

SEALED BID

CITY OF MOBILE

BID SHEET

Do Not Return Via Email or Fax

Mailing Address:
P. O. Box 1948
Mobile, Alabama 36633
(251) 208-7434

**Purchasing Department
and Package Delivery:**

**Government Plaza
4th Floor, Room S-408
205 Government St.
Mobile, Alabama 36644**

Postal Service Does Not Deliver to This Street Address

This is Not an Order

**READ TERMS AND CONDITIONS
ON REVERSE SIDE OF THIS PAGE
BEFORE BIDDING**

Typed by: lw Buyer: 005

Please quote the lowest price at which you will furnish the articles listed below

DATE 06/16/2025	BID NO. 5962	DEPARTMENT Various	Commodities to be delivered F.O.B. Mobile to: As Specified
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This bid must be received and stamped by the Purchasing office not later than:

12:01 PM, Wednesday, July 2, 2025

QUANTITY	ARTICLES	UNIT	UNIT PRICE		EXTENSION	
			Dollars	Cents	Dollars	Cents
	<p>TRAFFIC SIGNAL EQUIPMENT CABINETS, CONTROLLERS</p> <p>Please observe instructions on reverse side.</p> <p>Please quote your prices in the unit specified in the bid.</p> <p>All prices to be delivered pricing, FOB Mobile.</p> <p>Products bid are to be compatible with existing equipment currently in use by The City of Mobile.</p> <p>Provide Specifications on Traffic Signal Control Cabinets/Controllers.</p> <p>Pricing to be firm for a six (6) month period following the award of this bid. At the option of The City of Mobile and the successful vendor(s), the award of this bid may be extended for five (5) additional six (6) month periods.</p> <p>Approximate quantity is for each type of item, not for each optional item.</p> <p>All items must meet requirements as per attached specifications.</p>					
			TOTAL			

Page 1 of 3

**RETURN ONE SIGNED COPY OF THIS BID
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Phone Number _____

Email Address _____

We will allow a discount _____ % 20 days from date of receipt of goods
and correct invoice of completed order

State delivery time within _____ days of receipt of P.O.

Firm Name _____

Signature _____

Type or Print Name _____

1. All quotations must be signed with the firm name and by an authorized officer or employee.
2. Verify your bid before submission as it cannot be changed or corrected after being opened. In case of error in extension of prices, the unit price will govern.
3. If you do not bid, return this sheet and state reason. Otherwise, your name may be removed from our mailing list.
4. The right is reserved to reject any, or all quotations, or any portions thereof, and to waive technicalities if deemed to be in the interest of the City of Mobile.
5. This bid shall not be reassignable except by written approval of the Purchasing Agent of the City of Mobile.
6. State brand and model number of each item. All items bid must be new and latest model unless otherwise specified.
7. If bid results are desired, enclose a self-addressed and stamped envelope with your bid. (All or None bids only)
8. Do not include Federal Excise Tax as an exemption certificate will be issued in lieu of same. The City is exempt from the State of Alabama and City sales taxes.
9. PRICES ARE TO BE FIRM AND F.O.B. DESTINATION UNLESS OTHERWISE REQUESTED.
10. BID WILL BE AWARDED ON ALL OR NONE BASIS UNLESS OTHERWISE STATED.
11. Bids received after specified time will be returned un-opened.
12. Failure to observe stated instructions and conditions will constitute grounds for rejection of your bid.
13. Furnish literature, specifications, drawings, photographs, etc., as applicable with the items bid.
14. Vendor may be required to obtain City of Mobile Business License as applicable to City of Mobile Municipal Code Section 34-50. For Business License inquiry, contact the Revenue Department at (251) 208-7462 or cityofmobile.org/business-license-overview/
15. IF a bid bond is required in the published specifications, see below:
Each bid shall be accompanied by a **Cashier's Check, Certified Check, Bank Draft or Bid Bond** for the sum of five (5) Percent of the amount bid, made payable to the City of Mobile and certified by a reputable banking institution. All checks shall be returned promptly, except the check of the successful bidder, which shall be returned after fulfilling the bid.
16. Contracts in excess of \$50,000 require that the successful bidder make every possible effort to have at least fifteen (15) percent of the total value of the contract performed by socially and economically disadvantaged individuals.
17. All bids/bid envelopes must have the bid number noted on the front. Bids that arrive unmarked and are opened in error shall be returned to vendor as an unacceptable bid.
18. If successful vendor's principal place of business is out-of-state, vendor may be required to have a Certificate of Authority to do business in the State of Alabama from the Alabama Secretary of State prior to issuance of a Purchase Order. Vendors are solely responsible for consulting with the Secretary of State to determine whether a Certificate is required. See www.sos.alabama.gov/BusinessServices/ForeignCorps.aspx. Please note that the time between application for and issuance of a Certificate of Authority may be several weeks.
19. Vendors do not need a City of Mobile Business License or Certificate of Authority from the Alabama Secretary of State to submit a bid, but may need to obtain the Business License and Certificate of Authority if applicable, prior to issuance of a Purchase Order.
20. Bids and addendums are posted at www.cityofmobile.org/services/business/bids/. It is the responsibility of the vendor to check the City's bid page for updates and addendums.
21. Vendors must be able to provide the following upon request. Federal W-9 form, proof of registration in the E-Verify program, and Certificate of Authority to do business in Alabama/Registration with the Alabama Secretary of State within 24 hours of request.
22. City of Mobile applies local vendor preference to all purchases: Code of Alabama, 1975, Sections 41-16-50(a) and 41-16-50(d), except federally funded grants.
23. Equal Employment Opportunity. Except as otherwise provided under 41 CFR part 60, all contracts that meet the definition of "federally assisted construction contract" in 41 CFR Part 60-1.3 must include the equal opportunity clause provided under 41 CFR 60-1.4(b), in accordance with Executive Order 11246, "Equal Employment Opportunity" (30 FR 12319, 12935, 3 CFR Part, 1964-1965 Comp., p. 339), as amended by Executive Order 11375, "Amending Executive Order 11246 Relating to Equal Employment Opportunity," and implementing regulations at 41 CFR part 60, "Office of Federal Contract Compliance Programs, Equal Employment Opportunity, Department of Labor."
24. Davis-Bacon Act, as amended (40 U.S.C. 3141-3148) will apply when required by Federal program regulations.

BID CONTINUATION SHEET

Page _____ of _____

QUANTITY	ARTICLES	UNIT	UNIT PRICE		EXTENSION	
			Dollars	Cents	Dollars	Cents
Page 2 of 3						
QTY 1-10	<p>TS2-Type I</p> <p>TS2 Type 1 80 4 Ped 4 OL, Base Mounted Cabinet Assembly to include sixteen (16) Load Switches, eight (8) Flash Relays, NEMA Flasher, three (3) BIU Modules, one (1) Cabinet Power Supply, one (1) 16-Channel Detector Card Rack, Back-Up Generator Receptacle, cabinet interior painted white with black lettering</p> <p>Make _____ Model _____</p> <p>Unit Price \$ _____</p>					
QTY 1-5	<p>TS2-Type I</p> <p>TS2 Type 1 80 4 Ped or 4 OL, Pole or Base Mount Cabinet to include twelve (12) Load Switches, six (6) Flash Relays, NEMA Flasher, three (3) BIU Modules, one (1) Cabinet Power Supply, one (1) 16-Channel Detector Rack, Back-Up Generator Receptable, cabinet interior painted white with black lettering</p> <p>Make _____ Model _____</p> <p>Unit Price \$ _____</p>					
<p>THE ABOVE ITEMS MUST MEET THE ATTACHED SPECIFICATIONS.</p> <p>All vendors will be required to provide verification of enrollment in the E-Verify program. Additional information may be found at http://immigration.alabama.gov/</p> <p>If the successful vendor's principal place of business is out-of-state, vendor may be required to have a Certificate of Authority to do business in the State of Alabama from the Secretary of State prior to issuance of a Purchase Order.</p> <p>Vendors are solely responsible for consulting with the Secretary of State to determine whether a Certificate is required. See: www.sos.alabama.gov/BusinessServices/ForeignCorps.aspx. Please note that the time between application for the issuance of a Certificate of Authority may be several weeks.</p>						
			TOTAL			

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Firm Name _____

By _____

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and correct invoice of competed order.

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Page _____ of _____

QUANTITY	ARTICLES	UNIT	UNIT PRICE		EXTENSION	
			Dollars	Cents	Dollars	Cents
	<p>Page 3 of 3</p> <p>Upon notification, vendor will have 10 business days to provide the Certificate of Authority and the E-Verify numbers to the Purchasing Department before award can be completed. (Vendors will possibly need to pay the expedite fee to meet this requirement because application is not sufficient. We must have a copy of the certificate with your Company ID number).</p> <p>Vendors do not need a City of Mobile Business License or Certificate of Authority from the Alabama Secretary of State, nor the E-Verify for certification to submit a bid, but will need to obtain the Business License and Certificate of Authority verification and/or provide the E-Verify Certification, if applicable, prior to issuance of a Purchase Order.</p> <p>State of Alabama Local Vendor Preference Law 41-16-50 (a) and (d) will apply to this purchase.</p> <p>If you have any questions, please feel free to contact the Purchasing Department at 251-208-7434 or purchasing@cityofmobile.org. No questions will be answered 5 days before bid opening.</p> <p>Vendor must include contact information with this bid.</p> <p>Pricing to be firm for a (6) six-month period following the award of this bid. At the option of the City of Mobile and the successful vendor, the award of this bid may be extended for (5) five additional (6) six-month periods.</p> <p><u>CONE OF SILENCE.</u> From the time of advertising, and until the final award by completion of a signed contract or purchase document issued by the City, there is a prohibition on communication by respondents (or anyone on their behalf) with the City staff and elected officials regarding this request for bids, proposals, or qualifications. This does not apply to communications directly with the Procurement Department staff during authorized question periods, or with designated City staff during pre-bid conferences, interviews, requests for clarification, and written contract negotiations. Breaking the established prohibition on communication, if proven, may result in a disqualification of your submittal.</p> <p>TO BE AWARDED ALL OR NONE.</p>					
			TOTAL			

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IN ENCLOSED ENVELOPE**

READ ABOVE INSTRUCTIONS BEFORE QUOTING

Firm Name _____

By _____

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CITY OF MOBILE

SPECIFICATIONS FOR TRAFFIC SIGNAL EQUIPMENT

1. General.

The following are the requirements for traffic signal equipment. These requirements may be supplemented or amended by the requirements given elsewhere in the bid documents, on plan sheets, and on the details in the ALDOT Special and Standard Highway Drawings.

Requirements specified in these specifications shall comply with the latest editions of the NEC and the NESC. All equipment shall conform to the requirements in the NEMA Standards Publication No. TS 2-2016, "Traffic

Control Systems" or latest revisions and shall conform to the requirements specified within these specifications.

All equipment shall meet the latest NEMA Environmental and Operating Standards. In case of conflict with cited Standard Publications and these specifications, the requirements of these specifications shall govern.

For purposes of these specifications wherever the following terms or abbreviations are used, the meaning shall be interpreted as follows:

Amps Alternating Current

ANSI American National Standards Institute

ASTM American Society for Testing Materials

AWG American Wire Gage

DC Direct Current

HZ Hertz

IMSA International Municipal Signal Association

ITE Institute of Transportation Engineers

LED Light Emitting Diode

MUTCD Manual on Uniform Traffic Control Devices

NEC National Electrical Code

NEMA National Electrical Manufacturers Association

NESC National Electrical Safety Code Underwriters Laboratories

V Volts

VA Volt Amps

W Watts

Descriptions and definitions of the equipment, words, and terminology used in these specifications are given in the MUTCD, the NEMA TS 2-2016 Standards Publication, ITE publications, and the NEC.

11. Cabinet Assembly

The cabinet assembly shall be configured and bench-tested prior to installing the cabinet assembly. An

Electrician from the City of Mobile Electrical Department Traffic Division shall inspect the cabinet assembly prior to turning on the system.

Cabinet Assembly

The cabinet assembly shall be configured and bench-tested prior to installing the cabinet assembly. An Electrician from the City of Mobile Electrical Department Traffic Division shall inspect the cabinet assembly prior to turning on the system.

(a) DESCRIPTION.

A cabinet assembly shall consist of, auxiliary devices, electrical devices and other equipment as specified in these specifications, plans, or proposal mounted and wired into a cabinet to make a complete operational traffic cabinet assembly.

(b) CABINET DESIGN.

The cabinet shall be an approved weatherproof enclosure. it shall be designed for base mount or pole mount as shown on the plans. The cabinet shall be clean-cut in design and appearance.

1. MATERIAL.

The cabinet shall be fabricated from cast aluminum or shaped sheet aluminum. Unless otherwise shown on the plans, the cabinet shall be aluminum finish. When painting of the cabinet is specified, the cabinet shall be primed and finished with two coats of high-grade enamel paint, complying with the requirements of Section 855.

2. CABINET DIMENSIONS.

The cabinet shall be large enough to provide ample space to house the controller unit, conflict monitor, auxiliary devices, electrical devices, and other equipment as specified in these specifications, plans or proposal. The cabinet shall accommodate the largest controller dimensions for the specific number of phases required by the plans or proposal.

The minimum size of pole mounted controller cabinet shall be 41 inches in height, 28 inches in width, and 16 inches in depth.

The minimum size of base mounted controller cabinet shall be 54 inches in height, 38 inches in width, and 16 inches in depth.

3. DOORS.

When closed, the doors shall fit closely to gasketing, making the cabinet weather-resistant and dust-tight. Door hinges, bolts, and pins shall be of stainless steel or equivalent corrosion resistant material.

Main Cabinet Door: A hinged main cabinet door shall be provided permitting complete access to the interior of the cabinet. When opened, this door shall be provided with a device designed to hold the door in an opened position.

Secondary Access Door: An access door which allows access to the back side of the terminal facility shall be provided unless a pole mounted cabinet is required.

Auxiliary Cabinet Door: A small, hinged, auxiliary door (police compartment door) shall be provided on the outside of the main cabinet door. The auxiliary door

shall permit access to a switch panel, but shall not allow entrance to the controller mechanism nor to exposed electrical terminals.

4. GASKETING.

Gasketing shall be provided on all door openings and shall be dust tight. Gaskets 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.

5. LOCKS AND KEYS.

The main cabinet door and secondary access door shall each be equipped with a sturdy brass or stainless-steel lock. The locks shall be a traffic industry conventional lock and operate with a No. 2 key. The locks shall be permanently lubricated and shall be covered with a weatherproof tab.

The small auxiliary door (police compartment door) shall be equipped with a lock and shall use a standard skeleton key.

Two keys shall be furnished for each type of lock.

6. SHELVES.

The cabinet shall be supplied with two mounting shelves. One shelf shall be used for storage of the controller and its associated hardware and the other shelf for storage of detectors.

A pull-out drawer with lid shall be installed and centered under the bottom shelf. The drawer shall be made of aluminum and come out on full extension drawer slides with ball bearings. The lid on the pull-out drawer shall have a non-slip surface, provide an approximate 16-inch x 14 inch working area and have the ability to bear a constant 25-pound burden. The drawer shall include a rear hinge with sufficient storage to hold at least two copies of the cabinet drawings and other related cabinet documentation.

7. CABINET LIGHTING.

Cabinets shall be provided with a minimum of two (2) white light LED modules. One (1) lighting module shall be installed along the front top section of the cabinet and the second lighting module shall be installed underneath the bottom cabinet shelf in such a location as to provide light to the load bay area of the cabinet. Both LED lighting modules shall be controlled by a NEMA rated, commercial quality, pushbutton door switch.

8. POLICE PANEL SWITCHES.

The police door switch panel shall contain only two switches, a power ON/OFF switch, and a flash ON/OFF switch,

The power ON/OFF switch shall be a signal head off switch and not an AC power off switch for the cabinet. This switch shall not interrupt the controller power nor interrupt the controller cycling.

The flash ON/OFF switch shall apply a flash mode to the flasher relay and shall neither interrupt the controller power nor interrupt the controller cycling.

There shall be no remote plug-in contained within the police panel area.

9. POLE MOUNT HARDWARE.

A cabinet intended for side-of-pole mounting shall be provided with an adapter (exclusive of lag bolts or banding) necessary to permit mounting to a 4.5 inch diameter or larger pole. The adapter shall accommodate lag bolts up to 3/8-inch diameter or banding up to 1 inch wide. Mounting holes shall be provided at or near the top and bottom of the cabinet.

10. GROUNDING.

Ground electrodes at controllers shall be a copper clad rod 10 feet in length and 5/8 inch in diameter, driven to a depth of 8 feet and bonded by copper wire or strap of the same cross-sectional area as No. 6 AWG wire.

11. CONVENIENCE RECEPTACLE.

A convenience outlet shall be provided as part of the terminals and facilities. The convenience receptacle shall be a duplex, three prong, NEMA Type 5 — 15R grounding type outlet and shall have independent ground fault circuit protection.

12. CABINET VENTILATION.

Louvered vents shall be located on the main cabinet door. Vents shall allow the release of excessive heat and any explosive gases that might enter the cabinet.

A cabinet vent air filter, minimum size of 16 inches x 12 inches x 1 inch, shall be mounted on door and held in place by a spring.

A thermostatically controlled power vent and fan shall be provided* The thermostat shall activate the fan at 110 O F and de-activate the fan at 90 O F with an accuracy of ± 5 O F.

13. IDENTIFICATION PLATE.

An aluminum identification plate shall be affixed to the cabinet door. The identification plate shall be sized to provide the message "City of Mobile" either etched or embossed in 1-inch high letters. The letters shall be delineated in black enamel.

14. DATA LABEL.

A data label shall be placed on the inside of the cabinet door to provide the following information:

Manufacturer/s name —All equipment installed cabinet

Date of Manufacture

Wiring Schematics Number

Controller Model Number

Controller Serial Number

Conflict Monitor Model Number

Conflict Monitor Serial Number

Time Base Coordinator Model Number (If applicable)

Time Base Coordinator Serial Number (If applicable)

Communication Unit Model Number (If applicable)

Communication Unit Serial Number (if applicable)

Master Model Number (If applicable)

Master Serial Number (If applicable) Time Clocks Model Number (If applicable)

Time Clocks Serial Number (If applicable)

(c) AUXILIARY DEVICES.

1. GENERAL.

Auxiliary devices shall conform to the requirements of NEMA Standard Publication NO. TS 2-2016, "Traffic Controller Assemblies".

2. SOLID STATE FLASHERS.

The flasher shall be jack mounted.

3. FLASH TRANSFER RELAY.

The flash transfer relay shall be a heavy-duty relay designed for continuous duty. It shall mount on an eight-pin spade plug base.

4. SOLID STATE LOAD SWITCH.

The signal load switches and signal load base plate shall be furnished and wired in place for each phase provided.

Load switches shall be triple signal, NEMA input light indicating, rated for 10 A at 165 O F. The actual switching component shall have a minimum 500 V PIV rating.

5. DETECTOR TEST SWITCHES.

When specified, detector test switches shall be furnished to check all detector control circuits.

6. MERCURY CONTACTOR.

A mercury contactor input power relay shall be a 40 A relay for 2 phase and 4 phase controllers and a 60 A relay for 8 phase controllers.

(d) TERMINALS AND FACILITIES.

1. GENERAL.

The following define the performance and construction requirements of cabinet terminals and facilities that are considered to be of the attached or non plug-in type. These additional specifications cover the physical requirements, electrical requirements, interface, cabling, supporting terminal facilities, and labeling.

OPENINGS.

The cabinet shall be provided with necessary openings for mounting and connection as specified.

3. ARRANGEMENT OF DEVICES.

The controller equipment and terminal blocks shall be so arranged within the cabinet that they will not upset the entrance, training, and connection of the incoming conductors.

4. TERMINAL AND PANEL WIRING.

No printed circuit boards will be allowed in the cabinet wiring facility. Every panel and terminal shall be hardwired.

Each cabinet assembly is to be furnished with panels in the cabinet mounted in such a way as to provide visibility and accessibility.

All panel wiring shall be neat, firm, and hardwired.

5. TERMINAL PANEL.

As a minimum, the panel shall be provided with the following terminal blocks:

- Terminal block to provide connections for the circuit breaker and power supply line.
- Terminal block unfused, for neutral side of power supply line.
- Terminal blocks for conductors of signal control cable. One terminal for each signal circuit and one or more terminals for the common conductor shall be provided.

The terminal blocks shall be located at least 6 inches from the bottom of the base mount cabinet and arranged for adequate electrical clearance between terminal blocks.

6. POWER TERMINAL STRIP.

Terminal strip shall be supplied for incoming power.

7. INSERT TERMINALS.

All components, connectors, plug terminals, and insert terminals shall be clearly annotated.

8. TERMINAL STRIP SHIELDING.

If terminal points are located adjacent to a shelf so that possible shorting can be accomplished by shifting of components, the terminal strips shall be shielded.

9. TERMINAL POINTS AND TERMINAL STRIPS.

All terminal points and terminal strips shall be the double tie type and shall be clearly annotated.

There shall be no more than two connections made on any terminal point.

Connections shall be made by using ring tongue terminal connections stamped from one piece of pure copper.

The barrel will be formed with a brazed butted seam and shall be pre-insulated with an appropriate sleeve.

The terminal connections shall be required to be the correct size for the wire and terminal strip bolts.

Terminal connections used on solid wire shall be soldered.

10. WIRING.

Wiring with controller cabinet shall be neatly laced and identified.

All wires shall be cut to a proper length before assembly. No wire shall be doubled back to take up slack.

The outgoing traffic control signal circuits shall be of the same polarity as the line side of the power supply; the common return of the signal circuits shall be of the same polarity as the grounded side of the power supply.

All wiring to AC+ shall be colored black. All wiring to AC- shall be colored white. All wiring to chassis ground shall be colored green.

11. CABLES.

All cables shall be self-contained and have continuous jackets from terminal facility into connector.

The jacket shall be solid flexible sleeving or expandable self-fitting polyester sleeving. Spiral wrap type sleeving will not be accepted.

The position of cables between the components must be such that when the door is closed, it does not press against the cables or force the cables against various components inside the cabinet.

All cables shall be self-contained and shall not be split to feed more than one connector.

12. DETECTOR PANEL.

A separate panel shall be furnished for detector wiring with all NEMA functions available and wired to the terminal strips•

The panel shall also include an earth ground buss with terminal points parallel and adjacent to the loop connection terminals for lightning protection.

A twelve-position double tie blank terminal strip shall be mounted on detector panel for future use.

A 16 channel Detector Card Rack shall be hardwired to receive inputs from loop panel for input to controller.

13. SWITCH PANELS.

An internal switch panel shall be mounted on the inside of the main door. All switch functions shall be permanently and clearly labeled.

14. GROUNDING.

All logic ground, AC neutral, and chassis ground within the equipment and cabinet shall be isolated, split With separate ground buses being required for AC neutral and earth ground.

All lightning protection shall be grounded to the chassis ground. Lightning protection shall be installed before the power service to the cabinet is turned on.

All neutral conductors shall be grounded at the controller and at each terminal point.

15. LINE FILTERS.

Line filters shall be furnished to protect the controller from line voltage surges.

Line filters for two phase controllers shall be rated at 25 A and four phase controllers shall be rated at 30 A through eight phases shall be rated at 45 A.

16. RADIO INTERFERENCE SUPPRESSION.

Each cabinet shall be equipped with a radio interference suppressor installed. The suppressor shall be connected to filter interference completely from the controller and associated equipment.

17. MAINTENANCE PANEL SWITCHES.

These switches shall be mounted on the inside of the main door, on the back side of the auxiliary compartment (police compartment). All switch functions shall be permanently and clearly labeled. The switches shall be of a rocker type and protected to prevent accidental switching. The following switches shall be provided: STOP-TIME, Auto/Flash (NEMA TS-2 section 5.5.1), Signal ON/OFF (heads only). Controller ON/OFF switch interrupting power only to controller.

The STOP-TIME switch shall be connected to a three position switch that is labeled as followed: The top position shall be labeled as "STOP-TIME", which shall set the STOP-TIME bit to the controller, stopping the controller cycle, holding it in its current state; the middle position shall be labeled as "DISABLED", which disables the STOP-TIME bit in the monitor; the bottom position shall be labeled as "RIJN", which enables the STOP-TIME bit in the monitor.

The Auto/Flash switch be installed and labeled in accordance with the specifications contained in NEMA TS-2, Section 5.5.1.

The Signal ON/OFF switch shall be a two position switch the kills the power to the signal heads, making the intersection dark. This switch shall not interrupt the controller power nor shall it interrupt the controller cycling.

18. MAIN CIRCUIT BREAKERS.

A circuit breaker shall be furnished. Circuit breakers shall be rated at 20 A for two phase controllers, shall be rated at 30 A for three and four phase controllers, and shall be rated at 40 A for five through eight phase controllers.

The main circuit breaker shall turn off all power to the cabinet and shall not be used for the power switch, which is located in the service panel.

19. POWER SUPPLY.

Unless otherwise specified the controller unit and associated equipment shall operate reliably on 115 V; 60 Hz single phase alternating current.

Any internal DC voltages required to satisfactorily operate a cabinet assembly shall be from a regulated power supply designed to generate all DC voltages required, constructed as an integral part of the cabinet assembly,

The grounded side of the power supply shall be carried throughout the controller in a continuous circuit.

19a. TRANSFER SWITCH

Cabinet shall have an external recessed and lockable 30 amp 125 VAC receptacle (equivalent to a Hubbell 2615) capable of cord connecting a generator for operation. The transfer switch shall be an automatic type (equivalent to a Magnecraft 50-1289-1) swapping between Utility and Generator based on the supply source.

20. TIMER CONNECTIONS.

The electrical connections from the timer to the outgoing and incoming circuits shall be made in such a manner that the timer may be replaced with a similar unit, without the necessity of disconnecting and reconnecting the individual wires leading there from. This can be accomplished by means of a multiple plug and jack, a spring connected mounting, or equivalent arrangement.

21. SIGNAL LOAD SWITCH ARRESTOR.

The load switch output shall have a metal-oxide varistor, Type V150LA20A.

22. REPLACING LIGHTNING PROTECTION.

All lightning protection devices shall be replaceable without removing any panels.

23. INDICATOR LIGHTS.

Controllers having indicator lights with a design or jn circuit life of less than 75,000 hours shall have a micro-switch located on the cabinet door that will extinguish the indicators when the door is closed.

24. NEMA INDICATION WIRING.

All NEMA functions plus NEMA coded status bits and voltage monitor outputs as listed in the NEMA Standards Publication No. TS 2-2016. Outputs shall be brought out and wired to an individual tie point of a terminal strip before further routing.

25. PREEMPTION (PRIORITY CONTROL).

When preemption is required by the plans or proposal, electrical devices, logic circuits and special wiring shall be provided which will assume control over local traffic control equipment to require display of special safety modes giving preferential right-of-way to emergency vehicles or protection at railroad crossings.

(f) SURGE PROTECTION FOR CABINET ASSEMBLY.

1. PROTECTION OF CABINET ASSEMBLY.

All cabinet assemblies shall be furnished with a surge protector on the AC service input, which meets or exceeds the following performance requirements.

- Unit shall be capable of withstanding repeated 20,000 A surges a minimum of 25 times.
- Unit shall have internal follow-current limiters (resistive elements).

Unit shall contain a minimum of three active clamping Stages.

Unit shall self-extinguish within 8.3 milliseconds after the trailing edge of surge.

Parallel impedance of limiters shall be less than 0.15 ohms.

- Unit voltage shall be to the circuit breaker before cabinet voltage filters.
- Electrical connections on the unit shall be durable enough to accommodate a No. 6 AWG wire.

The unit shall have a mounting plate for easy removal and replacement and shall be mounted in a neat workmanlike manner in the controller cabinet with as short a run as possible from the power input to the circuit breaker.

2. PROTECTION OF SIGNAL LOAD SWITCHES.

Each load switch shall be furnished with a gas tube or metal-oxide varistor, Type 150LA20A.

Unit shall have an impulse breakdown of less than 1000 V in less than 0.1 microsecond at 10 kv per microsecond.

Unit shall be capable of withstanding 20 A AC for 1 second applied 10 times at 3 minute intervals on either section.

Unit shall have a current rating of 20,000 A (8/impulse) one time.

Unit shall have a striking voltage of 300 to 500 V DC.

Unit shall have a minimum holdover of 155 V DC,

Unit shall be installed across the Triac of each section of the load switch. The center electrode of the gas tube surge protector shall be connected to pin number 12 of the load switch plug. The load switch receptacle pin number 12 shall be wired to a minimum No. 8 wire ground buss. The ground buss shall be connected to the chassis ground and a ground rod. Connection terminal shall be provided a minimum distance possible from the physical center of the ground buss.

3. PROTECTION OF CONTROLLER UNIT AND CONFLICT MONITOR.

Power and neutral for controller and conflict monitor shall be wired through a high-speed approved suppressor. The output of the arrestor to failsafe, controller, etc., shall be through shielded cable or twisted pair to the unit's AC plus and AC minus inputs.

The surge protection device shall meet or exceed the following performance requirements.

Protectors, after being subjected to twenty-five 20 kA (8 X 20 us) pulses must remain operative and exhibit less than 5 percent plus or minus change in clamp voltage before and after the test.

The protector clamp shall never exceed 250 V when subjected to the 20-kA surge.

The peak current shall be 20,000 A.

The continuous service current shall be, 10 A maximum, 120 V ACP 60 Hz.
FILTERING SPECIFICATIONS, MIL-STD-220 Insertion Loss Test Data

Insertion Loss Requirements

Frequency Insertion Loss (dB)

60 Hz

10 kHz 34

50 kHz 55

100 kHz 76

500 kHz 68

2 MHz 58

5 MHz 58

10 MHz 58

20 MHz 63

4. PROTECTION OF REMOTE DETECTOR AND INTERCONNECT CABLE.

Each remote detector input line and interconnect line, as it enters the cabinet shall be furnished with a surge protection device that meets or exceeds the following requirements.

Unit shall be capable of withstanding 10,000 A 10:20 microsecond standard waveform surges a minimum of 50 times.

Unit shall have internal follow-current limiters (resistive elements).

Unit shall self-extinguish within 8.3 milliseconds after the trailing edge of surge.

Unit shall not have thermal circuit breakers in place of limiters.

Limiter resistance shall be between 0.15 Ω and 0.39 Ω .

Unit shall have a mounting plate for easy removal and replacement and shall be mounted in the controller cabinet in a neat workmanlike manner.

5. PROTECTION OF LOOP DETECTORS (EXTERNAL SURGE PROTECTION).

External surge protection for each detector must meet the following requirements.

Unit shall be a three terminal device capable of protecting the detector against differential (between the loop leads) surge, and against common mode (between leads and ground) surges.

Unit shall be of the inductive type with a maximum DC resistance of 150 m Ω .

Unit inductance shall be able to protect the detector electronics when the detector is subjected to a 400 A surge across the detector leads.

Unit shall be a two-stage device.

Unit shall clamp a 250 A surge to 25 V within 40 nanoseconds. Surge shall be applied between the two detector leads.

Unit shall clamp a 250 A COMMON mode (between leads and ground) surge to 35 V. These do not include protector lead IR drop.

Unit shall withstand repeated surges.

Unit and loop terminals to be physically mounted approximately 6 inches from bottom of cabinet.

(g) WIRING DIAGRAM.

Two copies of cabinet wiring diagram shall be supplied as well as copies of the following:

Controller circuit diagrams and schematics; Controller Operations Manual;

Conflict Monitor diagrams and schematics.

Flasher diagrams and schematics;

Load Relay diagrams and schematics;

- Diagrams and schematics of any external hardware supplied;
- Template of Base Mounting if base mounted.

Cabinet prints shall include flash color change instructions for all phases and all overlaps.

Cabinet prints shall be keyed to show every input and every output from every terminal. If prints use multiple ground and neutral busses, busses shall be numbered. All grounds and neutrals shall be keyed to the busses that they are connected to. Cabinet prints shall show every connector. Cabinet shall have all Load Switch and Relay bays populated with equipment intended for its purpose.



PROCUREMENT DEPARTMENT

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