

**Appendix A: Project Planning and Development**  
A-4 Replacement Bridge Alternative Design Criteria

## APPENDIX A4 – DESIGN CRITERIA

Table 1 I-287 Mainline Design Requirements

Critical Design Elements for I-287			
PIN:	8TZ1.00	NHS (Y/N):	Yes
Route No. & Name:	I-287	Functional Class:	Urban Principal Arterial Interstate
Project Type:	Reconstruction	Design Class:	Interstate
% Trucks:	12.4%	Terrain:	Rolling
ADT (2047):	218,551	Truck Access/Qualifying Highway:	Qualifying highway

	Design Element	Standard criteria (for information)	Standard Source	Existing Condition	Project Requirement
1	Design Speed (mph)	70	DRM Appendix D Urban	60	70 maximum
2	Minimum Lane Width (feet)	12	HDM §2.7.1.1B	11	12, with suitable transition to existing
3a	Minimum Shoulder Width (feet) Left and Right (on landings)	10 12 desirable	DRM §3.4.1 BM §2.3.1	0	12 on landings, with suitable transition to existing. Westchester-side ORT right shoulder shall be constructed for use as future 4 <sup>th</sup> ORT travel lane
3b	Minimum Shoulder Width (feet) Left (on Crossing)	10 12 desirable		0	20 over-widened left shoulder on westbound; 25 over-widened left shoulder eastbound
3c	Minimum Shoulder Width (feet) Right (on Crossing)	10 12 desirable		0	10
4	Minimum Roadway Width on Crossing (feet)	Match approach highway	DRM §Appendix D	3 lanes each way with one reversible lane: totaling 7 lanes	96 westbound; 87 eastbound; 108 on approach to Toll Plaza, to then enter Toll Plaza (see Part 6 DIR-009)

## Tappan Zee Hudson River Crossing Project

	Design Element	Standard criteria (for information)	Standard Source	Existing Condition	Project Requirement
5a	Maximum Grade – Crossing [Rolling]	3.0%	DRM §Appendix D	3.0% maximum	1.5%. For 1.5% to 2 % maximum (see Table 27.3.2-1A). Constant grade from landing to Main Span (see Note 1)
5b	Maximum Grade - Landing [Rolling]			3.0%	3.0% maximum
6	Horizontal Curvature (feet), Minimum Radius at superelevation 6%	2040	HDM §2.7.1.1F, Exhibit 2-2	-	2040 Spiral curves shall be utilized where appropriate (see Note 2)
7	Maximum Superelevation (e) Rate (%)	6%	HDM §2.7.1.1G	-	6%. Superelevation shall not be applied continuously between directional highways
8	Minimum Stopping Sight Distance (feet)	730	HDM §2.7.1.1H, Exhibit 2-2	472	730
9a	Minimum Horizontal Clearance (feet) Without Barrier/Rail	15	HDM §2.7.1.1I	N/A	15
9b	Minimum Horizontal Clearance (feet)with Barrier/Rail	Shoulder width (not less than 4)		1ft	Shoulder width (not less than 4)
10a	Minimum Vertical Clearance (feet) Mainline under State/local road	16.5	TSDM; §1.8.3	14.5	16.5
10b	Minimum Vertical Clearance (feet) Crossing over local roads	15.0	TSDM; §1.8.3	16	16.5
10c	Minimum Vertical Clearance (feet) Mainline over State/ local roads	15.0	TSDM; §1.8.3	TBD	15.0
10d	Minimum Vertical Clearance (feet) Overhead signs/pedestrian bridges	17.5	TSDM; §1.8.2	17	17.5
10e	Minimum Vertical Clearance (feet) Over railroad	23.0	TSDM; §1.9.1	estimate 80	23.0

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	Design Element	Standard criteria (for information)	Standard Source	Existing Condition	Project Requirement
11	Pavement Cross Slope	1.5% minimum 2% maximum	HDM §2.7.1.1K	2%	2%
12a	Maximum Rollover Between Lanes	4%	HDM §2.7.1.1L	-	4% minimum 8% maximum
12b	Maximum Rollover Edge of Traveled Way	8%			
13	Minimum Level of Service	C, D with supporting documentation	HDM §2.6.14, §2.7.1.1N, Heavily Developed Urban Area	Not determined	Estimated time of completion+30years C D with supporting documentation
14	Control of Access	Full	HDM §2.7.1.1O	Full	Full
15	Pedestrian Accommodation	Prohibited on Thruway (Note (3))	21 NYCRR Chap 3A §102.1; HDM Chapters 17 & 18, ADAAG	Prohibited on interstate	Prohibited on Thruway (Note (3))
16	Minimum Median Width (feet)	10 minimum 22 desirable 40 exclusive of shoulders at U-turns	DRM §Appendix D	Varies between 0 and existing shoulder widths with barrier on landings	Minimum median width shall be the width of the central barrier plus the adjacent shoulder widths.
17a	Minimum Structural Capacity of Crossing	AASHTO HL-93, NYSDOT Design Permit Vehicle and additional long-span criteria based on bridge type	HDM §2.7.1.1M; TSDM §2.1.1; BM §2.6.1	Original construction design standards	AASHTO HL-93, NYSDOT Design Permit Vehicle and additional long-span criteria based on bridge type
<b>Additional River Requirements</b>					
18	Minimum Clearance Over Shipping Channel (feet)	139 at existing piers	U. S. Coast Guard Requirement	139	U. S. Coast Guard Requirement: 139feet (applied 521 feet from the center of the channel)
19	Minimum Federal Navigation Channel Clearance (feet)	600	U. S. Coast Guard Requirement	1042	U. S. Coast Guard Requirement: 1042
20	Minimum Back Span Clearance Over Navigation Channel Back Span (feet)	N/A	U. S. Coast Guard Requirement	N/A	U. S. Coast Guard Requirement: 123 feet (applied within horizontal clearance envelope)

## Tappan Zee Hudson River Crossing Project

	Design Element	Standard criteria (for information)	Standard Source	Existing Condition	Project Requirement
<b>21</b>	Minimum Back Span Federal Navigation Channel Clearance (feet)	N/A	U. S. Coast Guard Requirement	N/A	U. S. Coast Guard Requirement: 100 feet (applied within horizontal clearance envelope)
<b>22</b>	Turnarounds between Bridge Roadways – Design Vehicle for turning maneuvers	N/A	N/A	None Existing	Four locations total. One either side of the main span and one near each landing. Four locations to be gated; gates with impact protection; gates to be manual with locking systems, to be operated by NYSTA for access. WB-60 Design Vehicle. Designed to pass WB-109 Design Vehicle.

Notes to Table 1:

Note 1: Changes in vertical grades shall be applied at a point appropriate relative to the horizontal geometry.

Note 2: Horizontal transition curves shall be used in the highway geometry as required so as to accommodate geometry for potential future loading. The use of large radii circular transition curves as transition curves is not permitted where such use would preclude compatibility with the potential future loading geometry.

Note 3: The Authority's Executive Director or designee is required to authorize any waiver to provide pedestrians and bicycle accommodations along the Thruway.

**Tappan Zee Hudson River Crossing Project**

**Table 1A Potential Future Loading Geometric Design Criteria**

	<b>Design Element</b>	<b>Reference</b>	<b>Project Requirement</b>
1	Design Speed (mph)	MW4 Part 3 §57.0(C)	65 for Passenger Rolling Stock
2a	Superelevation – Actual	MW4 Part 3 §57.1(C)	$E_a = 5$ inches
2b	Superelevation – Underbalance	MW4 Part 3 §57.1(C)	$E_u = 3$ inches
3	Rate of Change of Superelevation	MW4 Part 3 §57.3(C)	As determined by using Table (a) in MW4 Part 3 §57.3(C)
4	Length of Spiral (Superelevation Runoffs (feet)	MW4 Part 3 §57.4(C) – (j)	As determined by using the greatest length obtained from the formulas in subsection (j)
5	Minimum Vertical Curve Length (L) (feet)	MW4 Part 3 §62.4(C) AREMA 5.3.6 Passenger Lines;	$L = (D \times V^2 \times 2.15) / 0.6$ D is % grade change, V is speed (mph)
6	Maximum Grade	MW4 Part 3 §62.1(C)	1.5% maximum. 1.5% to 2.0% for short distances must have enclosure. (Refer to Part 3 Project Requirement 11)
7	Compensated Gradient Adjustment	MW4 Part 3 §62.1(C)	0.04% per Degree of Curve
8	Minimum Horizontal Clearance (feet)	AREMA figure 28.3.3	9 from track center AREMA 8.5
9	Minimum Vertical Clearance (feet)	MNR requirement	23 above rail
10	Minimum Track Centers Separation (feet)	MW4 Part 3 §61.1(C)	14 tangent
11	Minimum Structural Capacity of Crossing	-	See Part 3 Project Requirement 11

Note 1 to Table 1A: The minimum navigation clearances identified in Table 27.3.2-1 Item 18 and 19 shall be met as part of the potential future loading geometric requirements.

Note 2 to Table 1A: The tabulated requirements are applicable from abutment to abutment on the Crossing.

## Tappan Zee Hudson River Crossing Project

**Table 1B I-287 Toll Plaza Diversion Lanes Design Requirements**

Critical Design Elements for I-287 Diversion through Toll Plaza			
PIN:	8TZ1.00	NHS (Y/N):	Yes
Route No. & Name:	I-287	Functional Class:	Urban Principal Arterial Interstate
Project Type:	Reconstruction	Design Class:	Interstate
% Trucks:	12.4%	Terrain:	Rolling
ADT (2047):	218,551	Truck Access/Qualifying Highway	Qualifying highway

	Design Element	Standard Criteria	Standard Source	Existing Condition	Project Requirement
1	Design Speed (mph)	50	HDM §2.7.1.1A;	N/A	50 min
2	Minimum Lane Width (feet)	12	HDM §2.7.1.1B	N/A	12
3	Minimum Shoulder Width (feet)	10 minimum both sides	DRM §3.4.1	N/A	10 minimum right; 4 minimum left 10 preferred left With suitable transition to existing
4	Minimum Bridge Roadway Width (feet)	Match approach highway	DRM §Appendix D	N/A	Match approach highway
5	Maximum Grade [Rolling]	5% maximum. 1% maximum, 0% desirable in tolling booth area	HDM §2.7.1.1E, Exhibit 2-2 DRM Appendix D	N/A	Match ORT Lanes section 1% maximum, 0% desirable in tolling booth area
6	Horizontal Curvature, Minimum Radius (feet)	833 minimum @ e=6%	HDM §2.7.1.1F, Exhibit 2-2	N/A	833 minimum
7	Maximum Superelevation (e) Rate	6% (urban/ suburban)	HDM §2.7.1.1G	N/A	6%
8	Minimum Stopping Sight Distance (feet)	425 minimum	HDM §2.7.1.1H, Exhibit 2-10	N/A	425 minimum
9	Minimum Horizontal Clearance (feet)	Shoulder width (not less than 4)	HDM §2.7.1.1I	N/A	Shoulder width (not less than 4)
10a	Minimum Vertical Clearance (feet) Mainline under State/local road	16.5	TSDM ; §1.8.3	N/A	16.5
10b	Minimum Vertical Clearance (feet) Mainline over State/local Road	15.0	TSDM ; §1.8.3		15.0

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	Design Element	Standard Criteria	Standard Source	Existing Condition	Project Requirement
10c	Minimum Vertical Clearance (feet) Overhead signs/pedestrian bridges	17.5	TSDM ; §1.8.2		17.5
10d	Minimum Vertical Clearance (feet) Over railroad structures	23.0	TSDM ; §1.9.1		23.0
11	Pavement Cross Slope (normal crown)	1.5% to 2%	HDM §2.7.1.1K	N/A	2%
12	Maximum Rollover Between Lanes Edge of Travel Way	4% 8%	HDM §2.7.1.1L	4% 8%	4% 8%
13a	Structural Capacity Replacement	HL-93 & L/1000 plus DOT Permit Vehicle.	HDM §2.7.1.1M; TSDM §2.1; BM §2.6	Original construction design standards	HL-93 & L/1000 plus DOT Permit Vehicle.
13b	Structural Capacity Rehabilitation	HL-93 & L/800 if L/1000 not possible. DOT Permit Vehicle not required	HDM §2.7.1.1M; TSDM §2.1; BM §2.6	Original construction design standards	HL-93 & L/800 if L/1000 not possible. DOT Permit Vehicle not required
14	Minimum Level of Service	C, D acceptable with documentation	HDM §2.7.1.1N	N/A	C, D acceptable with documentation
15	Control of Access	Full	HDM §2.7.1.1O	N/A	Full
16	Pedestrian Accommodation	Prohibited on Thruway <sup>(1)</sup>	21 NYCRR Chap 3A §102.1; HDM Chapters 17 & 18, ADAAG	N/A	Prohibited on Thruway <sup>(1)</sup>
<p>Note (1) No public pedestrian/bicycle SUP accommodations shall be provided in the tolling ramp and plaza area.</p>					



## Tappan Zee Hudson River Crossing Project

**Table 2 I-287 Interchange Ramp Design Requirements**

Critical Design Elements for I-287 Ramps			
PIN:	8TZ1.00	NHS (Y/N):	Yes
Route No. & Name:	I-287	Functional Class:	Urban Principal Arterial Interstate
Project Type:	Reconstruction	Design Class:	Interstate Ramp
% Trucks:	12.4%	Terrain:	Rolling
ADT (2047):	218,551	Truck Access/Qualifying Highway	Qualifying highway

	Design Element	Standard criteria (for information)	Standard Source	Existing Condition	Project Requirement
1	Design Speed (mph)	25 min	HDM §2.7.5.2A;	25 minimum	Minimum: match existing
2	Range of Minimum Lane Widths - Case II D Ramps (feet)	Exhibit 2-9 (Case IID with shoulders) (Case III if opposing traffic)	DRM §Appendix D	Varies 12-15	15 to 25 depending on radius. With suitable transition to existing
3	Minimum Shoulder Width (feet)	10 minimum both sides; 4 on left if shared median	DRM §3.4.1	Varies 2 - 7	10 minimum both sides; 4 on left if shared median. With suitable transition to existing
4	Minimum Bridge Roadway Width (feet)	Match approach highway	DRM §Appendix D	-	Match ramp width
5	Maximum Grade [Rolling]	5% @ 45mph 6% @ 35 mph 7% @ 25mph	HDM §2.7.5.2E, Exhibit 2-10	5%	5% to 7% max. dependent upon ramp design speed (25 to 45 mph)
6	Horizontal Curvature, Minimum Radius (feet)	144 minimum at 25mph and e=6%	HDM §2.7.5.2F, Exhibit 2-10	230	230
7	Maximum Superelevation (e) Rate	6% (urban / suburban)	HDM §2.7.5.2G	6%	6%
8	Minimum Stopping Sight Distance (feet)	155 at 25 mph	HDM §2.7.5.2H, Exhibit 2-10	155	155 at 25 mph

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	<b>Design Element</b>	<b>Standard criteria (for information)</b>	<b>Standard Source</b>	<b>Existing Condition</b>	<b>Project Requirement</b>
9	Minimum Horizontal Clearance (feet)	Shoulder width but never less than 6ft right and 4ft left Shoulder width plus 4ft under bridge	DRM §Appendix D	-	Shoulder width but not less than than 6ft right and 4ft left. Shoulder width plus 4 under bridge With suitable transition to existing
10a	Minimum Vertical Clearance (feet) Mainline under State/local road	16.5	TSDM; §1.8.3	15.13	16.5
10b	Minimum Vertical Clearance (feet) Mainline over State/local Road	15.0	TSDM; §1.8.3		15.0
10c	Minimum Vertical Clearance (feet) Overhead signs/pedestrian bridges	17.5	TSDM; §1.8.2		17.5
10d	Minimum Vertical Clearance (feet) Over railroad structures	23.0	TSDM; §1.9.1		23.0
11	Pavement Cross Slope (normal crown)	1.5% to 2%	HDM §2.7.5.2K	Varies	1.5% minimum 2% maximum
12	Maximum Rollover Between Lanes Edge of Travel Way	4% 8%	HDM §2.7.5.2L	4% 8%	4% 8%
13a	Structural Capacity	HL-93 & L/1000 plus DOT Permit Vehicle	HDM §2.7.5.2M; TSDM §2.1; BM §2.6	Original construction design standards	HL-93 & L/1000 plus DOT Permit Vehicle
13b	Structural Capacity Rehabilitation	HL-93 & L/800 if L/1000 not possible. DOT Permit Vehicle not required	HDM §2.7.5.2M; TSDM §2.1; BM §2.6	Original construction design standards	HL-93 & L/800 if L/1000 not possible. DOT Permit Vehicle not required
14	Minimum Level of Service	C, D acceptable with documentation	HDM §2.7.5.2N	-	C, D acceptable with documentation
15	Control of Access	Full with retention of any existing maintenance and State Police facilities retained	DRM §Appendix D	Full with existing maintenance and State Police facilities retained	Full with retention of any existing maintenance and State Police facilities retained

## Tappan Zee Hudson River Crossing Project

	<b>Design Element</b>	<b>Standard criteria (for information)</b>	<b>Standard Source</b>	<b>Existing Condition</b>	<b>Project Requirement</b>
16	Pedestrian Accommodation	Prohibited on Thruway (Note (1)) In accordance with Chapters 17 & 18, ADAAG at ramp terminal	21 NYCRR Chap 3A §102.1; HDM Chapters 17 & 18, ADAAG	Prohibited on Interstate In accordance with HDM Chapters 17 & 18, ADAAG at ramp terminal	Prohibited on Thruway (Note (1)) In accordance with Chapters 17 & 18, ADAAG at ramp terminal

Note (1) Excepting ramp terminals, no provisions for pedestrians or bicyclists are permitted for interchange ramps.

## Tappan Zee Hudson River Crossing Project

**Table 3 I-287 Maintenance Ramps / Westchester Maintenance Roadway Design Requirements**

Critical Design Elements for I-287 Maintenance Ramps / Westchester Maintenance Roadway			
PIN:	8TZ1.00	NHS (Y/N):	Yes
Route No. & Name:	I-287	Functional Class:	Urban Principal Arterial Interstate
Project Type:	Reconstruction	Design Class:	Interstate Maintenance Ramp
% Trucks:	N/A	Terrain:	Rolling
ADT (2047):	N/A	Truck Access/Qualifying Highway	Qualifying highway

	Design Element	Standard Thruway Criteria	Existing Condition	Maintenance Roads	Maintenance Ramps
1	Design Vehicle	N/A (project specific)	Single Unit Truck	Single Unit Truck Pass WB-60	Single Unit Truck Pass WB-60
2	Minimum Width (feet)	N/A (project specific)	16	24	20
3	Maximum Grade	N/A (project specific)	20%	10%	10%
5	Minimum radius at mainline junction	N/A (project specific)	Not known	NA	Such that design vehicle path does not intrude beyond the right-most mainline lane
6	Sight distance (feet)	N/A (project specific)	Not known	125 Match connecting roadway standard at intersection	200 minimum along River Road. Match connecting roadway standard at intersection
7	Traffic control	MUTCD	Stops at termini No left turn at mainline	Stops at intersections	Stops at termini No left turn at mainline
8	Minimum Vertical Clearance (feet)	N/A (project specific)	20 above Fisher Drive	16.5	16.5

## Tappan Zee Hudson River Crossing Project

**Table 4 South Broadway in Rockland County\* and Piermont Avenue & River Road in Rockland County**

Critical Design Elements for Piermont Avenue and River Road in Rockland County			
PIN:	8TZ1.00	NHS (Y/N):	Yes
Route No. & Name:	South Broadway and River Road	Functional Class:	Urban Collector
Project Type:	Reconstruction	Design Class:	Collector
% Trucks:	4.8% South Broadway	Terrain:	Rolling
ADT (2008):	3075 South Broadway	Truck Access/Qualifying Highway	Neither

	Design Element	Standard criteria (for information)	Standard Source	Existing Conditions	Project Requirements
1	Design Speed (mph)	30 (designated by NYSDOT Region 8 traffic engineer)	HDM §2.7.3.2A	30	30
2a	Minimum Lane Width (feet) Travel Lane Curbed	10 12 desirable	HDM §2.7.3.2B Exhibits 2-6, 2-5 (ADT > 2000) (Truck Volume > 2%)	12 River Road South Broadway	16 Match Existing
2b	Minimum Lane Width (feet) Curbed Industrial	12			
2c	Minimum Lane Width (feet) Uncurbed	12			
2d	Minimum Lane Width (feet) Turning Lane	11 12 desirable			
2e	Minimum Lane Width (feet) Continuous Median Turning Lane	11 16 desirable			
2f	Minimum Lane Width (feet) Parking Lane (if included)	7 8 desirable			
2g	Minimum Lane Width (feet) Residential Parking Lane (if included)	8 11 desirable			
2h	Minimum Lane Width (feet) Commercial, Industrial Parking Lane (if included)	N/A			
3a	Minimum Shoulder Width (feet) Left - Curbed Divided	0 2 desirable	HDM §2.7.3.2C, Exhibits 2-6, 2-5 (ADT > 2000)	0 River Road South Broadway	0 River Road
3b	Minimum Shoulder Width (feet) Right Curbed, for Bicycle Use	5			
3c	Minimum Shoulder Width (feet) Uncurbed	8			

## Tappan Zee Hudson River Crossing Project

	Design Element	Standard criteria (for information)	Standard Source	Existing Conditions	Project Requirements
4	Minimum Bridge Roadway Width (feet)	Match approach roadway	HDM §2.7.3.2D; BM §2.3.1 Table 2-1	24 South Broadway	N/A River Road  Match existing at South Broadway
5	Maximum Grade [Rolling]	11%	HDM §2.7.3.2E, Exhibit 2-6	N/A River Road	N/A River Road
6	Horizontal Curvature, Minimum Radius at superelevation e=4% (feet)	250	HDM §2.7.3.2F, Exhibit 2-6	N/A River Road	N/A River Road
7	Maximum Superelevation (e) Rate	4%	HDM §2.7.3.2G	N/A River Road	N/A River Road
8	Minimum Stopping Sight Distance (feet)	200	HDM §2.7.3.2H, Exhibit 2-6	89	109
9a	Minimum Horizontal Clearance (feet) Without Barrier/Rail	1.5, 3 at intersections	HDM §2.7.3.2I	Unknown	1.5, 3 at intersections
9b	Minimum Horizontal Clearance (feet) With Barrier/Rail	0	HDM §2.7.3.2I	Unknown	0
10	Minimum Vertical Clearance (feet)	14 14.5 desirable	HDM §2.7.3.2J; BM §2.4.1, Table 2-2	14.5 River Road	16.5 River Road
11	Pavement Cross Slope	1.5% minimum 2% maximum 1.5% to 5% for parking lane	HDM §2.7.3.2K	2%	2%
12a	Maximum Rollover Between Lanes	4%	HDM §2.7.3.2L	4%	4%
12b	Maximum Rollover at edge of Traveled Way	8%	HDM §2.7.3.2L	8%	8%
16	Pedestrian accommodation, width (feet)	5 highway 5' 7" bridge	HDM §2.7.3.2N; HDM Ch 18, ADAAG	5 highway 5.5 bridge	Highway: 5 Bridge: 5'7"

Note: \*There are no Works anticipated on Route 9 South Broadway in Rockland County

## Tappan Zee Hudson River Crossing Project

**Table 5 Route 9 South Broadway in Westchester County\***

Critical Design Elements for South Broadway in Westchester County			
PIN:	8TZ1.00	NHS (Y/N):	Yes
Route No. & Name:	South Broadway	Functional Class:	Urban Principal Arterial – Other
Project Type:	Reconstruction	Design Class:	Urban Arterial
% Trucks:	5.8%	Terrain:	Rolling
ADT (2047):	13650	Truck Access/Qualifying Highway	Neither

	Design Element	Standard criteria (for information)	Standard Source	Existing Conditions	Project Requirements
1	Design Speed (mph)	40 (designated by NYSDOT Region 8 traffic engineer)	HDM §2.7.2.2A	40	40
2b	Minimum Lane Width (feet) Low Speed (<50mph)	11	HDM §2.7.2.2C, Exhibits 2-4  (ADT > 2000)  (Truck Volume > 2%)	-	11 minimum
2c	Minimum Lane Width (feet) Turning Lane	11 12 desirable			11 12 desirable
2d	Minimum Lane Width (feet) Continuous Median Turning Lane	11 16 desirable			11 16 desirable
3	Minimum Shoulder Width (feet) Curbed, for Bicycle Use	5			5
4	Minimum Bridge Roadway Width (feet)	Match approach roadway	HDM §2.7.2.2D; BM §2.3.1 Table 2-1	68	Match approach roadway
5	Maximum Grade [Rolling]	8%	HDM §2.7.2.2E, Exhibit 2-4	-	8%
6	Horizontal Curvature, Minimum Radius at superelevation e=4% (feet)	533	HDM §2.7.2.2F, Exhibit 2-4	1010	533
7	Maximum Superelevation (e) Rate	4%	HDM §2.7.2.2G	4%	4%
8	Minimum Stopping Sight Distance (feet)	305	HDM §2.7.2.2H, Exhibit 2-4	432	305

## Tappan Zee Hudson River Crossing Project

	Design Element	Standard criteria (for information)	Standard Source	Existing Conditions	Project Requirements
9a	Minimum Horizontal Clearance (feet)  Without Barrier/Rail	1.5  3 at intersections	HDM §2.7.2.2I	1.5	1.5  3 at intersections
9b	Minimum Horizontal Clearance (feet)  With Barrier/Rail	0			0
10a	Minimum Vertical Clearance (feet)	14  14.5 desirable	HDM §2.7.2.2J; BM §2.4.1, Table 2-2	varies	14.5
11	Pavement Cross Slope	1.5% minimum  2% maximum	HDM §2.7.2.2K	2%	2%
12a	Maximum Rollover Between Lanes	4%	HDM §2.7.2.2L	4%	4%
12b	Maximum Rollover At edge of Traveled Way	8%	HDM §2.7.2.2L	8%	8%
13a	Structural Capacity Replacement	HL-93, NYSDOT Design Permit Vehicle	HDM §2.7.2.2M; BM §2.6	Original construction design standards	HL-93, NYSDOT Design Permit Vehicle
13b	Structural Capacity Rehabilitation	HS20, HS25 Desirable	HDM §2.7.2.2M; BM §2.6	Original construction design standards	HS20, HS25 Desirable
16	Pedestrian Accommodation (feet)	5 Highway  5'7" Bridge	HDM §2.7.2.2N; HDM Ch 18, ADAAG	5 Highway  5'7" Bridge	5 Highway  5'7" Bridge

NOTE: \*Other than Works associated with the SUP (*Shared Use Path*), there are no Works anticipated on Route 9 South Broadway in Westchester.



## Tappan Zee Hudson River Crossing Project

**Table 6 Shared Use Path Geometric Standards**

	<b>Design Element</b>	<b>Standard criteria</b> (for information)	<b>Standard Source</b>	<b>Project Requirement</b>
1	Design Speed (mph)	20	HDM Chapter 17; AASHTO Bicycle Facilities Guide	20
2	Minimum Lane Width (feet)	10	HDM Chapter 17; AASHTO Bicycle Facilities Guide	12
3	Minimum Shoulder Width (feet)	2 (unpaved), 3 Desirable	AASHTO Bicycle Facilities Guide	N/A
4	Minimum Clear Bridge Width (feet)	Paved path width + 2 each side; 16	AASHTO Bicycle Facilities Guide	<b>12</b>
5	Maximum Grade	5% (continuous)	HDM Chapter 17; AASHTO Bicycle Facilities Guide	3%
6	Horizontal Curvature, Minimum Radius for e=2%, 20° lean angle (feet)	90	HDM Chapter 17; AASHTO Bicycle Facilities Guide, Tables 1 & 2	90
7	Maximum Superelevation (e) Rate	2%	AASHTO Bicycle Facilities Guide	2%
8	Minimum Stopping Sight Distance (feet)	140 Longer for downhills > 5%	AASHTO Bicycle Facilities Guide, Fig. 19	140
9	Minimum Horizontal Clearance (feet)	3 5 at hazards and side slopes >33%	HDM Chapter 17; AASHTO Bicycle Facilities Guide	3 5 at hazards and side slopes >33%
10a	Minimum Vertical Clearance (feet)	10 For maintenance vehicles, as needed > 10	HDM Chapter 17; AASHTO Bicycle Facilities Guide	For emergency / maintenance vehicles, as needed > 10
10b	Minimum Vertical Clearance over Railroad (feet)	23.0	TSDM ; §1.9.1	23.0
11	Pavement Cross Slope	2%	HDM Chapter 18; ADAAG	2%
12	Maximum Rollover	4%	-	4%
13	Structural Capacity	H10	NYSDOT BM §2.6.4	H10,HL-93, NYSDOT Design Permit Vehicle on the Crossing
14	Minimum Level of Service (Pedestrian)	B	HDM §18.5.4, Exhibit 18-2	B
15	Control of Access	Maintain separation from parallel roads	AASHTO Bicycle Facilities Guide	Maintain separation from
16	Pedestrian Accommodation	Per ADAAG	ADAAG; HDM Chapter 18	Per ADAAG

## **Tappan Zee Hudson River Crossing Project**

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Note 1 to Table 6: Grades between 5% and 11+% are permissible for short lengths varying from 800 feet to 50 feet, as prescribed in the AASHTO Bicycle Facilities Guide.

Note 2 to Table 6: Where applicable, a determination shall be made as to whether the pertinent roadway is in an urban or rural location, and the proper design requirements applied accordingly.