to residences on the closed portion of the road) either because of construction or maintenance operations or because of a temporary emergency such as high water or a landslide. It should not be used where traffic is maintained or where a route is detoured several miles in advance of the actual construction or blockade.

The Road Closed sign shall be 40 inches by 24 inches in size, with black lettering on a white background. It shall be illuminated or reflectorized.

The sign shall be mounted on a barricade in the center of the roadway or directly facing traffic on the right half of the roadway, at a height of 2½ feet to the bottom of the sign. If a temporary or detour route begins at the barricade, a Temporary Route assembly with a directional arrow (sec. 107) or a Detour sign (sec. 111) should be mounted just below the Road Closed sign, with the lowermost part of the assembly not less than 2 feet above the road surface.

Section 54.—Load Limit Sign (R–98)

Due to seasonal weakening of the road surface, obsolescence of bridges or pavement, or other impairment of a roadway, it is often necessary to limit the load permitted on a roadway. The Load Limit sign, reading LOAD LIMIT (10 TONS), shall be used to indicate such restrictions. The sign shall be 18 inches by 24 inches in size, with black lettering on a white background. It shall be located immediately in advance of the bridge or other structure to which the restriction applies. In the case of an extended length of road, the sign shall be placed on the right-hand side of the restricted roadway approximately 25 feet from any intersecting road on which the restriction does not apply, so as to be clearly visible from all vehicles turning onto the restricted roadway. A supplementary sign may be necessary on the left-hand side of the roadway. If the limit applies at an intermediate point where there is no alternate routing, a special sign should be provided to divert heavy vehicles at the nearest intersection where a suitable detour is available.

Load Limit signs in rural districts shall normally be erected at a height of 2½ feet to the bottom of the sign, and not less than 6 feet nor more than 10 feet from the roadway edge. In residence or business districts where a low mounting height will not give adequate visibility they shall be mounted not less than 7 feet nor more than 10 feet above the curb or roadway. On entrance ramps or channelized roadways, or where a curb is present, they shall be as close to the pavement edge as practicable, with a minimum of 1 foot to the nearest edge of the sign. At bridges they may be mounted on the bridge structure.

Section 55.—Other Regulatory Signs

Regulatory signs other than those specified above may be required to aid the enforcement of other laws or regulations. They should be of adequate size, and designed with black lettering on a white background on rectangular plates with the longer dimension vertical. They should be mounted in accordance with the general requirements for sign position (sec. 17), or as necessary to make them most effective.

Typical miscellaneous regulatory signs are TRACTORS WITH LUGS PROHIBITED, WET PAINT — DO NOT CROSS LINE, NO DUMPING ALLOWED, NO HITCH HIKING, and NO FISHING FROM BRIDGE. The use for such signs are sufficiently obvious to require no detailed specifications.

C—WARNING SIGNS

Section 56.—Application of Warning Signs

Warning signs, as their name implies, shall be used for the purpose of warning traffic of hazardous conditions either on or adjacent to the road. Warning signs require caution on the part of the motorist and generally call for reduction of speed in the interest of his own safety and that of other motorists and pedestrians. Adequate warnings are of great assistance to the vehicle operator and are valuable in safeguarding and expediting traffic. However, the use of warning signs should be kept to a minimum. Too frequent use of them tends to breed disrespect for all signs. Improved highway design generally reduces the need for warning signs.

Typical locations and hazards that may warrant the use of warning signs are:

1. Turns (secs. 59, 68).
2. Curves (sec. 60).
3. Reverse turns and curves (secs. 61, 62, 68).
4. Successions of curves, with or without short tangents (sec. 63).
5. Intersections (secs. 64–67).
6. Advance warnings of stop signs and traffic signals (secs. 69, 70).
9. Narrow roadways, bridges, and other points of limited clearance (secs. 78–80).
10. Road construction or repairs (secs. 81–83).
11. Other temporary road conditions (secs. 84, 85).
12. Pedestrian islands or similar obstructions (sec. 86).
13. School zones (sec. 87).
15. Entrances and crossings (sec. 90).

Determination of the sign to be erected shall be in accordance with the criteria set forth in the following pages. When doubt exists as to which sign to use, the one requiring the minimum restriction shall be erected.
Figure 5.—Typical applications of warning signs.

Figure 6.—Typical applications of warning signs.
Warning signs shall be applied only as specified in this manual. Those specified herein cover most conditions that are likely to be met. If other warnings are needed the signs shall be of standard shape and color for warning signs, and the messages shall be brief and simple.

Section 57.—Design of Warning Signs

Warning signs convey their message by legend or symbol, color, and shape. All, with the permissible exception of the Large Arrow sign (sec. 68), shall have a "highway yellow" background, with black lettering or symbols. They shall be diamond shaped (square with one diagonal vertical) with the exception of the Railroad Advance Warning sign, which shall be circular; the Railroad Crossbuck sign; the Large Arrow sign, which shall be a horizontal rectangle; and the Advisory Speed sign, which shall be square.

All warning signs shall be reflectorized or illuminated unless, like the School sign, they have significance only by day.

The sizes of signs here shown are to be regarded as minimum sizes. Where conditions require greater visibility or emphasis, larger signs should be used, with symbol or legend enlarged approximately in proportion to outside dimensions. The minimum standard size for warning signs, unless otherwise specified, is 24 inches by 24 inches. On rural highways three or more lanes in width the minimum size of warning signs should be 30 inches by 30 inches. (These dimensions are measured along the sides of the diamond.)

Section 58.—Location of Warning Signs

Since warning signs are placed primarily for the protection of the driver who is unacquainted with the road, it is very important that thought and care be given to their location and erection. Although it is specified herein at what distances the signs shall be placed in advance of the hazards they are to warn against, there will be many instances where the physical conditions will require different distances. Trial runs should be made by day and by night to determine the most effective location and erection characteristics for each installation. In cities, where speeds are relatively low, warning signs should usually be placed nearer to the points of hazard than on rural highways.

In rural and residence districts where no parking occurs, warning signs shall be erected not less than 6 feet nor more than 10 feet from the edge of the pavement or traveled roadway, with the lowest edge of the sign 2 1/2 feet above the crown of the roadway (fig. 1). In any location where they will obstruct sidewalks or pedestrian paths, however, they should be mounted at a height of not less than 7 feet to the bottom of the sign. In residence and business districts where parking is frequent, they shall be set so that the bottom of the signs is not less than 7 feet above the top of the curb, and the left-hand edge not less than 1 foot back from the outside edge of the curb.

Signs indicating conditions that are temporary or intermittent in occurrence, such as road repairs, should be mounted on portable standards so that they can be set up and removed as required.

Figures 5 and 6 show typical installations of warning signs.

Section 59.—Turn Sign (W-1)

The Turn sign, showing an arrow bent at a right angle (W-1, right or left), shall be used to mark curves having a curvature of 28 degrees and over, and to mark other curves having a curvature of from 15 degrees to 27 degrees when the central angle exceeds 45 degrees (see fig. 7 for a method of measuring curvature). All curves should be marked with Turn signs when a ball-band indicator shows banks of 10 degrees or more at speeds less than 31 miles per hour. All Turn signs shall be reflectorized. Where a Turn sign is warranted, a Large Arrow sign (sec. 68) shall be used on the outside of the turn.

Additional protection may be provided by use of the Advisory Speed sign (W-55, sec. 51).

The Turn sign shall be erected not less than 350 feet nor more than 500 feet in advance of the beginning of the turn, and in accordance with the general specifications for the placement of warning signs (sec. 58).

Section 60.—Curve Sign (W-2)

The Curve sign, showing a curved arrow (W-2, right or left), shall be used to mark a curve having a central angle of less than 45 degrees and a curvature of from 4 to 28 degrees, and to mark all other curves having a curvature between 4 degrees and 15 degrees and a central angle greater than 45 degrees (see fig. 7 for a method of measuring curvature). An alternative warrant for use of the sign is a ball-band indicator reading of 10 degrees or more at speeds between 31 and 60 miles per hour. A Turn sign (W-1) and Large Arrow sign (W-11) should be used where curvature exceeds that specified.

All Curve signs shall be reflectorized. Additional protection may be provided by the use of the Advisory Speed sign (W-55, sec. 51).

The Curve sign shall be erected not less than 300 feet nor more than 500 feet in advance of the beginning of the curve, and in accordance with the general specifications for the placement of warning signs (sec. 58).

Section 61.—Reverse Turn Sign (W-3)

Where two turns in opposite directions, as defined in the warrants for Turn signs (sec. 59), are separated by a tangent of less than 400 feet, a Reverse Turn sign shall be used, showing an arrow bent twice in opposite directions at right angles. If the first turn is to the right, a Right Reverse Turn sign (W-3-R) shall be used, and if the first turn is to the left, a Left
Reverse Turn sign (W-3-L). All such signs shall be reflectorized. For additional protection the Advisory Speed sign (W-35, sec. 91) may be used. The Reverse Turn sign shall be erected not less than 350 feet nor more than 500 feet in advance of the first turn, and in accordance with the general specifications for the placement of warning signs (sec. 58).

Section 62.—Reverse Curve Sign (W-4)
Where two curves in opposite directions, as defined in the warrants for Curve signs (sec. 60) are separated by a tangent of less than 400 feet, a Reverse Curve sign shall be used, showing an arrow curved twice in opposite directions. If the first curve is to the right, a Right Reverse Curve sign (W-4-R) shall be used, and if the first curve is to the left, a Left Reverse Curve sign (W-4-L). All such signs shall be reflectorized. For additional protection the Advisory Speed sign (W-35, sec. 91) may be used. The Reverse Curve sign shall be erected not less than 300 feet nor more than 500 feet in advance of the first curve, and in accordance with the general specifications for the placement of warning signs (sec. 58).

Section 63.—Winding Road Sign (W-5)
The Winding Road sign showing an arrow bent four times in opposite directions shall be used where there is a series of five or more turns or curves, as defined in the warrants for Turn and Curve signs, separated by tangent distances of less than 400 feet. If the first turn or curve is to the right, a Right Winding Road sign (W-5-R) shall be used, and if the first turn or curve is to the left, a Left Winding Road sign (W-5-L). All Winding Road signs shall be reflectorized.

Additional protection may be provided by the installation of road-delination markers as described in Part II of this manual (sec. 157), and by use of the Advisory Speed sign (W-35, sec. 91). Where there are fewer than five curves in succession, one or more Reverse Turn or Reverse Curve signs should be used.

The Winding Road sign shall be erected at the beginning of the first series of curves. In advance of this sign either a Turn or a Curve sign shall be erected showing the direction of the first curve. These signs shall be erected in accordance with the general specifications for the placement of warning signs (sec. 58).

Section 64.—Cross Road Sign (W-6)
The Cross Road sign, showing the vertical cross symbol, shall be erected on a through highway to indicate the presence of a cross road. Its use should be restricted to intersections with roads that are improved to such an extent that there is likely to be a fairly large volume of traffic entering or crossing the through route and where unusual features, such as poor sight distance or obscured entrances, make it advisable that the intersection be called to the motorist's attention. It should not ordinarily be

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**Figure 7.—Method for determining degree of curvature and central angle of horizontal curves.**

<table>
<thead>
<tr>
<th>Degree of curvature</th>
<th>Radius of curve (feet)</th>
<th>Central angle (degrees)</th>
<th>Sign required</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-3</td>
<td>2000 and over</td>
<td>all</td>
<td>none</td>
</tr>
<tr>
<td>4-14</td>
<td>400 to 1500</td>
<td>all</td>
<td>Curve</td>
</tr>
<tr>
<td>15-27</td>
<td>200 to 400</td>
<td>under 45</td>
<td>Curve</td>
</tr>
<tr>
<td>15-27</td>
<td>200 to 400</td>
<td>45 and over</td>
<td>Turn</td>
</tr>
<tr>
<td>28 and over</td>
<td>under 200</td>
<td>all</td>
<td>Turn</td>
</tr>
</tbody>
</table>
used where Junction signs or Turn Markers are present. Cross Road signs shall not be erected at unimproved intersecting roads. Stop signs (sec. 28) on the secondary road are far more effective than Cross Road signs on the main road. Too frequent use of the Cross Road sign should be avoided.

More complex intersections, or oblique crossings, may be shown by appropriate diagrams.

If there is a considerable difference in the importance of the intersecting roads, the more important route should be shown by a heavier line in the diagram. Since this requires the stocking of several different designs, however, and since a turn in a numbered route is shown by Route Markers, the use of different widths of line is not mandatory.

The Cross Road sign shall be erected not less than 300 feet nor more than 500 feet in advance of the intersection, and in accordance with general specifications for the placement of warning signs (sec. 58).

Section 65.—Side Road Sign (W-7, W-9)

The Side Road sign, showing a side-road symbol, either left or right, and at an angle of either 90 or 45 degrees, shall be used in advance of a side-road intersection according to the same warrants and specifications as set forth for the Cross Road sign (W-6, sec. 64).

The 90-degree symbol (W-7) need not be made in right or left sides, since a single design may be turned to show the intersecting road on either side. The 45-degree symbol, in rights (W-8-R) and lefts (W-8-L), may be mounted erect or inverted to indicate any oblique intersection with reasonable accuracy.

The relative importance of the intersecting roads should be shown by different widths of line, as indicated in section 64.

Section 66.—T Symbol Sign (W-9)

The T Symbol sign shall be used to warn traffic approaching a T intersection on the road that forms the stem of the T, i.e., where traffic must make a turn either to the right or the left. The sign shall not be used on an approach where traffic is required to stop before entering the intersection, nor at a T intersection that is channelized by traffic islands, nor, generally, where Junction signs or Turn Markers are present.

The relative importance of the intersecting roads should be shown by different widths of line, as indicated in section 64.

The T Symbol sign shall be erected not less than 350 feet nor more than 500 feet in advance of the intersection, and in accordance with the general specifications for the placement of warning signs (sec. 25). It may be desirable to place an additional T Symbol sign at the head of the T directly in line with approaching traffic.

Section 67.—Y Symbol Sign (W-10)

The Y Symbol sign shall be used to warn motorists approaching a Y intersection on the road that forms the stem of the Y. It shall not be used at a Y intersection that is channelized by traffic islands, nor, generally, where Junction signs or Turn Markers are present.

The relative importance of the intersecting roads should be shown by different widths of line, as indicated in section 64.

The Y Symbol sign shall be erected not less than 350 feet nor more than 500 feet in advance of the intersection, and in accordance with the general specifications for the placement of warning signs (sec. 58). It may be desirable to erect an additional Y intersection sign at the fork of the Y directly in line with approaching traffic.

Section 68.—Large Arrow Sign (W-11, W-12)

A Large Arrow sign is particularly useful at night to give notice of a sharp change of alignment. It shall be used on all curves where the curvature is 28 degrees or over, and on all curves having a curvature of from 15 to 27 degrees where the central angle exceeds 45 degrees (see fig. 7 for a method of measuring curvature). The sign may also be used at lesser curves if, during a 1-year period, there have been reported three or more personal-injury accidents of a type attributable to failure of the driver to negotiate the curve. It may also, in a single- or double-arrow design, be used at T or Y intersections that have proved hazardous. The sign shall not be used to mark the ends of median strips, center piers, etc., where there is no change in the direction of travel.

The Large Arrow sign shall be 40 inches by 20 inches in size, having a large arrow pointing to right or left (W-11) or to both right and left (W-12). As a warning sign, it should preferably have a yellow background, with symbol in black. Since the sign is designed primarily as a nighttime warning device, however, it is permissible to use a white reflectorized arrow on a black background, if desired, or a black arrow on a re-
The sign shall in all cases be effectively reflectorized.

The Large Arrow shall be erected on the outside of a curve or on the far side of an intersection, in line with, and at right angles to, approaching traffic. It shall be mounted high enough to be visible for at least 500 feet in advance of the sign. No exact specifications can be given for the placement of this sign. Its location must be checked by trial runs over the road by day and by night.

Section 69.—Stop Ahead Sign (W-13)

The STOP AHEAD sign shall be used in advance of a Stop sign (R-1, sec. 28) that is not visible for a sufficient distance to permit the driver to bring his vehicle to a stop at the Stop sign. Obstruction of view due to horizontal or vertical curves, parked vehicles, or foliage, and high approach speeds, should be considered in determining the need for the erection of this sign. In some cases it may be used for emphasis where there is poor observance of the Stop sign.

The Stop Ahead sign shall be erected not less than 350 feet nor more than 500 feet in advance of the Stop sign, and in accordance with the general specifications for the placement of warning signs (sec. 58). In cities it may be necessary to erect the sign less than 350 feet in advance of the Stop sign in order to have it within the same block.

Section 70.—Signals Ahead Sign (W-14)

The SIGNALS AHEAD sign shall be used at any rural signalized intersection where the signal is not visible for a distance of 400 feet in advance of the intersection, or at any signalized intersection where the prevailing approach speeds or conditions of visibility are such as to justify an advance warning.

Use of this sign is warranted where horizontal or vertical curves limit the sight distance on the approach to traffic signals, or where lights or illuminated signs at the intersection may distract the driver's attention from the signal.

The sign shall be erected not less than 400 feet nor more than 600 feet in advance of the hazard, and shall be erected in accordance with the general specifications for the placement of warning signs (sec. 58). In cities it may be necessary to erect the sign less than 400 feet from the signal, in order to have it within the same block.

Section 71.—Hill Sign (W-15)

The HILL sign shall be used only in advance of down grades of 6 percent or more for lengths given in the following table, or grades of 6 percent or more where any part of the grade is on a curve sharper than 4 degrees. Generally, a Hill sign is warranted on descending grades under the following conditions:

- On a 6-percent grade more than 2,000 feet long
- On a 6-percent grade more than 1,000 feet long
- On an 8-percent grade more than 750 feet long
- On a 9-percent grade more than 600 feet long
- On an 11-percent grade more than 400 feet long
- On a 13-percent grade more than 300 feet long
- On a 15-percent grade more than 200 feet long
- On a grade of 16 percent or more, of any length.

Where safety demands a descent of the grade in intermediate or low gear, the Oversize Hill sign (W-15, 48 inches by 48 inches in size, reflectorized, with a secondary message USE SECOND GEAR, USE LOW GEAR, TRUCKS USE LOWER GEARS, or similar warning, may be used.

The Hill sign or Oversize Hill sign shall be located not less than 300 feet nor more than 500 feet in advance of the beginning of that part of the down grade where conditions require a reduction of speed for safety. It shall be erected in accordance with the general specifications for the placement of warning signs (sec. 58).

Section 72.—Bump Sign (W-16)

The BUMP sign shall be used to give warning of a sharp rise in the profile of the road that is sufficiently abrupt to create a hazardous condition, to cause considerable discomfort to passengers, to cause a shifting of the cargo, or to deflect a vehicle from its true course when crossed at speeds 25 percent greater than the normal driving speed for that section of road.

The Bump sign shall be located not less than 300 feet nor more than 500 feet in advance of the hazard, and shall be erected in accordance with the general specifications for the placement of warning signs (sec. 58).

Section 73.—Dip Sign (W-17)

The DIP sign shall be used to give warning of any sharp depression in profile that is sufficiently abrupt to create hazards of the type described in connection with the Bump sign (W-16, sec. 72). The Dip sign shall be applicable and used in the same manner as the Bump sign.

The use of the Dip sign at a stretch of depressed alignment that may momentarily hide a
vehicle is not recommended. Such a condition should be treated as a no-passing zone (secs. 20, 40, 134-136).

Section 74.—Narrow Road Sign (W-18)

The NARROW ROAD sign shall be used on two-lane roads where the pavement width is reduced abruptly to a width such that two cars cannot pass safely without reducing speed. It is not warranted on minor roads carrying a low volume of traffic, even though the narrowed pavement is only from 16 to 18 feet in width, but the approach to a reduction in pavement width below 16 feet should always be marked.

The Narrow Road sign shall be erected not less than 300 feet nor more than 500 feet in advance of the beginning of the narrow road, and in accordance with the general specifications for the placement of warning signs (sec. 58).

Section 75.—Pavement Narrows Sign (W-19)

The PAVEMENT NARROWS sign shall be used to give advance notice of a reduction in the number of lanes of pavement, as from three lanes to two lanes, or from four lanes to two lanes. Pavement markings and reflector markers shall also be used to mark such transitions, as described in part II of this manual (secs. 138, 157).

Because wide roadways invite higher speeds, and because of the length of the message, the Pavement Narrows sign shall be 30 inches by 30 inches in minimum size. It shall always be reflectorized.

On divided highways, where the width of the median island will permit, two such signs shall be erected facing approaching traffic, one on the right side and the other on the median island. The sign or signs shall be located not less than 350 feet nor more than 550 feet in advance of the point where the reduction in width begins, and shall be erected in accordance with the general specifications for the placement of warning signs (sec. 58).

Section 76.—Divided Highway Ahead Sign (W-20)

The DIVIDED HIGHWAY AHEAD sign shall be used on the approaches to a section of highway where the opposing flow of traffic are separated by a median island. Because of the length of its message it shall be 30 inches by 30 inches in size. It shall be located not less than 300 feet nor more than 500 feet in advance of the dividing island, and in accordance with the general specifications for the placement of warning signs (sec. 58).

Section 77.—Divided Highway Ends Sign (W-21)

The DIVIDED HIGHWAY ENDS sign shall be used at the end of a section of divided highway as a warning of two-way traffic ahead. Because a divided highway invites high speed and because of the length of message, the Divided Highway Ends sign shall be 30 inches by 30 inches in minimum size. It shall always be reflectorized. The sign shall be located not less than 350 feet nor more than 550 feet in advance of the end of the median island, and shall be erected in accordance with the general specifications for the placement of warning signs (sec. 58).

Section 78.—Narrow Bridge Sign (W-22)

The NARROW BRIDGE sign shall be used to indicate a bridge having a clear roadway width of 16 to 18 feet, inclusive, or any bridge having a roadway clearance less than the width of the approach pavement. Additional protection may be provided by the use of reflector markers described in part II of this manual (sec. 158).

The Narrow Bridge sign shall be erected not less than 300 feet nor more than 500 feet in advance of the structure, and in accordance with the general specifications for the placement of warning signs (sec. 58).

Section 79.—One Lane Bridge Sign (W-23)

The ONE LANE BRIDGE sign shall be used to mark all bridges having a clear roadway width of less than 16 feet. It may also be used on bridges having roadway widths of less than 15 feet, when commercial vehicles constitute a high proportion of the traffic using the structure or when the alignment approaching the structure is poor. The sign shall be reflectorized, except where the condition or alignment of the approach road is such as to require slow speed. Additional protection may be provided by the erection of reflector markers described in part II of this manual (sec. 158).

The One Lane Bridge sign shall be erected not less than 300 feet nor more than 500 feet in advance of the structure, and in accordance with the general specifications for the placement of warning signs (sec. 58).
Section 80.—Low Clearance Sign (W-24)

The LOW CLEARANCE sign, indicating low overhead clearance and showing the exact amount of clearance at low bridges, underpasses, and other overhead structures, shall be used at all points where clearance is less than 6 inches greater than the maximum height of vehicle and load permitted under the State law, and in any case, where the clearance is less than 13 feet. The actual clearance shall be shown on the sign, to the nearest inch.

Act V of the Uniform Vehicle Code (sec. 172) sets a maximum height of 12½ feet for vehicle and load. Hence any clearance less than 13 feet should be marked, regardless of State law.

The Low Clearance sign shall be 30 inches by 30 inches in size, to accommodate the relatively long message required. Because low clearances are not always apparent, especially at night, it is essential that the sign be reflectorized on all but the least important roads. Additional protection should be provided by markings as specified in part II of this manual (secs. 151, 156).

In rural districts the sign shall be erected not less than 350 nor more than 500 feet in advance of the impaired clearance, and in accordance with the general specifications for the placement of warning signs (sec. 58). In urban districts it should ordinarily be located nearer to the point of hazard.

In the case of an arch or other structure under which the clearance varies greatly, two or more signs should be used as necessary on the structure itself to give accurate information as to the practical clearance over the entire roadway.

Section 81.—Pavement Ends Sign (W-25)

The PAVEMENT ENDS sign shall be used where a pavement surface changes from a hard-surfaced pavement to a low-type surface or an earth road.

It shall be erected not less than 300 feet nor more than 500 feet in advance of the beginning of the lower-type surface, and in accordance with the general specifications for the placement of warning signs (sec. 58).

Section 82.—Men Working Sign (W-26)

The MEN WORKING sign shall be used primarily for the protection of men working on the road in the path of traffic, or for the protection of traffic when the nature of the work itself is such as to create a hazard.

Men Working signs shall be placed approxi-
Section 85.—Slippery When Wet Sign (W-29)

The SLIPPERY WHEN WET sign shall be used to warn traffic of an extraordinary slippery condition when the pavement is wet. The use of this sign should be kept to an absolute minimum, and upon correction of the slippery condition the sign should be removed.

The sign shall be erected in accordance with the general specifications for the placement of warning signs (sec. 88). On rural highways it should be located 500 feet in advance of the beginning of the slippery section and at not greater than 2-mile intervals on long sections of such pavement. In urban districts these distances should be greatly reduced.

Section 86.—Double Arrow Sign (W-30)

The Double Arrow sign showing a double-headed horizontal arrow shall be used at loading and unloading islands, traffic islands with curbs more than 3 inches high, and obstructions in the roadway, where traffic is permitted to pass on either side of the island or obstruction.

The sign should normally be mounted at a height of 2½ feet to the bottom of the sign. On an island it should be mounted at the approach end or as close thereto as practicable. It should be mounted on the face of, or just in front of, a pier or other large obstruction, in which case the standard stripe markings on the obstruction (sec. 161) should be discontinued to leave a 3-inch space around the outside of the sign.

Because an obstruction in the line of traffic is likely to be obscured by vehicles, a second sign of the same design should ordinarily be mounted directly above the standard sign, with its lowest edge 7 feet above the pavement.

Where traffic must keep to the right of the island or other obstruction, the Keep Right regulatory sign (R-14, sec. 49) should be used.

Section 87.—School Sign (W-31)

The SCHOOL sign shall be used only at locations where school buildings or grounds are adjacent to the highway and where passing traffic creates a hazard. It shall remain in place during the school season and be removed at the end of the school year, except where the school ground is used throughout the summer as a playground.

This sign should be erected not to exceed 500 feet in advance of the school grounds or of the crossing used by pupils, in accordance with the general specifications for the placement of warning signs (sec. 88).

In some locations where the hazard is particularly great it may be desirable to use a portable sign set up in, or immediately adjacent to, the roadway. Such a sign shall be displayed only during the hazardous hours and shall be removed at all times when the presence of pupils does not require its use.

As an alternative to the portable sign, a sign on a fixed mounting may be designed with a hinge or other means of turning or folding it out of sight and locking it in functioning or nonfunctioning position.

Ordinarily the School sign need not be reflectorized but if there is any considerable use made of the school building at night it may be desirable to give the sign adequate nighttime visibility.

Section 88.—Railroad Advance Warning Sign (W-32)

Because railroad grade crossings present a special type of extreme hazard, warning signs of distinctive designs are prescribed for them (figs. 6, 18).

The Railroad Advance Warning sign shall be a yellow disk 30 inches in diameter, carrying a 90-degree crossbuck X and the letters RR in black. Every Railroad Advance Warning sign shall be reflectorized.

The sign shall be used in advance of every railroad crossing, even if protected by signals, gates, or flagmen, except in the following instances:

1. At a minor siding or spur which is infrequently used and which is guarded when in use by a member of the train crew.

2. In the business districts of large cities where the crossings are fully protected and the physical conditions are such that even a partially effective display of the sign is impossible.

In rural districts this sign shall normally be placed 500 feet in advance of the crossing, although local conditions, such as grades, curves, and limited visibility, may make some intermediate distance between 300 feet and 500 feet more satisfactory. In any case the distance shall be great enough to permit vehicles at prevailing speeds to be brought to a complete stop before the crossing is reached. The sign shall be erected on the right-hand side of the roadway in accordance with the general specifications for the placement of warning signs (sec. 88).
In residence or business districts where low speeds are prevalent, the sign may be placed at a minimum distance of 100 feet from the crossing. If there is a street intersection within 100 feet, an additional sign or signs should be placed as to warn traffic approaching the crossing from each intersected street.

Railroad Advance Warning signs are usually off the railroad right-of-way and are properly the responsibility of the highway authorities.

Section 89.—Railroad Crossbuck Sign (W-33)

The design of the commonly used Railroad Crossbuck, with auxiliary sign showing the number of tracks, has been standardized by the Joint Committee on Grade Crossing Protection of the Association of American Railroads. The crossbuck sign is furnished and installed by the railroad company, and is usually located on the railroad right-of-way to show the location of the tracks and the number of tracks.

Details are shown in Railroad Highway Grade Crossing Protection, Bulletin No. 3 (or subsequent issue), Association of American Railroads, Joint Committee on Grade Crossing Protection. It should be noted, however, that the bulletin shows certain crossbucks without reflectorization, whereas this manual specifies that all warning signs shall be reflectorized.

The crossbuck shall be white with the words RAILROAD CROSSING in black lettering. If there are two or more tracks, including sidings, the number of tracks shall be indicated on an auxiliary sign of inverted T shape mounted below the crossbuck. The distance that should be assumed to separate tracks before an additional crossing sign is considered necessary is 100 feet, unless local conditions require otherwise.

The practice in some localities of placing the Railroad Crossbuck sign on a pedestal or island in the center of the roadway is strongly disapproved. The sign shall be erected on the right-hand side of the roadway on each approach to the crossing, not more than 15 feet from the center line of the nearest track, and not less than 6 feet nor more than 10 feet from the edge of the pavement. The height should be 10 feet above the level of the highway to the center of the crossbuck, but this may be varied as required by local conditions.

Section 90.—Crossing Signs (W-34)

The Crossing sign, indicating various types of crossings, as SCHOOL CROSSING, TRUCK CROSSING, PEDESTRIAN CROSSING, CAT-

D—GUIDE SIGNS

Section 93.—Application of Guide Signs

Guide signs are essential to guide the motorist along established routes, to inform him of intersecting routes, to direct him to city or village destinations, to identify nearby rivers and streams, parks, forests, and historical sites, and generally to give him such informa-
tion as will help him along his way in the most simple, direct method possible.

Guide signs are here considered in three major groups:

1. Route markers and auxiliary markers (secs. 95-112).
2. Destination and distance signs (secs. 113-116).
3. Information signs (sec. 117).

Unlike other types of signs, guide signs do not lose effectiveness by frequent use. When there is any doubt as to the advisability of any such sign, it should be erected.

Section 94.—Design of Guide Signs

All Route Markers and auxiliary markers used therewith shall be designed with a white background on which the lettering or symbols and border shall be black. Destination, Distance, and Information signs shall be black on white, or, optionally for enlarged or oversize signs, white on black.

Recent studies by the Public Roads Administration and the Ohio State Department of Highways have shown that white lettering on a black background yields better legibility than the hitherto standard black on white, but that black signs of ordinary dimensions are definitely less conspicuous than white signs in the daytime. The optional white on black has had numerous advocates favoring its use in large signs where size alone gives sufficient assurance of conspicuous visibility. To improve daylight visibility, a relatively wide white border is recommended.

Except for Route Markers, which are of special shapes as specified hereafter (secs. 96, 97) all guide signs are rectangular, with the longer dimension horizontal.

Route Markers and Destination signs at important intersections shall be reflectorized or illuminated. Other guide signs may advantageously be reflectorized or illuminated and any doubt should always be resolved in favor of reflectorizing or illuminating.

Section 95.—Route Markers and Auxiliary Markers

Route Markers are important to identify numbered highway routes, but to accomplish their purpose they must be supplemented by various types of auxiliary markers and signs to indicate junctions, turns, and directions thereof as well as temporary, alternate, by-pass, and business routes and detours. Except where used as Confirming or as Reassurance Markers as hereinafter described (sec. 98), Route Markers are always mounted in conjunction with auxiliary signs to form Junction assemblies, Route Turn assemblies, or Directional Marking assemblies.

U S Route Markers shall be displayed only on the U S numbered highway system or the approaches thereto. Similarly, State Route Markers shall be used only on State numbered routes and their approaches.

Section 96.—Design of Route Markers (M-1, M-2)

The U S Route Marker (M-1) shall consist of a shield-shaped plate 16½ inches by 16 inches in size, carrying the State name, the letters "U S" and the route number. The sign shall have a white background with black lettering. State Route Markers (M-2) are of special design, as determined by each State. They should be of approximately the same size as U S markers.

Section 97.—Oversize Route Markers (M-101, M-102)

The Oversize Route Marker shall be a square sign 24 inches in size. For U S routes it shall carry only the route number, in large numerals, within the enlarged outline of the U S shield (M-101). For State numbered routes the design should incorporate some distinguishing outline from the State Route Marker, if possible, or other identifying character (M-102).

The symbol and numerals shall be black on a white background. The usual black border around the edge of the plate is omitted to emphasize the symbol.

The Oversize Route Marker should ordinarily be used only at rural intersections of two major routes, as defined in section 24, or occasionally at intersections in residence or business districts where special emphasis is needed. It may also be used as a Confirming Marker (sec. 98) just beyond such intersections. All auxiliary markers used with Oversize Route Markers (except Temporary, Alternate, by-pass, and Business Route, Detour, and Cardinal Direction Markers) shall also be of oversize design.

The Oversize Route Marker shall be located and erected according to the specifications set forth for the standard Route Marker.

Section 98.—Confirming and Reassurance Markers

Confirming Route Markers, without auxiliary Junction, Turn, or Directional Markers, shall be erected just beyond all intersections where there is any possibility that the motorist might lose the route. In rural districts they shall be placed not less than 25 feet nor more than 75 feet beyond the far pavement line of the intersected highway. In urban areas these distances shall be 10 feet and 50 feet, respectively.

The application of Confirming Route Markers is illustrated in figures 8, 9, and 10.

Reassurance Markers, also without auxiliary Junction, Turn, or Directional Markers, shall be located between intersections as required, and just outside the built-up area of any incorporated city or town. They shall be located on straight, open stretches of highway at random intervals not to exceed 1½ miles. On winding roads it may be desirable to place them more frequently.

Where two or more routes follow the same road, Route Markers for all the routes shall be erected on the same support. If both U S and State numbered routes are shown, the U S Marker or Markers should be placed at the top of the assembly, or to the left in horizontal assemblies, unless a State route has dominant importance. Subject to the precedence given U S Markers, Route Markers should be
mounted in numerical order from top to bottom or from left to right.

In rural districts single Route Markers shall be mounted so that the bottom will be 2½ feet above the crown of the roadway. In a group the bottom of the lowest marker shall not be less than 2 feet above the crown of the roadway. On ascending or descending grades these heights may be varied so that headlights will properly illuminate the marker or markers by night. Where parked vehicles or other obstructions may interfere with visibility, mounting heights shall be as specified for urban locations. The marker or markers shall be set not less than 6 feet nor more than 10 feet from the edge of the roadway, except on narrow or unimproved roads where this lateral spacing may be reduced (fig. 2).

In residence districts Route Markers, of either confirming or reassurance type, shall be spaced not more than two blocks apart, and in any case, so frequently that there is always at least one marker visible ahead along the route. The best location is immediately beyond the intersected street, to “pull” the motorists through the intersection. The markers shall be mounted so that the bottom of the marker or marker assembly is not less than 7 feet above the top of the curb. The left-hand edge of the marker or assembly shall be not less than 1 foot back from the edge of the curb. In locating markers, particular care should be taken so that they will not be obscured by parked cars, posts, trees, or other objects; and if they are not reflectorized they should, if possible, be so located that they can be illuminated by street lights.

In business districts the proper location of Route Markers is extremely important because it is very easy for the motorist to become confused and lose his route. Extreme care should be taken to erect the markers where they can be seen easily. Markers should be located on the far side of every street intersection on a numbered route, or so that at all times a Route Marker is plainly visible ahead. They shall be mounted so that the bottom of the marker or assembly shall be not less than 7 feet above the curb, and the left-hand edge at least 1 foot back from the curb.

Section 99—Junction Sign (M-3)

The Junction sign shall be a horizontal rectangle 16¼ inches by 8 inches in size, carrying the abbreviation JCT in black letters on a white background. It shall be mounted immediately above a Route Marker (M-1, M-2), thus making a Junction assembly.

A Junction assembly shall be erected in advance of every intersection where a marked route is intersected or joined by another marked route. The Route Marker in the assembly shall carry the number of the intersected or joined route. Where two or more routes are to be indicated, a separate Junction assembly shall be used for each route and all assemblies mounted on one post. Two assemblies should preferably be mounted side by side rather than one above the other.

Where there are several assemblies they should
be arranged, so far as practicable, in the following manner:

1. The assembly for a route intersecting from the left should be to the left of a lateral grouping, or in the middle of a vertical grouping.
2. The assembly for a route intersecting from both left and right, or for a route proceeding only straight ahead out of the intersection, should be at the top of a vertical grouping, or in the middle of a horizontal grouping.
3. The assembly for a route intersecting from the right should be to the right of a horizontal grouping, or at the bottom of a vertical grouping.

This arrangement is similar to that prescribed for the corresponding Directional Marking assemblies at the intersection (sec. 104).

In rural districts the Junction assembly shall be erected not less than 300 feet nor more than 500 feet in advance of the intersection, on the right-hand side of the roadway and facing approaching traffic. The assembly thus serves as an intersection warning as well as a guide sign. It shall normally be erected so that the lowermost part of the assembly will not be less than 2½ feet above the crown of the roadway, or, if several assemblies are grouped vertically the lowermost part shall not be less than 2 feet above the roadway crown. Where parked vehicles or other obstructions may interfere with visibility, the height should be as specified for urban locations. The assembly or group of assemblies shall be not less than 6 feet nor more than 10 feet from the edge of the roadway, except where shoulder width requires closer mounting (fig. 2).

In residence districts the Junction assembly shall be erected midway in the block preceding the intersection, but in no case farther than 200 feet from the center of the intersected street. It shall be erected so that the lowermost part of the assembly or group will be not less than 7 feet above the top of the curb. The nearest part of the assembly shall be not less than 1 foot back from the curb edge.

In business districts the Junction assembly shall be erected as in residence districts.

Figures 8, 9, and 10 show typical applications of Junction assemblies.

Section 100—Oversize Junction Sign (M-103)

The Oversize Junction sign, 24 inches by 16 inches in size, shall carry the abbreviation JCT in black letters on a white background. It shall be used in conjunction with an Oversize Route Marker (sec. 97) on a major route, as defined in section 24, in advance of its junction.

Figure 9.—Typical route markings at intersections (for one direction of travel only).
with another major route, and on minor routes at their intersections with major routes where physical conditions or the accident experience warrant. If more than one Junction assembly is required in a single mounting all shall be of the same size.

The Oversize Junction sign shall be located and erected according to the specifications for the standard Junction sign (sec. 99).

Section 101.—Combination Junction Sign (M-4, M-5, M-6)

As an alternative to standard or oversize Junction assemblies where more than one route is to be intersected or joined, a rectangular sign may be used carrying the word JUNCTION above the route numbers, each of which shall be identified as a U S or State route by an outline symbol as in the Oversize Route Marker. The numerals and symbols shall be black on a white background. The size of the sign will depend on the number of routes involved. It should be noted that the Combination Junction sign must be individually designed for each intersection, whereas the Junction assemblies use standard signs from stock (fig. 8).

The Combination Junction sign shall be located and erected according to the specifications set forth for Junction assemblies.

Section 102.—Advance Turn Marker (M-7, M-8)

The Advance Turn Marker shall be a plate 13 inches by 10 inches in size, carrying a right or left arrow the shaft of which is bent at a right angle (M-7) or at a 45-degree angle (M-8).

The Advance Turn Marker shall be placed directly under a Route Marker (M-1, M-2) to form a Route Turn assembly. A Route Turn assembly shall be used on a numbered route in advance of an intersection to indicate a turn or change in direction of that route at the intersection.

The bent-arrow design supersedes the former standard Advance Turn Marker having an R or an L to indicate the direction of the turn ahead. The revised design has the advantage of using clear directional symbols in place of the somewhat confusing letters of the old standard. The bent arrow, furthermore, indicates that the turn is to be made at a point a short distance ahead, thus avoiding the misunderstanding that frequently arises from the use of a straight horizontal arrow as an Advance Turn Marker. The horizontal arrow should be, and is, reserved for use only at the actual point where the turn is to be made.

If several routes turn at an intersection, each shall be marked with a separate Route Turn assembly, whether they turn in the same or in different directions. Where one or more routes turn while one or more proceed straight through, the routes that turn shall be marked with Route Turn assemblies, using the appropriate right or left Advance Turn markers, while the straight-through routes may be indicated by a similar assembly, using the vertical Directional Marker arrow (M-11).

Route Turn assemblies for all routes shall be mounted on one post, preferably in a horizontal arrangement. Where there are routes turning in opposite directions, Route Turn assemblies for routes turning left shall be mounted to the left of the group of assemblies, and those for right-turning routes to the right. If straight-through assemblies are used, the right- and left-turn assemblies shall be to the right and left of them, respectively. In a vertical arrangement of assemblies the straight-through assemblies shall be at the top, followed by left- and right-turn assemblies, respectively. Where two or more routes turn in the same direction, the assembly for a U S route should be above or to the left of that for a State route. If the number of turning routes makes it necessary to use a combination horizontal and vertical arrangement, the above rules can be followed in principle.

Figures 9 and 10 show typical applications of Route Turn assemblies.

Advance Turn Markers may be omitted where the character of the roadway clearly indicates the course of the route or routes.

In rural districts the Route Turn assembly shall be erected not less than 250 nor more than 300 feet in advance of the turn, facing traffic approaching the intersection. Height and lateral placement shall be the same as for Junction assemblies (sec. 99).

In residence and business districts the Route Turn assembly shall be erected not more than 250 feet in advance of the turn. It is suggested that in congested districts the assemblies be duplicated, spaced from 50 to 100 feet apart. The assemblies should be located so that they will not turn traffic into an alley or secondary street in advance of the proper turn. Height and lateral placement of Route Turn assemblies shall be the same as for Junction assemblies (sec. 99).
Section 103.—Oversize Turn Marker (M-107, M-108)

Oversize Turn Markers, 19½ inches by 15 inches in size, shall be used with Oversize Route Markers (sec. 97) on a major route, as defined in section 24, where extra emphasis is required, or at any intersection where the Oversize Junction sign (sec. 100) is used. The arrows shall be similar to those in the regular Advance Turn Markers, in black on a white background.

The Oversize Turn Marker shall be located and erected according to the specifications for the regular Advance Turn Marker. If more than one Advance Turn Marker is required in a single mounting, all shall be of the same size.

Section 104.—Directional Marker (M-9 to M-14, inclusive)

The Directional Marker shall be a horizontal rectangular plate 18 inches by 10 inches in size, carrying a single arrow pointing horizontally to right or left (M-9), diagonally upward to right or left (M-10), or vertically (M-11); a double horizontal arrow (M-12); or an L-shaped double arrow pointing both vertically and to right or left, either horizontally (M-13) or slanting upward (M-14). The arrows shall be black on a white background.

A Directional Marker shall be mounted directly below a Route Marker (M-1, M-2) to form a Directional Marking assembly, used at intersections to show the direction of a route turn or the direction of directions of an intersected route.

A Directional Marking assembly displaying the number of the turning route shall be used to confirm a turn or change in direction of a route at an intersection (indicated in advance by a Route Turn assembly, as prescribed in section 102). A separate Directional Marking assembly shall be used for each turning route. Only the single arrow (M-9, M-10) pointed in the direction of the turn can be used in such an assembly (figs. 9, 10). Where one or more routes turn or are intersected and one or more routes continue straight ahead, it is generally desirable to mark the straight-through route by a Directional Marking assembly using the vertical arrow (M-11).

A Directional Marking assembly with vertical arrow, however, should not be used at any inter-
section alone, in the absence of other assemblies indicating right or left turns. The Confirming Marker just beyond the intersection (sec. 98) provides adequate marking for a route passing straight through, where there are no turning or intersected routes.

A Directional Marking assembly, with the number of the intersected route and proper arrow, shall also be used to confirm a junction of two or more numbered routes (indicated in advance by a Junction assembly as prescribed in section 99), and to indicate the direction or directions of the intersected route (figs. 8-10). When two or more numbered routes are intersected, a separate Directional Marking assembly shall be used to mark each route.

When an intersected route begins or terminates at the intersection, the single-arrow Directional Marker (M-9, M-10) shall be used (fig. 9). A route crossed at the intersection (fig. 8) requires the use of the double-arrow Directional Marker (M-12), and a route that may be followed either by proceeding straight ahead or by turning (fig. 8) shall be indicated by the two-directional arrow (M-13, M-14).

Figures 8, 9, and 10 show typical applications of Directional Markers.

All Directional Marking assemblies, whether for route turns or for intersected routes, facing traffic entering an intersection from a single direction shall be on a single mounting. When more than one route turns or is intersected the assemblies should be arranged in the following order of precedence:

1. In a horizontal grouping the Directional Marker arrows from left to right should be: (a) Left horizontal arrow, (b) left diagonal arrow, (c) left L-shaped double arrow, (d) double horizontal arrow, (e) vertical arrow, (f) right L-shaped double arrow, (g) right diagonal arrow, and (h) right horizontal arrow.

2. In a vertical grouping the vertical arrow should be at the top, followed by the double horizontal arrow, then by the remaining arrows in the same order as for a horizontal arrangement.

When the same direction is displayed for more than one route, the US Markers, if any, should appear in the most conspicuous position, i.e., to the left or above.

A horizontal arrangement is generally preferable to a vertical, since each Directional Marker is thus more clearly associated with its respective Route Marker. Where there are more than two assemblies, however, it is usually desirable to adopt a combination vertical and horizontal arrangement.

Section 105.—Location of Directional Marking Assemblies

Directional Marking assemblies shall be located on the near right-hand corner of the intersection. At major intersections it is often desirable to install auxiliary markers on the far right-hand corner to confirm the near-side markers.

When a Directional Marking assembly and a Stop sign must be used at the same intersection an exception must be made to the general rule that signs for different purposes should be erected on separate posts, not less than 100 feet apart (sec. 19), or to the requirement that the Directional Marking assembly shall be on the near right-hand corner. The placement of the Stop sign is definitely fixed by the intersection design. Mounting a Directional Marking assembly above a Stop sign, on the same post, has serious disadvantages, particularly in urban areas where the lowest sign must be at least 7 feet above the curb (sec. 17). Placing the Directional Markers on a separate post adjacent to the Stop sign is not practical where space is limited. It may also draw attention away from the Stop sign. If located just in advance of a Stop sign, a Directional Marking assembly may obscure the more important regulatory sign. Furthermore, the guide signs so placed will not be visible to a driver who has properly stopped just short of the Stop sign.

It is more important that guide signs be readable at the right time and place than that they be located with absolute uniformity. When the same position is not practical for Directional Marking assemblies, therefore, as when a Stop sign must occupy that position, a far-side mounting is the preferred alternative for the Directional Markers, with oversize signs if necessary for legibility. If it is found advantageous to place Directional Marking assemblies in advance of the intersection, an additional set of markings should be mounted on the far right-hand corner. The standard near-corner location, however, places the Directional Marking assembly where it can be read at close range, without interference from cross traffic, and it should be held to in the absence of compelling reasons to the contrary.

In rural districts the Directional Marking assembly shall ordinarily be mounted so that its lowermost part is not less than 2½ feet above the crown of the roadway. Where two or more assemblies are mounted vertically, the lowermost part shall not be less than 2 feet above the crown of the roadway. Where there is heavy traffic, or where other obstructions to view may occur, a higher mounting as for residence or business districts may be necessary. The assembly should be located as near to the corner as practicable, not less than 6 feet nor more than 10 feet from the edge of either intersecting roadway (fig. 2).

Care should be taken that groups of Directional Marking assemblies in a single mounting will not block the view in any direction at an intersection.

In residence and business districts the assemblies shall be mounted not less than 7 feet above the top of the curb, and with their nearest edge not less than 1 foot back from either curb. In business districts it may be desirable to mount them on a bracket over the roadway, in which case they shall not be less than 14½ feet above the pavement.

At complex intersections or interchanges, with connecting ramps or
one-way roadways, the effective location of directional markings is often exceedingly difficult to achieve. It may be best under some circumstances to separate the Directional Marking assemblies so that those indicating a turn will be on the near side of the turn and those for straight-ahead traffic on the far side. However, no rules are here prescribed for directional markings at such intersections, as each must be studied independently and the best route marking be worked out by observation and experiment. It must be remembered that at complex interchanges the motorist cannot depend on his sense of direction to tell him whether to turn right or left, and that he is wholly dependent on the signs he reads. It is absolutely necessary, therefore, that the directional markings be clear and unmistakable.

Section 106.—Oversize Directional Marker (M-109 to M-114, inclusive)

Oversize Directional Markers, 19% inches by 15 inches in size, shall be used with Oversize Route Markers (sec. 97) on a major route, as defined in section 24, where extra emphasis is required; or at any intersection where the Oversize Junction sign (sec. 100) or Oversize Turn marker (sec. 103) is used. The arrows shall be similar to those in the regular Directional Markers, in black on a white background. The Oversize Directional Markers shall be located and erected according to the specifications for the regular Directional Marker. If more than one Directional Marker is required in a single mounting, all shall be of the same size.

Section 107.—Temporary Marker (M-15)

The Temporary Marker shall carry the word TEMPORARY in black letters on a white plate 16½ inches by 8 inches in size. It shall be mounted immediately above a Route Marker (M-1, M-2) to indicate either:

1. A route temporarily designated but not intended as a permanent part of a regularly numbered route.
2. A temporary detour from an established route, due to emergency or major reconstruction.

Where it is planned to relocate a route at a later date, use of the “temporary” designation will often help to avoid future misunderstanding and ill feeling. On the other hand, the use of “temporary” instead of “detour” avoids the suggestion of poor road that is associated in the public mind with the latter term. The temporary route may be another U S or State numbered route, a county or township road, or a city street.

The Temporary Route assemblies shall be used on temporary routes, and shall be located and erected in accordance with the specifications set forth for standard Route Markers. They shall promptly be removed when the temporary route is abandoned.

Section 108.—Alternate Marker (M-16)

The Alternate Marker shall carry the word ALTERNATE in black letters on a white plate 16½ inches by 8 inches in size. It shall be mounted immediately above a Route Marker (M-1, M-2) to designate an alternate routing between two points on a numbered route. The Alternate Route assembly shall be used in the same manner as a regular Route Marker, and shall be located and erected in accordance with the same specifications.

The designation of an alternate U S route shall be in accordance with the established policy of the American Association of State Highway Officials, as set forth in the 1946 Reference Book of that Association. No alternate U S route may be designated or marked without the approval of the Executive Committee of the Association.

Section 109.—By-pass Marker (M-17)

The By-pass Marker shall carry the word BY-PASS in black letters on a white plate 16½ inches by 8 inches in size. It shall be mounted immediately above a Route Marker (M-1, M-2) to designate a route that branches from the regular numbered route through a city, bypasses the city, and rejoins the regular numbered route beyond the city. The By-pass Route assembly shall be used in the same manner as a regular Route Marker, and shall be located and erected in accordance with the same specifications.

Section 110.—Business Route Marker (M-18)

The Business Route Marker shall carry the word BUSINESS in black letters on a white plate 16½ inches by 8 inches in size. It shall be mounted immediately above a Route Marker (M-1, M-2) to designate an auxiliary route that branches from a regular numbered route through a city to carry traffic through the business portion of the city. The Business Route assembly shall be used in the same manner as a regular Route Marker, and shall be located and erected in accordance with the same specifications.

Section 111.—Detour Marker (M-19, M-20)

The Detour Marker (M-19) shall carry the word DETOUR in black letters on a white plate 16½ inches by 8 inches in size. It shall be mounted immediately above a Route Marker (M-1, M-2) to indicate an emergency routing of traffic due to a temporary closing or blocking of the regularly marked route. Conditions calling for a detour include road reconstruction or major maintenance work, bridge out, high water, or similar circumstances that make the regular route impassable. The Detour assembly should be located and erected in general accordance with the...
specifications for regular Route Markers. However, since detours frequently necessitate the use of unimproved or poorly defined roads, there is greater likelihood that motorists following the route may become confused. Extreme care should be exercised to see that Detour assemblies are located and erected as conspicuously as possible and at short intervals as needed.

The use of the Temporary Marker (M-15) in place of the Detour Marker is optional. "Temporary" does not carry the suggestion of inferior roads often associated with the term "detour." In unforeseen emergencies, when it is necessary to detour traffic, there may be used the standard Detour Marker (M-19) with a Directional Marker (M-9 or M-11) mounted directly beneath it. These markers can be attached to any convenient post or other available support, and should be placed as frequently as necessary to guide traffic along the detour route back to the regularly marked route.

An alternative to this method is the use of a special marker (M-20) consisting of a rectangular sign 24 inches by 9 inches in size, with a white arrow on a black background and the word DETOUR centered on the arrow. This sign should be made in rights and lefts so it can be mounted to point in either direction.

A supply of Detour or Temporary Markers should be kept on hand in all highway districts for prompt use as needed. When the regular route is reopened, all Detour or Temporary Markers should be removed immediately.

Section 112.—Cardinal Direction Marker (M-21)
The Cardinal Direction Marker shall be a plate 16½ inches by 8 inches in size, carrying the words EAST BOUND, WEST BOUND, NORTH BOUND, or SOUTH BOUND, in black letters on a white background. It may be mounted directly above a Route Marker (M-1, M-2) or an Oversize Route Marker to indicate the general direction of the route. It should be used only where motorists, in transferring from one route to another, might be confused as to the direction in which the intersected route would take them.

Section 113.—Destination Sign (D-1, D-2, D-3)
The Destination sign (D-1) shall be a horizontal rectangle carrying the name of a city, village, or other objective, a directional arrow, and the mileage to the place named. If several destinations are to be shown at a single point the several destination names may be placed on a single panel (D-2, D-3) with an arrow and the mileage for each name. If more than one destination lies in the same direction a single arrow may be used for such a group of destinations, but in this case adequate separation should be made between any group of destinations in one direction and other destinations in other directions. This may be accomplished by suitable design of the arrow, by spacing of the lines, or by a heavy line entirely across the panel.

Under some circumstances it is desirable and permissible to omit the mileage from the Destination sign. Within metropolitan areas, for example, distances mean little, and points of reference for the measurement of miles are not easily defined. Frequently an indicated destination is so nearby as to warrant only the directional arrow. As a general rule, however, the mileages should be shown, particularly in rural areas. Care should be taken to avoid confusion where a mileage figure, by coincidence, is the same as the route number of a route leading in a different direction from the intersection.

The lettering, numerals, and symbols shall be either black upon a white background or, optionally on large signs, white upon a black background. On all important routes the signs should be reflectorized.

An arrow pointing to the right shall be at the extreme right of the sign, and an arrow pointing left or vertically shall be at the extreme left. The mileage figures shall follow after the destination name. Horizontal or sloping arrows should be of sufficient length to be clearly distinguishable from the vertical arrow. As a general rule the directional arrows should be horizontal or vertical, but where the intersection is irregular a sloping arrow will sometimes convey a clearer indication of the direction to be followed.

In rural districts on major routes, as defined in section 24, the sign shall have letters at least 6 inches in height for a single name (D-1) or for each of the names on a panel (D-2, D-3), and shall be long enough to accommodate the required name or names, each with its mileage and arrow symbol. On less important rural roads and in urban areas the signs shall have letters at least 4 inches in height for each name, with length in proportion. Where individual name signs are used all names in the same grouping shall have the same height and all signs in a group shall be of equal length, depending generally on the length of the longest destination name. Care should be exercised in erecting these assemblies to assure that all signs are in one plane so as to give a panel effect.
Destination signs are generally warranted:

1. At the intersections of U.S. or State numbered routes with other U.S. or State numbered routes.
2. At points where they serve to direct traffic from U.S. or State numbered routes to the business section of towns, or to other destinations reached by unnumbered routes.

Preferably not more than two or three names should be used in combination on one or more signs. As a general rule, the next important city or point of interest lying straight ahead should be at the top of the sign or assembly, and below it the next important destinations to the left and to the right, in that order. In the case of overlapping routes there should be shown only one destination in each direction on each route. If there is more than one destination in any direction the name of the nearest city or town should appear above that of any farther away.

Placing the vertical arrow at the top is not only consistent with the recommended arrangement for Route Marker assemblies, but also has the advantage that the arrow definitely points away from the other names shown. The sequence of left and right arrows also is like that specified for Route Marker assemblies, and gives priority position to the left turn, for which the driver must properly position himself in the center lane (secs. 99, 102, 104).

The choice of destination names must be somewhat flexible. The destination shown for each direction should ordinarily be the next county seat or the next principal city, rather than a more distant destination.

Section 114.—Location of Destination Signs

In rural districts, Destination signs or assemblies should generally be located not less than 100 feet nor more than 150 feet in advance of the intersection. This gives the motorist an opportunity to make up his mind as to the direction he wishes to turn before he reaches the intersection, and enables him to get into the proper lane for turning, if necessary.

The rural Destination signs shall be erected so that the bottom of the lowest sign will not be less than 2 1/2 feet above the crown of the roadway, and the left-hand edge not less than 6 nor more than 10 feet from the roadway edge. Care should be taken that the sign or signs do not obstruct the driver's view of the intersection.

Supplementary or confirmatory Destination signs may be erected on the far right-hand corner of the intersection. They should be mounted at such a height as not to impair the view of the intersection for drivers of vehicles entering from any direction.

At important T or Y intersections it may be preferable to place Destination signs on the far side of the intersection, directly ahead of approaching traffic.

At rural intersections of other than major routes, the smaller Destination signs (not less than 4-inch lettering) may be used. They shall be located and erected in the same manner as the larger signs.

In residence and business districts Destination signs should be erected 50 to 100 feet in advance of intersections of numbered routes, and should ordinarily be of the smaller size. Supplementary Destination signs may be placed on the far right corner of the intersection facing approaching traffic. In general, only two signs should be included in each installation, indicating the nearest town or city to right or left, respectively.

The signs shall be erected high enough to be seen over parked cars. They shall be not less than 7 feet to the bottom of the lowest sign in an assembly, and shall be set with a lateral clearance from the outside edge of the curb of not less than 1 foot. At intersections where it is impossible to erect individual posts the signs may, with permission from the proper authorities, be erected on trolley or light poles located in the proper positions. Where it is necessary that the signs project over the roadway they shall have a minimum clearance of 1 1/2 feet (fig. 2).

Destination signs pointing to the business district from a route that runs near but not through the business district may be erected at appropriate intersections. Signs placed to direct traffic from the business district to such a nearby route may also be used.

Figures 8, 9, and 10 show applications of Destination signs at intersections.

Section 115.—Distance Sign (D-4)

The Distance sign shall be a horizontal rectangle 40 inches by 20 inches in size, carrying the names of two incorporated cities, villages, or towns, and the mileages (to the nearest mile) to the centers of those places. Lettering shall be black on a white background or, optionally on enlarged signs, white on a black background.

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NEWTON  5
MIAMI  27
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The top name shall be that of the next incorporated municipality along the route. The lower name shall be that of the city in which the greater portion of the through traffic is interested. In the case of long routes, the lower name may be varied on successive signs, alternating between several cities, villages, or town names. However, if the route is approaching a large city with no other cities near, the name of the large city should be repeated on successive signs. On interstate routes, as a second objective, the name of a city in the adjacent State may be shown.

Distance signs shall be erected on important routes leaving municipalities, and just beyond intersections of numbered routes in rural districts, or at approximately 10-mile intervals along the route. They should not ordinarily be used on any but major routes.

Distance signs shall be placed approximately 500 feet outside of the municipal limits on the right-hand side of the road, facing traffic leaving the municipality, or at the edge of the built-up district if it extends beyond the corporation limits. Where overlapping routes separate a short distance from the corporation limits, the Distance sign should be omitted at the corporation limits and should be erected 500 feet beyond the junction of the two routes.
Where, just outside of an incorporated municipality, two routes are concurrent and continue so concurrent to the next incorporated municipality, the top name on the sign placed at such a point should be that of the town where the routes separate; the lower name should be that of the city in which the greater portion of the through traffic is interested.

Distance signs shall be mounted with the bottom of the sign not less than 2½ feet above the crown of the roadway, and not less than 6 feet nor more than 10 feet from the edge of the roadway.

Figures 8, 9, and 10 show the use of Distance signs at rural intersections.

Section 116.—Street Name Sign (D-5)

Street Name signs should be erected and maintained by the municipality, and should be placed at all street intersections regardless of other route marking that may be present. A black and white color combination is recommended, but other contrasting colors may be used.

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The street name should appear in lettering at least 3 inches high, and, on more important streets, not less than 4 inches high. Supplementary lettering to indicate the type of street (e.g., street, avenue, road, etc.) or section of city (e.g., N., S.W.) may be in smaller lettering, at least 2 inches high.

In business districts Street Name signs should be placed on diagonally opposite corners so that they will be on the far right-hand side of the intersection for traffic on the more important street. Signs indicating both streets should be erected at each location. They should be mounted as close to the corner as practicable, facing traffic on the cross street, with the nearest portion of each sign not less than 1 foot back from both curb lines. The signs should be mounted not less than 7 feet above the top of the curb, either at the same height or with one immediately above the other in a crossed position.

In residence districts Street Name signs should be mounted as in business districts, but a single location at each intersection will ordinarily suffice on all but the more important thoroughfares.

Care should be taken in all cases to insure that the signs are placed where they can easily be seen by motorists and pedestrians.

Section 117.—Information Signs (D-6)

Information signs are variable in size and in message. They include such information as names of rivers crossed, city, village, or town limits, county lines, State lines, elevations, etc.

Information signs shall be horizontal rectangles. They shall have black lettering on a white background or, optionally, white lettering on a black background. The size of lettering used should be such as to give adequate legibility for the purpose to be served. Typical signs of this type are illustrated in figure 11.
Since these signs are for information purposes and do not ordinarily serve to regulate, warn, or guide traffic (except perhaps indirectly in the case of city limits, etc.) the need for uniformity in design to insure automatic response is not altogether essential. They should, however, be of standard shape and color. In rural districts, the information sign should ordinarily be mounted from 6 to 10 feet from the pavement or roadway edge, and with the bottom not less than 2½ feet above the crown of the roadway. In residence and business districts the lowermost edge should be not less than 7 feet above the curb, and no portion of the sign should be less than 1 foot back from the curb. A sign giving the name of a river may be mounted on the end of a bridge truss.

Part II

MARKINGS

A—INTRODUCTION

Section 118.—Functions and Limitations of Markings

Markings have definite functions to perform in a proper scheme of traffic control. In some cases they are used to supplement the regulations or warnings of other devices such as traffic signs or signals. In other instances they obtain results solely on their own merits, that cannot be obtained by the use of any other device. In such cases they serve as a very effective means of conveying certain regulations and warnings that could not otherwise be made clearly understandable.

Markings also have definite limitations, especially when applied to pavement and curbs, where they may be entirely obliterated by snow, are not clearly visible when wet, and are not very durable when painted on surfaces exposed to traffic wear. In spite of these limitations, however, they have the advantage under favorable conditions that they can convey warning or information to the vehicle driver without diverting his attention from the roadway.

Section 119.—Legal Authority

Markings shall be placed only by the authority of a public body or official having jurisdiction for the purpose of regulating, warning, or guiding traffic.

Pavement and curb markings, being exclusively within the boundaries of public highways, should never be installed except by public authority. Delineators and markings on objects as a warning of their hazardous locations are also normally within the highway right-of-way, and should be subject to the same jurisdictional regulations.

A suitable model of legislation for the placing of markings is to be found in Act 5 of the Uniform Vehicle Code (secs. 19, 30, 31, 32, 33, 37). Interference with official markings is prohibited in section 58 of the same act.

Section 120.—Standardization

Markings, where used, shall be uniform in design, position, and application. As in the case of all other traffic control devices, it is imperative that markings be uniform so that they may be recognized and understood instantly.

Section 121.—Types of Markings

Markings as defined for the purposes of this manual are of a number of types:

1. Pavement markings:
   (a) Center lines (secs. 128-130).
   (b) Lane lines (secs. 131-133).
   (c) No-passing-zone markings (secs. 134-136).
   (d) Pavement edges (sec. 137).