City of Bellevue

Transportation Commission Study Session

DATE: July 15, 2021

TO: Chair Marciante and Members of the Transportation Commission

FROM: Kevin McDonald, Principal Transportation Planner, 425-452-4558 kmcdonald@bellevuewa.gov

SUBJECT: Mobility Implementation Plan: Vehicle Performance Targets and Performance Management Areas; Updated Performance Targets for Other Modes

DIRECTION REQUESTED

	Action
X	**Discussion/Direction**
X	**Information**

Based on the Transportation Commission's direction at the July 8 study session, staff and the consultant team will present revised maps and tables summarizing the existing conditions 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 – EXISTING CONDITIONS EVALUATION

Multimodal Level-of-Service Performance

Using the recommendations from the 2017 MMLOS Metrics, Standards, and Guidelines Report, the 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 quantified.

Pedestrian Facility Performance Metrics

As directed by the Transportation Commission at the July 8 study session, the pedestrian facility performance data summaries have been refined to focus more on facility gaps rather than the quality of existing facilities. The review has also been expanded to include all arterials citywide. **Table 1** summarizes the data into three categories: sidewalk complete on both sides of the

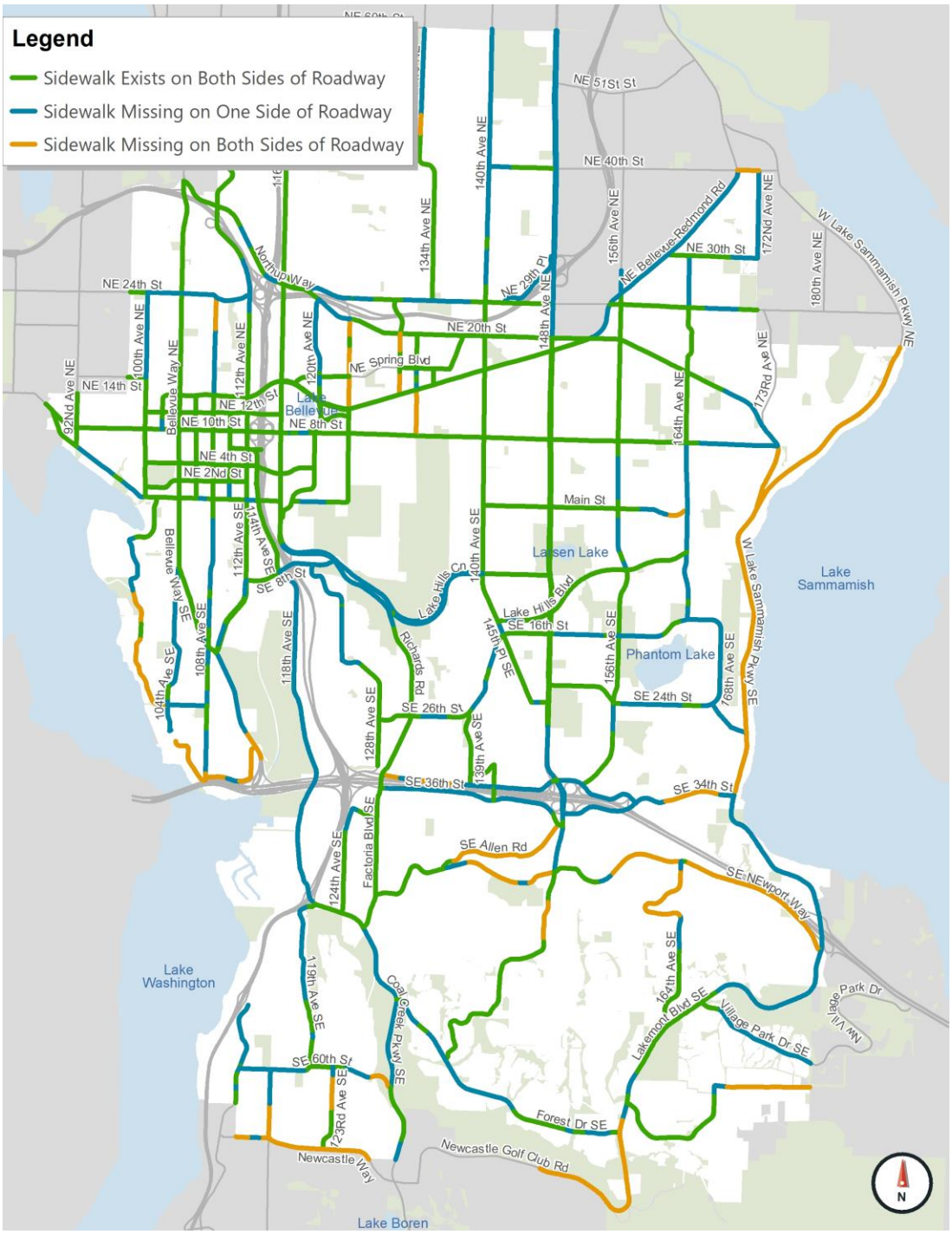
street, complete on one side of the street, or missing from both sides of the street. This reflects the Transportation Commission's discussion that filling gaps where sidewalks are missing on both sides of the street should be the highest priority for city investment.

Citywide, approximately 52% of arterial corridors have sidewalks on both sides of the street, 32% on one side of the street and 16% lack sidewalks on both sides. As shown in **Figure 1**, sidewalk gaps are most prevalent along arterials in the residential areas of the City, particularly in the residential areas of the Eastgate neighborhood, along West Lake Sammamish Parkway, and portions of Enatai and Newport Hills. Within the commercial/mixed-use Performance Management Areas, sidewalks are generally present on at least one side of the arterial, with some gaps in BelRed and Eastgate. These areas (BelRed and Eastgate), along with Wilburton, also have planned new streets, sidewalks, and pedestrian connections that will be built as the area develops. These will be taken into account as development implements these facilities.

Table 1. Pedestrian Network Performance

Sidewalk System Completion			
		Miles	**Proportion**
Sidewalks on Both Sides of the Street		81	52%
Sidewalks on One Side of the Street		51	32%
Sidewalk Gaps		26	16%
Total Sidewalk Distance		**158**	**100%**
Proportion of Sidewalk System Completion by Performance Management Area			
	Sidewalks on Both Sides	**Sidewalks on One Side**	**Sidewalk Gaps**
1. Downtown	96%	4%	0%
2. BelRed	78%	14%	8%
3. Wilburton/East Main	57%	43%	0%
4. Crossroads	100%	0%	0%
5. Eastgate	29%	62%	8%
6. Factoria	68%	30%	2%
7. Residential	43%	35%	21%

Figure 1.
Pedestrian Network Performance



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

Bicycle Facility Performance Metrics

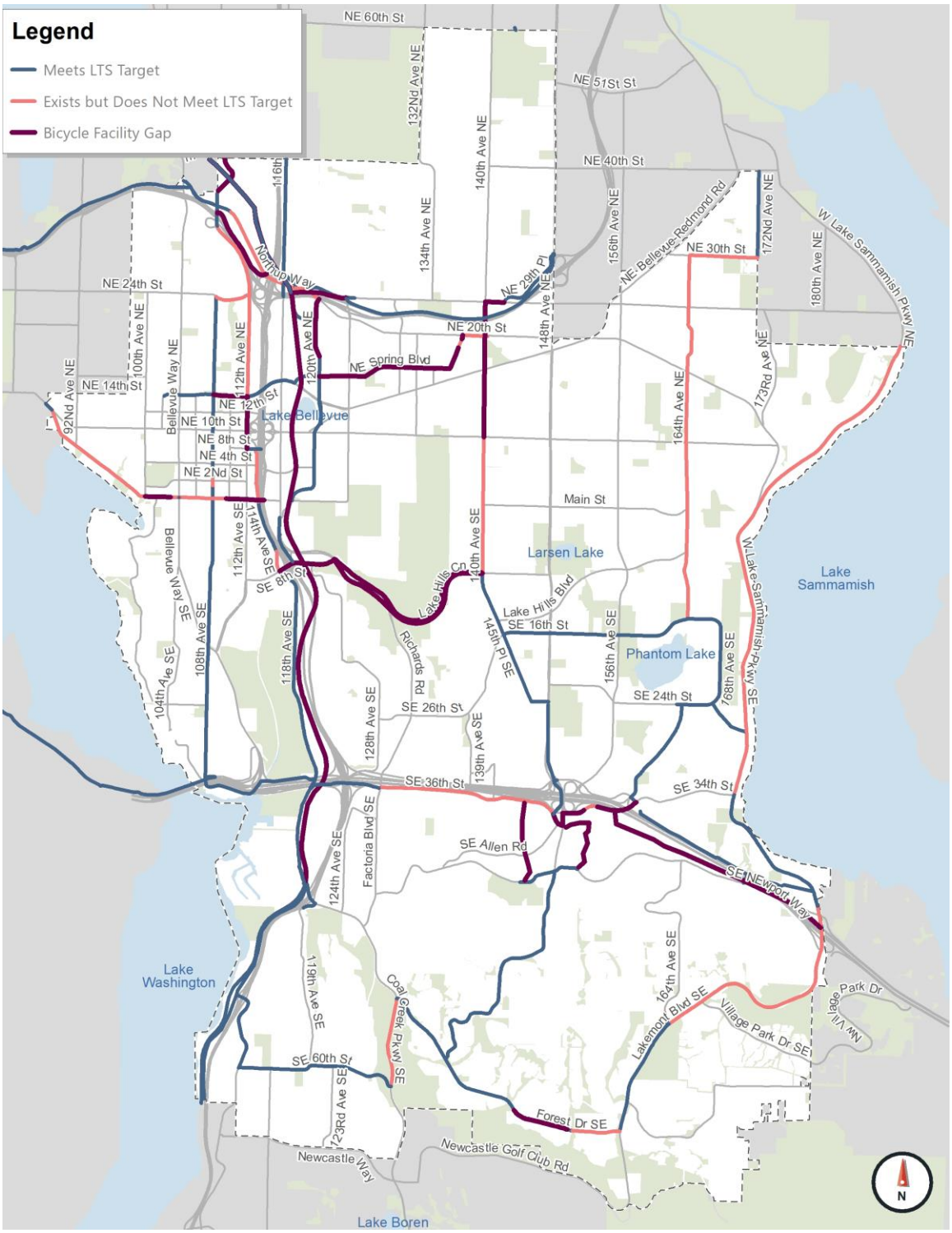
The Commission requested a bicycle facility level-of-traffic-stress (LTS) summary for the Priority Bicycle Corridors identified in the MMLOS Metrics, Standards & Guidelines Report and the Pedestrian and Bicycle Transportation Plan in addition to the Citywide analysis presented on July 8. **Figure 2** summarizes bicycle LTS for those corridors alongside **Figure 3** which shows bicycle LTS for the full bicycle network. The figure displays the performance of each bicycle network corridor with respect to the LTS: a bicycle facility meeting the intended LTS, a bicycle facility that does not meet the intended LTS, or a gap in bicycle facilities. The results are summarized by Priority Bicycle Corridor in **Table 2**.

Table 2. Priority Bicycle Corridor Facility Performance - Existing

Priority Bicycle Corridor	Miles	Facilities That Meet LTS	Existing Facilities That Do Not Meet LTS	Facility Gaps
Enatai-Northtowne	4	91%	9%	0%
Lake Washington Loop	8	68%	23%	9%
Eastrail	8	32%	0%	68%
Somerset-Redmond	9	62%	13%	25%
Spiritridge-Sammamish	6	43%	57%	0%
West Lake Sammamish Parkway	5	23%	77%	0%
520 Trail	4	77%	23%	0%
Downtown-Overlake	3	33%	0%	67%
Lake-to-Lake	7	49%	22%	29%
Mountains to Sound Greenway	6	30%	23%	47%
Coal Creek-Cougar Mountain	7	55%	38%	7%
Total	**67**	55%	26%	19%

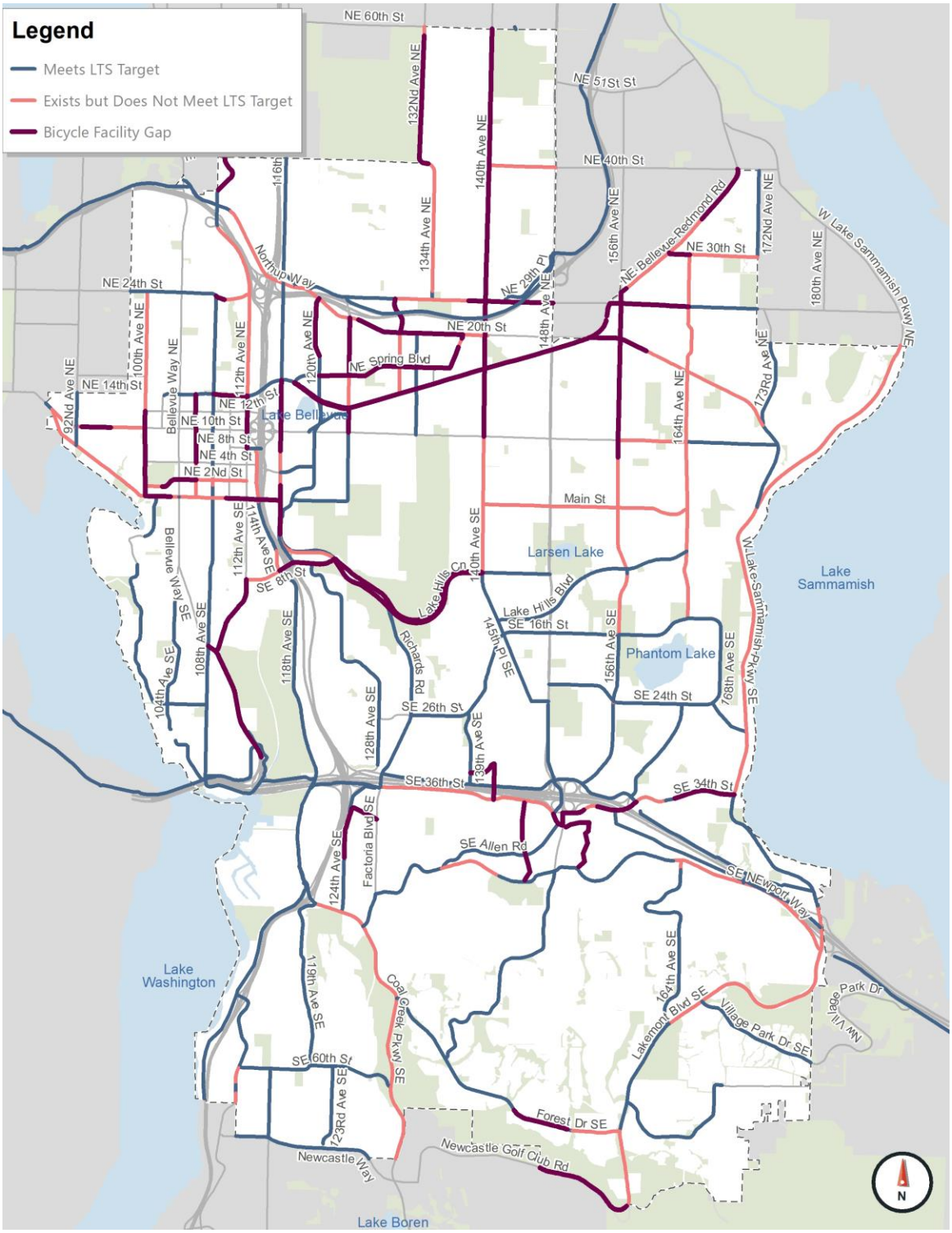
Slightly more than half of the planned bicycle network corridors meet their intended LTS, 26% of corridors have bicycle facilities that do not meet their intended LTS, and 19% of corridors lack bicycle facilities.

Figure 2. Existing Bicycle Facility LTS Performance on Priority Bicycle Corridors



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

Figure 3. Existing Bicycle Facility LTS Performance on Full Bicycle Network



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

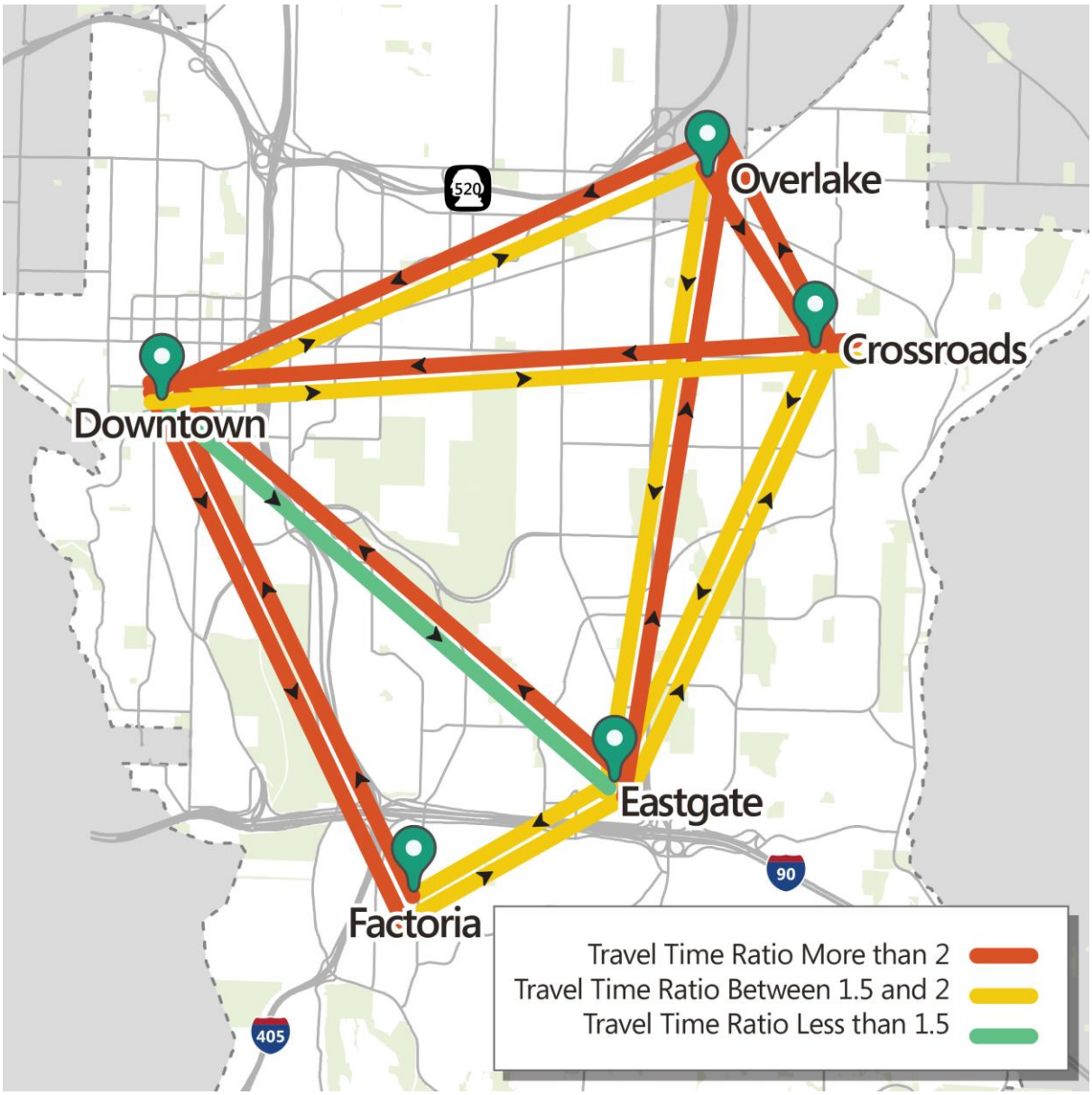
Transit Facilities Performance Metrics

At the July 8 study session, the Transportation Commission requested that the transit travel speed data be shown as a travel time ratio comparing transit travel times to auto travel times. This comparison speaks to how competitive transit is to local travelers as they choose what mode to take. The Transportation Research Board's Transit Capacity and Quality of Service Manual (TCQSM), 3rd Edition provides guidelines for how the transit-auto travel time ratio aligns with the passenger's travel time expectations. For the purposes of this evaluation, the following breakpoints are used, with qualitative descriptions from the TCQSM:

- Travel time ratio of less than 1.5: Comparable or tolerable for choice transit riders
- Travel time ratio of 1.5 to 2.0: Transit trip taking up to twice as long by transit as by auto; typical for mixed traffic operations in congested downtown areas
- Travel time ratio of more than 2.0: Unattractive option for all riders

The ratios were calculated by dividing the transit travel times between each Commercial/Mixed-Use Performance Management Area pair to the associated auto travel times collected by vehicle priority corridor. The results are summarized in **Figure 4**.

Figure 4. Existing Transit Travel Time Ratio Between Select Commercial/Mixed-Use Performance Management Areas



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

Vehicle Facility Performance Metrics

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.

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:[2]

- 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

In the agenda memo prepared for the July 8 Transportation Commission meeting, the corridor travel speed was analyzed over the entire 4-6PM peak period, which is consistent with how the intersection volume/capacity ratio is evaluated. However, the Transportation Commission noted, and staff agreed, that the results, while accurate, may not represent people's perception of how the system is operating. Therefore, for this memo, staff and the consultant team evaluated 5-6PM peak hour data. Per the Transportation Commission's request, the corridors evaluated have also been updated to include all arterial streets with more than 10,000 average daily vehicle trips. Some of the new corridors include Kamber Road, 156th Avenue SE (south of

[1] The 40% threshold equates to LOS D in Chapter 18 of the Highway Capacity Manual, a typical level of weekday afternoon traffic congestion levels in suburban settings.

[2] The MMLOS Report identified two additional categories, a threshold that was faster than 1.1 times typical urban travel speed and slower than 0.5 times typical urban travel speed. For the purposes of simplifying the maps and aligning Performance Targets with the Performance Management Areas, a simplified version of the MMLOS thresholds is presented in this memo.

NE 8th Street), and West Lake Sammamish Parkway. These new results are presented in **Figure 5**. Notable results along some of Bellevue's busier streets are shown in **Table 3**.

Table 3. Existing Corridor Travel Speed – Preliminary Results

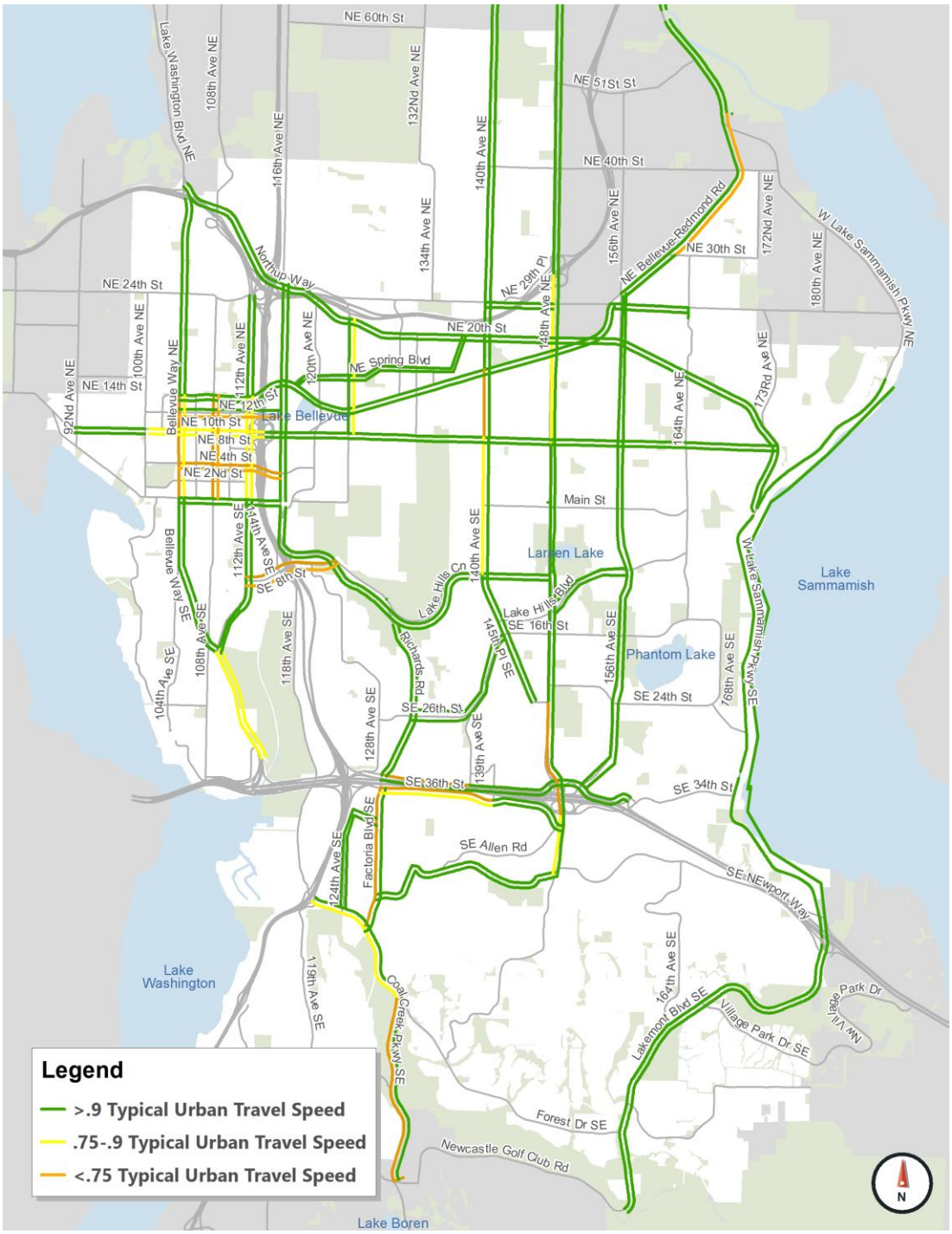
Corridor	From	To	Speed Limit	5-6PM Peak Hour Speed	5-6PM Peak Hour Travel Time
Bellevue Way (SB)	NE 12th St	Main St	30 mph	5 mph	9 min.
Bellevue Way (SB)	Main St	112th Ave SE	30 mph	11 mph	7 min.
Bel-Red Rd (EB)	116th Ave NE	124th Ave NE	35 mph	14 mph	5 min.
NE 8th St (EB)	I-405	124th Ave NE	30 mph	13 mph	3 min.
148th Ave SE (SB)	SE 24th St	SE 37th St	35 mph	6 mph	9 min.
Factoria Blvd (SB)	I-90	Coal Creek Pkwy	35 mph	11 mph	6 min.
Coal Creek Pkwy (SB)	I-405	Forest Dr	35 mph	11 mph	6 min.

Source: Fehr & Peers, 2021, Wejo data, October 2019.

The results in Figure 5 and Table 3 show some expected corridor speed results. Notably, several southbound arterials are showing areas of slower travel (Bellevue Way, Factoria Boulevard, Coal Creek Parkway, 148th Ave SE) as well as many downtown streets and the east-west arterials in the commercial area of Eastgate.

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

Figure 5. Corridor Travel Speed Performance – Existing



Note: Wejo data are preliminary and may be further refined.

Source: Fehr & Peers, 2021.

SUMMARY

Table 7 summarizes the current performance of the system relative to the revised Performance Targets discussed at the July 8 Transportation Commission study session. 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.

Based on the results in **Table 7**, the there are gaps in the facilities for the pedestrian, bicycle, and transit modes. The transit travel time ratios are in the green range for one of the activity center pairs with eight pairs having transit travel times that are more than twice the vehicle travel speeds, a threshold identified as being frustrating for transit riders by transit researchers at the Transportation Research Board.

For the vehicle mode, under 2019 conditions, all MMAs are meeting their intersection v/c Performance Targets (which are based on the existing concurrency standard). The corridor travel speed metrics are showing congestion on a handful of corridors in the City, particularly those corridors in some of the commercial/mixed-use areas of the city and those major corridors that connect the commercial areas of the city to major regional highways.

Table 7. Transportation System Performance Metrics – Existing Conditions Summary

Mode		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	Citywide Corridor LTS Completion	53%	23%	24%
Transit	Passenger Amenities	7%	55%	38%
	Transit Travel Time Ratio Between Activity Centers (Number of Activity Center Pairs)	**Less than 1.5**	**1.5 to 2.0**	**Greater than 2.0**
		1	8	8
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	**No Performance Targets Defined for Corridor Travel Speed**		

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 have summarized the findings of a 2030 analysis using the current Transportation Facilities Plan project list to see how the performance of the pedestrian, bicycle, and transit modes are expected to change given planned projects on the Transportation Facilities Plan transportation network (see Agenda Memo 7c). Additionally, the analysis considers the impact of other regional investments, such as the completion of East Link and King County Metro's planned RapidRide implementation.

Staff and the consultant team also considered using the 2030 Transportation Facilities Plan analysis for the vehicle mode; however, the city just received new land use targets from King County that are not accounted for in the 2030 traffic forecasts. Therefore, staff and the consultant team will be preparing a new set of traffic forecasts with these updated land use targets and the latest TFP projects to assess how the vehicle Performance Metrics are expected to change in the future.

Ultimately, 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 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.

APPENDIX

Corridor	From	To	NB/EB 5-6 PM Corridor Speed (mph)	NB/EB 5-6 PM Corridor Travel Time (mins)	SB/WB 5-6 PM Corridor Speed (mph)	SB/WB 5-6 PM Corridor Travel Time (mins)
Bellevue Way	SR 520	NE 12th St	23	4	26	3
Bellevue Way	NE 12th St	Main St	10	4	5	9
Bellevue Way	Main St	112th Ave SE	21	3	11	7
Bellevue Way	112th Ave SE	I-90	14	4	13	4
108th Ave NE	NE 12th St	Main St	7	6	6	8
112th Ave NE	Northup Way	NE 12th St	23	2	21	2
112th Ave NE	NE 12th St	Main St	10	4	9	5
112th Ave SE	Main St	Bellevue Way	31	2	14	4
116th Ave NE	Northup Way	NE 12th St	19	2	20	2
116th Ave NE	NE 12th St	Main St	14	4	12	5
116th Ave NE/Lake Hills Connector	Main St	Richards Road	23	3	23	3
124th Ave NE	SR 520	NE 8th St	11	5	11	4
124th Ave SE/SE 38th St	Factoria Blvd	Coal Creek Pkwy	16	4	13	5
Richards Road	Lake Hills Connector	I-90	22	4	14	6
Factoria Blvd	I-90	Coal Creek Pkwy	13	5	10	6
Coal Creek Pkwy	I-405	Forest Drive SE	17	4	11	6
Coal Creek Pkwy	Forest Drive SE	Newcastle	27	3	9	9
Lake Washington Blvd	I-405	Renton	21	3	23	3
140th Ave NE	Redmond	NE 24th St	15	10	27	6
140th Ave NE	NE 24th St	Bel-Red Rd	13	2	11	3
140th Ave NE	Bel-Red Rd	NE 8th St	17	2	5	6

Corridor	From	To	NB/EB 5-6 PM Corridor Speed (mph)	NB/EB 5-6 PM Corridor Travel Time (mins)	SB/WB 5-6 PM Corridor Speed (mph)	SB/WB 5-6 PM Corridor Travel Time (mins)
140th Ave	NE 8th St	SE 8th St	20	3	9	7
140th Ave NE/145th Pl SE	SE 8th St	SE 24th St	18	3	17	4
148th Ave NE	Redmond	SR 520	22	6	35	4
148th Ave	SR 520	NE 8th St	32	2	11	7
148th Ave	NE 8th St	SE 8th St	18	7	18	7
148th Ave SE	SE 8th St	SE 24th St	36	2	26	2
148th Ave SE	SE 24th St	SE 37th St	25	2	6	9
150th Ave SE	SE 37th St	Newport Way	13	2	10	3
156th Ave NE	Bel-Red Rd	NE 8th St	15	4	12	5
156th Ave	NE 8th St	Lake Hills Blvd	18	3	12	5
156th Ave SE	Lake Hills Blvd	Eastgate Way	16	6	17	6
West Lake Sammamish Pkwy	Redmond	Northup Way	28	3	30	3
West Lake Sammamish Pkwy	Northup Way	SE 34th St	28	5	9	14
West Lake Sammamish Pkwy	SE 34th St	I-90 (SE Newport Way)	14	6	18	5
Lakemont Blvd	I-90	164th Ave SE	25	4	16	6
Lakemont Blvd	164th Ave SE	Newcastle	27	3	24	4
Northup Way	Bellevue Way	124th Ave NE	16	6	15	7
NE 20th St	124th Ave NE	140th Ave NE	15	4	20	3
NE 20th St	140th Ave NE	156th Ave NE	14	4	15	4
Northup Way	156th Ave NE	West Lake Sammamish Pkwy	24	5	21	5
NE 24th St	140th Ave NE	148th Ave NE	15	2	14	2

Corridor	From	To	NB/EB 5-6 PM Corridor Speed (mph)	NB/EB 5-6 PM Corridor Travel Time (mins)	SB/WB 5-6 PM Corridor Speed (mph)	SB/WB 5-6 PM Corridor Travel Time (mins)
NE 24th St	Bel-Red Rd	164th Ave NE	17	2	17	2
NE Spring Boulevard	NE 12th St	NE 20th St	2	20	4	11
NE 12th St	Bellevue Way	116th Ave NE	15	3	16	3
NE 12th St	116th Ave NE	124th Ave NE	14	5	14	5
Bel-Red Rd	124th Ave NE	148th Ave NE	14	7	18	5
Bel-Red Rd	148th Ave NE	164th Ave NE	16	4	14	5
Bel-Red Rd	164th Ave NE	Redmond	8	16	17	7
NE 10th St	Bellevue Way	116th Ave NE	8	6	11	4
NE 8th St	Medina	100th Ave NE	20	2	20	2
NE 8th St	100th Ave NE	I-405	9	6	9	6
NE 8th St	I-405	124th Ave NE	13	3	17	2
NE 8th St	124th Ave NE	148th Ave NE	20	4	24	4
NE 8th St	148th Ave NE	164th Ave NE	19	3	18	3
NE 8th St	164 Ave NE	Northup Way	22	2	21	2
NE 4th St	Bellevue Way	116th Ave NE	5	9	5	9
Main St	Bellevue Way	116th Ave NE	14	3	12	4
SE 8th St	112th Ave SE	Lake Hills Connector	10	4	10	4
Lake Hills Connector/SE 8th St	Richards Road	148th Ave SE	33	3	39	2
Lake Hills Blvd	148th Ave SE	156th Ave SE	17	2	16	3
SE 26th St/Kamber Rd	Richards Road	140th Ave SE	23	3	20	3
Eastgate Way	Richards Road	139th Ave SE	19	2	3	15
Eastgate Way	139th Ave SE	150th Ave SE	13	3	19	2

Corridor	From	To	NB/EB 5-6 PM Corridor Speed (mph)	NB/EB 5-6 PM Corridor Travel Time (mins)	SB/WB 5-6 PM Corridor Speed (mph)	SB/WB 5-6 PM Corridor Travel Time (mins)
Eastgate Way	150th Ave SE	161st Ave SE	14	3	12	3
SE 36th St	Factoria Blvd	142nd Ave SE	11	5	8	6
SE 36th St	142nd Ave SE	150th Ave SE	13	3	18	2
Newport Way	Factoria Blvd	SE Allen Rd	17	2	17	2
Newport Way	SE Allen Rd	150th Ave SE	24	2	21	2