Section 3.10

Transportation

Sections of text related to freight and transit were reordered from the Draft EIS in response to comments.

This chapter presents a multimodal transportation evaluation of the potential impacts of implementing the range of land use alternatives under consideration. The chapter presents existing transportation conditions within the study area and future transportation conditions under ~~four~~ five alternatives: Alternative 1 No Action representing a continuation of the City's adopted land use plan in the study area~~, and~~ three Draft EIS Action Alternatives reflecting varying increases in the amount of growth accommodated by 2044 as a result of the proposal, and the Preferred Alternative as part of this Final EIS. Significant transportation impacts and potential mitigation strategies are identified for the Action Alternatives based on the policies and recommendations established in local plans.

Thresholds of significance utilized in this impact analysis include:

- Lengthy travel times on key corridors designated as major truck streets.
- Peak hour volumes on key corridors that cannot be accommodated by roadway capacity.
- Mode shares in conflict with City goals.
- Transit demand on key corridors that cannot be accommodated by planned service.
- Increases in pedestrian and bicycle demand in locations with network gaps or preclusion of planned pedestrian and bicycle improvements.
- Substantive increases in parking demand in excess of parking supply.
- Increases in serious and fatal crash rates in the study area.

More specific thresholds are described in **Section 3.10.2**.

3.10.1 Affected Environment

This section presents existing transportation conditions within the study area for all modes as well as the methodologies used to quantitatively evaluate the current performance of the transportation network. This includes evaluations of autos, freight, transit, people walking and biking, parking, and safety.

Primary & Secondary Study Areas

The study area includes the areas designated as Manufacturing/Industrial Centers (MICs) by the Puget Sound Regional Council (PSRC) as well as some nearby areas with similar uses. The study area is mapped in **Exhibit 3.10-1**. The Ballard Interbay Northend MIC (BINMIC) includes the secondary subareas of Ballard, Interbay Dravus, and Interbay Smith Cove. The Greater Duwamish MIC includes the secondary subareas of SODO/Stadium and Georgetown/South Park.

The locations of the MICs are unique in their transportation context and serve uses that could not be replaced elsewhere. In particular, the Duwamish MIC, adjacent to Elliott Bay's naturally deep harbor, is anchored by a marine container and breakbulk facilities and three major rail yards for the transfer of freight between rail, truck, and ship. These are essential facilities of the MIC transportation system and are critical to maintaining industrial activity and the local and regional economy and supply chain.

Exhibit 3.10-1 Study Area, 2021

Sources: Fehr & Peers, 2021.

Data & Methods

A variety of data were collected and compiled to assess transportation conditions in the study area. This section describes the data and methods used to evaluate key transportation metrics.

Travel Time

Travel time along major arterials (that are also part of the City's designated major truck street network) was selected as a performance measure because it is easily relatable and addresses the fundamental concern of most travelers—the time it takes to move within and through the study area. This metric is relevant for autos, freight, and transit that travel along these corridors. To assess existing conditions, PM peak hour travel times were analyzed using October 2019 data; this time period represents conditions before the COVID-19 pandemic as well as before the West Seattle Bridge was closed for emergency repairs. Based on the data collected, 4:45-5:45 PM was found to be the peak hour of the PM period. Data for the month of October 2019 was obtained from Wejo, which supplies raw data collected from connected vehicle data. For all observed trips during the PM peak hour, the total travel time and distance traveled along each study corridor was summed, and then a 25th percentile speed was calculated for the entire corridor.

EIS Analysis Years

This EIS considers two distinct time periods for analysis: 2019 as the baseline of existing conditions and 2044 as a horizon year at which the outcomes of the alternatives are compared. A variety of events have occurred over the past two years that have disrupted transportation patterns in the study area. These include global events like the COVID-19 pandemic which has changed longstanding commute patterns and created supply chain bottlenecks at West Coast ports including the Port of Seattle. Locally, the closure of the West Seattle Bridge has fundamentally changed travel patterns through the study area. For this reason, 2019 was selected as a more representative year for baseline travel conditions. While these factors are profoundly affecting the transportation system as of the publication of this EIS, it is assumed that they will be resolved in the next several years and therefore not meaningfully affect operations by the horizon year of 2044.

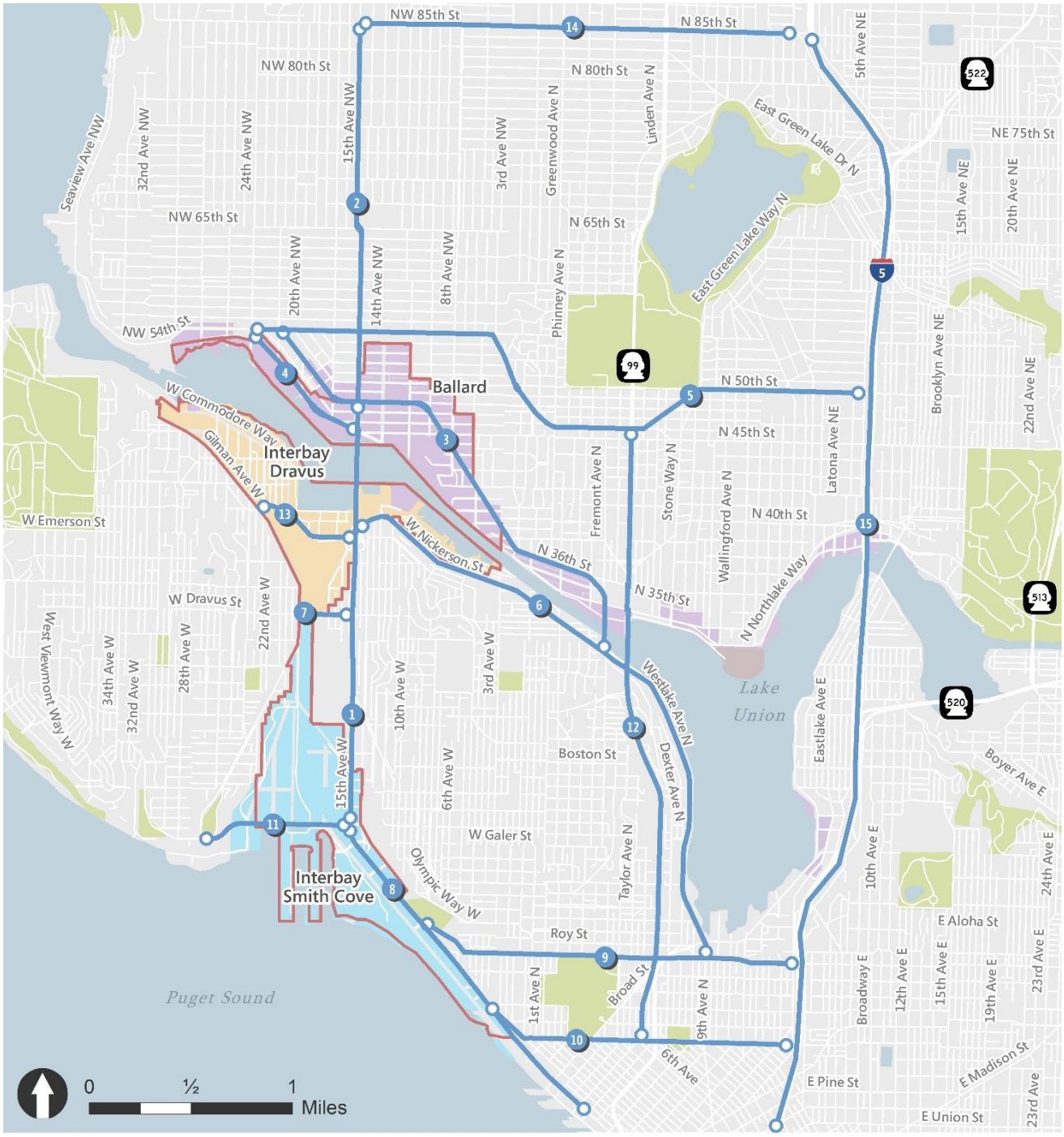
To provide context for the results, the concept of level of service (LOS) is used to describe traffic operations by assigning a letter grade of A through F, where A represents free-flow conditions, B represents free-flow conditions with some restrictions in lane changes, C is near free-flow conditions with a heavier flow, D is an unstable flow with minor queuing, E represents unstable flow with potentially extended queuing, and F represents highly congested conditions. This study uses concepts from the 6th Edition of the Highway Capacity Manual (HCM) to define thresholds for each LOS grade, as shown in **Exhibit 3.10-2**. The ranges shown in the table below represent the ratio between observed travel time and free-flow travel time (i.e., at the speed limit). For example, if you are traveling at half the free-flow speed, your travel time will be twice that of the free-flow travel time, which equates to the breakpoint between LOS C and LOS D. The travel time study corridors are shown in **Exhibit 3.10-3** and **Exhibit 3.10-4**.

Exhibit 3.10-2 LOS Thresholds for Travel Speeds and Travel Time

	LOS A	LOS B	LOS C	LOS D	LOS E	LOS F
Threshold for Ratio of PM Peak Hour Travel Time to Travel Time at Free-Flow Speed	<1.25	<1.5	<2.0	<2.5	<3.0	≥3.0

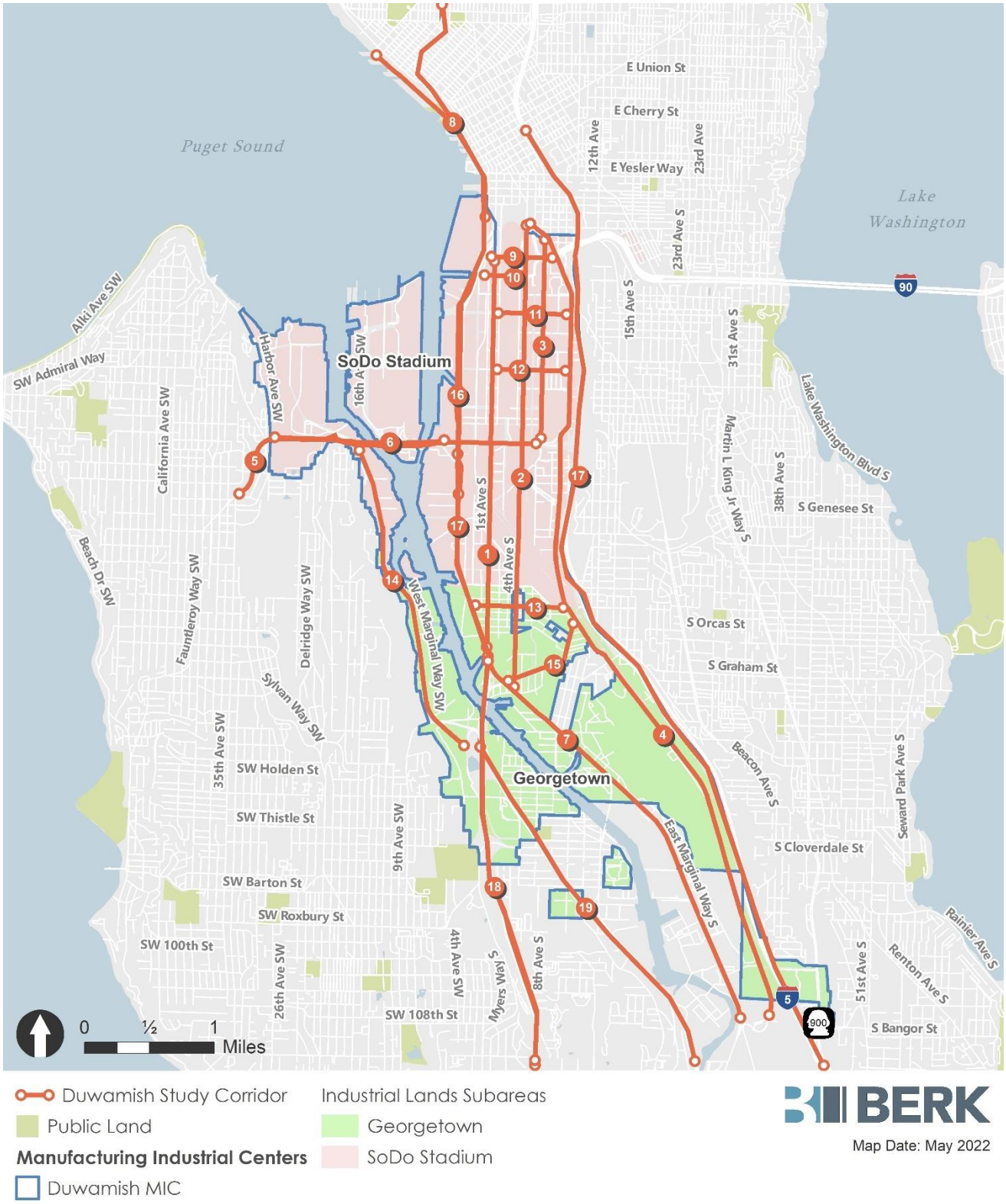
Source: Highway Capacity Manual, 6th Edition, 2016.

Exhibit 3.10-3 Study Corridors—Ballard Interbay Northend MIC, 2021



Sources: Fehr & Peers, 2021.

Exhibit 3.10-4 Study Corridors—Greater Duwamish MIC, 2021



Note: Map was updated to add two additional study corridors (18 and 19).
Sources: Fehr & Peers, 2021.

Mode Share

The *Seattle 2035* Comprehensive Plan uses the concept of mode share to evaluate Seattle's transportation network. Mode share is analyzed at a sector level rather than citywide; the analysis geographies are shown in **Exhibit 3.10-5**. For this EIS, mode share and single occupant vehicle (SOV) trips are evaluated for trips originating from or destined to the Northwest Seattle, Magnolia/Queen Anne, and Duwamish sectors during the PM peak period. All trip types are included in the analysis, and the existing mode share estimates are from the PSRC's most recently available Soundcast activity-based model which has a base year of 2014. Data from the PSRC 2017-2019 Household Survey sample was also reviewed but were found to have too small of a sample size at the sector level to estimate mode share. Mode share is used as one of the impact identification criteria as described in **Section 3.10.2**.

Screenlines

Prior to shifting to the mode share method, the City used a "screenline" methodology to evaluate transportation LOS for locally-owned arterials. Screenlines were used to evaluate autos, freight, and transit since buses usually travel in the same traffic stream as autos. A screenline is an imaginary line across which the number of passing vehicles (including passenger cars, trucks, or buses) is counted, often including multiple corridors. As stated in *Seattle 2035*, this methodology recognizes that no single intersection or arterial operates in isolation and motorists choose among multiple routes to minimize travel times, among other factors. This analytic methodology focuses on a "traffic-shed" where the screenlines measure groups of arterials among which drivers logically can choose to travel.

The City set an LOS threshold in the form of a volume-to-capacity (v/c) ratio: the number of vehicles crossing the screenline compared to the designated capacity of the roadways crossing the screenline. This method is also used to evaluate the magnitude of vehicles using the City's roadway network; this EIS focuses on the 11 screenlines most relevant to the study area. **Exhibit 3.10-5** and **Exhibit 3.10-6** summarize the location of each screenline, as well as its LOS threshold. Screenlines are used as one of the impact identification criteria as described in **Section 3.10.2**.

Exhibit 3.10-5 Mode Share Sectors and Screenlines

Sources: City of Seattle, 2020; Fehr & Peers, 2021.

Exhibit 3.10-6 LOS Thresholds for Screenlines

Screenline	Location	Volume-to-Capacity Threshold
2	Magnolia	1.0
3.11	Duwamish River—West Seattle Bridge and Spokane Street	1.2
3.12	Duwamish River—1st Avenue S and 16th Avenue S	1.2
4.13	South City Limit—SR 99 to Airport Way S	1.0
5.11	Ship Canal—Ballard Bridge	1.2
5.12	Ship Canal—Fremont Bridge	1.2
5.13	Ship Canal—Aurora Bridge	1.2
7.11	West of Aurora Avenue—Fremont Place N to N 65th Street	1.0
8	South of Lake Union	1.2
9.12	South of Spokane Street—E Marginal Way to Airport Way S	1.0
10.11	South of S Jackson Street—Alaskan Way S to 4th Avenue S	1.0

Source: *Seattle 2035* Comprehensive Plan Transportation Appendix, 2020.

Transit Load Factor

In addition to considering the roadway conditions on which buses operates, this EIS also includes a metric to evaluate whether there is sufficient transit capacity to accommodate demand. Specifically, King County Metro guidelines are used to measure bus passenger loads on transit routes through the study areas. The King County Metro Strategic Plan Service Guidelines define overcrowded routes as trips with average maximum loads greater than the thresholds for the entire service change period, and routes with standing loads (the amount of time passengers on the bus exceed the number of seats) greater than 20 minutes.

For this EIS, overcrowding is identified when the average maximum load of a bus trip exceeds the passenger load threshold. It is calculated by dividing the average maximum number of passengers on a particular route by the number of seats on the bus plus the number of standing people that can fit on the bus, assuming a standing person uses 4 square feet of floor space. In other words, the calculation represents the average maximum load factor over the PM peak period at the highest ridership location along the route. For this study, transit load factor is calculated for all transit routes that cross five screenlines:

- A: East of 8th Avenue NW (NW Market Street to Leary Way NW)
- B: Ballard Bridge
- C: Elliott Avenue W north of W Mercer Place
- D: North of S Lander Street (SR 99 to Airport Way S)
- E: West Seattle Bridge

This report also summarizes light rail passenger load information from the Sound Transit 2020 Service Implementation Plan (reflecting ridership from the 2018-2019 pre-pandemic time period).

Current Policy & Regulatory Frameworks

Relevant policies related to transportation in Seattle are summarized below. The City of Seattle has a 10-year strategic plan outlined in Move Seattle (2015). Seattle also has master plans for transit, freight, pedestrians, and bicycles. More detailed information is available in the specified documents.

Seattle Transportation Plan

The City has adopted citywide modal plans for pedestrian, bicycle, transit, and freight travel. SDOT will soon be embarking on a process to create a unified, multimodal Seattle Transportation Plan that will integrate the City's modal network visions into a single, holistic transportation plan.

Move Seattle

Move Seattle is a strategic document published in 2015 that guides SDOT's work over the following ten years with an updated workplan published in 2018. The plan identifies the following three key elements:

- Organizing daily work around core values: a safe, interconnected, vibrant, affordable, and innovative city.
- Integrating modal plans to deliver transformational projects: this includes creating a near-term strategy to integrate recommendations from the freight, transit, walking, and bicycling 20-year modal plans.
- Prioritizing projects and work to identify funding: in 2015, voters approved a nine-year $930 million Levy to Move Seattle. This funding source replaces the prior Bridging the Gap levy which expired in 2015. SDOT is using the levy funds to implement projects including safety improvements, new facilities, as well as maintenance of existing infrastructure.

SDOT provides annual reports summarizing accomplishments and delivery plans for the coming year.

Freight Master Plan

The *Freight Master Plan* (FMP) was adopted by the City in 2016. Its purpose is to ensure efficient and predictable goods movement in the region to promote economic activity and international trade. It analyzes the current freight facilities and their ability to accommodate future freight growth and overlays the truck street system with other modal systems with the goal of facilitating better understanding of the potential for modal conflicts. The plan identifies six main goals with a total of 92 actions that address economy, safety, mobility, state of good repair, equity, and the environment in order to create a comprehensive freight network. These include a list of freight supportive projects within the two MICs on corridors connecting the MICs to the freeway system and corridors connecting the MICs. ~~This document is especially~~

~~important for the two designated manufacturing and industrial centers, the BINMIC and Greater Duwamish MIC, and the Port of Seattle.~~

Transit Master Plan

The *Transit Master Plan (TMP)* is a 20-year plan that outlines the needs to meet Seattle's transit demand through 2030. It prioritizes capital investment to create frequent transit services that meet the needs of residents and workers. It outlines the high priority transit corridors and the preferred modes along each corridor. This document specifies capital projects to improve speed and reliability. Goals include:

- Meet sustainability, growth management and economic development goals.
- Make it easier and more desirable to take transit.
- Respond to needs of transit-reliant populations.
- Create great places where modes connect.
- Advance implementation within constraints.

The elements of the document include policies and programs, transit corridors and service, access and connections to transit, and funding and performance monitoring.

Pedestrian Master Plan

The *Pedestrian Master Plan* (PMP) envisions Seattle as the most walkable and accessible city in the nation. To achieve that vision, the following goals are identified:

- Reduce the number and severity of crashes involving pedestrians;
- Develop a connected pedestrian environment that sustains healthy communities and supports a vibrant economy;
- Make Seattle a more walkable city for all through public engagement, service delivery, accessibility, and capital investments that promote equity; and
- Get more people moving to improve health and increase mobility.

The plan documents existing pedestrian facilities and creates a Priority Investment Network to guide future improvements.

Bicycle Master Plan

The Seattle *Bicycle Master Plan* (BMP) provides guidance on future investments in bicycle facilities in Seattle, with a vision for bicycling as a safe and convenient mode for people of all ages and abilities on a daily basis. Goals include increasing bicycle ridership, safety, connectivity, equity, and livability. The document outlines the existing network and over 400 miles of planned future network for the city. Strategies for end-of-trip facilities, programs, maintenance, project prioritization and funding are included. SDOT publishes reports every two years to update the public on its progress toward implementing BMP projects and meeting the identified performance measures.

~~Freight Master Plan~~

~~The *Freight Master Plan* (FMP) was adopted by the City in 2016. Its purpose is to ensure efficient and predictable goods movement in the region to promote economic activity and international trade. It analyzes the current freight facilities and their ability to accommodate future freight growth. The plan identifies six main goals with a total of 92 actions that address economy, safety, mobility, state of good repair, equity, and the environment in order to create a comprehensive freight network. This document is especially important for the two designated manufacturing and industrial centers, the BINMIC and Greater Duwamish MIC, and the Port of Seattle.~~

Transportation Capital Improvement Program

For the 2021 to 2026 period, the Capital Improvement Program (CIP) plans to invest more than $1.5 billion on developing, maintaining, and operating Seattle's transportation system. The CIP aims to promote safe and efficient movement of people and goods and to enhance the quality of life, environments and economy within the city and surrounding areas. Funding has been designated for a subset of projects in all four of the adopted modal plans. Highlighted improvement projects include:

- Heavy Haul Network Program
- East Marginal Way, Phase I (separated bicycle/pedestrian facility between S Atlantic St and Spokane St) and Phase II (roadway reconstruction, signal, and ITS enhancements and safety measures to reduce conflicts between freight and non-motorized users)
- West Marginal Way Safe Street and Accessibility Improvements—rail crossing improvements, street crossing improvements, and sidewalk connections in the vicinity of West Marginal Way SW and SW Alaska St.
- Freight Spot Improvement Program—small scale mobility improvements to connections between port facilities, railroad intermodal yards, industrial businesses, the regional highway system, and supply chain first and last miles such as pavement repairs in industrial areas, turning radius adjustments, channelization changes, left-turn improvements, and signage.
- West Seattle Bridge Program—early work on the Reconnect West Seattle multimodal strategy, emergency repairs and bridge stabilization, bridge replacement options analysis and design, and Spokane Swing Bridge repairs and enhancements.
- Georgetown to South Park Trail—shared use path between Georgetown and South Park neighborhoods.
- New sidewalks, particularly near schools;
- School safety improvements;
- Pedestrian crossing improvements and stairway rehabilitation;
- Neighborhood greenways, bicycle lanes, and bicycle parking;
- Madison Street Bus Rapid Transit;
- RapidRide Roosevelt and Multimodal Corridor;
- South Lander Street Grade Separation Project (completed in 2020)—grade separation of S

Lander Street roadway and the BNSF railroad tracks between First Avenue S and Fourth Avenue S;

- Bridge rehabilitation and replacement; and
- Alaskan Way Main Corridor and Overlook Walk and East-West Connections Project.

Complete Streets

This 2006 policy directs SDOT to consider roadway designs that balance the needs of all roadway users, including pedestrians, bicyclists, transit riders and people of all abilities, as well as automobiles and freight. Design decisions are based on data, such as the adjacent land uses and anticipated future transportation needs. There is no set design template for complete streets as every situation requires a unique balance of design features within the available right-of-way. With respect to Major Truck Streets, the Complete Streets Ordinance (Section 3 of Ordinance No. 122386) states, "Because freight is important to the basic economy of the City and has unique right-of-way needs to support that role, freight will be the major priority on streets classified as Major Truck Streets. Complete Street improvements that are consistent with freight mobility but also support other modes may be considered on these streets." ~~However, the~~

SDOT has developed a Right-of-Way Improvements Manual, called Seattle Streets Illustrated, which helps property owners, developers, engineers, and architects who are involved in the design, permitting, and construction of local streets. Streets Illustrated sets standards for a variety of elements of the public right-of-way including sidewalks, landscaping, bicycle lanes, transit stop amenities, and vehicle lane widths.

Intelligent Transportation Systems (ITS) Strategic Plan

For the 2010-2020 period, the Intelligent Transportation Systems (ITS) Strategic Plan provides a 10-year approach for implementing ITS across Seattle. ITS employs electronic and communication technologies on the streets, as well as automated traffic systems, to enhance mobility for all modes by increasing the efficiency and safety of the transportation infrastructure. The goal of the strategic plan is to ensure the existing ITS infrastructure is maintained and preserved, maximize the value of the existing infrastructure, and expand ITS to provide additional geographic coverage and services to travelers.

PSRC Regional Centers Framework Update

PSRC adopted a Regional Centers Framework Update in 2018 to support the regional centers concept defined in VISION 2040 and the Regional Growth Strategy. The Regional Centers Framework Update includes a revised structure and criteria for defining regional and countywide centers and direction on policy and procedure updates. Of particular relevance to the study area, the Regional Centers Framework Update recognizes that MICs preserve lands for living-wage jobs which may offer higher than average wages, provide employment growth opportunities, act as a critical regional resource, support national and international trade, and

generate revenue for local governments. With respect to transportation, PSRC notes the unique characteristics of MICs and the critical nature of infrastructure to move freight and goods via trucks, rail, marine, and air modes to support manufacturing and industrial activity and regional economic objectives.

PSRC Plan Review Manual

The Plan Review Manual provides guidance on PSRC's plan review and plan certification program, with the most recent update completed in 2021 to align with VISION 2050. The manual assists jurisdictions in developing, updating, or amending center plans and identifies planning expectations for Regional Manufacturing/Industrial Center plans. The Plan Review Manual includes the following relevant expectations for policies and programs in MICs:

- Identify strategies to address deficiencies in the center's transportation network.
- Prioritize transportation projects that provide access to freight intermodal facilities to optimize freight movement for local, regional, and national distribution.
- Reduce commute impacts through Transportation Demand Management (TDM) strategies.
- Support an integrated multimodal transportation network, including freight, transit, pedestrian, and bicycle facilities and linkages to adjacent neighborhoods and districts.
- Identify strategies to achieve a mode split goal that advances a more sustainable mix of auto, transit, and non-motorized trips.

Current Conditions

This section describes current transportation conditions for all modes in the study area. Where applicable, more detail is provided at the subarea level.

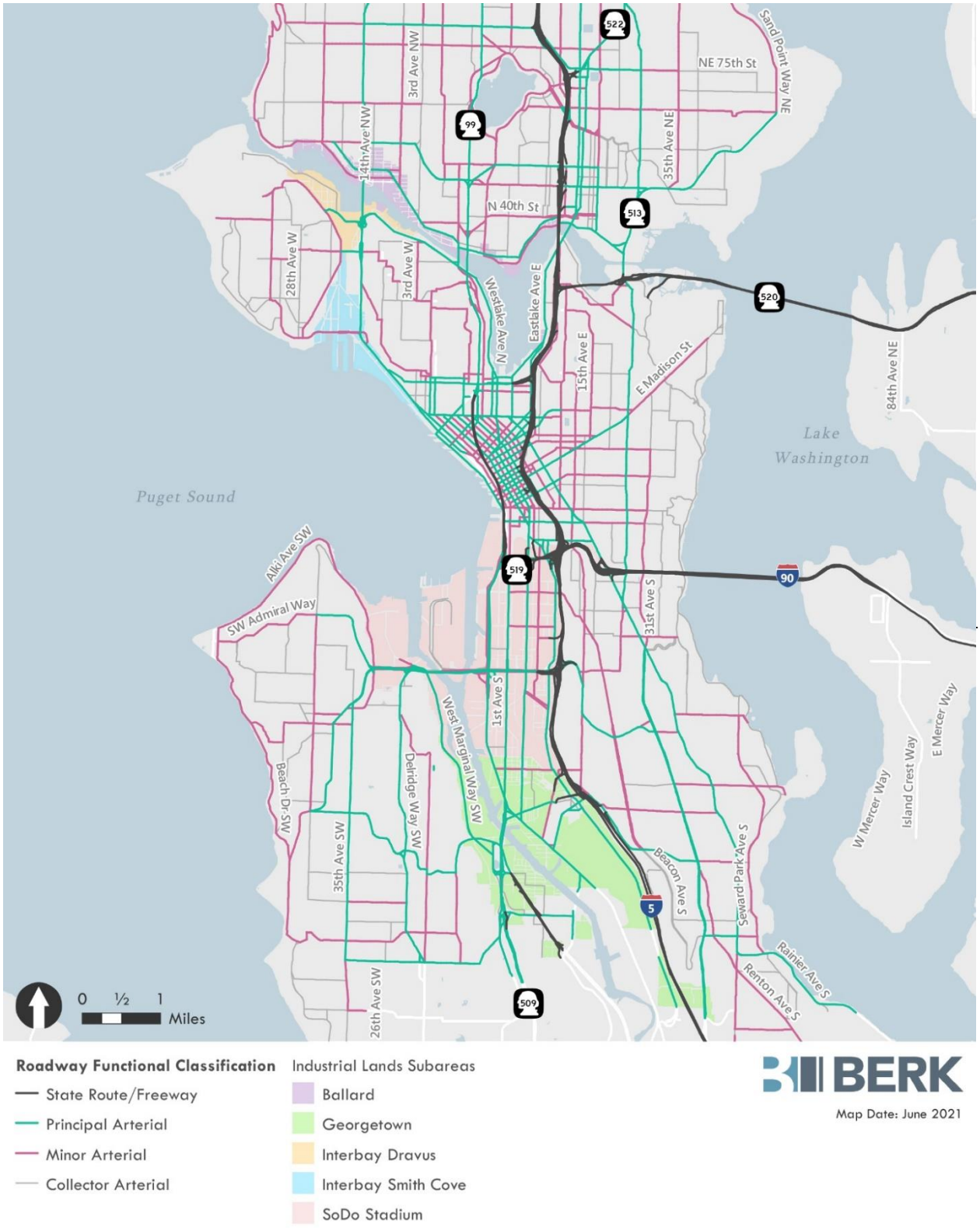
Roadway Users~~Auto & Freight~~

The City of Seattle is served by a dense roadway system of principal, minor, and collector arterials, as shown in **Exhibit 3.10-7**. Auto and freight travel also access several state highways—I-5, SR 99, and SR 509—which run north-south through the city. Bridges in the study area play a central role in facilitating travel across waterways and steep topography; these include the Ballard Bridge, Magnolia Bridge, West Seattle Bridge, 1st Avenue S Bridge, and South Park Bridge. In addition, rail grade separations act as both both structural constraints and connections across railways; these include locations in the Duwamish MIC including 1st Avenue South, 4th Avenue South, Airport Way, South Lander Street, and the Spokane Street Viaduct. The study area includes some of the most constrained areas of the city given the nature and location of water crossings and maritime and industrial land uses.

~~The City has designated a major truck street network throughout the city as shown in **Exhibit 3.10-13**. In the study area, the major truck street network includes most major arterials, including SR 99, SR 509, W Marginal Way SW, E Marginal Way S, 1st Avenue S, 4th Avenue S, Elliott Way, 15th Avenue W, and Leary Way.~~

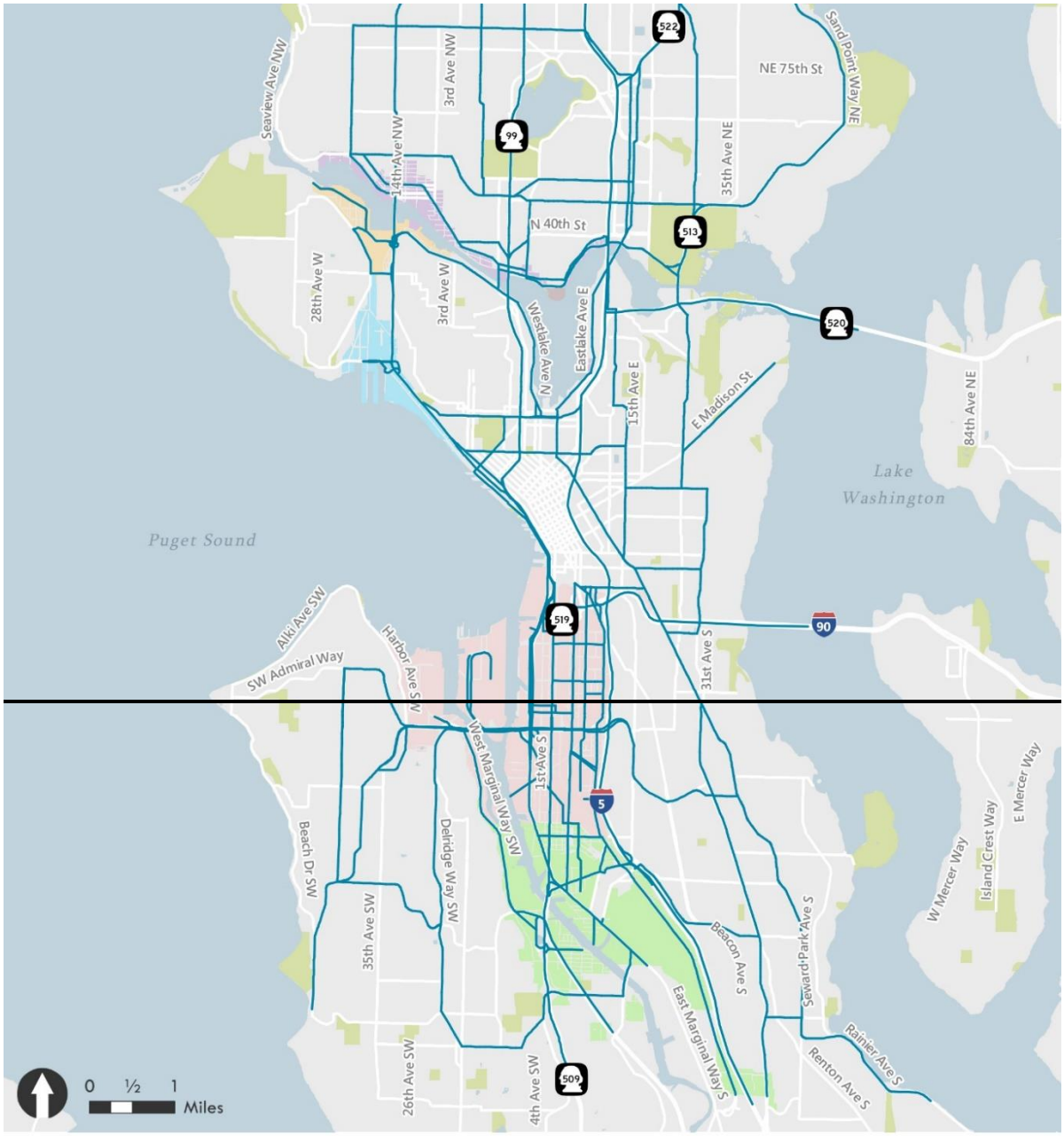
~~The Seattle Zero Emissions Freight Study included an evaluation of multiple data sources to understand freight activity throughout the city. The study found that roughly 2% of all vehicles in the Interbay area are freight vehicles while roughly 5% of vehicles in SODO are freight vehicles. In both areas, approximately one-quarter of freight vehicles are light-duty commercial vehicles and over one-half are medium-duty trucks. Most delivery VMT within the city is generated by medium-duty trucks. An analysis of freight activity within the Greater Duwamish MIC found that 50-70% of all medium- and heavy-duty truck trips in the Duwamish Valley are pass-through trips while 75-80% of medium- and heavy-duty truck trips in South Park—where SR 99, SR 509, and the South Park Bridge are located—are pass-through trips.~~

Exhibit 3.10-~~7~~12 Existing Roadway Network, 2021



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

~~Exhibit 3.10-13 Existing Freight Network, 2021~~



~~Source: City of Seattle, 2021; Fehr & Peers, 2021.~~

Travel Time

Using the HCM guidelines for defining LOS thresholds as described in the Data & Methods section, **Exhibit 3.10-8** summarizes the travel time conditions along each of the study corridors. The existing travel time was calculated using the 25th percentile speeds for PM peak hour (4:45-5:45pm) for each direction of the study corridors. In other words, the travel time estimates reflect a somewhat more congested condition than the average day. This analysis speaks to the relative congestion experienced by autos as well as freight, particularly as the study corridors were selected from the major street truck network. Traffic congestion is more difficult for freight to navigate and trucks typically travel at slower speeds than general auto traffic. However, much of the daily freight movement activity occurs in the midday when traffic congestion is less pronounced. Additional discussion related to freight mobility is provided in the subsequent section.

For facilities that have peak directional patterns, the AM peak hour is typically expected to have similar characteristics in the opposite direction than those shown for the PM peak hour. For example, 15th Avenue W shows longer travel times northbound in the PM peak hour so similar conditions are expected southbound during the AM peak hour. The travel times shown below are rounded to the nearest half minute.

Exhibit 3.10-~~8-14~~ Existing PM Peak Hour LOS

		PM Peak Hour LOS		Observed Travel Time (Minutes)	
ID	Corridor	N/E	S/W	N/E	S/W
Ballard Interbay Northend MIC					
1	15th Ave W from Magnolia Bridge to NW Leary Way	E	A	11.5	4.5
2	15th Ave NW from NW Leary Way to N 85th St	E	C	9.5	6.5
3	Leary Ave NW/ Leary Way NW/ N 36th S/ Fremont Bridge between NW Market St and W Nickerson St/Westlake Ave	C	C	11.0	12.0
4	Shilshole Ave NW between NW Market and 15th Ave NW	B	D	2.5	3.5
5	NW Market St/N 50th/ 46th St between 24th Ave NW and I-5	C	D	14.0	16.5
6	W Nickerson St/Westlake Ave N between 15th Ave W and Mercer St	C	C	13.0	11.5
7	W Dravus St between 15th Ave W and 20th Ave W	E	D	2.0	1.5
8	Elliott Ave W between Magnolia Bridge and Wall St	B	B	5.5	6.0
9	W Mercer St from Elliott Ave W to I-5	F	F	32.0	22.0
10	Denny Way from Elliott Ave W to I-5	F	E	14.5	11.0
11	Magnolia Bridge between 15th Ave W and Thorndyke Ave W	B	A	2.5	1.5
12	SR 99 between N 46th St and Denny Way[1]	C	E	8.5	14.0
13	W Emerson St between 15th Ave W and Gilman Ave W	F	F	6.0	4.0
14	N 85th St between 15th Ave NW and I-5	E	E	13.0	14.5

ID	Corridor	PM Peak Hour LOS		Observed Travel Time (Minutes)	
		N/E	S/W	N/E	S/W
15	I-5 between N 85th Street and Madison Street[1]	F	F	19.0	24.0
Greater Duwamish MIC					
1	1st Ave S between S Royal Brougham Way and SR 99	C	C	11.0	11.0
2	4th Ave S between Seattle Blvd S to E Marginal Way S	C	C	12.0	12.5
3	6th Ave S between Seattle Blvd S to Spokane St Viaduct	C	C	6.5	6.0
4	Airport Way S/ Seattle Blvd S between S Royal Brougham Way to S Boeing Access Rd	A	A	16.5	15.5
5	West Seattle Bridge/Spokane St Viaduct between 35th Ave SW and I-5	C	E	6.5	10.0
6	Spokane St Bridge between Harbor Ave SW and SR 99	B	B	4.5	4.5
7	E Marginal Way S between SR 99 and S Boeing Access Rd	C	D	8.5	10.5
8	Alaskan Way S from Broad St to SR 99	D	F	9.0	13.0
9	S Royal Brougham Way between SR 99 and Airport Way S	F	D	4.5	3.0
10	Edgar Martinez Dr S between SR 99 and 4th Ave	F	F	2.5	2.5
11	S Holgate St between 1st Ave and Airport Way S	D	F	3.0	4.5
12	S Lander St between 1st Ave and Airport Way S	E	E	4.0	4.0
13	S Lucile St between SR 99 and Airport Way S	D	E	4.0	5.0
14	W Marginal Way SW between West Seattle Bridge and 2nd Ave SW	A	A	5.0	4.5
15	S Michigan St/ Corson Ave S between E Marginal Way S and I-5	C	E	3.5	5.5
16	E Marginal Way S/SR 99 between S Atlantic Street and 1st Ave S Bridge	A	A	9.0	9.0
17	I-5 between Madison Street and SR 599[1]	E	F	25.5	30.0
18	SR 509 between SR 99 and SR 518[1]	A	C	6.0	9.0
19	SR 99/599 between SR 509 and I-5[2]	A	B	6.0	8.0

Note: 1. WSDOT sets a LOS D standard on I-5, SR 509, and SR 99 north of SR 509.
2. WSDOT sets a LOS E standard on SR 99/599 between SR 509 and I-5.
Source: Wejo, 2019; Fehr & Peers, 2021.

During the PM peak hour, most corridors operate at LOS E or better in both directions. Corridors operating at LOS F include:

- Both directions of W Mercer St from Elliott Avenue W to I-5
- Eastbound Denny Way from Elliott Avenue W to I-5
- Both directions of W Emerson St from Gilman Avenue W to 15th Avenue W
- Both directions of I-5 between N 85th Street and Madison Street
- Southbound Alaskan Way S from Broad St to SR 99
- Eastbound S Royal Brougham Way between SR 99 and Airport Way S

- Both directions of Edgar Martinez Dr S between SR 99 and 4th Avenue
- Westbound S Holgate St from Airport Way S to 1st Avenue
- Southbound I-5 from Madison Street to SR 599

Ballard

In the Ballard Subarea, principal arterials include 15th Avenue NW and Leary Way NW. These roadways, as well as Shilshole Avenue NW, carry high volumes of freight traffic in the area. Along 15th Avenue NW, the peak direction of travel during the PM peak hour is northbound with more balanced volumes on Leary Avenue NW and Shilshole Avenue NW. All study corridors in the Ballard Subarea operate at LOS E or better during typical conditions.

Interbay Dravus

The principal arterials and freight corridors in the Interbay Dravus Subarea include 15th Avenue W, W Dravus Street, W Emerson Street, and W Nickerson Street. All study corridors except W Emerson Street operate at LOS E or better in the Interbay Dravus study area during typical conditions.

Interbay Smith Cove

In the Interbay Smith Cove Subarea, the principal arterials and freight routes include 15th Avenue W, W Mercer Street, Denny Way, and Elliott Avenue W. The Magnolia Bridge is classified as a minor arterial as well as a freight route. Congestion stemming from the I-5 on-ramps affects travel times in the eastbound direction of both Denny Way and W Mercer St which operate at LOS F. Both routes typically have less congestion on the western ends closer to the study area, but congestion increases along the corridors as they near center city and I-5.

SODO/Stadium & Georgetown

In the SODO/Stadium Subarea, 1st Avenue S, 4th Avenue S, and E Marginal Way are primary arterials, and most other roadways are minor arterials. The West Seattle Bridge and the Spokane Street Bridge both span the Duwamish Waterway. The West Seattle Bridge has been closed since March 2020, resulting in major travel pattern changes and increased demand on alternate routes. However, the existing conditions discussed in this report focuses on the 2019 period, when operations were more "typical," both in terms of the available network and pre-pandemic travel demand.

Because of the predominantly industrial land uses, all arterials in the subarea are designated as freight routes. In particular, East Marginal Way S carries a high percentage of cargo trucks and provides access to multiple terminal entrances. Most corridors operate at LOS E or better during the PM peak hour, with the exception of the east/west corridors of S Holgate Street, S Royal Brougham Way, and Edgar Martinez Drive S.

Georgetown/South Park

In the Georgetown/South Park Subarea, all minor and principal arterials are designated freight corridors, including E Marginal Way S, 1st Avenue S, and S Michigan Street. Airport Way S is often used as a bypass of I-5 when the interstate is highly congested due to collisions or construction. As noted above, this area has been experiencing an increase in traffic volumes since March 2020 when the closure of the West Seattle Bridge caused motorists to seek alternate routes. Under typical 2019 conditions, almost all corridors operate at LOS E or better.

Mode Share

The existing SOV mode share in the City of Seattle is summarized by sector using the PSRC Soundcast model and is shown in **Exhibit 3.10-9**. Within the study area, the Duwamish sector has the highest share of PM peak period SOV trips at 53.5%. Magnolia/Queen Anne and Northwest Seattle have lower SOV percentages, as these sectors contain a larger mix of residential and commercial uses.

Exhibit 3.10-~~9~~ ~~15 Existing SOV Mode Share—PM Peak Period

Sector	Existing SOV Share
Duwamish	53.5%
Magnolia/Queen Anne	43.1%
Northwest	41.6%

Source: PSRC, 2021; Fehr & Peers, 2021.

Screenlines

The City's screenline thresholds are in the form of a volume-to-capacity (v/c) ratio: the number of vehicles crossing the screenline compared to the designated capacity of the roadways crossing the screenline. **Exhibit 3.10-10** summarizes the location of the study area screenlines, as well as their LOS threshold and current v/c ratio. All screenline locations are currently under the LOS threshold defined by the City of Seattle. A table showing the number of vehicles expected to cross each studied screenline during the PM peak hour in shown in **Appendix I**.

Exhibit 3.10-~~10~~ ~~16 Existing PM Peak Hour LOS

Screenline	Location	Volume-to-Capacity Threshold	2019 PM Peak Period v/c Ratio	
			N/E	S/W
2	Magnolia	1.0	0.51	0.54
3.11	Duwamish River—West Seattle Bridge and Spokane Street	1.2	0.57	0.53
3.12	Duwamish River—1st Avenue S and 16th Avenue S	1.2	0.54	0.51

Screenline	Location	Volume-to-Capacity Threshold	2019 PM Peak Period v/c Ratio	
			N/E	S/W
4.13	South City Limit—SR 99 to Airport Way S	1.0	0.40	0.45
5.11	Ship Canal—Ballard Bridge	1.2	1.01	0.75
5.12	Ship Canal—Fremont Bridge	1.2	0.59	0.66
5.13	Ship Canal—Aurora Bridge	1.2	0.30	0.34
7.11	West of Aurora Avenue—Fremont Place N to N 65th Street	1.0	0.54	0.62
8	South of Lake Union	1.2	0.62	0.69
9.12	South of Spokane Street—E Marginal Way to Airport Way S	1.0	0.47	0.48
10.11	South of S Jackson Street—Alaskan Way S to 4th Avenue S	1.0	0.58	0.66

Source: City of Seattle count data, 2019; Fehr & Peers, 2021.

Freight

This section addresses the freight network and its users. This includes descriptions of the roadway network, rail network, and intermodal yards that support the industrial uses throughout the MICs. Related issues such as truck parking and travel time reliability are also discussed. Note that safety is discussed in a separate section as it inherently relates to multiple modes and their potential conflicts.

Roadway Network

The City has designated a truck street network throughout the city as shown in **Exhibit 3.10-11** and **Exhibit 3.10-12**. In the study area, the major truck street network includes most major arterials, including SR 99, SR 509, W Marginal Way SW, E Marginal Way S, 1st Avenue S, 4th Avenue S, Elliott Way, 15th Avenue W, and Leary Way. Many of these streets are also designated as Over-legal Routes which are designated routes that may accommodate oversized and overweight trucks. The City requires permits to operate such vehicles on the designated over-legal routes.

Travel Patterns of Industrial Workers

While the most congested transit conditions occur during conventional AM and PM peak periods, some industrial land uses generate different temporal patterns. For example, some workers need to commute during off-peak periods for their shifts when transit options are more limited. Moreover, workers within the study area commute from a wide geographic area. As summarized in Exhibit 3.9-11 and mapped in Exhibit 3.9-13, roughly 40% of study area workers commute less than 10 miles; 37% commute 10-24 miles; 13% commute 25-50 miles; and 10% commute more than 50 miles. Therefore, the challenge in accessing transit service for some industrial workers may be the availability or convenience of the service.

In October 2015, the City of Seattle approved legislation that established a Heavy Haul network of city streets to allow heavier cargo containers to be transported between the Port of Seattle, industrial businesses, and rail yards with appropriate permits. The measure also provides a framework and funding to repair and build roadways within the network, calls for semi-annual safety inspections of heavy haul trucks, and aligns city weight regulations with those of the state and other municipalities across the country.

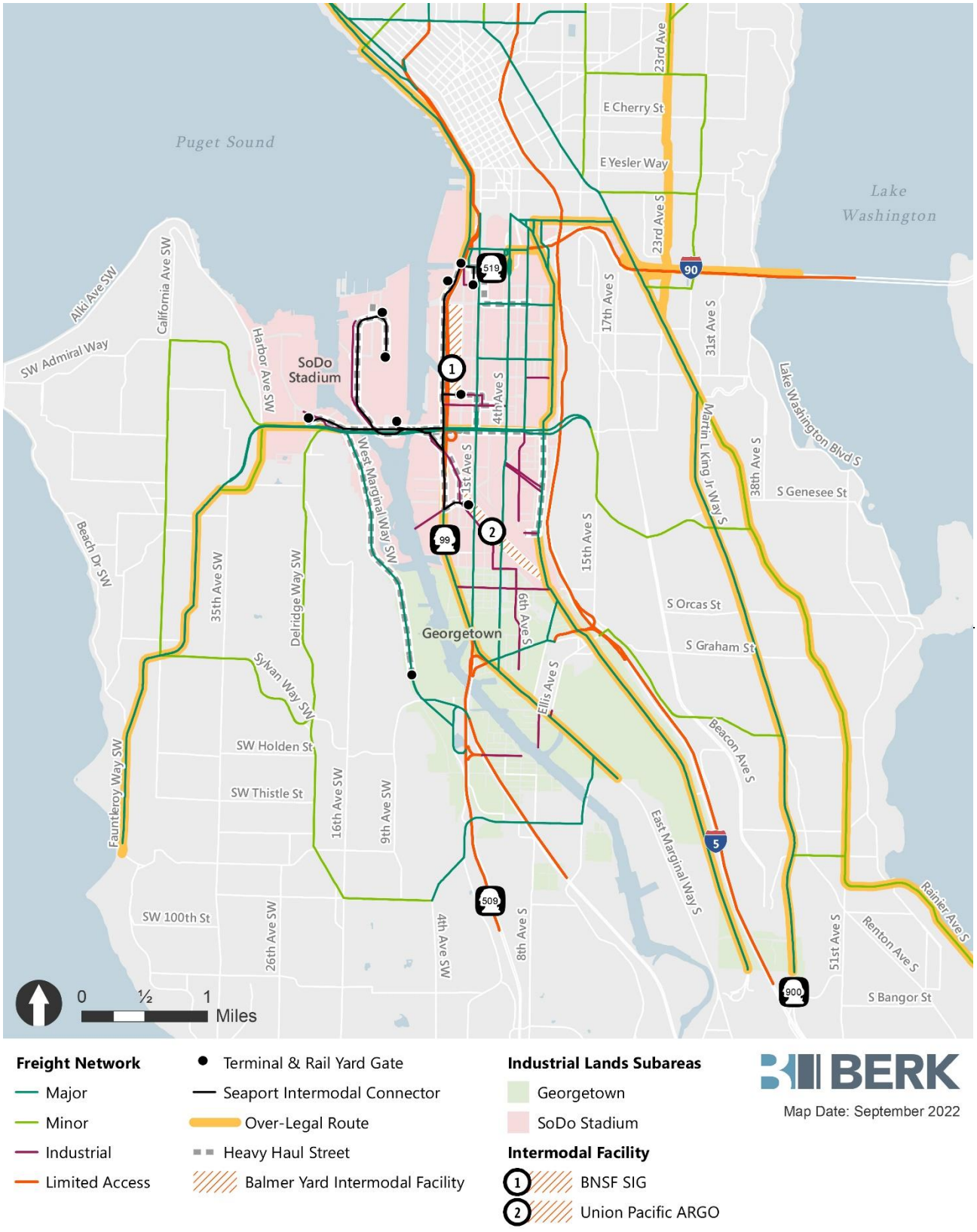
Exhibit 3.10-11 and **Exhibit 3.10-12** also show the locations of the three intermodal facilities serving the MICs: Balmer Yard in the BINMIC (operated by BNSF), Seattle International Gateway (SIG, also operated by BNSF) in the Duwamish MIC, and the Seattle ARGO Terminal (operated by Union Pacific) in the Duwamish MIC. At these facilities, freight is transferred between truck and railcar. As this area serves a seaport, freight is also transferred between ships and trucks and/or rail. Streets frequently used as seaport intermodal connectors in the Duwamish MIC are mapped in **Exhibit 3.10-12**. These routes provide access between Port terminals and railroad intermodal facilities.

Truck activity tends to be highest during the morning and midday and avoid the afternoon peak which is the most congested period of the day, as described in the Data and Methods section. To provide a conservative impact analysis, the most congested hour (4:45-5:45pm) is used for analysis of total vehicle volumes (passenger vehicles, trucks, and buses) and travel times.

Exhibit 3.10-11 Existing Roadway Freight Network—Ballard Interbay Northend MIC, 2021

Source: City of Seattle, 2022; Fehr & Peers, 2022.

Exhibit 3.10-12 Existing Roadway Freight Network—Greater Duwamish MIC, 2021



Source: City of Seattle, 2022; Fehr & Peers, 2022.

Traffic Congestion and Reliability

The travel time analysis presented in the previous section speaks to the relative congestion experienced by freight during the PM peak hour which is the most congested time period of the day. However, much of the daily freight movement activity occurs in the midday when overall traffic congestion is less pronounced. While the travel time analysis indicates the general congestion levels of the study corridors, it should be noted that traffic congestion is more difficult for freight to navigate and trucks typically travel at slower speeds than general auto traffic.

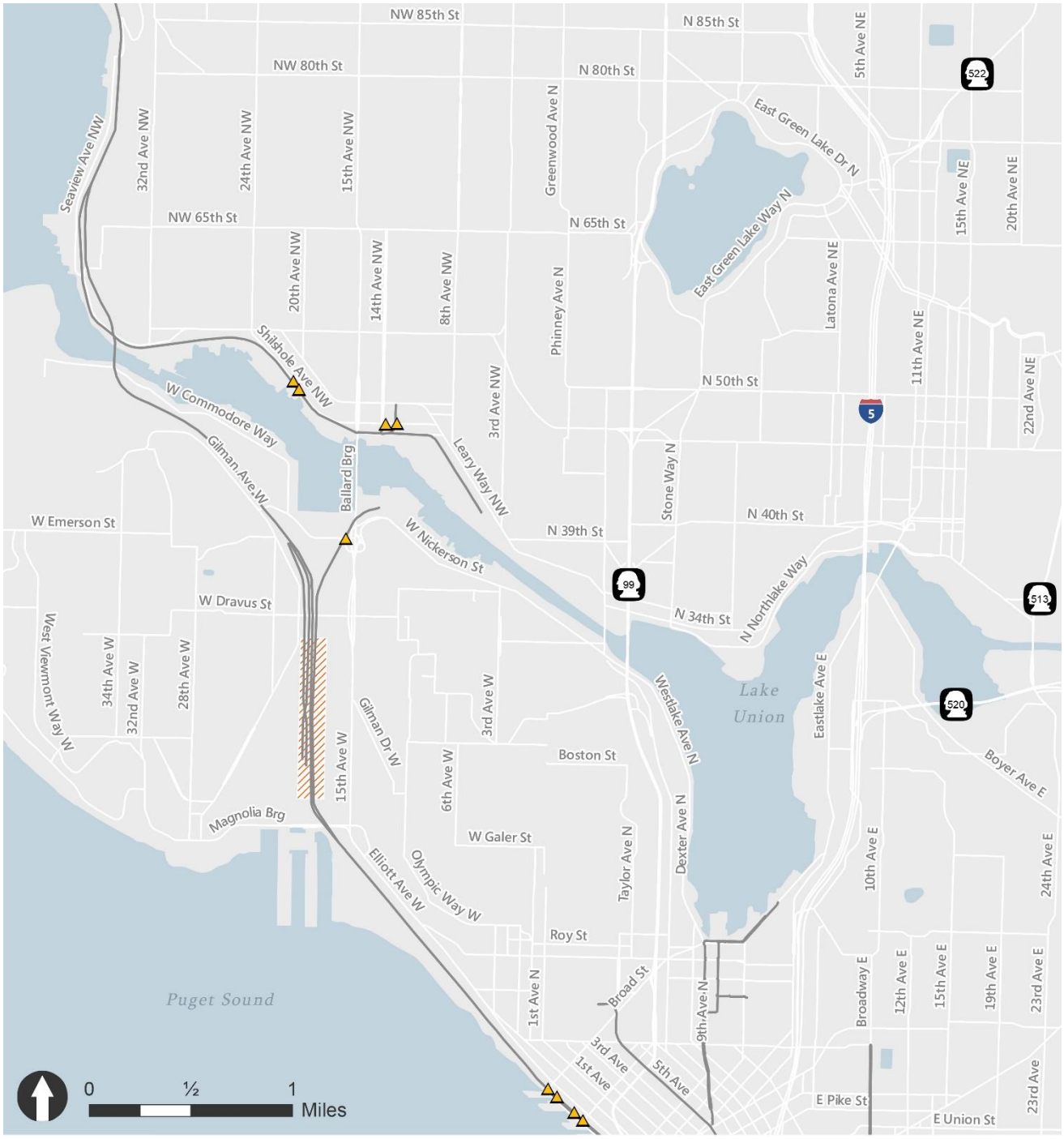
Freight corridors that experience substantial congestion are also more likely to have poor travel time reliability, a key concern for freight operators. Traffic congestion leads to worse reliability on the roadway network as the system is less resilient to recover from disruptions such as blocking incidents; moreover, freight operators have a more difficult time maneuvering in traffic congestion.

Rail Network

Rail is also a critical mode for freight movement within the MICs, as shown in **Exhibit 3.10-13** and **Exhibit 3.10-14**. There are two Class 1 railroads in Seattle: BNSF and the Union Pacific Railroad (UP). The BNSF mainline extends north-south through Seattle and operates in a doubled-tracked tunnel through downtown, serving Balmer Yard in the BINMIC and SIG in the Duwamish MIC. The UP mainline only operates south of downtown Seattle and parallels the BNSF network, serving the Seattle ARGO Terminal. The MICs also include a variety of local rail spurs that provide direct rail service to businesses as well as on-dock rail at Port of Seattle terminals. Lastly, Sound Transit's light rail system has several at-grade crossings in the study area.

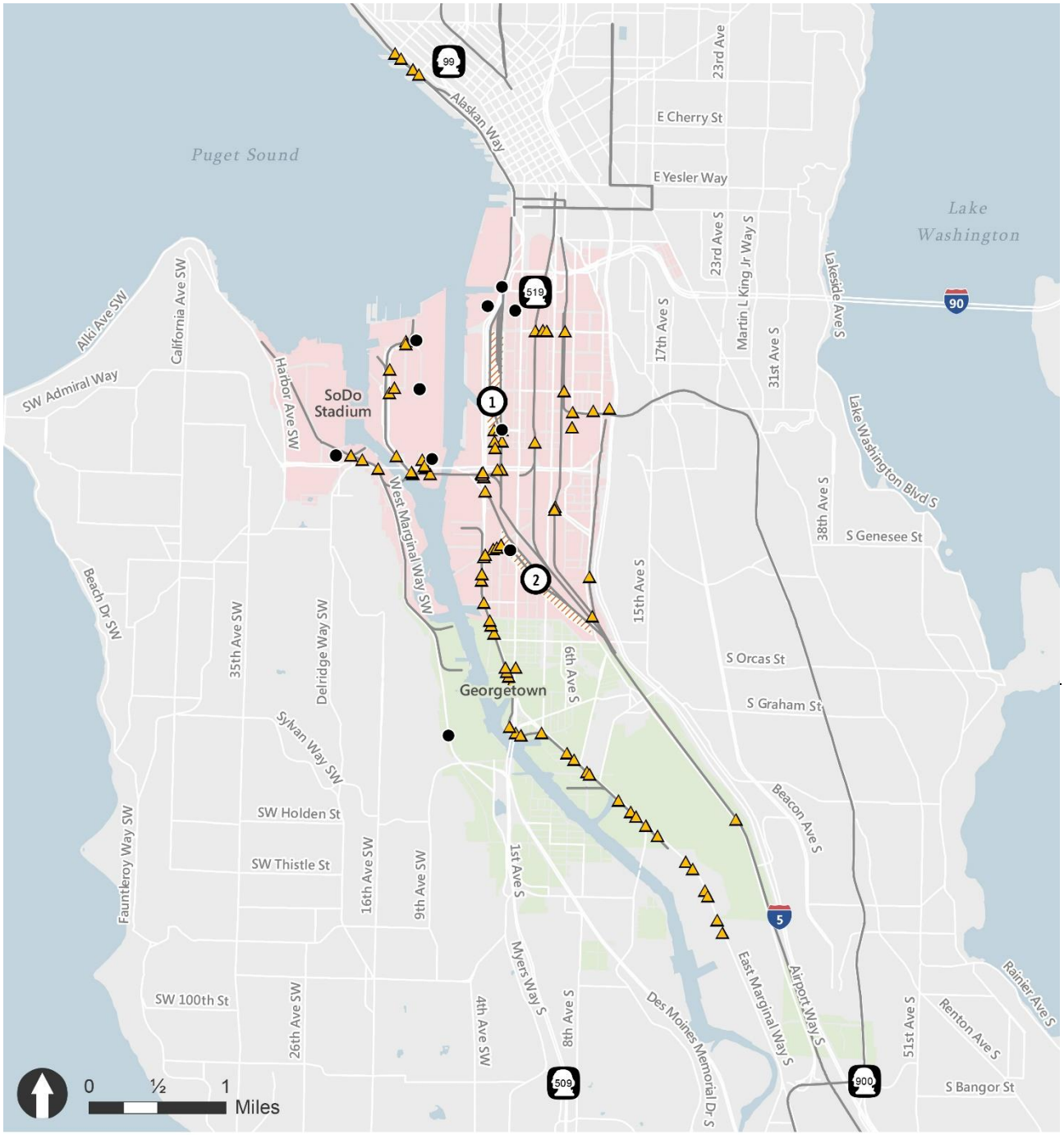
As shown in **Exhibit 3.10-13** and **Exhibit 3.10-14**, the BNSF and UP railroads cross roadways in many locations throughout the MICs. While at-grade crossings are more limited in the BINMIC, they are prevalent throughout the Duwamish MIC. When a train is passing through these locations, the crossing is closed to vehicle traffic resulting in delays to those on the roadway network, particularly truck freight in heavily industrial areas. Delays depend on the frequency and duration of the at-grade crossing closure and have been identified by the freight community as a key challenge for truck freight mobility.

Exhibit 3.10-13 Existing Rail Freight Network—Ballard Interbay Northend MIC, 2021



Source: City of Seattle, 2022; Fehr & Peers, 2022.

Exhibit 3.10-14 Existing Rail Freight Network—Greater Duwamish MIC, 2021



Source: City of Seattle, 2022; Fehr & Peers, 2022.

Truck Parking

Truck parking is of particular importance in the MICs as drivers need places to stage for loading, store their truck, and take required rest periods which are critical to safety. Curb space for trucks is also needed to conduct deliveries to businesses throughout the study areas. The Freight Master Plan identified adequate truck parking as an issue and included two related actions which speak to both the availability of truck parking as well as community impact if truck parking is not provided in appropriate locations:

- Action 3.5.1: Work with the Port of Seattle and other partners to determine suitable locations and technology to provide and manage additional truck parking.
- Action 5.2.2: Reduce long-term truck parking on residential streets through education and enforcement activities, and identify alternative truck parking locations.

Past reviews of truck parking supply and demand have estimated that there is demand for an additional 500 to 900 truck parking spaces in the city. Due to the shortage in parking areas suitable for trucks (and with supportive facilities nearby to serve driver needs), there is truck parking overflow from industrial areas resulting in some trucks parking illegally in residential neighborhoods. Truck parking is a regional, and even statewide, issue. WSDOT has a Joint Transportation Committee (JTC) Truck Parking Action Plan that is focused on understanding truck parking challenges and identifying solutions. City staff are actively engaged in these efforts. Locally, the City Council passed Ordinance 126647 in August 2022 which establishes the authority for SDOT to designate parking for truck tractors in public right-of-way and enforce such signage.

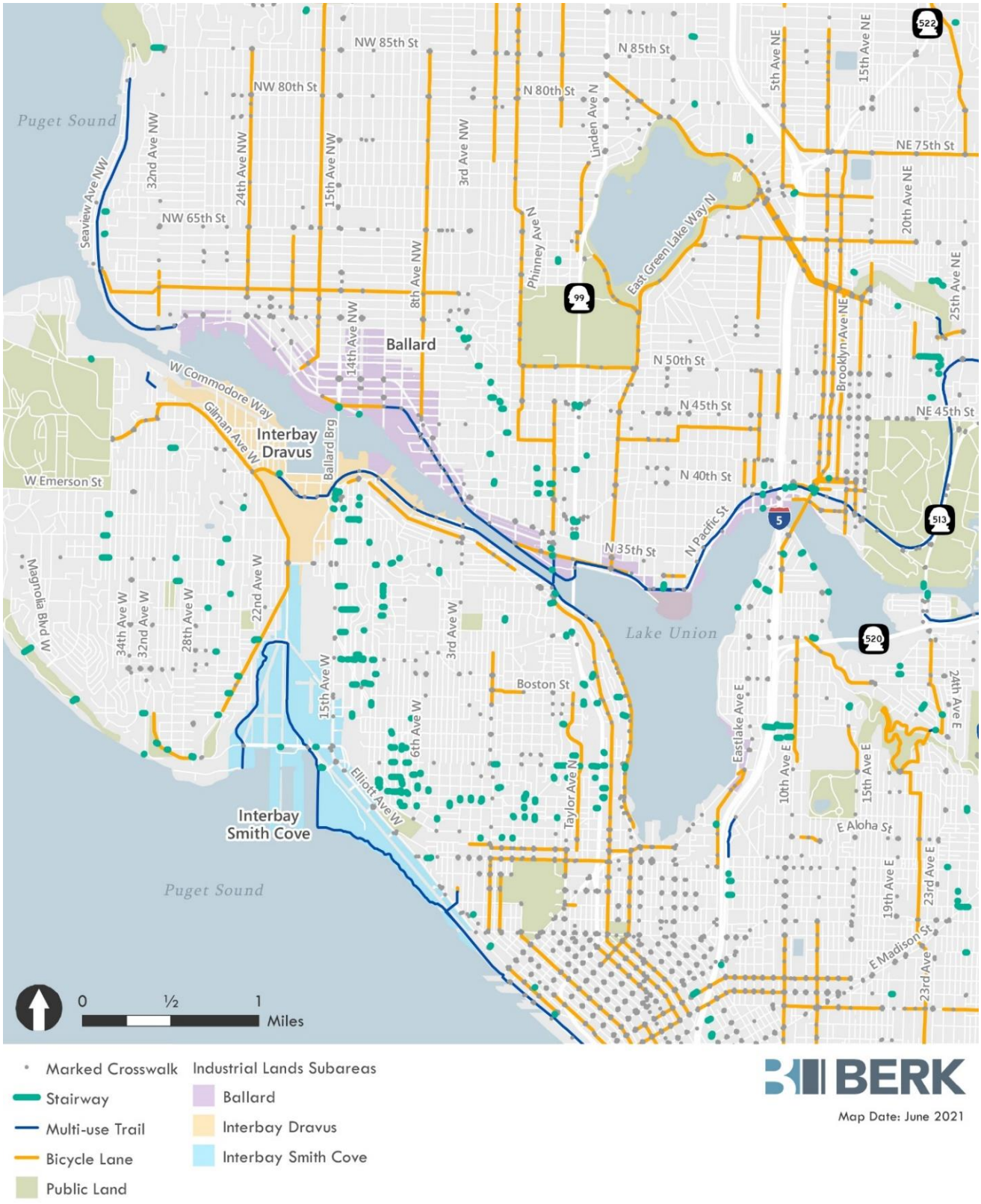
Active Transportation

The pedestrian network is composed of sidewalks, walkways, crosswalks, staircases, curb ramps, and multi-use trails. The presence, connectivity, and quality of the pedestrian network varies throughout the area often correlating with the prevailing land use. Industrial areas tend to have fewer pedestrian facilities and limited connectivity while adjacent commercial and residential areas usually have moderately dense pedestrian networks with sidewalks on at least one side of nearly all streets, and most intersections have marked crosswalks and curb ramps. Some pedestrian crossing locations have been enhanced with signage and/or curb extensions which shorten crossing distances. SDOT maintains an inventory of pavement condition which indicates that conditions tend to be poorer in more industrial areas such as SODO, South Park, and waterfront areas within the BINMIC.

The existing bicycle network is made up of bicycle lanes, cycle tracks (protected bike lanes), multi-use trails, signed routes, and shared streets known as Neighborhood Greenways designated with “sharrow” markings. Bicycle facilities are distributed throughout the city but are most prevalent in the Center City area situated between the MICs. The study area includes a variety of multi-use trails along waterways adjacent to industrial areas. This includes the Burke-Gilman Trail and Ship Canal Trail in the Ballard and Interbay Dravus areas; the Elliott Bay Trail connecting the Interbay Smith Cove Subarea to SODO; and the SODO Trail, West Seattle Bridge Trail, and Duwamish River Trail in the SODO/Stadium and Georgetown/South Park subareas.

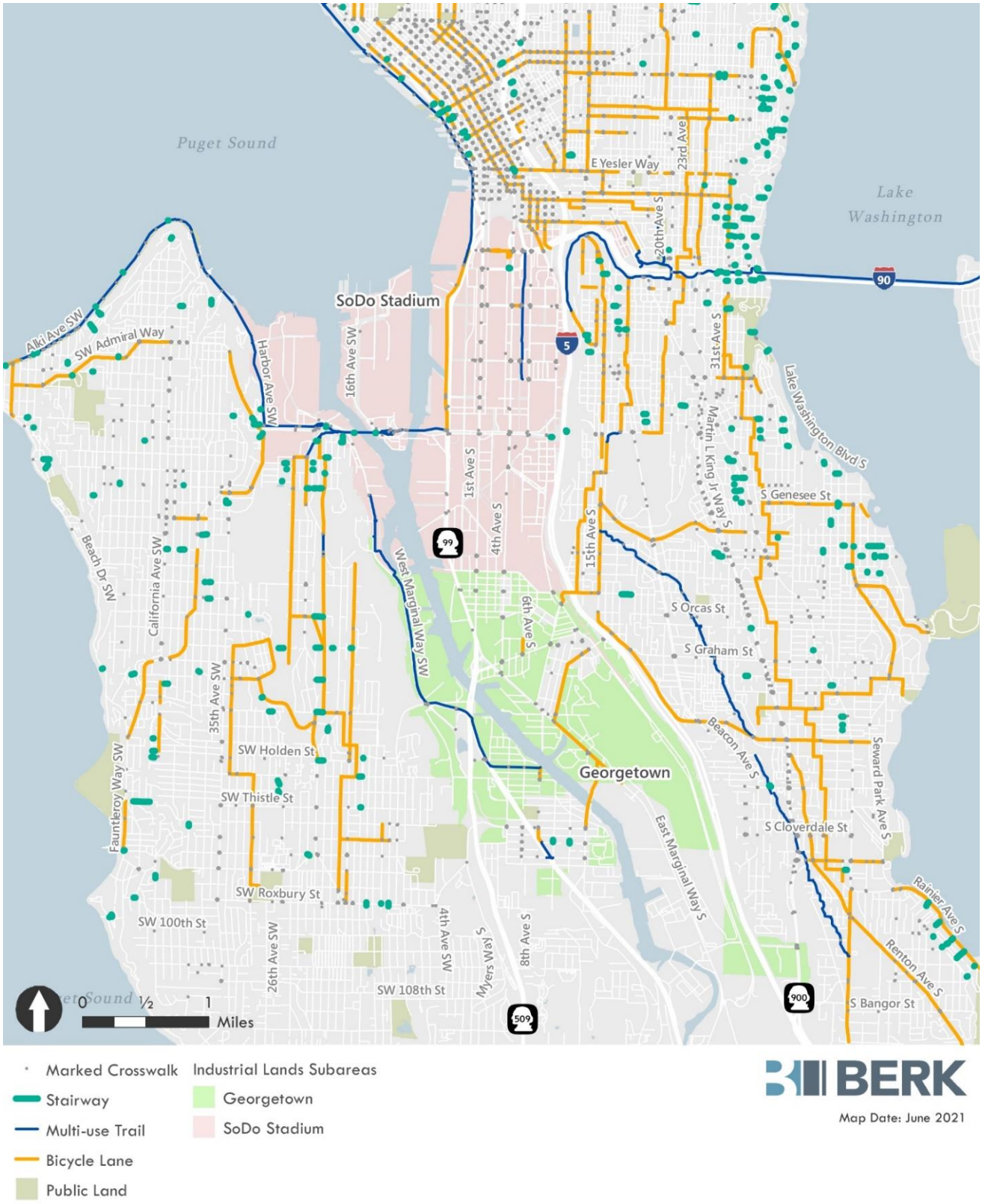
Pedestrian and bicycle facilities are mapped in **Exhibit 3.10-15** and **Exhibit 3.10-16**. The City of Seattle maintains data layers showing existing sidewalk and curb ramps; findings and trends from this data are described in the following sections. However, these data are not shown in the following exhibits due to legibility of the maps at the study area level. To explore the detailed data, the City's interactive GIS database can be accessed here.

Exhibit 3.10-15-7 Existing Active Transportation Facilities—Ballard Interbay Northend MIC, 2021



Source: City of Seattle, 2020; Fehr & Peers, 2021.

Exhibit 3.10-16-8 Existing Active Transportation Facilities—Greater Duwamish MIC, 2021



Source: City of Seattle, 2020; Fehr & Peers, 2021.

Ballard

Within the Ballard Subarea, there are sidewalks on both sides of nearly all streets within the study area. However, sidewalks and pedestrian connectivity are more limited closest to the waterfront where there are large parcels of industrial uses. There are limited marked crosswalks in the study area, most of which are located on Leary Way NW at major intersections. Curb ramps are generally present within the street grid, but there are some missing stretches, particularly along 14th Avenue NW and NW 50th Street, as well as within the industrial areas along the waterfront.

The Ballard study area includes a portion of the Burke-Gilman Trail, which includes frequent marked crossings west of Leary Way NW. There are also separated bike lanes on NW 45th Street that connect to the Burke-Gilman Trail at 11th Avenue NW. The Ballard Subarea is home to the "missing link" of the Burke-Gilman Trail which stretches from 11th Avenue NW to the Ballard Locks. Construction is underway along Market Street to include a shared use trail and sidewalk with plans to complete the trail along Shilshole Avenue NW and NW 45th Street. To cross the Ship Canal, people walking and biking share narrow pathways on either side of the Ballard Bridge. Due to the limited width of the facilities, it is difficult for people to pass one another comfortably, as shown in **Exhibit 3.10-17**.

Exhibit 3.10-17~~9~~ Pedestrian and Bicycle Facility Constraints

Note: Photo at left shows the Ballard Bridge and photo at right shows the Elliott Bay Trail between Terminal 91 and the BNSF Railyard.
Source: Seattle Department of Transportation, 2020.

Interbay Dravus

Interbay Dravus has a relatively complete pedestrian network along the main arterials; however, most other roadways in this industrial area have no sidewalks. There are limited marked pedestrian crossings, with marked crosswalks and curb ramps only at the major intersections along W Dravus Street and W Emerson Street. W Dravus Street and W Emerson Place/Street serve as the only connections across the railway between the North Queen Anne and Southeast Magnolia neighborhoods. W Dravus Street provides sharrows from 15th Avenue W to 20th Avenue W as well as sidewalks along the bridge. The Ship Canal Trail transitions to a cycle track along W Emerson Place. Both facilities connect with separated bike lanes on Gilman Avenue W and 20th Avenue W that provide bicycle connections to the Elliott Bay Trail to the south.

Interbay Smith Cove

The Interbay Smith Cove Subarea has minimal public pedestrian facilities, as the Seattle Armory and Port of Seattle properties comprise most of the subarea. Outside of this industrial area, there are sidewalks on both sides of nearly all streets, including the major thoroughfare of 15th Avenue W/Elliott Avenue W. Marked crosswalks and curb ramps exist about every fifth of a mile along this corridor. However, pedestrian and bicycle comfort along the corridor is affected by the width, traffic volumes, and speeds along the roadway.

East-west connectivity across the subarea is very limited. Travelers can use the Elliott Bay Trail around the perimeter of Terminal 91 or the Magnolia Bridge, which is the only roadway that provides public access east/west in Interbay Smith Cove. The Elliott Bay Trail has a constrained section, shown in **Exhibit 3.10-17**, where the trail passes through the Terminal 91 area. The Magnolia Bridge has a narrow sidewalk on one side; the bridge can be used to connect to 16^{r} Avenue W beneath the Magnolia Bridge or to the Magnolia neighborhood to the west though the grade is steep.

SODO/Stadium

In the SODO/Stadium Subarea, the pedestrian network is generally complete north of the West Seattle Bridge, with sidewalks on both sides of nearly all streets. Marked crosswalks and curb ramps exist at the major intersections within the area, along the north/south corridors of 1st Avenue, 4th Avenue, 6th Avenue, and Airport Way. However, the major east/west corridors in the subarea are spaced about a half-mile apart, which limits crossing options and increases travel distances for people looking to cross the street between these intersections. South of the bridge, sidewalks only exist along E Marginal Way, 1st Avenue S, and 4th Avenue S, with very limited marked crossings. West of the waterway on Harbor Island and Terminal 5, sidewalks exist on portions of 16th Avenue SW and along the lower Spokane Street Bridge, but the only marked crosswalks are at the port access intersections along the Spokane Street Bridge.

In the subarea, there are minimal bicycle facilities, with sharrows along 1st Avenue S and S Lander Street. The multi-use SODO Trail provides a bicycle connection between the SODO and

Stadium Link Light Rail stations and there are bike lanes along E Marginal Way S connecting the Waterfront Trail and the West Seattle Bridge Trail.

Georgetown/South Park

The Georgetown/South Park Subarea has a less dense pedestrian network, with sidewalks on both sides of the streets along the arterials such as Airport Way S, Ellis Avenue S, and S Michigan Street. Sidewalks also exist in the residential neighborhood located between Corson Avenue S and Ellis Avenue S. However, there are limited pedestrian crossings in the area, as marked crosswalks and curb ramps exist at only a few major intersections.

The Duwamish River Trail runs along the west side of the subarea providing a north-south route along the west side of the waterway. Bicycle sharrows exist on some local streets within the subarea, and separated bike lanes are present on Ellis Avenue S and E Marginal Way S. Connections across the Duwamish Waterway are limited: there is a shared use facility running alongside the 1st Avenue Bridge and sidewalks are provided on both sides of the 16th Avenue S Bridge. The Georgetown to South Park connection, to be constructed in 2022, will link the two neighborhoods via E Marginal Way and 16th Avenue S.

Transit

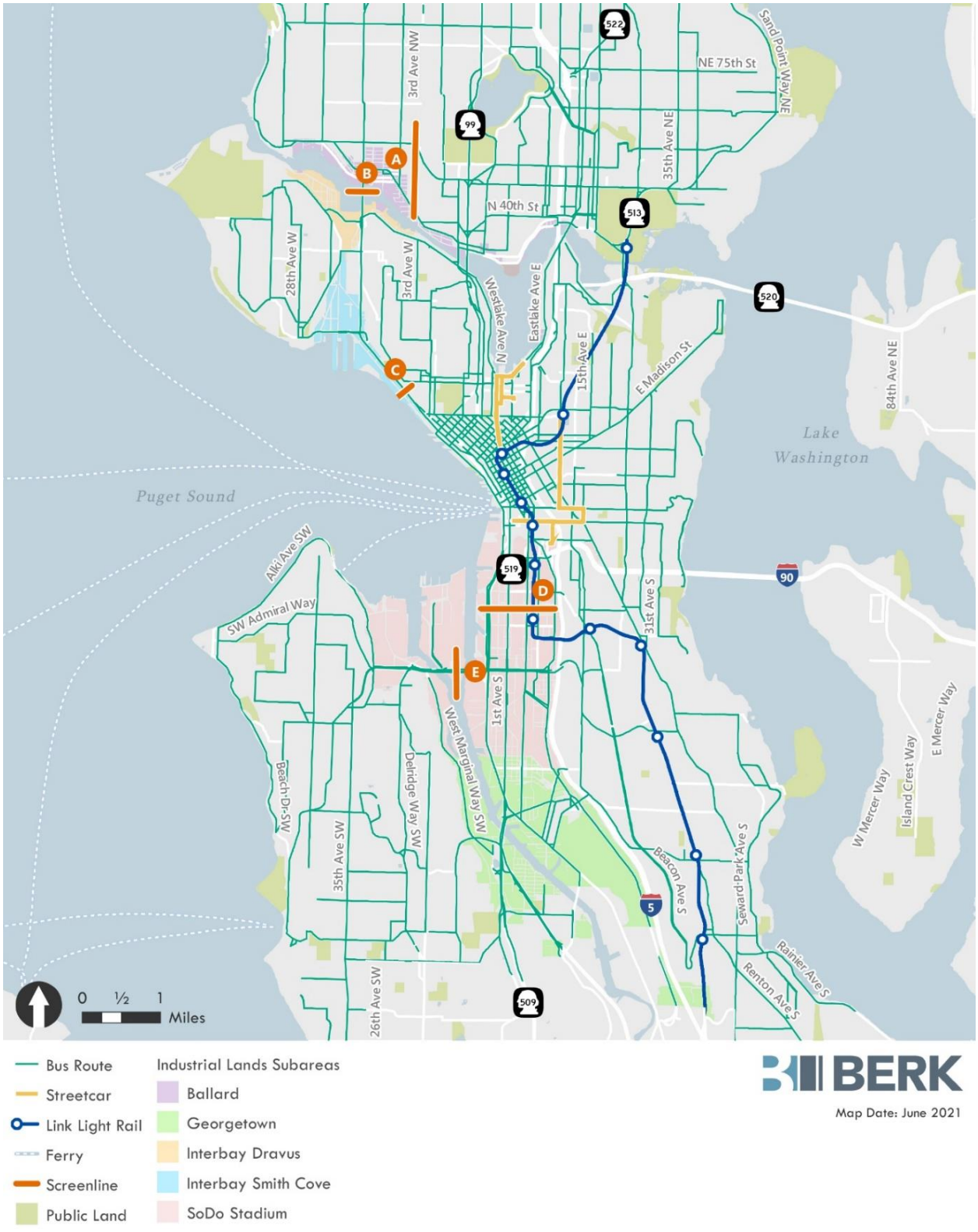
The study area and surrounding neighborhoods are served by King County Metro and Sound Transit public transit including local, rapid, and express fixed route bus services as well as light rail.

- King County Metro operates a fixed route bus system that includes RapidRide, a separately-branded set of frequent transit routes in West Seattle, Ballard, and Downtown.
- Sound Transit Express and Community Transit operate buses that provide service from outside the City of Seattle.
- Rail transit services include Sound Transit Link Light Rail, City-operated streetcars in South Lake Union and First Hill, and the Sounder commuter train that provides service from King Street Station north to Everett and south to Tacoma.

Sound Transit's expansion of Link Light Rail will provide expanded rail service to the SODO, Interbay Smith Cove, Interbay Dravus, and Ballard study areas. **Exhibit 3.10-18** displays the existing transit services as well as the five screenlines used to summarize demand along key transit corridors in the study area.

Sound Transit reports its ridership and passenger load trends in its annual Service Implementation Plan. According to the 2020 Service Implementation Plan, which reflects conditions in 2019 before the COVID-19 pandemic disrupted typical travel patterns, Link light rail between Angle Lake and the University of Washington had average weekday boardings of over 80,000. Peak loads typically occur between the CID and Pioneer Square stations just north of the SODO/Stadium Subarea. During the PM peak period, peak flows are in the southbound direction through the subarea as people travel outbound from center city. Sound Transit monitors the passenger loads on each trip and found only one trip consistently exceeding the loading standard.

Exhibit 3.10-18~~-10~~ Existing Transit Network, 2021



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

King County Metro ridership data for the PM peak period was summarized for each route that crosses a study area screenline. The average maximum load for each trip was extracted and compared to the capacity of the trip (i.e., the number of seats on the bus plus standing room) to determine if the trip exceeded King County Metro's crowding threshold. Note that the maximum load does not necessarily occur at the screenline. For instance, routes leaving downtown for outlying areas tend to have maximum loads occurring closer to the center city. The average maximum loads for the study area routes were aggregated at the screenline level and results are reported in **Exhibit 3.10-19**.

Exhibit 3.10-19~~-11~~ Passenger Load Factors on Bus Route across Transit Screenlines

	Average Maximum Load Factor on Routes Crossing Screenline	
Screenline	Inbound	Outbound
A: East of 8th Avenue NW	0.63	1.21
B: Ballard Bridge	0.98	1.13
C: North of W Mercer Place	0.86	1.08
D: North of Lander St	0.51	0.93
E: West Seattle Bridge	0.49	0.95

Note: Inbound refers to travel into the downtown area and outbound travel out of the downtown area.
Source: King County Metro, Fall 2018; Fehr & Peers, 2021.

Because the analysis period is the PM peak period, the outbound load factors are higher than the inbound load factors; the inverse pattern would be present during the AM peak period. The data show that many of the routes traveling across the study area screenlines operate over their crowding threshold at some point along their trip. Specific routes are discussed below.

Ballard, Interbay Dravus, & Interbay Smith Cove

The Ballard Bridge screenline includes routes traveling north-south through the Interbay area and into areas of center city. Nearly all of the routes traveling across the bridge exceed their crowding threshold at some point for more than half of their PM peak period trips. This includes the D Line (both inbound and outbound), Route 15, and Route 18. The screenline east of 8th Avenue NW captures routes 28, 40, and 44. All three of those routes exceed their crowding threshold on most of their PM peak period trips; however, the highest loads tend to occur closer to downtown or the U District rather than in the study area.

The screenline north of Mercer Place captures routes traveling along the Elliott Way/15th Avenue NW corridor. Several of these routes also cross the Ballard Bridge as described above. This screenline also includes routes serving Magnolia, Uptown, Fremont, Wallingford, and the U District. In addition to the D Line, Route 15, and Route 18 as mentioned above, Route 32 exceeds its crowding threshold on the majority of its PM peak period trips, with the maximum load usually occurring nearer to the U District.

SODO/Stadium & Georgetown

The north of Lander Street screenline captures a large number of routes that travel through the SODO/Stadium area as they approach center city. Most routes generally operate below their crowding thresholds. The exceptions are the outbound C Line, Route 118, and Route 101. The West Seattle Bridge screenline captures a variety of routes; however, only the C Line and Route 118 exceed their crowding thresholds on a majority of PM peak period trips.

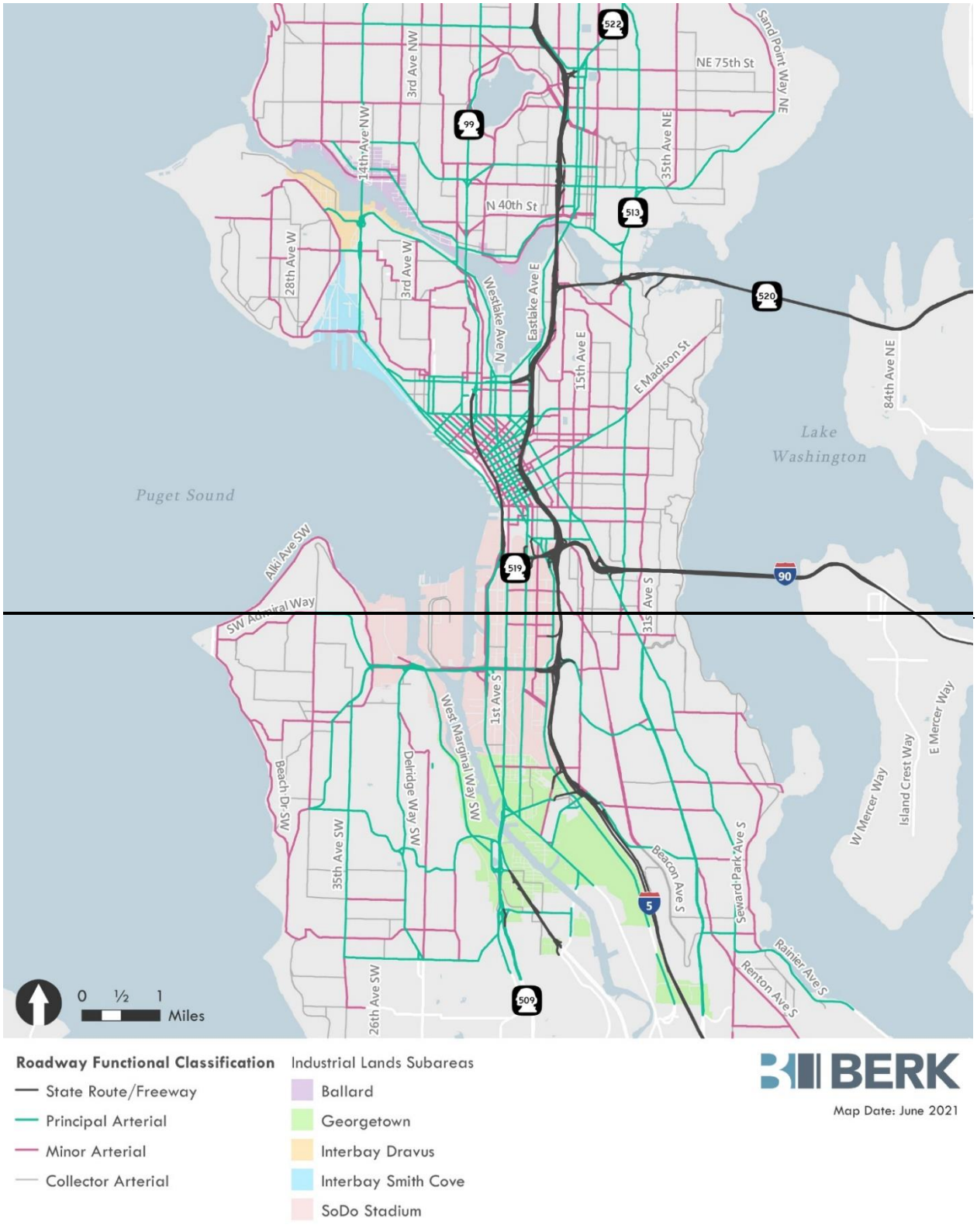
~~Auto & Freight~~

~~The City of Seattle is served by a dense roadway system of principal, minor, and collector arterials, as shown in **Exhibit 3.10-12**. Auto and freight travel also access several state highways—I-5, SR 99, and SR 509—which run north-south through the city. Bridges in the study area play a central role in facilitating travel across waterways and steep topography; these include the Ballard Bridge, Magnolia Bridge, West Seattle Bridge, 1st Avenue S Bridge, and South Park Bridge. The study area includes some of the most constrained areas of the city given the nature and location of water crossings and maritime and industrial land uses.~~

~~The City has designated a major truck street network throughout the city as shown in **Exhibit 3.10-13**. In the study area, the major truck street network includes most major arterials, including SR 99, SR 509, W Marginal Way SW, E Marginal Way S, 1st Avenue S, 4th Avenue S, Elliott Way, 15th Avenue W, and Leary Way.~~

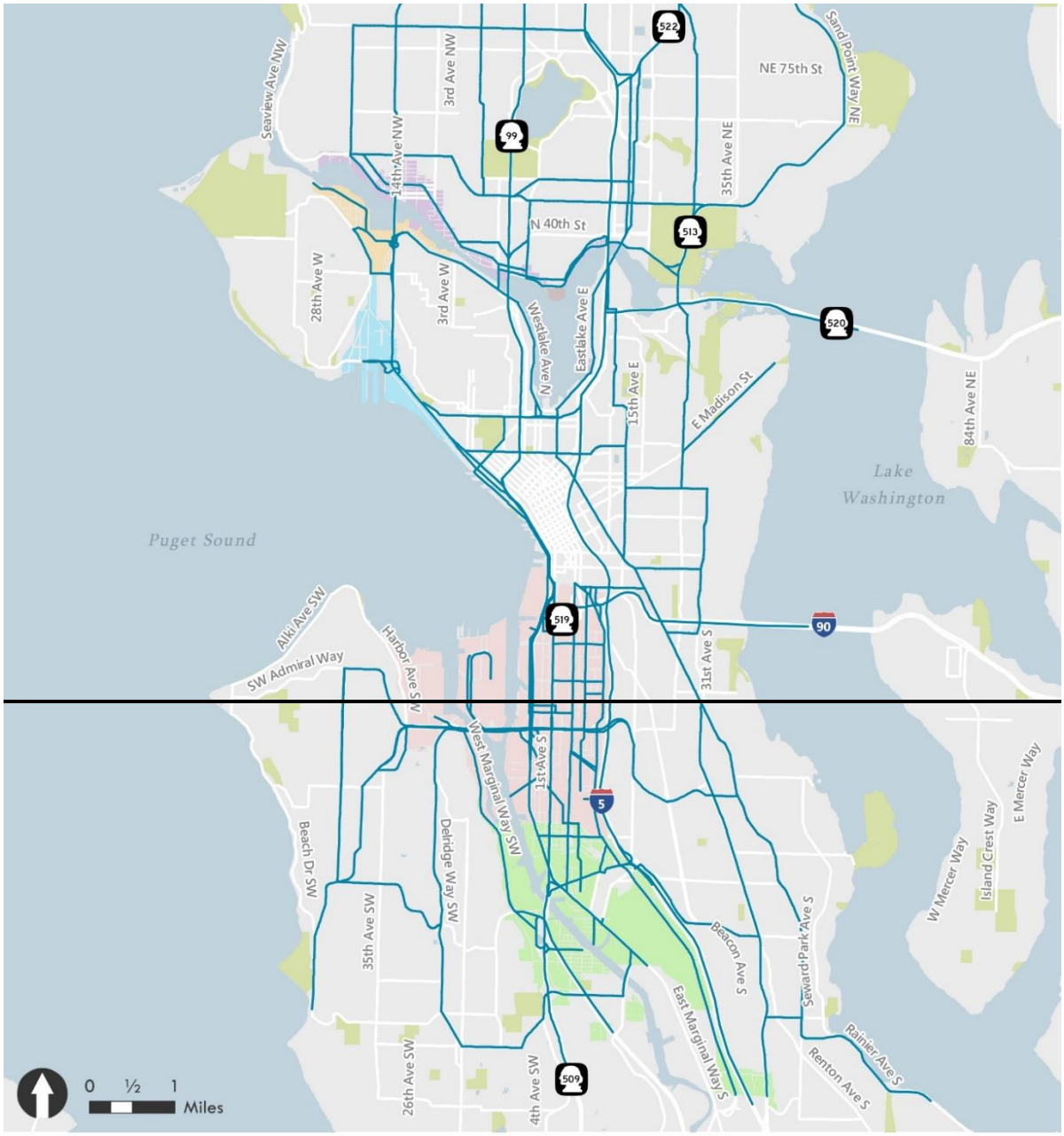
~~The Seattle Zero Emissions Freight Study included an evaluation of multiple data sources to understand freight activity throughout the city. The study found that roughly 2% of all vehicles in the Interbay area are freight vehicles while roughly 5% of vehicles in SODO are freight vehicles. In both areas, approximately one-quarter of freight vehicles are light-duty commercial vehicles and over one-half are medium-duty trucks. Most delivery VMT within the city is generated by medium-duty trucks. An analysis of freight activity within the Greater Duwamish MIC found that 50-70% of all medium- and heavy-duty truck trips in the Duwamish Valley are pass-through trips while 75-80% of medium- and heavy-duty truck trips in South Park—where SR 99, SR 509, and the South Park Bridge are located—are pass-through trips.~~

~~Exhibit 3.10-12 Existing Roadway Network, 2021~~



~~Source: City of Seattle, 2021; Fehr & Peers, 2021.~~

~~Exhibit 3.10-13 Existing Freight Network, 2021~~



~~Source: City of Seattle, 2021; Fehr & Peers, 2021.~~

Travel Time

Using the HCM guidelines for defining LOS thresholds as described in the Data & Methods section, **Exhibit 3.10-14** summarizes the travel time conditions along each of the study corridors. The existing travel time was calculated using the 25th percentile speeds for PM peak hour (4:45-5:45pm) for each direction of the study corridors. In other words, the travel time estimates reflect a somewhat more congested condition than the average day. Traffic congestion is more difficult for freight to navigate and trucks typically travel at slower speeds than general auto traffic. However, much of the daily freight movement activity occurs in the midday when traffic congestion is less pronounced.

For facilities that have peak directional patterns, the AM peak hour is typically expected to have similar characteristics in the opposite direction than those shown for the PM peak hour. For example, 15th Avenue W shows longer travel times northbound in the PM peak hour so similar conditions are expected southbound during the AM peak hour. The travel times shown below are rounded to the nearest half minute.

Exhibit 3.10-14 Existing PM Peak Hour LOS

		PM Peak Hour LOS		Observed Travel Time (Minutes)	
ID	Corridor	N/E	S/W	N/E	S/W
Ballard Interbay Northend MIC					
1	15th Ave W from Magnolia Bridge to NW Leary Way	E	A	11.5	4.5
2	15th Ave NW from NW Leary Way to N 85th St	E	C	9.5	6.5
3	Leary Ave NW/ Leary Way NW/ N 36th S/ Fremont Bridge between NW Market St and W Nickerson St/Westlake Ave	C	C	11.0	12.0
4	Shilshole Ave NW between NW Market and 15th Ave NW	B	D	2.5	3.5
5	NW Market St/N 50th/ 46th St between 24th Ave NW and I-5	C	D	14.0	16.5
6	W Nickerson St/Westlake Ave N between 15th Ave W and Mercer St	C	C	13.0	11.5
7	W Dravus St between 15th Ave W and 20th Ave W	E	D	2.0	1.5
8	Elliott Ave W between Magnolia Bridge and Wall St	B	B	5.5	6.0
9	W Mercer St from Elliott Ave W to I-5	F	F	32.0	22.0
10	Denny Way from Elliott Ave W to I-5	F	E	14.5	11.0
11	Magnolia Bridge between 15th Ave W and Thorndyke Ave W	B	A	2.5	1.5
12	SR 99 between N 46th St and Denny Way	C	E	8.5	14.0
13	W Emerson St between 15th Ave W and Gilman Ave W	F	F	6.0	4.0
14	N 85th St between 15th Ave NW and I-5	E	E	13.0	14.5
15	I-5 between N 85th Street and Madison Street	F	F	19.0	24.0

		PM Peak Hour LOS		Observed Travel Time (Minutes)	
ID	Corridor	N/E	S/W	N/E	S/W
Greater Duwamish MIC					
1	1st Ave S between S Royal Brougham Way and SR 99	C	C	11.0	11.0
2	4th Ave S between Seattle Blvd S to E Marginal Way S	C	C	12.0	12.5
3	6th Ave S between Seattle Blvd S to Spokane St Viaduct	C	C	6.5	6.0
4	Airport Way S/ Seattle Blvd S between S Royal Brougham Way to S Boeing Access Rd	A	A	16.5	15.5
5	West Seattle Bridge/Spokane St Viaduct between 35th Ave SW and I-5	C	E	6.5	10.0
6	Spokane St Bridge between Harbor Ave SW and SR 99	B	B	4.5	4.5
7	E Marginal Way S between SR 99 and S Boeing Access Rd	C	D	8.5	10.5
8	Alaskan Way S from Broad St to SR 99	D	F	9.0	13.0
9	S Royal Brougham Way between SR 99 and Airport Way S	F	D	4.5	3.0
10	Edgar Martinez Dr S between SR 99 and 4th Ave	F	F	2.5	2.5
11	S Holgate St between 1st Ave and Airport Way S	D	F	3.0	4.5
12	S Lander St between 1st Ave and Airport Way S	E	E	4.0	4.0
13	S Lucile St between SR 99 and Airport Way S	D	E	4.0	5.0
14	W Marginal Way SW between West Seattle Bridge and 2nd Ave SW	A	A	5.0	4.5
15	S Michigan St/ Corson Ave S between E Marginal Way S and I-5	C	E	3.5	5.5
16	E Marginal Way S/SR 99 between S Atlantic Street and 1st Ave S Bridge	A	A	9.0	9.0
17	I-5 between Madison Street and SR 599	E	F	25.5	30.0

Source: Wejo, 2019; Fehr & Peers, 2021.

During the PM peak hour, most corridors operate at LOS E or better in both directions. Corridors operating at LOS F include:

- Both directions of W Mercer St from Elliott Avenue W to I-5
- Eastbound Denny Way from Elliott Avenue W to I-5
- Both directions of W Emerson St from Gilman Avenue W to 15th Avenue W
- Both directions of I-5 between N 85th Street and Madison Street
- Southbound Alaskan Way S from Broad St to SR 99
- Eastbound S Royal Brougham Way between SR 99 and Airport Way S
- Both directions of Edgar Martinez Dr S between SR 99 and 4th Avenue
- Westbound S Holgate St from Airport Way S to 1st Avenue
- Southbound I-5 from Madison Street to SR 599

Ballard

In the Ballard Subarea, principal arterials include 15th Avenue NW and Leary Way NW. These roadways, as well as Shilshole Avenue NW, carry high volumes of freight traffic in the area. Along 15th Avenue NW, the peak direction of travel during the PM peak hour is northbound with more balanced volumes on Leary Avenue NW and Shilshole Avenue NW. All study corridors in the Ballard Subarea operate at LOS E or better during typical conditions.

Interbay Dravus

The principal arterials and freight corridors in the Interbay Dravus Subarea include 15th Avenue W, W Dravus Street, W Emerson Street, and W Nickerson Street. All study corridors except W Emerson Street operate at LOS E or better in the Interbay Dravus study area during typical conditions.

Interbay Smith Cove

In the Interbay Smith Cove Subarea, the principal arterials and freight routes include 15th Avenue W, W Mercer Street, Denny Way, and Elliott Avenue W. The Magnolia Bridge is classified as a minor arterial as well as a freight route. Congestion stemming from the I-5 on-ramps affects travel times in the eastbound direction of both Denny Way and W Mercer St which operate at LOS F. Both routes typically have less congestion on the western ends closer to the study area, but congestion increases along the corridors as they near center city and I-5.

SODO/Stadium & Georgetown

In the SODO/Stadium Subarea, 1st Avenue S, 4th Avenue S, and E Marginal Way are primary arterials, and most other roadways are minor arterials. The West Seattle Bridge and the Spokane Street Bridge both span the Duwamish Waterway. The West Seattle Bridge has been closed since March 2020, resulting in major travel pattern changes and increased demand on alternate routes. However, the existing conditions discussed in this report focuses on the 2019 period, when operations were more "typical," both in terms of the available network and pre-pandemic travel demand.

Because of the predominantly industrial land uses, all arterials in the subarea are designated as freight routes. In particular, East Marginal Way S carries a high percentage of cargo trucks and provides access to multiple terminal entrances. Most corridors operate at LOS E or better during the PM peak hour, with the exception of the east/west corridors of S Holgate Street, S Royal Brougham Way, and Edgar Martinez Drive S.

Georgetown/South Park

In the Georgetown/South Park Subarea, all minor and principal arterials are designated freight corridors, including E Marginal Way S, 1st Avenue S, and S Michigan Street. Airport Way S is often used as a bypass of I-5 when the interstate is highly congested due to collisions or construction. As noted above, this area has been experiencing an increase in traffic volumes

since March 2020 when the closure of the West Seattle Bridge caused motorists to seek alternate routes. Under typical 2019 conditions, almost all corridors operate at LOS E or better.

Mode Share

The existing SOV mode share in the City of Seattle is summarized by sector using the PSRC Soundcast model and is shown in **Exhibit 3.10-15**. Within the study area, the Duwamish sector has the highest share of PM peak period SOV trips at 53.5%. Magnolia/Queen Anne and Northwest Seattle have lower SOV percentages, as these sectors contain a larger mix of residential and commercial uses.

Exhibit 3.10-15 Existing SOV Mode Share—PM Peak Period

Sector	Existing SOV Share
Duwamish	53.5%
Magnolia/Queen Anne	43.1%
Northwest	41.6%

Source: PSRC, 2021; Fehr & Peers, 2021.

Screenlines

The City's screenline thresholds are in the form of a volume-to-capacity (v/c) ratio: the number of vehicles crossing the screenline compared to the designated capacity of the roadways crossing the screenline. **Exhibit 3.10-16** summarizes the location of the study area screenlines, as well as their LOS threshold and current v/c ratio. All screenline locations are currently under the LOS threshold defined by the City of Seattle.

Exhibit 3.10-16 Existing PM Peak Hour LOS

Screenline	Location	Volume-to-Capacity Threshold	2019 PM Peak Period v/c Ratio	
			N/E	S/W
2	Magnolia	1.0	0.51	0.54
3.11	Duwamish River – West Seattle Bridge and Spokane Street	1.2	0.57	0.53
3.12	Duwamish River – 1st Avenue S and 16th Avenue S	1.2	0.54	0.51
4.13	South City Limit – SR 99 to Airport Way S	1.0	0.40	0.45
5.11	Ship Canal – Ballard Bridge	1.2	1.01	0.75
5.12	Ship Canal—Fremont Bridge	1.2	0.59	0.66
5.13	Ship Canal – Aurora Bridge	1.2	0.30	0.34
7.11	West of Aurora Avenue—Fremont Place N to N 65th Street	1.0	0.54	0.62

Screenline	Location	Volume-to-Capacity Threshold	2019 PM Peak Period v/c Ratio	
			N/E	S/W
8	South of Lake Union	1.2	0.62	0.69
9.12	South of Spokane Street – E Marginal Way to Airport Way S	1.0	0.47	0.48
10.11	South of S Jackson Street – Alaskan Way S to 4th Avenue S	1.0	0.58	0.66

Source: City of Seattle count data, 2019; Fehr & Peers, 2021.

Parking

The City of Seattle sets goals and policies related to parking in its Comprehensive Plan. Goals include managing the on-street parking supply to achieve auto trip reduction and improved air quality. In addition, the City recognizes that the primary transportation purpose of the arterial street system is to move people and goods. See the **Freight** section for additional context regarding the importance of truck parking to freight mobility.

The City regulates on-street parking by issuing on-street permits, charging by the hour, setting time limits, and defining loading zones. Some areas of the study area have time-limited paid parking, in effect between 8 AM and 6 or 8 PM, with rates between $0.50 and $5 per hour depending on location. Some blocks have free time-limited parking, unrestricted parking, carpool only parking, or freight loading only zones. In some locations in both MICs, parking supply is currently being limited by business operator placement of "ecology blocks" that limit access of City on-street parking to the public.

Conditions in specific subareas are described below. One common trend is that on-street parking tends to be more informal in industrial areas, with the frontage of many parcels lacking curbs or delineated spaces. This type of parking can create obstacles for pedestrians and bicycles. More formal parking configurations are typically implemented as frontage improvements occur.

Ballard

In the Ballard Subarea, most roadways have unrestricted parking. Portions of NW Leary Way and Shilshole Avenue NW have free, time-limited parking. The only paid parking is along streets within a few blocks north and south of NW Market St between 26th Avenue NW and 15th Avenue NW. Parking in the industrial areas tends to be informal, with no curbs or delineated spaces. The Freight Master Plan identifies Ballard as needing additional truck-sized loading zones to support goods delivery.

Interbay Dravus

The Interbay Dravus Subarea has unrestricted parking on most streets within the subarea except for W Commodore Way, Thorndyke Avenue W, and several blocks west of the W Dravus Street Bridge which have time-limited parking. There is no on-street parking permitted on 15th Avenue W north of W Dravus Street. There is no paid parking within the Interbay Dravus Subarea.

Interbay Smith Cove

The Interbay Smith Cove Subarea has unrestricted parking on the residential streets east of 15th Avenue W, and west of the Magnolia Bridge. There are stretches of time-limited parking along portions of 15th Avenue W/Elliott Way. The southbound curb lane is bus only during the AM commute period and the northbound curb lane is bus only during the PM commute period. Outside of those hours, on-street parking is permitted. There is no paid parking within the Interbay Smith Cove Subarea.

SODO/Stadium

Near the stadiums and within the SODO/Stadium Subarea, most streets have time-limited parking. Multiple blocks surrounding the stadiums, and along 1st Avenue S, 4th Avenue S, 6th Avenue S, and Airport Way S do not allow parking. The only on-street paid parking within the subarea is along 1st Avenue S and Occidental Avenue S just west of Lumen Field. The north/south arterials tend to have more formal parking in front of businesses, with curbs and delineated spaces. Along many industrial parcels, parking is more informal as those areas often lack curbs and delineated spaces. Adequate parking for large trucks is a concern in this area as it surrounds the Duwamish MIC.

Georgetown/South Park

In the Georgetown/South Park Subarea, a variety of streets offer time-limited parking; there is no paid parking. Many of the local roadways have no restrictions on parking. On the west side of the Duwamish waterway, West Marginal Way SW does not include on-street parking. Adjacent land uses include off-street parking throughout the corridor. Adequate parking for large trucks is also a concern in this area as well as its potential effects on residents.

Safety

The City has a Vision Zero policy that aims to reduce the number of fatalities and serious injuries to zero by 2030. The Vision Zero program includes a variety of strategies, including reduced speed limits, Safe Routes to Schools investments, safety improvements at high-risk locations, enforcement, and education. In 2019, there were 26 fatalities and 194 serious injuries in the city. Although fatalities on city streets had been on a downward trend, there has been a recent increase, a trend similar to what has been observed nationwide. Of the 26 fatalities resulting from collisions within the city in 2019, three occurred within the study area. These included a pedestrian/bus collision on SR 509, a bicyclist/vehicle collision at Alaskan Way & S

Spokane St, and a vehicle/vehicle collision at Airport Way/Hinds Street. Of the 194 serious injuries in the city, 20 occurred within the study area, with the SODO subarea accounting for just over half.

Modal conflicts between trucks, pedestrians, and bicyclists (or micromobility users such as people riding scooters) are of particular concern given the size and visibility of trucks and the vulnerability of people walking and biking. As documented in the Freight Master Plan, trucks typically represent a higher proportion of fatal collisions than any other type of collision.

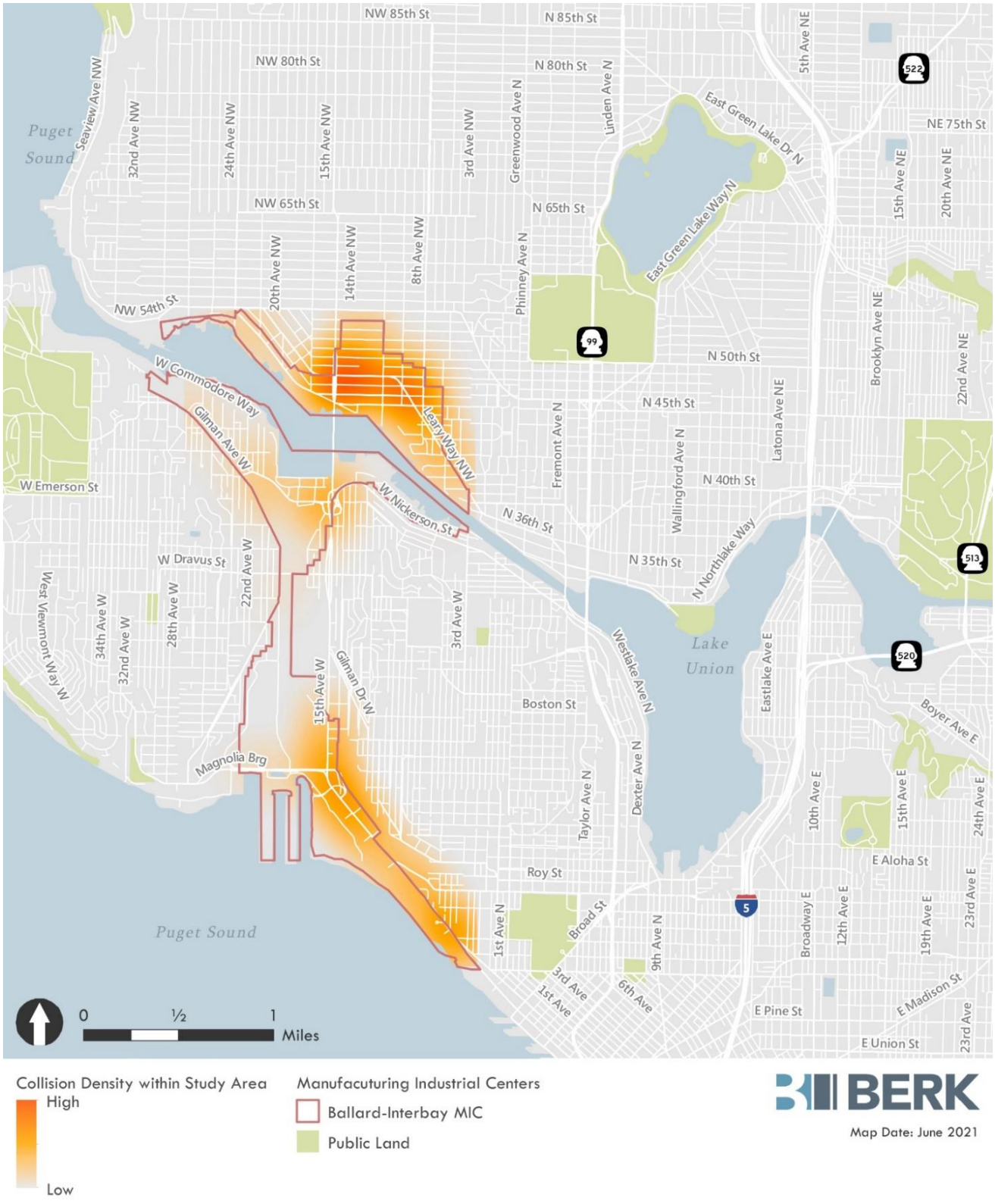
Exhibit 3.10-20~~-17~~ Modal Conflicts in Industrial Areas

Sources: Seattle Department of Transportation, 2020.

Exhibit 3.10-21 and **Exhibit 3.10-22** are heat maps created using five years (2016-2020) of recent collision data. Within the study area, most fatal and serious injury collisions occur on the major arterials, including Leary Way, 15th Avenue W, 4th Avenue S, E Marginal Way S, and 1st Avenue S. Other hot spots for collisions of all severities include Spokane Street, Edgar Martinez Drive, and Emerson Place.

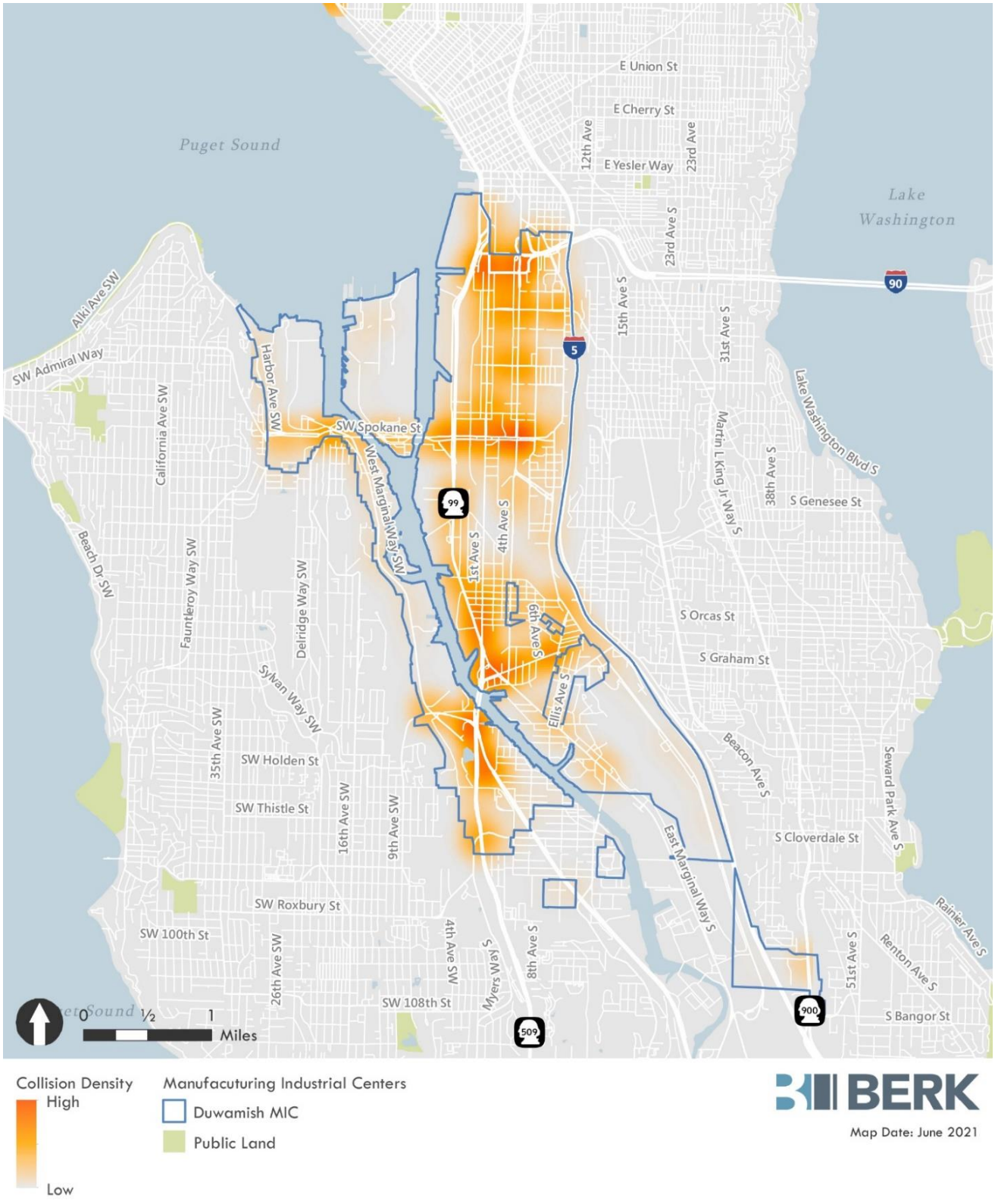
SDOT also completed a Bicycle and Pedestrian Safety Analysis (BPSA) in 2020 which identified locations that should be prioritized for improvements based on pedestrian and bicycle crash data. Findings related to each subarea are included below.

Exhibit 3.10-21-~~18~~ Collisions—Ballard Interbay Northend MIC, 2016-2020



Source: WSDOT, 2016-2020; Fehr & Peers, 2021.

Exhibit 3.10-22-~~19~~ Collisions—Greater Duwamish MIC, 2016-2020



Source: WSDOT, 2016-2020; Fehr & Peers, 2021.

Ballard, Interbay Dravus, & Interbay Smith Cove

Within the Ballard study area, collisions are most concentrated along Leary Way, in particular at the intersection of Leary Way NW and 15th Avenue NW. The majority of collisions throughout the Interbay subareas occur along the 15th Avenue NW corridor with multiple collisions near the intersections of the Galer Way Flyover and Magnolia Bridge.

The BPSA identified several locations in the study area as priority areas for improvements: the intersection of W Emerson Place and Gilman Avenue W, several locations along Leary Way, and a large cluster of locations in south Fremont near the waterfront (i.e., the vicinity of the Fremont Bridge and Burke-Gilman Trail).

SODO/Stadium & Georgetown/South Park

In the SODO/Stadium Subarea, collisions are most concentrated along the north/south arterials, including E Marginal Way S, 1st Avenue S, 4th Avenue S, and 6th Avenue S, with the greatest number of fatal and serious injury collisions on 4th Avenue S. The most pronounced "hotspots" are surrounding the intersection of Edgar Martinez Drive and 4th Avenue S, along the I-90/I-5 on-ramps, and along Spokane Street. The SODO area accounted for more than half of the serious injuries and fatalities that occurred within the study area in 2019.

In the Georgetown/South Park Subarea, collisions were most common along the major arterials, including E Marginal Way S and 1st Avenue S. The largest hotspot in the subarea is the intersection of the 1st Avenue S Bridge and E Marginal Way S.

The BPSA identified a substantial number of priority areas for improvements in the Greater Duwamish MIC. Locations including a large cluster in the Chinatown-International District; along 1st Avenue S between Downtown and the West Seattle Bridge; the convergence of Delridge Way, West Marginal Way SW, and the West Seattle Bridge; the SR 509/SR99 interchange area; and the southern end of the South Park Bridge.

3.10.2 Impacts

This section describes the potential impacts of each future year alternative. The impacts of the Action Alternatives are measured against conditions expected under Alternative 1 No Action.

Analysis Methodology & Planning Scenarios Evaluated

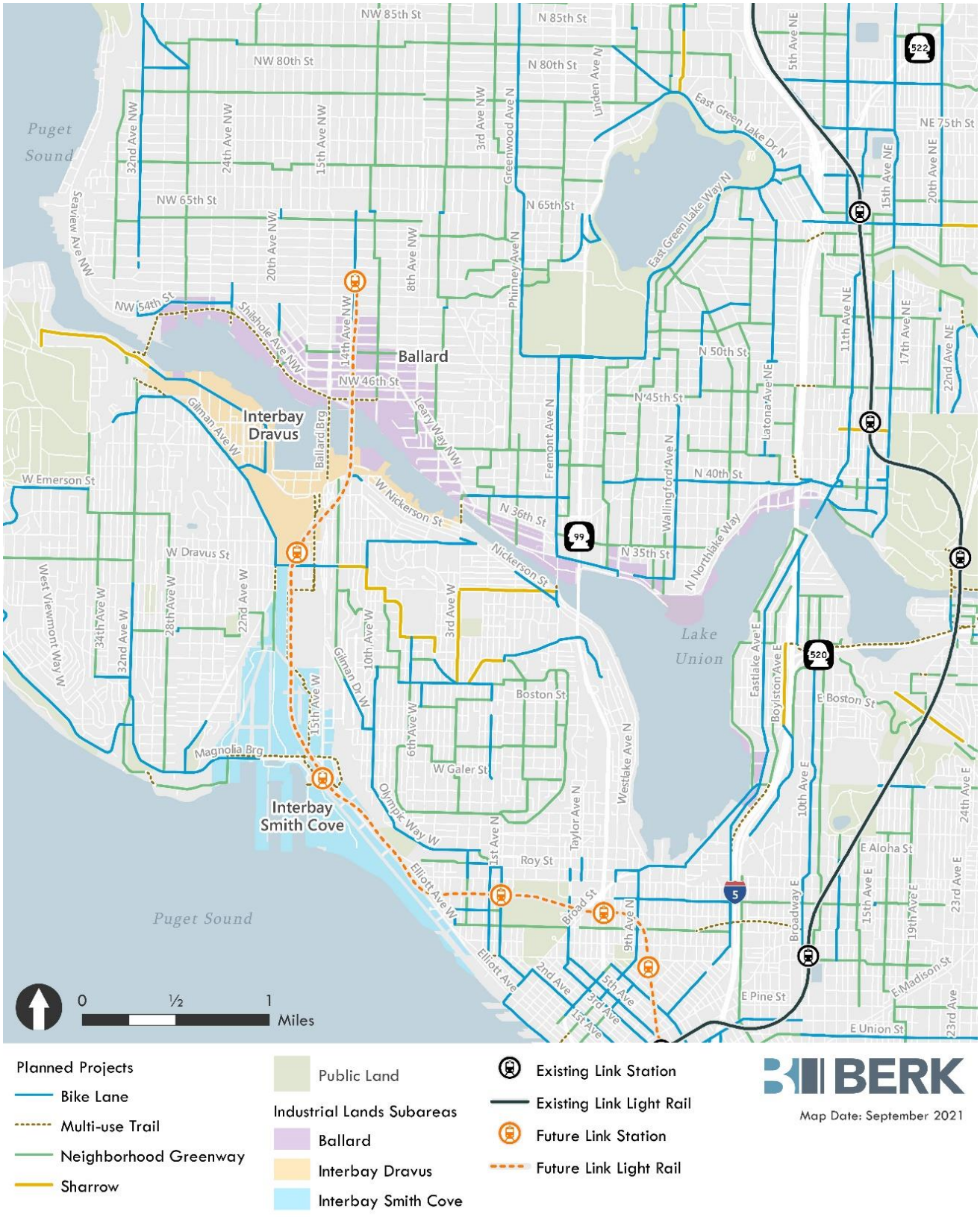
Four alternatives are evaluated under future year 2044 conditions: Alternative 1 No Action and three Action Alternatives. Alternative 1 No Action is consistent with the City's current zoning and adopted plans. The Action Alternatives would increase the amount of growth within the study area. A full description of the land use assumptions may be found in **Chapter 2**. All alternatives assume improvements included in current City and regional plans, as shown in **Exhibit 3.10-23** and **Exhibit 3.10-24**. Key projects include the West Seattle and Ballard Link light rail extensions, Waterfront Seattle improvements along Alaskan Way, and an expanded network of bicycle infrastructure.

To develop the future forecasts for this project, Fehr & Peers applied a version of the PSRC regional trip-based travel demand model developed for the West Seattle and Ballard Link Extension (WSBLE) project and the Ballard-Interbay Regional Transportation (BIRT) System project. The model estimates the demand for person and freight travel across a range of travel modes: private automobiles, trucks, transit vehicles, walking, and biking. The truck model defines a truck based on relative weight classes and separates medium and heavy trucks based on the definitions used by WSDOT for collecting truck counts.

This version of the PSRC model is an appropriate tool for this project given its level of detail in the study area (in terms of both land uses and transportation network), assumptions for transit investments, and future land use assumptions that are consistent with growth anticipated through 2042. While the No Action Alternative reflects land uses anticipated through 2042, the potential land use changes under the Action Alternatives extend slightly farther to a 2044 horizon year. This provides a conservative basis to evaluate potential impacts of the Action Alternatives compared to Alternative 1 No Action.

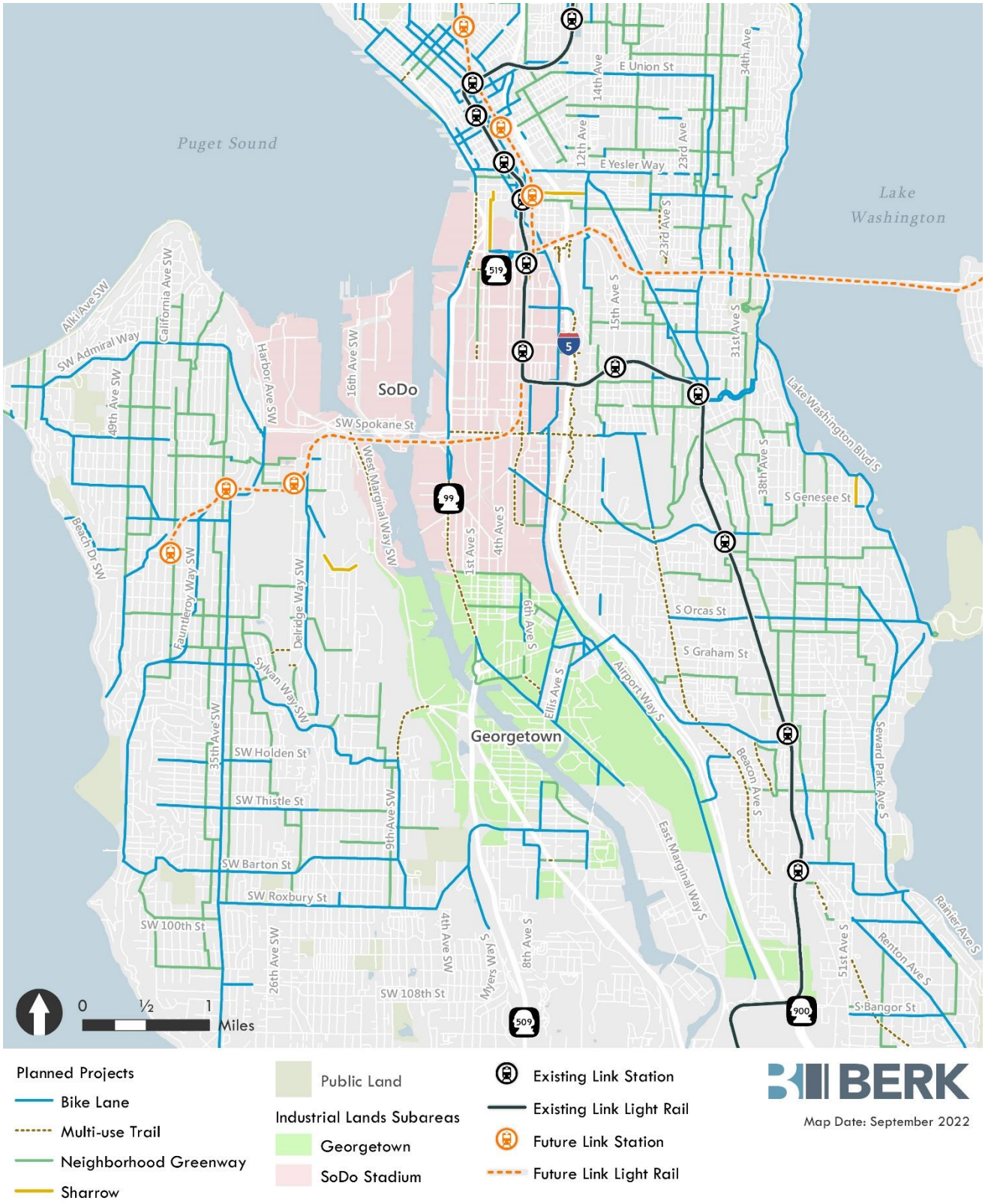
The model contains household and employment forecasts consistent with regional assumptions from PSRC and the City's MHA growth distributions. The model also incorporates planned transportation facilities into the model network, such as the Link light rail extensions to Ballard and West Seattle. Note that the Alternative 1 No Action model reflects the current capacities and configurations for the Magnolia Bridge and Ballard Bridge.

Exhibit 3.10-23-~~20~~ Planned Transportation Network Improvements—Ballard Interbay Northend MIC, 2044



Source: Fehr & Peers, 2021.

Exhibit 3.10-24-~~21~~ Planned Transportation Network Improvements—Greater Duwamish MIC, 2044



Note: Map was updated to include minor revisions to planned improvements.
Source: Fehr & Peers, 2021.

Thresholds of Significance

This section outlines the thresholds used to determine impacts of Alternative 1 No Action and the Action Alternatives; see **Data & Methods** section for background on these criteria. A transportation impact under *Alternative 1 No Action* is identified if:

- A corridor would have a travel time LOS grade of F.
- A screenline would exceed the threshold stated in the Seattle Comprehensive Plan by at least 0.01.
- A sector would have a percentage of SOV travel exceeding the target stated in the Seattle Comprehensive Plan.
- A transit screenline would have passenger load factor exceeding 1.0.

Potential impacts of Alternative 1 No Action related to active transportation, parking, and safety are discussed qualitatively.

Thresholds of significance were developed based on typical City of Seattle SEPA practices and with the intent of recognizing impacts of a magnitude beyond typical model variation and/or daily observed variation. A transportation impact is identified under an *action alternative* if:

- A study corridor that would operate at an acceptable travel time LOS under Alternative 1 No Action would operate at LOS F **or** the travel time along a study corridor identified as an impact under Alternative 1 No Action would increase by at least 5%.
- A screenline that would operate acceptably under Alternative 1 No Action would exceed the threshold **or** a screenline that is identified as an impact under Alternative 1 No Action would increase by at least 0.01.
- A sector that would operate acceptably under Alternative 1 No Action would exceed its mode share target **or** the mode share in a sector that is identified as an impact under Alternative 1 No Action would increase by at least 0.5%.
- A transit screenline that would operate acceptably under Alternative 1 No Action would exceed 1.0 **or** a transit screenline that is identified as an impact under Alternative 1 No Action would increase by at least 0.05.

Potential impacts of the Action Alternatives related to active transportation, parking, and safety are discussed qualitatively based on the following considerations:

- Active Transportation: A significant impact is identified if an action alternative would preclude planned pedestrian and bicycle investments or increase the number of people walking or biking compared to Alternative 1 No Action in locations with network gaps.
- Parking: A significant impact is identified if an action alternative is expected to result in parking demand exceeding supply for a sustained period and by a substantive amount compared to Alternative 1 No Action.
- Safety: A significant impact is identified if an action alternative is expected to increase the rate of serious and fatal collisions in the study area compared to Alternative 1 No Action.

Impacts Common to All Alternatives

Freight Mobility & Access

Corridor-specific travel time findings for roadway users—including freight—are presented by alternative subsequently in this chapter. Although freight uses the same facilities, traffic congestion is more difficult for large trucks to navigate, and trucks typically travel at slower speeds than general auto traffic. For those freight corridors that are projected to experience increased congestion compared to Alternative 1 No Action, it is also expected that travel time reliability may be affected. Traffic congestion leads to worse reliability on the roadway network as the system is less resilient to recover from disruptions such as blocking incidents; moreover, freight operators have a more difficult time maneuvering in traffic congestion. Therefore, lower LOS on study area roadways would also likely lead to lower reliability in travel times, a particular concern for freight operators.

This programmatic EIS addresses area-wide land use zoning changes, rather than a project-specific proposal. The proposal may result in a wide range of individual projects implemented over a long timeframe and across a large geographic area. Because the specific locations and sizes of development are unknown at this time, it is not possible to know how freight may be impacted by changes to loading zones or access needs at particular locations. These are potentially significant impacts that would need to be analyzed and mitigated at the project level. See the Parking section for a discussion of potential impacts to overall parking supply and demand, which would affect the availability of truck parking in the study area.

The alternatives under consideration are not expected to materially affect rail operations. The railroads in the study area are privately operated and regularly adjust their operations to respond to changing needs. At-grade rail crossing safety is discussed in the Safety section.

Active Transportation

The City is continually planning and implementing improvements to active transportation facilities through the *Pedestrian Master Plan* (PMP), *Bicycle Master Plan* (BMP), and various subarea planning efforts. The City will soon be developing a citywide transportation plan that will bring together its individual modal plans into a single integrated document.

The PMP includes the identification of a Priority Investment Network (PIN) which designates street segments that should be prioritized for investment. However, the PIN identifies many more locations than can be improved in the near term given the high cost of infrastructure. Given the City's emphasis on prioritizing neighborhoods with historical underinvestment, areas within the Greater Duwamish MIC would likely be prioritized higher than areas in the BINMIC. Among many other factors, the planning process will consider development trends and changes in land use patterns for continued prioritization and phasing of infrastructure improvement projects.

SDOT publishes a BMP Implementation Plan every two years detailing the infrastructure projects that will be constructed over the following four years. Between 2016 and 2020, SDOT completed more than 45 miles of bicycle facility improvements including bike lanes, protected bike lanes, trails, and neighborhood greenways. It is assumed that the City will continue to implement its BMP network under whichever alternative is pursued, though the pace of improvements will vary over time depending on funding availability.

Sound Transit's light rail extensions to Ballard and West Seattle is planned to be complete by 2044, providing frequent, high-capacity service along the Elliott Avenue W/15th Avenue NW corridor in the BINMIC and across the Duwamish Waterway in the Greater Duwamish MIC. These Link extensions would construct three stations within the BINMIC—Ballard, Interbay (in the vicinity of Dravus Street), and Smith Cove—and one new station in Delridge on the western edge of the Greater Duwamish MIC. The Greater Duwamish MIC also includes the existing Stadium and SODO stations. The light rail expansion would include a new station at SODO for the West Seattle Link Extension and potentially relocating the Stadium Station for the Ballard Link Extension (depending on the alternative selected).

It is expected that pedestrian and bicycle activity will continue to increase compared to existing conditions, both due to overall growth in the study area as well as an increasing share of people walking and biking. Therefore, under Alternative 1 No Action, there would be more demand in areas that lack sidewalks, curb ramps, pedestrian crossings, and dedicated bicycle facilities, particularly in industrial areas (as detailed in the Affected Environment section). While many locations in the study area would benefit from improvements to make walking and biking more comfortable, capacity constraints on active transportation facilities are rare throughout the study area and are typically only a concern at network bottlenecks (for example the walkway along the Ballard Bridge) or areas of extremely high pedestrian activity. Specific areas that may experience substantial increases in the number of people walking and biking are discussed in the following sections.

The Action Alternatives are not expected to preclude any planned pedestrian and bicycle improvements and would likely result in improved infrastructure in the areas zoned as Industry & Innovation and Urban Industrial because they would be subject to development standards for pedestrian and cyclist-oriented frontage improvements. However, because the Action Alternatives would result in higher levels of growth than Alternative 1 No Action, there would likely be more people walking and biking in areas with existing network gaps. Therefore, a significant impact to pedestrian and bicycle travel is identified under alternatives 2, 3, and 4 and the Preferred Alternative.

Ballard, Interbay Dravus, & Interbay Smith Cove

The BMP includes a variety of planned projects in the vicinity of the BINMIC including completion of the Burke-Gilman Trail "missing link" and multi-use trails on the Ballard Bridge and West Galer Street Flyover. Bicycle network connections are also recommended between

the Ballard Locks and the Ship Canal Trail, 20th Avenue W between Thorndyke Avenue W and the Elliott Bay Trail, and across the W Dravus Street bridge, among other areas.

Pedestrian and bicycle activity would increase substantially in the vicinity of the planned light rail stations as all riders would access the stations by walking, biking, transit, or pickup/dropoff (no on-site parking is being provided). Among the new stations, the highest numbers of people walking and biking would occur near the Ballard station as walking and biking access are more limited near the Interbay and Smith Cove stations due to topography, connectivity, and surrounding land uses. Key connections to the stations would include the Elliott Bay Trail, Ship Canal Trail, Magnolia Connector Trail, West Galer Street Flyover, and Helix pedestrian bridge depending on which station options are selected.

Based on the proposed development standards, the areas that would be zoned as Industry & Innovation and Urban Industrial would be the most likely to see substantial increases in people walking and biking. Within the Ballard, Interbay Dravus, and Interbay Smith Cove areas, the Action Alternatives would implement those development standards along the north side of Lake Union, slightly inland areas of Fremont and Ballard, and along the 15th Avenue W/Elliott Avenue W corridor.

SODO/Stadium & Georgetown

Among other projects, the BMP recommends improvements such as an extension of the SODO Trail south to Georgetown, a combination of protected bike lanes and a multi-use trail along E Marginal Way S between S Spokane Street and Ellis Avenue S, and extending the Duwamish River Trail from its current northern terminus to the West Seattle Bridge.

While the SODO and Stadium stations are already hubs of pedestrian and bicycle activity, the growing ridership with Sound Transit's system expansion will also increase the number of people walking and biking in the immediate vicinity of the stations. In contrast, the Delridge station will be a new hub of activity as the neighborhood is currently primarily residential. No on-site parking is being provided so all riders will access the stations by walking, biking, transit, or pickup/dropoff.

Based on the proposed development standards, the areas that would be zoned as Industry & Innovation, Urban Industrial, and Seattle Mixed would be the most likely to see substantial increases in people walking and biking. Within the SODO/Stadium and Georgetown/South Park subareas, the Action Alternatives would implement those development standards in areas of SODO north of S Lander Street, Georgetown, South Park, and north Delridge.

Parking

The City prioritizes the use of its public right-of-way to balance competing needs, including people walking, biking, taking transit, and driving whether for personal travel or for goods movement. The "flex zone" along the curb may be used for parking, bus stops, passenger loading, freight loading, travel lanes during peak times or other activating uses such as parklets

or play streets. Decisions on the use of the flex zone will continue to be made by the City as the context evolves throughout the study area. While the use of the flex zone will vary by location, it is unlikely that the overall supply of on-street parking in any subarea would increase under any of the alternatives. Industrial areas may be more likely to see changes in parking supply as redevelopment triggers frontage improvements such as adding curbs and delineating parking spaces in rights-of-way that were previously used for informal parking.

While parking demand varies throughout the study area, there are some localized areas where on-street parking demand exceeds parking supply, particularly demand for truck parking given the industrial nature of the MICs. Given projected growth throughout the city and that on-street parking is unlikely to increase in the future, a parking impact is expected under Alternative 1 No Action. With the increase in development expected under the Action Alternatives, parking demand would be higher than Alternative 1 No Action. Because the Action Alternatives are expected to increase demand in localized areas that already exceed supply, potentially for a sustained period and by a substantive amount compared to Alternative 1 No Action, significant adverse parking impacts are expected under all of the Action Alternatives. Impacts are expected to be greater under alternatives 3 and 4, which have higher levels of development planned than Alternative 2 or the Preferred Alternative.

The location and severity of impacts would vary by alternative depending on the concentrations of land use. The degree of parking supply impacts experienced in any given neighborhood would depend on many factors, including how much off-street parking is provided by future development projects, as well as varying conditions related to on-street parking patterns for both freight trucks and passenger vehicles and City regulations (e.g., pricing, enforcement, RPZ permits, etc.) within each neighborhood.

Ballard, Interbay Dravus, & Interbay Smith Cove

The Ballard, Interbay Dravus, and Interbay Smith Cove subareas will experience a substantial transportation change with the construction of new light rail stations for the Ballard Link light rail extension. The flex zones in the immediate vicinities of the stations (specific locations are still to be determined) are likely to experience changes as they will accommodate bus stops, pickup/dropoff areas, and potentially bus layover areas. None of the stations are planned to include parking facilities. While Sound Transit is planning for most access to occur via transit, walking, biking, and pickup/dropoff, some riders may drive to the station and seek parking in nearby areas, increasing baseline parking demand within walking distance of each station.

The City has already developed approaches to manage this type of “hide and ride” parking demand at new light rail stations, such as the U District and Roosevelt. It is assumed similar efforts will be made for the new light rail stations in the study area. The City’s management strategies include on-street parking surveys before station openings to identify and implement appropriate mitigation elements prior to station opening; mitigation measures such as paid parking meters, time-limit signs, passenger drop-off/pick-up zones, truck and load/unload zones, and residential parking zones (RPZs) within a 1/4-mile radius of each station; ongoing

monitoring of parking controls after the system opens to determine if RPZ boundaries or other on-street controls are insufficient; and parking enforcement.

Based on the proposed development standards and locations, the areas that would be zoned as Industry & Innovation and Urban Industrial would be the most likely to see increases in parking demand that exceed parking supply. Within the Ballard, Interbay Dravus, and Interbay Smith Cove areas, the Action Alternatives would implement those development standards along the north side of Lake Union, areas of Fremont and Ballard, and along the 15th Avenue W/Elliott Avenue W corridor.

SODO/Stadium & Georgetown

The SODO/Stadium area includes two existing light rail stations which will have ridership increases with the expansion of the light rail system. Improvements at these stations may result in changes to the flex zones in the immediate vicinity but they are likely to be minor. The new Delridge station would be located near the edge of the study area and would result in changes to the flex zones in the immediate vicinity to accommodate uses such as bus stops and pickup/dropoff areas. No parking facility is planned for the station area. While Sound Transit is planning for most access to occur via transit, walking, biking, and pickup/dropoff, it is possible some riders may drive to the station and seek parking in nearby areas, increasing baseline parking demand within walking distance of each station. The management approaches described above for the Ballard Link light rail extension would also likely be in place for the station areas within the Greater Duwamish MIC.

Based on the proposed development standards and locations, the areas that would be zoned as Industry & Innovation, Urban Industrial, and Seattle Mixed would be the most likely to see increases in parking demand that exceed available supply. Within the SODO/Stadium and Georgetown/South Park subareas, the Action Alternatives would implement those development standards in areas of SODO north of S Lander Street, Georgetown, South Park, and north Delridge.

Safety

The City has a Vision Zero policy that aims to reduce the number of fatalities and serious injuries to zero by 2030. This goal, and the policies and strategies supporting it, will continue to be pursued under whichever land use alternative is selected. Recent examples of policy changes include widespread reductions in speed limits along city streets and the introduction of leading pedestrian intervals to make people walking more visible to vehicles (timing signals to give people walking a head start before the vehicles receive a green light). SDOT also regularly studies intersections and corridors that have been identified as needing safety improvements by the community or through collision data review. The types of location-specific measures that can be implemented depending on the context include traffic calming treatments, new traffic signals, separation of facilities for vulnerable users, and hardened centerlines (small rubber barrier that require drivers making left turns to slow down and make

squarer left turns). The City will continue to monitor traffic safety and take any necessary steps to address areas of high need particularly for the most vulnerable users. Over time, it is expected that the safety program will result in decreases to the number of traffic fatalities and serious injuries.

The Action Alternatives are expected to result in between 0.8 to 2.5% more vehicle miles traveled than Alternative 1 No Action in the Greater Duwamish MIC area and roughly 1.4 to 5.1% more vehicle miles travelled than Alternative 1 No Action in the BINMIC area. In terms of relative exposure among the alternatives, alternatives 3 and 4 are expected to have more substantive VMT increases in the Duwamish MIC area: 2.3% and 2.5% increases for Alternative 3 and 4, respectively compared to 0.8% and 1.0% for Alternative 2 and the Preferred Alternative, respectively. Likewise, VMT increases in the BINMIC area would be 4.3% and 5.1% under alternatives 3 and 4, respectively, compared to more limited increases of 1.4% and 2.5% under Alternative 2 and the Preferred Alternative.

This could potentially lead to an increase in the number of collisions. In addition, the Action Alternatives may result in an increased number of truck and vehicle conflicts with vulnerable users such as people walking, ~~and~~ biking, and rolling in industrial areas, as outlined in the 2020 Bicycle and Pedestrian Safety Analysis. Risks to vulnerable users are heightened in areas with large truck activity which is inherent to industrial operations. Truck drivers have a limited range of sight distance and often encounter turning radii conflicts that are not expected from smaller vehicles. Because trucks represent a higher proportion of fatal collisions than any other type of collision (as documented in the *Freight Master Plan*), it is reasonably likely that the Action Alternatives could result in an increased rate of serious and/or fatal collisions in the study area. Likewise, the Action Alternatives would result in more vulnerable users in areas with routine at-grade train crossings, which has the potential to lead to an increase in the number of rail collisions.

Due to the potential increase of collisions between trucks/vehicles/rail and vulnerable users, a significant impact is expected under the Action Alternatives. Site-specific issues cannot be addressed at this level of analysis. However, individual development applications would be reviewed through the City's permitting process, at which time the City may identify required safety features for the specific site.

Pavement Condition

As noted above, the Action Alternatives are expected to result in an increased number of vehicle miles traveled in the Greater Duwamish MIC and BINMIC, areas of which already have worn pavement condition due to regular heavy vehicle use. While increased use of these roadways may incrementally degrade pavement condition further, vehicles are subject to gas taxes and weight-based license fees that can be directed toward more frequent maintenance of facilities. Therefore, while the Action Alternatives may cause some impact to roadway pavement condition, it is not expected to rise to a level of significance.

State Highway System

Per WSDOT Design Manual Chapter 1130.09(2)(a), published in September 2021, WSDOT considers any proposal that meets or exceeds either or both of the following thresholds to have a probable significant adverse impact to the state highway system:

- Addition of 10 or more AM or PM peak hour vehicle trips assigned to an individual approach leg to a state highway intersection.
- Addition of 25 or more AM or PM peak hour vehicle trips assigned to a state highway segment (two-way travel) or intersection (total 25 trips all legs).

Changes in traffic volumes in the regional travel demand model were reviewed across the state highway system in the study area vicinity. It was determined it was likely that the cumulative development proposed by each Action Alternative would exceed one or both of the above thresholds on I-5, SR 99, SR 509, and SR 599 throughout the city with alternatives 3 and 4 having higher increases than Alternative 2 and the Preferred Alternative. This is not an impact threshold currently adopted by the City of Seattle. It is a potential impact with respect to consistency with the WSDOT Design Manual. The City of Seattle will coordinate further with WSDOT regarding the individual project review process to determine impacts to the state highway system of any specific development proposal.

Equity & Environmental Justice Considerations

The City of Seattle developed a Racial and Social Equity Index that combines data on race, ethnicity, and socioeconomic and health disadvantages to identify neighborhoods with large proportions of priority populations as residents. Much of the SODO/Stadium Subarea as well as the South Park neighborhood were found to have among the highest disadvantages in the city.

The Action Alternatives—particularly alternatives 3 and 4—would result in more land use growth compared to Alternative 1 No Action particularly in the SODO/Stadium and South Park neighborhoods. With respect to transportation, this growth could provide both beneficial and adverse impacts to equity and environmental justice. Additional growth would bring increased traffic volumes, which in turn may bring impacts to the safety of people walking and biking, parking availability, and travel time delays to areas with high proportions of priority populations. At the same time, increased development could also bring improved infrastructure to neighborhoods with histories of long-term underinvestment. This is particularly the case for areas that would be rezoned as Industry & Innovation and Urban Industrial because those land use concepts would have development standards requiring frontage improvements such as sidewalks, pedestrian lighting, and street trees—all of which could be beneficial in progress toward more safe, connected, and accessible neighborhoods.

Impacts of Alternative 1 No Action

This section summarizes analysis results and environmental impacts of Alternative 1 No Action. Alternative 1 No Action serves as the baseline for the impact analysis of the Action Alternatives. It represents the operation of the transportation system if no zoning or network changes were made in the study area. However, growth would continue to occur under Alternative 1 No Action consistent with current adopted zoning. Alternative 1 No Action is expected to result in roughly 23,500 additional jobs in the study area compared to existing conditions. Residential development would be very minor—approximately 75 new dwellings over the study area. For both employment and residential uses, the growth is expected to be highest in the SODO/Stadium and Georgetown/South Park subareas.

Exhibit 3.10-25 summarizes the number of person trips expected to be generated during the PM peak hour by the land uses in the study area by mode of travel.

Exhibit 3.10-25 2044 Alternative 1 No Action Person Trips in Study Area—PM Peak Hour

Mode	Alternative 1 No Action	
SOV (in passenger vehicles)	35,400	40.5%
HOV (in passenger vehicles)	32,800	37.5%
Transit	4,800	5.5%
Walk	12,400	14.2%
Bike	2,100	2.4%
Total	87,500	100%

Source: Fehr & Peers, 2022.

~~Transit~~

~~As noted in the Active Transportation section, the study area would experience a fundamental change in transit service by 2044. Sound Transit's light rail extensions to Ballard and West Seattle would be complete, providing frequent, high-capacity service along the Elliott Avenue W/15th Avenue NW corridor in the BINMIC and across the Duwamish Waterway in the Greater Duwamish MIC. In addition to these routes directly affecting the study area, Sound Transit's light rail system would also include extensions north to Everett, east to Redmond and Issaquah, and south to the Tacoma Dome. Fixed route bus service would be restructured, where appropriate, to better connect surrounding neighborhoods to light rail stations and have fewer routes running into the downtown core.~~

~~For the existing conditions evaluation, there is extremely granular data available identifying the maximum load that occurs along an entire route for every trip in the peak period. For the future conditions evaluation, transit load factors are estimated using average passenger loads, as that is the metric available from traditional travel demand modeling tools. On average~~

across the studied routes, the maximum passenger load is approximately 78% higher than the average passenger load, though typically only for a short segment of the transit route. To reflect an appropriately conservative capacity against which *average* passenger loads should be measured, Sound Transit's planning load of 148 passengers per car is used as the light rail capacity and the number of seats on each bus is used as the bus capacity. In other words, both types of transit vehicles are able to accommodate higher capacities than are used for this analysis. The forecasted passenger loads for Alternative 1 No Action are consistent with Sound Transit's ongoing planning for the West Seattle and Ballard Link Extensions.

Exhibit 3.10-22 summarizes the average PM peak hour passenger load factor for the transit routes that would operate along key corridors in the study area. The passenger load factors include both light rail and bus services.

Exhibit 3.10-22 PM Peak Hour Passenger Load Factors—Alternative 1 No Action

Note: Inbound refers to travel into the downtown area and outbound travel out of the downtown area.
Source: King County Metro, Fall 2018; Fehr & Peers, 2021.

As is the case under current conditions, outbound transit (i.e., routes leaving Downtown or the U District) are expected to have higher passenger loads than inbound routes during the PM peak hour with the inverse true during the AM peak hour. While some of the routes traveling across the study area screenlines may operate over their crowding threshold for some individual trips, the load factors indicate that there would be adequate transit capacity across most of the transit screenlines. The exception is the outbound direction across 8th Avenue NW (from the U District to Ballard) which is expected to have a passenger load impact under Alternative 1 No Action. Specific routes are discussed below.

Ballard, Interbay Dravus, & Interbay Smith Cove

The Ballard Link Extension would construct three stations within the BINMIC: Ballard, Interbay (in the vicinity of Dravus Street), and Smith Cove. With trips running approximately every five minutes and each trip able to comfortably carry nearly 600 riders,[15] transit capacity along the corridor would dramatically increase compared to existing conditions. This is reflected in the average outbound passenger load factor of 0.39 across the Ballard Bridge and 0.59 north of W Mercer Place which indicate that transit demand would be accommodated by the planned capacity.

The screenline east of 8th Avenue NW shows a different trend as it includes east-west bus service between Ballard and the U District which would not be replaced by high-capacity transit. Demand across that screenline is expected to grow in the future with average passenger loads exceeding seated capacity indicating some passengers would need to stand. In practice, King

[15] This assumes four-car trains at Sound Transit's planning load of 148 passengers per car.

~~County Metro continually reallocates resources based on demand and it is likely that frequencies would be increased if necessary for those crosstown routes to alleviate crowding.~~

~~SODO/Stadium & Georgetown/South Park~~

~~Both the Ballard-Tacoma and West Seattle-Everett Link lines, along with multiple bus routes, would cross the screenline north of Lander Street. With the enhanced capacity, average passenger loads are expected to be roughly 0.75 indicating most trips would operate within the planned capacity.~~

~~The majority of transit riders crossing the West Seattle Bridge would use the new Link light rail extension which is expected to run roughly every six minutes. With the large increase in capacity, passenger loads are expected to be well within planned capacity, at 0.35 for an average passenger load during the PM peak hour.~~

Roadway Users~~Auto & Freight~~

Under Alternative 1 No Action, growth would continue throughout the city and region, resulting in increases in traffic volumes, including passenger vehicles and trucks. However, traffic volume growth rates within the study area are expected to be relatively low given that many facilities already operate with congestion during peak periods and new high-capacity transit options would be available, making non-auto modes increasingly competitive. This is consistent with traffic growth patterns over the past decade. According to SDOT's 2020 Traffic Report, average daily traffic volumes remained essentially flat over the 2009-2019 period despite a 24% increase in the City's population and a 23% increase in regional employment.[16]

Magnolia Bridge Replacement

All alternatives assume that the Magnolia Bridge retains the same fundamental configuration and connections as exist today. However, the City is also considering an option that would instead replace the Magnolia Bridge with a new bridge along Armory Way connecting to Thorndyke Avenue W at W Halladay Street. Refer to the BIRT Report for more information.

Travel Time

Using the HCM guidelines for defining LOS thresholds as described in the Data & Methods section, **Exhibit 3.10-26** summarizes travel time conditions along each of the study corridors under the No Action Alternative. Travel times for 2019 are also shown to illustrate change over time under Alternative 1 No Action. Note that these results ~~also represent~~ indicate relative effects on both auto traffic and freight operations which travel in the same lanes~~ as auto traffic~~.

[16] Seattle Department of Transportation, 2020 Traffic Report. Available at: https://www.seattle.gov/Documents/Departments/SDOT/About/DocumentLibrary/Reports/2020_Traffic_Report.pdf. Accessed September 7, 2021.

Although freight uses the same facilities, traffic congestion is more difficult for large trucks to navigate, and trucks typically travel at slower speeds than general auto traffic. While the actual travel times for large trucks may be higher, the magnitude of change is still reflective of how conditions will vary across alternatives. The travel times below are rounded to the nearest half minute.

Travel time reliability is also a key concern for travelers, particularly for freight operators. Traffic congestion leads to worse reliability on the roadway network as the system is less resilient to recover from disruptions such as blocking incidents. Therefore, lower LOS on study area roadways would also likely lead to lower reliability in travel times

Exhibit 3.10-26-~~23~~ PM Peak Hour Travel Time LOS—Alternative 1 No Action

		PM Peak Hour LOS / Travel Time (minutes)			
		Existing Conditions		Alternative 1 No Action	
ID	Corridor	N/E	S/W	N/E	S/W
Ballard Interbay Northend MIC					
1	15th Ave W from Magnolia Bridge to NW Leary Way	E / 11.5	A / 4.5	E / 12.5	A / 5
2	15th Ave NW from NW Leary Way to N 85th St	E / 9.5	C / 6.5	E / 9.5	C / 6.5
3	Leary Ave NW/ Leary Way NW/ N 36th S/ Fremont Bridge between NW Market St and W Nickerson St/Westlake Ave	C / 11	C / 12	C / 11	D / 13
4	Shilshole Ave NW between NW Market and 15th Ave NW	B / 2.5	D / 3.5	B / 2.5	D / 4
5	NW Market St/N 50th/ 46th St between 24th Ave NW and I-5	C / 14	D / 16.5	C / 14	D / 16.5
6	W Nickerson St/Westlake Ave N between 15th Ave W and Mercer St	C / 13	C / 11.5	C / 13.5	C / 12.5
7	W Dravus St between 15th Ave W and 20th Ave W	E / 2	D / 1.5	E / 2	D / 1.5
8	Elliott Ave W between Magnolia Bridge and Wall St	B / 5.5	B / 6	B / 6	B / 6.5
9	W Mercer St from Elliott Ave W to I-5	F / 32	F / 22	**F / 32**	**F / 22.5**
10	Denny Way from Elliott Ave W to I-5	F / 14.5	E / 11	**F / 15**	**F / 11.5**
11	Magnolia Bridge between 15th Ave W and Thorndyke Ave W	B / 2.5	A / 1.5	B / 2.5	A / 1.5
12	SR 99 between N 46th St and Denny Way[1]	C / 8.5	E / 14	D / 10.5	**F / 14.5**
13	W Emerson St between 15th Ave W and Gilman Ave W	F / 6	F / 4	**F / 6**	**F / 4**
14	N 85th St between 15th Ave NW and I-5	E / 13	E / 14.5	E / 13.5	E / 14.5
15	I-5 between N 85th Street and Madison Street[1]	F / 19	F / 24	**F / 22.5**	**F / 26**
Greater Duwamish MIC					
1	1st Ave S between S Royal Brougham Way and SR 99	C / 11	C / 11	C / 11	C / 12
2	4th Ave S between Seattle Blvd S to E Marginal Way S	C / 12	C / 12.5	C / 12.5	C / 13.5

		PM Peak Hour LOS / Travel Time (minutes)			
		Existing Conditions		Alternative 1 No Action	
ID	Corridor	N/E	S/W	N/E	S/W
3	6th Ave S between Seattle Blvd S to Spokane St Viaduct	C / 6.5	C / 6	C / 6.5	C / 6.5
4	Airport Way S/ Seattle Blvd S between S Royal Brougham Way to S Boeing Access Rd	A / 16.5	A / 15.5	A / 16.5	A / 16
5	West Seattle Bridge/Spokane St Viaduct between 35th Ave SW and I-5	C / 6.5	E / 10	C / 6.5	E / 10
6	Spokane St Bridge between Harbor Ave SW and SR 99	B / 4.5	B / 4.5	B / 4.5	B / 4.5
7	E Marginal Way S between SR 99 and S Boeing Access Rd	C / 8.5	D / 10.5	C / 8.5	D / 10.5
8	Alaskan Way S from Broad St to SR 99	D / 9	F / 13	E / 10.5	**F / 14.5**
9	S Royal Brougham Way between SR 99 and Airport Way S	F / 4.5	D / 3	**F / 4.5**	D / 3
10	Edgar Martinez Dr S between SR 99 and 4th Ave	F / 2.5	F / 2.5	**F / 3**	**F / 2.5**
11	S Holgate St between 1st Ave and Airport Way S	D / 3	F / 4.5	D / 3	**F / 4.5**
12	S Lander St between 1st Ave and Airport Way S	E / 4	E / 4	E / 4	E / 4
13	S Lucile St between SR 99 and Airport Way S	D / 4	E / 5	D / 4	E / 5
14	W Marginal Way SW between West Seattle Bridge and 2nd Ave SW	A / 5	A / 4.5	A / 5	A / 5
15	S Michigan St/ Corson Ave S between E Marginal Way S and I-5	C / 3.5	E / 5.5	C / 3.5	E / 5.5
16	E Marginal Way S/SR 99 between S Atlantic Street and 1st Ave S Bridge	A / 9	A / 9	A / 9	A / 9
17	I-5 between Madison Street and SR 599[1]	E / 25.5	F / 30	**F / 27.5**	**F / 31**
18	SR 509 between SR 99 and SR 518[1]	A / 6.0	C /9.0	A / 6.0	D / 11.5
19	SR 99/599 between SR 509 and I-5[2]	A / 6.0	B / 8.0	A / 6.5	B / 8.0

Note: Cells shown in bold indicate an impact.
1. WSDOT sets a LOS D standard on I-5, SR 509, and SR 99 north of SR 509.
2. WSDOT sets a LOS E standard on SR 99/599 between SR 509 and I-5.
Sources: Wejo, 2019; Fehr & Peers, 2021.

Overall, travel times along the study corridors are expected to remain relatively consistent between 2019 and 2044. During the PM peak hour under the 2044 Alternative 1 No Action, most corridors would continue to operate at LOS E or better in both directions with travel time increases of up to two minutes (the exception is northbound I-5 from Madison Street to N 85th Street with an increase of 3.5 minutes). Corridors operating at LOS F in both existing and 2044 Alternative 1 No Action, constituting an impact to auto and freight, include:

- Both directions of W Mercer Street from Elliott Avenue W to I-5
- Eastbound Denny Way from Elliott Avenue W to I-5
- Both directions of W Emerson Street from Gilman Avenue W to 15th Avenue W
- Both directions of I-5 between N 85th Street and Madison Street
- Southbound Alaskan Way S from Broad Street to SR 99
- Southbound Alaskan Way S from Broad Street to SR 99
- Eastbound S Royal Brougham Way between SR 99 and Airport Way S
- Both directions of Edgar Martinez Drive S between SR 99 and 4th Avenue
- Westbound S Holgate Street from Airport Way S to 1st Avenue
- Southbound I-5 from Madison Street to SR 599

In addition to these corridors, the following corridors that operated at LOS E or better under existing conditions would operate at LOS F under 2044 Alternative 1 No Action, constituting an impact to auto and freight:

- Westbound Denny Way from Elliott Avenue W to I-5
- Southbound SR 99 between N 46th Street and Denny Way
- Northbound I-5 from SR 599 to Madison Street

The following corridors are expected to have the largest increases in travel times, but would still operate at LOS E or better:

- Northbound SR 99 between N 46th Street and Denny Way
- Northbound Alaskan Way between SR 99 and Broad Street

Buses that operate on the impacted corridors would also experience the same travel time conditions.

Mode Share

The Alternative 1 No Action SOV mode share in the City of Seattle is summarized by sector using the PSRC model and is shown in **Exhibit 3.10-27**. The model predicts that SOV mode shares would decrease by 2044, with changes ranging from one to three percent depending on the sector. The smallest decrease is expected in the Duwamish sector while the Magnolia/Queen Anne sector would experience the largest decrease of drive-alone trips. Although all three sectors are expected to have lower SOV shares under the 2044 Alternative 1 No Action scenario than existing conditions, they are still expected to be two to three percentage points above the City's 2035 SOV targets. Therefore, there are expected to be mode share impacts for all three study area sectors under Alternative 1 No Action.

Exhibit 3.10-27~~-24~~ 2044 Alternative 1 No Action SOV Mode Share—PM Peak Period

Sector	2035 SOV Target	Existing SOV Share	Alternative 1 No Action SOV Share
Duwamish	51%	53.5%	**52.6%**
Magnolia/Queen Anne	38%	43.1%	**40.1%**
Northwest	37%	41.6%	**39.7%**

Note: Cells shown in bold indicate an impact.
Source: PSRC, 2021; Fehr & Peers, 2021.

Screenlines

The City's screenline thresholds are in the form of a volume-to-capacity (v/c) ratio: the number of vehicles crossing the screenline compared to the designated capacity of the roadways crossing the screenline. **Exhibit 3.10-28** summarizes the projected PM peak hour v/c ratios across each screenline in 2044. All screenline locations are forecasted to be under the LOS threshold defined by the City of Seattle, therefore no screenline impacts are expected under Alternative 1 No Action. There are no substantial capacity projects planned for construction within the study area between the existing and 2044 forecast year, so all changes in v/c ratios are due to traffic volume increases.

Within the study area, the greatest v/c ratio increases are seen at the South City Limit screenline, the Ballard Bridge, the Fremont Bridge, and south of Jackson Street. The Ballard Bridge screenline is the closest to reaching the City's screenline threshold.

Exhibit 3.10-28-~~25~~ Screenline Volume-to-Capacity Ratio—Alternative 1 No Action

Screenline	Location	v/c Ratio Threshold	PM Peak Period v/c Ratio			
			Existing Conditions		Alt. 1 No Action	
			N/E	S/W	N/E	S/W
2	Magnolia	1.0	0.51	0.54	0.51	0.54
3.11	Duwamish River—West Seattle Bridge and Spokane Street	1.2	0.57	0.53	0.57	0.53
3.12	Duwamish River—1st Avenue S and 16th Avenue S	1.2	0.54	0.51	0.53	0.52
4.13	South City Limit—SR 99 to Airport Way S	1.0	0.40	0.45	0.47	0.50
5.11	Ship Canal—Ballard Bridge	1.2	1.01	0.75	1.11	0.78
5.12	Ship Canal—Fremont Bridge	1.2	0.59	0.66	0.68	0.68
5.13	Ship Canal—Aurora Bridge	1.2	0.30	0.34	0.35	0.35
7.11	West of Aurora Avenue—Fremont Place N to N 65th Street	1.0	0.54	0.62	0.55	0.64
8	South of Lake Union	1.2	0.62	0.69	0.43	0.51
9.12	South of Spokane Street—E Marginal Way to Airport Way S	1.0	0.47	0.48	0.51	0.49
10.11	South of S Jackson Street—Alaskan Way S to 4th Avenue S	1.0	0.58	0.66	0.65	0.68

Source: City of Seattle count data, 2019; Fehr & Peers, 2021.

Transit

As noted in the Active Transportation section, the study area would experience a fundamental change in transit service by 2044. Sound Transit's light rail extensions to Ballard and West Seattle would be complete, providing frequent, high-capacity service along the Elliott Avenue W/15th Avenue NW corridor in the BINMIC and across the Duwamish Waterway in the Greater Duwamish MIC. In addition to these routes directly affecting the study area, Sound Transit's light rail system would also include extensions north to Everett, east to Redmond and Issaquah, and south to the Tacoma Dome. Fixed route bus service would be restructured, where appropriate, to better connect surrounding neighborhoods to light rail stations and have fewer routes running into the downtown core.

For the existing conditions evaluation, there is extremely granular data available identifying the maximum load that occurs along an entire route for every trip in the peak period. For the future conditions evaluation, transit load factors are estimated using average passenger loads, as that is the metric available from traditional travel demand modeling tools. On average across the studied routes, the maximum passenger load is approximately 78% higher than the average passenger load, though typically only for a short segment of the transit route. To

reflect an appropriately conservative capacity against which *average* passenger loads should be measured, Sound Transit's planning load of 148 passengers per car is used as the light rail capacity and the number of seats on each bus is used as the bus capacity. In other words, both types of transit vehicles are able to accommodate higher capacities than are used for this analysis. The forecasted passenger loads for Alternative 1 No Action are consistent with Sound Transit's ongoing planning for the West Seattle and Ballard Link Extensions.

Exhibit 3.10-29 summarizes the average PM peak hour passenger load factor for the transit routes that would operate along key corridors in the study area. The passenger load factors include both light rail and bus services.

Exhibit 3.10-29 PM Peak Hour Passenger Load Factors—Alternative 1 No Action

	Alternative 1 No Action—Average Passenger Load Factor	
Screenline	**Inbound**	**Outbound**
A: East of 8th Avenue NW	0.57	1.28
B: Ballard Bridge	0.09	0.39
C: North of W Mercer Place	0.29	0.59
D: North of Lander St	0.21	0.75
E: West Seattle Bridge	0.12	0.35

Note: Inbound refers to travel into the downtown area and outbound travel out of the downtown area.
Source: King County Metro, Fall 2018; Fehr & Peers, 2021.

As is the case under current conditions, outbound transit (i.e., routes leaving Downtown or the U District) are expected to have higher passenger loads than inbound routes during the PM peak hour with the inverse true during the AM peak hour. While some of the routes traveling across the study area screenlines may operate over their crowding threshold for some individual trips, the load factors indicate that there would be adequate transit capacity across most of the transit screenlines. The exception is the outbound direction across 8th Avenue NW (from the U District to Ballard) which is expected to have a passenger load impact under Alternative 1 No Action. Specific routes are discussed below.

Ballard, Interbay Dravus, & Interbay Smith Cove

The Ballard Link Extension would construct three stations within the BINMIC: Ballard, Interbay (in the vicinity of Dravus Street), and Smith Cove. According to the WSBLE Draft EIS, the following levels of activity are expected at the light rail stations in the area during the PM peak hour: approximately 3,400 people boarding or alighting at the Ballard Station, 1,100 people boarding or alighting at the Interbay Station, and 700 people boarding or alighting at the Smith Cove Station. With trips running approximately every five minutes and each trip able to

comfortably carry nearly 600 riders,[17] transit capacity along the corridor would dramatically increase compared to existing conditions. This is reflected in the average outbound passenger load factor of 0.39 across the Ballard Bridge and 0.59 north of W Mercer Place which indicate that transit demand would be accommodated by the planned capacity.

The screenline east of 8th Avenue NW shows a different trend as it includes east-west bus service between Ballard and the U District which would not be replaced by high-capacity transit. Demand across that screenline is expected to grow in the future with average passenger loads exceeding seated capacity indicating some passengers would need to stand. In practice, King County Metro continually reallocates resources based on demand and it is likely that frequencies would be increased if necessary for those crosstown routes to alleviate crowding.

SODO/Stadium & Georgetown/South Park

Both the Ballard-Tacoma and West Seattle-Everett Link lines, along with multiple bus routes, would cross the screenline north of Lander Street. With the enhanced capacity, average passenger loads are expected to be roughly 0.75 indicating most trips would operate within the planned capacity.

The majority of transit riders crossing the West Seattle Bridge would use the new Link light rail extension which is expected to run roughly every six minutes. According to the WSBLE Draft EIS, the following levels of activity are expected at the light rail stations in the area during the PM peak hour: approximately 3,700 people boarding or alighting at the SODO Station, 700 people boarding or alighting at the Stadium Station, and 8,100-9,300 people boarding or alighting at the CID Station. With the large increase in capacity, passenger loads are expected to be well within planned capacity, at 0.35 for an average passenger load during the PM peak hour.

Impacts of Alternative 2

This section summarizes analysis results and environmental impacts for Alternative 2 (Future of Industry—Limited) in 2044. Compared to Alternative 1 No Action, Alternative 2 would result in 10,900 additional jobs and residential growth would remain essentially flat. As with Alternative 1 No Action, most of the new growth would be concentrated in the Greater Duwamish MIC.

Exhibit 3.10-30 summarizes the number of person trips expected to be generated during the PM peak hour by the land uses in the study area by mode of travel.

[17] This assumes four-car trains at Sound Transit's planning load of 148 passengers per car.

Exhibit 3.10-30 2044 Alternative 2 Person Trips in Study Area—PM Peak Hour

Mode	Alternative 1 No Action		Alternative 2	
SOV (in passenger vehicles)	35,400	40.5%	36,500	40.7%
HOV (in passenger vehicles)	32,800	37.5%	33,600	37.5%
Transit	4,800	5.5%	4,900	5.5%
Walk	12,400	14.2%	12,500	14.0%
Bike	2,100	2.4%	2,100	2.3%
Total	87,500	100%	89,600	100%

Source: Fehr & Peers, 2022.

~~Transit~~

~~**Exhibit 3.10-26** summarizes the average PM peak hour passenger load factor for a transit trip along key corridors under Alternative 2. The average passenger load factors include both light rail and bus services. Passenger load factors under Alternative 2 would be similar to those under Alternative 1 No Action. This reflects both the modest magnitude of growth between the two alternatives and also the type of growth as industrial employees are often less likely to commute by transit than those of other employment sectors. While some of the routes traveling across the study area screenlines may operate over their crowding threshold for some individual trips, load factors indicate there would generally be adequate transit capacity across most of the transit screenlines (with the exception of the 8th Avenue NW screenline). No significant impacts to transit load are expected under Alternative 2.~~

~~**Exhibit 3.10-26 PM Peak Hour Average Passenger Load Factors—Alternative 2**~~

~~Note: Inbound refers to travel into the downtown area and outbound travel out of the downtown area.~~
~~Source: Fehr & Peers, 2021.~~

Roadway Users~~Auto & Freight~~

Under Alternative 2, traffic volumes would be higher than Alternative 1 No Action though the magnitude of change would be relatively small in relation to the amount of background traffic in the city. The PM peak vehicle miles traveled (VMT) within the Greater Duwamish MIC would increase by roughly 0.8% and the PM peak VMT within the BINMIC would increase by roughly 1.4%. The effects of this additional traffic in terms of travel time, mode share, and screenline volumes, are detailed below.

Travel Time

Exhibit 3.10-31 summarizes travel time conditions along each of the study corridors under Alternative 2. Travel times for Alternative 1 No Action are also shown to illustrate how travel times would change compared to development expected to occur by 2044 under current zoning. The travel times below are rounded to the nearest half minute.

During the PM peak hour under the 2044 Alternative 2, most corridors would continue to operate at similar levels of congestion as under Alternative 1 No Action with travel times increasing by no more than 4% on any study segment. Based on the criteria for travel time impacts, one significant travel time impact is expected under Alternative 2:

- Eastbound W Dravus Street between 15th Avenue W and 20th Avenue W
- W Dravus Street would be impacted because the increase in travel time would cause the segment to fall from LOS E under Alternative 1 No Action to LOS F under Alternative 2 though the magnitude of change is expected to be less than 3%. Because freight operates on the same corridors as autos, a freight impact is also identified along eastbound W Dravus Street. Any buses operating on that corridor in the future would also be impacted.
- All of the study segments expected to operate at LOS F under Alternative 1 No Action would continue to operate at LOS F and with slightly higher travel times under Alternative 2. However, these are not considered impacts caused by Alternative 2 because none of the travel time increases would reach the 5% impact threshold.

Gameday Conditions

The study area includes large event venues including Lumen Field and T-Mobile Park. During event ingress and egress, large numbers of event attendees access these venues, bringing congestion to area roadways. This is an existing condition of the Affected Environment and there is an established Transportation Management Plan process through which event traffic is managed. The typical PM peak conditions studied in this EIS identify the relative congestion expected to be generated by each alternative and therefore provide an indication of how alternatives may compare to one another during event ingress or egress.

~~Peak Spreading~~

~~As growth throughout the city continues, the city will likely experience "peak spreading." Peak spreading refers to travelers shifting their departure times to avoid the heaviest traffic congestion. The result is that while the peak hour may retain similar characteristics, the length of the congested period may grow.~~

~~At this programmatic level of analysis, it is not possible to know how freight may be impacted by changes to loading zones or access needs. These are potentially significant impacts that would need to be analyzed and mitigated at the project level.~~

As noted in the Alternative 1 No Action section, increased traffic congestion leads to worse reliability on the roadway network, which is of particular importance for freight operators. Therefore, Alternative 2 may result in worse travel time reliability due to increased volumes and travel times.

Exhibit 3.10-31-~~27~~ PM Peak Hour Travel Time LOS—Alternative 2

		PM Peak Hour LOS / Travel Time (minutes)			
		Alternative 1 No Action		Alternative 2	
ID	Corridor	N/E	S/W	N/E	S/W
Ballard Interbay Northend MIC					
1	15th Ave W from Magnolia Bridge to NW Leary Way	E / 12.5	A / 5	E / 12.5	A / 5
2	15th Ave NW from NW Leary Way to N 85th St	E / 9.5	C / 6.5	E / 10	C / 6.5
3	Leary Ave NW/ Leary Way NW/ N 36th S/ Fremont Bridge between NW Market St and W Nickerson St/Westlake Ave	C / 11	D / 13	C / 11	D / 13.5
4	Shilshole Ave NW between NW Market and 15th Ave NW	B / 2.5	D / 4	B / 2.5	D / 4
5	NW Market St/N 50th/ 46th St between 24th Ave NW and I-5	C / 14	D / 16.5	C / 14	D / 16.5
6	W Nickerson St/Westlake Ave N between 15th Ave W and Mercer St	C / 13.5	C / 12.5	C / 13.5	C / 12.5
7	W Dravus St between 15th Ave W and 20th Ave W	E / 2	D / 1.5	F / 2	D / 1.5
8	Elliott Ave W between Magnolia Bridge and Wall St	B / 6	B / 6.5	B / 6	B / 6.5
9	W Mercer St from Elliott Ave W to I-5	F / 32	F / 22.5	F / 32.5	F / 22.5
10	Denny Way from Elliott Ave W to I-5	F / 15	F / 11.5	F / 15	F / 11.5
11	Magnolia Bridge between 15th Ave W and Thorndyke Ave W	B / 2.5	A / 1.5	B / 2.5	A / 1.5
12	SR 99 between N 46th St and Denny Way[1]	D / 10.5	F / 14.5	D / 10.5	F / 14.5
13	W Emerson St between 15th Ave W and Gilman Ave W	F / 6	F / 4	F / 6	F / 4
14	N 85th St between 15th Ave NW and I-5	E / 13.5	E / 14.5	E / 13.5	E / 14.5
15	I-5 between N 85th Street and Madison Street[1]	F / 22.5	F / 26	F / 22.5	F / 26
Greater Duwamish MIC					
1	1st Ave S between S Royal Brougham Way and SR 99	C / 11	C / 12	C / 11	C / 12
2	4th Ave S between Seattle Blvd S to E Marginal Way S	C / 12.5	C / 13.5	C / 12.5	C / 13.5

		PM Peak Hour LOS / Travel Time (minutes)			
		Alternative 1 No Action		Alternative 2	
ID	Corridor	N/E	S/W	N/E	S/W
3	6th Ave S between Seattle Blvd S to Spokane St Viaduct	C / 6.5	C / 6.5	C / 6.5	C / 6.5
4	Airport Way S/ Seattle Blvd S between S Royal Brougham Way to S Boeing Access Rd	A / 16.5	A / 16	A / 16.5	A / 16.5
5	West Seattle Bridge/Spokane St Viaduct between 35th Ave SW and I-5	C / 6.5	E / 10	C / 6.5	E / 10
6	Spokane St Bridge between Harbor Ave SW and SR 99	B / 4.5	B / 4.5	B / 4.5	B / 4.5
7	E Marginal Way S between SR 99 and S Boeing Access Rd	C / 8.5	D / 10.5	C / 8.5	D / 10.5
8	Alaskan Way S from Broad St to SR 99	E / 10.5	F / 14.5	E / 10.5	F / 14.5
9	S Royal Brougham Way between SR 99 and Airport Way S	F / 4.5	D / 3	F / 4.5	D / 3
10	Edgar Martinez Dr S between SR 99 and 4th Ave	F / 3	F / 2.5	F / 3	F / 2.5
11	S Holgate St between 1st Ave and Airport Way S	D / 3	F / 4.5	D / 3	F / 4.5
12	S Lander St between 1st Ave and Airport Way S	E / 4	E / 4	E / 4	E / 4
13	S Lucile St between SR 99 and Airport Way S	D / 4	E / 5	D / 4	E / 5
14	W Marginal Way SW between West Seattle Bridge and 2nd Ave SW	A / 5	A / 5	A / 5	A / 5
15	S Michigan St/ Corson Ave S between E Marginal Way S and I-5	C / 3.5	E / 5.5	C / 3.5	E / 5.5
16	E Marginal Way S/SR 99 between S Atlantic Street and 1st Ave S Bridge	A / 9	A / 9	A / 9	A / 9
17	I-5 between Madison Street and SR 599[1]	F / 27.5	F / 31	F / 27.5	F / 32
18	SR 509 between SR 99 and SR 518[1]	A / 6	D / 11.5	A / 6	D / 12
19	SR 99/599 between SR 509 and I-5[2]	A / 6.5	B / 8	A / 6.5	B / 8

Note: Cells shown in bold indicate an impact.
1. WSDOT sets a LOS D standard on I-5, SR 509, and SR 99 north of SR 509.
2. WSDOT sets a LOS E standard on SR 99/599 between SR 509 and I-5.
Source: Fehr & Peers, 2021.

Mode Share

The Alternative 2 mode share is summarized by sector using the PSRC model and is shown in **Exhibit 3.10-32**~~**Exhibit 3.10-32**~~. The model predicts that SOV mode shares would remain very similar between Alternative 1 No Action and Alternative 2. Therefore, as is the case under Alternative 1 No Action, all three sectors are expected to have higher SOV shares than the City's 2035 SOV targets.

The Duwamish and Northwest sectors, where the largest changes in industrial employment would be concentrated, are expected to have a slightly higher SOV share though the magnitude of change is less than the 0.5% threshold for a significant impact. Therefore, no significant mode share impacts are expected under Alternative 2.

Exhibit 3.10-32~~**-28**~~ **2044 Alternative 2 SOV Mode Share—PM Peak Period**

Sector	2035 SOV Target	Alternative 1 No Action SOV Share	Alternative 2 SOV Share
Duwamish	51%	52.6%	52.8%
Magnolia/Queen Anne	38%	40.1%	40.1%
Northwest	37%	39.7%	39.8%

Source: Fehr & Peers, 2021.

Screenlines

Exhibit 3.10-33~~**Exhibit 3.10-33**~~ summarizes the projected PM peak hour v/c ratios across each screenline under Alternative 2. Although traffic volumes would increase under Alternative 2, the PM peak hour v/c ratios are expected to remain very similar to those under Alternative 1 No Action. All screenline locations are forecasted to be under the LOS threshold defined by the City of Seattle; therefore, no significant screenline impacts are expected under Alternative 2.

Within the study area, the largest v/c ratio increases between Alternative 1 No Action and Alternative 2 are expected at the South City Limit screenline and the Ballard Bridge.

Exhibit 3.10-33-~~29~~ Screenline Volume-to-Capacity Ratio—Alternative 2

Screenline	Location	v/c Ratio Threshold	PM Peak Period v/c Ratio			
			Alt. 1 No Action		Alt. 2	
			N/E	S/W	N/E	S/W
2	Magnolia	1.0	0.51	0.54	0.52	0.54
3.11	Duwamish River—West Seattle Bridge and Spokane Street	1.2	0.57	0.53	0.57	0.53
3.12	Duwamish River—1st Avenue S and 16th Avenue S	1.2	0.53	0.52	0.53	0.52
4.13	South City Limit—SR 99 to Airport Way S	1.0	0.47	0.50	0.47	0.52
5.11	Ship Canal—Ballard Bridge	1.2	1.11	0.78	1.13	0.78
5.12	Ship Canal—Fremont Bridge	1.2	0.68	0.68	0.69	0.68
5.13	Ship Canal—Aurora Bridge	1.2	0.35	0.35	0.35	0.35
7.11	West of Aurora Avenue—Fremont Place N to N 65th Street	1.0	0.55	0.64	0.55	0.64
8	South of Lake Union	1.2	0.43	0.51	0.43	0.51
9.12	South of Spokane Street—E Marginal Way to Airport Way S	1.0	0.51	0.49	0.51	0.49
10.11	South of S Jackson Street—Alaskan Way S to 4th Avenue S	1.0	0.65	0.68	0.65	0.68

Source: Fehr & Peers, 2021.

Transit

Exhibit 3.10-34 summarizes the average PM peak hour passenger load factor for a transit trip along key corridors under Alternative 2. The average passenger load factors include both light rail and bus services. Passenger load factors under Alternative 2 would be similar to those under Alternative 1 No Action. This reflects both the modest magnitude of growth between the two alternatives and also the type of growth as industrial employees are often less likely to commute by transit than those of other employment sectors. While some of the routes traveling across the study area screenlines may operate over their crowding threshold for some individual trips, load factors indicate there would generally be adequate transit capacity across most of the transit screenlines (with the exception of the 8th Avenue NW screenline). No significant impacts to transit load are expected under Alternative 2.

Exhibit 3.10-34 PM Peak Hour Average Passenger Load Factors—Alternative 2

	Alternative 1 No Action		Alternative 2	
Screenline	Inbound	Outbound	Inbound	Outbound
A: East of 8th Avenue NW	0.57	1.28	0.58	1.28
B: Ballard Bridge	0.09	0.39	0.09	0.39
C: North of W Mercer Place	0.29	0.59	0.30	0.59
D: North of Lander St	0.21	0.75	0.21	0.76
E: West Seattle Bridge	0.12	0.35	0.12	0.35

Note: Inbound refers to travel into the downtown area and outbound travel out of the downtown area.
Source: Fehr & Peers, 2021.

Impacts of Alternative 3

This section summarizes analysis results and environmental impacts for Alternative 3 (Future of Industry—Targeted) in 2044. Compared to Alternative 1 No Action, Alternative 3 would result in 33,900 additional jobs and 535 additional dwelling units. As with Alternative 1 No Action, most of the new employment growth would be concentrated in the Greater Duwamish MIC; the Ballard Subarea would have the highest increase in residential growth.

Exhibit 3.10-35 summarizes the number of person trips expected to be generated during the PM peak hour by the land uses in the study area by mode of travel.

Exhibit 3.10-35 2044 Alternative 3 Person Trips in Study Area—PM Peak Hour

Mode	Alternative 1 No Action		Alternative 3	
SOV (in passenger vehicles)	35,400	40.5%	39,600	41.3%
HOV (in passenger vehicles)	32,800	37.5%	35,700	37.2%
Transit	4,800	5.5%	5,200	5.4%
Walk	12,400	14.2%	13,200	13.8%
Bike	2,100	2.4%	2,200	2.3%
Total	87,500	100%	95,900	100%

Source: Fehr & Peers, 2022.

~~Transit~~

~~**Exhibit 3.10-30** summarizes PM peak hour average passenger load factors (including both light rail and bus) under Alternative 3. The largest increases in passenger load would occur eastbound across the 8th Avenue NW screenline toward the University District, and southbound on 15th Avenue NW toward Downtown. These increases reflect the expected travel~~

patterns of additional employees leaving the BINMIC area to travel home during the PM peak hour. Southbound travel demand across Lander Street would also increase slightly. Overall capacity across these screenlines is expected to be adequate for the demand—some routes traveling across the study area screenlines, however, may operate over their crowding threshold for some individual trips. Although a minor increase is expected westbound across 8th Avenue NW (which is already expected to have crowded transit routes under Alternative 1 No Action), the magnitude of change is less than the threshold for a significant impact. Therefore, no significant transit passenger load impacts are expected under Alternative 3.

Exhibit 3.10-30 PM Peak Hour Average Passenger Load Factors—Alternative 3

Note: Inbound refers to travel into the downtown area and outbound travel out of the downtown area.
Source: Fehr & Peers, 2021.

Roadway Users~~Auto & Freight~~

Under Alternative 3, traffic volumes would be slightly higher than Alternative 1 No Action. The PM peak vehicle miles traveled (VMT) within the Greater Duwamish MIC would increase by roughly 2.3% and the PM peak VMT within the BINMIC would increase by roughly 4.3%. The effects of this additional traffic in terms of travel time, mode share, and screenline volumes, are detailed below.

Travel Time

Exhibit 3.10-36 summarizes travel time conditions along each of the study corridors under Alternative 3 and compares them to travel times under Alternative 1 No Action. The travel times below are rounded to the nearest half minute.

During the PM peak hour under the 2044 Alternative 3, most corridors would continue to operate at similar levels of congestion as under Alternative 1 No Action with travel time increases of up to 2 minutes. Based on the criteria for travel time impacts, ~~three~~ four significant travel time impacts are expected under Alternative 3:

- Northbound 15th Avenue W from Magnolia Bridge to NW Leary Way
- Eastbound W Dravus Street between 15th Avenue W and 20th Avenue W
- Southbound I-5 from Madison Street to SR 599
- Southbound SR 509 between SR 99 and SR 518

The first two segments would be impacted because the increase in travel time would cause the segment to fall from LOS E under Alternative 1 No Action to LOS F under Alternative 3 and the fourth segment is because the increase in travel time would cause the segment to fall from LOS D to E, below WSDOT's LOS standard for SR 509. The I-5 segment is already expected to operate at LOS F under Alternative 1 No Action and under Alternative 3 is expected to experience a 6% increase in travel time compared to Alternative 1, exceeding the criteria for a significant impact. Because freight operates on the same corridors as autos, freight impacts are also identified along northbound 15th Avenue W, eastbound W Dravus Street, and southbound I-5. Any buses operating on those corridors in the future would also be impacted.

~~At this programmatic level of analysis, it is not possible to know how freight may be impacted by changes to loading zones or access needs. These are potentially significant impacts that would need to be analyzed and mitigated at the project level.~~As noted in the Alternative 1 No Action section, increased traffic congestion leads to worse reliability on the roadway network, which is of particular importance for freight operators. Therefore, Alternative 3 may result in worse travel time reliability due to increased volumes and travel times.

Exhibit 3.10-36-~~31~~ PM Peak Hour Travel Time LOS—Alternative 3

		PM Peak Hour LOS / Travel Time (minutes)			
		Alternative 1 No Action		Alternative 3	
ID	Corridor	N/E	S/W	N/E	S/W
Ballard Interbay Northend MIC					
1	15th Ave W from Magnolia Bridge to NW Leary Way	E / 12.5	A / 5	F / 13	A / 5
2	15th Ave NW from NW Leary Way to N 85th St	E / 9.5	C / 6.5	E / 10	C / 6.5
3	Leary Ave NW/ Leary Way NW/ N 36th S/ Fremont Bridge between NW Market St and W Nickerson St/Westlake Ave	C / 11	D / 13	C / 11.5	D / 13.5
4	Shilshole Ave NW between NW Market and 15th Ave NW	B / 2.5	D / 4	B / 2.5	D / 4
5	NW Market St/N 50th/ 46th St between 24th Ave NW and I-5	C / 14	D / 16.5	C / 14	D / 16.5
6	W Nickerson St/Westlake Ave N between 15th Ave W and Mercer St	C / 13.5	C / 12.5	C / 13.5	C / 12.5
7	W Dravus St between 15th Ave W and 20th Ave W	E / 2	D / 1.5	F / 2	D / 1.5
8	Elliott Ave W between Magnolia Bridge and Wall St	B / 6	B / 6.5	B / 6	B / 6.5
9	W Mercer St from Elliott Ave W to I-5	F / 32	F / 22.5	F / 32.5	F / 22.5
10	Denny Way from Elliott Ave W to I-5	F / 15	F / 11.5	F / 15	E / 11.5
11	Magnolia Bridge between 15th Ave W and Thorndyke Ave W	B / 2.5	A / 1.5	B / 2.5	A / 1.5
12	SR 99 between N 46th St and Denny Way[1]	D / 10.5	F / 14.5	D / 10.5	F / 14.5
13	W Emerson St between 15th Ave W and Gilman Ave W	F / 6	F / 4	F / 6	F / 4
14	N 85th St between 15th Ave NW and I-5	E / 13.5	E / 14.5	E / 13.5	E / 14.5
15	I-5 between N 85th Street and Madison Street[1]	F / 22.5	F / 26	F / 22.5	F / 26
Greater Duwamish MIC					
1	1st Ave S between S Royal Brougham Way and SR 99	C / 11	C / 12	C /11	C / 12
2	4th Ave S between Seattle Blvd S to E Marginal Way S	C / 12.5	C / 13.5	C / 12.5	C / 14

		PM Peak Hour LOS / Travel Time (minutes)			
		Alternative 1 No Action		Alternative 3	
ID	Corridor	N/E	S/W	N/E	S/W
3	6th Ave S between Seattle Blvd S to Spokane St Viaduct	C / 6.5	C / 6.5	C / 6.5	C / 7
4	Airport Way S/ Seattle Blvd S between S Royal Brougham Way to S Boeing Access Rd	A / 16.5	A / 16	A / 16.5	B / 17.5
5	West Seattle Bridge/Spokane St Viaduct between 35th Ave SW and I-5	C / 6.5	E / 10	C / 6.5	E / 10
6	Spokane St Bridge between Harbor Ave SW and SR 99	B / 4.5	B / 4.5	B / 4.5	B / 4.5
7	E Marginal Way S between SR 99 and S Boeing Access Rd	C / 8.5	D / 10.5	C / 8.5	D / 11
8	Alaskan Way S from Broad St to SR 99	E / 10.5	F / 14.5	E / 10.5	F / 14.5
9	S Royal Brougham Way between SR 99 and Airport Way S	F / 4.5	D / 3	F / 4.5	D / 3
10	Edgar Martinez Dr S between SR 99 and 4th Ave	F / 3	F / 2.5	F / 3	F / 2.5
11	S Holgate St between 1st Ave and Airport Way S	D / 3	F / 4.5	D / 3	F / 4.5
12	S Lander St between 1st Ave and Airport Way S	E / 4	E / 4	E / 4	E / 4
13	S Lucile St between SR 99 and Airport Way S	D / 4	E / 5	D / 4	E / 5
14	W Marginal Way SW between West Seattle Bridge and 2nd Ave SW	A / 5	A / 5	A / 5	A / 5
15	S Michigan St/ Corson Ave S between E Marginal Way S and I-5	C / 3.5	E / 5.5	C / 3.5	E / 5.5
16	E Marginal Way S/SR 99 between S Atlantic Street and 1st Ave S Bridge	A / 9	A / 9	A / 9	A / 9.5
17	I-5 between Madison Street and SR 599[1]	F / 27.5	F / 31	F / 27.5	**F / 33**
18	SR 509 between SR 99 and SR 518[1]	A / 6	D / 11.5	A / 6	**E / 12.5**
19	SR 99/599 between SR 509 and I-5[2]	A / 6.5	B / 8	A / 6.5	C / 8.5

Note: Cells shown in bold indicate an impact.
1. WSDOT sets a LOS D standard on I-5, SR 509, and SR 99 north of SR 509.
2. WSDOT sets a LOS E standard on SR 99/509 between SR 509 and I-5.
Source: Fehr & Peers, 2021.

Mode Share

The Alternative 3 mode share is summarized by sector using the PSRC model and is shown in **Exhibit 3.10-37**. The model predicts that SOV mode shares under Alternative 3 would remain similar or slightly higher than Alternative 1 No Action. Therefore, as is the case under Alternative 1 No Action, all three sectors are expected to have higher SOV shares than the City's 2035 SOV targets.

The Duwamish sector is expected to have the same SOV share as Alternative 1 No Action and the Magnolia/Queen Anne and Northwest sectors are expected to have slightly higher SOV shares. Because the SOV mode share in the Magnolia/Queen Anne sector is expected to increase by 0.5% compared to Alternative 1 No Action, a significant mode share impact is expected in that sector.

Exhibit 3.10-37~~-32~~ 2044 Alternative 3 SOV Mode Share—PM Peak Period

Sector	2035 SOV Target	Alternative 1 No Action SOV Share	Alternative 3 SOV Share
Duwamish	51%	52.6%	52.6%
Magnolia/Queen Anne	38%	40.1%	**40.6%**
Northwest	37%	39.7%	39.9%

Note: Cells shown in bold indicate an impact.
Source: Fehr & Peers, 2021.

Screenlines

Exhibit 3.10-38 summarizes the projected PM peak hour v/c ratios across each screenline under Alternative 3. Although traffic volumes would increase under Alternative 3, all screenline locations are forecasted to be under the LOS threshold defined by the City of Seattle. Therefore, no significant screenline impacts are expected under Alternative 3.

Within the study area, the largest v/c ratio increases between Alternative 1 No Action and Alternative 3 are expected at the Magnolia screenline, South City Limit screenline, and the Ballard Bridge.

Exhibit 3.10-38~~-33~~ Screenline Volume-to-Capacity Ratio—Alternative 3

Screenline	Location	v/c Ratio Threshold	PM Peak Period v/c Ratio			
			Alt. 1 No Action		Alt. 3	
			N/E	S/W	N/E	S/W
2	Magnolia	1.0	0.51	0.54	0.55	0.55
3.11	Duwamish River—West Seattle Bridge and Spokane Street	1.2	0.57	0.53	0.57	0.53
3.12	Duwamish River—1st Avenue S and 16th Avenue S	1.2	0.53	0.52	0.54	0.52
4.13	South City Limit—SR 99 to Airport Way S	1.0	0.47	0.50	0.48	0.56
5.11	Ship Canal—Ballard Bridge	1.2	1.11	0.78	1.15	0.77
5.12	Ship Canal—Fremont Bridge	1.2	0.68	0.68	0.69	0.69
5.13	Ship Canal—Aurora Bridge	1.2	0.35	0.35	0.35	0.35
7.11	West of Aurora Avenue—Fremont Place N to N 65th Street	1.0	0.55	0.64	0.55	0.64
8	South of Lake Union	1.2	0.43	0.51	0.43	0.52
9.12	South of Spokane Street—E Marginal Way to Airport Way S	1.0	0.51	0.49	0.52	0.50
10.11	South of S Jackson Street—Alaskan Way S to 4th Avenue S	1.0	0.65	0.68	0.65	0.68

Source: Fehr & Peers, 2021.

Transit

Exhibit 3.10-39 summarizes PM peak hour average passenger load factors (including both light rail and bus) under Alternative 3. The largest increases in passenger load would occur eastbound across the 8th Avenue NW screenline toward the University District, and southbound on 15th Avenue NW toward Downtown. These increases reflect the expected travel patterns of additional employees leaving the BINMIC area to travel home during the PM peak hour. Southbound travel demand across Lander Street would also increase slightly. Overall capacity across these screenlines is expected to be adequate for the demand—some routes traveling across the study area screenlines, however, may operate over their crowding threshold for some individual trips. Although a minor increase is expected westbound across 8th Avenue NW (which is already expected to have crowded transit routes under Alternative 1 No Action), the magnitude of change is less than the threshold for a significant impact. Therefore, no significant transit passenger load impacts are expected under Alternative 3.

Exhibit 3.10-39 PM Peak Hour Average Passenger Load Factors—Alternative 3

	Alternative 1 No Action		Alternative 3	
Screenline	Inbound	Outbound	Inbound	Outbound
A: East of 8th Avenue NW	0.57	1.28	0.64	1.29
B: Ballard Bridge	0.09	0.39	0.09	0.39
C: North of W Mercer Place	0.29	0.59	0.34	0.58
D: North of Lander St	0.21	0.75	0.21	0.77
E: West Seattle Bridge	0.12	0.35	0.12	0.35

Note: Inbound refers to travel into the downtown area and outbound travel out of the downtown area.
Source: Fehr & Peers, 2021.

Impacts of Alternative 4

This section summarizes analysis results and environmental impacts for Alternative 4 (Future of Industry—Expanded) in 2044. Compared to Alternative 1 No Action, Alternative 4 would result in 35,700 additional jobs and 2,120 additional dwelling units. Most of the new employment growth would be concentrated in the Greater Duwamish MIC. The Ballard and SODO/Stadium subareas would have the highest increases in residential growth.

Exhibit 3.10-40 summarizes the number of person trips expected to be generated during the PM peak hour by the land uses in the study area by mode of travel.

Exhibit 3.10-40 2044 Alternative 4 Person Trips in Study Area—PM Peak Hour

Mode	Alternative 1 No Action		Alternative 4	
SOV (in passenger vehicles)	35,400	40.5%	40,300	41.2%
HOV (in passenger vehicles)	32,800	37.5%	36,400	37.3%
Transit	4,800	5.5%	5,300	5.4%
Walk	12,400	14.2%	13,400	13.7%
Bike	2,100	2.4%	2,300	2.4%
Total	87,500	100%	97,700	100%

Source: Fehr & Peers, 2022.

~~Transit~~

~~**Exhibit 3.10-34** summarizes PM peak hour average passenger load factors under Alternative 4. The passenger load factors include both light rail and bus services. The largest increases in passenger load would occur eastbound across the 8th Avenue NW screenline toward the University District, and southbound on 15th Avenue NW toward Downtown. These increases~~

~~reflect the expected travel patterns of additional employees leaving the BINMIC area to travel home during the PM peak hour. Southbound travel demand across Lander Street would also increase slightly. Overall capacity across these screenlines is expected to be adequate for the demand—some routes traveling across the study area screenlines, however, may operate over their crowding threshold for some individual trips. Although a minor increase is expected westbound across 8th Avenue NW (which is already expected to have crowded transit routes under Alternative 1 No Action), the magnitude of change is less than the threshold for a significant impact. Therefore, no transit passenger load impacts are expected under Alternative 4.~~

~~Exhibit 3.10-34 PM Peak Hour Average Passenger Load Factors—Alternative 4~~

~~Note: Inbound refers to travel into the downtown area and outbound travel out of the downtown area.~~
~~Source: Fehr & Peers, 2021.~~

Roadway Users~~Auto & Freight~~

Among the alternatives, traffic volumes would be highest under Alternative 4. The PM peak vehicle miles traveled (VMT) within the Greater Duwamish MIC would increase by roughly 2.5% and the PM peak VMT within the BINMIC would increase by roughly 5.1%. The effects of this additional traffic in terms of travel time, mode share, and screenline volumes, are detailed below.

Travel Time

Exhibit 3.10-41 summarizes travel time conditions along each of the study corridors under Alternative 4 and compares them to travel times under Alternative 1 No Action. The travel times below are rounded to the nearest half minute.

During the PM peak hour under the 2044 Alternative 4, most corridors would continue to operate at similar levels of congestion as under Alternative 1 No Action with travel times increases of up to 2 minutes. Based on the criteria for travel time impacts, ~~three~~ four significant travel time impacts are expected under Alternative 4:

- Northbound 15th Avenue W from Magnolia Bridge to NW Leary Way
- Eastbound W Dravus Street between 15th Avenue W and 20th Avenue W
- Southbound I-5 from Madison Street to SR 599
- Southbound SR 509 between SR 99 and SR 518

The first two segments would be impacted because the increase in travel time would cause the segment to fall from LOS E under Alternative 1 No Action to LOS F under Alternative 4 and the fourth segment is because the increase in travel time would cause the segment to fall from LOS D to E, below WSDOT's LOS standard for SR 509. The I-5 segment is already expected to operate at LOS F under Alternative 1 No Action and under Alternative 4 is expected to experience a 7% increase in travel time compared to Alternative 1, exceeding the criteria for a significant impact. Because freight operates on the same corridors as autos, freight impacts are also identified

along northbound 15th Avenue W, eastbound W Dravus Street, and southbound I-5. Any buses operating on those corridors in the future would also be impacted.

~~At this programmatic level of analysis, it is not possible to know how freight may be impacted by changes to loading zones or access needs. These are potentially significant impacts that would need to be analyzed and mitigated at the project level.~~

As noted in the Alternative 1 No Action section, increased traffic congestion leads to worse reliability on the roadway network, which is of particular importance for freight operators. Therefore, Alternative 4 may result in worse travel time reliability due to increased volumes and travel times.

Exhibit 3.10-41-~~35~~ PM Peak Hour Travel Time LOS—Alternative 4

		PM Peak Hour LOS / Travel Time (minutes)			
		Alternative 1 No Action		Alternative 4	
ID	Corridor	N/E	S/W	N/E	S/W
Ballard Interbay Northend MIC					
1	15th Ave W from Magnolia Bridge to NW Leary Way	E / 12.5	A / 5	F / 13	A / 5
2	15th Ave NW from NW Leary Way to N 85th St	E / 9.5	C / 6.5	E / 10	C / 6.5
3	Leary Ave NW/ Leary Way NW/ N 36th S/ Fremont Bridge between NW Market St and W Nickerson St/Westlake Ave	C / 11	D / 13	C / 11.5	D / 13.5
4	Shilshole Ave NW between NW Market and 15th Ave NW	B / 2.5	D / 4	B / 2.5	D / 4
5	NW Market St/N 50th/ 46th St between 24th Ave NW and I-5	C / 14	D / 16.5	C / 14	D / 16.5
6	W Nickerson St/Westlake Ave N between 15th Ave W and Mercer St	C / 13.5	C / 12.5	C / 13.5	C / 12.5
7	W Dravus St between 15th Ave W and 20th Ave W	E / 2	D / 1.5	F / 2	D / 1.5
8	Elliott Ave W between Magnolia Bridge and Wall St	B / 6	B / 6.5	B / 6	B / 6.5
9	W Mercer St from Elliott Ave W to I-5	F / 32	F / 22.5	F / 32.5	F / 22.5
10	Denny Way from Elliott Ave W to I-5	F / 15	F / 11.5	F / 15	E / 11.5
11	Magnolia Bridge between 15th Ave W and Thorndyke Ave W	B / 2.5	A / 1.5	B / 2.5	A / 1.5
12	SR 99 between N 46th St and Denny Way[1]	D / 10.5	F / 14.5	D / 10.5	F / 14.5
13	W Emerson St between 15th Ave W and Gilman Ave W	F / 6	F / 4	F / 6	F / 4
14	N 85th St between 15th Ave NW and I-5	E / 13.5	E / 14.5	E / 13.5	E / 14.5
15	I-5 between N 85th Street and Madison Street[1]	F / 22.5	F / 26	F / 22.5	F / 26.5
Greater Duwamish MIC					
1	1st Ave S between S Royal Brougham Way and SR 99	C / 11	C / 12	C / 11	C / 12
2	4th Ave S between Seattle Blvd S to E Marginal Way S	C / 12.5	C / 13.5	C / 12.5	C / 14

		PM Peak Hour LOS / Travel Time (minutes)			
		Alternative 1 No Action		Alternative 4	
ID	Corridor	N/E	S/W	N/E	S/W
3	6th Ave S between Seattle Blvd S to Spokane St Viaduct	C / 6.5	C / 6.5	C / 6.5	C / 7
4	Airport Way S/ Seattle Blvd S between S Royal Brougham Way to S Boeing Access Rd	A / 16.5	A / 16	A / 16.5	B / 17.5
5	West Seattle Bridge/Spokane St Viaduct between 35th Ave SW and I-5	C / 6.5	E / 10	C / 6.5	E / 10
6	Spokane St Bridge between Harbor Ave SW and SR 99	B / 4.5	B / 4.5	B / 4.5	B / 4.5
7	E Marginal Way S between SR 99 and S Boeing Access Rd	C / 8.5	D / 10.5	C / 8.5	D / 11
8	Alaskan Way S from Broad St to SR 99	E / 10.5	F / 14.5	E / 10.5	F / 14.5
9	S Royal Brougham Way between SR 99 and Airport Way S	F / 4.5	D / 3	F / 4.5	D / 3
10	Edgar Martinez Dr S between SR 99 and 4th Ave	F / 3	F / 2.5	F / 3	F / 2.5
11	S Holgate St between 1st Ave and Airport Way S	D / 3	F / 4.5	D / 3	F / 4.5
12	S Lander St between 1st Ave and Airport Way S	E / 4	E / 4	E / 4	E / 4
13	S Lucile St between SR 99 and Airport Way S	D / 4	E / 5	D / 4	E / 5
14	W Marginal Way SW between West Seattle Bridge and 2nd Ave SW	A / 5	A / 5	A / 5	A / 5
15	S Michigan St/ Corson Ave S between E Marginal Way S and I-5	C / 3.5	E / 5.5	C / 3.5	E / 5.5
16	E Marginal Way S/SR 99 between S Atlantic Street and 1st Ave S Bridge	A / 9	A / 9	A / 9	A / 10
17	I-5 between Madison Street and SR 599[1]	F / 27.5	F / 31	F / 27.5	**F / 33**
18	SR 509 between SR 99 and SR 518[1]	A / 6	D / 11.5	A / 6	**E / 13**
19	SR 99/599 between SR 509 and I-5[2]	A / 6.5	B / 8	A / 6.5	C / 8.5

Note: Cells shown in bold indicate an impact.
1. WSDOT sets a LOS D standard on I-5, SR 509, and SR 99 north of SR 509.
2. WSDOT sets a LOS E standard on SR 99/599 between SR 509 and I-5.
Source: Fehr & Peers, 2021.

Mode Share

The Alternative 4 mode share is summarized by sector using the PSRC model and is shown in **Exhibit 3.10-42**. The model predicts that SOV mode shares under Alternative 4 would remain similar or slightly higher than Alternative 1 No Action. Therefore, as is the case under Alternative 1 No Action, all three sectors are expected to have higher SOV shares than the City's 2035 SOV targets.

The Duwamish sector is expected to have the same SOV share ~~than~~ as Alternative 1 No Action and the Magnolia/Queen Anne and Northwest sectors are expected to have slightly higher SOV shares. Because the SOV mode share in the Magnolia/Queen Anne sector is expected to increase by 0.5% compared to Alternative 1 No Action, a significant mode share impact is expected in that sector.

Exhibit 3.10-42~~-36~~ 2044 Alternative 4 SOV Mode Share—PM Peak Period

Sector	2035 SOV Target	Alternative 1 No Action SOV Share	Alternative 4 SOV Share
Duwamish	51%	52.6%	52.6%
Magnolia/Queen Anne	38%	40.1%	**40.6%**
Northwest	37%	39.7%	39.9%

Note: Cells shown in bold indicate an impact.
Source: Fehr & Peers, 2021.

Screenlines

Exhibit 3.10-43 summarizes the projected PM peak hour v/c ratios across each screenline under Alternative 4. Although traffic volumes would increase under Alternative 4, all screenline locations are forecasted to be under the LOS threshold defined by the City of Seattle. Therefore, no significant screenline impacts are expected under Alternative 4.

Within the study area, the largest v/c ratio increases between Alternative 1 No Action and Alternative 4 are expected at the Magnolia screenline, South City Limit screenline, and the Ballard Bridge.

Exhibit 3.10-43~~-37~~ Screenline Volume-to-Capacity Ratio—Alternative 4

Screenline	Location	v/c Ratio Threshold	PM Peak Period v/c Ratio			
			Alt. 1 No Action		Alt. 4	
			N/E	S/W	N/E	S/W
2	Magnolia	1.0	0.51	0.54	0.55	0.55
3.11	Duwamish River—West Seattle Bridge and Spokane Street	1.2	0.57	0.53	0.57	0.53
3.12	Duwamish River—1st Avenue S and 16th Avenue S	1.2	0.53	0.52	0.54	0.52
4.13	South City Limit—SR 99 to Airport Way S	1.0	0.47	0.50	0.48	0.56
5.11	Ship Canal—Ballard Bridge	1.2	1.11	0.78	1.15	0.77
5.12	Ship Canal—Fremont Bridge	1.2	0.68	0.68	0.69	0.69
5.13	Ship Canal—Aurora Bridge	1.2	0.35	0.35	0.35	0.35
7.11	West of Aurora Avenue—Fremont Place N to N 65th Street	1.0	0.55	0.64	0.55	0.64
8	South of Lake Union	1.2	0.43	0.51	0.43	0.51
9.12	South of Spokane Street—E Marginal Way to Airport Way S	1.0	0.51	0.49	0.52	0.50
10.11	South of S Jackson Street—Alaskan Way S to 4th Avenue S	1.0	0.65	0.68	0.66	0.68

Source: Fehr & Peers, 2021.

Transit

Exhibit 3.10-44 summarizes PM peak hour average passenger load factors under Alternative 4. The passenger load factors include both light rail and bus services. The largest increases in passenger load would occur eastbound across the 8th Avenue NW screenline toward the University District, and southbound on 15th Avenue NW toward Downtown. These increases reflect the expected travel patterns of additional employees leaving the BINMIC area to travel home during the PM peak hour. Southbound travel demand across Lander Street would also increase slightly. Overall capacity across these screenlines is expected to be adequate for the demand—some routes traveling across the study area screenlines, however, may operate over their crowding threshold for some individual trips. Although a minor increase is expected westbound across 8th Avenue NW (which is already expected to have crowded transit routes under Alternative 1 No Action), the magnitude of change is less than the threshold for a significant impact. Therefore, no transit passenger load impacts are expected under Alternative 4.

Exhibit 3.10-44 PM Peak Hour Average Passenger Load Factors—Alternative 4

	Alternative 1 No Action		Alternative 4	
Screenline	Inbound	Outbound	Inbound	Outbound
A: East of 8th Avenue NW	0.57	1.28	0.67	1.30
B: Ballard Bridge	0.09	0.39	0.09	0.39
C: North of W Mercer Place	0.29	0.59	0.35	0.58
D: North of Lander St	0.21	0.75	0.21	0.77
E: West Seattle Bridge	0.12	0.35	0.12	0.35

Note: Inbound refers to travel into the downtown area and outbound travel out of the downtown area.
Source: Fehr & Peers, 2021.

Impacts of the Preferred Alternative

This section summarizes analysis results and environmental impacts for the Preferred Alternative (Future of Industry—Balanced) in 2044, which is described in **Chapter 2**. The regional travel demand model was updated to include the Preferred Alternative's proposed land use to estimate how that growth would affect the transportation system throughout the study area. **Exhibit 3.10-45** summarizes the number of person trips expected to be generated by the land uses in the study area by mode of travel. PM peak hour person trips generated by the land uses in the study area are expected to increase from 87,500 to 92,600, a 6% increase. On a percentage basis, mode shares would remain essentially the same between the No Action Alternative and the Preferred Alternative.

Exhibit 3.10-45 2044 Preferred Alternative Person Trips in Study Area—PM Peak Hour

Mode	Alternative 1 No Action		Preferred Alternative	
SOV (in passenger vehicles)	35,400	40.5%	37,600	40.6%
HOV (in passenger vehicles)	32,800	37.5%	34,600	37.4%
Transit	4,800	5.5%	5,000	5.4%
Walk	12,400	14.2%	13,200	14.3%
Bike	2,100	2.4%	2,200	2.4%
Total	87,500	100%	92,600	100%

Source: Fehr & Peers, 2022.

Roadway Users

Among the alternatives, traffic volumes generated by the Preferred Alternative would be between those generated by alternatives 2 and 3. Relative to Alternative 1 No Action, the PM peak vehicle miles traveled (VMT) within the Greater Duwamish MIC would increase by roughly 1% and the PM

peak VMT within the BINMIC would increase by roughly 2.7%. The effects of this additional traffic in terms of travel time, mode share, and screenline volumes, are detailed below.

Travel Time

Exhibit 3.10-46 summarizes travel time conditions along each of the study corridors under the Preferred Alternative and compares them to travel times under Alternative 1 No Action. The travel times below are rounded to the nearest half minute.

During the PM peak hour under the 2044 Preferred Alternative, most corridors would continue to operate at similar levels of congestion as under Alternative 1 No Action with travel times increases of up to one minute. Based on the criteria for travel time impacts, two significant travel time impacts are expected under the Preferred Alternative:

- Northbound 15th Avenue W from Magnolia Bridge to NW Leary Way
- Eastbound W Dravus Street between 15th Avenue W and 20th Avenue W

Both segments would be impacted because the increase in travel time would cause the segment to fall from LOS E under Alternative 1 No Action to LOS F under the Preferred Alternative. Because freight operates on the same corridors as autos, freight impacts are also identified along northbound 15th Avenue W and eastbound W Dravus Street. Any buses operating on those corridors in the future would also be impacted.

As noted in the Alternative 1 No Action section, increased traffic congestion leads to worse reliability on the roadway network, which is of particular importance for freight operators. Therefore, the Preferred Alternative may result in worse travel time reliability due to increased volumes and travel times.

Exhibit 3.10-46 PM Peak Hour Travel Time LOS—Preferred Alternative

		PM Peak Hour LOS / Travel Time (minutes)			
		Alternative 1 No Action		Preferred Alternative	
ID	Corridor	N/E	S/W	N/E	S/W
Ballard Interbay Northend MIC					
1	15th Ave W from Magnolia Bridge to NW Leary Way	E / 12.5	A / 5	**F / 12.5**	A / 5
2	15th Ave NW from NW Leary Way to N 85th St	E / 9.5	C / 6.5	E / 10	C / 6.5
3	Leary Ave NW/ Leary Way NW/ N 36th S/ Fremont Bridge between NW Market St and W Nickerson St/Westlake Ave	C / 11	D / 13	C / 11.5	D / 13.5
4	Shilshole Ave NW between NW Market and 15th Ave NW	B / 2.5	D / 4	B / 2.5	D / 4
5	NW Market St/N 50th/ 46th St between 24th Ave NW and I-5	C / 14	D / 16.5	C / 14	D / 16.5
6	W Nickerson St/Westlake Ave N between 15th Ave W and Mercer St	C / 13.5	C / 12.5	C / 13.5	C / 12.5
7	W Dravus St between 15th Ave W and 20th Ave W	E / 2	D / 1.5	**F / 2**	D / 1.5
8	Elliott Ave W between Magnolia Bridge and Wall St	B / 6	B / 6.5	B / 6	B / 6.5
9	W Mercer St from Elliott Ave W to I-5	F / 32	F / 22.5	F / 32.5	F / 22.5
10	Denny Way from Elliott Ave W to I-5	F / 15	F / 11.5	F / 15	F / 11.5
11	Magnolia Bridge between 15th Ave W and Thorndyke Ave W	B / 2.5	A / 1.5	B / 2.5	A / 1.5
12	SR 99 between N 46th St and Denny Way[1]	D / 10.5	F / 14.5	D / 10.5	F / 14.5
13	W Emerson St between 15th Ave W and Gilman Ave W	F / 6	F / 4	F / 6	F / 4
14	N 85th St between 15th Ave NW and I-5	E / 13.5	E / 14.5	E / 13.5	E / 14.5
15	I-5 between N 85th Street and Madison Street[1]	F / 22.5	F / 26	F / 22.5	F / 26.5
Greater Duwamish MIC					
1	1st Ave S between S Royal Brougham Way and SR 99	C / 11	C / 12	C / 11	C / 11.5
2	4th Ave S between Seattle Blvd S to E Marginal Way S	C / 12.5	C / 13.5	C / 12.5	C / 13.5

		PM Peak Hour LOS / Travel Time (minutes)			
		Alternative 1 No Action		Preferred Alternative	
ID	Corridor	N/E	S/W	N/E	S/W
3	6th Ave S between Seattle Blvd S to Spokane St Viaduct	C / 6.5	C / 6.5	C / 6.5	C / 6.5
4	Airport Way S/ Seattle Blvd S between S Royal Brougham Way to S Boeing Access Rd	A / 16.5	A / 16	A / 16.5	A / 16.5
5	West Seattle Bridge/Spokane St Viaduct between 35th Ave SW and I-5	C / 6.5	E / 10	C / 6.5	E / 10
6	Spokane St Bridge between Harbor Ave SW and SR 99	B / 4.5	B / 4.5	B / 4.5	B / 4.5
7	E Marginal Way S between SR 99 and S Boeing Access Rd	C / 8.5	D / 10.5	C / 8.5	D / 10.5
8	Alaskan Way S from Broad St to SR 99	E / 10.5	F / 14.5	E / 10.5	F / 14.5
9	S Royal Brougham Way between SR 99 and Airport Way S	F / 4.5	D / 3	F / 4.5	D / 3
10	Edgar Martinez Dr S between SR 99 and 4th Ave	F / 3	F / 2.5	F / 3	F / 2.5
11	S Holgate St between 1st Ave and Airport Way S	D / 3	F / 4.5	D / 3	F / 4.5
12	S Lander St between 1st Ave and Airport Way S	E / 4	E / 4	E / 4	E / 4
13	S Lucile St between SR 99 and Airport Way S	D / 4	E / 5	D / 4	E / 5
14	W Marginal Way SW between West Seattle Bridge and 2nd Ave SW	A / 5	A / 5	A / 5	A / 5
15	S Michigan St/ Corson Ave S between E Marginal Way S and I-5	C / 3.5	E / 5.5	C / 3.5	E / 5.5
16	E Marginal Way S/SR 99 between S Atlantic Street and 1st Ave S Bridge	A / 9	A / 9	A / 9	A / 9
17	I-5 between Madison Street and SR 599[1]	F / 27.5	F / 31	F / 27.5	F / 32
18	SR 509 between SR 99 and SR 518[1]	A / 6	D / 11.5	A / 6	D /12
19	SR 99/599 between SR 509 and I-5[2]	A / 6.5	B / 8	A / 6.5	B / 8

Note: Cells shown in bold indicate an impact.
1. WSDOT sets a LOS D standard on I-5, SR 509, and SR 99 north of SR 509.
2. WSDOT sets a LOS E standard on SR 99/599 between SR 509 and I-5.
Source: Fehr & Peers, 2022.

Mode Share

The Preferred Alternative mode share is summarized by sector using the PSRC model and is shown in **Exhibit 3.10-47**. The model predicts that SOV mode shares under the Preferred Alternative would remain similar or slightly higher than Alternative 1 No Action. Therefore, as is the case under Alternative 1 No Action, all three sectors are expected to have higher SOV shares than the City's 2035 SOV targets.

The Duwamish sector is expected to have the same SOV share as Alternative 1 No Action and the Magnolia/Queen Anne and Northwest sectors are expected to have slightly higher SOV shares. However, the magnitude of change is less than the 0.5% threshold for a significant impact and therefore, no significant mode share impacts are expected under the Preferred Alternative.

Exhibit 3.10-47 2044 Preferred Alternative SOV Mode Share—PM Peak Period

Sector	2035 SOV Target	Alternative 1 No Action SOV Share	Preferred Alternative SOV Share
Duwamish	51%	52.6%	52.6%
Magnolia/Queen Anne	38%	40.1%	**40.4%**
Northwest	37%	39.7%	39.8%

Note: Cells shown in bold indicate an impact.
Source: Fehr & Peers, 2022.

Screenlines

Exhibit 3.10-48 summarizes the projected PM peak hour v/c ratios across each screenline under the Preferred Alternative. Although traffic volumes would increase under the Preferred Alternative, all screenline locations are forecasted to be under the LOS threshold defined by the City of Seattle. Therefore, no significant screenline impacts are expected under the Preferred Alternative.

Within the study area, the largest v/c ratio increases between Alternative 1 No Action and the Preferred Alternative are expected at the Magnolia screenline, and the Ballard Bridge.

Exhibit 3.10-48 Screenline Volume-to-Capacity Ratio—Preferred Alternative

Screenline	Location	v/c Ratio Threshold	PM Peak Period v/c Ratio			
			Alt. 1 No Action		Preferred Alt.	
			N/E	S/W	N/E	S/W
2	Magnolia	1.0	0.51	0.54	0.53	0.54
3.11	Duwamish River—West Seattle Bridge and Spokane Street	1.2	0.57	0.53	0.57	0.53
3.12	Duwamish River—1st Avenue S and 16th Avenue S	1.2	0.53	0.52	0.54	0.52
4.13	South City Limit—SR 99 to Airport Way S	1.0	0.47	0.50	0.47	0.51
5.11	Ship Canal—Ballard Bridge	1.2	1.11	0.78	1.13	0.78
5.12	Ship Canal—Fremont Bridge	1.2	0.68	0.68	0.69	0.69
5.13	Ship Canal—Aurora Bridge	1.2	0.35	0.35	0.35	0.35
7.11	West of Aurora Avenue—Fremont Place N to N 65th Street	1.0	0.55	0.64	0.55	0.65
8	South of Lake Union	1.2	0.43	0.51	0.43	0.51
9.12	South of Spokane Street—E Marginal Way to Airport Way S	1.0	0.51	0.49	0.51	0.49
10.11	South of S Jackson Street—Alaskan Way S to 4th Avenue S	1.0	0.65	0.68	0.65	0.68

Source: Fehr & Peers, 2022.

Transit

Exhibit 3.10-49 summarizes PM peak hour average passenger load factors under the Preferred Alternative. The passenger load factors include both light rail and bus services. Similar to the other alternatives, the largest increases in passenger load would occur eastbound across the 8th Avenue NW screenline toward the University District, and southbound on 15th Avenue NW toward Downtown. These increases reflect the expected travel patterns of additional employees leaving the BINMIC area to travel home during the PM peak hour. Southbound travel demand across Lander Street and westbound demand across 8th Avenue NW would also increase slightly. Overall capacity across screenlines is expected to be adequate for the demand—some routes traveling across the study area screenlines, however, may operate over their crowding threshold for some individual trips. Although a minor increase is expected westbound across 8th Avenue NW (which is already expected to have crowded transit routes under Alternative 1 No Action), the magnitude of change is less than the threshold for a significant impact. Therefore, no transit passenger load impacts are expected under the Preferred Alternative.

Exhibit 3.10-49 PM Peak Hour Average Passenger Load Factors—Preferred Alternative

	Alternative 1 No Action		Preferred Alternative	
Screenline	Inbound	Outbound	Inbound	Outbound
A: East of 8th Avenue NW	0.57	1.28	0.64	1.31
B: Ballard Bridge	0.09	0.39	0.09	0.39
C: North of W Mercer Place	0.29	0.59	0.33	0.58
D: North of Lander St	0.21	0.75	0.21	0.76
E: West Seattle Bridge	0.12	0.35	0.12	0.35

Note: Inbound refers to travel into the downtown area and outbound travel out of the downtown area.
Source: Fehr & Peers, 2022.

Summary of Impacts

Exhibit 3.10-50 summarizes significant transportation impacts anticipated under each alternative. The purpose of this EIS is to disclose how potential actions by the City may impact the transportation system in comparison to what is expected to occur with currently adopted zoning codes and development standards. Therefore, the impacts of the Action Alternatives are assessed against Alternative 1 No Action. Impacts identified under Alternative 1 No Action would remain throughout the Action Alternatives even if those alternatives would not result in additional impacts. While the focus of the EIS is not to mitigate conditions under the currently adopted zoning code and development standards (i.e., Alternative 1 No Action), many of the mitigation measures identified for the Action Alternatives would also benefit conditions under Alternative 1 No Action.

In summary, Alternative 1 No Action is expected to have significant impacts to active transportation, auto~~,~~ and freight in terms of travel time, mode share, transit, parking, and safety. Alternative 2 is expected to result in additional significant impacts to autos and freight on one corridor as well as impacts to active transportation, parking, and safety. Alternatives 3 and 4 are expected to result in additional significant impacts to auto and freight on four~~two~~ corridors and one mode share sector as well as impacts to active transportation, parking, and safety. The Preferred Alternative is expected to result in additional significant impacts to auto and freight on two corridors as well as impacts to active transportation, parking, and safety. The locations of the corridors impacted by the Action Alternatives are mapped in **Exhibit 3.10-51** and **Exhibit 3.10-52**.

Exhibit 3.10-50~~-38~~ Summary of Significant Transportation Impacts

Type of Impact	Alternative 1 No Action	Alternative 2	Alternative 3	Alternative 4	**Preferred Alternative**
~~Active Transportation~~	~~Yes~~	~~Yes~~	~~Yes~~	~~Yes~~	
Auto & Freight					
Travel Time	10 LOS F corridors	1 impacted corridor	~~3~~ 4 impacted corridors	~~3~~ 4 impacted corridors	2 impacted corridors
Mode Share	3 sectors	No	1 impacted sector	1 impacted sector	No
Screenline	No	No	No	No	No
Active Transportation	Yes	Yes	Yes	Yes	Yes
Transit	1 screenline	No	No	No	No
Parking	Yes	Yes	Yes	Yes	Yes
Safety	Yes	Yes	Yes	Yes	Yes

Source: Fehr & Peers, 2022~~1~~.

Exhibit 3.10-51-~~39~~ Impacted Study Corridors—Ballard Interbay Northend MIC, 2044

Note: This map was updated to include results of the Preferred Alternative analysis.

Source: Fehr & Peers, 2022~~1~~.

Exhibit 3.10-52-~~40~~ Impacted Study Corridors—Greater Duwamish MIC, 2044

Note: This map was updated to include results of the Preferred Alternative analysis and two additional study corridors (18 and 19).
Source: Fehr & Peers, 2022~~1~~.

3.10.3 Mitigation Measures

The City of Seattle is committed to investing in supportive transportation investments to improve access, mobility, and safety to allow the industrial and maritime sector to strengthen and grow. Maintaining freight mobility is critical and requires both transportation infrastructure and transportation systems management in the MICs. Because many industrial and maritime-related trips will need more convenient transit services and alternative travel options in order to convert from ~~remain as~~ SOV due to the nature of the industry, reducing the SOV mode share for other types of trips is key to limiting the potential severity of transportation impacts. Lowering SOV mode share when possible would not only reduce travel time, mode share, and parking demand impacts, but is consistent with numerous other goals and policies in the Comprehensive Plan.

This section identifies a range of potential mitigation strategies that could be implemented to help reduce severity of the adverse impacts of the Action Alternatives identified in the previous section. These include impacts to active transportation, travel time along key arterial corridors, mode share, parking, and safety.

Secondary Impacts

It should be noted that some transportation mitigation projects could have secondary impacts. For example, converting a general-purpose travel lane or a parking lane to a transit lane, truck-only lane, or cycle track would reduce capacity for autos to travel or park. As required, the City would prepare additional analysis and take public and stakeholder input into consideration before implementing specific transportation improvement projects. Given the programmatic nature of this study, this EIS simply lists the types of projects that could be considered to mitigate potential impacts of the proposed alternatives.

Incorporated Plan Features

The Action Alternatives propose three new land use concepts: Maritime, Manufacturing, and Logistics (MML), Industry and Innovation (II), and Urban Industrial (UI). Each concept includes characteristics and/or development standards, some of which would influence the transportation network and/or transportation behavior in those areas. These include:

- Standards for pedestrian and cyclist-oriented frontage improvements (sidewalks, pedestrian lighting, street trees, etc.)—Industry & Innovation and Urban Industrial
- Vehicle parking maximums and strong commute trip reduction program requirements—Industry & Innovation
- Proximity to a light rail station—Industry & Innovation

Regulations & Commitments

In addition to the development standards incorporated into the proposed land use concepts, the City of Seattle has numerous ongoing plans and strategies to support non-SOV travel modes and

increase the overall efficiency of the transportation system for all Seattle residents and employees. These strategies would be pursued as part of any of the future year alternatives. Strategies are discussed beginning with those expected to be most effective in mitigating impacts.

Project Highlight: East Marginal Way Corridor Improvement Project

The recently announced $20 million federal grant for the East Marginal Way Corridor Improvement Project is an example of how TSMO strategies can be integrated with enhanced maintenance and safety projects. The grant will fund improvements including widening and strengthening the corridor to accommodate larger and heavier truck traffic; construction of dedicated space for people walking and biking along the corridor; and installation of more advanced traffic signals to reduce traffic congestion, particularly for freight accessing the Port.

Transportation Systems Management and Operations (TSMO)

Transportation systems management and operations (TSMO) is a philosophy that encompasses strategies to optimize the existing transportation system by understanding the root causes of poor performance, improving collaboration, encouraging behavior changes through travel demand management, and using technology to manage how the system operates. TSMO strategies focus on cost-effective, near-term, multimodal improvements to better operate the City's infrastructure and systems.

Seattle has an ongoing program to improve the operations of traffic signals and provide drivers with more information about congestion and travel times in an effort to make more efficient use of the City's streets. The City will continue to implement new traffic signal systems, such as adaptive signal control which is already in place along the Mercer Street corridor and will soon be implemented along Denny Way. Adaptive signal control is a coordinated traffic signal system that gathers real-time vehicle demand data and dynamically adjusts signal timing to optimize traffic flow. These programs are designed to specifically reduce traffic congestion and improve freight and vehicle flow.

TSMO strategies can be targeted to high priority roadway users, including freight and transit. The *Transit Master Plan*, ~~and~~ *Freight Master Plan*, *and Seattle Industrial Areas Freight Access Project* identify speed and reliability improvements throughout the city that could benefit those particular modes. In particular, the Freight Master Plan identifies truck-only lanes on highly used truck routes as one potential strategy to improve freight mobility while the BIRT Study proposes joint-use Freight and Transit lanes along 15th Avenue W. SDOT is currently considering policy guidance on Freight-Transit Only Lanes and Truck-Only Lanes. Other potential strategies include:

- intelligent transportation systems (ITS) applications such as dynamic message signs to alert travelers to blocking incidents or give travel time information about route choices;
- truck-specific ITS notifications to inform truck drivers of incidents and major points of congestion;

- truck detection and signal priority to allow traffic signals to recognize an approaching truck so the green light may be extended to let the truck travel through the intersection (providing both freight mobility and safety benefits);
- wayfinding for trucks to improve route decisions and reduce illegal movements;
- geometric improvements at intersections to better design for key truck turning movements; and
- freight operations management to prioritize freight movements during certain times in certain locations.

~~Many of these~~Some types of improvements could be funded through the Move Seattle Levy which commits $14 million over the nine-year life of the levy for the Freight Spot Improvements Project while others would require partnering with regional and state agencies for comprehensive implementation.

Freight Mobility and Access Strategies

Specific projects and high priority areas for improvement may be found in:

- Freight Master Plan
- Seattle Industrial Areas Freight Access Project
- Ballard-Interbay Regional Transportation (BIRT) System Report
- Georgetown Mobility Study

Potentially significant impacts to freight mobility and access have been identified under all future year alternatives; all alternatives are expected to result in increased congestion affecting the roadway network as well as increased travel of other modes which may conflict with freight operator needs. To mitigate this impact, the City could pursue a variety of operational and capital projects aimed at addressing particular freight bottlenecks. The City can consider changing needs as new land uses develop and areas of need are identified.

The City has developed a citywide Freight Master Plan along with other studies addressing the MICs such as the Seattle Industrial Areas Freight Access Project, Ballard-Interbay Regional Transportation (BIRT) System Report, and Georgetown Mobility Study that propose a variety of projects that, if implemented, would improve freight mobility and access. Representative projects that could improve freight mobility and access include: truck-only or joint-use freight and truck lanes, rail corridor grade separation, intersection geometry improvements to address turn radii challenges for trucks, channelization improvements, signal phasing or timing modifications, wayfinding and signage, ITS strategies as described in the TSMO section, and dedicated pedestrian and bicycle facilities to separate vulnerable users from freight.

Travel Demand Management (TDM)

Managing demand for auto travel is an important element of reducing overall congestion impacts that affect auto, freight, transit, and parking demand. There are well-established travel demand management programs in place, including Transportation Management Programs (TMPs), the Commuter Benefit Ordinance, and the State's Commute Trip Reduction (CTR)

program. Because CTR and TMPs typically focuses on large employers, the City could pursue expansions of those programs tailored to smaller employers and residential buildings or support the creation of Transportation Management Associations (TMAs).

A TMA is an organization that provides transportation services and information in a defined area (for example, an office or industrial park or a commercial district). TMAs are typically oriented around TDM programs and focused on commuters but can also serve shoppers, hospital visitors, or residents depending on the characteristics of area they serve and the needs of their members. In some cases, TMAs are developed to advance shared goals among members around sustainability, employee retention, and congestion management. Seattle currently has a TMA in the Downtown area (Commute Seattle) and previously had an active TMA in the Duwamish area (currently TDM programs and services are supported by the SODO Business Improvement Area). There is local precedent for compelling participation in a TMA through code requirements; however, to fully implement a robust TMA, this would also need to be paired with a budget action to establish a funding and governance structure.

Industrial areas can be challenging for TDM due to the characteristics of workers' schedules. For example, many workers need to commute during off-peak periods for their shifts when transit options are more limited and workers often live relatively far from worksites (see **Exhibit 3.9-11** and **Exhibit 3.9-13** for commute length data). Potential TDM measures suited to the study area could include last-mile shuttle systems between key transit nodes and the MICs; coordination with King County Metro and/or Sound Transit to provide off-peak transit service tailored to shift workers with irregular hours; subsidized vanpools; rideshare matching to limit the number of drive-alone commute trips; and micromobility options such as scooters or bicycles to make last-mile connections. In addition to addressing the unique needs of MICs in terms of commute timing, the City could also coordinate with King County Metro through their routine service planning process to explore adding transit service on corridors that serve many industrial and maritime workers.

The City could consider updating municipal code and/or Director's Rules related to Transportation Management Plans to tailor requirements for transportation demand management measures that are most effective in industrial settings. This may include membership in a TMA and discounted or free transit passes and/or car share and bike share memberships. For residential buildings, the City could also consider extending Transportation Management Plans or requiring travel options programs (such as GreenTRIP in California).

Research by the California Air Pollution Control Officers Association (CAPCOA), which is composed of air quality management districts in that state, has shown that implementation of travel demand management programs can substantially reduce vehicle trip generation, which in turn reduces congestion for transit, freight, and autos. Reduced auto travel can indirectly mitigate on-street parking impacts. The City could consider modifying specific measures described below or expanding current strategies. It should be noted that any changes to off-street parking policies would be considered in consultation with stakeholders and in conjunction with improvements to make transit a more competitive option for workers.

- Parking maximums that would limit the number of parking spaces which can be built with new development.
- Review the parking minimums currently in place for possible revisions.
- Review on-street parking management strategies in concert with any adjustment to off-street parking standards to reduce the impact of spillover parking.
- Unbundling of parking to separate parking costs from total property cost, allowing buyers or tenants to forgo buying or leasing parking spaces.
- Increased parking taxes/fees.
- Review and revise transit pass provision programs for employees.
- Encourage or require transit pass provision programs for residents—King County Metro has a Passport program for multifamily housing that is similar to its employer-based Passport program. The program discounts transit passes purchased in bulk for residences of multifamily properties.

Pedestrian & Bicycle System Improvements

Specific projects and high priority areas for improvement may be found in:

- Pedestrian Master Plan
- Bicycle Master Plan
- Bicycle and Pedestrian Safety Analysis
- Ballard-Interbay Regional Transportation (BIRT) System Report
- Georgetown Mobility Study

Potentially significant impacts to active transportation have been identified under all future year alternatives because all are expected to result in more people walking and biking in areas with network gaps. To mitigate this impact, the City would need to improve the facilities provided for people walking, ~~and~~ biking, and rolling, with particular attention to areas that have safety concerns and areas of historic underinvestment. The City continually reevaluates its implementation prioritization and can consider changing needs as new land uses develop, for example to prioritize connections between bus stops/light rail stations and places of employment.

The City has developed a citywide *Pedestrian Master Plan* and citywide *Bicycle Master Plan* along with other subarea plans focused on particular neighborhoods. These plans and documents include myriad projects that, if implemented, would improve the environment for people walking and biking. Representative projects that could improve conditions for people walking and biking in the study areas include: facilities such as sidewalks, asphalt walkways, or painted walkways; signals to make crossing roadways easier; treatments such as rectangular rapid flashing beacons to alert drivers to people crossing the street; marked crosswalks; curb bulbs or extensions to shorten crossing distances and make people walking more visible to drivers; bicycle lanes (including protected and buffered bicycle lanes); and multi-use trails. This work will be refined and integrated into a single multimodal plan in the upcoming Seattle Transportation Plan which will include a holistic framework for system improvements. In addition, the City and Sound Transit are currently coordinating on transportation mitigation

around expanded and new light rail stations (coinciding with II zoning). While specific projects have not yet been identified, it is assumed that Sound Transit will be constructing improvements in the immediate vicinity of each station as part of their mitigation package. Additional improvements could also be implemented through Sound Transit's System Access Fund which awards funds to jurisdictions to design and construct improvements that make it easier and more convenient for people to reach transit. This could include capital projects such as sidewalks, bike lanes, shared use paths, transit integration, and pick-up/drop-off facilities,

~~SDOT also has ongoing safety programs that are aimed at reducing the number of collisions, benefiting both safety and reliability of the transportation system. Projects could be implemented through City-led efforts or in partnership with new development through the development review and permitting process.~~

In addition to creating a better connected and safer walking and riding environment for those already using active transportation modes, pedestrian and bicycle infrastructure investments would encourage additional travelers to choose walking~~, or~~ biking, or micromobility options such as scooters rather than driving~~, . This creates the secondary benefit of~~ contributing toward mitigation of the mode share, travel time, and parking impacts.

Safety Strategies

Potentially significant impacts to safety have been identified under all future year alternatives due to the potential increase of collisions between trucks/autos/rail and vulnerable users, such as people walking, biking, or riding scooters. The pedestrian and bicycle system improvements described in the previous section would help to mitigate safety issues by providing dedicated facilities to separate vulnerable users from motorized traffic (particularly large trucks which inherently operate with higher-risk collisions) and/or adding design elements designed to make vulnerable users more visible to truck and auto drivers. These include: facilities such as sidewalks, asphalt walkways, or painted walkways; signals to make crossing roadways easier; treatments such as rectangular rapid flashing beacons to alert drivers to people crossing the street; marked crosswalks; curb bulbs or extensions to shorten crossing distances and make people walking more visible to drivers; bicycle lanes (including protected and buffered bicycle lanes); and multi-use trails. Projects pertaining to increasing safety at at-grade rail crossings could include: grade separation to avoid the modal conflict entirely and improvements to active warning devices such as bells, flashing lights or gates.

SDOT also has ongoing safety programs that are aimed at reducing the number of collisions, benefiting both safety and reliability of the transportation system. Projects could be implemented through City-led efforts or in partnership with new development through the development review and permitting process.

Parking Strategies

While parking demand varies throughout the study area, there are some localized areas where on-street parking demand exceeds parking supply, particularly demand for truck parking and

near commercial nodes and activity centers such as the Ballard brewery area and businesses along 1st Avenue South. Because the Action Alternatives are expected to increase demand in localized areas that already exceed supply, potentially for a sustained period and by a substantive amount compared to Alternative 1 No Action, significant adverse parking impacts are expected under all of the Action Alternatives. Impacts are expected to be greater under alternatives 3 and 4, which have higher levels of development planned than Alternative 2 or the Preferred Alternative.

The City has multiple ongoing programs to manage on-street parking including the Community Access and Parking Program, Performance-Based Parking Pricing Program, and Restricted Parking Zone (RPZ) Program. These approaches could be modified and/or applied at the neighborhood level to manage the increased demand for the city's limited parking supply. The SDOT Curbside Management Team actively identifies and installs commercial vehicle and general load unload zones in business districts throughout Seattle and would identify load zone needs with new development as needed or requested by development projects. SDOT is also working on potential policy changes to more actively install load zones and other curb access needs at new development during the City development review process.

SDOT's Community Access and Parking Program works with community members to identify parking challenges and opportunities within a neighborhood and implement changes. Parking recommendations could include new time-limit signs, load zones, paid parking, restricted parking zones, bicycle parking, or other changes.

The City is expected to continue managing on-street paid parking through SDOT's Performance-Based Parking Program which evaluates data to determine if parking rates, hours of operation and/or time limits could be adjusted to achieve the City's goal of one to two available spaces per block face throughout the day. The City could continue to manage on-street paid parking through existing programs, redefine subareas and manage them with time-of-day pricing, and/or institute paid parking in new areas.

The study area does not have any current RPZs defined. However, if SDOT determines a RPZ would be a beneficial tool to manage parking demand as growth continues, one or more RPZs could be created. RPZs have typically been implemented in residential neighborhoods where there is high parking demand generated by a use such as a business district, hospital, or school; RPZs allow short-term parking for customers or visitors but limit long-term use by employees or commuters. Within the context of the alternatives considered in this EIS, this situation would be most likely to arise in the denser, mixed-use Industry & Innovation and Urban Industrial zones that are located near light rail stations and/or urban villages. Subsequent management changes could include splitting existing RPZs into multiple zones, adding new RPZs, or adjusting RPZ boundaries. The City could also review the RPZ program and its policies in areas that are oversubscribed (where there are more permits issued than parking spaces) to limit the number of permits issued.

Truck parking management could require a complementary set of strategies. The City is also actively engaged in addressing truck parking needs in partnership with the Port of Seattle; the

City and Port of Seattle entered into an agreement in November 2021 to identify 200 on-street and/or off-street truck parking spaces for drayage drivers by the end of 2023. While this effort is focused on accommodating existing needs, continuing this partnership is a strategy to continue to address truck parking needs as they evolve.

WSDOT held a Washington State Truck Parking Workshop in June 2021 which resulted in development of potential solutions for future consideration.[18] Among the strategies that could be applicable to the study area are:

- Encourage private businesses to develop truck parking in key areas.
- Investigate capacity access at unique facilities and partner with different stakeholders to foster this (examples: use of sports stadium, music venue, fairground, or boat launch parking lots when they are not in use).
- Determine future needs and opportunities for electric truck charging facilities. Looks for opportunities to increase parking availability when building out charging infrastructure.
- Incorporate truck parking into zoning codes and growth management policies. Develop minimum standards for truck and delivery vehicle staging for new developments.
- Assess targeted exceptions to land use provisions where suitable urban sites could be purchased by the state or a private company and used for truck parking.
- Partner with WSDOT and University of Washington on their Truck Parking Information and Management System (TPIMS) pilot project which allows information to be shared with truck drivers about where parking is available.

State Highway System

As described earlier, WSDOT considers any proposal that meets or exceeds a certain threshold of vehicle trips on state highway intersections and/or segments to have a probable significant adverse impact to the state highway system. The City of Seattle will coordinate further with WSDOT to determine how this threshold may be considered in the individual project review process to determine impacts to the state highway system of any specific development proposal.

[18] WSDOT, 2021. 2021 Washington State Truck Parking Workshop, Overview and potential solutions for consideration. Available at: https://wsdot.wa.gov/sites/default/files/2021-12/Synopsis-2021-WA-Truck-Parking-Workshop.pdf

Potential Mitigation Measure Funding Options

Programs like the City's Business Improvement Area (BIA) are possible models for future funding sources. A BIA is an organization funded by property owners and businesses within a local district to collectively fund the maintenance and improvement of their area. There are currently ten BIAs established in the city, including the SODO and Ballard neighborhoods. BIAs can help to fund and promote TMAs that focus on tailored TDM strategies for the local context.

Through the Department of Construction and Inspection's permitting processes, the City can negotiate a proportional share developer contribution toward multimodal transportation improvements needed to mitigate impacts of the project. Given the temporal travel characteristics of industrial land uses (not necessarily following a conventional peak period travel pattern), a proportional share could be estimated based on the expected daily trips of the project.

To support delivery of multimodal projects, the City of Seattle could also implement a Growth Management Act (GMA) compliant multimodal Transportation Impact Fee (TIF) program. The City has already done some initial research into what a program could look like, including consideration of the projects it could fund, how to consider growth, and how development projects' impacts could be measured. Some of the initial findings include that a multimodal TIF program in Seattle could help fund a project list that includes complete streets, transit supportive infrastructure, freight network improvements, and investments to create a more complete network for walking and biking. To align with City's mode-share level of service policy, the TIF program would likely be based on person trips rather than vehicle trips given the strong nexus between new development and the need to expand the City's multimodal transportation network. To implement the program, the City would need to complete a rate study establishing a nexus between the impact fee project list and rates charged and the City Council would need to adopt an impact fee ordinance and associated code language that directs how impact fees would be assessed and spent. RCW 82.02.050–.110 and WAC 365-196-850 provide direction for how counties, cities, and towns planning under the Growth Management Act (GMA) can impose impact fees.

Other Potential Mitigation Measures

Location-specific mitigation measures are discussed for the following two travel time corridor and transit screenline impacts:

- 15th Avenue W between Magnolia Bridge and NW Leary Way
- W Dravus Street between 15th Avenue W and 20th Avenue W

Travel Time Impact: 15th Avenue W between Magnolia Bridge and NW Leary Way

A travel time impact is expected along 15th Avenue W between Magnolia Bridge and NW Leary Way under both alternatives 3 and 4. The BIRT Study analyzed the 15th Avenue NW corridor in detail and outlines potential investments, some of which would mitigate the travel time

impacts. The scale of each project's potential efficacy in improving the transportation system is evaluated as either transformative or small. These include:

- Intersection operations refinements along 15th Avenue W at W Armory Way, Gilman Drive W and W Howe Street (transformative). This would include improvements such as turning radii adjustments to better accommodate frequent freight turning movements and signal phasing adjustments to shorten the amount of time needed for traffic flow crossing the 15th Avenue W corridor.
- Installation of an adaptive signal system along the corridor (transformative). Adaptive signal control is a coordinated traffic signal system that gathers real-time vehicle demand data and dynamically adjusts signal timing to optimize traffic flow.
- Joint-use of the existing bus-only lanes by both transit and freight on 15th Avenue W between Denny Way and Market Street ~~during off-peak times~~ (small). The City is currently planning a pilot project for Freight and Bus Lanes on Westlake Avenue which will provide information about benefits and implementation elsewhere, such as the 15th Avenue NW corridor.
- Replacement of the Ballard Bridge to improve northbound traffic flow (transformative). There are currently two options under consideration: a mid-level and a low-level replacement. The mid-level bridge would reduce the frequency of bridge span openings making travel times across the bridge more reliable and shorter on average while the low-level option would provide an easier grade for people walking and biking. Both options would include a Single Point Urban Interchange (SPUI) at W Nickerson Street/W Emerson Street which would improve travel time reliability for trucks entering and exiting the BINMIC.

Travel Time Impact: W Dravus Street between 15th Avenue W and 20th Avenue W

A travel time impact is expected along W Dravus Street between 15th Avenue W and 20th Avenue W under alternatives 2, 3, and 4. The BIRT Study outlines potential investments along the W Dravus Street corridor, some of which would mitigate the travel time impacts. These include:

- Signal operations improvements and ITS strategies (small). This could include optimizing traffic signal timing along W Dravus Street to support both general purpose traffic and freight reliability to and from the Terminal 91 North Gate if it reopens. Signal timing and hardware improvements at the 15th Avenue W and W Dravus Street ramps could also ensure vehicle queues on the bridge have cleared to give trucks adequate space to turn, minimizing the delays currently experienced at this location.
- Roadway striping/channelization modifications to remove geometric constraints for large trucks (small). This would include improving the turn radii at 15th Avenue W and W Dravus Street so trucks could more easily make the turn to and from the ramps, minimizing the delays currently experienced at this location.
- Access management enhancements at frequent and busy driveway access points (small).
- Replacement and/or widening of the W Dravus Street bridges (transformative). Options could include roadway rechannelization, conversion to a roundabout at 17th Avenue W, and/or widening the Dravus Street bridge west of 17th Avenue W.

Travel Time Impact: I-5 Between Madison Street & SR 599 & SR 509 Between SR 99 & SR 518

A travel time impact is expected along I-5 between Madison Street and SR 599 (stretching along the east side of the Greater Duwamish MIC) and SR 509 between SR 99 and SR 518 under alternatives 3 and 4. While the City of Seattle works closely with WSDOT regarding facilities running through the city limits, I-5 and SR 509 are ~~is~~ owned and operated by the State. In 2019, WSDOT and the City of Seattle jointly applied for a federal grant to move planning efforts for the I-5 system forward; however, the project was not awarded any funding at that time. Both agencies continue to work toward securing funding for I-5 improvements, as well as coordinate with the PSRC on potential approaches to address congestion on regional highways. However, for the purposes of this EIS, no location-specific capital improvement-based mitigation measures are assumed that would address travel time impacts along I-5 or SR 509.

Regarding land use mix and trips, under alternatives 3 and 4, the City could consider the balance of employment uses and plan for greater industrial jobs, and a smaller share of non-industrial jobs (e.g., retail, services, office) in the Greater Duwamish MIC to reduce trips. ~~The City could consider a preferred alternative that has less of the employment-dense Industry and Innovation zone than is found in alternatives 3 and 4 but more than Alternative 2 and still avoid significant adverse impacts on I-5.~~

The Preferred Alternative (developed based on feedback regarding potential impacts of the Draft EIS alternatives) would have less employment density than alternatives 3 and 4. The land uses proposed under the Preferred Alternative were analyzed using the regional travel demand model, which suggests there would be no significant travel time impacts to either I-5 or SR 509 under the Preferred Alternative.

3.10.4 Significant Unavoidable Adverse Impacts

This section describes the significant and unavoidable adverse impacts to transportation that would occur as a result of implementation of the Action Alternatives. Travel demand and associated congestion is expected to increase over time regardless of the alternative pursued. In addition to citywide transportation capacity improvements largely focused on improved transit, bicycle, pedestrian, and freight connections, the City will manage demand using policies, programs, and investments aimed at shifting travel to non-SOV modes. However, city streets will remain congested during peak periods as growth continues to occur. With respect to the three Action Alternatives studied in the~~is~~ Draft EIS and the Preferred Alternative studied in the Final EIS, potentially significant adverse impacts are identified for active transportation, corridor travel times (affecting autos, freight, and buses), mode share, on-street parking, and safety.

Potential mitigation measures for the 15th Avenue W and W Dravus Street corridors impacted by the Action Alternatives are proposed above. If these measures are implemented, it is expected that the travel time impact could be brought to a less-than-significant level in relation

to Alternative 1 No Action. At this time, no location-specific mitigation measures along I-5 or SR 509 are expected to fully mitigate the travel time impact to autos, freight, and buses under alternatives 3 and 4. However, the land use ~~M~~modifications ~~to alternatives 3 and 4 that~~proposed for the Preferred Alternative are expected to ~~reduce the total amount of future employment in the SODO subarea could potentially~~ mitigate the impact to I-5 and SR 509 ~~. Therefore, a significant travel time impact may be avoided on I-5 if the reduction in trips brings travel time increases~~ below the threshold of significance.

Some combination of the travel demand management strategies discussed in **3.10.3 Mitigation Measures** could be implemented to reduce the magnitude of SOV travel. Given the small magnitude of difference projected between Alternative 1 No Action and alternatives 3 and 4, it is expected that the mode share impact could be reduced to a less-than-significant level. The land use modifications proposed for the Preferred Alternative are expected to mitigate the mode share impact below the threshold of significance.

Parking impacts are anticipated to be brought to a less-than significant level by implementing a range of possible mitigation strategies such as those discussed in **3.10.3 Mitigation Measures**. While there may be short-term impacts as individual developments are completed (causing on-street parking demand to exceed supply), it is expected that with new strategies for truck parking accommodation, expanded paid parking zones, revised RPZ permitting, more sophisticated parking availability metrics, and continued expansion of non-auto travel options, the on-street parking situation ~~will~~ would reach a new equilibrium as residents, employees, and visitors adjust to the new context. Therefore, no significant unavoidable adverse impacts to parking are expected.

Significant impacts were identified to both active transportation and safety due to the projected increase in people walking~~, and~~ biking, and rolling in areas with network gaps and the increased potential for vehicle conflicts (particularly trucks) and rail with vulnerable users. While the City can pursue a variety of mitigation measures to improve active transportation facilities ~~for people walking and biking~~ and pursue supplemental funding through federal or state programs, it is not expected that all network gaps can be addressed given the number of locations needing improvement and the limited funding available. Therefore, it is expected that the Action Alternatives could have significant unavoidable adverse impacts to active transportation and safety.