrete suppliers in the area?

**Comply with bid documents and sec. 703.06 of the Blue Book.**

38. What are the train schedules, i.e., time, frequency, and nature of freight for the railroad traffic under the bridge? This information is needed to ascertain applicable railroad insurance rates for the project.

**There are approximately 27 freight trains and 48 passenger trains. The freight trains can be assumed to carry all kinds of freight. The freight train schedule changes day to day depending on supply and demand for goods, products, etc. Passenger trains are either Amtrak or Virginia Railway Express. Schedules can be found through these two sources. For the VRE, both the Manassas and Fredericksburg lines pass through the project work zone. For Amtrak, any trains that go through Manassas or Richmond pass through the project work zone.**

39. The project bid items indicate two separate pay items for variables message signs (pay items #0080 & 0090). Would the Department indicate how these two items are different?

**The items are different in that the signs are in different geographic locations and require different maintenance of traffic to perform the work.**

40. On page 4 of the project special provisions it is stated, "*Work also includes all incidentals needed to complete the project as shown on the Contract Plans, in accordance with Specifications and these Special Provisions*". Would the Department please clarify what exactly is meant by "incidentals" in this instance?

**This statement is located in the "Scope of Work" section of the special provisions. More information on incidentals is provided in each of the special provision sections and in the DDOT Standard Specification.**

41. On page 16 of the project special provisions, under section 22 A, it is stated, "*The Department will support the Contractor's efforts in applying for a variance permitting reasonable day and nighttime noise levels*". Would the Department please clarify what is meant by "support" in this instance, and provide a specific list of the nature of this "support".

**No further clarification is required.**

42. The demolition operations at this project, and as well as many other aspects of the job, will certainly exceed the noise level restrictions stated on page 16 of the specifications. Therefore, it will not be possible to perform many of the tasks associated with this project unless a variance from this noise ordinance is granted. Section 22 A of the special provisions also states, "*The Department gives no guarantee concerning the noise levels granted in any waiver, nor whether or not a variance will be granted*". This section of the special provisions puts the Contractor in the untenable position of either not being able to perform the work in accordance with the specifications (perform the work without exceeding the allowable noise levels), or having to perform the work by violating the specifications (performing the work in spite of violating the allowable noise levels). This is not reasonable; as special provisions are supposed to be, and can potentially cause a dispute between the Department and the Contractor. Therefore, absent a change in this section of the special provisions, would the Department please clarify what the consequence of the

inevitable violation of the stated noise levels on page 16 of the special provisions are? Alternatively, would the Department consider obtaining a noise variance for the project, as has been done on other DDOT projects, in order to allow the contractors to reasonably ascertain their risks and costs associated with this project, and also avoid potential dispute with the Owner due to this matter?

**Bidders shall comply with the requirements of special provision #22.**

43. The details for the two 3" GRS PVC coated show supports from Cross Frame Steel Angles CF-8 (Dwgs S14/68 & S17/71) at plus or minus 20 foot. Shouldn't the supports be less than 10 foot center to center?

**Conduits shall be supported in accordance with PEPCO standards or conduit manufactures recommendations whichever is more stringent. Conduits are indicated as galvanized steel and not PVC.**

44. There are no details for the conduit abutment sleeves construction. Do you want PEPCO standard abutment sleeves or some other approach?

**Yes. Comply with PEPCO standards.**

45. It might be advisable to use bullet resistant FRE ducts suspended under the bridge in lieu of the PVC coated steel conduits called for because of weight and maintenance concerns. Should this be changed?

**Work shall be performed in accordance with Bid Documents.**

46. Rather than routing the two 3" Conduits suspended under the bridge, it might be easier to route them across the bridge embedded in the parapet adjacent to the two 2" PVC roadway lighting conduits. Could this be considered?

**Work shall be performed in accordance with Bid Documents.**

47. Please give description of the moment slab concrete.

**Item 703 015 PCC Moment Slab. Details of the PCC Moment Slab can be found on Sheet 81, 83, and 84 of the plans. All provisions of Section 703 of the DC Standard Specifications shall apply. Concrete shall be 4500 psi Class A.**

48. The bid items listed below have no corresponding specification sections in the special provisions providing detailed information about the scope of those items. Could that be provided?

<u>Item</u>	<u>Spec</u>	<u>Description</u>
1460	618-394	Foundation, Lt. Pole
1470	618-454	(Remove) Transformer Base
1490	618-824	(Remove) Fixture, any type
1500	618-910	Grd Rod
1510	618-918	Elec Equip, Underpass

1520	618-928	Elec Junction Box
1530	618-936	Elec Equip Cab, Meter & Disc Sw
1540	618-942	(Remove) Elec Equip Cab
1550	618-944	Grd Testing
1560	618-946	Cable Insulation Testing
1570	618-948	Cathodic Protection

The items are found in the contract document. The Standard Specifications for Highways and Structures 2005 (Blue Book) is part of this contract, please be familiar with the blue book. The above mentioned items are found in the contract documents as described below.

**1460 618-394 Foundation, Lt. Pole: SEE STANDARD SPECIFICATIONS FOR HIGHWAYS AND STRUCTURES, 2005 (BLUE BOOK) 618.25, 618.28, and 617.06**

**1470 618-454 (Remove) Transformer Base: SEE S.P. 83**

**1490 618-824 (Remove) Fixture, any type: SEE STANDARD SPECIFICATIONS FOR HIGHWAYS AND STRUCTURES, 2005 (BLUE BOOK )621** The contractor is to remove the different types of light fixtures presently mounted on the abutment & pier walls in the underpass.

**1500 618-910 Grd Rod: SEE STANDARD SPECIFICATIONS FOR HIGHWAYS AND STRUCTURES, 2005 (BLUE BOOK) 618.39 and 621.06**

**1510 618-918 Elec Equip, Underpass: SEE STANDARD SPECIFICATIONS FOR HIGHWAYS AND STRUCTURES, 2005 (BLUE BOOK) 621** The electrical equipment in this bid item includes the lighting control cabinet indicated on Dwg. E-11 with a PEPCO meter socket, circuit breakers, and photo electric cell for the Underpass Electrical Cabinet/Wiring Diagram as per detail indicated on Dwg. E-4.

**1520 618-928 Elec Junction Box: SEE STANDARD SPECIFICATIONS FOR HIGHWAYS AND STRUCTURES, 2005 (BLUE BOOK) 618.11 and 621.14**

**1530 618-936 Elec Equip Cab, Meter & Disc Sw: SEE STANDARD SPECIFICATIONS FOR HIGHWAYS AND STRUCTURES, 2005 (BLUE BOOK) 621** This is a free standing stainless steel cabinet NEMA Type 3R (24" width, 20" depth, 42" height similar to DDOT' s model 336 S.) with PEPCO meter socket circuit breakers as indicated on Dwg. E-4 for power to CMS-A#6.

**1540 618-942 (Remove) Elec Equip Cab: SEE STANDARD SPECIFICATIONS FOR HIGHWAYS AND STRUCTURES, 2005 (BLUE BOOK) 621** This Bid item includes the removal of the existing electrical cabinet mounted in the south abutment including the photo electric cell, and temporary disconnection of the power feed from the PEPCO manhole.

**1550 618-944 Grd Testing: SEE STANDARD SPECIFICATIONS FOR HIGHWAYS AND STRUCTURES, 2005 (BLUE BOOK) 621.16 (A)**

**1560 618-946 Cable Insulation Testing: SEE STANDARD SPECIFICATIONS FOR HIGHWAYS AND STRUCTURES, 2005 (BLUE BOOK) 621.16 (B)**

**1570 618-948 Cathodic Protection: DELETE THIS ITEM.**

49. The drawings call for use of 25 Pair Communication Cable whereas the bid item calls for use of 12 Pair Communication Cable. Which is correct?

**Change bid item to 25 Pair Communication Cable.**

50. There is a 100 linear foot difference between the Bid Quantity values of New Communication Cable and Removed Communication Cable. Should these value be matched?

**Values should not match. We are putting in more than we are taking out.**

51. The drawings call for removal of some electrical manholes, yet there are no bid items on the schedule to cover this work. Is the lack of manhole removal bid items an oversight?

**Removal of electrical manholes should be paid for under Item 205 008 Demolition.**

SCHEDULE OF ITEMS

DATE:  
REVISED:

CONTRACT ID: KA2006B0012JJ PROJECT(S): BH-2112 (003) & STP-2112 (004)

CONTRACTOR : \_\_\_\_\_

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS

SECTION 0001 PARTICIPATING BRIDGE WORK-80% FAP BH-2112(003)

0010	000003 Employee Training	2000.000				
		HR	.		.	
0020	000506 Unassigned Special Item -EACH - CLEAN CATCH BASIN- 316 009	15.000				
		EACH	.		.	
0030	000506 Unassigned Special Item -EACH - F & I 30" X 30" CHANGEABLE MESSAGE SIGN (CMS- A#6)- 617 159	1.000				
		EACH	.		.	
0040	000506 Unassigned Special Item -EACH - F & I PCC FOUNDATION FOR ELECTRICAL METE RING CABINET- 617 039	1.000				
		EACH	.		.	
0050	000506 Unassigned Special Item -EACH - REMOVE EXISTING CATCH BASIN- 311 023	10.000				
		EACH	.		.	
0060	000506 Unassigned Special Item -EACH - SUPPORT FOR CHANGEABLE MESSAGE SIGN (CMS )- 617 161	1.000				
		EACH	.		.	
0070	000506 Unassigned Special Item -EACH - TYPE C GUARDRAIL APPROACH END TREATMENT- 605 000	3.000				
		EACH	.		.	

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			DOLLARS	CTS	DOLLARS	CTS
0080	000506 Unassigned Special Item -EACH - VARIABLE MESSAGE SIGN (VMS-A#2)- 617 165	1.000 EACH	.		.	
0090	000506 Unassigned Special Item -EACH - VARIABLE MESSAGE SIGN (VMS-B#2)- 617 163	1.000 EACH	.		.	
0100	000509 Unassigned Special Item -LF - CLEAN CATCH BASIN CONNECTION PIPE- 316 011	375.000 LF	.		.	
0110	000509 Unassigned Special Item -LF - F & I 1-3 INCH PVC ENCASED ELECTRICAL CO NDUIT - 617 013	1540.000 LF	.		.	
0120	000509 Unassigned Special Item -LF - F & I 2-3 INCH PVC ENCASED ELECTRICAL CO NDUIT- 617 015	215.000 LF	.		.	
0130	000509 Unassigned Special Item -LF - F & I 2-4 INCH PVC ENCASED ELECTRICAL CO NDUIT- 617 017	10.000 LF	.		.	
0140	000509 Unassigned Special Item -LF - F & I 5-4 INCH & ONE 2" PVC ENCASED ELEC TRICAL CONDUIT- 617 035	50.000 LF	.		.	
0150	000509 Unassigned Special Item -LF - F& I 6-4" & TWO 2" PVC ENCASED ELECTRICAL CONDUIT- 617 037	10.000 LF	.		.	

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
0160	000509 Unassigned Special Item -LF - FURNISH & INSTALL 2-2" & 2-4" PVC ENCASE D ELECTRICAL CONDUIT- 617 031	5.000 LF				
0170	000509 Unassigned Special Item -LF - REPAIR TYPE 3- CRACK REPAIR - 716 007	1010.000 LF				
0180	000511 Unassigned Special Item -LS - 618 130 REMOVE TRAFFIC SIGNAL POLE AND T RAFFIC SIGNAL EQUIPMENT	LUMP	LUMP			
0190	000511 Unassigned Special Item -LS - DEMOLITION- 205 008	LUMP	LUMP			
0200	000511 Unassigned Special Item -LS - MODIFY EXISTING RAILING- 709 013	LUMP	LUMP			
0210	000511 Unassigned Special Item -LS - SPLICE CONTROL & COMMUNICATION CABLE(FOC ) - 617 007	LUMP	LUMP			
0220	000514 Unassigned Special Item -SF - REPAIR TYPE 1- CONCRETE REPAIR- 716 003	990.000 SF				
0230	000514 Unassigned Special Item -SF - REPAIR TYPE 2- CONCRETE PATCH- 716 005	180.000 SF				

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
0240	000517 Unassigned Special Item -VLF - VACCUM EXCAVATIONS- 212 003	VLF 50.000	.	.	.	.
0250	108002 Progress Photographs	LUMP	LUMP	.	.	.
0260	108004 As-Built Drawings	LUMP	LUMP	.	.	.
0270	200008 Earthwork and Excavation Special Item - LS - GEOSYNTHETIC REINFORCED SOIL SLOPE SYSTEMS	LUMP	LUMP	.	.	.
0280	200009 Earthwork and Excavation Special Item - SF - TEMPORARY SUPPORT OF EXCAVATION- 205 003	SF 1900.000	.	.	.	.
0290	201002 Clear and Grub	LUMP	LUMP	.	.	.
0300	202002 Common Excavation	CY 600.000	.	.	.	.
0310	202004 Hard Surface Pavement Excavation	CY 1550.000	.	.	.	.
0320	204002 Embankment Fill	CY 380.000	.	.	.	.
0330	204004 Borrow Embankment Fill	CY 3439.000	.	.	.	.

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
0340	205002 Structure Excavation	1663.000 CY	.	.	.	.
0350	206002 Structure Backfill SP	235.000 CY	.	.	.	.
0360	206991 Structure Backfill Special Item -CY- LIGHTWEIGHT BACKFILL - 206 003	1724.000 CY	.	.	.	.
0370	207002 Trench Excavation and Backfill	665.000 CY	.	.	.	.
0380	207004 Trench Undercut Excavation	75.000 CY	.	.	.	.
0390	207006 Gravel for Trench Undercut	75.000 CY	.	.	.	.
0400	207008 Borrow Trench Backfill	350.000 CY	.	.	.	.
0410	207991 Trench Excavation and Backfill Special Item - CY - TREN.EXCA. -REM. 20" C.I.PIPE, REINFOR. C ON.THROUGH. BLOCK, PILES& B.FILL-207 003	65.000 CY	.	.	.	.
0420	209002 Aggregate Base Course	900.000 CY	.	.	.	.
0430	212002 Test Pit	10.000 EACH	.	.	.	.

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
0440	302002 Valve Casing	10.000 EACH	.		.	
0450	303002 Abandon Valve Casing	2.000 EACH	.		.	
0460	303004 Remove Fire Hydrant	1.000 EACH	.		.	
0470	304002 Butterfly Valve Manhole	2.000 EACH	.		.	
0480	305002 Ductile Iron Pipe, 4 - 8 Inch	25.000 LF	.		.	
0490	305004 Ductile Iron Pipe, 12 Inch	425.000 LF	.		.	
0500	305018 Extra Fittingd - Contractor Furnished	2000.000 LBS	.		.	
0510	305991 Pipe Water Main - Ductile Iron Special Item - LF - DUCTILE IRON PIPE, 20 INCH (CLASS 52)- 3 05 008	410.000 LF	.		.	
0520	305991 Pipe Water Main - Ductile Iron Special Item - LF - DUCTILE IRON PIPE, 20 INCH (CLASS 56)- 3 05 009	165.000 LF	.		.	

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
0530	305991 Pipe Water Main - Ductile Iron Special Item - LF - STEEL CASING PIPE, 30 INCH , AND ACCESSORIES- 305011	80.000 LF	.	.	.	.
0540	306002 Gate Butterfly Valve, 3 - 12 Inch	6.000 EACH	.	.	.	.
0550	306006 Gate Butterfly Valve, 20 Inch	2.000 EACH	.	.	.	.
0560	306991 Gate Butterfly Valve Special Item - EACH - FURNISH & INSTALL AIR VALVE- 306001	2.000 EACH	.	.	.	.
0570	307002 Set Fire Hydrant	1.000 EACH	.	.	.	.
0580	309002 Sewer Manhole on Sewer 48 Inch and Less Dia.	11.000 VLF	.	.	.	.
0590	310008 Basin Connect PCC Pipe, Class III, 15 Inch	225.000 LF	.	.	.	.
0600	310992 Catch Basins Special Item -EACH - DUAL INLET WATER QUALITY BASIN- 310 025	11.000 EACH	.	.	.	.
0610	311002 Adjust Sewer-Water-Utility Manhole Frame	15.000 EACH	.	.	.	.

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
0620	311016 Furnish Sewer-Water Manhole Frame	15.000 EACH	.		.	
0630	313002 Abandon Basin Connecting Pipe	8.000 EACH	.		.	
0640	313006 Abandon Basin	3.000 EACH	.		.	
0650	314004 PCC Pipe, Class III, Gasket, 15 Inch SP	35.000 LF	.		.	
0660	324002 PCC In-Line Thrust Block	1.000 EACH	.		.	
0670	324991 PCC In-Line Thrust Block Special Item - EACH - SP	4.000 EACH	.		.	
0680	402012 Sperrpave Surface Course, 12.5 mm	210.000 TON	.		.	
0690	402991 Hot Bituminous Pavement Special Item - TON - SUPERPAVE LEVELING COURSE, 9.5 MM - 402 006	790.000 TON	.		.	
0700	403002 Tack Coat	7300.000 SY	.		.	
0710	407991 Temporary AC Special Item - TON - TEMPORARY AC, SUPERPAVE 9.5 MM LEVELING COURSE - 407 006	330.000 TON	.		.	

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
0720	409002 Asphalt Patching, Superpave Surface Course, 12.5 mm	10.000 TON	.		.	
0730	409991 Asphalt Patching Special Item - TON - ASPHALT PATCHING, SUPERPAVE LEVELING COURSE, 9.5 MM - 409 006	40.000 TON	.		.	
0740	501008 Reinforced PCC Pavement, 10 Inch	3200.000 SY	.		.	
0750	502992 Portland Cement Concrete Base Special Item -SY - PCC BASE FOR UTILITY CUTS- 502 004	105.000 SY	.		.	
0760	605002 W Beam Guiderail	335.000 LF	.		.	
0770	605026 Thrie Beam Terminal Connector SP	2.000 EACH	.		.	
0780	605028 Thrie Beam Transition Panel SP	2.000 EACH	.		.	
0790	605038 Remove W Beam/Thrie Beam Guiderail	125.000 LF	.		.	
0800	605991 Steel Guiderails Special Item - EACH W BEAM TRAILING END TERMINAL- 605 021	2.000 EACH	.		.	
0810	606002 Pavement Profiling (Milling)	2050.000 SY	.		.	

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
0820	607991 Misc. Fencing Special Item - LF - DECORATIVE FENCE	1000.000 LF	.		.	
0830	608004 PCC Sidewalk, 4 Inch	875.000 SY	.		.	
0840	609068 Furnish and Set 8"x12" Granite Straight Curb	1650.000 LF	.		.	
0850	609072 Furnish and Set 8"x12" Granite Circular Curb, Radius 10-100 Ft.	100.000 LF	.		.	
0860	609200 PCC Wheelchair/Bicycle Ramp - New Construction	4.000 EACH	.		.	
0870	609993 Curb, Gutter, & Paved Flume Special Item - LF - FURNISH & SET GRANITE CIR. CURB, RADIUS > 100', SPECIAL- 609 079	140.000 LF	.		.	
0880	609993 Curb, Gutter, & Paved Flume Special Item - LF - FURNISH & SET GRANITE STRAIGHT CURB, SPE CIAL- 609 077	800.000 LF	.		.	
0890	609993 Curb, Gutter, & Paved Flume Special Item - LF - FURNISH AND SET 8"X12" MODIFIED GRANITE STRAIGHT CURB- 609 069	1300.000 LF	.		.	
0900	610004 Seed with 4 Inch Topsoil	2300.000 SY	.		.	

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
0910	611084 Wheel Stop	40.000 EACH	.		.	
0920	612002 Mobilization	LUMP	LUMP		.	
0930	614012 Portable Precast PCC Barrier	1700.000 LF	.		.	
0940	614992 PCC Traffic Barriers Special Item - LF - RELOCATE PORTABLE PRECAST PCC BARRIER- 6 14 014	3200.000 LF	.		.	
0950	616004 Construction Lane Closing	LUMP	LUMP		.	
0960	616006 Remove Lane Markings	3750.000 SF	.		.	
0970	616008 Temporary Construction Sign Supports	25.000 EACH	.		.	
0980	616012 Construction Warning and Detour Signs	400.000 SF	.		.	
0990	616016 Flashing Amber Warning Lights, Type "B"	20.000 EACH	.		.	
1000	616022 Construction Sign Warning Flags	2.000 EACH	.		.	

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
1010	616024 Type III PVC Barricade	4.000 EACH	.		.	
1020	616028 Traffic Drums	30.000 EACH	.		.	
1030	616030 Single-Faced White Raised Reflective Pavement Markers	82.000 EACH	.		.	
1040	616040 Thermoplastic Pavement Marking, 4 Inch	800.000 LF	.		.	
1050	616042 Thermoplastic Pavement Marking, 4 Inch Dash	100.000 LF	.		.	
1060	616044 Thermoplastic Pavement Marking, 6 Inch	500.000 LF	.		.	
1070	616050 Thermoplastic Pavement Marking, 12 Inch	150.000 LF	.		.	
1080	616060 Painted Lane Marking, 4 Inch	6100.000 LF	.		.	
1090	616090 Construction Zone Attenuator	8.000 EACH	.		.	
1100	616992 Traffic Control Special Item - EACH - DOUBLE-FACED WHITE/RED RAISED REFLECTIVE PAVEMENT MARKERS- 616034	5.000 EACH	.		.	

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LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
1110	616992 Traffic Control Special Item - EACH - PERMANENT PREFORMED PAVEMENT MARKING ARR OW- 616 055	EACH 2.000	.		.	
1120	616992 Traffic Control Special Item - EACH - PERMANENT PREFORMED PAVEMENT MARKING LETTER- 616 053	EACH 4.000	.		.	
1130	616994 Traffic Control Special Item - LF - PREFORMED HIGH CONTRAST TAPE, 4 INCH - 6 16 057	LF 1900.000	.		.	
1140	616994 Traffic Control Special Item - LF - PREFORMED PATTERNED TAPE, 12 INCH- 616 063	LF 400.000	.		.	
1150	616994 Traffic Control Special Item - LF - PREFORMED PATTERNED TAPE, 6 INCH- 616 061	LF 1250.000	.		.	
1160	617006 Remove Abandoned Traffic Signal Or Street Light Pole Foundation	EACH 17.000	.		.	
1170	617014 Furnish And Install One 2 Inch Pvc Encased Electrical Conduit	LF 15.000	.		.	
1180	617018 Furnish And Install No. 10 Awg Stranded Wire	LF 1589.000	.		.	
1190	617020 Furnish And Install No. 8 Awg Stranded Wire	LF 5493.000	.		.	

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DATE:  
REVISED:

CONTRACT ID: KA2006B0012JJ PROJECT(S): BH-2112 (003) & STP-2112 (004)

CONTRACTOR : \_\_\_\_\_

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
1200	617024 Furnish And Install Galvanized Steel Transformer Base	13.000 EACH	.		.	
1210	617028 Furnish And Install Handbox	1.000 EACH	.		.	
1220	617032 Furnish And Install One 2 Inch And One 4 Inch Pvc Encased El ectrical Conduits	45.000 LF	.		.	
1230	617034 Furnish And Install Four 4 Inch Pvc Encased Electrical Condu its	175.000 LF	.		.	
1240	617038 Furnish And Install Pcc Foundation For Controller Cabinet	1.000 EACH	.		.	
1250	617042 Furnish Temporary, Portable, Concrete Base For 20 Foot Steel Traffic Signal Pole Mounted On A Transformer Base	6.000 EACH	.		.	
1260	617046 Furnish And Install 20 Foot Tall Steel Traffic Signal Pole	4.000 EACH	.		.	
1270	617048 Furnish And Install 8 Foot Long Mast Arm With Clamp And Remo veable End Cap	2.000 EACH	.		.	

SCHEDULE OF ITEMS

DATE:R

REVISED:

CONTRACT ID: KA2006B0012JJ

PROJECT(S): BH-2112 (003) & STP-2112 (004)

CONTRACTOR : \_\_\_\_\_

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
1280	617050 Furnish And Install 7 Conductor 14 Awg Stranded Electrical T raffic Signal Cable	2100.000 LF	.		.	
1290	617058 Furnish And Install 25 Pair 19 Awg Underground Communication s Cable	1200.000 LF	.		.	
1300	617068 Furnish Red Ball Led Module	9.000 EACH	.		.	
1310	617070 Furnish Yellow Ball Led Module	9.000 EACH	.		.	
1320	617072 Furnish Green Ball Led Module	9.000 EACH	.		.	
1330	617078 Furnish Green Arrow Led Module	1.000 EACH	.		.	
1340	617084 Furnish 12 Inch Overlay Lunar White Walking Person And Portl and Orange Raised Hand Led Module	6.000 EACH	.		.	
1350	617086 Furnish 12 Inch Portland Orange Countdown Led Module	6.000 EACH	.		.	
1360	617124 Furnish And Install Traffic Signal Controller And Cabinet	1.000 EACH	.		.	

SCHEDULE OF ITEMS

DATE:

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CONTRACT ID: KA2006B0012JJ

PROJECT(S): BH-2112 (003) & STP-2112 (004)

CONTRACTOR : \_\_\_\_\_

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
1370	617126 Remove Abandoned Traffic Signal Controller Cabinet Foundation	EACH 1.000	.		.	
1380	617128 Remove Street Light Pole And Street Light Equipment	EACH 11.000	.		.	
1390	617132 Remove Traffic Signal Controller And Cabinet	EACH 1.000	.		.	
1400	617164 Traffic Sign Panels	SF 115.000	.		.	
1410	618002 Electrical Work PROBE DISCOVERY OF FAULTS (VMS, CMS, AND EQUIPMENT)- 618 003	LUMP		LUMP		.
1420	618022 Furnish and Install 48" x 48" x 48" Manhole	EACH 15.000	.		.	
1430	618038 Furnish and Install Frame and Cover for 48" x 48" Manhole	EACH 15.000	.		.	
1440	618050 Clean Electrical Manhole/Handhole	EACH 17.000	.		.	
1450	618052 Remove Hazardous Waste Materials from Manhole/Handhole	EACH 17.000	.		.	
1460	618140 Remove Electrical Conduit	LF 25.000	.		.	

SCHEDULE OF ITEMS

DATE:

REVISED:

CONTRACT ID: KA2006B0012JJ

PROJECT(S): BH-2112 (003) & STP-2112 (004)

CONTRACTOR : \_\_\_\_\_

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
1470	618250 Furnish and Install #0000 Stranded Wire	4628.000 LF	.	.	.	.
1480	618292 Furnish and Install #8 Stranded Ground Wire	3435.000 LF	.	.	.	.
1490	618394 Furnish and Install 15" B.C. Street Light Foundation	13.000 EACH	.	.	.	.
1500	618454 Remove Steel Transformer Base	11.000 EACH	.	.	.	.
1510	618548 Furnish and Install 28'-6" Steel Pendant Pole with Truss Arm	16.000 EACH	.	.	.	.
1520	618778 Furnish and Install 400 Watt HPS Tear Drop Fixture	16.000 EACH	.	.	.	.
1530	618824 Remove Fixture, Any Type	5.000 EACH	.	.	.	.
1540	618910 Furnish and Install Ground Rod	30.000 EACH	.	.	.	.
1550	618918 Furnish and Install Electrical Equipment for Underpass	1.000 EACH	.	.	.	.
1560	618928 Furnish and Install Electrical Junction Box	6.000 EACH	.	.	.	.

SCHEDULE OF ITEMS

DATE:

REVISED:

CONTRACT ID: KA2006B0012JJ

PROJECT(S): BH-2112 (003) & STP-2112 (004)

CONTRACTOR : \_\_\_\_\_

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
1570	618936 Furnish and Install Electrical Equipment Cabinet METER & DISCONNECT SWITCH)	1.000 EACH	.		.	
1580	618942 Remove Electrical Equipment Cabinet	1.000 EACH	.		.	
1590	618944 Ground Testing	LUMP		LUMP		.
1600	618946 Cable Insulation Testing	LUMP		LUMP		.
1610	618992 ELECTRICAL WORK SPECIAL ITEM -EACH- FURNISH & INSTALL FIXTURE ANY TYPE ( 250 WATT WALL PACK)- 618 821	6.000 EACH	.		.	
1620	618993 ELECTRICAL WORK SPECIAL ITEM -LF- CLEAN & ROD EXISTING CONDUIT (FOR COMMUNICATION CABLE)- 618 173	1100.000 LF	.		.	
1630	618993 ELECTRICAL WORK SPECIAL ITEM -LF- CLEAN & ROD EXISTING CONDUIT (FOR STREET LIGHT CABLE)- 618 175	105.000 LF	.		.	
1640	618993 ELECTRICAL WORK SPECIAL ITEM -LF- F & I 1- 3/4" & 1-2" FRE ENCASED ELECTRICAL CONDUIT- 618 077	45.000 LF	.		.	

SCHEDULE OF ITEMS

DATE:

REVISED:

CONTRACT ID: KA2006B0012JJ

PROJECT(S): BH-2112 (003) & STP-2112 (004)

CONTRACTOR : \_\_\_\_\_

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
1650	618993 ELECTRICAL WORK SPECIAL ITEM -LF- F & I 1-2" FRE ENCASED ELECTRICAL CONDUIT- 618 079	205.000 LF	.		.	
1660	618993 ELECTRICAL WORK SPECIAL ITEM -LF- F & I 2-2" PVC ENCASED ELECTRICAL CONDUIT T (BRIDGE PARAPET)- 618 085	615.000 LF	.		.	
1670	618993 ELECTRICAL WORK SPECIAL ITEM -LF- F & I 2-3" FRE ENCASED ELECTRICAL CONDUIT T- 618 081	185.000 LF	.		.	
1680	618993 ELECTRICAL WORK SPECIAL ITEM -LF- F& I 2-3" PVC COATED STEEL CONDUIT ( SUS PENDED FROM STRUCTURE)- 618 083	120.000 LF	.		.	
1690	618993 ELECTRICAL WORK SPECIAL ITEM -LF- FUR. & INSL. 1-1" PVC COATED STEEL ELECT .L CONDUIT (SURFACE MOUNTED)- 618 071	165.000 LF	.		.	
1700	618993 ELECTRICAL WORK SPECIAL ITEM -LF- FURNISH & INSTALL #10 STRANDED GROUND WI RE- 618 293	270.000 LF	.		.	
1710	618993 ELECTRICAL WORK SPECIAL ITEM -LF- FURNISH & INSTALL 2-2" PVC ENCASED ELECTRICAL CONDUIT- 618 087	45.000 LF	.		.	

District Department of Transportation  
 SCHEDULE OF ITEMS

PAGE: 20R  
 DATE:  
 REVISED:

CONTRACT ID: KA2006B0012JJ PROJECT(S): BH-2112 (003) & STP-2112 (004)

CONTRACTOR : \_\_\_\_\_

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
1720	618993 ELECTRICAL WORK SPECIAL ITEM -LF- FURNISH & INSTALL CONTROL & COMMUNICATIO N CABLE (FOC)- 618 005	4000.000 LF	.	.	.	.
1730	618993 ELECTRICAL WORK SPECIAL ITEM -LF- FURNISH & INSTALL ONE 1 1/2" CONDUIT ( L IGHTS ON BRIDGE STRUCTURE)- 618 075	10.000 LF	.	.	.	.
1740	618993 ELECTRICAL WORK SPECIAL ITEM -LF- FURNISH & INSTALL ONE 1 1/4" CONDUIT (LI GHTS ON BRIDGE STRUCTURE)- 618 073	10.000 LF	.	.	.	.
1750	618993 ELECTRICAL WORK SPECIAL ITEM -LF- FURNISH & INSTALL ONE 3/4" ENCASED ELECT RICAL CONDUIT- 618 069	100.000 LF	.	.	.	.
1760	618993 ELECTRICAL WORK SPECIAL ITEM -LF- REMOVE COMMUNICATION CABLE- 618 193	1100.000 LF	.	.	.	.
1770	618993 ELECTRICAL WORK SPECIAL ITEM -LF- REPAIR OF EXISTING CONDUIT (STREET LIGHT & TRAFFIC SIGNAL WORK)- 618 179	20.000 LF	.	.	.	.
1780	618999 Payment to PEPCO for Connection, Disconnection, Inspection INSPECTION	LUMP	LUMP	.	.	70000.00

SCHEDULE OF ITEMS

DATE:

REVISED:

CONTRACT ID: KA2006B0012JJ

PROJECT(S): BH-2112 (003) & STP-2112 (004)

CONTRACTOR : \_\_\_\_\_

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
1790	620002 Timber Ground Mounted Sign Posts, 4x4 Inch	32.000 LF	.		.	
1800	620004 Timber Ground Mounted Sign Posts, 4x6 Inch	235.000 LF	.		.	
1810	620006 Timber Ground Mounted Sign Posts, 6x6 Inch	40.000 LF	.		.	
1820	620012 Guide Sign Panels	85.000 SF	.		.	
1830	620032 Remove Existing Ground Mounted Sign	85.000 SF	.		.	
1840	620040 Federal Aid Project Sign	2.000 EACH	.		.	
1850	620993 Traffic Signing Special Item - EACH - REMOVE EXISTING OVERHEAD SIGNS ( CHANGEABLE MESSAGE SIGN)- 620 031	1.000 EACH	.		.	
1860	620993 Traffic Signing Special Item - EACH - REMOVE EXISTING OVERHEAD SIGNS ( VARIABLE MESSAGE SIGN)- 620 029	2.000 EACH	.		.	
1870	624002 Engineer's Field Facilities	LUMP	LUMP		.	
1880	625002 Field Layout	LUMP	LUMP		.	

SCHEDULE OF ITEMS

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CONTRACTOR : \_\_\_\_\_

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
1890	626002 Protection Shield	LUMP	LUMP			.
1900	628002 Erosion and Sediment Control	LUMP	LUMP			.
1910	703002 PCC Footing	36.000 CY		.		.
1920	703006 PCC Pier-Abutment-Wall	560.000 CY		.		.
1930	703008 PCC Superstructure	463.000 CY		.		.
1940	703014 PCC Approach Slab	235.000 CY		.		.
1950	703991 Concrete for Structures Special Item - CY - PCC MOMENT SLAB-703 015	300.000 CY		.		.
1960	704004 Epoxy Coated Reinforcement Bars	250000.000 LBS		.		.
1970	706006 Structural Steel - AASHTO M270, Grade 50	295500.000 LBS		.		.
1980	706020 Bridge Bearings, (Each)	50.000 EACH		.		.

SCHEDULE OF ITEMS

DATE:

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CONTRACT ID: KA2006B0012JJ

PROJECT(S): BH-2112 (003) & STP-2112 (004)

CONTRACTOR : \_\_\_\_\_

LINE NO	ITEM DESCRIPTION	APPROX. QUANTITY AND UNITS	UNIT PRICE		BID AMOUNT	
			DOLLARS	CTS	DOLLARS	CTS
1990	706993 Structural Steel Special Item - LS - UTILITY SUPPORTS ON BRIDGE- 706 031	LUMP	LUMP			.
2000	707002 Paint New Metalwork	LUMP	LUMP			.
2010	708004 Stone Masonry, Class B	200.000 CF		.		.
2020	708011 Reset Stone Masonry	1000.000 CF		.		.
2030	708013 Repoint Stone Masonry	1000.000 LF		.		.
2040	709012 Aluminum Railing	428.000 LF		.		.
2050	709991 Railing Special Item - LF - ORNAMENTAL FENCE- 709 015	248.000 LF		.		.
2060	717002 Armored Joint with Neoprene Strip Seal	281.000 LF		.		.
	SECTION 0001 TOTAL					.
	TOTAL BID					.

INVITATION NO. POKA-2006-B-0012-JJ

PROJECT: Rehabilitation of 11<sup>th</sup> Street Bridge over D Street Railroad and Approach Roadways

**ATTACHMENT TO BID FORM**  
**PRICE PROPOSAL SUMMARY**

Bidder:

1. Total Amount Bid from Pay Item Schedule = \$ \_\_\_\_\_

**2. Contract Administration Price for Project**

Number of calendar days after the Notice of Proceed (NTP) necessary to complete the work to have the project open to unrestricted highway traffic in its ultimate location.

\_\_\_\_\_ Calendar days x \$5,000.00 per calendar day = \$ \_\_\_\_\_

\_\_\_\_\_  
(Number in words)

Note: The number of calendar days **cannot exceed** a maximum of 730 days.

**3. Total Price of Project**

Sum of Total Amount Bid and Contract Administration Price = \$ \_\_\_\_\_

GOVERNMENT OF THE DISTRICT OF COLUMBIA  
 OFFICE OF THE CHIEF FINANCIAL OFFICER  
 OFFICE OF TAX AND REVENUE



**TAX CERTIFICATION AFFIDAVIT**

**THIS AFFIDAVIT IS TO BE COMPLETED ONLY BY THOSE WHO ARE REGISTERED TO CONDUCT BUSINESS IN THE DISTRICT OF COLUMBIA.**

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

Name of Organization/Entity: \_\_\_\_\_

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

Business Telephone No.: \_\_\_\_\_

Principal Officer:

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

Soc. Sec. No.: \_\_\_\_\_

Federal Identification No.: \_\_\_\_\_

Contract No.: POKA-2006-B-0012-JJ \_\_\_\_\_

Unemployment Insurance Account No.: \_\_\_\_\_

I hereby certify that:

1. I have complied with the applicable tax filing and licensing requirements of the District of Columbia.
2. The following information is true and correct concerning tax compliance for the following taxes for the past five (5) years:

District:		Current	Not Current	Not Applicable
Sales and Use		( )	( )	( )
Employer Withholding	( )	( )	( )	( )
Ball Park Fee		( )	( )	( )
Corporation Franchise		( )	( )	( )
Unincorporated Franchise		( )	( )	( )
Personal Property		( )	( )	( )
Real Property		( )	( )	( )
Individual Income		( )	( )	( )

**The Office of Tax and Revenue is hereby authorized to verify the above information with the appropriate government authorities. The penalty for making false statements is a fine not to exceed \$5,000.00, imprisonment for not more than 180 days, or both, as prescribed by D.C. Official Code § 47-4106.**

**This affidavit must be notarized and becomes void if not submitted within 90 days of the date notarized.**

\_\_\_\_\_  
 Signature of Authorizing Agent \_\_\_\_\_  
 Title

\_\_\_\_\_  
 Print Name

Notary: DISTRICT OF COLUMBIA, ss:

Subscribed and sworn before me this \_\_\_\_\_ day of \_\_\_\_\_ Month and Year

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

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

**DECORATIVE FENCE, Item 607 991**

**A. DESCRIPTION** – This work includes the fabricating, furnishing, assembling, and erecting of decorative ground mounted fence in conformance with these Special Provisions, the Plans, Specifications, or as directed by the Engineer. The design and architectural details shall be in the spirit of what is described here and coordinated with the existing fence to the east of Road E and north of the proposed bridge. The Contractor shall submit shop drawings and catalog sheets for approval.

The decorative fence shall be used throughout the project wherever the Contractor is required to remove and replace existing chainlink fence.

The fence shall be Ameristar Aegis II Majestic Style M3 (3 Rail) System or approved equal.

**AMERISTAR®**

1555 N. Mingo Road

Tulsa, Oklahoma 74116

Phone: (800) 321-8724

Fax: (877) 926-3747

E-mail: arch@ameristarfence.com

Web site: <http://www.ameristarfence.com>

The system shall meet the following requirements:

- 8'-0" tall
- 8'-0" maximum post spacing
- 1" square pickets
- Clear space between pickets shall not exceed 3"
- 1.75" square rails
- 3" square posts
- Post caps shall be provided for all posts.
- Brown color
- 3'-0" minimum post embedment. Post hole shall be backfilled with 3500 psi concrete. Hole diameter shall be 1'-0" minimum.
- The fence shall receive a fusion bonded polyester or similar coating. Painting shall not be acceptable.
- All connections shall be tamper resistant.
- Fence shall be capable of carrying a 600 lb load applied at midspan of a panel without permanent deformation.

**B. SUBMITTALS** – The contractor shall submit for approval shop drawings and catalog sheets for the proposed fence system. Submittals shall include but not be limited to the following information:

- Materials
- Finish
- Post embedment and foundation details
- Assembly and construction details

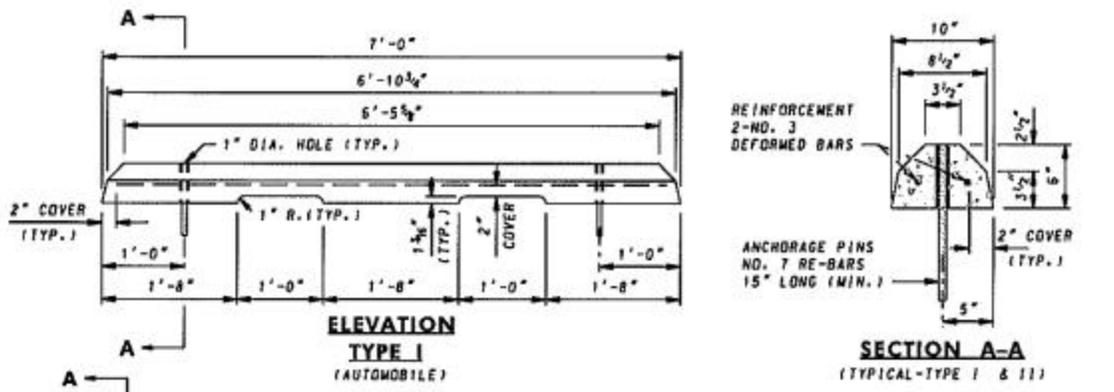
**C. CONSTRUCTION** – All posts and pickets shall be plumb. Appropriate foundations shall be provided per the Manufacturer’s recommendations. The fence shall be capable of accommodating thermal expansion and contraction. The bottom of the fence shall be held as uniformly as is practical to 2” above the finished grade. Any excavation or backfill required to comply with the above clearance shall be as approved by the Engineer.

**D. MEASUREMENT AND PAYMENT** – The unit of measure for DECORATIVE FENCE will be per linear foot. Payment will be made at the contract unit price per linear foot and will constitute full compensation for all materials, labor, tools, equipment, and incidentals necessary to complete the work.

**WHEEL STOPS, Item 611 084**

**A. DESCRIPTION** – This work includes furnishing and installing precast concrete wheel stops in conformance with these Special Provisions, the Plans, Specifications, or as directed by the Engineer. Wheel stops shall be placed as directed by the Engineer in the parking lot in the northwest corner of the Project along the proposed Decorative Fence.

Wheel stops shall match the details provided below, or the Contractor can submit an equal for approval by the engineer.



**B. MEASUREMENT AND PAYMENT** – The unit of measure for WHEEL STOPS shall be per each. Payment will be made at the contract unit price per each and will constitute full compensation for all materials, labor, tools, equipment, and incidentals necessary to complete the work.

**SP ADJUSTMENT OF PRICE FOR ASPHALT BINDER**

An adjustment will be made to the Contract unit price of Hot Mix Asphalt items if the price of asphalt fluctuates significantly from the prevailing price set by D-DOT as base price or quoted in the Contract Documents to the date of placement. The contract unit price will be adjusted by the amount of fluctuation above 5 percent for Contracts scheduled to be paved during more than one construction season or having an estimated mix quantity of 10000 tons or more. For Contracts completed within one construction season and having an estimated mix quantity of less than 10000 tons, the adjustment will be based upon the amount of fluctuation more than +/- 15 percent. Only the differential percent change beyond the above noted 5 and 15 percent will be used.

For the purpose of making these calculations, a monthly price index will be maintained by the D-DOT. This index will be the average F.O.B. selling price of asphalt binder at the supplier's terminal in DC or closest to DC.

The adjusted Contract unit price of Hot Mix Asphalt will be computed monthly by using the following formula:

$$F = (PP-PB)/PB \times 100$$

Where:

F = percent price increase/decrease of asphalt binder.

PP = index price of asphalt binder per ton at placement date, and

PB = prevailing index price of asphalt binder per ton as specified in the Invitation for Bids or as fixed by D-DOT.

Adjusted Contract unit price due Contractor when price of asphalt binder increases

$$A = B + ( D \times T \times PB )$$

Adjusted Contract unit price due D-DOT when price of asphalt binder decreases:

$$A = B - ( D \times T \times PB )$$

Where:

A= adjusted contract unit price per ton of Hot Mix Asphalt

B = Contract unit price per ton of Hot Mix Asphalt

D = differential percentage expressed as a decimal (F-5 percent or F-15 percent as defined above)

T = Design target asphalt content expressed as a decimal

PB= prevailing index price of asphalt binder per ton as specified in the contract or as fixed by D-DOT.

# **“ATTACHMENT 1”**

## **Fiber Optic cable acceptance testing requirements**

The following acceptance testing shall be performed:

### **1. Factory Testing**

The manufacturer or an independent testing laboratory shall perform the tests listed below. Submit certificates of compliance.

### **2. Compression Test**

The enclosure shall not deform more than 10 percent in its largest cross-sectional dimension when subjected to a uniformly distributed load of 300 pound-force(1335N) at temperature of -1F(-18C) and 100 F (38C). Perform the test after stabilizing at the required temperature for a minimum of 2 hours.

### **3. Impact Test**

The assembled enclosure shall be capable of withstanding an impact of 20.65 foot-pounds (28 Nm) at temperatures of -1 F (-18C) and 100 f(38C). Perform the test after stabilizing the enclosure at the required temperature for a minimum of 2 hours. The enclosure shall not exhibit any cracks or fractures to the housing that would preclude it from passing the water immersion test. There shall be no permanent deformation to the original diameter or characteristic vertical dimension by more than 15 minutes.

### **4. Cable Gripping and Sealing Test**

The cable gripping and sealing hardware shall not cause in an increase in fiber attenuation in excess of 0.05 dB/fiber at 1550 nm when attached to the cables and enclosure assembly. The test shall consist of measurements from 6 fibers, one from each buffer tube or channel, or randomly selected in the case of a single fiber bundle. Take the measurement from the test fibers, before and after assembly to determine the effects of the cable gripping and sealing hardware on the optical transmission of the fibers.

### **5. Vibration Test**

The splice organizers shall securely hold the fiber splices and store the excess fiber. Test the fiber splice organizers and splice –retaining hardware according to

EIA standard FOP-II. Test condition I. The individual fiber shall not show an increase in attenuation in excess of 0.1dB/fiber.

## **6. Fiber optic cable reel acceptance testing**

All fiber shall be pre-tested on the reel prior to installation and a record of testing shall be presented to the representative. Fiber-optic cable shall be tested in accordance with industry standards. An Optical Time Domain Reflectometer (OTDR), as well as a hand-held power meter, shall be used for testing.

## **7. Water Immersion Test**

The enclosure shall be capable of preventing a 10-foot (3m) water head from intruding into the splice compartment for a period of 7 days. Test splice enclosure by placing of the enclosure into pressure vessel and filling the vessel with tap water to cover with enclosure. Apply continuous pressure to the vessel to maintain a hydrostatic head equivalent to 10 feet (3m) on the enclosure and cable. Continue this process for 30 days. Remove the enclosure and open to check the presence of water. Any intrusion of water in the compartment containing the splices constitute a failure.

## **8. Fiber Optic System Testing**

9. The fiber optic testing shall be performed by certified fiber optic technician.

10. Notify the project engineer 48 hours in advance when fiber optic test is scheduled to be performed.

11. Test all fibers for continuity, event losses and total attenuation as follows:

11.1.1. Test each individual fiber for event losses using an OTDR. Conduct the test using the standard operating procedures as defined by the manufacture of the test equipment.

11.1.2. Connect the OTDR and cable with factory patch cord of a length equal to the dead zone of the OTDR. An optional factory fiber box of 325 feet

11.1.3. (100 m) minimum with no splices within the box can be used.

11.1.4. Test each individual fiber for total segment attenuation loss using an optical source/power meter. Conduct test using standard operating procedure as defined by the manufacturer of the test equipment.

- 11.1.5. With the use of an OTDR a test shall be conducted on both the inside and outside ends to insure optical performance and continuity of each fiber end to end.
- 11.1.6. All cable shall be tested at two wavelengths: Multi-mode fibers shall be tested at 850 nm and 1 300 nm. Single mode fibers shall be tested at 1300 nm and 1550 nm.
- 11.1.7. Provide five copies of the test results to the project engineer.
- 11.1.8. Provide copies of the fiber cable traces taken to during the OTDR test on CD for review. Provide electronic files in a universal file format, or with software to view the files.
- 11.1.9. Fiber optic Db/mile loss shall not exceed plus 3 percent of the factory test or plus 1 percent of the cable' s published production loss. The department will consider the error rate for the test equipment in evaluating results.

**12.Event losses for each direction tested shall be limited to the following:**

12.1.1.	EVENT TYPE	ALLOWABLE LOSS
12.1.2.	Fusion Splicing	0.10dB
12.1.3.	ST Connector	0.50 dB
12.2.	Other miscellaneous events	0.10 dB
12.3.	Total loss across the cable	1db/mile (0.62dB/km)

1. Basic Test form requirements

- 1. Date of test
- 2. Name of test personnel
- 3. Model numbers and serial numbers of all equipment
- 4. Dates of last calibration for all equipment
- 5. Test wavelength
- 6. Pulse duration(s) and scale range(s)
- 7. Index of refraction
- 8. Fiber cable type and part number
- 9. Fiber tube and fiber strand number
- 10. Direction of test
- 11. Overall distance
- 12. Attenuation in dB

District of Columbia Department of Transportation  
SPECIFICATIONS FOR TYPE 170 MICROPROCESSOR-BASED  
TRAFFIC SIGNAL CONTROLLER AND CABINET ASSEMBLIES  
DATE OF ISSUE: July 10, 2003

**1.0 GENERAL**

- 1.1 The Contractor shall supply Type 170 Traffic Signal Controller System - Hardware Specifications provided by the Federal Highway Administration, Implementation Package FHWA-IP-78-16, including all subsequent addenda. The controller assemblies shall consist of a type 170E Controller, a cabinet, a cabinet base, and auxiliary equipment necessary for a complete electrical system, all mounted in the controller cabinet. Specifications for auxiliary equipment, which may be purchased separately, are contained within this document. This specification supersedes all previous issues.
- 1.2 All equipment furnished under these specifications shall be of the solid-state design. Use of vacuum gaseous tube or electro-mechanical devices with the equipment is not acceptable unless otherwise indicated.
- 1.3 The equipment to be furnished shall be in compliance with the "Traffic Signal Control Equipment Specifications" published by the State of California, Business, Transportation, & Housing Agency; Department of Transportation (CALTRANS), dated January 1989, and all current Addenda, through Addendum 8, and revisions, except as modified in these specifications. In the event of a conflict these specifications shall prevail.
- 1.4 All components supplied under this contract shall be listed on the CALTRANS Qualified Product List (QPL) that is in effect on the issue date of this invitation. In the case of the enhanced conflict monitor monitor, and 170E controller, the vendor's enhanced monitor and 170E controller shall be listed on the CALTRANS QPL that is in effect on the issue date of this invitation. In the case of the modified 336SS and 332 cabinets, the vendor shall have a standard 336 cabinet, 332 cabinet, or 332A cabinet that is listed on the CALTRANS QPL that is in effect on the **issue date** of this invitation. (All references to 336 shall mean 336SS cabinet). The modified equipment shall be of substantially similar design and production quality, as determined by the District of Columbia or its designated representative, as those standard items that are listed on the CALTRANS QPL. Any other equipment that is not addressed by the CALTRANS TSCES specification that is in effect on the issue date of this invitation is not covered by this requirement. For each piece of equipment that is covered by this requirement, the vendor shall submit a notarized certification the equipment is listed on the QPL that was in effect as of the date of issue of this invitation. Failure to provide this certification shall cause the bid to be rejected as unresponsive. If during the course of the contract, any piece of equipment ceases to be listed on then current QPL, the District may, at its option, require the vendor to provide a suitable replacement that is listed on the then current QPL at no additional cost.
- 1.5 Documentation and Equipment Acceptance
- 1.6 Two (2) manuals shall be supplied with each item.
- 1.7 Manuals shall be printed using a Gothic Legal 12 (or equal size) typeface font, on 8.5 by 11

inch paper. Schematics, layouts, parts list and plan details shall have a minimum font size of

Gothic Legal 18 and may be on 11 by 17 inch sheets, but the sheets must be neatly folded to 8.5 by 11 inch size. The manual shall be bound in durable covers.

- 1.8 Each manual shall include the following:
  - 1.8.1 General Description
  - 1.8.2 General Characteristics
  - 1.8.3 Installation
  - 1.8.4 Adjustments
  - 1.8.5 Theory of Operation
  - 1.8.6 Systems Description (include block diagram)
  - 1.8.7 Detailed Description of Circuit Operation, with Signature Analysis
  - 1.8.8 Maintenance
  - 1.8.9 Preventive Maintenance
  - 1.8.10 Trouble Analysis
  - 1.8.11 Trouble Shooting Sequence Chart
  - 1.8.12 Wave Forms and Description
  - 1.8.13 Voltage Measurements
  - 1.8.14 Alignment Procedures
  - 1.8.15 Parts list (to include circuit and board designation, part type and class, power rating and component manufacturer and original manufacturer's part number.
  - 1.8.16 Electrical Interconnection Drawing.
  - 1.8.17 Schematic and Logic Diagram.
  - 1.8.18 Assembly drawings and a pictorial diagram showing physical locations and identification of each component.
  - 1.8.19 The serial numbers and revision numbers of equipment covered by manuals shall be printed on the front cover of the manuals.
  - 1.8.20 Manuals for the Model 170E Controller Unit, 332 cabinets, 336 cabinets, and all plug in units shall be furnished with the item and enclosed in the shipping container.

1.8.21 Prior to final printing, a preliminary draft of all manuals shall be submitted to the Engineer for

approval. The vendor also shall submit one prototype of each piece of equipment that is being provided. Within 60 days, the District will review the documentation and equipment for compliance with specifications. After the review is complete, the District will notify the vendor of any changes or corrections that may be required. The vendor shall remedy the defect and shall re-submit the equipment and documentation within 10 days. The District will complete subsequent reviews within 45 days. No equipment may be shipped until the District has approved all equipment designs and associated documentation. The District, at its discretion, may cancel the order after any failure of the equipment or documentation to meet specification requirements. No payment shall be made for any equipment or associated shipping costs for any piece of equipment that does not meet specification requirements.

1.8.22 Training.

1.8.23 On orders of 100 or more cabinets, the Contractor selected shall provide experienced instructors and training material in order to present formal classroom as well as "hands-on" training in the operation and maintenance of equipment being supplied as part of this contract.

1.8.24 Two (2) training courses shall be conducted in the area of 170E controller and cabinet operations and 170 controller and cabinet maintenance. Thirty (30) hours of instruction shall be provided for each course. The courses shall be held in the District of Columbia at facilities provided by the District or at leased facilities provided by the Contractor. The courses shall be conducted at a time mutually agreed upon by the District and the Contractor. The training material generated for each course shall contain "hand-outs" for each attendee, which shall serve not only as subject guidance, but also as quick reference material for future use by the students. All course material, in reproducible form, shall be delivered to the Engineer immediately following the course completion.

1.8.25 At least sixty (60) days prior to the commencement of the training courses, the Contractor shall submit to the Engineer, a detailed course curriculum, draft manuals and materials, and a resume of the instructor(s). The Engineer will review the course submittal data within in thirty (30) days and will return his comments to the vendor. The vendor shall make the indicated corrections and re-submit the materials. Training courses shall not commence until thirty (30) days after the Engineer's approval of the course submittals.

1.8.26 The Contractor shall provide fifteen (15) copies of the approved course materials (or copies for all scheduled attendees and two (2) spare copies, whichever is greater) at least fifteen (15) days in advance of the scheduled course.

1.8.27 Each of the two (2) training courses shall consist of five (5) consecutive days of six (6) hours each of classroom and "hands-on" training in accordance with the approved training curriculum. No more than twelve (12) operational and maintenance personnel will attend each course.

1.8.28 Manufacturer's personnel shall conduct two (2) Model 170E Controller training courses. The

courses shall completely cover the operation and maintenance of the controller, cabinet, and all auxiliary equipment. The course shall provide all necessary instruction to ensure complete operations, troubleshooting, and repair training.

### **1.9 Supplementary Equipment Training**

- 1.9.1 When supplemental equipment is required per section 1.6A, the Contractor(s) selected shall provide a one-time minimum of twelve (12) hours of formal classroom as well as "hands-on" training for District of Columbia personnel in the operation and maintenance of equipment being supplied as part of this contract. The training shall be conducted over a period of two (2) consecutive days.
- 1.9.2 Manufacturer's personnel shall conduct Supplementary Equipment Training. The Supplementary Equipment Training shall provide sufficient "hands-on" training for proper application of this equipment in the maintenance of the 170E Controller, Cabinet Assemblies, and Auxiliary Equipment.
- 1.9.3 Training shall be coincidental with the delivery of the first piece of equipment and completed within three (3) months after the first delivery.

## 2. MODEL 170E CONTROLLERS

- 2.1 The Model 170E Controller Units shall conform to the provisions of Chapter 2 of Specification FHWA-IP-78-16, and these Specifications.
- 2.2 The Model 170E Controller Units shall conform to the provisions of the "Traffic Signal Control Equipment Specifications" published by the State of California, Business, Transportation, & Housing Agency; Department of Transportation (CALTRANS), dated January 1989, **and** all current Addenda, through Addendum 8, and Revisions, except as modified in these specifications. In the event of a conflict these specifications shall prevail.
- 2.3 Each controller assembly supplied shall include the following equipment:

<u>Quantity</u>	<u>Description</u>
	Model 336-SS Cabinet with Base Adapter
1	Type 170E HC11 Controller Unit with Program module
1	Pull-out drawer
2	Model 496 modem
2	Fluorescent lamp fixtures
18	Model 200 Switch Packs (Load Switch)
2	Model 204 Flasher Units
2	Enhanced Conflict Monitor Unit (PEEK 225, or approved equal)
4	Model 242 Two-Channel D.C. Isolators
4	Model 222 Two-Channel Loop Detector Amplifiers
4	Cabinet Anchor Rods and Bolts (Only provide with new foundations?)
1	Input File
1	Output File with Hard-wired option
1	Auxiliary Output File with Hard-wired option
1	Power Distribution Assembly (PDA #2) with Circuit Breaker Option
1	Communications Assembly
7	Model 430 "Heavy Duty Relays"
20	Jumper Plugs for Output File Flash Programming (12 Red, 4 Yellow, 4 White)
1	STEP Diagnostic Program with Manuals
1	LADIAG R3F Diagnostics with Manuals

- 1 PC Downloading cable
- 1 PC Extension cable – to extend PC Downloading cable

## **2.4 170E HC11 Controller Unit**

- 2.4.1 This specification pertains to the 8HC11 CPU Module and Model 412HC Program Module.
- 2.4.2 The model 170E traffic controller unit shall meet all requirements of this specification.
- 2.4.3 The 68HC11 CPU board shall replace the standard CPU module for the Model 170E controller. It shall use a Motorola 68HC11F1 microprocessor instead of a Motorola 6802 microprocessor.
- 2.4.4 The 412HC Program Module shall be a non-functional Program Module that will be used in place of the standard Model 412C Program Module
- 2.4.5 The 68HC11 based CPU Module shall use a Motorola 68HC11F1 MPU to replace the existing 6802 MPU-based CPU module installed in standard 170E controllers. The MPU shall operate at a crystal-controlled frequency of 9.8MHz. The MPU chip shall be socket mounted in an AMP PLCC socket #821547-1 series HPT or equal.
- 2.4.6 All components on the 68HC11 CPU module and the module in its entirety shall be Year 2000 compliant.
- 2.4.7 The 68HC11 CPU Board shall have four (4) 68B50 Asynchronous Communications Interface Adapters (ACIA). The 68B50 communication IC's shall be used and shall operate with a crystal frequency of 9.8 MHz. Each ACIA shall have individual jumpers to select 5 different communication baud rates -1200, 2400, 4800, 9600, 19,200, and 38,400 bps. There shall be no IRQ inhibit jumpers provided; therefore, all ACIAs shall be active. Programs should be written to initialize the four communications ACIA chips upon startup. An IRQ status register shall be provided that conforms to the provisions of the "Traffic Signal Control Equipment Specifications" (TSCES) published by the State of California, Business, Transportation, & Housing Agency; Department of Transportation (CALTRANS), dated January 1989, and all current Addenda, through addendum 8.
- 2.4.8 It shall be possible to swap ports 2 and 3 by means of a Port Swap jumper on the 68HC11 CPU Board.
- 2.4.9 EPROM and RAM shall be resident on the CPU board, and shall be socket mounted. The EPROM socket shall be a 32-pin ZIF force Device. The RAM socket shall be a 28 pin Augat 828 series or equal. The EPROM shall be a type 27C010 or Engineer approve equal.
- 2.4.10 RAM will be continuous from locations \$0000 to \$6FFF. RAM shall be a ZERO

power device exclusively. The RAM on the 68HC11 CPU Board shall be a zero power device with a Real Time Clock. The Real Time Clock address shall be in the I/O map at locations \$7FF8 to \$7FFF. The following System Address map shall be supported.

ADDRESS	FUNCTION	SIZE (BYTES)	BANK MODE	DUAL PORT RAM
0000-6FFF	NVRAM	28K	NA	DISABLED
0000-5FFF	NVRAM	24K	NA	ENABLED
6000-6FFF	DUAL PORT RAM	4K	NA	ENABLED
7000	LOCATION SWITCH	1	NA	NA
7001	MCU REGISTERS	1	NA	NA
7002	PORT G	1	NA	NA
7003-7009	MCU REGISTERS	7	NA	NA
700A	FEATURE SWITCH	1	NA	NA
700B-705F	MCU REGISTERS	85	NA	NA
7060-73FF	VOLATILE CPU RAM	~1K	NA	NA
7400	DTA MINUTES	1	NA	NA
7401-740A	I/O	10	NA	NA
740B-740E	NOT USED	4	NA	NA
740F	DTA SECONDS	1	NA	NA
7410-7417	ACIA 1 TO 4	8	NA	NA
7418-74FF	RESERVED	232	NA	NA
7500-7507	RESERVED	8	NA	DISABLED
7500-7507	DPRAM SEMAPHORES	8	NA	ENABLED
7508-75FE	RESERVED	247	NA	NA
75FF (READ)	IRQ STATUS PORT	1	NA	NA
75FF (WRITE)	RTC RESET	1	NA	NA
7600-7FF7	NVRAM	~2K	NA	NA
7FF8-7FFF	NVRAM (REAL TIME) CLOCK/CALENDAR	8	NA	NA
8000-FFFF	PROM	32K*	DISABLED	NA
8000-FFFF	PROM	32k*	ENABLED	NA

Bank Switched

2.4.11 A jumper select shall be provided to switch locations \$6000 to \$6FFF from Internal to External mode for access to the remote Dual Port location. The status of the jumper position shall be read on the IRQ register-bit five (5). When an enhanced Program Module is used with this system, it will only have access to addresses \$6000 through 6FFF for dual port operation.

- 2.4.12 The CPU module shall support 32K x 8 and 128K x 8 EPROM devices. EPROM size shall be jumper selectable.
- 2.4.13 When using a 128K EPROM, a bank switch shall be enabled with the EPROM memory system. This bank switch shall function by moving to the upper 64K segment of the EPROM. This bank switch jumper controls address line A16. The bank shall be activated by a write to location \$7002 (directly connected to Port G on 68HC11 MPU), which will cause memory to go to the upper 64K of the 128K EPROM. This will enable an extra 32K of EPROM memory via bank switching. The status of A16 will read on the IRQ status register-bit six (6).
- 2.4.14 Feature and location switches shall be provided on the front portion of the 68HC11 CPU board. Switch Actuators shall be accessible from the front of the controller when the controller door is open. It shall be possible to set the Location and Feature DIP switches without removal of the CPU module. Each switch shall be an 8-position front reading dip switch. The Location Switch shall be mounted above the Feature Switch.
- 2.4.15 The Location and Feature switches shall be decoded as follows: Features switch shall be addressed at \$700A-Port E. Location Switches shall be addressed at \$7000-Port A. A header shall be provided near the front of the module for the SPI and serial interface pins.
- 2.4.16 It shall be possible to select whether the controller uses RAM on the CPU board or on the Program Module for memory functions in address range \$6000 to \$6FFF. The selection shall be made by making the appropriate jumper setting. If the jumper is set to the internal position, the CPU shall use the NORVRAM on the CPU module for operations in the address range of \$6000 to \$6FFF. If the jumper is set to the external position, the CPU shall use the RAM on the program module for operations involving address range \$6000 to \$6FFF.
- 2.4.17 Each CPU Board shall be furnished with a Dallas DS1744 or equal Non-Volatile RAM with Real Time Clock. The Real Time Clock components shall be Year 2000 compatible.
- 2.4.18 There shall be one LED indicator located on the front of the CPU board, which shall be controlled via a software output of Port G bit 3.
- 2.4.19 The +12VDC, +5VDC and -12VDC voltages input in the CPU board shall have transorb protection.
- 2.4.20 It shall be possible to map all memory locations to the 68HC11 CPU board. Manufacturer shall configure the 68HC11 CPU board to support the following:
- Use 27C010 EPROM on CPU Board

- Map all NOVRAM on CPU Board
- Map \$6000-\$6FFF Memory to CPU Board

2.4.21 Each CPU board shall be furnished with two blank 27C010 EPROMs.

2.4.22 The 68HC11 CPU board shall fit and operate correctly in standard McCain and Safetran 170E controllers.

2.4.23 The 68HC11 CPU board shall be compatible with the 68HC11 versions of BI Tran Systems Programs H215 and H233, as used in the District of Columbia. It shall not be necessary to use a Program Module with the BI Tran 215 and 233 programs in use in the District of Columbia

2.4.24 Each Model 170E controller shall be provided with a 412HC nonfunctional PROM module.

2.4.25 The 412HC PROM module shall be similar in appearance and construction to a Model 412C program module, except that it shall have no electronic components.

2.4.26 At a minimum, the 412HC shall consist of an unpopulated printed circuit board, a front panel, and a handle. The 412HC11 module have the legend “412HC” permanently silk-screened on the outside of the module. The legend for the module number shall be a minimum of 10 mm high.

2.4.27 A legend indicating the function of the Location and Feature switches shall be silk screened on the upper left corner of the 412HC module.

Legend for Feature Switch	
Legend	Address
SU-1	7000 Bit 0
SU-2	7000 Bit 1
SU-3	7000 Bit 2
SP-1	7000 Bit 3
SP-2	7000 Bit 4
SP-3	7000 Bit 5
IF-1	7000 Bit 6
IF-2	7000 Bit 7

Legend for Location Switch	
Legend	Address
ADDR 1	7001 Bit 0
ADDR 2	7001 Bit 1
ADDR 4	7001 Bit 2
ADDR 8	7001 Bit 3
DET	7001 Bit 4
ACT	7001 Bit 5
INT-S	7001 Bit 6
INT-M	7001 Bit 7

The 412HC module shall not be equipped with a DB-9 serial connector. The DB-9 connector for port 4 shall be mounted on the front chassis of the Model 170E controller.

2.4.28 All markings must be permanently silk-screened on the 412HC program module. No adhesive labels or dry-transfer may be used.

2.4.29 Provide two (2) spare modules for every ten (10) model 170E –HC11 controllers supplied.

- Input Board
- Output Board
- CPU Board
- Modem
- Utility (Display)Board
- Power Supply Module

### **3. MODEL 336-SS CABINETS**

- 3.1 This section defines the specifications applicable to the Model 336-SS cabinets with base adapters. All cabinets shall comply with the provisions of Specification FHWA-IP-78-16 and CALTRANS Traffic Signal Control Equipment Specification (TSCES), except as modified herein. Cabinet and adapter dimensions are shown in the separately attached Exhibits 1 and 3. Two types of base adapters will be provided.
- 3.2 The Model 336-SS cabinet shall be a weatherproof cabinet with dimensions shown in the Exhibits. The cabinet top shall be slanted to right side, side that is 90 degrees from front and rear, to prevent standing water.
- 3.3 The cabinet and doors shall be fabricated from 0.125-inch minimum thickness sheet aluminum. All exterior seams for cabinet and doors shall be welded. All exterior welds shall be ground smooth. All edges shall be finished to a radius of 0.025-inch minimum.
- 3.4 Cabinet fabrication shall conform to the requirements of ASTM Designation: B 209 for 5052-H32 aluminum sheets.
- 3.5 Welding on cabinets shall be done by the gas metal arc (MIG) or gas tungsten arc (TIG) process using bare aluminum welding electrodes. Electrodes shall conform to the requirements of the American Welding Society (AWS) A5.10 for ER5356 aluminum alloy base welding electrodes.
- 3.6 Procedures, welders, and welding operators for welding on aluminum shall be qualified in accordance with the requirements of AWS B3.0, "Welding Procedure and Performance Qualification", and to the practices recommended in AWS C5.6.
- 3.7 The surface of each aluminum cabinet shall be finished to conform to the requirements of Military Specification MIL-A-8625C ("Anodic Coatings for Aluminum and Aluminum Alloys") for a Type II, Class I coating, except that the anodic coating shall have a minimum thickness of 0.0007 inch and a minimum coating weight of 27 milligrams per square inch. Prior to applying the anodic coating, the cabinets shall be cleaned and etched as follows:
  - 3.7.1 Clean by immersion in inhibited alkaline cleaner such as Oakite 61A or Diversey 909, or equivalent, six to eight ounces per gallon, 160°F for five minutes.

- 3.7.2 Rinse in cold water.
- 3.7.3 Etch in a solution of sodium fluoride, one and one-half ounces plus sodium hydroxide, four to six ounces per gallon, at 140° to 150°F for 15 minutes.
- 3.7.4 Rinse in cold water.
- 3.7.5 De-smut in a 50 percent by volume nitric acid solution at room temperature for two minutes.
- 3.7.6 Rinse in cold water.
- 3.7.7 The anodic coating shall be sealed in a five percent aqueous solution of nickel acetate (pH 5.0 to 6.5) for 15 minutes at 208° to 212°F.
- 3.7.8 The cabinet shall have single front and rear doors, each equipped with a lock. When each door is closed and latched, the door shall be locked. The latching handles shall be removable. The operating handle shall be zinc-plated steel with a 7.5 inch overall length and provided with a 5/8 inch Allen-type hex head. The cabinet doorframe shall be double-flanged out on all four sides and shall be provided with strikers to hold tension on and form a firm seal between door gasketing and cabinet doorframe. The flange width shall be a minimum of 1/2 inch. The depth of the double flange shall be a minimum of one inch from the outside edge to the cabinet surface. The dimensions of the cabinet door opening shall be as shown in the Exhibits. Cabinet locks shall be the solid brass, 6-in tumbler, rim-type. The locks shall have rectangular, spring-loaded bolts. The bolts shall be 0.375-inch long and 0.75-inch wide by 0.375-inch thick (dimension tolerance is  $\pm 0.125$ -inch). The locks shall be left-hand on the front door and right-hand on the rear door. Keys shall be removable in the locked position only. The lock shall be rigidly mounted. The front portion of the lock shall extend 0.25-inch to 0.375-inch beyond the outside surface of the door. The locks shall be of custom keying to be determined by Contractor in consultation with DDOT.
- 3.7.9 Two keys shall be furnished with each cabinet for the cabinet door lock. A total of two removable handles shall be furnished per cabinet. Keys and handles shall not be interchangeable with keys and handles provided with existing cabinets. Keys shall be distinctively shaped as compared with standard number 2 or 3 keys. A ring shall be welded to the end of each door handled that allows placement of the handle on a minimum 3/16" tether or key ring. See Appendix B for alterations to the locking components to support the electronic cabinet security lock.
- 3.7.10 The latching mechanism shall be a 3-point draw roller type. Push rods shall be turned edgewise at the outward supports and shall be 0.25-inch by 0.75-inch, minimum. Supports shall be 0.105-inch steel, minimum. Rollers shall have a

minimum diameter of 0.375-inch and shall be equipped with ball bearings and nylon wheels. The center catch shall be fabricated of 0.1875-inch steel, minimum. See Appendix B for alterations to the locking components to support the electronic cabinet security lock.

- 3.7.11 The Model 336-SS door's hinging shall be assessed by the Contractor but be comprised of a minimum of four butt hinges. Each hinge shall have a fixed pin. Front and rear doors shall be provided with catches to hold the door open at 90 degrees and 180 degrees, plus or minus 10 degrees. The catches shall be capable of holding the door open at 90 degrees in a 60-mph wind at an angle perpendicular to the plane of the door. The front door shall open from the left, and the rear door shall open from the right when facing the doors. Door hinges, pins, and bolts shall be made of stainless steel. The hinges shall be bolted to the cabinet. The hinge pins and bolts shall not be accessible to vandals.
- 3.7.12 The police panel door shall be equipped with a lock keyed for a master police key. The police panel shall be mounted on the rear door of the cabinet. Police panel assembly shall extend no further than 1.5 to 2 inches from the back of the rear door. It shall be possible to store the removable cabinet door handle in the police panel.
- 3.7.13 Two keys shall be furnished with each cabinet for the police lock. Each police key shall have a shaft at least 1-3/4 inches in length. The lock and the key shall not match those of the existing controller cabinets.
- 3.7.14 A standard Electronic Industries Association (EIA) 19-inch rack cage shall be installed inside the cabinet for mounting the controller unit, pull-out hinged-top drawer, input file, power supply, output file, power distribution assembly, communications assembly and other devices as indicated in Exhibit 1. The EIA rack portion of the cage shall consist of two (2) pairs of full length, continuous, adjustable equipment mounting angles of 0.1345-inch nominal thickness zinc-plated steel tapped with 10-32 threads with EIA universal spacing. The angles shall comply with Standard EIA RS-310-B. The angles shall be supported top and bottom by welded support angles to form a cage.
- 3.7.15 The cabinet shall have ramps on either side level with the bottom edge of the door opening to provide horizontal support for the cage. The cage shall be vertically attached to each side of the cabinet at four points, two at the top and two at the bottom of the rails. Cage and horizontal support mating surfaces shall not be coated in any way to increase resistance of connection to chassis ground.
- 3.7.16 Two zinc-plated controller unit supporting angles extending from the front to the back rails shall be supplied to support the controller unit. The angles shall be designed to support a minimum of 50 pounds each. The horizontal side of each angle shall be a minimum of 3.0 inches. The angles shall be mounted 7.25 inches,

minimum, from the top of the EIA rails and shall be adjustable vertically to ensure at least a 7.25-inch vertical opening for mounting the Model 170E Controller Unit.

- 3.7.17 Gasketing shall be provided on all door openings and shall be dust-tight. Gaskets shall be 0.25 inches minimum thickness closed-cell neoprene and shall be permanently bonded to the metal. The mating surface of the gasketing shall be covered with a silicone lubricant to prevent sticking to the mating surface.
- 3.7.18 A pull out hinged-top drawer, having sliding tracks, with lockout and quick-disconnect feature, such as a Vent-Rak Retractable Writing Shelf, #D-4090-13 or equivalent – shall be provided as shown in the cabinet drawings. The pull-out drawer shall extend a minimum of 355 mm. It shall be possible to lift the hinged top to permit storage of documents and other small articles in the interior of drawer. The hinged top shall be covered with Formica® or other equivalent smooth, durable, chemical resistant plastic sheet. The minimum interior dimensions of the drawer shall be 25.4 mm high x 330.2 mm deep x 406.4 mm wide. The drawer shall be capable of supporting a weight of 20 kg when fully extended.
- 3.7.19 Bottom of Cabinet Base Adapter shall mate with existing foundation and temporary concrete portable base and top of Cabinet Base Adapter shall mate with cabinet – see and confirm dimensions in Exhibits 1 through 4.

### **3.8 CABINET VENTILATION REQUIREMENTS**

- 3.8.1 Each cabinet shall be equipped with **two** electric fans with ball bearings and a capacity of at least 100 cubic feet of air per minute for each. Each fan shall be independently wired of one another and each shall have separate thermostat control.
- 3.8.2 Each fan shall be mounted within the cabinet and vented out the top of the cabinet.
- 3.8.3 Each fan shall be thermostatically controlled and shall be manually adjustable to turn on between 33°C and 65°C with a differential of not more than 6°C between automatic
- 3.8.4 turn on and turn off. The cabinet fan circuits shall be fused at 125 percent of the amperage of the fan motor. The fuse holders shall be easily accessible from the front of the cabinet. It shall not be necessary to reach into the cavity above the 170E controller, or other equipment, in order to access the fuse holders for the fans.
- 3.8.5 Intakes (including filters) shall be modified from Caltrans requirements to pass a minimum of 100 cubic feet of air per minute per intake, with intakes on both the front and rear doors. The exhaust area shall accommodate the intake areas.

### **3.9 CABINET LIGHTING AND DOOR OPEN SWITCHING REQUIREMENTS**

- 3.9.1 Fluorescent lamps shall be installed in the top of the front and rear of the cabinets. Switches shall be installed on the front and rear doors for both lamp control and door open alarms. Opening of either or both doors shall illuminate both lights. Opening of either door shall provide a single ground true input signal to the 170E controller.
- 3.9.2 Each fluorescent lamp and switch shall be equipped with noise suppression devices. Activation of the fluorescent lamps and associated switches shall not cause any disruption of the 170E controller or any other electrical or electronic device in the cabinet. The Contractor shall install sufficient RFI and surge suppression equipment to assure that operation of the fluorescent lamps shall not disrupt the operation of other equipment in the cabinet.
- 3.9.3 Fluorescent lamps and associated ballasts shall be rated for high output in cold environments, providing high light output in ambient temperature of -25° C.
- 3.9.4 The cabinet lamp circuit shall be fused. The fuse holder shall be easily accessible from the front of the cabinet. It shall not be necessary to reach into the cavity above the 170E controller, or other equipment, in order to access the fuse holder for the cabinet lamps. The fuse holders and switches shall not interfere with the removal of the cabinet rack assembly.

### **3.10 CABINET ASSEMBLIES**

#### **3.10.1 INPUT FILE**

- 3.10.2 The input file shall utilize 5.25 inches of rack height. The input file shall inter-mate with and support 14 input devices as indicated in Figure 3.2.
- 3.10.3 The input file shall provide card guides (top and bottom) and a 22-pin, single-readout, edge-connector centered vertically for each detector. The input file shall allow air circulation through the top and bottom.
- 3.10.4 Pins F and W for each slot shall terminate on the terminal blocks mounted on the rear of the input file and shall connect to the proper controller unit inputs in the connector C7P. Common grounding of output emitters shall be permitted and the Bus brought out to C7P.
- 3.10.5 Conductors from connector C1 to the input file shall be terminated at C7S. A dummy plug shall be mounted on the cabinet wall to secure C7S when an input file is not used in the cabinet. Captive screws and sockets shall be provided for securing C7S to the dummy receptacle or C7P located on the input file. C7S pins shall be removable by use of a single pin extractor. Connector C7 shall be a 37 Pin "D" type connector, wired in accordance with Table 3.2.
- 3.10.6 The Input File shall be equipped with a connector to supply power to terminal block T16. The connector shall be designated as connector C8P. The connector shall be a Waldom-Molex 3 conductor connector. The male end shall be connected to terminal board T16. A mating female connector shall be installed in the cabinet and shall be wired according to Table 3.1 and shall be designated as connector C8S: Where an input file is installed in a cabinet, connector C8P shall be connected to C8S. Where no input file is installed a dummy plug shall be inserted into connector C8S to prevent inadvertent exposure to the conductors in C8S. Each cabinet shall be supplied with a dummy plug that is attached to the cabinet housing via a non-conducting tether.
- 3.10.7 Field wire terminal blocks shall be mounted vertically on the back of the assembly. The blocks shall be eight (8) position barrier type with marker strips, and shall be provided 8/32 x 5/16 inch minimum nickel-plated brass binder head screws and nickel-plated brass inserts.
- 3.10.8 The edge connectors shall be double-sided connectors with the numbered side of each pin shorted to its respective lettered side internally.
- 3.10.9 The card guide shall begin  $1.0 \pm 0.5$  inches back from the front face of the file.
- 3.10.10 The input file shall be provided with marker strips to identify items in the file. The marker strips shall be made of a material that can be easily and legibly written on

using a pencil or ballpoint pen. Marker strips shall be located immediately above and below the items they are to identify.

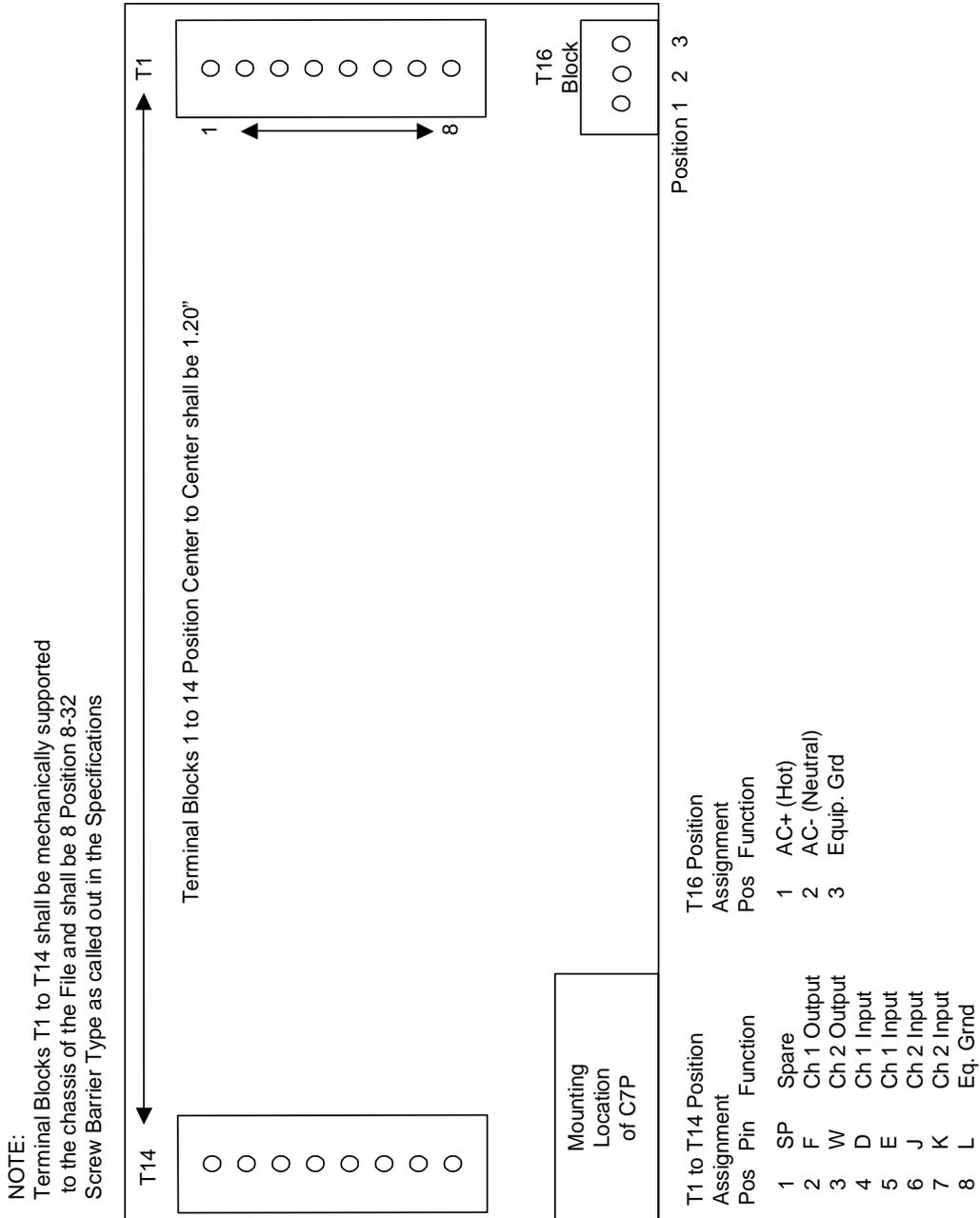
- 3.10.11 With the exception of connectors C8-P and C8-S, input files provided under this Contract shall be electrically and mechanically interchangeable with input files installed in existing cabinets in use with the District.

Table 3.1 Connector C8 Wiring	
Position	Function
1	AC+
2	AC-
3	Ground

The input file shall be wired and connected as shown on Figure 3.2.

<b>TABLE 3.2 - C7 CONNECTOR WIRING</b>		
<b>SOURCE</b>	<b>VIA</b>	<b>DESTINATION</b>
IF-1F	1	C1-56
IF-1W	2	C1-60
IF-2F	3	C1-39
IF-2W	4	C1-43
IF-3F	5	C1-58
IF-3W	6	C1-62
IF-4F	7	C1-41
IF-4W	8	C1-45
IF-5F	9	C1-55
IF-5W	10	C1-59
IF-6F	11	C1-40
IF-6W	12	C1-44
IF-7F	13	C1-57
IF-7W	14	C1-61
IF-8F	15	C1-42
IF-8W	16	C1-46
IF-9F	17	C1-67
IF-9W	18	C1-69
IF-10F	19	C1-68
IF-10W	20	C1-70
IF-11F	21	C1-47
IF-11W	22	C1-48
IF-12F	23	C1-49
IF-12W	24	C1-50
IF-13F	25	C1-51
IF-13W	26	C1-52
IF-14F	27	C1-53
IF-14W	28	C1-54
N/C	29	N/C
N/C	30	N/C
N/C	31	N/C
N/C	32	N/C
N/C	33	N/C
IF-1-IF-14A	34	DC Ground
IF-1-IF-14 B	35	+ 24 VDC
IF-1-IF-14 C	36	C1-102 Detector Reset
IF-1-IF-14 H & W	37	C1-14 Input DC Ground

Figure 3.2 Input File Layout



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### **3.11 POWER DISTRIBUTION ASSEMBLY**

3.11.1 A type PDA#2 power distribution assembly shall be furnished and mounted on the EIA 19-inch rack utilizing seven inches of rack height. All equipment shall be readily accessible for ease of replacement. The depth of the assembly shall not exceed 10 inches from the front rails including terminal blocks.

3.11.2 The power distribution assembly shall be provided with marker strips to identify flasher units in the assembly. The marker strip shall be of a material that can be easily and legibly written on using a pencil or ballpoint pen. Marker strips shall be located immediately below the flasher units they are to identify.

3.11.3 The following equipment shall be provided with the power distribution assembly:

- One Duplex NEMA 5-15R Controller Receptacle
- Two Duplex NEMA 5-15R Equipment Receptacle (one with GFI)
- One 1 Pole 50 Amperes minimum, 120 VAC Main Circuit Breaker
- Six Single Pole, 15 Amperes, 120 VAC Signal Bus Circuit Breakers with Auxiliary Switch Feature and Medium Trip Delay Characteristic
- One 2 Pole Ganged, 20 Amp, 120 VAC Flash Bus Circuit Breaker
- One Mercury Contactor - rated minimum 60 Amperes, 120 VAC
- Two Model 204 Flasher Units and Sockets
- One Model 206 Power Supply Module and Socket
- One Model 430 Heavy Duty Relay & Socket (Transfer Relay)\*
- One AUTO/FLASH Control Switch
- One Flash on Indicator Light
- Three 10 Position Terminal Blocks T1, T2 & T4
- 4 Position TBK T3

3.11.4 The six signal circuit breakers shall be wired and routed per the "Circuit Breaker Option One Line Diagram" of the CALTRANS Traffic Signal Control Equipment Specifications" (TSCES), published January 1989, and all subsequent addenda. The auxiliary switch in each breaker shall be open when the circuit breaker contacts are closed. The auxiliary switches on the signal circuit breakers shall be wired in parallel so that the tripping of any load switch breaker shall energize the mercury contactor coils, flash transfer relay coils, and the Flash On indicator. The auxiliary switch contacts shall be rated at 5 Amperes, 120 VAC. The auxiliary switch terminals shall be of the 'fast on' type.

3.11.5 All circuit breakers shall have interrupting capacities in accordance with the current edition of the NFPA National Electrical Code. Notwithstanding the minimum

requirements established by the National Electrical Code, all circuit breakers shall have sufficient interrupting capacities to effectively and safely halt the flow of current during any short circuit event.

- 3.11.6 The Main Circuit Breaker shall be rated for 50 Amperes at 120 VAC. The Equipment receptacles shall be NEMA 5-15R duplex type.
- 3.11.7 The Front Panel equipment receptacle shall have ground-fault circuit interruption as defined in the National Electrical Code. Circuit interruption shall occur on 6 milliamperes of ground-fault current and shall not occur on less than 4 milliamperes of ground-fault current.
- 3.11.8 An "Auto/Flash" switch shall be provided which, when placed in "Flash" position (down), shall energize the Mercury Contractor (MC) Coil. When the switch is placed in the "Auto" position (up), the switch packs shall control the signal indications. The switch shall be a single-pole, single-throw toggle switch rated for 20 amperes at 120 volts AC.
- 3.11.9 A lamp labeled "Flash Operation" shall be provided on the front panel of the assembly. The Flasher Unit Output shall illuminate the lamp whenever the cabinet is in flash.
- 3.11.10 The controller unit receptacle shall be a NEMA Duplex Type 5-15R mounted on the back of the cabinet assembly. A second NEMA Duplex Type 5 15R receptacle shall be provided on the rear of the power distribution assembly. The receptacle shall be labeled 'Equipment' and shall be wired to the load (protected) side ground fault receptacle on the front of the power distribution assembly.
- 3.11.11 Terminal blocks shall be provided and mounted on the back panel of the assembly. The blocks shall be of the same type as specified for signal field wire terminal blocks. Two spare positions shall be provided. All conductors from the power distribution assembly routed to the cabinet wiring shall be connected to the terminal block on the common side, except for the AC power conductor between the service terminal block and main circuit breaker. All internal conductors terminating at the blocks shall be connected to the other side of the blocks. Terminal position assignments shall be as shown on the plans.
- 3.11.12 The Flash Relays shall conform to the provisions in Chapter 17, "Heavy Duty Relays, Model 430," of Specification FHWA-IP-78-16 and CALTRANS Traffic Signal Control Equipment Specifications (TSCES)
- 3.11.13 A leakage resistor, which shall permit a small amount of current to pass through the relay coil if the contacts remain closed after the coil circuit is opened, shall be installed across the terminals of the relay socket to overcome the residual magnetism effects.

- 3.11.14 A stand alone fully enclosed NEMA 5-15R duplex receptacle shall be provided for red-light camera power. The receptacle shall be wired to the load side of the

Auxiliary Circuit Breaker. The location of the receptacle shall consider convenient access, proximity to other 120VAC terminal blocks and safety, such as mounted to the rack or service panel. The GFI shall not affect red light camera receptacle power. Service Panel space for two (2) additional fully enclosed NEMA 5-15R duplex receptacles shall be considered for future ITMS equipment. Cabinet layout drawings shall depict the position of the receptacles. The Power One-Line Diagram shall also depict the inclusion of the receptacles. The receptacles shall be wired to the load side of the Auxiliary Circuit Breaker. The location of the receptacles shall consider convenient access, proximity to other 120VAC terminal blocks and safety. The GFI shall not affect receptacle power. In conjunction with Section 5.4.2.6, the Contractor shall consider whether an additional Auxiliary Circuit Breaker shall be required in the cabinet.

### **3.12 OUTPUT FILE W/HARDWIRED MOTHERBOARD**

- 3.12.1 Nylon card guides shall be provided to support the switch packs and the monitor unit.
- 3.12.2 The output file shall utilize 10.5 inches of rack height and shall be capable of containing twelve switch packs, four flash transfer relays, and the monitor unit. Four Model 430 flash transfer relays, one Enhanced Monitor Unit, one isolation relay, and one logic relay shall be furnished with each output file.
- 3.12.3 The output file shall be “hard-wired”. With the exception of the red interface board for the conflict monitor, printed circuit boards shall not be used in the construction of the output file.
- 3.12.4 The output file shall be provided with marker strips to identify items in the file. The marker strips shall be made of a material that can be easily and legibly written on using a pencil or ballpoint pen. Marker strips shall be located immediately below the item they are to identify. Field terminal strips on the rear of the output file shall be permanently labeled to show Switch Pack number, Phase number, and Channel (G, Y, R) for each field terminal. In addition, a vertical white marker strip, at least 0.25” wide, shall be placed adjacent to each terminal strip.
- 3.12.5 Switch pack connectors, monitor unit connectors, flash transfer relay sockets and flash programming connectors shall be accessible from the back of the file without the use of tools.
- 3.12.6 Field wire terminal blocks shall be mounted vertically on the back of the assembly. The three terminal blocks shall be the 12-position type.
- 3.12.7 The controller unit outputs to the output file shall be connected through Connector C4.

3.12.8 The C6P receptacle located on the output file shall be used to inter-mate with the green

and yellow output signals of the auxiliary output file. It shall be a 16 pin male circular round connector, AMP Series 1 CPC Standard Sex Square Flange Receptacle. The receptacle on the output file shall be a C6P connector shall be wired to Channel 13 through 18 of the Enhanced Conflict Monitor in accordance with the pin assignments shown in Table 3.4.

3.12.9 The C6A receptacle located on the output file shall be used to inter-mate with the red output signals of the auxiliary output file. It shall be a 16 pin male circular round connector, AMP Series 1 CPC Standard Sex Square Flange Receptacle. A pin shall be installed in the Pin 16 location of the C6A connector on the output file. There shall be no connection to this pin. The C6A connector shall be wired to Channel 13 through 18 of the Enhanced Conflict Monitor in accordance with the Pin Assignments shown in Table 3.5

3.12.10 The red and yellow signals circuits of all switch packs shall be available at a Molex Type 1375 receptacle which shall inter-mate with a Molex Type 1375 plug to allow flash programming. Plug connectors, with programming jumpers, shall be furnished for each circuit to allow red or yellow flash programming. Connectors shall be readily accessible without the removal of any other equipment.

3.12.11 The monitor connector shall be a rigidly supported printed circuit board edge connector, having two rows of 28/56 independent double readout bifurcated contacts on 0.156-inch centers. The connector shall inter-mate with the Enhanced Monitor Unit. The monitor edge connector shall be “hard-wired” to the rest of the output files. Printed circuit boards shall not be used to connect the edge connector of the conflict monitor.

3.12.12 It shall be possible to remove the monitoring device without causing the intersection to go into flashing operation. The cabinet shall be wired so that with the front cabinet door closed and with the monitor unit removed, the intersection shall go into flashing operation. The cabinet shall contain a conspicuous warning against operation with the monitor unit removed.

3.12.13 The monitor unit connector shall be wired in accordance with the pin assignment shown on the plans and the tables in Section 3 of these specifications. Output files supplied under this contract shall be fully compatible with Enhanced monitors currently in use in the District.

3.12.14 The monitor unit compartment including the housed Enhanced Monitor unit shall extend no further than 1.25 inches in front of the 19-inch rack front surface. The switch pack socket connector front surface shall be no more than 8.5 inches in depth from the front surface of the output file.

<b>TABLE 3.4 – CONNECTOR C6P WIRING</b>		
<b>SOURCE</b>	<b>Contact</b>	<b>DESTINATION</b> Enhanced Monitor Unit Pin Assignment
SWPK 13-Pin 7	1	2
SWPK 13-Pin 5	2	8
SWPK 14 Pin 7	3	5
SWPK 14-Pin 5	4	11
SWPK 15-Pin 7	5	C
SWPK 15-Pin 5	6	K
SWPK 16-Pin 7	7	F
SWPK 16-Pin 5	8	N
SWPK 17-Pin 7	9	14
SWPK 17-Pin 5	10	P
SWPK 18-Pin 7	11	17
SWPK 18-Pin 5	12	T
N/C	13	N/C
N/C	14	N/C
N/C	15	N/C
Keying Plug	16	See Note *

\* A Keying Plug shall be installed in position 16 of the C6P connector from the auxiliary output file.

- 3.12.15 Red Monitor Program Card - A red monitor program card shall be mounted on the rear of the output file assembly. It shall connect allow the user to select whether the red signal going to the monitor comes from the load switch red output or from an AC+ source. This allows unused channels to be connected to the AC+ source. It shall be possible to individually program each of the eighteen load switch red channels. A removable jumper shall be provided for each channel. The jumper shall have 2 male pins. It shall mate with a three pin female receptacle on the red monitor program card that shall allow the user to select AC+ or Load Switch Red Output as the source for the conflict monitor red input. A removable clear acrylic access cover shall be provided to protect personnel from accidental contact with the red monitor program card.
- 3.12.16 The red monitor program card shall include a relay that disables the red enable line to the conflict monitor when pin C1-101 from the Model 170E controller is energized, indicating software flash. A jumper, similar to those specified in the preceding paragraph shall be provided to enable and disable this feature.

<b>TABLE 3.5 – CONECTOR C6A WIRING</b>		
<b>SOURCE</b>	<b>Contact</b>	<b>DESTINATION</b> PC Monitor Unit Pin Assignment
SWPK 13-Red	1	P20-Ch 13
SWPK 14 Red	2	P20-Ch14
Locating Pin	3	See note **
SWPK 15 Red	4	P20 Ch 15
SWPK 16-Red	5	P20 Ch 16
SWPK 17-Red3	6	P20 Ch 17
SWPK 18-Red	7	P20 Ch 18
N/C	8	N/C
N/C	9	N/C
N/C	10	N/C
N/C	11	N/C
N/C	12	N/C
N/C	13	N/C
N/C	14	N/C
N/C	15	N/C
N/C	16	See note ***

\*\* A Keying Plug shall be installed in position 3 of the C6A connector from the auxiliary output file.

\*\*\* A Blank Pin shall be installed in Position 16 of the C6A receptacle on the output file. There shall be no connection to this pin.

### **3.13 COMMUNICATIONS ASSEMBLY**

- 3.13.1 The communications assembly shall be furnished and mounted on the EIA 19-inch rack utilizing not more than 5.25 inches (3U) of rack height. All equipment shall be readily accessible for ease of replacement. The depth of the assembly shall not exceed 10 inches from the front rails including terminal blocks.
- 3.13.2 Within the controller cabinet, the communications cable shall be separated from the other cabinet cables and terminated on the communications assembly.
- 3.13.3 The communications assembly shall be provided with marker strips to identify wire pair numbers in the assembly. The marker strips shall be of material that can be easily and legibly written on using a pencil or ballpoint pen.

3.13.4 The following equipment shall be provided with the communications assembly:

- 1 Model R66MI-50 Termination Block with Grounding Bus attached. Grounding bus shall be terminated at the cabinet ground with No. 8 AWG THHN cable.
- 50 bridging clips
- 1 phone jack (stereo 1/4")
- 12 EDCO brand Model COHP 200 Arrestors or approved equivalent
- 6 EDCO brand Model COHP 350 Arrestors or approved equivalent.
- C2 Connector Harness of minimum 48" length, wired neatly and secured to the inside of the cabinet walls or rack, so that enough of the harness is available to connect to the controller and the remainder is out of harms way. Harness shall not be rolled up at back of Communications Assembly.
- The 66-type block shall have its 6 x 50 66-type clips arranged as two (2) rows of 50 x 3. One side of the termination block (50 x 3) shall be used to terminate the incoming cable and the other side of the block (50 x 3) shall be used to terminate the outgoing cable. Fifty 2-position bridging clips shall be furnished with each assembly and shall be made of the same material as the 66-type pushdown clips. The bridging clips shall be reusable.
- The Contractor shall provide suitable terminal strips for connection of Master/Sub-Unit harnesses.

### **3.14 FLASH TRANSFER RELAY**

3.14.1 Flash transfer relays shall conform to the provisions in Chapter 17 of Specification FHWA-IP-78-16, "Heavy Duty Relays, Model 430" and CALTRANS Traffic Signal Control Equipment Specifications (TSCES).

3.14.2 A leakage resistor, which shall permit a small amount of current to pass through the relay coil if the contacts remain closed after the coil circuit is opened, shall be installed across the terminals of the relay socket to overcome the residual magnetism effects.

3.14.3 The coil of the flash transfer relay shall be energized only when the signals are in flashing operation and the police panel "ON/OFF" switch is "ON."

### **3.15 POLICE PANEL**

- 3.15.1 A police panel shall be mounted behind the police panel door. The panel shall contain 2DPDT toggle switches. One (1) switch shall be labeled signals "ON/OFF" and the other shall be labeled "FLASH/AUTOMATIC." The "ON/OFF" switch shall be positioned so that the "ON" position is up. Other components related to the cabinet electronic security lock may be mounted to the police panel. See Appendix B for alterations to the locking components to support the electronic cabinet security lock.
- 3.15.2 The switches shall have contacts rated for 20 amperes at 120 volts AC.
- 3.15.3 The front and back of the panel shall be enclosed with a rigid plastic covering so that no parts having line voltage are exposed.

### **3.16 SIDE PANEL**

- 3.16.1 Two panels shall be provided and mounted on the EIA rack parallel to the cabinet sides.
- 3.16.2 In viewing from the back door, the left-side panel shall be designated as the "Input-Panel," and the right-side panel shall be designated as the "Service Panel."
- 3.16.3 Service Entry Terminal Block terminals shall be protected by a hinged plastic see-through non-conductive flip cover. A mechanism shall be provided to latch the flip cover in an upright position thereby facilitating wiring to the block.
- 3.16.4 A "Red Light Camera Interface Block" shall be mounted to the Service Panel and labeled as indicated herein. The block shall be a four position fuse block, have screw terminal wiring interfaces and hold 3AG fuses with quick-disconnect terminals. The block shall be wired to neutral and ground buses. The block shall accept two sets of green and amber sensing circuits required for the camera operation, but these circuits shall be wired by others.
- 3.16.5 The Contractor shall provide additional terminal blocks for current and future device interfaces for such equipment as advanced vehicle detection (VIDS/RTMS), UPS, over-temperature, door alarm preempt running, LCS, C11 connector harness and other controller interfaces, CCTV and communications equipment on both the Input and Service Panels based on equipment information to be provided by DDOT. Cabinet layout and wiring drawings shall depict the provisions.

### **3.17 MISCELLANEOUS**

- 3.17.1 A minimum of 7.25 inches of EIA rack height and 18 inches of depth (16 inches behind and two inches in front of the mounting ears) shall be provided for the Model 170E Controller Unit.
- 3.17.2 The following equipment shall be completely removable from the cabinet without removing any other equipment and using only a common screwdriver:
- Pull-out Drawer Assembly
  - Power Distribution Assembly
  - Input File
  - Output File
  - Auxiliary Output File
  - Communications Assembly
- 3.17.3 All fuses, circuit breakers, switches, (except Police Panel Switches) and indicators shall be readily visible and accessible when the front door is open.
- 3.17.4 The cabinet shall be delivered mounted on a 0.75-inch thick plyboard-reinforced shipping pallet. The pallet shall be bolted to the cabinet base. The cabinet shall be enclosed in a slipover cardboard packing shell. The cabinet type, purchase order number, shipping date, and serial number shall be clearly printed on the outside of the cardboard cover. A minimum 2" block letters shall be used.
- 3.17.5 All equipment in the cabinet shall be clearly and permanently labeled.
- 3.17.6 Transient suppression shall be provided at the relay bases (across relay coils) and in the fan circuit.

### **3.18 CONNECTORS**

- 3.18.1 Connector C1P shall contain 104 pin contacts and shall inter-mate with connector C1S mounted on the controller unit chassis. Corner guide pins for connector C1P shall be stainless steel and shall be 1.097 inches in length. Corner guide socket assemblies shall be stainless steel and shall be 0.625 inches in length, equipped with a T Handle.
- 3.18.2 Connector C4 shall contain 37 contacts and shall be the circular plastic type with quick connect/disconnect capability and thread assist, positive detent coupling. The plug connector C4P shall be mounted on the output file. Connector blocks for connector C1 pin and socket connectors shall be constructed of diallylphthalate or

better.                    Contacts shall be secured in the blocks with springs of stainless steel.

3.18.3       Connector C6P shall contain 16 contacts and shall be the circular plastic type with quick connect/disconnect capability and thread assist, positive detent coupling. It shall be an AMP Series 1 CPC connector and shall properly intermate with connectors in existing cabinets. The plug connector C6P shall be mounted on the output file and shall mate with connector C6P and harness located on the Auxiliary Output File. Position 3 of the C6P harness and connector from the auxiliary output file shall have a keying plug. The C6P receptacle on the output file and the C6P connector from the auxiliary output file shall be clearly and permanently labeled.

3.18.4       Connector C6A shall contain 16 contacts and shall be the circular plastic type with quick connect/disconnect capability and thread assist, positive detent coupling. It shall be an AMP Series 1 CPC connector and shall properly intermate with connectors in existing cabinets. The plug connector C6P shall be mounted on the output file and shall mate with connector C6A and harness located on the Auxiliary Output File. Position of the C6A receptacle on the output file shall contain a pin, but no connection shall be made to that pin. Position 16 of the C6A harness and connector from the auxiliary output file shall have a keying plug. The C6A receptacle on the output file and the C6A connector from the auxiliary output file shall be clearly and permanently labeled.

### **3.19       CABINET WIRING DIAGRAM**

3.19.1       Two sets of non-fading cabinet wiring diagrams shall be supplied with each cabinet. The diagrams shall be nonproprietary. They shall identify all circuits in such a manner as to be readily interpreted. The cabinet drawing shall show the component layout in an elevation view as viewed from the rear of the cabinet with the left and right cabinet walls shown in their relative positions. The diagrams shall be placed in a heavy-duty side-opening clear vinyl pouch and permanently attached to the front cabinet door. The pouch shall be of such design and material that it provides adequate storage and access to the wiring diagram.

3.19.2       Detailed equipment layout scale drawings and wiring diagrams of all equipment installed in the cabinet shall be submitted to the COTR for review prior to production. Approval by the COTR does not lessen the Contractor's responsibility to meet the specifications.

### **3.20       AUXILIARY OUTPUT FILE**

3.20.1       The auxiliary output file shall utilize 5.25 inches of rack height and shall be capable of containing six switch packs and two flash transfer relays. Two flash transfer relays shall be provided with each auxiliary output file.

3.20.2       One auxiliary output file shall be supplied with each model 336-SS cabinet. One auxiliary output file shall be packed separately and delivered with each model 336-SS cabinet. All necessary harnesses and connectors needed to support operation of the

auxiliary output file shall be installed in each model 336-SS cabinet. Where the cabinet is shipped with the auxiliary output file packaged separately (as with 336-SS cabinets), the connectors shall be secured and all exposed terminals and conductors shall be covered with heat shrink insulation tubing.

- 3.20.3 Nylon card guides shall be provided to support the switch packs.
- 3.20.4 Switch pack and flash transfer relay sockets shall be readily accessible from the back of the file without the use of tools.
- 3.20.5 Field terminal blocks shall be mounted vertically on the back of the file.
- 3.20.6 Controller unit outputs to the auxiliary output file shall be connected through Connector C5.
- 3.20.7 Connector C5P shall be mounted on the left side of the auxiliary output file back plane located to mate with its associated cabinet harness connector C5S. Connector C5 contact assignments shall be as shown on the plans.
- 3.20.8 The red and yellow signal circuits of all switch packs with the exception of load switches 3, 6, 9, 12, 15, & 18, shall be made available at a Molex receptacle/plug connection for flash programming. Each load switch flash programming socket shall have a label that indicates its load switch number (1 to 18). Labeling by phase number is not acceptable.
- 3.20.9 Connectors C6P and C6A and their associated harness shall be wired to the auxiliary output file back plane and shall be used to inter-mate with the C6P and C6A connectors located on the output file. The harness shall be a minimum of two feet in length. Connector contact assignments shall be as shown in Tables 3.4 and 3.5

### **3.21 FLASH TRANSFER RELAY**

- 3.21.1 Flash transfer relays shall conform to the requirements for heavy-duty relays.
- 3.21.2 A leakage resistor, which shall permit a small amount of current to pass through the relay coil if the contact remains closed after the coil circuit is opened, shall be installed across the terminals of the relay socket to overcome the residual magnetism effects.
- 3.21.3 The coil of the flash transfer relay shall be energized only when the signals are in flashing operation.
- 3.21.4 The flash transfer relay shall transfer switch pack output to flash control. Transfer of the flash transfer relay circuit to flash control shall not prohibit the operation of the

controller unit

- 3.21.5 Field terminals on the rear of the auxiliary output file shall be permanently labeled to show Switch Pack Number, Phase Number, Overlap Letter, and Channel (G/Y/R) for each field terminal. In addition, a white marker strip shall be provided to allow additional identification information to be written next to each terminal. The marker

strips shall be made of a material that can be easily and legibly written on using a pencil or ballpoint pen.

### **3.22 CABINET WIRING**

- 3.22.1 Conductors in the controller cabinet between the service terminals and the signal bus breakers including the chassis ground conductor to Power Distribution Assembly shall be size No. 8 AWG or larger.
- 3.22.2 All conductors used in controller cabinet wiring shall be No. 22, or larger, with a minimum of 19 strands. Conductors shall conform to Military Specification: MIL-W-1687D, Type B or better. The insulation shall have a minimum thickness of 10 mils and shall be nylon-jacketed polyvinyl chloride except that conductors No. 14 and larger may be UL Type THHN, with a minimum of seven (7) strands. All conductors carrying 110 VAC or higher voltages shall be No. 14 AWG minimum and shall be sized according to the requirements of the current edition of the NFPA National Electrical code.
- 3.22.3 All conductors shall be labeled. Labels attached to each end of the conductor shall identify the destination of the other side of the conductor.
- 3.22.4 All conductors used in controller cabinet wiring shall conform to the following color-code requirements:
- 3.22.5 The grounded conductors of AC circuits shall be identified by a continuous white color.
- 3.22.6 The equipment grounding conductors shall be identified by a solid green color.
- 3.22.7 The DC logic ground conductors shall be identified by a solid orange color with a colored (except green) stripe.
- 3.22.8 The ungrounded conductors shall be identified by any color not specified above.
- 3.22.9 All cabinet wiring harnesses shall be neat, firm, and routed to minimize cross talk and electrical interference. Printed circuit motherboards may be used to eliminate or reduce cabinet wiring.
- 3.22.10 Wiring containing AC shall be routed and bundled separately or shielded separately from all logic voltage control circuits.

- 3.22.11 Cabling shall be routed to prevent conductors from being in contact with metal edges. Cabling shall be arranged so that any removal assembly may be removed without disturbing conductors not associated with that assembly.
- 3.22.12 All conductors, terminals or parts, which could be hazardous to maintenance personnel, shall be protected with suitable insulating material. Insulating material, such as silicon sealant may not be used where it shall interfere with the removal of the component.
- 3.22.13 Within the cabinet wiring, the DC logic ground and equipment ground shall be Electrically isolated from the AC-grounded conductor and each other by 50 megohms when tested at 250 volts DC, with the power line surge protector disconnected.
- 3.22.14 Conductors from connector C7 to the Input File shall be of sufficient length to allow any conductor to be connected to any detector output terminal (positions S, F, W).
- 3.22.15 The AC- copper terminal bus shall not be grounded to the cabinet or connected to Logic ground and shall provide a minimum of 10 terminals spread evenly over a 6.5” length for connection of field conductors. Nylon screws with a minimum diameter of 0.25-inch shall be used for securing the bus to the service panel. The bus bar shall be made of 0.125” copper and tapped for #10-32 machine screws. Set screw compression terminals shall not be provided.
- 3.22.16 An equipment grounding (earth ground) bus shall be provided in each cabinet. The Bus shall be copper and grounded to the cabinet. . The bus bar shall be made of 0.125” copper and tapped for #10-32 machine screws. Set screw compression terminals shall not be allowed.
- 3.22.17 One side of the load side of the cabinet power supply shall be connected to the DC-logic ground bus using a size No. 14 AWG, or larger, stranded copper wire.
- 3.22.18 The DC logic ground bus shall be provided on the input panel as shown on the plans.
- 3.22.19 A size No. 8 AWG, or larger, conductor shall be connected between equipment ground bus and rack rails.
- 3.22.20 5A size No. 6 Bonding Jumper shall be provided with each cabinet assembly. The jumper shall be of sufficient length to reach from the Chassis Ground Bus to the AC-bus. As shipped with the cabinet, the bonding jumper shall have both ends terminated securely on the Chassis Ground Bus.
- 3.22.21 All cabinet wiring, including printed circuit boards, shall be of sufficient capacity to Handle the current and power requirements of the circuitry with which the wiring is associated. This includes, but is not limited to, the ability to withstand overcurrents

that may occur before tripping operation of the circuit breakers, activation of surge suppressors, and other operation of overcurrent and overvoltage devices that are supplied with the cabinet. In particular, all cabinet wiring shall be able to withstand the effects of normally expected field wiring faults such as bulb failure, bulb filament short circuits, and field wiring short circuits. The Contractor acknowledges that such temporary overcurrents are to be expected in the course of field operations and warrants that cabinet wiring shall not be adversely affected by these occurrences.

- 3.22.22 The Contractor shall warrant that the wiring is of sufficient capacity to withstand all Such occurrences as described in Section 5.5.1.17. In addition to other warranties required elsewhere in this specification, Contractor and shall provide a five year warranty covering parts and on-site labor for replacement or repair of any wiring component that fails under normal field service conditions as described in the preceding section. In addition, the Contractor shall provide a five year warranty covering parts and on-site labor to repair and/or replace on any other cabinet component that fails or is damaged as a consequence of the failure of any wiring component to perform in compliance with the requirements of the preceding section.
- 3.22.23 The intent of these requirements is to insure adequate design and construction of cabinet wiring components under normally encountered field service conditions. It is not intended to secure a warrant covering direct lightning strikes or sustained high voltage (greater than 600 volt) short circuits.

### **3.23 TERMINAL BLOCKS**

- 3.23.1 Terminal blocks shall be provided for terminating all field conductors.
- 3.23.2 The terminal blocks for field wires to the signal indications, power distribution assembly and the required unused position shall be the barrier type with marker strips and shall be provided with 10/32 x 5/8-inch nickel-plated binder head screws and nickel-plated brass inserts.
- 3.23.3 The terminal blocks shall be readily accessible through the cabinet rear door and shall be rated for 20 amperes at 600 volts rms, minimum.
- 3.23.4 The terminal blocks for the input file and power supply shall be the barrier type with marker strips and shall be provided with 6/32 x 1/2-inch nickel-plated binder head screws and nickel-plated brass inserts.
- 3.23.5 The terminals of the power line service terminal block shall be labeled "L1" and "AC-, " and shall be covered with a hinged clear insulating material to prevent inadvertent contact as described in other sections. Terminating lugs large enough to accommodate No. 2 conductors shall be furnished for the service terminal block. The terminal block shall be rated for 100 amperes at 600 volts, minimum.
- 3.23.6 The Contractor shall provide suitable terminal blocks for the terminations considered in all other sections. Layout and wiring diagrams shall depict terminal blocks.

**3.24 POWER LINE SURGE PROTECTORS**

3.24.1 Two types of power line surge protector shall be provided between both line conductors (AC+ and AC-) and equipment ground. The protectors shall be installed at the service terminal block.

3.24.2 One type of surge protector shall be the Three-Electrode Gas Tube Type and shall have the following ratings:

Impulse Breakdown: Less than 1,000 volts in less than 0.1 microseconds at 10 kilovolts/microseconds.

Standby Current: Less than one milliamperere.

Striking Voltage: Greater than 212 Volts DC.

Capable of withstanding 15 pulses of peak current each of which shall rise in eight microseconds and fall in 20 microseconds to one-half the peak voltage at 3-minute intervals. Peak current rating shall be 20,000 Amperes.

3.24.3 The other type of surge protector shall be Metal Oxide Varistors (MOV). One shall be installed between AC+ and equipment ground and the other between AC- and equipment ground. The varistors shall have the following ratings:

Recurrent peak voltage: 212 volts

Energy rating maximum: 20 joules

Power dissipation: Average 0.85 watts

Peak current for pulses: 2,000 amperes for less than 6 microseconds

Standby current: Less than 1 milliamperere

**3.25 FACTORY TESTING**

3.25.1 The general procedures and equipment, as described below, used in the evaluation of the controller unit, cabinet and auxiliary equipment are a minimum guide and shall not limit the testing and inspection to insure compliance of the equipment with these specifications.

3.25.2 These test procedures shall be followed by the Contractor who shall certify that he has Conducted inspection and testing in accordance with these specifications. Inspection - A visual and physical inspection shall include mechanical, dimensional and assembly conformance of all parts of these specifications that can be checked visually or manually with simple measuring devices.

3.25.3 Environmental - All components shall properly operate within the following limits:

Ambient Temperature: -37° to 74°C

Humidity: 5 to 95 percent

3.25.4 The relative humidity and ambient temperature values in the following table shall not be exceeded.

<b>AMBIENT TEMPERATURE VERSUS RELATIVE HUMIDITY AT BAROMETRIC PRESSURES (29.92 In. Hg.)</b>		
Ambient Temperature/ Dry Bulb (in °C)	Relative Humidity (In percent)	Ambient Temperature/ Wet Bulb (in °C)
-37 to 1.1	10	-17.2 to 42.7
1.1 to 46.0	95	42.7
48.8	70	42.7
54.4	50	42.7
60.0	38	42.7
65.4	28	42.7
71.2	21	42.7
74	18	42.7

- Shock-Test - per Military Specification: MIL-STD-810D Method 516.1
- Vibration - per Military Specification: MIL-STD-810D Method 514.1, equipment class G (Common Carrier).
- Cabinets shall comply with the requirements of UL Bulletin of Research No. 23, "Rain Tests of Electrical Equipment".

3.25.5 All equipment shall continue normal operation when subjected to the following:

- Low Temperature Test - With the item functioning at a line voltage of 90 VAC the ambient temperature shall be lowered from 20°C to -37°C at a rate of not more than 18°C per hour. The item shall be cycled at -37°C for a minimum of five hours then returned to 20°C at the same rate. The test shall be repeated with the line voltage at 135 VAC.
- High Temperature Test - With the item functioning at a line voltage of 90 VAC the ambient temperature shall be raised from 20°C to 70°C at a rate of nor more than 18°C per hour. The item shall be cycled at 70°C for five hours and then returned to 20°C at the same rate. The test shall be repeated with the line voltage at 135 VAC.

3.25.6 Electrical - All components shall operate properly within the following limits:

- Applied Line Voltage: 90 (with power failure power restoration operations to be determined by BiTran) to 135 VAC
    - Frequency: 60 ( $\pm 3.0$ ) Hertz
- 3.25.6 All circuits unless otherwise noted, shall commence operation at or below 90 VAC as the applied voltage is raised from 50 VAC to 90 VAC at a rate of 2 ( $\pm 0.5$ ) volts per second.
- 3.25.7 All equipment, when housed within its associated cabinet, shall be unaffected by transient voltages normally experienced on commercial power lines. Equipment purchased separately from cabinet shall be tested for compliance with the equipment housed within a DC accepted Model 336-SS cabinet and the cabinet connected to the commercial power lines.
- 3.25.8 All power line surge protection shall enable the equipment being tested to withstand (nondestructive) and operate normally following the discharge of a 25 microfarad capacitor, charged to plus and minus 2,000 volts, applied directly across the AC line (applied at Cabinet Service Terminal Block) at a rate of once every 10 seconds for a maximum of 50 occurrences per test. The unit under test shall be operated at 20° ( $\pm 5^\circ$ ) C and at 120 ( $\pm 12$ ) VAC.
- 3.25.9 The Model 400 Modem, M170E Auxiliary Board and Model 412C PROM Module shall be housed in a D.C. Accepted Model 170E Controller Unit, all provided by others, that in turn is housed in the cabinet during the test described above.
- 3.25.10 All equipment shall be unaffected by transient voltages normally experienced on commercial power lines. Equipment purchased separately from the cabinet shall be tested for compliance as follows:
- 3.25.10.1.1 The equipment shall withstand (nondestructive) and operate normally when one discharge pulse of plus or minus 300 volts is synchronously added to the AC power at the Cabinet Service Terminal Block and moved uniformly over the full wave across 360 degrees or stay at any point of Line Cycle once every second. Peak noise power shall be five kilowatts with a pulse rise time of 500 ns. The unit under test shall be operated at 20° ( $\pm 5^\circ$ ) C and at 120 ( $\pm 12$ ) VAC.
- 3.25.11 The Model 400 Modem shall comply with the above conditions when housed in a D.C. accepted Model 170E Controller Unit and tested under the above conditions.
- 3.25.12 The Model 400 shall also operate correctly when installed in the Central Communications Units being used by the District's central computer.
- 3.25.13 In no case shall the modems produce a carrier detect signal or transmit received data the central computer when the incoming carrier level is less than -40 dB.
- 3.25.14 Within the circuit of any device, module or PCB, electrical isolation shall be provided between DC logic ground, equipment ground and the AC grounded conductor. The DC logic ground and equipment ground shall be electrically isolated from the AC grounded conductor and from each other by 500 megohms, minimum, when tested at the input terminals with 500 VDC.

- 3.25.15 All equipment shall be capable of normal operation following opening and closing of contacts in series with the applied voltage to the cabinet at a rate of 30 openings and closings per minute for a period of two minutes in duration.
- 3.25.16 All equipment shall maintain normal operation during and following a period of at least five hours at -37°C and less than 10% humidity, when 90 VAC (with power failure power restoration operations to be determined by BiTran) is applied to the input terminals of the cabinet.
- 3.25.17 Ventilation Testing. Temperature testing shall be conducted on prototypes with full Ventilation subsystem in operation. When maximum internal ambient temperature and humidity are reached, ambient outside temperature shall be noted. At least one dozen temperature probes shall be positioned at strategic points around the cabinet innards and monitored. Hot spots and moisture shall be noted. Based on the results of the testing, the Contractor shall re-position equipment as required by the COTR.

### **3.26 TESTING CERTIFICATION**

- 3.26.1 The Contractor shall supply with each shipment a full test report of the quality control and final test conducted on each item. The test report shall indicate the name of the tester and shall be signed by a responsible manager.
- 3.26.2 The quality control procedure shall include the following:
- Acceptance testing of all supplied components.
  - Physical and functional testing of all components.
  - A minimum 100-hour burn-in of all modules.
  - A minimum 24 hour operation of all complete controller unit and cabinet assemblies.

### **3.27 AUXILIARY EQUIPMENT**

- 3.27.1 The modules and equipment listed in the following paragraphs shall be compatible with the input or output of the Type 170 Controller cabinets specified in Section 5 of these Specifications.

### **3.28 Model 204 Flasher Unit**

- 3.28.1 The flasher shall be a solid-state device, producing between 50 and 60 flashes per minute with a 50-percent duty cycle. The flasher mechanism shall be mounted on a plug-in base with a plug-in mounting and shall comply with the Model 204 Specification in FHWA-IP-78-16, Chapter 9, and CALTRANS Traffic Signal Control Equipment Specification (TSCES) except as noted herein. The output switch shall be capable of switching any current from 0.03 to 20 amperes of tungsten lamp load at 120 volts, 60 Hertz, or 20 amperes at a power factor of 0.85 at 72°.

3.28.2 Flasher units shall be compatible with the District's LED traffic signals.

### **3.29 Model 222 Two-Channel Loop Detector Unit**

3.29.1 Loop detector sensor units shall be installed to accommodate up to eight (8) loop detector inputs. These units will produce output signals to the controller indicating when vehicles pass over and/or remain over the loops embedded in the roadway. The loop detectors shall be the Model 222 and conform to the provisions of Chapter 4 of Specification FHWA-IP-78-16 and CALTRANS Traffic Signal Control Equipment Specification (TSCES).

### **3.30 Model 242 Two-Channel D.C. Isolators**

3.30.1 Channel isolators shall be utilized to provide independent isolation between electrical contacts external to the controller for pedestrian pushbuttons and other devices that provide a contact closure as an input. This module shall comply with the provisions of Chapter 7 of Specification FHWA-IP-78-16 and CALTRANS Traffic Signal Control Equipment Specification (TSCES).

### **3.31 Model 200 Switch Packs**

3.31.1 Signal light circuits shall be controlled externally to each controller unit by 3-circuit solid-state switches, which conform to the specifications for Model 200 Switch Packs as detailed in Chapter 8, Specification FHWA-IP-78-16 and CALTRANS Traffic Signal Control Equipment Specification (TSCES), except as noted herein. Each switch shall have the capability of switching any current from 0.05 to 20.0 amperes of tungsten lamp load at 120 volts 60 Hertz, or 20 amperes at a power factor of 0.85 and a temperature of 70°C.

3.31.2 Switch pack units must also be compatible with the District's LED traffic signals

### **3.32 Model 496 Modem Module**

3.32.1 All modems supplied shall be Model 496 Modem Module.

3.32.2 The modem shall provide two-wire half-duplex and four-wire full duplex communications. It shall be switch selectable between half-duplex and full duplex operation. In half duplex, pins X and Y shall be used for Audio In/Out.

3.32.3 The modem shall comply with the following requirements:

Data Rate: 0 to 9600 baud modulation

Modulation: Phase coherent frequency shift keying (FSK)

Data Format: Asynchronous, serial by bit

Line and Signal Requirements: Private Metallic Wire, Distance 10 miles minimum

ACIA and Modem Interface: EIA-232-C standards

Tone Carrier Frequencies (Transmit & Receive): 11.2 kHz (MARK) and 17.6 kHz (SPACE) with +/- 1% tolerance. The operating band shall be (half power, -3dB) between 9.9 kHz and 18.9 kHz.

Transmitting Output Signal Level: 0, -2, -4, -6, and -8 dB (at 14.7 kHz) continuous or switch selectable.

Receiver Input Sensitivity: 0 to -40 dB

Receiver Band-pass Filter: Shall meet the error rate requirement Specified in Paragraph A.2.15 and shall provide 20 dB/Octave, minimum active attenuation for all frequencies outside the operating band.

Clear-to-Send (CTS) Delay: 12 (+/- 2) ms

Receive Line Signal Detect Time: 8 (+/- 2) ms mark frequency

Minimum Carrier Detect Sensitivity: The modem shall not indicate carrier detect and shall not transmit received data to the controller when received signals are less than -42 (+/- 2) dB at modem carrier frequencies (11.2 kHz and 17.6 kHz).

Receive Line Squelch: 6.5 (+/-1) ms, 0 ms (OUT)

Soft Carrier (7.8 kHz) Turn Off Time: 10 (+/- 2) ms

Modem Recovery Time: Capable of receiving data within 22 ms after completion of transmission.

Error Rate: Shall not exceed 1 bit in 100,000 bits, with a signal-to-noise ratio of 16 dB measured with a flat weight over a 300 to 3000 Hz band.

Transmit Noise: Less than -50 dB across 600 ohm resistive load within the frequency spectrum of 300 to 3000 Hz at the maximum output.

The modem power requirements are as follows:

Input Voltage	Maximum Current Consumption
+12 VDC	75 milliamperes
-12VDC	75 milliamperes

Indicators shall be provided on the front of the modem to indicate Carrier Detect, Transmit Data, and Receive Data

The Model 496 modem card shall be supplied with blue card ejectors.

### **3.33 RADIO INTERFERENCE SUPPRESSOR**

- 3.33.1 All controller equipment shall be furnished with a radio interference suppressor. The radio interference suppressors shall provide a minimum attenuation of 50 decibels over a frequency range of 200 kilohertz to 75 megahertz when used in connection with normal installations. The interference suppressors shall be hermetically sealed in a metal case filled with an insulating compound. Terminals shall be nickel-plated, 10-24 brass studs of sufficient external length to provide space for connecting two (2) No. 8 conductors, and shall be so mounted that the terminals cannot be turned in the case, and the termination shall be protected by a removable and replaceable non-conducting transparent cover. Silicon sealant or other similar methods may not be used to provide an insulating cover. Ungrounded terminals shall be properly insulated from each other and shall maintain a surface leakage distance of not less than 1/4- inch between any exposed current conductor and any other metallic part, with an insulation factor of 100-200 megohms dependent on external circuit conditions. Suppressors shall be designed for 125 percent of the total connected load, and in no event less than 25 amperes on 120 volts, 60 Hz, circuits, and shall meet standards of the UL and the EIA.

### **3.34 CONFLICT MONITOR REQUIREMENTS**

- 3.34.1 Monitor shall be provided with a windows based interface program. Interface program shall be compatible for use with windows 2000 and XP.
- 3.34.2 The monitor software shall affix: '**District of Columbia Department of Transportation**' in any screen and printout headings.
- 3.34.3 The District shall be licensed for unlimited use of the monitor interface software and firmware.
- 3.34.4 The District's licensed use shall be extended to any and all contractors and or consultants authorized and or actively engaged in traffic signal work, and or supplying traffic equipment for the District for as long as they are engaged in such activity with the District. (This licensed use shall only be valid for the DC traffic system).
- 3.34.5 The District shall be entitled to all revisions of this software that is related to initially delivered functionality.

- 3.34.6 The District shall be provided with one laptop interface cable for every cabinet supplied.
- 3.34.7 The District shall be provided with 10 CD copies of the interface software installation files with first shipment of Monitors. The District shall be provided with 100 hard copies of the monitor interface software manual. All installation disks shall include the interface software manual in printable PDF form.
- 3.34.8 Monitor shall be programmable via interface program and traditional diode/jumper cards.
- 3.34.9 The monitor shall require a flash sense from the cabinet before any programming can be accepted. All parameters not programmable via diode cards shall be enterable via front panel Intersection ID number shall be stored in the monitor.
- 3.34.10 Intersection ID change in the monitor shall require re-initialization of all monitor programming to be compatible with all diode's present condition. Programming of monitor shall not be permitted unless ID number is set. All Monitors' programming shall be stored in database form according to currently used controller identification number and name (acisa, or current method).
- 3.34.11 All programming and log history shall be importable and exportable both addressable by individual intersection, and entire database; to floppy, CD, or over network for transport between workstations, laptops.
- 3.34.12 Following the import of programming data, the interface program will compare the newly imported values against the laptop's stored values. Before exiting the comparison screen or upon trying to save the newly imported data, the interface software shall ask the operator for permission to overwrite existing programming information if imported information is different from that stored in workstation.
- 3.34.13 All status log history information shall be appended to intersection database, and shall be limited to last 25 events. Retrieved log history information will automatically overwrite the existing log history information.
- 3.34.14 Monitor interface software shall be capable of printing out a one for one graphical representation of both program cards. This graphical representation shall resemble the exact card layout and shall be scaled to fit on no more than one page. All printouts shall include ID number and intersection name. All printable information for individual intersections shall be scaled to one page.
- 3.34.15 Monitor interface software shall Upload on demand and view; stored diode cuts and locally programmable parameters. Up load screen shall present a save in database option. Choosing of the save in database option shall ask for permission to overwrite current database information Upload on demand, current stored activity log stored in monitor. Saving of log history information is limited to the last 25 events.
- 3.34.16 An initial programming screen for an intersection just added to the local laptop shall present a diode card with all diodes present.
- 3.34.17 Laptop Interface software Monitor status screen shall include:
- Intersection name and ID
  - Current time and date set in monitor and time and date at time of failure
  - Current temperature and temperature at time of failure

- Failure/flash type (conflict, watchdog, etc.), if monitor indicates failure Status of all used channels at time of failure Status of all channels as presently operating
    - Current Line voltage and line voltage at time of failure
- 3.34.18 Time and date setting screen shall automatically be presented to operator when laptop communications is established with monitor. A default parameter may be set up to bypass the screen and automatically set the monitor's time and date.
- 3.34.19 All monitors shall be delivered with 2 of each program/jumper cards required to program monitor. The District shall be supplied with 20 spare diode/jumper kits. This kit shall be housed in a compartmented durable plastic box. Each kit shall include 100 replacement Diodes. Each kit shall include 50 pre bent jumpers to fit yellow inhibit and enhancement card.
- 3.34.20 A solid state monitoring device, herein referred to as Enhanced Monitor, shall be installed so that in the event of conflicting signal indications (vehicular or pedestrian, or both), the monitoring device shall cause the signal system to go into flashing operation. The flashing operations shall lock-in and shall release only upon operation of a reset switch. Operation of the monitor shall energize the stop-timing circuit of the controller unit. This device shall comply with the provisions of Chapter 3, Specification FHWA-IP-78-16, except as noted herein. The use of the term "Model 225" is not intended to specify a specific make and model of monitor; rather it is intended to refer to a monitor that meets the requirements contained within these specifications.
- 3.34.21 The Enhanced monitor unit shall be capable of monitoring a minimum of 18 field signal output circuits at the field terminals.
- 3.34.22 The monitor shall store and display the conflicting indications existing at the moment of conflict. These indications, 18 indicators, shall be mounted on the front panel. The monitor shall retain this display until reset by a front panel push-button, or upon the loss of power.
- 3.34.23 The monitor module shall be equipped with a programming card. The programming card shall be a printed circuit board 1/16 inch thick and shall plug into the module through a slot in the front panel. A programming card shall be supplied with a full complement of #1N4148 diodes, or equivalent. Each programming card shall contain 153 diodes. The programming card shall be logically labeled and laid out for easy identification of the diodes by switch pack.
- 3.34.24 The wiring of the connector for the conflict monitor programming card shall be in accordance with Table 3.6.
- 3.34.25 The connector that mates with the programming card shall be keyed between pins 25 and 25 (BB and CC) with an integral, permanent locating key. The locating key shall be part of the connector molding. Separate programming keys that are attached by adhesive or by pressure fit are not acceptable. One (1) spare programming card shall be supplied with each monitor. If a monitor uses more than one type of programming card, one (1) spare of each type shall be supplied.
- 3.34.26 The wiring of the Monitor Unit Connector in the Output File shall be in accordance with Tables 3.6 and 3.7
- 3.34.27 Conflict monitors being supplied under this contract shall operate properly when installed in existing cabinets that are wired to support existing 218 or 225 conflict monitors.
- 3.34.28 All switch pack signals being monitored shall be in conflict with all other switch pack signals being monitored, unless a diode (anode to numerical pins and cathode to alphabetical pins) has been removed. Removal of a diode shall define a non-conflict.

- 3.34.29 In addition, the yellow signals from all switch packs shall be monitored unless a jumper is placed between the appropriate yellow switch pack pin and a yellow inhibit pin common on the programming card.
- 3.34.30 The green, yellow and red indications for each switch pack phase shall be brought into the monitor individually. The red inputs for channels 1 to 16 and the red enable signal shall be brought into the monitor via a front panel connector. The connector shall be wired in accordance with Table 3.9.

**TABLE 3.6  
CMU PROGRAMMING CARD CONNECTOR WIRING**

<b>Pin</b>	<b>Function (Circuit Side)</b>	<b>Pin</b>	<b>Function (Component Side)</b>
1	Channel #2 Green	A	Channel #1 Green
2	Channel #3 Green	B	Channel #2 Green
3	Channel #4 Green	C	Channel #3 Green
4	Channel #5 Green	D	Channel #4 Green
5	Channel #6 Green	E	Channel #5 Green
6	Channel #7 Green	F	Channel #6 Green
7	Channel #8 Green	H	Channel #7 Green
8	Channel #9 Green	J	Channel #8 Green
9	Channel #10 Green	K	Channel #9 Green
10	Channel #11 Green	L	Channel #10 Green
11	Channel #12 Green	M	Channel #11 Green
12	Channel #13 Green	N	Channel #12 Green
13	Channel #14 Green	P	Channel #13 Green

14	Channel #15 Green	R	Channel #14 Green
15	Channel #16 Green	S	Channel #15 Green
16	DC Ground	T	Conflict
17	Channel #17Green	U	Channel #16 Green
18	Channel #18 Green	V	Channel # 17 Green
19	Channel # 1 Yellow	W	Channel #9 Yellow
20	Channel # 2 Yellow	X	Channel # 10 Yellow
21	Channel # 3 Yellow	Y	Channel # 11 Yellow
22	Channel # 4 Yellow	Z	Channel # 12 Yellow
23	Channel # 5 Yellow	AA	Channel # 13 Yellow
24	Channel # 6 Yellow	BB	Channel # 14 Yellow
---	Locating Key	---	Locating Key
25	Channel #7 Yellow	CC	Channel # 15 Yellow
26	Channel #8 Yellow	DD	Channel # 16 Yellow
27	No Connection	EE	Channel # 17 Yellow
28	Yellow Inhibit Common	FF	Channel # 18 Yellow

**TABLE 3.7  
MONITOR UNIT EDGE CONNECTOR WIRING – SIDE #1**

Pin	Function	Level To Operate	----- Voltage -----		Current Max
			MAX	MIN	
1	Channel 2 Green	120 VAC	135 VAC	25 VAC	15 MA
2	Channel 13 Green	120 VAC	135 VAC	25 VAC	15 MA
3	Channel 6 Yellow	120 VAC	135 VAC	25 VAC	15 MA
4	Channel 4 Green	120 VAC	135 VAC	25 VAC	15 MA
5	Channel 14 Green	120 VAC	135 VAC	25 VAC	15 MA
6	Channel 8 Yellow	120 VAC	135 VAC	25 VAC	15 MA
7	Channel 5 Green	120 VAC	135 VAC	25 VAC	15 MA
8	Channel 13 Yellow	120 VAC	135 VAC	25 VAC	15 MA
9	Channel 1 Yellow	120 VAC	135 VAC	25 VAC	15 MA
10	Channel 7 Green	120 VAC	135 VAC	25 VAC	15 MA
11	Channel 14 Yellow	120 VAC	135 VAC	25 VAC	15 MA
12	Channel 3 Yellow	120 VAC	135 VAC	25 VAC	15 MA
13	Channel 9 Green	120 VAC	135 VAC	25 VAC	15 MA
14	Channel 17 Green	120 VAC	135 VAC	25 VAC	15 MA
15	Channel 11 Yellow	120 VAC	135 VAC	25 VAC	15 MA
16	Channel 9 Yellow	120 VAC	135 VAC	25 VAC	15 MA
17	Channel 18 Green	120 VAC	135 VAC	25 VAC	15 MA
--	Locating slot				
18	Channel 12 Yellow	120 VAC	135 VAC	25 VAC	15 MA
19	Channel 17 Red				
20	Chassis Ground				
21	AC – (Neutral)				
22	Watchdog Input	DC Ground			
23	+ 24 VDC	+24VDC	+26 VDC	+22 VDC	500 MA
24	Tied to Pin 25				
25	Tied to Pin 24				
26	Not Assigned				
27	Not Assigned				
28	Output SW, Side 1				

**TABLE 3.7  
MONITOR UNIT EDGE CONNECTOR WIRING – SIDE #2**

Pin	Function	Level To Operate	---- Voltage ----		Current Max
			MAX	MIN	
A	Channel 2 Yellow	120 VAC	135 VAC	25 VAC	15 MA
B	Channel 6 Green	120 VAC	135 VAC	25 VAC	15 MA
C	Channel 15 Green	120 VAC	135 VAC	25 VAC	15 MA
D	Channel 4 Yellow	120 VAC	135 VAC	25 VAC	15 MA
E	Channel 8 Green	120 VAC	135 VAC	25 VAC	15 MA
F	Channel 16 Green	120 VAC	135 VAC	25 VAC	15 MA
H	Channel 5 Yellow	120 VAC	135 VAC	25 VAC	15 MA
J	Channel 1 Green	120 VAC	135 VAC	25 VAC	15 MA
K	Channel 15 Yellow	120 VAC	135 VAC	25 VAC	15 MA
L	Channel 7 Yellow	120 VAC	135 VAC	25 VAC	15 MA
M	Channel 3 Green	120 VAC	135 VAC	25 VAC	15 MA
N	Channel 16 Yellow	120 VAC	135 VAC	25 VAC	15 MA
P	Channel 17 Yellow	120 VAC	135 VAC	25 VAC	15 MA
R	Channel 10 Green	120 VAC	135 VAC	25 VAC	15 MA
S	Channel 11 Green	120 VAC	135 VAC	25 VAC	15 MA
T	Channel 18 Yellow	120 VAC	135 VAC	25 VAC	15 MA
U	Channel 10 Yellow	120 VAC	135 VAC	25 VAC	15 MA
--	Locating slot				
V	Channel 12 Green	120 VAC	135 VAC	25 VAC	15 MA
W	Channel 18 Red				
X	Not Assigned				
Y	DC Ground		DC Grnd		
Z	External Reset	DC Ground			
AA	+ 24 VDC	+24VDC	+26 VDC	+22 VDC	500 MA
BB	Stop Time				
CC	Special Function 2	120 VAC/ 24VDC	(Note 1)	(Note 1)	15 MA
DD	Special Function 3	120 VAC/ 24VDC	(Note 1)	(Note 1)	15 MA
EE	Output SW, Side #2				
FF	AC +	120 VAC	135 VAC	95 VAC	

<b>Pin</b>	<b>Function</b>	<b>Termination</b>
1	SWPK 2 Green	SP2-7
2	SWPK 13 Green	C6-Pin A
3	SWPK 6 Yellow	SP6-5
4	SWPK 4 Green	SP4-7
5	SWPK 14 Green	C6-Pin C
6	SWPK 8 Yellow	SP8-5
7	SWPK 5 Green	SP5-7
8	SWPK 13 Yellow	C6-Pin B
9	SWPK 1 Yellow	SP1-5
10	SWPK 7 Green	SP7-7
11	SWPK 14 Yellow	C6-Pin D
12	SWPK 3 Yellow	SP3-5
13	SWPK 9 Green	SP9-7
14	SWPK 17 Green	C6-Pin J
15	SWPK 11 Yellow	SP11-5
16	SWPK 9 Yellow	SP9-5
17	SWPK 18 Green	C6-PinL
18	SWPK 12 Yellow	SP12-5
19	SWPK 17 Red	
20	Chassis Ground	TB01-9
21	AC – (Neutral)	TB01-10
22	Watchdog Timer	C4-37
23	+24 VDC	TB02-1
24	CMU Interlock	Logic Relay Coil
25	CMU Interlock	Logic Ground
26	Not Assigned	N/C
27	Not Assigned	N/C
28	Output SW, Side #1	AC+ - TB01-11

<b>TABLE 3.8</b>		
<b>MONITOR UNIT PIN ASIGNMENTS – SIDE #2</b>		
<b>Pin</b>	<b>Function</b>	<b>Termination</b>
A	SWPK 2 Yellow	SP2-5
B	SWPK 6 Green	SP6-7
C	SWPK 15 Green	C6-Pin E
D	SWPK 4 Yellow	SP4-5
E	SWPK 8 Green	SP8-7
F	SWPK 16 Green	C6-Pin G
H	SWPK 5 Yellow	SP5-5
J	SWPK 1 Green	SP1-7
K	SWPK 15 Yellow	C6-Pin F
L	SWPK 7 Yellow	SP7-5
M	SWPK 3 Green	SP3-7
N	SWPK 16 Yellow	C6-Pin H
P	SWPK 17 Yellow	C6-Pin K
R	SWPK 10 Green	SP10-7
S	SWPK 11 Green	SP11-7
T	SWPK 18 Yellow	C6-Pin M
U	SWPK 10 Yellow	SP10-5
V	SWPK 12 Green	SP12-7
W	SWPK 18 Red	N/C
X	Not Assigned	N/C
Y	DC Ground	TB02-2
Z	External Reset	TB02-5
AA	+24 VDC	TB02-1
BB	Stop Time	TB02-3
CC	Not Assigned	N/C
DD	Not Assigned	N/C
EE	Output SW, Side #2	TB01-12
FF	AC+ (Hot)	TB01-11

<b>Table 3.9 Connector P20 Wiring</b>	
Pin Number	Assignment
1	Channel 15 Red
2	Channel 16 Red
3	Channel 14 Red
4	Chassis Ground
5	Channel 13 Red
6	Spec. Function 1
7	Channel 12 Red
8	RR Preempt
9	Channel 10 Red
10	Channel 11 Red
11	Channel 9 Red
12	Channel 8 Red
13	Channel 7 Red
14	Channel 6 Red
15	Channel 5 Red
16	Channel 4 Red
17	Channel 3 Red
18	Channel 2 Red
19	Channel 1 Red
20	Red Enable

- 3.34.31 Each switch pack shall be monitored for a ‘No Output’ condition, where ‘No Output’ is defined as a condition where all three outputs of a given switch pack fail to meet minimum voltage threshold criteria as defined in the CALTRANS Traffic Signal Control Signal Equipment Specifications (TSCES). When a no output condition is detected for a switch pack for the duration of time that is specified in section 3.34.33, the monitor shall trip and place the cabinet into a latching flash condition. There shall be an indicator that indicates “No Output” or “Red Fail”. The monitor shall also indicate, via individual indicators for each of the 18 switch packs, which switch pack caused the No Output event. The monitor shall provide, via some permanently attached hardware such as a switch, the disabling of monitoring for No Output failures by individual channel (switch pack).
- 3.34.32 The green, yellow, and red indications shall be monitored for multiple output conditions. A multiple output condition shall be defined where the output voltages of more than 1 channel of a given load switch exceeds minimum voltage threshold levels as defined in the CALTRANS Traffic Signal Control Signal Equipment Specifications (TSCES) for a duration of time as specified in section 3.34.33. The fault timers shall start immediately upon detection of any two or more simultaneous outputs and shall continue timing until only one or no output is detected for that switch pack. When a fault condition is detected, the monitor shall illuminate an indicator labeled “Multiple Output”. The monitor shall also indicate, via individual indicators for each of the 18 switch packs, which switch pack caused the Multiple Output fault. The monitor shall provide, via some permanently attached hardware such as a switch, the disabling of monitoring for Multiple Output failures on an individual channel (switch pack).
- 3.34.33 The monitor shall monitor output signals applied at the field terminals of each switch pack (green, yellow, red). For the conditions described in paragraphs 3.34.31 and 3.34.32, should a fault condition (no output, multiple output) be detected, the unit shall begin timing the duration of this fault condition. If this condition exists for less than 700 milliseconds, the unit will not trigger. If the condition last for more than 1000 milliseconds it will trigger and place the cabinet in a latching flash condition. The unit may or may not trigger if the condition exists for more than 700 milliseconds or less than 1000 milliseconds. For each fault condition, an individual timer shall be maintained for each switch pack. Should more than one switch pack experience a fault at one time, or should one switch pack experience more than one fault condition at one time, each fault timer shall operate independently without being affected by the operation of any other fault detection and timing features. Once a No output or Multiple Output fault has been determined according to the timing requirements in this section, the monitor shall trip and place the cabinet into a latching flash condition.
- 3.34.34 The monitor shall detect short or missing yellow cycle.
- 3.34.35 When the unit triggers for a fault condition, it shall cause the output relay contacts to transfer. These contacts shall remain in this state until the unit is reset by the activation of the panel control, or the activation of the external reset input. Power interruption shall not reset the conflict monitor when it has been triggered by detection of a faulty load switch output as indicated above.
- 3.34.36 At a minimum, the conflict monitor shall have the following indicators:
- 3.34.36.1.1 AC Power – This indicator shall illuminate when the AC input voltage to the monitor exceeds 103 (+/- 2) VAC. It shall be extinguished, when the AC input voltage falls below 98 (+/-2) VAC.
- 3.34.36.1.2 DC Power – This indicator shall illuminate when the 24VDC input to the monitor exceeds the minimum threshold voltage.
- 3.34.36.1.3 Watchdog Error – This indicator shall illuminate when a watchdog error is detected.
- 3.34.36.1.4 Conflict – This indicator shall illuminate when the monitor has detected a conflict.
- 3.34.36.1.5 PC Ajar – This indicator shall illuminate when the program board is not installed or not seated properly.

3.34.36.1.6 No Output or Red Fail – This indicator shall illuminate when a no output fault has been detected.

3.34.36.1.7 Multiple Output or Switch Fail – This indicator shall illuminate when the monitor has detected a multiple output fault.

3.34.36.1.8 Yellow Fail - shall illuminate when a short or missing yellow cycle is detected.

3.34.37 The monitor shall include signal output status indicators. There shall be one indicator for each channel of each of the 18 switch packs. The indicator for each switch pack shall illuminate when a red, yellow or green output voltage is present on the corresponding channel during normal operation. If the unit trips due to a conflict, the signal status display shall latch and display the output status of each channel at the time the conflict occurred. Should the monitor trip due to a No Output or Multiple Output condition, the signal status indicators shall display the channel(s) that caused the fault and shall latch status display until the monitor is reset.

3.34.38 After a power outage before which there was a fault, the monitor shall correctly show the previous fault. This will include fault type and channel that was in error.

3.34.39 The monitor shall provide a means to send fault and channel status to the controller via a serial port.

3.34.40 The monitor shall have a DB-9 sub-miniature connector that provides an RS-232 interface to the 170E controller. The vendor shall provide an interface cable between the DB-9 connector and the controller's C20S socket. The interface cable shall be wired in accordance with Table 3.5.

3.34.41 The monitor shall communicate using the following protocol: at 2400bps, Even Parity, 8 Data Bits, 1 Stop Bit. In response to a status request from the controller, the conflict monitor shall transmit the current conflict monitor status. Status communications shall be in accordance with the message format described in Table 3.6 The conflict shall not initiate any transmission of data except in response to reception of a valid status request. All responses shall conform to the specified message formats. The communications subroutines shall be interrupt-driven. The monitor shall respond within 15 milliseconds of respond of receiving a valid request from the controller. Once the monitor starts transmission of a message to the controller, maximum inter-byte time shall not exceed 15 milliseconds. Communications with the controller shall operate independently of the conflict monitor – that is communications with the 170E controller shall not be adversely affected by other conflict monitor functions; nor shall communications with 170E controller adversely impact the other operations of the conflict monitor.

3.34.42 In response to a status request command, the conflict monitor shall transmit the status information as described in the specified message formats.

3.34.43 The conflict monitor shall provide the following status in response to a status request from the 170E controller:

1. All fault status (conflict, AC low, 24V, Watchdog, PC Ajar, Red Fail, Switch Fail, Yellow Fail)
2. Enable status (Watchdog, Red Enable)
3. Channel status (Green, Yellow, Red) Channels 1 to 18

3.34.44 The conflict monitor shall contain a real-time clock that maintains the current Year, Month, Day of Month, Day of Week, Hour, Minute, and Second. The real time clock shall maintain the current time information during power outages. It shall continue to maintain accurate time during power outages of

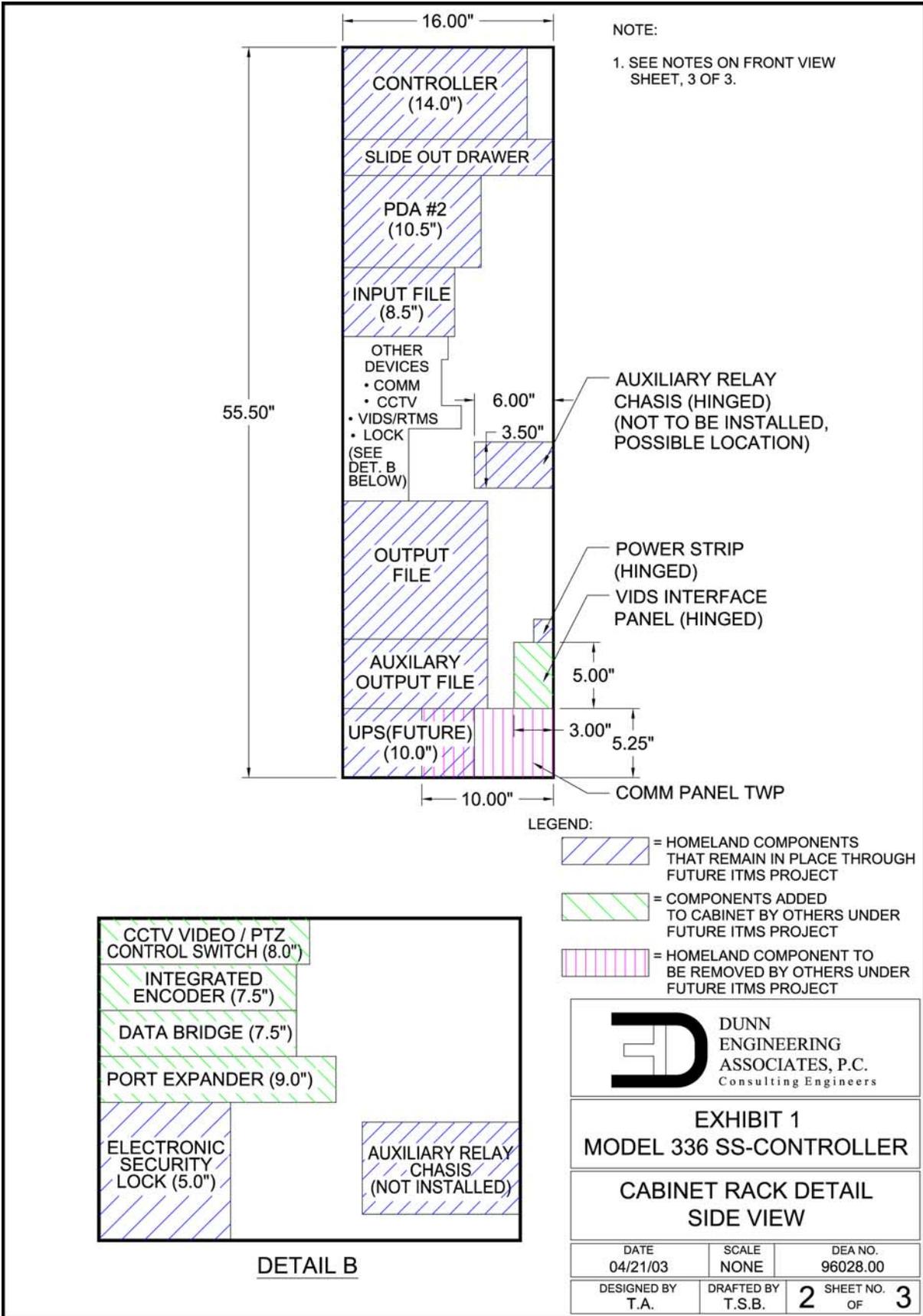
at least 30 days in duration. The real time clock shall provide automatic daylight savings time correction. The monitor shall function correctly in all respects with regard to Year 2000 issues.

3.34.45 The monitor shall update its real time clock in response to a properly formatted transmission from the 170E controller. It shall correctly set the real-time clock in accordance with the message formats described in Table 3.7

3.34.46 The contractor shall provide 225 Enhanced conflict monitor currently in utilized by the District. The conflict monitor shall conform to all features and protocols currently in use in the District.

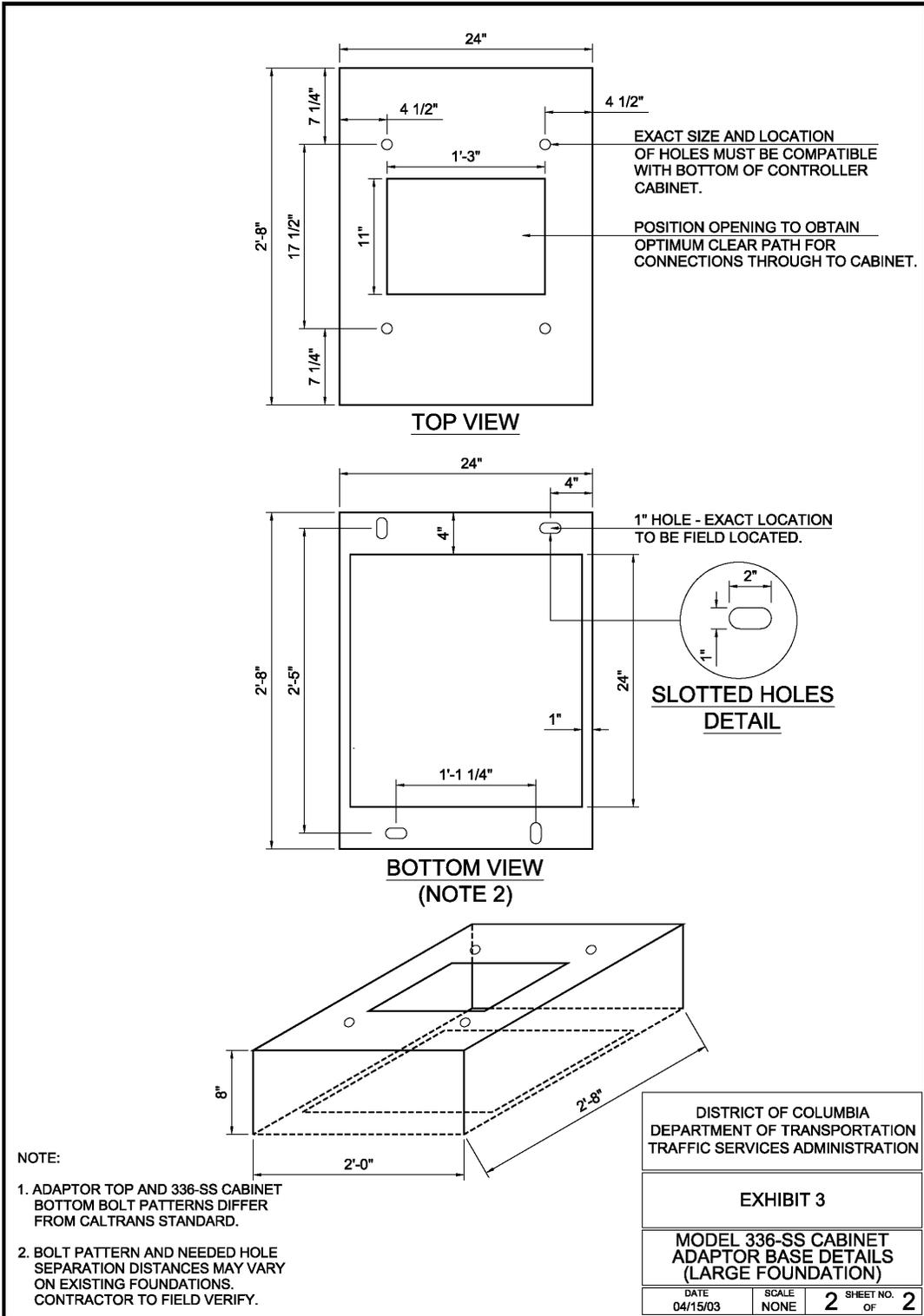
Table 3.5 CMU Wiring Harness

C 20 Pin	Function	DB-9 Male Pin (DCE)	Comments
K	TD	3	
L	RD	2	
N	GND	5	
J	RTS	N/C	Jumper to Pin M
M	CTS	N/C	Jumper from Pin J
D	+5 VDC	N/C	Jumper to Pin H
H	CD	N/C	Jumper from Pin D

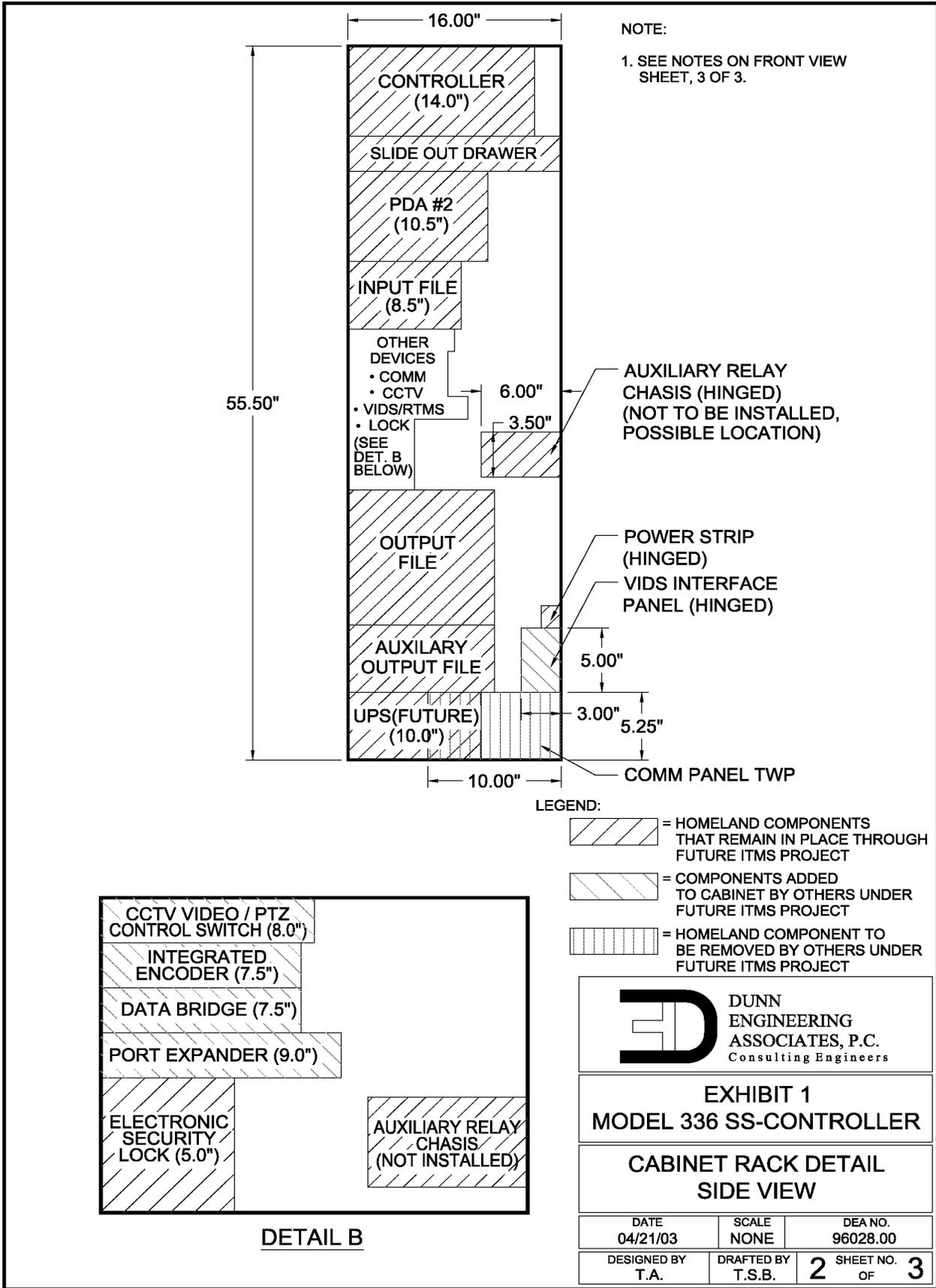


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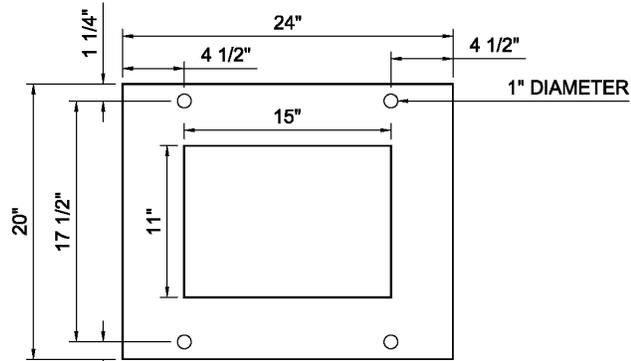
# **EXHIBIT 1 – MODEL 336-SS CONTROLLER CABINET**



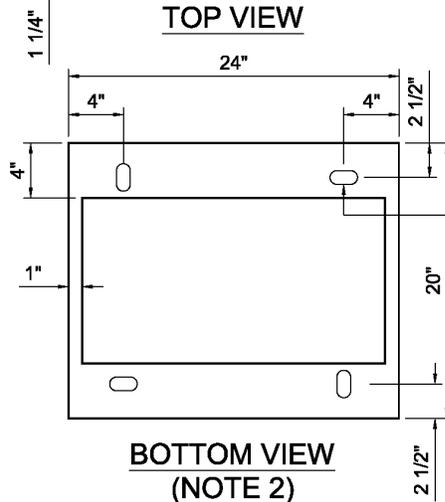
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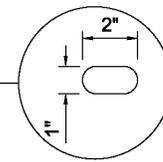
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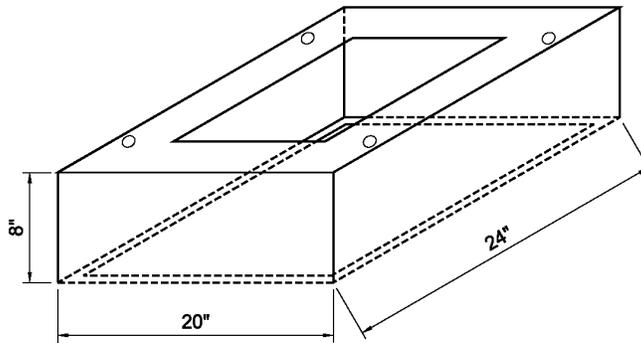
**TOP VIEW**



**BOTTOM VIEW  
(NOTE 2)**



**SLOTTED HOLES  
DETAIL**



**NOTES:**

1. ADAPTOR TOP AND 336-SS CABINET BOTTOM BOLT PATTERNS DIFFER FROM CALTRANS STANDARD.
2. BOLT PATTERN AND NEEDED HOLE SEPARATION DISTANCES MAY VARY ON EXISTING FOUNDATIONS. CONTRACTOR TO FIELD VERIFY.

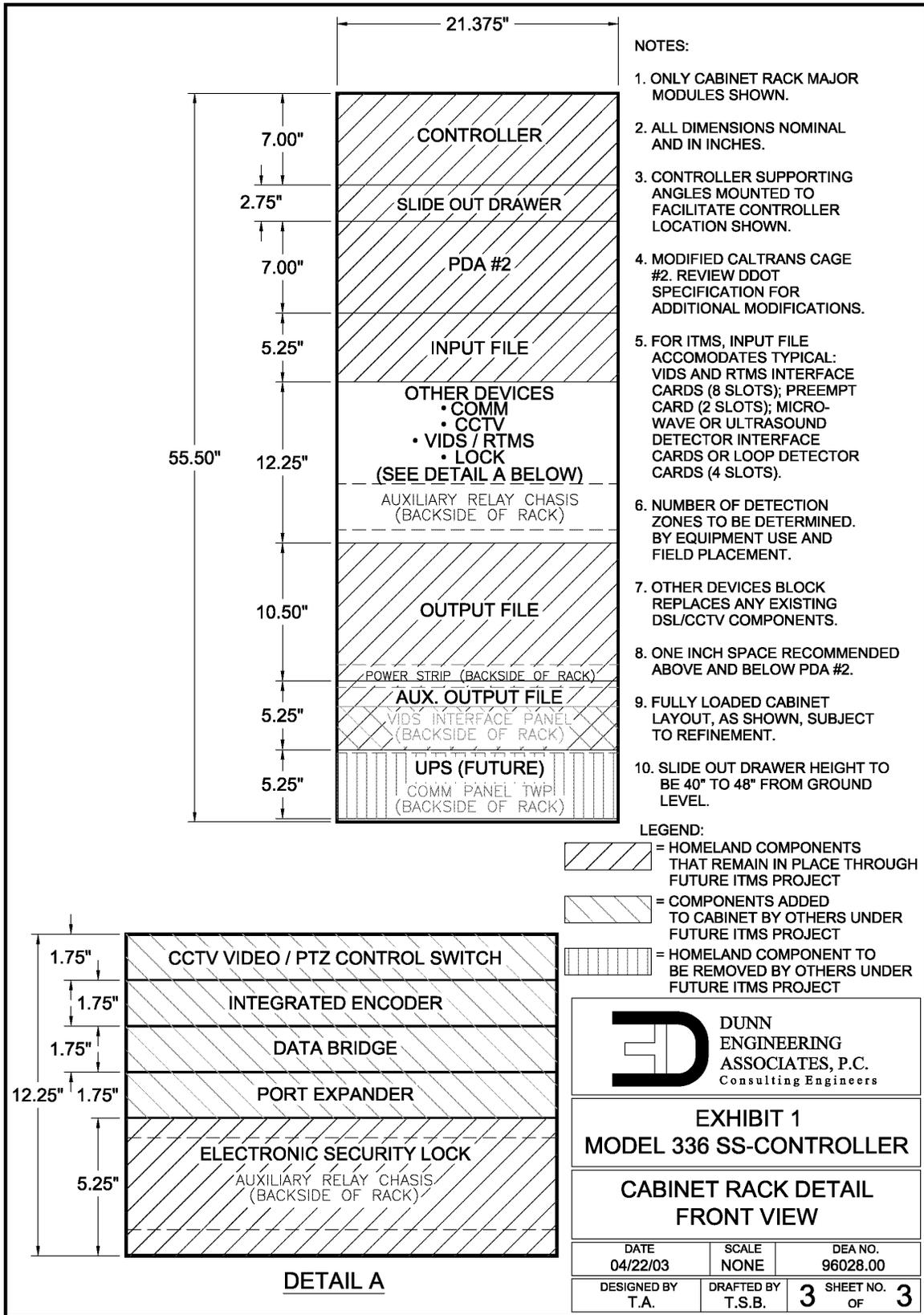
DISTRICT OF COLUMBIA  
DEPARTMENT OF TRANSPORTATION  
TRAFFIC SERVICES ADMINISTRATION

**EXHIBIT 3**

**MODEL 336-SS CABINET  
ADAPTOR BASE DETAILS  
(SMALL FOUNDATION)**

DATE 04/15/03	SCALE NONE	SHEET NO. 1 OF 2
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- NOTES:
1. ONLY CABINET RACK MAJOR MODULES SHOWN.
  2. ALL DIMENSIONS NOMINAL AND IN INCHES.
  3. CONTROLLER SUPPORTING ANGLES MOUNTED TO FACILITATE CONTROLLER LOCATION SHOWN.
  4. MODIFIED CALTRANS CAGE #2. REVIEW DDOT SPECIFICATION FOR ADDITIONAL MODIFICATIONS.
  5. FOR ITMS, INPUT FILE ACCOMODATES TYPICAL: VIDS AND RTMS INTERFACE CARDS (8 SLOTS); PREEMPT CARD (2 SLOTS); MICRO-WAVE OR ULTRASOUND DETECTOR INTERFACE CARDS OR LOOP DETECTOR CARDS (4 SLOTS).
  6. NUMBER OF DETECTION ZONES TO BE DETERMINED. BY EQUIPMENT USE AND FIELD PLACEMENT.
  7. OTHER DEVICES BLOCK REPLACES ANY EXISTING DSL/CCTV COMPONENTS.
  8. ONE INCH SPACE RECOMMENDED ABOVE AND BELOW PDA #2.
  9. FULLY LOADED CABINET LAYOUT, AS SHOWN, SUBJECT TO REFINEMENT.
  10. SLIDE OUT DRAWER HEIGHT TO BE 40" TO 48" FROM GROUND LEVEL.

- LEGEND:
- = HOMELAND COMPONENTS THAT REMAIN IN PLACE THROUGH FUTURE ITMS PROJECT
  - = COMPONENTS ADDED TO CABINET BY OTHERS UNDER FUTURE ITMS PROJECT
  - = HOMELAND COMPONENT TO BE REMOVED BY OTHERS UNDER FUTURE ITMS PROJECT

**DUNN**  
ENGINEERING  
ASSOCIATES, P.C.  
Consulting Engineers

**EXHIBIT 1**  
**MODEL 336 SS-CONTROLLER**

**CABINET RACK DETAIL**  
**FRONT VIEW**

DATE 04/22/03	SCALE NONE	DEA NO. 96028.00
DESIGNED BY T.A.	DRAFTED BY T.S.B.	SHEET NO. <b>3</b> OF <b>3</b>

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**Specifications for District Department of Transportation  
Electronic security lock**

**1. GENERAL**

- **Cabinet electronic security lock shall be compatible with and direct replacement in operation and mechanical construction to DDOT current cabinet electronic security lock developed and distributed by CIM Associates, Inc.**

**2. FIGURES**

**FIGURE 1** ELECTRONIC SECURITY LOCK SUBSYSTEM  
COMPONENTS

**FIGURE 2** POLICE PANEL ELECTRONIC SECURITY LOCK  
SUBSYSTEM

**3. DEFINITIONS**

<b>Access Code:</b>	Any system or method which automatically controls the passage of people and vehicles into or out of an area or structure.
<b>Annunciated:</b>	An audible and/or visual signaling device.
<b>Access Time:</b>	The period of time during which an access point is unlocked. (Also see shunt time).
<b>Audit Trail:</b>	A listing created which may be created in real time, which may be used to monitor the progress of a person through protected areas.
<b>Buffer Capacity:</b>	Refers to the amount of information the system can store, this may include the users, time of day and specific door.
<b>Database:</b>	A collection of data used and produced by a computer program. The files created at the host of the access control system forms its database.
<b>Device Address:</b>	Value set on an access control device to determine its unique identity.
<b>Electromagnetic:</b>	Pertaining to combined electric & magnetic fields associated with movements of electrons through conductors.
<b>Enclosure:</b>	A box or cabinet, usually constructed of metal, that houses

system components, such as circuit boards and other electronic and electrochemical controls and circuitry.

**Erasable Programmable Read-Only Memory (EPROM)** A programmed memory (often in a chip) that can not only be read, but can be repeatedly erased under high-intensity ultraviolet light and reprogrammed.

**Fail-Secure:** An electric lock that requires power to unlock. Also called fail-locked.

**History:** A log of system activity that can be recalled by utilizing the report command. Most systems offer a feature that notifies the console operator of the amount of available storage for history information preventing information from being written over. The message will usually alert the operator to archive the information onto a removable magnetic tape.

**Keypad:** A flat device which has buttons that may be pressed in a sequence to send data to a controller, and which differs (said to be “non-QUERTY”) from a typewriter-like computer board.

**Key lock blocker:** An electromechanical device which is part of the cabinet door locks that cannot physically engage until after the key lock is properly engaged.

**Lock Control Unit (LCU): Note, the PLC is the main part of LCU.** Micro-computer with inputs and outputs that can be programmed to control and monitor access to the key lock blocker, stores events and communicates with a central data server. Programmable Logic Controller (PLC) is the micro-computer that makes of the LCU. The LCU also includes the thermal fan and power supply for the PLC.

**Momentary Switch:** A switch that, after being activated, automatically returns to its original position; a spring-loaded contact that, when pressed, closes two contacts, and when pressure is removed, opens the contact.

**OPERATOR:** A person at a central location who controls the electronic security lock sub-system.

**Reader:** Refers to the “*front end*” that a user must interact with to allow access. Readers can be keypads, card readers, and proximity readers.

**Time Schedules:** Allows for Access based on time of day, date and user. Also allows for holidays, etc.

**Transaction:** A record created that contains pertinent information about an occurrence in the access control and monitoring system.

**USER:** An authorized person trying to gain access to field cabinets

through the electronic lock sub-system.

#### **4. CONCEPT OF OPERATION**

All controller cabinets shall be provided with a electronic security lock sub-system local components. The primary purpose of the electronic security lock sub-system is to provide local components that monitor the status of the authorized and unauthorized entry and closure of the controller cabinet. The sub-system shall be read from a central location and be able to store local and transmitted central data. Central reading/writing to the LCU shall be accomplished using a central security server/workstation and the DC ITMS Communications Sub-system. The central Security Management Software shall be able to support up to 2500 Electronic Security Sub-systems (LCUs).

All LCUs shall perform as required from any Traffic Management Center (TMC) or Traffic Operations Center (TOC) that is in primary control of the communications to the LCU. This requirement serves the need for the Integrated Traffic Management System (ITMS) system to be able to control the LCU from the appropriate TOC controlling the ITMS system. The ITMS communications system shall provide the channel to address the LCU for this control.

#### **5. DESCRIPTION OF LOCAL COMPONENTS**

The electronic security lock sub-system shall consist of the following main components:

##### **A. Lock Control Unit (LCU) includes the Programmable Logic Controller (PLC)**

This unit shall be mounted in the cabinet and shall perform the following functions:

- Accept user input codes from the local cabinet Security Keypad
- Determine the validity of an entered code and open the door lock
- Electromechanically interface to the mechanical cabinet locks to control entry
- Record and transmit data from various events such as authorized cabinet entry, unauthorized entry or attempted code picking.
- Capable of interfacing to the traffic cabinet communications interface through a dedicated serial communications port/channel independent of the signal controller. The serial data port can be configured to accommodate various data or event occurrences from the security sub-system as required by the user.
- LCU includes the PLC, a thermal fan and a power supply.

## **B. Keypad (Local User Interface)**

This unit shall be mounted behind a secure police panel door and shall perform the following functions:

- Input code entry for cabinet access
- Interface with the Lock Control Unit (LCU)

## **C. Backup External Power Supply Terminal (PST) 12VDC**

This unit shall be mounted behind a secure police panel door and shall perform the following function:

- Allow operator to power the electronic security lock sub-system from the police panel using a backup power supply cable (automobile cigarette lighter adapter) operating with 12VDC voltage supply.

## **D. Cabinet door locks with electromechanical release control**

This electromechanical release control shall be mounted in its normal cabinet door position and shall perform the following functions:

- Cabinet door locks shall include an electromechanical key lock blocker that allows the manual door key to unlock the cabinet door lock after the releasing of the blocking mechanism following receipt of a validated access code at the LCU.
- The electronic security lock sub-system shall check 1) door closure and 2) the position of the sub-system key lock blocker. This information should be adequate to determine proper closure and locking of the cabinet. Note that the subsystem lock blocker cannot physically engage until after the key lock is properly engaged. This means the door is already locked before the blocker can engage. The electronic sub-system shall not record the cabinet closure until both doors have been closed and locked.

## **E. Annunciator (Beeper)**

This unit shall be mounted behind the police panel and shall perform the following functions:

- When the electronic security lock sub-system releases the blocking mechanism, a distinct audible sound shall be produced that is capable of being heard by the user in the controller cabinet field environment (over the sound of passing vehicles, etc.).
- When electronic security lock sub-system is put into the block position (locked) after both cabinet doors are in the closed position, a distinct audible sound different from the release sound shall be produced that is capable of being heard by the user from a range of 24" or less in the controller cabinet field environment (over the sound of passing vehicles, etc.).

## **6. FUNCTIONAL REQUIREMENTS**

### **6.1 Lock Dependence and Control Requirements**

- The electronic security lock sub-system shall be integrated with the physical lock mechanism called a key lock blocker, to prevent the key lock from properly engaging unless authorized by the electronic sub-system.
- The electronic security lock sub-system shall remain in the locked condition (fail-secure) until validation of an authorized access code supports release of the key lock blocker mechanism.
- If both the physical door(s) are closed and the key locks for the doors are in the proper locked condition the electronic security lock sub-system shall engage. The LCU shall not record the cabinet closure until both cabinet doors have been closed and locked.
- This sub-system shall provide electronic lock self-diagnostics.
- Should the electromechanical key lock blocker fail, it shall not prevent the mechanical lock from being positioned in the proper lock condition.
- The electromechanical key lock blocker shall be able to be opened/closed from a central location by an operator via a computer workstation; for any individual LCU, a select group of LCUs or all LCUs.
- One LCU shall release both key lock blocker mechanisms at the same time so they can be physically opened.
- The electronic security lock sub-system shall remain in a locked condition when power is removed from the sub-system, unless externally powered and validation of an authorized access code or released from central location.

### **6.2 Central Security Management Software Requirements**

The software shall perform the following functions:

- Software shall reside on a security management server located at a central location and be able to communicate (read/write) with all cabinet security lock sub-systems individually and globally.
- Central shall read/write all LCUs, up to 2500 cabinet LCUs and they shall transmit back to central.
- Central Software shall provide multi-level addressing capability to uniquely communicate with each LCU, based upon the LCU's addressing capability and the serial communications channel provided. Multi-level addressing shall be able to support an addressing scheme that communicates to each LCU using the DC ITMS serial communications channel provided. Each LCU will be provided a Permanent Virtual Circuit (PVC) over the ATM

fiber network. Communication shall include reading/writing to memory locations within the LCU for the storage and retrieval of LCU data. For example, an address scheme could combine an LCU Station Address with an IP Port address and a Local LCU Group ID (group of security locks) to identify the delivery address for data to an LCU.

- Central shall be able to write data to each LCU to synchronize lock time and store authorized access codes, both individually and on a broadcast basis.
- Display alarms shall be able to be prioritized by cabinet and alarm type at central .
- Software shall run on in a Microsoft windows operating system environment or platform compatible to the dc ITMS software environment.
- Central shall be able to open/close the Key Lock Blocker for any individual LCU, a select group of LCUs or all LCUs.
- Password (configurable) shall be required for operation of this software.
- Central shall be able to assign Access Codes to specific users.
- Central shall maintain a database of Access Codes assigned to users
- Central shall communicate to all field Lock Control Units (LCUs) via serial. communications located at central location.
- Central shall be able to generate status reports of event logs for each LCU.

Reports shall be subject to engineer's approval and shall include at a minimum:

- Code Administrator name on each report
- All currently Authorized and Retired codes
- LCU event log (contains local status logged)
  - Unauthorized Access (Alarm)
  - Unsuccessful Access (Lock Picking) Attempts (Alarm)
  - Power Failure (AC) (Alarm)and duration
  - Low battery (Alarm)
  - Excessive open door status; various time duration thresholds (configurable from central) (Alarm)
- Date and time stamps for each event log entry
- Lock status open/closed (Alarm)
- Alphanumeric Intersection Location Identification obtained from ACISA number lookup table

- Supervisor Control shall be able to perform administration on all related cabinet security databases, reports, access code data, lock time clock and electronic lock control. The Supervisor Control shall be setup with a unique password code, given only to authorized individuals. The Supervisor Code shall be used to release the electronic lock local components in the event that the sub-system has encountered an error.

### **6.3 Code Structure and Storage Requirements**

- Code shall be an eight (8) digit unique identifier assigned to only one person requiring access to the controller cabinet. First four (4) digits uniquely identify the person assigned the code, while the second four (4) digits is a cabinet access identifier. The cabinet identifier can serve as a common number to all cabinets for a specified period of time. If an eight (8) digit code shall cause too much memory to be used a four (4) digit code may be considered, subject to the approval of the engineer.
- Valid time period for a specific cabinet access identifier is configurable from central location for all LCUs in the system.
- Electronic security lock sub-system shall be able to store valid access codes.
- Codes shall be downloaded, edited, and deleted from a central location.

u

### **6.4 LCU Requirements**

The required features of the LCU shall be compatible with the Central Security Management Software Requirements.

The software/firmware shall perform the following functions with 30 events being recorded and retained in the local memory for polling.

- LCU event log shall be provided containing the following local status information:
  - Authorized Access Code of field personnel opening cabinet
  - Unauthorized Access
  - Unsuccessful Access Attempts (and Code Sequences)
  - Power Failure (AC) and duration
  - Low battery
  - Excessive open door status (configurable from central)
  - Date and time stamps for logged events
  - Supervisor Access Code Change event
  - Door open/closed, with code, date and time stamp
  - Identity of controller cabinet using 4-digit ACISA number, which shall be supplied by the COTR. ACISA number shall be used at central to lookup intersection location name.
  - Verification of lock closure (reset in locked position)

- The LCU shall be uniquely addressable from central over ITMS communications network using serial communications protocol.
- This sub-system shall include software/firmware that facilitates data to be read from and written to the LCU.
- This sub-system shall be capable of immediate notification to central location of all authorized and unauthorized entries.
- In the event that communications to central is off-line, the cabinet security lock sub-system shall allow access based on its internal authorized list and shall store an audit trail of at the last 30 events.
- When communication is restored, the cabinet electronic security lock sub-system shall report, on request, all events to the central security management software database, and shall receive, on request all security sub-system related changes made at the central location.

#### **6.5 LCU Status Indicator Requirements**

- Transmit and Receive indicators for serial communications ports.
- Power indicator to show LCU is being powered.
- Program Run indicator to show current software/firmware is running
- Other diagnostic indicators and self-test buttons shall be located internal to the cabinet, available on the LCU.

#### **6.6 Data and Event Requirements**

- Unique LCU Serial Number for each LCU that is stored in the LCU and addressable from central server.
- Cabinet ACISA number, identifying unique intersection location for each LCU.
- Last Valid Access Code used, Date and Time of Access.
- List of Recent Valid Access Codes used, Date and Time of Access.
- Current Date and Time of lock clock upon event.
- Event status report from lock.
- Attempted Code Picking Events and Attempted Codes (3 strike lockout for configurable period of time).
- Last 30 events.
- Low Clock and Data Storage Backup Battery Event.
- AC Power failure.

## **6.7 Diagnostic Requirements**

The Electronic Security Lock sub-system shall perform the following diagnostics initiated locally or from central location:

- Lock open (Unlock)/Lock closed (Lock)
- Communicate with central location
- Exercise electronic security lock sub-system annunciator (beeper)

## **6.8 Maintenance Scenario Requirements**

### **Scenario 1: Electronic Lock not powered.**

An external power supply terminal (PST) shall be provided at each cabinet. External power supply connections are protected and cannot be used to damage internal cabinet components. External power can be supplied through protected external power connections.

The Electronic Security Lock Sub-system shall perform in a normal operating manner once external power to the lock is applied.

### **Scenario 2: Electronic lock malfunctions**

If an Electronic Security Lock Sub-system malfunctions and is not controllable from central or locally at the Cabinet, the key lock blocker shall be able to be released by an already established key lock maintenance procedure.

The maintenance procedure to release the security sub-system key lock blocker and key lock shall be accomplished by drilling the mechanical key cylinder. The drilling location for release of the cabinet lock, minimal cabinet intrusion, and effective removal and replacement of the cabinet lock and key lock blocker shall be confirmed by the engineer-in-charge.

### **Scenario 3: TMC Lockouts**

Three (3) unsuccessful attempts to access the Electronic Security Lock cause an automatic lockout to last by default 15 minutes (configurable from central location). Electronic security lock sub-system can be released from central during this period.

## 6.9 Communications Requirements

- Two (2) built-in serial ports
  - Port 1 is RS-232C, fixed at 9600 baud, used for programming the PLC.
  - **Port 2 is multi-function RS-232C, RS-422, RS-485 with selective baud rates – (300 - 38,400bps) for central communication.**
- Parity – Odd, Even, None
- Start Bits – 1
- Stop Bits – 1
- Data Bits – 8
- Protocol: Asynchronous, Half or Full Duplex (2-way communication)

## 6.10 Cabinet Installation/Mounting Requirements

- This sub-system shall be modular in design to allow for field installation in an existing cabinet.
- This sub-system shall be mounted internally to the cabinet, except for external components where noted, using the available cabinet space subject to the approval of the engineer. Consideration shall be given first to a LCU rack mount option (**See LCU Rack Mount Option below**). An interior side panel in the back of the controller cabinet may be considered only upon approval by the Engineer-in-Charge.
- Keypad shall be weather proofed, sealed keyboard with a panel seal gasket to protect it. No additional weather proofing or protection shall be required to protect it. All fasteners for removal of keypad shall be internal to the cabinet and shall not be accessible external to the cabinet or from behind the police panel door.
- Keypad, Backup External Power Supply Terminal and Annunciator required for electronic access to the cabinet shall be installed on the police panel, behind the police panel door. The Backup External Power Supply Terminal and Annunciator may be recommended for integration with the Keypad, if the integration will result in reducing the cost and simplifying the production installation. This integration shall not cause any performance problems and is subject to approval by the COTR and engineer.

## **LCU RACK MOUNT OPTION**

This option specifies the basic size, orientation, and location for mounting the LCU within a standard 19 inch controller cabinet equipment rack.

### **19 INCH RACK MOUNT OF LCU ENCLOSURE**

The LCU will be enclosed within a metal box from formed sheet metal. This enclosure shall be approximately 5.25 inch high x 5 inch deep x 12 inch wide. The enclosure shall be mounted on a standard 5.25 inch (3U) x 19 inch rack mount faceplate. The faceplate will be full width (19 inch), but the actual box enclosure on the back shall be approximately 12 inch wide and set off center to the left. This will leave room on the right side for wiring harness connectors.

The unit shall be mounted so any wire routing or cable harness will not obstruct air flow to the LCU, will be able to provide for loops of excess cable/wiring for door opening, and allow for easy storage and removal when necessary.

## **6.11 Electrical Requirements**

**Discrete Output Points (12 VDC).** The security sub-system shall have at least 4 outputs points available for custom functions. These points can be used to send signals to external devices or to engage relay contacts. The Electronic Security Lock sub-system outputs shall be to points to engage:

- Output 1: Solenoid Key lock Blocker
- Output 2: Annunciator (Beeper)
- Outputs 3 and 4 : Spares

**Discrete Input Points (12VDC sinking).** The security sub-system shall have at least 6 inputs points available for custom functions. These points can be used to send signals to the LCU electronics for use in triggering lock functions. The Electronic Security Lock sub-system inputs shall be to points to engage:

- Input 1: Keypad inputs
- Input 2: Cabinet Door Switches (one input for front and rear doors)
- Input 3: Solenoid Key lock Blocker
- Input 4: Backup External Power Supply Terminal (PST)

**Contact Closures Outputs (Capable of Handling 24 VDC signals).** The electronic security lock subsystem shall provide for 2 relay contacts for switching logic ground of 24 VDC referenced signals. In the absence of other requirements, relay contacts are driven by LCU special functions outputs. These contacts may be used for traffic signal controller interface via the C1 or C11 connector.

**Ground True Inputs (Referenced to Traffic Signal Controller 24 VDC Supply).** The electronic security lock subsystem shall accommodate 2 traffic signal controller control signals provided to the LCU as ground true referenced signals. In the absence of other requirements, the LCU shall process these inputs as Special Function Alarms to be communicated to Central. These contacts may be used for traffic signal controller interface via the C1 or C11 connector.

**Electrical Isolation.** The Electronic Security Lock Sub-systems shall not be interrupted or caused to operate abnormally due to Electromagnetic Interference (EMI) or Extraneous Power Signals. The sub-system shall be subjected to the same requirements provisioned in the Cabinet and Controller specification that this specification is an attachment to.

**Power Failure Recovery.** The electronic lock security sub-system shall recover from power outages transparently to the user. Recovery may be permanent, as in the case of PEPCO grid power restoration, or temporary, as in the case of externally applied power terminal. Under all power outage circumstances, electronic security lock sub-system shall operate as if power had never gone out.

## **6.12 Power Requirements**

12VDC shall be supplied by LCU internal power source; 120VAC converted.

- Output Voltage Range: 6-27VDC
- Maximum Output Voltage: 30VDC
- Maximum Output Current: 2A/point; 6A/common
- Smallest Recommended Load: 5mA@5VDC
- Off to On Response Time: <15ms
- On to Off Response Time: <10ms

Power Fuses – include for LCU unit; removable fuse holder mounted for LCU outside enclosure access.

Real Time Clock shall be backed up by battery. This battery shall be good for 3 years of clock operation in the event of a power failure to the cabinet.

### **6.13 Environmental Testing Requirements**

The Electronic Security Lock Sub-systems shall be subject to the level of testing specified in the Controller and Cabinet Specification.

### **6.14 Software/Firmware Licensing**

There shall be no software/firmware license fee for each LCU. The firmware for the LCU shall be provided by the supplier and installed at the factory as part of the electronic lock security sub-system.

## **7. MATERIALS REQUIREMENTS**

Basic parts list for Cabinet Electronic Security Lock Sub-system for each cabinet. Each cabinet has dual door controls.

- 1 ea. - Lock Control Unit (LCU) – Rack mountable or Side Panel Mountable, battery backed real time clock (3 yr. life after power loss to LCU). Includes Programmable Logic Controller, DC power supply, LCU power cable to connect to 120VAC, and internal cooling fan.
  - Two (2) built-in serial ports. Port 1: RS-232C; Port 2: multi-function RS-232C, RS-422, RS-485
  - Keypad – 12 Key telephone type keypad, environmentally sealed, tactile and tone feedback
- 1 ea. - Electromechanical key lock blocker for release/blocking control as part of each cabinet key door lock
- 1 ea. - Keypad, shall be installed behind Police Panel Door. Sealed keyboard, audible contact, 1 million push button operations per button, and panel seal gasket to protect keypad. Gasketing to also seal cabinet innards.
- Wiring harnesses/wire as necessary for such interfaces as: Keypad, Annunciator (Beeper) and Power Supply Terminal (PST) for LCU external power capability, and one(1) input from front and back cabinet door open contacts.
- 1 ea. – Backup Power Supply Terminal (PST), shall be installed behind Police Panel.
- 40 ea. - - Backup Power Supply Cable for PST. Shall be 30 ft. in length and able to plug into an automobile cigarette lighter. Cable shall be properly labeled.
- 1 ea. – Serial Communications Cable RS-485 for communication from LCU to internal cabinet communications channel (Data Bridge or Integrated Encoder contains Serial Port for Electronic Cabinet Lock supplied with communications equipment). Cable type and connectors shall be available at the time of purchase.

- 25 ea.– Serial Communications Cable RS-232C for communications to LCU from local laptop or similar technology. Cable type and connectors shall be available at the time of purchase.

## **8. DOCUMENTATION REQUIREMENTS**

Twenty-five (25) complete sets of operation and maintenance manuals in hard copy format shall be provided. Format and text style shall replicate that described in the controller and cabinet specification. In addition, at least five (5) copies of CD-ROM electronic manuals shall be delivered.

The manuals shall, as a minimum, include the following:

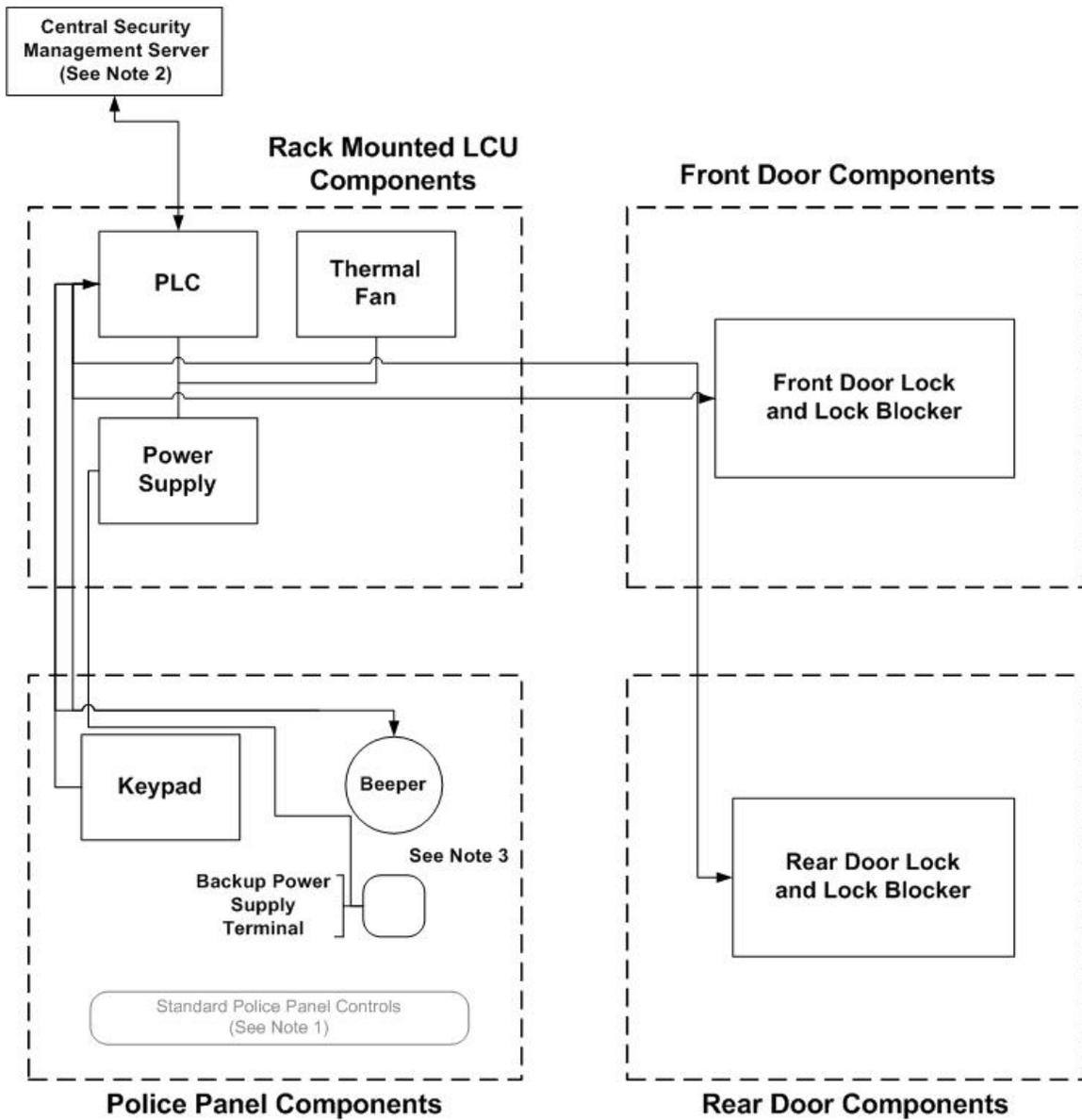
- Equipment operation
- Complete installation procedures
- Complete performance specifications (functional, electrical, mechanical and environmental)
- Complete and accurate troubleshooting, diagnostic and maintenance procedures, including cabinet lock drilling and removal procedure.

Complete source code documentation shall also be provided in hard copy (two copies) and electronic (five copies) formats.

## **9. TESTING REQUIREMENTS**

Electronic Security Lock Sub-system shall be subjected to the levels of testing for the described Environmental Requirements above. In addition, a self test diagnostics shall be cycled during the cabinet/controller burn-in period to ensure operational performance. Production test to exercise all LCU inputs and outputs logic shall be conducted. All test results shall be recorded and provided to the COTR for approval.

## ELECTRONIC SECURITY LOCK SUBSYSTEM COMPONENTS

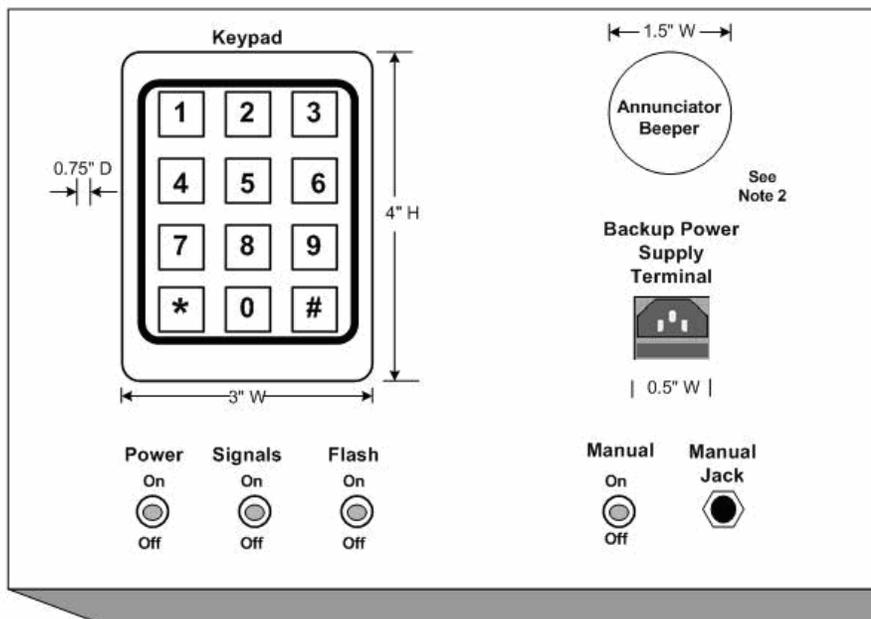


LCU - Lock Control Unit  
 Opt. - Optional  
 PLC - Programmable Logic Controller  
 Note 1 - Not part of Lock Sub-system.  
 Shown for completeness.  
 Note 2 - Central Security Management Server/  
 Workstation connected to its own serial channel that  
 sends/receives data to/from the PLC.

**Figure 1**

Note 3 - Annunciator (beeper) and  
 Backup Power Supply Terminal  
 (PST) may have the option to be  
 integrated with the Keypad. See  
 section 6.10 for detailed  
 requirements.

## POLICE PANEL ELECTRONIC SECURITY LOCK SUBSYSTEM



**Figure 2**

**Notes:**

1) All dimensions shown are approximate. Final sizes will be determined by the subcontractor.

2) Annunciator (Beeper) and Backup External Power Supply Terminal may be integrated with the Keypad at the discretion and approval of the COTR/engineer. See section 5.10 for detailed requirements.

# UltraPower PR1500 UPS

## Application:

The UltraPower Series of UPS products from PSI provides reliable battery backup for a variety of traffic applications including:

- \* **Intersection Backup**   \* **CCTV and Video Detection**
- \* **ITS Applications**   \* **Ramp Metering**

Designed to meet rigorous environmental specifications of 170/NEMA agencies, the UltraPower Line offers a reliable low cost solution to meet most traffic applications. Pure-Sine Wave operation with built in EMI, RFI, and Surge Circuitry protects the cabinet electronic equipment. **Buck/Boost AVR operation** provides for automatic voltage regulation. PSI “**Power Plus**” software provides diagnostics and desirable power management tools and information.

Power Interface Unit “PI” is available. This allows the removal of the UPS without affecting traffic operations. Special features such as, Event Timing & Flash Timing are also available.

UltraPower battery packs can be provided in powerful 65 Amp-Hr 2U rack mount packages 17” wide x 15” deep by 3.5” tall or integrated with in the inverter using a 28 Amp-Hr battery. Batteries can be installed within the traffic cabinets or in a separate battery pack enclosure. Advanced AGM battery construction does not require maintenance. Backed by a three year warranty for the inverter the UltraPower 1500 is a sound long-term investment.



UPS installed in 332 cabinet



UPS with 2 batteries



**Main Panel Screen:**

The main panel PC screen contains all of the status information. As seen in the picture this display contains the incoming voltage, out going voltage battery status, load and schedules. Voice or audible alarms can be enabled/disabled as well as the timing of alarms. The UPS can be automatically shut off after running on the batteries for a certain amount of time if required.

**Set-up Screen:**

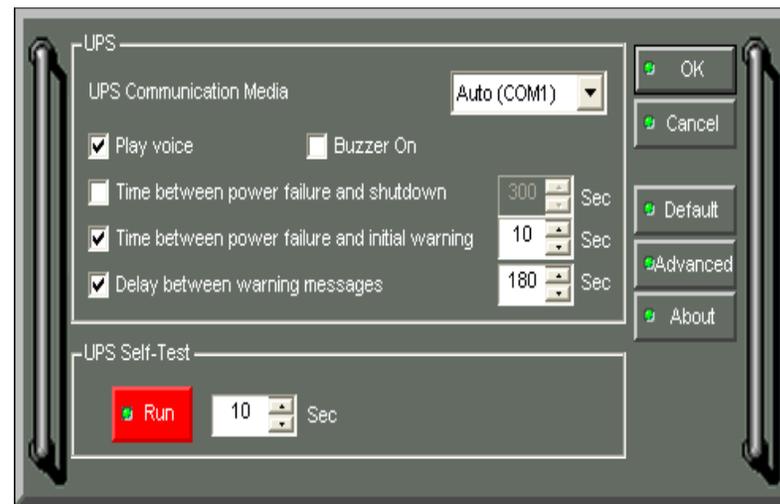
This display allows you to set up parameters of the UPS. The factory sets the UPS up for most traffic applications but the user can modify those settings if needed. Most of the set up on this panel is for your PC operation and applies when connected to the UPS.

**PI- Power Interface**

Rear Panel



**Power Plus Software**



# UltraPower 1500 Specification:

Capacity (VA)-----	capable of 3000VA rated at 2200VA by PSI
Capacity Watts)-----	1500Watts
AVR Operation-----	“Buck/Boost” compensation (if the line drops below a set threshold the UPS will automatically boost the voltage to acceptable level)
Input Voltage-----	87 to 147 VAC
Input Frequency -----	47 to 63Hz
Output Voltage on battery is selectable at (110/120/130 VAC-----	120 VAC $\pm$ 5% (selectable)
Output Frequency on battery-----	60Hz $\pm$ 1%
Lightening/Surge protection-----	Yes
Phone/Modem protection -----	available
Total Receptacles -----	2 plus 2 terminal blocks
Maximum Dimensions (inverter)-----	2U 17”x 15”x3.5”
Weight (inverter)-----	71 lbs
Interfaces-----	RS-232/USB/SNMP
Batteries, sealed AGM-----	65 amp/hr AGM/VRLA
Typical recharge time-----	8 hrs/Battery Pack
Environmental-----	minus 37C degree to plus 74C
Humidity-----	0-95% Non-condensing
Indicators (time before flash/power failure event/line power on/AVR/using battery/wiring fault/battery load level)	
Software-----	98/ME/NT/2000/XP Compatible
Event Timer-----	.1 min to 999.9 minutes



**50 A TRANSFER SWITCH  
MANUAL  
For  
Traffic Control Cabinets**

**REVISION C**

PSI, Inc  
1725 25<sup>th</sup> St. SE  
Salem, OR 97302  
Phone: 503-399-3517  
Fax: 503-399-7782  
[www.psi-traffic.com](http://www.psi-traffic.com)

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## GENERAL DESCRIPTION

The PSI, Inc. Transfer Switch is used in 300 Series Cabinets, which use a back-up Generator as a supplemental power source. The Transfer Switch will automatically transfer to the Input power, which is available with preference given to the standard AC Power Line over the generator power. The user does not have to do any switching of the power manually. The Transfer Switch checks the voltage level of the AC Power Line before switching back to the Power Line. The voltage sense level is adjustable with the pick-up voltage and dropout voltage being individually adjustable.

The PSI Transfer Switch is designed so the AC Power Line and the Generator power can never get cross-connected. Four normally open 60 Amp mercury contactors are used for switching the power from the AC Power Line to the Generator. Both the AC+ and AC- lines are switched so none of the power lines from the AC Power Line and Generator are connected. Relay logic prevents all 4 contactors from being turned on at the same time.

Time delays built into the Transfer Switch make sure the AC Power Line and Generator are producing stable voltages before switching. Short line permutations will not affect the operation of this switch. Hysteresis built into this switch prevents chattering of the relays as the power goes up and down.

The Transfer Switch mounts on the 19" rails of the cabinet and connects to the TBS Block for the AC Line Power. The front panel has a hinge so the unit can be swung out of the way to get to units behind the Transfer Switch. The Generator connector mounts to a metal box, which can be mounted on either sidewall of the cabinet. A door, similar to the police door, provides access to the Generator Connector. The Generator Connector and cable are capable of handling 50 Amps.

## SPECIFICATIONS

Power Handling Capability.....	50 Amps @ 120 VAC
Turn-On Voltage.....	90-140 VAC (Set to 103VAC)
Turn-Off Voltage.....	90-140 VAC (Set to 98 VAC)
Turn-On Delay AC Line.....	3-60 Seconds (Set to 5 seconds)
Turn-On Delay Generator.....	3-60 Seconds (Set to 15 Seconds)
Size.....	17.95"W x 6.25"H x 2.5"D

Indicators.....	NORMAL (AC Line Power) GENERATOR (Generator Power)
Environmental.....	-37° to +74° C 5 to 95% Humidity non-condensing
Connector.....	Amp Circular Plastic Connector # 213889 with # 213841 Pins (3) Pin 1.....AC+ Pin 2.....AC- Pin 3.....Equip. Gnd

## OPERATION

The AC+ and AC- lines from the utility power (TBS Block) are connected to the bottom side of its two mercury contactors. The AC+ and AC- lines from the Generator connector are connected to the bottom side of its two mercury contactors. The topsides of the mercury contactors have the AC+ signals tied together and the AC- signals tied together. These power lines then feed power to the rest of the cabinet.

No power can go to the cabinet unless the mercury contactors are energized since they are normally open parts. Therefore, if none of the rest of the control circuit is working, you cannot cross connect the Utility and Generator power lines.

The Utility power mercury contactors are controlled by a voltage controlled relay and a “Delay on Make” Relay. When power is first applied to the transfer switch, all of the relays are open. The “NORMAL” LED will illuminate dimly, indicating there is power on the AC Line side. When the AC Line input voltage reaches normal operating voltage, (which is settable), the Voltage Control Relay will pull in. That action will supply power to a “Delay on Make” relay, which will delay energizing the mercury contactors for about 5 seconds (settable). This will insure the power line is stable before applying power to the cabinet. The “NORMAL” status light will come on full intensity indicating the cabinet is under Utility power.

During normal operation, the Transfer Switch will ignore short power dips and sags because of the actuation times of the mercury contactor. The mercury contactor takes 80 milliseconds to release during a power failure. Any anomaly on the power line that is shorter than 80 milliseconds (~4 cycles), will be ignored by the Transfer Switch.

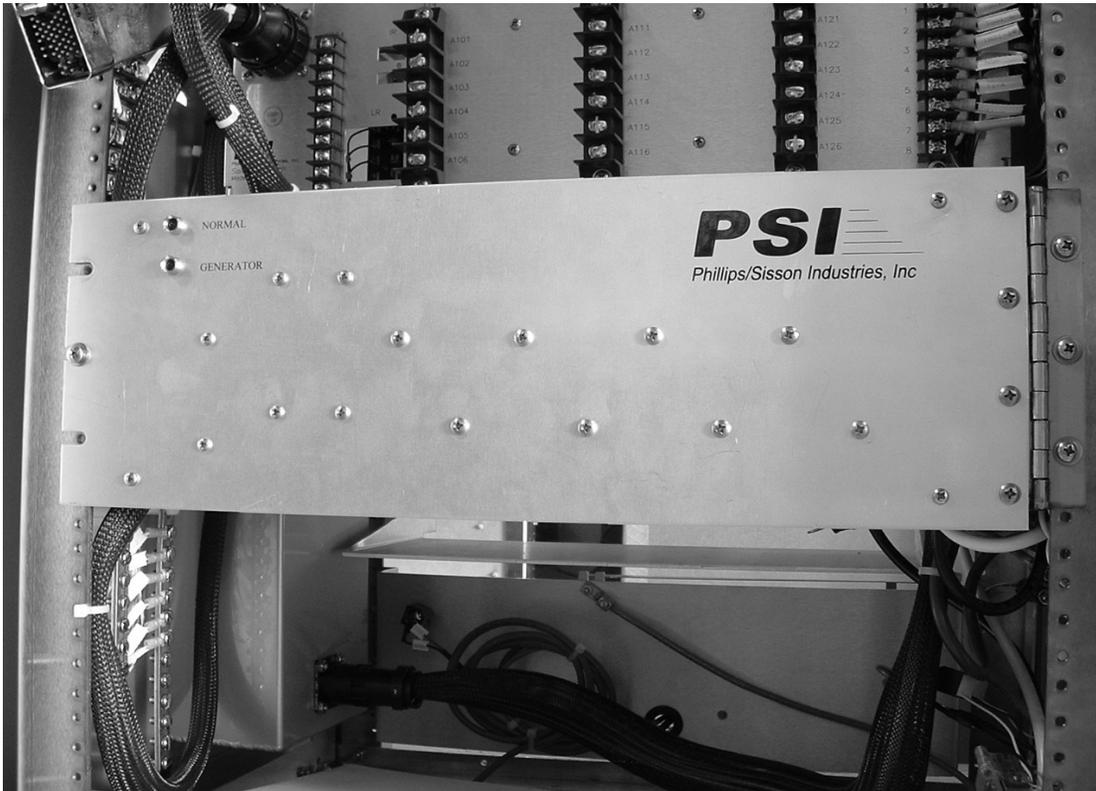
After the delay period, the “Delay on Make” relay closes and the mercury contactors close, 50 ms later the cabinet is supplied with power. To make sure the Generator cannot supply power during this period, a set of contacts on the voltage controlled relay and a separate relay, which is connected in parallel with the Mercury contactor coils, prevents

the Generator's mercury contactor from being energized. The "Delay on Make" relay makes sure the generator is disconnected about 5 seconds before the Utility power contactors are pulled in.

When Utility power fails or goes into a brownout condition, the Voltage controlled relay will release at the voltage it is set for (~90% of nominal line Voltage). This will cause the Utility power mercury contactors to release and remove power from the cabinet. The generator control circuit will be enabled so the cabinet can be powered from the Generator.

When the Generator is connected to the cabinet and started, a different "Delay on Make" Relay starts timing and prevents the power from getting to the cabinet. This is to allow the Generator to stabilize before trying to power the cabinet. The Generator LED will illuminate dimly indicating the generator is producing power. After the preset time, (settable-15 seconds is normal), the mercury contactors are energized and the cabinet is supplied power from the Generator. The Generator Status light comes on full intensity indicating the cabinet is under Generator power.

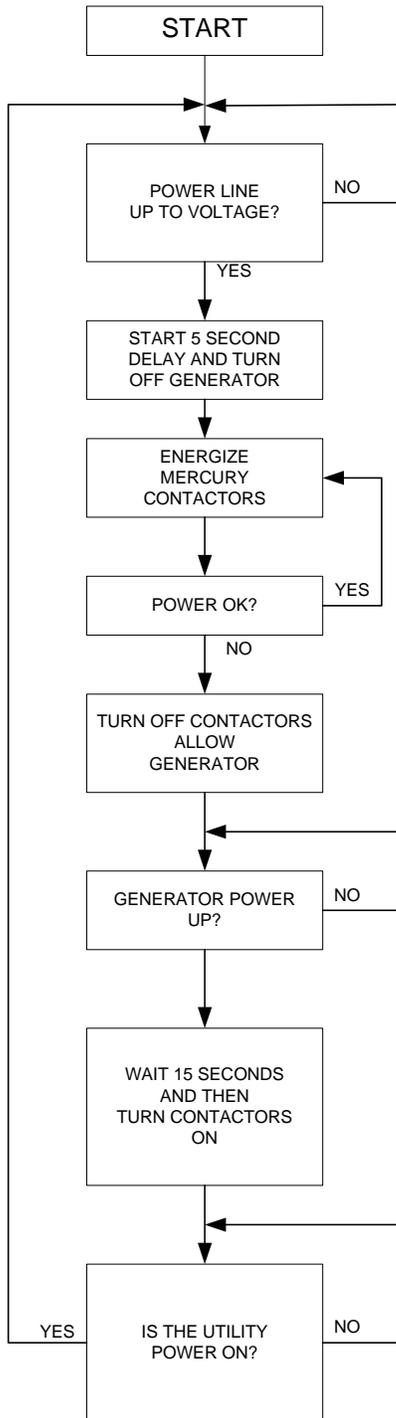
When the Utility power comes back on, the Voltage Sensing relay will pull in, turning off the Generator mercury contactors. 5 seconds later, the "NORMAL" mercury contactors will turn "ON" and the cabinet will once again be powered from the Utility power. The Generator will be supplying no power and will only idle until turned off.



Transfer Switch mounted in a 336SS Cabinet

The following diagram summarizes the Transfer Switch operation:

### TRANSFER SWITCH OPERATION



# INSTALLATION

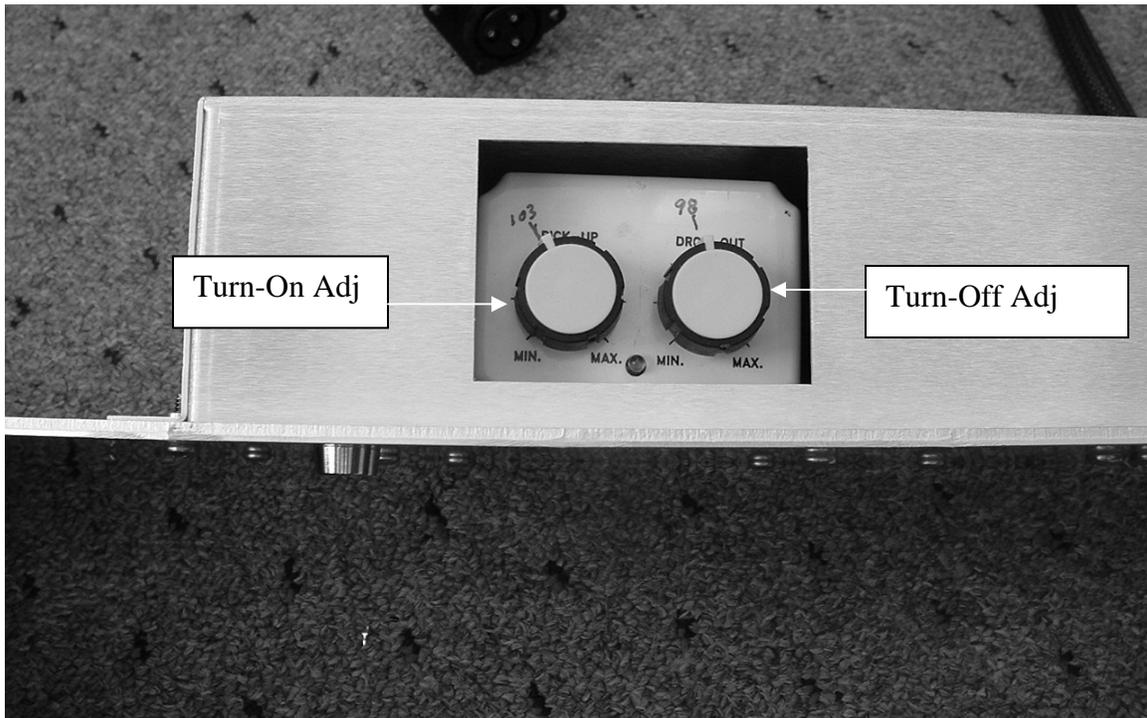
## ADJUSTMENTS

The PSI, Inc. Transfer Switch is set up with the following parameters before it is installed into the cabinet:

AC Line Pickup Voltage.....Set to 103 Volts

AC Line Dropout Voltage.....Set to 98 Volts

These are the same Voltage thresholds as used by the Traffic Controller. If different Voltages are required, these thresholds can be adjusted with the two knobs on the top of the Transfer Switch cover as shown below:



If the Pick-Up (Turn On) Voltage is set to high, the Cabinet will NOT turn on. Power to the Cabinet can be turned OFF in an emergency by turning the Pick-Up knob (and Drop-Out Knob) to the maximum position. This represents a voltage of about 140 VAC, which the AC line Voltage should never reach. **Warning: If a Voltage surge above 140 VAC occurs, the cabinet CAN turn on.**

To adjust these knobs to a different value, you will need to connect a variable AC Voltage source (Variac for instance) to the Cabinet TBS block. It is recommended that

the main breaker in the cabinet be turned OFF so the load on the AC Voltage source will be minimized:

1. Turn the Pick-Up and Drop-Out Knobs to their Maximum positions.
2. Set the AC Source to the Turn-On voltage required.
3. Slowly turn the Pick-Up Knob counter-clockwise until the green LED near the adjustment knobs turns on.
4. Set the AC Voltage Source to the Turn-Off voltage. PLEASE NOTE: A value 5 Volts below the Turn-On voltage is recommended for adequate hysteresis in the system. In a brown-out condition, if there is NOT enough hysteresis, the Transfer Switch may try to turn the cabinet back on; the line voltage moves up a Volt or two because of the lower load on the AC power coming into the cabinet.
5. Turn the Drop-Out Knob counter-clockwise until the green LED near the knobs turns off.
6. This completes the Voltage set-up. You may want to mark the new settings on the knobs so you can go back to those settings if you need to move the knobs.

The delay timings are set up as follows at the factory:

AC Line Voltage Good to enable cabinet power.....5 seconds

Generator Voltage Good to enable cabinet power.....15 seconds

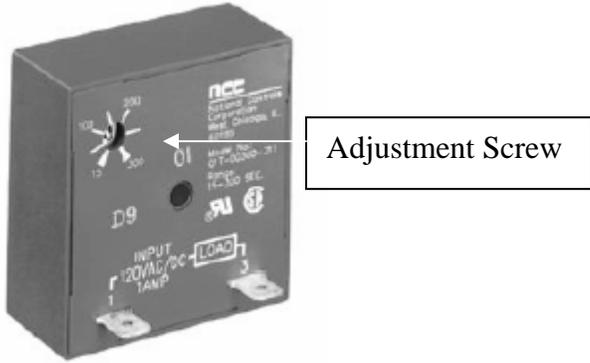
These values are what most of the industry uses for transfer switches. The Generator delay time of 15 seconds may have to be extended if your Generator takes longer to stabilize after starting up.

If the delay times need to be adjusted, the rear cover must be removed to gain access to the screw slots.

**\*\*\*WARNING\*\*\***

***BE VERY CAREFUL AFTER REMOVING THE BACK COVER.  
THERE ARE HIGH VOLTAGES ON ALL PARTS INSIDE THE  
TRANSFER SWITCH***

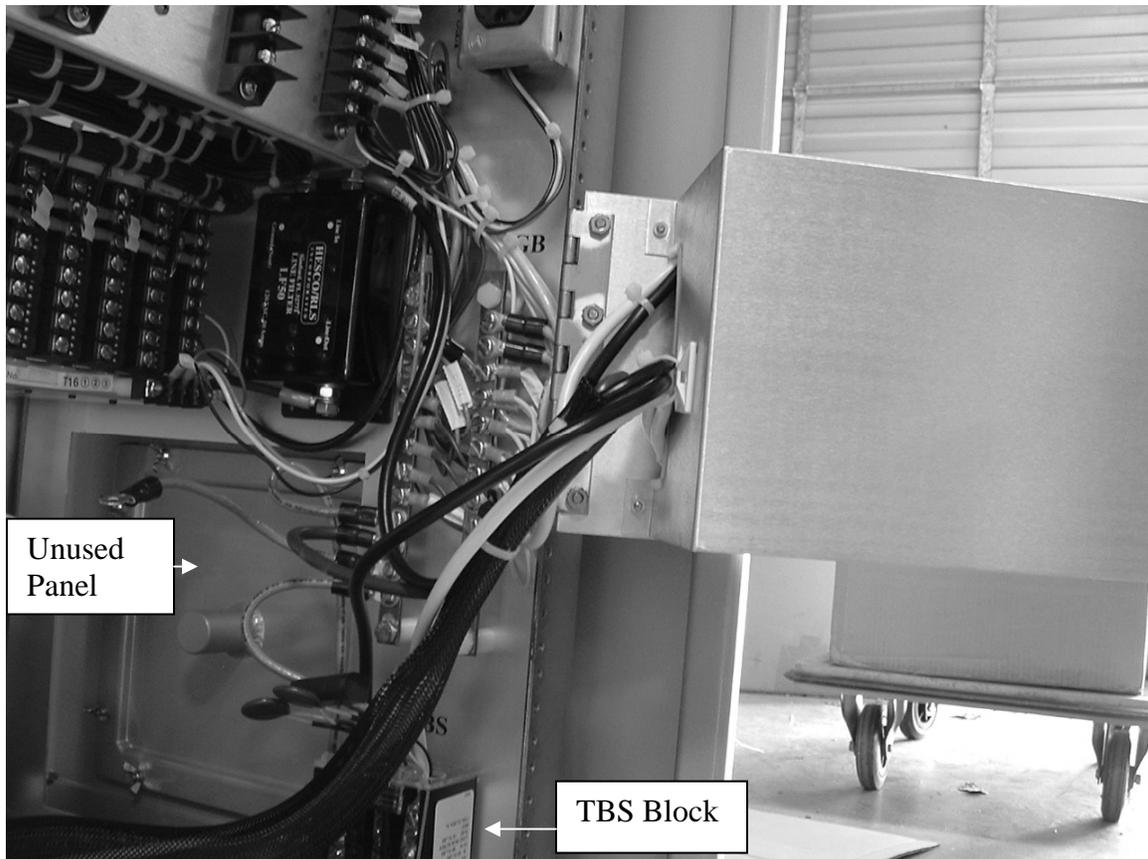
The back cover is removed by removing the four #6 screws holding the cover on. The delay relay looks like the picture below:



The timing can be adjusted from 3 to 60 seconds. Turning the screw clockwise increases the timing. When looking at the back of the Transfer Switch, the upper Delay switch controls the Generator timing and the lower unit controls the AC line Voltage timing.

## CABINET INSTALLATION

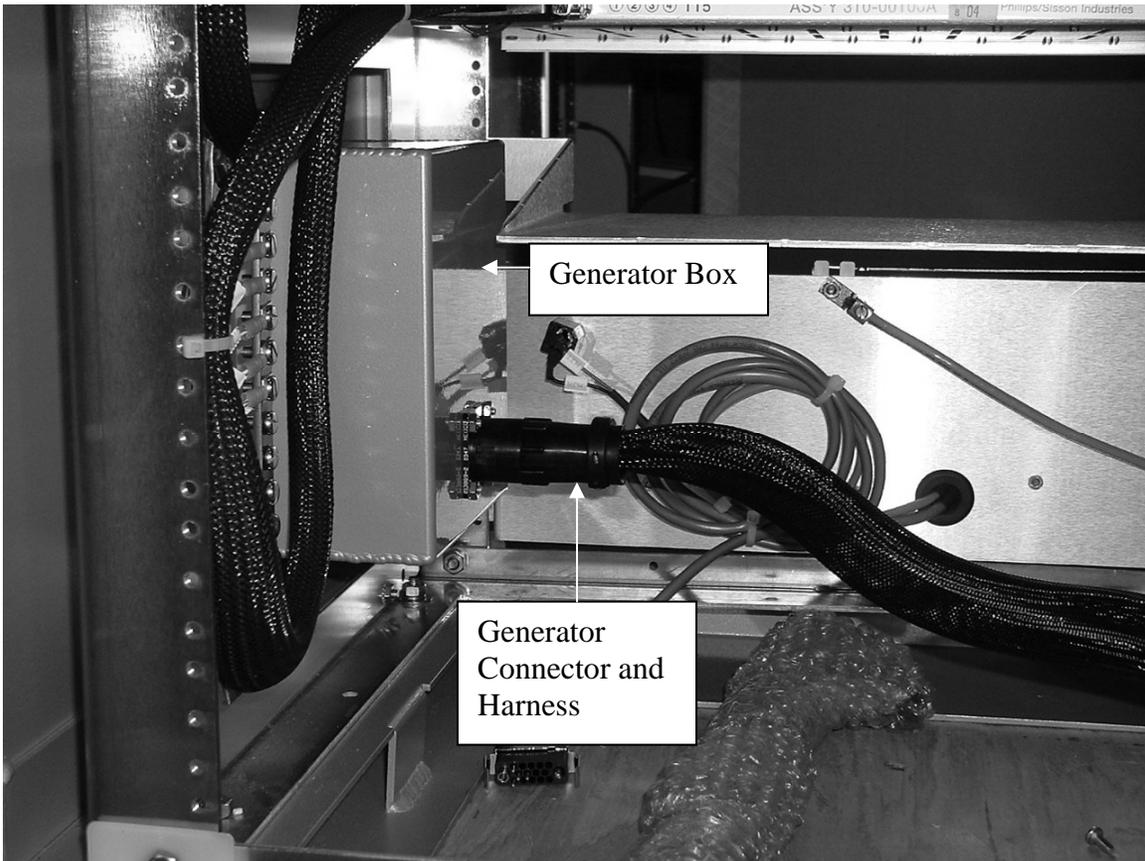
The following pictures show a typical cabinet installation. The Transfer Switch should be located close to the TBS Block to keep the power leads short and out of the way of other wiring. At least four #10 screws are required to attach the Transfer Switch to the Rails. The Transfer Switch must be mounted as shown because of the mercury contactors inside. The Transfer Switch must be within 10° of vertical.



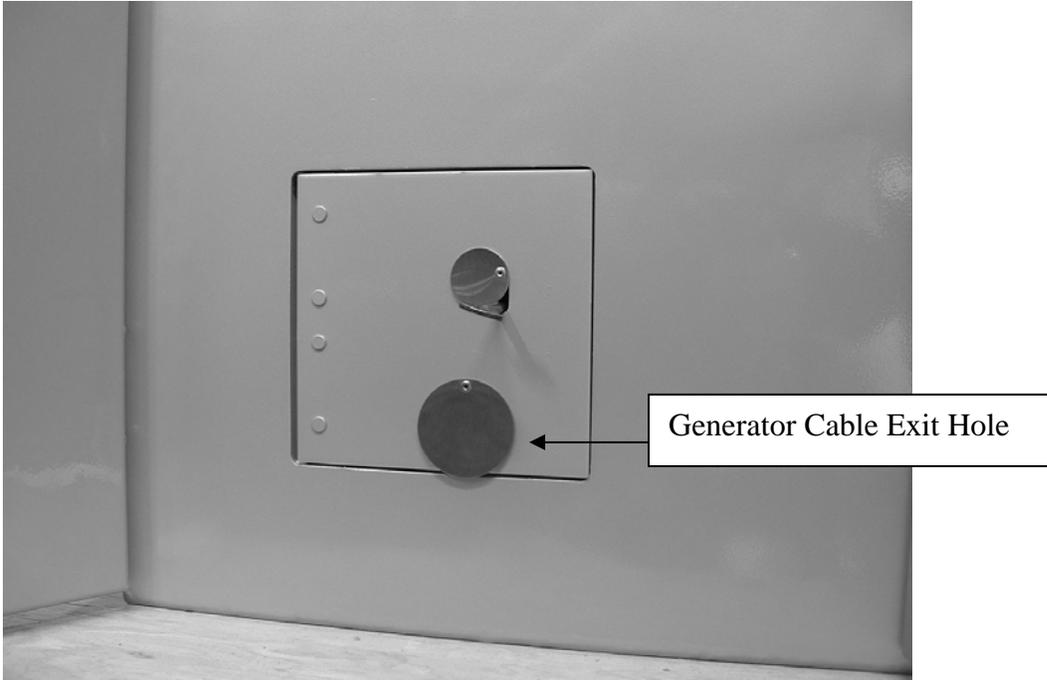
This picture shows the Transfer Switch swung open on its hinge. As shown, the Black AC+ wire and the White AC- wire from the Transfer Switch, connect into the top of the TBS Block. The Equipment Ground does not go through the Transfer Switch.

The Generator connector box can be installed on either side of the cabinet with a blank panel installed on the unused side.

The following picture shows the Generator Harness and box for the connector. The box can be moved to the other side of the cabinet easily. Four wing nuts hold the box to the side wall of the cabinet.



The door and panel on the outside of the cabinet are shown below:



After the Generator cable is connected to the Transfer Switch Connector, the door can be shut and locked with the cable exiting through the slot in the door. This will prevent

access to the connector after the door is closed. The connector will not come loose from normal cabinet vibration.

## **MAINTENANCE**

No regular maintenance is required.



1725 25<sup>th</sup> Street SE  
Salem, Oregon 97302  
Phone: 503-399-3517  
Fax: 503-399-7782  
[www.psi-traffic.com](http://www.psi-traffic.com)

*POKA-2006-B-0012-JJ  
Amendment No. 4*

*Rehabilitation of 11<sup>th</sup> Street SW Bridge  
over D Street Railroad and Approach Roadways*

**NEW APPENDIX**

TEAR DROPS AND 8' TRUSS ARM  
(2 PAGES)

*POKA-2006-B-0012-JJ*  
*Amendment No. 4*

*Rehabilitation of 11<sup>th</sup> Street SW Bridge  
over D Street Railroad and Approach Roadways*

**NEW APPENDIX**

TEAR DROPS AND 8' TRUSS ARM  
(2 PAGES)

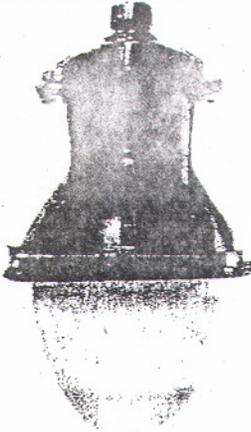
# TF41 Specification Sheet

Page 1 of 2

Fixture Type: \_\_\_\_\_

Hadco Catalog Number: \_\_\_\_\_

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



- Cast aluminum housing.
- Thermoset polyester powdercoat.
- Injection molded U.V. stabilized PolyAcryl™ or pressed borosilicate glass globes available.
- Horizontal reflector is preanodized and segmented. Vertical reflector is polished, etched, and anodized hydro-formed aluminum.
- Maximum 400W MH and HPS.
- UL and cUL Listed.

## Ordering Guide:

Housing	Mounting	Finish	Globe	Optics	Photo Control	Socket	Wattage	Voltage
TF41	N Cast Neck	A Black B White H Bronze J Green	GL Long Glass *L Long PolyAcryl™	2H Type II Horizontal 3H Type III Horizontal 4H Type IV Horizontal 4V Type IV Vertical 5V Type V Vertical	N None	D Medium G Mogul	150S 150W HPS *250S 250W HPS *400S 400W HPS 175H 175W MH *250H 250W MH *400H 400W MH	E 120V F 208V G 240V H 277V K 347V

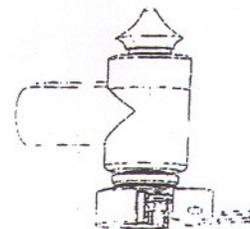
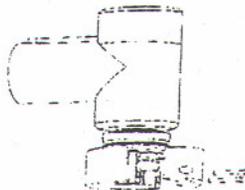
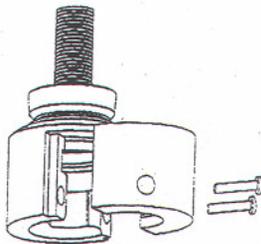
\*Mogul (G) socket only.

### ACCESSORIES:

**TFTC1:** Threaded clamp collar for arms threaded 3/4-14" NPS.

**TFHAM1:** 2-3/8" O.D. horizontal arm mounting adapter with photo twist-lock receptacle.

**TFHAM2:** 2-3/8" O.D. horizontal arm mounting adapter without photo twist-lock receptacle.



\*NOTE: TFTC1 not required when ordering Hadco mounting arms.

# HADCO®

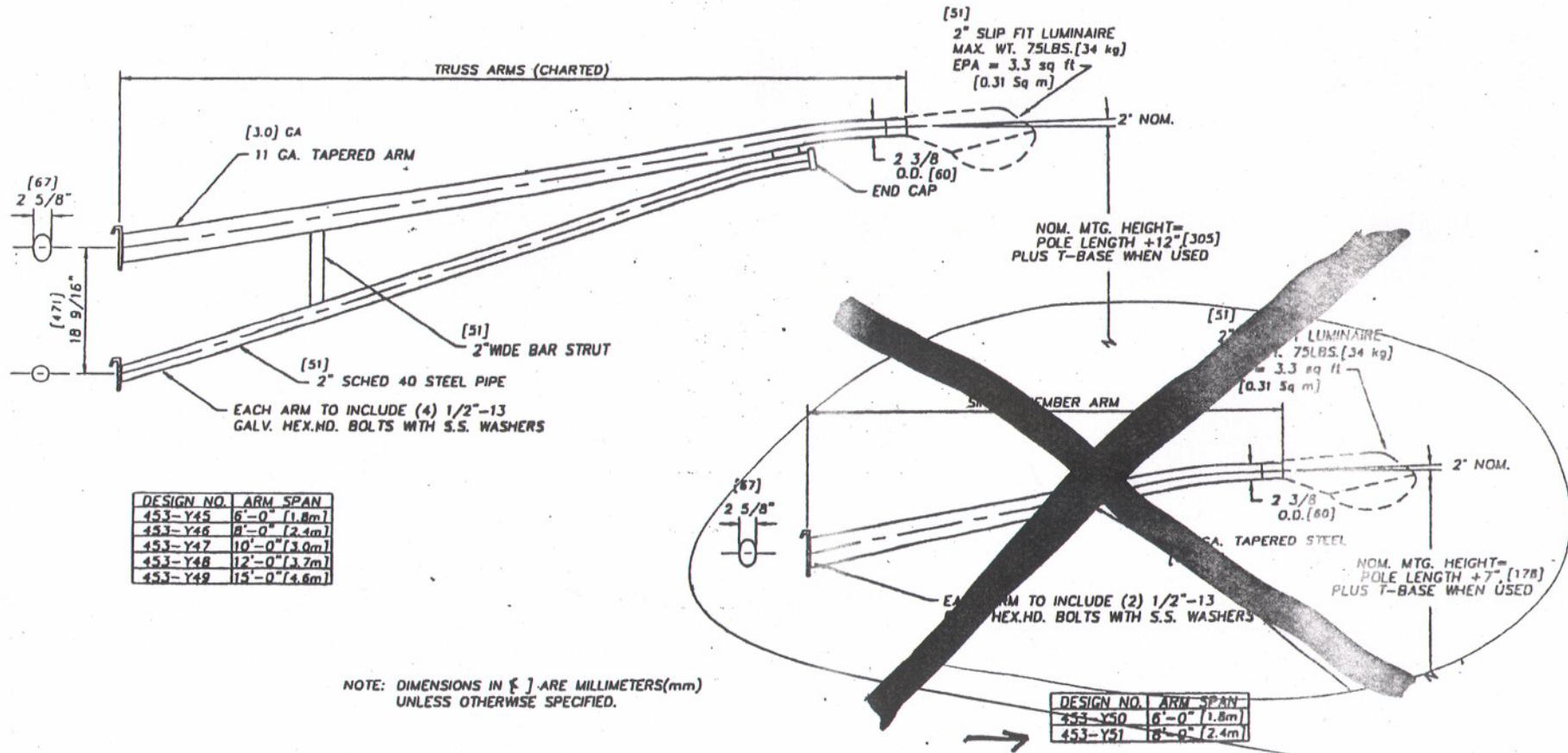
A Genlyte Company  
www.hadcolighting.com

Note: Hadco reserves the right to modify the above details to reflect changes in the cost of materials and/or production and/or design without prior notice.

ISO 9001 Registered

100 Craftway Littlestown, PA 17340  
tel (717) 359-7131 fax (717) 359-9289  
REV\_0105

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**FINISH NOTE**

- GALVANIZED AND POLYESTER POWDER COATED (OUTSIDE ONLY) 4 MILS D.C. GREY FEDERAL #16099

MATERIAL SPECIFICATIONS	
ARM TUBES	(36 KSI)
PIPE	ASTM-A501
MISC. PLATES	ASTM-A36
CONN. BOLTS	ASTM-A307
STRUCTURE FINISH SEE FINISH NOTE 1.	

NOTE:  
POLES USED WITH THESE ARMS  
ON DWGS 453-B17 OR 453-B19

REVISIONS		LIGHTING ARMS FOR WASHINGTON D.C.	
R1	1074 0888 REMOVED FINISH NOTES #1 thru #3, NEW NOTE #1 on #4 (ADDED "POLYESTER" TO THIS NOTE). "SEE FINISH NOTE 1." in MATL SPECS see "SEE NOTE 2". ADD DWG 453-B18 to NOTE. ADD METRICS & NOTE	12/13/89	10/24/94
		LOF YES	REQ. # 0857-06-97
		ENG. REF. #	S.O. # CAD # 0852894
		 <b>Union Metal CORPORATION</b>	
		DRAWN <u>NDJ</u>	DRAWING NO. 453-B18
		DATE <u>10/24/94</u>	
		CHECKED <u>hmp</u>	

ORIGINAL

General Decision Number: DC070001 05/18/2007 DC1

Superseded General Decision Number: DC20030001

State: District of Columbia

Construction Types: Heavy (Heavy and Sewer and Water Line) and Highway

County: District of Columbia Statewide.

HEAVY CONSTRUCTION PROJECTS (Including Sewer and Water Lines); HIGHWAY CONSTRUCTION PROJECTS

Modification Number	Publication Date
0	02/09/2007
1	05/04/2007
2	05/11/2007
3	05/18/2007

ASBE0024-001 10/01/2006

	Rates	Fringes
Asbestos Worker/Heat and Frost Insulator Includes the application of all insulating materials, protective coverings, coatings and finishes to all types of mechanical systems.....	\$ 27.13	13.13

ASBE0024-002 10/01/2006

	Rates	Fringes
Hazardous Material Handler Includes preparation, wetting, stripping, removal, scrapping, vacuuming, bagging and disposing of all insulation materials, whether they contain asbestos or not, from mechanical systems.....	\$ 18.00	6.45

ASBE0024-005 10/01/2006

	Rates	Fringes
Fire Stop Technician Includes the application of materials or devices		

within or around penetrations and openings in all rated wall or floor assemblies, in order to prevent the passage of fire, smoke or other gases. The application includes all components involved in creating the rated barrier at perimeter slab edges and exterior cavities, the head of gypsum board or concrete walls, joints between rated wall or floor components, sealing of penetrating items and blank openings.....\$ 22.00 6.24

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 BOIL0193-001 10/01/2006

	Rates	Fringes
BOILERMAKER.....	\$ 32.06	16.46

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 BRDC0001-001 04/30/2006

	Rates	Fringes
Bricklayer.....	\$ 25.90	6.19

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 \* CARP0132-001 05/01/2007

	Rates	Fringes
Carpenter/Lather.....	\$ 24.37	6.15
Piledriver.....	\$ 22.87	6.85

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 CARP0132-003 05/01/2004

	Rates	Fringes
Diver Tender.....	\$ 20.85	5.50
Diver.....	\$ 29.63	5.50

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 CARP1831-001 04/01/2003

	Rates	Fringes
Millwright.....	\$ 24.34	4.05

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 ELEC0026-001 11/06/2006

	Rates	Fringes
Electrician.....	\$ 32.45	11.32+a

a. PAID HOLIDAYS: New Year's Day, Martin Luther King Jr.'s Birthday, Inauguration Day, Memorial Day, Fourth of July, Labor Day, Veterans Day, Thanksgiving Day, the day after Thanksgiving and Christmas Day or days designated as legal holidays by the Federal Government.

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 ELEC0026-008 07/01/2003

	Rates	Fringes
Motor Repairmen		
Removal and reinstallation		
of electrical motors.....	\$ 23.69	7.73+3%+a

a. PAID HOLIDAYS:

New Year's Day, Martin Luther King Jr.'s Birthday, Inauguration Day, Memorial Day, Fourth of July, Labor Day, Veterans Day, Thanksgiving Day, the day after Thanksgiving and Christmas Day or days designated as legal holidays by the Federal Government.

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 ELEC0070-001 01/01/2006

	Rates	Fringes
Line Construction:		
Groundmen.....	\$ 12.03	4.75+18.75%
Linemen, Cable Splicers,		
Equipment Operators.....	\$ 25.50	4.75+18.75%
Truck with winch.....	\$ 12.35	4.75+18.75%

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 ENGI0077-001 05/01/2007

	Rates	Fringes
Power equipment operators:		
(HEAVY AND HIGHWAY		
CONSTRUCTION)		
GROUP 1.....	\$ 27.64	6.82+a
GROUP 2.....	\$ 27.18	6.82+a
GROUP 3.....	\$ 26.47	6.82+a
GROUP 4.....	\$ 24.44	6.82+a
GROUP 5.....	\$ 19.90	6.82+a
GROUP 6.....	\$ 29.01	6.82+a

POWER EQUIPMENT OPERATORS CLASSIFICATIONS

GROUP 1: 35 ton cranes & above, tower & climbing cranes, derricks, concrete boom pump, drill rigs (equivalent to L & Double L), mole.

GROUP 2: Backhoes, cableways, cranes, cherry pickers, elevating graders, hoists, paving mixers, power shovels, tunnel shovels. batch plants, shields, tunnel mining machines, gradalls, front end loaders, 3 1/2 cu. yds. and above, power driven wheel scoops and scrapers (50 cu. yds. struck capacity or above), rail tamper, draglines,

boomcat, mucking machines, graders in tunnels, pile driving engines.

GROUP 3: Front end loaders below 3 1/2 cu. yds, boom trucks, hydraulic backhoes 1/2 yds. capacity or below rubber or track mounted, tug boats, power driven wheel scoops & scrapers, blade graders, motor graders, bulldozers, trenching machines, concrete mixer, speed swing pettibone, ballast regulator, concrete pump, mechanic, welder, mechanic welder, shotcrete machines, Hoeram, locomotive (standard, narrow gauge), tuggers.

GROUP 4: High lifts above 10 feet, boilers (skelton), asphalt spreaders, bullfloat finishing machines, concrete finishing machines, concrete spreaders, fine graders, air compressors, welding machines, pumps, generators, well points, deep wells, hydraulic pumps, elevators, freeze uniits, tunnel motorman or dinky operator, roller, conveyors, well drilling machines, grout pump, fireman.

GROUP 5: Fork lifts, ditch witch, bobcat 1/3 cu. yd. and below, space heaters, sweepers, assistant engineers, oilers.

GROUP 6: Master mechanic.

a. PAID HOLIDAYS: New Years Day, Inaugural Day, Decoration Day, Independence Day, Labor Day, Martin Luther King's Birthday, Veterans' Day, Thanksgiving Day, Friday after Thanksgiving and Christmas Day.

b. PREMIUM PAY: Tower cranes and cranes 100-ton and over to receive \$1.00 per hour premium over Group One.

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ENGI0077-002 06/01/2006

	Rates	Fringes
Power equipment operators: (PAVING AND INCIDENTAL GRADING)		
GROUP 1.....	\$ 21.50	5.25
GROUP 2.....	\$ 19.05	5.25
GROUP 3.....	\$ 17.80	5.25
GROUP 4.....	\$ 16.59	5.25
GROUP 5.....	\$ 15.35	5.25
GROUP 6.....	\$ 21.45	5.25

POWER EQUIPMENT OPERATORS CLASSIFICATIONS

GROUP 1: Gradall operator, Crane.

GROUP 2: Boom Truck, Milling Machine, Excavator, Rubber Tire Backhoe, Asphalt Paver, Asphalt Plant Engineer.

GROUP 3: Motor Grader, Track Loader, Rubber Tire Loader, Track Dozer, Concrete Paver.

GROUP 4: Broom Truck, Asphalt Roller.

GROUP 5: Air Compressor, Grade Rollers.

GROUP 6: Mechanic.

	Rates	Fringes
Power equipment operators: (SEWER, GAS AND WATER LINE CONSTRUCTION)		
GROUP 1.....	\$ 19.43	5.12+a
GROUP 2.....	\$ 19.03	5.12+a
GROUP 3.....	\$ 18.88	5.12+a
GROUP 4.....	\$ 18.80	5.12+a
GROUP 5.....	\$ 18.69	5.12+a
GROUP 6.....	\$ 18.52	5.12+a
GROUP 7.....	\$ 18.62	5.12+a
GROUP 8.....	\$ 18.52	5.12+a
GROUP 9.....	\$ 19.06	5.12+a
GROUP 10.....	\$ 18.41	5.12+a
GROUP 11.....	\$ 18.29	5.12+a
GROUP 12.....	\$ 18.20	5.12+a

POWER EQUIPMENT OPERATORS CLASSIFICATIONS

GROUP 1: Backhoes, Cableways, Cranes, Derricks, Draglines, Power Shovels, Tunnel Shovels, Tunnel Mucking Machines (1 cubic yard capacity or above).

GROUP 2: Backhoes, Boom Cats, Cableways, Cranes, Derricks, Draglines, Elevating Graders, Hoists, Paving Mixers, Pile Driving Engines, Power and Tunnel Shovels, Tunnel Mucking Machines, Batch Plant, Concrete Pumps.

GROUP 3: Operators of Hydraulic Backhoes of below 1/2 yard capacity.

GROUP 4. Trenching machines above 83 inches.

GROUP 5: Trenching machines (up to & including 83"), Boilers (Skelton), Well Drilling Machines.

GROUP 6: Air Compressors (Tunnel).

GROUP 7: Front-end Loaders (Hi-Lift) and Bulldozers on Sewer and Water Line Work.

GROUP 8: Concrete Mixers, Power Driven Wheel Scoops and Scrapers, Blade graders, Motor Graders, Tunnel Mechanics, Tunnel Motormen.

GROUP 9: Mechanics.

GROUP 10: Bulldozers, Hydraulic Tamper and Hoe Pack Operators.

GROUP 11: Rollers.

GROUP 12: Air Compressors, Pumps, Welding Machines, Well Points.

a.PAID HOLIDAYS: New Year's Day, Inaugural Day, Washington's Birthday, Decoration Day, Independence Day, Labor Day, Veterans Day, Thanksgiving Day, Christmas Day and Martin Luther King's Birthday.

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 IRON0005-001 06/01/2006

	Rates	Fringes
Ironworkers:		
Structural, Ornamental and Chain Link Fence.....	\$ 25.68	11.345

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 IRON0201-001 05/01/2007

	Rates	Fringes
Ironworkers:		
Reinforcing.....	\$ 24.80	12.08

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 LABO0456-006 06/01/2006

	Rates	Fringes
Laborers: (BRICK MASONRY WORK)		
Mason Tenders.....	\$ 13.91	3.84
Scaffold Builders, Mortarmen and Small Equipment Operators.....	\$ 14.65	3.84

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 LABO0657-003 06/01/2006

	Rates	Fringes
Laborers: (HEAVY AND HIGHWAY AND SEWER & WATER LINES CONSTRUCTION)		
GROUP 1.....	\$ 19.18	3.84
GROUP 2.....	\$ 19.46	3.84
GROUP 3.....	\$ 19.61	3.84
GROUP 4.....	\$ 19.75	3.84
GROUP 5.....	\$ 20.15	3.84
GROUP 6.....	\$ 20.64	3.84
GROUP 7.....	\$ 21.11	3.84
GROUP 8.....	\$ 21.77	3.84

LABORERS CLASSIFICATIONS:

GROUP 1: Carloaders, choker setter, concrete crewman, crushed feeder, demolition laborers, including salvaging all material, loading, cleaning up, wrecking, dumpmen, flagmen, fence erector and installer (other than chain link), including installation and erection of fence, guard rails, medial rails, reference posts, guide posts and right-of-way markers, form strippers, general laborers, railroad track laborers, riprap man, scale man, stake jumper, structure mover, includes foundation, separation, preparation, cribbing, shoring,

jacking and unloading of structures, water nozzleman, timber  
bucker and faller, truck loader, water boys, tool room men.

GROUP 2: Combined air and water nozzleman, cement handler,  
dope pot fireman (nonmechanical), form cleaning machine,  
mechanical railroad equipment (includes spiker, puller, tile  
cleaner, tamper, pipe wrapper, power driven wheelbarrows,  
operators of hand derricks, towmasters, scootcretes,  
buggymobiles and similar equipment), tamper or rammer  
operator, trestle scaffold builders over one tier high, power  
tool operator (gas, electric or pneumatic), sandblast or  
gunnite tailhose man, scaffold erector, (steel or wood),  
vibrator operator (up to 4 feet), asphalt cutter, mortar men,  
shorer and logger, creosote material handler, corrosive enamel  
or equl, paver breaker and jackhammer operators.

GROUP 3: Multi-section pipe layer, non-metallic clay and  
concrete pipe layer (including caulker, collarman, jointer,  
rigger and jacker, thermal welder and corrugated metal culvert  
pipe layer.

GROUP 4: Asphalt block pneumatic cutter, asphalt roller,  
walker, chainsaw operator with attachment, concrete saw  
(walking), high scalers, jackhammer operator (using over 6  
feet of steel), vibrator operator (4 feet and over), well  
point installer, air trac operator.

GROUP 5: Asphalt screeder, big drills, cut of the hole drills  
(1 1/2 " piston or larger), down the hole drills (3 1/2"  
piston or larger) gunnite or sandblaster nozzleman, asphalt  
raker, asphalt tamper, form setter, demolition torch operator,  
shotcrete nozzlemen and potman.

GROUP 6: Powderman, master form setters.

GROUP 7: Brick paver (asphalt block paver, asphalt block  
sawman, asphalt block grinder, hastings block or similar type)

GROUP 8: Licensed powdermen.

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LAB00657-004 06/01/2006

	Rates	Fringes
Laborers: (HAZARDOUS WASTE REMOVAL, EXCEPT ON MECHANICAL SYSTEMS: Preparation for, removing and encapsulation of hazardous materials from non-mechanical systems)		
Skilled Asbestos Abatement Laborers.....	\$ 15.99	3.84
Skilled Toxic and Hazardous Waste Removal Laborers.....	\$ 18.61	3.84

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LABO0657-005 06/01/2006

	Rates	Fringes
Laborers: (TUNNEL, RAISE & SHAFT (FREE AIR) FOR HEAVY AND SEWER & WATER LINES CONSTRUCTION)		
GROUP 1.....	\$ 19.82	3.84
GROUP 2.....	\$ 20.39	3.84
GROUP 3.....	\$ 21.85	3.84
GROUP 4.....	\$ 22.47	3.84

LABORERS CLASSIFICATIONS:

GROUP 1: Brakeman, Bull Gang, Dumper, Trackmen, Concrete Man.

GROUP 2: Chuck Tender, Powdermen in Prime House, Form Setters and Movers, Nippers, Cableman, Houseman, Groutman, Bell or Signalman, Top or Bottom Vibrator Operator.

GROUP 3: Miners, Re-Bar Underground, Concrete or Gunnite Nozzlemen, Powdermen, Timbermen and Re-Timbermen, Wood Steel Including Liner plate or Other Support, Material Motorman, Caulkers, Diamond Drill Operators, Riggers, Cement Finishers-Underground, Welders and Burners, Shield Driver, Air Trac Operator, Shotcrete Nozzlemen and Potman.

GROUP 4: Mucking Machine Operator (Air).

LABO0657-006 06/01/2006

	Rates	Fringes
Laborers: (TUNNEL, RAISE AND SHAFT (COMPRESSED AIR) FOR HEAVY CONSTRUCTION ONLY		
Gauge Pressure Work Period		
(Pounds)	(Hours)	
1-14	7.....	\$ 24.16
14-18	6.....	\$ 28.43
		3.84
		3.84

FOOTNOTE: On any requirement for air pressure in excess of 18 PSI, work periods and rates should be negotiated at a pre-bid conference.

LABO0657-007 06/01/2006

	Rates	Fringes
Laborers: (PAVING AND INCIDENTAL GRADING)		
Asphalt Raker & Concrete		
Saw Operator.....	\$ 16.76	4.10
Asphalt Shoveler.....	\$ 16.23	4.10
Asphalt Tammer & Concrete		
Shoveler.....	\$ 16.47	4.10

Jack Hammer.....	\$ 16.66	4.10
Laborer.....	\$ 16.12	4.10
Sand Setter & Form Setter...	\$ 17.37	4.10

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MARB0002-003 05/01/2006

	Rates	Fringes
Marble & Stone Mason Includes Pointing, Caulking and Cleaning of All Types of Masonry, Brick, Stone and Cement Structures.....	\$ 29.87	11.15

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MARB0003-001 05/01/2006

	Rates	Fringes
Mosaic & Terrazzo Worker, Tile Layer Marble Mason and Tile Layer.\$	24.32	8.78
Terrazzo Worker.....	\$ 25.07	8.78

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MARB0003-004 05/01/2006

	Rates	Fringes
Marble, Tile & Terrazzo Finisher.....	\$ 19.59	7.90

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PAIN0051-001 06/01/2006

	Rates	Fringes
Painters: All Industrial Work.....	\$ 23.48	7.31
Bridges, Heavy Highway, Lead Abatement and Flame/Thermal Spray.....	\$ 26.37	7.31
Commercial and Mold Remediation, Painters, Wallcovers and Drywall Finishers.....	\$ 22.06	7.31
Metal Polishing and Refinishing.....	\$ 23.06	7.31

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PLAS0891-001 05/01/2006

	Rates	Fringes
Cement Masons: HEAVY CONSTRUCTION ONLY.....	\$ 25.45	5.46

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PLAS0891-002 06/01/2004

	Rates	Fringes
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Cement Masons: (PAVING & INCIDENTAL GRADING)

Cement Masons.....	\$ 16.25	4.10
Concrete Saw Operators.....	\$ 16.25	4.10
Form Setters.....	\$ 16.25	4.10

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PLUM0005-001 08/01/2006

	Rates	Fringes
Plumber.....	\$ 31.52	12.59+a

a. PAID HOLIDAYS: Labor Day, Veterans' Day, Thanksgiving Day and the day after Thanksgiving, Christmas Day, New Year's Day, Martin Luther King's Birthday, Memorial Day and the Fourth of July.

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PLUM0602-005 08/01/2006

	Rates	Fringes
Steamfitter, Refrigeration & Air Conditioning Mechanic.....	\$ 31.27	12.82+a

a. PAID HOLIDAYS: New Year's Day, Martin Luther King's Birthday, Memorial Day, Independence Day, Labor Day, Veterans Day, Thanksgiving Day and the day after Thanksgiving and Christmas Day.

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SHEE0100-001 07/01/2006

	Rates	Fringes
Sheet Metal Worker.....	\$ 30.39	11.05

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TEAM0639-001 03/07/2004

	Rates	Fringes
Truck drivers: (HEAVY & HIGHWAY CONSTRUCTION)		
Tandem & Triaxle (3 or more axles, including steering axle).....	\$ 16.00	5.82+a
Tractor-trailer, Low Boy....	\$ 20.00	5.82+a

a. VACATION: Employees will receive one (1) week's paid vacation after one (1) year of service.

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TEAM0639-002 06/01/2005

	Rates	Fringes
Truck drivers: (HEAVY & HIGHWAY CONSTRUCTION)		
Concrete Mixer Drivers.....	\$ 17.40	5.82+a+b

a. PAID HOLIDAYS: New Year's Day, Martin Luther King, Jr. Day, Memorial Day, July 4th, Labor Day, Thanksgiving Day, Christmas Day, or any day celebrated publicly in the District of Columbia as one of the above holidays.

b. PAID VACATIONS: Employees with one (1) year of service shall be entitled to a vacation of one (1) week; five (3) years of service are entitled to two (2) weeks; fifteen (10) years of service are entitled to three (3) weeks; twenty (20) years of service are entitled to four (4) weeks.

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TEAM0639-005 09/01/2006

	Rates	Fringes
Truck drivers: (PAVING & INCIDENTAL GRADING)		
All paving projects where the grading is incidental to the paving.....	\$ 14.05	3.69

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WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.  
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Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

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In the listing above, the "SU" designation means that rates listed under the identifier do not reflect collectively bargained wage and fringe benefit rates. Other designations indicate unions whose rates have been determined to be prevailing.  
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WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

- \* an existing published wage determination
- \* a survey underlying a wage determination
- \* a Wage and Hour Division letter setting forth a position on a wage determination matter
- \* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the

Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations  
Wage and Hour Division  
U.S. Department of Labor  
200 Constitution Avenue, N.W.  
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator  
U.S. Department of Labor  
200 Constitution Avenue, N.W.  
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board  
U.S. Department of Labor  
200 Constitution Avenue, N.W.  
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION

CABLE SUMMARY						
FROM STATION	TO STATION	DISTANCE	#8	#8 GRND		
952978	DISCON. SW	110	330	120		
DISCON. SW	CMS A#6	330	990	340		
CABLE QUANTITIES		440	1320	460		

CABLE SUMMARY							
FROM STATION	TO STATION	DISTANCE	4/0	#8	#10	#8 GRND	#10 GRND
171292	MI 4	11	63			21	
MI 4	MI 3	58	204			68	
MI 3	MI 2	197	621			207	
MI 4	MI 5	133	429			143	
MI 2	LI 3	6			48	16	
MI 2	LI 2	189		600		200	
MI 2	LI 4	202		636		212	
MI 5	LI 5	106		348		116	
MI 5	LI 6	114		372		124	
MI 5	LI 7	288		894		298	
180846	UNDERPASS ELECTRICAL CABINET	55 BY PEPCO					
UNDERPASS ELECTRICAL CABINET	SOUTH ABUT.	65			200		70
UNDERPASS ELECTRICAL CABINET	S.S. CENTER PIER	170			780		200
CABLE QUANTITIES			1317	2850	1028	1262	270

CABLE SUMMARY							
FROM STATION	TO STATION	DISTANCE	4/0	#8	#10	#8 GRND	
949925	M7	11	63			21	
M7	L8	18			54	28	
M7	M10	70	240			80	
M7	M8	74	252			84	
M7	L7	100	330			110	
M10	L11	15			75	25	
M10	M9	91	303			101	
M9	L10	14			72	24	
M8	L9	14			72	24	
L7	M6	66	228			76	
M6	JB3	25	105			35	
JB3	JB2	19	87			29	
JB2	JB1	106	348			116	
JB1	M2	20	90			30	
M2	M3	44	162			54	
M3	JB5	59	207			69	
JB 5	JB6	77	261			87	
JB 5	JB4	184	582			194	
JB 4	'O'	7		51		17	
'O'	EX. HB	103		339		113	
JB 2	L6	3			39	13	
JB 6	L5	3			39	13	
M2	L4	34			132	44	
M2	L1	301		933		311	
JB 4	L3	3			39	13	
EX. HB	L2	3			39	13	
CABLE QUANTITIES			3258	1323	561	1724	