

City of
Bellevue



Transportation Commission Study Session

DATE: July 1, 2021
TO: Chair Marciante and Members of the Transportation Commission
FROM: Kevin McDonald, Principal Transportation Planner, 425-452-4558
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SUBJECT: Mobility Implementation Plan: Existing Conditions

DIRECTION REQUESTED

Action

Discussion/Direction

Information

Staff will present information on the current performance of the vehicle, transit, pedestrian, and bicycle systems relative to the Performance Targets recommended in the 2017 Multimodal Level of Service (MMLOS) Metrics, Standards and Guidelines Report. This information documents the existing conditions the Transportation Commission may consider in setting Performance Targets for the Mobility Implementation Plan.

INFORMATION

Multimodal Level-of-Service Performance

Using the recommendations from the 2017 MMLOS Metrics, Standards, and Guidelines Report, the current performance of each mode has been evaluated; for the partially built modal networks that constitute the pedestrian, bicycle, and transit system, the level of system completeness is also quantified.

Pedestrian Facility Performance Metrics

Two pedestrian Performance Metrics were assessed against current conditions: sidewalk width (landscape strip plus sidewalk) and mid-block crossing frequency, both of which are derived from the MMLOS Metrics, Standards & Guidelines Report.

1. **Sidewalk Width:** Sidewalks within commercial/mixed-use Performance Management Areas (Downtown, BelRed, Wilburton/East Main, Crossroads, Factoria, and Eastgate)

were reviewed to assess whether they meet the sidewalk and landscape buffer width Performance Target as summarized in **Table 1**.

2. **Mid-block Crossing Frequency:** Arterial corridors within commercial/mixed-use Performance Management Areas were reviewed to assess whether they meet the mid-block crossing frequency Performance Target: which is generally 300-foot spacing in Downtown, 800 feet in Factoria, and 600 feet in the other commercial/mixed-use areas, subject to a formal engineering review to identify the appropriate crossing location, which has not been performed citywide.

Commercial/Mixed-Use Performance Management Area	Sidewalk and Buffer Width Targets	Source
Downtown	12 to 20 feet combined landscape strip or tree pits and sidewalk depending on corridor	LUC 20.25A.090
BelRed	12-14 feet combined landscape strip and sidewalk depending on corridor	LUC 20.25D.110
Other Commercial/Mixed-Use Performance Management Areas	16 feet combined landscape strip and sidewalk	Bellevue MMLOS Report

Source: MMLOS Metrics, Standards & Guidelines Report, 2017; City of Bellevue Land Use Code, 2021.

The findings of existing conditions are summarized in **Table 2**. Approximately 30% of sidewalks within commercial/mixed-use Performance Management Areas meet the Performance Targets from the MMLOS document. As shown in **Figure 1**, sidewalk gaps are most prevalent in Eastgate and BelRed.

<i>Sidewalk System Completion and Width</i>		
	Miles	Proportion
Sidewalks Meeting Performance Target	21	25%
Sidewalks Exist but Not Meeting Performance Target	45	52%
Sidewalk Gaps	20	23%
Total Sidewalk Distance	86	100%
<i>Mid-block Crossing Frequency</i>		
	Proportion	
Percentage of Recommended Mid-block Crossings Completed	~13%*	

Note: Only sidewalk segments within commercial/mixed-use Performance Management Areas are included in the calculations in Table 2 though some data outside those areas are shown in Figure 1 to identify how well the surrounding areas are connected.

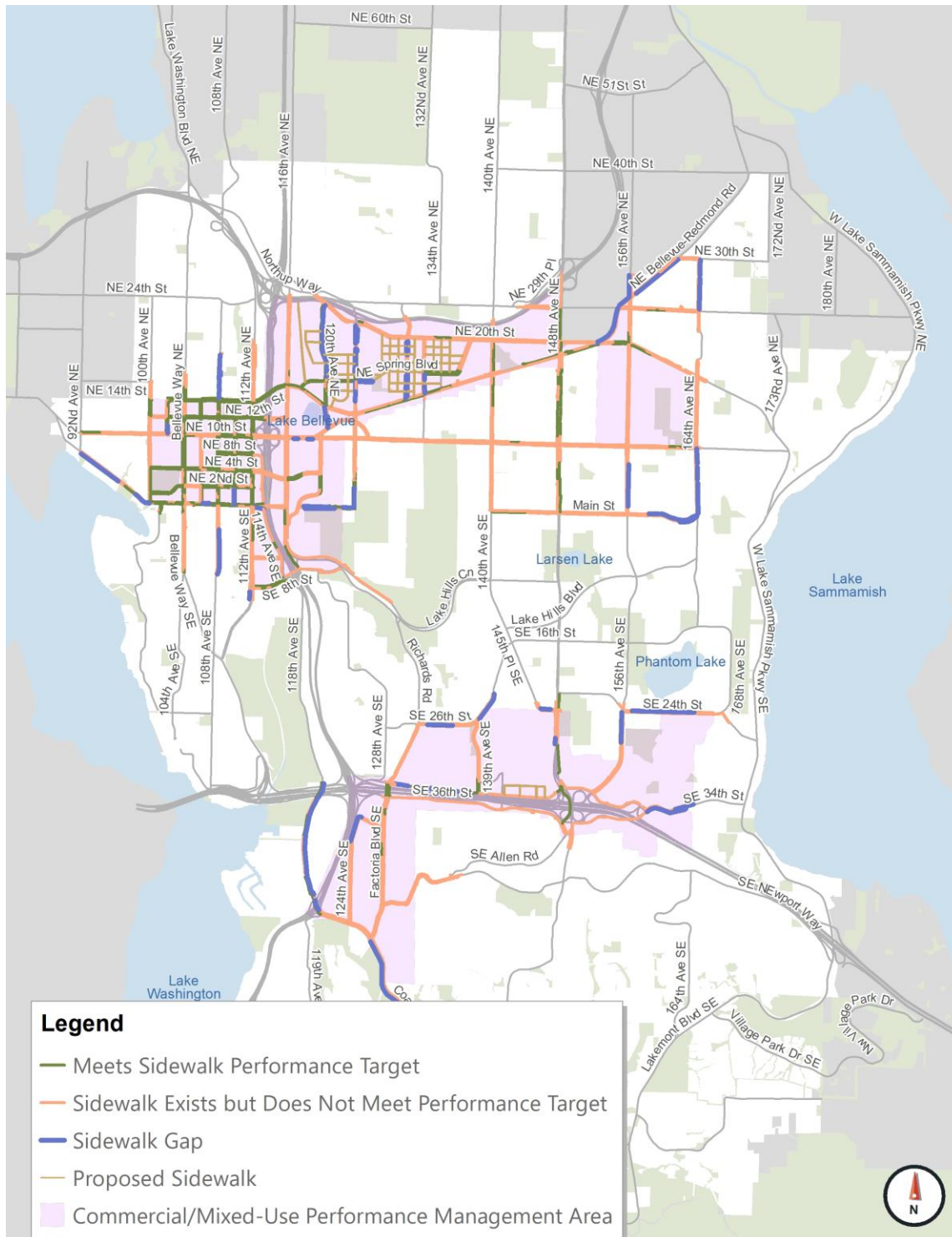
* The MMLOS Report identifies a nominal arterial crossing frequency that is desirable in each of the Performance Management Areas. In Downtown and along Factoria Boulevard SE, the City has completed an analysis for appropriate locations for arterial crossings, but not in the remainder of the commercial/mixed-use Performance Management Areas. Therefore, the proportion of completed mid-block crossings could change as the City performs additional analyses and engineering studies.

There are currently 17 mid-block crossings within the commercial/mixed-use Performance Management Areas. The approximate number of recommended new mid-block crossings was

estimated using the Downtown Transportation Plan and a GIS analysis of corridors in the other commercial/mixed-use Performance Management Areas based on the relevant crossing frequency guidelines. For all corridors within the commercial/mixed-use Performance Management Areas to meet their Performance Targets, approximately 118 additional midblock crossings would need to be installed. This equates to 13% of the total recommended number of midblock crossings currently complete. However, the recommended number of crossings will be refined as the City performs future engineering studies to more specifically identify appropriate crossing locations; it is likely the number of recommended crossings will be refined in the future as these studies are completed.

Note that this current analysis focused on the commercial/mixed-use Performance Management Areas because that is where data could readily be collected and evaluated. For the purposes of the Mobility Implementation Plan, at this time a focus on the commercial/mixed-use Performance Management Areas is an appropriate initial effort given that most of the City's growth will occur in these locations and this is also the area with the greatest pedestrian travel demand.

Figure 1.
Pedestrian Network Performance in Commercial/Mixed-Use Performance Management Areas



Notes: 1. Only sidewalk segments within commercial/mixed-use Performance Management Areas are included in the system completion calculations though some data outside those areas are shown in Figure 1.

2. Performance Management Areas boundaries are approximate as of June 2021 and may be refined in the future.

Source: City of Bellevue, 2021; Fehr & Peers, 2021.

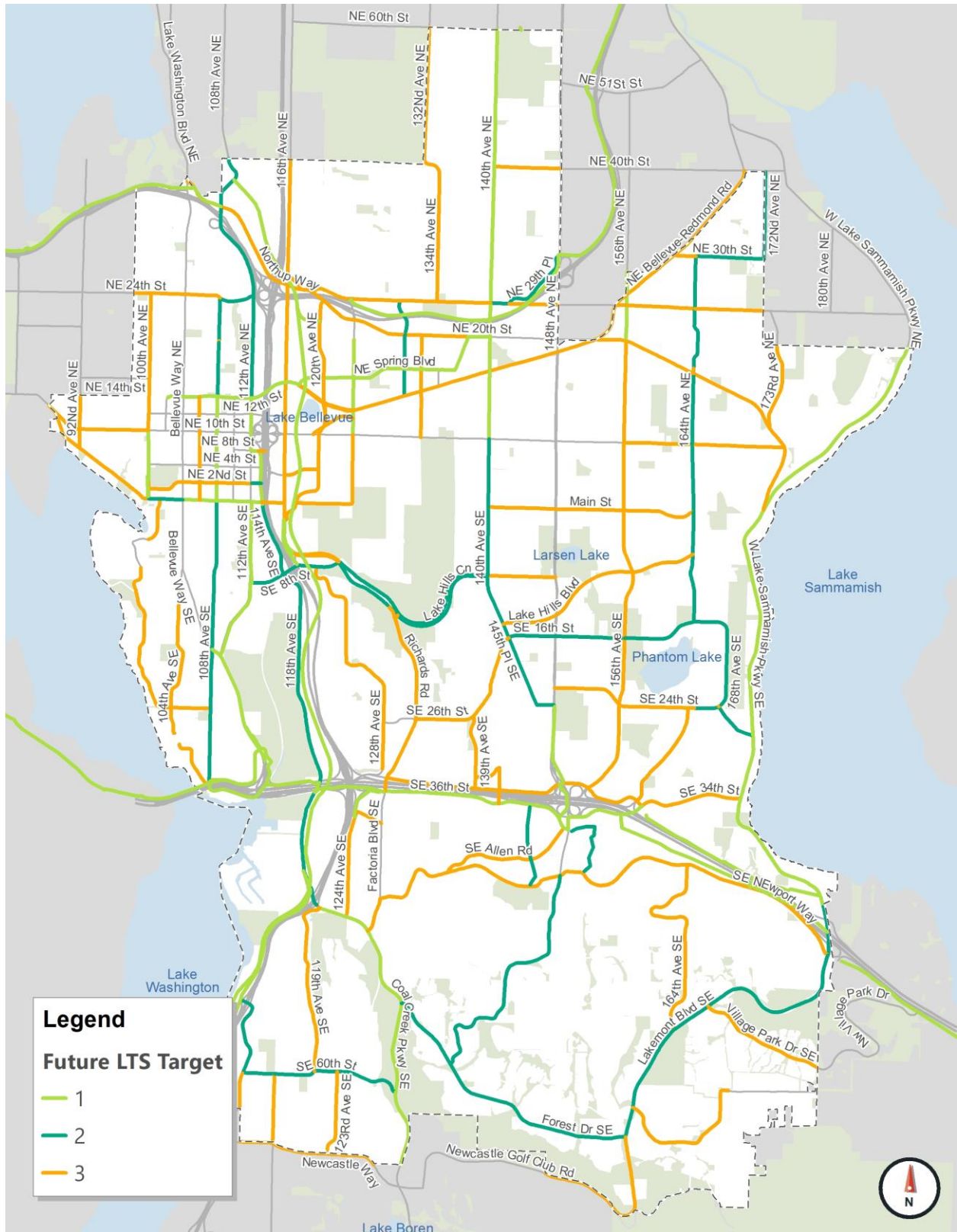
Bicycle Facility Performance Metrics

Bicycle facility level-of-traffic-stress (LTS) was assessed for bicycle priority corridors throughout the city consistent with the MMLOS bicycle LTS guidelines. Bicycle LTS considers vehicle volume, vehicle speed, and type of existing bicycle facility. Note that as part of a detailed review by the staff and consultant team, the recommended bicycle corridor LTS has been updated compared to the map shown in the MMLOS Metrics, Standards & Guidelines Report. The update was based on the results of studies conducted since the Transportation Commission prepared the MMLOS Report; the recommended LTS is shown in **Figure 2**. **Figure 3** displays the performance of each bicycle network corridor with respect to the LTS: a bicycle facility meeting the LTS, a bicycle facility that does not meet the LTS, or a gap in bicycle facilities. The results are summarized in **Table 3**.

Table 3. Bicycle Facility Performance		
	Miles	Proportion of Planned System
Bicycle Facilities Meeting LTS	74	53%
Bicycle Facilities Exist but Not Meeting LTS	32	23%
Bicycle Facility Gaps	33	24%
Total	139	100%

Roughly half of the City's planned bicycle network corridors meet LTS, 23% of corridors do not meet the LTS, and 24% of corridors lack bicycle facilities.

Figure 2. Recommended Bicycle LTS on Bicycle Network Corridors



Source: City of Bellevue, 2021; Fehr & Peers, 2021.

Transit Facilities Performance Metrics

Two types of transit facility Performance Metrics were assessed against current conditions: passenger amenities at bus stops on the existing Frequent Transit Network (FTN) and transit speed between commercial/mixed-use Performance Management Areas, both of which are derived from the MMLOS Metrics, Standards & Guidelines Report. The existing FTN includes the following King County Metro routes: RapidRide B, Route 240, Route 245, Route 250, and Route 271. Sound Transit Route 550 was excluded from analysis since it will be replaced with East Link Light Rail in 2023. The planned FTN is described in the Transit Master Plan and it includes a number of routes that will be developed in partnership with transit agencies.

1. **Passenger Amenities:** Each stop along the FTN was reviewed for the five amenities described in the MMLOS report: weather protection, seating, paved bus door passenger zone, wayfinding, and bicycle parking.
2. **Transit Speed:** Travel speed between each commercial/mixed-use Performance Management Area was collected using Spring/Summer 2021 bus schedules and speeds were calculated based on the bus route paths.

The results for both Performance Targets are summarized in **Table 4**.

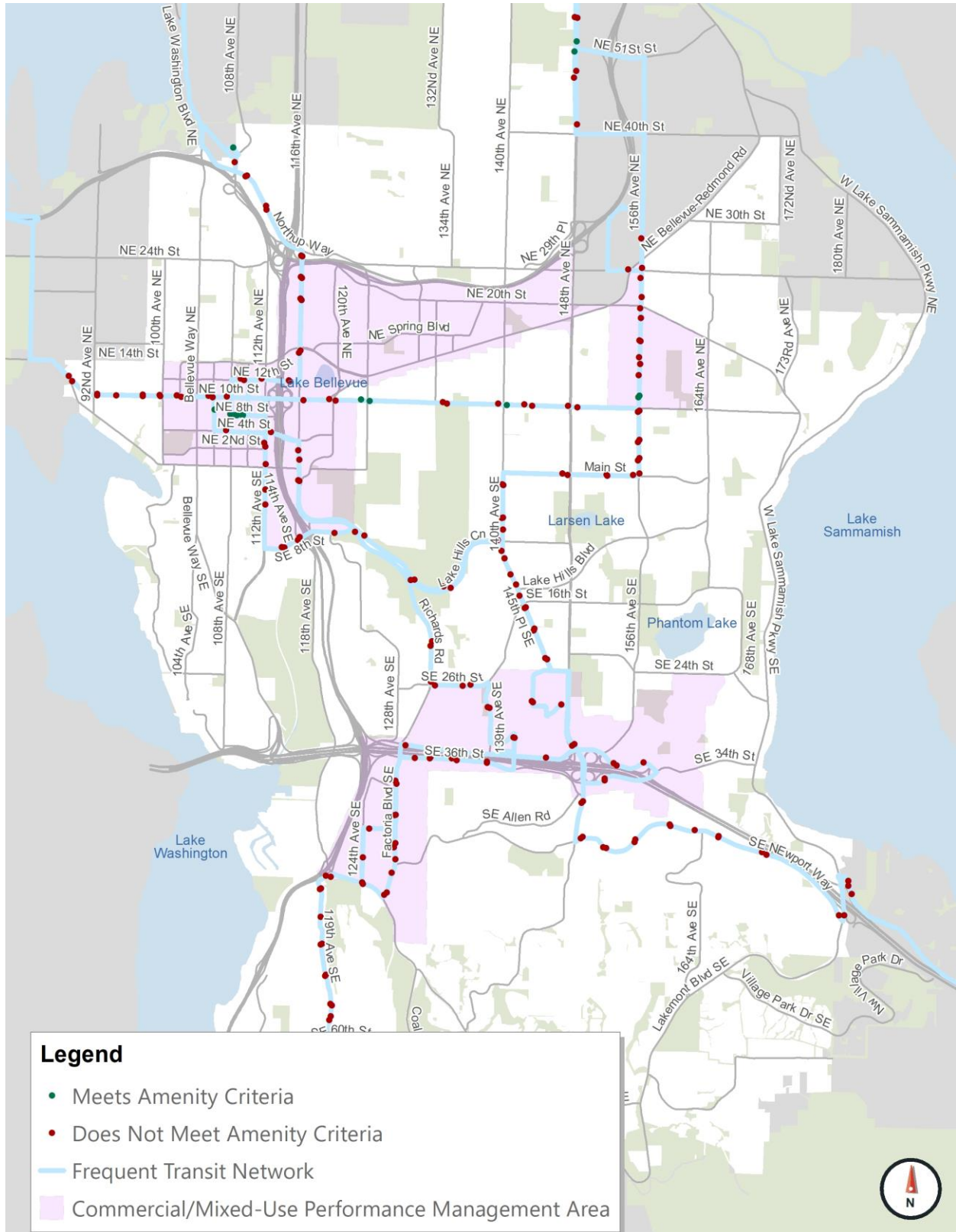
Table 4. Transit Performance Targets		
<i>Passenger Comfort, Access and Safety</i>		
Amenities	Number of Stops	Proportion
Stops Fully Meeting Amenity Performance Target	14	7%
Stops Meeting 3 or 4 Amenity Components	78	36%
Stops Meeting 1 or 2 Amenity Components	41	19%
Stops Meeting No Amenity Components	81	38%
Total Stops	214	100%
<i>Transit Travel Speed</i>		
Transit Speed	Number of Commercial/Mixed-Use Performance Management Areas Pairs	
Faster than 14mph Performance Target	2	
10-14mph	10	
Slower than 10mph	4	
Total Commercial/Mixed-Use Performance Management Areas Pairs	16	

Source: King County Metro, 2021; Fehr & Peers, 2021.

Of the 214 stops along the existing FTN, 7% are meeting all five of the amenity components. Another 36% meet at least three of the amenity components and the remainder have two or fewer amenities. The most commonly provided amenities are paved passenger zones (61% of stops), seating (42% of stops), and weather protection (36% of stops). Wayfinding and bike parking are provided at a small number of stops, 11% and 8%, respectively. **Figure 4** shows the performance of each stop on the Frequent Transit Network. Stops with all five passenger amenities are clustered in Downtown and several RapidRide stops along NE 8th Street and 156th Avenue NE.

Transit travel speed between each commercial/mixed-use Performance Management Area is shown in **Figure 5**. Currently, transit speed between two of the commercial/mixed-use Performance Management Area pairs, Downtown to Crossroads and Downtown to Eastgate, is more than 14mph. Ten of the pairs are operating in the 10-14mph range and four are operating at less than 10mph. The four commercial/mixed-use Performance Management Area pairs currently operating slower than 10mph are Downtown to Factoria, Factoria to Downtown, Eastgate to Factoria, and Overlake to Crossroads.

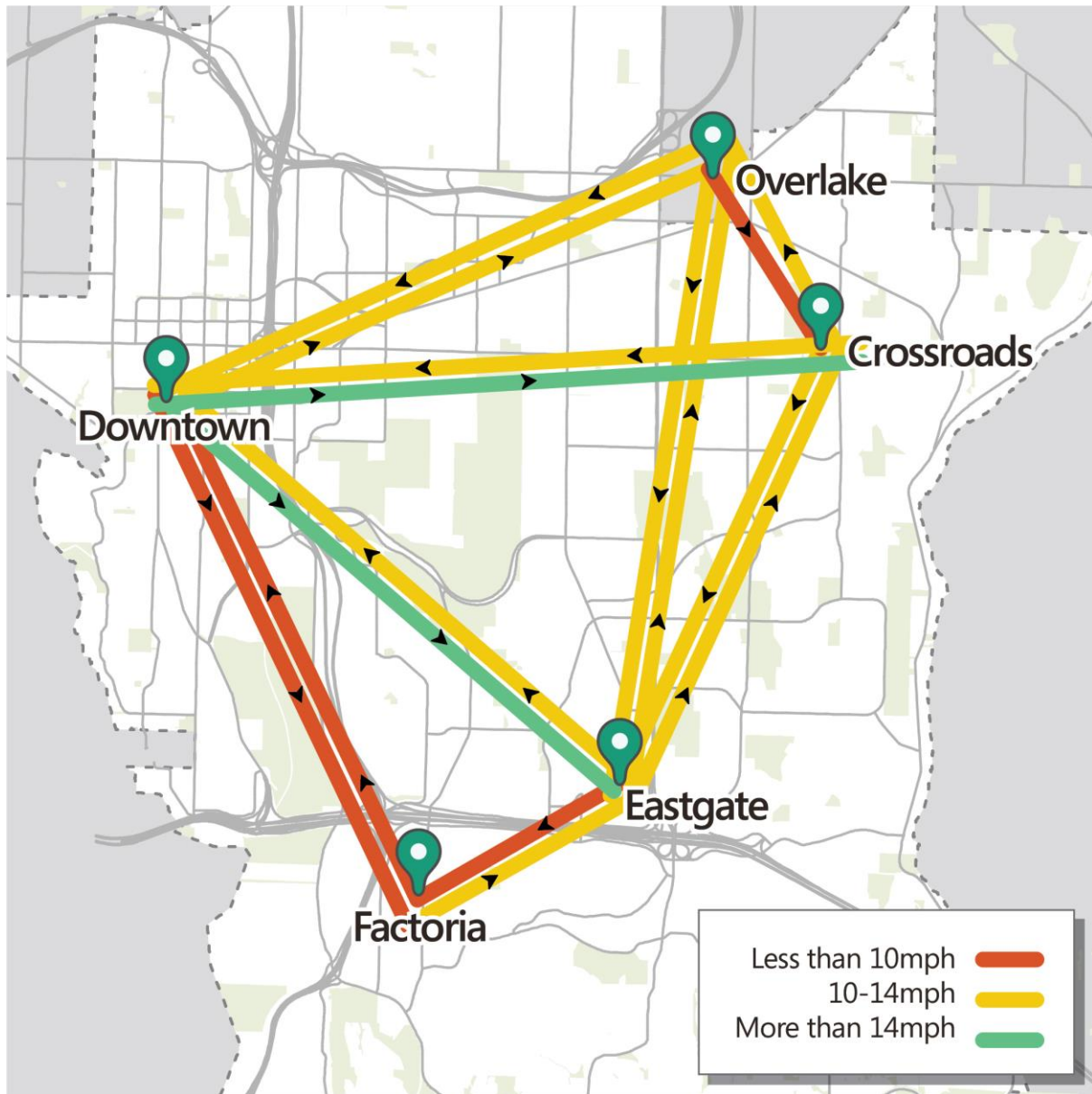
Figure 4. Frequent Transit Network Stop Performance



Note: Performance Management Areas boundaries are approximate as of June 2021 and may be refined in the future.

Source: Fehr & Peers, 2021.

Figure 5. Existing Transit Travel Speed Between Select Commercial/Mixed-Use Performance Management Areas



Source: King County Metro, 2021; Fehr & Peers, 2021.

Vehicle Facility Performance Metrics

Consistent with the Transportation Commission’s MMLOS Metrics, Standards, and Guidelines Report, two vehicle facility Performance Metrics were evaluated:

1. **Intersections:** PM peak period volume to capacity ratio (v/c) at system intersections.
2. **Corridors:** PM peak period corridor travel speed.

The v/c metric at system intersections identifies intersection performance and is complemented by the corridor travel speed metric. For example, a driver traveling along NE 8th Street will get more of the green signal time than a driver approaching from a perpendicular arterial – in this example, intersection v/c might be high, but travel speed on NE 8th Street is steady because of the coordinated and adaptive traffic signals. These two vehicle Performance Metrics together provide a complete picture of intersection congestion and travel flow. A corridor travel time metric has also been calculated on select arterials, per the Commission’s request, as shown in Table 6. Table A-1 provides travel time for all segments.

Table 5 summarizes the existing v/c at system intersections as well as the number of intersections that exceed the adopted v/c standard for each Mobility Management Area (MMA). As of 2020, all MMAs meet the adopted v/c standards and congestion allowance.

MMA	Adopted V/C Standard	Existing V/C	Congestion Allowance for MMA	Number of Intersections that Exceed V/C Standard
Area 1: North Bellevue	0.85	0.64	3	0
Area 2: Bridle Trails	0.80	0.69	4	3
Area 3: Downtown	0.95	0.72	9	2
Area 4: Wilburton	0.90	0.75	3	1
Area 5: Crossroads	0.90	0.71	2	0
Area 6: North-East Bellevue	0.80	0.70	2	0
Area 7: South Bellevue	0.85	0.76	4	1
Area 8: Richards Valley	0.85	0.70	5	1
Area 9: East Bellevue	0.85	0.83	5	5
Area 10: Eastgate	0.90	0.72	4	1
Area 11: Southeast Bellevue	0.80	0.71	3	2
Area 12: Bel-Red/Northup	0.95	0.73	7	1
Area 13: Factoria	0.95	0.79	5	0
Area 14: Newcastle	-	-	-	-
All System Intersections		0.73		17

Source: City of Bellevue, 2020.

Corridor travel speed was estimated using Wejo data, which supplies raw speed data anonymously obtained from connected vehicle data systems. The data was collected during the 4-6PM peak period in October 2019. As part of the MMLOS Metrics, Standards, and Guidelines Report, the Commission developed the “Typical Urban Travel Speed” metric. The “Typical Urban Travel Speed” is defined as 40% of the posted speed limit and corridor performance is

summarized relative to that speed. This methodology takes intersection delay along a corridor into account since vehicles rarely travel at a free-flow speed within an urban area and better accounts for travel through several intersections along a corridor. The 40% factor is identified as appropriate for urban corridors by the Highway Capacity Manual (Transportation Research Board, 2016).¹ The ratio of the observed speed to the Typical Urban Travel Speed is then calculated. For example, the Typical Urban Travel Speed of a 40mph corridor would be 16mph (40mph x 0.4). If that corridor operates at 12mph, then the ratio of observed speed to Typical Urban Travel Speed would be 0.75.

Figure 6 displays the corridor travel speed performance along vehicle priority corridors; note these data are preliminary at this time and will be refined. Each corridor is color coded based on the ratio of observed speed to Typical Urban Travel Speed using the following categories derived from the 2017 MMLoS Report:

- Green: More than 0.9 times the Typical Urban Travel Speed
- Yellow: Between 0.9 and 0.75 times the Typical Urban Travel Speed
- Orange: Less than 0.75 times the Typical Urban Travel Speed

Based on these groupings, 94% of the vehicle priority corridors are operating at more than 0.9 times the Typical Urban Travel Speed. The corridors operating below that level include southbound Bellevue Way and both directions of 108th Avenue NE between NE 12th Street and Main Street as well as southbound 140th Avenue NE between Bel-Red Road and NE 8th Street.

Notable results along some of Bellevue’s busiest streets are shown in **Table 6**:

Table 6. Existing Corridor Travel Speed – Preliminary Results					
Corridor	From	To	Speed Limit	4-6PM Peak Period Speed	4-6PM Peak Period Travel Time
Bellevue Way (SB)	NE 12th St	Main St	30 mph	9 mph	5 min.
Bellevue Way (SB)	Main St	112th Ave SE	30 mph	22 mph	3 min.
Bel-Red Rd (EB)	116th Ave NE	148th Ave NE	35 mph	22 mph	7 min.
NE 8th St (EB)	I-405	124th Ave NE	30 mph	20 mph	2 min.
148th Ave SE (SB)	SE 8th St	Eastgate Way	35 mph	16 mph	10 min.
Factoria Blvd (SB)	I-90	Coal Creek Pkwy	35 mph	14 mph	4 min.
Coal Creek Pkwy (SB)	I-405	Forest Dr	35 mph	24 mph	3 min.

Note: Wejo data are preliminary at this time and will be refined.

Source: Fehr & Peers, 2021.

Most of the arterial segments that are operating at least 10 percent slower than the Typical Urban Travel Speed (i.e. those shown in orange and yellow) are located within

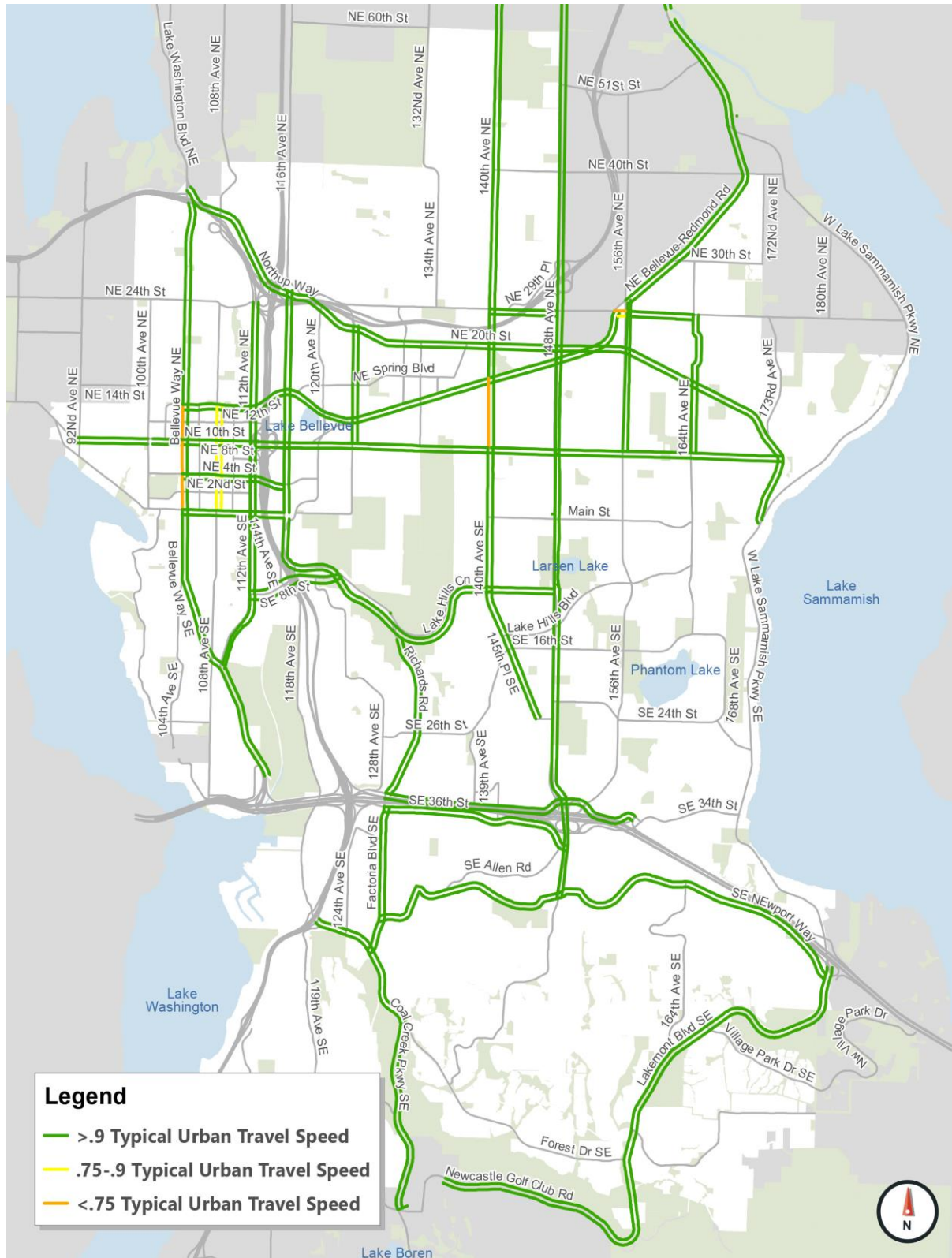
¹ The 40% threshold equates to the transition between LOS C and D in the Highway Capacity Manual, a typical level of weekday afternoon traffic congestion levels in suburban settings.

commercial/mixed-use Performance Management Areas. The exception is southbound 140th Avenue NE between Bel-Red Road and NE 8th Street which is operating at less than 75 percent of the Typical Urban Travel Speed (8 mph and 3 minutes). In general, this map indicates that most of the City's corridors are operating at a "green" level when based on the guidelines in the MMLOS Report. This result may not align with the public perception of corridor travel performance during the PM peak period, because people often recall a worst-case scenario. However, a close review of the data suggest that the results are reasonably accurate.

It is important to understand how the specific methodology impacts the results. The performance reflects the two-hour averaging of the PM peak period (which is consistent with how the intersection v/c ratio is calculated) and that the corridors span several signalized intersections, consistent with the HCM methodology. These factors: 1) a mix of signalized intersections are congested and uncongested and the higher speed between signalized intersections, and 2) the most congested condition typically does not last the entire two-hour PM period, result in the higher speeds summarized in **Figure 6**. These factors, combined with the matter that most people tend to recall travel speeds that are slower than average (people tend to remember the slowest commute, not the average commute) could result in the corridor travel speeds seeming to be out of alignment with expectations. As noted in the next steps for the Mobility Implementation Plan, it may make sense to revisit the performance guidelines defined in the 2017 MMLOS report as these were not evaluated on a citywide basis at the time.

The **Appendix** provides the detailed travel speed for each corridor during the PM peak period.

Figure 6. Corridor Travel Speed Performance



Note: Wejo data are preliminary and will be refined.

Source: Fehr & Peers, 2021.

SUMMARY

Table 7 summarizes the current performance of the system relative to the Performance Targets identified in the 2017 MMLOS Metrics, Standards, and Guidelines Report. Note that no Performance Targets were set for Corridor Travel Speed and that the Intersection V/C Performance Target is based on the existing concurrency standard, which is recommended to be replaced as part of the Mobility Implementation Plan.

The performance of the pedestrian, bicycle and transit passenger amenity metrics are evaluated on the degree to which the facilities meet the Performance Targets in the commercial/ mixed-use Performance Management Areas. Based on the results in **Table 7**, the bicycle network is most complete with roughly half of the bicycle priority corridors meeting their intended LTS. Sidewalk completion at the intended width is 25%, more than half of the network in commercial/mixed-use Performance Management Areas has some type of pedestrian facility, leaving 23% of arterial corridors with sidewalk gaps. Approximately 16% of the potential number of mid-block crossings have been completed. Approximately 7% of FTN bus stops have all passenger amenity components complete.

Transit speed between the commercial/mixed-use Performance Management Areas identified in the MMLOS Report varies depending on location, but generally the transit speed is within the 10-14mph range, with only two of the 16 Performance Management Area pairs meeting the Performance Targets established in the 2017 MMLOS Report.

For the vehicle mode, the results in Table 1 show that all MMAs are meeting their intersection v/c Performance Targets (which are based on the existing concurrency standard). 94% of vehicle priority corridors are operating at 0.90 or higher relative to the Typical Urban Corridor Travel Speed Performance Metric.

Table 7. Transportation System Performance Metrics – Existing Conditions Summary				
		Meeting Performance Target	Not Meeting Performance Target	
		Fully Complete	Partially Complete	Network Gap
Pedestrian	Sidewalk Completion	25%	52%	23%
	Crossing Frequency	13%	N/A	84%
Bicycle	Corridor LTS Completion	53%	23%	24%
Transit	Passenger Amenities	7%	55%	38%
	Transit Speed Between Activity Centers (Number of Activity Center Pairs)	Faster than 14mph	10-14mph	Slower than 10mph
		2	10	4
Vehicle	Intersection V/C (Number of MMAs)	Average V/C in MMA Meets Existing Concurrency Standard	Average V/C in MMA Does Not Meet Existing Concurrency Standard	
		13	0	
	Corridor Travel Speed (Number of Miles)	No Performance Targets Defined for Corridor Travel Speed		
		Faster than 0.9 times Typical Urban Travel Speed	Between 0.9 and 0.75 times Typical Urban Travel Speed	Slower than 0.75 times Typical Urban Travel Speed
	94%	3%	3%	

Source: City of Bellevue, 2021; Fehr & Peers, 2021.

NEXT STEPS

To further guide discussion and, ultimately, to support a recommendation on the Performance Targets and Performance Management Areas, staff and the consultant will present the findings of a 2030 analysis using the current Transportation Facilities Plan project list to see how the performance of all the modes are expected to change given the forecast land use and transportation network. This look at future conditions will help the Commission understand how much progress toward meeting the Performance Targets can be expected in the coming years. For the transit speed, intersection v/c ratio, and corridor travel speed, the results will provide an indication about how the performance of these metrics could change with growth. All this information will be important to setting Performance Targets, refining how corridor travel speed is calculated, and potential refinements to Performance Management Areas.

Please feel free to contact me prior to the July 8 meeting if you have questions about the Mobility Implementation Plan scope of work or the performance metrics, targets and management areas.

APPENDIX

Table A-1. Weekday Corridor Speed and Travel Time (4-6PM) – Preliminary Results						
			Northbound/Eastbound		Southbound/Westbound	
Corridor	From	To	Speed (mph)	Travel Time (minutes)	Speed (mph)	Travel Time (minutes)
Bellevue Way	SR 520	NE 12th St	32	3	33	3
Bellevue Way	NE 12th St	Main St	15	3	9	5
Bellevue Way	Main St	112th Ave SE	27	3	22	3
Bellevue Way	112th Ave SE	I-90	28	2	33	2
108th Ave NE	NE 12th St	Main St	10	5	10	5
112th Ave NE	Northup Way	NE 12th St	25	2	25	2
112th Ave NE	NE 12th St	Main St	13	3	13	3
112th Ave SE	Main St	Bellevue Way	21	5	20	5
116th Ave NE	Northup Way	NE 12th St	25	2	24	2
116th Ave NE	NE 12th St	Main St	16	3	17	3
116th Ave NE/Lake Hills Connector	Main St	Richards Road	22	6	21	7
124th Ave NE	SR 520	NE 8th St	19	2	15	2
Richards Road	Lake Hills Connector	I-90	27	3	22	4
Factoria Blvd	I-90	Coal Creek Pkwy	16	4	14	4
Coal Creek Pkwy	I-405	Forest Drive SE	21	3	24	3
Coal Creek Pkwy	Forest Drive SE	Newcastle	34	2	22	4
140th Ave NE	Redmond	NE 24th St	22	7	31	5
140th Ave NE	NE 24th St	Bel-Red Rd	15	2	16	2
140th Ave NE	Bel-Red Rd	NE 8th St	21	1	8	3
140th Ave NE/145th Pl SE	NE 8th St	SE 24th St	24	5	20	6
148th Ave NE	Redmond	SR 520	19	14	25	11
148th Ave	SR 520	SE 8th St	24	10	19	12
148th Ave SE	SE 8th St	Eastgate Way	23	7	16	10
150th Ave SE	Eastgate Way	Newport Way	21	3	11	5
West Lake Sammamish Pkwy	Redmond	Northup Way	22	3	18	4
West Lake Sammamish Pkwy	Northup Way	SE 34th St	21	3	18	3
West Lake Sammamish Pkwy	SE 34th St	I-90	25	4	33	3

Table A-1. Weekday Corridor Speed and Travel Time (4-6PM) – Preliminary Results						
			Northbound/Eastbound		Southbound/Westbound	
Corridor	From	To	Speed (mph)	Travel Time (minutes)	Speed (mph)	Travel Time (minutes)
Lakemont Blvd	164th Ave SE	Newcastle	35	5	34	5
Northrup Way	Bellevue Way	124th Ave NE	26	4	23	4
NE 20th St	124th Ave NE	156th Ave NE	22	5	20	6
Northrup Way	156th Ave NE	West Lake Sammamish Pkwy	29	4	29	4
NE 24th St	140th Ave NE	148th Ave NE	26	1	24	1
NE 24th St	Bel-Red Rd	156th Ave NE	10	0	9	1
NE 24th St	156th Ave NE	164th Ave NE	22	1	19	2
NE 12th St	Bellevue Way	116th Ave NE	22	2	21	2
Bel-Red Rd	116th Ave NE	148th Ave NE	22	7	22	7
Bel-Red Rd	148th Ave NE	164th Ave NE	16	2	23	2
Bel-Red Rd	164th Ave NE	Redmond	18	9	29	6
NE 8th St	Medina	100th Ave NE	23	2	24	2
NE 8th St	100th Ave NE	I-405	15	3	15	3
NE 8th St	I-405	124th Ave NE	20	2	18	2
NE 8th St	124th Ave NE	148th Ave NE	29	3	27	3
NE 8th St	148th Ave NE	164th Ave NE	24	2	24	3
NE 8th St	164 Ave NE	Northrup Way	25	2	25	2
NE 4th St	Bellevue Way	116th Ave NE	11	4	11	4
Main St	Bellevue Way	116th Ave NE	16	3	19	2
SE 8th St	112th Ave SE	Lake Hills Connector	19	2	16	3
Lake Hills Connector/ SE 8th St	Richards Road	148th Ave SE	29	5	26	5
Eastgate Way	Richards Road	150th Ave SE	19	4	21	4
Eastgate Way	150th Ave SE	161st Ave SE	17	2	20	2
SE 36th St	Factoria Blvd	150th Ave SE	22	4	18	5
Newport Way	Factoria Blvd	150th Ave SE	23	4	25	4
Newport Way	150th Ave SE	Lakemont Blvd	34	4	36	4