PBOT

PORTLAND BUREAU OF TRANSPORTATION

1120 SW Fifth Avenue, Suite 800 Portland, OR 97204 503.823.5185

Fax 503.823.7576 TTY 503.823.6868 www.portlandoregon.gov/transportation

**Chloe Eudaly** Commissioner **Chris Warner** Interim Director

**EAST PORTLAND ARTERIAL STREETS STRATEGY MEMO #3**

Date: July 5, 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

## Executive Summary

The East Portland Arterial Streets Strategy (EPASS) aims to guide PBOT decision-making on the design and operation of arterial streets east of 82nd Avenue with the intent of reducing fatal and serious injury crashes while improving mobility and accessibility for all road users. Conducted on each of the eleven EPASS corridors as well as an overall comparative network analysis, the EPASS traffic safety analysis is an assessment of ten years of crash data; vehicle speed count studies; multi-modal infrastructure; and street lighting.

Crash data in this study follows Portland Vision Zero guidelines and is a subset of all crashes, which includes only crashes resulting in fatal and serious injuries to vehicle occupants and all injury levels for cyclists and pedestrians. In the ten-year period, 878 crashes resulted in injuries to people walking, bicycling, or riding in vehicles—and 49 of these injuries were fatal. Pedestrian crashes were most common, accounting for 43 percent of injury crashes on EPASS corridors. Turning movements were a top crash type for all three modes (45% of all crashes). Angle crashes were common for bicyclists (26%) and, similarly, pedestrians were often struck by straight-moving vehicles (53%). Rear-end crashes were the most common among serious vehicle crashes (30%).

Each corridor had varying frequencies of crashes at night for each mode. Pedestrian crashes altogether occurred more frequently at night, especially on Sandy Boulevard, Glisan Street, Stark Street, and Division Street, while night-time bicycle crashes were more frequent on 122nd Avenue and Halsey Street. Corridors where more than 50 percent of vehicle crashes happened at night were on 102nd Avenue, 122nd Avenue, Airport Way, and Foster Road. Another trend identified was that pedestrians were more frequently struck by a vehicle while crossing an EPASS corridor and bicycle crashes were more often when a cyclist was moving along the corridor. Crash locations were also taken into consideration in the safety analysis of the EPASS network for bicycle and pedestrian crashes. Most pedestrian crashes occurred at signalized intersections but crashes at mid-block locations were also frequent. Bicyclists, however, were more often struck at unsignalized intersections, although crashes at driveway locations were also notable.

EPASS corridors have some of the highest posted speeds in the city, and most speed limits are 30 mph or greater, including some segments with speed limits up to 45 mph. However, the World Health Organization recommends that speed limits on urban roadways do not exceed 30 mph. In this study, vehicle speed data considered was 85th percentile, percentage of vehicles traveling over 30 mph, and percentage of vehicles traveling 10 or more mph over the speed limit. Despite the high posted speeds on EPASS corridors, many vehicles were excessively speeding.

Most multi-modal infrastructure on the EPASS network is substandard and does not meet PBOT guidelines, but there are many planned projects that aim to improve these conditions over the next several years. Similarly, street lighting on most of the EPASS corridors is only on one side, which is insufficient to illuminate these wide roadways.

In conclusion, the EPASS network is dangerous to all road users, but particularly for people walking. The historical context of these streets sheds light on the design of these major corridors that have deficient multi-modal infrastructure and street lighting as well as high posted speeds. These corridors may share many characteristics, but each one has a unique combination of safety issues that need to be addressed as Portland continues to grow.

## 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.

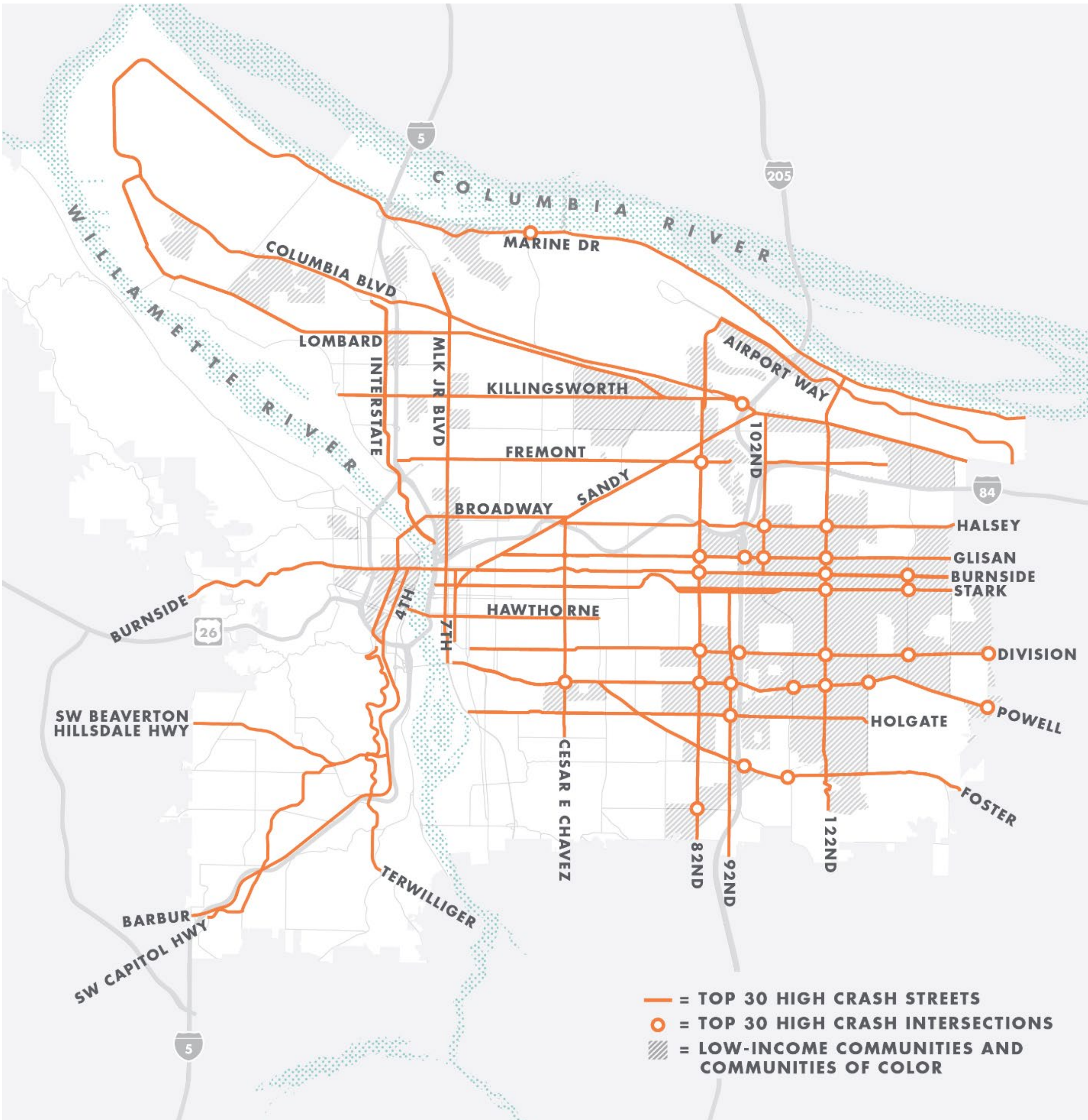
## Background

Vision Zero was adopted by the City of Portland City Council in 2015 with the goal of eliminating traffic fatalities and serious injuries on Portland streets by 2025. Vision Zero identified a High Crash Network (HCN), the top 30 streets in Portland with the most crashes by each travel mode (walking, bicycling, and operating or riding in motor vehicles (Map 1)). From 2014 – 2018[1], 65 percent of fatal crashes occurred on the HCN, which accounts for just eight percent of Portland streets.

East Portland, defined as the area of the city east of and including 82nd Avenue, includes over half of the High Crash Corridors (HCCs) and 28 out of the 30 High Crash Intersections (HCIs) that make up the HCN. The EPASS network is almost entirely composed of HCN streets, except for NE 148th Avenue and SE 162nd Avenue. The EPASS network accounts for 19 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 to help inform street design proposals made as part of EPASS and other efforts.

[1] Fatality data for 2018 is provided by the Portland Police Bureau (PPB) and is subject to change when official Oregon Department of Transportation (ODOT) crash data is available.




*Map 1: Portland's High Crash Network and High Crash Intersections*

## Data and Methodology

The EPASS traffic safety analysis pulls from several different data sources. Using data collected by PBOT and data provided by partners such as ODOT and PPB, staff summarized crashes within the most recent ten years of data and identified other traffic safety risk factors such as vehicle speeds, bicycle and pedestrian infrastructure deficiencies, and street lighting deficiencies along the EPASS corridors.

## Crash Analysis

Ten years of crash data was analyzed for each EPASS corridor. 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 traffic crash analysis was conducted for the period of 2007-2016. Analysis on non-motorist movements and direction of travel at the time of a crash was done using an additional data tool that is limited to the ten-year period of 2006–2015.

Crash data was analyzed by mode for each corridor or segment in the EPASS network. In this study, only fatal and incapacitating injury crashes were included for vehicle crashes and all injury levels for bike and pedestrian crashes. For brevity, this selection of crashes is here defined as **Vision Zero Focused Crashes** and follows the same methodology used in PBOT's Vision Zero crash data analysis. Crashes involving, but not resulting in injury to, cyclists and pedestrians were analyzed as additional insight into non-motor road user risk factors. Many of these pedestrian- or bike-involved crashes result in minor injuries to vehicle occupants or property damage only. 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 data, this safety analysis includes identification of other risk factors such as speed, presence/absence of pedestrian infrastructure, and street lighting deficiencies.

## Speed Data

The World Health Organization (WHO) lists speed as one of the five top risk factors for traffic injuries and states that vehicle speed directly influences risk of a crash, severity, and potential of death.[2] PBOT speed count data was used to analyze vehicle speed along the EPASS corridors and evaluate risk.  Existing speed count data is not evenly dispersed on the

[2] Global Status Report on Road Safety 2018, World Health Organization.

EPASS network, meaning that some portions of a corridor have more speed count studies than others. The speed count data used in this analysis was collected between May 2015 and April 2019 and each study collected data for 2 to 5 days, although the temporal limitation and date of the studies vary by corridor. The number of existing speed counts also varies by corridor, ranging from 2 on SE Foster Road to 29 on SE Division St. Speed count data points used in this study include date, location, posted speed(s) on the segment (if multiple), 85th percentile, and percentage of vehicles traveling 10 mph or more above the posted speed, also called "top-end speeding" or "excessive speeds." Values that were interpolated are the minimum, maximum, and average of the 85th percentile, percentages of vehicles traveling over 30 mph[3] ("over safe speeds" or "WHO recommended maximum speeds"), and top-end speeding. These values were calculated as an aggregate of all speed counts on the corridor.

## Multi-Modal Infrastructure

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 bicycle and pedestrian infrastructure, including location and whether the infrastructure meets PBOT guidelines. Detailed maps of this data can be found in Appendix 1.

*Ped PDX*, the city's Pedestrian Master Plan adopted in June 2019, provides new guidelines for the spacing of marked pedestrian crossings. Along streets designated as City Walkways or Major City Walkways (which includes all of the EPASS Network), marked pedestrian crossings should be provided every 800 feet, or every 530 feet within Pedestrian Districts. In addition, marked crosswalks should be provided within 100 feet of all transit stops. Very few EPASS corridors meet these guidelines, though upcoming capital projects such as the Outer Division Multimodal Safety Project will bring corridors much closer to compliance.

The city standard for pedestrian corridor width along arterial streets is 12 feet, or 15 feet in Pedestrian Districts. This width includes a minimum six-foot pedestrian through zone free

[3] According to the WHO Road Safety Report for 2018, best practice criteria for speed management includes urban speed limits not exceeding 50 km/h (approximately 30 mph).

of obstructions, a planting strip between the curb and the through zone, and a frontage zone between the back of sidewalk and the property line. Very few corridors in the EPASS network meet these standards. Most commonly sidewalks along the EPASS corridors are approximately six feet wide, located immediately adjacent to the curb (“curb-tight”), and obstructed by power poles, sign posts and other infrastructure.

Guidance for arterial bike lane design in Portland is provided by the *Portland Protected Bike Lane Planning and Design Guide* completed in November 2018. Based on National Association of City Transportation Officials (NACTO) guidance, the guide calls for installation of protected bike lanes on streets with daily vehicle volumes above 6,000 or speeds above 25 mph. These conditions are found on the entirety of the EPASS Network. The guide provides a flexible menu of design treatments and widths to establish a protected bike lane in different contexts. Generally, a protected bike lane requires between 7 and 11 feet of roadway width per direction, with an unobstructed bicycling zone between 5 and 8 feet wide, and a buffer zone between 1.5 and 3 feet wide. The installation of protected bike lanes is in process on several EPASS corridors including the NE Halsey-Weidler Couplet, NE Glisan Street, and SE Division Street.

## **Street Lighting**

Street lighting is an essential traffic safety tool in the Portland region due to the area’s climate and latitude. On the winter solstice, Portland experiences just 8 hours and 42 minutes of daylight.[4] Climatologically, Portland experiences an annual average of 296 cloudy or partly cloudy days and 36 inches of rain, mostly in the winter months.[5] Frequent precipitation, cloudy sky conditions, and short daylight hours in the winter contribute to lower pedestrian and cyclist visibility, including during peak traffic hours.

PBOT’s Signals and Street Lights (SSL) team provided streetlight data for the EPASS network. The data provided shows whether street lighting is present on one side of the street, on two sides, or neither. A unique aspect of the East Portland street network is that

[4] U.S. Naval Observatory, Astronomical Applications Department.
[5] U.S. National Weather Service, Local Climate Data from Portland Airport, “Condensed Climate Normals.” https://www.wrh.noaa.gov/pqr/pdxclimate/pg133.pdf.

nearly all 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 decreases visibility for all road users.

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.

All data described here is presented as a table, figure, or map in the following sections or appendices at the end of this document.

## 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. The four maps at the end of this section show the geographic distribution of crashes across the EPASS network.

Table 1 documents crash data for the whole EPASS network by mode and vehicle crash type for each corridor. The leading crash types are highlighted for each mode on each corridor. Below are some key findings for the EPASS network:

- 878 crashes resulted in injury
- 441 crashes involved a cyclist or pedestrian where the non-motorist was not injured.
- The number of injury crashes ranged from 3 on 148th to 220 on Division

**Table 1:** Vehicle crash types by mode on the EPASS corridors, 2007-2016. Bike- and pedestrian-involved crashes are shown below the main table and include Property Damage Only (PDO) crashes and some with minor injuries to vehicle occupants. Red shading indicates the highest crash frequencies for each mode.

| 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 | 7 | 10 | 8 |
| | Backing | - | - | - | - | - | - | - | - | - | - | - |
| | Fixed object | - | - | - | - | - | - | - | 1 | - | - | - |
| | Head-on | - | - | - | - | - | - | 1 | - | - | - | - |
| | Parking maneuver | - | - | - | - | - | - | - | - | - | 1 | - |
| | Pedestrian | - | - | - | - | - | - | - | - | - | - | - |
| | Rear-end | - | 1 | - | - | - | - | 1 | - | 2 | 1 | 1 |
| | Sideswipe - O/M | - | 2 | - | - | 1 | 1 | 1 | - | - | 2 | 2 |
| | Turning movement | 10 | 41 | - | 5 | 4 | 3 | 11 | 17 | 17 | 32 | 10 |
| | Other/non-collision | - | - | - | - | - | - | - | - | - | - | - |
| **Bike Total** | | 11 | 64 | - | 5 | 5 | 5 | 20 | 24 | 26 | 46 | 21 |
| Pedestrian | Angle | - | - | - | - | - | - | - | - | - | - | 1 |
| | Backing | - | - | - | - | - | - | - | - | - | 1 | - |
| | Fixed object | - | 1 | - | - | - | - | - | 2 | - | 1 | - |
| | Head-on | - | - | - | - | - | - | - | - | - | - | - |
| | Parking maneuver | - | - | - | - | - | - | - | 1 | 1 | - | - |
| | Pedestrian | - | - | - | - | - | - | - | - | - | - | - |
| | Rear-end | 1 | - | - | - | - | - | 1 | - | 1 | 1 | - |
| | Sideswipe - O/M | - | - | - | - | - | - | - | - | - | 1 | - |
| | Turning movement | 21 | 30 | - | 3 | 2 | 4 | 16 | 12 | 38 | 29 | 9 |
| | Straight movement - un | 4 | 39 | - | 2 | - | 15 | 10 | 22 | 28 | 68 | 11 |
| | Other/non-collision | - | 1 | - | - | - | - | - | 1 | - | - | - |
| **Pedestrian Total** | | 26 | 71 | - | 5 | 2 | 19 | 27 | 38 | 68 | 101 | 21 |
| 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 - O/M | 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** | | **51** | **154** | **3** | **16** | **22** | **27** | **77** | **100** | **141** | **220** | **67** |

| | 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 Involved** | - | 64 | - | 2 | - | 1 | 1 | 3 | 4 | 3 | 1 |
| **Pedestrian Involved** | 24 | 69 | - | 3 | 1 | 4 | 1 | 35 | 40 | 163 | 22 |

Table 2 summarizes the number of crashes per mile on each EPASS corridor by mode. The top crashes per mile for each mode is highlighted in red.

- SE Division Street has the highest number of crashes per mile in total and for pedestrian and motor vehicle crashes.
- NE/SE 122nd Avenue, the longest of the EPASS corridors, has the highest number of bike crashes per mile.

**Table 2:** EPASS corridor length and crashes per mile 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 | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **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 | **38.57** |
| **Ped Crashes Per Mile** | 7.50 | 11.45 | - | 3.05 | 0.53 | 19.15 | 5.63 | 9.47 | 12.74 | 21.72 | 7.90 | **99.13** |
| **Bike Crashes Per Mile** | 3.17 | 10.32 | - | 3.05 | 1.32 | 5.04 | 4.17 | 5.98 | 4.87 | 9.89 | 7.90 | **55.71** |
| **Vehicle Crashes Per Mile** | 4.04 | 3.06 | 2.91 | 3.66 | 3.97 | 3.02 | 6.25 | 9.47 | 8.80 | 15.70 | 9.41 | **70.30** |
| **Total Crashes Per Mile** | ***14.71*** | ***24.83*** | ***2.91*** | ***9.76*** | ***5.83*** | ***27.22*** | ***16.05*** | ***24.92*** | ***26.41*** | ***47.31*** | ***25.21*** | ***225.14*** |

Table 3 contains speed count data collected on or near the EPASS segments. This data is summarized by EPASS corridor and then grouped by counts collected at locations with the same posted speed. Because of the wide range of values collected, data is shown as maximum, minimum, and average values for each group of counts at a posted speed. These three values are shown for the three categories analyzed in this study: 85th percentile (mph), percent of vehicles traveling over 30 mph (WHO recommended maximum speed), and percent of vehicles top-end speeding (10+ mph over the posted speed).

**Table 3:** Traffic speed count collection data by EPASS corridor, 2015–2019. The percentage of vehicles traveling over 30 mph is included in this study even though posted speeds may be higher because the World Health Organization recommends that urban speed limits do not exceed 30 mph.

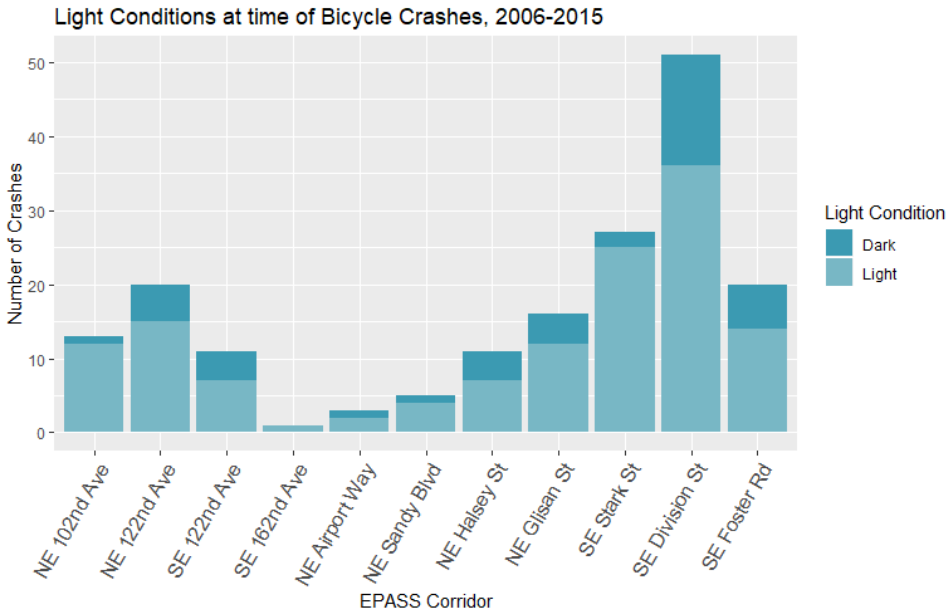
| | NE 102nd | | | NE 122nd | | | SE 122nd | | | NE 148th | | | SE 162nd | | | | | | NE Airport | | | NE Sandy | | | NE Halsey | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Posted Speed** | 35 | | | 35 | | | 35 | | | 35 | | | 35 | | | 40 | | | 45 | | | 35 | | | 25 | 35 | | | 45 | | |
| **85th Percentile (MPH)** | **Min** | **Max** | **Avg** | **Min** | **Max** | **Avg** | **Min** | **Max** | **Avg** | **Min** | **Max** | **Avg** | **Min** | **Max** | **Avg** | **Min** | **Max** | **Avg** | **Min** | **Max** | **Avg** | **Min** | **Max** | **Avg** | **Total** | **Min** | **Max** | **Avg** | **Min** | **Max** | **Avg** |
| | 31 | 42 | 37 | 36 | 49 | 40 | 35 | 42 | 37 | 40 | | | 40 | 43 | 41 | 38 | 46 | 42 | 44 | 50 | 48 | 38 | 40 | 39 | 34 | 35 | 41 | 39 | 44 | 47 | 46 |
| **% over 30mph** | 27 | 94 | 61 | 53 | 90 | 72 | 35 | 91 | 38 | 85 | 90 | 87 | 91 | 92 | 92 | 0.7 | 0.9 | 92 | 74 | 92 | 83 | 78 | 89 | 84 | 29 | 64 | 87 | 79 | 75 | 87 | 81 |
| **% 10+ mph over posted speed** | 0.1 | 5.6 | 2.4 | 0.7 | 29 | 5.3 | 0.1 | 5.0 | 1.3 | 2.4 | 3.9 | 3.2 | 3.0 | 7.4 | 6.1 | 0.0 | 0.2 | 5.2 | 0.3 | 4.4 | 2.0 | 1.0 | 2.7 | 1.9 | 12 | 0.5 | 4.7 | 2.8 | 0.5 | 1.5 | 1.0 |

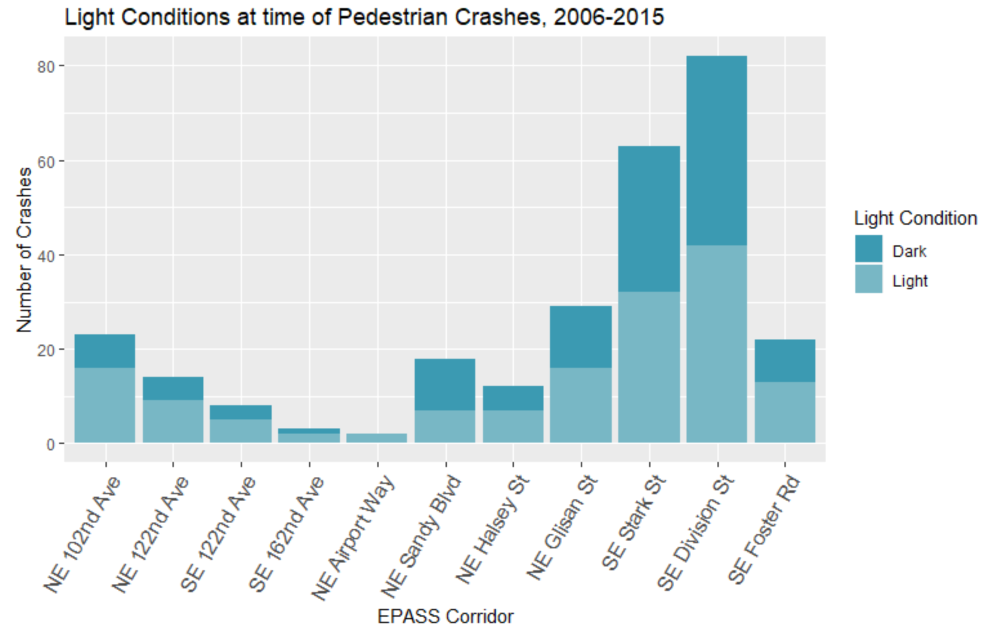
| | NE Glisan | | | | | | | | | SE Stark | | | | | | SE Division | | | | | | SE Foster | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 35 | | | 40 | | | 45 | | | 30 | | | 35 | | | 30 | | | 35 | | | 40 | | |
| | **Min** | **Max** | **Avg** | **Min** | **Max** | **Avg** | **Min** | **Max** | **Avg** | **Min** | **Max** | **Avg** | **Min** | **Max** | **Avg** | **Min** | **Max** | **Avg** | **Min** | **Max** | **Avg** | **Min** | **Max** | **Avg** |
| | 38 | 49 | 42 | 40 | 45 | 42 | 41 | | | 29 | 42 | 37 | 34 | 42 | 39 | 31 | 41 | 36 | 35 | 42 | 38 | 44 | 47 | 46 |
| | 82 | 96 | 90 | 81 | 96 | 87 | 47 | 50 | 48 | 11 | 92 | 64 | 49 | 94 | 81 | 21 | 93 | 60 | 56 | 93 | 74 | 94 | 97 | 96 |
| | 1 | 36.7 | 11 | 0.6 | 3.2 | 1.2 | 0.1 | 0.2 | 0.15 | 0.3 | 22.8 | 6.8 | 0.4 | 6.1 | 2.8 | 0.4 | 11.9 | 5.1 | 0.5 | 5.2 | 2.0 | 1.9 | 6.5 | 4.2 |

Figure 1 is composed of three side-by-side charts displaying the light conditions at the time of crashes on the EPASS network. From left to right, the figures show bicycle, pedestrian, and vehicle crashes that occurred from 2006-2015. The number of crashes on each EPASS corridor is represented by occurrence during light or dark light conditions. Dark light conditions include twilight, dusk, and dawn and are not a representation of street lighting presence. The bike and pedestrian charts do not show NE 148th Avenue because there were no crashes that occurred on this segment during the study period. Note that the y-axis for all three modes is different. Some key findings from the EPASS network analysis includes:

- Pedestrian crashes occur more frequently at night (45%) than other modes: bike (24%) and motor vehicle (43%)
- Sandy, Glisan, Stark, and Division have the highest occurrence of pedestrian crashes at night
- SE 122nd and Halsey have the highest frequency of bike crashes at night: 36 percent for each street
- Vehicle crashes during dark conditions occur on 102nd, 122nd, Airport Way, and Foster more frequently than on the other EPASS corridors (>50% of total).

**Figure 1:** Light conditions at time of crash on EPASS corridors, 2006-2015. From left to right are bikes, pedestrians, and vehicle crashes. Note that NE 148th Avenue is not shown on the bike and pedestrian charts because there were no crashes during this period.



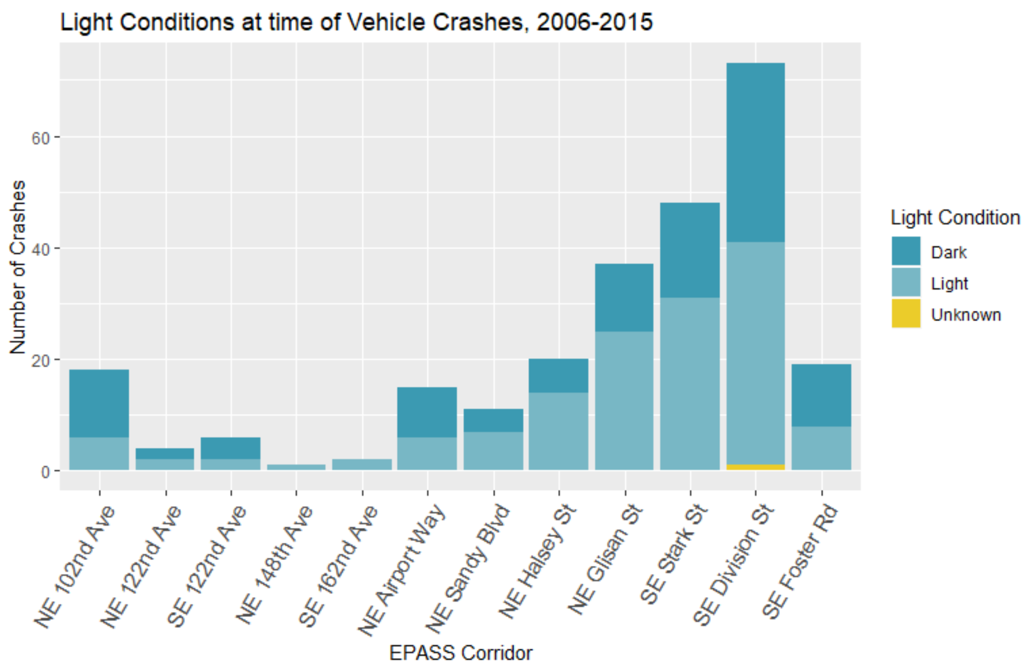
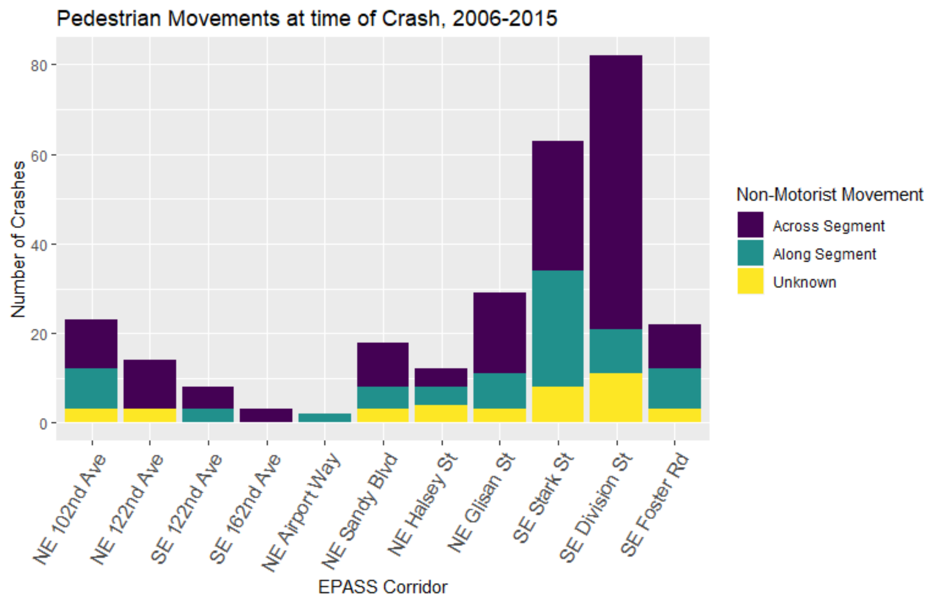
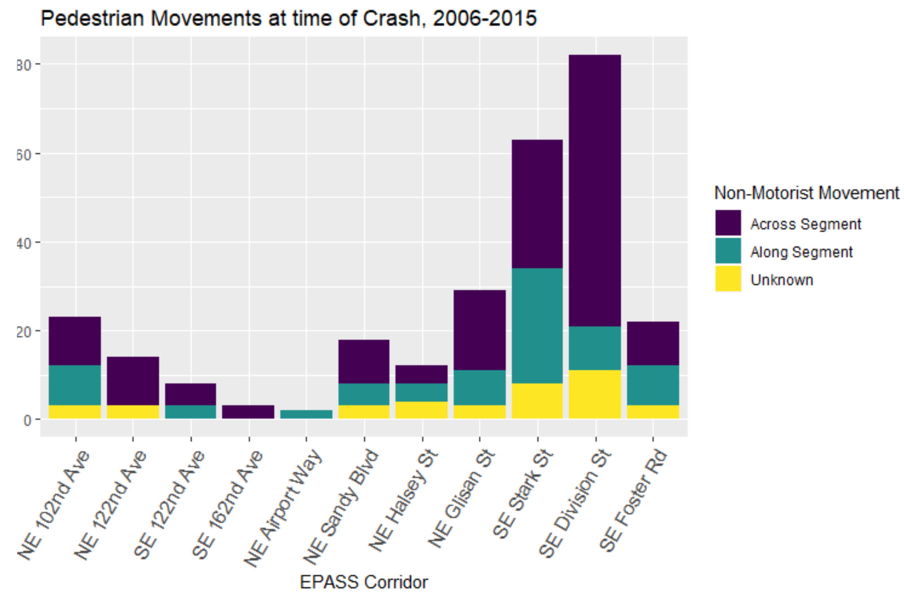



Figure 2 shows bicycle, pedestrian, and vehicle crashes with respect to road user movements at the time of the crash. For bicycles and pedestrians, movements are shown directionally in relation to the segment, such as moving across or along SE Stark Street. The chart for vehicle crashes shows the distribution of nine different crash types observed across the EPASS network, although they may not all be represented on each corridor. Some key findings from the EPASS network analysis includes:

- 58.6 percent of pedestrian crashes occur when the pedestrian is moving across the arterial street
- 69.7 percent of bicycle crashes occur while the cyclist is moving along the arterial street (typically hooked by a turning vehicle or cross traffic)
- Rear-end (30.3%) and turning movement (29.5%) crashes are the most common vehicle crash types, followed by angle (16.5%) and fixed object (15.7%)

**Figure 2:** Movement of road users at time of crash separated by mode. Bike and pedestrian movements are shown directionally in relation to the EPASS segment, while vehicle movements show the crash type only. Note that NE 148th Avenue is not shown on the bike and pedestrian charts because there were no crashes during this period.



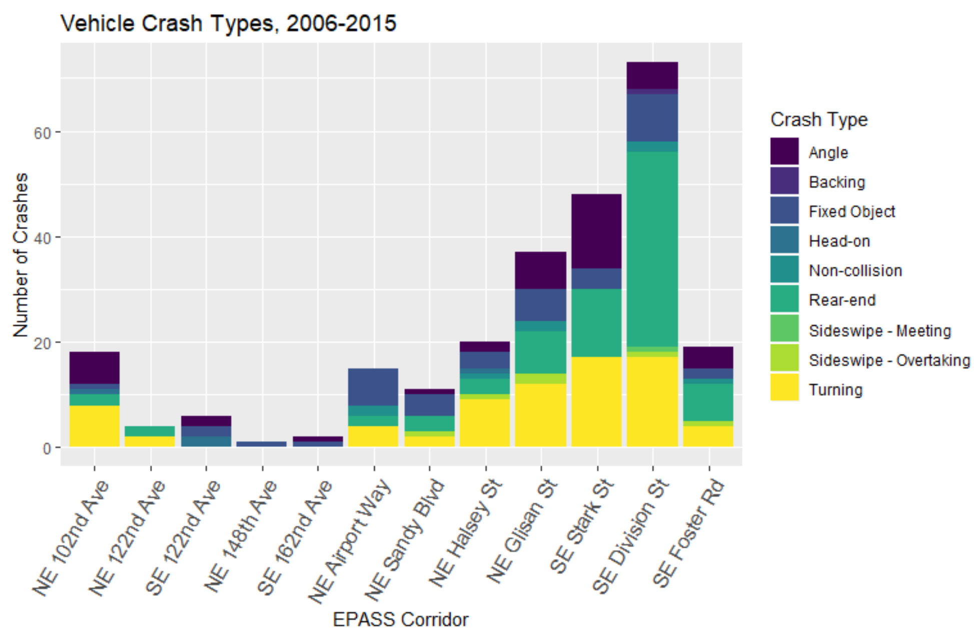



Table 4 summarizes pedestrian crash types at different locations on each corridor. The location types are driveway, mid-block, signalized intersection, and unsignalized intersection. The crash types for each location are descriptive in that they indicate the vehicle movement, pedestrian movement, or road user error, such as failure to yield for a pedestrian or a pedestrian crossing against a signal. The top numbers of crashes at each location type are highlighted.

- Signalized intersections are where the largest share of pedestrian crashes occur (38%). Two-thirds of pedestrian crashes occur when turning vehicles failed to yield to pedestrians.
- Crashes at unsignalized intersections are more attributed to pedestrians not providing enough time for a vehicle to stop, as well as those through-moving vehicles failing to yield, rather than from vehicles turning.
- At unsignalized intersections, pedestrians are more likely to be struck by a vehicle moving straight than at signalized intersections, especially on Glisan and Division streets.
- Division Street has a much higher rate of pedestrians being struck while crossing between intersections than other corridors.

**Table 4:** Pedestrian crashes summarized by crash type at different locations on each EPASS corridor, 2006 – 2015. Red shading indicates the highest crash frequencies.

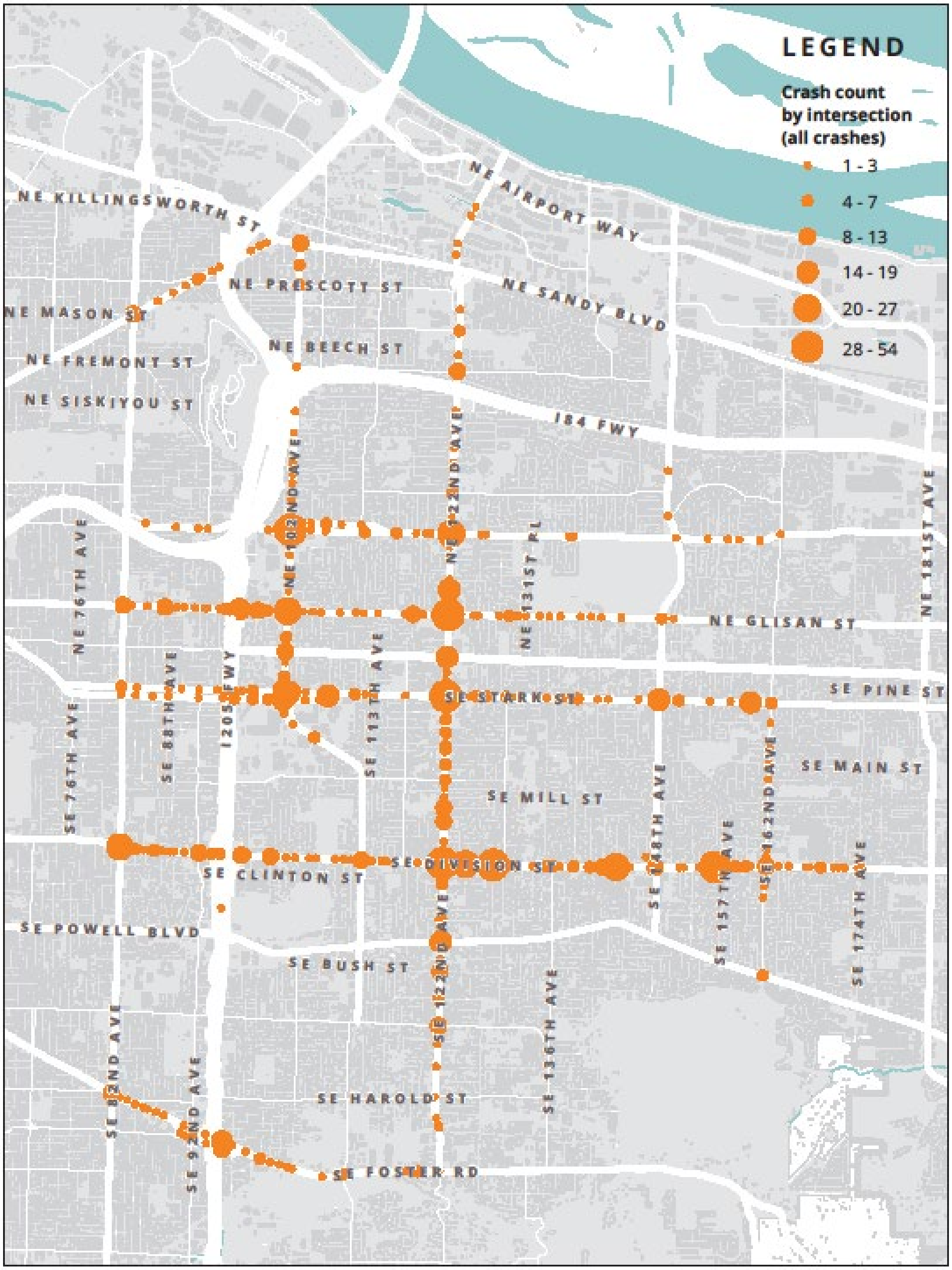
| Location Type | Crash Type: Pedestrian | EPASS Corridor | | | | | | | | | | | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | NE 102nd Ave | NE 122nd Ave | SE 122nd Ave | SE 162nd Ave | NE Airport Way | NE Sandy Blvd | NE Halsey St | NE Glisan St | SE Stark St | SE Division St | SE Foster Rd | |
| Signalized Intersection | Driver going straight failed to yield | | | | | | 1 | | 3 | 3 | 2 | 1 | 10 |
| | Left turning driver failed to yield | 8 | 6 | | | | 1 | 1 | 2 | 10 | 6 | | 34 |
| | Pedestrian crossing against signal | 2 | 2 | | | 1 | | 1 | | 6 | 2 | 2 | 16 |
| | Right turning driver failed to yield | 8 | | | 1 | 1 | | 2 | 5 | 6 | 11 | 2 | 36 |
| | Other | 2 | | | | | | 1 | 1 | 1 | 3 | 1 | 9 |
| | **Total** | **20** | **8** | | **1** | **2** | **2** | **5** | **11** | **26** | **24** | **6** | **105** |
| Unsignalized Intersection | Driver going straight failed to yield | | | | | | | | 7 | 3 | 7 | 1 | 18 |
| | Left turning driver failed to yield | | | 3 | | | 1 | | | 2 | 3 | 1 | 10 |
| | Ped did not provide sufficient time for vehicle to stop | | | 1 | | | 4 | 1 | 1 | 8 | 4 | 2 | 21 |
| | Right turning driver failed to yield | 1 | 1 | | | | 2 | | | 3 | | 1 | 8 |
| | Other | | | | | | | 1 | 2 | | 1 | 1 | 5 |
| | **Total** | **1** | **1** | **4** | **0** | **0** | **7** | **2** | **10** | **16** | **15** | **6** | **62** |
| Mid-block | Pedestrian crossing between intersections | | 4 | 3 | 2 | | 9 | 2 | 7 | 11 | 37 | 7 | 82 |
| | Other | | 1 | | | | | 1 | 1 | 6 | 3 | 3 | 15 |
| | **Total** | | **5** | **3** | **2** | | **9** | **3** | **8** | **17** | **40** | **10** | **97** |
| Driveway | Driveway | 2 | | 1 | | | | 2 | | 4 | 3 | | 12 |
| | **Total** | **2** | | **1** | | | | **2** | | **4** | **3** | | **12** |
| **TOTAL** | | **23** | **14** | **8** | **3** | **2** | **18** | **12** | **29** | **63** | **82** | **22** | **276** |

Table 5 summarizes the position and location of bicyclists in crashes involving bicycle and vehicle users. Some crash types unique to these crashes are improper lane change and whether the bike was in or outside of the roadway, such as on the sidewalk.

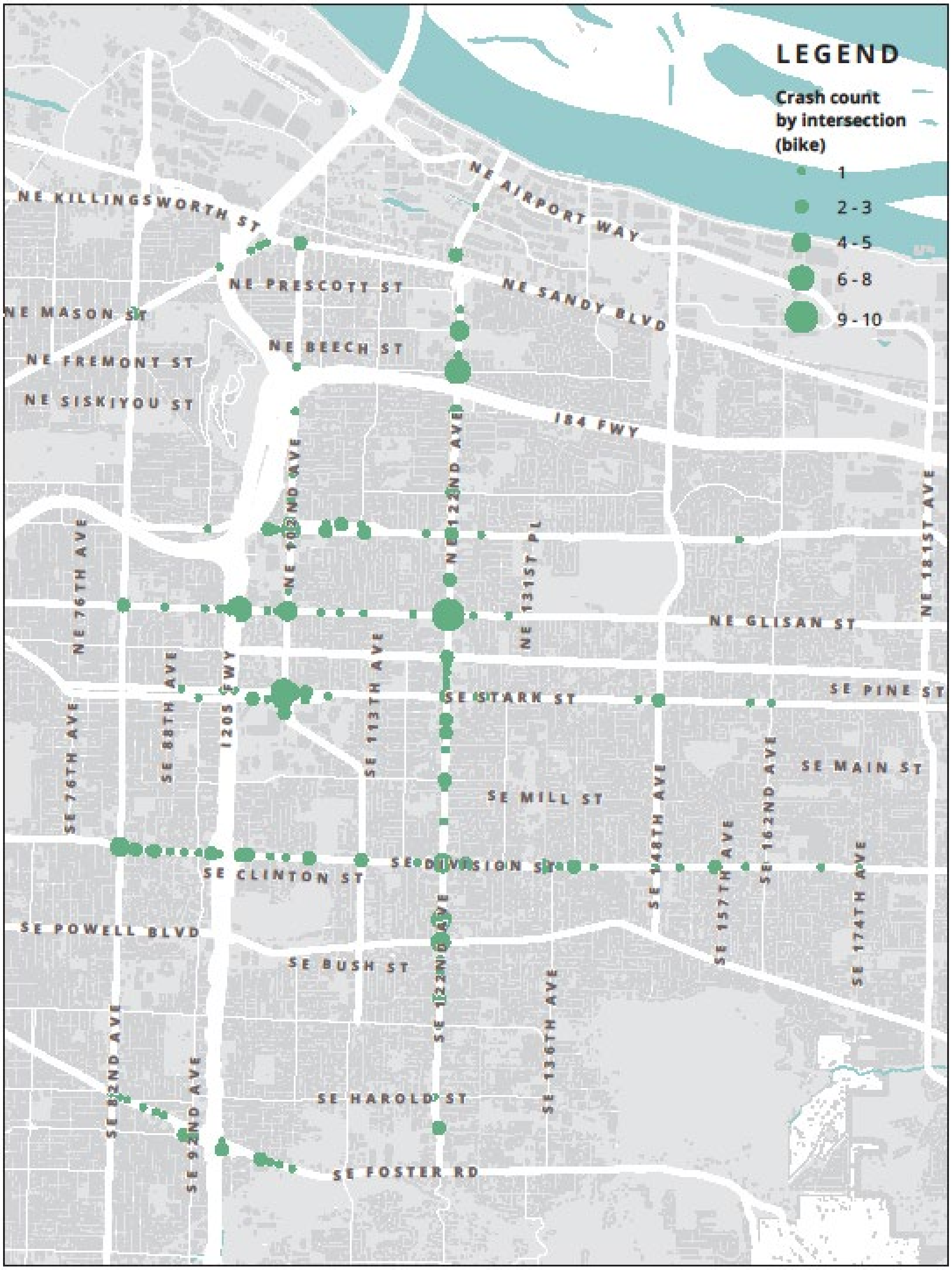
- The highest number of bike crashes are on SE Division Street, NE/SE 122nd Avenue, and SE Stark Street.
- When 122nd Avenue's NE and SE segments are combined, it has the second highest number of crashes (31); however, NE 122nd has twice as many bike crashes as the SE segment.
- More crashes occur at driveways for bicyclists than for pedestrians.
- Crashes when a bicyclist is riding outside of the roadway occur more than twice as often than when the bike is in the roadway.
- At signalized intersections, bike crashes occur most frequently (35%) when a right turning driver fails to yield to the cyclist.
- Slightly more bike crashes occur at unsignalized intersections, and they are primarily due to turning vehicles failing to yield.

**Table 5:** Bicycle crashes summarized by crash type at different locations, 2006 – 2015. Red shading indicates the highest crash frequencies.

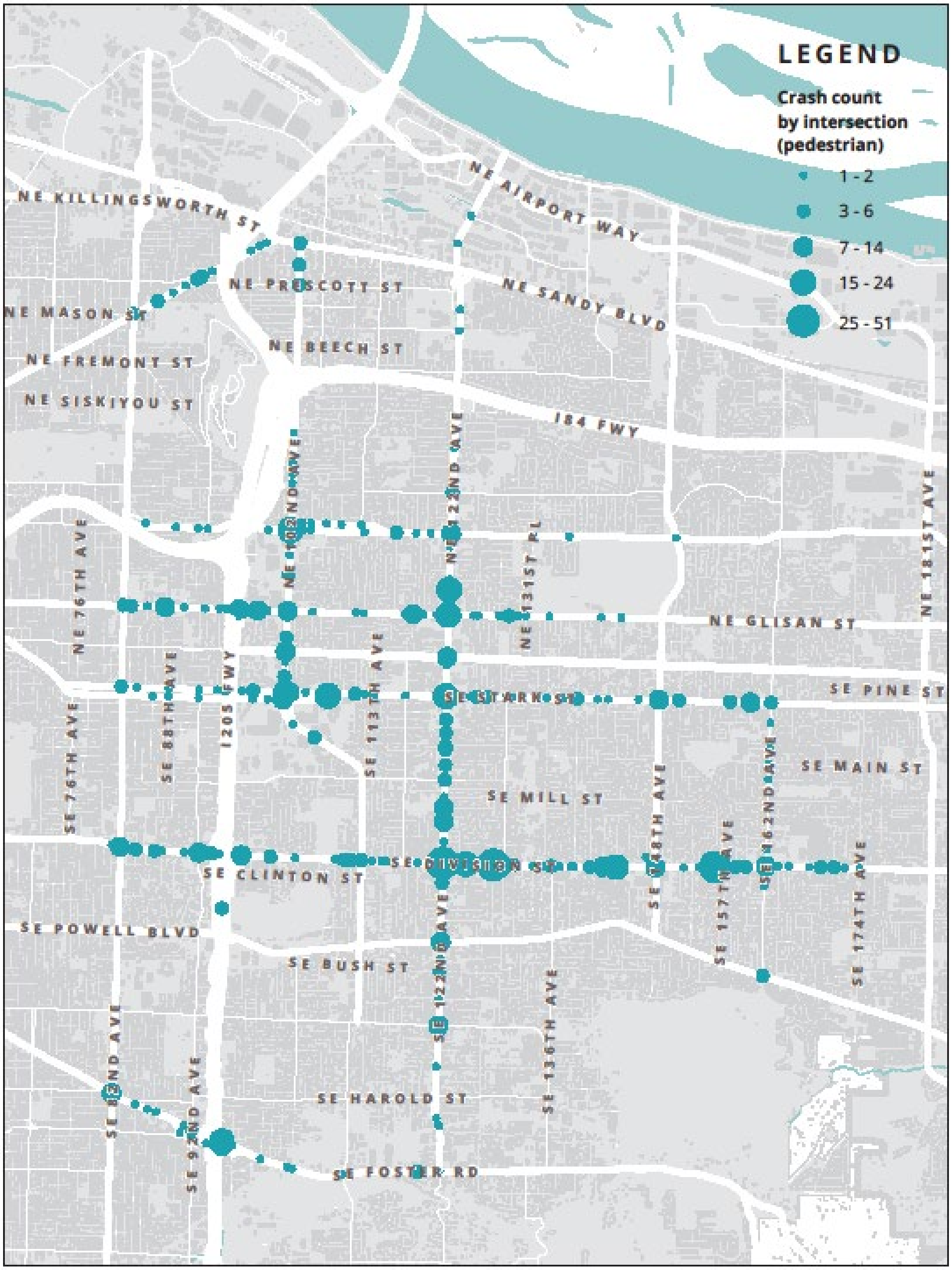
| Location Type | Crash Type: Bike | EPASS Corridor | | | | | | | | | | | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | NE 102nd Ave | NE 122nd Ave | SE 122nd Ave | SE 162nd Ave | NE Airport Way | NE Sandy Blvd | NE Halsey St | NE Glisan St | SE Stark St | SE Division St | SE Foster Rd | |
| Signalized Intersection | Bicyclist disregarded traffic signal or did not have right-of-way | | | | | | | 1 | 3 | 2 | 4 | 2 | 12 |
| | Driver going straight failed to yield | 1 | | | | | 1 | | | 2 | | 1 | 5 |
| | Left turning driver failed to yield | 1 | | 2 | | | 1 | | | | 1 | | 5 |
| | Right turning driver failed to yield | 4 | 1 | | | 1 | | 1 | 2 | 6 | 1 | 2 | 18 |
| | Other | 1 | 2 | | | | | 1 | 2 | 2 | 2 | 1 | 11 |
| **Signalized Intersection** | | **7** | **3** | **2** | | **1** | **2** | **3** | **7** | **12** | **8** | **6** | **51** |
| Unsignalized Intersection | Bicyclist did not have right-of-way | 1 | | | | | | | | 1 | | | 2 |
| | Bicyclist disregarded stop sign or flashing red | | | | | | | | | | 1 | 1 | 2 |
| | Driver going straight failed to yield | | | 1 | | | | 1 | | 2 | 2 | | 6 |
| | Left turning driver failed to yield | 2 | 3 | | | | | | 3 | 1 | 4 | 3 | 16 |
| | Right turning driver failed to yield | 1 | | 1 | | | | 3 | | 1 | 4 | 3 | 13 |
| | Other | 1 | 3 | | | | | 3 | 1 | | 9 | 2 | 19 |
| **Unsignalized Intersection** | | **5** | **6** | **2** | | | | **7** | **4** | **5** | **20** | **9** | **58** |
| Mid-block | Bike crossing or improper lane change | | 1 | 4 | | | 1 | | 2 | 1 | 5 | 3 | 17 |
| | Driver colliding with cyclist while traveling straight | | 1 | | | | | | | | 3 | 2 | 6 |
| | Other | | | | | | | | 2 | | 2 | | 4 |
| **Mid-block** | | | **2** | **4** | | | **1** | | **4** | **1** | **10** | **5** | **27** |
| Driveway | Driveway - Bike in roadway | 1 | 3 | | | | 1 | 1 | | 4 | 2 | | 12 |
| | Driveway - Bike outside roadway (e.g., sidewalk, bike path) | | 4 | 2 | 1 | 2 | 1 | | 1 | 5 | 8 | | 24 |
| | Other | | 2 | 1 | | | | | | | 3 | | 6 |
| **Driveway** | | **1** | **9** | **3** | **1** | **2** | **2** | **1** | **1** | **9** | **13** | | **42** |
| **TOTAL** | | **13** | **20** | **11** | **1** | **3** | **5** | **11** | **16** | **27** | **51** | **20** | **178** |



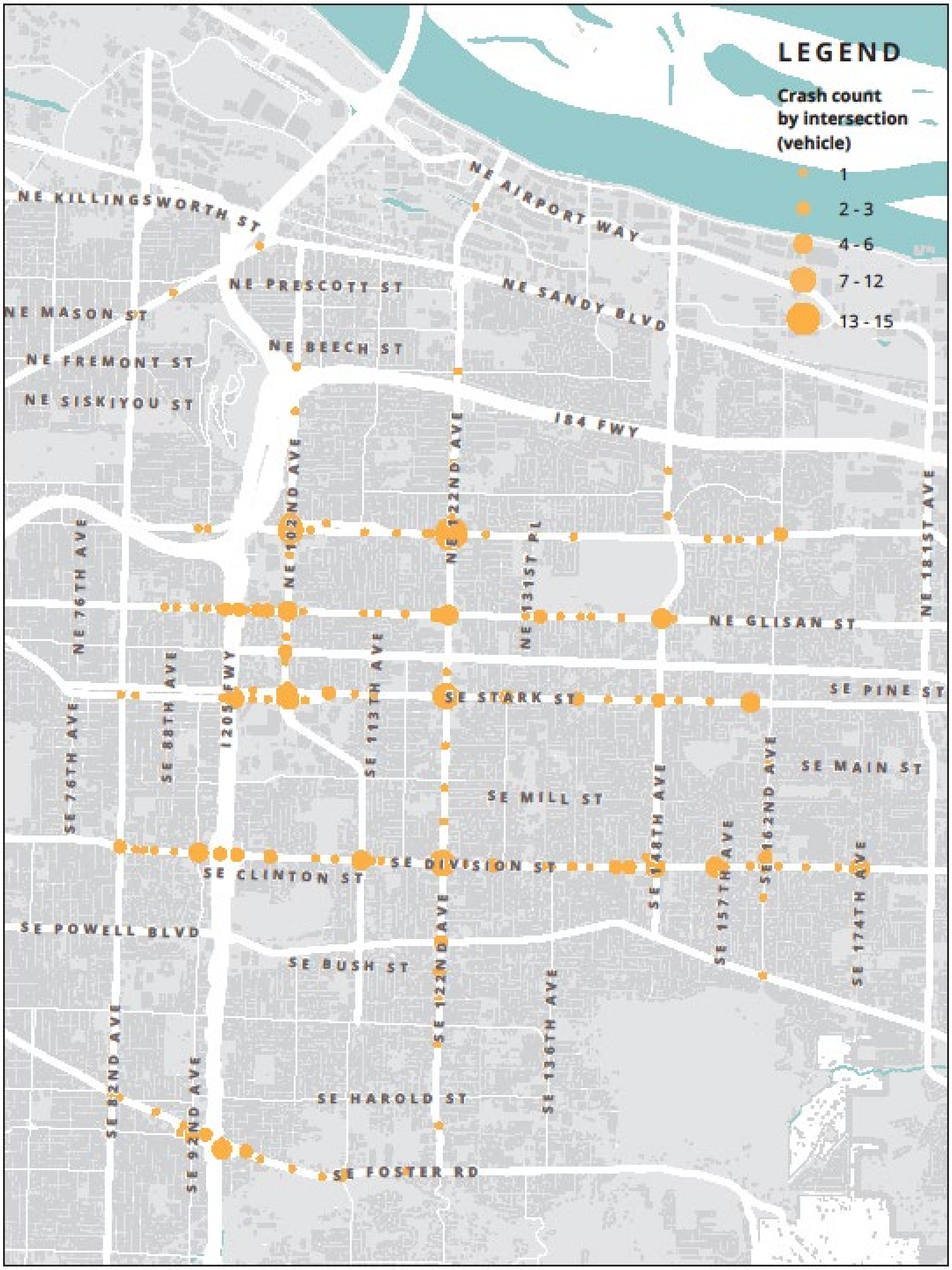

**Map 2:** Distribution of all High Priority Crashes on the EPASS network by number of occurrences, 2007-2016. Larger symbols indicate more crashes in an area. Crashes are not shown for non-EPASS network streets.




**Map 3:** Distribution of bike-related crashes on the EPASS network by number of occurrences, 2007-2016. Larger symbols indicate more crashes in an area. Crashes are not shown for non-EPASS network streets.




**Map 4:** Distribution of all pedestrian-related crashes on the EPASS network by number of occurrences, 2007-2016. Larger symbols indicate more crashes in an area. Crashes are not shown for non-EPASS network streets.




**Map 5:** Distribution of fatal and serious injury vehicle crashes on the EPASS network by number of occurrences, 2007-2016. Larger symbols indicate more crashes in an area. Crashes are not shown for non-EPASS network streets.

# EPASS Corridor Profiles

## NE/SE 102nd Ave (3.47 miles)

The EPASS network includes NE/SE 102nd Avenue with a short segment of SE 103rd Avenue and SE Cherry Blossom Street. The endpoints of this EPASS corridor are NE Sandy Boulevard and SE 106th Avenue. 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: the Halsey-Weidler Couplet, NE Glisan Street, and SE Stark-Washington Street. The intersections of NE 102nd Avenue at the Halsey-Weidler Couplet and NE Glisan are Vision Zero High Crash Intersections (HCIs), meaning that they are two of the thirty most dangerous intersections in Portland.

### Crash History

In the 10-year period analyzed, 51 crashes occurred on the 102nd Avenue corridor with 54 injuries. There were also an additional 24 pedestrian-involved crashes that did not result in injury to the pedestrian and zero additional bike-involved crashes (Figure 1). Crash injuries are summarized by mode in the table below (Table 6). Compared to the other corridors, 102nd Avenue also has a relatively moderate number of crashes per mile at 14.71 (Table 2).

| Mode | Crashes | Fatal | Injury A | Injury B | Injury C | Total Injuries |
|---|---|---|---|---|---|---|
| **Bike** | **11** | 0 | 0 | 6 | 5 | **11** |
| **Ped** | **26** | 1 | 1 | 9 | 16 | **27** |
| **Vehicle** | **14** | 1 | 15 | - | - | **16** |
| **Total** | **51** | **2** | **16** | **15** | **21** | **54** |

**Table 6**: Number of injury crashes and level of injuries sustained in traffic crashes on 102nd Avenue, 2007-2016.

Based on data in Figure 1, the number of crashes during light and dark conditions varied greatly by mode. Very few bike crashes occurred in dark conditions here (8 percent), while 30 percent of pedestrian and 67 percent of motor vehicle crashes occurred at night.

Most pedestrians were struck by vehicles while crossing 102nd Avenue (48 percent), rather than while crossing a side street along 102nd Avenue. This trend is not as strong as the network-wide average. Bicycle crashes, however, strongly follow the trend of a bicyclist moving along the segment when they were struck, accounting for 77 percent of bike crashes on this corridor. Crashes among vehicles were primarily turning movements (44 percent), followed by angle crashes (33 percent) (Figure 2).

### 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 count data on each corridor. NE 102nd Avenue had eight speed counts from 2015 – 2018, most recently in December 2018. Speed counts were only collected in segments where the posted speed was 35 mph. The average percentage of vehicles traveling over 30 mph was 60.7 percent and top end speeding was 2.4 percent.

### Multimodal Infrastructure and Lighting

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

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. The bicycling facilities on 102nd Avenue include 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 narrowed vehicle travel lanes and striped buffered bike lanes. A pilot project in 2019 will install buffered bike lanes and pedestrian crossing islands while reducing vehicle travel lanes from four to two north of NE Weidler Street.

### Summary

Based on crash analysis, vehicle speeds, bike and pedestrian infrastructure, and street lighting, the greatest areas of concern on 102nd Avenue are at the HCIs. 102nd Avenue is also among the top corridors for 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). Nighttime vehicle crashes are common and tied for the highest frequency of this type of crash on the EPASS network. Additionally, the narrow sidewalk on the I-84-Union Pacific Railroad overcrossing does not meet ADA horizontal clearance in places, which causes people on mobility devices to move into the roadway.

## NE/SE 122nd Avenue (6.2 miles)

Nearly the entire length of NE/SE 122nd Avenue, extending from NE Airport Way to SE Foster Road, is included in EPASS. 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. Totaling 6.20 miles in length, the 122nd Avenue EPASS corridor is the longest corridor in the network.

### Crash History

In the 10-year period analyzed, 154 crashes occurred on the 122nd Avenue corridor with 159 injuries. There were an additional 64 bike-involved crashes and 69 pedestrian-involved crashes on this corridor. Crash injuries are summarized by mode in Table 7. With 24.83 crashes per mile, 122nd Avenue ranks 6th; however, it does have the highest concentration of bicycle crashes in the EPASS network, 10.32 per mile (Table 2).

| Mode | Crashes | Fatal | Injury A | Injury B | Injury C | Total Injuries |
|---|---|---|---|---|---|---|
| **Bike** | **64** | 1 | 5 | 33 | 25 | **64** |
| **Ped** | **71** | 1 | 11 | 34 | 26 | **72** |
| **Vehicle** | **19** | 3 | 20 | - | - | **23** |
| **Total** | **154** | **5** | **36** | **67** | **51** | **159** |

**Table 7:** Number of injury crashes and level of injuries sustained in traffic crashes on 122nd Avenue, 2007-2016.

Figure 1 shows that about one-third of pedestrian crashes occurred at night on 122nd Avenue, similar to other EPASS corridors. However, both the NE and SE segments had some of the highest numbers of vehicle crashes in the network, both over 50 percent occurring in dark conditions. SE 122nd had 36 percent of bike crashes at night, which is tied with NE Halsey Street for the top bike crashes in this category.

### 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 2019 on the SE segment.

The average percentage of vehicles traveling over WHO recommended maximum speeds (30 mph) on NE 122nd Avenue was 72 percent, while the average on the SE segment was 38 percent (Table 3), which could be attributed to posted speeds of at least 35 mph. Top end speeding was also more prevalent on the NE segment with 5.3 percent of vehicles traveling faster than 10 mph over the posted speed, as opposed to 1.3 percent on SE 122nd Avenue.

**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, sidewalks along 122nd Avenue do not meet current PBOT standards, apart from a segment near the Springwater Corridor which was improved with a federal grant in the early 2010s. Most of 122nd Avenue does not meet PBOT's pedestrian crossing spacing standards, though new enhanced crossings have been added incrementally over the past ten years. Standard bike lanes are present for the entire length of the corridor.

Two pinch points are present for people walking, biking, and using mobility devices: the undercrossing of I-84 and the Union Pacific Railroad Graham Line, and the undercrossing of NE Sandy Boulevard and the Union Pacific Railroad Kenton Line.

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 number of crashes per mile. The high frequency of bicycle-related crashes on 122nd Avenue is notable, primarily attributed to turning movement collisions. 122nd Avenue also has the highest number of angle collisions (20) for bicycle-related crashes of any of the EPASS corridors. Pedestrian-related crashes are also prevalent on 122nd Avenue with 66 rear-end vehicle crashes, frequently due to a vehicle yielding to a pedestrian and the vehicle behind it following too closely. 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 15 percent of total injuries on 122nd Avenue. The leading vehicle collision type was turning movements, with 8 occurrences, or 42 percent of collisions (Table 1). Darkness appears to be a concern for vehicle and bike crashes, especially on the SE segment.

## NE 148th Avenue (1.03 miles)

The NE 148th Avenue EPASS corridor is a 1.03-mile long segment, from NE Sacramento Street to NE Glisan Street. 148th Avenue is a much longer corridor running from NE Marine Drive to SE Powell Boulevard, but only the segment with four or five vehicle lanes is studied in EPASS. NE 148th Avenue is not in the HCN and does not have any HCIs.  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 number of crashes 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—of 2.91crashes per mile (Table 2). Table 8 summarizes the number and severity of crashes on NE 148th Avenue.

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

**Table 8:** Number of injury crashes and level of injuries sustained in traffic crashes on NE 148th Avenue, 2007-2016.

Because there were so few crashes on NE 148th Avenue, it is undetermined whether there are any trends in day or night conditions. Two of the three crashes that occurred on 148th Avenue involved a vehicle colliding into a fixed object, both being a curb.

### 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 30 mph was 87 percent, while 3.2 percent of vehicles were top-end speeding. (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 west side of the street, and the segment from Halsey to Glisan had no walking infrastructure until a 2019 project completed sidewalks on the east side. 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 on one side.

### 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 crashes. 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. NE 148th Avenue does not have complete sidewalks along the segment, but pedestrian crossings are spaced to meet PBOT guidelines. One such crossing, at NE Sacramento Street, will be improved with a rectangular rapid flashing beacon as part of a Safe Routes to School project in 2020.

## SE 162nd Avenue (1.64 miles)

The EPASS segment of SE 162nd Avenue begins about 200 feet south of SE Stark Street and ends at SE Powell Boulevard. North of the EPASS segment, 162nd Avenue enters City of Gresham jurisdiction. This corridor only intersects with one other EPASS corridor at SE Division Street, though SE Stark Street is close by at the north end. SE 162nd Avenue is not in the HCN, but it does have two HCIs—one at SE Division Street and the other at SE Powell Boulevard. The 162nd Avenue corridor is relatively short compared to other streets in the EPASS network.

### Crash History

A total of 16 crashes and 17 injuries occurred on 162nd Avenue during the 10-year study period. 162nd Avenue has one of the lowest overall crashes per mile, 9.76, which is relatively evenly distributed across bike, pedestrian, and vehicle crashes (Table 2). Table 9 summarizes the number and severity of crashes by mode.

| Mode | Crashes | Fatal | Injury A | Injury B | Injury C | Total Injuries |
|---|---|---|---|---|---|---|
| **Bike** | **5** | 0 | 0 | 4 | 1 | **5** |
| **Ped** | **5** | 0 | 1 | 2 | 3 | **6** |
| **Vehicle** | **6** | 1 | 5 | - | - | **6** |
| **Total** | **16** | **1** | **6** | **6** | **4** | **17** |

**Table 9:** Number of injury crashes and level of injuries sustained in traffic crashes on SE 162nd Avenue, 2007-2016.

SE 162nd Avenue does not have many crashes and most of them happen during daylight. For vehicles and bikes, 100 percent of crashes occurred during the day, while one of the three pedestrian crashes was at night (Figure 1).

Similar to elsewhere in the EPASS network, the bike and pedestrian crashes on SE 162nd Avenue have similar characteristics of pedestrians crossing the segment and bikes traveling along the roadway when struck. The only vehicle crash types were angle crashes and collisions into fixed objects (Figure 2)

**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, 92 percent of vehicles were traveling over WHO recommended maximum speeds (over 30 mph) and 5.2 percent of vehicles were driving at excessive speeds (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 crashes per mile. Crash frequency is very similar between modes with no prevalent anomalies. The collision type to note on SE 162nd Avenue is turning movements, which had the highest frequency for bike-related crashes (6). Otherwise, all other modes' crashes were distributed across vehicle movement type (Table 1).

## <u>NE Airport Way (3.77 miles)</u>

NE Airport Way is the northern-most EPASS corridor and extends from NE Glenn Widing Drive (where PBOT gains roadway jurisdiction east of I-205) to the 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, has a higher level of access management, and features numerous curves. NE Airport Way was constructed as a new roadway in the 1990s to promote industrial development.

### 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 number of crashes per mile, 5.83 (Table 2). Airport Way had 22 crashes with 22 injuries.  In this auto-centric and industrial-focused district, the corridor had a higher frequency of vehicle crashes than other modes, accounting for 65 percent of total. Table 10 summarizes crashes by severity and mode.

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

**Table 10:** Number of injury crashes and level of injuries sustained in traffic crashes on NE Airport Way, 2007-2016.

Figure 1 shows that all pedestrian crashes happened during the day, and four of the five bike crashes on Airport Way happened during daylight hours. In contrast, 60 percent of auto crashes were in darkness or low-light conditions.

Although the frequency of bike and pedestrian crashes was low on Airport Way, all of them were when these road users were traveling along the corridor (Figure 2). When analyzing vehicle crashes, this corridor has the highest percentage of vehicles colliding with fixed objects (47 percent), many of these crashes citing speed or driving too fast for conditions as a factor.

### 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 30 mph was 83.3 percent and 2.0 percent were top-end speeding (Table 3).

### 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, curb-tight sidewalks are present on both sides of the roadway. The entire corridor meets PBOT’s crossing spacing standards and consistent bike lanes are present on both sides of the roadway, though they are less than six feet wide. NE Airport Way is the only corridor in the EPASS network that has street lighting on both sides of the whole corridor. NE Airport Way features extensive access management and center medians because of its construction as a uniform capital project in the 1990s.

**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 percent of vehicle crashes. Vehicle crashes occur at a higher frequency than bike and pedestrian crashes, especially under dark conditions. The most common 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. The roadway's numerous curves may be another factor in these crashes.

## NE Sandy Boulevard (0.99 miles)

The segment of NE Sandy Boulevard that is part of the EPASS network begins at NE 82nd Avenue and ends at NE Killingsworth Street / 99th Avenue. East of this location, Sandy Boulevard falls under ODOT jurisdiction. Sandy Boulevard is an HCC, but this segment does not intersect with any other EPASS corridors in this study. This corridor has HCIs at NE 82nd Avenue and NE Killingsworth Street. Only a mile in length, NE Sandy Boulevard is the shortest corridor in the EPASS network. NE Sandy Boulevard travels at an angle across the typical Portland grid, creating non-orthogonal intersections that pose safety and design challenges.

**Crash History**

Sandy Boulevard has the fourth highest number of crashes per mile in the network, 27.22. Many crashes are pedestrian-related, 19.15 per mile (Table 2). This is the second highest concentration of pedestrian-related crashes in the EPASS network, along with a high number of pedestrian injuries.

Table 11 details the injuries sustained on this corridor, where pedestrian injuries account for 69 percent of all injuries. In the 23 pedestrian-involved crashes, 20 pedestrians were injured. This is a higher crash-to-injury ratio than many other corridors, which often have more pedestrian-related, property damage only (PDO) crashes.

| Mode | Crashes | Fatal | Injury A | Injury B | Injury C | Total Injuries |
|---|---|---|---|---|---|---|
| **Bike** | **5** | 0 | 0 | 3 | 2 | **5** |
| **Ped** | **19** | 2 | 5 | 7 | 6 | **20** |
| **Vehicle** | **3** | 0 | 4 | - | - | **4** |
| **Total** | **27** | **2** | **9** | **10** | **8** | **29** |

**Table 11:** Number of injury crashes and level of injuries sustained in traffic crashes on NE Sandy Boulevard, 2007-2016.

Few motor vehicle and bike crashes happen on the EPASS segment of Sandy Boulevard, and most are during the day. However, Figure 1 shows that 61.1 percent of pedestrian crashes on this corridor are in dark conditions. This is the only corridor in the EPASS network where more than 50 percent of pedestrian crashes are after dark.

Bike crashes are common when a bicyclist is traveling along Sandy Boulevard (80 percent), whereas 56 percent of pedestrian crashes are when a person was crossing the segment, especially mid-block (Table 4). There were few vehicle crashes, and Figure 2 shows that 36.4 percent were crashes into fixed objects, the top vehicle crash type on this corridor.

### 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 84 percent of vehicles were traveling over 30 mph and 1.9 percent were driving at excessive speeds (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. New crossings will be added at NE 85th Avenue and NE 92nd Avenue in the summer of 2019. There are no bike lanes of any kind on Sandy Boulevard, although a bike lane in the westbound direction from the Parkrose Transit Center to NE 91st Avenue will be striped at the same time as the new crossings. 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 a high concentration of pedestrian crashes, especially at night. Most commonly, pedestrians are struck when a vehicle is moving straight (Table 2) and almost all crashes result in injury to the pedestrian. Combined, vehicle and bicycle crashes were only 28 percent 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 (4.80 miles)

The NE Halsey Street EPASS corridor begins at NE 82nd Avenue and continues east to NE 162nd Avenue, with at least five different cross sections along this 4.8-mile length. 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 HCIs. The Halsey Street EPASS corridor is the third-longest corridor in the EPASS network.

### Crash History

In the aggregate, the Halsey corridor ranks in the lower half of crashes per mile with 16.46 crashes per mile (Table 3). Of total crashes, vehicle crashes are the most frequent (6.25 per mile) and the most severe (Table 12). Out of 77 total crashes, 81 people were injured, the highest number being road users in vehicles with 34 fatal and serious injuries, or 42 percent of total.

| Mode | Crashes | Fatal | Injury A | Injury B | Injury C | Total Injuries |
|---|---|---|---|---|---|---|
| **Bike** | **20** | 1 | 1 | 8 | 10 | **20** |
| **Ped** | **27** | 0 | 2 | 13 | 12 | **27** |
| **Vehicle** | **30** | 2 | 32 | - | - | **34** |
| **Total** | **77** | **3** | **35** | **21** | **22** | **81** |

**Table 12:** Number of injury crashes and level of injuries sustained in traffic crashes on NE Halsey Street, 2007-2016.

Most crashes on Halsey Street happened during the day, but pedestrian crashes occurred at the highest nighttime crash frequency of the EPASS corridors (42 percent) (Figure 1). This street is also tied with SE 122nd Avenue for the highest ratio of nighttime bike crashes on the EPASS network, 36 percent, which were primarily crashes where a bicycle was traveling along the corridor (Figure 2). Turning movements were the most prevalent crash type for vehicle crashes involving an injury to a vehicle occupant.

### 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. In April 2019, PBOT received approval to lower the speed limit on Halsey Street from 137th Avenue to 162nd Avenue down to 40 mph.

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 WHO recommended maximum speeds was about 80 percent in 35 and 45 mph zones, but 29 percent where the posted speed was 25 mph. Top end speeding was also highest in the 25-mph zone, measuring 12 percent of vehicles driving over 10 mph over the posted speed. In the 35-mph speed zone, 2.8 percent of vehicles were top-end speeding, while 1 percent of vehicles were excessively speeding where posted speeds were 45 mph. The segment between 137th and 148th Avenues features Glendoveer Golf Course on the south side of Halsey Street. The relative lack of urban features on this side of the road—a lack of “friction”—may contribute to speeding in this area.

**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 sidewalks through NE 162nd Avenue but does have curbs. Nearly all these sidewalks do not meet PBOT standards. PBOT’s Outer Halsey Safety Project will provide some sidewalk infill east of 114th Avenue; while the federally-funded Halsey Safe Access to Transit will provide a multi-use path west of 92nd Avenue. For crossing spacing, the only segment that meets the crossing spacing guidelines is the Halsey-Weidler Couplet. This segment also has a bike lane from the west end of the couplet to 162nd Avenue. The 2019-completed Halsey-Weidler Streetscape project constructed parking-protected bike lanes on the Halsey-Weidler Couplet.

Street lighting on Halsey Street varies. The segments from 82nd Avenue to 102nd Avenue and 160th Avenue to 162nd Avenue have cobra-style lighting on both sides of the street. The Halsey-Weidler Streetscape project installed pedestrian-scale lighting in 2019. 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 frequency relative to the other corridors. Driving was the mode with the highest crash occurrence and the highest number of injuries. Turning movements were the leading collision type for bike and vehicle crashes on NE Halsey Street (Table 1). Speed does not appear to be coded as a prevailing factor in crashes on NE Halsey Street, despite the posted speed changing several times along the corridor and having some of the city's highest posted speeds east of 137th Avenue. 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 (4.01 miles)

The NE Glisan Street EPASS corridor extends from NE 82nd Avenue to several hundred feet west of NE 162nd Avenue, where it enters the City of Gresham. 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. Capital projects in 2019 and 2020 will reduce the number of vehicle lanes from five to three east of 102nd Avenue, except approaching major signalized intersections.

### Crash History

The NE Glisan Street corridor is four miles long and has the third highest overall number of crashes per mile, 34.49 (Table 2). In 10 years, there were 100 crashes and 113 injuries on Glisan Street. Over half of these crashes involved pedestrians (Table 1), and 38 pedestrians were injured. Four of the pedestrian injuries were fatal, making walking the mode with the most fatalities on NE Glisan Street (Table 13).

| Mode | Crashes | Fatal | Injury A | Injury B | Injury C | Total |
|---|---|---|---|---|---|---|
| **Bike** | **24** | 0 | 2 | 15 | 7 | **24** |
| **Ped** | **38** | 4 | 3 | 15 | 16 | **38** |
| **Vehicle** | **38** | 3 | 48 | - | - | **51** |
| **Total** | **100** | **7** | **53** | **30** | **23** | **113** |

**Table 13:** Number of injury crashes and level of injuries sustained in traffic crashes on NE Glisan Street, 2007-2016.

Light conditions do not appear to be a significant factor in crashes on NE Glisan Street because all modes are at or below average for the rate of nighttime crashes on the EPASS network. The amount of vehicle crashes at night (32 percent) is also below the EPASS network average. Twenty-five percent of bike crashes and 45 percent of pedestrian crashes occurred at night, comparable to the average across the EPASS network. However, night-time pedestrian crashes on NE Glisan Street occurred at the fourth highest frequency among the EPASS corridors (Figure 1).

Pedestrian crashes follow the trend on other EPASS corridors in that they are more common when a pedestrian is crossing the street. Bike crashes are evenly distributed among cyclists moving across and along NE Glisan Street. Turning movements are the leading crash type for vehicles (Figure 2).

**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. Posted speeds are proposed to be reduced to 30 mph as part of the capital projects east of 102nd Avenue.

From 2015-2018, there were 17 speed counts collected on NE Glisan Street. For those collected in the 35-mph segment, an average of 90 percent of vehicles were traveling faster than 30 mph and 11 percent of vehicles were top end speeding. In the areas with 40 and 45 mph posted speeds, the percentage of vehicles driving over WHO recommended maximum speeds and excessively speeding decreased as the posted speed increased (Table 3). The segment between 131st Place and 148th Avenues features Glendoveer Golf Course on the north side of Glisan Street. The relative lack of urban features on this side of the road—a lack of "friction"—may contribute to speeding in this area.

**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, particularly adjacent to Glendoveer Golf Course. The only segment that meets PBOT's crossing spacing guidelines is on the bridge over I-205. New crossings at 108th, 113th, and 128th are under design or construction and will help Glisan come closer to compliance. There are no bike lanes present on NE Glisan Street, though the 2019 and 2020 capital projects will be installed protected bike lanes east of 102nd Avenue. 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 occurrence. Pedestrian-related crashes prevail on this corridor, and it has one of the highest numbers of fatal pedestrian crashes in the network, suggesting there is a higher risk for pedestrians being struck while crossing the corridor. Pedestrian infrastructure on Glisan does not meet PBOT standards and there is no presence of bicycle infrastructure. The East Glisan Street Update, a PBOT initiative that encompasses five different capital projects in 2019 and 2020, will address many of these safety issues.

## SE Stark Street (5.34 miles)

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 Stark-Washington Couplet in the Gateway Regional Center. SE Stark Street is an HCC and intersects with two other EPASS corridors: SE 102nd Avenue (at both 102nd and 103rd Avenues) and SE 122nd Avenue. Stark Street has four HCIs: I-205 ramps, SE 122nd Avenue, SE 139th Avenue, and SE 148th Avenue.

### Crash History

SE Stark Street is the second longest corridor in the EPASS network and had the second highest overall number of crashes per mile. SE Stark had 35 crashes per mile (Table 2). In the 10-year period, 141 crashes and 150 injuries occurred on SE Stark (Table 14). Pedestrian-related crashes (40) and pedestrian injuries are far more frequent on this corridor than crashes for other modes.

| Mode | Crashes | Fatal | Injury A | Injury B | Injury C | Total Injuries |
|---|---|---|---|---|---|---|
| **Bike** | **26** | 0 | 3 | 13 | 10 | **26** |
| **Ped** | **68** | 4 | 8 | 37 | 23 | **72** |
| **Vehicle** | **47** | 2 | 50 | - | - | **52** |
| **Total** | **141** | **6** | **61** | **50** | **33** | **150** |

**Table 14:** Number of injury crashes and level of injuries sustained in traffic crashes on SE Stark Street, 2007-2016.

The distribution between crashes occurring in dark and light conditions varies greatly by mode (Figure 1). Vehicle crashes at night were below EPASS average (35.4 percent) and bicycle crashes were well-below average (7.4 percent), the lowest night rate of all the EPASS corridors. In contrast, 49.2 percent of pedestrian crashes happened after dark.

SE Stark Street follows the pattern of pedestrians being struck while moving across the corridor and bikes moving along the corridor (Figure 2). Turning movements, angle crashes, and rear-end crashes are common vehicle crash types on Stark Street, accounting for about one third of crashes each.

### Speed Data

As of April 30, 2018, the posted speed limit on the entire SE Stark EPASS corridor is 30 mph. At the time of traffic speed collection, speed limits on this corridor were 30 mph through the couplet and then 35 mph eastward to the city limits. Twenty-eight speed counts were collected in recent years and many vehicles were traveling over WHO recommended maximum speeds, likely due to the posted speeds. In the 30-mph segment, an average of

64 percent of vehicles were traveling over 30 mph and 7 percent of vehicles were top-end speeding. Where posted speeds were 35 mph, 3 percent of vehicles were traveling faster than 30 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 Stark-Washington Couplet—except for at the I-205 freeway crossing where sidewalks are only present on the southern side of the corridor. Very occasionally, new development has provided standard-width sidewalk corridors for short lengths. 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 number of crashes per mile in the EPASS network. On this corridor, pedestrian crashes occurred the most, approximately 20 crashes per mile, with a much lower vehicle and bike crash frequency: 8.8 and 5.6 per mile respectively. Turning movements were the leading crash type for all modes, but SE Stark Street had the highest number of angle vehicle crashes in the network.

This corridor has one of the highest average percentage of vehicles top-end speeding 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-related crashes.

## SE Division Street (4.65 miles)

The SE Division Street EPASS segment begins at SE 82nd Avenue and ends at the city limit at SE 175th Place. Division Street is an HCC and intersects SE 122nd Avenue and SE 162nd Avenue in the EPASS network. These two intersections are HCIs as well as the intersections at SE 82nd Avenue, I-205, SE 112th Avenue, SE 129th Avenue, SE 148th Avenue, and SE 174th Avenue. SE Division Street has the most HCIs in both the EPASS network and the Vision Zero HCN. SE Division Street is the most heavily travelled corridor in the EPASS network, with daily vehicle volumes exceeding 40,000 in some locations and the frequent #2 bus generating transit and pedestrian trips. Numerous business districts distributed throughout the corridor also act as trip generators and contribute to the mix of modes on the corridor.

**Crash History**

SE Division Street has the highest number of crashes per mile in the whole EPASS network—47.3 crashes per mile. This is approaching double the frequency of crashes on NE Sandy Boulevard, the corridor with the next highest number of crashes per mile. SE Division Street also had the highest concentration of pedestrian and vehicle crashes, 21.7 and 15.7 per mile respectively (Table 2). In the 220 total crashes on SE Division, 232 injuries occurred, and nearly half of those injured were pedestrians (Table 15).

| Mode | Crashes | Fatal | Injury A | Injury B | Injury C | Total Injuries |
|---|---|---|---|---|---|---|
| **Bike** | **46** | 1 | 1 | 28 | 17 | **47** |
| **Ped** | **101** | 13 | 27 | 36 | 29 | **105** |
| **Vehicle** | **73** | 2 | 78 | - | - | **80** |
| **Total** | **220** | **16** | **106** | **64** | **46** | **232** |

**Table 15:** Number of injury crashes and level of injuries sustained in traffic crashes on SE Division Street, 2007-2016.

Pedestrian and bike crashes on Division Street occurred at night at a slightly above average rate than the rest of the EPASS network. In this study, 49 percent of pedestrian and 29 percent of bike crashes happened after dark. Serious vehicle crashes more frequently occurred during daylight hours.

Non-motorized road user movements strongly follow the pedestrian-crossing and bike-along crash trend seen on the rest of the EPASS network. Among pedestrian crashes, 74 percent of people walking were crossing Division Street when they were struck by a vehicle, a similar proportion to cyclists struck while traveling along the corridor (73 percent). Among crashes resulting in serious or fatal injuries to vehicle occupants, 51 percent were rear-end crashes (Figure 2), a crash type that occurs nearly four times as frequently on this corridor than on the rest of the network.

Furthermore, Division Street has by far the most pedestrian-involved crashes (163), over twice as many as 122nd Avenue (69), which has the second highest frequency of crashes of this type (Table 1). As stated in other corridor profiles, pedestrian-involved crashes are often rear-end crashes, so the frequency of rear-end crashes on this corridor is quite high compared to the rest of the EPASS network. This finding suggests that there is potentially a higher risk of injury to vehicle occupants and people walking on SE Division Street. For these and other reasons, PBOT declared a safety emergency on SE Division Street in 2017, the first such declaration made by PBOT.

**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, 29 speed counts were collected along the corridor, most recently in April 2019. In 30 mph zones, 61 percent of vehicles were traveling faster than WHO recommended speeds and 5 percent of vehicles were excessively speeding. Where the posted speed was 35 mph, 74 percent were traveling faster than 30 mph and 2 percent were top-end speeding.

**Multimodal Infrastructure and Lighting**
Appendix 1, pages 64-72 depict maps of bike and pedestrian infrastructure on Division Street.

Like other corridors in the EPASS network, Division Street has substandard sidewalks present on both sides of the corridor, apart from a few segments of missing sidewalk that will be infilled as part of a 2019 capital project, and limited segments of standard sidewalks provided by new development. The entire corridor does not meet PBOT's crossing spacing guidelines, though capital projects in 2019 and 2020 will provide more than ten new crossings to bring Division closer to compliance. Division features a standard bike lane that will be upgraded to a vertically-protected bike lane in 2020. 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, where more complete lighting is present.

**Summary**
SE Division Street is unequivocally the most dangerous corridor in the EPASS network. Division Street leads in crashes per mile, 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, this corridor is distinguished by the high number of pedestrian crashes and injuries to pedestrians. In pedestrian-related crashes, 163 were of the rear-end crash type, suggesting that vehicles are yielding to pedestrians at times, but there may not be enough traffic control devices for drivers to be aware of a crossing. Vehicle turning movements are the leading collision type for bike and pedestrian collisions, while vehicle occupants are most often seriously injured in a rear-end crash. It is also worth noting that Division Street has some of the highest average daily traffic (ADT) volumes in the EPASS network, which should also be considered a risk factor. PBOT's East Portland Access to Transit project and Outer Division Multimodal Safety Project, along with TriMet's Division Transit Project, are installing numerous safety countermeasures to address these serious safety problems.

## SE Foster Road (2.66 miles)

SE Foster Road is the southern-most corridor in the EPASS network, stretching from SE 82nd Avenue to SE 122nd Avenue, and includes the Foster-Woodstock Couplet in Lents Town Center. Foster Road is an HCC and only intersects with other EPASS corridors at its endpoints. The SE 82nd Avenue intersection is also an HCI. The segment west of 90th Avenue underwent a 4-to-3 lane reorganization in 2019, along with the addition of bike lanes, wider sidewalks, and street lighting. The Foster-Woodstock Couplet west of I-205 received streetscape upgrades in the early 2010s, while the couplet east of I-205 is slated to receive safety upgrades in 2021. No projects are currently funded on the five-lane segment east of the couplet.

### Crash History

Despite its shorter length, this corridor has the fifth highest number of crashes per mile (33.8), but it does not have the top per-mile crash rate for any mode (Table 2). SE Foster Road had 67 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 16).

| Mode | Crashes | Fatal | Injury A | Injury B | Injury C | Total |
|---|---|---|---|---|---|---|
| **Bike** | **21** | 1 | 2 | 13 | 6 | **22** |
| **Ped** | **21** | 0 | 4 | 12 | 5 | **21** |
| **Vehicle** | **25** | 1 | 27 | - | - | **28** |
| **Total** | **67** | **2** | **33** | **25** | **11** | **71** |

**Table 16:** Number of injury crashes and level of injuries sustained in traffic crashes on SE Foster Road, 2007-2016.

SE Foster Road had one of the higher nighttime vehicle crash frequencies in the EPASS network, 58 percent, 15 percentage points above network-wide (Figure 1). Bike crashes were also above average, 30.0 percent of them happening after dark. In contrast, pedestrian crashes were slightly below average with 41 percent occurring in darkness.

Compared to Division Street and NE 122nd Avenue, there was less variance in pedestrian crash movements on Foster Road—46 percent crossing and 41 percent moving along the corridor. Bicyclists moving along the corridor were more frequently struck by a vehicle. Rear-end crashes are prevalent for vehicle crashes on this corridor (Figure 2).

### Speed Data

This segment of Foster Road has three different speed limits: 30 mph on the Foster-Woodstock Couplet, 35 mph from 82nd to 102nd Avenue, and 40 mph from 102nd to 122nd Avenue. The most recent traffic speed count on Foster Road was collected in a 40 mph zone in April 2019 (Table 3). Because of the high posted speed limit, an average of 96 percent of vehicles were traveling over the WHO recommended speed of 30 mph. However, the 85th percentile average of both directions in this segment was 45.5 mph. Top-end speeding in this section represented only 4 percent of vehicles, which is not unusual with such a high posted speed.

### Multimodal Infrastructure and Lighting

Bike and pedestrian infrastructure is mapped on pages 73-77 in Appendix 1. Bike lanes installed as part of the 2019 Foster Streetscape project are not shown.

As is common with other arterials in this network, sidewalks are present on both sides of the roadway, but most do not meet PBOT standards. The 2019 Foster Streetscape project east of 90th Avenue is unique in that it moved the curb lines toward the center of the street in order to install wider sidewalks. The corridor also does not meet PBOT crossing spacing standards on Foster Road but does meet these standards on the Foster-Woodstock Couplet.

Bike lanes are present through the couplet to SE 122nd Avenue. In a similar pattern, street lighting is found on both sides from 82nd through Woodstock, but single-sided on Foster from 92nd Avenue through 122nd. The Lents Town Center Streetscape project provided pedestrian-scale lighting in the couplet area west of I-205.

### Summary

SE Foster Road is similar to other EPASS corridors in lack of consistent multimodal infrastructure along the corridor. Foster Road does have a moderately high pedestrian-related crash per mile rate, 16.2, and half of these crashes do not result in pedestrian injury.  Turning movements are the leading crash type for cyclists on Foster and rear-end crashes are common in vehicle crashes. Even though posted speeds are high in places, speeding should be noted as a concern based on 85th percentile measurements. Speeding is particularly problematic east of the Foster-Woodstock Couplet where land uses become less dense and the roadway widens to 76 feet curb-to-curb.

## Conclusion

The data shows that the EPASS network is dangerous to all road users, particularly for people walking. Street designs that place high vehicle volumes and speeds in an environment where vulnerable road users are traveling along or across the street with insufficient safety infrastructure are contributing factors. Most EPASS corridors continue to have deficiencies in the availability and design of sidewalks, bike lanes, pedestrian crossings, and street lighting. These corridors may share many characteristics, but each one has a unique combination of safety issues that need to be addressed as Portland continues to grow. A lack of infrastructure for people walking and biking that meet PBOT guidelines, unsafe driving speeds, and driver behavior has resulted in injury and loss of life for too many people who live, work, and otherwise travel in East Portland. Consistent population growth, including an influx of residents more dependent on non-auto travel modes, will lead to more conflict on East Portland arterials. PBOT has responded to these issues with no less than 15 safety projects currently in planning, design, or construction on EPASS arterials. These engineering solutions must continue, along with education and enforcement initiatives, to create a safe system that is proactive—rather than reactive—in its quest for Vision Zero in a growing and diversifying city.