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**Department of Transportation**  
Office of the Chief Engineer

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MEMORANDUM

TO: REGION TRANSPORTATION DIRECTORS, PROGRAM ENGINEERS AND RESIDENT ENGINEERS  
FROM: JOSHUA LAIPPLY, CHIEF ENGINEER  
DATE: SEPTEMBER 10, 2019  
SUBJECT: FORMAL ADOPTION OF AASHTO 2018 PGDHS (GREEN BOOK)

This memorandum formally adopts the AASHTO 2018, *A Policy on Geometric Design of Highways and Streets, 7<sup>th</sup> Edition* (PGDHS or Green Book) that hereby supersedes the PGDHS, 6<sup>th</sup> Edition. While designers should immediately begin using the 2018 Green Book on all CDOT highway projects, a one-year transition period will be provided. All CDOT highway projects advertised after October 1, 2020 shall be designed per the 2018 Green Book.

CDOT formally adopts the 2018 Green Book per the relevant May 10, 2019 Federal Highway Administration (FHWA) memorandum. This FHWA memorandum both acknowledges that rulemaking to update 23 CFR part 625 has not occurred and permits DOT adoption of the 2018 Green Book for use on NHS projects without requesting a formal design exception.

Electronic copies of the 2018 PGHS (and many other AASHTO resources) can be downloaded via CDOT's IHS subscription by all CDOT employees at:

<https://login.ihsmarkit.com/>

An IHS account validation process is now required for access. There is twenty-four hour IHS customer support to assist with any access issues: <https://ihsmarkit.com/about/contact-us.html>

A 2011 to 2018 AASHTO PGDHS summary of changes is included for reference along with a key excerpt from "Chapter 1: New Framework for Geometric Design" that articulates the approach and implementation of performance based practical design (PBPD). Special emphasis is added to the expanded PBPD guidance in the 2018 Green Book as a reflection of CDOT's past and current strategic implementation of PBPD methodology when appropriate. Two additional points of emphasis are the deeper discussion on multimodal considerations and new context classifications in the 2018 PGDHS.

The release of the 2018 Green Book was anticipated during the development of the 2018 CDOT Roadway Design Guide (RDG). While the 2018 CDOT RDG is generally synchronized with the 2011 Green Book, the process of updating the CDOT RDG per the 2018 Green Book has begun. Beyond updating the CDOT RDG per AASHTO 2018, the next CDOT RDG version will more fully integrate PBPD and multimodal considerations.

Please contact Jerome Estes, CDOT Highway Design Area Engineer at [Jerome.Estes@state.co.us](mailto:Jerome.Estes@state.co.us) or (303) 757.9326 with any questions related to the application of 2018 Green Book or 2018 CDOT Roadway Design Guide.





U.S. Department  
of Transportation  
**Federal Highway  
Administration**

# Memorandum

Subject: **INFORMATION:** A Policy on Geometric Design Highways and Streets, 2018 (Green Book) Date: May 10, 2019

From: /s/ Brian J. Fouch  
Director, Office of Preconstruction,  
Construction, and Pavements

In Reply  
Refer To: HICP-10

To: Resource Center Directors  
Division Administrators  
Federal Lands Highway Division Directors

In September 2018, the American Association of State Highway and Transportation Officials (AASHTO) published the 7<sup>th</sup> edition of “A Policy on Geometric Design of Highways and Streets,” (also known as the ‘2018 Green Book’). Many State departments of transportation (SDOT) have expressed interest in adopting this new edition for use on National Highway System (NHS) projects.

As specified in part 625 of title 23, Code of Federal Regulations, the 2011 Green Book (6<sup>th</sup> edition) is currently the incorporated reference establishing the criteria for acceptable standards, policies, and standard specifications, approved by the Secretary of Transportation in cooperation with the SDOTs, for construction and reconstruction projects on the NHS. The 2018 Green Book was developed through the typical AASHTO consensus process and is an incremental evolution of the 2011 Green Book.

Until 23 CFR part 625 is updated through rulemaking procedure, the 2018 Green Book should be considered guidance only and the 2011 Green Book is still the adopted standard for construction and reconstruction projects on the NHS. However, FHWA has reviewed the 2018 Green Book and finds that the updates meet or improve upon the criteria of the 2011 Green Book. As a result, a SDOT may adopt the 2018 Green Book for use *on* NHS projects without requesting a formal design exception. As always, SDOTs maintain the discretion to adopt any standard they choose for use with projects on their State roads *off* the NHS.

Refer to Appendix A for additional information on the 2018 Green Book. Any questions regarding this topic should be directed to Robert Mooney ([Robert.mooney@dot.gov](mailto:Robert.mooney@dot.gov)) or Elizabeth Hilton ([Elizabeth.hilton@dot.gov](mailto:Elizabeth.hilton@dot.gov)).

## Appendix A

### Information on the AASHTO 2018 Green Book

The 2018 Green Book introduces new definitions of project types—new construction, reconstruction, and projects on existing roads—and explains how design flexibility is provided for each project type as part of the project development process. The project type of “projects on existing roads,” with the additional caveat in the policy “that do not change the basic roadway type,” has traditionally been referred to as a resurfacing, restoration or rehabilitation (RRR) project. The American Association of State Highway and Transportation Officials does not define the phrase “projects on existing roads that do not change the basic roadway type,” leaving room for FHWA to interpret this phrase in a manner consistent with Federal regulations.

The FHWA generally considers projects that change the general geometric character of a highway, such as widening to provide additional through motor vehicle lanes, widening to add a raised or depressed median where none currently exists, and projects that substantially modify horizontal or vertical alignments to be among those that result in a “change in the basic roadway type”. Road changes that are accomplished with no, or only minimal widening, such as lane reconfigurations (road diets), adding turn lanes, adding channelizing islands, or adding median curbs for access management are *not* considered a “change in the basic roadway type”.

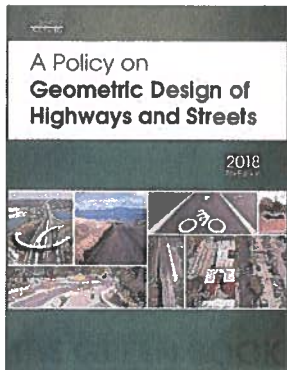
In addition, the 2018 Green Book states that full-depth pavement replacement projects that retain existing geometrics are not considered a “change in the basic roadway type”. The FHWA finds this interpretation acceptable for the purposes of determining geometric design criteria when applying the 2018 Green Book, but not for other purposes, such as pavement design.

The FHWA publication *Mitigation Strategies for Design Exceptions*, 2007 [FHWA-SA-07-011] is now considered obsolete and has been archived on the FHWA website. While the guidance regarding mitigation for design exceptions is still useful, much of the policy information in this publication is outdated.

# A POLICY ON GEOMETRIC DESIGN OF HIGHWAYS AND STREETS

## 7<sup>TH</sup> EDITION

### SUMMARY OF KEY REVISIONS AND UPDATES



The 2018 seventh edition of *A Policy on Geometric Design of Highways and Streets* (The AASHTO "Green Book") includes a number of key revisions and updates from the sixth edition, published in 2011.

The Green Book provides guidance to highway engineers and designers who strive to make unique design solutions that meet the needs of highway and street users, while maintaining the integrity of the environment. The seventh edition, specifically, describes how geometric design elements affect multiple transportation modes and recognizes the relationship between geometric design features and traffic operations.

The following table summarizes the key revisions and updates made to each chapter of the seventh edition.

<p><b>CHAPTER 1: NEW FRAMEWORK FOR GEOMETRIC DESIGN</b></p>	<p><b>Chapter 1</b> is a new chapter that explains application of the Green Book to accomplish flexible, performance-based design. The chapter presents the traditional functional classifications for roadways (local roads and streets, collectors, arterials, and freeways), as well as a new set of context classifications (rural, rural town, suburban, urban, and urban core) to guide geometric design. The chapter also explains how the functional and context classifications can be used together in a flexible and performance-based manner in the design of new construction projects, reconstruction projects, and projects on existing roads.</p>
<p><b>CHAPTER 2: DESIGN CONTROLS AND CRITERIA</b></p>	<p><b>Chapter 2</b> has been reorganized to emphasize transportation of people, rather than focusing primarily on moving vehicles. The chapter discusses multimodal level of service and puts greater emphasis on lower-speed, walkable, urban zones. The pedestrian walking speeds have been updated based on recent research.</p>

**CHAPTER 3:  
ELEMENTS OF DESIGN**

The key changes to **Chapter 3** include the following:

- Added an 85 mph [140 km/h] design speed to the tables for stopping sight distance
- Explained how to compute superelevation and minimum radius for design speeds greater than 80 mph [130 km/h]
- Provided more flexibility in the distribution and rate of rotation of superelevation in superelevation transitions
- Added an equation to check for potential oversupply of superelevation through superelevation transitions

**CHAPTER 4:  
CROSS SECTION ELEMENTS**

The key changes to **Chapter 4** include the following:

- Expanded discussion of driveway width guidelines
- Expanded discussion of median geometry to reduce cross-median crashes
- Updated noise abatement discussion based on latest FHWA guidance

**CHAPTER 5:  
LOCAL ROADS AND STREETS**

**Chapter 5** now includes the following:

- Revised rural traveled way and shoulder widths to more right-sized values
- Added material presenting design speed ranges for specific contexts
- Added a new section on driveways in rural areas
- Revised discussions of lane widths for urban streets to better align with the guidance for urban arterials
- Reorganized discussion of recreational roads and special purpose roads into separate sections
- Updated minimum curve radii for unpaved roads based on U.S. Forest Service guidance

**CHAPTER 6:  
COLLECTOR ROADS AND STREETS**

**Chapter 6** now includes the following:

- Revised rural traveled way and shoulder widths to more right-sized values
- Added material presenting design speed ranges for specific contexts
- Added discussion of high-speed to low-speed transition zones
- Revised discussions of lane widths for urban streets to better align with the guidance for urban arterials

<p><b>CHAPTER 7: ARTERIAL ROADS AND STREETS</b></p>	<p>The title of <b>Chapter 7</b> has been changed to Arterial Roads and Streets for consistency with Chapters 5 and 6. Key changes to Chapter 7 include the following:</p> <ul style="list-style-type: none"> <li>• Added section on design for the rural town context</li> <li>• Added section on speed management in design for urban areas</li> <li>• Added discussion of high-speed to low-speed transition zones</li> </ul>
<p><b>CHAPTER 8: FREEWAYS</b></p>	<p>Key changes to <b>Chapter 8</b> include the following:</p> <ul style="list-style-type: none"> <li>• Revised design speed guidance to encourage right-sized and context sensitive designs in urban and suburban settings</li> <li>• Removed material targeting specific levels of service</li> </ul>
<p><b>CHAPTER 9: INTERSECTIONS</b></p>	<p><b>Chapter 9</b> has been updated as follows:</p> <ul style="list-style-type: none"> <li>• Added or revised drawings and text on channelized right-turn lanes, offset left-turn lanes, bypass lanes, and reduced-conflict intersections</li> <li>• Removed seldom-used figures and tables on edge-of-traveled-way designs, median design layouts, and intersection sight distance</li> <li>• Added table on characteristics of non-motorized users</li> <li>• Added intersection sight distance discussion for roundabouts</li> <li>• Revised criteria for turn-lane length</li> </ul>
<p><b>CHAPTER 10: GRADE SEPARATIONS AND INTERCHANGES</b></p>	<p><b>Chapter 10</b> now includes the following:</p> <ul style="list-style-type: none"> <li>• Added section on diverging diamond interchanges</li> <li>• Added table on maximum ramp grade</li> <li>• Expanded tables of acceleration and deceleration lane lengths to include 80 mph [130 km/h] design speeds</li> </ul>

# 1 New Framework for Geometric Design

## 1.1 INTRODUCTION

This seventh edition of the *A Policy on Geometric Design of Highways and Streets* incorporates recent research that provides insight into the effect of specific geometric design elements of roads and streets for all transportation modes. This edition of the policy also introduces the consideration of five specific context classifications as an element of the geometric design process and emphasizes the consideration of multimodal needs in design. Together, context classification and functional classification constitute a new framework for geometric design. The policy also encourages flexible design, which emphasizes the role of the planner and designer in determining appropriate design dimensions based on project-specific conditions and existing and future roadway performance more than on meeting specific nominal design criteria. In the past, designers sought to assure good traffic operational and safety performance for the design of specific projects primarily by meeting the dimensional design criteria in this policy. This approach was appropriate in the past because the relationship between design dimensions and future performance was poorly understood. Traditional applications of this policy took the approach that, if the geometric design of a project met or exceeded specific dimensional design criteria, it would be likely to perform well. In some cases, this may have led to overdesign, constructing projects that were more costly than they needed to be or were inappropriate for the roadway context.

Recent research has improved our knowledge of the relationship between geometric design features and traffic operations for all modes of transportation and has developed new knowledge about the relationship of geometric design features to crash frequency and severity. Much of the recently developed information about assessing traffic operations for all transportation modes is presented in the TRB *Highway Capacity Manual* (25), while the recently developed information about estimating future crash frequencies and severities is presented in the AASHTO *Highway Safety Manual* (4, 7).

This edition of the policy introduces new definitions of project types—new construction, reconstruction, and projects on existing roads—and explains how design flexibility is provided for each project type as part of the project development process.