

**Contract Change Order**

Change Requested by: Engineer  Contractor

CCO No.	Suppl. No.	Contract No.	Contract Name	Federal Number(s)
2		PW 09 - 30493 CIP #72373	White Rock Road Widening And Signalization	None

To Granite Construction Company

Contractor

You are directed to make the following changes from the plans and specifications or do the following described work not included in the plans and specifications for this contract.

**NOTE: This change order must be approved by the Board of Supervisors. [X]Yes [ ] No**

Description of work to be done, estimate of quantities and prices to be paid. (Segregate between additional work at contract price, agreed price and force account.) Unless otherwise stated, rates for rental of equipment cover only such time as equipment is actually used and no allowance will be made for idle time. The last percentage shown is the net accumulated increase or decrease from the original quantity in the Engineer's Estimate.

**Extra Work at Agreed Lump Sum Price**

The Contractor is directed to incorporate the following specification changes into the contract documents:

- a) Delete Sections 8-1.03, 10-3.10, 10-3.11, 10-3.16, and 10-3.19 of the Contract Special Provisions, and
- b) Incorporate Attachment A in its entirety, which includes the following Special Provisions Section changes:
  - o Incorporation of new Sections 10-3.20, 10-3.21, 10-3.22, 10-3.23, and 10-3.24, and
  - o Remove and Replace Section 10-3.09

For the above work, the Contractor will be paid the Agreed Lump Sum Price of \$48,044.00. This agreed price constitutes full and complete compensation, including all markups, for the work of this change.

Agreed Lump Sum Price: ..... \$48,044.00

All work shall be performed in accordance with the Project Plans, Special Provisions, Standard Specifications, this change order, and as directed by the Engineer.

Estimated Cost:

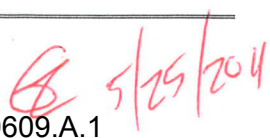
Decrease  Increase  \$ 48,044.00

By reason of this order the time of completion will be adjusted as follows: None

Submitted by		
Signature	(Print name & title)	Date
	Greg P, Zeiss, P.E., Resident Engineer (HDR)	
Approved:		
Signature	(Print name & title)	Date
	John Kahling, P.E., Deputy Director, Engineering	
Approved:		
Signature	(Print name & title)	Date
	Robert Slater, P.E., Asst. Director of Transportation	
Approved:		
Signature	(Print name & title)	Date
	James W. Ware, P.E., Director of Transportation	
Approved:		
Signature	(Print name & title)	Date
	Raymond J Nutting, Chair, Board of Supervisors	

We the undersigned contractor, have given careful consideration to the change proposed and agree, if this proposal is approved, that we will provide all equipment, furnish the materials, except as may otherwise be noted above, and perform all services necessary for the work above specified, and will accept as full payment therefore the prices shown above. The prices and terms of payment shown above comprise full and final compensation for all direct costs, indirect costs, cumulative costs, and all overhead costs incurred as a result of this contract change order. NOTE: If you, the contractor, do not sign acceptance of this order, your attention is directed to the requirements of the specification as to proceeding with the ordered work and filing a written protest within the time therein specified.

Contractor Acceptance by		
Signature	(Print name & title)	Date


  
 11-0609.A.1

## **CCO#2, Attachment A (Total 9 Pages)**

### **White Rock Road Widening And Signalization Project**

#### **10-3.09 SERVICE (Revised)**

Contractor shall construct a foundation as shown on the foundation plans for controller cabinet (including furnishing and installing anchor bolts), shall install the service cabinet on the foundation, and shall make field wiring connections to the terminal block in the service cabinet.

Contractor shall install #6 pull box at service point and conduit with service cable to service cabinet. Contractor shall notify PG&E (530- 621-7268) 48 hours prior to inspect conduit and substructure work. Once PG&E has completed inspection, and County has passed controller cabinet meter pedestal, Contractor shall provide PG&E 3 weeks notice for PG&E crews to make service connection. PG&E shall make connection at service point pull box. Contractor shall allow PG&E 2 days to access project site to make service connection.

The cost for placing pull box at service point, service cabinet, all associated conduit, and installation of service equipment shall be included in the lump sum bid price for Traffic signal and Lighting and no additional payment will be made therefore.

#### **10-3.20 CONTROLLER**

The Contractor shall furnish and install a new, brand-specific Naztec, Inc. Model 980 NEMA TS2, Type 1 Signal Controller with Ethernet. Contractor must quote brand and model indicated; alternative brands will not be accepted.

Pre-installation testing of the controller shall be performed by the Contractor. County representative(s) shall have the option of being present for the pre-installation testing. Contractor shall provide the Engineer with the manufacturer's certification that the pre-installation testing indicates that the controller is functioning within acceptable standards and is ready for installation.

The Contractor shall arrange to have a representative with responsibility and authority to address any controller related issues that may arise present in the field at the time the signal equipment is turned on. The representative shall check all signal heads, phases, and pedestrian heads to insure proper operation, shall activate for proper operation, and shall install initial signal timing.

**ITEM**  
Signal Controller Cabinet  
Configured according to Specifications

**SPECIFICATION**  
NEMA "Stretch P" TS2 Type 1  
68"H x 26"D x 44" H  
White interior  
RAL 7004 Grey Exterior – Full Gloss  
Wired for Emergency Vehicle Detection System

Cabinet to include:

- One (1) Cabinet Light
- Two (2) Adjustable Shelves
- One (1) Document Drawer
- One (1) Sixteen (16) position Load Bay
- Four (4) Sixteen (16) Channel Detector Panels
- Four (4) Two (2) Channel Detector Racks
- Two (2) TS2 Power Supplies
- One (1) Malfunction Management Unit (TS2 Conflict Monitor)
- Six (6) Bus Interface Units (Load Bay and Detector BIUs)
- Sixteen (16) Model 200 Load Switches Dual Indicating I/O
- Thirty two (32) Two (2) Channel Loop Detectors, LCD Display, Oracle
- One (1) Model 204 Flasher
- Four (4) Model 430 Flash Transfer Relays

The Contractor shall arrange to have a representative with responsibility and authority to address any controller related issues that may arise present in the field at the time the signal equipment is turned on. The representative shall check all signal heads, phases, and pedestrian heads to insure proper operation, shall activate for proper operation, and shall install initial signal timing. Local turn-on support services may be arranged with the local factory authorized controller manufacturer's dealer, Western Pacific Signal, (510) 276-6400.

A minimum four-hour session of training shall be provided to County personnel in the operation, setup and maintenance of Model 2070 controller unit. Instruction and materials shall be provided from controller factory certified instructors for a maximum of 15 persons, and shall be conducted at a location selected by the end-user public agency.

Following the manufacturers completed successful standard 8 phase 4 pedestrian functional testing the Traffic Signal Cabinet and associated Naztec Controller assembly shall be functionally tested for 72 hours at controller manufacturers authorized facilities for functional "Burn In" testing." The testing shall include the following conditions supplied by the local agency: local intersection timing, CMU/MMU programming, IO and detection channel programming per intersection engineering specifications. A signed test sheet shall be supplied with cabinet and controller assembly by manufacturers authorized representative indicating a pass condition of functional "Burn in" testing.

Controller assembly shall include an Naztec internal FSK modem capable of rejecting a 60 Hz voltage and communicating between controllers and other devices with communication ports.

### **10-3.21 CONTROLLER CABINET**

The controller cabinet shall conform to the provisions in Section 86-3.01 "Controller Assemblies," Section 86-3.04 "Controller Cabinets," and Section 86-3.05 "Cabinet Accessories," of the Standard Specifications and these special provisions.

The controller cabinet shall be a base-mounted NEMA "Standard Type P" TS2, Type 1 cabinet, such as Naztec, Inc. NEMA P-44 Traffic Control Cabinet; McCain, Inc. P44 TS2 NEMA Controller Cabinet; Econolite P44 Cabinet, or equal, conforming to the following specifications:

White Rock Road Widening - Contract Change Order  
Contract No. PW 09-30493 / CIP No. 72372

County of El Dorado, DOT  
Special Provisions

February 16, 2011

**CCO#2, Attachment A, Page -2**

11-0609.A.3

1. Dimensions: 55"H x 26"D x 44"W
2. Aluminum; White Interior
3. RAL 7004 Grey Exterior – Full Gloss
4. Wired for EVP
5. Compatible with Naztec, Inc. Model 980 TS2 Type 1 controller

Controller cabinet to include:

1. One (1) Cabinet Light
2. One (1) Adjustable Shelf
3. One (1) Document Drawer
4. One (1) sixteen (16) position Load Bay
5. Two (2) sixteen (16) Channel Detector Panels
6. Two (2) Two (2) Channel Detector Racks
7. One (1) TS2 Power Supply
8. One (1) Malfunction Management Unit (TS2 Conflict Monitor)
9. Four (4) Bus Interface Units (Load Bay and Detector BIUs)
10. Sixteen (16) Model 200 Loadswitches, Dual Indicating I/O
11. Sixteen (16) Two (2) Channel Loop Detectors, LCD Display, Oracle
12. One (1) Model 204 Flasher
13. Four (4) Model 430 Flash Transfer Relays

Police panels will not be required.

### **10-3.22 BATTERY BACKUP SYSTEM AND SERVICE CABINET**

#### **GENERAL**

The Contractor shall furnish and install a new, brand-specific TESCO Controls, Inc. Model 27-22BBS Service Pedestal and back-to-back Battery Backup System (BBS). Contractor must quote brand and model indicated; alternative brands will not be accepted.

#### **Submittals**

Before shipping external cabinets to the jobsite, submit material list including contract number, cabinet serial numbers, and contact information to the Engineer.

Submit a Certificate of Compliance for each external cabinet and batteries to the Engineer under Section 6-1.07, "Certificates of Compliance," of the Standard Specifications.

#### **Installation**

All inverter connections shall be made without the use of tools. This includes: A/C-Input, A/C-Output, Normally-Open, and Normally-Closed programmable contacts.

Contractor shall install the service cabinet on the foundation, and shall make field wiring connections to the terminal blocks in the service cabinet.

#### **Functional Testing**

After complete installation, BBS functional test must be performed. Test for 30 minutes of continuous, satisfactory operation with utility power turned off. Perform test in the presence of the Engineer.

#### **Warranty**

Batteries must be warranted by the manufacturer to operate within a temperature range of -25 °C to +60 °C for 2 years.

Manufacturers must provide a two (2) year factory-replacement parts warranty on the BBS. Cost of warranty must be included in the bid price. You must provide the Engineer with all warranty documentation before installation. Replacement batteries must be available within 5 business days after receipt of failed batteries at no cost to the State except the cost of shipping the failed batteries. Replacement batteries must be delivered to Department of Transportation Maintenance Shop at 2441 Headington Road, Placerville, Ca.

## **MATERIALS**

Service pedestal must:

1. Be equipped with Transient Voltage Surge Suppression protection
2. Be equipped with a Caltrans #2 lock (for cabinet)
3. Be equipped with a Photoelectric Unit (PEU) sensor for luminaire operation

BBS must:

1. Provide 700 watts of full control run time for four (4) hours, following which the system must provide a minimum of four (4) hours of flash
2. Be equipped with a Caltrans #2 lock (for cabinet)

Batteries must:

1. Be maintenance-free, deep cycle, sealed prismatic, lead-calcium-based, absorbed-glass mat and valve-regulated lead acid (AGM/VRLA) type
2. Be commercially available and stocked locally
3. Have a carrying handle
4. Be marked with date code, maximum recharge data, and recharge cycles
5. Include rubber insulating protective covers for protecting the lugs, posts, and wiring - red for positive terminal and black for negative terminal
6. Be new and fully-charged when furnished
7. Be free from damage or deformities

### **10-3.23 EMERGENCY VEHICLE DETECTOR SYSTEM**

Each traffic signal shall have an emergency vehicle detector system which shall conform to the details shown on the plans and these special provisions.

#### **GENERAL**

Each emergency vehicle detector system shall consist of an optical emitter assembly or assemblies located on the appropriate vehicle and an optical detector/discriminator assembly or assemblies located at the traffic signal.

Emitter assemblies are not required for this project except units for testing purposes to demonstrate that the systems perform as specified. Tests shall be conducted in the presence of the Engineer as described below under "System Operation" during the signal test period. The Engineer shall be given a minimum of 2 working days notice prior to performing the tests.

Each system shall permit detection of 2 classes of authorized vehicles. Class I (mass transit) vehicles shall be detected at ranges of up to 1,000 feet from the optical detector. Class II (emergency) vehicles shall be detected at ranges up to 1,800 feet from the optical detector.

Class I signals (those emitted by Class I vehicles) shall be distinguished from Class II signals (those emitted by Class II vehicles) on the basis of the modulation frequency of the light from the respective emitter. The modulation frequency for Class I signal emitters shall be 9.639 Hz  $\pm$ 0.110 Hz. The modulation frequency for Class II signal emitters shall be 14.035 Hz  $\pm$ 0.250 Hz.

A system shall establish a priority of Class II vehicle signals over Class I vehicle signals and shall conform to the requirements in Section 25352 of the California Vehicle Code.

## **EMITTER ASSEMBLY**

Each emitter assembly, provided for testing purposes, shall consist of an emitter unit, an emitter control unit, and connecting cables.

### **General**

Each emitter assembly, including lamp, shall operate over an ambient temperature range of -34°C to +60°C at both modulation frequencies and operate continuously at the higher frequency for a minimum of 3,000 hours at 25°C ambient before failure of the lamp or other components.

Each emitter unit shall be controlled by a single, maintained-contact switch on the respective emitter control unit. The switch shall be located to be readily accessible to the vehicle driver. The control unit shall contain a pilot light to indicate that the emitter power circuit is energized and shall generate only one modulating code, either that for Class I vehicles or that for Class II vehicles.

### **Functional**

Each emitter unit shall transmit optical energy in one direction only.

The signal from each Class I signal emitter unit shall be detectable at a distance of 1,000 feet when used with a standard optical detection/discriminator assembly and filter to eliminate visible light. Visible light shall be considered eliminated when the output of the emitter unit with the filter is less than an average of 0.0003-candela per energy pulse in the wavelength range of 380 nm to 750 nm when measured at a distance of 10 feet. A Certificate of Compliance, conforming to the requirements in Section 6-1.07, "Certificates of Compliance," of the Standard Specifications shall be submitted to the Engineer with each Class I emitter unit.

The signal from each Class II signal emitter unit shall be detectable at a distance of 1,800 feet when used with a standard optical detection/discriminator assembly.

The standard optical detection/discriminator assembly to be used in making the range tests shall be available from the manufacturer of the system. A certified performance report shall be furnished with each assembly.

### **Electrical**

Each emitter assembly shall provide full light output with input voltages of between 12.5 V (dc) and 17.5 V (dc). An emitter assembly shall not be damaged by input voltages up to 7.5 V (dc) above supply voltage. The emitter assembly shall not generate voltage transients, on the input supply, which exceed the supply voltage by more than 4 volts.

Each emitter assembly shall consume not more than 100 W at 17.5 V (dc) and shall have a power input circuit breaker rated at 10 A to 12 A, 12 V (dc).

The design and circuitry of each emitter shall permit its use on vehicles with either negative or positive ground without disassembling or rewiring of the unit.

### **Mechanical**

Each emitter unit shall be housed in a weatherproof corrosion-resistant housing. The housing shall be provided with facilities to permit mounting on various types of vehicles and shall have provision for aligning the emitter unit properly and for locking the emitter unit into this alignment.

Each emitter control unit shall be provided with hardware to permit the unit to be mounted in or on an emergency vehicle or mass transit vehicle. Where required for certain emergency vehicles, the emitter control unit and exposed controls shall be weatherproof.

## **OPTICAL DETECTION/DISCRIMINATOR ASSEMBLY**

### **General**

Each optical detection/discriminator assembly shall consist of one or more optical detectors, connecting cable and a discriminator module.

Each assembly, when used with standard emitters, shall have a range of at least 1,000 feet for Class I signals and 1,800 feet for Class II signals. Standard emitters for both classes of signals shall be available from the manufacturer of the system. Range measurements shall be taken with all range adjustments on the discriminator module set to "maximum".

### **Optical Detector**

Each optical detector shall be a waterproof unit capable of receiving optical energy from two separately aimable directions. The horizontal angle between the 2 directions shall be variable from 180 degrees to 5 degrees.

The reception angle for each photocell assembly shall be a maximum of 8 degrees in all directions about the aiming axis of the assembly. Measurements of reception angle will be taken at a range of 1,000 feet for a Type I emitter and at a range of 1,800 feet for a Type II emitter.

Internal circuitry shall be solid state and electrical power shall be provided by the associated discriminator module.

Each optical detector shall be contained in a housing, which shall include 2 rotatable photocell assemblies, an electronic assembly and a base. The base shall have an opening to permit mounting on a mast arm or a vertical pipe nipple, or suspension from a span wire. The mounting opening shall have female threads for 3/4 inch conduit. A cable entrance shall be provided which shall have male threads and gasketing to permit a waterproof cable connection. Each detector shall have weight of less than 2.5 pounds and shall present a maximum wind load area of 36 square inches. The housing shall be provided with weep holes to permit drainage of condensed moisture.

Each optical detector shall be installed, wired and aimed as specified by the manufacturer.

### **Cable**

Optical detector cable (EV-C) shall meet the requirements of IPCEA-S-61-402/NEMA WC 5, Section 7.4, 600-V (ac) control cable, 75°C, Type B, and the following:

- A. The cable shall contain 3 conductors, each of which shall be No. 20 (7 x 28) stranded, tinned copper with low-density polyethylene insulation. Minimum average insulation thickness shall be 25 mils. Insulation of individual conductors shall be color coded: 1-yellow, 1-blue, 1-orange.
- B. The shield shall be either tinned copper braid or aluminized polyester film with a nominal 20 percent overlap. Where film is used, a No. 20 (7 x 28) stranded, tinned, bare drain wire shall be placed between the insulated conductors and the shield and in contact with the conductive surface of the shield.
- C. The jacket shall be black polyvinyl chloride with minimum ratings of 600 V (ac) and 80°C and a minimum average thickness of 43 mils. The jacket shall be marked as required by IPCEA/NEMA.
- D. The finished outside diameter of the cable shall not exceed 0.35-inch.
- E. The capacitance, as measured between any conductor and the other conductors and the shield, shall not exceed 48 pf per foot at 1000 Hz.
- F. The cable run between each detector and the controller cabinet shall be continuous without splices or shall be spliced only as directed by the detector manufacturer.

### **Discriminator Module**

Each discriminator module shall be designed to be compatible and usable with a Naztec, Inc. Model 980 NEMA TS2, Type 1 controller and to be mounted in the input file of a NEMA Type P controller cabinet, and shall conform to the requirements of Chapter I of the State of California, Department of Transportation, "Traffic Signal Control Equipment Specifications."

Each discriminator module shall be capable of operating 2 channels, each of which shall provide an independent output for each separate input.

Each discriminator module, when used with its associated detectors, shall perform the following:

- A. Receive Class I signals at a range of up to 1,000 feet and Class II signals at a range of up to 1,800 feet.
- B. Decode the signals, on the basis of frequency, at 9.639 Hz  $\pm$  0.119 Hz for Class I signals and 14.035 Hz  $\pm$  0.255 Hz for Class II signals.

- C. Establish the validity of received signals on the basis of frequency and length of time received. A signal shall be considered valid only when received for more than 0.50-second. No combination of Class I signals shall be recognized as a Class II signal regardless of the number of signals being received, up to a maximum of 10 signals. Once a valid signal has been recognized, the effect shall be held by the module in the event of temporary loss of the signal for a period adjustable from 4.5 seconds to 11 seconds in at least 2 steps at 5 seconds  $\pm$  0.5 second and 10 seconds  $\pm$  0.5 second.
- D. Provide an output for each channel that will result in a "low" or grounded condition of the appropriate input of a Model 980 controller. For Class I signals the output shall be a 6.25 Hz  $\pm$  0.1 percent, rectangular waveform with a 50 percent duty cycle. For Class II signals the output shall be steady.

Each discriminator module shall receive electric power from the controller cabinet at either 24 V (dc) or 120 V (ac).

Each channel together with the channel's associated detectors shall draw not more than 100 mA at 24 V (dc) or more than 100 mA at 120 V (ac). Electric power, one detector input for each channel and one output for each channel shall terminate at the printed circuit board edge connector pins listed below:

**BOARD EDGE CONNECTOR PIN ASSIGNMENT**

A	DC ground		
B	+24 V (dc)	P	(NC)
C	(NC)		
D	Detector input, Channel A	R	(NC)
E	+24V (dc) to detectors	S	(NC)
F	Channel A output (C)	T	(NC)
		U	(NC)
H	Channel A output (E)	V	(NC)
J	Detector input, Channel B	W	Channel B Output (C)
K	DC Ground to detectors	X	Channel B Output (E)
L	Chassis ground	Y	(NC)
M	AC-	Z	(NC)
N	AC+		

(C) Collector, Slotted for Keying

(E) Emitter, Slotted for Keying

(NC) Not connected, cannot be used by manufacturer for any purpose.

Two auxiliary inputs for each channel shall enter each module through the front panel connector. Pin assignment for the connector shall be as follows:

- A. Auxiliary detector 1 input, Channel A
- B. Auxiliary detector 2 input, Channel A
- C. Auxiliary detector 1 input, Channel B
- D. Auxiliary detector 2 input, Channel B

Each channel output shall be an optically isolated NPN open collector transistor capable of sinking 50 mA at 30 V (ac) and shall be compatible with the Model 980 controller inputs.

Each discriminator module shall be provided with means of preventing transients received by the detector from affecting the Model 980 controller assembly.

Each discriminator module shall have a single connector board and shall occupy one slot width of the input file. The front panel of each module shall have a handle to facilitate withdrawal and the following controls and indicators for each channel:

- A. Three separate range adjustments each for both Class I and Class II signals.
- B. A 3-position, center-off, momentary contact switch, one position (down) labeled for test operation of Class I signals, and one position (up) labeled for test operation of Class II signals.



- C. A "signal" indication and a "call" indication each for Class I and for Class II signals. The "signal" indication denotes that a signal above the threshold level has been received. A "call" indication denotes that a steady, validly coded signal has been received. These 2 indications may be accomplished with a single indication lamp; "signal" being denoted by a flashing indication and "call" with a steady indication.

In addition, the front panel shall be provided with a single circular, bayonet-captured, multi-pin connector for 2 auxiliary detector inputs for each channel. Connector shall be a mechanical configuration conforming to the requirements in Military Specification MIL-C-26482 with 10-4 insert arrangement, such as Burndy Trim Trio Bantamate Series, consisting of the following:

- A. Wall mounting receptacle, G0B10-4PNE with SM20M-1S6 gold plated pins.
- B. Plug, G6L10-4SNE with SC20M-1S6 gold plated sockets, cable clamp and strain relief that shall provide for a right angle turn within 2-1/2 inches maximum from the front panel surface of the discriminator module.

### **SYSTEM OPERATION**

The Contractor shall demonstrate that the components of each system are compatible and will perform satisfactorily as a system. Satisfactory performance shall be determined using the following test procedure during the functional test period:

- A. Each system to be used for testing shall consist of an optical emitter assembly, an optical detector, an optical detector cable and a discriminator module.
- B. The discriminator modules shall be installed in the proper input file slot of the controller assembly.
- C. Two tests shall be conducted; one using a Class I signal emitter and a distance of 1,000 feet between the emitter and the detector, the other using a Class II signal emitter and a distance of 1,800 feet between the emitter and the detector. Range adjustments on the module shall be set to "Maximum" for each test.
- D. Each test shall be conducted for a period of one hour, during which the emitter shall be operated for 30 cycles, each consisting of a one minute "on" interval and a one minute "off" interval. During the total test period the emitter signal shall cause the proper response from the controller unit during each "on" interval and there shall be no improper operation of either the controller unit or the monitor during each "off" interval.

### **10-3.24 TRAFFIC SYSTEM TURN-ON PROCEDURES**

Some of the following procedures may be performed prior to the final turn-on as long as ALL tests are observed and/or accepted by the Engineer. All testing is the responsibility of the Contractor.

Unless otherwise noted, any changes to or modification of this standard turn-on procedure must be approved by the Engineer.

1. Check all signal lighting circuits. (Responsibility of Contractor. Engineer may request to be present at his discretion.)
  - a. Remove all load switches (model 200) and the flasher units (model 204). This must be done to assure their protection and to prevent feedback through the switch causing a possible misleading indication at the signals. The controller unit should be "off" during this test procedure.
  - b. Check each individual signal field circuit by applying 120 volts AC to the field terminal of each indication. This procedure is often called "flashing" the signal heads.
  - c. During "flashing" procedure, verify that all indications that should be "on" are "on" and that all indications that should be "off" remain "off" This verification may be accomplished through the use of small holes cut in the signal face coverings. **Signals must remain covered during this operation unless the Contractor provides manual traffic control (flagging) and that control has been approved by the Engineer.**
2. Check luminaires (street lighting). (Responsibility of the Contractor. Engineer may request to be present at his discretion.)
  - a. Check power pedestal to assure that switch for luminaires is set to "AUTO."

- b. Cover the photoelectric cell and verify that all luminaires come on. (This test will take a few minutes.)
  - c. Remove cover from photoelectric cell verifying that luminaires go dark.
  - d. Set switch in power pedestal to the "TEST" position and verify that all luminaires come on. (This test will take a few minutes.)
  - e. Set switch back to "AUTO" Signals may not be turned on unless all luminaires are functioning properly.
  - f. When all tests are complete, set switch to "TEST." This condition should remain for at least two weeks to allow "burn in" of luminaires. This period may occur after the signals have been turned on.
3. Check all detector circuits. Although these tests are the responsibility of the Contractor, some do require the cooperation and participation of the Engineer and appropriate coordination should be arranged.
- a. All detector loops are to be tested for continuity and resistance to ground. Resistance to ground shall exceed 100 meg ohms. Engineer, at his discretion, will be present during these tests and observe results.
  - b. The functionality of all vehicle detection shall be demonstrated by use of a Contractor-provided test vehicle while cabinet indications and responses are observed by the Engineer.
  - c. The Contractor shall demonstrate the functionality of the pedestrian push button circuits by activating the pedestrian push buttons while cabinet indications and responses are observed by the Engineer.
4. Signs and pavement markings.
- a. There must be a minimum of three (3) days of dry pavement prior to the application of any pavement markings.
  - b. Application of pavement markings shall be coordinated so that the work is completed on Monday through Wednesday and at least five (5) business days prior to any County observed holiday.
  - c. All pavement markings and traffic control signs shall be in place the day prior to signal turn-on to accommodate coordination. Any signs associated with the signals shall be covered by the Contractor and remain covered until final turn-on.
  - d. Between the time the striping is complete and the signals are placed into operation, the Engineer may require the Contractor to install interim signing and/or safety measures to meet the safety needs of the community.
  - e. Engineer shall check ALL pavement markings to assure that they are in place and comply with the plans prior to notifying involved or interested parties and/or agencies of planned turn-on schedule. (Example of parties to be notified, as needed: DOT Traffic Unit, CHP, Sheriff, contractor, etc.)
  - f. On the day of the turn-on, the Engineer will have the responsibility of determining the exact time of the turn-on based on safety and operational considerations.
5. Final turn-on procedure. (Responsibility of the Contractor except as noted.)

**The signals MAY NOT be turned on unless all signs and markings are in place.**

**Final signal turn-on shall not occur during rainy or foggy weather, and shall not occur on Monday, Friday, or within three (3) days prior to any holiday, unless otherwise specifically approved by the Engineer.**

- a. Verify that the Conflict Monitor has been tested and that the correct and properly tested program board is installed. Verify that the "permissives" programmed into the controller (viewed at controller location 1>3>4) are consistent with the jumpers on the Conflict Monitor program board.
- b. Check to verify that the timing plan provided by the Engineer has been properly entered into the Controller.
- c. Remove covers from signal heads. (Responsibility of Contractor.)
- d. Place signal into flashing operation.
- e. Remove all covers from signs. Also remove any interim signing or safety measures that may have been put in place. (This is the responsibility of the Contractor.)
- f. Remove all existing STOP signs. (This is the responsibility of the Contractor.)
- g. Place signals into automatic operation.
- h. Remove manual traffic control.
- i. Observe operations and make any adjustments to operations that are identified as necessary.