APPENDIX F:

Pedestrian Crossing Policy

This document is an update to the City of Vancouver's previous Pedestrian Crossing Improvement Policy, which was adopted in 2007 and last updated in 2010

CITY OF VANCOUVER

PEDESTRIAN CROSSING IMPROVEMENT POLICY AND DESIGN GUIDE

DRAFT – May 5, 2023

Introduction

This Pedestrian Crossing Improvement Policy updates City of Vancouver's previous Pedestrian Crossing Improvement Policy, which was adopted in 2007 and last updated in 2010. The goals of this policy update are to:

- Include crossing enhancements that were not included in the 2010 policy
- Expand the scope of the policy to provide crossing evaluation and treatment options for controlled intersections and school areas
- Provide a framework for crosswalks to be installed proactively in instances where traditional crossing warrants are not met
- Reduce delay for people walking and rolling, and encourage crossing at safe locations by reducing the distance between marked and enhanced crosswalks
- Broaden how pedestrian demand is evaluated

This document is intended to serve as the policy document that guides planning, engineering, and policy for City staff in determining where and how to improve crosswalks on City-owned and maintained streets to increase pedestrian safety and mobility. . Throughout this document, the terms "walking" and "pedestrian" are used to refer broadly to people who navigate sidewalks and streets without a vehicle, whether they walk on two feet or use a wheelchair or other device.

Requests from Vancouver residents, businesses, and other organization for crossing improvements must be considered and evaluated in addition to policies set forth in the Transportation System Plan (TSP) and in this document including:

- Whether the location helps meet desired crossing spacing guidelines in a Pedestrian Corridor or Center
- How the location ranks in the adopted TSP prioritization framework, which identifies the priority pedestrian network as well as complete corridors where infrastructure for all modes should be prioritized.

- Whether the location is appropriate based on the evaluation process, engineering review, and financial ability.

Policy Framework

The Vancouver Transportation System Plan (TSP) establishes policies to create a safe, convenient, and accessible environment for walking throughout the city. Prioritizing pedestrian mobility and safety is essential to help the City meeting its climate, equity, and safety goals, because:

- Walking does not create greenhouse gas emissions
- Walking is low or no-cost
- Walking provides health benefits to communities that go beyond transportation
- Pedestrians are the most vulnerable people using the transportation system; investing in safe and walkable infrastructure that minimizes risks to pedestrians is critical

Walking is the most fundamental means of transportation. Trips on public transit and even by motor vehicle end and begin with a walk. This policy supports many of the other policies in the TSP, including 15-minute neighborhoods, the low-stress pedestrian network, and complete corridors.

Crosswalk Definitions

An **unmarked crosswalk** is a legal crossing at a public road intersection without any pavement marking (i.e. marked crosswalk) to delineate the crossing.

A **marked crosswalk** is a legal crossing that is delineated with pavement markings.

A **controlled crosswalk** is a legal crossing across a roadway approach that is controlled by a traffic control device such as a stop sign, traffic signal, or pedestrian beacon.

An **uncontrolled crosswalk** is a legal crossing across a roadway approach that is not controlled by a traffic control device.

Washington State Law

Per the Revised Code of Washington (RCW) 46.61.235 and RCW 46.61.240, every public road intersection in Washington is a legal crossing unless marked with a physical sign prohibiting crossing.

Applicable Standards and Guidelines

The FHWA *Manual on Uniform Traffic Control Devices (2009)* (MUTCD) provides standard and guidance for traffic control devices, including markings, signs, beacons, and signals. A new

eleventh edition of the MUTCD is expected to be released in 2023 and will supersede the 2009 edition.

The Federal Highway Administration (FHWA) *Guide for Improving Pedestrian Safety at Uncontrolled Crossing Locations* (2018) suggests a process for determining appropriate safety countermeasures to apply at uncontrolled crossings and provides a table of recommended treatments based on the width, traffic volume, and traffic speeds of the road. These recommendations are based on research evaluating the effectiveness of each treatment under specific conditions.

FHWA's *Public Right-of-Way-Accessibility Guidelines* (PROWAG) (2011) provides guidelines for the design, construction, and alteration of pedestrian facilities in the public right-of-way to ensure universal access of pedestrian facilities.

The State of *Washington Administrative Code* amends the MUTCD to specify signs and crosswalk marking patterns to comply with laws and policies specific to the RCW.

The Washington State Department of Transportation (WSDOT) *Traffic Manual and Sign Fabrication Manual* provides guidance on pedestrian crossings, crosswalk specifications and standard details for crosswalks and stop lines.

The National Association of City Transportation Officials (NACTO) *Urban Street Design Guide* provides detailed design guidance for pedestrian crossings. Vancouver is a NACTO member and references NACTO for design guidance. The Washington State Department of Transportation (WSDOT) has endorsed NACTO design guidance. FHWA has also recognized the NACTO U*rban Street Design Guide* as compliant with the MUTCD.

Other guidance deemed relevant may be utilized for analysis of pedestrian crossings, including example crossings and case studies by other municipalities.

Expanding upon MUTCD Warrants

The MUTCD is intended to provide uniformity and consistency in the implementation and use of traffic control devices. Historically, its primary focus in regard to people crossing has been on prioritizing the free-flow of vehicular traffic over providing people with a safe, convenient place to cross the street; as mentioned throughout Section 4C - Traffic Control Signal Needs Studies in the MUTCD manual. Failure to meet MUTCD warrants is often used as a planning and/or engineering justification to dismiss an otherwise convenient, feasible, safe, and sensible crossings because, for example, there aren't enough people currently crossing at a given location to justify installing striping, signage, a beacon, or signal. There may be a desire for people to cross a street at a given location and no way to safely or comfortably do so; therefore, the presence of people not crossing a street is not a direct indication of demand, but a reflection of the safety of the built environment.

This policy update allows additional planning and engineering judgement based on an objective set of criteria to be utilized to justify a convenient, safe, sensible, and feasible

crossing if MUTCD warrants are not met, based on set of considerations and defined criteria. All marked crosswalks shall meet roadway geometric, traffic safety, and operational requirements, further discussed in "Site Evaluation".

Evaluation of Locations

Crossing Spacing

The City of Vancouver TSP identifies a network of Pedestrian Corridors and Centers. These locations have a concentration of destinations for people walking including transit stops, commercial and institutional land uses, and multifamily housing. Pedestrian Corridors and Centers are places that see a high level of pedestrian demand today, or are likely to continue to in the future with land use development and an improved walking environment. One way to improve the walking environment is to minimize delay and improve safety for pedestrians by putting in place new and improved marked crossings of streets. This policy sets a long-term goal for the spacing of marked and enhanced crosswalks.

Desired spacing of marked and enhanced crosswalks on the Pedestrian Network:

- Approximately every two blocks (530 feet) on pedestrian corridors within pedestrian centers
- Approximately every three blocks (800 feet) on pedestrian corridors outside of pedestrian centers

Specific locations for new or improved crossings in Pedestrian Corridors and Centers should be identified with the aim of meeting pedestrian mobility goals and the crossing spacing guidelines while also considering the criteria described in the Site Evaluation section below.

Crossing Improvement Project Prioritization

Crossing improvement projects will be prioritized and phased for implementation using the approach adopted in the TSP for all capital projects that are funded and implemented by the City of Vancouver. The prioritization framework advances projects that help achieve universal access, safety, equity, and climate goals. In addition, there may be opportunities to implement crossing improvements in conjunction with development projects, transit projects, street improvement projects, utility projects, and other projects within the public right-of-way.

Site Evaluation

Description of criteria

School walk routes - school districts in Washington are required by WAC 392-141-340 to have suggested walk route plans for every elementary school where children walk to school. The plan must cover a one-mile walking distance from the school, as measured along the shortest walkway. This may also be known as "Safe Routes to School".

Shared-use path or neighborhood greenway crossing – places where a shared-use path or neighborhood greenway crosses a street.

Daily traffic volumes – new marked crosswalks should be considered at uncontrolled locations on streets with an average daily traffic (ADT) volume of 1,500 per day and above, and at stop-controlled locations with an ADT volumes of 3,000 per day and above.

Locations with high existing or potential demand are defined as locations that meet any of the following conditions:

- The location is on a pedestrian corridor or with a pedestrian center, as designated by the Vancouver TSP.
- The location connects to a high trip generator such as a school, park, grocery store, hospital, commercial center, or entertainment venue.
- There is a transit stop, shared-use path, or neighborhood greenway crossing at the location, or the sidewalk ends on one side of the street and continues on the other.
- Any sidewalk, shared-use path, or street adjacent to the location sees 20 or more pedestrians per hour in the peak hour or 18 pedestrians per hour across two peak hours. Children, older adults, and people with disabilities are counted as two people each.

Stopping sight distance – sight distance is the length of the roadway ahead that is visible to a driver. Approaching a crosswalk, it should be sufficient to allow for a vehicle to stop given the design speed. The table below recommends typical stopping sight distance by design speed, but engineering judgement should be used based on the particulars of the location.

Figure 1 Stopping Sight Distance by Design Speed

Design Speed (mph)	Stopping Sight Distance (ft)
15	80
20	115
25	155
30	200
35	250

Design Speed (mph)	Stopping Sight Distance (ft)
40	305
45	360
50	425
55	495

Source: American Association of State Highway and Transportation Officials (AASHTO), *Policy on Geometric Design of Highways and Streets.*

Americans with Disabilities Act (ADA) accessibility – the immediate vicinity of the crosswalk should be ADA accessible or should be accompanied by the installation of curb ramps and the removal of barriers to universal access.

Crash history – locations with a history of pedestrian collisions are a high priority for crossing improvements. Locations that have characteristics associated with a high rate of fatal and severe injury crashes should be assessed to understand causes as well as all countermeasures that should be be considered.

Distance to nearest marked crossing – the distance to the nearest existing marked crosswalk, whether controlled or uncontrolled, should be at least 300 feet.

All potential crossing locations are subject to review and approval by City Traffic Engineering.

Figure 2 Uncontrolled Crossing Location Evaluation

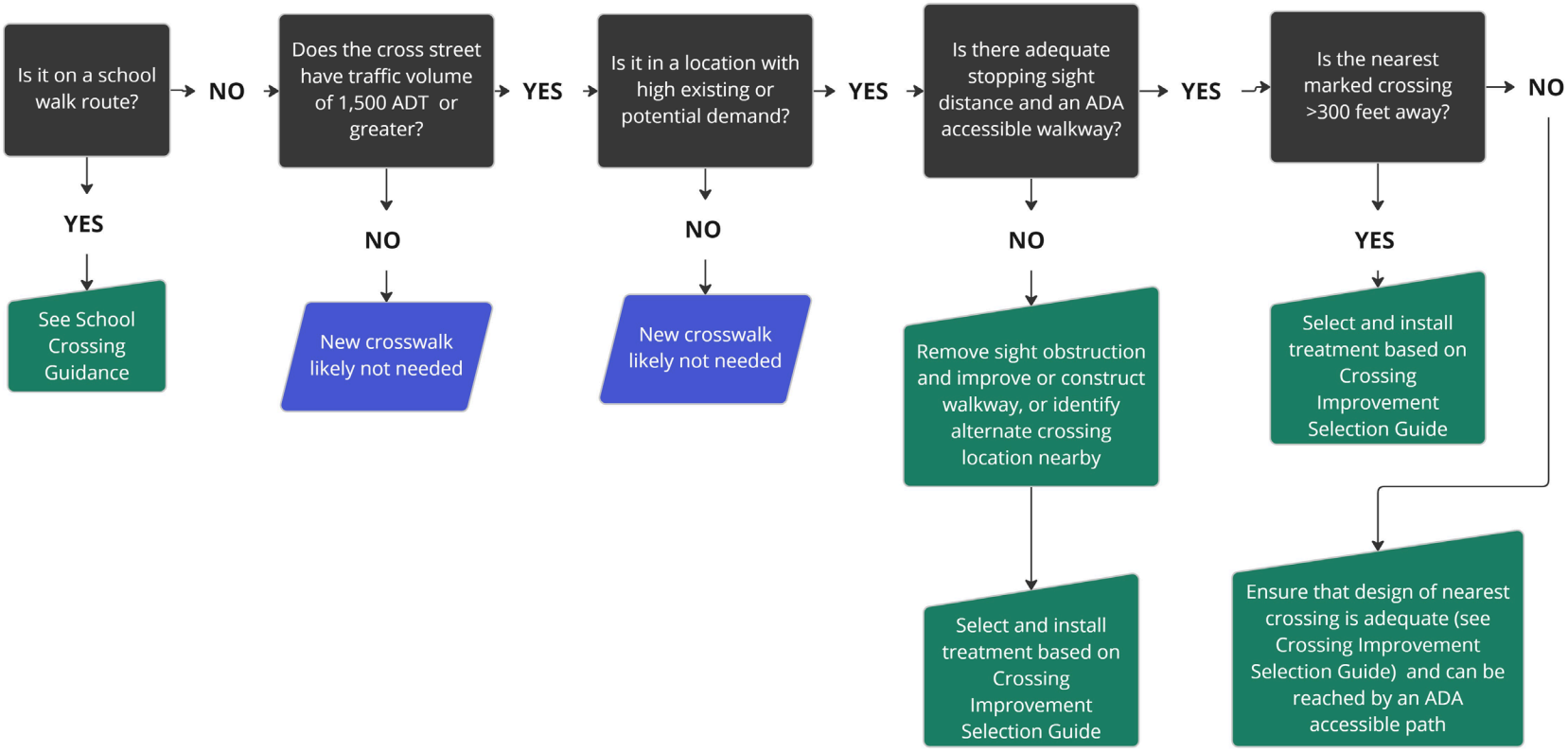
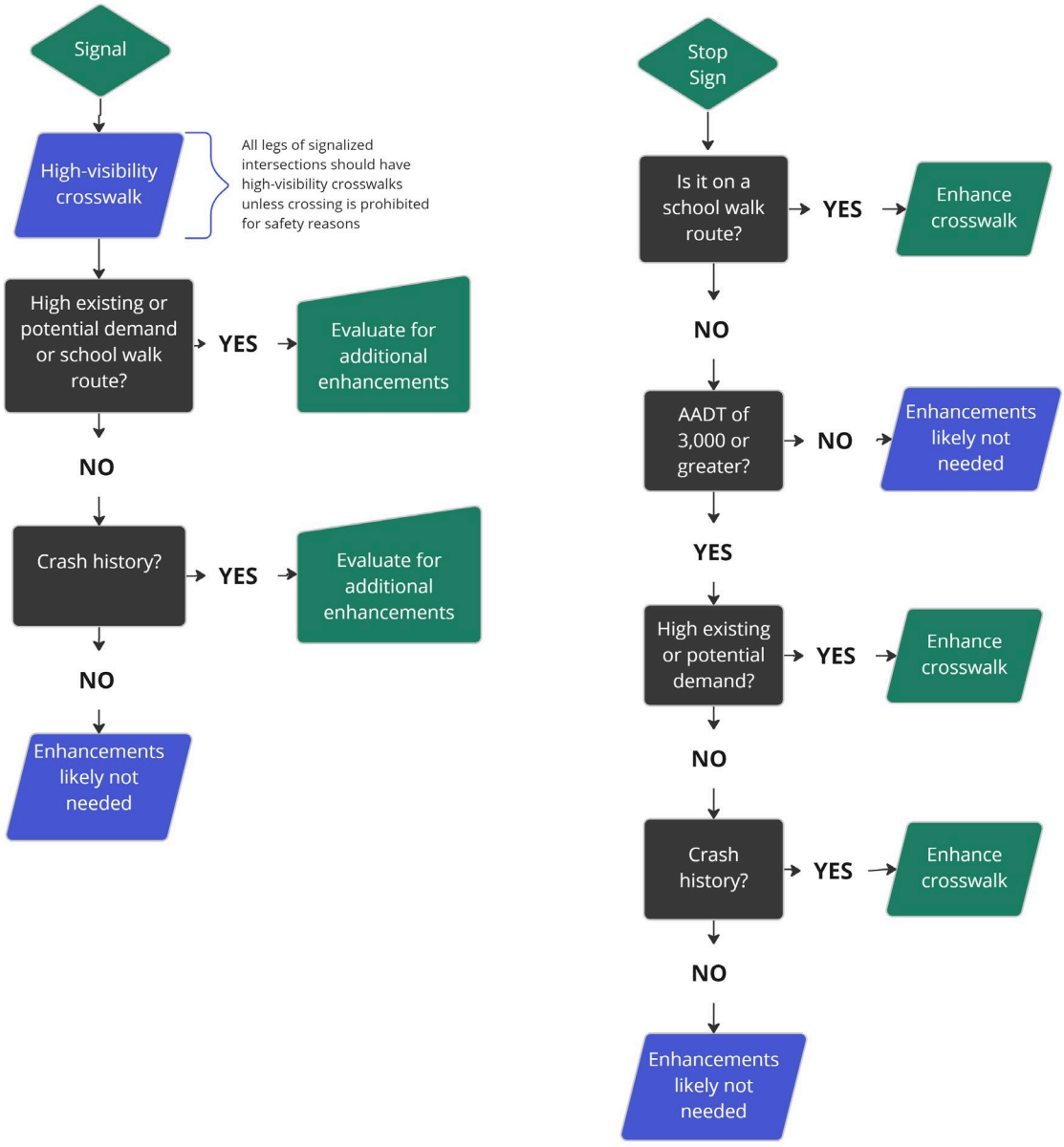


Figure 3 Controlled Crossing Location Evaluation



Guide to Crossing Treatments

After a location has been selected for a new or enhanced pedestrian crossing, a treatment must be selected that is appropriate for the context. This section describes the elements that can be used at different types of pedestrian crossings and provides treatment selection guidance. The City of Vancouver utilizes NACTO design guidance and has standard design details for many of the elements described below.

Basic Elements

These basic elements must be included at all marked crosswalk locations.

Curb ramps provide universal access from the sidewalk level to the crosswalk and are mandated by ADA to accommodate the transition from sidewalk to street grade. Curb ramps will be designed according to City of Vancouver Engineering design standards.

Marked crosswalks in Vancouver are marked in one of two styles. The standard crosswalk is a continental crosswalk with high-visibility markings. High-visibility markings are a proven safety countermeasure recommended by the FHWA and should be installed at all new or improved crosswalk locations. Many existing crosswalks in Vancouver use the crosswalk alternate, consisting of two parallel bars running perpendicular to vehicle travel, which is considered lower-visibility markings and should not be the standard at new or improved crosswalks.

Lighting should be installed in accordance with City of Vancouver lighting requirement.

Supplemental signs and markings include advance stop bars and advance pedestrian crossing signs. Stop bars are required at all crosswalks. Advance crossing signs are not required at controlled locations, but should be used at uncontrolled locations.

Geometric Elements

Design Treatments to Reduce Crossing Distance

WHAT IS IT

Curb extensions and **pedestrian refuge islands** are types of hardscape, geometric improvements that shorten the crossing distance for people walking. Curb extensions extend the sidewalk at corners, usually into the parking lane. Pedestrian refuge islands create designated space in the median for people walking, allowing them to cross in two stages and reducing their vulnerability to people driving, which is particularly beneficial for people who walk or use mobility devices at a slower pace.

WHY

Widening sidewalks at intersections has been shown to reduce collisions by 12%.[1] Pedestrian refuge islands have been shown to reduce pedestrian-involved crashes by 56%.[2]

CONSIDERATIONS

These enhancements can be applied at uncontrolled, stop or signal controlled crosswalks. Refuge islands are a best practice at uncontrolled crossings on roads with four or more lanes. Space for curb extensions or refuge islands can be made by narrowing lanes, using parking setbacks, or eliminating a lane. Refuge islands can also be created where a sufficiently wide median already exists.

Drainage improvements may be required to install hardscape elements which modify the gutter flow line. This requires further engineering study.

Design Treatments to Reduce Vehicle Speeds

WHAT IS IT

Raised crosswalks, reduced curb radii, slip lane closure, **standard lane widths**, and **centerline hardening** are enhancements that reduce the speed of vehicles.

- Raised crosswalks are elevated above the level of driving lanes and act as a speed cushion while making pedestrians more visible to drivers.
- Reduced curb radii cause vehicles to make sharper turns, which require slower speeds by all vehicles. The expanded corner also provides additional sidewalk space at corners.
- Right-turn slip lanes allow vehicles to take right turns at a relatively high speed. Closing slip lanes create a sharper right turn movement which vehicles must navigate at a slower speed., The closure also has the benefit of reducing the number and distance of the pedestrian crossing.
- Striping travel lane widths no greater than 11’ in urban areas creates a visual effect which encourages people driving to travel at lower speeds. In multilane facilities, 11’ curbside lane with 10.5’ inner lanes further encourages lower speeds. These widths are appropriate to accommodate all vehicles on urban roadways. Further narrow lane width constrictions, such as 10’ lanes, at marked crossings provides additional speed reductions and safety benefits.

[1] FHWA crash modification clearinghouse

[2] https://highways.dot.gov/safety/proven-safety-countermeasures/medians-and-pedestrian-refuge-islands-urban-and-suburban-areas

- Centerline hardening adds a vertical element (raised markings or posts) to the street centerline at the intersection, preventing left-turning vehicles from taking a wider turn through the opposing traffic lane.

WHY

Vehicle speeds are directly associated with increased injuries and fatalities for people walking. Reducing vehicle speeds through intersections and crossings reduces both frequency and severity of collisions involving people walking. Research has shown that raised line markings can reduce crashes by 22% while centerline posts have been seen to reduce crashes by 45%.[3]

CONSIDERATIONS

Raised crosswalks can be applied on streets up to three lanes wide that are not on a primary emergency response route. Reduced curb radii and centerline hardening can be applied at most intersections. They can be achieved without impacting parking spaces or travel lanes and are limited mainly by the size of vehicle that must be able to use the intersection (the design vehicle). Right-turn slip lane closure is applicable only where slip lanes exist.

Refer to NACTO guidance on curb radii for accommodation of larger vehicles, including transit and freight vehicles.

Beacons and Signals

WHAT IS IT

Rectangular Rapid Flashing Beacons (RRFBs), **Pedestrian Hybrid Beacons (PHBs or"HAWK" signals),** and **Full or Half Traffic Signals** are enhancements that alert drivers to stop for pedestrians in the roadway.

- RRFBs are pedestrian-activated devices using LED flashing beacons to provide a high-visibility strobe-like warning to drivers when pedestrians use a crosswalk.
- PHBs are pedestrian-activated traffic control devices with a signal head that flashes yellow and then turns red.
- Half signals are designed like a standard signal for traffic on the road with the crosswalk.

[3] Crash Modification Factors Clearinghouse. https://www.cmfclearinghouse.org/

WHY

RRFBs can reduce pedestrian crashes by 47% and increase motorist yield rates up to 98%.[4] PHBs can reduce pedestrian crashes by 55%.[5]

CONSIDERATIONS

Signals and beacons must always be used in conjunction with the basic crosswalk elements described above. RRFBs should be placed curbside on both sides of the road below the pedestrian crossing sign and above the arrow indication pointing at the crossing. RRFBs are not a preferred treatment for enhanced transit corridors because they cannot be outfitted with Transit Signal Priority

Half signals and PHBs can be used at midblock locations or in combination with stop signs at intersections with minor streets. These types of signals are preferred on enhanced transit corridors because they can be outfitted with Transit Signal Priority.

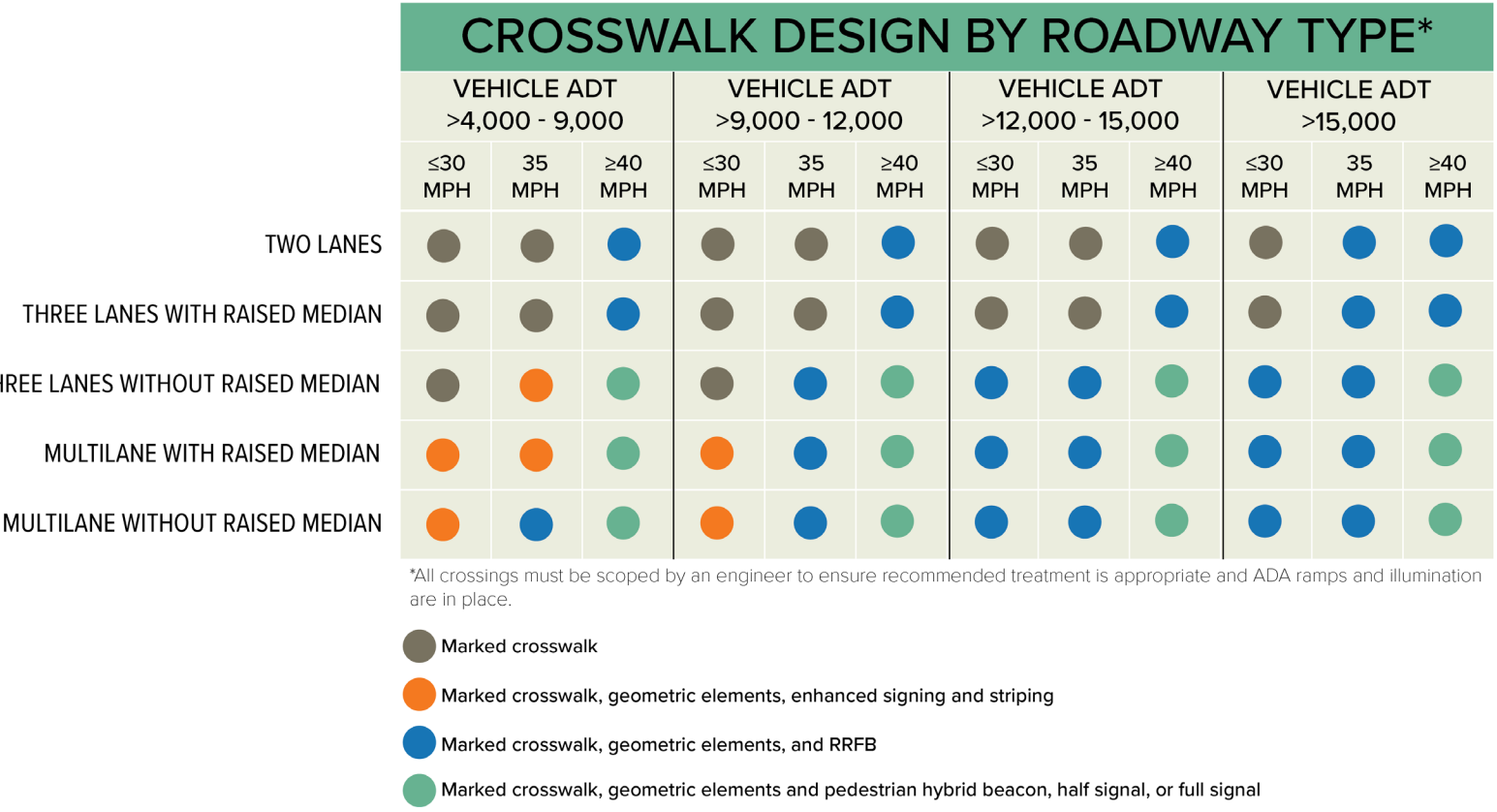
Improvement Selection for Uncontrolled Crosswalks

When a pedestrian crossing location has been identified, the type of treatment should be determined based on the characteristics of the roadway including posted or prevailing speed, width, and volume of motor vehicle traffic. The chart below indicated the minimum level of treatment that should be considered. Final design will be determined by an engineering study.

[4] https://highways.dot.gov/safety/proven-safety-countermeasures/rectangular-rapid-flashing-beacons-rrfb

[5] https://highways.dot.gov/safety/proven-safety-countermeasures/pedestrian-hybrid-beacons

Figure 4 Improvement Selection for Uncontrolled Crosswalks



Note: This table is based on the FHWA Guide for Improving Pedestrian Safety at Uncontrolled Crossing Locations

Signalized Intersections

Required Elements

All the basic crosswalk elements described previously should be installed at all legs of signalized intersections, except on legs where the crosswalk has been officially closed. A crosswalk should only be closed if there are documented geometric or operational conditions that present a significant pedestrian crash risk and cannot be reasonably mitigated. Crosswalks on at least two legs (one on each of the intersecting streets) should remain open if at all possible. Considerations for crosswalk closure include:

- Are there alternatives to crosswalk closure that will mitigate the pedestrian safety concern?
- Are there reasonable alternative pedestrian routes between the two points of crossing that are being closed?

In addition to the basic crosswalk elements, signalized crossings should include:

Pedestrian signal heads, commonly known as "walk" signs. At signalized intersections, they display a symbol at a location and height visible to people on the sidewalk that indicates whether they have a walk sign to cross the street. Countdown timers let pedestrians know how much time is remaining before the light turns yellow. MUTCD Chapter 4E[6] sets standards for pedestrian signal heads.

Walk intervals, the amount of time that the "walk" sign is illuminated, should be based on a walking speed of 3.5 feet per second and last a minimum of 7 seconds. MUTCD Chapter 4E provides standards and additional guidance on walk intervals.[7] The walk interval should be maximized using the following techniques:

- The pedestrian walk phase should operate on automatic recall, appearing in conjunction with every green signal phase.
- The walk interval should be as long as the available green light interval.

At traffic signals where motor vehicle and/or bicycle detectors are used to trigger a green phase (such as on a minor street intersecting with a major street), pedestrian detectors should also be installed. Pedestrian detectors may be pushbutton or passive detection devices.

Accessible pedestrian signals (APS) communicate information about the "walk" and "don't walk" intervals in a non-visual format for people who are vision impaired. The proposed

[6] https://mutcd.fhwa.dot.gov/htm/2009/part4/part4e.htm

[7] https://mutcd.fhwa.dot.gov/htm/2009/part4/part4e.htm

Accessibility Guidelines for Pedestrian Facilities in the Public Right-of-Way, published in 2011, requires APS at all newly constructed or reconstructed intersections where visual pedestrian signals are installed. The City plans to install APS at all signalized intersections. Accessible Pedestrian Signals: A Guide to Best Practices[8] provides more detail on where and how to install APS.

Optional Elements

These optional enhancements to signalized crossings should be considered at locations with high existing or potential demand or a history of crashes (see Evaluation of Locations section).

Leading Pedestrian Interval

WHAT IS IT

A Leading Pedestrian Interval (LPI) gives pedestrians a 3-to-10 second head start when entering an intersection, by presenting the "walk" sign while motor vehicle traffic has a red light in all directions.

WHY

LPI's provide pedestrians with the opportunity to begin crossing the street before people driving are permitted to proceed. This allows pedestrians to establish a presence in the crosswalk, which increases their visibility to drivers and reduces conflicts with turning vehicles. FHWA reports that LPIs can reduce crashes involving pedestrians by 13%. They are recommended for reducing crashes with both right and left-turning vehicles.[9]

CONSIDERATIONS

The MUTCD provides guidance on LPI timing. LPIs can be installed in high-demand areas (see site evaluation section above) where one or more of the following is true:[10]

- T-intersections and intersections with one-way streets, where drivers make left turns without the need to yield to oncoming traffic, which means they are less likely to be on the lookout for people crossing

[8] National Cooperative Highway Research Program Project 3-62

[9] Federal Highway Administration. Leading Pedestrian Interval (LPI) Countermeasure Tech Sheet. Safe Transportation for Every Pedestrian. October 2019. FHWA-SA-19-040.

[10] Based on Ohio DOT Multimodal Design Guide and Florida DOT, Development of Statewide Guidelines for Implementing Leading Pedestrian Intervals in Florida (2017)

- Visibility issues owing to irregular intersection geometry, crosswalk placement, obstructions such as buildings, topography, or blinding sun at certain times of the day
- High volume of turning vehicles (greater than 130 per hour in the peak hour or greater than 100 per hour over 8 hours)
- History of collisions and near-misses, or presence of crash risk factors
  - Two or more collisions of any type between people walking and turning vehicles in the last five years
  - One or more fatal or severe injury collisions involving people walking and turning vehicles
  - Average of three or more observed conflicts or near misses per 8-hour day of observation
  - Presence of crash risk factors identified in Vancouver's most recent citywide safety analysis (Local Road Safety Plan or Transportation System Safety Analysis)

Left Turn Signal Phasing

WHAT IS IT

Left-turn signal phasing gives a separate signal phase for vehicles to turn left at an intersection. When the signal displays a green left-turn signal, oncoming traffic has a red light and pedestrians are not permitted to cross. An exclusive left-turn phase can also be combined with a permissive phase at the same signal.

WHY

Protected left-turn phases almost completely prevent conflicts between people walking and left-turning vehicles. They reduce left-turn crashes for all modes by as much as 99% when they replace permissive left turns.[11] Permissive left turns create a safety risk for people walking because they give drivers who are turning left a green signal at the same time as pedestrians crossing in the parallel crosswalk. Drivers must wait for gaps in oncoming traffic that will allow them to turn. They often focus their attention on oncoming motor vehicle traffic rather than on pedestrians. Protected left turns have significant safety benefit because they reduce all conflicting movements at the intersection, while simplifying decision making for left-turning drivers.

[11] https://safety.fhwa.dot.gov/ped_bike/tools_solve/ped_tctpepc/

CONSIDERATIONS

Protected left turns can be implemented where a left-turn lane is present, or where one can be created. The State of Washington does not have a policy for selecting between protected, protected-permissive, and permissive left turns. Both permissive phasing and protected/permissive phasing allow for more people to turn left without waiting for a protected phase, but create a safety risk for people crossing, particularly on multi-lane facilities.[12] Protected phases should be considered at intersections that have a history of left-turn collisions, or that have potential for future collisions based on vehicle and pedestrian volumes and the size of the roadway. Recommended volume thresholds for protected left-turn phases are:

- 100 vehicles per hour when left-turns cross one oncoming lane
- 50 vehicles per hour when left-turns cross two oncoming lanes

Prohibited left turn movements may be an appropriate tool where left-turn collisions are high and there is not adequate space for a left turn pocket, with additional enforcement provided by a hardened centerline or median.

Right Turn Prohibition or Phasing

Prohibiting right turns on red is a simple, low-cost measure that can benefit people walking with low impacts to motor vehicle traffic. Right turns can be prohibited at all times, or only during the busiest parts of the day. This can be done with a simple sign posting.[13] A dedicated signal phase for right-turning vehicles separate from crossing phase may also be an option, which separates and removes the conflict between people walking and vehicles turning right.

WHY

State law requires motorists to come to a full stop and yield to cross street traffic and pedestrians prior to turning right on red. However, it's common practice for people driving to disregard these laws, or to pull up into the crosswalk to wait for a gap in traffic, which creates conflicts with people trying to cross. Engineering studies show an increase in pedestrian collisions where "right-on-red" is permitted.[14]

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[12] WSDOT (2018). Safety and Operations Assessment of Various Left-Turn Phasing Strategies.

[13] FHWA. Pedestrian Safety Guide and Countermeasure Selection System.

[14] 10% increase in right turn crashes where right turn on red is permitted - Handbook of Road Safety Measures, Elvik, R. and Vaa, T., 2004. 69% increase in vehicle/bike and vehicle/pedestrian crashes (all severities) – Highway Safety Manual, 1st Edition, 2010

CONSIDERATIONS

Right on red should be prohibited where and/or when there is high pedestrian demand in combination with high right turn volumes, where there are bike boxes at traffic signals, and in locations where restricted sightlines either prevent drivers from seeing pedestrians crossing or make it difficult for them to see cross traffic. Combined with an LPI (see above) is a safer option at intersections where left turn volumes are also high.

Locations with high pedestrian volumes and right turn volumes can benefit from right-turn-on-green-arrow only phase by separating people turning from people crossing, creating conflict-free right turns and provides a safer crossing for people. This may lead to an overall increase in right turn capacity as more people can turn without needing to stop for people crossing.

Exclusive Pedestrian Phase

WHAT IS IT

An exclusive pedestrian phase stops all motor vehicle movement and allows pedestrians to cross in any direction at the intersection, including diagonally. This is also referred to as a "ped scramble" or "all-way crossing". The exclusive phase is typically called by a manual call button but could also use passive pedestrian detection.

WHY

Recent studies have found that exclusive pedestrian phases reduce pedestrian crashes by 51%.[15] While more studies are needed of this treatment, exclusive phases have the potential to eliminate most conflicts between people walking and motor vehicles by stopping all traffic through an intersection during the "walk" phase. Exclusive pedestrian phasing uses readily available technology, is easy to understand for pedestrians and drivers, and is cost effective.[16] [17]

CONSIDERATIONS

Exclusive pedestrian phases are usually applied where pedestrian demand is very high and there are multiple destinations on all sides of the intersection, such as in downtown and other pedestrian centers. The safety benefits come with a tradeoff of delay for all modes due to the additional signal phase.

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[15] https://safety.fhwa.dot.gov/ped_bike/tools_solve/fhwasa18041/

[16] https://safety.fhwa.dot.gov/ped_bike/legis_guide/rpts_cngs/pedrpt_0808/chap_3.cfm

[17] https://pubmed.ncbi.nlm.nih.gov/35805835/

School Zone Elements

All signalized, stop controlled, and designated mid-block and uncontrolled crossing locations on designated school Walk Routes should include the basic elements described previously, and should be assessed for additional enhancements. Crossings of unsignalized intersections of streets with volumes of less than 1,500 ADT on a on a School Walk Route generally do not need to include marked crosswalks unless they are within 300 feet of the school.[18]

The WSDOT School Walk and Bike Route Guide states that mid-block crossings should only be designated on School Walk Routes if they are signalized or supervised by an adult member of the school patrol. Where a mid-block crossing is the preferred or only option for providing a convenient and direct route to school, a signal or beacon should always be considered.

School Crossing Warning Signs

In addition to the design treatments described in this Crossing Improvement Policy, additional signage is used to draw attention to school crossings.

- School crossing warning sign assemblies should be used to identify all marked crossings on the School Walk Route.
- On lower-speed residential streets (25 mph), consider placing in-street crosswalk signs (R1-6a) at uncontrolled crosswalks. See Figure 7.

School crossing assemblies should be used to identify crossings in school zones where children cross the roadway. See Figure 5.

Figure 5 School Crossing Assembly

On multi-lane arterials or roads with higher speed limits outside of school hours (30 mph or greater) crossing warning assemblies should be placed in advance of crosswalks, such as is shown in Figure 3.

[18] https://clark.wa.gov/sites/default/files/dept/files/public-works/Traffic/School_Zone_Traffic_Policy.pdf

Figure 6 Crossing Warning Assembly

On lower-speed neighborhood streets with uncontrolled crosswalks within school zones, in-street pedestrian crossing signs (R1-6a) are recommended. WAC 468-95-033 gives direction that in-street pedestrian crossing signs, if used, shall be placed in the roadway at the crosswalk location on the center line, a lane line, or a median island.

Figure 7 In-Street Pedestrian Crossing Sign