



Level-of-Service in Bellevue

Toward a Multimodal Approach to Mobility

TRANSPORTATION COMMISSION MMLOS DEEP DIVE SEPTEMBER 22, 2016

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OUTLINE

1. Summary of March 10, 2016 Transportation Commission MMLoS Discussion
2. Review Existing LOS Metrics and Standards for Vehicles
3. Recommended LOS Metrics and Standards for:
 - Pedestrians – sidewalks, intersections, mid-block crossings
 - Bicycles – priority network, arterial network
 - Transit – stops and stations, speed and reliability
4. Next Steps

TRANSPORTATION COMMISSION MARCH 10 MEETING SUMMARY

General agreement with the fundamentals of the recommended MMLOS metrics

- Mix of qualitative and quantitative measures

Desire to retain vehicle LOS metrics and standards

Concerns about level of complexity to calculate and apply MMLOS

Need to be mindful of funding constraints and setting standards appropriately

Focus on the quality of the environment for peds/bikes

Focus on elements of transit that City has control over

HOW WILL THIS ALL WORK TOGETHER?

Adopt LOS Metrics and Standards

- Update Transportation Element of the Comprehensive Plan
- Update Traffic Standards Code and Transportation Development Code

WHAT ARE WE LOOKING FOR FROM THE COMMISSION?

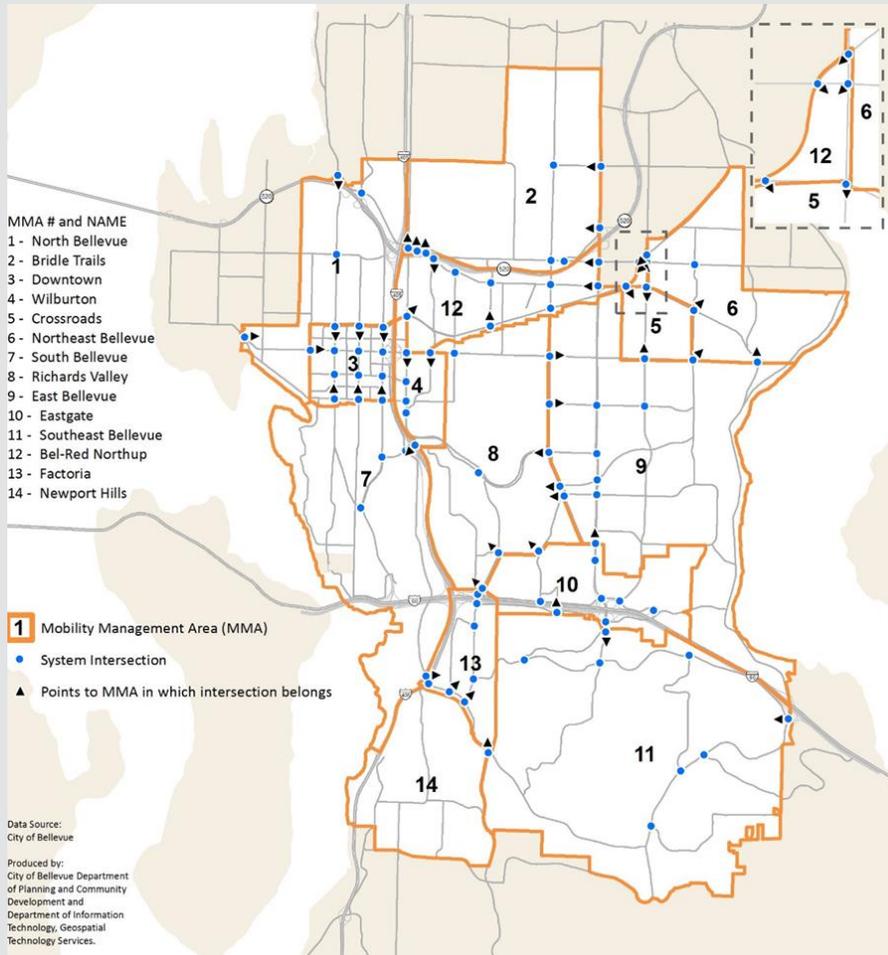
Discussion, input, and concurrence on the staff-recommended metrics and standards



VEHICLE LOS

1. Retain existing LOS metrics and standards for vehicles
2. Metric is volume/capacity (v/c) ratio (for Concurrency) and intersection delay (for long-range planning)
3. Standards for v/c and delay vary by Mobility Management Area (MMA)
4. Standards vary based on the urban form and mobility options available
5. May consider revising MMA boundaries in the next phase of this project

MMA_s AND VEHICLE LOS STANDARDS



Mobility Management Area (MMA)	MMA Average LOS Standard (Maximum v/c Ratio)	Congestion Allowance
Regional Center	0.950	
MMA #3 Downtown		9
Activity Area	0.950	
MMA # 12 BelRed/Northup		7
MMA #13 Factoria		5
Residential Areas	0.900	
MMA #4 Wilburton		3
MMA #5 Crossroads		2
MMA #10 Eastgate		4
Residential Group 1	0.850	
MMA #1 North Bellevue		3
MMA #7 South Bellevue		4
MMA #8 Richards Valley		5
MMA #9 East Bellevue		5
Residential Group 2	0.800	
MMA #2 Bridle Trails		4
MMA #6 NE Bellevue		2
MMA # 11 SE Bellevue		3
MMA # 14 Newport Hills		*
*No system intersections are currently identified in this mobility management area		

VEHICLE LOS

Discussion

PEDESTRIAN LOS

1. LOS standards recommended for arterial streets and consider:
 - Sidewalks
 - Intersections
 - Arterial Crossings
2. Adapted from City of Bellevue Street Design Standards and Land Use Code
3. Recommended LOS standards recognize land use context and the street environment, which define types of design components



PEDESTRIAN NETWORK LAND USE CONTEXT

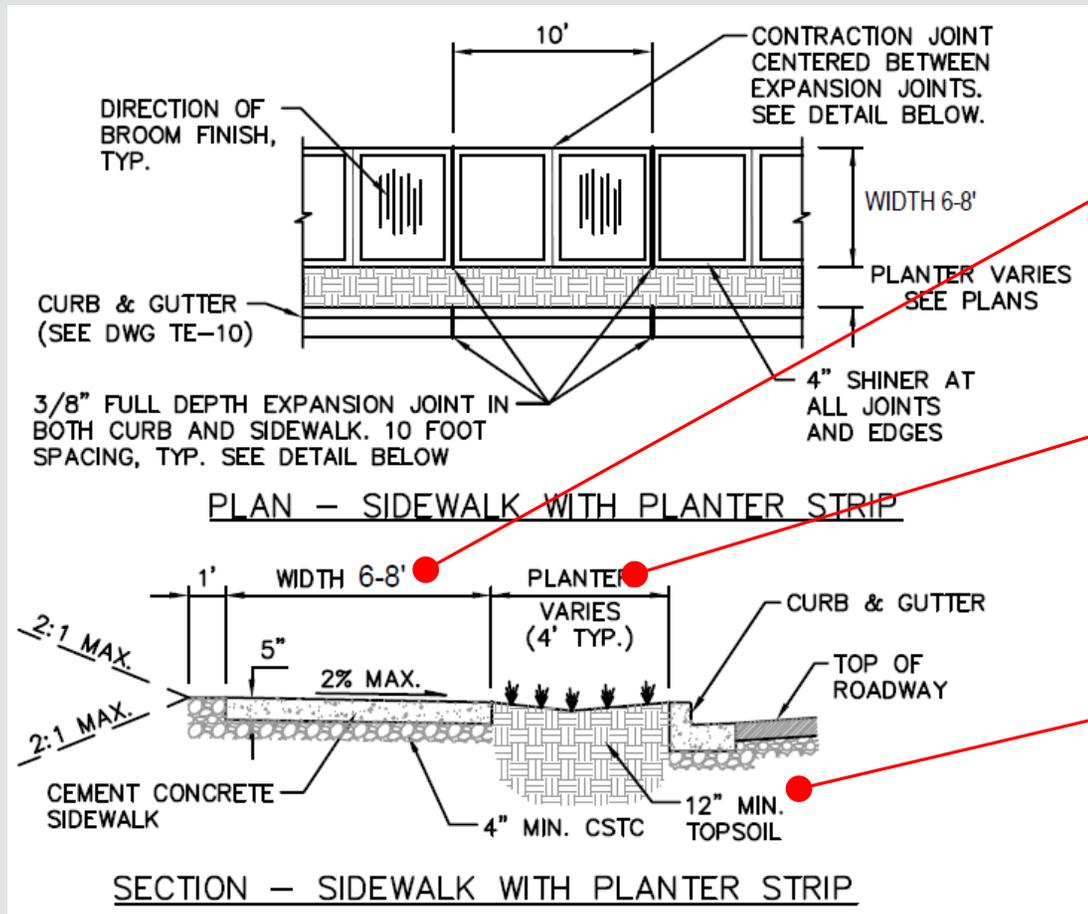
1. **Downtown**
2. **Activity Center**
 - BelRed
 - Crossroads
 - Factoria
 - Wilburton
 - Eastgate
3. **Neighborhood Shopping Center**
 - Northtowne
 - Lake Hills
 - Newport Hills
 - Other similar centers
4. **Pedestrian Destination**
 - School
 - Park
 - Community Center
 - Frequent Transit Network Stop
 - Trail Crossing
 - Library
5. **Elsewhere in the City**



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Toward a Multimodal Approach to Mobility

PEDESTRIAN LOS: STREET DESIGN MANUAL SIDEWALK WIDTH AND BUFFER



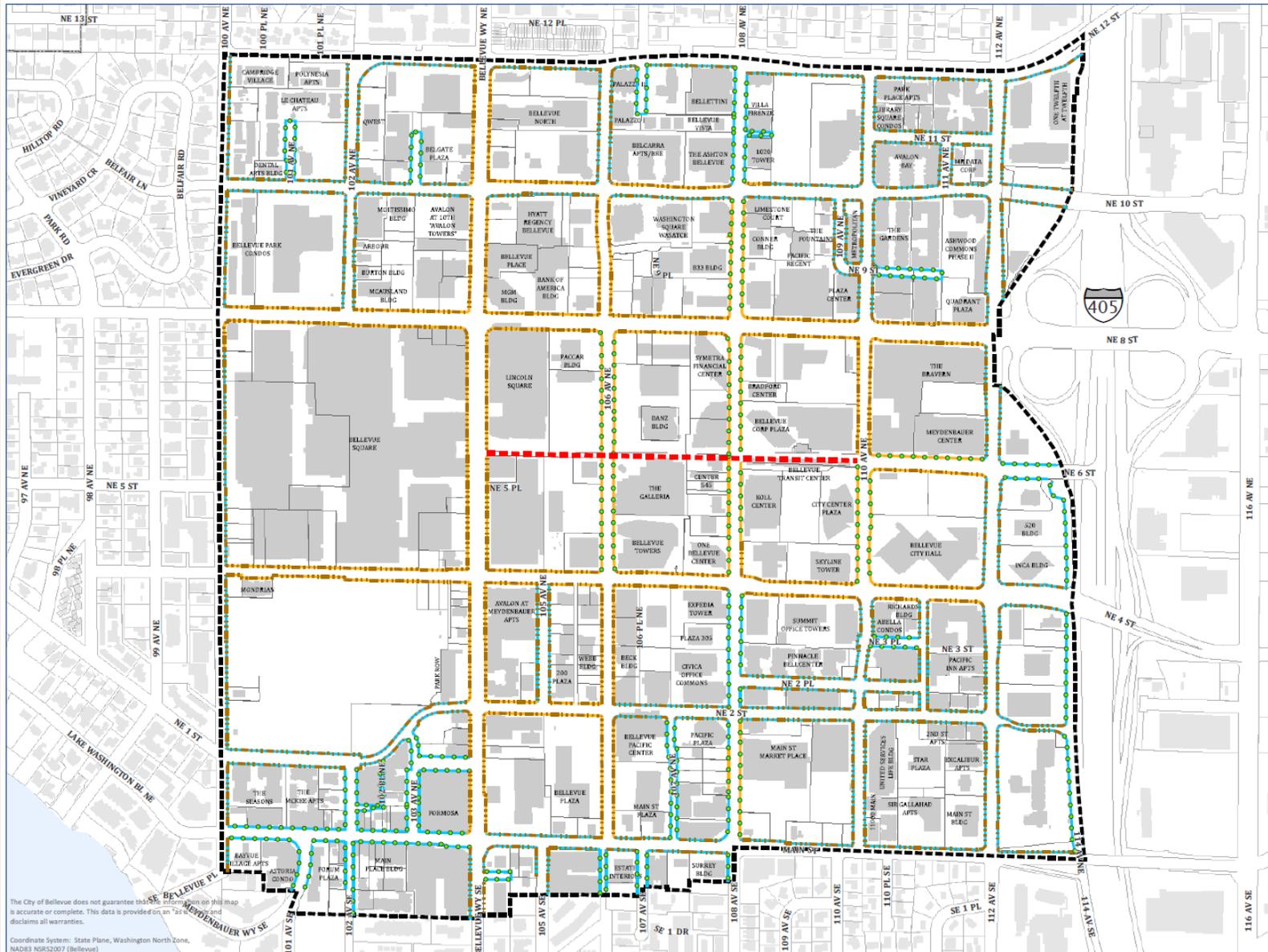
Sidewalk 6-8 feet

Landscape buffer typically 4 feet

Total: 10-12 feet

Source: Modified from the Transportation Design Manual, March 16, 2015

PEDESTRIAN LOS: DOWNTOWN TRANSPORTATION PLAN SIDEWALK WIDTH AND BUFFER



Downtown Sidewalk Width and Landscaping

Downtown Transportation Plan

Downtown Sidewalks LUC 20.2SA.060

- 12' Width
- 16' Width
- - - - Planter Strip with Street Trees
- Street Trees in Tree Grates
- - - - Pedestrian Corridor

Area Boundary

- Downtown Bellevue
- Building

The sidewalk width includes a 5-foot-wide landscaping strip at the curb, with either a planter or street tree.

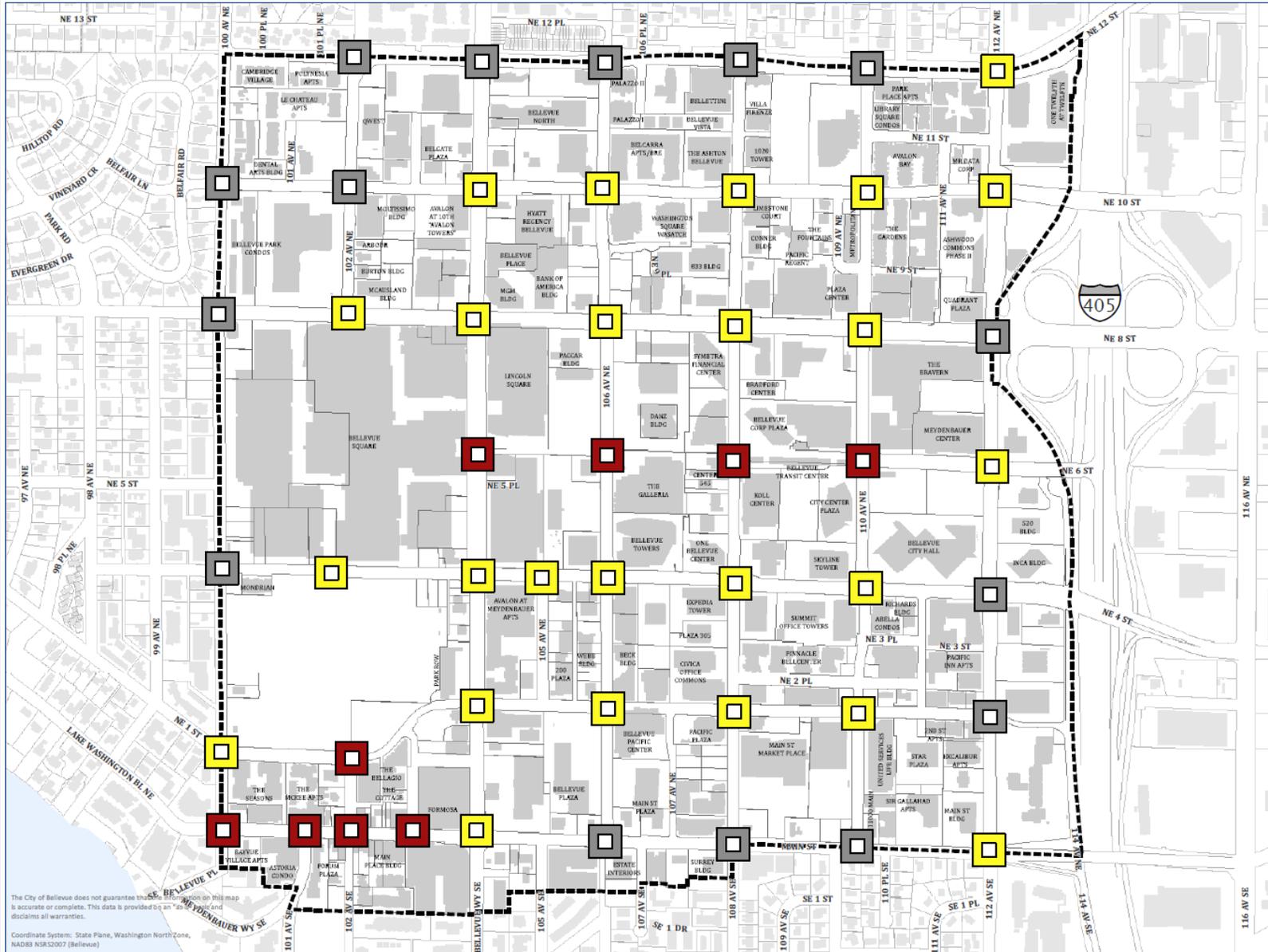


Sources: City of Bellevue Building Footprints: 2014

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Coordinate System: State Plane, Washington North Zone, NAD83 NSRS2007 (Bellevue)

PEDESTRIAN LOS: DOWNTOWN TRANSPORTATION PLAN INTERSECTION TYPES



Downtown Intersection Types

Downtown Transportation
Plan

- Intersection Type**
- Standard
 - Enhanced
 - Exceptional
- Area Boundary**
- Downtown
 - Building



Sources: City of Bellevue
Building Footprints: 2014

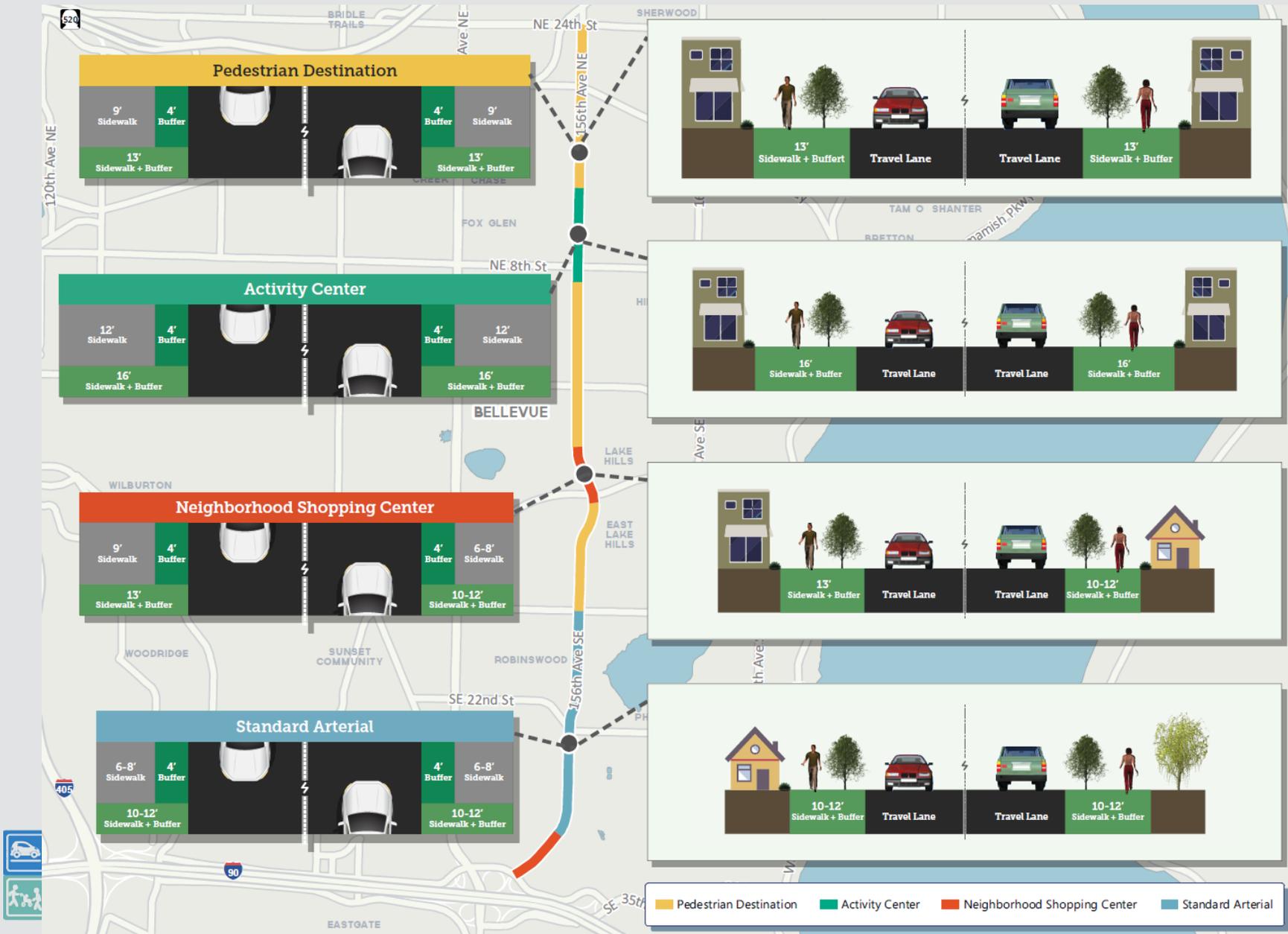
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PEDESTRIAN LOS RECOMMENDED STANDARDS

Context:	Downtown	Activity Centers	Neighborhood Shopping Center	Pedestrian Destinations	Elsewhere
Component					
Sidewalk and Buffer Width	Meets Downtown Land Use Code	Meet Land Use Code* or 16 feet for designated arterials in activity center.	13 feet adjacent to shopping center	13 feet adjacent to pedestrian destination or within 100 feet of a FTN stop	No Change: Meet Design Manual (6-8 foot sidewalk and 4 foot buffer = 10-12 feet)
Arterial Crossing Frequency**	≤ 300 feet	≤ 800 feet: Factoria ≤ 600 feet: Elsewhere	At least one crossing every 600 feet or less within shopping center area	Within 600 feet of destination. Within 300 feet of bus stop pair on FTN.	Not Applicable
Signalized Intersection Treatment	Meets DTP*** Designation	Meets Land Use Code* or DTP*** Enhanced	Per Design Manual	Per Design Manual	Per Design Manual

- * Meets BelRed Land Use Code in BelRed Subarea
- ** Must be an appropriate marked and potentially signalized crossing as determined by the Transportation Department.
- *** Downtown Transportation Plan

PEDESTRIAN LOS CROSS-SECTION EXAMPLES



PEDESTRIAN LOS

Discussion



BICYCLE LOS

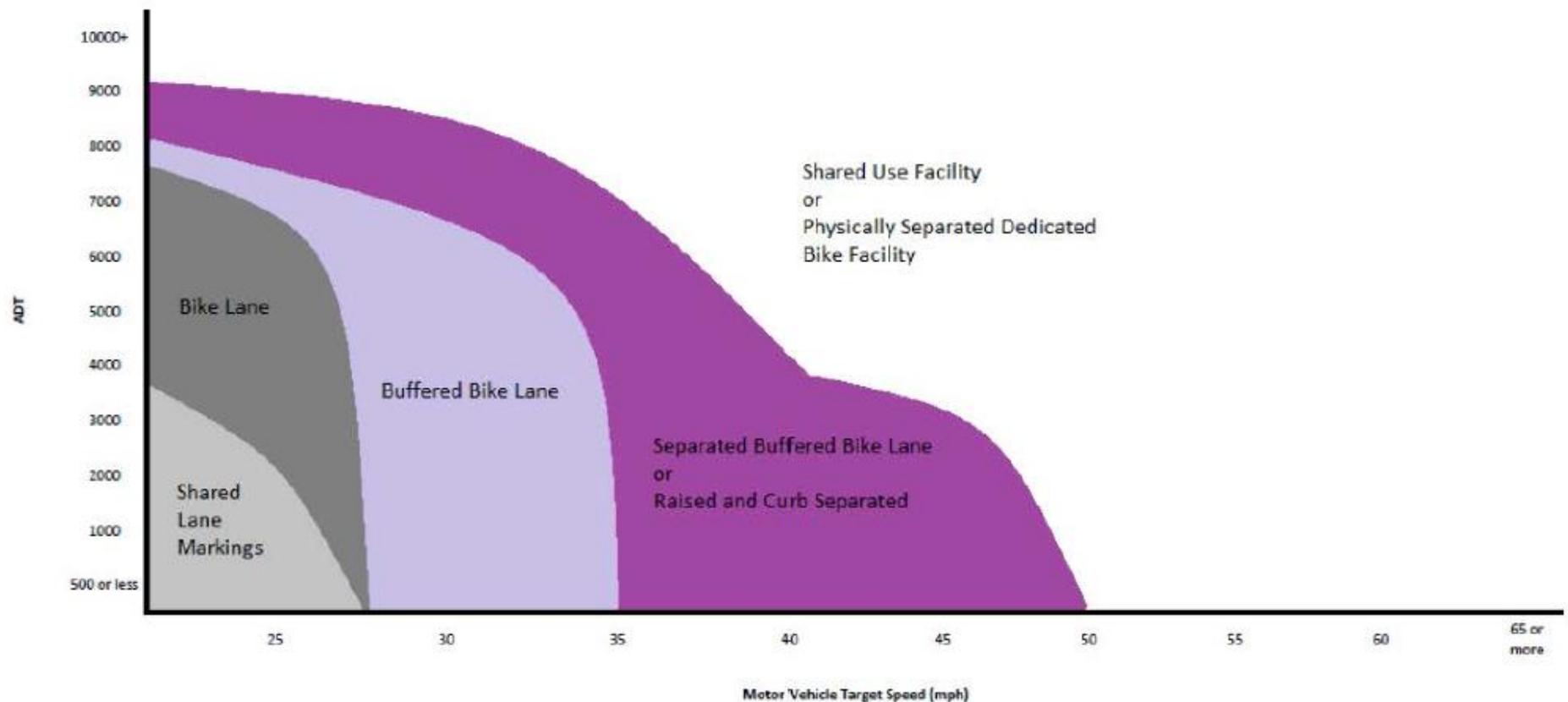
1. Bicycle LOS standards apply to arterial streets in the Bicycle Master Plan network
2. Adapt Level of Traffic Stress (LTS) methodology from (Furth/Mekuria 2011), Montgomery County, MD, and WSDOT Bicycle Design Manual
3. Components that affect Bicycle LOS are based on standard City designs, Bicycle Master Plan recommendations, and Bicycle Rapid Implementation Plan recommendations
4. Method focuses on comfort-level of cyclists of different types and riding ability on a type of facility
5. Standards vary based on urban form and the priority of the bicycle route



BICYCLE LOS

WSDOT Bike Level of Service

Exhibit 1520-6a Bicycle Facility Selection Chart – Interested, but Concerned Cyclists



Note: Adapted from *Montgomery County Bicycle Planning Guidance*, Montgomery County Department of Transportation, 2014.



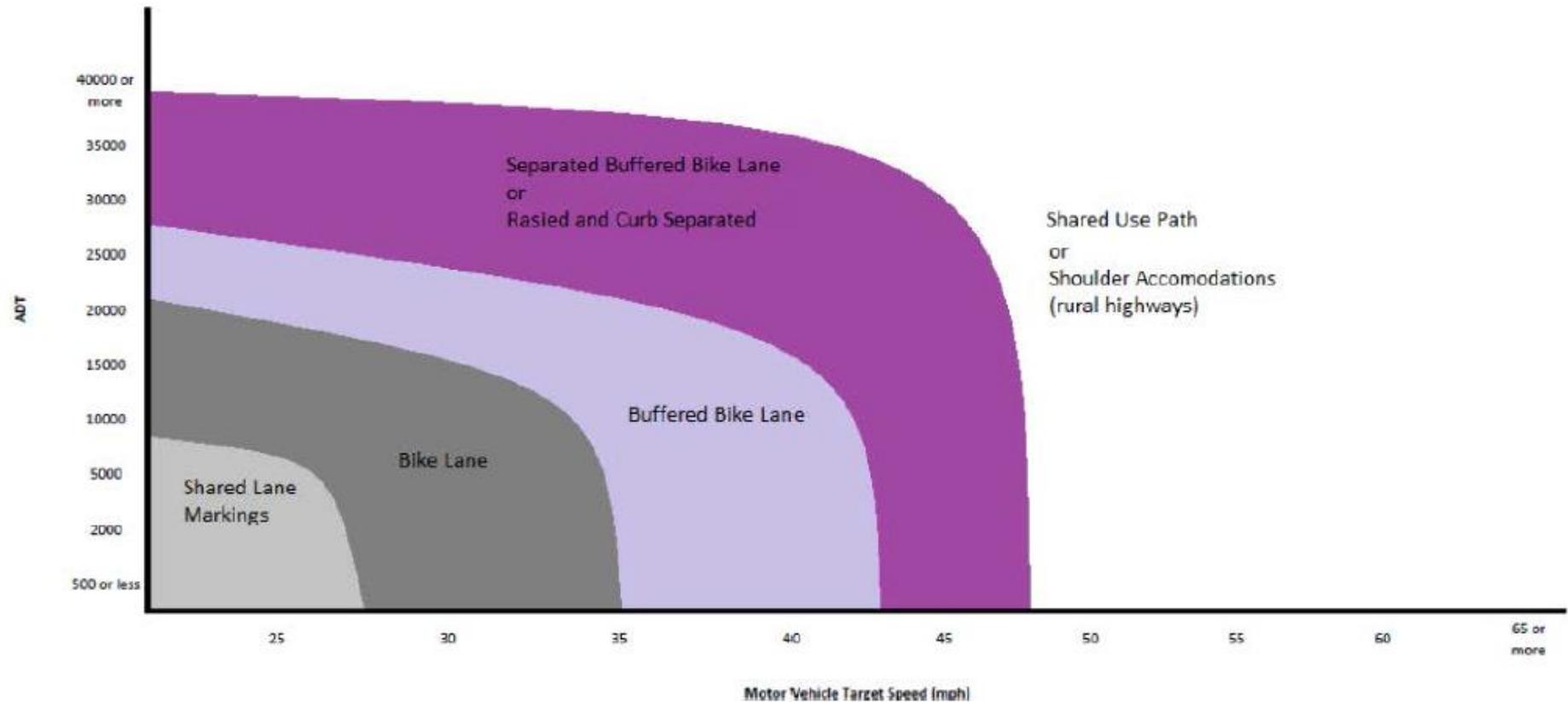
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BICYCLE LOS

WSDOT Bike Level of Service

Exhibit 1520-6b Bicycle Facility Selection Chart – Confident Cyclists



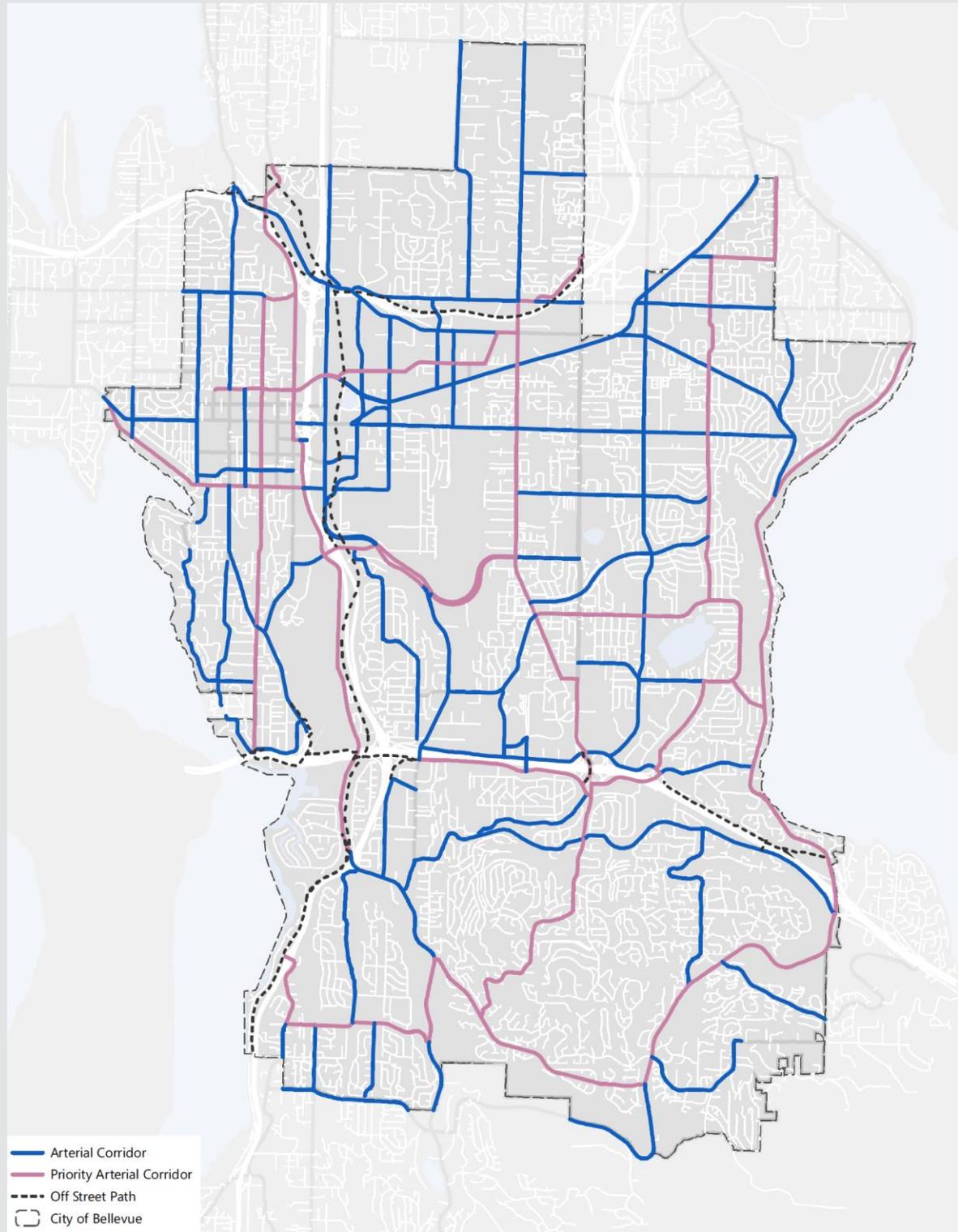
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BICYCLE LEVEL OF TRAFFIC STRESS (LTS)

LTS 1	LTS 2	LTS 3	LTS 4
Interested but Concerned – Children and Older Adults	Interested but Concerned – Adults	Enthused and Confident	Strong and Fearless

BICYCLE NETWORK



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BICYCLE LOS RECOMMENDED STANDARDS ALONG STREETS

Speed Limit (mph)	Arterial Traffic Volume	No marking	Sharrows	Striped Bike Lane	Buffered Bike Lane	Protected Bike Lane	Physically Separated Bikeway
≤25	<3k	1	1	1	1	1	1
	3-7k	3	2	2	2	1	1
	≥7k	3	3	2	2	1	1
30	<15k	4	3	2	2	1	1
	15-25k	4	4	3	3	3	1
	≥25k	4	4	3	3	3	1
35	<25k	4	4	3	3	3	1
	≥25k	4	4	4	3	3	1
40	Any volume	4	4	4	4	3	1

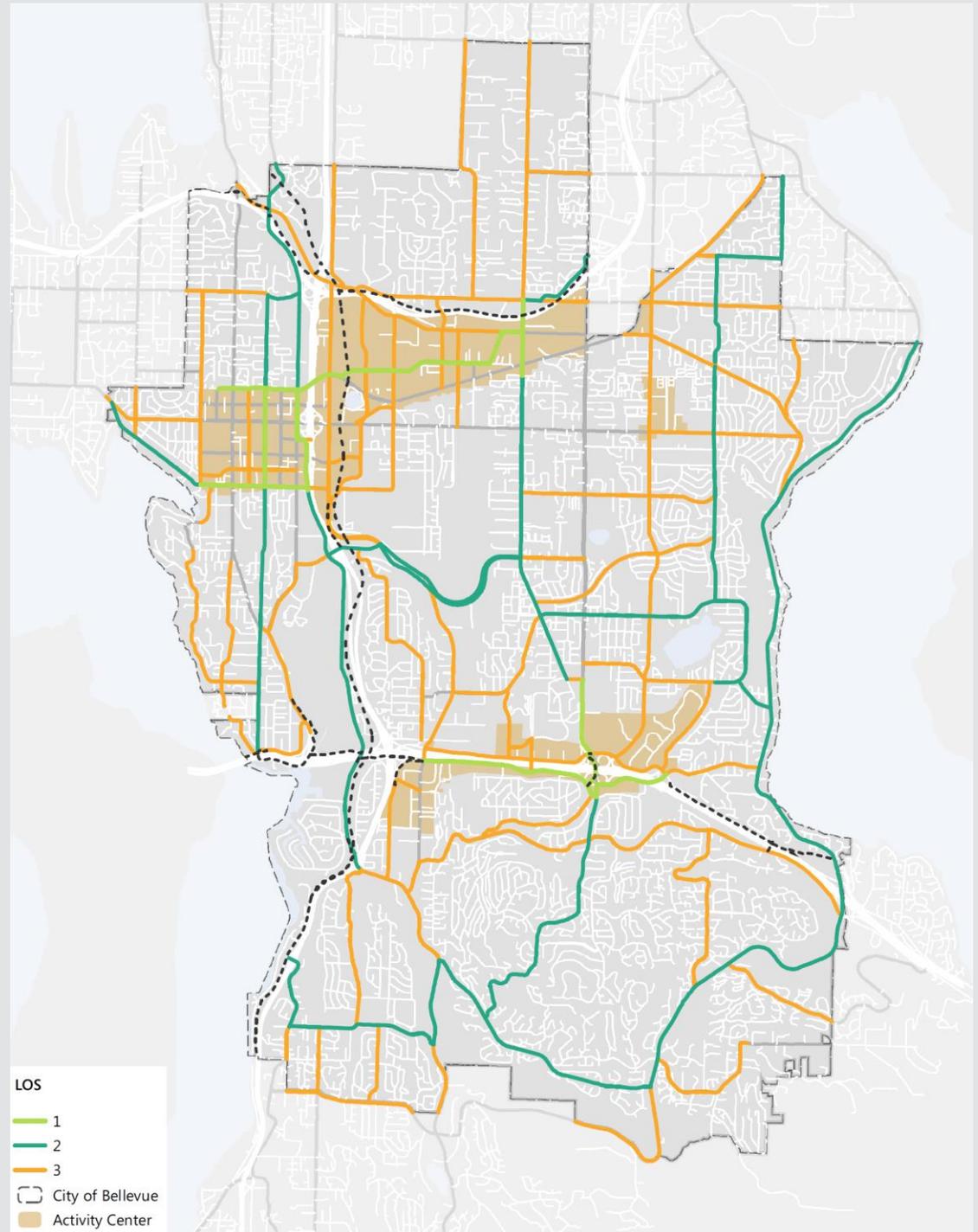
Number in each cell represents Bicycle LOS

BICYCLE LOS RECOMMENDED STANDARDS AT CROSSINGS

Crossing Treatment:	Signal Actuation	Bike Signal	Crossing Treatment	Near-Side Intersection Treatment	Near-Side with Right Turn Lane Treatment
Bike LOS					
1	Automatic	Bike signal on near and far side of intersection; leading bicycle phase or other bike-favorable signal timing	Solid or skip stripe green crossing	Green bike box; two-stage turn box at designated Bicycle Network intersections	Dutch intersection design
			Median refuge Island with RRFB for unsignalized crossings	Curb ramp to wide sidewalk	
2	Automatic	Bike signal on near and far side of intersection; leading bicycle phase or other bike-favorable signal timing	Dotted line extensions/ elephant feet striping	Standard bike box; two-stage turn box at designated Bicycle Network intersections	Green bike lanes to the left of right turning lane; green skip strip conflict zone
			Green colored conflict areas with sharrows		
			HAWK or RRFB with median island for unsignalized crossings		
3	Manual	Initial green is adequate for bicycle to clear intersection	Sharrows	None	For lanes >150' through bike lane to left of right turning lane
					For lanes < 150' either above treatment or combined bike/turn lane with narrow (4') green striped bike lane
Trail	Automatic	Near and far side bike signal	Solid or skip stripe green crossing	N/A	N/A



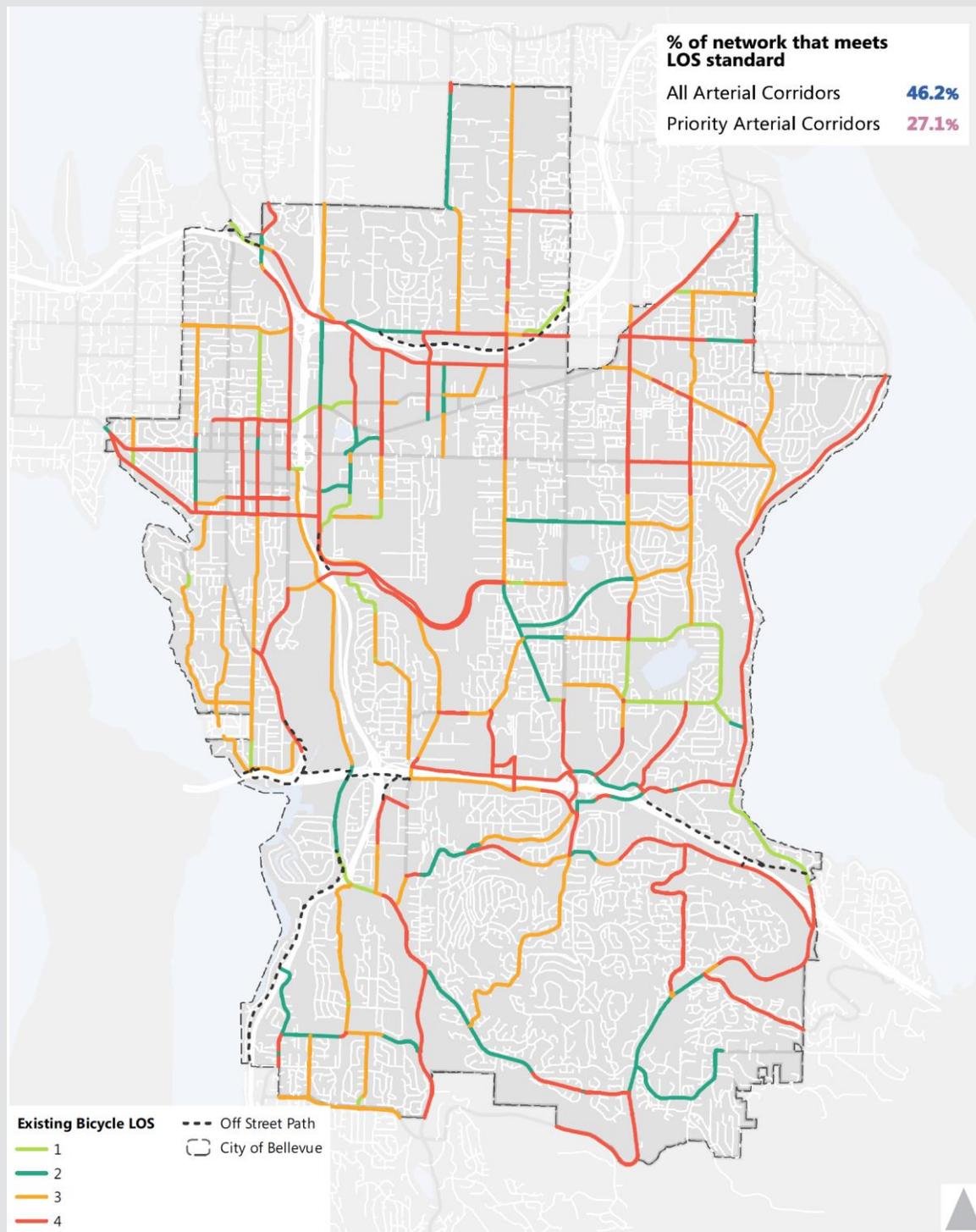
BICYCLE LOS RECOMMENDED STANDARDS:



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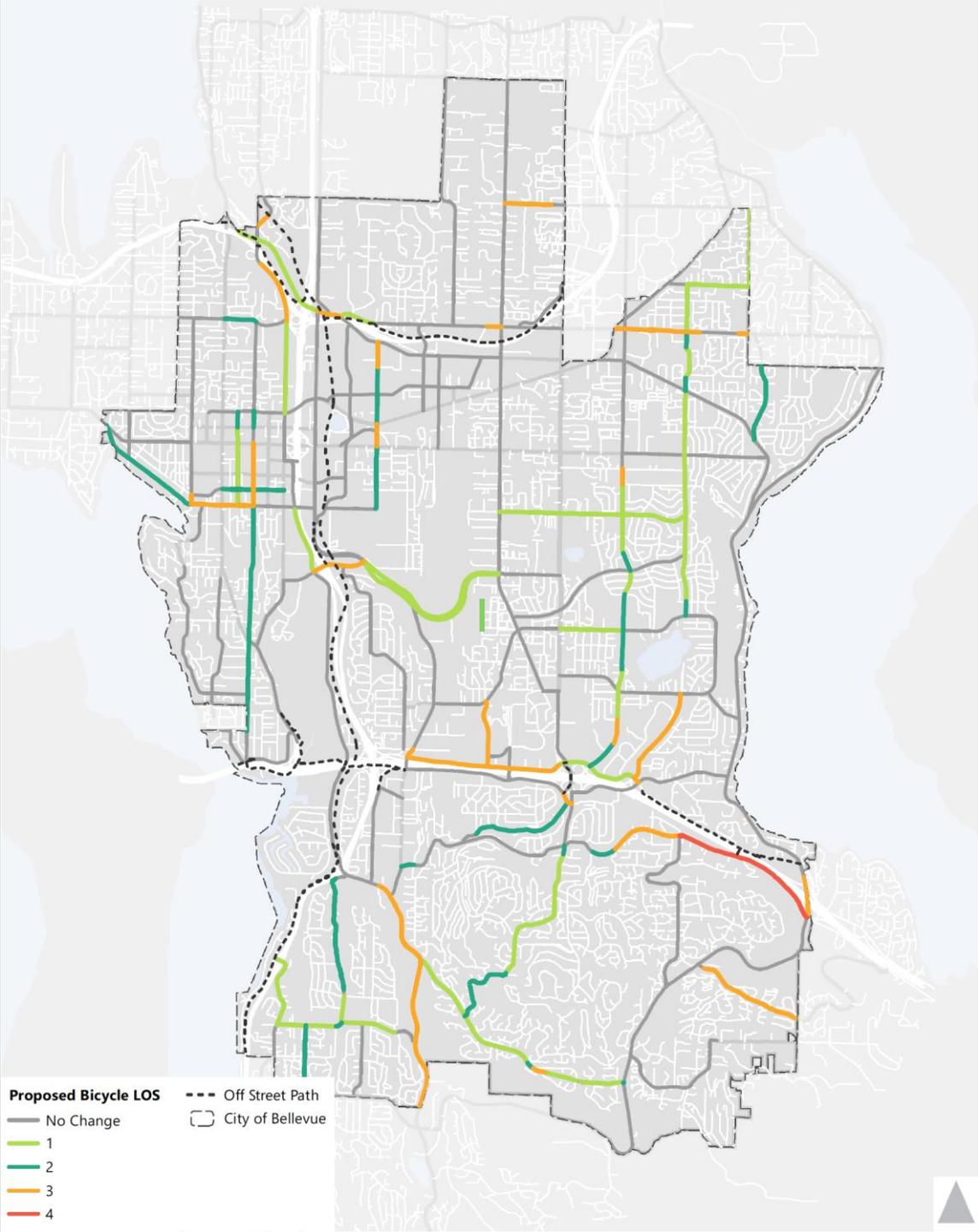
BICYCLE LOS: EXISTING CONDITIONS



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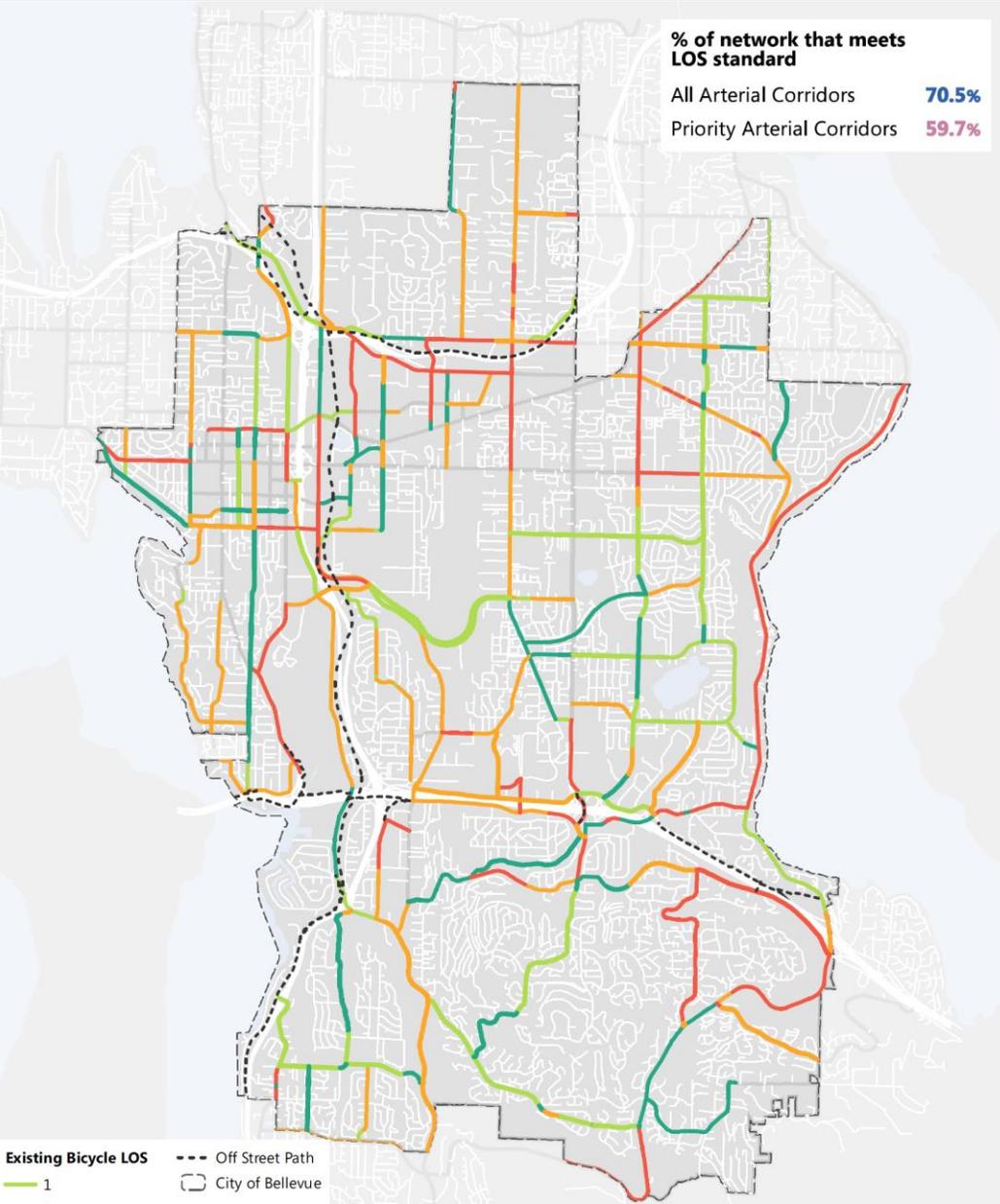
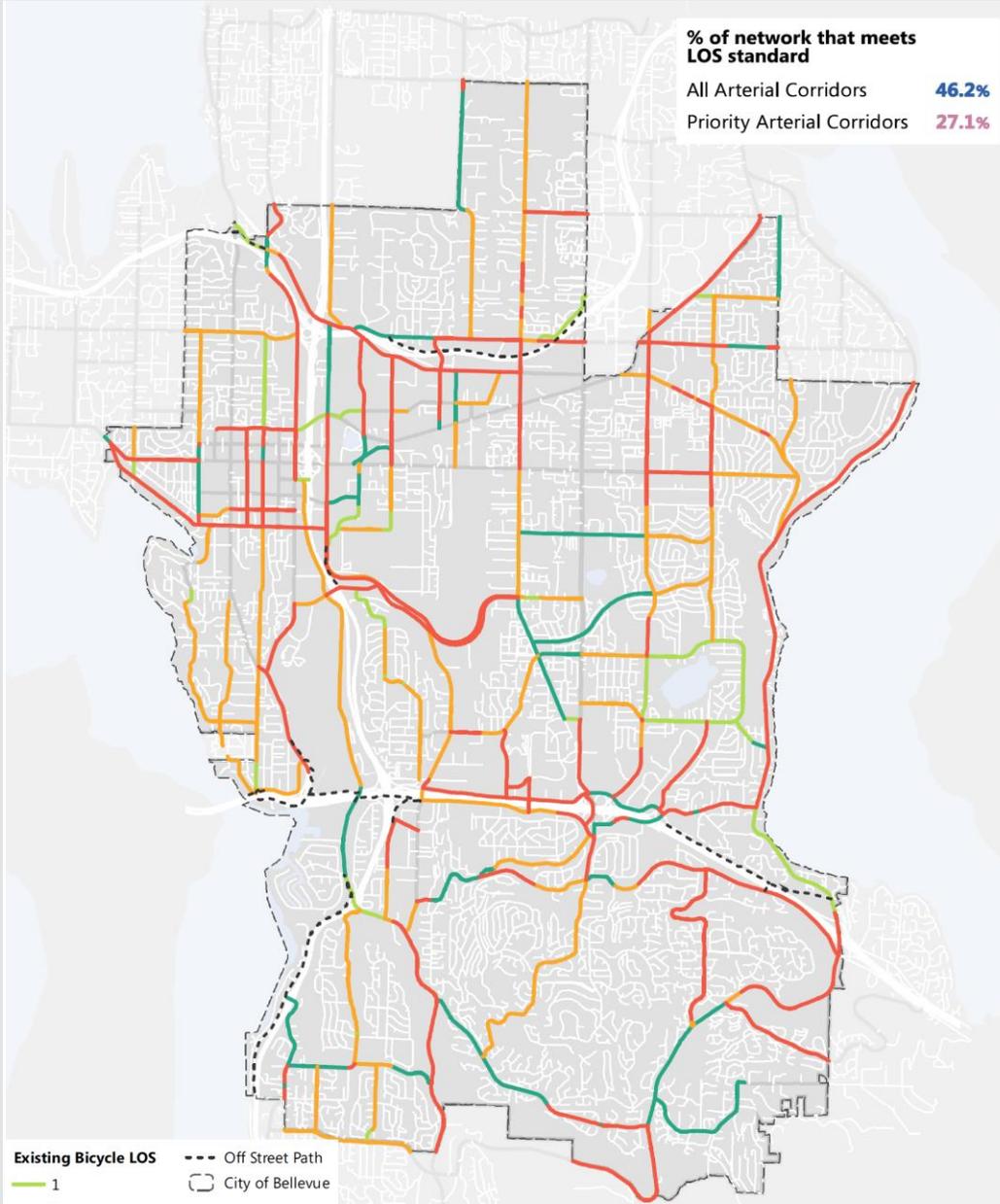
BICYCLE LOS: BRIP PROJECTS



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BICYCLE LOS: EXISTING VS BRIP



BICYCLE LOS

Discussion



TRANSIT LOS

- 1. Transit Stop/Station Amenity Factors (Passenger access in PedLOS)**
- 2. Speed Factors (Corridor and Intersection Improvements)**
 - Transit Priority Lane/Business Access and Transit (BAT) Lane
 - Queue Jump Lane/In-Lane Stop/Station
 - Transit Signal Priority
- 3. Standards consider planned urban form and quality of transit service**
 - Local transit stop –single route, transit headway >30 minutes
 - Primary transit stop –multiple routes or 30 minute headway
 - Frequent Transit Network (FTN)/RapidRide stop –frequent headway on FTN or RapidRide
 - Multimodal Hub – Light rail station, BRT station, multiple bus routes
- 4. Adapted from recommendations for transit speed and transit stop amenities in the Transit Master Plan and Downtown Transportation Plan**



TRANSIT LOS: STOPS/STATIONS RECOMMENDED STANDARDS

Context:	Local Stop	Primary Stop	Frequent Transit/ RapidRide Stop	Multimodal Hub
Component				
Weather Protection*	Yes, 25+ daily boardings	Yes	Yes	Yes
Seating	Yes, near uses like retail, healthcare, or senior housing	Yes	Yes	Yes
Bicycle Parking	One short-term rack (2-4 bikes)	One short-term rack (2-4 bikes)	One short-term rack (2-4 bikes)	Two short term racks (4-8 bikes) Bike Cage or Lockers
Bike Share Station	No	No	Yes** In Activity Centers	Yes**
Wayfinding	No	Yes	Yes	Yes

* Building mounted protection is preferred in areas where no building setback is required

** Bike share station to be provided if there is an active bike share program in Bellevue and based on input from the Transportation Department. If there is no active bike share program, space must be provided to accommodate bike share station. Minimum size for station is 6'x12'



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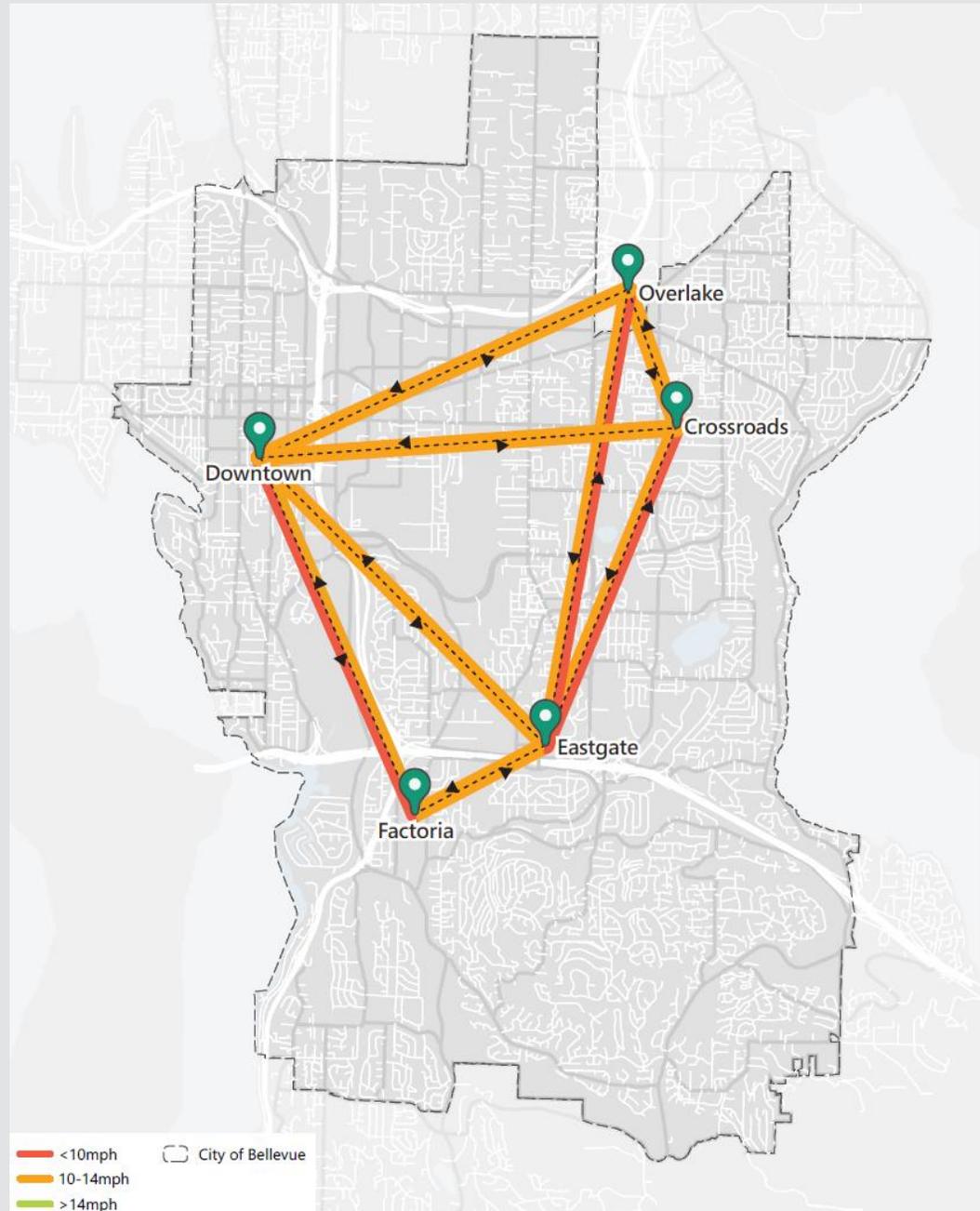
TRANSIT LOS: SPEED RECOMMENDED STANDARD

1. Focused on Frequent Transit Network Connections between Activity Centers
2. Based on target speeds in TMP
3. Standard: 14 mph or better speeds on FTN connections

LOS Rating	Transit Speed
	<10 mph
	10-14 mph
	>14 mph

TRANSIT LOS

Existing Conditions



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TRANSIT LOS

Discussion



NEXT STEPS

1. Refine MMLoS Metrics and Standards per Commission Feedback
2. Identify Implementation Strategies



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COMMENTS/QUESTIONS/OBSERVATIONS



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