

# **Quality Standard for Work Zone Traffic Control Devices**

## **2010**



**Illinois Department of Transportation**  
2300 South Dirksen Parkway / Springfield, Illinois / 62764

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BUREAU OF SAFETY ENGINEERING  
2300 SOUTH DIRKSEN PARKWAY, ROOM 323  
SPRINGFIELD, ILLINOIS 62764

TELEPHONE (217) 782-3568

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## **Introduction**

When the normal function of the roadway is suspended, temporary traffic control provides for the continuity of movement of motor vehicle, bicycle, and pedestrian traffic. The primary function of temporary traffic control is to provide for the reasonably safe and efficient movement of road users through or around work zones while reasonably protecting workers and equipment. Of equal importance to the road users is the safety of the workers.

An essential part of providing temporary traffic control is the use of a system of devices. The success of this system depends upon the quality and placement of each device.

The normal use of work zone traffic control devices subjects them to wear that does not occur to permanent devices. This wear may be caused by carelessness during the storage, shipping, relocating, and removal of these devices, impacts from traffic or equipment, or simply age. This wear causes deterioration of their appearance. A high percentage of these worn and damaged devices in a project can result in a loss of positive guidance to the road user, and an unprofessional appearance that reduces motorist confidence and compliance.

This standard will aid the inspector in determining the quality of work zone devices. The devices should be inspected at several stages: while in storage, during preparation for delivery to the work 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 jobsite. Doing so will minimize department involvement and reduce time, effort, and costs related to on-site replacement.

**All devices and combinations of devices shall meet the requirements of the National Cooperative Highway Research Program (NCHRP) Report 350 or the American Association of State Highway and Transportation Officials (AASHTO) Manual for Assessing Safety Hardware (MASH) 2009 for their respective categories, in accordance with Bureau of Design and Environment or Bureau of Safety Engineering special provisions, or the standard specifications.**

## **Application of This Standard**

**Any traffic control device which has become ineffective due to damage, wear, or defacement shall be replaced by the Contractor. All traffic control devices shall be maintained and kept clean such that the device maintains its appearance and retroreflectivity (if applicable). The Engineer shall be the sole judge as to the acceptability of placement and maintenance of all traffic control devices.**

## **Quality Classifications and Requirements**

The quality of the work zone devices in this standard has been divided into three categories, **acceptable**, **marginal**, and **unacceptable**.

**At the time of the initial set-up and at the time of major stage changes, 100 percent of each type of device (cones, drums, barricades, vertical panels, or signs) shall be acceptable. Throughout the duration of the project, the percentage of acceptable devices may decrease to 75 percent (25 percent marginal), only as a result of damage and/or deterioration during the course of the work. Devices used in a small quantity, such as arrow boards and PCMS, shall be evaluated individually. Any unacceptable device shall be replaced.**

**Acceptable:** Devices that meet the quality requirements herein for this classification and all other requirements in the plans and specifications, shall be determined to be **acceptable** for use on highway construction or contract maintenance projects.

**Marginal:** Devices that meet the quality criteria for **marginal** as described herein may remain in the work zone until they reach 25 percent for that type of device or until it is determined that they have become **unacceptable**.

**Unacceptable:** Devices in this category shall not be delivered to the jobsite. When found in the work zone, they shall be immediately removed and replaced.

The following photographs, together with the contract requirements of each specific project, shall be used as a guide to determine if the device is **acceptable**, **marginal** or **unacceptable**. A direct comparison of each device to this standard is not required for the rejection of devices; however, this standard shall be used to resolve disputes. Other resources include retaining samples of new, unused devices in each category to supplement the photographs shown in the following pages, or manufacturer's specifications.

## Quality Standard for Signs

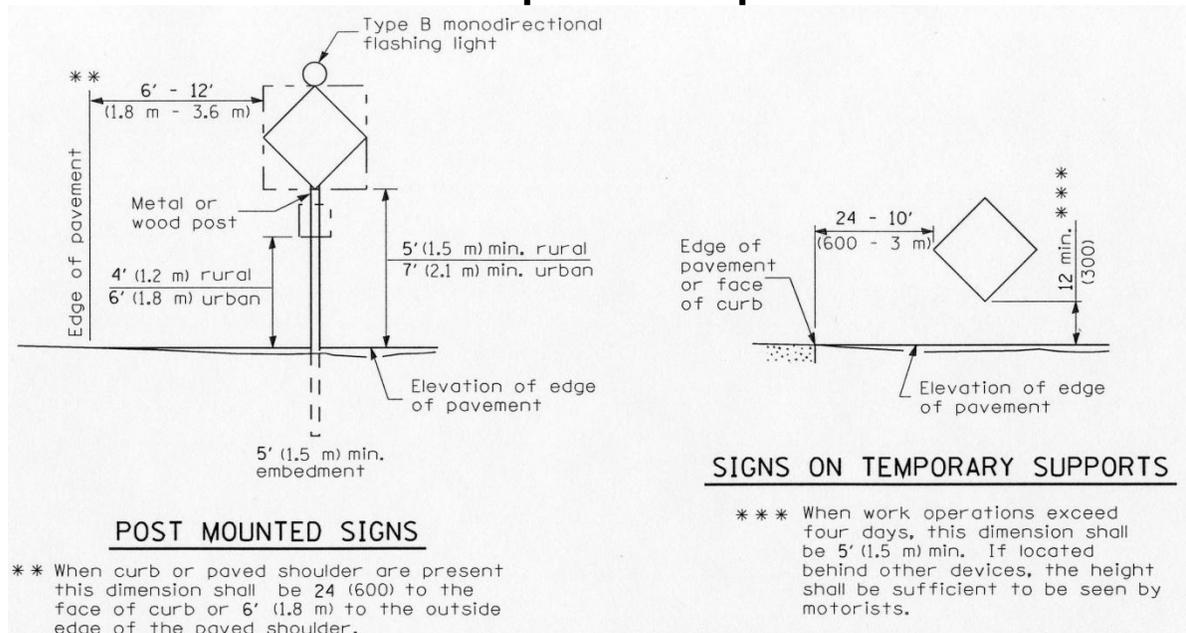
This standard applies to all signs; warning, regulatory and guide, furnished by a supplier, subcontractor, or contractor to be used for traffic control work zones.

All standard signs shall conform to the requirements of the contract documents, the Manual on Uniform Traffic Control Devices, and supporting manuals. In complying with these requirements, the contractor and suppliers will furnish signs that are correct in size, shape, color and legend. Special signs, should they be required, are detailed in the plans. Article 1106.01 of the Standard Specifications provides the requirements for retroreflectivity of work zone signs.

For signs to be used in work zones, all of the above must be met to the satisfaction of the department. In addition, Standard 701900 and Article 701.14 regarding sign erection shall be met. Sign installation dimensions must be met. Sign positioning at the work site should be determined based on site conditions.

The Evaluation Guide on page 4 is to be used to evaluate the quality of the sign face only. **No mention is made of dents, bends or other deformations. If any sign is bent to the extent that its shape is nonstandard or a portion of the sign itself is missing, the sign shall be determined unacceptable.**

### TYPICAL SIGN INSTALLATIONS See Standard 701901 Specified in Contract for Specific Requirements



All heights shall be measured above the pavement surface.

**Acceptable** - This is an example of an **acceptable** sign. It may be new, or in new condition. There are abrasions on the surface but very little loss of lettering. There has been no touch-up of the lettering.



**Marginal** - This is an example of a sign with **marginal** acceptability. Of the many surface abrasions throughout the sign face, many are within the individual letters of the message. The sign surface is free of any residue. Although some color fading is evident, the background color and reflectivity are still apparent at night.



**Unacceptable** - This is an example of an **unacceptable** sign. Signs with asphalt splatter and/or cement slurry or any combination of missing and/or covered reflective material similar in area presented make a sign **unacceptable**. Some letters have a loss of more than 50 percent. There is noticeable color fading.



**Please Note:** Orange work zone signs shall be fluorescent orange in color. Signs shall have retroreflective sheeting. Signs with bends and dents that alter the size and/or shape of the sign are unacceptable. These photos are examples of the condition of the sheeting.

## **Quality Standard for Barricades and Vertical Panels**

This standard applies to Type I, II and III barricades, vertical barricades, directional indicator barricades and panels furnished by a supplier, subcontractor, or contractor for traffic control use in work zones.

Barricade type and placement of barricades and vertical panels are specified in the contract documents. Article 1106.02 (c, d) of the Standard Specifications provides the requirements for retroreflectivity. Article 701.15 provides the requirements for barricades and vertical panels. The Bureau of Design and Environment may have additional requirements in the Special Provision.

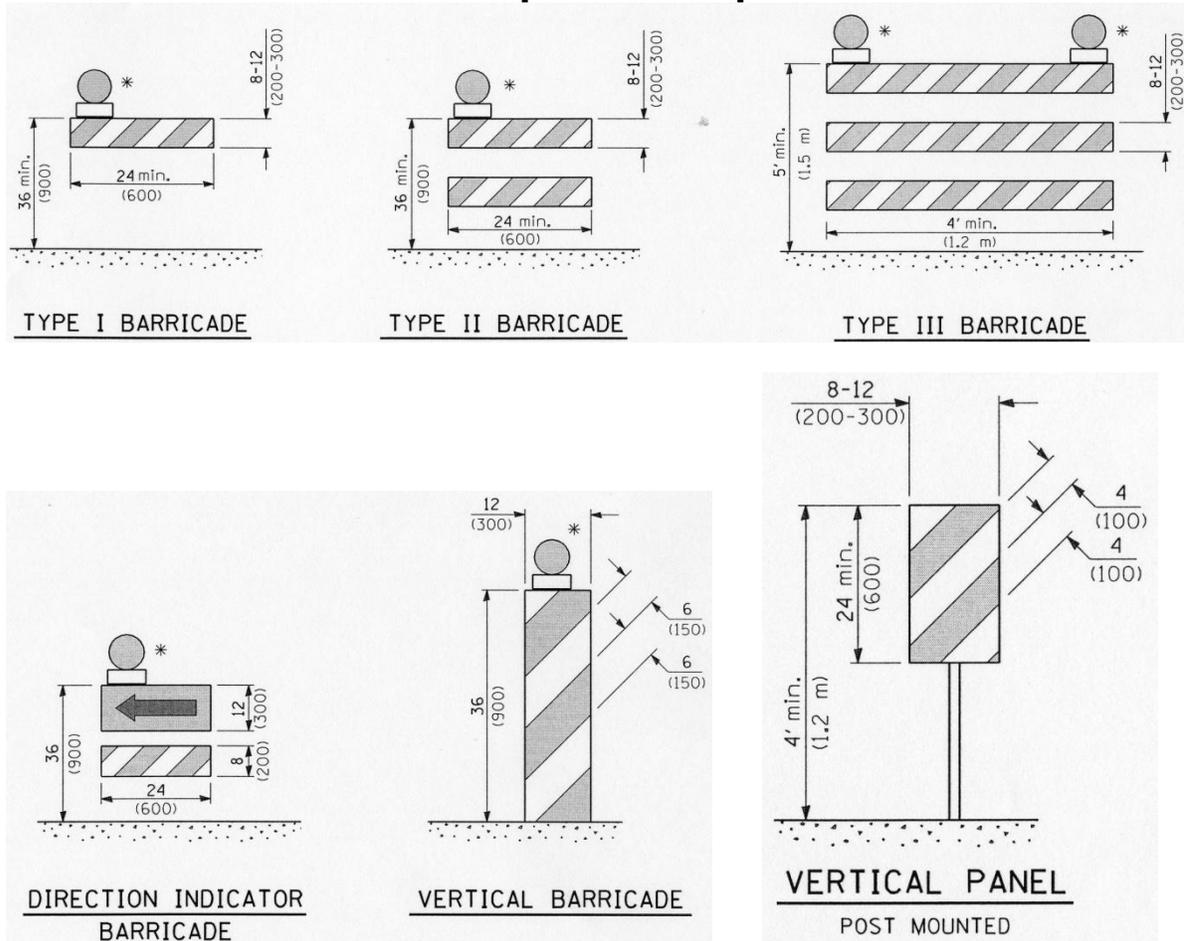
For barricades and vertical panels to be used in work zones, all of the above requirements shall be met to the satisfaction of the department. In addition, the requirements of Standard 701901 regarding size, shape, and mounting height shall be met. Vertical panels shall be erected and maintained in a vertical position.

The Evaluation guide on page 7 is to be used to evaluate the quality of the retroreflectorized portion of barricades and vertical panels. In addition to this evaluation, device supports must also be evaluated. **Any one or combination of the following will cause the device to be unacceptable:**

- **Deformation of the support assembly so the sheeted panel is not oriented correctly.**
- **Device is bent or legs are twisted.**
- **Rusty metal parts.**
- **Unpainted wooden rails.**
- **Broken panels.**
- **Does not meet NCHRP 350 or MASH 2009 requirements.**

# TYPICAL DRAWINGS OF TYPE I, II, AND III BARRICADES, DIRECTIONAL BARRICADES AND VERTICAL PANELS

See Standard 701901 Specified in Contract for Specific Requirements



\* Warning Lights (If Required)

All dimensions are in inches (millimeters) unless otherwise shown.

**Please Note:** The arrow panel in directional barricades shall conform to the Quality Standard for Signs.

**Acceptable** - This is an example of an **acceptable** panel. It may be new or in new condition. There are several abrasions on the surface but very little loss of retroreflective sheeting. The orange is vivid and the stripes provide contrast that is clearly visible with low beam headlights at night.



**Marginal** - This is an example of a panel with **marginal** acceptability. There are numerous surface abrasions throughout the panel surface. Some color fading is evident. However, it is free of large areas of residue or missing reflective material. The colors, stripes, and reflectivity are visible and discernible with low beam headlights at night.



**Unacceptable** - This is an example of an **unacceptable** panel. The surface is marred over a high percentage of the panel area. There is noticeable loss of reflectivity and obvious color fading. Panels with asphalt splatter and/or cement slurry, or any combination of missing and/or covered reflective material similar in area presented make a panel **unacceptable**.

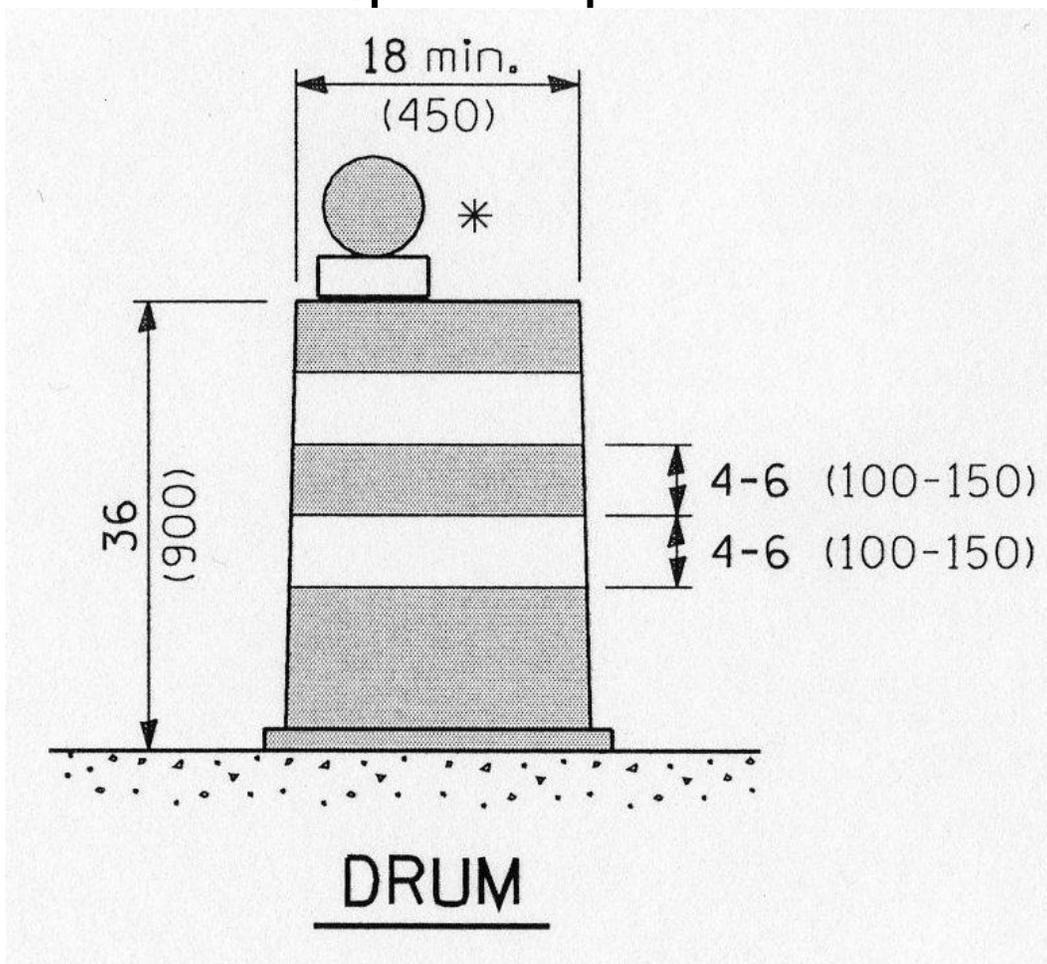


## Quality Standard for Drums

This standard applies to drums that are furnished by a supplier, subcontractor, or contractor for traffic control in work zones.

Drum placement is specified in the contract documents. Drums used in work zones shall meet Article 1106.02 (e), and have alternating Type AA, AP, or ZZ fluorescent orange and white horizontal, circumferential stripes. The Evaluation Guide on page 9 is to be used to evaluate the general appearance of drums. **In addition, drums that are dented severely enough to affect the overall dimension and shape or contain fractures that affect their stability or ability to retain the retroreflective sheeting are unacceptable.**

### **TYPICAL DRAWINGS OF DRUMS See Standard 701901 Specified in Contract For Specific Requirements**



**\*Warning Light (If Required)**

**Acceptable** - This is an example of an **acceptable** drum. It may be new, or in new condition. The sheeting has only minor tears and scratches. It will readily respond to washing.



**Marginal** – This is an example of a drum with **marginal** acceptability. The sheeting has numerous tears and scratches; however, it is free of large areas of residue or missing retroreflective material. Some fading is evident. It may not readily respond to washing.



**Unacceptable** - This is an example of an **unacceptable** drum. The large areas of missing retroreflective material make this drum **unacceptable**. Drums with asphalt splatter and/or cement slurry, or any combination of missing and/or covered reflective material similar in area presented make a drum **unacceptable**. Large areas of fading are evident. It will not respond to washing.



**Note:** Alternating white and fluorescent orange retroreflective sheeting is required on drums. All non-reflectorized portions of the drums shall be orange.

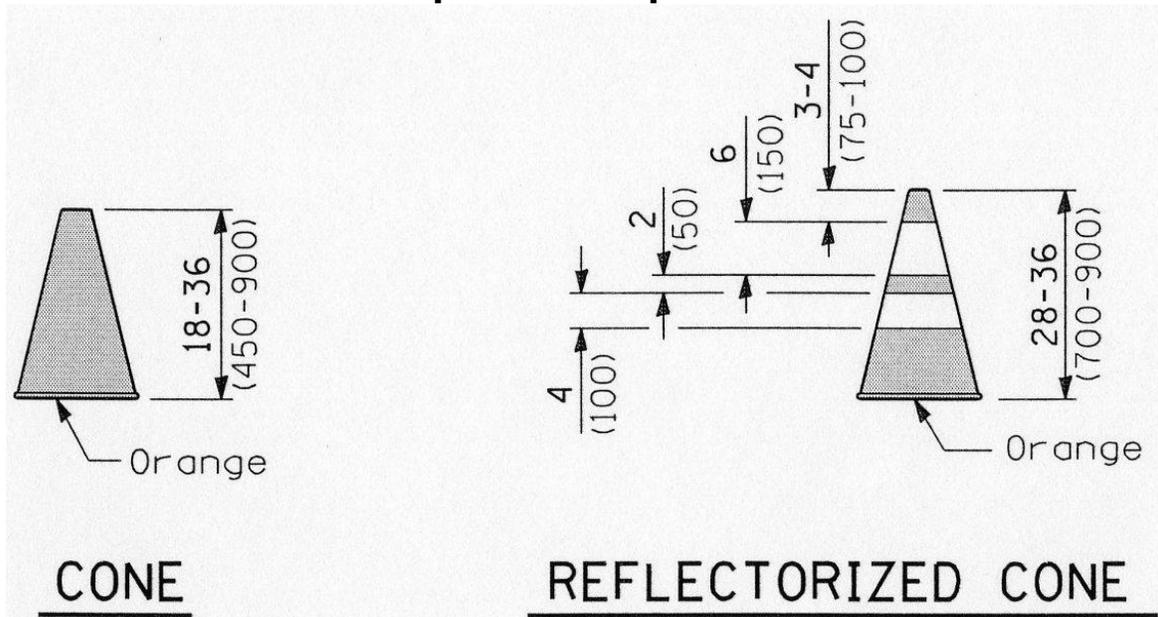
## Quality Standard for Cones

This standard applies to cones that are furnished by a supplier, subcontractor, or contractor for traffic control in work zones.

Cone placement and required minimum height is specified in the contract documents. Cones used in work zones shall be orange in color, and shall meet the requirements of Standard 701901 and Article 1106.02 (b) of the Standard Specifications.

The Evaluation Guide on page 11 should be used to evaluate the general appearance of cones. **In addition, cones that contain fractures that affect their stability or their ability to maintain their placement are unacceptable.**

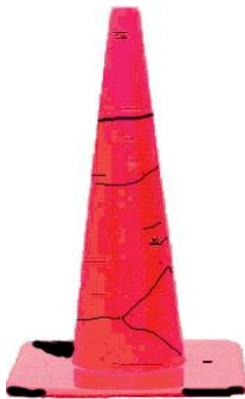
### **TYPICAL DRAWINGS OF CONES See Standard 701901 Specified in Contract For Specific Requirements**



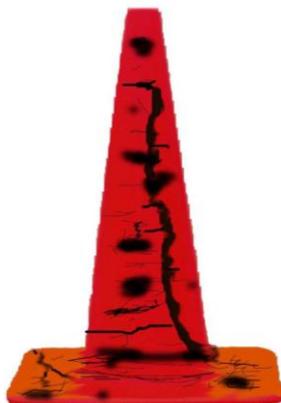
**Acceptable** – These are examples of **acceptable** cones. They may be new or in new condition. Surfaces are free of punctures and abrasions, and the color is bright. The surfaces may be dirty, but will readily respond to washing.



**Marginal** – These are examples of cones with **marginal** acceptability. The surfaces are dirty and may not be readily cleaned due to abrasion and discoloration.



**Unacceptable** - This is an example of **unacceptable** cones. Punctures and large areas of staining make these an unlikely candidate for improvement. Also, large areas of asphalt splatter and/or cement slurry make cones **unacceptable**.



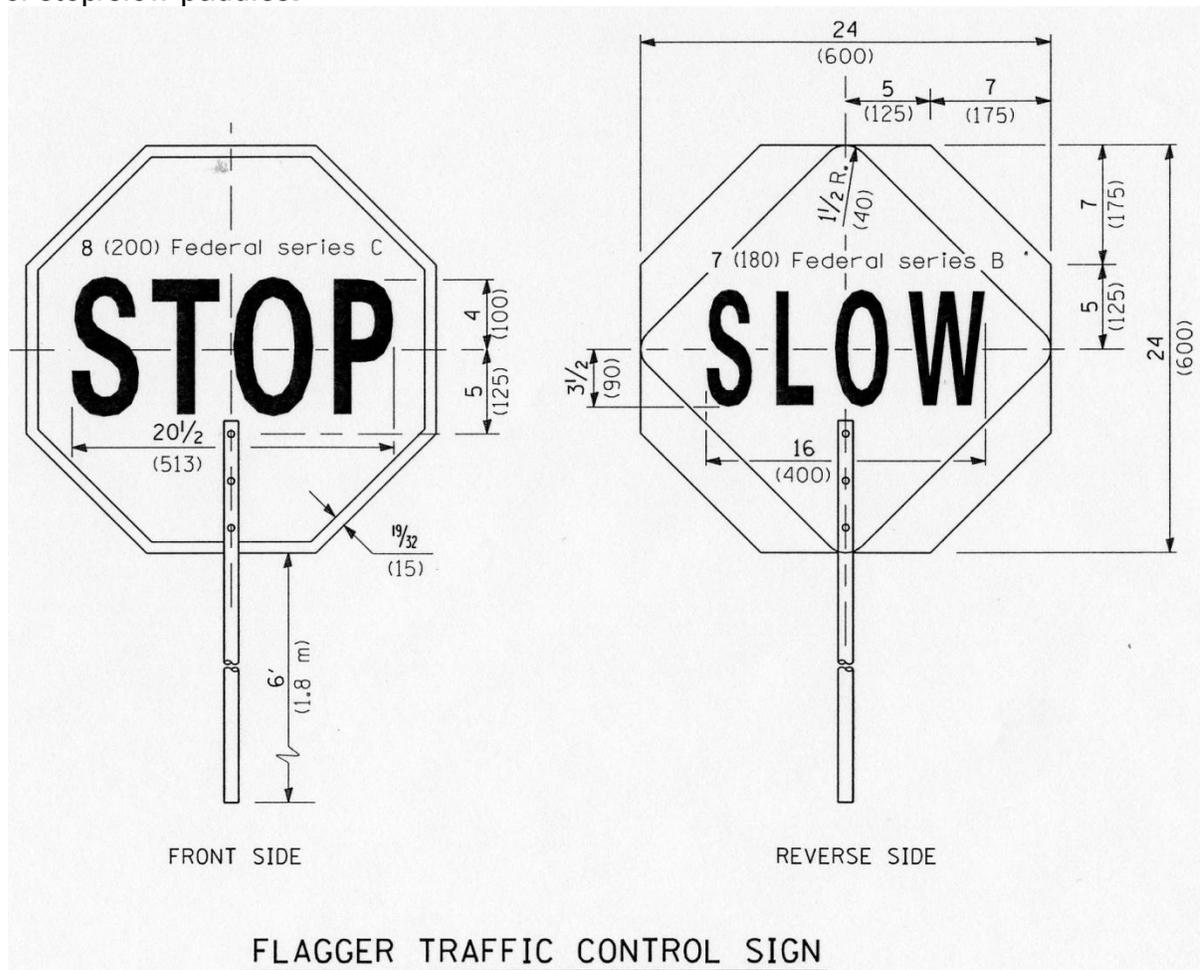
## Quality Standard for Stop/Slow Paddle

This standard applies to paddles furnished by a supplier, subcontractor, or contractor for traffic control in work zones.

Paddles used in work zones shall meet the requirements of Standard 701901 and Article 1106.01 of the Standard Specifications. In complying with these requirements, the contractor and suppliers will furnish signs that are correct in size, shape, color and legend.

The "STOP" face shall consist of white letters and border on a red retroreflectorized background. The "SLOW" face shall consist of black letters and border on a fluorescent orange retroreflectorized background. Area outside sign borders shall be light blue or black. The portion of the staff within the sign face shall match the sign colors. The staff may consist of two sections joined by a coupling.

The Evaluation Guide on page 13 should be used to evaluate the general appearance of stop/slow paddles.



**Acceptable** - This is an example of an **acceptable** paddle. It may be new, or in new condition. There are several abrasions on the surface, but very little loss of lettering. There has been no touch-up of the lettering. The sheeting color is vivid with contrasting colors. The handle color is the same as the sheeting color. The paddle is 6' high from pavement to bottom of sign. The surface may be dirty but will readily respond to washing.



**Marginal** - This is an example of a paddle with **marginal** acceptability. Of the many surface abrasions throughout the paddle face, many are within the individual letters of the message. The paddle surface is free of any residue. Although some color fading is evident, the background color and reflectivity are still apparent at night. The surface is dirty and may not be readily cleaned due to abrasion and discoloration.



**Unacceptable** - This is an example of an **unacceptable** paddle. Paddles with asphalt splatter and/or cement slurry throughout the face of this sign are **unacceptable**. Some letters have a loss of more than 20 percent. Color fading is noticeable.

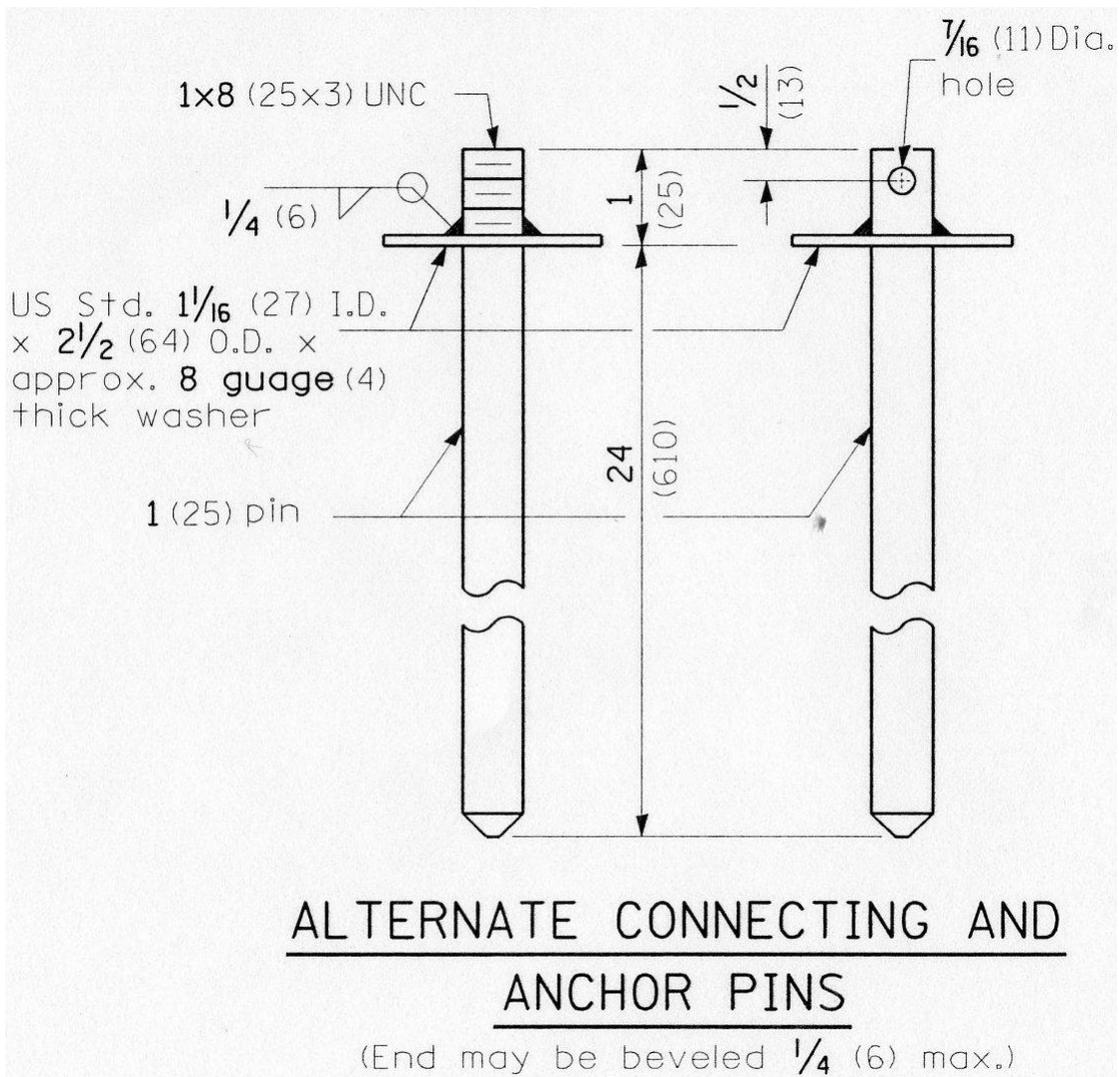


## Quality Standard for Temporary Concrete Barrier

This standard applies to temporary concrete barrier furnished by a supplier, subcontractor, or contractor for traffic control in work zones. Temporary concrete carrier shall conform to Section 704 of the Standard Specifications and Highway Standard 704001. Temporary concrete barrier shall meet NCHRP Report 350 or MASH 2009 Category 3, Test Level 3 requirements and have the F shape.

The barrier unit at each end of the installation shall be secured to the pavement or paved shoulder using six anchoring pins as shown on Standard 704001, and protected with an accepted NCHRP 350 or MASH 2009 Test Level 3 crashworthy device as shown on the plans.

Connecting pins and anchor pins shall be according to Standard 704001.



The Evaluation Guide on page 15 should be used to evaluate the general appearance of temporary concrete barrier.

## EVALUATION GUIDE - TEMPORARY CONCRETE BARRIER

**Acceptable** - This is an example of acceptable temporary barrier wall. The wall is new, or in new condition with few minor blemishes. Spalls and chipped concrete are no greater than 1.5 inches in depth. Connecting loop bars are in place and in good condition.



## EVALUATION GUIDE- TEMPORARY CONCRETE BARRIER

**Marginal**-These are examples of marginal temporary concrete barrier wall. The wall has minor spalls with hairline cracks, and minor imperfections along the base. It is still structurally sound. Connecting loop bars are in place and in good condition.



## EVALUATION GUIDE-TEMPORARY CONCRETE BARRIER

**Unacceptable**- These are examples of unacceptable temporary concrete barrier wall. The barrier wall has large spalls and cracks, with unsound concrete that could easily dislodge when hit. The spalled wall could cause tire damage if hit, especially along the base. Spalled concrete could cause the vehicle to "snag" and twist from the direction it is going. Any spall greater than 1.5 inches in depth or broken/damaged connecting loop is cause for rejection.



## Quality Guidelines for Work Zone Traffic Control Devices

The following guidelines are for several other work zone traffic control devices. The Quality Standards address individual devices. However, when a certain percentage of devices as a group become non-conforming, that portion of the traffic control installation will become **unacceptable**. The devices shall be reported on form OPER 726 or BT 726, Traffic Control Inspection Report, as **unacceptable**.

For example, when an arrow board has too many lights out or it does not dim properly, the entire device will be considered as **unacceptable** and it will be reported on form OPER 726 or BT 726 as such.

The following guidelines are to be used to rate a group of devices as **acceptable**, **marginal** or **unacceptable**. This guideline establishes IDOT intent. The Engineer is the sole judge as to the acceptability of devices and the action that is to be taken with regard to these guidelines.

# **Quality Guideline for Impact Attenuators, Temporary**

## **Sand Module Impact Attenuators**

This guideline applies to sand module impact attenuators furnished by a supplier, subcontractor, or contractor for traffic control in work zones.

Sand module impact attenuator placement is specified in the contract documents. The Recurring Special Provision for Impact Attenuators, Temporary indicates that the attenuator modules be fitted with alternating Type AA or AP fluorescent orange and reflectorized white horizontal circumferential stripes. Striping shall encircle the entire drum, and there shall be two of each stripe on each module. Sand module impact attenuators used in work zones shall meet the above requirements to the satisfaction of the department.

Acceptability of appearance for sand attenuators shall be the same as those for drums on page 9.

The Engineer shall be the sole judge as to the acceptability of damaged sand attenuators.

## **Evaluation Guide -- Sand Module Impact Attenuators**

**Acceptable:** No cracks or holes. Device has not been damaged.

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**Marginal:** Any small holes can be easily patched and any cracks are smaller than 1/4 the diameter of the drum in any direction, and neither affect the structural integrity of the drum.

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**Unacceptable:** When any of the following conditions exist: 1) All holes cannot be easily patched. 2) There is a crack which is greater than 1/4 the diameter of the drum in any direction. 3) The attenuator has been damaged such that it affects the structural integrity of the drum.

## **Other Temporary Impact Attenuators**

When other temporary Impact attenuators are allowed, the following guidelines shall apply:

- Any element of the impact attenuator that has been damaged, deformed or bent will not be allowed and shall be repaired to meet NCHRP 350 or MASH 2009 requirements.
- All elements of the device shall be in place and installed in accordance with the manufacturer's recommendations to meet NCHRP 350 or MASH 2009 requirements.
- The devices shall be delineated with a terminal marker on the nose, and reflectors along the side.

## Quality Guidelines for Warning Lights

This guideline applies to Type A and Type C low intensity, flashing, and steady burn lights furnished by a supplier, subcontractor, or contractor for traffic control in work zones.

Warning light type and placement shall be as specified in the applicable traffic control standard, and Article 701.16 of the Standard Specifications. Article 1106.02 (a) provides the material requirements for the lights. For lights to be used in work zones, all the above requirements shall be met to the satisfaction of the department.

Article 701.16 requires "Batteries for the lights shall be replaced on a group basis at such times as may be specified by the Engineer."

Article 1106.02 (a) requires "Lights shall be maintained so as to be visible on a clear night from a distance of 3000 ft (900 m)."

### **EVALUATION GUIDE -- LIGHTS**

**Acceptable:** When 100 percent of the Type A or C lights are lit and meet the above requirements.

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**Marginal:** When all the following conditions exist: 1) More than 90 percent of the Type A or C lights are lit. 2) No more than three (3) consecutive failed lights. 3) The lights meet the above requirements.

**Marginal for Tapers:** When all the following conditions exist: 1) More than 90 percent of the Type A or C lights are lit. 2) The lights meet the above requirements.

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**Unacceptable:** When any of the following conditions exist: 1) Less than 90 percent of the Type A or C lights are lit. 2) Four (4) or more consecutive failed lights. 3) The lights do not meet the above requirements.

**Unacceptable for Tapers:** When any of the following conditions exist: 1) Less than 90 percent of the Type A or C lights are lit. 2) The lights do not meet the above requirements.

## Quality Guideline for Arrow Boards

This guideline applies to arrow boards that are furnished by a supplier, subcontractor, or contractor for traffic control in work zones.

Arrow board placement shall be as specified in the applicable traffic control standard, Article 701.15 (i) of the Standard Specifications, or the Traffic Control Plan. Standard 701901 and Article 1106.02 (h) of the Standard Specifications provides the requirements for the arrow board. For arrow boards to be used in work zones, all the above requirements shall be met to the satisfaction of the department.

Any arrow board which is out of alignment from the driver's line of vision or not placed within 5° of a horizontal position (1"/1') shall be considered to be an unacceptable device.

Article 1106.02 (h) indicates minimum legibility distances.

### **EVALUATION GUIDE -- ARROW BOARDS** **FLASHING ARROW MODE**

**Acceptable:** No lights or LEDs are out and the arrow board is dimming properly.

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**Marginal:** Two (2) or less lights or LEDs out total, with only one (1) light or LED out in the head of the arrow. The arrow board is dimming properly.

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**Unacceptable:** When any of the following conditions exist: 1) Three (3) or more lights or LEDs out total. 2) Two (2) or more lights or LEDs out in the head of the arrow. 3) The arrow board is not dimming properly.

### **CAUTION MODE**

**Acceptable:** No lights or LEDs are out and the arrow board is dimming properly.

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**Marginal:** Minimum of four (4) lamps or LEDs operating and dimming properly.

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**Unacceptable:** When the following conditions exist: 1) Three (3) or less lamps or LEDs operating. 2) The arrow board is not dimming properly.

## Quality Guideline for Work Zone Pavement Marking

This guideline applies to work zone pavement markings that are furnished by a supplier, subcontractor, or contractor for traffic control in work zones.

Work zone pavement markings placement shall be as specified in the applicable traffic control standard, Article 703 of the Standard Specifications, and the Traffic Control Plan. Article 1095 of the Standard Specifications provides requirements for the pavement marking materials. All the above requirements shall be met to the satisfaction of the department.

### EVALUATION GUIDE -- WORK ZONE PAVEMENT MARKINGS

**Acceptable:** All pavement marking tape and paint required is in place and meets the above specifications.

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**Marginal:** Ninety percent or more of all pavement marking tape or paint is present, and two (2) or less consecutive skip lines are missing, and less than 50 ft (15 m) of continuous solid line is missing or nonreflective.

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**Unacceptable:** When any of the following conditions exist: 1) Less than ninety percent of all pavement marking tape or paint is present, 2) Three (3) or more consecutive skip lines are missing. 3) More than 50 ft (15 m) of continuous solid line are missing or nonreflective.

## **Quality Guideline for Reflectors on Pavement or Barrier Wall**

This guideline applies to reflectors used in work zones to delineate the pavement or temporary concrete barrier that are furnished by a supplier, subcontractor, or contractor for traffic control in work zones.

The placement of pavement or temporary concrete barrier reflectors shall be as specified in the applicable traffic control standard and the Traffic Control Plan. Articles 1096.02 and 1097.02 of the Standard Specifications provide requirements for the reflectors. All the above requirements shall be met to the satisfaction of the department.

The color of the reflector must be as specified in the contract, or the reflectors are unacceptable.

### **EVALUATION GUIDE -- REFLECTORS** **PAVEMENT MARKING AND BARRIER WALL**

**Acceptable:** All reflectors are in place and meet the above specifications.

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**Marginal:** Ninety percent or more reflectors are present, having two (2) or fewer consecutive reflectors missing.

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**Unacceptable:** When either of the following conditions exists: 1) Less than 90 % of all reflectors are present. 2) Three (3) or more consecutive reflectors missing.

## Quality Guideline for Portable Changeable Message Signs

This guideline applies to portable changeable message signs (PSMS) that are furnished by a supplier, subcontractor, or contractor for traffic control in work zones.

PCMS placement shall be as specified in the applicable traffic control standard, Article 701.15 (j) of the Standard Specifications, or the Traffic Control Plan. Article 1106.02 (i) provides the requirements for PCMS. For PCMS to be used in work zones, all of the above requirements shall be met to the satisfaction of the Engineer.

Any PCMS which is not visible from 1300 ft (400 m) under both day and night conditions and the letters are not visible from 750 ft (250 m) shall be considered an unacceptable device.

Any PCMS which is out of alignment from the driver's line of vision or not placed within 5° of a horizontal position (1"/1') shall be considered to be an unacceptable device.

### **EVALUATION GUIDE – PORTABLE CHANGEABLE MESSAGE SIGNS**

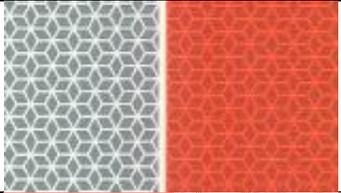
**Acceptable:** No bulbs, discs, or LEDs are out and the PCMS is dimming properly.

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**Marginal:** Two (2) or less bulbs, discs, or LEDs are out per each character, with no more than four (4) bulbs or discs out per message, and the PCMS is dimming properly.

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**Unacceptable:** When any of the following conditions exists: 1) Three (3) or more bulbs, discs, or LEDs are out per character, or five (5) or more are out per message. 2) The PCMS is not dimming properly.

MANUFACTURER	PRODUCT	WORK ZONE APPLICATION	SHEETING PATTERN SAMPLE
REFLEXITE	HIGH INTENSITY PRISMATIC	DRUMS BARRICADES VERTICAL PANELS	
AVERY DENNISON	PRISMATIC REBOUNDABLE	DRUMS FLEXIBLE DELINEATORS	
AVERY DENNISON	HIGH INTENSITY	BARRICADES VERTICAL PANELS	
AVERY DENNISON	PRISMATIC	SIGNS	
NIPPON CARBIDE INDUSTRIES	CRYSTAL GRADE	SIGNS	
3M	HIGH INTENSITY PRISMATIC	BARRICADES VERTICAL PANELS	
3M	HIGH INTENSITY PRISMATIC	SIGNS	
3M	DIAMOND GRADE	DRUMS	