COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF TRANSPORTATION

DATE: July 3, 2008 470-08-5

SUBJECT: Temporary Traffic Signals

TO: All District Executives

FROM: Daryl St. Clair, P.E., Acting Director /S/
Bureau of Highway Safety and Traffic Engineering

The purpose of this strike-off-letter is to reinforce the need for the thorough consideration of all design options when developing traffic control plans (TCPs) for projects that will require temporary traffic signals. This strike-off-letter has been assessed as "time-neutral."

Please see the attached Section 901.3(x) of Publication 408. Note that this section indicates that temporary traffic signals may be either temporary pole-mounted installations (i.e., temporary poles with span wire) or trailer-mounted portable signals.

At a time when our funding capabilities are under extreme pressure, we need to create opportunities to all in the marketplace to determine the best buy.

In the design phase of every project that will have temporary traffic signals, it is now required that both pole-mounted installations and trailer-mounted portable traffic signals always be considered before completing the design of the TCP. In some instances, trailer-mounted portable signals or pole-mounted signals can be used. On the other hand, in certain instances, pole-mounted signals may be preferable to trailer-mounted signals, or vice-versa, depending on the nature of the project, site conditions, traffic conditions, and other specific factors.

Before developing a TCP with temporary traffic signals, it is absolutely essential that the designer visit the proposed worksite beforehand. The site visit will enable the designer to evaluate various factors that will help in the determination of whether the TCP should permit both temporary signal design options, or one or the other. These factors include lateral clearance, trailer or pole placement, signal operation (phasing and timing), and others.

If the designer determines that only one temporary signal design option is justified for a particular project, then the TCP shall be prepared accordingly, and written documentation shall be maintained in the project file outlining the reasons for this determination. It would also be desirable to clearly indicate on the TCP that the other option will not be permitted for the project.

If the designer determines that trailer-mounted portable signals or pole-mounted signals would be acceptable, then the TCP should clearly show the exact design and operation of both alternatives so that additional plans from the contractor would not be necessary. The TCP should include the design of all anticipated needed features. For example, if platforms or other special features will be needed, their design and placement should be in the TCP.

Please remember that many of the bridges that will be upgraded under the Department's bridge enhancement initiative in the next few years are short spans on two-lane roads where trailer-mounted portable signals may be a suitable work zone alternative.

This policy change affects Traffic, Design, Highway Occupancy Permits, Construction, and Maintenance.

Also attached for your information is the Department's equipment performance specification for trailer-mounted portable traffic control systems, dated June 23, 2008. The Bureau of Highway Safety and Traffic Engineering is in the process of recertifying manufacturers' products in accordance with this new specification.

Policy changes to Publication 213 will also be forthcoming in an effort to streamline the temporary and portable signal permitting process.

This matter will also be discussed at the upcoming District Traffic Engineers Meeting scheduled for July 17-18, 2008 in District 6-0.

If you have any questions, please contact Glenn Rowe, P.E., P.T.O.E., Chief of the Traffic Engineering and Operations Division at (717) 787-3620.

Attachments

4700/DRS/(7-7350)/lap(7-3620)

cc: All Highway Administration Bureau Directors
All ADEs for Design
All ADEs for Construction
All ADEs for Maintenance
All District Traffic Engineers
All District Permit Managers
All BHSTE Division Chiefs
Paul Gnazzo, Director, Office of Legislative Affairs
Renee Sigel, FHWA
William Laubach, TEOD, BHSTE
Daniel Farley, TEOD, BHSTE
Kenneth Williams, RMASD, BHSTE
Larry Lentz, RMASD, BHSTE
Deputy Secretary Hogg's Reading File
TEOD Reading File

19. Pedestrian Protection.

- Improper or lack of pedestrian protection:
  - 24 hours

20. Improper Construction Equipment, Vehicle, or Material Storage.

- If poses hazard to motoring public:
  - Immediately
- No Hazard:
  - 24 hours

21. Improper Lane Width/Shoulder Not Provided/Improper Dropoff Protection.

- 24 hours

22. Temporary Roadway Crossover Not Properly Installed.

- 3 days

23. Any Temporary Traffic Control Item Not Included Within These Guidelines.

- If poses extreme hazard to traveling public or workers (e.g., blunt ends, unsigned road or bridge closures):
  - Immediately
- Critical: poses moderate to high hazard to traveling public (e.g., edge drop-off adjacent to traveling lane, or non-delineated hazard adjacent to roadway)
  - 2 hours
- Non-Critical: poses slight hazard to traveling public (e.g., missing barricade rails)
  - 24 hours

(w) Changeable Message Sign. Furnish, operate, and maintain three-line or full matrix portable, trailer mounted, changeable message signs for traffic control as indicated or directed. Have all locations, messages, and times of operation approved by the District Traffic Engineer or authorized Representative.

Provide telecommunications that are capable of changing message or sequences of messages from a hand held device and/or personal computer, with the computer having calendar and time mode capability. Provide appropriate software for personal computer for the purpose of remotely operating the changeable message sign(s).

For a full-matrix changeable message sign, transport, program, operate, and maintain the variable message signs as directed. For the duration of the project, provide a qualified technician familiar with the programming and operation of the full-matrix changeable message sign. Designate the technician to be on call 24 hours a day, 7 days a week and to arrive on the project site within 3 hours of notification.

If required, provide capability to monitor approaching vehicles via radar and display the vehicle's speed on the message sign.

(x) Temporary Traffic Signals. Furnish, install, maintain, and remove all items required to provide temporary signalization at the location(s) indicated.

Use a signal system with signal poles of wood, galvanized steel, or painted steel; or use a signal system of trailer-mounted portable traffic signals. Certify to the Department that the signal poles are designed to withstand the anticipated loading. Install the poles or trailer-mounted units to provide transverse and vertical clearances as specified in Publication 212 and Publication 213.

Provide a controller with an auto-manual switch and a manual control button with flexible cord.

Provide a Certificate of Approval, issued by the Department, for the signal head(s), controller(s), portable traffic signal system, and other functional equipment, if applicable.

Obtain a Traffic Signal Permit from the Department before installing the signal equipment and a Highway Occupancy Permit before any openings are being made in or under any portion of the highway, if required.

(y) Flagger Training. Provide flaggers that successfully completed a flagger-training course within the last 3 years that complies with the Department's minimum flagger training guidelines described below. Assure that flaggers carry a valid wallet-sized training card containing the name of the flagger, training source, date of successful completion of training, and signature; or provide a roster of trained flaggers to the Representative before the start of flagging operations that contains the names of flaggers, training source, and date of successful completion of training. Minimum flagger training guidelines include the following:

1. **Minimum Course Contents.**

- Why flagging is important
- Fundamental principals of work zone traffic control
  - Component parts of the work zone
  - Channelization devices, spacing
  - Tapers
  - Buffer Space
  - Visibility to approaching drivers
- Human factors – driver attitude, expectation, reaction
- Qualifications of a flagger
- Clothing
- Flagger Operations
  - Setting up the flagger station
  - Signaling devices and when used
  - Hand signaling procedure
  - Communications
  - Two-flagger operations
  - Single flagger operations
  - Flagging in intersections
  - Nighttime flagging
  - Emergency situations
- Flagging in adverse weather conditions
- Sign requirements
- Practical exercise

2. **Objectives.** At the end of the course the student should be able to:

- Describe why flagging is important
- Describe flagger qualifications
- Ensure the flagger station complies with Publication 212, Publication 213, and the MUTCD
- Gather all necessary equipment
- Select the proper flagging station/position/location
- Control traffic using the stop/slow paddle
- Control traffic using the red flag
- Control two-way traffic in one lane of a highway
- Control traffic at an intersection
- Recognize and be able to control traffic in unique or special flagging situations
- Control traffic at night and recognize a safe nighttime flagging operation
- Communicate with co-workers and the public

Commonwealth of Pennsylvania
Department of Transportation

Specification for Trailer-Mounted Portable Traffic Control Signal Systems

June 23, 2008

1. Description

This specification outlines the minimum requirements for trailer-mounted portable traffic control signal systems used on public streets and highways within the Commonwealth of Pennsylvania.

2. General Requirements

2.1 Publication 213. Trailer-mounted portable traffic control signal systems may be used for stationary, short-term operations or stationary, long-term operations in compliance with Department Publication 213. In addition to work areas, such systems may also be authorized for special events and applications that comply with the basic requirements outlined in Department Publication 213. Manufacturers shall advise users of their systems of these Department requirements and procedures.

2.2 MUTCD. Portable traffic control signal systems shall comply with Part 4 of the national Manual on Uniform Traffic Control Devices (MUTCD), including the physical display and operational requirements of a conventional traffic control signal.

3. Trailer

3.1 General. Each trailer shall be capable of accommodating a vertical upright and a horizontal mast arm.

3.2 Structural Adequacy. Each trailer shall be of welded steel construction, and shall be structurally adequate to support all trailer-mounted equipment. The trailer shall have adequate structural integrity to enable lifting and placing it as required.

3.3 Stabilizers. The trailer shall be equipped with at least four leveling jacks, pads, or feet, one at each corner of the trailer, for maintaining the trailer in a level, stabilized position. These stabilizers must be cable of locking in position.

3.4 Licensing. The trailer shall be equipped with all required lighting and other features to enable it to be legally transported on the public highway system. The trailer and all its components shall be of sufficient strength and rating to operate safely upon the public highway system at legal speeds without bending, cracking, bottoming, premature wear, or other damage.

3.5 **Lifting and Assembly Mechanisms.** All lifting and other assembly mechanisms shall be designed for simplicity and quick operation so that set up and take down time can be kept to a minimum, and so that they can be operated by one person. The lifting mechanism shall be equipped with a locking device to secure the assembly in a raised position. The horizontal, lowered position shall be for transport. The raised, vertical position, facing rearwards from the trailer, shall be for operation.

3.6 **Vandal-Resistant Features.** The trailer and its components shall be designed in such a manner as to help ensure continued proper placement and to forestall vandalism. The trailer design shall provide adequate vandal-proof housings for all equipment. The trailer tires and hitch must be capable of being removed, and battery enclosures, crank mechanisms for horizontal arms, and other mechanisms to adjust placement or operation must be lockable to eliminate tampering by unauthorized personnel. All lockable items must be keyed alike. The trailer drawbar shall be equipped with a swing-away, screw-type jack.

3.7 **Reflective Markings.** Reflective tape or reflectors shall be placed at each corner on the front, rear, and sides of the trailer.

3.8 **Labels.** The manufacturer, serial number, and emergency phone number shall be permanently marked on each trailer using a decal, metal plate, or other means suitable to the Department.

4. Signal Displays

4.1 **Number and Location.** Each trailer shall have a minimum of two signal heads. At least one signal head shall be mounted overhead on the mast arm. The horizontal mast arm shall be capable of extending a minimum distance of 9 feet from the edge of the trailer. The minimum horizontal distance between signal faces shall be 8 feet measured between centers of signal faces along a line perpendicular to the centerline of the approach.

4.2 **Vertical Clearance.** The bottom of the housing of a signal face suspended over the roadway shall be a minimum of 15 feet, but not more than 19 feet, above the pavement. The bottom of the housing of a signal face that is not mounted over the roadway shall be at least 8 feet, but not more than 15 feet, above the sidewalk or, if there is no sidewalk, above the pavement grade at the center of the roadway.

4.3 **Size and Orientation.** Each signal head shall be vertically-mounted and shall consist of indications that are 12 inches in diameter. The signal heads shall be mounted so that they have the ability to rotate 180° horizontally. The mountings must also be reversible to allow for a trailer to be placed on both sides of the road.

4.4 **Signal Head Design.** Signal head housings shall be yellow, complying with Section 1104.06 of Department Publication 408. Signal heads shall have visors that are a

minimum depth of 9.5 inches. All signal heads shall be equipped with backplates that extend at least 5 inches beyond each side of the signal face. All backplates and the inside of visors shall have a non-reflective black finish.

4.5 Approved Material Types. All signal heads shall have light emitting diode (LED) modules. All LED modules and the signal housings that make up each signal head shall have a Sale or Provisional Certificate of Approval issued by the Department.

4.6 Supplemental Signal Indicator Lamps. Provide these lamps on the backside of each unit so that there is a visual status of the signal indications.

5. Environmental Requirements

The trailer-mounted portable traffic control signal system shall operate acceptably over an ambient temperature range of minus 30° F to plus 165° F, and a relative humidity range of 0% to 95%.

6. Power Supply

The trailer-mounted portable traffic control signal system shall be battery-powered, or battery-powered with solar assist. The power supply shall be of sufficient capacity to power the system for 21 days at 72° F without charging. The system shall have a visual display of the battery charge status. There shall be an onboard battery charger capable of being used with a 110-volt power source. The system shall also be capable of running via existing commercial power.

7. Communication

All trailer-mounted portable traffic control signal systems used for long-term operations must be interconnected via hardwire or wireless radio link to ensure fail-safe operation and proper functioning. The interconnected trailers shall function as a master/slave system. Radio communications shall conform to applicable FCC requirements.

8. Modes of Operation

8.1 Required Modes. Each system shall be capable of operating via manually-controlled, fixed-time, traffic-actuated, and flashing modes.

8.2 Manually-Controlled Operation. Manual control shall be wireless remote. The manual control mode shall not allow the operator to interrupt any preprogrammed all-red clearance time in a manner that would create a conflict.

8.3 Fixed-Time Operation. The system shall be capable of accommodating a minimum of five timing patterns per 24-hour period.

8.4 Traffic-Actuated Operation. Use detection systems that have a Department Sale of Provisional Certificate of Approval, or that are otherwise acceptable to the Department.

8.5 Flashing Operation. The system shall be capable of both flashing red and flashing yellow operations.

8.6 Preemption. As an option, the system shall be capable of accommodating an optical, radio, and sound-based preemption system, as specified, to provide a green indication for a properly-equipped, approaching emergency vehicle. Preemption equipment shall have a Sale or Provisional Certificate of Approval issued by the Department.

9. Timing Parameters

9.1 Programmable Timing Patterns. The system shall allow users to program red, yellow, and green times in at least 1-second increments. Green times shall be programmable from 3 seconds to 250 seconds; yellow times from 1 second to 10 seconds; and red times from 1 second to 250 seconds. Operation in the traffic-actuated mode will require the ability to program maximum and minimum green times, and green time extensions.

9.2 Minimum Number of Phases. As a minimum, the system shall be capable of six-phase traffic signal operations.

9.3 Manual Programming. The system shall allow users the ability to program pre-selected timing patterns.

9.4 Timing Algorithms. If the system has software to automatically determine timing patterns based on certain input data, the manufacturer must submit a complete description of the logic behind the timing algorithm for the review and approval of the Department.

10. Conflict Monitoring

The system shall be capable of preventing or detecting the display of conflicting signal indications in accordance with the conflict monitoring provisions of the NEMA Standards. For short-term operations, if a conflicting display is detected, the system shall cause the transfer of the signals to steady red or flashing red. For long-term operations, if a conflicting display is detected, the system shall cause the transfer of the signals to flashing red.

11. Training and Documentation

The manufacturer shall provide training and documentation to users of the trailer-mounted portable traffic control signal system. Documentation shall include manuals that describe system operation, service procedures, and parts. The manuals may be supplied in an electronic format. A copy of the documentation, along with a training outline and training

materials, shall be submitted to the Department when seeking approval of the system in accordance with Section 12.

12. Approval Procedure

12.1 Certificate of Approval. The complete trailer-mounted portable traffic control signal system must have a Certificate of Approval issued by the Department prior to sale or use within the Commonwealth of Pennsylvania.

12.2 Application. Manufacturers that wish to have their product reviewed for possible approval should request an application from the Chief, Traffic Engineering and Operations Division, Bureau of Highway Safety and Traffic Engineering, Pennsylvania Department of Transportation, P.O. Box 2047, Harrisburg, Pennsylvania, 17105-2047.

12.3 Product Demonstration. As a part of the approval process, manufacturers will be required to demonstrate their trailer-mounted portable traffic control signal system to Department representatives.

12.4 30-Day Operational Test. As a condition for approval, manufacturers will be required to have their trailer-mounted portable traffic control signal system subjected to a 30-day operational test. The testing will be conducted by the Department, or may be conducted by an independent testing laboratory if approved by the Department. In order to be approved, the system shall perform acceptably for 30 consecutive days in accordance with this specification.

Glenn C. Rowe, P.E., P.T.O.E., Chief
Traffic Engineering and Operations Division
Bureau of Highway Safety and Traffic Engineering

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