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

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The MUTCD: Where It’s Been

There have been 10 editions of the MUTCD

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<th>Edition</th>
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*FHWA assumed MUTCD ownership

Summary of MUTCD Evolution

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Traffic Control Devices History

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

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

The wide variety of devices created the need for uniformity.

- 1911 - 1st centerline Michigan
- 1920 - 1st 3-color signal Detroit
- 1914 - 1st electric signal Cleveland
1923 Sign Shape Recommendations

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

- RR Grade Crossing
- Caution
- Stop Intersection
- Directions or Regulations
- Warning (speed reduction)

1924 Sign Color Recommendations

National Conference on Street and Highway Safety
For signs and signals

- Red - stop
- White - directions or distance
- Green - proceed
- Purple - intersection
- Yellow - caution
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

Signs, markings, and signals for urban areas

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

1935 Signs

- Thru Traffic
- Stop Traffic
- Railroad Crossing
- One Way
- Lexington 10
- Huntington 148

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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

- Speed Limit 50
- Bryan 8
- Hearne 25
- 35 M.P.H.
- Stop Ahead
- Keep Right
Early Stop & Yield Signs

1954 Revision

Significant sign changes

THRU STOP HWY Became STOP

Secondary messages eliminated

New Sign

YIELD RIGHT OF WAY
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

- **YIELD**
- **Metropolis Utopia**
- **ONLY**
- **TEXAS US 81**
- **EVACUATION ROUTE**

1971 MUTCD

- 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

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
- Bike Route
- Road Work

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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

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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” “may be justified”
“shall preferably be” “it is desirable that”
“normally should” “it is necessary that”
“may be required” “is intended for use”

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

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

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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**

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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**

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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
Flashung 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

National MUTCD
23 states

State MUTCD
11 states

State Supplement
16 states

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Future of the MUTCD

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

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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

TTC Manuals

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
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. GENT HAWKINS, JR.**

Several pages ago in this document, there was a picture of a control device and a discussion about the evolution of the MUTCD, which was originally developed by Hans K. Hawkins, known as Hawkins (MUTCD), which set forth the basic principles that govern the design and use of traffic control devices. The MUTCD has evolved over time, but always from one of the "hubs" of the field, the MUTCD historical development.

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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