• New FHWA MUTCD published in Dec 2009

• 23 CFR 655.603
  – The MUTCD is the national standard
  – States having their own MUTCD’s or Supplements shall revise them to be in “substantial conformance” to the new FHWA MUTCD within 2 years (by Jan 15, 2012)

• DE MUTCD:
  - Draft version Posted to DE Register April 2011
  - Publication Target: July 2011
2009 MUTCD Format Revisions

- Paragraphs are numbered
- **Guidance is italicized**
- No more metric
- Definitions relocated to Part 1

Section 8A.08  Temporary Traffic Control Zones
Support:

01  Temporary traffic control planning provides for continuity of operations (pedestrians and bicycles, transit operations, and access to property/utilities) at a grade crossing is suspended because of temporary traffic control operations. Standard:

02  Traffic controls for temporary traffic control zones that include grade crossings and maintenance of right of way, as provided in Chapter 6, Part 6.

03  When a grade crossing exists either within or in the vicinity of a temporary traffic control zone, flagging (in accordance with Chapter 6E) or other operations shall not be used that would cause vehicles to stop on the railroad or LRT tracks, even if automatic warning devices are in place. Guidance:

04  Public and private agencies, including emergency services, businesses should meet to plan appropriate traffic detours and the necessary signing, operations during temporary traffic control zone activities. Consideration that the grade crossing is to be closed, the type of rail or LRT and highway materials and techniques of repair.

- **Standards remain bold**
- Options and support remain unformatted
Standards are requirements that **SHALL** be followed unless there is an Option.

Guidance is recommended and **SHOULD** be followed.

Options **MAY** be followed and are sometimes modifications to Standards and Guidance.
• Most Delaware Revisions were introduced in previous versions of the DE MUTCD and will be retained.

Today’s training will focus more on the new changes from the Federal MUTCD

• Old Parts 8 (RR) and 10 (LRT) are now combined
  – Reduces redundancy and cross-references
  – Sections renumbered to include Part 10 (LRT)

Since we have no LRT in DE, will not discuss as part of today’s training

• New chapter 8D added for Pathway Grade Crossings

• “Grade crossing” is a new generic term
PART 8 – TRAFFIC CONTROL FOR RAILROAD AND LIGHT RAIL TRANSIT GRADE CROSSINGS

- 8A: General
- 8B: Signs and Markings
- 8C: Flashing-Light Signals, Gates, and Traffic Control Signals
- 8D: Pathway Grade Crossings (New Chapter)
DE Revision:

- New standard indicating that the railroad company is responsible for installing and maintaining all traffic control devices within RR right-of-way in DE.
New Section on “Quiet Zones”

Supports new Final Rule (49 CFR Part 222) adopted by Federal RR Administration

All TCDs used as part of a Quiet Zone SHALL comply with the MUTCD

- This primarily refers to Section 8B.21 NO TRAIN HORN Sign or Plaque

More discussion in Part 8B...
Important Distinction: Passive Versus Active Grade Crossings

• **Passive traffic control systems** consist of signs and pavement markings only

134. Passive Grade Crossing—a grade crossing where none of the automatic traffic control devices associated with an Active Grade Crossing Warning System are present and at which the traffic control devices consist entirely of signs and/or markings.

• **Active traffic control systems** consist of flashing light signals with or without gates

3. Active Grade Crossing Warning System—the flashing-light signals, with or without warning gates, together with the necessary control equipment used to inform road users of the approach or presence of rail traffic at grade crossings.

These are not new changes, just important definitions to remember when considering changes that follow
These are not necessarily examples of correct applications of the MUTCD, but examples of existing crossings in Delaware.
Section 8B.04 - Crossbuck Assemblies with YIELD or STOP Signs at Passive Grade Crossings

**Standard:**

A grade crossing Crossbuck Assembly shall consist of a Crossbuck (R15-1) sign, and a Number of Tracks (R15-2P) plaque if two or more tracks are present, that complies with the provisions of Section 8B.03, and either a YIELD (R1-2) or STOP (R1-1) sign installed on the same support, except as provided in Paragraph 8. If used at a passive grade crossing, a YIELD or STOP sign shall be installed in compliance with the provisions of Part 2, Section 2B.10, and Figures 8B-2 and 8B-3.

- **YIELD or STOP sign shall be installed at all passive grade crossings**
  - except when road users are directed by an authorized person

**Significant change impacting all passive grade crossings**

- **Compliance date: 12/31/19**

DelDOT sent letter to RR reminding them of new MUTCD requirements, and requesting notification when changes have been made.
Section 8B.04 - Crossbuck Assemblies with YIELD or STOP Signs at Passive Grade Crossings

INIncorrect

Passive Grade Crossing

Firetower Rd (Road 334A)

CORRECT
Section 8B.04 - Crossbuck Assemblies with YIELD or STOP Signs at Passive Grade Crossings

• The YIELD sign **shall** be the default traffic control device at Passive Grade Crossings

• Need for a STOP sign to be determined by an engineering study
  – Only for unusual conditions
    • Sight Distance
    • Number of Tracks
    • Speed of Trains
    • Crash History
The YIELD or STOP signs may be co-posted with the Crossbuck Assembly or installed on a separate support.
Section 8B.04 - Crossbuck Assemblies with YIELD or STOP Signs at Passive Grade Crossings

At all public highway-rail grade crossings that are not equipped with the active traffic control systems that are described in Chapter 8C, except crossings where road users are directed by an authorized person on the ground to not enter the crossing at all times that an approaching train is about to occupy the crossing, a Crossbuck Assembly shall be installed on the right-hand side of the highway on each approach to the highway-rail grade crossing.

If a Crossbuck sign is used on a highway approach to a public highway-LRT grade crossing that is not equipped with the active traffic control systems that are described in Chapter 8C, a Crossbuck Assembly shall be installed on the right-hand side of the highway on each approach to the highway-LRT grade crossing.

Where restricted sight distance or unfavorable highway geometry exists on an approach to a grade crossing that has a Crossbuck Assembly, or where there is a one-way multi-lane approach, an additional Crossbuck Assembly shall be installed on the left-hand side of the highway.

Lateral Placement of Crossbuck Assembly

Right-hand side:
• at all highway-rail and highway-LRT grade crossings not equipped with active traffic control systems.

Left-hand side:
• in addition to the right-hand side sign,
• where restricted sight distance or unfavorable geometric conditions exist,
• or one-way multi-lane approach (new).
YIELD/STOP Sign Mounting Height

- **On existing crossbuck supports:**
  - Min. 4’ above near edge of travelled way
Section 8B.04 - Crossbuck Assemblies with YIELD or STOP Signs at Passive Grade Crossings

YIELD/STOP Sign Mounting Height

- **On existing crossbuck supports:**
  - Min. 4’ above near edge of travelled way

- **On new sign supports:**
  - Rural: min. 5’
  - Urban (or in areas with pedestrian movements or parking): min. 7’
Section 8B.04 - Crossbuck Assemblies with YIELD or STOP Signs at Passive Grade Crossings

Standard:

15  A vertical strip of retroreflective white material, not less than 2 inches in width, shall be used on each Crossbuck support at passive grade crossings for the full length of the back of the support from the Crossbuck sign or Number of Tracks plaque to within 2 feet above the ground, except as provided in Paragraph 16.

Option:

16  The vertical strip of retroreflective material may be omitted from the back sides of Crossbuck sign supports installed on one-way streets.

- A 2-inch wide white retroreflective strip **shall** be placed on the back of the crossbuck support
- May be omitted on signs along one-way streets

Remains the same as Old Manual

INCORRECT  

NEW/CORRECT

![Correct Example Image]
Section 8B.04 - Crossbuck Assemblies with YIELD or STOP Signs at Passive Grade Crossings

Option:

If a YIELD or STOP sign is installed on the same support as the Crossbuck sign, a vertical strip of red (see Section 2A.21) or white retroreflective material that is at least 2 inches wide may be used on the front of the support from the YIELD or STOP sign to within 2 feet above the ground.

• Red or white vertical strip **may** be used in front of sign support with *combined* Crossbuck Assembly.
If a Crossbuck sign support at a passive grade crossing does not include a YIELD or STOP sign (either because the YIELD or STOP sign is placed on a separate support or because a YIELD or STOP sign is not present on the approach), a vertical strip of retroreflective white material, not less than 2 inches in width, shall be used for the full length of the front of the support from the Crossbuck sign or Number of Tracks plaque to within 2 feet above the ground.

- **White vertical strip shall be used in front of sign support for Crossbuck Assembly with separate YIELD/STOP sign**
New Standard

Yield Ahead (W3-2) or Stop Ahead (W3-1) Advance Warning Sign **shall** be installed in accordance with Section 2C.36

- if the TCD is not visible for a distance (found in Table 2C-4) or
- may be installed for additional emphasis

When used, it **shall** be installed downstream from the W10-1 sign.
Section 8B.06 Grade Crossing
Advance Warning Signs (W10 Series)

**Stop/Yield assembly (as determined by RR)**

**Stop Ahead/Yield Ahead Advance Warning Sign**
(Section 8B.06)
Example of placement of Advance Warning Signs, where ample SD exists, but additional emphasis being provided.
Section 8B.07 EXEMPT Grade Crossing Plaques (R15-3P, W10-1aP)

DE Revision:

- New standard indicating that traffic control signals shall be installed at all highway-rail grade crossings designated as exempt crossings.
Section 8B.07 EXEMPT Grade Crossing Plaques (R15-3P, W10-1aP)

Exempt RR Crossing on SR 41
Sections 8B.09 DO NOT STOP ON TRACKS SIGN (R8-8)

Guidance:

If a STOP or YIELD sign is installed at a location, including at a circular intersection, that is downstream from the grade crossing such that highway vehicle queues are likely to extend beyond the tracks, a DO NOT STOP ON TRACKS sign (R8-8) should be used.

- **Should be used if a STOP or YIELD sign is located downstream from the grade crossing such that queues are likely to extend beyond tracks**

Reybold near SR 72

Possible location for a DO NOT STOP ON TRACKS sign (R8-8)

W. North St at S. West St in Dover
DE Revision:

- New option that DO NOT STOP ON TRACKS signs may be placed overhead to improve visibility of the sign.
Sections 8B.09 DO NOT STOP ON TRACKS SIGN (R8-8)

INCORRECT

Note vehicle stopping on tracks

Example of railroad grade crossing missing a DO NOT STOP ON TRACKS sign (R8-8) where it is likely needed. Could be posted overhead or on side of road

US 113 at SR 14 in Milford
Example of older DO NOT STOP ON TRACKS sign near another non-standard DO NOT STOP ON RAILROAD CROSSING sign
Guidance:

A LOOK sign should not be mounted as a supplemental plaque on a Crossbuck Assembly that has a YIELD or STOP sign mounted on the same support as the Crossbuck.

• Should not be mounted on a Crossbuck Assembly that has a STOP or YIELD sign.
When used, shall include:

- USDOT grade crossing inventory number
- Emergency contact telephone number
- Shall have a white legend and border on a blue background
- Shall be positioned to
  - not obstruct any traffic control devices
  - not limit the view of approaching rail traffic
Section 8B.18 Emergency Notification Sign (I-13)

Guidance:
06 Emergency Notification signs should be retroreflective.
07 Emergency Notification signs should be oriented so as to face highway vehicles stopped on or at the grade crossing or on the traveled way near the grade crossing.
08 At station crossings, Emergency Notification signs or information should be posted in a conspicuous location.
09 Emergency Notification signs mounted on Crossbuck Assemblies or signal masts should only be large enough to provide the necessary contact information. Use of larger signs that might obstruct the view of rail traffic or other highway vehicles should be avoided.

Should be:
• Retroreflective
• Oriented to face highway vehicles
• Posted in a conspicuous location
• Large enough to provide necessary contact information
• Avoid use of larger signs that might obstruct the view of traffic
Section 8B.18 Emergency Notification Sign (I-13)

INCORRECT

CORRECT

SR 10, west of Camden
Section 8B.21 – NO TRAIN HORN sign or Plaque (W10-9) and (W10-9P)

- Section 8B.21 NO TRAIN HORN plaque remains from prior MUTCD
- New sign (W10-9) added for locations where a W10-1 sign is not present, so use of W10-9P not possible.
- Requires (shall) either the sign or plaque to be installed in each direction (new) at all locations where quiet zones have been established per 8A.07
DE Revision:

- Option added to allow use of CYCLES USE CAUTION (W10-12P-DE) plaque to supplement the Skewed grade crossing sign.

- This plaque was carried forward from the old DE MUTCD.
DE Revision:

- Revised the standard to require no passing in both directions in advance of a RR grade crossing.

- This DE Revision was also carried forward from the old DE MUTCD.
New Standard:

- Crossings equipped with active control devices (flashing lights): a stop line **shall** be installed
Passive crossings: May use either Stop or Yield line with YIELD sign

DE Revisions:

- In DE, Yield lines are typically installed with YIELD signs
- Stop & Yield lines should be placed between 15 and 50 feet from the nearest rail
Section 8B.28 Stop and Yield Lines

Stop Ahead/Yield Ahead Advance Warning Sign (Section 8B.06)
Section 8B.28 Stop and Yield Lines

OLD

Double yellow centerline **SHALL** be installed based on volume criteria (Standard, per Section 3)

NEW

Yield Line **may** be installed (Option)

Firetower Rd (Road 334A)
Section 8B.28 Stop and Yield Lines

OLD

Double yellow centerline **SHALL** be installed based on volume criteria (Standard, per Section 3)

NEW

Yield Line may be installed (Option)

missing RR pavement marking symbol **SHALL** be installed (per Standard in current MUTCD) if Posted Speed > 40 mph

Firetower Rd (Road 334A)
CHAPTER 8C – Flashing-Light Signals, Gates & Traffic Control Signals
Section 8C.02 Flashing-Light Signals

Standard:

References to lenses in this Section shall not be used to limit flashing-light signal optical units to incandescent lamps within optical assemblies that include lenses.

Support:

Research has resulted in flashing-light signal optical units that are not lenses, such as, but not limited to, light emitting diode (LED) flashing-light signal modules.

• “Lenses” **shall** not limit flashing-light signal optical units to incandescent lamps with assemblies that include lenses.
• Example: LED flashing light signals

**DRAFT**

Guidance:

17  *(DE Revision)* Flashing-light signals should be designed in accordance with the Roadside Design Guide, either as crashworthy, with positive protection, or placed outside the clear zone.

**DE Revision:**

• **DE Guidance:** Flashing-light signals should be designed with positive protection or be placed outside the clear zone
Section 8C.03 Flashing Light Signals at Highway-LRT Grade Crossings

**Standard:**

03 If flashing-light signals are in operation at a highway-LRT crossing that is used by pedestrians, bicyclists, and/or other non-motorized road users, an audible device such as a bell shall also be provided and shall be operated in conjunction with the flashing-light signals.

- **Shall** provide an audible device such as a bell at active LRT crossings used by pedestrians, bicyclists and/or non-motorized road users.
- (was option, now standard)
- Remains an option for RR grade crossings
- Also a **standard** for active pathway grade crossings (see Chapter 8D)
Section 8C.04 Automatic Gates

- **Shall** have **vertical stripes instead of 45 degree diagonal stripes**.
- A damaged gate can be replaced with
  - a gate having vertical stripes or
  - a gate having diagonal stripes to maintain consistency with other existing gates at the **same grade crossing**

Old

![Old Gate Image]

New

![New Gate Image]
Wayside Horn Systems: a stationary horn (or series of horns) located at a grade crossing to warn of approaching rail traffic.

- New Section
- May be installed to provide audible warning
- **Required (shall) to operate according to the requirements defined in Section 8A.07, when used in quiet zones**
- Lateral clearance as described in Section 8C.01
- **Should be installed no closer than 15 feet from the center of the nearest track.**
Section 8C.07 Wayside Horn Systems

TRAIN HORN

WAYSIDE HORN

• **Type of preemption and any related timing parameters** *shall* be provided to the railroad company

• **Note:** DelDOT is in the process of upgrading signal cabinets (circuitry) at all intersections near Highway-Rail grade crossings to become MUTCD compliant.
New Section

Circular intersections – roundabouts and traffic circles

Circular Intersections within 200 feet of a grade crossing:

- Shall require an engineering study to determine if queuing could impact the grade crossing.
- If impacted, provisions shall be made to clear highway traffic from the crossing prior to the arrival of rail traffic.
Section 8C.12 Grade Crossings
Within or In Close Proximity to Circular Intersections

Support:
03 Among the actions that can be taken to keep the grade crossing clear of traffic or to clear traffic from the grade crossing prior to the arrival of rail traffic are the following:

A. Elimination of the circular intersection,
B. Geometric design revisions,
C. Grade crossing regulatory and warning devices,
D. Highway traffic signals,
E. Traffic metering devices,
F. Activated signs, or
G. A combination of these or other actions.

- Actions that can be taken to clear the traffic from the grade crossing
  - Elimination of the circular intersection
  - Geometric design revisions
  - Grade crossing regulatory and warning signs
  - Highway traffic signals
  - Traffic metering devices
  - Activated signs
- A combination of these or other actions
One possible solution if your roundabout is close to a railroad:
• New Chapter
• Pathway vs. Sidewalk (DelDOT’s definition)
  – A walkway located immediately adjacent to a roadway alignment is called a sidewalk
  – A walkway, bikeway or mixed-use path located away from a roadway alignment is called a pathway
• Sidewalk grade crossings are covered under prior sections of Part 8
• Pathway grade crossings now specifically addressed in Chapter 8D
Section 8D.01 Purpose

Delaware Revision:

• Sidewalks and shared-use paths that are adjacent to the highway are considered to be part of a highway-rail crossing (rather than a pathway grade crossing)
• Covered in Chapters 8B & 8C
• However, many of the treatments in Chapter 8D still apply

Support: DRAFT

Except as specifically provided in this Chapter, sidewalks and shared-use paths that are parallel and adjacent to the highway are considered to be part of a highway-rail or highway-LRT grade crossing rather than a pathway grade crossing, and are covered by the provisions of Chapters 8B and 8C rather than by the provisions of this Chapter. However, many of the treatments outlined in this Chapter are applicable to sidewalks adjacent to highway-rail or highway-LRT grade crossings, including detectable warnings, swing gates, and automatic gates.
Section 8D.03 Pathway Grade Crossing Signs and Markings

- All signs **shall** be standard in shape, legend, and color.
- Minimum lateral clearance required = **2 feet**
- Minimum mounting height required for post mounted signs = **4 feet**
- Minimum lateral clearance required for overhead signs = **8 feet**
Section 8D.03 Pathway Grade Crossing Signs and Markings

Pathway grade crossing traffic control devices shall be located a minimum of 12 feet from the center of the nearest track.

Guidance:
If pathway users include those who travel faster than pedestrians, such as bicyclists or skaters, the use of warning signs and pavement markings in advance of the pathway grade crossing (see Figure 8D-1) should be considered.

- Minimum distance required from the center of the nearest track to traffic control devices = 12 feet
- Advance warning signs as shown in Figure 8D-1

Note: For active pathway grade crossings and passive pathway grade crossings with stop control, a stop line should be used, as shown. For passive grade crossings with yield control, a yield line should be used.

** Stop line should be placed 2 feet farther from the nearest rail than any gate, counterweight, or flashing light signals, if present.
The minimum sizes of pathway grade crossing signs shall be as shown in the shared-use path column in Table 9B-1.

<table>
<thead>
<tr>
<th>Sign or Plaque</th>
<th>Sign Designation</th>
<th>Section</th>
<th>Shared-Use Path</th>
<th>Roadway</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stop</td>
<td>R1-1</td>
<td>2B.05, 9B.03</td>
<td>18 x 18</td>
<td>30 x 30</td>
</tr>
<tr>
<td>Yield</td>
<td>R1-2</td>
<td>2B.08, 9B.03</td>
<td>18 x 18 x 18</td>
<td>30 x 30 x 30</td>
</tr>
<tr>
<td>Bike Lane</td>
<td>R3-17</td>
<td>9B.04</td>
<td>—</td>
<td>24 x 18</td>
</tr>
<tr>
<td>Bike Lane (plaques)</td>
<td>R3-17aP, R3-17bP</td>
<td>9B.04</td>
<td>—</td>
<td>24 x 8</td>
</tr>
<tr>
<td>Movement Restriction</td>
<td>R4-1,2,3,7,16</td>
<td>2B.28,29,30,32; 9B.14</td>
<td>12 x 18</td>
<td>18 x 24</td>
</tr>
<tr>
<td>Begin Right Turn Lane Yield to Bikes</td>
<td>R4-4</td>
<td>9B.05</td>
<td>—</td>
<td>36 x 30</td>
</tr>
<tr>
<td>Bicycles May Use Full Lane</td>
<td>R4-11</td>
<td>9B.06</td>
<td>—</td>
<td>30 x 30</td>
</tr>
<tr>
<td>Bicycle Wrong Way</td>
<td>R5-1b</td>
<td>9B.07</td>
<td>12 x 18</td>
<td>12 x 18</td>
</tr>
<tr>
<td>Push Button to Turn On Warning Lights</td>
<td>R10-25</td>
<td>9B.11</td>
<td>9 x 12</td>
<td>9 x 12</td>
</tr>
<tr>
<td>Bike Push Button for Green Light (arrow)</td>
<td>R10-26</td>
<td>9B.11</td>
<td>9 x 15</td>
<td>9 x 15</td>
</tr>
<tr>
<td>Grade Crossing (Crossbuck)</td>
<td>R15-1</td>
<td>8B.03, 9B.14</td>
<td>24 x 4.5</td>
<td>48 x 9</td>
</tr>
<tr>
<td>Number of Tracks (plaque)</td>
<td>R15-2P</td>
<td>8B.03, 9B.14</td>
<td>13.5 x 9</td>
<td>27 x 18</td>
</tr>
<tr>
<td>Look</td>
<td>R15-8</td>
<td>8B.17, 9B.14</td>
<td>18 x 9</td>
<td>36 x 18</td>
</tr>
<tr>
<td>Turn and Curve Warning</td>
<td>W1-1,2,3,4,5</td>
<td>2C.04, 9B.15</td>
<td>18 x 18</td>
<td>24 x 24</td>
</tr>
</tbody>
</table>
Delaware Revision:

- STOP sign = stop line
- YEILD sign = yield line at all passive pathway grade crossings
- Stop lines should be used all active pathway grade crossings

**Note:** For active pathway grade crossings and passive pathway grade crossings with stop control, a stop line should be used, as shown. For passive grade crossings with yield control, a yield line should be used.

**Stop line should be placed 2 feet farther from the nearest rail than any gate, counterweight, or flashing light signals, if present.**
• **Crossbuck Assembly** shall be installed on each approach to a pathway grade crossing except:
  – At station crossings
  – Approach to a crossing located within 25 ft of the traveled way.

• **Swing gates** shall be designed
  – to open away from the track(s)
  – automatically return to the closed position after each use.
• If used, an active traffic control systems at pathway grade crossings shall
  – include flashing light signals for each direction of the pathway
  – be provided with a bell or other audible warning device
• Alternately flashing red lights shall
  – Be aligned horizontally
  – Shall be at least 4 inches in diameter
  – Be mounted at least 4 feet high
Where a sidewalk is between the roadway and gate support:

- **The location, placement and height prescribed for vehicular gates shall be used**

If a separate automatic gate is used for a sidewalk:

- **The height of the gate arm when in the down position should be 2.5 – 4 feet above the sidewalk**
- **A separate mechanism should be provided to prevent a pedestrian from raising the vehicular gate**
Example of Sidewalk/Pathway Between Roadway and Gate Support

Figure 8C-5. Example of a Shared Pedestrian/Roadway Gate

Figure 8C-6. Example of a Separate Pedestrian Gate

Note: The provision of a separate pedestrian gate is optional based upon site-specific conditions. If a separate pedestrian gate is provided, the need for a separate Crossbucks sign, audible device, and flashing-light signals should be determined based upon site-specific conditions such as the proximity of the sidewalk or shared-use path to the roadway grade crossing devices.

SR 14 in Harrington