The MUTCD: Where It’s Been and Where It’s Going

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Manual on Uniform Traffic Control Devices

Known as the MUTCD
Contains basic principles for traffic control devices
Essential traffic engineering tool
Extensive information
Long history
Multiple versions - many editions
The MUTCD: Where It’s Been

There have been 10 editions of the MUTCD


Summary of MUTCD Evolution

<table>
<thead>
<tr>
<th>Edition</th>
<th>MUTCD Era</th>
<th>Pages</th>
<th>Parts</th>
<th>Size (inches)</th>
<th>Thickness (inches)</th>
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* FHWA assumed MUTCD ownership
Traffic Control Devices History

Early markers were used in the Roman Empire
Also used on pioneer trails in America
Automobile age created new demands

Roman Empire  Colonial America  Early 20th Century

Automobile Age
Early Intersection Control

Hand signals, police, and semaphores

Traffic Signal Towers
Early Traffic Signals

Many different signal designs

More Early Signals
Early Traffic Signs

Need for devices increased with more automobile travel. Little coordination between agencies.

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Early Traffic Control Devices

The wide variety of devices created the need for uniformity.

1911 - 1st centerline Michigan

1914 - 1st electric signal Cleveland

1920 - 1st 3-color signal Detroit

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1923 Sign Shape Recommendations

Mississippi Valley Assoc of St Hwy Dept
Number of sides represents hazard level

- RR Grade Crossing
- Stop Intersection
- Warning (speed reduction)

1924 Sign Color Recommendations

National Conference on Street and Highway Safety
For signs and signals

- Red - stop
- Green - proceed
- Yellow - caution
- White - directions or distance
- Purple - intersection
1925 Joint Board Report

Report of Joint Board on Interstate Highways
AASHO led
Developed U.S. Highway system
Included recommendations for standard signs

1927 AASHO Manual

Evolved from Joint Board
First national manual
Rural signs only
Title:
Manual and Specifications for the Manufacture, Display, and Erection of U.S. Standard Road Markers and Signs
Revised 1929 and 1931
1927 Signs

Block letter font

1930 NCHS Manual

Prepared by American Engineering Council

Title:

Manual on Street Traffic
Signs, Signal and Markings

Not Revised
1930 Signs

Birth of the MUTCD

Problems of two manuals led to creation of the MUTCD

Joint Committee

1927 Rural Manual

1930 Urban Manual

1935 MUTCD
1935 MUTCD

First MUTCD
- 1935 mimeograph
- 1937 typeset

Signs
- White or yellow
- Diamond, square, circle, octagon

Markings
- White, yellow, or black

Signals
- 3-color signal as standard

1937 Typeset Revised 1939

1935 Signs

THRU TRAFFIC
STOP
ONE WAY
LEXINGTON 10
HUNTINGTON 148
RAIL CROSSING
3 TRACKS
CROSSING ROAD
1942 MUTCD

Few major changes
Addressed wartime conditions
Conservation of materials
Blackout traffic control

Not Revised

Blackout Devices
1948 MUTCD

Significant rewrite
Signs
- Simplified messages
- Eliminated square signs
- Added advisory plate
- Rounded alphabet

Pavement markings
- Yellow - Double center & barrier line
- White - all other applications
- Edge lines not recommended

Simplified signal warrants

1948 Signs

- STOP AHEAD
- 35 M.P.H.
- SPEED LIMIT 50
- BRYAN 8
- HEARNE 25
- KEEP RIGHT

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Early Stop & Yield Signs

1954 Revision

Significant sign changes

THRU STOP HWY Became STOP
Secondary messages eliminated

YIELD RIGHT OF WAY New Sign
Traffic Signal Legacies

Non-standard traffic signals continued in use through the 1950s and 1960s in some locations

Darley 2 bulb signal
Wiley signal
NYC Olives

1958 AASHO Interstate Manual

Created for the new Interstate Highway system

New features
- White on green guide signs
- Lower case letters
- Green on white service signs
- Utilized larger sign sizes
- Blue service signs added in 1961 revision

New Interstate Signs

Federal compliance required
New material:
- Construction traffic control
- Civil defense signing
- Freeway guide signing

1961 MUTCD

Not Revised
1961 Signs

Significant rewrite
DOT ownership
New features:
  Content: school areas
  Color: orange
  Shapes: pennant, pentagon
International sign influence
  Many new symbols
  Yellow markings for opposing traffic

1971 MUTCD

Revised 8 times
1971 Signs

1978 MUTCD

Update of 1971 edition
Loose leaf (binder) format
Individual page revisions
New content
RR-hwy grade crossings
Bicycle facilities
Yellow markings on left side

Revised 4 times
1978 Signs

- Center lane
- Buses and 4 rider car pools only (6AM-9AM Mon-Fri)
- Bike route

1988 MUTCD

Update of 1978 edition
Included new revision (#5)
New content
Recreational/cultural signs
Logo signs
TODS
Planned to be revised only for safety reasons

Rev 3: Part VI
**MUTCD During the 1990s**

Blue ribbon panel (1989)
- Recommended reformat and rewrite of 1988 MUTCD
Need to clarify intent (shall, should, may)

Recognition of language challenges
- “shall be permitted”
- “shall preferably be”
- “normally should”
- “may be required”
- “may be justified”
- “it is desirable that”
- “it is necessary that”
- “is intended for use”

Reformat/rewrite process started in early 1990s
Resulted in 2000 MUTCD

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**MUTCD Rewrite Effort**

First step
- Evaluate current language
- Reformat all content
  - Classify as standard, guidance, option, support (with headings)

Second step
- Rewrite reformatted language
- Update content
- Fix inconsistencies

Multiple proposed rules in mid- to late-1990s
Resulted in 2000 MUTCD
Modern MUTCDs

2000 MUTCD
- Dramatically different from 1988 MUTCD
- Revised once (audible ped signals)
- Many errors and inconsistencies
- Errata did not address all the problems

2003 MUTCD
- Primarily a fix of the 2000 MUTCD
- Some new changes
- Revised twice
  - Pharmacy signing, minimum sign retroreflectivity

2009 MUTCD
- New edition with significant changes
- Much new material

2000 MUTCD
- Millennium edition
- Reformatted/rewritten
- Significantly different from 1988 MUTCD
- First with 8½ × 11 pages
- First to be on the internet
- Editorial and technical shortcomings

1 Errata
1 Revision

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Significant Changes

New structure
  Standard, Guidance, Option, Support
New parts added to MUTCD
  Low Volume Roads
  Highway-Light Rail Transit Grade Crossings
Islands part deleted
Definitions added
Primary units: metric

2000: Selected Key Changes

Legibility index = 40 ft/in
Sign graphics not accurate
Lane ending symbol (W4-2) dropped
Crosswalk lines dropped from crossing signs
New Yield Line
In-road lights
2003 MUTCD

Primarily an update of the 2000 MUTCD

Changes
- Editorial improvements
- Graphics corrected
- Minor technical corrections
- Some new material

Compressed text
- 982 to 754 pages

2 Revisions

2003: Selected Key Changes

- Some new/revised signs
- New sign color
  - Pink for incident mgmt
- Countdown ped signals
- Metric sign changes
- Accessibility in work zones

Revisions:
1: Pharmacy signing
2: Min sign retro
2009 MUTCD

Current edition (10th overall)
Final rule: Dec 16, 2009
ATSSA convention workshop
   MUTCD: An Update
       Wed & Thu at 10:00 am
NPA received more comments than any other
   15,000+ comments
Many significant changes

2009: Philosophical Changes

FWHA focus for 2009 MUTCD
   Uniformity
   Complete street concept: all road users
   Aging population
   Innovation
More specific detail, reduced ability to deviate
   Fine tuning of TCD use
   More devices addressed
Compliance dates restructured
   Compliance as part of systematic upgrade
MUTCD applies to private property
Combine RR and LRT parts
New content
   Toll road & managed lanes traffic control
       Purple for toll roads
   Changeable message signs
2009: Selected Key Changes

Paragraphs numbered, guidance italicized, metric values removed

Change in definition for a standard
  Added: “Standard statements shall not be modified or compromised based on engineering judgment or engineering study”

Legibility index = 30 ft/in
Revised optional lane guide signing
  Individual arrows
High-visibility safety apparel
  Required for all workers within the public right-of-way
School warning signs: FYG only
Cannot use Speed Limit sign alone to end school speed limit zone
Yield or Stop signs required at passive grade crossings

2009: Signal Changes

12 inch indications for all new installations
Limited use of 8 inch indications
Signal head for each lane when speed ≥ 45
Backplates required
Flashing yellow arrow for left turns
Hybrid beacon (HAWK) for ped crossing
Where the MUTCD May Be Going

MUTCD Trends

- Used by more and more people
- Less variation between states
- Greater consideration of local level perspective
- Size and content growing
  - More devices addressed
  - Greater specificity for devices
  - Some non-TCD material
  - TCD standards vs good practices
Top Traffic Engr Publications

Posting to ITE Traffic Engr listserv (Apr 04)
What are the top 3 TE documents?
19 responses
18 - MUTCD
11 - Green Book
10 - Highway Capacity Manual
6 - Trip Generation and TE Handbook
1 or 2 each - Assorted other publications

⇒ Everyone uses the MUTCD!

MUTCD Adoption

![Map showing MUTCD adoption](image)

- National MUTCD: 23 states
- State MUTCD: 11 states
- State Supplement: 16 states
What is the future of the MUTCD in 20 years?
If we were to write the MUTCD from a blank sheet of paper, what would we end up with?

Some key questions:
What is the MUTCD?
- Book of standards, guidelines, best practices, other
What audience is the MUTCD written for? (this is a different question from who uses the MUTCD)
- Traffic engineers (new, mid-career, experienced), contractors, lawyers, traveling, public, elected officials, architects, private property owners, other
Who should be responsible for the MUTCD?
- FHWA, NCUTCD, AASHTO, ITE, other
What is a traffic control device?
- Sign, signal, marking, rumble strip, floodlight, roundabout, glare screen, detectable warning, ...
MUTCD Critical Issues

- National trend of less traffic engineering experience within agencies
  - Smaller staffs, more movement during career
- MUTCD is encompassing more and more information (will it be like the tax code?)
  - Broadening subject matter
  - Providing more detailed guidance
  - Desire to have important non-TCD guidelines because everyone has the MUTCD (a one-stop document)
- Loss of Uniform Vehicle Code
  - NCUTLO has disbanded
  - Cannot provide standards for uniform TCDs if there is not a national basis for the traffic laws
- Desire to avoid litigation leads to more specific details in the MUTCD
  - Limits ability to use engineering judgment

MUTCD Strategic Plan

- NUCTCD Task Force developing a strategic plan for the MUTCD
  - What MUTCD should be in 20 years wrt Content, Organization, Administration
  - How to get there
  - Input welcome
    - Gene.Hawkins@tamu.edu
MUTCD Challenges

1988 MUTCD provided guidance while allowing variation
- It provided a “starting point” (liked by experienced traffic engineers)
- Encouraged engineering judgment and shared information about best practices without tying down details to only one way to address a given situation
- Weasel wording was confusing and more difficult to use (liability concerns)
- Required a basic level of knowledge to use as a tool

Modern MUTCD is used by a larger, mostly less experienced audience
- Fewer agency personnel
- More movement during careers

Changing the MUTCD is cumbersome and happens glacially
- Development and public comment seek input from all perspectives
- NCUTCD, as volunteer organization, responds slowly
- FHWA decision makers face competing interests

Results of post-1988 efforts:
- Reformat/rewrite process may have reduced readability
- Significantly more information on TCD principles, more devices addressed
- Increased detail may have decreased engineering flexibility

Strategic Planning Questions

What are the strengths and weaknesses of the MUTCD?
What are the opportunities and threats facing the MUTCD?
Who is the target audience of the MUTCD? Who are the MUTCD stakeholders?
What is the MUTCD supposed to be? (what is the goal of the MUTCD)
What should the MUTCD address? (what content should be included in the MUTCD)
How should the MUTCD be structured? (what is the best way to organize the content)
How often should the MUTCD be revised?
What is the best means of revising the MUTCD? (should it be revised as an entire document or should revisions address limited aspects?)
Is the slow pace of MUTCD changes good or bad?
What issues should be considered in the development of a strategic plan for the MUTCD?
What is the proper balance between identifying good practices and mandatory/recommended practices?
Can the MUTCD be all things to all people?
What is a traffic control device?
If the MUTCD is defined as a book of principles/standards/guidelines for traffic control devices, should the MUTCD address topics that are not defined as a traffic control device?
Who should be responsible for maintaining the MUTCD?
Other issues as identified ...
Potential Outcome

Perhaps a multi-volume MUTCD

Volume 1: Administrative stuff
  Procedures, definitions
Volume 2: Devices
  Signs, signals, markings
Volume 3: Applications
  Work zones (TTC), schools, RR crossings
Volume 4: Practices
  Setting speed limits, signal timing, traffic calming

Volume 4 might not be a part of “the MUTCD”

Evolution of TTC Guidelines
Evolution of TTC Devices

1955: 1st draft of national guidelines
Mid-1950s: state manuals
1955: PA 1956: NC, GA
1961: new part in MUTCD (Part V)
   TTC signs were yellow
1971: changed to Part VI, orange signs
1993: published as stand-alone document
TTC Signs

1927 ROAD REPAIRS AHEAD
1948 MEN WORKING
1935 ROAD CONSTRUCTION AHEAD
1961 MEN WORKING
1971 ROAD WORK AHEAD
1978 FLAGMAN AHEAD
1993

Typical Applications

1961 7 TA 47 p
1971 9 TA 53 p
1978 9 TA 60 p
1993 44 TA 195 p
2009 46 TA 184 p

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Additional Resources

**MUTCD web site**
http://mutcd.fhwa.dot.gov

**HTML & PDF versions of MUTCD**
Lists of changes

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**Evolution of the MUTCD: Early Standards for Traffic Control Devices**

*By H. Gene Hawkins, Jr.*

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**MUTCD History**

Google “Gene Hawkins” CE Profs website
Select MUTCD History link
http://ceprofs.civil.tamu.edu/ghawkins/MUTCD-History.htm

MUTCD history presentation
ITE Journal articles
Copies of old MUTCDs
Signs Not in the 2009 MUTCD

Questions