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EAST PORTLAND ARTERIAL STREETS STRATEGY MEMO #3

Date: April 3, 2019

To: PBOT and Consultant EPASS Staff

From: Anamaria Perez, Kate Drennan and Steve Szigethy on behalf of the PBOT EPASS Team

Subject: Traffic Safety Analysis on EPASS Corridors

Introduction and Purpose

The East Portland Arterial Streets Strategy (EPASS) will guide PBOT decision making on the design and operation of East Portland arterial streets with the intent of reducing fatal and serious injury crashes while improving mobility and accessibility for all road users. East Portland arterials have seen a disproportionate number of serious injury and fatal crashes relative to the city as a whole. This memo summarizes the quantity, type and circumstances of crashes experienced on the EPASS network (as defined in Memo #2) for the most recently available ten years of data. The intent of this summary is to help inform street design changes that will be proposed or supported as part of EPASS.

Background

Vision Zero was adopted by the City of Portland City Council in 2015 with the goal of eliminating traffic fatalities and injuries on Portland streets by 2025. Vision Zero identified

a High Crash Network (HCN), the top 30 streets in Portland with the most crashes experienced by people walking, bicycling and operating or riding in vehicles (see map on following page). From 2014 – 2018, 65 percent of fatal crashes occurred on the HCN, which accounts for just eight percent of Portland streets.

Over half of the High Crash Corridors (HCCs) and 28 out of the 30 High Crash Intersections (HCIs) that make up the HCN are located in East Portland, defined as the area of the city east of and including 82nd Avenue. The EPASS network is almost entirely composed of HCN streets, with the addition of NE 148th Avenue and SE 162nd Avenue. The EPASS network accounts for 19.3 percent of the HCN streets by mileage.

Many factors play into the disproportionate amount of crash activity seen on East Portland arterials, most significantly mid-20th century suburban road design and land use patterns that prioritized and encouraged fast automobile travel and property access. This memo aims to identify patterns and specific safety issues that will help inform street design proposals made as part of EPASS and other efforts.



Portland's High Crash Network

Data and Methodology

For each corridor in the EPASS network, staff conducted a historical traffic crash analysis. Historical traffic crash data is provided to PBOT by the ODOT Crash Analysis & Reporting Unit and includes all crashes involving a motor vehicle that resulted in property damage, injury, or fatality. This data derives from police reports and self-reported crashes to the

Oregon Department of Motor Vehicles. A full dataset from ODOT is only available through 2016, and thus the ten-year historical traffic crash analysis was conducted for the period of 2007-2016.

Historical crash data was analyzed by mode for each corridor or segment in the EPASS network. For vehicle-only crashes, only fatal and incapacitating injury crashes were included. All bike- and pedestrian-involved crashes at all injury levels were analyzed, including vehicle crashes that were caused by a vehicle yielding for a pedestrian or bicyclist. Each crash in the dataset describes the level of injury for all individuals involved as follows: Fatal, Incapacitating Injury (also called “severe”, “serious”, or “Injury A”), Non-incapacitating Injury (“moderate” or “Injury B”), and Possible Injury/Complaint of Pain (“minor” or “Injury C”).

In addition to the crash history data, this safety analysis includes identification of other risk factors such as speed, presence of pedestrian infrastructure, and street lighting. PBOT’s Engineering Division speed count data was used to analyze speed. Existing speed count data is not evenly dispersed on the EPASS network. The speed count data used in this study ranges from May 2015 to December 2018 and differs by EPASS corridor. The number of existing speed counts also varies by corridor, ranging from 2 to 27 per corridor. Three of the EPASS corridors do not have any speed counts within the last three years and further speed assessment may be necessary. Speed count data points include posted speeds on the segment (if multiple); 75th, 85th, and 90th percentiles; and the average percent of vehicles driving over the posted speed limit during the study.

This memorandum also documents the availability and spacing of pedestrian crossings, sidewalks, and bike lanes. This data is provided by PBOT’s Transportation Planning Division and includes information on bike and pedestrian infrastructure, including location and whether the infrastructure meets PBOT standards.

Street lighting is an essential safety aspect in the Portland region due to the area’s climate and latitude. Frequent precipitation and short daylight hours in the winter contribute to

lower pedestrian and cyclist visibility, including during peak traffic hours. A unique aspect of the East Portland street network is that nearly all of the five-lane corridors have street lighting on only one side of the street. Single-sided lighting on wide, five-lane corridors results in uneven lighting conditions, creating pockets of darkness between street lights. This is unsafe for both drivers and non-motor users because all users' visibility decreases. There is no apparent pattern or reasoning behind why lighting is on one side or the other (north vs. south side of a corridor, for example). Many street lights are mounted on utility poles and the location of these poles is driven by utility company needs.

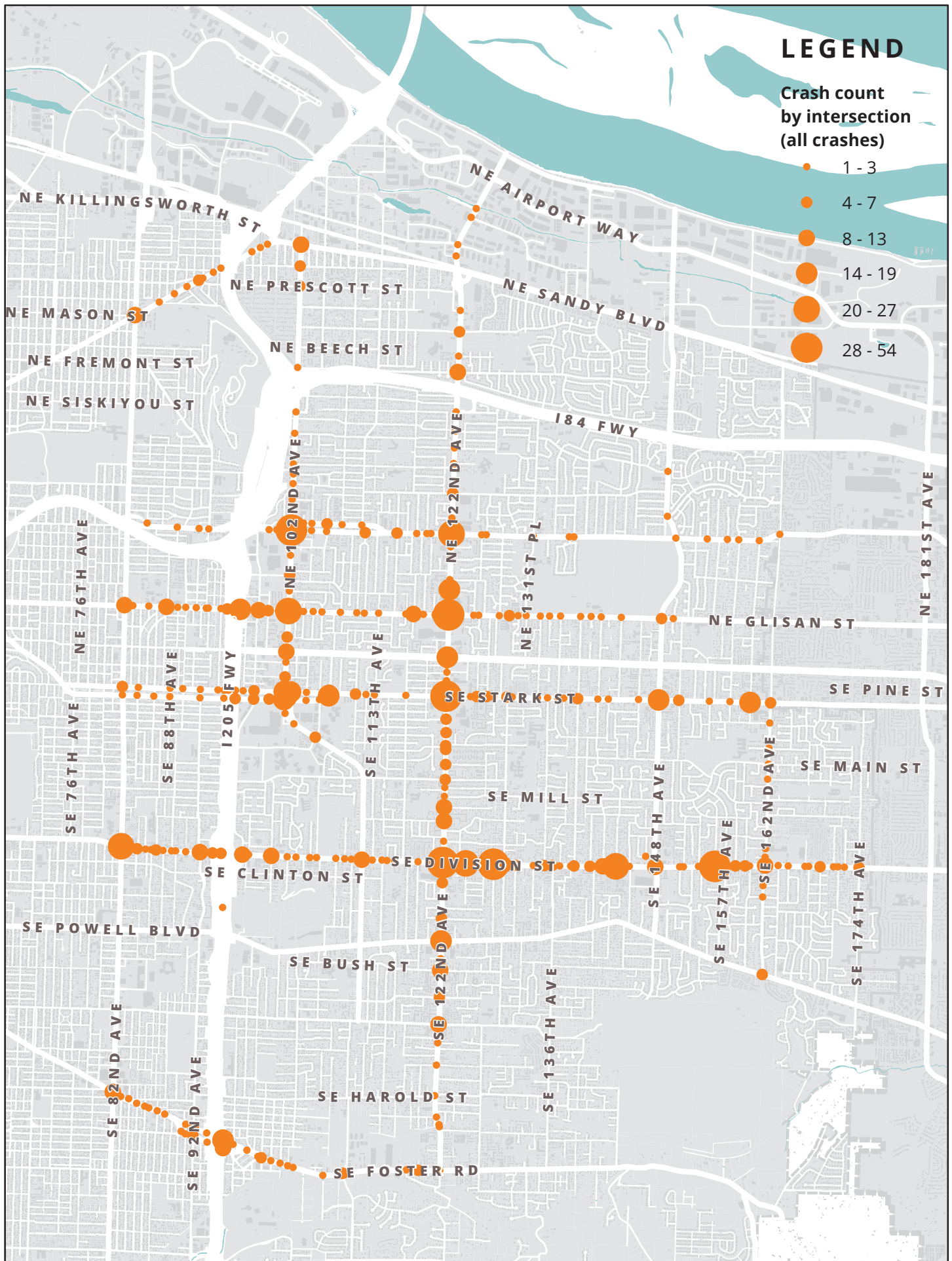
EPASS Network

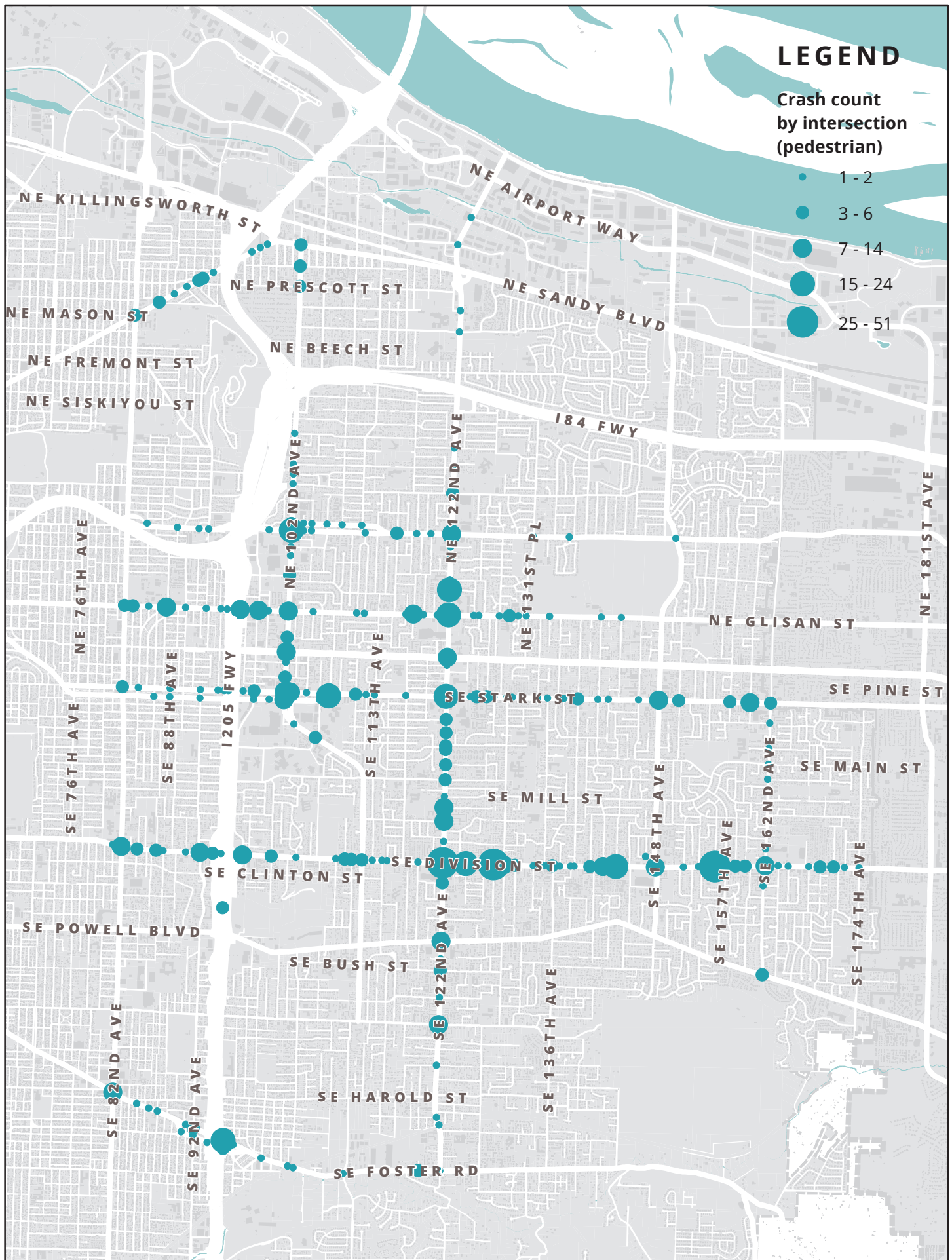
The EPASS network is comprised of eleven major arterials in the East Portland area. In the next section, the EPASS corridors are individually analyzed with respect to each of the datasets mentioned previously. Despite the similarity in width and speeds on these arterials, each of the EPASS corridors is unique. Data gaps and overall trends in the network are documented here in the aggregate.

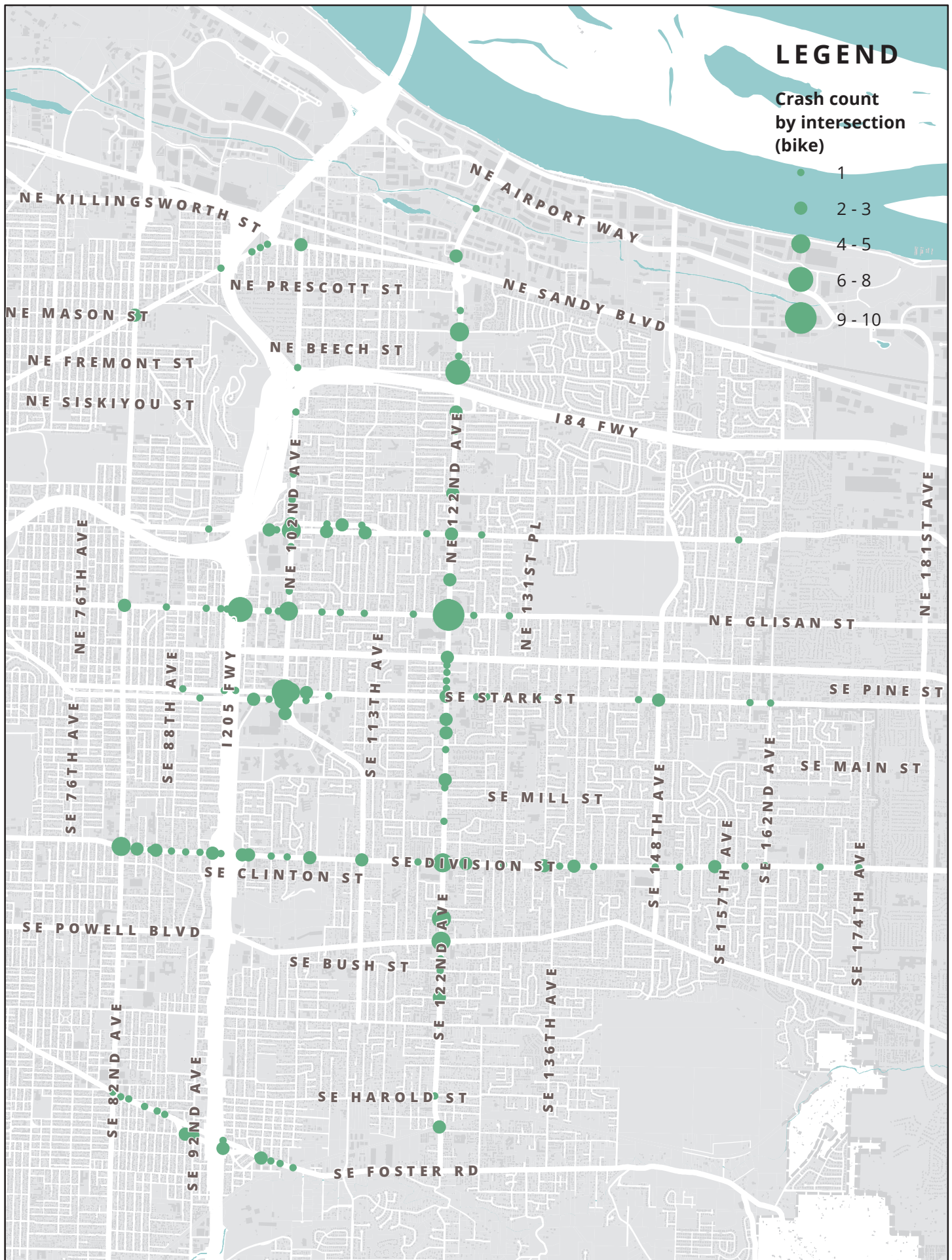
Table 1 documents the crash history for all of the EPASS network. The table identifies crashes by mode and crash type for each EPASS corridor. In the 10-year period, 1,261 crashes occurred on the EPASS network. The number of crashes on a corridor ranged from 3 to 386 crashes, NE 148th Avenue and SE Division Street, respectively. The leading crash types are highlighted for each mode on each corridor.

Table 2 summarizes the crash rates on each corridor of the EPASS network. The top crash rate for each mode is highlighted in red.

Preceding these tables are four crash "heat maps" organized by travel mode, providing a picture of the geographic distributions and concentrations of traffic crashes.







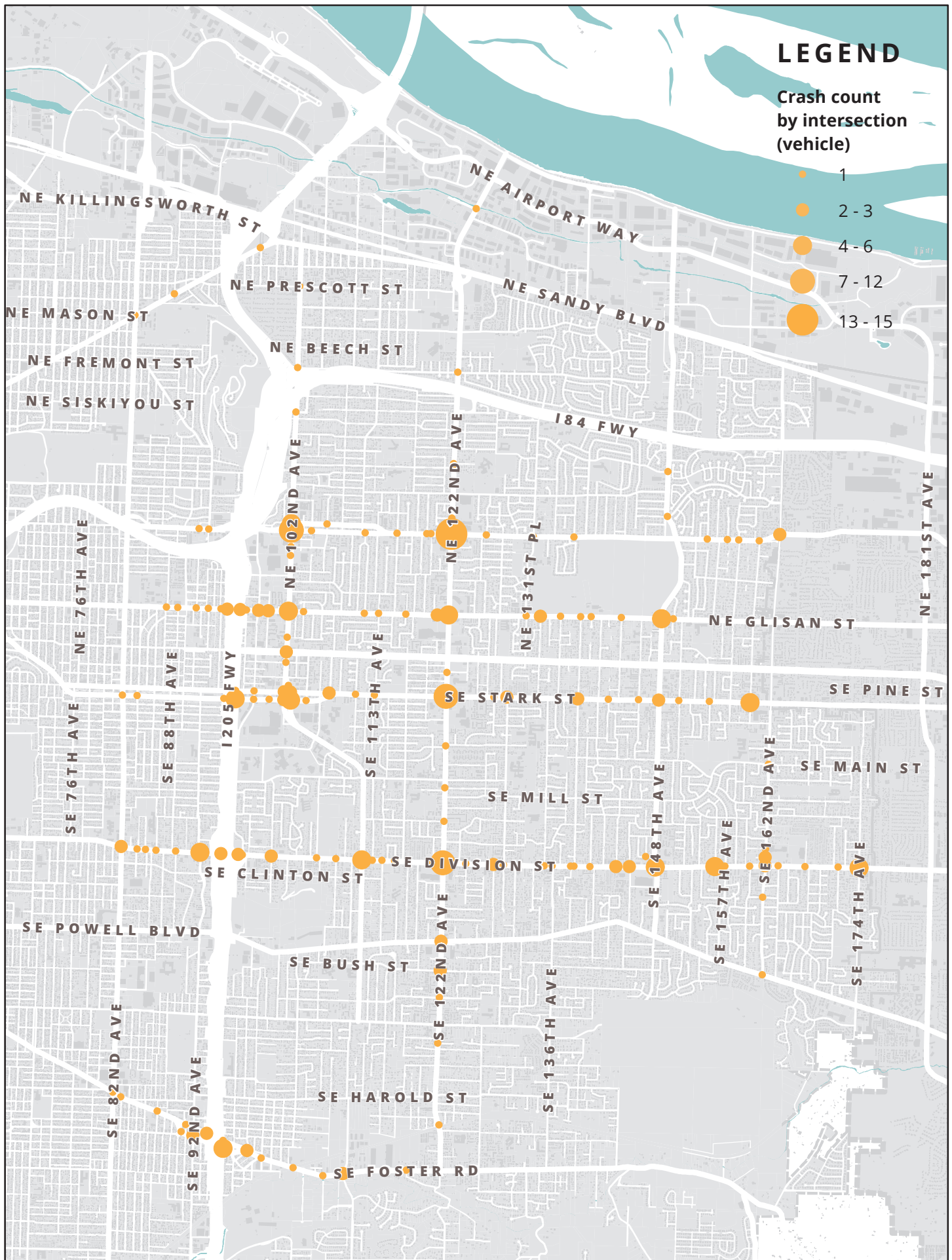


Table 1: Crash types by mode on the EPASS corridors, 2007-2016. This table includes Property Damage Only (PDO) crashes for bike and pedestrian modes.

Mode	Crash Type	NE/SE 102nd	NE/SE 122nd	NE 148th	SE 162nd	NE Airport	NE Sandy	NE Halsey	NE Glisan	SE Stark	SE Division	SE Foster
Bike	Angle	1	20	-	-	-	1	6	6	8	10	8
	Backing	-	-	-	-	-	-	-	-	-	-	-
	Fixed object	-	-	-	-	-	-	-	1	-	-	-
	Head-on	-	1	-	-	-	1	1	-	-	-	-
	Parking maneuver	-	-	-	-	-	-	-	-	-	1	-
	Pedestrian	-	-	-	-	-	-	-	-	-	-	-
	Rear-end	-	3	-	1	-	-	2	3	3	4	2
	Sideswipe - overtaking/	-	2	-	-	1	1	1	-	-	2	2
	Turning movement	10	44	-	6	4	3	11	17	19	32	10
	Other/non-collision	-	-	-	-	-	-	-	-	-	-	-
Bike Total		11	70	-	7	5	6	21	27	30	49	22
Pedestrian	Angle	1	1	-	-	-	-	-	-	-	-	2
	Backing	2	1	-	-	-	-	-	-	-	1	-
	Fixed object	-	1	-	-	-	-	-	2	-	2	-
	Head-on	-	-	-	-	-	-	-	1	-	-	-
	Parking maneuver	-	-	-	-	-	-	-	1	1	-	-
	Pedestrian	-	-	-	-	-	-	-	-	-	-	-
	Rear-end	22	66	-	3	1	6	17	45	78	185	27
	Sideswipe - overtaking/	-	-	-	-	-	-	-	-	-	2	2
	Turning movement	21	31	-	3	2	2	1	1	1	6	1
	Straight movement - un	4	39	-	2	-	15	10	22	28	68	11
	Other/non-collision	-	1	-	-	-	-	-	1	-	-	-
Pedestrian Total		50	140	-	8	3	23	28	73	108	264	43
Vehicle	Angle	2	3	-	-	-	1	5	5	15	7	8
	Backing	-	-	-	-	-	-	-	-	-	-	-
	Fixed object	-	3	2	2	8	-	3	6	4	8	4
	Head-on	-	1	-	-	-	-	1	2	-	-	-
	Parking maneuver	-	-	-	-	-	-	-	-	-	-	-
	Pedestrian	-	-	-	-	-	-	-	-	-	-	-
	Rear-end	4	4	-	2	2	-	4	10	13	40	7
	Sideswipe - overtaking/	1	-	-	-	-	1	1	1	-	2	1
	Turning movement	7	8	1	2	3	1	15	12	15	14	4
	Other/non-collision	-	-	-	-	2	-	1	2	-	2	1
Vehicle Total		14	19	3	6	15	3	30	38	47	73	25
TOTAL		75	229	3	21	23	32	79	138	185	386	90

Table 2: EPASS corridor length and crash rate by mode, 2007-2016.

	NE/SE 102nd	NE/SE 122nd	NE 148th	SE 162nd	NE Airport	NE Sandy	NE Halsey	NE Glisan	SE Stark	SE Division	SE Foster
Corridor Length (mi)	3.47	6.20	1.03	1.64	3.77	0.99	4.80	4.01	5.34	4.65	2.66
Ped Crashes	14.42	22.57	-	4.88	0.79	23.19	5.83	18.19	20.23	56.77	16.18
Bike Crashes	3.17	11.28	-	4.27	1.32	6.05	4.38	6.73	5.62	10.54	8.28
Vehicle Crashes	4.04	3.06	2.91	3.66	3.97	3.02	6.25	9.47	8.80	15.70	9.41
Total Crashes	21.63	36.92	2.91	12.80	6.09	32.26	16.46	34.39	34.65	83.01	33.86

Table 3: Traffic speed count collection data, 2015–2018.

	NE 102nd	SE 102nd	NE 122nd	SE 122nd	NE 148th	SE 162nd	NE Airport	NE Sandy	NE Halsey	NE Glisan	SE Stark	SE Division	SE Foster
Number of Speed Counts	8	-	11	15	2	4	4	4	5	17	21	27	-
Most Recent	12/3-7/2018	-	11/13-15/2017	4/10-13/2018	4/27-29/2015	5/1-4/2018	5/27-29/2015	9/28-29/2017	2/26-3/1/2018	6/20-22/2018	11/5-9/2018	5/17-18/2018	-
Posted Speed	35	35	35	35	35	40	45	35	35, 45	35, 40	30, 35	30, 35	35
70th Percentile	28-39	-	33-45	33-39	38	38-40	42-47	36-38	33-39, 42-44	35-46, 38-43	33-39, 32-39	30-38, 32-39	-
85th Percentile	31-42	-	36-49	36-42	40	40-43	44-50	38-40	35-41, 44-47	38-49, 40-45	35-42, 32-42	32-41, 35-42	-
90th Percentile	33-43	-	37-51	37-43	41-42	42-44	46-52	39-41	36-43, 45-48	39-51, 42-46	36-43, 36-43	33-42, 36-43	-
Average % over posted	43.01%	-	39.75%	28.87%	51.80%	61.65%	29.03%	42.93%	45.33%, 18%	61.75%, 28.03%	76.4%, 45.58%	61%, 39.24%	-
Intersections	NE Shaver, NE Sacramento, NE Holladay, NE Glisan	N/A	NE Inverness, NE Beech, NE Stanton, NE Broadway, NE Holladay, NE Davis	SE Morrison, SE Tibbetts, SE Liebe, SE Raymond, SE Ramona	NE 148th PI (not EPASS)	SE Taylor St, SE Sherman St	122nd, 148th	86th, 91st	106th, 114th, 153rd	85th, 92nd, 113th, 125th, 136th, 143rd, 155th, 157th	86th, 99th, 111th, 126th, 135th, 153rd	84th, 90th, 104th, 109th, 116th, 129th, 141st, 152nd, 165th, 171st	N/A

EPASS Corridor Profiles

NE/SE 102nd Ave

The EPASS Network includes NE/SE 102nd Avenue with a short segment of SE 103rd Avenue and SE Cherry Blossom Street. The segment north of E Burnside Street is part of the HCN, while the SE segment is not. The 102nd Avenue corridor intersects with three other EPASS corridors: NE Halsey-Weidler Street, NE Glisan Street, and SE Stark-Washington Street. The intersections of NE 102nd Avenue at NE Halsey-Weidler and NE Glisan are Vision Zero High Crash Intersections (HCIs), meaning that they are two of the thirty most dangerous intersections in Portland. Totaling 3.47 miles in length, the 102nd Avenue EPASS corridor is the 7th longest corridor in the network.

Crash History

In the 10-year period analyzed, 75 crashes occurred on the 102nd Avenue corridor with 54 injuries. The injuries are summarized by mode in the table below (Table 4). Compared to the other corridors, 102nd Avenue also has a relatively low crash rate at 21.63 crashes per mile (Table 2).

Mode	Crashes	Fatal	Injury A	Injury B	Injury C	Total Injuries
Bike	11	0	0	6	5	11
Ped	50	1	1	9	16	27
Vehicle	14	1	15	-	-	16
Total	75	2	16	15	21	54

Table 4: Injuries sustained in traffic crashes on 102nd Avenue, 2007-2016.

Speed Data

The posted speed limit on the 102nd Avenue EPASS corridor ranges from 25 to 35 mph. From the NE Weidler Loop to NE Multnomah Street—a highly commercial area—the posted speed is 25 mph. In late 2018, the posted speed limit was lowered from 35 to 30 mph on the northern and southern segments of 102nd Avenue.

Table 3 summarizes the speed counts on each corridor. NE 102nd Avenue had eight speed counts from 2015 – 2018, most recently in December 2018. The average percentage of vehicles traveling over the posted speed was 43.01%.

Appendix 1 contains detailed maps of the current pedestrian and bicycle infrastructure on all EPASS corridors. Pages 1-7 show the 102nd Avenue corridor.

Multimodal Infrastructure & Lighting

Although the entirety of 102nd Avenue has sidewalks present on at least one side, most of these sidewalks do not meet PBOT standards, particularly north of the Halsey/Weidler couplet. Similarly, there are few segments of this corridor that meet PBOT's crossing spacing standards, especially north of E Burnside Street. When examining bicycling facilities on 102nd Avenue, this corridor has a mix of bike lanes and buffered bike lanes; however, they are only present from NE Weidler Street to SE Stark Street.

Street lighting on 102nd Avenue is present, but it is not uniform along the whole corridor. The segments of 102nd Avenue that have street lighting on both sides are from NE Fremont Street to NE 103rd Place and from NE Weidler Street to E Burnside Street.

A multi-phase, urban renewal-funded streetscape project in the 2000s improved 102nd Avenue from E Burnside Street to NE Weidler Street with wider sidewalks, pedestrian scale street lighting, street trees and periodic median islands. Repaving in 2017 allowed for narrowing vehicle travel lanes and striping buffered bike lanes.

Summary

Based on crash history, vehicle speeds, bike and pedestrian infrastructure, and street lighting, the greatest areas of concern on 102nd Avenue are at the HCIs. 102nd Avenue also has the highest number of pedestrian-related crashes that occurred while a vehicle was turning. Turning movements were also the leading crash type for bike-related crashes and vehicle-only crashes on this corridor (Table 1).

NE/SE 122nd Avenue

The 122nd Avenue EPASS corridor is nearly the entire length of NE and SE 122nd Avenue, extending from NE Airport Way to SE Foster Road. The 122nd Avenue corridor is an HCC and intersects with six other EPASS Corridors in this study: NE Airport Way, NE Halsey Street, NE Glisan Street, SE Stark Street, SE Division Street, and SE Foster Road. The intersections at NE Halsey, NE Glisan, SE Stark, and SE Division are also HCIs in the High Crash Network. Totalling 6.20 miles in length, the 122nd Avenue EPASS corridor is the longest corridor in the network, but it does not have the highest crash rate.

Crash History

In the 10-year period analyzed, 200 crashes occurred on the 122nd Avenue corridor with 159 injuries. The injuries are summarized by mode in the table below (Table 5). With 32.24 crashes per mile, 122nd Avenue ranks 6th in overall crash rate; however, it does have the highest rate of bicycle-related crashes, 11.28 per mile (Table 2).

Mode	Crashes	Fatal	Injury A	Injury B	Injury C	Total Injuries
Bike	70	1	5	33	25	64
Ped	111	1	11	34	26	72
Vehicle	19	3	20	-	-	23
Total	200	5	36	67	51	159

Table 5: Injuries sustained in traffic crashes on 122nd Avenue, 2007-2016.

Speed Data

The posted speed limit on 122nd Avenue is 35 mph from NE Sandy Boulevard to SE Foster Road. Between NE Airport Way to NE Sandy the posted speed is 45 mph. Since 2015, there have been 26 traffic speed counts on the corridor, the most recent in November 2017 on the NE segment, and in April 2018 on the SE segment. The average percentage of vehicles traveling over the posted speed limit on NE 122nd Avenue was 39.75%, while the average on the SE segment was 28.87% (Table 3).

Multimodal Infrastructure and Lighting

Appendix 1, pages 8-20 include maps of the bike and pedestrian infrastructure on 122nd Avenue. Sidewalks are present on both sides of the street except for in the northern-most segment. From the NE Sandy Boulevard ramp to NE Airport Way, sidewalks are lacking, primarily on the eastern side of the corridor. Regardless, all sidewalks along 122nd Avenue do not meet current PBOT standards, with the exception of a few corners and half-block segments. Except for a few block-long segments at various part of the corridor, 122nd Avenue does not meet PBOT's pedestrian crossing spacing standards. Standard bike lanes are present for the entire length of the corridor.

Street lighting on 122nd Avenue, is primarily only on one side of the roadway. There are two short segments with two-sided street lighting on 122nd Avenue: NE Inverness Drive to NE Sandy Boulevard and NE Fremont Street to the NE 122nd Avenue Frontage Road. The latter segment crosses the I-84 freeway, which is a similar street lighting pattern to NE 102nd Avenue.

Summary

122nd Avenue has a high crash frequency, but not a necessarily high crash rate. The high bicycle-related crash rate stands out on 122nd Avenue with turning movements being the leading collision type for this mode. 122nd Avenue also has the highest number of angle collisions (20) for bicycle-related crashes on any of the EPASS corridors. Pedestrian-related crashes are also prevalent on 122nd Avenue with 66 rear-end vehicle crashes, frequently

due to one vehicle yielding to a pedestrian. There were also 39 crashes in which a pedestrian was struck by a vehicle moving straight, the second highest frequency of this pedestrian crash type on the EPASS network. Vehicle injuries only accounted for 14.5% of total injuries on 122nd Avenue. The leading vehicle collision type was turning movements, with 8 occurrences, or 42.1% of collisions (Table 1).

NE 148th Avenue

The NE 148th Avenue EPASS corridor is a 1.03-mile long segment, from NE Sacramento Street to NE Glisan Street. NE 148th Avenue is not in the HCN and does not have any HCLs. The roadway does intersect with two other EPASS corridors: NE Halsey Street and NE Glisan Street. NE 148th Avenue is the second shortest corridor in the EPASS network and has the lowest crash rate for all modes.

Crash History

There were zero bike- or pedestrian-related crashes on 148th Avenue and only three vehicle crashes, resulting in a vehicle—and total—crash rate of 2.91 per mile (Table 2). Table 6 summarizes the number and severity of crashes on NE 148th Avenue.

Mode	Crashes	Fatal	Injury A	Injury B	Injury C	Total
Bike	0	0	0	0	0	0
Ped	0	0	0	0	0	0
Vehicle	3	1	2	-	-	3
Total	3	1	2	0	0	3

Table 6: Injuries sustained in traffic crashes on NE 148th Avenue, 2007-2016.

Speed Data

The posted speed limit on NE 148th Avenue is 35 mph and no recent traffic speed counts have been conducted on this segment. The most recent speed counts (2) were collected in April 2015 at NE 148th Place, which is north of the I-84 freeway and north of the EPASS segment. The speed limit at this location is 35 mph and the average percentage of vehicles driving over the posted speed was 51.80% (Table 3).

Multimodal Infrastructure and Lighting

In Appendix 1, pages 21-23 map bike and pedestrian facilities on 148th Avenue. This corridor lacks sidewalks on almost the entire western side of the street, and the segment from Halsey to Glisan does not have sidewalks at all. North of Halsey, sidewalks are present on the east side of the street but vary in whether they meet PBOT's standards. Some

segments lack sidewalks, but have a curb. Despite the lack of sidewalk presence, the entire segment meets PBOT's crossing spacing guidelines. For cyclists, a standard bike lane is present for the entire length of the 148th Avenue EPASS corridor. Street lighting on the 148th Avenue corridor is all single-sided.

Summary

148th Avenue is relatively uniform for the entire EPASS segment. There have been few fatal and serious injury crashes in the most-recent ten years of data, and no bike- or pedestrian-related crashes. However, the lack of street lighting and sidewalks may make this corridor unwelcoming to pedestrians, despite sufficient crossing frequency. When analyzing vehicle crashes on this corridor, two of the three crashes involved a vehicle crashing into a fixed object; in both cases the vehicles struck a curb.

SE 162nd Avenue

The EPASS segment of SE 162nd Avenue begins about 200 feet south of SE Stark Street and ends at SE Powell Boulevard. This corridor only intersects with one other EPASS corridor at SE Division Street. SE 162nd Avenue is not in the HCN, but it does have two HCLs—one at SE Division Street and the other at SE Powell Boulevard. The 162nd Avenue corridor is one of the shorter streets in the EPASS network, totaling 1.64 miles in length.

Crash History

A total of 21 crashes and 17 injuries occurred on 162nd Avenue during the 10-year study period. 162nd Avenue has one of the lowest overall crash rates, 12.80 crashes per mile, with an average modal crash rate of 4.27 per mile (Table 2). Table 7 summarizes the number and severity of crashes by mode.

Mode	Crashes	Fatal	Injury A	Injury B	Injury C	Total
Bike	7	0	0	4	1	5
Ped	8	0	1	2	3	6
Vehicle	6	1	5	-	-	6
Total	21	1	6	6	4	17

Table 7: Injuries sustained in traffic crashes on SE 162nd Avenue, 2007-2016.

Speed Data

162nd Avenue is the only EPASS corridor that is entirely posted at 40 mph. There have been four recent traffic speed counts on this segment, most recently in May 2018. Even

with the higher speed limit relative to the other nearby arterials, on average, 61.65% of vehicles were traveling over the posted speed (Table 3).

Multimodal Infrastructure and Lighting

As mapped in Appendix 1, pages 24-27, the bicycle and pedestrian infrastructure on 162nd Avenue is more complete than the other EPASS corridors previously described. The entire length of the corridor meets PBOT crossing spacing standards and sidewalks are present on both sides, with a single block exception between SE Main Street and SE Market Street. While present, all of the existing sidewalks are substandard. A bike lane is present on 162nd Avenue and street lighting is only present on one side of the street.

Summary

SE 162nd Avenue is unique in that it is relatively uniform across the corridor in posted speed, bicycle and pedestrian facilities, lighting, and crash rates. Crash frequency is very similar between modes with no prevalent anomalies. The only collision type worth noting on SE 162nd Avenue is that turning movements had the highest frequency for bike-related crashes (6), otherwise, all other modes had about two or three crashes per vehicle movement that occurred (Table 1).

NE Airport Way

NE Airport Way is the northern-most EPASS corridor and extends from NE Glenn Widing Drive to Portland city limits at NE 181st Avenue. Airport Way is in the HCN, does not have any HCIs, and intersects with only NE 122nd Avenue on the EPASS network. This corridor differs from other EPASS corridors in that it runs through a primarily commercial and industrial land use area.

Crash Data

The NE Airport Way EPASS corridor is moderate in length compared to the rest of the network at 3.77 miles, and has the second lowest crash rate, 6.09 crashes per mile (Table 2). Airport Way had 23 crashes with 22 injuries. In this auto-centric district, the corridor has a higher frequency of vehicle crashes than other modes, accounting for 65.2% of total. Table 8 summarizes crashes by severity and mode.

Mode	Crashes	Fatal	Injury A	Injury B	Injury C	Total
Bike	5	0	1	3	1	5
Ped	3	0	0	1	1	2
Vehicle	15	4	11	-	-	15
Total	23	4	12	4	2	22

Table 8: Injuries sustained in traffic crashes on NE Airport Way, 2007-2016.

Speed Data

The posted speed limit on the whole NE Airport Way EPASS corridor is 45 mph, the highest single-speed corridor in the network. The most recent traffic speed counts were collected in May 2015. The data from these four speed counts indicates that the average percentage of vehicles driving over the posted speed was 29.03% (Table 3). This is the corridor with the second lowest excessive speed percentage, after 122nd Avenue.

Multimodal Infrastructure and Lighting

Appendix 1, pages 28-35 include maps of the pedestrian and bicycle infrastructure on NE Airport Way. Infrastructure, is uniform along the whole corridor. Substandard sidewalks are present on both sides, except for a short segment on the south side of the corridor, west of NE 122nd Avenue. The entire corridor meets PBOT's crossing spacing standards and a consistent bike lane is present. NE Airport Way is the only corridor in the EPASS network that has street lighting on both sides of the whole corridor.

Summary

NE Airport Way is a homogeneously designed corridor in the EPASS network—pedestrian and bike facilities are consistent and lighting is on both sides of the corridor. The speed limit is higher than others in the network, and it is evident that speed is a factor in approximately 40% of vehicle crashes. Vehicle crashes occur at a higher rate than bike and pedestrian crashes. The most frequent collision type for vehicle crashes on Airport Way was a vehicle crashing into a fixed object (Table 1). On this corridor, fixed object crashes include collisions with curbs, utility poles, and trees, with speed or driving too fast for conditions commonly being a contributing cause.

NE Sandy Boulevard

The segment of NE Sandy Boulevard that is part of the EPASS network begins at NE 82nd Avenue and ends at NE Columbia Boulevard. Sandy Boulevard is a HCC, but this segment does not intersect with any other EPASS corridors in this study. There is one HCI at NE

Columbia Boulevard. This segment is 0.99 miles in length, the shortest corridor in the EPASS network.

Crash History

Sandy Boulevard has the fourth highest crash rate in the network, 34.27 crashes per mile. Many crashes are pedestrian-related, with a rate of 25.20 per mile (Table 2). This is the second highest pedestrian-related crash rate in the EPASS network.

The number of pedestrian injuries on this segment of Sandy Boulevard is also reflective of the high pedestrian-related crash rate. Table 9 details the injuries sustained on this corridor where pedestrian injuries account for 68.9% of all injuries. In the 23 pedestrian-related crashes, 20 pedestrians were injured. This is a higher crash-to-injury ratio than other corridors, which often have more pedestrian-related, property damage only (PDO) crashes.

Mode	Crashes	Fatal	Injury A	Injury B	Injury C	Total
Bike	6	0	0	3	2	5
Ped	23	2	5	7	6	20
Vehicle	3	0	4	-	-	4
Total	32	2	9	10	8	29

Table 9: Injuries sustained in traffic crashes on NE Sandy Boulevard, 2007-2016.

Speed Data

The posted speed limit on the EPASS segment of NE Sandy Boulevard is 35 mph. The most recent speed counts were collected in September 2017, where an average of 42.93% vehicles were traveling over the speed limit (Table 3). Despite the rate of speeding vehicles, there are few crashes for any mode that list speed as a contributing factor.

Multimodal Infrastructure and Lighting

Appendix 1, pages 36-map the existing bicycle and pedestrian infrastructure on NE Sandy Boulevard. Sidewalks are present on both sides of the corridor, although they do not meet the PBOT standards. Sandy Boulevard has some short segments that meet PBOT's crossing spacing standards, but it varies along the corridor. There are no bike lanes of any kind on Sandy Boulevard. The western half of Sandy Boulevard has single-sided street lighting while the eastern half has lighting on both sides.

Summary

NE Sandy Boulevard is the shortest corridor in the EPASS network and has one of the highest rates of pedestrian-related crashes. Most frequently, pedestrians are struck when a

vehicle is moving straight (Table 2). Combined, vehicle and bicycle crashes were only 28% of crashes on Sandy Boulevard. Infrastructure for non-motorized users is substandard, and non-existent for cyclists. Similarly, street lighting is present on NE Sandy Boulevard, but not consistent along the whole corridor.

NE Halsey Street

NE Halsey Street begins at NE 82nd Avenue and continues east to NE 162nd Avenue. The EPASS corridor also includes the Halsey-Weidler couplet between NE 100th Avenue and NE 114th Avenue. NE Halsey Street is an HCC and intersects with three other EPASS corridors: NE 102nd Avenue, NE 122nd Avenue, and NE 148th Avenue. The intersections at 102nd Avenue and 122nd Avenue are also HCLs. The Halsey Street EPASS corridor is 4.8 miles long, making it the third-longest corridor in the EPASS network.

Crash History

In the aggregate, the Halsey corridor ranks in the lower half of crash rates with 16.46 crashes per mile (Table 3). Of total crashes, vehicle crashes occur at the highest rate (6.25). Frequency of vehicle crashes is also evident in the injury data for this corridor (Table 10). Out of 79 total crashes, 81 people were injured, the highest number being road users in vehicles with 34 fatal and serious injuries, or 41.9% of total.

Mode	Crashes	Fatal	Injury A	Injury B	Injury C	Total
Bike	21	1	1	8	10	20
Ped	28	0	2	13	12	27
Vehicle	30	2	32	-	-	34
Total	79	3	35	21	22	81

Table 10: Injuries sustained in traffic crashes on NE Halsey Street, 2007-2016.

Speed Data

NE Halsey Street has four different posted speed limits along the corridor. Beginning from the western end of the corridor, the speed limit is 35 mph, then decreases at the Halsey-Weidler couplet: NE Weidler Street becomes 30 mph while NE Halsey Street becomes 25 mph for several blocks (until 105th Avenue) and then increases to 30mph. After the couplet, the posted speed increases to 35 mph until NE 137th Avenue where it increases again to 45 mph through the remainder of the corridor.

The most recent traffic speed counts were collected in February 2018 and in locations where posted speeds at the time were 35 and 45 mph (Table 3). The average percentage of vehicles traveling over the posted speed was 45.33% (35 mph posted speed) and 18% (45

mph). Speed does not appear to be a disproportionate factor in overall crashes of any mode.

Multimodal Infrastructure and Lighting

The Halsey Street EPASS corridor has varying levels of infrastructure for bicycles and pedestrians, as seen in Appendix 1, pages 38-45. From west to east, NE Halsey Street has sparse sidewalks until after the I-205 freeway overpass. The Halsey-Weidler couplet has sidewalks present on both sides on both streets, which continues through NE 128th Place. The segment east of NE 128th Place has little to no sidewalk presence through NE 162nd Avenue, but does have curbs. Nearly all these sidewalks do not meet PBOT standards. For crossing spacing, the only segment that meets the crossing spacing guidelines is NE Weidler Street couplet. A bike lane is present from the western end of the Halsey-Weidler couplet to 162nd Avenue. There is no bike lane from 82nd Avenue to the couplet.

Halsey Street also has varying street lighting. The segments from 82nd Avenue to 102nd Avenue and 160th Avenue to 162nd Avenue have lighting on both sides of the street. All other segments on this corridor have single-sided lighting.

Summary

NE Halsey Street is one of the longest corridors in the EPASS network but does not have a high crash rate relative to the other corridors. Vehicle crashes had the highest occurrence and also had the highest numbers of injury. Turning movements are the leading collision type for bike and vehicle crashes on NE Halsey Street (Table 1). For pedestrian-related crashes, the most frequent collision type is rear-end between vehicles. Speed does not appear to be a prevailing factor in crashes on NE Halsey Street, despite the posted speed changing several times along the corridor. Sidewalks and crossings do not meet PBOT's standards and although bike lanes and street lighting are present along the corridor, they are likely not enough to make road users feel safe.

NE Glisan Street

NE Glisan Street extends from NE 82nd Avenue to several hundred feet west of NE 162nd Avenue, stopping at the end of the City of Portland jurisdiction. This segment of NE Glisan Street is an HCC and intersects with NE 102nd Avenue, NE 122nd Avenue, and NE 148th Avenue in the EPASS network. Glisan Street has four HCIs on this segment: NE 82nd Avenue, the I-205 on- and off-ramps, NE 102nd Avenue, and NE 122nd Avenue.

Crash History

The NE Glisan Street corridor is 4.01 miles long, fifth in the EPASS network, and the third highest overall crash rate, 34.49 (Table 2). There were 138 crashes and 113 injuries on

Glisan Street. Over half of the crashes involved pedestrians, and 38 pedestrians were injured. Four of the injuries were fatal, making walking the mode with the most fatalities on NE Glisan Street (Table 11).

Mode	Crashes	Fatal	Injury A	Injury B	Injury C	Total
Bike	27	0	2	15	7	24
Ped	73	4	3	15	16	38
Vehicle	38	3	48	-	-	51
Total	138	7	53	30	23	113

Table 11: Injuries sustained in traffic crashes on NE Glisan Street, 2007-2016.

Speed Data

NE Glisan Street has two posted speed limits on the EPASS segment. From 82nd Avenue to 122nd Avenue, the posted speed is 35 mph. East of 122nd Avenue, the speed limit increases to 40 mph through the city limit. From 2015-2018, there were 17 speed counts collected on NE Glisan Street. For those collected in the 35-mph segment, an average of 61.75% of vehicles were traveling over the speed limit. In the 40-mph area, 28.03% of vehicles were speeding, a significant decrease from the other segment (Table 3). Speed is flagged as a contributing crash factor is slightly more frequently than on other corridors in the EPASS network.

Multimodal Infrastructure and Lighting

Appendix 1, pages 46-54 show the sidewalk and bike lane presence and crossing gaps on NE Glisan Street. This corridor has a substandard, but nearly complete double-sided sidewalk network until NE 122nd Avenue. East of 122nd, there are several blocks missing sidewalks. The only segment that meets PBOT's crossing spacing guidelines is on the bridge over I-205. There are no bike lanes present on NE Glisan Street. Street lighting is present on both sides of the corridor from NE 82nd Avenue to NE 99th Avenue, where it becomes single-sided through the city limits.

Summary

NE Glisan Street is a moderately long corridor in the EPASS network with a high overall crash rate. Pedestrian-related crashes prevail on this corridor, and it has one of the highest numbers of fatal pedestrian crashes in the network. Pedestrian infrastructure on Glisan does not meet PBOT standards and there is no presence of bicycle infrastructure. Turning movements are the leading collision type for all three modes, although rear-end crashes are the top pedestrian-related crash type (Table 1).

SE Stark Street

The SE Stark Street corridor is similar in orientation to the NE Halsey Street and NE Glisan Street corridors. The SE Stark Street EPASS segment begins at SE 82nd Avenue and ends at the city limit, several hundred feet west of SE 162nd Avenue. This corridor also includes the SE Washington Street couplet. SE Stark Street is a HCC and intersects with two other EPASS corridors: SE 102nd Avenue (at both 102nd and 103rd Avenues) and SE 122nd Avenue. Stark Street has three HCIs: I-205 ramps, SE 122nd Avenue, and SE 148th Avenue.

Crash History

SE Stark Street is the second longest corridor in the EPASS network and has the second highest overall crash rate. At 5.34 miles long, SE Stark has a crash rate of 34.65 crashes per mile (Table 2). In the 10-year period, 185 crashes and 150 injuries occurred on SE Stark (Table 12). Pedestrian-related crashes and pedestrian injuries are far more frequent on this corridor than other modes.

Mode	Crashes	Fatal	Injury A	Injury B	Injury C	Total
Bike	30	0	3	13	10	26
Ped	108	4	8	37	23	72
Vehicle	47	2	50	-	-	52
Total	185	6	61	50	33	150

Table 12: Injuries sustained in traffic crashes on SE Stark Street, 2007-2016.

Speed Data

The posted speed limit on the entire SE Stark EPASS corridor is 30 mph as of April 2018. At the time of traffic speed collection, speed limits on this corridor were 30 mph through the couplet and then 35 mph to the city limits. Twenty-one speed counts were collected in recent years and many vehicles were traveling over the posted speed. In the 30 mph segment, 76.4% of vehicles were speeding and 45.58% of vehicles where the posted speed was 35 mph (Table 3).

Multimodal Infrastructure and Lighting

Appendix 1, pages 55-63 document the bike and pedestrian infrastructure on SE Stark Street. Substandard sidewalks are present on both sides of the corridor—including the SE Washington Street couplet—except for at the I-205 freeway crossing where sidewalks are only present on the southern side of the corridor. There are a few block-long segments where crossing gaps meet PBOT guidelines, primarily in the Stark-Washington couplet. Similarly, bike lanes are only present from SE 82nd Avenue through the couplet. Street

lighting is primarily on one side of the corridor except on Stark from 82nd Avenue to 92nd Avenue, and over the I-205 freeway.

Summary

SE Stark Street is the second longest corridor and has the second highest crash rate in the EPASS network. On this corridor, pedestrian crashes have the highest crash rate, 20.23 crashes per mile, with a much lower vehicle and bike crash rate: 8.80 and 5.62 respectively. Turning movements are the leading crash type for all modes, but SE Stark Street has the highest number of angle vehicle crashes in the network (Table 1).

This corridor has the highest average of vehicles traveling above the posted speed in all the network, however speed is not cited as a frequent crash factor in the crash data. Bike, pedestrian and street lighting infrastructure are substandard and incomplete along the corridor. This may contribute to the high number of pedestrian- and bike- related crashes.

SE Division Street

The SE Division Street EPASS segment begins at SE 82nd Avenue and ends at the city limit at SE 175th Place. Division Street is a HCC and intersects SE 122nd Avenue and SE 162nd Avenue in the EPASS network. These two intersections are HClIs as well as the intersections at SE 82nd Avenue, I-205, SE 112th Avenue, SE 148th Avenue, and SE 174th Avenue. SE Division Street has the most HClIs in both the EPASS network and the Vision Zero HCN.

Crash History

Measuring 4.65 miles in length, Division Street is the fourth-longest EPASS corridor, but has the highest crash rate in the whole network—83.01 crashes per mile, by a measurable amount. This is more than double the rate of SE Stark Street, the corridor with the second highest rate of crashes. SE Division Street also has the highest rate of pedestrian and vehicle crashes, 56.77 and 15.70 respectively (Table 2). From the 386 total crashes on SE Division, 232 injuries occurred. Nearly half of those injuries involved pedestrians, and 13 of crashes resulted in a fatality (Table 13).

Mode	Crashes	Fatal	Injury A	Injury B	Injury C	Total
Bike	49	1	1	28	17	47
Ped	264	13	27	36	29	105
Vehicle	73	2	78	-	-	80
Total	386	16	106	64	46	232

Table 13: Injuries sustained in traffic crashes on SE Division Street, 2007-2016.

Speed Data

In March 2017, the posted speed limit on Division Street was lowered to 30 mph, but recent speed count data was collected prior to this change when some segments were 35 mph. Since 2015, 27 speed counts were collected along the corridor, most recently in May 2018. At 30 mph, 61.0% of vehicles were traveling faster than the posted speed limit, while 39.24% were over when the posted speed was 35 mph.

Multimodal Infrastructure and Lighting

Appendix 1, pages 64-72 depict maps of bike and pedestrian infrastructure on Division Street. Similar to other corridors in the EPASS network, Division Street has substandard sidewalks present on both sides of the corridor, with the exception of a few broken segments. The entire corridor does not meet PBOT's crossing spacing guidelines. The full corridor does have a standard bike lane. Division Street has street lighting on one side for most of the corridor, except for the segments between 82nd Avenue and 92nd, and 122nd Avenue and 130th.

Summary

SE Division Street is unequivocally the most dangerous corridor in the EPASS network. Division Street leads in crash rates, crash frequencies, injury frequencies, pedestrian injuries, and pedestrian fatalities.. Even though most of the EPASS corridors are similar to SE Division Street in that their pedestrian infrastructure is below the PBOT standard, the frequency of pedestrian injuries suggests that there is higher pedestrian traffic on this corridor. Vehicle turning movements are the leading collision type for bike and pedestrian collisions, 32 and 68 respectively. In pedestrian-related crashes, 185 were of the rear-end crash type, suggesting that vehicles are yielding to pedestrians at times.

SE Foster Road

SE Foster Road is the southern-most corridor in the EPASS network, stretching from SE 82nd Avenue to SE 122nd Avenue, and includes the SE Woodstock Boulevard couplet. Foster Road is an HCC and the only other EPASS corridors it intersects are at its endpoints. The SE 82nd Avenue intersection is also an HCI.

Crash History

The eighth longest corridor in the EPASS network, this segment of SE Foster Road is 2.66 miles long. Regardless, this corridor has the fifth highest crash rate (33.86), but it does not have the highest crash rate for any mode (Table 2). SE Foster Road had 90 total crashes with 71 injuries, with all injury frequencies in a similar range. Of the 43 pedestrian-related crashes, half of them resulted in a pedestrian being injured (Table 14).

Mode	Crashes	Fatal	Injury A	Injury B	Injury C	Total
Bike	22	1	2	13	6	22
Ped	43	0	4	12	5	21
Vehicle	25	1	27	-	-	28
Total	90	2	33	25	11	71

Table 14: Injuries sustained in traffic crashes on SE Foster Road, 2007-2016.

Speed Data

This segment of Foster Road has three different speed limits: 30 mph on the SE Woodstock Boulevard couplet, 35 mph from 82nd to 102nd Avenue, and 40 mph from 102nd to 122nd Avenue. There were no recent traffic speed counts collected on this segment of Foster Road (Table 3).

Multimodal Infrastructure and Lighting

Bike and pedestrian infrastructure is mapped on pages 73-77 in Appendix 1. As is common with other arterials in this network, sidewalks are present on both sides of the roadway, but do not meet PBOT standards apart from a few corners. The corridor also does not meet PBOT crossing spacing standards on Foster Road but does meet these standards on the Woodstock Boulevard couplet and I-205 freeway crossings.

Bike lanes are present through the couplet to SE 122nd Avenue. In a similar pattern, street lighting is on both sides from 82nd through Woodstock, but single-sided on Foster from 92nd Avenue through 122nd.

Summary

SE Foster Road is similar to other EPASS corridors. Foster Road does have a moderately high pedestrian-related crash rate, 16.18, but most of these crashes do not result in pedestrian injury. Turning movements are the leading crash type for cyclists on Foster and angle crashes are common in vehicle crashes. Disregard for signals and traffic control devices seems to be a trend on this corridor.