

MICHIGAN
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION
FOR
DYNAMIC LANE MERGE SYSTEM

C&T:JKG

1 of 4

C&T:APPR:JAR:BM:08-14-03

a. Description. The Contractor is to provide a **Dynamic Lane Merge System**, within the approach to a lane closure, to notify the motorists to merge as soon as possible, allowing a smooth flow of traffic. The Dynamic Lane Merge System shall consist of 5 Dynamic Lane Merge Trailers, a full matrix Portable Changeable Message Sign and various temporary mounted signs.

b. Materials. The **Dynamic Lane Merge Trailers** shall include the following components:

- 4 - Traffic Sensors
- Communication Devices
- 5 sets - Flashers
- Signs
- 5 -Trailers
- 5 sets - Solar Power Equipment and Batteries

1. Traffic Sensors - All electronic detectors shall be of the non-intrusive, "off-road" type. The sensors shall be true presence microwave radar technology. They shall be mounted on a trailer or cabinet and measure detector zone occupancy. The detectors shall be low power and powered (or recharged) from the sign unit's solar power unit. The sensors must detect at all vehicle travel speeds, including stationary, congested and fast moving vehicles. The traffic detection unit shall be unaffected by weather conditions. It shall be a multi-lane indicator for measurements of volume, occupancy and speed in up to 8 separate zones (lanes) and up to 200 ft away.

The sensors must operate in a minimum of the following:

- A. Environmental Conditions:
- | | |
|-----------------------------|---------------------------|
| Temperature | -35 to +165 F |
| Precipitation(rain or snow) | to 4 in/hr |
| Humidity | to 95% RH |
| Vibration | 2g up to 200 Hz |
| Shock | 5g 10m Sec half sine wave |
- B. Power Requirements:
- 12-24 Volt DC @6W
 - Power consumption between 6 and 8 watts

Automatic recovery from power failure within 5 seconds

- C. Interface
12V DC
Contact Closure
- D. Mechanical:
The unit shall be water-tight
Size: 6.3 x 9.5 x 4.7 in
Weight: 4.8 lb
- E. Maintainability:
Self-Test diagnostic Software
- F. Reliability:
MTBF (Mean Time Between Failures) designed for 90,000hrs (10 years)
- G. Accuracies and Ranges:
Single lane Occupancy (side-fired) 5% Error

2. **Communication Devices** - The communication component shall be wireless with a transmission range of not less than 5 miles. It must have average power consumption less than 200mA and use an unlicensed transmission band. It shall also have full duplex communication.

3. **Flashers** - The sign assembly shall incorporate strobe type flashing lights mounted at the same level, one on each side of the "DO NOT PASS" sign. The strobe lights shall feature unidirectional yellow or amber lenses with reflectors. The lights shall be visible through a range of 120 degrees when viewed facing the sign. The lights shall have a flash rate of 2 Hz. The lights shall operate on full battery power with a solar panel.

4. **Signs** - Signs on the trailers shall have Prismatic Retroreflective background sheeting. Each trailer shall have a:

- A. "DO NOT PASS", per MDOT Standard Sign Manual, R4-1, black letters and border on white, 48 inch X 60 inch
- B. "WHEN FLASHING", 6 inch Series C stacked letters, black letters and border on white, 48 inch X 24 inch
- C. ** "LEFT LANE" , 6 in Series C stacked letters, black letters and border on white, 48 inch X 24 inch
- D. ** "RIGHT LANE", 6 inch Series C stacked letters, black letters and border on white, 48 inch X 24 inch

**** NOTE:** only "LEFT LANE" or "RIGHT LANE" place on the trailer, one at a time.**

5. **Trailer** - Each trailer shall be designed for transporting and setting up the sign assembly in the field. The trailer shall have four adjustable jackstands. One shall be

mounted on each corner of the unit. The trailer shall be designed to be set up at the site with its on chassis and jackstands with the sign in a vertical 90 degree position in relation to the roadway. It shall remain in place in winds of 60mph. The trailer shall be equipped and shall be built to permit movement over the highway system in accordance with state laws pertaining to the operation of the trailer. The trailer shall be painted Federal orange.

6. Solar Power Equipment and Batteries - Solar Power charging system shall be capable of maintaining a charged battery level. A photo-controlled transfer relay for automatic lamp intensity may be used. During nighttime operation the lowest photo control setting shall not be less than 50 percent of full intensity.

The unit shall be equipped with a sign/solar panel lifting mechanism. The lifting mechanism shall be designed to safely carry the capacity of the sign assembly's load. The lifting mechanism shall incorporate a positive locking device to secure the panel in a raised or lowered position.

7. Additional Materials - To make to Dynamic Lane Merge System complete additional materials include:

Portable Changeable Message Sign, Modified shall be provided meeting the criteria spelled out in Standard Specifications for Construction, 922.05.C.. Also, the Portable Changeable Message Sign, Modified must have a full matrix board.

Other signs required are noted on the plans. Some of the specific signs include:

A. "DO NOT PASS", per MDOT Standard Sign Manual, R4-1, black letters and border on white, 48 inch X 60 inch

B. "FORM ONE LANE RIGHT", shall be similar to MDOT Standard Sign Manual, R4-5, four lines of legend, 8 in Series D stacked, black letters and border on white, 48 inch X 60 inch

c. Construction. The Dynamic Lane Merge System shall be placed in the configuration as detailed on the plans. If the system is to be placed on the right side of the road, place all devices shown in the diagram on the right side, rather than the left.

If any component of a Dynamic Lane Merge Trailer malfunctions in any way, the Contractor has 72 hours once notified by the Engineer, to repair any problems. If the repair is not made with 72 hours of notice, a five percent reduction in unit price bid will be applied to **Dynamic Lane Merge Trailer, Furnished** and **Dynamic Lane Merge Trailer, Operated**. This reduction will be applied to the actual field count of trailers in need of repair or trailers directly effected by the malfunction at the time of the inspection. Once notice is given, this 5 percent reduction will be assessed for each 72 hours in which the repair is not performed.

MDOT will provide to the Contractor the Threshold Occupancy, Sensor Detection Time and the Duration of Flash setting.

d. Method of payment. Measurement and payment will be according to subsection 812.04 and as modified here:

Contract Item (Pay Item)	Pay Unit
Dynamic Lane Merge Trailer, Furnished.	Each
Dynamic Lane Merge Trailer, Operated.	Each
Sign, Portable, Changeable, Furnished, Modified.	Each
Sign, Portable, Changeable, Operated, Modified.	Each

Dynamic Lane Merge Trailer, Furnished includes traffic sensor, communication device, flashers, signs (DO NOT PASS, WHEN FLASHING, LEFT LANE, RIGHT LANE), trailer, solar power equipment and batteries and other materials, equipment and labor required to furnish, install and initially calibrate. **Dynamic Lane Merge Trailer, Furnished** will be measured as the maximum number of units required by the Engineer at one time during the life of the project.

Dynamic Lane Merge Trailer, Operated includes traffic sensor, communication device, flashers, signs (DO NOT PASS, WHEN FLASHING, LEFT LANE , RIGHT LANE) , trailer, solar power equipment and batteries and other materials, equipment and labor required to operate, inspect, maintain, clean and remove from the project. **Dynamic Lane Merge Trailer, Operated** will be measured as the maximum number of units required by the Engineer at one time during the life of the project.

Sign, Portable, Changeable, Furnished, Modified includes all material, equipment and labor required to furnish a full matrix portable changeable message sign and install. **Sign, Portable, Changeable, Furnished, Modified** will be measured as the maximum number of units required by the Engineer at one time during the life of the project.

Sign, Portable, Changeable, Operated, Modified includes all material, equipment and labor required to operate, inspect, maintain, clean, relocate and remove the full matrix portable changeable message sign from the project. **Sign, Portable, Changeable, Operated, Modified** will be measured as the maximum number of units required by the Engineer at one time during the life of the project.

The Sign, Type B, Temporary will be paid at contract unit prices.