Traffic Engineering 101 - The Basics

Understanding the basic principles and how these drive the decisions regarding traffic management in Louisiana
Traffic Engineering 101

• Purpose:

  – To provide an overview of engineering principles; guidelines & laws which govern traffic management in Louisiana

  – Discuss how DOTD’s decisions impact local communities

  – Facilitate feedback & questions from local agencies on state and local traffic engineering issues
Manual on Uniform Traffic Control Devices

• Federal policy
• All states must adopt
• Set minimums for traffic control devices such as
  – Signs
  – Pavement marking
  – And signals
Engineering Design Standard Manual

• DOTD policy

• Signed by Chief Engineer

• Provides additional requirements
Basic Principle of Traffic Engineering

“Everything is designed to meet Driver Expectancy”
Driver Expectancy
Driver Expectancy
TR Engineering 101

• Module:

1. Introduction & Overview (3/22/10)
2. Speed Management Overview (4/26/10)
3. School Zones (4/26/10)
4. Intersection Traffic Control (5/24/10)
5. Traffic Signal (5/24/10)
6. Roundabouts (5/24/10)
7. Sign Selection & Installation (6/28/10)
8. Work Zones (6/28/10)
9. Access Management (7/26/10)
10. Roundabouts (8/23/10)
Work Zone Signing and Devices

- MUTCD & DOTD Policy
- DOTD current details
Standard Signs, Special Signs and Installation

• MUTCD & DOTD Policy
• Installation of signs
More Suggestions?

• Other traffic issues or questions?

• Contact Jody Colvin at Jody.Colvin@la.gov

• or Marie B. Walsh at mbwalsh@ltrc.lsu.edu
Work Zones - Temporary Traffic Control

Traffic Engineering 101
Webinar
June 28, 2010
Work Zones - Temporary Traffic Control

WHY SHOULD WE BE CONCERNED?
Work Zones - Temporary Traffic Control

- Work zones account for 800 to 1000 fatalities per year on our roads.
- About 40,000 injuries occur in work zones every year, and most are occupants of vehicles.
- Work zones account for about 10 percent of delays due to traffic congestion nationwide, or 24 percent of non-recurring delays.
Work Zones - Temporary Traffic Control

Special concerns:

- Work zones present road users with changing and unexpected circumstances
- Work zones affect the public’s perception of government, in both good and bad ways
- As our road system ages, more and more projects must be done under active traffic conditions (80% and rising), meaning more exposure to workers and motorists
Work Zones - Temporary Traffic Control

- There are over 3000 active work zones at any time on our busiest highways.
- Motorists can expect to encounter one work zone for every 100 miles traveled.
The key to safe and efficient work zones, as in all traffic control, is good communication with the road user.

Most communication with road users is done visually through signs, markings, and channelizing devices.
Work Zones - Temporary Traffic Control
Work Zones - Temporary Traffic Control

- Design and usage of Traffic Control Devices in Work Zones is governed by the Manual on Uniform Traffic Control Devices (MUTCD)

- Part 6 of the MUTCD addresses the special requirements for Temporary Traffic Control in Work Zones
Work Zone Traffic Management

- The most common type of sign in work zones is the warning sign, but instead of being yellow, warning signs in work zones are orange.

- Most other signs used in work zones keep the same colors as their counterparts outside of the work zone.
Work Zones - Temporary Traffic Control

- Channelizing devices
  - Drums
  - Cones
  - Delineators
- Always used in a series to provide guidance to road users
On which side of this barricade should traffic pass?
Work Zones - Temporary Traffic Control

- Portable Changeable Message Signs (PCMS)
- Programmable Messages
- Can give updates on road, lane and ramp closures
Work Zones - Temporary Traffic Control

- PCMS Messages must relate to traffic conditions
- No advertising allowed
- Guidance and approved abbreviations in the MUTCD
Temporary Traffic Control Plans must be prepared by qualified engineering personnel!
Work Zones - Temporary Traffic Control

- Site specific plans will still be needed in many cases
- TC Details developed by DOTD can help standardize Traffic Control in Work Zones
Work Zones - Temporary Traffic Control

Additional resources:

- ATSSA.org
- FHWA.dot.gov
- LTAP center
  - www.louisianaltap.org
- DOTD District Traffic Operations Engineers
Work Zones - Temporary Traffic Control

Steven C. Strength, PE, PTOE
District Traffic Operations Engineer
LADOTD
District 02 New Orleans
Steve.Strength@la.gov
(504) 484-0205
What are the LA DOTD Traffic Control Details?

- A resource for state and local agencies
- Also known as TC Details
- General and specific information
  - Design of temporary traffic control plans
  - Placement of traffic control devices
The LA DOTD TC Details also provide:

- Examples of typical traffic control layouts
- References to publications related to work zone safety:
  - NCHRP Reports
  - ATSSA Guidelines
  - LA DOTD QPL List
  - LA Standard Specifications for Roads and Bridges
  - FHWA Handbooks
  - AASHTO Roadside Design Guide
DOTD uses the Traffic Control Details for:

- Permits
- Road and bridge construction
- Roadside mowing and clearing
- Traffic signal maintenance
- Sign installation and replacement
- Roadway striping
Local Agencies can use the TC Details for:

- Implementing state standards into traffic control design
- Answering questions related to traffic control
- Maintaining uniformity in the use of traffic control devices
- Guidance for common traffic control situations
Who else uses the Traffic Control Details?

- Consultants
- Contractors
- Traffic Control Technicians and Supervisors
- Utility Workers
- Maintenance Personnel
2010 Traffic Control Details

- Revised March 2010
- Collaboration of the Louisiana Work Zone Task Force
- Required for Plan Delivery Dates of August 2010 or later
- 20 Sheets
First General Notes Sheet

TCG-00(A)

GENERAL PROVISIONS:
- All temporary traffic control (TTC) devices used shall be in accordance with the Louisiana Standard Specifications for Roads and Bridges, the MUTCD, and shall meet the NHCRP Report 350 requirements for Test Level 3 devices.
- Materials used for TTC shall be in accordance with the Louisiana Standard Specifications for Roads and Bridges, and, when applicable, the LADOTD OPL.
- No TTC shall be erected without the approval of the Project Engineer and until work is about to begin, unless they are covered.
- No lane closures, lane shifts, diversions, or detours shall occur without the approval of the Project Engineer.
- Responsibility is hereby placed upon the contractor for the installation, maintenance, and operation of all TTC devices called for in these plans or required by the Project Engineer for the protection of the traveling public as well as the LADOTD and construction personnel.
- The contractor shall also be responsible for the maintenance of all permanent signs, pavement markings, and traffic signals left in place as an aspect of the same movement and guidance of traffic within the project limits.
- The DDOE shall serve as a technical advisor to the Project Engineer for all traffic control matters.
- The Chief Construction Engineer or his appointed designee shall approve all signs and situations not addressed in the plans based on the Project Engineer’s and the DDOE’s recommendations. All changes shall be noted in all project traffic control documents.
- Any additional signs shown in the MUTCD and required by the Project Engineer shall be installed under Item 7.1.2.1.1.00000.
- Neither work activity nor storage of equipment, vehicles, or materials shall occur within the buffer space.
- Where a work area has been established on one side of the roadway only, there shall be no conflicting operations or parking on the opposite shoulder within 500 feet of the work area.
- A lighting plan shall be submitted to the Project Engineer 30 days prior to night work for approval. See Section 13.2.20 of the Louisiana Standard Specifications for Roads and Bridges.
- Parking of vehicles or unattended equipment, or storage of materials within the clear zone shall not be permitted unless protected by guardrail barriers. If the clear zone is not defined on the plans, the project engineer shall vary.
- Brief typical sections:
  - Upon removal of existing guard rail, the contractor shall install on NHCRP 350 approved crash attenuator or barrier to protect the front end of the bridge or column until new guard rail is installed. After removed the existing guard rail, new guard rail should be installed within Item 7.1.2.1.1.00000.
  - All costs associated with crash devices are to be included in Item 7.1.2.1.1.00000.

PAVEMENT MARKINGS (see CPL):
- All pavement markings within the limits of the project that are in conflict with the project signing or the required traffic movements shall be removed from the pavement by bleed cleaning or grinding. (Existing stripping shall be painted over with black paint or covered with tape.)
- If specific pavement markings are necessary, they shall be reflectorized, removable, and accompanied by the proper storage.
- Temporary raised pavement markers may be added to supplement temporary striping in areas of transition, in diversions, or in other areas of need as shown in the plans or as directed by the Project Engineer.
- Materials and placement of temporary pavement markings shall conform to Section 7.15 of the Louisiana Standard Specifications for Roads and Bridges.
- Permanent markings or temporary markings remaining in the pavement construction shall comply with DOTD standard plan PM-01, MUTCD, and for the permanent striping plans.

DYNAMIC MESSAGE SIGNS (DMS):
- DMS shall be used on all Interstates and highways and on all other roadways where space is available with an ADT greater than 20,000. DMS will be paid for each under Item 7.1.2.1.1.00001.
- When used in advance of a lane closure or a lane shift, the DMS shall be placed on the right side of the road, a minimum distance of 2 miles in advance of the taper for interstates and to be determined by the Project Engineer on other highways.
- For interstates and multi-lane highways, if vehicles are passing beyond the 2 mile DMS, an additional DMS should be placed on the right-hand side of the road approximately 5 miles in advance of the taper or at the end of the shoulder, whichever is greater.
- DMS message shall be approved by the DOTD. Message shall be no more than 3 lines and 2 screens.
- DMS should be placed as far from the traveled lane as possible. They shall be shielded by guardrail or barriers. If this is not possible, they shall be shielded with one or more of the other barriers available.
- When the DMS is not displaying a work zone appropriate message pertaining to the ongoing construction project it shall be shielded by guardrail or barriers, or removed from the clear zone.

SPEED LIMITS:
- The Project Engineer may approve a 10 mph drop in the speed limit for posted speeds of 45 mph or greater and for any construction, maintenance, or utility operation that requires one or more of the following:
  A. The condition of the traveled way is degraded due to raised surfaces on a narrow lane that is greater than 1/3 inches.
  B. Work is in progress in the immediate vicinity of the traveled way requiring lane closures or lane width reductions less than 5 feet.
  C. Workers are present on the shoulder within 2 feet of the edge of the traveled way without barrier protection.
- The reduced speed zone shall only apply to those portions of the project limits affected. The Project Engineer may also SPEED LIMIT WHEN FLASHING signs to supplement reduced speed zones.
- If the speed limit is reduced, speed limit signs shall be placed:
  A. Beyond major intersections
  B. At one mile interval in rural areas
  C. At half mile intervals in urban areas.
- At the end of the reduced speed zone, a speed limit sign displaying the original speed limit prior to construction shall be installed.
- For other speed limit reductions not listed above the Project Engineer and the DDOE shall recommend the speed reduction to the Chief Construction Engineer or his appointed designee for approval.
- If the speed limit is reduced more than 10 mph, placement of the signs shall be re-evaluated according to the MUTCD.

FLASHING ARROW PANELS:
- All flashing Arrow Panels should be 4 feet by 8 feet and Type C.
- Flashing Arrow Panels should be placed on the shoulder. When there is no shoulder or median area, the arrow panel (with arrow placed within the closed lane behind the channelizing devices) is to be placed on the shoulder. When the arrow is not being used, it shall be protected by guardrail or barriers, or removed.
- Flashing arrow panels shall be connected with two reflective traffic control devices.
- Arrow panels shall only be used for lane reduction markers and shall not be used for lane shifts.

ABBREVIATIONS:
- LADOTD: Louisiana Department of Transportation and Development
- MUTCD: Manual on Uniform Traffic Control Devices
- NHCRP: National Cooperative Highway Research Program
- OPL: ODOT Project List
- DDOE: District Traffic Operations Engineer
- DMS: Dynamic Message Sign
- ADT: Average Daily Traffic
- TCG: Temporary Control Guidelines
- TCC: Temporary Traffic Control Center
- ANSI: American National Standards Institute
- AGC: Associated General Contractors of America
- ATSSA: American Traffic Safety Services Association

D.O.P. Beginning of Project
E.O.P. End of Project
Second General Notes Sheet

**TC-00(B)**

**SIGNS**
- Signs used for temporary traffic control shall follow the plans, the LADOTD TC Details, and the MUTCD.
- Signs shown in the TC illustrations are typical and may vary with specific conditions.
- When projects are separated by less than one mile, they shall be signed in one project.
- The Type 2 High Intensity signs shall be supplemented with the first sign (or part of sign) that gives warning about a lane closure during nighttime operations (see OPL).
- High intensity signs shall not be allowed on any project.
- Contractor shall use caution to damage existing signs which remain in place. Any LADOTD signs damaged by work operations shall be replaced by the contractor under Item 713-C of the specifications.
- Signs (assuming and temporary) shall be removed or completely covered with a strong, lightweight, opaque material (no tape or paper clips). (Signage is not an acceptable material to cover signs.)
- No short term warning signs giving a particular operation be left in place once the operation has been completed or where the condition has been removed.
- Signs shall have a minimum of two bulbs per post.
- Warning signs used for temporary traffic control must meet the following guidelines unless otherwise noted in the plans:
  - A sign shall be 48 inches by 48 inches.
  - All signs must be in accordance with the most recent MUTCD, LADOTD, and QC.
  - Keep in mind that if a sign is on a bridge it shall be attached to a bridge rail and extra light may not be required for roadways with a center left turn lane and for undivided roadways.

**SIGN SUPPORT AND MOUNTING**
- Signs over 50 square feet shall be mounted on at least two posts and signs over 20 square feet shall be mounted on at least three posts. The following sign height and support shall be required:
  - A: at least 5 feet above the ground (see NCW Report 350).
  - B: for four-lane or more highways at least 6 feet above the ground (see NCW Report 350).
  - C: for urban areas the sign height shall be a minimum of 7 feet above the roadway (see NCW Report 350).
- For working signs used for lane closures and lane shifts where the road will return to full width within 12 hours and the roadway has no more than 2 lanes in each direction:
  - A: a work zone sign shall be added or modified if required to meet site-specific conditions (see NCW Report 350).
  - B: NCW Report 350 approved portable sign frames may be used provided they are visible to the driver (see NCW Report 350).
  - C: whenever temporary traffic control is used in any project more than 4 feet 6 inches on a street, parking lot, or other traffic control devices shall be in use.

**REFERENCES**
- the contractor shall be responsible for understanding the rules and requirements in the current edition of the following documents:
  1. Louisiana Standard Specifications for Roads and Bridges: http://www.dotldot.state.la.us/Specs/Specs05.pdf
  10. American Traffic Safety Services Association (ATSSA) Quick Reference to Traffic Control Devices and Features

**FLAGS**
- All flags shall be qualified.
- The contractor shall be responsible for choosing and ensuring that all flags are qualified to perform flagging duties.
- A qualified flagger is one that has completed courses such as those offered by ATISSA, ROSA, or other courses approved by the LADOTD Work Zone Traffic Force. The contractor shall be responsible for getting the flagger course approved.
- When utilizing a flagger, the flagger shall use a minimum 18 inch rectangular flag on a minimum 6 foot rod/pole and wear ANSI Class 3 Line Green reflective during daylight operations and ANSI Class 3 Line Green reflective during night operations.
- In all flagging operations, the flagger must be visible from the flagger advance warning sign.
Third General Notes Sheet

TC-00(C)

CHANNELIZING DEVICES

- The following devices may be used as channelizing devices: Traffic Markers, Vertical Panels, Cones, Drums, and Super Cones.
- 28 inch traffic cones are not allowed on
  - Interstates
  - Highways with speeds greater than 40 mph.
- During night time operations 25 inch and 35 inch cones are not allowed.
- Reflective material pattern used on super cones shall match that used on drums.

Taper Areas:

- Standard Spacing: See Standard Device Spacing and Buffer Space table.
- Nighttime Operations: Drums are spaced at standard spacing. All other devices are 1/2 standard spacing.
- Highways Operations: Drums are spaced at standard spacing. All other devices are 1/3 standard spacing.

Type Barriers:

- At the beginning of a closed lane or shoulder and at 1,000 feet intervals where no active work is ongoing and the lane must remain closed. A minimum of 2 barriers shall be placed if the lane or shoulder closure is less than 2,000 feet.
- Type C barriers shall be placed at the beginning of the lane closure and one shall be placed in the middle of the lane closure.
- Type barriers shall be placed:
  - Before each or group of unlighted holes or holes filled with temporary material.
  - Before unlighted concrete.
  - In the closed lane on each side of every intersection and crossroad.
  - In front of piles of material (talc, aggregate, broken concrete, gravel, and equipment when near the work zone).

DROP-OFFS:

- Where a shoulder drop-off greater than 2 inches but less than 6 inches wide, a "SHOULDER DROP-OFF" sign shall be used. The drop-off shall be placed adjacent to the pavement edge at the drop-off during nonworking hours when the drop-off is greater than 3 feet.
- For drop-offs on non-interstate routes, vertical panels and a temporary shoulder shall be used:
  - (A) For pre-construction speeds of 40 mph or less space at 20 feet.
  - (B) For pre-construction speeds of 45 mph or more space at 40 feet.
- A concrete barrier shall be used:
  - On interstate work where a drop-off is 6 inches or greater and within 2 feet of the traveled way.
  - For non-interstate roadways with speeds greater than 45 mph where a drop-off is 10 inches or greater and within 2 feet of the traveled way.
- A portable concrete barrier will be required when the deflection shall be considered in the design.

All details are shown minimum construction signing. All details are to be reviewed and approved by the engineer. Contractors are responsible for complying with all TC details.
Fourth General Notes Sheet

TC-00(D)

NOTES

This sheet shall be used with the Temporary Traffic Control General Notes Sheets TC-00(A), TC-00(B), and TC-00(C), and another Temporary Traffic Control Sheets.

1. This layout represents the minimum traffic controls required for placement of "Road Work Next XX Miles" and "End Road Work" signs.

2. This layout does not replace other TC Detail Sheets, but is intended as a supplement to the required signing.

3. The "Road Work Next XX Miles" sign shall be required on all projects. The distance on the "Road Work Next XX Miles" sign shall be stated to the nearest whole mile. This sign shall be placed at the beginning of Project (E.O.P.) limits.

4. The "Road Work Next XX Miles" sign shall be a minimum of 36 inches by 60 inches for all multiple roadways and a minimum of 24 inches by 48 inches for two-lane roadways unless otherwise noted.

5. The "End Road Work" sign shall be placed 500 feet past the End of Project (E.O.P.) limits.

6. If "Road Work Ahead" sign is used on a cross road to warn of road work on another route, then "End Road Work" sign is not required.

7. "Road Work Ahead" signs are not required if the street has no other access except through the work zone.

ALL TC DETAILS SHOW MINIMUM CONSTRUCTION SIGNING.

ALL SITUATIONS SHALL BE REVIEWED AND/OR DESIGNED BY THE ENGINEER. CONTRACTORS ARE RESPONSIBLE FOR COMPLYING WITH ALL TC DETAILS.
Example of a Typical Layout

TC-01

NOTES

1. This layout represents the minimum traffic controls required for workers and equipment operating more than 15 feet from the travel way.

2. If the operation results in equipment or other vehicles being parked closer than 15 feet to the travel way but not within the roadway, each vehicle shall have an amber light.

3. When a work area has been established on one side of the roadway only, there shall be no parking on the opposite shoulder within 500 feet of the work area.

SIGN SPACING CHART

- Traffic Sign
- Work Area
- Direction of Travel
- Truck with Amber Light

LEGEND

WORK AREA
TC Details address the following situations:

- Shoulder work
- Flagging operations
- Diversions
- Lane closures
- Detours
- Moving operations
Highlights of the Traffic Control Details

- Encourage uniformity
- Provide guidance above MUTCD minimum
- Consult TC Details:
  - Before performing work that affects traffic
  - Before designing temporary traffic control plans
- Contractors are responsible for complying
Resources

- Contact LTAP for on-site work zone training
  - Low-volume roads
  - www.LouisianaLTAP.org
  - Louisiana Roads Scholar Program
- Contact a local LA DOTD District traffic office
LA DOTD Traffic Control Details are located at www.dotd.la.gov.

For more information or to request a copy of the DOTD Traffic Control Details contact Joy Johnson:

(225) 242-4636
joy.johnson@la.gov
Signs
Why a Sign?

Convey Messages
  – Laws
  – Warning
  – Guide

Communicate!
Too Many Signs?
Excessive Use of Signs

• All signs should be used conservatively

• If over used tend to lose their effectiveness.

• Signs should be used only where justified by engineering judgment or studies
Which way do you go?
Which route?
Standard Signs

• Covered in the MUTCD

• Different categories
  – Regulatory
  – Warning
  – Guide

• Standardized
  – Shapes
  – Colors
  – Sizes
  – Layouts
  – Fonts
  – Symbols
Standard Signs

A. Regulatory signs give notice of traffic laws or regulations.
Standard Signs

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.
Standard Highway Signs

This manual shows typical signs approved for use on streets and highways.

What’s included:

• Design layout for standard signs
• Design guidelines for non standard signs
• Approved alphabet
• Pavement marking standards
Standard Sign Layout

See page 6-2 for symbol design.

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>J</th>
<th>K</th>
<th>L</th>
<th>M</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>18</td>
<td>.375</td>
<td>.625</td>
<td>7.25</td>
<td>2.25</td>
<td>2.625</td>
<td>5.875</td>
<td>3.75</td>
<td>1.875</td>
<td>1.625</td>
<td>2.6</td>
<td>1.5</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>.375</td>
<td>.625</td>
<td>9.625</td>
<td>3</td>
<td>3.6</td>
<td>7.75</td>
<td>5</td>
<td>2.5</td>
<td>1.5</td>
<td>.813</td>
<td>3.25</td>
<td>1.5</td>
</tr>
<tr>
<td>30</td>
<td>.5</td>
<td>.75</td>
<td>12</td>
<td>3.75</td>
<td>4.375</td>
<td>9.888</td>
<td>6.25</td>
<td>3</td>
<td>1.875</td>
<td>1</td>
<td>4.063</td>
<td>1.875</td>
</tr>
<tr>
<td>36</td>
<td>.625</td>
<td>.875</td>
<td>14.375</td>
<td>4.5</td>
<td>5.25</td>
<td>11.625</td>
<td>7.5</td>
<td>3.625</td>
<td>2.25</td>
<td>1.25</td>
<td>4.875</td>
<td>2.25</td>
</tr>
<tr>
<td>48</td>
<td>.75</td>
<td>1.25</td>
<td>19.188</td>
<td>6</td>
<td>7</td>
<td>15.5</td>
<td>10</td>
<td>4.875</td>
<td>3</td>
<td>1.625</td>
<td>6.5</td>
<td>3</td>
</tr>
</tbody>
</table>

WARNING SIGN COLORS:
LEGEND — BLACK
BACKGROUND—YELLOW (RETROREFLECTIVE)

TTC SIGN COLORS:
LEGEND — BLACK
BACKGROUND—ORANGE (RETROREFLECTIVE)
Alphabet Example
Symbols

• All symbols shall be unmistakably similar to, or mirror images of, the adopted symbol signs

• Symbols and colors shall not be modified unless otherwise provided in the MUTCD

• In the “Standard Highway Signs and Markings” book
Word Messages

• Where a standard word message is applicable, the wording shall be as provided in this Manual.

• Non standard word message signs may be used on the same shape and color as described in the MUTCD
Signs at Night

- Signs shall be retroreflective or illuminated
- Must look the same at night as during the day
  - Same shape
  - Similar color
- The requirements for sign illumination shall not be considered to be satisfied by street or highway lighting.
Shapes

Particular shapes shall be used exclusively for specific signs or series of signs.
Shapes

Particular shapes shall be used exclusively for specific signs or series of signs.
## Table 2A-4. 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>Grade Crossing Advance Warning*</td>
</tr>
<tr>
<td>Pennant Shape/Isosceles Triangle (longer axis horizontal)</td>
<td>No Passing*</td>
</tr>
<tr>
<td>Pentagon (pointed up)</td>
<td>School Advance Warning Sign (squared bottom corners)*</td>
</tr>
<tr>
<td></td>
<td>County Route Sign (tapered bottom corners)*</td>
</tr>
<tr>
<td>Crossbuck (two rectangles in an “X” configuration)</td>
<td>Grade Crossing*</td>
</tr>
<tr>
<td>Diamond</td>
<td>Warning Series</td>
</tr>
<tr>
<td>Rectangle (including square)</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 and Cultural Interest Area Series</td>
</tr>
<tr>
<td></td>
<td>National Forest Route Sign</td>
</tr>
</tbody>
</table>

* This sign shall be exclusively the shape shown.

** Guide series includes general service, specific service, tourist-oriented directional, general information, recreational and cultural interest area, and emergency management signs.
Colors

The colors to be used on standard signs and their specific use on these signs shall be as provided in the applicable Sections of the MUTCD.
Colors

The colors to be used on standard signs and their specific use on these signs shall be as provided in the applicable Sections of the MUTCD.

Regulatory

Warning

Construction
## Table 2A-5. Common Uses of Sign Colors

<table>
<thead>
<tr>
<th>Type of Sign</th>
<th>Legend</th>
<th>Background</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regulatory</td>
<td>X</td>
<td>X X X X</td>
</tr>
<tr>
<td>Prohibitive</td>
<td>X X</td>
<td>X X</td>
</tr>
<tr>
<td>Permissive</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Warning</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Pedestrian</td>
<td>X</td>
<td>X X</td>
</tr>
<tr>
<td>Bicycle</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Guide</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Interstate Route</td>
<td>X</td>
<td>X X</td>
</tr>
<tr>
<td>State Route</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>U.S. Route</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>County Route</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Forest Route</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Street Name</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Destination</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Reference Location</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Information</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Evacuation Route</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Road User Service</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Recreational</td>
<td>X</td>
<td>X X</td>
</tr>
<tr>
<td>Temporary Traffic Control</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Incident Management</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>School</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>ETC-Account Only</td>
<td>X</td>
<td>X****</td>
</tr>
</tbody>
</table>

### Changeable Message Signs

<table>
<thead>
<tr>
<th>Type of Sign</th>
<th>Legend</th>
<th>Background</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regulatory</td>
<td>X***</td>
<td>X</td>
</tr>
<tr>
<td>Warning</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Temporary Traffic Control</td>
<td>X X</td>
<td>X</td>
</tr>
<tr>
<td>Guide</td>
<td>X</td>
<td>X**</td>
</tr>
<tr>
<td>Motorist Services</td>
<td>X</td>
<td>X**</td>
</tr>
<tr>
<td>Incident Management</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>School, Pedestrian, Bicycle</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

---

* Fluorescent versions of these background colors may also be used.

** These alternative background colors would be provided by blue or green lighted pixels such that the entire CMS would be lighted, not just the legend.

*** Red is used only for the circle and slash or other red elements of a similar static regulatory sign.

**** The use of the color purple on signs is restricted per the provisions of Paragraph 1 of Section 2F.03.
Example of Sign Colors

### Table 2A-5. Common Uses of Sign Colors

<table>
<thead>
<tr>
<th>Type of Sign</th>
<th>Legend</th>
<th>Background</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Black</td>
<td>Green</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>-------</td>
<td>--------</td>
</tr>
<tr>
<td>Incident Management</td>
<td></td>
<td></td>
</tr>
<tr>
<td>School, Pedestrian, Bicycle</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

* Fluorescent versions of these background colors may also be used.
** These alternative background colors would be provided by blue or green lighted pixels such that the entire CMS would be lighted, not just the legend.
*** Red is used only for the circle and slash or other red elements of a similar static regulatory sign.
**** The use of the color purple on signs is restricted per the provisions of Paragraph 1 of Section 2F:03.

![Figure 7B-1. School Area Signs](image)

- **School Advance Crossing Assembly**
- **School Crossing Assembly**
- **School Zone Sign**
- **School Speed Limit Assembly**

69
Regulatory

- Used to inform road users of selected traffic laws or regulations

- Rectangular unless specifically designated otherwise in the MUTCD

- Black letters on white background or red letters on white background

- Exceptions
  - Stop Sign
  - Yield sign
Regulatory Signs for City Ordinances

- Non standard Sign
- Complete a Traffic Control Device Permit Form
- Attach
  - Ordinance
  - Shop drawing of sign
  - Map showing proposed location of sign
Warning

• Used to alert road users to conditions that might call for a reduction of speed or an action in the interest of safety and efficient traffic operations.

• The use of warning signs shall be based on an engineering study or on engineering judgment.

• The use of warning signs should be kept to a minimum as the unnecessary use of warning signs tends to breed disrespect for all signs.
Warning

• Diamond shaped unless specifically designated otherwise in the MUTCD

• Black letters on yellow background

• Exception:
  – Construction Warning signs
    • Orange background and black lettering
Warning

• Placed to provide an adequate Perception Reaction Time.

• MUTCD Table 2C-4 show the guidelines for advance warning signs

• Do not place too far in advance of the condition because drivers might forget the warning because of other driving distractions.
## Table 2C-4. Guidelines for Advance Placement of Warning Signs

<table>
<thead>
<tr>
<th>Posted or 85th-Percentile Speed</th>
<th>Advance Placement Distance for Condition A: Speed Reduction and Lane Changing in Heavy Traffic</th>
<th>Condition B: Deceleration to the listed advisory speed (mph) for the condition</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0³</td>
<td>10⁴</td>
</tr>
<tr>
<td>20 mph</td>
<td>225 ft</td>
<td>100 ft</td>
</tr>
<tr>
<td>25 mph</td>
<td>325 ft</td>
<td>100 ft</td>
</tr>
<tr>
<td>30 mph</td>
<td>460 ft</td>
<td>100 ft</td>
</tr>
<tr>
<td>35 mph</td>
<td>565 ft</td>
<td>100 ft</td>
</tr>
<tr>
<td>40 mph</td>
<td>670 ft</td>
<td>125 ft</td>
</tr>
<tr>
<td>45 mph</td>
<td>775 ft</td>
<td>175 ft</td>
</tr>
<tr>
<td>50 mph</td>
<td>885 ft</td>
<td>250 ft</td>
</tr>
<tr>
<td>55 mph</td>
<td>990 ft</td>
<td>325 ft</td>
</tr>
<tr>
<td>60 mph</td>
<td>1,100 ft</td>
<td>400 ft</td>
</tr>
<tr>
<td>65 mph</td>
<td>1,200 ft</td>
<td>475 ft</td>
</tr>
<tr>
<td>70 mph</td>
<td>1,250 ft</td>
<td>550 ft</td>
</tr>
<tr>
<td>75 mph</td>
<td>1,350 ft</td>
<td>650 ft</td>
</tr>
</tbody>
</table>

1. The distances are adjusted for a sign legibility distance of 180 feet for Condition A. The distances for Condition B have been adjusted for a sign legibility distance of 250 feet, which is appropriate for an alignment warning symbol sign. For Conditions A and B, warning signs with less than 6-inch legend or more than four words, a minimum of 100 feet should be added to the advance placement distance to provide adequate legibility of the warning sign.

2. Typical conditions are locations where the road user must use extra time to adjust speed and change lanes in heavy traffic because of a complex driving situation. Typical signs are Merge and Right Lane Ends. The distances are determined by providing the driver a PRT of 14.0 to 14.5 seconds for vehicle maneuvers (2005 AASHTO Policy, Exhibit 3-3, Decision Sight Distance, Avoidance Maneuver E) minus the legibility distance of 180 feet for the appropriate sign.

3. Typical condition is the warning of a potential stop situation. Typical signs are Stop Ahead, Yield Ahead, Signal Ahead, and Intersection Warning signs. The distances are based on the 2005 AASHTO Policy, Exhibit 3-1, Stopping Sight Distance, providing a PRT of 2.5 seconds, a deceleration rate of 11.2 feet/second², minus the sign legibility distance of 180 feet.

4. Typical conditions are locations where the road user must decrease speed to maneuver through the warned condition. Typical signs are Turn, Curve, Reverse Turn, or Reverse Curve. The distance is determined by providing a 2.5 second PRT, a vehicle deceleration rate of 10 feet/second², minus the sign legibility distance of 250 feet.

5. No suggested distances are provided for these speeds, as the placement location is dependent on site conditions and other signing. An alignment warning sign may be placed anywhere from the point of curvature up to 100 feet in advance of the curve. However, the alignment warning sign should be installed in advance of the curve and at least 100 feet from any other signs.

6. The minimum advance placement distance is listed as 100 feet to provide adequate spacing between signs.
Table 2C-4. Guidelines for Advance Placement of Warning Signs

<table>
<thead>
<tr>
<th>Posted or 85th-Percentile Speed</th>
<th>Condition A: Speed reduction and lane changing in heavy traffic</th>
<th>Advance Placement Distance¹</th>
<th>Condition B: Deceleration to the listed advisory speed (mph) for the condition</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0³</td>
<td>10⁴</td>
<td>20⁴</td>
</tr>
<tr>
<td>20 mph</td>
<td>225 ft</td>
<td>100 ft³</td>
<td>N/A⁵</td>
</tr>
<tr>
<td>25 mph</td>
<td>325 ft</td>
<td>100 ft³</td>
<td>N/A⁵</td>
</tr>
<tr>
<td>30 mph</td>
<td>460 ft</td>
<td>100 ft³</td>
<td>N/A⁵</td>
</tr>
<tr>
<td>35 mph</td>
<td>565 ft</td>
<td>100 ft³</td>
<td>N/A⁵</td>
</tr>
<tr>
<td>40 mph</td>
<td>670 ft</td>
<td>125 ft</td>
<td>100 ft³</td>
</tr>
<tr>
<td>45 mph</td>
<td>775 ft</td>
<td>175 ft</td>
<td>125 ft</td>
</tr>
<tr>
<td>50 mph</td>
<td>885 ft</td>
<td>250 ft</td>
<td>200 ft</td>
</tr>
<tr>
<td>55 mph</td>
<td>990 ft</td>
<td>325 ft</td>
<td>275 ft</td>
</tr>
<tr>
<td>60 mph</td>
<td>1,100 ft</td>
<td>400 ft</td>
<td>350 ft</td>
</tr>
<tr>
<td>65 mph</td>
<td>1,200 ft</td>
<td>475 ft</td>
<td>450 ft</td>
</tr>
<tr>
<td>70 mph</td>
<td>1,250 ft</td>
<td>550 ft</td>
<td>525 ft</td>
</tr>
<tr>
<td>75 mph</td>
<td>1,350 ft</td>
<td>650 ft</td>
<td>625 ft</td>
</tr>
</tbody>
</table>

¹ The distances are adjusted for a sign legibility distance of 180 feet for Condition A. The distances for Condition B have been adjusted for a sign legibility distance of 250 feet, which is appropriate for an alignment warning symbol sign. For Conditions A and B, warning signs with less than 6-inch legend or more than four words, a minimum of 100 feet should be added to the advance placement distance to provide adequate legibility of the warning sign.

² Typical conditions are locations where the road user must use extra time to adjust speed and change lanes in heavy traffic because of a complex driving situation. Typical signs are Merge and Right Lane Ends. The distances are determined by providing the driver a PRT of 14.0 to 14.5 seconds for vehicle maneuvers (2005 AASHTO Policy, Exhibit 3-3, Decision Sight Distance, Avoidance Maneuver E) minus the legibility distance of 180 feet for the appropriate sign.

³ Typical condition is the warning of a potential stop situation. Typical signs are Stop Ahead, Yield Ahead, Signal Ahead, and Intersection Warning signs. The distances are based on the 2005 AASHTO Policy, Exhibit 3-1, Stopping Sight Distance, providing a PRT of 2.5 seconds, a deceleration rate of 11.2 feet/second², minus the sign legibility distance of 180 feet.

⁴ Typical conditions are locations where the road user must decrease speed to maneuver through the warned condition. Typical signs are Turn, Curve, Reverse Turn, or Reverse Curve. The distance is determined by providing a 2.5 second PRT, a vehicle deceleration rate of 10 feet/second², minus the sign legibility distance of 250 feet.

⁵ No suggested distances are provided for these speeds, as the placement location is dependent on site conditions and other signing. An alignment warning sign may be placed anywhere from the point of curvature up to 100 feet in advance of the curve. However, the alignment warning sign should be installed in advance of the curve and at least 100 feet from any other signs.

⁶ The minimum advance placement distance is listed as 100 feet to provide adequate spacing between signs.
Table 2C-4. Guidelines for Advance Placement of Warning Signs

<table>
<thead>
<tr>
<th>Posted or 85th-Percentile Speed</th>
<th>Advance Placement Distance&lt;sup&gt;1&lt;/sup&gt;</th>
<th>Condition A: Speed reduction and lane changing in heavy traffic</th>
<th>Condition B: Deceleration to the listed advisory speed (mph) for the condition</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>0&lt;sup&gt;3&lt;/sup&gt;</td>
<td>10&lt;sup&gt;4&lt;/sup&gt;</td>
</tr>
<tr>
<td>20 mph</td>
<td>225 ft</td>
<td>100 ft</td>
<td>N/A&lt;sup&gt;5&lt;/sup&gt;</td>
</tr>
<tr>
<td>25 mph</td>
<td>325 ft</td>
<td>100 ft</td>
<td>N/A&lt;sup&gt;5&lt;/sup&gt;</td>
</tr>
<tr>
<td>30 mph</td>
<td>460 ft</td>
<td>100 ft</td>
<td>N/A&lt;sup&gt;5&lt;/sup&gt;</td>
</tr>
<tr>
<td>35 mph</td>
<td>565 ft</td>
<td>100 ft</td>
<td>N/A&lt;sup&gt;5&lt;/sup&gt;</td>
</tr>
<tr>
<td>40 mph</td>
<td>670 ft</td>
<td>125 ft</td>
<td>100 ft&lt;sup&gt;6&lt;/sup&gt;</td>
</tr>
<tr>
<td>45 mph</td>
<td>775 ft</td>
<td>175 ft</td>
<td>125 ft&lt;sup&gt;6&lt;/sup&gt;</td>
</tr>
<tr>
<td>50 mph</td>
<td>885 ft</td>
<td>250 ft</td>
<td>200 ft</td>
</tr>
<tr>
<td>55 mph</td>
<td>990 ft</td>
<td>325 ft</td>
<td>275 ft</td>
</tr>
<tr>
<td>60 mph</td>
<td>1,100 ft</td>
<td>400 ft</td>
<td>350 ft</td>
</tr>
<tr>
<td>65 mph</td>
<td>1,200 ft</td>
<td>475 ft</td>
<td>450 ft</td>
</tr>
<tr>
<td>70 mph</td>
<td>1,250 ft</td>
<td>550 ft</td>
<td>525 ft</td>
</tr>
<tr>
<td>75 mph</td>
<td>1,350 ft</td>
<td>650 ft</td>
<td>625 ft</td>
</tr>
</tbody>
</table>

<sup>1</sup> The distances are adjusted for a sign legibility distance of 180 feet for Condition A. The distances for Condition B have been adjusted for a sign legibility distance of 250 feet, which is appropriate for an alignment warning symbol sign. For Conditions A and B, warning signs with less than 6-inch legend or more than four words, a minimum of 100 feet should be added to the advance placement distance to provide adequate legibility of the warning sign.

<sup>2</sup> Typical conditions are locations where the road user must use extra time to adjust speed and change lanes in heavy traffic because of a complex driving situation. Typical signs are Merge and Right Lane Ends. The distances are determined by providing the driver a PRT of 14.0 to 14.5 seconds for vehicle maneuvers (2005 AASHTO Policy, Exhibit 3-3, Decision Sight Distance, Avoidance Maneuver E) minus the legibility distance of 180 feet for the appropriate sign.

<sup>3</sup> Typical condition is the warning of a potential stop situation. Typical signs are Stop Ahead, Yield Ahead, Signal Ahead, and Intersection Warning signs. The distances are based on the 2005 AASHTO Policy, Exhibit 3-1, Stopping Sight Distance, providing a PRT of 2.5 seconds, a deceleration rate of 11.2 feet/second<sup>2</sup>, minus the sign legibility distance of 180 feet.

<sup>4</sup> Typical conditions are locations where the road user must decrease speed to maneuver through the warned condition. Typical signs are Turn, Curve, Reverse Turn, or Reverse Curve. The distance is determined by providing a 2.5 second PRT, a vehicle deceleration rate of 10 feet/second<sup>2</sup>, minus the sign legibility distance of 250 feet.

<sup>5</sup> No suggested distances are provided for these speeds, as the placement location is dependent on site conditions and other signing. An alignment warning sign may be placed anywhere from the point of curvature up to 100 feet in advance of the curve. However, the alignment warning sign should be installed in advance of the curve and at least 100 feet from any other signs.

<sup>6</sup> The minimum advance placement distance is listed as 100 feet to provide adequate spacing between signs.
Curve Warning Signs

• Shall be used in advance of horizontal curves:
  – on freeways,
  – on expressways, and
  – on roadways with more than 1,000 AADT
Figure 2C-2. Example of Warning Signs for a Turn

Legend
Direction of travel

Notes:
1. See Table 2C-4 for advance placement distance guidelines
2. See Table 2C-5 for the selection of horizontal alignment signs
3. See Table 2C-6 for spacing of W1-8 signs
4. A 25-mph advisory speed is shown for illustrative purposes only

Table 2C-5. Horizontal Alignment Sign Selection

<table>
<thead>
<tr>
<th>Type of Horizontal Alignment Sign</th>
<th>Difference Between Speed Limit and Advisory Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5 mph</td>
</tr>
<tr>
<td>Turn (W1-1), Curve (W1-2), Reverse Turn (W1-3), Reverse Curve (W1-4), Winding Road (W1-5), and Combination Horizontal Alignment/Intersection (W10-1) (see Section 2C.07 to determine which sign to use)</td>
<td>Recommended</td>
</tr>
<tr>
<td>Advisory Speed Plaque (W13-1P)</td>
<td>Recommended</td>
</tr>
<tr>
<td>Chevrons (W1-6) and/or One Direction Large Arrow (W1-6)</td>
<td>Optional</td>
</tr>
<tr>
<td>Exit Speed (W13-2) and Ramp Speed (W13-3) on exit ramp</td>
<td>Optional</td>
</tr>
</tbody>
</table>

Note: Required means that the sign and/or plaque shall be used, recommended means that the sign and/or plaque should be used, and optional means that the sign and/or plaque may be used.

See Section 2C.06 for roadways with less than 1,000 ADT.
Guide Signs

- Rectangular unless specifically designated otherwise in the MUTCD
- White message and border on a green background.
- Letters and numerals shall be at least 6 inches in height for all upper-case letters, or a combination of 6 inches in height for upper-case letters and 4.5 inches in height for lower-case letters.
Guide Signs

• Limited to no more than three lines of destinations, which include place names, route numbers, street names, and cardinal directions.

• Where two or more signs are included in the same overhead display, the amount of legend should be further minimized.
Too Much Information?
Street Name Signs

- Shall be retroreflective or illuminated
- Background colors shall be green, blue, brown, or white
- Legend and border shall be white unless a white background then the legend and border shall be black.
<table>
<thead>
<tr>
<th>Type of Mounting</th>
<th>Type of Street or Highway</th>
<th>Speed Limit</th>
<th>Recommended Minimum Letter Height</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Initial Upper-Case</td>
</tr>
<tr>
<td>Overhead</td>
<td>All types</td>
<td>All speed limits</td>
<td>12 inches</td>
</tr>
<tr>
<td>Post-mounted</td>
<td>Multi-lane</td>
<td>More than 40 mph</td>
<td>8 inches</td>
</tr>
<tr>
<td>Post-mounted</td>
<td>Multi-lane</td>
<td>40 mph or less</td>
<td>6 inches</td>
</tr>
<tr>
<td>Post-mounted</td>
<td>2-lane</td>
<td>All speed limits</td>
<td>6 inches*</td>
</tr>
</tbody>
</table>

* On local two-lane streets with speed limits of 25 mph or less, 4-inch initial upper-case letters with 3-inch lower-case letters may be used.
# Table 2D-2. Recommended Minimum Letter Heights on Street Name Signs

<table>
<thead>
<tr>
<th>Type of Mounting</th>
<th>Type of Street or Highway</th>
<th>Speed Limit</th>
<th>Recommended Minimum Letter Height</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Initial Upper-Case</td>
</tr>
<tr>
<td>Overhead</td>
<td>All types</td>
<td>All speed limits</td>
<td>12 inches</td>
</tr>
<tr>
<td>Post-mounted</td>
<td>Multi-lane</td>
<td>More than 40 mph</td>
<td>8 inches</td>
</tr>
<tr>
<td>Post-mounted</td>
<td>Multi-lane</td>
<td>40 mph or less</td>
<td>6 inches</td>
</tr>
<tr>
<td>Post-mounted</td>
<td>2-lane</td>
<td>All speed limits</td>
<td>6 inches*</td>
</tr>
</tbody>
</table>

* On local two-lane streets with speed limits of 25 mph or less, 4-inch initial upper-case letters with 3-inch lower-case letters may be used.
Supplemental Guide Signs MUTCD

- No more than one on each interchange approach.
- Should not list more than two destinations.
- Should be installed as an independent guide sign assembly
- States and other agencies should adopt an appropriate policy for installing supplemental signs
  - Such items as population, amount of traffic generated, distance from the route, and the significance of the destination should be taken into account.
DOTD Policy

• EDSM VI.2.1.3 Supplemental Guide Signs on Interstate Highways

• EDSM VI.2.1.4 Supplemental Guide Signs on Non Interstate State Maintained Highways
Supplemental Guide
Signs on the Interstate

• No more than 2 destinations

• Charts that give examples of what qualifies and what doesn’t qualify
### Guideline Criteria for Signing Traffic Generators Accessible from Interstates in Louisiana

<table>
<thead>
<tr>
<th>Type of Generator</th>
<th>Specific Criteria</th>
<th>Above 400,000</th>
<th>50,000 – 400,000</th>
<th>Below 50,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Airports</td>
<td>Number of regularly scheduled movements (one-way) per day (commercial)</td>
<td>35</td>
<td>25</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Mileage from interchange</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Colleges*</td>
<td>Total enrollment full-time &amp; part time</td>
<td>2,000</td>
<td>1,000</td>
<td>1,000</td>
</tr>
<tr>
<td>Universities*</td>
<td>Mileage from interchange</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Military Bases*</td>
<td>Employees or permanently assigned personnel</td>
<td>5,000</td>
<td>5,000</td>
<td>5,000</td>
</tr>
<tr>
<td></td>
<td>Mileage from interchange</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Arenas</td>
<td>Seating capacity</td>
<td>6,000</td>
<td>5,000</td>
<td>4,000</td>
</tr>
<tr>
<td>Auditoriums</td>
<td>Annual attendance</td>
<td>300,000</td>
<td>250,000</td>
<td>200,000</td>
</tr>
<tr>
<td>Convention Halls</td>
<td><strong>Mileage from interchange</strong></td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Dams</td>
<td>Regional Medical Centers</td>
<td>600</td>
<td>500</td>
<td>400</td>
</tr>
<tr>
<td>Fairs &amp; Race Tracks</td>
<td>Type of care</td>
<td>Hospital has 24-hour emergency physician coverage and regularly offering cardiology and trauma-related surgical specialties (i.e. general surgery, neurosurgery, and orthopedics)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fairgrounds</td>
<td>State Parks</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Recreation Areas</td>
<td>State Parks</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Stadiums</td>
<td>Toll Highways and Bridges</td>
<td>Direct access from exit and part of the state highway system.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>State Parks</td>
<td>Business District</td>
<td>Direct access and not more than 5 miles from the interchange.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>State Police</td>
<td>Shopping Centers</td>
<td>See RS 48:244.3 and LAC 70:401</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stations (Troop QHS)</td>
<td>Audubon Trail Golf Courses</td>
<td>See Act 951 of the 2001 Regular Session of the Louisiana Legislature</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Distance may be increased one mile for each 10% over the minimum students or employees listed up to a maximum of 25 miles.

** Distance may be increased one mile for each 20,000 people over the minimum attendance shown up to a maximum of 25 miles.
### Guideline Criteria for Signing Traffic Generators Accessible from Interstates in Louisiana

<table>
<thead>
<tr>
<th>Type of Generator</th>
<th>Specific Criteria</th>
<th>Major Metropolitan Area</th>
<th>Urban Areas</th>
<th>Rural Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Airports</strong></td>
<td>Number of regularly scheduled movements (one-way) per day (commercial)</td>
<td>35</td>
<td>25</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Mileage from interchange</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td><em><em>Colleges</em> / Universities</em></td>
<td>Total enrollment full-time &amp; part-time</td>
<td>2,000</td>
<td>1,000</td>
<td>1,000</td>
</tr>
<tr>
<td></td>
<td>Mileage from interchange</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td><strong>Military Bases</strong>*</td>
<td>Employees or permanently assigned personnel</td>
<td>5,000</td>
<td>5,000</td>
<td>5,000</td>
</tr>
<tr>
<td></td>
<td>Mileage from interchange</td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>** Arenas / Auditoriums / Convention Halls / Dams / Fairgrounds / Race Tracks / Lakes / National Historical Sites / Monuments / National Parks / Recreation Areas / Stadiums / State Parks**</td>
<td>Seating capacity</td>
<td>6,000</td>
<td>5,000</td>
<td>4,000</td>
</tr>
<tr>
<td></td>
<td>Annual attendance</td>
<td>300,000</td>
<td>250,000</td>
<td>200,000</td>
</tr>
<tr>
<td><strong>Regional Medical Centers</strong></td>
<td><strong>Mileage from interchange</strong></td>
<td>5</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Total no. of beds</td>
<td>600</td>
<td>500</td>
<td>400</td>
</tr>
<tr>
<td></td>
<td>Mileage from interchange</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Type of care</td>
<td>Hospital has 24 hour emergency physician coverage and regularly offering cardiology and trauma-related surgical specialties (e.g., general surgery, neurosurgery, and orthopedics)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>State Police Stations (Troop HQs)</strong></td>
<td>Mileage from interchange</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td><strong>Toll Highways and Bridges</strong></td>
<td>Direct access from exit and part of the state highway system.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Business District</strong></td>
<td>Direct access and not more than 5 miles from the interchange.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Shopping Centers</strong></td>
<td>See RS 48.244.3 and LAC 70-401</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Audubon Trail Golf Courses</strong></td>
<td>See Act 951 of the 2001 Regular Session of the Louisiana Legislature</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Distance may be increased one mile for each 10% over the minimum students or employees listed up to a maximum of 25 miles.

** Distance may be increased one mile for each 20,000 people over the minimum attendance shown up to a maximum of 25 miles.
Non Interstate Supplemental Guide Signs

- No more than 3 traffic generators per intersection
- Not signed for if there is a need for trail blazers
- Charts that give examples of what qualifies and what doesn’t qualify
<table>
<thead>
<tr>
<th>CLASSIFICATION</th>
<th>CRITERIA</th>
<th>EXAMPLES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transportation Facilities</td>
<td>Commercial Aviation Airports must provide at least two scheduled movements (one-way) per day. General Aviation Airports: Facility must accommodate freight, charter and private aircraft, have a minimum of five year-round based aircraft and have a fixed based operator. Railroad Stations: Must provide regular scheduled passenger service. Bus Station: Must provide regular scheduled passenger service.</td>
<td></td>
</tr>
<tr>
<td>Educational Institutions</td>
<td>1. Post high-school institutions having a minimum of 1,000 full-time or part-time students.</td>
<td>Colleges: 4 year Junior Community Universities Seminaries Trade Schools</td>
</tr>
<tr>
<td></td>
<td>2. State schools for special education.</td>
<td>School for Deaf School for Blind</td>
</tr>
<tr>
<td></td>
<td>3. Middle and High Schools with athletic facilities.</td>
<td>Private Middle Senior High</td>
</tr>
<tr>
<td>Correctional Institutions</td>
<td>Federal or State operated.</td>
<td>Correctional Centers, Youth Camps, Prisons</td>
</tr>
<tr>
<td>Health Care Facilities</td>
<td>Any hospital or mental health care facility licensed by the State.</td>
<td>Mental Health Facilities: Mental Health Centers Development Centers State Hospitals State Schools Hospitals: General Veterans</td>
</tr>
<tr>
<td>Historical, Recreational, or Cultural Facilities</td>
<td>1. The facilities must be open to the general public have a minimum annual attendance of 50,000 with no charge when privately owned.</td>
<td>Historical Sites/ Areas: Home/ Buildings Indian Sites Monuments</td>
</tr>
<tr>
<td></td>
<td>2. Outdoor recreational facilities provided by youth organizations.</td>
<td>Camps Boy/Girl Scout Church 4-H YMCA/YWCA</td>
</tr>
<tr>
<td>CLASSIFICATION</td>
<td>CRITERIA</td>
<td>EXAMPLES</td>
</tr>
<tr>
<td>--------------------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Historical, Recreational, or Cultural Facilities</td>
<td>3. Special local historical attractions open continuously, with no charge to the public, or any State historical site listed on the official State map.</td>
<td>National Cemeteries State Historical Site National Historical Sites</td>
</tr>
<tr>
<td></td>
<td>4. The facilities must be open to the public and have a minimum annual attendance of 50,000.</td>
<td>Cultural Attractions: Aquariums, Museums, Zoos, Planetariums and Arboretums</td>
</tr>
<tr>
<td></td>
<td>5. Indoor facilities with a seating capacity of 5,000.</td>
<td>Arenas, Auditoriums, Convention Halls, Civic Centers</td>
</tr>
<tr>
<td></td>
<td>7. The facilities must have an annual attendance of 200,000.</td>
<td>Fairgrounds, Racetracks and Stadiums.</td>
</tr>
<tr>
<td>Miscellaneous Governmental Facilities</td>
<td>Any building complex owned &amp; operated or specifically for a local State or Federal governmental agency that has 10 employees or assigned personnel.</td>
<td>Ammunition Plants, Military Bases, Research Facilities: State-Federal, Highway Department Facilities, Court Houses, State Police Offices, City Police Station, Sheriff's Offices.</td>
</tr>
<tr>
<td>Business Districts</td>
<td>The marked route within city limits and not closer than three blocks to the C.B.D. of a community with less 10,000 population.</td>
<td></td>
</tr>
<tr>
<td>Parking Facilities</td>
<td>The facilities must be open to the public, be 4 blocks of the marked route and have a minimum of 400 parking spaces.</td>
<td>Public off-street parking facilities Private off-street parking facilities open to the public &amp; not operated to serve any specific business.</td>
</tr>
</tbody>
</table>
Gateway Signs

- Community Welcome Sign
- Standard and Non Standard
- Policy in LADOTD Traffic Engineering Manual

Non Standard

Standard
Standard Gateway Sign

- Installed and maintained by DOTD forces
- Make sign request to DTOE
- Placed at:
  - State Line
  - Parish Line
  - Corporate Limits of an incorporated community
Non Standard Gateway Sign

- Installed and maintained by local government

- Complete a Traffic Control Device Permit signed by a government official and attach
  - Proposed location
  - Shop Drawing

- Shall be retroreflective or illuminated

- No commercial advertising or sponsorship
Non Standard

• Should be placed beyond the clearzone

• If in the clearzone then shall be breakaway

• Minimum letter heights
  – Interstate   13 inches
  – Multi lane   10 inches
  – Other        6 inches
Gateway Signs
Summary

No Conflicting Messages

No Confusing Information
Summary

Only use standard symbols

Limit the information
Use standard font & font sizes
Summary

Message needs to make sense

Follow Policy
Questions?

Contact

Jody Colvin
225-242-4635
Installation & Maintenance of Signs

Jared Chaumont, P.E.
District 05 Assistant Traffic Operations Engineer
Uniform Vehicle Code Section 15-116

“No person shall install or maintain in any area of private property used by the public any sign, signal, marking, or other device intended to regulate, warn, or guide traffic ...”
Figure 2A-2. Examples of Heights and Lateral Locations of Sign Installations

A - ROADSIDE SIGN IN RURAL AREA

B - ROADSIDE SIGN IN RURAL AREA

C - ROADSIDE SIGN IN BUSINESS, COMMERCIAL, OR RESIDENTIAL AREA

D - WARNING SIGN WITH ADVISORY SPEED PLAQUE IN RURAL AREA

*Where parking or pedestrian movements are likely to occur
Figure 2A-3. Examples of Locations for Some Typical Signs at Intersections

A - ACUTE ANGLE INTERSECTION

B - CHANNELIZED INTERSECTION

C - MINOR CROSSROAD

D - URBAN INTERSECTION
Figure 2A-4. Relative Locations of Regulatory, Warning, and Guide Signs on an Intersection Approach

A – Single-lane approach

B – Multi-lane approach

Note: See Chapter 2D for information on guide signs and Part 3 for information on pavement markings

* See Table 2C-4 for the recommended minimum distance
** See Section 2C.46 for the application of the W2-1 sign and Section 2C.36 for the application of the W3-1 sign
*** See Section 2B.22 for the application of Intersection Lane Control signs
<table>
<thead>
<tr>
<th>Posted or 85th-Percentile Speed</th>
<th>Condition A: Speed reduction and lane changing in heavy traffic&lt;sup&gt;2&lt;/sup&gt;</th>
<th>Advance Placement Distance&lt;sup&gt;1&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Condition B: Deceleration to the listed advisory speed (mph) for the condition</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0&lt;sup&gt;3&lt;/sup&gt;</td>
<td>10&lt;sup&gt;4&lt;/sup&gt;</td>
</tr>
<tr>
<td>20 mph</td>
<td>225 ft</td>
<td>100 ft&lt;sup&gt;6&lt;/sup&gt;</td>
</tr>
<tr>
<td>25 mph</td>
<td>325 ft</td>
<td>100 ft&lt;sup&gt;6&lt;/sup&gt;</td>
</tr>
<tr>
<td>30 mph</td>
<td>460 ft</td>
<td>100 ft&lt;sup&gt;6&lt;/sup&gt;</td>
</tr>
<tr>
<td>35 mph</td>
<td>565 ft</td>
<td>100 ft&lt;sup&gt;6&lt;/sup&gt;</td>
</tr>
<tr>
<td>40 mph</td>
<td>670 ft</td>
<td>125 ft</td>
</tr>
<tr>
<td>45 mph</td>
<td>775 ft</td>
<td>175 ft</td>
</tr>
<tr>
<td>50 mph</td>
<td>885 ft</td>
<td>250 ft</td>
</tr>
<tr>
<td><strong>55 mph</strong></td>
<td><strong>990 ft</strong></td>
<td><strong>325 ft</strong></td>
</tr>
<tr>
<td>60 mph</td>
<td>1,100 ft</td>
<td>400 ft</td>
</tr>
<tr>
<td>65 mph</td>
<td>1,200 ft</td>
<td>475 ft</td>
</tr>
<tr>
<td>70 mph</td>
<td>1,250 ft</td>
<td>550 ft</td>
</tr>
<tr>
<td>75 mph</td>
<td>1,350 ft</td>
<td>650 ft</td>
</tr>
</tbody>
</table>
Standard:

Regulatory, warning, and guide signs and object markers shall be retroreflective ... to show the same shape and similar color by both day and night...
### Table 2A-3. Minimum Maintained Retroreflectivity Levels

<table>
<thead>
<tr>
<th>Sign Color</th>
<th>Sheeting Type (ASTM D4956-04)</th>
<th>Additional Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Beaded Sheeting</td>
<td>Prismatic Sheeting</td>
</tr>
<tr>
<td></td>
<td>I</td>
<td>II</td>
</tr>
<tr>
<td>White on Green</td>
<td>$W^*; G \geq 7$</td>
<td>$W^*; G \geq 15$</td>
</tr>
<tr>
<td></td>
<td>$W^*; G \geq 7$</td>
<td>$W \geq 120; G \geq 15$</td>
</tr>
<tr>
<td>Black on Yellow or</td>
<td>$Y^<em>; O^</em>$</td>
<td>$Y \geq 50; O \geq 50$</td>
</tr>
<tr>
<td>Black on Orange</td>
<td>$Y^<em>; O^</em>$</td>
<td>$Y \geq 75; O \geq 75$</td>
</tr>
<tr>
<td>White on Red</td>
<td>$W \geq 35; R \geq 7$</td>
<td></td>
</tr>
<tr>
<td>Black on White</td>
<td>$W \geq 50$</td>
<td></td>
</tr>
</tbody>
</table>

1. The minimum maintained retroreflectivity levels shown in this table are in units of cd/lx/m² measured at an observation angle of 0.2° and an entrance angle of -4.0°.
2. For text and fine symbol signs measuring at least 48 inches and for all sizes of bold symbol signs.
3. For text and fine symbol signs measuring less than 48 inches.
4. Minimum sign contrast ratio $\geq 3:1$ (white retroreflectivity $\div$ red retroreflectivity).

* This sheeting type shall not be used for this color for this application.

To Identify Sheeting Types see, [http://www.trafficsign.us/signsheet.html](http://www.trafficsign.us/signsheet.html)
Standard:

Public agencies or officials having jurisdiction shall use an assessment or management method that is designed to maintain sign retroreflectivity at or above the minimum levels in Table 2A-3.
Except for those signs specifically identified in Paragraph 6, one or more of the following assessment or management methods should be used to maintain sign retroreflectivity:
A. Parking, Standing, or Stopping Signs (R7 and R8 series)

B. Walking/Hitchhiking/Crossing signs (R9 and R10-1 through R10-4b series)

C. Acknowledgement signs

D. All signs with blue or brown backgrounds

E. Bikeway signs that are intended for exclusive use by bicyclists or pedestrians
Reflectivity Assessment or Management Methods

A. Visual Nighttime Inspection
B. Measured Sign Reflectivity
C. Expected Sign Life
D. Blanket Replacement
E. Control Signs
F. Other Methods
Visual Nighttime Inspection

• The retroreflectivity of an existing sign is assessed by a trained sign inspector conducting a visual inspection from a moving vehicle during nighttime conditions.

• Signs identified below minimum retroreflectivity levels should be replaced.
Measured Sign Retroreflectivity

• Sign retroreflectivity is measured using a retroreflectometer.

• Signs with retroreflectivity below the minimum levels should be replaced.
Expected Sign Life

• When signs are installed, the installation date is labeled or recorded so that the age of the sign is known.

• The age of the sign is compared to the expected sign life.

• The expected sign life is based on the experience of sign retroreflectivity degradation in a geographic area compared to the minimum levels.
Blanket Replacement

• All signs in an area/corridor, or of a given type, should be replaced at specified intervals.

• This eliminates the need to assess retroreflectivity or track the life of individual signs.

• The replacement interval is based on the expected sign life, compared to the minimum levels, for the shortest-life material used on affected signs.
Control Signs

• Replacement of signs in the field is based on the performance of a sample of control signs.

• The control signs are monitored to determine the end of retroreflectivity life for the associated signs.

• All field signs should be replaced before the retroreflectivity levels of the control sample reach the minimum levels.
Other Methods

Other methods developed based on engineering studies can be used.
Contact LTAP for more information on technical assistance to help your agency prepare to comply with the new regulations, portions of which begin to take effect in 2012.
Traffic Engineering 101

Thank You!

See you on July 26th at 2:00PM for Access Management