

Quality Standards

Methods to determine whether the various traffic control devices are Acceptable, Marginal, or Unacceptable.



Quality Standards

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These standards as well as the entire Field Manual, Flagging Handbook, and other documents are available on the MnDOT Traffic Engineering website:

www.dot.state.mn.us/trafficeng

Introduction

Traffic controls are a necessary part of a Temporary Traffic Control (TTC) zone to warn motorists of hazards, advise them of the proper path through the zone, delineate areas where they may not operate, and to separate them from the workers. This is accomplished by the deployment of a system of devices. The success of this system depends on the visibility of each device at the time of a project's initial installation as well as throughout the life of the project. Since it is not practical to require new devices at all times, standards are needed to evaluate the condition of the devices to assure their continued effectiveness. The standards in this publication should aid in the determination of the quality of temporary traffic control devices.

The use of TTC devices subjects them to wear which does not occur with permanent devices. Although errant vehicles cause much of the damage to the devices, they also deteriorate in appearance from wear that occurs during storage, shipment, installation, relocation, and removal. When many of these worn and damaged devices appear on the same project, the general appearance of the temporary traffic control zone deteriorates, reducing the level of safety provided to the workers, pedestrians, and traveling public.

The following quality standards have been developed in an effort to offset the deterioration in the appearance of TTC devices. A determination of the condition of device quality should be made at several stages: while in storage, during preparation for delivery to the temporary traffic control zone, during initial set up, and periodically during the course of the work. Suppliers and contractors are encouraged to apply this standard prior to delivery of devices to the job site. Doing so will minimize agency involvement and reduce costs related to on-site replacement.

These standards are intended to cover the quality of TTC devices for planned work and are not meant to cover the needs of emergency situations.

Quality Classifications and Requirements

Temporary Traffic Control (TTC) devices in this standard have been divided into three quality classifications: **Acceptable, Marginal, and Unacceptable.**

1. **Acceptable Devices** meet MN MUTCD requirements such as design, size, color, weight, etc., are properly placed as specified, and clearly perform their intended function.
2. **Marginal Devices** are considered marginally acceptable or reaching the lower end of acceptability.
3. **Unacceptable Devices** shall not be delivered to the job site.

All TTC devices (except Category 4 trailer mounted devices) used in work zones shall be crashworthy.

The required minimum percentage of acceptable devices has been established for each type of device and varies upon the duration of the Temporary Traffic Control (TTC) zone.

Intermediate and Long Term Duration

The following requirements shall be followed for TTC zones that are to remain in place for more than twelve (12) hours:

- At the time of the initial set up or at the time of major stage changes, one hundred percent (100%) of each type of device (channelizers, barricades, signs, warning lights, arrow boards, portable changeable message signs, pavement tape, and raised pavement markers) shall be classified as "acceptable".
- Throughout the duration of the project, the number of acceptable devices may decrease to seventy-five percent (75%) of the initial quantity of each particular device, as a result of damage and/or deterioration during the course of the work with the remainder of the devices in the "marginal" category.
- Devices in the marginal category may remain in the temporary traffic control zone until their total number exceeds the twenty-five percent (25%) maximum for that type of device, which is considered an "unacceptable" situation. Should the percentage of devices in the marginal category exceed twenty-five percent (25%), all marginal devices shall be replaced so as to bring the group of devices back up to acceptable standards.
- All devices categorized as unacceptable shall be replaced within twelve (12) hours of notification.
- Missing or knocked down devices should be replaced or re-set in a timely manner.

Short Term Duration

The following requirements may be followed for TTC zones that are to remain in place for less than twelve (12) hours:

- At the time of the initial set up, one hundred percent (100%) of all TTC devices except channelizing devices and barricades shall be classified as "acceptable". During the short term duration of the project, the intermediate and long term duration standards shall be maintained for these devices.
- At the time of the initial set up, a minimum of seventy-five percent (75%) of each type of channelizer and barricade shall be classified as "acceptable". Up to a maximum of twenty-five percent (25%) of these devices may be classified as "marginal". "Unacceptable" devices shall not be installed.
- During the short term duration of the project, the number of marginal devices may increase beyond the twenty-five percent (25%) of the initial quantity, as a result of damage and/or deterioration during the course of the work.
- Missing or knocked down devices should be replaced or re-set in a timely manner.

The following descriptions, together with the accompanying photographs, should be used to determine if a device is acceptable, marginal, or unacceptable.

EVALUATION GUIDE: Warning Signs

Acceptable

To be considered acceptable, a sign shall meet all of the following conditions:

- There may be several abrasions on the surface, but very little loss of lettering.
- There has been no touch up of the lettering.
- The message is legible both day and night.
- Sign faces shall be approximately perpendicular to the roadway. Post-mounted signs are no more than 3 inches out-of-plumb for the entire height of the assembly. Signs on portable stands are no more than 3 inches per foot out-of-plumb for the entire height of the assembly.
- The back side is free of any retroreflective materials except small logos or identification markings and have a bare surface or be painted a uniform color as approved by the road authority.
- The sign is in place at the specified spacing and properly aligned to traffic.

Examples of "Acceptable" warning signs.



EVALUATION GUIDE: Warning Signs, cont.

Marginal

Signs are considered marginal if they meet all conditions listed under acceptable with the exception of either of the following conditions:

- There are many surface abrasions throughout the sign face, and only a few are within the individual letters of the message.
- Some color fading may be evident, but the background color and retroreflectivity are still apparent at night.

Examples of "Marginal" warning signs.



EVALUATION GUIDE: Warning Signs, cont.

Unacceptable

A sign is considered unacceptable if it meets any of the following conditions:

- Asphalt splatter, cement slurry, other residue, or abrasions that are evident on the face of the sign.
- Portions of letters are missing such that they become confusing to identify.
- The message is illegible or defaced.
- There is noticeable color fading or loss of retroreflectivity at night.
- Sign face is not perpendicular to the roadway.
- Signs on post-mounted structures are installed more than 3 inches out-of-plumb for the entire height of the assembly.
- Signs on portable structures are more than 3 inches per foot out-of-plumb for the entire height of the assembly.
- Signs are damaged or defaced in a way that they no longer have the same shape as a new sign.

Examples of "Unacceptable" warning signs.



EVALUATION GUIDE: Type A & B Channelizing Devices

Acceptable

To be considered acceptable, a channelizing device shall meet all of the following conditions:

- The shape should remain clearly identifiable with no significant distortion and shall be free standing in its normal position.
- Surface is free of punctures and abrasions.
- Surface is free of asphalt splatter, cement slurry, or other material, and will readily respond to washing.
- The retroreflective bands have little or no loss of retroreflectivity, with only minor tears and scratches.
- Any dents do not seriously reduce the retroreflectivity of the sheeting.



Marginal

The channelizing device is considered marginal if it meets any of the following conditions:

- The surface has some asphalt splattering or cement slurry and may not be readily cleaned due to abrasions and discoloration.
- The retroreflective bands have numerous tears and scratches; but have no large areas of residue or missing retroreflective material.
- Any dents do not reduce the strength of the device.



EVALUATION GUIDE: Type A & B Channelizing Devices, cont.

Unacceptable

A channelizing device is considered unacceptable if it meets any of the following conditions:

- Punctures and large areas of staining asphalt splatter or cement slurry that cannot be cleaned due to abrasions or discoloration.
- There is noticeable fading of the device's color.
- Large areas of missing or stained retroreflective material.
- Substantial deformation of a device, which reduces the original dimensions, or the device has lost the intended shape.
- Several dents or fractures that affect their stability or ability to retain the retroreflective sheeting.



EVALUATION GUIDE: Type I, II, or III Barricade Panels or Vertical Panels

Acceptable

To be acceptable, the panel shall meet all of the following conditions:

- Panels are not deformed to an extent so as to decrease the panels target value.
- There may be several abrasions on the surface but very little loss of retroreflective sheeting.
- The orange is vivid and the stripes provide contrast.
- The Type III barricade has been fabricated according to the approved crashworthy requirements.



Marginal

The panel is considered marginal if it meets any of the following conditions:

- Panels are not deformed to an extent so as to decrease the panels target value.
- There are numerous surface abrasions through the panel surface.
- Some color fading is evident; however, it has no large areas of residue or missing retroreflective material.
- The Type III barricade has been fabricated according to the approved crashworthy requirements.



Unacceptable

A panel is considered unacceptable if it meets any of the following conditions:

- The surface is marred over a high percentage of the panel area.
- There is a noticeable loss of retroreflectivity and obvious color fading.
- Panels with asphalt splatter, cement slurry, and/or other residue or any combination of missing and covered retroreflective material.
- Barricades have bent or twisted legs, or deformation of the support assembly to the extent that the barricade panel is not reasonably parallel to the roadway surface.



EVALUATION GUIDE: Warning Lights

Acceptable

To be acceptable, warning lights shall meet all of the following conditions:

- One hundred percent (100%) of all warning lights shall be operating properly. Any warning light that is out of alignment from the intended driver's line of vision is considered not operating properly.
- Type A Low-Intensity Flashing warning lights and Type C Steady-Burn warning lights shall be maintained so as to be capable of being visible on a clear night from a distance of 3000 feet.
- Type B High-Intensity Flashing warning lights shall be maintained so as to be capable of being visible on a sunny day when viewed without the sun directly on or behind the device from a distance of 1000 feet.
- Warning lights shall have a minimum mounting height of 30 inches to the bottom of the lens.

Marginal

The warning light is marginal when it meets any of the following conditions:

- Type A and C warning lights - at least ninety percent (90%) of the warning lights shall be operating properly with no more than three (3) adjacent lights failing.
- Type B warning lights - one (1) light failing.

Unacceptable

A warning light is considered unacceptable if it meets any of the following conditions:

- Type A and C warning lights - less than ninety percent (90%) of the warning lights operating properly, or more than three (3) adjacent lights failing.
- Type B warning lights - more than one (1) light failing.

EVALUATION GUIDE: Flashing Arrow Boards

Acceptable conditions for all arrow boards

An arrow board is acceptable if it meets all of the following conditions:

- All lamps are properly aligned for the intended driver's line of vision. Any operating lamp which is out of alignment shall be considered not functioning properly.
- No lamps are burnt out.
- All lamps dim properly.
- All lamps are the same level of intensity.

Unacceptable conditions only for truck or trailer-mounted arrow boards

An arrow board is unacceptable if it meets any of the following conditions:

- The arrow board is not within 3 inches of plumb for the height of the board.
- The trailer-mounted arrow board is not raised to at least 7 feet above the roadway surface (measured to the bottom of the board).
- The truck-mounted arrow board is mounted less than 3 feet above the roadway surface (measured to the bottom of the board) unless the road authority determines the height is as high as practical.

FLASHING ARROW MODE and SEQUENTIAL ARROW MODE

Marginal

An arrow board in this mode is marginal if it meets the following condition:

- Up to two (2) lamps out in the stem and no lamps out in the head.

Unacceptable

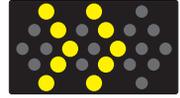
An arrow board in this mode is unacceptable if it meets any of the following conditions:

- Any lamp out in the head.
- More than two (2) lamps out in the stem.
- The arrow board message is not visible at 1000 feet.



EVALUATION GUIDE: Flashing Arrow Boards, cont.

CHEVRON MODE



Marginal

An arrow board in this mode is marginal if it meets the following condition:

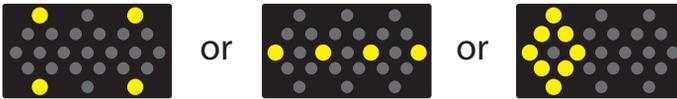
- No more than one (1) lamp out in any one chevron segment.

Unacceptable

An arrow board in this mode is unacceptable if it meets any of the following conditions:

- Two (2) or more lamps out in any one chevron segment.
- The arrow board message is not visible at 1000 feet.

CAUTION MODE (4 Corners, Bar, or Alternating Diamonds)



Marginal

An arrow board in this mode is marginal if it meets the following condition:

- At least seven (7) lamps functioning properly in each diamond shape (on the Alternating Diamonds).

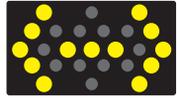
Unacceptable

An arrow board in this mode is considered unacceptable if it meets any of the following conditions:

- Less than four (4) lamps functioning properly (on the 4 Corners or Bar), or less than seven (7) lamps functioning properly in either of the 2 diamond shapes (on the Alternating Diamonds).
- The arrow board message is not visible at 1000 feet.

EVALUATION GUIDE: Flashing Arrow Boards, cont.

DOUBLE ARROW MODE



Marginal

An arrow board in this mode is marginal if it meets the following condition:

- Two (2) lamps out in the stem and both heads completely functional with no lamps out.

Unacceptable

- An arrow board in this mode is considered unacceptable if it meets any of the following conditions:
- More than two (2) lamps out in the stem.
- One (1) lamp out in the head.
- The arrow board message is not visible at 1000 feet.

EVALUATION GUIDE: Portable Changeable Message Signs (PCMS)

Acceptable

A PCMS is acceptable if it meets the following condition:

- One hundred percent (100%) of the pixels per character module shall be operating properly.

Marginal

A PCMS is marginal if it meets the following condition:

- At least ninety percent (90%) of the pixels per character module shall be operating properly.

Unacceptable for all PCMSs

A PCMS is unacceptable if it meets any of the following conditions:

- Less than ninety percent (90%) of the pixels per character module are operating properly.
- The PCMS is not properly aligned for the intended driver's line of vision.
- The PCMS message is not legible.

Unacceptable for Trailer-Mounted PCMS

A trailer-mounted PCMS is unacceptable if it meets any of the following conditions:

- The sign panel more than 3 inches out of plumb.
- The sign panel is raised less than 5 feet above the roadway surface on rural roadways or less than 7 feet on urban roadways (measured to the bottom of the board).

EVALUATION GUIDE:

Trailer-Mounted Electronic Traffic Control Devices

This includes devices such as Automated Flagger Assistance Devices (AFADs), Portable Traffic Signals, and Dynamic Speed Display Signs.

Acceptable

An electronic traffic control device is acceptable if it meets all of the following conditions:

- The device shall be operating correctly for its intended usage within allowable tolerances and with all fail-safes properly functioning.
- All lamps, LED displays, and signs are properly aligned for the intended driver's line of vision. Any operating lamp, LED display, or sign which is out of alignment shall be considered not functioning properly.
- One hundred percent (100%) of the LED pixels per character module are operating properly.
- One hundred percent (100%) of the lamps are operational.
- All lamps and LED displays dim properly.
- The signs meet or exceed the quality standards for acceptable "Warning Signs".
- The device's leveling stands shall be adjusted to properly plumb the device.
- The bottom of any overhead signal head shall be between 17 and 19 feet above the roadway surface.

Marginal

An electronic traffic control device is marginal if it meets the following conditions:

- At least ninety percent (90%) of the LED pixels per character module are operating properly.
- The signs meet the quality standards for marginal "Warning Signs".

Unacceptable

An electronic traffic control device is unacceptable if it meets any of the following conditions:

- The device is malfunctioning for any of its intended functions including but not limited to signal operations, radio communications, detection, or message display.
- Any of the lamps are burned out.
- Less than ninety percent (90%) of the LED pixels per character module are operating properly.
- The device is not properly aligned for the intended driver's line of vision.
- The lamps and LED displays are not dimming properly.
- The device is not within 3 inches of plumb for the height of the device (excluding an overhead signal head mast).
- The bottom of any overhead signal head is lower than 17 feet or higher than 19 feet above the roadway surface.