

Additional Guidance When Using AASHTO to Justify a Deviation From the Design Manual

Design Manual Chapter 330 (330.04[4], page 330-6) includes the following:

“If the element meets current AASHTO guidance adopted by FHWA, such as *A Policy on Geometric Design of Highways and Streets*, but not the *Design Manual* criteria, it is a deviation from the *Design Manual* that does not require approval by FHWA or the HQ Design Office. However, it only requires documentation and justification in the DDP to support the use of the AASHTO guidance. The following documentation is required:

- Identify the design element
- Explain why the design level specified in the design matrices was not used
- Explain which AASHTO guidance was used (including the title of the AASHTO guidance, the publication date, and the chapter and page number of the guidance)”

In accordance with 23 CFR 625.4, the only AASHTO guidance adopted by FHWA is: *A Policy on Geometric Design of Highways and Streets*, AASHTO, both 2001 and 2004, and *A Policy on Design Standards – Interstate System*, AASHTO, January 2005 (www.fhwa.dot.gov/programadmin/standards.cfm).

To assist with identifying design elements that can utilize this flexibility, the HQ Design Office has developed a table of comparison of WSDOT *Design Manual* to *A Policy on Geometric Design of Highways and Streets*, AASHTO 2004 and *A Policy on Design Standards – Interstate System*, AASHTO, January 2005.

Shaded cells  indicate areas that AASHTO policy does not meet WSDOT policy.

Design Element	Location	WSDOT	AASHTO (Green Book)										
1. Design Speed ⁽¹⁾	Interstate	Exhibit 1140-5 80 – 60 mph ⁽²⁾ Urbanized: 70 – 50 mph ⁽³⁾	2005 Interstate Standards, Pg 2 Rural: 70 to 80 mph ⁽⁴⁾ (50 to 60 mph in mountainous terrain) Urban: 50 mph										
	Principal Arterial Freeway (P1)	Exhibit 1140-6⁽⁵⁾ 80 – 50 mph (may be reduced to 50 mph in urbanized areas)	2004 “Green Book,” Pgs 444, 470, & 503 Same as Interstate.										
	Other multilane divided	70 – 60 mph (may be reduced to 60 mph in urban areas)	All other arterials: Rural: 75 – 40 mph Urban: 60 – 30 mph										
	Multilane undivided	Rural: 70 – 40 mph Urban: 60 – 30 mph											
	Two-lane	Rural: 70 – 40 mph Urban: 60 – 30 mph											
	Minor Arterial Multilane divided	Exhibit 1140-7⁽⁵⁾ 70 – 50 mph (may be reduced to 50 mph in urban areas)	AASHTO does not separate arterials into principal and minor.										
	Multilane undivided	Rural: 70 – 40 mph Urban: 60 – 30 mph											
	Two-lane	Rural: 70 – 40 mph Urban: 60 – 30 mph											
	Collector Multilane undivided	Exhibit 1140-8⁽⁵⁾ Rural: 70 – 40 mph Urban: 60 – 30 mph	2004 “Green Book,” Pgs 422 & 430 Rural: 60 – 30 mph (20 mph allowed on low-volume mountainous terrain) Urban: Not less than 30 mph										
	Two-lane	Rural: 70 – 40 mph Urban: 60 – 30 mph											
Urban managed access and Design speed based on posted speed	Exhibits 1130-1 & 1140-1	AASHTO does not provide guidance for establishing design speed based on posted speed.											
	<table border="1"> <thead> <tr> <th>Route Type</th> <th>Posted Speed</th> <th>Design Speed</th> </tr> </thead> <tbody> <tr> <td>Freeways</td> <td>All</td> <td>10 mph over the posted speed</td> </tr> <tr> <td rowspan="2">Nonfreeways</td> <td>45 mph or less</td> <td>Not less than the posted speed</td> </tr> <tr> <td>Over 45 mph</td> <td>5 mph over posted speed</td> </tr> </tbody> </table>		Route Type	Posted Speed	Design Speed	Freeways	All	10 mph over the posted speed	Nonfreeways	45 mph or less	Not less than the posted speed	Over 45 mph	5 mph over posted speed
Route Type	Posted Speed		Design Speed										
Freeways	All	10 mph over the posted speed											
Nonfreeways	45 mph or less	Not less than the posted speed											
	Over 45 mph	5 mph over posted speed											

(1) FHWA policy is that the design speed is to be equal to or exceed the posted or regulatory speed limit of the completed facility.
(2) May be reduced to 60 mph in mountainous terrain & 70 mph in rolling terrain.

(3) May be reduced to 50 mph with a corridor analysis.
(4) Design values are given for 80 mph; 70 mph is given as minimum.
(5) Minimum values may be used in mountainous terrain.

Design Element	Location	WSDOT	AASHTO (Green Book)
2. Lane Width	Interstate	Exhibit 1140-5 12 ft	2005 Interstate Standards, Pg 3 12 ft
	Principal Arterial	Exhibit 1140-6 11 – 12 ft	2004 “Green Book,” Pgs 455 & 472 10 – 12 ft
	Minor Arterial	Exhibit 1140-7 11 – 12 ft	AASHTO does not separate arterials into principal and minor.
	Collector	Exhibit 1140-8 11 – 12 ft	2004 “Green Book,” Pgs 425 & 433 10 – 12 ft
	Urban Managed Access	Exhibit 1140-9 11 – 12 ft based on design class and design speed	No AASHTO equivalent class.
	Existing	Full design level; separate values for existing not provided.	Interstate & other freeways: Separate values for existing not provided.
		Exhibits 1130-10 & 11 Modified: 11 – 12 ft based on ADT & truck %	2004 “Green Book,” Pgs 425 & 455 Other: 11 ft rural
	Turning roadway width Full design level	Chapter 1240 Calculated width based on swept width of WB-67 for 2-lane 2-way & WB-40 for 1-way; less than 2 ft widening not required for existing; widening may be reduced for small turn angles.	2004 “Green Book,” Pgs 208 – 223 Design vehicle WB-50 or representative of the actual traffic on the facility. Rounded widths for WB-65 ⁽⁶⁾ on 2-lane open roadways agree with WSDOT; widening less than 2 ft not required; no adjustment for turn angle.
Modified design level	Exhibits 1130-12a & b Calculated width based on swept width of large truck with less clearance than for full design level; width includes shoulders.	No AASHTO “Green Book” equivalent.	
(6) AASHTO has two tables; the other is for turning roadways (Exhibits 3-47 with 3-48 & Exhibit 3-50). The comparison is based on Exhibits 3-47 and 3-48. The AASHTO values for turning roadways (ramps) for the WB-65 from Exhibit 3-50 are consistently 2 ft larger than WSDOT values.			

Design Element	Location	WSDOT	AASHTO (Green Book)
3. Shoulder Width	Interstate	Exhibit 1140-5 10 ft on the right (consider 12 ft when truck ADT \geq 250) 4 ft on the left 4-lane 10 ft on the left 6 or more lanes (consider 12 ft when truck DDHV \geq 250)	2005 Interstate Standards, Pg 3 Same
	Existing 6-lane	6 ft on the left may remain	10 ft
	Principal Arterial Freeway (P1)	Exhibit 1140-6 Same as Interstate	2004 "Green Book," Pgs 448, 463, & 505 Same
	Existing 6-lane	6 ft on the left may remain	10 ft
	Other Principal	4 – 10 ft, by design class and DHV ⁽⁷⁾	4 – 8 ft by ADT
	Minor Arterial	Exhibit 1140-7 4 – 10 ft, by design class and DHV ⁽⁷⁾	AASHTO does not separate arterials into principal and minor.
	Collector	Exhibit 1140-8 4 – 8 ft, by design class and DHV ⁽⁷⁾	2004 "Green Book," Pgs 424, 425 & 433 2 ⁽⁸⁾ – 8 ft by functional class and ADT
	Urban with curb	Exhibit 1140-3 2 – 4 ft; with mountable curb, shoulder on left desirable but not required when speed <35 mph. 4 ft on right when on local, state, or regional significant bike route.	2004 "Green Book," Pg 322 1 – 2 ft, for low-speed urban desirable but not required
	Existing Full Modified	Separate values for existing not provided. Exhibits 1130-10 & 11 2 – 6 ft based on ADT & truck %	Separate values for existing not provided. No AASHTO "Green Book" equivalent.
(7) WSDOT design class limits are at higher volumes than AASHTO on the non-NHS; this results in up to 2 ft less shoulder width.		(8) 2 ft for low-volume (ADT<400) collector	

Design Element	Location	WSDOT	AASHTO (Green Book)
4. Bridge Width	Interstate	Exhibit 1140-5 Full design roadway width ⁽⁹⁾	2005 Interstate Standards, Pg 5 Full roadway width
	Long bridges ⁽¹⁰⁾	Not considered	Traveled way + 4 ft each side
	Principal Arterial	Exhibit 1140-6 Full design roadway width	2004 “Green Book,” Pgs 447 & 481 Full roadway width
	Long bridges ⁽¹⁰⁾	Not considered	Traveled way + 4 ft each side
	Minor Arterial	Exhibit 1140-7 Full design roadway width	AASHTO does not separate arterials into principal and minor.
	Collector	Exhibit 1140-8 Full design roadway width	2004 “Green Book,” Pg 426 ADT>2000: Full roadway width ADT≤2000: Traveled way + 2 to 4 ft each side ⁽¹¹⁾
	Urban managed access	Exhibit 1140-9 Full design roadway width based on an 11 ft lane + shoulders, except 2-lane >45 mph is 32 ft (up to 6 ft less than traveled way + shoulders).	
	Existing to remain in place Interstate	Full design level: Separate values for existing not provided.	2005 Interstate Standards, Pg 5 Traveled way + shoulders; left shoulder (both shoulders for long bridges) may be reduced to 3.5 ft
	Arterial		2004 “Green Book,” Pgs 447 & 481 Rural: Traveled way + 2 ft Urban: Reasonable attempts to meet current design policies
	Collector		2004 “Green Book,” Pg 427 ADT >1500: 22 ft ADT 1500 – 2000: 24 ft ADT <2000: 28 ft
Modified design level to remain in place	Exhibits 1130-10 & 11 Modified traveled way width to traveled way width + 6 ft.		

(9) Full roadway width is traveled way + shoulders. (11) For bridges over 100 ft long, traveled way + 3 ft each side is acceptable.
(10) A long bridge has an overall length in excess of 200 ft.

Design Element	Location	WSDOT	AASHTO (Green Book)
5. Structural Capacity	New construction All functional classes	720.04(1)(a) (Page 720-2) HL-93	2005 Interstate Standards, Pg 5 2004 “Green Book,” Pgs 427, 447, & 506 HS-20
	Existing to remain in place	1120.04(1)(b) (Page 720-3) NHS: <ul style="list-style-type: none"> • Operating load rating is at least 36 tons (which is equal to HS-20) • Not permanently posted for legal weight • Not permanently restricted for overweight permits Non-NHS: <ul style="list-style-type: none"> • Not permanently posted for legal weight • Not permanently restricted for overweight permits 	2005 Interstate Standards, Pg 5 Interstate: >20 years service life 2004 “Green Book,” Pg 447 Arterial: >HS-20 2004 “Green Book,” Pg 427 Collector: H-15
Design Element	Location	WSDOT	AASHTO (Green Book)
6. Horizontal Alignment	All functional classes	Chapter 1210 Same as AASHTO	2004 “Green Book,” Pgs 131 – 231
7. Vertical Alignment	All functional classes	Chapter 1220 Same as AASHTO	2004 “Green Book,” Pgs 231 – 280
8. Grade	All functional classes	Exhibits 1140-5 – 8 Same as AASHTO	2005 Interstate Standards, Pg 3 2004 “Green Book,” Pgs 423, 432, 446, 472, & 506

Design Element	Location	WSDOT	AASHTO (Green Book)
9. Stopping Sight Distance	All functional classes Stopping distances	Chapter 1260 Same as AASHTO.	2004 “Green Book,” Pgs 112, 127
	Object height	Full design level 0.5 ft. 2 ft allowed in urban areas (with justification) or when sight obstruction is traffic barrier.	2 ft
	Existing Full design level	1260.04(7), Exhibit 1260-13 (Pgs 1260-10,11, & 12) Stopping distances less than AASHTO ⁽¹²⁾ using 2 ft object height.	Not considered – Full design distances required.
	Modified design level	1130.03(3), Exhibits 1130-2, 8, & 9a (Pgs 1130-3&4) Stopping distances based on 15 mph below design speed ⁽¹³⁾ using 2 ft object height.	No AASHTO “Green Book” equivalent.

(12) The distances are based on the average running speeds formerly used by AASHTO; the *Design Manual* does not state that a lower speed is used.

(13) The *Design Manual* does not state that the difference is the use of a lower speed.

Design Element	Location	WSDOT	AASHTO (Green Book)
10. Cross Slope	New construction	1230.04(1) (Page 1230-3 & 4) 2% 1.5% – 2.5% with justification 3% low pavements type (BST)	2005 Interstate Standards, Pg 4 2004 “Green Book,” Pgs 305 – 310 1.5 – 2% 2.5 % allowed 2 – 6% low pavements type
	Existing	Full design level: Separate values for existing not provided Modified design level: 1 – 3% (1130.05 , Pg 1130-7)	Separate values for existing not provided.
	Passing rollover at crown line	Full design level: Design values not provided Modified design level(1130.05, Pg 1130-7): ADT>2000: 4% ADT≤2000: 5%	4%

Design Element	Location	WSDOT	AASHTO (Green Book)
11. Superelevation	All functional classes	Chapter 642	2004 “Green Book,” Pgs 132 - 207
	Superelevation rate	6 to 10% e_{max} , same as AASHTO Urban, same as AASHTO	Allows e-max 4 to 12% (pgs 155 – 159) (Pg 152)
	Runoff length (Hwy) (Ramp)	Same as AASHTO Highway length adjusted for 15 ft lane width	(Pg 181)
	Runoff placement	70% on tangent	60 to 80% on tangent (Pgs 179 – 182)
	e_{max} selection	10% e_{max} desirable - all 8% e_{max} - urban freeways 6% e_{max} - urban nonfreeway and mountainous e_{max} equation - intersections and urban managed access and urban ramps with design speed \leq 40mph	12% maximum rate, (Pg 144-145) 10% e-max common 8% max for snow & ice 4% or 6% urban May be omitted on low-speed urban streets with severe constraints
Design Element	Location	WSDOT	AASHTO (Green Book)
12. Vertical Clearance	Interstate and other freeways	Exhibit 1120-1	2005 Interstate Standards, Pg 5 2004 “Green Book,” Pg 506
		New: 16.5 ft Widening roadway or structure & resurfacing under: 16 ft No Change to Vertical Clearance: 14.5 ft Pedestrian bridge: 17.5 ft Overhead signs: 17.5 ft	Rural: 16 ft Urban: 16 ft for one route 14 ft other routes Sign & pedestrian bridges and through truss bracing: 17 ft
	Nonfreeway routes	Exhibit 1120-1 New: 16.5 ft Widening roadway or structure & resurfacing under: 15.5 ft No Change to Vertical Clearance: 14.5 ft Pedestrian bridge: 17.5 ft Overhead signs: 17.5 ft WSDOT uses a value of 0.5 ft for future overlay allowance (included in the values above).	2004 “Green Book,” Pgs 427 & 436 Collectors: 14 ft 2004 “Green Book,” Pgs 447 & 472 Arterials: 16 ft Existing 14 ft may remain with an alternate route AASHTO recommends allowance for future resurfacing (not included in the values above). 0.5 ft given in “Green Book,” pg 763.

Design Element	Location	WSDOT	AASHTO (Green Book)
13. Horizontal Clearance	All	<p>Shoulder width: Exhibits 1130-10, 11, 14 & 1140.09 Clear zone: 1600.04</p> <p>Shoulder width and clear zone normally required; shoulders may be reduced to 2 ft at existing bridge piers.</p> <p>Curb: 10 ft clear zone</p> <p>City is responsible for clearance behind curb within city limits on managed access facilities.</p>	<p>2004 “Green Book,” Pgs 427, 437, 448, 481, & 507</p> <p>Rural: Shoulder width and clear zone, 10 ft minimum on collectors</p> <p>Urban with curb: 18 in. offset</p> <p>Clear zone desirable</p>