

## SECTION 8

# ACCIDENT PREVENTION SIGNS, TAGS, LABELS, SIGNALS, PIPING SYSTEM IDENTIFICATION AND TRAFFIC CONTROL

### 08.A. SIGNS, TAGS, LABELS AND PIPING SYSTEMS

08.A.01 Signs, tags, and labels shall be provided to give adequate warning and caution of hazards. They are provided to instruct and direct workers and the public.

08.A.02 All warning systems such as signs, tags, and labels shall be visible at all times when the hazard or problem exists, and shall be removed or covered when the hazard or problem no longer exists.

08.A.03 All employees shall be informed as to the meaning of the various signs, tags, and labels used throughout the workplace and any special precautions that may be required.

08.A.04 The safety and occupational health related signs in the USACE sign manual (EP 310-1-6a) have been determined to meet or exceed ANSI and/or OSHA requirements. USACE facilities shall use signs based upon the specifications in the USACE Sign Manual at permanent USACE-owned and USACE-operated sites. USACE employees and contractors may opt to use signs meeting either the OSHA or ANSI standards for temporary use during the life of a project.

08.A.05 Signs, Tags, Placards, Labels, and Piping Systems shall meet or exceed the following standards:

- a. USACE Sign Standards Manual, EP 310 1-6;
- b. 29 CFR 1910.145;
- c. ANSI/IEEE C95.2;

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- d. ANSI Z136.1;
- e. ANSI Z535.1;
- f. ANSI Z535.2;
- g. ANSI Z535.5;
- h. ANSI/ASME A13.1; and
- i. DOT Federal Highway Administration, *Manual on Uniform Traffic Control Devices for Streets and Highways* (MUTCD).

08.A 06 The type of sign or tag used in a particular situation shall be appropriate for the degree of hazard or intent of message. The Workplace Safety signs with Danger and Caution headings have standard legends that must be used exactly as shown in the USACE Sign Standards Manual. If a sign with a unique legend not appearing on pages 11-4 to 11-7 or in the UNICOR catalog is needed, the procedures detailed on page 1-13 should be followed. The sign legend shall be concise, easy to read and should contain enough information to be easily understood. > See Figure 8-1 for Sign and Tag Signal Word Headings; Figure 8-2 for Example Tag Layout; Figure 8-3 for Example Sign Layout; Table 8-1 for Accident Prevention Sign Requirements.

a. DANGER SIGNS: Danger signs must conform to the following requirements:

(1) Danger signs will be used only when the circumstances indicate an imminently hazardous situation that, if not avoided, **will** result in death or serious injury.

(2) Signal word.

(a) USACE Standard: The signal word "Danger" is white on a red background at the top of the sign.

(b) ANSI Alternate Standard: Danger signs must have the signal word “**DANGER**” in white letters placed at the top of a rectangular safety red background placed at the top of the sign. The safety alert symbol shall precede the signal word. The base of symbol shall be on the same horizontal level as the base of the letters of the signal word - the height equaling or exceeding the signal word height. > **See Figure 8-1.**

(c) OSHA Alternate Standard: As an alternative, Danger Signs may have “**DANGER**” in white letters on a safety red oval background with a white border on a black rectangular field. This distinctive panel shall appear in the uppermost portion of the sign. No other signal word or symbol shall be used within this distinctive shape and color arrangement.

(3) The message panel.

(a) USACE Standard: For workplace safety signs the lettering describing the specific danger is black letters on a white background. On other approved Danger Signs, the message is white lettering on a red background.

(b) OSHA or ANSI Alternate Standard: The lettering shall be black letters on a white background or white letters on a black background and the symbol/pictorial panel, if used, shall be square with a black safety red, or black and safety red symbol on a white background.

b. WARNING SIGNS: Warning signs must conform to the following requirements:

(1) Warning signs may be used only when the circumstances indicate a potentially hazardous situation that, if not avoided, **could** result in death or serious injury. The hazards may be the same as those associated with Danger signs but are of significantly less magnitude.

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(2) Signal Word.

(a) USACE Standard: On approved Warning Safety signs the signal word "Warning" appears in black lettering on a yellow-green background under a black top border. There are no Warning workplace safety signs in the Corps system.

(b) ANSI Standard: Warning signs must have the signal word "**WARNING**" in black letters on a rectangular range background placed at the top of the sign. The safety alert symbol shall precede the signal word. The base of symbol shall be on the same horizontal level as the base of the letters of the signal word – the height equaling or exceeding the signal word height.  
> **See Figure 8-1.**

(c) OSHA Standard Alternative: As an alternative, Warning Signs may have the signal word "**WARNING**" in black lettering within a safety orange truncated diamond on a black rectangular background. The distinctive panel shall be located at the uppermost portion of the sign. No other word or symbol shall be used within this distinctive shape or color arrangement.

(3) The message panel.

(a) USACE Standard: On approved Warning signs the message panel shall be in black lettering on a yellow-green background.

(b) OSHA or ANSI Alternate Standard: The message panel shall be in black lettering on a white background or white lettering on a black background. The message may, as an alternative, be in black letters on a safety orange background. The symbol/pictorial panel, if used, shall be square with a black symbol on a white background. The symbol panel used as an alternative may be square with a black symbol on an orange background.

c. CAUTION SIGNS: Caution signs must conform to the following requirements:

(1) Caution signs may be used only when circumstances indicate a potentially hazardous situation that, if not avoided, **may** result in a minor or moderate injury. It may also be used to alert against unsafe practices that may result in property damage. The hazards may be the same as those associated with Danger signs but are of significantly less magnitude.

(2) Signal Word.

(a) USACE Standard: On Workplace Safety Signs the word "Caution" appears in yellow lettering on black bar at the top of the yellow message panel. On other approved Caution Safety Signs the signal word "Caution" appears in black lettering on a yellow-green background under a black top border.

(b) Alternate ANSI Standard: Caution signs must have the signal word "**CAUTION**" in black lettering on a rectangular yellow background placed at the top of the sign. The safety alert symbol shall precede the signal word if the hazard is a potential personal injury hazard. (The alert symbol is not used when the situation is used to indicate property damage hazards.) The base of the symbol shall be on the same horizontal level as the base of the letters of the signal word – the height shall equal or exceed the signal word height. > **See Figure 8-1.**

(c) Alternate OSHA Standard: As an alternative, caution signs may have the signal word "**CAUTION**" in safety yellow letters within a black rectangular background, and this distinctive panel shall be located in the uppermost portion of the sign. No other signal word or symbol shall be used with this distinctive color or signal shape arrangement.

(3) Message Panel.

(a) USACE Standard: The descriptive legend appears in black lettering on a yellow panel.

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(b) OSHA or ANSI Alternate Standard: The message panel shall be in black lettering on a white background or white lettering on a black background. The message may, as an alternative, be in black lettering on a safety yellow background. The symbol/pictorial panel, if used, shall be square with a black symbol on a white background. As an alternative, it may be square with a black symbol on a safety yellow background.

d. NOTICE SIGNS: Notice signs should conform to the following requirements:

(1) Notice signs may be used to indicate a statement of company policy directly or indirectly related to the safety of personnel or protection of property. The signal word SHOULD NOT be associated directly with a hazard or hazardous situation, and shall not be used in place of “Danger”, “Warning”, or “Caution.” These signs are used to control or define access and circulation. They are used primarily for information and are not placed to identify a hazard.

(2) Notice signs shall have the signal word “Notice” in white lettering on a safety blue background on a rectangular field, and this distinctive panel shall be located in the uppermost portion of the visual alerting device. No other signal word or symbol shall be used within this distinctive shape and color arrangement.

(3) Message panel:

(a) General Standards for Workplace: The message shall be in safety blue or black letters on a white background. The symbol/pictorial panel, if used, shall be square with a safety blue or black symbol on a white background.

(b) USACE Alternative for Outdoor Use: Notice signs posted on USACE managed property for public viewing in areas accessible to the public, including recreation areas, may have white letters on blue background. Text for these custom signs shall be approved by the District Sign Manager. Other signs

used to define access and use may include prohibition symbol signs or Restricted Area signs.

e. GENERAL SAFETY SIGNS: General safety signs should conform to the following requirements:

(1) General safety signs may be used to indicate general instructions relative to safe work practices, remind of proper safety procedures or indicate the location of safety equipment. These signs identify rules and facilities relating to health, first aid, medical equipment, sanitation, housekeeping practice and general safety information.

(2) Legend Panel: White signal word "Safety" on safety green header with black text on white panel.

f. FIRE SAFETY SIGNS: Fire safety signs shall conform to the following requirements:

(1) Fire safety signs may be used to indicate the location of emergency firefighting equipment. Fire extinguisher signs shall be placed where fire extinguishers cannot be directly seen from designated exit pathways. (NFPA 10 D2.2.2)

(2) These signs do NOT have a signal word.

(3) The message panel shall be in safety red letters on a white background in either a square or rectangular field. The symbol/pictorial panel, if used, shall be safety red on white or white on safety red.

g. DIRECTIONAL ARROW SIGNS: Directional arrow flow signs should conform to the following requirements:

(1) Directional arrow signs may be used to indicate the direction to emergency equipment, safety equipment, and other locations important to safety.

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(2) Directional signs that relate to accident prevention use a format similar to all other Workplace Safety signs. The header shall have white lettering on a black rectangular background. The arrow symbol shall be in black lettering on a white background.

h. COLORS: Color coding shall be in accordance with Table 8-2 of this manual. Color specifications for Corps safety signs are found in the USACE Sign Standards Manual.

i. Piping systems shall be identified. The identification of piping systems (including pipes, fittings, valves, and pipe coverings) shall be in accordance with Table 8-3 of this manual.

j. The RF radiation hazard-warning symbol specified in Figure 8-4 of this manual shall be used in the identification of RF radiation hazards.

k. Laser caution and warning signs shall be in accordance with ANSI Z136.1. > **See Figures 8-5 and 8-6 for examples.**

l. Ionizing radiation warning signs, labels, and signals shall contain the symbol show in Figure 8-7 of this manual.

m. Vehicles or equipment that, by design, move at 25 miles per hour (mph) (1.1 meters per second (m/s)) or less on public roads shall display the slow-moving vehicle emblem. > **See Figure 8-8.**

08.A.07 Safety sign finishes shall be of durable materials with colors in accordance with the USACE Signs Standards Manual, or ANSI Z535.1.

08.A.08 Safety signs shall be so placed to alert and inform the viewer in sufficient time to take appropriate evasive actions to avoid the potential harm from the hazard. They shall be legible, non-distracting, and not hazardous in themselves. They shall be fabricated with retro-reflective sheeting as appropriate for adequate visibility under normal and emergency operating conditions.

08.A.09 Each container of hazardous material shall be labeled, tagged or marked with the identity of the material(s), appropriate hazard warnings, potential health effects and the name and address of the manufacturer, importer or other responsible party.

> **See 06.B.01**

a. Signs, placards, process sheets, batch tickets, operating procedures, or other written means may be used in lieu of affixing labels to stationary process containers if the alternative method identifies the containers to which it is applicable and conveys the information required above. The written information shall be readily available to employees in their work area throughout each work shift.

b. Portable containers into which hazardous material(s) are transferred from labeled containers and which are intended only for the immediate use by the employee who performs the transfer are not required to be labeled. However, there shall be a means of indicating that the hazardous material has been used in the container.

08.A.10 Signs, tags and labels shall be located as close as safely possible to their respective hazards. Tags will be affixed by a positive means (such as wire, string, or adhesive) that prevents their loss or unintentional removal.

08.A.11 Signs, tags, and labels shall be legible and in English.

a. In areas where a significant percentage of the workforce or the visiting population speaks primarily in a foreign language, the use of symbol signs is strongly encouraged. > **See USACE *Sign Standards Manual, Section 8.***

b. When no symbols exist or where words are essential, two signs - one in English and one in the foreign language - should be placed side by side.

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c. These signs will follow the same format: same overall size, letter size and style, color, and mounting.

d. Because of variations in dialect, the legends on non-English signs shall be developed at the local level.

e. Two languages should never appear on the same sign.  
> **See 01.A.04.**

08.A.12 Signs shall be furnished with rounded or blunt corners and shall be free from sharp edges, burrs, splinters, or other sharp projections. The ends or heads of bolts or other fastening devices shall be located so that they are not a hazard.

08.A.13 Construction areas shall be posted with legible traffic signs at points of hazard in accordance with the MUTCD.

08.A.14 Signs required to be seen at night shall be reflectorized.

08.A.15 Accident prevention tags shall be used only as a temporary means of warning employees of an existing hazard, such as defective tools, equipment, and lockout. > **See Figure 8-9; See Section 12 for lockout/tagout requirements.**

08.A.16 Tags shall contain a signal word (either "**DANGER**" or "**CAUTION**") and a major message (presented in either pictographs, written text, or both) to indicate the specific hazardous condition or the instruction to be communicated to the employee. The signal word shall be readable at a minimum distance of 5 ft (1.5 m) or such greater distance as warranted by the hazard. The signal word and major message shall be understandable to all employees who may be exposed to the hazard. > **See 08.A.05 for basic design criteria.**

08.A.17 Accident prevention tags shall be rectangular in shape and shall be no smaller than 3 in x 5 in (8 cm x 13 cm). The corners may be square cut, chamfered, or rounded.

08.A.18 Kerosene lamps and open flame pots shall not be used for, or with, warning signs or devices.

08.A.19 Warning signs shall be placed on unattended Government-owned floating plant and land-based heavy equipment accessible to the public and shall read "**No Trespassing – U.S. Government Property.**"

## **08.B SIGNAL SYSTEMS, PERSONNEL AND PROCEDURES**

08.B.01 A standard signal system shall be used on all operations.

- a. Hand signals for crane operations shall conform to ANSI/ASME B30 series. > **See Figures 16-1.**
- b. Traffic flagging procedures shall be in accordance with the DOT Federal Highway Administration's MUTCD.
- c. For Marine signals, see Section 19 of this manual.
- d. For helicopter hand signals, see Figure 16-2 of this manual.

08.B.02 Standard hand signals shall be posted at the operator's position, signal control points and other points as necessary to inform those concerned.

08.B.03 Manual (hand) signals may be used when the distance between the operator and signal person is not more than 100 ft (30.4 m). Radio, telephone, or a visual and audible electrically-operated system shall be used when the distance between operator and signal person is more than 100 ft or when they cannot see each other.

08.B.04 A signal person shall be provided when the point of operation (includes area of load travel and area immediately surrounding the load placement) is not in full view of the vehicle, machine, or equipment operator; when vehicles are backed more than 100 ft (30.4 m); when terrain is hazardous; or when two or more vehicles are backing in the same area.

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08.B.05 A flag person or other controls shall be provided when operations or equipment on or next to a highway create a traffic hazard. An exception shall be made only when an adequate mechanical signaling or control device is provided for safe direction of the operation.

08.B.06 Where manual (hand) signals are used, only one person shall be designated to give signals to the operator. This signal person shall be located to see the load and be clearly visible to the operator at all times.

08.B.07 Flag signaling shall be accomplished by use of red flags at least 18 in (45.7 cm) square or sign paddles. In periods of darkness, red lights shall be used.

08.B.08 High visibility apparel shall be worn by flag and signal persons. > **See Section 05.F.**

08.B.09 Signal systems shall be protected against unauthorized use, breakage, weather, or interference; any malfunction shall be cause to stop all work.

08.B.10 Only persons who are competent and qualified by experience and/or training with the operations being directed shall be used as signal persons.

08.B.11 Signal persons shall back one vehicle at a time. While under control of a signal person, the driver shall not back or maneuver until directed and the driver shall stop when visual contact with the signal person is lost.

08.B.12 The signal person shall have a warning device of clear range and penetrating sound to warn persons when the load is coming in so they have time to get in the clear.

## **08.C TRAFFIC CONTROL**

08.C.01 Traffic control shall be accomplished in accordance with DOT Federal Highway Administration's MUTCD.

08.C.02 The Contractor shall conduct his operations in such a manner as to offer the least possible obstruction to the safe and satisfactory movement of traffic over the existing roads during the life of the contract.

08.C.03 The Contractor shall be responsible for providing, erecting, maintaining, and removing all traffic signs, barricades, and other traffic control devices necessary for maintenance of traffic.

08.C.04 All barricades, warning signs, lights, temporary signals, other devices, flagmen, and signaling devices shall meet or exceed the minimum requirements of the local DOT requirements.

08.C.05 Prior to the commencement of contract operations, the Contractor shall submit for acceptance the complete details of the proposed traffic control plan for the maintenance of traffic and access through the contract work area.

08.C.06 The Contractor shall coordinate with the GDA and obtain approval from local authorities prior to closing or restricting any roads.

08.C.07 Barricades, danger, warning and detour signs, as required, shall be erected before any roads are closed.

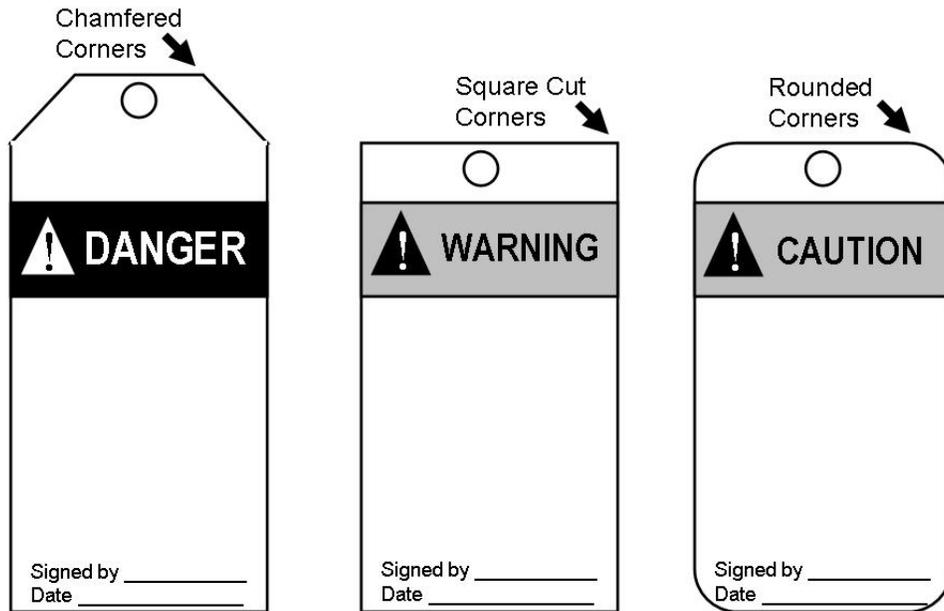
a. When roads are temporarily closed to public access, barricades or gates shall be used that are highly visible in day or night conditions. At a minimum, barriers shall be coated with reflective paint or be applied with highly reflective tape on both sides, and be signed with R11-2, 'ROAD CLOSED'.

b. Affected roads shall also be posted with appropriate warning signs a minimum of 100 ft (30.5 m) before the barrier by W20-3, DNG-11, WRN-24, or other appropriate signs from the MUTCD or EP 310-6-1a. Size and placement of signs depends on viewing distance and speed limit of roadway.

**FIGURE 8-1**  
**SIGN AND TAG SIGNAL WORD HEADINGS**

USACE	ANSI	OSHA
 Warning	 Warning	 Warning
 Danger	 Danger	 Danger
 Caution - Workplace Safety	 Caution	 Caution
 Caution - Undesignated Safety		
 Safety		
 Notice		

**FIGURE 8-2**  
**EXAMPLE TAG LAYOUT**



**TABLE 8-1**

**ACCIDENT PREVENTION SIGN REQUIREMENTS**

<b>TYPE</b>	<b>PURPOSE</b>	<b>DESIGN</b>
DANGER	Indicates a specific immediate and grave danger, a hazard capable of producing irreversible damage or injury, and prohibition against harmful activity.	Layout as shown in Fig 8-1. Shall have "DANGER" in white letters at top of rectangular safety red background placed at top of sign. Safety alert symbol shall precede signal word. Base of symbol shall be on same horizontal level as base of letters of signal word-height equaling or exceeding signal word height. Alternate OSHA or ANSI requirement calls for lettering to be black letters on white background or white letters on black background and symbol/pictorial panel, if used, shall be square with black safety red, or black and safety red symbol on a white background. The USACE standard requires that the specific danger be described in black letters on a white background. On other approved Danger signs, the message is white lettering on a red background.
CAUTION	Call attention to a specific potential hazard capable of resulting in severe, but not irreversible, injury or damage.	Layout as shown in Fig 8-1. Shall have "CAUTION" in yellow on black background and lower panel for additional sign wording in black on a yellow background.

**TABLE 8-1 (Continued)**

**ACCIDENT PREVENTION SIGN REQUIREMENTS**

<b>TYPE</b>	<b>PURPOSE</b>	<b>DESIGN</b>
GENERAL SAFETY	Includes notices of general practice and rules relating to health, first aid, medical equipment, sanitation, housekeeping, and general safety.	Layout as shown in Fig 8-1 or consisting of single panel. Shall have appropriate keyword as signal word in white on a green background in the upper panel and a lower panel for additional sign wording or symbols in black or green on a white background. Alternatively, the entire sign may be white letters on a green background.
FIRE AND EMERGENCY	Used only to label or points the way to fire extinguishing equipment, fires escapes and exits, gas shutoff valves, sprinkler drains, and emergency procedures.	Layout as shown in Fig 8-1 or consisting of a single red panel. Shall have the appropriate keyword as the signal word in white on a red background in the upper panel and a lower panel for additional sign wording or symbols in red on a white background. Alternatively, the entire sign may be white letters on a red background.
INFORMATION	Provide information of a general nature, such as designation of facilities or services, in order to avoid confusion or misunderstanding.	Layout as shown in Fig 8-1 or consisting of a single panel. Should have signal word "NOTICE" in white on blue background in upper panel and lower panel for additional wording or symbols in blue or black on a white background OR entire sign may be white letters on blue background.
EXIT	Used to indicate exits.	Lettered in legible letters, not less than 6 in (15.2 cm) high, on white field. The principal stroke of letters shall be at least 3/4 in (5.1 cm) in width.

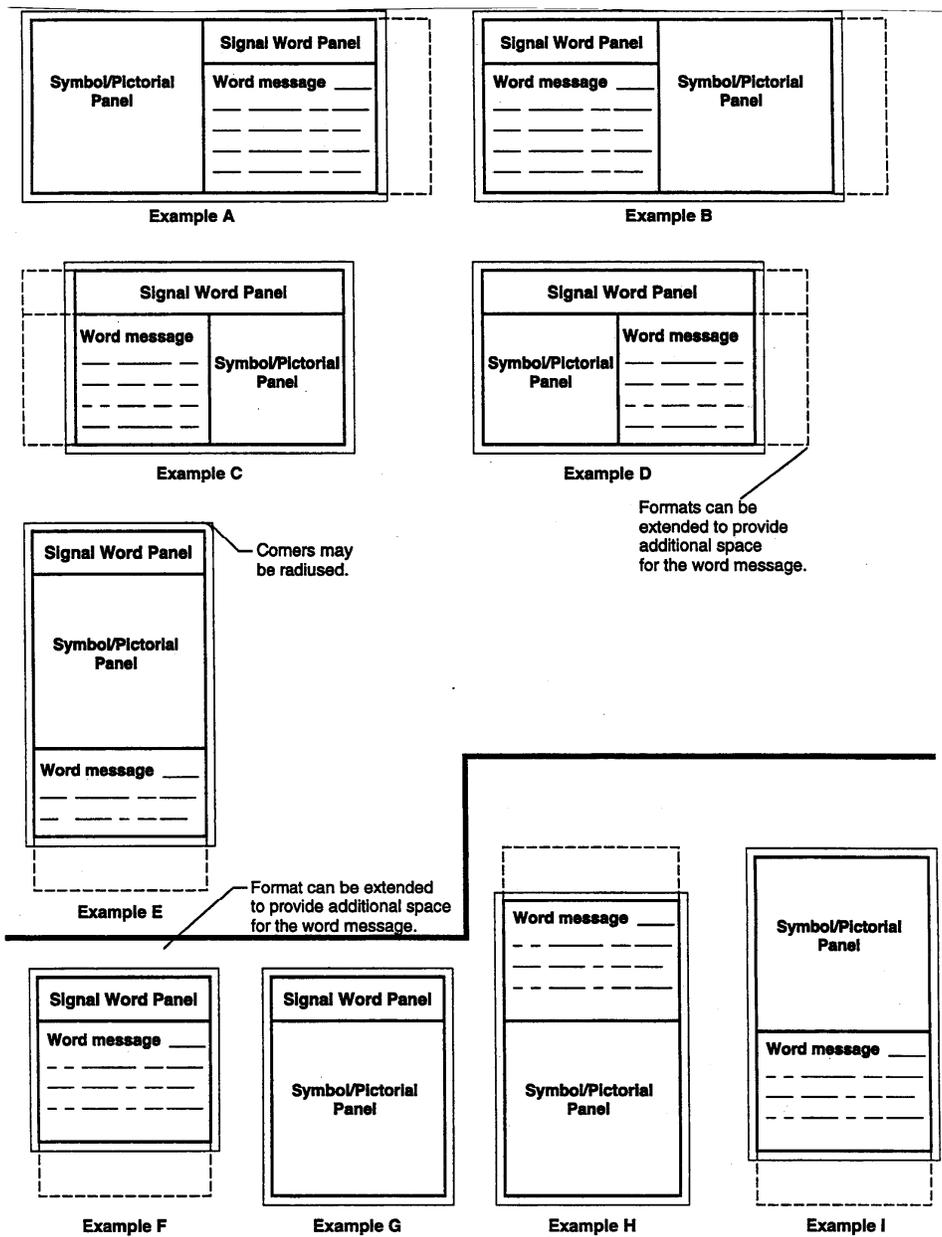
**TABLE 8-2**

**ACCIDENT PREVENTION COLOR CODING**

<b>COLOR</b>	<b>PURPOSE</b>
Red	Red shall be the color used for identifying dangerous conditions, emergency controls, fire detection equipment and fire suppression systems, and containers of flammable liquids.
Orange	Orange shall be the color used for designating dangerous parts of machines and energized equipment. Orange shall also be used for temporary traffic control signs in construction zones.
Yellow	Yellow shall be the color for designating conditions requiring caution, marking dangerous chemicals, marking physical hazards, and markings for ionizing radiation.
Green	Green shall be the color for designating safety equipment and operator devices and the location of first-aid and safety equipment (other than firefighting equipment).
Blue	Blue shall be the color used for designating information of a non-safety nature.
Purple	Purple shall be the color used to designate ionizing radiation hazards.

FIGURE 8-3

EXAMPLE SIGN LAYOUT



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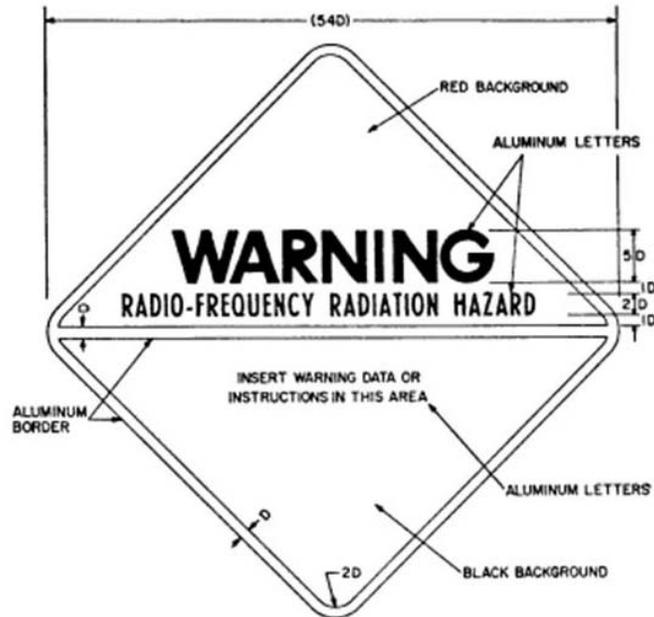
**TABLE 8-3**

**IDENTIFICATION OF PIPING SYSTEMS**

<b>Outside diameter of pipe or covering</b>	<b>Length of color field "A"</b>	<b>Size of letters "B"</b>
3/4 to 1 1/4 inches	8 inches	1/2 inch
1 1/2 to 2 inches	8 inches	3/4 inch
2 1/2 to 6 inches	12 inches	1 1/4 inch
8 to 10 inches	24 inches	2 1/2 inch
over 10 inches	32 inches	2 1/2 inch



**FIGURE 8-4**  
**RADIO FREQUENCY WARNING SYMBOL**



D = scaling unit

Lettering: ratio of letter height to thickness of letter lines

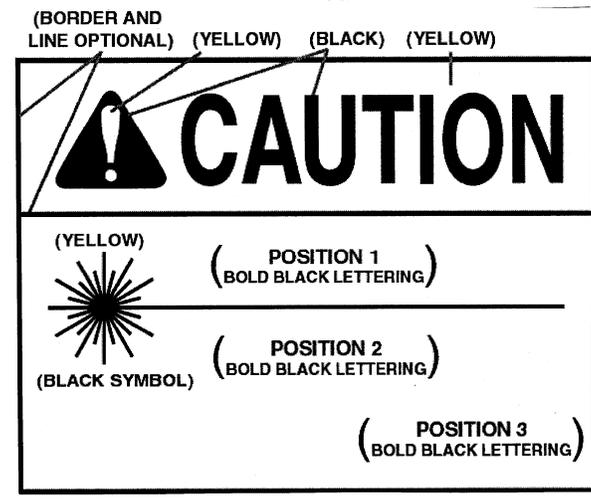
Upper triangle:       5 to 1 = large  
                              6 to 1 = medium

Lower triangle:       4 to 1 = small  
                              6 to 1 = medium

Symbol is square, triangles are right-angle isosceles

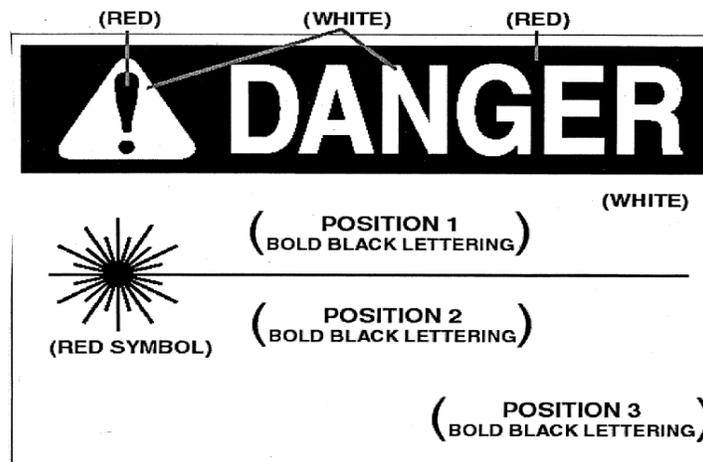
**FIGURE 8-5**

**LASER CAUTION SIGN**

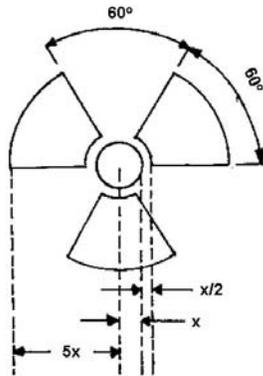


**FIGURE 8-6**

**LASER WARNING SIGN**

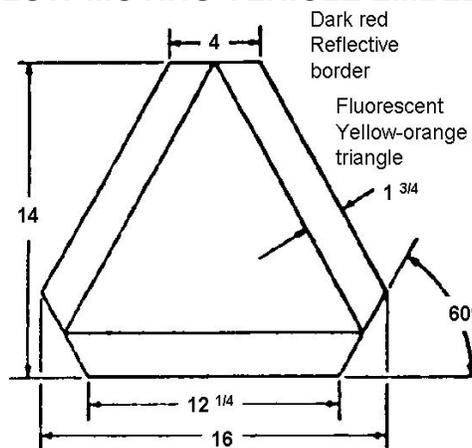


**FIGURE 8-7**  
**RADIOLOGICAL WARNING SYMBOL**



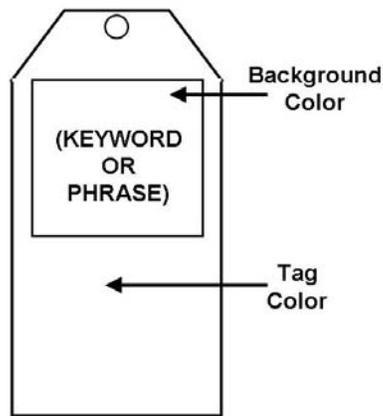
1. Cross-hatched area is to be magenta or purple.
2. Background is to be yellow.

**FIGURE 8-8**  
**SLOW-MOVING VEHICLE EMBLEM**



NOTE: All dimensions are in inches

**FIGURE 8-9**  
**ACCIDENT PREVENTION TAGS**



<b>Keyword/Phrase</b>	<b>Keyword/Phrase Print Color</b>	<b>Background Color</b>	<b>Tag Color</b>
"DANGER"	White in red oval	Black	White
"CAUTION"	Yellow	Black	Yellow
"DO NOT OPERATE"	White	Red	White
"OUT OF ORDER"	White	Black	White
"DO NOT USE"			
Informational message or inspection	Black or green	N/A	Green & white OR White & black