Chapter 23

Exceptions and Variations

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Chapter 23

Exceptions and Variations

23.1 General

The Department's roadway design criteria and standards are contained in this volume and are usually within the desirable ranges established by AASHTO. The values given in this volume have been accepted by FHWA and govern the design process. When it becomes necessary to deviate from the Department's criteria, early documentation and approval are required. There are three approval processes: Design Exceptions, Utility Exceptions and Design Variations. When the Department's criteria are met, no Design Exception, Utility Exception or Design Variation is required. However, when the Department's criteria are not met, a Design Exception, Utility Exception or Design Variation is required. This requirement applies to all entities affecting planning, design, construction, maintenance and utilities.

For projects using safety funds and developed to improve specific safety problems, only the elements identified under the scope of work for the safety improvement project are subject to these approval processes. The existing features, within the limits of the safety improvement project that do not meet design criteria do not require approval to remain (if the project does not create a nonconforming condition).

For drainage projects, only elements identified in the scope of services for the drainage project are subject to these approval processes. The existing features, within the limits of the drainage project that do not meet design criteria, do not require approval to remain (if the project does not create a nonconforming condition).

Maintenance Resurfacing, Ride Rehabilitation and Skid Hazard Projects do not require Design Exceptions or Variations other than for ADA curb ramp requirements. If compliance with ADA curb ramp requirements is determined to be technically infeasible, documentation as a Design Variation is required. Maintenance Resurfacing Projects can only be programmed on routes that meet the requirements identified in ***Chapter 28*** of the ***Work Program Instructions***.

23.2 Identification

To allow time to research alternatives and begin the analysis and documentation activities, it is important proper approval process be identified as early in the Planning and Design as possible. This is preferably done during the PD&E process for major projects and the scope development process for minor projects. It is required that approval be obtained no later than the initial engineering phase.

Design Exceptions are required when the proposed design elements (other than utility elements) are below both the Department's governing criteria and AASHTO's new construction criteria for the 13 Controlling Design Elements.

The 13 Controlling Design Elements are:

1. Design Speed
2. Lane Widths
3. Shoulder Widths
4. Bridge Widths
5. Structural Capacity
6. Vertical Clearance
7. Grades
8. Cross Slope
9. Superelevation
10. Horizontal Alignment
11. Vertical Alignment
12. Stopping Sight Distance
13. Horizontal Clearance

Section 23.9 provides AASHTO's minimum requirements for the above elements.

Utility Exception requirements are found in the ***Utility Accommodation Manual (UAM)***.

Design Variations are required when proposed design elements are below the Department's criteria and where a Design Exceptions or Utility Exception is not required.

23.3 Approval

All required approvals shall be obtained as described in this section. Approvals from multiple individuals may be required for certain issues. The Director of Design shall resolve any approval authority issues if conflicting objectives arise.

Approval is required from the State Chief Engineer for the following:

- Design Exceptions for Design Speed on FIHS/SIS facilities (following review by the State Transportation Planner).
- Utility Exceptions for limited access R/W use.
- Design Variations for Design Speed on FIHS/SIS facilities (following review by the State Transportation Planner).

Approval is required from the FHWA Division Administrator for the following:

- Design Exceptions on full FHWA oversight projects.
- Exceptions involving horizontal or vertical clearances for railroads not meeting the requirements of ***Rule 14-57 F.A.C.*** or the clearance criteria for the South Florida Rail Corridor (***Topic No. 000-725-003 - South Florida Rail Corridor Clearance Policy for 25 KV service***).
- All exceptions to the 16-ft vertical clearance standard on rural Interstate routes or on a single Interstate route through urban areas: The District is responsible for completing an "Interstate Vertical Clearance Exception Coordination" form, (http://www.fhwa.dot.gov/design/090415.cfm) for exceptions to vertical clearance requirements. The District will submit the form to the Surface Deployment and Distribution Command Transportation Engineering Agency (SDDCTEA) via e-mail for approval, copying the FHWA Florida Division. Allow for 10 working days after SDDCTEA receipt for action before requesting notification of disposition (via email or fax). A copy of the approval must be provided with the Design Exception. A request for coordination must take place before the District Design Engineer can recommend the Design Exception.

Approval is required from the District Design Engineer or Turnpike Design Engineer for the following:

- Design Exceptions.
- Utility Exceptions.
- Design Variations.

Approval is required from the State Roadway Design Engineer for the following:

- Design Exceptions for elements other than Structural Capacity.
- Utility Exceptions.
- Design Variations involving modifications to or elimination of required rumble strips.

Approval is required from the State Structures Design Engineer for the following:

- Design Exceptions for Bridge Width, Structural Capacity, Horizontal Clearance and Vertical Clearance impacting Category 1 and 2 structures.
- Utility Exceptions impacting Category 2 structures, or impacting Category 1 structures with controlling elements below AASHTO's criteria.
- Design Variations for Bridge Width, Structural Capacity, Horizontal Clearance and Vertical Clearance impacting Category 2 structures.
- Design Variations for Structural Capacity due to deficient load ratings impacting both Category 1 and 2 structures

Approval is required from the District or Turnpike Structures Design Engineer for the following:

- Utility Exceptions impacting Category 1 structures, with none of the 13 Controlling Design Elements below AASHTO's Criteria.
- Design Variations for Bridge Width, Structural Capacity, Horizontal Clearance and Vertical Clearance impacting Category 1 Structures.

23.4 Justification for Central Office Approval

Sufficient detail and explanation must be given in order to build a strong case to those reviewing the request. The 13 Controlling Design Elements are considered safety related and the strongest case must be made to lower these requirements. At some point, this justification may be used to defend the Department’s and/or the designer’s design decisions. All deviations must be uniquely identified, located, and justified; no blanket approvals are given.

A strong case can be made if it can be shown that:

- The required criteria are not applicable to the site specific conditions.
- The project can be as safe by not following the criteria.
- The environmental or community needs prohibit meeting criteria.

Most often a case is made by showing the required criteria are impractical and the proposed design wisely balances all design impacts. The impacts usually compared are:

- Operational Impacts.
- Impacts on Adjacent Section.
- Level of Service.
- Safety Impacts.
- Long term effects.
- Costs.
- Cumulative Effects.

A case should not be made based solely on the basis that:

- The Department can save money.
- The Department can save time.
- The proposed design is similar to other designs.

23.5 Documentation for Central Office Approval

During the justification process supporting documentation will be generated which needs to accompany each submittal. This documentation includes, but is not limited to the following:

Utility Exception documentation requirements are found in ***Chapter 13 of the Utility Accommodation Manual (UAM)***.

All Design Variations needing Central Office approvals and all Design Exceptions should include the following documentation:

a) ***Exhibit 23-A*** Submittal/Approval Letter Included (Cover Letter)

b) Summary description of included support documentation such as:
    1) Location map or description,
    2) Typical section,
    3) Aerial or Photo logs when they best illustrate the element issues,

4) Crash History and analysis,
5) Plan sheets in the area of the exception/variation elements,
6) Profiles in the area of vertical alignment exception/variation elements,
7) Tabulation of pole offsets for horizontal clearance exception/variation, and
8) Any Applicable Signed and Sealed Engineering Support Documents.

c) Project description (general project information, typical section, begin/end milepost, county section number). Include Work Mix, To – From, Objectives, Obstacles and Schedule.

d) Description of the exception/variation element and applicable criteria (AASHTO and Department value or standard). Detailed explanation of why the criteria or standard cannot be complied with or is not applicable. Description of any proposed value for project and why it is appropriate.

e) Amount and character of traffic using the facility. Description of the anticipated impact on Operations, Adjacent Sections, Level Of Service, Safety, Long and Short Term Effects. (Is the Exception temporary or permanent?) Description of the anticipated Cumulative Effects.

f) A plan view or aerial photo of the exception location, showing right of way lines, and property lines of adjacent property.

g) A photo of the area.

h) Typical section or cross-section of exception location.

i) The milepost and station location of the exception.

j) Any related work programmed or in future work plans.

k) The Project Schedule Management (PSM) Project Schedule Activities maintained by the Finance Management Office.

l) All mitigating efforts. An explanation of what if any associated existing or future limitations as a result of public or legal commitments. Description and explanation of any practical alternatives, the selected treatment and why.

m) Comments on the most recent 5-year crash history including all pertinent crash reports.

n) Description of the anticipated Cost (Social and to the Department - Benefit/Cost)

o) Summary Conclusions

For the specified conditions the following additional documentation is required:

p) For design speed on FIHS/SIS, provide typical sections at mid blocks and at intersections.

q) For lane width, provide locations of alternative routes that meet criteria and a proposal for handling drainage, the proposed signing and pavement markings.

r) For shoulder width, provide a proposal for handling stalled vehicles and a proposal for handling drainage.

s) For bridge width, provide a plan view of the approaching roadways and existing bridge plans (these may be submitted electronically).

t) For a bridge with a design inventory load rating less than 1.0, a written evaluation and recommendation by the Office of Maintenance is required. Provide the load rating calculations for the affected structure.

u) For vertical clearance, provide locations of alternative routes that meet criteria.

v) For cross-slope, provide a proposal for handling drainage and details on how the cross slope impacts intersections.

w) For conditions that may adversely affect the roadway's capacity, provide the comments on compatibility of the design and operation with the adjacent sections. Effects on capacity (proposed criteria vs. AASHTO) using an acceptable capacity analysis procedure and calculate reduction for design year, level of service).

x) For superelevation, provide the side friction factors for the curve for each lane of different cross-slope at the PC of the curve, the point of maximum cross-slope, and the PT of the curve using the following equation.

$$f = \frac{V^2 - 15Re}{V^2e + 15R}$$

where
f = Side Friction Factor
V = Design Speed (mph)
R = Radius (feet)
e = Superelevation (ft/ft) at the station evaluated

y) For areas with crash histories or when a benefit to cost analysis is requested, provide a time value analysis between the benefit to society quantified in dollars and the costs to society quantified in dollars over the life of the exception. In general practice the benefit to society is quantified by the reduction in crash cost foreseeable because of the proposed design and the cost due to the implementation of that change such as construction and maintenance costs over the life of the project. The Discount (interest) rate to be utilized in benefit/cost analysis is 4%.

Two acceptable methods for calculating a benefit/cost analysis are:

1. Roadside Safety Analysis Program (RSAP)

This method complements the Roadside Design Guide dated June 2002. When hazards cannot be removed or relocated, designers need to determine if a safety device, such as a guardrail or a crash cushion, is warranted to protect motorists from the roadside obstacle. This method can be used to perform a benefit/cost analysis comparing a safety treatment with the existing or baseline conditions (i.e., the do-nothing option) and/or alternative safety treatments. Based on the input (offsets, traffic, slopes, crash history, traffic accident severity levels, etc.) of information available to the user, the program will offer results which can be used in comparing courses of action.

When utilizing RSAP for analysis, the accident severity level costs should be revised as follows:

Option 3: KABCO

Crash Severity	**Comprehensive Crash Cost**
Fatal (K)	$6,380,000
Severe Injury (A)	$521,768
Moderate Injury (B)	$104,052
Minor Injury (C)	$63,510
Property Damage Only (O)	$6,500

Source: Florida Department of Transportation Crash Analysis Reporting (C.A.R.) System

2. Historical Crash Method (HCM)

This method can be used for sites with a crash history. It is basically the ratio (benefit/cost) of the estimated reduction in crash costs to the estimated increase in construction and maintenance cost. The annualized conversion will show whether the estimated expenditure of funds for the

benefit will exceed the direct cost, thereby lending support as to whether the improvement should be done or not.

The HCM uses the following ***Highway Safety Improvement Program Guideline (HSIPG)*** cost per crash by facility type to estimate benefit to society while the cost to society is estimated by the cost of right of way, construction, and maintenance.

HSIPG COST/CRASH BY FACILITY TYPE						
FACILITY TYPE	DIVIDED			UNDIVIDED		
	URBAN	SUBURBAN	RURAL	URBAN	SUBURBAN	RURAL
2-3 Lanes	$85,851	$151,015	$260,531	$92,847	$228,613	$402,003
4-5 Lanes	$83,359	$181,265	$366,422	$83,359	$193,774	$94,171
6+ Lanes	$107,658	$130,385	$478,263	n/a	n/a	n/a
Interstate	$141,197	n/a	$295,810	n/a	n/a	n/a
Turnpike	$124,459	n/a	$215,507	n/a	n/a	n/a

All State Roads Average Cost/Crash: **$142,472**

*The above values were derived from 2005, 2006, 2007, 2008, and 2009 traffic crash and injury severity data for crashes on state roads in Florida, using the formulation described in ***FHWA Technical Advisory "Motor Vehicle Accident Costs", T 7570.1, dated June 30, 1988*** and ***FHWA Technical Advisory, T 7570.2, dated October 31, 1994*** using updated fatality cost of $5.8 million as recommended in the U.S. Department of Transportation ***Office of Secretary Transportation memo, Treatment of the Economic Value of a Statistical Life in Department Analysis dated February 5, 2008 (http://ostpxweb.dot.gov/policy/reports/080205.htm).***

23.6 Central Office Submittal and Approval

Submittals, when complete, shall contain 3 parts, and shall be compiled in the same order as addressed below.

1. Part 1 shall consist of a cover letter. The cover letter shall be either the ***Plans Preparation Manual Volume 1***, ***Exhibit 23-A Submittal/Approval Letter*** for Design Exceptions or the ***Utility Accommodation Manual Exhibit A Utility Exception Form***. If both types of Exceptions are contained in a single submittal, both forms must be completed and submitted in the same package. They shall not be combined on a single form.
2. Part 2 shall consist of the justification or report proper including all signed and sealed documents. Part 2 may contain or require more than one separately signed and sealed report. An example is a single submittal that includes a structural analysis and a roadway geometry analysis. There may also be documents or discussions that are not within the bounds of individually signed and sealed analysis.
3. Part 3 shall consist of any support documents to facilitate an understanding of Part 2. Note that Part 3 may include any supplementary documentation developed or added by the Central Office after the District submittal. This shall be considered a part of the submittal justification package and is provided only to assist the District in getting a favorable and timely review and approval. Any supplemental documents provided by the Central Office will be appended and shall not alter the Engineer of Record's analysis or design.

The report justifying and documenting a request is to be sealed by the Responsible Engineer in accordance with ***Chapter 19*** of this volume. The Responsible Engineer then attaches a Submittal/Approval Letter (***Exhibit 23–A***) to the Sealed Report and submits them to the District or Turnpike Design Engineer. The District or Turnpike Design Engineer then approves or denies the request and notifies the Responsible Engineer. When further approvals are required the District or Turnpike Design Engineer will forward the Submittal/Approval Letter and Sealed Report to the State Roadway Design Office.

The State Roadway Design Office will assign reference numbers to each request. The request will be reviewed then forwarded for approval to the Chief Engineer, the State Roadway Design Engineer, the State Structures Design Engineer, the Planning Office and/or FHWA as appropriate.

Each request will be reviewed on a case by case basis and approved on its merits. When approval is obtained the Roadway Design Office will e-mail the District or Turnpike Design Engineer the Central Office's disposition and return the signed Submittal/Approval Letter and Sealed Report. The Roadway Design Office will keep a copy filed under the assigned reference number. Additional copies will be provided upon request.

23.7 Central Office Denial and Resubmittal

When a request is denied, the State Roadway Design Office will notify the District or Turnpike Design Engineer of the Central Office's disposition.

Denied requests can be resubmitted when all deficiencies, noted in the denial notification, have been addressed. This may require only a new Submittal/Approval Letter if the Sealed Report does not need to be amended. However, if the Sealed Report requires revision, a new Sealed Report and attached Submittal/Approval Letter must be submitted.

The State Roadway Design Office will assign the resubmittal a tracking reference number. The resubmittal will be reviewed for completeness and forwarded for approval to the Chief Engineer, the State Roadway Design Engineer, the Structures Design Engineer, the Planning Office and/or FHWA as appropriate.

23.8 Design Variations Needing District Approval Only

For Design Variations needing District approval only, the following is the minimum justification and documentation required. However, on a case by case basis the District approvers may require more or may opt for the Design Variation to follow ***Sections 23.4-7***:

A Design Variation request must address the following items:

1. Design criteria versus proposed criteria.
2. Reason the design criteria are not appropriate.
3. Justification for the proposed criteria.
4. Any background information which documents or justifies the request.

The Responsible Engineer then attaches a Submittal Approval Letter (***Exhibit 23-A***) to the sealed report and submits them to the District or Turnpike Design Engineer. The District or Turnpike Design Engineer then approves or denies the request and notifies the Responsible Engineer.

Design Variations requiring Central Office approval from the State Chief Engineer, State Roadway Design Engineer, and/or the State Structures Design Engineer (see ***Section 23.3***) follow the processes in ***Sections 23.4-7***.

23.9 AASHTO Criteria for Controlling Design Elements

As an aid to the designer, the following tables may be used as a reference for determining when a Design Exception is required based on AASHTO criteria, but are in no way intended to replace Department design criteria. The page numbers referenced are to AASHTO's ***A Policy on Geometric Design of Highways and Streets 2004*** (unless otherwise noted) and are a starting point for researching project criteria. Please note that the criteria used for determining exceptions on Interstate projects must be based on AASHTO's ***A Policy on Design Standards Interstate System***.

Criteria Tables Cross Reference

Table 23.9.1 AASHTO Design Speed (Minimum)

Type Facility	Other Factors	Design Speed (mph)	AASHTO
Freeways	Urban Rural	50 70	pg. 503
Urban Arterials	Major Other	30 30	pg. 72
Rural Arterials	Rolling terrain Level terrain	50 60	pg. 444
Urban Collectors		30	pg. 430
Rural Collectors	Level ADT < 400 ADT 400 - 2000 ADT > 2000 Rolling ADT < 400 ADT 400 - 2000 ADT > 2000	40 50 60 30 40 50	pg. 422, Exh. 6-2
CBD	Major or Minor	30	pg. 430
Ramps	Highway Design Speeds (mph) 30 35 40 45 50 55 60 65 70	 15 18 20 23 25 28 30 30 35	pg. 826
Loop Ramps	150 ft. radius	25	pg. 825
Connections	Direct Semi-Direct	40 30	pg. 825

Table 23.9.2 AASHTO Lane Widths (Minimum)

Type Facility	Lane Width (feet)	AASHTO
Freeways (including Auxiliary lanes)	12	pg. 504, 814, DSIS pg.3 (1)
Rural Arterials	11	pg. 448, Exh. 7-3
Urban Arterials	10	pg. 472
Urban Collectors	10	pg. 433
Rural Collectors	10	pg. 425, Exh. 6-5
Low Speed	10	pg. 312
Residential	9	pg. 312
Auxiliary (all but Freeway)	10	pp. 312, 433
Continuous TWLTL	10	pg. 312

1. DSIS = AASHTO's ***A Policy on Design Standards Interstate System*** (January 2005).

Table 23.9.3 AASHTO Shoulder Widths (Minimum)

Type Facility	Other Factors	Right (feet)	Median (feet)	AASHTO
Freeways	4 lanes	10	4	pg. 505
	≥ 6 lanes	10	10	pg. 505
Rural Arterial	ADT > 2000	8		pg. 448, Exh. 7-3
	ADT 400-2000	6		
	ADT < 400	4		
	Divided highway 4 lanes	8	4 paved	pg. 455
	Divided highway 6 lanes	8	8	pg. 456
Urban Arterial	Low Type	2		pg. 314
	High Type	10		pg. 314
Heavily Traveled	High Speed (≥ 50 mph)	10		pg. 314
Rural & Urban Collectors	ADT > 2000	8		pg. 425, Exh. 6-5
	ADT 1500-2000	6		
	ADT 400-1500	5		
	ADT < 400	2		

Table 23.9.4 AASHTO Bridge Widths (Minimum)

Type Facility	Other Factors	Bridge Widths	AASHTO
Freeways	New Bridges	Approach Roadway Width	pg. 506
Rural Arterials	New Bridges (Short)	Approach Roadway Width	pg. 447
	New Long Bridges (> 200 ft.)	Travel Lanes + 4 ft. each side	pg. 447
	Remain in Place	Travel Lanes + 2 ft. each side	pg. 447
Urban Arterials	Long (> 200 ft.), where shoulders or parking lanes are provided on the arterial	Travel Lanes + 4 ft. each side	pg. 481
	All new bridges	Curb to curb width of street	pg. 481

		Bridge Widths		
Type Facility	**Other Factors**	**New or Reconstruction**	**To Remain**	**AASHTO**
Rural and Urban Collectors	Under 400 ADT	Traveled Way + 2 ft. each side (1)	22 ft. (2)	pp. 426, 427
	ADT 400-1500	Traveled Way + 3 ft. each side (1)	22 ft. (2)	pp. 426, 427
	ADT 1500-2000	Traveled Way + 4 ft. each side (1),(3)	24 ft. (2)	pp. 426, 427
	ADT > 2000	Approach Roadway Width (1),(3)	28 ft. (2)	pp. 426, 427

1. If the approach roadway has paved shoulders, then the surfaced width shall be carried across the bridge.
2. Bridges longer than 100 ft. are to be analyzed individually.
3. For bridges > 100 ft. in length, the minimum bridge width of traveled way plus 3 ft. on each side is acceptable.

Table 23.9.5 AASHTO Structural Capacity (Minimum Loadings)

Type Facility	AASHTO
All Facilities	See ***AASHTO LRFD*** for minimum loadings.

Table 23.9.6 AASHTO Vertical Clearance (Minimum)

Type Facility		Vertical Clearance (feet)	AASHTO
Freeways		16 (1),(2),(5)	pp. 506, 507, 763, 764
Arterials:	Rural	16 (1),(2)	pp. 447, 763, 764
	Urban	16 (1),(2)	pp. 472, 763, 764
Other Highways		14 (2)	pp. 385, 507
Sign Trusses		17 (2)	pg. 507
Pedestrian Overpass		17 (2)	pg. 507
Tunnels:	Freeways	16 (2)	pg. 355
	Other Highways	14 (2)	pg. 355
Railroads		23 (2),(3),(4)	pg. 522

1. 14 feet allowed in highly developed urban areas if alternate route has 16 feet.
2. Minimum value that can be used without a Design Exception. An allowance of 6 inches should be added to vertical clearance to accommodate future resurfacing.
3. Over High Speed Rail Systems: See Department guidelines and specifications for Intermediate Class Rail Operations entitled ***Standard Specifications for the Design and Construction of Railways***.
4. Over Electrified Railroad: The minimum vertical clearance shall be 24 feet 3 inches. This provision is based on FDOT Policy for 25 kV service: ***South Florida Rail Corridor Clearance (Topic No. 000-725-003***)
5. All exceptions to the 16-ft vertical clearance standard on rural Interstate routes or on a single Interstate route through urban areas must be coordinated with Surface Deployment and Distribution Command Transportation Engineering Agency (SDDCTEA) as described in ***Section 23.3***.

Table 23.9.7 AASHTO Grades (Minimum and Maximum)

Maximum Grades

Type Facility	Type Terrain	Grades (%) For Design Speed (mph)									AASHTO
		30	35	40	45	50	55	60	65	70	
Freeway [1]	Level	---	---	---	---	4	4	3	3	3	pg. 506,
	Rolling	---	---	---	---	5	5	4	4	4	Exh. 8-1
Rural Arterial	Level	---	---	5	5	4	4	3	3	3	pg. 446,
	Rolling	---	---	6	6	5	5	4	4	4	Exh. 7-2
Urban Arterial:	Level	8	7	7	6	6	5	5	---	---	pg. 472,
	Rolling	9	8	8	7	7	6	6	---	---	Exh. 7-10
Rural Collector[2]	Level	7	7	7	7	6	6	5	---	---	pg. 423,
	Rolling	9	9	8	8	7	7	6	---	---	Exh. 6-4
Urban Collector[2]	Level	9	9	9	8	7	7	6	---	---	pg. 432,
	Rolling	11	10	10	9	8	8	7	---	---	Exh. 6-8

1. Grades one percent steeper than the values shown may be used for extreme cases in urban areas where development precludes the use of flatter grades and for one-way downgrades.
2. Short lengths of grade in rural and urban areas, such as grades less than 500 ft. in length, one-way downgrades, and grades on low-volume rural and urban collectors may be up to 2 percent steeper than the grades shown above.

Minimum Grades for Urban Curb & Gutter

Type Facility	Minimum %	AASHTO
Arterials	as required for adequate drainage	pg. 471
Collector Roads & Streets	0.30	pg. 431
Local Roads & Streets	0.20	pg. 391

Table 23.9.8 AASHTO Cross Slope (Minimum and Maximum)

Type Facility	Other Factors	Minimum	Maximum	AASHTO
Freeways	---	0.015	0.025 [1]	pg. 504
Arterials	Rural	0.015	0.02 [1]	pg. 446
	Urban	0.015	0.03	pg. 472
Divided Highways	---	0.015	0.02 [1]	pg. 455
Collectors	Rural	0.015	0.02 [1]	pg. 421
	Urban	0.015	0.03	pg. 431
Shoulders	Paved	0.02	0.06	pg. 316
	Gravel	0.04	0.06	pg. 316
	Turf	0.06[2]	0.08[2]	pg. 316

1. Values given are for up to two lanes in one direction. Additional outside lanes may have cross slopes of 0.03.
2. Shoulder cross slopes which meet FDOT criteria do not require a Design Exception.

Table 23.9.9 AASHTO Superelevation (Maximum)

Type Facility	Superelevation Rate	AASHTO
Highways (Rural)	0.12	pg. 144
Urban	0.06	pg. 145
Low Speed Urban w/severe constraints	None	pg. 145
Ramps and Turning Roadways at Intersections	0.10	pg. 639

Table 23.9.10 AASHTO Horizontal Alignment

Minimum Radius (feet) with Superelevation (page 147, Exh. 3-15)

Type Facility	Super-elevation e-max	Minimum Curve Radius (feet) for Design Speed (mph)											
		15	20	25	30	35	40	45	50	55	60	65	70
Rural Highways and High Speed Urban Streets	0.04	42	86	154	250	371	533	711	926	1190	1500	---	---
	0.06	39	81	144	231	340	485	643	833	1060	1330	1660	2040
	0.08	38	76	134	214	314	444	587	758	960	1200	1480	1810
	0.10	36	72	126	200	292	410	540	694	877	1090	1340	1630
	0.12	34	68	119	188	272	381	500	641	807	1000	1220	1480

Minimum Radius (feet) for Section with Normal Cross Slope (***2001 AASHTO***, page 168, Exh. 3-26)

Type Facility	Minimum Curve Radius (feet) for Design Speed (mph)											
	15	20	25	30	35	40	45	50	55	60	65	70
All	960	1700	2460	3350	4390	5570	6880	8350	9960	11720	13180	14730

Minimum Radius (feet) for Intersection Curves (***2001 AASHTO***, page 201, Exh. 3-43)

Design Speed (MPH)	10	15	20	25	30	35	40	45
Minimum Radius (feet)	25	50	90	150	230	310	430	540
Assumed Minimum Superelevation Rate	0.02	0.02	0.02	0.04	0.06	0.08	0.09	0.10

Minimum Passing Sight Distance (feet) (page 124, Exh. 3-7)

Design Speed (mph)	20	25	30	35	40	45	50	55	60	65	70
Passing Sight Distance	710	900	1090	1280	1470	1625	1835	1985	2135	2285	2480

Table 23.9.11 AASHTO Vertical Alignment

(Taken from page 272 Exh. 3-72, page 277 Exh. 3-75, and page 422 Exh. 6-2)

Design Speed (mph)	K Value [1] for Vertical Curves Rounded for Design	
	Crest	Sag
15	3	10
20	7	17
25	12	26
30	19	37
35	29	49
40	44	64
45	61	79
50	84	96
55	114	115
60	151	136
65	193	157
70	247	181

1. Rate of vertical curvature, K, is the length of curve per percent algebraic difference in the intersecting grades.

Table 23.9.12 AASHTO Stopping Sight Distance

(Taken from page 112, Exh. 3-1)

Design Speed (mph)	Stopping Sight Distance (feet) Computed for Design
15	80
20	115
25	155
30	200
35	250
40	305
45	360
50	425
55	495
60	570
65	645
70	730

Table 23.9.13 AASHTO Horizontal Clearance (Minimum)

Feature	Clearance		AASHTO
Bridges	See ***Table 23.9.4***		---
Tunnels		2.5 ft. from edge of traffic lane	pg. 354, Exh. 4-17
Underpasses	2-lane: (1)	Normal shoulder width (to edge of barrier)	pg. 762, Exh. 10-6
	Divided Roadway:	Normal shoulder (outside or median) width (to edge of barrier) (1)	
Barrier Wall & Guardrail		Normal shoulder width	pg. 762, Exh. 10-6
Light Poles (2)	Rural:	Outside clear zone (if non-breakaway)	pg. 291
	Urban:	1.5 ft. from face of curb	pg. 319
Trees greater than 4 inches in diameter measured 6 inches above the ground	Rural Arterials:	Outside clear zone	pg. 399, 481
	Collectors ≤ 45 mph:	10 ft. from traveled way	pg. 427
	Collectors > 45 mph:	Outside clear zone	pg. 427
	Urban:	1.5 ft. from face of curb	pg. 399, 437, 481
	Freeways (Rural and Urban):	Outside clear zone	pg. 507
Sign supports		Outside clear zone (if non-breakaway)	pg. 294
Utility Poles (2)	Rural:	Outside clear zone	pg. 294
	Urban:	1.5 ft. from face of curb	pp. 293, 319
Building Line		15 feet from elevated roadway (wall)	pg. 522
Signal Pole and Controller Cabinets	Rural:	As far from the roadway as practicable	pg. 4-13 (3)
	Urban:	1.5 ft. from face of curb	pg. 319

1. For metal guardrail, add deflection distance.
2. Exceptions for utility poles are to be in accordance with the current ***Utility Accommodation Manual*** exceptions procedure for horizontal clearance for utility poles.
3. ***2002 AASHTO Roadside Design Guide***.

Exhibit 23-A Submittal/Approval Letter

To: _____ Date: _____
District or Turnpike Design Engineer

Financial Project ID: _____ New Const. ( ) RRR ( )
Federal Aid Number:_____
Project Name: _____
State Road Number: _____ Co./Sec./Sub. _____
Begin Project MP: _____ End Project MP: _____
Full Federal Oversight: Yes ( ) No ( )
Request for Design Exception ( ), Design Variation ( )

(For Design Exception or Variations Requiring Central Office Approval)
Re-submittal: Yes ( ) No ( ) Original Ref# _____ - ____ - _____

Requested for the following element(s):

( ) Design Speed	( ) Lane Widths	( ) Shoulder Widths	( ) Bridge Widths
( ) Structural Capacity	( ) Vertical Clearance	( ) Grades	( ) Cross Slope
( ) Superelevation	( ) Horizontal Alignment	( ) Vertical Alignment	( ) Stopping Sight Distance
( ) Horizontal Clearance	( ) Other _____		

1. **Include a brief statement here concerning the project and the exception or variation requested.**
2. **Attach the Sealed Report including applicable documentation as per *Section 23.5*.**

Recommended by:

_____ Date _____
Responsible Professional Engineer

Approvals:

_____ Date _____
District or Turnpike Design Engineer

_____ Date _____
District Structures Design Engineer

_____ Date _____
State Roadway Design Engineer

_____ Date _____
State Structures Design Engineer

_____ Date _____
State Chief Engineer

_____ Date _____
FHWA Division Administrator