MICHIGAN
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION
FOR
RADAR VEHICLE DETECTION EPIQ

SIG:HJK 1 of 5 APPR:HLO:EMS:11-21-25
FHWA:APPR:12-04-25

a. Description. This work consists of furnishing and installing a Radar Vehicle Detection Epiq (EPIQ) capable of providing vehicle presence, stop bar, and advance detection. The EPIQ must utilize a forward-fire frequency modulated continuous wave (FMCW) to detect and track vehicles at distances up to 900 feet for stop bar and advanced detection using a 110-degree field of view. The sensor system must use vehicle information from the radar sensors to provide detection for simultaneous stop bar presence detection and advanced detection. Each sensor must additionally include an integrated video camera for surveillance purposes only.

Furnish a radar vehicle detection device from the following list and install associated equipment:

1. Econolite EPIQ Radar sensor(s) and Econolite EPIQ Radar Hub.

2. Approved Equal (AE). Ensure the AE is evaluated, tested and approved per the MDOT New Traffic Signal Device Product Review Guidelines. The review time is not justification to delay the project.

b. Materials. Ensure the EPIQ system consists up to four radar sensors as shown on plans, equipped with a single detection processor unit capable of processing radar sensor data. Furnish materials in accordance with sections 918 and 921 of the Standard Specifications for Construction and this special provision.

1. Detection Processor Unit (DPU). Hardware Requirements.

A. Ensure the DPU can be shelf mounted within NEMA type signal cabinets.

B. Furnish four programmable logic controller (PLC) channels supporting up to eight PLC channel connections with two connectors per PLC channel.

C. Supply DPU with a quad-core 1.7 Gigahertz (GHz) processor and an additional 300 Megahertz (MHz) input/output (I/O) processor.

D. Furnish one 25 pin C12S connector compatible with NEMA type signal cabinets.

E. Supply the following interfaces:

(1) One local area network (LAN) Ethernet port that supports 10 Megabits per second (Mbps) and 100 Mbps transfer speeds.

(2) One wide area network (WAN) Ethernet port that supports 1 Gigabit per second (Gbps) transfer speeds.

(3) Two universal serial bus (USB) A 3.0 ports and one secure digital memory (SD) card port on the front of the unit.

(4) One micro-USB port for serial communication.

F. Furnish an LCD touchscreen display with a graphical interface on the front of the unit for configuration and status monitoring.

G. Ensure DPU has an operating voltage range between 85 VAC to 265 VAC.

H. Furnish 48 VDC and 12 VDC power supply that is built into the DPU.

I. Ensure DPU can operate in temperature ranges between -34 °F and +165 °F.

J. Comply with FCC Part 15 Subpart B, Class A regulations.

2. Radar Sensor. Hardware Requirements.

A. Establish detection range up to 900 feet to provide vehicle stop bar and advance detection.

B. Ensure sensor has a horizonal field of view angle of 110 degrees.

C. Ensure capability to track 128 objects from 512 unique detections.

D. Ensure the radar sensor detects vehicles in real time as they travel across each radar detection zone.

E. Ensure when mounted outdoors, the radar operates in a temperature range from -40 °F to +165 °F.

F. Ensure sensor operates between a range of 20 VDC to 28 VDC. Ensure power consumption of 38 Watts is typical.

G. Ensure sensor operates on K band frequencies 24.05 GHz to 24.25 GHz.

H. House the radar sensor in a weather-tight sealed enclosure in accordance with ingress protection 67 specifications. The housing must allow the radar to be adjusted to allow proper alignment between the sensor and the traveled road surface.

I. Furnish sensor with a built-in 1080p, 30 frames per second (FPS) camera with low-light sensitivity to be used for surveillance and visual validation only.

J. Certify compliance with FCC Part 15, ETSI EN 300-440, RSS-310, and RSS-210.

K. Ensure electromagnetic compatibly (EMC) with International Electrotechnical Commission (IEC) standards 61000 Parts 2, 4, and 5.

L. Provide 100Base-T Ethernet interface.

M. Establish communication and power for sensor with a single three-conductor cable.

N. Furnish termination of the three-conductor cable in each sensor. Attach each conductor to a phoenix plug via a screw connection.

O. Provide power line communication to sensor using common 14/2 cable up to 1000 feet.

3. Management Software.

A. Include management system software for detection configuration and operation.

B. Certify software is compatible with Windows 7 and Windows 10 operating systems (OS).

C. Ensure the software communicates with the detection system via Ethernet.

D. Allow pre-installation setup of an intersection through management software with the ability to download a satellite image to aid with intersection set-up.

E. Support up to 10 different conditional outputs per detection zone.

4. Warranty. Furnish materials with a manufacturer's warranty, transferable to the Department or the local agency responsible for the project, that the supplied materials are 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 the date of shipment, to the Engineer prior to acceptance.

c. Construction. Furnish and install a EPIQ as shown on the plans or as directed by the Engineer. Ensure that the EPIQ is installed as documented by installation materials provided by the manufacturer. Complete this work in accordance with sections 818 and 820 of the Standard Specifications for Construction and this special provision.

The recommended sensor installation height is between 17 and 24 feet above the roadway, or as otherwise specified on the plans, positioned on signal structures to optimize detection efficiency for vehicles on two approaches of the intersection. For optimum detection, ensure the sensor is mounted on signal structures in respective quadrants. Ensure sensor placement and field of vision are unobstructed and as noted in the installation documentation provided by the supplier.

When EPIQ system is called for, deliver all equipment internal to the controller cabinet to the MDOT Statewide Signal shop or to the inspecting agency for setup and installation in the controller cabinet.

Do not install the EPIQ equipment until all other signal equipment has been installed and inspected. Obtain the Engineer's approval prior to beginning installation. Correct sensor installation that was completed prior to the approval of the Engineer, and which is found to be non-optimal placement of the sensors at no additional cost to the contact. The Engineer will not authorize extra payment or time extensions for work required to reorient or move the sensor(s).

The supplier must provide a limited 3-year warranty on the EPIQ. During the warranty period, ensure technical support is available from the supplier via telephone within 4 hours of the time a call is made by a user, and this support is available from factory-certified personnel or factory-certified installers. During the warranty period, ensure updates to DPU software are available from the supplier without charge.

Acceptance for field staff will be based on:

1. Providing shop drawing submittal and approval prior to construction.

2. Furnishing devices tested and approved in accordance with the MDOT New Traffic Signal Device Product Review Guidelines.

3. Passing visual inspection during construction for proper materials and installation in accordance with sections 918 and 921 of the Standard Specifications for Construction, applicable special details, and 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**
Radar Vehicle Detection Epiq System	Each
Radar Vehicle Detection Epiq System, Rem	Each
Radar Vehicle Detection Epiq System, Salv	Each
Radar Vehicle Detection Epiq, Stop Bar and Advance Detection Sensor	Each
Radar Vehicle Detection Epiq, Stop Bar and Advance Detection Sensor, Rem	Each
Radar Vehicle Detection Epiq, Stop Bar and Advance Detection Sensor, Salv	Each

1. **Radar Vehicle Detection Epiq System** includes furnishing and installing the radar system, detection processor unit, cables, connectors, and other appurtenant material required to complete the work.

2. **Radar Vehicle Detection Epiq System, Rem** includes removing any previous detection processor unit, cables, connectors, and other appurtenant material.

3. **Radar Vehicle Detection Epiq System, Salv** includes removing, storing, and reinstalling an existing radar vehicle detection system, detection processor unit, cables, connectors, and other appurtenant material.

4. **Radar Vehicle Detection Epiq, Stop Bar and Advance Detection Sensor** includes furnishing and installing the radar sensor, enclosure, mounting bracket, hardware, cables, connectors, and other appurtenant material required to complete the work.

5. **Radar Vehicle Detection Epiq, Stop Bar and Advance Detection Sensor, Rem** includes removing previous detection sensor, mounting bracket, hardware, cables, connectors, and other appurtenant material. **Radar Vehicle Detection Epiq, Stop Bar and Advance Detection Sensor, Rem** also includes storage, as directed by the Engineer, or proper disposal of all removed materials.

6. **Radar Vehicle Detection Epiq, Stop Bar and Advance Detection Sensor, Salv**

includes removing, storing, and reinstalling an existing radar sensor, cables, connectors, mounting hardware, and other appurtenant material.