MUTCD - Roadway Traffic Control

An Online Continuing Education Course for Engineers

Course Number: T-5014

Credit: 5 Hours / 5 PDH / 5 CPD

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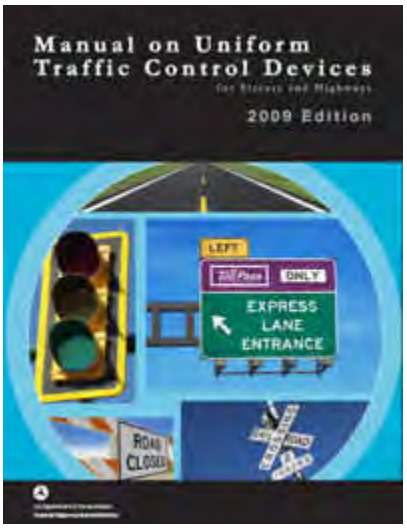
INTRODUCTION

This course discusses how to use the *Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD)* to establish roadway traffic control. The contents of this course are intended to serve as guidance and not as an absolute standard or rule. It is intended to help you to use the MUTCD more effectively and not replace it. Should there be any conflicts between the contents of this course and the MUTCD, always follow the MUTCD.

Upon course completion, you should be familiar with the general MUTCD guidelines for traffic control devices. The overall course objective is to give engineers and designers an in-depth look at the principles to be considered when selecting and designing for traffic control.

For this course, the *Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD) 2009 Edition* will serve as the text for the fundamental design principles of traffic signs and pavement markings. This document is recognized as the **national standard** for all traffic control devices installed on any street, highway, bikeway, or private road open to public travel. Any traffic control device design or application contained within the MUTCD is considered to be in the public domain and available for use.



http://mutcd.fhwa.dot.gov/pdfs/2009/mutcd2009edition.pdf

Traffic signs and pavement markings are the primary communication devices used to convey laws and regulations, traffic and roadway conditions, and guidance and other information. These critical tools can provide important information to help users to travel safely on any U.S. roadway system.

However, traffic control devices cannot solve all traffic problems. Drivers process different types of visual and non-visual information differently: speed, roadway conditions, traffic, legal enforcement, noise levels, etc. Also, signs and markings serve as reminders of important information, so road users do not have to memorize everything.

The goal is to provide drivers with relevant information when they need it - resulting in safer, more efficient roadways with reduced liability risks. On the other hand, poor sign management and maintenance can greatly reduce safety, contribute to roadway incidents, and increase liability exposure.

The *Standard Highway Signs and Markings* book contains detailed specifications for all adopted standard signs and pavement markings. All traffic control devices shall be similar to or mirror images of those shown in this manual. Any symbols or colors cannot be modified unless otherwise stated.

http://mutcd.fhwa.dot.gov/SHSe/shs_2004_2012_sup.pdf

MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD)

By law (23 CFR 655, Subpart F), the *Manual on Uniform Traffic Control Devices* (MUTCD) is recognized as "the national standard for all traffic control devices installed on any street, highway, bikeway, or private road open to public travel". It is the definitive authority for traffic signs and pavement markings.

The MUTCD is published by the Federal Highway Administration (FHWA) to promote safety and efficiency on our public roads by establishing uniform standards for traffic control devices. It defines the nationwide standards for the installation and maintenance of the devices on all streets and highways. The MUTCD allows us to drive anywhere in the U.S. using the same basic signs. Drivers who see a particular sign should expect it to mean the same thing and be prepared to take the same action regardless of location.

The MUTCD has nine chapters ("Parts"):

General Information
Signs
Low-Volume Roads
Highway-Rail Grade Crossings
Markings
Highway Traffic Signals
Temporary Traffic Control
School Areas
Bicycle Facilities

SHALL, SHOULD, and MAY

The terms "shall," "should," and "may" have specific meanings when used in the MUTCD. These words are defined as follows:

SHALL – Required, mandatory or specifically prohibitive practice. Statements with "shall" conditions are typically used as a STANDARD in the MUTCD. These items cannot be modified or compromised. There is no allowance for discretion and they must be followed.

SHOULD – Advisory or recommended practice in typical situations. Deviation is appropriate if justified by engineering judgment or study. Statements marked as "should" are used for GUIDANCE in the MUTCD.

MAY – Permissive or optional practice without requirement or recommendation.

Items marked as “may” are typically used in OPTION statements in the MUTCD and can contain allowable modifications.

SUPPORT statements do not contain the verbs “shall”, “should”, or “may”. These statements are for informational purposes only (without any mandate, recommendation, or enforcement).

BASIC REQUIREMENTS OF TRAFFIC CONTROL DEVICES

In order to be effective, any traffic control device has to be used correctly. The MUTCD lists the following principles to be used when selecting and applying each device:

- **Fulfill a need**

A sign should only be installed if there is a *need* for warning, regulation or guidance information. If a need exists and the sign in question does not meet that need, use something else. Overusing signs can lead to disrespect and loss of emphasis value while underuse can result in persistent but correctable safety problems.

- **Command attention**

Standard signs are designed to be noticed and attract attention. The high-contrast color combinations were chosen due to their ability to stand out and be easily read. Oversized signs, doubled signs, or flashing beacons may also emphasize the sign’s message.

- **Command respect**

Warning and regulatory signs that seem unneeded or unreasonable are regularly disobeyed. Good sign management and maintenance is crucial to commanding respect for traffic control devices. Nonstandard or damaged signs are more likely to be disregarded.

- **Have one simple message**

A sign’s message needs to be clear and readable. By using standard signs in the MUTCD that have been researched and evaluated by the FHWA, most drivers should understand their meanings.

- **Provide adequate time for proper response**

Traffic control devices should meet or exceed MUTCD standards so drivers have adequate time (Perception-Response Time – PRT) and distance to take appropriate actions before reaching a situation. Otherwise, insufficient response time may result in roadway crashes.

Traffic speed is crucial for determining driver response time. High speeds require longer response time and more reaction distance. This increased distance can be obtained by using larger signs, or by placing signs in advance of the location where the information is needed.

Using the five basic requirements will help make traffic control devices more effective. Design, placement, operation, maintenance, and uniformity should be considered to maximize the ability of a device to meet these principles. However, by disregarding the five requirements, road users may tend to disregard your traffic control devices.

The MUTCD defines a road user as "a vehicle operator, bicyclist, or pedestrian, including persons with disabilities, within the highway or on a private road open to public travel". This group includes drivers of different skill levels and ages, pedestrians, wheelchairs, runners, rollerbladers, bicyclists, truck drivers, and motorcyclists. The ability to empathize with the road user is important skill for engineers in order to meet the needs of everyone using the road. By meeting their needs, you can minimize any problems that the average road user may encounter.

The Americans with Disabilities Act (ADA) of 1990
The regulations of the Americans with Disabilities Act are designed to prevent any discrimination against disabled individuals, including road users. This act requires access needs of the disabled be accommodated through the use of specialized signs, pavement markings, sign placements, etc.

SIGNS

Readability and Retroreflectivity
Drivers must be able to read a sign from a reasonable distance and have adequate response time to safely travel the roadway. Improving nighttime visibility of signs and pavement markings becomes more important as we get older. As we age, our eyes gradually become less sensitive to light. As the national population gets older, the average driver gets older, and people continue driving at older ages.

Retroreflectivity is the ability of a traffic control device to reflect light from its surface to its original source. Retroflective traffic signs are used to increase nighttime visibility. Maintaining retroreflectivity is crucial to traffic safety since fatal night crashes occur approximately three (3) times as often as daytime traffic fatalities.

To work properly, retroreflectivity needs the following elements: **Light source** (vehicle headlights); **Target** (traffic control device); and **Receptor** (driver's eyes). Technologies involving glass beads or prismatic reflectors are more visible and bright because they reflect more light directly back at the original source.

All signs (regulatory, warning, and guide) and object markers need to be retroreflective or illuminated to display the same shape and color regardless of time and day. New materials or methods can be used as long as the traffic control devices meet the standard color requirements.

Sign design should be uniform without any increase in: **visibility, legibility,** or **driver comprehension during day or night conditions.**

Sign Type and Designation

Over the years, traffic signs have been responsible for providing messages of increasing complexity. To accomplish this goal, the MUTCD specifies standard design features to encourage adequate perception-reaction time for the road user. These features (size, shape, and color) are specific to the functional category of each traffic sign.

Sign Categories and Use	
Category	**Use**
Regulatory	its actions by the road user
Warning	litions that may require an zardous situation
Guide & Informatic	way, informs user of .
Recreational & Cult	tion and cultural
Non-Traffic Control	y use, or contains d to highway use or

Sign Color and Shap

A sign's color and sha ion. These specific combinations are used l shapes are meant to command attention and one color for the legend (typically black Some signs (such as prohibition signs) have lash over a black symbol. The Federal Highway A ablished the following color code of appropriate colors for tra ol devices.