Washington Transportation Professionals

Forum and Peer Exchange

April 29, 2025

8:30 AM-12:00 PM

Welcome

- Implementing Multimodal Level of Service (MMLOS) Standards
- Updates to the AASHTO Guide for the Development of Bicycle Facilities: In-depth Review of Separated Bike Lanes and Side Paths
- ADA Compliance and Public Right-of-Way Accessibility Guidelines (PROWAG)

Washington Transportation Professionals

- **Formed**
  - Over 40 years ago as the Urban Traffic Engineers Council.
  - By city traffic engineers and focused on traffic operations.

- **Evolution and Growth**
  - All cities, all counties, MPOs/RTPO's, vendors, consultants, nonprofits, & other agencies = Over 400 entities (Over 1000 individuals).
  - Discuss local agency transportation issues of statewide significance.

- **Forums and Peer Exchanges**
  - Facilitated by WSDOT's Local Programs and Active Transportation divisions with help from public agencies, consultants, and vendors.
  - Looking for relevant topics and presenters.

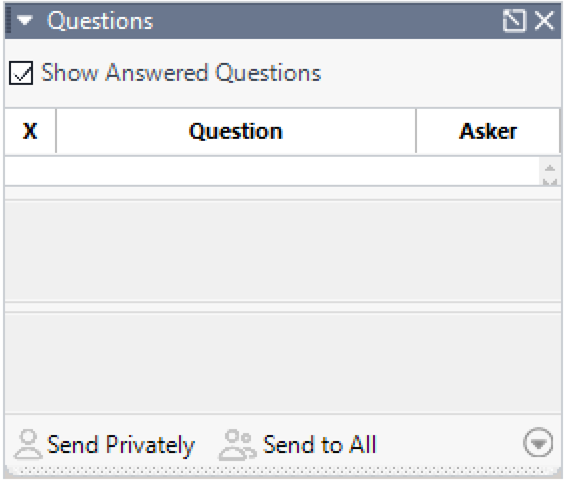
Statewide Participation

- Cities
- Counties
- Tribes
- WSDOT–All regions, WSF, and HQ
- MPOs/RTPOs
- FHWA
- State Agencies—WTSC, CRAB, TIB, DOH, +others
- Transit, Ports, Railroads, and other transportation providers
- Nonprofit Organizations
- Consultants and Vendors

Webinar Logistics

- Show and hide the GoToWebinar screen: Press the orange arrow toggle button.

- You are in listen-only mode. Please type comments and questions into the “Questions” box. We will read it to the presenter for a response.



LTAP Update

- FHWA instructors are currently unavailable to LTAP
- WSDOT work zone courses (Burlington): May 6, May 7
- Partner training opportunity with UW Workforce Development Institute for flagger certification courses
  - May 13 (Spokane)
  - June 5 (Seattle)
  - Cost is $150, but $100 discount code for local agencies available

- Receive training notifications via our LTAP training listserv
- Sign up for roughly bi-weekly emails on upcoming trainings

Agenda

- Implementing Multimodal Level of Service (MMLOS) Standards
- Updates to the AASHTO Guide for the Development of Bicycle Facilities: In-depth Review of Separated Bike Lanes and Side Paths
- ADA Compliance and Public Right-of-Way Accessibility Guidelines (PROWAG)

Implementing Multimodal Level of Service (MMLOS) Standards

Chris Comeau, FAICP, CTP
Senior Transportation Planner
Transpo Group

Kevin McDonald, AICP
Principal Transportation Planner
City of Bellevue

Kendra Dedinsky, PE, PTOE
City Traffic Engineer
City of Shoreline

SOME PRACTICAL REALITIES OF IMPLEMENTING MULTIMODAL LEVEL OF SERVICE (MMLOS) STANDARDS

Washington Transportation Professionals
Forum and Peer Exchange
April 29, 2025

Chris Comeau, FAICP-CTP

Potentially Controversial Comments Ahead

These slides are meant to spur questions, consideration, and conversation amongst transportation practioners about what we do and how we do it.

The goal is to ask:

"How can we, as transportation professionals, discuss best practices

AND

better explain implementation constraints and contextual realities?"

GROWTH MANAGEMENT ACT (GMA)
TRANSPORTATION REQUIREMENTS

RCW 36.70A.070 Comprehensive Plans – Mandatory Elements - *2023 amendments from ESSHB 1181*

"The plan shall be an internally consistent document and all elements shall be consistent with the future land use map."

(6) "A transportation element that implements, and is consistent with, the land use element."

(A) "Inventory of .... *active transportation facilities, ...*" *(sidewalks, bikeways, trails)*

(B) "*Multimodal* level of service [LOS] standards for all locally owned arterials, *local & regional* transit routes *in urban areas* ... *and active transportation facilities* to serve as a gauge to judge performance of the system."

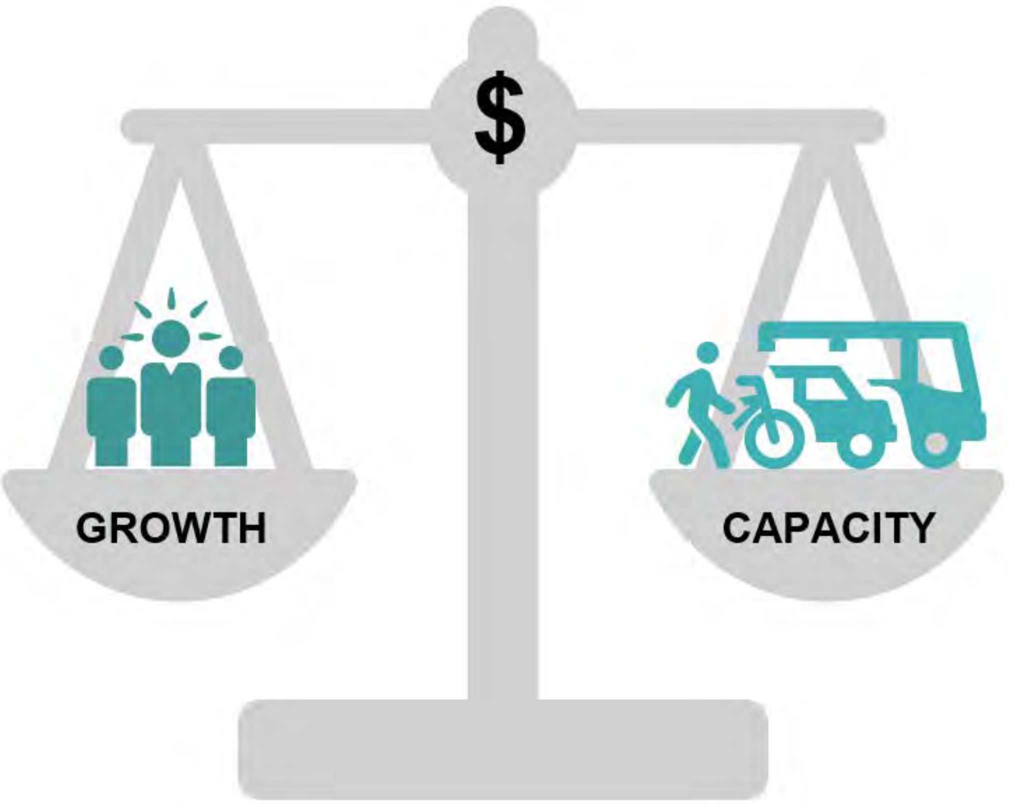
(C) For State-owned transportation facilities, *multimodal* LOS standards for highways ...

(b) "Local jurisdictions must adopt and enforce [concurrency] ordinances to prohibit development that causes the level of service .... to decline below adopted standards" *[However, agency can't deny development if it agrees to fund adequate active transportation, transit service, or TDM measures that mitigate the impacts to MMLOS]*

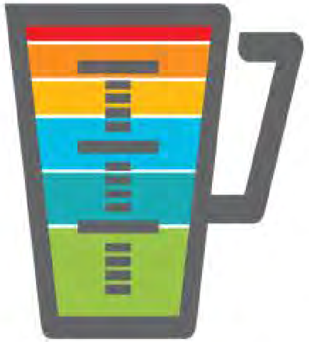
IF land use goals = higher density infill, THEN LOS & concurrency ordinance should allow infill served by adequate transportation

WHAT IS TRANSPORTATION CONCURRENCY?

- GMA requires transportation systems to be adequate to serve planned growth. The definition of "Adequate' is up to each agency.
- Transportation concurrency links land use plans with transportation and capital improvement plans, providing a tool for effectively balancing and managing the growth of a community based on the financial capacity to fund infrastructure.
- Every community is different and should have MMLOS performance measures that reflect local community goals and priorities for land use, transportation, quality of life, and financial realities.
- There is no one right way to do this and no universal, unifying MMLOS standard …. **It's all about context**.



TRADITIONAL HIGHWAY CAPACITY MANUAL
VEHICULAR LOS STANDARDS

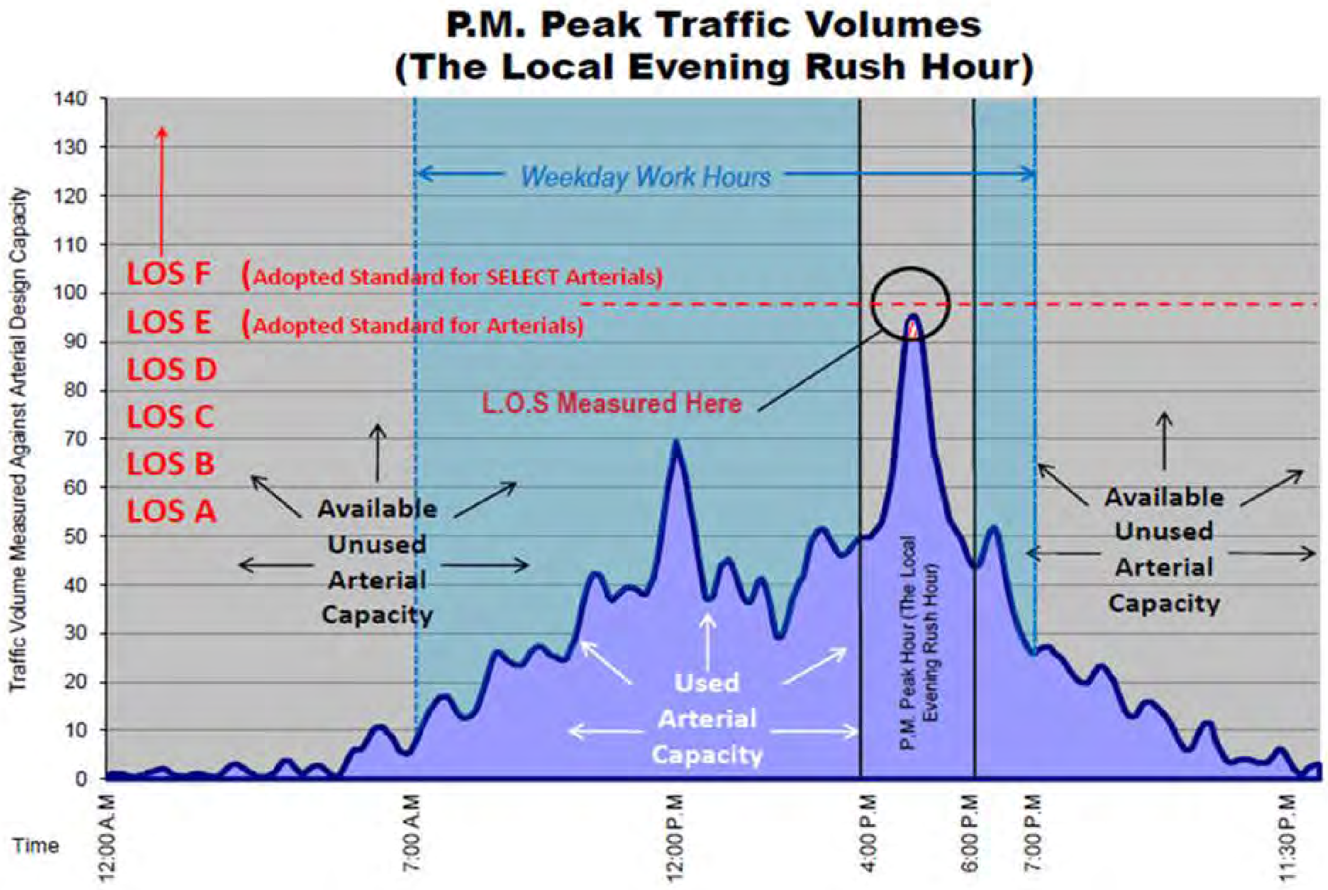


Roadway Volume-to-Capacity

(vehicle throughput)

Intersection Delay/ seconds per vehicle

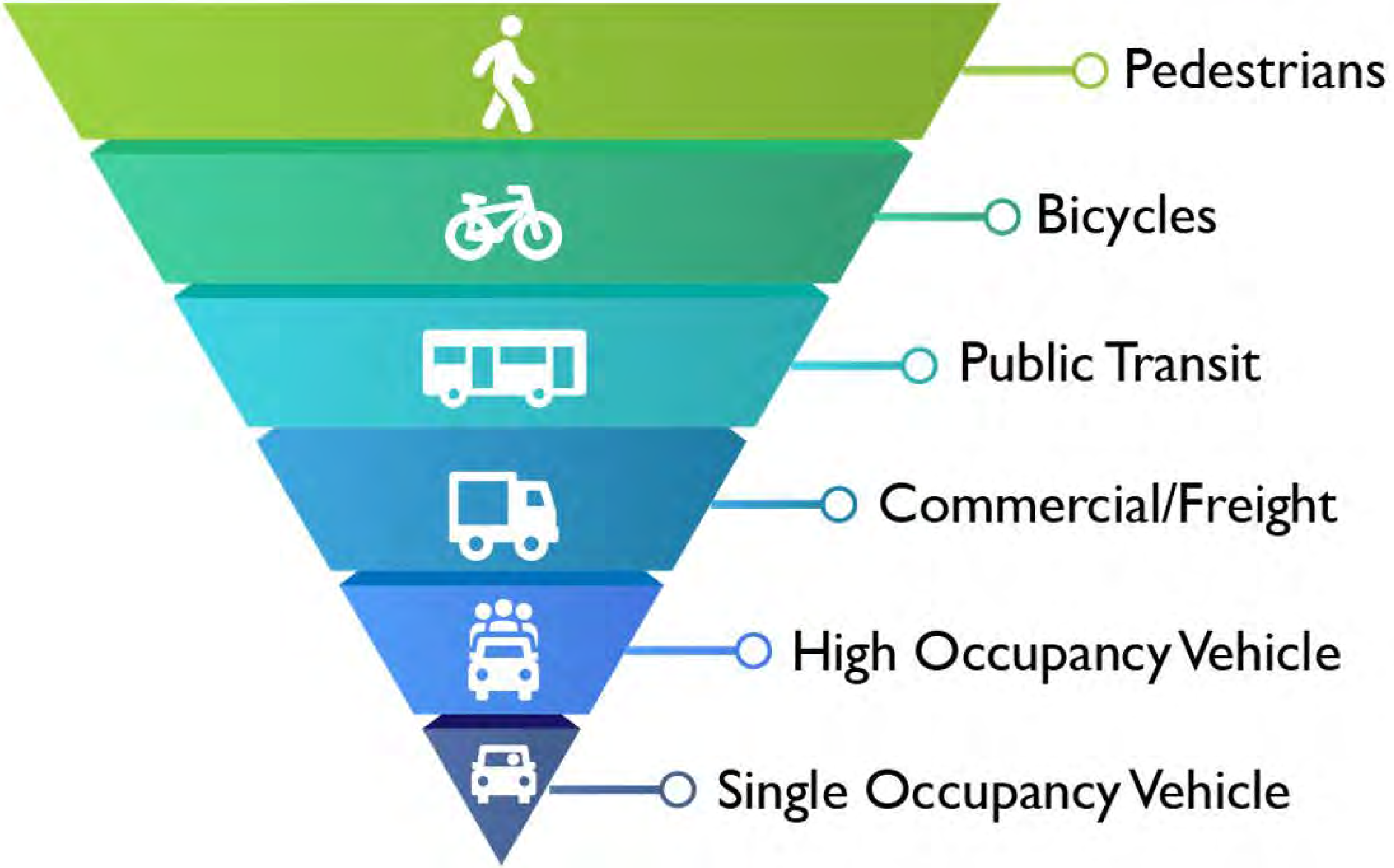
(driver inconvenience)



Bellingham was 1st Multimodal Concurrency System in Washington - 2009

Case Study: *MMLOS in the City of Bellingham – Moving Beyond the Automobile*

COMPLETE STREETS: WHO ARE WE PLANNING FOR?

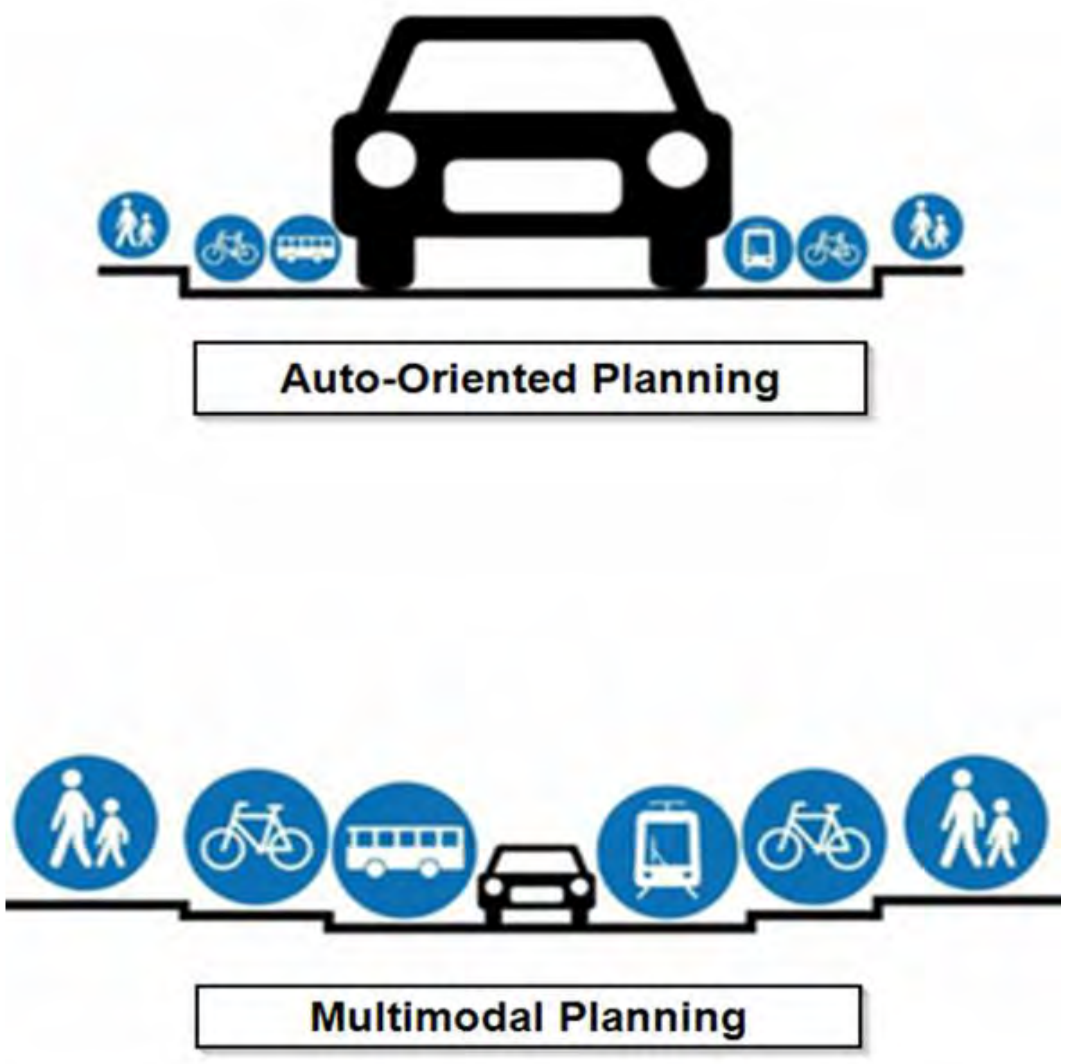


BALANCE

ALL mobility needs, modes, land use contexts, and funding capacities must be carefully considered, balanced, and implemented for a multimodal transportation system to provide space and safety for everyone, *where possible*.

Complete Streets means different things in different geographic contexts.
It rarely means facilities for every user group on every street – even in urbanized areas.

WSDOT STATE HIGHWAY PLANS & RCW AMENDMENTS



RCW 47.04.035 Complete Streets

All WSDOT state highway projects costing > $500,000* near population centers must include facilities for users of all ages and abilities per Complete Street principals

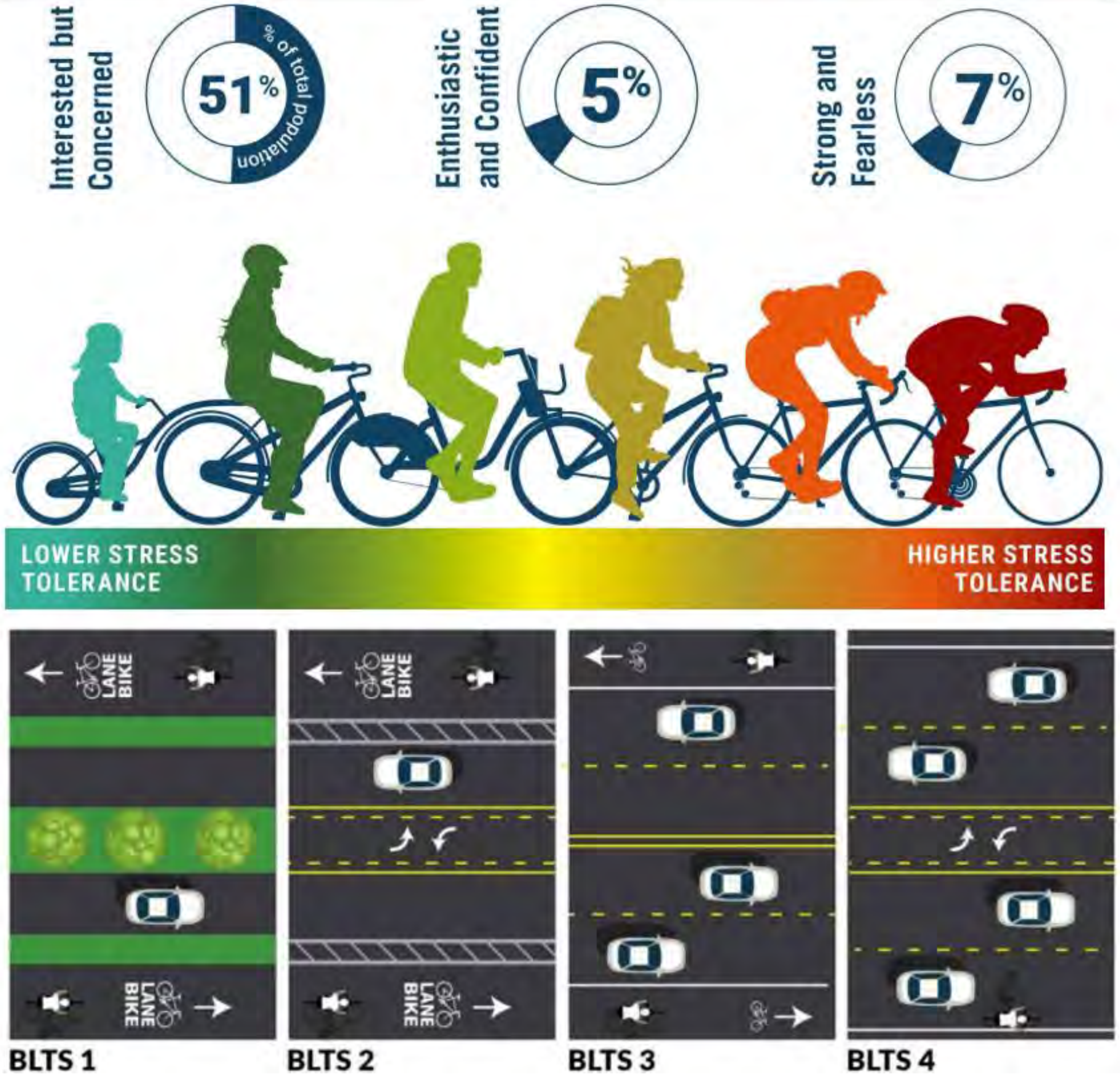
*Now > $1,000,000 as of August 1, 2025 per ESSB 5801

WSDOT Active Transportation Plan 2020 and Beyond

Requires WSDOT to work with cities and counties to ensure that state highways include active transportation facilities that are well-connected to local pedestrian, bicycle, and trail networks; Advocates for LTS type 1 or 2 facilities.

Required for *"Population Centers"* according to WSDOT map

WHAT IS BICYCLE LEVEL OF TRAFFIC STRESS (LTS)?



← **Bicycle LTS = Measure of User Comfort**

Based on age, physical health, and confidence

Subjective to individual user experience

Wide spectrum of user skill levels

← **Bicycle LTS = Measure of Facility Comfort**

Based on facility and user proximity to moving traffic, speed, volume, land use context

Subject to physical space (ROW) available and agency financial constraints

ALL AGES AND ABILITIES

National Association of City Transportation Officials, December 2017

Gap between theory and reality

Valid policy intent can't always be implemented

Comfort Typology of Bicyclists

Design User Profile	Non-Bicyclist	Interested but Concerned	Somewhat Confident	Highly Confident
Bicycling Preferences	Uncomfortable bicycling in any condition, have no interest in bicycling, or are physically unable to bicycle.	Often not comfortable with bike lanes, may bike on sidewalks even if bike lanes are provided; prefer off-street or separate bicycle facilities or quiet or traffic-calmed residential roads. May not bike at all if bicycle facilities do not meet needs for perceived comfort.	Generally prefer more separated facilities, but are comfortable riding in bicycle lanes or on paved shoulders if need be.	Comfortable riding with traffic, will use roads without bike lanes.
Percent of Population	31-37%	51-56%	5-9%	4-7%

"Don't let your dreams be constrained by the bounds of reality"
- Quote from a Planning Professor

In an ideal world with no constraints, agencies could provide walking, biking, and rolling facilities for everyone's level of comfort

The real world is messy, constrained, expensive, and requires difficult political and economic choices, trade-offs, and priorities

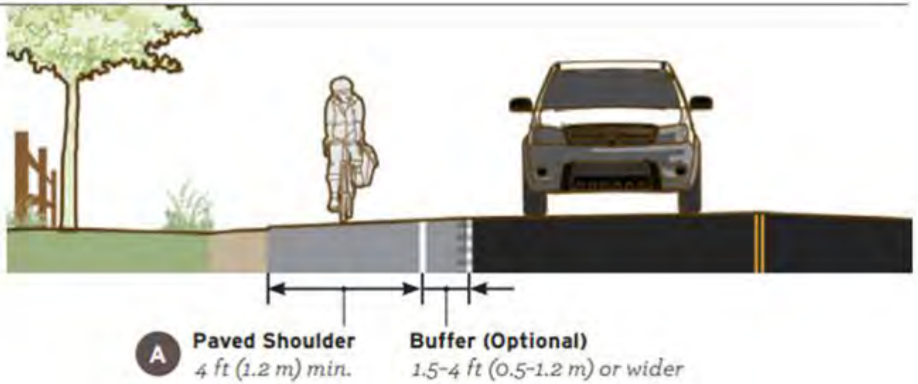
NATIONAL GUIDANCE FOR RURAL AREAS

Establishing an Active Transportation Network is challenging for an unincorporated rural geography.

- The low-density land use context, large geographic distances, and reality of living in a rural environment demands a different societal expectation for what type of walking and bicycle facilities can be provided by a County government.
- Per national guidance, a 4-foot paved shoulder with buffer is considered *minimum standard* for a designated bicycle facility in rural areas (Source: FHWA Small Town and Rural Design Guide, 2017 *; Paved Shoulder illustration below*).

Paved Shoulder

Shoulders can improve bicyclist comfort and safety when traveling in higher speed and/or volume situations but only when adequate width is provided. If used, locate rumble strips on the edge line or within a buffer area that will not reduce usable space for bicyclists.



- There are many county roads and State highways that currently have shoulders equal to or greater than 5-feet in width, that can meet this *minimum standard*. **A small city, county, or State DOT often cannot fund LTS type 1-2 bike facilities but may be able to fund LTS type 3-4 bike facilities, which can be an improvement over no accommodation at all.**

IMPROVEMENTS

Active Transportation Network Improvements

- Explore Feasibility
- County staff and BPAC to Recommend Active Facility Type(s)
- 2025 Cost Estimates
- Develop Strategic Implementation Plan:
  - Whatcom County Comprehensive Plan*
  - WSDOT Active Transportation Plan*
  - Grant Programs and Funding Cycles
  - Local/Private Funding

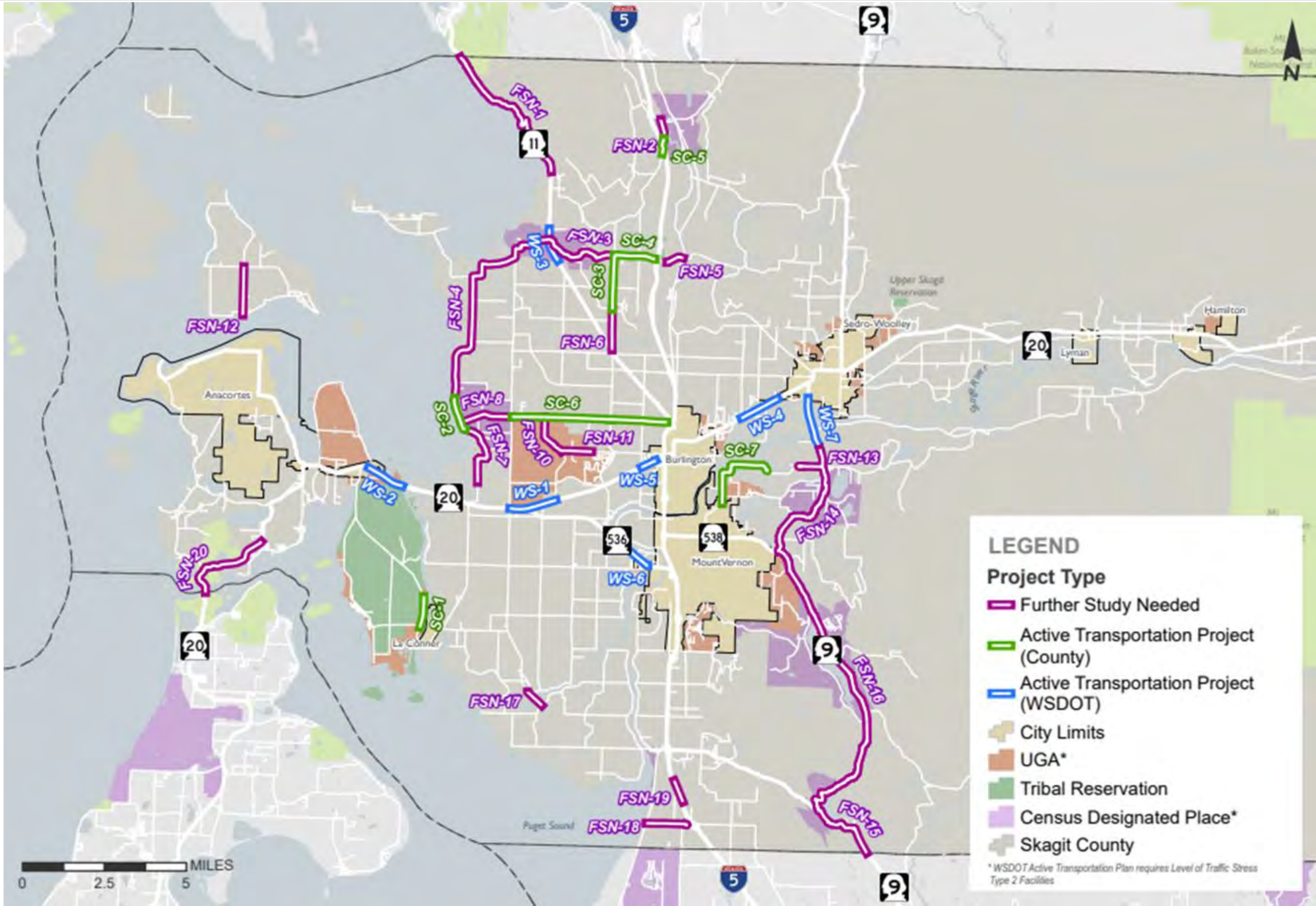
**WSDOT must consider ped-bike facility connections identified in local agency Comprehensive Plan*

CAN LTS 1 OR 2 IMPROVEMENTS REALLY BE MADE ON SR 9?

Active Transportation Network Improvements

- Explore Feasibility
- County staff and BPAC to Recommend Active Facility Type(s)
- 2025 Cost Estimates
- Develop Strategic Implementation Plan:
  - Skagit County Comprehensive Plan*
  - WSDOT Active Transportation Plan*
  - Grant Programs and Funding Cycles
  - Local/Private Funding

**WSDOT must consider ped-bike facility connections identified in local agency Comprehensive Plan*



LESSONS LEARNED OVER MANY YEARS OF PRACTICE

There is no universal MMLOS performance standard

– and there shouldn't be …….

- Multimodal facilities, services, needs, and LOS standards are very different for urban, rural, and regional geographies
- Density begets amenity – low-density often cannot support "best practice" bikeways and sidewalks. This is an unpopular, but important message to convey
- Metrics must be tailored to local land use, transportation, and funding context

LESSONS LEARNED OVER MANY YEARS OF PRACTICE

You can't build (or use) what you can't fund

- don't create expectations that cannot be met by funding reality

- YES, we should *always* advocate for safety and best practices *AND always* provide an honest assessment of implementation feasibility and funding capacity
- LTS 1 or 2 Separated/Protected bike facilities are "best practice" and "gold standard" but are also very expensive and often cannot be funded by small cities, rural agencies, or DOTs
- Do not let perfect be the enemy of good. Every increment of safety is an improvement over none. Where an LTS 1 off-road multiuse path is not financially feasible, a 5-foot LTS 4 paved shoulder with bike markings is better than none.

LESSONS LEARNED OVER MANY YEARS OF PRACTICE

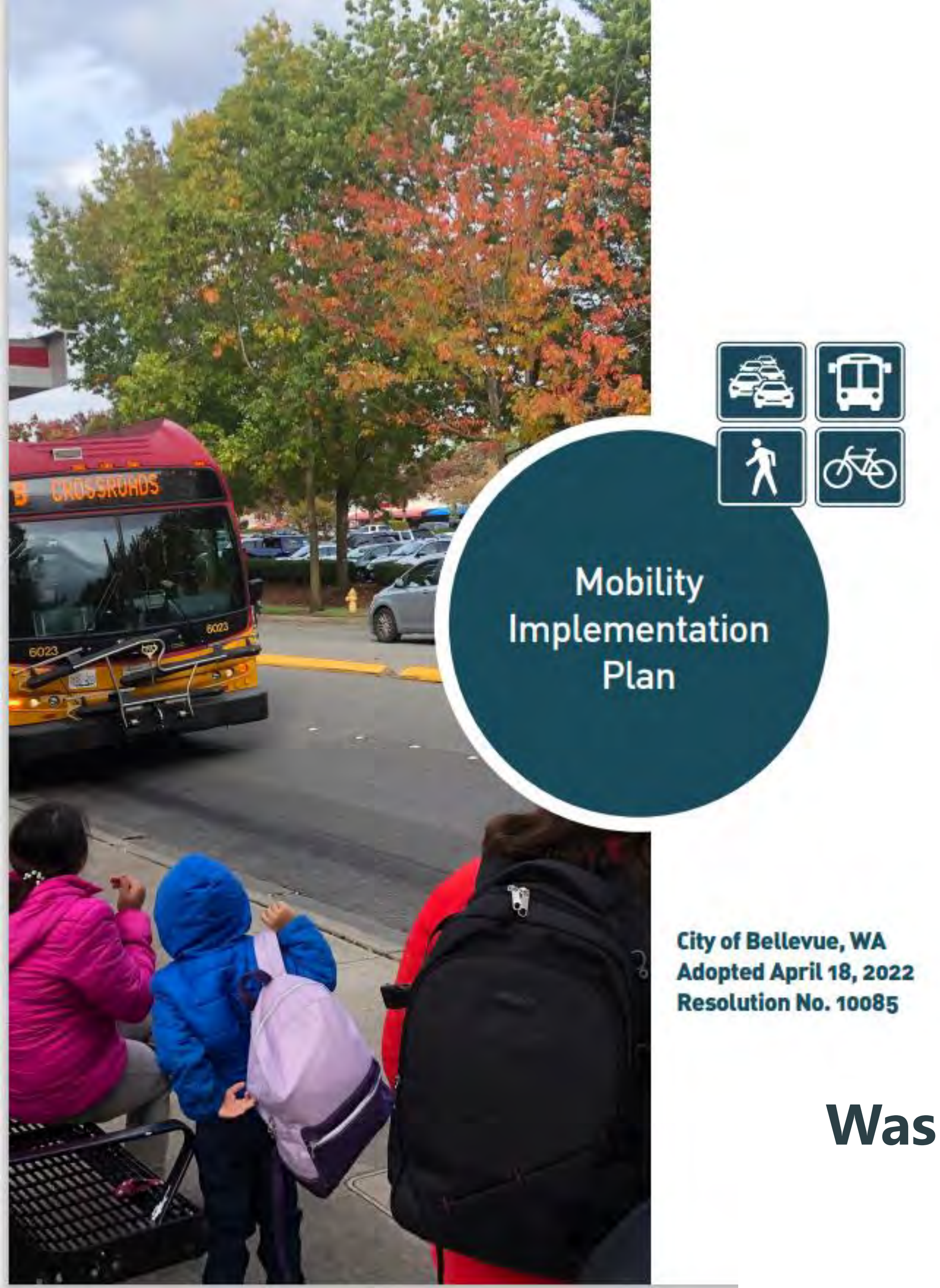
Plans that cannot be implemented do not serve anyone's interests
– but they do lead people to believe that government is not doing its job

- Active transportation plans with lines on a map and recommendations for "all ages" or LTS 1 improvements beyond agency funding capacity are doomed to fail. This is especially true for long distances and places with low density development.

- Active transportation networks must evolve over long periods of time (No zero to LTS 1 overnight); Prioritize for Short-term; Mid-term; Long-term; or Feasibility Study

- Small or lower cost improvements (signs, markings, wider edge lines, etc.) can be implemented rapidly and can lead to more awareness for need and support of walk-bike-roll facilities …… *and perhaps more community willingness to fund*


Q&A
Chris Comeau, FAICP-CTP
Senior Transportation Planner



Bellevue Mobility Implementation Plan

Transportation

Kevin McDonald, AICP

Washington Transportation Professionals Forum and Peer Exchange: April 28, 2025

Discussion Outline

- Introduction
- Mobility Implementation Plan (MIP) Overview
- MIP Implementation
- 2025 MIP Update

Mobility Implementation Plan (MIP)

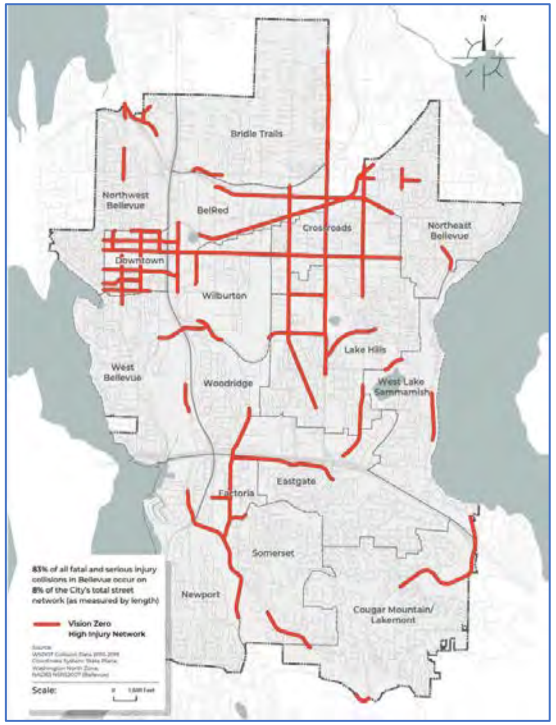
- Transportation Commission
- Council adopted April 2022
  - o Performance Management Areas
  - o Performance Metrics
  - o Performance Targets
- MIP Implementation Guide
  - Performance Target Gaps
  - Priorities and Project Concepts
- Awards
  - ▪ Governor's 2022 Smart Communities Award
  - ▪ PSRC Vision 2050 Award

MOBILITY IMPLEMENTATION PLAN

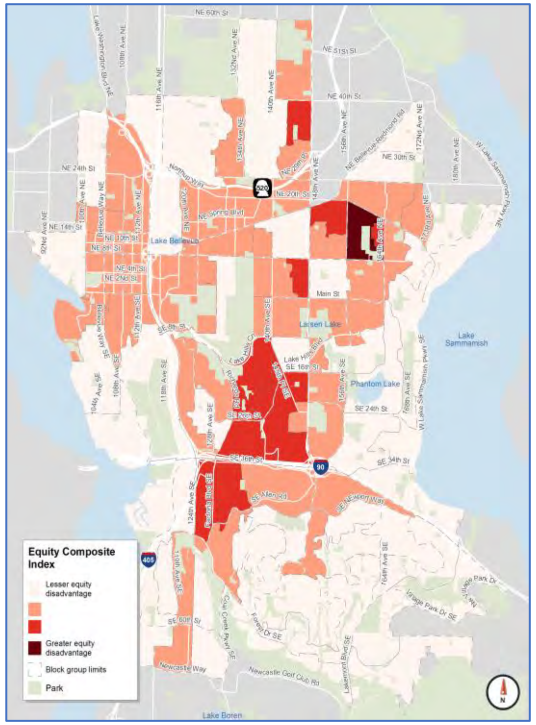
Mobility Implementation Plan Goals

- **Safety:** Eliminate serious injuries and fatalities from crashes (Vision Zero)
- **Equity:** Design and prioritize projects to address equitable access
- **Growth:** Support growth and accommodate multimodal travel
- **Access/Mobility:** Complete transportation networks to provide mobility

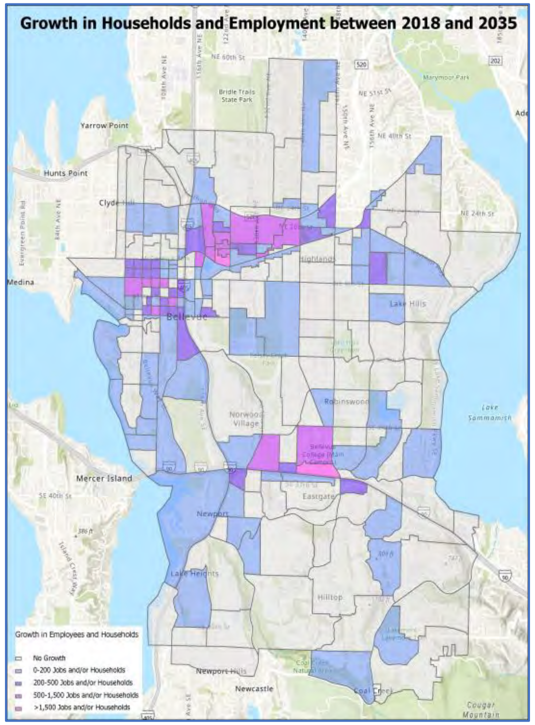
Improve Safety



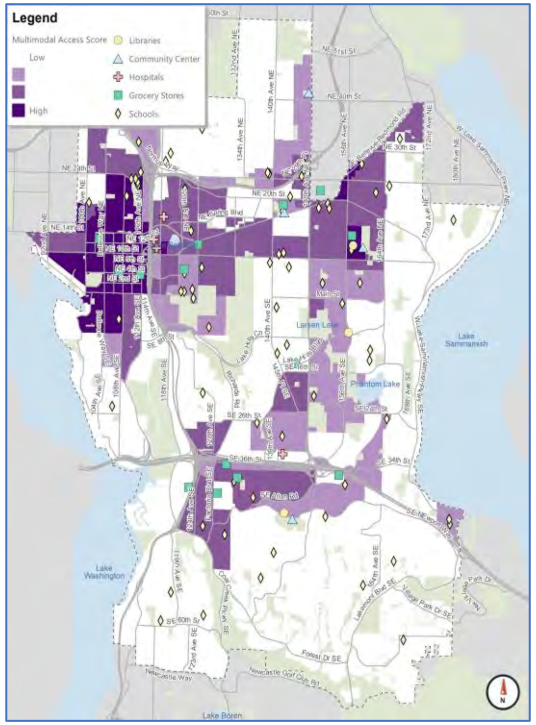
Consider Equity



Accommodate Growth



Improve Access/Mobility



Performance Management Areas

Three types of Performance Management Areas (PMAs) describe the land use and mobility context

PMA 1: High-Density Mixed-Use

- Light Rail Stations

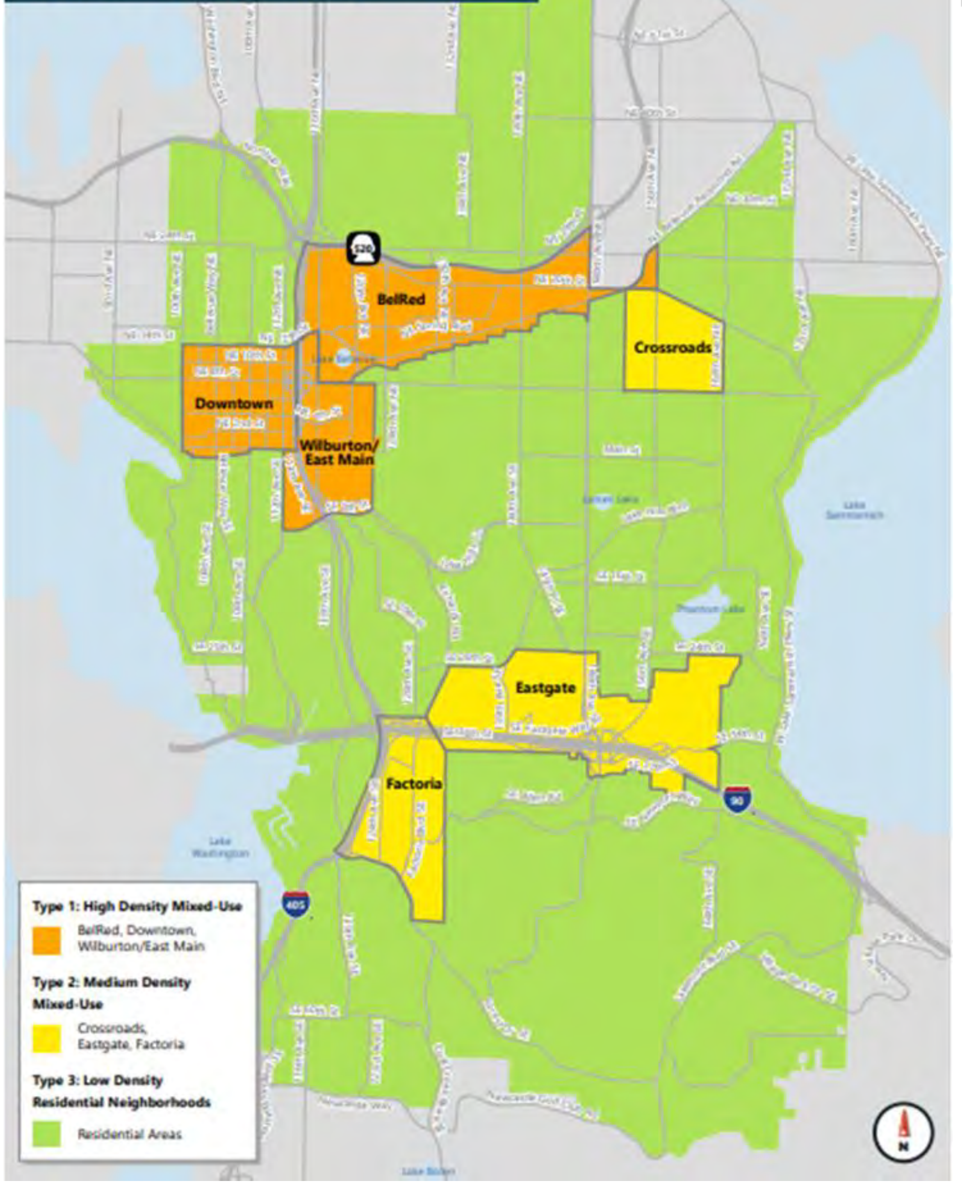
PMA 2: Medium-Density Mixed Use

- Frequent Transit Network Service

PMA 3: Residential and Neighborhood-Serving Retail

- Bus

Figure 2: Performance Management Areas



Performance Metrics

Bicycle Mode

Bicycle Level of Traffic Stress (BLTS) on bicycle network corridors

Primary Metrics:

Travel Speed	**Bicycle Facility**
Traffic Volume	

Bicycle Level of Traffic Stress: BLTS 1, BLTS 2, BLTS 3, BLTS 4

Arterial Characteristics		Bicycle Facility Components					
Arterial Actual/Estimated Travel Speed	Arterial Daily Traffic Volume	No Marking	Sharrow Lane Marking	Striped Bike Lane	Buffered Bike Lane (Horizontal)	Protected Bike Lane (Vertical)	Shared Use Path
≤30	≤3k	1					
	>3k-7k			2			
	>7k						
>30-36 mph	≤10k						
	>10 -25k				3		
	>25k						
>36-42 mph	≤25k						
	>25k						
>42	Any				4		

Performance Metrics

Pedestrian Mode

Pedestrian Level of Traffic Stress (PLTS)

Primary Metrics:

Travel Speed	**Sidewalk Width**
Traffic Volume	**Buffer Width**

Pedestrian Level of Traffic Stress

- PLTS 1
- PLTS 2
- PLTS 3
- PLTS 4

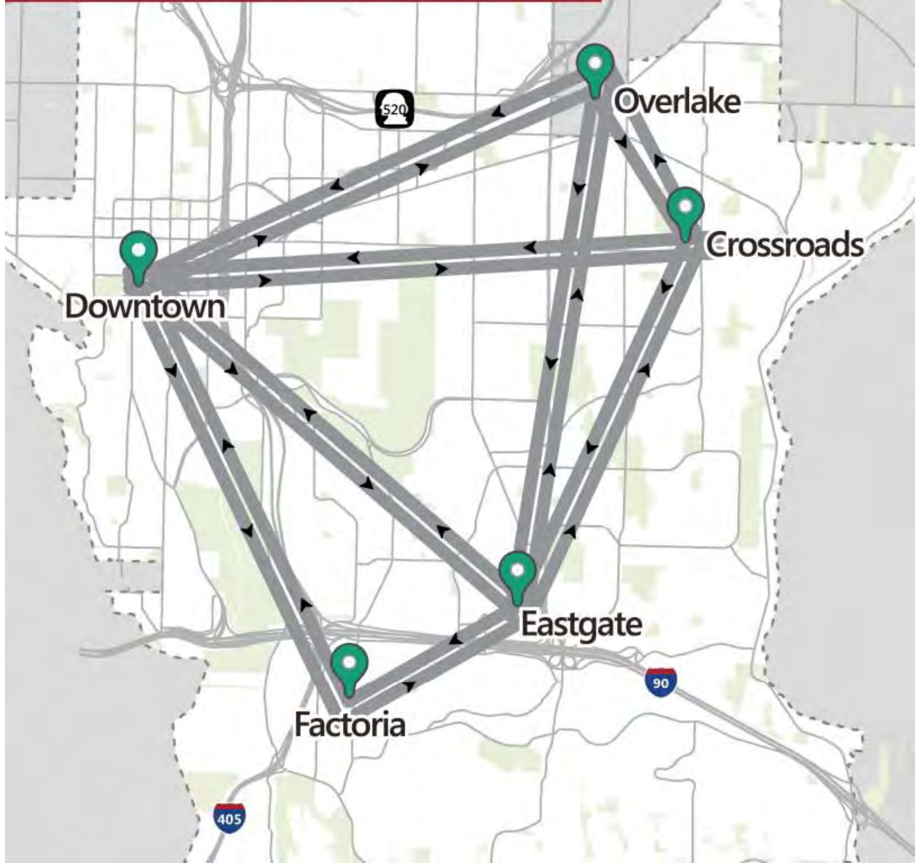
Arterial Characteristics		Sidewalk Characteristics								
		Width of Sidewalk								
		only shoulder	<4 feet		≥4 feet - <6 feet		6 feet - <10 feet		≥10feet	
		Width of Buffer								
Arterial Actual/Estimated Travel Speed	Arterial Daily Traffic Volume	0 feet	<5 feet	≥5 feet	<5 feet	≥5 feet	<5 feet	≥5 feet	<5 feet	≥5 feet
≤25	≤3k	1								
	>3k-7k		2							
	>7k									
>25-30 mph	≤10k			3						
	>10 -25k									
	>25k									
>30-35 mph	≤25k									
	>25k									
>35	Any				4					

Performance Metrics

Transit Mode

- Travel Time Ratio (2X)
  - Relative to auto travel time between activity centers on Frequent Transit Network

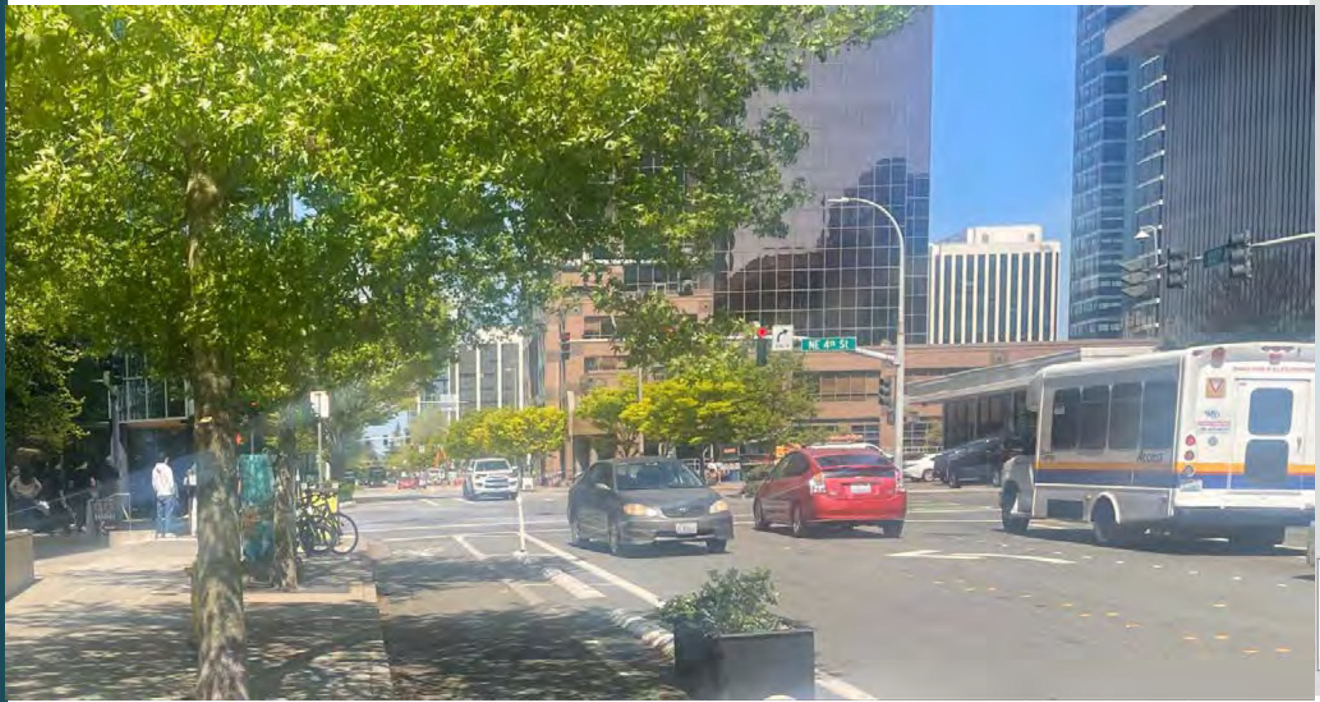
Figure 11: Transit Travel Time Origin-Destination Pairs

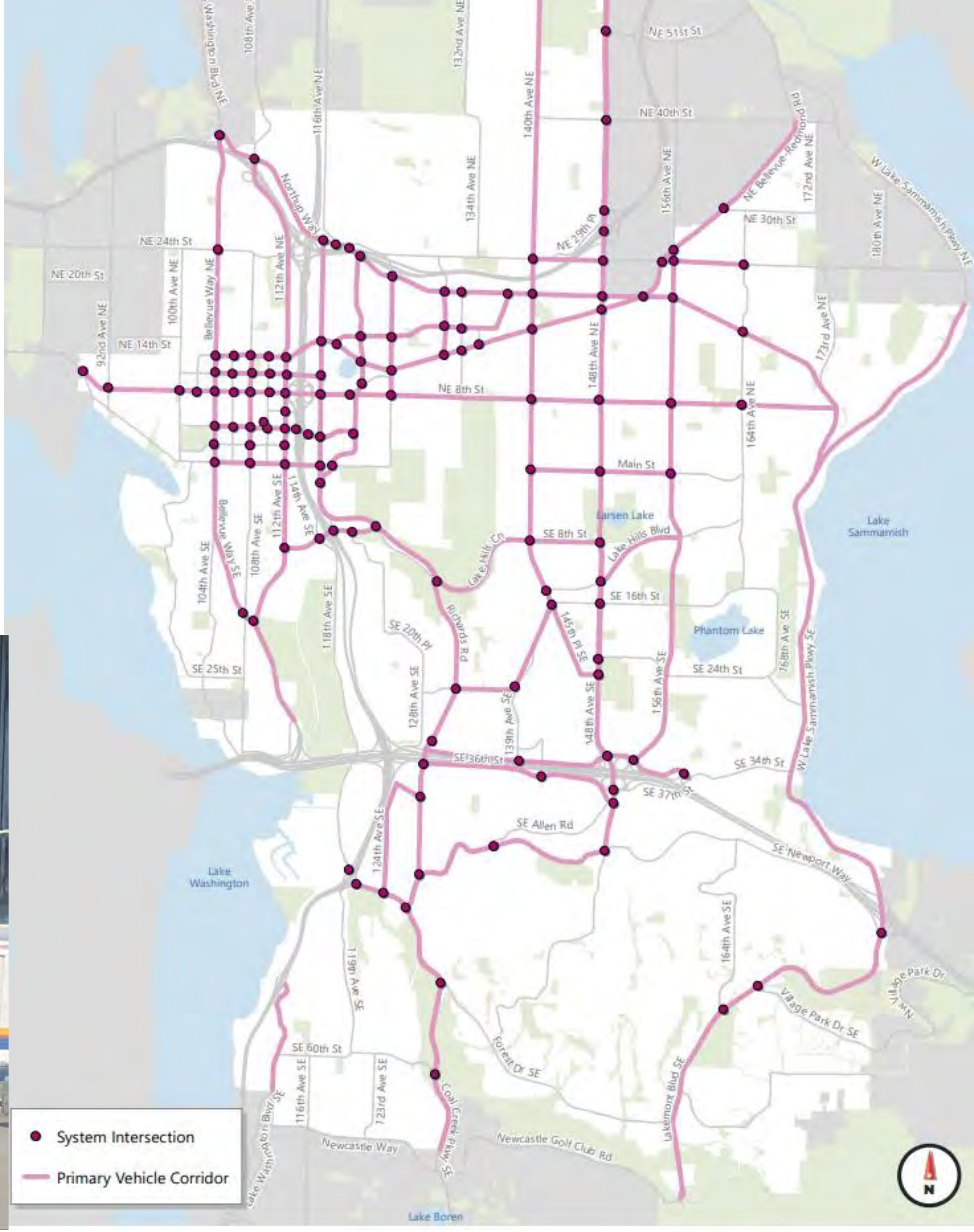


Performance Metrics

Vehicle Mode

- Vehicle Travel Speed
  - On Primary Vehicle Corridors
- Volume/Capacity Ratio
  - At System Intersections





Performance Targets for Each Mode

Mode		Performance Target	Monitoring and Reporting
Pedestrian		• Sidewalk on both sides of the arterial; sidewalk dimensions vary • Arterial crossings at designated spacing near major trip-generating land uses; the spacing of arterial crossings varies by land use context	Percentage of sidewalk network complete citywide and for locations within each PMA
Bicycle		Bicycle network facilities (corridors and intersections) meet the intended LTS	Percentage of bicycle network complete citywide and for locations by PMA
Transit		• Transit travel time ratio of 2.0 or less • Stops on the Frequent Transit Network have passenger amenities	List and map of activity center pairs that meet the travel time ratio Performance Target; Percent of bus stops on the FTN that include all five passenger amenities
Vehicle	**Type 1 PMA High Density Mixed-Use**	• 1.0 V/C ratio at System Intersections • ≥0.5 Typical Urban Travel Speed for Primary Vehicle Corridors	List and map of Primary Vehicle Corridors and System Intersections that meet the PMA Performance Target
	Type 2 PMA Medium Density Mixed-Use	• 0.90 V/C ratio at System Intersections • ≥0.75 Typical Urban Travel Speed for Primary Vehicle Corridors	
	Type 3 PMA Residential	• 0.85 V/C ratio at System Intersections • ≥0.9 Typical Urban Travel Speed for Primary Vehicle Corridors	

Performance Target – Pedestrian Network

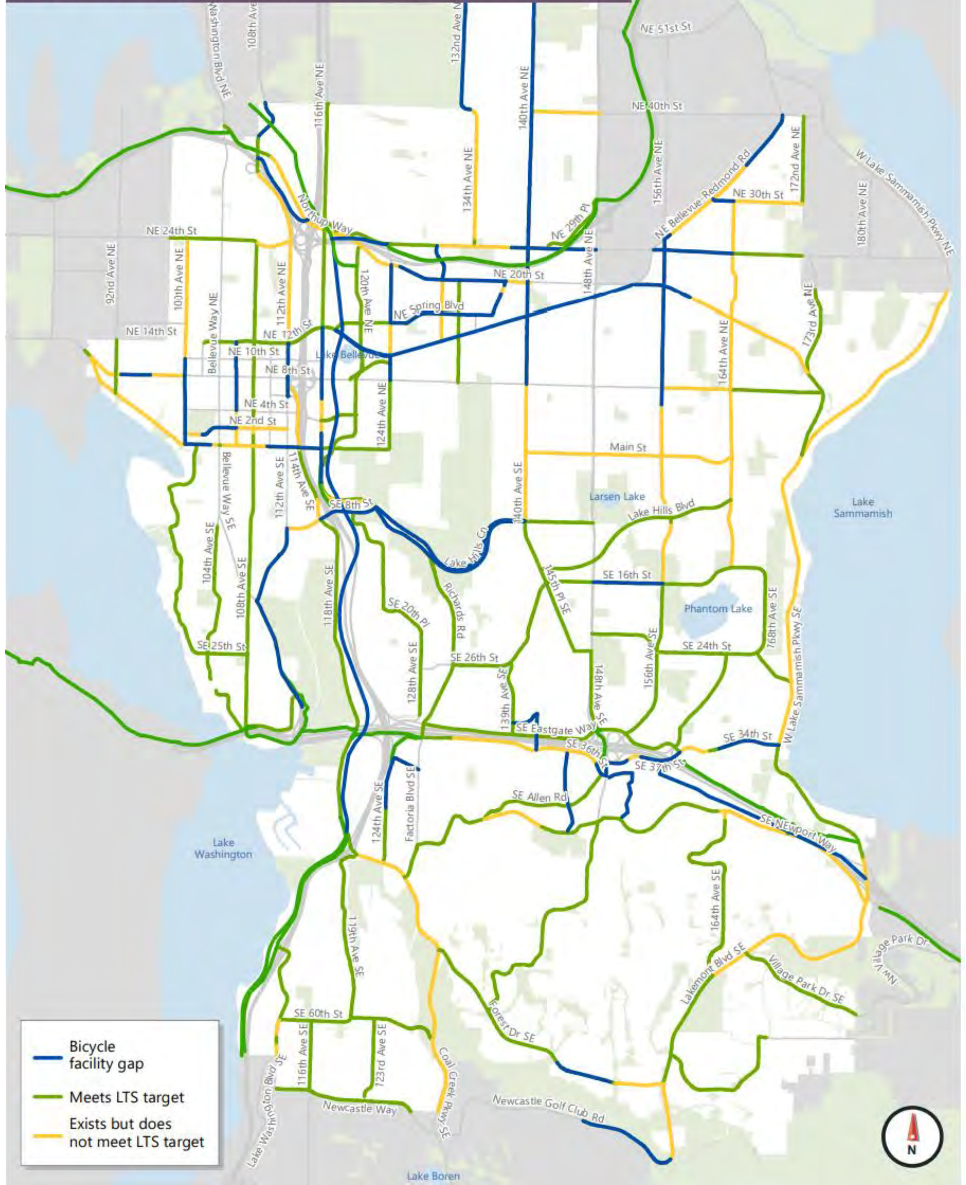
Figure 15: Pedestrian Network Performance – Existing

Citywide	Sidewalk on Both Sides	Sidewalks on One Side	Sidewalk Gaps
Miles	77	44	17
Proportion of Total	56%	32%	12%

Locations within the PMA		Sidewalk on Both Sides	Sidewalks on One Side	Sidewalk Gaps
Type 1 High Density Mixed-Use	Downtown	95%	5%	0%
	BelRed	86%	8%	6%
	Wilburton/ East Main	75%	25%	0%
Type 2 Medium Density Mixed-Use	Crossroads	100%	0%	0%
	Eastgate	29%	63%	8%
	Factoria	70%	28%	2%
Type 3 Residential		47%	37%	16%

Performance Target – Bicycle Network

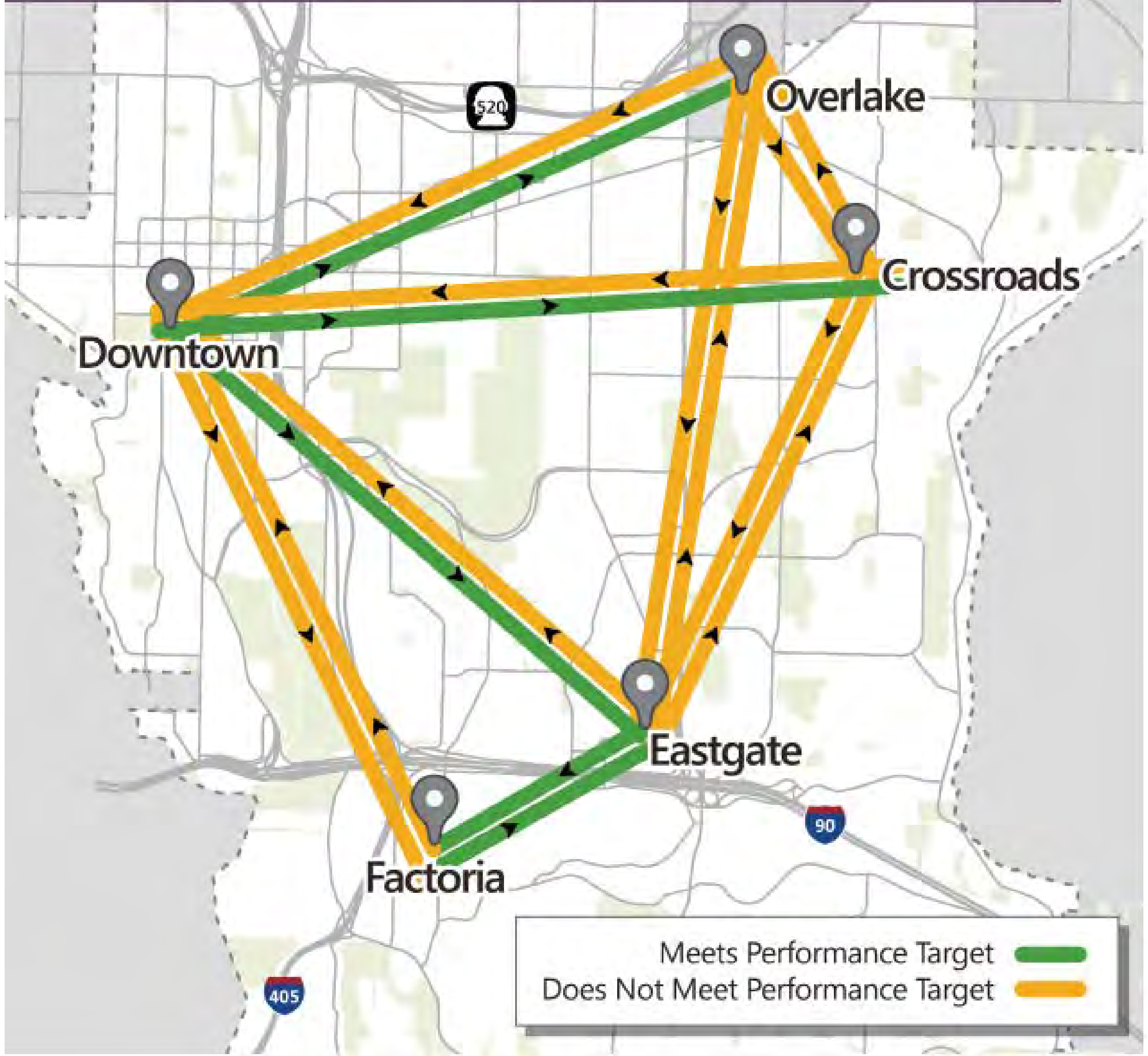
Figure 17: Bicycle Network Performance - Existing



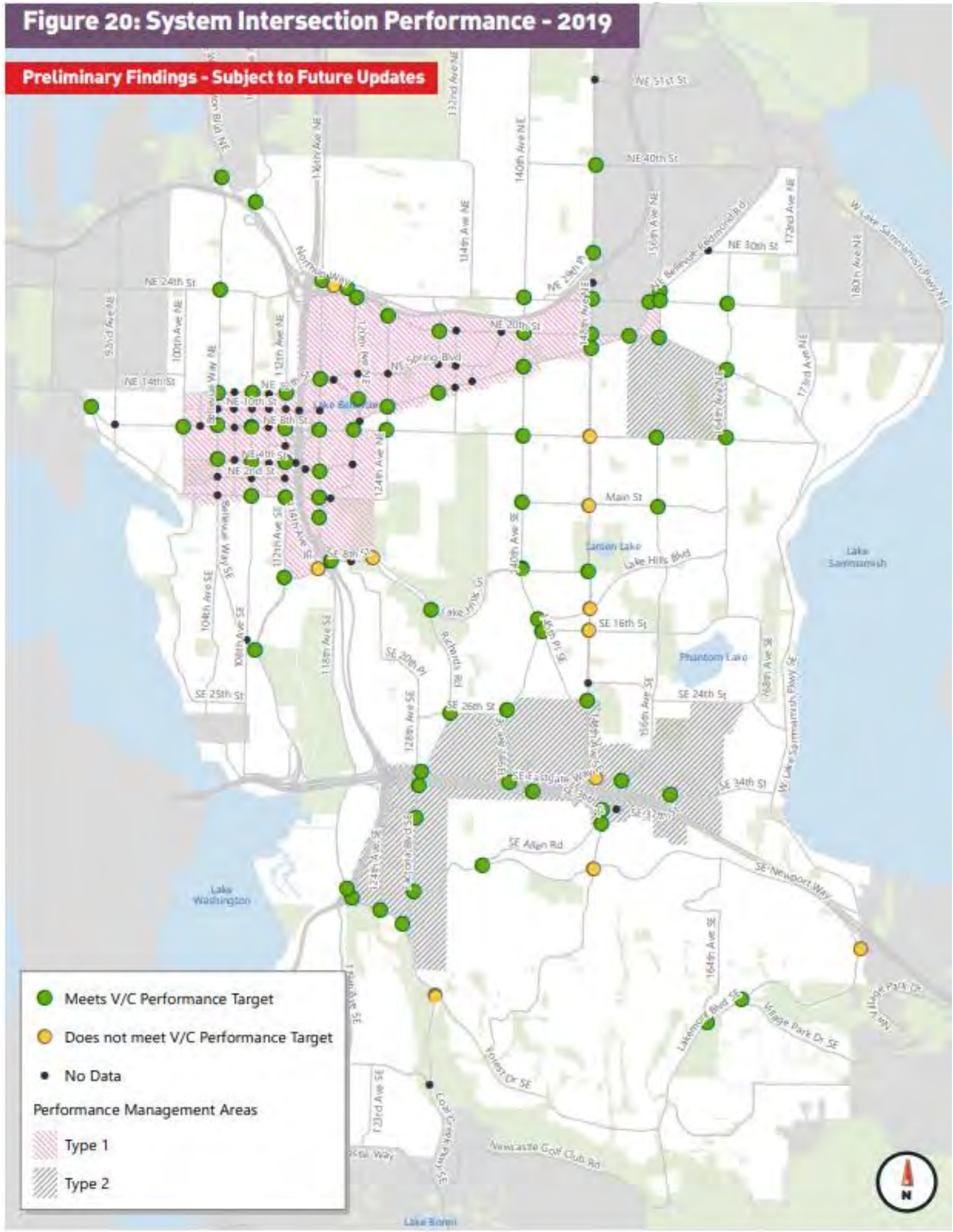
			Facilities that Meet LTS	Facilities Do Not Meet LTS	Facility Gaps
Citywide		Miles	72	33	33
Citywide		Proportion of Total	52%	24%	24%
Performance Management Area	Type 1 High Density Mixed-Use	Downtown	27%	36%	37%
		BelRed	37%	8%	55%
		Wilburton/East Main	47%	14%	38%
	Type 2 Medium Density Mixed-Use	Crossroads	1%	59%	40%
		Eastgate	60%	24%	16%
		Factoria	58%	27%	15%
	Type 3 Residential		57%	25%	18%
Priority Bicycle Corridor		Enatai-Northtowne	93%	7%	0%
		Lake Washington Loop	65%	25%	10%
		Eastrail	23%	0%	77%
		Somerset-Redmond	62%	17%	21%
		Spiritridge-Sammamish	44%	56%	0%
		West Lake Sammamish Pkwy	25%	75%	0%
		SR 520 Trail	77%	23%	0%
		Downtown-Overlake	41%	10%	49%
		Lake-to-Lake Trail	41%	21%	38%
		Mountains to Sound Greenway	32%	26%	42%
		Coal Creek-Cougar Mountain	55%	39%	6%
		Total	50%	28%	22%

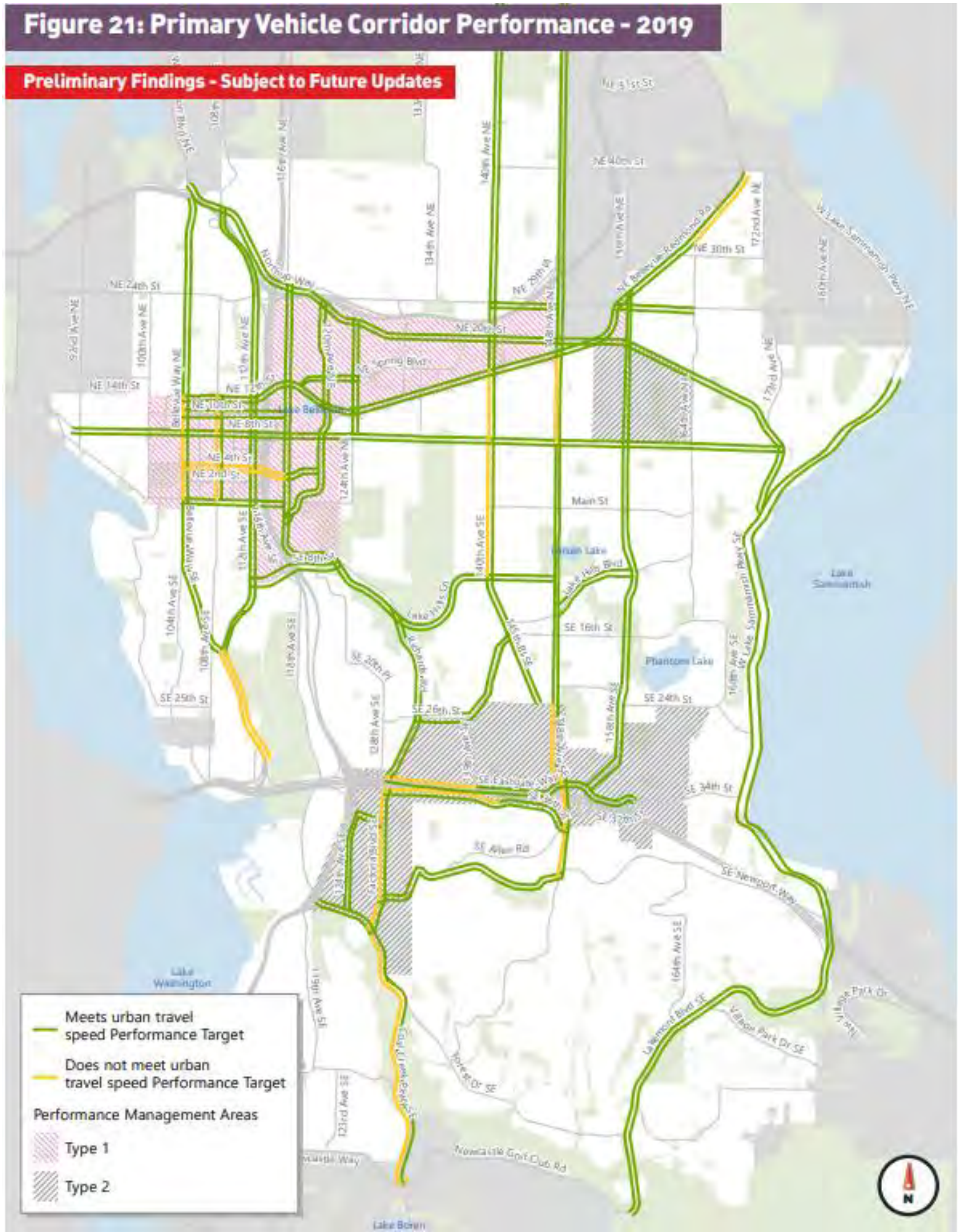
Performance Target – Transit Network

Figure 18: Transit Network Performance - Existing



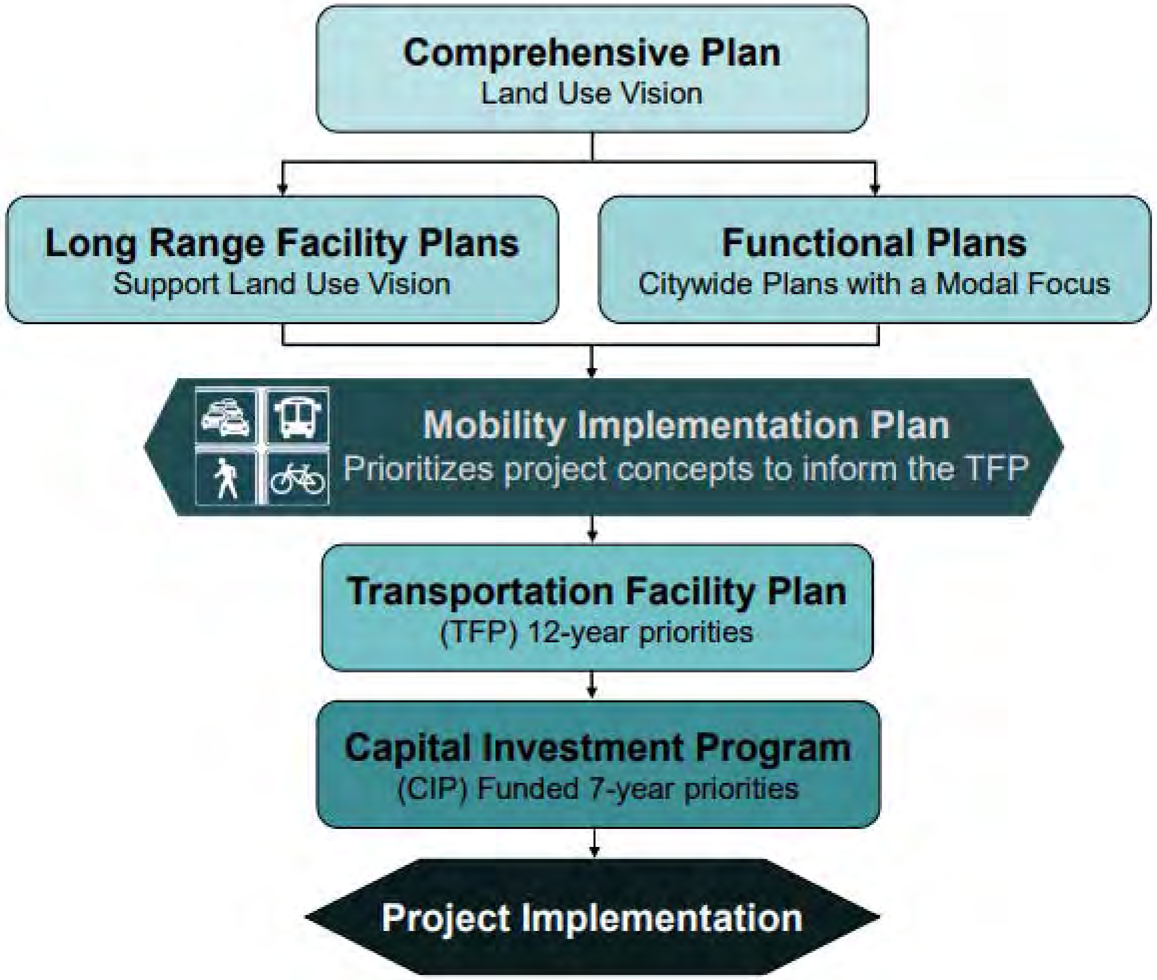
Performance Target – Vehicle Network





Transportation Projects Mobility Implementation Plan Role

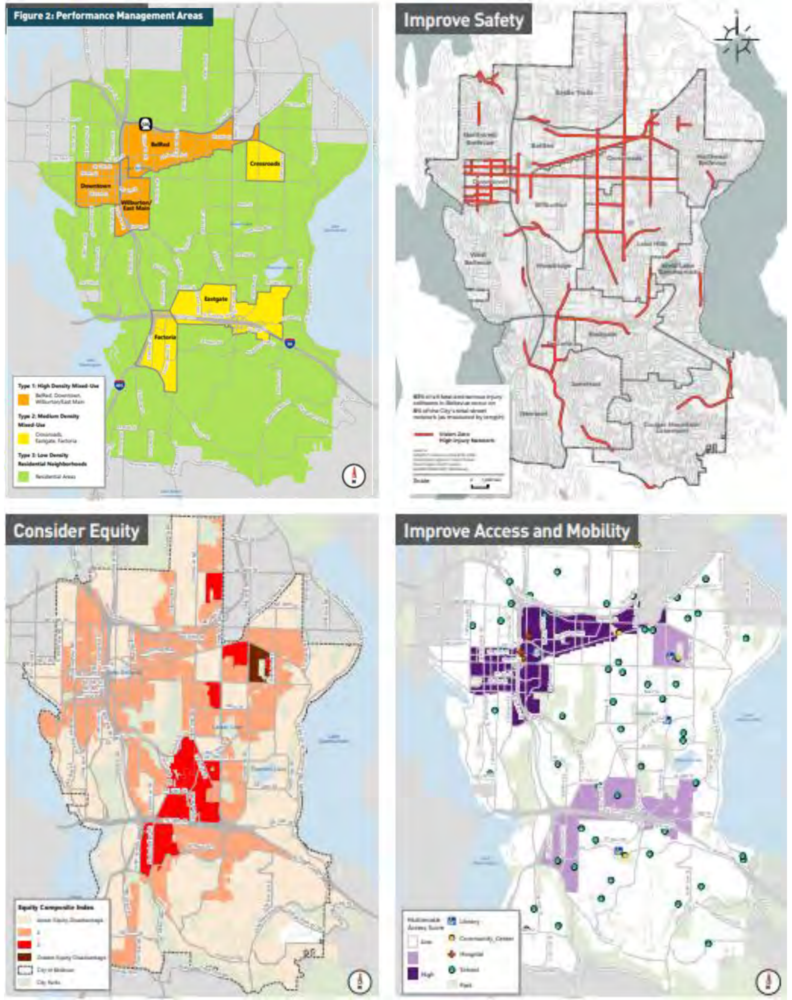
- Identify Performance Target gaps
- Prioritize Performance Target gaps
- Prepare Project Concepts for high-scoring gaps
- Refer Project Concepts for consideration in the Transportation Facilities Plan



MOBILITY IMPLEMENTATION PLAN

Prioritize Performance Target Gaps

Assess Network Performance Target Gaps against MIP Goals

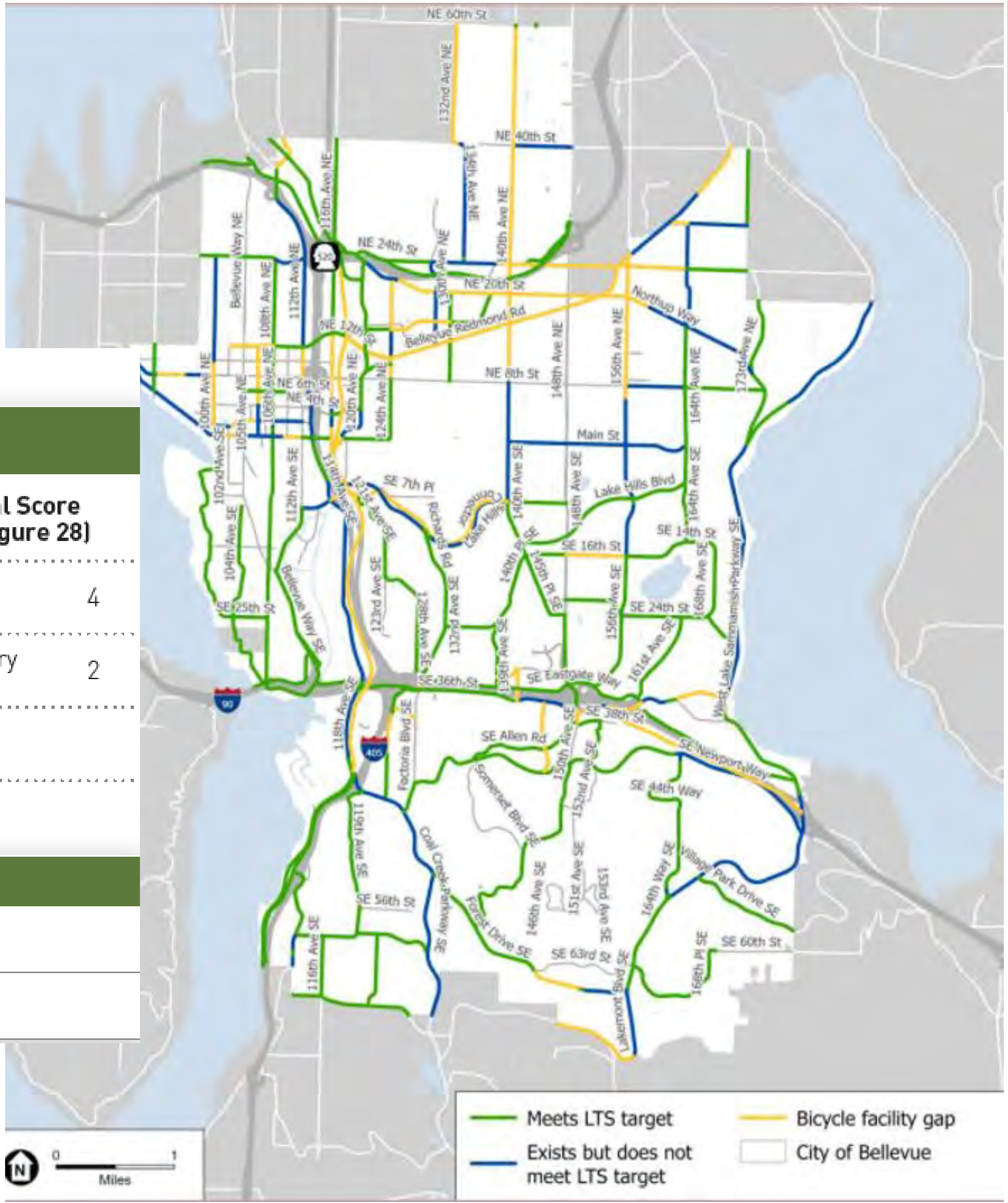


Example Scoring: Arterial Bicycle Network

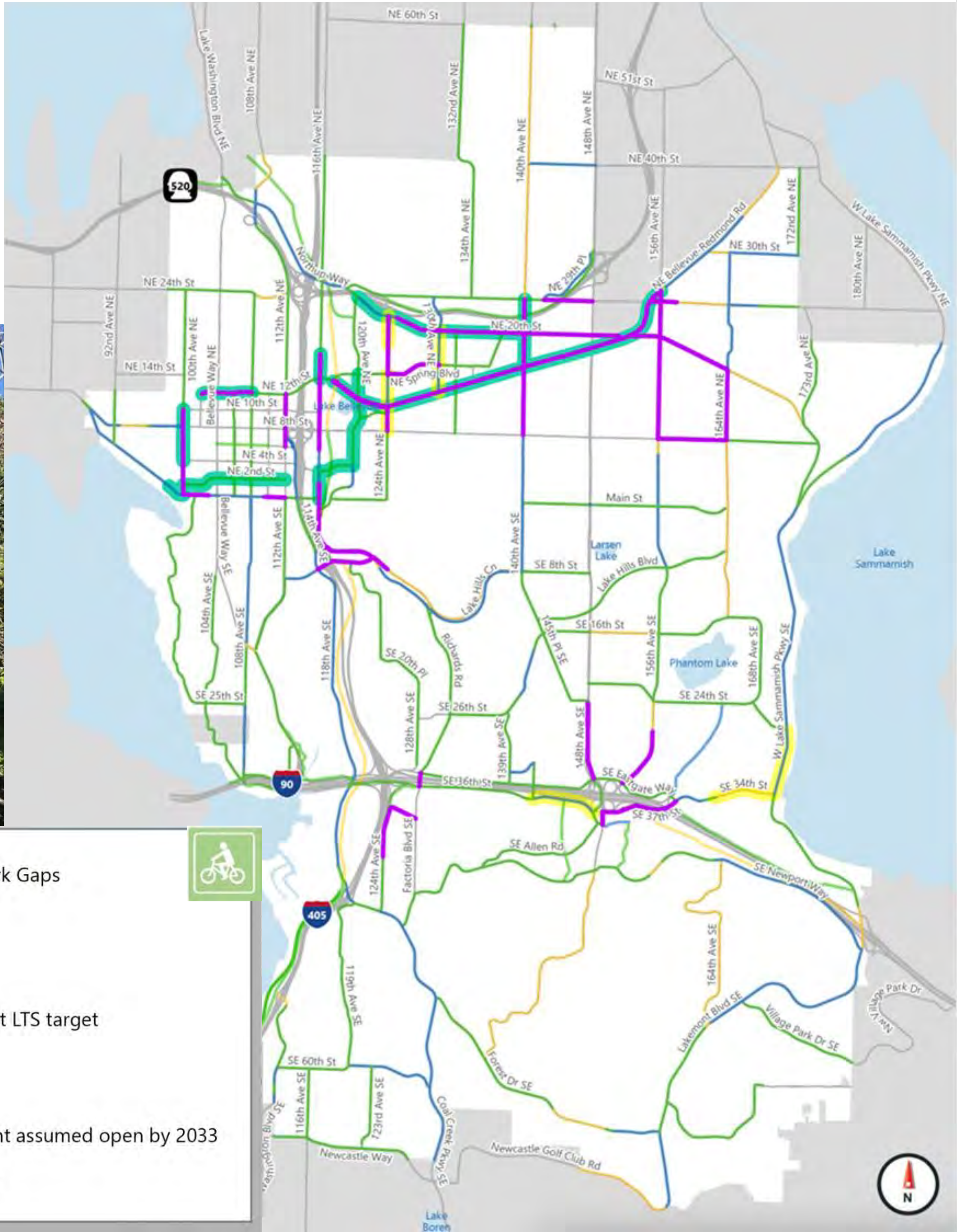
Table 3: Bicycle Mode Scoring MIP Goals

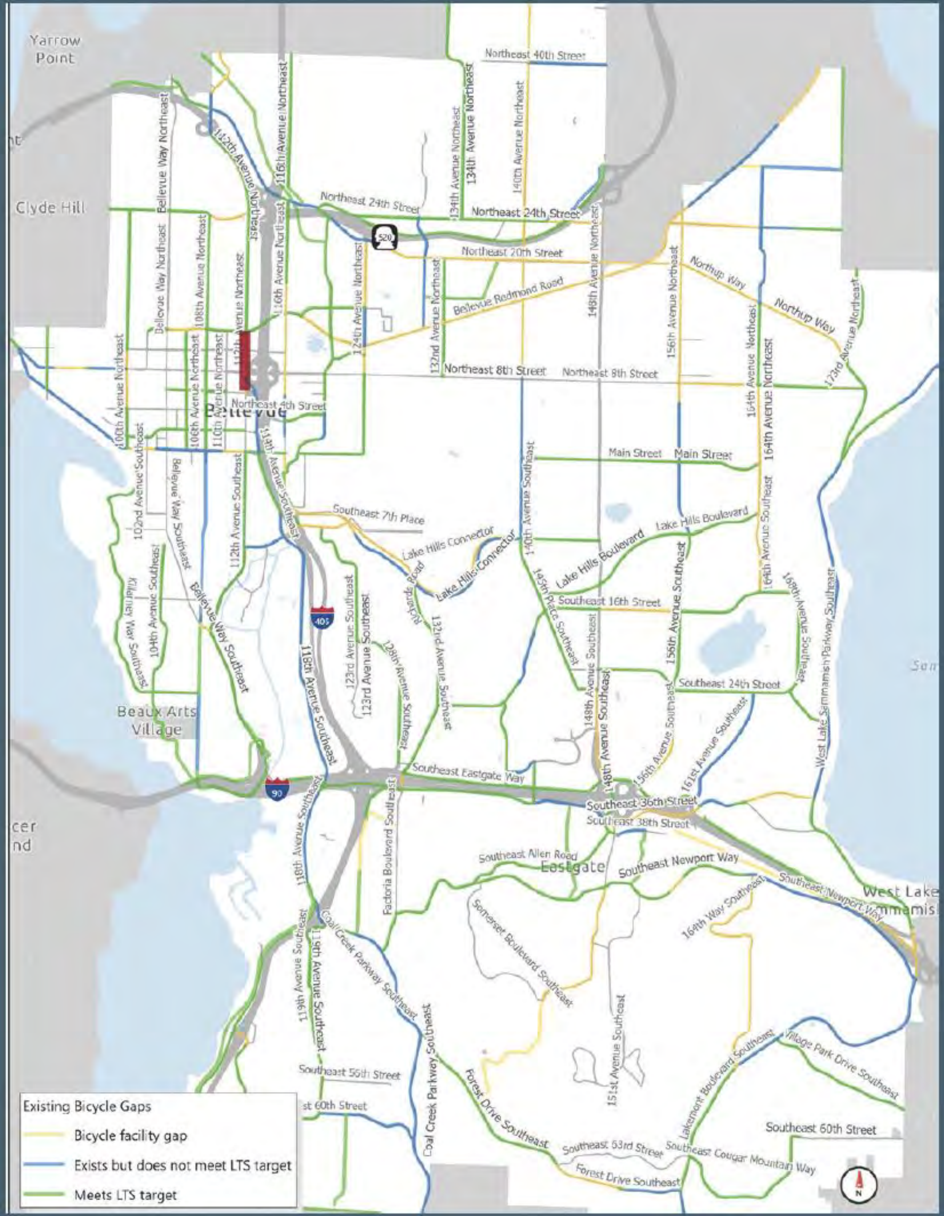
MIP Goal Score: Bicycle Mode LTS Gaps on Bicycle Network							
Growth Goal Score		Access/Mobility Goal Score (see MIP Figure 30)		Equity Goal Score (see Appendix E)		Safety Goal Score (see MIP Figure 28)	
PMA1	4		2		1	High Injury Network	4
PMA2	2		4		2	Not-High Injury Network	2
PMA3	1				3		
					4		

Supplemental Score – Bicycle Mode		
Physical Gap on a Bicycle Network Corridor	Network Corridor	+ 2
	Priority Bicycle Corridor	+ 4



MIP Scoring Results Bicycle Network





B-1 112th Avenue NE

EXTENT

NE 6th to NE 12th Street

PROJECT CONCEPT DESCRIPTION:

Add protected bike lanes to each side of 112th Avenue NE.

LTS Target: 1

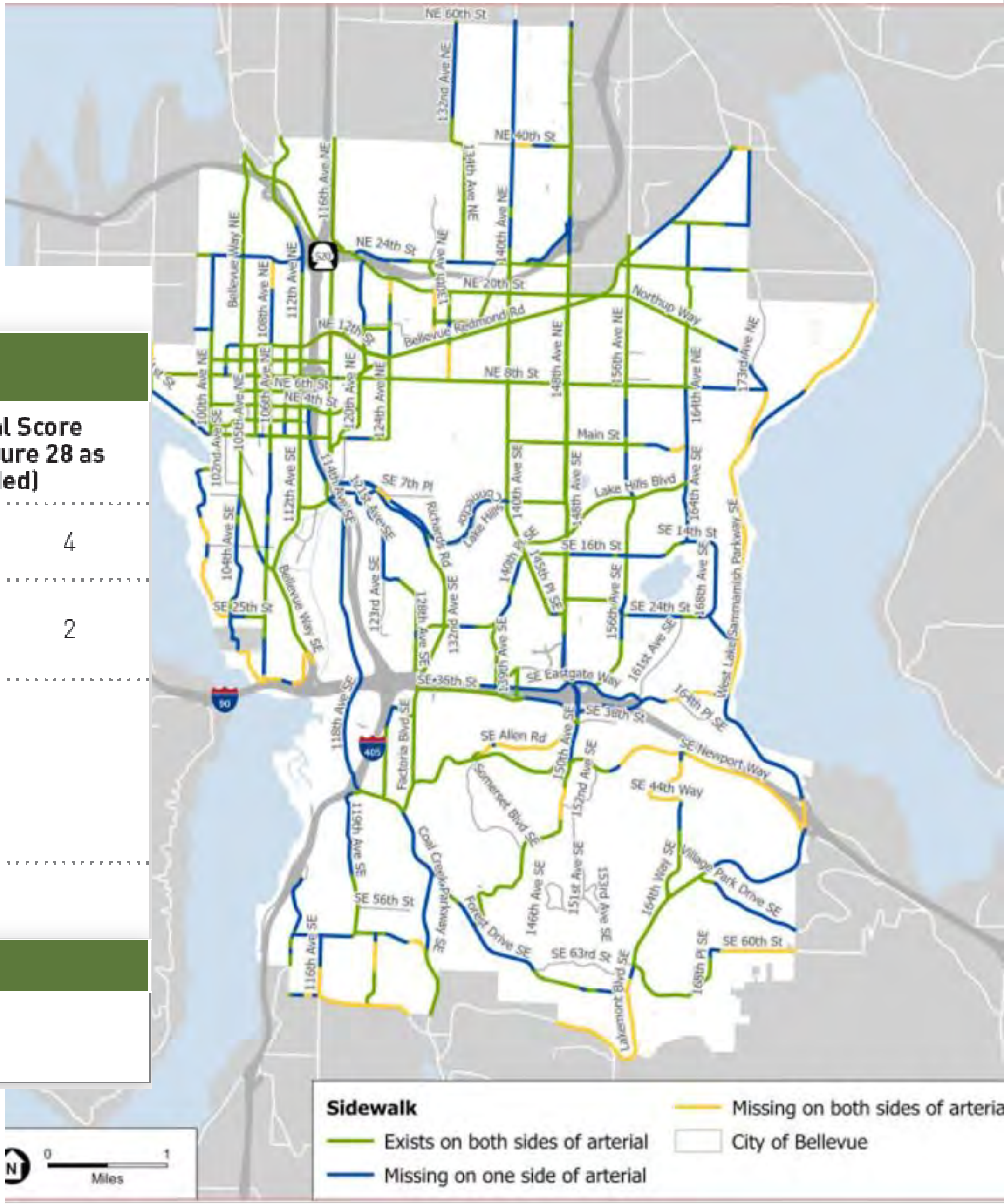
Cost: N/A with redevelopment; $$$$ if city initiated

Example Scoring: Arterial Pedestrian Network

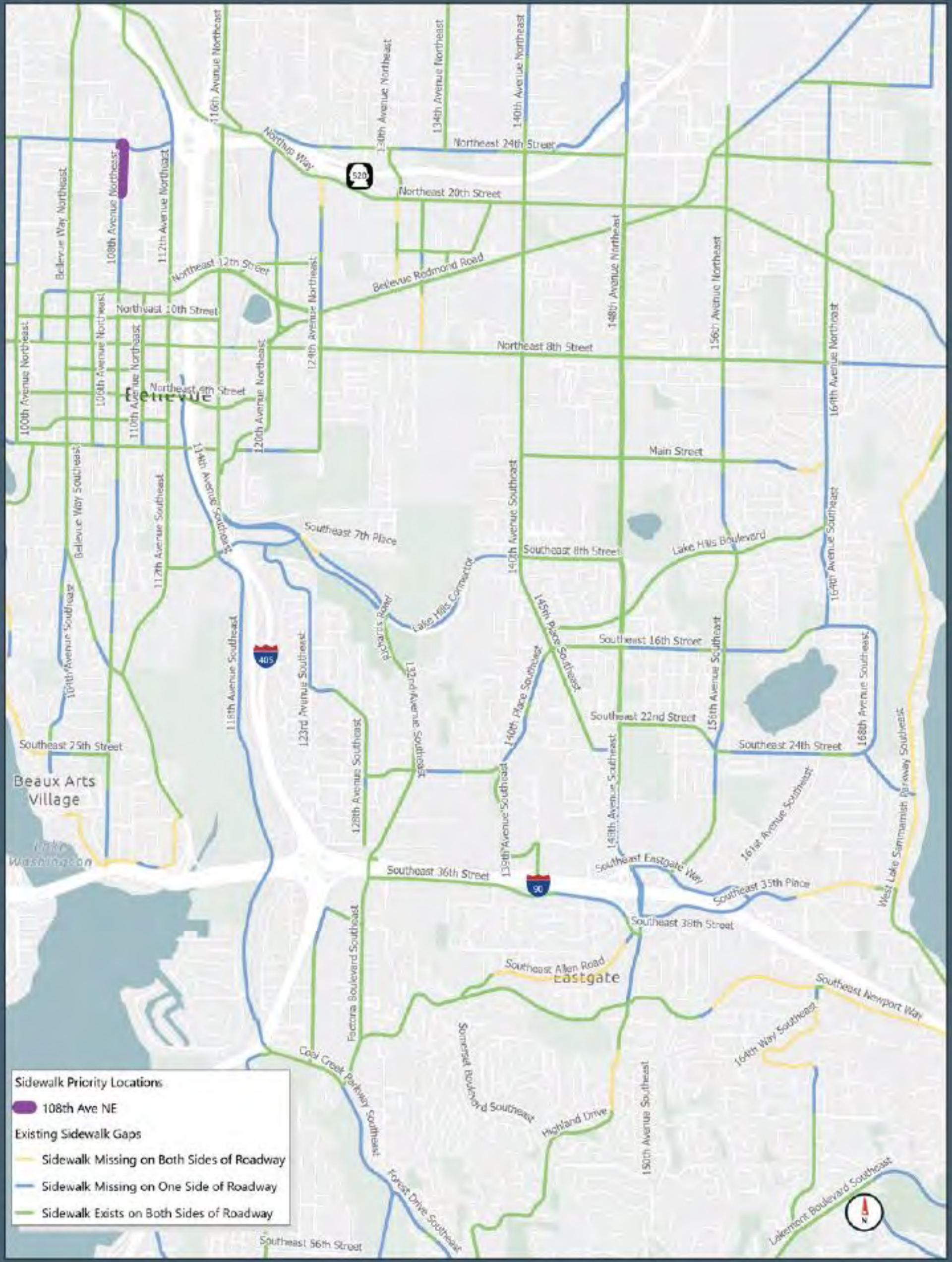
Table 2: Pedestrian Mode Scoring for MIP Goals

MIP Goal Score: Pedestrian Mode Sidewalk Gaps on Arterials							
Growth Goal Score		Access/Mobility Goal Score (see MIP Figure 30 as amended)		Equity Goal Score (see Appendix E)		Safety Goal Score (see MIP Figure 28 as amended)	
PMA1	4		2		1	High Injury Network	4
PMA2	2		4		2	Not-High Injury Network	2
PMA3	1	For gaps in PMA 3: Proximity to pedestrian destinations on MIP Figure 30: school, park, library, community center, hospital, grocery store	+2		3		
		For gaps in PMA 3: Proximity to FTN stop	+1		4		

Supplemental Score – Pedestrian Mode	
Sidewalk missing both sides	+ 4



MIP Scoring Results Pedestrian Network



P-1 108th Avenue NE

EXTENT

NE 24th Street to NE 19th Place

PROJECT CONCEPT DESCRIPTION:

Install a 6' sidewalk and 5' planter strip on either the east or west side of the street, pending further study.

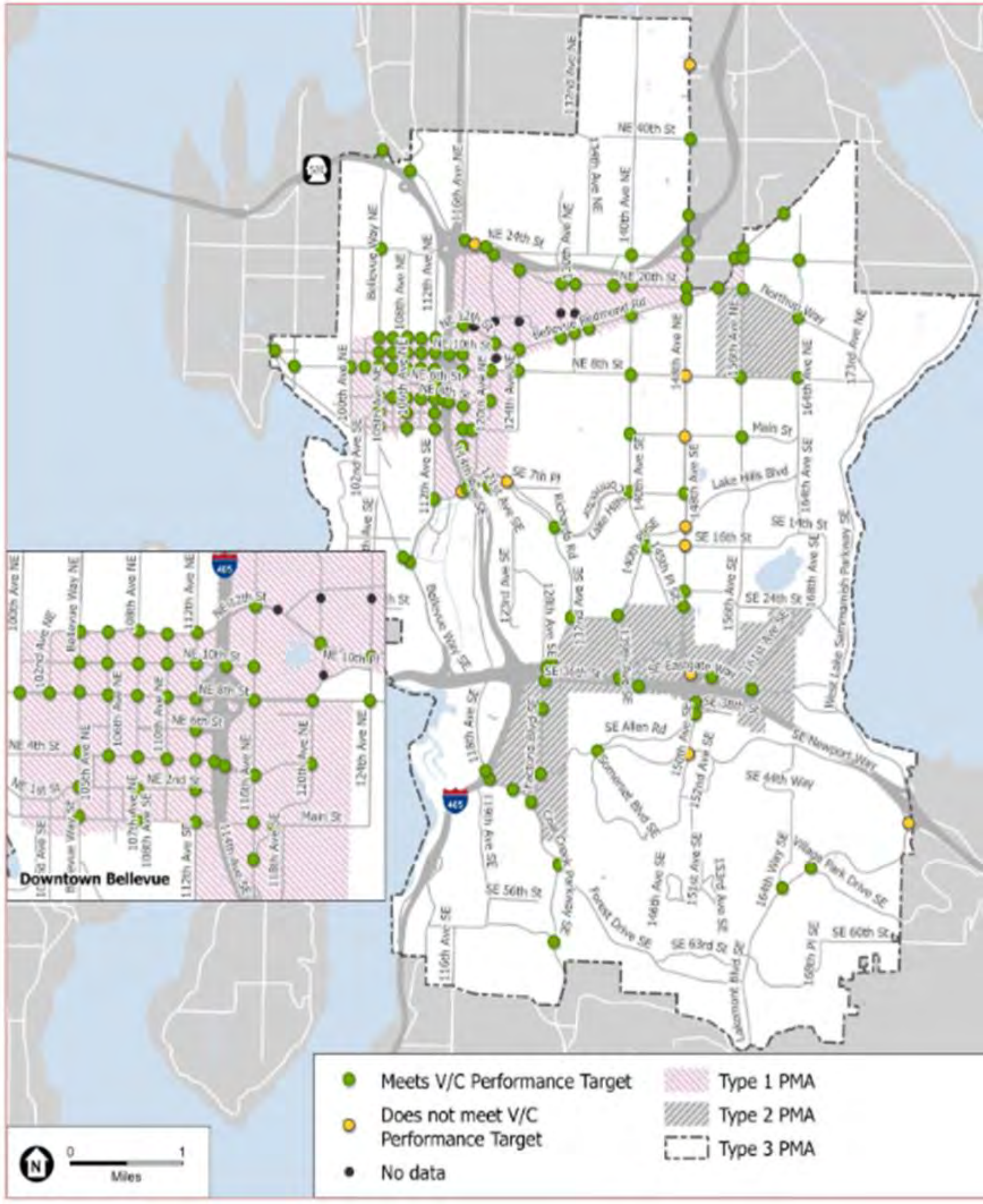
Cost: $$

Example Scoring: Vehicle Network System Intersections

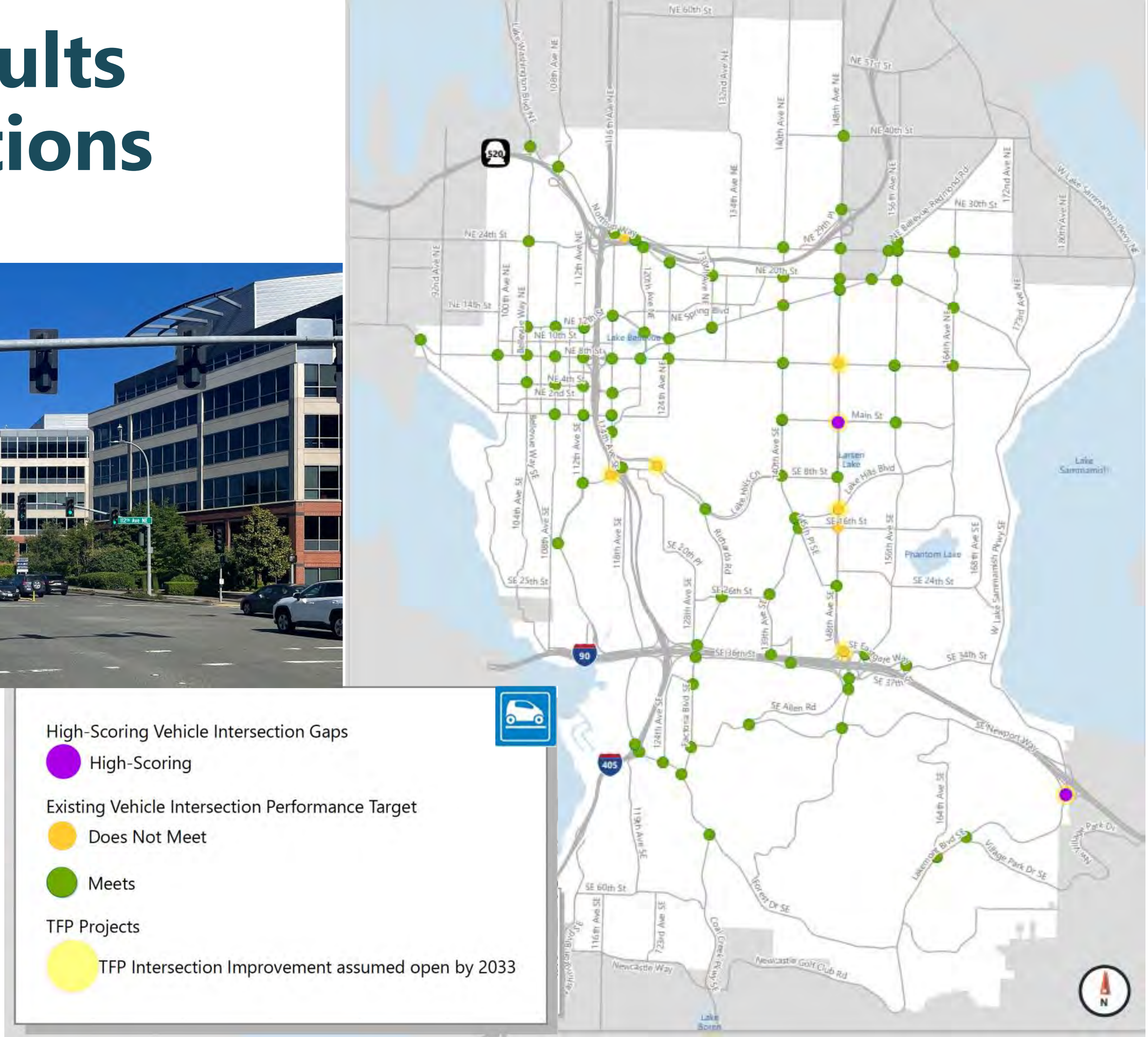
Table 4: Vehicle Mode Scoring MIP Goals

MIP Goal Score: Vehicle Mode V/C Gaps and Corridor Travel Speed Gaps							
Growth Goal Score		Access/Mobility Goal Score (see MIP Figure 30)		Equity Goal Score (see Appendix E)		Safety Goal Score (see MIP Figure 28)	
PMA1	1	(light purple)	-1	(light yellow)	N/A	High Injury Network	4
PMA2	2	(dark purple)	-2	(yellow)	N/A	Not-High Injury Network	2
PMA3	4		0	(orange)	N/A	Any vehicle mode Performance Target gap that, if addressed, will result in a wider road or higher speeds	0
				(brown)	N/A		

Supplemental Score – Vehicle Mode			
V/C Performance Target Gap		Travel Speed Performance Target Gap	
< 10%	+ 1	< 10%	+ 1
10%-20%	+ 2	10%-20%	+ 2
20%-30%	+ 3	20%-30%	+ 3
> 30%	+ 4	> 30%	+ 4



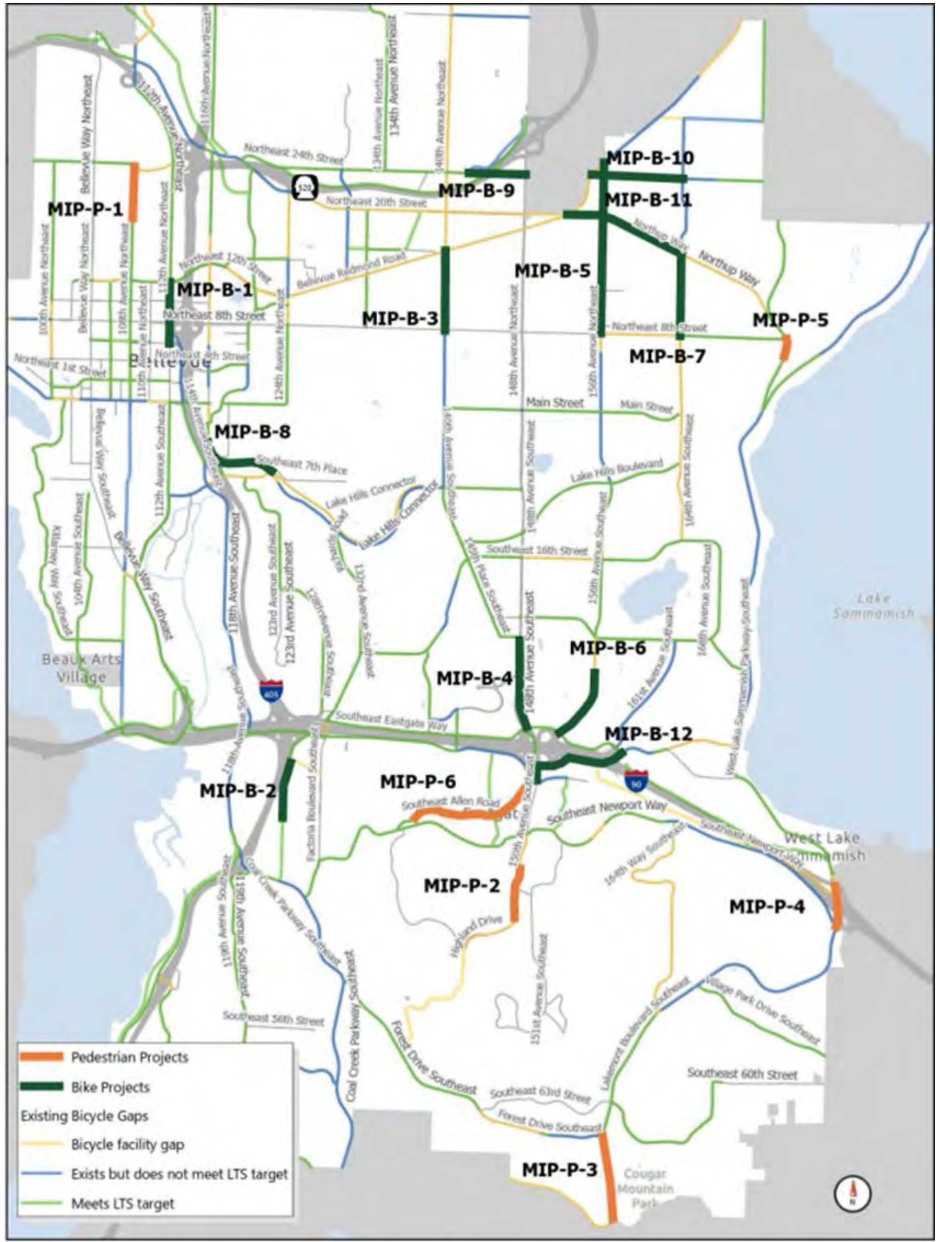
MIP Scoring Results System Intersections



Main Street at 148th Avenue

N

Referrals to the TFP 2026-2037 Update



2022-2033

TRANSPORTATION FACILITIES PLAN

July 2022

MIP – 2025 Update

Comprehensive Plan

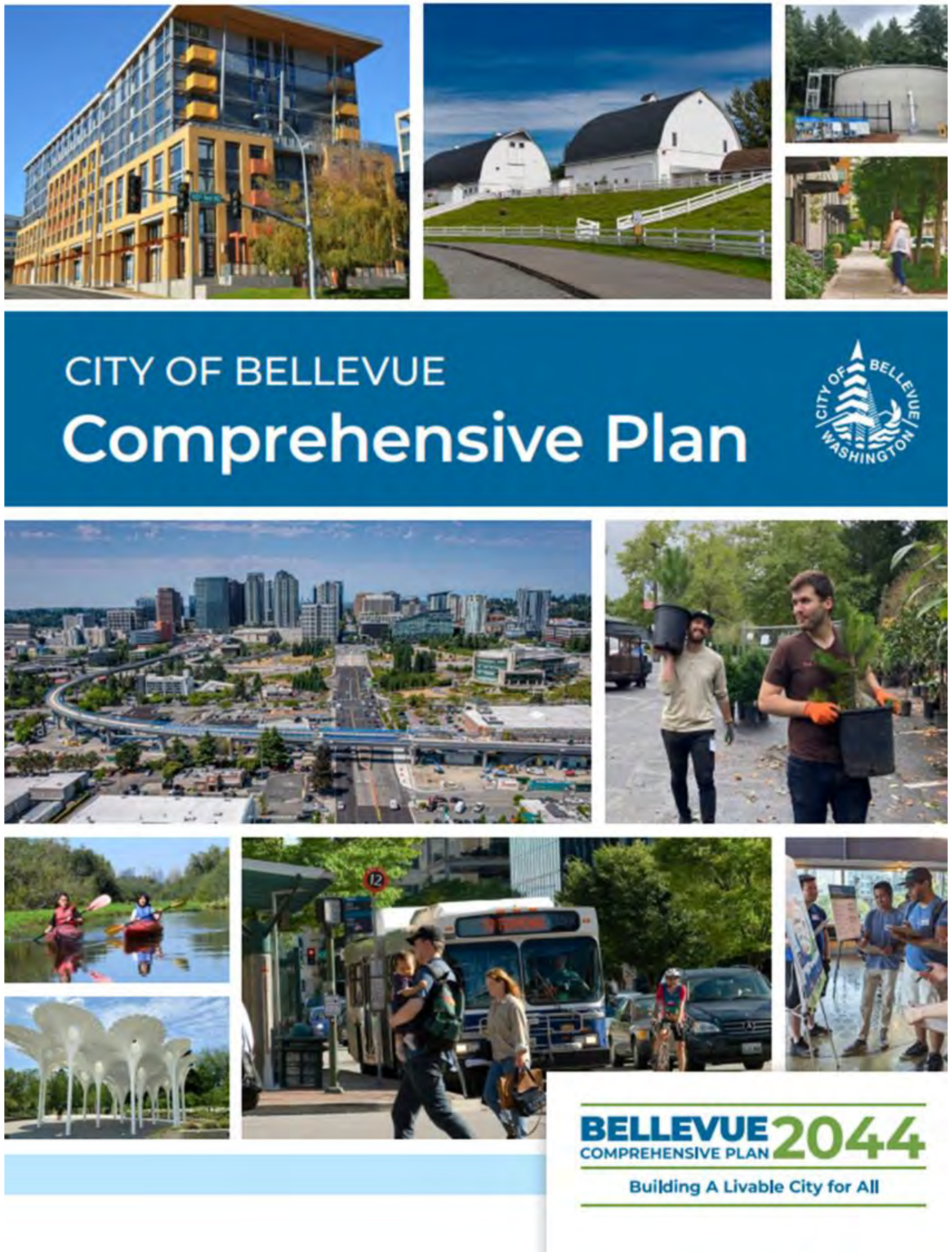
Policy TR-28: *Engage the community to evaluate and modify the Mobility Implementation Plan as needed, in concert with each periodic update of the Comprehensive Plan, or as warranted by changed circumstances.*

Changed Circumstances

- Pedestrian Level of Traffic Stress (PLTS)
- Bicycle Level of Traffic Stress at Intersections
- Data in MIP is 4-5 years old. Update!

Transportation Commission

- Recommend to City Council Q3 2025



Mobility Implementation Plan

Thank You!

Kevin McDonald
kmcdonald@bellevuewa.gov
425-452-4558

Visit the
Mobility Implementation Plan web site

Updates to the AASHTO Guide for the Development of Bicycle Facilities:

In-depth Review of Separated Bike Lanes and Side Paths

Jeremy Chrzan, PE, PTOE

Multimodal Design Practice Lead

Toole Design Group

2024 AASHTO Bike Guide 5th Edition

Washington Transportation Professionals Forum and Peer Exchange
April 29, 2025

Jeremy Chrzan, PE, PTOE, LEED AP
Multimodal Design Practice Lead

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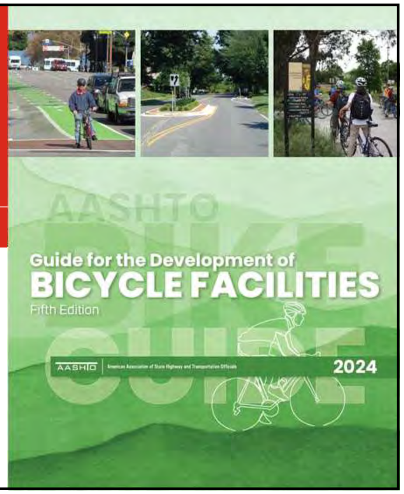


1

2012 Guide compared to 2024 Guide

2012 Guide	2024 Guide	Notable Changes of 2024 compared to 2012
Chapter 1. Introduction	1. Introduction	REWRITE with new discussion of design range concept
Chapter 3. Bicycle Operation and Safety	2. Bicycle Operation & Safety	REWRITE of former Chapter 3
Chapter 2. Bicycle Planning	3. Bicycle Planning	REWRITE and NEW CONTENT added to former Chapter 2
	4. Facility Selection	NEW CHAPTER with a few items carried from Chapter 2
	5. Elements of Design	NEW CHAPTER with some content pulled from Chapters 4 and 5
Chapter 5. Design of Shared Use Paths	6. Shared Use Paths	REVISION of Chapter 5
	7. Separated Bike Lanes & Side Paths	NEW CHAPTER with new content
	8. Bicycle Boulevards	NEW CHAPTER with new content
Chapter 4. Design of On-Road Facilities	9. Bike Lanes & Shared Lanes	REVISION of Chapter 4
	10. Traffic Signals and Active Warning Devices	NEW CHAPTER with new content
	11. Roundabouts, Interchanges, and Alternative Intersections	NEW CHAPTER with new content
	12. Rural Area Bikeways	NEW CHAPTER with some content pulled from Chapter 4
	13. Structures	NEW CHAPTER with some content pulled from Chapter 5
	14. Wayfinding	NEW CHAPTER with some content pulled from Chapter 4
Chapter 7. Maintenance and Operations	15. Maintenance & Operations	REVISION of chapter 7
Chapter 6. Bicycle Parking Facilities	16. Parking, Bike Share, & End of Trip Facilities	REVISION of chapter 6

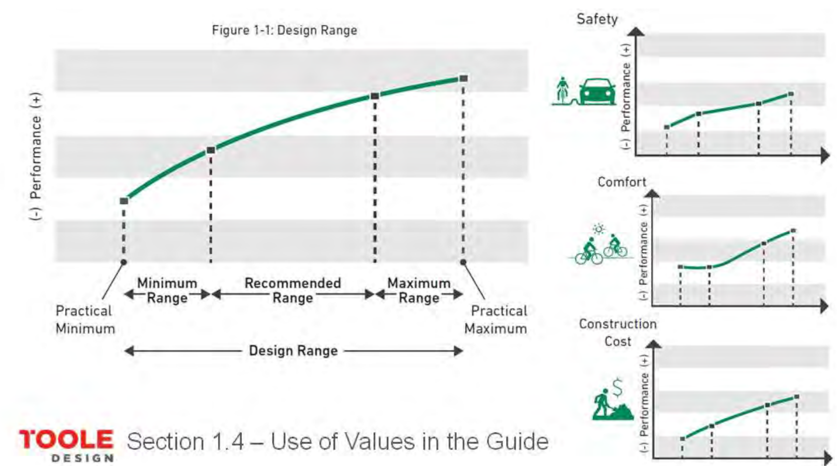
TOOLE DESIGN

2

Chapter 1 – Introduction

1.1 Design Imperative for Bicycle Facilities
1.2 Purpose
1.3 Design Flexibility
1.4 Use of Values in the Guide
1.5 Scope
1.6 Relationship to other Design Guides and Manuals
1.7 Structure of this Guide
1.8 Definitions

3



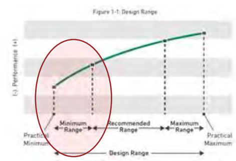
TOOLE DESIGN Section 1.4 – Use of Values in the Guide

4

Section 1.4 – Use of Values in the Guide

1.4.1. Minimum Range

The use of **values within the minimum range should be minimized** because they are likely to diminish mobility, safety, and comfort



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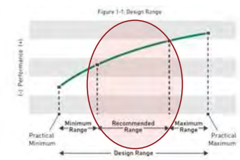
5

Section 1.4 – Use of Values in the Guide

1.4.2. Recommended Values Range

The use of **values within the recommended range should be chosen** to maximize mobility, safety and comfort benefits for bicyclists as well as other users.

These values were determined by research or established best practice.



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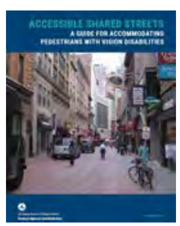
6

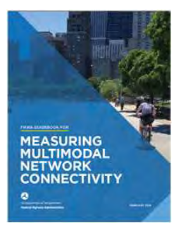
Section 1.6 - Relationship to Other Manuals

FHWA Separated Bike Lane Planning and Design Guide
May 2015

FHWA Achieving Multimodal Networks
August 2016



FHWA Accessible Shared Streets
September 2017



FHWA Measuring Multimodal Network Connectivity
February 2018

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7

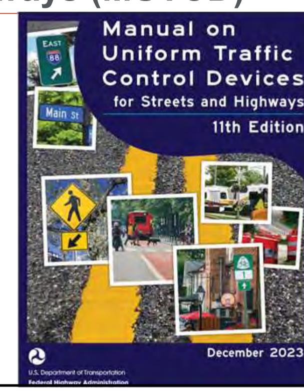
1.6.1. Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD)

MUTCD defines design and application of traffic control devices (TCDs).

2024 Bike Guide conforms to 2023 MUTCD

> Includes some TCDs that require experimental approval by FHWA (located at the end of their respective section)

AASHTO expands upon the application of TCDs



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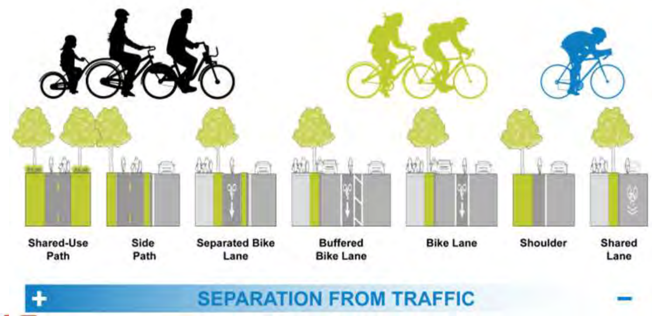
8

Chapter 2 - Bicycle Operation and Safety

9

Comfort Increases with Separation



TOOLE DESIGN

10

2.3. Bicyclist Design User Profiles

Comfort Typology of Bicyclists

Design User Profile	Non-Bicyclist	Interested but Concerned	Somewhat Confident	Highly Confident
Bicycling Preferences	Uncomfortable bicycling in any condition, have no interest in bicycling, or are physically unable to bicycle.	Often not comfortable with bike lanes; may bike on sidewalks even if bike lanes are provided. Prefer off-street or separate bicycle facilities or quiet or traffic-calmed residential roads. May not bike at all if bicycle facilities do not meet needs for perceived comfort.	Generally prefer more separated facilities, but comfortable riding in bicycle lanes or on paved shoulders if need be.	Comfortable riding with traffic; will use roads without bike lanes.
Percent of Population	31–37%	51–56%	5–9%	4–7%

Figure 2-2: Comfort Typology of Bicyclists (See Chapter 2 References: Dill and McNeill, 2016)

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11

2.7. Guiding Principles for Bicyclist Safety

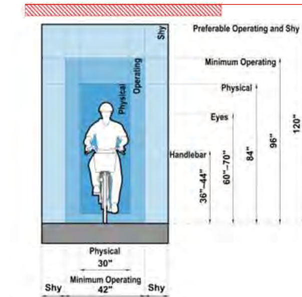


Figure 2-5: Typical Adult Bicyclist Operating Space

- Reduced injury risk compared to standard bike lanes and shared lanes
  (Lusk et al., 2013; Lusk et al., 2011; NYCDOT, 2014; Winters et al., 2013)
- SBL preferred over striped or shared lanes by both cyclists and motorists
  (Monsere et al., 2014; Monsere et al., 2012; Sanders, 2014)
- One-way generally safer than two-way
  (Schepers et al., 2011; Thomas & DeRobertis, 2013)
- Two-way SBLs on one-way roads, preferable on right side
  (Schepers et al., 2011; Zangenehpour et al., 2015)

TOOLE DESIGN

12

Chapter 4 - Guidance for Choosing a Bikeway Type

4.1 Introduction

4.2 Project Performance Goals and Objectives

4.3 Selecting the Preferred Bikeway Type

4.4 Strategies to Achieve the Preferred (or Next Best) Design

4.5 Evaluating Design Alternatives and Trade-offs to Select a Bikeway

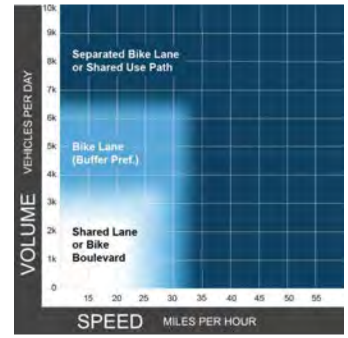
13

Section 4.3.1 – Streets in Urban, Suburban and Rural Town Contexts

Identifies the **preferred** bikeway type assuming:

Design User = Interested but Concerned bicyclist

Analysis = Level of Traffic Stress



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14

4.4.2. Example Strategies for Constrained Rights-of-Way

4.4.2.1 Traffic Analysis Approach

4.4.2.2 Narrowing Travel Lanes

4.4.2.3 Removing Travel Lanes

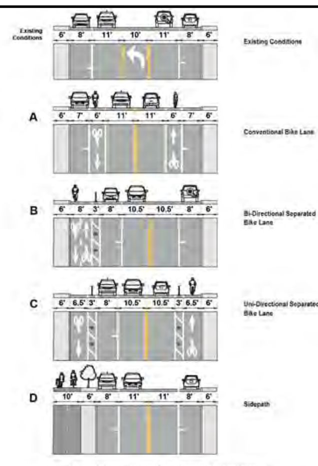
4.4.2.4 Reorganizing Street Space

4.4.2.5 Making Changes to On-Street Parking

4.4.2.6 Reducing Bikeway Widths

4.4.2.7 Reducing Motor Vehicle Traffic Volumes and Speeds

4.5.2. Example of Trade-off Considerations Between Common Bikeway Types



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15

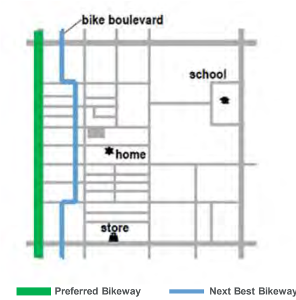
4.5.3. Selecting the Next Best Facility When the Preferred Bikeway Is Not Feasible

Alternative Route

If no other design improvements are feasible, it is necessary to consider alternative parallel routes.

Research indicates that for an alternative low-stress route to be viable, **the increase in trip length should be less than 30 percent.**

Broach, J., Dill, J., and J., Gliebe. Where Do Cyclists Ride? A Route Choice Model Developed with Revealed Preference GPS Data



TOOLE DESIGN

16

Chapter 5 – Elements of Design

17

5.5.4.1 Sight Distance and Approach Clear Space for Bikeways at Roadway Intersections

- **Turning Motorist Yields to (or Stops for) Through Bicyclists:** When a through moving bicyclist that arrives or will arrive at the crossing prior to a turning motorist, the motorist must stop or yield.
- **Through Bicyclist Yields to (or Stops for) Turning Motorist:** When a turning motorist arrives or will arrive at the crossing prior to a through moving bicyclist, the bicyclist must stop or yield.
- **User with Right-of-Way Yields to (or Stops for) Another User:** Sometimes the user with the right-of-way will instead yield the right-of-way.
- **APPROACH CLEAR SPACE ALLOWS THIS TO FUNCTION!**

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18

5.5.4.1.1 Case S – Right-Turning Motorist Across Separated Bike Lane or Side Path

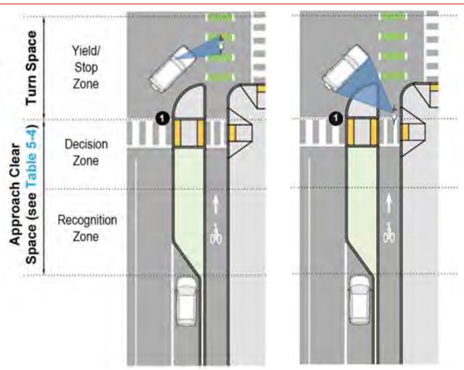
Table 5-4: Recommended Intersection Approach Clear Space by Vehicular Turning Design Speed

Effective Vehicle Turning Radius	Vehicular Turning Speed	Recommended Approach Clear Space
<18 ft	<10 mph[a]	20 ft
18 ft	10 mph	40 ft
25 ft	15 mph	50 ft
30 ft	20 mph	60 ft
>30 ft	25 mph	70 ft

[a] Most low-volume driveways and alleys

legend

line of sight



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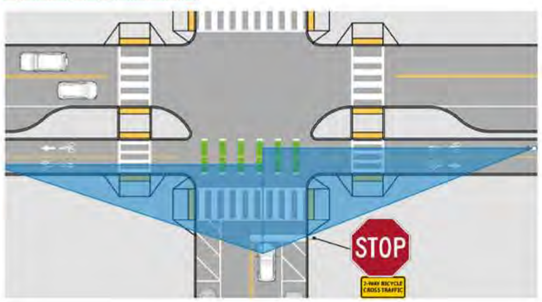
19

5.5.4.1.3 Case U1 – Near-Side Through Motorist Crossing of SBL or SUP



Case U Intersection Sight Distance		
$ISD_{bike} = 1.47 V_{bike} t_g$		
Where:		
ISD_{bike}	=	intersection sight distance (length of the leg of sight triangle along the bikeway) (ft)
V_{bike}	=	design speed of bikeway (mph)
t_g	=	time gap for vehicle to cross bikeway (sec): • passenger vehicle = 6.5 seconds • single-unit truck = 8.5 seconds • combination truck = 10.5 seconds

legend

Case U1 sight triangles

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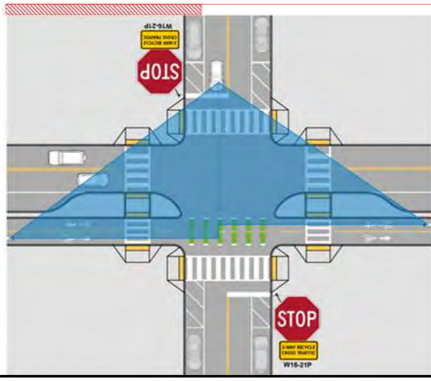
20

5.5.4.1.3 Case U2 – Far-side Through Motorist Crossing of SBL or SUP



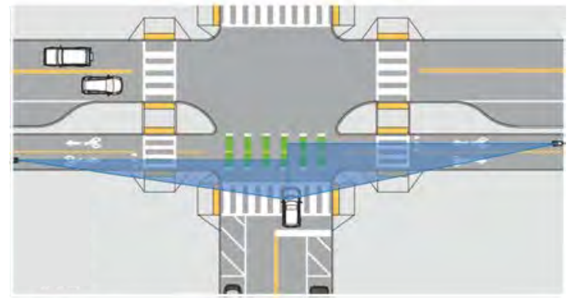
at a minimum the **provision of stopping sight distance for bicyclists should be provided** to allow a bicyclist to slow or stop if a vehicle encroaches into the separated bike lane or side path

legend

Case U2 sight triangles

21

7.9.5 Case U1 – Multistep Variant



Chapter 7 sight distance

- Driver looks for pedestrians, then moves forward
- Driver looks for bicyclists, then moves forward
- Driver looks for other motorists, then proceeds

legend

Case U1 sight triangles — AASHTO Green Book Case B sight triangles

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22

5.6.2. Horizontal Alignments

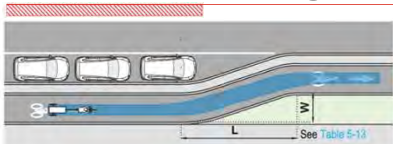


Table 5-13: Shifting Taper Equation

Shifting Taper Equation		
$L = \frac{WS^2}{60}$		
Where:		
L	=	longitudinal lane shift (ft), minimum 20 ft
W	=	lateral width of offset (ft)
S	=	target bicyclist operating speed (mph)

Legend

bicycle trailer envelope

23

5.8. Intersection Design Objectives

5.8.1. Minimize Exposure to Conflicts

5.8.2. Reduce Speeds at Conflict Points

5.8.3. Communicate Right-of-Way Priority

5.8.4. Providing Adequate Sight Distance

5.8.5. Transitions to Other Facilities

5.8.6. Accommodating Persons with Disabilities

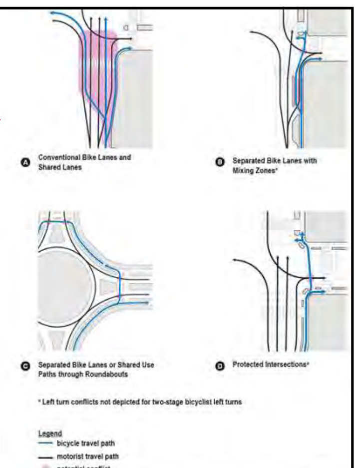


Figure 5-13: Comparison of Bicyclist Exposure to Motor Vehicles at Intersections

TOOLE DESIGN

24

Chapter 6 – Shared Use Paths

Chapter 6
SUP Width (Two-way)

6.4.3. Recommended Shared Use Path Widths

Table 6-3: Recommended Shared Use Path Widths* to Achieve SUP LOS "C"

Shared Use Path Operating Widths and Operational Lanes*					
SUPLOS "C" Peak Hour Volumes	Recommended Operational Lanes	Practical Minimum	Recommended Lower Limit	Recommended Upper Limit	Practical Maximum
150 to 300	2	8 ft	10 ft	12 ft	13 ft
300 to 500	3	11 ft	12 ft	15 ft	16 ft
500 to >600	4	15 ft	16 ft	20 ft	None

*Typical Mode Split is 55% adult bicyclists, 20% pedestrians, 10% runners, 10% in-line skaters, and 5% child bicyclists

11' wide provides three (3) operational lanes

TOOLE DESIGN

6.4.2. Shared Use Path Level of Service

Table 6-1: Shared Use Path Operating Conditions Based on Level of Service Criteria

Shared Use Path Level of Service (SUPLOS) and Operating Conditions	
SUPLOS	Peak Operating Conditions
A. Excellent	A significant ability to absorb more users across all modes is available.
B. Good	A moderate ability to absorb more users across all modes is available.
C. Fair	Path is close to functional capacity with minimal ability to absorb more users.
D. Poor	Path is at its functional capacity. Additional users will create operational and safety problems.
E. Very Poor	Path operating beyond its functional capacity resulting in conflicts and people avoiding the path.
F. Failing	Path operating beyond functional capacity resulting in significant conflicts and people avoiding the path.

Table 6-2: Shared Use Path Level of Service Look-Up Table, Typical Mode Split

Shared Use Path Level of Service Look-Up Table, Typical Mode Split*										
Shared Use Path Peak Hour Volume	Shared Use Path Width (ft)									
	8	10	11	12	14	15	16	18	20	≤ 25
50	B	B	B	B	B	A	A	A	A	A
100	D	C	B	B	B	A	A	A	A	A
150	D	C	B	B	B	A	B	A	A	A
200	D	D	C	B	B	A	B	A	A	A
300	E	D	C	C	C	B	B	B	B	A
400	F	E	D	D	C	C	C	B	B	A
500	F	F	D	D	D	C	C	C	C	A
600	F	F	E	E	E	D	D	C	C	A
800	F	F	F	F	F	E	E	E	E	A
1,000	F	F	F	F	F	E	F	F	F	A
≥ 1,200	F	F	F	F	F	F	F	F	F	A

*Assumptions:

1. Mode split is 55 percent adult bicyclists, 20 percent pedestrians, 10 percent runners, 10 percent in-line skaters, and 5 percent child bicyclists.
2. An equal number of trail users travel in each direction (the model uses a 50 percent–50 percent directional split).
3. Trail volume represents the actual number of users counted in the field (the model adjusts this volume based on a peak hour factor of 0.85).
4. Trail has a centerline.

TOOLE DESIGN

6.4.4. Separation of Pedestrians and Bicyclists

6.4.4.1 Land Use Considerations Where Separation is Desirable

6.4.4.2 Volume Thresholds Where Separation is Desirable

Should be considered when:

- Level of Service is projected to be at or below level "C."
- Pedestrians can reasonably be anticipated to be 30% or more of the volume

6.4.4.3 Separation Strategies

6.4.4.4 Accessibility Considerations

Figure 6-3: Burke-Gilman Shared Use Path (2008) and Separated Paths (2021), Seattle, WA

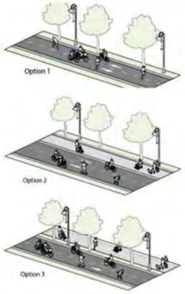
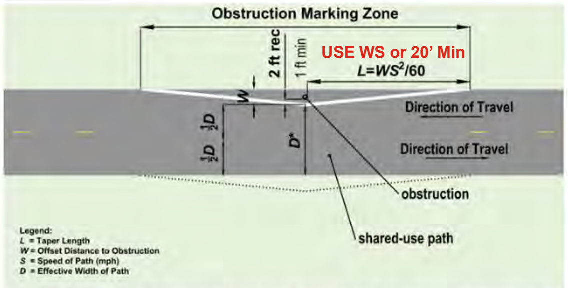


Figure 6-4: Options for Separating Bicyclists and Other Wheeled Users from Pedestrians

TOOLE DESIGN

6.6.9.3 Obstruction Markings



Note: Where $D \leq 8$ ft, path widening should be considered. Where the path cannot be widened, the center line should not be marked within the limits, *L*.

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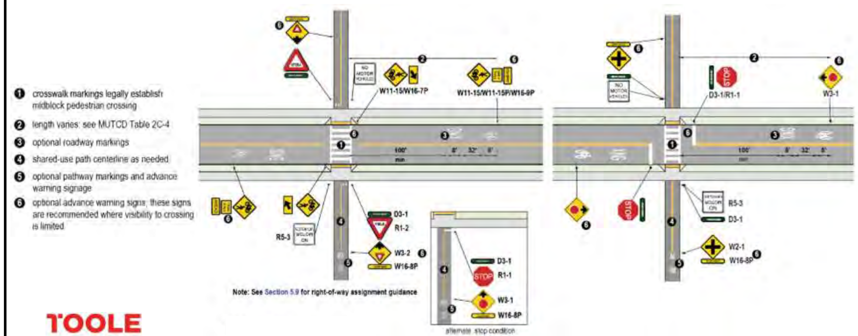
29

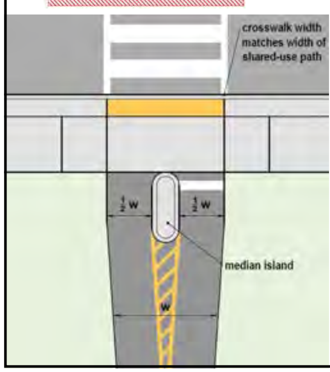
6.7. Shared Use Path Intersections and Transitions



TOOLE DESIGN

30

6.7.8 – Restricting Motor Vehicles



Bollards are a last resort

- Post No Motor Vehicle signs
- Use different materials
- Use a center island at approaches
- Use targeted enforcement
- Consider flex posts before bollards

- Bollards must be retroreflective
- Must include markings to guide users around bollards

31

Chapter 7 – Separated Bike Lanes and Side Paths

32

7.2. General Design Considerations

The cross section of a separated bike lane comprises three distinct zones (see Figure 7-1):

1. **Bike lane**—The bike lane is the space in which the bicyclist operates. It is located between the street buffer and the sidewalk buffer.
2. **Street buffer**—The street buffer separates the bike lane or side path from motor vehicle traffic.
3. **Sidewalk buffer**—The sidewalk buffer separates the bike lane from the sidewalk.

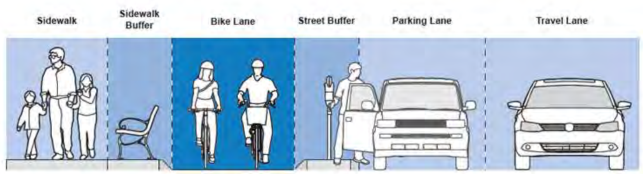


Figure 7-1: Separated Bike Lane Zones

TOOLE DESIGN

33

7.2. General Design Considerations

- Zones and interplay between them
- Smooth transitions between elevation
- Accommodate volumes & passing
- Account for shy distances
- Address the needs of people with disabilities
- Address pedestrian and vehicle encroachment

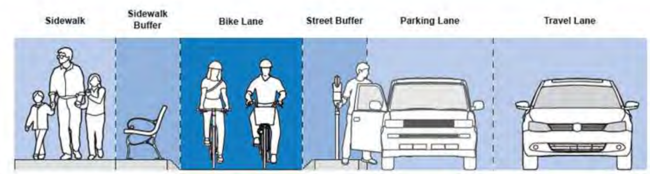


Figure 7-1: Separated Bike Lane Zones

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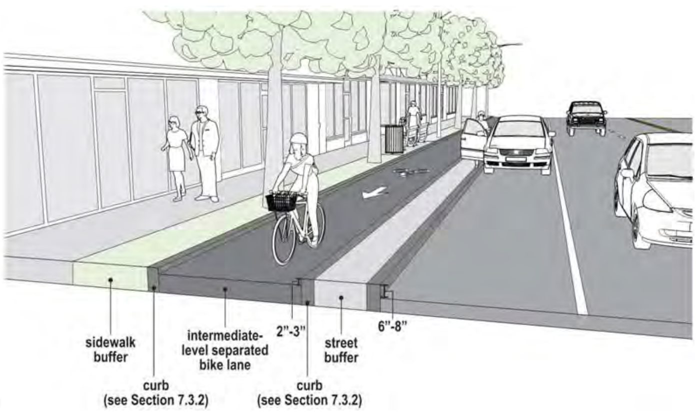
34

Section 7.2.2 – Intermediate-Level Separated Bike Lanes



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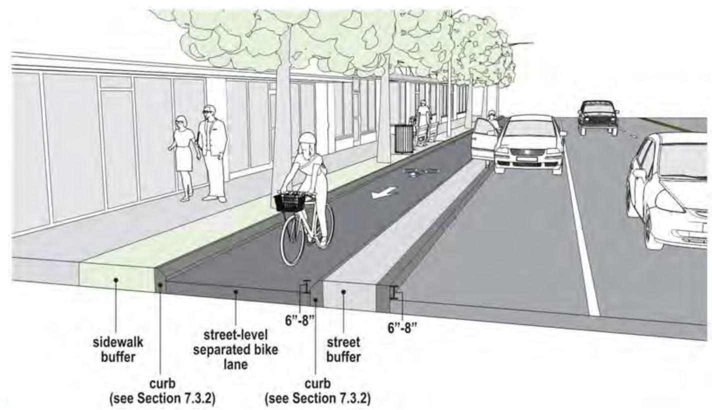
Section 7.2.2 – Street-Level Separated Bike Lanes



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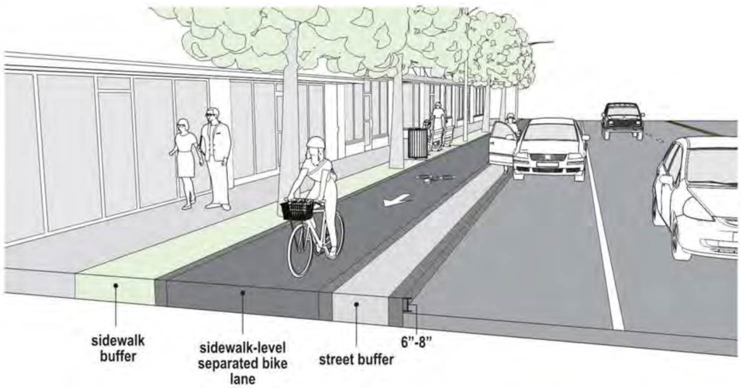
Section 7.2.2 – Sidewalk-Level Separated Bike Lanes



37

Section 7.2.3 – One-Way vs Two-Way
Section 7.2.4 – Where to Locate SBLs

Corridor-level Planning Considerations	One-way SBL	Counterflow SBL	One-way SBL Plus Counterflow SBL	Two-way SBL
Access to Destinations	Limited access to other side of street		Full access to both sides of street	Limited access to other side of street
Network Connectivity	Does not address demand for counterflow bicycling; may result in wrong way riding or sidewalk riding	Requires bicyclists traveling in the direction of traffic to share the lane (may result in wrong way riding or sidewalk riding); counterflow progression through signals may be less efficient	Accommodates two-way bicycle travel, but counterflow progression through signals may be less efficient	
Crash Risk	Lower because pedestrians and turning drivers expect concurrent bicycle traffic	Higher because pedestrians and turning drivers may not expect counterflow bicycle traffic		
Intersection Operations	May use existing signal phases; bike phase may be required depending on volumos	Typically requires additional signal equipment; bike phase may be required depending on volumes		

Typically the easiest option to integrate into existing operation

Provides intuitive and direct connections with the transportation network

Consistent with driver expectation since bicyclist operation is in the same direction as motor vehicles

38

Section 7.2.3 – One-Way vs Two-Way
Section 7.2.4 – Where to Locate SBLs

Corridor-level Planning Considerations	One-way SBL Pair	Two-way SBL	Median Two-way SBL
Access to Destinations	Full access to both sides of street	Limited access to other side of street	Limited access to both sides of street
Network Connectivity	Accommodates two-way bicycle travel		
Crash Risk	Lower because pedestrians and turning drivers expect concurrent bicycle traffic	Higher because pedestrians and turning drivers may not expect counterflow bicycle traffic	Higher because pedestrians and turning drivers may not expect counterflow bicycle traffic, but median location may improve visibility and create opportunities to separate conflicts
Intersection Operations	May use existing signal phases; bike phase may be required depending on volumes	Typically requires additional signal equipment; bike phase may be required depending on volumes	

One-way is not always practical or desirable

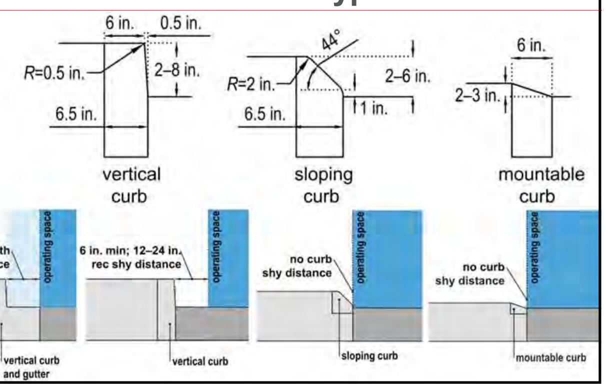
Two-way can save a little space

Two-way may require additional intersection control and treatments to handle counterflow movement

39

Section 7.3.2 – Bikeway Width: Consider The Curb Types

Shy distances and bikeway widths are intertwined



TOOLE DESIGN

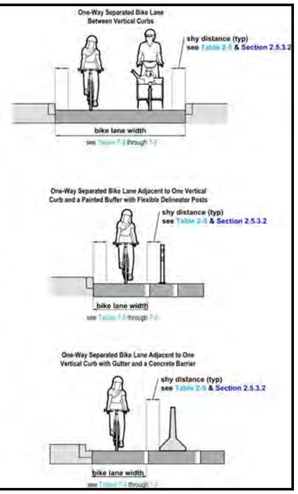
40

Section 7.3.4 – SBL Width (One-way)

Table 7-3: One-Way Separated Bike Lane Widths Based on Existing or Anticipated Volumes

Peak Hour Directional Bicyclist Volume	One-Way Separated Bike Lane Width (ft) Recommended Values		
	Between Vertical Curbs without Gutter	Adjacent to One Vertical Curb	Between Sloped Curb, at Sidewalk Level, or Adjacent to Curb with Gutter
<150	6.5–8.5	6–8	5.5–7.5
150–750	8.5–10	8–9.5	7.5–9
>750	≥10	≥9.5	≥9
Practical Minimum*	4.5	4	4

*Peak Hour Directional Bicyclist Volume not applicable



41

Section 7.3.4 – SBL Width (One-way)

Table 7-3: One-Way Separated Bike Lane Widths Based on Existing or Anticipated Volumes

Peak Hour Directional Bicyclist Volume	One-Way Separated Bike Lane Width (ft) Recommended Values		
	Between Vertical Curbs without Gutter	Adjacent to One Vertical Curb	Between Sloped Curb, at Sidewalk Level, or Adjacent to Curb with Gutter
<150	6.5–8.5	6–8	5.5–7.5
150–750	8.5–10	8–9.5	7.5–9
>750	≥10	≥9.5	≥9
Practical Minimum*	4.5	4	4

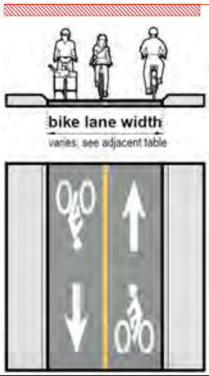
*Peak Hour Directional Bicyclist Volume not applicable

Low end of width accommodates occasional passing

Practical Minimum width does not accommodate passing. Only recommend for limited distances.

42

Section 7.3.4 – SBL Width (Two-way)



Peak Hour Directional Bicyclist Volume	Two-Way Separated Bike Lane Width (ft) Recommended Values		
	Between Vertical Curbs without Gutter	Adjacent to One Vertical Curb	Between Sloped Curb, at Sidewalk Level, or Adjacent to Curb with Gutter
<150	10–12	9.5–11.5	9–11
150–350	12–16	11.5–15.5	11–15
>350	≥16	≥15.5	≥15
Practical Minimum*	8.5	8	7.5

*Peak Hour Directional Bicyclist Volume not applicable

43

Section 7.3.5 – Design Speed

15 MPH is generally appropriate

Typical Adult Upright Bicyclist Performance Characteristics		
Feature	Value	Recommended Default Design Value
Speed, paved level terrain	8.0–15.0 mph	15 mph design speed 8.0 mph (intersection crossing speed) 11 mph (intersection approach speed)[b]

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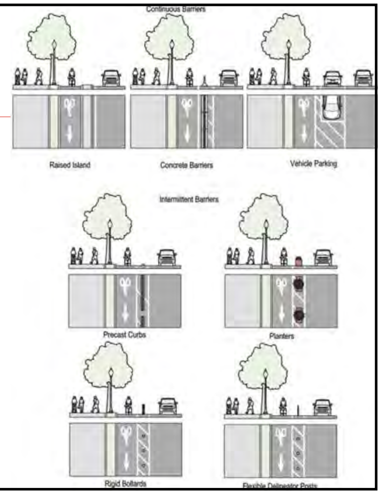
44

Section 7.4 – Street Buffer Zone

Guide covers each of the different buffer treatments including:

- Benefits
- Considerations
- Challenges



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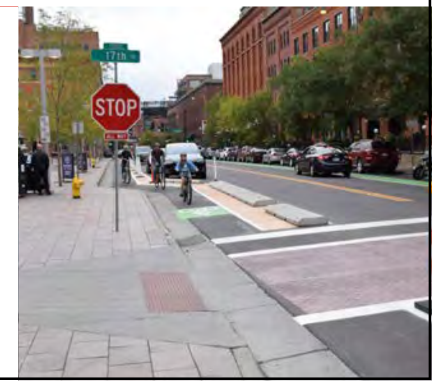
45

Section 7.4.2 – Street Buffer Zone Raised Medians

- Considerations
  - Curb Type on both sides
  - Cast-in-Place or Precast
- Benefits
  - High degree of separation
  - Work well into protected intersections
  - Possible to move some of them
- Challenges
  - Higher Expense
  - Stormwater considerations



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46

Section 7.4.2 – Street Buffer Zone Concrete Barrier / Rigid Barrier

- Considerations
  - Provides continuous separation
  - Recommended for higher-speed roads
- Benefits
  - Highly durable
  - Increased safety and comfort
  - Reduced headlight glare
- Challenges
  - Less attractive
  - Introduces a fixed object for motorists

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47

Section 7.4.2 – Street Buffer Zone Flexible Delineators

- Considerations
  - Spacing to prevent encroachment
  - Size and Color (MUTCD)
- Benefits
  - Removable
  - Frangible – Good on low and high speed
- Challenges
  - Aesthetics
  - Durability & dislodged crash hazard

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48

Section 7.4.2 – Street Buffer Zone
Precast Curbs / Parking Stops

- Considerations
  - Good in highly constrained spaces
  - Often supplemented with flex posts
- Benefits
  - Removable
  - Durable
- Challenges
  - Not same level of comfort and safety due to low height
  - Tripping hazard

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Section 7.4.2 – Street Buffer Zone
Planters

- Considerations
  - Can use different spacing
  - Lots of options for size/appearance
- Benefits
  - Enhance community aesthetics
  - Effective at reducing vehicle speeds
- Challenges
  - Not recommend for higher speed
  - Require long-term maintenance for plantings

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Section 7.4.2 – Street Buffer Zone
Parking

- Benefits
  - Enhance separation for bicyclists
  - Maintains parking
- Challenges
  - Vehicle encroachment in bike lane - vertical elements in buffer often necessary
  - ADA considerations
  - More space needed for buffer (door zone)

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Section 7.5 – Sidewalk Buffer

Use street furniture, landscaping beds, or curb to define the buffer between SBL and sidewalk

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5.10.8 Directional Indicators

Per ISO 23599 the width of the directional indicator (DI) can vary based on use:

- If perpendicular to the pedestrian path of travel (for example to direct a pedestrian towards a mid-block crossing or transit stop), it must be a minimum width of 2 ft to be detectable.
- If parallel to the pedestrian path of travel, it can be as narrow as 1 ft.
- At some locations (such as near intersections) pedestrian paths may interact with directional indicators both parallel and perpendicular, and in these situations the wider width should be used.

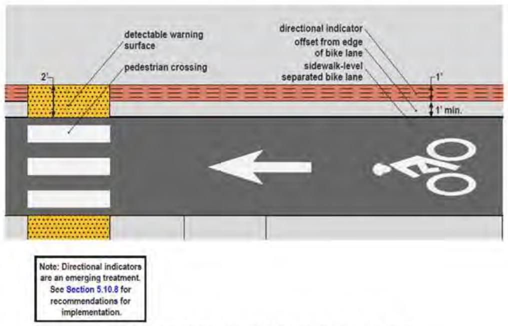

Figure 5-24: Sidewalk-Level Separated Bike Lane with Directional Indicator

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53

7.7.1. Drainage and Stormwater Management

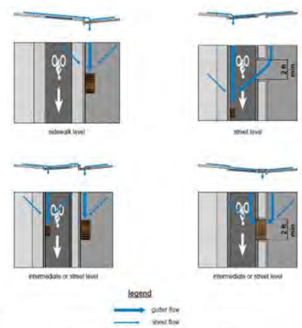


Figure 7-11: Examples of Separated Bike Lane Drainage Options

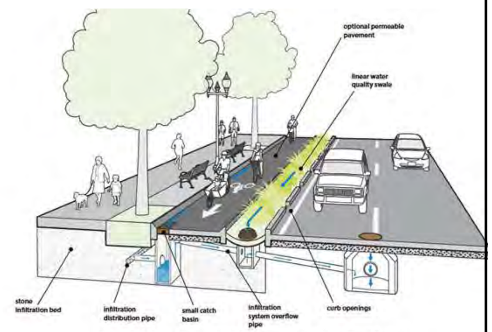
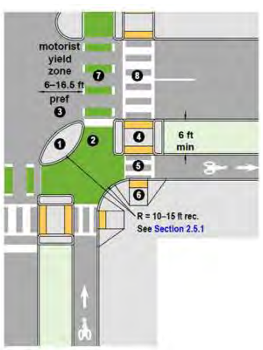
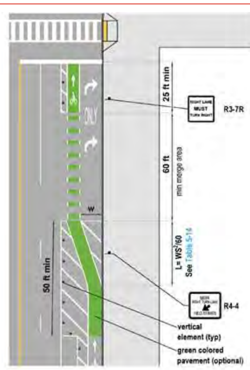


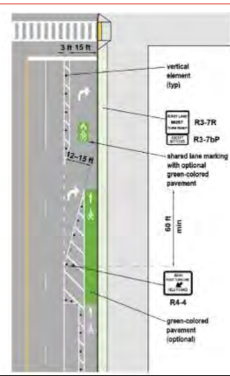
Figure 7-10: Green Stormwater Infrastructure in an Urban Street Context

54

7.9 SBL/SUP Intersection Design





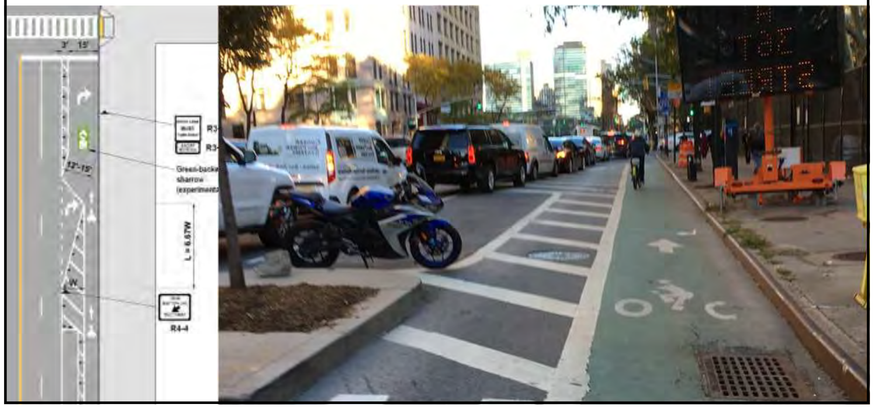


55

Mixing Zone Flaw – Aggressor Always Wins

56

Mixing Zone Flaw – Unclear Right of Way



57

Protected Intersections

"**Protected intersections** maintain the physical separation through the intersection, thereby eliminating the merging and weaving movements inherent in conventional bike lane and shared lane designs."

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58

58

7.9.7 Protected Intersections

- 7.9.1. Minimizing Exposure to Conflicts
- 7.9.2. Reducing Speeds at Conflict Points
- 7.9.3. Transitions between Elevations
- 7.9.4. Right-of-Way Priority
- 7.9.5. Sight Distance
- 7.9.6. Restricting Motor Vehicles

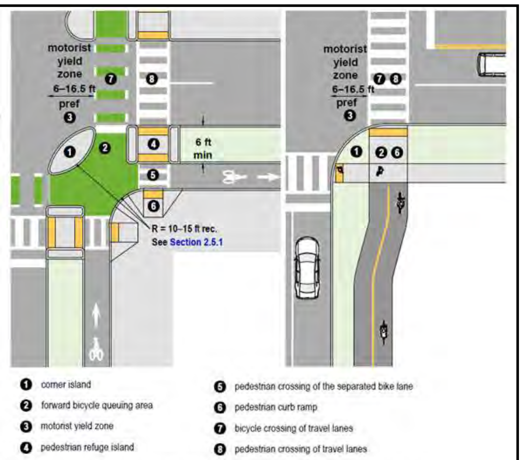

Figure 7-13: Protected Intersection Design for Separated Bike Lanes and Side Paths

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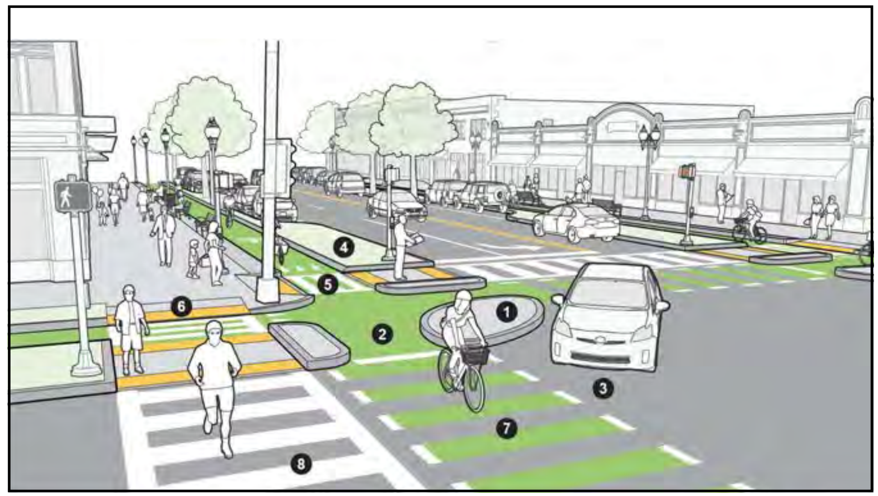
59



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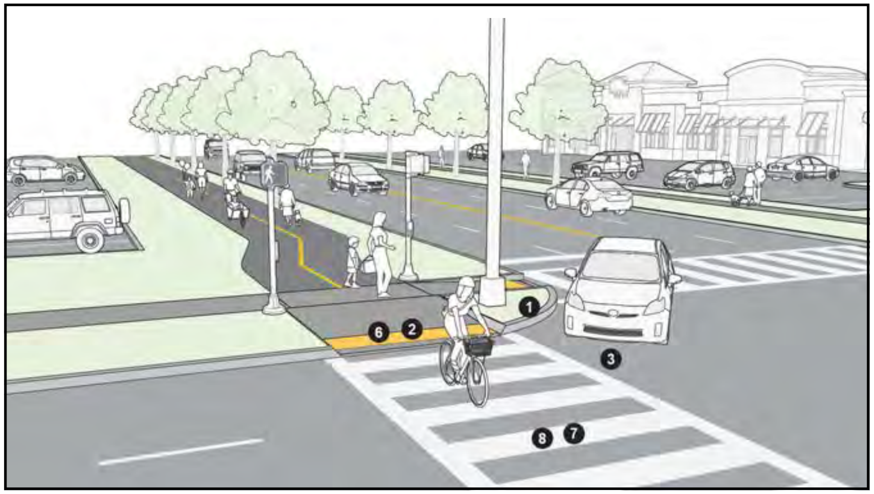

61

7.9.7.1 Corner Island

Benefits:

- forward bicycle queuing area
- space for turning vehicles to wait
- reduces crossing distances
- reduces motorist turning speeds
- can reduce bicyclist speeds by adding deflection to the bike lane or side path

Figure 7-15: Corner Island with Flexible Delineator Posts (Source: Carl Sundstrom, PE, Office of Bicycle and Pedestrian Programs, New York City Department of Transportation)

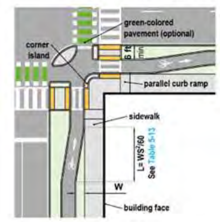

Figure 7-16: Bend-Out Example

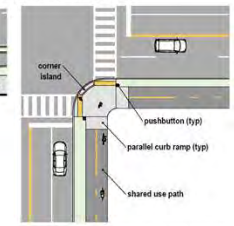

Figure 7-17: Side Path Curb Ramps at Constrained Intersection

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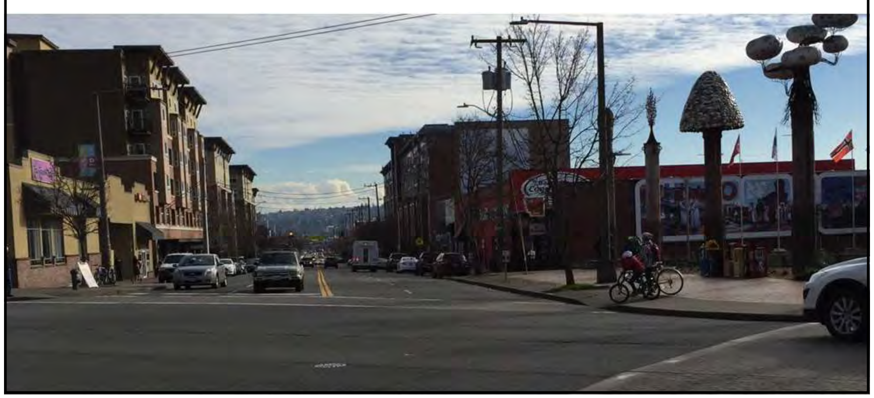
62

Does Corner Radius Matter?



63

Protected Intersection Corners

64

7.9.7.3 Motorist Yield Zone

"Protected intersection concept" helps with left turns too

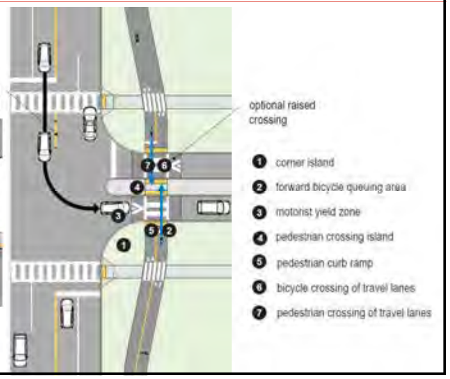


Image: MassDOT SBL Guide

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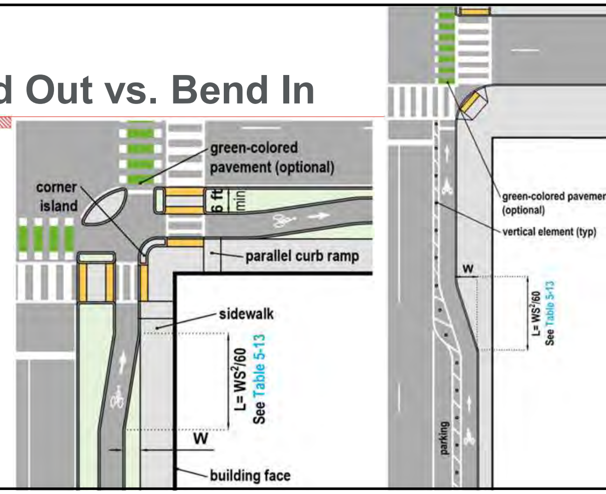
7.9.8 Bend Out vs. Bend In



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7.9.9. Intersection Design with Mixing Zones NOTE: see NCHRP 1125 for selection process

Reduce speeds of motor vehicles entering the merge point to 20 mph or less:

- Minimize the length of the merge area
- Locate the merge point as close as practical to the intersection.
- Minimize the length of the storage portion of the turn lane.
- Provide a buffer and physical separation (e.g., flexible delineator posts) from the adjacent through lane after the merge area, if feasible.
- Highlight the conflict area with a green-colored pavement and dotted bike lane markings (see Figure 7-20), as necessary, or shared lane markings (see Figure 7-21).
- Raise the elevation of the turn lane at the start of the mixing zone.

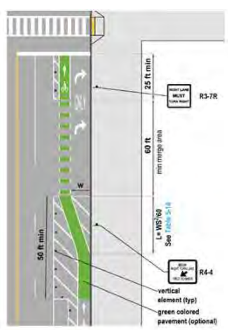

Figure 7-20. Angled Crossing Mixing Zone with Bike Lane

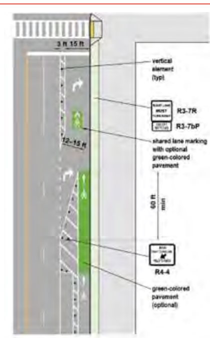

Figure 7-21. Angled Crossing Mixing Zone with Shared Lane

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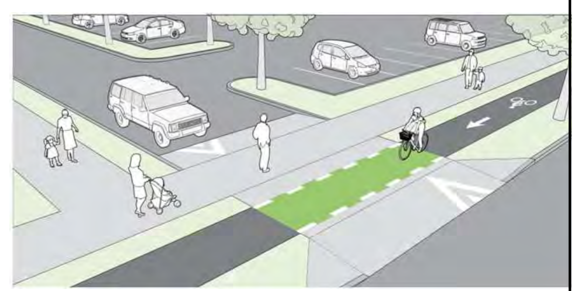
Section 7.9.10 – Driveway Crossings

Low Volume Driveways
Higher Volume Driveways
Driveway Frequency



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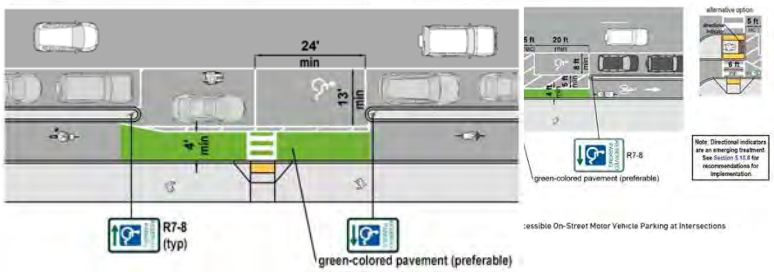
7.9.12.1 Accessible Motor Vehicle Parking



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69

7.9.14. Transit Stops

70

7.9.14. Transit Stops

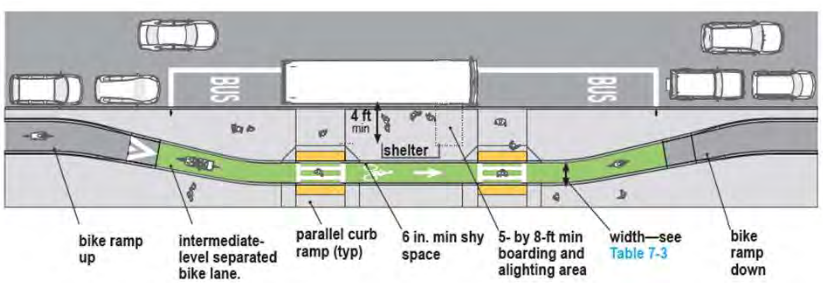
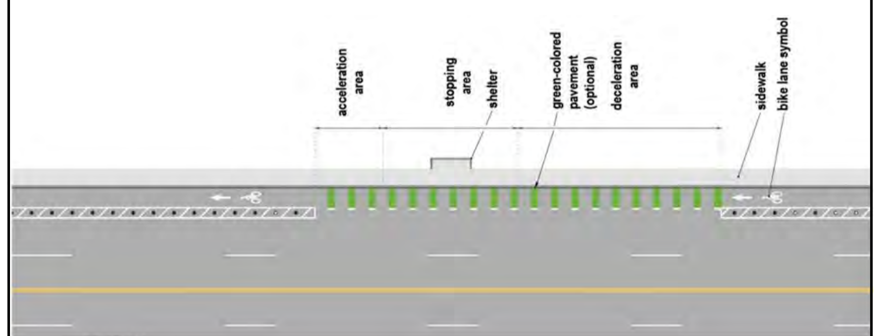


Figure 7-26: Example Configuration: Floating Transit Stop (Mid-Block)

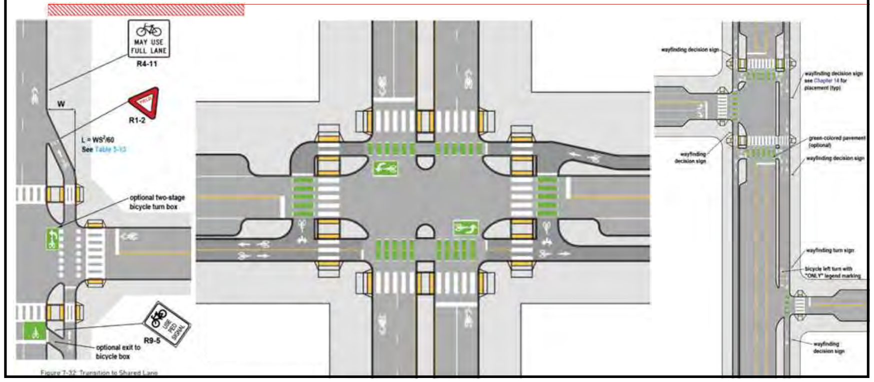
71

7.9.14. Transit Stops



72

7.9.14. Transitions

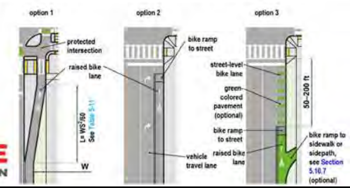


73

7.11. Raised Bike Lanes

Raised Bike Lane Widths				
Bike Lane Context	Practical Minimum (ft)	Recommended Lower Limit (ft)	Recommended Upper Limit (ft)[2]	Practical Maximum (ft)[2]
Intermediate level or sidewalk level raised bike lane[1]	5	6.5	8	10

[1]Raised bike lane widths are exclusive of the gutter unless the gutter is integrated into the full widths of the bike lane.
[2]Separated bike lane with a street buffer may be preferable to a curb-attached, wide raised bike lane.



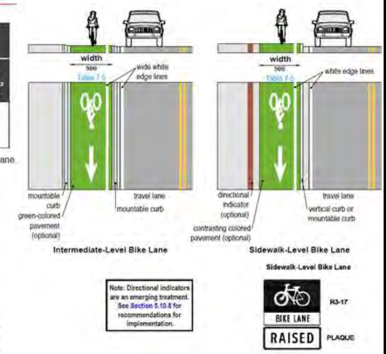


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Figure 7-39: Intermediate-Level and Sidewalk-Level Raised Bike Lanes

74

Thank you! Questions?

Jeremy Chrzan, PE, PTOE
Multimodal Design Practice Lead
jchrzan@tooledesign.com

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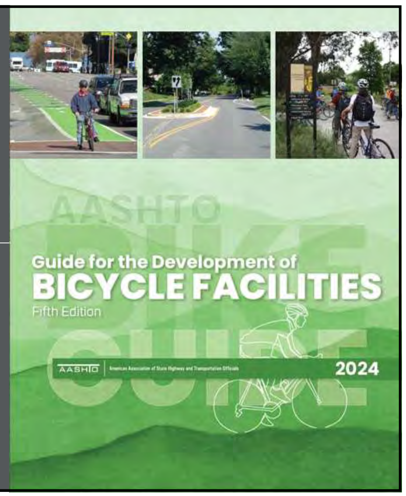


75

ADA Compliance and Public Right-of-Way Accessibility Guidelines (PROWAG)

Maggie Slife, PE

LTAP and ADA Engineer

WSDOT Local Programs Division

What's New in PROWAG Final Rule?

Maggie Slife, WSDOT LTAP ADA Engineer

April, 2025

Americans with Disabilities Act: July 26, 1990

PROWAG finalized: August 2023

US DOT /DOJ Adoption- DOT (Jan 25)/DOJ Unknown

What is Different from 2004 or 2012?

- NOT TOO MUCH!
- Added clarification
- Addresses issues brought up to the Joint Technical Assistance council
- Illustrations
- Changes some “oughts” to “musts”
- Most importantly: 2012 PROWAG has been adopted into the CFR. Final Rule has not. Final Rule applies to Bus Stops but not general rights of way.
- Most states have updated their standards to follow Final Rule.

Basic Outline of PROWAG Final Rule

- **Chapter 100**: Application/Definitions
- **Chapter 200**: Scoping/Triggers
- **Chapter 300**: Technical Requirements
- **Chapter 400:** Ramps, 3D Spaces

Section 100: Application and Definitions

R1: Application and Administration

R101 Purpose and Application

R102 Deviations from These Guidelines

R103 Conventions

R104 Definitions

Major Clarification in Section 100

R101.1 Purpose

These guidelines contain scoping and technical requirements to ensure that ***pedestrian facilities*** located in the *public right-of-way* (including a *public right-of-way* that forms the boundary of a site or that lies within a site bounded by a property line), are readily *accessible* to and usable by ***pedestrians*** with disabilities.

Major Clarification in Section 100

R102.1 ADA-Covered Facilities and Equivalent Facilitation

The use of alternative designs, products, or technologies that result in **substantially equivalent or greater accessibility and usability** than the requirements in these guidelines shall be permitted for *pedestrian facilities* in the *public right-of-way* subject to the ADA.

Major Clarification in Section 100

R104.1 Undefined Terms

Terms that are not defined in R104.3 or in regulations issued by the Department of Justice and the Department of Transportation under the ADA, the four standard setting agencies under the ABA or other federal agencies that adopt these guidelines as accessibility standards shall be given their **ordinarily accepted meaning in the sense that the context implies.**

Section 200: Scoping Requirements

R2: Scoping Requirements

R202.3 Maximum Extent Feasible

- **R202.3 Existing Physical Constraints**

- In *alterations*, where existing physical constraints make compliance with applicable requirements technically infeasible, compliance with these requirements is required to the **maximum extent feasible***. Existing physical constraints include, but are not limited to, underlying terrain, underground structures, adjacent *developed* facilities, drainage, or the presence of a significant natural or historic feature**.

- *Formerly Maximum Extent Practicable
- **ROW is no longer an "existing physical constraint"

- **WSDOT has an idea of what a MEF finding should entail (see DM Chp 15)**
- **PROWAG is silent on the need for a Document detailing the MEF findings.**

>R202.5 Major Clarification:

R202.5 Alterations to Qualified Historic Facilities

Where the State Historic Preservation Officer or Advisory Council on Historic Preservation determines that compliance with an applicable requirement of these guidelines would threaten or destroy the historic significance of a *qualified historic building or facility*, compliance with that requirement is required to the maximum extent feasible without threatening or destroying the historic significance of the *qualified historic building or facility.*

>R203.6 Must
Curb Ramp In Each Direction

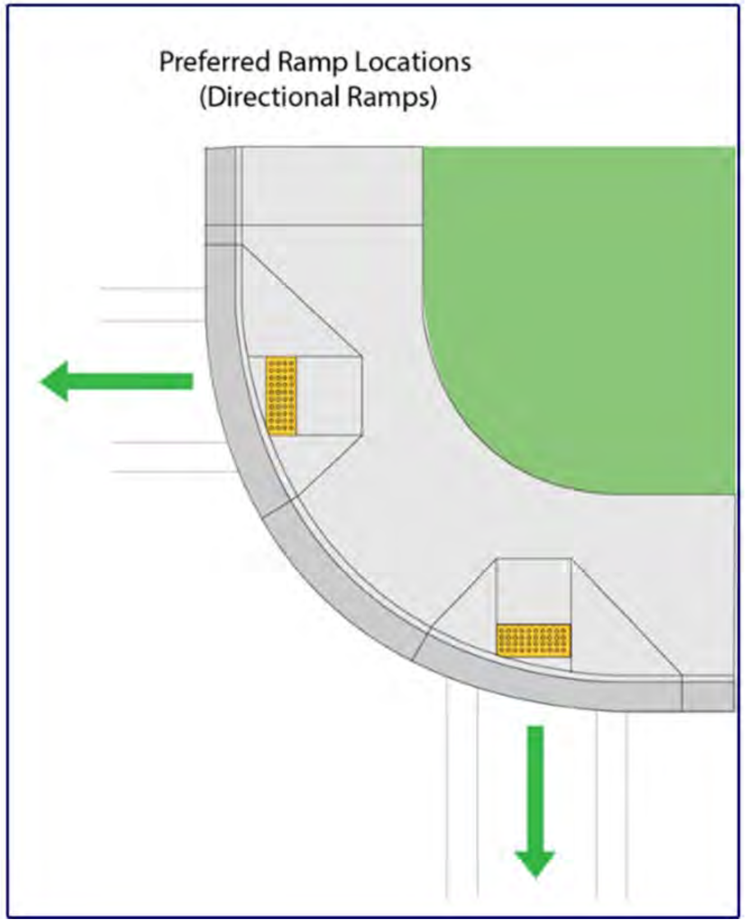
R203.6.1.1 Crosswalks at an Intersection

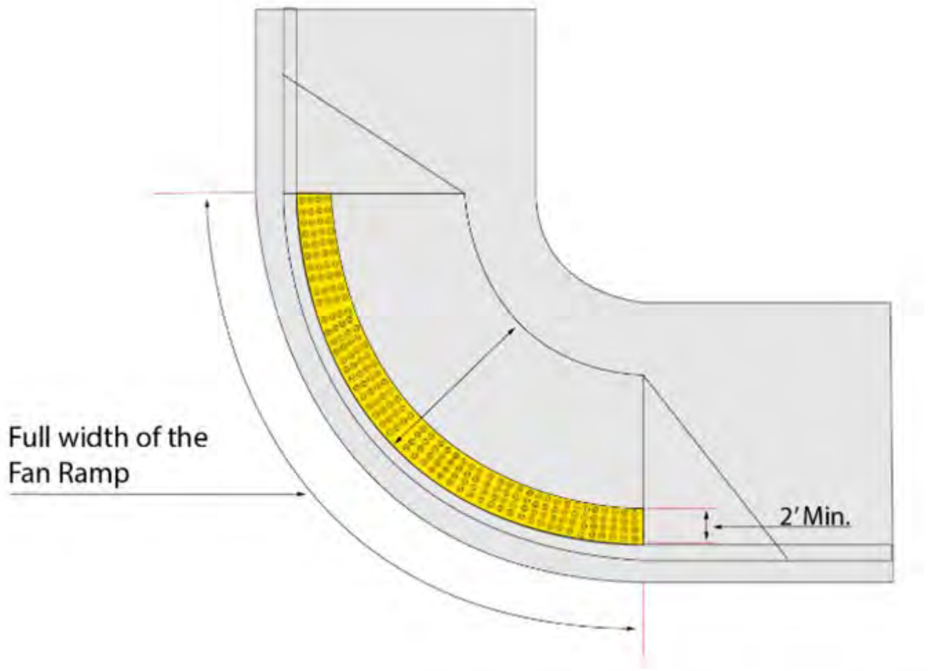
At an intersection corner, one *curb ramp* or *blended transition* shall be provided for each *crosswalk*, or a single *blended transition* that spans all *crosswalks* at the intersection corner may be provided.

Where *pedestrian* crossing is prohibited, *curb ramps* or *blended transitions* shall not be provided, and the *pedestrian circulation path* shall be either (a) separated from the *roadway* with landscaping or other non-prepared surface or (b) separated from the *roadway* by a detectable vertical edge treatment with a bottom edge 15 inches maximum above the *pedestrian circulation path*.

EXCEPTION: In *alterations*, where existing physical constraints make compliance with R203.6.1.1 technically infeasible, a single *curb ramp* complying with R304 shall be permitted at the apex of the intersection corner.

R203.6.1.1 Curb Ramp Placement- One for Each Direction or One for All





https://kp.uky.edu/knowledge-portal/articles/pedestrian-curb-ramps/

> R203.6 Must
Curb Ramp Placement Both Ends of Crosswalk

R203.6.1.2 Mid-Block and Roundabout Crosswalks

At a mid-block or *roundabout crosswalk*, *curb ramps* or *blended transitions* shall be provided on both ends of the *crosswalk*.

Where *pedestrian* crossing is not intended, *curb ramps* or *blended transitions* shall not be provided, and the *pedestrian circulation path* shall be either:

(a) separated from the *roadway* with landscaping or other non-prepared surface

(b) separated from the *roadway* by a detectable vertical edge treatment with a bottom edge 15 inches maximum above the *pedestrian circulation path*.

Physical Barriers to Prevent Pedestrian Crossings

Physical Fence Barrier–
max 15” above ground level

Vegetative buffer with controlling curbs

Physical fence with Pedestrian Curb

> R203.6.2 Must Crosswalk Alterations Trigger Ramps

R203.6.2 Alterations to Crosswalks

When *alterations* are made to *crosswalks*, *curb ramps* or *blended transitions* shall be provided on both ends of the *crosswalk* where the *pedestrian access route* crosses a *curb*.

(We have been doing this in WA due to our own RCW)

Section 300: Technical Requirements

R301 General

R302 Pedestrian Access Routes

R303 Alternate Pedestrian Access Routes

R304 Curb Ramps and Blended Transitions

R305 Detectable Warning Surfaces

R306 Crosswalks

R307 Pedestrian Push Buttons and Passive Pedestrian Detection

R308 Accessible Pedestrian Signal Walk Indications

R309 Transit Stops and Transit Shelters

R310 On-Street Parking Spaces

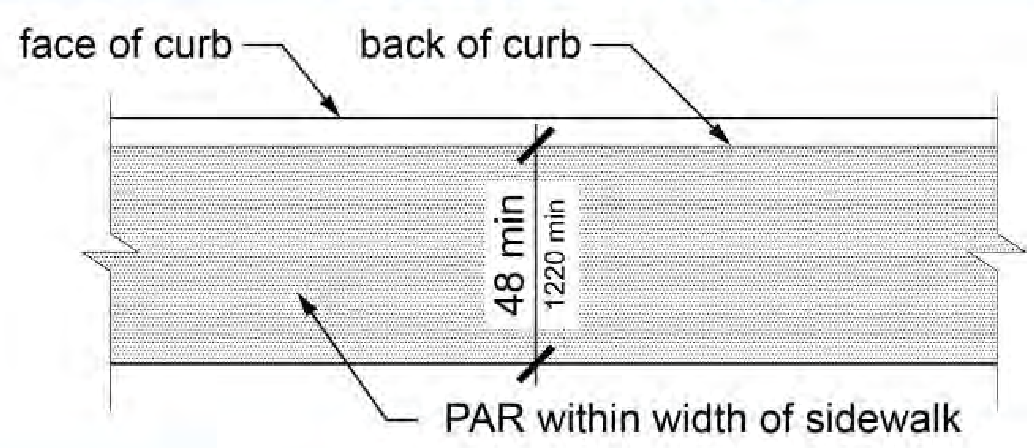
R311 Passenger Loading Zones

>R302.2 Clarification Curb Ramp Clear Width

R302.2 Continuous Clear Width

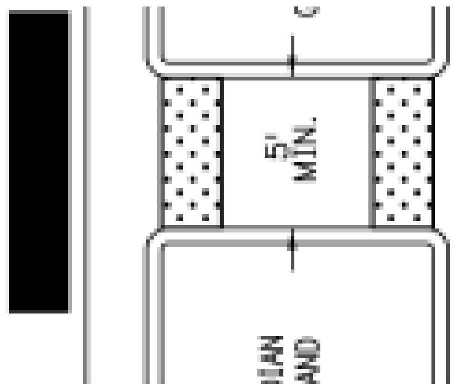
Except as provided in R302.2.1 and R302.2.2, the continuous clear width of *pedestrian access routes* shall be 48 inches (1220 mm) minimum, exclusive of the width of any *curb*.

Figure R302.2 Continuous Clear Width



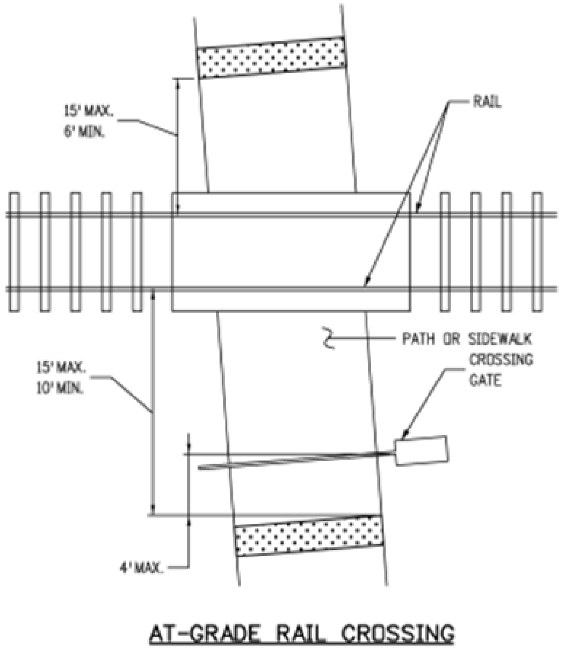
>R305 Clarification
Truncated Dome Placement

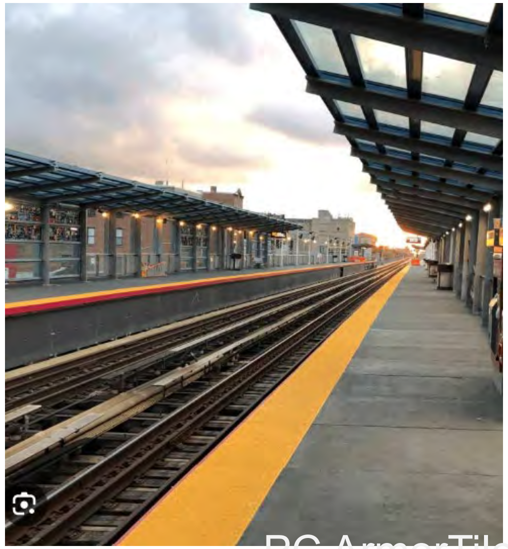
- 24” in direction of travel continuous (no tapered corners)
- At Pedestrian cut throughs– Full width of the Pedestrian Circulation Path (pedestrian refuges are also further defined as min. 72”)



>R305 Must
Truncated Dome Placement

- *Pedestrian* at-grade rail crossings= width of the *pedestrian circulation path*.
- *Boarding platforms*, full length of the unprotected platform.
- *Sidewalk* or *street* level *transit stops* for rail vehicles= full length of *transit stop*.

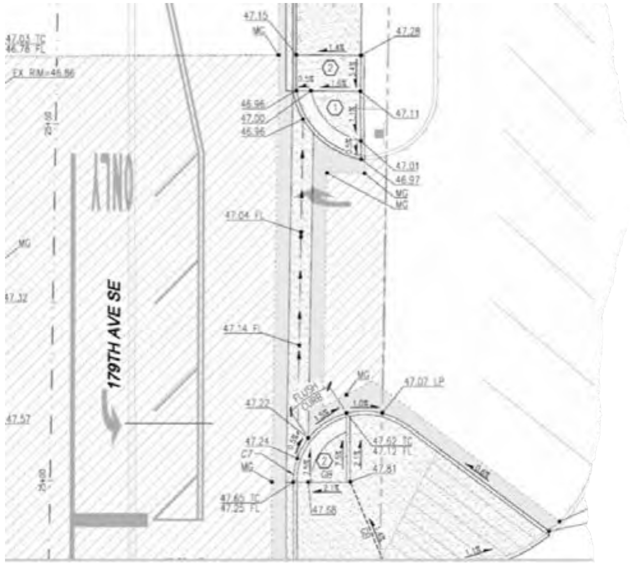


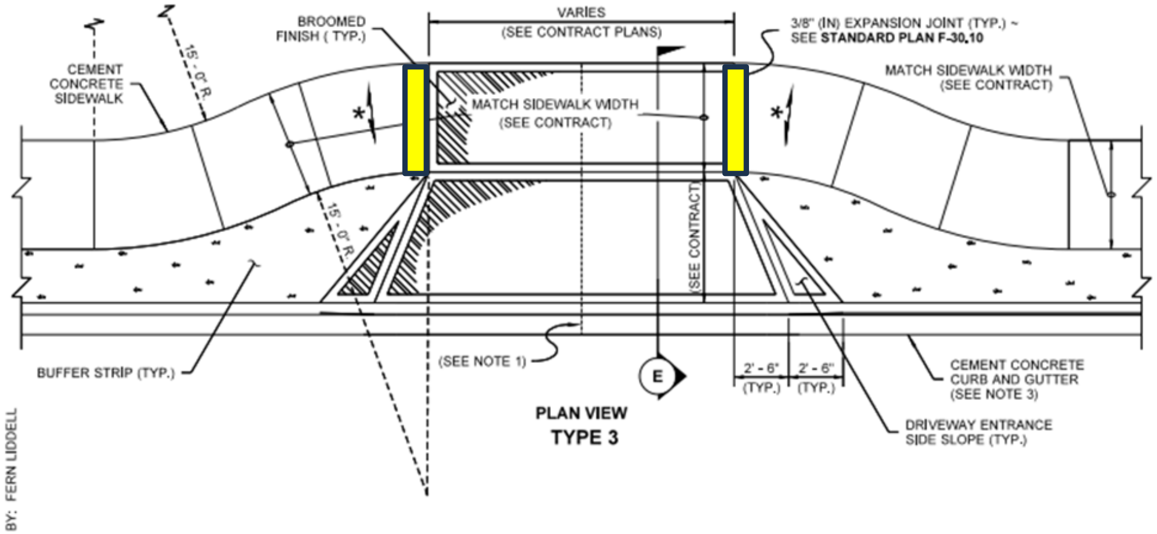


>R305 Must
DWS on Signed/Signaled Driveways

R305.2.8 Driveways

Where driveways are controlled with yield or stop control devices or traffic signals, *detectable warning surfaces* shall be provided on the *pedestrian circulation path* where the *pedestrian circulation path* meets the driveway.





>R306.4 Must
Crosswalk and PCP Edge Treatment

- **R306.4 Roundabouts**
- Where *pedestrian circulation paths* are provided at *roundabouts*, they shall comply with R306.4.
- **R306.4.1 Edge Detection**
- The *street* side edge of the *pedestrian circulation path* at the approach and along the circulatory *roadway* of the *roundabout* shall comply with R306.4.1.1 where not attached to the *curb*, or R306.4.1.2 where attached to the *curb*. *Detectable warning surfaces* shall not be used for *roundabout* edge detection.
- **R306.4.1.1 Separation**
- Where *pedestrian* crossing is not intended, the *pedestrian circulation path* shall be separated from the *curb*, *crosswalk* to *crosswalk*, with landscaping or other nonprepared surface 24 inches (610 mm) wide minimum.
- **R306.4.1.2 Vertical Edge Treatment**
- Where *pedestrian* crossing is not intended, a *curb*-attached *pedestrian circulation path* shall have a continuous and detectable vertical edge treatment along the *street* side of the *pedestrian circulation path*, from *crosswalk* to *crosswalk*. The bottom edge of the vertical edge treatment shall be 15 inches (380 mm) maximum above the *pedestrian circulation path*.

>R306.4.1 Vertical Edge Treatments

P.C. US AccessBoard

P.C. Vanguard Products

>R306.4.2 Must
Crosswalk Treatment at Roundabouts

Each multi-lane segments of a roundabout with a crosswalk must provide one or more of:

- Traffic control signal with ped signal head
- Pedestrian Hybrid Beacon
- Pedestrian Actuated RRFB
- Raised Crossing

>R306.5 Must
Crosswalk Treatment at Channelized Turn Lanes

Crosswalks at multi-lane channelized turn lanes must provide one or more of:

- Traffic control signal with ped signal head
- Pedestrian Hybrid Beacon
- Pedestrian Actuated RRFB
- Raised Crossing

>R307, 308 Must Audible Pedestrian Signals

- R307 and R308 Cover Pedestrian signal walk indicators
    - Location
    - Activation
    - Volume
    - Vibrotactile Features
    - Tone
    - Duration
    - Tactile Features (extruded arrows)

* All of these requirements come from the MUTCD and are consistent with guidance there.

>R309 Must
Transit and Alighting Areas

Federally adopted by DOT➔ THIS PART OF PROWAG FINAL RULE IS THE LAW NOW

- Must serve each accessible boarding area for the bus (some buses have 2)
- 96”x60” with applicable cross slopes; may run at running grade of the road
- Transit Shelters must have a clear space for mobility devices

>R310 Must Parking Spaces

Must connect to Pedestrian Access Routes

DWS not required on curb ramps used exclusively for Parking Space access

Where 2 or more parallel on street spots are on the same block, each must have a separate connection to the PAR

>R311 Must
Passenger Loading Zones

- 8’ x 20’
- Access aisle size: 60” min. width for full length of pull-up space
- Surface compliant with R302.6
- Connected to PAR
- Access aisle marked to discourage parking
- DWS not required for ramps used exclusively for connection to PAR’s

Section 400: Supplemental and Technical Requirements

- R401 General
- R402 Protruding Objects and Vertical Clearance
- R403 Operable Parts
- R404 Clear Spaces
- R405 Knee and Toe Clearance
- R406 Reach Ranges
- R407 Ramps
- R408 Stairs
- R409 Handrails
- R410 Visual Characters on Signs
- R411 International Symbol of Accessibility

>R400 Clarification/Cross-Ref'd Must Generally

- Includes a lot of information also found in the Building Accessibility Standards
- Objects mounted on Posts and Pylons
- R403, R406- Addresses acceptable reach on push buttons
- R404 Clear Space (min. 30" x 48") for reach (forward/parallel approaches)
- Surface requirements generally apply, Refer back to R300

Thank You!

Questions?

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Thank you!

Next Forum and Peer Exchange:

- September 2025
- Do you have a topic of interest?
- Contacts:
  Ed Spilker– Ed.Spilker@wsdot.wa.gov
  Charlotte Claybrooke– ClaybrC@wsdot.wa.gov