

# Selected Portions of the United States Army Corp of Engineers Sign Standards Manual

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This document is available as publication EP 310-1-6A and EP 310-1-6B (two volumes) and is available at no cost. Contact the USACE via its web site (see section VI.B) to request these documents. Make sure to request all updates when ordering this document, as there have been several updates to the manual.

(Note: Numbers/letters in parentheses indicate the original section in the USACE manual)

Well planned and properly designed directional signs are important visitor aids. They lead visitors to a Corps project, direct them to the various recreation areas, and then guide them to the facilities within each area. Directional signs are highly visible, seen not only by the boaters, campers, swimmers, and picnickers using a facility, but also by the many people traveling in the vicinity of a Corps project. It is important, therefore, that directional signs are correctly fabricated, carefully placed, and properly maintained.

The Corps does not have authority to erect signs on the national system of interstate and defense highways. This responsibility is reserved for the respective state highway departments. However, under the signing policy and standards set forth in the *Manual on Uniform Traffic Control Devices* (MUTCD) for signing such highways, signs may be placed by the governing jurisdiction in cooperation with the Corps to direct travelers to Corps projects. A cordial working relationship with state agencies is essential to appropriately serve traffic needs and provide awareness for project features and facilities.

Directional signs must be provided on access roads to guide the visitor to a Corps project and its recreation areas. These signs should logically begin at the nearest state or US highway used to approach the project and continue along the best route to a specific site. A sign should be provided at all intersections where a change of direction is necessary or where directional reinforcement is required. Design and installation of these directional

signs must be fully coordinated with the local or state highway department. In some cases, these agencies will furnish and install needed signs. If they cannot, permission to install Corps signs should be obtained. These signs are illustrated on pages 6.3-10. Consultation with the respective highway department should be made to ensure that signs satisfy local desires and standards.

Signs directing potential users to a Corps project may be located several miles from that project. In such cases, it would be desirable to indicate the services available at that project using the recreation area symbols. These should logically include major services such as camping, RV accommodations, and boat launches. Users should be made aware of available services before visiting the site, which will often save a futile trip. In addition, an indication of services available is good public relations: passersby note what is available for future reference. There are two formats available for placing symbols indicating services on directional signs; these are illustrated on pages 6.9-10.

Directional signs within a project or recreation area are designed for viewing at slower speeds. Therefore, there is a different sign specifically designed for use on project roadways. Its use and format are shown on pages 6.11-15.

In addition, within a recreation area, symbols can be used for directional signs instead of words. Guidelines for their use will be found in Section 8, pages 8.5-8.

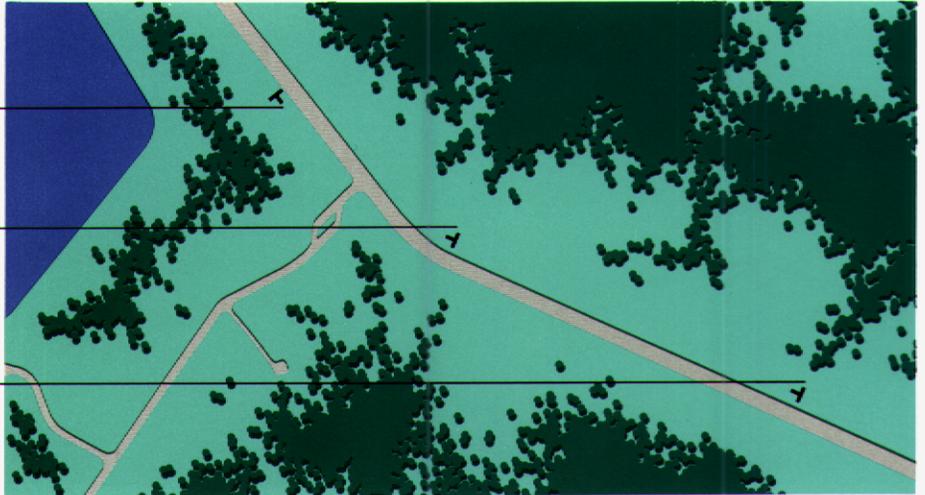
The diagrams below illustrate the use of directional signs on the roads leading to a Corps project and within that project. On access roads, the signs are words alone (pages 6.3-8) or words accompanied by three or four symbols (pages 6.9-10).

Once inside a project, the signs are either words alone (pages 6.11-15) or symbols alone (pages 8.5-8).

Cook Recreation → Area  
[Picnic Table] [Swimming Beach] [Camp] [Boat Ramp]

↑ J. Percy Priest Dam 1.5 Miles  
← Cook Recreation Area

↑ J. Percy Priest Dam 2 Miles  
Cook Recreation Area .5 Miles

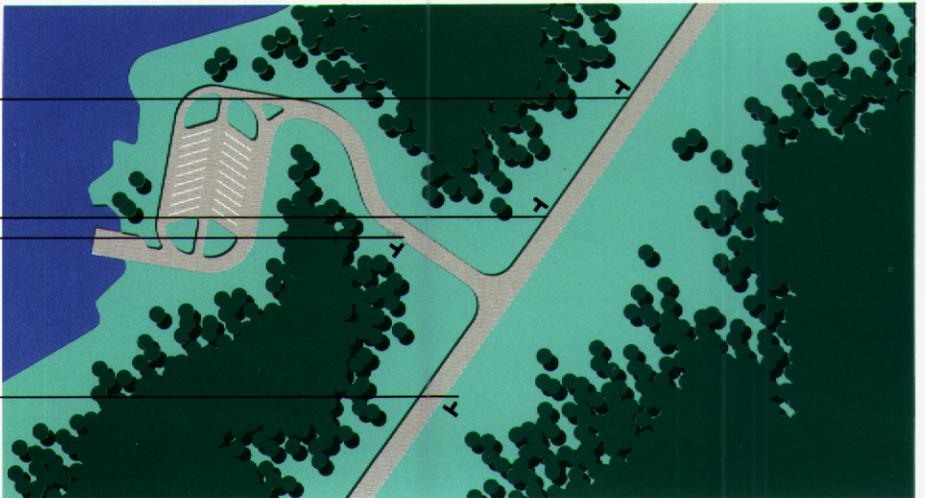


[Picnic Table] [Swimming Beach] [Camp] [Boat Ramp]  
↑

[Picnic Table]  
→

← Exit  
Campground →  
Swimming Beach  
Picnic Area

↑ Exit  
← Boat Ramp



The design of directional signs on public roadways has been standardized to maintain consistent visual identification for visitors approaching Corps projects. They have been designed for optimum legibility. The illustration below shows a typical directional sign. The elements of the sign

design are described in the captions to the left of the illustration.

These signs are made of HDO plywood with applied reflective sheeting. Aluminum may be used as an alternate panel material for larger signs. The background color is Corps Brown (page 4.11); the lettering and borders are white. Typography is Helvetica Medium, upper and lower case,

initial capitals only. To specify the size of typography, refer to the Viewing Distance Guide on page 2.6. Artwork for the arrow is on page F141. The use of the Corps Signature, Castle or District designation is not permitted on Directional signs.

**Border:** Top border is one-half the size of basic grid unit A; bottom border is .375A.

**Typography:** Helvetica Medium, upper and lower case, initial capitals only. The size of the capital letters determines the basic unit A of the layout grid (page 6.6). Letter size is the same for all messages on a given sign. All messages are aligned flush left.

**Sign Panel:** Layout based on grid. Overall size of panel determined by length and number of messages.

**Color:** Corps Brown background with white borders, arrows, and typography. Refer to color standards (page 4.11).

**Note:** If local rules or regulations prohibit use of Corps Brown on Approach Roadway Directionals, Recreation Brown (as per the *Specifications for Standard Highway Sign Colors*, published by the Federal Highway Administration) can be substituted.

**Post:** Attached to the back of the sign panel, set in two units (2A) from the outside edge of the panel. Size and material determined by panel size.

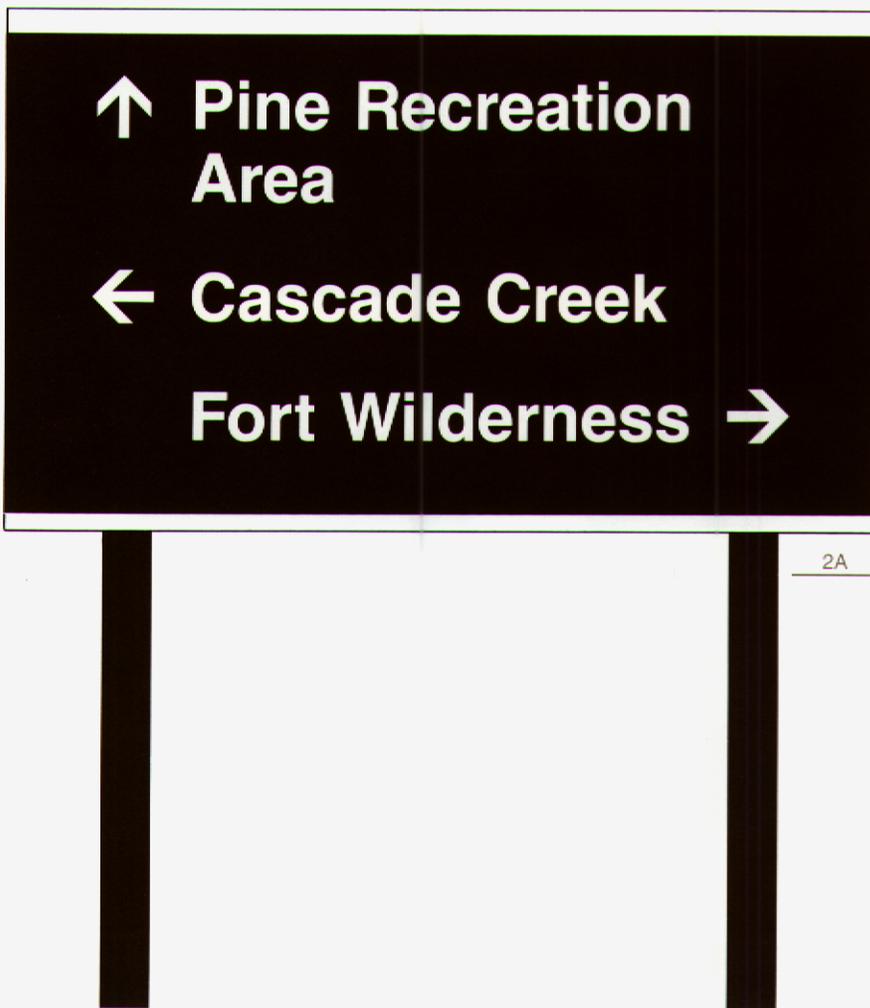
**Materials:** Signs are fabricated from HDO plywood or aluminum. The face is applied reflective sheeting. Refer to matrix shown below and specifications in Appendix B.

**Arrows:** An arrow may be placed on a sign panel to indicate one of five possible directions. (see page 4.19).

\*Panel size varies with legend length and configuration (see page 6.6).

\*\*Post size and number of posts required will depend on size of sign. Refer to the Directional Sign Post and Footing Specification in Appendix B.

Post length and mounting height for sign placed on sloping or inclined grade may require adjustment as shown for appropriate installation.



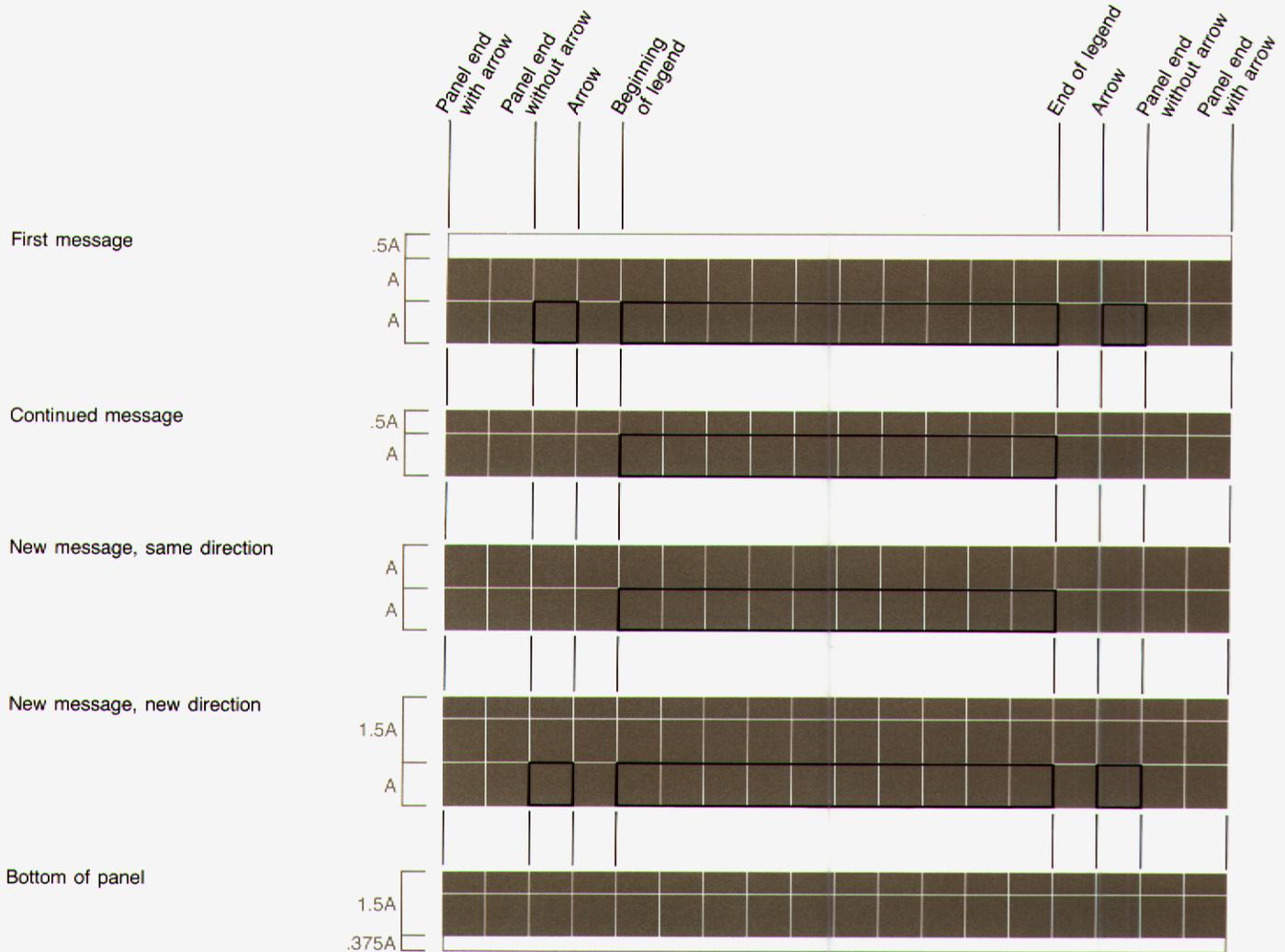
Sign Type	Legend Size (A)	Panel Size	Post Size	Specification Code	Mounting Height	Color Bkg/Lgd
APRDIR	4"	*	**	HDO-4	60"	BR/WH
APRDIR	6"	*	**	HDO-4	60"	BR/WH
APRDIR	9"	*	**	HDO-4/ALU-4	66"	BR/WH



All directional signs on public roadways use the grid illustrated below for message format and typographic layout. The height of lettering used for legends, referred to as A, is the basic unit on which all dimensions are based. Letter size is based on viewing distance (see chart on page 2.6). Once the letter size is determined, all other dimensions follow. No matter what

letter size is chosen, the relationships shown in the grid will remain the same. This grid format system consists of five parts, including the top and bottom borders. The top border equals .5A, the bottom border equals .375A. The first message is placed one unit A below the edge of the top border. The placement of the next message depends on its relationship to

the first message. The different possibilities are: a continuation of the first line, a new message with the same directional, or a new message with a different directional. The length of the legends can be determined by typesetting (see D.1 for approved systems) or by calculating using the method outlined on page D.2.



The width of the sign panel is based on the longest message, plus space for arrows. When mileage to a destination is indicated, numerals are considered part of the message, just as if they were letters. Double the standard word-space between the legend and the mileage number. Place the word "Miles" after the number (see page 6.9). Directional legends with three or more words may be placed on two lines for ease of reading and to keep the panel from becoming overly long. For an explanation of how to divide a message onto two lines, see page 2.4. Arrows left or straight ahead are placed

one unit A to the left of the first destination in that direction. The left edge of the sign panel is 2A units to the left of the arrow. An arrow right is placed to the right of the first destination with that directional, one unit A beyond the end of the longest message on the sign panel. In some cases, this may mean that the arrow right is more than one unit from the lettering. The right edge of the sign panel is then 2A to the right of the arrow. When there is an arrow on only one side of the sign, the sign panel ends 2A beyond the last letter on the longest line.

Two formats, one shown below and one on the following page, are provided for placing symbols indicating services on an Approach Roadway Directional Sign. In both cases, there is to be only one written destination placed on a maximum of two lines. The first format is for use with three symbols. The second format is for use with four symbols. The pictograms in the

three-symbol configuration are slightly larger than those in the four-symbol layout. Where mileage to a destination is indicated, double the standard word-space between the last letter of the message and the numeral.

First message



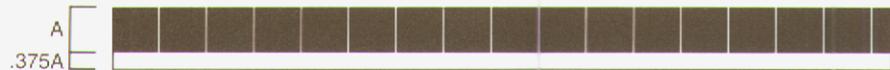
Continued message (if necessary)



Three symbols



Panel bottom



All of the components in the grid shown below and on the following page are the same as that on page 6.5 except for the element with the symbols and the bottom of the panel. The first line "Pine Recreation" is placed one unit A below the border. The next line "Area" is a continuation of the message and is placed with a .5A line space below the first line. The symbols are equal to 2A in height, as measured to the outside edge of the holding line around the image, and are placed with a one unit A line-space below the previous line. The first symbol is aligned flush left with the typography. Each symbol is one unit A to the right of the previous symbol. The bottom of the panel is one unit A deep.



\*Panel size varies with legend length and configuration.

\*\*Post size and number of posts required will depend on size of sign. Refer to the Directional Sign Post and Footing Specification Matrix in Appendix B.

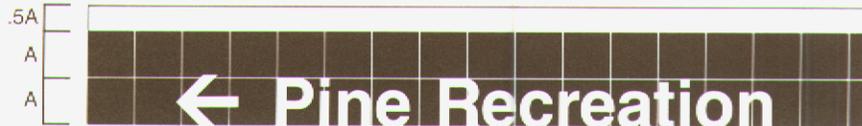
Sign Type	Legend Size (A)	Panel Size	Post Size	Specification Code	Mounting Height	Color Bkg/Lgd
APRS-3	4"	*	**	HDO-4	60"	BR/WH
APRS-3	6"	*	**	HDO-4	60"	BR/WH
APRS-3	9"	*	**	HDO-4/ALU-4	66"	BR/WH

The layout of a sign with four symbols is identical to that for three symbols, except for the reduced size of the symbols. When there are four symbols, their height is equal to 1.5A as measured to the outside edge of the holding line around the image rather than 2A as shown on the previous page. The symbols are placed one unit A

line space below the legend line. One unit A space is placed between each symbol. The bottom panel is one unit A deep.

Refer to the display on pages 8.9-15 to select symbols. For reproduction art, see Appendix F.

First message



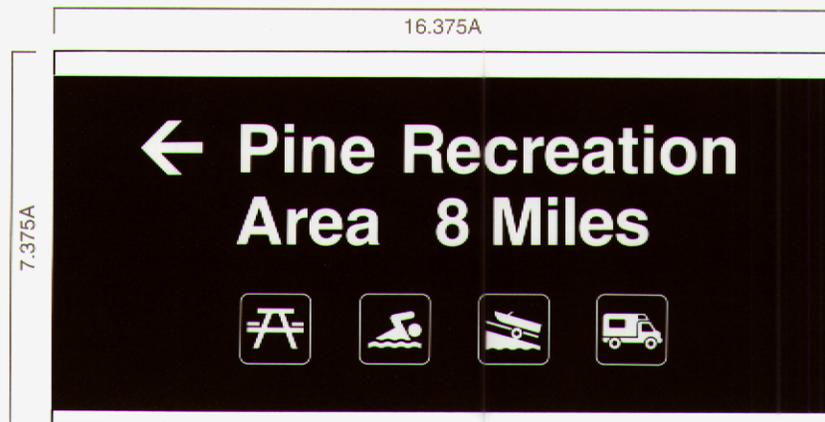
Continued message (if necessary)



Four symbols



Bottom of panel



\*Panel size varies with legend length and configuration.

\*\*Post size and number of posts required will depend on size of sign. Refer to the Directional Sign Post and Footing Specification Matrix in Appendix B.

Sign Type	Legend Size (A)	Panel Size	Post Size	Specification Code	Mounting Height	Color Bkg/Lgd
APRS-4	4"	*	**	HDO-4	60"	BR/WH
APRS-4	6"	*	**	HDO-4	60"	BR/WH
APRS-4	9"	*	**	HDO-4/ALU-4	66"	BR/WH

Directional signs within the boundaries of a Corps project or facility are similar in look to the Approach Roadway Directionals, but are simpler, more compact, and more appropriate for viewing at slower speeds. The typography is Helvetica Medium. To specify the size of typography,

refer to the Viewing Distance Guide on page 2.6. Because they are viewed at a slower speed, the panel has a different layout configuration. The signs can be made out of HDO plywood with reflective sheeting. The colors, Corps Brown and white (page 4.11), are the same as those used for Approach Roadway Directionals.

The illustration below shows a typical Directional sign for use within a Corps project. The elements of the sign design are described in the captions above the illustration. The use of Corps Signature, Castle or District designation is not permitted.

Sign Panel: Layout based on grid. Overall size of panel determined by length and number of messages.

Typography: Helvetica Medium, upper and lower case, initial capitals only. The size of the capital letters determines the basic unit A of the layout grid (page 6.14). Letter size is the same for all messages on a given sign. All messages are aligned flush left.

Color: Corps Brown background with white typography and arrows.

Post: Nominal width is equal to A. Post is attached to the back of the sign panel, set in 2 units (2A) from the outside edge of the panel.

Arrows: An arrow may be placed on a panel to indicate one of five possible directions (see page 4.19).

Materials: Signs are constructed of HDO plywood with reflective sheeting background and graphics.

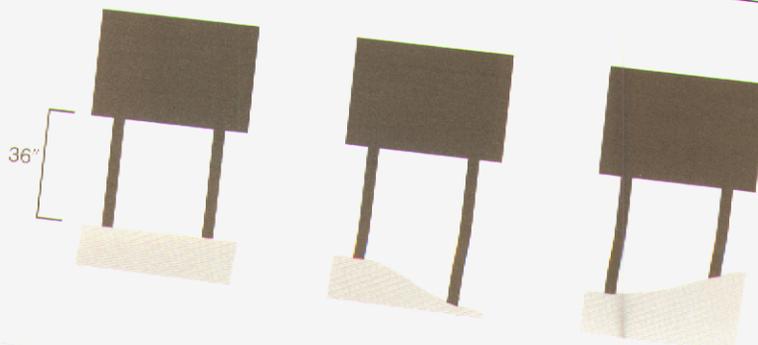


\*Panel size varies with legend length and configuration (see page 6.14).

\*\*Post size and number of posts required will depend on size of sign. Refer to the Directional Sign Post and Footing Specification in Appendix B.

Post length and mounting height for sign placed on sloping or inclined grade may require adjustment as shown for appropriate installation.

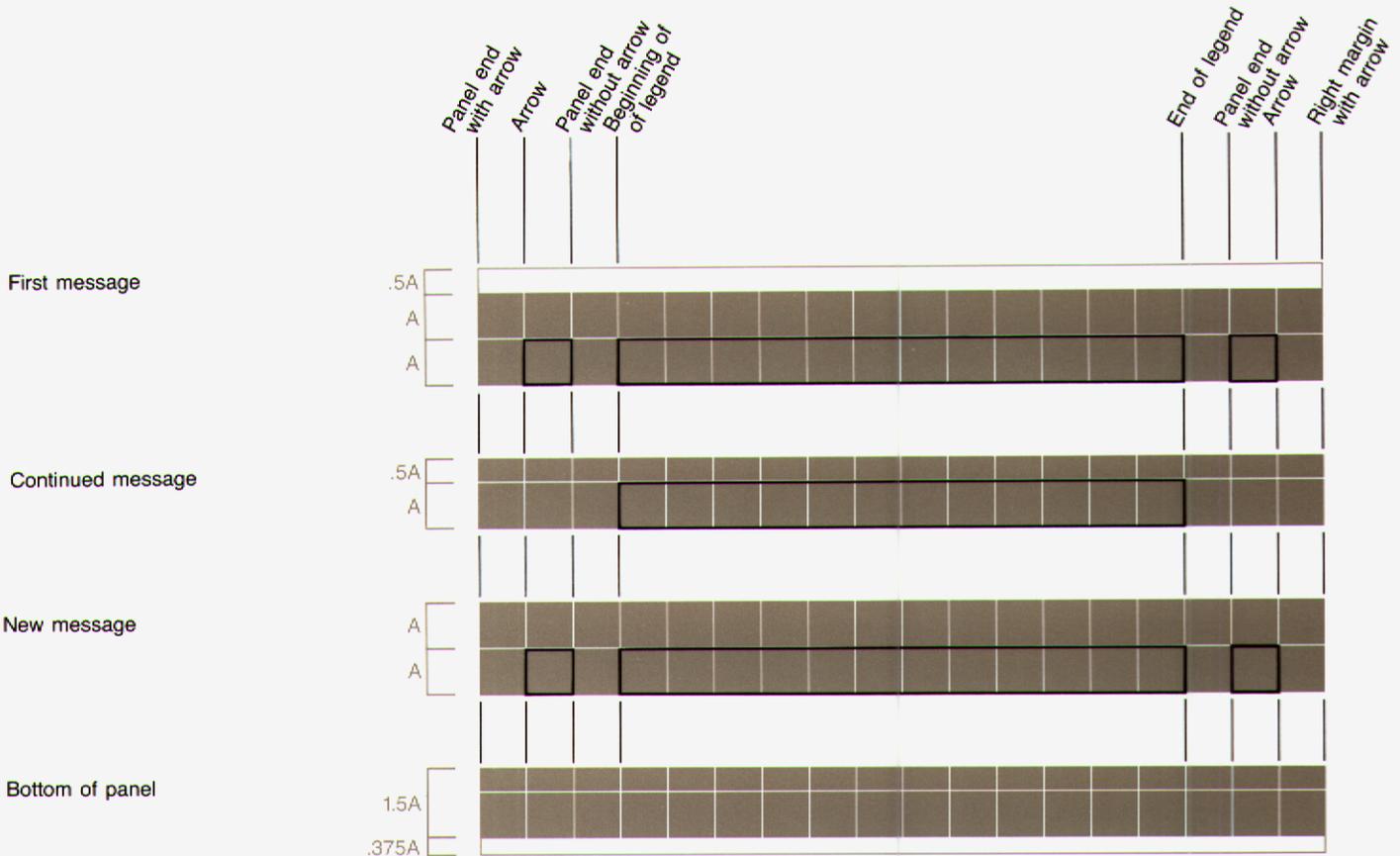
Sign Type	Legend Size (A)	Panel Size	Post Size	Specification Code	Mounting Height	Color Bkg/Lgd
PRJDIR	2"	*	**	HDO-5	36"	BR/WH
PRJDIR	3"	*	**	HDO-4	36"	BR/WH
PRJDIR	4"	*	**	HDO-4	36"	BR/WH



All Directional signs on roadways within Corps boundaries use the grid illustrated below for message format and typographic layout. The height of lettering used for legends, referred to as A, is the basic unit on which all dimensions are based. Letter size is based on viewing distance (see chart on page 2.6). Once the letter size is

determined, all other dimensions follow. No matter what letter size is chosen, the relationships shown in the grid will remain the same. The grid consists of four parts, including the top and bottom borders. Just as on the Approach Roadway Directional, the top border equals 1.5A, the bottom border equals .375A. The first message is placed

one unit A below the top edge of the sign. The placement of the next line depends on whether it is a continuation of the message, or a new message. Unlike Approach Roadway signs (page 6.6), the spacing between lines is consistent, regardless of the directions associated with the messages.



The width of the sign panel is based on the longest message, plus space for arrows. Arrows left or straight ahead are placed one unit A to the left of the first destination in that direction. The left edge of the sign panel is one A unit to the left of the arrow. An arrow right is placed to the right of the first destination with that directional, one unit A beyond the end of the longest message on the sign panel. In some cases, this means that the

arrow right is more than one unit from the lettering. The right edge of the sign panel is then 1A to the right of the arrow. When there is an arrow on only one side of the sign, the sign panel ends 1A beyond the last letter on the longest line. The legend length can be determined by typesetting (see D.1 for approved systems) or by calculating using the method outlined on page D.2.

The example below illustrates the use of Project Roadway Directional sign grid B. The first message, "Daniel Oscar Picnic Area", is the one with a straight-ahead arrow. Because it is significantly longer than the other two messages, it is divided into two lines. The first line is located one

unit A below the border. "Picnic Area", being a continuation of message, is placed with a .5A line-space below the first line. The next message, "Nature Trail", has a left-turn arrow. It is placed with a one unit A line-space below the first message. The last message, "Swim Beach", has a right-turn arrow. It is placed with a one unit A

line-space below the second message. The bottom of the sign panel is 1.5A below the last message. The total height of the sign is 9.875 units; its width is 14.5 units.

First message



Continued message



New message



New message



Bottom of panel



Sign proportions are the same regardless of letter size. To determine the size of the sign panel, multiply the letter size, A, times the number of units. For example, if the type is 4", the length of sign below is 4" x 14.5 units, which is 58". The depth is 4" x 9.875 units which equals 39.5". With 3" lettering the length is 40.5" (3" x 14.5 units) and the depth is 29.625" (3" x 9.875 units).



**Foreword**

This report provides a guide on letter size and the placement of directional signs on roadways leading to, or in the Corps of Engineers recreation projects.

The primary references utilized in this report include the following:

- *Geometric Design of Highways and Streets, by the American Association of State Highway and Transportation Officials (AASHTO), dated 1984.*
- *Manual on Uniform Traffic Control Devices (MUTCD) Revision 4, by the U.S. Department of Transportation, dated 1986.*
- *Research Records by the Transportation Research Board (TRB), National Research Council, Formerly the Highway Research Board (HRB).*

The research documented in these references ranges from 1939 to present.

**Principles**

Careful selection of letter size and sign location will enable the motorist to detect and understand the sign message before passing the sign. There should be time to comfortably react to the sign message after passing the sign. The typical reaction of the motorist would be to slow

from the operating speed and then to turn either right or left at the appropriate crossroad or access road. On multi-lane roadways, the motorist may have to change lanes before slowing to the crossroad or access road.

**Detection and Recognition Time**

The information handling process of a motorist<sup>1</sup> includes time periods for the delay between the time a directional sign is presented and the time the eyes begin to move, the eye fixation, and the recognition or perception of the sign message. These times vary between two-thirds of a second to six seconds<sup>2</sup> depending on the complexity of the information and whether it is expected or unexpected. A

detection and recognition time of up to three seconds is recommended for design on road up to 70 miles per hour<sup>3</sup> and a 3.0 second time is used for general warning signs<sup>4</sup>.

It is concluded from the information presented by AASHTO and the MUTCD that a three-second detection and recognition time would be appropriate for directional signs on roadways of all speeds.

**Viewing Distance**

The viewing distance is the distance a motorist travels during the detection and recognition time. This distance must be unobstructed and the directional sign must be within the motorist's cone of vision. The viewing distance in feet is calculated by the following formula:

$$D = 1.47 TV$$

Where:  $D$  = viewing distance in feet  
 $T$  = detection and recognition time in seconds  
 $V$  = operating speed in miles per hour

The operating speed is defined as the 85th percentile speed (the speed at or below which 85% of the vehicles are moving).

**Letter Size**

The size of the upper case letters in the sign message consisting of upper and lower case letters is determined by the motorists ability to read the sign throughout the viewing distance.

Research in 1939<sup>5</sup> established a viewing standard of 50 feet per inch of letter height for daylight conditions and 40 feet per inch for nighttime conditions. These

values were for a static visual acuity of 20/20 and represented the 80th percentile of the distribution of the observed legibility distances. A 20/40 visual acuity is to be used for design to comply with Federal Highway Administration Standards since drivers licenses are commonly issued with that minimum vision. Therefore, the viewing standard

<sup>1</sup> AASHTO, *Geometric Design of Highways and Streets*, Washington D. C., 1984, p. 146.

<sup>2</sup> Ibid, pp. 42-45

<sup>3</sup> Ibid p. 147

<sup>4</sup> U.S. Department of Transportation, *Manual on Uniform Traffic Control Devices (MUTCD)*, Revision 4, 1986.

<sup>5</sup> Forbes, T. W., and Holmes, R. S., *Legibility Distances of Highway Destination Signs in Relation to Letter Height, Letter Width and Reflectorization*, H.R.B. Proceedings, Vol. 19, 1939, pp. 321-334.