Traffic Signs and Markings

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Traffic Signs

- **Definition:**
  A traffic sign is defined as a device mounted on a fixed or portable support whereby a specific message is conveyed by means of words or symbols.
  The sign is placed or erected for the purpose of regulating, warning, or guiding vehicular, pedestrian, or bicycle traffic.

See the FHWA and the MUTCD website at [http://mutcd.fhwa.dot.gov](http://mutcd.fhwa.dot.gov)
Traffic Signs

- **Purpose:**
The purpose of traffic control devices, as well as the principles for their use, is to promote highway safety and efficiency by providing for the orderly movement of all road users on streets and highways throughout the Nation.

Traffic Signs

- **Purpose (continued):**
  Traffic control devices or their supports shall not bear any advertising message or any other message that is not related to traffic control.
Traffic Signs

- **Function of signs:**
  
  *Signs shall be defined by their function as follows:*

  A. **Regulatory** signs give notice of traffic laws or regulations.
  
  B. **Warning** signs give notice of a situation that might not be readily apparent.
  
  C. **Guide** signs show route designations, destinations, directions, distances, services, points of interest, and other geographical, recreational, or cultural information.

Traffic Signs

- **Sign Limitations:**
  
  - Easily damaged due to impact or vandalism
  
  - Visual quality degrade over time due to dirt and normal reflectivity deterioration
  
  - Require continuous maintenance
Traffic Signs

- **Principles of traffic signs and markings:**

  *Traffic signs and markings are most effective when they satisfy five basic requirements:*
  - Fulfill a need;
  - Command attention;
  - Convey a clear, simple meaning;
  - Command respect from road users; and
  - Give adequate time for proper response.

Traffic Signs

- **Changeable Message Signs**

  Changeable message signs are traffic control devices designed to display variable messages. Changeable message signs should not be used to display information other than regulatory, warning, and guidance information related to traffic control.
Traffic Signs

- **Changeable Message Signs**
  
  Changeable message signs, with more sophisticated technologies, are gaining widespread use to inform road users of variable situations, particularly along congested traffic corridors.

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Traffic Signs

- **Changeable Message Signs: (continued)**
  
  In order to ensure that the above principles are fulfilled the following aspects should be considered:
  - design;
  - placement and operation;
  - maintenance; and uniformity.
Traffic Signs

1. **Design**
   Shape, color, Size, composition, lighting or retro-reflection should command attention and convey a simple meaning.

   *The sign should have:*
   
   A. High **visibility** by day and night; and
   B. High **legibility** (adequately sized letters or symbols, and a short legend for quick comprehension by a road user approaching a sign).

Traffic Signs

- **Shapes**

  Particular shapes, as shown in the Table below, shall be used exclusively for specific signs or series of signs.

  **Use of Sign Shapes**

<table>
<thead>
<tr>
<th>Shape</th>
<th>Signs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Octagon</td>
<td>* Stop</td>
</tr>
<tr>
<td>Equilateral Triangle (1 point down)</td>
<td>* Yield</td>
</tr>
<tr>
<td>Circle</td>
<td>Highway-Rail Grade Crossing (Advance Warning)</td>
</tr>
<tr>
<td></td>
<td>Emergency Evacuation Route Marker</td>
</tr>
</tbody>
</table>
Traffic Signs

<table>
<thead>
<tr>
<th>Shape</th>
<th>Signs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pennant Shape / Isosceles Triangle (longer axis horizontal)</td>
<td>* No Passing</td>
</tr>
<tr>
<td>Pentagon (pointed up)</td>
<td>* School Crossing Series</td>
</tr>
<tr>
<td></td>
<td>* County Route Sign</td>
</tr>
<tr>
<td>Crossbuck (two rectangles in an “X” configuration)</td>
<td>* Highway-Rail Grade Crossing</td>
</tr>
<tr>
<td>Diamond</td>
<td>Warning Series</td>
</tr>
<tr>
<td>Rectangle</td>
<td>Regulatory Series</td>
</tr>
<tr>
<td></td>
<td>** Guide Series</td>
</tr>
<tr>
<td></td>
<td>Warning Series</td>
</tr>
<tr>
<td>Trapezoid</td>
<td>* Recreational Series</td>
</tr>
</tbody>
</table>

* Indicates exclusive use  
** Guide series includes general service, specific service, and recreation signs

Traffic Signs

- **Color code**

  See also Table 16-1, page 16-3

  The general meanings of colors used in signs are as follows:

<table>
<thead>
<tr>
<th>Color</th>
<th>General Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yellow</td>
<td>Warning</td>
</tr>
<tr>
<td>Red</td>
<td>Stop or prohibition</td>
</tr>
<tr>
<td>Blue</td>
<td>Road user services guidance, tourist information, and evacuation route</td>
</tr>
<tr>
<td>Green</td>
<td>Indicated movements permitted, direction guidance</td>
</tr>
<tr>
<td>Brown</td>
<td>Recreational and cultural interest area guidance</td>
</tr>
<tr>
<td>Orange</td>
<td>Temporary traffic control</td>
</tr>
<tr>
<td>Black</td>
<td>Regulations</td>
</tr>
<tr>
<td>White</td>
<td>Regulation</td>
</tr>
<tr>
<td>Fluorescent Yellow - Green</td>
<td>Pedestrian warning, bicycle warning, school bus and school warning</td>
</tr>
</tbody>
</table>
Traffic Signs

- **Size:**
  
  See the MUTCD for standard sizes of signs.
  
  - Normal sizes of signs are used in urban areas
  - Larger signs are used in rural areas.
  - Larger signs are also used for added emphasis or to ensure that they attract motorists attention.

Traffic Signs

- **Message:**
  
  A. **word messages**
    
    brief, 3 words maximum on regulatory or warning signs
  
  B. **symbolic**
    
    for faster recognition by drivers
    
    - pictograms; arrows, curve warning, deer crossing
    - symbols, should be learned by the code; red circle with a slash, and DO NOT ENTER SIGN.
Traffic Signs

- **Lettering**
  Uppercase letters or all regulatory and warning signs

Traffic Signs

**Illumination and reflectorization**

- **Illumination**
  - External light,
  - light within or behind the sign,
  - luminous tubing shaped to the letter or symbol

- **Reflectorization**
  - Reflective sheet background
  - Reflective letters, symbol or border
Traffic Signs

- **Sign location**
  - See page 16-4 for details
  - On the right hand side of the roadway
  - Facing approaching traffic
  - Supplementary signs in other locations may be used
  - Guide signs are often mounted overhead (on wide and high speed streets)
  - Visible only to the traffic for which they are intended.

  - Longitudinal placement
  - Lateral placement

Traffic Signs

- **Longitudinal placement**
  Must be coordinated with roadside features (guardrails and other signs)

  **Regulatory signs:**
  normally placed at or near the location where the regulation:
  - exists (stop, yield)
  - begins (wrong way, do not pass)
  - additional signs where a regulation continues over an extended section of the highway (speed limit)
Traffic Signs

Warning signs:
- in advance of the hazard
- as a function of approaching traffic speed

Guide signs:
- In advance of an intersection or junction
- At the point where they apply (street names, kilometer posts)

Traffic Signs

- Lateral placement
  Within the driver's cone of vision
Traffic Signs

- **Sign support**
  New changes for safety at impact
  Large ground-mounted signs are now acceptable only if:
  - They are placed beyond the clear zone of behind protective barriers
  - Most supports for small signs ($5m^2$) are now designed to break away or yield and bend over

Traffic Signs

- **Sign application**
  See details in page 16-5
Traffic Signs

2. Placement and operation
   - Properly seen;
   - Give adequate time for proper response;
   - Vertical and lateral locations;
   - Fulfill a need;
   - Command respect;
   - Unnecessary traffic control devices should be removed.

Traffic Signs

3. Maintenance
   - Physical maintenance of traffic control devices should be performed to ensure legibility and visibility.
   - Devices should be removed if no longer appropriate.
Traffic Signs

4. Uniformity

Treating similar situations in a similar way and using consistent fashion for similar signs.

Uniformity in design shall include:

- shape,
- color,
- dimensions,
- legends,
- Borders,
- and illumination or retroreflectivity.

Traffic Signs

4. Uniformity (continued)

Uniformity of devices simplifies the task of the road user because it aids in recognition and understanding, thereby reducing perception/reaction time.
PAVEMENT MARKINGS

**Definition:**
Traffic markings are
- all lines,
- patterns,
- symbols,
- words,
- colors,

or other devices, except signs and power-operated traffic control devices, set into the surface of, applied upon, or attached to the pavement or curbing.

PAVEMENT MARKINGS

**Definition:**
Traffic markings are placed for the purpose of
- regulating,
- warning, or
- guiding

traffic.
PAVEMENT MARKINGS

- **Marking functions:**
  - Markings may **supplement** other traffic control devices or
  - they may be used **alone** to convey information that would be difficult to convey using other devices.

PAVEMENT MARKINGS

- **Marking functions:**
  - Markings may supplement other traffic control devices or
  - they may be used alone to convey information that would be difficult to convey using other devices.

PAVEMENT MARKINGS are specifically used to:

A. Display regulations (no passing zones, curb parking restrictions)
B. Supplement other devices (STOP lines, symbol arrows)
C. Guide traffic (lane lines, rout number)
D. Warn traffic (SIGNAL AHEAD, rail-highway crossing legend)
PAVEMENT MARKINGS

- **Marking Limitations**
  Markings have several important limitations.
  - May be hidden by:
    - other vehicles directly over the markings or
    - by snow, or
    - by dirt.

PAVEMENT MARKINGS

- **Marking Limitations (continued)**
  - May be worn by sand or gravel.
  - May not be visible when wet.
  - They wear due to traffic and the environment and must be maintained or replaced.
  - Removal of markings from the pavement is a difficult task.
PAVEMENT MARKINGS

Marking Design:

Materials

- All markings that apply at night must be reflectorized.
- Paint, thermoplastic and cold plastic are used for markings.
- Materials must provide the color and reflectivity throughout their useful life.

Reflectivity in painted markings is achieved by mixing small glass heads with the paint.

Raised pavement markers, 10-25 mm high, may be used.

Jiggle bars (raised bars) are usually 75 mm high.

Marking material used near pedestrian or bicycle activity should not present hazards of tripping or slipping to pedestrians or two-wheel vehicles users.
PAVEMENT MARKINGS

- **Color**
  - White
  - Yellow
  - Red
  - Blue

- **Longitudinal Markings**
  (parallel to the roadway)
  - Broken lines, permissive
  - Dotted lines, path guidance
  - Solid lines, restrictive
  - Double lines, maximum restriction
  - Width of line indicates degree of emphasis

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PAVEMENT MARKINGS

- **Transverse Markings**  (Table 16-2)
  - Stop bars 300 – 6000 mm in width, 1.2 m before crosswalk lines
  - Crosswalk lines min. width 1.8 m
  - Railroad crossing markings X & RR and a pair of transverse lines
  - Diagonal lines in traffic islands

- **Parking space markings**
  - 100-150 mm wide
  - **blue** and **white** for disabled places
PAVEMENT MARKINGS

- **Word markings**
  - Only used in support of standard signs
  - Limited to as few words as possible,
    never > 3 words
  - White in color and elongated
    - 2.4 m high and 1.8 m at low speed roads
  - Should be read as below

<table>
<thead>
<tr>
<th>AHED</th>
<th>not</th>
<th>STOP</th>
</tr>
</thead>
<tbody>
<tr>
<td>XING</td>
<td>PED</td>
<td>XING</td>
</tr>
</tbody>
</table>

PAVEMENT MARKINGS

- **Marking applications**

  See page 16-14

  Before any new highway, paved detour, or temporary route is opened to traffic,

  all necessary markings should be in place.
PAVEMENT MARKINGS

• ADVANTAGES

Under most highway conditions, markings provide important information while allowing minimal diversion of attention from the roadway.

Pavement markings can enhance roadway delineation with the addition of audible and tactile features such as bars, differential surface profiles, raised pavement markers, or other devices intended to alert the road user that delineation on the roadway is being traversed.

PAVEMENT MARKINGS

• Examples of Pavement Markings

![Diagram of Pavement Markings]
Figure 3B-20. Typical Lane-Use, Lane-Reduction, and Wrong-Way Arrows for Pavement Markings

a. Through Lane-Use Arrow

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b. Turn Lane-Use Arrow

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PAVEMENT MARKINGS

Posted or Statutory Speed Limit 70 km/h (45 mph) or greater
PAVEMENT MARKINGS

Figure 3B-1: Typical Two-Lane, Two-Way Marking Applications

Legend

- Direction of flow

Typical lane, two-way marking with passing permitted in both directions

b - Typical pavement markings with optional double-turn lane lines, lane-use turn arrows, crosswalk lines, and stop lines
PAVEMENT MARKINGS

- Signs and markings must draw the driver’s attention.
- Driver’s attention is directly proportional to:
  - The density of traffic
  - Vehicle speed
  - Complexity of maneuvering areas
  - Operating environment (urban & rural)