

Chapter Five
COORDINATION WITH OTHER PUBLICATIONS

Table of Contents

<u>Section</u>	<u>Page</u>
5.1 NATIONAL PUBLICATIONS	5.1(1)
5.1.1 Manual on Uniform Traffic Control Devices	5.1(1)
5.1.1.1 Description.....	5.1(1)
5.1.1.2 Department Application	5.1(1)
5.1.2 A Policy on Geometric Design of Highways and Streets	5.1(2)
5.1.2.1 Description.....	5.1(2)
5.1.2.2 Department Application	5.1(2)
5.1.3 Roadside Design Guide.....	5.1(2)
5.1.3.1 Description.....	5.1(2)
5.1.3.2 Department Application	5.1(3)
5.1.4 ADA Accessibility Guidelines for Buildings and Facilities	5.1(3)
5.1.4.1 Description.....	5.1(3)
5.1.4.2 Department Application	5.1(3)
5.1.5 Highway Capacity Manual	5.1(3)
5.1.5.1 Description.....	5.1(3)
5.1.5.2 Department Application	5.1(4)
5.1.6 Roadway Lighting Design Guide	5.1(4)
5.1.6.1 Description.....	5.1(4)
5.1.6.2 Department Application	5.1(4)
5.1.7 Roadway Lighting Handbook.....	5.1(4)
5.1.7.1 Description.....	5.1(4)
5.1.7.2 Department Application	5.1(5)

Table of Contents

(Continued)

<u>Section</u>		<u>Page</u>
5.1.8	Standard Highway Signs	5.1(5)
	5.1.8.1 Description.....	5.1(5)
	5.1.8.2 Department Application	5.1(5)
5.1.9	Manual of Transportation Engineering Studies.....	5.1(6)
	5.1.9.1 Description.....	5.1(6)
	5.1.9.2 Department Application	5.1(6)
5.1.10	Traffic Engineering Handbook	5.1(6)
	5.1.10.1 Description.....	5.1(6)
	5.1.10.2 Department Application	5.1(6)
5.1.11	Trip Generation	5.1(7)
	5.1.11.1 Description.....	5.1(7)
	5.1.11.2 Department Application	5.1(7)
5.1.12	Railroad-Highway Grade Crossing Handbook.....	5.1(7)
	5.1.12.1 Description.....	5.1(7)
	5.1.12.2 Department Application	5.1(8)
5.2	DEPARTMENT PUBLICATIONS.....	5.2(1)
5.2.1	Montana Road Design Manual	5.2(1)
5.2.2	Montana Standard Specifications for Road and Bridge Construction	5.2(1)
5.2.3	Montana Geometric Design Standards.....	5.2(2)
5.2.4	Approach Standards for Montana Highways	5.2(2)
5.2.5	MDT Detailed Drawings.....	5.2(2)
5.2.6	Montana Right-of-Way Manual.....	5.2(3)
5.2.7	Montana Surveying Manual.....	5.2(3)
5.2.8	Montana Construction Administration Manual	5.2(3)
5.2.9	Montana Materials Manual	5.2(4)
5.2.10	Montana Maintenance Manual	5.2(4)
5.2.11	Montana CADD Standards Manual	5.2(4)
5.2.12	Montana Signs and Signing Materials Catalog.....	5.2(5)

Table of Contents

(Continued)

<u>Section</u>		<u>Page</u>
5.2.13	Montana Typical Traffic Plans	5.2(5)
5.2.14	Montana Consultant Services Procedures Manual.....	5.2(5)

Chapter Five

COORDINATION WITH OTHER PUBLICATIONS

The Montana Traffic Engineering Manual (Manual) is not intended to present all information that may be needed by the traffic designer on a specific project. The Manual does include the majority of the design information for the vast majority of projects designed by the Traffic Engineering Section. However, on specific projects or for specific project elements, the designer may need to reference other publications to perform a fully comprehensive analysis of the project. Chapter Five briefly discusses other publications in the national highway engineering literature and those published by the Montana Department of Transportation.

5.1 NATIONAL PUBLICATIONS

For the relevant national publication, this Section provides 1) a brief description of each publication, and 2) its application on Department projects.

5.1.1 Manual on Uniform Traffic Control Devices

5.1.1.1 Description

The Manual on Uniform Traffic Control Devices (MUTCD), published by FHWA, AASHTO, ITE and ATSSA in coordination with the National Committee on Uniform Traffic Control Devices, presents nationwide criteria for the selection, design and placement of signs, pavement markings, traffic signals, traffic control devices for low-volume roads, temporary traffic control, traffic control devices in school areas, traffic control devices for highway-railroad grade crossings, traffic control devices for bicycle facilities, and traffic controls for highway-light rail transit grade crossing. The basic objective of the MUTCD is to establish effective means to convey traffic control information to the driver for uniform application nationwide.

5.1.1.2 Department Application

The Department has adopted the use of the MUTCD in its entirety, including the context of its presentation. The MDT Detailed Drawings and the following Montana Traffic Engineering Manual chapters present additional information on traffic control devices which supplements the criteria in the MUTCD:

1. [Chapter Twelve](#) presents the Department criteria for traffic signals.
2. [Chapter Eighteen](#) presents the Department criteria for highway signs.
3. [Chapter Nineteen](#) presents the Department criteria for pavement markings.

5.1.2 A Policy on Geometric Design of Highways and Streets

5.1.2.1 Description

The AASHTO A Policy on Geometric Design of Highways and Streets, more commonly known as the Green Book, discusses the nationwide policies, practices and criteria for the geometric design of highways and streets. It is intended to present a consensus view on the most widely accepted approach to the design of a variety of geometric design elements including design speed, horizontal and vertical alignment, cross section widths, intersections and interchanges. Note that the FHWA design exception process, as discussed in [Section 24.7](#) of the Montana Traffic Engineering Manual, is based on the numerical criteria presented in the Green Book.

5.1.2.2 Department Application

Part IV of the Montana Traffic Engineering Manual addresses geometric design elements. The Manual's geometric design treatments are based on the Green Book but tailored to the prevailing climate, topography and practices within Montana. Also, the Manual is intended to clarify, where needed, specific presentations in the Green Book and to discuss geometric design information not presently included in the Green Book.

5.1.3 Roadside Design Guide

5.1.3.1 Description

The AASHTO Roadside Design Guide presents the nationwide policies, practices and criteria for roadside safety along highways and streets. It is intended to present a consensus view on the most widely accepted approach to providing a reasonably safe roadside for run-off-the-road vehicles. The Roadside Design Guide discusses clear zones, drainage appurtenances, sign and luminaire supports, roadside barriers, median barriers, bridge rails, crash cushions and roadside safety within construction work zones. The overall objective of the Roadside Design Guide is to recommend an appropriate roadside safety treatment for specific sites considering the consequences of run-off-the-road crashes, specific roadway features (e.g., traffic volumes, design speed, roadside topography) and construction/ maintenance costs.

5.1.3.2 Department Application

The Montana Road Design Manual addresses roadside safety in Chapter Fourteen “Roadside Safety.” The roadside safety criteria in this chapter are based on the criteria presented in the Roadside Design Guide but tailored to the prevailing practices and conditions in Montana. Also, the Montana Road Design Manual is intended to clarify, where needed, the issues presented in the Roadside Design Guide and to discuss roadside safety information not included in the AASHTO document. [Chapter Six](#) of the Montana Traffic Engineering Manual presents the roadside safety issues that are particular to the Traffic Engineering Section (e.g., sign supports, highway lighting supports).

5.1.4 ADA Accessibility Guidelines for Buildings and Facilities

5.1.4.1 Description

The ADA Accessibility Guidelines for Buildings and Facilities, published by the U.S. Architectural and Transportation Barrier Compliance Board, presents the nationwide accessibility criteria to buildings and facilities for individuals with disabilities. The basic objective of this document is to establish the criteria mandated by the Americans with Disabilities Act (ADA) of 1990. It provides accessibility criteria for both interior and exterior facilities including parking spaces, sidewalks, hallways, doorways, curb ramps, ramps, stairs, telephones, drinking fountains, rest rooms, elevators, etc.

5.1.4.2 Department Application

The Department’s accessibility criteria meet the ADA Accessibility Guidelines for Buildings and Facilities. Chapter Eighteen of the Montana Road Design Manual addresses the exterior accessibility features the designer will typically encounter including sidewalks, parking spaces, ramps, curb ramps, etc. For interior features (e.g., at rest areas), the designer should use the requirements presented in the ADA Accessibility Guidelines for Buildings and Facilities.

5.1.5 Highway Capacity Manual

5.1.5.1 Description

The Highway Capacity Manual (HCM), published by the Transportation Research Board, presents the nationwide criteria for capacity analyses for highway projects. The HCM includes methodologies for freeways, weaving areas, ramps and ramp junctions, urban streets, two-lane highways, multilane highways, signalized intersections, non-

signalized intersections, etc. The basic objective of the capacity methodologies in the HCM is to aid in determining the necessary configuration and dimensions of a specific highway element to accommodate the projected traffic volumes at a given level of service.

5.1.5.2 Department Application

The Department uses the Highway Capacity Manual for capacity analyses with some adjustments for local factors. [Chapter Thirty](#) of the Montana Traffic Engineering Manual discusses several adjustments for Montana.

5.1.6 Roadway Lighting Design Guide

5.1.6.1 Description

The AASHTO Roadway Lighting Design Guide presents guidance on warrants and criteria for highway lighting along streets, in rest areas and for signs. It provides information on the illuminance and luminance techniques that may be used in the design of roadway lighting, warrants for freeway and interchange lighting, and design criteria for freeway facilities, non-freeway facilities, pedestrian and bicycle facilities, underpasses, tunnels, rest areas and signing.

5.1.6.2 Department Application

The Montana Traffic Engineering Manual addresses highway lighting in [Chapter Thirteen](#) “[Highway Lighting Design](#).” The highway lighting criteria in this chapter are based on the AASHTO Roadway Lighting Design Guide and other documents, and it is tailored to the prevailing practices and conditions in Montana. Also, the Montana Traffic Engineering Manual is intended to clarify, where needed, the issues presented in the Roadway Lighting Design Guide and to discuss lighting information not included in the AASHTO document.

5.1.7 Roadway Lighting Handbook

5.1.7.1 Description

The FHWA Roadway Lighting Handbook presents guidance in the planning, design, operation and maintenance of roadway lighting systems. It is intended to present a consensus view on the most widely accepted approach to providing a reasonable roadway lighting system. The Roadway Lighting Handbook discusses warrants for

roadway lighting, selecting lighting equipment, selecting lighting system configurations, designing the lighting system using both the illuminance and luminance techniques, designing the lighting hardware, operating and maintaining the lighting system and analyzing its economics.

5.1.7.2 Department Application

The Montana Traffic Engineering Manual addresses highway lighting in [Chapter Thirteen “Highway Lighting Design.”](#) The lighting criteria in Chapter Thirteen are based on the criteria presented in the Roadway Lighting Handbook and other documents. They are tailored to meet the prevailing practices and conditions in Montana. Also, the Montana Traffic Engineering Manual is intended to clarify, where needed, the issues presented in the Roadway Lighting Handbook and to discuss roadway lighting information not included in the FHWA document.

5.1.8 Standard Highway Signs

5.1.8.1 Description

The Standard Highway Signs, published by FHWA, presents criteria for presenting and laying out information on highway signs, and criteria for determining the width, height, spacing and stroke widths for letters and numerals for use on highway signs and pavement markings. It is to be used in conjunction with the MUTCD. Dimensions are provided for the borders, symbols, words and overall sign outline based on the sign size. Symbols that are used on signs are provided on grids to allow the designer to change the symbol size and yet present it in proper proportion. The letters and numerals are also shown on grids to allow the designer to easily enlarge or decrease the letter sizes and yet present them in proper proportion. Values for signs are provided for Series B 2000, C 2000, D 2000, E 2000, E(M) 2000 and F 2000.

In addition to the sign sizes, alphabet and numerals, the Standard Highway Signs provide guidelines for pavement marking symbols including turn arrows, freeway/ramp arrows, preferential lane symbols, railroad crossing symbols and bicycle symbols.

5.1.8.2 Department Application

The Department has adopted the use of the FHWA Standard Highway Signs for the design and layout of all signs and pavement markings. [Chapters Eighteen](#) and [Nineteen](#) of the Montana Traffic Engineering Manual and the MDT Detailed Drawings

provide additional guidance on the layout of highway signs and the application of letters and numerals on the highway signs and pavement markings.

5.1.9 Manual of Transportation Engineering Studies

5.1.9.1 Description

The Institute of Transportation Engineers Manual of Transportation Engineering Studies provides guidance on how to prepare, conduct and analyze different types of traffic studies including spot speed studies, traffic impact studies, parking studies, pedestrian studies, speed studies, etc. The ITE Manual also provides guidance on statistical analyses and presentation of data for reports, meetings and hearings.

5.1.9.2 Department Application

[Part VI “Traffic Engineering Investigations”](#) of the Montana Traffic Engineering Manual addresses several of these studies. The Montana Traffic Engineering Manual’s discussion has been tailored to meet the conditions and practices prevalent in Montana. For the actual procedures for conducting these studies, the designer may reference the ITE Manual for additional guidance.

5.1.10 Traffic Engineering Handbook

5.1.10.1 Description

The Institute of Transportation Engineers’ Traffic Engineering Handbook provides guidance and information on traffic engineering practices including driver, pedestrian and vehicular characteristics, traffic studies, crash analyses, highway safety, highway capacity, geometric design, parking, signs, pavement markings, traffic signals, highway lighting, freeway surveillance and control, intelligent vehicle-highway systems, traffic regulations, traffic management, public relations, administration and legal liabilities. In general, the Handbook summarizes the major highway and traffic engineering elements found in other references used by the designer.

5.1.10.2 Department Application

Much of the applicable information presented in the ITE Traffic Engineering Handbook has been incorporated into the Montana Traffic Engineering Manual. The Handbook may be used by the designer for additional guidance on design elements not addressed in the Montana Traffic Engineering Manual.

5.1.11 Trip Generation

5.1.11.1 Description

The Institute of Transportation Engineers Trip Generation provides guidance for various types of traffic generators. It contains data from over 3500 studies and provides information on multi-use projects and pass-by trips. It includes trip generation data for commercial development, office development, residential, etc.

5.1.11.2 Department Application

Unless local data is available or where a developer can substantiate its basis for its numbers, the Department requires that all traffic impact analyses use the ITE Trip Generation data.

5.1.12 Railroad-Highway Grade Crossing Handbook

5.1.12.1 Description

The FHWA Railroad-Highway Grade Crossing Handbook presents guidelines for prioritizing improvements to railroad-highway grade crossings and information on the various types of improvements that can be made to the crossing. The Railroad-Highway Grade Crossing Handbook provides formulas that can be used to determine the risk at the crossing, to identify locations in need of improvement and to prioritize the hazardous locations that are scattered throughout the State. Also, various types of at-grade crossing improvements are described including:

1. closing the crossing,
2. grade separations,
3. active warning devices,
4. passing warning devices,
5. sight distance improvements,
6. operational improvements, and
7. crossing surface improvements.

In addition, the Railroad-Highway Grade Crossing Handbook provides guidelines to determine which crossing improvement is the most cost effective for the site.

5.1.12.2 Department Application

The Department uses the FHWA Railroad-Highway Grade Crossing Handbook as a guide for addressing railroad-highway grade crossings in the State. The Electrical Unit may use this document when the railroad crossing is near a signalized intersection and interconnection is required between the traffic signal and railroad signal. The Geometrics Unit may use this document as a guide to address roadside safety issues, geometrics and sight distance. The Signing and Pavement Markings Unit may use this document to review sight distance issues and alternative signing and pavement markings.

5.2 DEPARTMENT PUBLICATIONS

The Department has prepared many publications in addition to the Montana Traffic Engineering Manual (Manual) that may apply to a traffic engineering project. Most of these Manuals can be downloaded from the Department's website. This Section briefly discusses other relevant MDT publications.

5.2.1 Montana Road Design Manual

The Road Design Section is responsible for the Montana Road Design Manual, which presents Department procedures and design criteria for the following:

1. road design process,
2. plan preparation,
3. quantity and cost estimating,
4. horizontal alignment,
5. vertical alignment,
6. cross sections,
7. intersections at-grade,
8. roadside safety,
9. maintenance and protection of traffic through work zones,
10. drainage and irrigation design, and
11. numerous special design elements.

The major objective of the Montana Traffic Engineering Manual is to present MDT criteria on the design and construction plan preparation for roadway projects on the State highway system. Because of the similar responsibilities of the Road Design and Traffic Engineering Sections, several sections of the Montana Road Design Manual have been summarized or incorporated into the Montana Traffic Engineering Manual. However, there are many topics addressed in the Montana Road Design Manual that are not presented in the Montana Traffic Engineering Manual (e.g., roadside safety, quantities, drainage and irrigation design, maintenance and protection of traffic through construction zones).

5.2.2 Montana Standard Specifications for Road and Bridge Construction

The Contract Plans Bureau is responsible for the Montana Standard Specifications for Road and Bridge Construction. The Standard Specifications present the work methods and materials approved by the Department for the construction of traffic, road and bridge projects. The publication presents information on:

1. bidding,
2. awarding the contract,
3. contractor duties,
4. controlling material quality,
5. contractor and Department legal requirements,
6. executing the contract, and
7. measuring and paying for contract items.

See [Section 4.2](#) of the Montana Traffic Engineering Manual for more information on the Standard Specifications.

5.2.3 Montana Geometric Design Standards

Based on the Intermodal Surface Transportation Efficiency Act of 1991, the Department has adopted geometric design criteria for the Federal-aid funding categories. The Montana Geometric Design Standards, in conjunction with the Montana Traffic Engineering Manual, present the minimum criteria that should be used to design highways in Montana. The minimum criteria presented in the Montana Geometric Design Standards are used as the basis for determining the need for a design exception. See [Chapter Twenty-four](#) for more information on design exceptions.

5.2.4 Approach Standards for Montana Highways

The Traffic Engineering Section, the Right-of-Way Bureau and the Maintenance Division are responsible for the Approach Standards for Montana Highways, which have been adopted as a regulation by the Montana Transportation Commission. The Approach Standards for Montana Highways present instructions for obtaining an approach permit and MDT criteria on the frequency, design and construction of public and private access to the State-maintained highways. The objectives of the criteria are to maintain a balance between the safe and efficient movement of traffic on the highway mainline and the need for reasonable access to the highway system by adjacent property owners.

5.2.5 MDT Detailed Drawings

The Contract Plans Bureau is responsible for the MDT Detailed Drawings. The Drawings provide details on various design treatments that are consistent from project to project (e.g., guardrail, signing, object markers, fencing, sidewalks, drainage details), and they provide information on how to lay out or construct the design elements.

See [Section 4.2](#) of the [Montana Traffic Engineering Manual](#) for more information on the [MDT Detailed Drawings](#).

5.2.6 Montana Right-of-Way Manual

The Right-of-Way Bureau is responsible for the [Montana Right-of-Way Manual](#), which presents Department criteria for the following:

1. access control and encroachments,
2. appraisals and acquisitions,
3. relocation assistance,
4. R/W agreements,
5. R/W design and plan preparation,
6. condemnations, and
7. utilities.

5.2.7 Montana Surveying Manual

The Photogrammetry and Survey Section is responsible for the [Montana Surveying Manual](#), which presents Department criteria for the following:

1. survey datums and coordinate systems,
2. survey measurements and equipment,
3. errors and maximum closure,
4. conventional surveys,
5. aerial photography and photogrammetry,
6. global positioning system,
7. data collectors,
8. hydraulic surveys, and
9. construction surveys.

5.2.8 Montana Construction Administration Manual

The Construction Administration Services Bureau is responsible for the [Montana Construction Administration Manual](#). It supplements the [Montana Standard Specifications for Road and Bridge Construction](#) by providing explanatory information on:

1. contract administration,
2. earthwork,
3. aggregate surfaces and base courses,

4. bituminous pavements,
5. rigid pavements,
6. structures, and
7. miscellaneous construction.

5.2.9 Montana Materials Manual

The Materials Bureau is responsible for the Montana Materials Manual, which presents the Department's criteria for sampling and testing procedures for materials used in road and bridge construction. The objective of the Montana Materials Manual is to coordinate with the relevant national publications (e.g., AASHTO Standard Specifications for Transportation Materials and Methods of Sampling and Testing) and to indicate which testing methods:

1. follow a national standard,
2. basically follow a national standard with some modification for MDT application, or
3. are unique to Montana.

5.2.10 Montana Maintenance Manual

The Maintenance Division is responsible for the Montana Maintenance Manual, which contains Department criteria for the following:

1. maintenance of bituminous surfaces,
2. maintenance of concrete surfaces,
3. roadside landscaping and vegetation control,
4. safety and crash prevention, and
5. signs and pavement markings.

5.2.11 Montana CADD Standards Manual

The CADD Coordinator, in conjunction with the various other Department Sections including the Traffic Engineering Section, is responsible for the Montana CADD Standards Manual, which contains Department criteria for the following:

1. accessing the CADD software;
2. creating, editing and referencing files;
3. descriptions and applications of commands;

4. element placement and usage;
5. cell management; and
6. plotting.

5.2.12 Montana Signs and Signing Materials Catalog

The Traffic Engineering Section and the Maintenance Division are responsible for the Montana Signs and Signing Materials Catalog, which contains information on the signs used by the Department. The Catalog provides the following signing information:

1. MUTCD number;
2. the sizes of the sign used by the Department;
3. Montana's highway code number;
4. description (i.e., illustration of the sign); and
5. any special remarks relative to the sign.

5.2.13 Montana Typical Traffic Plans

The Montana Typical Traffic Plans are published in [Part VII](#) of the MDT Traffic Engineering Manual. This document illustrates the Department's preferred practices for presenting the design information on construction plan sheets used by the Traffic Engineering Section. It contains the following construction plans sheets:

1. Title Sheets,
2. Signing and Pavement Marking Plan Sheets,
3. Electrical Plan Sheets, and
4. road design plan sheets for Geometric and Safety projects.

5.2.14 Montana Consultant Services Procedures Manual

The Consultant Design Section is responsible for the Montana Consultant Services Procedures Manual. The Manual provides the development process for projects designed by consultants. The MDT Project Management System has been modified so consultants can incorporate their planning values into the Department's system. The System can be used to identify the critical path of a project's development and allow the consultant and the Department to monitor progress on the consultant's projects.

The Manual describes the activities and provides a flowchart for project development. This Manual is not an all inclusive guide for the development of a set of plans.

