

**SHELBY COUNTY, TENNESSEE
SPECIAL PROVISION J
UTILITY CABINET**

I. Description

This section specifies the minimum requirements for equipment cabinets furnished and installed on this project as shown in the Plans. The cabinet will provide a protective outdoor housing enclosure in which to install field hardware required for ITS devices to communicate with the TOC. Major elements of the equipment cabinet include the cabinet housing and equipment mounting hardware, interior wiring and termination facilities, power supplies, electrical accessories, and field installation.

II. Materials

A. General

- 1) Furnish only new equipment and materials.
- 2) Furnish equipment cabinets and integral materials recommended by the manufacturers for outside plant use and the intended application. This requirement includes wiring and electrical materials and configurations (including connector pin-outs) that are wholly or partially related to the field device applications (Solar School Flashers, Radar Detection Systems (RDS), etc.).
- 3) Furnish and configure equipment cabinets to be installed at locations as shown in the Plans. Furnish and configure all equipment and materials for each specific location as shown in the Plans.
- 4) Provide electrical system and components with UL-listings.
- 5) Unless otherwise specified, provide wire and cable with stranded copper conductors, 75°/90° Celsius wet/dry rated insulation, and sized for the maximum voltage and current in the circuit.
- 6) Terminal blocks and component terminals shall be nickel-plated copper, copper alloy, or brass.
- 7) Terminal blocks shall have voltage and current ratings greater than the ratings of the wires that are terminated, be able to terminate wires from #8 AWG to #4 AWG wiring, and shall be assembled into housing enclosures such that all exposed surfaces are touch-safe. Conductor fastening screws shall be captive. Terminal block housings shall be colored as follows:
 - a) 120 VAC line/hot: black
 - b) 120 VAC neutral: white
 - c) 24 VDC positive: red
 - d) TCP/IP Ethernet communications: blue
 - e) Ground: green or green/yellow
- 8) Provide door locks for all cabinet doors. Provide one key with each cabinet.
- 9) Fans and Ventilation (For Primary RDS Cabinet (Type A) Only).
 - a) All primary RDS cabinets (Type A) shall be furnished with a thermostatically operated roof-mounted electric exhaust fan. All cabinets shall have fans rates at 200 cubic feet per minute at 100 degrees F. The fan shall be equipped with long-lasting permanently lubricated bearings for constant unattended operation. The exhaust fan shall be mounted

in a rain-tight housing attached to the cabinet top. The thermostat shall have an adjustable turn on at temperatures ranging from 70 to 160 degrees F.

- b) In all primary RDS cabinets (Type A), the inlet ventilation openings shall be located in the lower part of the cabinet door, shall be screened and fitted with a fiberglass, furnace-type replaceable air filter of adequate size and capacity to pass a volume of air equal to or greater than the rated capacity of the fan. The air filter supplied shall be a type and size which is readily available commercially.
- 10) Provide cabinet ID labels on all cabinets inside and outside. Labels shall meet the following minimum requirements:
- a) Labels shall be flat black lettering on a white background. Lettering shall be a minimum of 1/2 inch in height for inside the cabinet door, and 1 inch in height for outside the cabinet door.
 - b) Labels shall be manufactured from pre-coated adhesive backed reflective sheeting material meeting the minimum requirements of AASHTO M268 Type 1.
 - c) The cabinet ID labels shall be one continuous adhesive sheet. Contact City of Memphis Traffic Signal Maintenance Department for cabinet ID and wording.
 - d) Inside the cabinet, cabinet ID sticker shall be installed on the inside of the cabinet door. The cabinet ID sticker shall be printed on labeling tape using labeling machine.
 - e) Outside the cabinet, the Contractor shall use pre-made mailbox letters/numbers. The cabinet ID sticker shall be installed on the outside, lower-left corner of the cabinet door.
- 11) Provide a voltage label on all cabinets or enclosures in accordance with the NEC labeling requirements. Voltage labels shall meet the following minimum requirements:
- a) Labels shall be flat black lettering on a reflective yellow background. Lettering shall be a minimum of 1 inch in height.
 - b) Labels shall be manufactured from pre-coated adhesive backed reflective sheeting material meeting the minimum requirements of AASHTO M268 Type 1.
 - c) Labels shall include the voltages entering the cabinet and shall be one continuous adhesive sheet. Examples are "120VAC" or "24VDC".
 - d) Labels shall be installed on all cabinet doors.

B. Cabinet

- 1) Cabinets will be used to support RDS units and be of a battery compartment design. The primary RDS cabinet (Type A) shall have one center mount shelf.
- 2) Provide a cabinet intended for outdoor use with a minimum NEMA 3R rating.
- 3) The cabinet enclosure shall be manufactured from 0.125-inch aluminum.
- 4) The primary RDS cabinet (Type A) shall provide a minimum of one ventilation louver on at least two sides. Any louver opening greater than 3/16 inch in any dimension shall be screened to prevent insect entry.

- 5) The cabinet shall be intended for strapped pole-mounting; provide all mounting hardware necessary including 1/2-inch stainless steel mounting straps.
- 6) For primary RDS cabinet (Type A), provide a cabinet enclosure with a maximum dimension of 36 inches (H) by 20 inches (W) by 15 inches (D) and a minimum dimension of 30 inches (H) by 18 inches (W) by 15 inches (D).
- 7) Cabinet door shall reveal the entire front opening of the cabinet for accessibility. The hinge shall be a piano hinge with stainless steel pin and installed on the right side of cabinet.
- 8) Include a single-piece 0.125-inch aluminum back panel covering no less than 90% of the cabinet back wall. Back panel shall be affixed to the enclosure with threaded fasteners and shall be removable from the enclosure with hand tools only and without requirement to remove the cabinet door, mounting straps, or any other components other than communications or device wiring.
- 9) Provide on the back panel a grounding lug capable of terminating #6 AWG wire and directly bonded to the back panel.
- 10) All cabinets supporting RDS units shall be identical in manufacture and assembly regardless of the number of RDS units shown in the Plans at a specific location.
- 11) All cabinets supporting RDS units shall provide a remote RDS communications wiring module that includes the following:
 - a) Component installed on the center mount cabinet shelf (for primary RDS cabinet (Type A) only)
 - b) Strain relief brackets for the RDS cable(s) and the RDS unit harness cables
 - c) Parallel-connection single-stage surge suppressors for the RS-232/CAT5 data signal for the RDS units with integral or separate terminals for a minimum of three RDS cables and connection wiring to the RDS local/remote communications disconnect module.
 - d) Parallel-connection zero-power dissipation surge suppressor for the 12-24VDC power supply for the RDS units with integral or separate terminals for a minimum of three RDS cables and two RDS unit harness cables.
 - e) Local/remote communications disconnect module for the RS-232 data signal that includes the following:
 - i) Terminal facilities for one remote RDS cable connection from the surge suppressor, bus-connected to two separate local/remote disconnect switches, one for each RDS unit that simultaneously makes/breaks all of the RS-232/CAT5 signal lines for a given RDS unit.
 - ii) Separate terminal facilities for each of the RDS unit harness cables on the local side of the local/remote disconnect switch.
 - iii) Separate DB9 connectors with gold-plated pins/sockets and shell for each of the RDS units, bus-connected with the RDS unit harness cable terminals on the local side of the local/remote disconnect switches. Provide protective covers for DB9 connectors.
 - iv) Provision for installing RS-232/CAT5 terminating resistors on the terminals on the remote side of the local/remote disconnect switch. Provide terminating resistors at cabinet locations in accordance with the RDS manufacturer's recommendations.

- v) Alternately, provide two separate local/remote communications disconnect modules, one per RDS unit, with jumper wiring between the remote side terminals of the two modules.
- f) Connection/jumper wiring between the surge suppressors and the local/remote communications disconnect module(s) shall be of the same conductor size, type, and insulation color as in the RDS cable.

III. Installation Requirements

A. General

- 1) Install and configure cabinets as shown in the Plans, including installations and dimensions given for pole-mounting in relationship to the surrounding grade.
- 2) Bond all cabinets to the pole grounding lug with minimum #6 AWG stranded copper bare or green-insulated cabinet grounding wire.
- 3) Do not install electrical service or electronic devices in the cabinet or connect to the cabinet until ground testing for the pole or structure has been successfully completed and accepted, and the cabinet ground connection has been installed.
- 4) Drill a 2 inch hole in the new metal pole a minimum of 6 inches below the bottom of the pole mounted cabinet. Install a flexible 2 inch conduit run from the hole into the base of the cabinet. The flexible 2 inch conduit is to be installed at a radius that accommodates a minimum 6 strand fiber optic cable. A grommet or similar finishing is to be installed around the 2 inch hole to create a weatherproof seal between the conduit and the pole.

B. Project Testing

- 1) General Requirements
 - a) The Contractor shall conduct a project testing program for all equipment cabinets. The project testing program for equipment cabinets shall include but is not limited to, the additional specific requirements in this subsection.
 - b) All test results shall confirm physical and performance compliance with this TSP.
 - c) Submit all test results documentation to the Engineer within 14 days of completion of the tests. The Engineer will review test documentation in accordance with the Submittal Review Process.
- 2) Standalone Acceptance Test (SAT)
 - a) Perform a SAT on all equipment cabinets on this project after field installation is complete, including, but not limited to, all field devices to be installed in or connected to that given cabinet.
 - b) A SAT for a given equipment cabinet shall only be performed in conjunction with the SAT for all devices installed in or connected to that given cabinet.
 - i) Visual inspection of installation.
 - ii) Inspection of cabinet documentation.
 - iii) Functional test of all cabinet equipment, including circuit breaker, receptacles, fan and thermostat, and lights and door switches.
 - iv) Measurement of DC power supply operating under full load.

IV. Measurement

Cabinets will be measured in units of each and paid for at the contract price per each. The price bid shall include furnishing and installing the equipment cabinet and all related material and equipment specified in the Plans and this TSP, and all labor, system integration, testing, system documentation and miscellaneous materials necessary for a complete and accepted installation. The unit price shall also include but is not limited to, the cabinet and all interior materials, mounting hardware foundations, protection bollards, external conduit entrances including conduit bodies and nipples, electrical service and pole grounding terminations. This price shall be full compensation for all labor, tools, materials, equipment and incidentals necessary to complete the work.

V. Payment

The contract unit price shall be full compensation for all work specified in this section.

Payment will be made under:

Item Number	Description	Unit
725-24.01	Cabinet (Type A)	EACH
725-24.04	Cabinet (Type D)	EACH

Equipment Cabinet will be paid per each as follows:

- 1) 70% of the contract unit price for complete installation of equipment cabinet and all interior components, electrical service feed (activated), interior cabinet components, all conduit entrances, grounding connection, and testing.
- 2) Additional 20% of the contract unit price for completion of Stand Alone Site Test of all field devices housed or connected to the equipment cabinet.
- 3) Final 10% of the contract unit price upon Final System Acceptance.