WSDOT

ACTIVE TRANSPORTATION PROGRAMS DESIGN GUIDE

FEBRUARY 2024

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Part 1
Guide overview

INTRODUCTION

The Safe Routes to School (SRTS) and Pedestrian/Bicyclist (PBP) programs fund projects for people who walk, bike, or roll.

The Washington State Department of Transportation (WSDOT) created this guide to clarify details associated with treatments that the programs will favor for funding. It aims to assist local agencies and tribal governments in the preparation of applications for the SRTS program and PBP and in project delivery. Other funding programs may adopt these guidelines as they deem appropriate. Because this guidance is for safety programs, the guide emphasizes treatments intended to provide safer conditions for people who walk, bike, and roll, also known as pedestrians and bicyclists.

HOW TO USE THIS GUIDE

This guide provides information on designing and building each treatment funded by the programs to improve safety for pedestrians and bicyclists. Applicants will determine where to place treatments based on additional guidance documents referenced in this guide and engineering judgement. If applicable, drawings accompany some treatments described in this guide that applicants may adopt for use in grant applications (refer to appendix Plan sheet details).

Dimensions and design features

Project submissions that best meet the dimensions and design features included in this guide will tend to rank more favorably during the competitive grant application review. Agencies that wish to use specialized designs that exceed the active transportation intent of the designs provided in this guide may also score well in the grant application review. Local agencies and tribal governments wishing to use guidance or standards that vary from this document may provide alternate standard drawings, sample plans, or other examples with their applications.

Local agency guidelines

The Local Agency Guidelines Manual permits innovative or creative efforts that go beyond the manual's stated design standards and which could result in better quality or better cost savings. For the purposes of the SRTS program and PBP, this document serves as design guidance to ensure projects that receive funding improve safety and comfort for pedestrians and bicyclists.

Improvements on state routes

Some local agencies, tribal governments, or other applicants may sometimes prioritize a location for a proposed project that is on or adjacent to a state route; crosses a state route; or is within WSDOT rights of way. For these locations, apply the policy and guidance provided in the WSDOT Design Manual, WSDOT Standard Plans, WSDOT Standard Specifications, and other WSDOT publications as necessary, including the processes associated with design criteria, exceptions, and approvals. The applicant should coordinate through the appropriate WSDOT regional office. The applicant should also give the project schedule additional time by the regional administrator or their designee.

Level of traffic stress overview

The grant programs will use WSDOT's methodology for level of traffic stress (LTS) found in the WSDOT Design Manual, Division 15 to evaluate the performance of facilities designed for pedestrians and bicyclists. LTS, as adopted by WSDOT, uses a scale of 1 (the least stressful) to 4 (the most stressful). This guide contains design direction aimed to achieve facilities that align with the safety and comfort associated with an LTS of 1 or 2. However, the designs alone do not guarantee LTS 1 or 2, as the context of the project site plays an important role in determining LTS.

For final design, verify the design through a documented analysis, and approval by the engineer of record based on site conditions.

Equity

Consider active transportation facility location, planning, and design to serve people affected by societal disadvantages associated with race, ethnicity, income, and disabilities. WSDOT will review equity and rank each project using statewide available data. Americans with Disabilities Act (ADA) accommodations must be included. Projects that appropriately incorporate cultural design elements of public art are encouraged and may be given additional consideration in the grant selection process.

When developing a project, involve the community to inform design decisions that will best serve their needs and infuse equity into the project. Consider the following ways to create equitable and inclusive outreach as recommended by the Washington State Department of Commerce:

- "Host meetings in the evenings, and provide food and childcare
- "Offer meeting translation services, and ensure engagement materials are available in multiple languages and formats…

"When present in the jurisdiction, community-based organizations (CBOs) and representatives of these organizations can be particularly helpful partners and collaborators because of their roles as trusted partners in overburdened communities. They also bring broader community perspectives, not only the perspectives of individual community members."[1]

In addition, ensure all outreach events are easily accessible to non-drivers via public transit, virtual attendance, or other means.

For additional resource on community engagement, refer to the WSDOT Community Engagement Plan.

Designing streets for children

The funding programs aim to improve safety and mobility for all people who walk, bike, or use other active transportation modes. The guidance contained herein provides best practices to achieve all ages and abilities designs. However, the Safe Routes to School program especially focuses on the safety and mobility of children traveling to school. Children vary in sizes and abilities as they age. However, younger children especially are shorter and therefore can be harder for drivers to see and have a lower field of vision themselves. Research indicates they may also have difficulty judging driving speeds, may move less predictably than adults, and may behave more impatiently or impulsively than adults.[2] Consider ways to incorporate these characteristics into design for projects aiming to improve safety for children. Some design approaches could include:

FIGURE 1. CHILD AND ADULT BIKING ALONG SR 99 IN SEATTLE, WA.

- Widening sidewalks.
- Providing wide bicycling facilities.
- Lowering driving speeds.
- Improving conspicuity and possible traffic control at crosswalks.[3]

1 Washington State Department of Commerce. 2023. *Climate Element Planning Guidance.*
2 American Association of State Highway and Transportation Officials. 2021. *Guide for the Planning, Design, and Operation of Pedestrian Facilities, 2nd Edition*. Washington, DC.
3 Global Designing Cities Initiative. 2020. *Designing Streets for Kids*. New York.

Resiliency and green infrastructure

Although not a requirement for the funding programs, active transportation design and construction projects may present opportunities to build resiliency into infrastructure. Consider ways to minimize stormwater impacts from transportation projects with green infrastructure including raingardens, bioswales, and street trees. For more information, refer to the Washington State Department of Ecology and other regional stormwater resources.

GREEN INFRASTRUCTURE AND ACTIVE TRANSPORTATION CASE STUDY

The City of Spokane reconfigured East Indiana Avenue from a four-lane road with unbuffered sidewalks to a two-lane road with bike lanes. The redesign also alternates landscaped swales and parallel parking as a buffer between the sidewalk and the road. The city implemented the stormwater elements to address permitting needs related to the combined sewer overflows, while also improving the street for people walking and biking.

FIGURE 2. EAST INDIANA AVENUE ROAD RECONFIGURATION IN SPOKANE, WA. SOURCE: GOOGLE MAPS.

Standards for traffic control devices

The Federal Highway Administration (FHWA) classifies some treatments included in this guide as traffic control devices. As of publication, the standard for traffic control devices in Washington state is the 2009 Manual of Uniform Traffic Control Devices (MUTCD) (with Revisions 1, 2, and 3 Incorporated), and as modified by Washington Administrative Code (WAC) 468-95 . On December 19, 2023, FHWA published the 11th Edition of the MUTCD with an effective date of January 18, 2024. Washington state has 2 years from the effective date to adopt the MUTCD with possible modifications. This guide aligns with the standards outlined in the 2009 MUTCD as modified by the WAC, however once the state adopts the 11th Edition, practitioners will be required to comply with the state's adopted standard. For more information and to stay up to date on the most recent state standard, refer to MUTCD for Streets and Highways.

The treatments included in this guide fall under the following categories:

- Not a traffic control device and therefore not subject to MUTCD.
- A traffic control device consistent with core MUTCD as amended by the WAC 468-95.
- A traffic control device consistent with FHWA interim approvals that has received approval at the state level by WSDOT.
- A traffic control device consistent with FHWA interim approvals that hasn't received approval at the state level by WSDOT.
- A traffic control device that would require an FHWA approved request for experimentation.

Request for inclusion in WSDOT interim approval

WSDOT has received statewide approval for some traffic control devices for use by all local jurisdictions. However, local jurisdictions may have received their own individual approval from FHWA. Agencies with their own local approval don't need to also submit for inclusion in WSDOT's statewide approval unless those devices are to be used in state highway right-of-way.

More information about the list of statewide interim approvals can be found on the WSDOT Local Programs website.

This icon identifies treatments in the design guide included in WSDOT's statewide interim approvals.

Request for experimentation

Local and state agencies can request an experimentation from FHWA to test a new traffic control device that is either:

- Not in the 2009 MUTCD and hasn't been tested.
- In the 2009 MUTCD but the device would be used in a new way (i.e., different size, type, location) that hasn't been tested.[4]
- Not available as part of the FHWA interim approvals.

Some treatments contained in this guide as of publication will require a request for experimentation for use. The design guide includes these treatments as some jurisdictions have implemented them but are still awaiting research or approval by FHWA.

This icon identifies treatments in the design guide that require a request for experimentation

Designing for pedestrian and bicyclist safety while accommodating large vehicle turns

To prioritize pedestrian and bicyclist safety, **select the smallest feasible corner radii for turning geometry.** Smaller corner radii promote slower turning speeds, shorten crossing distances, and improve visibility between drivers and pedestrians and bicyclists, reducing the risk for bicyclists or pedestrians crossing the street. Consider setback stop bars, modified medians, and mountable truck aprons to accommodate large vehicles while still minimizing the corner radii. For more information on mountable truck aprons, refer to the WSDOT Design Manual section 1510.09(5)(a).

Consider that the geometry of the physical street corner may not represent the effective turning radius available to vehicular traffic. Parking lanes, shoulders, bike lanes, and other features that offset the travel lane from the physical curb line or painted edge lines along non-curbed roadways may allow effective turning radii that are much larger than the physical corner radii designed at a corner. Consider additional design treatments to reduce the effective turn radius.

Designing intersections considers the concept of *design* vehicle. The design vehicle is the largest typical vehicle or the vehicle that requires the most space to complete a maneuver that will commonly use the street. It may be acceptable for the design vehicle to use all the first lane and part of the second lane of the receiving street, but it isn't acceptable to encroach upon the sidewalk or curb ramps.

[4] FHWA. 2009. "Experimentations." Last modified Sept. 14, 2022

Designing to *accommodate* a vehicle means that some level of encroachment upon other lanes may be needed for the vehicle to make a particular movement. The accommodated vehicle is the largest vehicle or the vehicle that requires the most space to complete a maneuver that will rarely use the street. In addition to using all the first lane and part of the second lane of the receiving street, expect that this vehicle may use mountable elements and may enter the lane adjacent to its lane of origin. Figure 3 is an example of accommodating and designing for a large vehicle at a multilane intersection.[5]

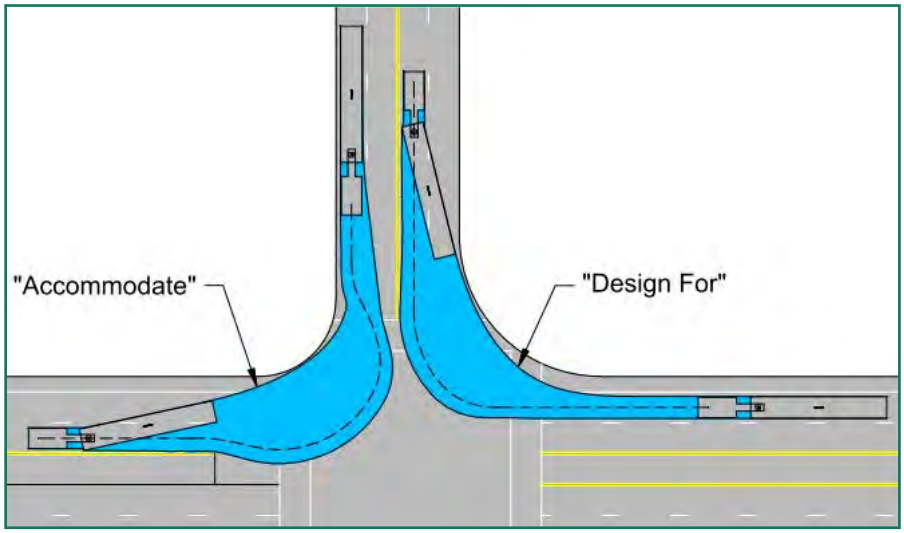

FIGURE 3. DESIGNING FOR AND ACCOMMODATING VEHICLES AT AN INTERSECTION. SOURCE: SEATTLE RIGHT-OF-WAY IMPROVEMENTS MANUAL.

Designing for vehicle turns

For SRTS and PBP projects that include corner treatments, such as reduced corner radii, curb extensions, and protected intersections, consider guidance in Table 1 to determine the appropriate design vehicle and turning speed for a corner treatment. Select a design vehicle based on the largest vehicle that regularly makes a turn at an intersection.

TABLE 1: DESIGN VEHICLES AND SPEEDS.

Intersection context	Design for
In neighborhood and residential areas	Delivery truck (DL-27)[6] at 5 mph or less[7]
In downtown or commercial areas	30-foot single unit vehicle (SU-30) at 5 mph or less[7]
In industrial areas or along designated freight routes	Largest vehicle that will frequently use the street at 5 mph or less[6]
All other publicly accessible, paved roads	30-foot single unit vehicle (SU-30) at 10 mph or less[8]

Accommodating vehicle turns

Along transit routes, accommodate the largest applicable transit vehicle or the transit vehicle that requires the most space to complete a maneuver at 5 mph or less. For all other roadways, determine the largest vehicle that will infrequently make a turn at the intersection. Analyze the corner treatments for this vehicle traveling 1-5 mph.[9]

5 City of Seattle. 2023. *Seattle Right-of-Way Improvements Manual.*
6 Bureau of Engineering and Department of Transportation. 2020. *Los Angeles Supplemental Street Design Guide*.
7 NACTO. 2019. "Design, Control, & Managed Vehicles." *Don't Give Up at the Intersection*.
8 City of Seattle. 2023. *Seattle Right-of-Way Improvements Manual*.
9 NACTO. 2019. "Design, Control, & Managed Vehicles." *Don't Give Up at the Intersection*.

ADDITIONAL GUIDANCE

This design guide is based on best practices from across the country as they apply in Washington state. The sources contained herein represent the outcomes of the most recent research and practitioner expertise in the field of pedestrian and bicyclist safety. This is a rapidly changing time for multimodal design and as such, WSDOT aims to update this guide prior to each application cycle. For more guidance about when and where to design the included treatments, refer to the most recent editions of the following:

- FHWA Accessible Shared Streets Guide
- FHWA Achieving Multimodal Networks
- FHWA Bikeway Selection Guide
- FHWA Guide for Improving Pedestrian Safety at Uncontrolled Crossing Locations
- FHWA Pedestrian Lighting Primer
- FHWA Small Town and Rural Multimodal Networks
- National Association of City Transportation Officials (NACTO) City Limits Guide
- NACTO Don't Give Up at the Intersection
- NACTO Urban Bikeway Design Guide
- NACTO Urban Street Design Guide
- NACTO Urban Street Stormwater Guide
- National Cooperative Highway Research Program (NCHRP) Research Report 926 Guidance to Improve Pedestrian and Bicyclist Safety at Intersections
- Federal Transit Administration Manual on Pedestrian and Bicycle Connections to Transit
- Association of Pedestrian and Bicycle Professionals Bicycle Parking Guidelines
- American Association of State Highway and Transportation Officials (AASHTO) Guide for the Planning, Design, and Operation of Pedestrian Facilities, Second Edition
- AASHTO Guide for the Development of Bicycle Facilities
- U.S. Access Board Public Right-of-Way Accessibility Guideliness

Part 2
Treatment toolbox

This section contains descriptions, design guidance, and additional references for active transportation treatments. When selecting treatments for an application, ensure that the treatments compliment each other and work as a system of treatments for a design. Consider and develop operations and maintenance approaches for all projects. The treatments are grouped into the following categories:

- Speed management treatments
- Crossing and intersection treatments
- Grade-separated treatments
- Illumination
- ADA improvements
- Linear treatments designed for bicyclists
- Linear treatments designed for pedestrians
- Linear treatments designed for pedestrians and bicyclists

The term “highway” is used throughout to refer to public roadways, as defined in RCW 46.04.197. “State highway” or “state route” refers to a highway designated as a state highway through legislative action.

Speed management treatments

Treatments that lower driver speeds are an important part of providing safer places for people to walk and bike. The link between speed and injury severity in crashes is consistent, direct, and especially critical for pedestrians,[10] bicyclists, and users of mobility assistive devices.[11] Pedestrians struck by a driver traveling at 30 mph have about a 50 percent chance of sustaining severe injury and a 25 percent chance of fatality.[12] The Washington State Injury Minimization and Speed Management Policy Elements and Implementation Recommendations urges owners of public roads, streets, and highways in Washington state to consider injury minimization and speed management in all transportation investments.[13]

The Manual on Uniform Traffic Control Devices - Washington State Modifications, WAC 468-95-045, directs authorities to set speed limits based on RCW 46.61.405, 46.61.410, and 46.61.415. RCW 46.61.400 sets statutory speed limits for city and town streets at 25 mph. RCW 46.61.415 allows local agencies to reduce speed limits to 20 mph on nonarterial highways within a residence district or business district without an engineering and traffic investigation, if the local authority has developed procedures regarding establishing the maximum speed limit in such areas. For more information refer to the treatment description for 20 mph speed zone designation and signs. To achieve local support for speed reductions, communicate the safety improvements of reduced speeds and coordinate with local departments, partners, and the community.

The SRTS program and PBP encourage all applicants to consider ways to set injury minimization target speeds and implement associated speed management treatments for all projects to achieve those target speeds.

Example text for a policy could include the following injury minimization target speeds to improve safety for pedestrians and bicyclists:

- Use 20-mph target for residential and business districts.
- Use 25-mph-or-less target for arterials and non-limited access state highways (or other arterials that act in a similar way) in urban, suburban, and rural town centers where origins and destinations are within walking (1 mile) or biking (3 mile) distance.

Speed management treatments in this section include engineering, traffic control, and road design elements with the potential to induce drivers to travel at target speeds. Consider setting injury minimization speed limits in combination with the treatments in this guidance. This may involve an iterative approach over time to shift a corridor from higher speeds where only a few speed management treatment options apply (i.e., automated traffic safety cameras, speed feedback signs) to lower operating speeds where local jurisdictions can install more vertical and horizontal deflection treatments (i.e., speed humps, pinch points).

For more information about setting speed limits for injury minimization, see:

- Washington State Injury Minimization and Speed Management Policy Elements and Implementation Recommendations
- NACTO City Limits Guide

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

[10] National Transportation Safety Board. 2017. "Reducing Speeding-Related Crashes Involving Passenger Vehicles." Safety Study NTSB/SS-17/01.

[11] Washington Injury Minimization and Speed Management Policy and Guidelines Workgroup. 2020. "Washington State Injury Minimization and Speed Management Policy Elements and Implementation Recommendations."

[12] Teft, Brian. 2011. *Impact Speed and a Pedestrian's Risk of Severe Injury or Death*. Washington, DC: AAA Foundation for Traffic Safety.

[13] Washington Injury Minimization and Speed Management Policy and Guidelines Workgroup. 2020. "Washington State Injury Minimization and Speed Management Policy Elements and Implementation Recommendations."

SPEED TRANSITION ZONES

In locations where a higher speed road transitions to a lower speed zone in a community, consider implementing speed transition zone treatments. Speed transition zones may exist in many land-use contexts. Some treatments include center islands, raised medians, roundabouts, roadway narrowing, lane-width reductions, textured pavement, and layered landscaping. These treatments aim to slow drivers. However, when paired with or in advance of active transportation improvements, these treatments may improve safety and comfort for pedestrians and bicyclists. In such designs, these treatments qualify for SRTS program and PBP. For more information on speed transition zones, refer to NCHRP Report 737: Design Guidance for High-Speed to Low-Speed Transition Zones for Rural Highways.

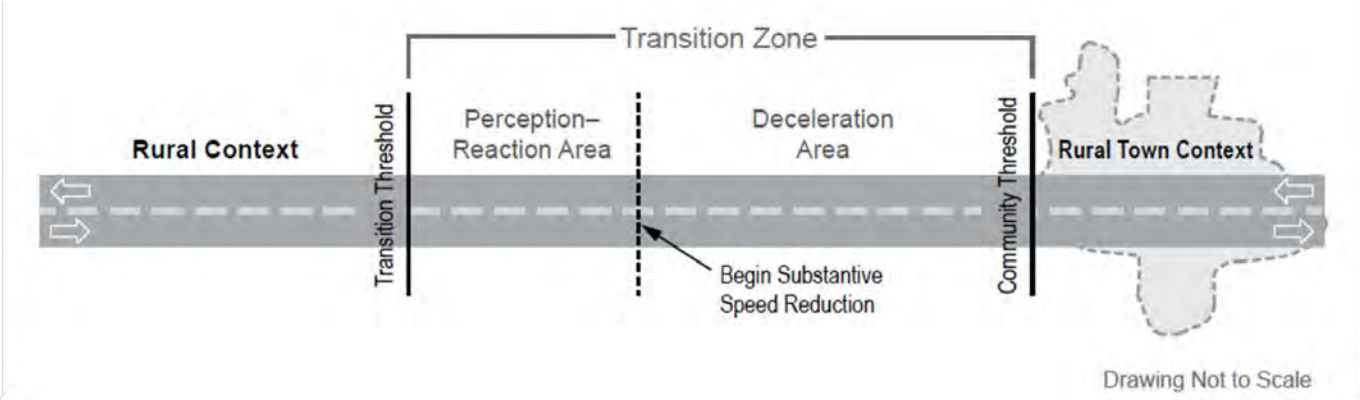

FIGURE 4. SPEED TRANSITION ZONE AREAS. SOURCE: AASHTO.

1. 20-mph speed zone designation and signs

DESCRIPTION

Setting speed limits to 20 mph on city streets reduces speeds, collisions, serious injuries, and fatalities.[14] Lower speed limits also allow agencies to design their streets for slower speeds, which can include reducing turn radii and installing vertical deflection, among other potential design treatments. Washington state law allows local agencies to establish 20-mph speed limits on non-arterial highways without the need for an engineering and traffic investigation.[15] Speeds may be set to 20 mph in a designated area or townwide/citywide. Washington state law also allows local agencies to set 20-mph speed limits on arterial highways when appropriate through resolution or ordinance, following an engineering and traffic investigation.

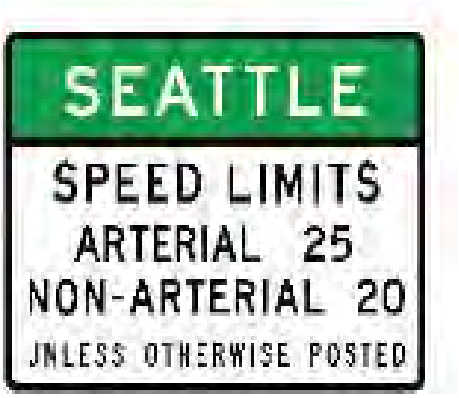

FIGURE 5. EXAMPLE SIGNAGE FOR SEATTLE'S CITYWIDE SPEED LIMITS. SOURCE: SDOT

The SRTS program and PBP can provide funds for signage to notify drivers of speed limits in an area or along a corridor with these lower speeds.

DESIGN GUIDANCE

To reduce speeds to 20 mph for a designated street or area, a local authority must adopt the speed limit reduction. If the city doesn't yet have a citywide 20-mph speed limit or a process for lowering the speed to 20 mph without a study, a local traffic engineer may perform analysis to determine where the speed reduction will apply and provide a recommendation to the local authority for adoption through resolution or ordinance.[16] If there is interest in reducing the speed limit to 20 mph for a location, consider setting a default injury minimization target speed of 20 mph in all areas that have the same context, density, and/or road characteristics.[17]

Consider other speed management treatments to supplement a 20-mph speed zone designation.

Place 20-mph signage at appropriate locations to notify drivers of speed limits in a jurisdiction or area. This may also include jurisdiction-wide signs placed at highway offramps; city or town limits; or neighborhood boundaries.[18]

City streets that also fall under WSDOT jurisdiction require approval from WSDOT regions to reduce speed limits.

DESIGN APPLICABILITY

Jurisdictions may establish 20-mph speed limits on a nonarterial highway or part of a nonarterial highway.

14 Karen Milton et. al. 2021. "Use of Natural Experimental Studies to Evaluate 20mph Speed Limits in Two Major UK Cities." *Journal of Transport & Health 22* (Sept.).
15 RCW 46.61.415.
16 Municipal Research and Services Center of Washington (MRSC). 2023. *Speed Limits and Traffic Calming*.
17 Washington Injury Minimization and Speed Management Policy and Guidelines Workgroup. 2020. "Washington State Injury Minimization and Speed Management Policy Elements and Implementation Recommendations."
18 Seattle Department of Transportation (SDOT). 2022. "Speed Limits." Accessed May 10, 2023.

COMPLEMENTARY TREATMENTS

- Speed management treatments (all)
- Bicycle boulevard

MORE INFORMATION

- NACTO City Limits
- RCW 46.64.415
- Washington State Injury Minimization and Speed Management Policy Elements and Implementation Recommendations

2. School or playground 20-mph speed zone with flashing beacons and signage

DESCRIPTION

State law allows local agencies to establish a 20-mph speed zone at a marked school or playground crosswalk when the crosswalk is posted with standard school or playground speed-limit signing, or within a speed zone on a roadway bordering a school or playground when posted. [19]

A Washington State Traffic Safety Commission study noted that "when flashing" school-zone signs were more effective in slowing vehicles than "when children are present" or "when flagged" signs. The study notes that where the approach speed to a school speed zone is 35 mph or above, schools with "when flashing" signs had significantly fewer vehicles travelling over 35 mph (3 percent) than schools with "when children are present" (30 percent) and "when flagged" signs (23 percent).[20]

FIGURE 6. SCHOOL 20-MPH SPEED ZONE SIGN ASSEMBLY IN SPOKANE, WA.

DESIGN GUIDANCE

Standard reduced school zone speed limit signing at a marked school or playground speed zone includes:

- "School" sign (S1-1) with "ahead" plaque (W16-9P).
- "School speed limit" sign assembly (S5-101).
- "School" sign (S1-1) with "arrow" plaque (W16-7P).
- "End school zone" sign (S5-2) with subsequent "speed limit" sign (R2-1) below.

The "school speed limit" sign assembly (S5-501) has three sections:

- "School" legend (S4-3) with black letters on a fluorescent yellow green background.
- "20-mph speed limit" sign (R1-1).
- "Window of enforcement" legend.

Coordinate with the school district to determine the enforcement time. Select the enforcement legend from any of the following:

- "When flashing" sign (S5-1) used in conjunction with a flashing beacon above the sign, as described in MUTCD Section 4L.04.
- "When children are present" sign (S5-101) used in conjunction with definitions provided in WAC 392-151-035 and WAC 468-95-350.
- "When flagged" sign (S5-102) used in conjunction with warning flags included 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." sign (S4-5) used to display the specific hours of the school speed limit.

[19] RCW 46.61.440.
[20] WSDOT 2021. *Traffic Manual M 51-02.10*. (Engineering and Regional Operations).

Supplement the "school speed zone sign" assembly with flashing beacons to draw attention and increase compliance with the reduced speed zone.

Per MUTCD Section 4L.04:

> "A Speed Limit Sign Beacon shall consist of one or more signal sections of a standard traffic control signal face, with a flashing CIRCULAR YELLOW signal indication in each signal section. The signal indications shall have a nominal diameter of not less than 8 inches. If two signal indications are used, they shall be vertically aligned, except that they shall be permitted to be horizontally aligned if the Speed Limit (R2-1) sign is longer horizontally than vertically. If two signal indications are used, they shall be alternately flashed."

Install a power source through solar panel or electrical connection.

DESIGN APPLICABILITY

- The limits of a school or playground speed zone: "three hundred feet from the border of the school or playground property; however, the speed zone may only include area consistent with active school or playground use."[21]
- Highways where the approach speed to a school speed zone is 35 mph or more, or where a wide roadway increases children's exposure.
- Three hundred feet from a marked school or playground crosswalk, "when such marked crosswalk is fully posted with standard school speed limit signs or standard playground speed limit signs. The speed zone at the crosswalk shall extend three hundred feet in either direction from the marked crosswalk."[21]
- If a crosswalk and school or playground are along the same segment of road, a local agency determines whether to extend the speed zone 300 feet from the crosswalk or the border of the property.

COMPLEMENTARY TREATMENTS

- High-visibility crosswalk
- Stop line at an uncontrolled crosswalk
- Automated traffic safety camera
- Speed management treatments (all)

MORE INFORMATION

- WSDOT Traffic Manual
- RCW 46.41.440

PLAN SHEET DETAILS

- 2 - 20-mph Speed Zone Designation and Signs

21 RCW.46.61.440.

3. Speed feedback sign

DESCRIPTION

Speed feedback signs display a driver's speed when they approach or exceed the posted speed limit. Speed feedback signs reduce speeds by 2-4 mph across all vehicle types.[22] While these results are modest, even small reductions in operating speed can reduce speeding-related crashes and improve crash outcomes for all roadway users. Speed feedback signs are likely to be more effective when combined with other speed management treatments.

FIGURE 7. SPEED FEEDBACK SIGN IN OAK HARBOR, WA.

DESIGN GUIDANCE

Speed feedback signs consist of a speed limit sign; a speed-measuring device; loop detectors or radar; and a message sign that displays the driver's speed. Program signs to not display actual driving speeds at a set speed above the speed limit (typically 2-5 mph above the speed limit) to discourage the practice of some drivers attempting to cause the sign to display very high speeds. At higher speeds, the sign may include a message such as "slow down" or other beacon to warn drivers of their speed.[23]

Per the Washington State Modifications to the MUTCD, "the legend your speed xx (mph) or such similar legend should be shown. The color of the changeable message legend should be a yellow legend on a black background or the reverse of these colors."

Place speed feedback signs behind the curb or edge of roadway with **300 feet** of clear sight distance on the approach. Consider light intrusion into neighboring buildings and provide blinders to minimize the effect, if necessary.[24] Determine the operating speed that will activate the feedback sign.

Install a power source through solar panel or electrical connection.

DESIGN APPLICABILITY

Appropriate on most roadways with frequent speed violations. Especially consider implementation on roads where 15 percent or more of drivers exceed the speed limit by 5 mph or more.[25]

COMPLEMENTARY TREATMENTS

- Speed management treatments (all)

22 Fisher, D. L., Breck, A., Gillham, O., & Flynn, D. 2021. *Effectiveness of Dynamic Speed Feedback Signs Volume I: Literature Review and Meta-Analysis*. (Report No. DOT HS 813 170-A). National Highway Traffic Safety Administration.
23 Zineddin, Abdul, Shauna Hallmark, Omar Smadi, and Neal Hawkins. "Spotlighting Speed Feedback Signs". *Public Roads* vol. 79, no. 5.
24 City of Bellevue Transportation Department. 2009. *Stationary Radar Sign Program 2009 Report*.
25 SDOT. 2023. "Radar Speed Sign."

MORE INFORMATION

- Washington State Modifications to the MUTCD
- City of Bellevue 2009 Stationary Radar Sign Report
- Institute of Transportation Engineers (ITE) Unsignalized Intersection Improvement Guide

PLAN SHEET DETAILS

- 3- Speed Feedback Sign

4. Automated traffic safety camera

DESCRIPTION

Automated traffic safety cameras detect driver speeds or traffic violations and capture photographs of vehicles and license plates.[26] Agencies can then work with local law enforcement to issue penalties to the owner of the vehicle. This treatment reduces overall crashes on urban principal arterials up to 54 percent[27] and reduces speed violations in school zones by 63 percent during school hours. [28]

Washington state law allows the use of automated traffic safety cameras in designated areas to detect speed, red light, and railroad crossing violations. Additional locations and uses outlined in state law authorize certain agencies to use automated traffic safety cameras under pilot projects. [29]

FIGURE 8. AUTOMATED TRAFFIC SAFETY CAMERA IN KIRKLAND, WA. SOURCE: CITY OF KIRKLAND

DESIGN GUIDANCE

Pair automated traffic safety cameras with other roadway improvements to slow traffic. Consider using automated traffic safety cameras as part of an iterative process to reduce operating speeds and lower posted speed limits.

Place signs notifying drivers of the use of an automated traffic safety camera and their presence in a school walk area, public park speed zone, or hospital speed zone, if applicable. Install the signs at least 30 days prior to the activation of the camera. Place cameras to primarily take pictures of the vehicle and the vehicle license plate and minimize the effect of the flash on drivers.

If located within a school speed zone, program the automated traffic safety cameras to operate at the correct speeds during and after school zone speeds are in effect.

Conduct community outreach in advance of placing automated traffic safety cameras. Consider the equitable distribution of this treatment across a community to ensure cameras aren't only placed in overburdened communities. Place automated traffic safety cameras in conjunction with other roadway safety improvements.

RCW 46.63.170 outlines more information on required ordinances, enforcement, and permitted uses. Follow the appropriate processes and procedures outlined in the RCW prior to proposing automated traffic safety cameras as part of a project funded by SRTS or PBP.

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26 FHWA. 2021. "Speed Safety Cameras." *Proven Safety Countermeasures.*

27 Shin et al. "Evaluation of the Scottsdale Loop 101 automated speed enforcement demonstration program." Accident Analysis and Prevention, Vol. 41, (2009).

28 New York City DOT. 2018. Automated Speed Enforcement Program Report 2014-2017.

29 RCW 46.63.170.

DESIGN APPLICABILITY

- Within a school speed zone, school walk area, public park speed zone, or hospital speed zone:[30]
  - "School speed zone" means an area extending up to 300 feet from the border of the school property within the area consistent with active school use.[31]
  - "School walk area" means the area around a school with an adequate roadway configuration to provide students access to school with a walking distance of less than one mile.[32]
  - "Public park speed zone" means the marked area within public park property and extending 300 feet from the border of public park property.
  - "Hospital speed zone" means the marked area within hospital property and extending 300 feet from the border of hospital property"[33]
- Additional locations permitted for certain jurisdictions based on state law.
- High-risk corridors based on local road safety plans or with demonstrated crash histories.

COMPLEMENTARY TREATMENTS

- Speed management treatments (all)

MORE INFORMATION

- FHWA Proven Safety Countermeasures – Speed Safety Cameras
- NCHRP 729 Automated Enforcement for Speeding and Red Light Running

30 Ibid.
31 RCW 46.61.440
32 RCW 28A.160.160
33 RCW 46.63.170

5. Lane width reduction

DESCRIPTION

The designed width of traffic lanes has direct effects on driving speed, pedestrian street crossing distances, and the ability to add facilities for other modes including pedestrian refuge islands, bike lanes, sidewalks, and landscaping. Roadways may have existing lane widths that encourage high driving speeds. Narrowing travel lanes to 9-11 feet, depending on the context, can promote slower driving speeds and as a result, reduce the severity of crashes should they occur.[34] At signalized intersections, narrower lanes can reduce the pedestrian crossing distance, allowing for shorter pedestrian crossing phase lengths and reducing pedestrian exposure.

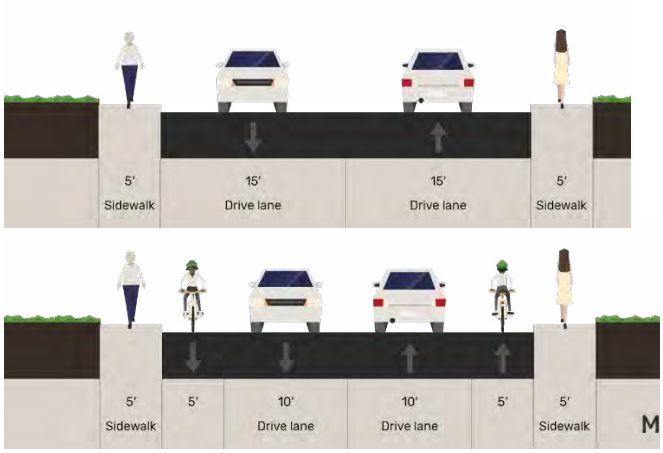

FIGURE 9. LANE WIDTH REDUCTION ON A ROAD WITH A 25-MPH POSTED SPEED LIMIT. SOURCE: STREETMIX.

DESIGN GUIDANCE

APPLIES TO SPEED MANAGEMENT

Restripe lanes to create cross section space for other treatments. Consider **0.5-foot** increments within the parameters specified below if it will allow for a compromise to accommodate better pedestrian and bicyclist facilities.

Unless along a road classified as a state highway, use the following vehicle lane widths:

Context	Lane Width
Low-speed, lower-volume roads with no bike lanes	Consider through lane widths as narrow as **9 feet** if feasible.[35]
All roads under 35 mph	Use **10 feet** (preferred) or **11 feet** (maximum) for all through lanes and **9 feet** (minimum) for turn lanes.[36] If along a roadway with high truck or transit volumes, provide necessary turn lane and outside through lane widths of **11 feet**.[37]
Roadways with speeds over 35 mph	Use **11 feet** for through lanes and **10 feet** for turn lanes if there is minimal truck or transit turning volumes.[38]
Parking lanes	Use **7-9 feet** depending on the context of the road and typical vehicle type using the parking lane.[39] For accessible parking spaces, use **13 feet** per the Public Right-of-Way Accessibility Guidelines (PROWAG) unless providing accessible parking spaces during alterations as outlined in PROWAG.[40]

Where existing lane widths exceed **12 feet** on corridors with heavy freight activity, transit, or high vehicle volumes, reduce lane widths to **12 feet** and consider implementing additional speed management treatments.

34 NACTO. 2013. "Lane Width." *Urban Street Design Guide.*
35 AASHTO. 2018. *A Policy on Geometric Design of Highways and Streets, 7th Edition*. Washington, DC..
36 Ibid
37 National Academies of Sciences (NAS), Engineering, and Medicine. 2022. Roadway Cross Section Reallocation: A Guide. Washington, DC: The National Academies Press.
38 AASHTO. 2018. *A Policy on Geometric Design of Highways and Streets, 7th Edition*. Washington, DC.
39 Ibid.
40 U.S. Access Board. 2023. *Public Right-of-Way Accessibility Guidelines.*

On lower speed, lower volume neighborhood streets with highly utilized parking, consider implementing yield streets that provide a single bidirectional through lane with parking arranged to allow opposing vehicles periodic yield space. Provide a **10- to 18-foot** travel lane for two-way vehicular travel. Consider yield streets where drivers can see oncoming vehicles with sufficient warning to allow time to yield to one another.[41] Coordinate with local emergency services, fire departments, and other applicable city services (e.g., garbage removal, delivery services) when implementing this lane width.

Per PROWAG, provide a minimum of 1 accessible parking space for every 25 parking spaces up to 100 spaces and refer to PROWAG table R211 for further information. For parallel parking spaces, provide **13 feet** minimum width unless the project includes the alterations outlined in PROWAG R310.2.1. For alteration projects, provide the same minimum accessible parking space width as the adjacent spaces. Place the accessible spaces nearest the crosswalk and a curb ramp serving the crosswalk.

For projects on state routes, refer to the WSDOT Design Manual regarding lane widths.

DESIGN APPLICABILITY

All roads with lane widths greater than the recommended dimension per the roadway context listed above.

COMPLEMENTARY TREATMENTS

- Road reconfiguration
- Median diverter for multi-stage crossing
- Linear treatments designed for pedestrians (all)
- Bike lanes
- Buffered bike lanes
- Separated bike lanes

MORE INFORMATION

- AASHTO A Policy on Geometric Design of Highways and Streets 2018
- NCHRP 1036 – Roadway Cross Section Reallocation: A Guide

41 NACTO. 2013. "Yield Street." *Urban Street Design Guide*.

6. Road reconfiguration

DESCRIPTION

Road reconfigurations (also known as "road diets") involve repurposing the existing cross section to reduce the number of vehicle travel lanes and create space for other uses. Road reconfigurations can improve safety for pedestrians and bicyclists along or across roadways. They can reduce the number of vehicular lanes a pedestrian must cross while also providing space for improved sidewalks or bike lanes along the corridor.

Road reconfigurations can also contribute to a more appropriate contextual use of the public right of way in town centers and urban areas. In these cases, road reconfigurations can support town center revisioning projects and other urban revitalization projects.

Road reconfigurations that result in one lane in each direction can reduce high end driver speeding and aggressive passing movements. Where they provide a dedicated left turn lane for vehicles outside the path of the through lanes, they can reduce the amount of lane changing from vehicles trying to pass left-turning traffic in a through lane.

Consider road reconfigurations in locations with planned land use changes, high incidence of crashes, public interest, or excess vehicle capacity. FHWA recommends 4-lane to 3-lane road diets on roads with an average daily traffic of 25,000 vehicles per day (vpd) or less, however locations with higher vpd may also be candidates for road reconfiguration based on safety or mobility needs.[42]

FIGURE 10. ROAD RECONFIGURATION. SOURCE: FHWA.

DESIGN GUIDANCE

A road reconfiguration can occur with only restriping or involve partial or full reconstruction of the roadway. For all road reconfigurations, develop a cross section that improves safety for all roadway users.[43]

Road reconfigurations include removing at least one vehicular travel lane, turn lane, or parking lane for the purposes of:

- Constructing or widening a sidewalk or sidepath.
- Constructing or widening a bike lane.
- Creating a buffer for a sidewalk, sidepath, or bike lane.
- Improving pedestrian or bicyclist crossings with enhanced features such as a pedestrian refuge island.
- Reducing the number of lanes a pedestrian or bicyclist must cross.
- Other safety improvements for bicyclists or pedestrians.
- Adding accessible parking spaces.

42 FHWA. 2022. "Road Diets (Roadway Reconfiguration)." *Proven Safety Countermeasures*.
43 NAS, Engineering, and Medicine. 2022. *Roadway Cross Section Reallocation: A Guide*. Washington, DC: The National Academies Press.

Also consider ways to manage access along a corridor to reduce conflicts at intersections, driveways, and bus stops. Limit driver movements where applicable with medians or raised curb. For more on corridor access management, refer to the FHWA Proven Safety Countermeasures.

DESIGN APPLICABILITY

- For 4-lane to 3-lane reconfigurations, generally roads with 25,000 vpd or less.[44] On higher volume roads, use engineering judgement to determine the feasibility of a road reconfiguration.
- Roads with four or more lanes and, if possible, on roads with two or three lanes in the appropriate context.

COMPLEMENTARY TREATMENTS

- Lane width reduction
- Pedestrian refuge island
- Bike lanes
- Buffered bike lanes
- Separated bike lanes
- Linear treatments designed for pedestrians (all)
- Shared-use path

MORE INFORMATION

- NCHRP 1036 - Roadway Cross Section Reallocation: A Guide
- FHWA Proven Safety Countermeasures – Road Diets

[44] FHWA. 2022. "Road Diets (Roadway Reconfiguration)." *Proven Safety Countermeasures*.

7. Chicanes

DESCRIPTION

Chicanes are a speed management strategy that use alternating curves or lane shifts to direct a driver back and forth along a road. This movement encourages slower speeds for drivers and can also discourage drivers from using roads prioritized for pedestrians and bicyclists. Bicycle boulevards can include chicanes to slow drivers and provide a safer place for bicyclists to ride.

FIGURE 11. CHICANES IN SEATTLE, WA. SOURCE: DONGHO CHANG.

DESIGN GUIDANCE

Implement chicanes with the construction of physical barriers that extend from the curb on alternating sides along a road. Physical barriers may include curbed landscape areas or other similar treatments. Because of their shape and relationship to the through curb line, these treatments also make good candidates for green stormwater infrastructure locations. Alternatively, to create a chicaning effect, consider alternating highly used on-street parking (angled or parallel) between lane shifts if contextually appropriate, such as along a neighborhood street or commercial corridor.

If implemented along a two-way road with two full-width lanes, consider a median or hardened centerline treatment to prevent drivers from cutting a straight path across the centerline.[45] This treatment is not necessary if chicanes are located on neighborhood yield streets.

Along roads with bike lanes, continue bike lanes straight between the chicane and the curb or edge of roadway. Provide a **5-foot minimum** clearance from the edge of the gutter to the face of the chicane curb. When using this arrangement, paint chicane curbing white to ensure visibility by bicyclists and consider object markers to increase visibility. Provide curb radii or tapered entrances on the upstream side of the bike lane cut through at a minimum (don't design the curb with sharp corners at the entry side of the bike lane cut through). Consider drainage effects and snow or leaf removal with this design.

Provide sufficient width for emergency vehicle access and large vehicles at slow speed if along a route with high truck or bus volumes. For corner or midblock treatments intended to reduce pedestrian crossing distances refer to curb extension.

DESIGN APPLICABILITY

- Local streets or lower-volume roads.
- One-lane, one-way, and two-lane, two-way roads.
- Roads with or without curb and gutter.
- Typically roads with 30 mph or less posted speeds.
- Compatible with transit routes if designed properly to accommodate buses.

[45] FHWA. "3.5 Chicane." *Traffic Calming e-Primer*.

COMPLEMENTARY TREATMENTS

- Bicycle boulevard

MORE INFORMATION

- FHWA Traffic Calming e-primer

PLAN SHEET DETAILS

- 7- Chicanes

8. Neighborhood traffic diverter

DESCRIPTION

Neighborhood traffic diverters are physical barriers that restrict vehicle movements at an intersection, while still allowing pedestrians and bicyclists to pass. This treatment is typically applied to a minor street approach and reduces motor vehicle volumes along a street segment by preventing cut through traffic. Diverters create lower volume streets and as a result help convert streets to bicycle boulevards. Where they restrict turning movements, neighborhood traffic diverters also reduce the number of potential driver and pedestrian/bicyclist conflict points at an intersection.

FIGURE 12. NEIGHBORHOOD TRAFFIC DIVERTER IN SPOKANE, WA.

DESIGN GUIDANCE

There are four main types of traffic diverters:

- **Diagonal diverters –** Place the diverter diagonally across the intersection to force drivers on all approaches to turn left or right only. Construct cut outs through the center of the intersection wide enough for a bicycle, tricycle, and adaptive bicycle/tricycle to pass, but not large enough for a vehicle.
- **Median diverter** – Place a median island in the centerline of the crossing street to prevent motor vehicles from passing straight through or turning left at the intersection. Construct cut outs wide enough for a bike to pass over the median island.
- **Partial closure –** With a curb extension or a median, close one direction of vehicular traffic for at least one leg of an intersection. Maintain a **5-foot minimum** for bicycle movements only and mark it for bicycle access with markings and signs.
- **Full closure –** With curb extensions or other barriers, prohibit vehicular access at one leg of an intersection entirely. Maintain a **5-foot minimum** cut through access for bicyclists per direction. Accommodate emergency vehicle access if needed. Full closures will typically require that the roadway being closed off be provided a vehicular turnaround at the end of the closed block.

For all treatments, use appropriate signage and markings to notify drivers of closures or required turns. Consider placing landscaping, art, or other materials within the diverter. If accommodating emergency vehicle access across the diverter, ensure landscaping or other materials are traversable by those vehicles.

Consider the street network and possible circulation and business access limitations when restricting vehicular movement at an intersection.

DESIGN APPLICABILITY

- Along bicycle boulevards to reduce vehicular volumes overall or to mitigate for possible increases in vehicular volumes due to the removal of stop signs that aim to improve efficiency for bicyclists along a bicycle boulevard.[46]
- Typically, at the intersection of two lower-volume and low-speed streets. Also feasible at an intersection with only one lower-volume and low-speed street.
- Where vehicular volume reduction will improve safety for pedestrians and bicyclists.
- Streets with desired volumes of below 3,000 vpd or on higher volume roads at intersections with low volume streets.

COMPLEMENTARY TREATMENTS

- Bicycle boulevard
- Curb extension

MORE INFORMATION

- NACTO Urban Bikeway Design Guide
- BikeSafe

PLAN SHEET DETAILS

- 8 - Neighborhood Traffic Diverter

[46] NACTO. 2014. "Volume Management." *Urban Bikeway Design Guide, Second Edition.*

9. Median diverter for multi-stage crossing

DESCRIPTION

In contrast to neighborhood traffic diverters, median diverters are generally applied within the median of a major street. Median diverters prohibit drivers at minor street approaches from traveling straight or left at an intersection and drivers on the major street from turning left while still allowing pedestrians and bicyclists to cross. Median diverters can also provide refuge for pedestrians and bicyclists at a multi-stage crossing. The channelization reduces cut through traffic to create lower vehicular volume facilities and improve pedestrian and bicyclist comfort while also allowing pedestrians and bicyclists to cross one direction of vehicle traffic at a time.[47]

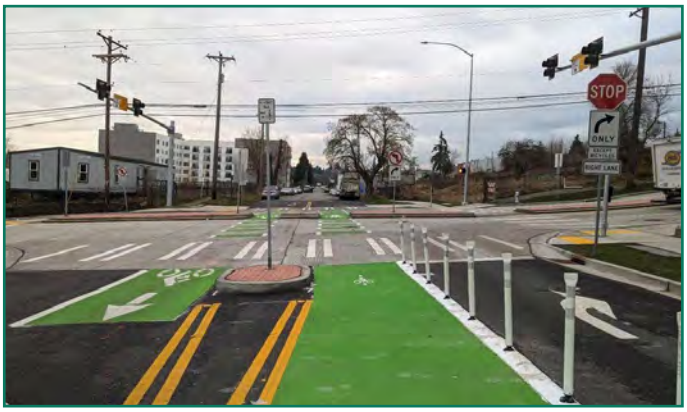

FIGURE 13. MEDIAN DIVERTER IN TACOMA, WA. SOURCE: DONGHO CHANG.

DESIGN GUIDANCE

At the intersection, construct a median to prevent through vehicle travel from the side street approaches. Use a median or posts, curb, or other physical barrier along the center of the mainline road through the intersection and placed at a sufficient length leading up to the intersection to prevent drivers on the mainline from turning left. Provide cut outs in the median diverter wide enough for the pedestrian or bicyclist crossing. Install illumination for the intersection.

Provide an **8-foot minimum** median width to accommodate a bicyclist and a pedestrian refuge.[48] Consider a **10- to 12-foot** median width to allow bicyclists with trailers, cargo bikes, adaptive cycles, or other longer devices devices to fit within the refuge island. At uncontrolled crossings, consider other crossing treatments such as a rectangular rapid flashing beacon, pedestrian hybrid beacon, advance-stop lines, or in-street "stop for pedestrian" sign to enhance the visibility of the crossing.

Mark high-visibility crosswalks across the intersection. Consider bicycle intersection crossing markings to direct bicyclists across the intersection. Consider the street network and possible circulation and business access limitations when restricting vehicular movement at an intersection.

DESIGN APPLICABILITY

- Crosswalk and/or bicycle boulevard crossing at an intersection.
- Bicycle boulevard crossing of a major road.
- Pedestrian and/or bicycle routes where the sidewalk or linear bicycle facility on a side street crosses an arterial or a road with an LTS rating of 3 or 4.

47 FHWA. 2014. "Traffic Diverter." *BikeSafe.*
48 SDOT. 2017. "Median Diverter Island and Standard Median or Crossing Islands." *Seattle Right-of-Way Improvements Manual.*

COMPLEMENTARY TREATMENTS

- Illumination
- Half signal for pedestrians and bicyclists
- Stop line at a controlled crosswalk
- Stop line at an uncontrolled crosswalk
- Stop sign
- Bicycle intersection crossing markings
- Bicycle boulevard

MORE INFORMATION

- NACTO Urban Bikeway Design Guide
- BikeSafe
- Seattle Streets Illustrated

PLAN SHEET DETAILS

- 9- Median Diverter for Multi-Stage Crossing

10. Neighborhood traffic circle

DESCRIPTION

Neighborhood traffic circles are small circular islands located in unsignalized intersections that allow traffic to flow in one direction around them. This treatment slows traffic approaching the intersection and reduces the potential for high-angle, head-on, and left-turning crashes. Neighborhood traffic circles encourage lower driving speeds and discourage through motorist traffic in neighborhood street networks. Neighborhood traffic circles may include landscaping, pavers, artwork, or street trees on the island. Some traffic circles may be fully or partially mountable to allow larger vehicles to pass over portions of the circle if needed.[49]

FIGURE 14. NEIGHBORHOOD TRAFFIC CIRCLE IN BELLINGHAM, WA.

DESIGN GUIDANCE

Restrict parking within **30 feet** of the intersection. Provide a center island to accommodate a **16- to 20-foot-wide** circulating lane. Consider a mountable truck apron to accommodate vehicles larger than a DL-27. Design the center island to allow a DL-27 vehicle to navigate the intersection without mounting a truck apron. If the intersection frequently accommodates SU-30 or larger vehicles, design a fully mountable island.[50]

Consider including landscaping in the center island while maintaining mature landscaping heights in line with sight distance requirements.[51] Account for maintenance to prevent obstructing visibility at the intersection. If designing a fully mountable island, ensure the color and texture of the center island is distinct from the circulating roadway.

Consider including splitter islands with paint at the approaches to the traffic circle. If placed in a high pedestrian area, mark crosswalks on all approach legs.

If placed along a bicycle boulevard, include wayfinding route markings and signage to direct bicyclists along the bicycle route.

DESIGN APPLICABILITY

- Meet all the following characteristics:
  - Intersection of two lower-volume and low-speed streets (generally less than 3,000 vpd and 25 mph speed limit) including T-intersections.
  - Intersection of one-way or two-way streets.
- Not typically appropriate for an offset intersection.
- Streets may or may not have curb and gutter.

49 FHWA. "3.8 Small Modern Roundabout and Mini-Roundabout (Not Traffic Circle)." *Traffic Calming e-Primer.*
50 Bureau of Engineering and Department of Transportation. 2020. Los Angeles Supplemental Street Design Guide.
51 SDOT. 2023. "Traffic Circles."

COMPLEMENTARY TREATMENTS

- Bicycle boulevard

MORE INFORMATION

- FHWA Traffic Calming ePrimer
- NACTO Urban Street Design Guide

PLAN SHEET DETAILS

- 10 - Neighborhood Traffic Circle

11. Choker

DESCRIPTION

Chokers (also known as pinch-points) extend the curb into the roadway, narrowing the roadway width. This treatment encourages slower driver speeds. At mid-block crosswalks, chokers or pinch-points may also reduce pedestrian crossing distances and provide physical barriers to restrict parking near the crosswalk. Chokers can also narrow two-lane roads to one-lane at points, requiring drivers to slow and yield to each other when passing through the choker. For chokers at mid-block crosswalks, refer to physical barrier to restrict parking near crossings or curb extensions.

FIGURE 15. CHOKER WITH BIKE PASSAGE IN BELLINGHAM, WA.

DESIGN GUIDANCE

Construct one choker on either side of the road at the desired pinch-point. Extend the choker for the width of the parking lane if present or to narrow the road to the width of either one or two vehicle lanes between the chokers. Consider narrowing two-lane roads to one through-lane at a pinch point on low-speed, lower-volume roads.

Reconstruct the curb to extend out to the face of the choker or maintain a drainage channel and construct the choker detached from the existing curb line. Consider placing landscaping, street trees, planters, bike parking, or other decorative elements in the choker while still maintaining clear sightlines for drivers and pedestrians if at a crosswalk. This treatment may include a median island on two-lane, two-way roads to allow drivers to pass each other comfortably while also visually narrowing the traveled way.[52]

Along roads with separated bike lanes, continue the separated bike lanes straight between the choker and the curb or edge of roadway. Provide a **5-foot** minimum clearance from the edge of the gutter to the face of the choker curb. Consider drainage effects and snow or leaf removal with this design. When using this arrangement, paint curbing white to ensure visibility for bicyclists and consider object markers to increase visibility. Provide curb radii or tapered entrances on the upstream side of the bike lane cut through at a minimum. Don't design the curb with sharp corners at the entry side of the bike lane cut through.

Along roads with bike lanes, bend the bike lanes behind the choker, as with separate bike lanes, or include sufficient width within the choker to accommodate the bike lane and the travel lane.

In business districts, consider parklets within a parking lane to provide the effect of chokers. Maintain a **20-foot** clearance between the parklet and a pedestrian crossing to ensure visibility of crossing pedestrians.

For development/design-only projects on state routes, consider using Washington's Safe, Healthy, and Active Streets Program to temporarily reallocate lanes to provide pedestrians, bicyclists, and residents more access to public space, goods, and services. For more information, refer to Washington's Safe, Healthy, and Active Streets Program.

[52] FHWA. "3.17 Choker." *Traffic Calming e-Primer*

DESIGN APPLICABILITY

- Often with on-street parking.
- One-lane, one-way, or two-lane, two-way roads.
- Generally less than 3,000 vpd and 25 mph speed limit.

COMPLEMENTARY TREATMENTS

- Physical barrier to restrict parking near crosswalk
- High-visibility crosswalk
- Stop line at an uncontrolled crosswalk
- Rectangular rapid flashing beacon
- Bicycle boulevard

MORE INFORMATION

- FHWA Traffic Calming ePrimer
- NACTO Urban Street Design Guide

PLAN SHEET DETAILS

- 11 - Choker

12. Raised intersection

DESCRIPTION

Raised intersections are raised areas covering intersections with ramps for drivers on all legs. This treatment improves intersections for pedestrian and bicyclist use by slowing driver operating speeds.[53] In particular, raised intersections calm traffic and increase vulnerable user conspicuity to support safer pedestrian and bicyclist crossings. Typically, a raised intersection doesn't require ADA curb ramps because it maintains a level crossing at sidewalk height across the whole intersection.

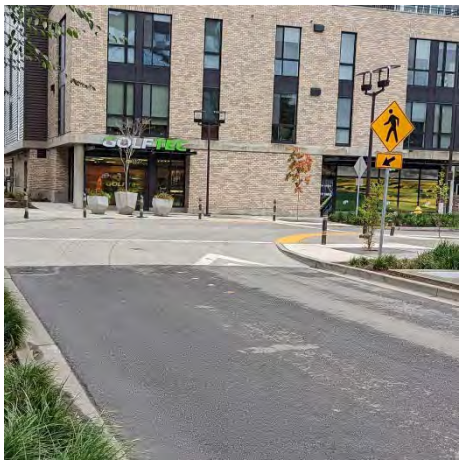

FIGURE 16. RAISED INTERSECTION IN BELLEVUE, WA. SOURCE: DONGHO CHANG.

DESIGN GUIDANCE

Construct ramps for drivers at each approach to meet the height of the sidewalk. Create a level landing area that covers the whole intersection and includes all crosswalks. Provide tactile warning for pedestrians with visual disabilities at the edge of the sidewalk before entering the intersection.

Consider constructing raised intersections with patterned pavement, pavers, or other material that meets ADA requirements to notify all roadway users of the raised intersection. Consider vertical barriers such as bollards at the corners where driver encroachment onto the sidewalk is a concern. Consider effects to access covers for underground utilities. This treatment may also require drainage modifications.

DESIGN APPLICABILITY

- Signalized or all-way stop controlled intersections with three or more legs.
- Generally at intersections that warrant crosswalks on all legs.
- Residential or commercial areas.
- Maximum speed limit of 35 mph.
- Traffic volume on each approach 10,000 vpd or less.
- If along an emergency route or transit route, coordinate with emergency services or the local transit agency.
- Maximum roadway grade of 8 percent.

COMPLEMENTARY TREATMENTS

- Bicycle boulevard
- Chicanes
- Neighborhood traffic diverter
- Speed hump
- Speed table

[53] FHWA. "3.15 Raised Intersection." *Traffic Calming e-Primer.*

MORE INFORMATION

- FHWA Traffic Calming ePrimer

PLAN SHEET DETAILS

- 12 - Raised Intersection

13. Speed hump or speed cushions

DESCRIPTION

Speed humps are raised mounds on the roadway that calm streets for pedestrian and bicyclist use by slowing driver operating speeds. Used in a series, this treatment can support bicycle boulevard development by deterring drivers from using the street and as a result, may reduce motorized traffic by an average of 20 percent.[54] Speed humps reduce overall crashes by 33-48 percent.[55]

FIGURE 17. SPEED HUMP IN BELLEVUE, WA. SOURCE: ROHIT AMMANAMANCHI.

DESIGN GUIDANCE

Construct a speed hump as wide as the travel width of the road. Provide a **1-foot** gap between the curb and the beginning of the speed hump on streets with curbs or a **6-inch** gap from the edge of a non-curbed street. Speed humps typically range from **3-4 inches i**n height.[56] Refer to Table 2 for recommended speed hump geometric characteristics for varying contexts.

Along bicycle boulevards or to better accommodate emergency vehicles, consider providing gaps within the hump to create speed cushions. This design still provides vertical deflection for smaller passenger vehicles, while allowing emergency vehicles to straddle the hump and bicyclists to pass between the humps.[57]

Place speed humps approximately **150-250 feet** from an intersection.[58] Space speed humps and other vertical deflection treatments between **200-400 feet** apart.[59]

Provide sufficient signage and markings to notify drivers of the presence of a speed hump. Consider the use of "speed hump" signs (W17-1) with advisory speed plaques (W13-1P) at the location of speed humps.[60]

In locations without sidewalks, consider providing **48 inches** clear on either side of the speed hump for people walking, using a wheelchair, or other mobility device to avoid having to traverse the speed hump.[61]

Consider speed hump profiles shaped as sinusoidal, circular, parabolic, or straight. This guidance recommends considering sinusoidal or straight profiles. However, consider other profiles based on local experience. If installed in an area with snow removal, consider designing the speed hump with a sinusoidal profile to better accommodate snowplows.[62] Coordinate with local maintenance crews, emergency services, and transit authorities prior to installing speed humps or cushions. Consider installing signs or markers adjacent to speed humps or cushions to alert snowplow drivers of their placement.[63]

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54 FHWA. "4.1 Speed Hump and Speed Cushion." *Traffic Calming e-Primer.*
55 FHWA. 2014. "Engineering Speed Management Countermeasures: A Desktop Reference of Potential Effectiveness in Reducing Crashes."
56 FHWA. "4.1 Speed Hump and Speed Cushion." *Traffic Calming e-Primer.*
57 Ohio Department of Transportation. 2023. *Multimodal Design Guide.*
58 FHWA. "3.10 Speed Hump." *Traffic Calming e-Primer.*
59 Ohio Department of Transportation. 2023. *Multimodal Design Guide.*
60 FHWA. 2009. "2009 Manual of Uniform Traffic Control Devices (with Revisions 1 and 2 Incorporated)." Last modified Sept. 14, 2022.
61 Disability Mobility Initiative. (2023, November 1). WSDOT Active Transportation Design Guide Workgroup.
62 FHWA. 2020. *Agencies Design Raised Crosswalks for Snow, Rain, and Heavy Vehicles.*
63 FHWA. "Module 5: Effects of Traffic Calming Measures on Non-Personal Passenger Vehicles." Traffic Calming e-Primer.

TABLE 2: VERTICAL DEFLECTION CHARACTERISTICS AND DESIRED MOTORIST SPEED AT CROSSING. SOURCE: OHIO DOT MULTIMODAL DESIGN GUIDE.

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

DESIGN APPLICABILITY

- Residential or other, lower-volume street.
- Single-lane, one-way street, or two-lane, two-way street (one lane in each direction).
- Midblock locations.
- Consider safety for bicyclists on roadways with grades of 5 percent or more.
- If along an emergency route or transit route, coordinate with emergency services or the local transit agency.
- Don't place along sharp curves (300-foot minimum horizontal curve radius).[64]

COMPLEMENTARY TREATMENTS

- Raised crosswalk
- Bicycle boulevard
- Chicanes
- Neighborhood traffic diverter
- Speed table

MORE INFORMATION

- ITE Guide to Vertical Deflection Speed Reduction Techniques
- FHWA Traffic Calming ePrimer
- NACTO Urban Street Design Guide

PLAN SHEET DETAILS

- 13 - Speed Hump

64 FHWA. "3.10 Speed Hump." *Traffic Calming e-Primer.*

14. Speed table

DESCRIPTION

Like speed humps, speed tables are raised areas across a roadway. This treatment calms streets for pedestrian and bicyclist use by slowing driver operating speeds. A well-designed speed table presents little disruption to a moving bicyclist. A speed table has a flat top long enough to accommodate the full length of a passenger car. Used in a series, this treatment can support bicycle boulevard development by deterring drivers from using the street and as a result, may reduce motorized traffic by 20 percent[65] and overall crashes by 36-64 percent.[66]

FIGURE 18. SPEED TABLE. SOURCE: PEDBIKE IMAGES/AUSTIN BROWN.

DESIGN GUIDANCE

Construct a curved speed table with a **10-foot** plateau, a minimum of **22 feet** long, and as wide as the travel width of the road. Provide a 1-foot gap between the curb and the beginning of the speed hump on streets with curbs or a **6-inch** gap from the edge of a non-curbed street. Speed tables typically range **3-4 inches** in height.[67] Refer to Table 3 for recommended speed table geometric characteristics.

Place speed tables approximately **150 feet** from an unsignalized intersection or **250 feet f**rom a signalized intersection. If used in a series to maintain low speeds along a corridor, space speed tables and other vertical deflection treatments **200-400 feet** apart. Place speed tables a minimum of **5 feet** from a driveway.[68]

Provide sufficient signage and markings to notify drivers of the presence of a speed table.

Consider speed table profiles shaped as sinusoidal, circular, parabolic, or straight. This guidance recommends considering sinusoidal or straight profiles. However, consider other profiles based on local experience. If installed in an area with snow removal, consider designing the speed hump with a sinusoidal profile to better accommodate snowplows.[69] Coordinate with local maintenance crews, emergency services, and transit authorities prior to installing speed tables. Consider installing signs or markers adjacent to speed tables to alert snowplow drivers of their placement.[70]

65 FHWA. "4.1 Speed Hump and Speed Cushion." *Traffic Calming e-Primer.*
66 FHWA. 2014. "Engineering Speed Management Countermeasures: A Desktop Reference of Potential Effectiveness in Reducing Crashes."
67 FHWA. "4.1 Speed Hump and Speed Cushion." *Traffic Calming e-Primer*
68 Parkhill, Margaret, Rudolph Sooklall, and Geni Bahar. 2007. *Updated Guidelines for the Design and Application of Speed Humps.*
69 FHWA. 2020. *Agencies Design Raised Crosswalks for Snow, Rain, and Heavy Vehicles.*
70 FHWA. "Module 5: Effects of Traffic Calming Measures on Non-Personal Passenger Vehicles." Traffic Calming e-Primer.

TABLE 3: VERTICAL DEFLECTION CHARACTERISTICS AND DESIRED MOTORIST SPEED AT CROSSING. SOURCE: OHIO DOT MULTIMODAL DESIGN GUIDE.

Desired motorist speed	Maximum table 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 in 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

DESIGN APPLICABILITY

- Single-lane, one-way street, or two-lane, two-way street.
- Consider if 5 percent or less of vehicles traversing the hump have a long wheelbase.
- Midblock locations only. For a related treatment applicable to intersections refer to the treatment guidance for raised crosswalk or raised intersection.
- Consider only installing on streets with grades of 8 percent or less.
- If along an emergency route or transit route, coordinate with emergency services or the local transit agency.
- Do not place along sharp curves (300-foot minimum horizontal curve radius).[71]

COMPLEMENTARY TREATMENTS

- Raised crosswalk
- Bicycle boulevard
- Chicanes
- Neighborhood traffic diverter
- Speed hump
- Raised intersection

MORE INFORMATION

- ITE Guide to Vertical Deflection Speed Reduction Techniques
- FHWA Traffic Calming ePrimer
- NACTO Urban Street Design Guide

PLAN SHEET DETAILS

- 14- Speed Table

71 FHWA. "3.10 Speed Hump." *Traffic Calming e-Primer.*

Crossing and intersection treatments

Marked crosswalks alone, under the right application, may help to improve pedestrian and bicyclist safety and connectivity of the pedestrian network. However, additional treatments at intersections or midblock crossings can improve safety for pedestrians and bicyclists. Regular siting of crossings at midblock and intersection locations may reduce driving speed along a corridor.

The treatments in the following section include roadway geometry, signage, signals, and pavement markings. Consider these treatments individually or combined as a suite of strategies to improve safety for pedestrians and bicyclists at intersections or other crossing locations.

At crossing locations, consider how exposure, speed reduction, delay, conspicuity, and separation in space and/or time affect the relationship between drivers and pedestrians/bicyclists. These characteristics can be positively influenced by implementing one or more design and operations strategies. Consider strategies to promote the intersection's anticipated safety performance and efficiency for pedestrians and bicyclists by:

- Decreasing pedestrian/bicyclist exposure to motor vehicle traffic.
- Decreasing motor vehicle operating speed.
- Decreasing pedestrian/bicyclist delay.
- Increasing pedestrian/bicyclist user conspicuity.
- Increasing separation in space between motorists and pedestrians/bicyclists.
- Increasing separation in time between motorists and pedestrians/bicyclists.

To reduce driving speeds or emphasize safety for bicyclists and pedestrians, the programs may fund conspicuity enhancements to traffic control devices as applicable. These may include vertical reflective signpost strips, supplemental beacons, and flags.

Additional resources for selecting appropriate crossing and treatments:

- FHWA Guide for Improving Pedestrian Safety at Uncontrolled Crossing Locations
- NCHRP 926 Guidance to Improve Pedestrian and Bicyclist Safety at Intersections
- WSDOT Design Manual, Section 1310.03
- FHWA Crosswalk Marking Selection Guide

15. Raised crosswalk

DESCRIPTION

FIGURE 19. RAISED CROSSWALK IN BELLEVUE, WA. SOURCE: DONGHO CHANG.

Raised crosswalks are flat-top speed tables with a marked crossing for pedestrians, bicyclists, or both. The elevated crossing slows vehicles and increases the rate at which drivers yield to pedestrians or bicyclists crossing the road.[72] Because they provide a visual and physical contrast to the vehicular lane, raised crosswalks reinforce the message that pedestrians have priority in the crossing zone, improve driver awareness of the crossing, and improve the visibility of pedestrians and bicyclists. Raised crosswalks can also help convey the message to drivers that they are in a zone with many pedestrians when used consistently in contexts such as college and business campuses. Raised crosswalks can also provide easier crossings for people using wheelchairs, walkers, and other personal mobility devices because they eliminate or reduce the grade change between the sidewalk and the crossing.

DESIGN GUIDANCE

Reconstruct the sidewalk to remove curb ramps or construct curb ramps to meet the height of the raised crosswalk. Provide a minimum raised crosswalk height of 3 inches, with a maximum of curb height. Raised crosswalks at the height of the curb may allow for a continuous pedestrian access route without the need for ADA curb ramps. At potential raised crosswalk locations with a high volume of low-clearance vehicles, consider balancing the needs of crossing pedestrians and these vehicles. Consider recommending alternate routes for low-clearance vehicles if needed.

Refer to Table 4 for recommended speed table geometric characteristics. Provide ADA tactile warning panels and construct a level crossing from one sidewalk across the road to the opposite sidewalk. Accommodate drainage at street level on either side of the crosswalk or create a trench drain through the raised crosswalk covered with an ADA-compliant grate. Coordinate with local maintenance crews, emergency services, and transit authorities prior to installing raised crosswalks. Consider installing signs or markers adjacent to raised crosswalks to alert snowplow drivers of their placement.[73]

Mark the raised crosswalk with pavement markings for speed humps and high visibility crosswalk markings, such as ladder style.

[72] NAS, Engineering, and Medicine. 2016. "Application of Pedestrian Crossing Treatments for Streets and Highways." Washington, DC: The National Academies Press.

[73] FHWA. "Module 5: Effects of Traffic Calming Measures on Non-Personal Passenger Vehicles." Traffic Calming e-Primer.

TABLE 4: Vertical deflection characteristics and desired motorist speed at crossing. Source: Ohio DOT Multimodal Design Guide.

Desired motorist speed	Appropriate locations	Appropriate ramp profiles	Approximate ramp target slope
≤ 20 mph	Local streets	All	1:12
≤ 25 mph	All streets without designated emergency response, truck, or frequent transit routes	Sinusoidal or straight	1:18
≤ 30 mph	Arterial or collector streets without designated emergency response, truck, or frequent transit routes	Sinusoidal or straight	1:24
≤ 35 mph	Arterial streets with designated emergency response, truck, or frequent transit routes	Straight	1:24

DESIGN APPLICABILITY

- One-lane to three-lane road or four-lane, two-way road with a median.[74]
- Speed limits of 35 mph or less.[75]
- At commercial driveway crossings, minor intersection crossings, midblock crossings, intersections, slip lanes, roundabout crossings, or shared-use path crossings.
- Coordinate with local emergency services and transit agencies. Consider additional coordination with local freight industries if located along a major freight route. May not be appropriate on emergency response routes or freight routes.

COMPLEMENTARY TREATMENTS

- Curb extension
- Rectangular rapid flashing beacon
- Pedestrian hybrid beacon
- High-visibility crosswalk

MORE INFORMATION

- FHWA Safe Transportation for Every Pedestrian – Raised Crosswalk
- FHWA Traffic Calming ePrimer
- MUTCD Section 3B.25—Speed Hump Markings
- FHWA STEP - Agencies Design Raised Crosswalks for Snow, Rain, and Heavy Vehicles
- ITE Guide to Vertical Deflection Speed Reduction Techniques

PLAN SHEET DETAILS

- 15 - Raised Crosswalk

74 FHWA. 2018. "Raised Crosswalk." *Safe Transportation for Every Pedestrian*.
75 WSDOT. 2023. *Design Manual M 22-01.22*. (Engineering and Regional Operations).

16. Reduced corner radii

DESCRIPTION

Historically, designers built many street intersections with large corner radii with the intent of providing easier access for larger vehicles. The negative effect of these larger turning radii is that passenger vehicles can negotiate turns at a higher speed than is appropriate for many contexts. Additionally, larger radii corners increase the length of crosswalks and can create difficult accessibility ramp connections. Together, these effects have a negative influence on pedestrian and bicyclist safety and comfort.

Reducing curb radii can reduce the turning speeds of vehicles to more appropriate speeds. Lower turning speeds afford a wider effective cone of view, work better for human reaction time, and decrease stopping distance for vehicles yielding to crossing pedestrians or bicyclists. This treatment can also improve sightlines between drivers and pedestrians, create larger waiting areas at the corner, and shorten pedestrian crossing distance/time to reduce exposure.

FIGURE 20. TIGHTER CURB RADIUS. SOURCE: PEDSAFE.

DESIGN GUIDANCE

Determine the appropriate radius primarily for slow driver turns and improved visibility of pedestrians and bicyclists; and secondarily the design vehicle for each right turn movement. Refer to the section Designing for pedestrian and bicyclist safety while accommodating large vehicle turns for corner radii design guidance.

Consider that the geometry of the physical street corner may not represent the effective turning radius available to vehicular traffic as shown in Figure 21. Parking lanes, shoulders, bike lanes, and other features that offset the travel lane from the physical curb line may allow effective turning radii that are much larger than the physical corner radii designed at a corner. Consider these additional design treatments to reduce the effective turn radius.

Consider frequency of the design vehicle and effects a given radius would have on other design users, specifically pedestrian crossing distances and times; and bicycle turning and through movements.

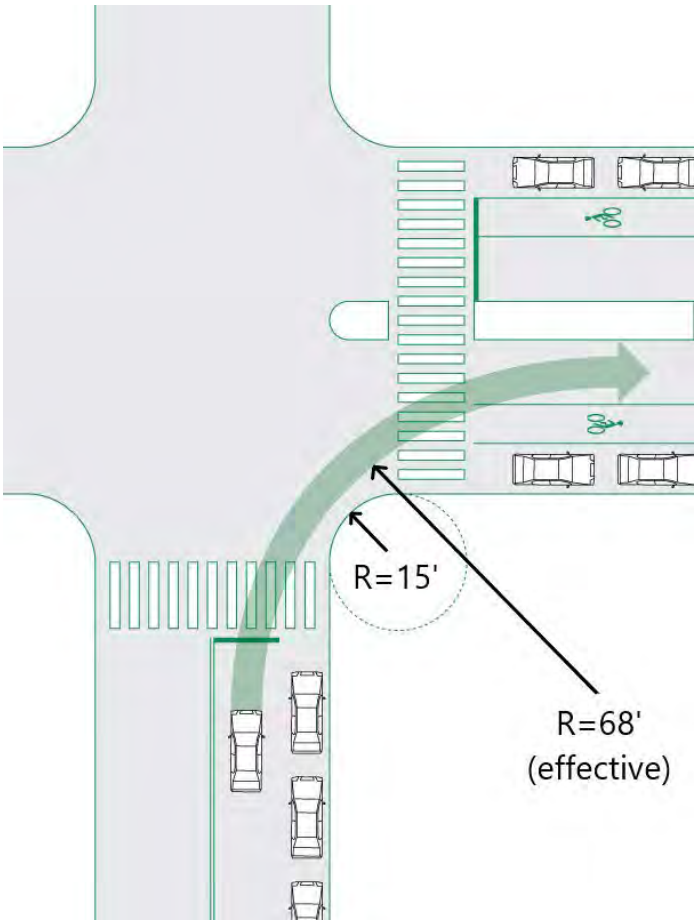


FIGURE 21. EFFECTIVE TURNING RADIUS. SOURCE: NACTO URBAN STREET DESIGN GUIDE

Minimize curb radii while still accommodating occasional large vehicle turn movements by employing some or all the following:

- Evaluating the turning movement with use of multiple receiving lanes.
- Recessing stop lines.
- Constructing mountable truck aprons to slow passenger vehicle turns while still allowing larger vehicles to mount the aprons. For more information on mountable truck aprons, refer to WSDOT Design Manual Section 1510.09(5)(a).

DESIGN APPLICABILITY

At most intersections.

COMPLEMENTARY TREATMENTS

- Curb extension
- High-visibility crosswalk

MORE INFORMATION

- NCHRP 926 Guidance to Improve Pedestrian and Bicyclist Safety at Intersections
- AASHTO Guide for the Planning, Design, and Operation of Pedestrian Facilities 2021

17. Pedestrian refuge island

DESCRIPTION

Pedestrian refuge islands reduce the exposed crossing distance and provide a place for pedestrians to evaluate their ability to cross traffic one direction at a time. They may also provide a place to stand and wait either for a gap in traffic or for drivers to stop. They are in the middle of a street at an intersection or midblock locations. At mid-block locations, pedestrian refuge islands also increase driver awareness of the crossing. FHWA considers this treatment a proven safety strategy. Pedestrian refuge islands can provide a 32-percent reduction in pedestrian crashes.

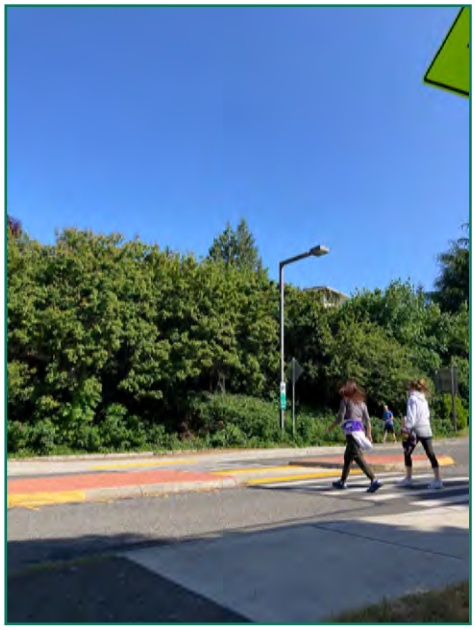


FIGURE 22. PEDESTRIAN REFUGE ISLAND ON MERCER ISLAND, WA.

DESIGN GUIDANCE

Install pedestrian refuge islands at midblock or intersection crossing locations. Provide a **6-foot** minimum transverse width for pedestrians only or **10 feet** preferred, **8 feet** minimum for pedestrians and bicyclists. Construct islands with concrete, asphalt, or other materials. Consider low-level landscaping, planters, or other physical barriers in the island while also maintaining sight lines for pedestrians and drivers. Cut throughs of existing continuous medians may also function as pedestrian refuge islands if they include all other design features mentioned here. Consider an angled cut-through to position bicyclists and pedestrians to face oncoming traffic.

Provide sufficient pedestrian-scale lighting at the crossing locations to ensure drivers can see pedestrians at the crossing. Install the pedestrian refuge island with high visibility crosswalks and consider an advance-stop line at an uncontrolled crosswalk. If at an uncontrolled crossing location, include advanced warning signage. Restrict parking **20-50 feet** in advance of the crossing. Determine the appropriate parking restriction and advance-stop line placement based on stopping sight distance and the roadway geometry at the crossing. Pedestrian refuge islands may also be used in conjunction with rectangular rapid flashing beacons or pedestrian hybrid beacons.

DESIGN APPLICABILITY

- Appropriate on roads with two or more travel lanes, at least one lane in each direction.
- Consider at shared-use path crossings of roads for pedestrians and bicyclists.
- Highly desirable for midblock pedestrian crossings on roads with the following characteristics:
  - Roads with 2-5 travel lanes where a pedestrian won't cross more than two travel lanes before reaching the sidewalk or pedestrian refuge island for both stages of the crossing.
  - Roads with 35 mph speeds or greater.
  - Roads with 9,000 vpd or higher.[76]

[76] FHWA. 2018. "Pedestrian Refuge Island." *Safe Transportation for Every Pedestrian.*

COMPLEMENTARY TREATMENTS

- Curb extension
- Rectangular rapid flashing beacon
- Pedestrian hybrid beacon
- In-street “stop for pedestrian” sign

MORE INFORMATION

- FHWA Safe Transportation for Every Pedestrian – Pedestrian Refuge Island
- NCHRP 926 Guidance to Improve Pedestrian and Bicyclist Safety at Intersections
- WSDOT Standard Plan F-45.10-03 Detectable Warning Surface

PLAN SHEET DETAILS

- 17 - Pedestrian Refuge Island

18. Physical barrier to restrict parking near crossings

DESCRIPTION

Restricting parking in advance of a crosswalk allows for improved sightlines between pedestrians and bicyclists and approaching drivers, and as a result, improves comfort for pedestrians and bicyclists when deciding to cross the street. Washington state law prohibits vehicles from parking within 20 feet of a crosswalk.[77] Signage and pavement markings may not be sufficient to prevent drivers from parking in this area. Physical barriers, such as vertical delineators, placed in this area can prevent drivers from blocking pedestrian ramps and obstructing these important sightlines. Physical barriers to restrict parking provide similar speed reduction benefits as chokers, which reduce 85th percentile speeds by 1-4 mph.[78]

FIGURE 23. PHYSICAL BARRIER TO RESTRICT PARKING IN TACOMA, WA. SOURCE: DONGHO CHANG.

DESIGN GUIDANCE

If reconstructing the curb and gutter or edge of roadway, construct concrete, asphalt, or landscaped curb extensions within the no-parking area. Accommodate drainage along existing or reconstructed flow lines. Also consider including stormwater management within the physical barrier.

If constructing with paint and physical barriers, delineate the restricted parking area on both sides of the crosswalk. Place vertical delineators, planters, curb stops, or other barriers within or along the border of the striped area. Physical barriers shouldn't obstruct sightlines between pedestrians standing at the curb and approaching vehicles. Consider possible art integration with street murals within the barrier area. Also consider placing bike parking corrals in the barrier area, provided the parking corrals don't reduce the sidewalk area.

- At 25 mph or less, restrict parking with a physical barrier at least **20 feet** from the crosswalk.
- At 30-35 mph, restrict parking with a physical barrier at least **30 feet** from the crosswalk.[79]

If the corridor includes a parking separated bike lane, construct or place the barrier in the parking lane and maintain **5-foot** minimum width for the bike lane at the curb or edge of road. Provide a barrier area that meets the requirements of a pedestrian refuge island (**6-foot** minimum of transverse width with tactile warning panels). If the corridor lacks bike lanes, consider warning signs and markings to alert bicyclists using the shoulder or parking lane area to enter travel lanes in advance of the treatment.

DESIGN APPLICABILITY

- Only appropriate where drivers won't use the parking lane as a travel lane during any hour of the day.
- Because state law prohibits parking **20 feet** in advance of any crosswalk, this treatment may be appropriate at all crossing locations where there is street parking.

77 RCW 46.61.570
78 FHWA. 2014. "Engineering Speed Management Countermeasures: A Desktop Reference of Potential Effectiveness in Reducing Crashes."
79 FHWA. 2018. "Crosswalk Visibility Enhancements." *Safe Transportation for Every Pedestrian.*

COMPLEMENTARY TREATMENTS

- Curb extension
- High-visibility crosswalk

MORE INFORMATION

- NCHRP 926 Guidance to Improve Pedestrian and Bicyclist Safety at Intersections
- FHWA Guide for Improving Pedestrian Safety at Uncontrolled Crossing Locations

PLAN SHEET DETAILS

- 18 - Physical Barrier to Restrict Parking Near Crossing

19. Curb extension

DESCRIPTION

FIGURE 24. CURB EXTENSION ON BAINBRIDGE ISLAND, WA. SOURCE: PEDBIKE IMAGES/CARL SUNDSTROM.

Curb extensions (also known as "neckdowns," "bumpouts," or "bulbouts") extend the sidewalk or curb face into the parking lane or shoulder at an intersection or midblock crossing, improving sight distance between the driver and pedestrian. They typically don't extend further than the edge of a vehicle travel lane. They reduce the pedestrian crossing distance, improve visibility between motorists and pedestrians, and provide more space for pedestrians waiting to cross. Curb extensions may create space for landscaping or stormwater management.[80] At intersections, they also slow the speed of right-turning vehicles.

DESIGN GUIDANCE

Extend the curb no farther than the edge of the travel lane. Design the curb extension to provide sufficient space for directional ADA curb ramps. Consider pedestrian and bicyclist illumination and high visibility crosswalk markings. Consider angles and radii for the curb extensions that are compatible with local street sweepers and snow removal, if applicable.

Select and place site features such as landscaping, cabinets, poles, benches, planters, bollards, newspaper stands, and sandwich boards so they don't obstruct the vision of pedestrians or drivers within curb extension areas. Consider possible art integration with street murals within the curb extension.

If a bike lane is present, ramp the bike lane to the sidewalk level to provide a raised pedestrian crossing of the bike lane. Alternatively, provide **6-foot** minimum width cut outs for the bike lane to pass through with a tapered approach to warn bicyclists of the cut out or limit the extension to prevent interruptions to the bike facility. When using a bike lane cut-through, paint curbing white to ensure visibility by bicyclists and consider adding object markers to increase visibility. Provide curb radii or tapered entrances on the upstream side of the bike lane cut-through at a minimum. Don't design the curb with sharp corners at the entry side of the bike lane cut through. Refer to protected intersections for linear bicycle facilities for bike-specific treatments at intersections.[81] Alternatively, in locations with drainage or maintenance concerns, continue the bike lane in front of the curb extension.

For constrained conditions or areas where maintenance is a concern, design the curb extension to extend the face of the curb to the edge of the bike lane.

In locations where the curb extension extends into a shoulder and bicyclists may ride in this shoulder, consider either:

- Formalizing the bike lane along the road and designing the curb extension with a raised crossing for bicycles or a bike lane cut-through. Alternatively, the bike lane may bend in before the curb extension to run adjacent to the travel lane.

[80] WSDOT. 2018. *Action Plan for Implementing Pedestrian Crossing Countermeasures at Uncontrolled Locations*.

[81] NAS, Engineering, and Medicine. 2020. *Guidance to Improve Pedestrian and Bicyclist Safety at Intersections*. Washington, DC: The National Academies Press.

- Placing warning signage ("shoulder ends" (W8-25)) and object markers per the MUTCD guidance in advance of the curb extension.

Curb extensions may double as physical barriers to restrict parking near crossings. Refer to that treatment's guidance for more design information

DESIGN APPLICABILITY

- Intersections and midblock crosswalks.
- Most appropriate along roadways with on-street parking.
- Consider where there is no on-street parking. A shoulder provides sufficient width to safely accommodate a **5-foot minimum** curb extension. Consider effects to bicyclists using the shoulder.

COMPLEMENTARY TREATMENTS

- Protected intersection for linear bicycle facilities
- Rectangular rapid flashing beacon
- Pedestrian hybrid beacon
- High-visibility crosswalk

MORE INFORMATION

- FHWA Traffic Calming ePrimer
- NCHRP 926 Guidance to Improve Pedestrian and Bicyclist Safety at Intersections
- FHWA Guide for Improving Pedestrian Safety at Uncontrolled Crossing Locations

PLAN SHEET DETAILS

- 19 - Curb Extension

20. Protected intersection for linear bicycle facilities

DESCRIPTION

Protected intersections are geometric treatments that keep bicyclists physically separated from drivers up to the intersection, including the corners. The term "protected" in this context refers to the separation provided between vehicle lanes and pedestrians and bicyclists. This treatment continues linear bicycle facilities comfortably through an intersection by reducing conflicts between bicyclists and drivers. They can reduce driver turning speeds, improve driver yielding rates, and improve sightlines.[82]

FIGURE 25. PROTECTED INTERSECTION CORNER IN BELLEVUE, WA. SOURCE: DONGHO CHANG.

DESIGN GUIDANCE

Protected intersections include the following elements:

- **Corner island** – Design corner radii for passenger vehicles turning at speeds under 10 mph, likely a **10- to 15-foot** curb radius. If needing to accommodate larger vehicles, include a mountable truck apron.
- **Bike queue area** – Provide sufficient space for the expected volume of bicyclists waiting at the intersection. Minimum **6.5 feet** deep, **10 feet** or greater preferred.
- **Bikeway setback and driver yield zone** – Provide a **6- to 16.5-foot** setback to create sufficient space for the driver to wait between the travel lane and the bicycle crossing markings.[83] This setback improves sightlines between turning drivers and crossing pedestrians and bicyclists.

- **Pedestrian refuge island** – Construct **6- to 8-foot** wide pedestrian refuge islands at all corners to accommodate pedestrians waiting between the bike lane and the travel lane.
- **Pedestrian crossing of the bike lane** – Install a pedestrian crosswalk across the bike lane between the pedestrian refuge island and the curb ramp.
- **Pedestrian curb ramp** – Construct directional pedestrian curb ramps for all corners of the intersection.
- **Bicyclist crossing of travel lanes** – Mark bicycle-crossing markings through the intersection.
- **Pedestrian crossing of travel lanes** – Mark high-visibility crosswalks for all pedestrian crossings.

On higher speed, higher volume roadways, construct the corner islands and pedestrian refuge islands with a **6-inch** curb filled with concrete, asphalt, or low-level plantings. On lower speed, lower volume roadways, consider constructing protected intersection treatments with paint and posts, bollards, planters, or mountable vertical elements.

At intersections with buffered bike lanes on the approach, provide separated bike lanes for **25 feet** leading up to and away from the intersection.

82 NACTO. 2019. "Protected Intersections." *Don't Give Up at the Intersection.*

83 Schepers, J. P., Kroeze, P. A., Sweers, W., & Wüst, J. C.. 2011. *Road factors and bicycle motor vehicle crashes at unsignalized priority intersections.* Accident Analysis & Prevention, 43(3), 853-861.

If the protected intersection is signalized, include pedestrian countdown signals and consider bike-signal faces to provide separate phases for vehicle turning movements and bike movements.

Place detectable warning surfaces at the boundary between each pedestrian path of travel and the motor vehicle travel way or bicyclist travel way. For intersections with sidewalk-level bike lanes, provide a detectable edge or buffer between the bike lane and sidewalk.

DESIGN APPLICABILITY

- All-way stop controlled or signalized intersections.
- Any street with protected or buffered bike lanes.
- Most feasible where there is on-street parking.
- Desirable at intersections where bike facilities cross each other.

COMPLEMENTARY TREATMENTS

- Separated bike lanes
- Buffered bike lanes
- Two-stage bicycle turn box
- Bicycle intersection crossing markings
- Pedestrian refuge island
- Bike-signal face

MORE INFORMATION

- NACTO Don't Give up at the Intersection

PLAN SHEET DETAILS

- 20 - Protected Intersection for Linear Bicycle Facilities

21. Roundabout with pedestrian/bicyclist facilities and crossings

DESCRIPTION

Modern roundabouts are most commonly near-circular intersections at grade. They have fewer conflict points and lower speeds for vehicles than a conventional intersection. Roundabout design aims to accommodate vehicles efficiently but can become barriers for pedestrians and bicyclists without proper design features. The features of a roundabout that reduce driving speeds, increase pedestrian conspicuity, and decrease pedestrian and bicyclist exposure can more easily achieve low stress crossings than a signalized intersection that employs a combination of crossing treatments. People who are blind or have low vision rely on hearing for detecting gaps to cross and may not hear bicyclists or electric vehicles approaching an uncontrolled roundabout crossing. Certain design elements can improve the crossing environment for all pedestrians and bicyclists.[84] Guidance provided here can apply to the design of compact roundabouts, single-lane roundabouts, or multilane roundabouts.

FIGURE 26. SR 125 ROUNDABOUT IN WALLA WALLA, WA.

DESIGN GUIDANCE

Consider single lane roundabouts when optimizing a crossing for pedestrians and bicyclists. Whether single or multilane, consider avoiding inclusion of slip lanes to minimize crossing exposure for pedestrians and bicyclists.

Accommodate pedestrians and bicyclists with a either a **10-foot** or greater continuous, shared-use facility or with separate sidewalks and bike lanes around the circulating roadway. For separate sidewalks and bike lanes provide a buffer between the circulating roadway and the pedestrian and bicyclist space around the roundabout. Provide a detectable edge between the sidewalk and bike lane to delineate the pedestrian space for low-vision or blind pedestrians.[85]

For pedestrian and bicyclist crossings at roundabouts consider user convenience based on desired routes. Especially for pedestrians, consider the distance to cross the street. Roundabouts may result in longer crossing distances when compared to a signalized intersection. Place high-visibility crosswalks approximately one car length from the circulating roadway edge (**20 feet)**[86] with "bicycle/pedestrian warning" signs (W11-15) and a diagonal downward pointing arrow (W16-7P) plaque.[87] Provide splitter islands for the crossings per the guidance for pedestrian refuge islands to allow pedestrians and bicyclists to cross one vehicle direction at a time.[88] In constrained compact roundabouts, prioritize placement of the crosswalk near the roundabout entry, and consider maintaining the splitter islands, but reducing the width below the **6-foot** minimum required for a pedestrian refuge island, creating a single stage crossing across both directions of vehicle travel.

84 NAS, Engineering, and Medicine. 2023. *Guide for Roundabouts*. Washington, DC: The National Academies Press.
85 Ibid
86 Ibid
87 FHWA. 2009. "2009 MUTCD (with Revisions 1 and 2 Incorporated)." Last modified Sept. 14, 2022.
88 WSDOT. 2021. *Traffic Manual M 51-02.10*. (Engineering and Regional Operations).

Align crossings per one of the following:

- Perpendicular to the outside curb to create the shortest possible crossing exposure for pedestrians and bicyclists.
- Perpendicular to the centerline of the approach roadway to create the shortest overall travel distance for pedestrians and bicyclists.
- Staggered with the exit side crossing further from the circulatory roadway to allow for supplemental crossing treatments. However, this alignment may create more space for drivers to accelerate as they exit the roundabout.[89]

Consider additional crossing enhancements such as raised crosswalks, especially at roundabout exits, and/or rectangular rapid flashing beacons to increase conspicuity of the crossing for drivers when a pedestrian or bicyclist wants to cross the roadway.[90]

To align with the Public Right-of-Way Accessibility Guidelines, at each multi-lane segment of the roundabout, provide one or more of the following: a pedestrian countdown signal, a pedestrian hybrid beacon, a rectangular rapid flashing beacon, or a raised crosswalk.[91]

If there are bike lanes on an approach to the roundabout, ramp the bicyclists up to the shared-use facility or separated bike lane in advance of the roundabout and ramp back down to street level as necessary after the exit on each leg. Provide dashed edge lines or sharrows to indicate merging areas for bicyclists and motor vehicles. Provide a dashed line for the bike lane **50-200 feet** in advance and at the exit of the ramp to allow more confident bicyclists the option to merge into and out of vehicular traffic.[92] Provide a bike facility or connection to paved shoulders on the exit of the roundabout to allow bicyclists to avoid merging into vehicular traffic immediately after the roundabout.

DESIGN APPLICABILITY

If planning a roundabout for an intersection, determine pedestrian and bicyclist routes through the intersection. Accommodate both modes at all roundabouts unless explicitly disallowed due to a limited access designation.

COMPLEMENTARY TREATMENTS

- Raised crosswalk
- Rectangular rapid flashing beacon
- Pedestrian hybrid beacon

MORE INFORMATION

- Roundabouts | WSDOT (wa.gov)
- AASHTO Guide for the Planning, Design and Operation of Pedestrian Facilities 2021
- NCHRP 1043 Guide for Roundabouts

PLAN SHEET DETAILS

- 21 - Roundabout with Pedestrian-Bicyclist Facilities and Crossings

89 NAS, Engineering, and Medicine. 2023. *Guide for Roundabouts*. Washington, DC: The National Academies Press.
90 U.S. Access Board. "Pedestrian Access to Modern Roundabouts: Design and Operational Issues for Pedestrians who are Blind."
91 U.S. Access Board. 2023. *Public Right-of-Way Accessibility Guidelines*.
92 NAS, Engineering, and Medicine. 2023. *Guide for Roundabouts*. Washington, DC: The National Academies Press.

22. High-visibility crosswalk

DESCRIPTION

FIGURE 27. HIGH-VISIBILITY CROSSWALK IN UNIVERSITY PLACE, WA. SOURCE: PEDBIKE IMAGES/CARL SUNDSTROM.

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. High-visibility 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]

For marked crosswalks, the MUTCD minimum requirement is two transverse lines; however, this marked crosswalk treatment 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]

93 RCW 46.04.160
94 RCW 46.61.235
95 FHWA. 2018. "Crosswalk Visibility Enhancements." *Safe Transportation for Every Pedestrian.*
96 WSDOT. 2018. *Action Plan for Implementing Pedestrian Crossing Countermeasures at Uncontrolled Locations*
97 WAC 468-95-220

- 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

98 RCW 46.61.235
99 NACTO. 2013. "Crosswalks and Crossings." *Urban Street Design Guide.*

23. Stop line at a controlled crosswalk

DESCRIPTION

At signalized or stop-controlled crossings, drivers may stop too close to a crosswalk, blocking part of the pedestrian route. Advance-stop lines can help prevent driver encroachment into the crossing to maintain a clearer pedestrian access route.[100]

FIGURE 28. STOP LINE AT A SIGNALIZED INTERSECTION IN BELLINGHAM, WA.

DESIGN GUIDANCE

At signalized or stop-controlled crossings, place **1.5- to 2-foot-wide,** solid-white, advance-stop lines a minimum of **4 feet f**rom the crosswalk, and up to **10 feet** if in an area with many high seat vehicles such as buses or trucks.[101] Determine the appropriate distance from the crosswalk based on stopping sight distance.

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

DESIGN APPLICABILITY

- Stop-controlled locations with crosswalks.
- Pedestrian hybrid beacons; and pedestrian, half, and full traffic signals.

COMPLEMENTARY TREATMENTS

- High-visibility crosswalk
- Physical barrier to restrict parking near crosswalk
- Pedestrian and bicyclist illumination at the crossing or intersection
- Stop sign
- Pedestrian hybrid beacon
- Pedestrian traffic signal
- Half signal for pedestrians and bicyclists
- Full traffic signal

MORE INFORMATION

- MUTCD Section 3B.16 – Stop and Yield Lines
- ITE Unsignalized Intersection Improvement Guide

PLAN SHEET DETAILS

- 23 - Stop Line at Controlled Crosswalk

100 FHWA. "Advanced Stop Lines at Traffic Signals." *PedSafe.*
101 AASHTO. 2021. *Guide for the Planning, Design, and Operation of Pedestrian Facilities, 2nd Edition*. Washington, DC.

24. Stop line at an uncontrolled crosswalk

DESCRIPTION

Advance-stop lines at an uncontrolled crosswalk direct drivers to stop at a distance from the crosswalk that improves the visibility of pedestrians or bicyclists in the crosswalk and reduces the risk of multiple-threat crashes. A multiple-threat crash exists at uncontrolled crossings on roadways with two or more lanes in one direction of travel, where a driver that has stopped for a crossing pedestrian may block the sightlines of drivers in adjoining lanes. A multiple-threat crash results when the second driver doesn't recognize why the first driver has stopped because they can't see the pedestrian in the crosswalk, and they continue through the crosswalk while the pedestrian is crossing.

FIGURE 29. ADVANCE-STOP LINE AT AN UNCONTROLLED CROSSWALK IN OLYMPIA, WA.

DESIGN GUIDANCE

At uncontrolled marked crosswalks, place **1.5- to 2-foot**-wide solid white advance-stop lines and "stop here for pedestrians" signs (R1-5b/R1-5c) **20-50 feet** in advance of a crosswalk. Prohibit parking in the area between the stop line and the crosswalk.

FIGURE 30. MODIFIED R1-5B SIGN.

At locations with crossing facilities used by bicyclists, such as a shared-use path or bike lane, consider a modified "stop here for (bicycle symbol)" (R1-5b) (Figure 26) with a bicycle or both a bicycle and a pedestrian symbol. This sign is currently experimental and thus requires a request to experiment from FHWA.

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

DESIGN APPLICABILITY

- Any multilane uncontrolled crossing of two lanes or less in each direction.[102]

COMPLEMENTARY TREATMENTS

- High-visibility crosswalk
- Physical barrier to restrict parking near crosswalk
- Pedestrian and bicyclist illumination at the crossing or intersection
- Rectangular rapid flashing beacon

[102] WSDOT. 2021. *Traffic Manual M 51-02.10*. (Engineering and Regional Operations).

MORE INFORMATION

- MUTCD Section 3B.16 – Stop and Yield Lines
- 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

- 24 - Stop Line at Uncontrolled Crosswalk

25. In-street, "stop for pedestrian" sign

DESCRIPTION

In-street, "stop for pedestrian" signs can remind drivers of laws regarding pedestrian right of way at an uncontrolled crosswalk. These signs can help address conflicts at crossing locations, excessive driving speed, inadequate visibility, and drivers not stopping for pedestrians in crosswalks.[103] In Washington state, drivers must stop for pedestrians or bicyclists crossing a roadway in a marked or unmarked crosswalk.[104]

DESIGN GUIDANCE

Place in-street, "stop for pedestrian" signs (R1-6a) on the centerline, a lane line, or in a median.

If there is a median or a pedestrian refuge island, place the sign in the island.[105] FHWA also recommends developing a plan to fund and replace damaged signs promptly.

DESIGN APPLICABILITY

- Two-lane or three-lane roads with speed limits of 30 mph or less.[106]
- Unsignalized crosswalks.

COMPLEMENTARY TREATMENTS

- Pedestrian refuge island
- High-visibility crosswalk
- Stop line at an uncontrolled crosswalk

MORE INFORMATION

- FHWA Guide for Improving Pedestrian Safety at Uncontrolled Crossing Locations
- Refer to MUTCD - Washington State Modifications: WAC 468-95-033 for installation guidance.

FIGURE 31. R1-6A SIGN. SOURCE: MUTCD.

103 FHWA. 2018. *Guide for Improving Pedestrian Safety at Uncontrolled Crossing Locations*.
104 RCW 46.61.235
105 FHWA. 2009. "2009 MUTCD (with Revisions 1 and 2 Incorporated)." Last modified Sept. 14, 2022.
106 FHWA. 2018. "Crosswalk Visibility Enhancements." *Safe Transportation for Every Pedestrian*

26. "Turning vehicles stop for pedestrians" sign

DESCRIPTION

At intersections with a concurrent pedestrian "walk" phase and vehicle turning movement, "turning vehicles stop for pedestrians" signs (R10-15) can notify drivers of the law requiring them to stop for pedestrians in the crosswalk. These signs may improve safety for pedestrians when separation of phases isn't possible.

FIGURE 32. "TURNING VEHICLES STOP FOR PEDESTRIANS AND BICYCLISTS" SIGN IN SEATTLE, WA.

DESIGN GUIDANCE

Place "turning vehicles stop for pedestrians" signs (R10-15) at near side or far side of an intersection where drivers can see the sign before turning.[107] Mark a high-visibility crosswalk for the pedestrian crossing.

At signalized intersections, place signs near the appropriate signal head for the movement that runs concurrent to the "walk" phase. Also install pedestrian countdown signals and accessible pedestrian signals for the pedestrian crossing.

In Washington state, drivers must stop for pedestrians or bicyclists crossing a roadway in a marked or unmarked crosswalk.[108] Although the R10-15 sign included in the most recent version of the MUTCD states, "turning vehicles stop for pedestrians," FHWA Interpretation Letter 2(09)-165 (I) –R10-15 Modified with Stop Sign Symbol allows jurisdictions to use "stop for" in place of "yield to".[109] In Washington state, install R10-15 signs with the "stop for" modification to align with state law.

FIGURE 33. MODIFIED R10-15 SIGN

At locations with adjacent facilities used by bicyclists, such as a shared-use path or bike lane, consider the modified R10-15 in Figure 29 with both a bicycle and a pedestrian symbol. This sign is currently experimental and thus requires a request to experiment from FHWA.

DESIGN APPLICABILITY

Crosswalks at signalized or unsignalized intersections.

COMPLEMENTARY TREATMENTS

- Full traffic signal
- Leading pedestrian interval

MORE INFORMATION

- AASHTO Guide for the Planning, Design, and Operation of Pedestrian Facilities 2021
- Refer to MUTCD Section 2B.53 – Traffic Signal Signs for installation guidance.

107 FHWA. 2009. "2009 MUTCD (with Revisions 1 and 2 Incorporated)." Last modified Sept. 14, 2022.
108 RCW 46.61.235
109 FHWA. 2019. "Interpretation Letter 2(09)-165 (I) –R10-15 Modified with Stop Sign Symbol." Last modified March 20, 2020.

27. Pedestrian countdown signal

DESCRIPTION

Pedestrian countdown signals provide pedestrians with information about how much time they have remaining to cross the street. The countdown helps clarify any confusion behind the meaning of the flashing "don't walk" hand.[110] Countdown signals also notify bicyclists of time remaining in the phase when they approach an intersection and look to enter a bicycle box in front of stopped vehicles.

FIGURE 34. PEDESTRIAN COUNTDOWN SIGNAL. SOURCE: PEDBIKE IMAGES/ LAURA SANDT.

DESIGN GUIDANCE

Install pedestrian displays with the bottom of the display housing no less than **7 feet a**nd no more than **10 feet** above the sidewalk surface. Install displays to provide maximum visibility at the beginning of the controlled crosswalks. To accomplish this, locate pedestrian displays no more than **5 feet f**rom the outside edge of the crosswalk, as measured on a line perpendicular to the crosswalk centerline. If physical constraints prevent placement of the display more than **5 feet** from the outside edge of the crosswalk, consider offsetting the display up to a maximum of **10 feet** from the outside edge of the crosswalk.[111]

Calculate the pedestrian change interval based on the time it would take a pedestrian traveling at 3.5 feet per second to leave the curb at the end of the "walk" signal indication and reach the far side of the crosswalk. At crosswalks used by pedestrians who travel slower than 3.5 feet per second consider calculating the pedestrian change interval to accommodate a 3 feet per second or slower crossing speed. Also consider rest in walk or other strategies to extend pedestrian crossing times. During rest in walk, the walk indication is displayed while the parallel traffic signal is green.[112]

DESIGN APPLICABILITY

- All new traffic signals with pedestrian crossings.
- Any signalized intersection.
- No intersection may have a mix of countdown and non-countdown pedestrian displays.
- Required where the pedestrian clearance interval exceeds 7 seconds.[113]

COMPLEMENTARY TREATMENTS

- Bicycle box
- Pedestrian hybrid beacon
- Pedestrian traffic signal
- Half signal for pedestrians and bicyclists
- Full traffic signal
- Pedestrian-only phase

110 Pedestrian and Bicycle Information Center. "Traffic Signals." *SRTS Guide*
111 WSDOT. 2023. *Design Manual M 22-01.22*. (Engineering and Regional Operations).
112 FHWA. 2009. "2009 Manual of Uniform Traffic Control Devices (with Revisions 1 and 2 Incorporated)."
113 AASHTO. 2021. *Guide for the Planning, Design, and Operation of Pedestrian Facilities, 2nd Edition*. Washington, DC.

MORE INFORMATION

- AASHTO Guide for the Planning, Design, and Operation of Pedestrian Facilities 2021

PLAN SHEET DETAILS

- WSDOT Standard Plan J-20.16-02

28. Stop sign

DESCRIPTION

Stop signs can help pedestrians and bicyclists cross intersections by stopping one or more approaches of traffic where traffic volumes and obstructed visibility increase the potential for conflict. Providing stop signs for all intersection approaches can also help address safety issues at intersections arising from conflicts between vehicles and pedestrians and bicyclists.[114] The MUTCD provides standards and guidance for when to implement stop signs at intersections.

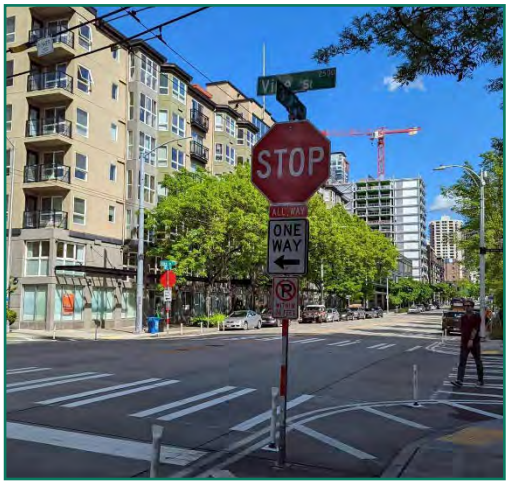


FIGURE 35. STOP SIGN IN SEATTLE, WA
SOURCE: DONGHO CHANG.

DESIGN GUIDANCE

Select stop signs per the MUTCD standards and guidance at roadway intersections and at shared-use path or bikeway intersections. Note, per the MUTCD, "stop signs should not be used for speed control." Generally, consider the following plaque sizes:

- Place **18-inch** by **18-inch** stop signs at approaches along exclusive bicycle facilities or shared bicyclist/pedestrian facilities.
- Place **30-inch** by **30-inch** stop signs at vehicular, lower-volume, single-lane road approaches or at shared-use path approaches to emphasize the stop condition.
- Place **36-inch** by **36-inch** stop signs at vehicular multilane road approaches.
- Place **48-inch** by **48-inch** stop signs at vehicular divided highways with at-grade intersections, at ramp terminals, or where otherwise indicated by engineering judgment.[115]

At locations where shared-use paths cross roadways, consider speeds, volumes, and visibility to determine the crossing priority for drivers or pedestrians and bicyclists. Assign stop signs based on this priority.

Consider the use of an advance-stop line with the placement of the stop sign.

DESIGN APPLICABILITY

- MUTCD Section 2B provides standards and guidance for when and how to apply stop signs.

COMPLEMENTARY TREATMENTS

- High-visibility crosswalk

MORE INFORMATION

- WSDOT Traffic Manual
- Refer to MUTCD Section 2B for installation standards and guidance.

[114] FHWA. 2009. "2009 MUTCD (with Revisions 1 and 2 Incorporated)." Last modified Sept. 14, 2022.
[115] WSDOT. 2021. *Traffic Manual M 51-02.10*. (Engineering and Regional Operations).

29. Flashing stop sign

DESCRIPTION

Embedded light-emitting diodes (LEDs) in flashing stop signs can improve driver stop compliance and enhance the visibility of the stop sign to drivers.[116] The embedded LEDs especially improve stop compliance at night.

FIGURE 36. FLASHING STOP SIGN. SOURCE: FHWA.

DESIGN GUIDANCE

Per MUTCD Section 2A.07:

> "LEDs may be placed within the border or within one border width within the background of the sign.
>
> "The LEDs shall have a maximum diameter of 1/4 inch and be white or red.
>
> "... [The lights] shall flash simultaneously at a rate of more than 50 and less than 60 times per minute."[117]
>
> Consider local outreach to communicate the selection process for this treatment in place of a standard stop sign.

Consider the use of an advance-stop line with the placement of the STOP sign.

DESIGN APPLICABILITY

- Unsignalized intersections with a history of noncompliance with an existing stop sign.
- Existing poor sign visibility.[118]

COMPLEMENTARY TREATMENTS

- High-visibility crosswalk

MORE INFORMATION

- FHWA Embedded LEDs in Signs
- Refer to MUTCD Section 2B.07 for installation standards and guidance for STOP signs.

116 FHWA. 2009. "Embedded LEDs in Signs." Safe Roads for a Safer Future.
117 FHWA. 2009. "2009 MUTCD (with Revisions 1 and 2 Incorporated)." Last modified Sept. 14, 2022.
118 FHWA. 2015. *Signalized Intersection Safety Strategies*.

30. Prohibit turn-on-red

DESCRIPTION

Allowing turn-on-red typically aims to accommodate traffic flow and doesn't consider possible conflicts with pedestrians trying to cross the street or the presence of bicyclists waiting at the red light beside a vehicle. Drivers who are preparing to legally turn against a red light are watching traffic coming from the opposite direction and often don't see pedestrians or bicyclists who are legally crossing the street in front of their vehicle. Restricting this movement removes this conflict and permits safer and more comfortable crossings for pedestrians and bicyclists. This separates users in time, meaning drivers and pedestrians won't try to occupy the same space at the same time, one of the principles of the FHWA Safe Systems Approach.[119]

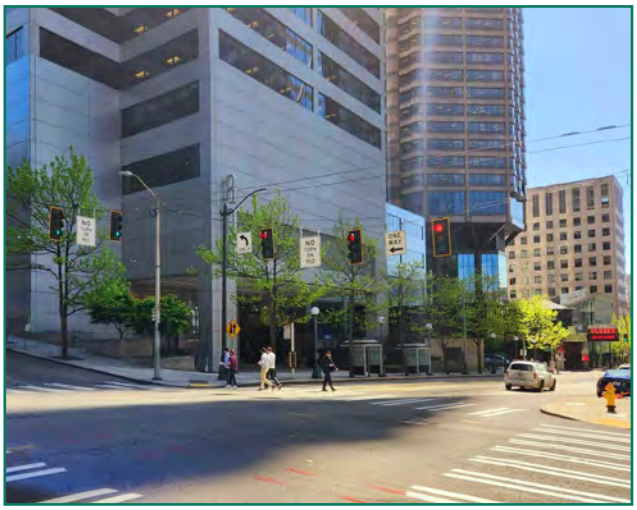


FIGURE 37. "NO TURN ON RED" SIGNS IN SEATTLE, WA. SOURCE: SDOT.

DESIGN GUIDANCE

When prohibiting a turn-on-red, based on engineering judgment, at a signalized intersection, install a "no turn on 'red ball'" sign (R10-11) on the signal mast arm or signal pole adjacent to the signal face to which it applies. When replacing existing "no turn on red" signs (R10-11a or R10-11b) signs use "no turn on 'red ball'" signs (R10-11).[120]

Consider the use of a blank-out sign that displays "no turn on red" or an appropriate symbol, to restrict turns on red during certain times of day or phases of the cycle.[121] A blank-out sign could allow for right-turn-on-red movements exclusive from the pedestrian phase.[122] Note, per RCW 46.61.055, drivers are permitted to turn after stopping when facing a steady red arrow. As such, consider prohibiting turn-on-red at these signals if applicable.

At locations where a two-way, separated bike lane crosses an intersection, restrict all conflicting turns on red due to the cognitive load on drivers to track the vehicular lane and two lanes of bi-directional bicycle traffic at the same time. Note that this includes turns across the separated bike lane from the street on which the separated bike lane lies, as well as turns from the crossing street on the approach that meets the side of the main street that carries the separated bike lane.

At locations with two-stage bicycle turn boxes, prohibit turn-on-red if the two-stage bicycle turn box lies in the path of turning traffic.

At locations with bicycle boxes, prohibit turn-on-red on the approach(es) with the bike box.

At locations with a pedestrian-only phase, prohibit turn-on-red on all legs.

At locations with bike-signal faces, prohibit turn-on-red during conflicting protected bicycle phases.

Although most of these conflicts exist at right-turn locations, Washington state law allows left turn-on-red when a driver turns from either a one-way or a two-way street onto a one-way street. At these locations, consider turn-on-red prohibition under these same principles.

119 FHWA. 2023. *Zero Deaths and Safe System*.
120 WSDOT. 2021. *Traffic Manual M 51-02.10.* (Engineering and Regional Operations).
121 FHWA. 2009. "2009 MUTCD (with Revisions 1 and 2 Incorporated)." Last modified Sept. 14, 2022.
122 AASHTO. 2021. *Guide for the Planning, Design, and Operation of Pedestrian Facilities, 2nd Edition*. Washington, DC.

DESIGN APPLICABILITY

- Poor sight distance for the right turning driver to see drivers coming from the left.
- Intersection layout where turn-on-red could create conflicts.
- Crossings near schools, senior centers, or other facilities with a high number of children, older pedestrians, or people with disabilities.[123]
- Intersections with bike lanes, two-way bike lanes, leading pedestrian intervals, two-stage bicycle turn boxes, bicycle boxes, or exclusive pedestrian or bicycle phases.
- High-pedestrian-volume crossings.
- Exclusive pedestrian phases.
- History of crashes, especially turn-on-red crashes.

COMPLEMENTARY TREATMENTS

- Leading pedestrian interval
- Full traffic signal
- Pedestrian-only phase
- Pedestrian countdown signal

MORE INFORMATION

- WSDOT Traffic Manual
- FHWA Interim Approval IA-18 Optional Use of an Intersection Bicycle Box
- Refer to MUTCD Section 2B.54 - No Turn on Red Signs for implementation guidance.

[123] FHWA. "Right-Turn-on-Red Restrictions." *PedSafe*.

31. Rectangular rapid flashing beacon

DESCRIPTION

At some uncontrolled crossings, it can be difficult to achieve compliance with laws that require drivers to stop for pedestrians. One type of device proven to improve driver yielding compliance at crossings is the rectangular rapid flashing beacon (RRFB). RRFBs include a pedestrian crossing sign and an intense and rapid flashing beacon activated by a pedestrian detector or push button. These devices provide immediate service to pedestrians with little or no wait times.

FIGURE 38. RRFB IN EVERETT, WA. SOURCE: DONGHO CHANG.

DESIGN GUIDANCE

Design RRFBs in accordance with FHWA's Interim Approval (IA-21). WSDOT has received statewide interim approvals for use on all local jurisdiction-owned roadways and state highways.[124] As such, consider RRFBs only at uncontrolled marked crossing locations.

FHWA INTERIM APPROVAL

Place one RRFB on either side of the crosswalk and on the median or pedestrian refuge island as applicable. Install RRFBs with connection to a power source or as a standalone device with solar panels. Consider placement of the beacons based on maintenance considerations, site context, and pedestrian desire lines. At four-way intersections consider placement with two beacons at both crossings of a four-way intersection, with one beacon at each approach leg, or at one leg of crossing as appropriate.

Consider the use of pedestrian pushbuttons with the RRFB. Pedestrian pushbuttons at RRFBs include a locator tone and "yellow lights are flashing" spoken message played twice. Note, the pushbutton shall not include vibrotactile features indicating a walk interval[125] and as such, may not provide sufficient communication for pedestrians who are blind or deaf and blind.

At intersections where a bicyclist may use the RRFB from an on-street bike facility, consider a curbside pushbutton for bicyclists.

At some locations, consider the following in place of the pedestrian crossing sign (W11-2) within the assembly:

- Pedestrian and bicyclist crossing sign (W11-15) where the crossing will serve a pedestrian and bicyclist facility such as a shared-use path or sidewalk with adjacent bike lane.
- School sign (S1-1) near schools.

Consider pedestrian and bicyclist illumination at crosswalk with RRFBs to improve visibility of pedestrians and bicyclists using the crosswalk. Coordinate a maintenance plan prior to installation to ensure continued usability of the treatment.

124 WSDOT. 2023. "Changes and experimentations for the Manual on Uniform Traffic Control Devices."
125 U.S. Access Board. 2023. *Public Right-of-Way Accessibility Guidelines.*

DESIGN APPLICABILITY

- Intersections or midblock locations.
- Most effective at multilane crossings with posted speeds below 40 mph.[126]
- Usually at high-volume pedestrian crossings, but also consider for school crossings, priority bicycle route crossings, or locations where bike facilities/trails cross roads at mid-block locations.
- For more information on applicability of RRFBs, refer to FHWA Guide for Improving Pedestrian Safety at Uncontrolled Crossing Locations Table 1.

COMPLEMENTARY TREATMENTS

- High-visibility crosswalk
- Stop line at an uncontrolled crosswalk
- Pedestrian refuge island

MORE INFORMATION

- FHWA Proven Safety Countermeasures – Rectangular Rapid Flashing Beacons
- FHWA Interim Approval 21 – Rectangular Rapid-Flashing Beacons at Crosswalks
- WSDOT Traffic Manual

PLAN SHEET DETAILS

- 31 - Rectangular Rapid Flashing Beacon

[126] FHWA. 2018. Guide for Improving Pedestrian Safety at Uncontrolled Crossing Locations.

32. Pedestrian hybrid beacon

DESCRIPTION

FIGURE 39. PHB IN TACOMA, WA

Pedestrian hybrid beacons (PHB) (also known as HAWK beacons) are a form of traffic control used at pedestrian and bicyclist crossings. The beacon lights are dark until a pedestrian or bicyclist activates the signal. The cycle includes a warning phase for drivers, then a stop phase when pedestrians and bicyclists receive the "walk" signal to cross the street. PHBs provide a controlled crossing for pedestrians, while creating less delay for drivers than a pedestrian traffic signal or full traffic signal. For pedestrians who have low vision, are blind, or deaf and blind, a PHB with a pedestrian countdown signal and accessible pedestrian signal indicating "walk" while drivers receive a red light is more comfortable and definitive than an uncontrolled crossing.[127] PHBs can address conflicts at crossing locations, excessive driving speed, inadequate visibility, and drivers not stopping for pedestrians in crosswalks. PHBs can reduce pedestrian crashes by 55 percent[128] and serious injury and fatal crashes by 15 percent.[129]

DESIGN GUIDANCE

Consider installing a PHB at a location that either meets the MUTCD traffic signal warrants or aligns with the MUTCD PHB-specific guidelines. Place at least two pedestrian hybrid beacon faces for each approach of the major street. For roads with operating speeds over 35 mph, place both PHB faces over the roadway. Prohibit parking at least **100 feet** in advance and at least **20 feet** beyond the marked crosswalk. For further PHB guidance, refer to the MUTCD Chapter 4F. However, also consider PHB placement at intersections or midblock locations based on updated guidance from FHWA.[130]

Consider PHBs at multi-lane pedestrian crossings of roundabouts.[131]

Install with a high-visibility crosswalk and advance-stop lines. Provide pedestrian countdown signals and accessible pedestrian signals.

Considerations for bicyclists

At locations also intended to serve bicyclist crossings, alternatively consider a half signal or full traffic signal. During the flashing red phase for drivers, pedestrians receive a flashing "don't walk" phase. Bicyclists may see the flashing "don't walk" phase, but still perceive they could clear the intersection within the remaining time. Drivers may not expect bicyclists at the intersection given their higher speed, resulting in a possible conflict in the intersection between drivers and bicyclists.[132] However, if an agency does decide to install PHBs at a crosswalk where bicyclists will also cross, include active or passive bike detection and "bikes use ped signal" signs (R9-5) as applicable.

127 NAS, Engineering, and Medicine. 2017. "Crossing Solutions at Roundabouts and Channelized Turn Lanes for Pedestrians with Vision Disabilities: A Guidebook." Washington, DC: The National Academies Press.

128 NAS, Engineering, and Medicine. 2017. *Development of Crash Modification Factors for Uncontrolled Pedestrian Crossing Treatments.* Washington, DC: The National Academies Press.

129 Fitzpatrick, K. and Eun Sug Park. 2010. "Safety Effectiveness of the HAWK Pedestrian Crossing Treatment." FHWA-HRT-10-042. FHWA.

130 FHWA. 2018. "Pedestrian Hybrid Beacon." *Safe Transportation for Every Pedestrian.*

131 U.S. Access Board. 2023. *Public Right-of-Way Accessibility Guidelines.*

132 Ohio Department of Transportation. 2023. *Multimodal Design Guide.*

DESIGN APPLICABILITY

- Multi-lane roundabout crossings.
- One-way approaches to intersections, such as freeway exit ramps.
- Intersections or midblock crossing locations
- Three or more lanes and/or annual average daily traffic (AADT) over 9,000 vpd.[133]

COMPLEMENTARY TREATMENTS

- Shared-use path
- Roundabout with pedestrian/bicyclist facilities and crossings
- Pedestrian refuge island

MORE INFORMATION

- MUTCD Chapter 4F. Pedestrian Hybrid Beacons

PLAN SHEET DETAILS

- 32 - Pedestrian Hybrid Beacon

[133] FHWA. 2018. *Guide for Improving Pedestrian Safety at Uncontrolled Crossing Locations.*

33. Half signal for pedestrians and bicyclists

DESCRIPTION

Half signals are an intersection treatment that only provides signal control for a major road, and either stop control or one-way exiting the intersection for the side streets. Half signals can improve the safety of existing pedestrian and bicyclist crossings or create a new crossing at a high-speed location. Seattle, WA and Portland, OR both install and maintain half signals within their jurisdictions.

FIGURE 40. HALF SIGNAL IN SEATTLE, WA. SOURCE: DONGHO CHANG.

DESIGN GUIDANCE

Install standard signal heads for drivers on the main road at the crossing location. Mark high-visibility crosswalks for all pedestrian crossings.

On the side street approach, install stop signs, a pedestrian push button, and a pedestrian countdown signal. Provide bike detection at traffic signals in the form of passive detection or a curbside push button that bicyclists can reach from the bikeway.[134] At half signals, consider restricting driver turns from the side streets without signal heads, making the side streets right-in-right-out or converting the side streets to one-way exiting the intersection to minimize conflicts.

Half signals remain green and pedestrian signal heads remain in "don't walk" until activated by pedestrians or bicyclists. The activation changes the signal to red and provides a standard "walk" and flashing "don't walk" phase for pedestrians and bicyclists.[135]

Seattle's Pedestrian Signal Timing policy recommends running half signals at "half the cycle length of adjacent signals except where there are very closely spaced intersections and where the adjacent intersections already run a short cycle length."[136]

Per MUTCD Section 2B.04:

> "STOP signs shall not be used in conjunction with any traffic control signal operation except… If a minor street or driveway is located within or adjacent to the area controlled by the traffic control signal but does not require separate traffic signal control because an extremely low potential for conflict exists."

Per this guidance, agencies can decide to install half signals based on engineering judgement.[137]

134 Wardrip, Lewis. 2019. "City Traffic Engineer Directive - Half Signals." *Portland Bureau of Transportation.*
135 Portland Bureau of Transportation. 2019. *Companion to City Traffic Engineer Directive LW-003 - Half Signals.*
136 Adiam Emery et. al. 2021. *SDOT Policy for Traffic Signal Cycle Time, and Pedestrian Signal Timing and Actuation*
137 FHWA. 2009. "2009 MUTCD (with Revisions 1 and 2 Incorporated)." Last modified Sept. 14, 2022.

DESIGN APPLICABILITY

- Intersections where minor streets have an AADT of 2000 vpd or less.
- Where a bike boulevard crosses a major street.
- Locations that meet MUTCD guidelines for a pedestrian hybrid beacon.[138]
- MUTCD provides signal warrants specifically related to pedestrian volumes, Warrant 4 – Pedestrian Volume and Warrant 5 – School Crossing. Base the warrant analysis on estimated future demand and land use. Actual usage counts for roads that don't have existing crossing facilities and that have a level of traffic stress 3 or 4 are not sufficient especially where safety risks would deter use by a reasonably careful road user. The MUTCD also allows bicyclists to be counted as pedestrians for signal warrant analysis.

COMPLEMENTARY TREATMENTS

- Bike detection at traffic signals
- Median diverter for multi-stage crossing
- Bicycle boulevard
- Accessible pedestrian signal

MORE INFORMATION

- Portland Bureau of Transportation (PBOT) City Traffic Engineer Directive – Half Signals
- PBOT Companion to City Traffic Engineer Directive LW-003 – Half Signals

PLAN SHEET DETAILS

- 33 - Half Signal for Pedestrians and Bicyclists

[138] NAS, Engineering, and Medicine. 2006. Improving Pedestrian Safety at Unsignalized Crossings. Washington, DC: The National Academies Press.

34. Pedestrian traffic signal

DESCRIPTION

Traffic signals, if implemented with appropriate treatments for pedestrians and bicyclists, can improve safety by creating controlled crossing locations. Pedestrian signals can facilitate midblock or intersection crossing and use common signal faces that drivers are familiar with and understand implicitly. Pedestrian signals might be appropriate at locations with frequent pedestrian crossings, multiple lanes in each direction, high traffic volumes, and higher posted speed limits.

FIGURE 41. PEDESTRIAN TRAFFIC SIGNAL IN SEATTLE, WA. SOURCE: DONGHO CHANG.

DESIGN GUIDANCE

Install pedestrian traffic signals with pedestrian countdown signals, accessible pedestrian signal, high-visibility crosswalks, ADA curb ramps, and advance-stop lines.

DESIGN APPLICABILITY

MUTCD provides signal warrants specifically related to pedestrian volumes, Warrant 4 – Pedestrian Volume and Warrant 5 – School Crossing. Base the warrant analysis on existing conditions and projected demand.[139] Consider future land use, active transportation network connections, and other factors that may increase demand for the crossing. Actual usage counts for roads that don't have existing crossing facilities and that have a level of traffic stress 3 or 4, aren't sufficient, especially where safety risks would deter use by a reasonably careful road user. MUTCD also allows bicyclists to be counted as pedestrians for signal warrant analysis.

COMPLEMENTARY TREATMENTS

- Bike detection at traffic signals

MORE INFORMATION

- WSDOT Design Manual
- AASHTO Guide for the Planning, Design, and Operation of Pedestrian Facilities 2021
- MUTCD Part 4. Highway Traffic Signals

[139] NACTO. 2013. "Crosswalks and Crossings." Urban Street Design Guide.

35. Full traffic signal

DESCRIPTION

Traffic signals, if implemented with appropriate treatments for pedestrians and bicyclists, can improve safety by creating controlled crossing locations. MUTCD provides warrants for determining the applicability of full traffic signals.

FIGURE 42. TRAFFIC SIGNAL IN OLYMPIA, WA

DESIGN GUIDANCE

Install traffic signals with pedestrian countdown signals, accessible pedestrian signals, high-visibility crosswalks, ADA curb ramps, bike detection at traffic signals and advance-stop lines.

Consider use of a pedestrian-only phase, leading pedestrian interval, and/or pedestrian signal phase separated from left-turn protected phase.

Consider other strategies to improve pedestrian and bicyclist safety at intersections as appropriate including the following:

- Pedestrian recall – signal timing that causes a pedestrian walk phase to activate on every cycle
- Rest in walk – the walk indication is displayed when the parallel traffic signal is green

DESIGN APPLICABILITY

MUTCD provides signal warrants specifically related to pedestrian volumes, Warrant 4 – Pedestrian Volume and Warrant 5 – School Crossing. Base the warrant analysis on existing conditions and projected demand.[140] Actual usage counts for roads that don't have existing crossing facilities and that have a level of traffic stress 3 or 4 aren't sufficient, especially where safety risks would deter use by a reasonably careful road user. MUTCD also allows bicyclists to be counted as pedestrians for signal warrant analysis.

COMPLEMENTARY TREATMENTS

- Bike signal face
- Leading bike interval

MORE INFORMATION

- AASHTO Guide for the Planning, Design, and Operation of Pedestrian Facilities 2021
- MUTCD Part 4. Highway Traffic Signals
- NCHRP 969 Traffic Control Strategies for Pedestrians and Bicyclists

[140] NACTO. 2013. "Crosswalks and Crossings." Urban Street Design Guide.

36. Leading pedestrian interval

DESCRIPTION

A leading pedestrian interval (LPI) is a signal-timing strategy that provides the "walk" signal before the light turns green for drivers on the parallel roadway. LPIs can improve visibility of pedestrians and bicyclists by allowing them to better establish themselves in the crosswalk before drivers receive the green light to turn right or left. This can improve the rate of drivers yielding to pedestrians.[141] LPIs can reduce pedestrian-vehicle crashes at intersections by 13 percent.[142]

FIGURE 43. LEADING PEDESTRIAN INTERVAL. SOURCE: FHWA.

DESIGN GUIDANCE

Provide sufficient advance walk time for a pedestrian to position themselves in the crosswalk where a driver will look to turn. Provide at least three seconds or more for the "walk" signal before the light turns green for drivers on the parallel roadway.

Consider prohibiting turn-on-red with a "no turn on red" (R10-11) sign on the signal mast arm or signal pole for drivers on the parallel roadway. Consider also installing an "turning vehicles stop for pedestrians" sign (R10-15).

Install accessible pedestrian signals with LPIs to notify pedestrians who have low vision, are blind, or deaf and blind they may begin crossing. If this is infeasible due to costs or maintenance, set the pedestrian crossing phase to the appropriate time needed to cross in addition to the LPI to allow pedestrians who have low vision, are blind, or deaf and blind sufficient time to cross.[143]

If bicyclists in a bike facility adjacent to the sidewalk will also use the LPI at an intersection, install a "bikes use ped signal" sign (R9-5), near the pedestrian countdown signal.

DESIGN APPLICABILITY

- Intersections with high volumes of turning vehicles.
- Intersections with high pedestrian volumes.
- Intersections with a high number of children, older pedestrians, pedestrians with physical disabilities.

141 FHWA. 2021. "Leading Pedestrian Interval." *Proven Safety Countermeasures.*

142 Goughnour, E., D. Carter, C. Lyon, B. Persaud, B. Lan, P. Chun, I. Hamilton, and K. Signor. 2018. "Safety Evaluation of Protected Left-Turn Phasing and Leading Pedestrian Intervals on Pedestrian Safety." FHWA-HRT-18-044. FHWA.

143 National Committee on Uniform Traffic Control Devices. 2021. "Requirement for Accessible Pedestrian Signals When Leading Pedestrian Intervals are Used." *NCUTCD Proposal for Changes to the Manual on Uniform Traffic control Devices*

COMPLEMENTARY TREATMENTS

- Prohibit right-turn-on-red
- Full traffic signal
- Bike signal face
- Leading bike interval
- Pedestrian countdown signal
- Accessible pedestrian signal

MORE INFORMATION

- AASHTO Guide for the Planning, Design, and Operation of Pedestrian Facilities 2021
- FHWA Proven Safety Countermeasures – Leading Pedestrian Interval
- Refer to MUTCD Section 4E.06 for signal timing guidance.

37. Pedestrian-only phase

DESCRIPTION

A pedestrian-only phase (also known as a "pedestrian scramble") is a separate signal timing phase that allows pedestrians to cross in any direction while drivers on all approaches have red lights. Pedestrian-only phases can reduce conflicts between drivers and pedestrians. In Washington state, Bicyclists may also use pedestrian-only phases unless a local ordinance prohibits otherwise.[144] This treatment does present trade- offs and agencies should consider if pedestrian-only phases are appropriate for their conditions.[145]

FIGURE 44. PEDESTRIAN-ONLY PHASE IN SEATTLE, WA.

DESIGN GUIDANCE

Provide pedestrian countdown signals for all approaches and accessible pedestrian signals to notify people with visual disabilities that they can cross in all directions. Program the signal timing to allow for pedestrian crossing times for the longest direct route across the intersection.[146]

Pedestrian-only phasing may also include all-way crossing pavement markings or signs to notify pedestrians that the "walk" signal indication permits them to cross in all directions. Consider effects to ADA curb ramps if marking a diagonal crossing. If the pedestrian-only phase will also permit bicyclists to cross, install "bikes use ped signal" (R9-5) signs near the edge of the sidewalk where bicyclists will begin to cross.[147]

Pedestrian-only phases typically require "no turn on red" (R10-11) signing to prevent vehicles from executing turning maneuvers during the pedestrian-only phase.

Consider if the pedestrian-only phase will increase pedestrian wait times significantly. If the pedestrian signal phase will require pedestrians to wait a long time for the "walk" signal, they may ignore the "walk" signal and try to cross between vehicles.[148] In this condition, another treatment may better improve safety for pedestrians at that location.

Consider accessible pedestrian signals at locations with pedestrian-only phasing with an audible walk message to inform pedestrians of the all-way crossing.

DESIGN APPLICABILITY

- Intersections with high pedestrian crossing volumes, especially where pedestrians cross more than one approach.
- Intersections where all driver approaches simultaneously have a red light for any one pedestrian leg.
- Intersections with high pedestrian-driver conflict.

144 RCW 46.61.261
145 New York City Department of Transportation. 2017. *Walk this Way - Exclusive Pedestrian Signal Phase Treatments Study.*
146 FHWA. 2013. *Signalized Intersections Informational Guide Second Edition*.
147 FHWA. 2009. "2009 MUTCD (with Revisions 1 and 2 Incorporated)." Last modified Sept. 14, 2022.
148 FHWA. "Pedestrian Signal Timing." *PedSafe.*

COMPLEMENTARY TREATMENTS

- Stop line at a controlled crosswalk
- Accessible pedestrian signal
- Prohibit turn-on-red

MORE INFORMATION

- PedSafe
- AASHTO Guide for the Planning, Design, and Operation of Pedestrian Facilities 2021

38. Pedestrian signal phase separated from left-turn "protected" phase

DESCRIPTION

A common conflict at intersections occurs when drivers turn left during a permissive phase while pedestrians try to cross in the crosswalk across the driver's receiving lane. Protected-only left turns can restrict drivers turning left from conflicting with crossing pedestrians or bicyclists. A study of older pedestrian safety based on data analysis and a stakeholder workshop recommended protected left turns specifically to improve safety for pedestrians.[149]

FIGURE 45. PROTECTED-LEFT-TURN SIGNAL IN SEATTLE, WA.

DESIGN GUIDANCE

This treatment may improve safety for pedestrians only if the existing condition includes a left-turn pocket or a road reconfiguration allows for the reduction of through lanes and the creation of a left-turn pocket. At intersections that require widening to implement a protected left-turn phase, consider other pedestrian-specific treatments.

Install a left-turn-only arrow signal for the left-turn lane. Provide separate signal timing phases for drivers turning left and pedestrians crossing the street. If existing or proposed adjacent destinations generate or may generate high pedestrian volumes during certain peak hours of the day, consider the pedestrian push buttons and flashing yellow arrows when the pedestrian phase isn't activated and to allow flexibility in prohibiting permissive turns.[150]

Consider effects to overall signal systems, pedestrian crossing distance, and cycle lengths.[151]

DESIGN APPLICABILITY

- Intersections with existing left-turn pockets or road reconfigurations
- Intersection with high left-turn volumes, high pedestrian volumes, or high incidence of conflicts between pedestrians and left-turning drivers.

COMPLEMENTARY TREATMENTS

- High-visibility crosswalk
- Pedestrian countdown signal
- Accessible pedestrian signal
- Pedestrian refuge island

149 Anderson, Jason C., Sirisha Kothuri, Christopher Monsere, and David Hurwitz. 2022. "Systemic Opportunities to Improve Older Pedestrian Safety: Merging Crash Data Analysis and a Stakeholder Workshop." Transportation Research Record 2676(10) 351–360.

150 AASHTO. 2021. *Guide for the Planning, Design, and Operation of Pedestrian Facilities, 2nd Edition*. Washington, DC.

151 FHWA. "Left Turn Phasing." *PedSafe*.

MORE INFORMATION

- AASHTO Guide for the Planning, Design, and Operation of Pedestrian Facilities 2021
- PedSafe
- Refer to MUTCD Section 4D for implementation guidance.

39. Bike detection at traffic signals

DESCRIPTION

Signalized intersections may have vehicle detection technology that is not sensitive enough to detect the presence of a bicycle. Detection for bicyclists can reduce bicyclist dependence on vehicle presence for a green light at an intersection and, as a result, reduce bicyclist delay and the need for bicyclists to travel through an intersection without a green light.[152] Per RCW 46.61.184, bicyclists have the legal right to proceed through or left at an intersection if the signal has not detected them after one full cycle. Forms of detection include passive detection through loops, cameras, or other technology or active detection with a push button.

Bicyclist detection may also extend signal lengths for bike speeds determined based on topography when present at intersections.

FIGURE 46. BIKE DETECTION IN EVERETT, WA. SOURCE: DONGHO CHANG

DESIGN GUIDANCE

At actuated or semi-actuated signals, place detection devices anywhere intended for bicyclists to wait for a signal. This includes bicycle boxes, two-stage, bicycle-turn boxes, and bike lanes. In the absence of a dedicated bike lane, provide vehicular detectors in-lane that also detect bicyclists. Mark a bicycle detector symbol at the optimum position for the signal to detect the bicyclist.[153] For passive detection, install loops, video detection, microwave radar, or other detection that routinely and reliably detects bicyclists. Only consider active detection where a bicyclist can easily reach the button without leaving the bikeway. For active detection, place push buttons within arm's reach of the bike lane so a bicyclist can push the button without dismounting.[154]

State law requires all vehicle-activated traffic control signals to detect bicyclists "routinely and reliably." RCW 47.36.025 provides specific guidance on when to update intersections to meet this requirement.

Consider the type of detection based on the context and ability to maintain the selected method.

Consider supplementing a bicycle detector pavement marking with a "to request green wait on (bicycle symbol)" (R10-22) sign. At push buttons, install "push button for green" (R10-4), "push button for green light" (R10-24), or "push button for green light (arrow)" (R10-26) to notify bicyclists of the push button.

Mark detection areas where the detection area isn't in the middle of the lane in advance of the stop line or crosswalk. [155]

152 FHWA. 2014. "Bike-Activated Signal Detection." *BikeSafe.*
153 FHWA. 2009. "2009 MUTCD (with Revisions 1 and 2 Incorporated)." Last modified Sept. 14, 2022.
154 NACTO. 2014. "Signal Detection and Actuation." *Urban Bikeway Design Guide, Second Edition.*
155 RCW 47.36.025

DESIGN APPLICABILITY

- Adjust all existing traffic control signals to detect bicyclists to the extent the existing equipment is capable. Adjust existing signals during routine maintenance or monitoring activities subject to the availability of funds.[156]
- When replacing or upgrading a substantial[157] portion of detection equipment along arterials, bicycle routes, public roads.
- "All vehicle-activated traffic control signals that are design complete and put in operation after July 26, 2009..."[158]

COMPLEMENTARY TREATMENTS

- Half signal for pedestrians and bicyclists
- Bike-signal face
- Leading bike interval

MORE INFORMATION

- MUTCD Section 9C.05 - Bicycle Detector Symbol & Section 9B.11 Bicycle Regulatory Signs
- BikeSafe
- RCW 47.36.025

PLAN SHEET DETAILS

- 39 - Bike Detection at Traffic Signals

156 RCW 47.36.025
157 Ibid.
158 Ibid.

40. Bike detection confirmation light and signage

DESCRIPTION

Bike detection confirmation lights provide greater emphasis for the bicycle and indicates to adjacent drivers that there is a bicycle close by – particularly if they are not readily visible from a driver's position.

A longstanding issue is determining how a bicyclist can verify that the traffic signal system has detected them and that they have triggered the appropriate system response. Agencies and manufacturers have developed a few versions of detection confirmation lights that can address this concern.

FIGURE 47. BIKE DETECTION CONFIRMATION ON SR 240 IN RICHLAND, WA.

In Washington state, WSDOT has implemented signage and white lights to notify bicyclists the signal has detected their presence. Other agencies have used a blue detection confirmation light. A study out of Oregon of a blue light detection confirmation light and sign, found that this treatment provided useful information to bicyclists while waiting at an intersection.[159]

FIGURE 48. WSDOT D11-1 (MOD.-1) SIGN.

DESIGN GUIDANCE

Install either a separated combination of sign and confirmation light or a combined sign and light. A separate combination of sign and confirmation light simplifies sign construction and equipment assembly, rather than having to provide a custom-built sign with attached or embedded indicator light. Consider use of a white indicator light, so as not to cause confusion with other similar enforcement lights, but agencies may also use blue lights to align with existing installations or based on their own engineering judgement. Coordinate with local enforcement to communicate the needs of the sign and determine an appropriate light style.

Consider placement of the sign so that it is prominently visible to bicyclists as they wait on the marked detection area. Implement this treatment at locations with existing or proposed bike detection at traffic signals.

Place a "(bicycle symbol) detected when illuminated" (D11-1 MOD.-1) sign at a near or far side location where it is visible to both bicyclists and drivers. Consider the use of multiple signs per approach to provide sufficient visibility to both bicyclists and drivers.

[159] Christopher Monsere et. al. 2021. *Assessment of Bicycle Detection Confirmation and Countdown Devices. Oregon Department of Transportation*.

DESIGN APPLICABILITY

- Signalized intersections with existing or proposed bike detection.

COMPLEMENTARY TREATMENTS

- Full traffic signal
- Pedestrian hybrid beacon
- Pedestrian traffic signal
- Half signal for pedestrians and bicyclists
- Bicycle box
- Bike-signal face
- Leading bike interval

MORE INFORMATION

- Assessment of Bicycle Detection Confirmation and Countdown Devices - ODOT

41. Bike-signal face

DESCRIPTION

Bike-signal faces can denote a bike-signal phase without any conflicting vehicle movements. This phase can improve bicyclist safety at intersections by separating driver turning movements from bicyclists' movements and allowing for increased conflict point management. Providing bicycle phasing with bike-signal faces allows bikes to change lanes or make other necessary maneuvers without interacting with higher speed vehicles at intersections.[160] Bike-signal phases using bike-signal faces can help address right-hook or left-hook crashes between bicyclists and drivers.

FIGURE 49. BIKE-SIGNAL FACE IN BELLINGHAM, WA.

DESIGN GUIDANCE

When installing bike-signal faces, follow the FHWA Interim Approval IA-16. Bike signals include steady red, yellow, and green indications.

WSDOT hasn't received statewide approval for bike-signal faces for use by all local jurisdictions. For use of bike-signal faces, agencies will need to submit a request to authorize use of the FHWA's interim approval.

To use bike-signal faces for bike phases running concurrent to vehicle turns, such as leading bike intervals, FHWA requires an approval for request to experiment. NACTO's *Don't Give Up at the Intersection* includes guidance for a leading bicycle interval and concurrent bicycle phase with permissive vehicle turns.

DESIGN APPLICABILITY

- Intersections with bike lanes and conflicting vehicle movements that need separation in time, such as a left-turn only or right-turn-only lanes.
- Intersections with contraflow bike lanes or two-way bike lanes.
- Intersections with any bike-specific phase.[161]

FHWA INTERIM APPROVAL

*not included in WSDOT's statewide approval

160 WSDOT. 2021. *Traffic Manual M 51-02.10*. (Engineering and Regional Operations).
161 FHWA. 2014. "Bicycle Signal Heads." *BikeSafe*.

COMPLEMENTARY TREATMENTS

- Protected intersection for linear bicycle facilities
- Bicycle intersection crossing markings
- Bike detection at traffic signals
- Leading bike interval
- Buffered bike lanes
- Contraflow bike lane
- Bike lanes

MORE INFORMATION

- FHWA Interim Approval for Optional Use of a Bicycle Signal Face (IA-16)
- BikeSafe
- NACTO Don't Give Up at the Intersection

42. Leading bike interval

DESCRIPTION

Like an LPI, a leading bike interval (LBI) is a signal timing strategy that provides a green signal indication 3-8 seconds before the light turns green for drivers on the parallel roadway. It allows bicyclists to enter an intersection before drivers on the parallel roadway receive the green light. LBIs can improve the visibility of bicyclists by allowing them to better establish themselves in the intersection before drivers receive the green light to turn right or left. This may also allow bicyclists additional time to accelerate if their start up is on a hill.

In Washington state, bicyclists are also permitted to cross in a crosswalk without dismounting when provided with the "walk" signal.[162] As such, the guidance provided here is similar to that of an LPI.

DESIGN GUIDANCE

Install a pedestrian countdown signal with "(bike symbol) use ped signal" (R9-5) on the legs with the bike-facility crossings. Time the LBI for either a 3-8 second walk signal or the length required for an LPI, whichever is longer, prior to green indication for drivers on the parallel roadway. Provide sufficient advance green time for bicyclists to position themselves in the intersection where a vehicle will look to turn.

Prohibit right-turn-on-red with a "no turn on red" (R10-11) sign on the signal mast arm or signal pole for drivers on the parallel roadway. If an LBI is adjacent to an LPI, install a "turning vehicles stop for pedestrians" sign (R10-15). Alternatively, consider using the sign shown in "turning vehicles stop for pedestrians and bicyclists."[163] This sign requires approval for a request to experiment from FHWA.

DESIGN APPLICABILITY

- Intersections with high volumes of turning vehicles.
- Intersections with high bicyclist volumes.
- Signalized intersections with bike lanes on at least one leg.
- Bike facilities that approach an intersection stop line on an incline or in the middle of an incline.

COMPLEMENTARY TREATMENTS

- Leading pedestrian interval
- Bicycle intersection crossing markings
- Bike-signal face

MORE INFORMATION

- NACTO Don't Give up at the Intersection

[162] RCW 46.61.261
[163] NACTO. 2019. "Leading Bike Interval (LBI) & Lagging Left Turn." *Don't Give Up at the Intersection*.

43. Bicycle intersection crossing markings

DESCRIPTION

The MUTCD allows dashed, white lines to extend bike lanes across intersections as a marked point of crossing. These crossing markings can indicate the preferred path for bicyclists across intersections, ramps, turn lanes, and other conflict areas. These bike lane extension markings raise awareness of the conflict area and make the movement of bicyclists more predictable.[164] These markings alone don't remove conflicts, but rather increase conspicuity and provide preferred paths for bicyclists through intersections.

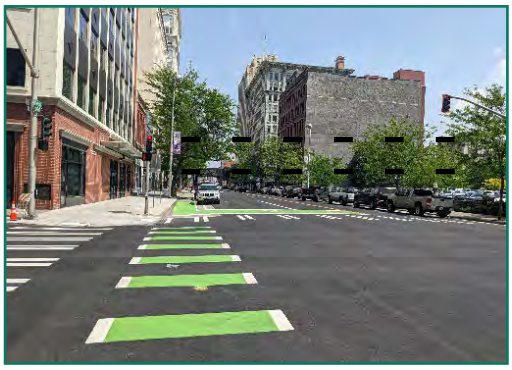


FIGURE 50. BICYCLE INTERSECTION CROSSING MARKINGS IN SPOKANE, WA.

The FHWA interim approval for green-colored pavement in bike lanes allows the use of additional green coloring as a supplement to bicycle-intersection-crossing markings, further enhancing the visibility of the bicycle intersection crossing markings in certain circumstances.

DESIGN GUIDANCE

FHWA INTERIM APPROVAL

Per the MUTCD, lane extension markings across an intersection connect to dedicated lanes on either end of the crossing. For this reason, don't use bicycle intersection crossing markings with shared-lane markings alone. At a minimum, extend a dedicated bike lane a minimum of **50 feet** from the intersection on both bike approaches or connect bicycle intersection crossing markings to another dedicated-bike facility, such as a two-stage-turn box.

Place white-dashed pavement markings to delineate the preferred path for bicyclists. Use additional green-ladder striping between white-dotted striping through the extent of the conflict area or intersection crossing where green pavement marking is desired. If closely spaced conflict areas exist, consider carrying solid green into the next conflict area.

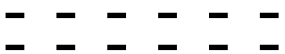
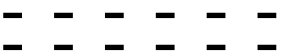
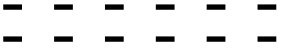
If the conflict zone or intersection crossing is for a two-way bike lane, provide a dashed-yellow centerline through the middle of a **10-foot**-wide-or-more, two-way, green-dashed pavement marking.

Consider the guidance in Table 5 to determine if white-dashed markings or green-dashed markings are appropriate given the bike-facility and roadway context.[165] In some locations, treat high-vehicular-volume driveways as unsignalized intersections. Consider green bicycle intersection crossing markings when used as part of a suite of green markings along certain bike routes, especially when used in conjunction with separated bike lanes. Apply a consistent suite of treatments at intersections along a designated bike facility. Consider variation based on intersecting roadway type if necessary. When placing bicycle intersection crossing markings adjacent to high visibility crosswalks, alter the bicycle intersection crossing markings to align with the crosswalk spacing.

In lower conflict areas, white-dashed markings alone may provide sufficient direction for bicyclists through an intersection.

[164] NACTO. 2014. "Intersection Crossing Markings." *Urban Bikeway Design Guide, Second Edition.*
[165] Ohio Department of Transportation. 2023. *Multimodal Design Guide*.

TABLE 5: INTERSECTION CROSSING MARKINGS BY BIKE FACILITY AND CONTEXT. ADAPTED FROM THE OHIO DOT MULTIMODAL DESIGN GUIDE

Intersection type	Condition	Separated bicycle lane	Conventional/buffered bike lane
Signalized	Turn conflict		
	No turn conflict		
Unsignalized	High turning volume		
	All other conditions		

White-dashed markings

Green bicycle intersection crossing markings

DESIGN APPLICABILITY

- Bike-lane crossings at uncontrolled intersections, including highway ramps.
- Conflict zones where driving lanes and bike lanes cross over each other.
- Bike-lane crossings at signalized intersections, especially if the intersection is wide or complex or if simultaneous drive movements conflict with the bicyclist movement or if used as part of suite of markings along a bike route.
- Parallel to a crosswalk if a bike lane and a crosswalk will cross next to each other, as at a bike boulevard crossing.

COMPLEMENTARY TREATMENTS

- Bike boulevard
- Bike lanes
- Buffered bike lanes
- Contraflow bike lane
- Separated bike lane

MORE INFORMATION

- NACTO Urban Bikeway Design Guide
- Ohio DOT Multimodal Design Guide
- FHWA Improving Intersections for Pedestrians and Bicyclists

PLAN SHEET DETAILS

- 43 - Bicycle Intersection Crossing Markings

44. Bicycle box

DESCRIPTION

Bicycle boxes are designated areas for bicyclists, positioned across and in front of the bike and motor-vehicle lanes. Bicycle boxes apply only at signalized intersections and increase both mobility and safety performance for bicyclists. Applying a bicycle box assists mobility performance by prioritizing the bicyclist's movement at an intersection. Bicycle boxes prevent bicyclist and motor vehicle encroachment into the pedestrian crossing, reducing conflicts with pedestrians at intersections. The increased visibility of the bicyclist improves safety performance and reduces conflicts between motor vehicles making a right turn and the bicycle-through movement (also known as "right-hook" conflict).[166]

FIGURE 51. BICYCLE BOX IN SPOKANE, WA

DESIGN GUIDANCE

To mark a bicycle box, place the advance-stop line for drivers at least **10 feet** in advance of the pedestrian crossing stop line. Place at least one bike symbol within the bicycle box. Consider green colored pavement within the bicycle box. Provide at least 50 feet of a bike lane, buffered bike lane, or separated bike lane leading up to the bicycle box.[167]

FHWA INTERIM APPROVAL

Install "stop here on red" (R10-6 or R10-6a) and "except bicycles" (R3-7bP) signs at the stop line defining the bicycle box. Prohibit right-turn-on-red with a "no turn on red" (R10-11) sign on the signal mast arm or signal pole for drivers on the parallel roadway.

APPLIES TO SPEED MANAGEMENT

Bicyclists may use the box to make a conventional left turn or two-stage left turn at some intersections. To accommodate bicyclist left turns also consider installation of a two-stage bicycle turn box.

At actuated signalized intersections, provide bike detection at traffic signals within the bicycle box.

DESIGN APPLICABILITY

- Signalized intersections only.
- Helpful along freight routes for drivers to better see bicyclists by situating them ahead of drivers at intersections.[168]
- Not appropriate on bicycle boulevards unless located at a signalized intersection with 50 feet of advance bike lane.

166 WSDOT. 2023. *Design Manual M 22-01.22.* (Engineering and Regional Operations).
167 FHWA. 2016. "Interim Approval for Optional Use of an Intersection Bicycle Box (IA-18)." Last modified March 8, 2017.
168 WSDOT. 2021. *Traffic Manual M 51-02.10*. (Engineering and Regional Operations).

COMPLEMENTARY TREATMENTS

- Bike detection at traffic signals
- Two-stage bicycle turn box
- Bicycle boulevard
- Separated bike lane

MORE INFORMATION

- FHWA Interim Approval for Optional Use of an Intersection Bicycle Box (IA-18)

PLAN SHEET DETAILS

- 44 - Bicycle Box

45. Two-stage bicycle turn box

DESCRIPTION

Two-stage bicycle turn boxes designate space in an intersection where bicyclists can wait before traveling in a different direction. This treatment allows bicyclists to make left-turn movements or navigate complex intersections without waiting in a vehicular through-left or left-turn lane.

On one-way streets, the turn box might be located on the left side of the street to accommodate right-turning bicyclists. Bicyclists can also use two-stage turn boxes as a queueing area at locations where a bike lane must transition from one side of the street to the other.

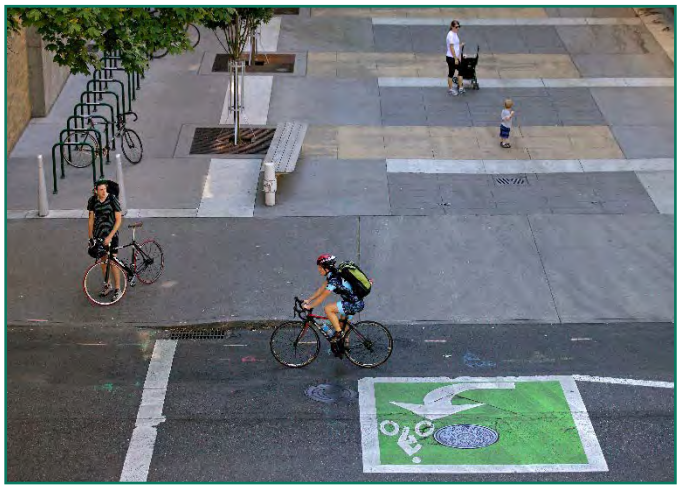


FIGURE 52. TWO-STAGE-BICYCLE-TURN BOX. SOURCE: PEDBIKE IMAGES/ZACHARY KAUFMAN.

DESIGN GUIDANCE

Place two-stage bicycle turn boxes out of the path of through and turning traffic, bicyclists traveling through the intersection, and outside of the crosswalk.[169] Place the box adjacent to the path of the bicyclist and downstream of the cross-street intersection stop line and the crosswalk. Within the two-stage bicycle turn box place green colored pavement, a bike symbol oriented in the direction of entering bicycle traffic, and an arrow pointing in the direction of the turn.

FHWA INTERIM APPROVAL

Maximize the depth of the box with a minimum depth of **6.5 feet** in the direction the bicyclist will travel.

Place the box either in front of the pedestrian crossing, adjacent to a sidewalk, or between the travel lane and the path of through bicyclist movements at the end of a parking lane or median island.

Consider installation of “left turn may use turn box” (D11-20) and “left turn box” (D11-20a) signs in locations where bicyclists and drivers may not be familiar with two-stage bicycle turn boxes..

At signalized intersections, prohibit right-turn-on-red for vehicle movement that would conflict with bicyclists waiting in the two-stage bicycle turn box. Place a “no turn on red” (R10-11) sign on the signal mast arm or signal pole.

At actuated signalized intersections, provide bike detection at traffic signals within the two-stage bicycle turn box.[170]

DESIGN APPLICABILITY

- One or two-way bike facilities at intersections.
- Signalized intersections.
- Any intersection with a designated left-turn lane.

169 FHWA Interim Approval IA-20
170 Ohio Department of Transportation. 2023. *Multimodal Design Guide.*

- Especially at intersections where the adjacent roadway exceeds 6,000 vpd or 30 mph.[171]

COMPLEMENTARY TREATMENTS

- Full traffic signal
- Bike detection at traffic signals
- Bicycle box
- Bike-signal face
- Leading bike interval

MORE INFORMATION

- FHWA Interim Approval IA-20
- Ohio Multimodal Design Guide

PLAN SHEET DETAILS

- 45 - Two-Stage Bicycle Turn Box

171 Ibid.

Grade-separated treatments

Where at-grade intersection treatments may not provide the safest and most direct routes for pedestrians and bicyclists, grade-separated treatments, overpasses or underpasses may maintain connectivity for these users. Consider these treatments only across or under barriers such as railroad tracks, limited-access highways, geographic elements, and bodies of water. At intersections, consider ways to improve the configuration of the intersection for safer at-grade crossings in lieu of grade-separating a pedestrian or bicyclist crossing. These treatments are only appropriate if they don't create longer or more circuitous routes for pedestrians and bicyclists.

46. Pedestrian/bicyclist overpass

DESCRIPTION

Overpasses can improve safety by separating pedestrians and bicyclists from major barriers such as railroad tracks, limited-access highways, geographic elements, and water bodies. They're only appropriate if they don't create longer or more circuitous routes for pedestrians and bicyclists. Overpasses are most effective when the barrier is below the natural ground line, as in a cut section. Elevated-grade separations, where pedestrians and bicyclists climb stairs or use long approach ramps, are often not the best crossing option unless they're located across otherwise uncrossable facilities.

FIGURE 53. PEDESTRIAN/BICYCLIST OVERPASS IN OLYMPIA, WA.

DESIGN GUIDANCE

Locate the grade-separated crossing where pedestrians and bicyclists are most likely to cross the barrier.

Overpasses need adequate right of way to accommodate accessible ramp approaches leading up to and off the structure. The structure must comply with ADA requirements and meet the accessibility criteria for either a pedestrian circulation path (if the grade is 5 percent or less) or an access ramp (if the grade is greater than 5 percent but less than or equal to 8.3 percent) and must include a pedestrian-access route. Follow applicable structural and geotechnical design requirements and approvals for all structures.

Provide a minimum **17.5 feet** vertical clearance from the bottom of the pedestrian structure to the roadway beneath if above a limited-access highway. For overpasses across bodies of water, railroad tracks, and other barriers, coordinate with appropriate agencies to determine clearance height. The height of the structure can affect the length of the ramp approaches to the structure. When access ramps aren't feasible, provide both elevators and stairways and identify a regular maintenance program for elevators.[172]

Provide railings on bridges. Consider providing a bridge fence depending on the context to protect areas beneath the structure, and pedestrians and bicyclists using the overpass. Provide sufficient pedestrian and bicyclist illumination along the length of the overpass.

Maintain the width of the approach path with the addition of 2- or 3-foot horizontal shy distance on either side. Provide a minimum clear width of **14 feet**, or the equivalent of a **10-foot** path with **2-foot** horizontal shy distance on either side.[173]

DESIGN APPLICABILITY

- Where there is a pedestrian or bicyclist crash history, and a roadway redesign can't accommodate pedestrians and bicyclists at grade.
- Where an overpass would improve the efficiency of a pedestrian or bicycle route.
- Across a body of water, railroad tracks, limited-access highway, or other barrier to pedestrians and bicyclists.
- As part of a shared-use path.

172 WSDOT. 2023. *Design Manual M 22-01.22*. (Engineering and Regional Operations).
173 AASHTO. 2021. *Guide for the Planning, Design, and Operation of Pedestrian Facilities, 2nd Edition*. Washington, DC.

COMPLEMENTARY TREATMENTS

- Shared-use path

MORE INFORMATION

- AASHTO Guide for the Planning, Design, and Operation of Pedestrian Facilities 2021

47. Pedestrian/bicyclist underpass

DESCRIPTION

Underpasses can separate pedestrians and bicyclists from major barriers but only provide an effective option if used in a way that doesn't create longer or more circuitous routes for pedestrians and bicyclists. Avoid long tunnels that pass under multiple lanes of traffic. Shorter, at-grade underpasses, which receive significant natural or ambient light, are more appealing for users.

FIGURE 54. PEDESTRIAN/BICYCLIST UNDERPASS IN SPOKANE, WA.

DESIGN GUIDANCE

When feasible, design the underpass with a nearly level profile to provide an unobstructed line of sight from portal to portal.[174]

Maintain the width of the approach path with the addition of a **2-** or **3-foot** horizontal shy distance on either side, with a minimum width of **15 feet**. For tunnels over **60 feet** long, increase the width to provide a feeling of security when people pass each other. The vertical clearance should be at least **10 feet**. Consider increasing this clearance to **12 feet** for equestrian use if expected. For comfort, provide a width that is approximately 1.5 times the height of the underpass. [175]

Use light-colored interior walls or wall artwork to improve visibility and comfort. Consider applying anti-graffiti coating to protect murals or surfaces. Provide appropriate lighting within the underpass, and on the approach and exit to ensure sufficient visibility of the paved surface and other people in the underpass. Develop a regular maintenance strategy to monitor the underpass for graffiti and debris.

Consider effects to adjacent land uses and street frontage at a location for an underpass. Prioritize preserving pedestrian and bicyclist access to adjacent businesses.

DESIGN APPLICABILITY

- Where there is a pedestrian or bicyclist crash history, and a roadway redesign can't accommodate pedestrians and bicyclists at grade.
- Where an underpass would improve the efficiency of a pedestrian or bicycle route.
- Consider drainage implications when determining applicability.
- As part of a shared-use path.

COMPLEMENTARY TREATMENTS

- Shared-use path

MORE INFORMATION

- AASHTO Guide for the Planning, Design, and Operation of Pedestrian Facilities 2021
- AASHTO Roadway Lighting Design Guide 2018
- Crime Prevention through Environmental Design

174 WSDOT. 2023. *Design Manual M 22-01.22*. (Engineering and Regional Operations).
175 AASHTO. 2021. *Guide for the Planning, Design, and Operation of Pedestrian Facilities, 2nd Edition*. Washington, DC.

ILLUMINATION

Illumination for pedestrian and bicyclist facilities can enhance safety by improving visibility of the users for drivers while also improving social safety. Luminaires used to light the roadway may not provide appropriate illumination for pedestrians and bicyclists along adjacent facilities. Provide uniform illumination along linear facilities and at intersections. Note, luminaires don't need to be decorative to achieve pedestrian-scale lighting objectives. Consider the following when implementing lighting improvements for pedestrians and bicyclists:

- **Maintenance implications –** Develop strategies to maintain luminaires and secure the systems as needed.
- **Spillover light –** Select pole and light placement to provide sufficient illumination without casting excessive light off the facility. Especially in less densely populated areas, excessive off-facility lighting may become detrimental to the natural environment at night. Consider effects in wildlife buffer areas as appropriate.
- **Light pollution –** Implementation of dark-sky approved luminaires can prevent light pollution. Refer to the International Dark-Sky Association for more information.
- **Controls –** Lighting controls may allow luminaires to dim and brighten based on daylight and motion detection.

When designing illumination for shared pedestrian and bicyclist use, consider illumination on the shared facility. For separate pedestrian and bicyclist facilities, consider illumination levels on each facility to improve safety for both user groups.

ILLUMINATION CASE STUDY

Haxton Way in the Lummi Nation Reservation provides access to important services in the area. The Lummi Nation Planning and Public Works Department along with other partners developed a pedestrian-bicycle trail adjacent to the road to provide active-transportation access to the area. The project aimed to minimize effects to the surrounding natural environment while also providing illumination along the trail. The solar-powered lighting along the trail adjusts light levels based on daylight and usage.[176]

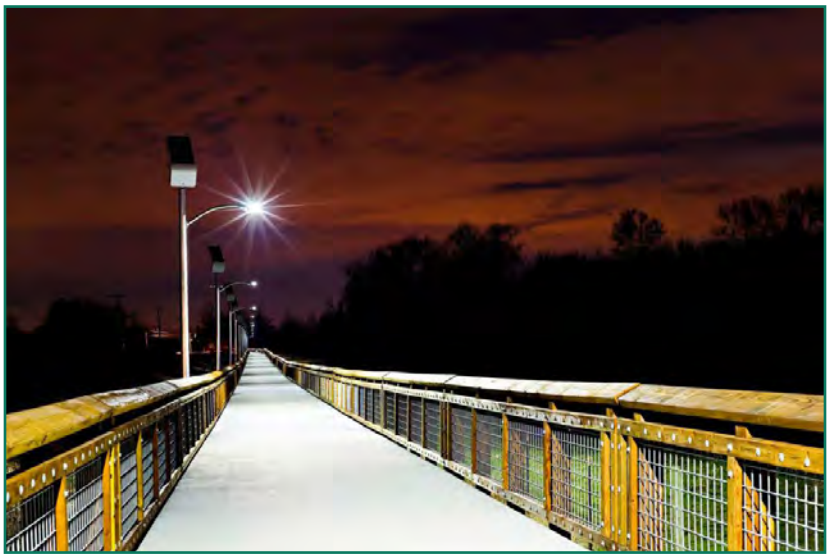


FIGURE 55. HAXTON WAY PATHWAY IN THE LUMMI NATION RESERVATION. SOURCE: SOL.

176 FHWA. 2020. "Tribal Transportation Case Study: Lummi Nation - Haxton Way Pedestrian Pathway Project."

48. Pedestrian and bicyclist illumination at a crossing or intersection

DESCRIPTION

In Washington state, the highest number of crashes between motorists and pedestrians tends to occur November-February, when there are more hours of darkness and reduced visibility because of weather.[177] Illumination of pedestrian and bicyclist crossings is an important design consideration because lighting increases the likelihood of a driver seeing a pedestrian or bicyclist in a crosswalk at night as well as providing a personal sense of security to the pedestrian or bicyclist. Illumination provided solely for vehicular traffic isn't always effective in lighting crossings or intersections for pedestrians and bicyclists.

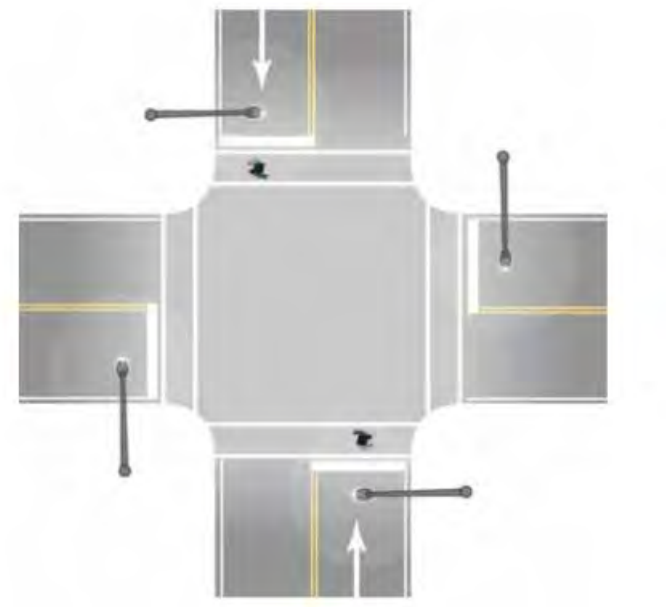


FIGURE 56. RECOMMENDED INTERSECTION LIGHTING LAYOUT. SOURCE: FHWA.

DESIGN GUIDANCE

At intersection crosswalks, place luminaires away from the intersection as shown in Figure 56 to provide positive illumination of the pedestrian or bicyclist in a crosswalk as viewed by the driver entering the intersection. Consider a minimum of two luminaires or increasing to four luminaires to provide sufficient light levels across wider intersections.[178]

At midblock crosswalks, place luminaires to provide lighting out to **50 feet i**n advance of the stop line for the crosswalk and **10 feet** beyond the downstream edge of the crosswalk for each approach direction. Evaluation of vertical light levels at the crosswalk are important to ensure that pedestrians are adequately illuminated.

At intersection crosswalks, light the entirety of the intersection area, including paved shoulders, extending back to one of the following on each approach, in order of precedence:

1. To the stop line for the approach.
2. To **25 feet** before the outside edge (edge away from intersection core) of the marked crosswalk.
3. To the leading end of the edge line radius return.[166]

Place luminaires on the upstream side of the crosswalk to light the side of crossing pedestrians that is facing oncoming traffic. This may include one luminaire on each side of the crossing, placed diagonally opposite each other to light the appropriate side of crossing pedestrians in both directions. For most intersections, roadway lighting is necessary to provide adequate illumination for the entirety of the crosswalk.

Refer to Table 6 for light source characteristics for pedestrian crossing locations as established in the FHWA Pedestrian Lighting Primer.

177 WSDOT. 2021. *Traffic Manual M 51-02.10. (Engineering and Regional Operations).*
178 WSDOT. 2023. *Design Manual M 22-01.22. (Engineering and Regional Operations).*

TABLE 6: Pedestrian crossing facilities illumination recommendations. Source: FHWA.

Pedestrian facility considerations	Light source characteristics			
	Average illuminance	Average luminance		CCT (LED Only)
		Rural	Urban	
Intersection crosswalk	**30 lux vertical (2.79 footcandles)**	*	*	**3,000 K to 4,000 K**
Midblock crosswalk	**20 lux vertical (1.86 footcandles)**	*	*	**3,000 K to 4,000 K**

Note: *Values are for roadway-scale luminaire heights (6.5 meters or 20 feet or higher). For pedestrian-scale lighting (6.5m in height or lower), add 2 vertical lux (0.19 footcandles) and 0.5 cd/m² to the criteria to overcome increased glare resulting from the use of a lower mounting height.*

**Use minimum maintained average pavement luminance criteria from RP-8.*

Note that 4000K LED luminaires won't meet International Dark-Sky Association requirements. WSDOT Design Manual Section 1040.10 provides minimum average horizontal light levels for various combinations of crossing types and pedestrian activity levels, and a minimum average vertical light level of 0.9 footcandles for midblock crossings and crosswalks at roundabouts. Vertical light levels are measured at a height of 5 feet above the roadway.[179]

DESIGN APPLICABILITY

- Midblock crosswalks
- Intersections

COMPLEMENTARY TREATMENTS

- High-visibility crosswalk
- Stop line at a controlled crosswalk
- Stop line at an uncontrolled crosswalk
- Pedestrian and bicyclist illumination

MORE INFORMATION

- WSDOT Design Manual
- FHWA Pedestrian Lighting Primer
- PedSafe
- Illuminating Engineering Society Recommended Practice: Lighting Roadway and Parking Facilities (RP-8-22)

[179] WSDOT. 2023. *Design Manual M 22-01.22. (Engineering and Regional Operations).*

49. Pedestrian and bicyclist segment illumination

DESCRIPTION

Like pedestrian and bicyclist intersection lighting, effective segment lighting is an important safety feature for pedestrians and bicyclists at night. Illumination provided solely for vehicular traffic isn't always effective in lighting parallel facilities for pedestrians and bicyclists.

FIGURE 57. PEDESTRIAN-SCALE ILLUMINATION. SOURCE: PEDBIKE IMAGES/RON BLOOMQUIST.

DESIGN GUIDANCE

Provide lighting for pedestrians and bicyclists. The type of lighting will depend on if there is an adjacent roadway and the type of adjacent roadway facility.

Consider supplemental pedestrian and bicyclist lighting at luminaire pole mounting height of less than **20 feet** to increase light levels on the pedestrian and bicyclist facility. Especially consider pedestrian lighting for standalone pedestrian and bicyclist facilities that are separated from roadways, such as shared-use paths. Refer to Table 7 for light source characteristics for pedestrian and bicyclist facilities as established in the FHWA Pedestrian Lighting Primer.

Provide lighting that includes the full width of the sidewalk, bike lane, or shared facility in the lighting design area. Consider the placement of pedestrian lighting when in close proximity to a roadway, as the lower mounting height can significantly increase glare for drivers.

TABLE 7: Linear pedestrian facilities illumination recommendations. Source: FHWA.

Pedestrian facility considerations		Light source characteristics			
		Average illuminance	Average luminance		CCT (LED Only)
			Rural	Urban	
Facility adjacent to roadway	Low to medium[1] pedestrian activity	2 lux vertical (0.19 footcandles)	-	1 cd/m^3	3,000 K to 4,000 K
	High[2] pedestrian activity and/or school zones	10 lux semi-cylindrical (0.93 footcandles	1 cd/m^3	2 cd/m^3	3,000 K to 4,000 K

Note: Values are for roadway-scale luminaire heights (6.5 meters or 20 feet or higher). For pedestrian-scale lighting (6.5m in height or lower), add 2 vertical lux (0.19 footcandles) and 0.5 cd/m^2 to the criteria to overcome increased glare resulting from the use of a lower mounting height.

[1] Low to medium pedestrian and bicyclist activity – Areas may include suburban streets with single family dwellings, very low-density residential developments, and rural or semi-rural areas. Also areas where lesser numbers of pedestrians are expected during hours of darkness. Examples may include downtown office areas, libraries, apartments, neighborhood

shopping, industrial, parks, and streets with nearby transit lines.

[2] High pedestrian and bicyclist activity– Areas with significant numbers of pedestrians expected during hours of darkness. Examples may include downtown retail areas, theaters, concert halls, stadiums, and transit terminals.

Note that 4000K LED luminaires won't meet International Dark-Sky Association requirements. WSDOT Design Manual Section 1040.10 (Table 1040-43) provides minimum average horizontal light levels for various pedestrian activity levels.[180]

DESIGN APPLICABILITY

- Any pedestrian or bicyclist facility adjacent to a roadway. Refer to the guidance regarding applicability for certain pedestrian activity levels.
- Especially at transit stops and similar locations where pedestrians wait along roadways.

COMPLEMENTARY TREATMENTS

- Linear treatments designed for pedestrians (all)
- Linear treatments designed for bicyclists (all)
- Linear treatments designed for pedestrians and bicyclists (all)

MORE INFORMATION

- WSDOT Design Manual
- FHWA Pedestrian Lighting Primer
- PedSafe
- Illuminating Engineering Society Recommended Practice: Lighting Roadway and Parking Facilities (RP-8-22)

[180] WSDOT. 2023. *Design Manual M 22-01.22. (Engineering and Regional Operations).*

ADA improvements

Section 504 of the Rehabilitation Act and the Americans with Disabilities Act of 1990 (ADA) require pedestrian facilities to be designed and constructed so they're readily accessible to and usable by people with disabilities. Refer to the US Access Board Public Right-of-Way Accessibility Guidelines and other related documents to meet ADA requirements on all pedestrian facilities.

Some agencies have partnered with local disability rights representatives, non-drivers, and people living with disabilities to develop innovative ways to address mobility access. WSDOT's Active Transportation funding programs encourage these partnerships to continue to find ways to improve access and mobility for people with disabilities. The programs encourage consideration of universal design principles for all projects. For more information about universal design for streets, refer to the Snohomish County Transportation Coalition's Incorporating Universal Design into Street Design and Safe Routes to School website's Universal Design and Access, among other resources.

50. ADA curb ramp retrofit

DESCRIPTION

Curb ramps provide an accessible connection from a raised sidewalk down to the roadway surface. A curb ramp (or combination of curb ramps) connects pedestrian access routes to crosswalks (marked or unmarked) where curbs and sidewalks are present, except where pedestrian crossing is prohibited.

FIGURE 58. ADA CURB RAMP IN OLYMPIA, WA.

DESIGN GUIDANCE

Provide curb ramps that orient pedestrians in each direction of travel. Make the curb ramp width consistent with the crosswalk it serves. Provide receiving curb ramps at the other end of the crosswalk unless the pedestrian facility is at-grade or there is no curb nor sidewalk on that side.[181]

Provide curb ramps at midblock crossings where curbs and sidewalks are present, and at median islands where there is a raised pedestrian refuge.

DESIGN APPLICABILITY

- Wherever raised pedestrian facilities transition to the roadway surface.
- Existing curb ramp locations where the existing curb ramp doesn't meet ADA requirements.

COMPLEMENTARY TREATMENTS

- High-visibility crosswalk
- Linear treatments designed for pedestrians (all)
- Crossing and intersection treatments (all)

MORE INFORMATION

- WSDOT Field Guide for Accessible Public Rights of Way
- U.S. Access Board Public Right-of-Way Accessibility Guidelines

PLAN SHEET DETAILS

- WSDOT Standard Plan F-40 Series

181 RCW 35.68.075

51. Accessible pedestrian signal

DESCRIPTION

Accessible pedestrian signals (APS) are push buttons with devices that communicate "walk" and "don't walk" information to pedestrians at signalized intersection in a non-visual format (audibly or using tactile vibration). This treatment provides helpful indications about when pedestrians receive the "walk" indication to cross for pedestrians who have low vision, are blind, or deaf and blind.

FIGURE 59. APS IN SEATTLE, WA.

DESIGN GUIDANCE

APS consist of a pedestrian pushbutton with integrated vibro-tactile and audible versions of the visual indications presented by pedestrian signal displays. Install APS at any location with a pedestrian display – *even if there was no pedestrian detection previously.*[182] Include APS at all new construction traffic signals.

Installation of APS may include new or relocated poles, as well as additional ramp and sidewalk work beyond what is necessary for basic sidewalk and ramp ADA compliance. Consider the volume of the audible tone in line with the Public Right-of-Way Accessibility Guidelines.

Operate APS as follows:

- At an intersection use either rapid tick or speech messages (don't implement mixed operations at a single intersection).
- Limit street names in speech messages to the basic street name. Don't include cardinals (i.e., N, S, E, W) or street type (i.e., street, avenue, road) unless needed to avoid confusion where two streets have the same name, such as 2nd Avenue and 2nd Street or Center Drive at Center Way.
- Format walk messages: "Walk sign is on to cross <street>."
- Format button press messages during flashing or solid "don't walk" phases as follows:
  - Short press: "Wait."
  - Long press: "Wait to cross <street1> at <street2>". Use the same street name described above.
  - Long press with extended crossing time: "Wait to cross <street1> at <street2> with extended crossing time."
- Consider multilingual messages in areas with a high presence of people with limited English proficiency.

Place APS pedestrian pushbutton (PPB) as follows:

- The PPB should be **4-6 feet** from the face of curb, where sidewalk is present, or the edge line of the roadway where there is no sidewalk. The PPB may be **1.5-4 feet** from the curb face or edge line but consider implications of this placement in proximity to the roadway. The PPB may not be closer than **1.5 feet** from the curb face or edge line. If geometric constraints make it impractical to place the PPB within the **4-** to **6-foot** range, the PPB shouldn't be further than **10 feet** from the edge of curb, shoulder, or pavement.
- The PPB should be located as close to the outside edge of the crosswalk line as possible, so that the button and sign face towards the core of the intersection to orient pedestrians in the direction of travel for the associated crosswalk. The PPB may be located no more than **5 feet** outside either edge of the crosswalk line.

182 U.S. Access Board. 2023. *Public Right-of-Way Accessibility Guidelines*

- If possible, PPBs should be located on separate poles and separated by a minimum of **10 feet**.[183] Place PPBs to allow a maximum reach per PROWAG. Limit any obstruction between an accessible path and the push button to **10 inches**. This includes the base of any decorative poles with mounted PPBs.

DESIGN APPLICABILITY

- At all crosswalks for all new traffic signal systems.
- At all crosswalks for any signalized intersection.

COMPLEMENTARY TREATMENTS

- Pedestrian countdown signal
- Pedestrian hybrid beacon
- Pedestrian traffic signal
- Half signal for pedestrians and bicyclists
- Full traffic signal

MORE INFORMATION

- U.S. Access Board Public Right-of-Way Accessibility Guidelines
- WSDOT Field Guide for Accessible Public Rights of Way
- MUTCD – Chapter 4E. Pedestrian Control Features

PLAN SHEET DETAILS

- WSDOT Standard Plan J-20 Series

183 WSDOT. 2023. Design Manual M 22-01.22. *(Engineering and Regional Operations).*

Linear treatments designed for bicyclists

WSDOT's bicycle level of traffic stress (BLTS) can inform facility selection of linear treatments designed for bicyclists. The ranking system is tied to roadway characteristics and facility types that support the Safe System Approach and that may affect a user's willingness to use a given facility. In some jurisdictions, facilities designed for bicyclists may also accommodate micromobility devices and other means of travel. For more information on designing for micromobility, refer to the NACTO's Designing for Small Things With Wheels. Consider how treatments designed for bicyclists will interface with pedestrian crossings, transit stops, and other modes. Provide markings, separation, and speed reduction measures as needed to minimize risks at these conflicts.

Facilities that reduce driver operating speeds, reduce bicyclist exposure, and increase the conspicuity of vulnerable road users decrease the likelihood of a serious injury or fatality crash.

- **Reduce operating speeds** – Linear treatments designed for bicyclists don't necessarily reduce operating speeds. However, road reallocations associated with treatments may. Different bike-facility types are chosen to mitigate for higher speed conditions.
- **Reduce bicyclist exposure** – Linear treatments designed for bicyclists generally reduce bicyclist exposure along roadways. Exposure decreases as separation and protective elements increase.
- **Increase bicyclist conspicuity** – Linear treatments designed for bicyclists don't necessarily make it easier for drivers to see bicyclists. However, they may increase a driver's attention to the fact that bicyclists may be present.

Use the table below to select an appropriate bicycle facility based on the roadway context. This table aligns with WSDOT's BLTS tables. For more information, refer to WSDOT Design Manual, Division 15.

TABLE 8: Guidance for selecting bicycle facilities to achieve LTS 1 or 2.

Roadway context			All ages & abilities bicycle facility
Target driving speed	Target motor vehicle volume	Motor vehicle lanes	
25 mph (or less)	up to 3,000	1 or less each direction	Bicycle boulevard, conventional bike lane, buffered bike lane, separated bike lane
	3,000 to 6,000	2 or less each direction	Conventional bike lane, buffered bike lane, separated bike lane
	>6,000	2 or more lanes each direction	Buffered bike lane, separated bike lane
	Any	3 or more lanes each direction	Separated bike lane
30 mph		1 or less each direction	Conventional bike lane, buffered bike lane, separated bike lane
	up to 6,000	2 lanes each direction	Buffered bike lane, separated bike lane
	>6,000	2 or more lanes each direction	Separated bike lane
> 30 mph	Any	Any	Separated bike lane

Also prioritize providing bicycle linear treatments for both directions along a road or as a pair with a nearby parallel street to provide a complete bicycle network. If providing directional facilities on parallel roads, design frequent bike crossings to allow bicyclists to access both facilities.

52. Bicycle boulevard

DESCRIPTION

Bicycle boulevards (also known as neighborhood greenways) are low-speed streets with low vehicle volumes that give bicyclists priority and minimize conflicts with drivers. Bicycle boulevards may also provide benefits for pedestrians walking along a sidewalk or within the roadway. Signs, pavement markings, speed humps, chicanes, diverters, and other tools discourage vehicle through travel and encourage low speeds and efficient bicyclist travel. Some local streets may already include features of a bike boulevard, and as a result may be prime candidates for conversion.

FIGURE 60. DELRIDGE NEIGHBORHOOD GREENWAY, SEATTLE, WA. SOURCE: SDOT.

DESIGN GUIDANCE

The following are constituent features of bike boulevard designs:

- **Low operating speeds –** Install traffic calming measures to achieve the desired operating speed (15 mph preferred; 20 mph maximum). These may include speed humps, speed tables, raised crosswalks, curb extensions, chicanes, neighborhood traffic circles, speed limit signs, and other speed-management strategies listed in this gui de. Space traffic calming measures **200-400** feet apart along the bicycle boulevards.[184] Consider a 20 mph speed zone designation to lower speeds along the bicycle boulevard.
- **Low traffic volume –** Limit motor vehicle access to and movement on the road if the existing traffic volumes along any segment of the bike boulevard exceed the desired volume (at most 3,000 vpd). This may include the use of median diverters or neighborhood traffic diverters. Consider pedestrian/bicyclist-only crossings at intersections or connections through vehicle dead ends. Coordinate with emergency services to ensure diversions don't adversely affect emergency access. Evaluate traffic volume counts and local circulation to select locations for diverters.
- **Prioritized travel for bicyclists –** Provide stop and yield signs for local road approaches that intersect with the bike boulevard. Avoid installing stop and yield signs along the bike boulevard itself. Also consider mini roundabouts for intersection control if appropriate**.**
- **Wayfinding –** Install directional signage along the bike boulevard at decision points. Consider including destination and distance information.
- **Intersection crossing treatments –** Where the bicycle boulevard intersects with higher speed or higher volume roadways, install appropriate crossing treatments based on the speed and volume of the roadway. This could include a traffic signal, pedestrian hybrid beacon, or rectangular rapid flashing beacon. Provide bike-activated signals or push buttons at the back of a curb that a bicyclist could reach without dismounting. For various intersection treatments, refer to plan sheet details below.

Within a jurisdiction, select a specific suite of treatments to identify bike boulevards throughout the jurisdiction and apply consistently (and completely) on every bike boulevard in the jurisdiction. A consistent application of the same set of individual treatments on bike boulevards will ensure people bicycling, walking, and driving on the corridor recognize the facility.

184 Ohio Department of Transportation. 2023. *Multimodal Design Guide*..

DESIGN APPLICABILITY

- Two-lane road.
- Preferred 15 mph road; maximum 20 mph road.[185]
- Maximum 3000 vpd.
- Appropriate for access to schools, however not along vehicle school pick-up/drop-off areas.

COMPLEMENTARY TREATMENTS

- Curb extension
- Bike lanes
- Buffered bike lanes
- Separated bike lane
- Sidepath
- RRFB
- Pedestrian hybrid beacon
- Pedestrian traffic signal
- Full traffic signal
- Pedestrian refuge island
- Median diverter for multi-stage crossing
- Chicanes
- Speed table
- Neighborhood traffic circle
- Speed management treatments

MORE INFORMATION

- NACTO Urban Bikeway Design Guide
- FHWA Small Town and Rural Multimodal Design Guide

PLAN SHEET DETAILS

- 52 - Bicycle Boulevard

185 FHWA. 2018. *Bikeway Selection Guide*

53. Bike lanes

DESCRIPTION

Conventional bike lanes use pavement markings and signage to designate exclusive space for bicyclists at grade and adjacent to a travel lane on some lower speed roadways. Conventional bike lanes designate space on the road for bicyclists to ride at a comfortable speed without interference from drivers. Bike lanes run in the same direction as vehicle traffic. For bike lanes that flow in the opposite direction of vehicle traffic, refer to contraflow bike lane.

FIGURE 61. BIKE LANE IN UNIVERSITY PLACE, WA. SOURCE: PEDBIKE IMAGES/CARL SUNDSTROM.

DESIGN GUIDANCE

Provide linear bicycle treatments for both travel directions. For more information, refer to linear treatments designed for bicyclists. For adjacent two-way bike lanes refer to separated bike lane.

Provide a preferred width of **6 feet** for the bike lane or 7 feet in areas with existing or expected high bicycle use, measured between the edge of the nearest travel lane and the face of the gutter pan, or the face of curb in the absence of a gutter pan. Provide a single solid white stripe between the motor vehicle lane and bike lane.[186] It may be desirable to use a wider solid white stripe (**6-inch or 8-inch)** than typically used for shoulder edge striping to make the lane more recognizable as a bike lane. Place bike symbol markings centered in the bike lane at the near side of an intersection, far side of an intersection, and midblock locations where the block is more than **250 feet.**[187] Placed bike symbol markings at intersections **10-25 feet f**rom the intersection, or crosswalk marking where such markings exist. Along long stretches of uninterrupted bike lanes place a bike symbol marking every **250-500 feet.** Consider additional width when anticipating higher volumes of bicyclists. Consider the cross slope of the roadway. Generally, if the cross slope of the roadway meets the design requirements of the road for vehicles, it'll meet the needs of a bicyclist.[188]

Consider using "bike lane" (R3-17) and "ahead" (R3-17aP) signs in advance of a bike lane to notify bicyclists and drivers of the facility. Consider "bike lane" signs (R3-17) adjacent to the bike lane at intervals as needed along the bike lane.[189]

DESIGN APPLICABILITY

- Roads with two through lanes per direction (including two-lane, one-way streets) with less than 6,000 vehicles per day and vehicle operating speeds of 25 mph or less.
- Roads with one through lane per direction or one-lane, one-way with any volume and operating speeds of 30 mph or less.

186 WSDOT. 2022. Design Manual M 22-01.21. (Engineering and Regional Operations.
187 SDOT. *Design Standards for In-Street Bike Facilities.*
188 AASHTO. 2012. *Guide for the Development of Bicycle Facilities*, 4th Edition. Washington, DC.
189 FHWA. 2009. "2009 MUTCD (with Revisions 1 and 2 Incorporated)." Last modified Sept. 14, 2022.

COMPLEMENTARY TREATMENTS

- Linear treatments designed for bicyclists (all)
- Road reconfiguration
- Bicycle intersection crossing markings
- Bicycle box
- Two-stage bicycle turn box
- Bike detection at traffic signals
- Bike-signal face

MORE INFORMATION

- Bicycle Lanes | FHWA (dot.gov)
- Conventional Bike Lanes | National Association of City Transportation Officials (nacto.org)
- Bike Lane - Rural Design Guide

PLAN SHEET DETAILS

- 53 - Bike Lanes

54. Buffered bike lane

DESCRIPTION

Buffered bike lanes are like conventional bike lanes, but with an additional striped buffer to designate space between the bike lane and travel lane. Buffered bike lanes don't include any vertical elements in the buffer, other than the possible addition of raised pavement markers (refer to separated bike lane for bike lanes with buffers that include vertical elements). This treatment provides greater offset distance between bicyclists and drivers. Bike lanes with buffers on both sides of the lane can also create space between a parking lane and a bike lane to direct bicyclists to ride outside of the door zone of parked cars.

FIGURE 62. BUFFERED BIKE LANES IN PORT TOWNSEND, WA. SOURCE: DONGHO CHANG.

DESIGN GUIDANCE

Provide linear bicycle treatments for both travel directions. For more information, refer to linear treatments designed for bicyclists.

Provide a **5-foot** minimum, **6-foot** preferred width for the bike lane from the edge of the road, edge of the parking lane, edge of the gutter, or face of curb in the absence of a gutter. Provide two solid lines between the motor vehicle lane and bike lane, spaced a minimum of **2 feet** apart with diagonal white cross hatching within the buffer. For buffers **3 feet** or greater, stripe the buffer with chevron markings. If locating the buffered bike lane between a parking lane and a travel lane, consider providing a minimum **3-foot** buffer on the parking lane side of the bike lane and **2-foot** on the travel lane side with dashed markings to allow drivers to cross the bike lane.[190] Place bike lane markings in the same manner as described for conventional bike lanes. Consider additional bike lane width when anticipating higher volumes of bicyclists.[191] Consider the cross slope of the roadway. Generally, if the cross slope of the roadway meets the design requirements of the road for vehicles, it'll meet the needs of a bicyclist.[192]

Mark buffered bike lanes in both directions along a two-way road. On a one-way road, consider including a contraflow bike lane to provide bicyclists access to destinations along the roadway.

DESIGN APPLICABILITY

- Roads with two through lanes per direction (including two-lane, one-way streets) with either:
  - Less than 6,000 vpd and vehicle operating speeds of 30 mph or less.
  - More than 6,000 vpd and vehicle operating speeds 25 mph or less.
- Roads with one through lane per direction or one-lane, one-way with any volume and operating speeds of 30 mph or less.

190 NACTO. 2014. "Buffered Bike Lanes." *Urban Bikeway Design Guide, Second Edition.*
191 SDOT. *Design Standards for In-Street Bike Facilities.*
192 AASHTO. 2012. *Guide for the Development of Bicycle Facilities*, 4th Edition. Washington, DC

COMPLEMENTARY TREATMENTS

- Linear treatments designed for bicyclists (all)
- Road reconfiguration
- Protected intersection for linear bicycle facilities
- Bicycle box
- Bicycle intersection crossing markings
- Two-stage bicycle turn box
- Bike detection at traffic signals
- Bike-signal face

MORE INFORMATION

- Buffered Bike Lanes | National Association of City Transportation Officials (nacto.org)

PLAN SHEET DETAILS

- 54 - Buffered Bike Lanes

55. Separated bike lane

DESCRIPTION

Separated bike lanes include a bike lane, a buffer area, and a vertical feature within the buffer that reduces the likelihood of encroachment into the bike lane by motor vehicles and increases user comfort. This treatment provides space for bicyclists separated from drivers and pedestrians. Separated bike lanes can accommodate one-way or two-way travel for bicyclists. A parking lane with high parking utilization between the buffer and the travel lane can further protect the bike lane from the travel lane. Separated bike lanes can improve safety and comfort for bicyclists and increase the number of bicyclists overall.

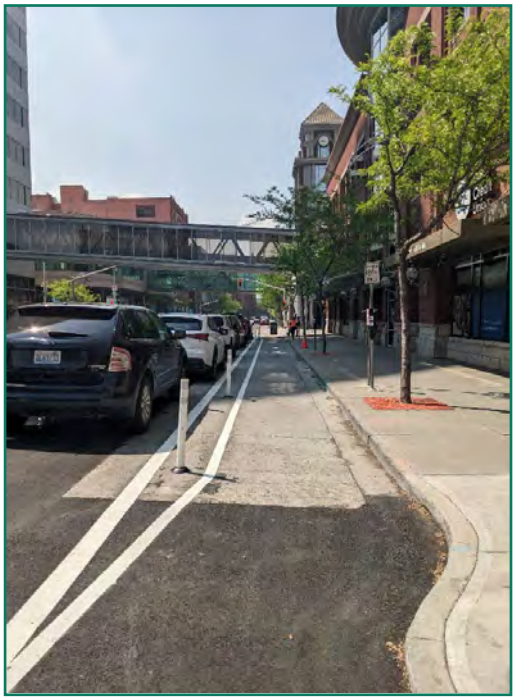


FIGURE 63. SEPARATED BIKE LANE IN SPOKANE, WA.

DESIGN GUIDANCE

Provide linear bicycle treatments for both travel directions. For more information, refer to Linear treatments designed for bicyclists.

Provide a **5-foot** minimum, **6-foot** preferred width for the bike lane, measured between the inside edge of the buffer and the face of the gutter pan, or the face of curb in the absence of a gutter pan. In locations that require seasonal snow removal, consider **7-foot** or wider bike lanes based on the width of available plows to clear the bike lane. Place bike lane markings in the same manner as described for conventional bike lanes. Consider additional bike lane width when anticipating higher volumes of bicyclists.[193]

Provide a minimum **2-foot** buffer, or **3-foot** buffer if adjacent to parking, with a vertical physical feature between the travel lane and the bike lane. Locate the bike lane adjacent to the curb or edge of roadway and place the parking outside the buffer, allowing for drivers to exit their cars in the buffer without opening their doors in the bike lane. Consider the elevation of the separated bike lane, at street level, at sidewalk level, or at an interim height. For further design guidance on elevation, refer to Chapter 3 of the MassDOT Separated Bike Lane Planning & Design Guide. Consider the cross slope of the roadway. Generally, if the cross slope of the roadway meets the design requirements of the road for vehicles, it'll meet the needs of a bicyclist.[194]

Place curb, flexible posts, raised medians, landscaping, traffic barriers, planters, linear green stormwater infrastructure, or bollards in the buffer area to provide the vertical buffer. Consider the needs of permeability for bicyclist access and comfort along the bike lane along with access for people exiting parked cars or loading zones. Along high stress corridors, consider impermeable separation to discourage driver intrusion into the bike lane. In most other contexts, place objects **10- to 20-feet** on-center or with regular gaps for drainage and bicyclist access.[195]

Provide access to ADA parking stalls with raised crossings or loading zones at parking spaces near crosswalks. For design related to separated bike lanes and curbside activity including accessible parking, loading zones, and transit stops, refer to FHWA Separated Bike Lane Planning and Design Guide.

For parking separated bike lanes, provide **20-foot** parking setbacks from driveways and side streets.[196]

193 SDOT. *Design Standards for In-Street Bike Facilities.*
194 AASHTO. 2012. *Guide for the Development of Bicycle Facilities*, 4th Edition. Washington, DC
195 Benton, Janice. 2018. *Design Information Bulletin 89-01*. State of California Department of Transportation.
196 FHWA. 2015. "Step 3: Midblock Considerations." *Separated Bike Lane Planning and Design Guide*.

At signalized intersections, consider signal phase separation of the separated bike lanes where turning movement counts exceed 150 vph. Lower thresholds may apply in certain configurations, especially for two-way separated bike lanes (see below).[197] This may include adding turn lanes at locations where they don't already exist to signal-control the pertinent turning movement(s).

Two-way separated bike lanes – Special considerations

For two-way separated bike lanes provide a minimum width of **10 feet** for the bike lane, measured between the inside edge of the buffer and the face of the gutter pan, or face of curb in the absence of a gutter pan. Place a dashed yellow centerline through the middle of the bike lane to designate directional lanes.

On one-way streets, locate a two-way separated bike lane on the left side of the street when possible. This arrangement places the bike lane nearest the general-purpose lanes in the same travel orientation as the general-purpose traffic, and the contraflow bike traffic away from the general-purpose traffic traveling in the opposite direction. This is the more natural configuration for overall traffic flow and allows bicyclists who wish to enter general purpose traffic the ability to do so without crossing opposing bicycle traffic. This arrangement also places the separated bike lane on the opposite side of the street from transit operations when present. However, consider curbside activity, cross streets, and driveways to determine if placement of a two-way separated bike lane would be more desirable on the right side of a one-way street.

On two-way streets, a two-way separated bike lane will always place the bike lane nearest the general-purpose lanes in the opposite travel orientation from the nearest general-purpose traffic, regardless of which side of the street it is located on. In this arrangement, drivers turning into the general-purpose lanes to and from cross streets will cross over bike traffic that may come from a direction drivers wouldn't normally anticipate. Because of this, provide positive separation between the separated bike lane and adjacent general-purpose lanes, and carefully consider how to control traffic turning to and from the general-purpose lanes at intersections and driveways. Generally, prohibit turn-on-red to and from cross streets over the separated bike lane at signal-controlled intersections. Place additional signing and pavement markings alerting drivers to the two-way bicycle traffic at driveways and uncontrolled or stop-controlled intersections. Consider signal phase separation for the bikeway at signalized intersections where turning movement counts over the bikeway exceed 100 vph. Lower thresholds may apply in certain configurations.[198]

DESIGN APPLICABILITY

- Any roadway.
- Desirable on roads where speeds exceed 30 mph and vehicle volumes exceed 6,000 vpd or where multilane roads create a higher potential for conflict.

[197] ITE. 2017. *Protected Bikeway Practitioners Guide.* Washington, DC. 18.
[198] Ibid

COMPLEMENTARY TREATMENTS

- Linear treatments designed for bicyclists (all)
- Road reconfiguration
- Protected intersection for linear bicycle facilities
- Bicycle box
- Bicycle intersection crossing markings
- Two-stage bicycle turn box
- Bike detection at traffic signals
- Bike-signal face

MORE INFORMATION

- FHWA Separated Bike Lane Planning and Design Guide
- NACTO Urban Bikeway Design Guide
- MassDOT Separated Bike Lane Planning & Design Guide

PLAN SHEET DETAILS

- 55 - Separated Bike Lanes

56. Contraflow bike lane

DESCRIPTION

A contraflow bike lane provides a bicyclist dedicated space to ride along a one-way street in the opposite direction of drivers. A contraflow bike lane can include a buffer between the driving lane and the bike lane. For a contraflow lane as part of a pair within a two-way bike lane, refer to separated bike lane. A contraflow bike lane can formalize space for bicyclists to ride on streets where they may already ride to avoid more circuitous or dangerous routes. This treatment may include a buffer or physical protection.

FIGURE 64. CONTRAFLOW BIKE LANE IN SEATTLE, WA. SOURCE: DONGHO CHANG.

DESIGN GUIDANCE

Provide linear bicycle treatments for both travel directions. For more information, refer to linear treatments designed for bicyclists.

On one-way streets locate the contraflow lane on the left side of the general-purpose lane to match normal two-way travel patterns. However, consider locating a contraflow lane instead on the right side of a general-purpose lane if this provides better connectivity to the overall bike network.

Provide a minimum width of **5 feet** for the bike lane, measured between the edge of the nearest travel lane and the face of the gutter pan, or the face of curb in the absence of a gutter pan. Provide paint or physical barrier between the contraflow bike lane and the oncoming travel lane. If using paint, provide a double yellow or white lane line between the bike lane and the oncoming travel lane or two solid yellow or white lines if spaced 2 feet apart or more. If providing a painted buffer of **3 feet** or greater, include diagonal yellow cross hatching within the buffer. For physical barrier design, refer to design guidance for a separated bike lane.[199] Consider the cross slope of the roadway. Generally, if the cross slope of the roadway meets the design requirements of the road for vehicles, it'll meet the needs of a bicyclist.[200]

If located adjacent to a parking lane, install the contraflow bike lane between the curb and the parking lane, with a minimum **3-foot** buffer between the bike lane and the parking lane.

Place bike lane markings centered in the bike lane at the near side of an intersection, far side of an intersection, and midblock locations where the block is more than **250 feet.** Consider additional width when higher volumes of bicyclists are anticipated.[201]

Install with a conventional bike lane, buffered bike lane, or separated bike lane in the direction permitted for vehicular travel. Provide buffer or protection for the contraflow bike lane to match the with-flow bike facility.

Consider installing "except bikes" sign plaques with "do not enter" signs at intersections. Also consider "no turn on red" restrictions at signalized intersections.

199 NACTO. 2014. "Contra-Flow Bike Lanes." *Urban Bikeway Design Guide, Second Edition*.
200 AASHTO. 2012. Guide for the Development of Bicycle Facilities, 4th Edition. Washington, DC
201 SDOT. *Design Standards for In-Street Bike Facilities.*

DESIGN APPLICABILITY

Level of buffer or protection of the contraflow lane determined by applicability of the with-flow bike lane if applicable.

COMPLEMENTARY TREATMENTS

- Prohibit right-turn-on-red
- Linear treatments designed for bicyclists (all)
- Road reconfiguration

MORE INFORMATION

- Contra-Flow Bike Lanes | National Association of City Transportation Officials (nacto.org)

PLAN SHEET DETAILS

- 56 - Contraflow Bike Lane

57. Bike wayfinding signs and markings

DESCRIPTION

Bikeway networks may consist of various bike-facility types connected throughout a region. Effective bike wayfinding with signs and markings can designate preferred bike routes or communicate destination and distance information to bicyclists. Signs alone cannot create a bike facility, but they can stitch together the greater bikeway network and make navigation easier for bicyclists along bike facilities.

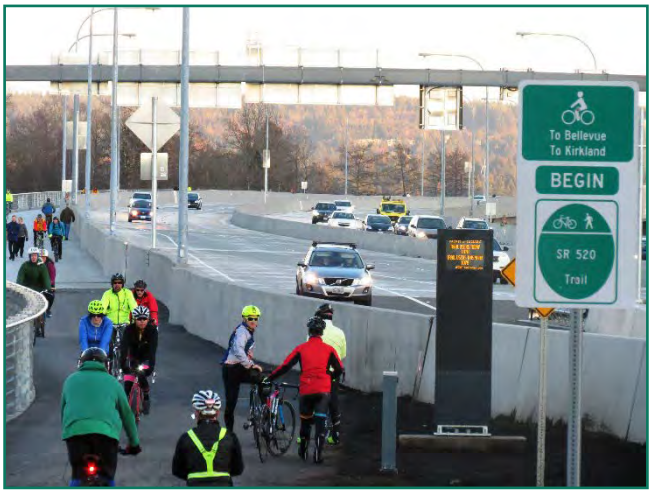


FIGURE 65. BIKE WAYFINDING SIGNAGE ON SR 520 TRAIL.

DESIGN GUIDANCE

Place signs and markings at intersections and decision points. Destinations listed on signs may include commercial centers, public transit centers, schools, parks, trails, hospitals, and bridges. Consider classifying the types of destinations to include on the signs within a region to determine appropriate distances from the destinations to notify bicyclists.

There are three main types of wayfinding signs:

- **Route confirmation signs** – Reminds or notifies bicyclists that they're bicycling on a bike facility. May include destinations and distance to the destinations. Place confirmation signs at the start of a route, unless other route signage serves that function, as well as **50-100 feet** beyond the far side of roadway intersections near major roadways or traffic generators, and beyond locations where bike routes intersect unless within **150 feet** of a route monitoring or decision sign.
- **Route monitoring signs** – Notifies bicyclists that the preferred bike route turns onto another street or path. Signs include arrows and a destination or destinations in the direction of the arrow. Place prior to the route turn.
- **Route decision signs** – Notifies bicyclists of a junction in the bike network. Include direction arrow, destination (place name or adjoining path) and distance rounded to the nearest 0.1 mile. Place at the near side of an intersection prior to the bikeway junction.[202]
- **Route destination signs** – Notifies bicyclists of the terminus of the routing or the arrival at a destination. In some cases, other signage such as community gateway signage, makes destination signage unnecessary.

Install pavement markings per the bike-facility type. Where appropriate, consider the use of bicycle crossing markings, sharrows, or other to guide bicyclists across junctions to continuing bike facilities.

DESIGN APPLICABILITY

All bikeway networks, especially to navigate circuitous designated bike-facility routes.

[202] NACTO. 2014. "Bike Route Wayfinding Signage and Markings System." *Urban Bikeway Design Guide, Second Edition*.

COMPLEMENTARY TREATMENTS

- Linear treatments designed for bicyclists (all)
- Linear treatments designed for pedestrians and bicyclists (all)
- Bicycle intersection crossing markings

MORE INFORMATION

- NACTO Urban Bikeway Design Guide
- MassTrails Bike Wayfinding Guide

PLAN SHEET DETAILS

- 57 - Bike Wayfinding Signs and Markings

Linear treatments designed for pedestrians

Linear treatments designed for pedestrians include sidewalks and separated at-grade walkways. These treatments provide accessible routes for people walking or using a wheelchair or other assistive mobility device. To meet the intent of the funding programs, these treatments do not address the mobility needs of bicyclists. However, state law allows bicyclists on sidewalks unless a local ordinance prohibits otherwise.[203] A sidewalk's primary purpose is to accommodate pedestrians and therefore is designed for pedestrian travel. Per RCW 46.61.261 and RCW 46.61.755, bicyclists riding on sidewalks are subject to pedestrian rights and duties, but they're still defined as bicyclists and must yield to pedestrians when using sidewalks.

Prioritize providing a linear treatment designed for pedestrians on both sides of the street to provide a continuous pedestrian network. This may include a sidewalk, separated at-grade walkway, or sidepath. Provide the most direct path and avoid meandering or winding paths around numerous obstructions. Ensure pedestrian access routes are firm, stable, slip resistant, and free of bumps.[204] When constructing a linear treatment designed for pedestrians on only one side of the street, provide a greater density of crossing opportunities, especially at key locations that pedestrians will need to access, such as transit stops, libraries, K-12 schools, and colleges. For pedestrian crossing treatments, refer to Crossing and Intersection Treatments for more information.

For all linear treatments designed for pedestrians, follow the Public Right-of-Way Accessibility Guidelines. This includes a minimum of **4 feet** continuous clear width around obstacles, visible and detectable edges, and cross slopes for pedestrian access routes. Consider how landscaping, tree roots, and other streetscape items may affect pedestrian access routes. Develop maintenance plans for all seasons and weather conditions to ensure continuous usability of the project and comply with ADA requirements.

[203] RCW 46.61.755
[204] U.S. Access Board. 2023. Public Right-of-Way Accessibility Guidelines.

58. Sidewalk without buffer

DESCRIPTION

Sidewalks provide a separated facility for pedestrians while allowing bicyclists travel along them unless restricted by local ordinance and yield to pedestrians at conflicts. If providing a facility for multiple active transportation modes, consider a sidepath or shared-use path instead. Widening a standard sidewalk alone doesn't meet the requirements of a designated shared-use path.

Sufficient sidewalk widths facilitate easy movement by pedestrians and may vary depending on the character of an area. They invite pedestrian activity and inform other road users that people may walk in the area. Construction of sidewalks can reduce crashes involving pedestrians walking along a roadway by 65-89 percent.[205]

FIGURE 66. SIDEWALK WITHOUT BUFFER. SOURCE: PEDBIKE IMAGES/DAN BURDEN.

DESIGN GUIDANCE

Construct sidewalks without buffers only in constrained scenarios where there isn't sufficient right of way width for a buffer or where the posted speed is 25 mph or less with three or fewer driveways per block.

Prioritize providing a linear pedestrian treatment on both sides of the street. For more information, refer to linear pedestrian treatments.

At a minimum, sidewalk widths must meet the contextual requirements of the ADA pedestrian access route. At locations with bus stops, consider bus boarding areas to accommodate bus loading and unloading. For more information, coordinate with the local transit authority to provide bus stop designs that meet the needs of the authority's riders and vehicles.

Where the sidewalk includes no buffer from motor vehicle traffic, provide a minimum sidewalk width of **6 feet** in residential areas and at least **8 feet** where there will be greater numbers of pedestrians, such as adjacent to schools and sports facilities and in commercial areas. Construct a **6-inch** curb with a raised sidewalk behind the curb. The sidewalk width doesn't include the width of curb. Consider rolled curbs at lower-volume driveway entrances instead of driveway aprons where there isn't room to continue a full-width sidewalk behind a standard driveway apron.

Provide additional width as needed in commercial areas for frontage zones and where context creates high pedestrian demand. In locations immediately adjacent to roadways and building faces, include at least **2 feet** of width for shy distance from walls, railings and fixed objects while also providing the necessary width for easy travel by the expected pedestrian, including people who use wheelchairs or other mobility devices.

If constructing a sidewalk adjacent to guardrail, locate the sidewalk so the guardrail separates the sidewalk from the roadway.

[205] Gan et al. 2005. Update of Florida Crash Reduction Factors and Countermeasures to Improve the Development of District Safety Improvement Projects. Florida Department of Transportation.

DESIGN APPLICABILITY

- In populations centers.
- Roads with a posted speed of 25 mph or less.
- Generally, roads with 3 or fewer driveways per block or where driveway ramps can be accommodated without changing the level of the sidewalk.

COMPLEMENTARY TREATMENTS

- Sidewalk with buffer
- Separated walkway with linear stormwater treatment
- Sidepath
- Shared-use path
- Pedestrian and bicyclist illumination

MORE INFORMATION

- AASHTO Guide for the Planning, Design, and Operation of Pedestrian Facilities 2021

PLAN SHEET DETAILS

- Refer to WSDOT Standard Plan F-30.10-04

59. Sidewalk with buffer

DESCRIPTION

Sidewalks with buffers provide greater separation of pedestrians from motor vehicles and therefore support increased safety and comfort for people using sidewalks. Landscape buffers provide space to manage driveway slopes, making it easier to comply with cross slope limits that facilitate the preservation of the pedestrian access route at driveway crossings and prevent the need to drop sidewalks to grade at every driveway crossing and intersection. Buffer areas allow space for storage of snow removed from adjacent roadways in climates where snow accumulation is common. Buffers may also serve as a place for stormwater management. Other buffers include parking lanes, bike lanes, shoulders, and hardscaped street furniture zones.

FIGURE 67. SIDEWALK WITH BUFFER IN SEATTLE, WA. SOURCE: DONGHO CHANG.

DESIGN GUIDANCE

Prioritize providing a linear pedestrian treatment on both sides of the street. For more information, refer to linear treatments designed for pedestrians.

Provide a minimum sidewalk width of **5 feet** in residential areas and at least **8 feet** in where there will be greater numbers of pedestrians such as adjacent to schools and sports facilities and in commercial areas. Construct a **6-inch** curb with a raised sidewalk behind the curb. The preferred sidewalk width doesn't include the width of curb. Construct sidewalks on both sides of the street. Consider rolled curbs at lower-volume driveway entrances instead of driveway aprons where there isn't room to continue a full-width sidewalk behind the driveway. Design the driveway apron to be the same width as the buffer zone so that the sidewalk can continue in a straight path across the throat of the driveway. At locations with bus stops, consider bus boarding areas in the buffer strip to accommodate bus loading and unloading. For more information, coordinate with the local transit authority to provide bus stop designs that meet the needs of the authority's riders and vehicles.

Buffers that are **4.5 feet** wide with **4-foot** landscaping and **6-inch** curb provide space for street trees and other landscaping. Buffers **7 feet** wide or greater allow for installation of curb ramps, streetlights, and signs outside the pedestrian access route.[206] In lower speed contexts, provide a buffer widen enough to accommodate the space occupied by any objects placed there, and still provide **2 feet** clear to the roadway. In higher speed contexts, ensure the street side of the buffer meets clear zone requirements for any objects placed in the buffer zone. If planning to use the buffer area for snow storage, scale the buffer width accordingly, bearing in mind that people who rely on pedestrian access continue to do so during the winter.

Consider the use of **4.5-foot** buffers for all sidewalks. For posted speeds 30 mph or more, refer to the following for widths:

- For operating speeds of 30 mph or less, provide a minimum **4.5-foot** buffer.
- For operating speeds of 35 mph, provide a minimum **4.5-foot** buffer, **7-foot** buffer preferred, or a vertical concrete barrier as right of way allows.
- For operating speeds 40 mph or more, provide a minimum **7-foot** buffer width equal to the clear zone or a vertical concrete barrier between the roadway and the sidewalk as right of way allows.

206 AASHTO. 2021. *Guide for the Planning, Design, and Operation of Pedestrian Facilities, 2nd Edition*. Washington, DC.

DESIGN APPLICABILITY

- Along roads in population centers where pedestrians are permitted.
- Roads with more than three driveways per block.

COMPLEMENTARY TREATMENTS

- Sidewalk without buffer
- Separated walkway with linear stormwater treatment
- Shared-use path
- Pedestrian and bicyclist illumination

MORE INFORMATION

- AASHTO Guide for the Planning, Design, and Operation of Pedestrian Facilities 2021

PLAN SHEET DETAILS

- 59 - Sidewalk with Buffer

60. Separated walkway with linear stormwater treatment

DESCRIPTION

In some contexts, construction of curb and gutter may be cost prohibitive and not fit the local environment. In these cases, walkways with a roadway ditch or other linear stormwater treatment separating the facility from the road can provide safer places for pedestrians while also accommodating stormwater management and providing a physical barrier.

FIGURE 68. SEPARATED WALKWAY WITH BIOSWALE IN OLYMPIA, WA.

DESIGN GUIDANCE

Prioritize providing a linear treatment designed for pedestrians on both sides of the street.

Provide a minimum walkway width of **5 feet.** Provide a roadway ditch, swale, or other linear stormwater treatment separation of at least **4 feet** wide between the walkway and the travel lanes.

Include in the separation a roadway ditch, bioswale, raingarden, or other stormwater management to prevent ponding on the street or walkway. Provide continuous vertical depth or landscaping in the separation to deter drivers from traveling or parking in the separation. Use canopy trees, low shrubs, or other landscaping in the separation while still maintaining sufficient visibility for pedestrians and drivers at driveway crossings and intersections.

DESIGN APPLICABILITY

Roads without curb and gutter.

COMPLEMENTARY TREATMENTS

- Sidewalk with buffer
- Sidewalk without buffer
- Pedestrian and bicyclist illumination

MORE INFORMATION

- Washington State Department of Ecology Stormwater Management Manual
- NACTO Urban Street Stormwater Guide

PLAN SHEET DETAILS

- 60 - Separated Walkway with Linear Stormwater Treatments

61. Pedestrian-only streets

DESCRIPTION

Closing streets to vehicles can create pedestrian-only streets or parks that can also serve bicyclists. These places can serve as pedestrian routes between and through areas or create places for people to sit and enjoy as parks. Pedestrian streets restrict vehicle access but may also have time limitations allowing deliveries or other vehicle access at certain off-peak pedestrian times. These streets work best in locations with high pedestrian volumes from adjacent land uses such as schools, parks, or commercial areas.

FIGURE 69. GRACE STREET PARKLET IN COUPEVILLE, WA.

DESIGN GUIDANCE

Consider the selection of a pedestrian street by evaluating existing or potential pedestrian activity from the adjacent land uses. Evaluate effects to circulation for pedestrians, bicyclists, drivers, and freight to maintain connectivity for all users within the network. Engage with adjacent land uses to determine needs for adjacent business owners, schools, or residences. Coordinate with emergency services to determine if they require emergency access and how to best accommodate these situations. Ensure closures don't affect transit operations or other community services.

Pedestrian-only streets can involve full reconstruction of a street or simply include barricades and amenities on an existing street. Close the entrance to the street with bollards, planters, or other barricades. Provide amenities such as benches and planters along the street as appropriate.

Consider how pedestrians with vision disabilities will find and navigate the street. Ensure barriers meet detectable requirements per the Public Right-of-Way Accessibility Guidelines and prevent pedestrians from inadvertently wandering into the vehicle travel way. Alternatively, consider detectable indicators to guide pedestrians to accessible curb ramps. Consider maintaining a comfort zone along the road, such as a designated sidewalk or delineated pedestrian access route, for pedestrians with vision disabilities to navigate along the street.[207]

For locations that allow delivery access, emergency services, or vehicle access for people with limited mobility, ensure the street has movable barriers, bollards, or planters to accommodate these few vehicles as necessary.

DESIGN APPLICABILITY

- Adjacent to vibrant commercial areas or restaurants.
- Along the edges of schools to allow more space for pick up and drop off for students walking and biking.

COMPLEMENTARY TREATMENTS

- Pedestrian and bicyclist illumination

MORE INFORMATION

- PedSafe
- Global Street Design Guide
- FHWA Accessible Shared Streets: Notable Practices and Considerations for Accommodating Pedestrians with Vision Disabilities

[207] FHWA. 2017. *Accessible Shared Streets: Notable Practices and Considerations for Accommodating Pedestrians with Vision Disabilities.*

Linear treatments designed for pedestrians and bicyclists

Linear treatments designed for pedestrians and bicyclists accommodate the design speeds of bicyclists with sufficient width and crossing details to also accommodate pedestrians and other vulnerable users. These facilities may run parallel to the roadway or along separate right of way. Consider the volume of pedestrians and bicyclists along a shared facility. In locations with high volumes of pedestrians or bicyclists or both, segregated facilities may be more appropriate to minimize conflicts between users. For more information about appropriate volumes for shared facilities, refer to the FHWA Shared-Use Path Level of Service Calculator.

62. Shared-use path

DESCRIPTION

Shared-use paths are two-way transportation facilities used by pedestrians and bicyclists within independent rights-of-way. Shared-use paths have minimal crossing conflicts with drivers. In some cases, shared-use paths also accommodate equestrian use, typically by providing a second natural surface path that parallels the main pathway. For shared-use path directly adjacent to the roadway, refer to the guidance for sidepath.

FIGURE 70. SHARED-USE PATH IN SPOKANE, WA.

DESIGN GUIDANCE

Provide a minimum paved area width of **12 feet** with **2 feet** paved or unpaved shoulders on either side. To determine the appropriate width of the facility beyond the minimum, refer to the table below.

TABLE 9: SHARED USE PATH OPERATING WIDTHS FOR ANTICIPATED PEAK HOUR VOLUMES (OHIO DOT MULTIMODAL DESIGN GUIDE).

Shared Use Path Operating Widths	
Minimum (ft)	**SUPLOS "C" Peak Hour Volumes at Preferable Width**
11	150 - 300
12 – 15	300 - 500
16 – ≥20	500 - ≥600

If the expected volume of pedestrians and bicyclists along a shared-use path may exceed the planned capacity, consider evaluating the volumes with the FHWA Shared-Use Path Level of Service Calculator or providing separate facilities for pedestrians and bicyclists instead of a shared-use path. Separated paths are feasible on paths that meet the combined minimum width requirements for sidewalks **(5 feet)** and two-way bike lanes **(10 feet)**, for a total of **15 feet** pending the existing or expected user volumes for the paths. Consider providing path separation with pavement markings, traversable linear tactile warning strips, or physical separation such as a curb or landscaping.

Consider providing signs that indicate permitted users and who should yield to whom on the path per local ordinance as applicable.[208]

Design shared-use paths without obstructions in the path of travel (e.g., bollards, fences, z-gates) unless there is a documented history of vehicle intrusion and all other treatments from the AASHTO Guide for the Development of Bicycle Facilities have been tried.

For design speeds, cross slopes, running slopes, pavement structural section, and stopping sight distance for shared-use paths, refer to the AASHTO Guide for the Development of Bicycle Facilities most recent edition.

When the shared-use path crosses a roadway, mark intersection crossings with a high-visibility crosswalk and advance-stop line. Determine whether the trail or the road will have the right of way and provide traffic control

[208] FHWA. 2006. *Designing Sidewalks and Trails for Access.*

devices as appropriate. At uncontrolled crossings, consider the use of other crossing improvements such as an RRFB, PHB, in-street "stop for pedestrian" sign, a raised crosswalk, a pedestrian refuge island, and curb extensions.

DESIGN APPLICABILITY

Along exclusive right of way.

COMPLEMENTARY TREATMENTS

- Pedestrian/bicyclist overpass
- Pedestrian/bicyclist underpass
- In-street stop for pedestrian sign
- Rectangular rapid flashing beacon
- Pedestrian hybrid beacon
- Pedestrian traffic signal
- Half signal for pedestrians and bicyclists
- Full traffic signal
- Pedestrian refuge island
- Raised crosswalk

MORE INFORMATION

- AASHTO Guide for the Development of Bicycle Facilities 2012
- FHWA Small Town and Rural Design Guide
- FHWA Shared-Use Path Level of Service Calculator
- Public Right-of-Way Accessibility Guidelines

PLAN SHEET DETAILS

- 62 - Shared-Use Path

63. Sidepath

DESCRIPTION

Sidepaths are transportation facilities used by pedestrians and bicyclists within roadway rights-of-way, and adjacent to travel lanes. A buffer, open space, or barrier physically separates the facility from travel lanes. Sidepaths can offer comfortable facilities for pedestrians and bicyclists especially along high-speed, high-volume roads or where right-of-way constraints limit the ability to provide active transportation facilities on both sides of a roadway. When constructing a sidepath on only one side of the street, provide a greater density of crossing opportunities, especially at key destinations. Driveway crossings for drivers entering and exiting business adjacent to the roadway require careful consideration for sidepath design.

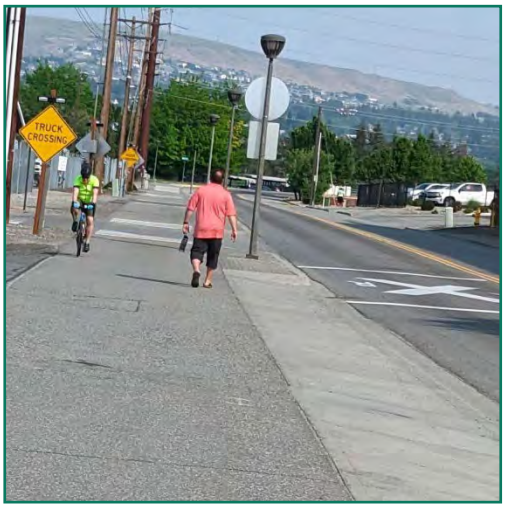


FIGURE 71. SIDEPATH IN WENATCHEE, WA. SOURCE: DONGHO CHANG.

DESIGN GUIDANCE

Provide a minimum paved area width of **12 feet** with **2 feet** of unpaved or paved shoulders on either side. To determine the appropriate width of the facility beyond the minimum, refer to Table 10.

TABLE 10: SHARED USE PATH OPERATING WIDTHS FOR ANTICIPATED PEAK HOUR VOLUMES (OHIO DOT MULTIMODAL DESIGN GUIDE).

Shared Use Path Operating Widths	
Minimum (ft)	**SUPLOS "C" Peak Hour Volumes at Preferable Width**
11	150 - 300
12 – 15	300 - 500
16 – ≥20	500 - ≥600

If the expected volume of pedestrians and bicyclists along a sidepath may exceed the planned capacity consider evaluating the volumes with the FHWA Shared-Use Path Level of Service Calculator or providing separate facilities for pedestrians and bicyclists instead of a sidepath. Separated paths are feasible on paths that meet the combined minimum width requirements for sidewalks **(5 feet)** and two-way bike lanes **(10 feet)**, for a total o**f 15 feet** pending the existing or expected user volumes for the paths. Consider providing path separation with pavement markings, traversable linear tactile warning strips, or physical separation such as a curb or landscaping.

For buffer widths based on adjacent vehicular operating speeds refer to the following:

- For operating speeds of 30 mph or less, provide a minimum **3-foot** buffer from the edge of the roadway shoulder to the edge of the sidepath shoulder.
- For operating speeds of 35 mph or more, provide a minimum **5-foot** buffer from the edge of the roadway shoulder to the edge of the sidepath shoulder or a vertical concrete barrier. [209]

[209] WSDOT. 2023. *Design Manual M 22-01.22*. *(Engineering and Regional Operations).*

Design sidepaths without obstructions in the path of travel at the entry/exit points (e.g., bollards, fences, z-gates) unless there is a documented history of vehicle intrusion. For more information about how to prevent motor vehicle intrusion on sidepaths, refer to WSDOT Design Manual Section 1515.06(2).

For detailed design elements including design speeds, cross slopes, running slopes, pavement structural section, and stopping sight distance for sidepaths, refer to the shared-use path guidance in the AASHTO Guide for the Development of Bicycle Facilities, most recent edition.

Provide the same priority to sidepaths as the parallel roadway at minor street crossings. If possible, reduce the frequency of driveways along the corridor. This treatment may not be the best fit for corridors with a high density of driveways. At minor street and major driveway crossings:

- Minimize corner radii to encourage slow vehicle turning speeds.
- Design driveways so the sidepath doesn't drop to roadway grade. Consider raised crossings and pedestrian refuge islands across minor streets and driveways to enhance safety for pedestrians and bicyclists crossing.
- Mark high-visibility crosswalks and advance-stop lines.[210]

Where right of way allows, provide a **20-foot** setback from the intersection for a sidepath crossing of a minor street to allow a driver to stop for sidepath users and oncoming vehicles separately.[211]

DESIGN APPLICABILITY

Within roadway rights of way for most road types, but especially along high-speed limited access roadways, natural corridors, or geographic edge conditions.

COMPLEMENTARY TREATMENTS

- Roundabout with pedestrian/bicyclist facilities and crossings
- Pedestrian/bicyclist overpass
- Pedestrian/bicyclist underpass
- Raised crosswalk
- Pedestrian refuge island

MORE INFORMATION

- AASHTO Guide for the Development of Bicycle Facilities 2012
- FHWA Small Town and Rural Design Guide
- FHWA Shared-Use Path Level of Service Calculator
- FHWA Improving Intersections for Pedestrians and Bicyclists

PLAN SHEET DETAILS

- 63 - Sidepath

210 Alta Planning + Design. "Sidepath." *Small Town and Rural Design Guide.*
211 FHWA. 2022. Improving Intersections for Pedestrians and Bicyclists.

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Acronyms and abbreviations

AADT	Annual average daily traffic
AASHTO	American Association of State Highway and Transportation Officials
ADA	Americans with Disabilities Act
APS	Accessible pedestrian signals
BLTS	Bicycle level of traffic stress
CBO	Community-based organization
FHWA	Federal Highway Administration
IA	Interim approval
ITE	Institute of Transportation Engineers
LBI	Leading bike interval
LPI	Leading pedestrian interval
LTS	Level of traffic stress
MRSC	Municipal Research and Services Center of Washington
MUTCD	Manual of Uniform Traffic Control Devices
NACTO	National Association of City Trasnportation Officials
NAS	National Academies of Sciences
NCHRP	National Cooperative Highway Research Program
PBOT	Portland Bureau of Transportation
PBP	Pedestrian/Bicyclist Program
PHB	Pedestrian hybrid beacon
PLTS	Pedestrian level of traffic stress
RCW	Revised Code of Washington
RRFB	Rectangular rapid flashing beacon
SDOT	Seattle Department of Transportation
SRTS	Safe Routes to School
VPD	Vehicles per day
WAC	Washington Administrative Code
WSDOT	Washington State Department of Transportation

Appendix

DEMONSTRATION PROJECT

Consider the use of this guidance to plan and construct a demonstration project, sometimes also known as tactical urbanism. Although not a requirement as part of the grant process, a jurisdiction may, at their option, choose to adapt one or more proposed treatment descriptions and Sheet Plan Details in this guide by using lower cost materials to learn more about the applicability, performance, and community response to the treatments. Applications for development/design-only projects may include funding for trial installations. In addition, project applications for mobility infrastructure improvements will tend to rank more favorably during the competitive grant application review if the local agency or Tribe has previously implemented a demonstration project of the design.

Materials for demonstration projects may include:

- Traffic cones
- Free standing delineators
- Delineator posts
- Barriers
- Tape
- Movable chairs and tables
- Signs
- Tires
- Planters
- Plants
- Tires
- Chalk
- Paint

CITY OF AIRWAY HEIGHTS, KING ST DEMONSTRATION PROJECT

Local, state, and national partners worked together to implement a demonstration project in Airway Heights, WA. The team used pavement paint, traffic control equipment, games, and plants to design a space intended to slow traffic and create space for people walking, biking, and enjoying the amenities along the street. The project had many benefits for the team including strengthening the case for streetscape changes and gaining community support.

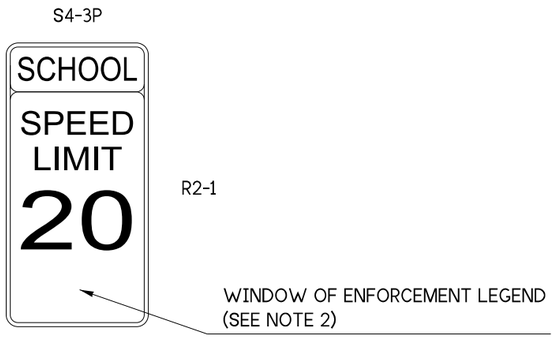
FIGURE 72: KING ST DEMONSTRATION PROJECT. SOURCE: SMART GROWTH AMERICA.

Plan Sheet Details

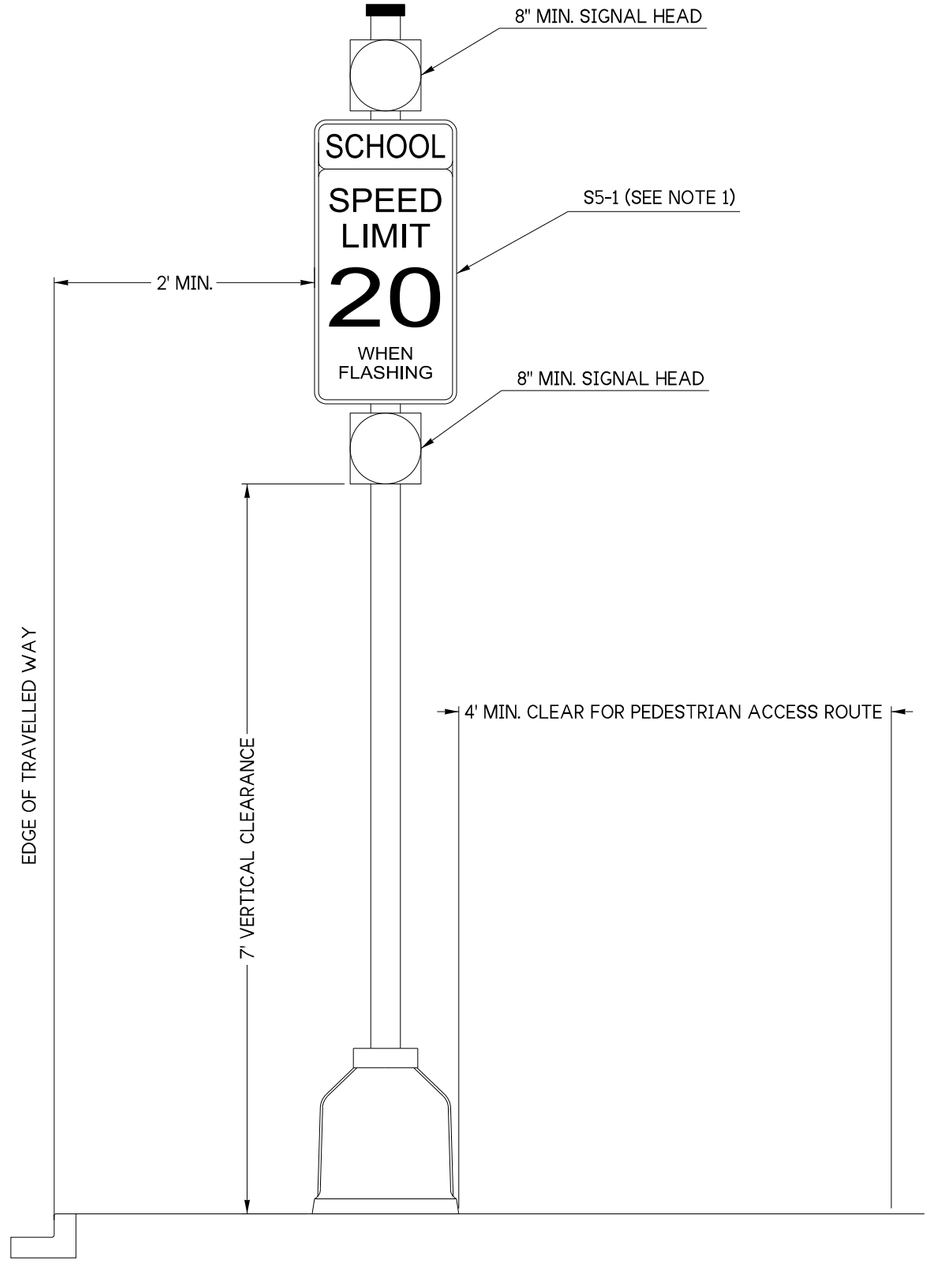
NOTES

1. IN SCHOOL SPEED ZONE SIGN ASSEMBLY WITH FLASHING BEACON, S5-1 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).

2. 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 MUTCD SECTION 4L.04.
   - WHEN CHILDREN ARE PRESENT (S4-2P) USED IN CONJUNCTION WITH DEFINITIONS PROVIDED IN WAC 392-151-035.
   - WHEN FLAGGED (S4-501) 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. (S4-1P) 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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TIME	3:56:39 PM				10	WASH		WSDOT Active Transportation Programs Design Guide Plan Sheet Details	
DATE	12/11/2023				JOB NUMBER				SHEET 1 OF 52 SHEETS
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CHECKED BY					WSDOT				
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REGIONAL ADM.		REVISION	DATE	BY		DATE P.E. STAMP BOX - SEE SHEET CT1 FOR SIGNATURE	DATE P.E. STAMP BOX - SEE SHEET CT1 FOR SIGNATURE	2 - 20-mph Speed Zone Designation and Signs	

NOTES

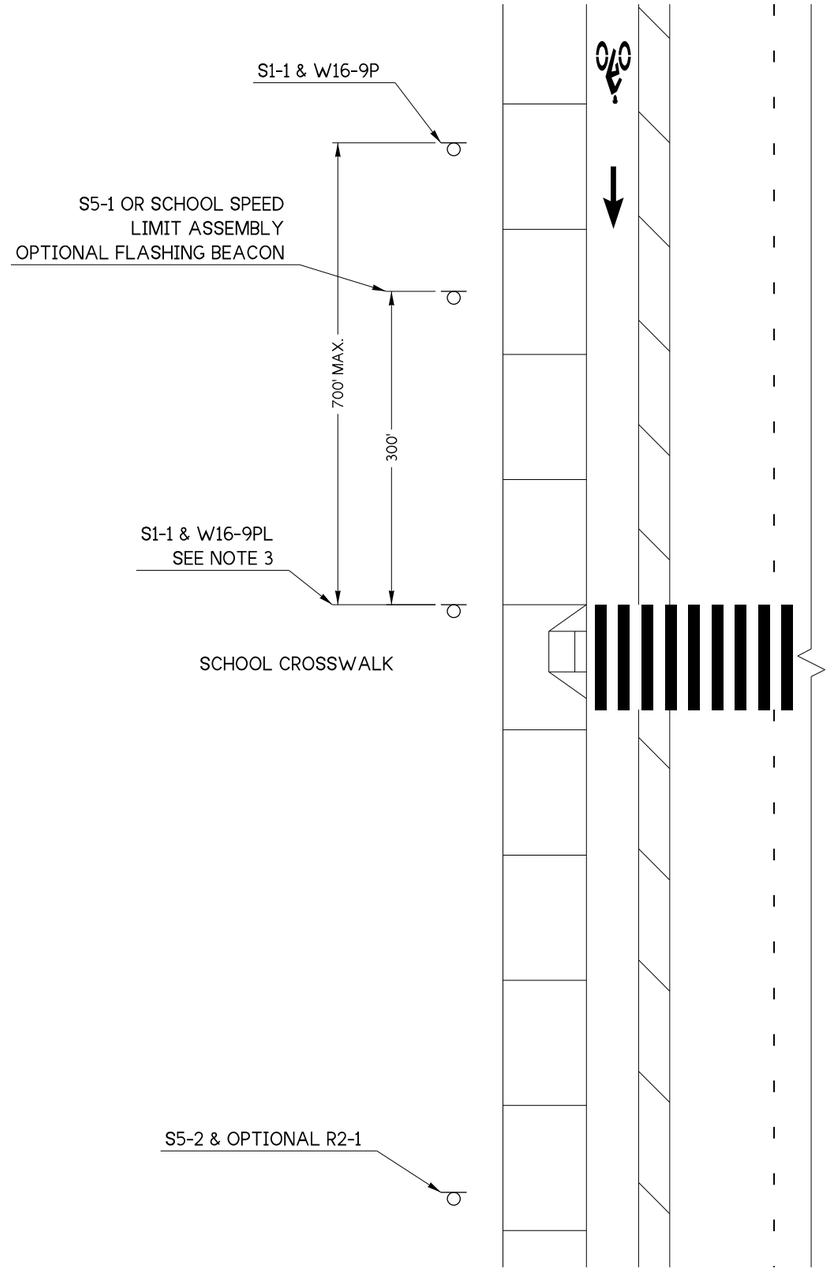
1. INSTALL SIGNAGE ON BOTH ROADWAY APPROACHES.

2. SCHOOL CROSSINGS MAY BE ESTABLISHED EITHER ADJACENT TO THE SCHOOL OR AS PART OF A SCHOOL PEDESTRIAN ROUTE.

3. THE S1-1 SIGN MAY BE INSTALLED AT A CROSSING CONTROLLED BY A TRAFFIC SIGNAL, BUT NOT AT AN INTERSECTION CROSSING CONTROLLED BY A STOP OR YEILD 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.

5. 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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2 - 20-mph Speed Zone
Designation and Signs

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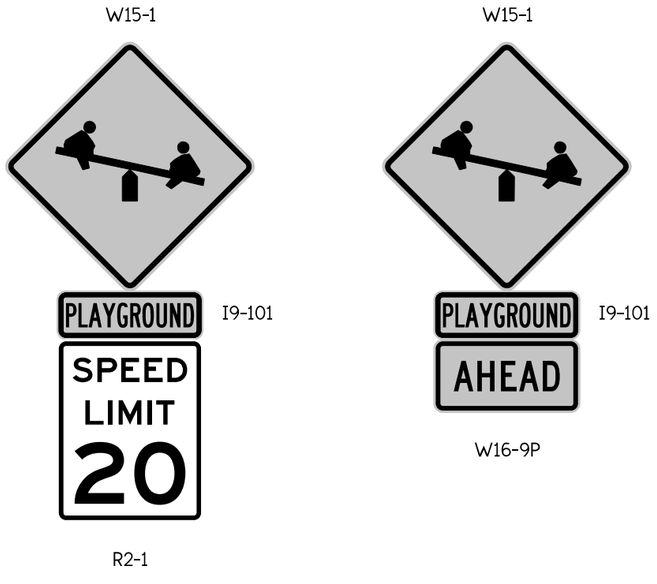
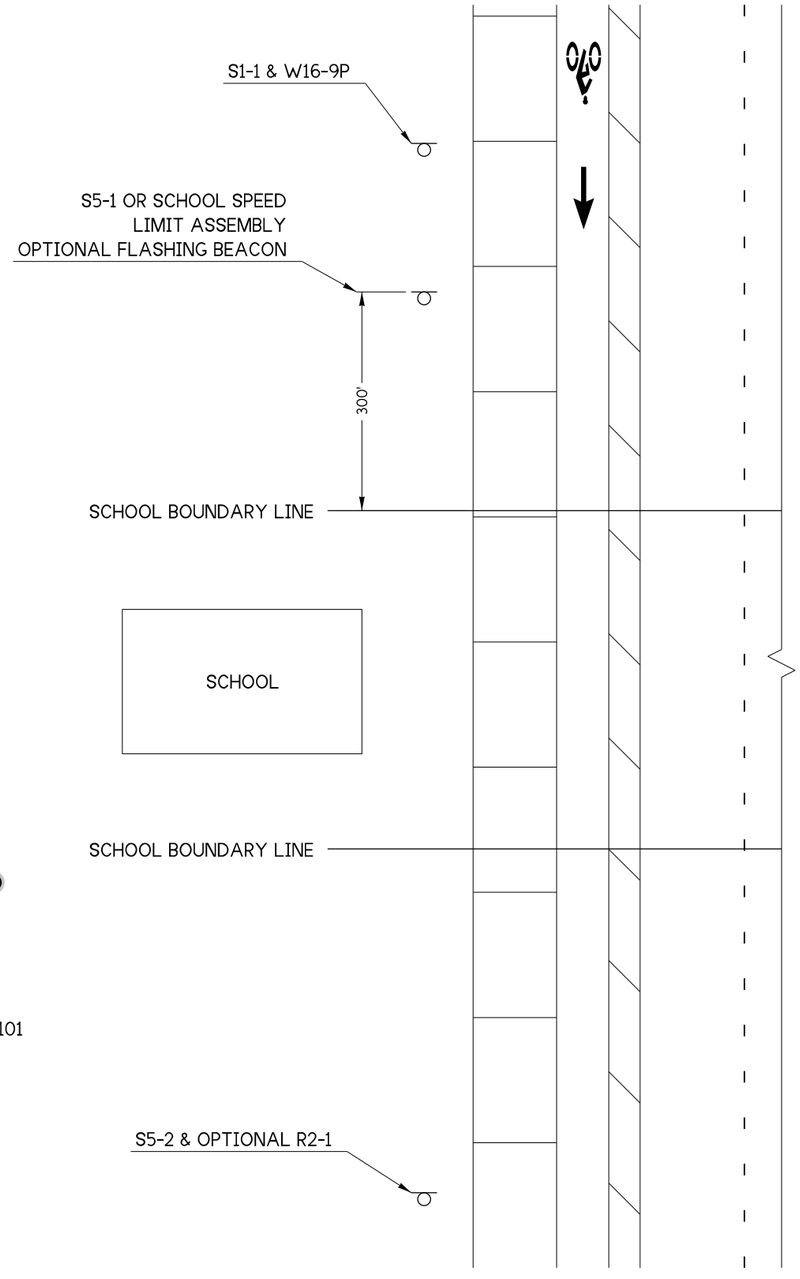
NOTES

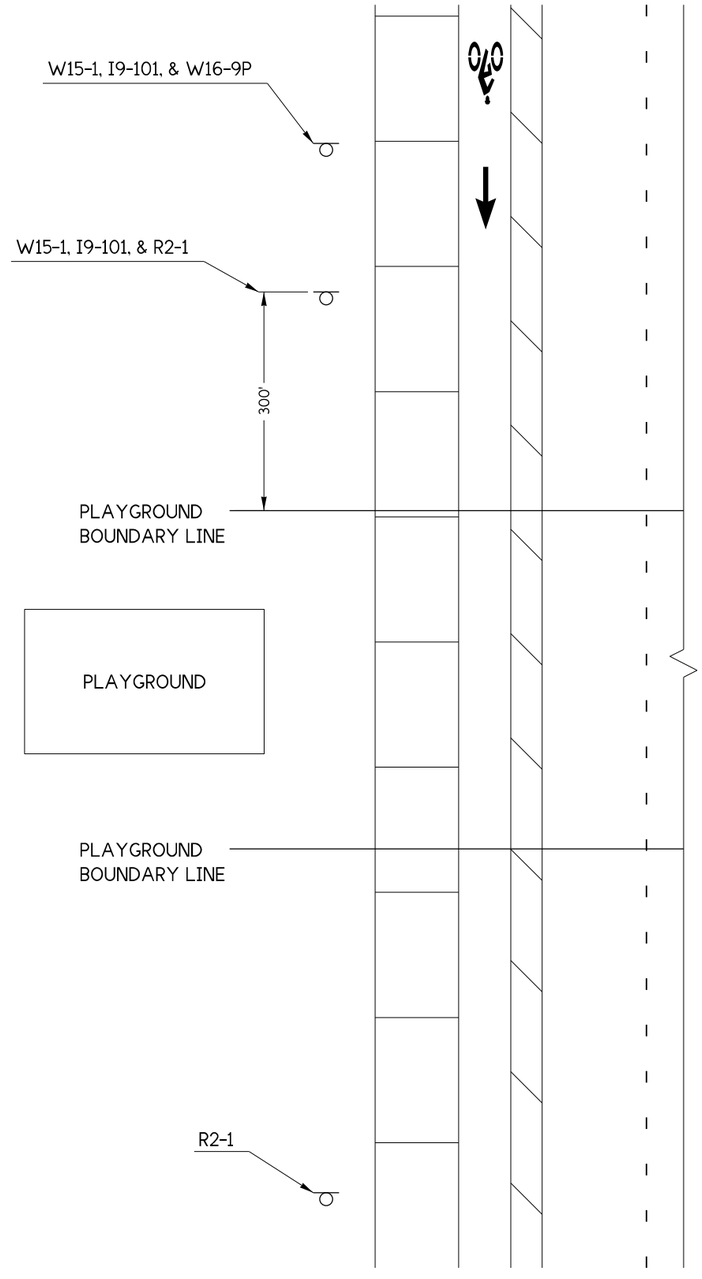
1. INSTALL SIGNAGE ON BOTH ROADWAY APPROACHES.
2. PER WAC 468-95-330, APPLICABLE TO COUNTY ROADS OR CITY STREETS, THE SCHOOL OR PLAYGROUND SPEED ZONE MAY EXTEND UP TO 300 FEET FROM THE BORDER OF THE SCHOOL OR PLAYGROUND PROPERTY WHEN FULLY POSTED WITH STANDARD SCHOOL SPEED LIMIT SIGNS OR STANDARD PLAYGROUND SPEED LIMIT SIGNS.



PLAYGROUND SPEED ZONE SIGN ASSEMBLIES



SCHOOL SPEED ZONE SIGNING



PLAYGROUND SPEED ZONE SIGNING

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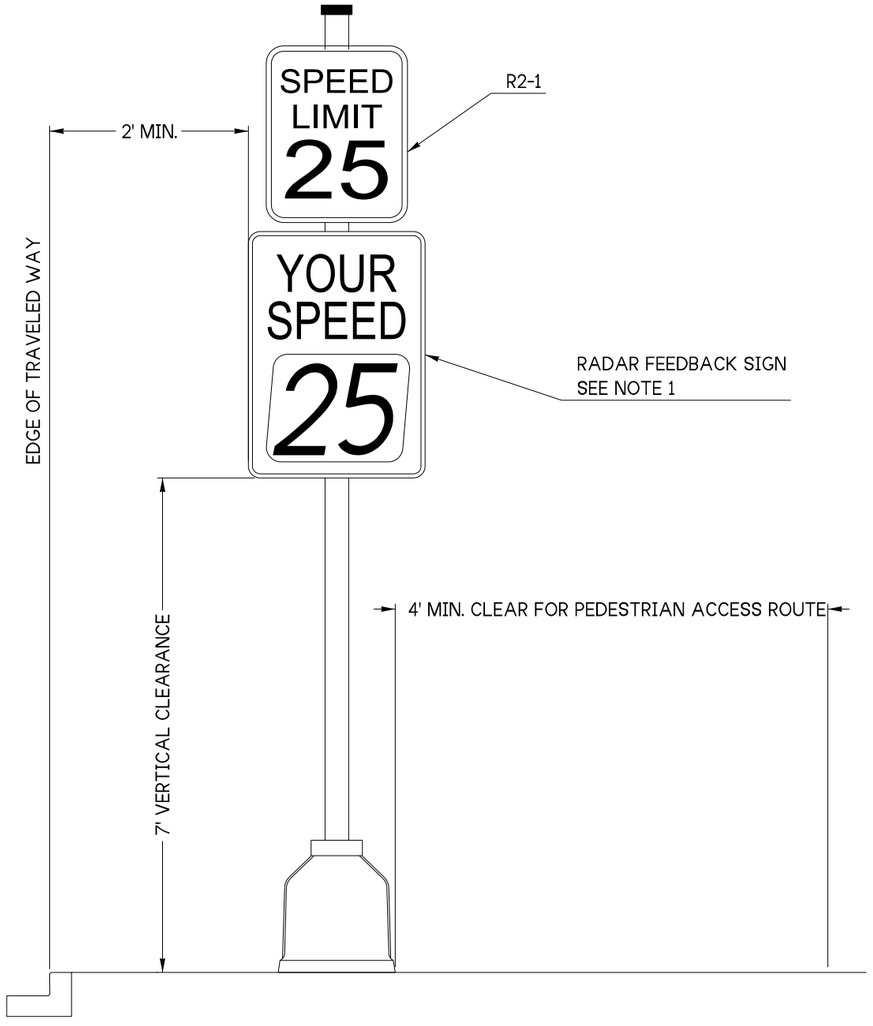
Design Guide
Plan Sheet Details

2 - 20-mph Speed Zone
Designation and Signs

NOTES

1. DO NOT SHOW SPEEDS ON SIGNS AT A SET SPEED TYPICALLY 2 TO 5 MPH ABOVE THE SPEED LIMIT. SIGN MAY DISPLAY A MESSAGE SUCH AS "SLOW DOWN" OR OTHER BEACON AT SPEEDS EXCEEDING THE DETERMINED THRESHOLD FOR DISPLAY.

2. THE COLOR OF THE CHANGEABLE MESSAGE SHOULD BE A YELLOW LEGEND ON A BLACK BACKGROUND OR THE REVERSE OF THESE COLORS.



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3 - Speed Feedback Sign

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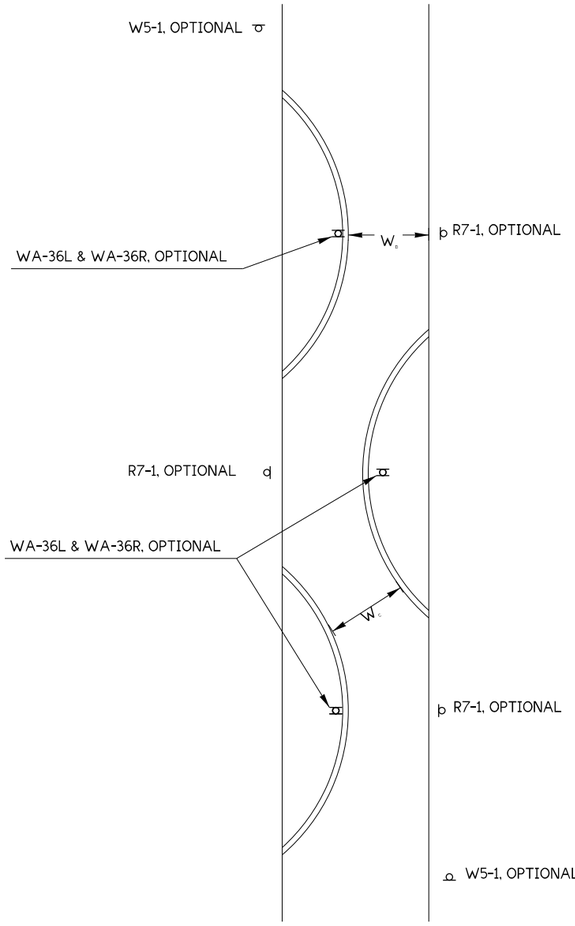
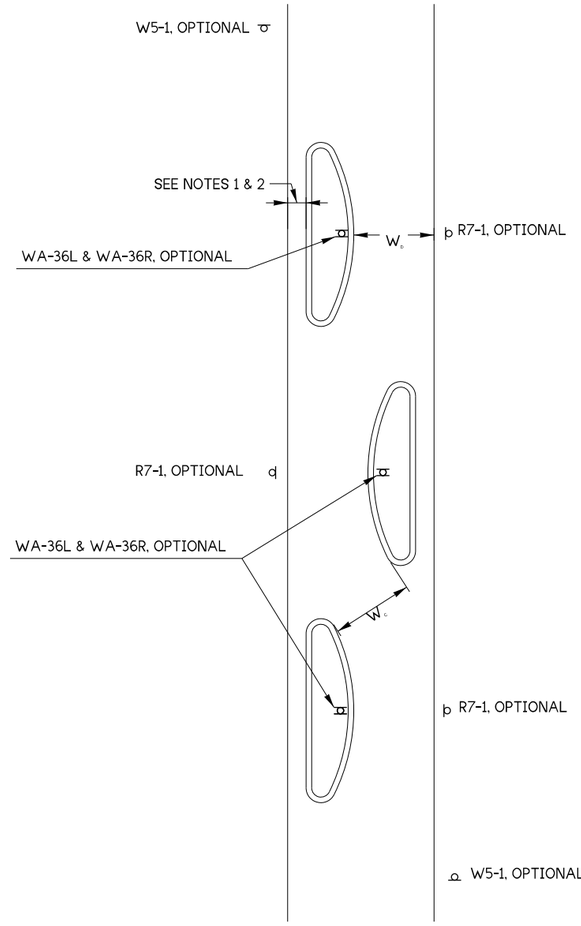


CURBLINE EXTENSION CHICANES



DETATCHED CHICANES WITH DRAINAGE CHANNEL

NOTES

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

	TWO LANES	ONE LANE
W_b	23'	15'
W_c	20' MIN.	11' MIN.

FILE NAME	7 - Chicanes.dgn				REGION NO.	STATE	FED. AID PROJ. NO.	WSDOT Active Transportation Programs Design Guide Plan Sheet Details
TIME	3:56:49 PM				10	WASH		
DATE	12/11/2023				JOB NUMBER			
PLOTTED BY	WeisgeB							
DESIGNED BY								
ENTERED BY								
CHECKED BY					CONTRACT NO.		LOCATION NO.	
PROJ. ENGR.								
REGIONAL ADM.		REVISION	DATE	BY				

PRELIMINARY PLAN

DATE
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DATE
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7 - Chicanes

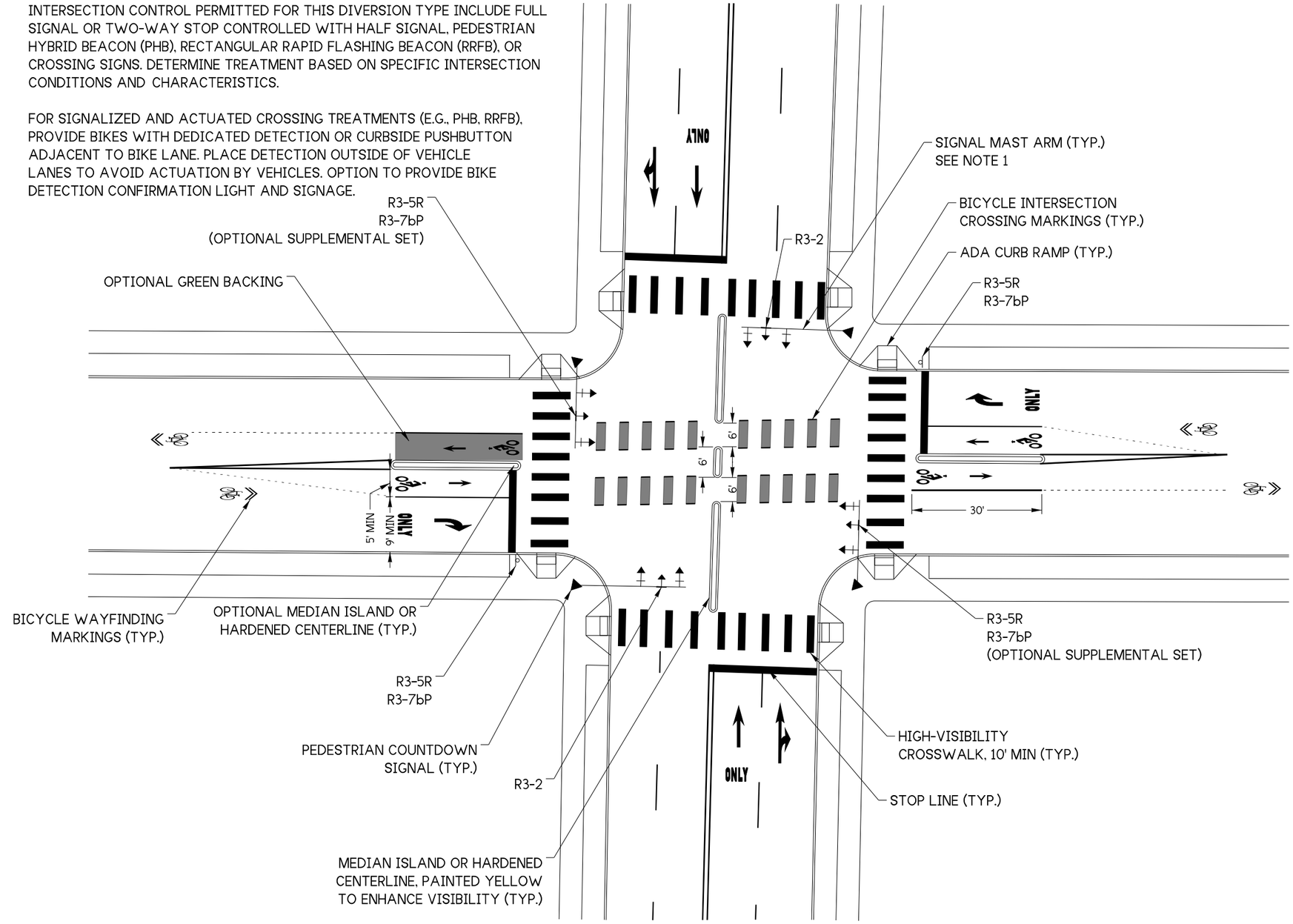
PLAN REF NO

SHEET 5 OF 52 SHEETS

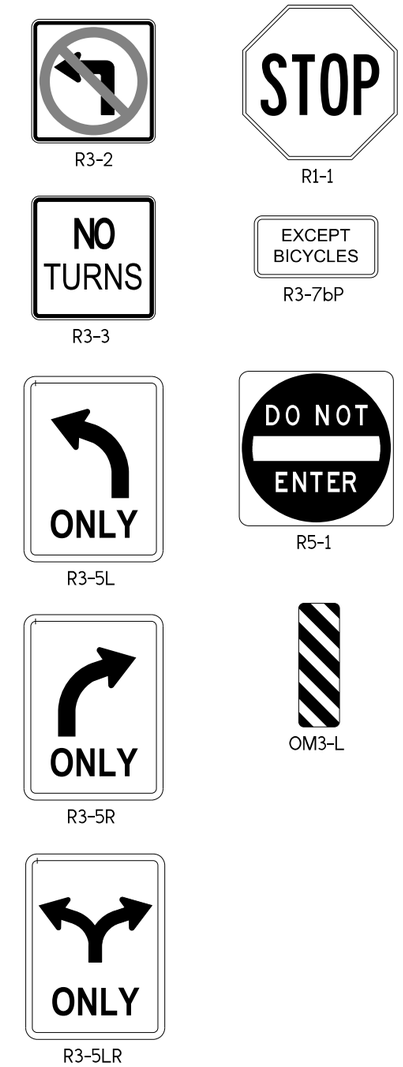
NOTES

1. INTERSECTION CONTROL PERMITTED FOR THIS DIVERSION TYPE INCLUDE FULL SIGNAL OR TWO-WAY STOP CONTROLLED WITH HALF SIGNAL, PEDESTRIAN HYBRID BEACON (PHB), RECTANGULAR RAPID FLASHING BEACON (RRFB), OR CROSSING SIGNS. DETERMINE TREATMENT BASED ON SPECIFIC INTERSECTION CONDITIONS AND CHARACTERISTICS.

2. FOR SIGNALIZED AND ACTUATED CROSSING TREATMENTS (E.G., PHB, RRFB), PROVIDE BIKES WITH DEDICATED DETECTION OR CURBSIDE PUSHBUTTON ADJACENT TO BIKE LANE. PLACE DETECTION OUTSIDE OF VEHICLE LANES TO AVOID ACTUATION BY VEHICLES. OPTION TO PROVIDE BIKE DETECTION CONFIRMATION LIGHT AND SIGNAGE.



NEIGHBORHOOD TRAFFIC DIVERTERS
SIGN LEGEND



TRAFFIC DIVERSION - MEDIAN DIVERTER
MINOR STREET RIGHT TURN ONLY & MAJOR STREET LEFT TURN RESTRICTION

FILE NAME	8 - Neighborhood Diverter.dgn			REGION NO.	STATE	FED. AID PROJ. NO.	WSDOT	WSDOT Active Transportation Programs Design Guide Plan Sheet Details
TIME	3:56:55 PM			10	WASH			
DATE	12/11/2023			JOB NUMBER			PRELIMINARY PLAN	8 - Neighborhood Traffic Diverter
PLOTTED BY	WeisgeB							
DESIGNED BY				CONTRACT NO.		LOCATION NO.		
ENTERED BY								
CHECKED BY								
PROJ. ENGR.								
REGIONAL ADM.		REVISION	DATE	BY				

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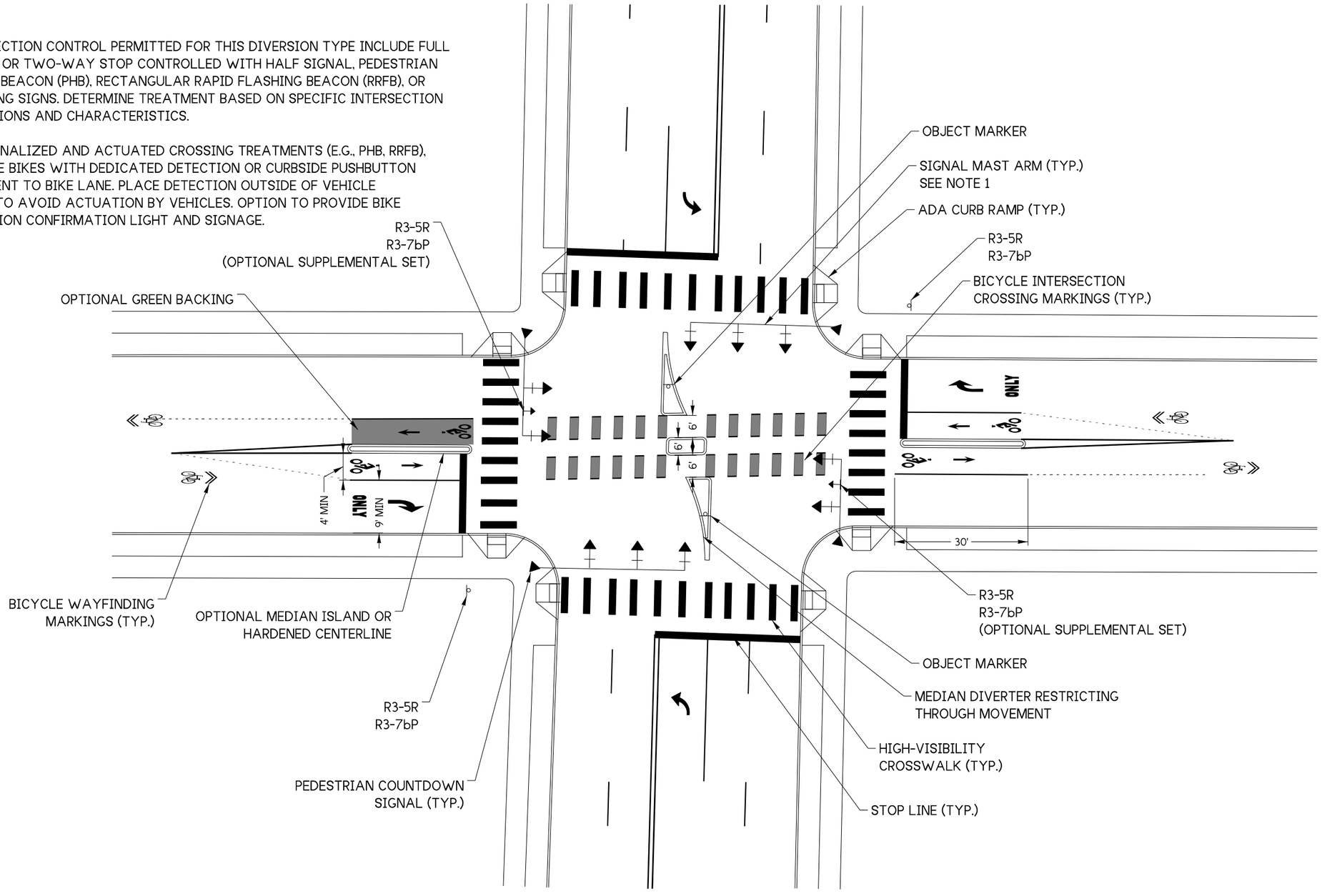
PLAN REF NO

SHEET 6 OF 52 SHEETS

NOTES

1. INTERSECTION CONTROL PERMITTED FOR THIS DIVERSION TYPE INCLUDE FULL SIGNAL OR TWO-WAY STOP CONTROLLED WITH HALF SIGNAL, PEDESTRIAN HYBRID BEACON (PHB), RECTANGULAR RAPID FLASHING BEACON (RRFB), OR CROSSING SIGNS. DETERMINE TREATMENT BASED ON SPECIFIC INTERSECTION CONDITIONS AND CHARACTERISTICS.

2. FOR SIGNALIZED AND ACTUATED CROSSING TREATMENTS (E.G., PHB, RRFB), PROVIDE BIKES WITH DEDICATED DETECTION OR CURBSIDE PUSHBUTTON ADJACENT TO BIKE LANE. PLACE DETECTION OUTSIDE OF VEHICLE LANES TO AVOID ACTUATION BY VEHICLES. OPTION TO PROVIDE BIKE DETECTION CONFIRMATION LIGHT AND SIGNAGE.



TRAFFIC DIVERSION - MEDIAN DIVERTER
MINOR STREET RIGHT TURN ONLY

FILE NAME	8 - Neighborhood Diverter.dgn				REGION NO.	STATE	FED. AID PROJ. NO.	WSDOT Active Transportation Programs Design Guide Plan Sheet Details
TIME	3:56:56 PM				10	WASH		PLAN REF NO
DATE	12/11/2023				JOB NUMBER			
PLOTTED BY	WeisgeB							SHEET 7 OF 52 SHEETS
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ENTERED BY								
CHECKED BY							PRELIMINARY PLAN	
PROJ. ENGR.								
REGIONAL ADM.		REVISION	DATE	BY				8 - Neighborhood Traffic Diverter

DATE P.E. STAMP BOX - SEE SHEET CT1 FOR SIGNATURE

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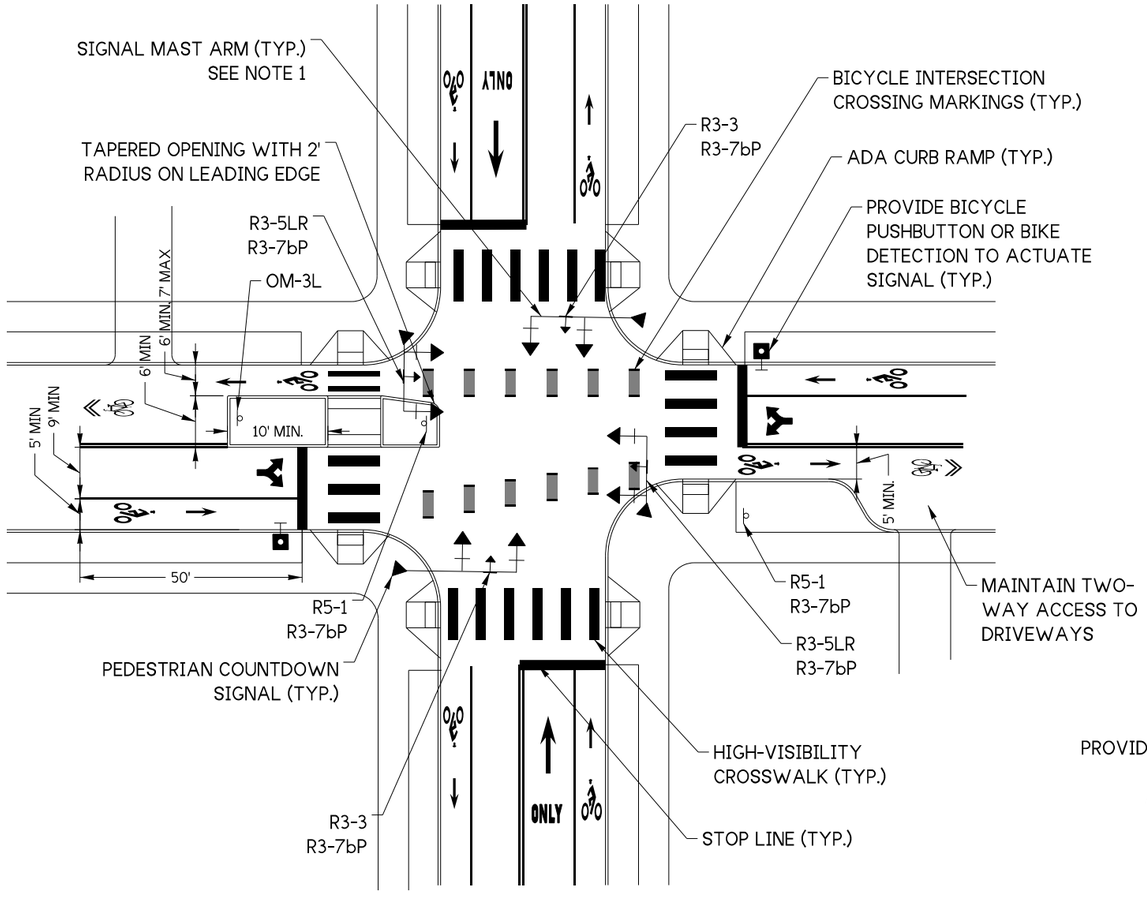
NOTES

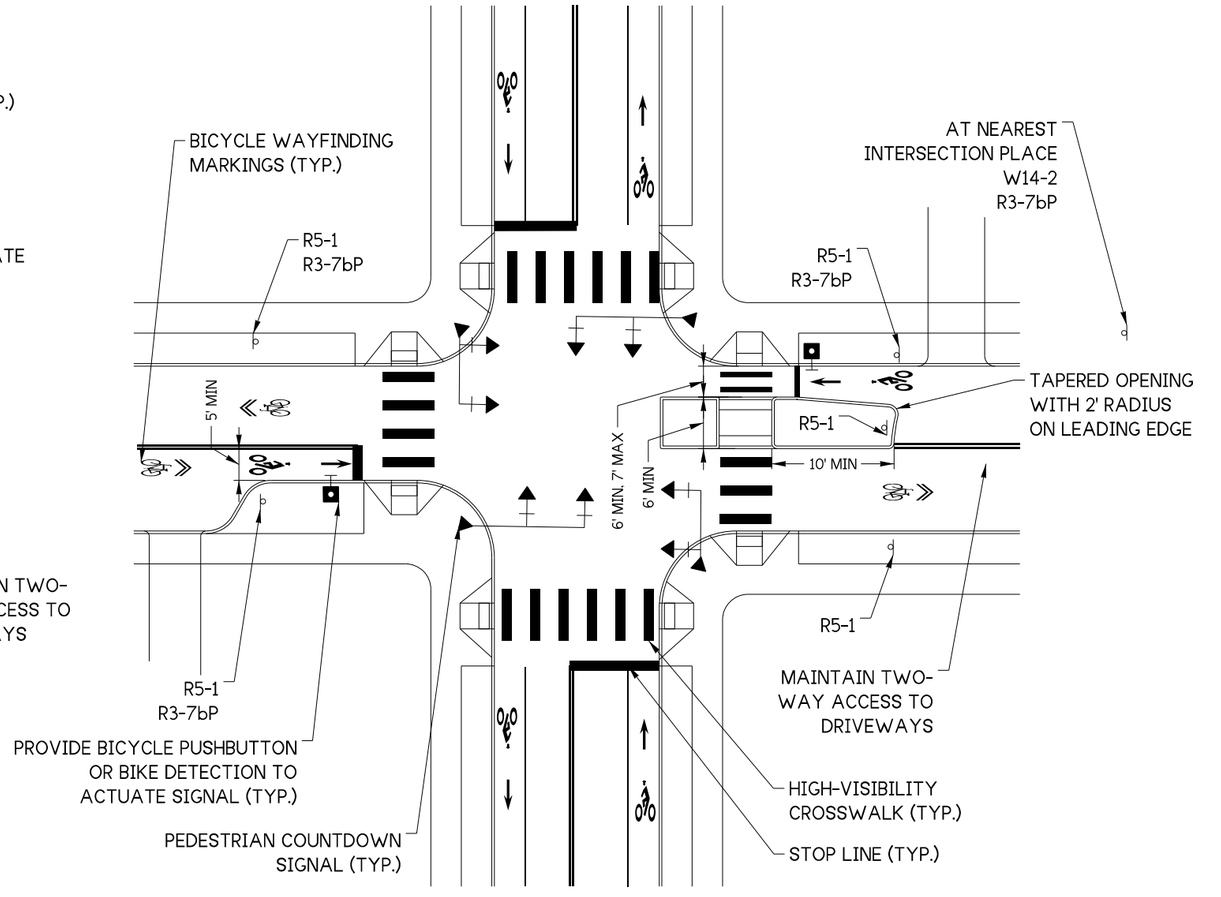
1. INTERSECTION CONTROL PERMITTED FOR THESE DIVERSION TYPES INCLUDE FULL SIGNAL OR TWO-WAY STOP CONTROLLED WITH HALF SIGNAL, PEDESTRIAN HYBRID BEACON (PHB), RECTANGULAR RAPID FLASHING BEACON (RRFB), OR CROSSING SIGNS. DETERMINE TREATMENT BASED ON SPECIFIC INTERSECTION CONDITIONS AND CHARACTERISTICS.

2. FOR SIGNALIZED AND ACTUATED CROSSING TREATMENTS (E.G., PHB, RRFB), PROVIDE BIKES WITH DEDICATED DETECTION OR CURBSIDE PUSHBUTTON ADJACENT TO BIKE LANE. PLACE DETECTION OUTSIDE OF VEHICLE LANES TO AVOID ACTUATION BY VEHICLES. OPTION TO PROVIDE BIKE DETECTION CONFIRMATION LIGHT AND SIGNAGE.

3. EACH SIDE OF THE INTERSECTIONS SHOWN DEPICT DIFFERENT VARIATIONS OF DIVERTERS. EACH DIVERTER CAN BE SELECTED SEPARATELY BASED ON THE NEED OF THE INTERSECTION LEG.



TRAFFIC DIVERSION - PARTIAL CLOSURE
MINOR STREET THROUGH RESTRICTION/MAJOR STREET TURN RESTRICTION



TRAFFIC DIVERSION - PARTIAL CLOSURE
MINOR STREET TURN AND THROUGH RESTRICTION

FILE NAME	8 - Neighborhood Diverter.dgn			
TIME	3:56:56 PM			
DATE	12/11/2023			
PLOTTED BY	WeisgeB			
DESIGNED BY				
ENTERED BY				
CHECKED BY				
PROJ. ENGR.				
REGIONAL ADM.		REVISION	DATE	BY

REGION NO.	STATE	FED. AID PROJ. NO.
10	WASH	
JOB NUMBER		
CONTRACT NO.		LOCATION NO.

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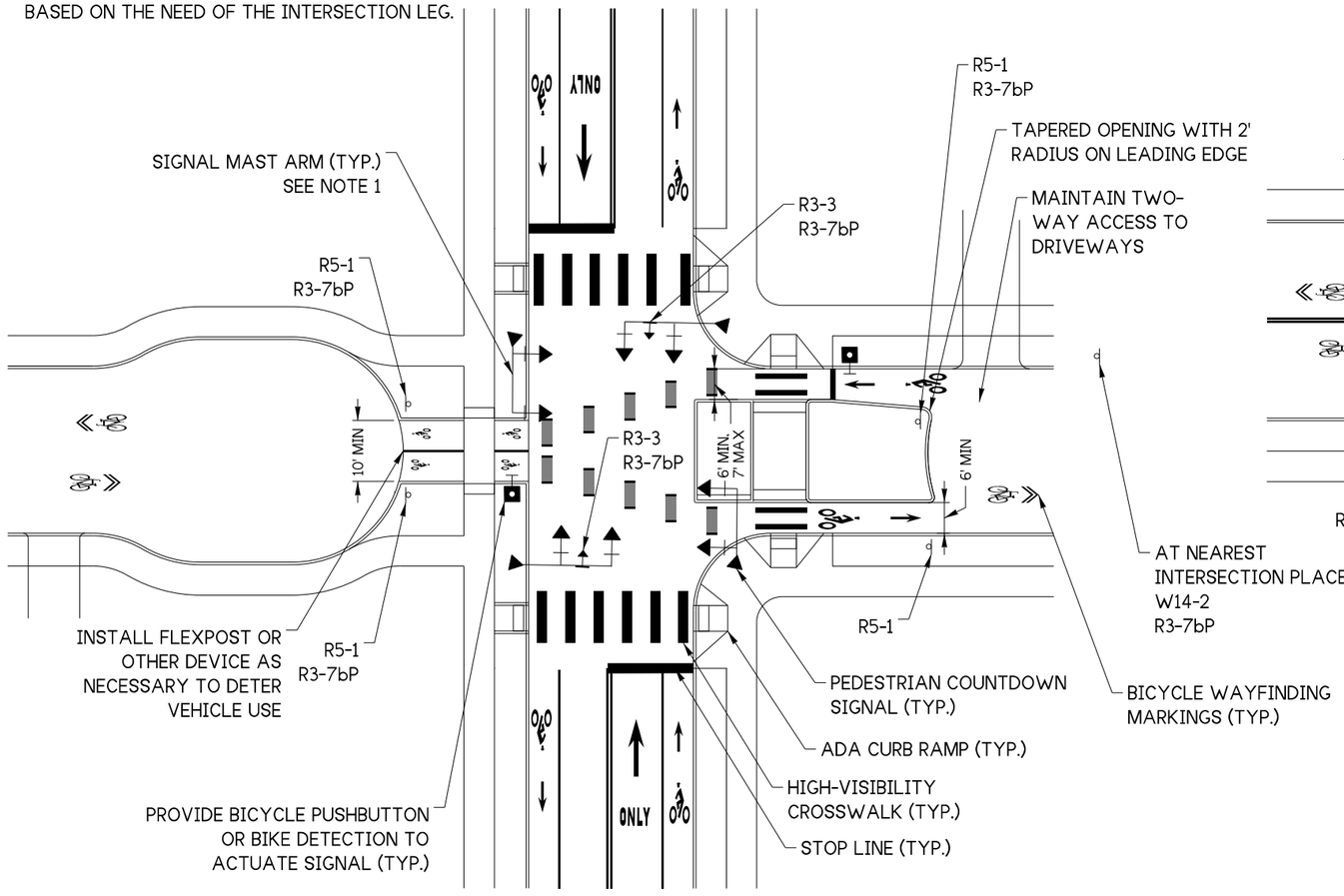
8 - Neighborhood Traffic Diverter

PLAN REF NO

SHEET 8 OF 52 SHEETS

NOTES FOR FULL CLOSURE DIVERSION

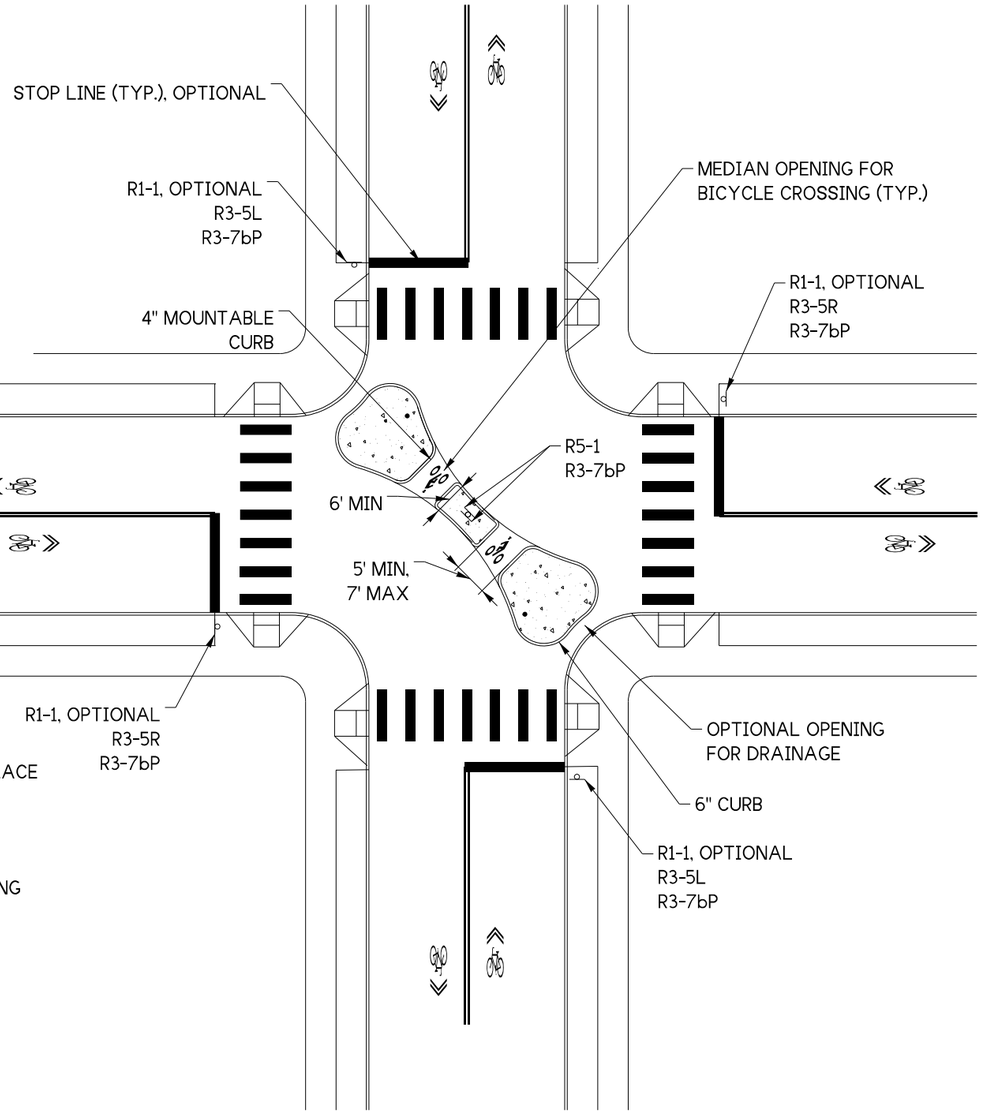
1. INTERSECTION CONTROL PERMITTED FOR THIS DIVERSION TYPE INCLUDE FULL SIGNAL, HALF SIGNAL, PEDESTRIAN HYBRID BEACON (PHB), RECTANGULAR RAPID FLASHING BEACON (RRFB), OR UNCONTROLLED WITH CROSSING SIGNS. DETERMINE TREATMENT BASED ON SPECIFIC INTERSECTION CONDITIONS AND CHARACTERISTICS.
2. FOR SIGNALIZED AND ACTUATED CROSSING TREATMENTS (E.G., PHB, RRFB), PROVIDE BIKES WITH DEDICATED DETECTION OR CURBSIDE PUSHBUTTON ADJACENT TO BIKE LANE. PLACE DETECTION OUTSIDE OF VEHICLE LANES TO AVOID ACTUATION BY VEHICLES. OPTION TO PROVIDE BIKE DETECTION CONFIRMATION LIGHT AND SIGNAGE.
3. ENSURE TURNAROUNDS ARE FEASIBLE WITHIN STREET. ADDITIONAL TREATMENTS INCLUDING WIDENING ROADWAY TO INCLUDE CUL-DE-SAC BULB END OR NEW HAMMER HEAD CONFIGURATION MAY BE NECESSARY.
4. EACH SIDE OF THE INTERSECTIONS SHOWN DEPICT DIFFERENT VARIATIONS OF DIVERTERS. EACH DIVERTER CAN BE SELECTED SEPARATELY BASED ON THE NEED OF THE INTERSECTION LEG.



TRAFFIC DIVERSION - FULL CLOSURE
MINOR STREET TURN AND THROUGH RESTRICTION/MAJOR STREET TURN RESTRICTION

NOTES FOR FULL CLOSURE DIVERSION

1. INTERSECTION CONTROL PERMITTED FOR THIS DIVERSION TYPE INCLUDE FULL SIGNAL, ALL-WAY STOP, ALL-WAY YIELD, OR UNCONTROLLED. DETERMINE TREATMENT BASED ON SPECIFIC INTERSECTION CONDITIONS AND CHARACTERISTICS.



TRAFFIC DIVERSION - DIAGONAL DIVERTER

FILE NAME	8 - Neighborhood Diverter.dgn				REGION NO.	STATE	FED. AID PROJ. NO.	PLAN REF NO
TIME	3:56:56 PM				10	WASH		
DATE	12/11/2023				JOB NUMBER			
PLOTTED BY	WeisgeB							SHEET 9 OF 52 SHEETS
DESIGNED BY								
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CHECKED BY					CONTRACT NO.		LOCATION NO.	
PROJ. ENGR.								
REGIONAL ADM.		REVISION	DATE	BY				

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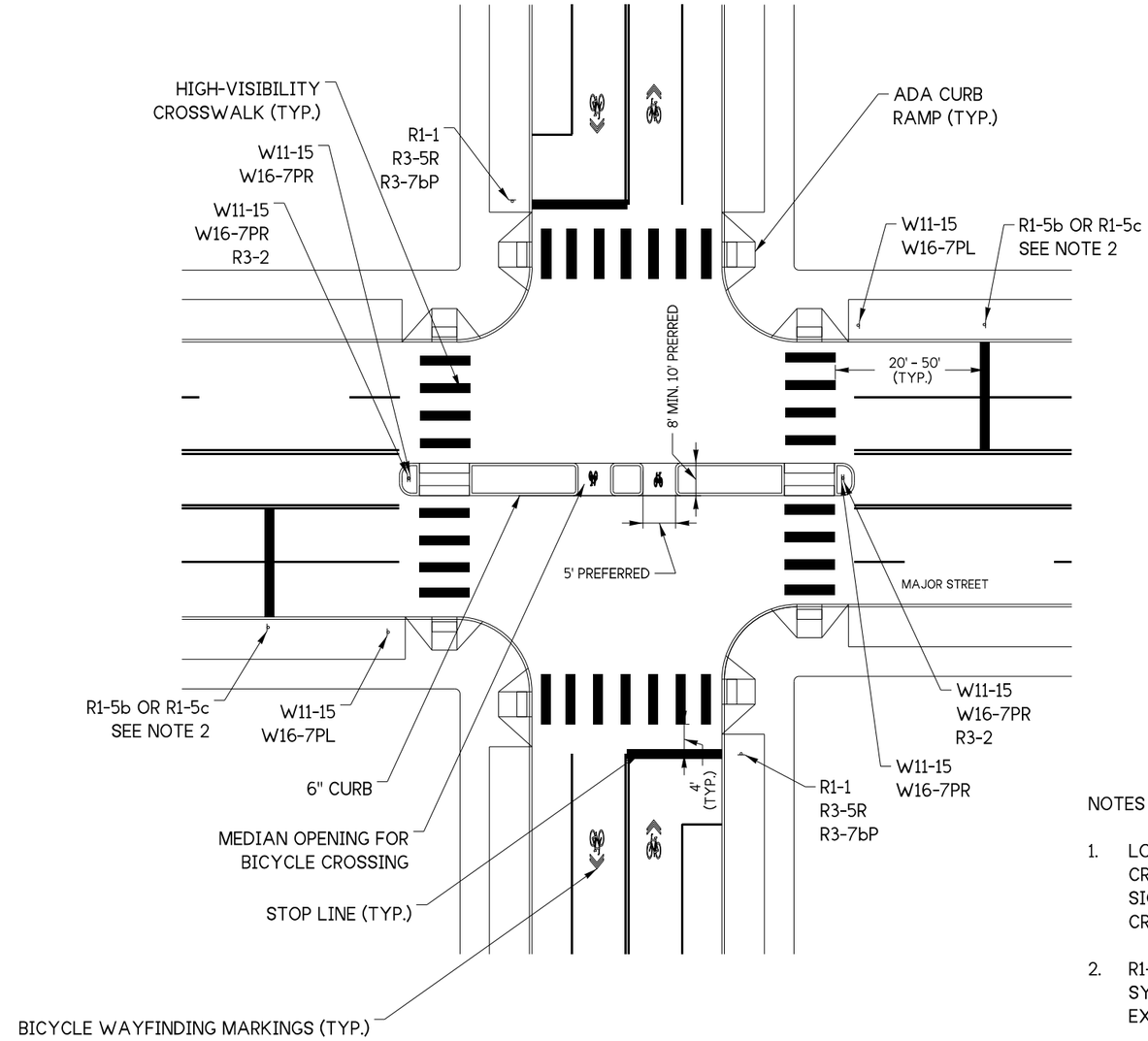
8 - Neighborhood Traffic Diverter

pw://projectstore.wsdot.wa.gov:WSDOT/Documents/_HQ/Active Transportation Division/Planning_Details/_DGN/Toole Design Files/8 - Neighborhood Diverter.dgn c:\users\weisgeb\pw_wsdot1d06101608 - Neighborhood Diverter.dgn



NOTES

1. LOCATION OF ADVANCE STOP LINE ON APPROACH TO CROSSWALK VARIES DEPENDING ON PRESENCE OF TRAFFIC SIGNAL. LOCATION ON DETAIL DEPICTS UNCONTROLLED CROSSING.

2. R1-5b (MOD.) WITH BOTH A BICYCLE AND A PEDESTRIAN SYMBOL MAY BE USED WITH AN APPROVED REQUEST TO EXPERIMENT FROM FHWA.

FILE NAME	9 - Median Diverter.dgn			REGION NO.	STATE	FED. AID PROJ. NO.		PLAN REF NO
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DATE	12/11/2023			JOB NUMBER				
PLOTTED BY	WeisgeB							
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CHECKED BY				CONTRACT NO.		LOCATION NO.		
PROJ. ENGR.								
REGIONAL ADM.		REVISION	DATE	BY				

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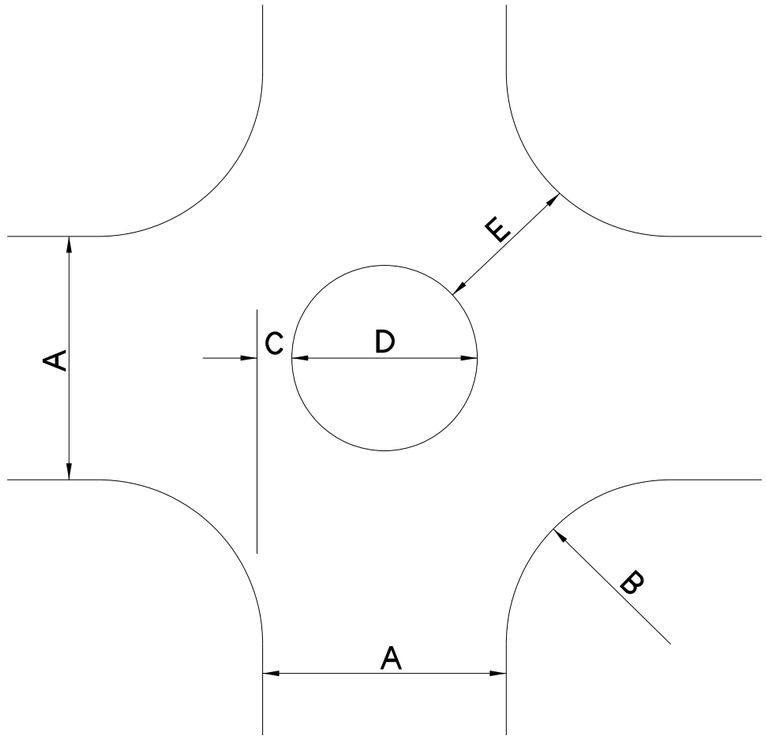
9 - Median Diverter for
Multi-stage Crossing

SHEET 10 OF 52 SHEETS

GEOMETRY



DIMENSIONS

A STREET WIDTH	B CURB RETURN RADIUS	C OFFSET DISTANCE	D CIRCLE DIAMETER	E OPENING WIDTH
20'	<15'	RECONSTRUCT CURBS		
	15'	5.5'	9'	16'+
	18'	5.0'	10'	17'+
	20'	4.5'	11'	18'-
	25'	4.0'	12'	19'+
24'	<12'	RECONSTRUCT CURBS		
	12'	5.5'	13'	16'
	15'	5.0'	14'	17'-
	20'	4.5'	15'	18'+
	25'	3.5'	17'	20'-
25'	<12'	RECONSTRUCT CURBS		
	12'	5.5'	14'	16'+
	15'	5.0'	15'	17'-
	18'	4.5'	16'	18'-
	20'	4.5'	16'	18'+
	25'	3.5'	18'	20'-
30'	10'	5.5'	19'	16'+
	12'	5.0'	20'	17'-
	15'	5.0'	20'	17'+
	18'	4.5'	21'	18'+
	20'	4.0'	22'	19'+
	25'	3.0'	24'	20'
32'	10'	5.5'	21'	16'+
	12'	5.0'	22'	17'-
	15'	4.5'	23'	18'-
	18'	4.0'	24'	19'-
	20'	4.0'	24'	19'+
	25'	2.5'	27'	20'
36'	10'	5.0'	26'	17'-
	12'	5.0'	26'	17'+
	15'	4.5'	27'	18'+
	18'	4.0'	28'	19'+
	20'	3.5'	29'	20'-
	25'	1.5'	33'	20'
40'	10'	5.0'	30'	17'+
	12'	4.5'	31'	18'+
	15'	4.0'	32'	19'-
	18'	3.5'	33'	20'-
	20'	3.0'	34'	20'
	25'	1.0'	38'	20'

NOTES

1. USE DIMENSION SCHEDULE AS A DESIGN GUIDE. FINAL DIMENSIONS TO BE DETERMINED BY THE ENGINEER.

2. 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' +

FILE NAME	10 - Neighborhood Traffic Circle.dgn			
TIME	3:57:03 PM			
DATE	12/11/2023			
PLOTTED BY	WeisgeB			
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PROJ. ENGR.				
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REGION NO.	STATE	FED. AID PROJ. NO.
10	WASH	
JOB NUMBER		
CONTRACT NO.		LOCATION NO.

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10 - Neighborhood Traffic Circle

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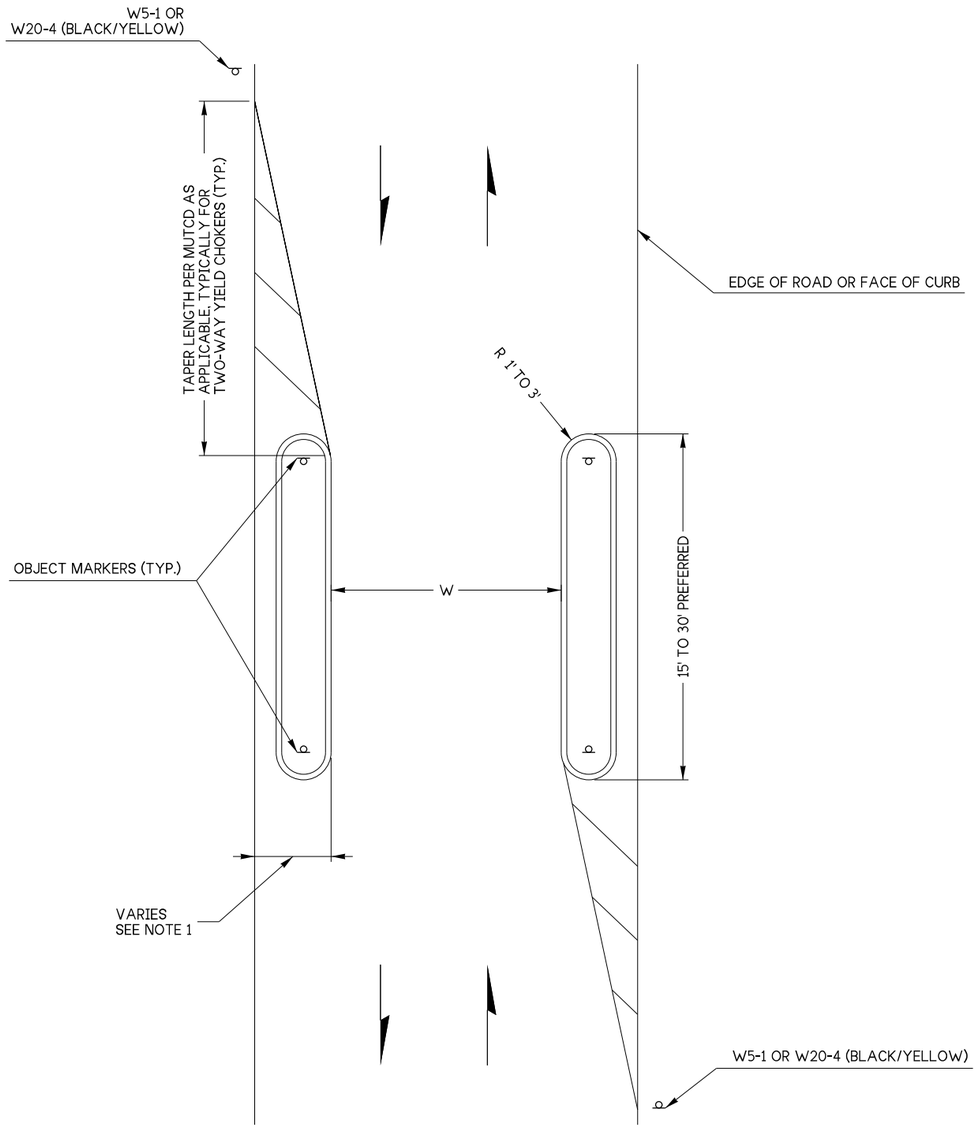

NOTES

1. CHOKER MAY BE BUILT AS AN EXTENSION OF THE EXISTING CURB LINE OR CAN BE DETACHED WITH A DRAINAGE CHANNEL (AS SHOWN).
2. 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
W	20' MIN.	12' MIN.

CHOKER (WITHOUT BIKE PASS-THROUGH)

FILE NAME	11 - Choker.dgn				REGION NO.	STATE	FED. AID PROJ. NO.		PLAN REF NO
TIME	3:57:06 PM				10	WASH		WSDOT Active Transportation Programs Design Guide Plan Sheet Details	
DATE	12/11/2023				JOB NUMBER				
PLOTTED BY	WeisgeB								SHEET 12 OF 52 SHEETS
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CHECKED BY									
PROJ. ENGR.									
REGIONAL ADM.		REVISION	DATE	BY				11 - Choker	

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DATE
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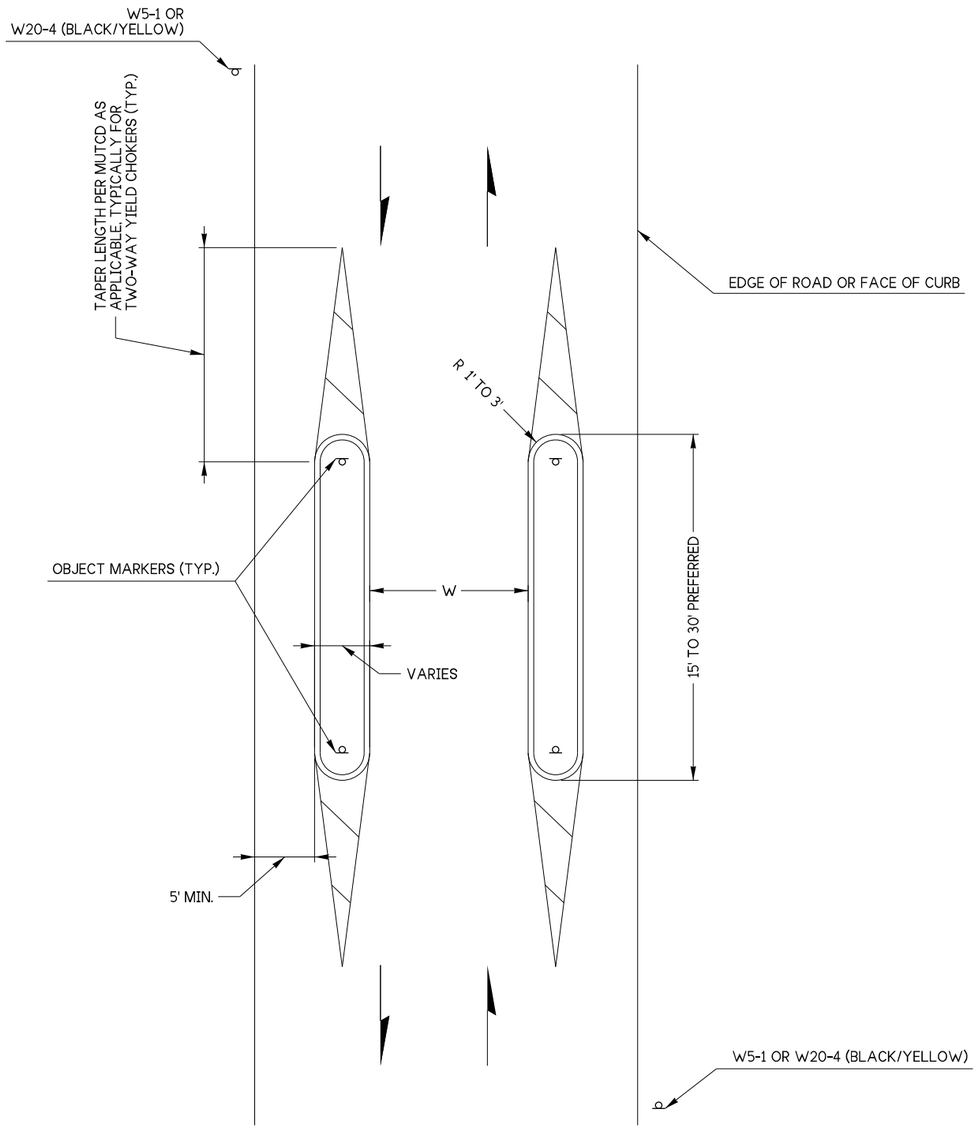

NOTES

1. EXTEND THE FACE OF CURB OR MAINTAIN A DRAINAGE CHANNEL BETWEEN THE CURB OR EDGE OF ROADWAY AND THE CHOKER.
2. 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
W	20' MIN.	12' MIN.

CHOKER WITH BIKE PASS-THROUGH

FILE NAME	11 - Choker.dgn				REGION NO.	STATE	FED. AID PROJ. NO.		PLAN REF NO
TIME	3:57:06 PM				10	WASH		WSDOT Active Transportation Programs Design Guide Plan Sheet Details	
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DESIGNED BY					CONTRACT NO.		LOCATION NO.		
ENTERED BY									
CHECKED BY							PRELIMINARY PLAN		
PROJ. ENGR.									
REGIONAL ADM.		REVISION	DATE	BY				11 - Choker	

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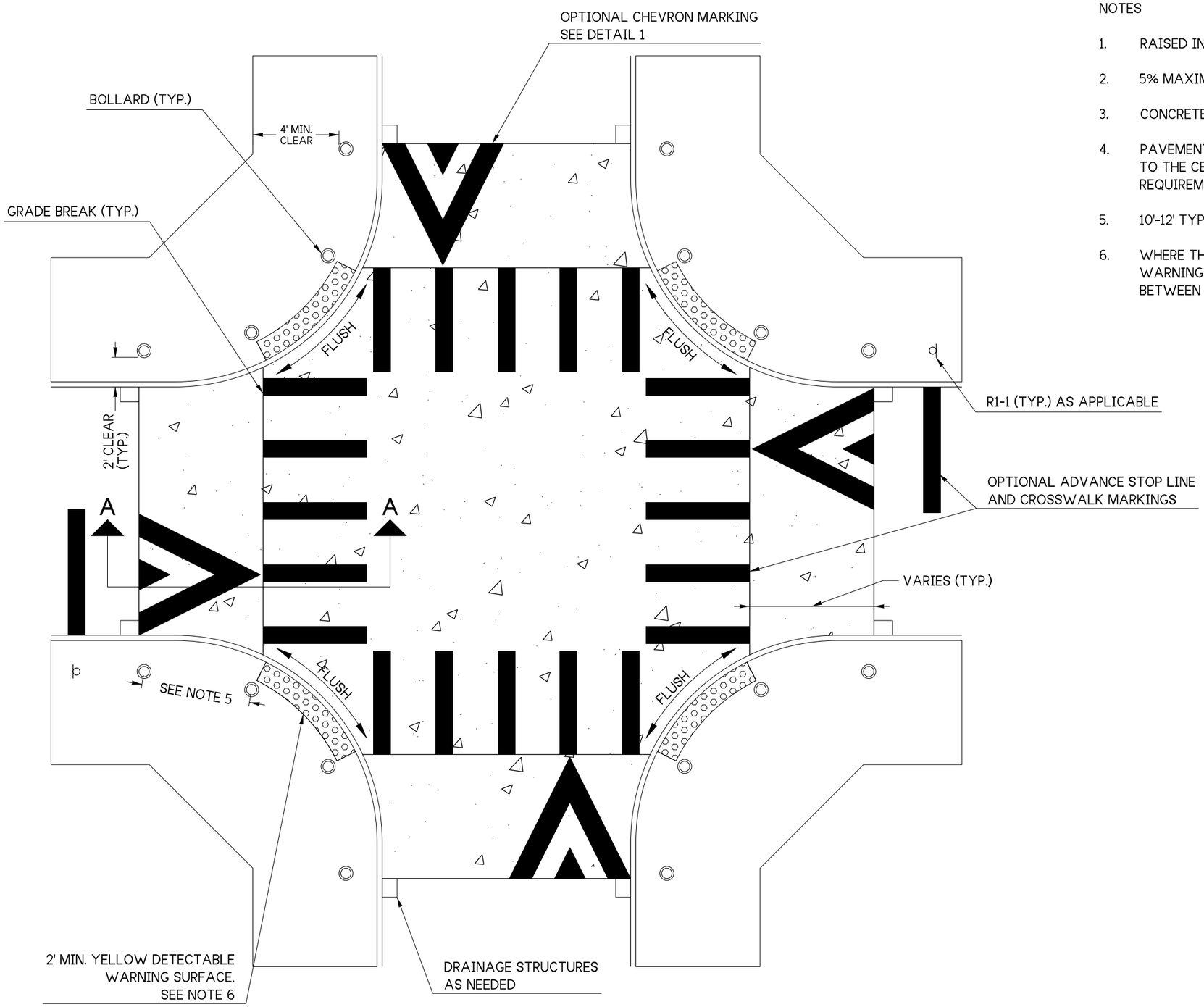
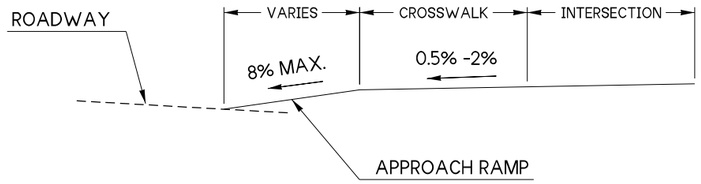
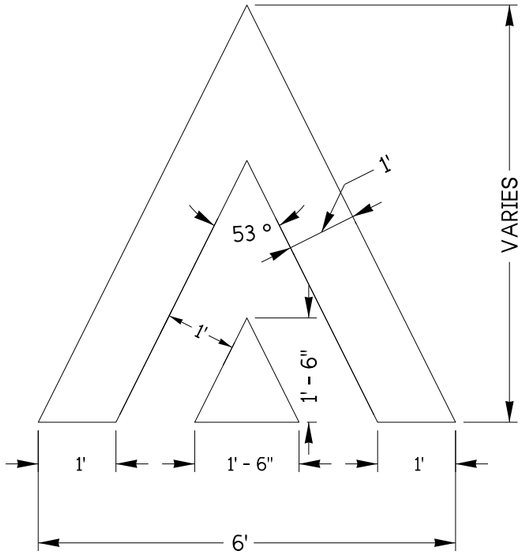


NOTES

1. RAISED INTERSECTION AND APPROACH RAMPS MAY BE CEMENT CONCRETE.
2. 5% MAXIMUM SLOPE AT APPROACH TO INTERSECTION.
3. CONCRETE JOINTS SHALL ALIGN WITH LANE LINE PROJECTIONS.
4. PAVEMENT COLOR OR TEXTURE MAY BE ACCEPTABLE. COLOR SHALL BE INTEGRAL TO THE CEMENT CONC. MIX AND TEXTURE SHALL COMPLY WITH ADA REQUIREMENTS.
5. 10'-12' TYPICAL CLEARANCE BETWEEN BOLLARDS.
6. WHERE THE INTERSECTION GEOMETRY WILL REQUIRE SEPARATE DETECTABLE WARNING SURFACES FOR EACH CROSSING, PROVIDE BOLLARDS OR OTHER OBJECT BETWEEN THE DETECTABLE WARNING SURFACES AT THE CORNER.



SECTION A-A



DETAIL 1
CHEVRON MARKING

FILE NAME	12 - Raised Intersection.dgn			REGION NO.	STATE	FED. AID PROJ. NO.	PLAN REF NO
TIME	3:57:09 PM			10	WASH		
DATE	12/11/2023			JOB NUMBER			
PLOTTED BY	WeisgeB						
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PROJ. ENGR.							
REGIONAL ADM.		REVISION	DATE	BY			

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12 - Raised Intersection

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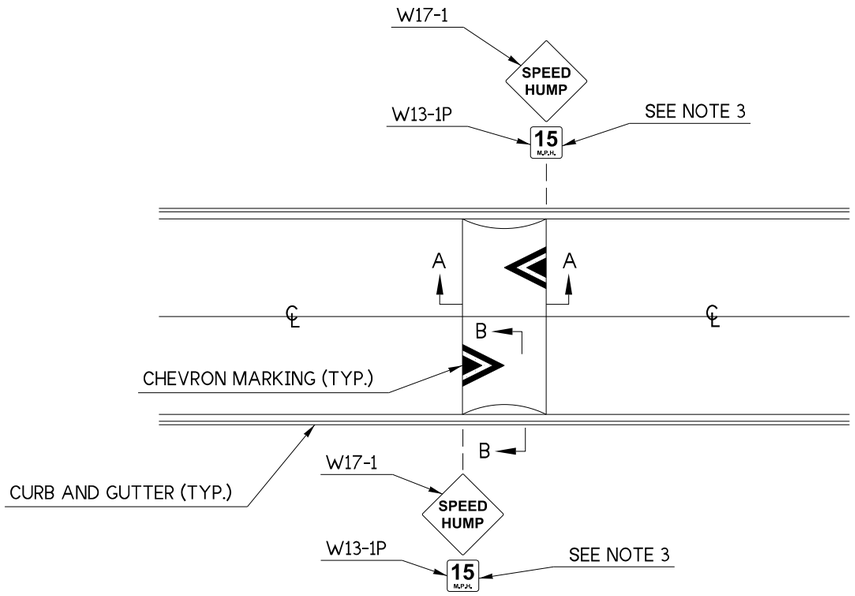
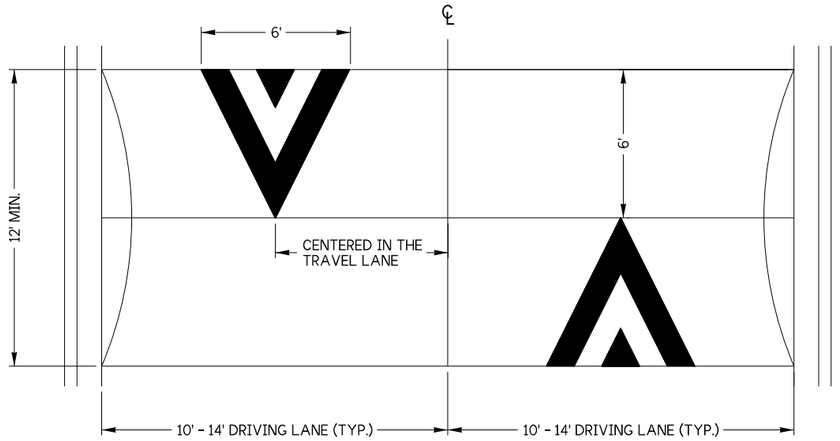


SPEED HUMP MARKING AND SIGNING



MARKING DETAIL

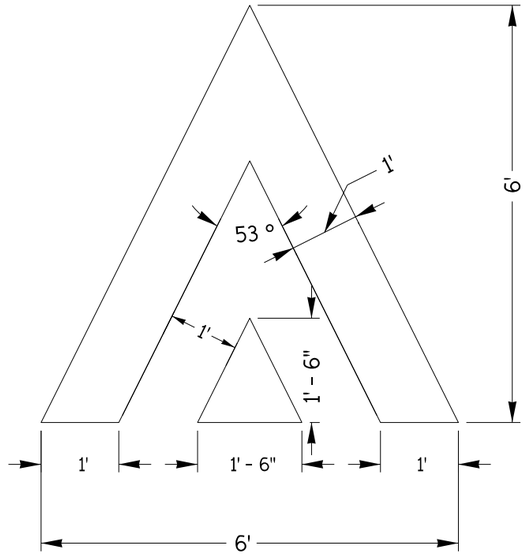
NOTES

1. SAWCUT OR FEATHER GRIND TO KEY IN SPEED HUMP. SEE SECTION A-A.

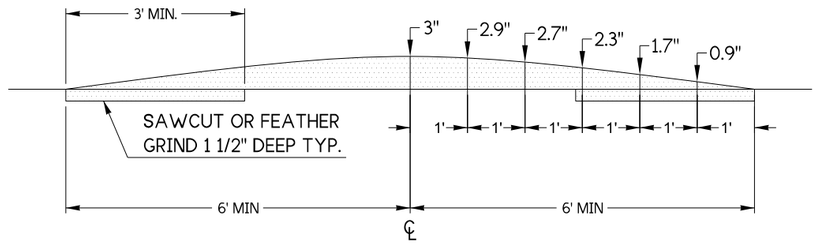
2. SIGN LOCATIONS TO BE VERIFIED BY THE ENGINEER PRIOR TO INSTALLATION.

3. FOR A SERIES OF SPEED HUMPS IN CLOSE PROXIMITY, THE ADVISORY SPEED PLAQUE MAY BE ELIMINATED ON ALL BUT THE FIRST SPEED BUMP SIGN IN THE SERIES FOR EACH DIRECTION OF TRAVEL.

4. SPEED HUMP MAY ALSO BE DESIGNED WITH A SINUSOIDAL, CIRCULAR, OR STRAIGHT PROFILE. SPEED HUMP MAY BE A MAXIMUM OF 4" HIGH.

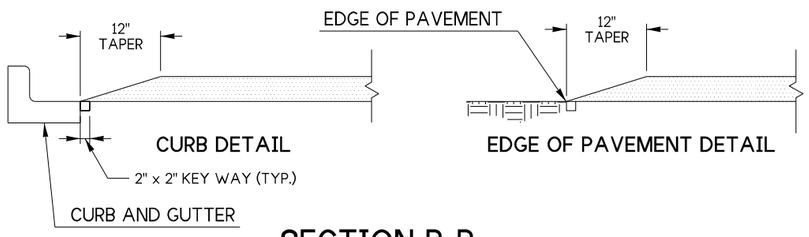


CHEVRON DETAIL



SECTION A-A PARABOLIC

SEE NOTE 4



SECTION B-B

FILE NAME	13 - Speed Hump.dgn				REGION NO. 10	STATE WASH	FED. AID PROJ. NO.
TIME	3:57:13 PM				JOB NUMBER		
DATE	12/11/2023						
PLOTTED BY	WeisgeB						
DESIGNED BY							
ENTERED BY							
CHECKED BY					CONTRACT NO.		LOCATION NO.
PROJ. ENGR.							
REGIONAL ADM.		REVISION	DATE	BY			

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13 - Speed Hump

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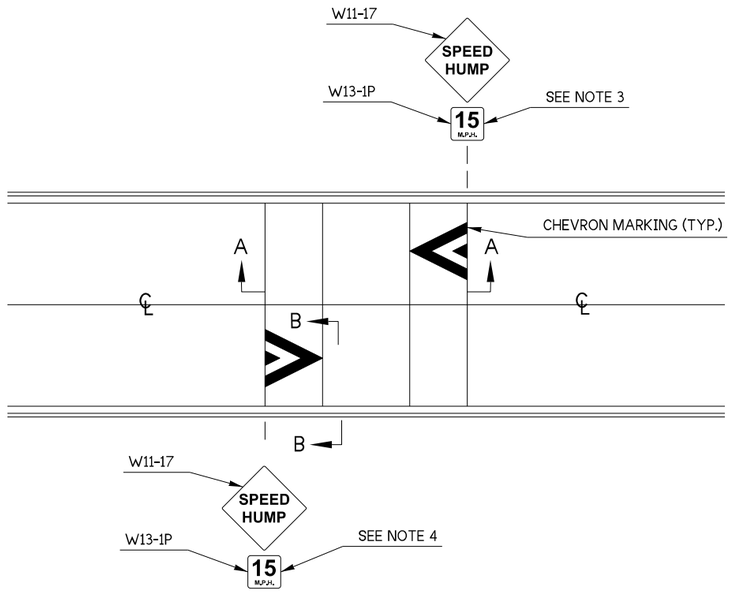
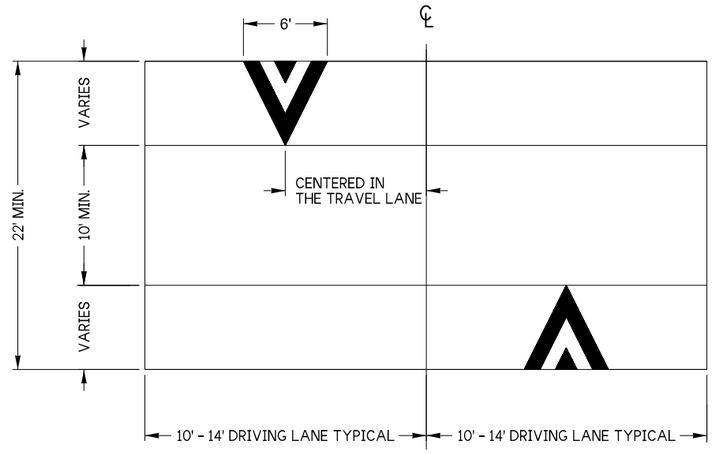


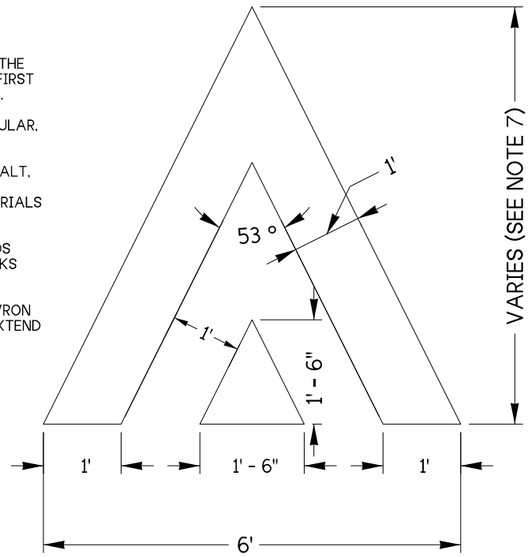
SPEED TABLE MARKING AND SIGNING



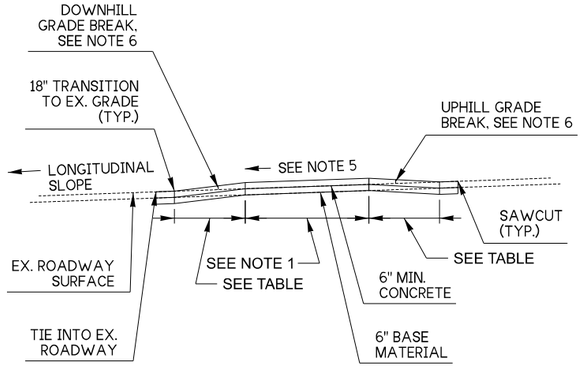
MARKING DETAIL

NOTES

1. SAWCUT OR FEATHER GRIND TO KEY IN SPEED HUMP. SEE SECTION A-A.
2. SIGN LOCATIONS TO BE VERIFIED BY THE ENGINEER PRIOR TO INSTALLATION.
3. FOR A SERIES OF SPEED HUMPS OR TABLES IN CLOSE PROXIMITY, THE ADVISORY SPEED PLAQUE MAY BE ELIMINATED ON ALL BUT THE FIRST SPEED BUMP SIGN IN THE SERIES FOR EACH DIRECTION OF TRAVEL.
4. SPEED TABLE MAY ALSO BE DESIGNED WITH A SINUSOIDAL, CIRCULAR, OR STRAIGHT PROFILE.
5. 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.
6. DETERMINE GRADE BREAKS BASED ON EXISTING ROADWAY SPEEDS AND DESIRED SPEED REDUCTION. GENERALLY HIGHER GRADE BREAKS CORRESPOND TO HIGHER SPEED REDUCTION.
7. 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.

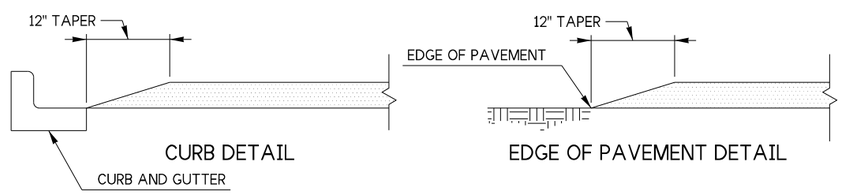


CHEVRON DETAIL



SECTION A-A

ROADWAY LONGITUDINAL SLOPE	APPROACH RAMP LENGTH			
	5-6% GRADE BREAK		8-10% GRADE BREAK	
	UPHILL	DOWNHILL	UPHILL	DOWNHILL
0%	5.0'-5.5' (3.0'-4.0')	5.0'-5.5' (3.0'-4.0')	3.0'-3.5' (2.0'-2.5')	3.0'-3.5' (2.0'-2.5')
2%	5.0'-5.5' (3.0'-4.0')	5.0'-5.5' (3.0'-4.0')	3.0'-3.5' (2.0'-2.5')	3.0'-3.5' (2.0'-2.5')
4%	5.0'-5.5' (3.0'-4.0')	8.0'-10.0' (6.5'-7.5')	3.0'-3.5' (2.0'-2.5')	5.0'-6.0' (4.0'-5.0')
6%	5.0'-5.5' (3.0'-4.0')	11.0'-13.5' (9.5'-11.5')	3.0'-3.5' (2.0'-2.5')	6.5'-8.5' (5.5'-7.0')



SECTION B-B

FILE NAME	14 - Speed Table.dgn			
TIME	3:57:16 PM			
DATE	12/11/2023			
PLOTTED BY	WeisgeB			
DESIGNED BY				
ENTERED BY				
CHECKED BY				
PROJ. ENGR.				
REGIONAL ADM.		REVISION	DATE	BY

REGION NO.	STATE	FED. AID PROJ. NO.
10	WASH	
JOB NUMBER		
CONTRACT NO.		LOCATION NO.

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14 - Speed Table

PLAN REF NO

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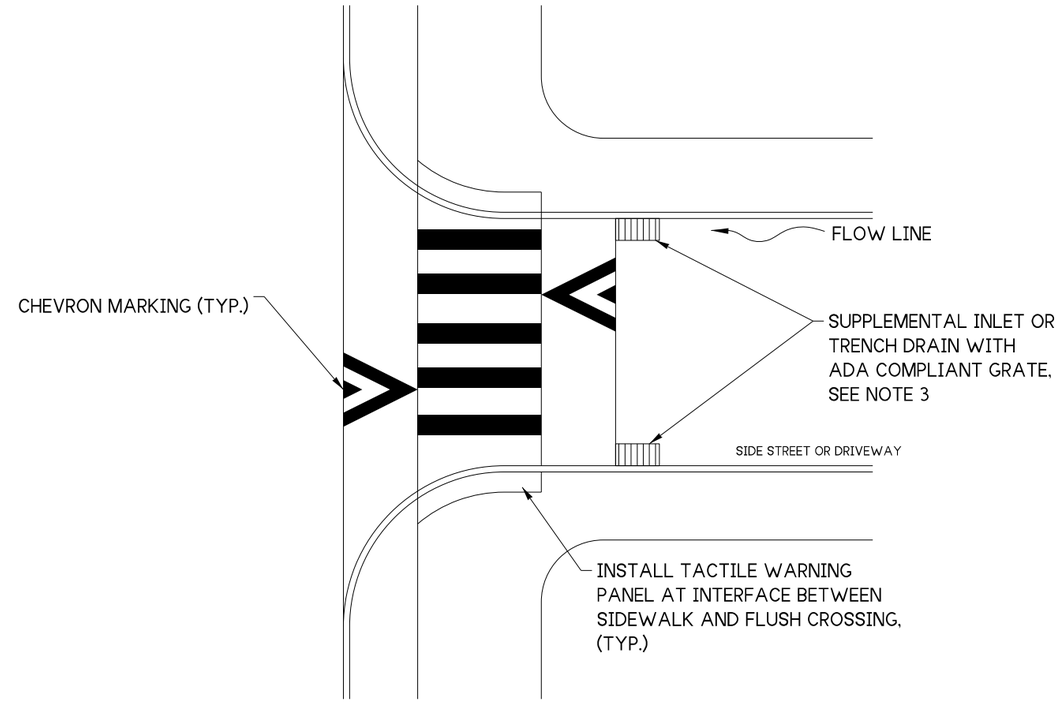

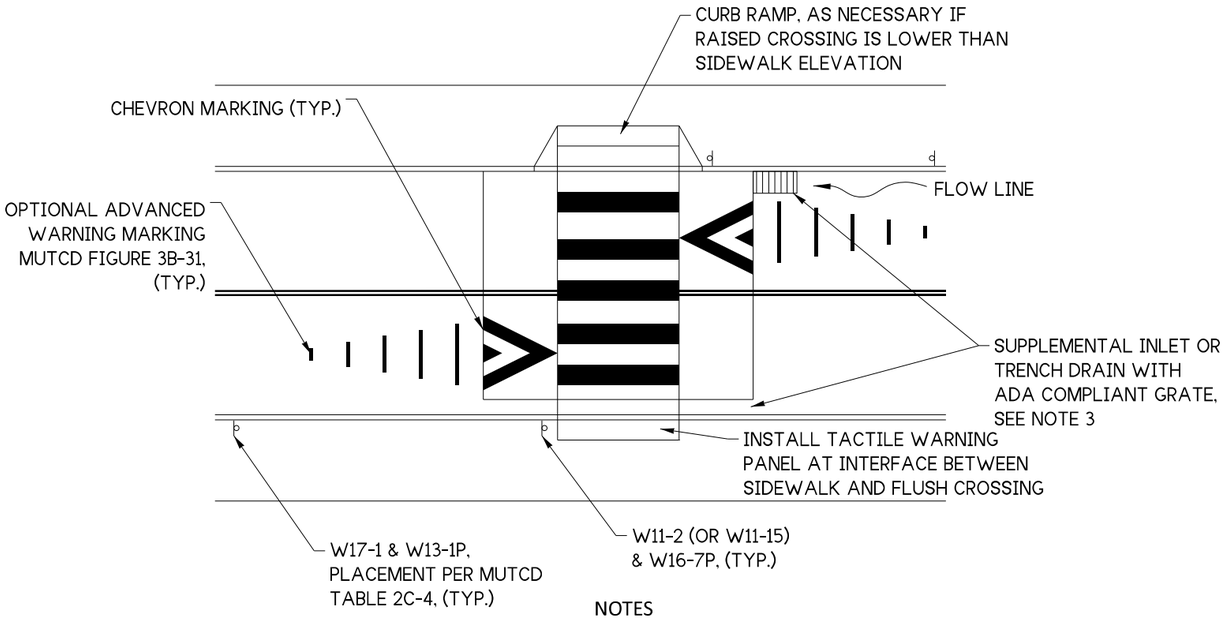

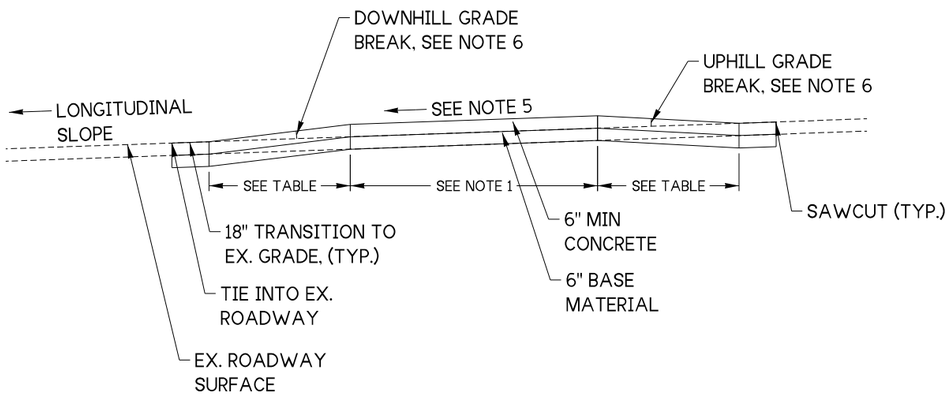

ROADWAY LONGITUDINAL SLOPE	APPROACH RAMP LENGTH			
	5-6% GRADE BREAK		8-10% GRADE BREAK	
	UPHILL	DOWNHILL	UPHILL	DOWNHILL
0%	5.0'-5.5' (3.0'-4.0')	5.0'-5.5' (3.0'-4.0')	3.0'-3.5' (2.0'-2.5')	3.0'-3.5' (2.0'-2.5')
2%	5.0'-5.5' (3.0'-4.0')	5.0'-5.5' (3.0'-4.0')	3.0'-3.5' (2.0'-2.5')	3.0'-3.5' (2.0'-2.5')
4%	5.0'-5.5' (3.0'-4.0')	8.0'-10.0' (6.5'-7.5')	3.0'-3.5' (2.0'-2.5')	5.0'-6.0' (4.0'-5.0')
6%	5.0'-5.5' (3.0'-4.0')	11.0'-13.5' (9.5'-11.5')	3.0'-3.5' (2.0'-2.5')	6.5'-8.5' (5.5'-7.0')

NOTES

1. MATCH THE WIDTH OF THE TOP OF RAISED CROSSWALKS WITH THE WIDTH OF THE CONNECTING SIDEWALK, SHARED USE PATH, OR DESIRED CROSSWALK, BUT NOT LESS THAN 10' IN WIDTH.
2. 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.
3. WHERE POSITIVE DRAINAGE CANNOT BE ACHIEVED, INSTALL SUPPLEMENTAL DRAIN INLET AND CONNECT TO EXISTING STORMWATER CONVEYANCE SYSTEM OR PROVIDE TRENCH DRAIN WITH ADA COMPLIANT GRATE COVER.
4. PER THE PUBLIC RIGHT-OF-WAY ACCESSIBILITY GUIDELINES, CROSSWALK GRADE SHOULD BE NO GREATER THAN 5%, HOWEVER, WHERE ROADWAY DESIGN REQUIRES SUPERELEVATION GREATER THAN 5% AT THE LOCATION OF A CROSSWALK, THE GRADE OF THE CROSSWALK MAY BE THE SAME AS THE SUPERELEVATION.
5. PER THE PUBLIC RIGHT-OF-WAY ACCESSIBILITY GUIDELINES, CROSSWALK CROSS SLOPE SHOULD NOT EXCEED 2.1% AT STOP OR YIELD CONTROLLED INTERSECTIONS, 5% AT UNCONTROLLED, SIGNALIZED, OR PEDESTRIAN HYBRID BEACON LOCATIONS AND SHALL NOT EXCEED STREET GRADES AT MIDBLOCK OR ROUNDABOUTS.
6. DETERMINE GRADE BREAKS BASED ON EXISTING ROADWAY SPEEDS AND DESIRED SPEED REDUCTION, GENERALLY HIGHER GRADE BREAKS CORRESPOND TO HIGHER SPEED REDUCTION.

FILE NAME	15 - Raised Crosswalk.dgn			
TIME	3:57:19 PM			
DATE	12/11/2023			
PLOTTED BY	WeisgeB			
DESIGNED BY				
ENTERED BY				
CHECKED BY				
PROJ. ENGR.				
REGIONAL ADM.		REVISION	DATE	BY

REGION NO. 10 | STATE WASH | FED. AID PROJ. NO.
JOB NUMBER
CONTRACT NO. | LOCATION NO.

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15 - Raised Crosswalk

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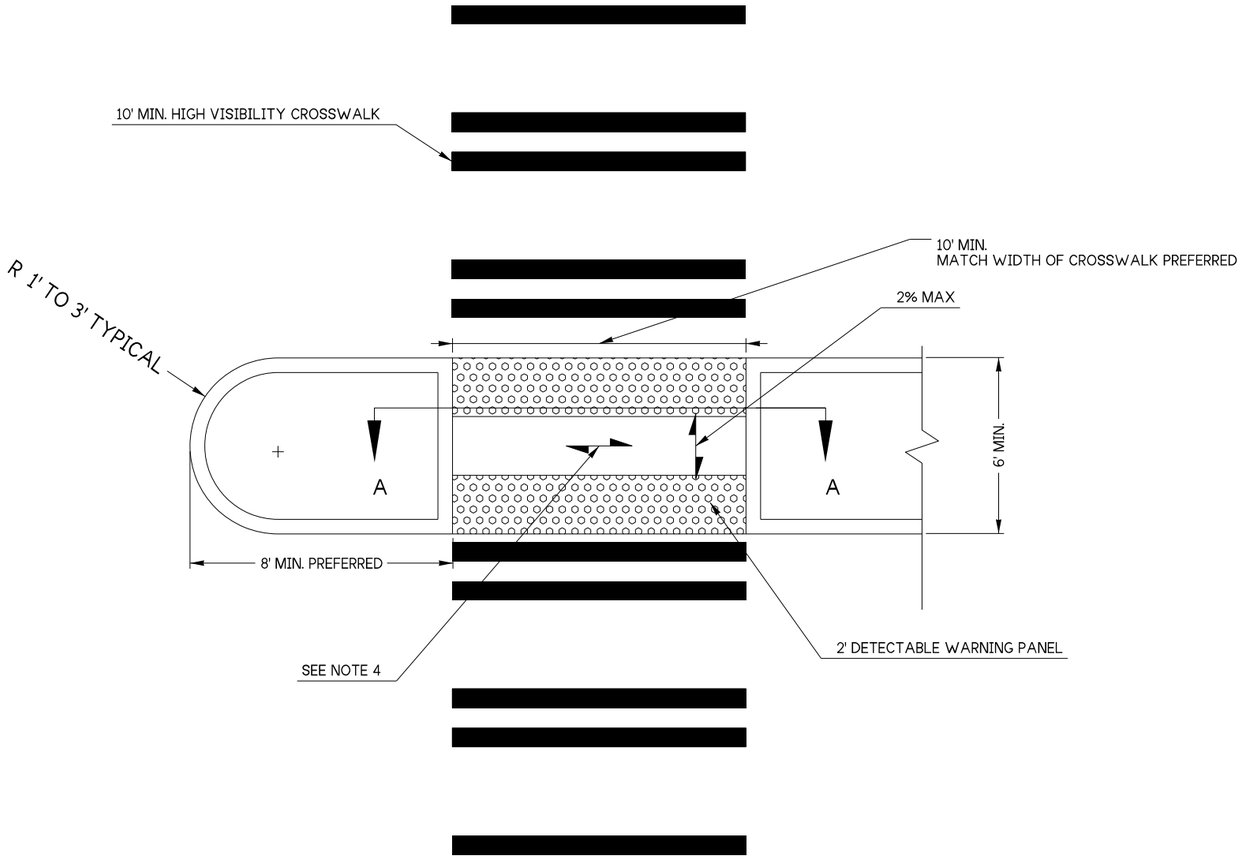
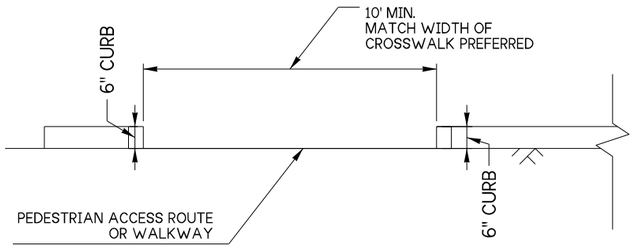
NOTE

1. LANDSCAPING FOR ISLANDS SHALL MAINTAIN SIGHTLINES FOR ALL VEHICLE MOVEMENTS.
2. ALLOW FOR DESIGN VEHICLE TURNING MOVEMENT AROUND NOSE OF ISLAND AT INTERSECTION.
3. PROVIDE A LONGITUDINAL SLOPE FOR THE PEDESTRIAN PATH THROUGH THE ISLAND NOT TO EXCEED 2% (1.5% PREFERRED).
4. PER THE PUBLIC RIGHT-OF-WAY ACCESSIBILITY GUIDELINES, 2.1% MAX AT STOP OR YIELD CONTROLLED INTERSECTIONS. 5% MAX AT UNCONTROLLED, SIGNALIZED, OR PEDESTRIAN HYBRID BEACON LOCATIONS. SHALL NOT EXCEED STREET GRADES AT MIDBLOCK LOCATIONS OR ROUNDABOUTS.





SECTION A-A

FILE NAME	17 - Pedestrian Refuge Island.dgn			
TIME	3:57:23 PM			
DATE	12/11/2023			
PLOTTED BY	WeisgeB			
DESIGNED BY				
ENTERED BY				
CHECKED BY				
PROJ. ENGR.				
REGIONAL ADM.		REVISION	DATE	BY

REGION NO. 10 | STATE WASH | JOB NUMBER | CONTRACT NO. | FED. AID PROJ. NO. | LOCATION NO.

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17 - Pedestrian Refuge Island

PLAN REF NO

SHEET 18 OF 52 SHEETS

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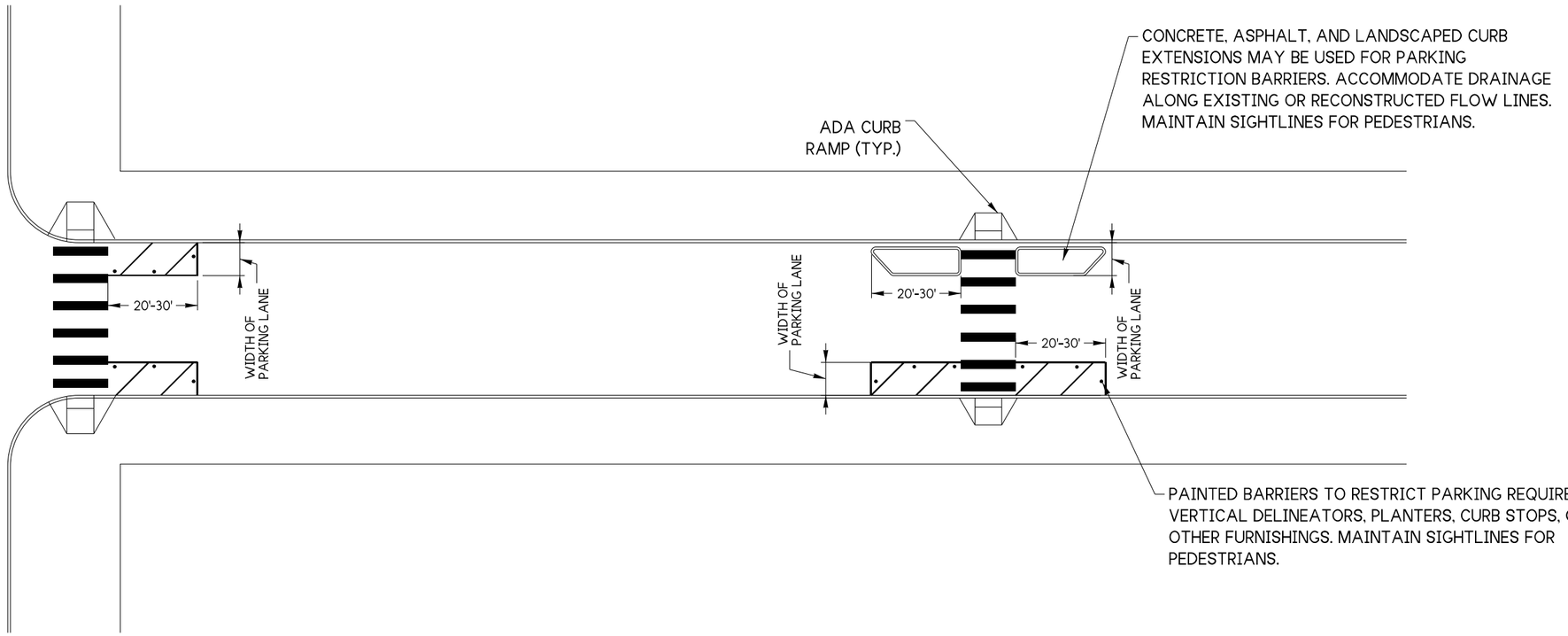

PHYSICAL BARRIER TO RESTRICT PARKING
AT INTERSECTION CROSSINGS

PHYSICAL BARRIER TO RESTRICT PARKING
AT MIDBLOCK CROSSINGS

FILE NAME	18 - Physical Barrier.dgn			REGION NO.	STATE	FED. AID PROJ. NO.	WSDOT		PLAN REF NO
TIME	3:57:26 PM			10	WASH			WSDOT Active Transportation Programs Design Guide Plan Sheet Details	
DATE	12/11/2023			JOB NUMBER			PRELIMINARY PLAN		SHEET 19 OF 52 SHEETS
PLOTTED BY	WeisgeB							18 - Physical Barrier to Restrict Parking Near Crossing	
DESIGNED BY				CONTRACT NO.		LOCATION NO.			
ENTERED BY									
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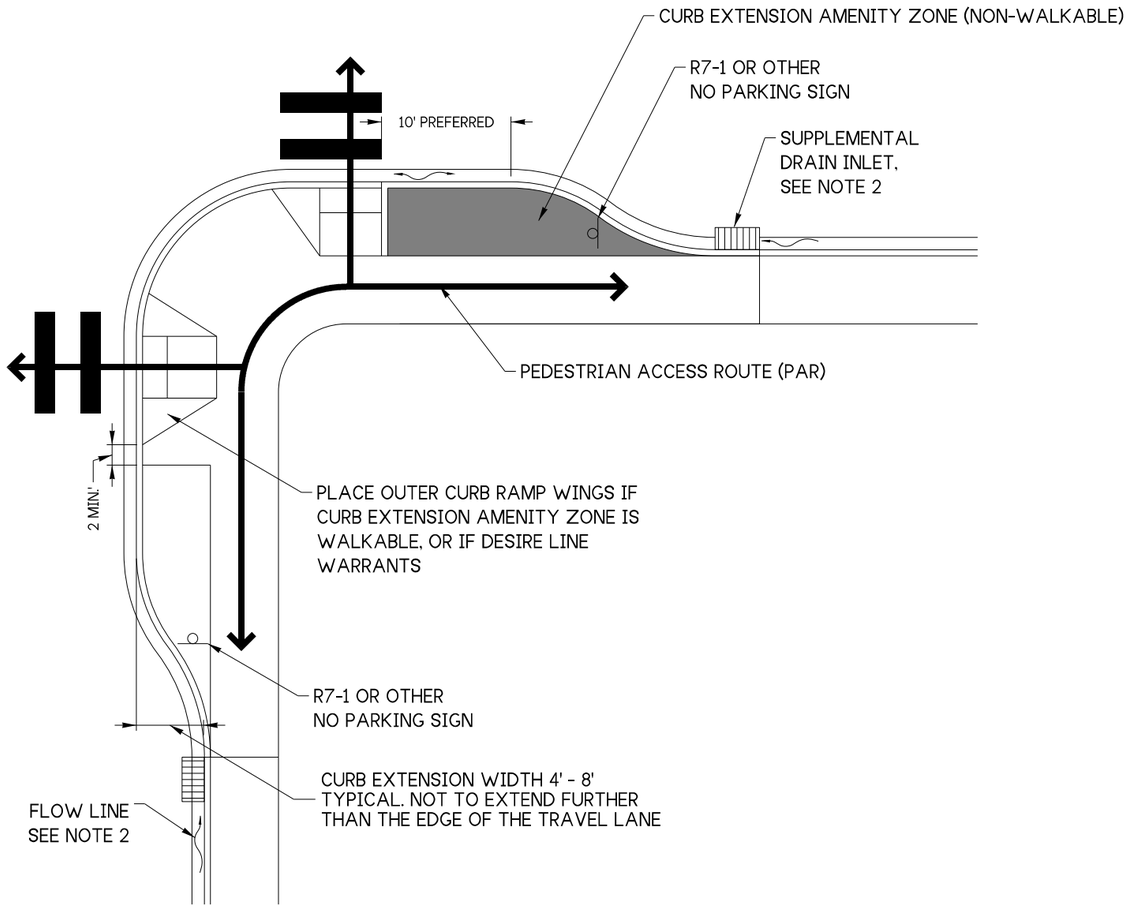

NOTES

1. APPROXIMATE LOCATION OF CROSSWALK, SIDEWALK, AND CURB RAMPS SHOWN.

2. STREET SECTION SHALL BE REVIEWED FOR IMPACTS OF PROPOSED CURB EXTENSION GEOMETRY AND ELEVATIONS, INCLUDING INTERFACE WITH EXISTING STREET CROSS SECTION. INSTALLATION OF CURB EXTENSION CAN AFFECT DRAINAGE CAPACITY.

3. THE REVERSE CURVES AT EACH END OF THE PARKING POCKET SHALL BE TANGENT TO EACH OTHER AND EACH CURB SHALL BE TANGENT WITH THE CURB LINE CONTINUING IN EACH DIRECTION.

4. THE LENGTH OF THE EXTENSION IS MEASURED AS 20' FROM THE CLOSEST EDGE OF THE CROSSWALK, WHICH IS TYPICALLY DEFINED AS THE CLOSEST POINT OF THE CURB RAMP THROAT OR THE MARKED CROSSWALK WHEN PRESENT.

5. IF THERE IS AN EXISTING OR PROPOSED BUS STOP OR DRIVEWAY AT THE CORNER, INCREASE THE LENGTH OF THE EXTENSION TO ACCOMMODATE THE FULL LENGTH OF THE BUS STOP/DRIVEWAY.

6. LIMITS OF STREET CUT AND PATCHING SHALL BE SET TO ENSURE THAT THE PEDESTRIAN ACCESS ROUTE (PAR) WITHIN THE STREET (THE CROSSWALK) IS NOT ADVERSELY AFFECTED BY CAUSING ANY PAR DESIGN ELEMENTS TO BE EXCEEDED.

7. CURB EXTENSIONS MAY BE INSTALLED WITH PAINT AND POST OR CURB DETACHED WITH A DRAINAGE CHANNEL IN PLACE OF ATTACHED CURB EXTENSIONS. DESIGN WITH THE KEY DIMENSIONS SHOWN.

FILE NAME	19 - Curb Extension.dgn				REGION NO.	STATE	FED. AID PROJ. NO.	PLAN REF NO
TIME	3:57:29 PM				10	WASH		
DATE	12/11/2023				JOB NUMBER			
PLOTTED BY	WeisgeB							SHEET 20 OF 52 SHEETS
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CHECKED BY					CONTRACT NO.		LOCATION NO.	
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REGIONAL ADM.		REVISION	DATE	BY				

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19 - Curb Extension

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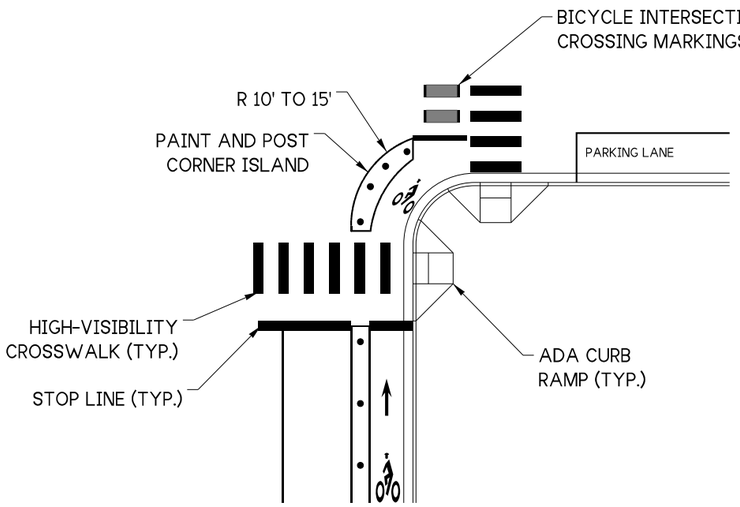
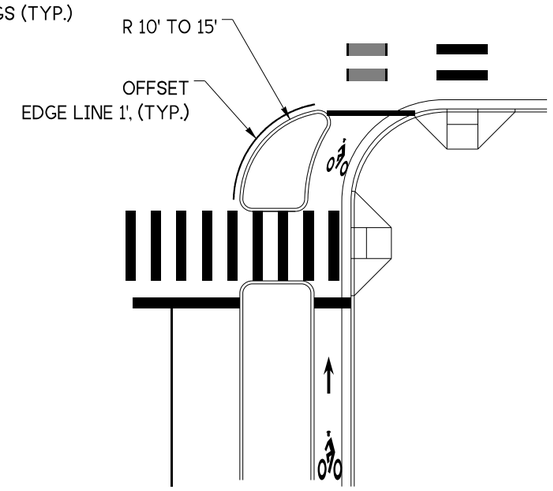
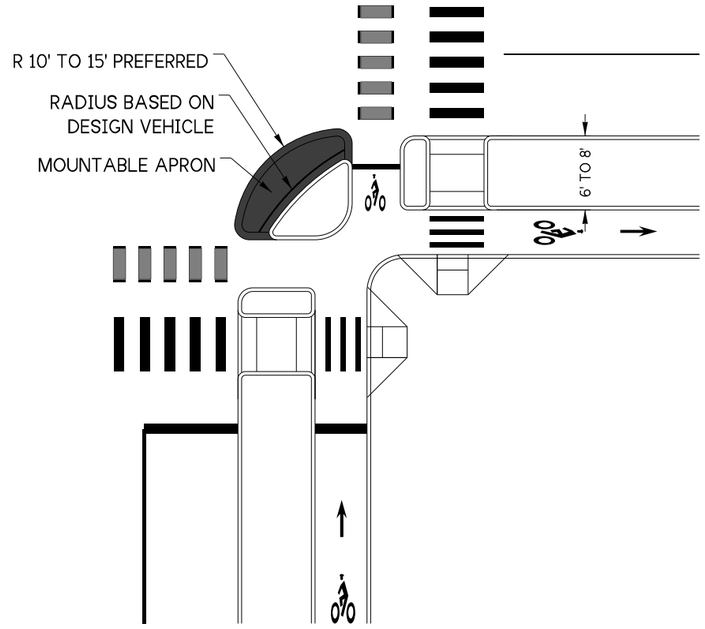


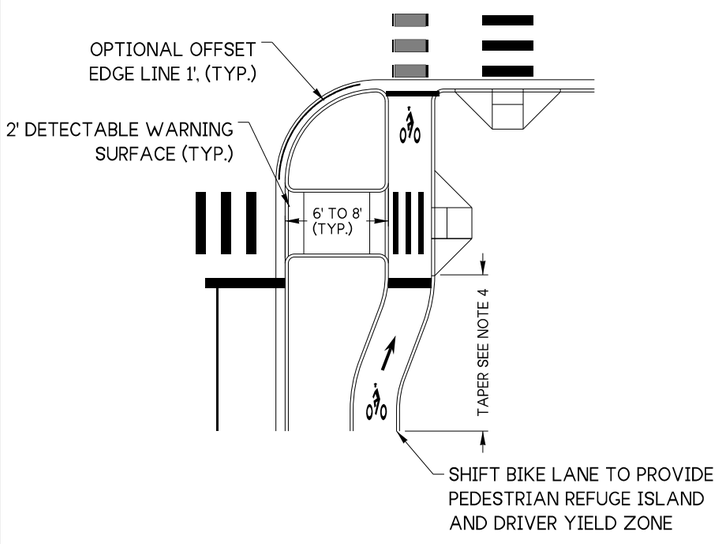
RETROFIT PROTECTED CORNER ISLAND WITH PAINT AND POST



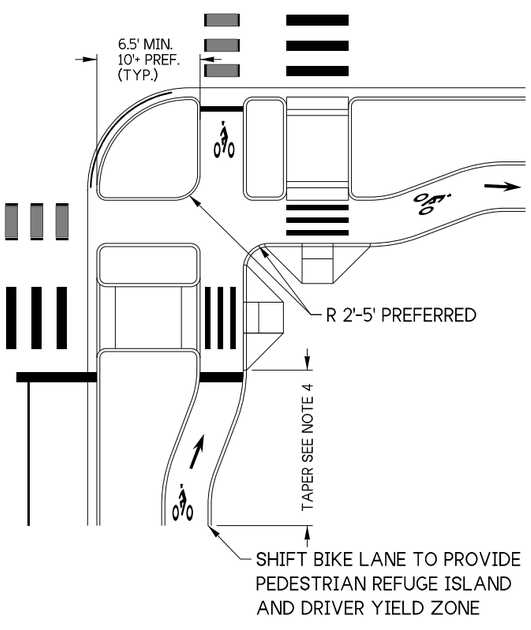
RETROFIT PROTECTED CORNER ISLAND WITH CONCRETE



RECONSTRUCTED PROTECTED CORNER ISLAND WITH CONCRETE AND MOUNTABLE APRON



RECONSTRUCTED PROTECTED CORNER ISLAND WITH CONCRETE



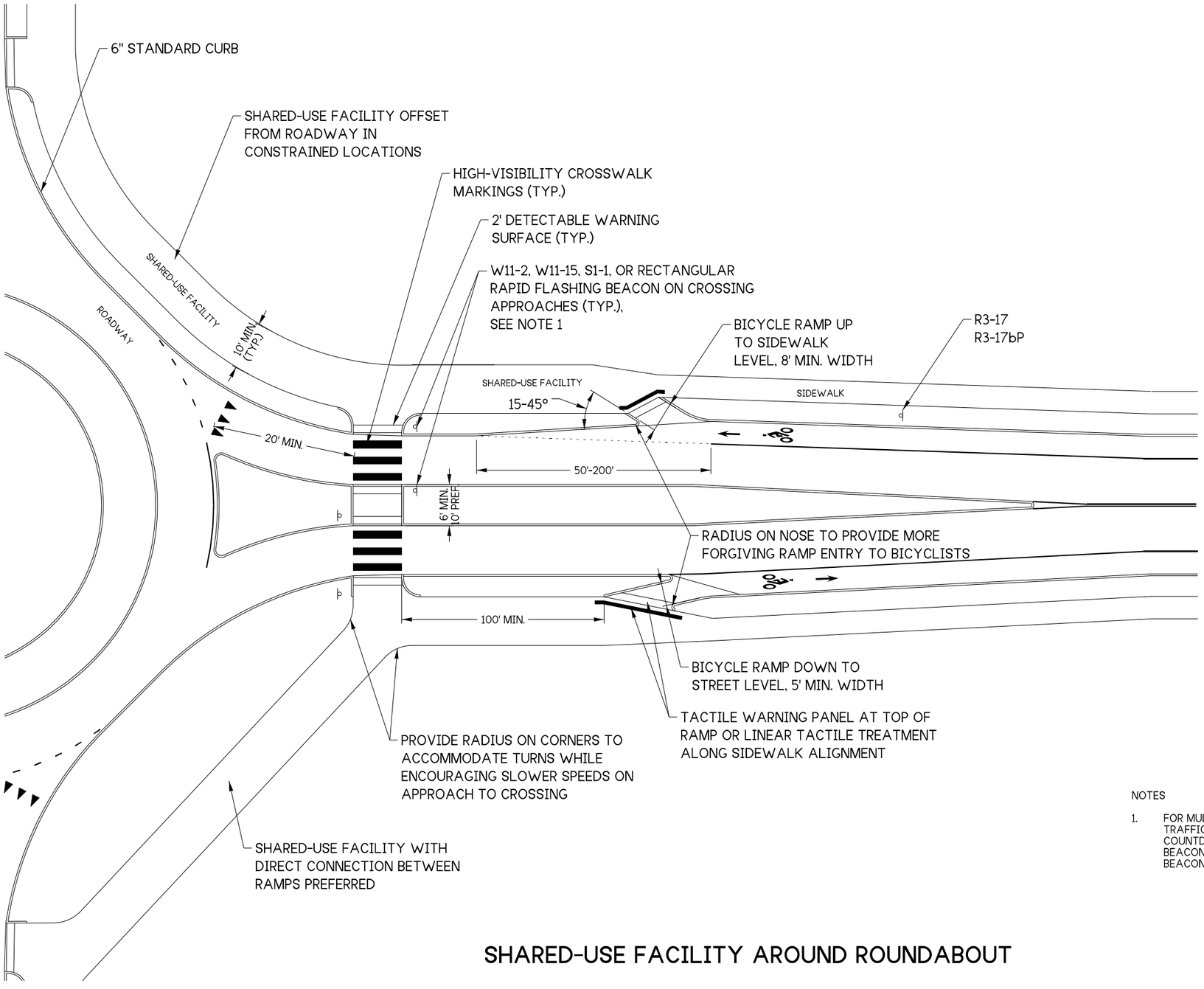
RECONSTRUCTED PROTECTED CORNER ISLAND WITH CONCRETE AT INTERSECTION OF BIKE FACILITIES

NOTES

1. CONSULT DESIGN PLANS FOR VARIATIONS.
2. SIZE AND SHAPE OF CORNER TREATMENTS ARE DEPENDENT ON INTERSECTION CHARACTERISTICS
3. 6' BIKE LANE WIDTH PREFERRED, 5' MIN.
4. BIKE LANE TAPERS PREFERRED AT 7:1 SHIFT, MINIMUM 3:1 SHIFT IN CONSTRAINED LOCATIONS WHERE BIKE SPEED IS ≤ 13 MPH.

FILE NAME	20 - Protected Intersection.dgn			REGION NO.	STATE	FED. AID PROJ. NO.	WSDOT	PLAN REF NO
TIME	3:57:32 PM			10	WASH			
DATE	12/11/2023			JOB NUMBER			PRELIMINARY PLAN	WSDOT Active Transportation Programs Design Guide Plan Sheet Details
PLOTTED BY	WeisgeB							SHEET 21 OF 52 SHEETS
DESIGNED BY				CONTRACT NO.		LOCATION NO.		
ENTERED BY								
CHECKED BY								
PROJ. ENGR.								
REGIONAL ADM.		REVISION	DATE	BY			DATE P.E. STAMP BOX - SEE SHEET CT1 FOR SIGNATURE	DATE P.E. STAMP BOX - SEE SHEET CT1 FOR SIGNATURE

20 - Protected Intersection for Linear Bicycle Facilities



NOTES

1. FOR MULTILANE ROUNDABOUTS, PROVIDE A TRAFFIC CONTROL SIGNAL WITH PEDESTRIAN COUNTDOWN SIGNAL, A PEDESTRIAN HYBRID BEACON, A RECTANGULAR RAPID FLASHING BEACON, OR RAISED CROSSWALK FOR EACH LEG.

SHARED-USE FACILITY AROUND ROUNDABOUT

FILE NAME	21 - Roundabout.dgn				REGION NO.	STATE	FED. AID PROJ. NO.	PLAN REF NO.
TIME	3:57:38 PM				10	WASH		
DATE	12/11/2023				JOB NUMBER			
PLOTTED BY	WeisgeB							SHEET 22 OF 52 SHEETS
DESIGNED BY								
ENTERED BY					CONTRACT NO.		LOCATION NO.	
CHECKED BY								
PROJ. ENGR.								
REGIONAL ADM.		REVISION	DATE	BY				

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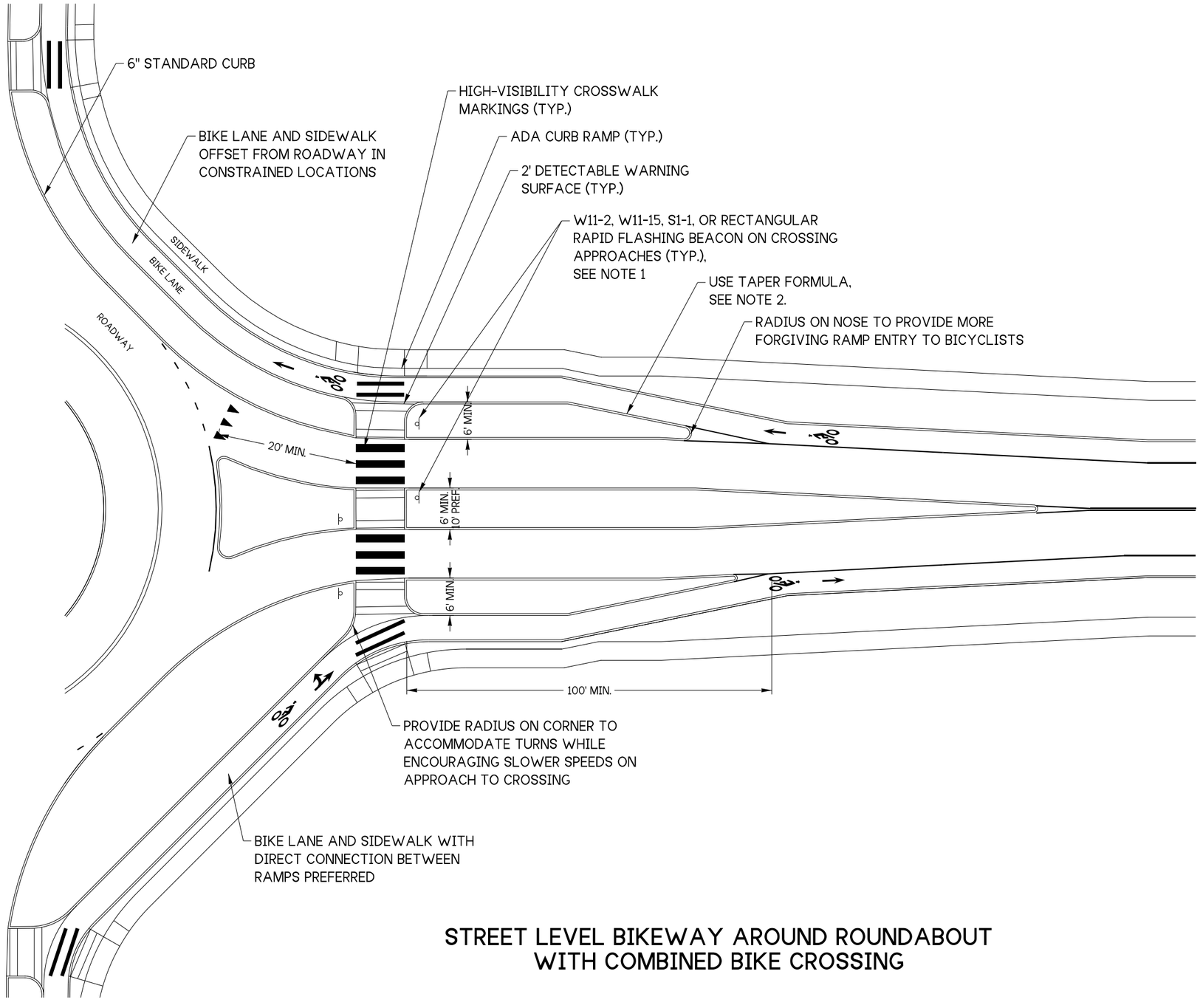
21 - Roundabout with Pedestrian-Bicyclist Facilities and Crossings



NOTES

1. FOR MULTILANE ROUNDABOUTS, PROVIDE A TRAFFIC CONTROL SIGNAL WITH PEDESTRIAN COUNTDOWN SIGNAL, A PEDESTRIAN HYBRID BEACON, A RECTANGULAR RAPID FLASHING BEACON, OR RAISED CROSSWALK FOR EACH LEG.
2. BIKE LANE TAPERS PREFERRED AT 7:1 SHIFT, MINIMUM 3:1 SHIFT IN CONSTRAINED LOCATIONS WHERE BIKE SPEED IS ≤13 MPH.

STREET LEVEL BIKEWAY AROUND ROUNDABOUT WITH COMBINED BIKE CROSSING

FILE NAME	21 - Roundabout.dgn				REGION NO.	STATE	FED. AID PROJ. NO.		PLAN REF NO
TIME	3:57:38 PM				10	WASH		WSDOT Active Transportation Programs Design Guide Plan Sheet Details	
DATE	12/11/2023				JOB NUMBER				
PLOTTED BY	WeisgeB								SHEET 23 OF 52 SHEETS
DESIGNED BY									
ENTERED BY					CONTRACT NO.		LOCATION NO.		
CHECKED BY									
PROJ. ENGR.							PRELIMINARY PLAN		
REGIONAL ADM.		REVISION	DATE	BY				21 - Roundabout with Pedestrian-Bicyclist Facilities and Crossings	

DATE
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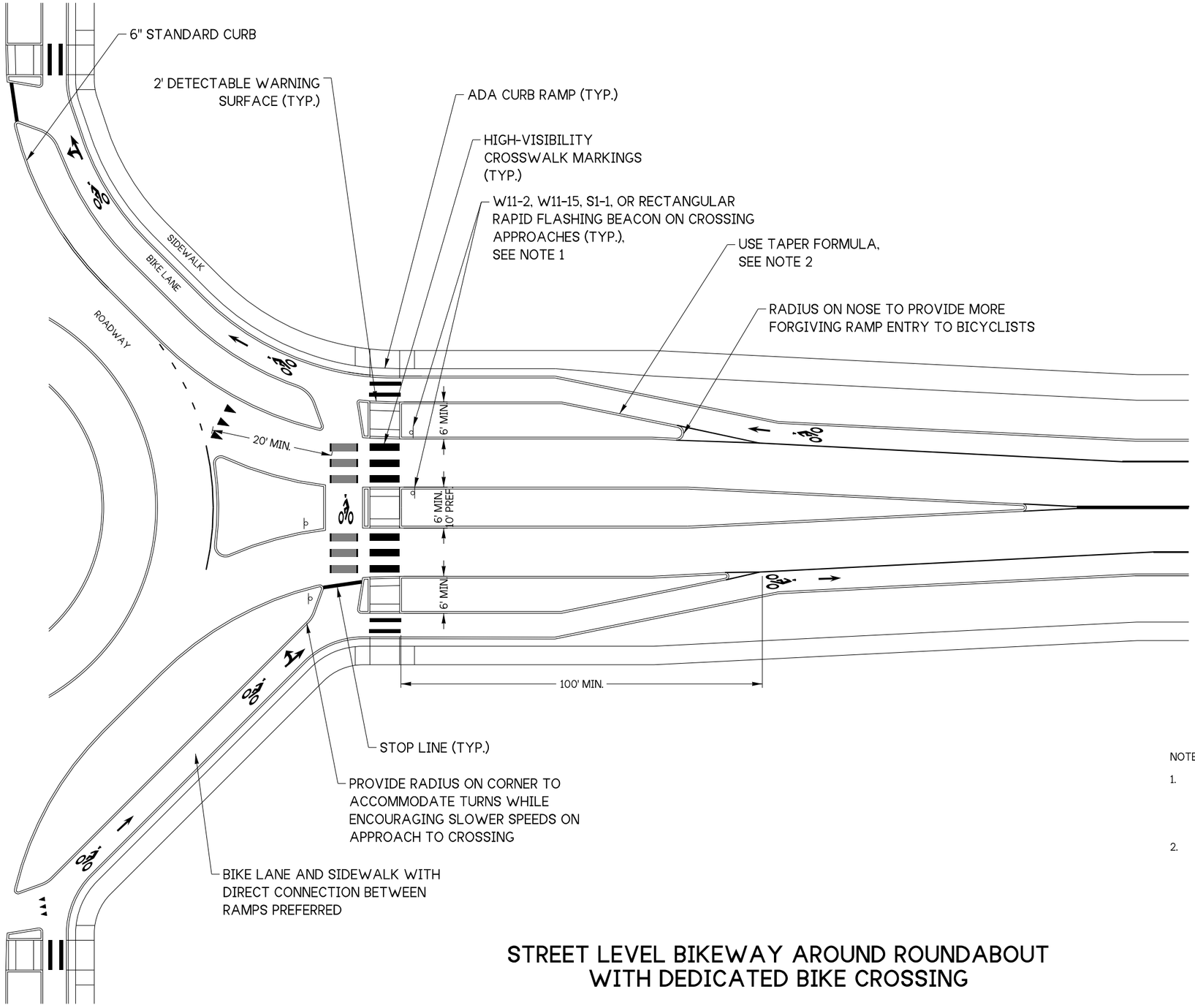
DATE
P.E. STAMP BOX - SEE SHEET CT1 FOR SIGNATURE



NOTES

1. FOR MULTILANE ROUNDABOUTS, PROVIDE A TRAFFIC CONTROL SIGNAL WITH PEDESTRIAN COUNTDOWN SIGNAL, A PEDESTRIAN HYBRID BEACON, A RECTANGULAR RAPID FLASHING BEACON, OR RAISED CROSSWALK FOR EACH LEG.
2. BIKE LANE TAPERS PREFERRED AT 7:1 SHIFT, MINIMUM 3:1 SHIFT IN CONSTRAINED LOCATIONS WHERE BIKE SPEED IS ≤13 MPH.

STREET LEVEL BIKEWAY AROUND ROUNDABOUT WITH DEDICATED BIKE CROSSING

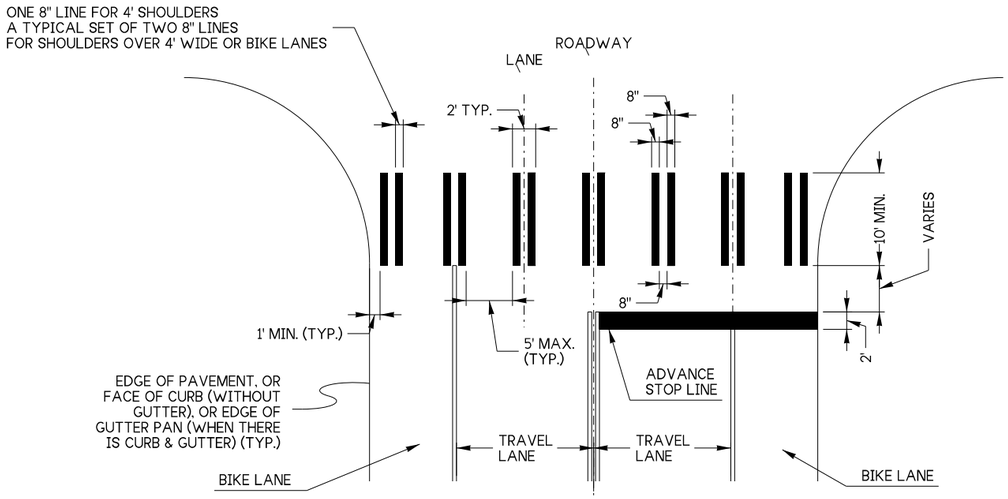
FILE NAME	21 - Roundabout.dgn				REGION NO.	STATE	FED. AID PROJ. NO.		PLAN REF NO
TIME	3:57:38 PM				10	WASH		WSDOT Active Transportation Programs Design Guide Plan Sheet Details	
DATE	12/11/2023				JOB NUMBER				
PLOTTED BY	WeisgeB								SHEET 24 OF 52 SHEETS
DESIGNED BY									
ENTERED BY									
CHECKED BY					CONTRACT NO.		LOCATION NO.		
PROJ. ENGR.									
REGIONAL ADM.		REVISION	DATE	BY				21 - Roundabout with Pedestrian-Bicyclist Facilities and Crossings	

WSDOT

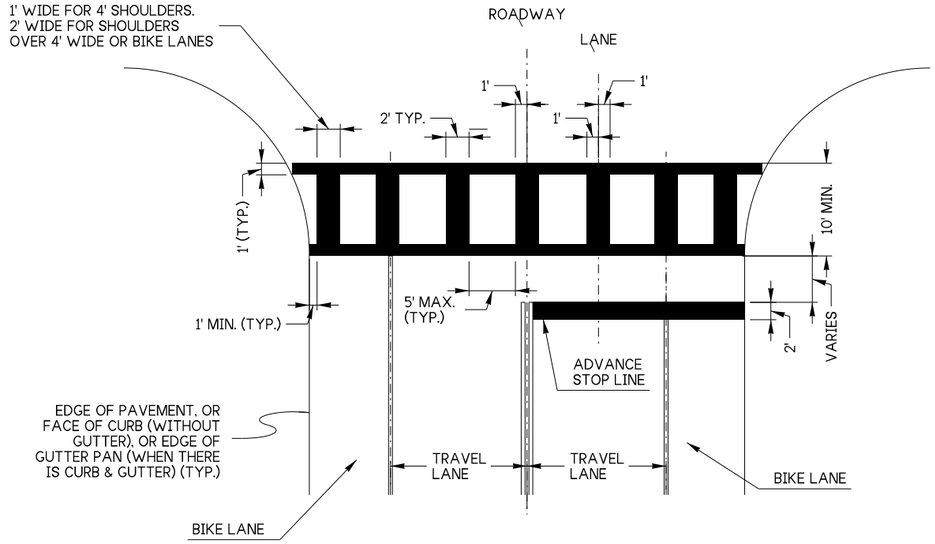
PRELIMINARY PLAN

DATE
P.E. STAMP BOX - SEE SHEET CT1 FOR SIGNATURE

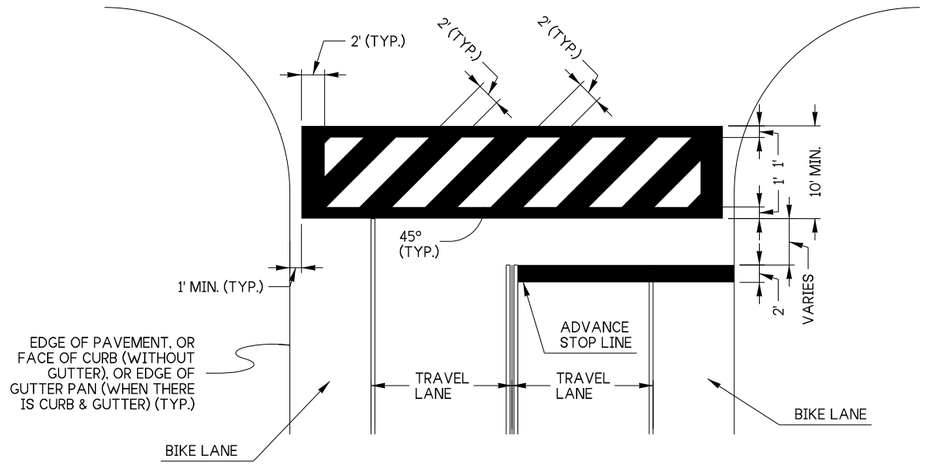
DATE
P.E. STAMP BOX - SEE SHEET CT1 FOR SIGNATURE



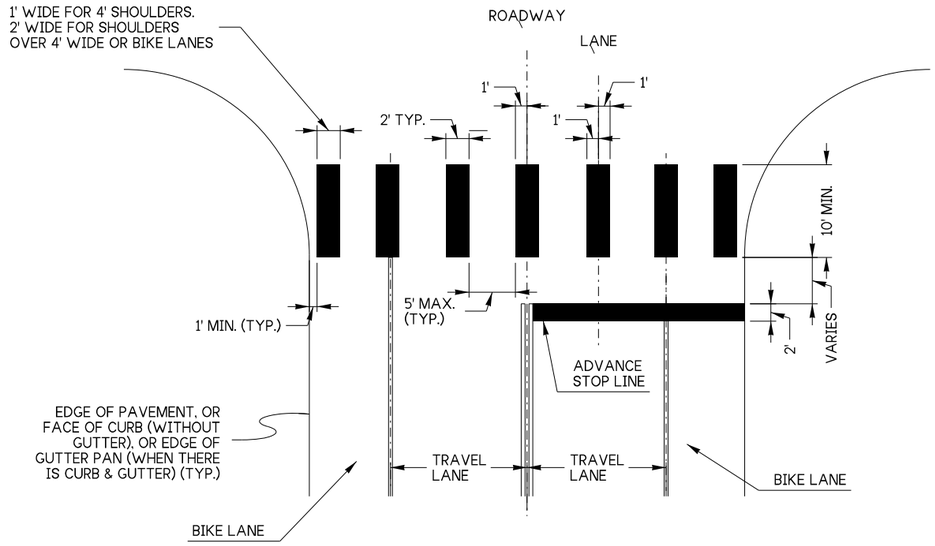
BAR PAIRS DETAIL



CONTINENTAL DETAIL



ZEBRA DETAIL



CONTINENTAL DETAIL

FILE NAME	22 - High-visibility Crosswalk.dgn			
TIME	3:57:42 PM			
DATE	12/11/2023			
PLOTTED BY	WeisgeB			
DESIGNED BY				
ENTERED BY				
CHECKED BY				
PROJ. ENGR.				
REGIONAL ADM.		REVISION	DATE	BY

REGION NO.	STATE	FED. AID PROJ. NO.
10	WASH	
JOB NUMBER		
CONTRACT NO.		LOCATION NO.

WSDOT

PRELIMINARY PLAN

DATE
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DATE
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WSDOT Active Transportation Programs
Design Guide
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22 - High-visibility Crosswalk
Markings

PLAN REF NO

SHEET 25 OF 52 SHEETS

NOTES:

1. FOR PLACEMENT OF ADDITIONAL ENHANCEMENT FEATURES AT HIGH-VISIBILITY CROSSWALKS, REFER TO STOP LINE AT UNCONTROLLED CROSSWALK OR STOP LINE AT CONTROLLED CROSSWALK.

2. FOR SKEWED LONGITUDINAL CROSSWALKS, POSITION THE LINES PARALLEL TO THE TRAFFIC LANE.

3. LOWER LANDING OF CURB RAMP MUST FALL WHOLLY WITHIN CROSSWALK LINES.

4. ANGLE THE CURB RAMP CENTERLINE PERPENDICULAR TO THE CROSSWALK CENTERLINE TO THE MAXIMUM EXTENT POSSIBLE.

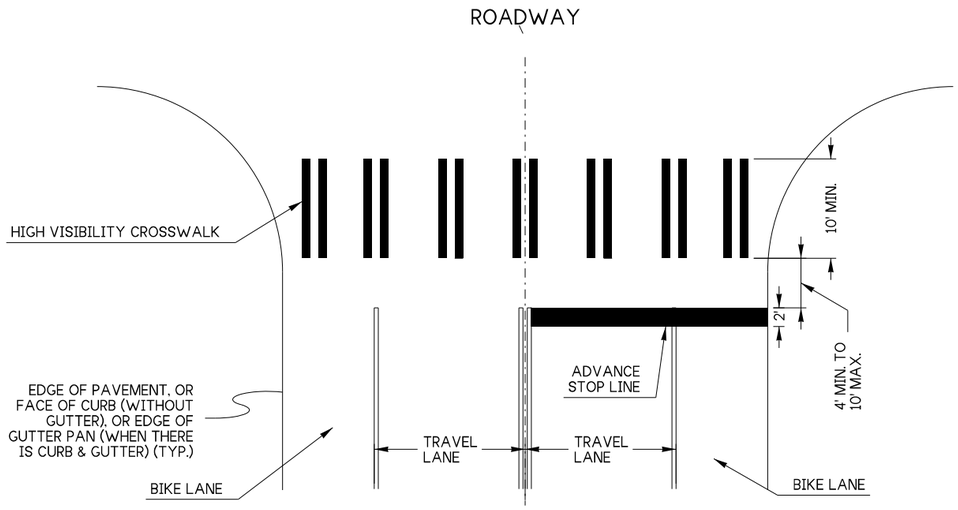
5. PLACE THE CROSSWALK PERPENDICULAR TO THE CENTERLINE OF THE TRAVELED WAY TO THE MAXIMUM EXTENT POSSIBLE.

6. USE RETRO-REFLECTIVE MARKING MATERIALS AND INLAY OR THERMOPLASTIC TAPE.

FILE NAME	22 - High-visibility Crosswalk.dgn			REGION NO.	STATE	FED. AID PROJ. NO.	WSDOT		WSDOT Active Transportation Programs Design Guide Plan Sheet Details
TIME	3:57:42 PM			10	WASH				
DATE	12/11/2023			JOB NUMBER			PRELIMINARY PLAN	DATE P.E. STAMP BOX - SEE SHEET CT1 FOR SIGNATURE	DATE P.E. STAMP BOX - SEE SHEET CT1 FOR SIGNATURE
DESIGNED BY									22 - High-visibility Crosswalk Markings
ENTERED BY									
CHECKED BY				CONTRACT NO.		LOCATION NO.			
PROJ. ENGR.									
REGIONAL ADM.		REVISION	DATE	BY					

PLAN REF NO

SHEET 26 OF 52 SHEETS



STOP-CONTROLLED OR SIGNALIZED CROSSING

FILE NAME	23 - Stop Line Controlled.dgn			
TIME	3:57:45 PM			
DATE	12/11/2023			
PLOTTED BY	WeisgeB			
DESIGNED BY				
ENTERED BY				
CHECKED BY				
PROJ. ENGR.				
REGIONAL ADM.		REVISION	DATE	BY

REGION NO. 10 | STATE WASH | JOB NUMBER | CONTRACT NO. | FED. AID PROJ. NO. | LOCATION NO.

WSDOT

PRELIMINARY PLAN

DATE
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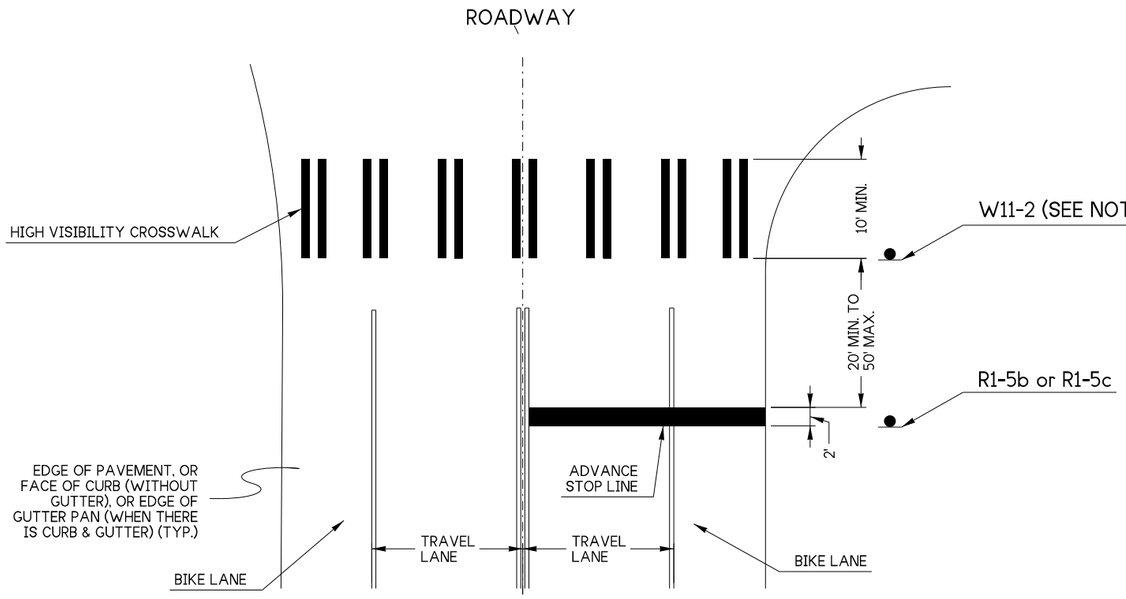
DATE
P.E. STAMP BOX - SEE SHEET CT1 FOR SIGNATURE

WSDOT Active Transportation Programs
Design Guide
Plan Sheet Details

23 - Stop Line at Controlled Crosswalk

PLAN REF NO.

SHEET 27 OF 52 SHEETS



UNCONTROLLED CROSSING

NOTES

1. AT SHARED-USE PATH CROSSINGS, USE A W11-15 IN PLACE OF THE W11-2.
2. AT SCHOOL CROSSINGS, USE A S1-1 SIGN IN PLACE OF THE W11-2.
3. W11-2 SIGN MAY BE SUBSTITUTED WITH A RECTANGULAR RAPID FLASHING BEACON.

FILE NAME	24 - Stop Line Uncontrolled.dgn			
TIME	3:57:49 PM			
DATE	12/11/2023			
PLOTTED BY	WeisgeB			
DESIGNED BY				
ENTERED BY				
CHECKED BY				
PROJ. ENGR.				
REGIONAL ADM.		REVISION	DATE	BY

REGION NO. 10 | STATE WASH | JOB NUMBER | CONTRACT NO. | FED. AID PROJ. NO. | LOCATION NO.

WSDOT

PRELIMINARY PLAN

DATE
P.E. STAMP BOX - SEE SHEET CT1 FOR SIGNATURE

DATE
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WSDOT Active Transportation Programs
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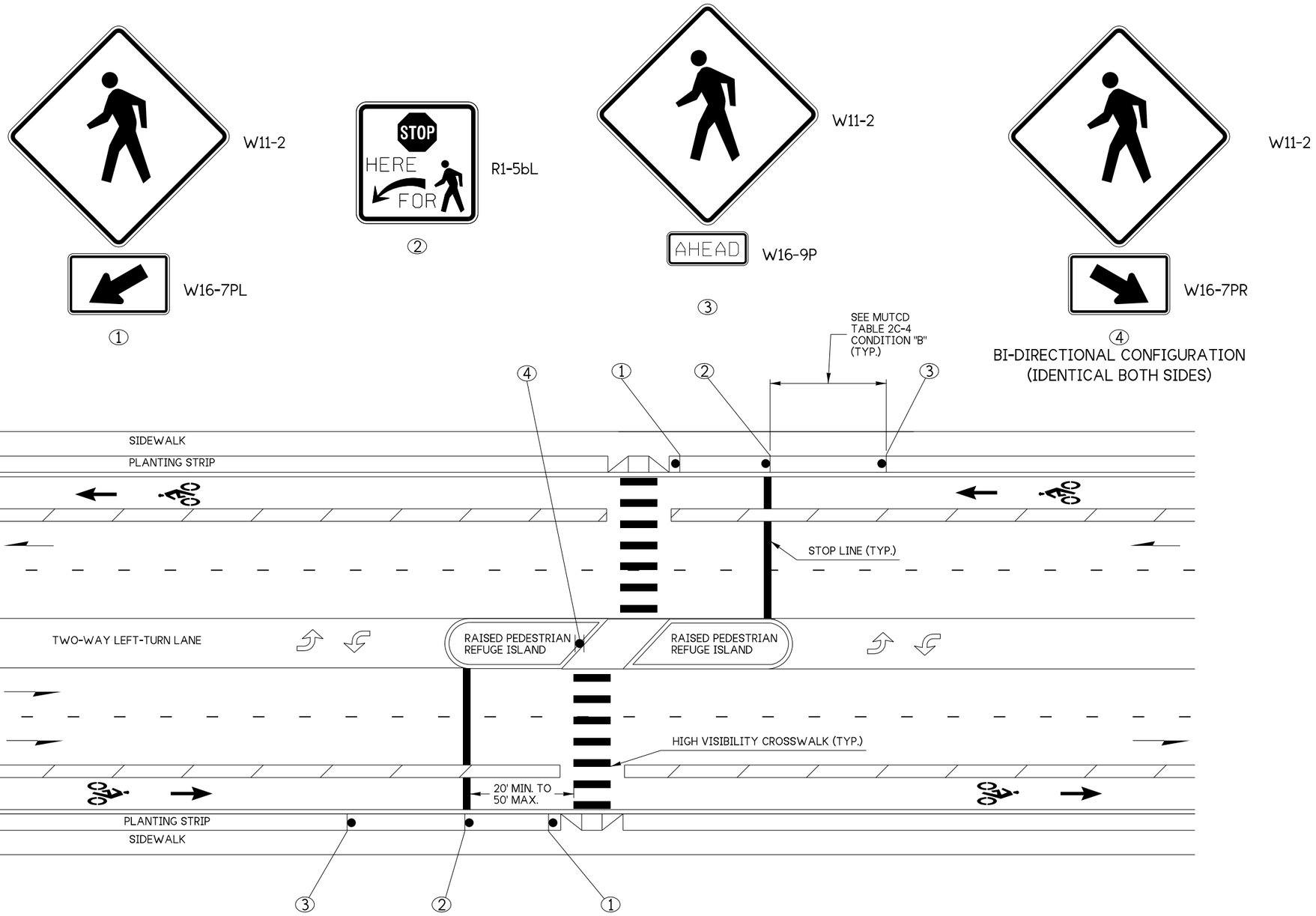
Plan Sheet Details

24 - Stop Line at Uncontrolled Crosswalk

PLAN REF NO

SHEET 28 OF 52 SHEETS

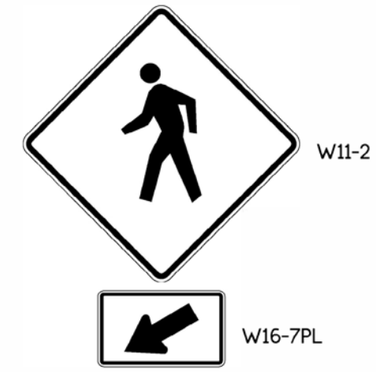


MIDBLOCK CROSSWALK SIGNAGE AND PAVEMENT MARKINGS ON MULTILANE ROADWAY

FILE NAME	24 - Stop Line Uncontrolled.dgn			REGION NO.	STATE	FED. AID PROJ. NO.	WSDOT	PLAN REF NO
TIME	3:57:49 PM			10	WASH			
DATE	12/11/2023			JOB NUMBER			PRELIMINARY PLAN	WSDOT Active Transportation Programs Design Guide Plan Sheet Details
PLOTTED BY	WeisgeB							
DESIGNED BY								
ENTERED BY								
CHECKED BY				CONTRACT NO.		LOCATION NO.		
PROJ. ENGR.								
REGIONAL ADM.		REVISION	DATE	BY			DATE P.E. STAMP BOX - SEE SHEET CT1 FOR SIGNATURE	DATE P.E. STAMP BOX - SEE SHEET CT1 FOR SIGNATURE

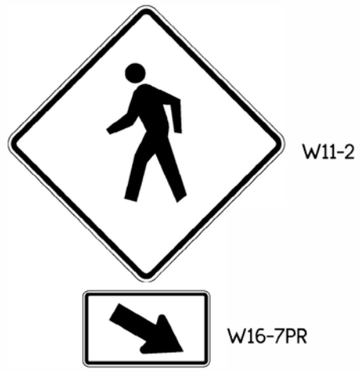
24 - Stop Line at Uncontrolled Crosswalk

SHEET 29 OF 52 SHEETS



①

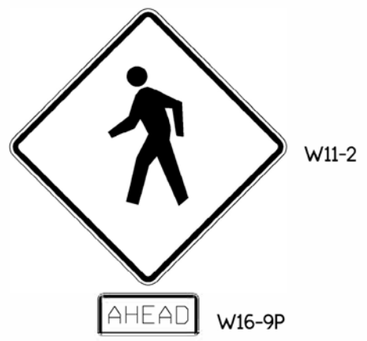
FRONT OF POLE
(FACING APPROACHING TRAFFIC)



①

BACK OF POLE

②



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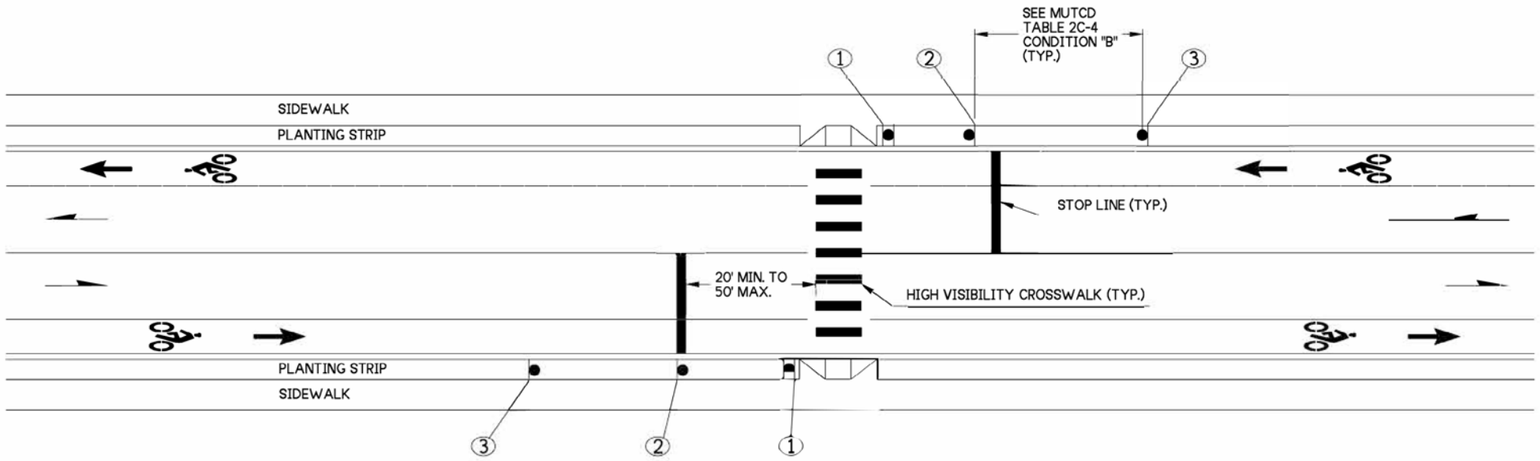


MIDBLOCK CROSSWALK SIGNAGE AND PAVEMENT MARKINGS ON A TWO-LANE TWO-WAY ROADWAY

~~FILE NAME~~	24 - Stop Line Uncontrolled.dgn				REGION NO. 10	STATE WASH	FED. AID PROJ. NO.	WSDOT Active Transportation Programs Design Guide Plan Sheet Details
TIME	2:34:36 PM				JOB NUMBER			
DATE	8 /28 /20 23							24 - Stop Line at Uncontrolled Crosswalk
PLOTTED BY	WeisgeB				CONTRACT NO.		LOCATION NO.	
DESIGNED BY								
ENTERED BY								
CHECKED BY								
PROJ. ENGR.								
REGIONAL ADM.		REVISION	DATE	BY				

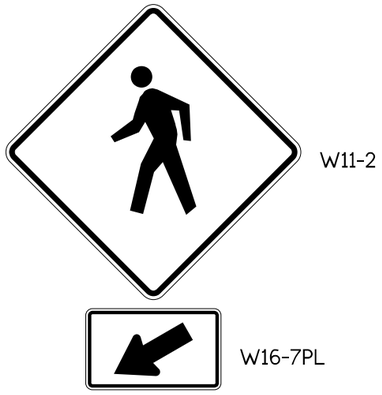
PRELIMINARY PLAN

P.E. STAMP BOX - SEE SHEET CT1 FOR SIGNATURE — DATE

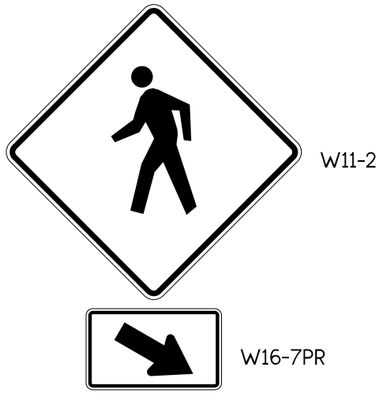
P.E. STAMP BOX - SEE SHEET CT1 FOR SIGNATURE — DATE

P. MARKER NO

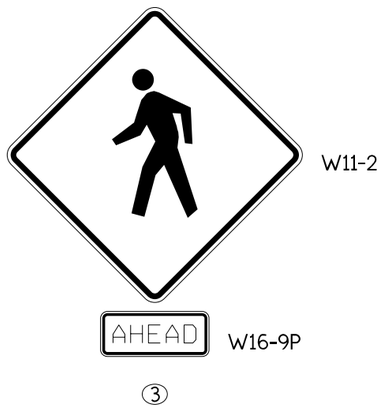
SHEET 30 OF 52 SHEETS

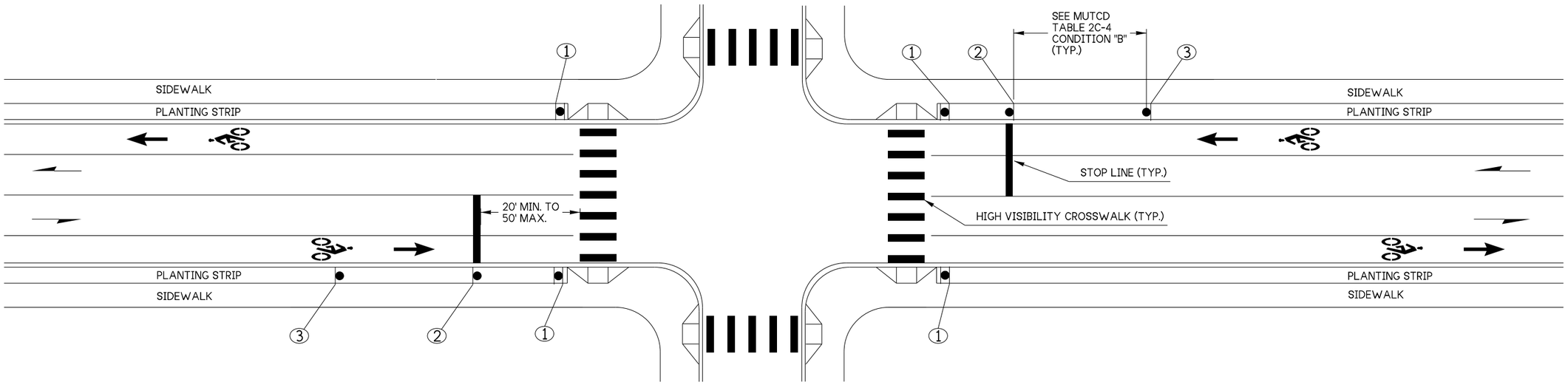


FRONT OF POLE
(FACING APPROACHING TRAFFIC)



BACK OF POLE





SIGN PLACEMENT FOR UNCONTROLLED CROSSWALK AT INTERSECTION

FILE NAME	24 - Stop Line Uncontrolled.dgn			
TIME	3:57:49 PM			
DATE	12/11/2023			
PLOTTED BY	WeisgeB			
DESIGNED BY				
ENTERED BY				
CHECKED BY				
PROJ. ENGR.				
REGIONAL ADM.		REVISION	DATE	BY

REGION NO.	STATE	FED. AID PROJ. NO.
10	WASH	
JOB NUMBER		
CONTRACT NO.		LOCATION NO.

WSDOT

PRELIMINARY PLAN

DATE
P.E. STAMP BOX - SEE SHEET CT1 FOR SIGNATURE

DATE
P.E. STAMP BOX - SEE SHEET CT1 FOR SIGNATURE

WSDOT Active Transportation Programs
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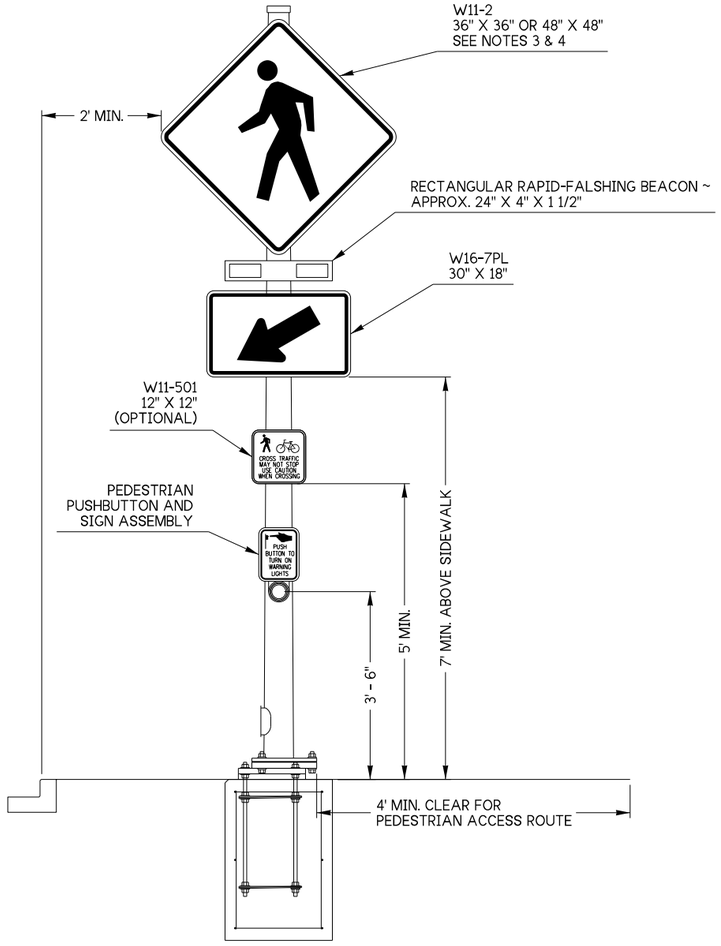
24 - Stop Line at Uncontrolled Crosswalk

PLAN REF NO

SHEET 31 OF 52 SHEETS



NOTES

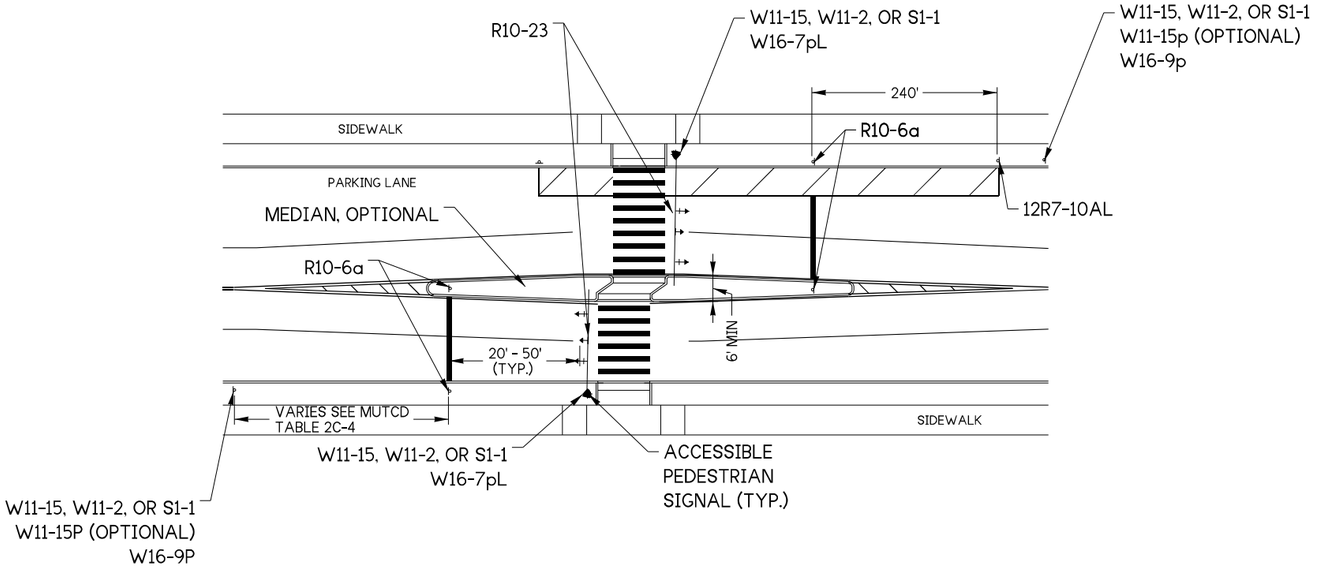
1. REFER TO STOP LINE AT UNCONTROLLED CROSSWALK FOR RECOMMENDED PLACEMENT OF RRFBS AT CROSSWALKS ALONG WITH STOP LINES, HIGH-VISIBILITY CROSSWALKS, AND SUPPLEMENTAL CROSSING SIGNAGE.
2. REFER TO WSDOT PLAN SHEET DETAIL IS-22 FOR A POSSIBLE RRFB DETAIL.
3. AT SHARED USE PATH CROSSINGS, USE A W11-15 SIGN IN PLACE OF THE W11-2.
4. AT SCHOOL CROSSINGS, USE A S1-1 SIGN IN PLACE OF THE W11-2. USE FLUORESCENT YELLOW-GREEN W16-7PR AS APPROPRIATE TO BE CONSISTENT WITH THE COLOR OF THE S1-1.

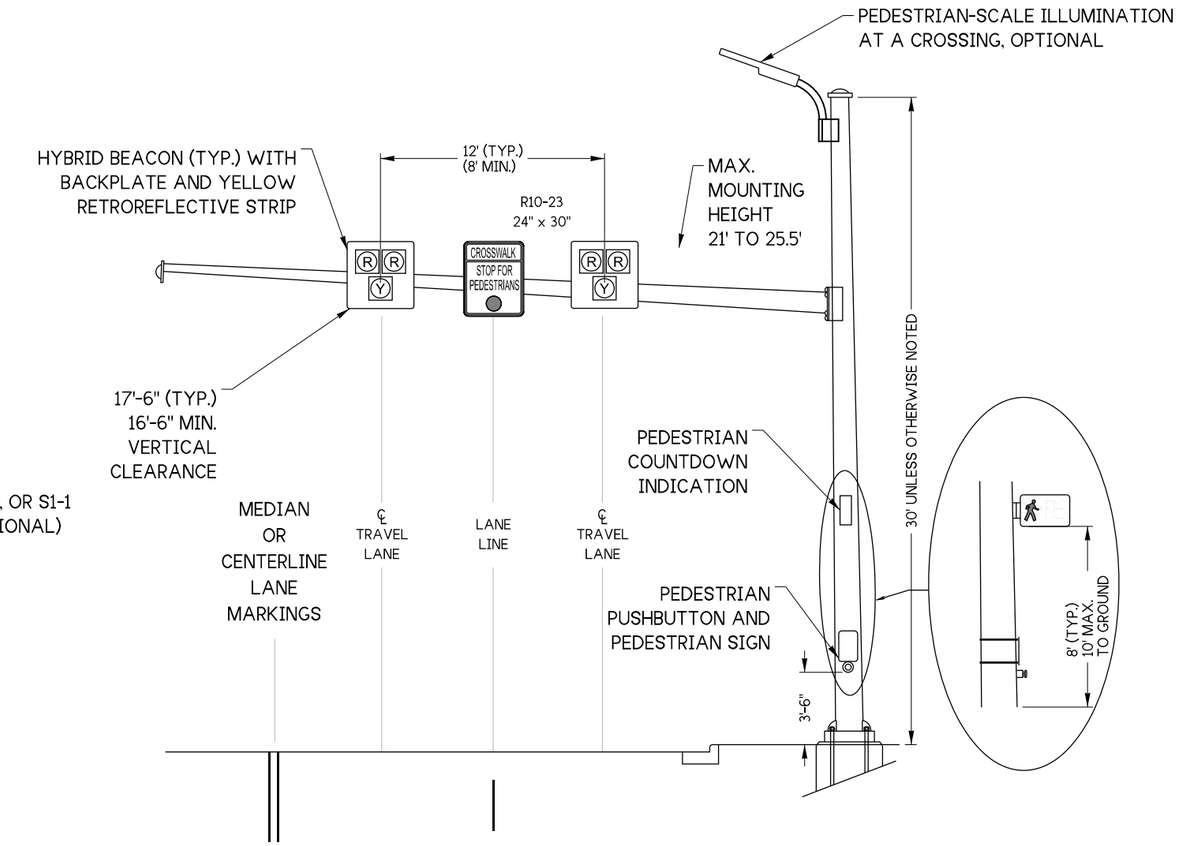
W11-501
(12" x 12")

PEDESTRIAN SYMBOL HEIGHT - 4" (IN)
BICYCLE SYMBOL HEIGHT - 3" (IN)
LETTERS - 1" C
LEGEND - BLACK
BACKGROUND - YELLOW

RECTANGULAR RAPID FLASHING BEACON (RRFB)

FILE NAME	31 - RRFB.dgn			REGION NO. 10	STATE WASH	FED. AID PROJ. NO.	WSDOT Active Transportation Programs Design Guide Plan Sheet Details
TIME	3:57:55 PM			JOB NUMBER			PLAN REF NO
DATE	12/11/2023						
PLOTTED BY	WeisgeB						SHEET 32 OF 52 SHEETS
DESIGNED BY							
ENTERED BY							
CHECKED BY				CONTRACT NO.	LOCATION NO.	PRELIMINARY PLAN	31 - Rectangular Rapid Flashing Beacon
PROJ. ENGR.							
REGIONAL ADM.	REVISION	DATE	BY			P.E. STAMP BOX - SEE SHEET CT1 FOR SIGNATURE / DATE	P.E. STAMP BOX - SEE SHEET CT1 FOR SIGNATURE / DATE





NOTES

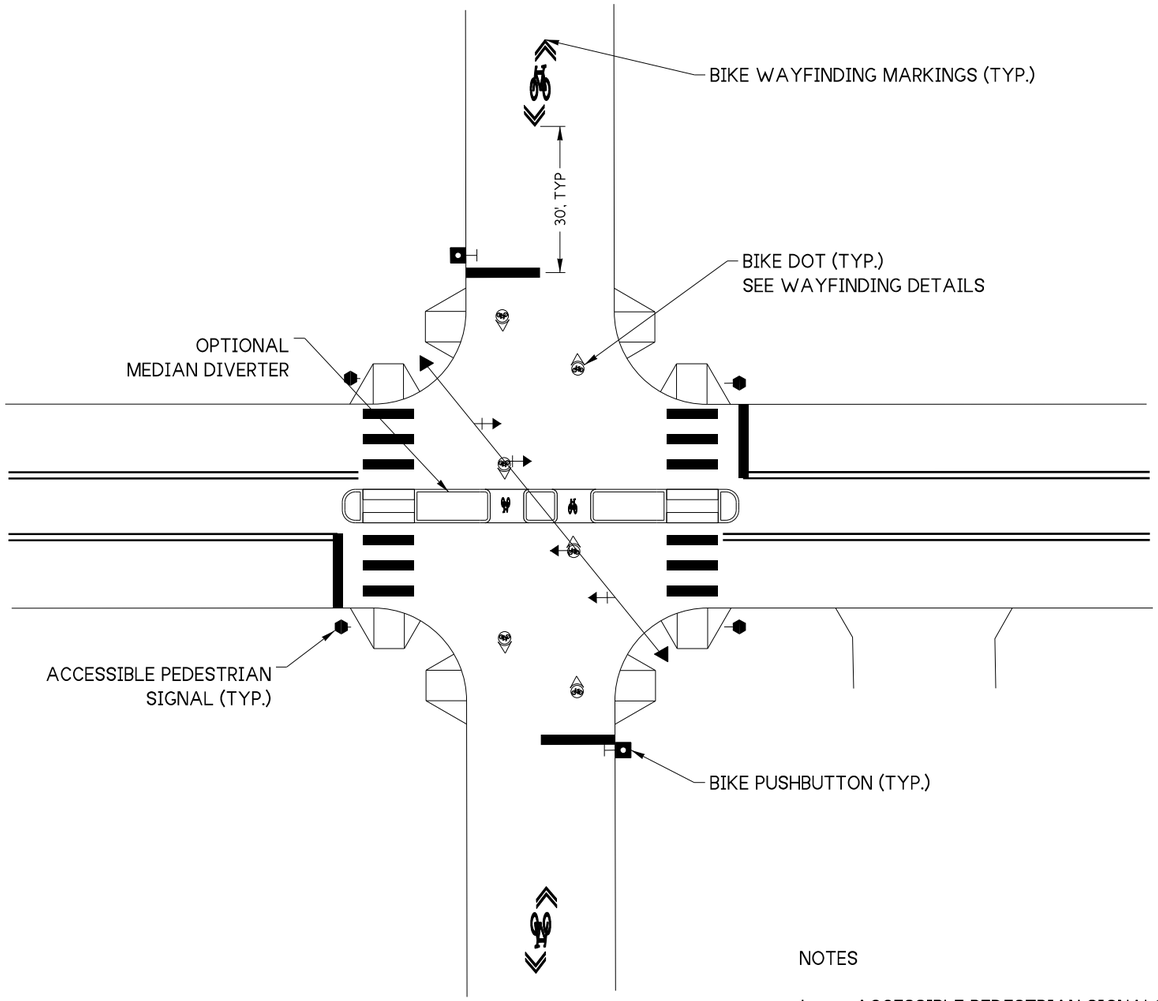
1. THE R10-23 SIGN SHALL BE CENTERED BETWEEN THE HYBRID BEACON INDICATIONS.
2. PEDESTRIAN PUSHBUTTONS SHALL BE INSTALLED IN COMPLIANCE WITH SECTION 4E.08 THROUGH 4E.13 OF THE MUTCD.
3. PROVIDE A WALK SIGNAL PHASE TIMED TO ALLOW CROSSING OF ENTIRE STREET.
4. SIGNALS AND SIGNAGE FOR BOTH DIRECTIONS MAY BE INSTALLED ON A SINGLE MAST ARM.

FILE NAME	32 - PHB.dgn			REGION NO.	STATE	FED. AID PROJ. NO.	WSDOT	WSDOT Active Transportation Programs Design Guide Plan Sheet Details
TIME	3:57:59 PM			10	WASH			PLAN REF NO
DATE	12/11/2023			JOB NUMBER			PRELIMINARY PLAN	
PLOTTED BY	WeisgeB							SHEET 33 OF 52 SHEETS
DESIGNED BY								
ENTERED BY								
CHECKED BY				CONTRACT NO.		LOCATION NO.		
PROJ. ENGR.								
REGIONAL ADM.		REVISION	DATE	BY				

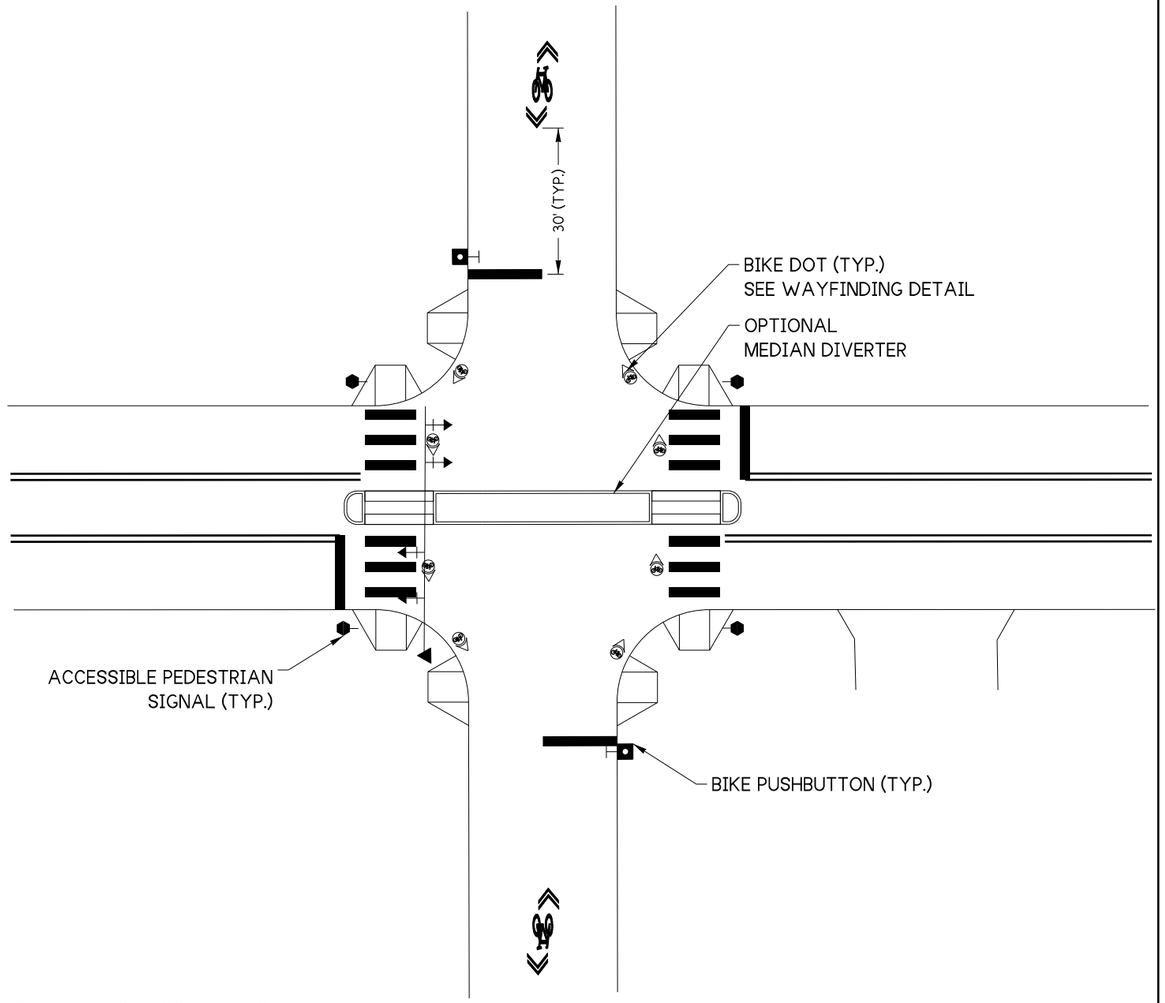
DATE
P.E. STAMP BOX - SEE SHEET CT1 FOR SIGNATURE

DATE
P.E. STAMP BOX - SEE SHEET CT1 FOR SIGNATURE

32 - Pedestrian Hybrid Beacon



HALF SIGNAL WITH
DIAGONAL SPAN WIRE



HALF SIGNAL WITH
SIGNAL MAST ARM

NOTES

1. ACCESSIBLE PEDESTRIAN SIGNALS SHALL BE INSTALLED IN COMPLIANCE WITH SECTION 4E.08 THROUGH 4E.13 OF THE MUTCD.
2. PROVIDE A WALK SIGNAL PHASE TIMED TO ALLOW CROSSING OF ENTIRE STREET.
3. CONSIDER INSTALLING PEDESTRIAN AND BICYCLIST SCALE ILLUMINATION AT THE INTERSECTION.
4. CONSIDER LIMITING ACCESS TO SIDE STREET TO RIGHT-IN, RIGHT-OUT MOVEMENTS WHERE FEASIBLE. SEE NEIGHBORHOOD TRAFFIC DIVERTERS OR MEDIAN DIVERTER FOR MULTI-STAGE CROSSING DETAILS.
5. BICYCLE CROSSING CAN BE INDEPENDENT OR COMBINED WITH CROSSWALK ALIGNMENT.

FILE NAME	33 - Half Signal.dgn			
TIME	3:58:03 PM			
DATE	12/11/2023			
PLOTTED BY	WeisgeB			
DESIGNED BY				
ENTERED BY				
CHECKED BY				
PROJ. ENGR.				
REGIONAL ADM.		REVISION	DATE	BY

REGION NO. 10 | STATE WASH | JOB NUMBER | CONTRACT NO. | FED. AID PROJ. NO. | LOCATION NO.

WSDOT

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DATE
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33 - Half Signal for Pedestrians and Bicyclists

PLAN REF NO.

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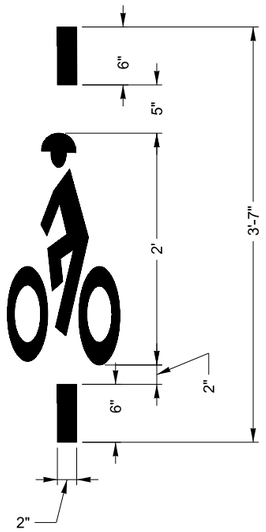
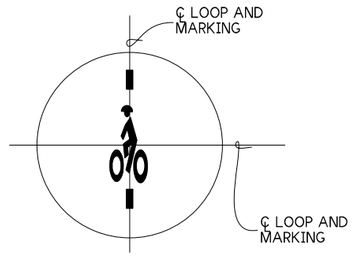
pw://projectstore.wsdot.wa.gov:WSDOT/Documents/_HQ/Active Transportation Division/Planning_Details/_DGN/Toole Design Files/33 - Half Signal.dgn

c:\users\weisgeb\pw_wsdot\d06l0160\33 - Half Signal.dgn

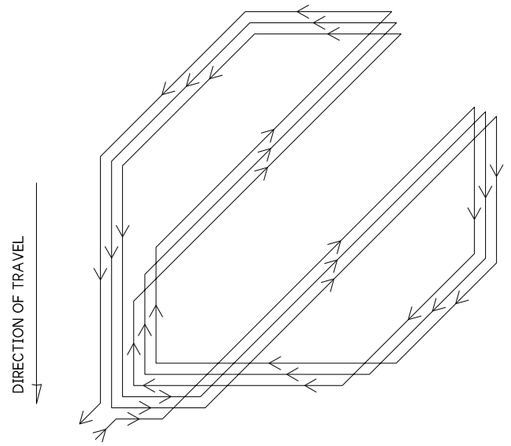


BICYCLE DETECTOR SYMBOL

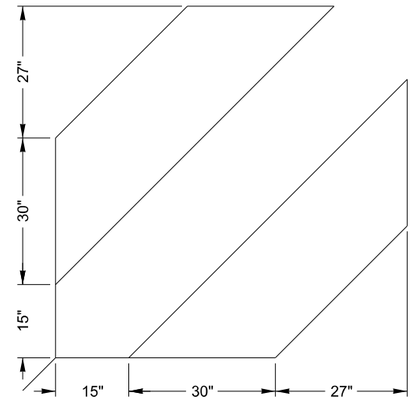


ROUND

BICYCLE QUADIRPOLE

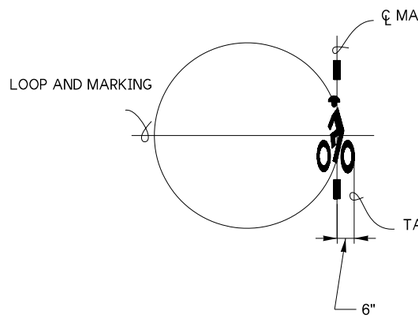


WINDING DETAIL

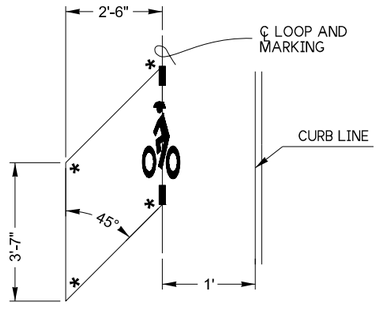


SAWCUT DETAIL

BICYCLE TYPE "D" LOOP



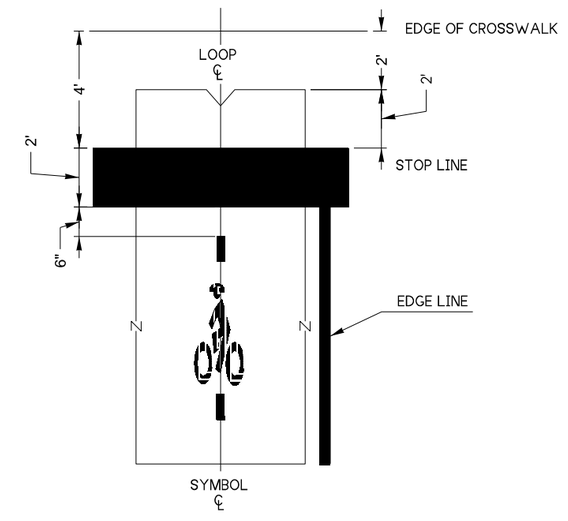
ROUND



PARALLELOGRAM

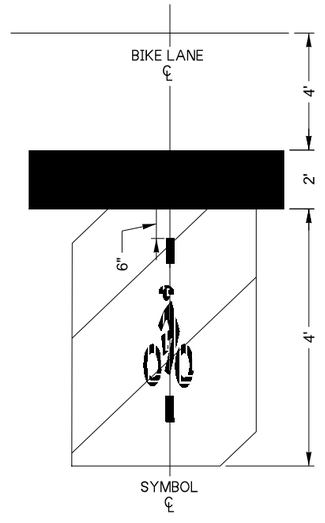
*NOTE
OVERLAP CUT FOR FULL DEPTH AT CORNERS (TYP) CHIP 1" BACK THEN ROUND OFF CORNERS WHERE LOOP WIRE WILL BE BENT 90° OR LESS.

BICYCLE DIPOLE



TYPE 1 INDUCTION LOOP

PLACE SYMBOL 6" FROM STOP LINE.
IF NO STOP LINE, PLACE SYMBOL 2' 6" FROM CROSSWALK LINE



TYPE "D" LOOP FOR BIKE LANES

PLACE SYMBOL 6" FROM STOP LINE.
IF NO STOP LINE, PLACE LOOP 2' FROM THE CROSSWALK LINE AND SYMBOL 2'-6" FROM THE CROSSWALK LINE.

BICYCLE DETECTOR SYMBOL LOCATION FOR TYPE 1 AND TYPE "D" LOOPS

FILE NAME	39 - Bike Detection.dgn				REGION NO.	STATE	FED. AID PROJ. NO.
TIME	3:58:07 PM				10	WASH	
DATE	12/11/2023				JOB NUMBER		
PLOTTED BY	WeisgeB						
DESIGNED BY							
ENTERED BY							
CHECKED BY					CONTRACT NO.		LOCATION NO.
PROJ. ENGR.							
REGIONAL ADM.		REVISION	DATE	BY			

WSDOT
PRELIMINARY PLAN

DATE
P.E. STAMP BOX - SEE SHEET CT1 FOR SIGNATURE

DATE
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WSDOT Active Transportation Programs
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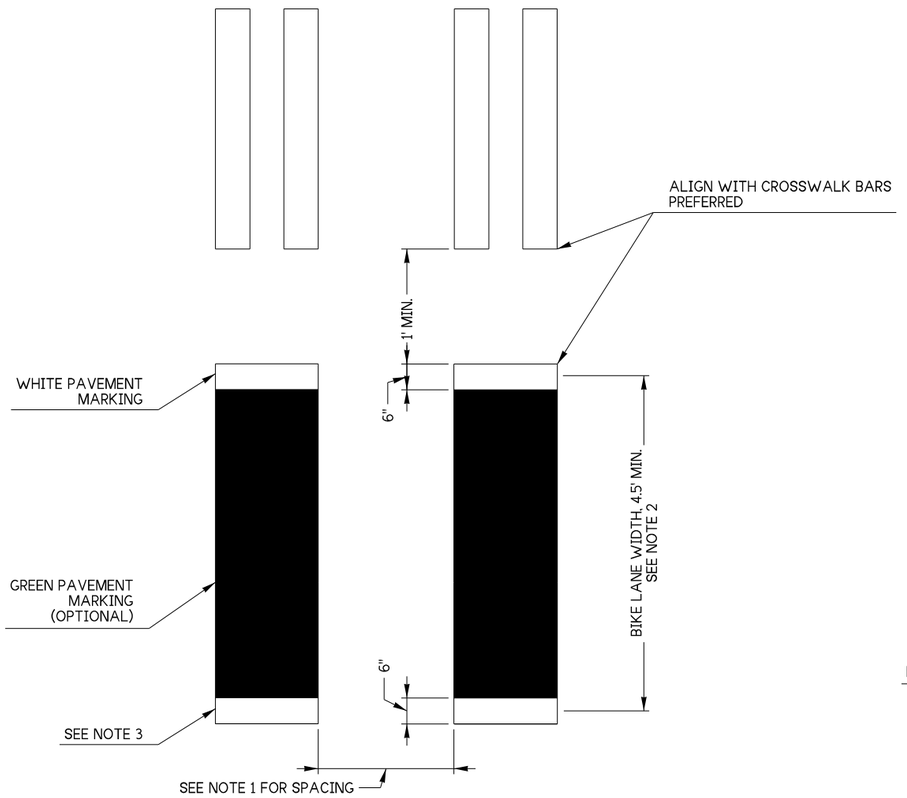
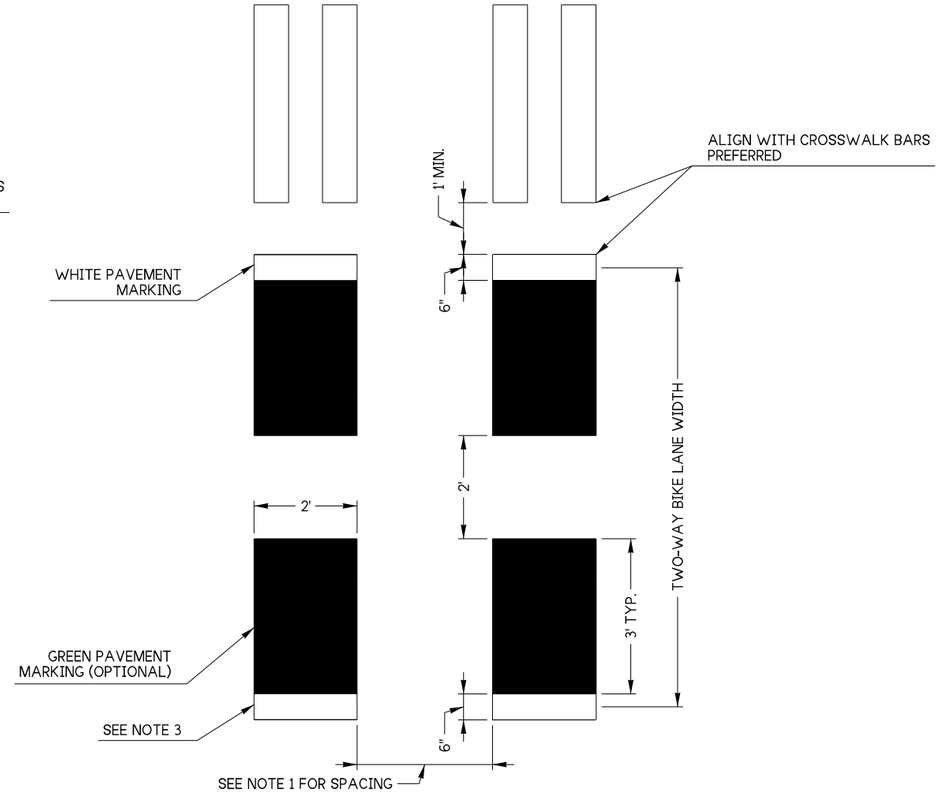
39 - Bike Detection at Traffic Signals

PLAN REF NO

SHEET 35 OF 52 SHEETS



ONE-WAY BIKE LANE LAYOUT



TWO-WAY BIKE LANE LAYOUT

NOTES

1. AT LOCATIONS WITHOUT AN ADJACENT STRIPED CROSSWALK, PLACE BIKE INTERSECTION CROSSING MARKINGS AT LANE LINE AND 1/2 LANE WIDTH CONSISTENT. AT LOCATIONS WITHOUT AN ADJACENT STRIPED CROSSWALK OR LANE LINE, PLACE BIKE INTERSECTION CROSSING MARKINGS AT 5' ON CENTER.
2. WHEN CONNECTING BIKE LANES OF VARYING WIDTH, SIZE THE BIKE INTERSECTION CROSSING MARKINGS TO THE NARROWER OF THE TWO FACILITIES.
3. PAVEMENT MARKINGS EXTENDED INTO OR CONTINUED THROUGH AN INTERSECTION SHALL BE THE SAME COLOR AS THE LINE MARKINGS THEY EXTEND.

FILE NAME	43 - Bicycle Intersection Markings.dgn				REGION NO.	STATE	FED. AID PROJ. NO.		PLAN REF NO
TIME	3:58:13 PM				10	WASH		WSDOT Active Transportation Programs Design Guide Plan Sheet Details	
DATE	12/11/2023				JOB NUMBER				
PLOTTED BY	WeisgeB								SHEET 36 OF 52 SHEETS
DESIGNED BY									
ENTERED BY									
CHECKED BY					CONTRACT NO.		LOCATION NO.		
PROJ. ENGR.									
REGIONAL ADM.		REVISION	DATE	BY					

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PRELIMINARY PLAN

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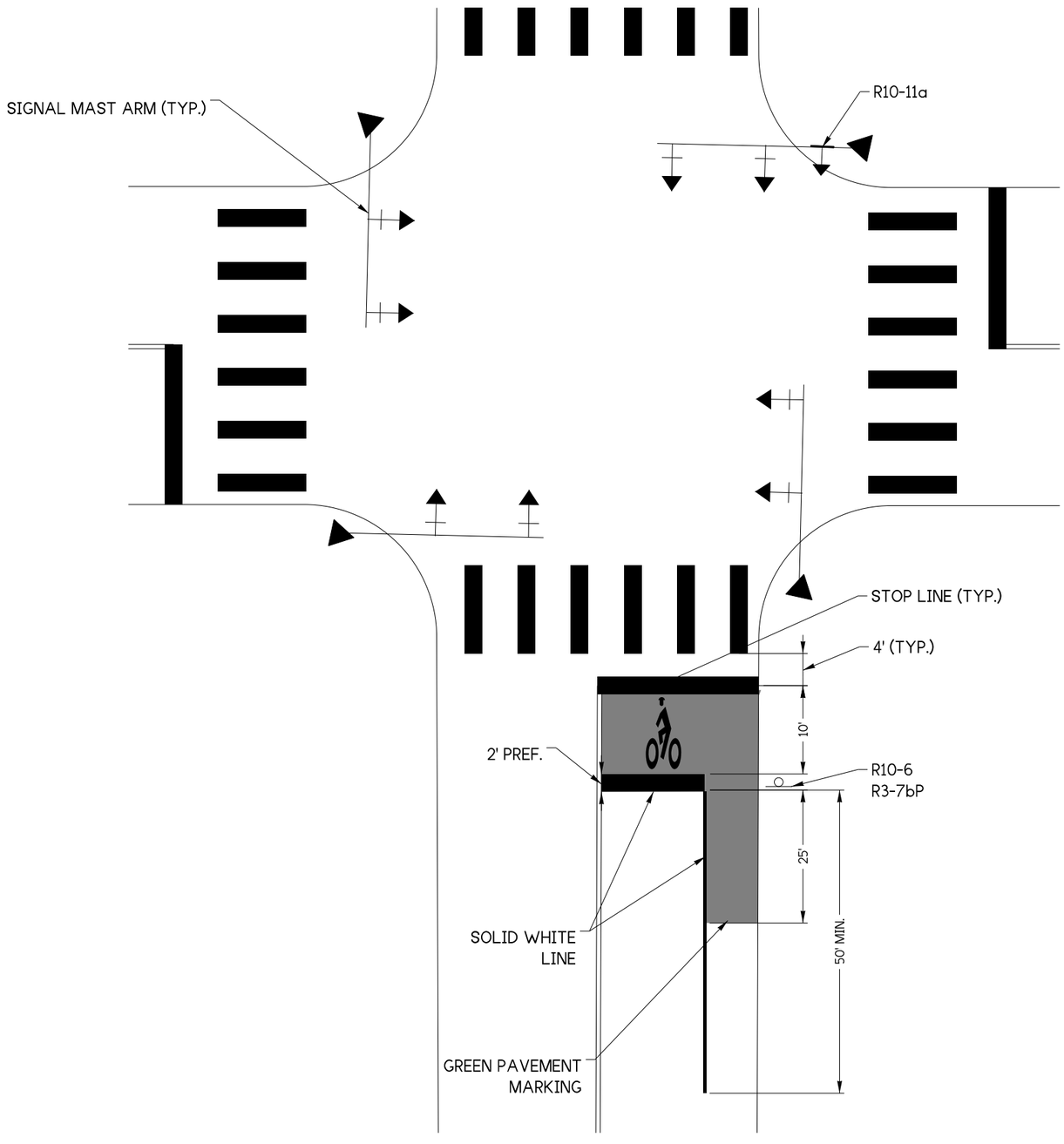
43 - Bicycle Intersection Crossing Markings



FILE NAME	44 - Bicycle Box.dgn				REGION NO.	STATE	FED. AID PROJ. NO.		PLAN REF NO
TIME	3:58:19 PM				10	WASH		WSDOT Active Transportation Programs Design Guide	
DATE	12/11/2023				JOB NUMBER			Plan Sheet Details	SHEET 37 OF 52 SHEETS
PLOTTED BY	WeisgeB								
DESIGNED BY									
ENTERED BY									
CHECKED BY					CONTRACT NO.		LOCATION NO.		
PROJ. ENGR.									
REGIONAL ADM.		REVISION	DATE	BY			PRELIMINARY PLAN	44 - Bicycle Box	

DATE
P.E. STAMP BOX - SEE SHEET CT1 FOR SIGNATURE

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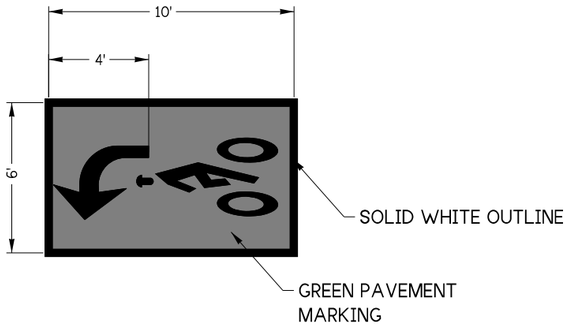
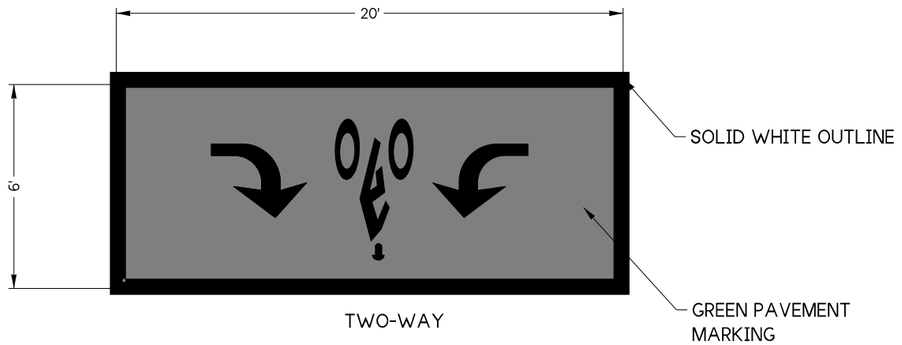
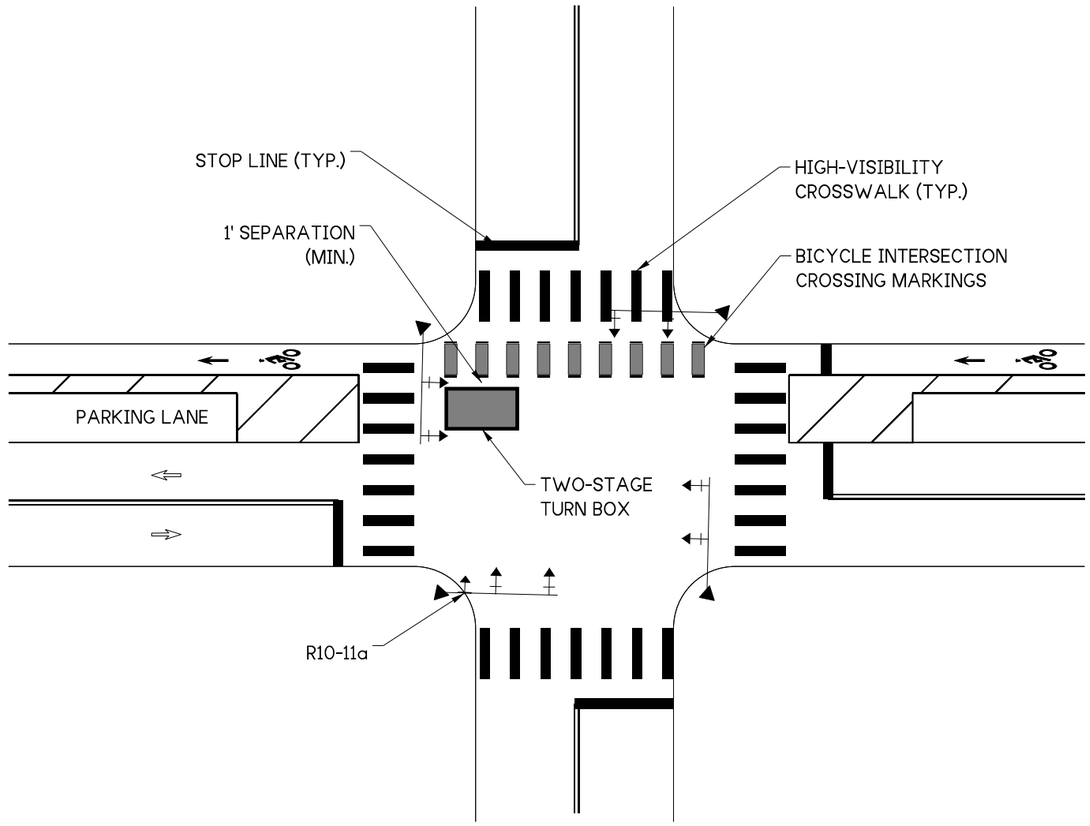
P.E. STAMP BOX - SEE SHEET CT1 FOR SIGNATURE



ONE-WAY



TWO-WAY



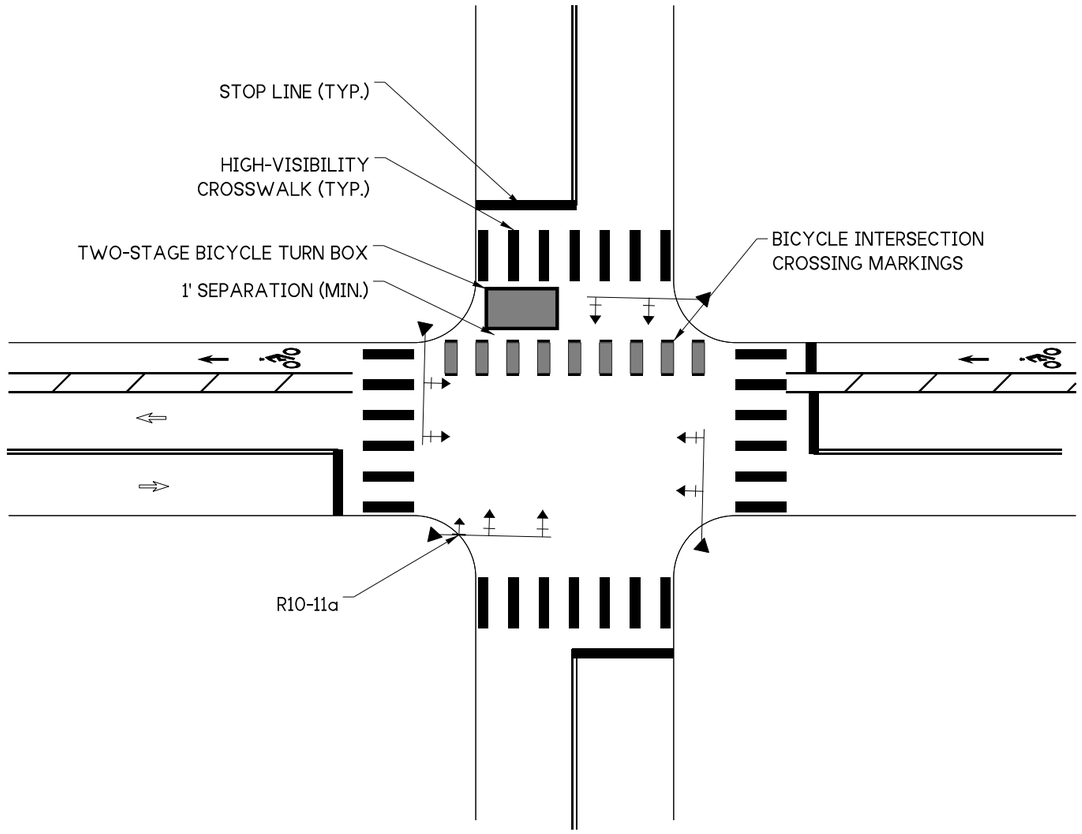
NOTES

1. TWO-STAGE BICYCLE TURN BOX DIMENSIONS MAY VARY. DIMENSIONS SHOWN ARE PREFERRED.

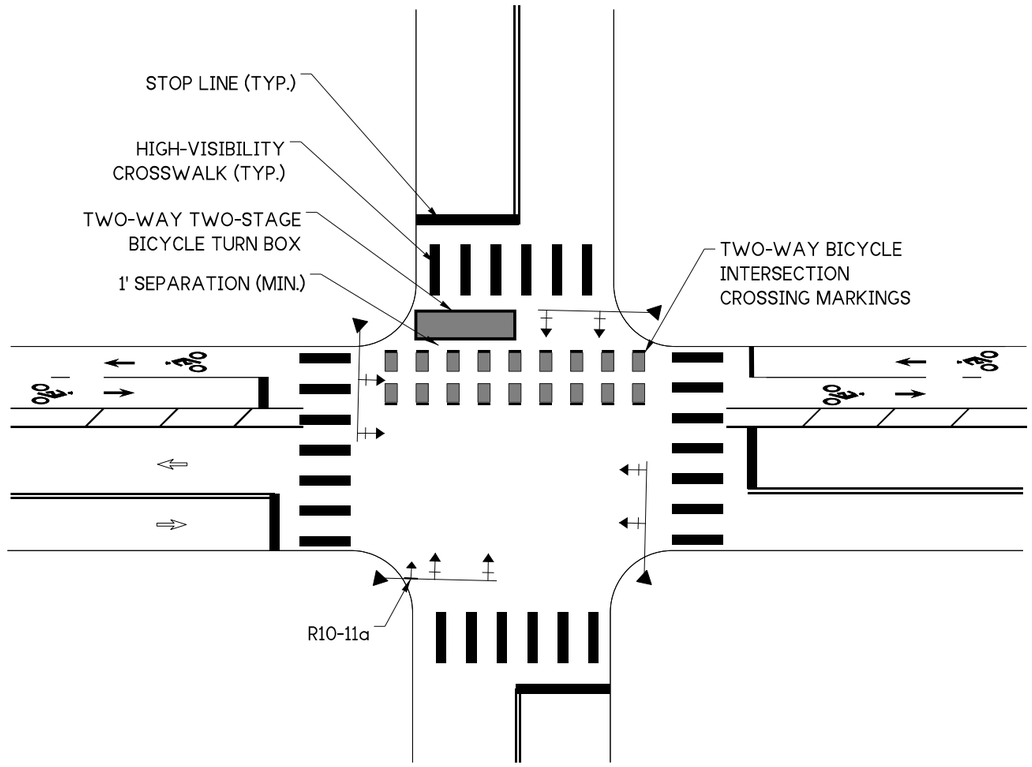
PLACEMENT WITH PARKING

FILE NAME	45 - Two-Stage Box.dgn			REGION NO.	STATE	FED. AID PROJ. NO.	WSDOT	PLAN REF NO.
TIME	3:58:22 PM			10	WASH			
DATE	12/11/2023			JOB NUMBER			PRELIMINARY PLAN	WSDOT Active Transportation Programs Design Guide Plan Sheet Details
PLOTTED BY	WeisgeB							SHEET 38 OF 52 SHEETS
DESIGNED BY								
ENTERED BY								
CHECKED BY				CONTRACT NO.		LOCATION NO.		
PROJ. ENGR.								
REGIONAL ADM.		REVISION	DATE	BY			P.E. STAMP BOX - SEE SHEET CT1 FOR SIGNATURE DATE	P.E. STAMP BOX - SEE SHEET CT1 FOR SIGNATURE DATE

45 - Two-Stage Bicycle Turn Box



PLACEMENT WITHOUT PARKING



TWO-WAY PLACEMENT

FILE NAME	45 - Two-Stage Box.dgn			
TIME	3:58:22 PM			
DATE	12/11/2023			
PLOTTED BY	WeisgeB			
DESIGNED BY				
ENTERED BY				
CHECKED BY				
PROJ. ENGR.				
REGIONAL ADM.		REVISION	DATE	BY

REGION NO.	STATE	FED. AID PROJ. NO.
10	WASH	
JOB NUMBER		
CONTRACT NO.		LOCATION NO.

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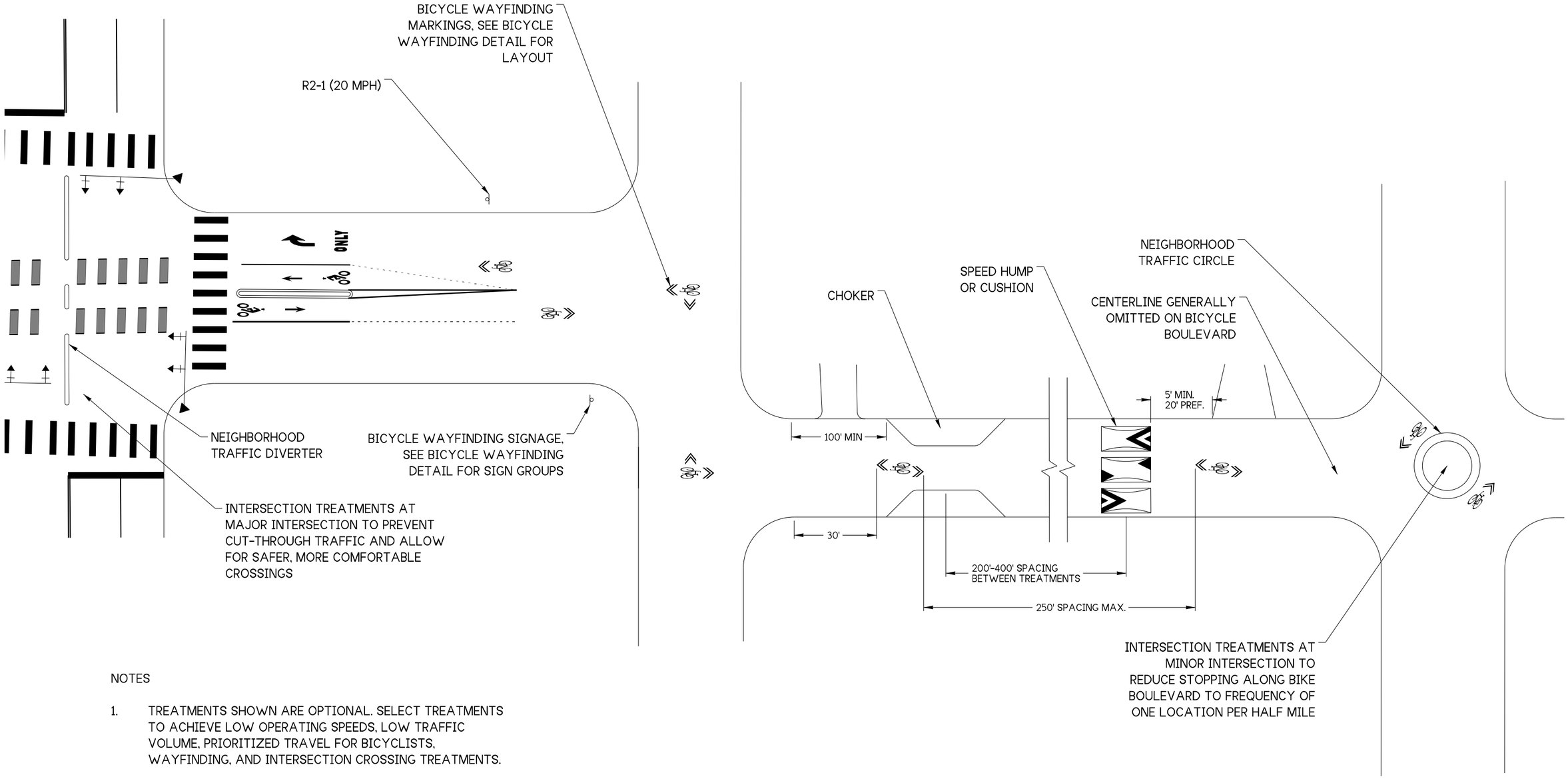
45 - Two-Stage Bicycle Turn Box

PLAN REF NO

SHEET 39 OF 52 SHEETS



NOTES

1. TREATMENTS SHOWN ARE OPTIONAL. SELECT TREATMENTS TO achieve LOW OPERATING SPEEDS, LOW TRAFFIC VOLUME, PRIORITIZED TRAVEL FOR BICYCLISTS, WAYFINDING, AND INTERSECTION CROSSING TREATMENTS.

FILE NAME	52 - Bicycle Boulevard.dgn				REGION NO. 10	STATE WASH	FED. AID PROJ. NO.	PLAN REF NO
TIME	3:58:26 PM				JOB NUMBER			
DATE	12/11/2023							
PLOTTED BY	WeisgeB							
DESIGNED BY								
ENTERED BY								
CHECKED BY					CONTRACT NO.		LOCATION NO.	
PROJ. ENGR.								
REGIONAL ADM.		REVISION	DATE	BY				

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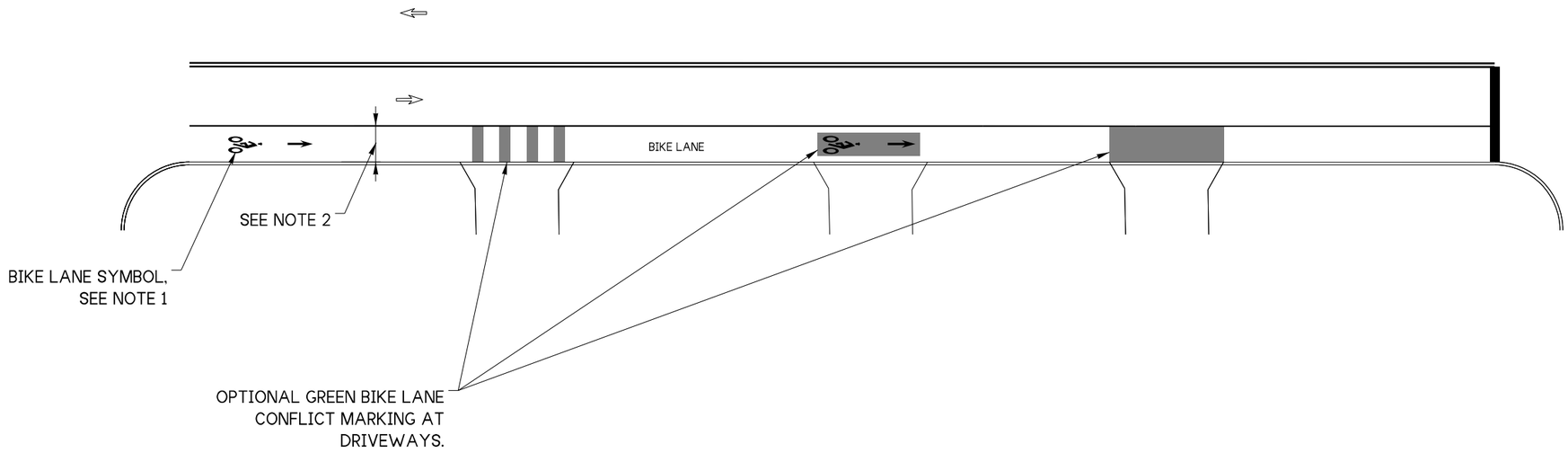
52 - Bicycle Boulevard

SHEET 40 OF 52 SHEETS



NOTES

1. PLACE BIKE LANE SYMBOL AT BEGINNING OF BLOCK, AFTER LARGE DRIVEWAYS, AND AT REGULAR SPACING (250' - 500') WITH INFREQUENT CROSS STREETS AND LONG BLOCK FACES.

2. BIKE LANE WIDTH MEASURED BETWEEN BIKE LANE LINE AND PARKING LINE, EDGE OF GUTTER PAN WHERE PRESENT, OR FACE OF CURB IN THE ABSENCE OF GUTTER PAN. 6' PREFERRED, 5' MINIMUM WIDTH,

3. CONSIDER ADDING A BUFFER OR PROTECTION WHEN BIKE LANE WIDTH EXTENDS BEYOND 7' TO DIFFERENTIATE WITH PARKING OR VEHICLE LANE.

FILE NAME	53 - Bike Lanes.dgn				REGION NO.	STATE	FED. AID PROJ. NO.	WSDOT Active Transportation Programs Design Guide Plan Sheet Details	PLAN REF NO.
TIME	3:58:29 PM				10	WASH			
DATE	12/11/2023				JOB NUMBER				SHEET 41 OF 52 SHEETS
PLOTTED BY	WeisgeB								
DESIGNED BY									
ENTERED BY									
CHECKED BY					CONTRACT NO.		LOCATION NO.		
PROJ. ENGR.									
REGIONAL ADM.		REVISION	DATE	BY					

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P.E. STAMP BOX - SEE SHEET CT1 FOR SIGNATURE

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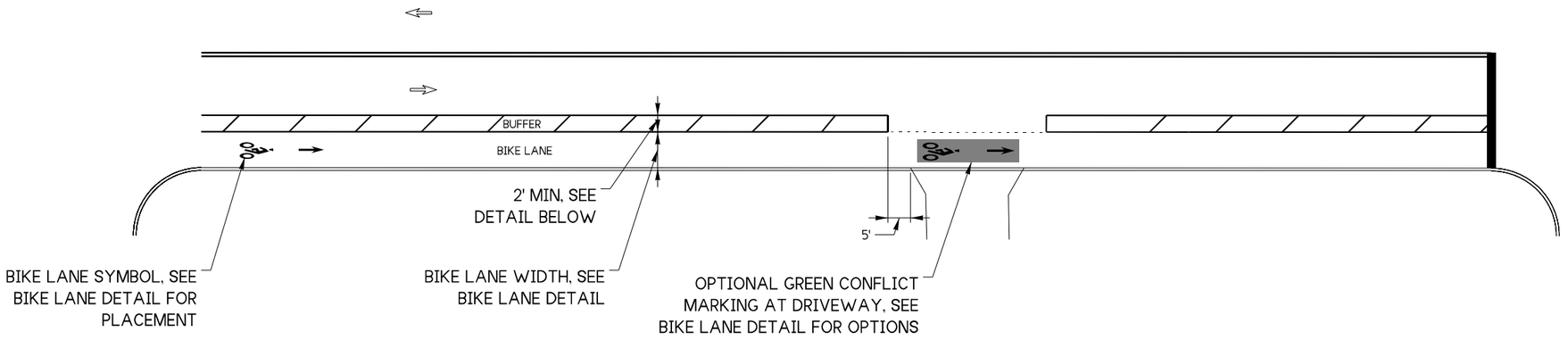
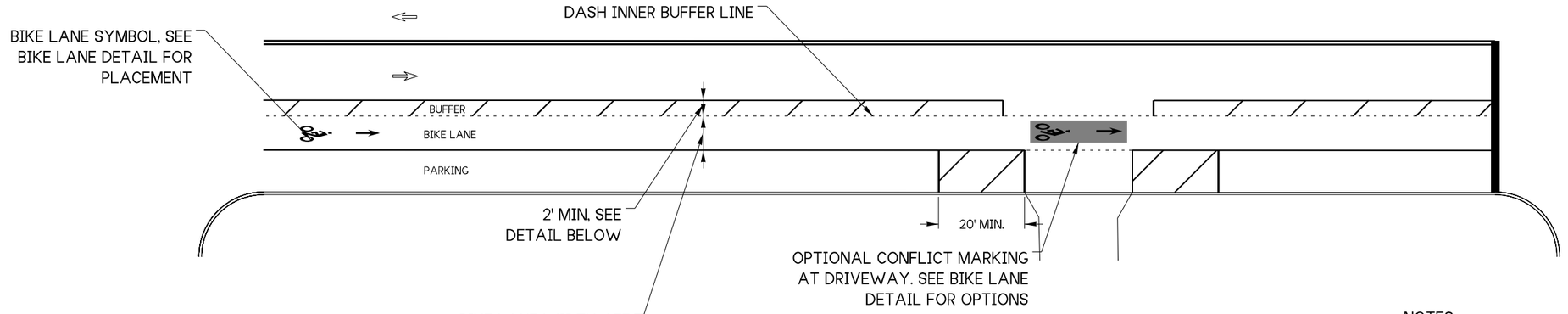
53 - Bike Lanes



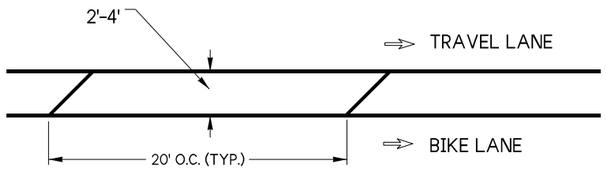
WITHOUT PARKING



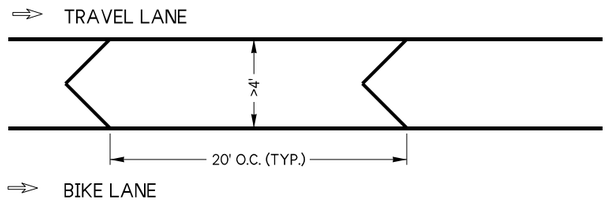
WITH PARKING (SEE NOTE 1)

NOTES

1. BUFFER CAN BE ON EITHER OR BOTH SIDES OF THE BIKE LANE DEPENDING ON SPACE AVAILABLE, PARKING TURNOVER RATE, AND VEHICLE SPEED AND VOLUME



DIAGONAL BUFFER



CHEVRON BUFFER

FILE NAME	54 - Buffered Bike Lanes.dgn			REGION NO.	STATE	FED. AID PROJ. NO.	PLAN REF NO
TIME	3:58:32 PM			10	WASH		
DATE	12/11/2023			JOB NUMBER			
PLOTTED BY	WeisgeB						SHEET 42 OF 52 SHEETS
DESIGNED BY							
ENTERED BY							
CHECKED BY				CONTRACT NO.		LOCATION NO.	
PROJ. ENGR.							
REGIONAL ADM.		REVISION	DATE	BY			

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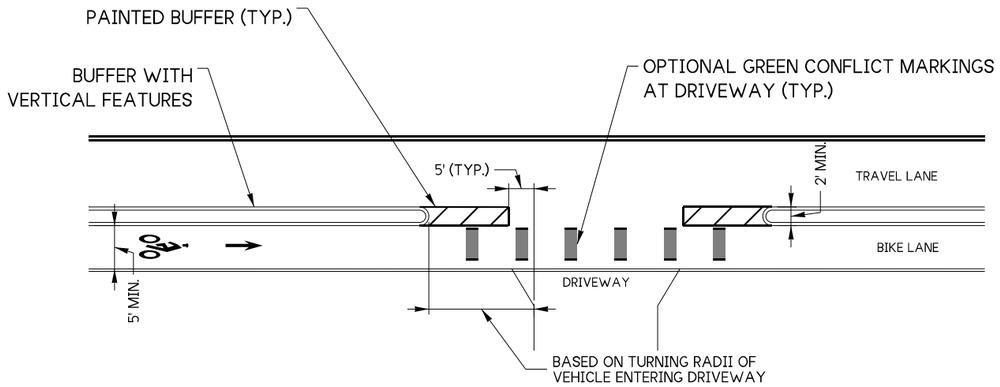
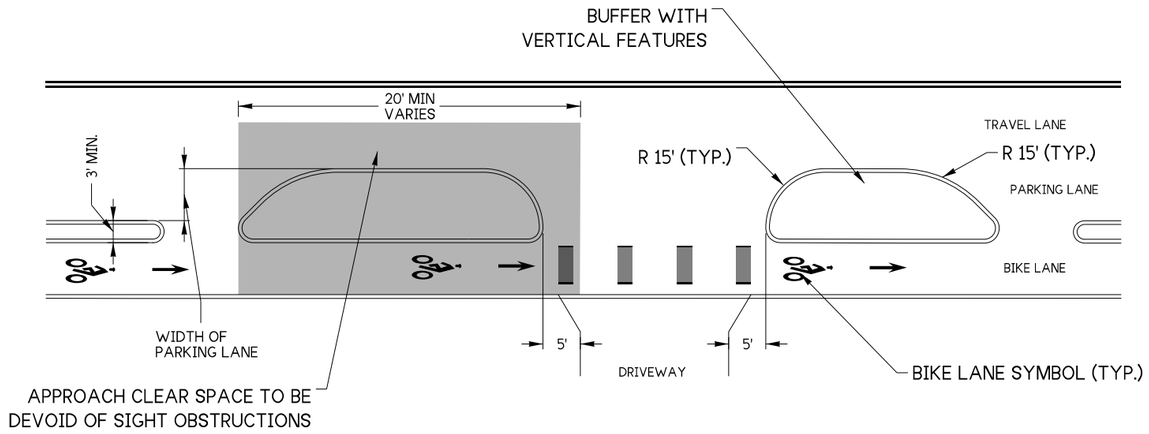
54 - Buffered Bike Lanes

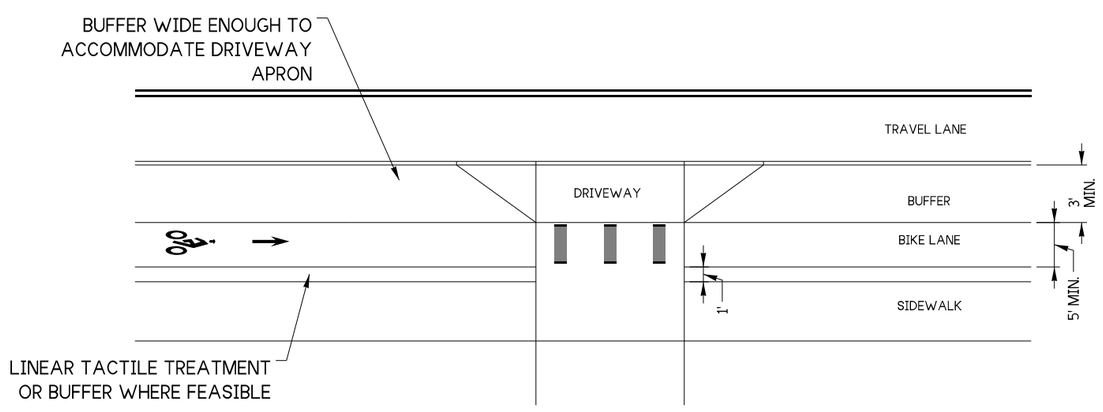
pw://projectstore.wsdot.wa.gov:WSDOT/Documents/_HQ/Active Transportation Division/Planning_Details/_DGN/Toole Design Files/54 - Buffered Bike Lanes c:\users\weisgeb\pw_wsdot\d0610160\54 - Buffered Bike Lanes.dgn



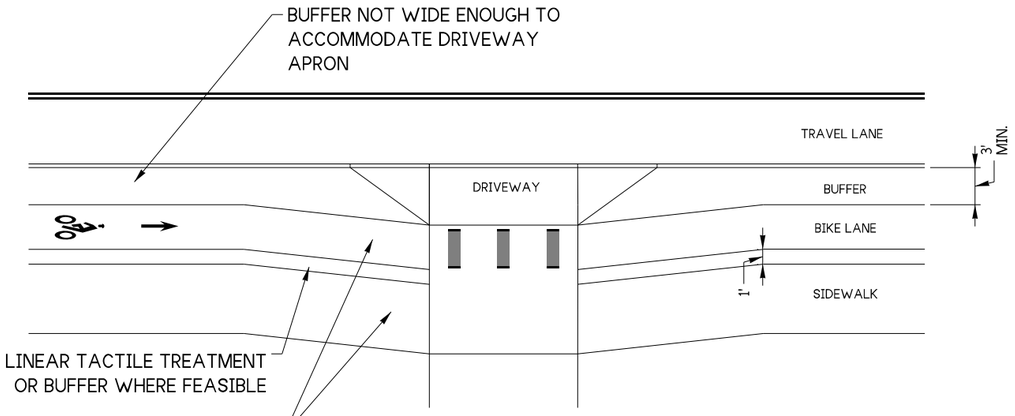
STREET LEVEL SEPARATED BIKE LANE AT DRIVEWAY



STREET LEVEL SEPARATED BIKE LANE AT DRIVEWAY WITH PARKING



SIDEWALK LEVEL SEPARATED BIKE LANE AT DRIVEWAY



SIDEWALK LEVEL SEPARATED BIKE LANE TAPERED AT DRIVEWAY

FILE NAME	55 - Separated Bike Lanes.dgn			REGION NO. 10	STATE WASH	FED. AID PROJ. NO.	PLAN REF NO
TIME	3:58:36 PM			JOB NUMBER			
DATE	12/11/2023						
PLOTTED BY	WeisgeB						
DESIGNED BY							
ENTERED BY							
CHECKED BY				CONTRACT NO.		LOCATION NO.	
PROJ. ENGR.							
REGIONAL ADM.		REVISION	DATE	BY			

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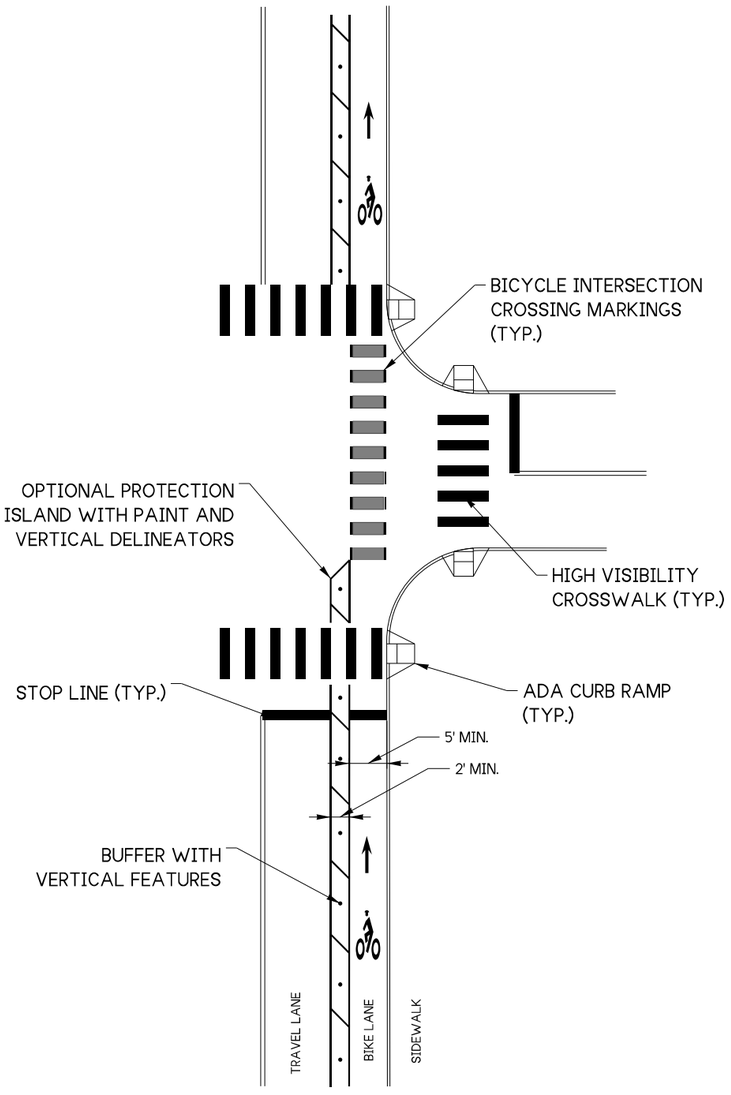
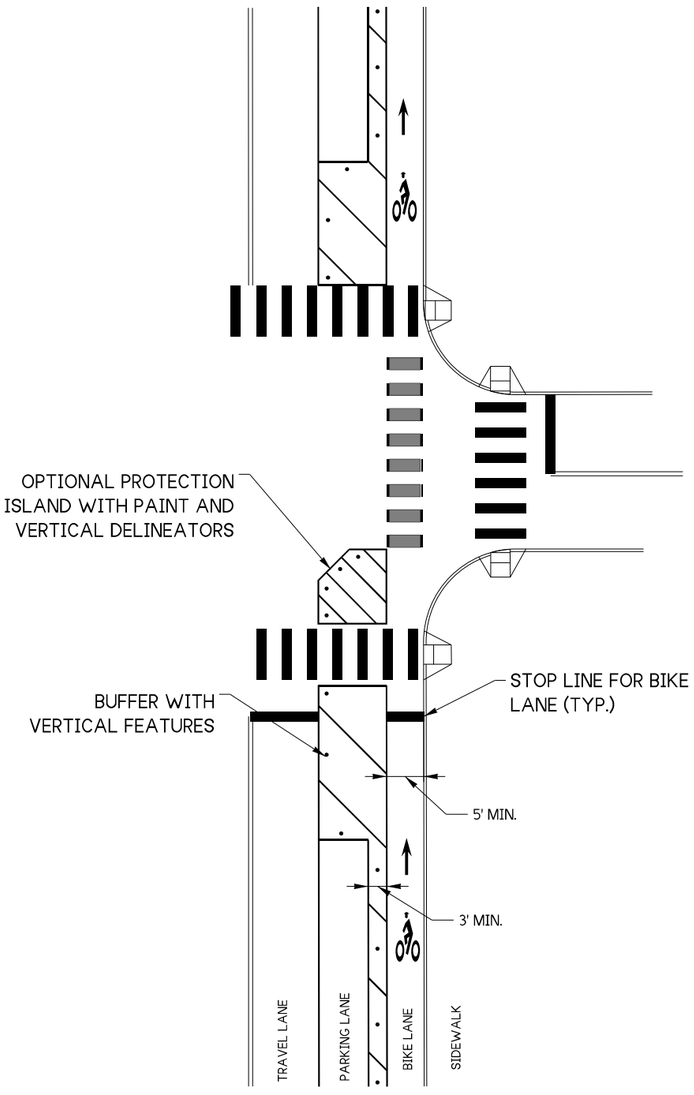
55 - Separated Bike Lanes

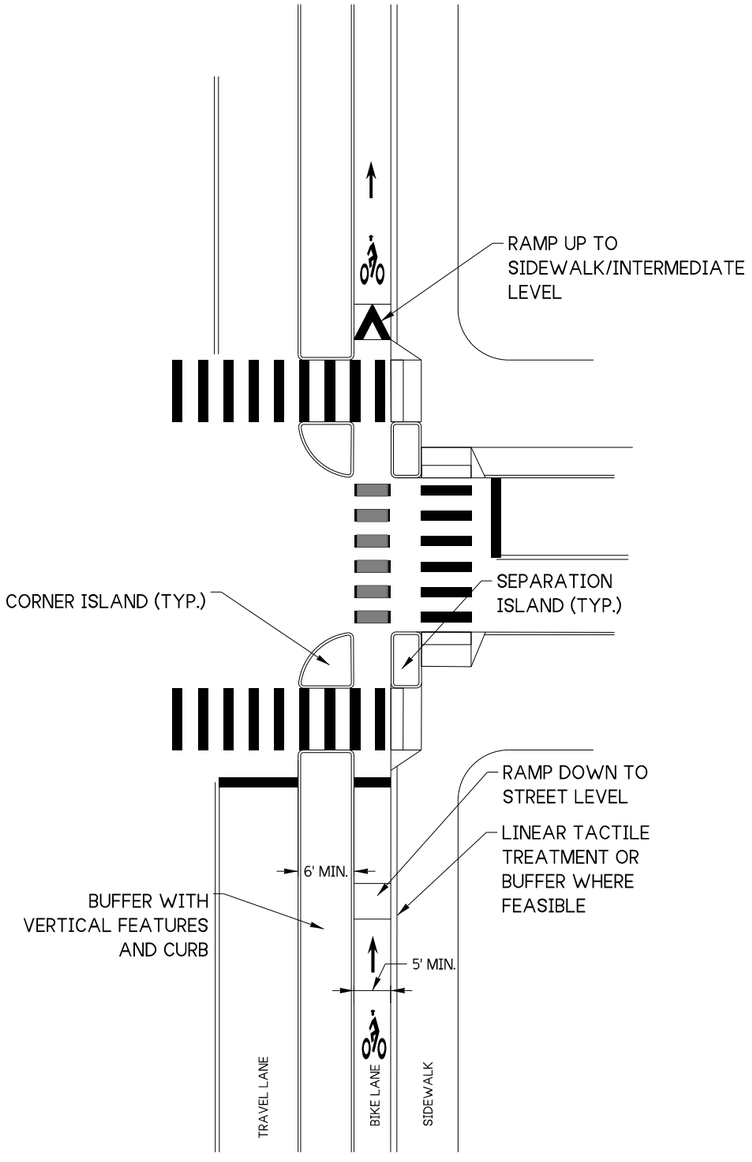
SHEET 43 OF 52 SHEETS



STREET LEVEL SEPARATED
BIKE LANE WITHOUT PARKING



STREET LEVEL SEPARATED
BIKE LANE WITH PARKING



SIDEWALK/INTERMEDIATE
LEVEL SEPARATED BIKE LANE
CONTINUED TO INTERSECTION

FILE NAME	55 - Separated Bike Lanes.dgn			
TIME	3:58:36 PM			
DATE	12/11/2023			
PLOTTED BY	WeisgeB			
DESIGNED BY				
ENTERED BY				
CHECKED BY				
PROJ. ENGR.				
REGIONAL ADM.		REVISION	DATE	BY

REGION NO. 10 | STATE WASH | JOB NUMBER | CONTRACT NO. | FED. AID PROJ. NO. | LOCATION NO.

WSDOT

PRELIMINARY PLAN

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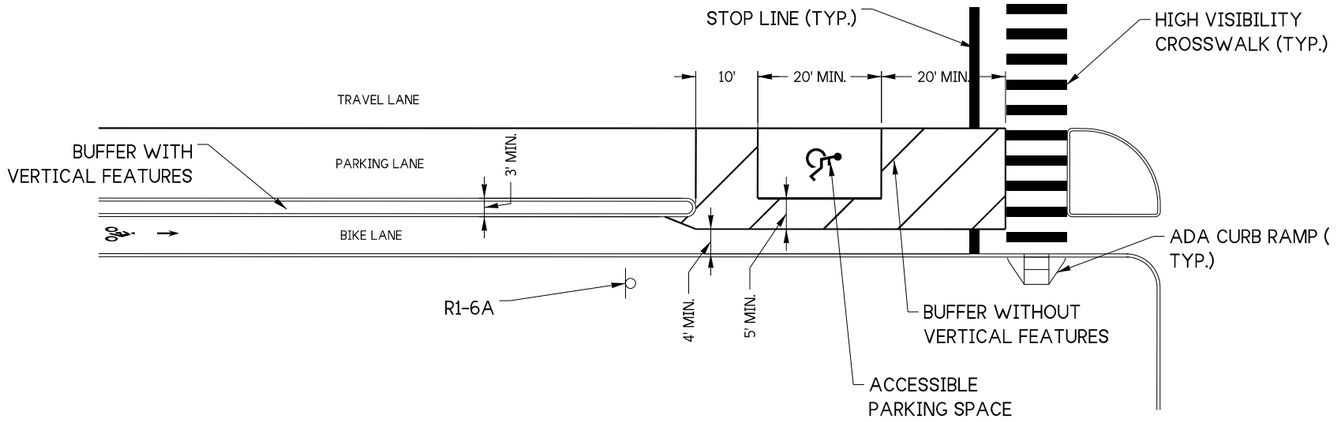
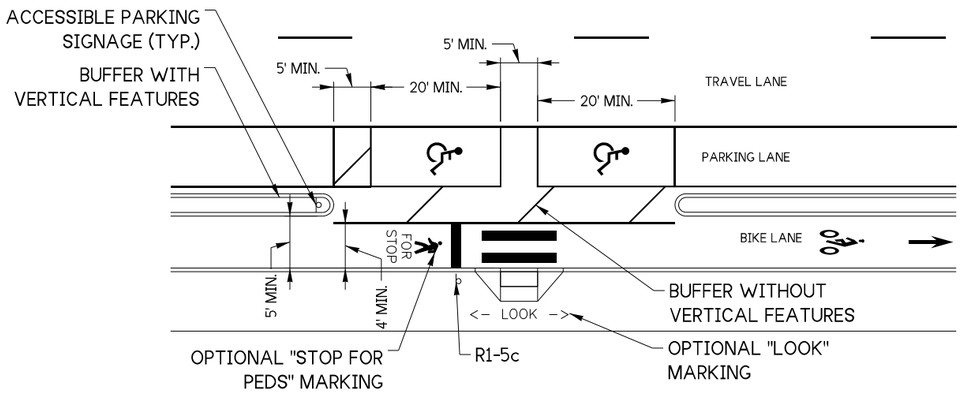
55 - Separated Bike Lanes

PLAN REF NO.

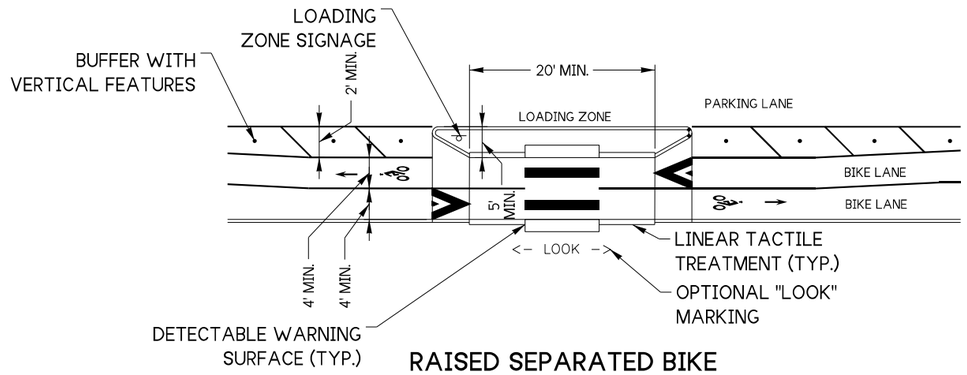
SHEET 44 OF 52 SHEETS



STREET LEVEL SEPARATED BIKE LANE WITH ACCESSIBLE PARKING SPOT AT BLOCK END



STREET LEVEL SEPARATED BIKE LANE WITH ACCESSIBLE PARKING SPOT AT MIDBLOCK



RAISED SEPARATED BIKE LANE AT LOADING LOCATION

NOTES

1. REFER TO THE U.S. ACCESS BOARD PUBLIC RIGHT-OF-WAY ACCESSIBILITY GUIDELINES FOR ADDITIONAL INFORMATION ON PARALLEL PARKING SPACE DIMENSIONS AND APPLICABILITY.

FILE NAME	55 - Separated Bike Lanes.dgn			REGION NO.	STATE	FED. AID PROJ. NO.	WSDOT Active Transportation Programs Design Guide Plan Sheet Details
TIME	3:58:37 PM			10	WASH		PLAN REF NO
DATE	12/11/2023			JOB NUMBER			
PLOTTED BY	WeisgeB						SHEET 45 OF 52 SHEETS
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CHECKED BY				CONTRACT NO.		LOCATION NO.	
PROJ. ENGR.							
REGIONAL ADM.	REVISION	DATE	BY				

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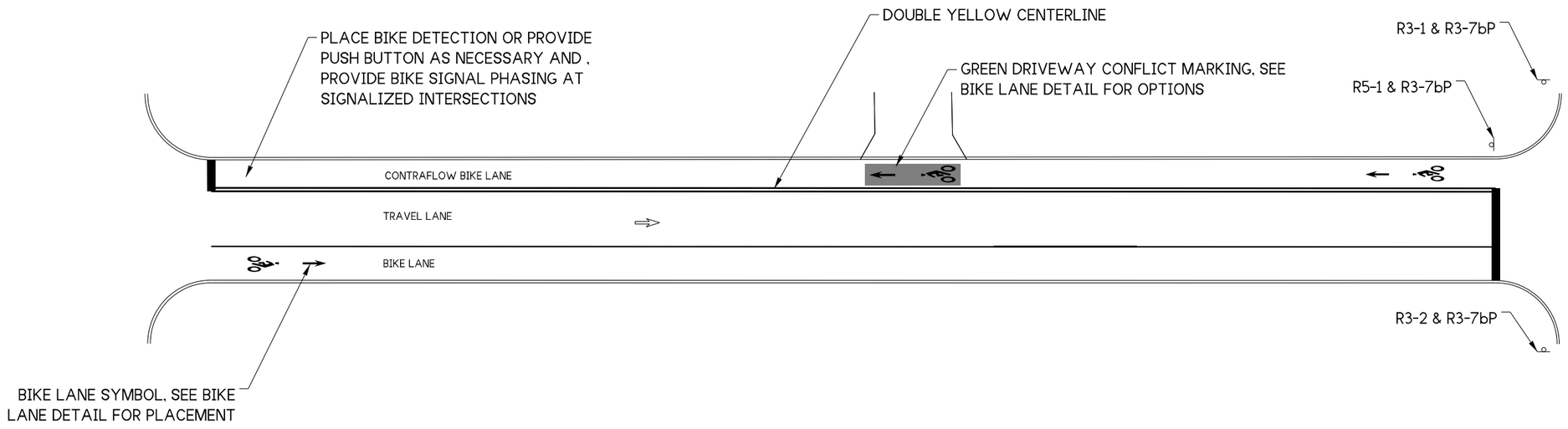
55 - Separated Bike Lanes



FILE NAME	56 - Contraflow Bike Lane.dgn				REGION NO. 10	STATE WASH	FED. AID PROJ. NO.	WSDOT	PLAN REF NO
TIME	3:58:40 PM				JOB NUMBER			PRELIMINARY PLAN	WSDOT Active Transportation Programs Design Guide Plan Sheet Details
DATE	12/11/2023								SHEET 46 OF 52 SHEETS
PLOTTED BY	WeisgeB								
DESIGNED BY									
ENTERED BY									
CHECKED BY					CONTRACT NO.		LOCATION NO.		
PROJ. ENGR.									
REGIONAL ADM.		REVISION	DATE	BY					

DATE
P.E. STAMP BOX - SEE SHEET CT1 FOR SIGNATURE

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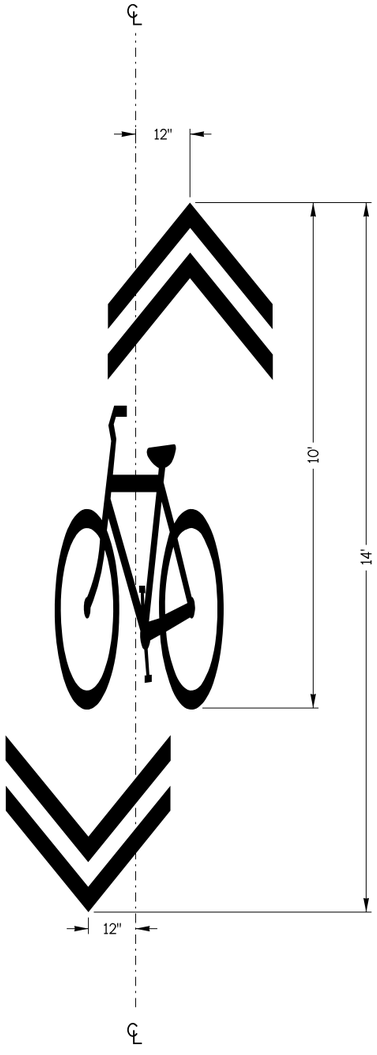
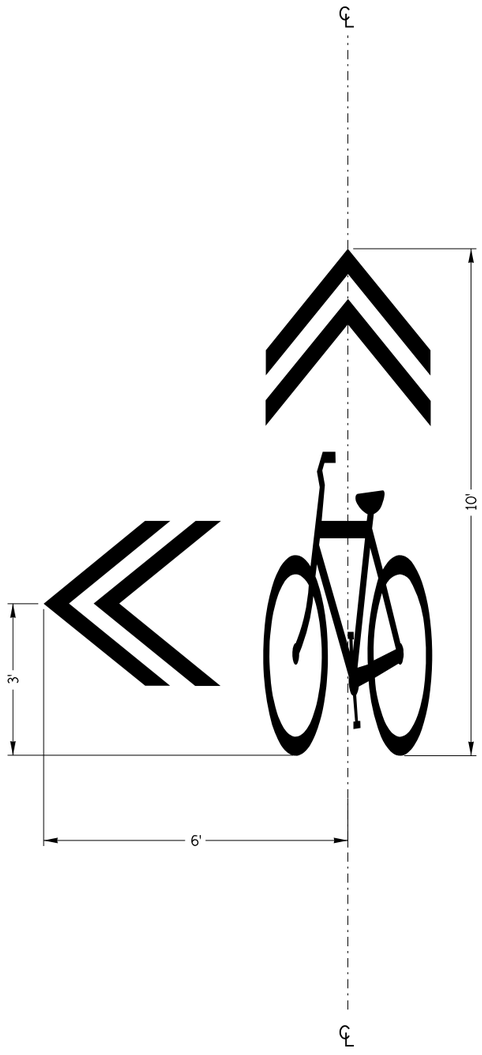
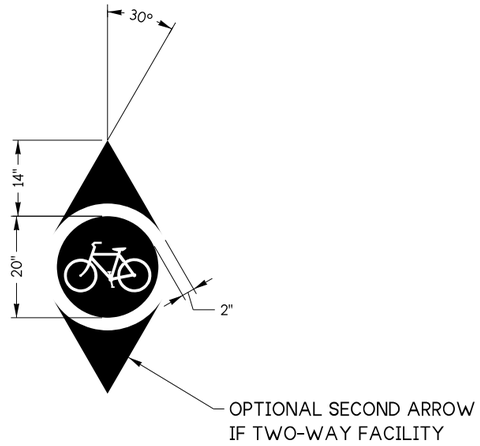
56 - Contraflow Bike Lane



BIDIRECTIONAL BIKE SHARROW



BIDIRECTIONAL BIKE SHARROW



BIKE DOT W/ ARROW(S)

FILE NAME	57 - Bike Wayfinding.dgn				REGION NO.	STATE	FED. AID PROJ. NO.		PLAN REF NO
TIME	3:58:43 PM				10	WASH		WSDOT Active Transportation Programs Design Guide Plan Sheet Details	
DATE	12/11/2023				JOB NUMBER				SHEET 47 OF 52 SHEETS
PLOTTED BY	WeisgeB								
DESIGNED BY									
ENTERED BY									
CHECKED BY					CONTRACT NO.		LOCATION NO.		
PROJ. ENGR.									
REGIONAL ADM.		REVISION	DATE	BY					

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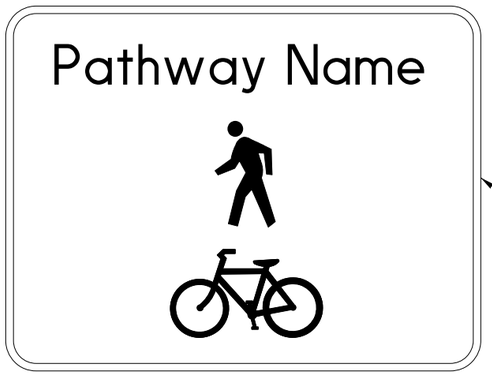
57 - Bike Wayfinding Signs and Markings



ROUTE CONFIRMATION SIGN

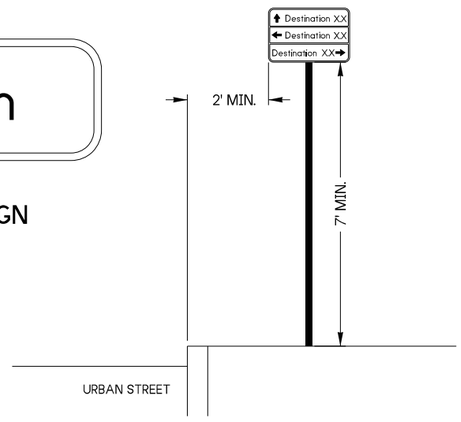
ROUTE CONFIRMATION SIGN

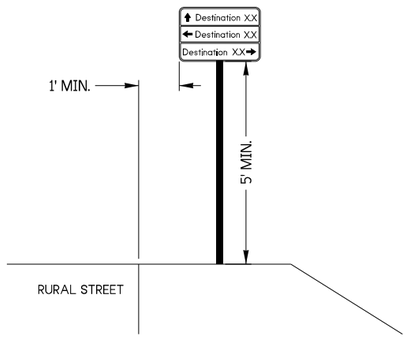
ROUTE DESTINATION SIGN

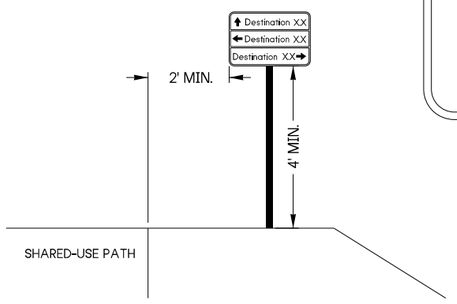
D1-Xc

MILEAGE ROUNDING GUIDELINES	
DISTANCE (MI)	GUIDELINE
< 0.2	DO NOT INCLUDE MILEAGE
0.2 - 5.0	ROUND TO NEAREST TENTH MILE
> 5.0	ROUND TO NEAREST WHOLE MILE

ROUTE DECISION SIGN







SIGN PLACEMENT

ROUTE MONITORING SIGN

MUTCD M5 & M6 SERIES SIGN

ROUTE MONITORING SIGN

FILE NAME	57 - Bike Wayfinding.dgn			REGION NO.	STATE	FED. AID PROJ. NO.	PLAN REF NO
TIME	3:58:44 PM			10	WASH		
DATE	12/11/2023			JOB NUMBER			
PLOTTED BY	WeisgeB						SHEET 48 OF 52 SHEETS
DESIGNED BY							
ENTERED BY							
CHECKED BY				CONTRACT NO.		LOCATION NO.	
PROJ. ENGR.							
REGIONAL ADM.		REVISION	DATE	BY			

WSDOT

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DATE
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DATE
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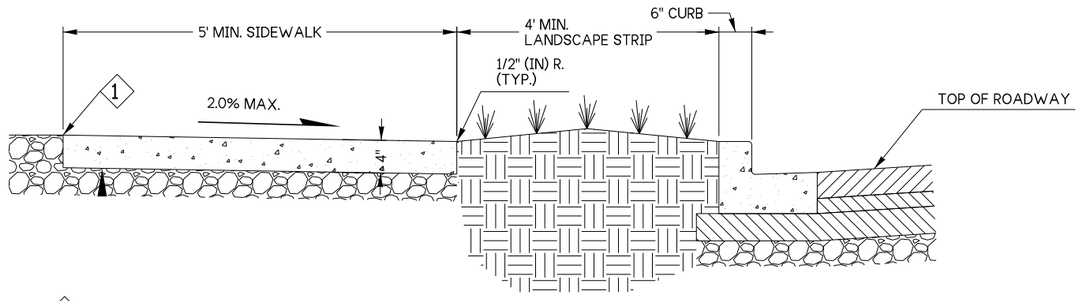
57 - Bike Wayfinding Signs and Markings

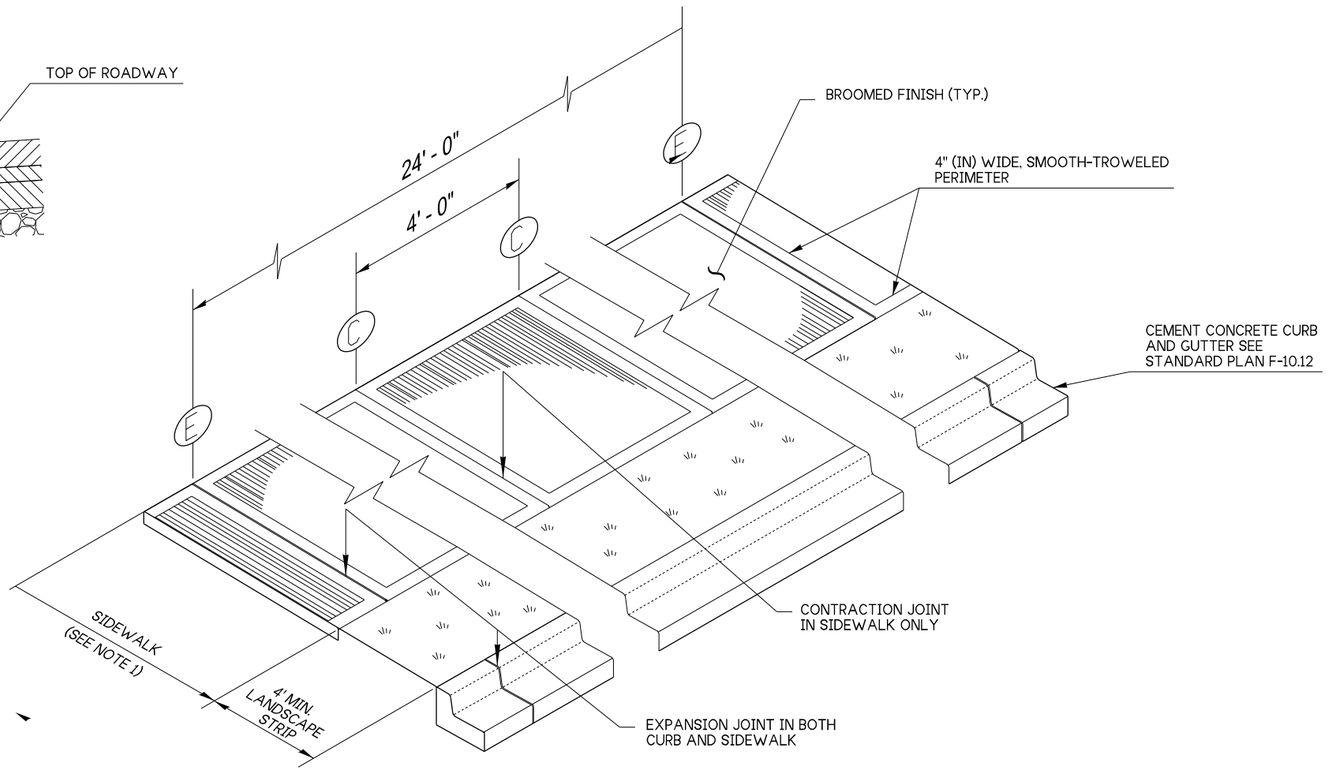
pw://projectstore.wsdot.wa.gov:WSDOT/Documents/_HQ/Active Transportation Division/Planning_Details/_DGN/Toole Design Files/57 - Bike Wayfinding

c:\users\weisgeb\pw_wsdot\d0610160\57 - Bike Wayfinding.dgn

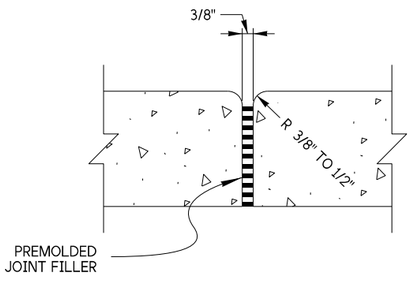
NOTE:

1. GRATINGS, ACCESS COVERS, JUNCTION BOXES, CABLE, VAULTS, PULL BOXES AND OTHER APPURTENANCES WITHIN THE SIDEWALK MUST HAVE SLIP RESISTANT SURFACES, BE FLUSH WITH SURFACE, AND MATCH GRADE OF THE SIDEWALK.

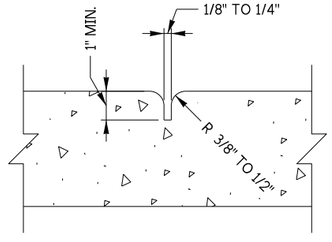




ISOMETRIC VIEW



(E) EXPANSION JOINT



(C) CONTRACTION JOINT

JOINT AND FINISH DETAIL

FILE NAME	59 - Sidewalk with Buffer.dgn				REGION NO.	STATE	FED. AID PROJ. NO.	PLAN REF NO
TIME	3:58:47 PM				10	WASH		
DATE	12/11/2023				JOB NUMBER			
PLOTTED BY	WeisgeB							SHEET 49 OF 52 SHEETS
DESIGNED BY								
ENTERED BY								
CHECKED BY					CONTRACT NO.		LOCATION NO.	
PROJ. ENGR.								
REGIONAL ADM.		REVISION	DATE	BY				

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59 - Sidewalk with Buffer

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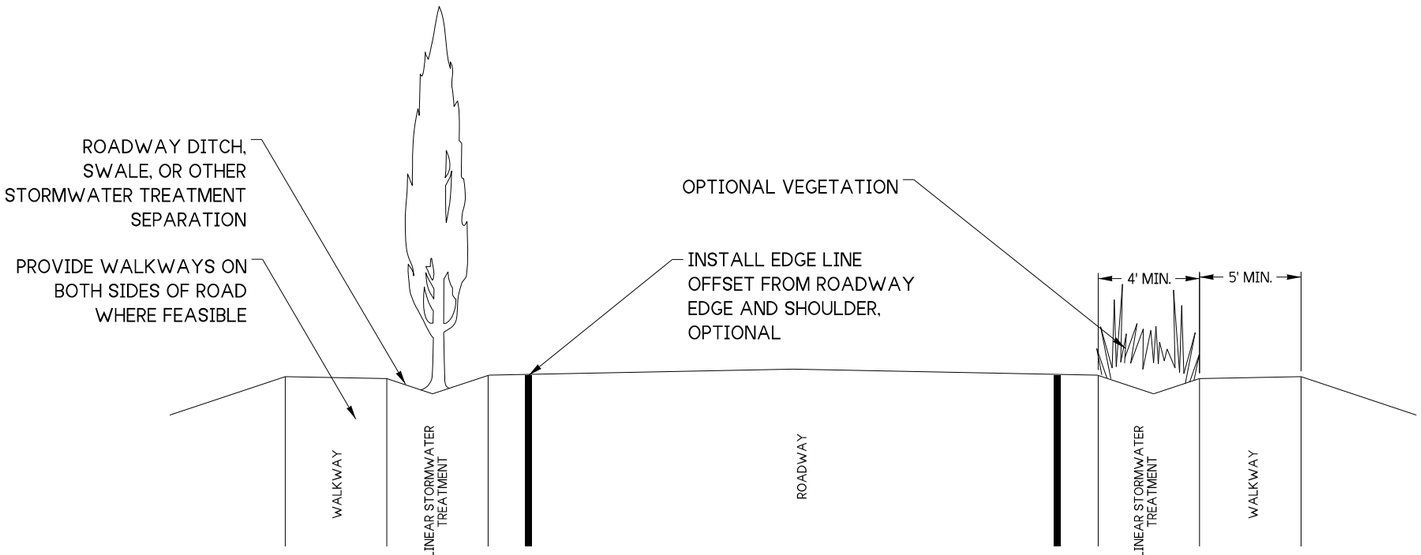

NOTES

1. BUFFER MAY INCLUDE A ROADWAY DITCH, BIOSWALE, RAIN GARDEN, OR OTHER STORMWATER MANAGEMENT.

2. PROVIDE CONTINUOUS VERTICAL DEPTH OR LANDSCAPING IN THE FORM OF CANOPY TREES, LOW SHRUBS, OR GROUNDCOVER IN THE BUFFER TO DETER DRIVERS FROM TRAVELING OR PARKING IN THE SEPARATION. MAINTAIN SUFFICIENT VISIBILITY FOR PEDESTRIANS AND DRIVERS AT DRIVEWAY CROSSINGS AND INTERSECTIONS.

FILE NAME	60 - Separated Walkway.dgn			
TIME	3:58:51 PM			
DATE	12/11/2023			
PLOTTED BY	WeisgeB			
DESIGNED BY				
ENTERED BY				
CHECKED BY				
PROJ. ENGR.				
REGIONAL ADM.		REVISION	DATE	BY

REGION NO. 10 | STATE WASH | JOB NUMBER | CONTRACT NO.

FED. AID PROJ. NO. | LOCATION NO.

WSDOT

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60 - Separated Walkway with
Linear Stormwater Treatments

PLAN REF NO

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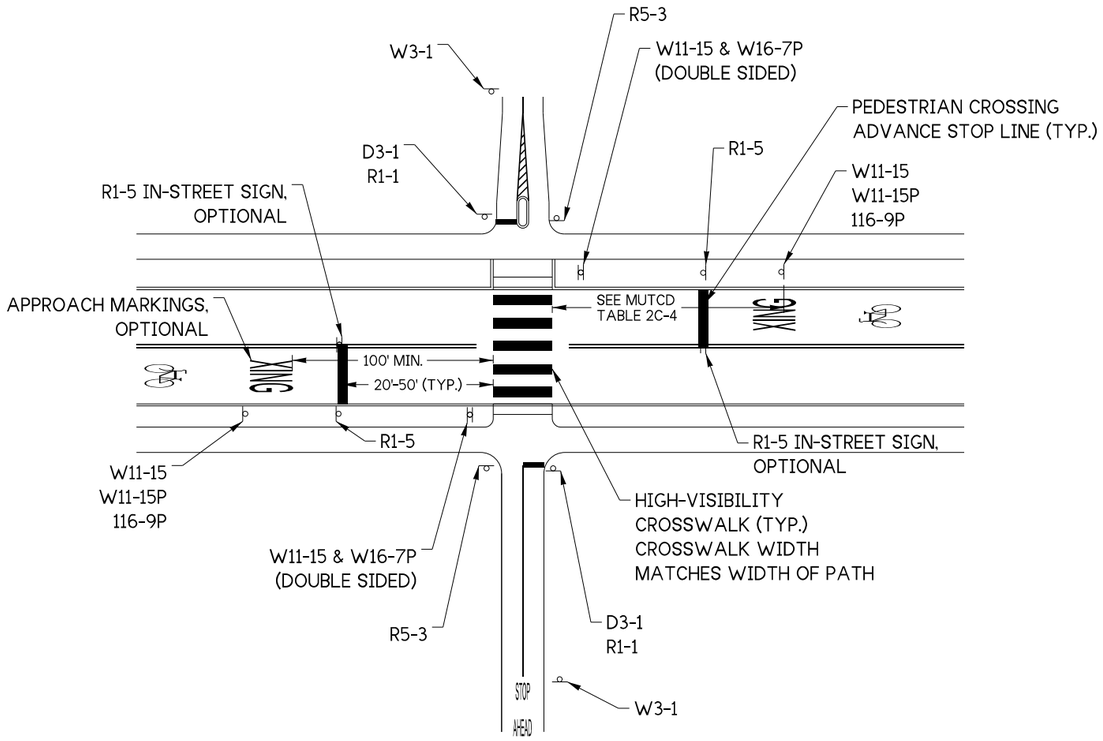
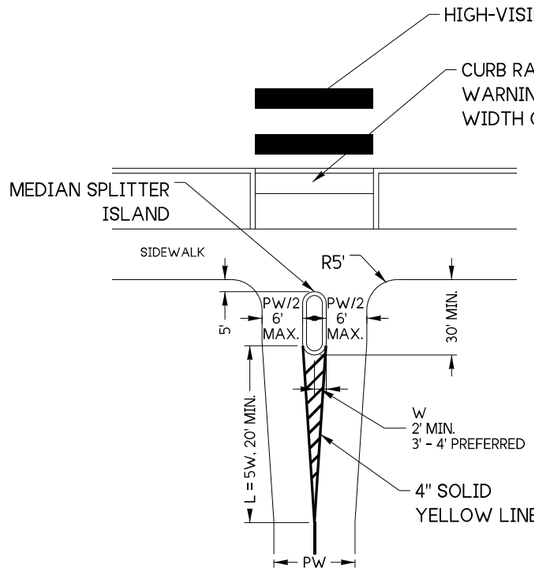


MIDBLOCK CROSSING

NOTES

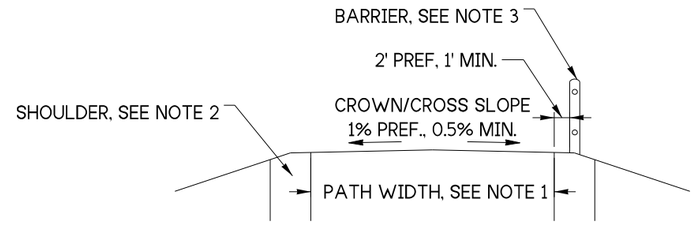
1. DETERMINE SHARED-USE PATH WIDTH BASED ON FHWA SHARED-USE PATH LEVEL OF SERVICE CALCULATOR OR THE SHARED-USE PATH OPERATING WIDTHS TABLE. MINIMUM 12' WIDTH.
2. RECOVERABLE GRADED SHOULDER OF 5' RECOMMENDED WIDTH (2' MINIMUM AT CONSTRAINED LOCATIONS) WITH MAXIMUM CROSS-SLOPE OF 1V:6H PROVIDED.
3. PROVIDE BARRIER ALONG PATH WHERE ADJACENT TO STEEP SLOPE OR HAZARDOUS CONDITION.
4. PROVIDE OVERHEAD CLEARANCE OF 10', 8' MINIMUM.
5. CONSULT THE AASHTO BIKE GUIDE FOR GEOMETRIC DESIGN OF SHARED USE PATHS INCLUDING VERTICAL AND HORIZONTAL ALIGNMENTS.
6. CONSIDER SEPARATION OF PEDESTRIANS AND BICYCLISTS ON HIGH VOLUME FACILITIES, SEE AASHTO BIKE GUIDE FOR DETAILS.
7. CROSSING CAN BE SUPPLEMENTED WITH CROSSING ENHANCEMENTS (E.G., RECTANGULAR RAPID FLASHING BEACON, PEDESTRIAN HYBRID BEACON, HALF SIGNAL, CROSSING ISLAND, RAISED CROSSING).
8. SEE SIDEPATH DETAIL FOR INFORMATION ON CROSSINGS NEAR INTERSECTIONS.



MEDIAN SPLITTER ISLAND NOTES

1. USE MOUNTABLE CEMENT CONCRETE TRAFFIC CURB AROUND THE PERIMETER OF THE ISLAND TO REDUCE THE POTENTIAL FOR PEDAL STRIKES. PAINT PERIMETER CURBING YELLOW TO INCREASE VISIBILITY OF THE ISLAND.
2. FOR ISLANDS THAT INCLUDE PLANTINGS, USE LOW GROWING, HARDY VEGETATION CAPABLE OF WITHSTANDING THE OCCASIONAL EMERGENCY/MAINTENANCE VEHICLE TRAVELING OVER IT.

TRAIL SPLITTER ISLAND FOR VEHICLE ACCESS PREVENTION



CROSS SECTION

MINIMUM (FT)	SUPLOS "C" PEAK HOUR VOLUMES AT PREFERABLE WIDTH
11	150-300
12 - 15	300 - 500
16 - 20+	500 - 600+

SHARED-USE PATH OPERATING WIDTHS

FILE NAME	62 - Shared-Use Path.dgn				REGION NO.	STATE	FED. AID PROJ. NO.
TIME	3:58:54 PM				10	WASH	
DATE	12/11/2023				JOB NUMBER		
PLOTTED BY	WeisgeB						
DESIGNED BY							
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CHECKED BY					CONTRACT NO.		LOCATION NO.
PROJ. ENGR.							
REGIONAL ADM.		REVISION	DATE	BY			

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62 - Shared-Use Path

PLAN REF NO

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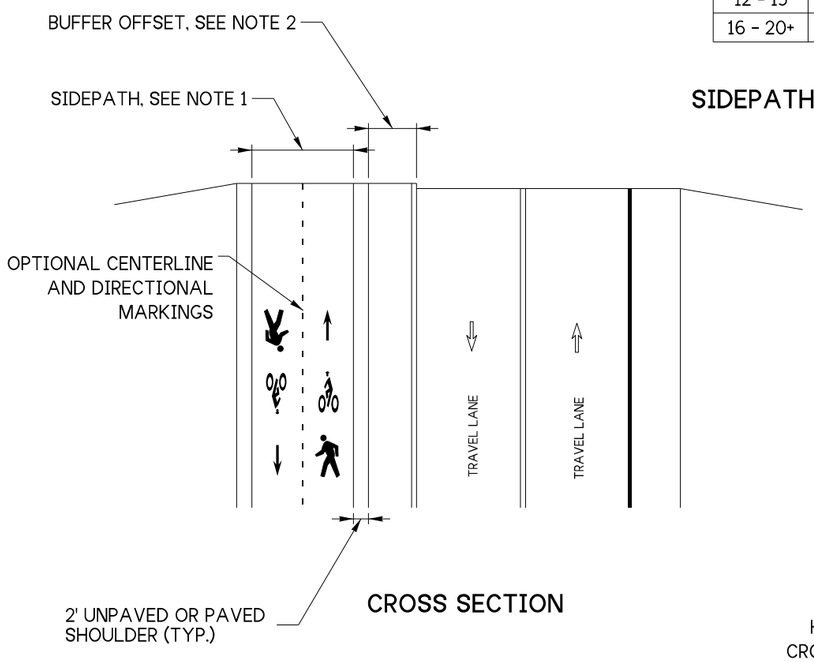
MINIMUM (FT)	SUPLOS "C" PEAK HOUR VOLUMES AT PREFERABLE WIDTH
11	150-300
12 - 15	300 - 500
16 - 20+	500 - 600+

SIDEPATH OPERATING WIDTHS



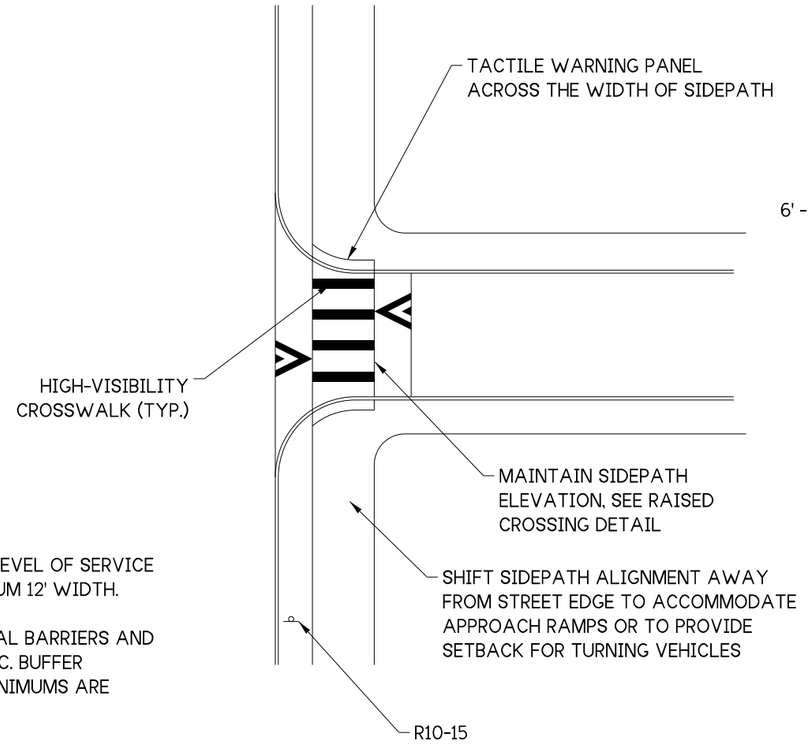
CROSS SECTION

NOTES

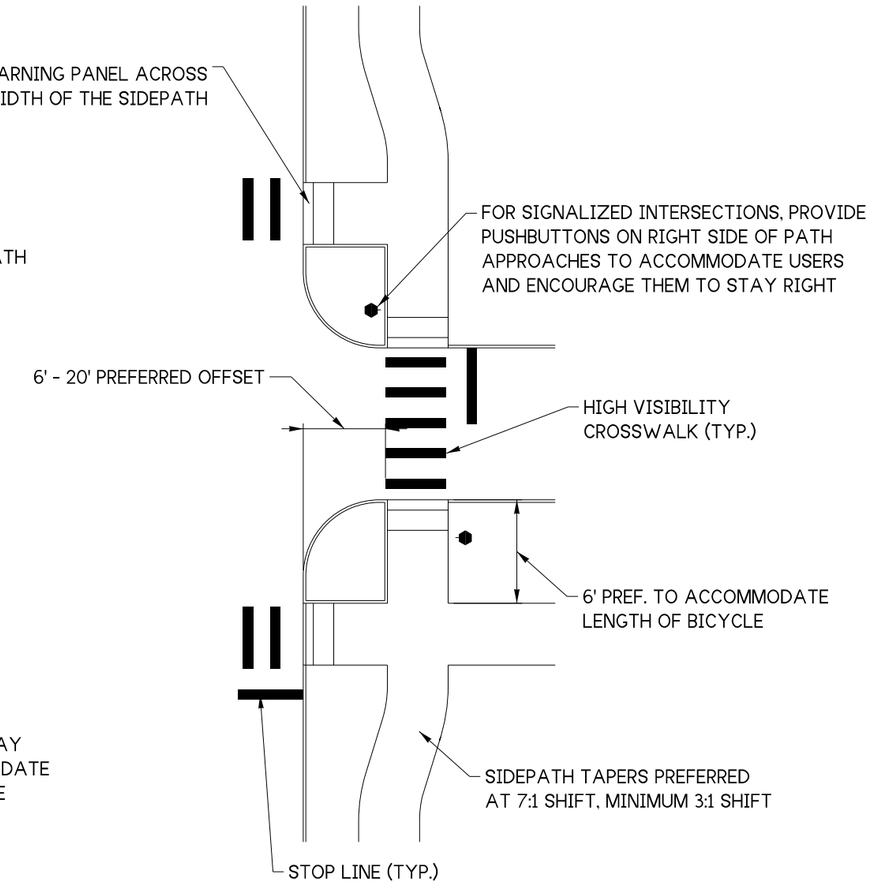
1. DETERMINE SIDEPATH WIDTH BASED ON FHWA SHARED-USE PATH LEVEL OF SERVICE CALCULATOR OR THE SIDEPATH OPERATING WIDTHS TABLE. MINIMUM 12' WIDTH.

2. MAXIMIZE BUFFER WIDTH WHERE POSSIBLE AND CONSIDER VERTICAL BARRIERS AND CURB AND GUTTER TO PROVIDE SEPARATION FROM VEHICLE TRAFFIC. BUFFER WIDTHS DO NOT INCLUDE SIDEPATH SHOULDERS. BUFFER WIDTH MINIMUMS ARE BASED ON ADJACENT ROADWAY CHARACTERISTICS:
   - FOR OPERATING SPEEDS ≤ 30MPH, 3' MINIMUM
   - FOR OPERATING SPEEDS ≥ 35MPH, 5' MINIMUM OR VERTICAL CONCRETE BARRIER

3. CONSIDER SEPARATION OF PEDESTRIANS AND BICYCLISTS ON HIGH VOLUME FACILITIES, SEE FHWA SHARED-USE PATH LEVEL OF SERVICE CALCULATOR.



RAISED MINOR STREET OR DRIVEWAY CROSSING



MAJOR STREET CROSSING

FILE NAME	63 - Sidepath.dgn				REGION NO.	STATE	FED. AID PROJ. NO.	WSDOT Active Transportation Programs Design Guide Plan Sheet Details
TIME	3:58:57 PM				10	WASH		PLAN REF NO
DATE	12/11/2023				JOB NUMBER			
PLOTTED BY	WeisgeB							SHEET 52 OF 52 SHEETS
DESIGNED BY								
ENTERED BY								
CHECKED BY					CONTRACT NO.		LOCATION NO.	
PROJ. ENGR.								
REGIONAL ADM.		REVISION	DATE	BY				

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63 - Sidepath

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ENGLISH

Title VI Notice to Public

It is the Washington State Department of Transportation's (WSDOT) policy to assure that no person shall, on the grounds of race, color, national origin, as provided by Title VI of the Civil Rights Act of 1964, be excluded from participation in, be denied the benefits of, or be otherwise discriminated against under any of its programs and activities. Any person who believes his/her Title VI protection has been violated, may file a complaint with WSDOT's Office of Equity and Civil Rights (OECR). For additional information regarding Title VI complaint procedures and/or information regarding our non-discrimination obligations, please contact OECR's Title VI Coordinator at (360) 705-7090.

Americans with Disabilities Act (ADA) Information

This material can be made available in an alternate format by emailing the Office of Equity and Civil Rights at wsdotada@wsdot.wa.gov or by calling toll free, 855-362-4ADA(4232). Persons who are deaf or hard of hearing may make a request by calling the Washington State Relay at 711.

ESPAÑOL

Notificación de Titulo VI al Público

La política del Departamento de Transporte del Estado de Washington (Washington State Department of Transportation, WSDOT) es garantizar que ninguna persona, por motivos de raza, color u origen nacional, según lo dispuesto en el Título VI de la Ley de Derechos Civiles de 1964, sea excluida de la participación, se le nieguen los beneficios o se le discrimine de otro modo en cualquiera de sus programas y actividades. Cualquier persona que considere que se ha violado su protección del Título VI puede presentar una queja ante la Oficina de Equidad y Derechos Civiles (Office of Equity and Civil Rights, OECR) del WSDOT. Para obtener más información sobre los procedimientos de queja del Título VI o información sobre nuestras obligaciones contra la discriminación, comuníquese con el coordinador del Título VI de la OECR al (360) 705-7090.

Información de la Ley sobre Estadounidenses con Discapacidades (ADA, por sus siglas en inglés)

Este material puede estar disponible en un formato alternativo al enviar un correo electrónico a la Oficina de Equidad y Derechos Civiles a wsdotada@wsdot.wa.gov o llamando a la línea sin cargo 855-362-4ADA(4232). Personas sordas o con discapacidad auditiva pueden solicitar la misma información llamando al Washington State Relay al 711.

한국어 – KOREAN

제6조 관련 공지사항

워싱턴 주 교통부(WSDOT)는 1964년 민권법 타이틀 VI 규정에 따라, 누구도 인종, 피부색 또는 출신 국가를 근거로 본 부서의 모든 프로그램 및 활동에 대한 참여가 배제되거나 혜택이 거부되거나, 또는 달리 차별받지 않도록 하는 것을 정책으로 하고 있습니다. 타이틀 VI에 따른 그/그녀에 대한 보호 조항이 위반되었다고 생각된다면 누구든지 WSDOT의 평등 및 민권 사무국(OECR)에 민원을 제기할 수 있습니다. 타이틀 VI에 따른 민원 처리 절차에 관한 보다 자세한 정보 및/또는 본 부서의 차별금지 의무에 관한 정보를 원하신다면, (360) 705-7090으로 OECR의 타이틀 VI 담당자에게 연락해주십시오.

미국 장애인법(ADA) 정보

본 자료는 또한 평등 및 민권 사무국에 이메일 wsdotada@wsdot.wa.gov 을 보내시거나 무료 전화 855-362-4ADA(4232)로 연락하셔서 대체 형식으로 받아보실 수 있습니다. 청각 장애인은 워싱턴주 중계 711로 전화하여 요청하실 수 있습니다.

русский – RUSSIAN

Раздел VI Общественное заявление

Политика Департамента транспорта штата Вашингтон (WSDOT) заключается в том, чтобы исключить любые случаи дискриминации по признаку расы, цвета кожи или национального происхождения, как это предусмотрено Разделом VI Закона о гражданских правах 1964 года, а также случаи недопущения участия, лишения льгот или другие формы дискриминации в рамках любой из своих программ и мероприятий. Любое лицо, которое считает, что его средства защиты в рамках раздела VI были нарушены, может подать жалобу в Ведомство по вопросам равенства и гражданских прав WSDOT (OECR). Для дополнительной информации о процедуре подачи жалобы на несоблюдение требований раздела VI, а также получения информации о наших обязательствах по борьбе с дискриминацией, пожалуйста, свяжитесь с координатором OECR по разделу VI по телефону (360) 705-7090.

Закон США о защите прав граждан с ограниченными возможностями (ADA)

Эту информацию можно получить в альтернативном формате, отправив электронное письмо в Ведомство по вопросам равенства и гражданских прав по адресу wsdotada@wsdot.wa.gov или позвонив по бесплатному телефону 855-362-4ADA(4232). Глухие и слабослышащие лица могут сделать запрос, позвонив в специальную диспетчерскую службу штата Вашингтон по номеру 711.(4232). Глухие и слабослышащие лица могут сделать запрос, позвонив в специальную диспетчерскую службу штата Вашингтон по номеру 711.

tiếng Việt – VIETNAMESE

Thông báo Khoản VI dành cho công chúng

Chính sách của Sở Giao Thông Vận Tải Tiểu Bang Washington (WSDOT) là bảo đảm không để cho ai bị loại khỏi sự tham gia, bị từ khước quyền lợi, hoặc bị kỳ thị trong bất cứ chương trình hay hoạt động nào vì lý do chủng tộc, màu da, hoặc nguồn gốc quốc gia, theo như quy định trong Mục VI của Đạo Luật Dân Quyền năm 1964. Bất cứ ai tin rằng quyền bảo vệ trong Mục VI của họ bị vi phạm, đều có thể nộp đơn khiếu nại cho Văn Phòng Bảo Vệ Dân Quyền và Bình Đẳng (OECR) của WSDOT. Muốn biết thêm chi tiết liên quan đến thủ tục khiếu nại Mục VI và/hoặc chi tiết liên quan đến trách nhiệm không kỳ thị của chúng tôi, xin liên lạc với Phối Trí Viên Mục VI của OECR số (360) 705-7090.

Thông tin về Đạo luật Người Mỹ tàn tật (Americans with Disabilities Act, ADA)

Tài liệu này có thể thực hiện bằng một hình thức khác bằng cách email cho Văn Phòng Bảo Vệ Dân Quyền và Bình Đẳng wsdotada@wsdot.wa.gov hoặc gọi điện thoại miễn phí số, 855-362-4ADA(4232). Người điếc hoặc khiếm thính có thể yêu cầu bằng cách gọi cho Dịch vụ Tiếp âm Tiểu bang Washington theo số 711.

العَرَبِيّة – ARABIC

العنوان 6 إشعار للجمهور

تتمثل سياسة وزارة النقل في ولاية واشنطن (WSDOT) في ضمان عدم استبعاد أي شخص، على أساس العرق أو اللون أو الأصل القومي من المشاركة في أي من برامجها وأنشطتها أو الحرمان من الفوائد المتاحة بموجبها أو التعرض للتمييز فيها بخلاف ذلك، كما هو منصوص عليه في الباب السادس من قانون الحقوق المدنية لعام 1964. ويمكن لأي شخص يعتقد أنه تم انتهاك حقوقه التي يكفلها الباب السادس تقديم شكوى إلى مكتب المساواة والحقوق المدنية (OECR) التابع لوزارة النقل في ولاية واشنطن. للحصول على معلومات إضافية بشأن إجراءات الشكاوى و/أو بشأن التزاماتنا بعدم التمييز بموجب الباب السادس، يرجى الاتصال بمنسق الباب السادس في مكتب المساواة والحقوق المدنية على الرقم 7090-705 (360).

معلومات قانون الأمريكيين ذوي الإعاقة (ADA)

يمكن توفير هذه المواد في تنسيق بديل عن طريق إرسال رسالة بريد إلكتروني إلى مكتب المساواة والحقوق المدنية على wsdotada@wsdot.wa.gov أو عن طريق الاتصال بالرقم المجاني: 855-362-4ADA (4232). يمكن للأشخاص الصم أو ضعاف السمع تقديم طلب عن طريق الاتصال بخدمة Washington State Relay على الرق 711.

中文 – CHINESE

《权利法案》Title VI公告

<华盛顿州交通部(WSDOT)政策規定，按照《1964 年民權法案》第六篇規定，確保無人因種族、膚色或國籍而被排除在WSDOT任何計畫和活動之外，被剝奪相關權益或以其他方式遭到歧視。如任何人認為其第六篇保護權益遭到侵犯，則可向WSDOT的公平和民權辦公室(OECR)提交投訴。如需關於第六篇投訴程式的更多資訊和/或關於我們非歧視義務的資訊，請聯絡OECR的第六篇協調員，電話(360) 705-7090。

《美国残疾人法案》(ADA)信息

可向公平和民權辦公室發送電子郵件wsdotada@wsdot.wa.gov或撥打免費電話 855-362-4ADA(4232)，以其他格式獲取此資料。听力丧失或听觉障碍人士可拨打711联系Washington州转接站。

Af-soomaaliga – SOMALI

Ciwaanka VI Ogeysiiska Dadweynaha

Waa siyaasada Waaxda Gaadiidka Gobolka Washington (WSDOT) in la xaqiijiyo in aan qofna, ayadoo la cuskanaayo sababo la xariira isir, midab, ama wadanku kasoo jeedo, sida ku qoran Title VI (Qodobka VI) ee Sharciga Xaquuqda Madaniga ah ah oo soo baxay 1964, laga saarin ka qaybgalka, loo diidin faa'iidooyinka, ama si kale loogu takoorin barnaamijyadeeda iyo shaqooyinkeeda. Qof kasta oo aaminsan in difaaciisa Title VI la jebiyay, ayaa cabasho u gudbin kara Xafiiska Sinaanta iyo Xaquuqda Madaniga ah (OECR) ee WSDOT. Si aad u hesho xog dheeraad ah oo ku saabsan hanaannada cabashada Title VI iyo/ama xogta la xariirta waajibaadkeena ka caagan takoorka, fadlan la xariir Iskuduwaha Title VI ee OECR oo aad ka wacayso (360) 705-7090.

Macluumaadka Xeerka Naafada Marykanka (ADA)

Agabkaan ayaad ku heli kartaa qaab kale adoo iimeel u diraaya Xafiiska Sinaanta iyo Xaquuqda Madaniga ah oo aad ka helayso wsdotada@wsdot.wa.gov ama adoo wacaaya laynka bilaashka ah, 855-362-4ADA(4232). Dadka naafada maqalka ama maqalku ku adag yahay waxay ku codsan karaan wicitaanka Adeega Gudbinta Gobolka Washington 711.

If you have difficulty understanding English, you may, free of charge, request language assistance services by calling 360-705-7090 or email us at: TitleVI@wsdot.wa.gov

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ESPAÑOL – SPANISH

Servicios de traducción

Aviso a personas con dominio limitado del idioma inglés: Si usted tiene alguna dificultad en entender el idioma inglés, puede, sin costo alguno, solicitar asistencia lingüística con respecto a esta información llamando al 360-705-7090, o envíe un mensaje de correo electrónico a: TitleVI@wsdot.wa.gov

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한국어 – KOREAN

번역 서비스

영어로 소통하는 것이 불편하시다면 360-705-7090, 으로 전화하시거나 다음 이메일로 연락하셔서 무료 언어 지원 서비스를 요청하실 수 있습니다: TitleVI@wsdot.wa.gov

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русский – RUSSIAN

Услуги перевода

Если вам трудно понимать английский язык, вы можете запросить бесплатные языковые услуги, позвонив по телефону 360-705-7090, или написав нам на электронную почту: TitleVI@wsdot.wa.gov

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tiếng Việt – VIETNAMESE

các dịch vụ dịch thuật

Nếu quý vị không hiểu tiếng Anh, quý vị có thể yêu cầu dịch vụ trợ giúp ngôn ngữ, miễn phí, bằng cách gọi số 360-705-7090, hoặc email cho chúng tôi tại: TitleVI@wsdot.wa.gov

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ARABIC – اَلْعَرَبِيَّةُ

خ دمات الترجمة

إذا كنت تجد صعوبة في فهم اللغة الإنجليزية، فيمكنك مجا نًا طلب خدمات المساعدة اللغوية عن
طر يق الاتصال بالرقم 360-705-7090 أو مراسلتنا عبر البريد الإلكتروني : TitleVI@wsdot.wa.gov

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中文 – CHINESE

翻译服务

如果您难以理解英文 , 则请致电 : 360-705-7090 , 或给我们发送电子邮件 : TitleVI@wsdot.wa.gov , 请求获取免费语言援助服务。

Af-soomaaliga – SOMALI

Adeegyada Turjumaada

Haddii ay kugu adag tahay inaad fahamtid Ingiriisida, waxaad, bilaash, ku codsan kartaa adeegyada caawimada luuqada adoo wacaaya 360-705-7090 ama iimayl noogu soo dir: TitleVI@wsdot.wa.gov