

MICHIGAN
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION
FOR
GLOBAL POSITIONING SYSTEM TIME SYNCHRONIZATION MODULE

SIG:EMS

1 of 3

APPR:HLO:NJB:05-09-24
FHWA:APPR:06-04-24

a. Description. This work consists of completing one or more of the following work types at locations shown on the plans:

1. Furnishing and installing a GPS time synchronization module.
2. Removing and disposing of an existing GPS time synchronization module.
3. Removing, storing, and reinstalling an existing GPS time synchronization module.

As applicable, this work includes installing or removing a GPS time synchronization module, with integrated antenna, wiring, terminal compartment, brackets, mounting hardware, conduit, cable to controller, connectors, and associated hardware required to ensure a complete removal or installation, as specified for a location. Storage and disposal of materials, when required, is also included in this item.

b. Material. Furnish material in accordance with sections 918 and 921 of the Standard Specifications of Construction and this special provision.

1. Global positioning system time synchronization module.
 - A. Furnish a GPS time synchronization module from the following list.
 - (1) Garmin GPS 16x
 - (2) RTC TR-4
2. Furnish a GPS time synchronization module meeting the following general requirements:
 - A. Furnish an accurate time reference system that can be either interfaced with individual traffic signal controllers or attached to a central system;
 - B. Synchronize the traffic signal controller time to the GPS-acquired time at 2 second intervals, once the satellite lock has been established, and allow for continuous tracking of all visible satellites; and
 - C. Include an integrated antenna and appropriate interface hardware to draw power from the traffic signal control cabinet to communicate time and date information to the traffic signal controller.

3. The GPS module must meet the following mechanical requirements:
 - A. Be furnished in an enclosure suitable for outdoor installation and able to be mounted to a flat surface or on a pole located near the traffic signal control cabinet;
 - B. Be no greater than 2 inches high and 4 inches in diameter;
 - C. Include an optional mounting bracket, for use in mounting the module to a 3/4 inch conduit, that ensures an overall mounted module height of not more than 4 inches; and
 - D. Have an overall weight, including the GPS, enclosure and mounting bracket, but not including the cable, less than or equal to 8 ounces.
4. The GPS module must meet the following electrical requirements:
 - A. Operate on 8 to 40 VDC unregulated at no more than 60 milliampere (mA);
 - B. Have a minimum receiver sensitivity of 165 decibel watt (dBW);
 - C. Have an acquisition time, when cold, of not greater than 1 minute; and
 - D. Have an update rate of 1 to 900 seconds, programmable in 1-second increments.
 - E. Be supplied with at least 25 feet of foil shielded, number 8 conductor 28 AWG cable for communications and power;
5. The GPS module must meet the following interface requirements:
 - A. Furnish true recommended standard (RS)-232 output, asynchronous serial input compatible with RS-232 or transistor-transistor logic (TTL) voltage levels, RS-232 polarity;
 - B. Be equipped with an interface panel with terminal block, to terminate the cable from the GPS module cable, pre-wired with a 6 foot RS-232 cable that connects to the traffic signal controller and a second fused power cable.
 - C. Be equipped with a dust and moisture resistant aluminum terminal compartment.
6. The GPS module must meet the following environmental requirements:
 - A. Have an operational temperature range of -34 °F to +183 °F (-37 °C to +84 °C); and
 - B. Be rated waterproof at 3-foot submersion for 30 minutes.
7. Ensure the GPS module is delivered as follows:
 - A. Ensure each module is permanently and legibly marked with the vendor's name, trademark, or other suitable identification;
 - B. Ensure each module is individually packaged to prevent damage during transportation to the destination; and

C. Ensure each module package is legibly marked with a description of the contents, order number, and vendor's name.

8. Furnish a manufacturer's warranty, transferable to the Department or the local agency responsible for the project, that the supplied materials will be free from all defects in materials and workmanship. Furnish the warranty and other applicable documents from the manufacturer, and a copy of the invoice showing date of shipment, to the Engineer prior to acceptance.

c. Construction. Complete this work in accordance with sections 818 and 820 of the Standard Specifications for Construction, the contract, and this special provision. Store or dispose of removed material as directed by the Engineer in accordance with section 204 of the Standard Specifications for Construction.

1. Installation. When installing new equipment is specified, furnish, and install the GPS module as shown on the plans.

2. Removal. When removal is specified, remove the GPS module as shown on the plans. Removal includes the GPS module, antenna, wiring, terminal compartment, brackets, mounting hardware, conduit, cable to controller, connectors, and any other material required to ensure a complete removal.

3. Salvage. When salvage is specified, remove the GPS module and all materials required for a complete removal, store salvaged materials in a protected and clean environment, and reinstall the materials. Complete reinstallation as shown on the plans and in accordance with 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
Global Positioning System Module	Each
Global Positioning System Module, Rem	Each
Global Positioning System Module, Salv	Each

1. **Global Positioning System Module** includes furnishing and installing a new GPS module at a location shown on the plans.

2. **Global Positioning System Module, Rem** includes removing and disposing of an existing GPS module at a location shown on the plans.

3. **Global Positioning System Module, Salv** includes removing an existing GPS module, storing the removed materials on site, and reinstalling materials at a location shown on the plans.