

MICHIGAN
DEPARTMENT OF TRANSPORTATION
SPECIAL PROVISION
FOR
**NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION TYPE ADVANCED
TRANSPORTATION CONTROLLER**

SIG:HJK

1 of 4

APPR:EMS:NJB:03-25-26
FHWA:APPR:04-06-26

a. Description. This work consists of furnishing, delivering, and installing a traffic signal controller, *NEMA* Advanced Transportation Controller (ATC) type.

This work includes furnishing and delivering the controller to the maintaining agency for controller timing and setup. This work includes transporting the controller from the maintaining agency to the job site for installation. This work includes providing Management Information Bases (MIBs) required for a third-party software to integrate all controller functionality. This work includes installation of the traffic signal controller unit (CU) and accessories required to provide the traffic signal control operations as shown on the plans, in accordance with the *MMUTCD* and this special provision.

b. Material. Furnish materials meeting the requirements in sections 918 and 921 of the Standard Specifications for Construction and this special provision.

1. Controller Unit (CU).

A. Furnish a CU from the following list. Confirm the appropriate firmware version with the Engineer prior to ordering. No additional payment will be made based on the firmware version provided:

(1) Siemens M60 NEMA ATC running Siemen's SEPAC controller firmware over Linux using NTCIP communications. The firmware version will be 05.02.05 or the latest version as approved by the Engineer.

(2) Econolite Cobalt NEMA ATC running Econolite's EOS controller firmware over NTCIP communications. The firmware version will be 03.02.15 or the latest version as approved by the Engineer.

B. Furnish a CU with data key functionality for transferring timing programs. Include two data keys.

C. Furnish adapter cables as shown on the plans, if a CU is furnished that does not match the cabling in the existing cabinet, to allow the CU to operate in the cabinet without additional wiring changes in the cabinet.

D. Provide and make available to MDOT the MIBs in industry standard electronic and PDF formats, required for a third-party signal control software to provide all controller functionality via remote software application. Provide updated MIBs with each controller firmware update through the entire contract period and 1-year software warranty period. MDOT reserves the right to make the MIBs available to third-party

software developers contracted with the State of Michigan for custom integration of controller features.

E. Interface Standards. Ensure the CU provides an input-output interface that meets the following requirements.

(1) Ethernet Port. Ensure there is a built-in base-T Ethernet with registered jack (RJ)-45 connector on the controller front panel. Ensure there is a unique, built-in IP address for each controller.

(2) *NEMA* Port 1 synchronous data link (SDLC).

(a) Furnish a CU with a 15-pin connector to communicate to hardware devices within the cabinet.

(3) *NEMA* Port 2.

(a) Furnish a CU with a 25-pin connector compliant with the *Electronics Industry Association (EIA)-232* communications standard that serves two functions.

(b) Ensure Port 2 provides hardwired data communications to devices nearby such as laptop personal computers (PCs), personal digital assistants (PDA's), phone modems, or printers. Ensure communications baud rates are user selectable baud rates of 38,400 bits per second (bps) minimum.

(c) Ensure Port 2 also provides signals that implement the C50 function of the joint *NEMA/AASHTO/ITE* Specification of the ATC and is present on the secondary transmit and receive pins described in the *EIA-232* specification for a 25-pin connection.

(4) *NEMA* Port 3.

(a) Furnish a CU with an internal *NEMA* Port 3 communications port. This port must provide systems communications to on-street masters or central office computers. Ensure this port is addressable with user selectable baud rates of 38,400 bps minimum.

(b) Furnish a CU with a module that contains an additional 9-Pin recommended standard (RS)-232 port and a 25-Pin RS-232 port.

(c) Ensure the CU provides a data key receptacle to program and read serial data keys.

(d) Furnish a built in Universal Serial Bus (USB) 2.0 port that will enable data transfer used by the software application to another CU or local or central system database.

(e) Furnish an optional Port 3 fiber optic modem when called for on the plans.

(5) D Connector. Ensure there is a D connector on the front of the unit to provide

for additional input/output functions and for systems communications. Ensure these functions are manufacturer specified. Ensure a number of the input and output definitions are programmable in the CU. Ensure this connector provides the ability of the controller to be used in a systems environment.

(6) Signal Phasing and Timing (SPaT). Furnish a CU that is SPaT data compliant with the latest *NEMA Standards Publication TS 2-2016 - Traffic Controller Assemblies with NTCIP Requirements Version 03.07*, *NTCIP Standards 1201, 1202, 1211, and 1103*, *SAE J2735_201603*, and with the FHWA Connected vehicle programs. Ensure this data stream is accessible via the IP addressable Ethernet port and support at least two destination IP addresses.

(7) Furnish CU capable of outputting signal driver status on the SDLC communications bus without communication to the Malfunction Management Unit (MMU).

2. Packing and Marking. Ensure each CU is packed separately in such a manner that there will be no injury or defacement to the CU during transportation to the point of destination, unless otherwise specified in the contract. Ensure each carton is legibly marked with the CU description, purchase order number, and vendor's name.

3. Warranty. Provide a minimum manufacturer's or vendor's warranty of 1 year for CU software and 2 years for CU hardware beginning with the acceptance date for the traffic signal, transferable to MDOT. Furnish the warranty and other applicable documents from the manufacturer or vendor, and a copy of the invoice showing the date of shipment, to the Engineer prior to final written acceptance.

c. Construction. Complete this work in accordance with sections 818 and 820 of the Standard Specifications for Construction, as shown on the plans and as directed by the Engineer.

1. MIBs. Provide MIBs for approved controller firmware to MDOT in industry standard electronic and PDF unless otherwise indicated by the Engineer. If MIBs for proposed controller and hardware combination have been previously approved and received by MDOT, submit documentation of previous submittal for approval by the Engineer.

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
Controller, NEMA, ATC Type, M60	Each
Controller, NEMA, ATC Type, Cobalt	Each

1. **Controller, NEMA, ATC Type, M60** includes:

A. Installing a Siemens M60 NEMA ATC traffic signal CU, and accessories required to provide the traffic signal control operation as shown on the plans and in accordance with the *MMUTCD* and this special provision.

B. Furnishing and delivering the controller to the maintaining agency for controller

timing setup.

C. Transporting the controller from the maintaining agency to the job site for installation.

2. Controller, NEMA, ATC Type, Cobalt includes:

A. Installing an Econolite Cobalt NEMA ATC traffic signal CU, and accessories required to provide the traffic signal control operation as shown on the plans and in accordance with the *MMUTCD* and this special provision.

B. Furnishing and delivering the controller to the maintaining agency for controller timing setup.

C. Transporting the controller from the maintaining agency to the job site for installation.

The Engineer may process a partial payment for units delivered to MDOT signals shop or other approved location after initial inspection and acceptance and after the Contractor provides either a paid invoice/proof of payment or a receipt for delivery. If payment is based on the delivery invoice, the Contractor must provide a copy of the paid invoice/proof of payment to the supplier within 10 calendar days of the prime Contractor receiving payment for the materials. Partial payments for delivered materials/units meeting all project specifications will be limited to the smaller of the actual invoice amount or 96 percent of the contract bid amount. Final payment will be processed after final acceptance of the individual traffic signal installation.