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**CHAPTER SEVENTY-FIVE**

# HIGHWAY SIGNS

The majority of the information required for the selection, design and placement of highway signs is shown in the *Manual on Uniform Traffic Control Devices (MUTCD)* and the INDOT *Standard Drawings*. The intent of this chapter is not to reiterate the information presented in these sources but, rather, to supplement these references and, where deemed necessary, to provide the user with additional guidance.

## 75-1.0 MUTCD CONTEXT

Throughout the *MUTCD*, the words "shall," "should," and "may" are used to describe the appropriate application for various traffic control devices. The *MUTCD* defines these terms as follows:

1. Shall. A *mandatory* condition. Where certain requirements in the design or application of the device are described with the "shall" stipulation, it is mandatory when an installation is made that these requirements be met.

2. Should. An *advisory* condition. Where the word "should" is used, it is considered to be advisable usage, recommended but not mandatory.

3. May. A *permissive* condition. No requirement for design or application is intended.

The *MUTCD* shall prevail on any highway or street open to the public in which Federal funds will be or were used.

The *MUTCD* shall prevail on the National Highway System regardless of the funding source.

## 75-2.0 GENERAL CRITERIA

Signs should only be used where they are warranted by the *MUTCD* criteria, accident history, or field studies. Signs should provide information on special regulations, for hazards which are not self-evident and for highway routes, directions, destinations, and points of interest. In general, all traffic control devices should meet the basic requirements as follows:

1. They should be capable of fulfilling an important need.
2. They should command attention.
3. They should convey a clear, simple meaning.
4. They should command respect of road users.
5. They should be located to give adequate time for response.
6. They must be sanctioned by law if they control or regulate traffic.

## 75-2.01 References

The following is the recommended list of publications for selecting, designing, constructing, and installing highway signs.

1. *Manual on Uniform Traffic Control Devices*, FHWA;

2. *Traffic Control Devices Handbook*, FHWA;

3. *Standard Highway Signs*, FHWA;

4. *INDOT Standard Highway Signs*;

5. *Standard Alphabets for Highway Signs and Pavement Markings*, FHWA;

6. *Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals*, AASHTO;

7. INDOT *Standard Specifications*;

8. *Traffic Engineering Handbook*, Institute of Transportation Engineers;

9. Chapter Forty-nine of this *Manual*; and

10. *Manual of Steel Construction*, American Institute of Steel Construction.

The INDOT publications may be obtained by contacting the Design Division's Specialty Project Group. For other publications, the indicated source should be contacted.

## 75-2.02 Reflectorization

All signs should be reflectorized. They may also be illuminated. Section 75-2.03 discusses illumination criteria. The INDOT *Standard Drawings* provide the reflectorization criteria for signs. For a local facility, reflectorization of signs will be based on the city or county preference. The following describes the common reflective sheeting types that are available.

1. Enclosed Lens. This reflective sheeting consists of spherical lens elements embedded beneath the surface of a smooth, transparent, flexible plastic resulting in a non-exposed lens, optical reflecting system. This sheeting type is commonly called engineering grade sheeting. Super-engineering grade sheeting is similar, except that it is made with higher quality materials and more spherical lens elements.

2. Encapsulated Lens. This reflective sheeting consists of spherical glass beads which are adhered to a synthetic resin and encapsulated by a flexible, transparent waterproof plastic having a smooth surface. This sheeting type is commonly called high-performance grade or high-intensity grade sheeting.

3. Prismatic Lens. High-intensity prismatic reflective sheeting is similar to encapsulated lens sheeting, except that it uses unmetallized prismatic reflectors instead of glass beads. Super-high intensity reflective sheeting is similar to high-intensity sheeting except that it uses cube-corner prismatic lens.

4. Flexible Encapsulated Lens. This retroreflective material is intended to be applied to flexible, impact-resistant plastic devices such as flexible delineators or plastic drums used as channelizing devices in work zone traffic control. It is referred to as "flexible" because it can withstand expansion and contraction and will generally not crack when hit by a vehicle or when roughly handled.

Although encapsulated and prismatic lens sheetings are generally more expensive than enclosed lens sheeting, they provide much better retroreflectivity. For permanent sign installation, only encapsulated or prismatic sheeting should be used. For additional information on reflective materials, the designer may review the publications as follows:

1. *Retroreflectivity of Roadway Signs for Adequate Visibility: A Guide*, FHWA/DF-88/001, November 1987.

2. NCHRP Report 346, *Implementation Strategies for Sign Retroreflectivity Standards*, TRB, April 1992.

3. ASTM Designation: D4956 *Standard Specification for Retroreflectivity Sheeting for Traffic Control*, latest version.

## 75-2.03 Illumination

Most signs are generally designed to be illuminated by vehicular headlights and the sign message reflected back to the driver. Signs may also be internally or externally illuminated by a direct source. Street or highway lighting does not meet the requirements for sign illumination. The following provide guidelines for when sign illumination should be considered.

1. Overhead Signs. Lighting should be provided where background lighting obscures the legend of the sign, the sign is not adequately visible, or there is nearby highway lighting. In an urban area, overhead panel signs should be illuminated. In a rural area, the need for overhead panel sign illumination will be determined on a case-by-case basis. Lighting may also be used on overhead panel signs at an interchange or intersection where the traffic volume warrants in Figure 75-2A, External Overhead Sign Lighting Guidelines, are met and where a power supply is readily available. If full interchange lighting is provided, all overhead signs should be illuminated. External lighting of overhead panel signs should be accomplished with the fixtures at the bottom of the sign. Internally lighted signs may also be used. Figure 75-2$B_1$, Overhead Sign Luminaires, and Figure 75-2$B_2$, Luminaire Horizontal Placement Dimensions for Overhead Signs, should be used to determine the number and spacing of external sign luminaires for each overhead sign.

   Figure 75-2A also includes night traffic volumes below which the designer may consider removing existing lighting for overhead panel signs.

2. Truck Weigh Stations. Lighting may be provided for the sign preceding a truck weigh station which indicates that the station is open or closed. This is typically accomplished with an internally lighted sign.

## 75-2.04 Sign Placement

The *MUTCD* and the INDOT *Standard Drawings* provide criteria for the placement of signs next to and/or over the roadway. These sources also provide criteria for the maximum and minimum allowable sign heights.

A warning sign is normally placed in advance of the conditions to which it calls attention. A regulatory sign is placed where its mandate or prohibition applies or begins. A guide sign is placed at a variable location to inform drivers of their route of travel, destination, or points of interest.

The uniform position of each sign, although desirable, is not always practical to achieve because the alignment and design of the road often dictates the most advantageous position for the sign. When

determining the sign location, the designer should review the guidelines as follows:

1. Signs should be placed on the driver's right side. Signs may sometimes be placed on channelizing islands or overhead or, where there are short sharp curves to the right, they may be placed on the driver's left side directly in front of the driver.

2. Dual-mounted signs may be considered for additional emphasis where it is anticipated that a single sign may not provide adequate warning, such as at an intersection just beyond a sharp horizontal curve or at a location where drivers may be required to make an unexpected maneuver.

3. Sign placement and the roadway geometric design should be coordinated as early as practical during the project planning and design stages. If a roadway design does not permit adequate placement of the required signs, the geometric design may need to be revised accordingly. An improper geometric design cannot always be corrected by signing.

4. Where lane control is desired, signs should be placed directly over their affected lanes.

5. Signs should be located to optimize nighttime visibility.

6. Adherence to the criteria presented in the *MUTCD* and INDOT *Standard Drawings* is not always practical. Actual sign placement may be adjusted to meet field conditions. The following lists several placement problem areas that should be avoided.

    a. at short dips in the roadway;

    b. beyond the crest of a vertical curve;

    c. where a sign may be obscured by parked cars;

    d. where a sign would create an obstruction for pedestrians or bicyclists;

    e. where a sign would interfere with a driver's visibility to hazardous locations or objects;

    f. where sign visibility would be impaired due to existing overhead illumination;

    g. where a sign is vulnerable to roadside splatter or to being covered with snow by plowing operations; or

    h. too close to trees or other foliage that could cover the sign face now or in the future.

7. A sign's location can sometimes be shifted longitudinally without compromising its intended purpose. This may improve its visibility, avoid blocking other signs, enhance safety, or enhance traffic operations (e.g., by providing more distance between signs in a series).

8. Each sign should be erected individually on separate posts or mountings. However, it may be appropriate to group signs (e.g., route markers) with consideration for wind loading and breakaway characteristics.

9. The INDOT *Standard Drawings* provide criteria for the lateral clearance of roadway signing. In addition, the designer should review Section 75-2.05.

10. All wide-flange post installations should include a perforated fuse plate as well as a perforated hinge plate. A note on the plan sheet and wide-flange sign summary sheet should also be included, so that the contractor will install the structure accordingly.

## 75-2.05 Roadside Safety

Chapter Forty-nine describes the Department's criteria for clear zones, roadside barriers, impact attenuators, and other roadside safety issues. These are also applicable to roadside signs. In addition, the designer should consider the following.

1. Ground-Mounted-Sign Support. The support for each ground-mounted sign should be made breakaway or yielding, including those outside the clear zone. Posts should be of the square cross section type shown in the INDOT *Standard Drawings*. However, for a local agency project, channel posts may be used if desired by the local agency. A new sign support behind guardrail should have adequate clearance to the back of the guardrail post to provide for the guardrail dynamic deflection (see Section 49-4.0).

2. Overhead-Sign Support. The support for each overhead sign should be non-breakaway. Each overhead-sign structure inside the clear zone must be protected with guardrail or, where applicable, with an impact attenuator. In a median, an overhead-sign support should be protected as follows:

    a. If the distance between the sign support and the edge of the travel lane or auxiliary lane is 25 ft or less, an impact attenuator should be used.

    b. If the distance between the sign support and the edge of the travel lane or auxiliary lane is greater than 25 ft, a gravel barrel array should be used.

See Section 49-6.0 for additional information on the design and layout of impact attenuators.

3. Ground-Mounted Panel Sign. A sign of over 48 $ft^2$ in area on slipbase breakaway supports should not be placed where the opportunity exists for it to be struck more than 9 in. above the normal point of vehicular bumper impact. Normal bumper height is 1'-6". To avoid being struck at an improper height, a sign should be placed as follows:

   a. Fill Slopes Flatter than 4:1. A sign should be located a minimum of 30 ft from the edge of the travel lane to the nearest edge of the sign.

   b. Fill Slopes 4:1 or Steeper. The nearest sign edge should be located 6 ft from the edge of shoulder or 12 ft from the edge of the travel lane, whichever is greater.

4. Roadside Appurtenances. A large breakaway sign support should not be located in or near the flow line of a ditch. If such a support is placed on a backslope, it should be offset at least 3 ft from the toe of the backslope of the ditch.

5. Exit Gore Sign. An exit gore sign should be placed in each gore area of a freeway as shown on Figure 75-2C, Sign Gore Treatment.

## 75-2.06 Overhead Signs

The following provides guidelines to consider in whether to place an overhead or ground-mounted panel sign.

1. Lane Control. An overhead sign should be considered where the message is applicable to a specific lane. If the sign is placed over the lane, lane use can be made significantly more effective, especially where additional guidance is required for unfamiliar drivers.

2. Visibility. An overhead sign should be considered where traffic or roadway conditions are such that an overhead mounting is necessary for adequate visibility (e.g., vertical or horizontal curves, closely spaced interchanges, three or more through lanes in one direction).

3. Divergent Roadways. An overhead sign should be considered, at, or just in advance of, a divergence from a heavily traveled roadway (e.g., at a ramp exit where the roadway becomes wider and a sign on the right side is usually not in the line of sight for the driver).

4. Exit. An overhead panel sign should be considered where left-hand or multi-lane exit ramps are used.

5. Interchange. Overhead panel signs should be considered at complex interchanges where there may be some driver confusion, where there are closely spaced interchanges, Interstate-to-Interstate interchanges, or where there are lane drops on the exit ramp or mainline within the interchange.

6. Trucks. An overhead sign should be used where there are significant numbers of large trucks which may block the driver's visibility to a ground-mounted sign.

7. Limited Right of Way. An overhead panel sign should be considered where there is limited space for a sign on the roadside (e.g., where right-of-way is narrow).

8. Roadside Development. An overhead sign should be considered where roadside development seriously detracts from the effectiveness of a roadside sign (e.g., a brightly lighted area).

9. Uniformity. An overhead sign may be used to be consistent with other signs on a given section of highway.

Each new overhead sign installation will require a minimum vertical clearance of 17'-6" above the roadway and shoulders but not greater than 18'-0". This includes an additional 6 in. clearance for a future overlay. An existing overhead sign may have a vertical clearance of 17'-0".

Where sign lighting is used, an overhead sign should not be placed on a bridge overpass. A non-lighted sign may be placed on an overcrossing structure provided that the vertical clearance of the sign exceeds the vertical clearance of the overcrossing structure by at least 6 in..

## 75-2.07 Sign Priority

Overloading motorists with too much information may cause improper driving and impair safety. Therefore, some sign information may need to be removed, replaced, or relocated. Where sign overloading may be a problem, the following lists the recommended priority for sign types.

1. regulatory signs (e.g., speed limit, stop, turn prohibition);
2. warning signs (e.g., curve, crossroad, narrow bridge);
3. guide signs (e.g., destination);
4. emergency services signs (e.g., hospital, telephone);
5. motorist service signs (e.g., fuel, food, camping);
6. public transportation signs (e.g., park and ride, bus stop);
7. traffic generator signs (e.g., museum, ball park, historic building); and
8. general information signs (e.g., county line, city limit).

Within the various sign groups, the sign bearing the most important message should supersede the others.

## 75-2.08 Computer Software

There are many computer software programs available that may be used in the design of highway signing including sign layouts, legends, quantities, structural supports, etc. The designer should be aware that not all software packages are applicable to Indiana. Therefore, the user should first contact the Design Division's Specialty Project Group, traffic sign / lighting engineer to determine which programs and versions are acceptable for use for an INDOT project. The following is a brief summary of the programs currently acceptable to the Department.

1. SignCAD 2000. This program helps the designer determine the appropriate panel size for each guide sign along a freeway. The program was developed by Berg and Effrem, Inc.

2. GuidSIGN. This program provides the designer with standardized guide sign layouts, text fonts, letter spacing, and sign sizes. The program was developed by Transoft Solutions.

Addresses or contacts for the software companies listed above may be obtained from the Design Division's Specialty Project Group, traffic sign / lighting engineer.

## 75-2.09 Symbology

Where the *MUTCD* permits the use of either words or symbols on the sign, INDOT's preferred practice is to use only the symbol message.

## 75-2.10 Structural Design

The INDOT *Sign Design Guide* provides the Department's criteria for foundation design, sign structure design, I-beam post selection, etc. Copies of this publication can be obtained from the Design Division's Specialty Project Group.

## 75-2.11 Applications

All placement and usage of signs should follow the criteria described in the *MUTCD* and INDOT *Standard Drawings*. The use of an experimental traffic control device is acceptable provided that its

approval is in accordance with the criteria shown in the *MUTCD*. Figure 75-2D, Sign Types, provides guidelines for general usage of each sign type. The following sections on regulatory, warning, and guide signs provide additional guidance or supplementary information for specific signs. For all signs, including those in the following sections, the references in Section 75-2.01 should be reviewed to determine the appropriate sign application.

## 75-3.0 REGULATORY SIGNS

### 75-3.01 Official Action

An "official action" will be required whenever there is a proposed change in the regulatory nature of a sign or situation affecting a facility. For example, an "official action" is required where changes are made to the intersection control, parking restrictions, no-passing zones, traffic signals, or certain work site speed zones (e.g., installing a stop sign at an existing uncontrolled intersection). For a Department-maintained facility, the designer must obtain an approval for the proposed change from the appropriate district traffic engineer prior to implementation of the change. For a local facility, approval must be obtained from the appropriate jurisdiction prior to implementation.

### 75-3.02 "Stop" or "Yield" Signs

#### 75-3.02(01) General

A "Stop" sign should be installed at each at-grade, non-signalized local road or street which intersects a Department-maintained highway. A "Yield" sign may be used if the intersection is operating in a merge condition (e.g., channelized intersection with a turning roadway) or at an entrance ramp to an access-controlled facility.

For a local facility, the warrants provided in the *MUTCD* should be followed. For additional information, the following publications may be reviewed to determine the need for a "Stop" or "Yield" sign.

1. *Stop, Yield, and No Control at Intersections*, Report No. FHWA/RD-81/084, FHWA, June 1981; and

2. NCHRP 320, *Guidelines for Converting Stop to Yield Control at Intersections*, TRB, October 1989.

### 75-3.02(02) Multiway Stop Control

The *MUTCD* describes the warrants for where a multiway "Stop" signs installation may be considered. However, it should not be used unless the traffic volumes for each approach leg of the intersection are approximately equal. A traffic signal is the preferred traffic control device for an intersection with heavy volumes of traffic.

A multiway stop control is frequently used in a residential area. The following lists guidelines for the installation of a multiway stop control in a residential area.

1. Collector Streets. At the intersection of two collector streets that are primary to the area.

2. Four-way Intersection. Where there is a 60-40 percent (or closer) volume split for a four-way intersection.

3. Three-way Intersection. Where there is a 75-25 percent (or closer) volume split for a three-way intersection.

4. Accidents. Where there are three or more accidents in one year which may be corrected by a multiway stop sign.

### 75-3.02(03) Stop Signs at Railroad Crossing

"Stop" signs may be placed at a highway-rail crossing where two or more trains cross per day and is without automatic traffic control devices. For a crossing with passive protection, "Stop" signs may be placed after a need has been established by a traffic engineering study. The study should consider such factors as: volume and character of highway and train traffic, adequacy of stopping sight distance, crossing accident history and need for active control devices. Where "Stop" signs are installed, "Stop Ahead" advance warning signs should also be installed.

## 75-3.03 Speed Limit Signs

The district traffic engineer is responsible for determining speed limits on each Department-maintained facility. Each request for a speed limit determination must be transmitted to the appropriate district office. For a local facility, each local jurisdiction is responsible for determining the appropriate speed limit within its boundaries. This typically occurs after a speed study has been conducted. When determining a speed limit, the considerations that are made are as follows:

1. the 85th-percentile speed;

2. the design speed used during project design;
3. the road surface characteristics, shoulder condition, grade, alignment, and sight distance;
4. functional classification and type of area;
5. type and density of roadside development;
6. the accident experience during the previous 12 months;
7. parking practices and pedestrian activity; and
8. the maximum or minimum speed permitted by State law.

The *MUTCD* indicates the elements that should be reviewed in an engineering study. The ITE *Manual of Traffic Engineering Studies* provides guidance on how to conduct a speed study. All public road speeds are controlled by regulatory speed limits, either through "Speed Limit" signs or with speed limits established by State law. Section 40-3.02(03) lists the maximum and minimum legal speed limits for rural and urban areas and for State and local facilities.

## 75-3.04 "No U-Turn" Sign

On a freeway, the "No U Turn" sign should be placed at each median crossover. This sign should be placed at the far side of the median crossover for oncoming traffic.

## 75-3.05 Lane-Use Control Signs at Intersection

Overhead lane-use control signs should be placed at a major urban intersection where left- and right-turn lanes are provided or where there is the possibility of confusion at the intersection.

## 75-3.06 "Right-Turn Only" Sign

Where an exclusive right-turn-only lane is provided, the use of an overhead sign should be considered where background clutter may be a problem. If background clutter is not a problem, a ground-mounted sign may be as visible and may be more cost effective.

## 75-3.07 Two-Way Left-Turn Only (TWLTO) Signs

Overhead lane control signs should be provided at the beginning and end of a two-way left-turn-only lane. In an urban area, they should also be placed approximately every 1000 ft along the lane. In a suburban or built-up rural area, the intermediate TWLTO sign spacing may be increased to normally not greater than 1200 ft. For the beginning and end, the supplementary "Begin" and "End" plates should also be included.

TWLTO signs should also be used on the back side of a "Left Turn Only" sign where a two-way left-turn lane is transitioned into a one-way left-turn lane. The supplementary "Begin" and "End" plates are typically not included for this situation. Section 76-2.05(02) illustrates the pavement markings used for this transition.

The Department's preferred practice is to mount the overhead signs on cantilever supports, if feasible; if not, cable supports may be used. Supplemental post-mounted signs are not necessary.

## 75-3.08 "No Passing Zone" Sign

The beginning of a no-passing zone is normally marked with a "No Passing Zone" sign on the driver's left side of the roadway. The end of the zone is normally indicated with a sign post installed on the driver's right side of the roadway with three white delineators attached. A "No Passing Zone" sign is not required for a zone marked due to presence of a railroad crossing, nor at a zone marked due to presence of an intersection or in an urbanized area.

## 75-3.09 Parking Signs

The generic "No Parking" sign should be used where practical on a Department-maintained facility. Where necessary, signs with other messages regarding parking restrictions or permissions may be used as shown in the *MUTCD*.

## 75-3.10 "No Turn OnRed" Sign

A right turn at a red light after a stop is permitted at each intersection leg unless the leg is signed to prohibit it. Where two one-way streets intersect, a left turn at a red light after a stop is permitted at each applicable intersection leg unless the leg is signed to prohibit it. After conducting an engineering study as defined in the *MUTCD*, the designer will submit a recommendation on the need for eliminating turn-on-red movements to the district traffic engineer or to the appropriate local jurisdiction. The district traffic engineer or local jurisdiction will have final approval for any turn-on-red restrictions. Once the decision has been made to eliminate the turning movement, the proper "No Turn On Red" sign should be placed as specified in the *MUTCD*.

## 75-4.0 WARNING SIGNS

A warning sign is used where it is deemed necessary to warn drivers of an existing or potentially hazardous condition on or adjacent to a highway or street. Each warning sign must be located in advance of the condition to which it applies. The use of warning signs should be kept to a minimum. Overuse of warning signs at an obvious hazardous location tends to cause non-compliance for all signs. The following sections provide additional guidance for the placement of warning signs.

## 75-4.01 Placement of Advance Warning Signs

Figure 75-4A, Suggested Minimum Distances for Placement of Advance Warning Signs, provides the suggested minimum distances for preliminary placement of advance warning signs. The final location for each warning sign will be determined during the field check in conjunction with INDOT or local agency personnel. The distances in Figure 75-4A are based on the conditions which are defined by the *MUTCD* as follows:

1. Condition A. A high driver-judgment condition which requires the driver to use extra time in making and executing a decision because of a complex driving situation.

2. Condition B. A condition in which the driver will likely be required to stop.

3. Condition C. A condition in which the driver will likely be required to decelerate to a specific speed.

If these distances cannot be achieved, other measures should be considered to attract the motorist's attention to the sign. These additional measures will be determined as required for each site.

For those warning signs typically used by the Department, Figure 75-4B indicates which of the three Conditions will most likely apply. The following examples illustrate how to use Figures 75-4A and 75-4B, Conditions for Placement of Advance Warning Signs.

*** * * * * * * * * ***

### Example 75-4.1

Given: Stop-controlled intersection
Posted speed limit on stop-controlled leg is 50 mph

Problem: Where to place a "Stop Ahead" sign

Solution: From Figure 75-4B it is determined that the "Stop Ahead" sign is a Condition B category (i.e., the driver must stop). From Figure 75-4A, the set-back distance from the "Stop" sign should be 375 ft.

If the sign cannot be adequately placed at a set-back distance of approximately 375 ft, then other measures may be required to provide additional emphasis to the warning sign.

**Example 75-4.2**

Given: A 45 mph horizontal curve
Posted speed limit 55 mph

Problem: Where to place a Curve Ahead symbol sign

Solution: From Figure 75-4B it is determined that the Curve Ahead symbol sign is a Condition C category (i.e., the driver must slow down from 55 mph to 45mph). From Figure 75-4A, the minimum set-back distance from the horizontal curve PC is shown to be 180 ft.

An Advisory Speed "45 MPH" plate indicating that the maximum recommended speed of the curve is 45 mph should also be used.

* * * * * * * * * *

## 75-4.02 Turn Signs and Curve Signs

The *MUTCD* describes several horizontal alignment signs, but it does not fully identify where to use these signs. The decision on using an advance turn or curve warning sign is dependent upon many factors including posted speed, alignment, accident history, etc. It would be impractical and uneconomical to place an advance warning sign at every horizontal curve. Before using an advance turn or curve warning sign, the designer should consider the following:

1. Speed Determinations. In determining whether or not to place an alignment warning sign and advisory speed plate, the designer first needs to determine the appropriate speed of the curve. If the curve radius and superelevation rate are known (e.g., from construction plans), then the appropriate speed of the curve can be calculated (see Section 43-2.0). If the radius of the curve is unknown, then a field study is usually warranted. These types of studies are typically done using a ball-bank indicator.

The ball-bank indicator test involves driving a test vehicle around a curve at various speeds and reading a curved level to determine an appropriate speed for the curve. Figure 75-4C, Ball-Bank Indicator Readings, lists the various maximum recommended speeds for a curve based on several ball-bank readings. Test runs should be conducted in both directions.

2. Highway Alignment. The designer should review the overall highway alignment to determine if warning signs are warranted. An unexpected curve after a long tangent section is a likely candidate for placement of an advance warning sign. Conversely, curves on a winding highway may not warrant the use of an advance warning sign because the driver will be expecting the turn. A Curve Ahead symbol sign should always be provided where the vertical alignment obstructs the driver's vision of the horizontal curvature.

3. Posted Speed. Relative to the posted speed, the designer should consider the following:

   a. A highway with a posted or statutory speed limit of lower than 30 mph generally will not warrant an advance warning sign.

   b. A Turn Ahead symbol or Curve Ahead symbol sign should be considered if the maximum recommended speed of the curve is found to be more than 12 mph below the posted speed limit.

4. Accident History. The accident history should be reviewed to determine if there is a disproportionate number of run-off-the-road accidents that can be attributed to the horizontal curve. A high-accident location will most likely warrant an advance warning sign, an Advisory Speed plate, and/or Chevron symbol signs.

5. Driver Familiarity. A highways serving local needs (e.g., collector or local road) will rarely warrant advance warning signs because the typical driver will be aware of the restrictive alignment. However, on an arterial or a recreational road the typical driver may be less familiar with the highway and may require additional warnings.

6. Area Classification. An urban area will typically not warrant the use of advance warning signs because speeds tend to be lower and there is greater driver familiarity and awareness.

7. Public Reaction. Local residents generally have some indication of how drivers are reacting to a horizontal curve. If there are no complaints relative to near misses or accidents, the curve will probably not warrant the need for signing. Frequent complaints usually warrant further investigation.

8. Turn Ahead Versus Curve Ahead Symbol Sign. If it is determined that an advance alignment warning sign is warranted, the *MUTCD* recommends that a Turn Ahead symbol sign be used if the curve's maximum recommended speed is 30 mph or lower and that a Curve Ahead symbol sign be used if the curve's maximum recommended speed is higher than 30 mph.

9. Advisory Speed Plate. If a Turn Ahead symbol sign is placed, an Advisory Speed plate should also be placed showing the maximum recommended speed. For a Curve Ahead symbol sign, an Advisory Speed plate should be placed if the recommended speed of the curve is more than 12 mph below the posted speed limit. Typically, no Advisory Speed plate is required where the curve speed is equal to or greater than the posted or statutory speed limit.

10. Combination Curve. A combination curve consists of two or more successive curves. They may be connected with or without a short tangent section, and they may be in the same or in opposite directions. If either of the curves requires a Turn Ahead or Curve Ahead symbol sign, a Reverse Curve symbol sign should be used instead. For three or more successive curves, the Winding Road symbol sign should be used. If an Advisory Speed plate is necessary, the lowest recommended speed for all of the curves should be shown on the plate.

## 75-4.03 Chevron Symbol Signs

Chevron symbol signs should be used where there is a history of run-off-the-road accidents in conjunction with a horizontal curve. The Department's practice is to install at least three Chevron symbol signs. The *MUTCD* provides the criteria for placement of such signs.

## 75-4.04 Signal Ahead Symbol Sign

The need for the Signal Ahead symbol sign will be determined for each signalized intersection based on the accident history and any sight distance restrictions. Typical locations for Signal Ahead symbol signs include an isolated signalized intersection or in advance of the first intersection in a series of signalized intersections. They are typically not used in an urban area with multiple signalized intersections.

## 75-4.05 Advisory Exit Speed Sign

An Advisory Exit Speed signs should be placed at each freeway exit ramp gore where the ramp design speed is lower than the mainline design speed. The "Exit ____ MPH" sign may be used on the freeway ramp. If the ramp connects two freeways, the "Ramp ____ MPH" sign should be used.

### 75-4.06 Advance Street/Road Name Sign

An Advance Street/Road Name sign may be provided before each major street crossing. On a Department-maintained facility, signs are usually not provided for minor street crossings. This supplementary sign is used in conjunction with the Cross Road, Side Road, or Signal Ahead symbol signs.

## 75-5.0 GUIDE SIGNS

The *MUTCD* provides the criteria for the placement and design of guide signs. In addition, the following sections provide supplemental information relative to guide signs.

### 75-5.01 Distance Sign

A Distance sign can have either two or three destination points and the distances to these destinations. Destination points should be arranged on the Distance sign as follows:

1. Top Line. The top line should include the name of the next meaningful community, number of the next intersecting route, or name of the next intersecting highway, and distance in miles to it, on which the traveler's route passes.

2. Middle Line. The middle line, if used, should include the name of a community, number of an intersecting route, or name of an intersecting highway, and distance in miles to it, that is beyond the destination listed in the top line and is of general interest to the traveler. Figure 75-5A provides a list of the regional control cities for use on distance signs along the Interstate system. Regional control cities are the intermediate cities between the major control cities that are located within the State's boundaries.

3. Bottom Line. The bottom line should include the name of the next national control city and the distance in miles to it. Figure 75-5B provides a list of the major control cities for use on distance signs along the Interstate system. National control cities are those cities which have national significance for the through traveler.

## 75-5.02 Logo Signing

A Logo sign is a specific-informational panel that has a separately-attached sign consisting of a single or multicolored symbolic design unique to a product, business, or service facility. It is used to identify traveler services that are available on a crossroad at or near an interchange or an intersection. Information on INDOT's logo signing policy can be found in the State statutes and by contacting the Operations Support Division. These signs are placed and maintained through a contract with INDOT. However, Logo signs are a part of the INDOT signing system. They may be relocated or temporarily removed as deemed necessary by the contractor. The *MUTCD* should be consulted in the design, layout, and placement of each Logo sign.

## 75-5.03 Supplemental Guide Signs

Figure 75-5C describes the Department's general guidelines for determining the eligibility of traffic generators (cities, attractions, other major traffic generators) to place permanent tourist-oriented directional signs or other supplemental information guide signs along a Department-maintained highway. If the designer is requested to install new such signage, he or she should contact the Operations Support Division and/or the district traffic engineer for more information on the Department's supplemental guide signage policy.

## 75-5.04 Guide Signs for Interchange Crossroads

The design and layout criteria for Advance Exits and Directional signs on a freeway are clearly defined and shown in the *MUTCD*. Figures 75-5D through 75-5Q illustrate INDOT's preferred practice for the placement of Directional signs along the crossroad approaching an interchange. Figure 75-5D lists the guidelines for which sign layout plans shown in Figures 75-5E through 75-5Q should be used for the various interchanges and crossroad types. The figures and the titles are listed below.

| | |
|---|---|
| 75-5D | Typical Crossroad Signing at Freeway Interchange |
| 75-5E | Diamond Interchange Signing (Major Crossroad Over) |
| 75-5F | Diamond Interchange Signing (Major Crossover Under) |
| 75-5G | Diamond Interchange Signing (Minor Crossroad Over) |
| 75-5H | Diamond Interchange Signing (Minor Crossover Under) |
| 75-5 I | Full Cloverleaf Interchange Signing (Major Crossroad Over) |
| 75-5J | Full Cloverleaf Interchange Signing (Major Crossover Under) |
| 75-5K | Full Cloverleaf Interchange Signing (Minor Crossroad Over) |
| 75-5L | Full Cloverleaf Interchange Signing (Minor Crossover Under) |
| 75-5M | Partial Cloverleaf Interchange Signing (Major Crossroad Over) |

| | |
|---|---|
| 75-5N | Partial Cloverleaf Interchange Signing (Major Crossover Under) |
| 75-5 O | Partial Cloverleaf Interchange Signing (Minor Crossroad Over) |
| 75-5P | Partial Cloverleaf Interchange Signing (Minor Crossover Under) |
| 75-5Q | Trumpet Interchange Signing |

## 75-5.05 Street Name Sign

A Street Name sign is very helpful to the motorist and should be legible a sufficient distance in advance of the cross street to permit the motorist to perceive and react in time to make the desired maneuver in a safe manner. In order to provide adequate sign visibility, sign letter heights should be as follows:

1. Ground-Mounted Sign.

    a. Posted speed limit ≥ 30 mph.
        (1) Upper-case letters: Series C or D, 6 in. height
        (2) Lower-case letters: Series C or D, 4 ½ in.height

    b. Posted speed limit ≤ 25 mph: Upper-case letters only, Series C or D, 4 in. height.

2. Overhead Sign.

    a. Upper-case letters: Series EM, 8 in. height.
    b. Lower-case letters: Series EM, 6 in. height.