Portable Signals: INDOT Design Guidance and Specifications

Joe Bruno, P.E.
Traffic Administration, INDOT

March 7, 2017
Portable Signals

Presentation Overview

- Background
- Design Manual §83-5.0 and Design Memo 16-06
- Cost and Pay Item Info
- Recurring Special Provisions (801-T-211, 801-T-211d, and 801-T-212)
Portable Signals

Background

- Portable signals were not allowed in Indiana until 2014.
- Revision 2 to the 2011 MUTCD permits portable signals in limited situations.
- Revision 2 requires all portable signals in Indiana to be selected from the INDOT Approved Materials List.
Under §4D.32, portable signals are allowed:

- To maintain two-way traffic on a one lane road in a work zone. The one lane road can have driveways or intersections that are also controlled by portable signals.
- To temporarily function for a permanent signal when the signal has been damaged or during a power outage.
- To temporarily provide access to a site where a permanent signal has been approved.
Portable Signals

IMUTCD Requirements (Cont’d)

Under §6F.84, portable signals shall not be used for:

- Mobile work zones.
- Short duration work zones (work at a location up to 1 hr).

Automated Flagger Assistance Device (AFAD)
Portable Signals

Indiana Test Method 956

- Establishes the testing procedures for portable signal manufacturers that would like to get on the INDOT Approved Materials List.
- Devices submitted for approval must meet a draft NEMA TS-5 Standard, survive a 21 day battery test between November and February, and be capable of being set-up within 20 minutes.
INDOT’s permanent and fixed temporary signals must meet the NEMA TS-2 standard.

The NEMA TS-5 standard has been in development for many years and will have the following requirements for portable signal systems:

- Portable signal trailers can withstand 80 mph wind loads
- The controller can support at least 6 phases
- A malfunction management system is present
The design procedure is as follows:

- Determine whether a fixed temporary signal or a portable signal is appropriate.
- Fixed temporary signals should be selected for projects that will last several months unless there are utility service issues (service cost or delay).
- Determine the portable signal placement and stop bar locations for the one lane road. A temporary landing area for the portable signal trailer may be constructed if necessary.
The design procedure is as follows:

- Develop the signal timing plan for the temporary signal (fixed or portable).
- Determine the vehicle detection method. For portable signals the default method is wireless vehicle detection from Sensys Networks, but other detection methods may be considered.
- Prepare the plan sheet(s) for the temporary signal. Specify if both signal faces must be mounted overhead.
Note:

1. The contractor may select either inductive loops or wireless vehicle detection for temporary traffic signals. If another detection method is needed, the designer should specify it with a special provision.

VEHICLE DETECTION TYPICAL PLACEMENT AREAS

Figure 83-5A
Portable Signals

Design Memo 16-06

- Issued on 3/8/16 and became effective with the September 2016 lettings.
- Summarizes the design procedure changes for temporary signals (fixed and portable).
- Contains additional guidance on the pay item codes.
## Portable Signals

### Cost and Pay Item Info (Before)

#### 2015 Unit Price Averages for Fixed Temporary Signals

<table>
<thead>
<tr>
<th>Code</th>
<th>Pay Item Description</th>
<th>Unit</th>
<th>Avg. Cost</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>801-53072</td>
<td>Temporary Traffic Signal</td>
<td>LS</td>
<td>$37,326</td>
<td>11</td>
</tr>
<tr>
<td>801-01851</td>
<td>Temporary Traffic Signal, with Detectors</td>
<td>LS</td>
<td>$57,732</td>
<td>18</td>
</tr>
</tbody>
</table>

#### 2014 Unit Price Averages for Fixed Temporary Signals

<table>
<thead>
<tr>
<th>Code</th>
<th>Pay Item Description</th>
<th>Unit</th>
<th>Avg. Cost</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>801-53072</td>
<td>Temporary Traffic Signal</td>
<td>LS</td>
<td>$29,500</td>
<td>4</td>
</tr>
<tr>
<td>801-01851</td>
<td>Temporary Traffic Signal, with Detectors</td>
<td>LS</td>
<td>$49,905</td>
<td>15</td>
</tr>
</tbody>
</table>
## Portable Signals

### Cost and Pay Item Info (After)

<table>
<thead>
<tr>
<th>Code</th>
<th>Pay Item Description</th>
<th>Unit</th>
<th>Avg. Cost</th>
<th>Contracts</th>
</tr>
</thead>
<tbody>
<tr>
<td>801-12081</td>
<td>Portable Signal</td>
<td>LS</td>
<td>$17,346</td>
<td>3</td>
</tr>
<tr>
<td>801-12082</td>
<td>Fixed Temporary Signal</td>
<td>LS</td>
<td>$33,520</td>
<td>8</td>
</tr>
</tbody>
</table>
Portable Signals

RSP 801-T-211

- Creates two types of temporary signals: fixed and portable.

- Vehicle detection is now required for fixed temporary signals unless the plans show otherwise.

- Specifies the default detection methods for temporary signals:
  - Fixed temporary = inductive loops or wireless (Sensys)
  - Portable signals = wireless (Sensys)
Portable signals must be equipped with remote monitoring.

Drums must be placed in front of the portable signal trailer.

The contractor must have a technician certified by the portable signal manufacturer to respond to any malfunctions.
Portable Signals

RPD 801-T-211d

- A completed inspection checklist must be provided to the PE/PS before any portable signals are activated.

- The inspection checklist (801-T-211d) has the following items:
  - Battery Components
  - Solar Components
  - Signal Indications
  - Operating System
  - Wireless Communications
  - Controller Cabinet
  - System Testing
Portable Signals

RSP 801-T-212

- The Temporary Signal Timing Plan (801-T-212) must be completed by the designer and included in the Contract Information Book.
- Any changes to the signal timing plan after the letting require the contractor to complete a new version of this form and provide a copy to the PE/PS.
Portable Signals

RSP 801-T-212

601-T-212 TEMPORARY SIGNAL TIMING PLAN
(Adopted 12-17-15)

Intersection:   Contract No.:   Official Action #:

Controller Type:  □ Temporary Traffic Signal  □ Portable Traffic Signal

Intersection Operation:  □ Pre-Timed  □ Semi-Actuated  □ Fully Actuated

Preemption:  □ None  □ Railroad  □ Emergency Vehicle

Interconnection:  □ None  □ Radio  □ Fiber-Optic  □ Other

Pedestrian Phasing:  □ Yes  □ No

Phase Diagram

☐ Two Phase

☐ Four Phase

☐ Eight Phase
## Portable Signals

**RSP 801-T-212 (Cont’d)**

<table>
<thead>
<tr>
<th>Signal Timing Parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase Number</td>
</tr>
<tr>
<td>Minimum Green</td>
</tr>
<tr>
<td>Yellow</td>
</tr>
<tr>
<td>All Red</td>
</tr>
<tr>
<td>Max. Green 1</td>
</tr>
<tr>
<td>Max. Green 2</td>
</tr>
</tbody>
</table>

**Other Instructions:**

- [ ]
- [ ]
- [ ]
- [ ]
- [ ]
- [ ]
- [ ]
Portable Signals

Summary

- Designers should refer to §83-5.0 of the Design Manual if a temporary signal (fixed or portable) will be used to maintain traffic.
- Portable signals will have an increasing role on INDOT construction projects.
- Temporary signals involve some planning and attention to detail during both the design and construction stages.
Portable Signals

Questions?

Joe Bruno, P.E.
Traffic Administration Engineer
INDOT Traffic Engineering Division
(317) 234-7949
jbruno@indot.in.gov