



Traffic Engineering, Operations & Safety Manual

Chapter 1 General

Section 5 Manual Organization

1-5-1 Subject Numbering System

June 2005

DEFINITIONS

Chapter: A main divisional unit of this manual, addressing one of the major functions of traffic engineering or supporting functions.

Section: A grouping of related subjects within a chapter.

Subject: A specific guideline, policy or procedure.

SUBJECT NUMBERING

The manual is divided into topical chapters with each chapter having one or more sections that are divided into specific treatments of material, called subjects.

Chapters, sections and subjects are all numbered.

Chapter numbers are numbered consecutively, generally without gaps. Sections and subjects are numbered consecutively or sometimes with gaps--5, 10, 15, 20--to allow for future insertions of material at the most appropriate locations within the chapter or to follow the MUTCD numbering system.

Chapters 2 through 10 are allotted to subjects related to traffic control devices covered in the corresponding Parts 2 through 10 of the MUTCD.

1-5-5 Table of Contents

August 2021

CHAPTER 1 - GENERAL

SECTION 1 - TRAFFIC GUIDELINES MANUAL

Subject 1 - Purpose 1-1-1

SECTION 5 - MANUAL ORGANIZATION

Subject 1 - Subject Numbering System 1-5-1

Subject 5 - Table of Contents 1-5-5

Subject 10 - Index 1-5-10

SECTION 10 - DOCUMENTS

Subject 5 - Approval Dates 1-10-5

Subject 20 - Index to Statutes 1-10-20

Subject 21 - Index to Administrative Code 1-10-21

Subject 25 - Federal Aid Policy Guide 1-10-25

SECTION 11 - AUTHORIZATION

Subject 1 - Highway Numbering 1-11-1

Subject 5 - U.S. Route Renumbering Process 1-11-5

SECTION 16 - COMMITTEES

Subject 1 - Standing Committees Charter & Policy Development Process 1-16-1

Subject 2 - FHWA Approvals 1-16-2

Subject 3 - Traffic Engineering Materials & Technology Standards 1-16-3

SECTION 20 - SPECIAL TOPICS (LIABILITIES)

Subject 1 - Liability in Tort 1-20-1

Subject 4 - Indemnification 1-20-4

Subject 5 - Avoiding Utility Damage 1-20-5

Subject 10 - Response to Damage 1-20-10

SECTION 25 - BUSINESS MANAGEMENT

Subject 6 - Charging for Signs 1-25-6

SECTION 30 - PROJECT DELIVERY PROCESS

Subject 1 - Traffic Role in Improvement Program 1-30-1

CHAPTER 2 - SIGNS

SECTION 1 - GENERAL

Subject 1 - Introduction 2-1-1
 Subject 3 - Standardization 2-1-3
 Subject 7 - Dynamic Speed Display Signs 2-1-7
 Subject 8 - LED Blinker Signs 2-1-8
 Subject 30 - Sign Numbering 2-1-30
 Subject 35 - Optimum Size of Signs for Highway Classification 2-1-35
 Subject 41 - Jurisdictional Boundary Signs 2-1-41
 Subject 42 - State Entrance Signing 2-1-42
 Subject 45 - Usage of Fluorescent Sheeting on Signs 2-1-45
 Subject 50 - Snowmobile Trail Signing 2-1-50
 Subject 55 - Alternate Roadway Signing 2-1-55
 Subject 60 - Community Sensitive Design Signing 2-1-60
 Subject 65 - Pedestrian Crossing Flags 2-1-65

SECTION 2 - REGULATORY SIGNS

Subject 4 - STOP and YIELD Signs for Separated Turn Lanes 2-2-4
 Subject 4.5 - STOP and YIELD Signs on Driveways & Private Roads 2-2-4.5
 Subject 5 - Sizes of STOP Signs on Roadways 2-2-5
 Subject 12 - In-Street Pedestrian Crossing Signs 2-2-12
 Subject 13 - Location of Speed Limit Signs 2-2-13
 Subject 15 - NO TURNS - Freeway 2-2-15
 Subject 19 - No U Turn Sign (Freeway/Expressway Median
 Crossover Sign Placement) 2-2-19
 Subject 19.1 - No U Turn Signs (Controlled Intersection Placement) 2-2-19.1
 Subject 20 - Intersection Lane Control Sign 2-2-20
 Subject 28 - Restricting Pedestrians and Non-motorized Vehicles on
 Expressways and Freeways 2-2-28
 Subject 30 - Engine Brake Signing 2-2-30
 Subject 35 - Littering Signs 2-2-35
 Subject 40 - Seatbelt Signs 2-2-40
 Subject 41 - Community Parking Restriction Signs 2-2-41
 Subject 45 - Move Over or Slow Down Signs 2-2-45
 Subject 50 - Spacing of Reminder Signs 2-2-50
 Subject 51 - Except Right Turn Signs 2-2-51
 Subject 53 - Signing for Flashing Yellow Arrow Traffic Signals 2-2-53
 Subject 54 - Stop for School Bus Flashing Red Lights State Law Sign 2-2-54

SECTION 3 - WARNING SIGNS

Subject 10 - Use of Chevrons 2-3-10
 Subject 14 - Hill Blocks View Sign 2-3-14
 Subject 18 - Merge Sign Locations 2-3-18
 Subject 19 - Divided Highway Warning Signing 2-3-19
 Subject 25 - Single Diagonal Arrow Sign 2-3-25
 Subject 27 - BUMP and ROUGH ROAD Policy 2-3-27
 Subject 30 - Speed Reduction Signs (Reduced Speed Ahead) 2-3-30
 Subject 35 - Advisory Speed on Curves 2-3-35
 Subject 36 - Ramp Warning Signs 2-3-36
 Subject 38 - NO PASSING ZONE Signs 2-3-38
 Subject 40 - Trail Crossing Signs 2-3-40
 Subject 41 - Deer Crossing Signing 2-3-41
 Subject 43 - Parallel On-Ramp lane Reduction Signing 2-3-43
 Subject 45 - Icy Bridge Deck Signing 2-3-45
 Subject 49 - Determination of Sight Distance for Warning Signs 2-3-49
 Subject 50 - Horse-Drawn Vehicles 2-3-50
 Subject 51 - Pedestrian Crossing Warning Signs 2-3-51

Subject 54 - School Area Signing	2-3-54
Subject 55 - School Bus Stops on 65 MPH Expressways	2-3-55
Subject 60 - Children at Play	2-3-60
Subject 64 - Type I Object Markers under Keep Right Signs	2-3-64
Subject 65 - Rumble Strip Signing	2-3-65
Subject 70 - Low Flying Plane Signs	2-3-70
SECTION 4 - GUIDE SIGNS - CONVENTIONAL	
Subject 19.1 - Business Route Marking	2-4-19.1
Subject 33 - Trailblazer Assemblies	2-4-33
Subject 40 - Historical Marker Guide Signs	2-4-40
Subject 41 - Advance Supplemental Guide Signs	2-4-41
Subject 43 - Conventional Road Intersections	2-4-43
Subject 44 - Conventional Roads on Approaches to Interchanges	2-4-44
Subject 45.1 - Emergency Hospital Signing	2-4-45.1
Subject 45.2 - Emergency Medical Services Signing	2-4-45.2
Subject 48 - Signing for Unincorporated Communities	2-4-48
Subject 48.1 - Neighborhood Watch Signing	2-4-48.1
Subject 49 - Street Name Signs	2-4-49
Subject 50 - Advance Crossroad Name Signs	2-4-50
Subject 51 - Rustic Road Signs	2-4-51
Subject 52 - Heritage Directional Signs	2-4-52
Subject 53 - Auto Tour Signing Policy	2-4-53
Subject 55 - Stream/River/Lake Signs	2-4-55
Subject 60 - Township Boundary and Land Use Zoning Signs	2-4-60
Subject 65 - Amenity Signs	2-4-65
SECTION 6 - GUIDE SIGNS - FREEWAY	
Subject 19 - Exit Numbers	2-6-19
Subject 21 - Overhead Arrow Per Lane Guide Signs	2-6-21
Subject 30 - Grade Separated Crossroad Name Signs	2-6-30
Subject 35 - Tourist Information Signs	2-6-35
Subject 36 - Parallel Off-Ramp Exit Direction Signing	2-6-36
Subject 40 - No Re-Entry to Freeway Signs	2-6-40
Subject 50 - Community "Downtown" Signing	2-6-50
Subject 54 - Reference Location Signs	2-6-54
Subject 55 - Community "Historic Downtown" Signing	2-6-55
Subject 60 - Cellular 911 Signs	2-6-60
Subject 61 - 511 Travel Information Signs	2-6-61
Subject 65 - Rest Area Amenity Signs	2-6-65
SECTION 10 - SPECIAL EVENTS	
Subject 1 - Special Events (Detour Permitting)	2-10-1
Subject 2 - Special Events (Roadway Open to Traffic)	2-10-2
Subject 3 - Special Events (Advanced Directional Signing)	2-10-3
SECTION 15 - COMPREHENSIVE GUIDING POLICIES	
Subject 1.1 - AASHTO Guide for Supplemental Signs	2-15-1.1
Subject 3 - Sign Categories and Policy for Directional Signing	2-15-3
Subject 4 - Pictographs on Signs	2-15-4
Subject 5 - Destinations on Signs	2-15-5
Subject 6 - Community Wayfinding Signs	2-15-6
Subject 7 - Temporary Traffic Generator Signing on Improvement Projects	2-15-7
Subject 11 - Transition, Two to Four Lanes	2-15-11
Subject 12 - Wrong Way Prevention	2-15-12
Subject 15 - Recreational Trail Signing	2-15-15
Subject 16 - ATV Route Signing	2-15-16
Subject 20 - Cemetery Signing	2-15-20
Subject 30 - Hydrant Signing	2-15-30
Subject 31 - Signing for Low Inlets along Barrier Walls	2-15-31

Subject 36 - Distance Signs, D2-Series and Post Interchange E8-Series	2-15-36
Subject 51 - Routine Sign Replacement Criteria	2-15-51
Subject 52 - Maintenance of Signs and Sign Post Designs	2-15-52
Subject 53 - New Bypass Signs	2-15-53
Subject 55 - Signing for J Turns	2-15-55
Subject 56 - Signing for Diverging Diamond Interchanges	2-15-56
Subject 58 - Specific Information Signs	2-15-58
Subject 59 - Tourist Oriented Directional Signs	2-15-59
Subject 60 - Trans 200 Guidance Signs	2-15-60
Subject 61 - Signing and Marking Maintenance of Roadside Facilities	2-15-61
Subject 62 - Memorial Signing	2-15-62
SECTION 20 - SIGN MANUFACTURE	
Subject 10 - Sign Delivery Process	2-20-10
Subject 15 - Sign Evaluation Form for Regions	2-20-15
SECTION 25 - FIELD CREW GUIDANCE	
Subject 1 - Field Crew Guidance and Contacts	2-25-1
Subject 2 - Field Crew Safety and Training	2-25-2
CHAPTER 3 - MARKINGS	
SECTION 2 - APPLICATIONS	
Subject 1 - Long Line Markings	3-2-1
Subject 2 - No Passing Zone Standards	3-2-2
Subject 3 - Special Markings	3-2-3
Subject 4 - Island Marking	3-2-4
Subject 5 - Interchange Ramps	3-2-5
Subject 11 - Raised Pavement Markers	3-2-11
Subject 15 - Dynamic Envelope Markings	3-2-15
Subject 23.1 - Curb Ramp Markings	3-2-23.1
SECTION 3 - ROUNDABOUTS	
Subject 1 - Marking for Roundabouts	3-3-1
SECTION 4 - MAINTENANCE	
Subject 1 - Maintenance of Markings	3-4-1
SECTION 6 - DELINEATION	
Subject 1 - Delineators	3-6-1
SECTION 10 - PROGRAM	
Subject 1 - Pavement Marking Materials Selection Policy	3-10-1
SECTION 15 - COMPREHENSIVE POLICY	
Subject 5 - Temporary Pavement Markings	3-15-5
SECTION 25 - FIELD CREW GUIDANCE	
Subject 1 - Field Crew Guidance and Contacts	3-25-1
Subject 2 - Field Crew Safety and Training	3-25-2
Subject 3 - Field Inspections	3-25-3
CHAPTER 4 - SIGNALS	
SECTION 2 - TRAFFIC CONTROL SIGNALS	
Subject 1 - Restricted Locations	4-2-1
Subject 4 - Flashing Operations	4-2-4
Subject 5 - Vehicle Clearance Intervals	4-2-5
Subject 8 - Battery Backup Systems	4-2-8
Subject 20 - Emergency Vehicle Pre-emption	4-2-20
Subject 34 - Signal Sequencing during Railroad Preemption	4-2-34

SECTION 4 - PEDESTRIAN SIGNALS	
Subject 3 - Applications / Warrants	4-4-3
Subject 4 - Animated Eyes Symbol	4-4-7
SECTION 5 - BEACONS	
Subject 1 - General Provisions	4-5-1
SECTION 6 - SPECIAL	
Subject 1 - Control for Emergency Vehicle Access	4-6-1
SECTION 12 - IN-ROADWAY WARNING LIGHTS	
Subject 2 - At Pedestrian Crossings	4-12-2
CHAPTER 6 - WORK ZONE TRAFFIC CONTROL	
SECTION 1 - GENERAL	
Subject 1 - Work Zone Policy Statement	6-1-1
SECTION 2 - SIGNS	
Subject 55 - PCMS Use in Construction and Maintenance Projects	6-2-55
SECTION 3 - ELEMENTS	
Subject 4.5 - Width Restrictions	6-3-4.5
Subject 6 - Freeway Service Team Policy and Procedure	6-3-6
Subject 7 - Freeway Service Team Sponsorship	6-3-7
Subject 10 - Work Zone Incident Management Plans (IMPs)	6-3-10
SECTION 6 - CONTROL OF TRAFFIC	
Subject 20 - One-lane Bridges	6-6-20
SECTION 8 - SPECIAL DEVICES	
Subject 15 - Highway Advisory Radios (HAR)	6-8-15
SECTION 10 - DETOURS	
Subject 20 - Signing and Marking - Local Roads	6-10-20
CHAPTER 8 - RAILROAD GRADE CROSSINGS	
SECTION 2 - SIGNS AND MARKINGS	
Subject 2 - Grade Crossing Sign Installation	8-2-2
Subject 29 - Dynamic Envelope Markings	8-2-29
CHAPTER 9 - TRAFFIC CONTROLS FOR BICYCLE FACILITIES	
SECTION 2 - SIGNS	
Subject 18 - SHARE THE ROAD Bicycle Warning Signs	9-2-18
Subject 19 - Bicycle Route Guide Signs (D11-1)	9-2-19
SECTION 3 - MARKINGS	
Subject 4 - Bicycle Lanes	9-3-4
Subject 7 - Shared Lane Markings	9-3-7
CHAPTER 11 - ROADWAY LIGHTING	
SECTION 1 - INITIAL SYSTEM APPROVAL	
Subject 1 - Initial System Approval	11-1-1
Subject 2 - Lighting System Design Review	11-1-2
SECTION 2 - LIGHTING SYSTEMS DESIGN	
Subject 1 - General Overview, Considerations and Parameters	11-2-1
SECTION 3 - PERMITTED LIGHTING	
Subject 1 - Permitted Lighting Systems	11-3-1
Subject 2 - Aesthetic Lighting on Structures	11-3-2

SECTION 4 - ROUNDABOUT LIGHTING	
Subject 4 - Policy and Design Guidelines	11-4-1
SECTION 5 - SIGNALIZED INTERSECTION LIGHTING	
Subject 1 - Policy and Design Guidelines	11-5-1
SECTION 13 - ELECTRICAL MAINTENANCE GUIDELINES	
Subject 1 - Incident Management Protocols	11-13-1
SECTION 14 - ELECTRICAL INVENTORY NUMBERING	
Subject 1 - Electrical Inventory Numbering System Guidelines	11-14-1
CHAPTER 12 - SAFETY	
SECTION 3 - SAFETY ANALYSIS	
Subject 1 - Crash Modification Factor Table	12-3-1
SECTION 5 - COUNTERMEASURES	
Subject 3 - Intersection Conflict Warning Systems	12-5-3
Subject 4 - Friction Surface Treatment	12-5-4
CHAPTER 13 - TRAFFIC REGULATIONS	
SECTION 1 - THROUGH HIGHWAY DECLARATIONS	
Subject 1 - Statutory Authority	13-1-1
Subject 2 - Approval Process	13-1-2
Subject 5 - Declaration Format	13-1-5
SECTION 2 - TRUCKING	
Subject 5 - Temporary Long Truck Routes	13-2-5
Subject 10 - Oversize/Overweight Single Trip Permitting	13-2-10
Subject 11 - Oversize/Overweight Wind Industry Permits	13-2-11
Subject 12 - Oversize/Overweight Inspection Request & Waiver Procedure	13-2-12
Subject 15 - Oversize/Overweight Permit Suspension	13-2-15
SECTION 3 - LOW SPEED VEHICLES (LSVs)	
Subject 1 - Low Speed Vehicles	13-3-1
SECTION 5 - SPEED LIMITS	
Subject 1 - Statutory Authority and the Approval Process	13-5-1
Subject 2 - Local Speed Limits	13-5-2
Subject 5 - School Zones	13-5-5
Subject 6 - Temporary Traffic Control Zones	13-5-6
Subject 7 - Maintenance Work Zones	13-5-7
Subject 8 - Speed Limits on Approach to Controlled Intersections	13-5-8
Subject 10 - Declarations Format	13-5-10
Subject 11 - County Ordinance	13-5-11
Subject 12 - Posted versus Design Speeds	13-5-12
SECTION 10 - DETOUR PERMITS	
Subject 1 - Authority and Policy	13-10-1
SECTION 11 - SURVEY PERMITS	
Subject 1 - Policy	13-11-1
SECTION 12 - PERMITS FOR TEMPORARY BANNERS AND CIVIC DISPLAYS	
Subject 1 - Policy	13-12-1
SECTION 13 - SNOWMOBILES CROSSING FREEWAYS	
Subject 1 - Authority and Policy	13-13-1
Subject 2 - Model Ordinance	13-13-2

SECTION 25 - TURN PROHIBITIONS	
Subject 11 - No Turn On Red	13-25-11
SECTION 26 - INTERSECTION CONTROL	
Subject 1 - Passing on Right at Intersections	13-26-1
Subject 5 - All-Way Stop	13-26-5
CHAPTER 16 – TRAFFIC ANALYSIS & MODELING	
SECTION 1 - TRAFFIC MODELING PROCESS	
Subject 1 - Overview	16-1-1
Subject 2 - Basic Principles	16-1-2
SECTION 5 - DATA ASSEMBLY & PREPARATION	
Subject 5 - Data Assembly and Collection	16-5-1
Subject 15 - Volume Balancing	16-5-15
Subject 20 - Origin-Destination Matrix Development	16-5-20
Subject 70 - References	16-5-70
SECTION 10 - TRAFFIC ANALYSIS TOOLS	
Subject 1 - Overview of Available Traffic Analysis Tools	16-10-1
Subject 5 - Traffic Analysis Tool Selection	16-10-5
Subject 20 - References	16-10-20
SECTION 15 - HIGHWAY CAPACITY MANUAL (HCM) – DETERMINISTIC ANALYSIS	
Subject 1 - Basic Principles	16-15-1
Subject 5 - Signalized Intersections	16-15-5
Subject 10 - Two-Way Stop-Controlled (TWSC) Intersections	16-15-10
Subject 15 - All-Way Stop-Controlled (AWSC) Intersections	16-15-15
Subject 20 - Roundabouts	16-15-20
Subject 25 - Alternative Intersections	16-15-25
Subject 30 - Interchange Ramp Terminals	16-15-30
Subject 35 - Urban Street Facilities	16-15-35
Subject 40 - Freeway Facilities	16-15-40
Subject 45 - Multilane Highways	16-15-45
Subject 50 - Two-Lane Highways	16-15-50
Subject 60 - Pedestrian and Bicycle Facilities	16-15-60
Subject 70 - References	16-15-70
SECTION 20 - MICROSCOPIC SIMULATION TRAFFIC ANALYSIS	
Subject 1 - Basic Principles	16-20-1
Subject 2 - Traffic Model Development	16-20-2
Subject 3 - Measures of Effectiveness (MOEs)	16-20-3
Subject 4 - Microsimulation Analysis Software	16-20-4
Subject 5 - Microsimulation Model Calibration	16-20-5
Subject 6 - Calibration Parameters and Simulation Settings	16-20-6
Subject 7 - Simulation Runs	16-20-7
Subject 8 - Model Validation	16-20-8
Subject 9 - Design Year Analysis	16-20-9
Subject 10 - Documentation/Reporting/Presentation of Results	16-20-10
Subject 11 - Upgrading Simulation Models	16-20-11
Subject 12 - References	16-20-12
SECTION 25 - TRAFFIC MODEL PEER REVIEW POLICY	
Subject 1 - Introduction	16-25-1
Subject 2 - Process	16-25-2
CHAPTER 17 – SYSTEM OPERATIONS & INTELLIGENT TRANSPORTATION SYSTEMS	
SECTION 1 - DYNAMIC MESSAGE SIGNS (DMS)	
Subject 1 - Policies & Procedures	17-1-1

SECTION 2 - PORTABLE CHANGEABLE MESSAGE SIGNS (PCMS)	
Subject 1 - Policies & Procedures	17-2-1
SECTION 3 - 511 SYSTEM	
Subject 1 - Real Time Data Sharing Procedures	17-3-1
Subject 2 - Floodgate Messages	17-3-2
SECTION 4 - ITS COMMUNICATIONS NETWORK	
Subject 1 - Policies and Procedures	17-4-1
SECTION 5 - FUNDING ADMINISTRATION	
Subject 1 - Federal ITS Continuing Appropriations Process	17-5-1
SECTION 6 - PLANNING	
Subject 1 - TSM&O Traffic Infrastructure Process (TIP)	17-6-1