MOT Common Problems and Best Practices to Improve Safety in Work Zones

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Richard Toulson
DelDOT Traffic

Causes of Work Zone Crashes/Incidents

- Unexpected or confusing situations
- Obstructions
- Diverted attention
- Exposed workers
- Improper Temporary Traffic Control Setup

Hazard Identification

Restricted Sight Distance

Hazard Identification

Restricted Sight Distance at Construction Access

Hazard Identification

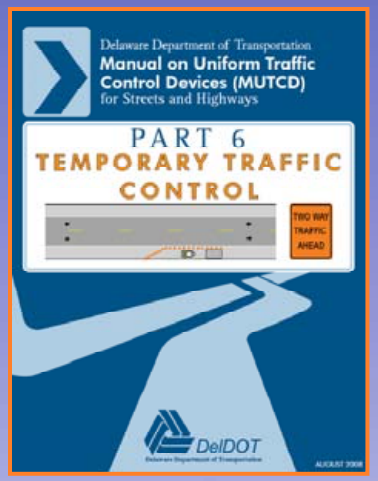
Accessibility For All Users

All road users shall be accommodated:

- **Motorists**
- **Bicyclists**
- **Pedestrians, including persons with disabilities in accordance with ADA**

Temporary Traffic Control Devices

- Signs
- Barricades
- Channelizing Devices
  - Cones
  - Drums
- Concrete Barriers
- Pavement Markings
- Arrow Panels
- Portable Changeable Message Signs
- Warning Lights
- Traffic Signals
- Truck Mounted Attenuators



Common Problems - Signing

- Inapplicable signs not being completely covered, removed or turned away from traffic
- Improper sign mounting
- Improper spacing
- Improper height
- Sign obstructions (foliage, other signs) or poor sign placement affecting sight distance

Poor Sign Spacing

Common Problems – Sign Supports

Improper Breakaway Sign Support

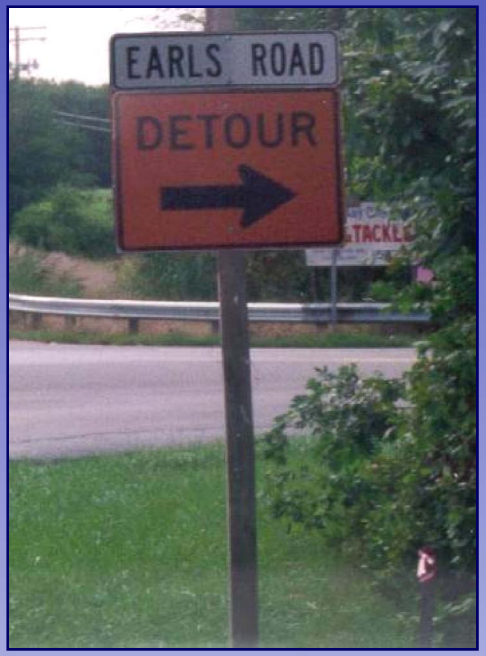
Unacceptable Portable Sign Mounting

Unacceptable Pedestrian Signing

Detour Signing

Unacceptable

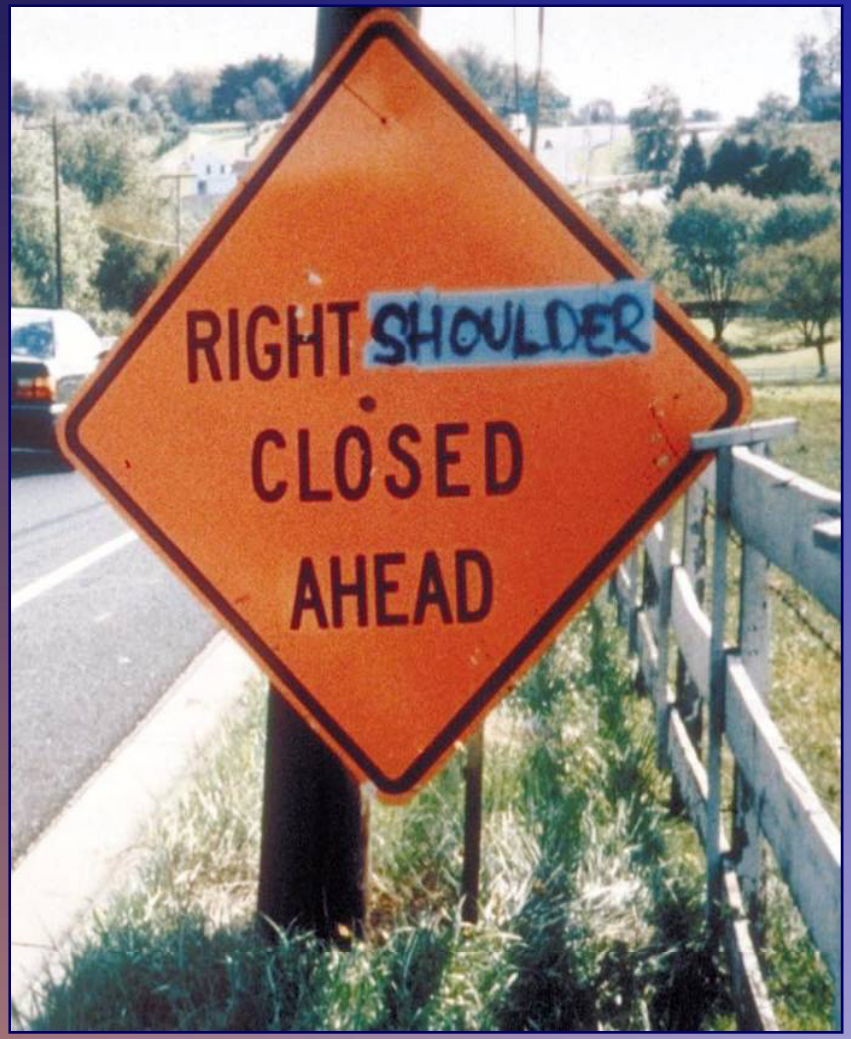
Accepta



Sign Placement/Coordination

Sign Placement/Coordination

Unacceptable Method of Covering Signs



Acceptable Method of Covering Signs

Sign Respect

Sign Respect

Unacceptable Signing on Barricades

Common Problems - Barricades

Missing Type B Warning Lights

Common Problems – Channelizing Devices

- Improper drums (not meeting material specification and/or reflective striping specification)
  - Lack of reflective collars on cones at night
  - Improper spacing, both laterally and longitudinally
  - Inadequate shoulder, taper, and/or buffer lengths

Common Problems – Taper/Buffer Lengths

- Posted speeds are not being used to establish the safest temporary traffic control setup

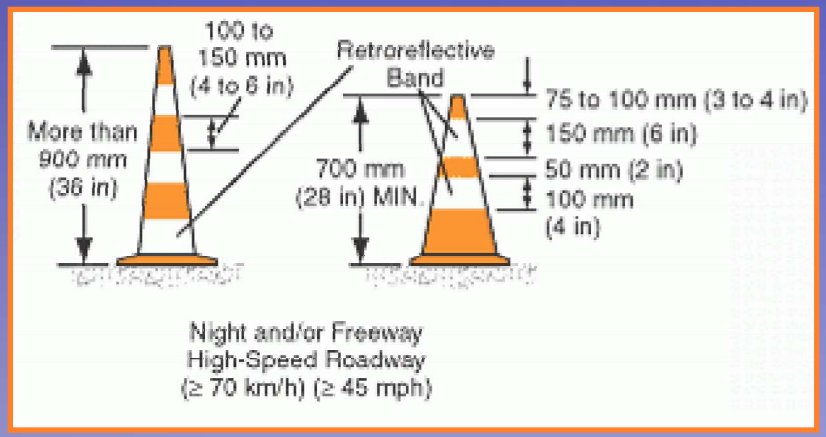
Common Problems – Taper/Buffer Lengths

Common Problems – Taper/Buffer Lengths

Common Problems – Taper/Buffer Lengths

Cones

- Minimum height of 28 inches for all operations
- Cones not to be used for nighttime operations (unless for a single nighttime emergency operation)
- If Cones are used at night, they should be retroreflectorized for maximum visibility



Unacceptable Cones

Drums

- Effective 12/31/09, the horizontal markings on drums shall be fluorescent orange and white prismatic retroreflective sheeting
- 1 Amber Type B flashing light shall be installed on each of the first 2 drums in series used for channelization
- 1 Amber Type B flashing light shall be installed on the drum at the end of the work space
- If all drums meet the new sheeting requirements, lights are not required.

Unacceptable Drums

Common Problems – Temporary Concrete Barrier

- Improperly flared barrier end sections
- Improper advance channelization
- Improper delineation
- Reflectors improperly mounted on flared barrier end sections (reflectors are prohibited on flared barrier end sections)
- Missing/unseated joints
- Defective/cracked barriers

Common Problems – Defective/Cracked Barrier

Common Problems - Missing/Unseated Joints

Temporary Traffic Barriers - End Treatments

- For posted speeds greater than 30 MPH, an impact attenuator or crash cushion shall be installed at the end of barrier if less than 30 ft from the travelway.

- For posted speeds of 30 MPH or less, a tapered end shall be installed (unless otherwise directed by the Chief Traffic Engineer).

Common Problems - End Treatments

Improper Installation

Improper Sign Storage

Common Problems - End Treatments

Unacceptable within Clear Zone

Unacceptable over 30 mph

Unacceptable

Truck-Mounted Attenuators (TMAs)

- TMAs required by 16 of 25 cases in DelDOT MUTCD – Part 6
- TMAs are required on all limited access highways and highways with 4 or more lanes with posted speeds of 45 mph or greater for the following:
  - Pavement marking
  - Roadside spraying
  - Patching
  - Rotomilling
  - Sweeping
  - Temporary traffic barrier placement
  - Others as directed by the Chief Traffic Engineer

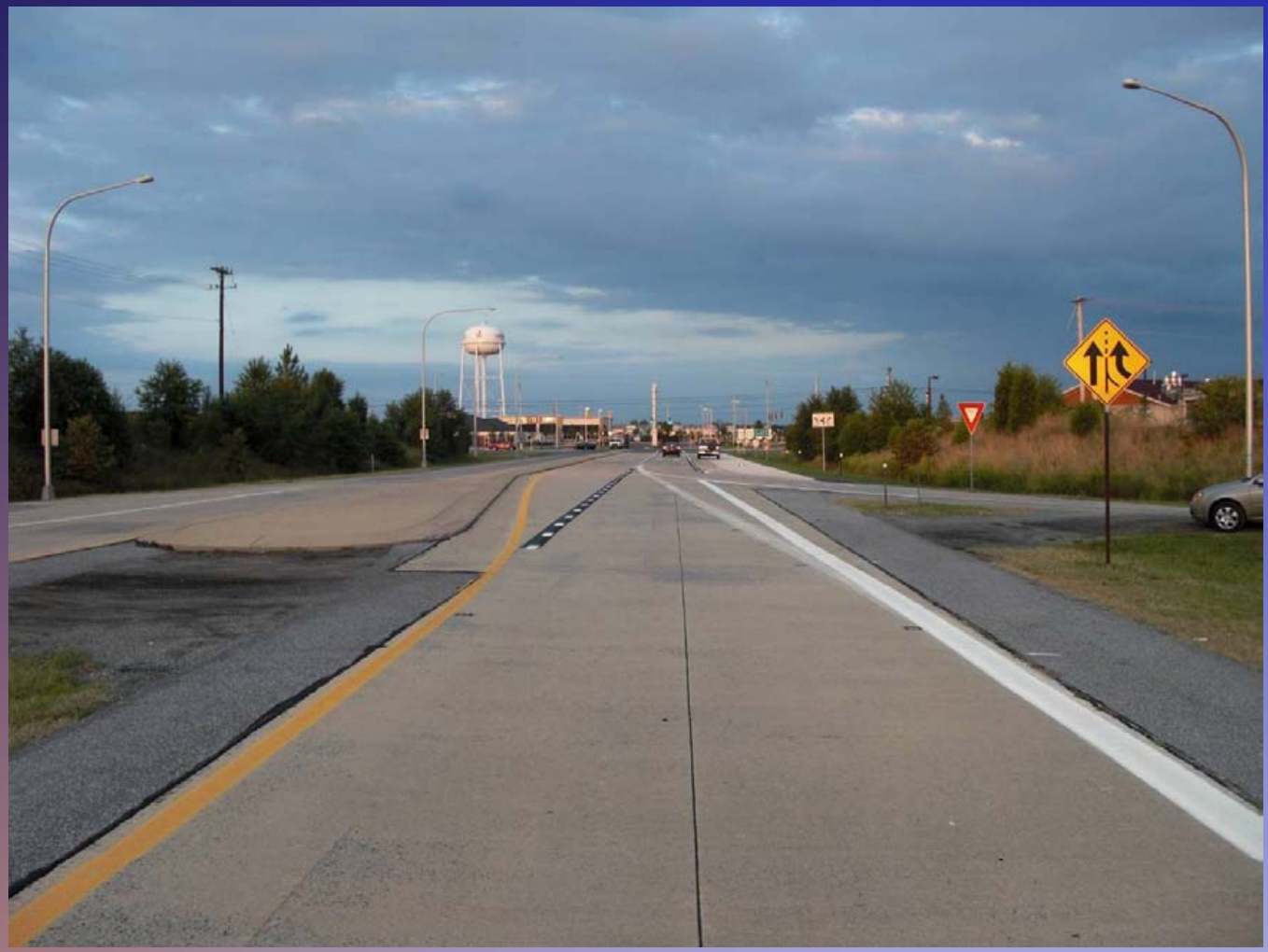
- All vehicles with TMAs shall have arrow panels

Common Problems – Pavement Markings

- Unnecessary pavement markings not being completely removed
- Improper application of temporary pavement markings

Unacceptable Pavement Marking Removal

Unacceptable Pavement Marking Removal



Unacceptable Pavement Marking Removal

Unacceptable Temporary Marking Installation

Common Problems – Arrow Panels

- Not properly aimed to provide maximum visibility
- Maintenance, especially bulb replacement
- Not dimmed during nighttime

Acceptable Arrow Panel Placement

Arrow Panels

Caution Mode

Aiming

Unacceptable Arrow Panel Placement

Unacceptable Arrow Panel Use

Flagger Operations

Qualifications

- All flaggers (except emergency personnel and law enforcement officers), shall be certified by a DelDOT-recognized flagger certification program.

Apparel

- Class 3 vests
- Orange head gear

Common Problems - Flagging

- Improper flagging techniques

- Incorrectly using STOP/SLOW paddles
- Using inadequate two-way radios

Flagging During Nighttime

- Flagger stations shall be illuminated at night (except in emergency situations)

Vertical Difference Guidelines

- Vertical Difference is created whenever a difference in grade of more than 1” exists
- Vertical Difference treatments shall meet the requirements indicated in Table 6G-1

Vertical Difference Guidelines
DelDOT MUTCD - Table 6G-1

Table 6G-1. Vertical Difference
(DelDOT MUTCD Only)

Type of Vertical Difference	Type of Direction	Height of Vertical Difference			
		≤ 25 mm (1 in)	> 25 mm (1 in) to < 50 mm (2 in)	≥ 50 mm (2 in) to ≤ 150 mm (6 in)	> 150 mm (6 in)
Longitudinal, < 3.7 m (12 ft) from edge of Travelway	Standard	• No channelizing devices required	• For differences along or between travelways, the UNEVEN LANES (W8-11) sign shall be used • For differences between the travelway and a shoulder, or at the edge of pavement less than 3 m (10 ft) from the travelway, the LOW SHOULDER (W8-9) sign shall be used	• At the end of the work day, a fillet of material, a wedge of gravel, or other suitable material as directed by the Chief Traffic Engineer or designee shall be placed in a manner that will provide stability for errant vehicles. This material shall be placed no steeper than a 4 to 1 slope. • Temporary traffic barrier shall be used if fillet cannot be placed • Drums shall be used throughout vertical difference condition, until fillet is placed [1] • Warning signs shall be used	• Temporary traffic barrier shall be used • Work area shall be limited to distances of not more than 305 m (1,000 ft) [1]
	Guidance		• Wedge not required, however, vertical difference should be eliminated no later than the following day • Drums should be used throughout vertical difference condition • Work area should be limited to distances of not more than 305 m (1,000 ft) [1]	• Work area should be limited to distances of not more than 305 m (1,000 ft) [1] • Cases should be used to determine additional devices required for specific operations	• Cases should be used to determine additional devices required for specific operations
Longitudinal, ≥ 3.7 m (12 ft) to ≤ 9.1 m (30 ft) from edge of Travelway [2],[3]	Standard	• No channelizing devices required	• No channelizing devices required	• Drums shall be used throughout vertical difference condition [2]	• Drums shall be used throughout vertical difference condition [2]
Transverse	Standard	• No channelizing devices required	• BUMP (W8-1) or DIP (W8-2) sign shall be used	• Ramp with Bituminous Temporary Roadway Material at a slope of 20 to 1 or flatter	• Ramp with Bituminous Temporary Roadway Material at a slope of 20 to 1 or flatter

[1] Unless otherwise directed by the Chief Traffic Engineer or designee
[2] No channelizing devices are required if the vertical difference is:
- outside right-of-way
- behind guiderail, barrier, or curb

[3] No channelizing devices are required if the vertical difference is further than 9.1 m (30 ft) from the edge of the roadway

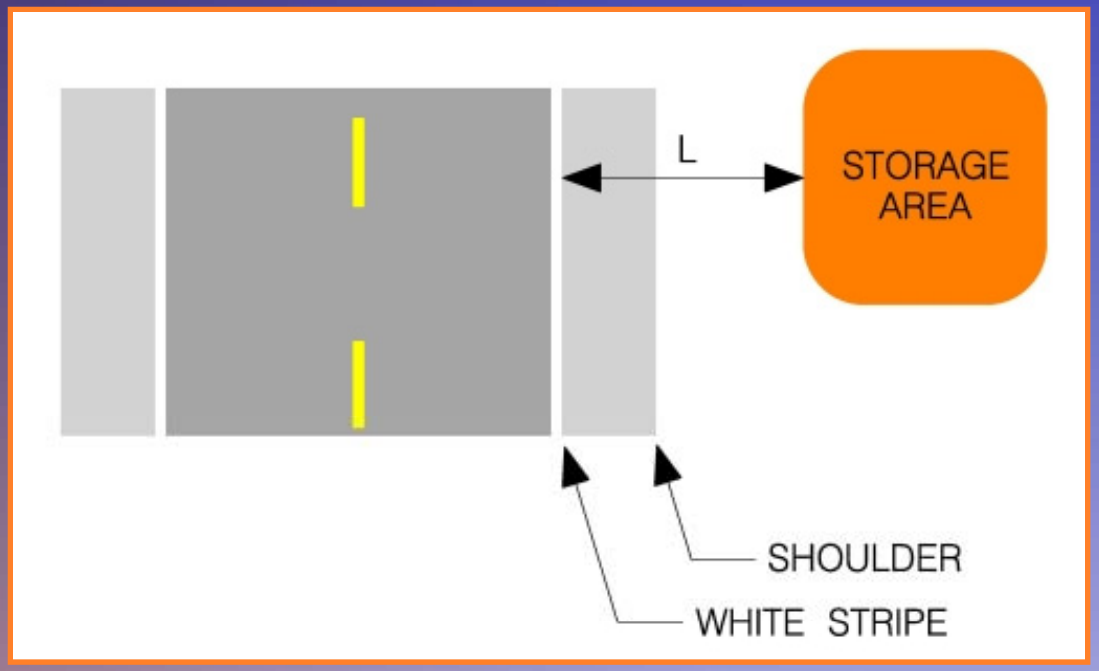
The edge of the travelway shall be defined as the white stripe. If there is no white line, the curb or the edge of pavement shall be the edge of the travelway.

Where: < = "Less than" ≤ = "Less than or equal to" ≥ = "Greater than or equal to" > = "Greater than"

Unacceptable Vertical Differences

Storage of Equipment

- Storage areas shall be treated as a road side obstacle



Storage of Equipment
DelDOT MUTCD – Table 6G-2

Table 6G-2. Storage of Equipment
(DelDOT MUTCD Only)

Road Type	Distance from Travelway*, L (feet)	Speed, V (mph)	Required Channelizing Devices
Flammable Materials (fuel, propane, etc.)			
All roadways			
	L ≤ 30	All	Temporary Traffic Barrier
	L > 30	All	Drums (Expressway) None (Other Roadways)
Equipment and All Other Materials			
Expressway / Freeway			
	L ≤ 30	All	Temporary Traffic Barrier
	L > 30	All	Drums
All other roadways			
	0 ≤ L ≤ 12	V ≤ 25	Drums
		V > 25	Temporary Traffic Barrier
	12 < L ≤ 30	V ≤ 25	None
		V > 25	Drums
	L>30	All	None

< "Less than"
≤ "Less than or equal to"
> "Greater than"

* The edge of the travelway shall be defined as the white stripe (see diagram below). If there is no white line, the curb or the edge of pavement shall be the edge of the travelway.

Questions