

Active Transportation Programs Design Guide Session 1 – Guide Overview and Speed Management

Briana Weisgerber, P.E. Active Transportation Programs Engineer Month Day, 2024

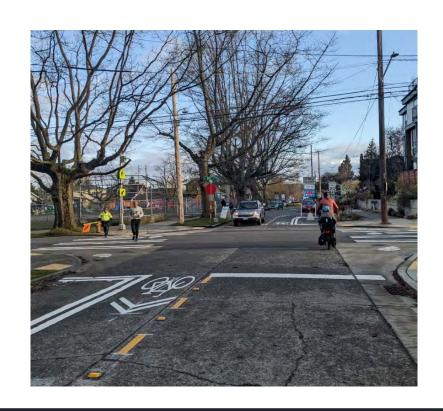
Safe Routes to School and Pedestrian/Bicyclist Programs

- Aim to improve safety for pedestrians and bicyclists
- All roads
- All public agencies & Tribal governments are eligible
- Projects must:
 - Comply with funding requirements
 - No match is required



Training on Applications

- Overview Webinar
 - March 11 (recording available)
- Design Guide Trainings
 - March 13
 - March 20
 - March 27
- Application Process Workshop
 - April 15
- For more information about the funding programs, visit:
 - Safe Routes to School Program
 - Pedestrian & Bicycle Program





	Pedestrian/Bicyclist Program	Safe Routes to School Program
Program purpose	 Eliminate pedestrian and bicyclist fatal and serious injury traffic crashes. Increase the availability of connected pedestrian and bicyclist facilities that provide low traffic stress and serve all ages and abilities. Increase the number of people that choose to walk and bike for transportation. 	 Enable and encourage children, including those with disabilities, to walk, roll, and bicycle to school. Make bicycling and walking to school a safer and more appealing form of transportation, encouraging a healthy and active lifestyle from an early age. Facilitate the planning, development, and implementation of projects and activities that will improve safety and reduce traffic, fuel consumption, and air pollution in the vicinity of schools.
Estimated available funding amount	\$23,190,000	\$25,575,000
Funding source	State	Federal and State
Applications due date	May 31, 2024	June 7, 2024

Project Ranking

Category	Max Category Points	Subcategory	Max Subcategory Points
Safety	40	Safety Treatments	24
Salety	40	Safety Need	16
Equity	25	Highest Equity Need Census Tract	20
		Community Engagement	5
Mobility with Considerations for Equity	10		
Deliverability	10		
Value	10		
Geographic Diversity	5		
Total	100		



Linear Safety Treatments

- Do linear treatments and existing conditions meet WSDOT level of traffic stress (LTS)
 2 or better for both pedestrians and bicyclists?
- If a project proposes volume or speed management to meet a certain LTS, will the proposed treatments likely achieve the needed reductions?

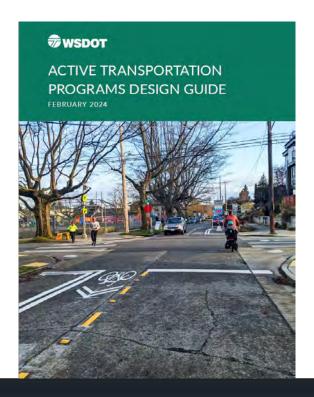


Intersection/Crossing Safety Treatments

- Crossing features for pedestrians and bicyclists should aim to:
 - Decrease pedestrian/bicyclist **exposure** to points of conflict with motor vehicle traffic
 - Decrease motor vehicle operating speed
 - Increase pedestrian/bicyclist user conspicuity
 - Increase the **predictability** of movements of different user groups through the intersection
 - Increase separation in space between motorists and pedestrians/bicyclists
 - Increase separation in time between motorists and pedestrians/bicyclists



The Design Guide





Purpose of the Design Guide

- Establishes common definitions of the treatments for these funding programs
- Expands on the prior list of treatments with design guidance
- Simplifies project development and application for funding
- Emphasizes "how" to design treatments





When Does the Guide Apply

- SRTS and PBP applications on local or county roads
- On state routes, comply with WSDOT Design Manual and related agency standards

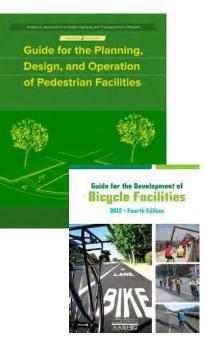


References Informing the Guide



NACTO



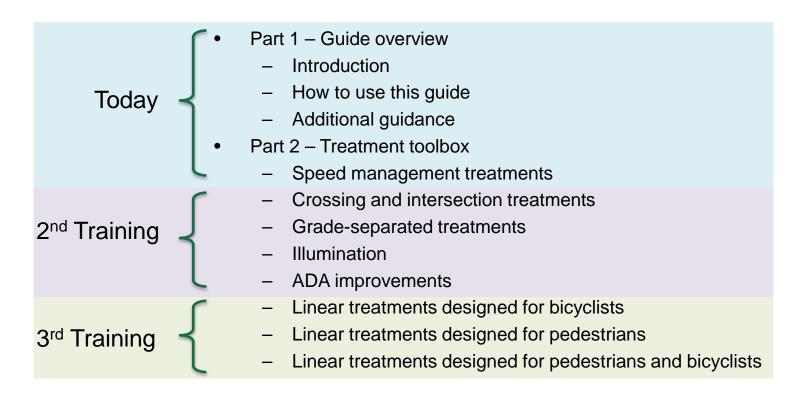


AASHTO



FHWA

Guide Outline





Part 1 - Guide Overview WSDOT





Part 1 - Guide Overview Continued

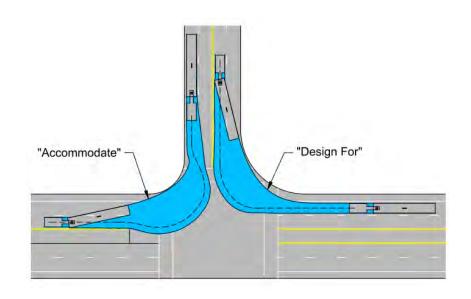
- Projects that align with or exceed the safety design features of the guide will tend to rank more favorably during the competitive application review
- Consider equity in planning, outreach, and design





Part 1 - Guide Overview Cont.

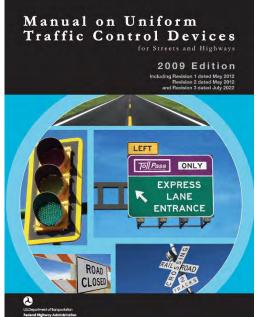
- Special design considerations
 - Streets for children
 - Resiliency and green infrastructure
- Designing for and accommodating large vehicle turns

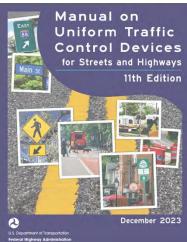




Part 1 - MUTCD

- Current standard is the 2009 MUTCD with Revisions 1, 2, and 3 incorporated as modified by WAC 468-95
- Washington state has 2 years to adopt the 11th Edition MUTCD (released 12/2023)
- Interim approvals still apply for now either at the local level or through WSDOT's statewide approval for some devices
- WSDOT MUTCD Webpage







Part 1 - Level of Traffic Stress

- Projects will be evaluated on their ability to meet LTS 1 or 2 for both pedestrians and bicyclists
- LTS tables are contained within the WSDOT Design Manual Chapter 1510 and 1520
- Based on speed, number of lanes, volume, buffer, facility width
- More information in Session 3

Exhibit 1510-1 Pedestrian Level of Traffic Stress (PLTS) in mixed traffic (no marked bicycle lane, with or without shoulder) (New Exhibit 2023)

PLTS in mixed traffic (no pedestrian facility)											
Lawre	AADT	Target Speed									
Lanes	AADT	≤20	25	30	35	40	45	50+			
1 thru lane per direction (or 1 lane one-way street)	0 - 750	1	1	3	4	4	4	4			
	751 - 1500	1	2	3	4	4	4	4			
	1501 - 3000	2	2	3	4	4	4	4			
	> 3000	2	3	3	4	4	4	4			
2 thru lanes per direction	0 - 6000	3	3	3	4	4	4	4			
	> 6000	3	3	4	4	4	4	4			
3+ thru lanes per direction	Any ADT	4	4	4	4	4	4	4			

Exhibit 1520-5 Bicycle Level of Traffic Stress in mixed traffic (no bicycle facility) (New Exhibit 2023)

BLTS in mixed traffic (no bicycle facility)										
		Target Speed								
Lanes	AADT	≤20	25	30	35	40	45	50+		
1 thru lane per direction (or 1 lane one-way street)	0 - 750	1	2	3	4	4	4	4		
	751 - 1500	1	2	3	4	4	4	4		
	1501 - 3000	2	2	3	4	4	4	4		
	> 3000	2	3	3	4	4	4	4		
2 thru lanes per direction	0 - 6000	3	3	3	4	4	4	4		
	> 6000	3	3	4	4	4	4	4		
3+ thru lanes per direction	Any ADT	4	4	4	4	4	4	4		



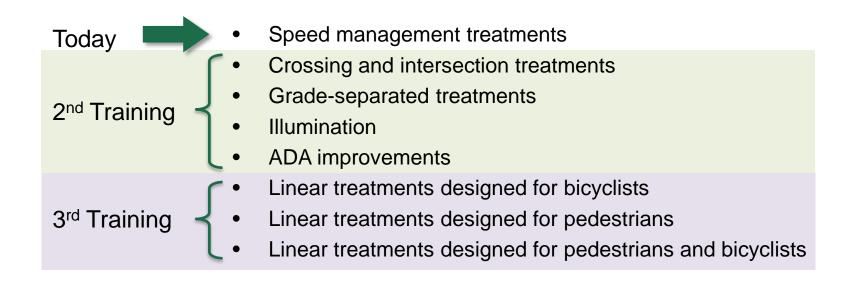
Part 2 - Treatment Toolbox WSDOT





Source: Tom Haggarty, P.E., City of Medical Lake, City Engineer

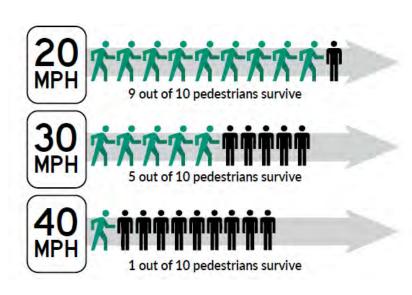
Part 2 - Treatment Toolbox Continued





Part 2 - Speed Management

- Encourage all applicants to set injury minimization target speeds for projects
- Example:
 - 20 mph in residential and business districts
 - 25 mph for arterials or non-limited access roads in town centers
- Washington State Injury Minimization and Speed Management Policy Elements and Implementation Recommendations
- NACTO City Limits Guide



Part 2 - Speed Management Continued

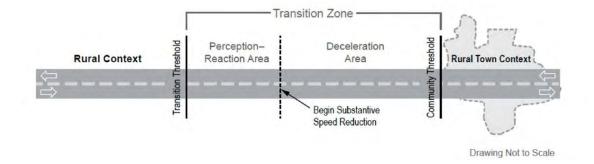
- Manual on Uniform Traffic Control Devices -Washington State Modifications, WAC 468-95-045
- RCW 46.61.400 25 mph statutory speed limits for city and town streets
- RCW 46.61.415 can reduce to 20 mph on a nonarterial highway or part of a nonarterial highway
 - Requirement to be within a residence or business district removed in 2022
- Begin the local process to reduce speeds prior to applying. Coordinate with local emergency services and other partners.



Source: Rohit Ammanamanchi, City of Bellevue

Part 2 - Speed Transition Zones

- Transition higher speed roads to lower speed zone in a community
- Treatments may include:
 - Center islands
 - Raised medians
 - Roundabouts
 - Roadway narrowing
 - Lane-width reductions
 - Layered landscaping



Part 2 - Speed Management Treatments

- 1. Twenty-mph speed zone designation and signs
- 2. School or playground 20-mph speed zone with flashing beacons and signage
- 3. Speed feedback sign
- 4. Automated traffic safety camera
- 5. Lane width reduction
- 6. Road reconfiguration
- 7. Chicanes
- 8. Neighborhood traffic diverter
- 9. Median diverter for multi-stage crossing
- 10. Neighborhood traffic circle
- 11. Choker
- 12. Raised intersection
- 13. Speed hump or speed cushions
- 14. Speed table



Some treatments in other sections of the toolbox also can help manage speeds. This icon identifies these treatments.

22. High-visibility crosswalk

DESCRIPTION

In Washington, legal crosswalks exist at all intersections whether marked or not unless specifically prohibited by appropriate signage,93 and Washington state law requires drivers to stop for pedestrians and bicyclists crossing the roadway in a marked or unmarked crosswalk.94 Marking crosswalks can raise awareness for drivers that pedestrians or bicyclists may cross the street at that location. Highvisibility crosswalk markings make it easier for drivers to see the crosswalk, not just the pedestrian, and emphasizes that pedestrians have the right of way. Crosswalk visibility enhancements can reduce crashes by 23-48 percent.95



FIGURE 27. HIGH-VISIBILITY CROSSWALK IN UNIVERSITY PLACE, WA. SOURCE: PEDBIKE

For marked crosswalks, the MUTCD minimum requirement is two transverse lines; however, this marked crosswalk treatment IMAGES/CARL SUNDSTROM doesn't meet the standards for high-visibility crosswalk

marking. Standard high-visibility crosswalk markings include bar pairs, continental, and ladder type markings. Some jurisdictions may also use zebra markings, or enhanced crosswalks that include painted or thermoplastic patterns, or colored and/or patterned pavement, in conjunction with the MUTCD transverse lines. These crosswalk treatments may require additional review to determine if they meet the intent of high-visibility markings.

DESIGN GUIDANCE

Provide a crosswalk with changes in level of no greater than 1/4 inch or with the appropriate beveled edges per the Public Right-of-Way Accessibility Guidelines.

At high-visibility crosswalks include:

- At least 10-foot-wide high visibility crosswalk markings such as ladder style or continental markings.96
- Striped or physical barrier to restrict parking at least 20 feet from the crossing.

In addition:

- At signalized crossings, place a stop line at a controlled crosswalk a minimum of 4 feet in advance of the crosswalk.
- At stop-controlled crossings, consider placing a stop line at a controlled crosswalk a minimum of 4 feet in advance of the crosswalk
- At uncontrolled crossings, place W11-2 signs or a rectangular rapid flashing beacon adjacent to the marked crosswalk. Consider an advance-stop line and "stop for pedestrians" signs adjacent to each other and within 20-50 feet of the crosswalk 97

 In Washington State drivers must come to a full stop for pedestrians in crosswalks.98 For this reason, don't use yield pavement markings or signs ahead of crosswalks (this guidance doesn't preclude yield pavement markings or signs when located with the intent for drivers to yield to crossing vehicular traffic).

Pedestrians will prefer to not make three crossings when only trying to cross one leg of an intersection. As a result, at signalized intersections, consider marking crosswalks on all approaches unless the pedestrians are prohibited from accessing a section of the intersection.99

All crosswalks should also include sufficient pedestrian lighting to meet the guidance provided in pedestrian and bicyclist illumination at a crossing or intersection.

DESIGN APPLICABILITY

- Consider high visibility crosswalk markings for all marked crosswalks.
- All signalized or stop controlled pedestrian crossings.
- All existing uncontrolled crossing locations or new uncontrolled crossing location with appropriate treatments per Table 1 of FHWA Guide for Improving Pedestrian Safety at Unsignalized Locations.

COMPLEMENTARY TREATMENTS

- Curb extension
- Physical barrier to restrict parking near crosswalk
- Stop line at a controlled crosswalk
- · Stop line at an uncontrolled crosswalk
- In-street stop for pedestrian sign
- · Rectangular rapid flashing beacon
- Pedestrian hybrid beacon
- Half signal for pedestrians and bicyclists
- · Full traffic signal
- · Pedestrian refuge island
- Raised crosswalk
- · Linear treatments designed for pedestrians (all)

MORE INFORMATION

- MUTCD Section 3B.18 Crosswalk Markings
- FHWA Crosswalk Marking Selection Guide
- NCHRP 926 Guidance to Improve Pedestrian and Bicyclist Safety at Intersections
- WSDOT Action Plan for Implementing Pedestrian Crossing Countermeasures at Uncontrolled Locations
- FHWA Guide for Improving Pedestrian Safety at Uncontrolled Crossing Locations

PLAN SHEET DETAILS

22 - High-visibility Crosswalk Markings



64

RCW 46,04,160

FHWA. 2018. "Crosswalk Visibility Enhancements," Safe Transportation for Every Pedestrian.
WSDOT. 2018. Action Plan for Implementing Pedestrian Crossing Countermeasures at Uncontrolled Locations

WAC 468-95-220

⁸⁸ RCW 46.61.235

NACTO. 2013. "Crosswalks and Crossings." Urban Street Design Guide.

Speed Zones

- 1. 20-mph speed zone designation and signs
- 2. School or playground 20-mph speed zone with flashing beacons and signage
- 3. Speed feedback sign
- 4. Automated traffic safety camera





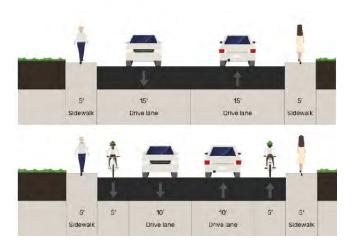






Road Reconfiguration

- 5. Lane width reduction
- 6. Road reconfiguration









Horizontal Deflection

- 7. Chicanes
- 8. Neighborhood traffic diverter
- 9. Median diverter for multi-stage crossing
- 10. Neighborhood traffic circle
- 11. Choker











Vertical Deflection

- 12. Raised intersection
- 13. Speed hump or speed cushions
- 14. Speed table
- 15. Raised crosswalk (crossing treatment)











Recommended Vertical Deflection Characteristics

Desired motorist speed	Maximum hump height	Appropriate locations	Appropriate ramp profiles	Approximate ramp target slope
≤ 20 mph	4 inches (3-inch minimum)	Local streets	All	1:12
≤ 25 mph	3.5 inches (3-inch minimum)	All streets without designated emergency response, truck or frequent transit routes	Sinusoidal or straight	1:18
≤ 30 mph	3 inches	Arterial or collector streets without designated emergency response, truck or frequent transit routes	Sinusoidal or straight	1:24
≤ 35 mph	3 inches	Arterial streets with designated emergency response, truck or frequent transit routes	Straight	1:24



Implementation

- Can use a suite of speed management treatments and simultaneously lower speeds along a corridor
- Candidate locations especially along school walk routes, near playgrounds, or in population centers



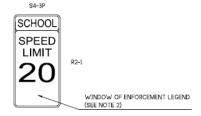




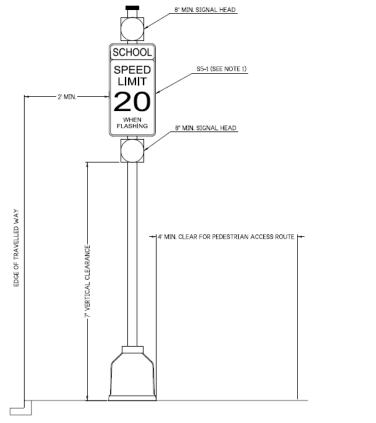




- IN SCHOOL SPEED ZONE SIGN ASSEMBLY WITH FLASHING BEACON, SS-1 MAY BE SUBSTITUTED FOR AN
 ASSEMBLY CONSISTING OF A SCHOOL PLAQUE (S4-3), A 20 MPH SPEED LIMIT SIGN (R2-1), AND A WHEN
 FLASHING PLAQUE (S4-4).
- THE ENFORCEMENT LEGEND IS DETERMINED BY THE SCHOOL DISTRICT AND CAN BE ANY OF THE FOLLOWING:
 - · WHEN FLASHING (S5-1) USED IN CONJUNCTION WITH A FLASHING BEACON ABOVE THE SIGN, AS DESCRIBED IN MUTCH SECTION 4L.04.
 - WHEN CHILDREN ARE PRESENT (S4-2P) USED IN CONJUNCTION WITH DEFINITIONS PROVIDED IN WAC 392-151-035.
 - WHEN FLAGGED (\$4-50!) USED IN CONJUNCTION WITH WARNING FLAGS THAT ARE INSTALLED ON THE SIGN DURING THE WINDOW OF ENFORCEMENT. THE SCHOOL IS RESPONSIBLE FOR INSTALLATION AND REMOVAL OF THE FLAGS.
 - X:00 A.M. TO X:00 A.M./P.M. (S4-IP) USED TO DISPLAY THE SPECIFIC HOURS OF THE SCHOOL SPEED LIMIT.



SCHOOL SPEED LIMIT SIGN

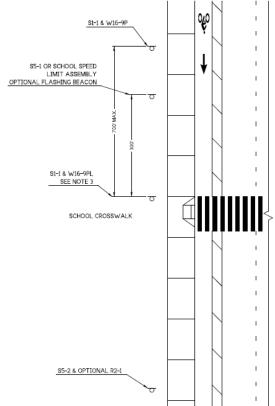


SCHOOL SPEED ZONE SIGN ASSEMBLY WITH FLASHING BEACON

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- INSTALL SIGNAGE ON BOTH ROADWAY APPROACHES.
- SCHOOL CROSSINGS MAY BE ESTABLISHED EITHER ADJACENT TO THE SCHOOL OR AS PART OF A SCHOOL PEDESTRIAN ROUTE.
- THE SI-1 SIGN MAY BE INSTALLED AT A CROSSING CONTROLLED BY A TRAFFIC SIGNAL, BUT NOT AT AN INTERSECTION CROSSING CONTROLLED BY A STOP OR YELLD SIGN.
- 4. PER WAC 468-95-330, APPLICABLE TO STATE HIGHWAYS, COUNTY ROADS, OR CITY STREETS, THE REDUCED SCHOOL OR PLAYGROUND SPEED ZONE SHALL EXTEND FOR 300 FEET IN EITHER DIRECTION FROM THE MARKED CROSSWALK WHEN THE MARKED CROSSWALK IS FULLY POSTED WITH STANDARD SCHOOL SPEED LIMIT SIGNS OR STANDARD PLAYGROUND SPEED LIMIT SIGNS OR
- PER WAC 468-95-330. NO SCHOOL OR PLAYGROUND SPEED ZONE MAY EXTEND LESS THAN 300 FEET FROM A MARKED SCHOOL OR PLAYGROUND CROSSWALK, BUT MAY EXTEND BY TRAFFIC REGULATION BEYOND 300 FEET BASED ON A TRAFFIC AND ENGINEERING INVESTIGATION.

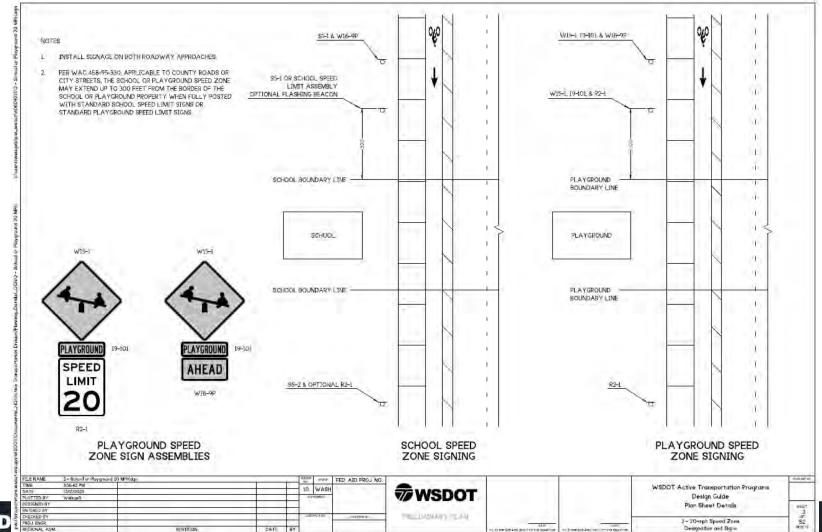


SCHOOL SPEED ZONE SIGNING AT A SCHOOL CROSSWALK

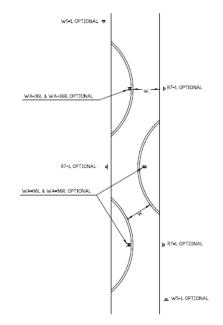
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W5-I, OPTIONAL TO SEE NOTES 1 & 2 p R7-1, OPTIONAL WA-36L & WA-36R, OPTIONAL R7-L, OPTIONAL WA-36L & WA-36R, OPTIONAL b R7-1, OPTIONAL W5-1, OPTIONAL

NOTES

- ALONG ROADS WITH BIKE LANES, CONTINUE BIKE LANES BETWEEN THE CHICANE AND THE CURS OR EDGE OF ROADWAY, PROVIDE 6 FT, MIN, CLEAR FROM THE EDGE OF THE GUTTER TO THE FACE OF THE CHICANE CURS. PAINT CHICANE CURS WHITE TO ENSURE VISIBILITY.
- MAINTAIN A DRAINAGE CHANNEL FOR DETACHED CHICANES.
- THE TRAVEL PATH THROUGH THE CHICANE CAN BE ONE LANE OR TWO LANES AS NOTED.
- PLACE ANY LANDSCAPING IN CHICANES TO NOT OBSCURE DRIVER'S VIEW.

TWO LANES ONE LANE

15' 11' MIN.

CURBLINE EXTENSION CHICANES

DETATCHED CHICANES WITH DRAINAGE CHANNEL

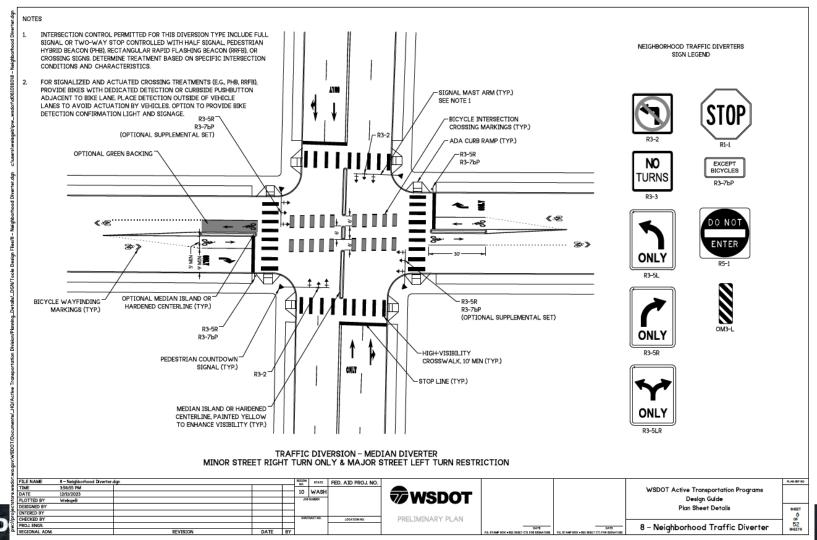
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52 SHEETS



NOTES

- USE DIMENSION SCHEDULE AS A DESIGN GUIDE. FINAL DIMENSIONS TO BE DETERMINED BY THE ENGINEER.
- OPTIONAL USE OF ADVANCE WARNING SIGNS, W2-6 AND W16-12P, PLACED 75' TO 100' BACK FROM TRAFFIC CIRCLE ON EACH APPROACH. OPTIONAL USE OF OBJECT MARKERS PLACED IN CENTER OF TRAFFIC CIRCLE FOR EACH APPROACH.

OPTIMUM CRITERIA

OFFSET DISTANCE (C)	OPENING WIDTH (E)
5.5' MAX.	16' MIN.
5.0'	17" +
4.5'	18' +
4.0'	19' +
3.5' OR LESS	20'+

DIMENSIONS

A STREET WIDTH	B CURB RETURN RADIUS	C OFFSET DISTANCE	D CIRCLE DIAMETER	E OPENING WIDTH
WIDIU			UCT CURBS	MIDIU
	<15'			
	15'	5.5'	9'	16+
20'	18'	5.0'	10'	17'+
	20'	4.5'	11'	18'-
	25'	4.0'	12 ^t UCT CURBS	19'+
	<12'			
	12'	5.5'	13'	16'
24'	15'	5.0'	14'	17'-
	20'	4.5'	15'	18'+
	25'	3.5'	17'	20'-
	<12'		UCT CURBS	
	12'	5.5'	14'	16'+
25'	15'	5.0'	15'	17'-
25	18'	4.5'	16'	18'-
	20'	4.5'	16'	18'+
	25'	3.5'	18'	20'-
	10'	5.5'	19'	16'+
	12'	5.0'	20'	17'-
30'	15'	5.0'	20'	17'+
30	18'	4.5'	21'	18'+
	20'	4.0'	22'	19'+
	25'	3.0'	24'	20'
	10'	5.5'	21'	16'+
	12'	5.0'	22'	17'-
32'	15'	4.5'	23'	18'-
32	18'	4.0'	24'	19'-
	20'	4.0'	24'	19'+
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	10'	5.0'	26'	17'-
	12'	5.0'	26'	17'+
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36	18'	4.0'	28'	19'+
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	10'	5.0'	30'	17'+
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- EXTEND THE FACE OF CURB OR MAINTAIN A DRAINAGE CHANNEL BETWEEN THE CURB OR EDGE OF ROADWAY AND THE CHOKER.
- ALONG ROADS WITH BICYCLE BOULEVARDS OR BIKE LANES, PROVIDE 5' MINIMUM PASS-THROUGH BETWEEN THE FACE OF CURB OR EDGE OF ROADWAY AND THE CHOKER.

TWO-WAY NON-YIELD

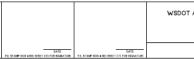
TWO-WAY YIELD

12' MIN. W 20' MIN.

CHOKER WITH BIKE PASS-THROUGH

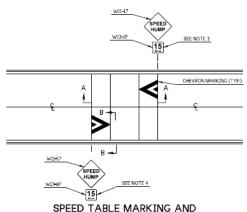
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WSDOT Active Transportation Programs Design Guide Plan Sheet Details 13 of 52 sheets 11 - Choker





SPEED TABLE MARKING AND SIGNING

- SAWCUT OR FEATHER GRIND TO KEY IN SPEED HUMP, SEE SECTION A-A.
- SIGN LOCATIONS TO BE VERIFIED BY THE ENGINEER PRIOR TO INSTALLATION.

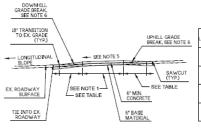
NOTES

- FOR A SERIES OF SPEED HUMPS OR TABLES IN CLOSE PROXIMITY, THE ADVISORY SPEED PLAQUE MAY BE BLIMINATED ON ALL BUT THE FIRST SPEED BUMP SIGN IN THE SERIES FOR EACH DISECTION OF TRAVEL.
- SPEED TABLE MAY ALSO BE DESIGNED WITH A SINUSOIDAL, CIRCULAR, OR STRAIGHT PROFILE.
- MODIFY EXISTING STREET PAVING, PLANING AND OVERLAY ASPHALT, OR RECONSTRUCTION OF PAVING AS NECESSARY TO RESTORE A SMOOTH TRANSITION AND STREET CROWN, MATCH PAVING MATERIALS AND THICKNESS.
- DETERMINE GRADE BREAKS BASED ON EXISTING ROADWAY SPEEDS AND DESIRED SPEED REDUCTION, GENERALLY HIGHER GRADE BREAKS CORRESPOND TO HIGHER SPEED REDUCTION.
- WHERE APPROACH RAMPS ARE LESS THAN 6' LONG, INSTALL CHEVRON WITH THE TIP OF THE MARKING AT THE TOP OF THE RAMP AND EXTEND MARKING ONTO THE APPROACH ROADWAY.



CENTERED IN THE TRAVEL LANE 10'-14' DRIVING LANE TYPICAL 10'-14' DRIVING LANE TYPICAL

MARKING DETAIL



	APPROACH RAMP LENGTH					
ROADWAY	5-6% GRA	DE BREAK	8-10% GRADE BREAK			
ONGITUDINAL SLOPE	UPHOLL	DO/WNHILL	UPHILL	DOWNHILL		
0%	5.0'-5.5'	5.0-5.5'	3.0-3.5'	3.0'-3.5'		
	(3.0'-4.0')	(3.0-4.0')	(2.0-2.5')	(2.01-2.5')		
2%	5.0°-5.5°	5.0¥5.5'	3.0+3.5'	3.0'-3.5'		
	(3.0°-4.0°)	(3.0'-4.0')	(2.0'-2.5')	(2.0'-2.5')		
4%	5.0°-5.5°	8.0'-10.0'	3.0-3.5'	5.0'-6.0'		
	(3.0°-4.0°)	(6.5'-7.5')	(2.0-2.5')	(4.0'-5.0')		
6%	5.0°-5.5'	11.0°43.5'	3.0=3.5'	6.5° 8.5'		
	(3.0'-4.0')	(9.5°-11.5')	(2.0=2.5')	(5.5° 7.0')		

SECTION A-A



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Summary



- Programs aim to improve safety for pedestrians and bicyclists
- Projects evaluated based on ability to provide low stress connections and crossings for pedestrians and bicyclists
- Review design guide for selected treatments
- Consider injury minimization speeds and treatments to achieve these speeds
- Plan sheet details can support project development and implementation

Future Training Sessions WSDOT

- Session 1 Today
- Session 2 March 20
- Session 3 March 27
- All are virtual and will be recorded and posted to the <u>LTAP website</u> and the funding program webpages

Questions, Additional Training, and Project Photos



Briana Weisgerber, PE

Active Transportation Programs Engineer

Email: <u>briana.weisgerber@wsdot.wa.gov</u>

Phone: 564-669-4552

