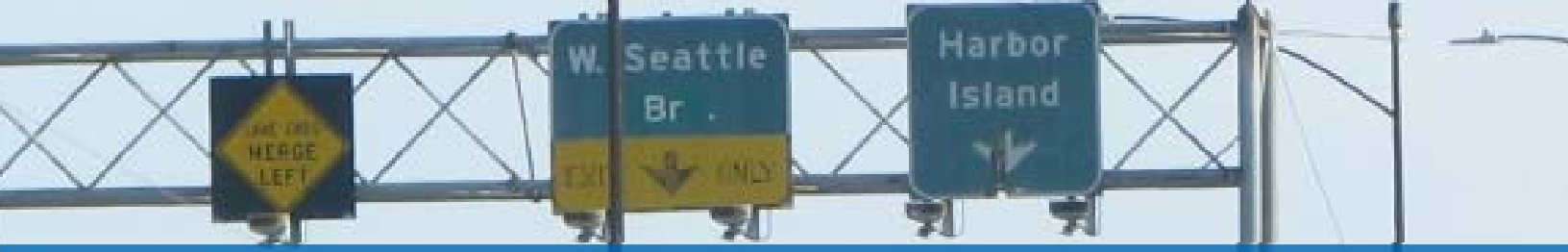
The Seattle Department of Transportation

East Marginal Way Multimodal Corridor Study

Existing Conditions Report



October 2016

DRAFT

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Introduction

The purpose of the City of Seattle (City) Multimodal Corridor Program is to identify potential improvements along key corridors in Seattle that would enhance safety, efficiency, and functionality for all modes of travel. Corridor improvements will be coordinated with *Move Seattle* (2015), Seattle's strategic vision for transportation over the next 10 years, and the City's various modal plans, including the *Seattle Freight Master Plan* (2016) and *Freight Access Project* (2015), the *Seattle Transit Master Plan* (2012), the *Seattle Pedestrian Master Plan* (2009), and the *Seattle Bicycle Master Plan* (2014).

East Marginal Way Corridor Objectives

East Marginal Way is identified as a high priority corridor within the Multimodal Corridor Program. It is a major freight corridor that provides connections for trucks and other vehicles traveling to and from Port of Seattle (Port). Improving freight and vehicular connections with local industrial businesses, the regional highway system, and the freight rail system is a primary objective for the project. The anticipated improvements along the corridor are critical for maintaining and expanding the Puget Sound economy and keeping Seattle area businesses competitive and strong. In addition to freight movement, East Marginal Way serves people who walk, bike and use transit. This corridor serves as a major connection for people walking and biking to and from neighborhoods including West Seattle, Georgetown, South Park, and SODO to Downtown Seattle, including employees in the area who bike to work, walk to work, or walk to and from bus stops.

The East Marginal Way Multimodal Corridor Project seeks to meet the following major objectives:

- Safely and predictably accommodate people walking, biking, and using public transit.
- Maintain freight access, mobility and connections needed to support the vitality of the Port, local industrial businesses, and regional commerce.

Overview of Corridor Segments

For purposes of analysis, the East Marginal Way study corridor is divided into three segments, shown on **Figure 1**. Each segment has unique characteristics and issues that need to be addressed in order to meet the overall project objectives.

- The **North Segment** is located from S Atlantic St to S Spokane St. It is a two- to three-lane roadway that provides truck access on the west side to Port terminal gates 25, 30, and 46, and vehicle access to the US Coast Guard Building. It is also a major thoroughfare for people walking and biking. There is a continuous sidewalk on the west side and buffered bicycle lanes on both sides of the street. On the east side of the corridor, railroad tracks are located along a majority of the segment. Uncontrolled gravel parking occurs along the east side between S Hanford St and S Atlantic St. It provides access to the Seattle International Gateway (SIG) Intermodal Yard via S Atlantic St to the north and S Hanford St to the south.

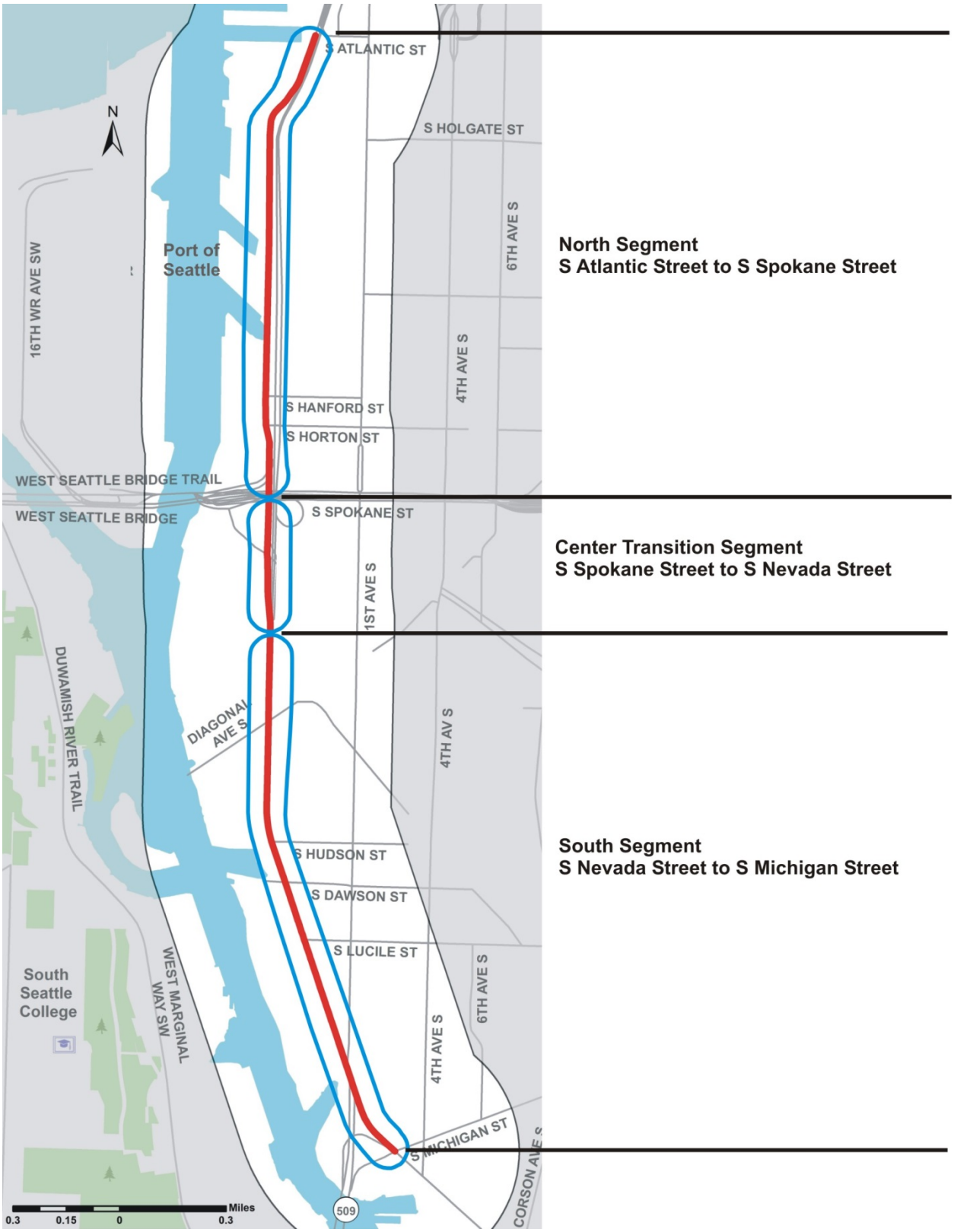
  The North Segment has two major travel characteristics: (1) a high number of people regularly walk and bike along this segment between the West Seattle Bridge Trail and the Elliott Bay Trail/Downtown Seattle, and (2) primary freight access is provided between three Port terminals, two intermodal rail yards, and the regional highway system. This results in high truck volumes along the segment and a high number of trucks turning across bike lanes and sidewalks. ***Improvements along this segment seek to enhance safety for people of all ages and abilities walking and biking, while still adequately accommodating vehicle operations that are vital to the Port, intermodal yards, and US Coast Guard.***

- The **Center Transition Segment**, located between S Spokane St and S Nevada St, connects the North and South Segments beneath State Route 99 (SR 99) Viaduct and West Seattle Bridge structures. Navigation through this area for vehicles, people walking, and people biking, is highly constrained due to the presence of bridge piers and ramps, railroad tracks, parked cars and trucks, stored equipment, and truck access to the Union Pacific Intermodal Terminal (Argo Yard) located directly to the south. ***Improvements along this segment seek to better delineate paths between the North and South Segments, to enhance safety and wayfinding beneath the bridge structures for all travel modes.***

- The **South Segment** is located between S Nevada St and S Michigan St. It is a six- to seven-lane roadway that is also a state highway (SR 99), with high vehicle volumes. It has sidewalk along portions of the east side and no sidewalk along the west side. It has no bicycle facilities. Independent railroad tracks are located along the west side of the corridor from its southern end to S Diagonal St and S Idaho St. A rail spur to Argo Yard traverses across East Marginal was at S Diagonal St.

  The South Segment has numerous street and driveway intersections along the entire length. It provides connections for people who walk and bike to and from businesses and bus stops in the area. This segment provides a major connection between Downtown to the north, and the Georgetown and South Park neighborhoods to the south. ***Improvements along this segment seek to provide facilities to safely accommodate people of all ages and abilities walking and biking, and to improve transit and non-motorized access for services and businesses located along the corridor, while still maintaining SR 99's essential function as part of the citywide and statewide freight transportation network.***

Figure 1. East Marginal Way – Analysis Segments



Source: City of Seattle GIS database, compiled by Heffron Transportation, Inc., October 2016.

Corridor Characteristics

Community Attributes

There are no residences directly adjacent to the East Marginal Way study corridor, but a diverse population lives and works in the vicinity. **Table 1** summarizes some attributes of the community members who live near the corridor. More than 40 percent of the households in the area live below 200 percent of the poverty level, and a similar proportion of households have no cars available. Approximately one-quarter of the population in the area is disabled. About 40 percent of the population in the area includes people of color, and a variety of languages are spoken in non-English-speaking households, including Chinese, Spanish, Korean, Tagalog, and Vietnamese.

Table 1. Community Attributes

Attribute	Percent of Population in Corridor Vicinity[1]	City of Seattle Demographics
People of Color	40%	30.5%
Households with No Cars Available	43%	16%
Households Below 200% of Poverty Level	46%	26%
Population over Age 64	14%	11%
Population under Age 18	5%	15%
Population with Disabilities	25%	9%
Population with Diabetes	5%	N/A
Obesity Rate	20%	23%
Languages Spoken at Home (where English is spoken "less than well")	Chinese – 10%; Spanish – 4%; Korean – 2%; Tagalog – 2%; Vietnamese – 1%	

Source: City of Seattle, based upon 2010 US Census data, Analysis from 2010 demographic data from census tracts adjacent to the East Marginal Way corridor and King County Public Health Reporting Areas (HRAs).

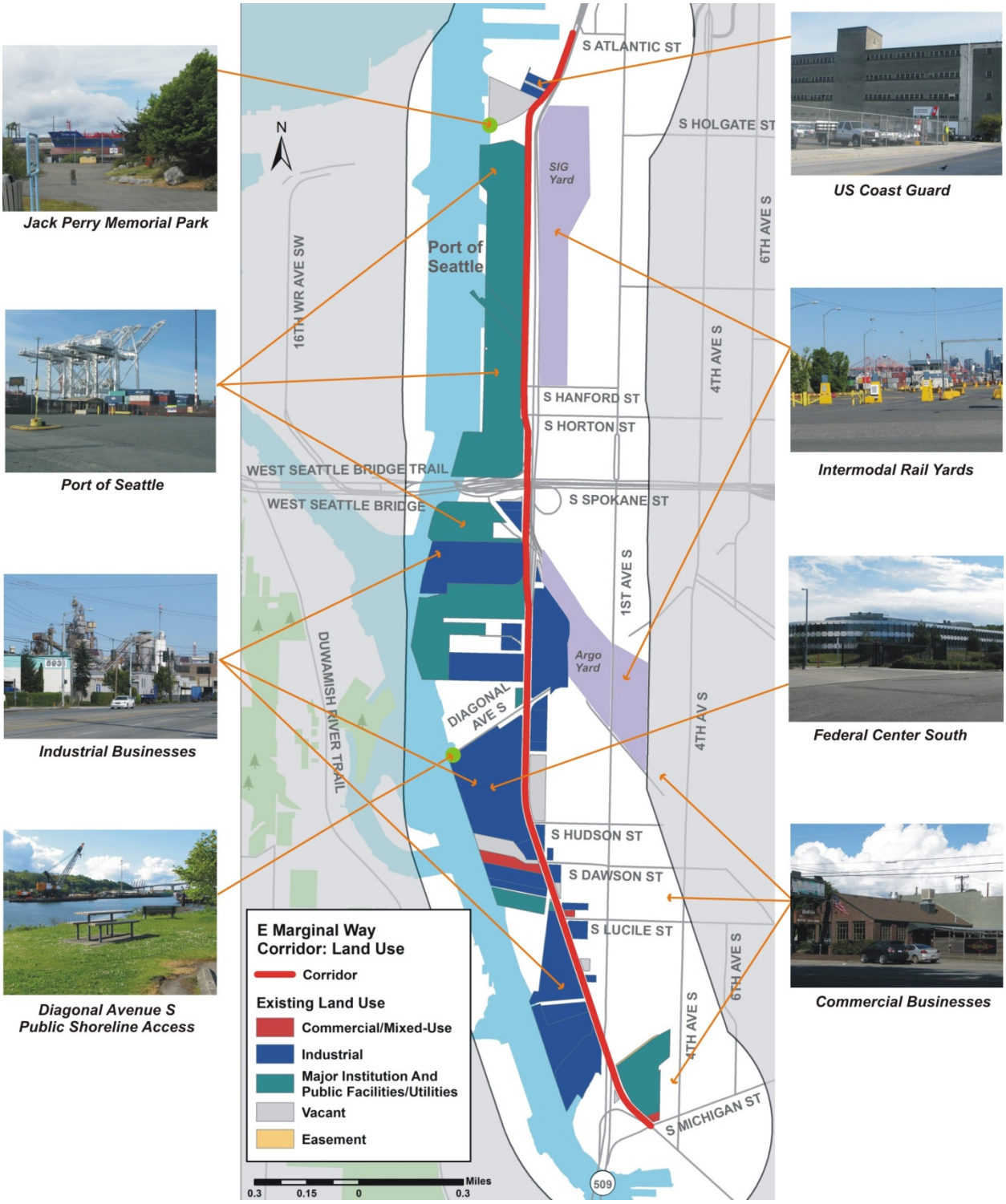
1. Out of population of approximately 3,600 – includes residents within the East Marginal Way and 1st Ave S corridor vicinity.

Corridor Land Uses & Community Assets

The East Marginal Way corridor is located within the Duwamish Manufacturing/ Industrial Center (MIC). **Figure 2** shows existing land uses adjacent to the study corridor, which consist predominantly of Port of Seattle marine facilities, inter-modal/rail facilities, industrial and manufacturing facilities, federal offices including the US Coast Guard Building and the Federal Center South, and commercial development including offices and a small amount of retail. The Federal Center South building is the only business adjacent to the corridor that is considered a Commute Trip Reduction (CTR) business as it employs 100 or more employees and, by law, requires employers to implement programs to reduce drive-alone trips to their worksite. The existing land uses are consistent with the area's zoning and the intent of the MIC designation, and they are not expected to change significantly in the future. The corridor also connects to two public shoreline access points—the Jack Perry Memorial Park near the north end of the corridor, and the Diagonal Ave S Public Shoreline Access near the central portion of the corridor.

Manufacturing/ Industrial Centers (MICs) are designated employment areas with intensive, concentrated manufacturing and industrial land uses that cannot be easily mixed with other activities.

Figure 2. Existing Land Use and Community Assets



Source: City of Seattle GIS database, compiled by Heffron Transportation, Inc. and Concord Engineering, June 2015.

Environmental Profile

East Marginal Way is a highly built-out corridor with minimal pervious surface that is located primarily in intermittent narrow strips adjacent to the existing roadway. Seattle Public Utility (SPU) data indicates that the roadway is not suitable for bio-retention between S Forest St and S Nevada St. Green Stormwater Infrastructure (GSI) may be considered outside of this area. The north segment is located in the East Waterway Basin and the south segment is located in the Duwamish Basin of the Duwamish River. The entire corridor is within an environmental critical area liquefaction zone and a few portions of the corridor, where the Duwamish River has inserts near the roadway, are wildlife critical areas and contain a shoreline habitat designation.

Green Stormwater Infrastructure (GSI) uses vegetation, soils, and natural processes to manage water and create healthier urban environments.

As the existing conditions report from Seattle's *Freight Master Plan* states, the economic importance of goods movement along the East Marginal Way corridor is of utmost need; however it is also important to address community concerns and quality of life issues associated with goods movement. Freight mobility does generate negative externalities that affect public health and environmental health. Goods movement causes air pollution, noise, is a part of congestion, potential safety issues, and visual blight. These impacts are most directly felt by people who live near ports, rail yards, freeways, railways, warehouses, and distribution centers, all within the area of the East Marginal Way corridor. Port and intermodal yards are air pollution "hot spots" due to concentration of truck traffic. [1] The health risks (potential for disease) of exposure to many pollutants is well understood, and it is well established that low-income and/or minority populations are disproportionately exposed to pollution and increased health risks because of their proximity to pollution sources such as industrial facilities, highways, low income housing (lead), and agricultural areas (pesticide application).[2]

The Duwamish Valley *Cumulative Health Impacts Analysis* (CHIA) supports the identification of Seattle's 98108 zip code (Georgetown/Beacon Hill/South Park) as a geographic area with disproportionate health burdens and fewer health benefits as compared to other areas of Seattle. These disproportionate burdens are a result of the cumulative impact of social and environmental vulnerabilities, including socioeconomic factors, sensitive populations, environmental exposures and effects, and public health effects. Yet, residents also rely on efficient freight mobility through both the convenience that freight allows for daily life, as well as the necessity and desire for goods and services. For example, those who live in Seattle depend upon weekly and bi-weekly garbage, recycling and composting pick-ups from their residences, and pay for an external company to dispose of trash. People who live, work, and spend time in Seattle rely on restaurants, coffee shops, bars, grocery stores, retail shops, etc., to sell them the goods that they desire. Businesses, like residents, rely on the transportation system to move goods within the city, region, state, country, and internationally on a daily basis. Business expectation is a safe, efficient and resilient freight system ensuring that goods are transported to customers where and when they are needed. The Duwamish Industrial area provides facilities that support many of the city's freight needs—waste transfer facilities where citywide waste is transferred from truck to rail modes of travel, and distribution centers where goods to local businesses originate. If these facilities were located outside of the city, it would increase the distance that local trucks would have to travel to reach such facilities, which also affects the neighborhood with increased highway congestion and air quality impacts.

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1 Laetitia Dablanc, Genevieve Giuliano, Kevin Holliday, and Thomas O'Brien, Best Practices in Urban Freight Management: Lessons from an International Survey, Transportation Research Board, August 2013, https://hal.archives-ouvertes.fr/hal-00854997/document

2 Linn Gould and BJ Cummings, Duwamish Valley Cumulative Health Impacts Analysis: Seattle, Washington, Just Health Action and Duwamish River Cleanup, March 2013, http://duwamishcleanup.org/wp-content/uploads/2013/03/CHIA_low_res.pdf

The East Marginal Way Multimodal Corridor Study may not be able to address all of the environmental and public health concerns related to goods movement, but it is important to recognize the impacts to which freight and other vehicles contribute. The corridor study and design alternatives will aim to provide safe and predictable operating conditions for people driving trucks as well as higher quality pedestrian and bicycle facilities along or parallel to the corridor, giving single occupant vehicle drivers alternative choices for traveling that will help to reduce congestion, truck idling and in turn, result in lower greenhouse gas emissions. Intelligent Transportation Systems (ITS) will also be considered to efficiently manage the traffic flows along this corridor. Businesses located along the corridor, as well as those that use the corridor to transport goods, are encouraged to develop sustainable freight practices. Sustainable freight practices result in a "win" for businesses, consumers, residents, and the environment. Using cleaner fuels, such as natural gas and electricity, reduces both emissions and costs; applying sustainable development and operations practices to the freight industry reduces energy and water consumption, as well as emissions, landfill waste, and urban stormwater runoff.

Intelligent Transportation System (ITS) measures are advanced information and communications technology that are applied to surface transportation in order to achieve enhanced safety and mobility while reducing the environmental impact of transportation.

Transportation Context

Transportation Characteristics

Figure 3 shows the major transportation characteristics of the East Marginal Way study corridor.

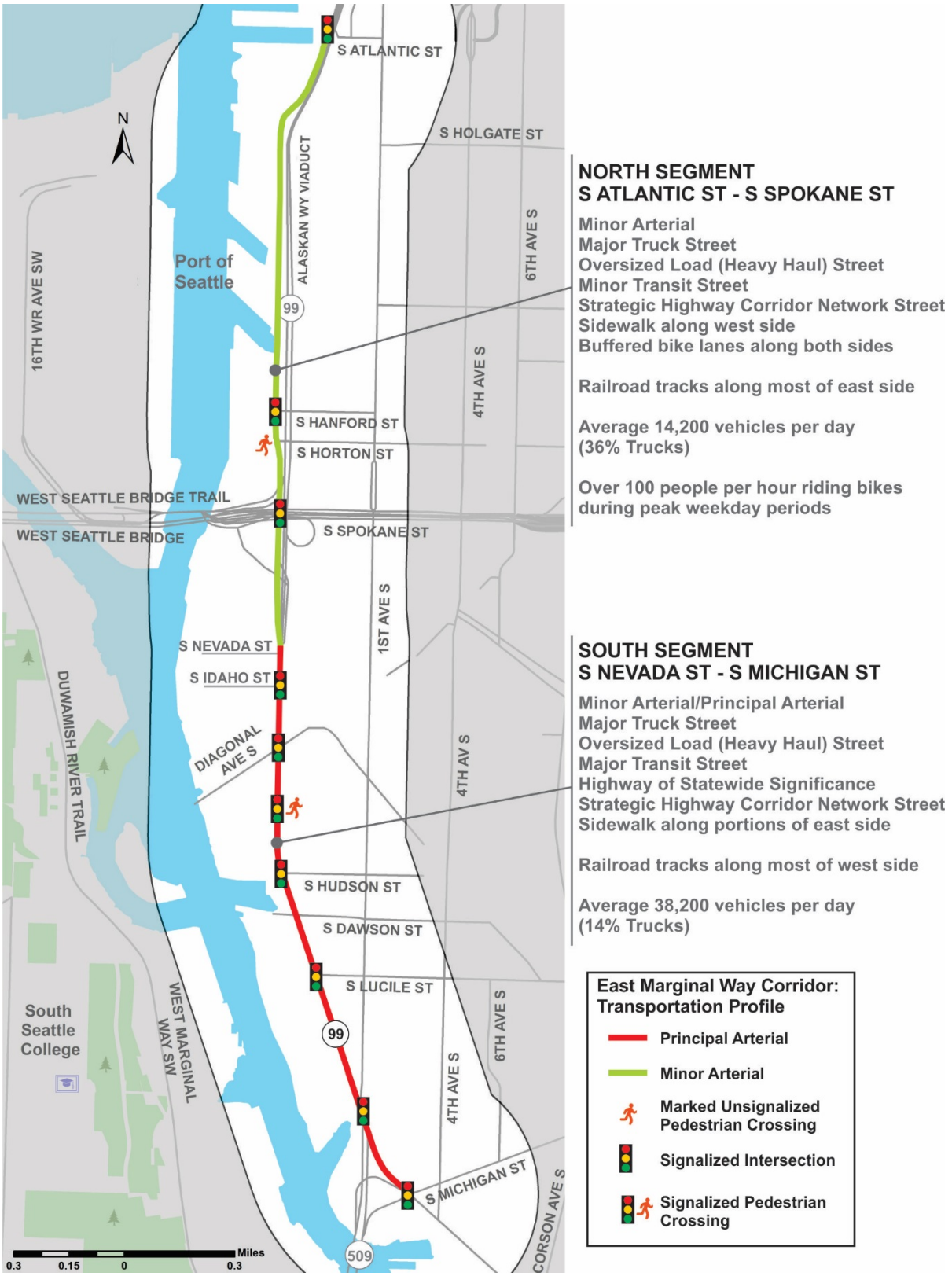
The North Segment is classified as a Minor Arterial and Major Truck Street; it is located at ground level just west of the Alaskan Way Viaduct. This segment is classified as a Minor Transit Street as it was a streetcar route in the past, although it currently does not have transit service. This segment of East Marginal Way is the primary roadway serving trucks traveling to and from Port Terminals 25, 30 and 46, connecting them to the BNSF Railway's Seattle International Gateway (SIG) Yard, where containerized freight is transferred between truck and rail modes of travel. There are two access points to different segments of this yard: the Main SIG Yard is accessed from S Hanford St, and North SIG is accessed from Colorado Ave S via S Atlantic St at the far north end of the corridor. Of the 14,200 vehicles that travel through this segment of the corridor on a typical day, approximately 36 percent are heavy trucks. This segment is also a major non-motorized thoroughfare, providing direct connection between the West Seattle Bridge Trail, the SODO neighborhood, and Downtown Seattle. Over 100 bicyclists per hour have regularly been observed to travel through the corridor during peak weekday periods, with numbers sometimes as high as 200 to 400. The pavement along this segment consists of both concrete and asphalt; pavement quality along the north and south ends of the North Segment is in satisfactory to good condition, but the pavement quality along a large portion of the segment (between the Terminal 30 gate and S Horton St) is in poor to serious/failed condition.

The South Segment is classified as a Minor Arterial to the north of the Alaskan Way Viaduct, and as a Principal Arterial where it becomes State Route (SR) 99 at the south end of the viaduct. Where it becomes SR 99, it is also classified as a Major Truck Street, a Major Transit Street, and is a Highway of Statewide Significance. This segment of East Marginal Way carries about 38,200 vehicles on a typical day, of which about 14 percent are heavy trucks. It also is an important part of the freight network, connecting trucks generated by the Port and area industrial facilities to the regional highway system, including direct connection to SR 509 at the corridor's south end. The Union Pacific's (UP) Argo rail yard is located just east of East Marginal Way. Trucks from the Port can enter this yard via the North Argo Connector, which intersects East Marginal Way under the Alaskan Way Viaduct. Trucks exiting the Argo Yard return to the Port using Diagonal Ave S and East Marginal Way. This segment of East Marginal Way is lacking in non-motorized facilities and thus carries very low volumes of people walking or biking. The pavement along this segment consists of both concrete and asphalt; the portion of the South Segment adjacent to the Alaskan Way Viaduct is in serious/failed condition, but the rest of the segment south of the viaduct is in fair condition; as the corridor approaches S Michigan St, the pavement condition is satisfactory.

Highways of Statewide Significance are designated state highways that promote and maintain significant statewide travel and economic linkages, and are planned from a statewide perspective.

Both segments are part of the nation's Strategic Highway Corridor Network (STRAHNET), which consists of routes that link Department of Defense installations with key ports, and are used in the mobilization of defense forces.

Figure 3. Transportation Profile



Source: City of Seattle GIS database and modal plans, compiled by Heffron Transportation, Inc., June 2015.

Roadway Width and Channelization

Table 2 summarizes the existing roadway width and right-of-way width along the corridor. Although the existing right-of-way is much wider than the roadway, it is important to note that much of the additional right-of-way serves other transportation uses, including bridge piers for the elevated Alaskan Way Viaduct and West Seattle Bridge, and railroad track sidings that serve the industrial and manufacturing businesses located along the East Marginal Way corridor. As the corridor study moves into conceptual design, it will focus on the roadway width dimensions, including the back-of-sidewalk dimensions (where they exist) in developing alternatives, rather than the right-of-way width.

Right-of-Way is public land reserved for transportation uses including streets, sidewalks, bike lanes, trails, and railroads, and also for utility uses.

Table 2. Right-of-Way Characteristics

Segment	Roadway Width (feet)	Right-of-Way Width (feet)	Other Characteristics
North Segment			
S Atlantic St – S Hanford St	55	200	Railroad sidings and Alaskan Way Viaduct piers in right-of-way on east side of street
S Hanford St – S Hinds St	42	250	Alaskan Way Viaduct piers in right-of-way on east side
S Hinds St – S Spokane St	42	200	Alaskan Way Viaduct and West Seattle Bridge piers in right-of-way
South Segment			
S Spokane St – Duwamish Ave S	44	200	Alaskan Way Viaduct and West Seattle Bridge piers in right-of-way
Duwamish Ave S – Alaskan Viaduct Ramp	46	200	Alaskan Way Viaduct piers in right-of-way. One-way ramps connect surface East Marginal Way to SR 99 south of Alaskan Way Viaduct.
Alaskan Way Viaduct Ramp – Diagonal Ave S	74	130	Railroad sidings in right-of-way on west side of street
Diagonal Ave S – 1st Ave Bridge	76	130	Railroad sidings in right-of-way on west side of street
1st Ave Bridge – S Michigan St	58	100	Ramp connections to 1st Ave S Bridge on the west side of the street

Source: City of Seattle GIS database, compiled by CM Design Group, June 2015.

Figure 4 shows the typical widths of the different sections of the East Marginal Way corridor. As the figure shows, the majority of the North Segment is three lanes wide – two travel lanes and one two way left turn (center) lane, with a sidewalk on the west side and buffered bike lanes on both sides. It narrows to two lanes at the south end of the segment. The majority of the South Segment is seven lanes wide with intermittent sidewalk on the east side. It is two lanes wide north of the Alaskan Way Viaduct connection (north of S Nevada St) and narrows from seven lanes to six lanes south of 1st Ave S.

Figure 4. Street Channelization

S Atlantic St to S Horton St

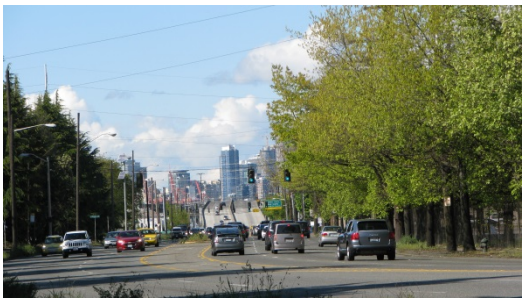
- 3-lane section
- One travel lane in each direction
- Two-way left-turn lane (center lane)
- Bicycle lanes on each side; portions have painted buffer of varying width
- Sidewalk on west side

S Horton St to S Spokane St

- 2-lane section
- One travel lane in each direction
- Bicycle lanes on each side with painted buffer
- Sidewalk on west side
- Uncontrolled gravel parking area on east side

S Spokane St to S Nevada St

- 2-lane section
- One travel lane in each direction
- Intermittent sub-standard sidewalk on west side
- Roadway winds through the area under the Alaskan Way Viaduct and West Seattle Bridge, and includes a southbound flyover ramp over Duwamish Ave S and railroad lines
- Uncontrolled gravel parking area on east side



S Nevada St to 1st Ave S

- 7-lane section
- Three travel lanes in each direction
- Two-way left-turn lane (center lane)
- Intermittent sub-standard sidewalk on east side

1st Ave S to S Michigan St

- 6-lane section
- Three northbound travel lanes and two southbound travel lanes
- Two-way left-turn lane (center lane)
- Sub-standard sidewalk on east side

Source: Heffron Transportation, Inc., June 2015.

Traffic Volumes

Figure 5 shows the hourly traffic volumes over a typical weekday on the north and south segments. As shown, both segments are characterized by a conventional commute-oriented weekday traffic pattern, with the maximum northbound volume (toward Downtown) occurring during the AM peak hour, and the maximum southbound volumes (away from Downtown) occurring during the PM peak hour. However, on the north segment, the daytime off-peak volumes are closer to the peak period maximums, reflecting a higher volume of truck traffic generated by the Port and railyards that travel predominantly during the off-peak periods.

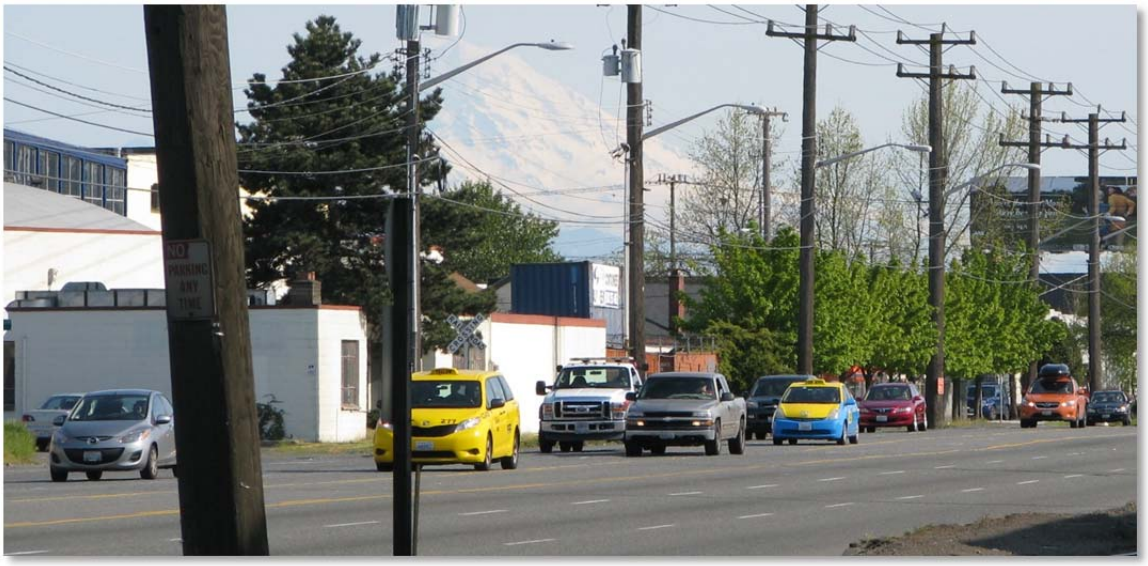
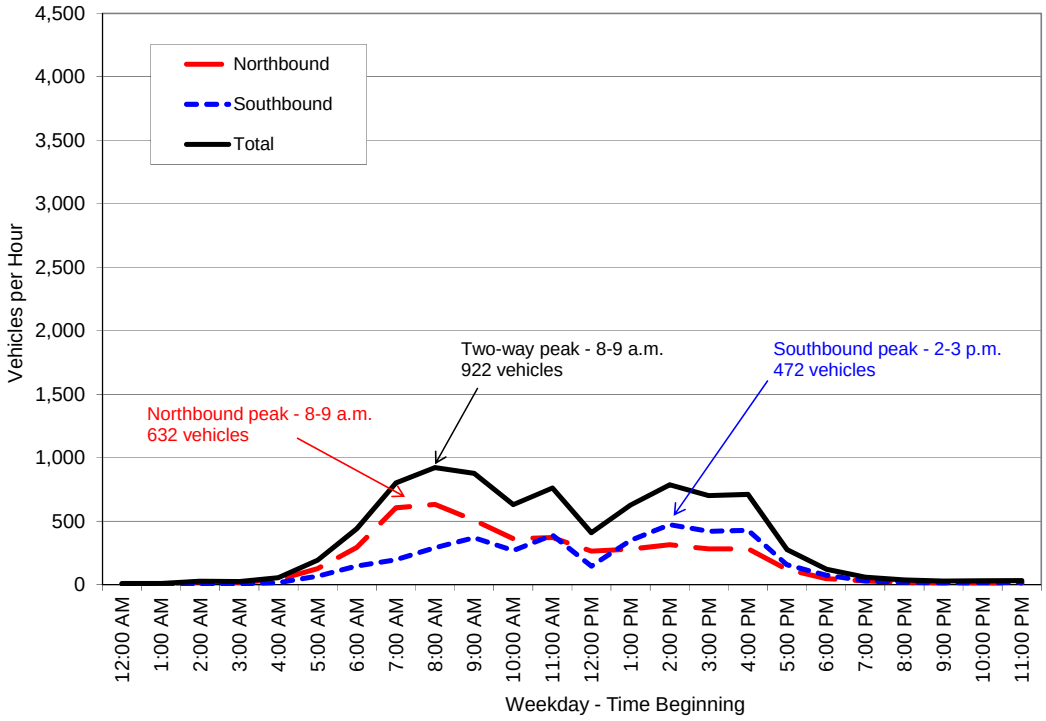
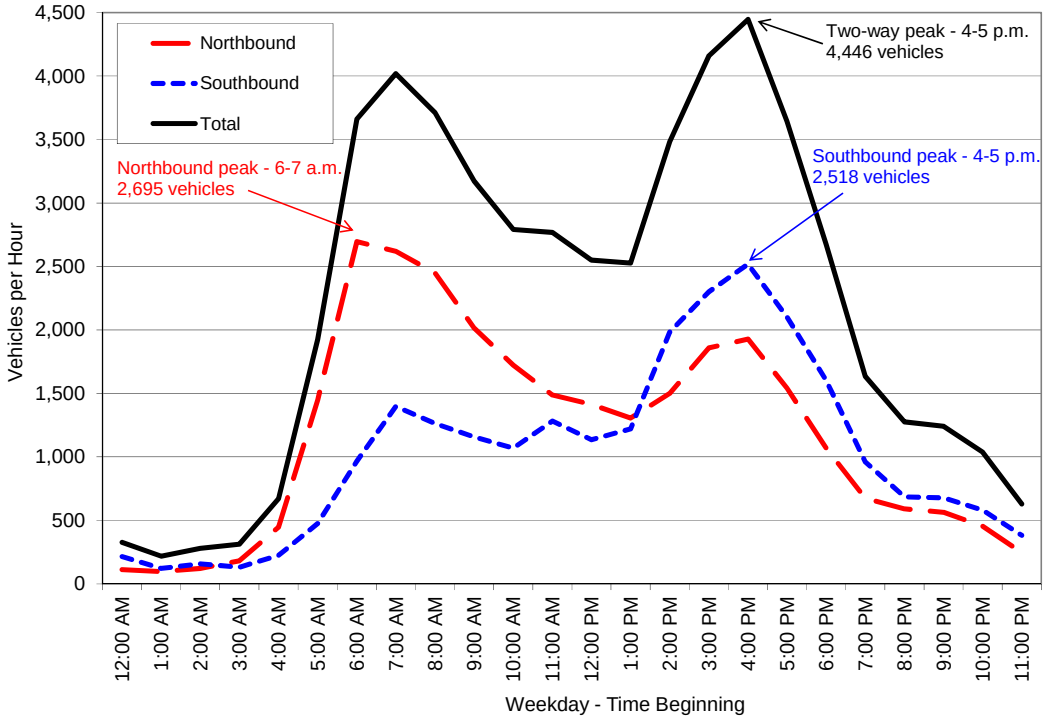


Figure 5. Weekday Hourly Traffic Volumes

North Segment: East Marginal Way, north of S Spokane St



South Segment: East Marginal Way, north of 1st Ave S



Source: SDOT, 24-hour traffic counts conducted in April 2015; compiled by Heffron Transportation, Inc., April 2016.

Level of Service

Traffic operations are evaluated using level of service (LOS) with six letter designations, "A" through "F", described in **Table 3**. LOS A is the best and represents good traffic operations with little or no delay to motorists. LOS F is the worst and indicates poor traffic operations with long delays.

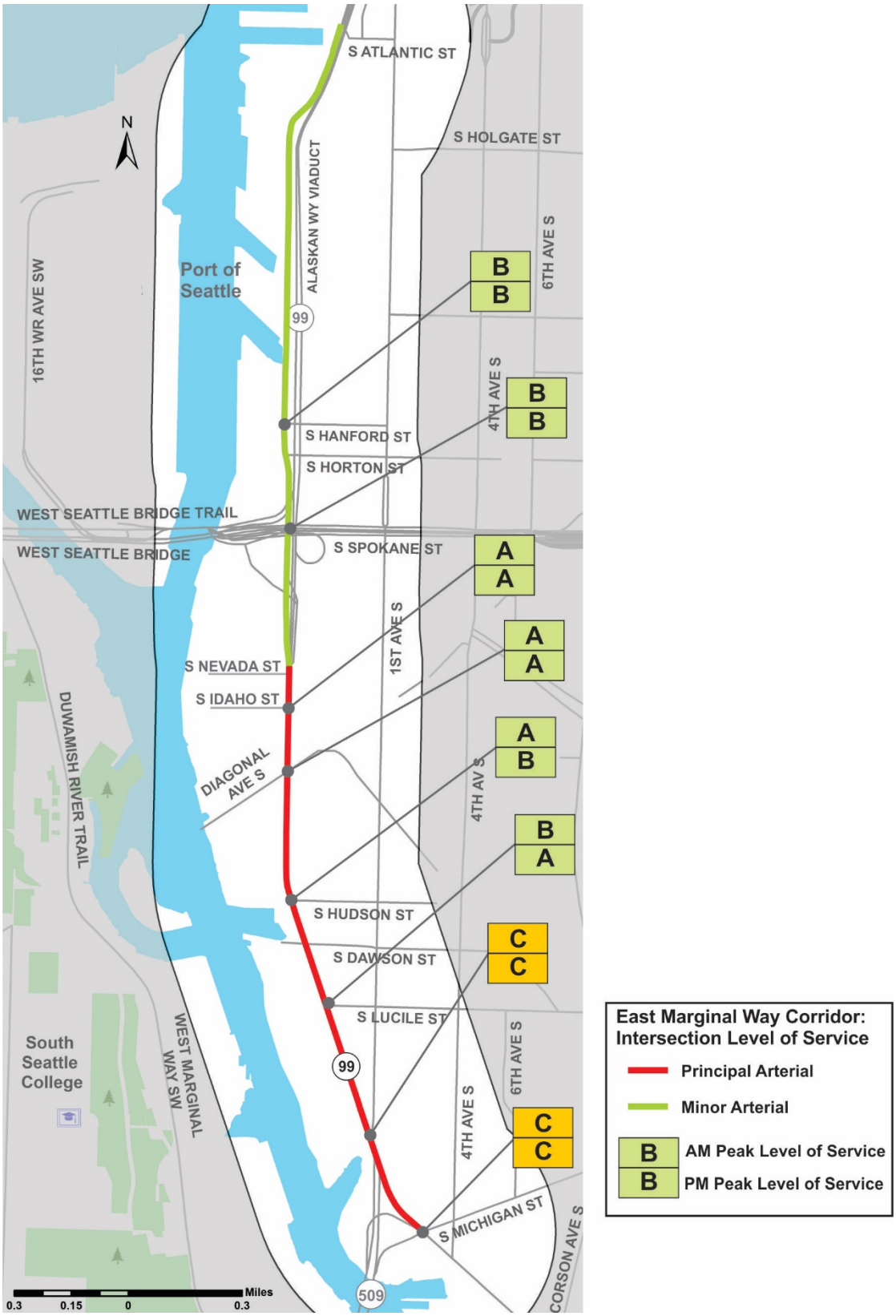
Table 3. Intersection Level of Service Criteria

Level of Service	Average Delay Per Vehicle	Description
A	Less than 10.0 Seconds	Free flow
B	10.1 to 20.0 seconds	Stable flow (slight delays)
C	20.1 to 35.0 seconds	Intermediate flow
D	35.1 to 55.0 seconds	Intermediate flow
E	55.1 to 80.0 seconds	At or approaching congested conditions
F	Greater than 80.0 seconds	Forced flow

Source: Transportation Research Board, Highway Capacity Manual, 2010.

Figure 6 shows existing level of service for signalized intersections along the East Marginal Way corridor, based upon vehicle turning movement counts collected by SDOT in 2013 and adjusted based on annual machine count data to reflect 2016 conditions. The figure shows that in general, vehicle operation along most of the corridor is currently LOS A or LOS B, with operation at the south end at LOS C. However, it is important to note that during periods of peak activity at the Port and/or rail yards, high truck volumes occur along East Marginal Way between S Atlantic St and S Diagonal St, resulting in more congested conditions along the roadway, and often a presence of queued trucks that are waiting to enter the Port terminals or rail yards. These 'peak freight activity' conditions will also need to be accommodated in any future improvements that are implemented for the East Marginal Way corridor.

Figure 6. Existing (2016) Intersection Level of Service



Source: SDOT turning movement counts, 2013; compiled by Heffron Transportation, Inc., and evaluated by Concord Engineering.

Recent Transportation Improvements

The following localized improvements have been completed in the last five years to improve safety for people walking and biking along the North Segment:

- Provision of a bicycle/pedestrian connection between the Portside trail and S Atlantic St
- Installation of a rapid flashing beacon at the S Horton St pedestrian crossing
- Removal of trees along the west side of street to widen the sidewalk
- Provision of a bike ramp from SW Spokane St to the East Marginal Way buffered bike lane
- Removal of inactive railroad tracks
- Replacing structural bridge under East Marginal Way near S Hanford St

The following improvement has been completed to improve safety along the South Segment:

- Prohibition of southbound left turns at S Alaska St

In addition, the Alaskan Way Viaduct Replacement Project is currently underway. North of S Royal Brougham Way, this project will replace the viaduct with a tunnel, but Alaskan Way will remain as an elevated structure adjacent to the north portion of the study corridor, and its south end will ramp down to connect to East Marginal Way, just as it currently does. The Alaskan Way Viaduct Replacement Project has completed the following improvements for freight mobility and safety in the vicinity of the East Marginal Way study corridor:

- S Atlantic St reconfiguration (little H project) – This project created a structure that vehicles can use when trains block S Atlantic St during switching and train building operations in the SIG Yard.
- East Marginal Way Grade Separation – This project constructed a new structure that grade-separates vehicular traffic on Duwamish Ave S and East Marginal Way from BNSF Railway and UP train movements to/from Harbor Island and West Seattle.
- Argo connector (East Marginal Way to UP Argo yard) – This project allows trucks travelling from the Port to access the Argo Yard without merging across three lanes of East Marginal Way between the Alaskan Way Viaduct and Diagonal Ave S.

Additional improvements constructed as part of the Multimodal Corridor Program will need to be integrated with projects that have already been completed along the East Marginal Way corridor.

Pedestrian crossing with rapid flashing beacon at S Horton St

Non-motorized Facilities

Figure 7 shows the existing bicycle and pedestrian facilities in the East Marginal Way study corridor. The two analysis segments have distinct non-motorized characteristics.

Varying buffer between the bike lanes, sidewalk, and vehicle lanes along the North Segment

The North Segment serves as a major non-motorized corridor, providing the connection between the West Seattle Bridge Trail and the SODO and Downtown neighborhoods. Over 100 bicyclists per hour regularly travel through the corridor during weekday peak periods, with numbers sometimes as high as 200 to 400. The majority of movement along the North Segment consists of northbound and southbound through-travel, with crossings occurring at S Atlantic St at the north end, and S Hanford St, S Horton St, or S Spokane St, at the south end. Some people riding bikes travel from the West Seattle Bridge Trail along S Spokane St to access the E-3 busway multi-use trail which begins at S Forest St, though the connections to the trail are not predictable or easy to use. Both the S Atlantic St and S Hanford St intersections are signalized, and the S Horton St intersection is unsignalized with pedestrian crossing signs and a rapid flashing beacon. A continuous sidewalk is provided along the west side of the road; a central section has a planted buffer between the sidewalk and curb, but the majority of the sidewalk has no buffer. A bicycle lane is provided in each direction; many sections include a painted buffer between the vehicle lane that varies in width, though some sections do not have a buffer. The sidewalk and bicycle lanes cross the Terminal 25 and Terminal 30 gates, and at the north end, they cross the access street to Jack Perry Memorial Park and S Massachusetts St.

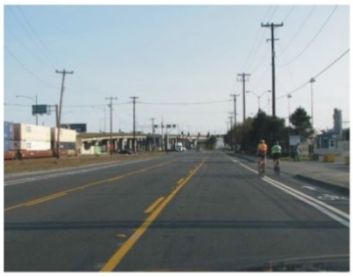
Along the Center Transition Segment under the West Seattle and SR 99 Bridges, there are a few intermittent sidewalks but no continuous connections, and no bicycle facilities. There are no delineated paths or way finding guidance for people walking between the two segments. There are gravel areas with uncontrolled parking that also contribute to the scattered assembly of elements without much specific dedicated space for any mode in this area.

There are no delineated pedestrian paths along the Center Transition Segment

Signalized pedestrian crossing at the Federal Center South

The South Segment has no bicycle facilities, and an intermittent sidewalk on the east side that varies in width and quality. Most sections of the sidewalks that are present have uneven pavement and objects located in the paved area that significantly reduce the pedestrian travel way. There is no sidewalk on the west side of the street. People walking on the west side must either walk along railroad sidings that are adjacent to the street, or cross the street to use walkways on the east side if they are present. Signalized pedestrian crossings are provided at seven intersections between S Idaho St and S Michigan St. To the north of S Hudson St, signalized crossings of East Marginal Way are spaced at 800 to 1000-foot intervals, including a pedestrian-only signal located near the main entrance to the Federal Center South. To the south of S Hudson St, signalized crossings are spaced at 1,500 to 1,800 feet. At the East Marginal Way/1st Ave S intersection, crosswalks with pedestrian signals are present across the East Marginal Way leg and the southbound 1st Ave leg, but the northbound 1st Ave leg has only a pedestrian crossing sign and no crosswalk.

Figure 7. Non-Motorized Facilities



North segment has sidewalk on west side and bike lanes on both sides with buffer of varying width.

South segment has intermittent sidewalk on east side; walkways that exist have numerous obstacles.

Lack of sidewalk on south segment west side requires pedestrians to walk along rail sidings or cross the the street to walkways if they are present.

East Marginal Way Corridor: Non-motorized Facilities

- East Marginal Way Corridor
- Sidewalk
- Bike Lane
- Marked Unsignalized Pedestrian Crossing
- Signalized Intersection
- Signalized Pedestrian Crossing

Source: City of Seattle GIS database, compiled by Heffron Transportation, Inc., June 2015.

Incomplete sidewalk network along the south portion of the corridor

The South Segment typically has lower observed pedestrian and bicycle volumes than the North Segment. The availability of on-site parking at the facilities located along the corridor, the gaps in walkways along the corridor, the poor quality of the pedestrian facilties that do exist, and the distance between signalized pedestrian crossings, all combine to discourage people walking along the roadway. People riding bikes are unable to travel outside of the vehicle lanes for the same reasons, and high traffic volumes and speeds result in unsafe conditions for bicycle travel in the vehicle lanes. As a result, the City's *Bicycle Map* guides people riding bikes between the Georgetown/South Park and Downtown neighborhoods to instead use 1st Ave S, which has sharrow (shared street) pavement markings. However, the offices, commercial businesses and industrial businesses located along the East Marginal Way corridor do generate non-motorized demand related to employee commutes in particular.

The City's *Pedestrian Master Plan* identifies the following Tier 1 (highest priority) pedestrian improvement projects along the East Marginal Way study corridor.

- Provide walkway connections along the roadway in the south portion of the corridor between S Brandon St and 1st Ave S. These connections would results in a continuous sidewalk from the south end of the Alaskan Way Viaduct to S Michigan St.
- Provide a pedestrian crossing at S Orca St between S Lucille St and 1st Ave S. This would reduce the maximum distance between crossings from 1,800 feet to 1,200 feet.

The City's *Bicycle Master Plan* identifies the following future improvements along the East Marginal Way study corridor.

- A protected bicycle lane between S Royal Brougham Way and the south end of the Alaskan Way Viaduct.
- An off-street (multi-use trail) facility between the south end of the Alaskan Way Viaduct and 1st Ave S.
- A protected bicycle lane south of 1st Ave S.

A protected bicycle lane is an exclusive bicycle facility completely separated from vehicular traffic, often by a barrier.

Transit Service and Facilities

Figure 8 shows the transit facilities and service in the East Marginal Way study corridor, as well as the typical daily boardings and alightings at the corridor bus stops. As shown, the North Segment has no transit service. Five King County Metro bus routes provide service in the South Segment, with stops located near the signalized intersections at S Idaho St, Diagonal Ave S, the Federal Center South pedestrian crossing, S Hudson St, S Lucille St, and S Michigan St.

Table 4 summarizes bus service in the East Marginal Way study corridor. Service is provided only during weekday commute periods, generally northbound (toward Downtown) in the morning and southbound (away from Downtown) in the evening with the off-peak directional buses known as "opportunity routes." Only Route 121 provides opposite-direction service during commute periods. The table also summarizes the typical total daily boardings for each route that serves the study corridor, which total about 2,200 boardings for all routes. The 276 boardings and alightings recorded along the East Marginal Way study corridor make up about 13 percent of the total demand on buses that serve it.

Table 4. Transit Service

Bus Route	Destinations Served	Total Number of Buses Per Day		Average Weekday Boardings for Route [3]
		Weekday AM Commute Period [1]	Weekday PM Commute Period [2]	
113	Shorewood, White Center, Downtown	5 northbound	4 southbound	300
121	Des Moines, Normandy Park, Burien, Downtown	9 northbound 7 southbound	8 northbound 10 southbound	900
122	Des Moines, Normandy Park, Burien, Downtown	6 northbound	8 southbound	500
123	Burien, Downtown	4 northbound	5 southbound	300
154	Auburn, Tukwila, Boeing Industrial, Federal Center South	4 northbound	4 southbound	200
			Total	2,200

Source: King County Metro Transit, 2015.

1. *AM commute service provided between ~5:00 A.M. and 10:00 A.M.*
2. *PM commute service provided between ~2:00 P.M. and 8:00 P.M.*
3. *Includes all boardings for the route, not just those in the corridor study area.*

Figure 8 shows the highest transit demand in the corridor is generated at the stops serving the Federal Center South at the signalized pedestrian crossing and at S Hudson St. Demand at the other stops is relatively low, with 12 or fewer total boardings and alightings at each stop. The availability of on-site parking at the facilities located along the corridor, the gaps in walkways along the corridor, the poor quality of the pedestrian facilties that do exist, and the distance between signalized pedestrian crossings likely contribute to lower transit demand. In addition, the beginnings and endings of employee shifts at some industrial and manufacturing facilities in the area may not correspond with the morning and evening commute periods in which transit service is provided.

Figure 8. Transit Facilities and Service

Northbound bus stops north of S Hudson Street are served by sidewalks of varying width.

Northbound bus stop at S Lucille Street is not served by sidewalks.

Southbound bus stops are adjacent to railroad sidings and are not served by sidewalks.

East Marginal Way Corridor: Transit Service

- East Marginal Way Corridor
- Bus Route (XXX / XXX)
- Bus Stop
- X on X off — Typical Daily Boardings and Alightings
- Signalized Intersection
- Signalized Pedestrian Crossing

Source: City of Seattle GIS database, King County Metro Boarding and Alighting data, compiled by Heffron Transportation, Inc., June 2015.

Freight Facilities

The entire East Marginal Way study corridor provides a critical link in the regional and statewide freight transportation network. The corridor is designated as a Major Truck and Oversize Load Route, and 14 to 36 percent of daily traffic volumes throughout the corridor consist of trucks.[3] It provides major connections for trucks and other vehicles traveling between the Port and local industrial businesses, the regional highway system, and the freight rail system. Along the North Segment, trucks also regularly use areas outside of the travel way (center left-lane or adjacent uncontrolled gravel parking areas) to park or queue near the Port terminal gates. As described previously, several projects to improve freight mobility between the Port, highway network, and rail network have been constructed at the north portion of the corridor as part of the Alaskan Way Viaduct replacement project. Projects constructed to improve non-motorized safety also improve freight mobility by reducing potential truck-bicycle and truck-pedestrian conflicts and offering affordable transportation options for people traveling. East Marginal Way is part of the nation's Strategic Highway Corridor Network (STRAHNET), which consists of routes that link Department of Defense installations with key ports. They are used in the mobilization of defense forces.

The *Freight Access Project Report* identifies Tier 1 (highest priority) projects to improve freight movement between S Atlantic St and S Diagonal St, which include rebuild of pavement along heavy haul routes, roadway upgrades, and ITS signal improvements. It acknowledges East Marginal Way as a combined truck-bicycle street, and identifies both mobility and safety improvement as major objectives of improvements along this corridor. The report also identifies the following Tier 1 projects along or near East Marginal Way, and therefore would need to be coordinated with future improvements identified as part of the multimodal improvement project:

- East Marginal Way – Rebuild to support heavy haul between the Port and railyards, and implement signalization and ITS improvements.
- S Hanford St – Rebuild to improve truck access at East Marginal Way and SIG Yard, support heavy haul, improve railroad crossings, and evaluate the need for railroad crossing gates.
- S Atlantic St, Alaskan Way to 4th Ave S – Implement signalization, channelization and ITS improvements based upon monitoring program implemented after the SR 99 tunnel is completed.
- S Spokane St, Harbor Island to Airport Way S – Design and construct freight-only lanes, install signal and signage upgrades, and provide ITS improvements.

East Marginal Way provides major truck connections to support freight mobility and goods movement

[3] SDOT and Port of Seattle, Seattle Industrial Areas Freight Access Project, May 2015.

Safety

Figure 9 shows the number and locations of collisions that have occurred along the East Marginal Way study corridor from 2012 through 2015, a total of 395 collisions. **Figure 10** shows the total collisions that have occurred each year during that period, as well as the severity of the collisions. As the figures show, 47 collisions have occurred along the North Segment over that period. Five collisions involved people riding bikes. One that occurred at S Hanford St resulted in a fatality and the other four resulted in injury. Four of the five collisions involving people riding bikes occurred in 2012 or 2013, prior to the non-motorized improvements in this area that were described previously. One vehicle-vehicle collision at S Spokane St also resulted in a fatality.

A high number of collisions occurred along the South Segment, with an average of about 87 collisions per year along this 1½-mile long section. A high proportion of collisions resulted in property damage only, and none resulted in fatalities. The data do not indicate any unusual patterns; the collisions reflect a variety of types that are common along corridors with high traffic volumes, high vehicle speeds, and a high number of locations where vehicle-vehicle or vehicle-pedestrian conflicts can occur. As Figure 8 shows, collision locations were spread throughout the corridor. One pedestrian collision occurred in the vicinity of 1st Ave S, resulting in an injury.

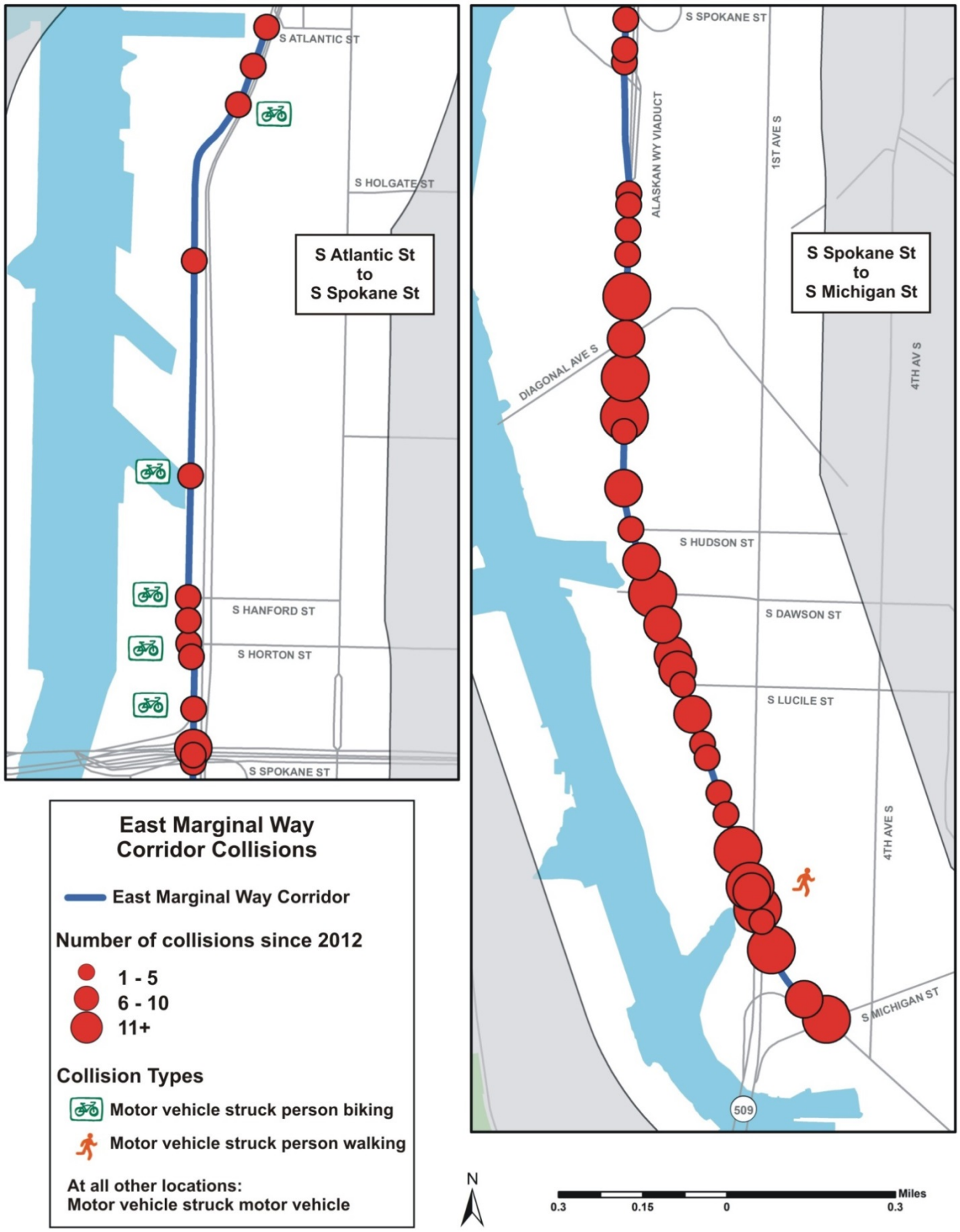
Table 5 summarizes the measured speeds along the corridor. The data indicates that the 85th percentile speed (indicating that 85 percent of vehicles travel at or below this speed) is 1.5 mph over the speed limit of 35 mph along the North Segment, and under the speed limit of 45 mph along the South Segment. Speeders were observed along both segments, including high end speeders traveling greater than 10 mph over the speed limit.

Table 5. Vehicle Speeds

Corridor Segment	Posted Speed (mph)	85th Percentile Speed (mph)	Number of Speeders on a Weekday	Number of High End Speeders on a Weekday[1]
S Atlantic St – S Spokane St	35	36.5	501	24
S Spokane St – 1st Ave S	45	38.6	1,519	381
1st Ave S – S Michigan St	35	n/d	n/d	n/d

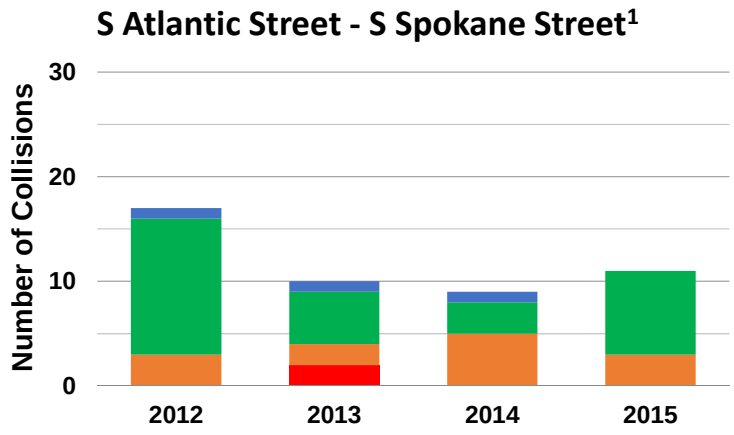
Source: SDOT, 2015.
n/d = no data
1. ≥10mph over the speed limit.

Figure 9. Corridor Collision Summary



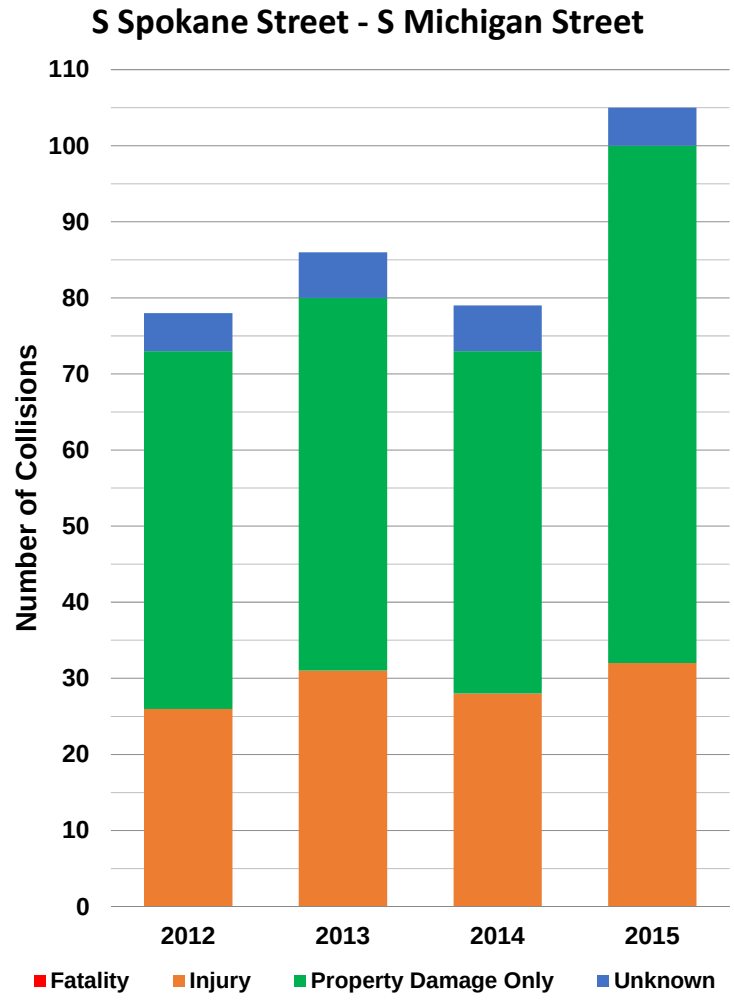
Source: City of Seattle GIS database, SDOT collision report database, 2012-2014, compiled by Concord Engineering, June 2015.

Figure 10. Collisions by Year and Severity, 2012-2015



- 47 collisions reported in 4-year period (average 12 per year), including 2 that resulted in a fatality
- 5 collisions involved people riding bikes and included 1 fatality at S Hanford St
- 1 vehicle-vehicle fatality collision occurred at S Spokane St

[1] Includes collisions at S Spokane St intersection



- 348 collisions reported in 4-year period (average 87 per year), including 117 that resulted in injury
- 1 collision involving a person walking occurred at 1st Ave S, resulting in an injury

Source: SDOT collision report database, 2012-2015, compiled by Heffron Transportation, Inc., April 2016.

Multimodal Overlap

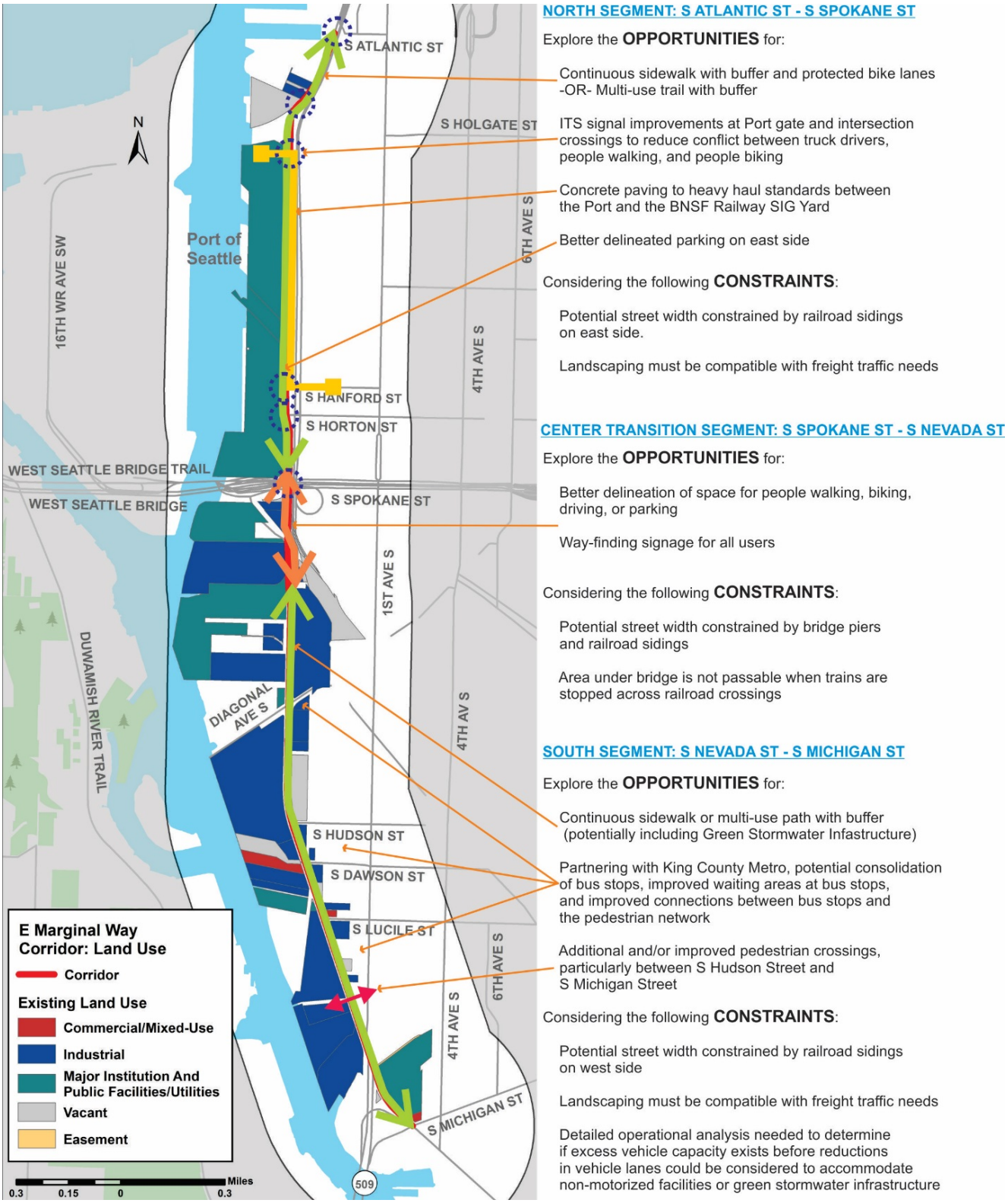
The elements identified in the City's multimodal plans for the East Marginal Way corridor are compatible with each other, though may include competing goals for space within the right-of-way, to ensure safe and predictable movement by all modes. The priority improvements identified in the *Pedestrian Master Plan* focus on completing the sidewalk system along the roadway and providing an additional pedestrian crossing in the south portion of the South Segment. The recommended future improvements in the *Bicycle Master Plan* include protected bicycle lanes along East Marginal Way along the North Segment and to the south of 1st Ave S in the South Segment, and an off-road multi-use trail facility along the South Segment area where priority pedestrian improvements have been identified. The *Freight Access Project Report* and *Move Seattle* identify East Marginal Way as a core freight route, and recognize that bicycle and pedestrian improvements will need to be incorporated in a predictable way that maintains freight efficiency, but also that non-motorized safety improvements will improve freight mobility by reducing the potential for truck conflicts with people riding bikes and walking.

Multimodal users of East Marginal Way

Opportunities and Constraints

Figure 11 summarizes the potential multimodal opportunities in the East Marginal Way corridor, based upon the existing conditions summarized in this report.

Figure 11. Opportunities and Constraints



Source: City of Seattle GIS database, compiled by Heffron Transportation, Inc., June 2015.