



**INDIANA DEPARTMENT OF TRANSPORTATION
DIVISION OF MATERIALS AND TESTS**

**PROCEDURE FOR EVALUATION AND APPROVAL
LIST REQUIREMENTS FOR PORTABLE
TRAFFIC SIGNALS
ITM No. 956-19**

1.0 SCOPE.

- 1.1 This evaluation procedure covers the methods that a portable traffic signal is evaluated and is placed, maintained, or removed from an approval list.
- 1.2 This ITM may involve hazardous materials, operations, and equipment and may not address all of the safety problems associated with the use of the test method. The user of the ITM is responsible for establishing appropriate safety and health practices and determining the applicability of regulatory limitations prior to use.

2.0 REFERENCES

2.1 Industry Standards

AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals (4th ed. 2001)

NEMA Portable Traffic Signal Systems (PTSS) Standard TS 5-2017

SAE J684 Trailer Couplings, Hitches, and Safety Chains – Automotive Type

2.2 Other Standards.

Indiana Manual on Uniform Traffic Control Devices (IMUTCD)

ITE Vehicle Traffic Control Signal Heads

49 CFR §393.11 Requirements for Trailer Lamps and Reflective Devices

- 3.0 **TERMINOLOGY.** Definitions for terms and abbreviations shall be in accordance with the Department’s Standard Specifications, Section 101.

- 4.0 SIGNIFICANCE AND USE.** This ITM is used to evaluate, approve, maintain approval, and remove from the approval listing of Portable Traffic Signals which are placed on the Department List of Portable Traffic Signals. Each model of Portable Traffic Signals will be evaluated separately.
- 5.0 SAMPLING.** The manufacturer shall furnish, at no cost to the Department, 2 randomly selected production-run Portable Traffic Signals of each model for up to a 6 week evaluation. The samples must be delivered to the Department between November 15 and February 15.
- 6.0 SUBMITTAL.**
- 6.1** The manufacturer of the unit shall submit the Preliminary Product Material Evaluation Form for each model Portable Traffic Signals **in order** to be added to the approved list.
- 6.2** The manufacturer of the unit shall submit the following with the Evaluation Form:
- 6.2.1** A complete set of customer documentation (i.e. manual, specification, etc.) prior to testing,
- 6.2.1.1** Controller cabinet with auxiliary equipment in the cabinet
- 6.2.1.2** Power supplies
- 6.2.1.3** Input and output devices
- 6.2.1.4** Malfunction management system
- 6.2.1.5** Signal faces with 5 in. backplates
- 6.2.1.6** Preemption devices for emergency vehicle preemption
- 6.2.1.7** Equipment for **microwave** or Doppler radar vehicle detection
- 6.2.1.8** Equipment to interface with a remote monitoring system
- 6.2.1.9** Other equipment required for the operation of the Portable Traffic Signals.

- 6.2.2 An invoice showing an initial zero dollar amount (\$0.00) for the use of the evaluation sample device during the evaluation. The invoice shall also list the deferred cost of the device the Department would pay if the device is purchased instead of returned upon the successful completion of the evaluation.
- 6.2.3 Operation and maintenance manual(s) which include a description of the set-up, operation, schematics and component parts listing. A manufacturer representative shall be provided for on-site setup and demonstration.
- 6.2.4 List of required software and any other additional items required to operate the product.
- 6.2.5 Certification from an independent testing laboratory that the model meets NEMA TS-5 and wind loading up to 80 mph per the AASHTO Standard Specifications for Structural Supports for Highway Signs, Luminaires, and Traffic Signals (4th ed. 2001).

7.0 SUBMITTAL REVIEW. The documentation will be reviewed for usability of the Portable Traffic Signals. The manufacturer's recommended schedule and extent of maintenance will be reviewed for acceptability.

8.0 EVALUATION.

- 8.1 **Portable Traffic Signals Configuration.** The Portable Traffic Signals submitted shall be solar powered and in compliance with the Standards as stated in Sections 4D.32 and 6F.84 of the IMUTCD. The manufacturer shall configure their Portable Traffic Signal with the standard number of batteries and amp-hour capacity as specified in the technical documentation of the device. The solar array output wattage of each Portable Traffic Signal shall be determined by the manufacturer and shall be appropriate for the climate of the State.
- 8.2 **Portable Traffic Signals Verification.** The following specific requirements will be verified:
 - 8.2.1 The equipment, wiring diagrams, operation manuals and documentation supplied.
 - 8.2.2 The overall quality of the equipment and cabinet wiring.
 - 8.2.3 The Portable Traffic Signals shall be fully set-up within 20 minutes and communicate wirelessly.

- 8.2.4 The model is capable of displaying two signal faces over traffic.
- 8.2.5 Model shall be available with 3 and 5 section signal faces with all the combination of indication types.
- 8.2.6 The mast arm shall be capable of extending at least 9 ft from the edge of the trailer.
- 8.2.7 The bottom of the signal housing and any related signal face attachments maintain at least 16 ft of vertical clearance. The top of the signal housing is not more than 25.6 ft above the pavement.
- 8.2.8 The signal faces use 12 in. diameter signal indications that meet the ITE specification for light emitting diode (LED) indications.
- 8.2.9 The model can be programmed for at least 6 phases and is compatible with standard loop and wireless vehicle detection, pedestrian signals, emergency vehicle and railroad preemption.

9.0 OPERATIONAL PERFORMANCE EVALUATION.

- 9.1 INDOT will require six weeks for completion of the performance evaluation. Samples must be submitted for evaluation between November 15 and February 15 for operational performance evaluation during winter weather conditions.
- 9.2 INDOT will check all specified input and output control functions during the performance evaluation and verify that all non-control devices such as switches, circuits, and fans are in proper working order.
- 9.3 The two Portable Traffic Signal Units, connected wirelessly and if requested by the vendor via fiber optic and/or hard wire cable, will be tested concurrently on a flat surface. During the evaluation, the ambient air temperature and precipitation will be recorded.
- 9.4 The controller unit timing and control functions will be programmed, and the inputs adjusted to simulate actual traffic control conditions. After the initial run through in one lane – two way applications or intersection applications, the battery test will begin. The controller will be programmed to simulate one lane – two way traffic and the solar panels will be disconnected with the Portable Traffic Signals in the power on position for a 21 day period. The voltage level of the battery bank will be checked at the beginning and end of the testing period.

- 9.5** The control devices will be visually observed during the test for proper input, output, and control operation. Models will be tested for proper operation in one lane - two way and intersection applications. The intersection application test will be performed in 3 modes: permissive turn movement, protected/permissive turn movement, and protected only turn movement. Appropriate signal faces shall be provided to perform each of these tests. **The manufacturer may elect to have the intersection application test done before or after the battery test.**
- 9.6** These INDOT specific operational performance standards shall be met:
- 9.6.1** Yellow change interval shall be set at 4 seconds as a default and shall be adjustable in no greater than 1 second increments between 3 seconds and 6 seconds
- 9.6.2** Red clearance interval shall be set at 10 seconds and shall be adjustable in no greater than 1 second increments from 1 second to 255 seconds.
- 9.6.3** Flashing mode shall be all RED.
- 9.6.4** **The microwave or Doppler vehicle detection can detect vehicles from 200 ft with approach speeds of 3 mph or more and extend the minimum green time in detected mode operation.**
- 9.7** The Portable Traffic Signals will be exposed to ambient temperatures during the coldest part of the year in Indiana. The reliability of the battery and the controller unit timing functions during periods of low temperature will be monitored and recorded.
- 9.8** The manufacturer will be notified of all control equipment failures and shall be allowed to make on-site repairs within five days of receiving the notification. If the control equipment fails a second time, or the manufacturer does not repair the equipment after five days, the Portable Traffic Signals will be rejected.
- 10.0 REPORT.** A final report will include the notations and findings from the pre-evaluation review, the operational performance evaluation results and any other supplemental documentation as follows:
- 11.0 APPROVAL LIST.**
- 11.1 Approval of Portable Traffic Signals.** The Portable Traffic Signals model will be placed on the approval list when the following conditions are met:

11.1.1 A potential net benefit to the Department is realized by inclusion of the item on the List.

11.1.2 The required documentation is submitted.

11.1.3 The field testing is completed with satisfactory results.

11.1.4 No excessive amount of routine or periodic maintenance is required.

11.1.5 All manuals, documents, and software of the Portable Traffic Signals are submitted.

11.1.6 Only minimal maintenance operations were necessary during the testing.

11.2 Maintaining Approval.

11.2.1 The Office of Traffic Administration shall be notified each time any update or revision of the model is made, and the changes and benefits of the change shall be submitted for approval. The Department will determine if and to what extent a revision is to be placed into field operation and may fully re-evaluate any model revision.

11.2.2 If the manufacturer makes any changes to an approved model to correct a safety issue, the Department shall be notified immediately. The manufacturer shall correct all existing equipment purchased by the Department either directly, by contract, or through agreement prior to the change being incorporated at the manufacturer's production level.

11.2.3 A design change to an approved model will require a submittal of documented changes. At the discretion of the Department, resubmission of the model for testing and evaluation may be required. Permanent addition or removals of component parts or wires, printed circuit board modifications or revisions to memory or processor software, are examples of items that are considered to be design changes.

11.3 Removal from Approval List. The Portable Traffic Signals model will be removed from an approval list for, but not limited to, the following reasons:

11.3.1 Changes in the Portable Traffic Signals components or production process that fail testing and/or evaluation.

11.3.2 If three consecutive years elapse without furnishing the Portable Traffic Signals model.

11.3.3 Performance of the Portable Traffic Signals no longer meets the intended purpose.

11.3.4 Recurring similar product failures indicative of a manufacturer's defect.

11.3.5 Failure to provide or notify the Department of the items required in Section 11.2 above.