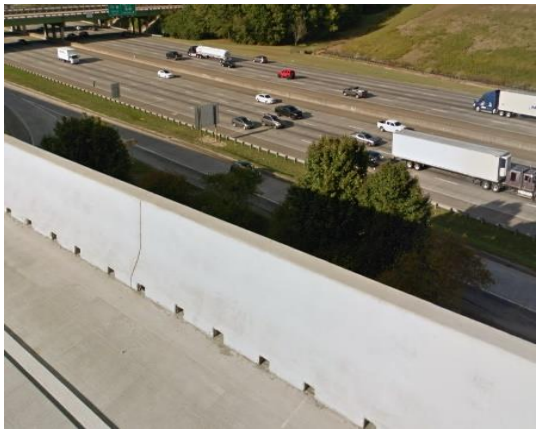
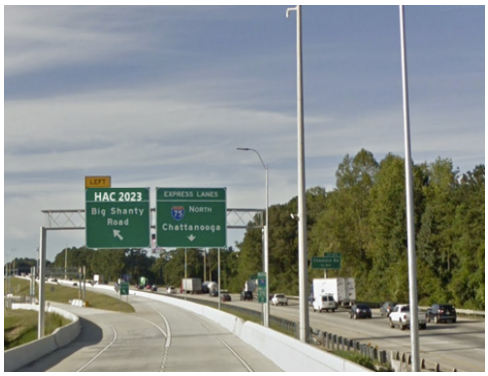
DE/DV Guide
(Design Exception/Design Variance)

DESIGN EXCEPTION



DESIGN VARIANCE



12/01/2024
Revision 1.0
Atlanta, GA 30308

GDOT
Georgia Department of Transportation

This document was developed as part of the continuing effort to provide guidance within the Georgia Department of Transportation in fulfilling its mission to provide a safe, efficient, and sustainable transportation system through dedicated teamwork and responsible leadership supporting economic development, environmental sensitivity and improved quality of life. This document is not intended to establish policy within the Department, but to provide guidance in adhering to the policies of the Department.

Your comments, suggestions, and ideas for improvements are welcomed.

Please send comments to:

State Design Policy Engineer
Georgia Department of
Transportation One Georgia
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DISCLAIMER

The Georgia Department of Transportation maintains this printable document and is solely responsible for ensuring that it is equivalent to the approved Department guidelines.

Revision History

Revision Number	Revision Date	Revision Summary
1.0	12/01/24	Original Guide

List of Effective Chapters

Document	Revision Number	Revision Date
List of Effective Chapters	1.0	12/01/24
Table of Contents	1.0	12/01/24
Acronyms and Definitions	1.0	12/01/24
Chapter 1. Introduction	1.0	12/01/24
Chapter 2. General Guidance	1.0	12/01/24
Chapter 3. Controlling and Standard Criteria	1.0	12/01/24

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Table of Contents

Acronyms and Definitions

Acronyms

The below acronyms are referenced in the DE/DV Guide. For additional acronyms, see the GDOT DPM.

AASHTO – American Association of State Highway and Transportation Officials (https://transportation.org/)

ADA – Americans with Disabilities Act

CMF – Crash Modification Factor (https://www.cmfclearinghouse.org/)

DD – Design Deviation

DE – Design Exception

DPL – Design Phase Leader

DPM – Design Policy Manual (https://www.dot.ga.gov/PartnerSmart/DesignManuals/DesignPolicy/GDOT-DPM.pdf)

DV – Design Variance

EOR – Engineer of Record

FHWA – Federal Highway Administration (https://highways.dot.gov/)

GEARS – Georgia Electronic Accident Reporting System (https://www.gearsportal.com/Pages/Public/Home.aspx)

GDOT – Georgia Department of Transportation (https://www.dot.ga.gov/Pages/Default.aspx)

GDOT – Crash Data Portal (Numetrics) https://gdot.aashtowaresafety.net/crash-data#/

HSM – Highway Safety Manual (https://www.highwaysafetymanual.org/Pages/default.aspx)

ITE – Institute of Transportation Engineers (https://www.ite.org/)

PM – Project Manager

PODI – Projects of Division Interest

PROWAG – Public Rights-of-Way Accessibility Guidelines (https://www.access-board.gov/prowag/)

Definition of Terms

For a substantive listing of Definitions, see the GDOT Design Policy Manual (DPM) and/or the Plan Development Process (PDP) references.

AASHTO Green Book – American Association of State Highway and Transportation Officials (AASHTO) publication named *A Policy on Geometric Design of Highways and Streets*. See DPM **References** for additional information.

AASHTO Low Volume Guide – American Association of State Highway and Transportation Officials (AASHTO) publication named *Guidelines for Geometric Design of Low-Volume Roads.* This Guide contains applicable geometric design selections for local and collector roads that have low daily traffic volumes.

AASHTOWARE Safety – This is an AASHTO web-based software portal that provides various safety related information such as crash data Numetrics as well as other safety data collection and resources.

ADA (Americans with Disabilities Act) – A federal law that was enacted in 1990 for the purpose of ensuring that all Americans have the same basic rights of access to services and facilities. The ADA prohibits discrimination on the basis of disability. To effect this prohibition, the statute required certain designated federal agencies to develop implementing regulations.

CMF (Crash Modification Factor) – For in-depth information and CMF FAQ's, reference the CMF Clearinghouse. The CMF is used as a computational component to assist in quantifying an estimate for a potential change/expectation in crashes based on proposed alternative countermeasures.

DD (Design Deviation)– A design condition that does not meet "recommended practice" or "guidelines" but does not violate FHWA Controlling or GDOT Standard criteria. An Engineering study, appropriate justification, and documentation by the EOR of the design decision is required but the documentation is not submitted for approval from the Chief Engineer. The Design Deviation is retained in the project records. It is recommended to submit these at Field Plan Reviews.

DE (Design Exception) – A design condition that does not meet AASHTO guidelines and requires specific approval from the GDOT Chief Engineer and FHWA for Projects of Division Interest.

DV (Design Variance) – A design condition that does not meet GDOT policy. A design variance requires specific approval from the GDOT Chief Engineer.

DPL (Design Phase Leader) – The individual charged with the responsibility to design the Roadway portion of the project and compile the various activities from other phase leaders.

Engineer of Record – A licensed Professional Engineer who is responsible for the adequacy and safety of the design.

Federal Highway Administration (FHWA) – An agency of the U.S. Department of Transportation and is headquartered in Washington, D.C., with field offices across the United States. The FHWA administers the Federal-Aid Highway Program. The FHWA Georgia Division webpage is available at: https://www.fhwa.dot.gov/gadiv/

FHWA Controlling Criteria – FHWA identified 10 design elements listed as having substantial importance to the operational and safety performance of a roadway such that special agency attention should be given to the criteria in the design decision making process. See DE/DV Guide – Chapter 3 – for a listing of criteria and application.

GDOT Crash Data Portal (Numetrics) – (https://gdot.aashtowaresafety.net/crash-data#/) Application for use in determining crash history within the project limits and in particular crash history for features requiring a design exception or variance request.

GDOT Standard Criteria – GDOT identified an additional 14 design elements that have substantial importance to the operational and safety performance of a roadway such that special agency attention should be given to the criteria in the design decision making process. See DE/DV Guide – Chapter 3 – for a listing of criteria and application.

GDOT Existing Roadways DV Template – An abbreviated template (***Design Variance Template Only***) to be used exclusively for projects on existing roads as discussed in AASHTO Green Book 1.7.3. This template is applicable only for retained (or slightly improved) geometric design feature(s) which are nonstandard but can be shown to be performing well today and are anticipated to continue to perform well in the future. Additional information is provided in this Policy Memo dated November 22, 2022.

GDOT Standard DE/DV Template – This template is used for DE requests based on Green Book Criteria 1.7.1 – 1.7.3 and for DV requests for 1.7.1 – 1.7.2 (as well as any applicable DV criteria in 1.7.3).

GEARS (Georgia Electronic Accident Reporting System) – This is an application portal for the State of Georgia's repository for traffic accident reports completed by Georgia law enforcement agencies (https://www.gearsportal.com/Pages/Public/Home.aspx).

HSM (Highway Safety Manual) – A manual providing tools to assist in the analysis and projected safety performance of a design. If applicable the HSM spreadsheets can be instrumental in predicting the impact of proposed alternatives on safety.

Mitigation – A measure to minimize any potential adverse impacts to the safety and operation of a roadway.

PoDI (Project of Division Interest) – Projects identified by the FHWA GA Division that represent an elevation risk (threat or opportunity) to the Federal-aid highway program. These projects have an individual project Stewardship and Oversight Plan (i.e., PoDI plan), that outlines the level and type of involvement (reviews, approvals, or authorizations) that FHWA will have on a project.

Preconstruction Status Report (PSR) – A GDOT report depicting a project's status information, description, location, preliminary letting dates, and project activities.

Chapter 1. Introduction

1.1 Objective

The purpose of the DE/DV Guide is to provide resources and guidance to assist the Engineer of Record (EOR) in the preparation and submittal of GDOT Design Exceptions/Design Variances (DE/DVs). The primary intent is to streamline the process and aid in the reduction of the number of DE/DV submittal iterations, comments, and subsequent revisions.

Although constraints can be encountered on projects which may require deviations (DE/DVs) from the minimum standards, the primary focus should always endeavor to be highway safety. An emphasis on practical design initiatives, appropriate study, extensive evaluation, and comprehensive documentation should be applied to DE/DVs on applicable projects.

This guide is for use by GDOT personnel, consulting engineering firms, local governments (if applicable) and other entities that may benefit from information regarding the DE/DV process.

The DE/DV Guide is a supplemental document to be used only as an aid for development of DE/DV submissions. AASHTO and GDOT Policy, Manuals and Templates are the controlling documents.

1.2 Contacts

The DE/DV Guide is maintained by the Division of Engineering, Office of Design Policy and Support. To submit questions/comments pertaining to the DE/DV Guide, please send an email here: DesignException@dot.ga.gov.

1.3 Guide Updates

This document is updated periodically to conform to GDOT's current design policies and practices. The version and latest revision date are listed in the Revision History and at the bottom of each page of the guide.

1.4 Chapter Overview

The DE/DV Guide is structured and categorized as follows:

Chapter 1. Introduction – presents an overview of the DE/DV (Design Exception/Design Variance) Guide, Contact Information and Guide Update status.

Chapter 2. General Guidance – discusses DE/DV processes and procedures. This Chapter provides instructions on Report Preparation guidance and discusses requisite information needed for each of the Report Sections.

Chapter 3. Controlling and Standard Criteria – presents the FHWA Controlling Criteria and the GDOT Standard Criteria requirements. This Section categorizes, clarifies, and provides tools and strategies to assist in the documentation for DE/DV Submission of the Controlling and/or Standard Criteria components.

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Chapter 2. General Guidance

2.1 Report Preparation

This Section provides guidance and documentation practices for the development of a comprehensive DE/DV Report. The determination of when a Design Exception/Design Variance is needed, DE/DV resources available, the requisite DE/DV Template(s) required, report organization and other aspects are discussed.

2.1.1 Need for Design Exception/Design Variance

A Design Exception/Design Variance is needed when an existing and/or proposed feature/element on a roadway project does not meet the required conditions established for FHWA Controlling Criteria and/or GDOT Standard Criteria. These criteria are defined in the GDOT Design Policy Manual (DPM) Chapter 2. The GDOT DPM reference source provides a structured layout of the requisite criteria that is to be followed regarding applicable DE/DV features and elements and stipulates when a DE is required versus a DV.

There are many factors that must be taken into consideration regarding the acceptance of a DE/DV to ensure that operational and safety performances are adhered to. A thorough study and a well-documented design decision prepared and submitted by the EOR for a DE/DV is a critical component in this process. FHWA and/or GDOT perform an in-depth review and evaluation of the documented DE/DV for acceptance/non-acceptance to ensure engineering principles, operating performance and safety conditions are not compromised.

Below are descriptions of the DE/DV documented design decisions:

Design Exception (FHWA Requirement) – Design condition does not meet AASHTO guidelines. Requires specific approval from GDOT Chief Engineer and FHWA for Projects of Division Interest.

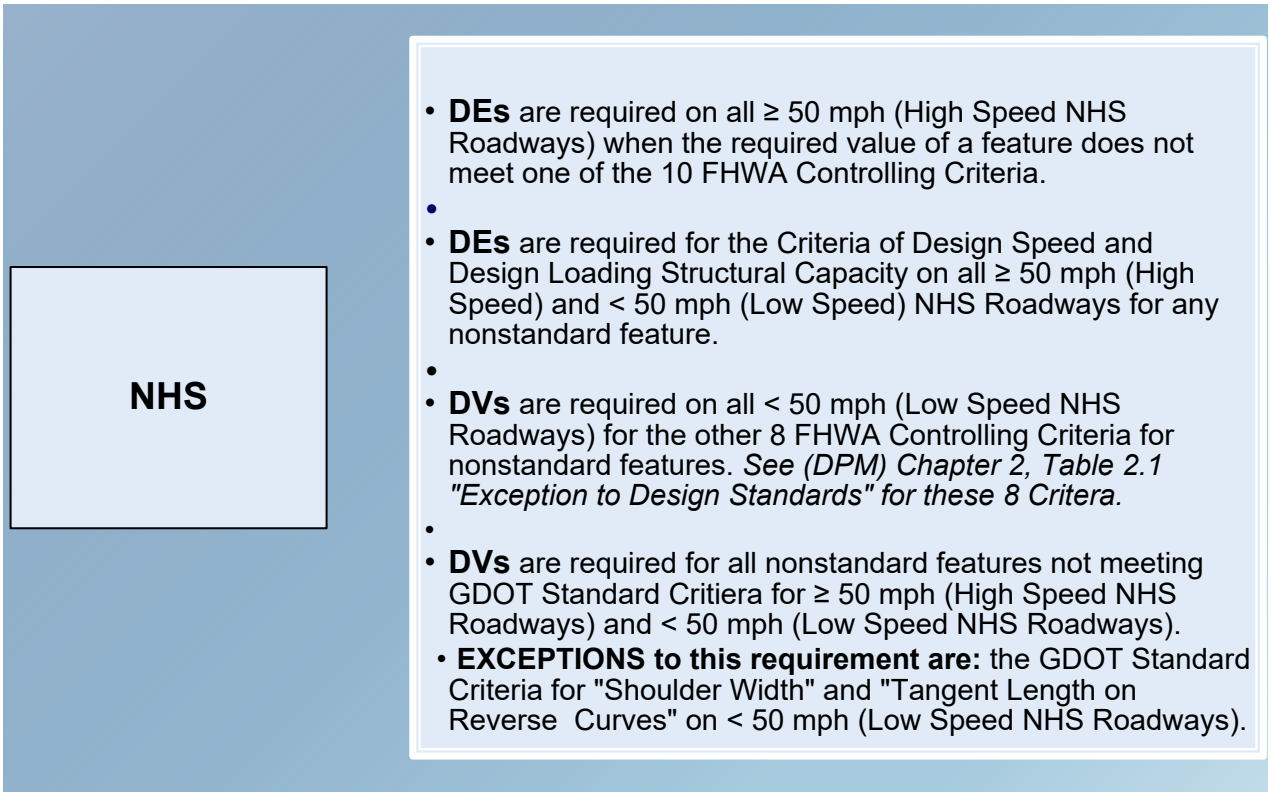
Design Variance (GDOT Requirement) – Design condition does not meet GDOT policy. A design variance requires specific approval from the GDOT Chief Engineer.

New Construction Roadway (AASHTO Green Book 1.7.1) **Limited Flexibility for DE/DVs**	Includes very limited flexibility/need for DE/DVs since new construction should easily meet standard design criteria.
Reconstruction Roadway (AASHTO Green Book 1.7.2) **Greater Flexibility for DE/DVs**	Consists of somewhat more flexibility/need for DE/DVs due to retaining existing/established roadway features such as existing alignments, intersections, site constraints, etc.
Existing Roadway (AASHTO Green Book 1.7.3) **Greatest Flexibility for DE/DVs**	This type of roadway would entail a greater flexibility/need for DE/DVs because it consists of a majority of limitations due to the nature of the roadway and prevailing conditions.

Depicted below is an overview of the conditions for Design Exceptions/Design Variances pertaining to nonstandard features on **NHS** and **State Route Roadway Systems**. For Detailed DE/DV Criteria requirements see GDOT Design Policy Manual (DPM) Chapter 2, Table 2.1 *Exception to Design Standards.*

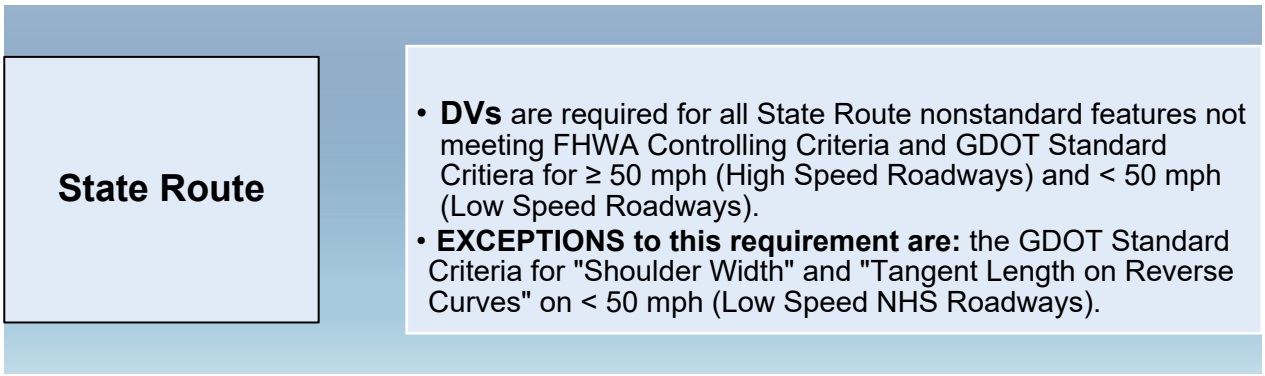
NHS

Nonstandard Feature/Element Requirements



State Route

Nonstandard Feature/Element Requirements



Depicted below is an overview of the conditions for Design Exceptions/Design Variances pertaining to nonstandard features/elements on **Off-System** and **Connecting Roadway Systems**. For Detailed DE/DV Criteria requirements see GDOT Design Policy Manual (DPM) Chapter 2, Table 2.1 *Exception to Design Standards.*

Off-System

Nonstandard Feature/Element Requirements

Off-System

DVs are not required for nonstandard features violating FHWA Controlling Criteria and/or GDOT Standard Criteria on Off-System Roadways (High Speed/Low Speed) **UNLESS the following conditions apply:**

- ***GDOT Personnel Resources are involved in the following*:**
  Design
  Engineering
  ROW Acquisition
  Construction Letting

(This also applies if the work above is on behalf of GDOT and performed by Consulting Engineering firms and/or Contractors).

OTHER EXCEPTIONS:

1. **DVs apply** on applicable Off-System Roadways (High/Low Speed) if the nonstandard feature violates the FHWA Constrolling Criteria of "Design Loading Structural Capacity".
2. The requirement(s) for the GDOT Standard Criteria for "Shoulder Width" and "Tangent Length on Reverse Curves" on < 50 mph (Low Speed Roadways) are not applicable.

Connecting Roadways

Nonstandard Feature/Element Requirements

Connecting Roadways to NHS

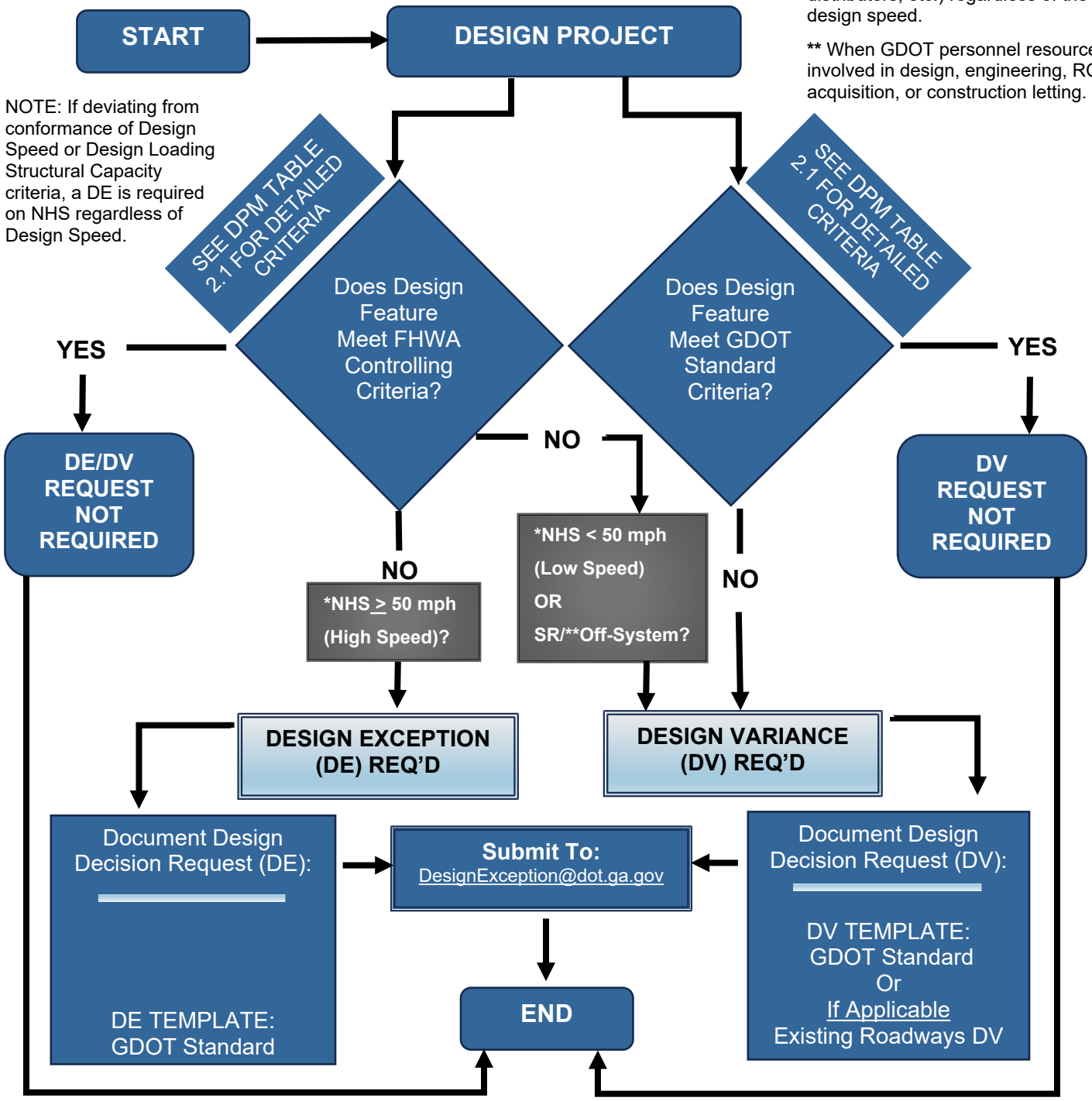
. **DEs** are required for nonstandard features violating FHWA Controlling Criteria on "connecting roadways" to NHS High Speed facilities (i.e. ramps, collector-distributors, etc.) regardless of the Design Speed.

. **DVs** are required for nonstandard features violating GDOT Standard Criteria on "connecting roadways" to NHS High Speed facilities (i.e. ramps, collector-distributors, etc.) regardless of the Design Speed.

Design Exception/Design Variance Decision Workflow

*A Design Exception is also required for connecting roadways to NHS high speed facilities (i.e., ramps, collector-distributors, etc.) regardless of the design speed.

** When GDOT personnel resources are involved in design, engineering, ROW acquisition, or construction letting.



* **GDOT Design Policy Manual (DPM)** – **Reference** DPM Chapter 2, Table 2.1 *Exception to Design Standards* regarding specific FHWA Controlling Criteria and the GDOT Standard Criteria.
https://www.dot.ga.gov/PartnerSmart/DesignManuals/DesignPolicy/GDOT-DPM.pdf

Design Exception/Design Variance – 24 Controlling and Standard Criteria

FHWA CONTROLLING CRITERIA

- Design Speed
- Design Loading Structural Capacity

DE

***NHS:**
HIGH SPEED (≥ 50 MPH)
& LOW SPEED (< 50 MPH)

DV

SR/OFF-SYSTEM:**
HIGH SPEED (≥ 50 MPH)
& LOW SPEED (< 50 MPH)

- Stopping Sight Distance
- Horizontal Curve Radius
- Superelevation Rate
- Maximum Grade
- Vertical Clearance
- Lane Width
- Cross Slope
- Shoulder Width

DE

***NHS:**
HIGH SPEED (≥ 50 MPH)

DV

***NHS:**
LOW SPEED < 50 MPH)

SR/OFF-SYSTEM =**
HIGH SPEED (≥ 50 MPH)
& LOW SPEED (< 50 MPH)

GDOT STANDARD CRITERIA

- Access Control
- # Shoulder Width
- Intersection Sight Distance
- Intersection Skew Angle
- # Tangent Lengths on Reverse Curves
- Lateral Offset to Obstruction
- Rumble Strips
- Safety Edge
- Median Usage
- Roundabout Illumination Levels
- Pedestrian, Bicycle, & Transit Warrants
- ADA Requirement in PROWAG
- GDOT Construction Standards
- GDOT Drainage Manual

DV

***NHS:**
HIGH SPEED (≥ 50 MPH)
& LOW SPEED (< 50 MPH)

SR/OFF-SYSTEM:**
HIGH SPEED (≥ 50 MPH)
& LOW SPEED (< 50 MPH)

*A Design Exception is also required for connecting roadways to NHS high speed facilities (i.e., ramps, C-Ds, etc.) regardless of the design speed.

** When GDOT personnel resources are involved in design, engineering, ROW acquisition, or construction letting.

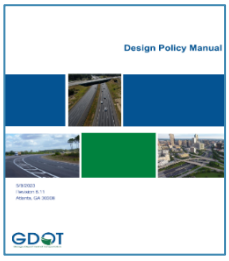
See DPM Table 2.1 for Exceptions RE: " Shoulder Width" and "Tangent Lengths on Reverse Curves" on < 50 mph (Low Speed).

2.1.2 DE/DV Reference Sources

The primary reference(s) and associated hyperlinks for use in the preparation and submittal of GDOT DE/DVs are listed below:

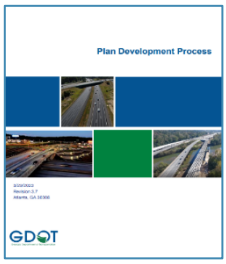
1. **GDOT Design Policy Manual (DPM)** – Chapter 2 contains in-depth information regarding the requirements for DE/DVs. This includes the FHWA Controlling Criteria and the GDOT Standard Criteria. DPM Chapter 2, Table 2.1 *Exception to Design Standards* provides an organized layout of the requisite criteria that is to be followed regarding applicable DE/DV features and elements.

   https://www.dot.ga.gov/PartnerSmart/DesignManuals/DesignPolicy/GDOT-DPM.pdf



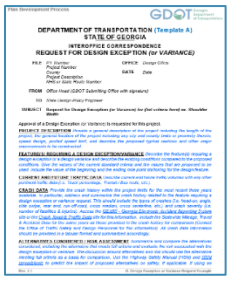
2. **GDOT Plan Development Process (PDP)** – This Document contains pertinent information pertaining to DE/DVs as it relates to the stages of Design.

   https://www.dot.ga.gov/PartnerSmart/DesignManuals/PlanDevelopmentProcess/PDP.pdf



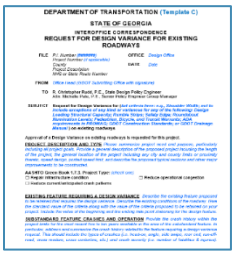
3. **GDOT Standard DE/DV Template** – This consists of Template A (Internal Version – GDOT Design) and Template B (External Version - Engineering Firm Design). This template represents the typical DE/DV standard content used in most submittals.

   https://www.dot.ga.gov/PartnerSmart/DesignManuals/PlanDevelopmentProcess/Design Exception or Variance Request Example-Appendix_D.zip



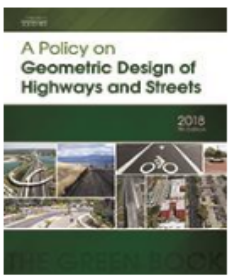
4. **GDOT Existing Roadways DV Template** – This consists of Template C (Internal Version – GDOT Design) and Template D (External Version – Engineering Firm Design). This is an abbreviated DV template (***Design Variance Template Only***) for use exclusively on existing roads (when applicable criteria are met).

   https://www.dot.ga.gov/PartnerSmart/DesignManuals/PlanDevelopmentProcess/Design Variance on Existing Roadways Template - Appendix D.zip



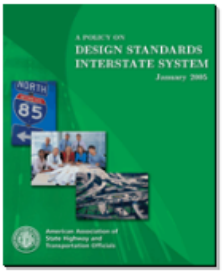
5. **AASHTO Green Book (Current Edition)** – American Association of State Highway and Transportation Officials (AASHTO) publication named *A Policy on Geometric Design of Highways and Streets*.

   https://store.transportation.org/item/collectiondetail/180



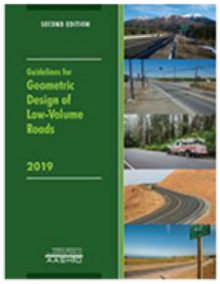
6. **AASHTO – A Policy on Design Standards --- Interstate System (Current Edition)** – American Association of State Highway and Transportation Officials (AASHTO) publication containing Standards that apply to Interstate Highways.

   https://store.transportation.org/Item/PublicationDetail?ID=2624



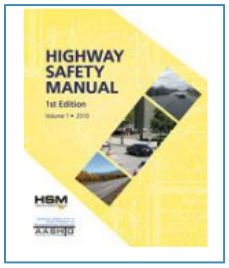
7. **AASHTO Guidelines for Geometric Design of Low-Volume Roads (Current Edition)** – American Association of State Highway and Transportation Officials (AASHTO) Guide for design of roads with low volumes.

   https://store.transportation.org/Item/CollectionDetail?ID=195



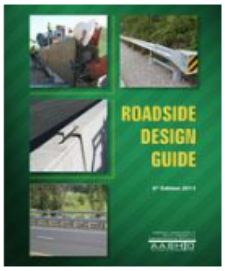
8. **AASHTO Highway Safety Manual (HSM) (Current Edition)** – American Association of State Highway and Transportation Officials (AASHTO) Manual used to assist in providing quantification of safety considerations during design of a project.

   https://store.transportation.org/Item/CollectionDetail?ID=135



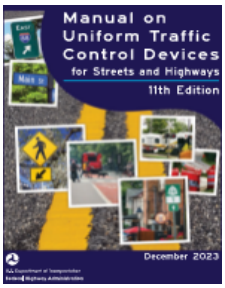
9. **AASHTO Roadside Design Guide (RDG) (Current Edition)** – American Association of State Highway and Transportation Officials (AASHTO) Guide related to practices pertaining to Roadside Safety.

   https://store.transportation.org/Item/CollectionDetail?ID=105



10. **FHWA Manual on Uniform Traffic Control Devices (MUTCD) (Current Edition)** – FHWA Manual approved as the national standard for the placement and standardization of all signs, signals, and markings placed on public facilities.

    https://mutcd.fhwa.dot.gov/kno_11th_Edition.htm



2.1.3 Design Exception/Design Variance (DE/DV) VS. Design Deviation (DD)

A **Design Exception/Design Variance (DE/DV)** is a documented Mandatory Requirement pertaining to feature(s) not meeting FHWA Controlling and/or GDOT Standard Criteria (typically denoted by "Shall" in the DPM). These require specific documented approval from FHWA and/or GDOT's Chief Engineer.

A **Design Deviation (DD)** pertains to features/elements that are in non-conformance to criteria involving "recommended practice" or a "guideline" (typically denoted by "Should" in the DPM). **DDs** are allowed when appropriate engineering analysis can justify why the recommended criteria for the feature(s) cannot be attained. An Engineering study, appropriate justification, and documentation by the EOR of the design decision is required. A GDOT Template is not provided for the Design Deviation and the stated documentation is not typically submitted to the Office of Design Policy for review/acceptance. A decision to deviate from guidelines are for project records only and is subject to review by GDOT if requested.

Example of Design Deviation: On a Low Impact Bridge Project (LIBP) – Documented Design Deviation for 1-ft of free-board in roadside Ditches.

2.1.4 Templates: GDOT Standard DE/DV and GDOT Existing Roadways DV

1. GDOT currently maintains two format types of Templates for submittals of Design Exceptions and/or Design Variances:

    1. The GDOT Standard DE/DV Template
    2. The GDOT Existing Roadways DV Template - (i.e., a condensed version template with less required documented information).

The primary difference between the two templates is that the Existing Roadways DV Template can only be used exclusively on existing roads (1.7.3), it cannot be used for Design Exceptions, and there are qualifying conditions in which it can be used for specific Design Variances.

GDOT Standard Template	This template is for use on all DE/DV requests based on AASHTO Green Book Criteria 1.7.1 – 1.7.2 and for all DE requests for applicable criteria in 1.7.3. For DV Use on 1.7.3 – See the GDOT DE/DV Template Decision Table (in this Guide) for specific criteria application.
GDOT Existing Roadways Template	***Not for use on DEs. Can be applied for Specific DVs only.*** This template is used exclusively on existing roads (1.7.3) See AASHTO Green Book 1.7.3 for details of applicable roadway type. There are specific conditions for use of the Existing Roadways DV Template for certain features/elements. See additional information provided in the GDOT DE/DV Template Decision Table (in this Guide) as well as the Existing Roadways DV Template and this Policy Memo dated November 22, 2022.

2. In order to use the Existing Roadways DV Template, the below required criteria must also be met:

AASHTO Green Book 1.7.3. Project Type: *(**One** criteria must be met)*

☐ Repair infrastructure condition ☐ Reduce operational congestion

☐ Reduce current/anticipated crash patterns

*(All **Four** criteria must be met)*

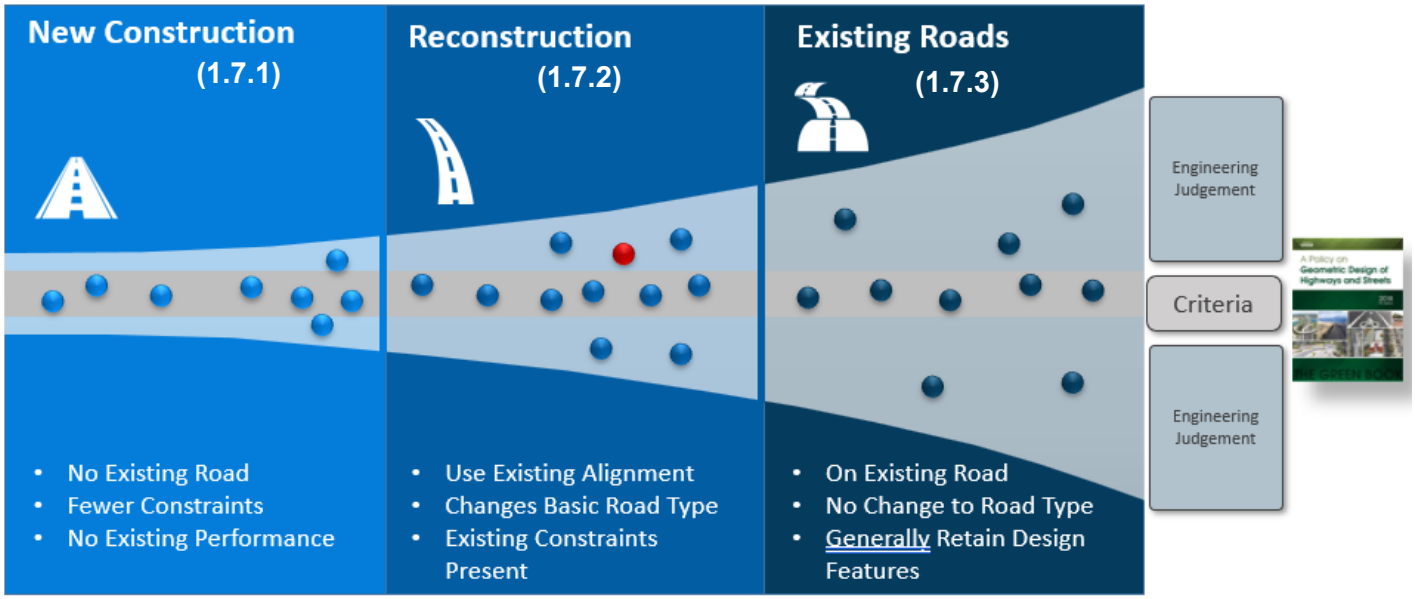
☐ Project type meets requirements of AASHTO Green Book Section 1.7.3.

☐ The nonstandard feature is an existing condition that will not be worsened.

☐ The nonstandard feature performs well today and is anticipated to continue to perform well.

☐ The nonstandard feature is recommended for retention on this project.

Below is a brief overview of the current AASHTO Green Book criteria for Roadways that are classified as New Construction (1.7.1), Reconstruction (1.7.2) or Existing Roads (1.7.3):



GDOT DE/DV Template Decision Table

LEGEND:
S = Standard Template
ER = Existing Roadways Template
— = Does Not Apply

	New Construction 1.7.1		Reconstruction 1.7.2		Existing Road 1.7.3	
FHWA Controlling Criteria	**DE**	**DV**	**DE**	**DV**	**DE**	**DV**
Design Speed	S	S	S	S	S	ER
Design Loading Structural Capacity	S	S	S	S	S	S
Stopping Sight Distance	S	S	S	S	S	ER
Horizontal Curve Radius	S	S	S	S	S	ER
Maximum Grade	S	S	S	S	S	ER
Vertical Clearance	S	S	S	S	S	ER
Superelevation Rate	S	S	S	S	S	ER
Lane Width	S	S	S	S	S	ER
Cross Slope	S	S	S	S	S	ER
Shoulder Width	S	S	S	S	S	ER
GDOT Standard Criteria	**DE**	**DV**	**DE**	**DV**	**DE**	**DV**
Access Control	—	S	—	S	—	ER
Shoulder Width	—	S	—	S	—	ER
Intersection Sight Distance	—	S	—	S	—	ER
Intersection Skew Angle	—	S	—	S	—	ER
Tangent Lengths on Reverse Curves	—	S	—	S	—	ER
Lateral Offset to Obstruction	—	S	—	S	—	ER
Rumble Strips	—	S	—	S	—	S
Safety Edge	—	S	—	S	—	S
Median Usage	—	S	—	S	—	ER
Roundabout Illumination Levels	—	S	—	S	—	S
Pedestrian, Bicycle, and Transit Warrants	—	S	—	S	—	S
ADA Requirement in PROWAG	—	S	—	S	—	S
GDOT Construction Standards	—	S	—	S	—	S
GDOT Drainage Manual	—	S	—	S	—	S

2.1.5 Report Organization - Multiple Design Exceptions/Design Variances

There may be cases during project design when multiple conditions/locations exist for proposed and/or existing use of nonstandard features and a design decision (DE/DV) is planned to retain them. Criteria, features, and locations should be documented in a systemized format and (in-general) in separate reports. Below are some recommendations regarding DE/DV report organization for multiple nonstandard features:

1. **Combining Multiple DE/DV Criteria in one report:**
   - Combining multiple DE/DVs for different criteria for features in one report is generally discouraged.
   - If multiple features are documented, always ensure that the proposed/existing nonstandard features are described separately in the Template Section(s) entitled "FEATURE(S) REQUIRING A DESIGN EXCEPTION/VARIANCE" or EXISTING FEATURE REQUIRING A DESIGN VARIANCE".
   - Ensure crash data is analyzed separately for each feature because different nonstandard features may be prone to different crash patterns.
   - It is also suggested that each DE/DV criteria generally deviate from the standard condition based on a similar degree or risk. Otherwise, a subsequent revision may be needed to remove one or more criteria from the final report.

2. **Combining Multiple Locations of the same nonstandard feature in one report:**
   - In some cases, the same feature criteria may be considered nonstandard in several areas for a particular project. Example: ISD at multiple intersections or nonstandard curve radii at various corridor locations. While these features/elements may be incorporated into a single DE/DV report, each location should be analyzed separately with associated crash data clearly presented for each particular (unique) location.
   - It is also recommended that each of the feature locations should generally deviate from the standard condition to a similar degree or risk. Otherwise, as noted in the section above, a revision may be needed to remove one or more locations from the final report.

Use engineering judgement and the above recommendations to ensure that the DE/DV report is presented/documented in an organized format to easily differentiate between the nonstandard criteria, the proposed/existing feature(s), and the supporting design decision(s) pertaining to them.

2.1.6 DE/DV Submission(s)

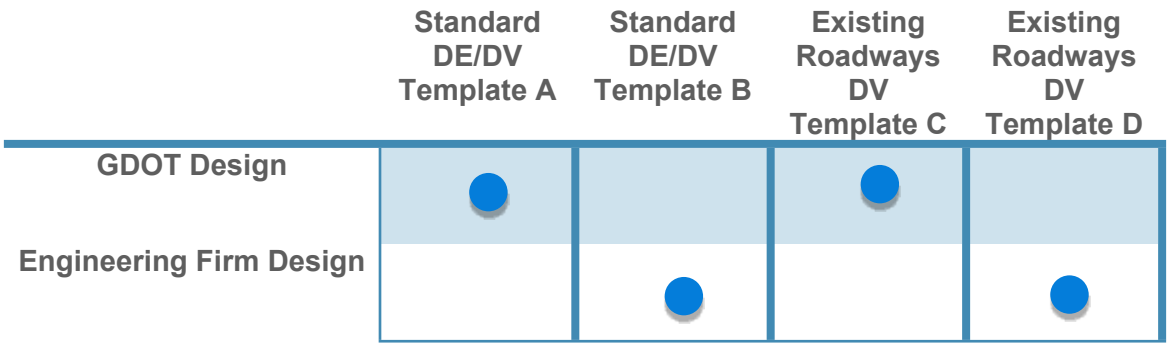
1. **Submission Schedule:**

The Engineer of Record shall prepare and submit any Design Exceptions and/or Design Variances (DE/DV) to the GDOT Project Manager (PM) as soon as they are found to be necessary, and the information and studies needed to justify the DE/DV have been completed.

a)	DE/DVs should be submitted prior to the completion of the right-of-way plans.
b)	On Project of Division Interest (PoDI) projects, DE/DV's identified during the Concept phase require FHWA review and approval of the DE/DV before they approve the concept. If a DE/DV is identified on a PoDI project after FHWA has approved the concept, the DE/DV should be promptly submitted and communicated to FHWA.
c)	Applicable DE/DVs shall be obtained prior to the implementation of a "VE study recommendation" which deviates from adopted design standards or defined policy.

2. **DE/DV (ABCD) Template Selection (GDOT Design/Engineering Firm Design):**

There are four (4) applicable templates available for use in Standard DE/DV and/or Existing Roadways DV Submissions. Based on the template selected using the GDOT DE/DV Template Decision Table, the Templates are further differentiated by GDOT Design or Engineering Firm Design. The Table below depicts the respective templates for determining the appropriate DE/DV Template to select:



NOTE: Requests from Engineering Firm Design should also be submitted on the Engineering Firm's letterhead. (See Template B & D for Example(s)).

3. Standard DE/DV Report and/or Existing Roadways DV Report(s) - Attachments:

In addition to the design decision narrative in the DE/DV Report, the requisite supporting document attachments are essential components in the submission of a well-developed DE/DV request.

Below are the attachments required to assist in the FHWA DE and/or GDOT DE/DV package review and evaluation. The attachments are listed by Template Type:

NOTE: All attachments may not be applicable in some cases as noted in the table(s) below:

STANDARD DE/DV TEMPLATE ATTACHMENTS	EXISTING ROADWAYS DV TEMPLATE ATTACHMENTS
Location Sketch	Location Sketch
Typical Sections	Typical Sections (If applicable)
Photo image of location	Photo image of location
Plan sheets denoting DE/DV location including latitude and longitude coordinates	Plan sheets denoting DV location including latitude and longitude coordinates
Profile sheets denoting location of DE/DV	Profile sheets denoting location of DV (If applicable)
Preconstruction Status Report	Preconstruction Status Report
Bridge ID and Inventory Data Sheet for bridge projects	Bridge ID and Inventory Data Sheet for bridge projects
CMF Detail sheet (If applicable) If using HSM, provide the tables as an attachment; if using CMF Clearinghouse, provide the ID Number as an attachment.	***Not Applicable***
Any other documentation pertinent to request. (e.g., for lateral offset to obstruction requests provide the offset for each individual object not meeting GDOT Standards).	Any other documentation pertinent to request. (e.g., for lateral offset to obstruction requests provide the offset for each individual object not meeting GDOT Standards).

4. Design Exception/Design Variance Requests – Electronic Submission:

All Design Exceptions and Design Variances request(s) should be submitted to the following Email Address: DesignException@dot.ga.gov

2.2 Report Sections

The following documentation consists of guidance for the DE/DV Template "**Report Sections**" as depicted in the Standard DE/DV (abbreviated as **STD. DE/DV**) and Existing Roadways DV (abbreviated as **E.R. DV**) Templates. The purpose of this chapter is to present additional recommendations and information to assist the EOR in delivering thorough responses to support the design decision for the requested DE/DV. A well-documented report not only facilitates the review and evaluation but also aides in the reduction of the number of DE/DV submittal iterations, comments, and subsequent revisions.

Note: The Template Report Section instructions (depicted in BLUE text in the actual Templates) may not be duplicated verbatim in this Section; a condensed version is provided here for reference. The Template Report Section requirements may also vary depending on the Template Type selected; the below Blue text is primarily representative of just the Standard DE/DV Template. Refer to the Templates for the Complete Template Instructions. The intent of the Sections below is to provide additional guidance for both the GDOT Standard DE/DV and the GDOT Existing Roadways DV Template(s).

2.2.1 Project Description – STD. DE/DV
Project Description and Type – E.R. DV

Applies to Template(s): ☑ STD. DE/DV ☑ E.R. DV

Required Information: Refer to the Templates for the Complete Template Instructions.

Provide a general description of the project including the length of the project, the general location of the project including any city and county limits or proximity thereto, speed design, posted speed limit, and describe the proposed typical sections and other major improvements to be constructed.

Additional Guidance:

- For the description, include the AASHTO Functional Classification: EX. Principle Arterial, Minor Arterial, Collector Road, etc. Designate if it is a NHS, SR, or connecting road, etc. and detail the type of project: Widening, Intersection Improvement, Roundabout, Passing Lane, etc.
- Provide a brief descriptive summary of the need for the project and the intent of project.
- Ensure the described proposed typical sections correspond/match the attached typical section plan sheets.
- Describe other major improvements. Example: addition of turn lanes at intersection reconstructions, drainage structure enhancements, inclusion of bike/shared use paths, etc.
- If using an E.R. DV Template for Design Variances, verify that the project description meets and adheres to one of the three conditions (see list below) of an AASHTO 1.7.3 project. If one of the three conditions are not met – an E.R. DV cannot be used.

  - ☐ Repair infrastructure condition
  - ☐ Reduce operational congestion
  - ☐ Reduce current/Anticipated crash patterns

- In order to use the E.R. DV Template - the ENTIRE PROJECT must meet the description of 1.7.3 for Projects on Existing Roads/Alignments. Side roads, tie-in points, or other sub-sections of projects on existing alignments (if within a larger scale project) do not qualify for E.R. DVs.

2.2.2 Feature(s) Requiring a Design Exception/Variance - STD. DE/DV Existing Feature Requiring a Design Variance - E.R. DV

Applies to Template(s): ☑ STD. DE/DV ☑ E.R. DV

Required Information: Refer to the Templates for the Complete Template Instructions.

Describe the feature(s) requiring a design exception or a design variance and describe the existing conditions compared to the proposed conditions. Give the values of the current standard criteria and the values that are proposed to be used. Include the value of the beginning and the ending mile point stationing for the design feature.

Additional Guidance:

- Refer to Chapter 3 in this DE/DV Guide for additional suggested documentation to include for the specific criteria for the nonstandard Feature(s). Chapter 3 provides in-depth information for the FHWA Controlling Criteria and the GDOT Standard Criteria.
- Reference the source of the controlling or standard criteria value.
- Provide the actual criteria value of the proposed feature (or existing feature for E.R. DV) to be retained).
- Include the degree to which the proposed feature (or existing feature for E.R. DV) does/does not meet the required criteria.
    - Example: SSD does not meet 65’ but does meet 55’.
    - Example: ISD may require 300’ – but only meets 180’

  To assist in the write-up for each non-conforming feature, tables may be illustrated depicting the Feature(s), Location, Proposed Criteria Value, Standard Criteria Value, and any other additional pertinent information that applies to the feature(s). Below is an Example Table (Table information may vary based on nonstandard feature, required associated criteria, and supporting provisions).

Table 2.1 Features Requiring a Design Exception/Design Variance

Nonstandard Feature	Station	Mile Point	Road Name	Proposed Value SSD	Standard Criteria Value SSD
Feature #1	379+94	9.57	US##/SR ##	55’	65’
Feature #2	550+48	12.80	US ##/SR ##	45’	65’

- Ensure the beginning and ending mile point stationing value is provided for the nonstandard feature(s) to assist in facilitation of the DE/DV review.
- Describe the proposed design feature (or existing feature to be retained) that is not meeting the appropriate standard criteria in as much detail as practicable to facilitate the DE/DV review.
- If multiple locations of nonstandard features are combined in one report, ensure that these features are described separately and presented clearly for each unique location.

2.2.3 Current And Future Traffic Data - STD. DE/DV

Applies to Template: ☑ STD. DE/DV

Required Information: Refer to the Templates for the Complete Template Instructions.

Describe current and future traffic volumes with any other pertinent traffic data (i.e. Truck percentage, Transit / Bus route, etc.).

Additional Guidance:

- Provide truck percentages when/if available.
- There is no need to include traffic sheets (traffic flow diagrams) for the project.
- Provide the traffic volume, preferably in ADT Units when available. AADT is acceptable as an alternative unit.
- Traffic Data tables may be depicted to assist in the displaying of current and future traffic data. Below is an Example Table (Table information may vary).

Table 2.2 Current And Future Traffic Data

Location	Station	24-HR AADT (2020)	24-HR AADT (2021)	Truck % (2021)	Highest Hr. Single Direction of Travel (2021)		Future ADT
Location #1	140+35	#	#	#	#	#	#
Location #2	142+20	#	#	#	#	#	#
Location #3	145+80	#	#	#	#	#	#

2.2.4 Crash Data - STD. DE/DV Nonstandard Feature Crashes and Operation - E.R. DV

Applies to Template(s): ☑ STD. DE/DV ☑ E.R. DV

Required Information: Refer to the Templates for the Complete Template Instructions.

Provide the crash history within the project limits for the most recent three years available. In particular, address and summarize the crash history related to the feature requiring a design exception or variance request. This should include the types of crashes (i.e. head-on, angle, side swipe, rear end, run-off-road, cross median, cross centerline, etc.) and crash severity (i.e. number of fatalities & injuries). Access the GEARS - Georgia Electronic Accident Reporting System site or the Crash, Road & Traffic Data site for this information. Include the Statewide Mileage, Travel & Accident Data for the same years as those provided in the crash history for comparison (Contact the Office of Traffic Safety and Design Personnel for this information). All crash data information should be provided in a tabular format and summarized accordingly.

Additional Guidance:

- For the Standard DE/DV Template, Crash Data should be shown for the last 3-5 years.
- For the Existing Roadways DV Template, Crash Data should be shown for the last 5-10 years.
- Breakdown Crash Data by crash type pertinent to the nonstandard design feature.
- Present a narrative that details and explains the crashes involved in relation to the nonstandard design feature.
- A comparison to the state-wide average (for comparable roadway type) should be provided when/if available.
- In some cases - depending on the feature - additional analysis may be needed for certain conditions. Examples include crashes occurring during wet conditions vs. dry conditions, crashes occurring at night vs. daylight, crash location on the typical section, etc.
- It is discouraged to combine multiple criteria for Design Features in one report, however if this is done, ensure that the crash data is analyzed separately for each applicable feature. This is also the case if multiple locations of the same criteria are depicted in one report. It is crucial that each nonstandard feature's crash data is separated and analyzed independently.
- Existing Roadways (1.7.3) Projects may be a candidate for the E.R. DV Template based on the "Reduce current/Anticipated crash patterns" - which is one of the three conditions required for the use of the E.R. DV Template. Along with other factors and conditions discussed previously in this Chapter, ensure all criteria are met before using the E.R. DV Template. This condition for reduction of crash patterns is just one of many other factors to consider.
- To assist in the documentation and review of the Crash Data, provide the information in a tabular format and summarize accordingly.
- Depicted below is Example Crash Data in Tabular Format:

Note – the (Crash Type) and breakdown of data for DE/DV submissions may differ from that shown in the table below based on various factors applicable to the nonstandard design feature(s).

Table 2.3 Crash Data

YEAR	*Provide a Description and Project Location of the Crash Data*								
	Enter "Crash Type" Numbers in Columns Below								
	Total Crashes	Angle	Rear End	Head-on	Side Swipe	Run-Off Road	Struck Object	Injuries	Fatalities
2019	#	#	#	#	#	#	#	#	#
2020	#	#	#	#	#	#	#	#	#
2021	#	#	#	#	#	#	#	#	#
2022	#	#	#	#	#	#	#	#	#
Summary (In Percentage Format)	%	%	%	%	%	%	%	%	%

2.2.5 Alternatives Considered/Risk Assessment - STD. DE/DV

Applies to Template: ☑ STD. DE/DV

Required Information: Refer to the Templates for the Complete Template Instructions.

Summarize and compare the alternatives considered, including the alternative that meets full criteria and evaluate the risk associated with the design exception or variance. The discussion around alternatives and risk should use the alternative meeting full criteria as a basis for comparison. Use the Highway Safety Manual (HSM) and HSM spreadsheets to predict the impact of proposed alternatives on safety, if applicable. If using an appropriate CMF, please list the CMF ID# and include the CMF details from the clearinghouse website as an attachment. Special attention should be given to the applicability of the CMF as it relates to the proposed condition and project characteristics. When utilizing multiple CMFs, a discussion of the method of application should be included. Please see the CMF Clearinghouse page on "Using CMFs" for more information. For existing nonstandard conditions to be retained and where adequate crash data is provided (for years where that condition existed), no HSM analysis is required. Explain why the HSM cannot be applied if it is determined that no analysis is available.

In some cases, where the HSM is not applicable, the Office of Design Policy and Support may request three to five examples of facilities with comparable characteristics to demonstrate that safety is not a risk. These examples would be for nearby facilities with similar roadway characteristics such as classification, roadway volumes, lane width, number of lanes, median, etc.

Please list additional design exceptions or variances that overlap in the proposed area, and please properly address their corresponding risk. These include any exceptions or variances that have not been submitted, are under review, or have already been approved.

Additional Guidance:

- Highway Safety Manual (HSM) analysis is encouraged where applicable. Crash Modification Factor(s) (CMFs) used from the Clearinghouse should match the type of roadway and be consistent with the proposed project. Do not include CMFs that do not match the proposed project type.
- HSM analysis/comparisons should correspond to the usage of the nonstandard feature. If there is no CMF that exists for the nonstandard feature and the HSM analysis compares only AADT or other geometric changes to the existing, it should not be included (i.e., do not include a comparison of present day to future conditions – comparison should be between the standard condition to the proposed nonstandard condition).
- Any alternatives meeting the standard criteria should be included.
- Any alternatives that result in an improvement to the current existing condition – while not fully meeting the standard criteria – should also be considered and included where warranted.
- Do not list any alternatives depicted in the Concept Report.
- Risk assessment should focus on the proposed nonstandard feature and not project delivery or schedule.
- In HSM, mitigation for a proposed alternative can also apply to an existing condition (e.g., do not include rumble strips and wider pavement marking CMFs just to the proposed and not include it in the existing alternative – since the CMFs can be applied to both).
- If using HSM, provide the tables as an attachment; if using CMF Clearinghouse, provide the ID Number as an attachment.
- Note that Highway Safety Manual (HSM) analysis is not required for existing nonstandard conditions that are to be retained and where adequate crash data is provided (for years in which that condition existed).
- As stated in the required template instructions, any potential DEs/DVs that are proposed in the area that may overlap should be listed. This includes DEs/DVs that have not been submitted, ones under the review process or any that have already been approved.

2.2.6 Anticipated Performance of Nonstandard Feature - E.R. DV

Applies to Template: ☑ E.R. DV --- (ONLY)

Required Information: Refer to the Templates for the Complete Template Instructions.

Specify if anticipated traffic will cause the nonstandard feature to perform worse. State if any aspect of your proposed project is likely to change the performance of the nonstandard feature. Please list additional design exceptions or variances that overlap in the proposed area, and please properly address their corresponding risk. These include any exceptions or variances that have not been submitted, are under review, or have already been approved.

Additional Guidance:

- The feature cannot be reduced from existing conditions (the existing condition will not be worsened).
- Other proposed project features cannot exacerbate the retained nonstandard feature.
  - Example: Keep the nonstandard shoulder width, but project reduces lane width.
  - Example: Nonstandard ISD in existing condition, but ISD may become more nonstandard in the future due to a widened intersection or increased mainline design speed, etc.
- Demonstrate/justify the acceptable performance of the nonstandard feature or that it is working well today.
- Verify the compatibility of the retained nonstandard feature to proposed project conditions.

2.2.7 Cost To Meet Standard Criteria - STD. DE/DV

Applies to Template: ☑ STD. DE/DV

Required Information: Refer to the Templates for the Complete Template Instructions.

Summarize the cost estimate for construction and right-of-way and other associated costs for constructing or reconstructing the design feature to meet current standards. Additionally, please also list the cost as a percentage of the overall project if the standard criteria were to be met.

Additional Guidance:

- Noted costs can include Construction, RW, Utilities, User Delay Costs and Reasonable Contingencies, etc.
- Other potential costs to consider are features/structures in close proximity (Example: drainage structures, light poles, guardrail, etc.) which also may be affected by the construction/reconstruction of the nonstandard feature in order to meet current standards.
- Costs can also consist of non-monetary activities such as Environmental or Historical Impacts.
- PE, financing costs and schedule costs should not be included.
- As noted in the template, also provide the cost as a percentage of the overall project in order to meet the standard criteria.

2.2.8 Why The Current Standard Criteria Cannot Be Met - STD. DE/DV

Applies to Template: ☑ STD. DE/DV

Required Information: Refer to the Templates for the Complete Template Instructions.

Summarize why the current AASHTO Standard Controlling Criteria (Design Exception)/GDOT Standard Criteria (Design Variance) cannot be met.

Additional Guidance:

- Avoid any reasoning related to project delivery or schedule.
- The reasoning and justification should be definitive (i.e., specific environmental impacts should be shown for the standard condition instead of just presuming resources would be impacted). This should be backed up by rough analysis defined by alignments and cross-sections.

2.2.9 Mitigation Proposed - STD. DE/DV Mitigation Proposed - E.R. DV

Applies to Template(s): ☑ STD. DE/DV ☑ E.R. DV

Required Information: Refer to the Templates for the Complete Template Instructions.

Describe any mitigation proposed to lessen the impact of not meeting current standard criteria. (FHWA publication Mitigation Strategies for Design Exceptions is a good reference) If mitigation or other additional enhancement costs are significant, summarize these costs at this point. Other resources providing mitigation ideas or traffic safety-related accident countermeasure / accident pattern countermeasure ideas include the American Association of State Highway and Transportation Officials (AASHTO) May 2004 "A Guide for Achieving Flexibility in Highway Design" and the Institute of Transportation Engineers (ITE) "Traffic Engineering Handbook".

Additional Guidance:

- The mitigation that is proposed should be applicable to the nonstandard feature.
- Mitigation should not violate other criteria (e.g., MUTCD guidance for signage).
- Ensure that applying mitigation to one nonstandard feature does not in turn produce an adverse effect on another feature's condition.
- Mitigation should be coordinated with appropriate offices (e.g., Traffic Operations, District Maintenance, State Maintenance, etc.).
- Future proposed projects can be used as a mitigation measure only when the project is programmed and – in the case of Design Exceptions – a letter of commitment from the Chief Engineer is required.
- Mitigation features should typically be composed of "nonstandard practice" items. While Standard GDOT practices such as Rumble Strips and/or Construction Detail P-7 Safety Edge can be acknowledged and included in the project in the applicable Mitigation section, these items should not be listed explicitly as the only mitigation. Example of nonstandard items: Curve advisory signs, reflective stripes on 4-way stop sign posts, addition of flashing beacons, etc.
- Mitigation may be included to improve the existing condition even if it doesn't meet the current standard criteria.

2.2.10 Recommendation/Signature Block - STD. DE/DV
Recommendation/Signature Block - E.R. DV

Applies to Template(s): ☑ STD. DE/DV ☑ E.R. DV

Required Information: Refer to the Templates for the Complete Template Instructions.

The Engineer of Record must make a recommendation to the approving authority for action. Any conditions to the approval of this exception should be clearly stated. Include name and contact number.

Additional Guidance:

- In addition to the statement of recommendation for action - the name, email address and contact number of the EOR is required.
- The EOR Signature is needed.
- The EOR PE Registration Number is required.
- Ensure that correct signature lines are selected/provided. There is a difference between DE and DV signature lines depending on whether the request is for a Design Exception or a Design Variance.
- **Note:** In the "Recommendation Section" for submittals of DVs using the Existing Roadways DV Template, there is an additional requirement. The submitted DV must also meet the required criteria shown below. All FOUR requirements must be met/checked before using that template.

  ☐ Project type meets requirements of AASHTO Green Book Section 1.7.3.
  ☐ The nonstandard feature is an existing condition that will not be worsened.
  ☐ The nonstandard feature performs well today and is anticipated to continue to perform well.
  ☐ The nonstandard feature is recommended for retention on this project.

2.3 General Guidance Summary

Design Exception(s)/Design Variance(s) are mechanisms to apply when encountering design constraints or to assist in the flexibility of design, practical design, and context sensitive design. Comprehensive documentation and justification of the design decision is a critical component in this process. The recommended practices and guidance presented in this Section should assist in the preparation of a thorough DE/DV Report, facilitation of the review process and reduction in revisions to Report submittals.

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Chapter 3. Controlling and Standard Criteria

3.1 Criteria Overview

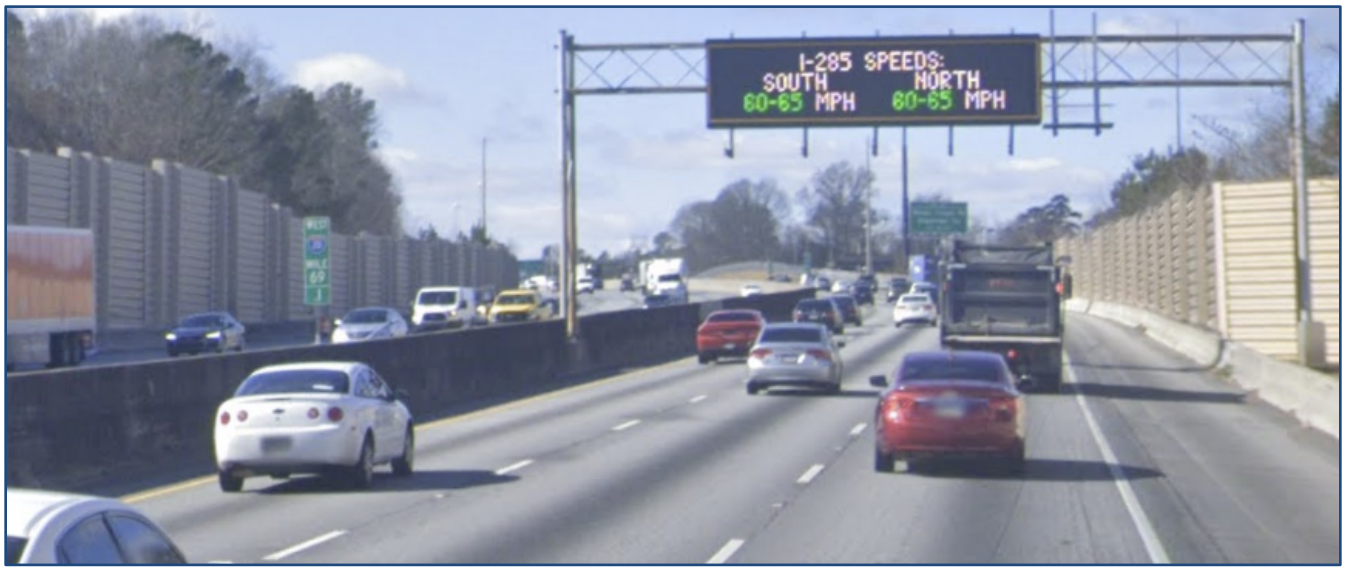
This Section presents information and requirements of FHWA Controlling Criteria and GDOT Standard Criteria. Each of the criteria is characterized by a respective identification number listed in the table below.

The following guidance is provided to assist in the documentation for DE/DV Submission of the Controlling and/or Standard Criteria for nonstandard features. Topics discussed include Criteria Clarification, Evaluation Tools, Mitigation Strategies, Additional Supporting Documentation, Other Checks, Interdependence of Criteria, and Reference Documents.

FHWA CONTROLLING CRITERIA	GDOT STANDARD CRITERIA
3.2 Design Speed	**3.12** Access Control
3.3 Design Loading Structural Capacity	**3.13** Intersection Sight Distance
3.4 Stopping Sight Distance	**3.14** Intersection Skew Angle
3.5 Horizontal Curve Radius	**3.15** Tangent Lengths on Reverse Curves
3.6 Superelevation Rate	**3.16** Lateral Offset to Obstruction
3.7 Maximum Grade	**3.17** Rumble Strips
3.8 Vertical Clearance	**3.18** Safety Edge
3.9 Lane Width	**3.19** Median Usage
3.10 Cross Slope	**3.20** Roundabout Illumination Level
3.11 Shoulder Width*	**3.21** Pedestrian, Bicycle, and Transit Warrants
See GDOT Design Policy Manual (DPM) Chapter 2, Table 2.1 *Exception to Design Standards* for DE/DV Classification Chart	**3.22** ADA Requirement in PROWAG
	3.23 GDOT Construction Standards
	3.24 GDOT Drainage Manual

* **NOTE:** *Shoulder Width consists of FHWA Controlling Criteria and the GDOT Standard Criteria. Information for both have been combined in* ***Shoulder Width - Identification # 3.11A & B****.*

3.2 Design Speed
FHWA Controlling Criteria



Source: Google Maps

3.2 Design Speed Overview

Design Speed is an FHWA Controlling Criterion. If the requisite Design Speed value is not met, a Design Exception is required for all NHS Roadways regardless of Design Speed. All other applicable roadways would require a Design Variance (DV) for nonstandard control. The Designer should perform a comprehensive study and obtain the appropriate approval noted above if not meeting this controlling criterion. Design Speed differs from the other controlling and standard criteria depicted in this Guide since it is a “design control” and in turn dictates the selection and establishment of values for various geometric elements of a roadway. Design Speed is a governing factor in the development of roadway geometrical and some aspects of cross-sectional design elements.

3.2 Criteria Clarification

For Design Speed Criteria Controlling Values, GDOT adopts the AASHTO Green Book, "A Policy on Geometric Design of Highways and Streets" (Current Edition) and the AASHTO, "A Policy on Design Standards – Interstate System" (Current Edition). GDOT also references the AASHTO "Guidelines for Geometric Design of Low-Volume Roads (Current Edition) and the Design Policy Manual (Current Edition) Chapter 3.3 "Design Speed" and Chapter 11.1.2 "Controlling Criteria for Non-Interstate Systems (GDOT 3R Standards)".

The Design Speed is based on "roadway functional classification, topography, anticipated operating speed" and additional context elements. This criterion is the governing mechanism for a number of other controlling design criteria such as Horizontal Alignments (Horizontal Curve Radius, Superelevation Rate) and Vertical Alignments (Maximum Grade), Stopping Sight Distance, Lane Width, and Shoulder Width, etc. All of these elements (values) are based on the fundamental principle of Design Speed along with other factors which enhance the operational performance and safety of roadways. The Design Speed criterion has a major effect on the other criteria described in this Guide and as a result a DE/DV for Design Speed is generally discouraged.

In general terms, the Design Speed is usually greater than or equal to the posted speed and should typically be consistent with the 85th percentile speed.

Special consideration should be taken regarding Design Exceptions/Design Variances with this criterion. Instead of adjusting the Design Speed to meet other criteria – it is encouraged to obtain any requisite DE/DV for the specific controlling and/or standard geometric criteria: (such as nonstandard Superelevation Rate, Horizontal Curve Radius, Stopping Sight Distance, etc.) and not the actual Design Speed control criterion itself.

If Design Speed must be adjusted, a "limited continuous section" of the roadway length should be considered for Design Speed modification. The adjustment is not intended for the overall length of the project or for nonstandard values corresponding to small non-contiguous sections.

See the GDOT DPM Section 3.3.2 "Design Speeds at Intersections" for additional discussion of varying design speeds for specific intersection conditions.

For information on Design Speed regarding Four-Foot-Wide Flush Medians – reference GDOT DPM Chapter 6.12.2.1 and Section 3.19 in this DE/DV Guide.

The Design Speed criterion requirement applies to standard design projects as well as non-interstate systems 3R projects.

Before documenting a Design Speed DE/DV, it is recommended that a meeting be arranged with the Office of Design Policy and Support to discuss the nonstandard feature and possible alternatives.

3.2 Evaluation Tools

IHSDM (Interactive Highway Safety Design Module) contains software analysis tools to assist in determining operational aspects of geometric design decisions on roadways. One of the modules (Design Consistency Module (DCM))" - can be used as a tool to provide an estimated 85th percentile speed study to determine if the Design Speed is acceptable.

3.2 Mitigation Strategies

The strategies are suggested below to help offset operational and/or safety challenges that are often encountered with Design Speed. Further discussion regarding application of mitigation strategies is provided in FHWA's *Design Decision Documentation And Mitigation Strategies For Design Exceptions* (Current Edition).

The following strategy should be considered for mitigation of Design Speed:

- Modify the geometrical and cross-sectional elements for other controlling/standard criteria (EX. Horizontal Curve Radius, SE, etc.) to lessen operational speed in order to meet the reduced Design Speed control.

3.2 Additional Supporting Documentation

The provided list is not all encompassing, but any supporting information that provides additional clarification relevant to the Design Speed criterion will be beneficial in documenting the DE/DV.

- Perform and provide estimated 85th percentile speed study for existing roadways.
- If using IHSDM (Interactive Highway Safety Design Module) software analysis tools, provide the resultant output as documentation.

Per FHWA Document (Federal Register) 81 FR 27187 and FHWA Memo "Revisions to the Controlling Criteria for Design and Documentation for Design exceptions (dated May 5, 2016) [1] ***the following is required to be provided for all DE/DV requests for Design Speed:***

- It is required to provide the "Length of roadway section where the proposed reduced Design Speed is located compared to the overall length of the entire project".[1]
- Document the procedures for "Measures used in transitions to adjacent sections with higher or lower design or operating speeds".[1]

3.2 Other Checks

- A Design Speed DE/DV should be seldom needed. If it is required, the Design Speed Control affects a number of the other Controlling/Standard Criteria (See Interdependence of Criteria below). If retaining a nonstandard Design Speed, note the effect it may have on the other criteria and adjust accordingly.
- Consider the Design Speed of adjacent roadway sections that could be affected or of intersecting roadways.

3.2 Interdependence of Criteria

In certain cases, the nonstandard design feature identified in a DE or DV may affect other controlling/standard criteria that should be reviewed. As many of these values are interrelated, care should be exercised that these also do not exceed the guidance values or require additional exceptions/variances. The following is a list of additional controlling/standard criteria to evaluate when presenting a DE/DV for Design Speed:

- Stopping Sight Distance
- Horizontal Curve Radius
- Maximum Grade
- Superelevation Rate
- Lane Width
- Shoulder Width
- Intersection Sight Distance
- Tangent Lengths on Reverse Curves

3.2 Reference Documents

- AASHTO, A Policy on Geometric Design of Highways and Streets (Current Edition)
- AASHTO, A Policy on Design Standards – Interstate System (Current Edition)
- AASHTO, Guidelines for Geometric Design of Low-Volume Roads (Current Edition)
- FHWA, Design Decision Documentation And Mitigation Strategies For Design Exceptions (Current Edition)
- FHWA, Manual on Uniform Traffic Control Devices (MUTCD) (Current Edition)
- FHWA, Speed Concepts: Informational Guide – September 2009
- GDOT, Design Policy Manual (Current Edition)
- GDOT Policy Memo – Update to FHWA Controlling Criteria – 06/01/2016
- TRB, NCHRP 313 Selecting Ramp Design Speeds (Vol. 1 – Web Only) – June 2021

3.3 Design Loading Structural Capacity
FHWA Controlling Criteria

Source: Google Maps

3.3 Design Loading Structural Capacity Overview

Design Loading Structural Capacity is an FHWA Controlling Criterion. If the requisite criterion conditions are not met, a Design Exception (DE) is required for all NHS Roadways regardless of Design Speed. All other applicable roadways (including Off-System Roadways) would require a Design Variance (DV) for nonstandard control. The Designer should perform a comprehensive study and obtain the appropriate approval noted above if not meeting the controlling criterion. Design Loading Structural Capacity differs from other controlling and standard criteria depicted in this Guide since it is a "governing control" in the design of load carrying capacity of structures to support the safety of vehicles traversing the bridge and/or structure.

3.3 Criteria Clarification

For the Design Loading Structural Capacity Criterion, GDOT adopts the "Bridges and Structures Design Manual" (Current Edition). See Chapter 2.2 "Loads" for additional information.

The Design Loading Structural Capacity is a controlling factor for the safe support and carrying ability of various vehicle configurations as well as pedestrian transport on bridges/structures. A Design Exception/Design Variance for this criterion is exceedingly rare since the appropriate Design Loading Structural Capacity is a primary requirement/component in the Design of all applicable structures and should be adhered to.

The Design Loading Structural Capacity consists of the maximum load that a bridge or structure is designed to safely accommodate. The Design Loading Structural Capacity criterion also pertains to concrete box culverts that handle traffic loads. This criterion is applicable for proposed bridge structures as well as existing bridge structures.

All new and full replacement bridges and culverts on NHS and State Route System Bridges are required to be designed using LRFD (Load and Resistance Factor Design). LRFD Design is also preferred for Off-System Bridges (not on NHS). See GDOT Bridges and Structures Design Manual for applicable criteria.

The Design Loading Structural Capacity requirement criterion applies to standard design projects as well as non-interstate systems 3R projects.

3.3 Evaluation Tools

There are various software(s) available for evaluation of design loads (Ex. MathCAD, MathCAD Prime, AASHTOWare Bridge Rating BrR, etc.). These software tools can be used to determine the load rating capacity for the requisite bridge, structure, etc.

3.3 Mitigation Strategies

The strategies are suggested below to help offset operational and/or safety challenges that may be encountered with Design Loading Structural Capacity.

The following strategies should be considered for mitigation in <u>rare cases</u> for Design Loading Structural Capacity:

- Provide warning signs.
- Post signage of Load Weight Limits.
- For proposed bridges, decrease the dead load and increase strength by selection of appropriate materials (Ex. beams, reinforcing strands, etc.).
- Furnish alternate routes for vehicles (e.g., trucks) to detour around the structure.

3.3 Additional Supporting Documentation

The provided list is not all encompassing, but any supporting information that provides additional clarification relevant to the Design Loading Structural Capacity criterion will be beneficial in documenting the DE/DV.

- Furnish the Load Rating calculations for the bridge/structure.
- If an existing structure, provide photographs of the structure.
- Provide the Bridge Plan Sheets.

Per FHWA Document (Federal Register) 81 FR 27187 and FHWA Memo "Revisions to the Controlling Criteria for Design and Documentation for Design exceptions (dated May 5, 2016) [1] ***the following is required to be provided for all DE/DV requests for Design Loading Structural Capacity:***

- It is required to provide the "Verification of safe load-carrying capacity (load rating) for all State unrestricted legal loads or routine permit loads, and in the case of bridges and tunnels on the Interstate, all Federal legal loads".[1]

3.3 Other Checks

- Consider adjacent/nearby roadways that could be affected by increased traffic if detours are implemented to bypass the bridge.

3.3 Interdependence of Criteria

In certain cases, the nonstandard design feature identified in a DE or DV may affect other controlling/standard criteria that should be reviewed. As many of these values are interrelated, care should be exercised that these also do not exceed the guidance values or require additional exceptions/variances. The following is a list of additional controlling/standard criteria to evaluate when presenting a DE/DV for Design Loading Structural Capacity:

- Lane Width
- Shoulder Width

3.3 Reference Documents

- AASHTO, A Policy on Design Standards – Interstate System (Current Edition).
- AASHTO, LRFD Bridge Design Specifications – (9th Edition-2020)
- AASHTO, Standard Specifications for Highway Bridges (17th Edition-2002)
- GDOT, Design Policy Manual (Current Edition)
- GDOT, Bridge and Structures Design Manual (Current Edition)
- GDOT Policy Memo – Update to FHWA Controlling Criteria – 06/01/2016

3.4 Stopping Sight Distance
FHWA Controlling Criteria

Source: Google Maps

3.4 Stopping Sight Distance Overview

Stopping Sight Distance is an FHWA Controlling Criterion. If standard conditions are not met a Design Exception (DE) is required for NHS Roadways with a Design Speed greater than or equal to 50 mph (high speed). All other applicable roadways would require a Design Variance (DV). The Designer should perform a comprehensive study and obtain the appropriate approval for any nonstandard feature. A decision to propose a Stopping Sight Distance value on horizontal curves and crest vertical curves that do not meet the minimum AASHTO criteria requires a DE/DV.

3.4 Criteria Clarification

For Stopping Sight Distance Criteria Values, GDOT adopts the AASHTO Green Book, "A Policy on Geometric Design of Highways and Streets" (Current Edition) and the AASHTO, "A Policy on Design Standards – Interstate System" (Current Edition). GDOT also references the AASHTO "Guidelines for Geometric Design of Low-Volume Roads (Current Edition) and the Design Policy Manual (Current Edition) Chapter 4.1.2 "Stopping Sight Distance" and Chapter 11.1.2 "Controlling Criteria for Non-Interstate Systems (GDOT 3R Standards)".

DE/DVs are required for roadways in which the Stopping Sight Distance is not met for the applicable horizontal curve and/or crest vertical curve. Note: the criterion is not K-Value for crest vertical curves. K-Value is a surrogate for SSD but is not always indicative of provision or lack of provision of SSD. A DE/DV is not required for sag vertical curves. A DD should be prepared for sag vertical curves which do not meet AASHTO Green Book K-Values. Sag vertical curves should provide driver comfort at a minimum.

When SSD is evaluated along vertical curves, AASHTO Green Book Table 3-1 "Stopping Sight Distance on Level Roadways" should be used.

A DE/DV is required in most cases for nonstandard Stopping Sight Distance on horizontal curves and crest vertical curves on non-interstate systems 3R projects. There are exceptions to this requirement based on a certain speed below AASHTO guidelines and accident history. See GDOT DPM Chapter 11.1.2 Table 11.4 for "Horizontal Alignment for Existing Features not meeting 3R Guidelines". This table also applies to the policy for Stopping Sight Distance DE/DV on crest vertical curves for non-interstate systems 3R projects.

The Stopping Sight Distance not only applies to SSD to the roadway itself but also for SSD visibility at approaches to intersections.

For information regarding Stopping Sight Distance on Four-Foot-Wide Flush Medians – reference GDOT DPM Chapter 6.12.2.1 and Section 3.19 in this DE/DV Guide.

3.4 Evaluation Tools

For SSD Evaluation, Designers may use the InRoads "Roadway Visibility Tool" or the OpenRoads (ORD version/release 10.12 and later) "Sight Visibility Tool". It is important to note that results are dependent on the accuracy of the model created.

Plotting sight lines on plans may be beneficial and used in evaluation.

3.4 Mitigation Strategies

The strategies are suggested below to help offset operational and/or safety challenges that are often encountered if not meeting the Stopping Sight Distance criterion. Further discussion regarding application of mitigation strategies is provided in FHWA's *Design Decision Documentation And Mitigation Strategies For Design Exceptions (Current Edition).*

Standard GDOT Project Mitigation Strategies include:

- Application of "Patch" Rumble Strips (Construction Detail T-19) near approaches to stop signs/stop controls at intersections.
- Rumble Strips
- Raised Pavement Markers (RPMs)

Additionally, the following strategies should be considered for mitigation of Stopping Sight Distance:

For Stopping Sight Distance on Roadway:

- Provide advanced crest vertical curve warning signage such as the W7-6 (Hill Blocks View) and a supplementary W13-1P (Advisory Speed Plaque) sign. See MUTCD (Current Edition) for guidance. **NOTE:** the W14-4 (Limited Sight Distance Sign) is no longer included in the current MUTCD and not available for use.
- Consider larger size warning signs when MUTCD guidance permits.
- Adjust the Lane Width/placement to assist in sight distance visibility.
- Establish wider shoulders or wider paved portions of shoulders.

For Stopping Sight Distance Approaching an Intersection:

- At intersection approaches, provide enhanced advance warning signage such as Stop Ahead (W3-1) and enhanced regulatory signage such as Stop (R1-1) with Flashing Beacons (Signal Permit from Traffic Operations required) or other additional warning signs as appropriate.
- Apply full-stop Traffic Signal control or flashing red/yellow traffic signals as a visible warning at the intersection.

3.4 Additional Supporting Documentation

The provided list is not all encompassing, but any supporting information that provides additional clarification relevant to the Stopping Sight Distance criterion will be beneficial in documenting the DE/DV.

- Document the physical restrictions (terrain, structures, etc.) that make it infeasible to correct the nonstandard horizontal curve and/or crest vertical curve.
- Describe the reasons (cost, environmental impacts, etc.) that additional right-of-way cannot be purchased to correct the grade, horizontal, and/or vertical curvature to meet Stopping Sight Distance.
- Provide the Existing Stopping Sight Distance and compare it to the Proposed Stopping Sight Distance when applicable (i.e., when proposing to retain existing conditions).
- State the Design Speed that the Proposed SSD meets.
- Provide signal plans (if applicable) at intersections and signing and marking plans.
- Supply the InRoads/OpenRoads (ORD version/release 10.12 and later) Sight Triangle report documentation and diagrams. See previous "Evaluation Tools" section for additional information.

- Furnish graphical studies (scaled distances) on plan/profile sheets of the plotted sight lines.
- Provide the findings of the SSD study in the DV report narrative. This should include the minimum required SSD and the proposed SSD.

3.4 Other Checks

- Check for Stopping Sight Distance near vertical clearances such as sags in the lower roadway near an overhead structure which may affect a vehicle's ability to see and clear the structure. (Example Vehicles: single unit truck, tractor-trailers, recreational vehicles, etc.) Improve this condition when applicable.
- Stopping Sight Distance also applies to visibility of pedestrians and cyclists. Ensure that some form of improvement is applied to the safety of these roadway users if retaining/proposing the nonstandard SSD.
- Verify if there are any vertical alignment (grade/vertical curve) adjustments that may improve visibility and Stopping Sight Distance.
- Determine if there are any roadside barriers or other obstacles/hazards that may hinder sight distance and remove and relocate if feasible.

3.4 Interdependence of Criteria

In certain cases, the nonstandard design feature identified in a DE or DV may affect other controlling/standard criteria that should be reviewed. As many of these values are interrelated, care should be exercised that these also do not exceed the guidance values or require additional exceptions/variances. The following is a list of additional controlling/standard criteria to evaluate when presenting a DE/DV for Stopping Sight Distance:

- Intersection Sight Distance
- Intersection Skew Angle
- Shoulder Width
- Lane Width
- Horizontal Curve Radius
- Superelevation Rate
- Vertical Clearance
- Lateral Offset to Obstruction

3.4 Reference Documents

- AASHTO, A Policy on Geometric Design of Highways and Streets (Current Edition)
- AASHTO, A Policy on Design Standards – Interstate System (Current Edition)
- AASHTO, Guidelines for Geometric Design of Low-Volume Roads (Current Edition)
- FHWA, Design Decision Documentation And Mitigation Strategies For Design Exceptions (Current Edition)
- GDOT, Design Policy Manual (Current Edition)
- GDOT Policy Memo – Update to FHWA Controlling Criteria – 06/01/2016
- TRB, NCHRP 400 Determination of Stopping Sight Distance - 1997

3.5 Horizontal Curve Radius

FHWA Controlling Criteria

Source: Google Maps

3.5 Horizontal Curve Radius Overview

Horizontal Curve Radius is an FHWA Controlling Criterion. If standard conditions are not met a Design Exception (DE) is required for NHS Roadways with a Design Speed greater than or equal to 50 mph (high speed). All other applicable roadways would require a Design Variance (DV). The Designer should perform a comprehensive study and obtain the appropriate approval for any nonstandard feature. The Horizontal Curve Radius and the Superelevation Rate are two major components of horizontal curvature. The Horizontal Curve Radius is correlated with the selected Design Speed and Maximum Superelevation Rate.

3.5 Criteria Clarification

For Horizontal Curve Radius Values, GDOT adopts the AASHTO Green Book, "A Policy on Geometric Design of Highways and Streets" (Current Edition) and the AASHTO, "A Policy on Design Standards – Interstate System" (Current Edition). GDOT also references the Design Policy Manual (Current Edition) Chapter 4.2 "Horizontal Alignment", and Chapter 11.1.2 "Controlling Criteria for Non-Interstate Systems (GDOT 3R Standards)".

GDOT uses circular curves in horizontal alignment design. Spiral curves are typically not used except in rare cases.

The Horizontal Curve Radius, Design Speed and Superelevation Rate criteria are all correlated. The minimum radius criteria should be exceeded when practical. The radius varies based on the associated Design Speed and Superelevation Rate. Reference the AASHTO Green Book Chapter 3 "Elements of Design" for the applicable tables.

For a given Design Speed and a given SE Rate (any rate), the minimum horizontal curve is determined by the maximum side friction factor for a given Design Speed and SE Rate. See AASHTO Green Book Table 3.7 and Equation 3-8.

The Horizontal Curve Radius requirement criterion applies to standard design projects as well as some non-interstate systems 3R projects.

Based on the requirements in the GDOT DPM in Chapter 11.1.2 Table 11.4 (non-interstate 3R projects): If reconstructing a horizontal curve to meet the minimum AASHTO radius is not attainable (based on the requirements for 3R listed in the table) the GDOT Traffic Operations Office should provide further evaluation. If they determine that a need is confirmed, then a future project should be programmed to correct the nonstandard Horizontal Curve Radius.

3.5 Evaluation Tools

Designers may use horizontal alignment report tools (style sheets) in InRoads/OpenRoads to evaluate the horizontal alignment and curve data (including radius, degree of curve, deflection angle, length of curve, etc.).

3.5 Mitigation Strategies

The strategies are suggested below to help offset operational and/or safety challenges that are often encountered when not meeting the Horizontal Curve Radius criterion. *Note: Some of the same Mitigation Strategies also apply to the Superelevation Rate criteria due to the interrelation of the criteria.* Further discussion regarding application of mitigation strategies is provided in FHWA's *Design Decision Documentation And Mitigation Strategies For Design Exceptions* (Current Edition).

Standard GDOT Project Mitigation Strategies include:

Rumble Strips, Raised Pavement Markers (RPMs), GDOT Construction Detail P-7 (Safety Edge)

Additionally, the following strategies should be considered for mitigation of Horizontal Curve Radius:

- Widen the lane and shoulders or pave a wider portion of the shoulder.

- Provide advance warning signage for sharp curves such as W1-2 (Curve), W1-11 (Hairpin Curve), and supplemental signs such as W1-8 (Chevron Alignment), W1-13 (Truck Rollover Sign), etc. See MUTCD (Current Edition) for guidance.
- Consider enhanced advance warning signage with Flashing Beacons (Signal Permit from Traffic Operations required).
- Specify roadway delineators.
- Improve ability to stay within the travel lane such as enhanced delineation and paved shoulders.
- For existing pavements – surface treatments that increase friction can be considered.
- Design traversable shoulders/slopes.
- Remove, relocate, or shield fixed objects/hazards with roadside safety hardware.

3.5 Additional Supporting Documentation

The provided list is not all encompassing, but any supporting information that provides additional clarification relevant to the Horizontal Curve Radius criterion will be beneficial in documenting the DE/DV.

- Supply documentation of any physical or environmental restrictions or anticipated costs pertaining to the terrain that make it non-viable to meet the Horizontal Curve Radius.
- Document any right-of-way acquisition issues/restrictions/costs that prohibit meeting the requisite Horizontal Curve Radius.
- Provide plan sheets depicting the Curve Data Table information.
- Furnish the style sheet documentation generated by InRoads/OpenRoads software(s) containing Horizontal Alignment and Curve Data information.
- Demonstrate that the proposed design does not introduce drainage issues.
- Provide sight distance calculations.

3.5 Other Checks

- Verify that the combined Horizontal and Vertical alignments provide as much sight distance as possible.
- To alleviate potential run-off road impacts with fixed-objects and roadside hazards, relocate and/or shield the fixed objects with installation of roadside safety hardware.
- Check entrance/exit ramps to ensure that the minimum radius and applicable ramp design speed is met.
- Pavement selection should be assessed to ensure the proper material is selected for conditions to facilitate skid resistance in the superelevated curves.
- Trucks have a higher potential for roll-over in curves. Wider pavement widths may be needed in sharp curves to prevent pavement edge drop offs.
- Horizontal Curvature and associated SE in near proximity to sign bridges/overhead structures should be reviewed which may influence a vehicle's ability to successfully navigate under the structure on the high side of SE.

3.5 Interdependence of Criteria

In certain cases, the nonstandard design feature identified in a DE or DV may affect other controlling/standard criteria that should be reviewed. As many of these values are interrelated, care should be exercised that these also do not exceed the guidance values or require additional exceptions/variances. The following is a list of additional controlling/standard criteria to evaluate when presenting a DE/DV for Horizontal Curve Radius:

- Stopping Sight Distance
- Intersection Sight Distance
- Intersection Skew Angle
- Vertical Clearance
- Maximum Grade
- Shoulder Width
- Lane Width
- Superelevation Rate
- Tangent Lengths on Reverse Curves

3.5 Reference Documents

- AASHTO, A Policy on Geometric Design of Highways and Streets (Current Edition)
- AASHTO, A Policy on Design Standards – Interstate System (Current Edition)
- AASHTO, Guidelines for Geometric Design of Low-Volume Roads (Current Edition)
- AASHTO, Roadside Design Guide (Current Edition)
- FHWA's Design Decision Documentation And Mitigation Strategies For Design Exceptions (Current Edition)
- GDOT, Design Policy Manual (Current Edition)
- GDOT Policy Memo – Update to FHWA Controlling Criteria – 06/01/2016

3.6 Superelevation Rate
FHWA Controlling Criteria

Source: Google Maps

3.6 Superelevation Rate Overview

Superelevation Rate is an FHWA Controlling Criterion. If standard conditions are not met a Design Exception (DE) is required for NHS Roadways with a Design Speed greater than or equal to 50 mph (high speed). All other applicable roadways would require a Design Variance (DV). The Designer should perform a comprehensive study and obtain the appropriate approval for any nonstandard feature. A decision to propose a Superelevation Rate that does not meet the requisite GDOT Maximum Superelevation Rate (e_{max}) requires a DE/DV.

3.6 Criteria Clarification

For Superelevation Rate Criteria Values, GDOT adopts the Design Policy Manual (Current Edition) Chapter 4.5.1 "Superelevation Rate" and Table 4.8 "Maximum Superelevation Rates" as the standard for SE Rates in Georgia. GDOT adopts Chapter 11.1.2 "Controlling Criteria for Non-Interstate Systems (GDOT 3R Standards)". GDOT also references the AASHTO Green Book, "A Policy on Geometric Design of Highways and Streets" (Current Edition), AASHTO, "A Policy on Design Standards – Interstate System" (Current Edition) and AASHTO, Guidelines for Geometric Design of Low-Volume Roads (Current Edition).

GDOT requires that the Maximum Superelevation Rate allowed on Georgia roadways must adhere to the (e_{max}) as designated in GDOT DPM Table 4.8 "Maximum Superelevation Rates". A DE/DV is required if not adhering to the GDOT (e_{max}) value as designated in this table. This also includes using a smaller (e_d) for a given radius than is defined in the AASHTO Green Book ($e_{max)}$ tables or using a larger (e_d) than the required (e_{max}).

Very flat (large radius) horizontal curves typically do not require superelevation and the normal cross-slope that is used in the tangent section is also carried through on the curve.

For the Superelevation tables referencing the Minimum Radii for Design Superelevation Rates, Design Speeds, and specific (e_{max}), see the AASHTO Green Book Chapter 3 "Elements of Design". Note that Design Speed, Horizontal Curve Radius, and Superelevation Rates criteria are correlated.

When possible and if applicable at intersections, the SE cross slope of one roadway should be coordinated with the profile grade of the intersecting roadway for smooth intersection transition.

The Superelevation Rate Criterion also applies to non-interstate systems 3R projects in which there is nonstandard Superelevation Rate.

3.6 Evaluation Tools

The Designer may use the InRoads/OpenRoads software(s) style sheet for SE Reporting (GDOT Superelevation Data Report) to generate information on Horizontal Alignment superelevation that lists the Station, Cross Slope, and Point Type (Normal Crown, Zero Cross Slope, Reverse Crown, and Full Super) for each superelevation transition location.

Designers may use horizontal alignment report tools (style sheets) in InRoads/OpenRoads to evaluate the horizontal alignment and curve data.

3.6 Mitigation Strategies

The strategies are suggested below to help offset operational and/or safety challenges that are often encountered when not meeting the Superelevation Rate criterion. *Note: Some of the same Mitigation Strategies also apply to the Horizontal Curve Radius criterion due to the interrelation of the criteria.*

Further discussion regarding application of mitigation strategies is provided in FHWA's *Design Decision Documentation And Mitigation Strategies For Design Exceptions* (Current Edition).

Standard GDOT Project Mitigation Strategies include:

Rumble Strips, Raised Pavement Markers (RPMs), GDOT Construction Detail P-7 (Safety Edge)

Additionally, the following strategies should be considered for mitigation of Superelevation Rate:

- Provide advance warning signage for sharp curves such as W1-2 (Curve), W1-11 (Hairpin Curve), and supplemental signs such as W1-8 (Chevron Alignment), W1-13 (Truck Rollover Sign), etc. See MUTCD (Current Edition) for guidance.
- Consider enhanced advance warning signage with Flashing Beacons (Signal Permit from Traffic Operations required).
- Specify roadway delineators.
- Widen the lane and shoulders.
- Improve ability to stay within the travel lane such as enhanced delineation and paved shoulders.
- For existing pavements – surface treatments that increase friction can be considered.
- Design traversable shoulders/slopes.
- Remove, relocate, or shield fixed objects/hazards with roadside safety hardware.

3.6 Additional Supporting Documentation

The provided list is not all encompassing, but any supporting information that provides additional clarification relevant to the Superelevation Rate criterion will be beneficial in documenting the DE/DV.

- Supply documentation of any physical or environmental restrictions or anticipated costs pertaining to the terrain that make it non-viable to meet the Superelevation Rate.
- Document any right-of-way acquisition issues/restrictions/costs that prohibits meeting the requisite curve Superelevation Rate.
- Provide plan sheets, profile sheets, and cross-sections depicting the existing/proposed Superelevation, cross slope, and radii to support the DE/DV to show why the requisite SE Rate cannot be met.
- Furnish the style sheet documentation generated by InRoads/OpenRoads software(s) containing Superelevation Data Report, Horizontal Alignment, and Curve Data information.
- Present sight distance calculations.

3.6 Other Checks

- There are various requirements for updating Superelevation on 3R and Pavement Reconstruction Projects. See GDOT DPM Chapter 11.1.1 and Table 11.1 for specific Geometric requirements for these projects and functional classifications. If these SE standards are not met a DE/DV is required.
- Superelevation and associated cross slope on horizontal curves should be evaluated regarding transitioning of cross slope back to normal crown to ensure grade and cross slope combinations do not produce a drainage issue. A GDOT Ponding Report style sheet in InRoads/OpenRoads is useful in finding these potential locations in the profile/cross slope design.
- Pavement selection should be assessed to ensure the proper material is selected for conditions to facilitate skid resistance in the superelevated curve.
- Trucks have a higher potential for roll-over in nonstandard superelevation. Wider pavement widths may be needed in sharp curves to prevent pavement edge drop offs.

3.6 Interdependence of Criteria

In certain cases, the nonstandard design feature identified in a DE or DV may affect other controlling/standard criteria that should be reviewed. As many of these values are interrelated, care should be exercised that these also do not exceed the guidance values or require additional exceptions/variances. The following is a list of additional controlling/standard criteria to evaluate when presenting a DE/DV for Superelevation Rate:

- Stopping Sight Distance
- Horizontal Curve Radius
- Intersection Sight Distance
- Intersection Skew Angle
- Vertical Clearance
- Maximum Grade
- Shoulder Width
- Lane Width
- Tangent Lengths on Reverse Curves

3.6 Reference Documents

- AASHTO, A Policy on Geometric Design of Highways and Streets (Current Edition)
- AASHTO, A Policy on Design Standards – Interstate System (Current Edition)
- AASHTO, Guidelines for Geometric Design of Low-Volume Roads (Current Edition)
- AASHTO, Roadside Design Guide (Current Edition)
- FHWA, Design Decision Documentation And Mitigation Strategies For Design Exceptions (Current Edition)
- GDOT, Design Policy Manual (Current Edition)
- GDOT Policy Memo – Update to FHWA Controlling Criteria – 06/01/2016
- TRB, NCHRP 774 Superelevation Criteria for Sharp Horizontal Curves on Steep Grades

3.7 Maximum Grade
FHWA Controlling Criteria

Source: Google Maps

3.7 Maximum Grade Overview

Maximum Grade is an FHWA Controlling Criterion. If standard conditions are not met a Design Exception (DE) is required for NHS Roadways with a Design Speed greater than or equal to 50 mph (high speed). All other applicable roadways would require a Design Variance (DV). The Designer should perform a comprehensive study and obtain the appropriate approval for any nonstandard feature. The Maximum Grade requirement criterion applies to standard design projects as well as some non-interstate systems 3R projects (see **Chapter 11.1.2)**

3.7 Criteria Clarification

For Maximum Grade Criteria Values, GDOT adopts the AASHTO Green Book, "A Policy on Geometric Design of Highways and Streets" (Current Edition) and the AASHTO, "A Policy on Design Standards – Interstate System" (Current Edition). GDOT also references the Design Policy Manual (Current Edition) Chapter 4.3 "Vertical Alignment", Chapter 4.3.2 "Maximum Vertical Grades" and Chapter 11.1.2 "Controlling Criteria for Non-Interstate Systems (GDOT 3R Standards)".

The criteria values for Maximum Grade are based on Design Speed, functional classification, and terrain type as depicted in the AASHTO Green Book and GDOT DPM Table 4.5.

Generally, the maximum design grade is not used; grades should usually be less than the maximum. There are some caveats and allowances to the Maximum Grade based on the functional classification provided in the AASHTO Green Book (see the specific Green Book Chapter pertaining to the designated functional classification). If no allowances are provided based on the applicable Maximum Grade tables, no allowances will be permitted by GDOT and a DE/DV will be required. See GDOT Chapter 4.3.2 "Maximum Vertical Grades" and Table 4.5 for additional notes and details.

Per the GDOT DPM, maximum grade values in GDOT DPM Table 4.5 "may be reduced when upgrades cause a speed reduction greater than or equal to 10 mph". If this is not feasible, a climbing lane should be provided and if the climbing lane cannot be provided or the maximum grade cannot be reduced – then a DE/DV will be required. See GDOT DPM Chapter 4.3.2 "Maximum Vertical Grades" and AASHTO Green Book Chapter 3 for additional details.

A DE/DV is **not required** if not meeting the minimum longitudinal grade; however, it is very important to ensure that adequate drainage is accounted for in these areas.

Grade corrections are usually outside the scope of a non-interstate 3R project, but if the grade is corrected it must not exceed the Maximum Grade standards – otherwise a DE/DV is required. See **Chapter 11.1.2 "Controlling Criteria for Non-Interstate Systems (GDOT 3R Standards)** for additional information regarding Maximum Grade criterion for non-interstate systems 3R projects.

3.7 Evaluation Tools

Designers may use vertical alignment report tools (style sheets) in InRoads/OpenRoads to evaluate the longitudinal grade and provide documentation of the grade, vertical curve data, etc.

As larger size trucks are typically the vehicles most affected by steeper grades, truck speed models as outlined in NCHRP 505 may also be investigated.

3.7 Mitigation Strategies

The strategies are suggested below to help offset operational and/or safety challenges that are often encountered when exceeding the Maximum Grade criterion. Further discussion regarding application of mitigation strategies is provided in FHWA's *Design Decision Documentation And Mitigation Strategies For Design Exceptions* (Current Edition).

Standard GDOT Project Mitigation Strategies include:
Rumble Strips, Raised Pavement Markers (RPMs), GDOT Construction Detail P-7 (Safety Edge)

Additionally, the following strategies should be considered for mitigation of Maximum Grade:

- Design climbing lanes (typically for trucks) on high-speed roadways with steep longitudinal grades. Climbing lanes may mitigate the reduced speeds of trucks.
- Establish Runaway (Escape) truck ramps on downhill grades along with warning signs W7-4b (Runaway Truck Ramp Entrance Direction), W7-4c (Truck Escape Ramp), and advance warning signs such as W7-4 (Runaway Truck Ramp XX Miles) etc. See MUTCD (Current Edition) for guidance.
- Provide advance warning signs such as W7-1 (Hill), W7-1a (Hill with Grade), W7-2P (Use Low Gear), W7-3P (XX% Grade), etc. See Current MUTCD for applicable signage.
- Provide enhanced advance warning signage with Flashing Beacons (Signal Permit from Traffic Operations required).
- Improve the ability to recover from lane departure such as wider paved shoulders.
- Relocate, remove hazardous roadside objects if feasible or protect with roadside safety hardware.
- Design for recoverable – or at a minimum traversable – slopes.

3.7 Additional Supporting Documentation

The provided list is not all encompassing, but any supporting information that provides additional clarification relevant to the Maximum Grade criterion will be beneficial in documenting the DE/DV.

- Supply documentation of any physical restrictions pertaining to the terrain, construction limits constraints, right-of-way, etc. that make it impracticable to reduce the maximum grade.
- Describe the reasons (earthwork cost, environmental impacts, or right-of-way impacts/costs, etc.) that preclude the correction of the grade.
- Present cross-sections and profile plans to support the DE/DV to show why the maximum grade cannot be reduced.

3.7 Other Checks

- Check the combination of a steep grade and a horizontal curve at the bottom of the grade. This can intensify the risk of vehicles being unable to negotiate the curve and increase run-off road situations.
- Determine if the maximum grade through intersections may affect intersection sight distance.
- Verify ADA PROWAG grade requirement effects along the roadway which should not exceed the roadway grade. See GDOT DPM Chapter 4.3.2.
- If maximum grade is exceeded near or approaching intersections, evaluate "Case A" ISD as well as decision sight distance along the intersecting roadway of the major/minor road having the nonstandard grade.

3.7 Interdependence of Criteria

In certain cases, the nonstandard design feature identified in a DE or DV may affect other controlling/standard criteria that should be reviewed. As many of these values are interrelated, care should be exercised that these also do not exceed the guidance values or require additional exceptions/variances. The following is a list of additional controlling/standard criteria to evaluate when presenting a DE/DV for Maximum Grade:

- Stopping Sight Distance
- Intersection Sight Distance
- Vertical Clearance
- ADA Requirement in PROWAG

3.7 Reference Documents

- AASHTO, A Policy on Geometric Design of Highways and Streets (Current Edition)
- AASHTO, A Policy on Design Standards – Interstate System (Current Edition)
- AASHTO, Guidelines for Geometric Design of Low-Volume Roads (Current Edition)
- FHWA, Design Decision Documentation And Mitigation Strategies For Design Exceptions (Current Edition)
- GDOT, Design Policy Manual (Current Edition)
- GDOT Policy Memo – Update to FHWA Controlling Criteria – 06/01/2016

3.8 VERTICAL CLEARANCE

FHWA Controlling Criteria

Source: Google Maps

3.8 Vertical Clearance Overview

Vertical Clearance is an FHWA Controlling Criterion. If features do not adhere to requisite standards, a Design Exception (DE) is required for NHS Roadways with a Design Speed greater than or equal to 50 mph (high speed). All other applicable roadways would require a Design Variance (DV). The Designer should perform a comprehensive study and obtain the appropriate approval for any nonstandard feature. Vertical Clearance consists of the measurement of the height differential between the bottom of an overhead structure and the surface of the lower roadway. The Vertical Clearance criterion applies to various types of grade separation facilities such as overhead roadway bridges, bicycle/pedestrian bridges, overhead railway bridges and tunnels. This criterion also applies to sign bridges, support structures, or any other assembly in which overhead clearance is a factor.

3.8 Criteria Clarification

For Vertical Clearance Criteria Values, GDOT adopts the AASHTO Green Book, "A Policy on Geometric Design of Highways and Streets" (Current Edition) and the AASHTO, "A Policy on Design Standards – Interstate System" (Current Edition). GDOT also references the GDOT Bridges and Structures Design Manual (Current Edition) – Chapter 2.3.3.1 "Vertical Clearances" and Table 2.3.3.1-1 "Vertical Clearances for Bridges" and the Design Policy Manual (Current Edition) – Chapter 4.3 "Vertical Alignment" and Chapter 11.1.2 "Controlling Criteria for Non-Interstate Systems (GDOT 3R Standards)".

The criteria values for Vertical Clearance are discussed in the above AASHTO Publications for each type of roadway functional classification. The Vertical Clearance requirement applies to the entire roadway width. For interstates/freeways, the Vertical Clearance criterion includes the roadway width along with shoulders, any auxiliary lanes, ramps, and C-D roads. In addition, future pavement resurfacing, and overlays should be accounted for which may potentially affect structure clearance.

Vertical Clearance is an exclusive controlling criterion that requires additional review/approval for Design Exception requests pertaining to the Interstate System. Since Interstates are considered a critical component for mobility for National Defense purposes, approval for any Design Exceptions must also be coordinated with the Department of Defense's DOD – SDDCTEA (Department of Defense – Surface Deployment and Distribution Command Transportation Engineering Agency). The Georgia FHWA Division assists in the coordination with DOD – SDDCTEA.

The Vertical Clearance requirement criterion applies to standard design projects as well as non-interstate systems 3R projects.

3.8 Evaluation Tools

Designers may use third-party software such as AutoTurn or some other CAD-based software for 2D/ 3D Vertical Clearance analysis and simulations to determine if vehicles can safely clear the structure.

3.8 Mitigation Strategies

The strategies are suggested below to help offset operational and/or safety challenges that are often encountered with Vertical Clearance of nonstandard overhead structures. Further discussion regarding application of mitigation strategies is provided in FHWA's *Design Decision Documentation And Mitigation Strategies For Design Exceptions* (Current Edition).

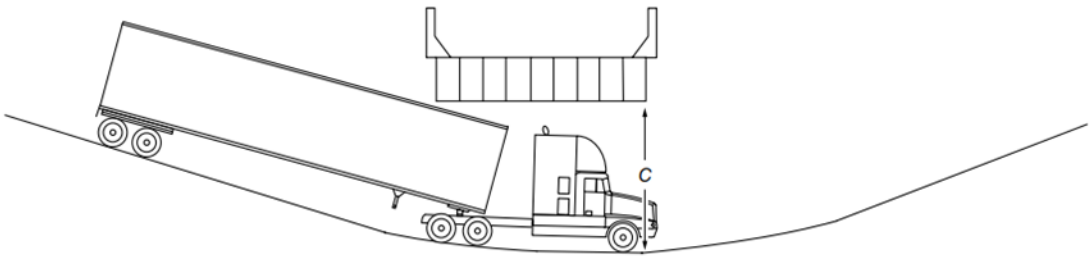
The following strategies should be considered for mitigation of Vertical Clearance:

- Provide advanced signage to warn of low vertical clearance and maximum vehicle height limits. See MUTCD (Current Edition) for guidance.
- Enhance signage by installing flashing warning lights/beacons.
- Prohibit over-height trucks from entering certain roadways to avoid overhead structures.
- Furnish alternate routes for vehicles (e.g., trucks) to detour around the overhead structure.

3.8 Additional Supporting Documentation

The provided list is not all encompassing, but any supporting information that provides additional clarification relevant to the Vertical Clearance criterion will be beneficial in documenting the DE/DV.

- Supplement Crash Data focusing on the frequency of historical impacts regarding the clearance of the overhead structure (bridge, tunnel, sign bridge, other assembly, etc.).
- Truck percentages should be included with the traffic data when available. Truck traffic is a critical component in the discussion regarding Vertical Clearances.
- Provide clearance diagrams depicting the vertical height between the overhead structure, the lower roadway centerline as well as the left/right edges of pavement.
- Identify any pertinent structure information regarding present conditions, existing signage, general description, current Vertical Clearance height, etc.
- Determine/provide sight distance calculations at under crossings. See Chapter 3 of the AASHTO Green Book.
- If applicable, ensure adequate sag vertical curve length under structure is calculated/provided to allow tractor and trailer to pass.



3.8 Other Checks

- The profile grade is an important aspect pertaining to Vertical Clearances such as sags in the lower roadway near the overhead structure which may affect a vehicle's ability to clear the structure. (Example Vehicles: single unit truck, tractor-trailers, recreational vehicles, etc.).
- Consideration should be given to future pavement resurfacing as well as future lanes programmed to be added beneath the structure, which could affect Vertical Clearance.

3.8 Interdependence of Criteria

In certain cases, the nonstandard design feature identified in a DE or DV may affect other controlling/standard criteria that should be reviewed. As many of these values are interrelated, care should be exercised that these also do not exceed the guidance values or require additional exceptions/variances. The following is a list of additional controlling/standard criteria to evaluate when presenting a DE/DV for Vertical Clearances:

- Stopping sight distance
- Maximum Grade
- Superelevation Rate
- Cross Slope

3.8 Reference Documents

- AASHTO, A Policy on Geometric Design of Highways and Streets (Current Edition).
- AASHTO, A Policy on Design Standards – Interstate System (Current Edition).
- FHWA, Design Decision Documentation And Mitigation Strategies For Design Exceptions (Current Edition)
- GDOT, Design Policy Manual (Current Edition)
- GDOT, Bridge and Structures Design Manual (Current Edition)
- GDOT Policy Memo – Update to FHWA Controlling Criteria – 06/01/2016

3.9 Lane Width
FHWA Controlling Criteria

Source: Google Maps

3.9 Lane Width Overview

Lane Width is an FHWA Controlling Criterion. If standard conditions are not met a Design Exception (DE) is required for NHS Roadways with a Design Speed greater than or equal to 50 mph (high speed). All other applicable roadways would require a Design Variance (DV). The Designer should perform a comprehensive study and obtain the appropriate approval for any nonstandard feature. Lane Width requirements apply to all travel lanes including ramps and auxiliary lanes. A DE/DV is also required for nonstandard Bridge Lane Widths.

3.9 Criteria Clarification

For Lane Width Criteria Values, GDOT adopts the AASHTO Green Book, "A Policy on Geometric Design of Highways and Streets" (Current Edition) and the AASHTO, "A Policy on Design Standards – Interstate System" (Current Edition). GDOT also references the AASHTO "Guidelines for Geometric Design of Low-Volume Roads (Current Edition) and the Design Policy Manual (Current Edition) Chapter 6.1 "Lane Width" and Chapter 11.1.2 "Controlling Criteria for Non-Interstate Systems (GDOT 3R Standards)".

The criteria values for Lane Width are discussed in the AASHTO Publications for each type of facility. For new construction, Lane Width criterion for each different type of roadway functional classification is provided in the *AASHTO Green Book*. It is further categorized by Design Speed. In several cases, this guidance is also represented by traffic volume or included as a combination with useable shoulder widths. The *AASHTO Guidelines for Geometric Design of Low-Volume Roads* guidelines also has Lane Width guidance for applicable low-volume roadways. The *AASHTO A Policy on Design Standards – Interstate System* provides policy regarding Interstate travel Lane Width.

The number of travel lanes in each direction (generally a single lane needs to be wider), width of adjacent shoulder, median, on-street parking, curbing, or bike lane also influence Lane Width. In some cases, such as on divided multi-lane roadways, a narrower inside travel lane may be adjacent to a wider outside lane (which would have greater distribution of the traffic volume and larger size vehicles). The project's Design Vehicle or Check Vehicle may also influence the Lane Width. Based on vehicle tracking, Lane Widths may need to be wider in areas with tighter horizontal curvature or where turning movements occur at intersections.

For information on Lane Width regarding Four-Foot-Wide Flush Medians – reference GDOT DPM Chapter 6.12.2.1 and Section 3.19 in this DE/DV Guide.

The Lane Width requirement criterion applies to standard design projects as well as non-interstate systems 3R projects.

3.9 Evaluation Tools

Designers may use third-party software such as AutoTurn or some other CAD-based software that references Design Vehicle dimensions and tracking turning paths based on Chapter 2 of the AASHTO Green Book. Tracking turning paths may need to be included in documentation where there is concern of vehicle lane discipline.

3.9 Mitigation Strategies

The strategies are suggested below to help offset operational and/or safety challenges that are often encountered with Lane Width. Further discussion regarding application of mitigation strategies is provided in FHWA's *Design Decision Documentation And Mitigation Strategies For Design Exceptions* (Current Edition).

Standard GDOT Project Mitigation Strategies include:
Rumble Strips, Raised Pavement Markers (RPMs), GDOT Construction Detail P-7 (Safety Edge)

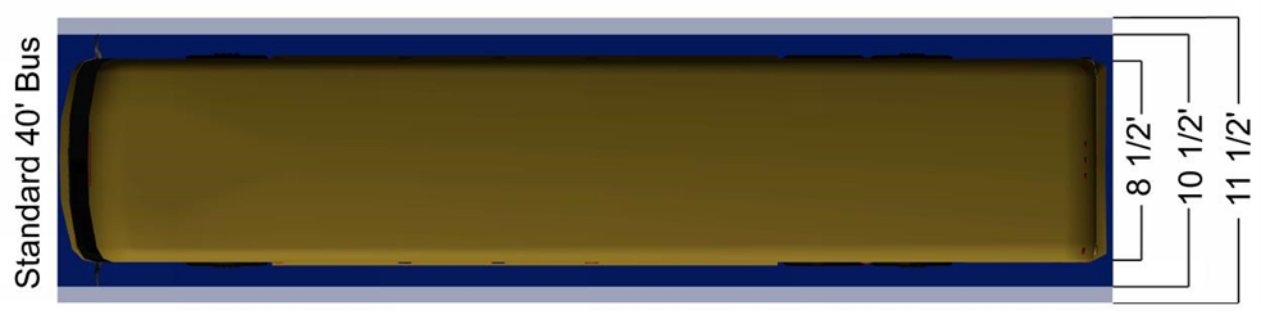
Additionally, the following strategies should be considered for mitigation of lane width:

- Distribute cross-sectional width with other typical section features, such as paved shoulders.
- Provide advance warning of lane width reduction as provided in the MUTCD (Current Edition). Note that "ROAD NARROWS (W5-1)" is not applicable for many lane width reductions.
- Improve ability to recover from lane departure with paved shoulders, and recoverable slopes.
- Remove, relocate, or shield fixed objects/hazards with roadside safety hardware when appropriate.

3.9 Additional Supporting Documentation

The provided list is not all encompassing, but any supporting information that provides additional clarification relevant to the Lane Width criterion will be beneficial in documenting the DE/DV.

- For documentation of nonstandard Lane Widths - sideswipe same-direction crashes, sideswipe opposite-direction crashes, head on crashes, and the crash severity of these crash types should be reviewed and discussed in a narrative below the tabulated crash data. Clarify if this area consists of high truck frequency.
- Discuss whether bus routes are in the area of proposed lane width reduction. Where bus lanes are present, the proposed roadway widths should take into account the bus width including mirrors.

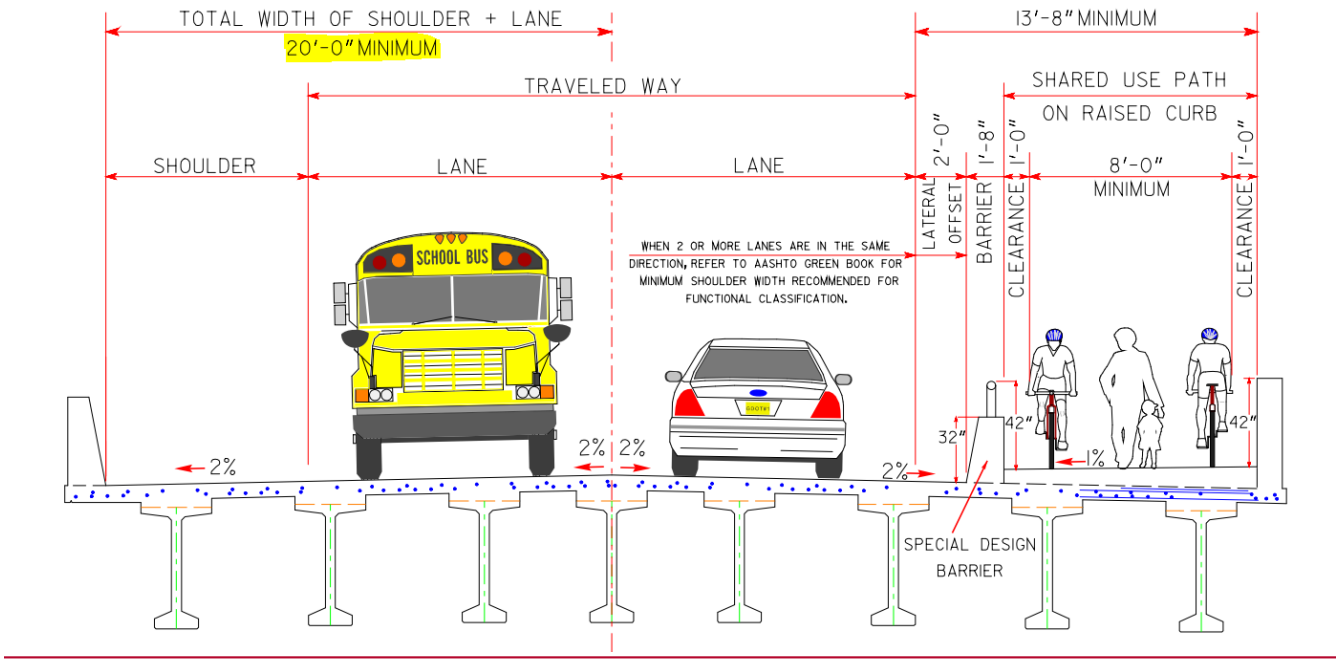


Drawing of Standard 40 foot Bus

- Curvature of the roadway may affect the ability to stay within lanes. Documentation of vehicle turning paths should be provided.
- Provide evidence that sufficient right of way does not exist and is not attainable to widen the travel lane.

3.9 Other Checks

- Ensure that gutter spread requirements are met.
- If encountering restrictive right-of-way conditions in urban areas, the use of header curb and/or narrow curb and gutter placement next to travel lane is allowed only under certain conditions. Reference the GDOT DPM Chapter 6.9.2 for detailed information and requirements.
- Verify that the reduced Lane Width does not result in drainage structures (e.g., grates) located directly in the vehicle wheel path. If this cannot be avoided for existing conditions, ensure that the grates are traffic rated for the requisite vehicle load.
- Verify if Lane Width will influence traffic capacity/LOS as per the AASHTO Highway Capacity Manual.
- DE/DVs also apply to nonstandard Bridge Lane Widths.
- Ensure there is adequate through lane width and shoulder width for emergency vehicles to pass. Below is an example of a typical section that accounts for emergency passing. In urban areas, the median may be available for emergency operation.



3.9 Interdependence of Criteria

In certain cases, the nonstandard design feature identified in a DE or DV may affect other controlling/standard criteria that should be reviewed. As many of these values are interrelated, care should be exercised that these also do not exceed the guidance values or require additional exceptions/variances. The following is a list of additional controlling/standard criteria to evaluate when presenting a DE/DV for Lane Widths:

- Shoulder Width
- Superelevation Rate
- Horizontal Curve Radius
- Lateral Offset to Obstruction
- Rumble Strips
- Pedestrian, Bicycle, and Transit Warrants

3.9 Reference Documents

- AASHTO, A Policy on Geometric Design of Highways and Streets (Current Edition)
- AASHTO, A Policy on Design Standards – Interstate System (Current Edition)
- AASHTO, Guidelines for Geometric Design of Low-Volume Roads (Current Edition)
- AASHTO, Roadside Design Guide (Current Edition)
- FHWA, Design Decision Documentation And Mitigation Strategies For Design Exceptions (Current Edition)
- GDOT, Design Policy Manual (Current Edition)
- GDOT Policy Memo – Update to FHWA Controlling Criteria – 06/01/2016
- GDOT, Signing and Marking Design Guidelines (Current Edition)

3.10 Cross Slope
FHWA Controlling Criteria

Source: Google Maps

3.10 Cross Slope Overview

Cross Slope is an FHWA Controlling Criterion. If standard conditions are not met a Design Exception (DE) is required for NHS Roadways with a Design Speed greater than or equal to 50 mph (high speed). All other applicable roadways would require a Design Variance (DV). The Designer should perform a comprehensive study and obtain the appropriate approval for any nonstandard feature. A decision to propose a Cross Slope value that does not meet the requisite AASHTO criteria requires a DE/DV. Typical practice is to provide a 2% pavement cross slope for travel lanes. This may vary on 3 lane or multi-lane roadways to facilitate roadway drainage.

3.10 Criteria Clarification

For Cross Slope Criteria Values, GDOT adopts the AASHTO Green Book, "A Policy on Geometric Design of Highways and Streets" (Current Edition) and the AASHTO, "A Policy on Design Standards – Interstate System" (Current Edition). GDOT also references the Design Policy Manual (Current Edition) Chapter 6.3 "Cross Slope" and Chapter 11.1.2 "Controlling Criteria for Non-Interstate Systems (GDOT 3R Standards)".

The Cross Slope criterion pertains to travel lanes in tangent conditions, and on curves where superelevation is not used. It consists of both minimum and maximum values. A DE/DV is required if not meeting this minimum/maximum range. Any DE/DVs relating to Superelevation would be requested for the Superelevation Rate criterion. This criterion is discussed in Section 3.6 in more detail.

A maximum cross slope breakover rate of 8% between lane and shoulder is also part of the Cross Slope criterion. If this maximum is exceeded, a DE/DV is required.

The Cross Slope criterion requirement also applies to non-interstate systems 3R projects in which there is nonstandard Cross Slope.

3.10 Evaluation Tools

Where less than the minimum cross slope is proposed, a drainage analysis should be performed to determine if water ponding may be an issue in combination with certain aspects of longitudinal grade and transitions from SE on roadway Cross Slope. Designers may use design software such as InRoads or OpenRoads to check for potential ponding in these areas regarding longitudinal grade and the roadway Cross Slope. The software(s) provide a style sheet for Ponding (GDOT Ponding Report) which produces a report at profile stations where the longitudinal grade <1.0% and the roadway Cross Slope <0.5%.

3.10 Mitigation Strategies

The strategies are suggested below to help offset operational and/or safety challenges that are often encountered when not meeting the Cross Slope criterion. Further discussion regarding application of mitigation strategies is provided in FHWA's *Design Decision Documentation And Mitigation Strategies For Design Exceptions* (Current Edition).

Standard GDOT Project Mitigation Strategies include:

Not applicable.

Additionally, the following strategies should be considered for mitigation of Cross Slope:

- Provide advance warning signage for areas where potential drainage may be inadequate such as W8-5 (Slippery When Wet), W8-5P (When Wet), and W8-18 (Road May Flood), etc. See MUTCD (Current Edition) for guidance.
- Improve drainage systems/structures in the area to facilitate drainage.
- Use OGFC (Open Graded Friction Course) Pavement.
- For existing pavements – surface treatments that increase friction can be considered.

3.10 Additional Supporting Documentation

The provided list is not all encompassing, but any supporting information that provides additional clarification relevant to the Cross Slope criterion will be beneficial in documenting the DE/DV.

- Document any physical restrictions or anticipated costs pertaining to the terrain, pavement construction, etc. that make it non-viable to meet the Cross Slope.
- Present any drainage remediations that may affect the maximum Cross Slope allowance.
- Provide documentation of any ADA PROWAG conflicts that support not meeting the required min/max cross slope.
- Supply any drainage profiles/drainage cross section plans to support the DE/DV request for retaining/proposing the nonstandard Cross Slope.
- Provide cross-sections depicting the existing and proposed Cross Slope and profile plans to support the DE/DV to show why the requisite Cross Slope cannot be met.
- Furnish the style sheet documentation generated by InRoads/OpenRoads software(s) containing ponding information (longitudinal grade and roadway Cross Slope).

3.10 Other Checks

- It is critical in resurfacing projects that the Cross Slope is retained as designed in order to avoid pavement drainage issues. Hydroplaning is a concern when the minimum Cross Slope is not designed/maintained according to requisite conditions.
- There are various requirements for updating Cross Slope on 3R and Pavement Reconstruction Projects. See GDOT DPM Chapter 11.1.1 and Table 11.1 for specific Geometric requirements for these projects and functional classifications. If these Cross Slope standards are not met a DE/DV is required.
- Cross Slope is an important aspect regarding ADA requirements. Verify the effects of Cross Slope on ADA PROWAG. See GDOT DPM Chapter 9.5 “Design of Accommodations” in particular the cross-walk section regarding Cross Slope as well as other ADA applications pertaining to Cross Slope.
- Pavement drainage is an important consideration regarding Cross Slope design. There may be cases in which the drainage requirement may need to exceed the requisite Cross Slope (i.e., greater than normal 2%) and should be evaluated accordingly.
- To facilitate proper drainage, design the proposed vertical and horizontal curves to ensure that the flat profile of a vertical curve is not located near the flat cross slope of the SE transition.

3.10 Interdependence of Criteria

In certain cases, the nonstandard design feature identified in a DE or DV may affect other controlling/standard criteria that should be reviewed. As many of these values are interrelated, care should be exercised that these also do not exceed the guidance values or require additional exceptions/variances. The following is a list of additional controlling/standard criteria to evaluate when presenting a DE/DV for Cross Slope:

- Superelevation Rate
- Pedestrian, Bicycle, and Transit Warrants

3.10 Reference Documents

- AASHTO, A Policy on Geometric Design of Highways and Streets (Current Edition)
- AASHTO, A Policy on Design Standards – Interstate System (Current Edition)
- AASHTO, Guidelines for Geometric Design of Low-Volume Roads (Current Edition)
- FHWA, Design Decision Documentation And Mitigation Strategies For Design Exceptions (Current Edition)
- GDOT, Design Policy Manual (Current Edition)
- GDOT, Drainage Manual (Drainage Design for Highways) (Current Edition)
- GDOT Policy Memo – Update to FHWA Controlling Criteria – 06/01/2016

3.11 A & B

Shoulder Width
FHWA Controlling Criteria
GDOT Standard Criteria

Source: Google Maps

3.11A & B Shoulder Width Overview

Shoulder Width is an FHWA Controlling Criterion as well as a GDOT Standard Criterion. The following Sections 3.11A & B describes both of these conditions. The Designer should perform a comprehensive study and obtain the appropriate approval for any nonstandard feature/element that does not meet the requisite criterion. The Shoulder Width consists of a graded and/or paved area bordering the traveled way that laterally supports the road surface and also aids in the drainage of water away from the roadway and may assist in the reduction of pavement failure. Shoulders may also be used in some cases for the accommodation of bicycles. Shoulder Width provides an important safety feature for emergency accommodation of vehicles, recovery areas for run-off road vehicles, and lateral offset for roadside safety hardware placement. This criterion also includes bridge shoulder widths.

3.11A **FHWA Controlling Criteria:** If AASHTO conditions are not met a Design Exception (DE) is required for NHS Roadways with a Design Speed greater than or equal to 50 mph (high speed). All other applicable roadways would require a Design Variance (DV).

3.11B **GDOT Standard Criteria:** A Design Variance is required if not meeting GDOT specific standard criteria for Shoulder Width. See GDOT DPM Chapter 6.5 and the Criteria Clarification in the next section for additional information.

NOTE: If a Design Exception has been approved for the Shoulder Width criterion, GDOT does not require an additional Design Variance for transitions between a GDOT standard Shoulder Width and the approved Design Exception Shoulder Width. See GDOT DPM Chapter 6.5 "Shoulders" for additional information.

3.11A&B Criteria Clarification

3.11A **FHWA Controlling Criteria:** ***For applicable AASHTO Shoulder Width Values, GDOT adopts the AASHTO Green Book, "A Policy on Geometric Design of Highways and Streets" (Current Edition) and the AASHTO, "A Policy on Design Standards – Interstate System" (Current Edition). GDOT also references the AASHTO "Guidelines for Geometric Design of Low-Volume Roads (Current Edition) and the Design Policy Manual (Current Edition) Chapter 11.1.2 "Controlling Criteria for Non-Interstate Systems (GDOT 3R Standards)".***

The minimum Shoulder Width is primarily based on the roadway functional classification and traffic volume and consists of the paved and/or graded shoulder from the edge of the travel lane to the shoulder break point. Nonstandard shoulder widths should be limited to locations with specific constraints to minimize the length of the nonstandard shoulder. Nonstandard shoulder width should widen out to standard widths as quickly as possible after areas of constraint.

For typical requirements for Local Roadways, Collector Roadways, Arterial Roadways and Freeways, see the GDOT DPM Chapter 6 – Tables 6.4, 6.5, 6.6 and 6.7. It should be noted that all values in these tables are not standards - and in some cases - exceed the minimum standards and are only applicable based on the assumptions detailed in the foot notes of each table. Care should be taken when using these tables to ensure they are applicable to the context, functional classification, design speed, and volume of the roadway being designed.

For 3R Projects, the requirements are presented in the GDOT DPM Chapter 11. These requirements vary for non-interstate system and interstate system. A Design Exception (high speed roadways) or a Design Variance (low speed roadways) are required if not meeting the applicable Shoulder Width.

Often, required offsets to guardrail are reduced or eliminated with the proposal of nonstandard Shoulder Widths. When a nonstandard Shoulder Width is proposed, the DE/DV should state that the required guardrail offset is also not met, and no further documentation of the guardrail offset requirement is needed (i.e., no separate DV for the guardrail offset). However, separate Design Variances for guardrail offset per GDOT Construction Standards are required for nonstandard offsets until the minimum shoulder width violates GDOT or AASHTO standard width and a DE/DV for minimum shoulder width is needed.

NOTE: See GDOT Policy Memo – Curb Usage on High-Speed Facilities – 10/01/2021 and the GDOT DPM Chapter 6.9 for Design Exception/Design Variance pertaining to curb usage on Shoulder Widths for high-speed roadways (≥ 50 mph). *Curb use cannot be used as a justification to reduce the appropriate Shoulder Width on high-speed roadways.* Typically, vertical curbs should not be used along freeways or other high-speed roadways – but if curb is needed it must be the sloping type and located no closer to the traveled way than the outer edge of the shoulder. For inside shoulders, the sloped curbs will be offset at least 4-ft from the inside travel lane. **A DE/DV is required if placing curb closer than the shoulder widths specified in Chapter 6.9 of the GDOT DPM.**

It should be noted that V-gutter is not considered curb, and its total width is allowed within the shoulder.

3.11B GDOT Standard Criteria: ***GDOT references the Design Policy Manual (Current Edition) Chapter 6.5 "Shoulders".***

In addition to the AASHTO Shoulder Width Criterion, GDOT has adopted and defined additional requirements. If these additional GDOT requirements are not met, a Design Variance is required.

1. GDOT has adopted 10-ft as the typical overall Shoulder Width for higher volume (ADT > 2000) and higher speed (greater than or equal to 50 mph) rural collector and rural arterial roadways.
2. GDOT has also adopted (for high-speed freeways and interstates) 14-ft as the typical overall "*Outside Shoulder Width*" with 12-ft paved adjacent to the traveled way, and 12-ft as the typical overall "*Inside Shoulder Width*" with 10-ft paved adjacent to the traveled way.

3.11A&B Evaluation Tools

Not Applicable.

3.11A&B Mitigation Strategies

The strategies are suggested below to help offset operational and/or safety challenges that are often encountered with nonstandard Shoulder Width. Further discussion regarding application of mitigation strategies is provided in FHWA's *Design Decision Documentation And Mitigation Strategies For Design Exceptions* (Current Edition).

Standard GDOT Project Mitigation Strategies include:

Rumble Strips, Raised Pavement Markers (RPMs), GDOT Construction Detail P-7 (Safety Edge)

Additionally, the following strategies should be considered for mitigation of Shoulder Width:

- Distribute cross-sectional width with other typical section features, such as travel lanes and add auxiliary lanes.
- Where no shoulder is provided, apply appropriate signage per MUTCD (Current Edition).
- Improve the ability to stay within the travel lane or to recover from lane departure by providing enhanced pavement lane markings, delineators, paved shoulders, and recoverable slopes.
- Provide pull-offs.
- Remove, relocate, or shield fixed objects/hazards with roadside safety hardware when appropriate.
- Verify whether or not a programmed project with shoulder-widening will address the nonstandard Shoulder Width at a future date. If a project is programmed that would address the nonstandard Shoulder Width, provide the PI Number and Preconstruction Status Report in the DE/DV.

3.11A&B Additional Supporting Documentation

The provided list is not all encompassing, but any supporting information that provides additional clarification relevant to the Shoulder Width criterion will be beneficial in documenting the DE/DV.

- For documentation of nonstandard Shoulder Width - sideswipe same-direction crashes, sideswipe opposite-direction crashes, head on crashes, and the crash severity of these crash types should be reviewed and discussed in a narrative below the tabulated crash data. Clarify if this area consists of high truck frequency and/or high bicycle usage.
- Present evidence that adequate right of way does not exist and is not attainable to widen the shoulder in the form of plan sheets or layouts showing the needed right of way for providing the standard and the considered alternatives.
- To increase roadside safety for reduced Shoulder Width, provide documentation that roadside safety hardware or break-away hardware is provided (if needed) for fixed objects that cannot be relocated/removed.

3.11A&B Other Checks

- Ensure that the nonstandard Shoulder Width does not adversely affect the operation and capacity of travel lanes. Narrower shoulders can result in reduction of free-flowing traffic speed.
- When narrow shoulders are present, drivers typically shy away from the edge-line which can result in encroachment into another lane. If the shoulder cannot be widened, determine if a composite shoulder (small, paved shoulder combined with unpaved section) can be provided.
- Verify that the shoulder is designed to facilitate drainage away from the travel lanes through either curb and gutter or slope drainage and that gutter spread requirements are met.
- Check if the nonstandard Shoulder Width adversely affects sight distance around curves.
- Determine if the area has high bicycle traffic and if the design or retention of nonstandard shoulders will negatively impact bicycle use or accommodation.
- Check for hazards or fixed objects horizontally offset of the nonstandard shoulder and provide appropriate removal, relocation, or roadside safety hardware protection.
- Verify that the Cross Slope between the mainline travel lane Cross Slope and the shoulder Cross Slope does not exceed 8%.

3.11A&B Interdependence of Criteria

In certain cases, the nonstandard design feature identified in a DE or DV may affect other controlling/standard criteria that should be reviewed. As many of these values are interrelated, care should be exercised that these also do not exceed the guidance values or require additional exceptions/variances. The following is a list of additional controlling/standard criteria to evaluate when presenting a DE/DV for Shoulder Widths:

- Stopping Sight Distance (especially Horizontal Sight Offset – HSO)
- Vertical Clearance
- Median Usage
- Lane Width
- Lateral Offset to Obstruction
- Rumble Strips
- Pedestrian, Bicycle, and Transit Warrants
- GDOT Construction Standards (especially offset to guardrail)

3.11A&B Reference Documents

- AASHTO, A Policy on Geometric Design of Highways and Streets (Current Edition)
- AASHTO, A Policy on Design Standards – Interstate System (Current Edition)
- AASHTO, Guidelines for Geometric Design of Low-Volume Roads (Current Edition)
- AASHTO, Roadside Design Guide (Current Edition)
- GDOT, Design Policy Manual (Current Edition)
- GDOT, Bridge and Structures Design Manual (Current Edition)
- FHWA, Design Decision Documentation And Mitigation Strategies For Design Exceptions (Current Edition)
- FHWA, Manual on Uniform Traffic Control Devices (MUTCD) (Current Edition)
- GDOT Policy Memo – Curb Usage on High-Speed Facilities – 10/01/2021
- GDOT Policy Memo – Update to FHWA Controlling Criteria – 06/01/2016
- GDOT Policy Memo – GDOT Standard Design Criteria for Shoulder Width – 05/09/2016

3.12 Access Control
GDOT Standard Criteria

Source: Google Maps

3.12 Access Control Overview

Access Control is a GDOT Standard Criterion and as such will require a Design Variance if not met. The Designer should perform a comprehensive study and obtain the appropriate approval for any nonstandard feature/element that does not meet the GDOT Standard for this criterion. Access Control consists of an approach to regulate/limit ingress and egress to various highway facilities from adjoining properties. Typically, the degree of access control is governed by the roadway functional classification. Types of Access Control consist of Full Access Control, Partial Access Control, Permitted Access, and No Access Control. Limiting the access to certain roadway types (such as high-speed, high-volume roadways) increases the traffic flow efficiency as well as the safety of the roadway by eliminating and/or reducing conflict points. The Access Control criterion also applies to Median Openings.

3.12 Criteria Clarification

For Access Control Standard Requirements, GDOT references the Design Policy Manual (Current Edition) – Chapter 3.5 "Establishment of Access Control" and Chapter 7.3 "Median Openings".

Design Variance requests for Access Control apply to the following conditions:

1. Access Control applies to the provision of the appropriate type of Access Control for an applicable roadway functional classification. Access Control also applies to the specific GDOT Standard criterion for the feature/element (Example: Median Opening).
2. Breaks in Access are only considered under specific conditions such as at State or Local government public road intersections. See GDOT DPM Chapter 3.5 for complete Break in Access requirements. Also, the Plan Development Process (PDP) Chapter 6.4.1 contains additional procedures for the evaluation for Breaks in Access.
3. The request for addition of a **median opening by a particular development** also falls under Access Control. A Design Variance is required if the intended design does not conform to GDOT median opening criteria for either a proposed or existing roadway. See GDOT DPM Chapter 7.3 "Median Openings" for additional information.

3.12 Evaluation Tools

Not Applicable.

3.12 Mitigation Strategies

The strategies are suggested below to help offset operational and/or safety challenges that are often encountered with any nonstandard feature/element not meeting Access Control standards.

The following strategies should be considered for mitigation of Access Control:

- Provide frontage or access roads to establish connections to allow ingress/egress to properties.
- Consolidate driveways where frontage or access roads are not feasible.
- Where breaks in access are proposed, consider Right In/Right Out configurations and raised medians to limit turning maneuvers.
- Construct access points on other accessible areas of the property and/or purchase the property.
- Consider R-Cuts for one-way (left turn only) to facilitate median openings where Right In/Right Out configurations are not feasible.

3.12 Additional Supporting Documentation

The provided list is not all encompassing, but any supporting information that provides additional clarification relevant to the Access Control criterion will be beneficial in documenting the DV.

- Plan view layouts should be provided and should depict the appropriate line styles shown. See GDOT DPM Chapter 3.5 “Establishment of Access Control” for additional information.

- Present any documentation for future programmed projects that may affect Access Control and/or median openings.
- If a Parcel is land-locked and meets the requirements for buy-out, provide an estimated cost for this purchase.
- For proposed median openings, provide the applicable GDOT Construction Details M-3A or M-3B.
- Meeting minutes or input received from discussions with District Traffic Operations.
- In partial or limited access, check not only the sight distance for the mainline, but also any side-roads, drives and/or ramps that may be affected.
- Where access breaks or nonstandard access limits are proposed near ramp terminals, assess the visibility up the ramp from the access break.
- Provide signing and marking plans for the area of the DV.

3.12 Other Checks

- For median openings, verify that sufficient taper lengths, deceleration length and storage length for specific traffic volume requirements. Reference: GDOT DPM Chapter 7.3.
- Perform traffic analysis for the proposed nonstandard condition and expected operational effects. Demonstrate proposed condition does not contribute to excessive in-lane queueing, which may contribute to rear end crashes.
- Check for typical fencing requirements for full Access Control roadways and whether fencing is needed on partial/limited Access Control in certain cases. Reference GDOT DPM Chapter 3.7.1 for fencing on Access-Controlled roadways.

3.12 Interdependence of Criteria

In certain cases, the nonstandard design feature identified in a DV may affect other controlling/standard criteria that should be reviewed. As many of these values are interrelated, care should be exercised that these also do not exceed the guidance values or require additional exceptions/variances. The following is a list of additional controlling/standard criteria to evaluate when presenting a DV for Access Control:

- Intersection Sight Distance
- Stopping Sight distance
- Median Usage

3.12 Reference Documents

- AASHTO, A Policy on Geometric Design of Highways and Streets (Current Edition)
- AASHTO, Guidelines for Geometric Design of Low-Volume Roads (Current Edition)
- AASHTO, A Policy on Design Standards – Interstate System (Current Edition)
- GDOT, Design Policy Manual (Current Edition)
- GDOT, Plan Development Process (Current Edition)
- GDOT Construction Details M-3A and M-3B.
- GDOT, Signing and Marking Design Guidelines (Current Edition)
- OCGA, Title 32, Chapter 6, Article 4 Limited-Access Roads (§ 32-6-111 — 32-6-114)

3.13 Intersection Sight Distance
GDOT Standard Criteria

Source: Google Maps

3.13 Intersection Sight Distance Overview

Intersection Sight Distance (ISD) is a GDOT Standard Criterion and as such will require a Design Variance if not met. The Designer should perform a comprehensive study and obtain the appropriate approval for any nonstandard feature/element that does not meet the requisite criteria. ISD is a critical component in the safety design of intersections due to the number of potential conflict points in these areas. Intersections should be clear of obstructions so that drivers on both the major and the minor roadway have unobstructed views. The AASHTO Green Book, Chapter 9 Section 9.5 “Intersection Sight Distance” details criteria pertaining to traffic control conditions at intersections. Some of the same conditions that apply to Intersection Skew Angle also apply to Intersection Sight Distance.

3.13 Criteria Clarification

For Intersection Sight Distance Criteria Values, GDOT adopts the AASHTO Green Book, "A Policy on Geometric Design of Highways and Streets" (Current Edition). GDOT also references the Design Policy Manual (Current Edition) – Chapter 4.1.5 "Intersection Sight Distance".

Reference GDOT DPM Chapter 4.1.5 for additional information pertaining to Intersection Sight Distance (ISD) graphical studies, decision point location, case requirements, etc. The Designer should ensure that the appropriate ISD vehicle types are evaluated. For the ISD sight triangles, the entire sight triangle – not just the maximum sight line - should be clear of obstructions.

Note: GDOT Policy Memo – Intersection Sight Distance – 09/26/2018 requires an ISD study containing calculations and graphical drawings to be provided with PFPR submittal package. Any exceptions for the omission of this requirement are also listed in the memo. Similar studies should be provided for a DV request.

A Design Variance is not required if right turn on red is prohibited at a traffic signal-controlled intersection. A Design Variance for ISD is required for permissive and protected-permissive left turns at a traffic signal-controlled intersection where adequate ISD is not provided.

Reference NCHRP 1043 (Guide for Roundabouts – 2023) and NCHRP 959 (Diverging Diamond Interchange Informational Guide – 2021) for additional information regarding ISD at these alternative intersections.

For information regarding Intersection Sight Distance on Four-Foot-Wide Flush Medians – reference GDOT DPM Chapter 6.12.2.1 and Section 3.19 in this DE/DV Guide.

3.13 Evaluation Tools

For ISD Evaluation, Designers may use the InRoads "Surface Visibility Tool" or the OpenRoads (ORD version/release 10.12 and later) "Line of Sight Tool". It is important to note that results are dependent on the accuracy of the model created.

Sight line profiles along the hypotenuse of the sight triangle and at any other critical location within the sight triangle may be beneficial and used in evaluation.

3.13 Mitigation Strategies

The strategies are suggested below to help offset operational and/or safety challenges that are often encountered with any nonstandard feature/element not meeting Intersection Sight Distance.

The following strategies should be considered for mitigation of Intersection Sight Distance:

- Apply full-stop Traffic Signal control (if warranted) or flashing red/yellow traffic signals at the intersection.
- Provide an optimal zero offset for opposing left turn lanes at intersections.
- On existing intersections, increase the lane width of opposing left turn lanes or provide striped islands to reduce left-turn lane offsets.
- Prohibit right turn on red at signalized intersection.
- Reduce the grade at intersections to improve visibility.
- Establish wider shoulders on mainline.
- Furnish a flattened channelized island for right turn to create larger skew angle.
- Ensure appropriate right of way flares are provided for existing/ proposed conditions.

- Remove, relocate, or modify obstructions (trees, bushes, structures, etc.) in the sight triangle for better visibility.
- Restrict turn movements using a raised median.
- Consider installation of R-Cut to reduce conflict points.

3.13 Additional Supporting Documentation

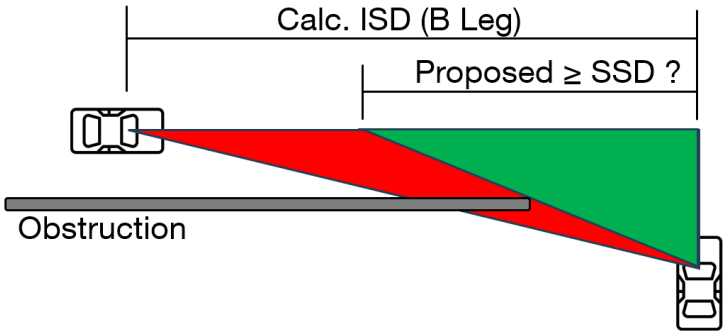
The provided list is not all encompassing, but any supporting information that provides additional clarification relevant to the Intersection Sight Distance criterion will be beneficial in documenting the DV.

- Document the physical restrictions (terrain, structures, etc.) that make it infeasible to re-align the intersecting roadways.
- Describe the reasons (cost, etc.) that additional right-of-way cannot be purchased to provide R/W flares within the sight triangles to clear obstructions or re-align the roadway(s).
- Provide justifications for the reason alternative intersections (such as roundabouts) cannot be constructed.
- Furnish signal plans (if applicable) and signing and marking plans.
- Supply Bentley InRoads/OpenRoads (ORD version/release 10.12 and later) Sight Visibility Tool (Sight Triangle) reports.
- Present documentation of graphical studies (scaled distances on plan/profile sheets defining the decision point and the sight triangle) and if conditions dictate – plot the sight line location on applicable cross section plan sheets. Provide the findings of the ISD study in the DV report narrative.
- Provide Existing (if relevant to proposed condition), required, and proposed ISD comparisons. Below is a suggested table format:

Existing, Required, and Proposed ISD Comparison Table						
Intersection Location	Design Vehicle	Leg Evaluated	ISD Case	Existing ISD (if relevant to proposed condition)	Required ISD	Proposed ISD

- Determine if there are other obstacles/potential hazards that can be removed or relocated near the intersection to improve Intersection Sight Distance such as vegetation, terrain, structures, barriers, etc.
- Intersection Sight Distance also applies to visibility of pedestrians and cyclists. Ensure that some form of improvement is applied to the safety of these roadway users if retaining/proposing the nonstandard ISD.
- Check on any vertical alignment (grade/vertical curve) adjustments that may improve visibility and sight distance.
- Intersection Sight Distances (ISD) vary greatly with skewed intersections. Hence, Design Variances need to be evaluated as well for the Intersection Skew Angle.
- For roundabout ISD, two conditions of the sight distance triangle need to be checked independently: Intersection Sight Distance at the entry and Intersection Sight Distance in advance of the entry. See NCHRP 1043 for additional information.

- Discuss whether the proposed ISD provides a clear sight triangle with a B-leg equal to or greater than the mainline stopping sight distance. See figure below.



3.13 Interdependence of Criteria

In certain cases, the nonstandard design feature identified in a DV may affect other controlling/standard criteria that should be reviewed. As many of these values are interrelated, care should be exercised that these also do not exceed the guidance values or require additional exceptions/variances. The following is a list of additional design checks and items to consider when presenting a DV for Intersection Sight Distance:

- Intersection Skew Angle
- Stopping Sight Distance
- Superelevation Rate
- Horizontal Curve Radius
- Median Usage
- Tangent Lengths on Reverse Curves
- Lateral Offset to Obstruction
- Maximum Grade
- Shoulder Width
- Lane Width
- Access Control

3.13 Reference Documents

- AASHTO, A Policy on Geometric Design of Highways and Streets (Current Edition)
- AASHTO, Guidelines for Geometric Design of Low-Volume Roads (Current Edition)
- FHWA, Highway Design Handbook for Older Drivers and Pedestrians – May 2001
- GDOT, Design Policy Manual (Current Edition)
- GDOT Policy Memo – Intersection Sight Distance – 09/26/2018
- GDOT Policy Memo – Intersection Control Evaluation – 06/208/2017
- GDOT Policy 4A-5 – Last Reviewed – 04/30/2019
- GDOT Policy 6785-2 – Left Turn Phasing – 8-13-2020
- ITE, Traffic Engineering Handbook – (Current Edition)
- TRB, NCHRP 1043 Guide for Roundabouts – 2023
- TRB, NCHRP 959 Diverging Diamond Interchange Informational Guide – 2021
- TRB, NCHRP 279 Intersection Channelization Design Guide – 1985

3.14 Intersection Skew Angle
GDOT Standard Criteria

Source: Google Maps

3.14 Intersection Skew Angle Overview

Intersection Skew Angle is a GDOT Standard Criterion and as such will require a Design Variance if not met. The Designer should perform a comprehensive study and obtain the appropriate approval for any nonstandard feature/element that does not meet the requisite criteria. GDOT requires a minimum skew angle of 75-degrees at intersections. The GDOT preferred skew angle for intersecting roadways is at or near 90-degrees (right angle intersection) to achieve sight lines that improve intersection sight distance. Some of the same conditions that apply to Intersection Sight Distance also apply to Intersection Skew Angle.

3.14 Criteria Clarification

For Intersection Skew Angle Requirements, GDOT references the Design Policy Manual (Current Edition) – Chapter 4.1.6 "Intersection Skew Angle".

When designing minor roadways or driveways, align the legs to 90-degrees as much as possible to "T" up to the existing or proposed mainline. This is especially the case in areas with high truck traffic.

Alternative intersections such as Roundabouts and DDIs (Diverging Diamond Interchanges) do not require a Design Variance for Intersection Skew Angle.

Roadway re-alignment should be considered in order to alleviate any nonstandard skew angles for proposed or existing conditions if right-of-way conditions/cost allow.

Roundabouts should also be considered for possible application where Intersection Skew Angle is severe, and realignment cannot be obtained.

3.14 Evaluation Tools

For ISD Evaluation, Designers may use the InRoads "Surface Visibility Tool" or the OpenRoads (ORD version/release 10.12 and later) "Line of Sight Tool". It is important to note that results are dependent on the accuracy of the model created.

Sight line profiles along the hypotenuse of the sight triangle and at any other critical location within the sight triangle may be beneficial and used in evaluation.

Sight line profiles may be beneficial and used in evaluation.

3.14 Mitigation Strategies

The strategies are suggested below to help offset operational and/or safety challenges that are often encountered with any nonstandard feature/element not meeting Intersection Skew Angle standards.

Standard GDOT Project Mitigation Strategies include:

- Application of "Patch" Rumble Strips (Construction Detail T-19) typically for stop sign/stop control approach.
- Raised Pavement Markers (RPMs)

Additionally, the following strategies should be considered for mitigation of Intersection Skew Angle:

- Apply full-stop Traffic Signal control (if warranted) or flashing red/yellow traffic signals as a visible warning at the intersection.
- Provide advanced warning signage. See MUTCD (Current Edition) for guidance.
- Widen the pavement at the radius return, hatch pavement striping and place angled stop bar accordingly to give vehicles additional room to intersect the roadway at an improved angle.
- Restrict turn movements using a raised median.
- Provide a flattened island to channelize and separate left and right turns to create larger skew angle (if R/W constraints permit).
- Consider installation of R-Cut to reduce conflict points.
- Determine if there are other obstacles/potential hazards that can be removed or relocated near the intersection skew to improve visibility.
- Establish wider shoulders on mainline.

3.14 Additional Supporting Documentation

The provided list is not all encompassing, but any supporting information that provides additional clarification relevant to the intersection Skew Angle criterion will be beneficial in documenting the DV.

- Truck percentages should be included with the traffic data when available. Truck traffic is a critical component in the discussion regarding sight distance and turning movements at skewed intersections.
- Determine/provide ISD calculations.
- Provide signal plans (if applicable) and signing and marking plans.
- Document the physical restrictions (terrain, structures, etc.) that make it infeasible to re-align the intersecting roadways.
- Describe the reasons (cost, etc.) that additional right-of-way cannot be purchased to re-align to meet or exceed the 75-degree angle.
- Provide justifications for the reason alternative intersections (such as roundabouts) cannot be constructed.
- Furnish Bentley InRoads/OpenRoads horizontal alignment/intersecting angle reports.

3.14 Other Checks

- Determine if there are other obstacles/potential hazards that can be removed or relocated near the intersection skew to improve Intersection Sight Distance.
- Large Intersection Skew Angles necessitate non-matching corner radii, as well as very large or very small radii to accommodate the skew.
- If proposing channelized right-turn lanes, this may require an amplified degree of operator head turn to check for traffic conflicts before merging. As a result, the paths traveled are often significantly curved, which may result in increased difficulty for drivers to estimate stopping distances along the travel path.
- Special care should be taken in designing intersections near horizontal curves. The driving task of following the curve takes up much of the driver's attention, leaving less focus for conflict resolution.
- Ascertain if there are any design enhancements to the mainline road at the juncture of the two roadways that can assist in the alleviation of the nonstandard Intersection Skew Angle.
- Check on any vertical alignment adjustments that may improve visibility and sight distance.
- Intersection Sight Distances (ISD) vary greatly with skewed intersections. Hence, ISD Design Variances need to be evaluated.

3.14 Interdependence of Criteria

In certain cases, the nonstandard design feature identified in a DV may affect other controlling/standard criteria that should be reviewed. As many of these values are interrelated, care should be exercised that these also do not exceed the guidance values or require additional exceptions/variances. The following is a list of additional controlling/standard criteria to evaluate when presenting a DV for Intersection Skew Angle:

- Intersection Sight Distance
- Stopping Sight Distance
- Superelevation Rate
- Horizontal Curve Radius
- Lateral Offset to Obstruction
- Maximum Grade
- Shoulder Width
- Lane Width

3.14 Reference Documents

- AASHTO, A Policy on Geometric Design of Highways and Streets (Current Edition)
- AASHTO, Guidelines for Geometric Design of Low-Volume Roads (Current Edition)
- FHWA, Impact of Intersection Angle on Highway Safety – January 2021
- FHWA, Highway Design Handbook for Older Drivers and Pedestrians – May 2001
- GDOT, Design Policy Manual (Current Edition)
- GDOT Policy Memo – Intersection Sight Distance – 09/26/2018
- GDOT Policy Memo – Intersection Control Evaluation – 06/8/2017
- GDOT Policy 4A-5 – Last Reviewed – 04/30/2019
- ITE, Traffic Engineering Handbook – (Current Edition)
- MBTC FR 1073, Intersection Angle Geometry and the Driver's Field of View - 1997
- TRB, NCHRP 1043 Guide for Roundabouts – 2023
- TRB, NCHRP 959 Diverging Diamond Interchange Informational Guide – 2021
- TRB, NCHRP 279 Intersection Channelization Design Guide – 1985

3.15 Tangent Lengths on Reverse Curves
GDOT Standard Criteria

Source: Google Maps

3.15 Tangent Lengths on Reverse Curves Overview

Tangent Lengths on Reverse Curves is a GDOT Standard Criterion. A Design Variance is needed if tangent lengths between reverse curves are less than required by calculated AASHTO methods for roadways with a design speed greater than or equal to 50 mph. The Designer should perform a comprehensive study and obtain the appropriate approval for any nonstandard feature/element that does not meet the requisite criteria. This criterion consists of providing the necessary tangent length between two reverse curves to establish sufficient superelevation transitions. The tangent distance should allow the roadway to rotate from 2/3 of the full superelevation of the first curve to 2/3 of the superelevation of the second curve. Sudden reversal of the horizontal alignment should be avoided.

3.15 Criteria Clarification

For Tangent Lengths on Reverse Curves Standard Requirements, GDOT references the Design Policy Manual (Current Edition) – Chapter 4.2.2 "Types of Curves…Reverse Curves".

A Design Variance is not required for roadways with a design speed less than 50 mph. A design deviation may be documented for roadways with a design speed of 45 mph or less where a minimum tangent of 100 feet is not provided.

For roadways with a design speed of 50 mph or greater, a Design Variance is required if not meeting the specified criteria.

In addition, roadways with a design speed of 50 mph or greater (in which curves are flat enough to not require superelevation) do not require a tangent between them, but where practical a 150-ft. tangent should be proposed between curves.

3.15 Evaluation Tools

Designers may use horizontal alignment report tools (style sheets) in InRoads/OpenRoads to evaluate the tangent data proposed between reverse curves.

3.15 Mitigation Strategies

The strategies are suggested below to help offset operational and/or safety challenges that are often encountered with nonstandard Tangent Lengths on Reverse Curves.

Standard GDOT Project Mitigation Strategies include:
Rumble Strips, Raised Pavement Markers (RPMs), GDOT Construction Detail P-7 (Safety Edge)

Additionally, the following strategies should be considered for mitigation of Tangent Lengths on Reverse Curves:

- Provide Reverse Turn (W1-3) and the Reverse Curve warning sign (W1-4) and supplemental signs such as W1-8 (Chevron Alignment), W1-13 (Truck Rollover Sign). See MUTCD (Current Edition) for guidance.
- Typically, 2/3 of SE run-off is outside of curve and 1/3 in the curve. Adjust superelevation if feasible so that 1/2 is in the curve and 1/2 is outside the curve to avoid overlap in SE runoff with the adjacent curve.
- Obtain adequate Right of Way to flatten the curve design.
- Provide roadway delineators.
- Increase Lane Width, provide wider Shoulder Width.
- Switch from CL rotation to a split profile.
- Design for traversable/recoverable slopes.
- Relocate, remove hazardous roadside objects if feasible or protect with roadside safety hardware.
- Improve ability to stay within the travel lane such as enhanced delineation.
- For existing pavements – surface treatments that increase friction can be considered.

3.15 Additional Supporting Documentation

The provided list is not all encompassing, but any supporting information that provides additional clarification relevant to the minimum Tangent Lengths on Reverse Curve criterion will be beneficial in documenting the DV.

- Truck percentages should be included with the traffic data when available. Truck traffic is a critical component in the discussion regarding wheel tracking on reverse curves.
- Determine/provide sight distance calculations.
- Demonstrate that the proposed design does not introduce drainage issues.
- Document the physical restrictions (terrain, etc.) that make it infeasible to eliminate the reduced tangent between the reverse curves.
- Provide documentation of the reasons (cost, etc.) that additional right-of-way cannot be purchased to provide a flatter curve and/or additional Lane/Shoulder Width.

3.15 Other Checks

- Verify that the combined Horizontal and Vertical alignments provide as much sight distance as possible.
- Ensure adequate drainage at the curve reversal point.
- To alleviate potential run-off road impacts with fixed-objects and roadside hazards, relocate, remove, and/or shield the fixed objects or install roadside safety hardware.

3.15 Interdependence of Criteria

In certain cases, the nonstandard design feature identified in a DV may affect other controlling/standard criteria that should be reviewed. As many of these values are interrelated, care should be exercised that these also do not exceed the guidance values or require additional exceptions/variances. The following is a list of additional controlling/standard criteria to evaluate when presenting a DV for Tangent Lengths on Reverse Curves:

- Stopping Sight Distance
- Horizontal Curve Radius
- Superelevation Rate
- Shoulder width
- Lane Width
- Maximum Grade
- Lateral Offset to Obstruction

3.15 Reference Documents

- AASHTO, A Policy on Geometric Design of Highways and Streets (Current Edition)
- GDOT, Design Policy Manual (Current Edition)
- (TRB), Design Considerations for Highway Reverse Curves - 1994

3.16 Lateral Offset to Obstruction
GDOT Standard Criteria

Source: Google Maps

3.16 Lateral Offset to Obstruction Overview

Lateral Offset to Obstruction is a GDOT Standard Criterion and as such will require a Design Variance if not met. The Designer should perform a comprehensive study and obtain the appropriate approval for any nonstandard feature that does not meet the GDOT Standard for this criterion. The Lateral Offset to Obstruction pertains to the horizontal offset distance to a vertical roadside feature or element on uncurbed and curbed shoulders. GDOT has developed offset values for lateral offset to obstruction for the following:

- Signs
- Light standards
- Utility poles
- Signal poles
- Controller cabinets
- Trees and shrubs
- Drop-off hazards

Reference the GDOT DPM Chapter 5.3 for specific offset requirements for this criterion.

3.16 Criteria Clarification

For Lateral Offset to Obstruction Standard Requirements, GDOT references the Design Policy Manual (Current Edition) – Chapter 5 "Roadside Safety and Lateral Offset to Obstruction". For specific requirements, see Chapter 5.2 "Lateral Offset to Obstruction" and Chapter 5.3 "Lateral Offsets for Roadside Features". GDOT also references Chapter 11.1.2 "Controlling Criteria for Non-Interstate Systems (GDOT 3R Standards)".

Uncurbed Shoulder - Lateral Offset to Obstruction: This is measured as the horizontal distance from the edge of traveled way to the face of a vertical roadside object/feature. The uncurbed shoulder includes the area that is paved and/or graded flush to the traveled way.

Curbed Shoulder – Lateral Offset to Obstruction: This is based on the specific vertical roadside object/feature (EX. utility pole, tree, etc.). See Chapter 5.3 "Lateral Offsets for Roadside Features" for GDOT standard offsets. On curbed roadways, this is measured from the face of curb to the face of the vertical roadside object/feature. Per the AASHTO Green Book, 1-ft. 6 in. is the absolute minimum distance that is acceptable for this curb face to the face of vertical object horizontal offset distance. A lateral offset of 3-ft. should be provided at intersections.

For non-interstate systems 3R Projects, Lateral Offset to Obstruction values will follow the guidelines set by the AASHTO Roadside Design Guide. See GDOT DPM Chapter 11.1.2 – "Lateral Offset to Obstruction". A Design Variance is needed if a decision to use or maintain a horizontal distance value for Lateral Offset to Obstruction is less than what is required.

For the following conditions, a Design Variance is applied for under a different GDOT Standard criteria – **not** for the "Lateral Offset to Obstruction" criterion:

1. For a proposed roadside safety device not built to standards or for retention of an existing roadside safety device not meeting standards (Ex. Concrete Barrier - Single Slope Face and Jersey Face, Parapet Wall, Guardrail, Double-Faced Guardrail, etc.) – the Design Variance should be requested for the "GDOT Construction Standards" Criterion – not the "Lateral Offset to Obstruction" criterion. This applies even if the device is in the clear zone or within the lateral offset area.
2. Careful attention should be given to other conditions regarding roadside safety devices listed in the GDOT Construction Standards 4000 series. If the Design Variance pertains to the actual roadside safety device/placement requirement of that device and does not adhere to the GDOT Standard requirements depicted in the Standard, the DV request should be for the "GDOT Construction Standards" criterion.
3. For DVs pertaining to curb locations and placement, the Design Variance request would be for "Shoulder Width" criterion – not "Lateral Offset to Obstruction" criterion.

Note that Lateral Offset criteria for drop-off hazards (if within clear zone) has been implemented. In applicable areas, these drop-offs need to be barrier protected or will require a Design Variance. See **GDOT Policy Memo – Lateral Offset Criteria for Drop-off Hazards – 12/01/2021** and Chapter 3 and 5 of the Roadside Design Guide for additional information.

3.16 Evaluation Tools

Designers may use the InRoads/OpenRoads horizontal style sheets to determine the lateral offset distance to the obstruction. The location for most objects (such as trees, light poles, signal poles, sign structures, etc.) are typically collected in the field survey. Steep drop off hazards can also be determined by InRoads/OpenRoads with existing cross section data. The InRoads/OpenRoads surface modeling tools can also be used for the existing/proposed design evaluation of slopes and other roadside terrain features.

Designers may also use photo evidence of collision impacts with roadside objects such as marks on existing poles and trees, recently replaced poles, and other evidence of damage to roadside objects.

3.16 Mitigation Strategies

The strategies are suggested below to help offset operational and/or safety challenges that are often encountered with any nonstandard feature/element not meeting Lateral Offset to Obstruction criterion.

The following strategies should be considered for mitigation of Lateral Offset to Obstruction:

- Distribute cross-sectional width with other typical section features, such as paved shoulders and travel lanes to increase the horizontal offset to obstruction.
- Provide enhanced delineation.
- Shield fixed objects/hazards (i.e., utility poles, trees, signal poles, steep drop-off hazards, etc.) with roadside safety hardware such as concrete barrier walls, retaining walls, and guardrail when appropriate.
- When applicable, ensure that the roadside obstacles (such as signs and light standards) have breakaway mounting design.

3.16 Additional Supporting Documentation

The provided list is not all encompassing, but any supporting information that provides additional clarification relevant to the Lateral Offset to Obstruction criterion will be beneficial in documenting the DV.

- For documentation of reduced lateral offset distance – side-swipe, existing roadside object/obstruction crashes and the crash severity of these crash types should be reviewed and discussed in a narrative below the tabulated crash data. Clarify if this area consists of high truck frequency.
- Document the reasoning that steep drop-off hazards of slopes (right-of-way cost, terrain limitations, etc.) cannot be flattened out in order to provide a recoverable slope.
- Provide evidence that sufficient right of way does not exist and is not attainable to widen the required lateral offset distance particularly in uncurbed rural conditions.
- Describe the context and conditions of the roadway area in detail – such as the limitations that are present that preclude the widening of the area to achieve the desired lateral offset.
- To increase roadside safety for vertical hazards, provide documentation that roadside safety hardware or breakaway hardware is provided (if needed) for fixed objects that cannot be relocated. Provide evidence that roadside safety hardware is effective for the Lateral Offset to Obstruction mitigation to alleviate impacts with the vertical object/hazard.
- Furnish InRoads/OpenRoads style sheet documentation depicting the working offset distance to the vertical object/obstruction.
- Provide photo evidence of visible signs of collisions with existing obstructions.

3.16 Other Checks

- Ensure that the nonstandard Lateral Offset to Obstruction does not adversely affect the operational effects and capacity of travel lanes. Reduced horizontal offset to vertical obstructions can result in reduction of free-flowing traffic.
- When a narrow offset to an object is present, drivers typically shy away from the edge-line which can result in encroachment into another lane.
- Check if the nonstandard Lateral Offset to vertical object/obstruction adversely affects sight distance around curves.
- Verify if existing or proposed landscaping will affect sight distance.
- For on-street parking, check if there are issues with opening of passenger side doors and clearance for vehicle side mirrors.
- Determine if barrier protection of the vertical object/obstruction inadvertently introduces any other safety issues due to the limited working area.
- Verify if the reduced Lateral Offset will affect pedestrian safety and ADA requirements.

3.16 Interdependence of Criteria

In certain cases, the nonstandard design feature identified in a DV may affect other controlling/standard criteria that should be reviewed. As many of these values are interrelated, care should be exercised that these also do not exceed the guidance values or require additional exceptions/variances. The following is a list of additional controlling/standard criteria to evaluate when presenting a DV for Lateral Offset to Obstruction:

- Intersection Sight Distance
- Stopping Sight distance
- Shoulder Width
- Lane Width
- Horizontal Curve Radius
- Superelevation Radius
- ADA Requirement in PROWAG
- GDOT Construction Standards

3.16 Reference Documents

- AASHTO, A Policy on Geometric Design of Highways and Streets (Current Edition)
- AASHTO, Roadside Design Guide (Current Edition)
- GDOT, Design Policy Manual (Current Edition)
- GDOT, Signing and Marking Design Guidelines (Current Edition)
- GDOT, Pedestrian and Streetscape Guide (Current Edition)
- GDOT Policy Memo – Lateral Offset Criteria for Drop-off Hazards – 12/01/2021

3.17 Rumble Strips
GDOT Standard Criteria

Source: Google Maps

3.17 Rumble Strips Overview

Rumble Strips are a GDOT Standard Criterion and as such will require a Design Variance if not met. The Designer should perform a comprehensive study and obtain the appropriate DV approval for a design decision to exclude the GDOT Standard placement for this criterion. Rumble Strips are safety feature(s) that provide sound and vibrations to alert drivers if their vehicle(s) departs out of the respective lane.

3.17 Criteria Clarification

For Rumble Strip Standards, GDOT references the Design Policy Manual (Current Edition) – Chapter 6.5.1 "Rumble Strips" (Table 6.1 "Rumble Strip Placement") and for 3R and Pavement Reconstruction Projects, Chapter 11.1.1 "Rumble Strips" (Table 11.2 "Rumble Strip Placement").

This criterion applies to Cylindrical/Sinusoidal Indentation Rumble Strips and Audible Profiled Thermoplastic Stripes on roadways with the standard placement consisting of shoulder or edge line. The Construction Details (listed in "Rumble Strip Placement" Tables 6.1 and 11.2) provide the placement layouts for these Rumble Strips. The Rumble Strip placement criterion applies to standard design projects as well as 3R and Pavement Reconstruction projects.

Note: If a Design Variance proposes to deviate from the Rumble Strip Construction Details, the DV would be submitted for the Rumble Strip Criterion – not for the "GDOT Construction Standards" criterion. The "GDOT Construction Standards" criterion only applies to the use of "Construction Standards". The Rumble Strips are "Construction Details" and do not fall under that criterion.

Note: To install a combination of centerline and edge line rumble strips, the minimum lane width should be 11 Feet. Where lane widths are less than 11 Feet, treatment preference would be given to the outside shoulders or edge lines unless a safety study demonstrates the centerline to be the preferred treatment.

For information regarding centerline rumble strip use on Four-Foot-Wide Flush Medians – reference GDOT DPM Chapter 6.12.2.1 and Section 3.19 in this DE/DV Guide.

3.17 Evaluation Tools

Not Applicable.

3.17 Mitigation Strategies

The strategies are suggested below to help offset operational and/or safety challenges that are often encountered when omitting the use of Rumble Strip Placement standards. Further discussion regarding application of mitigation strategies is provided in *FHWA's Decision Support Guide for the Installation of Shoulder and Center Line Rumble Strips on Non-Freeways* – August 2016

Standard GDOT Project Mitigation Strategies include:

- Raised Pavement Markers (RPMs), GDOT Construction Detail P-7 (Safety Edge)

Additionally, the following strategies should be considered to improve the ability to avoid/ reduce severity of crashes and/or alert drivers:

- Provide wider shoulders.
- Advanced Warning Signs/Shoulder Signage. See MUTCD (Current Edition) for guidance.
- Provide enhanced delineation.
- Consider Type 2 (OM2) or Type 3 (OM3) object markers.
- Remove, relocate, shield fixed objects, and install roadside safety hardware when appropriate.

NOTE: The Rumble Strip criterion itself is typically used as a mitigation strategy for proposed DE/DV for other controlling/standard criteria.

3.17 Additional Supporting Documentation

The provided list is not all encompassing, but any supporting information that provides additional clarification relevant to the use of the Rumble Strip criterion will be beneficial in documenting the DV.

- Provide the applicable Construction Details for Rumble strips listed in the GDOT DPM "Rumble Strip Placement" Tables 6.1 and/or Table 11.2.
- Furnish documentation of the Design Speed and the existing/proposed minimum Lane/Shoulder Width dimensions to support omission of Rumble Strips when requesting a DV.
- If proposing to omit Rumble Strip placement - provide documentation that roadside safety hardware or break-away hardware is provided (if needed) for fixed objects/steep drop-off hazards that cannot be corrected/relocated.

3.17 Other Checks

- Verify if there may be any conflict with Rumble Strip placement and bicycle traffic.
- Determine if the area is residential and if sound/noise of Rumble Strips will be an issue.

3.17 Interdependence of Criteria

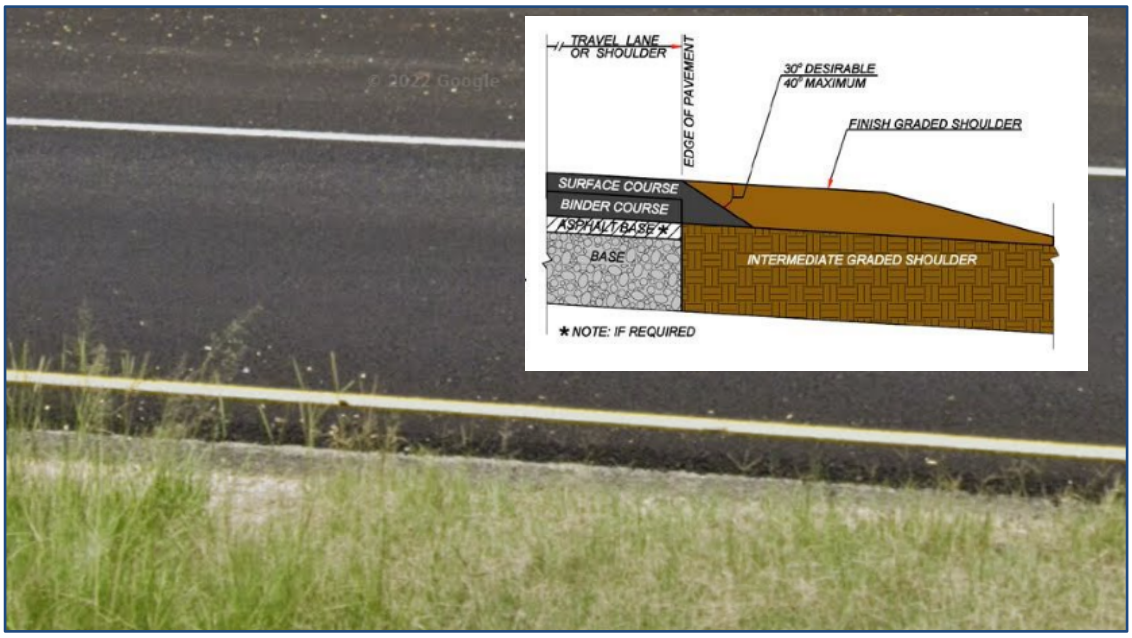
In certain cases, the nonstandard design feature identified in a DV may affect other controlling/standard criteria that should be reviewed. As many of these values are interrelated, care should be exercised that these also do not exceed the guidance values or require additional exceptions/variances. The following is a list of additional controlling/standard criteria to evaluate when presenting a DV for Rumble Strips:

- Lane Width
- Shoulder Width
- Safety Edge
- Pedestrian, Bicycle, and Transit Warrants

3.17 Reference Documents

- AASHTO, A Policy on Geometric Design of Highways and Streets (Current Edition)
- AASHTO, Roadside Design Guide (Current Edition)
- GDOT, Design Policy Manual (Current Edition)
- GDOT Construction Details – Rumble Strip Placement
- GDOT, Signing and Marking Design Guidelines
- GDOT Policy Memo – Rumble Strip Details Implementation – 10/26/2017
- GDOT Policy Memo – Rumble Strips & Pavement Edge Treatment – 09/30/2011

3.18 Safety Edge
GDOT Standard Criteria



Source: Google Maps/Insert – GDOT DPM

3.18 Safety Edge Overview

The application of a Safety Edge (aka pavement edge treatment) is a GDOT Standard Criterion and as such will require a Design Variance if not met. The Designer should perform a comprehensive study and obtain the appropriate DV approval for a design decision to exclude the GDOT Standard placement for this criterion. Safety Edges are safety feature(s) used to eliminate/reduce vertical drop-offs at pavement edges by providing a tapered/sloped edge. This assists drivers who veer off the road to avoid over-correction and to safely steer the vehicle back onto the paved shoulder or travel lane. Safety Edges are a cost-efficient pavement application to assist in the reduction of run-off road crashes.

3.18 Criteria Clarification

For Safety Edge Standard Requirements, GDOT references the Design Policy Manual (Current Edition) – Chapter 6.5.2 "Pavement Edge Treatment".

This criterion applies to Safety Edges for both asphalt pavement and concrete pavement. Construction Detail P-7 provides additional construction details for application on the various asphalt and concrete pavement configurations. Safety Edge installation should be achievable in most conditions.

Note: If a Design Variance proposes to deviate from the P-7 Construction Detail, the DV would be submitted for the Safety Edge Criterion – not for the "GDOT Construction Standards" criterion. The "GDOT Construction Standards" criterion only applies to the use of "Construction Standards". The P-7 is a "Construction Detail" and does not fall under that criterion.

As Noted in GDOT DPM Chapter 6.5.2 for mill and inlay projects, the safety edge is not required under the following conditions:

- No shoulder filling work is being required
- The inlay elevation matches the existing earth shoulder elevation with no shoulder filling being required.

NOTE: The Safety Edge criterion itself is typically used as a mitigation strategy for proposed DE/DV for other controlling/standard criteria.

3.18 Evaluation Tools

Not Applicable.

3.18 Mitigation Strategies

The strategies are suggested below to help offset operational and/or safety challenges that are often encountered when omitting the use of Safety Edge placement standards. These mitigation efforts are similar to Rumble Strip mitigation for run off road alleviation measures.

The following strategies should be considered for mitigation of Safety Edge:

Standard GDOT Project Mitigation Strategies include:

- Raised Pavement Markers (RPMs), Application of Rumble Strips

Additionally, the following strategies should be considered for mitigation of Safety Edge placement:

- On existing roads, overlay/replace pavement at same level with the adjacent ground.
- Shield fixed objects and install roadside safety hardware when appropriate.
- Provide Wider shoulder.

3.18 Additional Supporting Documentation

The provided list is not all encompassing, but any supporting information that provides additional clarification relevant to the use of Safety Edge criterion will be beneficial in documenting the DV.

- Furnish specific documentation and details for the reason(s) that the Safety Edge cannot be installed such as a future programmed project in which it will be installed later.
- Provide plans depicting cross-sections and right-of- way limits for the nonstandard feature.

3.18 Other Checks

- To alleviate potential run-off road impacts with fixed-objects and roadside hazards, relocate and/or shield the fixed objects or install roadside safety hardware.
- If an existing roadway, check for pavement tire wear, erosion of the area and settling of edge of pavement to determine means for rehabilitation.

3.18 Interdependence of Criteria

In certain cases, the nonstandard design feature identified in a DV may affect other controlling/standard criteria that should be reviewed. As many of these values are interrelated, care should be exercised that these also do not exceed the guidance values or require additional exceptions/variances. The following is a list of additional controlling/standard criteria to evaluate when presenting a DV for Safety Edge:

- Lane Width
- Shoulder Width

3.18 Reference Documents

- FHWA's Center for Accelerating Innovation – June 2017*:* https://www.fhwa.dot.gov/innovation/everydaycounts/edc-1/safetyedge.cfm
- GDOT, Design Policy Manual (Current Edition)
- GDOT Construction Detail P-7
- GDOT Policy Memo – Rumble Strips & Pavement Edge Treatment – 09/30/2011

3.19 Median Usage

GDOT Standard Criteria

Source: Google Maps

3.19 Median Usage Overview

Median Usage is a GDOT Standard Criterion and as such will require a Design Variance if not met. The Designer should perform a comprehensive study and obtain the appropriate approval for any nonstandard feature that does not meet the GDOT Standard for this criterion. A Design Variance for Median Usage is required if not meeting the median dimension value for any type of median. In addition, a Design Variance is also required for specific use of 4-ft flush medians if not meeting the requisite requirements. The selection of Median Usage dimension values are based on various factors such as functional classification, design speed, and traffic volumes, etc.

3.19 Criteria Clarification

For Median Usage Standard Requirements, GDOT references the Design Policy Manual (Current Edition) – Chapter 6.12 "Medians".

A median consists of a defined area in a roadway that separates the travel lanes of opposing traffic. Median width is measured from the edge of the innermost travel lane to the edge of the innermost opposing travel lane of a roadway.

A Design Variance is required if the median dimension value is not met for the median type (i.e., flush, raised, depressed or barrier separated) based on speed, functional classification, and volume.

For Freeway median dimension requirements, GDOT also references the AASHTO Green Book, "A Policy on Geometric Design of Highways and Streets" (Current Edition) and the AASHTO, "A Policy on Design Standards – Interstate System" (Current Edition). It should be noted that the minimum median width for freeways is the threshold for provision of positive barrier separation (e.g., concrete median barrier).

For Arterial median options, reference the GDOT DPM Table 6.3 "Median Options for Arterials (Including GRIP Corridors)". This table depicts the Median Width based on associated Design Speeds/ADT for 4-ft flush median (rural shoulder), 14-ft flush median, 20-ft or 24-ft raised median, 32-ft depressed median, and 44-ft depressed median.

For the following conditions, a Design Variance is applied for under a different GDOT Standard criteria – **not** for the "Median Usage" criterion:

1. For Design Variances pertaining to Median Openings, the DV would be submitted under the "Access Control" criterion.
2. If a DV is needed pertaining to Roadside Safety Hardware (i.e., concrete barrier and guardrail) in the median, the DV would be submitted under the "GDOT Construction Standards" criterion.
3. For DVs pertaining to trees, shrubs, or other median obstructions, the DV would be applied under the "Lateral Offset to Obstruction" criterion.
4. Where median barrier is proposed and the median width is less than the required inside shoulder widths plus the width of the median barrier, a DE/DV for shoulder width should be submitted.

For Four-Foot-Wide Flush Medians - specific requirements shall be met or a DV must be obtained. Reference the **GDOT Policy Memo – Median Usage Policy Update – 10/01/2021** and associated GDOT DPM Chapter 6 for policy compliance. The policy memo also provides CMFs for Median Usage on Rural Four-Lane High Speed Roadways.

It is important to note that the use of a 4-ft. flush median shall not be combined with other minimum geometric design criteria and that other design elements are required if using a 4-ft. flush median. This includes centerline rumble strips and new striping, widening for left turn lanes at intersections and major traffic generators and 12-ft. wide travel lanes are required if designing for a 4-ft. flush median. These are just some of the minimum requirements. For the complete list, see the above-mentioned Policy Memo and GDOT DPM Chapter 6.12.

3.19 Evaluation Tools

Designers may use the InRoads “Roadway Visibility Tool” and the OpenRoads (ORD version/release 10.12 and later) “Sight Visibility Tool” to analyze stopping sight distance (SSD). Designers may also use the InRoads “Surface Visibility Tool” and the OpenRoads (ORD version/release 10.12 and later) “Line of Sight Tool” to analyze intersection sight distance (ISD).

3.19 Mitigation Strategies

The strategies are suggested below to help offset operational and/or safety challenges that are often encountered with any nonstandard feature/element not meeting Median Usage standards.

Standard GDOT Project Mitigation Strategies include:
Rumble Strips (on inside shoulder of depressed medians), GDOT Construction Detail P-7 (Safety Edge)

The following strategies should be considered for mitigation of Median Usage:

- For roadways consisting of depressed medians that do not meet the minimum width, provide roadside safety hardware such as cable barrier or double-faced guardrail to assist in the alleviation of opposing cross-over traffic.
- Distribute cross-sectional width with other typical section features, such as paved shoulders and travel lanes.
- Delineate applicable medians (i.e., flush medians) with enhanced delineation, reflectorized markers, etc.
- On roadways with depressed medians, provide recoverable slopes.
- Remove, relocate, or shield fixed objects/hazards in the median (i.e., sign bridges, light poles, bridge columns, etc.) with roadside safety hardware when appropriate.

3.19 Additional Supporting Documentation

The provided list is not all encompassing, but any supporting information that provides additional clarification relevant to the Median Usage criterion will be beneficial in documenting the DV.

- For documentation of narrower median widths - opposite-direction crashes and the crash severity of these crash types should be reviewed and discussed in a narrative below the tabulated crash data. Clarify if this area has high truck frequency.
- Document the reasoning (right-of-way cost, etc.) that a bifurcated (independent alignment) cannot be constructed to provide a wider median.
- Provide evidence that sufficient right of way does not exist and is not attainable to widen the median or if there are any terrain constraints that prevent median widening.
- To increase roadside safety for reduced median width, provide documentation that roadside safety hardware or break-away hardware is provided (if needed) for fixed objects that cannot be relocated. Provide evidence that roadside safety hardware is effective for the median width mitigation to alleviate cross-over traffic to opposing lanes.

3.19 Other Checks

- For depressed medians, evaluate if the reduced width median will affect the flat bottom ditch to determine if drainage may be impacted.
- Also, for depressed medians, ensure the median ditch section is within the RDG “Preferred Cross Sections for Channels” guidance.
- Where narrow raised medians are proposed, ensure this median width can accommodate planned drainage structures and sign widths.
- Depending on the Design Speed and median type selected (i.e., raised median) ensure that the appropriate curb type and gutter width is provided.
- Check if landscaping/trees in the narrow median obscure the roadway.
- Determine if median separation is needed for areas with high pedestrian traffic and if so verify that the median design provides adequate accommodation for an ADA-compliant pedestrian refuge.

3.19 Interdependence of Criteria

In certain cases, the nonstandard design feature identified in a DV may affect other controlling/standard criteria that should be reviewed. As many of these values are interrelated, care should be exercised that these also do not exceed the guidance values or require additional exceptions/variances. The following is a list of additional controlling/standard criteria to evaluate when presenting a DV for Median Usage:

- Stopping Sight distance
- Access Control
- Shoulder Width
- Lane Width
- Lateral Offset to Obstruction
- GDOT Construction Standards

3.19 Reference Documents

- AASHTO, A Policy on Geometric Design of Highways and Streets (Current Edition)
- AASHTO, A Policy on Design Standards – Interstate System (Current Edition)
- GDOT, Design Policy Manual (Current Edition)
- GDOT, Signing and Marking Design Guidelines (Current Edition)
- GDOT, Pedestrian and Streetscape Guide (Current Edition)
- GDOT Policy Memo – Median Usage Policy Update – 10/01/2021

3.20 Roundabout Illumination Level

GDOT Standard Criteria

Source: Google Maps

3.20 Roundabout Illumination Level Overview

Roundabout Illumination Level (lighting) is a GDOT Standard Criterion and as such will require a Design Variance if not met. The Designer should perform a comprehensive study and obtain the appropriate DV approval for a design decision to exclude or not meet the required illumination level for the GDOT Standard application of this criterion. Roundabout illumination is a safeguard feature for all roundabout users: motor vehicle drivers, pedestrians, and cyclists. Visibility is a critical safety factor to ensure pedestrians and cyclists can be seen from a distance and to assist pedestrians in securely navigating through crosswalks. Lighting and visibility also aids cyclists to safely merge into the roundabout traffic flow.

3.20 Criteria Clarification

For Roundabout Illumination Level requirements, GDOT adopts the Illuminating Engineering Society (IES) RP-8-18 "Recommended Practice for Design and Maintenance of Roadway and Parking Facility Lighting" (Current Edition) and the GDOT Design Policy Manual (Current Edition) – Chapter 8.2.4 "Lighting" and Chapter 14 "Lighting".

GDOT has adopted the (IES) illumination values depicted in Table 12.4 of the RP-8 as the standard for the design of Roundabout Lighting. Illumination values depicted in Table 12.2 of the RP-8 may be used for roundabouts on roadways that are not continuously lighted.

As noted in the GDOT DPM, the need for lighting on mini-roundabouts is handled on a case-by-case basis and is excluded/not subject to a DV. Coordinate with the Office of Design Policy and Support/ Lighting Group for evaluation on project specific lighting needs for mini-roundabouts.

The location and placement of light poles around the perimeter of the roundabout are an important design aspect regarding illumination. This ensures consistent lighting levels around the circulatory roadway and will enhance visibility for pedestrians and cyclists.

Reference the GDOT DPM Chapter 14.3.3. "Intersections and Roundabouts" for additional information pertaining to the Roundabout Illumination and photometric requirements.

NOTE: Before proceeding with any Roundabout Illumination Level DV, coordinate with the GDOT Office of Design Policy and Support - Lighting Group.

3.20 Evaluation Tools

There are several Photometric Analysis/Modeling software(s) such as AGi32 and Visual available to assist in required photometric calculations. Some manufacturers and suppliers also provide photometric data files.

3.20 Mitigation Strategies

The strategies are suggested below to help offset operational and/or safety challenges that are often encountered with the nonstandard Roundabout Illumination Level criterion.

Standard GDOT Project Mitigation Strategies include:

- Application of "Patch" Rumble Strips (Construction Detail T-19) at roundabout approaches.
- Raised Pavement Markers (RPMs)

Additionally, the following strategies should be considered for mitigation of Roundabout Illumination Level:

- Provide illumination to the greatest extent possible.
- Provide enhanced signage such as Yield (R1-2) with Flashing Beacons (Signal Permit from Traffic Operations required) or other warning signs as appropriate. See MUTCD (Current Edition) for guidance.
- Specify supplemental retroreflective pavement markings/symbols/words.
- Install bollard cross-walk lighting.
- Consider installation of Rectangular Rapid Flashing Beacons (RRFB) for pedestrian cross-walks.
- Program a future project to install required lighting.

3.20 Additional Supporting Documentation

The provided list is not all encompassing, but any supporting information that provides additional clarification relevant to the Roundabout Illumination Level criterion will be beneficial in documenting the DV.

- Provide photometric calculations.
- In rural areas, if no power supply is available in the vicinity, provide a cost estimate needed for power installation to meet minimum illumination levels.
- Determine/provide sight distance calculations.
- Document the physical constraints (terrain, etc.) for adequate pole locations.
- Provide any correspondence from local municipalities expressing support for or opposition of the installation of lighting.
- Document whether any other lighting is present in the vicinity of the roundabout.

3.20 Other Checks

- To reduce the number of fixed objects (such as light poles), evaluate if fewer poles can be installed (but with higher intensity lighting) to reduce poles as a fixed hazard.
- If applying additional safety measures such as RRFB or other sign structures, ensure that these are breakaway and don't introduce additional hazards.
- Ensure requisite detectable warning surfaces, pedestrian refuge islands and cut-through walkways are provided.
- Analyze the design of the proposed roundabout geometry and circulatory roadway components for optimal sight lines to enhance daytime/nighttime visibility of pedestrians/cyclists as well as other motorists.

3.20 Interdependence of Criteria

In certain cases, the nonstandard design feature identified in a DV may affect other controlling/standard criteria that should be reviewed. As many of these values are interrelated, care should be exercised that these also do not exceed the guidance values or require additional exceptions/variances. The following is a list of additional controlling/standard criteria to evaluate when presenting a DV for Roundabout Illumination Levels:

- Intersection Sight Distance
- Stopping Sight Distance
- Pedestrian, Bicycle, and Transit Warrants
- ADA Requirement in PROWAG
- Lateral Offset to Obstruction

3.20 Reference Documents

- Illuminating Engineering Society (IES) RP-8-18 "Recommended Practice for Design and Maintenance of Roadway and Parking Facility Lighting" (Current Edition)
- GDOT, Design Policy Manual (Current Edition)
- GDOT, Roundabout Design Guide (Current Edition)
- GDOT Policy Memo – Recommended Practice for Design and Maintenance of Roadway and Parking Facility Lighting (IES RP-8) – 05/30/2019
- TRB, NCHRP 1043 Guide for Roundabouts - 2023

3.21 Pedestrian, Bicycle and Transit Warrants

GDOT Standard Criteria

Source: Google Maps

3.21 Pedestrian, Bicycle and Transit Warrants Overview

Pedestrian, Bicycle and Transit Warrants are a GDOT Standard Criterion. A Design Variance is needed if this criterion is not met. The Designer should perform a comprehensive study and obtain the appropriate approval for any Ped/Bike/Transit facilities that are not accommodated in a project as required per the standard “warrants”. These warrants apply only to roadway locations where pedestrians and bicyclists are allowed to travel. Interstates and other high-speed limited access facilities (where bicycles are not permitted) are excluded from warrant consideration requirements.

3.21 Criteria Clarification

For Pedestrian, Bicycle and Transit Warrants Standard Requirements, GDOT references the Design Policy Manual (Current Edition) – Chapter 9.4 "Warrants for Accommodation". This is a sub-section of Chapter 9 - Complete Streets Design Policy.

The GDOT DPM Chapter 9.4 lists the required Warrants for each of the respective Pedestrian, Bicycle, and Transit accommodation requirements required on roadways. As noted, these warrants apply only to roadway locations where pedestrians and bicyclists are allowed to travel.

The GDOT DPM provides Standard Warrants (denoted by the word *shall*) and Guideline Warrants (denoted by the word *should*). A Design Variance is only required if not meeting the "Standard Warrants" criteria.

There are also exclusions that apply to this criterion. The GDOT DPM Chapter 9.4.4 lists the stipulations for omission of the accommodations for certain roadway facility types and conditions.

Designers should make every effort to include full (i.e., ideal) accommodation for pedestrians/bicyclists on a project when standards warrant; however, if only partial accommodations can be provided, then no Design Variance is required. **Example:** If a sidewalk can only be established due to conditions on just one quadrant or one side of a bridge/roadway, then this partial establishment satisfies the warrant and no DV is needed. Ideal accommodation should always be considered when applicable and then work down from that hierarchy.

While Local Governments are encouraged to apply Complete Streets principles, Design Variances for pedestrian, bicycle, or transit warrants will not apply to Local Maintenance Improvement Grant (LMIG) projects. A DV does apply to all TE, TAP and LCI if on the State right-of-way.

Pedestrian accommodations may be made without curb by providing a path of appropriate width and cross slope that is firm, stable, and slip resistant. Asphalt is an acceptable material in these situations.

Provision of accommodations do not have to be immediately adjacent to the roadway. They can be offset to the back of the right-of-way.

3.21 Evaluation Tools

Not Applicable.

3.21 Mitigation Strategies

The strategies are suggested below to help offset operational and/or safety challenges that are often encountered if not meeting the Pedestrian, Bicycle and Transit Warrants.

The following strategies should be considered for mitigation of Pedestrian, Bicycle and Transit Warrants:

- If application of a sidewalk/path is not attainable, determine if a future project (if programmed) will establish an off-road shared-use path nearby that is located parallel from the roadway.
- If a sidewalk/path cannot meet transit warrant requirements, determine if an alternate site or location is feasible.
- Based on the planning studies, use practical design principles to determine if the need for warrants on a pedestrian/bicycle facility may be better served on a future programmed project instead of the current proposed project.
- Provide wider shoulders to expand the distance between vehicles and pedestrians/bicyclists who travel parallel to the roadway.

3.21 Additional Supporting Documentation

The provided list is not all encompassing, but any supporting information that provides additional clarification relevant to the Pedestrian, Bicycle and Transit Warrants criterion will be beneficial in documenting the DV.

- Supply any pedestrian and bicycle counts/volumes and any count projections.
- Furnish transit maps in the area.
- Provide planning studies that demonstrate that ped/bike accommodation is justified/not justified.
- Photographs depicting visual evidence that worn foot paths along the roadside have/have not been created by foot traffic.
- Present crash data in the area pertaining to bicycle crashes or pedestrian crash impacts.
- Demonstrate if existing multi-use path/shared paths or parallel routes are present nearby in the area to accommodate pedestrian/bicyclists in order to lessen the need for establishment on the proposed project.

3.21 Other Checks

- Verify if there are any nearby transit facilities, activity centers, parks, or schools, etc. that would be affected by the absence of pedestrian/bicycle facilities.
- Check to see if nearby off-site locations may be feasible to implement a future programmed project to address the establishment of accessible pedestrian/bicycle paths.
- Ensure that all safety measures are addressed such as barrier separation, etc. to assist in the protection of pedestrian/bicyclists traversing the area near the bridge/roadway.
- Investigate if there are plans for a major upgrade to a nearby roadway/development that would entail further study to ensure the best pedestrian/bicycle system is established to accommodate the new development.
- Ensure ADA and PROWAG requirements as defined by the DPM are met.

3.21 Interdependence of Criteria

In certain cases, the nonstandard design feature identified in a DV may affect other controlling/standard criteria that should be reviewed. As many of these values are interrelated, care should be exercised that these also do not exceed the guidance values or require additional exceptions/variances. The following is a list of additional controlling/standard criteria to evaluate when presenting a DV for Pedestrian, Bicycle and Transit Warrants:

- ADA Requirement in PROWAG

3.21 Reference Documents

- AASHTO, Guide for the Development of Bicycle Facilities (Current Edition)
- AASHTO, Guide for Geometric Design of Transit Facilities on Highways and Streets (Current Edition)
- AASHTO, Guide for the Planning, Design, and Operation of Pedestrian Facilities (Current Edition)
- FHWA, MUTCD – Manual on Uniform Traffic Control Devices (Current Edition)
- GDOT, Design Policy Manual (Current Edition)
- GDOT, Pedestrian and Streetscape Guide (Current Edition)
- GDOT, Roundabout Design Guide (Current Edition)
- GDOT, Context Sensitive Design Online Manual (Current Edition)
- NACTO, Urban Bikeway Design Guide (Current Edition)
- US Access Board, PROWAG (Public Right-of-Way Accessibility Guidelines (Current Edition)

3.22 ADA Requirement in PROWAG

GDOT Standard Criteria

Source: Google Maps

3.22 ADA Requirement in PROWAG Overview

ADA Requirement in PROWAG is a GDOT Standard Criterion. If specific justification requirements are met, a Design Variance may be applicable for this criterion. The Designer should perform a comprehensive study and obtain the appropriate approval for any design decision that excludes accessible pedestrian accommodations for all users as detailed in the GDOT adopted requirements from the U.S. Access Board's PROWAG (Public Right-of-Way Accessibility Guidelines). See GDOT Design Policy Manual Chapter 9.5.1 for adopted PROWAG requirements and additional information. A Design Variance may be appropriate if it is determined that meeting the ADA pedestrian accommodation PROWAG requirements are "structurally impractical", "technically infeasible", or if the addition would result in an unsafe condition.

3.22 Criteria Clarification

GDOT references the Design Policy Manual (Current Edition) – Chapter 9.5.1 "Pedestrian Accommodation Design", which adopts specific portions of the U.S. Access Board's PROWAG "Public Right-of-Way Accessibility Guidelines" (Current Edition). This is a sub-section of Chapter 9 - Complete Streets Design Policy.

Note: As of September 7, 2023 – the PROWAG has been published as a final rule in the Federal Register. It is anticipated that DOJ and DOT will adopt and enforce the ruling.

If the requisite PROWAG criteria values cannot be met, a Design Variance may be applicable if justification is presented showing one of the following conditions:

- structurally impractical – *(new construction only)*
- technically infeasible – *(applies to alterations and elements added to existing facilities)*
- or if the addition would result in an unsafe condition.

A Design Variance will not be approved for submission of deficient ADA Requirements in PROWAG criteria if justification for the above conditions are not met.

If any of the above conditions apply, a Design Variance with requisite justification should be presented if not meeting the requisite grade, cross slope, and pedestrian street crossings criteria as defined in PROWAG or the more selective GDOT criteria. See GDOT DPM Chapter 4.3.2 "Maximum Vertical Grades" for additional information.

The above noted conditions also apply to various other pedestrian accommodations such as crosswalks, curb ramps, detectable warning surfaces, on-street parking, etc. See additional accommodations as depicted in GDOT DPM Chapter 9.5.1 "Pedestrian Accommodation Design".

A Design Variance is required for omission of curb ramp(s) when physical constraints make it technically infeasible - this pertains specifically to alterations. See GDOT DPM Chapter 11.1 "ADA Requirement to Provide Curb Ramps" for additional information regarding the distinction between "alterations" and "maintenance".

For non-interstate systems 3R projects, ADA requirements shall be adhered to the maximum extent that is reasonable within any project limitations. If not practical, a Design Variance is required for non-compliance. See GDOT DPM 11.1.2.

Additionally, any design decisions relating to pedestrian accommodations shall not reduce the existing accessibility level below the currently stated minimums provided from the PROWAG in the GDOT DPM.

3.22 Evaluation Tools

Not Applicable.

3.22 Mitigation Strategies

The strategies are suggested below to help offset operational and/or safety challenges that are often encountered if not meeting the ADA Requirement in PROWAG.

The following strategies should be considered for mitigation of ADA Requirement in PROWAG:

- If full compliance with PROWAG is structurally impractical or technically infeasible, then at the very least a partial compliance to the extent that is practical/feasible should be attempted.
  Example 1: If a proposed required sidewalk width at a certain section cannot be obtained, then passing space should be provided.
  Example 2: If only one section of the proposed sidewalk does not meet the minimum required width, ensure that the adjacent sections of the proposed sidewalk does meet the required widths where it is practical/feasible.
- If a sidewalk width is nonstandard and it is not practical/feasible to correct, ensure that any protruding objects such as overhanging tree branches or other obstructions are removed from the sidewalk area so that the existing width is not further reduced.
- For paths or other pedestrian walkways that do not meet the minimum width requirements and are near steep drops-offs, ensure barrier/safety rail protection is provided.
- If the required longitudinal slope is not practical/feasible for a sidewalk and it exceeds the requisite grade, provide a detour with appropriate signage to direct pedestrians to an alternate pedestrian route that does meet the grade requirements.
- For nonstandard crosswalks in which it is not practical to obtain the requisite cross-slope or longitudinal slope, consider a pedestrian bridge.
- If application of the required grade or cross slope is not attainable for a pedestrian accommodation in the current project due to project scope (such as right of way acquisition or movement of underground structure), verify if a future proposed project is programmed that can be used to adjust the nonstandard feature.

3.22 Additional Supporting Documentation

The provided list is not all encompassing, but any supporting information that provides additional clarification relevant to the ADA Requirement in PROWAG criterion will be beneficial in documenting the DV.

- Supply any pedestrian counts/volumes and any count projections.
- Provide supporting documentation for the reason the nonstandard feature meets one of the following: structurally impractical – *(new construction only)* technically infeasible – *(applies to alterations and elements added to existing facilities)* or if the addition would result in an unsafe condition.
- Provide a listing of facilities in the area that are heavy traffic areas for pedestrians.
- Furnish cross sections depicting the roadway and the cross-slope of nonstandard sidewalk and/or profile of the roadway and the nonstandard longitudinal slope of the sidewalk.
- Present crash data in the area pertaining to pedestrian crash impacts.

3.22 Other Checks

- Verify if there are any nearby heavy pedestrian traffic areas such as transit facilities, activity centers, hospitals, or schools, etc. that would be affected by the absence of PROWAG compliant pedestrian facilities.
- In some cases, construction of pedestrian facilities will be omitted if they cannot be constructed to ADA requirements. In this situation, the need for a Design Variance for Pedestrian, Bicycle and Transit Warrants should be reviewed.
- Adjusting the horizontal location of a sidewalk in order to achieve required geometry may impact intersection stop bar locations. In this situation, the resulting intersection sight distance should be checked.
- Ensure that all safety measures such as signage, safety rails/handrails (if applicable), pedestrian signals, etc. are addressed to assist in the protection of pedestrians traversing the area near the roadway.

3.22 Interdependence of Criteria

In certain cases, the nonstandard design feature identified in a DV may affect other controlling/standard criteria that should be reviewed. As many of these values are interrelated, care should be exercised that these also do not exceed the guidance values or require additional exceptions/variances. The following is a list of additional controlling/standard criteria to evaluate when presenting a DV for ADA Requirement in PROWAG:

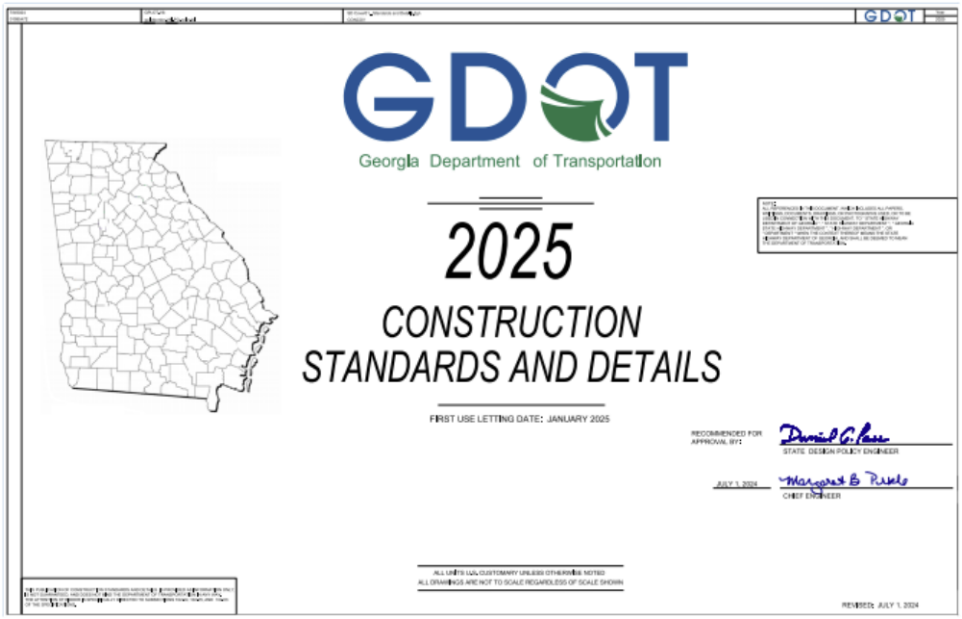
- Intersection Sight Distance
- Maximum Grade
- Cross Slope
- Lateral Offset to Obstruction
- Pedestrian, Bicycle and Transit Warrants

3.22 Reference Documents

- GDOT, Design Policy Manual (Current Edition)
- GDOT, Pedestrian and Streetscape Guide (Current Edition)
- GDOT, Roundabout Design Guide (Current Edition)
- GDOT Construction Details A-3, A-4 and T-11A
- GDOT Policy Memo – ADA Requirement to provide Curb Ramps – 08/18/2014
- US Access Board, PROWAG: Public Right-of-Way Accessibility Guidelines (Current Edition)

3.23 GDOT Construction Standards

GDOT Standard Criteria



Source: GDOT CS&D Book

3.23 GDOT Construction Standards Overview

The GDOT Construction Standards is a GDOT Standard Criterion. A Design Variance is needed if this criterion is not met. The Designer should perform a comprehensive study and obtain the appropriate approval for any Construction Standards that are not adhered to. The GDOT Construction Standards are collected in the GDOT CS&D Book (Construction Standards and Details) Book. The CS&D Book contains the current applicable Construction Standards that are in effect for a specified calendar year and the Designer references the applicable CS&D Book on the Cover Sheet of the Project Plans. If there are exceptions/additions to the Standards provided in the CS&D Book for a given year, a Design Policy Memo is provided directing the Designer to the updated/revised individual Standard to include in the Project Plans.

3.23 Criteria Clarification

For GDOT Construction Standards Requirements, GDOT adopts the Construction Standards and Details Book (CS&D Book) - (Current Edition).

The GDOT Construction Standards criterion only applies to the "Construction Standards" and one Special Construction Detail (4949A). The "Construction Details" do not fall under this category. To distinguish between the two – Construction Standards begin with a number (e.g., 4380, 1030D, 2401-1) and Construction Details begin with an alphanumeric designation (e.g., P-7, T-23A, M-3A).

A Design Variance IS REQUIRED if the Standard is deviated from, and no alternatives are provided. The alternatives listed below are acceptable in most cases and if they are determined to be viable substitutions, a Design Variance is not required:

1. During the Design phase - if it is determined that a Construction Standard does not meet a specific design requirement for a project, a Special Construction Detail can be created to address the design intent. The Special Construction Detail shall be submitted to the GDOT Office of Design Policy and Support at (StandardsandDetails@dot.ga.gov) for review. If found to be acceptable, a Design Variance is not required.
2. During the Construction phase – if the contractor determines that a deviation from a specific Construction Standard (such as a change from a cast-in-place-structure to a precast structure) would be beneficial (such as cost savings or ease of installation) and it does not change the design intent, a shop drawing may be submitted to GDOT for review and acceptance. In this case, a Design Variance is not required.

NOTE: The applicable Standards in the Construction Standards and Details Book (CS&D Book) must be used that is applicable for the year of the proposed letting. If an older standard is needed, coordinate with the Office of Design Policy because in most cases a Design Variance will be required to allow the use of an older standard, but the new book should still be used. A previous year's CS&D Book cannot be referenced.

Specific Design Variance Requirements regarding Roadside Safety GDOT Standards:

1. A decision to use or retain W-beam guardrail less than 31 inches in height shall require a Design Variance.
2. A decision to use concrete barriers other than Standards 4941A, 4941B, 4949B, 4949C, 4949D AND Special Detail 4949A or to replace or extend existing barriers in kind for lengths 60-ft or greater shall require a Design Variance.

3.23 Evaluation Tools

Not Applicable.

3.23 Mitigation Strategies

Since there are numerous GDOT Construction Standards, a mitigation strategy for each individual Standard is not detailed, but the basic mitigation premise depicted below should apply when not meeting most Standards.

The following strategy should be considered for mitigation of GDOT Construction Standards:

- List other standard features that can be proposed and mentioned as helping the issue and/or increasing the safety and operational factors for the proposed/retained nonstandard GDOT Construction Standard feature.

3.23 Additional Supporting Documentation

Since there are numerous GDOT Construction Standards, Additional Supporting Documentation for each individual Standard is not detailed, but the basic premise depicted below should apply if not meeting most GDOT Construction Standards.

- Specify any supporting information, calculations, studies, etc. that provide additional clarification relevant to the GDOT Construction Standards criterion that will be beneficial in documenting the DV.

3.23 Other Checks

Since there are numerous GDOT Construction Standards, Other Checks for each individual Standard is not detailed, but the basic premise depicted below should apply if not meeting most GDOT Construction Standards.

- If proposing or retaining the nonstandard feature, verify that additional features/elements are not adversely affected.

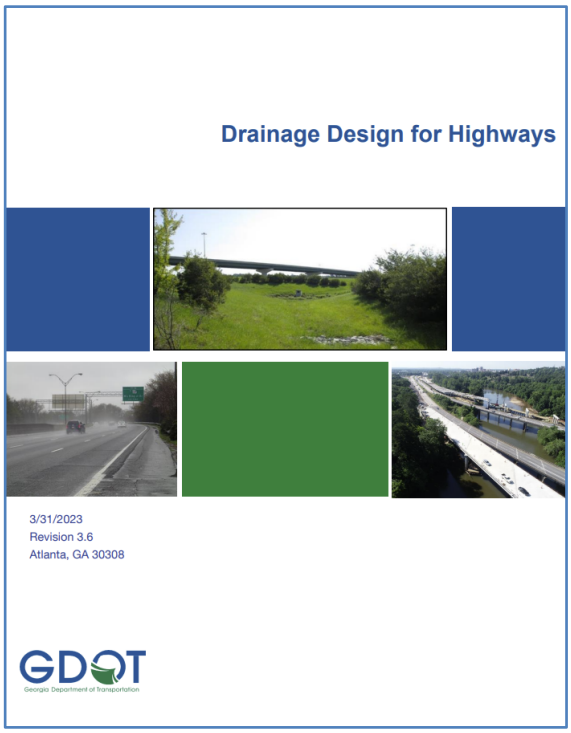
3.23 Interdependence of Criteria

In certain cases, the nonstandard GDOT Construction Standard feature identified in a DV may affect other controlling/standard criteria that should be reviewed. As many of these values are interrelated, care should be exercised that these also do not exceed the guidance values or require additional exceptions/variances. Verify that additional controlling/standard criteria are evaluated when presenting a DV for the GDOT Construction Standards.

3.23 Reference Documents

- GDOT Construction Standards and Details Book (CS&D Book) – (Current Edition)
- GDOT Construction Standards and Details Book (CS&D Book) User Guide – 10-21-21
- GDOT, Design Policy Manual (Current Edition)
- GDOT, Bridge and Structures Design Manual (Current Edition)
- GDOT, Signing and Marking Design Guidelines (Current Edition)
- GDOT, Drainage Manual (Drainage Design for Highways) (Current Edition)
- GDOT, Low Impact Bridge Program Manual (Current Edition)
- GDOT, Standard Specifications Construction of Transportation Systems (Current Edition)
- GDOT, Supplemental Specifications (Current Edition)
- GDOT Policy Memo – GDOT 2022 – Construction Standards and Details Book (CS&D) Book – 09/15/2021
- GDOT Policy Memo – GDOT Cast-in-Place Concrete Barrier Construction Standards – 07/31/2020
- GDOT Policy Memo – Roadside Safety Hardware (Implementation of MASH Testing Criteria AMENDED – 10/15/2018
- GDOT Policy Memo – W-Beam Terminals (June 30, 2018 – MASH Implementation) – 05/29/2018
- GDOT Policy Memo – Reinforced Concrete Box Culvert Standards (Implementation of LRFD) – 11/15/2017

3.24 GDOT Drainage Manual
GDOT Standard Criteria



Source: GDOT Drainage Manual

3.24 GDOT Drainage Manual Overview

The GDOT Drainage Manual is classified as a GDOT Standard Criterion. A Design Variance is needed if this criterion is not met. The Designer should perform a comprehensive study and obtain the appropriate approval for any applicable GDOT Drainage Manual requirements that are not adhered to.

NOTE: The GDOT Drainage Manual is currently in the process of re-development/re-write; therefore, Section 3.24 will be revised/updated to correspond to any applicable changes that are included in the restructured GDOT Drainage Manual when it is released and published.

3.24 Criteria Clarification

For GDOT Drainage Manual requirements, GDOT adopts the GDOT Drainage Design for Highways (aka GDOT Drainage Manual) - (Current Edition).

The GDOT Drainage Manual consists of various requirements that may require a Design Variance if not met. See the GDOT Drainage Manual for specifics.

3.24 Evaluation Tools

Not Applicable.

3.24 Mitigation Strategies

Since there are numerous GDOT Drainage Manual requirements, a mitigation strategy for each individual requirement is not detailed, but the basic mitigation premise depicted below should apply when not meeting most situations.

The following strategy should be considered for mitigation of the GDOT Drainage Manual:

- List other features/elements that can be proposed and mentioned as helping the issue and/or increasing the safety and operational factors for the proposed/retained nonstandard GDOT Drainage Manual feature.

3.24 Additional Supporting Documentation

Since there are numerous GDOT Drainage Manual requirements, Additional Supporting Documentation for each individual requirement is not detailed, but the basic premise depicted below should apply if not meeting most GDOT Drainage Manual standards.

- Specify any supporting information, calculations, studies, etc. that provide additional clarification relevant to the GDOT Drainage Manual criterion that will be beneficial in documenting the DV.

3.24 Other Checks

Since there are a number of GDOT Drainage Manual standards/requirements, Other Checks for each individual requirement is not detailed, but the basic premise depicted below should apply if not meeting most GDOT Drainage Manual criteria.

- If proposing or retaining the nonstandard feature, verify that additional features/elements are not adversely affected.

3.24 Interdependence of Criteria

In certain cases, the nonstandard drainage design feature identified in a DV may affect other controlling/standard criteria that should be reviewed. As many of these values are interrelated, care should be exercised that these also do not exceed the guidance values or require additional exceptions/variances. Verify that additional controlling/standard criteria are evaluated when presenting a DV for the GDOT Drainage Manual.

3.24 Reference Documents

- GDOT, Design Policy Manual (Current Edition)
- GDOT, Bridge and Structures Design Manual (Current Edition)
- GDOT, Drainage Manual (Drainage Design for Highways) (Current Edition)
- GDOT, Low Impact Bridge Program Manual (Current Edition)
- GDOT, GDOT Construction Standards and Details Book (CS&D Book) – (Current Edition)
- GDOT Policy Memo – GDOT Manual on Drainage Design for Highways (March 2023 Edition) – 04/05/2023

3.2 Controlling and Standard Criteria Summary

The enumeration of the 24 Controlling and Standard Criteria in this section provides suggested documentation to assist in the development of a comprehensive Design Exception/Design Variance Report. Detailed justification of the design decision pertaining to the aforementioned criteria should assist in the facilitation of the review process and reduction in revisions to Report submittals.

See GDOT Design Policy Manual (DPM)
Chapter 2.1.1 “Design Policy Guidelines and Standards”
For Controlling and Standard Criteria References
located in the GDOT DPM.