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DEPARTMENT OF TRANSPORTATION
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MEMORANDUM

TO: All Users of the Delaware Manual on Uniform Traffic Control Devices

VIA: Mark Luszcz, P.E., PTOE ML
Deputy Director, Operations & Support

FROM: James Osborne, P.E. JO
Safety Programs Manager

DATE: March 8, 2024

SUBJECT: Interim Guidance for the Use of Radar Speed Feedback Sign (RSFS) Trailers within work zones in Delaware

Introduction

Radar Speed Feedback Signs (RSFS) are radar activated changeable message signs that display to approaching drivers the speed at which they are traveling. Use of RSFS is permitted as defined in Section 2B.13 Paragraphs 19-21A of the Delaware Manual on Uniform Traffic Control Devices (DE MUTCD). RSFS may be installed in conjunction with a regulatory posted speed sign, or work zone speed limit sign. These devices are also referred to as “Speed Display Sign”, “Driver Feedback Sign”, or “Vehicle Speed Feedback Sign”. Typically, RSFS are used either as permanently pole/post-mounted or temporary trailer-mounted units. This memorandum only focuses on the temporary application of RSFS trailers and sets forth recommendations and guidelines for their deployment in work zones along state-maintained roadways.

Applications for use of RSFS within Work Zones

RSFS should be considered for use on projects administered by the Department using the guidelines below. If it is determined, at time of project development, that the RSFS trailers would assist with the safety and compliance of the motorist within the work zone, the item should be added to the contract documents. Capital or maintenance projects should use this guidance

document for the locations and details for placement and operation of the RSFS trailers within the project's work zone. During constructability or progress meetings, the use and placement of RSFS will be discussed prior to deployment for safety and effective applications. Projects administered by the Division of Maintenance & Operations may use the RSFS trailers for such projects as utility projects, developer projects, or other activities conducted by Maintenance & Operations, following the location and placement guidance contained herein.

There is some evidence that RSFS can encourage motorists to reduce their speed. Therefore, RSFS trailers used within work zones are intended to improve safety for all road users and road workers and encourage motorist compliance with work zone speed limits. Deployment of RSFS trailers within a work zone should be considered on projects along state-maintained roadways as a measure to provide enhanced safety of workers as well as road users. RSFS trailers shall not replace any other temporary traffic control devices.

The following situations are potential conditions where deployment of RSFS trailers within a work zone should be considered:

- Work activities that result in workers, equipment, and materials being in close proximity to travel lanes and where the activity area is unprotected by concrete barriers or there is a higher risk of vehicular intrusion.
- Where work zone geometric design hazards exist such as narrow or closed shoulders, narrow or long-term closures of travel lanes, lane shifts, or under contraflow conditions.
- Where there is an expectation of queuing, slowed traffic, or potential for rear-end collisions within the work zone.
- Work zones with a history of speed-related crashes. In such cases, stronger mitigation strategies should be considered, as the installation of RSFS trailers alone may not be sufficient to yield a drastic speed reduction.
- Where there are indications of vehicles speeding in a work zone, based on the results of a spot speed study or engineering judgment.
- Night work activity on roadways classified as Minor Arterials, Principal Arterials, Other Expressways & Freeway, or Interstate.
- Where one or more lanes are closed or shifted.
- Not recommended for shoulder-only closures or work zones that do not restrict the travel lanes.
- Not recommended for short term or mobile operations or work zones that will not remain in place for more than 30 days.

The speed reduction impact of RSFS trailers is highest after initial deployment and can diminish with overuse. For long-term applications, the trailer should be relocated from its original location to other locations within the project's limits on a monthly basis or more frequently as required by the Department, so that motorists do not become desensitized to the speed feedback messaging and to maintain the speed reduction effectiveness. When applicable, having work zone speed enforcement at or near the radar speed trailers is recommended. RSFS trailers are more effective where only one travel lane exists per direction and their use on roadways with three or more lanes in one direction is not recommended.

Guidelines for the use of RSFS Trailers within work zones:

Placement considerations per the following:

- Best practices for placement of RSFS within certain work zone setups are provided at the end of this guidance.
- A static WORK ZONE G20-5aP plaque and SPEED LIMIT R2-1 sign displaying the posted speed limit shall be attached to the RSFS trailer or adjacent to the RSFS trailer.
- If engineering judgment dictates to install RSFS trailer upstream of the typical application setup, it should be placed behind positive protection when feasible. When placed on or adjacent to the shoulder with no positive protection, delineate the RSFS trailer with six drums. In such cases, the height of all displays and plaques must be adjusted so they are visible to approaching drivers and the drums or positive protection do not block their visibility.
- Place RSFS trailers such that they do not interfere with the normal operation of the roadway for vehicular, bicycle, pedestrian traffic, or construction activities.
- Place RSFS trailers such that they do not restrict sight distance or block other regulatory, warning or guide signs, or interfere with other work zone temporary traffic control devices.
- Place RSFS trailers as far from the travel lane as possible to reduce the potential of being struck by an errant vehicle, but not hindering the operation of the radar sensor or reducing the visibility of the speed feedback display.
- When used on the approach to a transition area (lane reduction/merge area), place RSFS trailers within the advance warning area, approximately ½ mile to 1 mile in advance of the work zone activity area or based on anticipated queuing within the transition area. Adjust placement of the RSFS trailer based on anticipated queuing.
- To maintain speed reductions throughout the work zone, more than one RSFS trailer should be considered in work zones longer than one mile.
- If more than one RSFS trailer is used on the same side of the roadway, they should be separated by at least 1,000 feet.
- On single lane sections, RSFS trailers can be placed on either side of the open lane adjacent to or opposite of the work zone. When more than one lane is open to traffic and an adjacent lane(s) is closed, RSFS trailers should be placed in the closed lane(s) adjacent to the work zone.
- On single lane sections, placement on both sides of the roadway should be separated by at least 1,000 feet. Placement at the same location may cause driver distraction and conflicting messages.

Setup and aiming considerations per the following:

- Setting up proper aiming angle (the angle between vehicle's approach line and radar's shooting line) is critical for accurate speed measurement. For aiming angle, refer to the RSFS manufacturers' recommendations.
- Place RSFS in areas that receive sufficient sunlight in order to maintain solar panel charging for 24-hour operation.
- RSFS trailers should be placed outside of a curve, along a tangent section of the road to gain maximum accuracy.

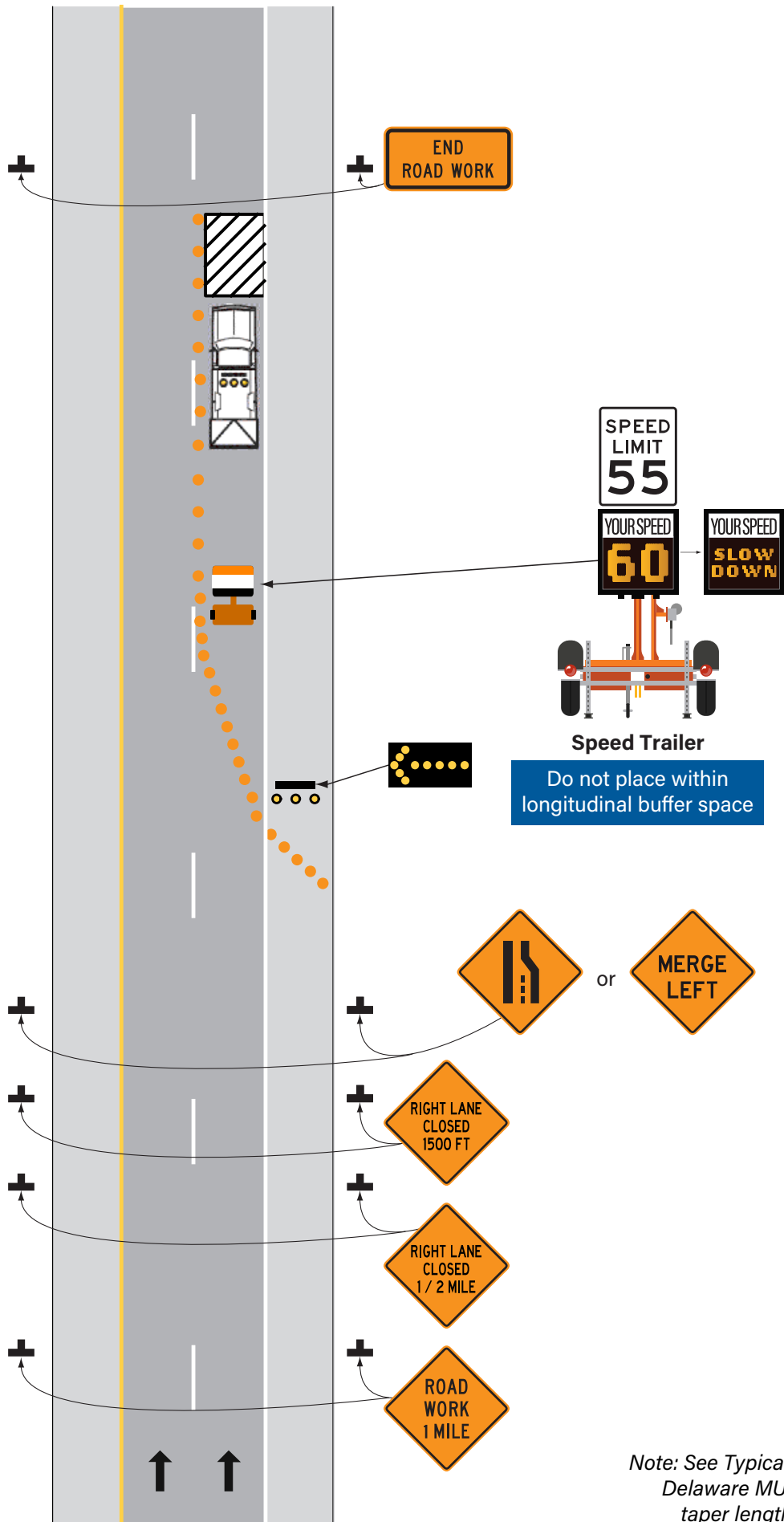
- Typically, an optimal positioning should provide the radar with a straight line-of-sight from 500 to 1,000 feet to ensure high accuracy as well as giving motorists ample time to read and react to the displayed feedback.
- Each time the RSFS trailer is set up, the radar should be checked and adjusted (if necessary) to ensure accuracy.
- For nighttime operations ensures device's angle does not cause glare for approaching drivers.

Data collection and reporting per the following:

- The RSFS trailer should have the ability to log and store vehicle counts and speeds, by direction, for a minimum of 15 days.
- Data shall be retrievable via USB, Bluetooth, WiFi, or optional wireless modem. The option to log and store vehicle counts and speeds shall also be available when the RSFS trailer is in dark mode.

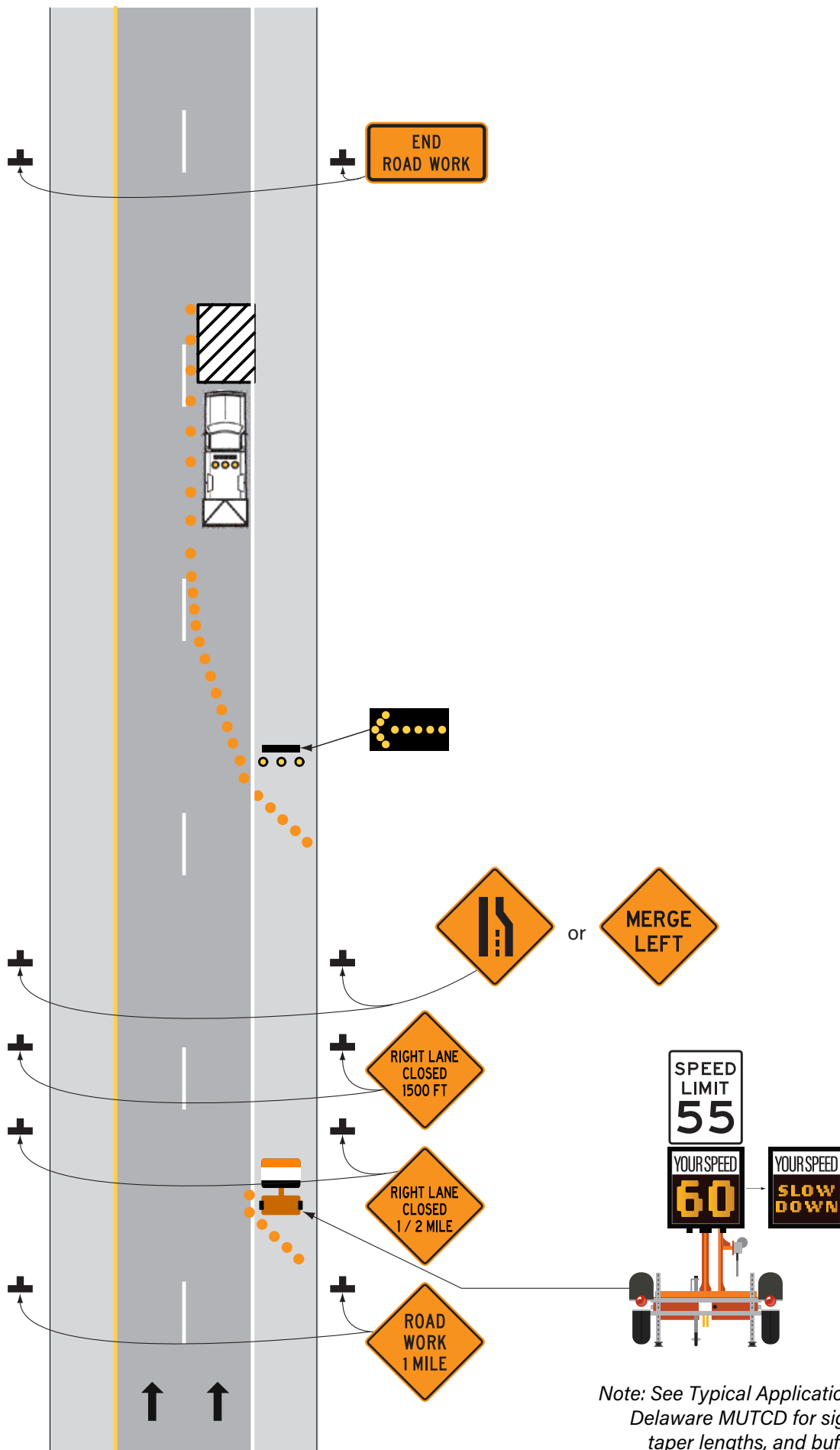
The guidance contained in this document does not supersede Contract Documents in accordance with Section 105.6 of the DelDOT *Standard Specifications for Road and Bridge Construction* per the contract referenced revisions. The reader should first refer to the contract documents as listed to meet specification requirements.

Portable Radar Speed Feedback Sign Work Zone Placement Best Practices
Roadway with Two Lanes in the Same Direction - **Single Lane Closure, Placement in Advance of Activity Area**



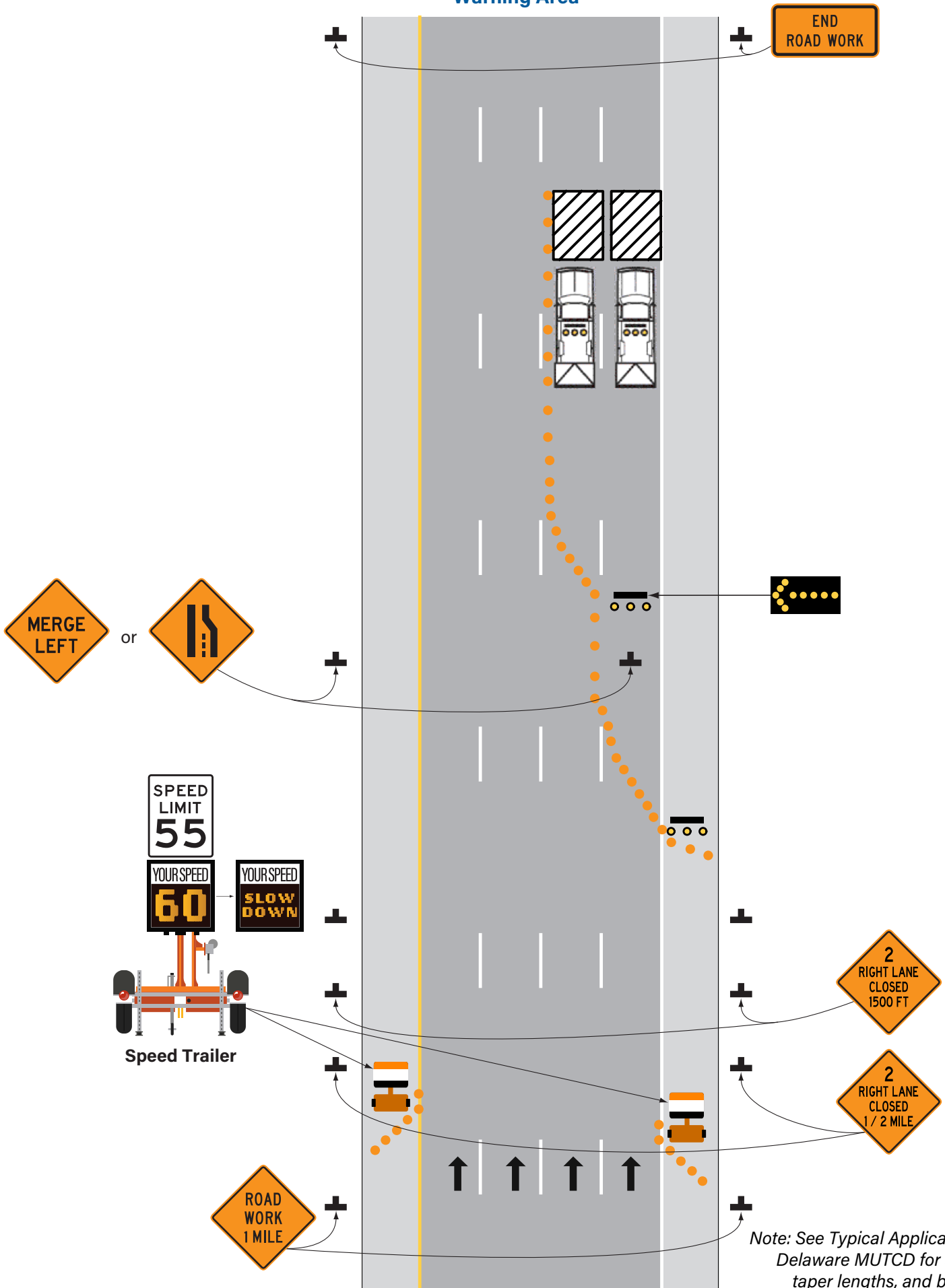
Note: See Typical Application 33 of the Delaware MUTCD for sign spacing, taper lengths, and buffer lengths.

Portable Radar Speed Feedback Sign Work Zone Placement Best Practices
Roadway with Two Lanes in the Same Direction - Single Lane Closure, Placement in Advance Warning Area



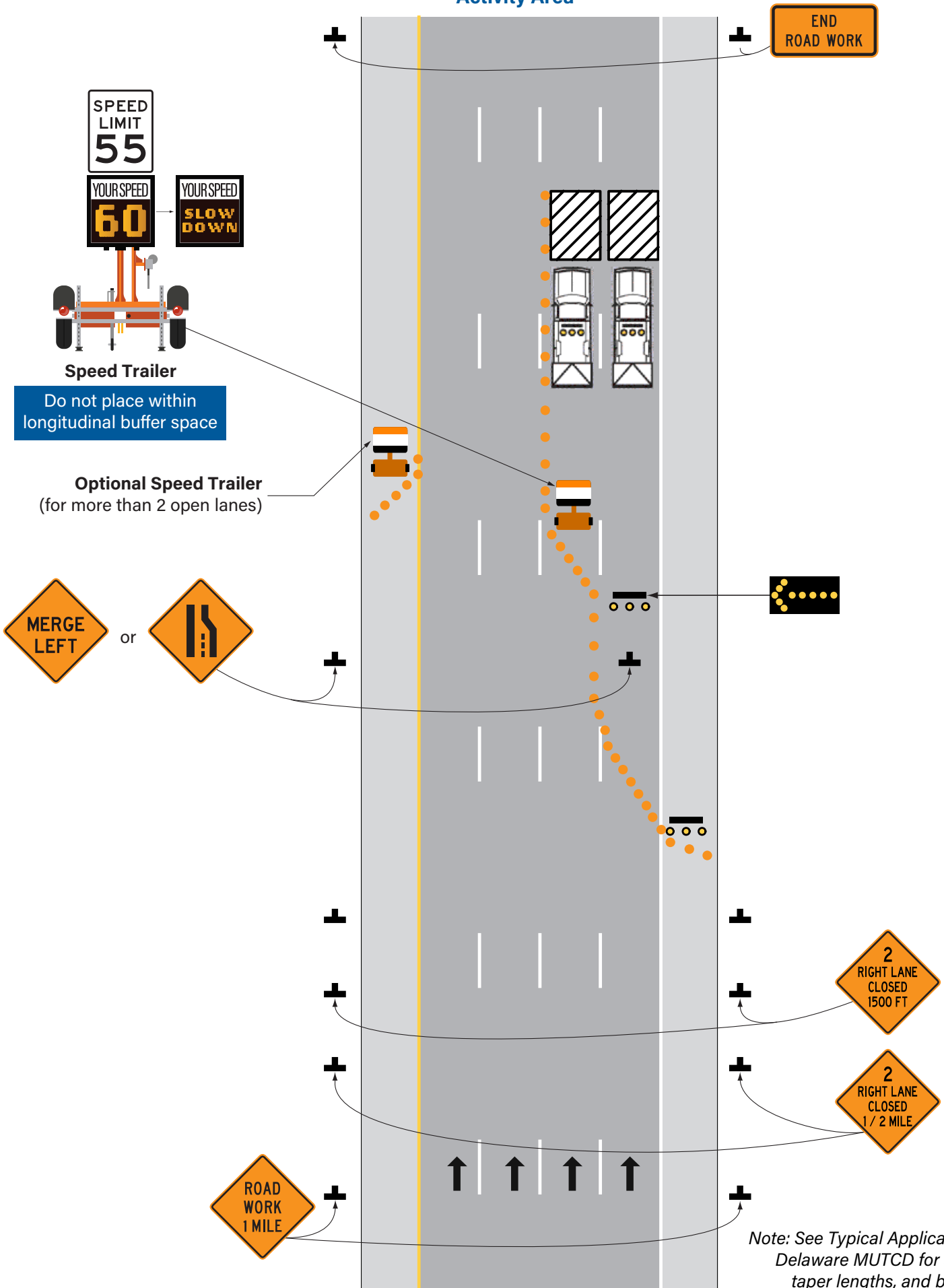
Note: See Typical Application 33 of the Delaware MUTCD for sign spacing, taper lengths, and buffer lengths.

Portable Radar Speed Feedback Sign Work Zone Placement Best Practices
Roadway with more than Two Lanes in the Same Direction - Multiple Lane Closure, Placement in Advance
Warning Area



Note: See Typical Application 37 of the Delaware MUTCD for sign spacing, taper lengths, and buffer lengths.

Portable Radar Speed Feedback Sign Work Zone Placement Best Practices
Roadway with more than Two Lanes in the Same Direction - Multiple Lane Closure, Placement in Advance of Activity Area



Note: See Typical Application 37 of the Delaware MUTCD for sign spacing, taper lengths, and buffer lengths.

Portable Radar Speed Feedback Sign Work Zone Placement Best Practices Placement within a Stationary Work Zone - Long-Term Project

