Appendix H presents guidance for the design of new and reconstructed projects.

AASHTO MINIMUM DESIGN GUIDANCE

SOURCES

1. American Association of State Highway and Transportation Officials, A Policy on Geometric Design of Highways and Streets (*Green Book*), Washington, D.C., 2018.
2. American Association of State Highway and Transportation Officials, A Policy on Design Standards Interstate System (*I-State Green Book*), Washington, D.C., 2016.
3. American Association of State Highway and Transportation Officials, Roadside Design Guide, Washington, D.C., 2011.

DEFINITIONS

The following definitions are from A Policy on Geometric Design of Highways and Streets (2018)

- **Rural Context:** "The rural context applies to roads in rural areas that are not within a developed community. These include areas with the lowest development density; few houses or structures; widely dispersed or no residential, commercial, and industrial land uses; and usually large building setbacks. The rural context may include undeveloped land, farms, outdoor recreation areas, or low densities of other types of development. Most roads in rural areas fit the rural context and should be designed in a manner similar to past design criteria for rural facilities."

- **Rural Town Context:** "The rural town context applies to roads in rural areas located within developed communities. Rural towns generally have low development densities with diverse land uses, on-street parking, and sidewalks in some locations, and small building setbacks. Rural towns may include residential neighborhoods, schools, industrial facilities, and commercial main street business districts, each of which present differing design challenges and differing levels of pedestrian and bicycle activity. The rural town context recognizes that rural highways change character where they enter a small town, or other rural community, and that design should meet the needs of not only through travelers, but also the residents of the community. Speed expectations of through travelers change when they enter a rural town."

- **Suburban Context:** "The suburban context applies to roads and streets, typically within the outlying portions of urban areas, with low to medium development density, mixed land uses (with single-family residences, some multi-family residential structures, and nonresidential development including mixed town centers, commercial corridors, big box commercial stores, light industrial development). Building setbacks are varied with mostly off-street parking. The suburban context generally has lower development densities and drivers have higher speed expectations than the urban and urban core contexts. Pedestrians and bicyclist flows are higher than in the rural context, but may not be as high as found in urban and urban core areas."

- **Urban Context:** "The urban context has high-density development, mixed land uses, and prominent destinations. On-street parking and sidewalks are generally more common than in the suburban context, and building setbacks are mixed. Urban locations often include multi-story and low- to medium-rise structures for residential, commercial, and educationsl uses. Many structures accommodate mixed uses: commercial, residential, and parking. The urban context includes light industrial, and sometimes heavy industrial, land use. The urban context also includes prominent destinations with specialized structures for entertainment, including athletic and social events, as will as conference centers. In small- and medium-sized communities, the central business district may be more an urban context than an urban core context. Driver speed expectations are generally lower and pedestrian and bicyclist flows higher than in suburban areas. The density of transit routes is generally greater in the urban context than the suburban context, including in-street rail transit in larger communities and transit teminals in small- and medium-sized communities."

- **Urban Core Context**: "The urban core context includes areas of the highest density, with mixed land uses within and among predominantly high-rise structures, and with small building setbacks. The urban core context is found predominantly in the central business districts and adjoining portions of major metropolitan areas. On-street parking is often more limited and time restricted than in the urban context. Substantial parking is in multi-level structures attached to or integrated with other structures. The area is accessible to automobiles, commercial delivery vehicles, and public transit. Sidewalks are present nearly continuously, with pedestrian plazas and multi-level pedestrian bridges connecting commercial and parking structures in some locations. Transit corridors, including bus and rail transit, are typically common and major transit terminals may be present. Some government services are available, while other commercial uses predominate, including financial and legal services. Structures may have multiple uses and setbacks are not as generous as in the surrounding urban area. Residences are often apartments or condominiums. Driver speed expectations are low and pedestrian and bicycle flows are high."

AASHTO MINIMUM DESIGN GUIDANCE

AASHTO CLASSIFICATION/ STATE FUNCTIONAL CLASSIFICATION
[NATIONAL FUNCTIONAL CLASSIFICATION]

NEW AND RECONSTRUCTED RURAL PROJECTS

NEW AND RECONSTRUCTED MUNICIPAL PROJECTS

ROADSIDE DESIGN GUIDE EXHIBITS

EXHIBITS

NEW AND RECONSTRUCTED RURAL STATE HIGHWAYS AASHTO CLASSIFICATION: INTERSTATE STATE FUNCTIONAL CLASSIFICATION: INTERSTATE NATIONAL FUNCTIONAL CLASSIFICATION: PRINCIPAL ARTERIAL – INTERSTATE	
Design Speed	70 mph
Lane Width	12 ft.
Shoulder Width	Right = 10 ft. 4-Lane (2 lanes in each direction): Left = 4 ft. Truck Traffic > 250 DDHV: Right = 12 ft. should be considered ≥ 6-Lane (≥ 3 lanes in each direction): Left = 10 ft. Truck Traffic > 250 DDHV: Right & Left = 12 ft. should be considered (Note: All shoulder widths are paved).
Horizontal Alignment	
Superelevation	e_{max} = 8%
***Minimum Radius (Based on Maximum Superelevation)**	1,810 ft.
Vertical Alignment	
***Crest K Value**	247
***Sag K Value**	181
***Maximum Grade**	3% Level 4% Rolling
***Stopping Sight Distance**	730 ft.
Cross Slope	
Lane	1.5% (A)
Shoulder	2% to 6% paved (B)
Lateral Offset to Obstruction	The nominal shoulder width.
Vertical Clearance (1)	Structure: 16 ft. Sign trusses and pedestrian/ bicycle overpass: 17 ft.
Bridge Width	Full width of the approach roadway including paved shoulders. (D)
Structural Capacity	HL93

For additional information, see A Policy on Design Standards Interstate System, May 2016 and A Policy on Geometric Design of Highways and Streets, 2018

* The minimum value is based on the design speed; see Exhibits H.1, H.2, and H.3

(1) Over the entire roadway width, including auxiliary lanes, shoulders, ramps, and collector-distributor roads.

(A) On roadways where there are more than two lanes inclined in the same direction, the cross slope may be increased by 0.5% to 1% for each additional lane, up to a maximum of 3%.

(B) The surfaced shoulder cross slope should not be less than the cross slope of the adjacent lane.

(D) Long bridges (longer than 200 ft.) may have a lesser width and should be analyzed individually. On long bridges a reduced shoulder width of 4 ft. may be used on both the left and right sides.

NEW AND RECONSTRUCTED RURAL STATE HIGHWAYS AASHTO CLASSIFICATION: RURAL FREEWAY STATE FUNCTIONAL CLASSIFICATION: EXPRESSWAY (ACCESS ONLY AT INTERCHANGES) NATIONAL FUNCTIONAL CLASSIFICATION: PRINCIPAL ARTERIAL – OTHER FREEWAYS AND EXPRESSWAYS	
Design Speed	50 mph
Lane Width	12 ft.
Shoulder Width	Right = 10 ft. 4-Lane (2 lanes in each direction): Left = 4 ft. Truck Traffic > 250 DDHV: Right = 12 ft. should be considered ≥ 6-Lane (≥ 3 lanes in each direction): Left = 10 ft. Truck Traffic > 250 DDHV: Right & Left = 12 ft. should be considered (Note: All shoulder widths are paved).
Horizontal Alignment	
Superelevation	e_{max} = 8%
***Minimum Radius (Based on Maximum Superelevation)**	758 ft.
Vertical Alignment	
***Crest K Value**	84
***Sag K Value**	96
***Maximum Grade**	4% Level 5% Rolling
***Stopping Sight Distance**	425 ft.
Cross Slope	
Lane	1.5% to 2% (A)
Shoulder	2% to 6% paved (C)
Lateral Offset to Obstruction	The nominal shoulder width.
Vertical Clearance (2)	Structure: 16 ft. Sign trusses and pedestrian/ bicycle overpass: Structure clearance + 1 ft.
Bridge Width	Full width of the approach roadway. (E)
Structural Capacity	HL93

For additional information, see A Policy on Geometric Design of Highways and Streets, 2018

* The minimum value is based on the design speed; see Exhibits H.1, H.2, and H.3

(2) Over the entire roadway width, including auxiliary lanes, shoulders, and collector-distributor roads.

(A) On roadways where there are more than two lanes inclined in the same direction, the cross slope may be increased by 0.5% to 1% for each additional lane, up to a maximum of 3%.

(C) The surfaced shoulder cross slope should not be less than the cross slope of the adjacent roadway lane and can be at least 1% greater.

(E) Bridges longer than 200 ft. may have a lesser width and should be analyzed individually.

NEW AND RECONSTRUCTED RURAL STATE HIGHWAYS	
AASHTO CLASSIFICATION: RURAL DIVIDED ARTERIAL STATE FUNCTIONAL CLASSIFICATION: EXPRESSWAY NATIONAL FUNCTIONAL CLASSIFICATION: PRINCIPAL ARTERIAL	
Design Speed	50 mph
Lane Width	12 ft. (11 ft. may be retained based on alignment and crash history)
Shoulder Width	8 ft. Right usable (paved is preferred, 4 ft. min. paved if used for bicycles) 4 ft. Left (paved) ≥ 6 Lane (≥ 3 lanes in each direction): Left = 8 ft.
Horizontal Alignment	
Superelevation	e_{max} = 8%
***Minimum Radius (Based on Maximum Superelevation)**	758 ft.
Vertical Alignment	
***Crest K Value**	84
***Sag K Value**	96
***Maximum Grade (4)**	4% Level 5% Rolling
***Stopping Sight Distance**	425 ft.
Cross Slope	
Lane	1.5% to 2% (A)
Shoulder	2% to 6% paved (B) 6% to 8% turf
Lateral Offset to Obstruction	The greater of the shoulder width or 4 ft. from the edge of the travelled way.
Vertical Clearance (3)	Structure: 16 ft. (14 ft. may be retained if allowed by local statute). Sign trusses and pedestrian/ bicycle overpass: Structure clearance +1 ft.
Bridge Width	Full width of the approach roadway including shoulders and pedestrian/ bicycle facilities. Bridge L > 200 ft. without pedestrian facilities and with infrequent bicycle use: Shoulder width shall be at least 4 ft.
Structural Capacity	HL93

For additional information, see A Policy on Geometric Design of Highways and Streets, 2018

* The minimum value is based on the design speed; see Exhibits H.1, H.2, and H.3

(3) Over the entire roadway width, including the usable width of the shoulders.

(4) Grade may be up to 1% steeper for tangent length less than 500 ft.

(A) On roadways where there are more than two lanes inclined in the same direction, the cross slope may be increased by 0.5% to 1% for each additional lane, up to a maximum of 3%.

(B) The surfaced shoulder cross slope should not be less than the cross slope of the adjacent lane.

NEW AND RECONSTRUCTED RURAL STATE HIGHWAYS AASHTO CLASSIFICATION: RURAL TOWN DIVIDED ARTERIAL STATE FUNCTIONAL CLASSIFICATION: EXPRESSWAY NATIONAL FUNCTIONAL CLASSIFICATION: PRINCIPAL ARTERIAL	
Design Speed	20 mph
Lane Width	10 ft.
Shoulder Width	8 ft. Right usable (paved is preferred, 4 ft. min. paved if used for bicycles) 4 ft. Left (paved) ≥ 6 Lane (≥ 3 lanes in each direction): Left = 8 ft.
Horizontal Alignment	
Superelevation	e_{max} = 8%
***Minimum Radius (Based on Maximum Superelevation)**	76 ft.
Vertical Alignment	
***Crest K Value**	7
***Sag K Value**	17
***Maximum Grade (4)**	5% Level 8% Rolling
***Stopping Sight Distance**	115 ft.
Cross Slope	
Lane	1.5% to 2% (A)
Shoulder	2% to 6% paved (B) 6% to 8% turf
Lateral Offset to Obstruction	The greater of the shoulder width or 4 ft. from the edge of the travelled way.
Vertical Clearance (3)	Structure: 16 ft. (14 ft. may be retained if allowed by local statute). Sign trusses and pedestrian/ bicycle overpass: Structure clearance +1 ft.
Bridge Width	Full width of the approach roadway including shoulders and pedestrian/ bicycle facilities. Bridge L > 200 ft. without pedestrian facilities and with infrequent bicycle use: Shoulder width shall be at least 4 ft.
Structural Capacity	HL93

For additional information, see A Policy on Geometric Design of Highways and Streets, 2018

* The minimum value is based on the design speed; see Exhibits H.1, H.2, and H.3

(3) Over the entire roadway width, including the usable width of shoulders.

(4) Grade may be up to 1% steeper for tangent length less than 500 ft.

(A) On roadways where there are more than two lanes inclined in the same direction, the cross slope may be increased by 0.5% to 1% for each additional lane, up to a maximum of 3%.

(B) The surfaced shoulder cross slope should not be less than the cross slope of the adjacent lane.

NEW AND RECONSTRUCTED RURAL STATE HIGHWAYS AASHTO CLASSIFICATION: RURAL ARTERIAL STATE FUNCTIONAL CLASSIFICATION: MAJOR ARTERIAL NATIONAL FUNCTIONAL CLASSIFICATION: ARTERIAL	
Design Speed	50 mph
Lane Width	ADT > 2,000 VPD: 12 ft. (11 ft. may be retained based on alignment & crash history) ADT ≤ 2,000 VPD: 11 ft.
Shoulder Width	ADT > 2,000 VPD: 8 ft. usable (paved is preferred) ADT 400 – 2,000 VPD: 6 ft. usable (paved is preferred) ADT < 400 VPD: 4 ft. usable (paved is preferred) (All shoulders - 4 ft. minimum should be paved if used for bicycles, a minimum of 2 ft. may be paved if low volumes and no bicycle use)
Horizontal Alignment	
Superelevation	e_{max} = 8%
***Minimum Radius (Based on Maximum Superelevation)**	758 ft.
Vertical Alignment	
***Crest K Value**	84
***Sag K Value**	96
***Maximum Grade (4)**	4% Level 5% Rolling
***Stopping Sight Distance**	425 ft.
Cross Slope	
Lane	1.5% to 2% (A)
Shoulder	2% to 6% paved (B) 6% to 8% turf
Lateral Offset to Obstruction	The greater of the shoulder width or 4 ft. from the edge of the travelled way.
Vertical Clearance (3)	Structure: 16 ft. (14 ft. may be retained if allowed by local statute). Sign trusses and pedestrian/ bicycle overpass: Structure clearance + 1 ft.
Bridge Width	Full width of the approach roadway including shoulders and pedestrian/ bicycle facilities. Bridge L > 200 ft. without pedestrian facilities and with infrequent bicycle use: Shoulder width shall be at least 4 ft.
Structural Capacity	HL93

For additional information, see A Policy on Geometric Design of Highways and Streets, 2018

* The minimum value is based on the design speed; see Exhibits H.1, H.2, and H.3

(3) Over the entire roadway width, including the usable width of shoulders.

(4) Grade may be up to 1% steeper for tangent length less than 500 ft.

(A) On roadways where there are more than two lanes inclined in the same direction, the cross slope may be increased by 0.5% to 1% for each additional lane, up to a maximum of 3%.

(B) The surfaced shoulder cross slope should not be less than the cross slope of the adjacent lane.

NEW AND RECONSTRUCTED RURAL STATE HIGHWAYS AASHTO CLASSIFICATION: RURAL TOWN ARTERIAL STATE FUNCTIONAL CLASSIFICATION: MAJOR ARTERIAL NATIONAL FUNCTIONAL CLASSIFICATION: ARTERIAL	
Design Speed	20 mph
Lane Width	≤ 45 mph: 11 ft. ≥ 50 mph: 12 ft.
Shoulder Width	ADT > 2,000 VPD: 8 ft. usable (paved is preferred) ADT 400 – 2,000 VPD: 6 ft. usable (paved is preferred) ADT < 400 VPD: 4 ft. usable (paved is preferred) (All shoulders - 4 ft. minimum should be paved if used for bicycles, a minimum of 2 ft. may be paved if low volumes and no bicycle use)
Horizontal Alignment	
Superelevation	e_{max} = 8%
***Minimum Radius (Based on Maximum Superelevation)**	76 ft.
Vertical Alignment	
***Crest K Value**	7
***Sag K Value**	17
***Maximum Grade (4)**	5% Level 8% Rolling
***Stopping Sight Distance**	115 ft.
Cross Slope	
Lane	1.5% to 2% (A)
Shoulder	2% to 6% paved (B) 6% to 8% turf
Lateral Offset to Obstruction	The greater of the shoulder width or 4 ft. from the edge of the travelled way.
Vertical Clearance (3)	Structure: 16 ft. (14 ft. may be retained if allowed by local statute). Sign trusses and pedestrian/ bicycle overpass: Structure clearance + 1 ft.
Bridge Width	Full width of the approach roadway including shoulders and pedestrian/ bicycle facilities. Bridge L > 200 ft. without pedestrian facilities and with infrequent bicycle use: Shoulder width shall be at least 4 ft.
Structural Capacity	HL93

For additional information, see A Policy on Geometric Design of Highways and Streets, 2018

* The minimum value is based on the design speed; see Exhibits H.1, H.2, and H.3

(3) Over the entire roadway width, including the usable width of shoulders.

(4) Grade may be up to 1% steeper for tangent length less than 500 ft.

(A) On roadways where there are more than two lanes inclined in the same direction, the cross slope may be increased by 0.5% to 1% for each additional lane, up to a maximum of 3%.

(B) The surfaced shoulder cross slope should not be less than the cross slope of the adjacent lane.

NEW AND RECONSTRUCTED RURAL STATE HIGHWAYS AASHTO CLASSIFICATION: RURAL COLLECTOR STATE FUNCTIONAL CLASSIFICATION: MAJOR ARTERIAL NATIONAL FUNCTIONAL CLASSIFICATION: COLLECTOR/ LOCAL			
	ADT > 2,000	**ADT 400 – 2,000**	**ADT < 400**
Design Speed	50 mph	40 mph	30 mph
Lane Width	11 ft. (6)	11 ft.	10 ft. (7)
Shoulder Width	6 ft.	4 ft.	2 ft.
Horizontal Alignment			
Superelevation	e_{max} = 8%	e_{max} = 8%	e_{max} = 8%
***Minimum Radius (Based on Max. Superelevation)**	758 ft.	444 ft.	214 ft.
Vertical Alignment			
***Crest K Value**	84	44	19
***Sag K Value**	96	64	37
***Maximum Grade**	6% Level (4) 7% Rolling (4)	7% Level (5) 8% Rolling (5)	7% Level (5) 9% Rolling (5)
***Stopping Sight Distance**	425 ft.	305 ft.	200 ft.
Cross Slope			
Lane	1.5% - 2%	1.5% - 2%	1.5% - 2%
Shoulder	2% - 6% paved (B) 6% - 8% turf	2% - 6% paved (B) 6% - 8% turf	2% - 6% paved (B) 6% - 8% turf
Lateral Offset to Obstruction	1.5 ft. from the edge of the travelled way (the greater of the shoulder width or 4 ft. is desirable).	1.5 ft. from the edge of the travelled way (the greater of the shoulder width or 4 ft. is desirable).	1.5 ft. from the edge of the travelled way (the greater of the shoulder width or 4 ft. is desirable).
Vertical Clearance (3)	Structure: 14 ft. Sign trusses and pedestrian/ bicycle overpass: Structure clearance + 1 ft.	Structure: 14 ft. Sign trusses and pedestrian/ bicycle overpass: Structure clearance + 1 ft.	Structure: 14 ft. Sign trusses and pedestrian/ bicycle overpass: Structure clearance + 1 ft.
Bridge Width	Full width of the approach roadway plus surfaced shoulder width. Bridge L > 100 ft.: Traveled way + 3 ft. on each side.	Traveled way + 4 ft. on each side. Bridge L > 100 ft.: Traveled way + 3 ft. on each side.	Traveled way + 2 ft. on each side.
Structural Capacity	HL93	HL93	HL93

For additional information, see A Policy on Geometric Design of Highways and Streets, 2018

* The minimum value is based on the design speed; see Exhibits H.1, H.2, and H.3

(3) Over the entire roadway width with an additional allowance for future resurfacing.

(4) Grade may be up to 1% steeper for tangent length less than 500 ft.

(5) For an AADT less than 2,000 vehicles/day, the grade may be up to 2% steeper for tangent length less than 500 ft.

(6) Consider 12 ft. lanes for design speed ≥ 55 mph where substantial truck volumes are present or agricultural equipment frequently uses the road.

(7) 9 ft. may be used for design speeds ≤ 40 mph with ADTs < 250 veh/day.

(B) The surfaced shoulder cross slope should not be less than the cross slope of the adjacent lane.

NEW AND RECONSTRUCTED RURAL STATE HIGHWAYS AASHTO CLASSIFICATION: RURAL TOWN COLLECTOR STATE FUNCTIONAL CLASSIFICATION: MAJOR ARTERIAL NATIONAL FUNCTIONAL CLASSIFICATION: COLLECTOR/ LOCAL			
	ADT > 2,000	**ADT 400 – 2,000**	**ADT < 400**
Design Speed	45 mph	40 mph	30 mph
Lane Width	11 ft. (6)	11 ft.	10 ft. (7)
Shoulder Width	6 ft.	4 ft.	2 ft.
Horizontal Alignment			
Superelevation	e_{max} = 8%	e_{max} = 8%	e_{max} = 8%
***Minimum Radius (Based on Max. Superelevation)**	587 ft.	444 ft.	214 ft.
Vertical Alignment			
***Crest K Value**	61	44	19
***Sag K Value**	79	64	37
***Maximum Grade**	7% Level (4) 8% Rolling (4)	7% Level (5) 8% Rolling (5)	7% Level (5) 9% Rolling (5)
***Stopping Sight Distance**	360 ft.	305 ft.	200 ft.
Cross Slope			
Lane	1.5% - 2%	1.5% - 2%	1.5% - 2%
Shoulder	2% - 6% paved (B) 6% - 8% turf	2% - 6% paved (B) 6% - 8% turf	2% - 6% paved (B) 6% - 8% turf
Lateral Offset to Obstruction	1.5 ft. from the edge of the travelled way (the greater of the shoulder width or 4 ft. is desirable).	1.5 ft. from the edge of the travelled way (the greater of the shoulder width or 4 ft. is desirable).	1.5 ft. from the edge of the travelled way (the greater of the shoulder width or 4 ft. is desirable).
Vertical Clearance (3)	Structure: 14 ft. Sign trusses and pedestrian/ bicycle overpass: Structure clearance + 1 ft.	Structure: 14 ft. Sign trusses and pedestrian/ bicycle overpass: Structure clearance + 1 ft.	Structure: 14 ft. Sign trusses and pedestrian/ bicycle overpass: Structure clearance + 1 ft.
Bridge Width	Full width of the approach roadway plus surfaced shoulder width. Bridge L > 100 ft.: Traveled way + 3 ft. on each side.	Traveled way + 4 ft. on each side. Bridge L > 100 ft.: Traveled way + 3 ft. on each side.	Traveled way + 2 ft. on each side.
Structural Capacity	HL93	HL93	HL93

For additional information, see A Policy on Geometric Design of Highways and Streets, 2018

* The minimum value is based on the design speed; see Exhibits H.1, H.2, and H.3

(3) Over the entire roadway width with an additional allowance for future resurfacing.

(4) Grade may be up to 1% steeper for tangent length less than 500 ft.

(5) For an AADT less than 2,000 vehicles/day, the grade may be up to 2% steeper for tangent length less than 500 ft.

(6) Consider 12 ft. lanes for design speed ≥ 55 mph where substantial truck volumes are present or agricultural equipment frequently uses the road.

(7) 9 ft. may be used for design speeds ≤ 40 mph with ADTs < 250 veh/day.

(B) The surfaced shoulder cross slope should not be less than the cross slope of the adjacent lane.

NEW AND RECONSTRUCTED RURAL STATE HIGHWAYS AASHTO CLASSIFICATION: RECREATIONAL ROADS STATE FUNCTIONAL CLASSIFICATION: MAJOR ARTERIAL – SCENIC RECREATION NATIONAL FUNCTIONAL CLASSIFICATION: COLLECTOR/ LOCAL		
	ADT ≥ 400	**ADT < 400**
Design Speed	40 mph	30 mph
Lane Width	11 ft.	10 ft.
Shoulder Width	2 ft.	2 ft.
Horizontal Alignment		
Superelevation	e_{max} = 6%	e_{max} = 6%
***Minimum Radius (Based on Max. Superelevation)**	485 ft. (paved roadway)	231 ft. (paved roadway)
Vertical Alignment		
***Crest K Value**	44	19
***Sag K Value**	64	37
***Maximum Grade**	7% Level 9% Rolling	7% Level 10% Rolling
***Stopping Sight Distance**	305 ft.	200 ft.
Cross Slope		
Lane	1.5% - 2% paved 2% - 6% aggregate (3% desirable)	1.5% - 2% paved 2% - 6% aggregate (3% desirable)
Shoulder	2% - 6% paved (B) 4% - 6% aggregate 6% - 8% turf	2% - 6% paved (B) 4% - 6% aggregate 6% - 8% turf
Lateral Offset to Obstruction	The shoulder width.	The shoulder width.
Vertical Clearance (3)	Structure: 14 ft. Sign trusses and pedestrian/ bicycle overpass: Structure clearance + 1 ft.	Structure: 14 ft. Sign trusses and pedestrian/ bicycle overpass: Structure clearance + 1 ft.
Bridge Width	Traveled way + 3 ft. on each side.	Traveled way + 2 ft. on each side.
Structural Capacity	HL93	HL93

For additional information, see A Policy on Geometric Design of Highways and Streets, 2018

* The minimum value is based on the design speed; see Exhibits H.1, H.2, and H.3

(3) Over the entire roadway width with an additional allowance for future resurfacing.

(B) The surfaced shoulder cross slope should not be less than the cross slope of the adjacent lane.

NEW AND RECONSTRUCTED MUNICIPAL STATE HIGHWAYS AASHTO CLASSIFICATION: INTERSTATE STATE FUNCTIONAL CLASSIFICATION: INTERSTATE NATIONAL FUNCTIONAL CLASSIFICATION: PRINCIPAL ARTERIAL – INTERSTATE	
Design Speed	50 mph
Lane Width	12 ft.
Shoulder Width	Right = 10 ft. 4-Lane (2 lanes in each direction): Left = 4 ft. Truck Traffic > 250 DDHV: Right = 12 ft. should be considered ≥ 6-Lane (≥ 3 lanes in each direction): Left = 10 ft. Truck Traffic > 250 DDHV: Right & Left = 12 ft. should be considered (Note: All shoulder widths are paved).
Horizontal Alignment	
Superelevation	e_{max} = 8%
***Minimum Radius (Based on Maximum Superelevation)**	758 ft.
Vertical Alignment	
***Crest K Value**	84
***Sag K Value**	96
***Maximum Grade**	4% Level 5% Rolling (Grades may be up to 1% steeper)
***Stopping Sight Distance**	425 ft.
Cross Slope	
Lane	1.5% (A)
Shoulder	2% to 6% paved (B)
Lateral Offset to Obstruction	The nominal shoulder width.
Vertical Clearance (1)	Structure: 16 ft. for at least one route and 14 ft. for other routes. Sign trusses and pedestrian/ bicycle overpass: Structure clearance + 1 ft.
Bridge Width	Full width of the approach roadway including paved shoulders. (D)
Structural Capacity	HL93

For additional information, see A Policy on Design Standards Interstate System, May 2016 and A Policy on Geometric Design of Highways and Streets, 2018

(1) Over the entire roadway width, including auxiliary lanes, shoulders, ramps, and collector-distributor roads.

* The minimum value is based on the design speed; see Exhibits H.1, H.2, and H.3

(A) On roadways where there are more than two lanes inclined in the same direction, the cross slope may be increased by 0.5% to 1% for each additional lane, up to a maximum of 3%.

(B) The surfaced shoulder cross slope should not be less than the cross slope of the adjacent lane.

(D) Long bridges (longer than 200 ft.) may have a lesser width and should be analyzed individually. On long bridges a reduced shoulder width of 4 ft. may be used on both the left and right sides.

NEW AND RECONSTRUCTED MUNICIPAL STATE HIGHWAYS AASHTO CLASSIFICATION: SUBURBAN FREEWAY STATE FUNCTIONAL CLASSIFICATION: EXPRESSWAY (ACCESS ONLY AT INTERCHANGES) NATIONAL FUNCTIONAL CLASSIFICATION: PRINCIPAL ARTERIAL – OTHER FREEWAYS AND EXPRESSWAYS	
Design Speed	50 mph
Lane Width	12 ft.
Shoulder Width	Right = 10 ft. 4-Lane (2 lanes in each direction): Left = 4 ft. Truck Traffic > 250 DDHV: Right = 12 ft. should be considered ≥ 6-Lane (≥ 3 lanes in each direction): Left = 10 ft. Truck Traffic > 250 DDHV: Right & Left = 12 ft. should be considered (Note: All shoulder widths are paved).
Horizontal Alignment	
Superelevation	e_{max} = 8%
***Minimum Radius (Based on Maximum Superelevation)**	758 ft.
Vertical Alignment	
***Crest K Value**	84
***Sag K Value**	96
***Maximum Grade**	4% Level 5% Rolling (Grades 1% steeper may be provided)
***Stopping Sight Distance**	425 ft.
Cross Slope	
Lane	1.5% to 2% (A)
Shoulder	2% to 6% paved (C)
Lateral Offset to Obstruction	The nominal shoulder width.
Vertical Clearance (2)	Structure: 16 ft. for at least one route and 14 ft. for other routes. Sign trusses and pedestrian/ bicycle overpass: Structure clearance + 1 ft.
Bridge Width	Full width of the approach roadway. (E)
Structural Capacity	HL93

For additional information, see A Policy on Geometric Design of Highways and Streets, 2018

* The minimum value is based on the design speed; see Exhibits H.1, H.2, and H.3

(2) Over the entire roadway width, including auxiliary lanes, shoulders, and collector-distributor roads.

(A) On roadways where there are more than two lanes inclined in the same direction, the cross slope may be increased by 0.5% to 1% for each additional lane, up to a maximum of 3%.

(C) The surfaced shoulder cross slope should not be less than the cross slope of the adjacent roadway lane and can be at least 1% greater.

(E) Bridges longer than 200 ft. may have a lesser width and should be analyzed individually.

NEW AND RECONSTRUCTED MUNICIPAL STATE HIGHWAYS AASHTO CLASSIFICATION: URBAN FREEWAY STATE FUNCTIONAL CLASSIFICATION: EXPRESSWAY (ACCESS ONLY AT INTERCHANGES) NATIONAL FUNCTIONAL CLASSIFICATION: PRINCIPAL ARTERIAL – OTHER FREEWAYS AND EXPRESSWAYS	
Design Speed	50 mph
Lane Width	12 ft.
Shoulder Width	Right = 10 ft. 4-Lane (2 lanes in each direction): Left = 4 ft. Truck Traffic > 250 DDHV: Right & Left = 12 ft. should be considered ≥ 6-Lane (≥ 3 lanes in each direction): Left = 10 ft. Truck Traffic > 250 DDHV: Right & Left = 12 ft. should be considered (Note: All shoulder widths are paved).
Horizontal Alignment	
Superelevation	e_{max} = 8%
***Minimum Radius (Based on Maximum Superelevation)**	758 ft.
Vertical Alignment	
***Crest K Value**	84
***Sag K Value**	96
***Maximum Grade**	4% Level 5% Rolling (Grades 1% steeper may be provided)
***Stopping Sight Distance**	425 ft.
Cross Slope	
Lane	1.5% to 2% (A)
Shoulder	2% to 6% paved (C)
Lateral Offset to Obstruction	The nominal shoulder width.
Vertical Clearance (2)	Structure: 16 ft. for at least one route and 14 ft. for other routes. Sign trusses and pedestrian/ bicycle overpass: Structure clearance + 1 ft.
Bridge Width	Full width of the approach roadway. (D)
Structural Capacity	HL93

For additional information, see A Policy on Geometric Design of Highways and Streets, 2018

* The minimum value is based on the design speed; see Exhibits H.1, H.2, and H.3

(2) Over the entire roadway width, including auxiliary lanes, shoulders, and collector-distributor roads.

(A) On roadways where there are more than two lanes inclined in the same direction, the cross slope may be increased by 0.5% to 1% for each additional lane, up to a maximum of 3%.

(C) The surfaced shoulder cross slope should not be less than the cross slope of the adjacent roadway lane and can be at least 1% greater.

(D) Bridges longer than 200 ft. may have a lesser width and should be analyzed individually.

NEW AND RECONSTRUCTED MUNICIPAL STATE HIGHWAYS AASHTO CLASSIFICATION: URBAN CORE FREEWAY STATE FUNCTIONAL CLASSIFICATION: EXPRESSWAY (ACCESS ONLY AT INTERCHANGES) NATIONAL FUNCTIONAL CLASSIFICATION: PRINCIPAL ARTERIAL – OTHER FREEWAYS AND EXPRESSWAYS	
Design Speed	50 mph
Lane Width	12 ft.
Shoulder Width	Right = 10 ft. 4-Lane (2 lanes in each direction): Left = 4 ft. Truck Traffic > 250 DDHV: Right & Left = 12 ft. should be considered ≥ 6-Lane (≥ 3 lanes in each direction): Left = 10 ft. Truck Traffic > 250 DDHV: Right & Left = 12 ft. should be considered (Note: All shoulder widths are paved).
Horizontal Alignment	
Superelevation	e_{max} = 8%
***Minimum Radius (Based on Maximum Superelevation)**	758 ft.
Vertical Alignment	
***Crest K Value**	84
***Sag K Value**	96
***Maximum Grade**	4% Level 5% Rolling (Grades 1% steeper may be provided)
***Stopping Sight Distance**	425 ft.
Cross Slope	
Lane	1.5% to 2% (A)
Shoulder	2% to 6% paved (C)
Lateral Offset to Obstruction	The nominal shoulder width.
Vertical Clearance (2)	Structure: 16 ft. for at least one route and 14 ft. for other routes. Sign trusses and pedestrian/ bicycle overpass: Structure clearance + 1 ft.
Bridge Width	Full width of the approach roadway. (D)
Structural Capacity	HL93

For additional information, see A Policy on Geometric Design of Highways and Streets, 2018

* The minimum value is based on the design speed; see Exhibits H.1, H.2, and H.3

(2) Over the entire roadway width, including auxiliary lanes, shoulders, and collector-distributor roads.

(A) On roadways where there are more than two lanes inclined in the same direction, the cross slope may be increased by 0.5% to 1% for each additional lane, up to a maximum of 3%.

(C) The surfaced shoulder cross slope should not be less than the cross slope of the adjacent roadway lane and can be at least 1% greater.

(D) Bridges longer than 200 ft. may have a lesser width and should be analyzed individually.

NEW AND RECONSTRUCTED MUNICIPAL STATE HIGHWAYS	
AASHTO CLASSIFICATION: SUBURBAN ARTERIAL STATE FUNCTIONAL CLASSIFICATION: EXPRESSWAY NATIONAL FUNCTIONAL CLASSIFICATION: PRINCIPAL ARTERIAL – OTHER FREEWAYS AND EXPRESSWAYS	
Design Speed	30 mph
Lane Width	11 ft.
Shoulder Width	Curbed: Not Applicable 8 ft. Right usable (paved is preferred, 4 ft. min. paved if used for bicycles) 4 ft. Left (paved) ≥ 6 Lane (≥ 3 lanes in each direction): Left = 8 ft.
Horizontal Alignment	
Superelevation	e_{max} = 8%
***Minimum Radius (Based on Maximum Superelevation)**	214 ft.
Vertical Alignment	
***Crest K Value**	19
***Sag K Value**	37
***Maximum Grade (4)**	7% Level 9% Rolling
***Stopping Sight Distance**	200 ft.
Cross Slope	
Lane	1.5% to 3% (A)
Shoulder	2% to 6% paved (B) 6% to 8% turf
Lateral Offset to Obstruction	Curbed: 1.5 ft. from face of the curb (3 ft. at intersections). Non-curbed: The greater of the shoulder width or 4 ft. from the edge of the travelled way.
Vertical Clearance (3)	Structure: 16 ft. (14 ft. may be retained if allowed by local statute). Sign trusses and pedestrian/ bicycle overpass: Structure clearance + 1 ft.
Bridge Width	Curbed: The curb to curb width of the street, including sidewalks, bike paths and bike lanes. Non-curbed: The full width of the approach roadway including shoulders and pedestrian/ bicycle facilities. Bridge L > 200 ft.: Shoulder width should be at least 4 ft.
Structural Capacity	HL93

For additional information, see A Policy on Geometric Design of Highways and Streets, 2018

* The minimum value is based on the design speed; see Exhibits H.1, H.2, and H.3

(3) Over the entire roadway width, including the usable width of shoulders.

(4) Grade may be up to 1% steeper for tangent lengths less than 500 ft.

(A) On roadways where there are more than two lanes inclined in the same direction, the cross slope may be increased by 0.5% to 1% for each additional lane, up to a maximum of 3%.

(B) The surfaced shoulder cross slope should not be less than the cross slope of the adjacent lane.

NEW AND RECONSTRUCTED MUNICIPAL STATE HIGHWAYS	
AASHTO CLASSIFICATION: URBAN ARTERIAL STATE FUNCTIONAL CLASSIFICATION: EXPRESSWAY NATIONAL FUNCTIONAL CLASSIFICATION: PRINCIPAL ARTERIAL – OTHER FREEWAYS AND EXPRESSWAYS	
Design Speed	25 mph
Lane Width	11 ft.
Shoulder Width	Curbed: Not Applicable 8 ft. Right usable (paved is preferred, 4 ft. min. paved if used for bicycles) 4 ft. Left (paved) ≥ 6 Lane (≥ 3 lanes in each direction): Left = 8 ft.
Horizontal Alignment	
Superelevation	e_{max} = 8%
***Minimum Radius (Based on Maximum Superelevation)**	134 ft.
Vertical Alignment	
***Crest K Value**	12
***Sag K Value**	26
***Maximum Grade (4)**	7% Level 10% Rolling
***Stopping Sight Distance**	155 ft.
Cross Slope	
Lane	1.5% to 3% (A)
Shoulder	2% to 6% paved (B) 6% to 8% turf
Lateral Offset to Obstruction	Curbed: 1.5 ft. from face of the curb (3 ft. at intersections). Non-curbed: The greater of the shoulder width or 4 ft. from the edge of the travelled way.
Vertical Clearance (3)	Structure: 16 ft. for one route & 14 ft. for other routes. Sign trusses and pedestrian/ bicycle overpass: Structure clearance + 1 ft.
Bridge Width	Curbed: The curb to curb width of street, including sidewalks, bike paths and bike lanes. Non-curbed: The full width of the approach roadway including shoulders and pedestrian/ bicycle facilities. Bridge L > 200 ft.: Shoulder width may be reduced to 4 ft.
Structural Capacity	HL93

For additional information, see A Policy on Geometric Design of Highways and Streets, 2018

* The minimum value is based on the design speed; see Exhibits H.1, H.2, and H.3

(3) Over the entire roadway width, including the usable width of shoulders.

(4) Grade may be up to 1% steeper for tangent lengths less than 500 ft.

(A) On roadways where there are more than two lanes inclined in the same direction, the cross slope may be increased by 0.5% to 1% for each additional lane, up to a maximum of 3%.

(B) The surfaced shoulder cross slope should not be less than the cross slope of the adjacent lane.

NEW AND RECONSTRUCTED MUNICIPAL STATE HIGHWAYS	
AASHTO CLASSIFICATION: URBAN CORE ARTERIAL STATE FUNCTIONAL CLASSIFICATION: EXPRESSWAY NATIONAL FUNCTIONAL CLASSIFICATION: PRINCIPAL ARTERIAL – OTHER FREEWAYS AND EXPRESSWAYS	
Design Speed	30 mph
Lane Width	10 ft.
Shoulder Width	Curbed: Not Applicable 8 ft. Right usable (paved is preferred, 4 ft. min. paved if used for bicycles) 4 ft. Left (paved) ≥ 6 Lane (≥ 3 lanes in each direction): Left = 8 ft.
Horizontal Alignment	
Superelevation	e_{max} = 8%
***Minimum Radius (Based on Maximum Superelevation)**	214 ft.
Vertical Alignment	
***Crest K Value**	19
***Sag K Value**	37
***Maximum Grade (4)**	7% Level 9% Rolling
***Stopping Sight Distance**	200 ft.
Cross Slope	
Lane	1.5% to 3% (A)
Shoulder	2% to 6% paved (B) 6% to 8% turf
Lateral Offset to Obstruction	Curbed: 1.5 ft. from face of the curb (3 ft. at intersections). Non-curbed: The greater of the shoulder width or 4 ft. from the edge of the travelled way.
Vertical Clearance (3)	Structure: 16 ft. for one route & 14 ft. for other routes. Sign trusses and pedestrian/ bicycle overpass: Structure clearance + 1 ft.
Bridge Width	Curbed: The curb to curb width of street, including sidewalks, bike paths and bike lanes. Non-curbed: The full width of the approach roadway including shoulders and pedestrian/ bicycle facilities. Bridge L > 200 ft.: Shoulder width may be reduced to 4 ft.
Structural Capacity	HL93

For additional information, see A Policy on Geometric Design of Highways and Streets, 2018

* The minimum value is based on the design speed; see Exhibits H.1, H.2, and H.3

(3) Over the entire roadway width, including the usable width of shoulders.

(4) Grade may be up to 1% steeper for tangent lengths less than 500 ft.

(A) On roadways where there are more than two lanes inclined in the same direction, the cross slope may be increased by 0.5% to 1% for each additional lane, up to a maximum of 3%.

(B) The surfaced shoulder cross slope should not be less than the cross slope of the adjacent lane.

NEW AND RECONSTRUCTED MUNICIPAL STATE HIGHWAYS AASHTO CLASSIFICATION: SUBURBAN ARTERIAL STATE FUNCTIONAL CLASSIFICATION: MAJOR ARTERIAL NATIONAL FUNCTIONAL CLASSIFICATION: ARTERIAL	
Design Speed	30 mph
Lane Width	11 ft.
Shoulder Width	Curbed: Not Applicable ADT > 2,000 VPD: 8 ft. usable (paved is preferred) ADT 400 – 2,000 VPD: 6 ft. usable (paved is preferred) ADT < 400 VPD: 4 ft. usable (paved is preferred) (All shoulders - 4 ft. minimum should be paved if used for bicycles, a minimum of 2 ft. may be paved if low volumes and no bicycle use)
Horizontal Alignment	
Superelevation	e_{max} = 8%
***Minimum Radius (Based on Maximum Superelevation)**	214 ft.
Vertical Alignment	
***Crest K Value**	19
***Sag K Value**	37
***Maximum Grade (4)**	7% Level 9% Rolling
***Stopping Sight Distance**	200 ft.
Cross Slope	
Lane	1.5% to 3% (A)
Shoulder	2% to 6% paved (B) 6% to 8% turf
Lateral Offset to Obstruction	Curbed: 1.5 ft. from face of the curb (3 ft. at intersections). Non-curbed: The greater of the shoulder width or 4 ft. from the edge of the travelled way.
Vertical Clearance (3)	Structure: 16 ft. (14 ft. may be retained if allowed by local statute). Sign trusses and pedestrian/ bicycle overpass: Structure clearance + 1 ft.
Bridge Width	Curbed: The curb to curb width of street, including sidewalks, bike paths and bike lanes. Non-curbed: The full width of the approach roadway including shoulders and pedestrian/ bicycle facilities. Bridge L > 200 ft.: Shoulder width should be at least 4 ft.
Structural Capacity	HL93

For additional information, see A Policy on Geometric Design of Highways and Streets, 2018

* The minimum value is based on the design speed; see Exhibits H.1, H.2, and H.3

(3) Over the entire roadway width, including the usable width of shoulders.

(4) Grade may be up to 1% steeper for tangent lengths less than 500 ft.

(A) On roadways where there are more than two lanes inclined in the same direction, the cross slope may be increased by 0.5% to 1% for each additional lane, up to a maximum of 3%.

(B) The surfaced shoulder cross slope should not be less than the cross slope of the adjacent lane.

NEW AND RECONSTRUCTED MUNICIPAL STATE HIGHWAYS AASHTO CLASSIFICATION: URBAN ARTERIAL STATE FUNCTIONAL CLASSIFICATION: MAJOR ARTERIAL NATIONAL FUNCTIONAL CLASSIFICATION: ARTERIAL	
Design Speed	25 mph
Lane Width	11 ft.
Shoulder Width	Curbed: Not Applicable ADT > 2,000 VPD: 8 ft. usable (paved is preferred) ADT 400 – 2,000 VPD: 6 ft. usable (paved is preferred) ADT < 400 VPD: 4 ft. usable (paved is preferred) (All shoulders - 4 ft. minimum should be paved if used for bicycles, a minimum of 2 ft. may be paved if low volumes and no bicycle use)
Horizontal Alignment	
Superelevation	e_{max} = 8%
***Minimum Radius (Based on Maximum Superelevation)**	134 ft.
Vertical Alignment	
***Crest K Value**	12
***Sag K Value**	26
***Maximum Grade (4)**	7% Level 10% Rolling
***Stopping Sight Distance**	155 ft.
Cross Slope	
Lane	1.5% to 3% (A)
Shoulder	2% to 6% paved (B) 6% to 8% turf
Lateral Offset to Obstruction	Curbed: 1.5 ft. from face of the curb (3 ft. at intersections). Non-curbed: The greater of the shoulder width or 4 ft. from the edge of the travelled way.
Vertical Clearance (3)	Structure: 16 ft. for one route & 14 ft. for other routes. Sign trusses and pedestrian/ bicycle overpass: Structure clearance + 1 ft.
Bridge Width	Curbed: The curb to curb width of street, including sidewalks, bike paths and bike lanes. Non-curbed: The full width of the approach roadway including shoulders and pedestrian/ bicycle facilities. Bridge L > 200 ft.: Shoulder width may be reduced to 4 ft.
Structural Capacity	HL93

For additional information, see A Policy on Geometric Design of Highways and Streets, 2018

* The minimum value is based on the design speed; see Exhibits H.1, H.2, and H.3

(3) Over the entire roadway width, including the usable width of shoulders.

(4) Grade may be up to 1% steeper for tangent lengths less than 500 ft.

(A) On roadways where there are more than two lanes inclined in the same direction, the cross slope may be increased by 0.5% to 1% for each additional lane, up to a maximum of 3%.

(B) The surfaced shoulder cross slope should not be less than the cross slope of the adjacent lane.

NEW AND RECONSTRUCTED MUNICIPAL STATE HIGHWAYS AASHTO CLASSIFICATION: URBAN CORE ARTERIAL STATE FUNCTIONAL CLASSIFICATION: MAJOR ARTERIAL NATIONAL FUNCTIONAL CLASSIFICATION: ARTERIAL	
Design Speed	30 mph
Lane Width	10 ft.
Shoulder Width	Curbed: Not Applicable ADT > 2,000 VPD: 8 ft. usable (paved is preferred) ADT 400 – 2,000 VPD: 6 ft. usable (paved is preferred) ADT < 400 VPD: 4 ft. usable (paved is preferred) (All shoulders - 4 ft. minimum should be paved if used for bicycles, a minimum of 2 ft. may be paved if low volumes and no bicycle use)
Horizontal Alignment	
Superelevation	e_{max} = 8%
***Minimum Radius (Based on Maximum Superelevation)**	214 ft.
Vertical Alignment	
***Crest K Value**	19
***Sag K Value**	37
***Maximum Grade (4)**	7% Level 9% Rolling
***Stopping Sight Distance**	200 ft.
Cross Slope	
Lane	1.5% to 3% (A)
Shoulder	2% to 6% paved (B) 6% to 8% turf
Lateral Offset to Obstruction	Curbed: 1.5 ft. from face of the curb (3 ft. at intersections). Non-curbed: The greater of the shoulder width or 4 ft. from the edge of the travelled way.
Vertical Clearance (3)	Structure: 16 ft. for one route & 14 ft. for other routes. Sign trusses and pedestrian/ bicycle overpass: Structure clearance + 1 ft.
Bridge Width	Curbed: The curb to curb width of street, including sidewalks, bike paths and bike lanes. Non-curbed: The full width of the approach roadway including shoulders and pedestrian/ bicycle facilities. Bridge L > 200 ft.: Shoulder width may be reduced to 4 ft.
Structural Capacity	HL93

For additional information, see A Policy on Geometric Design of Highways and Streets, 2018

* The minimum value is based on the design speed; see Exhibits H.1, H.2, and H.3

(3) Over the entire roadway width, including the usable width of shoulders.

(4) Grade may be up to 1% steeper for tangent lengths less than 500 ft.

(A) On roadways where there are more than two lanes inclined in the same direction, the cross slope may be increased by 0.5% to 1% for each additional lane, up to a maximum of 3%.

(B) The surfaced shoulder cross slope should not be less than the cross slope of the adjacent lane.

NEW AND RECONSTRUCTED MUNICIPAL STATE HIGHWAYS	
AASHTO CLASSIFICATION: SUBURBAN COLLECTOR STATE FUNCTIONAL CLASSIFICATION: MAJOR ARTERIAL NATIONAL FUNCTIONAL CLASSIFICATION: COLLECTOR	
Design Speed	35 mph
Lane Width	10 ft.
Shoulder Width	Curbed: Not Applicable ADT > 2,000 VPD: 6 ft. ADT 400 – 2,000 VPD: 4 ft. ADT < 400 VPD: 2 ft.
Horizontal Alignment	
Superelevation	e_{max} = 8%
***Minimum Radius (Based on Maximum Superelevation)**	314 ft.
Vertical Alignment	
***Crest K Value**	29
***Sag K Value**	49
***Maximum Grade (5)**	7% Level 9% Rolling
***Stopping Sight Distance**	250 ft.
Cross Slope	
Lane	1.5% to 3% (A)
Shoulder	2% to 6% paved (B) 6% to 8% turf
Lateral Offset to Obstruction	Curbed: 1.5 ft. from face of the curb (3 ft. at intersections). Non-curbed: The greater of the shoulder width or 4 ft. from the edge of the travelled way.
Vertical Clearance (3)	Structure: 14 ft. Sign trusses and pedestrian/ bicycle overpass: Structure clearance + 1 ft.
Bridge Width	Curbed: The curb to curb width of the approach roadway. Non-curbed: The full width of the approach roadway, sidewalks on the approaches should be extended across the structure.
Structural Capacity	HL93

For additional information, see A Policy on Geometric Design of Highways and Streets, 2018

* The minimum value is based on the design speed; see Exhibits H.1, H.2, and H.3

(3) Over the entire roadway width with additional allowance for resurfacing.

(5) For an AADT less than 2,000 vehicles/day, the grade may be up to 2% steeper for tangent length less than 500 ft.

(A) On roadways where there are more than two lanes inclined in the same direction, the cross slope may be increased by 0.5% to 1% for each additional lane, up to a maximum of 3%.

(B) The surfaced shoulder cross slope should not be less than the cross slope of the adjacent lane.

NEW AND RECONSTRUCTED MUNICIPAL STATE HIGHWAYS AASHTO CLASSIFICATION: URBAN COLLECTOR STATE FUNCTIONAL CLASSIFICATION: MAJOR ARTERIAL NATIONAL FUNCTIONAL CLASSIFICATION: COLLECTOR	
Design Speed	30 mph
Lane Width	10 ft.
Shoulder Width	Curbed: Not Applicable ADT > 2,000 VPD: 6 ft. ADT 400 – 2,000 VPD: 4 ft. ADT < 400 VPD: 2 ft.
Horizontal Alignment	
Superelevation	e_{max} = 6%
***Minimum Radius (Based on Maximum Superelevation)**	231 ft.
Vertical Alignment	
***Crest K Value**	19
***Sag K Value**	37
***Maximum Grade (4)**	9% Level 11% Rolling
***Stopping Sight Distance**	200 ft.
Cross Slope	
Lane	1.5% to 3% (A)
Shoulder	2% to 6% paved (B) 6% to 8% turf
Lateral Offset to Obstruction	Curbed: 1.5 ft. from face of the curb (3 ft. at intersections). Non-curbed: The greater of the shoulder width or 4 ft. from the edge of the travelled way.
Vertical Clearance (3)	Structure: 14 ft. Sign trusses and pedestrian/ bicycle overpass: Structure clearance + 1 ft.
Bridge Width	Curbed: The curb to curb width of the approach roadway. Non-curbed: The full width of the approach roadway, sidewalks on the approaches should be extended across the structure.
Structural Capacity	HL93

For additional information, see A Policy on Geometric Design of Highways and Streets, 2018

* The minimum value is based on the design speed; see Exhibits H.1, H.2, and H.3

(3) Over the entire roadway width with additional allowance for resurfacing.

(4) Grade may be up to 1% steeper for tangent lengths less than 500 ft.

(A) On roadways where there are more than two lanes inclined in the same direction, the cross slope may be increased by 0.5% to 1% for each additional lane, up to a maximum of 3%.

(B) The surfaced shoulder cross slope should not be less than the cross slope of the adjacent lane.

NEW AND RECONSTRUCTED MUNICIPAL STATE HIGHWAYS AASHTO CLASSIFICATION: URBAN CORE COLLECTOR STATE FUNCTIONAL CLASSIFICATION: MAJOR ARTERIAL NATIONAL FUNCTIONAL CLASSIFICATION: COLLECTOR	
Design Speed	25 mph
Lane Width	10 ft.
Shoulder Width	Curbed: Not Applicable ADT > 2,000 VPD: 6 ft. ADT 400 – 2,000 VPD: 4 ft. ADT < 400 VPD: 2 ft.
Horizontal Alignment	
Superelevation	e_{max} = 6%
***Minimum Radius (Based on Maximum Superelevation)**	144 ft.
Vertical Alignment	
***Crest K Value**	12
***Sag K Value**	26
***Maximum Grade (4)**	9% Level 12% Rolling
***Stopping Sight Distance**	155 ft.
Cross Slope	
Lane	1.5% to 3% (A)
Shoulder	2% to 6% paved (B) 6% to 8% turf
Lateral Offset to Obstruction	Curbed: 1.5 ft. from face of the curb (3 ft. at intersections). Non-curbed: The greater of the shoulder width or 4 ft. from the edge of the travelled way.
Vertical Clearance (3)	Structure: 14 ft. Sign trusses and pedestrian/ bicycle overpass: Structure clearance + 1 ft.
Bridge Width	Curbed: The curb to curb width of the approach roadway. Non-curbed: The full width of the approach roadway, sidewalks on the approaches should be extended across the structure.
Structural Capacity	HL93

For additional information, see A Policy on Geometric Design of Highways and Streets, 2018

* The minimum value is based on the design speed; see Exhibits H.1, H.2, and H.3

(3) Over the entire roadway width with additional allowance for resurfacing.

(4) Grade may be up to 1% steeper for tangent lengths less than 500 ft.

(A) On roadways where there are more than two lanes inclined in the same direction, the cross slope may be increased by 0.5% to 1% for each additional lane, up to a maximum of 3%.

(B) The surfaced shoulder cross slope should not be less than the cross slope of the adjacent lane.

Design Speed (mph)	Design ADT	Foreslopes			Backslopes		
		1V:6H or flatter	1V:5H to 1V:4H	1V:3H	1V:3H	1V:5H to 1V:4H	1V:6H or flatter
≤ 40	UNDER 750 [C]	7 – 10	7 – 10	[B]	7 – 10	7 – 10	7 – 10
	750 – 1500	10 – 12	12 – 14	[B]	12 – 14	12 – 14	12 - 14
	1500 – 6000	12 – 14	14 – 16	[B]	14 – 16	14 – 16	14 – 16
	OVER 6000	14 – 16	16 – 18	[B]	16 – 18	16 – 18	16 – 18
45 – 50	UNDER 750 [C]	10 – 12	12 – 14	[B]	8 – 10	8 – 10	10 – 12
	750 – 1500	14 – 16	16 – 20	[B]	10 – 12	12 – 14	14 – 16
	1500 – 6000	16 – 18	20 – 26	[B]	12 – 14	14 – 16	16 – 18
	OVER 6000	20 – 22	24 – 28	[B]	14 – 16	18 – 20	20 – 22
55	UNDER 750 [C]	12 – 14	14 – 18	[B]	8 – 10	10 – 12	10 – 12
	750 – 1500	16 – 18	20 – 24	[B]	10 – 12	14 – 16	16 – 18
	1500 – 6000	20 – 22	24 – 30	[B]	14 – 16	16 – 18	20 – 22
	OVER 6000	22 – 24	26 – 32 [A]	[B]	16 – 18	20 – 22	22 – 24
60	UNDER 750 [C]	16 – 18	20 – 24	[B]	10 – 12	12 -14	14 – 16
	750 – 1500	20 – 24	26 – 32 [A]	[B]	12 – 14	16 – 18	20 – 22
	1500 – 6000	26 – 30	32 – 40 [A]	[B]	14 – 18	18 – 22	24 – 26
	OVER 6000	30 – 32 [A]	36 – 44 [A]	[B]	20 – 22	24 – 26	26 – 28
65 – 70 [D]	UNDER 750 [C]	18 – 20	20 – 26	[B]	10 – 12	14 – 16	14 – 16
	750 – 1500	24 – 26	28 – 36 [A]	[B]	12 – 16	18 – 20	20 – 22
	1500 – 6000	28 – 32 [A]	34 – 42 [A]	[B]	16 – 20	22 – 24	26 – 28
	OVER 6000	30 – 34 [A]	38 – 46 [A]	[B]	22 - 24	26 - 30	28 - 30

Notes:

A) When a site – specific investigation indicates a high probability of continuing crashes or when such occurrences are indicated by crash history, the designer may provide clear-zone distances greater than the clear zone shown in Table 3-1. Clear zones may be limited to 30 ft. for practicality and to provide a consistent roadway template if previous experience with similar projects or designs indicates satisfactory performance.

B) Because recovery is less likely on the unshielded, traversable 1V:3H fill slopes, fixed objects should not be present in the vicinity of the toe of these slopes. Recovery of high-speed vehicles that encroach beyond the edge of the shoulder may be expected to occur beyond the toe of slope. Determination of the width of the recovery area at the toe of slope should consider right-of-way availability, environmental concerns, economic factors, safety needs, and crash histories. Also, the distance between the edge of the through traveled lane and the beginning of the 1V:3H slope should influence the recovery area provided at the toe of slope. While the application may be limited by several factors, the foreslope parameters that may enter into determining a maximum desirable recovery area are illustrated in Figure 3-2. A 10-ft. recovery area at the toe of slope should be provided for all traversable, non-recoverable fill slopes.

C) For roadways with low volumes it may not be practical to apply even the minimum values found in Table 3-1. Refer to Chapter 12 for additional considerations for low-volume roadways and Chapter 10 for additional guidance for urban applications.

D) When design speeds are greater than the values provided, the designer may provide clear-zone distances greater than those shown in Table 3-1.

Table 3-1. Suggested Clear-Zone Distances in Feet from Edge of Through Traveled Lane

Source: American Association of State Highway and Transportation Officials: Roadside Design Guide (2011)

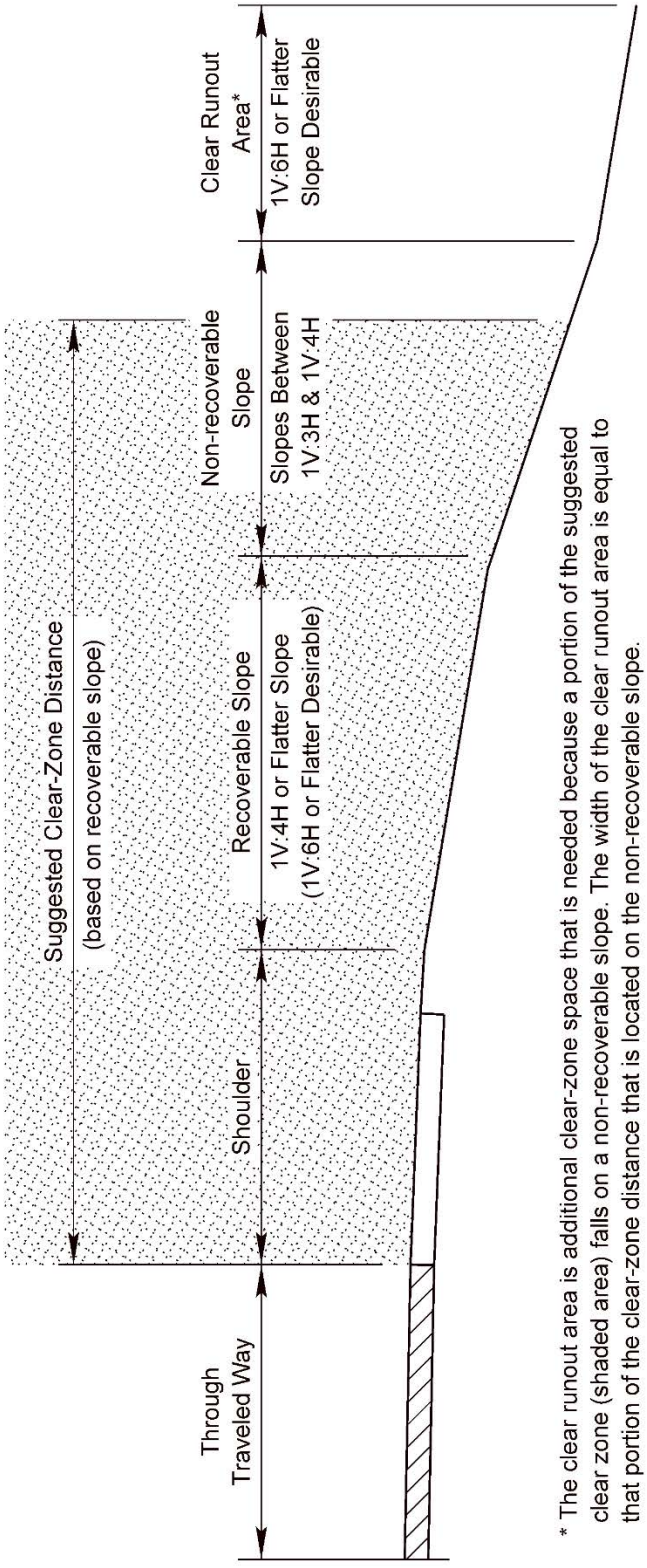

Figure 3-2. Clear Zone for Non-Recoverable Parallel Foreslope

Source: Adapted from American Association of State Highway and Transportation Officials: Roadside Design Guide (2011)

Figure 3-2. Clear Zone for Non-Recoverable Parallel Slope

DESIGN CRITERIA DEPENDENT ON SPEED – NEW AND RECONSTRUCTED PROJECTS

CRITERIA	DESIGN SPEED (mph)												
	15	20	25	30	35	40	45	50	55	60	65	70	75	80
Minimum Radius														
Max. Super. 8%	38 ft.	76 ft.	134 ft.	214 ft.	314 ft.	444 ft.	587 ft.	758 ft.	960 ft.	1200 ft.	1480 ft.	1810 ft.	2210 ft.	2670 ft.
Max. Super. 6%	39 ft.	81 ft.	144 ft.	231 ft.	340 ft.	485 ft.	643 ft.	833 ft.	1060 ft.	1330 ft.	1660 ft.	2040 ft.	2500 ft.	3050 ft.
Max. Super. 4%	42 ft.	86 ft.	154 ft.	250 ft.	371 ft.	533 ft.	711 ft.	926 ft.	1190 ft.	1500 ft.	---	---	---	---
* **Crest K Value**	3	7	12	19	29	44	61	84	114	151	193	247	312	384
* **Sag K Value**	10	17	26	37	49	64	79	96	115	136	157	181	206	231
* **Stopping Sight Distance**	80 ft.	115 ft.	155 ft.	200 ft.	250 ft.	305 ft.	360 ft.	425 ft.	495 ft.	570 ft.	645 ft.	730 ft.	820 ft.	910 ft.

Source: American Association of State and Highway Transportation Officials, A Policy on Geometric Design of Highways and Streets (2018) Tables 3-7, 3-35, and 3-37.

* For **NDOT** desirable values see the Roadway Design Manual, Chapter Three: Roadway Alignment, **EXHIBITS 3.9 AND 3.14**. The use of less than the desirable value, down to and including the values given in this table, require **Roadway Design Unit Head** approval. The use of values less than those given in this table will require a Relaxation of the Nebraska Minimum Standards and, if required, a Design Exception from the **FHWA** (see Section 2, "Departure from Standards" of this document).

Exhibit H.1 Design Criterial Dependent on Speed - New and Reconstructed Projects

MAXIMUM ALLOWABLE GRADES – NEW & RECONSTRUCTED RURAL PROJECTS

AASHTO CLASSIFICATION/ STATE FUNCTIONAL CLASSIFICATION	TERRAIN	DESIGN SPEED (mph)														
		15	20	25	30	35	40	45	50	55	60	65	70	75	80
INTERSTATE/ INTERSTATE	Level	---	---	---	---	---	---	---	4%	4%	3%	3%	3%	3%	3%
	Rolling	---	---	---	---	---	---	---	5%	5%	4%	4%	4%	4%	4%
FREEWAY/ EXPRESSWAY (ACCESS ONLY AT INTERCHANGES)	Level	---	---	---	---	---	---	---	4%	4%	3%	3%	3%	3%	3%
	Rolling	---	---	---	---	---	---	---	5%	5%	4%	4%	4%	4%	4%
RURAL DIVIDED ARTERIAL/ EXPRESSWAY (A)	Level	---	5%	5%	5%	5%	5%	5%	4%	4%	3%	3%	3%	3%	3%
	Rolling	---	8%	8%	7%	7%	6%	6%	5%	5%	4%	4%	4%	4%	4%
RURAL TOWN DIVIDED ARTERIAL/ EXPRESSWAY (A)	Level	---	5%	5%	5%	5%	5%	5%	4%	4%	3%	3%	3%	3%	3%
	Rolling	---	8%	8%	7%	7%	6%	6%	5%	5%	4%	4%	4%	4%	4%
RURAL ARTERIAL/ MAJOR ARTERIAL (A)	Level	---	5%	5%	5%	5%	5%	5%	4%	4%	3%	3%	3%	3%	3%
	Rolling	---	8%	8%	7%	7%	6%	6%	5%	5%	4%	4%	4%	4%	4%
RURAL TOWN ARTERIAL/ MAJOR ARTERIAL (A)	Level	---	5%	5%	5%	5%	5%	5%	4%	4%	3%	3%	3%	3%	3%
	Rolling	---	8%	8%	7%	7%	6%	6%	5%	5%	4%	4%	4%	4%	4%
RURAL COLLECTOR/ MAJOR ARTERIAL – COLLECTOR (B)	Level	---	7%	7%	7%	7%	7%	7%	6%	6%	5%	---	---	---	---
	Rolling	---	10%	10%	9%	9%	8%	8%	7%	7%	6%	---	---	---	---
RURAL TOWN COLLECTOR/ MAJOR ARTERIAL - COLLECTOR (B)	Level	---	7%	7%	7%	7%	7%	7%	6%	6%	5%	---	---	---	---
	Rolling	---	10%	10%	9%	9%	8%	8%	7%	7%	6%	---	---	---	---
RECREATIONAL ROADS/ MAJOR ARTERIAL - SCENIC RECREATION	Level	8%	8%	7%	7%	7%	7%	---	---	---	---	---	---	---	---
	Rolling	12%	11%	10%	10%	9%	9%	---	---	---	---	---	---	---	---

Sources: American Association of State and Highway Transportation Officials publications, A Policy on Geometric Design of Highways and Streets (2018) Tables 5-7, 6-2, 7-2, and 8-1 and A Policy on Design Standards Interstate System (May 2016) Table 2

(A) Grades may be up to 1% steeper for tangent lengths less than 500 feet.
(B) Grades may be up to 2% steeper for tangent lengths less than 500 feet.

Exhibit H.2 Maximum Allowable Grades – New and Reconstructed Rural Projects

MAXIMUM ALLOWABLE GRADES – NEW & RECONSTRUCTED MUNICIPAL PROJECTS

ASHTO CLASSIFICATION/ STATE FUNCTIONAL CLASSIFICATION	TERRAIN	DESIGN SPEED (mph)												
		20	25	30	35	40	45	50	55	60	65	70	75	80
INTERSTATE/ INTERSTATE (D)	Level	---	---	---	---	---	---	4%	4%	3%	3%	3%	3%	3%
	Rolling	---	---	---	---	---	---	5%	5%	4%	4%	4%	4%	4%
SUBURBAN FREEWAY/ EXPRESSWAY (ACCESS ONLY AT INTERCHANGES) (D)	Level	---	---	---	---	---	---	4%	4%	3%	3%	3%	3%	3%
	Rolling	---	---	---	---	---	---	5%	5%	4%	4%	4%	4%	4%
URBAN FREEWAY/ EXPRESSWAY (ACCESS ONLY AT INTERCHANGES) (D)	Level	---	---	---	---	---	---	4%	4%	3%	3%	3%	3%	3%
	Rolling	---	---	---	---	---	---	5%	5%	4%	4%	4%	4%	4%
URBAN CORE FREEWAY/ EXPRESSWAY (ACCESS ONLY AT INTERCHANGES) (D)	Level	---	---	---	---	---	---	4%	4%	3%	3%	3%	3%	3%
	Rolling	---	---	---	---	---	---	5%	5%	4%	4%	4%	4%	4%
SUBURBAN ARTERIAL/ EXPRESSWAY (A)	Level	8%	7%	7%	7%	7%	6%	6%	5%	5%	---	---	---	---
	Rolling	10%	10%	9%	8%	8%	7%	7%	6%	6%	---	---	---	---
URBAN ARTERIAL/ EXPRESSWAY (A)	Level	8%	7%	7%	7%	7%	6%	6%	5%	5%	---	---	---	---
	Rolling	10%	10%	9%	8%	8%	7%	7%	6%	6%	---	---	---	---
URBAN CORE ARTERIAL/ EXPRESSWAY (A)	Level	8%	7%	7%	7%	7%	6%	6%	5%	5%	---	---	---	---
	Rolling	10%	10%	9%	8%	8%	7%	7%	6%	6%	---	---	---	---
SUBURBAN ARTERIAL/ MAJOR ARTERIAL (A)	Level	8%	7%	7%	7%	7%	6%	6%	5%	5%	---	---	---	---
	Rolling	10%	10%	9%	8%	8%	7%	7%	6%	6%	---	---	---	---
URBAN ARTERIAL/ MAJOR ARTERIAL (A)	Level	8%	7%	7%	7%	7%	6%	6%	5%	5%	---	---	---	---
	Rolling	10%	10%	9%	8%	8%	7%	7%	6%	6%	---	---	---	---
URBAN CORE ARTERIAL/ MAJOR ARTERIAL (A)	Level	8%	7%	7%	7%	7%	6%	6%	5%	5%	---	---	---	---
	Rolling	10%	10%	9%	8%	8%	7%	7%	6%	6%	---	---	---	---
SUBURBAN COLLECTOR/ MAJOR ARTERIAL (B)	Level	7%	7%	7%	7%	7%	7%	6%	6%	5%	---	---	---	---
	Rolling	10%	10%	9%	9%	8%	8%	7%	7%	6%	---	---	---	---
URBAN COLLECTOR/ MAJOR ARTERIAL (A)	Level	9%	9%	9%	9%	9%	8%	7%	7%	6%	---	---	---	---
	Rolling	12%	12%	11%	10%	10%	9%	8%	8%	7%	---	---	---	---
URBAN CORE COLLECTOR/ MAJOR ARTERIAL (A)	Level	9%	9%	9%	9%	9%	8%	7%	7%	6%	---	---	---	---
	Rolling	12%	12%	11%	10%	10%	9%	8%	8%	7%	---	---	---	---

Sources: American Association of State and Highway Transportation Officials publications, A Policy on Geometric Design of Highways and Streets (2018) Tables 6-2, 6-7, 7-4a, and 8-1 and A Policy on Design Standards Interstate System (May 2016) Table 2

(A) Grades may be up to 1% steeper for tangent lengths less than 500 feet.
(B) Grades may be up to 2% steeper for tangent lengths less than 500 feet.
(D) Grades 1% steeper than the value shown may be used in urban areas.

Exhibit H.3 Maximum Allowable Grades – New and Reconstructed Municipal Projects