

Addendum #1

R94644 / B303383

Traffic Signal Heads

(1) Specifications are attached.

(2) The due date for Bids is unchanged. Sealed Bids should be delivered to the Purchasing Office by 2:00 PM on June 12, 2014.

Bidders should acknowledge receipt of this Addendum by signing below and submitting a signed copy of this Addendum with their Bids.

Receipt of this Addendum is acknowledged by _____

on behalf of _____
Supplier

5. When not illuminated, the "Walking Figure" and "Upraised Hand" shall not be distinguishable by pedestrians at the far end of the crosswalk they control.
6. The symbols shall be at least 6 inches high for crossings where the pedestrian enters the crosswalk less than 30 meters (100 feet) from the pedestrian signal indications. For distances of 30 meters (100 feet) or more, the symbols shall be at least 9 inches high.

Each section shall be provided with a visor encompassing the top and sides of the signal face of a size and shape adequate to shield the lens from external light sources or shall be covered by an egg crate style shield. The pedestrian indications shall be LED symbols, either solid or outline.

The housing shall be polycarbonate, clamshell style. Hinge pins shall be stainless steel. The door shall be provided with a neoprene gasket capable of making a weather resistant, dust-proof seal when closed.

All pedestrian signal heads shall have yellow bodies with black faces and visors.

Delete Subsection 730.25 and 730.26 and substitute the following:

730.25- Controllers

Cabinet and Wiring - Cabinets shall be provided as complete units, ready for installation with all wiring and materials to accomplish the signal operation as shown on the plans or in attached signal sequence charts.

Cabinets shall be fabricated from aluminum or copper bearing fourteen (14) gauge sheet steel. Aluminum cabinets shall have a minimum wall thickness of 2.5 millimeters (0.100 inches). All welds shall be neat, smooth and free of blowholes. Where practical, welds shall be internal to present a neat appearance. Non-aluminum cabinets shall be painted aluminum in color.

Cabinets shall have a right-hinged front opening door, which shall include substantially the full area of the cabinet front and one (1) auxiliary police door-in-door for access to emergency controls. The main door shall be equipped with a positive hold fast device to secure the door in at least two (2) open positions, one (1) position being approximately ninety (90) degrees open and the other at one hundred and twenty (120) degrees or more. The hold fast device shall be easily secured and released without the use of tools.

Each door shall be furnished with a neoprene rubber door-sealing gasket to assure the weatherproof integrity of the cabinet doors when closed. The main cabinet door shall employ a heavy gauge aluminum continuous hinge utilizing a non-removable 3/16" diameter stainless steel hinge pin for door support, carriage bolted in place, for ease of door removal. The police panel door shall employ a 14-gauge stainless steel continuous hinge with a 3/32" diameter hinge pin. The switch compartment is mounted flush to the main cabinet door.

Add to the end of the paragraph on Optical Units in Subsection 730.24:

The red, green, and arrow indications shall be sealed LED units meeting I.T.E. specifications.

Add to the end of section 730.24 under Signal head Mounting and Mounting Brackets:

Signals mounted on mast arms shall be mounted by a bracket secured by cables to the mast arm, so that the signal head is rigidly mounted but adjustable in height, horizontal direction, and vertical direction.

Delete the second paragraph on Directional Louvers in Subsection 730.24 and substitute the following:

Directional louvers shall be so constructed as to have a snug fit in the signal hoods. The outside cylinder and vanes shall be constructed of a non-ferrous metal, galvanized sheet steel, or polycarbonate. Metal louvers shall be painted with two coats of black enamel as specified in these specifications.

Delete the wording under Back plates in Subsection 730.24 and substitute the following:

Where shown on the Plans, back plates shall be furnished and attached to the signal heads. All back plates shall be polycarbonate. They shall be constructed so as to permit installation after signal heads are in place. Back plates shall have a dull black appearance, and shall provide a 5" wide border around the signal head.

Delete all wording under Pedestrian Signals in Subsection 730.24 and substitute the following:

Pedestrian Signals- When shown on the Plans, pedestrian signals shall conform to the following:

1. Pedestrian indications should attract the attention of and be readable to the pedestrian both day and night and at all distances from 3 meters (10 feet) to the full width of the area to be crossed.
2. All pedestrian indications shall consist of the international symbols of a "Walking Figure" and "Upraised Hand".
3. When illuminated, the "Walking Figure" shall be lunar white meeting the standards of the Institute of Traffic Engineers. All except the symbol shall be black.
4. When illuminated, the "Upraised Hand" shall be Portland orange meeting the standards of the Institute of Traffic Engineers, with all except the symbol being black.

Noise/transient suppression shall be provided to minimize the noise levels in the cabinet. The supplier shall take care to provide suppression where noise generation may occur.

Suppression Equipment - Noise/transient suppression shall be provided to protect equipment in the cabinet in accordance with NEMA. Suppression devices shall be provided that meet or exceed both NEMA and the following requirements:

- a. All lightning arrestors and surge protectors shall be easily accessible from the front of the panel.
- b. The transient voltage surge suppressor shall have a peak surge current rating of 100 kA per phase. The peak clamping voltage shall be 395 VAC. Normal operating current is 15 Amps with an operating temperature of -40C to +85C. All relay devices shall have resistor/capacitor network across the coil terminals of the relay.
- c. The fan and thermostat control shall have adequate noise suppression.
- d. Interconnect lines shall be protected by a unit capable of withstanding a 10 KA, 8 x 20 nanosecond surge five times without damage. The response time of the unit shall be less than 50 nanoseconds. The maximum clamping voltage shall be no greater than 400 volts at one MA. The units must be individually packaged for interconnect line protection and in a package of three for the signal loads.
- e. Signal loads (Load Switch Outputs) shall be protected by a three circuit protective device capable of withstanding a 10ka (8x20 microsecond) waveform. Occurrences should be >100 at 200 amps with a maximum clamp voltage of 475 volts per occurrence. Resistor Loads shall be provided for any unused Load Switch Output. Load switches should be mounted on the rear panel near the field outputs.
- f. Each detector input line from a remote detector or pedestrian push-button shall be protected by a two-stage hybrid device capable of withstanding a minimum of 30 surges of at least 5,000 amperes each applied to the input. The device shall have one input lead, one output lead, and a ground lug in order for the signal wire to "pass through" the protector. The voltage across the output must be held to 30 volts when the input is subject to a 2,000 ampere, 10:20 microsecond surge. The unit must not interfere with the normal operation of the signal equipment, and must respond in less than 20 nanoseconds.
- g. The manufacturer shall provide cabinet noise suppression as required by the particular controller.
- h. The external data communications pair (twisted pair FSK cable) shall be protected at the cabinet entry point by a two stage series of hybrid device capable of withstanding a peak surge of 4,000 amps, 8 x 20 microsecond waveform. The device shall have a minimum life of 50 surges at 4000 amps with a response time of less than 20 nanoseconds. The maximum clamping voltages shall be 200V on the incoming telephone line and 15V on the incoming multi-pair voice grade interconnect line.
- i. If radio communications is required in the cabinet assembly then an EDCO CXFN or approved equal coax arrestor shall be installed across the coax input from the antenna. An EDCO SRS232-25 or approved equal arrestor shall be installed across the serial input to the traffic signal controller.

Other cabinet facilities shall include:

1. A GFI Duplex receptacle and a standard duplex receptacle with fifteen (15) amp breaker protection.
2. Fluorescent cabinet lamp with manual on/off switch.
3. The receptacle and lamp shall be wired so that they may be used when the main circuit breaker is off.

Cabinet switch facilities shall be provided according to the following:

1. The police auxiliary panel shall contain the following switches:
 - a. Signal Automatic/Flashing. (Controller power to be removed when in the Flashing Mode)
 - b. Signal On/Off.
2. On the panel behind the police panel, the following switches shall be provided:
 - a. Signal Automatic/Flashing (Controller remains on when in flash mode).
 - b. Signal On/Off. (Removes only signal power when in Off).
 - c. Cabinet Lamp On/Off.
 - d. Individual phase vehicle and pedestrian detector test switches to be miniature toggle of the On-Off Momentary type to place:
 - (1) No Call - Call provided by detectors.
 - (2) Locked detector call.
 - (3) Momentary detector call.

Switch terminals on back of main cabinet door shall be insulated or shielded so that no live parts are exposed.

Leads from the terminal block to the auxiliary door switches shall be no less than 0.82 square millimeters (No. 18 AWG) stranded, with TW plasticized polyvinyl chloride or nylon insulation enclosed in an insulating loom and shall be of sufficient length to permit full opening of the main cabinet door.

All cabinet wiring shall be neat, with no in-line splicing of wires. All wires shall be securely terminated with minimal excess wiring length. All wiring shall be stranded conductor.

Cabinet space and clearances shall be adequate to house any standardized NEMA device with maximum allowed NEMA dimensions without modifications to or adjustments of cabinet wiring or appurtenances.

In addition, the vendor shall certify in writing that he has operated the controller and all of the auxiliary equipment successfully for a period of not less than (50) fifty hours burn in time.

Cabinet wiring facilities shall be positioned according to the following:

1. AC Service connections shall be on the lower right wall. Detector and remote inputs shall be on the lower left wall.
2. All controller wiring, signal monitor wiring, etc. shall take place on a single panel, which shall be mounted on the rear wall. All terminals on the rear wall panel shall be silk-screen labeled according to a number sequence, which will identify all termination points.

The cabinet wiring shall be such that it shall be possible to program each phase output to flash Red, Yellow, or No Flash. Flash programming shall employ simple measures using color-coded jumper wire(s) to indicate flash output.

Signal circuits which are designated as flash shall be routed through mechanical flash transfer relays. Flash transfer relays shall be in the energized position for non-flash operation and shall fail-safe to flash operation. Flash transfer relays shall operate from 115 VAC, and shall be heavy-duty type. Contact rating shall be ten (10) amperes minimum. Relays shall be of the male plug type, and shall have a minimum plug length of 18 millimeters (0.70 inches). Contacts shall be of a silver bearing material to reduce contact pitting.

When specified on the plans, or the bid document, loop vehicle detector card rack assembly shall be wired in place. The card rack assembly shall have slots spaced at 2.25" to facilitate the use of 2" or 2.25" detectors, either video or inductive loop. Each position to be wired as follows:

<u>Slot</u>	<u>Function</u>
1	Rack Power Supply
2	Ch1=Ø1, Ch2-4=Ø6
3	Ch1=Ø5, Ch2-4=Ø2
4	Ch1=Ø3, Ch2-4=Ø8
5	Ch1=Ø7, Ch2-4=Ø4
6	Opticom Preemption

This configuration shall be considered "STANDARD" unless otherwise specified. The call wires shall be hooked to a terminal strip on the detector panel. The wires shall be movable to actuate a different phase if so desired. The detectors and rack must meet NEMA specifications.

730.25 K. MALFUNCTION MANAGEMENT UNIT

This section sets forth the minimum requirements for a shelf-mountable, sixteen channel, solid-state Malfunction Management Unit (MMU) with Ethernet capability. The MMU shall meet, as a minimum, all applicable sections of the *NEMA Standards Publication No. TS2-2003*. Where differences occur, this specification shall govern.

1. MONITORING FUNCTIONS

The following monitoring functions shall be provided in addition to those required by the NEMA Standard Section 4.

A. DUAL INDICATION MONITOR

Dual Indication monitoring shall detect simultaneous input combinations of active Green (Walk), Yellow, or Red (Don't Walk) field signal inputs on the same channel. In Type 12 mode this monitoring function detects simultaneous input combinations of active Green and Yellow, Green and Red, Yellow and Red, Walk and Yellow, or Walk and Red field signal inputs on the same channel.

When voltages on two inputs of a vehicle channel are sensed as active for more than 450 msec, the MMU shall enter the fault mode, transfer the OUTPUT relay contacts to the Fault position, and indicate the DUAL INDICATION fault. The MMU shall remain in the fault mode until the unit is reset by the RESET button or the EXTERNAL RESET input. When voltages on two inputs of a vehicle channel are sensed as active for less than 200 msec, the MMU shall not transfer the OUTPUT relay contacts to the Fault position.

When operating with Port 1 communications enabled, Bit #68 (Spare Bit #2) of the Type #129 response frame shall be set to indicate a Dual Indication fault has been detected.

Dual Indication Monitoring shall be disabled when the RED ENABLE input is not active.

DUAL INDICATION PROGRAMMING

Programming shall be provided to enable the Dual Indication monitoring function for the Green and Red, Green and Yellow, and Yellow and Red combinations for each individual channel. In the Type 12 mode, the Walk inputs shall be logically OR'ed with the Green inputs for purposes of Dual Indication programming.

B. FIELD CHECK MONITORING

The Field Check Monitor function shall provide two modes of operation, Field Check Fault and Field Check Status.

Field Check Monitoring shall be disabled when the RED ENABLE input is not active.

The main door shall have pin-tumbler cylinder lock keyed for a #2 key. The police panel door shall be furnished with a standard police sub-treasury lock. Two (2) keys for each lock shall be provided with each cabinet.

All cabinets shall be of the base type with size according to the type of controller to be housed. A "P" cabinet shall be mounted on a concrete pad 30" deep X 48" wide X 24" high, with an extension in front of the cabinet 36" deep X 48" wide X 4" high to stand on while working in the cabinet. An "M" cabinet shall be mounted on a concrete pad 21" deep X 34" wide X 24" high, with an extension in front of the cabinet 36" deep X 34" wide X 4" high. If the cabinet base is located so that there is a paved area in front of the cabinet door, the extension may be omitted. Dimensions of the cabinets shall be as follows:

	Eight Position Cabinet	Twelve Position Cabinet	Sixteen Position Cabinet
Height	49"	57"	55"
Depth	16-17"	16-17"	26"
Width	30"	30-34"	44"

All hardware for mounting shall be furnished, including hot dipped galvanized anchor bolts, nuts and washers.

All cabinets shall be equipped with substantial metal shelves to support included hardware.

All cabinets shall be equipped with thermostatically controlled exhaust fan with filtered air inlet. The fan shall be of the permanently lubricated type with roller bearings and shall have an operating capacity of 0.8 cubic meters (130 cubic feet) per minute with the filter installed. The filter shall be of the replaceable furnace type. The thermostat shall be adjustable over the range of 20-65 degrees C (70-150 degrees F), with surge protection/transient suppressor across the contacts. The filtered opening shall be in the lower part of the cabinet door, with positive retention of the filter.

Wiring in the cabinet shall be done in a neat, workmanlike manner. All wiring shall be routed and secured to minimize the effects of vibration.

All wiring shall take place at barrier-type terminals. Each wire shall be terminated into a fork-tongue or push-on compression fitting of the insulated type. Compression fittings shall be sized according to the cable and termination point. Compression fittings shall be installed by a calibrated pressure compression tool. Ground connections need not meet this requirement.

Field terminations shall be at barrier type terminals meeting the following requirements:

1. FIELD OUTPUTS for signal circuits shall be made at barrier terminal strips of the double-tie, removable link type. Barrier spacing shall be a minimum of 14 millimeters (0.55 inches) and securing screws shall be a

minimum #10 size. There shall be no connections made to the "B" (Output) side of the signal output terminal strip.

- 2. DETECTOR LOOP INPUTS shall be terminated at barrier terminals with minimum screw size #8.
- 3. All other cabinet terminals shall utilize screw terminations with screw size no less than #6.

The cabinet shall be provided with an AC service connection protected by a magnetic/hydraulic circuit breaker of a size to properly protect the cabinet wiring and supply the current necessary to operate the specified signal operation. The circuit breaker shall be designed to accept ten (10) gauge copper wire. The AC common line shall be attached to a copper lug designed to accept a #10 copper wire.

There shall be a grounded neutral copper ground buss with multiple screw terminals for twelve (12) gauge copper wire (minimum of twenty-four (24) positions) and a four (4) gauge copper each connection.

Field wiring termination points shall be provided in the quantity shown below:

	4Ø	8Ø
Signal Outputs	32	48
Detector Inputs	12	24
Interconnect	8	8
Pedestrian Detectors	4	8

*Interconnect connections required only if specified in the plans.

The above quantities are minimum. Cabinets shall be supplied to accomplish the specified operation shown in the plans.

NEMA Signal load switch base plates shall be wired in the cabinet according to the following:

	Eight Position	Twelve Position	Sixteen Position
Vehicle Phase	4	4	8
Overlap	2	4	4
Pedestrian Phase	2	4	4
Programmable X	X	X	X

These numbers are minimal and quantity supplied shall be sufficient to meet the specified sequence. Programming of load switch base plates shall be via front panel mounted jumpers between barrier terminal strips (solder connections not permitted).