

Temporary Traffic Control Device Quality Standards and Field Practices



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Objectives

Temporary traffic control (TTC) devices are a necessary part of work zones as they guide motorists and pedestrians safely through the work zone, warning them of potential hazards and separating them from the workers. Therefore, it is important that the traffic control devices are in good condition and are placed according to established State Highway Administration (SHA) standards and practices.

This handbook was developed to provide assistance to SHA Inspectors, Project Engineers, Traffic Engineers, Contractors and other personnel in understanding the quality classifications and acceptability requirements regarding temporary traffic control devices and their suitability for placement in work zones.

These same principles and guidelines apply to highway workers involved with incident management.

Quality Standards

As the appearance of temporary traffic control devices deteriorates, either due to damage from errant vehicles or from wear occurring while on site, in storage, and in transport, the devices need to be replaced to maintain the integrity of the temporary traffic control set-up.

Furthermore, this handbook intends to serve as the means of settling disputes regarding the acceptability of devices (condition, coloring, retrofit, retro-reflectivity etc.) that are installed on SHA rights-of-way.

Field Practices

In addition to reviewing the condition of individual traffic control devices, inspectors/reviewers are responsible for evaluating field practices associated with these devices, including placement and maintenance.

This handbook will assist inspectors/reviewers in identifying improper Maintenance of Traffic practices and/or TTC devices. This handbook includes examples and photos of deficiencies.

Authority to Maintain TTC Devices

The Manual on Uniform Traffic Control Devices (MUTCD), 2003 Edition, states: "TTC zones should be carefully monitored under varying conditions of road user volume, light, and weather to check that applicable TTC devices are effective, clearly visible, clear, and in compliance with the TTC plan."

The Maryland Manual on Uniform Traffic Control Devices (MdMUTCD) 2006 Edition indicates that TTC devices shall be properly maintained for cleanliness, visibility, and correct positioning. Devices that have lost significant legibility and visibility shall be repaired or replaced.

SHA's "Standard Specifications for Construction and Materials", Section 104-Maintenance of Traffic, describes device requirements and the need for the replacement of defective devices.

Quality Classifications & Requirements

There are two categories of quality classifications of TTC devices: acceptable and unacceptable.

Acceptable

All TTC devices shall be considered acceptable if they meet the requirements that follow, provided they also meet all other requirements (design, size, color, etc.) described in SHA's "Standard Specifications for Construction and Materials", are NCHRP Report 350 approved (if applicable), and are an SHA "Qualified Product". Acceptable TTC devices are those devices that are new or like new, i.e. have marginally acceptable deterioration or damage.

Unacceptable

Unacceptable devices shall not be delivered to the job site. When found in work zones, they shall be repaired or replaced within the time frame outlined in SHA's "Standard Specifications for Construction and Materials". For the purposes of this guide, illustrations of acceptable devices would correlate only to devices in "like new" condition, the minimum acceptable quality of the traffic control device.

The following illustrations and descriptions should be used as a guide to help determine if a device should be considered acceptable or unacceptable.

TTC SIGNS

Acceptable

- New or like new condition (minimum acceptable quality as shown below).
- Clearly legible per MdMUTCD/SHA criteria.
- Surface free of residue, tape, or other foreign materials.
- Minimum of 70% reflectivity over 90% of the reflectorized surface at initial installation.



(See page 29 for more information)

TTC SIGNS

Unacceptable

- Less than 70% reflectivity over 90% of the reflectorized surface.
- Partially illegible legend.
- Visually damaged or faded.
- Contains foreign matter, such as tape, residue, or advertisements.

Unacceptable signs shall be replaced by the contractor within four hours of notification by the engineer.



CONES

Acceptable

- New or like new condition (minimum acceptable quality as shown below).
- Sheeting has only minor tears and scratches.
- The intended original shape is maintained.
- Free of residue and not missing reflective material.
- Minimum of 80% reflectivity over 90% of the reflectorized surface at initial installation.



(See page 33 for more information)

CONES

Unacceptable

- Less than 80% reflectivity over 90% of the reflectorized surface.
- Deformation/dents/material loss that alter the intended shape.
- Coverage by asphalt or cement residue over more than 10% of the surface.
- Lettering or markings other than what is specified in 104.14.03 of the Standard Specifications.

Unacceptable cones shall be replaced by the contractor within four hours of notification by the engineer.



DRUMS

Acceptable

- New or like new condition (minimum acceptable quality as shown below).
- Sheeting has only minor tears and scratches.
- The intended original shape is maintained.
- Free of residue and not missing reflective material.
- Minimum of 80% reflectivity over 90% of the reflectorized surface at initial installation.
- Base appropriately weighted, between 20 and 40 lbs.



(See page 33 for more information)

DRUMS

Unacceptable

- Less than 80% reflectivity over 90% of the reflectorized surface.
- Deformation/dents/material loss that alter the intended shape.
- Coverage by asphalt or cement residue over more than 10% of the surface.
- Lettering or markings other than what is specified in 104.12.03 of the Standard Specifications.
- Missing or inappropriate weighting (i.e. top of drum).

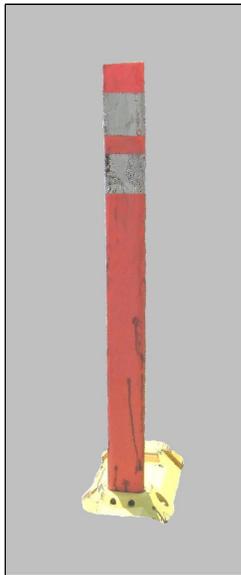
Unacceptable drums shall be replaced by the contractor within four hours of notification by the engineer.



TUBULAR MARKERS

Acceptable

- New or like new condition (minimum acceptable quality as shown below).
- Sheeting has only minor tears and scratches.
- The intended original shape is maintained.
- Minimum of 80% reflectivity over 90% of the reflectorized surface at initial installation.



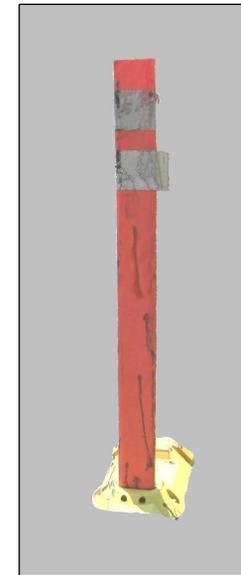
(See page 33 for more information)

TUBULAR MARKERS

Unacceptable

- Less than 80% reflectivity over 90% of the reflectorized surface.
- Deformation/dents/material loss that alter the intended shape or the device is not vertically plumb.
- Contains asphalt or cement residue over more than 10% of the surface.
- Resetting mechanism is inoperable.

Unacceptable tubular markers shall be replaced within four hours of notification by the engineer.



BARRICADE PANELS & VERTICAL PANELS

Acceptable

- New or like new condition (minimum acceptable quality as shown below).
- Conveys clear and simple meaning per MdMUTCD/SHA criteria.
- Surface free of residue, tape, or other foreign matters.
- Minimum of 70% reflectivity over 90% of the reflectorized surface at initial installation.



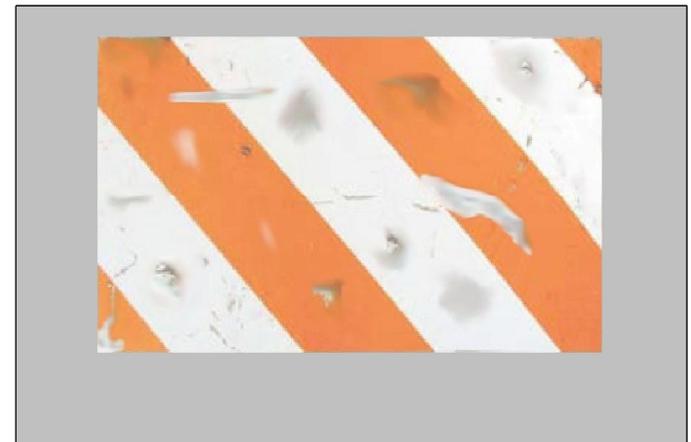
(See page 29 for more information)

BARRICADE PANELS & VERTICAL PANELS

Unacceptable

- Less than 70% reflectivity over 90% of the reflectorized surface.
- Visually damaged or faded.
- Coverage by foreign materials, such as tape, residue, and advertisements.

Unacceptable panels shall be replaced by the contractor within four hours of notification by the engineer.



PAVEMENT MARKINGS

Acceptable

- No more than 5% of all tape, paint or message is missing within any 2000 ft. section.
- No more than one consecutive skip line is missing.
- No more than 10 continuous feet of solid line is missing.



(See page 31 for more information)

PAVEMENT MARKINGS

Unacceptable

- More than 5% of all tape, paint or message is missing within any 2000 ft. section.
- Two or more consecutive skip lines are missing.
- More than 10 continuous feet of solid line is missing.
- Black out tape not completely covering permanent markings.
- Retro-reflectance falls below 150 millicandelas per lux per square meter for white and 100 for yellow, as specified in 104.11.03 of the Standard Specifications.

Unacceptable pavement markings shall be corrected within four hours of notification or as directed by the engineer.



HIGH VISIBILITY APPAREL

Acceptable

- New or like new condition (minimum acceptable quality as shown below).
- Good visibility/reflectivity.
- Some soiling or light fading.
- Good color contrast.
- Current ANSI/ISEA Standard, Class II minimum retroreflectivity.



DAYTIME



NIGHTTIME

(See page 35 for more information)

HIGH VISIBILITY APPAREL

Unacceptable

- Little or no reflectivity.
- Significant soiling and/or fading.
- Poor color contrast.
- Not in accordance with current ANSI/ISEA Standard, Class II Apparel.

Unacceptable apparel shall be replaced immediately upon notification by the engineer.



DAYTIME



NIGHTTIME

TEMPORARY RAISED PAVEMENT MARKERS (RPMs)

Acceptable

- No more than 10% of the total RPMs or more than two consecutive RPMs are missing/malfunctioning.
- Conveys clear and simple meaning per SHA Criteria (MdMUTCD, Standard Specifications, etc.).

Unacceptable

- More than 10% of the total RPMs or three or more consecutive RPMs are missing/malfunctioning.

Unacceptable RPMs shall be repaired/replaced within 24 hours after notification to contractor.

ACCEPTABLE



UNACCEPTABLE



(See page 31 for more information)

ARROW PANELS

Acceptable

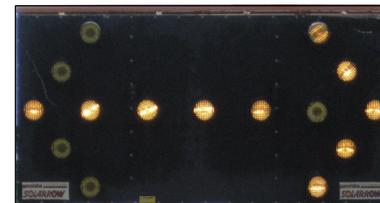
- Arrow Mode - no more than one lamp out in stem, and none out in arrow head.
- Caution Mode - all 4 lamps operating.

Unacceptable

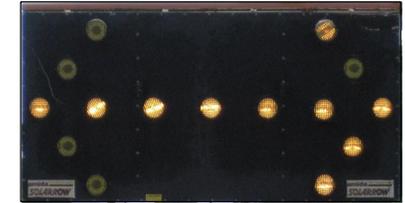
- Arrow Mode - two or more lamps out in stem, or one or more out in arrow head.
- Caution Mode - less than four functioning lamps.

Unacceptable arrow panels shall have the appropriate number of lamps operational within four hours of notification by the engineer.

ACCEPTABLE



UNACCEPTABLE



(See page 27 for more information)

PORTABLE VARIABLE MESSAGE SIGNS (PVMS)

Acceptable

- 90% or more of the pixels in each character are operating properly.
- Clearly visible and legible per SHA criteria (MdMUTCD, Standard Specifications, etc.).

Unacceptable

- Less than 90% of the pixels in each character are operating properly.
- Visibility and legibility less than 900 feet, as required by SHA Criteria.

Unacceptable PVMS shall be repaired within four hours after notification to contractor.

(See page 37 for additional guidelines)

TTC Device Field Practices

This handbook will assist inspectors/reviewers in identifying improper Maintenance of Traffic practices and TTC devices. This handbook includes examples and photos of deficiencies.

Illustrations of these deficient practices should serve as a reminder to consider the condition and placement of the TTC devices listed in this handbook. Also, the practices listed in this handbook should not be assumed to address all TTC devices.

Additionally, the following conditions should be noted and corrected if encountered in the field:

- Lane closures with no ongoing operations/work.
- Improper stopping, detouring, or access of traffic and/or pedestrians.
- Unprotected hazards on or adjacent to travelway.
- Non-compliant pavement drop-off or drop-off protection.

TEMPORARY CONCRETE BARRIER/END TREATMENTS

Examples of Unacceptable Field Practices

- ① Improper barrier wall flare
- ② Improper/missing barrier end treatment
- ③ Improper barrier end transition with existing W-beam or concrete barrier
- ④ Non-standard/missing object marker/vertical panel
- ⑤ Reflector maintenance needed
- ⑥ Reflector on barrier not allowed
- ⑦ Barrier wall damaged or dirty
- ⑧ Improper barrier delineation
- ⑨ Inadequate/missing crash cushion
- ⑩ Improper installation of crash cushions, including missing lids
- ⑪ Crash cushions damaged or dirty



① ②



① ②



⑩

ARROW PANELS

Examples of Unacceptable Field Practices

- ① None or Non-standard
- ② Malfunction (unlit bulbs, etc.)
- ③ Incorrect placement
- ④ Incorrectly aimed (or misaligned bulbs)
- ⑤ Improper nighttime dimming
- ⑥ Not protected as required by SHA standard
- ⑦ Inadequate sight distance
- ⑧ Wrong indication/display



② ③ ⑥



③ ⑥

SIGNS/SIGN SUPPORTS

Examples of Unacceptable Field Practices

- 1 SHA's typical or TCP (for the current phase of the job) not followed
- 2 Non-standard type (material, size, color)
- 3 Poor reflectivity
- 4 Conflicting permanent & temporary signing
- 5 Sign legend unclear; illegible
- 6 Signs are obstructed, damaged, dirty, non-standard, not visible, or have duct tape and/or overlay plates on the sign faces.
- 7 Wrong message
- 8 Inappropriate/contradictory signs not covered/removed
- 9 Sign support deficiency
- 10 Sign missing or down
- 11 Horizontal and vertical clearance requirements not followed
- 12 Improper installation



12



6



9

10

PAVEMENT MARKINGS

Examples of Unacceptable Field Practices

- ① None or non-standard markings
- ② Less than full complement of pavement markings/delineation
- ③ Unnecessary or conflicting markings not obliterated completely
- ④ Failing of temporary markings/RPMs
- ⑤ Less than required number of RPMs
- ⑥ Improper alignment
- ⑦ Incorrect skip size/space



③



③

CHANNELIZING DEVICES (CONES, DRUMS, ETC.)

Examples of Unacceptable Field Practices

- ① Non-standard device (shape, density, sheeting)
- ② Non-standard single or multilane taper
- ③ Incorrect spacing
- ④ Placed too far away from traffic (> 2 ft.)
- ⑤ Damaged, dirty or non-reflective
- ⑥ Improper alignment/devices knocked down
- ⑦ No CDs placed preceding barrier end sections
- ⑧ Improperly weighted/secured
- ⑨ Missing or poor reflectivity
- ⑩ Signs mounted on devices



⑥ ⑧



⑧



① ⑩

FLAGGING OPERATIONS

Examples of Unacceptable Field Practices

- ① Non-registered flagger
- ② STOP/SLOW paddle is non-standard
- ③ Incorrect signaling device (flag)
- ④ Incorrect flagging procedures/practices
 - Flagger should face stopped traffic.
 - Flagger should be on shoulder near travel lane when "SLOW" is being displayed.
 - Flagger should stand in travel lane only when traffic is completely stopped.
- ⑤ Wearing improper apparel (per current ANSI/ISEA standard, Class II)
- ⑥ No flaggers present (sign displayed)
- ⑦ Improper distance from advance warning sign to flagger
- ⑧ No advance warning signs



④



④

⑧



⑥

PORTABLE VARIABLE MESSAGE SIGNS

Examples of Unacceptable Field Practices

- ① Application does not meet SHA guidelines
- ② Incorrect or unapproved message
- ③ Non-standard or unapproved PVMS equipment
- ④ Not protected as per SHA standard 104.01.22
- ⑤ Improper placement
- ⑥ Inadequate sight distance
- ⑦ Too many messages/sequences/stages
(SHA permits 2-stage message at maximum)



④ ⑤

Note: A minimum of seven devices should be used to form the shoulder taper.

Choose Safety for Life



**Drive Safely.
Stay Alert.
Stay Alive.**

For additional information, contact:
Maryland Department of Transportation
State Highway Administration
Office of Traffic and Safety
Traffic Development & Support Division
7491 Connelley Drive
Hanover, MD 21076
1-888-963-0307

Melinda Peters
Maryland State Highway Administrator

www.marylandroads.com