

TEXAS DEPARTMENT OF TRANSPORTATION  
DEPARTMENTAL SPECIFICATION  
TPP 122104  
BASE MOUNTED TRAFFIC DATA COLLECTION CABINET

1.0 SCOPE

This specification sets forth the minimum requirements for a base mounted traffic data collection cabinet to be used by the Transportation Planning and Programming Division (TPP) of the Texas Department of Transportation (TxDOT).

2.0 CABINET ASSEMBLY

This specification describes the minimum acceptable requirements for a cabinet assembly to house traffic data collection equipment and associated peripherals.

2.1 Cabinet Design Requirements

- 2.1.1 The cabinet shall be constructed using unpainted sheet aluminum with a minimum thickness of 0.125 inches. No wood, wood fiber products, or other flammable materials shall be used in the cabinet. All welds shall be neat and of uniform consistency.
- 2.1.2 The size of the cabinet shall be size 5 or size 6, as noted below and defined by Paragraph 7.3 of the National Electrical Manufacturer's Association (NEMA) Standard Publication TS-2-1998.

<b>Cabinet Option</b>	<b>Size</b>	<b>Width</b>	<b>Height</b>	<b>Depth</b>
Option 1	5	30 inches	48 inches	16 inches
Option 2	6	44 inches	52 inches	24 inches

Tolerance on all dimensions is +10% / -0%. These are outside dimensions exclusive of hinges, handle, overhangs, vents, and adapters. Cabinet heights are measured to the lowest point of the top surface of the cabinet.

- 2.1.3 The cabinet shall be manufactured so as to prevent the accumulation of water on its top surface.
- 2.1.4 Vertical shelf support channels shall be provided to permit adjustment of shelf location in the field. The channels shall have a single continuous slot to allow shelves to be placed at any height within the cabinet. Channels with fixed notches or holes are not acceptable.

- 2.1.5 Each cabinet shall be equipped with an extra set of unistrut channels or a keyhole panel on either side of the front section of the cabinet to permit the purchaser to mount additional equipment as necessary.
- 2.1.6 Each cabinet shall be equipped with two shelves. The shelves shall be at least 13 inches deep and be located in the cabinet to provide at least 0.50 inch clearance between the back of the shelf and the back of the cabinet.
- 2.1.7 A 1.5 inch drawer shall be provided in the cabinet, mounted directly beneath the upper support shelf. The drawer shall have a hinged top cover and shall be capable of storing documents and miscellaneous equipment. This drawer shall support up to 10 lbs. in weight when fully extended. The drawer shall open and close smoothly. Drawer dimensions shall make maximum use of available depth offered by the upper support shelf and be a minimum of 23.6 inches.
- 2.1.8 The cabinet shall be vented and cooled by two thermostatically controlled fans. The fans shall be a commercially available model with a capacity of at least 95 cubic feet per minute. The thermostats shall be adjustable over the range of 91°F to 113°F with a differential of not more than 11°F between automatic turn-on and turn-off.
- 2.1.9 The cabinet shall be provided with a unique five digit serial number which shall be stamped directly on the cabinet or engraved on a metal or metalized Mylar plate, epoxied or riveted with aluminum rivets to the cabinet. The digits shall be at least 0.2 inches in height and located on the upper right sidewall of the cabinet near the front.

## 2.2 Cabinet Door

- 2.2.1 The cabinet shall be provided with one door in front that will provide access to the cabinet. The door shall be provided with three hinges with non-removable stainless steel pins, or a full-length piano hinge with stainless steel pins spot welded at the top of the hinge. The hinge(s) shall be mounted so that it is not possible to remove it (them) from the door or cabinet without first opening the door. The bottom of the door opening shall extend at least to the bottom level of the sensor and communication panel. The door and hinge(s) shall be braced to withstand 15 lbs. per square foot applied uniformly over the outer edge of the door standing open. There shall be no permanent deformation or impairment of the door or the cabinet body when the load is removed.

- 2.2.2 The cabinet door shall be provided with a door stop that holds the door open at the 90° ( $\pm 10^\circ$ ) and 180° ( $\pm 10^\circ$ ) positions. A means shall be provided to minimize the accidental release of the door stop.
- 2.2.3 The main door opening of all cabinets shall be at least 80 percent of the area of the side with the door closes, exclusive of the area for plenums.
- 2.2.4 The cabinet door shall be fitted with a Number 2 Corbin lock and cast aluminum or chrome plated steel handle with a 0.63 inch (minimum) shaft (or equivalent cross-sectional area for a square shaft) and a three-point latch. The lock and latch design shall be such that the handle cannot be released until the lock is released. One key shall be provided for each cabinet.
- 2.2.5 A gasket material shall be of a nonabsorbent material and shall maintain its resiliency after long term exposure to the outdoor environments. Gaskets shall be attached with a permanent adhesive bond. The gasket shall have a minimum thickness of 0.25 inch and be located in a channel provided on the cabinet or on the door(s). An "L" bracket is acceptable in lieu of this channel if the gasket is fitted snugly against the bracket to insure a uniform dust and weather resistant seal around the entire door facing. Any other method is subject to written purchaser approval during inspection of an order.
- 2.2.6 The main door handle shall rotate from the locked position such that the handle does not extend beyond the perimeter of the main door at any time. The operation of the handle shall not interfere with the key or other cabinet mechanism or projection.
- 2.2.7 The intake for the vent system shall be filtered with a permanent air filter. The minimum filter dimensions shall be 16 inches wide by 12 inches high x 1 inch depth. The filter shall be securely mounted so that any air entering the cabinet must pass through the filter. The cabinet opening for intake of air shall be large enough to use the entire filter. The air intake and exhaust vent shall be screened to prevent entry of insects. The screen shall have openings no larger than 0.0125 square inches. The total free air opening of the exhaust vent shall be large enough to prevent excessive backpressure on the fans.

## 2.3 Wiring

- 2.3.1 All wiring within the cabinet shall be neat and routed such that opening and closing the door or raising or lowering the sensor and communication panel, if it is hinged, will not twist or crimp the wiring. All wiring harnesses shall be braided, sheathed in nylon mesh sleeving, or made of PVC or polyethylene insulated jacketed cable only.
- 2.3.2 Size
  - 2.3.2.1 All conductors between the main power circuit breakers and any suppression or filtering device shall be a minimum size 10 AWG stranded copper. All AC services lines shall be of sufficient size to carry the maximum current of the circuit or circuits that are provided for. Minimum cabinet conductor size shall be 22 AWG stranded copper. All wiring and insulation shall be rated for 600 volts or greater.
  - 2.3.2.2 Conductors for AC common shall be white. Conductors for equipment grounding shall be green. All other conductors shall be a color different than the foregoing.
- 2.3.3 A barrier terminal block with a minimum of three compression fitting terminals designed to accept up to a #4 AWG stranded wire shall be provided for connection of the AC power lines. The block shall be rated at 50 amperes and shall have double 10-32 x 5/16 inch binder head screw terminals or larger.
- 2.3.4 All terminals shall be permanently identified in accordance with the cabinet wiring diagram. Where through-panel solder lugs or other suitable connectors are used, both sides of the panel shall have the terminal properly identified. Identification shall be permanently attached and as close to the terminal strip as possible and shall not be affixed to any part which is easily removable.
- 2.3.5 A copper ground bus bar shall be provided for the chassis ground. The bus bar must provide a minimum of ten unused terminals with 8-32 x 5/16 inch or larger screws.
- 2.3.6 A 20 ampere thermal type circuit breaker shall be mounted and wired in the cabinet. The 20 ampere breaker shall protect all equipment installed in the cabinet. The breaker shall be Square "D" QUO 150 Series or equivalent.

- 2.3.7 The circuit breaker shall be equipped with solderless connectors and installed on the right side wall (facing the cabinet). The breaker shall be easily accessible and shall be positioned so that the rating markings are visible.
- 2.3.8 A Ground Fault Circuit Interruption (GFCI) type duplex receptacle shall be mounted and wired in the lower right side wall of the cabinet. An additional GFCI type duplex receptacle and two duplex receptacles shall be mounted and wired in conjunction with the sensor and communication panel.
- 2.3.9 The two GFCI duplex receptacles shall be a neutral color. The two duplex receptacles shall be an orange color.
- 2.3.10 The cabinet shall include a pluggable surge protection unit on the AC service input that meets or exceeds the following requirement: (EDCO SHA-1250 or equivalent utilizing 12 pin and 2 guide pins Beau connectors). The surge arrestor shall be a multi-stage series hybrid type power line surge device. The surge arrestor shall be installed between the applied line voltage and earth ground. The unit shall have 2 LED indicators for operational display status. The surge arrestor shall be capable of reducing the effect of lightning transient voltages applies to the AC line and provide filtering that conforms to 50 kHz with a minimum insertion loss of 50 dB. The arrestor shall conform to the following:
  - 2.3.10.1 Peak surge current for an 8 X 20 microsecond waveform; 20,000 A for 20 occurrences.
  - 2.3.10.2 Clamp voltage at 20,000 A; 280 V max.
  - 2.3.10.3 Maximum continuous operating current at 120 V/60 Hz: 15 A
  - 2.3.10.4 Series Inductance: AC Line/AC Neutral – greater than 20 mH typical.
  - 2.3.10.5 Response time: (< a nanosecond) Voltage never exceeds 280V during surge.
  - 2.3.10.6 Temperature range: -40 to +85 degrees Celsius
  - 2.3.10.7 Spike suppression for +/- 700V spike: +/- 40 V deviation from sine wave all phase angles between 0 and 180 degrees.
  - 2.3.10.8 The arrestor shall have the following terminals:
    - 2.3.10.8.1 Main Line (AC line first stage terminal)
    - 2.3.10.8.2 Main Neutral (AC neutral input terminal)
    - 2.3.10.8.3 Equipment Line In (AC line second stage input terminal, 10A)
    - 2.3.10.8.4 Equipment Line Out (AC line second stage output terminal, 10A)

- 2.3.10.8.5 Equipment neutral out (neutral terminal to protected equipment)
- 2.3.10.8.6 Ground (GND) (earth connection).
- 2.3.10.9 The arrestor shall be encapsulated in a flame-retardant material.
- 2.3.10.10 The equipment line out shall provide power to the two orange-colored duplex receptacles.
  
- 2.3.11 The suppressor ground connection shall be connected to the cabinet by means of a short, copper ground strap, which shall be bonded to the cabinet.
  
- 2.3.12 The suppressor shall be connected to the line filter as recommended by the manufacturer. Number 10 AWG or larger wire shall be used for connections to the suppressor and line filter.
  
- 2.3.13 A fluorescent light, with switch and rapid start ballast, shall be installed in the cabinet. This light shall turn on when the cabinet door is opened, and turn off when the cabinet door is closed. A metal-oxide varistor (MOV) or other such transient suppression device shall be placed across the AC power input to the light.
  
- 2.3.14 A radio frequency interference (RFI) suppressor shall be provided and installed on the load side of the circuit breaker and shall be protected by the surge protector. This filter shall be rated a minimum of 20 amperes and shall provide a minimum attenuation of 50 decibels over the frequency range of 200 kilohertz to 75 megahertz.
  
- 2.3.15 Except where soldered, all wires shall be provided with lugs or other approved terminal fittings for attachment to binding posts. Insulation parts and wire insulation shall be insulated for a minimum of 600 volts.
  
- 2.3.16 All exposed AC wiring points, including the RFI filter and surge suppressor shall be covered with a clear non-conductive plastic cover to prevent accidental contact. Wiring at terminal strips is exempt from this requirement.

## 2.4 Sensor and Communication Panel

- 2.4.1 The cabinet shall have a sensor and communication panel mounted and wired in the bottom rear of the cabinet. This panel shall provide for all connections between loops at the street and traffic data collection device(s) as well as all interface circuits and wiring for communication functions. Removal of this panel shall be possible using simple tools.
- 2.4.2 The chassis ground shall be bussed to a common point and wired to the sensor and communication panel.
- 2.4.3 The logic ground shall be bussed to a common point and wired to the sensor and communication panel.
- 2.4.4 The sensor and communication panel shall provide all connections between the detector loops and the detector amplifiers.
- 2.4.5 The panel shall be constructed of 0.125 inch aluminum.
- 2.4.6 The panel shall contain a 3.0 inch horizontal slot in each corner to accommodate 0.25 inch mounting bolts.
- 2.4.7 All inputs from the loops shall be brought through posted 10-32 x 5/16 inch binder screw terminals.
- 2.4.8 Each loop input pair (total of sixteen) shall be protected by lightning surge suppressors prequalified for use on a loop detector input by the Traffic Operations Division, Signal Operations. The suppressors shall be removable and shall be mounted on the front of the sensor and communication panel.
- 2.4.9 The panel shall provide the following connection points as a minimum:

<b>Connection Point</b>	<b>Number of Connection Points</b>
Loop Inputs	32 – (16 loop pairs)
Other Inputs	32
Logic Ground	4
Chassis Ground Bus	1 Bus

- 2.4.10 A chassis ground bus bar shall be provided on the panel and connected to the cabinet by an insulated copper ground strap which shall be bonded to the cabinet.

2.4.11 Two RJ-11 telephone jack connections for two shielded twisted pair communication lines shall be provided with a coordinated four stage electrical protection; including primary overvoltage protection, resettable overcurrent protection, secondary clamping voltage protection, and fast transient filtering. The secondary overvoltage stage shall allow peak voltage of no more than 250 volts. The fast transient filtering stage shall provide no less than 40 dB/decade of attenuation to transients above the required pass band. The four stage protection shall be provided in an integrated closure with input/output terminations and ground connection.

2.4.12 The configuration for the sensor and communication panel shall be approved by the Transportation Planning and Programming Division.

### 3.0 DOCUMENTATION

Each cabinet shall be provided with the following documentation:

- a. One complete, accurate, and fully legible diagram and once schematic for every electronic device. This shall include but not be limited to cabinet wiring, power panel, and sensor and communication panel.
- b. Complete parts list including names of vendors for parts not identified by universal part numbers such as JEDEC, RETMA, or EIA.
- c. Manufacturer's specifications for cooling fans which include the fans flow capacity.

### 4.0 BID REQUIREMENTS

4.1 The supplier's facilities shall be of sufficient size and staffing that all warranty repairs to the cabinet assembly provided can be made on a timely basis. Timely return of equipment is interpreted as a period of time no longer than 18 calendar days from the date of receipt by the supplier to the return receipt of the equipment at the specified location. This requirement may be met by field service. Failure to meet these requirements may result in rejection of future bids.

4.2 The traffic data collection cabinet shall be delivered on 4 inch by 4 inch runners covered with 0.5 inch plywood to facilitate handling. Runners consisting of 2 inch stacked boards are not acceptable.

4.3 A pre-shipment sample of the Option 1 – Size 5 cabinet shall be provided to the Transportation Planning and Programming Division for approval.