
C. Function of Devices

Traffic control devices include signs, signals, lighting units, pavement markings, delineators, channelizing units, hand signaling signs or flags, and portable barriers which are used to warn, guide, or regulate traffic. This section discusses elements of design, proper application, and placement for various devices used. Table 4 notes how several devices may be attached to other devices and supports.

The examples of devices portrayed in this Handbook are those commonly used. They follow the MUTCD standards in dimension, copy size, and message. Alternates that are available are given in the MUTCD.

1. Signs

Typical signs that are available are shown in Part VII of the Ohio MUTCD. They are classified as regulatory, warning, and guide signs.

Regulatory Signs

Regulatory signs impose legal restrictions and may not be used without permission from the authority having jurisdiction over the roadway.

- *Design* - Regulatory signs are typically rectangular in shape with the long dimensions vertical. The standard color scheme is black lettering on a white background. A red circle with a diagonal slash may be used in conjunction with a black diagram to indicate a prohibited maneuver.
- *Exceptions* - Red is used as a predominant color for STOP, YIELD, DO NOT ENTER and WRONG WAY signs. Unique shapes and color schemes increase the target value for these important signs.

Warning Signs

Warning signs are used to give notice of conditions that are potentially hazardous to traffic. They should be used when such conditions are real, particularly

SIGNS AND DEVICES THAT MAY BE MOUNTED ON OR USED IN COMBINATION WITH OTHER DEVICES

Attachments	Supports										
	Signs	Cones & Tubes	Vertical Panels	Barricades, Types I, II	Barricades, Type III	Drums	Barriers	High-Level Warning Device	Shadow Vehicle	Work Vehicle	Post, Single Support
Signs											
Flags											
Delineators											
Flashing Light, Type A											
Flashing Light, Type B											
Steady Burn Light, Type C											
High-Level Warning Device											
Arrow Panel											
Crash Cushion											

NOTE: Shaded blocks indicate appropriate devices which may be attached to other devices or supports.

TABLE 4

when the danger is not obvious or cannot be seen by the motorist. They should not be overused or they will lose their attention-getting value. Likewise, they should not overwarn or be overly restrictive or they will lose credibility with motorists.

- *Design* - Warning signs are typically diamond-shaped with one diagonal vertical. Permanent warning signs have a black legend on a yellow background. Construction and maintenance warning signs are a special series with the black legend on an orange background. The orange color is used to indicate the temporary nature of the condition and the additional potential hazard of the work site. Traditionally, work activities have include construction, maintenance, and utility operations. However, orange colored warning signs may have application for all work activities within the right-of-way such as survey crews (other than for C & M projects) or temporary weighing stations.
- *Exceptions* - Two warning signs have unique shapes which make them easily distinguishable:
 - The railroad crossing warning sign is round with a yellow background only; and
 - The NO PASSING ZONE sign is pennant shaped.

The TURN OFF 2-WAY RADIO and END BLASTING ZONE zone warning signs are rectangular with their long dimension horizontal to better accommodate the message.

The Large Arrow sign, because of its shape, is placed on a rectangular background with the long dimension horizontal.

Mounting considerations for large warning signs on freeways and expressways may justify a change to the rectangular shape; however, such variances should have prior approval of the appropriate highway authority.

- *Placement* - Warning signs should be placed sufficiently in advance of the condition for which warning is given to permit the motorist time to understand the information and make any required response. Exceptions to this principle include the Large Arrow and the TWO WAY TRAFFIC signs.

Guide Signs (Informational Signs)

Guide signs show destinations, directions, distances, services, points of interest and other geographical or cultural information. They may be used if their placement does not distract from the more important regulatory and warning signs.

Informational signs are required at work zones as follows:

- Standard route markings, to the extent that temporary route changes are necessary.
- Directional signs and street name signs, when used with detour routing, may have a black legend on an orange background.
- Special information signs relating to the work being done shall have a black message on an orange background. Typical examples are:
ROAD CONSTRUCTION NEXT 5 MILES,
END CONSTRUCTION,
DETOUR, and
PILOT CAR FOLLOW ME.

Choosing Signs

Standard signs and messages, as shown in the MUTCD, should be used. Drivers are familiar with those signs and know how to react. Nonstandard sign messages may be confusing. All signs should be made in a quality sign shop or purchased from a reputable business. "Homemade" signs are immediately suspect and do not command any driver respect.

When choosing signs, the following should be considered:

- Choose signs that are appropriate; signs that accurately describe the work situation.
- Choose the message on signs according to what action the driver needs to take. Use larger signs when greater visibility is desired, as with high speed or volume. Avoid messages having only a local meaning since it may not be clear to strangers.

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- Start with a common sign at the beginning of the work area. Then use signs with more specific messages, with the most specific sign stating what action should be taken closest to the work area. Drivers sometimes forget what they are told so the last sign in the advance warning area should tell them specifically what to look for or expect, such as a flagger or a one-lane road.
 - The message "AHEAD," or an appropriate distance, is used on the warning signs. Use the end of the advance warning area as the point for deciding on the measurement on warning signs. For example, ROAD WORK 1 MILE means that the advance warning area ends in one mile and the transition or work area starts.
 - The overall effect of the signs should be to make the driver aware of what he is approaching and what action may be required.

The warning area length for moving operations will vary according to geometrics and sight distance.

Sign Spacing

Where a series of advance warning signs are used, the warning sign nearest the work site should be approximately 500 feet from the point of restriction with additional signs at 500-1000 foot intervals.

A "rule-of-thumb" for the spacing between signs in a series is:

- 250 feet for urban, residential or business districts, or with speeds under 40 m.p.h.;
- 500 feet for urban arterials and rural roads, or with speeds over 40 m.p.h.;
- and
- 1,000 feet for expressways and freeways.

Other Considerations

The location of the advance warning area may need to be adjusted when special problems are encountered. Typical situations include:

- Urban distance restrictions can be imposed by the length of city blocks; additional advance warning may be necessary due to "extra" intersections created by alleys, shopping centers, and side streets.
- Rural, open highway: there is a need for greater warning distances and larger signs.
- Divided roadways and one-way streets with two or more lanes in one direction: signing on both sides of the roadway should be considered if a median is available. Existing overhead sign structures may be used for warning signs.
- Signs should be high enough to be seen over parked cars or traffic.
- Signs should not block the view of vehicles entering the area from gas stations, restaurants, cross roads, etc.
- All signs should be carefully placed for best visibility. Existing signs which are not needed during the work activity should be removed or covered.

Speed zone signing, either advisory or regulatory, is usually not an effective way to control traffic. Posting severely reduced speed limits that cannot be enforced is particularly ineffective. The need for speed reduction must be obvious to drivers. Drivers will slow down only if they see that they need to.

If traffic is heavy and becomes backed up, additional warning signs should be placed in advance of the backup.

A drive-through check, both day and night, should be made periodically to determine if signs have been properly spaced to allow adequate driver response time. Project personnel are normally quite familiar with the project. They should try to look at the work area as through the eyes of a stranger.

Sign Supports

Signs may be attached to posts or portable supports. Fixed sign supports should be used on long-term projects. Portable supports are more practical for short-term projects or changing activities such as flagging.

Lightweight, yielding or breakaway supports should be used for all sign installations. Construction zone sign supports should meet the breakaway requirements for permanent installations. To avoid glare from headlights, signs may be tilted back and slightly away from the roadway.

Figure 2, page 38, shows the minimum height requirements for signs attached to posts. Signs on portable supports are required by the MUTCD to be at least 1 foot above the roadway (Figure 3, page 39). Sign locations and mounting heights may be adjusted above the minimum requirements to obtain good visibility.

Single sign supports are usually adequate for signs up to 36 x 36 in. Larger signs normally require two supports to preclude twisting and turning of the assembly caused by wind or air movement resulting from trucks passing close to the sign.

Signs at Night

All signs used at night are required by the MUTCD to be reflectorized or illuminated.

- *Reflectorized* signs should be checked periodically for proper reflectivity and cleanliness. One method is to drive through the work zone at night using low-beam headlights. Another method is for the inspector to use a piece of reflectorized sign material, (inspector's guide) which has been predetermined by the agency to be of minimum acceptable quality for reflectivity. Place the inspector's guide on the sign to be inspected. Step back about 30 feet, view the sign and inspector's guide with a flashlight held close to the eye. If the inspector's guide is brighter than the sign, the sign should be cleaned and/or replaced.

Experience has shown that beads on paint are not effective for reflectorizing signs or channelizing devices. The beads are easily worn off and they do not reflect when the surface is wet. Reflectorized sheeting having a

HEIGHT AND LATERAL LOCATIONS OF SIGNS: TYPICAL INSTALLATION

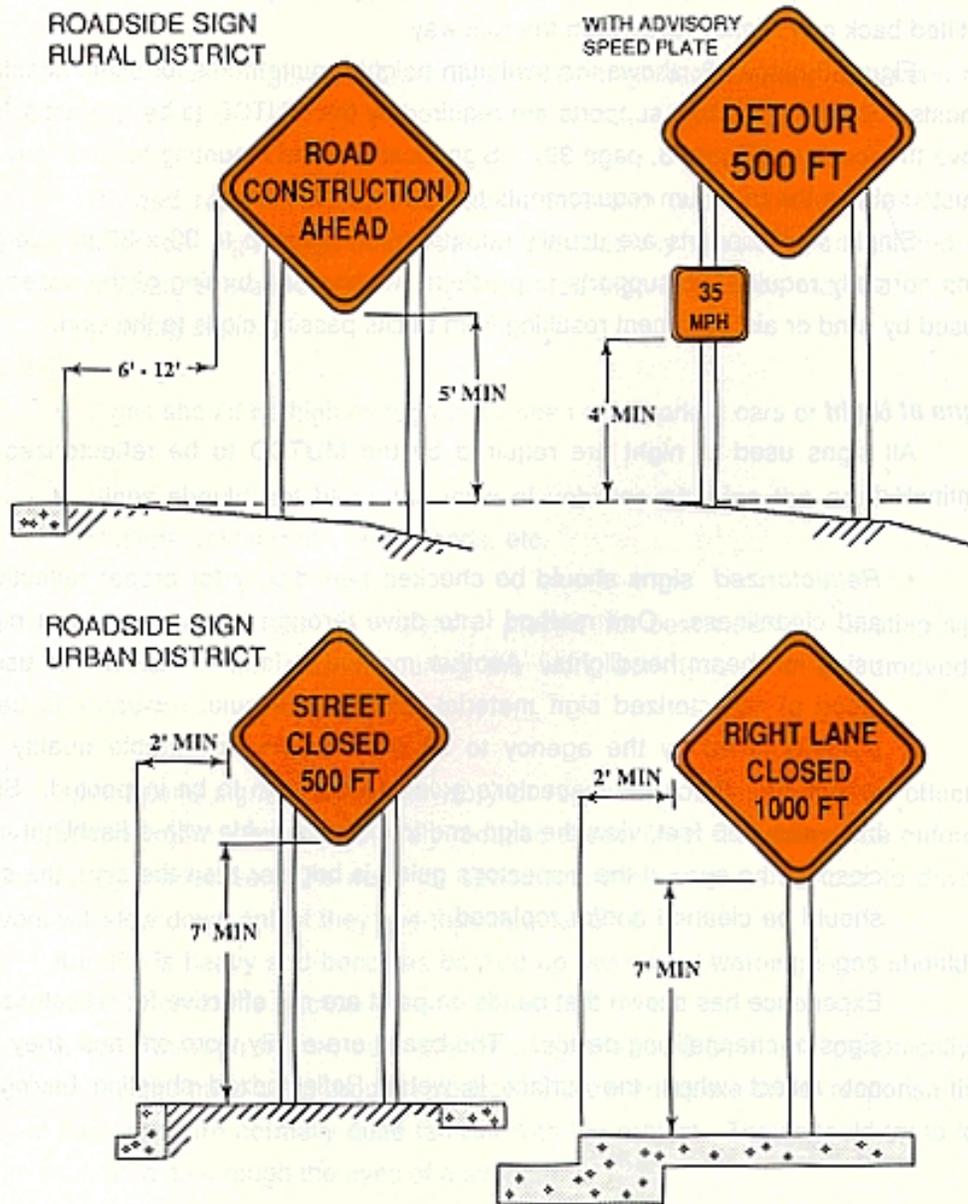
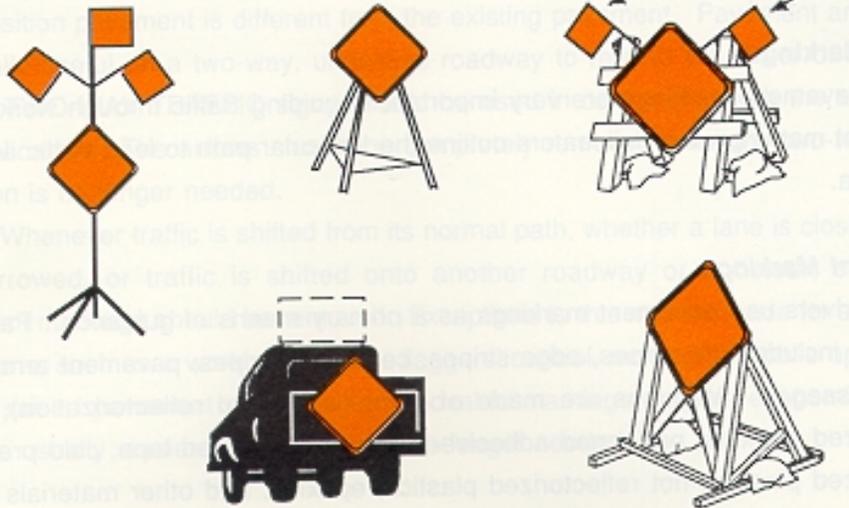


Figure 2
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METHODS OF MOUNTING SIGNS OTHER THAN ON POSTS

PORTABLE AND TEMPORARY MOUNTINGS



WING BARRICADES

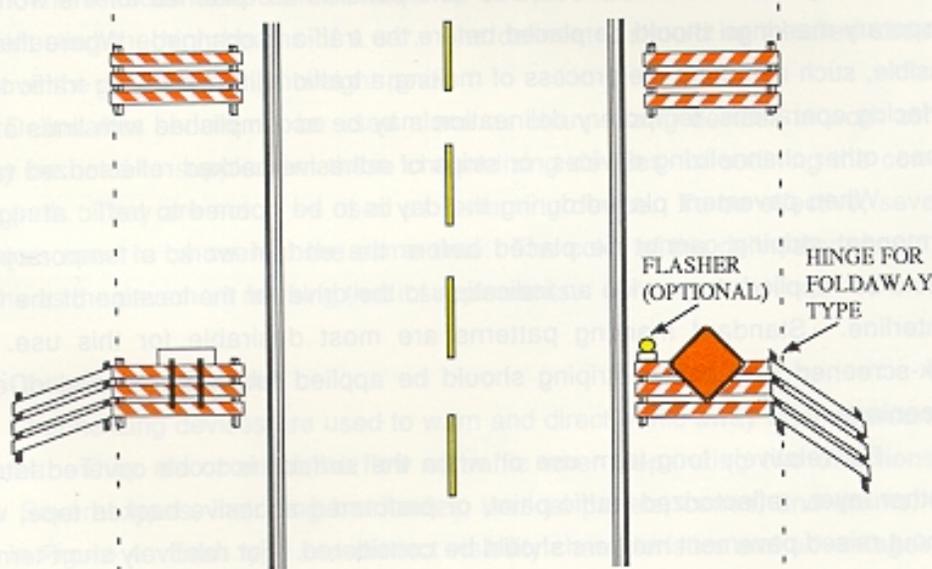


Figure 3

smooth, sealed outer surface should be used for signs and other traffic control devices. ReflectORIZED material should meet the agency's specifications for new material.

- *Illuminated* signs should be considered when a reflectORIZED sign is not effective, as when the sign is overhead or when background light sources reduce the sign's visibility.

2. Markings

Pavement markings are very important in guiding traffic through work zones. Pavement markings and delineators outline the vehicular path to lead traffic around a work area.

Pavement Markings

Drivers use pavement markings as a primary means of guidance. Pavement markings include lane stripes, edge stripes, centerline stripes, pavement arrows and word messages. Markings are made of paint (with bead reflectORIZATION), raised reflectORIZED markers, preformed adhesive-backed reflectORIZED tape, cold preformed reflectORIZED plastics, hot reflectORIZED plastics, epoxies, and other materials placed by heating and spraying.

The standard markings planned for the road should be in place before opening a new facility to traffic. Also, if revised lane patterns are planned for the work zone, temporary markings should be placed before the traffic is changed. Where this is not feasible, such as during the process of making a traffic shift or carrying traffic through surfacing operations, temporary delineation may be accomplished with lines of traffic cones, other channelizing devices, or strips of adhesive-backed reflectORIZED tape.

When pavement placed during the day is to be opened to traffic at night and permanent striping cannot be placed before the end of work, a temporary stripe should be applied to provide an indication to the driver of the location of the lane or centerline. Standard marking patterns are most desirable for this use. On rock-screened seal coats, striping should be applied following removal of excess screenings.

For relatively long-term use or when the surface is to be covered later with another layer, reflectORIZED traffic paint, or preformed adhesive-backed tape, with or without raised pavement markers should be considered. For relatively short-term use,