

MICHIGAN
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION
FOR
**UNINTERRUPTIBLE POWER SUPPLY FOR INTELLIGENT TRANSPORTATION
SYSTEMS**

ITS:EG

1 of 4

APPR:MDW:JVG:04-17-20
FHWA:APPR:04-23-20

a. Description. This work consists of one or more of the following:

1. Furnish and install a rack-mounted, uninterruptible power supply (UPS) in an ITS cabinet or indoor location and connection to the power supply and equipment within the ITS cabinet or rack;
2. Remove and salvage a UPS and all required mounting hardware, power supply, cables, patch cords, and jumpers;
3. Install a salvaged UPS and all required mounting hardware, power supply, cables, patch cords, and jumpers.

b. Materials.

1. Uninterruptible Power Supply.

A. Provide a UPS that meets the following environmental requirements:

- (1) Operating temperature range of -29 degrees Fahrenheit (F) to 165 degrees F for ITS cabinets and Environmental Sensor Stations (ESS);
- (2) Operating temperature range of 32 degrees F to 104 degrees F for indoor racks;
- (3) Non-condensing operating humidity range of 5 percent to 90 percent.

B. Provide a rack-mounted, line-interactive UPS with an input voltage of 120 volts alternating current (VAC) and an output voltage of 120VAC.

C. Provide a UPS with minimum output power capacity of 1000 watts (W).

D. Provide a UPS with an auto-bypass feature and a serial interface port for local management.

E. Provide a UPS with at least eight protected outlets.

F. Provide a UPS with automatic low-battery and high temperature shutdown features. Ensure the UPS will return to normal operations without a manual reset.

G. Provide a UPS capable of remote management over an Ethernet/Internet Protocol (IP) network via Simple Network Management Protocol (SNMP). The UPS will be configurable to report failure of line power, high temperature, failures of the battery system, and overloads.

2. Batteries.

A. Provide batteries capable of discharging and charging over the following temperature ranges:

(1) -29 degrees F to 140 degrees F for ITS cabinets and ESS. The charging temperature range will be at least 0 degrees F to +140 degrees F, using a charger with temperature compensation.

(2) 32 degrees F to 104 degrees F for indoor racks. The charging temperature range will be at least that of the battery operating temperature.

B. Include connectors and cables recommended by the battery manufacturer and compliant with the *NEC*. Ensure the batteries are capable of being serviced and replaced separately from the main UPS.

(1) Size batteries to be capable of running the full anticipated load for 15 minutes for ITS cabinets and indoor racks.

(2) Size batteries to be capable of running the full anticipated load for 4 hours for ESS sites.

3. Battery Heater.

A. Provide a heater and thermostat at each ESS location. Place the heater inside of the ITS cabinet.

B. Provide a heater that does not consume more than 100W.

C. Provide silicone rubber or polyester type heaters to provide controlled heat to the UPS batteries.

D. Include a thermostat to automatically adjust the heater temperature to avoid overheating of the equipment.

E. The heater is included in the Uninterruptible Power Supply, Environmental Sensor Stations pay item and will not be paid for separately.

c. Construction.

1. Mount the UPS in the cabinet.

2. Connect the UPS to the UPS breaker inside the ITS cabinet.

3. Ensure that the UPS inside the ITS cabinet or proposed shelter is labeled to clearly identify which circuits/devices it backs up.

4. Label all service disconnects in accordance with *NEC 702.8* to provide proper notification to maintenance personnel that a standby (UPS) is being used.

5. Warranty. Provide a UPS with a standard manufacturer's warranty, transferable to MDOT. The UPS must carry a warranty (parts, software and labor) of 2 years from the date of shipment with at least 1 year of warranty remaining at the start of burn-in. Furnish warranty and other applicable documents from the manufacturer, and a copy of the invoice showing the date of shipment, to the Engineer prior to final written acceptance.

6. Remove. If UPS removal is specified in the contract, the following procedures apply:

A. Do not damage the ITS cabinet or associated equipment.

B. Remove the UPS, mounting hardware, power supply, and power cabling associated with the UPS. Disconnect all communication cables from the UPS. The equipment will remain the property of the Contractor.

C. Notify the Transportation Operations Center (TOC) and the Engineer a minimum of 7 days in advance of decommissioning the UPS hardware.

7. Remove and Salvage. If UPS removal and salvage is specified in the contract, the following procedures apply:

A. Do not damage the ITS cabinet or associated equipment.

B. Remove the UPS, mounting hardware, power supply, and power cabling associated with the UPS. Disconnect all communication cables from the UPS and leave them in place unless otherwise directed by the Engineer.

C. Notify the Transportation Operations Center (TOC) and the Engineer a minimum of 7 days in advance of decommissioning the UPS hardware.

D. Salvage the UPS, including mounting hardware, power supply, surge protectors (if any) and cabling, as directed by the Engineer. The salvaged equipment is to be stored at a location free of moisture, and rodent/insect intrusion. If the UPS is to be reinstalled it must be stored until then, otherwise notify the Engineer once the equipment has been salvaged for pickup to be arranged.

8. Install Salvaged. If a salvaged UPS is to be installed at a location specified in the contract, follow the procedures detailed in section c of this special provision.

d. Measurement and Payment. The completed work, as described, will be measured and paid for at the contract unit price using the following pay items:

Pay Item	Pay Unit
Uninterruptible Power Supply, ITS Cabinet.....	Each
Uninterruptible Power Supply, Indoor	Each
Uninterruptible Power Supply, ESS	Each
Uninterruptible Power Supply, Rem.....	Each

Uninterruptible Power Supply, Rem and Salv	Each
Uninterruptible Power Supply, Install Salv	Each