DESCRIPTION

The bidder shall furnish a suitable (NEMA 3r or better) weatherproof cabinet and terminal facility. Each new cabinet and terminal facility shall be provided completely wired by the manufacturer, with all internal components (such as back panels, shelves, terminal strips, harnesses, etc.) as well as all mounting hardware necessary to provide installation as described herein. Each new cabinet and terminal facility shall be fully assembled. Interconnections for the internal equipment complement shall be provided via the cabinet and terminal facility harness by means of mating "MS" type connectors and shall be performed by the manufacturer. Wiring and cabling addition to new units in the field are expressly prohibited. "D" connector may be used as stated in the construction details.

MATERIALS

FUNCTIONAL REQUIREMENTS

The cabinet and terminal facility shall provide a weatherproof enclosure for all internal equipment. All equipment except detectors shall be shelf mounted and all terminal and panel facilities shall be placed on the lower portion of the cabinet walls below all shelves. The manufacturer shall submit a cabinet layout for each type of cabinet for review by Monroe County. Only cabinets with approved layouts will be accepted under this project.

Cabinet components as shown below: Items 4, 5, and 6 are purchased only in quantities as required.

1	Main switch and/or breaker
2	Radio Interference Filter and Suppressor
3	Surge protection and isolation (suitable for microprocessor-based equipment)
4	Three-circuit solid-state load switches (spec. # 686.802700)
5	Detector rack, a minimum of eight (8) slots for dual-channel loop detector modules, two slots for two-channel preempt cards, and a rack slot for the power supply. The rack shall be wired as required to the various terminals. Loop detector modules, rack-mounted (spec. # 686.802900), detector power supply (spec. # 686.802910). Preempt cards are mechanically similar to loop detector cards.
6	Conflict monitor unit, twelve (12) channel (spec. # 686.803400)
7	Two-circuit solid-state flasher (spec. # 686.802500); six (6) NEMA flash transfer relays
8	Police panel (containing : auto-manual switch, auto-flash switch, manual control jack for switch)
9	Service panels and terminal blocks
10	Ventilation fan, continuous duty, vents and shrouded filter to create positive pressure within cabinet

11	Thermostatically-controlled heater (900 W) with integral circulator fan
12	Three (3) door-actuated switches (1st = fans off, 2nd = cabinet illumination, 3rd = 'door open' alarm)

VENTILATION

All cabinets shall be furnished with suitable top and bottom vents. The vents shall be designed to prohibit the entry of rain, insects, and other foreign objects.

All cabinets shall be equipped with a thermostatically-controlled ventilation fan. The fan shall have a rating of (170-238 CFM), be equipped with sealed ball bearings and rated for continuous operation. Replaceable air filter shall be mounted directly behind the door vent. A thermostat to control this fan shall be adjustable from 39 degrees F to 70 degrees F. Replaceable air filters shall be mounted directly behind the door vent. The fan shall have a protective grill to prevent injury to maintenance personnel.

All cabinets shall be equipped with a thermostatically controlled heater. The thermostat shall be adjustable from 2 degrees F to 60 degrees F. The heater shall be wired with appliance grade wire rated for the 900 watt heater with a low RPM circulator fan (again, with sealed ball bearings) to reduce condensation, and shall be designed, positioned and protected so as to prevent harm to operating personnel.

POLICE PANEL

All cabinets shall be furnished with a police compartment within which shall be located:

1) A hex - head wrench handle to open the cabinet door. ***One handle shall be supplied with each cabinet.***

2) Auto-Flash switch to cause the controller to operate the intersection in its pre-programmed flashing mode.

3) Auto-Manual jack (J1) which will apply a stop time command to the controller unit upon installation of the two-meter P1 plug into J1. A push-button switch will advance the controller intervals. Removal of P1 resumes normal controller timing. One (1) P1 and pushbutton two-meter cord shall be supplied for every ten (10) cabinets.

4) A 'Signals On-Off' switch to extinguish the signal faces and maintain controller operation.

DOOR ACTIVATED SWITCH

The cabinet shall be provided with three door actuated, hermetically sealed micro switches. One switch shall be wired to pin 16 (door open on telemetry connector) terminals on the terminal facility and shall provide a dry contact closure across these terminals when the cabinet door is opened. The second switch shall be wired to a cabinet light. The third switch removes 120VAC from the fans. Example: Micro switch #MSBZ2RW82A2

MANUAL FLASH OPERATION

The manual flash switch shall extinguish all signal indications except power to the yellow and red signals to permit programmable emergency flashing operations. The power supply to the controller shall not be affected and the controller shall continue to operate normally.

As a minimum, terminal facilities shall be wired and configured for load switch Bays as listed below:

The Sixteen (16) load bays will be assigned as follows:

Eight (8) Bays-Phases 1-8	Four (4) Bays - Peds 2,4,6,8	Four (4) Bays - overlaps A-D

TECH PANEL SWITCHES

There shall be four (4) toggle switches mounted on the inside portion of the main door. Each switch shall operate as follows:

1. Auto-flash switch shall command the intersection into its pre-programmed flashing mode, and the controller shall operate in a normal cycle.

2. Controller On-Off switch shall remove power to the controller and conflict monitor.

3. Auto-Off-Stop Time switch shall be a single-pole double-throw with a center off position. The off position shall disable any stop time signal from inputting to the controller. The stop time position shall apply a logic true to the controller's stop time input. The AUTO position will apply a stop time to the controller whenever a fault is detected by the conflict monitor and the intersection goes to flash.

4. Signal Power ON-OFF switch shall remove the signal power only and allow the controller unit to cycle.

LOGIC GROUND BUSS

A logic ground buss shall be mounted on the left side of the controller back panel.

CONNECTOR "D" HARNESS

Each cabinet shall have wired, to a sub-panel, a harness six (6) feet in length that mates with the connector `D` on the controller. (Econolite ASC/2-2100). See attached controller specification # 686.802819P for the pin out for the 'D' connector.

TELEMETRY CONNECTOR

In addition, a 25-pin male telemetry connector is used for input of system sensor and cabinet alarm information. It is secured via spring latches (AMP p/n 745012-1). A pinout of the telemetry connector can be found at the end of this specification. A two-meter harness for this connector is required.

The flasher relay shall energize the flasher and transfer signal light circuits from controller unit to flasher. Flash relays shall be physically and functionally interchangeable with Midtex #136-4995 or equal.

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

MECHANICAL REQUIREMENTS

SIZE

Cabinets shall be provided in the following sizes:

Type/Size	Height (inches)	Width (inches)	Depth (inches)
P - CABINETS	55 Front 54 Rear	45	23

(See Appendix "B")

Type P cabinets shall be fabricated from (minimum) .125" marine-grade reinforced aluminum. In all cases, the cabinets furnished shall have clean cut, smooth appearance. All welds, mold marks, etc., shall be ground smooth and/or sanded to affect this requirement. All County cabinets shall be a milled and polished finish.

DOOR

The main door of all cabinets shall include substantially the full area of the front of the cabinet. All doors shall be reinforced on the inside in such a manner as to prevent warping.

The door for fabricated cabinets shall be hinged on the right-hand side by means of one (1) full length piano hinge with a ¼" (min.) stainless steel hinge pin. Alternate hinging methods will be considered for approval. A gasket bead shall be installed on the inside of the door, which together with the neoprene air-cored cabinet gasket shall form a weather-tight seal between the housing and the cabinet door. The moving bars or rods shall be Teflon coated where they make contact with other parts or bearing surfaces.

LOUVER SLOTS and FILTER FRAME

In-door 16" x 20" x 2" lip and frame to positively hold filter against slots. Frame must designed for quick release for filter replacement. (16" x 20" x 2" filter).

CABINET MOUNTING AND SHELVING

1	2 - .125" aluminum shelves
2	Adjustable rack mounting bracket
3	Back panel support brackets, A.O.B.E.

LOCK ASSEMBLY

The three point lock assembly shall be made of 5/8" stock minimum. The door handle shall be made of material with a 5/8" minimum thickness. (With removable hex wrench-handle)

MAIN DOOR

The main door for all cabinets shall be equipped with a cylinder lock keyed for a Corbin key, with a dust cover. In fabricated cabinets, the lock shall engage a cam controlling a three-point locking system for the main door. The cam shall be activated by a cast aluminum (or approved equal) handle having an arm radius of at least 6 inches. The cam mechanism shall be designed to reduce "leverized" pressure on the lock tongue from attempts to force the handle. The handle travel shall not extend over the lock cylinder access.

Two (2) positions Door catch shall be supplied to hold the door in an open position of 135°, plus or minus ten degrees. The catch shall manually engage and hold the door open until released.

*** See P-Cabinet Detail Sheet (# 9) ****

POLICE DOOR

All cabinets shall be furnished with full doors and a flush-mounted auxiliary door equipped with a lock for a police key and dust cover. Neoprene gasket and stainless steel hinge pins

shall be provided.

KEYS

One key shall be furnished for each cabinet lock, plus a police key. The lock shall be a Corbin "Conn 1".

Special Note:

Door handle and opening hardware

Special handle that is removable from the outside after opening or closing the door, so as to make the face of door surface flush. A protective opening cover shall cover the opening for the handle.

ELECTRICAL REQUIREMENTS

CIRCUIT BREAKER

The circuit breaker shall be approved and listed by Underwriters Laboratories. The operating mechanism shall be enclosed, trip free from operating handle on overload, and trip indicating. Contacts shall be silver alloy enclosed in an arc-quenching chamber. Each cabinet shall have, as a minimum, a circuit breaker rated at 15 amperes to protect the vent fan and duplex outlet. In addition, a circuit breaker rated at 20 amperes shall be furnished to protect all other equipment except at locations where otherwise specified. Circuit breakers shall be unaffected by ambient temperature range, relative humidity, applied power shock and vibration range specified in NEMA TS-2-1992. Breakers shall have a minimum interrupt capacity of 5000 amperes.

WIRING

All cabinet wiring where connected to terminal strips, flasher, relays, switches, radio interference suppressor, etc., shall be identified by the use of hot stamping of the wire or approved equal, before attachment of the lug or making the connection. The wire shall carry the proper identification number so that a translating sheet will not be required. All wires shall be cut to the proper length before assembly. No wires shall be doubled back to take up slack, except for the conflict monitor. Wires shall be neatly laced into cables with nylon lacing. Cables shall be secured with nylon cable clamps. The grounded side of the electric service shall be carried throughout the cabinet without a break.

SPECIAL REQUIREMENTS:

All cable harness shall have a loop of wire left in the harness, so that the main wiring panel can be lowered without disconnecting the harness from the interior cabinet. All electrical

connections in the cabinet, including relays, flasher, terminal strips, etc., shall have sufficient clearance between each terminal and cabinet to provide an adequate distance to prevent a leakage path or physical contact under stress. Where these distances cannot be maintained, barriers must be provided. A clearance of 2 inches will be kept between all ground and AC Power points.

All equipment grounds shall run directly and independently to the ground buss. The lay of the interconnect cable between the components must be such that when the door is closed, it does not press against the cables or force the cabinets against the various components inside the cabinet.

Terminals used for field connections shall secure conductors by means of a #8-32 nickel- or cadmium- plated brass binder head screw. Terminals used for interwiring connections, but not for field connections, shall secure conductors by means of a #6-32 nickel- or cadmium-plated brass binder head screw.

As a minimum, all connections to and from the controller unit shall terminate to an interwiring type block. These blocks will act as intermediate connection points for all controller units I/O.

DUPLEX OUTLET

Each cabinet shall be supplied with a NEMA type 5-15R duplex receptacle equipped with integral ground fault interrupting circuit as defined in the national electrical code, and a bulb outlet with switch and 100 watt bulb, wired to the 15 amp aux breaker.

EMI and RFI protection

A single plug-in noise filter and surge protector unit with base.(ie: EDCO SHA – 1250) The unit will have indicators for fault conditions.

CHARACTERISTICS

Peak Current (8 X 20 micro seconds)..... 20,000 Amperes

Life Test 5% change
(Voltage clamp before and after
25 surges of 20kA waveshape)

Clamp Voltage..... 250 V typical @ 20kA

Response Time..... < 5 nano seconds

Continuous Service Current.....15 Amps max, 60 Hz, 120V

Operating Temperature Range..... -40°C to + 85°

Noise suppression over a large frequency range at least 10db@10khz, 50db@100khz, 90db@1mhz.
The surge arrestor/line filter shall be installed after the circuit breaker.

Isolation shall be provided for field inputs, 4 pedestrian button or auxiliary detector inputs

OUTLET POWER STRIP

A six outlet power strip will be mounted in the cabinet for plugging in modems, amps and other auxiliary equipment. The power strip will be of a sturdy metal construction and meet UL standards. It will be fed from the noise filter/surge protector unit.

HARNESS REQUIREMENTS

All wiring containing line voltage AC shall be routed and bundled separately, and/or shielded from all low voltage, i.e., control circuits. All conductors and live terminals or parts, which could be hazardous to maintenance personnel, shall be covered with suitable insulating material.

All conductors used in controller cabinet wiring shall be #22 AWG or larger with a minimum of 19 strands. Conductors shall conform to MIL SPEC #MIL-W-16878D type B or D. The insulation shall have a minimum thickness of 10 MILS. All wiring containing line voltage shall be a minimum size of #14 AWG, or the suitable size.

The AC return and equipment ground wiring shall be electrically isolated from each other and the AC + wiring by an insulation resistance of at least 10 megohms when measured at 250 VAC AC return and equipment ground wiring shall be color-coded white and green, respectively.

All inputs and outputs which are wired to a connector on a module shall be terminated at a terminal block in the controller cabinet as specified in NEMA TS-2 for a Type 2 controller.

TERMINAL BLOCKS

Terminal strips located within the cabinet shall be accessible to the extent that it shall not be necessary to remove the controller from the cabinet to make an inspection or connection.

Terminal blocks shall be two position multiple pole barrier type. Shorting bars shall be provided in each of the positions provided along with an integral marking strip or equal. Terminal blocks shall be so arranged that they shall not upset the entrance, training and connection of incoming field conductors. All terminals shall be suitably identified (block and terminal numbers) by legends permanently affixed and attached or silk screened. Not more than three conductors shall be brought to any one terminal screw. No electrically alive parts shall extend beyond the protection afforded by the barriers. A majority of the terminal blocks shall be installed on a main back panel. This back panel shall be hinged on

the bottom so the panel can be unbolted at the top and dropped forward, so as to allow one room enough to work on the backside of the panel.

AC return and equipment ground wiring shall terminate to buss bars. Each buss bar shall have a minimum of 20 contact points, each capable of securing at least one #10 conductor or be at least 2 inches away from any AC Power points.

The bottom row of field terminal blocks, and the flash yellow or red programming terminal blocks shall be installed on a hinged, angled, back panel plate that will allow the terminal blocks on the plate to be set in a 15° to 75° angle range to the front of cabinet, for the ease of flash configuration programming, installing field wiring, and dropping the backpanel.

MERCURY CONTACTOR

A mercury contactor, rated at a minimum of 50 amperes, normally-open configuration, shall be furnished to break the feed to the signal power buss (solid state load switch power feed). This contactor shall be utilized to disconnect AC power from the signal buss when operation so requires.

CONNECTING HARNESSES

Terminal facilities shall be provided with harnesses of appropriate length, terminated to connectors of the MIL - 26482 series, to allow the placement of the controller and monitor units anywhere within the cabinet specified for the controller.

The cabinet shall have sufficient harness length to enable one to move all equipment to any shelf position.

All wiring including spare wires will be terminated to pins in connectors or terminal blocks.

BACK PANEL PRINTS

Two copies of documentation of the back panel wiring shall be provided. The prints shall include diagrams of wiring to all components, as well as lists of all wiring terminations and their respective functions within the cabinet.

QUALITY ASSURANCE PROVISIONS - CABINETS AND TERMINAL FACILITIES

All equipment shall meet the environmental requirements as specified in NEMA Standard Publication number TS2 – 1992 Section 2 (or latest revision).

Design approval tests shall be as specified for temperature and humidity. The bidder shall prepare test procedures and data forms for approval by the County of Monroe.

Each shipped cabinet shall include a written and signed checklist documenting functional

testing.

METHOD OF MEASUREMENT

Cabinets together with their *Testing Results Documentation,* associated terminal facilities, after inspection and acceptance by Monroe County will each be measured as a single unit.

BASIS OF PAYMENT

Payment for each cabinet and its associated terminal facilities will be made for the measured quantity at the contract price for each. The unit price shall be full compensation for furnishing, transporting, labor, tools, materials, equipment and incidentals necessary, including racks, rack detector power supplies, detectors, load relays, load switch packs, flasher module, and conflict monitor.

> **Sixty-five (65) percent of the contract bid price shall be paid upon delivery. Thirty-five (35) percent shall be paid upon satisfactory functional testing by Monroe County after delivery.**

Functional testing shall be performed within ninety days from delivery.

Telemetry Connector Pin Assignments

Pin	Function	I/O
3	System Detector A1	I
2	System Detector A2	I
5	System Detector B1	I
19	System Detector B2	I
4	System Detector C1	I
1	System Detector C2	I
7	System Detector D1	I
8	System Detector D2	I
18	Local Flash	I
20	Conflict Flash	I
16	Door Open (Maintenance Required)	I
17	Alarm 1	I
21	Alarm 2	I
14	TLM Spare 1	I
6	TLM Spare 2	I
15	External Address Enable	I
24	Receive 1	O
25	Receive 2	O
12	Transmit 1	O
13	Transmit 2	O
9	TLM Special Function 1	O
22	TLM Special Function 2	O
10	TLM Special Function 3	O
23	TLM Special Function 4	O

BASIS OF PAYMENT

The unit bid price for this item shall include the cost of furnishing a new traffic control cabinet and terminal facility as described herein.

Payment will be made under:

Item No.	Item	Pay Unit
C686.808128	Traffic control cabinet, NEMA T2-2, type 2, size P – eight phase, sixteen (16) position, fully traffic actuated	EA